

## **“To fizz or not to fizz”: the post-release behaviour and fate of tournament-caught smallmouth bass after “fizzing” to alleviate distended swim bladder**

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### **Research Summary:**

One of numerous factors contributing to the stress and disturbances of tournament-caught fish is the incidence of barotrauma. This problem occurs when fish are removed from deep water and rapidly brought to the surface. The rapid decrease in pressure expands the gases in the swim bladder and blood vessels and does not allow sufficient time for depressurization. Consequently, it can lead to considerable impacts on the physiological and physical conditions of decompressed fish. But more importantly, the distended swim bladders caused by decompression prevent fish from returning to depth leaving them susceptible to harsh environmental conditions, predation, and other injuries (Photo 1). Therefore, with the addition of other tournament-related stress, these conditions are not ideal for releasing fish and as such, there is much interest in reducing the impact of barotrauma.

Recent work at LaBelle's 2006 Fall Tournament used biotelemetry to reveal that smallmouth bass that suffered barotrauma endured behavioural and physiological disturbances and faced higher probability of death. Since post-tournament behaviour and survival of smallmouth bass were significantly affected by barotrauma, there is a need to develop ways to mitigate or reduce its impacts. In an attempt to reduce the effects of barotraumas, many anglers have adopted a technique known as “fizzing” (i.e., the use of a hypodermic needle to artificially deflate gas

from the distended swim bladder), though it is unknown whether it affects the long-term survival of fish in the wild. With support from the Rainy Lake Fisheries Charity Trust and Carleton University, we conducted a study at the Fall Bass Classic Tournament on Rainy Lake in 2007. Our goal was to determine if “fizzing” is an effective means of remedying the consequences of barotrauma in tournament caught smallmouth bass.



Photo 1. Two smallmouth bass showing symptoms of barotrauma. Note the distended swim bladder and the loss of equilibrium.

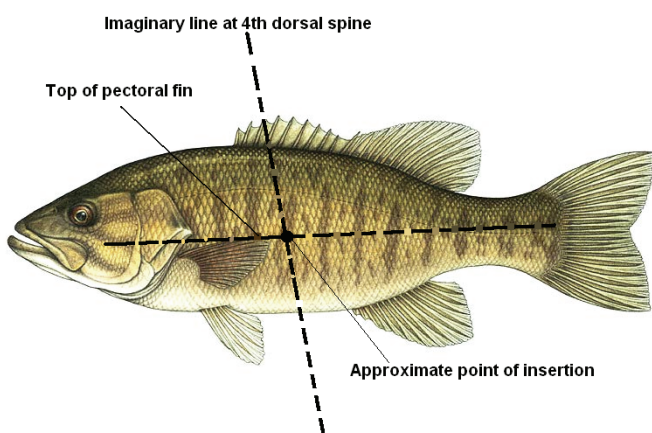
During the tournament we randomly intercepted the fish following the weigh-in procedure but prior to their placement into a live-release pontoon boat. Fish were examined for signs of barotraumas and placed into three treatment groups: i) fish with signs of barotrauma that were not fizzed ( $n = 8$ ), ii) fish with barotrauma that were fizzed ( $n = 9$ ), and iii) fish that showed no signs of barotrauma and fizzed ( $n = 10$ ). The last treatment group (iii) is a sham control group used to determine if the physical action of fizzing can alter the survival and behaviour of fish. The swim bladder was punctured (e.g. fizzed) while the fish was submerged in water using a 21-gauge, 1.5 inch, hypodermic needle (Photo 2). The needle was inserted underneath the scale at a 45° angle towards the head, through the skin at a

depth of approximately 10-15 mm, and into the swim bladder.



**Photo 2. "Fizzing" of a tournament-caught smallmouth bass**

The insertion point occurred where an imaginary line was drawn from the top of the pectoral fin across to the fourth dorsal spine (Photo 3).

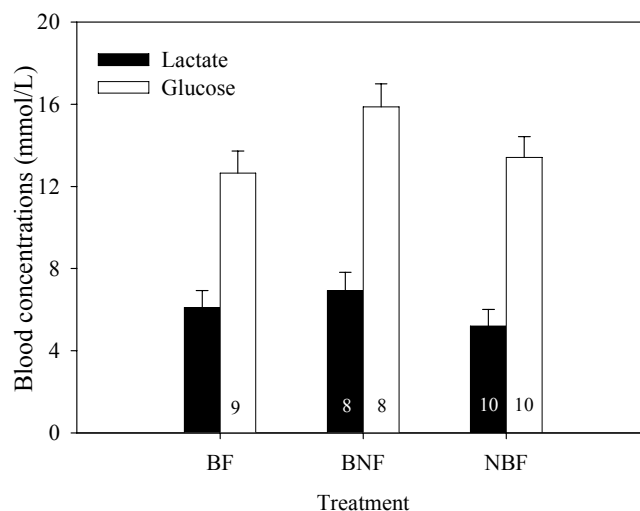


**Photo 3. Revised needle insertion point for "fizzing" of smallmouth bass.**

The belly was gently squeezed until there were no more gas bubbles released (Photo 2). A dissection of a smallmouth bass had been performed prior to the experimental venting to ensure that the insertion of the needle was correctly positioned, since no study on the fizzing of smallmouth bass has been done in the past. Non-lethal blood samples were taken from each fish for physiological assessment. In addition, to determine post-release behaviour

and survival of these fish, we released the fish with flattened external radio-transmitters at a common site and radio-tracked them for 96 hours or until they left the release site (approx. 2 km).

Physiologically, blood concentrations of lactate and glucose levels provided context for the condition of fish at the end of the tournament. We found no difference in the physiological stress levels of decompressed fish and non-decompressed fish, indicating that the collective tournament procedures and weigh-in event were stressful (Fig. 1). Hence, any efforts to reduce stress by enabling fish to return to depth have the potential to be beneficial.

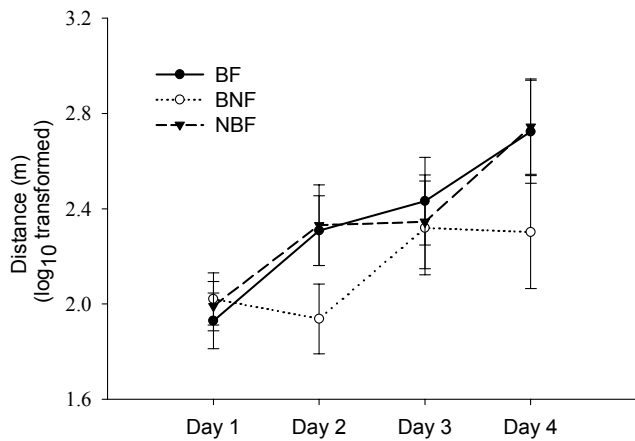


**Figure 1. Lactate and glucose plasma levels in relation to treatment groups: barotrauma and fizzed (BF), barotrauma and not fizzed (BNF), and no barotrauma and fizzed (NBF)**

We recorded no mortality in any of the treatment groups whereas previous studies have shown significant mortality in fish with barotrauma. Specifically, the 2006 study by Gravel and Cooke (2008) showed nearly 40 % mortality in fish with barotrauma. The variation between findings of each study may be explained by the different severity of barotrauma influenced by depth of captures and the general increase in regional temperatures.

The post-release behaviour of tagged fish was measured by their mean daily movement and the time to exit the release site.

We noted a trend where unfizzed fish with expanded swim bladders moved less (Fig. 2) and took longer to exit the release site.

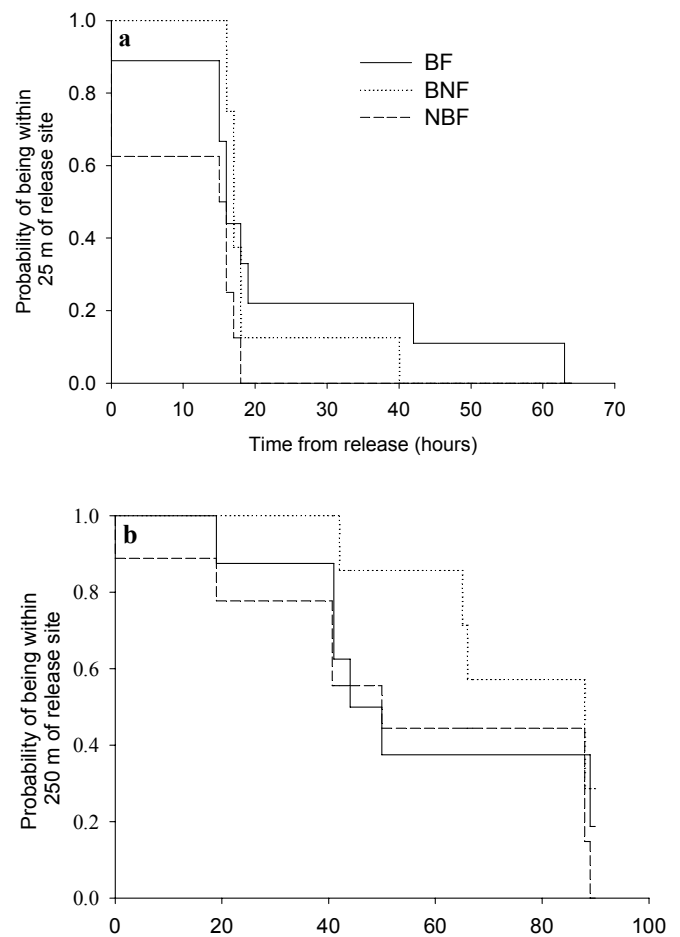


**Figure 2. Mean daily movement (distance traveled) performed by fish with barotrauma and fizzed (BF;  $6 \leq N \leq 8$ ), fish with barotrauma and not fizzed (BNF;  $5 \leq N \leq 8$ ), and fish with no barotrauma and fizzed (NBF;  $5 \leq N \leq 9$ ).**

It took fish without barotrauma 19 hours to disperse over 50 m from release site, whereas both unfizzed and fizzed barotrauma fish took 40 hours and 62 hours respectively (Fig 3a). Only the fizzed fish without barotrauma reached the 250 m dispersal mark (Fig 3b). And at the end of the study period, we found that unfizzed barotrauma fish had the highest probability of being within the release site (83%), whereas fizzed barotrauma fish were the least likely to be found within the release site (47%). Although there was no statistical significance in our findings, it should also be noted that our power was generally low, suggesting a larger sample size should be used.

Our study is the first to evaluate the effects of fizzing on smallmouth bass in the wild and in a tournament setting using telemetry where fish are subjected to multiple stressors. In general, we found that the effect of fizzing was not detrimental to fish. However, it was also not found to be significantly beneficial. Studies have argued that fizzing can reduce some problems associated with barotrauma (i.e., allowing fish to return to depth), but it may have little effect on any

tissue and physiological damage that have already been inflicted. This is of particular concern in tournaments where fish are held in live-wells at atmospheric pressure for several hours prior to release. Furthermore, our dissection of smallmouth bass revealed that needle insertion points differ from that described for largemouth bass. The revised location to deflate an expanded smallmouth bass swim bladder is more anterior. Consequently, fizzing location appears to vary among different species, even among closely related congeners, and benefits of fizzing may also vary between species.



**Figure 3. Probability of being within 50 m (A) and 250 m (B) of release site for fish with barotrauma and fizzed (BF;  $8 \leq N \leq 9$ ), fish with barotrauma and not fizzed (BNF;  $7 \leq N \leq 8$ ), and fish with negligible barotrauma and fizzed (NBF;  $8 \leq N \leq 9$ ). Sample sizes ranges per day and per treatment group.**

Several tools have been introduced to manually deflate expanded swim bladders, such as: hypodermic needles of various

gauges, tagging guns, Sea Grant tool/*Canula*, fish hooks, and knives. For our study we used a 21-gauge, 1.5 inch hypodermic needle -- though we recommend a larger gauge (18-gauge) as it would increase the rate of deflation and avoid plugging of the needle. A hypodermic needle is also recommended because its puncture may heal the fastest (Shasteen & Sheehan, 1997). These findings confirm that fizzing is not unfavourable to barotrauma fish; however, accidental punctures of other organs can have adverse effects.

Our work has direct implications for recreational fisheries where decompression is an important issue. The preliminary behavioural findings in our study may be valuable for marine angling and tournaments as regaining immediate equilibrium and swimming abilities would highly benefit marine species that reside in environments where predation is frequent and conditions are harsher. We have shown that fizzing landmarks may vary between species, thus managers that endorse fizzing should offer training and information regarding appropriate situations and locations to fizz. Benefits of fizzing will depend on the depth of capture, the species, and the severity of tissue and physiological damage. Continued research is needed to develop and validate other less invasive approaches to recompressing fish in order to maintain their welfare and increase survival rates.

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