

A survey of recreational trailer boat fishing in the marine waters of New South Wales—a case study

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Introduction

Many user-groups participate in the marine recreational fishery in New South Wales waters. These groups can be classified conveniently according to harvest methods (angling or spearfishing), fishing platform (boat-based or shore-based), boat size and possible range (trailer boats or cruisers and gameboats or charter boats), and finally by the access point used to reach the fishery (boat-based—ramps, marinas, moorings, private jetties, direct ocean launching across beaches; shore-based—ocean beaches, rocky headlands, man-made breakwaters).

These diverse groups within the recreational sector serve to illustrate the complexity and difficulties that are met when trying to assess the entire marine recreational fishery. We have restricted this paper to a discussion of a current boat ramp-based survey of trailer boat anglers who fish in the marine waters of NSW, even though we are also currently assessing other components of the marine recreational fishery.

This paper serves several purposes:

1. To provide a brief description of the aims and methods of this ongoing recreational fishing survey of trailer boat anglers;
2. To present some preliminary results of the recreational catches of trailer boat anglers;
3. To provide an example of the importance of collecting data about the directed fishing effort of anglers engaged in multi-species fisheries.

Background and aims of trailer boat survey

When planning this study we had little information about the size of this multi-species recreational fishery. The available anecdotal evidence suggested that the size of the recreational catch made by trailer boat anglers in marine waters was large. However the impact of the recreational sector on the resource was unknown. We carried out several pilot studies to assess the suitability of different survey designs and used the results of these pilot studies to allocate the limited resources in a cost-effective way.

The trailer boat survey has two main objectives:

1. To estimate total harvest, fishing effort and harvest rates, of recreational anglers; and
2. To compare recreational and commercial harvests and assess the relative sizes of these user-groups.

Survey details

The trailer boat survey is expected to span two years (September 1993 to the end of August 1995). At each selected site our trained field staff survey anglers and record all completed recreational fishing trips on 6 weekdays and 6 weekend days per quarter (season). This gives sampling fractions of about 10% for weekdays and about 20% for weekend days. Data from our pilot studies showed it was not cost-effective to sample at night or before 0900 hours. Thus, we defined the sampling day unit as being between 0900 hours and sunset. Note that many fishing trips completed after 0900 hours would have fished during the night/dawn period.

We have divided the NSW coastline into three regions, North, Sydney metropolitan, and South, and within each region we selected four survey sites. We chose Kingscliff, Evans Head, Coffs Harbour and Crowdy Head within the northern region. We have covered all four of the large ports (Broken Bay, Port Jackson, Botany Bay and Port Hacking) within the Sydney metropolitan region. We selected Wollongong, Ulladulla, Bermagui and Eden as survey sites within the south coast region.

At each survey site, we located a field officer at the boat ramp with the most off-shore fishing traffic. This was done to max-

imise the number of interviews obtained. The field officers in the northern and southern regions also monitored the level of recreational fishing effort at their port by recording all completed recreational boating trips during rostered survey days. This was more difficult to do in the Sydney metropolitan region because of the many access points within each of the large port systems. We overcame this difficulty, for each metropolitan port, by placing an observer on one of the headlands to census the numbers of recreational fishing vessels that returned from sea.

What is the catch?

We have confirmed that the marine recreational trailer boat fishery is a diverse multi-species fishery. To date over 140 species of finfish, ranging from great white sharks (> 4 m) *Carcharodon carcharias* to tiny girdled parmas (about 8 cm) *Parma unifasciata*, have been recorded in the landed catches of recreational anglers throughout NSW. We have summarised the landed catches of recreational anglers, in terms of numbers of individual fish harvested, for the first two seasons of the survey (Table 1). These data show clearly that there are large differences among sites in the species composition and proportional contribution of important fish species in the recreational harvest (Table 1). How can these differences in recreational harvest among sites be explained? There are three main related reasons to explain the observed patterns. Firstly, we know that there are latitudinal differences in the relative abundances and the catchability of fish species among sites. This is clearly demonstrated in the cases of snapper *Pagrus auratus* and eastern blue-spotted flathead *Platycephalus caeruleopunctatus* (Table 1). Snapper have dominated the

harvest in the north of the State, whereas the eastern blue-spotted flathead has dominated the landed catch in the southern and central parts of the State. Flathead species accounted for over 30% of the observed total landed catch during the first two seasons of the survey.

Secondly, anglers assign different subjective values to different fish species (a social phenomenon) and these perceived values vary among sites and regions of the coast. For example, the eastern blue-spotted flathead is highly prized in the south of the State and, as expected, many recreational anglers target and harvest this species. In contrast, anglers in the north of the State have low regard for this species resulting in little targeting and small catches by the recreational sector. It is interesting to note that the eastern blue-spotted flathead is abundant in these northern waters as it is a large and regular part of the retained commercial by-catch of trawlers engaged in the offshore king prawn fishery.

Thirdly, anglers target their fishing effort at favoured species (directed fishing effort). It is a complex combination of factors which influences the species targeting of anglers. The expectation that many recreational anglers have when they go fishing strongly influences their choice of target species. For example, a selected fishing location may have a reputation for producing large individuals of a certain species and it is not surprising that anglers would tend to target that species at that location. The directed fishing effort of most anglers would also be linked to the relative abundance and catchability of a species at a particular site and its perceived value by those anglers.

Directed fishing effort

Multi-species recreational fisheries are characterised by the diversity of specialised methods used to target individual species or groups of species. The methods used by anglers will obviously also influence what they catch because all of the available species in the area are not equally vulnerable to capture using a single fishing method. For example, an angler who is trolling for large pelagics (billfish, tunas, dolphin fish) is unlikely to catch any seafloor associated species such as flathead or snapper. Thus, each available species in an area has an unequal probability of capture and hence catch rates for individual species or groups of species derived from total fishing effort (undirected effort) data are biased and inadequate because they dilute the real catch rate for all components of the recreational fishery. This makes it more difficult to detect changes in the fishery and may even mask trends among sites and trends over time.

In multi-species recreational fisheries we need to know about the directed fishing effort of anglers and the catch rates associated with these targeted populations of fishes. We have done this in our survey by partitioning the fishing trip into its various distinct categories of fishing. We ask anglers to estimate the amount of time and associated catch when targeting squid, baitfish, pelagic fish, reef fish, and sand fish. We also have a category to cater for those anglers who are unable to identify exactly what they have been doing. Table 2 gives an example of the importance of estimating directed fishing effort. The data show that for these two sites on the north coast of NSW there are large differences in the directed fishing effort of anglers (Table 2). These differences must be considered

when trying to make comparisons of catches and catch rates between these sites.

When directed effort data are used to partition multi-species fisheries it also becomes necessary to consider the concept of 'incidental catch'. Many anglers have expressed the view that the diversity of species available to them in offshore waters and the unpredictable nature of the landed catch on any given fishing day are important variables which add to the enjoyment of their fishing trip. Although these anglers are targeting their fishing effort at favoured species they still welcome the added bonus of incidentally caught non-target species. These incidental catches are important components of the harvest in multi-species fisheries and it is common for the same species or groups of species to be taken during more than one distinct category of fishing. Thus, for species that are taken incidentally it is possible to calculate more than one catch rate. Examples of this are provided for snapper and eastern blue-spotted flathead catches from Crowdy Head (Table 3). Eastern blue-spotted flathead are more commonly caught when targeting fish over sandy habitats but they are also taken occasionally by anglers targeting reef associated fish. A comparison of the catch rates of eastern blue-spotted flathead taken whilst sand fishing and reef fishing confirm this assertion (Table 3). The reverse is true for snapper. They are more commonly caught by anglers targeting reef associated fishes than by anglers targeting sand associated fishes. The catch rates of snapper taken during reef and sand fishing reflect this (Table 3).

Conclusions

- The marine recreational trailer boat fishery is a diverse multi-species fishery.
- There are large differences among sites in the species composition and proportional contribution of important fish species in the recreational harvest.
- Directed fishing effort data and associated catch rates for distinct categories of fishing are needed when assessing multi-species recreational fisheries. These data allow meaningful comparisons of catch and catch rates to be made among sites and over time.
- The incidental catch taken by anglers in multi-species recreational fisheries is important.

Table 1. Species composition and proportional contribution, based on the number of landed fish, of the observed recreational harvest of trailer boat anglers for the period September 1993 to February 1994 inclusive.

(n = individual numbers of fish observed in anglers' catches.)

Northern region

Kingscliff (n = 544)

Common name	Taxon	% Catch
Snapper	<i>Pagrus auratus</i>	48.7
Silver trevally	<i>Pseudocaranx dentex</i>	10.3
Kingfish	<i>Seriola lalandi</i>	5.7
Yellowfin bream	<i>Acanthopagrus australis</i>	5.7
Blackspot goatfish	<i>Parupeneus signatus</i>	4.2
Other spp.		25.4

Evans Head (n = 1795)

Common name	Taxon	% Catch
Snapper	<i>Pagrus auratus</i>	53.4
Teraglin	<i>Atractoscion aequidens</i>	19.8
Red Scorpioncod	<i>Scorpaena spp.</i>	4.7
Eastern blue-spotted flathead	<i>Platycephalus caeruleopunctatus</i>	3.3
Mulloway	<i>Argyrosomus hololepidotus</i>	2.1
Other spp.		16.7

Coffs Harbour (n = 1819)

Common name	Taxon	% Catch
Snapper	<i>Pagrus auratus</i>	24.2
Eastern blue-spotted flathead	<i>Platycephalus caeruleopunctatus</i>	23.2
Kingfish	<i>Seriola lalandi</i>	6.7
Slimy mackerel	<i>Scomber australasicus</i>	6.4
Silver sweep	<i>Scorpius lineolatus</i>	5.7
Other spp.		33.8

Crowdy Head (n = 2966)

Common name	Taxon	% Catch
Eastern blue-spotted flathead	<i>Platycephalus caeruleopunctatus</i>	53.2
Redfish	<i>Centroberyx affinis</i>	19.9
Snapper	<i>Pagrus auratus</i>	5.6
Tiger flathead	<i>Neoplatycephalus richardsoni</i>	3.9
Blue morwong	<i>Nemadactylus douglasii</i>	2.5
Other spp.		14.9

Table 1. (continued) Species composition and proportional contribution, based on the number of landed fish, of the observed recreational harvest of trailer boat anglers for the period September 1993 to February 1994 inclusive.
(n = individual numbers of fish observed in anglers' catches.)

Sydney region

All sites combined (n = 4825)

Common name	Taxon	% Catch
Eastern blue-spotted flathead	<i>Platycephalus caeruleopunctatus</i>	14.4
Silver trevally	<i>Pseudocaranx dentex</i>	13.2
Snapper	<i>Pagrus auratus</i>	10.6
Yellowtail	<i>Trachurus novaezelandiae</i>	7.3
Silver sweep	<i>Scorpius lineolatus</i>	5.9
Other spp.		48.6

Southern Region

Wollongong (n = 3679)

Common name	Taxon	% Catch
Eastern blue-spotted flathead	<i>Platycephalus caeruleopunctatus</i>	15.5
Silver sweep	<i>Scorpius lineolatus</i>	15.5
Slimy mackerel	<i>Scomber australasicus</i>	11.7
Snapper	<i>Pagrus auratus</i>	8.2
Sergeant baker	<i>Aulopus purpurissatus</i>	7.3
Other spp.		41.8

Ulladulla (n = 3488)

Common name	Taxon	% Catch
Eastern blue-spotted flathead	<i>Platycephalus caeruleopunctatus</i>	52.2
Blue morwong	<i>Nemadactylus douglasii</i>	7.7
Redfish	<i>Centroberyx affinis</i>	6.9
Maori wrasse	<i>Ophthalmolepis lineolatus</i>	4.9
Snapper	<i>Pagrus auratus</i>	3.5
Other spp.		24.8

Bermagui (n = 2455)

Common name	Taxon	% Catch
Eastern blue-spotted flathead	<i>Platycephalus caeruleopunctatus</i>	43.3
Tiger flathead	<i>Neoplatycephalus richardsoni</i>	13.1
Slimy mackerel	<i>Scomber australasicus</i>	9.2
Skipjack tuna	<i>Katsuwonus pelamis</i>	4.2
Blue morwong	<i>Nemadactylus douglasii</i>	4.0
Other spp.		26.2

Eden (n = 2661)

Common name	Taxon	% Catch
Eastern blue-spotted flathead	<i>Platycephalus caeruleopunctatus</i>	41.1
Slimy mackerel	<i>Scomber australasicus</i>	7.7
Yellowtail	<i>Trachurus novaezelandiae</i>	6.5
Tiger flathead	<i>Neoplatycephalus richardsoni</i>	6.3
Silver sweep	<i>Scorpius lineolatus</i>	5.7
Other spp.		32.7

Table 2. Proportional composition of directed fishing effort for recreational trailer boat anglers at Evans Head and Crowdy Head (Northern region) for the period September 1993 to November 1993 inclusive.

	Evans Head (n = 208.5 boat hr)	Crowdy Head (n = 293 boat hr)
Type of fishing		
Reef	91.8%	42.6%
Sand	2.9%	39.2%
Pelagic	2.6%	5.8%
Baitfish	1.0%	3.4%
Squid	0.0%	0.0%
Cannot determine	1.7%	9.0%
Total	100.0%	100.0%

Table 3. Mean daily catch rates (number of fish per boat hour, n = 8 days) and standard errors for eastern blue-spotted flathead and snapper landed by recreational trailer boat anglers that were targeting reef fishes and sand fishes at Crowdy Head (Northern region) during the period September 1993 to November 1993 inclusive.

Eastern blue-spotted flathead—<i>Platycephalus caeruleopunctatus</i>		
Type of fishing	Mean	Standard error
Reef	0.16	0.08
Sand	5.43	0.67
Snapper—<i>Pagrus auratus</i>		
Type of fishing	Mean	Standard error
Reef	0.58	0.13
Sand	0.04	0.02