Bonefish Catch-and-Release Science:

Past, Present & Future

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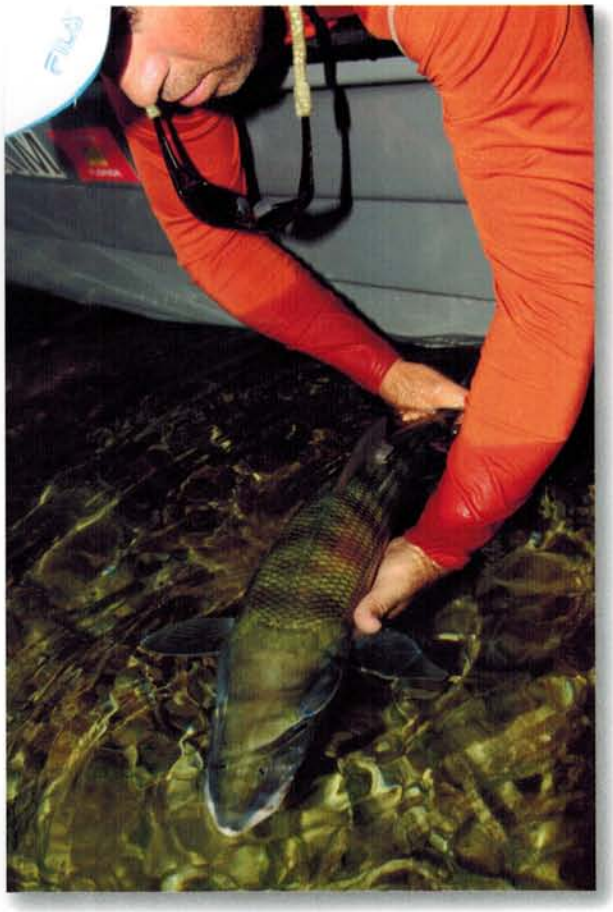

Photo by Dr. Aaron Adams

At the first BTT symposium in 2001, we delivered a presentation on bonefish catch-and-release. In hindsight, the presentation didn't have much in the way of data on bonefish because the science on bonefish was just getting started. Instead we borrowed concepts and patterns developed using other marine and freshwater fish and considered how that information might be relevant to the catch-and-release of bonefish. We knew it was a reach, but we had to start somewhere. We made a lot of assumptions: barbed hooks worked well for trout fishing, so surely there would benefit bonefish; providing bonefish with extra oxygen during recovery from stress should increase survival; if we let bonefish go closer to cover, such as mangrove roots, they would be able to hide from predators until they recover. What a long way we have come. We now have real data based on bonefish research supported by BTT for bonefish-specific catch-and-release best practices.

History

The first bonefish catch-and-release scientific article was published in 2004 and confirmed what many anglers knew already: If there were sharks hanging around, there was a decent chance that fish could be eaten after release. That paper identified a problem but did little to suggest solutions. Thankfully, almost all the work on bonefish since that initial study has focused on solutions, such as handling strategies or fishing gears to maximize bonefish survival after release. Arguably, the Common Bonefish *(Albula vulpes)* is now one of the best-studied marine species with respect to catch-and-release, with now more than 10 scientific articles published since 2004.

Hook Type

What happens to a bonefish that has the line break and swims away with a hook in its mouth? Will the hook come out on its own? What should an angler do if the bonefish they just caught is deeply hooked? Are barbless hooks better for the fish?

To address these questions we quantified the impacts of hook location and duration of hook retention on the survival and feeding of bonefish, and compared barbed versus barbless hooks. We took wild bonefish, exercised them to simulate angling, implanted fishing hooks in their mouths in various locations (some fish were hooked in the lip, some in the esophagus, some fish had barbless hooks, etc.), and the fish

were then held in a tank at the Cape Eleuthera Institute for two weeks. The study showed that hook retention for bonefish resulted in little physical or behavioral impairment despite the range of treatments that were applied. All bonefish survived the two-week observation period in the lab regardless of hook size (#4 vs. 1/0), hook location (lip vs. esophagus) or hook type (barbed vs. barbless) and were subsequently released back into the ocean. Forty-seven percent of the bonefish lost their hook within five days after hooking, and almost three-quarters of bonefish hooked in the lip lost their hook during the two-week holding period. Hooks located in the lip were more likely to be ejected by the end of the two-week study compared to hooks located in the esophagus. There was no difference in shedding rates between barbed and barbless hooks. Based on this study, we recommend that anglers should consider cutting the line and leaving the hook before releasing a bonefish if it is deeply hooked —especially if anglers are using barbless hooks.

Photo by Ian Davis

Oxygen—Just like humans, bonefish have specific oxygen requirements that need to be met to keep them happy, healthy and vigorous. When we interact with bonefish through angling, we have the potential to impact their access to oxygen, which is something that frequently goes unnoticed. Previous research has shown that angling is essentially exercise for fish and can result in changes to their physiology—their heart rate goes up, they consume a great deal of energy and they also produce wastes such as lactate, similar to what we would produce if we were exercising.

To minimize the likelihood of predator attacks on angled fish, anglers sometimes choose to hold fish in a livewell for short durations to allow for safe recovery before releasing the fish. Similarly, bonefish caught during live-release angling tournaments are sometimes held in livewells prior to the weigh-in, and this holding period can last for several hours. We used blood physiology and behavioral observations to identify what dissolved oxygen concentration bonefish need and, more importantly, if it's possible to give bonefish too much oxygen.

Results showed that recovery from exercise was slowed by low oxygen conditions compared to having bonefish recover in regular seawater. Perhaps more notable was that recovery was also slowed for bonefish held in high oxygen levels compared to normal seawater. This is because hyper-oxygenated water (water with above normal oxygen levels) caused physiological disturbances that persisted for several hours. We also studied the behavior of bonefish under different levels of oxygen, with similar results.

Based on this work, we recommend that the dissolved oxygen concentrations during holding do not deviate from natural seawater, such as in a flow-through livewell.

Photo by Ian Davis

Release Environment

Since we know that sharks eat bonefish, especially those that are tired after being caught, an obvious question for those that stalk bonefish on the flats is whether a bonefish released into thick cover such as mangrove prop roots will be able to avoid predation by sharks. To address that, our research group compared the behavior and survival of bonefish released near cover (mangrove roots) or away from cover. It turns out that there was no benefit provided by mangrove roots, largely because bonefish tended to swim away from those areas. Moreover, the likely predators include juvenile lemon sharks that were

able to move into the mangrove areas with ease. So, even though in principle the idea of releasing bonefish close to cover should reduce predation, we did not observe that pattern in the field.

Interestingly, the most important factor in determining whether a bonefish was attacked by a predator after release involved the amount of air-exposure time. Bonefish exposed to air for short periods (seconds or not at all) tended to survive while those that were held out of the water for extended periods were unable to avoid predators after release.

Fortunately, with the help of BTT we have come a long way since 2001, and scientifically tested best-practices for bonefish catch-and-release.

Future Knowledge

This has been a summary of the more interesting and important findings related to research on bonefish catch-and-release, and questions remain. For example, are there better ways to assist recovery of bonefish after they are caught to reduce post-release predation? We also don't know if different species of bonefish respond to catch and release in the same way as *Albula vulpes*.

At the population level, we're still unaware of what amount of post-release mortality could be detrimental to the population—something critical to determine, especially as the popularity of bonefishing increases.

Fortunately, with the help of BTT we have come a long way since 2001, and scientifically tested best-practices for bonefish catch-and-release (including what to do and what not to do) are conveniently summarized and available on the BTT website as well as printed on a small card that would fit nicely in a fly box. Contact BTT for a copy of the card or to suggest handling practices for bonefish and other flats species that should be tested as a way to increase the sustainability of our sport.