

Keeping Your Fish in Good Condition

A Guide for “Big Water” Tournament Anglers

by Dr Bruce Tufts

Preamble

Anybody who fishes tournaments knows that there are a lot of different ideas out there about how to keep your fish in good condition. For many people, it can be tough figuring out what to believe. As a professional scientist, one of the things that truly amazes me is how many different ideas there are on this issue with little or no science to back them up. That’s one of the big reasons that I’ve spent much of my career conducting science to determine the best way forward in this area.

I’ve been fishing bass tournaments on the Great Lakes for a few years now. Like many anglers, it didn’t take me long to realize that focusing my efforts on those big pelagic smallmouth was my best strategy if I hoped to finish anywhere near the top. I also quickly realized that it was a lot harder to keep a limit of big smallmouth alive compared to a limit of largemouth. Some of the problems were relatively easy to solve. Others were more difficult and have required some research to understand what was happening. In recent years, several of the research projects within my lab have been directed towards solving these problems. There are still a few issues to sort out, but we now have a much better understanding of the best practices to keep smallmouth in better condition.

The purpose of this guide is to tell you everything I've learned about keeping smallmouth in good condition in "big water" tournaments. Even if you are not targeting smallmouth in your tournament fishing, or don't fish the big lakes, you will still find a lot of valuable information in here about fish care. Because we've still got a few more things to resolve in this area, I can't guarantee that you'll never have a dead fish penalty again. If you put this information into practice, however, I can guarantee that your fish will be in the best possible condition, based on the best available science.



Graduate students from Queen's University have been examining the condition of bass at tournaments for many years.

What are the issues?

Oxygen

The most important danger that fish encounter during tournaments is lack of oxygen. When you think about it, it seems so obvious that it probably shouldn't be a problem, but it is. Lack of oxygen is one of the most common ways that fish get killed in tournaments because most anglers don't have the technology to measure it and because we are often trying to keep large weights of fish alive in relatively small volumes of water. When it comes to smallmouth in big water bodies, this problem is made even worse by two things. First, the weights of fish are typically greater than those for largemouth. Second, smallmouth are more sensitive to low oxygen than largemouth. In this scenario, simple mistakes can quickly become fatal.

We invented the Shimano Water Weigh-in System to solve problems caused by lack of oxygen at weigh-ins. More recently, I've realized that there are also some problems with livewells in this area. This problem eluded us for a while because it isn't noticeable when you're transporting largemouth, or when you are running around smaller back lakes. It's only when you try and transport a limit of big smallmouth over longer distances on big lakes that this problem can really play havoc with your fish.



We invented the Shimano Water Weigh-In System to solve problems caused by lack of oxygen at weigh-ins.”

Here’s the issue. Because of the way most livewells are designed, they are not able to take in fresh water when you put the boat on plane. In fact, most livewells quickly lose water if you do not put your livewell on “recirc” when you go on plane. Without fresh water coming in, there’s no new oxygen being added to the system. So, if you are traveling any distance at speed and your livewell is not on recirc, your fish will be in a situation where the livewell is essentially a “closed system” with a very small volume of water. Under these conditions, oxygen can drop to dangerous levels very quickly. When you combine this issue with a big limit of smallmouth that are more sensitive to low oxygen, you’ve got big problems.

Interestingly, putting the livewell on “recirc” doesn’t always solve the problem. Many of the anglers I know actually plug their livewell drains to keep them full of water during their long runs on big water and then also put their livewells on recirc. For a couple of reasons, this helps. With a full livewell, the fish don’t get knocked around as much on big water. A larger water volume also provides the fish with more oxygen. In this situation, however, there can be very little oxygenation of the water being returned to the livewell because the head that normally sprays the water into the livewell to oxygenate it is now below the surface of the water (the spray in these systems is what creates the oxygen). Although the larger water volume buys the fish a little more time, the entire set up is again virtually a closed system and oxygen can become a big issue in a relatively short period of time.

Many of these issues are problems that anglers wouldn’t have to deal with if we had a better livewell design in boats that incorporated the right technology to solve these problems. Unfortunately, we are not there yet and anglers have to work with what they have. So, here’s my advice on the best approach to these problems using the current livewell set up. First, be sure to put your livewell on recirc when you put your boat up on plane. If you are making a run in big water and want to plug your livewell drain to reduce the potential for banging your fish around, that’s also a good idea. In either case, be sure to stop every few minutes (10 – 15 min) and add some fresh water to the system. This is what I do and I can tell you it helps.

If you are paying close attention to things here, you might ask... "why not just put the livewell on recirc and forget about it?" For a couple of reasons, this is dangerous. First, I do believe that it is important to reduce the potential for these fish to get banged around in the livewell and filling it completely full helps solve this problem to some degree (we'll talk more about this below). In addition, my experience in this area has taught me that the spray system used to oxygenate the water in livewells may not always be effective enough to provide sufficient oxygen to a large limit of fish, especially smallmouth. In view of these issues, my best advice is to frequently refresh the water in your livewell to ensure that the oxygen levels get back to normal.

One last comment is warranted here. There are a lot of differences between livewells and you need to get to know yours. My 10 minute rule for refreshing some water may be 20 or 30 minutes in some boats and 5 in others. These times also depend on the weight of the fish you are carrying and the temperature. With bigger weights of fish and higher temperatures, you'll have to do this more frequently. The most important take home message from this section is that oxygen can be a problem when your boat is on plane, so if you are losing fish during these times (or you are noticing that they look bad after making runs), try refreshing your livewell at frequent intervals and you will likely solve the problem. You'll also have to experiment with your system to learn how often you need to do this.

Pressure Changes

Another issue that's critically important for keeping smallmouth in good condition is dealing with the pressure problems that arise when these fish are caught from depths greater than 20 feet or so. Most people already know a few things about this issue and I won't go into a detailed explanation about "why" this happens. The brief explanation is that pressure increases with depth and bringing fish to the surface from significant depths causes a variety of problems associated with the rapid change in pressure. For most bass caught deeper than about 20 feet, the most obvious short-term problem is over-inflation of the swimbladder (the gas expands and can't be easily released). Although there are likely other problems that arise, solving the swimbladder over-inflation problem relatively quickly (within the first 10-20 minutes) seems to be one of the key issues when it comes to keeping these fish in good shape (pun intended). A few years ago, I never thought I would be saying this, but a lot of experiments and first-hand experience in this area have convinced me that "fizzing" is currently the best available method to solve this problem.

There is already a lot of information out there about how to fizz fish. In my opinion, the best way to learn this technique is to have someone with experience show you how to do it. I will also provide you with some information here about the method that I use (see photo & caption). It takes a little practice to learn, but once learned, it is a skill that can be extremely valuable. My suggestion is to practice on a few fish

well before you have to use this technique in a tournament situation.

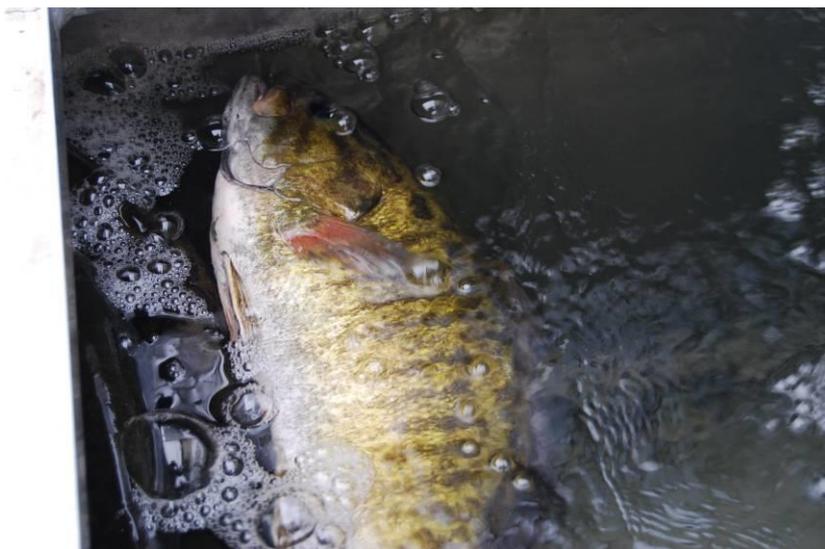


Steps to fizz a bass:

- 1) Very briefly, remove the fish from the livewell and lay it on its side.
- 2) Press the pectoral fin against the side of the fish and mark a spot $\frac{3}{4}$ to 1 inch further down the side of the fish from the posterior end of the pectoral fin (towards the tail).
- 3) Insert the needle into this spot on a slight angle towards the head of the fish. Once the needle is in about $\frac{3}{4}$ of an inch, place the fish back in the water and check for bubbles as you continue to insert the needle.
- 4) When the needle passes into the swimbladder, there will be a steady stream of bubbles flowing out of the base of the needle into the water. Hold the fish and needle in this position until the stream of bubbles becomes very slow. Don't squeeze the fish and be sure to remove needle before the air bubbles stop, so that water doesn't flow in the reverse direction into the swimbladder.

* I use a 2 inch 18 gauge needle for this procedure, but anything close to this should work fine. If you are having a problem, one of the most common reasons is that the needle has become plugged with bits of tissue. I use a piece of wire to clean the bore of the needle every time I use it.

My only other comment in this section is that the magnitude of this problem seems to vary between fish and isn't always something that can be completely explained by the depth that fish are caught from. For example, I've caught smallmouth from the 20 foot range that had severe swimbladder problems immediately. In other situations, I've caught fish from closer to 40 feet that didn't seem to exhibit any pressure problems. I can only speculate that the reasons for these differences may be associated with things such as fish size (bigger fish seem to have more of a problem in this area) or the depths the fish were acclimated to before they were caught (the fish might have just come from a much deeper area). With regard to these issues, my suggestion is to only "fizz" the fish if you notice that it is having trouble with buoyancy (struggling to stay down, rolls on its side or is upside down). If you are not seeing any of these problems (which can happen), don't bother "fizzing". The obvious downside of the fizzing technique is that we are poking a needle into the fish. If this isn't necessary, it's best to avoid it.



Only fish that are having trouble with buoyancy...struggling to stay down, rolling on their sides or upside down.

Physical Impacts

If you've fished any of the big bodies of water in rough weather, you know what I am talking about here. Even in moderate winds, everything in the boat can end up taking a real pounding. Have you ever wondered what that is like for your fish? We did. So, we did some experiments. We actually built a plexiglass livewell and videotaped the fish in these situations as part of a recent Master's thesis. We also measured the tissue damage that can occur as a result of the fish hitting the sides of the livewell. Even in moderate conditions (medium speeds and wave heights), our experiments showed that the fish can end up hitting the walls of the livewell several hundred times for every hour of driving under these conditions. We also showed that this can cause a significant amount of tissue damage. Not surprising really when

you think about it. These fish don't have seat belts on. If you've been a passenger on a ride across one of our big lakes in rough weather, you know how hard it can be to stay in your seat sometimes. The fish don't get to hold on to anything.

My point here is that physical impacts between the fish and the walls of the livewell are another important issue on big water. It's important to keep this in mind. If you want to keep your fish in good condition, one of the simple things you can do is slow down, especially in rough weather. Remember that every time you hit a wave hard, that probably also affects the condition of your fish. As mentioned above, plugging the drain of the livewell, letting it fill to the top and then switching the livewell to recirc, before putting the boat on plane is another strategy that people use to reduce this problem. I've also started doing this because it makes sense and seems to help.



The Shimano live-release boat assisting with Dr Tufts experiments on Lake Simcoe.

Temperature

When it comes to fish care, high temperatures make everything more difficult. In terms of oxygen, for example, increases in temperature will increase the rate of oxygen consumption by the fish, but at the same time, increased temperature will reduce oxygen solubility in the water. The bottom line is that fish need more oxygen at higher temperatures, but there is also less available in any given volume of water. This being the case, it takes a lot less time for fatal mistakes to happen with oxygen levels at higher temperatures.

We've done a lot of different experiments with temperature over the years. Rather than go into a lot of detail here, it makes more sense to tell you some general things that we've learned from our experiments and the scientific literature in this area. The first thing is that the magnitude of any physiological disturbance seems to be greater at higher temperatures. For anglers, the take home message from this statement is that you have to be even more careful to follow the suggestions above and to not make any other careless mistakes (eg turning off your livewell for too long) at higher temperatures.

In this section, we also have to talk about the use of ice, or any other strategies, to reduce livewell temperatures. If you can do it, it makes good sense to try and reduce the temperature of your livewell "to some extent" when it gets really hot. This is probably more important for smallmouth than largemouth. If you're catching your smallmouth at

depths of 20 feet or more on big lakes, there's a good chance that the water temperature that you're taking them from is going to be a few degrees below the surface temperature, especially compared to surface temperatures in bays and marina's where weigh-ins typically take place. This is less of an issue early and late in the season and usually only important in mid-summer when water temperatures are peaking.

If you are going to try and cool the water in your livewell, there are a couple of things to keep in mind. The first thing is that cooling too much can also be a problem and will stress your fish. In most situations, all you need to do is to take a few degrees off the surface temperature to make your fish feel more comfortable. Our experiments have shown that a five degree reduction provides the greatest benefit in most situations. In my opinion, this makes sense because it probably brings the fish very close to the temperature that it was caught from. The only time it would make sense to cool your fish further would be if you knew that the temperature you caught them from was even lower. The other thing to keep in mind is that tap water may have substantial amounts of chlorine in it and can cause further stress to your fish. So, don't put ice from tap water directly into your livewell.

Until now, the only strategy that I have used to control temperature is to completely fill my livewell with water from the main lake (where the water is often cooler) and then put the livewell on recirc before entering the marina or bay where the weigh-in is going to take place. Since summer temperature peaks seem to be climbing these days, however, I am also seriously considering some type of temperature control device

in my livewell. I am already aware of at least one product on the market that will do this and I believe there may be more devices for temperature control of livewells available in the future.

My final comment in this section is that thermometers are cheap and easy to use. If you are going to try and control livewell temperature, you might want to consider purchasing a couple of cheap plastic aquarium versions to gain a better understanding of the temperature changes occurring in your livewell.

Final thoughts

When it comes to fish care, I think a lot of people make it more complicated than it needs to be. In general, the best starting point is to realize that the fish are already very comfortable in the natural environment that they came from. As long as you can provide them with similar physical variables, such as sufficient oxygen and a similar temperature, you are already way ahead of the game. When it comes to species such as smallmouth that we catch from depth on big water bodies, there are also a few other issues that we now have to find a way to deal with such as the pressure changes that occur when the fish are caught and the physical impacts in the livewell during long runs on big water.

In the future, I suspect many of these problems will be solved by better livewells and technology in boats. We are already working on this and hope that our science and ideas will help move the yardsticks in this area. My suggestions here

should be taken as one approach to solve the current issues that arise with the equipment that most of us are using now. Everyone should also understand that my advice is not the only way to solve these problems. If you are already doing something else that works, or have a better idea to solve the same problems, that's great. Keep doing it and I'd love to hear about it.

Since I've provided a lot of detail in the main section of this document, I thought it might be helpful to provide a quick summary of the key problems and my suggested solutions below. I have also added a final section with my responses to the questions that I am most frequently asked about fish care.

Hopefully some of you will find this document helps you with your fish care. Good fishing.



Dr Tufts taking a blood sample from a smallmouth bass. Information within this brochure is based on many years of research in this area."

Quick Summary

Problem: Fish in poor condition after running with the boat on plane.

Likely cause: Low oxygen caused by livewell limitations with boat on plane.

Solution: Put the livewell on recirc before going on plane and stop every few minutes (10-20) to refresh the water in the livewell.

Problem: Fish in poor condition (upside down or on side and looking bloated) after catching them earlier from depths of 20 feet or more.

Likely cause: Over-inflation of the swim bladder due to pressure changes.

Solution: Fizz your fish within first 20 minutes after being caught.

Problem: Fish in poor condition after runs in big water.

Likely cause: If you have already followed the suggestions above to deal with oxygen problems, this is likely due to physical impacts with the walls of the livewell.

Solution: 1) Plug your livewell drain (a rag stuffed in the drain works for this) and fill the livewell right to the top, then switch the livewell to recirc before putting the boat on plane and 2) Slow down. In rough water, you will still lose water in the

livewell and will need to stop and refresh the water in the livewell every few minutes (see above).

Problem: Fish deteriorate when the boat is sitting with livewell on flow through (often in shallow water, back bays, marinas etc during summer months).

Likely cause: Temperatures are getting too high in your livewell due to warm surface temperatures or due to temperature changes that are too great between the surface and the depths where the fish were caught.

Solution: Refill with cooler main lake water and put the livewell on recirc in these areas or use another approach to drop the temperature a few degrees in your livewell.

Frequently Asked Questions

Q: Why does your list of suggestions for fish care not include a livewell solution since these products claim to improve the condition of fish in livewells?

A: I used to think this might be important until I spent 5 or 6 years examining the physiological condition of fish at the end of tournaments. This research showed that the serious problems that the fish were experiencing (eg low oxygen) weren't things that could be solved by something in a solution. We also examined some of these products and never obtained any results showing that they significantly improved the physiological condition of the fish. As a final comment here, note that the fish don't need a solution to be comfortable in

nature. They just need water with the right physical properties (oxygen and temperature).

Q: If I have an oxygenator, or another similar product, in my livewell, can I forget about having any problems with oxygen?

A: In my opinion, no. Oxygen could still be a problem in your livewell. The only way I would relax about oxygen as an issue would be if you had a way to measure it (eg portable O₂ meter) and spent some time doing experiments involving oxygen measurements in your livewell. In the course of our research, we have also examined some of the products that are intended to produce oxygen in livewells. Although we found that these products did produce oxygen as they claimed, they produced it so slowly that it couldn't keep up with the rate of oxygen consumption by a large limit of bass. This situation may have improved, but I have yet to see any data to convince me that these problems are completely solved.

Q: Are waste products like ammonia a problem for fish during tournaments?

A: The short answer is "no". We have done studies that examined the rate of ammonia production by bass and the threshold levels of ammonia that cause physiological problems. The rates of production are so low that they never come close to being a problem in a tournament situation. This isn't something that anglers need to worry about.

Q: If I wanted to take things a step further in terms of fish care in my boat, what would be the best things I could do?

A: 1) The first thing I would suggest would be to find a way to put a better aeration system in your livewell. If you could hook up an additional aerator that constantly produced a fine mist of bubbles (as in an aquarium) in your livewell, you would likely protect yourself from many of the potential oxygen problems. 2) The next thing I'd suggest would be to buy a thermometer and develop some type of temperature control system in your livewell that could consistently hold your livewell temperature a few degrees (ideally 5) below surface temperatures. 3) If you fish "big lake" tournaments, the final thing would be to find a way to pad the front and back of your livewell to reduce physical impacts.

Q: You seem to be very reluctant to recommend any of the products on the market that claim to improve fish condition in livewells. Why is this?

A: My biggest problem with most of the products out there is that they make big claims, but never seem to show any data to back these up. As a scientist, I am convinced by the data. If we could see data from experiments showing that these products work, I'd be more inclined to consider them. The other issue here is that fish care is not complicated. The most important aspect of fish care simply involves keeping a few important physical variables (oxygen and temperature) as close as possible to normal levels from the wild.

Biographical Information...



Dr Bruce Tufts is a professor in the Department of Biology at Queen’s University. He also supervises the Freshwater Fisheries Conservation Lab at Queen’s which has been involved in many different fisheries conservation projects over the years including numerous scientific studies to develop the best practices at “live-release” tournaments. His laboratory has published many scientific papers in this area and also invented the Shimano Water Weigh-In System.