

Catch & release data



The sea cages used to hold hooked-and-released fish in Botany Bay.

The science of releasing fish

Do fish survive when you let them go? Info from the Botany Bay Research Challenge is shedding light on the do's and don'ts of C&R. MATT BROADHURST reports.

AUSTRALIAN anglers release millions of fish such as bream, flathead and trevally annually. These numbers are of considerable concern to fisheries managers because they have the potential to represent high levels of unknown mortalities.

The regulation of recreational hook-and-line fisheries in NSW mostly involves legal lengths and daily bag limits. It's assumed that the majority of released fish survive. However, a lack of information on the fate of most species makes it difficult to estimate the benefits of current management. A recent review prioritised several species as potentially susceptible to high levels of mortality after release from capture by recreational fisheries.

Despite the above concerns, there's very little information available on the post-release survival rates for line-caught fish in NSW. Our aims in this study were to provide a first step in addressing this issue by doing an experiment to estimate the immediate and short-term survival of key species released during a recreational angling event. This work is part of a two-year research project (funded by the NSW Department of Primary Industries and the NSW Recreational Fishing Trust) entitled "Using recreational anglers to estimate and maximize the survival of released line-caught fish".

The experiment was done in Botany Bay during February 2004 and involved 71 anglers fishing from 48 boats, 10 marshal boats and six moored sea cages (each 4 x 4 x 3m). Fish were hooked and released into the sea cages on February 14 (between 6am and 5pm) by the participating anglers, all of whom were divided into two groups.

The first group (the "live weigh-in group") comprised 47 anglers (distributed among 36 boats) participating in a live weigh-in tournament. Each boat had an onboard fish-holding tank. As per regular tournaments, the anglers in the live weigh-in group were allowed to use any configuration of legal fishing gear to target legal sizes (where applicable) of five key species (dusky flathead, yellowfin bream, sand whiting, trevally and luderick). All anglers in this group were asked to present the largest two live individuals of each key species to researchers (located at designated "stations") at three times (9am, 12:30pm and 4pm) throughout the day. Researchers measured and tagged individual fish, collected data on gear and operational and handling processes (e.g. type of terminal rig used, hook location in fish, fish condition, duration of exposure to air, etc) and then returned the fish to the anglers, who transported them to the sea cages where they were placed in either of two randomly-selected cages.

The second group (the "immediate-release group") comprised 24 anglers on 11 boats who fished continuously throughout the day (i.e.



Control fish were caught using a seine net in Botany Bay and then tagged prior to release into the sea cages.



A yellowfin bream being tagged prior to release into the cages.

no “weigh-in” of fish). Fish caught by the immediate-release group represented those individuals that are routinely released due (to legal sizes and/or bag limits, or as part of catch-and-release tournaments). All boats in this group had a researcher onboard and an assigned marshal boat. Immediately after capture, fish were measured and tagged by the researchers and then placed into identical 70-litre onboard fish-holding tanks. Data was collected on the capture process while the marshal boats were signalled to transport the tagged fish to two randomly-selected sea cages, separate from the fish in the live weigh-in group.

Two days after all fish were hooked (by both groups of anglers) and released into the sea cages appropriate numbers of control fish were caught in Botany Bay using a seine. All control fish were removed from the codend of the seine, tagged and placed in the remaining two sea cages. Few flathead were caught in the seine, and so an additional 20 flatties were captured using a gillnet. Researchers handled all control fish in exactly the same way as the fish caught by anglers; the only differences were the capture processes. All fish placed in the sea cages were monitored twice daily over 10 days. At the end of this period, the surviving fish were released back into Botany Bay.

Anglers in the live weigh-in and immediate-release groups caught a total of 125 and 224 fish, respectively. Fifteen species were recorded, although dusky flathead, yellowfin bream and silver trevally dominated the live weigh-in group (96 per cent of catch) and, along with snapper, accounted for more than 80 per cent of the catches in the immediate-release group. Similar compositions and numbers of these four main species were caught in the seine and used as controls.

The numbers (between 42 and 96) and percentage mortality rates (between 1.96 and 36.58 per cent) for key fish that were hooked and released are provided in the table below. Irrespective of the treatment group, most yellowfin bream and snapper died within four hours of being hooked and released into the cages, while trevally and dusky flathead were characterised by relatively low initial mortalities, which then increased after the third day of confinement. For dusky flathead, a similar trend in mortalities occurred for the control fish, suggesting a confounding effect due to confinement in the cages. Many of the dead flathead from both treatment and control cages were observed to have striated lesions on their ventral and lateral sides. Similar lesions were also observed on large tooth flounder. Presumably, these lesions were caused by abrasion with the netting in the sea cages. In future experiments, flathead should be held in cages with sandy or muddy bottoms.

An examination of the various gear, operational and handling data collected for each fish revealed that hook location was the main factor affecting the mortality of yellowfin bream, with six mortalities occurring from 13 fish that swallowed hooks, compared to only one

death from 29 fish that were hooked in the jaw. For trevally, the main factor affecting mortality was the duration fish were held in the anglers’ on-board holding tanks. Specifically, fish that were held for more than 45 minutes were much more likely to die than those that were released quickly. There was no single explanation for the deaths of snapper - it’s

likely that a combination of several factors contributed towards their observed mortalities.

While there were considerable differences between species with respect to their observed mortalities, the estimated individual percentages (between 1.96 and 36.58 per cent) of fish dying as a result of being hooked and then released are comparable to those recorded in previous studies done in both Australian and overseas recreational fisheries.

More research will be done using recreational anglers during fishing events to provide a detailed examination of the sorts of factors influencing the post-release mortality of snapper and other species, as well as simple modifications to recreational catch-and-release practices that could help to maximize survival.



Matt Broadhurst is a research scientist with the NSW Department of Primary Industries’ Fisheries Conservation Technology Unit in Coffs Harbour. More research into C&R mortality is currently being conducted. Fisho will keep you up to date on any new developments.

BOTANY BAY C&R RESULTS

SPECIES	Live weigh-in Group		Immediate-release Group		Both groups combined	
	No.	dead fish (%)	No.	dead fish (%)	No.	dead fish (%)
Dusky flathead	57	6.73	39	00	96	00
Yellowfin bream	24	8.33	18	27.77	42	16.66
Trevally	41	36.58	51	1.96	92	17.39
Snapper	—	—	72	33.48	—	—

The above table details number of fish caught (No.) and the percentage of fish that died for individual key species in the treatment groups and both groups combined.
— = not caught.