Physiological Recovery of Bonefish (Albula vulpes) to Multiple Catch and Release Angling Events

Robert Zintl, Alex Ulm, Jon Charette, Sam Palmsano and Cam Risinger

Advisors: Georgie Burbuss, Dr. Aaron Shultz

**Introduction**

Bonefish (Albula vulpes), a species of marine fish, inhabit the shallow flats and mangrove creeks of the Bahamian Archipelago (Danylchuk et al. 2014). A common victim to angling, bonefish experience intense stress during each catch and release event. In the Bahamas, bonefish are commonly caught by angling and released, often for their value to the recreational fishing industry. Commonly caught by great barracuda and lemon sharks, bonefish are an important indicator species and biomass of the forest, permitting them to be used as a benchmark for measuring the relative health and productivity of the ecosystem (Shultz et al. 2010).

**Methods**

**Study Location, Fish Collection, Fishing Pressure**

Bonefish are collected in tidal creeks and flats surrounding Cape Eleuthera by seining (Fig. 1). A large net is placed across a creek (Fig. 2), and the fish are ushered towards the net and captured using hand nets. Three to five fish are transported back to the wet lab at the Cape Eleuthera Institute. During fish collection and angling the total number of anglers are recorded along with the time each fish is being fished. Fish captured are fasted for 24 hours and the process is repeated. A one-way repeated measures analysis of variance test is then used to test for statistical trends in data for each fish after all four trials. After data has been collected SMR and EPOC are compared using a Student’s t-test. Asker et al (2006) identified that the probability of detecting a difference across the four simulated angling events.

**Chase to Exhaustion and Respirometry**

Post capture, fish recover 48 hours, and after feeding, are fasted for 24 hours (Shultz et al. 2011), ensuring accurate metabolic rate readings. Fish are measured and angling the number of anglers are recorded along with the time each fish is being fished. Fish handled repeatedly over a series of simulated angling events do not have significantly different physiological effects on bonefish during the 12 day testing period. Best head and tail events were adopted throughout this experiment and no fish were exposed to air or handled roughly during the testing period. Fish handled roughly were exposed during each repeated simulated angling event did not alter their physiological reaction and recovery from capture. However, the sample size of this study was quite low (n=4 for three simulated angling events, n=4 for four simulated angling events). Fish handled repeatedly over a series of simulated angling events do not have significantly different physiological effects on bonefish during the 12 day testing period. Best head and tail events were adopted throughout this experiment and no fish were exposed to air or handled roughly during the testing period. Fish handled roughly were exposed during each repeated simulated angling event did not alter their physiological reaction and recovery from capture. However, the sample size of this study was quite low (n=4 for three simulated angling events, n=4 for four simulated angling events). Fish handled repeatedly over a series of simulated angling events do not have significantly different physiological effects on bonefish during the 12 day testing period. Best head and tail events were adopted throughout this experiment and no fish were exposed to air or handled roughly during the testing period. Fish handled roughly were exposed during each repeated simulated angling event did not alter their physiological reaction and recovery from capture. However, the sample size of this study was quite low (n=4 for three simulated angling events, n=4 for four simulated angling events).

**Results**

The outcomes of this study will provide data on the fishing pressure in Southern Eleuthera (Fig. 13). The results of the repeated simulated angling events indicate no difference in time or distance traveled for fish during each subsequent event (Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6).

**Discussion**

The economic impact of flats fishing in the Bahamas was estimated in 2006 (Fedler, A. (2010). The economic impact of flats fishing in the Bahamas. Report to the Everglades Foundation). Asker et al (2006) identified that the probability of detecting a difference across the four simulated angling events is high in different areas of Eleuthera. Specifically, given the high pressure at Savannah Sound, with at least one angler per day during peak angling season (Shultz et al. 2014). Further research is needed to determine the effect of fishing pressure on the flats and tidal creeks of South Eleuthera compared to anecdotal evidence of the fishing pressures in Northern Eleuthera. The observed decrease in CPUE suggests that fish are being caught more than once. This disturbance can be quantified by simulating an angling event, the tail of the fish is repeatedly grabbed, resulting in burst swimming (Fig. 5, Fig. 6). This continues until the fish no longer burst swimming (Fig. 5, Fig. 6).

**Acknowledgements**

Thank you to Chris Assery and the Cape Eleuthera Foundation for funding this research. We would also like to thank our research advisors, Georgie Burbuss and Aaron Shultz, for their help and support, and Alex Gabe for photography. We are thankful to the generous donations from the Edwards family to fund this research.

**Literature Cited**


