

Abstracts from ASFB 1994 Annual Conference

The different catch characteristics of the commercial, recreational and charter boat fisheries for snapper (*Pagrus auratus*) in Southern Queensland

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Snapper (*Pagrus auratus*) are fished by three fishing sectors in Queensland: commercial line fishers, recreational line fishers and recreational anglers fishing from charter boats. Queensland fishing regulations ensure that no particular sector has a competitive advantage since each sector has identical restrictions on fishing gear. Despite the similarities in gear there are major differences in the catch between these sectors and within the participants of a particular sector. As expected the largest variance in both catch rates and size composition of the catch was amongst recreational anglers, largely due to different levels of experience and expertise. Charter boats had the least variance in catch rates and size composition with catch rates remaining fairly stable seasonally. Surprisingly, significant catch differences between commercial fishers operating from the same fishing port and fishing the same area were also noted. These differences were related to the targeting of certain sizes to meet the demands of different markets. The biological sampling problems caused by size selective targeting are discussed.

The recreational flathead (*Platycephalus fuscus*) fishery in Moreton Bay, Queensland

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Tagging studies and roving creel surveys at two estuary entrances were used to investigate the recreational fishery for dusky flathead (*P. fuscus*) in Moreton Bay.

4900 dusky flathead were tagged and released throughout Moreton Bay by the QDPI/ ANSA Sportfish Tagging Program. 640 (13%) have been recaptured with 90% of recaptures made by recreational anglers.

A roving creel survey of 1632 anglers over 54 days was undertaken at the Caloundra and Jumpinpin estuary entrances during daylight hours in 1993. It was estimated that there were 460 000 recreational fisher hours of effort at these two areas during the survey period. Highest seasonal catch rates at Caloundra and Jumpinpin were .07 and .11 flathead/fisher hour respectively. These catch rates occurred during spring, which coincides with the peak spawning activity of the species. No anglers interviewed reached the proposed bag limit of 10 flathead/angler. The total annual recreational catch of dusky flathead at the Caloundra and Jumpinpin estuary entrances was estimated to be 7.5 and 13.1 tonnes respectively.

On the basis of tag returns and roving creel surveys the recreational catch of dusky flat-head in Moreton Bay is more than 5 times the annual commercial catch of 45 tonnes.

Recreational fishing— open platform information systems

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The Sportfish Tagging Program, a joint project between the Australian National Sportfish Association and the Department of Primary Industries in Queensland, has generated a large data base of capture/recapture information. Computer software has been developed to service this data base.

There are considerable advantages in developing a common platform for data interchange in this area. Methods to achieve information sharing amongst recreational fishers and their organisations, fisheries agencies and other Government agencies, and Universities are discussed.

Development of a model of the Western Australian fishery for Australian salmon, *Arripis truttaceus* Johnston

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The Australian salmon, *Arripis truttaceus*, is one of the more significant species for recreational fishers in Western Australia, and is

also the basis of an important commercial fishery. The species is also caught by recreational and commercial fishers in South Australia.

To meet the requirement for management advice, a predictive model was developed to integrate available biological information and evaluate the sensitivity of model output to any inadequacy in assumptions about the salmon stock. The model developed was an age structured spatial model incorporating data from South Australian and Western Australian commercial and recreational fisheries. Salmon is a migratory species returning to Western Australia to spawn and consequently this aspect of its life history was incorporated in the model. The model structure is discussed with sample output to illustrate its adequacy to the Western Australian salmon fishery.

The recreational whitebait fishery in Tasmania

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The Tasmanian recreational whitebait fishery is based on migrating juvenile galaxiids (*Galaxias spp*) and adults of the Tasmanian whitebait (*Lovettia seali*). Harvests are made as juvenile galaxiids migrate from estuarine/marine environments into freshwater zones and as Tasmanian whitebait migrate into freshwater tidal zones of tributaries to spawn.

Tasmania supported a commercial whitebait fishery from the early 1940s to 1973, with the most significant harvests occurring in the 1940s. Declining catches from 1950 effectively ended the fishery because of lit-

the commercial interest and participation. A formal closure occurred in 1974. A recreational fishery was introduced in 1990 and has operated for three years. There is an illegal fishery which has operated during this period and which is still continuing.

The fishery is regulated by gear restrictions, temporal regulations (season timing and length, diurnal restrictions), river selection, in addition to daily and total catch quotas. The fishery is managed to permit limited harvests of juvenile galaxiids and to minimise harvests of the Tasmanian whitebait.

The harvests and catch rates are monitored by limited creel surveys and questionnaire returns. Attempts are being undertaken to examine the effects of harvests on adult galaxiid populations. The primary management objective is to maintain harvests at sustainable levels without adversely affecting riverine galaxiid populations.

Reproductive biology and management of school (*Scomberomorus queenslandicus*) and spotted (*S. munroi*) mackerel throughout Northern Australia

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School (*Scomberomorus queenslandicus*) and spotted (*S. munroi*) mackerel are morphologically similar species that co-habit inshore coastal waters. These species form important commercial and recreational fisheries throughout Queensland and the Northern Territory. Conflict between the fishing sectors and concern over increasing

catches initiated this study. Samples were obtained from the east coast of Queensland and Northern Territory waters. Spawning seasonality, reproductive indices and sex composition were examined in relation to location, time and size of fish. Spatial and temporal differences were observed in the species reproductive patterns. School mackerel have an extended summer spawning period across its range. In contrast, spotted mackerel are in spawning condition during late winter and early spring throughout their northerly distribution. School mackerel initially spawn at a smaller size compared with spotted mackerel. Management implications from these reproductive parameters are discussed with reference to other biological aspects.

Developments in hatchery production of mullo way *Argyrosomus hololepidotus*

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NSW Fisheries scientists are evaluating mullo way for aquaculture. Originally chosen because similar species are successfully cultivated overseas, mullo way are highly fecund, fast growing, euryhaline and have a good market profile and price. In addition to assessing the culture of mullo way to market size, initially in sea cages, research is also directed at assessing the potential for release of juvenile fish to enhance wild stocks.

Mullo way were bred for the first time in 1992 at the NSW Fisheries Research Centre (FRC) at Port Stephens. Wild-caught broodstock have been induced to ovulate with 1000 U/Kg human chorionic

gonadotropin as have fish held for 18 months in a large marine pool at the Fisheries Research Institute (FRI) at Cronulla. However, female broodstock held in 50 000 L tanks at FRC and in South Australia have not matured. To overcome this impediment new temperature/photoperiod controlled rooms have been installed at FRC and FRI to encourage spawning in captivity. Broodstock research has been funded by the Aquaculture CRC.

Some 10 000 juveniles of 50 mm were produced in 1993 and 6 000 fish are being held in sea cages to assess growth. While larval mulloway require live foods and are cannibalistic, juvenile fish appear amenable to crowding and artificial feeding. Fish kept in tanks grow to a mean weight of 540 ± 194 g in one year. Growout research is being funded by the Fishing Research and Development Corporation.

Using scale patterns and shape to identify wild and hatchery-reared fish

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Stocking hatchery-reared fingerling fish into natural waterways is a widely practised management technique for enhancing recreational fish stocks. However, little work has been done to evaluate the efficacy of such programmes—primarily because no suitable marking system has been available to distinguish the stocked fish from those spawned in the wild. Recently however, the analysis of fish scale patterns and scale shape has shown potential for discriminating wild and hatchery-reared fish. This technique uses automated video digitising equipment to

acquire circulus spacing and scale shape data, and discriminant function analyses to classify fish to their stock of origin.

The use of a scale recognition system to identify the origins of fish in natural systems holds many advantages over traditional marking methods. For instance, problems inherent in individually tagging large numbers of small fish are avoided. Scale features are permanent and do not affect survival, behaviour or growth; and scales can be collected by recreational anglers, which not only generates interest in the stocking programme but also reduces the cost of scientific surveys to retrieve the marked fish. In addition, fish can be released after scale samples have been removed; i.e. it is not necessary to kill the fish in order to retrieve the marker. This paper reviews the technique and its application in a few southern Queensland rivers.

Catch and Effort of spearfishers in NSW waters and implications for management

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Competition and recreational spearfishers were surveyed by headcounts and interviews at Jervis Bay in southern NSW. Spearfishing effort, fish catch and fish catch per unit effort (cpue) were determined for both groups. Estimates of effort were more accurate than those obtained from previous studies due to investigation of precise diving locations and diver searching time. Usually unreported components of competition

catches (fish below minimum weights and duplicate species) were also estimated.

Competition spearfishers expended a greater daily effort, captured more species and achieved a higher cpue than recreational spearfishers. Recreational spearfishers fished a wider variety of locations, their estimated total annual catch was almost double the competition catch, and the average individual fish weight was larger. The most common species captured by both competition and recreational spearfishers was the red morwong, *Cheilodactylus fuscus*.

The implications of competition and recreational spearfishing catch and effort are discussed with respect to the management of aquatic reserves, protected species, bag limits, size limits, effects on rocky reef fish community structure, and the potential conflict between commercial and recreational fishers and SCUBA divers.

The recreational flathead fishery in the offshore waters of New South Wales—a preliminary report

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Recreational anglers who fish in the offshore waters of NSW target and catch a wide variety of fishes. The flatheads (Family *Platycephalidae*) are an important component of the total recreational catch. To date we have recorded 9 species of flatheads in the recreational catches.

The most commonly retained flathead species are: eastern blue-spotted flathead *Platycephalus caeruleopunctatus*, marbled flat-

head *P. marmoratus*, tiger flathead *P. richardsoni*, and dusky flathead *P. fuscus*.

We present some preliminary data on the relative importance of these four species to the recreational fishing sector and highlight some interesting biological observations.

Estimation of recreational prawning catch and effort for four NSW estuaries

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Estimates of catch and effort by recreational prawners are presented for four NSW estuaries (Wallis Lake, Tuggerah Lakes, Lake Illawarra and Coila Lake) for the summer seasons of 1991/92, 1992/93 and 1993/94. The aim of the project was to estimate the relative contributions of commercial and recreational prawning in these estuaries. The fishery was sampled by an intercept creel survey, based on stratification by moon-phase, tide and time of night. As part of the interview process subsamples of the catch were examined, to provide estimates of the length frequency distribution of the recreational catch and the composition by species. In addition to intercept surveys, a brief survey of recreational prawners at exit points was completed in the 1992/93 season for comparison with results from the intercept survey method. The estimated commercial and recreational catches are compared for each of the four estuaries.

NSW fisheries gamefish tagging program 1973–1993 **—(poster)**

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In 1973 NSW Fisheries began a cooperative big-gamefish tagging program involving anglers throughout Australia who were members of registered fishing clubs affiliated with the Game Fishing Association of Australia (GFAA) and/or the Australian Sportfishing Association (ANSA).

Tagging is carried out on a voluntary basis by recreational anglers. These anglers tag fish that are recognised as gamefish by the GFAA, including billfish, tunas, sharks, kingfish and some other pelagic species. Both GFAA and ANSA have trophies and competitions which are designed to encourage tag and release. The Fisheries Research Institute supplies tagging kits free to anglers on request, or to tagging officers of clubs who distribute the kits to members.

Since the program's introduction, 148 088 tag cards have been returned. A total of 3 177 (2.1%) recaptures have been reported and verified. The main species or species groups tagged are; billfish (28 337), tunas (51 574), sharks (10 775) and kingfish (15 574). Despite a slight reduction in numbers tagged during the late 1980s, the 1990–91 fishing season showed an increase in numbers with 17 864 being tagged, the greatest number of releases recorded in any one year since the program commenced.

This poster summarises the results of the program up to 1993 and presents some of the more important data concerning movements of the recaptured tagged fish.