NSW DEPARTMENT OF
PRIMARY INDUSTRIES

NSW Gamefish Tournament Monitoring – Angling Research Monitoring Program. Final report to the NSW Recreational Fishing Trust.

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NSW Gamefish Tournament Monitoring
– Angling Research Tournament Monitoring Program –

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Photo: M. James

October 2007

NSW Department of Primary Industries –
Fisheries Final Report Series
No. 94
ISSN 1449-9967

NSW DEPARTMENT OF
PRIMARY INDUSTRIES

ANGLING RESEARCH
NSW DPI

NSW Gamefish Tournament Monitoring – Angling Research Tournament Monitoring Program

October 2007

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Published By:	NSW Department of Primary Industries (now incorporating NSW Fisheries)
Postal Address:	Cronulla Fisheries Research Centre of Excellence, PO Box 21, NSW, 2230
Internet:	www.dpi.nsw.gov.au

ISSN 1449-9967

(Note: Prior to July 2004, this report series was published as the 'NSW Fisheries Final Report Series' with ISSN number 1440-3544)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACKNOWLEDGEMENTS

The authors would like to thank the following organisations and persons for their contribution to this project:

- The Recreational Fishing Saltwater Trust Expenditure Committee (RFSTEC) and NSW Department of Primary Industries (DPI) for providing funds for this project.
- The Gamefishing Association of Australia (GFAA) and the NSW Gamefishing Association (NSWGFA) and their associated committee members for their continued support of this program.
- All gamefishing club committee members and tournament organisers/volunteers for their assistance and support of data collection from their events.
- All tournament participants who have willingly provided data during post-fishing interviews.
- The Bureau of Rural Sciences (BRS) for graphics as presented in Bromhead *et al.* (2006).
- Many thanks to the following NSW DPI staff for their assistance:
- Anne-Marie Austin for her recent aid in the management and collection of data, collecting angler information at fishing tournaments and for generating various graphs for this report.
- Sandra Howarth for her clerical skills entering the vast majority of the more recent tournament data presented in this report.
- Danielle Williams for her efforts coordinating the collection of and collecting data from tournaments, including interviewing of anglers. Also, for her contribution as an editor of this report.
- Primary field-based staff (Amy Smoothey and Yola Metti) for giving their time to attend tournaments to interview hundreds of anglers and collect other tournament data. Also, other personnel who gave a significant amount of time as field staff to interview angling parties (Dr Michael Lowry and Nick James).
- Dr Michael Lowry, Dr Kevin Rowling, Dr James Scandol and Dr Charles Gray and Dr Steve Kennelly for their time and contribution as reviewers of this report.
- Tracey McVea for the final formatting of this report.

NON-TECHNICAL SUMMARY

NSW Gamefish Tournament Monitoring
– Angling Research Tournament Monitoring Program –
By Tim Park

Monitoring of the NSW recreational gamefish fishery began in the early 1990s. Monitoring is based around affiliated gamefish tournaments using three data collection methods: tournament scheduled radio reports ('scheds') of location and fishing activity; post-fishing angling-party interviews; and, tournament results. Data collection was formalised when the NSW Department of Primary Industries' (DPI) Gamefish Tournament Monitoring Program (GTMP) was initiated with the support of the Recreational Fishing Saltwater Trust.

This report is a synthesis of the data collected through the GTMP from the 1993/94 season to the 2004/05 season. The purpose of the report is to disseminate the data collected and to provide interpretation and comment on any implications for the status of the main target species. The longer and more complete coverage of this report provides a better opportunity than earlier reports for revealing trends in the indices of angling success (and hence potential indices of abundance) as well as demographic trends in target species. Furthermore, previous reports did not examine the interaction of the commercial longline fishery and the recreational fishery. This report also incorporates data from other sources such as from the NSW DPI Gamefish Tagging Program and the NSW DPI Charter Logbook Program to provide comparison and enhance interpretation.

This report focuses on those species for which there are sufficient data from the monitored tournaments to derive some conclusions. These species are: the three marlin species (striped; black; and, blue marlin); the principal recreational shark species (tiger; mako; hammerhead; and, blue shark); and, the main sportfish species (yellowfin tuna; mahi mahi; and, albacore).

Species composition changed over the monitoring period. The most notable trend was the decline in the proportion of blue marlin in the catch and the corresponding increase in the proportion of striped marlin. Similarly, there was a decrease in the proportion of albacore and an increase in the proportion of mahi mahi over the study period.

There were some indications of an overall change in angler behaviour notable by a change in gamefish targeting, with an increase in the proportion of fishers targeting billfish and a corresponding decrease in the proportion of fishers targeting sharks. There was also an increasing rate of fish tagged compared to those retained and weighed over the study period. Furthermore, there was a distinct change in recent seasons in the number of billfish caught by bait-type. Live-bait usage accounted for increasing numbers of striped marlin and black marlin caught at tournaments since 2000/01. Live-bait usage has been attributed as a likely factor causing improved catch rates of these species.

Catch rates of striped marlin and black marlin fluctuated, with large recruitment pulses being the apparent cause of very high catch rates in some years for black marlin. Tournament catch rates for striped marlin fluctuated but did not follow the declining trend of the longline and charter fisheries. This may be an artefact of an increase in the catchability of striped marlin as a result of the apparent increasing trend in the usage of live bait. Blue marlin catch rates declined, which is likely to be due to a shift in targeting to striped and black marlin.

Of concern was a decline in catch rates of tiger sharks and blue sharks. Tiger sharks are the principal target species of shark fishers and their methods have changed little over the period, thus changes in tiger shark catch rates may reflect real changes in abundance. Mako sharks appear to

have had a stable catch rate in recent years, but the biology of mako sharks (great longevity and late maturity of females) could make them susceptible to overfishing. Despite their life history characteristics, mako sharks were the most abundant of the shark species and juveniles comprised a large proportion of the catch. Mako sharks appeared to have periodic pulses of recruitment. Juvenile hammerhead sharks were also common in the catch, though juveniles were rarer in tiger shark and blue shark catches.

Among the sportfish, albacore catch rates have declined over the period though this does not appear to be reflected in commercial catch rates in the region. Yellowfin tuna were the most abundant of all species caught at tournaments, though their catch rates were variable. This variability may reflect oceanographic conditions since NSW waters are at the edge of the latitudinal range of yellowfin tuna. Mahi mahi catch rates fluctuated and the catch was composed mostly of juveniles.

Resource-sharing issues associated with striped marlin are also covered in this report as a summary of a recent collaborative study between the Australian Department of Agriculture, Fisheries and Forestry and NSW DPI. In summary, the three resource users catching pelagic fish off NSW (gamefish, recreational-charter and domestic-longline fisheries) overlap in that striped marlin is a primary target species in the two recreational fisheries and a by-product species in the commercial longline fishery (the longline fishery is not permitted to target striped marlin, but it is able to sell striped marlin as a by-product). The importance and value of striped marlin for each of these fisheries has resulted in direct conflict over the resource. The competition for the same population of striped marlin has been demonstrated through tag-recaptures, with longliners reporting 54% of the tag-recaptures from recreationally-tagged striped marlin. Both sectors also appear to compete for the same age classes of striped marlin as shown by a similar size structure of the catches and the geographical and seasonal overlap in striped marlin catch, which is most notable off the south-coast of NSW in late summer. The commercial-longline and recreational-charter fisheries have had declining catch rates of striped marlin in recent years. This is not evident in tournament catch rate trends though this may be confounded by an increase in the usage of live bait in tournaments.

Following are a number of recommendations derived from the results of this report that should be considered for all prospective gamefish monitoring:

- Maintain the Gamefish Monitoring Program's system of collecting data via 'scheds' and tournament catch records.
- Maintain a sufficient level of post-fishing interviews as this is the sole source of important data such as undeclared catch and the usage of bait.
- Effort should be put into developing more standardised indices of abundance, particularly for species of concern such as tiger and blue sharks. Priority should be given to assessing their stock status. This should include resources dedicated to establishing habitat preferences and cryptic mortality such as by the use of PSAT tags. Information pertaining to other sources of mortality of tiger and blue sharks, such as the mortality associated with commercial fisheries should also be incorporated into investigations.
- Improved standardisation of marlin catch rates through inclusion of information such as bait-type should be developed.
- Due to the importance of the recreational-gamefish fishery in NSW, improved standardised catch rate data for the primary gamefish species should be included in departmental resource assessment processes to enable more robust managerial recommendations to be made.
- There have been several studies in recent years that have made requests for gamefish-club data. To minimise the resources required to meet these requests and to provide timely reporting to user groups and data providers, a solution would be to have a standardised central repository of all gamefish-club data. This would be accessible by the Gamefishing Association of Australia (GFAA), New South Wales Gamefishing Association (NSWGFA), contributing gamefish clubs and NSW DPI.

- There is a need for a standardised mapping system used by tournaments. The lack of consistency among tournament charts used was one of the factors that caused difficulties in the analysis.
- That the GFAA and NSWGFA extend their promotion of the use of circle hooks for live baiting. There is evidence that this would reduce post-release mortality in striped marlin, as well as the other marlins.
- Continue consultation with GFAA and NSWGFA in determining research priorities.

1. INTRODUCTION

The history and development of recreational gamefishing off south-eastern Australia is well documented (Bromhead, Pepperell *et al.* 2004; Kalish, Campbell *et al.* 2000; Kalish, Campbell *et al.* 2001; Pepperell and Henry 1998; Pepperell 2000; West 1990). An important aspect of the history of gamefishing in Australia is that it was established early in the global history of gamefishing. The NSW Angler's Casting Club of Australia established the first gamefishing rules in 1908, only a decade after the formation of the world's first gamefishing club in Catalina Island, California. Newcastle Angling Club established its gamefishing division in 1928, while the first dedicated gamefishing club in Australia appears to have been the Great Barrier Reef Game Fish Angling Club, formed in 1929 (Bromhead, Pepperell *et al.*; Dunn 1991). The Game Fishing Association of Australia (GFAA) formed in 1938 and pre-dated the international world body, the International Game Fish Association (IGFA) by a year (Kalish, Campbell *et al.* 2006).

The recreational gamefish fishery off the south-eastern coast of Australia is seasonal, with the tournaments being focussed during the austral summer and autumn. The principal billfish and sportfish species tend to be tropical and subtropical and the fishery relies on the East Australian Current to transport warm tropical oceanic waters south to encourage a seasonal migration of the target species along the NSW coast. The GFAA identifies the species that are recognised as eligible target species. These are listed in Appendix 1.

The commercial sector of the East Coast Tuna and Billfish Fishery (ETBF) is the domestic longline fishery that target yellowfin tuna or swordfish. Marlin species are also commonly caught as bycatch. Amongst the bycatch species, striped marlin can be retained for sale in NSW (though not targeted). As a result of these issues, and the increasing longline catches of striped marlin, a conflict has arisen between the commercial longliners and gamefishers over access to the resource.

In addition to the commercial and recreational fisheries there is also a recreational charter vessel fishery for the same target species as the recreational gamefish fishery. The NSW Department of Primary Industries (NSW DPI) operates a charter vessel logbook, which has been phased in since 2001.

The need for a method for recording catch and effort in the recreational gamefish fishery was recognised in the 1980s. In 1989, the Australian Bureau of Rural Sciences funded a study to develop a cost-effective system for measuring catch and effort in the recreational gamefish fishery (West 1990). Pepperell and Henry (1998) initiated the current system of monitoring and recording at gamefish tournaments. They also incorporated some historic data (from 1993/94 season), and included southern Queensland tournament data. Data collection was formalised during the 1999/00 season when the Gamefish Tournament Monitoring Program (GTMP) was initiated with the support of the Recreational Fishing Saltwater Trust. Data collection was incorporated into the NSW DPI Baitfish program until 2004/05 season, when the GTMP was incorporated into the Angling Research Tournament Monitoring Program as recommended in Murphy *et al.* (2002).

The data collected for the GTMP should be interpreted in conjunction with the other programs that NSW DPI use to collect data from recreational gamefishers i.e., the Gamefish Tagging Program (GTP) and the Charter Vessel Monitoring Program CMP) (Lowry and Murphy 2003; Murphy, Lowry *et al.* 2002).

Reviews of the program and summaries of the gamefish tournament data were provided by Pepperell and Henry (1998) and Murphy *et al.*(2002). These provided summaries of three and five seasons of tournaments respectively. The purpose of this report is to provide an overview of results

from the NSW data available – with particular emphasis on recent seasons. There are now twelve seasons monitored (to 2004/05). The most recent seven seasons have more comprehensive coverage of tournaments than the earlier years. The more extensive coverage now available provides a better opportunity for revealing trends in the indices of angling success and hence potential indices of abundance. Furthermore, the previous reports did not examine the interaction between the commercial longline fishery and the recreational fishery. A summary of a recent collaborative study between the Australian Department of Agriculture Fisheries and Forestry and NSW DPI is provided (Bromhead, Park *et al.* 2006; Knight, Park *et al.* 2006). With the negotiations on resource allocation of striped marlin in progress, this aspect of the report is particularly poignant.

The GFAA recognises 52 species that occur in waters off NSW (Appendix 1). Many of the species are rarely caught or targeted in gamefishing tournaments, so this report focuses on those species for which there are sufficient data from the monitored tournaments to derive some conclusions. These species are generally referred to using common names in this report.

Table 1. Principal species considered in this report.

Billfish	Marlin – Black	*Makaira indica*
	Marlin – Pacific Blue	*Makaira mazara*
	Marlin – Striped	*Tetrapturus audax*
Sharks and rays	Shark – Blue	*Prionace glauca*
	Shark – Hammerhead	*Sphyrna spp.*
	Shark – Mako	*Isurus spp.*
	Shark – Tiger	*Galeocerdo cuvier*
	Shark – Whalers	*Carcharinus spp.*
Tunas	Tuna – Yellowfin	*Thunnus albacares*
Sportfish	Albacore	*Thunnus alalunga*
	Kingfish – Yellowtail	*Seriola lalandi*
	Mahi Mahi (Dolphin Fish)	*Corypheana spp.*

The data presented in this report do not represent all effort in the organized gamefish tournament fishery. It does not, for example, contain non-tournament club point-score results. Coverage of tournaments has varied over the period of reporting; there have been three phases of monitoring of gamefish tournaments by NSW DPI, with hiatuses between. There are also no data presented on recreational game fishing outside of organised tournaments. This report is intended as an overview and foundation on which further research will be based.

2. OBJECTIVES

- The objectives of the program as outlined in the funding approval are:
- Measure indices of fishing success from recreational gamefishers at organised tournaments.
- Monitor these indices through time.
- Analyse spatial measures of recreational gamefish tournament fishing effort and comment on the potential conflict with other fishing sectors.
- Provide information on the relative distribution and abundance of tuna and billfish resources on the east coast of Australia.

3. "POINT-SCORE" CALCULATIONS

Vessels are ranked in gamefish tournaments according to the number of points they score from fish caught. The importance of detailing the points system in this report is that it influences the behaviour of anglers with regard to their behaviour of 'tag and release' or 'landing and weighing' of fish caught. The points awarded are established in the NSWGFA Rules and Records (See Appendix 4). For the seasons monitored there were a fixed number of points for tagged fish depending on species; but fish landed and weighed, the points given are determined by species from formulae that involve the weight of the fish and line class.

The general formula used is $P = W^2 \times F \,/\, L$; where points scored (P) is equal to the weight of the fish in kilograms squared (W^2) times the factor (F) divided by the line class (L) in kilograms. The factors (F) by line class are in table 1.

Table 2. Multiplicative factor 'F' by line class 'L' used in points calculation for game fishing tournaments. The ratio of the F/L for each line class is also shown.

Line class (L kg)	Factor (F)	Ratio F/L
4	29.5	7.38
6	19.5	3.25
8	14.5	1.18
10	11.5	1.15
15	7.5	0.50
24	4.6	0.19
37	3	0.08
60	1.7	0.03

Moreover, the points given (P) are then doubled for marlin and broadbill, trebled for all other sportfish, halved for sharks, except blue shark for which the points are quartered.

Minimum weights apply for landed fish to be weighed for points. Marlin weighed must be a minimum of 60 kg on line classes up to 10 kg and a minimum of 80 kg on line classes 15 kg and over. Sharks must be a minimum of 60 kg on line classes up to 10 kg, a minimum of 80 kg for line

classes 15 to 37 kg and a minimum of 120 kg on 60 kg line class. Yellowfin and southern bluefin tuna must be at least 15 kg on line classes to 15 kg and at least equal to the line class for 24 kg line class and above.

Tagged fish are given a fixed number of points according to their species, regardless of size. Marlins and billfish are the most prestigious and are given the highest points, 10,000 for a tagged fish. Sharks are awarded 2,000 points per tagged fish. The premier tuna species are awarded 1,000 points while other sportfish (longtail tuna, albacore, wahoo and Spanish mackerel that are tagged receive 500 points. Yellowtail kingfish receive 250 points and mahi mahi, barracuda, and cobia are given 25 points. Skipjack and kawa kawa can only be credited to junior anglers and receive 10 points.

Points awarded for weighed fish increase with decreasing line strength. This incentive is to encourage anglers to use lighter lines and with the purpose of improving the 'sport' by increasing the fish's chance of escape.

The fixed-point system for tagged fish encourages heavier lines to be used by anglers intending to tag fish as it reduces the fight time and hence increases the opportunity for more captures. Hence fight times are often short for tagged fish in tournaments.

The influence on fisheries assessment of the point system for landed fish is two-fold, fight time is influenced by the line class therefore as the average fight time is decreased the effective fishing effort is increased. It also influences the targeting of anglers toward the higher scoring, more prestigious fish, hence blue sharks and mahi mahi are not actually targeted unless there is a perceived high chance of success. This would have an effect on nominal Catch Per Unit of Effort (CPUE) estimates. There is also concern amongst some anglers that increased fight time may decrease the chances of survival of fish that escape.

The figures (1 – 5) below show the point value of landed fish below the tag point threshold value for the different gamefish. From these relationships, anglers can calculate the weight by line class at which landing is worth more points than tagging.

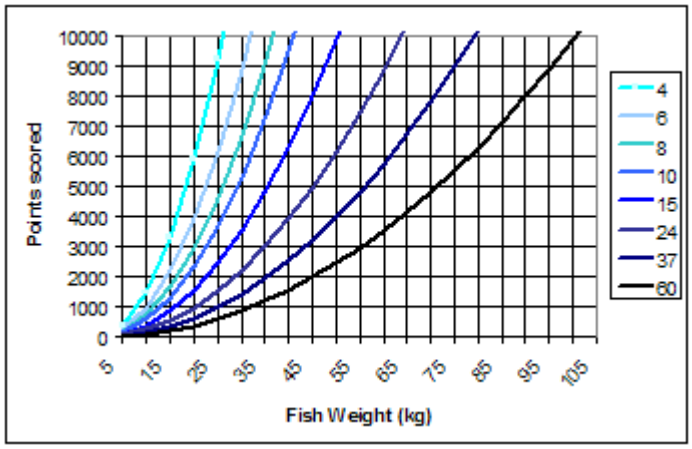

Figure 1. Marlin and broadbill point scores by weight per line class for billfish weighed up to 10,000 points. Points awarded on the graph are for weighed fish over the minimum size criteria.

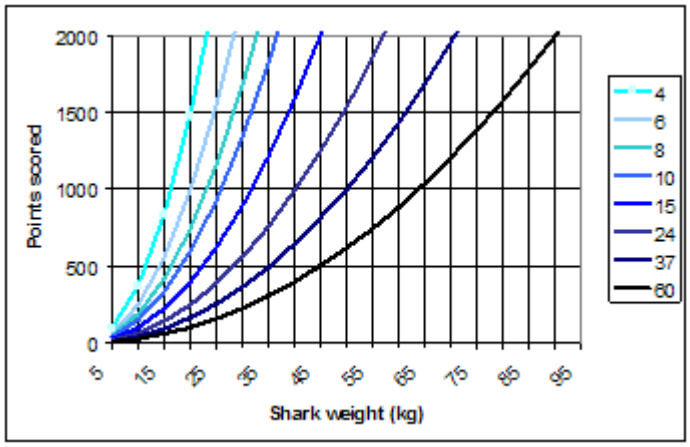

Figure 2. Shark point score by weight per line class for sharks weighed up to 2,000 points.

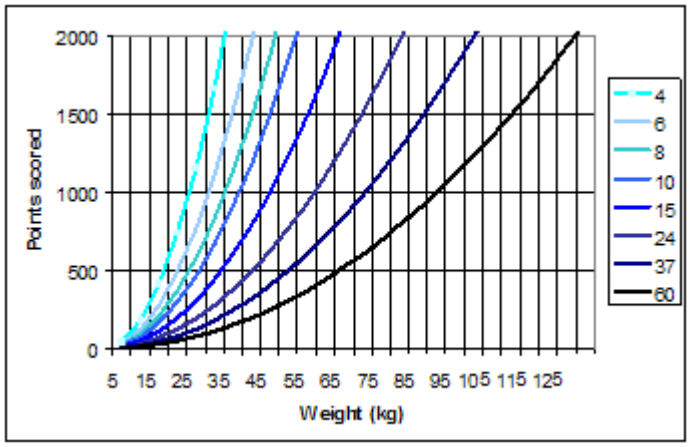

Figure 3. Blue shark point score by weight per line class for blue sharks weighed up to 2,000 points.

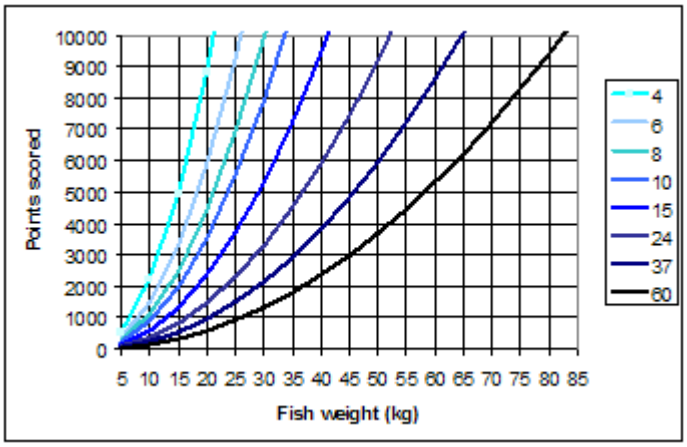

Figure 4. Other billfish (sailfish and shortbill spearfish) point scores by weight per line class for billfish weighed (up to 10,000 points).

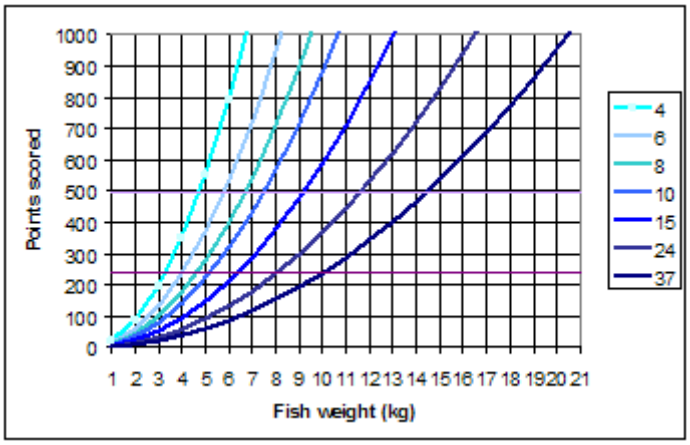

Figure 5. Points scored by weight per line class for other gamefish including tuna and other sports fish for fish weighed (up to 1,000 points). The 500-point threshold and the 250-point threshold are marked.