

USING MOBILE TOOLS TO TRACK RECREATIONAL FISHING ON THE ZAMBEZI RIVER

by Sven M. Vrdoljak



The Lower Zambezi Catch and Release Initiative (LZCRI) started in early 2012 to promote catch-and-release fishing in the Zambezi Valley and instigate monitoring and evidence-based management of recreational fishing in and around the Lower Zambezi National Park in Zambia. It is impossible to monitor fishing activities without proper data and one of the objectives of the programme is to engage tourism operators and recreational anglers in collecting these data by recording the fish that they catch during their activities on the river. During the 2012 fishing season the LZCRI designed and tested tools for recording fishing activity and logging the details of fish caught and released during trips on the Zambezi River. Pen and paper remains a simple, affordable and reliable option that is very quick to implement. We designed fishing logbooks containing forms that were quick and easy to use and required minimal time or writing to record as much information as possible. The logbooks were used successfully throughout the 2012 season by a number of lodges. For many fishing guides this was the first they were introduced to the concept of keeping a record of the fish that they catch (and release). Refinements to data collection will continue, but these logbooks will remain an important means of collecting angling data for the LZCRI.

There are however drawbacks to collecting data from a large and dispersed group of participants in this way. Firstly, the data need to be submitted which involves either physically collecting logbooks or transmitting copies of the information that they contain. In remote areas like the Lower Zambezi this can present logistical problems, or require that physical or electronic copies are made. If a logbook is lost, an entire season's records could also be lost if no copies have been made. Collating the data into an electronic database that can be used for analysis of the results can be tedious, time-consuming and prone to errors in transcription. Additionally, as much of the data collected has a spatial component, it would be convenient to have each record accurately geo-located rather than relying on reported locations which may be inaccurate or difficult to verify.

Mobile, handheld devices provide a good alternative to pen and paper based data collection. More and more people own at least one mobile device and mobile apps are becoming an integral part of our daily lives, performing many of the tasks that we would previously have used paper notebooks or diaries for. We set out to find a mobile application that could record the same data as the paper logbooks, but also provide more detailed, geo-referenced information fishing effort based on distance covered and time spent fishing. The system would also need to improve the accuracy and ease with which detailed information could be recorded. Usually this would require programming skills, or hiring a programmer to write a customised app to run on a handheld GPS device. Fortunately, a solution to this problem was available through the Cybertracker software package. Cybertracker is "greenware", a freely available, customisable software solution for collecting ecological data using a variety of PDA and GPS devices (for more information on cybertracker visit www.cybertracker.org). Loaded onto a GPS-enabled mobile device, the Cybertracker client can run custom-made routines to collect geo-referenced data quickly and easily. Creating Cybertracker routines requires no code-writing and the design of the routine that runs on the handheld is done entirely by the end-user in the Cybertracker desktop application. Using Cybertracker, we designed and tested a routine which we named "TigerTracker" and used it to track daily fishing activity and log detailed information about catches and releases during the 2012 fishing season (March - December).



Handheld devices can overcome many of the problems of data-collection, providing a means to capture accurate, geo-referenced data in the field. Here, Cybertracker was used to create custom routines to collect detailed information about fish caught and released on the Zambezi River

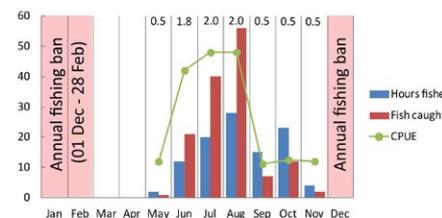
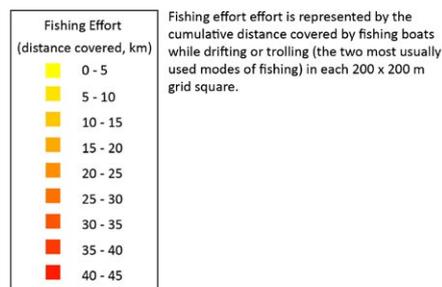
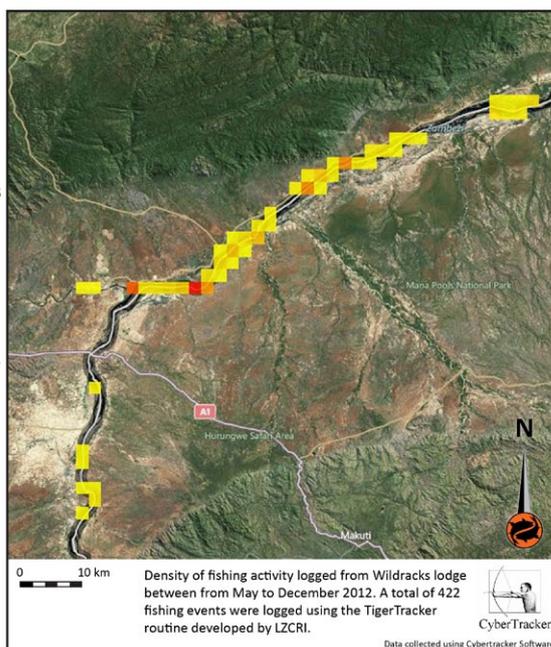
The trial version of Tiger Tracker needs a little refinement, yet it is an effective means to rapidly build a useful dataset. A major advantage is that the geo-referenced data collected are already in an electronic database, that can be queried to answer a range of specific questions related to the extent and impact of catch-and-release. It is very easy to extract specific information about a particular species (for example the number, size and locations of all tigerfish caught, as well as the condition of the fish when they were released). Data can easily be backed up, both on the GPS and separately on a desktop computer using the desktop application, which also creates maps and generates database queries and reports. Cybertracker also provides the means to send data to a remote server from wi-fi or mobile broadband capable devices.

In 2012 the TigerTracker routine was tested on two handheld GPS units as part of a pilot programme to test different methods of data collection and the feasibility of recruiting fishing guides and anglers to voluntarily collect data to monitor recreational fishing. Using data collected from Wildtracks Lodge (LZCRI's base of operations) between May and December 2012, the examples below were extracted from a database of 420 fishing events, representing 104 hours of fishing time. The information collected included timed tracks of fishing trips, details of species caught, fishing methods and tackle used, and the condition of released fish. These data can be used to examine the duration and intensity of fishing, catch per unit effort, species composition of recreational angling catches and the potential impacts of catch-and-release angling across the entire catch or for particular species of interest. With more units deployed across the Lower Zambezi, it is clear that TigerTracker could be used as a powerful tool for monitoring and managing the recreational fishery in the area.

FISHING EFFORT

During the 2012 season, 104 hours of fishing were logged on boats operating from Wildtracks Lodge. Most of this fishing activity was concentrated within a 20km radius of the lodge, but there were excursions as far as 60 and 70 km up and downstream from the lodge. Fishing effort was focused on the Zambezi river but also penetrated 12km up the Kafue River.

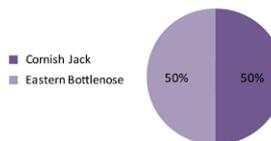
Fishing effort peaked during July and August. During this period the number of fish caught also increased and the CPUE reached it's maximum of 2 fish per hour spent fishing.



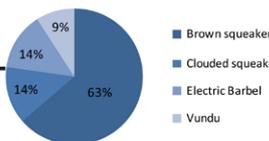
Analysis of 104 hours of fishing logged from May to December 2012. Blue columns represent hours fished per month and red columns represent total number of fish caught per month. The green line and figures above each month represents catch per unit effort (fish caught/hour). Note: CPUE is **not** to the same scale indicated on the left hand vertical axis of the chart



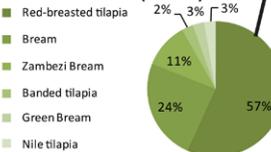
Mormyrids (snoutfishes)



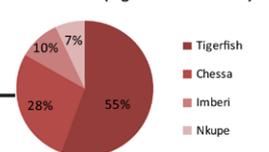
Catfish & Squeakers



Cichlids (Breams)



Characiforms (Tigerfish & relatives)



SPECIES COMPOSITION

During the 2012 season, 139 fish, comprising sixteen different species were caught on rod and line at Wildtracks Lodge.

The majority of these were tigerfish, chessa and nkupe (characiforms), being commonly targeted species by anglers visiting the Zambezi. Although the cichlids (bream species) are also a sought after angling species, quiet, well vegetated habitats where bream are often caught are not common on this stretch of river, so not as many fish in this group were caught.

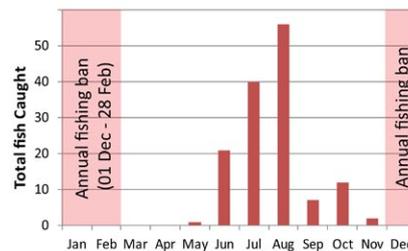
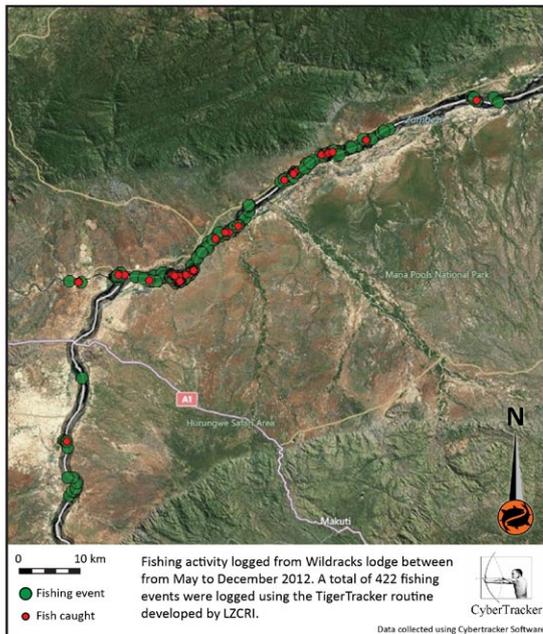
Interesting species caught include the mormyrids cornish jack and Eastern bottlenose. These species are not often specifically targeted by anglers and prefer deep waters with rocks or other structure and are not often encountered by anglers targeting open-water species such as tigerfish.

SUCCESSFUL RELEASES

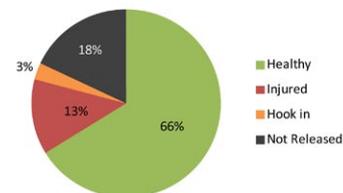
A total of 139 fish were logged as caught during the 2012 fishing season. Of these, the majority were released in a healthy state.

Of the 22 fish that were released but were not healthy, fourteen fish suffered some kind of hook injury during capture. Two fish were hooked too deep to remove the hooks and were released with the hooks still embedded. Although injured fish do face a higher risk of post release mortality, it is common to catch fish that show some signs of being caught before. Anecdotal reports of apparently healthy tigerfish with hooks or trace wire still visibly protruding from their body suggest that fish will often survive, even if they are released with an imbedded hook.

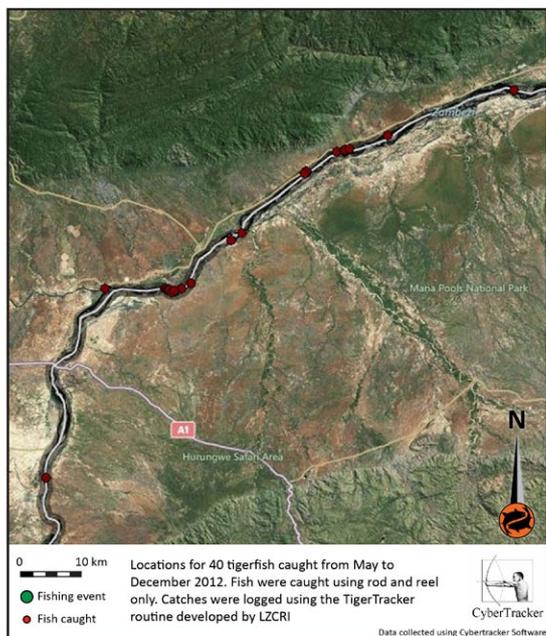
Twenty-five fish were not release, but records show that these were mostly chessa that were kept as bait for tigerfishing.



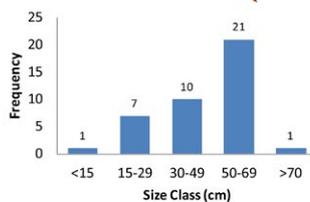
Total numbers of fish caught and logged at Wildtracks Lodge from May to December 2012. In total 139 fish and sixteen different species were logged.



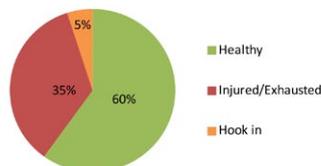
The fate of 139 individual fish caught during the 2012 fishing season. Two-thirds of the fish were released unharmed. A further 22 fish were released but were either injured or exhausted or still had a hook embedded. Only 25 fish were not released.



Tigerfish *Hydrocynus vittatus*



Size class distribution for 40 tigerfish caught from May to December 2012. Fork-length (FL) was used as the measure of size for all fish caught.



The fate of 40 tigerfish caught during the 2012 fishing season. All fish were released, with no direct mortality observed, although two fish had hooks embedded too deeply to remove and 14 other fish had suffered some injury during capture.

TIGERFISH RECORDS

Forty tigerfish catches were logged in the 2012 season. Fish were caught across a range of sizes, although the most just over half of the fish were in the 50-69 cm range. Tigerfish of this size are usually mature females. The largest recorded fish had a fork length of 70 cm and weighed 7.2 kg.

Release performance was good, with no immediate catch-related mortality. All forty fish were released, although 14 fish were injured during capture, or showed some signs of exhaustion upon release. Only two fish were released with an embedded hook, one of which was gut-hooked. Most fish were hooked either in the mouth or jaw and suffered more minor injuries.

Handheld devices are still relatively expensive items and this limits the number of people who already own or are able to purchase one to track their fishing activity. For many fishing guides and anglers, this means that paper logbooks will still be the best way to record catches. However, Cybertracker has recently released an Android version of their mobile client, that will allow Cybertracker routines to run on Android based phones and tablets. This will make the platform accessible to more users who already have GPS enabled smart phones or tablets, enabling a more extensive rollout of the Tiger Tracker routine without the need to purchase further GPS units.



The TigerTracker routine was developed as part of the **Lower Zambezi Catch & Release Initiative**, and independent initiative to promote sustainable recreational angling on the Zambezi River. (www.wildtracks-zambia.com/index.php/LZCRI)

Funding for the project was provided by the **Rufford Small Grants Foundation** (www.ruffordsmallgrants.org)

The LZCRI runs from and is supported by **Wildtracks Lodge, Zambia** (www.wildtracks-zambia.com)

TigerTracker was developed using **Cybertracker** software for collection of ecological field data (www.cybertracker.org)