NSW DPI GAME FISH TAGGING PROGRAM

REPORT 2017-2018

Recreational Fishing Trusts

NSW GOVERNMENT Primary Industries

Pepperell Research
Marine Science & Recreational Fisheries

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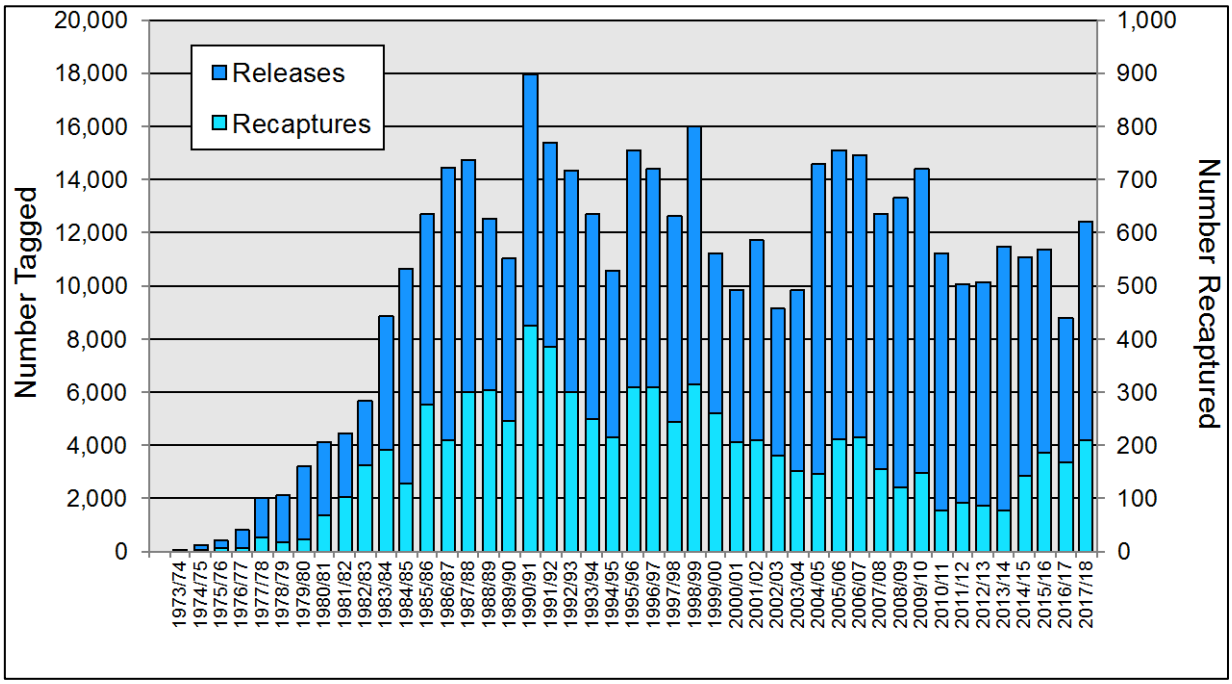
INTRODUCTION

During 2017/18 the total number of fish tagged on the program was 12,386, a big increase on last year's total and the highest tally since 2009/10. In addition, 208 recaptures of tagged fish were reported during the year, the most since 2006/07.

Figure 1 shows the number of fish tagged and recaptured since the origin of the program to July 2018. 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 12,500, made up of varying proportions of species of fish tagged in different years. The total 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 significant increase in numbers of fish tagged in 2017/18 compared with the previous year was mainly contributed by marked increases in tagging of all three marlin species and sailfish. These and other factors are discussed further in the report.

FIGURE 1. NUMBER OF FISH RECAPTURED BY YEAR, 2017/18.



Cover photo: Gina Cleaver releasing a nice black marlin off Jervis Bay NSW. Photo: Chris Cleaver

THE PROGRAM TO DATE

As at the end of June 2018, the grand totals of fish tagged and recaptured on the program stood at 470,961 and 8,208 respectively (Table 1), continuing the program's status as the largest of its kind in the world. The table summarises taggings and recaptures of the main 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 just over 70,500 tagged (15% 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 1974-2018.

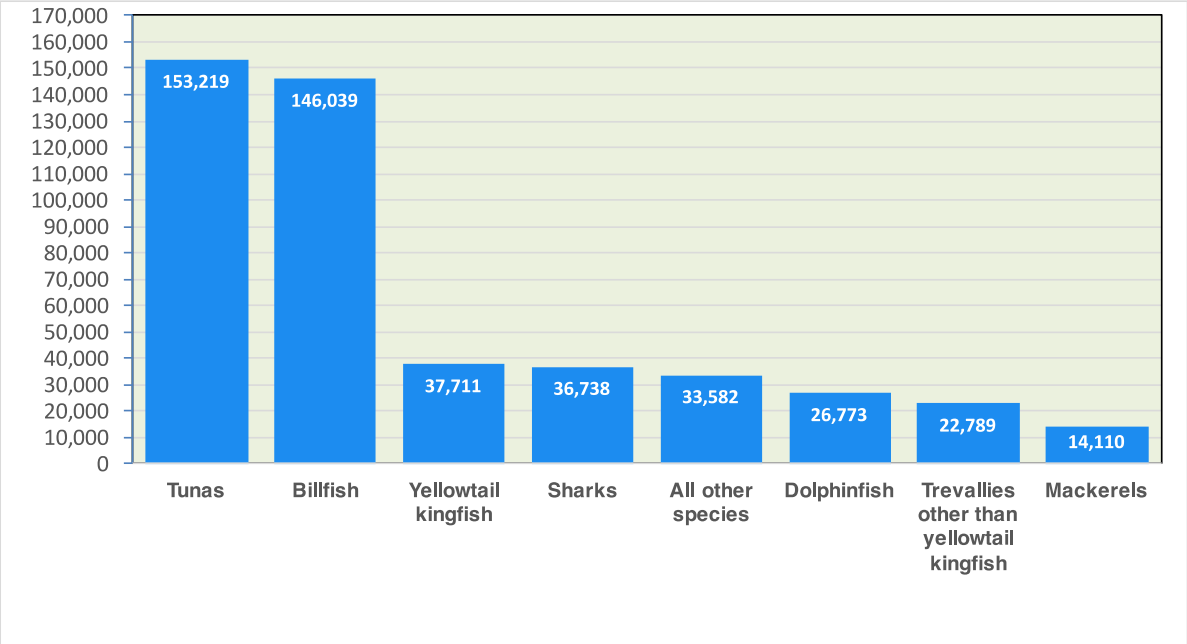
Species	Total Tagged	Recaptured	% Recapture
BLACK MARLIN	70,526	555	0.79
YELLOWFIN TUNA	38,263	708	1.85
YELLOWTAIL KINGFISH	37,711	2,541	6.74
SAILFISH	33,489	341	1.02
STRIPED MARLIN	29,483	258	0.88
DOLPHINFISH	26,773	246	0.92
SOUTHERN BLUEFIN TUNA	26,310	208	0.79
ALBACORE	22,333	171	0.77
STRIPED TUNA	21,503	68	0.32
MACKEREL TUNA	20,820	62	0.30
BONITO	13,247	219	1.65
BLUE MARLIN	11,770	39	0.33
AUSTRALIAN SALMON	10,414	634	6.09
SPANISH MACKEREL	9,459	93	0.98
MAKO SHARK	8,444	191	2.26
WHALER SHARKS	14,086	290	2.06
SILVER TREVALLY	7,149	200	2.80
HAMMERHEAD SHARKS	5,782	61	1.05
BLUE SHARK	5,170	78	1.51
LONGTAIL TUNA	5,077	59	1.16
TAILOR	4,032	122	3.03
QUEENFISH	3,472	10	0.29
TREVALLY	3,415	31	0.91
BARRACUDA	3,392	6	0.18
SAMSON FISH	2,930	108	3.69
GIANT TREVALLY	2,746	37	1.35
OTHER SPECIES COMBINED	33,165	872	2.63
TOTAL	**470,961**	**8,208**	**1.74**

*Whaler sharks in this table include the following tag card entries: Whaler, bronze whaler, bull shark, black tip whaler, white tip shark and Galapagos shark.

**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 combined remain the group tagged in the largest numbers – 153,219 tagged, or 32.5% of the total, followed by billfish – 146,039 – 31.0% of all fish tagged. A single species, yellowtail kingfish, with 37,711 tagged, accounts for 8.0% of all taggings while the total number of sharks combined (36,738) constitute 7.8% of the total number of fish tagged on the Program.

FIGURE 2. TOTAL NUMBERS OF FISH TAGGED AS SPECIES GROUPINGS, 1974-2018.



SPECIES SUMMARY OF TAGGING ACTIVITY FOR 2017/18

Table 2 lists the numbers of all fish tagged and recaptured during 2017/18. As has been the case for some time, the six species tagged in highest numbers continue to be black marlin, striped marlin, southern bluefin tuna, blue marlin, sailfish and yellowtail kingfish, although their positions on the 'leaderboard' may change from year to year depending on their relative abundance. Of particular note this year was the total number of billfish tagged – 7,491, which is an all-time record since the beginning of the program. This was heavily contributed to by the near record number of black marlin tagged (see below) but numbers of striped marlin, blue marlin and sailfish were also well up on the previous year's totals.

TABLE 2. NUMBERS OF ALL SPECIES OR SPECIES GROUPS TAGGED AND RECAPTURED DURING 2017/18.

Species	Total Tagged	Total Recaptures
BLACK MARLIN	3414	26
STRIPED MARLIN	1809	6
SOUTHERN BLUEFIN TUNA	1359	21
SAILFISH	1114	5
BLUE MARLIN	1109	5
YELLOWTAIL KINGFISH	844	90
DOLPHINFISH	362	2
WHALER SHARK	352	4
SAMSON FISH	308	15
BRONZE WHALER	225	6
MAKO SHARK	146	4

Species	Total Tagged	Total Recaptures
ALBACORE	113	2
HAMMERHEAD SHARK	102	2
GOLDEN TREVALLY	77	
QUEENFISH	76	
BLUE SHARK	74	
SPANISH MACKEREL	70	5
STRIPED TUNA	70	
TIGER SHARK	57	2
AUSTRALIAN SALMON	55	3
COBIA	54	2
MACKEREL TUNA	56	
YELLOWFIN TUNA	50	1
SPOTTED MACKEREL	47	
LONGTAIL TUNA	46	
BULL SHARK	36	1
GALAPAGOS SHARK	35	
SILVER TREVALLY	34	
GUMMY SHARK	33	3
WAHOO	30	
SCHOOL MACKEREL	27	
BARRACUDA	26	
GIANT TREVALLY	26	
BROADBILL SWORDFISH	24	1
EAGLE RAY	22	
SCHOOL SHARK	21	
SHORTBILL SPEARFISH	21	1
GOLD SPOTTED TREVALLY	15	
TREVALLY	8	
BLACKTIP SHARK	7	
LEMON SHARK	6	1
BROAD BARRED MACKEREL	5	
BONITO	3	
CHINAMAN	3	
DOGTOOTH TUNA	3	
THRESHER SHARK	3	
WHITE SHARK	3	
AMBERJACK	2	
BIGEYE TUNA	1	
PORBEAGLE SHARK	1	
RAINBOW RUNNER	1	
SHOVEL NOSE SHARK	1	
TOTAL	12386	208

BLACK MARLIN

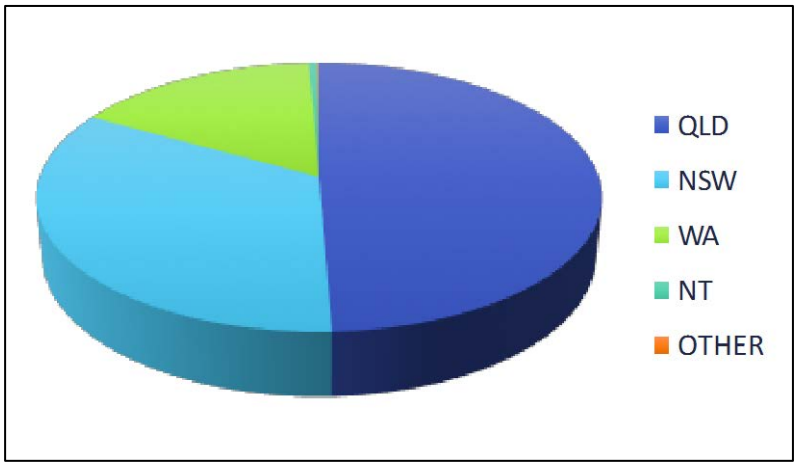
As was the case in 2016/17, black marlin topped the list with 3,414 fish tagged, nearly double the number for last year. In fact, this was a near record year for black marlin tagging over the whole history of the program, only surpassed in 1996/97, one of the strongest La Nina years on record.

Following a weak run of juvenile black marlin along eastern Australia in 2016/17, this year saw a strong recruitment of small to very small fish (5 to 10 kg), initially off Cairns and Townsville and later inside Fraser Island, southern Queensland. This run continued off the Sunshine Coast and Gold Coast, extending into New South Wales, especially off Seal Rocks and Port Stephens.

In Western Australia, the two main game fishing regions of Exmouth and Dampier, both experienced good shows of small black marlin in the 15 to 20 kg range, with a total of 410 tagged off Exmouth (a big increase from the previous year) and 144 off Dampier. For the second year running, no black marlin were tagged off Broome, although this more reflected a change to tagging practices there than lack of fish (see below under 'Sailfish').

Other areas where black marlin were tagged included Weipa, in the Gulf of Carpentaria (23), the Northern Territory off Darwin (20) and just three in other areas (PNG and Tonga) (Figure 3).

FIGURE 3. PROPORTIONS OF BLACK MARLIN TAGGED BY STATE, 2017/18.



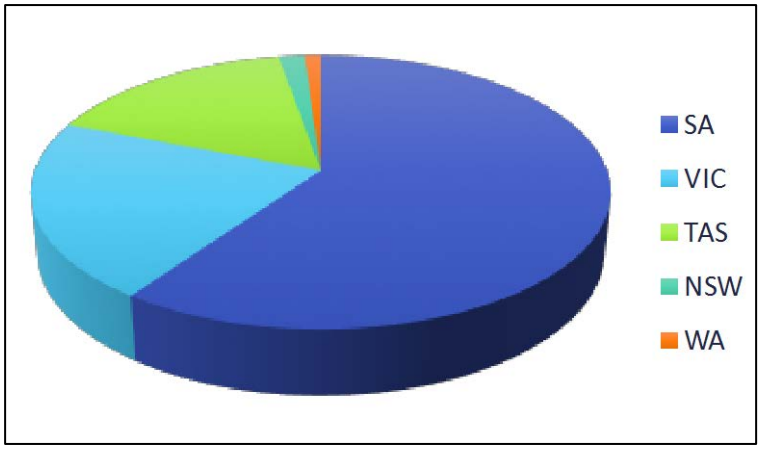
The number of black marlin reported tagged during the heavy tackle season off Cairns/Lizard Island continued the trend over the past several years of a marked decline compared with earlier years. This year, 106 fish were tagged during the season, similar to the 92 tag records from last year. As indicated in previous reports, these numbers are far fewer than the actual numbers of fish released – as evidenced by reports through the season on social media websites, especially the comprehensive blog, www.blackmarlinblog.com. The reasons for this decline in usage of tags over time in the fishery are mainly due to decisions of charter captains not to tag most if not all black marlin brought to the boat (except perhaps during tournaments when fish must be tagged to earn points). In a fishery such as this, with a high rate of release, tag cards can be used as a surrogate for total catch through time, so in this case, and also for the sailfish fishery off Broome, WA (see below), the use of release cards is being considered in order to continue the long-term recording of total released catch, with or without a tag.

One interesting final statistic for the year: Of the 3,414 black marlin tagged overall, 58% were estimated at 30 kg or less, while 93% were estimated at under 100 kg.

SOUTHERN BLUEFIN TUNA

A total of 1,359 southern bluefin tuna (SBT) were tagged in 2017/18, an increase from the previous year (1,126). Figure 4, shows that nearly 60% of SBT tagged this year were released in South Australia, followed by Victoria (21%) and Tasmania (16%). As is usually the case, numbers tagged in New South Wales and Western Australia were very small (23 and 14 respectively).

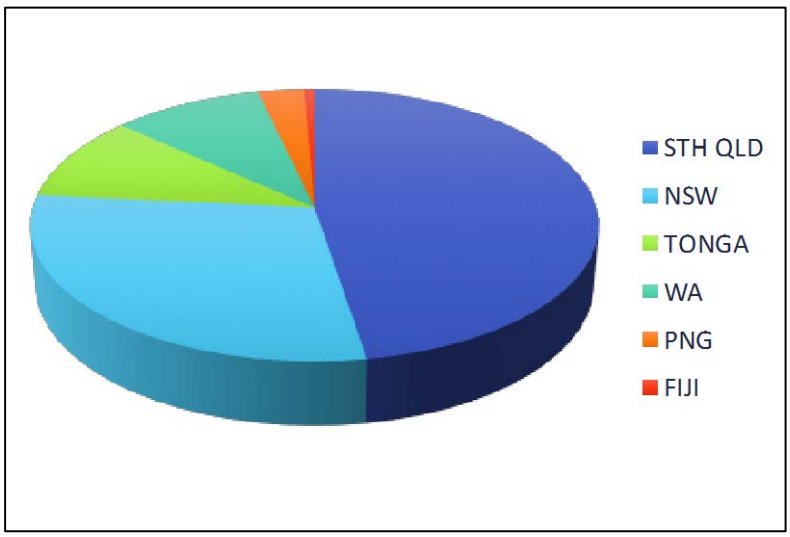
FIGURE 4. PROPORTIONS OF SOUTHERN BLUEFIN TUNA TAGGED BY STATE, 2017/18.



BLUE MARLIN

With an impressive total of 1,109 tag cards received, 2017/18 was the first year that numbers of blue marlin tagged surpassed 1,000. Figure 5 shows tagging effort was spread mainly between southern Queensland (521 tagged) and New South Wales (320), with good numbers also recorded around Tonga (111) and off Exmouth, Western Australia (107). While most of the blue marlin encountered off eastern and western Australia tend to be larger than 100 kg, there were quite a few fish tagged this year in the 50 to 100 kg range off the east coast, usually an indicator of warmer than usual water in the southerly flowing East Australia Current.

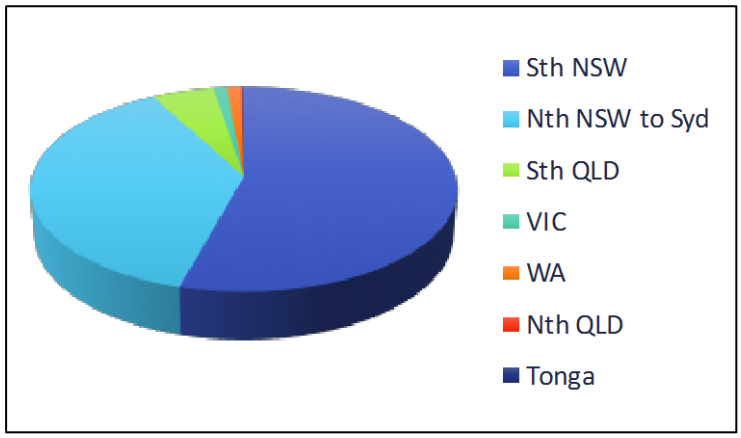
FIGURE 5. PROPORTIONS OF BLUE MARLIN TAGGED BY REGION, 2017/18.



STRIPED MARLIN

2017/18 was a strong year for tagging striped marlin. A total of 1,809 fish were tagged, over half of which were on the south coast of New South Wales, extending to the waters off Eden and as far south as Mallacoota in Victoria (Figure 6). The majority of the other tagged striped marlin were released off the Port Stephens area, especially at a site as 'the car park', where the species regularly aggregates to feed on large schools of baitfish.

FIGURE 6. PROPORTIONS OF STRIPED MARLIN TAGGED BY REGION, 2017/18.

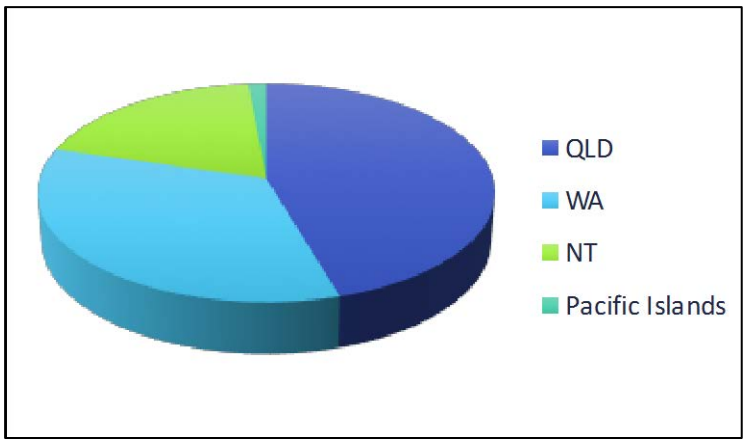


SAILFISH

While the total number of sailfish tagged in 2017/18 (1,114) remained relatively high, as was noted last year, changes to local fishing practices in Broome, WA, where historically, large numbers of sailfish have been tagged annually, resulted in a virtual cessation of tagging from that port (just three were tagged there this year). However, a total of 218 sailfish were released without tagging from just 10 boats during the annual Broome Billfish Tournament. Release cards are now being used in this area which will be considered for compiling with tagging program data.

As can be seen in Figure 7, the gap created by lack of tagging of sailfish off Broome has been picked up by more tagging in other areas, in particular, off Weipa in the eastern Gulf of Carpentaria (390 tagged), and off Darwin in the Northern Territory (189 tagged).

FIGURE 7. PROPORTIONS OF SAILFISH TAGGED BY REGION, 2017/18.



YELLOWFIN TUNA

Yellowfin tuna are included here, not because of large numbers tagged, but for the opposite reason. In the past, yellowfin tuna have often been among the top four or five species tagged on the program, especially off New South Wales, where numbers tagged usually exceeded 500 per year, and up to 2,000 or more in some years. Following a marked decline in 2009, numbers of yellowfin tagged have continued to decline to historic lows. In 2017/18, just 50 yellowfin tuna were tagged, only 23 of which were tagged off New South Wales, the fourth year running when the total has been less than 50 fish. A research project funded by the NSW Recreational Fishing Trusts is currently examining possible causes for this apparent marked decline in availability of yellowfin tuna to the recreational fishery off NSW.

TAGGING TRENDS OVER TIME

In reviewing the numbers of different species of gamefish tagged over this long running program, it is clear that these 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 8), while individual graphs for ten of the key species tagged for the past 11 years are shown in Figure 9. One point to note when examining these graphs is that Figure 8 shows the same scale for numbers tagged of all species, while in Figure 9, the numbers tagged – shown on the vertical axes – are not to scale, but more easily show relative fluctuations by species through time and covering double the time frame of Figure 8.

FIGURE 8. NUMBERS OF THE MAIN SPECIES AND SPECIES GROUPS TAGGED IN 2017/2018 AND THE PREVIOUS FOUR YEARS.

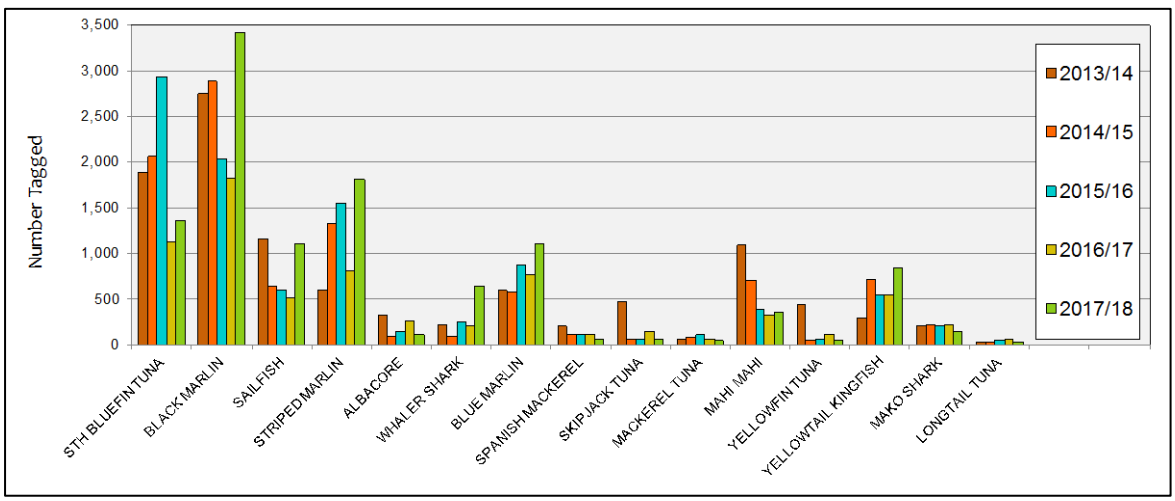
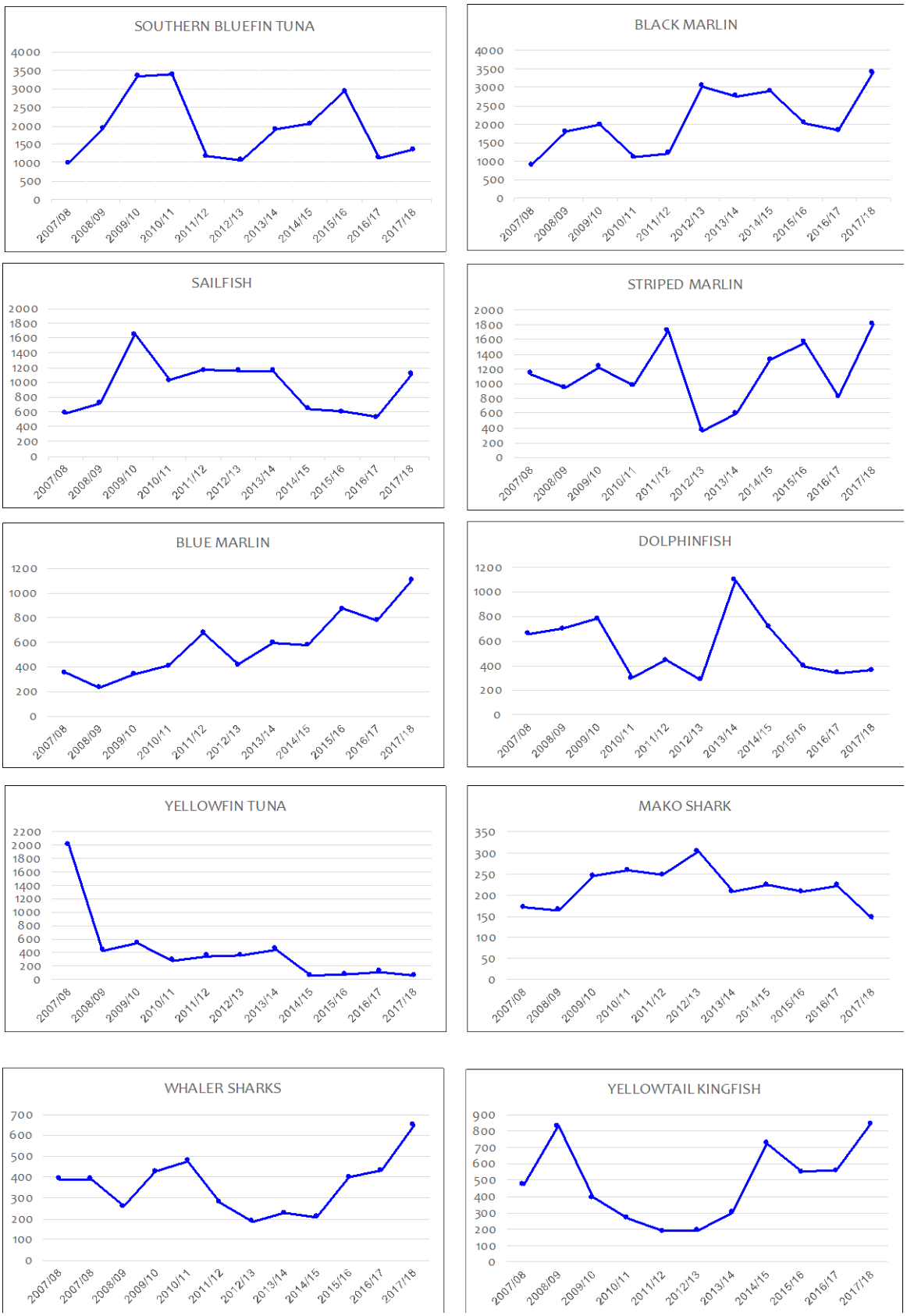


FIGURE 9. INDIVIDUAL PLOTS OF NUMBERS OF KEY GAMEFISH SPECIES TAGGED OVER THE PAST 11 YEARS.



Focusing in turn on particular species shown in Figure 9, we see quite large fluctuations in numbers of southern bluefin tuna tagged over the given timeframe, 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 and then a drop again to around 1,000 fish tagged, numbers kicked up again in 2017/18 to over 1,400.

Black marlin tag numbers had been showing a slow decline over the previous four years, but as noted, rose to near record levels in 2017/18. Similarly, numbers of sailfish tagged had been relatively low for the past three years, but increased markedly in 2017/18, due in large part to greatly increased tagging off Weipa in the Gulf of Carpentaria. 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, almost certainly reflecting targeting behaviour of game fishers. Numbers of dolphinfish tagged from year to year are highly variable, 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 numbers since 2014/15. The number of mako sharks tagged has been relatively steady over the past decade, albeit with a dip for 2017/18, while numbers of whaler sharks (combined species), from a low base 3 to 5 years ago, have shown a steady increase to a record high in 2017/18. Finally, for yellowtail kingfish, following a dip in the early 2010s, numbers climbed steadily to match in 2017/18 the number tagged ten years earlier. It should be noted that, in the case of yellowtail kingfish, changes in tagging have been influenced by angler behaviour and Department support.

Combining the species tagged into species or species groups, Figure 10 shows that billfish dominated overall taggings in 2017/18, comprising 60.5% of all fish tagged – considerably higher than the previous year (51.5%) or the year before (45.1%) and continuing a trend of much higher numbers than for more 'average' years when billfish have averaged between 30 and 35%. On the other hand, the proportion of tunas tagged represented just 13.7% of the total in 2017/18, down from 20.5% last year and 30% the year before. Sharks represented 8.9% of the total tagged in 2017/18, compared with a high of 12.3% last year, but still higher than the average of about 7% over the last decade or so.

FIGURE 10. SPECIES GROUPS TAGGED IN 2017/2018.

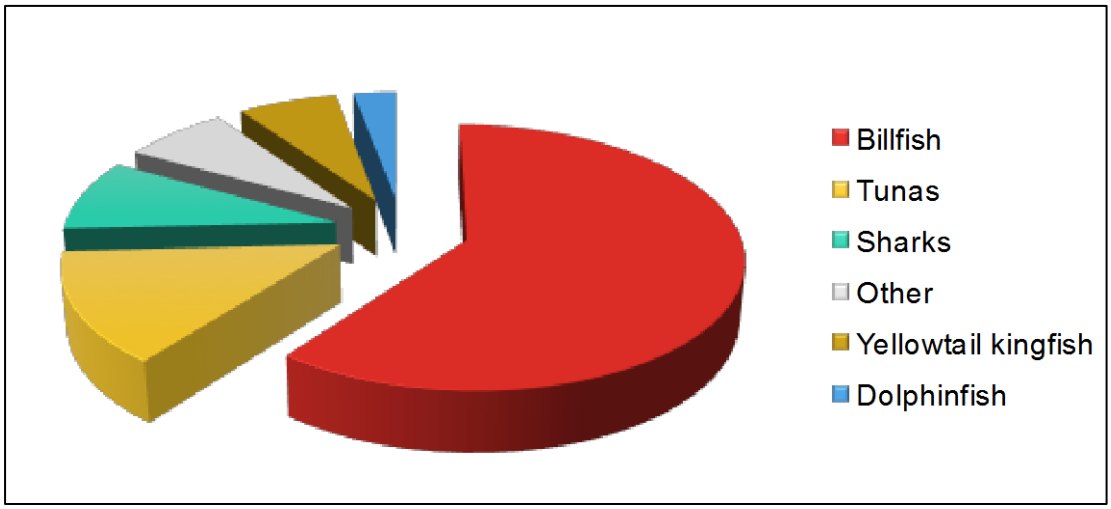
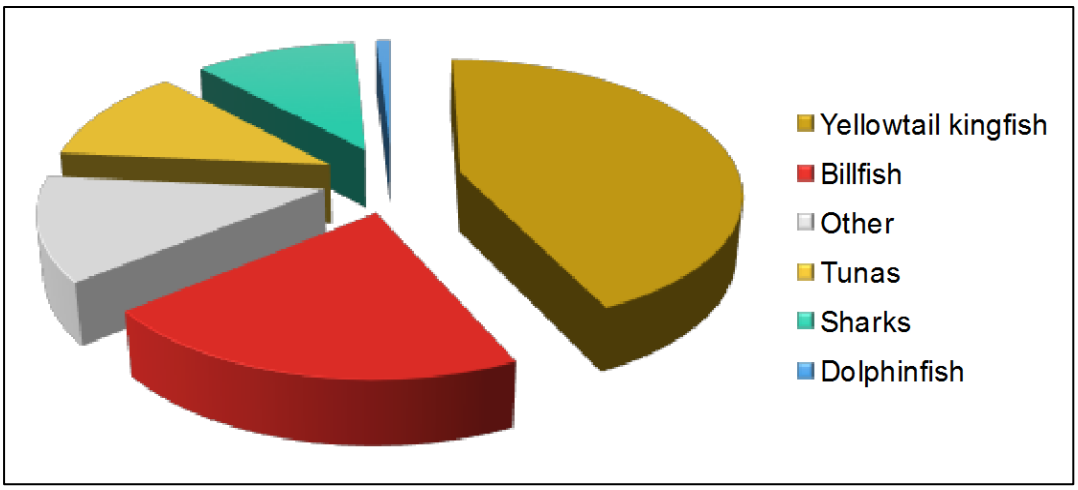


Figure 11 shows the proportions of the major species groups recaptured in 2017/18, and as is usually the case, indicates quite different proportions to those tagged. This year, yellowtail kingfish again dominated, with 52.9% of all recaptures (45.3% last year and 37.5% the year before) while billfish represented the next highest proportion of recaptures at 25.9% (16.5% last year and 24.5% the year before). Shark recaptures as a proportion of the total (13.5%) were similar to last year (14.1%) remaining considerably higher than the year before (8.7%).

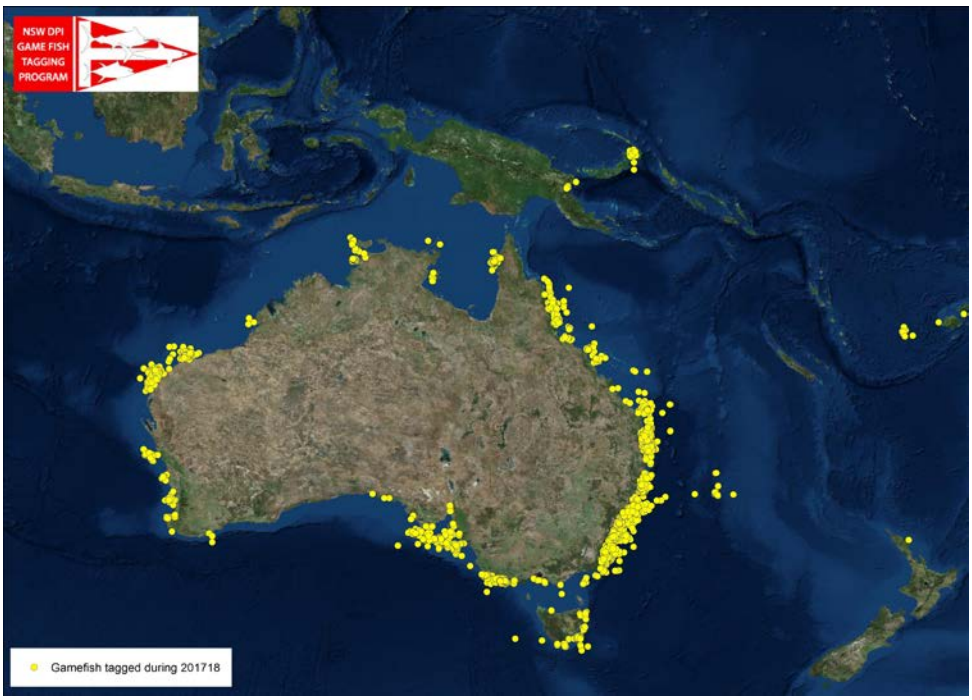
FIGURE 11. SPECIES GROUPS RECAPTURED IN 2017/2018.



DISTRIBUTION OF TAGGING EFFORT IN 2017/18

The map below (Figure 12) shows locations of the 12,386 fish tagged in 2017/18. 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 shows very similar distribution of tagging effort to previous years, with clustering of activity around known 'hot spots' but also a broad spread right along the Australian east coast, especially from southern Queensland to Victoria.

FIGURE 12. POSITIONS OF RELEASES OF TAGGED GAMEFISH DURING 2017/18.



RECAPTURE HIGHLIGHTS IN 2017/18

All of the completed recaptures recorded in 2017/18 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, however, these may 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

No less than 26 recaptures of black marlin were reported during the year with times at liberty ranging from 0 to 761 days (2 years 1 month) and minimum distances travelled from zero to 4,717 nautical miles. Thirteen of the recaptured black marlin had been tagged in Queensland waters, 10 in NSW waters and three off Western Australia (all off Dampier).

Recaptures of black marlin tagged off Australia and recaptured north of the equator are relatively rare occurrences, but this year, three such recaptures were reported, all by commercial longline vessels in the northern Pacific (Figure 13).

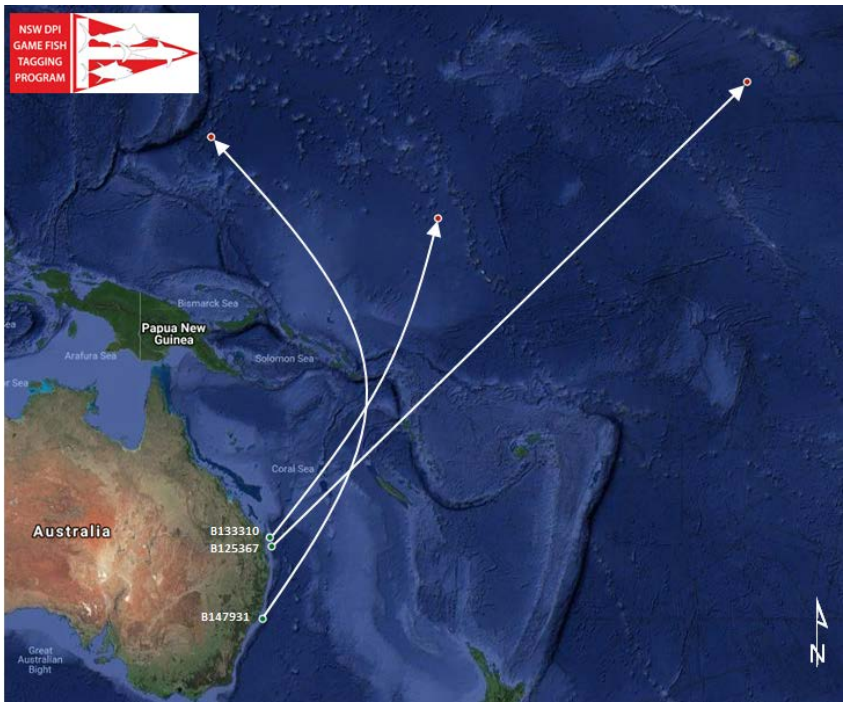
The first of these was released in January 2017 off Noosa QLD (at a spot known as 'the Hards') and subsequently recaptured in September 2017 about 700 nautical miles east of Hawaii by an Hawaiian longline vessel, and estimated at 45 kg.

During its eight months of liberty, it had grown from about 25 kg to an estimated 45 kg and covered a minimum straight line distance of 4,717 nautical miles (19 nautical miles per day). As such, it marks the third longest distance travelled by a black marlin under the program. The record for the furthest distance travelled by a tagged black marlin is another QLD release. That fish was tagged off Cairns in 1996 and recaptured four years later off Costa Rica, having travelled over 7,800 nautical miles across the entire Pacific.

The second black marlin that headed to the northern Pacific was also tagged off Noosa QLD, in February 2017, just one month after the above fish. It was recaptured near Majuro Atoll in the Marshall Islands, again after a time at liberty of 8 months, having covered a minimum distance of 2,245 nautical miles. Its growth rate during that time was also very similar to the above fish, from about 25 kg to about 40 kg. Remarkably, this journey almost exactly mirrored one by a black marlin tagged in the same area back in late 1995 and recaptured seven months later in 1996 at virtually the same spot off Majuro Atoll. On that occasion, the fish was somewhat larger though, being estimated at 48 kg on release and recaptured at a measured weight of 57 kg.

The third trans-equatorial recapture of a black marlin for the year was tagged off Seal Rocks NSW in March 2018 at an estimated weight of 20 kg. It was recaptured just 82 days later by a commercial longline vessel about 200 nautical miles to the east of the northern Marianas island of Saipan, a minimum distance of just under 3,000 nautical miles at a remarkable average rate of 36 nautical miles per day.

FIGURE 13. THE THREE LONGEST DISTANCES MOVED BY RECAPTURED BLACK MARLIN RECORDED THIS YEAR, ESPECIALLY NOTABLE SINCE ALL THREE WERE RECAPTURED NORTH OF THE EQUATOR.



These three important recaptures, all recorded in the same year, demonstrate the long term value of the tagging program, which continues to add valuable and new information to our knowledge of the life cycles of highly mobile pelagic fish.

Ben Coombes releasing a south coast Black Marlin on board Cleavedge. Photo: Chris Cleaver

In most years, we receive reports of juvenile black marlin tagged in northern Queensland which make their way southwards along the eastern Australian coast. Such recaptures not only inform us of seasonal movements of black marlin in their first year of life, but also can be very useful in determining early growth rates of this species in different years. In August 2017, a small black marlin was tagged near Pixie Reef, near Cairns, northern Queensland and subsequently recaptured 142 days later off South Stradbroke Island, southern Queensland, a minimum distance moved of 798 nautical miles. At release, it was estimated at 15 kg and at recapture, 25 kg, fitting well with expected growth rates derived from previous recaptures and also recent research on ageing of juvenile black marlin by counting daily increments on their otoliths (ear bones).

Three black marlin tagged off Dampier WA were recaptured this year with apparent distances moved of just 6 to 16 nautical miles, even though they had been at liberty for some time – 373, 391 and 760 days to be exact. These recaptures, and other earlier ones for black marlin in the same area, continue to 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.

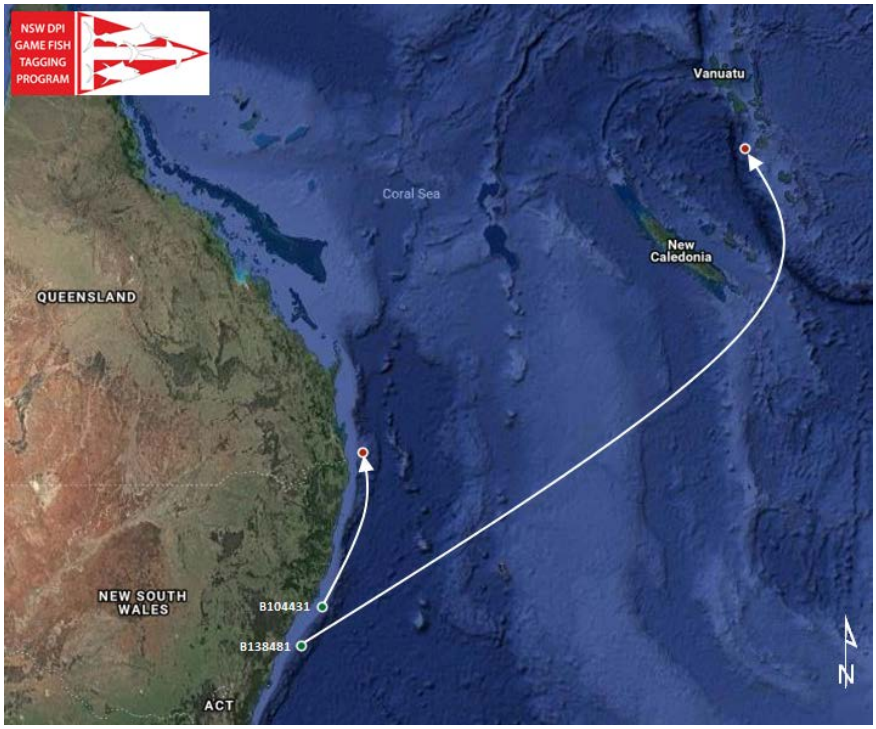
Finally, a nice story this year linking two anglers’ first marlin. In February 2017, Wade Blinco tagged and released his first billfish off Noosa – a black marlin estimated at about 18 kg. Some 308 days later, the fish was recaptured off the Gold Coast, about 80 miles from its release point, by James Saltwell.

It was also James' first billfish, which he re-released with a new tag. Interestingly, the highly experienced captain of the recapturing boat, Ryan Goding, estimated the marlin at recapture at around 60 kg, indicating a rapid growth rate in the intervening 10 months of liberty.

BLUE MARLIN

Recaptures of tagged blue marlin have been relatively rare events in the past, but with the increase in numbers being tagged in recent years, a lot more fish are now being recaptured. In 2017/18 four

FIGURE 14. MINIMUM MOVEMENT ARROWS OF TWO OF FOUR BLUE MARLIN RECAPTURED IN 2017/18.



The furthest distance and fastest rate of travel recorded by a tagged blue marlin this year was 1,317 nautical miles, achieved by a fish tagged wide of the continental shelf off Botany Bay NSW in late March 2018 and recaptured by a charter boat off Port Vila, Vanuatu 57 days later. The fish was estimated at 60 kg when tagged and 75 kg at recapture, which is an unusually small sized blue marlin to be encountered off southeastern Australia.

Two blue marlin tagged off Port Stephens, NSW were both recaptured at the same location off the Gold Coast (the 'Kink'), one after 74 days, the other after 250 days. And travelling in exactly the opposite direction, the fourth blue marlin to be recaptured was tagged at the 'Kink' and recaptured at Browns Mountain off Sydney 132 days later. All three of the Australian recaptured blue marlin were caught by recreational boats.

SAILFISH

Five sailfish recaptures were reported this year – three from the Gulf of Carpentaria, one from Dundee, NT and one from Exmouth WA. None of the recaptured fish showed much movement from their release points (0 to 15 miles). Two of these, both tagged off Groote Eylandt, were recaptured very close to a year after release (362 and 385 days) while the sailfish recaptured in the Exmouth Gulf had been at liberty for just over two years.

Over the course of the tagging program, 341 sailfish have been recaptured, and while a small number of these have moved minimum distances as far 500, or in just one case, 1,000 nautical miles, the overwhelming majority have been recaptured close to their release points. This is true for sailfish tagged on both the west and east coasts and more lately, in the Gulf of Carpentaria. Furthermore, as was again the case for three recaptures this year, many recaptures have occurred very close to their release locations after times at liberty of one, two, three, four or in one case off Broome WA, seven years. It is generally believed in these locations that sailfish are not present year round, so these results suggest annual homing, or 'philopatry', a term meaning the tendency to return to one's homeland. The general lack of recaptures of sailfish away from tagging sites remains difficult to explain, however, but may simply be due to lack of fishing effort targeting sailfish in other areas and at other times of the year.

STRIPED MARLIN

Six recaptures of striped marlin were reported in 2017/18, the same number as last year. Times between release and recapture ranged from 8 to 356 days and apparent distances moved between 10 and 146 nautical miles. All six fish had been tagged off New South Wales, two off Port Stephens, two off Jervis Bay, one off Terrigal and one off Narooma. The two fish tagged off Jervis Bay were released just two days apart. One was recaptured 17 days off Port Stephens, the other travelled in the opposite direction to be recaptured 30 days later off Bermagui.

Over the long course of the program, the dearth of long term recaptures of striped marlin is somewhat of a continuing mystery. There have now been 258 recaptures recorded on the program but only 2.9% of these have been recaptured more than one year after release. This contrasts with two other billfishes, black marlin and sailfish, for which 11.2% and 10.6% of recaptures have occurred more than a year after release. The most likely explanation for this discrepancy is that striped marlin have an natural tendency to reject tags at a higher rate than other species, although this has yet to be proven.

A NSW south coast striped marlin positioned at the side of the boat for a perfect placement of the tag by Chris Cleaver. Photo: Ben Coombes

SPEARFISH & SWORDFISH

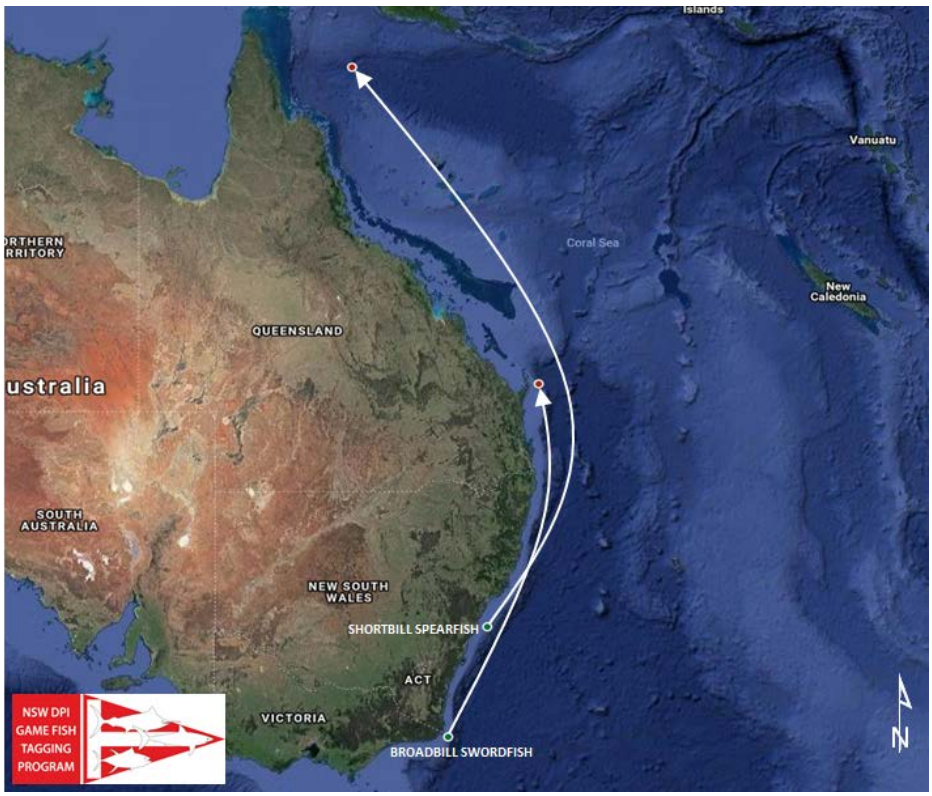
As well as recaptures of the three marlin species and sailfish, two other species of billfish were recaptured this year, both relatively rare events. The first was a shortbill spearfish that had been tagged off Sydney in April 2016 at an estimated size of 16 kg. It was recaptured 584 days (19 months) later in the northern Coral Sea by a Japanese longliner (Figure 15). The shortbill spearfish is one of the smallest and least understood species of billfishes. Only 578 have been tagged and released since the program's beginnings in 1973 and this is just the second to have been recaptured. The first recaptured spearfish had been tagged off Port Stephens NSW in February 2009 and caught again 45 days later about 45 nautical miles to the east of Fraser Island QLD.

The second unusual billfish recapture was a broadbill swordfish, tagged in May 2017 off Mallacoota Victoria by well known angler Chris Cleaver, who has been promoting tag and release of swordfish for some time. Estimated at just 18 kg, it was at liberty for over a year (387 days) and was recaptured by an Australian longline vessel while fishing the Fraser Seamount off the southern Queensland coast. Interestingly, the fish had approximately doubled its weight in that time, with an estimated whole weight of 36 kg at recapture.

This recapture is the fourth Australian broadbill swordfish to be recaptured of 193 released to date. It sets a new record for the program for the furthest distance travelled by a tagged swordfish and also marks the longest time at liberty for the species.

Chris Cleaver releasing his swordfish tagged off Victoria that would later be recaptured off Fraser Island, southern Queensland.

FIGURE 15. DEPICTIONS OF DISTANCES MOVED BY A SHORTBILL SPEARFISH AND A BROADBILL SWORDFISH RECAPTURED DURING 2017/18. RECAPTURES OF BOTH SPECIES ARE NOT COMMON, SO INFORMATION SUCH AS THIS IS VERY VALUABLE.



SOUTHERN BLUEFIN TUNA

A total of twenty one recaptured southern bluefin tuna (SBT) were reported in 2017/18, 15 of which were recaptured by commercial vessels associated with the tuna aquaculture industry operating out of Port Lincoln South Australia, three were caught by longline vessels off southern NSW and three by recreational anglers close to their points of release in South Australia.

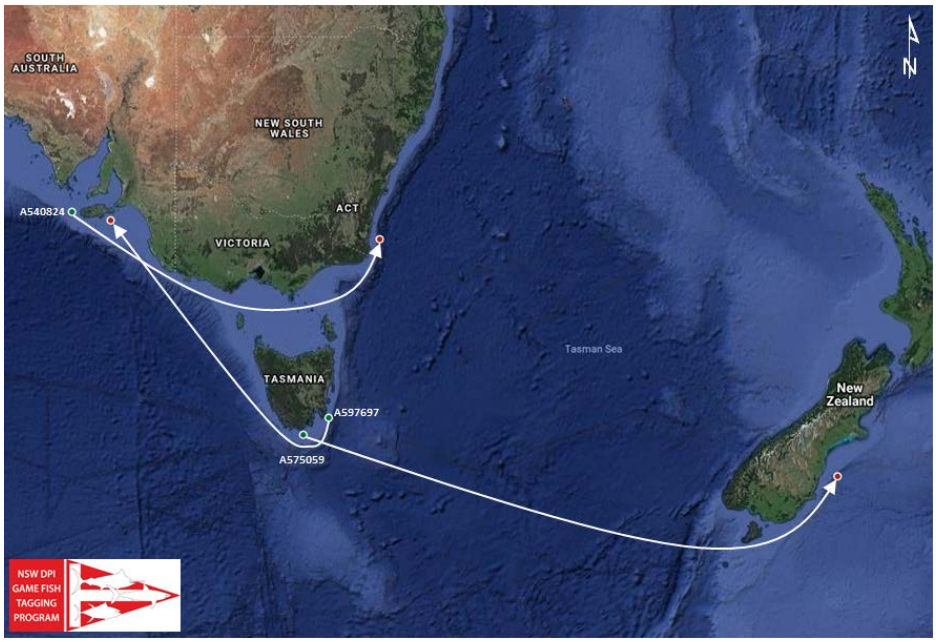
The furthest distance moved by a tagged SBT this year was by an estimated 25 kg fish tagged off Pedra Branca, southern Tasmania in February 2016. It was recaptured 2 years, 2 months later by a longline vessel off the east coast of the South Island of New Zealand, a straight line distance of 1,101 nautical miles (Figure 16). At recapture, the size of the fish was estimated at 40 kg. To date, of 208 recaptured SBT, only four have been recaptured off the coast of New Zealand, with this being the first Tasmanian-tagged SBT to be reported recaptured in NZ waters.

Another very interesting recapture of an SBT this year was a fish estimated at 14 kg when tagged off Investigator Strait, SA in March 2012. It was then at liberty for 5 years, 4 months before being recaptured by a commercial longline vessel wide of Merimbula, on the south coast of NSW. At recapture the fish weighed 66.7kg, providing very useful information to add to our knowledge of the growth rate of this important species.

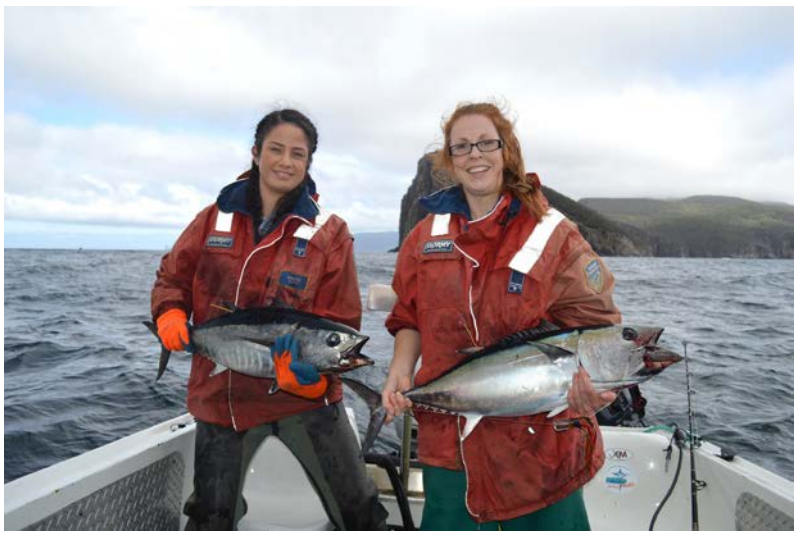
The third longline-recaptured SBT was tagged off Maatsuyker Island, at the southern tip of Tasmania in March 2014. Estimated at 30 kg on release, it was recaptured wide of Eden, southern NSW 3 years, 4 months later at a weight of 49.5 kg.

Yet another Tasmanian-tagged SBT was recaptured this year after travelling from its release position off Tasman Island to Kangaroo Island SA. Estimated at 20 kg at release, it weighed 25.7 kg on recapture 247 days later.

FIGURE 16. THREE OF THE LONGER DISTANCES MOVED BY RECAPTURED SOUTHERN BLUEFIN TUNA DURING 2017/18.



As was the case last year, the majority of the other recaptured SBT 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 (6-12 kg) which were subsequently recaptured from a few weeks up to months or even years later. For these recaptures, we often do not obtain accurate growth information since the fish are held alive in pens for months after capture, and fed liberally with pilchards to increase their weight and quality for the market. This means that the tags are not found until the fish are harvested and processed.

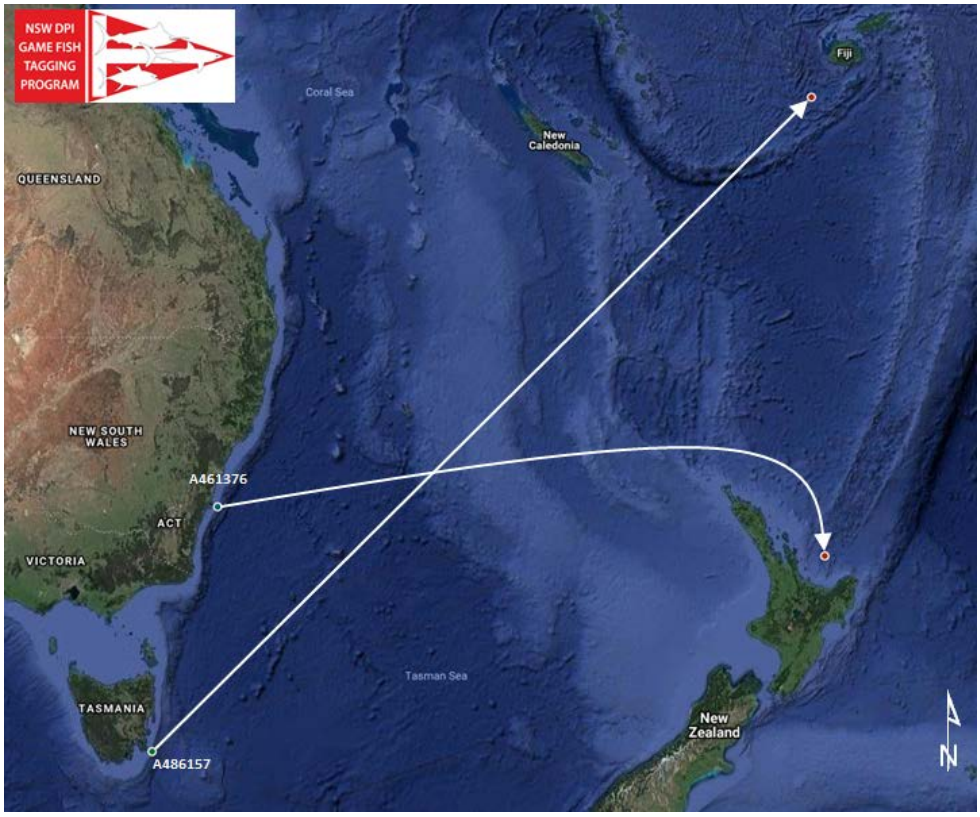


A pair of school sized southern bluefin tuna tagged and about to be released off Eagle Hawk Neck, Tasmania. Photo: Jonah Yick

ALBACORE

Just two albacore were recaptured in 2017/18, however, both were of considerable significance due to considerable distances moved and exceptional times-at-liberty (see Figure 17). The first was tagged off Jervis Bay in November 2008, and recaptured by a longline vessel off Tauranga New Zealand in April 2018, setting a new record for time-at-liberty for a tagged albacore. During its near ten years of freedom, it had grown from an estimated 7 kg to 20 kg. The second was tagged off southeastern Tasmania in April 2012 and recaptured, also by a longliner, near Fiji 5 years 7 months later. The minimum distance travelled by this fish, 2,147 nautical miles is a new record for distance travelled recorded for an albacore under the program, surpassing the previous record of 1,909 nautical miles travelled by a fish released off Port MacDonnell, SA, which was recaptured deep in the Indian Ocean. This fish was estimated at just 2 kg at release and 11 kg at recapture. Both recaptures suggest a relatively slow growth rate for albacore, which is in keeping with current scientific opinion.

FIGURE 17. THE ONLY TWO ALBACORE RECAPTURED IN 2017/18 BOTH SET RECORDS FOR THE PROGRAM; ONE FOR THE LONGEST TIME AT LIBERTY FOR THE SPECIES, THE OTHER FOR THE FURTHEST DISTANCE MOVED.



YELLOWTAIL KINGFISH

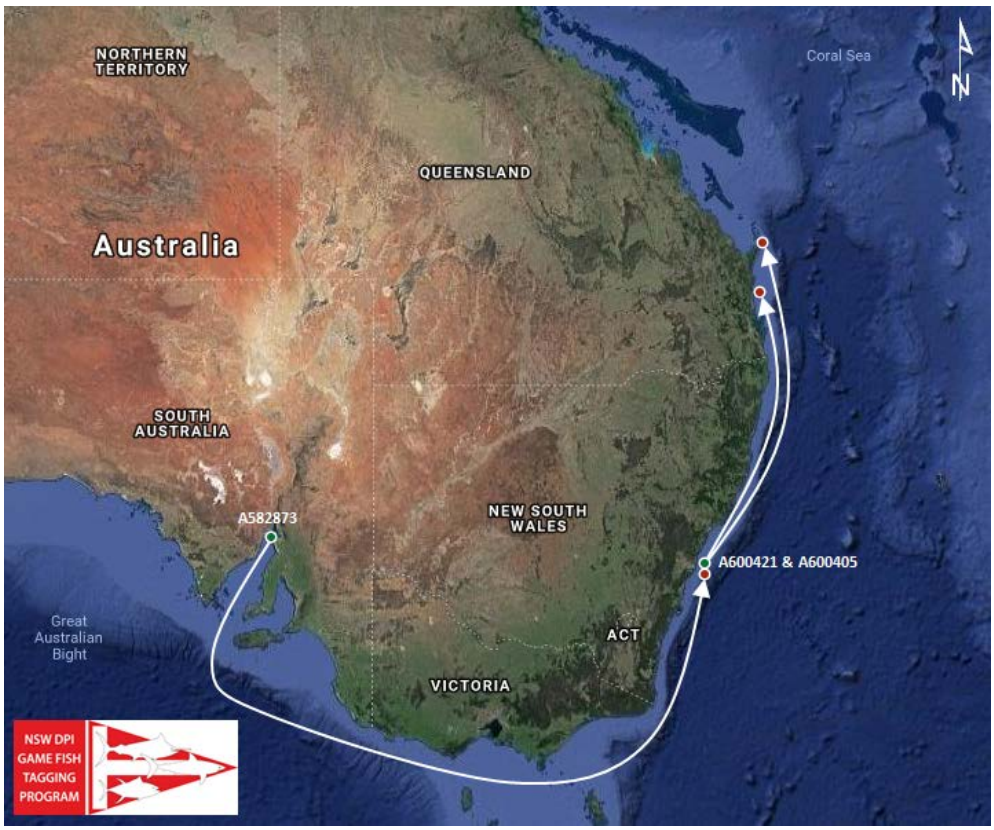
Recapture rates of tagged yellowtail kingfish have always been relatively high, showing an overall rate of 6.63% over the life of the tagging Program to date. In fact, this species accounts for 31% of all recaptures, even though it represents 8% of fish tagged. This means that every year, many reports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

This year, 97 recaptures of kingfish were reported (with and addition 7 recaptures for which tag cards have not yet to be received). Times at liberty ranged from 12 days to 1,515 days (4 years and 2 months). The latter fish had been tagged off Coffin Bay SA and was recaptured in Spencer Gulf off Port Augusta SA.

Of the 90 completed kingfish recaptures, 49 were recaptured very close to their release locations, a further 15 were recaptured within 20 nautical miles of where they were tagged, and only 13 had moved more than 100 nautical miles. The furthest distance moved this year by a tagged kingfish was from Coffin Bay SA to Sydney. The calculated minimum displacement for this and all other fish recaptured on the progam is a straight line between the release and recapture points. In this case, that distance is 791 nautical miles, however, when land masses are taken into account, the minimum swim by this fish around the coast, passing through Bass Strait, was 1,090 nautical miles. Two other kingfish made similar journeys this year; one from Port Augusta SA to Seal Rocks NSW, the other from Coffin Bay SA to Bluefish Point, Sydney NSW. Those fish had been at liberty for 371 and 713 days respectively.

Two kingfish tagged in New South Wales were recaptured off southern Queensland this year, also after relatively lengthy times at liberty. The first was tagged off the Peak, Sydney and recaptured off Noosa after 668 days, while the second was tagged off Long Reef and recaptured off Fraser Island 593 days later.

FIGURE 18. THREE OF THE LONGER DISTANCES MOVED BY RECAPTURED YELLOWTAIL KINGFISH DURING 2017/18.



SAMSON FISH

Related to yellowtail kingfish, but entirely native to Australian waters, nearly 3,000 samsonfish have been tagged over the course of the program off both Western Australia and South Australia. In previous years, some samsonfish tagged off Perth WA have travelled right across the Great Australian Bight to Kangaroo Island. This year, 15 samsonfish were recaptured, all in the general vicinity of the mouth of Spencer Gulf, South Australia. Nearly all of these recaptured fish had been tagged between 0 and 30 miles of their release points except for two fish that had moved a little further, one from Kangaroo Island to Rocky Island (154 nautical miles), the other from Rocky Island to Pondalowie Island (102 nautical miles). What was particularly interesting about most of these recaptures was not so much their apparent displacements, or lack thereof, but the fact that most had been at liberty for relatively long periods – 7 years in one case, nearly or more than 2 years for four fish and nearly or more than one year for another 4 fish.

Interestingly, one of the recaptured samsonfish had been previously recaptured on another occasion. Originally tagged in Marion Bay SA in June 2013, it was recaptured for the first time in August 2016 in the same area, re-released and then recaptured a second time, again in the same area, in June 2018, almost exactly five years since its original release. The fish was measured each time, and had grown from 123 cm to 134 cm over the total time period. And in case you were wondering, yes, the fish was again released, still bearing its tag, perhaps to be recaptured again in the future.

This samsonfish, originally tagged at Marion Bay, South Australia, had been recaptured and re-released after 3 years, and was again recaptured and re-released in the same area almost exactly 5 years after its original release.

MAKO SHARK

Four mako sharks were recaptured in 2017/18, two of which were recaptured the same day they were tagged, suggesting that the sharks were not troubled by their previous experience of being hooked, played and tagged. A third mako was tagged off Port Fairy, VIC and travelled 160 nautical miles eastwards to Cape Wollomai in just 7 days. The fourth recaptured mako was tagged off Bermagui NSW and recaptured 110 days later off St Helens, on the northeast coast of Tasmania.

Bryan Van Wyk with a mako boat side, tagged of the east coast of Tasmania. Photo: Jonah Yick

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, NSWDPI received information on 16 recaptures for which no matching tag card had been received at the time of writing this report. These are shown in Table 4 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.

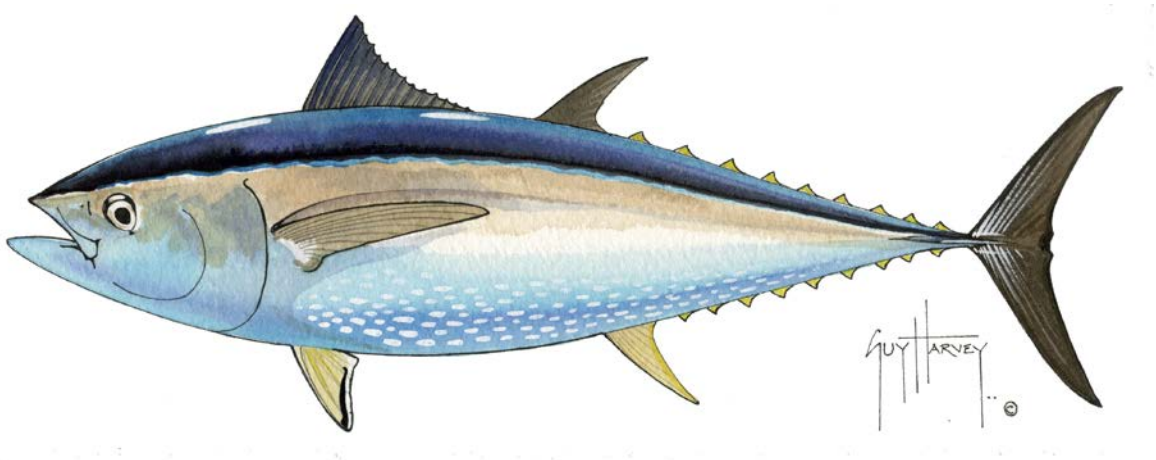
TABLE 3. DETAILS OF FISH RECAPTURED IN 2017/18 FOR WHICH NO TAG CARD HAS BEEN RECEIVED.

Tag No	Species	Where recaptured	Date recapt	Recapt Lngth (cm)	Recapt Wt (kg)
B140472	BLACK MARLIN	FITZROY ISLAND	23/9/17		15
B110746	BLACK MARLIN	BARWON BANKS	21/1/18		20
B113676	BLACK MARLIN	GIBBER REEF (EAST)	14/3/18		35
B086867	BLACK MARLIN	BARWON BANKS	26/3/18		25
A612578	DOLPHINFISH	SYDNEY (80 FATH E)	29/3/18	72	3
A586066	SOUTHERN BLUEFIN TUNA	KANGAROO ISLAND (SOUTH)	15/2/18		
A567152	SOUTHERN BLUEFIN TUNA	SANDERS BANK (SA)	15/3/18		
S265491	TIGER SHARK	ORCHID BEACH (FRASER ISLAND)	28/4/18	310	
A420681	WHALER SHARK	WARNBRO SOUND	14/11/17	235	
A611858	YELLOWTAIL KINGFISH	PORT AUGUSTA (OUTLET CHANNEL)	13/8/17	120	14.3
A612374	YELLOWTAIL KINGFISH	PORT AUGUSTA (OUTLET CHANNEL)	7/11/17	136	20
A572604	YELLOWTAIL KINGFISH	LENNOX HEAD (12 NM E)	15/11/17	95	7
A626877	YELLOWTAIL KINGFISH	SYDNEY HARBOUR	8/5/18	76	
A626873	YELLOWTAIL KINGFISH	SYDNEY HARBOUR	24/6/18	71	

SCIENTIFIC VALUE OF THE GAME FISH TAGGING PROGRAM

It may not be widely realized that data accumulated on the Game Fish Tagging Program is often sought for a wide variety of studies of aspects of the biology and fisheries of pelagic fishes. Appendix III shows the impressive list of reports, University theses and peer-reviewed scientific papers that utilized data from the program in some way. And it is not just information derived from recaptures of tagged fish that make the Game Fish Tagging Program so valuable. Understanding 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. Thus, the tagging database is widely recognised 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 catches in relation to historic environmental variables such as temperature, chlorophyll, sea height and El Nino/La Nina cycles. Such studies' reports and publications are also included in Appendix III.

FOCUS ON LONGTAIL TUNA (*THUNNUS TONGGOL*)



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 longtail tuna has been adapted from the book, 'Fishes of the Open Ocean' by Julian Pepperell (UNSW Press). Longtail tuna illustration courtesy Guy Harvey.

The longtail tuna is one of the 'true' tunas, that is, a member of the genus Thunnus. Around the northern half of Australia it is a favourite target of inshore and land-based gamefish anglers, which, as of 2007, has been a declared recreational-only species throughout its range in Australian waters. Traditionally, this species was called 'northern bluefin tuna' by Australian anglers because it is mainly found in northern Australian waters. However, because that name was sometimes confused with the 'true' northern Pacific bluefin tuna, Thunnus orientalis, which is mainly found in the northern Pacific ocean, the name 'longtail tuna' is preferred.

GEOGRAPHIC RANGE

While all of the other true tuna species have very broad, trans-oceanic or even global distributions, often dubbed 'fish without a country', the longtail's geographic range is restricted to the coastal waters of the northern half of Australia, most of southeast Asia and the coastal regions of the northern Indian ocean, extending into the Persian Gulf and the Red Sea. Over all this range, longtail are usually found within 10 miles or less of the coast, the main exceptions being in shallow gulfs, or in the immediate vicinity of offshore islands.

Having noted that the longtail is a coastal species, it tends to avoid turbid or 'dirty' water, and rarely enters estuaries, although it is often found in large marine dominated embayments (Moreton Bay, Queensland is a good example). Interestingly, a stuffed specimen of a tuna caught inside Sydney Harbour in the late 1800s, and now housed at the historic club rooms of the Amateur Fishermen's Association of NSW, is without doubt a longtail – one of the first gamefish to be captured on rod and reel in Australia.

A quick glance at the record longtail tunas listed by the Game Fishing Association of Australia (GFAA) shows that the four heaviest specimens so far recorded (ranging from 26.5 to 35.9 kg) were all caught off southern New South Wales, either at Montague Island or at Green Cape. And even more significantly, all of the line class IGFA world records for longtail have been taken off the Australian east coast between Moreton Bay in southern Queensland and the Victorian/New South Wales border. The odd thing, however, is that fish of these sizes (25kg plus) are rarely, if ever recorded in commercial catches anywhere else in the world, so the population of large longtails which makes its seasonal movement south along the Australian east coast may well be very important to the overall stock since they certainly represent prime, adult fish. On the other hand, because longtail are found right through southeast Asia all the way to eastern Africa, it is also quite likely that other areas holding large adult fish are yet to be discovered, at least by sportfish anglers.

Movements

Over the past 30 years or so, more than 5,000 longtail tuna have been tagged and released on the Australian Gamefish Tagging Program, a high proportion of which were larger fish released within Moreton Bay, Queensland. Of the total tagged, 59 (about 1.1%) have been reported as recaptured. Results indicate that annual homing to Moreton Bay may occur since seven of the recaptured fish had apparently returned to their release area in the Bay after roughly one year. Three longtail tagged in Moreton Bay were recaptured well to the south (330 km after 674 days, 490 km after 221 days and 775 km – off Sydney – in 345 days) while several had traveled northwards at rapid rates (one fish moved 550 km in 34 days while another covered 850 km in just 20 days – an average of 42.5km per day). From this limited amount of information, it seems that these larger longtail move southwards along the southern Queensland and New South Wales coasts with the expanding warmer waters of summer, probably as small feeding pods of fish. Then, as the water cools by about mid Autumn, they turn around and head rapidly for warmer waters to the north. Exactly how far this northerly migration extends, however, is not presently known. None of these Australian tagged fish has ever been recaptured in Papuan or southeast Asian waters, although movement that far would presumably be quite feasible.

Growth and size

The best estimates of age at size for longtail tuna are generally agreed to be about 45 to 50 cm for one year old fish, and then 60 cm to 90 cm fish being anywhere from three to eight years old. The most recent study by CSIRO scientist Dr Shane Griffiths suggest the species lives longer than previously thought, with estimates for some specimens as old as 19 years. In the same study, the heaviest fish that was aged weighed 27.8 kg and was estimated at just under 14 years old.

The maximum size to which longtail grow is 35.9 kg which is, in fact, the all tackle world record fish caught at Montague Island in 1982. Around the same time, a number of other longtail tuna in excess of 30 kg were caught at the same location, so it appears that this is a good example of the largest specimens of a species occurring at the very extremes of their geographical ranges.

Reproduction

Some recent ground breaking research published by CSIRO scientist and keen angler, Dr Shane Griffiths, revealed that longtail tuna spawn when they are just 55 to 60 cm long, at which size they are just 2 to 3 years old. He also found that there are three distinct Australian spawning areas for longtail – one along the Coburg Peninsular, NT, one in the eastern Gulf of Carpentaria and one extending from south of Cairns to the central Queensland coast. The latter spawning ground is the most likely source of the occasional 'run' of very small juvenile longtails (1-2 kg) that sometimes appear off Fraser Island or as far south as Caloundra in summer.

Behaviour

Longtail tuna tend to feed on small prey items, even when adult. Anchovies and sprats, for example, are favoured baitfish in Moreton Bay. Specialist anglers are aware of this, and use small baitfish such as hardyheads, or very small lures or saltwater flies when targeting them. I once examined the stomach contents of a 5 kg longtail caught off Hamilton Island that contained a fascinating variety of food items – all measuring about the same size (1.5 cm long) including trigger fish, toadfish, ponyfish, squid and even a tiny octopus.

Interestingly, a CSIRO study on the diet of longtail in the Gulf of Carpentaria, also by Shane Griffiths, found them to be generally very opportunistic feeders. He examined the contents of nearly 500 stomachs and identified 101 different types of food items, dominated by small herrings and anchovies. Other important prey included slimy mackerel, longtom, garfish, whiting, squid and prawns. Dr Griffiths and co-researchers even made some calculations on the total amount of food that the population of longtail in the Gulf might consume, and came up with a figure of 148,000 tonnes! One surprising finding was that of this total, about 550 tonnes consisted of commercially important prawns, or about 11% of the entire catch of the northern prawn fishery in the Gulf.

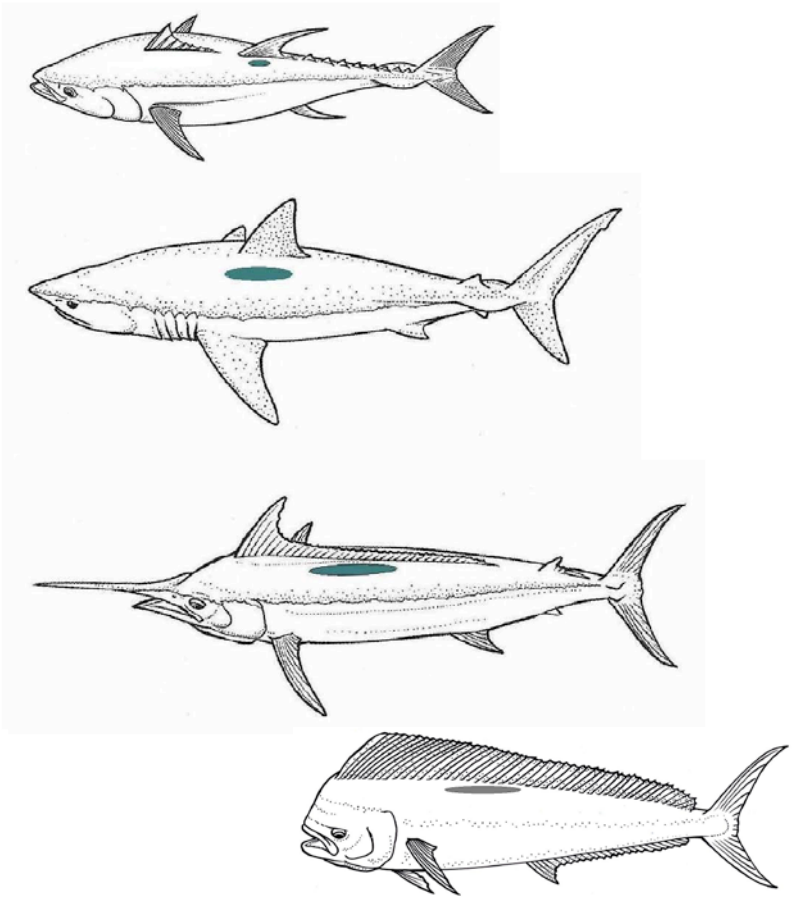
Unlike other tropical tunas, the longtail rarely, if ever forms large schools. When small, they often associate with pods of mackerel tuna, and at times, will also aggregate with dolphins and even whale sharks. Small schools of longtail tend to surface only for brief periods, and are generally very flighty, being easily scared into sounding or scattering. Pods of 15 to 20 adult longtail have been observed to attack their prey in an arrow shaped formation, each fish spaced equidistant from its neighbours. This form of cooperative feeding behaviour has also been observed in giant Atlantic bluefin tuna off the eastern United States.

Fisheries

Not many anglers would be aware that in 2007, the longtail tuna was declared a recreational-only species for all of Australia, a status that is very special, especially given the fact that worldwide catches of the species have greatly increased to over 200,000 tonnes per annum in recent years. There is still a lot we don't know about this enigmatic, coastal tuna, but hopefully, its future in Australia as a top-rated angling species is looking good.

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 using a hand tagger or short pole since 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 (i.e. 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 marine 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 of the event (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.

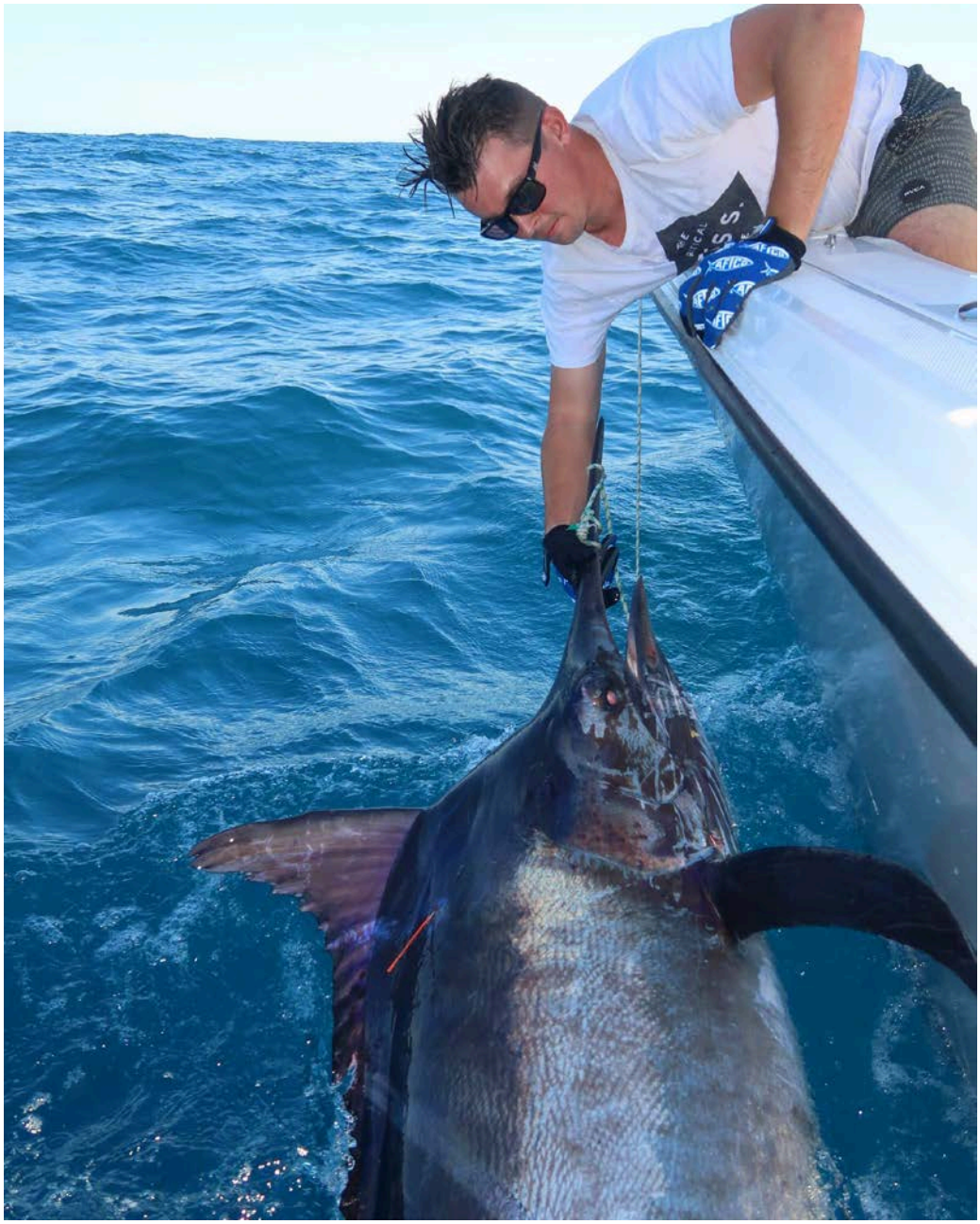
CONTACT THE PROGRAM

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) 6691 9602 or email gamefish.tagging@dpi.nsw.gov.au.

ACKNOWLEDGEMENTS

The Game Fish Tagging Program operated by NSW DPI 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, Clay Hilbert, Mick Gamble and Emma Mitchell of NSW DPI.



APPENDIX I: ALL RECAPTURES OF TAGGED FISH REPORTED IN 2017/2018

Species	*Date tagged*	*Release location*	*Days at liberty*	*Dist moved (nmi)*	*Direction*
ALBACORE	8/11/08	JERVIS BAY CANYONS (NSW)	3434	1227	SE
ALBACORE	20/4/12	TASMAN ISLAND (TAS)	2045	2147	ENE
AUSTRALIAN SALMON	21/6/17	KANGAROO ISLAND (SA)	64	3	NE
AUSTRALIAN SALMON	24/8/17	KANGAROO ISLAND (SA)	27	0	NW
AUSTRALIAN SALMON	29/8/17	KANGAROO ISLAND (SA)	0	0	
BLACK MARLIN	25/11/16	CAPE MORETON (QLD)	367	48	ENE
BLACK MARLIN	13/3/18	SEAL ROCKS (NSW)	86	2986	NW
BLACK MARLIN	12/1/18	BARWON BANKS (QLD)	80	1	NE
BLACK MARLIN	24/2/18	PORT STEPHENS (NSW)	35	2	N
BLACK MARLIN	14/2/18	PORT STEPHENS (NSW)	6	69	WSW
BLACK MARLIN	11/2/18	BARWON BANKS (QLD)	73	0	NW
BLACK MARLIN	4/3/18	BARWON BANKS (QLD)	22	0	NW
BLACK MARLIN	18/2/18	PORT STEPHENS	31	81	NNE
BLACK MARLIN	17/2/18	PORT STEPHENS (NSW)	14	38	SSW
BLACK MARLIN	24/2/18	PORT STEPHENS (NSW)	17	33	NW
BLACK MARLIN	23/2/18	PORT STEPHENS (NSW)	13	1	S
BLACK MARLIN	7/1/18	PORT MACQUARIE (NSW)	1	3	SSE
BLACK MARLIN	5/2/18	PORT STEPHENS (NSW)	34	2	SSW
BLACK MARLIN	6/1/18	PORT MACQUARIE (NSW)	50	207	NE
BLACK MARLIN	1/6/15	DAMPIER (WA)	761	10	NE
BLACK MARLIN	29/12/17	MOOLOOLABA (QLD)	4	0	NW
BLACK MARLIN	23/12/17	BARWON BANKS (QLD)	0	0	NW
BLACK MARLIN	10/10/17	FRASER ISLAND (QLD)	80	120	S
BLACK MARLIN	12/8/17	PIXIE REEF (QLD)	142	798	SSE
BLACK MARLIN	12/2/17	THE HARDS (QLD)	308	83	S
BLACK MARLIN	12/2/17	LITTLE SHIPS (QLD)	240	2245	NNE
BLACK MARLIN	12/1/17	THE HARDS (QLD)	244	4717	ENE
BLACK MARLIN	24/8/17	OYSTER REEF (QLD)	17	1	N
BLACK MARLIN	24/8/17	OYSTER REEF (QLD)	19	1	N
BLACK MARLIN	5/6/16	DAMPIER (WA)	391	16	SE
BLACK MARLIN	31/7/16	DAMPIER (WA)	373	6	NNW
BLUE MARLIN	26/3/18	BOTANY BAY (NSW)	57	1317	NE
BLUE MARLIN	18/2/18	PORT STEPHENS (NSW)	74	278	NE
BLUE MARLIN	27/12/17	GOLD COAST (QLD)	132	373	SSW
BLUE MARLIN	26/2/17	PORT STEPHENS (NSW)	250	296	NE
BROADBILL SWORDFISH	13/5/17	MALLACOOTA (VIC)	387	881	NNE
BRONZE WHALER	5/2/14	SCOTTS BAY (SA)	1497	28	ESE
BRONZE WHALER	10/2/18	PORT STEPHENS (NSW)	0	3	SE
BRONZE WHALER	10/2/18	PORT STEPHENS (NSW)	0	2	N
BRONZE WHALER	28/12/13	FOWLERS BAY (SA)	1388	75	ESE
BRONZE WHALER	30/12/14	KANGAROO ISLAND (SA)	1054	0	NW
BRONZE WHALER	13/3/17	ROYSTON HEAD (SA)	211	98	NNE
BULL SHARK	1/4/17	WELLINGTON POINT (QLD)	280	15	SSE
COBIA	18/8/17	DAMPIER (WA)	158	2	ENE
COBIA	6/10/17	DAMPIER (WA)	111	2	ENE
DOLPHINFISH	24/3/18	PORT HACKING (NSW)	9	9	S
DOLPHINFISH	19/1/18	JUMPINPIN (QLD)	23	467	SW
DOLPHINFISH	10/2/18	SWANSEA (NSW)	47	50	SW
GUMMY SHARK	5/2/14	DOG FENCE BEACH (SA)	1436	27	NE
GUMMY SHARK	24/3/17	PORTLAND (VIC)	124	0	NW
GUMMY SHARK	25/3/17	WESTERN PORT BAY (VIC)	157	20	W
HAMMERHEAD SHARK	5/5/18	DAMPIER (WA)	55	1	S
HAMMERHEAD SHARK	11/2/17	WINDANG ISLAND (NSW)	444	108	NNE

Species	*Date tagged*	*Release location*	*Days at liberty*	*Dist moved (nmi)*	*Direction*
LEMON SHARK	10/1/18	WELLINGTON POINT (QLD)	105	7	NE
MAKO SHARK	12/8/17	LONG REEF (NSW)	0	0	NW
MAKO SHARK	12/11/17	BERMAGUI (NSW)	110	305	SW
MAKO SHARK	12/8/17	SYDNEY (NSW)	0	0	NW
MAKO SHARK	29/12/17	PORT FAIRY (VIC)	7	161	E
MULLOWAY	28/5/16	COFFS HARBOUR (NSW)	409	54	NE
SAILFISH	12/3/18	DUNDEE (NT)	12	1	E
SAILFISH	9/10/16	GROOTE EYLANDT (NT)	362	15	SSW
SAILFISH	1/11/15	EXMOUTH (WA)	743	0	NW
SAILFISH	25/9/16	GROOTE EYLANDT (NT)	385	4	E
SAILFISH	28/10/17	WEIPA (QLD)	10	2	S
SAMSON FISH	27/1/18	WEDGE ISLAND (WA)	0	0	
SAMSON FISH	8/7/16	MARION BAY (SA)	717	25	NE
SAMSON FISH	22/10/17	PONDALOWIE (SA)	247	0	NW
SAMSON FISH	30/4/17	GREENLY ISLAND (SA)	343	0	NW
SAMSON FISH	23/12/17	ROCKY ISLAND (SA)	91	32	ENE
SAMSON FISH	10/3/11	GREENLY ISLAND (SA)	2572	11	SSW
SAMSON FISH	30/3/16	HUMMOCKS (SA)	702	14	SW
SAMSON FISH	15/3/17	KANGAROO ISLAND (SA)	351	154	WNW
SAMSON FISH	15/8/15	HOPKINS ISLAND (SA)	954	3	ENE
SAMSON FISH	28/7/16	HOPKINS ISLAND (SA)	590	10	ESE
SAMSON FISH	17/4/16	ROCKY ISLAND (SA)	695	102	SE
SAMSON FISH	2/2/17	HUMMOCKS (SA)	380	15	SW
SAMSON FISH	8/7/16	MARION BAY (SA)	416	15	NNE
SHORTBILL SPEARFISH	3/4/16	SYDNEY (NSW)	584	1271	NW
SOUTHERN BLUEFIN TUNA	3/6/17	TASMAN ISLAND (TAS)	247	623	NW
SOUTHERN BLUEFIN TUNA	27/1/18	CAPE HART (SA)	9	15	SE
SOUTHERN BLUEFIN TUNA	23/4/17	CABBAGE PATCH (SA)	288	142	ESE
SOUTHERN BLUEFIN TUNA	23/3/17	LIGUANEA ISLAND (SA)	330	132	SE
SOUTHERN BLUEFIN TUNA	27/1/18	CAPE HART (SA)	20	45	SSW
SOUTHERN BLUEFIN TUNA	21/1/17	WEDGE ISLAND (WA)	408	102	SSE
SOUTHERN BLUEFIN TUNA	8/5/17	PORT MACDONNELL (SA)	301	171	WNW
SOUTHERN BLUEFIN TUNA	31/3/18	CABBAGE PATCH (SA)	9	1	E
SOUTHERN BLUEFIN TUNA	31/3/18	CABBAGE PATCH (SA)	10	32	NNE
SOUTHERN BLUEFIN TUNA	13/5/17	PORTLAND (VIC)	253	215	NW
SOUTHERN BLUEFIN TUNA	12/6/16	CABBAGE PATCH (SA)	588	142	ESE
SOUTHERN BLUEFIN TUNA	27/1/18	CAPE HART (SA)	48	18	SE
SOUTHERN BLUEFIN TUNA	31/3/18	CABBAGE PATCH (SA)	11	32	NNE
SOUTHERN BLUEFIN TUNA	14/5/16	PORT MACDONNELL (SA)	643	172	NNW
SOUTHERN BLUEFIN TUNA	14/3/17	CABBAGE PATCH (SA)	307	133	ESE
SOUTHERN BLUEFIN TUNA	21/2/16	PEDRA BRANCA (TAS)	789	1101	SE
SOUTHERN BLUEFIN TUNA	11/1/18	SOUTH NEPTUNE ISLAND (SA)	61	77	WNW
SOUTHERN BLUEFIN TUNA	2/5/15	PORT MACDONNELL (SA)	994	170	NW
SOUTHERN BLUEFIN TUNA	1/3/14	MAATSUYKER ISLAND (TAS)	1239	492	NE
SOUTHERN BLUEFIN TUNA	26/6/11	BERMAGUI (NSW)	2208	42	ESE
SOUTHERN BLUEFIN TUNA	3/3/12	INVESTIGATOR STRAIT (SA)	1958	692	SE
SPANISH MACKEREL	2/3/18	MORETON ISLAND (QLD)	78	6	N
SPANISH MACKEREL	2/3/18	CAPE MORETON (QLD)	103	1	S
SPANISH MACKEREL	24/11/16	LODESTONE REEF (QLD)	406	4	NNW
SPANISH MACKEREL	1/10/14	DEVEREAUX ROCKS (QLD)	1096	8	SSE
SPANISH MACKEREL	25/10/15	HAYMAN ISLAND (QLD)	646	93	SE
STRIPED MARLIN	24/2/18	PORT STEPHENS (NSW)	43	10	NE
STRIPED MARLIN	9/2/18	PORT STEPHENS (NSW)	14	18	NNE
STRIPED MARLIN	12/3/17	TERRIGAL (NSW)	356	43	NE

Species	*Date tagged*	*Release location*	*Days at liberty*	*Dist moved (nmi)*	*Direction*
STRIPED MARLIN	24/2/18	JERVIS BAY CANYONS (NSW)	30	140	SW
STRIPED MARLIN	22/2/18	JERVIS BAY CANYONS (NSW)	17	146	NNE
STRIPED MARLIN	9/3/18	NAROOMA (NSW)	8	10	SW
TIGER SHARK	22/3/18	EXMOUTH (WA)	33	178	ENE
TIGER SHARK	1/8/15	NICKOL BAY (WA)	963	182	WSW
WHALER SHARK	3/1/17	ELIZABETH REEF	369	3	ESE
WHALER SHARK	3/1/17	ELIZABETH REEF	371	3	ESE
WHALER SHARK	11/2/18	PORT STEPHENS (NSW)	0	13	SW
WHALER SHARK	22/1/18	CRONULLA (NSW)	34	0	NW
YELLOWFIN TUNA	13/8/17	FRASER ISLAND (QLD)	1	15	SSE
YELLOWTAIL KINGFISH	26/3/16	HUMMOCKS (SA)	718	1	N
YELLOWTAIL KINGFISH	7/2/18	HUMMOCKS (SA)	31	0	NW
YELLOWTAIL KINGFISH	16/10/17	PORT AUGUSTA (SA)	167	0	NW
YELLOWTAIL KINGFISH	6/12/17	SYDNEY (NSW)	5	1	S
YELLOWTAIL KINGFISH	3/7/16	12 MILE REEF (NSW)	549	0	NW
YELLOWTAIL KINGFISH	14/11/17	PORT HACKING (NSW)	49	8	ESE
YELLOWTAIL KINGFISH	20/7/17	ROSE BAY (NSW)	52	3	WNW
YELLOWTAIL KINGFISH	10/9/17	SYDNEY HARBOUR (NSW)	0	0	
YELLOWTAIL KINGFISH	1/5/18	THE PEAK (NSW)	9	0	NW
YELLOWTAIL KINGFISH	20/7/17	ROSE BAY (NSW)	52	3	WNW
YELLOWTAIL KINGFISH	11/10/17	GOAT ISLAND (NSW)	108	5	ESE
YELLOWTAIL KINGFISH	4/3/18	HUMMOCKS (SA)	11	1	SSE
YELLOWTAIL KINGFISH	28/10/17	PORT AUGUSTA (SA)	14	0	NW
YELLOWTAIL KINGFISH	30/1/18	GOAT ISLAND (SYDNEY)	116	3	E
YELLOWTAIL KINGFISH	24/11/17	LONG REEF (NSW)	151	15	S
YELLOWTAIL KINGFISH	4/3/18	CURRARONG (NSW)	34	0	NW
YELLOWTAIL KINGFISH	4/3/18	CURRARONG (NSW)	56	6	SSW
YELLOWTAIL KINGFISH	4/3/18	CURRARONG (NSW)	34	0	NW
YELLOWTAIL KINGFISH	6/12/17	ROCKY ISLAND (SA)	15	0	NW
YELLOWTAIL KINGFISH	29/9/17	PORT AUGUSTA (SA)	56	0	NW
YELLOWTAIL KINGFISH	2/10/17	PORT AUGUSTA (SA)	56	0	NW
YELLOWTAIL KINGFISH	27/11/16	PORT AUGUSTA (SA)	380	0	NW
YELLOWTAIL KINGFISH	1/11/17	PORT AUGUSTA (SA)	18	0	NW
YELLOWTAIL KINGFISH	7/2/18	HUMMOCKS (SA)	24	0	NW
YELLOWTAIL KINGFISH	12/11/17	GOAT ISLAND (NSW)	148	206	SW
YELLOWTAIL KINGFISH	15/12/17	SYDNEY (NSW)	0	0	NW
YELLOWTAIL KINGFISH	11/10/17	GOAT ISLAND (NSW)	172	206	SW
YELLOWTAIL KINGFISH	20/7/17	ROSE BAY (NSW)	52	3	WNW
YELLOWTAIL KINGFISH	10/3/18	GREENLY ISLAND (SA)	21	0	NW
YELLOWTAIL KINGFISH	19/11/17	PORT HACKING (NSW)	134	64	SW
YELLOWTAIL KINGFISH	23/7/17	THE PEAK (NSW)	248	0	NW
YELLOWTAIL KINGFISH	12/4/17	GREENLY ISLAND (SA)	331	0	NW
YELLOWTAIL KINGFISH	27/10/17	PORT AUGUSTA (SA)	14	0	NW
YELLOWTAIL KINGFISH	5/12/17	PORT AUGUSTA (SA)	101	38	SW
YELLOWTAIL KINGFISH	1/11/17	PORT AUGUSTA (SA)	27	0	NW
YELLOWTAIL KINGFISH	28/9/17	PORT AUGUSTA (SA)	56	0	NW
YELLOWTAIL KINGFISH	22/10/17	PORT AUGUSTA (SA)	39	0	NW
YELLOWTAIL KINGFISH	27/5/17	LONG REEF (NSW)	244	0	NW
YELLOWTAIL KINGFISH	9/12/17	THE SHALLOWS (NSW)	74	3	ENE
YELLOWTAIL KINGFISH	13/12/14	ROCKY ISLAND (SA)	1166	16	NE
YELLOWTAIL KINGFISH	10/10/17	COFFIN BAY (SA)	8	0	NW
YELLOWTAIL KINGFISH	2/3/17	GOAT ISLAND (NSW)	244	0	NW
YELLOWTAIL KINGFISH	29/10/17	QUAKERS HAT POINT (NSW)	13	2	ESE
YELLOWTAIL KINGFISH	1/7/17	GOAT ISLAND (SYDNEY)	233	9	NE
YELLOWTAIL KINGFISH	4/6/17	THE PEAK (NSW)	41	0	NW

Species	*Date tagged*	*Release location*	*Days at liberty*	*Dist moved (nmi)*	*Direction*
YELLOWTAIL KINGFISH	1/12/17	LONG REEF (NSW)	10	47	SSW
YELLOWTAIL KINGFISH	7/12/17	THE SHALLOWS (NSW)	3	0	NW
YELLOWTAIL KINGFISH	14/11/17	GOAT ISLAND (SYDNEY)	8	0	NW
YELLOWTAIL KINGFISH	5/1/18	THE SHALLOWS (NSW)	22	5	SE
YELLOWTAIL KINGFISH	29/3/17	LONG REEF (NSW)	133	0	NW
YELLOWTAIL KINGFISH	7/12/17	GOAT ISLAND (NSW)	60	2	E
YELLOWTAIL KINGFISH	16/7/17	JERVIS BAY (NSW)	165	6	NE
YELLOWTAIL KINGFISH	15/4/17	OLD MANS HAT (NSW)	278	5	NNE
YELLOWTAIL KINGFISH	2/11/13	COFFIN BAY (SA)	1511	791	E
YELLOWTAIL KINGFISH	14/12/17	PORT HACKING (NSW)	18	1	S
YELLOWTAIL KINGFISH	7/7/17	NORTH SOLITARY ISLAND (NSW)	183	0	NW
YELLOWTAIL KINGFISH	7/12/17	CURRARONG (NSW)	19	0	NW
YELLOWTAIL KINGFISH	24/12/16	KURNELL (NSW)	360	12	NE
YELLOWTAIL KINGFISH	10/11/17	SWANSEA (NSW)	24	0	NW
YELLOWTAIL KINGFISH	23/7/17	THE PEAK (NSW)	140	0	NW
YELLOWTAIL KINGFISH	8/7/17	GOAT ISLAND (NSW)	112	0	NW
YELLOWTAIL KINGFISH	30/9/17	GOAT ISLAND (NSW)	62	0	NW
YELLOWTAIL KINGFISH	16/7/17	POINT PERPENDICULAR (NSW)	104	77	NE
YELLOWTAIL KINGFISH	7/7/17	NORTH SOLITARY ISLAND (NSW)	131	0	NW
YELLOWTAIL KINGFISH	3/7/17	GOAT ISLAND (NSW)	86	0	NW
YELLOWTAIL KINGFISH	30/7/17	NOOSA (QLD)	72	4	E
YELLOWTAIL KINGFISH	20/11/16	PORT AUGUSTA (SA)	371	747	E
YELLOWTAIL KINGFISH	10/10/17	PORT AUGUSTA (SA)	45	0	NW
YELLOWTAIL KINGFISH	1/3/17	ROCKY ISLAND (SA)	221	176	ENE
YELLOWTAIL KINGFISH	27/2/14	GREENLY ISLAND (SA)	1335	195	NE
YELLOWTAIL KINGFISH	13/9/14	COFFIN BAY (SA)	1169	170	NE
YELLOWTAIL KINGFISH	13/10/15	PORT AUGUSTA (SA)	726	0	NW
YELLOWTAIL KINGFISH	16/9/17	PORT AUGUSTA (SA)	44	0	NW
YELLOWTAIL KINGFISH	28/10/16	COFFIN BAY (SA)	384	170	NE
YELLOWTAIL KINGFISH	20/9/13	COFFIN BAY (SA)	1515	170	NE
YELLOWTAIL KINGFISH	28/10/15	COFFIN BAY (SA)	713	788	E
YELLOWTAIL KINGFISH	1/7/17	GOAT ISLAND (NSW)	98	0	NW
YELLOWTAIL KINGFISH	3/7/17	GOAT ISLAND (NSW)	96	0	NW
YELLOWTAIL KINGFISH	23/10/15	PORT AUGUSTA (SA)	713	0	NW
YELLOWTAIL KINGFISH	2/3/17	GOAT ISLAND (NSW)	212	0	NW
YELLOWTAIL KINGFISH	9/8/17	SYDNEY (NSW)	24	2	NNE
YELLOWTAIL KINGFISH	3/7/17	GOAT ISLAND (NSW)	64	0	NW
YELLOWTAIL KINGFISH	23/8/17	MUGS REEF (NSW)	12	0	NW
YELLOWTAIL KINGFISH	19/7/16	HUMMOCKS (SA)	412	0	NW
YELLOWTAIL KINGFISH	8/12/15	LONG REEF (NSW)	593	537	NE
YELLOWTAIL KINGFISH	1/10/15	THE PEAK (NSW)	668	477	NE
YELLOWTAIL KINGFISH	1/7/17	GOAT ISLAND (NSW)	52	0	NW
YELLOWTAIL KINGFISH	22/7/17	GOAT ISLAND (NSW)	36	0	NW
YELLOWTAIL KINGFISH	3/7/16	12 MILE REEF (NSW)	364	238	NNE

APPENDIX II: TOP TAGGING BOATS AND ANGLERS FOR 2017/2018.

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 2017/2018 season. We will continue to develop these end of season summaries and acknowledge the strong supporters of the tagging program in future years.

Key Species Tagged During 2017/2018

The 2017/2018 game fishing season ended on June 30, 2018 and resulted in over 12,800 fish tagged.

The top ten species tagged are shown in the table below.

KEY SPECIES TAGGED 2017/2018

Species	Number tagged
BLACK MARLIN	3414
STRIPED MARLIN	1809
SOUTHERN BLUEFIN TUNA	1359
SAILFISH	1114
BLUE MARLIN	1109
YELLOWTAIL KINGFISH	844
DOLPHINFISH	362
WHALER SHARK	352
SAMSON FISH	308
BRONZE WHALER	225

TOP TAGGING BOATS AND ANGLERS 2017/18

Species	Top boat	Runner up boat
Billfish combined	155 – Pole Dancer (QLD) Sunshine Coast GFC	149 – Mistress (QLD) Gold Coast GFC
Black Marlin	129 - Pole Dancer (QLD) Sunshine Coast GFC	91 – Reel Capture (QLD) Sunshine Coast GFC
Blue Marlin (International)	93 - Blue Marlin Magic (Tonga) Vava'u SFC	13 - Stephanie (PNG) New Britain GFC
Blue Marlin (Australia)	81 - Mistress (QLD) Gold Coast GFC	38 - Caboom (QLD) Gold Coast GFC

Species	Top boat	Runner up boat
Striped Marlin	58 – Flying Dutchman (NSW) Eden S & GFC	57 – She Left (NSW) Bermagui BGAC
Sailfish	97 - Get N Any (QLD) Weipa Billfish Club	78 – Wine Down (QLD) Weipa Billfish Club
Shortbill Spearfish	2 – Not a Word (TAS) Tuna Club of Tasmania, The Master (NSW) Botany Bay GFC	1 - (16 Recreational Vessels)
Swordfish	7 – Home Straight (VIC) Bass Straight GFC	5 - Cleavedge (NSW)
Shark combined	65 – Wet Dreams (WA) King Bay GFC	50 - Tantrum (NSW) Sydney GFC
Mako Shark	11 – Casey (NSW) Sydney GFC	6 – 4 Play (TAS) GFC of Northern Tasmania, Smart Bill (NSW) Sydney GFC
Blue Shark	4 – Bluefin II (VIC) Bass Straight GFC, South Wind (VIC) Bass Straight GFC, Stik Face II (VIC) Warnambool Offshore FC	3- Baitwaster (SA) Port MacDonnell OAC, Longshot (VIC) Bass Straight GFC, Mr Magoo (NSW) Port Hacking GFC, Papa Zulu (TAS) St.Helens GFC, Reckless (NSW) Shellharbour GFC, The General Lee (TAS) GFC of Northern Tasmania
Tiger Shark	6 – French Maid (WA) King Bay GFC	5 – Get Reel (NSW) Newcastle & Port Stephens GFC
Whaler Shark	58 – Wet Dreams (WA) King Bay GFC	47 - Tantrum (NSW) Sydney GFC
Hammerhead	9 – Asalt Weapon (NSW) Port	6 – Up 4 It (NSW) Shellharbour

Species	Top boat	Runner up boat
Shark	Macquarie GFC	GFC
Thresher Shark	1 – Lagoon (VIC), Shaitun (NSW) Bermagui BGAC, The Hulk (NSW) Eden S & GFC	
Tuna combined	347 – Broadbill (SA) GFC of SA	149 - Meerkat (VIC) Warnambool Offshore FC
Yellowfin Tuna	6 - Tagged by Commercial Vessel (NSW)	4 – Big Blue (NSW) Broken Bay GFC, Mistress (QLD) Gold Coast GFC
Southern Bluefin Tuna	347 – Broadbill (SA) GFC of SA	149 - Meerkat (VIC) Warnambool Offshore FC
Bigeye Tuna	1 - Tagged by Commercial Vessel (NSW)	
Albacore Tuna	10 - Mayphine (TAS) GFC of Northern Tasmania, Never Satisfied (TAS) Tuna Club of Tasmania	7 – Grey Ghost (TAS) Tuna Club of Tasmania, Ocean Pearl (TAS) Tuna Club of Tasmania, Shock Wave (TAS) GFC of Northern Tasmania
Longtail Tuna	7 – Hardline (QLD) Mackay GFC, Striper (QLD) Weipa Billfish Club, Time Out (QLD) Mackay GFC	6 – Mofo (QLD)
Dogtooth Tuna	3 - Big Cat Tender (QLD)	
Spanish Mackerel	12 – Hardline (QLD) Mackay GFC, Wet Dreams (WA) King Bay GFC	7 – Time Out (QLD) Mackay GFC

Species	Top boat	Runner up boat
Mahi Mahi	30 – Hooked Up (NSW)	16 - Nemo (NSW) Broken Bay GFC
Yellowtail Kingfish	80 - Reel Therapy (SA) Absolute Fishing Charters	78 – Ocean Hunter (NSW) Ocean Hunter Sports Fishing Charters
Species	**Top individual**	**Runner up individual**
Billfish	85 – Barry Alty (QLD) Gold Coast GFC	76 – Darryl French (NT) Weipa Billfish Club
Shark	60 – Chloe Hornhardt (WA) King Bay GFC	37 – Phil Turner (NSW) St.George SFC
Tuna	150 – Rolf Czabayski (SA) GFC of SA	88 – Jan Oosthuizen (VIC) Warnambool Offshore SFC
Seriola	78 – Vic Levett (NSW) Ocean Hunter Sports Fishing Charters	59 – Scott Lihou (SA)

APPENDIX III

SCIENTIFIC PUBLICATIONS THAT HAVE UTILIZED OR CITED DATA FROM THE TAGGING PROGRAM

(Listed chronologically, from most recent)

Williams, S.M., J.G. Pepperell, M.B. Bennett, B.J. Holmes and J.R. Ovenden (2018). Global genetic population structure of black marlin (Istiompax indica) and its relevance to fishery management. In Review.

Brodie S., L. Litherland, J. Stewart, H.T. Schilling, J.G. Pepperell and I.M. Suthers (2018). Citizen science records describe the distribution and migratory behaviour of a piscivorous predator, Pomatomus saltatrix. ICES Journal of Marine Science, doi:10.1093/icesjms/fsy057

Tracey, S. and J. Pepperell (2018). Understanding the movement, behaviour and post-capture survival of recreationally caught swordfish from southeast Australia – a pilot study. FRDC Project No 2015/022, 87pp.

Champion, C., A. J. Hobday, Z. Xuebin, G.T. Pecl and S.R. Tracey (2018). Changing windows of opportunity: past and future climate-driven shifts in temporal persistence of kingfish (Seriola lalandi) oceanographic habitat within south-eastern Australian bioregions. Marine and Freshwater Research, doi.org/10.1071/MF17387.

Brodie, S., A.J. Hobday, J.A. Smith, C.M. Spillman, J.R. Hartog, J.D. Everett, M.D. Taylor, C.A. Gray and I.M. Suthers. (2017). Seasonal forecasting of dolphinfish distribution in eastern Australia to aid recreational fishers and managers. Deep Sea Research Part II: Topical Studies in Oceanography 140, 222-229

Heard, M., S. Sutton, P. Rogers and C. Huveneers (2016). Actions speak louder than words: Tournament angling as an avenue to promote best practice for pelagic shark fishing. Marine Policy, 64, 168-173.

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Zischke, Mitchell T., Litherland, Lenore, Tilyard, Benjamin R., Stratford, Nicholas J., Jones, Ebony L. and Wang, You-Gan (2016). Otolith morphology of four mackerel species (Scomberomorus spp.) in Australia: species differentiation and prediction for fisheries monitoring and assessment. Fisheries Research 176, 39-47.

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Moore, A., Hall, K., Khageswor, G., Tracey, S., Hansen, S., Stobutzki, I., Ward, P., Andrews, J., Nicol, S. & Brown, P. (2015). Developing robust and cost- effective methods for estimating the national recreational catch of Southern Bluefin Tuna in Australia, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, December. CC BY 3.0.

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McLoughlin, K. and G. Eliason (2008). Review of information on cryptic mortality and the survival of sharks and rays released by recreational fishers. Bureau of Rural Sciences, Canberra. SEDAR21-RD-22, 22 pp.

Hutson, K.S., B.P. Smith, R.T. Godfrey, I.D. Whittington, C.B. Chambers, I. Ernst and B. M. Gillanders. A tagging study on yellowtail kingfish (Seriola lalandi) and samson fish (S. hippos) in South Australian waters. Transactions of the Royal Society of South Australia, 131 (1), 128-134.

Epe, S., Phillips, K., Hender, J. and Ward, P. (2007). Australian National Tuna Fishery Report presented at the third meeting of the Scientific Committee of the Western and Central Pacific Fisheries Commission, 13–24 August 2007, Honolulu,USA. WCPFC, Pohnpei, Federated States of Micronesia.

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UNIVERSITY THESES

The following theses have all been successfully completed, most of them relying heavily on data from the NSW DPI Game Fish Tagging Program:

Cameron Baber, James Cook University. Examining the impacts of environmental factors on the distribution of the shortfin mako shark, Isurus oxyrinchus, from eastern Australia. M.Sc., 2018.

Samuel Williams, University of Queensland. The global biology, ecology and phylogenetic status of black marlin (Istiompax indica) Ph.D. 2018.

Shane Ovington, University of Queensland. The distribution and size structure of blue marlin (Makaira nigricans) along the East Coast of Australia, modelled from recreational capture and tagging data. B.Sc. Honours 2017.

Stephanie Brodie, University of New South Wales. The ecology and distribution of two pelagic fish: yellowtail kingfish Seriola lalandi and dolphinfish Coryphaena hippurus. Ph.D. 2016.

Bonnie Holmes, University of Queensland. The biology and ecology of the tiger shark (Galeocerdo cuvier) on the east coast of Australia. Ph.D 2015.

Nicholas Hill. James Cook University. Variability in the distribution and movement of black marlin (Istiompax indica) determined via environmental conditions along the East Coast of Australia using recreational tag data. B.Sc. Honours, 2014.

Samuel Williams, University of Queensland Genetic population structure of black marlin (Istiompax indica) within the central Indo-Pacific: Breeding populations defined despite mitonuclear discordance. B.Sc. Honours, 2014.

Ronan Lynch, University of Queensland, Variability in the spatial and temporal occurrence, and size composition of sailfish (Istiophorus platypterus) in eastern Australian waters, and the influence of environmental conditions. B.Sc. Honours, 2012.

Richard Keller Kopf, Charles Sturt University. Age, growth and reproductive dynamics of striped marlin, Kajikia audax, in the southwest Pacific ocean. Ph.D., 2010.

Tom Bridge, University of Sydney. Effects of environmental variables on the recruitment and distribution of juvenile black marlin, Makaira indica, off the east coast of Australia. B.Sc. Honours, 2007.

John Hoolihan, University of New South Wales, Biology and stock structure of sailfish in the Persian Gulf. Ph.D., 2005.

Danielle Williams, University of New South Wales. Variations in the size composition and occurrence of yellowfin tuna (Thunnus albacares) in eastern Australian waters through time, inferred from a unique recreational-based dataset. B.Sc. Honours, 2003.

Ricky Chan, University of New South Wales. Biology of pelagic sharks off New South Wales. Ph.D., 2001.

Joanne Bennett, University of New South Wales. Ecology of dolphin fish (Coryphaena hippurus) and other large pelagic species: Environmental influences on their distribution. B.Sc. Honours, 2000.

CURRENT PROJECTS USING DATA

Two studies are currently under way that are utilizing data from the Game Fish Tagging Program. They are:

"Where have all the yellowfin tuna gone? Investigating the disjunct between commercial and recreational catches off NSW". Led by Pepperell Research and CSIRO co-investigating.

"Investigate oceanographic and environmental factors impacting on the Eastern Tuna and Billfish Fishery (ETBF)". Led by CSIRO with input from AFMA, BoM, ABARES and the University of the Sunshine Coast.

MAGAZINES, EMAIL LISTS

Regular updates, provided by NSW DPI, and articles on the tagging program have appeared in recreational fishing magazines, especially in 'Bluewater Boats & Sportfishing', which is targeted at a game fishing audience.

Tag Times e-zine, produced by NSW DPI, is also distributed to a large email list on a regular basis. You can subscribe to receive these emails here.

Lastly, detailed Annual Reports of the Game Fish Tagging Program have been regularly published throughout its history, originally in hard copy, and digitally over the past decade. These are all available at NSW Game Fish Tagging Reports.