

# Juvenile Snapper



## Increasing their Post-Release

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For the past four years, the NSW Department of Primary Industries (DPI - using money from recreational fishing licences) has been undertaking research to estimate and maximise the survival of key salt and freshwater fish released by anglers. So far, 12 species have been studied with quite positive results; both in terms of the numbers surviving (typically > 70 per cent for most fish) and ways this can be improved via simple, but practical, changes to fishing practices.

One of the more popular, recently-examined species was snapper, which are commonly angled at a variety of sizes (between 10 and 100cm total length - TL) in bays and offshore reefs throughout their southern distribution from southeast Queensland to Western Australia.

No current data is available on the number of angled snapper released each year, although a national 12-month survey back in 2000/01 estimated more than 2.5 million; a large proportion of which included juveniles. Concerns over the fate of these released snapper led to two experiments (done during 2001 in Shark Bay, WA and 2004 in Botany Bay, NSW), which showed that while most survived (96 and 72 per cent, respectively), there were still some mortalities. Unfortunately, the causes of these deaths were not clear, making it difficult to suggest strategies by which they might be minimised.

We aimed to address this deficit during two recent experiments in NSW. The first was done in January 2008 in Botany Bay. Twenty four anglers were asked to use conventional gear to target juvenile snapper (< 30cm TL) and then individually place their fish into 110litre cages (which were then sunk to the seabed) before recording relevant information on a datasheet concerning the angling, handling and release processes. Forty-eight control fish (previously caught in commercial traps four to six months prior to the study) were similarly confined, and all fish were checked for survival after five days.

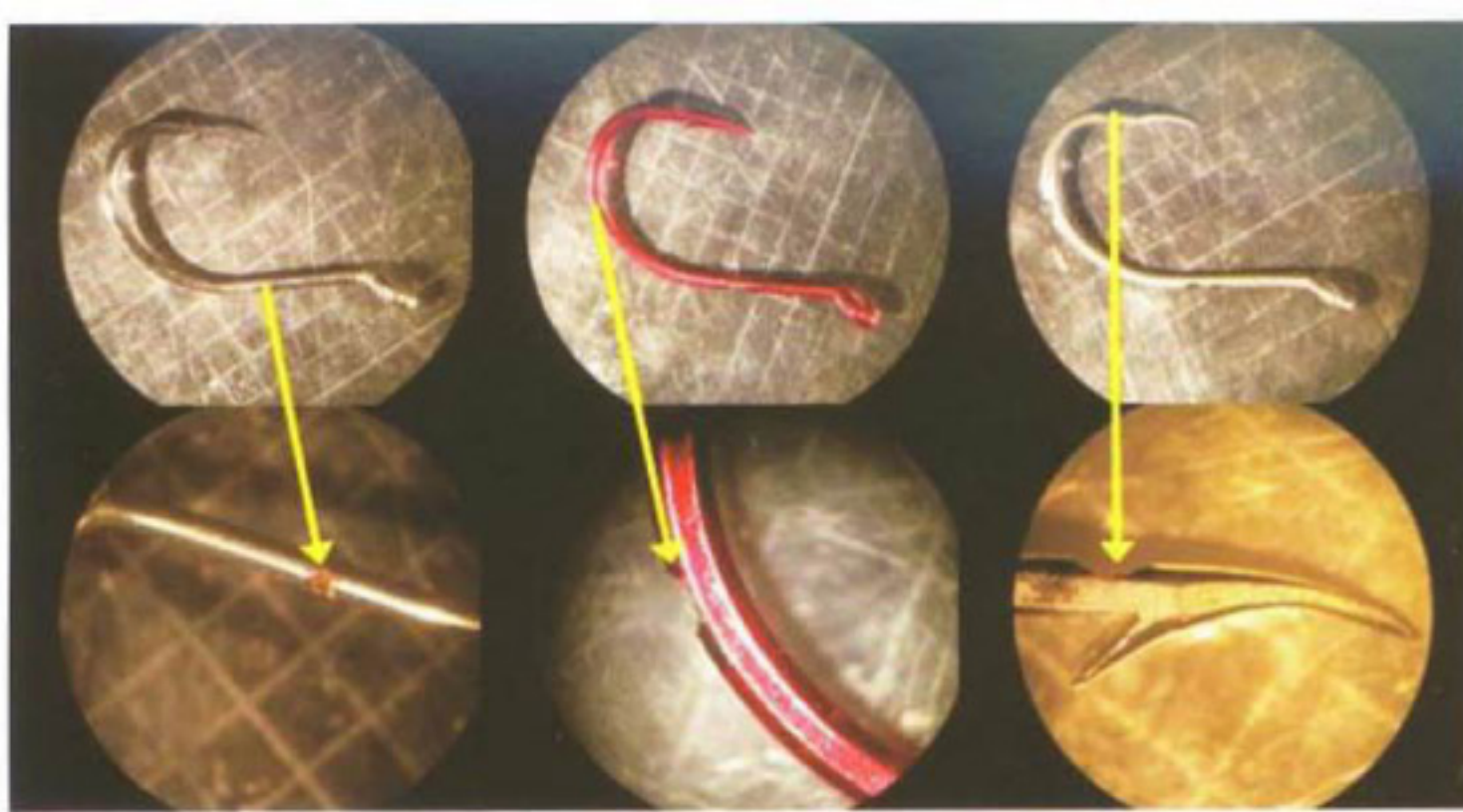
All of the controls survived. By comparison, 12 of the 158 angled snapper (ranging in size from 12 to 28cm TL) died, providing an overall survival rate of 92 per cent. Like for similar-sized individuals of several other local species, including yellowfin bream, sand whiting and Australian bass, hook ingestion (i.e. gut hooking) was identified as being the main cause of death. Further, the probability of juvenile snapper dying increased if their ingested hooks were physically removed prior to them being released. These results support the current NSW DPI recommendation of releasing hook-ingested fish with their lines cut (and allowing them to eventually eject their hooks). However, no information was available on the longer-term fate of released, hook-ingested snapper, or if the

rate at which they eventually eject hooks could be promoted via different designs and/or materials.

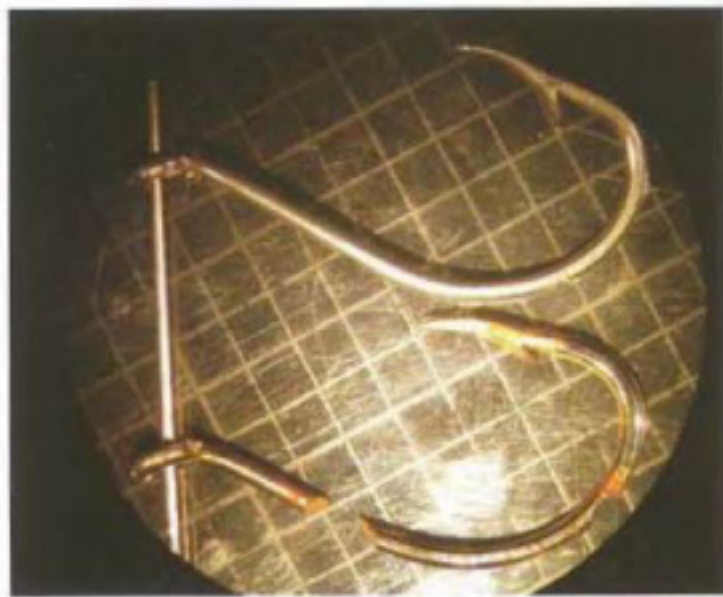
These two questions were addressed during the second experiment, done in March 2008 using the National Marine Science Centre aquaria facilities at Coffs Harbour. More than 300 juvenile snapper (12 to 33cm TL) were distributed among five 3000-l holding tanks. Six groups of fish (18 in each group) were angled from three of the holding tanks and allowed to ingest either conventional or modified size 2 hooks made from three materials (stainless-steel and red-lacquer and nickel-plated carbon steel) and baited with school prawns.

The three materials were chosen to represent varying levels of corrosion resistance; estimated by the manufacturer as evidence of rust across 3, 30 and 52 per cent, respectively of the hook surface area after several hours of exposure to salt spray. The modified hooks had a small notch (similar to a baitholder barb) cut into the shaft, bend and point designed to increase their surface area, subsequent oxidation and, therefore, their probability of breaking during ingestion (without significantly affecting their strength).

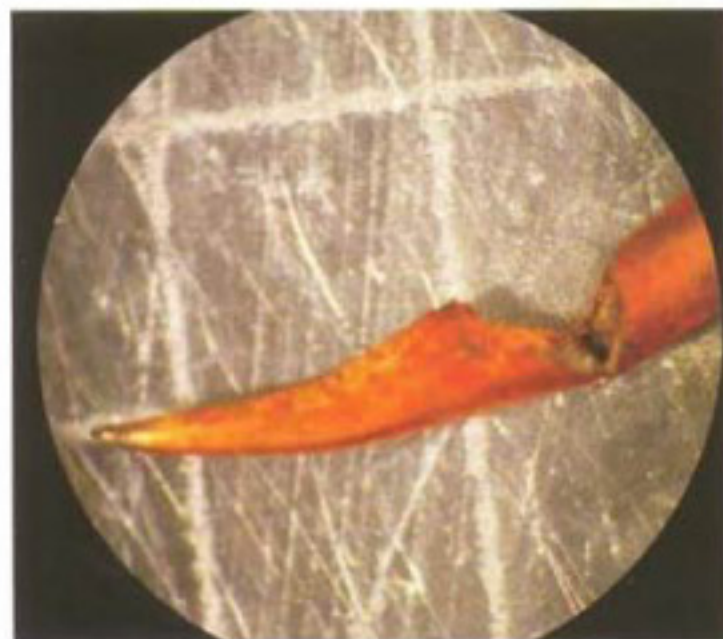
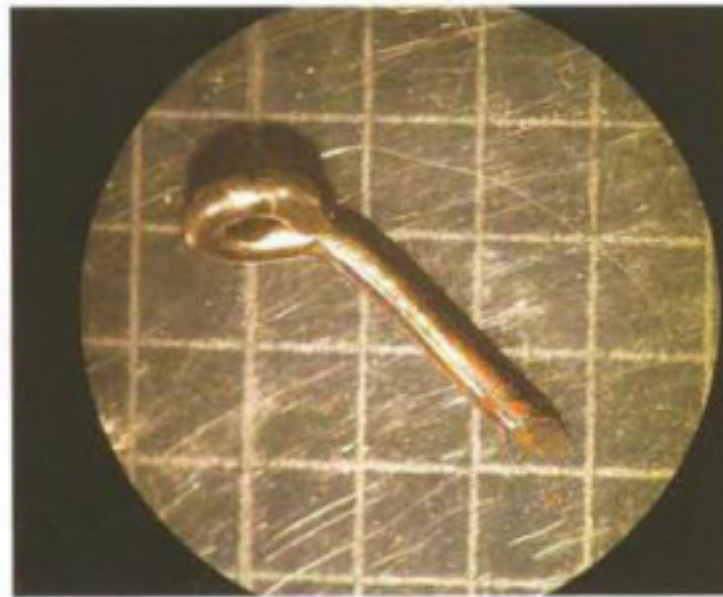
After being caught, the fish had their lines cut 5cm from their mouth, were measured and then released in pairs into 110 litre experimental tanks (all within 30 seconds).



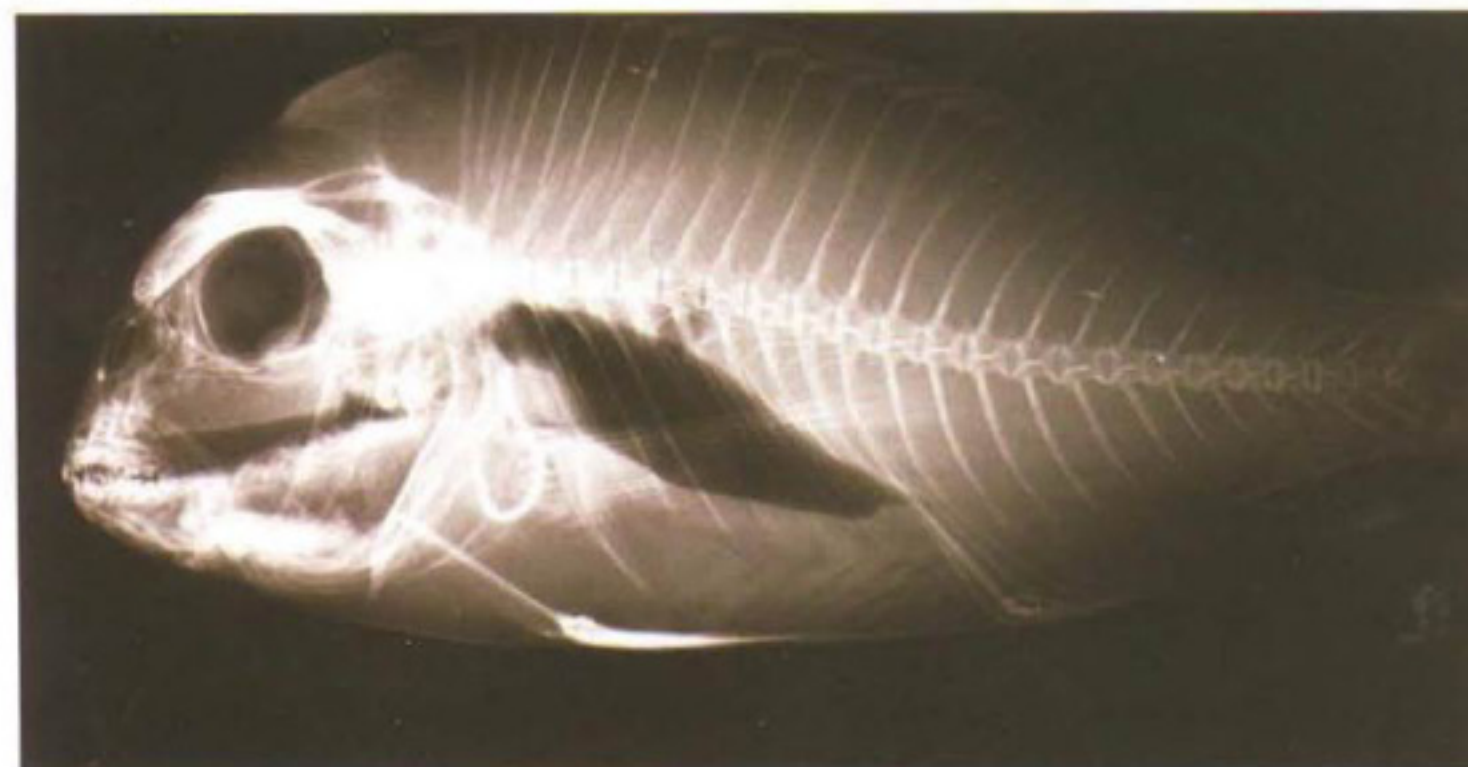
The three different hook types (from left nickel-plated and red-lacquer coated carbon steel and stainless steel) and the notches made in the shaft, bend and point of the modified hooks



LEFT: Stainless-steel (top) and nickel-plated carbon-steel (bottom) hooks that were ejected on day 14 of the experiment RIGHT: Ejected shaft of a nickel-plated carbon-steel hook after 10 days



LEFT: Corrosion that occurred on the barb of a nickel-plated carbon-steel hook after 16 days RIGHT: Infection caused by the irritation of a stainless-steel hook that could not be passed by a snapper



X-ray of a hook ingested snapper

Eighteen 'control' fish were collected in scoop nets from two unfished tanks and similarly released into separate 110 litre tanks after being measured. All fish were regularly fed school prawns and monitored over six weeks for their mortalities, when they started feeding and the ejection of their hooks.

None of the controls died, compared to 27 of the hook-ingested fish, providing a total overall survival of 75 per cent for the latter group. All surviving fish resumed feeding within the first week after hook ingestion. There were no clear differences in the rates of oxidation between the modified and conventional hooks for each metal type, and so these data were combined. Of the fish that ingested the nickel-plated and red-lacquer hooks, 89 and 86 per cent ejected their hooks (on average after 10 and six days) while 19 and 22 per cent died, respectively. In contrast, only 53 per cent of fish ejected stainless-steel hooks (on average after 14 days), but 33 per cent died. Compared to the stainless-steel hooks, the average rate of oxidation (expressed as a percentage of hook weight) for the nickel-plated and red-lacquer carbon hooks was up to 20 times greater.

Although the results are only based on a few fish, they suggest that, when ingested, stainless-steel hooks may have a stronger negative impact on the fate of released juvenile snapper than carbon steel; both in terms of the rates of survival and ejection.

Further, these impacts may worsen over time as stainless-steel hooks remain sharp and could irritate fish, prevent feeding and eventually pierce vital organs which might lead to infection and/or death. Simply choosing to use carbon-steel hooks has the potential to reduce the probability of such effects, and ultimately improve survival.

While the above experiments have identified some of the potential impacts to snapper associated with catch and release, it is important to remember that the work was done under controlled conditions (i.e. fish were held in cages or tanks). In the wild, the post-release survival of juvenile snapper could be lower due to a range of other factors, including a greater susceptibility to disease and predation and/or a reduced ability to acquire food.

The NSW DPI will be examining the impacts of some of these additional stressors as part of future research.

In the meantime, it would seem appropriate to recommend avoiding using stainless-steel hooks and cutting the line on hook-ingested snapper as an appropriate strategy for improving their post-release survival.