NSW DPI Game Fish Tagging Program

Report 2016-2017

Recreational Fishing Trusts

NSW GOVERNMENT Primary Industries

Pepperell Research
Marine Science & Recreational Fisheries

NSW DPI Game Fish Tagging Program

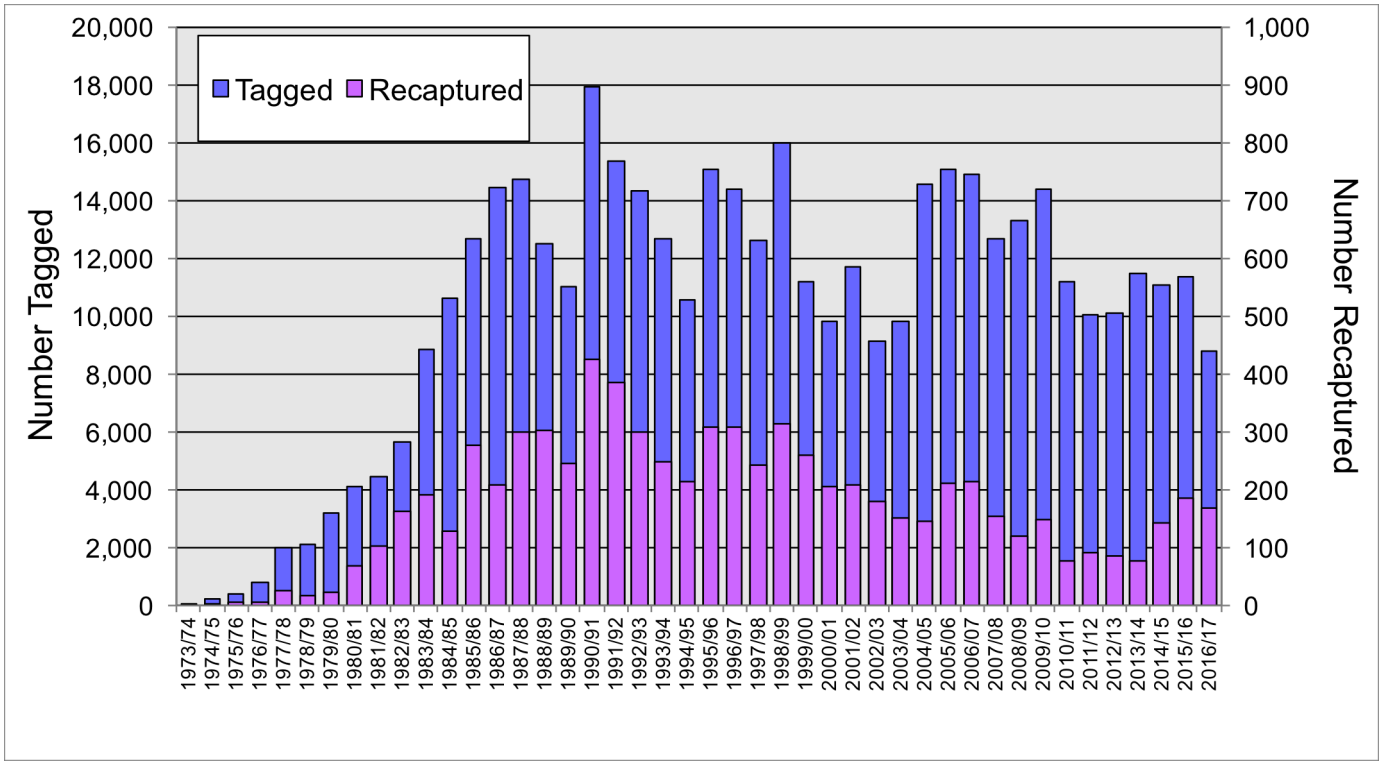
2016/2017

During 2016/17 the total number of fish tagged on the program was 8,794. This was considerably down on recent years when more than 11,000 fish have been tagged. Even so, the number of reported recaptures throughout the year was 170, only slightly fewer than last year's total of 184, which was the highest in nine years.

Figure 1 shows the number of fish tagged and recaptured on the program since the origin of the Program. Following a rapid increase in tagging during the 1970s and early 1980s, numbers of fish tagged each year have fluctuated around an average of about 12,300, made up of varying proportions of species of fish tagged in different years. The numbers of fish tagged each year vary for many reasons, not least the availability of certain species of highly mobile pelagic fish at different times and locations. For example, the Program's two peak tagging years of 1990/91 and 1997/98 coincided with strong La Nina conditions on the east coast of Australia, resulting in greater than usual numbers of some pelagic species becoming available to anglers.

The decline in the total of tagged fish in 2016/17 compared with the previous year was largely due to a marked decrease in the numbers of both southern bluefin tuna and striped marlin tagged. These and other factors will be discussed further in the report.

Figure 1. Numbers of fish tagged and recaptured by year, to 2016/2017



The Program to date

As at the end of June 2017, the grand totals of fish tagged and recaptured on the program stood at 457,069 and 7,910 respectively (Table 1), continuing the program's status as the largest of its kind in the world. This table summarises taggings and recaptures of the top species or species groups tagged, with the remainder combined as 'all other species'.

The single species tagged in the highest numbers continues to be black marlin with nearly 67,000 tagged (14.6% of all releases) followed by yellowfin tuna, yellowtail kingfish, sailfish, striped marlin, dolphinfish and southern bluefin tuna. Other prominent key species are albacore, whaler sharks (as a group – *Carcharhinus* spp.), blue marlin, narrow barred Spanish mackerel and shortfin mako sharks.

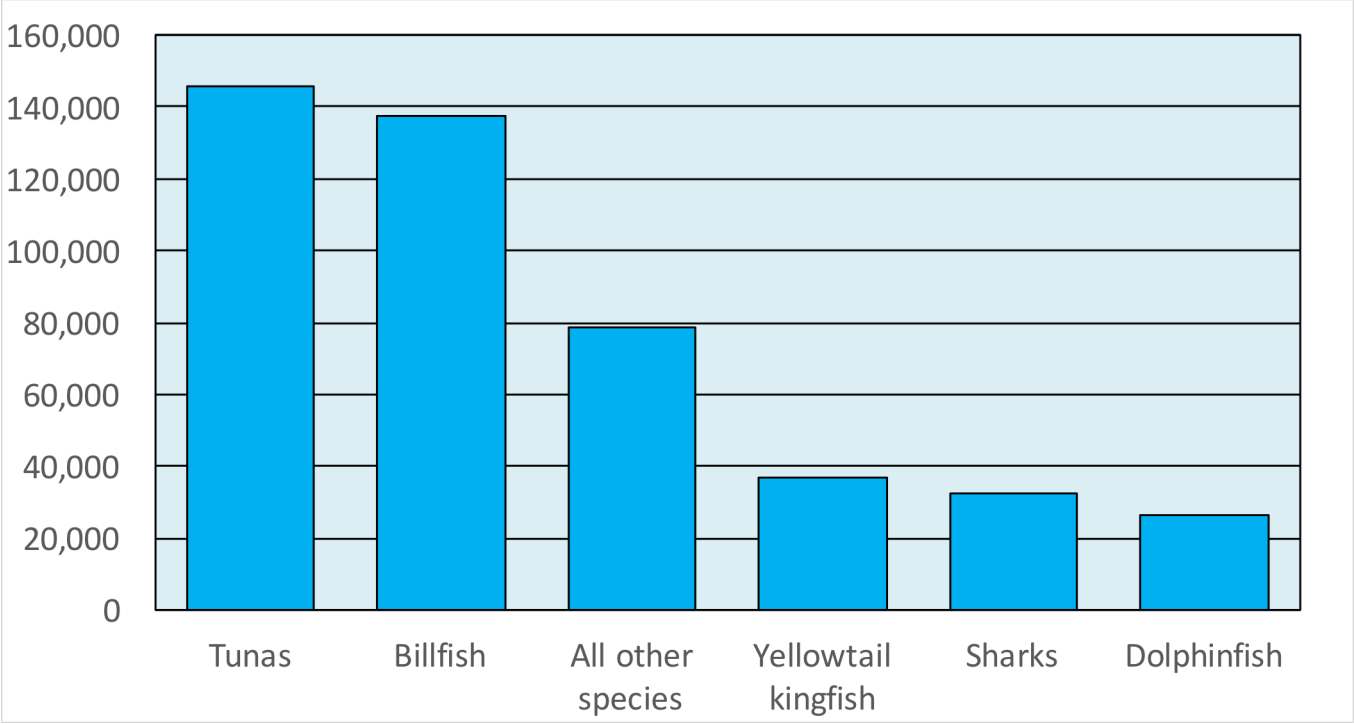
Table 1. Total numbers of fish tagged and recaptured: 1974-2017

Species	Total Tagged	Recaptures	% Recapt
BLACK MARLIN	66,957	523	0.78
YELLOWFIN TUNA	38,208	707	1.85
YELLOWTAIL KINGFISH	36,814	2,441	6.63
SAILFISH	32,313	334	1.03
STRIPED MARLIN	27,429	252	0.92
DOLPHINFISH	26,359	243	0.92
SOUTHERN BLUEFIN TUNA	24,710	176	0.71
ALBACORE	22,204	169	0.76
STRIPED TUNA	21,420	68	0.32
MACKEREL TUNA	20,758	62	0.30
BONITO	13,244	219	1.65
WHALER SHARK*	13,538	278	2.05
AUSTRALIAN SALMON**	10,343	631	6.10
BLUE MARLIN	10,552	34	0.32
SPANISH MACKEREL	9,385	88	0.94
MAKO SHARK	8,282	187	2.26
SILVER TREVALLY**	7,115	200	2.81
HAMMERHEAD SHARK	5,665	59	1.04
BLUE SHARK	5,085	78	1.53
LONGTAIL TUNA	5,029	59	1.17
TAILOR**	4,032	122	3.03
TREVALLY	3,405	31	0.91
QUEENFISH	3,394	10	0.29
ALL OTHER SPECIES	40,828	939	2.30
TOTAL	**457,069**	**7,910**	**1.73**

*Whaler sharks in this table include the following tag card entries: Whaler sharks, bronze whalers, black tip and white tip sharks.
**Some species, such as tailor, silver trevally and Australian salmon, were tagged in large numbers in the past, but have since been removed from the list of desirable species to tag.

Combining the main species or species groups together over the history of the Program, Figure 2 shows that tunas remain the group tagged in the largest numbers – 145,573 tagged, or 31.8% of the total, followed by billfish – 137,251 – 30.0% of all fish tagged. A single species, yellowtail kingfish, with 36,814 tagged, represents 8.1% of all taggings while the total number of sharks combined (32,570) represent 7.1% of the total number of fish tagged on the Program.

Figure 2. Total numbers of fish tagged as species groupings, 1974-2017



Summary for 2016/2017

Table 2. Numbers of all species or species groups tagged and recaptured during 2016/2017

Species	Total Tagged	Total Recaptures
BLACK MARLIN	1,835	16
SOUTHERN BLUEFIN TUNA	1,126	16
STRIPED MARLIN	820	6
BLUE MARLIN	777	2
YELLOWTAIL KINGFISH	559	76
SAILFISH	527	4
DOLPHINFISH	341	3
ALBACORE	265	
MAKO SHARK	222	5
SAMSON FISH	214	15
AUSTRALIAN SALMON	208	7
WHALER SHARK	208	3
STRIPED TUNA	148	
BRONZE WHALER	126	3
SILVER TREVALLY	121	1
BLUE SHARK	119	
SPANISH MACKEREL	119	
YELLOWFIN TUNA	112	
BULL SHARK	95	4
HAMMERHEAD SHARK	86	
GUMMY SHARK	83	3
TIGER SHARK	83	1
MACKEREL TUNA	76	
LONGTAIL TUNA	67	
MULLOWAY	57	1
QUEENFISH	52	
GOLDEN TREVALLY	37	1
SCHOOL SHARK	36	1
EAGLE RAY	30	
SPOTTED MACKEREL	30	
SCHOOL MACKEREL	25	
SNAPPER	21	2
BARRACUDA	20	
SHORTBILL SPEARFISH	20	
BROAD BARRED MACKEREL	15	
TREVALLY	14	
WAHOO	14	
BROADBILL SWORDFISH	13	
COBIA	10	
GIANT TREVALLY	10	
LEMON SHARK	8	
THRESHER SHARK	6	
GOLD SPOTTED TREVALLY	5	
WHITE SHARK	5	
AMBERJACK	4	
BIGEYE TREVALLY	4	
BONITO	4	
FRIGATE MACKEREL	2	
KAWA KAWA	2	
ALMACO JACK	1	
BARRACOUTA	1	
BARRAMUNDI	1	
BIGEYE TUNA	1	
BLACKTIP SHARK	1	
DOGTOOTH TUNA	1	
DUSKY FLATHEAD	1	
PORBEAGLE SHARK	1	
TAILOR	1	
UNKNOWN	4	
TOTAL	**8,794**	**170**

Even though black marlin topped the list for numbers of fish tagged during 2016/17, the total (1,835) was slightly down on the previous year (2,031). This year, the 'run' of juvenile black marlin from northern Queensland to central NSW occurred again, but weaker than in the past several seasons. This was compensated to some extent by greater numbers of older fish (40 to 100 kg) appearing off southern Queensland and central and southern New South Wales.

About 760 black marlin were tagged off the Fraser, Sunshine and Gold Coasts of southern Queensland compared with 600 the previous year. Numbers of black marlin tagged off NSW (493) were down on the previous year (850), mainly due to relatively few being tagged off the Port Stephens area. For the second year running, over 200 black marlin were tagged on the southern NSW coast, most of those in the 70 – 110 kg size range.

Numbers of black marlin tagged off Western Australia (359) were very similar to the previous year (370) with numbers slightly down off Dampier and zero tagged off Broome, but with increased numbers tagged off Exmouth (231 compared with 165 the previous year).

As indicated in last year's report, numbers of black marlin reported tagged during the heavy tackle season off Cairns/Lizard Island have declined markedly compared with earlier years. This year, just 92 tag records for this fishery were received – far fewer than the actual number of fish released – as evidenced by just one charter vessel recording over 100 releases during the season. There are several likely explanations for this decline in usage of tags in the fishery, mainly relating to decisions of charter captains not to tag most if not all fish brought to the boat (except perhaps during tournaments when fish must be tagged to earn points). In a fishery with a high rate of tag and release, tag cards can be used as a surrogate for total catch, so in this case, in order to continue the long-term recording of total numbers of fish brought to the boat and released, with or without a tag, a new method for reliably recording non-tagged fish will need to be developed.

From a high of just under 3,000 tagged last year, numbers of tagged southern bluefin tuna (SBT) dropped to 1,126 in 2016/17. Geographically, the decrease was across the board. In a similar pattern to last year, over half of the SBT were tagged in South Australia (688) followed by Tasmania (287) and Victoria (118). The great majority of SBT tagged off South Australia were in the 6 to 15 kg range, while Victorian fish ranged up to 20 kg or so, with one 'barrel' at an estimated 110 kg tagged. Off Tasmania, sizes were generally 10 to 30 kg, with again, several large fish, including the tagging of one estimated at 150 kg. Lastly, just 27 SBT were tagged off the southern New South Wales coast (ranging from 20 to 60 kg) and six off southern Western Australia.

The 2016/17 season was another good one for blue marlin around Australia with 777 tagged, comparing favourably with the record 873 tagged the previous year. Of these, 453 were tagged off southern Queensland and New South Wales (632 last season), and 147 off Exmouth WA (81 last season). Again the remainder were tagged off South Pacific nations including Tonga (85 tagged) Papua New Guinea (71) and Fiji (8).

While numbers of sailfish tagged overall in 2016/17 were similar to the previous year, a change to local fishing rules in Broome resulted in a sharp drop in the number of sailfish tagged but not in the number of fish released without tagging.

This year, anglers were allowed to record releases of sailfish simply by touching the leader before release, rather than deploying a tag. Thus, even though there were just 52 sailfish tags recorded off Broome, the annual tournament actually saw 285 fish released (and a further 40+ black marlin released without tags). The same rule did not apply for Dampier, WA nor in the Gulf of Carpentaria where numbers of sailfish tagged off both areas were considerably higher than last year.

Continuing a trend, the number of yellowfin tuna tagged during the year was again very low, although at 112, represented an increase on just 68 and 49 tagged in the previous two years. Focusing on New South Wales where historically average numbers of yellowfin tagged annually were greater than 1,000 fish, last year saw just 44 tagged, compared with 28 and 44 in the previous two years. As flagged in last year's report, a research project to examine this apparent marked decline in availability of yellowfin tuna to the recreational fishery off NSW has been funded by the NSW Recreational Fishing Trusts and will commence in 2018.

In reviewing the numbers of different species of gamefish tagged over this long running program, it is clear that these numbers can and do fluctuate widely over time, sometimes showing trends, and sometimes marked shifts from one year to the next. Such changes may be reflecting the abundance of a given species over these periods, or they may simply be reflecting changes in availability of those species to recreational fisheries around Australia. For example, the number of black marlin tagged each year is strongly influenced by the appearance or non-appearance of a strong year class of juvenile fish on both the Australian east or west coast.

In order to consider this in more detail, the numbers of gamefish tagged over the past 5 years are plotted on a single graph (Figure 3), while individual graphs for nine of the key species tagged for the past 10 years are shown in Figure 4. One point to note when examining these graphs is that Figure 3 shows the same scale for numbers tagged of all species, while in Figure 4, the numbers tagged, shown on the vertical axes, are not to scale, but more easily show relative fluctuations through time and over double the time frame.

Figure 3. Numbers of main species and species groups tagged in 2016/2017 and the previous four years.

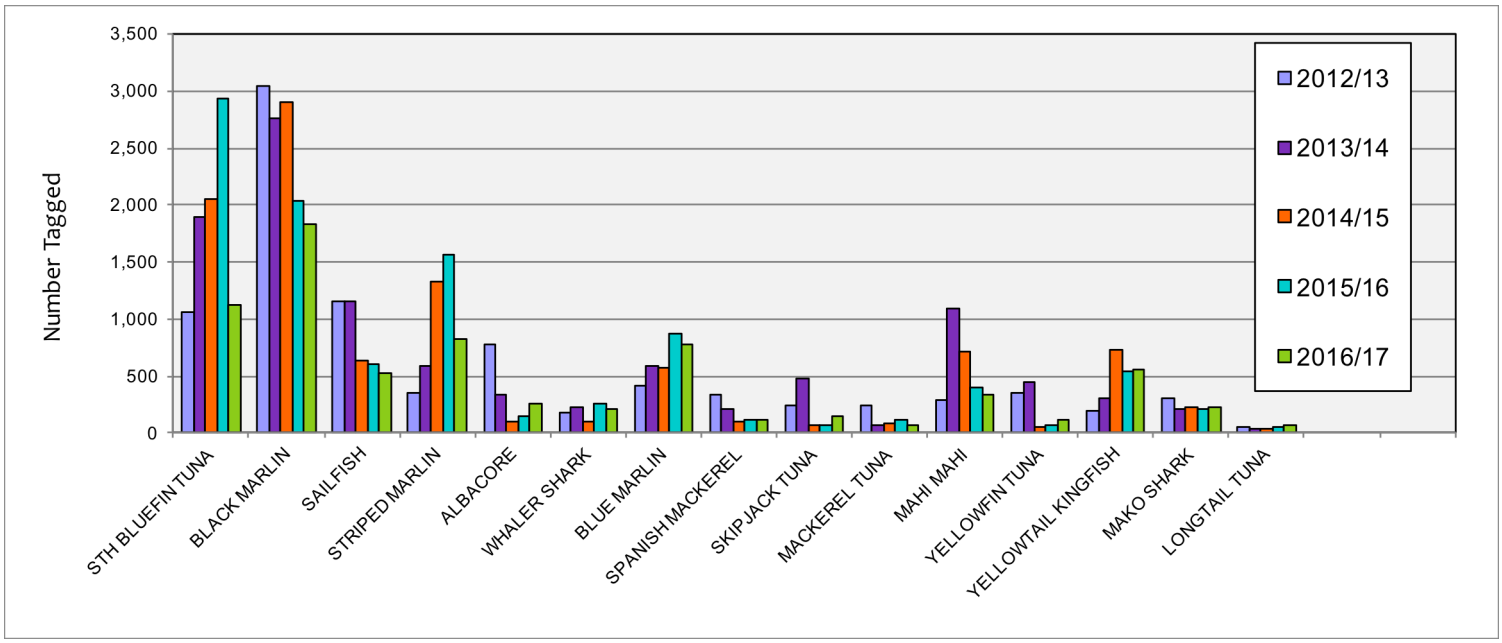
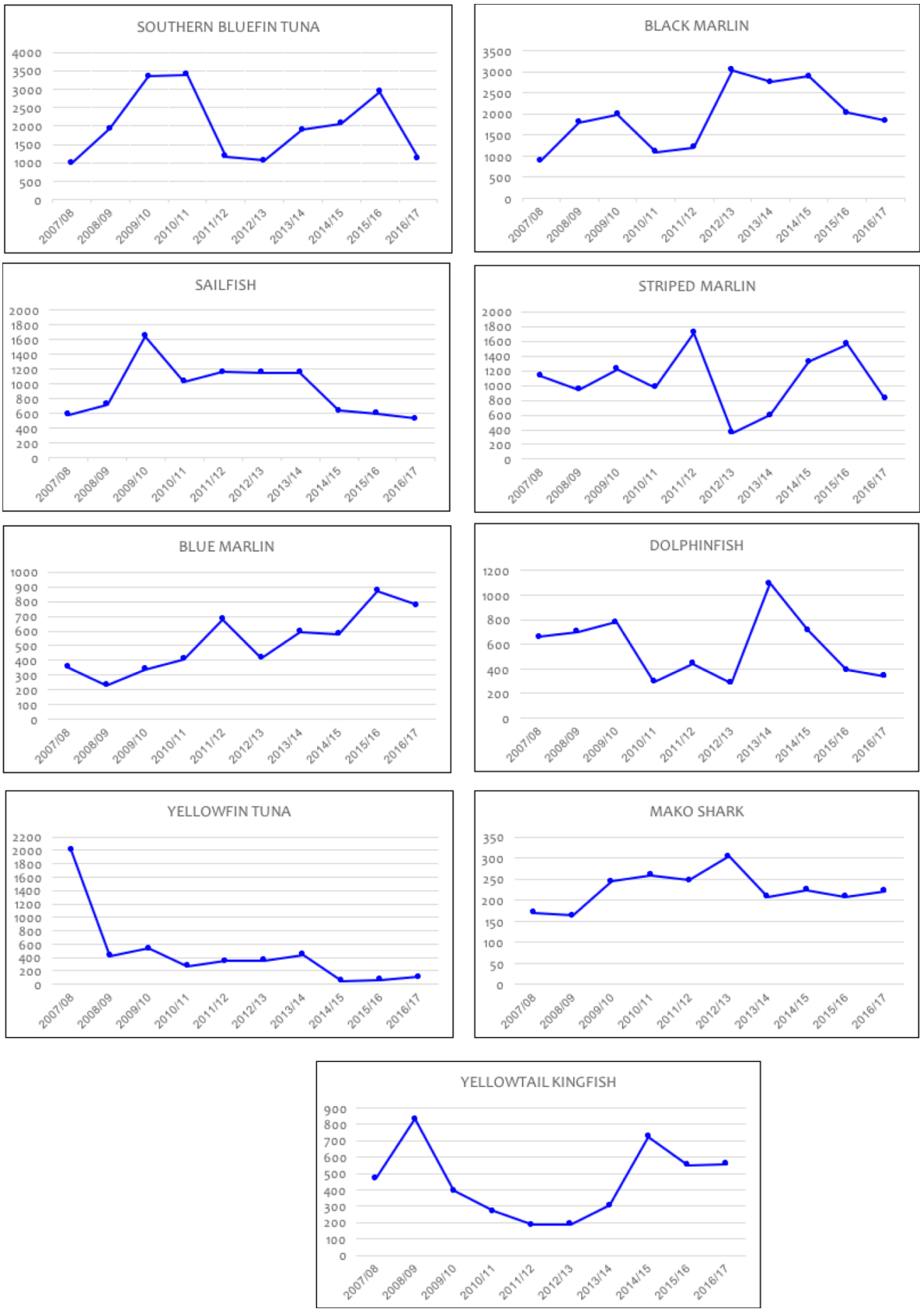


Figure 4. Individual plots of numbers of key gamefish species tagged over the past 10 years. (Note, the apparent decline in sailfish numbers in 2016/17 was due to nearly 300 sailfish released without tags off Broome, WA).



Looking at each species in turn, particularly in Figure 4, we see quite large fluctuations in numbers of southern bluefin tuna tagged over the given timeframes, from lows of around 1,000 in several years to highs of over 3,000 in others. After a steady build up from a low in 2012/13 to a peak of 2,900 tagged in 2015/16, last season saw a drop again to around 1,000 fish tagged, a level reached in three other seasons in the past 10 years.

Black marlin show a decline over the past four years, but from a high point, and not to the level at the beginning of the series. Sailfish numbers are down in recent years to levels of ten years ago, but as noted already, this species can be highly variable in its appearance from place to place. There is no trend in the number of striped marlin tagged through time, whereas the number of blue marlin tagged has shown a steady increase over the past decade, likely reflecting targeting behaviour of game fishers. Numbers of dolphinfish tagged are highly variable, almost certainly reflecting recruitment events of this very short-lived species. As noted, yellowfin tuna have shown the most dramatic shift, with numbers tagged declining sharply in 2008/09 followed by a stable period and then another sharp and sustained drop in since 2014/15. The number of mako sharks tagged has been relatively steady over the past decade, while yellowtail kingfish numbers, following a dip in the early 2010s, have climbed to earlier levels, although in the last case, changes in tagging behaviour have been influenced by Departmental advice.

Combining the species tagged into species or species groups, Figure 5 shows that billfish dominated overall taggings in 2016/17, comprising 51.5% of all fish tagged – a higher proportion than the previous year (45.1%), and continuing a trend of much higher than average years when billfish have averaged between 30 and 35% of all fish tagged in a given year. The proportion of tunas tagged represented just 20.5% of the total (almost 30% last year) while sharks represented 12.3% of the total, much higher than the average of about 7% over the last decade or so.

Figure 5. Species groups tagged in 2016/2017

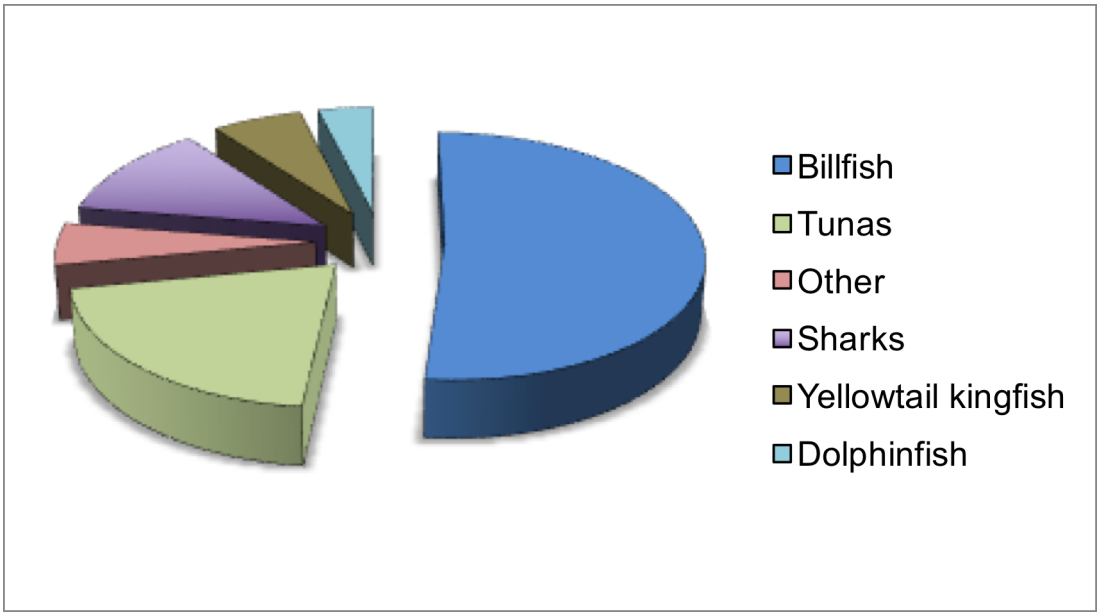
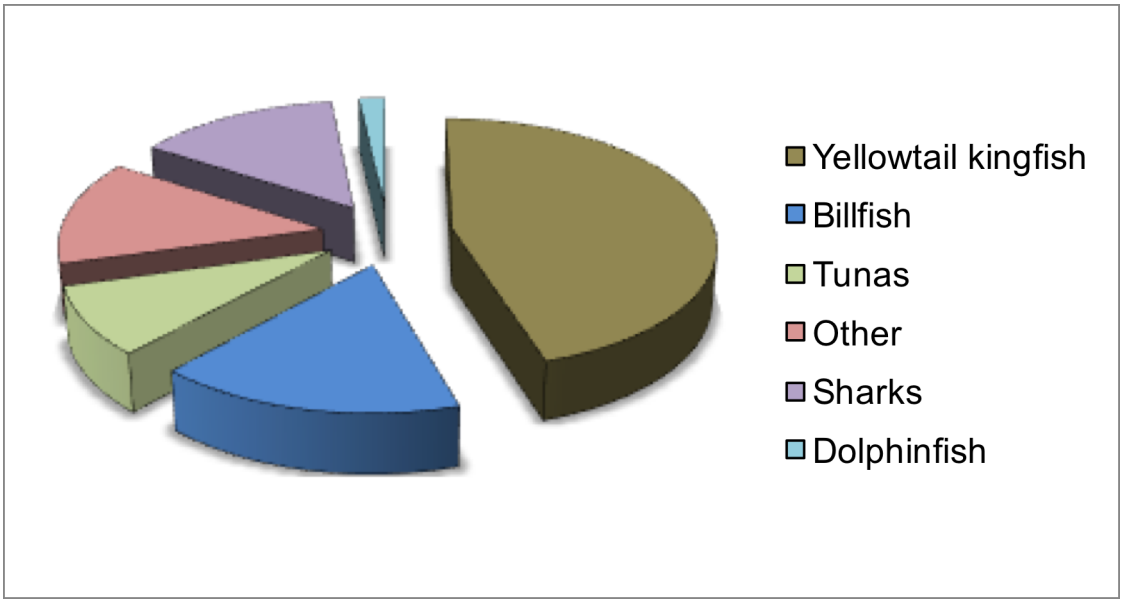


Figure 6 shows the proportions of the major species groups recaptured in 2016/17, and as is usually the case, indicating quite different proportions to those tagged. This year, yellowtail kingfish again dominated, with 45.3% of all recaptures (37.5% last year) while billfish represented the next highest proportion of recaptures at 16.5% (24.5% last year). Shark recaptures as a proportion of the total (14.1%) showed a significant increase over last year (8.7%).

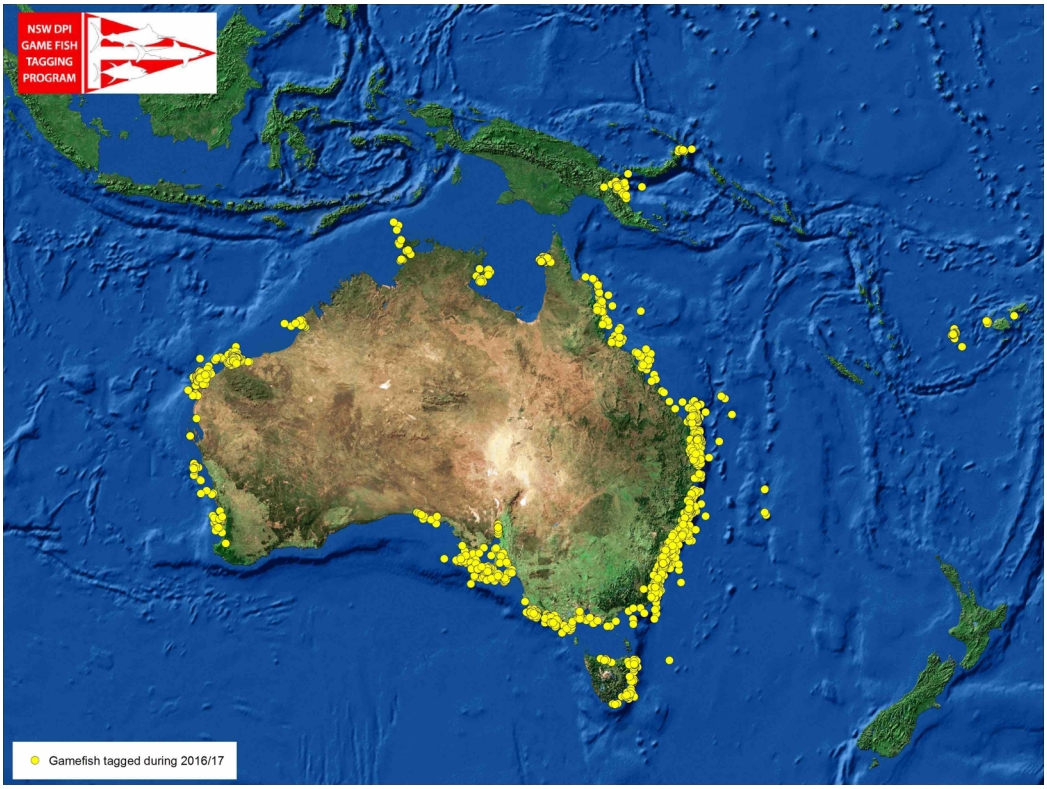
Figure 6. Species groups recaptured in 2016/2017



Highlights of the 2016/17 tagging year

The map below (Figure 6) shows locations of the 8,794 fish tagged in 2016/17. While the program is primarily conducted around the Australian coast, it has historically also extended to neighbouring regions where anglers wish to tag their catch, with obvious benefits to accruing knowledge of the pelagic fishes of our general region. This map is very similar to previous years, albeit with a little less activity in the wider Coral Sea, eastern Papua New Guinea and Lord Howe Island but more activity in the Great Australian Bight and on the continental shelf off Darwin. Note that New Zealand operates its own similar tagging program.

Figure 6. Positions of releases of tagged gamefish during 2016/17.

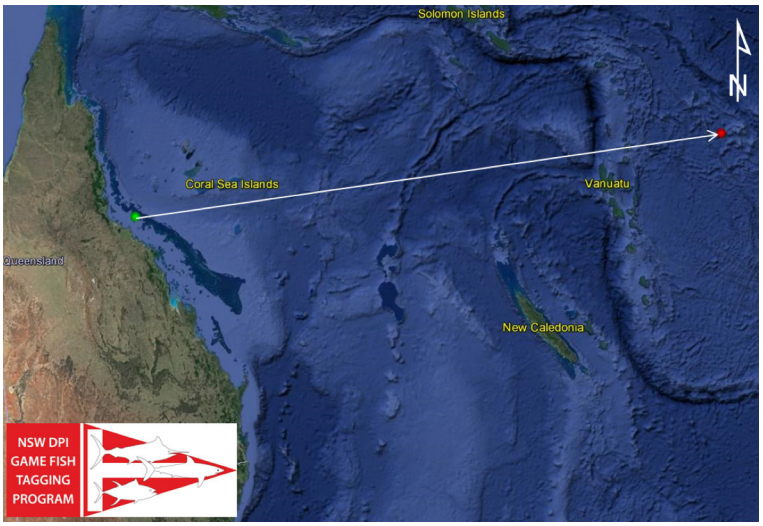


Recaptures in 2016/17

All of the completed recaptures recorded in 2016/17 are listed in Appendix I. Following are just some of the highlights of these recaptures. Because of the interest among anglers, we tend to emphasise some of the longer times at liberty or longer distances moved by tagged fish and as such, these may quite often be exceptions to the rule. In contrast, many fish are also recaptured relatively close to their points of release, often, but not always within relatively short times. Therefore, it is stressed that the information gained from these recaptures is just as important to our understanding of the movements and growth of game fish as are longer term, longer distance recaptures.

Black marlin

Over the past several years, the number of black marlin recaptures has increased considerably, and 2016/17 was no exception. Sixteen recaptures were reported during the year with times at liberty ranging from 21 to 1,472 days (4 years 11 days) and distances travelled from 1 to 2,250 nautical miles. Six of the recaptured black marlin were tagged in NSW waters, five in WA (all off Dampier) and five off Queensland.



Above: A 40kg black marlin being released wide off Townsville that was recaptured 233 days later northeast of Vanuatu by a Chinese longline vessel. It weighed 87kg at recapture.

The fish that recorded the longest distance was tagged off Mooloolaba QLD in February 2014 and recaptured on 30 July 2017 by a commercial longliner 170 nautical miles northeast of Samoa. Estimated at 20 kg at release, unfortunately the size of the fish at recapture was not reported to the international fisheries observer who received the tag. A second long distance recapture of note was an estimated 40 kg black marlin tagged wide of Townsville in September 2016. It was recaptured nearly 8 months later by a Chinese longliner about 300 nautical miles northeast of Vanuatu at a weight of 87 kg.

As was the case last year, the recapture of two very small black marlin tagged inside Fraser Island proved the value in tagging small fish. The first of these, estimated at just 6 kg, was tagged in June 2016 and recaptured at Rainbow Beach in the net of a contractor operating in the Queensland Shark Control Program. This fish had been at liberty for just 4 months and 20 days and in that time had grown to a fork length of 134 cm which converts to a weight of about 18 kg. The second Fraser Island tagged baby black marlin was estimated on release at 5 kg, and recaptured off Port Stephens NSW 281 days later at an estimated 30 kg in size. Similar growth rates were recorded last year for two fish released at similar sizes and fit well with the rapid growth rate previously estimated for this species.

Left: A tiny black marlin about to be tagged off Fraser Island in June 2016. **Lower left**: the same fish being released again off Port Stephens in March 2017. During that time, its first year of life, it grew from an estimated 5kg to about 30kg, adding more information to knowledge of the rapid growth rate of black marlin.

Six black marlin tagged off New South Wales, ranging in size from 20 to 50 kg at release, were also recaptured this year, all on the coast, and all within 250 miles of their release points. The most rapid apparent movement rate of these was by a fish tagged off Port Stephens in late January 2017 and recaptured 21 days later at 'the Banks' off Greenwell Point NSW, a modest movement rate of 8 miles (14.8 km) per day. Other fish moved from Port Stephens to Caloundra in 57 days, Hat Head to Broken Bay in 31 days and Sydney to Bermagui in 34 days. Coincidentally, another Sydney-tagged black marlin was also recaptured at Bermagui, but that fish had been released some 10 months earlier. In that time, it had grown from 50 kg to 70 kg (both estimated).

Lastly, five black marlin tagged off Dampier WA were all recaptured this year with apparent distances moved of 1 to 11 nautical miles. Two of these had been at liberty for 39 and 69 days, however, the other three had been tagged 365, 494 and 1,472 days earlier. These recaptures strongly suggest that at least some black marlin exhibit what is known as 'philopatry' or returning to the same location, often on an annual basis. This has been noted previously on the Program on many occasions over the years, especially for black marlin and sailfish.

Blue marlin

Only two blue marlin were recaptured during 2016/17 but unfortunately, a discrepancy in dates has confounded one of these recaptures. The successfully traced recapture was of a 150 kg fish tagged off Forster NSW and recaptured six months later off the Gold Coast QLD.

The second blue marlin was recaptured off Rabaul PNG on 18 November 2016. However, the tag card matching the tag number indicated a blue marlin tagged off Lae PNG on 23 November 2016, that is, after the recapture. Efforts to determine the nature of this probable clerical error have so far been unsuccessful, but the details are given here as a reminder to all those taking part in the tagging program to try and check details on tag cards, especially matching tag numbers used with cards prior to mailing or handing in to the club recorder.

Sailfish

There were four recaptures of tagged sailfish reported for 2016/17. Interestingly, each of the fish was tagged in a different location, two in the Gulf of Carpentaria (off Weipa and Groote Eylandt) and two off Western Australia (Broome and Dampier). All were short term recaptures (5 to 98 days) showing little movement from their release points (0 to 18 miles). Over the course of the tagging program, over 300 sailfish have been recaptured, and while a small number of these have indicated some movements as far as several hundred miles, the overwhelming majority have been recaptured close to their release points. This is especially true for sailfish tagged at Australian locations, both on the west and east coasts and more lately, in the Gulf of Carpentaria. Furthermore, many recaptures have occurred near release locations after times at liberty of one, two, three or even four years. It is generally accepted in these locations that sailfish are not present year round, so these results suggest annual homing, or 'philopatry', as mentioned also for black marlin. The general lack of recaptures away from tagging sites is, however, difficult to explain, but may simply be due to lack of fishing effort targeting sailfish in other areas.

Striped marlin

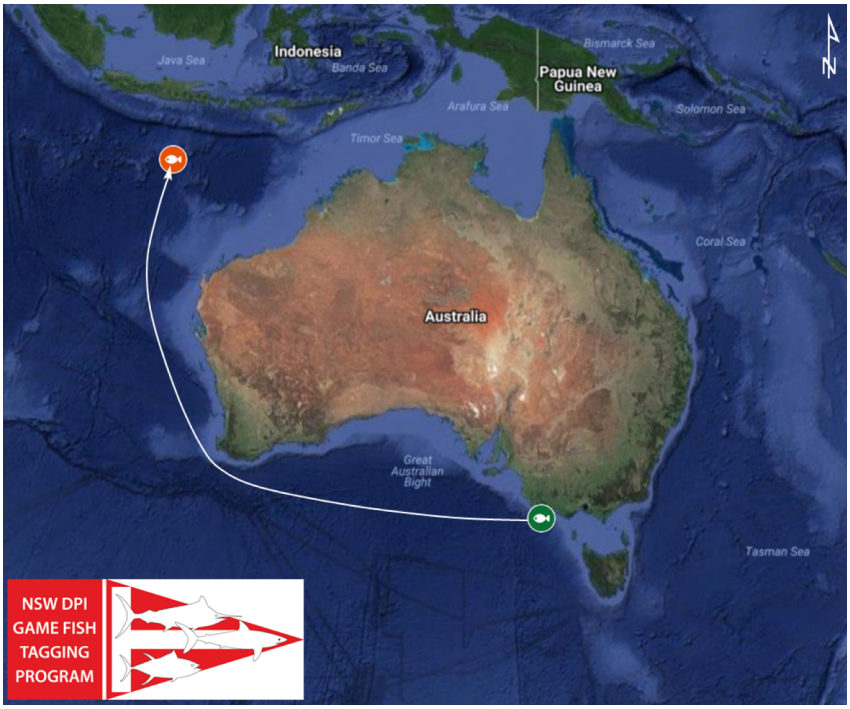
Six recaptures of striped marlin were reported in 2016/17, with all but one tag card received at the time of writing. All of these had been tagged off NSW (from Swansea to Merimbula) and interestingly, all were recaptured by recreational fishers off Bermagui/Narooma. Times between release and recapture ranged from 31 to 388 days and apparent distances moved between 7 and 221 miles. As noted in previous reports, the lack of long term recaptures of striped marlin is somewhat of a continuing mystery. Of more than 250 recaptures now recorded on the Program, only a very small proportion of these have been recaptured beyond one year at liberty, including the fish recaptured this year after nearly 13 months. The most likely explanation for this phenomenon (not seen in other billfish species) is that striped marlin have an innate tendency to reject tags at a higher rate than other species, although proving this would be very difficult.

Estimated at 110kg, this tagged striped marlin was caught and retagged off Narooma NSW in February 2016. It had been previously tagged less than 100 miles away, off Culburra, NSW in April 2016 when it was also estimated at 110kg. Its time-at-liberty of 308 days is typical for striped marlin recaptured on the program, with few recaptures recorded after more than one year.

Southern bluefin tuna (SBT)

Although the number of southern bluefin tuna (SBT) tagged during 2016/17 was well down on the previous year, 16 recaptures were reported. Many of these showed lengthy times at liberty, ranging from 224 days to more than five years. Apparent straight-line distances moved also covered a wide range, from just 4 miles (for a fish at liberty for nearly exactly two years) to 2,200 miles. One of these fish was tagged off Kangaroo Island SA in February 2015 and recaptured 850 days later by a commercial longliner off Hawkes Bay, on the east coast of the north island of New Zealand. During that time, its weight had increased from an estimated 18 kg to 35 kg. Recaptures of recreationally-tagged SBT off New Zealand are relatively rare, but this year, a second one was also reported. Tagged off Victor Harbour SA, in February 2016, this fish, estimated at 27 kg was also caught by a New Zealand commercial vessel 476 days later, this time off the west coast of South Island at which time it weighed 35 kg.

Also this year, a particularly noteworthy long distance recapture of a SBT was recorded. This was an estimated 20 kg fish tagged off Portland VIC in April 2014 and recaptured 905 days later, 250 miles south or the Indonesian island of Java by an Indonesian longliner – a minimum distance by sea of 2,900 miles. The region where the fish was recaptured has long been known to be the only spawning area for SBT, but in the past CSIRO scientists had tagged many thousands of juvenile SBT around southern Australia with very few being subsequently recaptured on the spawning grounds. The Portland-tagged fish, which at recapture weighed 55 kg, was recaptured on the grounds in late September – the start of the spawning season for the species. This is the first recapture of a recreationally-tagged SBT on the spawning grounds, although there have been 19 other recaptures in the Indian ocean, five of them off the coast of South Africa. This groundbreaking recapture again demonstrates the value of the Game Fish Tagging Program and the fact that new information is constantly being generated.



Release (green) and recapture (red) points of the first recreationally-tagged southern bluefin tuna to be recovered on the spawning grounds of the species. It had grown from about 20kg to 55kg during its 905 days of liberty.

The majority of the other recaptured SBT this year were tagged either off South Australia or western Victoria and caught by commercial purse seiners taking live fish for the tuna ranching industry based in Port Lincoln. These were generally small fish at release (6-10 kg), tagged in June and recaptured the following January/February. One exception to this pattern was a fish tagged off Bermagui NSW in June 2011 and recaptured more than 5 years later near Kangaroo Island SA.

A southern bluefin tuna of about 10kg tagged off Warrnambool, VIC in June, 2016. As has been the case for quite a number of other recaptured SBT, it was caught in a purse seine net off Kangaroo Island, SA and grown in a sea-cage near Port Lincoln for six months before being harvested in June, 2017, when the tag was discovered. At that stage, it weighed 26.2kg, having been fed on pilchards for some months.

Yellowtail kingfish

Recapture rates of tagged yellowtail kingfish have always been relatively high, showing an overall rate of 6.63% over the life of the tagging Program to date. In fact, this species accounts for 31% of all recaptures, even though it represents 8% of fish tagged. This means that every year, many reports of tagged kingfish are received, adding incrementally to our knowledge of the species, but also providing constant surprises as well.

This year, 76 recaptures of kingfish were reported (with 6 tag cards yet to be received). Times at liberty ranged from just one day to a new record for the Program for kingfish – 4,095 days, or 11 years 2 months and 16 days. That particular fish, estimated at just 2.5 kg at release, had been tagged in November 2011 off Mowarry Point on the far south coast of NSW, one of many tagged at that time. Then, in January 2017 it was recaptured off Forster NSW, about 320 miles from its release point and estimated at about 20 kg. Impressively, this fish smashed the previous time-at-liberty for kingfish by more than five years.

Of the 70 recaptured fish with release information, just eight had moved more than 100 miles, six of those having been tagged off South Australia at quite large sizes (16 to 23 kg). The two longest distances recorded by tagged kingfish this year were both by fish tagged off Port Augusta SA and recaptured in New South Wales, one off Seal Rocks after 423 days and the other, speared at Bluefish Point (Sydney) after 810 days. Seven previous tagged kingfish were also tagged off Port Augusta and recaptured on the east coast, the northernmost recapture point being Jumpinpin QLD. Note that the distances between release and recapture shown in Appendix I are measured as straight lines between the two points, so taking land masses into account, the two long distance swimming kingfish this year covered actual minimum distances of 1,250 and 1,150 nautical miles respectively.

Left: This kingfish, released on 3 July, 2016 off the 12 mile reef, Sydney, was recaptured 238 nautical miles to the north off South Solitary Island NSW almost a year to the day after its release. It had grown from 98cm to 110cm in that time.
Below: The kingfish that well and truly broke the record for the longest time-at-liberty for the species – 11 years! See text for details.

Samsonfish

An unusual number of samsonfish were recaptured this year, providing further information on the biology of this popular recreational species. A total of 15 recaptures were reported 14 of which had been tagged in a general area off Port Lincoln SA. All of these fish were recaptured close to their release points (apparent distances moved ranging from zero to 33 nautical miles), so it is interesting to note that, apart from two short term recaptures, the times at liberty of the remaining fish were all quite lengthy, ranging from 279 to 1,145 days. At release, the fish were estimated at sizes between 4 and 20 kg, but the apparent growth rates of most of the recaptured fish were minimal. This is in contrast to the close relative of samsonfish, the yellowtail kingfish, which has demonstrated some very rapid growth rates by tagged fish on this Program.

Other notable recaptures

There were two notable recaptures this year of species that are not normally encouraged to be tagged on the Program. One was a pink snapper that was tagged off Ardrossan SA in October 2008 and recaptured in November 2016 off Gulf St Vincent's, about 36 miles from its release point. During its 8 years 15 days at liberty, it had grown from 74 cm long and an estimated 5 kg to 94 cm and 12 kg in weight.

The second even longer time at liberty was recorded by a mulloway which coincidentally had also been tagged off Ardrossan SA. Released on 2 January 2004 at 74 cm and 3.5 kg, it was recaptured off Spencer Gulf 13 years and 3 months

later. During the intervening period, it had grown to 140 cm in length and a weight of 35 kg.

Value of release information

Again reiterating points made in previous reports, it is not just recaptures of tagged fish that make the Game Fish Tagging Program to valuable. The detection and quantification of changes through time in availability of fish or fishing activities of the recreational sector would not be possible in the absence of the tagging program. The tagging database is widely recognised by many scientific institutions as a vital source of information on long term trends in the relative abundance of pelagic fish, and is used wherever possible for studies on changes in abundance in relation to historic environmental variables (eg. Hill et al. 2015).

Recaptures with no tag cards

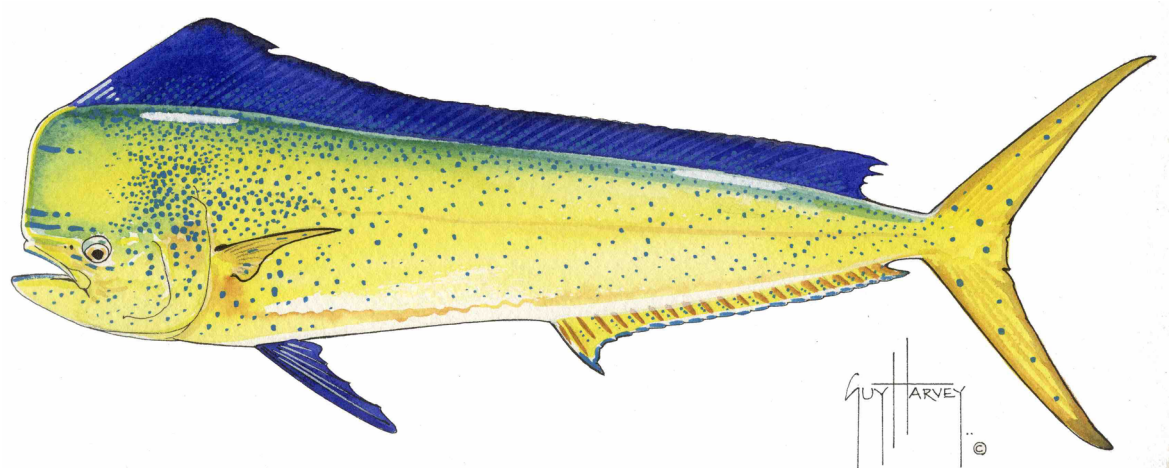
Each year, NSWDPI is notified of the recapture of some fish for which no tag card has been received. In many cases, the missing card is eventually sent, or is located by contacting club recorders or boat owners who have returned tag cards from the same batch of tags as the missing ones. In some cases though, cards are not received in which case, potentially valuable information is lost.

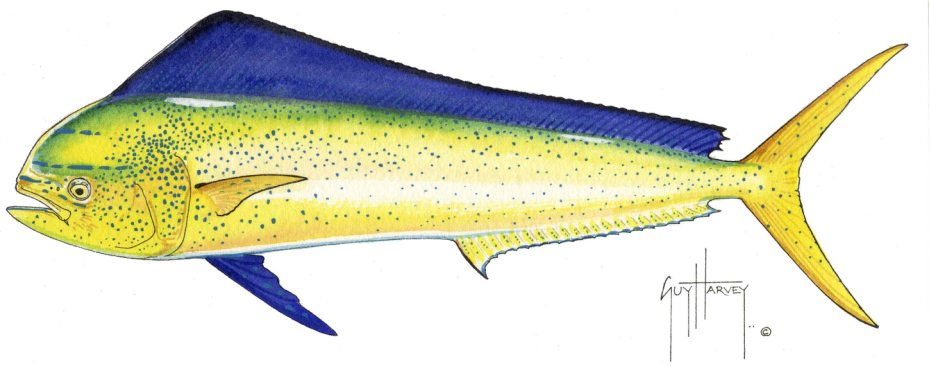
This year, information on 11 recaptures was received with no matching tag card, as yet, in the database. These are shown in the table below in the hope that the cards might be located, and to encourage the return of any completed tag cards, regardless of when the fish were released.

Table 3. Fish recaptured in 2016/17 for which no tag card has been received

Tag No	Species	Where recaptured	Date recaptured	Recapt Lngth (cm)	Recapt Wt (kg)
A524804	YELLOWTAIL KINGFISH	ROSE BAY	29/10/16	61	2
B118170	STRIPED MARLIN	DEE WHY WIDE	27/10/16	220	90
S112641	MAKO SHARK	NORAH HEAD CANYONS	1/1/17	–	15
S112541	MAKO SHARK	NORAH HEAD CANYONS	1/1/17	–	15
S248859	MAKO SHARK	MARLO (VIC)	28/3/17	120	–
A606173	YELLOWTAIL KINGFISH	SYDNEY (12 MILE REEF)	22/4/17	98	12
A598506	SNAPPER	DAWESVILLE (STH OF MANDU	20/4/17	68	5
A589229	YELLOWTAIL KINGFISH	SYDNEY (OAR)	18/4/17	53	–
A599241	YELLOWTAIL KINGFISH	BONDI	12/11/16	71	–
A592831	YELLOWTAIL KINGFISH	JERVIS BAY	7/12/16	72	–
A601951	YELLOWTAIL KINGFISH	PORT HACKING	1/9/16	84	–

Focus on: Dolphinfish (*Coryphaena hippurus*)





Each year, the tagging report takes a look at the biology of key species tagged on the Program. The following summary of the biology of the dolphinfish has been adapted from the book, 'Fishes of the Open Ocean' by Julian Pepperell (UNSW Press). Blue marlin illustration courtesy Guy Harvey.

Of all the fishes of the open ocean, the dolphinfish has been known to humans for the longest time. It is a relatively common inhabitant of the Mediterranean Sea, and the ancient Greeks and Romans were quite familiar with it, writing about its habits with obvious knowledge. Surprisingly accurate depictions of dolphinfish appear in Cretan frescoes and on Greek urns, so it is reasonable to assume that this fish was held in high regard. Mediterranean fishermen were well aware of the attraction of dolphinfish to floating objects, and used this to advantage, not only by fishing near floating debris, but also by constructing the first Fish Aggregating Devices (FADs) to make fishing for dolphinfish easy. As early as the mid sixteenth century, there is even evidence that aquaculture of dolphinfish was being attempted. The French naturalist Rondelet not only made accurate illustrations of the species, but gave accounts of Spanish fishermen keeping them alive in wicker pens for later sale at the markets.

The dolphinfish is the one of the most colorful denizens of the surface layers of the world's oceans. Its vibrant colors flash from bright yellow to gold to silver to iridescent blue. When caught, they usually show yellow coloration but can also flash brilliant purples or even exhibit a mirror-like surface.

There are two species of dolphinfish worldwide; the common dolphin (*Coryphaena hippurus*) and the somewhat rarer pompano dolphin (*Coryphaena equiselis*). The primary difference between the two is body depth – the common dolphin having its greatest body depth at about the level of the pectoral fin, while the pompano dolphin is deepest at mid body. The pompano dolphin does not attain the size of the common dolphin. The two species are characterized by a single long dorsal fin, a deeply forked tail, broad pelvic fins and in the males, a very high forehead.

There is no connection between dolphinfish and the marine mammal dolphin. The origin of the name, dolphinfish, is uncertain, but probably refers to its surface, fast-swimming habit, interspersed with arcing leaps, perhaps reminiscent of true dolphins.

Geographic range

Both species of dolphinfish occur in the three major oceans (Pacific, Atlantic and Indian), but the common dolphin has been recorded over the widest area. Dolphinfish are abundant throughout their range, especially around tropical and sub-tropical islands in all oceans.

Dolphinfish occur year round in the tropics, but in more temperate latitudes, their appearance is seasonal, coinciding with invasions of warm water masses.

Movements

There are two main tagging programs under which large numbers of dolphinfish have been tagged. They are the NSW DPI Game Fish Tagging program, through which over 26,000 common dolphinfish have been tagged off eastern Australia, and the program of the South Carolina Department of Natural Resources, in which 21,000 dolphinfish have been tagged off the eastern US.

In the Australian study, some 70% of 230 recaptures were made at the points of release near Fish Aggregating Devices (FADs) or other buoys. The remaining recaptures have indicated mainly short coastal movements, but some as far as 500km. The exception to this rule, and the furthest distance moved between release and recapture for an Australian tagged dolphin was a remarkable 1,810 nautical miles after 241 days at liberty. This fish was tagged north of Sydney at a size of only 40cm and recaptured at Fiji weighing 9.8kg. This general lack of long distance movements, especially offshore, is in direct contrast with results from the eastern US. There, while many were also short term recaptures, the average time at liberty was 40 days and average distance moved, an impressive 281 miles. One fish travelled 835 miles in only 9 days – an average of 93 miles per day while another moved 137 miles in a single day. And lastly, considering only tagged fish which moved away from the coast, the average distance travelled was a remarkable 1,560 miles. These results are perhaps indicative of the level of fishing for dolphinfish throughout the Caribbean (and therefore the chances of recaptures) compared with the situation off eastern Australia and neighbouring regions.

Growth and size

It is widely accepted that the dolphinfish is one of the fastest growing of all fishes. In captivity, male dolphinfish have grown from a pinhead sized egg to over 16 kg in only eight months.

One classic study of the growth rate of the species was carried out off southern Florida where scientists aged over 500 dolphinfish measuring between 47cm and 1.52 metres. The results indicated that one year old fish ranged in size from 47cm to 1.17 metres, two year olds (only nine fish) ranged from 1.0 to 1.13 metres, and that the largest fish, 1.52 metres long, was only 3 years old. At the time of the study, the all-tackle world record dolphinfish, weighing 35 kg, was aged, and estimated at only 4 years old, the presumed maximum longevity of the species.

Female dolphinfish only grow to about half the maximum size of males. This is thought to be due to the constant production of eggs (see below) which consumes much of their available energy.

The all-tackle record for dolphinfish was a 39.46 kg fish, caught off Costa Rica in 1976, but a considerably larger specimen, weighing 46 kg (just over 100 pounds) is reliably reported to have been caught off Puerto Rico in 1979.

Reproduction

Dolphinfish mature at a surprisingly small size. Off Florida, one study showed that female dolphinfish show signs of maturing at a length of only 35 cm, and are all fully mature at 55 cm (about 2 kg). Similarly, the smallest maturing males average about 42 cm long. All fish of both sexes were found to mature within their first year of life.

Dolphinfish are relatively easy to keep in captivity and will spawn quite readily. Through these observations, it has been shown that dolphinfish will spawn every second day for many months on end, the females releasing perhaps 100,000 eggs at a time. Spawning takes place at the surface, nearly always at night, and another interesting observation is that fish usually form pairs to spawn.

Larvae of dolphinfish have been found throughout the tropics and subtropics of the world's three major oceans, and the Mediterranean. It would appear then that dolphinfish will spawn in any suitable location, given availability of food and surface temperatures above 23-24°C.

Behaviour

It has been known for thousands of years that dolphinfish have a strong attraction for floating objects. Why this is so is uncertain. It may be for protection, for feeding or for orientation in an otherwise featureless oceanic void, but whatever the reason, fishers have used this characteristic to their advantage, either by fishing near floating objects, or mooring buoys or floats especially designed for the purpose. This tendency to find and stay near floating objects is also a feature which makes dolphinfish very welcome fellow travelers of mariners around the globe, and of shipwrecked sailors who have survived by catching the dolphinfish attracted to their rafts.

The diet of dolphinfish is remarkably varied, A study of the items found in the stomachs of 2,600 dolphinfish from the western Atlantic in 1984 found not only a wide variety of fish, crustaceans and squid in most stomachs, but also a significant quantity of plastic or other man-made items such as tar balls, cigarette filters, nylon string and even a light bulb!

Fisheries

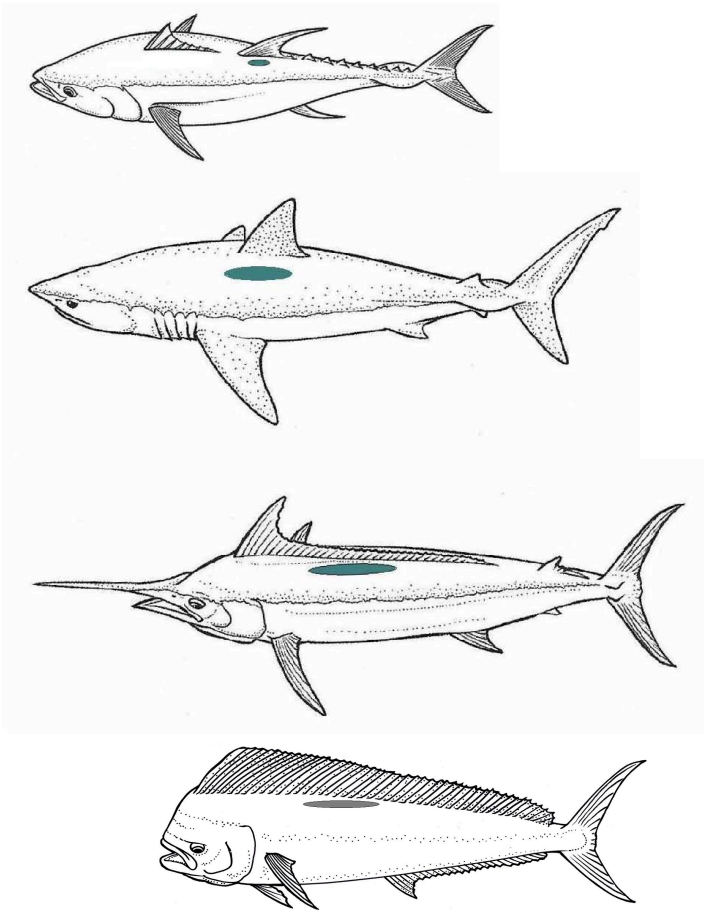
Dolphinfish are targeted commercially in the Caribbean, and many Pacific and Indian Ocean islands. The demand for dolphinfish in Hawaii (marketed as mahi mahi) is so high that large quantities need to be imported, with artisanal fisheries in the Philippines supplying much of this demand.

Sportfish anglers catch dolphinfish incidentally throughout much of their range. On the high seas, dolphinfish are a constant, and significant bycatch of the longline fleets of the world. One of the problems with attempting to estimate the dolphinfish bycatch though, especially of the distant water longline fisheries, is that a high proportion of them are discarded at sea, simply because they would take up valuable freezer space which is intended for the main target species, bigeye and yellowfin tuna. This issue of unseen, unrecorded bycatch of important species such as dolphinfish certainly needs to be addressed by management agencies.

The dolphinfish is widely regarded as one of the best eating fishes which swims in the surface layers of the ocean. This is particularly true when eaten fresh, but the flesh tends to dry out somewhat when frozen. In some areas of its range, a protozoan parasite (*Kudoa* sp.) infects the flesh of dolphinfish, causing it to become soft and mushy after death, even when placed on ice immediately after landing. Fortunately, the phenomenon only affects a small proportion of fish. Because it occurs in the wild, however, the parasite has caused problems in the development of dolphinfish aquaculture industries in some areas.

Tagging Tips

Recommended tagging areas



How to tag large game fish

- Once the angler brings the fish within range, the fish should be traced and led alongside the boat so that it presents a broad tagging target. It is usually best to keep the boat moving slowly forwards to enable better control of the fish.
- Once the fish is in position for tagging, the person handling the tag pole should take position behind the person tracing the fish to allow for a clear tag shot.
- An attempt to apply the tag should only be made if the fish is calm or subdued. The tag should be placed towards the middle of the fish, well above the lateral line towards the dorsal fin.
- For billfish and most sportfish, the fish should be tagged with a firm, well-aimed stroke—simply place the tag against the fish's flank and push. Do not stab. Sharks will require a firm jab in order to penetrate their tough skin.
- Once the tag has been placed, remove the hook if possible (a de-hooker can facilitate this) or cut the trace close to the fish's mouth.

- Revive any fish that appear to be exhausted or are struggling to remain upright in the water. A commonly used approach for billfish is to hold the fish firmly by its submerged bill whilst the boat moves forwards at 2 to 3 knots. This ensures a good flow of water over the fish's gills. The fish should only be released when it shows strong signs of life and displays improved skin colour, which may take several minutes or more. Exercise caution, especially in rough weather. Alternatively, use a snooter. This is a safe and effective tool for reviving billfish.
- Fill out the tag card immediately and return to NSW DPI (or your fishing club recorder) as soon as possible, otherwise tagging is of no value.

How to tag small game/sport fish

Smaller pelagic species may be removed from the water before tagging. This enables improved accuracy of tagging and may simplify hook removal. Often holding the fish on its back will lessen its 'flapping'. Try to prevent the fish damaging itself on hard, hot, or dry surfaces. A wet foam mat or similar is ideal (or a wet towel will suffice) for on-boat tagging.

Pelagic tags should be inserted by hand tagger or short pole, as they are designed to lock behind the bony structures of the dorsal fin or second dorsal fin in order to stay in position. Carefully insert the tag into the fish's back, close to the base of the fin and angled in so that it passes through the bony structures at the base of the fin. Try to insert the tag at an angle of at least 45° to reduce water friction and then twist the tag pole before removing it. In effect, you should be trying to hook the barb of the tag around one of these spines, which then locks the tag in place.

Tagging and improved survival tips

- Elect one crew member as the person in charge of the tagging equipment, to ensure that:
    - the number of the tag in position on the tag pole matches that on the tag card
    - details of the tagging are promptly recorded on the card
    - the card is handed to the fishing club recorder or mailed to NSW DPI as soon as possible

- Use non-offset circle hooks whenever possible when using live or dead baits. These hooks minimise deep hooking, foul hooking and bleeding and promote the survival of tagged fish.
- Keep your tag cards in an orderly bundle. This will help to ensure that tags do not become loose and fall out of their corresponding tag card
- Load your tagging pole with a tag before you hook a fish to ensure that it is attached properly and is readily available whenever you wish to tag a fish.
- Check the length of your billfish tag applicator 75mm is the optimal length for most billfish —this ensures that the tag is placed at the correct depth and reduces the risk of the tag being shed by the fish.
- Do not attempt to tag very active fish, especially if the fish is jumping at the side of the boat. Poor tag placement can injure fish or result in the tag being shed. The recommended tagging areas are shown below. It is better to release the fish without tagging, if accurate tag placement is not possible.

Estimating the size of tagged fish

This may be done by estimating the weight of the fish or by measuring the fish when it is in, or alongside the boat. If the fish is less than a metre in length it may be carefully brought on board and measured using a standard measuring tape. However, larger fish should remain in the water.

If you estimate the size of the fish (especially fish weight), get a consensus from all the crew immediately after release, and record immediately (first impressions are always best!).

For measuring length of fish in the water, it is best to rig up a simple tape measure. It helps if it is flexible, and at least 4 metres long. Attach a tennis ball to the zero end and when a fish is alongside, or being held at the back of the boat, float the tennis ball to the tail fork and get a measurement to the fish's snout, or to the tip of the lower jaw for billfish. For billfish, it is important that the recorded measurement should state where the fish was measured from and to (ie lower jaw to tail fork length or total length - tip of bill to end of tail).

Reporting a previously tagged fish

If an earlier tag is noticed on a fish, should the tag be retrieved and the fish re-tagged, or should the fish be kept for scientific examination? Unfortunately, there is no clearcut answer, but generally speaking, if the tag looks very fresh (ie, bright yellow or orange with no growth) then it is probably a very recent tag and the fish can be returned after first either recording the tag number, or better, cutting off the tag and putting another into the fish.
If the fish is small enough to measure, then this should be done, ideally from the tip of the snout to the fork in the tail (or if a billfish, from the tip of the lower jaw to the tail fork). Alternatively, if the tag is fairly obviously an old one, usually identified by being faded and covered with at least some growth, then the best advice is to keep the fish, if possible, for later scientific examination. It should be wrapped in plastic and frozen, and a call made to NSW DPI Nowra, or your local Fisheries Department, for advice. Very useful information can be gathered from inspection of recaptured fish, including more accurate growth rates, condition of released fish and effectiveness of different types of tags and tagging sites.

One other point regarding reporting recaptures of tagged fish should be kept in mind. In these days of nearly 100% release of billfish, previously tagged fish are quite often caught and re-released without being able to retrieve the earlier tag. If you do hook and release a fish which has a previous tag in place, you should definitely record the details (even though the tag number is unknown) and report the incident to NSW DPI (Fisheries) at Nowra as a genuine recapture. In this way, better statistics on actual recapture rates of billfish will be able to be maintained.

Contact the program

If you would like to contact the game fish tagging program either to obtain further information on the program, tags, or to report a recapture directly, call +61 (02) 4424 7411 or email gamefish.tagging@dpi.nsw.gov.au.

Acknowledgements

The Game Fish Tagging Program operated by NSWDPI is generously supported by the NSW Recreational Fishing Trust through funds raised from the Recreational Fishing Licence in that State. We also acknowledge the thousands of anglers, club officials, captains and crew who participate in the Program. Without this continued effort, our knowledge of the biology of pelagic fish would be much the poorer. This report was prepared with the assistance of Phil Bolton and Mick Gamble of NSWDPI.

Appendix I: All Recaptures of Tagged Fish Reported in 2016/2017.

Species	Date tagged	Release location	Days at liberty	Distance moved (nmi)	Direction
AUSTRALIAN SALMON	18/4/17	ROTTNEST ISLAND (WA)	13	10	SE
AUSTRALIAN SALMON	26/4/17	ROWBOAT ROCK (WA)	50	1	E
AUSTRALIAN SALMON	23/4/17	MEWSTONE (WA)	2	1	E
AUSTRALIAN SALMON	10/5/17	COCKBURN SOUND (WA)	12	1	W
AUSTRALIAN SALMON	3/5/17	MEWSTONE (WA)	42	30	S
AUSTRALIAN SALMON	12/5/17	YORKE PENINSULA (SA)	46	5	NE
AUSTRALIAN SALMON	27/11/16	KANGAROO ISLAND (SA)	55	1	W
BLACK MARLIN	15/9/16	BROADHURST REEF (QLD)	233	1416	NE
BLACK MARLIN	10/4/15	DAMPIER (WA)	494	5	SSE
BLACK MARLIN	29/7/16	DAMPIER (WA)	39	4	SE
BLACK MARLIN	6/6/16	DAMPIER (WA)	69	11	SE
BLACK MARLIN	15/8/15	DAMPIER (WA)	365	3	ESE
BLACK MARLIN	3/8/12	DAMPIER (WA)	1472	1	SE
BLACK MARLIN	10/6/16	FRASER ISLAND (QLD)	141	70	SW
BLACK MARLIN	21/6/16	FRASER ISLAND	281	469	SW
BLACK MARLIN	11/1/17	LITTLE SHIPS (QLD)	83	282	NE
BLACK MARLIN	21/2/14	MOOLOOLABA (QLD)	890	2250	NE
BLACK MARLIN	28/1/17	SOUTH WEST ROCKS (NSW)	57	252	N
BLACK MARLIN	12/1/17	HAT HEAD (NSW)	31	170	SSW
BLACK MARLIN	31/1/17	PORT STEPHENS (NSW)	21	162	SSW
BLACK MARLIN	29/2/16	PORT STEPHENS (NSW)	318	77	NNE
BLACK MARLIN	16/4/16	SYDNEY (NSW)	321	181	SSW
BLACK MARLIN	22/1/17	SYDNEY (NSW)	34	162	SSW
BLUE MARLIN	23/11/16	LAE (PNG)	0	344	ENE
BLUE MARLIN	25/3/16	FORSTER NSW	183	272	NE
BRONZE WHALER	16/2/14	COFFIN BAY (SA)	1096	78	ESE
BRONZE WHALER	1/3/17	SURFSIDE BEACH (NSW)	38	0	NW
BRONZE WHALER	14/4/17	SURFSIDE BEACH (NSW)	21	2	SSE
BULL SHARK	22/1/17	LOGAN RIVER (QLD)	4	0	NW
BULL SHARK	22/1/17	LOGAN RIVER (QLD)	6	6	SSE
BULL SHARK	22/1/17	LOGAN RIVER (QLD)	6	6	SSE
BULL SHARK	6/11/16	LOGAN RIVER (QLD)	64	4	NE
DOLPHINFISH	18/3/17	EDEN (NSW)	11	0	NW
DOLPHINFISH	20/3/17	EDEN (NSW)	6	0	NW
DOLPHINFISH	19/3/17	EDEN (NSW)	7	0	NW
GOLDEN TREVALLY	1/8/14	DAMPIER (WA)	729	1	E
GUMMY SHARK	10/12/16	PORT MACDONNELL (SA)	131	7	NNW
GUMMY SHARK	24/3/17	PORTLAND (VIC)	0	0	
GUMMY SHARK	6/8/16	PORT MACDONNELL (SA)	0	0	
MAKO SHARK	15/5/16	SYDNEY (NSW)	77	7	ESE
MAKO SHARK	25/11/16	JERVIS BAY (NSW)	86	92	SSW

Appendix I (contd.): All Recaptures of Tagged Fish Reported in 2016/2017

Species	Date tagged	Release location	Days at liberty	Distance moved (nmi)	Direction
MULLOWAY	2/1/04	ARDROSSAN (SA)	4840	64	WSW
SAILFISH	17/12/16	WEIPA (QLD)	5	0	NW
SAILFISH	18/9/16	GROOTE EYLANDT (NT)	13	4	SSE
SAILFISH	29/5/16	BROOME (WA)	98	18	WSW
SAILFISH	13/8/16	DAMPIER (WA)	14	5	NNW
SAMSON FISH	3/4/16	JURIEN BAY (WA)	235	0	NW
SAMSON FISH	18/4/17	GREENLY ISLAND (SA)	5	33	NE
SAMSON FISH	30/3/16	HUMMOCKS (SA)	372	1	S
SAMSON FISH	30/3/16	HUMMOCKS (SA)	373	16	SW
SAMSON FISH	26/2/15	ROCKY ISLAND (SA)	795	8	NE
SAMSON FISH	26/3/16	HUMMOCKS (SA)	279	1	N
SAMSON FISH	16/1/17	ROCKY ISLAND (SA)	19	2	S
SAMSON FISH	25/2/16	ROCKY ISLAND (SA)	360	0	NW
SAMSON FISH	29/12/15	ROCKY ISLAND (SA)	311	2	SSW
SAMSON FISH	7/3/15	ROCKY ISLAND (SA)	676	0	NW
SAMSON FISH	15/3/16	ROCKY ISLAND (SA)	375	13	NNE
SAMSON FISH	21/6/16	MEMORY COVE (SA)	322	3	S
SAMSON FISH	4/8/16	MARION BAY (SA)	310	14	ESE
SAMSON FISH	16/6/13	WEDGE ISLAND (SA)	1145	7	WNW
SAMSON FISH	6/2/16	MARION BAY (SA)	406	8	SE
SCHOOL SHARK	14/3/17	WEDGE ISLAND (SA)	58	21	NNW
SILVER TREVALLY	26/11/16	KANGAROO IS. (SA)	52	1	NNE
SNAPPER	17/10/08	ARDROSSAN (SA)	2938	36	SE
SOUTHERN BLUEFIN TUNA	14/3/15	HUMMOCKS (SA)	680	176	ESE
SOUTHERN BLUEFIN TUNA	6/5/16	CABBAGE PATCH (SA)	298	47	E
SOUTHERN BLUEFIN TUNA	12/6/16	CABBAGE PATCH (SA)	257	219	NNW
SOUTHERN BLUEFIN TUNA	4/6/16	CABBAGE PATCH (SA)	268	54	WNW
SOUTHERN BLUEFIN TUNA	15/1/15	CABBAGE PATCH (SA)	744	139	ESE
SOUTHERN BLUEFIN TUNA	17/1/16	CABBAGE PATCH (SA)	292	17	NW
SOUTHERN BLUEFIN TUNA	5/3/16	VICTOR HARBOUR (SA)	316	24	SSW
SOUTHERN BLUEFIN TUNA	14/2/15	KANGAROO ISLAND (SA)	714	4	W
SOUTHERN BLUEFIN TUNA	27/2/16	VICTOR HARBOUR (SA)	476	1488	ESE
SOUTHERN BLUEFIN TUNA	26/6/11	BERMAGUI (NSW)	1887	637	W
SOUTHERN BLUEFIN TUNA	19/7/15	PORT MACDONNELL (SA)	546	176	NW
SOUTHERN BLUEFIN TUNA	5/6/16	WARRNAMBOOL (VIC)	224	268	WNW
SOUTHERN BLUEFIN TUNA	7/4/14	PORTLAND (VIC)	905	2214	WNW
SOUTHERN BLUEFIN TUNA	3/4/15	PORT FAIRY (VIC)	654	239	NW
SOUTHERN BLUEFIN TUNA	7/2/15	SANDERS BANK (SA)	850	1894	ESE

Appendix I (contd.): All Recaptures of Tagged Fish Reported in 2016/2017

Species	Date tagged	Release location	Days at liberty	Distance moved (nmi)	Direction
STRIPED MARLIN	6/2/16	SWANSEA (NSW)	388	221	SSW
STRIPED MARLIN	20/4/16	BERRY (NSW)	308	83	SSW
STRIPED MARLIN	12/2/17	BERMAGUI (NSW)	62	9	SSW
STRIPED MARLIN	21/2/17	BERMAGUI (NSW)	31	7	SE
STRIPED MARLIN	4/2/17	MERIMBULA (NSW)	55	26	NW
TIGER SHARK	29/7/16	DAMPIER (WA)	48	25	ESE
WHALER SHARK	24/3/11	EXMOUTH (WA)	2037	18	SSW
WHALER SHARK	11/1/17	ELIZABETH REEF (NSW)	88	112	S
WHALER SHARK	17/11/12	KANGAROO IS. (SA)	1509	0	NW
YELLOWTAIL KINGFISH	10/1/15	SEAL ROCKS (NSW)	678	0	NW
YELLOWTAIL KINGFISH	1/12/16	PORT AUGUSTA (SA)	18	0	NW
YELLOWTAIL KINGFISH	20/11/16	PORT AUGUSTA (SA)	27	0	
YELLOWTAIL KINGFISH	10/11/16	PORT AUGUSTA (SA)	3	0	NW
YELLOWTAIL KINGFISH	10/11/16	PORT AUGUSTA (SA)	4	0	NW
YELLOWTAIL KINGFISH	2/11/16	PORT AUGUSTA (SA)	14	0	NW
YELLOWTAIL KINGFISH	15/10/16	PORT AUGUSTA (SA)	28	0	NW
YELLOWTAIL KINGFISH	10/10/16	PORT AUGUSTA (SA)	49	0	NW
YELLOWTAIL KINGFISH	29/7/16	PORT AUGUSTA (SA)	29	0	NW
YELLOWTAIL KINGFISH	23/4/16	PORT AUGUSTA (SA)	371	0	NW
YELLOWTAIL KINGFISH	4/11/15	PORT AUGUSTA (SA)	381	170	SW
YELLOWTAIL KINGFISH	3/11/15	PORT AUGUSTA (SA)	423	745	E
YELLOWTAIL KINGFISH	28/10/15	PORT AUGUSTA (SA)	402	0	NW
YELLOWTAIL KINGFISH	23/10/15	PORT AUGUSTA (SA)	382	0	NW
YELLOWTAIL KINGFISH	7/10/15	PORT AUGUSTA (SA)	410	0	NW
YELLOWTAIL KINGFISH	2/10/15	PORT AUGUSTA (SA)	421	0	NW
YELLOWTAIL KINGFISH	20/7/15	PORT AUGUSTA (SA)	471	0	NW
YELLOWTAIL KINGFISH	29/4/15	PORT AUGUSTA (SA)	481	0	NW
YELLOWTAIL KINGFISH	17/11/14	PORT AUGUSTA (SA)	710	38	SSW
YELLOWTAIL KINGFISH	6/9/14	PORT AUGUSTA (SA)	810	684	SE
YELLOWTAIL KINGFISH	19/12/16	NEWPORT (NSW)	99	5	S
YELLOWTAIL KINGFISH	19/12/16	NEWPORT (NSW)	176	5	SW
YELLOWTAIL KINGFISH	1/12/16	DEE WHY (NSW)	108	3	S
YELLOWTAIL KINGFISH	1/12/16	LONG REEF (NSW)	28	12	SW
YELLOWTAIL KINGFISH	22/11/16	LONG REEF (NSW)	24	77	SW
YELLOWTAIL KINGFISH	22/11/16	LONG REEF (NSW)	53	10	SW
YELLOWTAIL KINGFISH	9/11/16	MUGS REEF (NSW)	20	3	N
YELLOWTAIL KINGFISH	23/4/17	MIDDLE HARBOUR (NSW)	32	3	WSW
YELLOWTAIL KINGFISH	21/10/16	MIDDLE HARBOUR (NSW)	32	0	NW
YELLOWTAIL KINGFISH	9/9/16	MIDDLE HARBOUR (NSW)	24	0	NW
YELLOWTAIL KINGFISH	1/10/15	MIDDLE HARBOUR (NSW)	408	0	NW

Appendix I (contd.): All Recaptures of Tagged Fish Reported in 2016/2017

Species	Date tagged	Release location	Days at liberty	Distance moved (nmi)	Direction
YELLOWTAIL KINGFISH	1/3/17	MIDDLE HARBOUR (NSW)	46	0	NW
YELLOWTAIL KINGFISH	30/10/16	SYDNEY (NSW)	104	5	N
YELLOWTAIL KINGFISH	1/6/17	SYDNEY (NSW)	6	0	NW
YELLOWTAIL KINGFISH	9/3/17	SYDNEY (NSW)	14	2	NNE
YELLOWTAIL KINGFISH	24/4/17	SYDNEY (NSW)	4	0	NW
YELLOWTAIL KINGFISH	28/12/15	SYDNEY (NSW)	295	271	NNE
YELLOWTAIL KINGFISH	29/10/16	SYDNEY (NSW)	187	4	NW
YELLOWTAIL KINGFISH	11/7/16	SYDNEY (NSW)	213	2	NNE
YELLOWTAIL KINGFISH	21/3/17	SYDNEY (NSW)	32	3	NW
YELLOWTAIL KINGFISH	2/10/16	SYDNEY (NSW)	43	0	NW
YELLOWTAIL KINGFISH	12/11/16	SYDNEY (NSW)	88	2	SSW
YELLOWTAIL KINGFISH	2/10/16	SYDNEY (NSW)	64	4	NE
YELLOWTAIL KINGFISH	12/8/16	SYDNEY (NSW)	26	3	SW
YELLOWTAIL KINGFISH	6/10/16	SYDNEY (NSW)	92	5	NE
YELLOWTAIL KINGFISH	16/8/15	SYDNEY (NSW)	468	12	NW
YELLOWTAIL KINGFISH	28/2/17	BOTANY BAY (NSW)	53	4	NE
YELLOWTAIL KINGFISH	1/6/17	SYDNEY (NSW)	28	0	NW
YELLOWTAIL KINGFISH	20/5/17	SYDNEY (NSW)	1	0	NW
YELLOWTAIL KINGFISH	20/5/17	SYDNEY (NSW)	35	0	NW
YELLOWTAIL KINGFISH	21/9/15	PORT HACKING (NSW)	376	14	NE
YELLOWTAIL KINGFISH	15/12/16	PORT HACKING (NSW)	171	55	SW
YELLOWTAIL KINGFISH	15/12/16	PORT HACKING (NSW)	13	0	NW
YELLOWTAIL KINGFISH	25/10/15	PORT HACKING (NSW)	258	57	SW
YELLOWTAIL KINGFISH	24/12/16	PORT HACKING (NSW)	16	0	NW
YELLOWTAIL KINGFISH	4/12/16	PORT HACKING (NSW)	28	32	SSW
YELLOWTAIL KINGFISH	14/12/16	ARDROSSAN (SA)	87	76	SW
YELLOWTAIL KINGFISH	5/11/14	COFFIN BAY (SA)	747	170	NE
YELLOWTAIL KINGFISH	14/10/15	COFFIN BAY (SA)	396	170	NE
YELLOWTAIL KINGFISH	19/2/17	GREENLY ISLAND (SA)	14	0	NW
YELLOWTAIL KINGFISH	16/2/14	GREENLY ISLAND (SA)	1104	0	NW
YELLOWTAIL KINGFISH	12/1/17	HUMMOCKS (SA)	10	0	NW
YELLOWTAIL KINGFISH	6/1/17	HUMMOCKS (SA)	53	0	NW
YELLOWTAIL KINGFISH	19/7/16	HUMMOCKS (SA)	237	8	NE
YELLOWTAIL KINGFISH	26/3/16	HUMMOCKS (SA)	286	1	N
YELLOWTAIL KINGFISH	21/3/15	HUMMOCKS (SA)	583	195	NE
YELLOWTAIL KINGFISH	28/4/16	THISTLE ISLAND (SA)	99	6	WNW
YELLOWTAIL KINGFISH	26/10/14	POINT PERPENDICULAR (NSW)	911	2	WNW
YELLOWTAIL KINGFISH	14/3/17	WEDGE ISLAND (SA)	5	77	WNW
YELLOWTAIL KINGFISH	11/11/05	MOWARRY POINT (NSW)	4095	322	NNE

Appendix II: NSW DPI Game Fish Tagging Program
Top Tagging Boats and Anglers for 2016/2017

NSW DPI would like to recognise the boats and anglers that have provided exceptional contributions to the program over the past season. These boats and anglers are shown in the table below with the numbers of fish that they tagged over the 2016/2017 season. We will continue to develop these end of season summaries and acknowledge the strong supporters of the tagging program in future years.

Species	Top boat	Runner up boat
Billfish combined	**96 - *Chaos* (QLD) Sunshine Coast GFC**	**87 - *The Wench* (QLD) King Bay GFC**
Black Marlin	**75 - *Chaos* (QLD) Sunshine Coast GFC**	**42 - *The Wench* (QLD) King Bay GFC**
Blue Marlin (International)	**60 - *Blue Marlin Magic* (Tonga) Vava'u SFC**	**12 - *Backload* (PNG) Lae GFC**
Blue Marlin (Australia)	**20 - *Chaos* (QLD) Sunshine Coast GFC, 20 - *Mistress* (QLD) Gold Coast GFC**	**16 - *Caboom* (QLD) Gold Coast GFC, 16 - *Jugs* (QLD) Gold Coast GFC**
Striped Marlin	**62 - *Happy Hour* (VIC) Latrobe Valley GFC**	**58 - *Head Hunter* (NSW)**
Sailfish	**34 - *Get N Any* (QLD) Weipa Billfish Club**	**32 - *The Wench* (WA) King Bay GFC**
Shortbill Spearfish	**2 - *Seaduce* (NSW), *Sojurn* (NSW), *True Grit* (NSW)**	**1 - (*14 Recreational Vessels*)**
Swordfish	**4 - *Terminator* (TAS) GFC of Northern Tasmania**	**3 - *Cleavedge* (NSW)**

Species	Top boat	Runner up boat
Shark combined	**63 - *Tantrum* (NSW) Sydney GFC**	**41 - *Reel Hooked* (SA) Adelaide GFC**
Mako Shark	**9 - *Just Livin* (NSW) Shellharbour GFC, *Mr Magoo* (NSW) Port Hacking GFC**	**8 - *Far Out II* (VIC) South Gippsland GFC, *The General Lee* (TAS) ST Helens GFC**
Blue Shark	**11 - *Casey* (NSW) Sydney GFC**	**8 - *Baitwaster* (SA) Port MacDonnell OAC, *Intruder* (SA) Port MacDonnell OAC**
Tiger Shark	**13 - *Blue Stuff* (WA) Nickol Bay SFC**	**7 - *Razor Back* (WA) Exmouth GFC**
Whaler Shark	**57 - *Tantrum* (NSW) Sydney GFC**	**33 - *Stainless Still* (NSW) Wollongong GFC**
Hammerhead Shark	**7 - *Ahh Datts Betta* (NSW) Wollongong GFC**	**5 - *The Hulk* (NSW) Eden S & GFC**
Thresher Shark	**5 - *Reel Scream* (VIC) Warrnambool Offshore & Light Game Fishing Club**	**1 - *Reel A Peel* (NSW) Newcastle & Port Stephens GFC**
Tuna combined	**192 - *Spartacus* (SA) GFC of SA**	**116 - *Broadbill* (SA) GFC of SA**
Yellowfin Tuna	**21 - *Oceanic* (WA) Geraldton Districts OAC**	**17 - *Mandalay* (WA) Perth GFC**
Southern Bluefin Tuna	**192 - *Spartacus* (SA) GFC of SA**	**107 - *Broadbill* (SA) GFC of SA**

Species	Top boat	Runner up boat
Bigeye Tuna	**1 - *Tagged by Commercial Vessel* (NSW)**	
Albacore Tuna	**39 - *Out For* (NSW) Merimbula BG & LAC**	**17 - *4 Play* (TAS) GFC of Northern Tasmania**
Longtail Tuna	**10 - *Tag Team* (QLD) Weipa Billfish Club**	**9 - *Giddy Up* (QLD) Moreton Bay GFC**
Dogtooth Tuna	**1 - *Big Cat Tender* (QLD) Adelaide GFC**	
Spanish Mackerel	**20 - *Allure* (WA) Geraldton Districts OAC**	**16 - *Defiant One* (WA) Geraldton Districts OAC**
Mahi Mahi	**27 - *Polaris* (NSW) Eden S & GFC**	**26 - *The Hulk* (NSW) Eden S & GFC**
Yellowtail Kingfish	**77 - *Oceanhunter* (NSW) Ocean Hunter Sports Fishing Charters**	**39 - *Reel Therapy* (SA) Absolute Fishing Charters**

Species	Top individual	Runner up individual
Billfish	**41 - Tyrone O'Connor (NSW) Bermagui BGAC**	**36 - Scott MacGowan (WA) King Bay GFC**
Shark	**44 - Patrick Shaw (NSW) Sydney GFC**	**35 - Hugh Magarey (SA) Adelaide GFC**
Tuna	**39 - Ashley North (SA) GFC of SA**	**28 – Alexandra Czabayski (SA) GFC of SA**