

Tag team fishing!

NSW DPI researchers are using tags to take a closer look at the survival of released angler-caught mulloway, yellowfin bream and trevally. By MATT BROADHURST, PAUL BUTCHER & SHANE McGRATH.

IN 2004, the NSW DPI started a five-year project (using money from recreational fishing licences) to estimate and maximise the survival of key coastal fish released by anglers. Much of this work involves using anglers during tournaments to catch and handle fish according to conventional methods. Researchers then collect the fish and transport them in aerated live wells to large floating sea cages, where they are released and regularly checked for deaths over a period of up to five days. Comparable numbers of "control" fish (either caught using non-invasive methods or collected from aquaculture farms) are also placed in the cages and similarly monitored. So far, in most cases, all of the controls have survived, and so any deaths to the hooked-and-released fish have been attributed to their capture and handling.

This system has been used to estimate the survival of several species, including snapper (67 per cent), trevally (63-98 per cent), yellowfin bream, (72-100 per cent), sand whiting (93 per cent) and dusky flathead (80-96 per cent), as well as the main factors causing the few deaths. For example, the chances of sand whiting and yellowfin bream dying appears to be strongly related to their anatomical hook location, with mouth-hooked fish much more likely to survive than gut-hooked individuals. Other species, like flathead and trevally, are more susceptible to extremes in environmental conditions and have demonstrated positive relationships between their rates of mortality and water temperature and confinement in live-wells, respectively.



The sea cage used to hold fish during short-term survival experiments.

While the above research has provided valuable estimates of immediate and short-term (about five days) survival, one concern is that because the fish are confined to sea cages, they do not experience all of the factors that might contribute towards mortalities under normal conditions. For example, those fish that are hooked and then immediately released back into the wild may suffer short or long-term behavioural impairment and/or a delayed recovery from stress that could either reduce their ability to feed and/or increase their susceptibility to infections or predation from other fish, sharks, birds or marine mammals. Such effects are likely to vary among species and their sizes, but nevertheless could significantly add towards total mortality and therefore

need to be examined.

One method of assessing the above effects as part of the overall mortality of angler-caught fish is to tag and then release them into the wild (as per conventional practices), and then free a similar number of tagged control fish. Providing the control fish are not overly stressed, any long-term differences in recapture rates between these two groups can be used to estimate the total mortality of the angler-caught fish; including that caused directly by the catch & release process as well as any subsequent infection and/or predation. Tagging and releasing key recreational fish also has the added benefit of providing important information on their movements and growth.

We used the above approach during an

Table 1

Summary of the numbers of hooked and control fish released and recaptured, their range of days at liberty and their greatest distance travelled between release and recapture.

	NUMBER RELEASED		NUMBER RECAPTURED (after 10 mths)		Days between release & recapture	Greatest distance travelled (km)
	Hooked	Control	Hooked	Control		
Mulloway	1500	1500	3	1	242 - 282	10
Yellowfin bream	771	771	18	20	4 - 275	200
Silver trevally	252	252	10	14	1 - 300	8



A researcher releasing a tagged silver trevally.



A happy angler with a yellowfin bream.



Researchers collecting fish from anglers in Botany Bay.



An angler with one of the recaptured mulloway.

experiment done in Botany Bay between April and May 2006. This work involved about 60 anglers, 10 researchers and six moored sea cages. Between two and six months before the experiment started, about 4000 mulloway, 2000 yellowfin bream, and 600 silver trevally were released into the six cages. All of the silver trevally, and about 500 of the yellowfin bream, were originally caught using seines in Botany Bay, while the remaining

yellowfin bream and mulloway were collected from aquaculture farms.

Anglers and some researchers were asked to target the three species throughout Botany Bay (on boats), and catch them from some of the sea cages, using any configuration of legal fishing gear. After landing a fish, anglers either removed those hooks that were in the mouth or cut the line on swallowed hooks and measured the total length (TL), before placing each fish into a live well and recording relevant catch information. Researchers confirmed the data, removed the fish from the live well and inserted a yellow plastic t-bar tag (with the words 'NSW DPI, COFFS HBR', a code and the phone number: 02 6648 3910) near the dorsal fin before releasing them back into Botany Bay. On the same day, similar numbers (and sizes) of control fish were scooped from the sea cages, tagged, placed in live wells and then released at the same locations as the hooked individuals. A reward was (and still is) offered for the return of each tagged fish.

In total, 3000 mulloway (16 to 39 cm TL), 1542 yellowfin bream (13 to 42 cm TL) and 504 silver trevally (16 to 67 cm TL), comprising even numbers of similar-sized hooked and control fish for each species, were tagged and released. Most of these three species were hooked in the mouth (85, 87 and 94 per cent, respectively), while a further 14, 10 and 3 per cent, respectively, were gut hooked. Fewer than 3 per cent of all individuals were hooked in the body. Of all the hooked-and-released fish, only 13 mulloway (six gut hooked and seven mouth hooked fish) died before being released.

So far, in addition to the above fish, anglers have returned tags from 66 recaptured individuals. Most were yellowfin bream (20 control and 18 hooked fish caught between four and 275 days post-release) and silver trevally (14

control and 10 hooked fish caught between one and 300 days post release). Only four tagged mulloway have been returned (one control and three hooked fish caught between 242 and 282 days post release).

Most recaptures were in Botany Bay, but two of the yellowfin bream (one hooked and one control fish) were caught in Port Stephens (about 200km from Botany Bay). A third yellowfin bream was recaptured in Dolans Bay, about 17km to the south of Botany Bay. All of the recaptured hooked fish were originally hooked in the mouth.

While more tag returns are still required to help estimate the survival of the original hooked-and-released fish, the available data nevertheless supports the results from our earlier short-term experiments – especially for yellowfin bream. For example, similar numbers of control and hooked yellowfin bream were recaptured, confirming that the latter have high survival rates (i.e. estimated at 100% for mouth-hooked fish during our earlier work). Further, no fish that were previously gut-hooked have been recaptured which, like our earlier work, is probably indicative of comparatively greater mortalities to these individuals. It is also apparent that at least some yellowfin bream and silver trevally commence feeding soon after being hooked and released, with individuals of both species recaptured within one week. In contrast, no tagged mulloway were caught until more than eight months after being released.

The continued return of tagged fish by recreational anglers will enable us to more accurately estimate post-release survival for these species, as well as provide important information on their movements and growth. Therefore, we strongly encourage any anglers that catch a tagged fish to record the TL, tag number, date and location of capture and then either release the fish with the tag in place or keep the fish and send the tag and associated information to Paul Butcher at PO Box J321, Coffs Harbour, NSW 2450 (ph: 02 66483915). The rewards (gift vouchers) have been increased to \$20 for each returned tagged mulloway and \$30 for each returned tagged yellowfin bream and silver trevally. The ongoing co-operation and involvement of anglers in this important research will contribute towards understanding the correct procedures for maximising the survival of released fish, and ultimately ensure the sustainability of recreational fishing in NSW.