

**THE PHYSIOLOGICAL EFFECTS OF HANDLING AND VARYING
AMOUNTS OF AIR EXPOSURE ON WALLEYE DURING THE
WEIGH-IN AT LIVE-RELEASE ANGLING EVENTS**

Shaun S. Killen

Queen's University, Department of Biology, Kingston, ON, Canada, K7L 3N6
Phone: 613-533-6000 ext.75398 Fax: 613-533-6617
Email: killens@biology.queensu.ca

Cory D. Suski

Queen's University, Department of Biology, Kingston, ON, Canada, K7L 3N6
Email: suskic@biology.queensu.ca

Bruce L. Tufts

Queen's University, Department of Biology, Kingston, ON, Canada, K7L 3N6
Email: tuftsb@biology.queensu.ca

EXTENDED ABSTRACT ONLY – DO NOT CITE

Introduction

In recent years, the popularity of live-release angling tournaments has increased dramatically (Schramm et al., 1991). Several authors have suggested procedural guidelines for reducing stress among tournament fish, but the importance of weigh-in handling and air exposure has been largely overlooked. During the weigh-in of live-release angling events, fish are handled and air exposed as they are weighed on a scale and held for photographs. In most fish species, air exposure causes a severe inhibition of gas exchange due to a collapse of the delicate gill lamellae and a reduction of functional gill surface area (Boutilier, 1990; Ferguson and Tufts, 1992). This may lead to a decrease or complete cessation of carbon dioxide excretion, as well as a reduced capacity to perform aerobic metabolism (Ferguson and Tufts, 1992). This study uses walleye (*Stizostedion vitreum*) to examine the impacts of weigh-in handling and air exposure from a physiological perspective.

Methods

We subjected adult walleye to a weigh-in simulation with varying amounts of air exposure. Individual walleye were carefully netted from a common holding tank and transferred (three fish per trial) into a portable livewell (35 x 35 x 87 cm). The livewell was continuously supplied with flowing water (11-12°C), which was spray aerated by passing through a section of perforated plastic tubing located approximately 5 cm above the surface of the water. Fish remained undisturbed for 4 hours, at which time individual fish were removed from the livewell and held for 5 min in a clear plastic bag containing 15 L of lake water (one fish per bag). The plastic bag was then emptied into a laundry basket that allowed the drainage of water. Fish remained in the basket and were air exposed for either 30 s or 90 s. Another set of fish received the same livewell and plastic bag treatment but were not air exposed during the weigh-in simulation. Instead of being placed into the laundry basket, these fish were transferred into a plastic container full of water for 90 s.

Immediately after either of the three weigh-in treatments (no air exposure, 30 s of air exposure, or 90 s of air exposure), individual fish were anaesthetized in a buffered solution of MS-222 (250 mg / L) and sampled for blood and white muscle. The blood samples were later analyzed for plasma lactate, and the white muscle samples were analyzed for phosphocreatine (PCr), adenosine triphosphate (ATP), glycogen, lactate, and intracellular pH. Data collected for the three air exposure treatments were also compared to control fish that were sampled after 48 hours of quiet rest in darkened Perspex boxes. Immediately before sampling, water flow into the boxes was stopped, and anaesthetic was added. Following full anesthesia, fish were sampled for blood and white muscle as was previously described for the air exposure groups.

Results and Conclusions

The handling associated with plastic bag confinement caused a physiological disturbance that was intensified when followed by air exposure. Most walleye struggled during bag confinement, and even the no air exposure treatment showed substantial decreases in white muscle PCr and glycogen when compared to resting values. However, increasing amounts of air exposure after the period of bag confinement caused a further physiological disturbance, with significant white muscle ATP depletions after 90 s of air exposure. Furthermore, white muscle lactate after 90 s of air exposure was about 12 times higher than resting

values, and about 3 times higher than in fish receiving the no air exposure weigh-in treatment. There was also an intracellular acidosis that progressively increased with handling and air exposure. Plasma lactate showed a gradual increase with longer duration of air exposure, but the differences between weigh-in treatments were not statistically significant.

Together, these results indicate that handling during the weigh-in causes a significant physiological disturbance in walleye, and that this disturbance is exacerbated by air exposure. We recommend that tournament organizers focus on reducing the duration of air exposure during the weigh-in at competitive live-release angling events.

References

- Boutilier, R. G. 1990. Control and co-ordination of gas exchange in bimodal breathers, p. 280-346. *In* R. G. Boutilier [ed.] *Advances in comparative & environmental physiology*. 6. Vertebrate gas exchange: from environment to cell. Springer Verlag, New York, NY.
- Ferguson, R. A., and B. L. Tufts. 1992. Physiological effects of brief air exposure in exhaustively exercised rainbow trout (*Oncorhynchus mykiss*): implications for "catch and release" fisheries. *Can. J. Fish. Aquat. Sci.* 49:1157-1162.
- Schramm, H. L. Jr., M. L. Armstrong, N. A. Funicelli, D. M. Green, D. P. Lee, R. E. Manns, Jr., B. D. Taubert, and S. J. Waters. 1991. The status of competitive sport fishing in North America. *Fisheries* 16:4-12.

