NSW DPI Game Fish Tagging Program

Report 2012-2013

Recreational Fishing Trusts

NSW GOVERNMENT Primary Industries

Pepperell Research
Marine Science & Recreational Fisheries

NSW DPI Game Fish Tagging Program

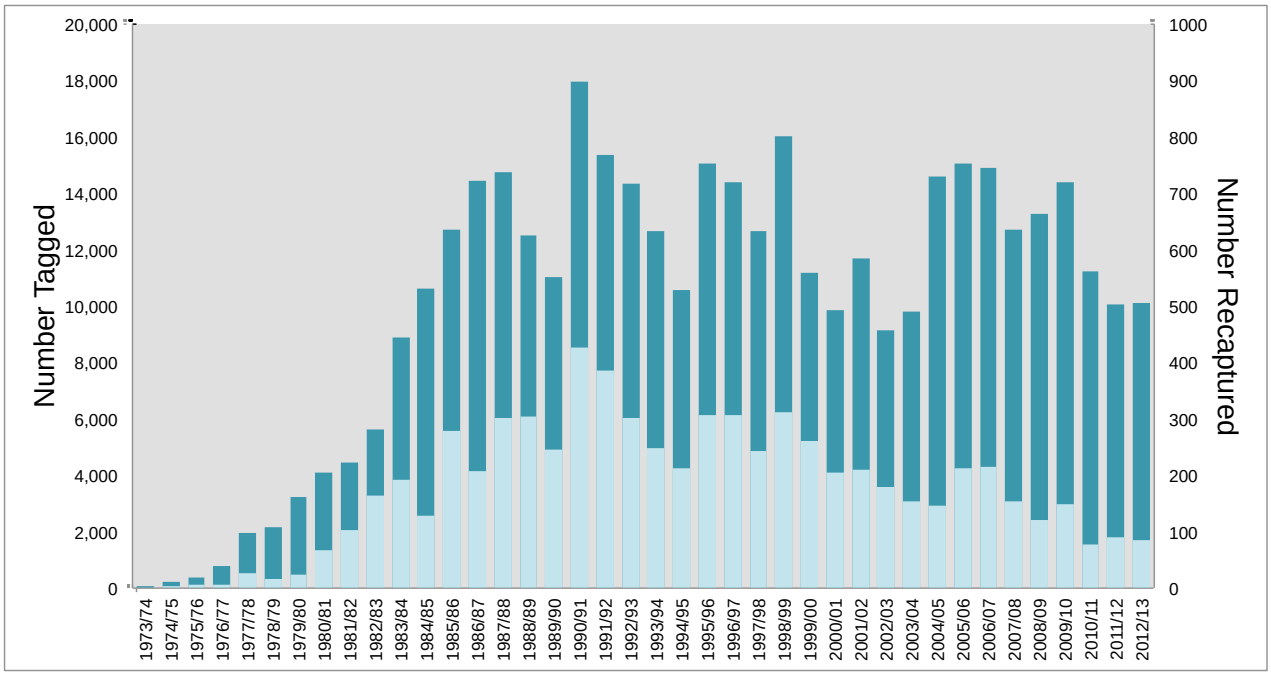
2012/2013

The 2012/2013 fishing year marked a milestone for the Game Fish Tagging Program with the 400,000th fish being tagged during the year. This is a great tagging effort by many thousands of volunteer anglers throughout the history of the Program, and has resulted in extensive increase in knowledge of many species of saltwater gamefish.

The number of fish tagged during the 2012/2013 tagging year was a slight increase on the previous year. A total of 10,133 fish were tagged for the year and 85 completed recaptures were recorded. Figure 1 shows the number of fish tagged (and recaptured) on the program throughout its history, and indicates that the number of fish tagged in 2012/2013 topped 10,000 for the ninth year in succession. The numbers of fish tagged each year has fluctuated through time. There was a steady increase in annual numbers of taggings to the mid 1980s as the program gained acceptance and tag-and-release became the norm in game fishing. In nearly every year since then, the total number of fish tagged has exceeded 10,000 (Figure 1).

Total numbers of fish tagged each year vary depending on the availability of different species of fish at different times and locations; for example, the two peak tagging years of 1990/91 and 1997/98 coincided with strong La Nina conditions on the east coast of Australia, resulting in influxes of some species in the warmer currents. This year, as outlined further in the report, juvenile black marlin appeared in some numbers from Townsville to Port Stephens, resulting in the largest numbers of that species being tagged since 1998/99. On the other hand, numbers of southern bluefin tuna tagged declined for the second year running, to about one third of the record numbers tagged over the preceding three years.

Figure 1. Numbers of fish tagged and recaptured by year, to 2012/2013.



The Program overall

Over the history of the program, the grand total of fish tagged and recaptured, as at the end of June 2013, stood at 406,427 and 6,998 respectively, continuing the program's status as one of the largest of its kind in the world (Table 1). This table summarises taggings and recaptures of the top species (or species groups) tagged, with all others combined as 'all other species'.

The species tagged in the greatest numbers continues to be black marlin (just under 56,000 tagged, and representing 13.8% of all releases) followed by yellowfin tuna, yellowtail kingfish, sailfish, mahi mahi (dolphinfish) and striped marlin.

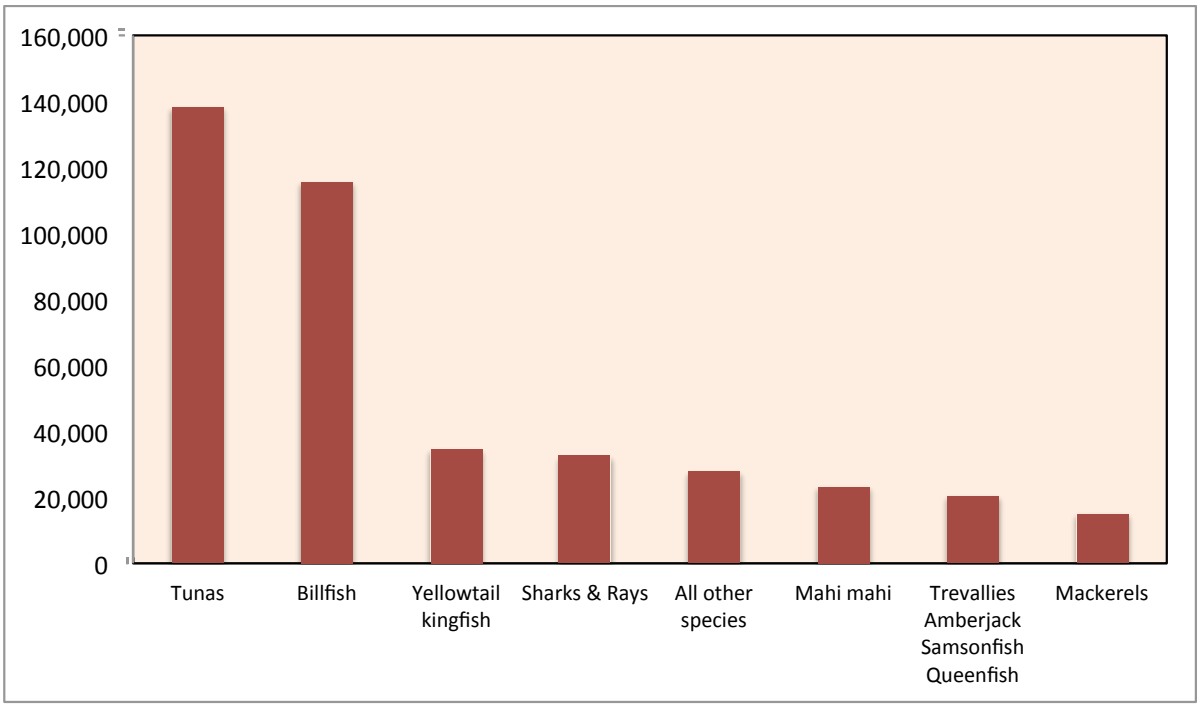
Table 1. Total numbers of fish tagged and recaptured: 1974-2013

Species	Total Tagged	Recaptures	% Recapt
BLACK MARLIN	55,984	432	0.77
YELLOWFIN TUNA	37,428	685	1.83
YELLOWTAIL KINGFISH	34,402	2182	6.34
SAILFISH	28,841	295	1.02
MAHI MAHI	23,209	215	0.93
STRIPED MARLIN	22,698	217	0.96
ALBACORE	21,305	161	0.76
STRIPED TUNA	20,543	68	0.33
MACKEREL TUNA	20,338	62	0.30
SOUTHERN BLUEFIN TUNA	16,323	120	0.74
BONITO	13,239	219	1.65
WHALER SHARKS	12,168	258	2.12
AUSTRALIAN SALMON*	9,616	610	6.34
SPANISH MACKEREL	8,709	81	0.93
BLUE MARLIN	7,328	21	0.29
MAKO SHARK	7,328	169	2.31
SILVER TREVALLY*	6,925	197	2.84
HAMMERHEAD SHARK	5,283	55	1.04
LONGTAIL TUNA	4,829	59	1.22
BLUE SHARK	4,545	76	1.67
TAILOR*	4,030	122	3.03
TREVALLY	3,349	31	0.93
BARRACUDA	3,223	5	0.16
QUEENFISH	3,163	10	0.32
GIANT TREVALLY	2,557	34	1.33
ALL OTHER SPECIES	29,064	614	2.11
TOTAL	**406,427**	**6998**	**1.72**

* Some species, such as tailor, silver trevally and Australian salmon, were tagged in large numbers in the past, but they have since been removed from the list of desirable species to tag.

Grouping the main species or species groups together for the history of the Program, Figure 2 shows that tunas remain the group tagged in the largest numbers (138,003 tagged, or 34% of the total) followed by billfish (115,350 or 28.4% of all fish tagged). Total numbers of sharks and rays (32,360 tagged) represent just 8% of the total number of fish tagged.

Figure 2. Total numbers of fish tagged as species groupings, 1974-2013



Summary for 2012/2013

Table 2. Numbers of fish tagged and recaptured in 2012/2013

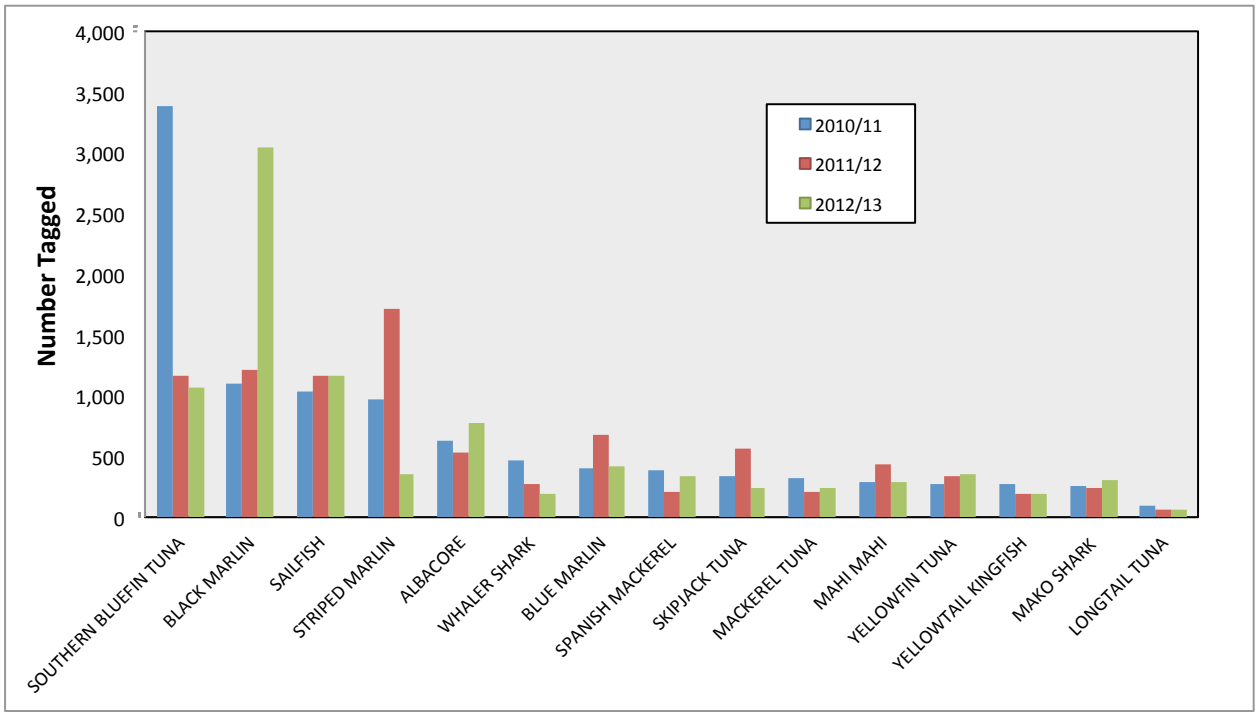
Species	Number	Recaptured
BLACK MARLIN	3040	27
SAILFISH	1157	5
SOUTHERN BLUEFIN TUNA	1061	
ALBACORE	774	
BLUE MARLIN	417	
STRIPED MARLIN	360	4
YELLOWFIN TUNA	356	
SPANISH MACKEREL	344	3
MAKO SHARK	304	6
MAHI MAHI	283	4
SKIPJACK TUNA	246	
MACKEREL TUNA	244	1
YELLOWTAIL KINGFISH	191	16
WHALER SHARK	180	6
BLUE SHARK	127	2
SHARK MACKEREL	115	
QUEENFISH	113	
WAHOO	96	
BARRACUDA	90	
SNAPPER	89	1
LONGTAIL TUNA	60	
TIGER SHARK	55	2
AUSTRALIAN SALMON	43	1
HAMMERHEAD SHARK	42	
GIANT TREVALLY	39	
SAMSON FISH	33	1
EAGLE RAY	28	1
GOLDEN TREVALLY	27	
GUMMY SHARK	26	1
SPOTTED MACKEREL	24	
COBIA	23	1
BONITO	20	
GOLD SPOTTED TREVALLY	18	
AMBERJACK	16	
SCHOOL SHARK	15	2
BROAD BARRED MACKEREL	10	
SILVER TREVALLY	10	
SHORTBILL SPEARFISH	9	
DOGTOOTH TUNA	8	
BIGEYE TUNA	5	
MISCELLANEOUS	5	
MULLOWAY	5	
RAINBOW RUNNER	5	
SCHOOL MACKEREL	5	
BLACKTIP SHARK	4	1
TREVALLY	4	
BIGEYE TREVALLY	2	
THRESHER SHARK	2	
WHITETIP SHARK	2	
SWORDFISH	1	
TOTAL	**10133**	**85**

Table 2 shows that in 2012/13, black marlin was the species tagged in the greatest numbers (3,040) – more than in any year since 1998/99. Interestingly, of that number, 436 were juvenile fish (10-40 kg) tagged in Western Australia, mainly off Exmouth and Dampier, which is an historical high for WA. The number of blue marlin tagged, at 418, was less than the record set last year (680), and again was spread geographically with numbers being tagged off Papua New Guinea (Lae and Madang), Exmouth WA, Tonga, Vanuatu and the eastern coast of Australia. Numbers of southern bluefin tuna tagged did not reach the heights of several years ago when over 3,000 were tagged in three successive years, but over 1,000 taggings was still healthy compared with historic numbers tagged.

As indicated in previous reports, the real-time detection and quantification of such changes in either fishing practices of the recreational sector, or availability of fish, would be all but impossible in the absence of the tagging program.

Figure 3 shows a comparison of species or species groups tagged over the past three years. As noted, this clearly shows the shifts in numbers of black marlin and southern bluefin tuna tagged over that time. It also shows that numbers of striped marlin tagged last year were well down on a long term average of about 1,000 annual taggings, that numbers of sailfish tagged continue to be quite consistent (also at around 1,000 per year) and that numbers of yellowfin tuna tagged were again relatively low (although slightly up on the previous two years).

Figure 3. Numbers of main species and species groups tagged in 2012/2013 and the previous two years.



Combining the species tagged into groups, Figure 4a shows that, in 2012/2013 billfish dominated overall taggings constituting 48.9% of all fish tagged – considerably higher than has been the case in average years when billfish have averaged about 30 to 35% of all fish tagged in a given year. With the tagging of southern bluefin tuna reducing from peak levels, the proportion of tunas in the totals for the year reduced to 26.9% while sharks and rays combined represented about 7.3% of all fish tagged – a typical figure over the course of the program in the last decade or more. Figure 4b plots the proportions of the major species groups recaptured in 2012/2013, indicating quite different proportions to those tagged. While billfish still dominate recaptures, a higher recapture rate for sharks resulted in their constituting 24.7% of recaptures for the year. Remarkably, only one tuna was reported recaptured in 2012/2013 – a mackerel tuna.

Figure 4a. Species groups tagged in 2012/2013

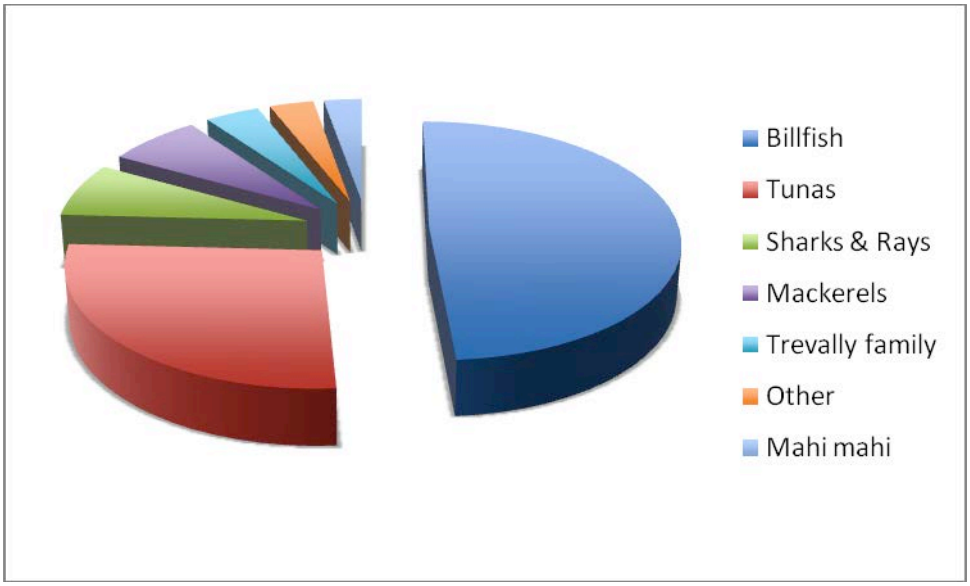
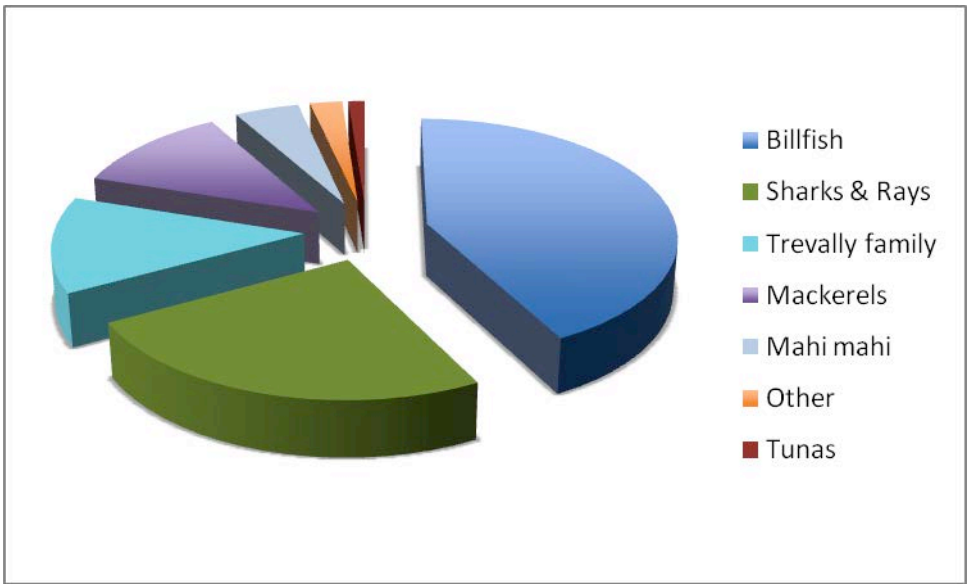


Figure 4b. Species groups recaptured in 2012/2013

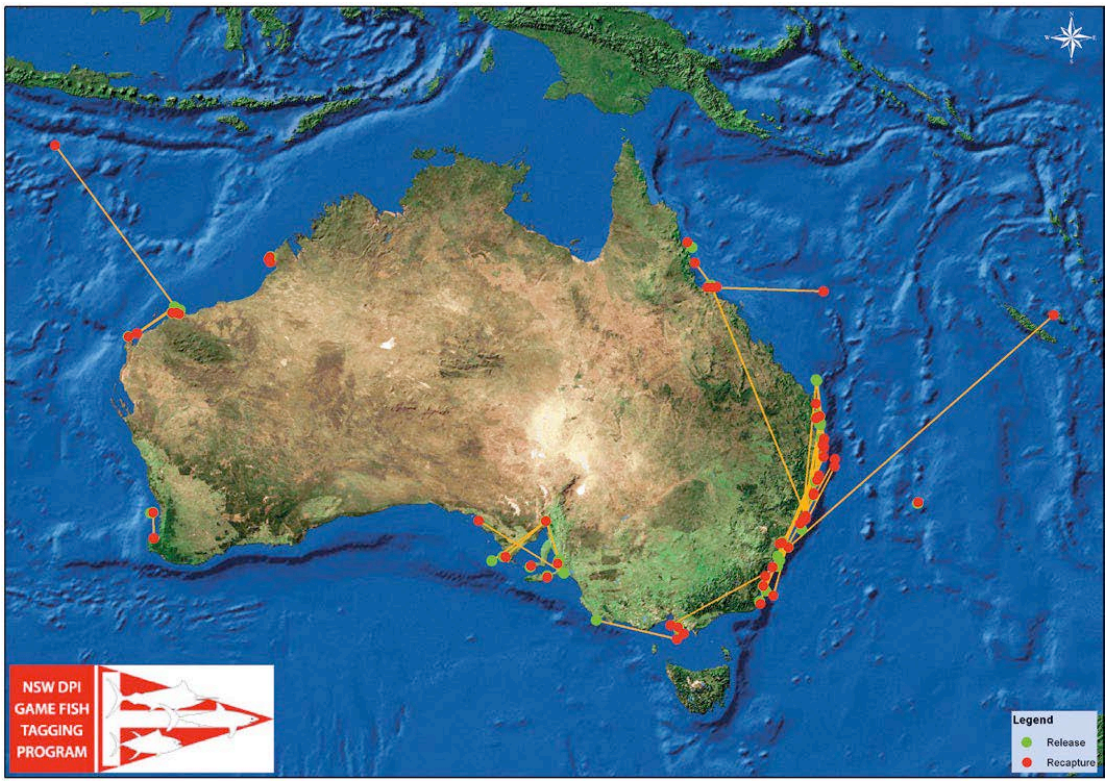


Recapture highlights

All of the completed recaptures recorded in 2012/2013 are listed in Appendix I. This season there were unusually high numbers of black marlin recaptured (27 compared to 3 from the 2011/2012 season) reflecting the extraordinary run of juvenile fish that were caught and tagged along the east coast. In contrast, the number of striped marlin recaptured was unusually low, with only 4 fish being recaptured compared to the record breaking 30 recaptured in 2011/2012. These fluctuations are likely to be attributable to the environmental conditions experienced during the normal peak striped marlin season of summer and early autumn in NSW – with a strong warm current heading down the coast with the East Australian Current followed by very heavy rains and associated flood waters in Queensland and northern NSW in February impacting heavily on the ocean water out to the continental shelf all along the NSW coast. These strong, warm currents positively influenced the black marlin fishery during the earlier spring and summer months before the influx of rainwater from the flooding also impacted on the inshore fishery whilst many of the fish were present in NSW waters.

The map below shows all recaptures of fish recorded in 2012/2013. Species making these movements are outlined below, but the map illustrates the geographic spread of the Program and the extent of information being derived on a continual basis.

Figure 5. Plot of all recaptures of fish reported in 2012/2013



Following are just some of the highlights of these recaptures. These tend to emphasise some of the longer times at liberty, or longer distances moved by tagged fish, and as such, are often exceptions to the rule. In fact, many fish are recaptured relatively close to their points of release, often within relatively short times and it is important to realise that the information gained from these recaptures is just as important to our understanding of the movements and growth of game fish as longer term, longer distance recaptures.

Black marlin

With over 3,000 black marlin tagged in 2012/2013, it was perhaps not surprising that there were also good numbers of recaptures reported. Twenty seven tagged black marlin were recaptured, with times at liberty ranging from just one day to 395 days and distances travelled from zero to 837 nautical miles. The furthest moving fish was tagged off Cape Bowling Green at an estimated size of just 14 kg and recaptured only 7 months later off Cape Hawke NSW, landed, and found to weigh 31 kg. This supports previous estimated growth rates of black marlin in their first year of life, showing them to be one of the fastest growing fish in the ocean.

The second furthest distance moved by a recaptured black marlin during the season was by another juvenile fish, but this time tagged off Western Australia. This fish had been tagged off Exmouth in August 2011 and was recaptured by an Indonesian commercial vessel in the Java Trench, 687 nautical miles northwest of its release point. This fish had been heading in a similar direction to two previously tagged black marlin released off Exmouth, one of which reached the coast of Sri Lanka and the other, the southeastern coast of India.

Sailfish

There were only five sailfish recaptured during 2012/2013, all released off Western Australia (three off Broome and two off Dampier). All had been at liberty for at least 6 months – two for nearly a year, one for 14 months and one for almost exactly seven years. The latter is the longest time-at-liberty for a sailfish on the Program, and remarkably, it was recaptured just 3 nautical miles from its point of release off Broome. In contrast, the furthest distance moved by a sailfish in 2012/2013 (151 nautical miles) was by the fish at liberty for the shortest time (183 days). These and many previous recaptures of sailfish are indicating that the species may well exhibit strong annual homing tendencies with recaptures in the same general locations as releases after time periods of one year, or multiples of one year.

Striped marlin

While there were only four striped marlin recaptures reported during the year, these again reinforcing previous years' results. None was at liberty for more than five months and none moved more than 420 nautical miles, that distance being covered by a fish tagged off Bermagui and recaptured 32 days later off Coffs Harbour. Over the history of the Tagging Program, 217 striped marlin have now been recaptured, but only a handful of those have been recaptured after more than a year. Distances moved by the vast majority of recaptured fish indicates that this species is the least mobile of the three Indo-Pacific marlins, with blue and black marlin showing much greater tendencies to move over large distances in relatively short periods of time. The relative lack of movement of striped marlin has almost certainly led to the existence of distinct, discrete populations of the species in the Pacific.

Dolphinfish

Usually, dolphinfish, or mahi mahi, don't rate much mention in recapture highlights since most are recaptured after relatively short periods, often near buoys of FADs where they were originally tagged. Such information is very useful in fisheries assessments, but is not particularly 'newsworthy' in terms of times at liberty and distances moved. This year though, two recaptures of mahi mahi are certainly worth recounting.

The first was a small fish of about 1.5 kg that was tagged at Windang Reef off Shellharbour NSW in February 2012 from the boat *Argus* of Shellharbour GFC. The fish was subsequently reported as recaptured by the tuna coordinator at the Secretariat of the Pacific Community. The fish had been caught on 28 September, 2012, between Lifu and Ouvea islands off the east coast of New Caledonia by a commercial fisher – a minimum straight line swim of 1,176 nautical miles. This is the second-furthest travelled dolphinfish recaptured under the Program. The record is held by a fish tagged at Port Stephens, NSW and recaptured in Fiji. Interestingly, of the top four furthest-travelled dolphinfish, three have been recaptured in the New Caledonia area. During its 230 days at liberty the fish had grown from an estimated 55cm to 98cm. This is a fairly modest growth rate for dolphinfish – a species that is recognised as a fast-growing, short-lived species. Average growth rates for dolphinfish sampled from around the world for fish from 6 to 12 months of age range from approximately 3 to 4mm per day. Most dolphinfish don't live beyond two years of age and have a maximum life expectancy of four years.

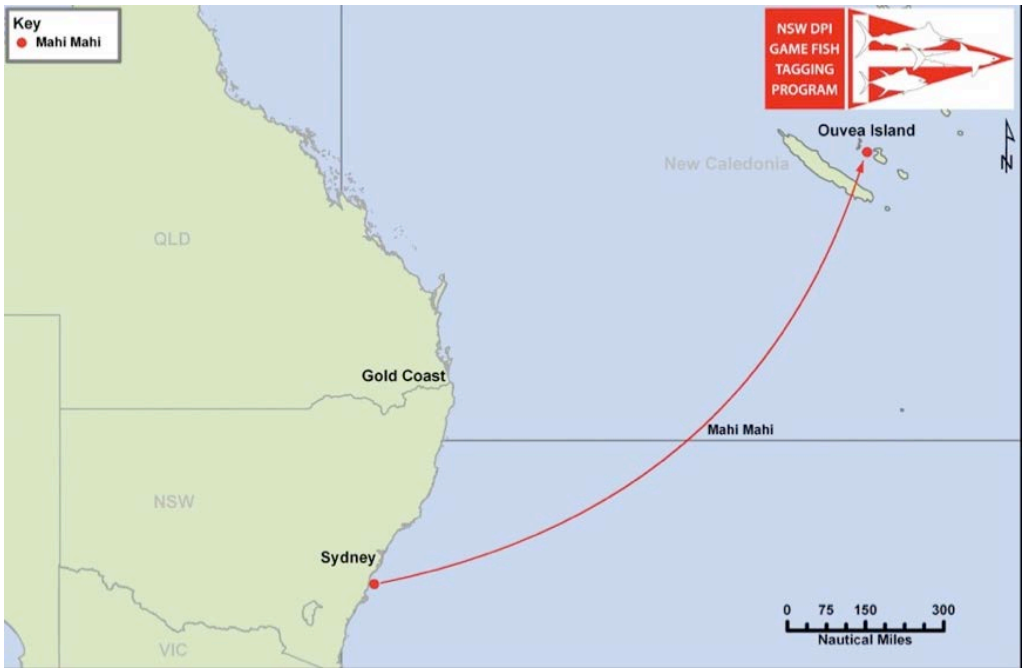


Figure 6. The second longest distance moved by a tagged dolphinfish was recorded this year

Mako shark

Mako sharks made their predictable seasonal appearance off central and southern NSW during winter and early spring, and off the Victorian coast over summer of 2012/2013.

Three makos, originally tagged near the Browns Mountain seamount directly east of Sydney in August and September, were all recaptured shortly afterwards in roughly the same location after up to 21 days at liberty. This includes one fish that was captured twice in the one day by the same boat! This tight group of recaptures is probably linked to the significant fishing activity in this area during the winter months, when many anglers target the aggregation of deep-sea fish such as blue eye trevalla and gemfish and, of course, the sharks that seem to be associated with these fish.

Local anglers assisted Ph.D student Rob French of the University of Tasmania tag a number of these makos with satellite archival tags programmed to pop-off and transmit their data after 30 days. While a few fish were found to stay in the same general area, some made startling movements north into the Coral Sea. And proving that pelagic fish often move in different directions, a mako that was originally tagged wide of Jervis Bay in November was recaptured 49 days later and 354 nautical miles away off Cape Schanck, Victoria.

School shark record

A shark released by an angler in 1994 off Ulladulla was recaptured after more than 19 years at liberty! The fish was originally recorded as a whaler shark when first caught by Batemans Bay Game Fishing Club boat *Sambuca.* However, on recapture by a commercial gummy shark fisher off Wingan Inlet, Victoria, it was clearly identified as a school shark (otherwise known as tope in the northern hemisphere). The fish had grown from an estimated length of 120cm to an estimated length of 170cm and had covered a straight-line distance of 141 nautical miles.

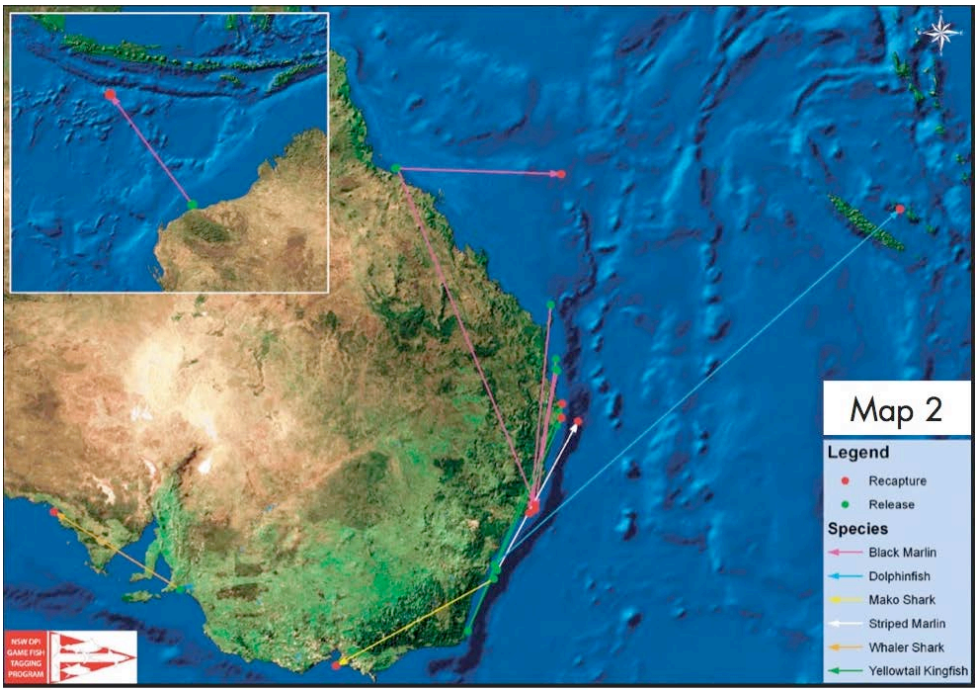
This recapture smashed the Game Fish Tagging Program's previous record time-at-liberty set by a mako shark tagged off Port Macquarie and recaptured off Sydney almost 12 years later.

School sharks are distributed worldwide and are most abundant in cold to temperate waters. They are primarily a deep-water demersal species, although they've been recorded making daily migrations from depths of 500m during the day to 100m at night. They are a relatively small shark. In Australia, pups are reported to be born at 30cm long and adults grow to approximately 175cm. School sharks are similar to other shark species in that they have low reproductive potential and are long lived. They are believed to mature at around 10 years of age and reproduce every two to three years. Life expectancy is believed to be over 55 years! These factors make these sharks very sensitive to fishing pressure. It is reported that the current mature biomass of school shark in southern Australia is estimated to be below 20 per cent of the pre-fishing level.

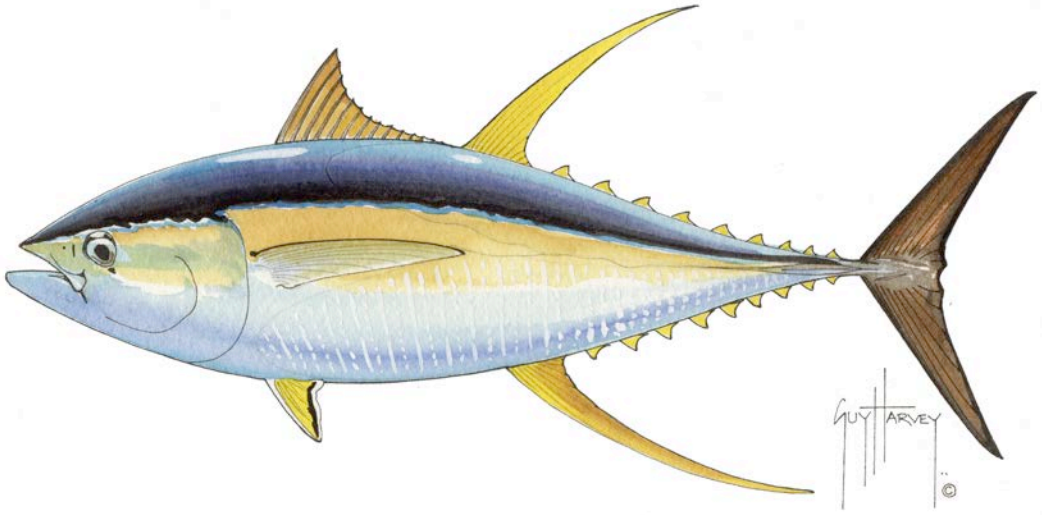
Blacktip shark

One other recapture that occurred in 2012/2013 is worth singling out. A blacktip shark tagged off Lae, Papua New Guinea in September 1997 was recaptured just 12 nautical miles from its release point in November 2012 for a time-at-liberty of 15 years 2 months. This became the second longest time between tagging and release for the Program, only surpassed by the school shark mentioned above. It was estimated at 18 kg at release and at 45 kg at recapture. There are several species of similar-looking blacktip whaler sharks in PNG waters, so unfortunately we can't be sure which species this one was. The shark was retagged so who knows, perhaps it might be recaptured again in the future to continue its fascinating life story.

Figure 7. Composite map of movements of recaptured fish in 2012/2013 that had moved straight line distances of more than 300 nautical miles



Focus on: Yellowfin tuna (*Thunnus albacares*)



The following summary of the biology of the yellowfin tuna has been adapted from the book, 'Fishes of the Open Ocean' by Julian Pepperell (UNSW Press).

By any standards, the yellowfin tuna is an impressive fish. Beautifully adapted and streamlined for its oceanic existence, it has been given many names, but none more evocative than the Hawaiian name 'Ahi', meaning 'Fire'. One can imagine those early, intrepid Polynesian fishermen yelling "ahi!" as their cord lines burnt their calloused hands with the blistering first runs of those keenly sought tuna.

Identification

Above a size of about 35 kg, yellowfin tuna are easily identified by their extended anal and second dorsal fins, which become extremely long in large adults. Fish less than 15 kg may be confused with other species, especially the bigeye tuna. Yellowfin and bigeye tunas can be separated by examining the surface of the liver, which is marked with dark streaks (striations) in the bigeye, but is plain colored in the yellowfin. Externally, the belly and flanks of live yellowfin show numerous vertical silvery rows of spots, alternating with solid bands, while in the bigeye, these bands are widely separated and mostly solid.

Geographic range

The yellowfin tuna has a worldwide distribution which includes the Atlantic, Indian and Pacific oceans. While yellowfin tuna are generally classified among the 'tropical' tunas, they sometimes frequent much cooler water. They certainly spawn in the tropics, between latitudes 15° north and south, but their geographic range is much broader – usually between latitudes 40°N to 40°S.

Although genetic studies have shown that the yellowfin is a single, world-wide species, it is very likely that localized, regional populations exist. The body shapes of fish can vary from place to place (as determined by computer analysis), probably reflecting transient 'races' of fish. For example, off southeastern Australia, yellowfin tuna encountered in offshore waters were found to have longer anal and second

dorsal fins than inshore fish of the same size. Why this should be so is not clearly understood, but it probably indicates that the inshore fish live quite separately from the oceanic fish for at least their first two years of life.

Movements

Significant numbers of yellowfin have been tagged by recreational anglers operating through the NSW DPI Gamefish Tagging Program. Since the inception of that program, just over 36,700 yellowfin have been tagged and 682 recaptures have been reported. While a few tagged yellowfin have made extensive movements, these tend to be exceptions to the rule. In fact, results indicate little movement away from the continental shelf for up to two years, but rather, a consistent seasonal movement of fish north and south along the coast in response to sea surface temperature. These results strongly suggest that yellowfin which find their way onto the continental shelf off eastern Australia tend to remain as a group within the coastal strip, effectively separated from those encountered in the wider southwestern Pacific.

Another major tuna tagging operation was undertaken off Hawaii in the early 2000s. There, yellowfin and bigeye tuna were tagged over several seamounts where there is targeted commercial pole-and-line fishing for tuna. Recapture rates of tagged fish average about 10%, from fish recaptured not only at the seamounts, but also near the island of Oahu, indicating frequent exchange between the island and the seamounts As part of this exercise, yellowfin tuna were also tagged from sportfishing boats at Midway Island, at the northwestern tip of the Hawaiian chain. Some recaptures of those fish showed quite extensive movements to the west, proving that at least some yellowfin may make long movemens across open ocean. However, the emerging picture from all this tagging is that the average yellowfin tuna does not undertake long distant movements during its lifetime.

Daily patterns of behaviour of yellowfin tuna have been extensively studied using various electronic tags. This research has revealed that yellowfin tuna are surface oriented fish, preferring to remain above the thermocline most of the time (the thermocline being the depth where warmer surface waters meet colder, deeper water, usually less than 100 metres below the surface). Data from many fish also showed that they are even more surface associated at night compared with daylight hours. One interesting finding from tracking yellowfin in Hawaii was that fish associated with surface buoys or islands will move in a highly predictable daily feeding pattern. Fish tagged near a particular FAD (Fish Aggregating Device) would always leave the FAD at the same time, usually around dusk, and swim in a consistent circuit to other FADs, often many kilometres away, completing their trip by dawn the next day. While these results suggest that yellowfin may be creatures of habit, it was also shown that the repeat behaviour patterns don't go on indefinitely. After periods of a few days to a week or so, fish would depart the scene, presumably to resume their more nomadic lifestyle.

In recent years, larger numbers of yellowfin have been implanted with archival tags, revealing even more remarkable details of their behaviour. Again, fish stayed nearer the surface at night compared with daylight hours, making forays to around 150 metres below the surface every now and then. However, the big surprise from this study was that some fish made far deeper dives than ever before recorded, some exceeding 1,000 metres below the surface. As well, deep diving fish often remained at these depths, where temperatures were less than 5°C , for up to an hour, proving that these remarkable fish have broader tolerances than previously thought.

Growth and size

Yellowfin tuna grow fast, perhaps faster than any other tuna. From the size of a pinhead at hatching, they reach about 15 kg after only one year, 30 kg plus by year two, and by their fifth birthday, the average fish would weigh about 55 kg while a 70 kg fish would be no more than seven years old.

Some of the largest yellowfin in the world have been caught near the Revilliagigendo islands, about 400km west of Cabo San Lucas, Mexico. Long range sport fishing boats make regular trips to these grounds, and many of the heavy tackle world records have been, and are held by fish from this area. The all-tackle game fishing record for yellowfin tuna was caught in 2012 to the east of these islands, and weighed 193.68 kg (the Australian record yellowfin weighed 124 kg and was caught off Bermagui in 1993.

Reproduction

Even though some references suggest that yellowfin might mature at a size as small as 60 cm in length (only about 4 kg) it is much more widely accepted that most yellowfin mature at 25 to 30kg in weight, or about 100 cm long. Full maturity is reached by about 45 kg, or 3 years old. Most spawning occurs in the tropics between the latitudes of 15° north and 15° south in the three major oceans.

A remarkable feature of yellowfin reproduction (and probably that of all other tunas) is that a female fish may spawn every day or every second day for several months. Each time she spawns, she will produce several hundred thousand eggs, so over her lifetime, she will have cast many tens of millions of potential offspring to the mercies of the currents.

Fertilization is external, and mortality of eggs and larvae must obviously be very high. The larvae have large eyes and mouths, and immediately begin actively swimming and pursuing food in the form of other plankton. It is at this critical stage in the life cycle of the yellowfin when slight increases or decreases in mortality will determine how good or bad fishing will be when this 'year class' of fish grow to a fishable size (this is termed ‘recruitment’ of fish into a fishery). It has been found that good years and bad years for catches are closely linked to the strength of these recruitment events.

Fisheries

The yellowfin tuna is an enormously important commercial species. The total world catch is at least 800,000 tonnes, over half of which is taken in the central and western Pacific Ocean. For many years, the global catch and western Pacific Ocean catch of yellowfin continued to rise, but in recent years, the catch has shown signs of flattening out. Changes which have occurred include a reduced total catch of yellowfin by longline and a greatly increased catch of juvenile fish by purse seine and by artisanal fishermen in the Philippines and Indonesia. Sophisticated stock assessments of yellowfin and other tunas are carried out each year and have begun to sound some warning bells about the viability of continued high exploitation rates of this species.

Tagging Tips

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. Where possible, try to place the tag at an angle of at least 45° to reduce water friction on the tag.

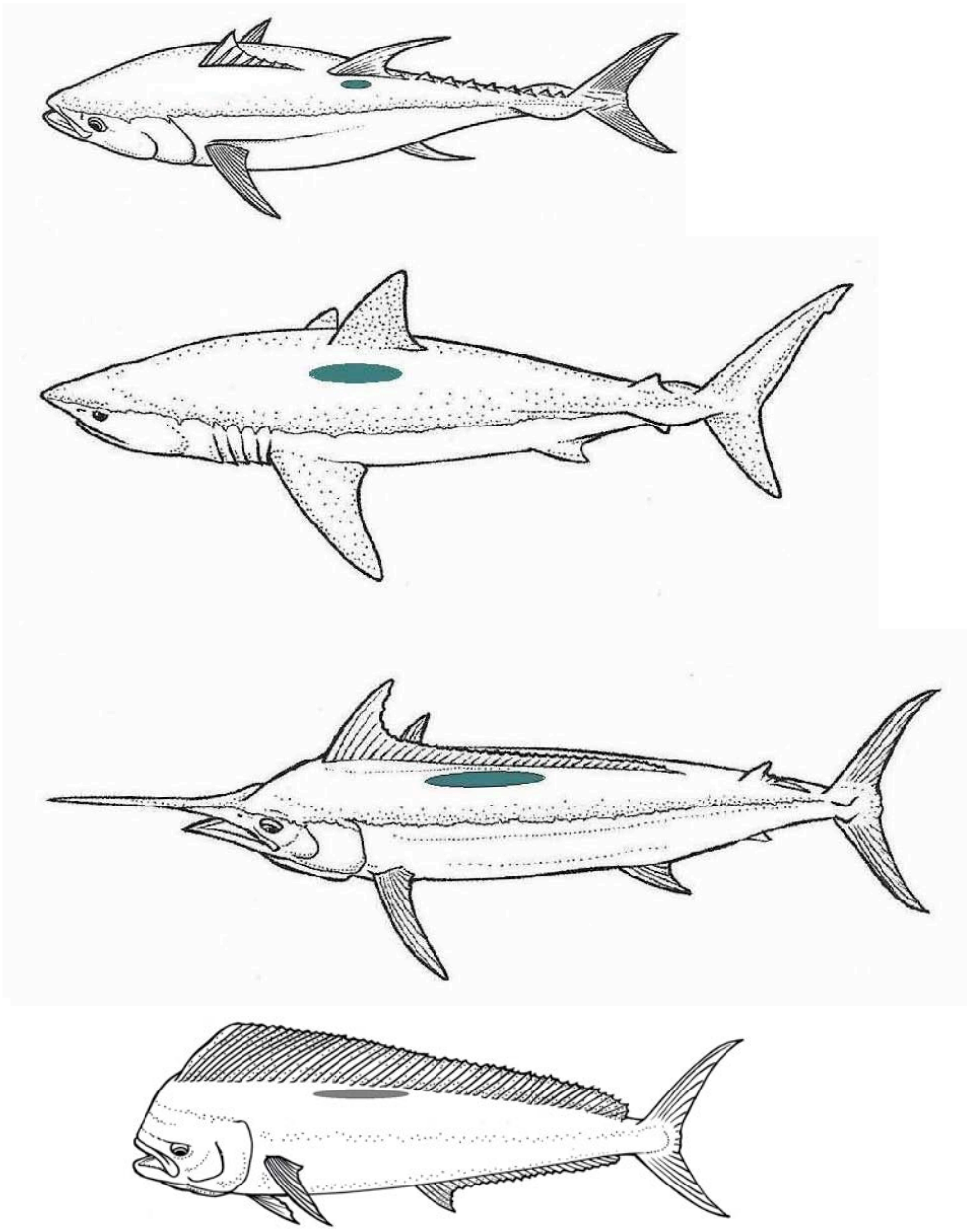
Tagging and improved survival tips

- 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 area is shown below. It is better to release the fish without tagging, if accurate tag placement is not possible.

Recommended tagging areas



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, 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) 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(0)2 9527 8411 or email game fish.tagging@dpi.nsw.gov.au.

Acknowledgements

The Game Fish Tagging Program 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.

Appendix I: All Recaptures of Tagged Fish Reported in 2012/2013 for which tag cards had been received

Species	Release Date	Release Locality	Days at Liberty	Distance moved (n.mi)	Direction
Australian Salmon	29/09/12	Browns Beach (SA)	12	4	NNE
Barramundi	20/01/09	Karratha (airport)	1377	0	S
Black Marlin	28/07/11	Dampier (WA)	395	2	ENE
Black Marlin	14/08/11	Dampier (WA)	346	687	NNW
Black Marlin	18/08/12	Cape Bowling Green	14	10	SE
Black Marlin	23/08/12	Thetford Reef (QLD)	15	22	NW
Black Marlin	31/08/12	Cape Bowling Green	204	837	SSE
Black Marlin	31/08/12	Cape Cleveland	275	366	E
Black Marlin	2/09/12	Cape Bowling Green	7	16	ESE
Black Marlin	2/09/12	Cape Bowling Green	10	95	NNW
Black Marlin	17/10/12	Fraser Island	53	121	S
Black Marlin	17/10/12	Fraser Island	68	199	SE
Black Marlin	10/11/12	Fraser Island	133	488	S
Black Marlin	25/11/12	Hutchison Shoals	77	23	NNW
Black Marlin	1/12/12	Moreton Is. Trench (QLD)	127	341	SW
Black Marlin	8/12/12	Mooloolaba (wide)	1	0	S
Black Marlin	8/12/12	Gold Coast (east)	47	296	SW
Black Marlin	16/12/12	Gold Coast	16	78	NW
Black Marlin	20/12/12	Cape Moreton (QLD)	89	234	S
Black Marlin	21/12/12	Mooloolaba (18 Nm Ne)	89	272	S
Black Marlin	21/12/12	Cape Moreton (QLD)	99	337	SW
Black Marlin	23/12/12	Point Plomer	12	63	NNE
Black Marlin	2/01/13	Mooloolaba (east)	101	352	SW
Black Marlin	6/01/13	Coffs Harbour	66	150	SSW
Black Marlin	12/01/13	Gold Coast (east)	12	156	SW
Black Marlin	12/01/13	Mooloolaba (18 Nm Ne)	66	271	S
Black Marlin	16/01/13	Hat Head	25	195	NE
Black Marlin	6/02/13	Hat Head	45	84	SSW
Black Marlin	23/03/13	Mooloolaba (wide)	33	4	SE
Blacktip Shark	16/09/97	Lae (PNG)	5542	12	SSE
Blue Shark	20/01/13	St Helens (TAS)	0	0	N
Blue Shark	6/04/13	Sydney (wide)	0	1	N
Cobia	25/04/13	Mooloolaba (8 Nm Ne)	37	3	SW
Eagle Ray	26/11/11	Kangaroo Island (SA)	469	5	SW
Gummy Shark	23/09/10	Port Macdonnell (SA)	796	226	ESE
Mackerel Tuna	22/08/12	Mooloolaba (8 Nm Ne)	3	44	NW
Mahi Mahi	1/03/09	Port Stephens (80 Fath E)	1463	16	SW
Mahi Mahi	11/02/12	Windang Reef	230	1176	NE
Mahi Mahi	15/02/13	South West Rocks Fad	22	218	SSW
Mahi Mahi	23/03/13	Fremantle Sailing Club Fad	12	7	NE
Mako Shark	4/08/12	Browns Mountain (NSW)	12	0	S

Species	Release Date	Release Locality	Days at Liberty	Distance moved (n.mi)	Direction
Mako Shark	4/08/12	Browns Mountain (NSW)	21	1	S
Mako Shark	9/09/12	Browns Mountain (NSW)	0	0	S
Mako Shark	23/11/12	Jervis Bay (wide)	49	357	WSW
Mako Shark	7/01/13	Cape Woolamai (VIC)	13	3	SW
Mako Shark	10/03/13	Cape Woolamai (VIC)	1	16	SE
Sailfish	19/07/05	Broome (19 Nm Nw)	2551	3	WSW
Sailfish	27/07/11	Broome (WA)	359	5	NNE
Sailfish	20/08/11	Dampier (WA)	428	150	WSW
Sailfish	21/04/12	Dampier (WA)	183	151	WSW
Sailfish	30/07/12	Broome (WA)	322	17	SW
Samson Fish	19/01/10	Club Marine Fad	1105	88	S
School Shark	28/05/94	Ulladulla (brush Island)	6965	141	SW
School Shark	20/06/10	Port Macdonnell (SA)	1099	252	SE
Snapper	29/02/08	Glenelg (SA)	1633	1	NNW
Spanish Mackerel	29/07/07	Salamander Reef	1799	4	NW
Spanish Mackerel	15/09/10	Mackerel Islands (WA)	1011	36	NNE
Spanish Mackerel	3/03/12	Gold Coast (east)	325	15	SE
Striped Marlin	14/03/12	Port Stephens	146	237	NNE
Striped Marlin	30/12/12	Kiama Canyons	102	381	NNE
Striped Marlin	27/01/13	Botany Bay (wide)	44	177	SW
Striped Marlin	1/04/13	Bermagui (wide)	32	420	NNE
Tiger Shark	1/08/11	Dampier (dolphin Island)	418	15	WSW
Tiger Shark	3/08/12	Dampier (north West Reef)	1	0	S
Whaler Shark	27/01/08	Goolwa Beach (SA)	1775	303	WNW
Whaler Shark	27/12/11	Lord Howe Island	333	4	NE
Whaler Shark	16/03/12	Exmouth (WA)	241	0	S
Whaler Shark	18/11/12	Lae (PNG)	7	1	NE
Whaler Shark	20/01/13	Port Neill	80	37	SW
Whaler Shark	5/04/13	The Banks	84	186	SSW
Yellowtail Kingfish	2/12/06	Mowarry Point	2122	529	NNE
Yellowtail Kingfish	21/03/11	Rocky Island (SA)	572	205	NE
Yellowtail Kingfish	8/04/11	Mowarry Point	596	560	NNE
Yellowtail Kingfish	12/09/11	Port Augusta (SA)	381	169	SW
Yellowtail Kingfish	16/10/11	Port Augusta (SA)	262	0	S
Yellowtail Kingfish	17/10/11	Coffin Bay	366	6	SE
Yellowtail Kingfish	8/11/11	Long Reef	250	250	NNE
Yellowtail Kingfish	24/02/12	Montague Island	282	51	NW
Yellowtail Kingfish	10/03/12	Mowarry Point	268	8	SE
Yellowtail Kingfish	19/04/12	Port River (adelaide)	126	139	NW
Yellowtail Kingfish	20/07/12	Shark Island (sydney Harbou	55	5	NW
Yellowtail Kingfish	13/12/12	Long Reef	107	90	SSW
Yellowtail Kingfish	9/03/13	Montague Island	50	1	N
Yellowtail Kingfish	13/03/13	South Solitary Island	43	2	E
Yellowtail Kingfish	6/04/13	Sydney (north Head)	6	2	NNE
Yellowtail Kingfish	30/04/13	Sydney Harbour	41	0	S

Appendix II: NSW DPI Game Fish Tagging Program Top Taggers for 2012/2013

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 2012/2013 season.

Species	Top boat	Runner up boat
Billfish combined	109 – *Reel Capture* (QLD) Sunshine Coast GFC	108 – *Kamikaze* (NSW) Sunshine Coast GFC
Blue Marlin (International)	58 – *Reel Addiction* (Tonga) Vava'u SFC / Reel Addiction Charters.	25 – *Talio* (PNG) Madang GFC / Reel Fish Charters
Blue Marlin (Australia)	6 – *Mistress* (QLD) Gold Coast GFC / Mistress Sportfishing Charters	5 – *Phantom* (WA), *Black Marlin* (WA), *Winora II* (WA), *Mahi Mahi III* (WA), *The Bear* (WA)
Black Marlin	103 – *Kamikaze* (QLD) Sunshine Coast GFC	93 – *Reel Capture* (QLD) Sunshine Coast GFC
Striped Marlin	18 – *Mr Hooker* (NSW) Bermagui BGAC	15 – *Sniper* (NSW) Jervis Bay GFC and Polaris (NSW) Eden S & GFC
Sailfish	70 – *On Strike* (WA) Exmouth GFC / On Strike Charters	48 – *No More Favours* (NT) Groote Eylandt G & SFC
Shortbill Spearfish	2 – *Entourage* (NSW) Ulladulla S & GFC	1 – *No Frills* (NSW), *Aurora* (QLD), *Dads Lad* (NSW), *Shotgun* (NSW), *Elempi* (QLD), *Black & Blue* (NSW), *Thumpa* (NSW)
Swordfish	1 – *Reel Teaser* (WA) Broome FC / Reel Teaser Charters	-
Shark combined	35 – *Tourettes* (WA) Nickol Bay SFC	24 – *Top Shelf* (WA) King Bay GFC and Perth GFC
Mako Shark	13 – *Tonlu II* (NSW) Jervis Bay GFC and *Little Audrey* (NSW) Sydney GFC	12 – *Chasing Tail* (NSW) Sydney GFC
Blue Shark	14 – *Polaris* (NSW) Eden S & GFC	8 – *Reckless* (NSW) Shellharbour GFC
Tiger Shark	27 – *Tourettes* (WA) Nickol Bay GFC	5 – *Top Shelf* (WA) King Bay GFC
Whaler Shark	15 – *Top Shelf* (WA) King Bay GFC and Perth GFC	11 – *Southern Blue* (SA) Adelaide GFC
Hammerhead Shark	4 – *That's Gold* (NSW) Port Macquarie GFC and *Top Shelf* (WA) King Bay GFC and Perth GFC	3 – *Childs Play* (NSW) Ulladulla S & GFC
Thresher Shark	1 – *Wet Dreams* (VIC) South Gippsland GFC	-
Tuna combined	150 – *Galaxy Star* (SA) GFC of South Australia	64 – *Choona Chasa* (TAS) Tuna Club of Tasmania

Yellowfin Tuna	24 – *Tanacious* (NSW) Sydney GFC	20 – *Malolo* (NSW) Sydney GFC
Southern Bluefin Tuna	150 – *Galaxy Star* (SA) GFC of South Australia	56 – *Choona Chasa* (TAS) Tuna Club of Tasmania
Bigeye Tuna	-	-
Albacore Tuna	61 – *Team Penn* (TAS) GFC of Northern Tasmania and St Helens GFC	49 – *Tintoi* (TAS) GFC of Northern Tasmania and St Helens GFC
Longtail Tuna	10 – *Tourettes* (WA) Nickol Bay SFC	7 – *Top Shelf* (WA) King Bay GFC
Dogtooth Tuna	5 – *Maverick* (QLD) Townsville GFC	3 – *Drug Runner* (PNG) Lae GFC
Spanish Mackerel	39 – *Mandalay* (WA) Geraldton District OAC and Perth GFC	28 – *Big Mac* (NT) Groote Eylandt G & SFC
Mahi Mahi	15 – *Argus* (NSW) Shellharbour GFC	11 – *Polaris* (NSW), *Hang Time* (NSW) and *Mayhem* (NSW)
Yellowtail Kingfish	32 – *Sea Jay* (SA) Adelaide GFC	23 – *Strikezone* (NSW)

Species	**Top individual**	**Runner up individual**
Billfish	83 – Jeff Oates (QLD) Sunshine Coast GFC	51 – Jay Graham (QLD) Sunshine Coast GFC
Shark	20 – Kevin Deacon (WA) Nickol Bay SFC	13 – Dennis Heinicke (SA) Adelaide GFC
Tuna	44 – Mitchell Hill (TAS) St Helens GFC	43 – Ian Tarbotton (SA) GFC of South Australia