# Stocked Piscivores May Be Tougher Than We Thought

**Jeff Schaeffer**
U.S. Geological Survey, USGS Great Lakes Science Center,
1451 Green Road, Ann Arbor, MI 48105. E-mail: jschaeffer@usgs.gov

Many sport fish populations are maintained by stocking age-0 piscivores, and success depends on survival of the stocked fish. Managers have often encountered short-term mortality via predation, but are also concerned with overwinter mortality during the first year after stocking. Many species exhibit shifts toward larger body sizes over winter; this has often been attributed to size-selective mortality with smaller individuals dying at higher rates than large ones. A common belief is that small individuals lack energy reserves to make it through the cold temperatures.

However, recent findings by Jahn Kallis and Elizabeth Marschall at The Ohio State University suggest that this view may be oversimplified (Kallis and Marschall 2014). Using both tagging and pool experiments, they found that overwinter shifts in size distributions in saugeye (female Walleye *Sander vitreus x* male Sauger *S. Canadensis*) stocked in Ohio reservoirs were driven by growth, and not mortality. Tagged saugeye of all sizes grew during winter; there was no evidence of size dependent overwinter mortality or evidence of energy depletion.

However, pool experiments revealed their true overwinter resilience. Saugeye residing in outdoor pools survived 200 days in the complete absence of food. They lost weight, and their energy density declined, but all survived and were able to resume feeding in the spring when presented with fathead minnows.

Although this experiment was conducted on a single species, it suggests that temperate piscivores may be more durable than thought previously, and that overwinter conditions may not be as universally stressful as we think. The approach used by Kallis and Marschall (2014) not only explained that shifts in size distribution were due to growth rather than mortality, but their methods also provide researchers with a way to examine overwinter effects in other species as well.

## REFERENCE

Kallis, J. L., and E. A. Marschall. 2014. How body size and food availability Influence first-winter growth and survival of a stocked piscivore. Transactions of the American Fisheries Society 143:1434-1444.

AFS



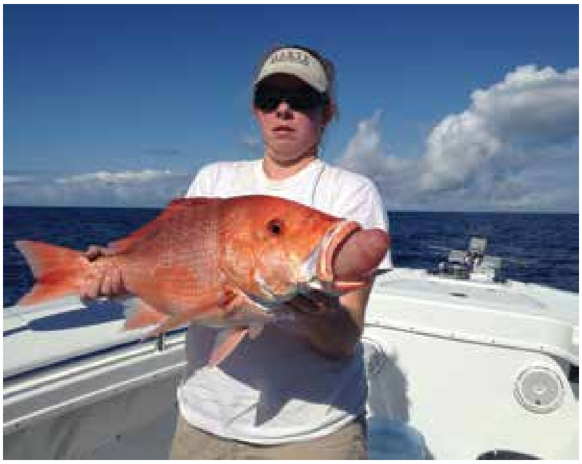
# Increasing Survival Rates of Discarded Red Snapper: Best Release Strategies

**Sarah Harrison**
AFS Contributing Editor. E-mail: sharrison@fisheries.org

Red Snapper (*Lutjanus campechanus*) is one of the most highly sought-after fish in the Gulf of Mexico and also one of the most intensively managed. Considered overfished since the 1980s, anglers have had to endure shortened fishing seasons in an effort to rebuild the stock. Last year, the Red Snapper recreational season was reduced to just nine days in federal waters; this year's 2015 season is likely to be even shorter. Combine this with bag limits of just two fish in addition to strict size requirements (16-inch minimum total length limit), and many captured Red Snapper have to be released or discarded. The impact of these "regulatory discards" to the fishery remains controversial as well as the most effective release strategy (i.e., venting, non-venting, and rapid recompression) at increasing the chances of survival for discarded Red Snapper (Stunz and Curtis 2012).

So what happens to released/discarded Red Snapper? According to scientists at the Harte Research Institute for Gulf of Mexico Studies at Texas A&M University–Corpus Christi, Red Snapper, a deep-dwelling physoclist (i.e., the swim bladder is completely closed, separated from the gut through loss of the pneumatic gland), can suffer pressure-related injuries (i.e., barotrauma) when brought to the surface during capture. Fish suffer from barotrauma, when gas in the swim bladder expands because pressure decreases during ascent, and they may exhibit symptoms such as an expanded abdomen, the stomach protruding through the mouth, or bulging eyes (i.e., exopthalmia). In addition to inflicting direct injuries, barotrauma can also make it difficult for fish to return to deeper waters due to increased buoyancy, and as a result, these fish can become an easy meal for predators when floating at the surface.

In an effort to improve Red Snapper survival rates, Greg Stunz, Karen Drumhiller, Matthew Johnson, Sandra Diamond, and Megan Reese Robillard  conducted a study on ways to relieve barotrauma-related injuries and evaluated two releasing strategies as reported



Red Snapper with stomach protruding through mouth. Photo credit: Greg Stunz.

Red Snapper being placed inside an aquatic hyperbaric chamber. Photo credit: Greg Stunz.

in the current issue of the American Fisheries Society's journal of *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* (Drumhiller et al. 2014). One method they tested was venting, also known historically as the "pop-and-drop" method. Traditionally seen as the accepted method of getting fish back down to the bottom, a hollow instrument is inserted into a fish's body cavity to release built-up gases so the fish can easily re-submerge. However, according to Stunz, "a major issue with venting is that many anglers do not know the proper technique and often try and vent the fish's stomach that is protruding from the mouth," causing more harm than good.

The other method they tested was rapid recompression, a relatively newer and non-invasive method, where the fish is returned to a specified depth. A wide variety of recompression devices exist, including weighted hooks and drop cages, as well as the latest developments: specialized release hooks and pressure-activated lip-grips (SeaQualizer). Returning a fish to depth using a recompression device may take several minutes as well as require dedicated gear and personnel. In comparison, venting takes a relatively short amount of time (typically ≤ 1 minute).

One impediment in understanding the effects of barotrauma-related injuries is the inability of scientists to observe the fate of released fish. To solve this problem, Stunz and his team conducted laboratory experiments using aquatic hyperbaric chambers to simulate fishing events and test the two release strategies. Fish were placed in chambers, acclimated to depth, and then rapidly decompressed to stimulate a catch-and-release event. After decompression, fish were examined for barotrauma-related injuries and then assigned to one of four treatment groups: (1) vented surface release = vented with a hollow metal venting tool and then released at the surface into an aquaculture tank; (2) non-vented surface release = released at the surface into a tank without venting; (3) vented and rapidly recompressed = vented as above but returned to the hyperbaric chambers and repressurized to a depth group (0, 30, or 60 m) within 1–2 minutes; and (4) non-vented and rapidly recompressed = returned to the hyperbaric chambers without venting and repressurized to a depth group (0, 30, or 60 m) within 1–2 minutes.

Experimental results indicated that Red Snapper that were vented or rapidly recompressed had higher survival rates than non-vented or non-recompressed fish. Vented fish in the simulated surface release group (1) had 100% overall survival, while non-vented surface release fish (2) had 58% overall survival. For non-vented surface release fish (2), a depth effect was also present with 67% and 17% survival in fish decompressed from 30 m and 60 m, respectively. Fish that were vented and rapidly recompressed (3) had 100% overall survival, while non-vented and rapidly recompressed (4) fish had a 92% overall survival. A depth effect was also present with the non-vented and rapidly recompressed group (4): 100% survival from 30 m and 83% survival from 60 m. These results show clear benefits of venting or rapid recompression as effective tools for alleviating barotrauma symptoms, improving predator evasion, and increasing overall survival of regulatory discarded Red Snapper. Their study also illustrates that venting alone is a beneficial technique when performed properly.

As of September 2013, anglers are no longer required to have and use a venting tool when fishing for reef fish, such as Red Snapper, in federal waters of the Gulf of Mexico (U.S. Office of the Federal Register 2013). This change now gives anglers the freedom to choose the best release strategy. According to Stunz, this is a positive step, because "the rule prevented the 'legal' use of recompression devices that are very effective." "Furthermore, some fish do not need to be vented; however, it takes some experience to know when this is the case." Overall, Stunz and his research team recommend, "venting when a lot of fish are hitting the deck, because it is faster." However, they suggest that "recompression is actually better than venting-only, because it returns fish back to the depth (and temperature) they were captured and you avoid the surface predation."

For a video of a Red Snapper being recompressed using the SeaQualizer descending device:
www.youtube.com/watch?v=hvdBhhEQCSc

## REFERENCES


Drumhiller, K. L., M. W. Johnson, S. L. Diamond, M. M. Reese Robillard, and G. W. Stunz. 2014. Venting or rapid recompression increase survival and improve recovery of Red Snapper with barotrauma. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 6:190-199.

Stunz, G. W., and J. Curtis. 2012. Examining delayed mortality in barotrauma afflicted red snapper using acoustic telemetry and hyperbaric experimentation. SEDAR31-DW21. SEDAR, North Charleston, South Carolina.

U.S. Office of the Federal Register. 2013. Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; reef fish fishery of the Gulf of Mexico; reef fish management measures, final rule. Federal Register 78:149(2 August 2013):46820– 46822.


AFS