Barotrauma in snapper

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Barotrauma in Snapper

Research by Paul Butcher, Matt Broadhurst, Karina Hall and Craig Brand

Industry and Investment NSW scientists investigate the frequency and symptoms and the effectiveness of common methods for releasing afflicted fish.

It is well known that when fish with a closed swim bladder (e.g. snapper, pearl perch, mulloway and even Australian bass and golden perch) are angled from deep (> 10 m) water, they can suffer a range of injuries due to the rapid changes in pressure. These impacts are collectively termed 'barotrauma'; the most common symptom being positive buoyancy, which can prevent a released fish from swimming back to its preferred depth. Other more severe injuries include the stomach being forced into the mouth, or the intestines from the anus, bulging eyes, and gas bubbles in the eyes, mouth, fins or skin. Such injuries are of concern, since they negatively impact on the welfare of fish and, in some cases, cause death.

One way of dealing with the issue of barotrauma is to try and avoid it in the first place. Unfortunately, this can't be done by altering the speed at which fish are reeled in, because even the slowest retrieval is still too fast for them to compensate for the pressure changes. It might be possible to reduce the frequency of barotrauma in some species by choosing rigs that increase the probability of catching legal-size fish, and so avoid under-size individuals. But for many species, all sizes occur across the same habitats and are caught with the same gears. In any case, due to bag limits and non-consumptive fishing, many legal-sized fish are also released.

The above limitations mean that barotrauma typically needs to be addressed through handling. Three common approaches include: (1) doing nothing and simply releasing fish at the surface; (2) using a weight or cage to return the fish to its capture depth (termed 'assisted release'); or (3) deflating the swim bladder with a needle (termed 'venting'). All three methods are widely used by Australian anglers, but very little is known about their effectiveness for treating afflicted fish. We aimed to answer this question for snapper, as part of an I & I NSW project (using funds from recreational fishing licences) to improve the post-release survival of key species in NSW.

Snapper are very popular throughout their southern distribution from Hinchinbrook Island in Queensland to Barrow Island in Western Australia, where they are angled across a range of sizes (up to 130 mm total length) and from as deep as 200 m. There are no recent estimates of total recreational catches, but a national 12-month survey done 10 years ago estimated more than 3.8 million fish; 66% of which were released.

Although angled snapper are known to suffer barotrauma, no scientific data is available on the frequency or severity, which are necessary prerequisites to assessing the utility of the three handling methods listed above. We therefore collected this information by assessing more than 300 fish that were hooked by researchers and anglers from 6 to 128 metres off Coffs Harbour between June 2009 and January 2010. The data showed that, regardless of size, barotrauma started to occur in nearly all fish caught from 11 metres or deeper. In addition to an inflated swim bladder, the typical symptoms included redness around the anus, internal bleeding, a ruptured swim bladder and, sometimes, organ movement and the stomach being pushed into the mouth. The severity of symptoms varied considerably between individuals, but the range remained similar across all depths > 15 metres.

The same types of barotrauma symptoms were then induced among 84 snapper and their fate assessed after handling according to the three common methods described above during an experiment in Port

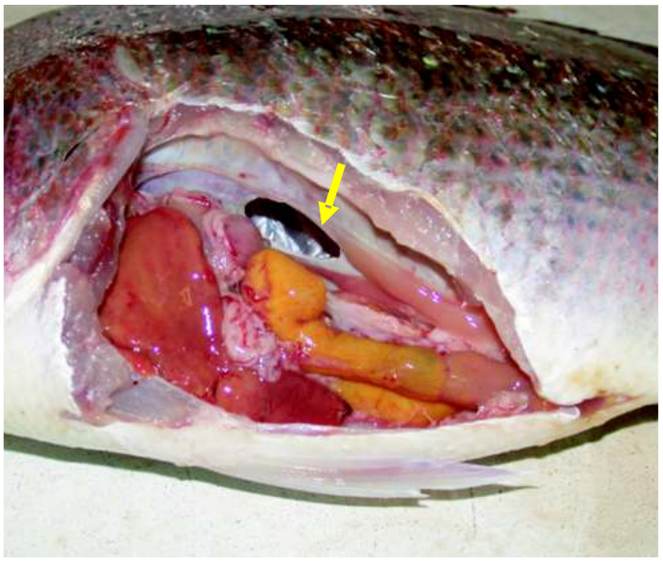
Anglers with snapper that were hooked off Coffs Harbour. All fish were caught from similar depths and had inflated swim bladders, but only one (previous page) had its stomach pushed out of its mouth.

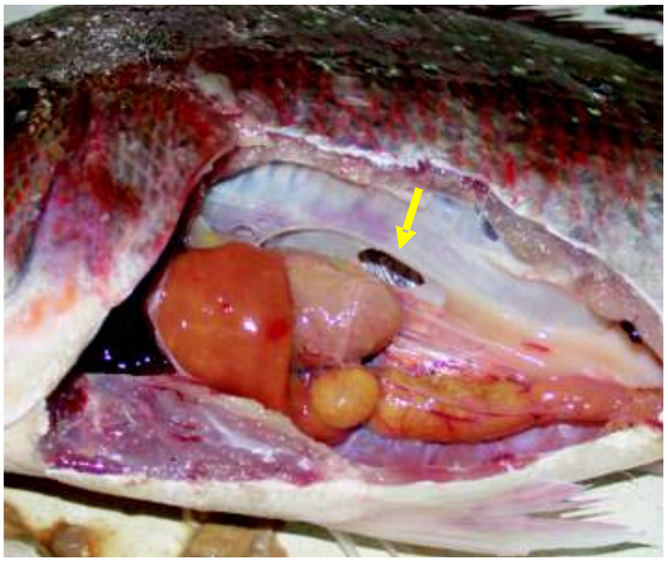
Jackson, NSW. The fish were individually placed into 110 litre plastic cages at 20m for 24 hours and then rapidly hauled to the surface with a motorised winch. Twenty-eight fish were then released at the surface of one of two deep cylindrical cages (2.5m diameter by 20m depth) with no treatment. Another 28 snapper were vented with a hypodemic needle at the intersection of the fifth dorsal spine and the top of the pectoral fin prior to release at the surface of the cages, while the remaining 28 fish had an assisted release to 15 m using a weighted hook (attached to a rope) through their jaw. Twenty-eight other snapper were placed into the 110-l cages as above, but were deployed and retrieved from only 5 m before being released into the deep cages as 'controls'. All fish were monitored for three days. At the end of the experiment, an additional five and 10 fish were deployed to 5 and 20 metres, respectively (as above) and retrieved, but instead of being released, they were immediately euthanized and dissected to assess any internal changes.

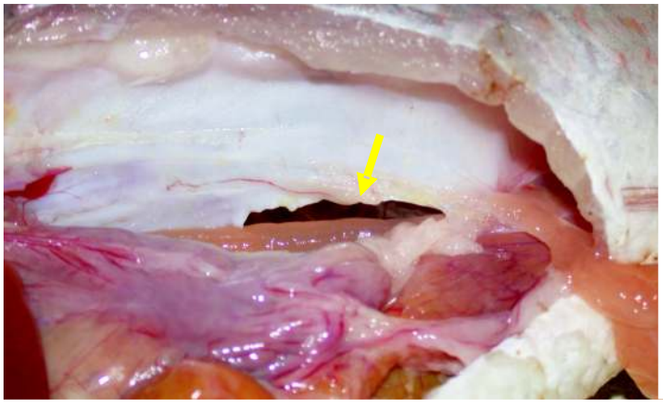
The results revealed no barotrauma among the controls, but all of the fish that were hauled from 20 metres had some external symptoms, which mainly included redness around the anus and/or the stomach protruding into the mouth. Internal examinations of the euthanized fish showed that the damage extended to internal bleeding, organ movement and ruptured swim bladders.

Despite these symptoms, none of the snapper died during the monitoring period. The 28 vented fish swam away rapidly, while most of those that were left untreated struggled near the surface, but eventually were able to swim down. Two of these latter fish floated upside down for

The 110 litre cages (top) used to hold fish for 24 hours before they were released into the deep cages for monitoring over three days in Port Jackson, NSW (bottom).







Examples of snapper with ruptured swim bladders. The lesions (yellow arrows) mostly occurred in the same position, mid way along the swim bladder where the connective tissue to the stomach was located.

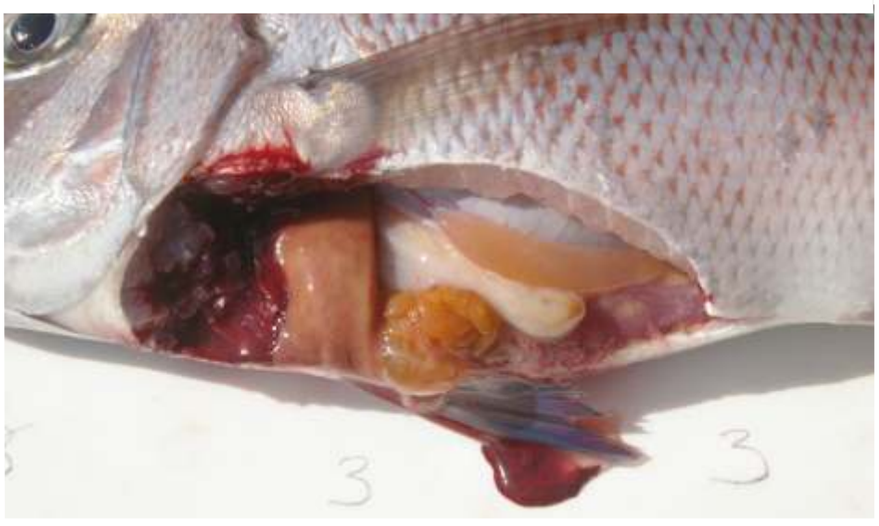
Below: ***A healthy control fish hauled from five metres with an intact swim bladder (top and yellow arrow) and all organs in place (bottom). Note the difference in organ position between those fish that ruptured their swim bladder in the examples above and those that did not.***

between 10 and 20 seconds at the surface before swimming away. One of the fish that was lowered with the release weight returned to the surface after 20 seconds and then spent 30 minutes upside down before swimming away. At the end of the experiment, all of the confined snapper were in good condition and had no major damage.

The results support all three methods for handling snapper that incur barotrauma, but there are some important considerations. First, the fish were released into cages, and therefore were not exposed to predation. Under normal circumstances, snapper that remain at the surface, or slowly swim downwards, might be easy targets for other fish, birds, sharks, or dolphins.

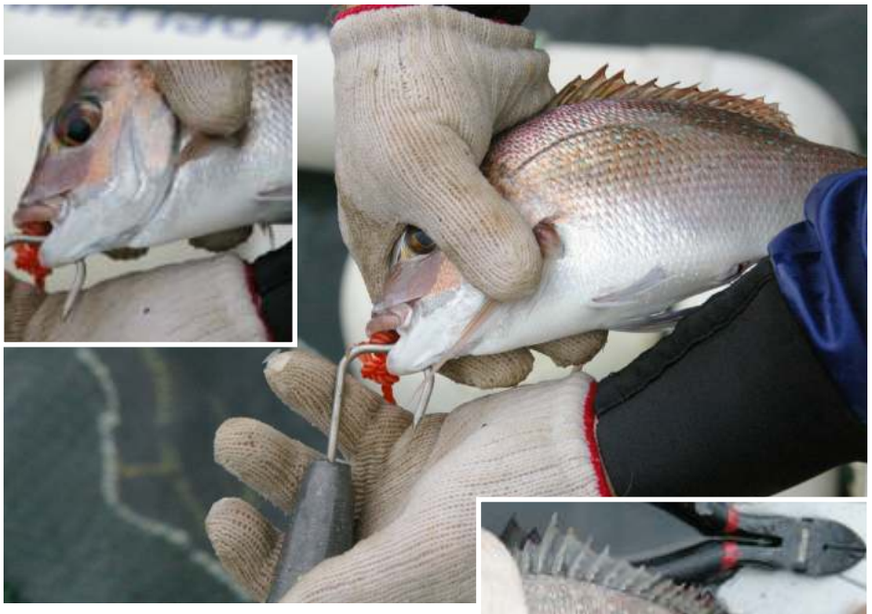
Second, while venting is popular, its effectiveness is entirely dependent on the skill of the operator. Previous studies have identified incorrect venting techniques as a major cause of mortality among fish that have barotrauma.

Third, and perhaps most importantly, we do not know the longer-term fate of snapper after incurring barotrauma. While the results from our experiment suggest that most minor injuries resolve quite



An example of a snapper with a red anus (left) and then one with and without (right). Swelling around the anus was evident in all fish retrieved from deeper than 15 m. No fish retrieved from 5 m had this symptom.

An over-inflated swim bladder caused the intestines to be pushed out of the anus.



Using a weighted hook to provide 'assisted release' to the approximate capture depth.

Venting is a straight forward procedure, designed to release gas from the swim bladder. However, care is required since many studies have shown that incorrect venting can result in organs being punctured and eventually death.

quickly, no information is available on more severe injuries such as the time required for ruptured swim bladders to heal. Any snapper with a damaged swim bladder may have difficulty regulating its depth, which could also increase predation and mortality.

Ongoing work is required to determine the importance of the above conditions. In the meantime, based on the research done so far, if angled snapper have only mild signs of barotrauma (e.g. redness around the anus), then they should be released at the surface with no treatment. However, if barotrauma symptoms are extreme and likely to affect buoyancy (e.g. an obviously overinflated swim bladder with the stomach protruding from the mouth), then assisted release to depth would be the preferred option. Owing to the risk of injury, venting should only be done by an experienced person.

More information on the results of research into the fate of released snapper and other species can be found at (www.industry.nsw.gov.au).

This web site is continually updated to include the latest recommendations for improving the welfare of released fish.