Condition	Description	Abbreviation
Tight abdomen	Abdomen swollen, feels tight when touched	TA
Exopthalmia	Eyes protruding out of orbit	PE
Bloody Fins	Hemorrhaging present in fins	BF
Ocular Emphysema	Gas present in eye	OE
Esophageal Eversion	Eversion of esophageal tissue into the buccal cavity	EE
Absence of Dorsal Erection	Fins do not become erect when fish is restrained	DE
Absence of Mouth Clamp	Mouth does not clamp shut when lifted or opened	MC
Absence of Restraint Resistance	Fish does not exhibit muscle flex for escape	RR
Hook Wound	Wounding in or around the mouth	HW
Fin Damage	Fins frayed or missing parts	FD
Lamprey wound	Noticeable circular wounding from lamprey	LW

Table 1. Physical indicators of fish stress

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Additional information about catch-and-release bass tournament recommendations is available from:

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LCSG-13-04

Lake Champlain Bass Tournaments

Practices that Increase Survival and Dispersal Rates

Background and rationale

The catch-and-release bass tournament industry in North America has a track record of research and management practices designed to maximize fish survival, and minimize impacts to largemouth and smallmouth populations.

Despite this history, some questions regarding dispersal of bass in large northern lakes have remained unanswered. Recent research activities on Lake Champlain have uncovered some intriguing aspects of bass behavior and responses to stress associated with angling, transport and weigh-in at tournaments in Plattsburgh, NY. This fact sheet summarizes the findings of research conducted by LCRI staff in 2011-2012, and offers recommendations to improve tournament release practices.

Stress management

Fish subjected to angling may encounter a host of physiological challenges. Subsequent capture, transport (e.g. live wells), handling (at tournament site) and holding (tournament site and release boat), may exacerbate such physiological challenges. These challenges may produce a suite of symptoms and signs (i.e. stress responses). The resulting internal and external responses are well documented, and some are easily observed. A major driver of fish stress is low oxygen levels and/or poor water quality, both of which can be mediated (or exacerbated) by temperature.

We suggest that club-level, regional amateur and professional tournament organizers pay close attention to earlier publications supported by the tournament industry. Two publications geared towards non-scientists that may be helpful are "Keeping Bass Alive: A Guidebook for Anglers and Tournament Organizers" (Gilliland and et al 2002) and "The Shimano Water Weigh-In System: A 'Fish-Friendly' Guide" (Tufts and Morlock 2004). At a minimum, these two publications serve as excellent documents for participants and tournament organizers to review prior to each tournament season.

Since longer livewell transport distances increase stress responses, any measures to promote shorter livewell transport distances will reduce stress to fish brought to weigh-in events. Water temperature has long been known as a key to fish stress and survival, and observations at Plattsburgh-based tournaments corroborated many earlier studies. Both largemouth and smallmouth bass were less likely to exhibit dorsal fin erection as temperatures rose from 16° C (61° F) to 22° C (72° F). Tournament organizers, biologists, and anglers recognize that higher water temperatures (typically found in summer) are associated with lower dissolved oxygen levels. This may pose challenges to fish that are unable to find cooler temperatures due to confinement in livewells, staging tanks, and release boat tanks. Though most tournament organizers already attempt to manage water temperatures and associated dissolved oxygen levels, vigilant attention to these water quality parameters could further reduce stress and subsequent mortality.

Specific recommendations for holding tanks

At a minimum, weigh-in and release boat tank systems should include:

- shading
- thermometers
- water pumps
- air pumps
- plastic tubing for air delivery
- air stones
- air chilling system (see below) or ice during summer months

Weigh-in tank systems should include provisions to keep water temperature similar to that of lake temperature. While ice is commonly added to holding tanks, homemade air chillers may be more effective at controlling tank temperatures. This system offsets the heat gain of pumped air systems, and allows for more even cooling than may be achieved by adding bags of ice to weigh-in tanks. Chillers can be made of ice chests modified by adding 1.5 inch entrance and exit holes. Garden hose can then be routed in, coiled, and then routed out of the chest. During weigh-in setup (and as necessary during the event), the cooler is filled with ice and air pumps positioned to pump air through the chilled hose coil, to deliver chilled air through the air stones in the holding tanks.

Anglers and staging tanks at tournament weigh-in

Observable indicators of stress

Even with good management of dissolved oxygen levels and water temperatures, fish may still exhibit internal or external signs of stress. We recorded the presence or absence of a suite of stress indicators that could be readily observed by anglers and tournament managers. These conditions and associated descriptions are given in Table 1 (see back page).

Three of these indicators were positively correlated with other tournament variables. The probability of fish exhibiting fin damage increased with the distance fish traveled in a livewell, and the likelihood of bloody fins increased with fish length. Similarly, the likelihood of fish failing to exhibit dorsal fin erection was linked to higher lake temperatures. The presence of these stress indicators provides indirect predictions of post tournament mortality. As such, tournament managers should monitor these indicators and consider ways to minimize stress during tournament operations.

Dispersal and release sites

The lag time between release and bass dispersal presents a problem for using a release site close to the tournament weigh-in site. In Plattsburgh, we observed heavy angling harvest associated with several popular fishing areas and boat launches in western Cumberland Bay, adjacent to the tournament release site (Fig. 1). Research on other water bodies has shown that the more times a fish is caught, the higher its stress levels and the lower its chance for survival. Because the fish are released so close to the New York shoreline, they tend to remain in these areas of localized heavy fishing pressure for several weeks post-release, thus decreasing their chances for survival. Moving the release point farther away from areas of heavy shore-based angling has been successful for reducing bass capture vulnerability post-release at other venues. With this in mind, we recommend locating the release point further offshore and suggest that tournaments use one of two designated release zones approximately 3-4 km from the Plattsburgh waterfront (Fig. 1). However, we recognize this may not be logistically possible due to weather conditions; therefore, we also recommend there be a secondary release zone designated as a "foul-weather release site." (Note: additional discussion of release site recommendations may be found in the LCBP Technical Report #77).

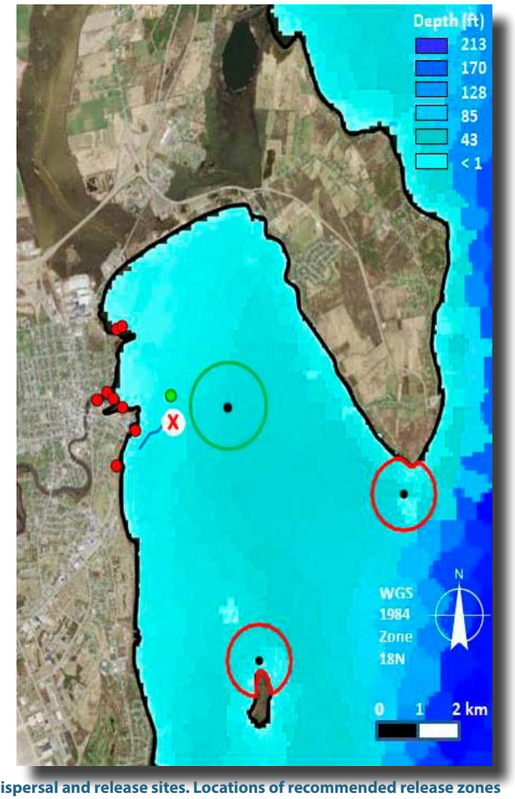

Figure 1: Dispersal and release sites. Locations of recommended release zones at Crab Island and Cumberland Head (red circles) with foul weather release (green circle) located east of Plattsburgh Buoy 1 (green dot). Popular public fishing areas and boat ramps are represented by red dots. The current release location is marked by a red X through a circle.

Fizzing/Barotrauma

Four stress indicators recorded by LCRI staff were indicative of barotrauma – the rapid depressurization of blood gasses and swimbladder brought on by retrieval of fish caught at depth. These indicators were tight abdomen (TA), exopthalmia or "pop-eye," (PE), ocular emphysema, or "clouded eye" (OE), and esophageal eversion (EE). The occurrence of this suite of indicators was relatively rare in Plattsburgh-based bass tournaments (Figure 2). This is not surprising given that most tournament fish are caught in relatively shallow waters.

Given the relatively low occurrence of barotrauma, we caution against the routine use of a "fizzing" technique whereby swimbladders are deflated by release-boat tournament staff. Fishery biologists management agencies are divided on the utility of fizzing as a treatment for barotrauma.

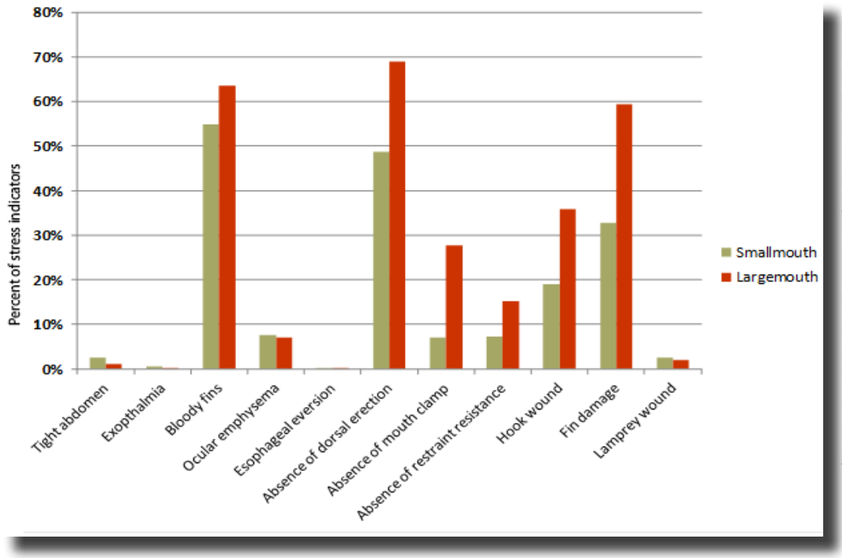

Figure 2: Percent occurrence of stress indicators observed at Plattsburgh-based bass tournaments

Fishery management agencies in New York, Vermont, and Quebec do not advocate fizzing. Fizzing should be viewed as a measure of "last resort" for fish unable to submerge.

Our recommendations based on post-tournament release observations and research are as follows:

• Don't confuse a fish's inability to maintain equilibrium with barotrauma. Signs of barotrauma include bloating, along with hemorraghing inside the mouth, on the body surface, or within the dorsal, caudal, anal, pelvic, and pectoral fins.

• Use hollow needle devices and sterilize devices prior to reuse in succeeding fishes.

• Carefully locate the insertion point. First view an imaginary line connecting the notch between the spiny/soft-ray portion of the dorsal fin, downward to the anus. Position the needle on the imaginary line, 3-5 scale rows below the lateral line. Carefully lift a scale and insert the needle through the body wall into the swimbladder

• Do NOT attempt to access the swimbladder through the mouth (Figure 3a). Such improper technique may well damage the esophagus, yet still leave the swimbladder distended. The correct technique is demonstrated in Figure 3b.


Figure 3a. Incorrect method to deflate swimbladder

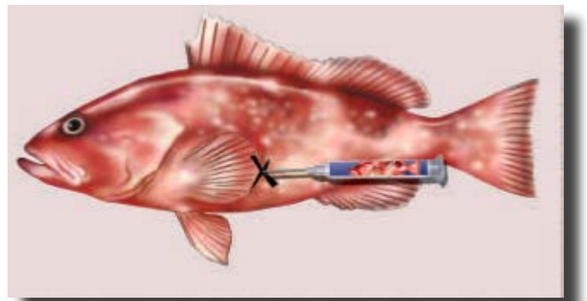
Figure 3b. Correct method to deflate swimbladder Credit: Florida Sea Grant

To read LCBP's full report, please visit the LCBP's publications database at http://www.lcbp.org/wp-content/uploads/2013/11/77_PostTournamentMovements_BlackBass.pdf