First SA study on stress levels of CAUGHT AND RELEASED FISH

For the first time a South African study is being undertaken to determine the effect on fish of 'catch and release' angling in the country. Lani van Vuuren reports.

'Catch and release' fishing – where the fish is released almost immediately after capture – has become a popular conservation strategy among recreational anglers across the world, including South Africa. It is specifically promoted for the conservation of scarce and/or overfished species.

In recent years, however, a global debate has started among fishing circles questioning the benefits of this approach. The most physically demanding form of exercise stress in fish is capture by angling, and researchers have called for caution against the overzealous implementation of catch and release angling in light of the lack of knowledge regarding the sub-lethal effects and post-release mortalities this approach may have on individual fish species. It has been proposed that species-specific guidelines be developed taking into account the inter-specific diversity of fishes and variation in fishing techniques.

As a result of this debate, the body of literature evaluating the impacts of catch and release has expanded rapidly. To date, the majority of these studies have focused on freshwater fish in North America, specifically rainbow trout and largemouth bass.

LACK OF LOCAL KNOWLEDGE

In 2008, the Centre of Aquatic Research (CAR) at the University of Johannesburg kicked off a project with funds from the Water Research Commission to investigate the effects of catch and release angling on smallmouth yellowfish in the Vaal River. This is the first time a study of this nature has been undertaken in South Africa, and it is one of very few studies targeting fish species found in Africa.

The Vaal-Orange smallmouth yellowfish or ***Labeobarbus aeneus*** is a highly-prized game fish for sport anglers in the Vaal River. Their proximity to the Gauteng heartland is the keystone of the yellowfish fly-fishing industry in South Africa, however, all forms of angling have targeted this species with great success.

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Smallmouth yellowfish are opportunistic feeders, eating a variety of food types from plant material to aquatic insects, crabs, shrimps and small fish, with adult fish attaining a mass of about 9 kg. They are a slow-growing species with a low egg-to-mass ratio and only become sexually active when they are between four and six years old (depending on the system and sex of the fish).

Catch and release of yellowfish species is being actively and successfully promoted in the Orange-Vaal River system. However, as Ruan Gerber, a Masters student, supervised by Prof Nico Smit at CAR points out, to date there has been no real understanding of the potential effects of this type of angling on this specific species. "The ultimate success of catch and release angling depends on ensuring high release survival rates. If we are uncertain on the effects of catch and release on a specific species how can we promote it as an effective conservation tool?"

Speaking at the Young Water Professionals Symposium, held in Pretoria earlier

Research by the Centre of Aquatic Research at the University of Johannesburg shows that catch & release fishing has a greater effect on smallmouth yellowfish than thought.

All photographs courtesy Centre of Aquatic Research

this year, Gerber noted that around 5 000 sport anglers target smallmouth yellowfish in the Upper Vaal River each year, catching a (very conservative) estimated 320 000 fish each year.

A SOUTH AFRICAN FIRST

Gerber and his team of fly-fishermen collected data from 96 fish caught and released from the Vaal River during a period of six months using standard fly-fishing techniques. Following capture the fish were anaesthetised for two minutes, blood samples taken, weighed, and measured before being revived and released. For each fish caught the times to land fish and handling procedure (hook removal) were also recorded. The landing and handling times were combined to determine a total angling time.

The levels of glucose, cortisol and lactate (known stress biomarkers) were measured for each fish to determine the physiological effect of angling time, fish size and water temperature (influenced by the time of year). To serve as controls, 16 randomly selected fish were kept for 72 hours in a 15 000 ℓ pool filled with river water.

The blood parameters tested from the angled smallmouth yellowfish exhibited decrease glucose, increased cortisol (in some individuals) and increased plasma lactate concentrations with increasing angling time (confirming that the longer it took to land the fish the more stress it was experiencing). Interestingly, the fish showed stress even after short angling durations (upwards of one minute).

BIG FISH, BIG STRESS

As can be expected there was a very positive correlation between fish size and angling time, raising suspicion that larger smallmouth yellowfish are experiencing more constant stress as they are caught and released throughout a season. "These larger individuals would most likely be repeating spawners and deliver the largest contributions to the growth and replenishment of the population during spawning periods," said Gerber.

This is significant as the main season that smallmouth yellowfish are targeted by fly-fishermen is from mid-September to mid-April. These times correspond to their spawning season, which lasts from late-September through to mid-March, depending on the river temperature and flow. If fish are stressed in such a way by angling that their spawning behaviour is affected (which has been reported in fish species elsewhere) catch and release could, in fact, be negatively affecting fish populations rather than helping to conserve the species.

"Many studies have also demonstrated that fish may stop feeding following a stress event such as angling, and this can result in decreased growth. Higher cortisol levels may also lead to a suppressed immune system, thus leaving fish susceptible to disease during the recovery period," noted Gerber. Recovery took as long as 24 to 72 hours after capture (depending on the biomarker).

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CATCH & RELEASE ANGLING AROUND THE WORLD

In countries such as the UK catch and release has been performed for more than a century by coarse fishermen to protect target species from disappearing in heavily fished waters. The practice has increasingly caught on and many salmon and trout rivers are now considered 'no kill' zones.

In the US, catch and release was first introduced as a management tool in the state of Michigan in 1952. Today, conservationists are strongly advocating catch and release as a way to ensure sustainability and to avoid overfishing of fish stocks.

In other countries, such as Australia and Canada, catch and release has caught on more slowly, only really becoming widespread from the 1970s and 1980s. In Canada, catch and release is now mandatory for some species. The country also requires, in some cases, the use of barbless hooks to facilitate and reduce injury.

Interestingly, not all countries advocate catch and release. For example, in Switzerland, catch and release fishing has been banned from 2009, with the country's anglers now obliged to take a course on 'humane methods' for catching fish.

Source: Wikipedia

Sport anglers catch upward of 320 000 smallmouth yellowfish in Upper Vaal River each year.

A smallmouth yellowfish being revived prior to release.

Water temperature did have an effect on stress hormone levels. Captured fish showed higher energy levels at intermediate temperatures than at low (11°C) and high (27°C) temperatures. The lactate response found in fish from this study, show that smallmouth yellowfish angled at lower and intermediate temperatures have the smallest response, while fish angled at the upper temperatures have the greatest response to angling. "Therefore, fish angled at higher water temperatures are put under greater stress and as a result under greater risk of a wide range of sub-lethal impacts and even mortality than fish angled at lower water temperatures," reported Gerber. Although the effect of air exposure was not assessed during this study, it is important to note that it may also play a role in the stress response of angled fish.

According to Gerber there is no doubt that smallmouth yellowfish do experience stress when captured and that guidelines are urgently needed to ensure fish experience as little stress as possible. "Catch and release angling is a valuable tool for conserving fisheries resources, but only if it is done correctly."

Additional reading: To find out more about yellowfish in South Africa try, *State of Yellowfish in South Africa* (**WRC Report No: TT 302/07**). To order, contact Publications at Tel: (012) 330-0340 or Email: orders@wrc.org.za. To download a free copy, Visit: www.wrc.org.za.