NSW GOVERNMENT Industry & Investment

I&I NSW Game Fish Tagging Program

Summary 2006/2007 & 2007/2008

Recreational Fishing Trusts

Pepperell Research
Marine Science & Recreational Fisheries

I&I NSW GAME FISH TAGGING PROGRAM

I&I NSW Game Fish Tagging Program

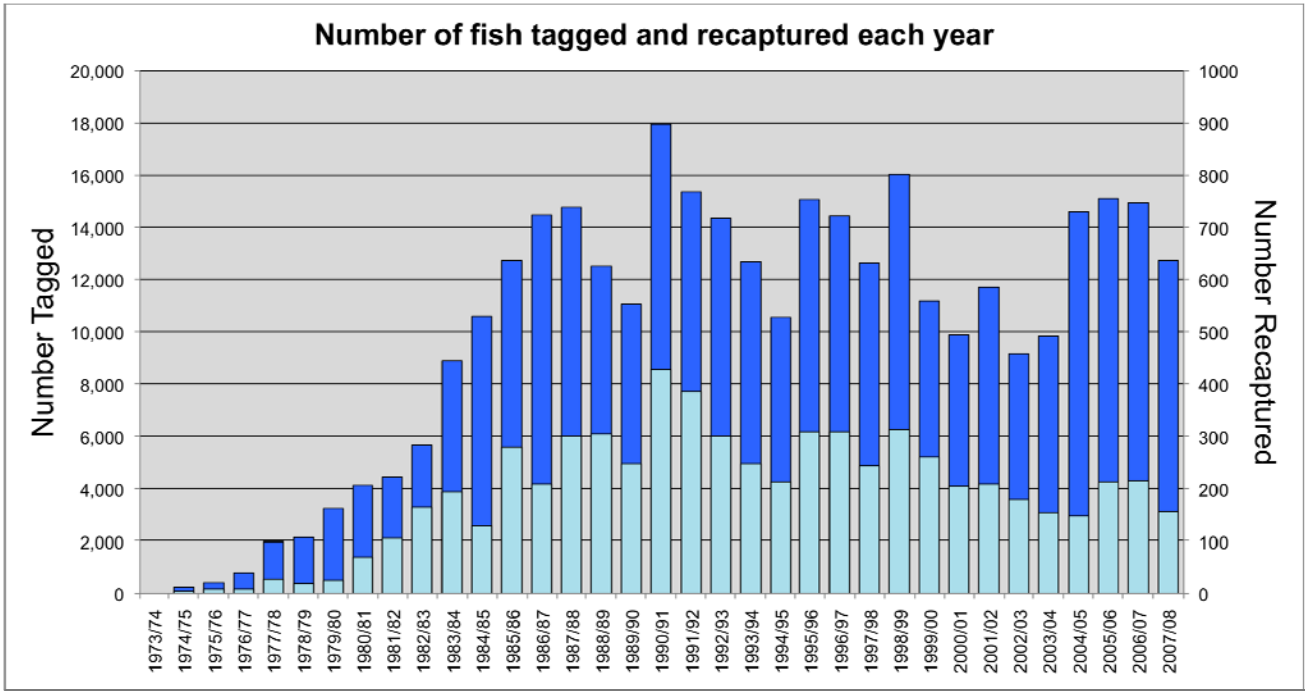
Summary and Report
2006/2007 & 2007/2008

This report of the I&I NSW Game Fish Tagging Program incorporates both the 2006/2007 and 2007/2008 game fishing seasons. The report provides a summary from each year and a detailed description of recaptures of note. Also included is an analysis of striped marlin and southern bluefin tuna recaptures since the start of the Program.

The Game Fish Tagging Program, which has been operated since 1973 by NSW Fisheries (later NSW DPI and now I&I NSW), has continued strongly over these past two seasons. Large numbers of key game fish were tagged in each of these years and recaptures of tagged fish continued to add new information to our understanding of the biology of many species.

As might be expected over such a long period, the number of fish tagged each year has fluctuated, although following steady growth to the mid 1980s, in nearly all years since then, the total tagged has exceeded 10,000 (Figure 1 – number of tagged fish in dark blue, number of recaptures in light blue). Three of the last four years of the Program saw more than 14,000 fish tagged, followed by a slight drop in the 2007/2008 season. This drop was attributable to a relatively poor season in the Cairns black marlin fishery, the lower abundance of juvenile black marlin along the east coast, and generally bad weather during the New South Wales summer fishing season which restricted the number of days fished.

Figure 1. Numbers of fish tagged and recaptured by year.



The total of fish tagged and recaptured during the Program to the end of June 2008 stood at 345,858 and 6,520 respectively, continuing the program's status as one of the largest of its kind in the world.

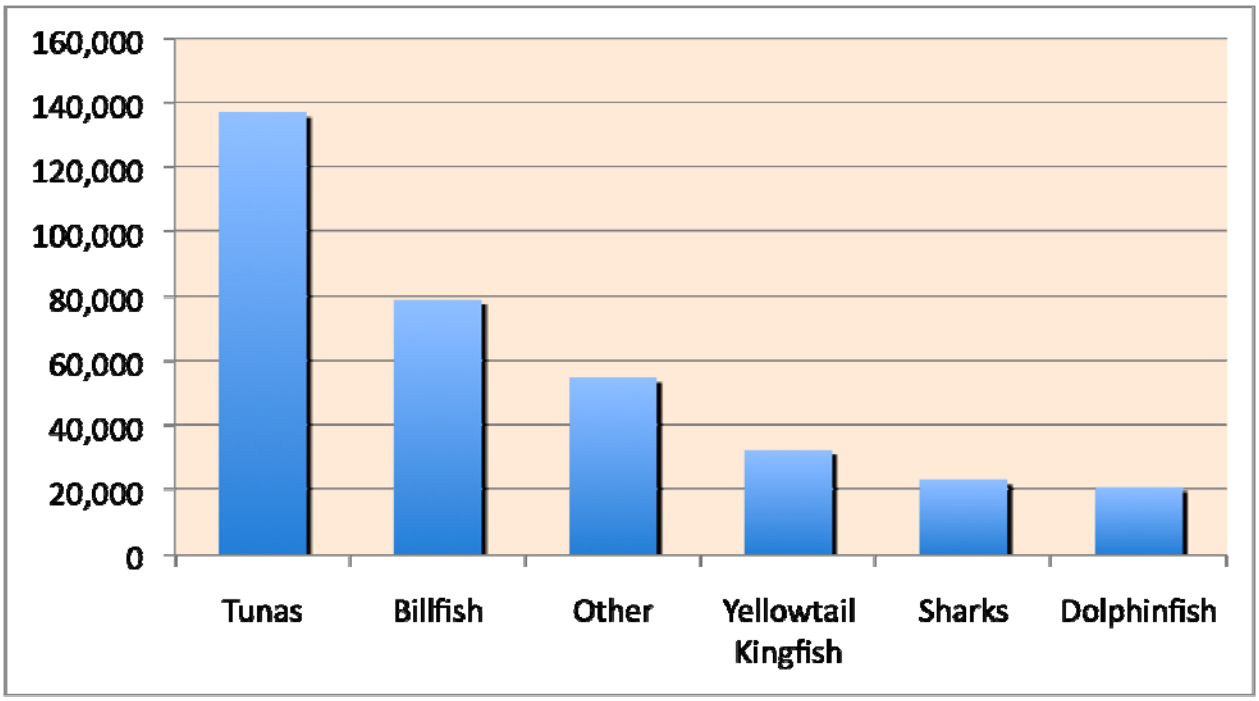
The species tagged in the greatest numbers continues to be black marlin (over 46,000 tagged, and representing 13.5% of all releases) followed by yellowfin tuna, yellowtail kingfish, sailfish and dolphinfish.

Table 1. Total numbers of the top 25 fish species (or species groups) tagged and recaptured, 1973-2008

Species	No. Tagged	No. Recap	% Recap
BLACK MARLIN	46,560	354	0.8
YELLOWFIN TUNA	35,362	663	1.9
YELLOWTAIL KINGFISH	32,515	2,104	6.5
SAILFISH	23,001	232	1
DOLPHINFISH	20,960	200	1
MACKEREL TUNA	18,467	60	0.3
SKIPJACK TUNA	18,112	62	0.3
STRIPED MARLIN	17,463	168	1
ALBACORE	17,136	156	0.9
BONITO	13,074	219	1.7
AUSTRALIAN SALMON	9,089	598	6.6
SPANISH MACKEREL	6,869	67	1
SILVER TREVALLY	6,809	195	2.9
MAKO SHARK	6,000	141	2.4
SOUTHERN BLUEFIN TUNA	5,427	101	1.9
BLUE MARLIN	5,221	16	0.3
WHALER SHARKS	5,169	97	1.9
HAMMERHEAD SHARKS	4,943	54	1.1
LONGTAIL TUNA	4,256	57	1.3
BRONZE WHALER	4,234	87	2.1
TAILOR	4,029	122	3
BLUE SHARK	3,950	71	1.8
TREVALLY	3,315	31	0.9
BARRACUDA	2,655	5	0.2
QUEENFISH	2,641	9	0.3
ALL OTHER SPECIES	28,601	651	2.3
TOTAL	**345,858**	**6,520**	**1.9**

Combining the main species or species groups together, shows that the tunas have been tagged in the largest numbers (over 137,000 tagged, or 39.4% of the total). Followed by billfish (nearly 80,000, or 22.7% of all fish tagged) (Figure 2). Yellowtail kingfish represent 9.3% of all taggings whilst sharks only represent 6.7% of all tagged fish (23,300 tagged).

Figure 2. Total numbers of fish tagged as species groupings or species



2006/2007 Tag Summary

In terms of total numbers of fish tagged, 2006/2007 was one of the largest tagging years on record with 14,905 fish tagged (Table 2).

Table 2. Numbers of fish tagged and recaptured in 2006/2007

Species	Tagged	Recaptured
BLACK MARLIN	2,572	23
YELLOWFIN TUNA	2,033	22
YELLOWTAIL KINGFISH	1,477	72
SOUTHERN BLUEFIN TUNA	1,404	8
STRIPED MARLIN	1,199	15
ALBACORE	951	2
SAILFISH	689	5
MACKEREL TUNA	601	2
BLUE MARLIN	461	2
STRIPED TUNA	432	3
SPANISH MACKEREL	399	2
DOLPHINFISH	281	3
WAHOO	245	0
AUSTRALIAN SALMON	227	16
GIANT TREVALLY	164	1
LONGTAIL TUNA	157	0
WHALER SHARK	154	3
COBIA	114	3
MAKO SHARK	110	3
BRONZE WHALER	108	1
QUEENFISH	108	0
BLUE SHARK	93	7
SAMSON FISH	93	1
LARGE SCALE TUNA	90	0
BARRACUDA	87	0
SNAPPER	87	8
HAMMERHEAD SHARK	82	1
EAGLE RAY	64	0
DOGTOOTH TUNA	52	1
MULLOWAY	45	2
BARRAMUNDI	33	1
TREVALLY	33	0
RAINBOW RUNNER	31	1
MISCELLANEOUS	30	2
SILVER TREVALLY	30	4
BONITO	29	1
GUMMY SHARK	27	0
SPOTTED MACKEREL	23	0
GOLD SPOTTED TREVALLY	17	0
AMBERJACK	12	0
BLACKTIP SHARK	12	1
SHORTBILL SPEARFISH	11	0
TIGER SHARK	9	1
SCHOOL MACKEREL	8	0
BROAD BARRED MACKEREL	6	0
BIGEYE TREVALLY	4	0
BIGEYE TUNA	3	0
THREADFIN SALMON	3	0
SCHOOL SHARK	2	0
BARRACOUTA	1	0
WATSONS LEAPING BONITO	1	0
WHITETIP SHARK	1	0
TOTAL	**14,905**	**217**

In 2006/2007, the species tagged in the greatest number was black marlin, with just over 2,500, followed by yellowfin tuna, yellowtail kingfish, southern bluefin tuna and striped marlin.

2007/2008 Tag Summary

Compared with the 2006/2007 season, the number of fish tagged during 2007/2008 was down slightly. A total of 12,709 fish were tagged and 157 recaptured during this period (Table 3).

Table 3. Numbers of fish tagged and recaptured in 2007/2008

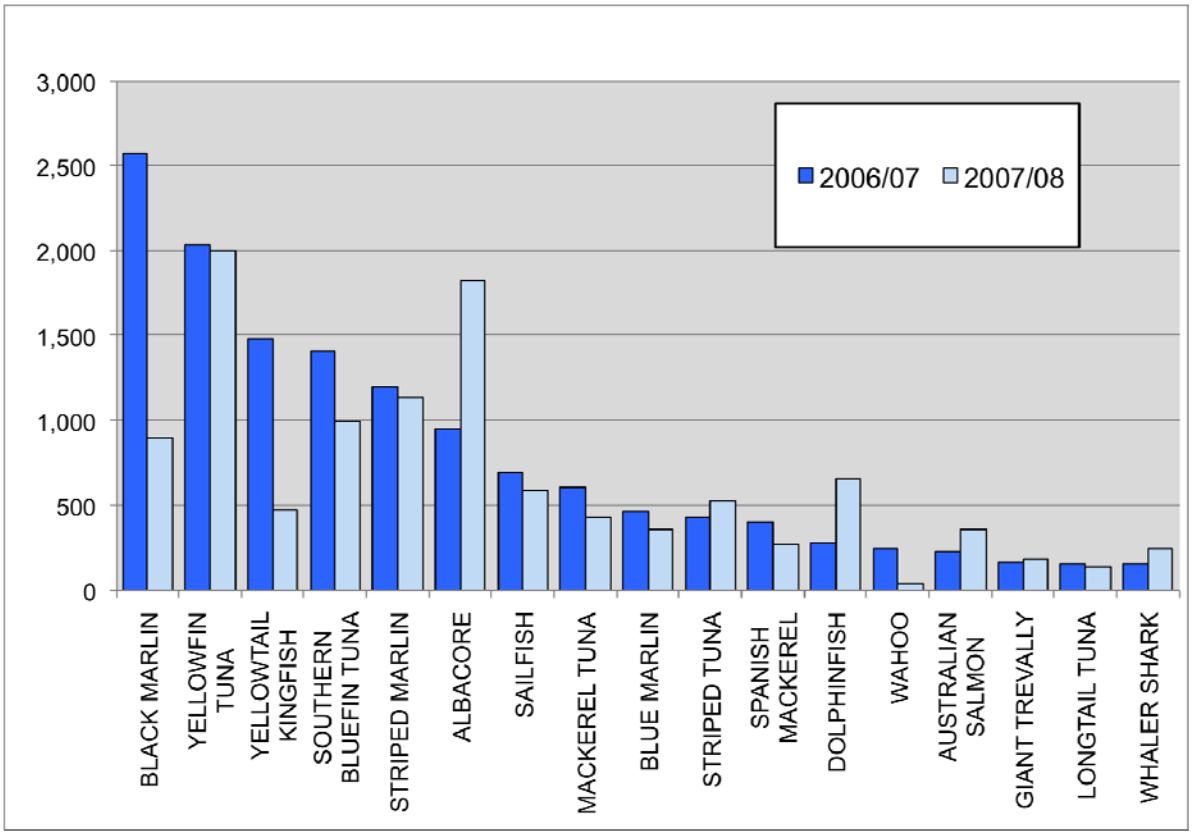
Species	Tagged	Recaptured
YELLOWFIN TUNA	2,001	27
ALBACORE	1,821	1
STRIPED MARLIN	1,132	11
SOUTHERN BLUEFIN TUNA	991	7
BLACK MARLIN	899	12
DOLPHINFISH	660	10
SAILFISH	585	1
STRIPED TUNA	527	0
YELLOWTAIL KINGFISH	471	35
MACKEREL TUNA	431	3
AUSTRALIAN SALMON	358	7
BLUE MARLIN	355	2
SPANISH MACKEREL	273	1
WHALER SHARK	244	2
GIANT TREVALLY	178	5
MAKO SHARK	171	3
SNAPPER	157	8
LONGTAIL TUNA	140	0
BRONZE WHALER	128	1
EAGLE RAY	127	0
BARRACUDA	100	0
LARGE SCALE TUNA	89	0
QUEENFISH	73	0
TREVALLY	72	0
BLUE SHARK	70	1
HAMMERHEAD SHARK	69	1
COBIA	63	5
BARRAMUNDI	51	1
MISCELLANEOUS	50	1
DOGTOOTH TUNA	44	0
RAINBOW RUNNER	41	1
WAHOO	41	0
BROAD BARRED MACKEREL	35	1
GUMMY SHARK	31	1
SPOTTED MACKEREL	30	0
SHORTBILL SPEARFISH	29	0
MULLOWAY	27	4
SAMSON FISH	23	2
BLACKTIP SHARK	19	0
TIGER SHARK	18	0
BONITO	13	1
SILVER TREVALLY	12	0
AMBERJACK	10	0
THREADFIN SALMON	10	0
SCHOOL SHARK	9	0
GOLD SPOTTED TREVALLY	8	0
BIGEYE TREVALLY	5	0
SCHOOL MACKEREL	5	0
BARRACOUTA	4	0
WHITETIP SHARK	4	0
BIGEYE TUNA	3	2
BROADBILL	1	0
FRIGATE MACKEREL	1	0
TOTAL	**12,709**	**157**

In 2007/2008, the top species tagged was yellowfin tuna, with just over 2,000 tagged (only 32 less than the year before) followed by albacore, striped marlin, southern bluefin tuna and black marlin.

One of the main differences between the two seasons was the number of black marlin tagged – just 899 during 2008/2009 compared to more than 2,500 during 2007/2008. Such variation in the number of pelagic fish tagged is quite common. In the case of black marlin, the number of juvenile fish (approximately 6 to 18 months old) that move southward along the east coast has a big influence on the number of the species tagged each year. In 2007/2008, only about 300 of these juveniles were tagged compared with about 1,600 in 2006/2007, thereby accounting for most of the difference in the number of fish tagged each year.

Figure 3 shows a comparison of species or species groups tagged in each year. Apart from the difference in black marlin numbers mentioned above, the main differences were greater numbers of yellowtail kingfish and southern bluefin tuna tagged in 2006/2007 and greater numbers of albacore and dolphinfish tagged in 2007/2008.

Figure 3. Numbers of main species and species groups tagged in 2006/2007 and 2007/2008.



Combining the species into groups, Figures 4 and 5 show that there were not just more billfish tagged in 2006/2007 compared with 2007/2008, but billfish made up a significantly higher proportion of all fish tagged in that year.

Figure 4. Species groups tagged in 2006/2007

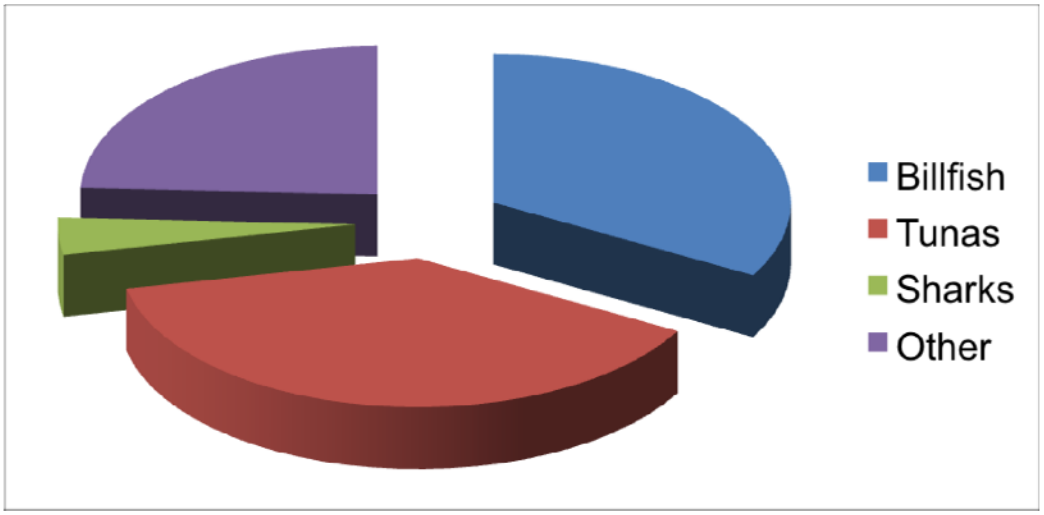
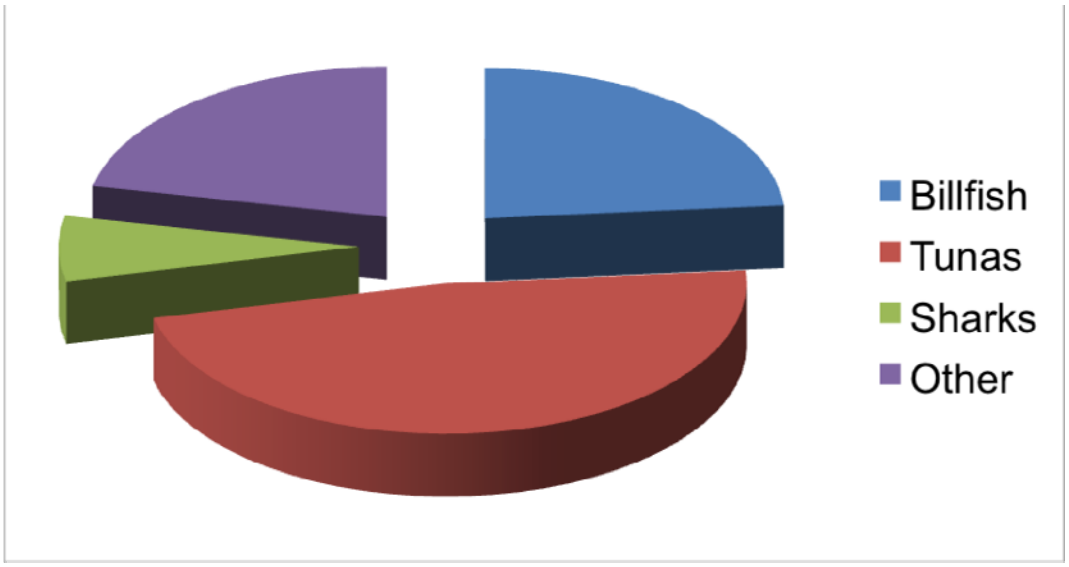


Figure 5. Species groups tagged in 2007/2008



Recapture highlights

All of the recaptures recorded in 2006/2007 and 2007/2008 are listed in Appendices I and II respectively.

As noted in Tabes 1 and 2, during the two tagging years covered in this report there were 372 recaptured fish reported. Below 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. However, many fish are recaptured relatively close to their points of release, often within relatively short times of being tagged and it is important to realise that these are just as important to our understanding of the movements and growth of gamefish.

2006/2007 recaptures of note

Black marlin

The tagging program includes our neighbouring Pacific Island nations, and tagging is quite active in some of these areas. A black marlin tagged off Vanuatu was at liberty for 18 months before being recaptured in the Cook Islands, 533 nautical miles to the northwest. Its estimated weight was not given at release, but it was estimated at 180 kg on recapture. This is one of the few recaptures from the Cook Islands and continues to illustrate that black marlin travel and mix freely throughout the Pacific.

A black marlin tagged off South Stradbroke Island, QLD in December 2004 travelled a long way in its 580 days at liberty. Estimated at 25 kg on release, it travelled all the way to Tahiti, a distance of 3,286 nautical miles, where it was recaptured by a local longliner.

Another juvenile black marlin, this one tagged off Cape Bowling Green, QLD was recaptured nearly two years later near Guam, 1,850 nautical miles north of its release point.

Three black marlin tagged off the Gold Coast all made similar journeys to the north, to be recaptured at Woodlark Island on the northeast coast of Papua New Guinea. They were all caught on a commercial fishing vessel in June 2007. The three fish were tagged within a month of each other, and recaptured within 6 days of each other in the same general location.

The last black marlin recapture described is for a very fast fish. This fish was tagged off Port Stephens during the Interclub tournament in March 2007. Just 59 days later, it was recaptured 1,650 nautical miles to the north, in the Solomon Islands, a sustained average swimming speed of 28 nautical miles per day. Many small black marlin tagged off eastern Australia have been recaptured in the Solomons.

Blue marlin

There was one blue marlin recapture recorded this year. This fish was tagged wide of Cape Moreton QLD in April 2004 at an estimated size of 100 kg. It was at liberty for just over 3 years and recaptured 612 nautical miles south off Bermagui by an Australian longliner.

Yellowtail kingfish

Yellowtail kingfish are recaptured in greater numbers than any other species on the Program. Many of these show short term, short distance movements, but the following are of particular interest.

A kingfish tagged at Eden NSW in January 2003 was recaptured a little less than 4 years later at Long Reef, Sydney. It was measured at 52 cm at release and weighed 13 kg when recaptured. Another, tagged in the same location in May 2004 was at liberty for just under 3 years, but was recaptured where it was released. It had grown from 2.7 kg to 5.8 kg in that time.

Another kingfish was at liberty for just over 3 years. This fish was tagged off the Entrance, NSW and recaptured off Tweed Heads NSW.

Yellowtail kingfish are recaptured at a greater rate than any other species in the tagging program.

Mako shark

A mako shark tagged off Ulladulla NSW showed that this species is capable of long distance movement. Tagged in April 2005, it was recaptured 18 months later off Port Moresby PNG. Although makos are rarely caught on the surface in the tropics, recaptures such as this, by longliners which set hooks at least 100 metres below the surface, show us that makos certainly occur in these waters, but prefer to remain in the deeper, cooler waters near the thermocline.

A mako shark hooked perfectly with a circle hook in the side of the jaw. Tagged and released, this fish, like so many others, has the potential of adding to our knowledge about its species

Yellowfin tuna

Many recaptured yellowfin tuna have shown that once near the continental shelf, this species has a tendency to stay relatively near to the coast, at least for the first few years. As usual though, there are always interesting exceptions.

A yellowfin tuna (estimated weight 15 kg) tagged off Jervis Bay NSW in November 2004 was recaptured 22 months later off Rabaul, PNG, a distance of 1,840 nautical miles. In that time, it had grown to 40 kg, which is around the size at maturity for the species, and indicating that it had probably headed to the tropics to become part of the spawning population.

Another yellowfin tagged off Bermagui in January 2005 travelled 1,480 nautical miles to just south of the Solomon Islands where it was recaptured by a Japanese longliner. It was estimated at 65 cm long at release and weighed 22 kg when it was recaptured 533 days later.

Southern bluefin tuna

Many southern bluefin tuna tagged off South Australia are recaptured well to the west in the Indian ocean. However, a 13 kg fish, tagged off Rocky Island, South Australia in March 2007 went the other way. This fish was recaptured after only 105 days during which time it had moved to the Tasman Sea, about 320 nautical miles east of Eden. Its rate of travel averaged exactly 10 nautical miles per day.

Another southern bluefin did, however, follow the more usual route. It was tagged off South Australia in March 2006 and estimated at 14 kg. It was at liberty for approximately 200 days, but covered just over 2,500 nautical miles in that time, where it was recaptured in the mid Indian ocean by a Taiwanese longliner.

Albacore

A tagged albacore recaptured this year was at liberty for 6 years 10 months. It was originally tagged off the NSW south coast in December 1999 at an estimated weight of 11 kg and when recaptured, it weighed 27.2 kg. It was recaptured by a local longliner in the Fijian Islands, 1,730 nautical miles from its point of release. This recapture supports other findings that albacore are relatively slow growing tuna.

Blue shark

Blue sharks are known to be oceanic travellers, and the following example was no exception. This one, estimated at 40 kg, was tagged off Cape Schanck VIC in February 2006. It was subsequently recaptured 290 days later, 450 nautical miles west of Carnarvon WA, again estimated at 40 kg.

2007/2008 recaptures of note

Black marlin

Even though relatively few black marlin were tagged in 2007/2008, quite a few important recaptures of this species were recorded for fish tagged in previous seasons.

A black marlin tagged at Cape Bowling Green, Townsville, at an estimated size of 20 kg, was recaptured 14 months later in Papua New Guinea waters (a distance of 1,142 nautical miles). At recapture, this fish was measured at 173 cm long and a weight of 35.6 kg, indicating a virtual doubling of size during its time at liberty.

Another black marlin tagged off Moreton Island at an estimated 30 kg was recaptured 13 months after release off Port Stephens. It was estimated at 55 kg, supporting projected rapid growth rates for black marlin. This fish was retagged and released.

A black marlin estimated at 30 kg was tagged off the central NSW coast and recaptured 7 months later by a Korean longlining vessel north of the Solomon Islands, a distance of 1,734 nautical miles. At recapture, this fish weighed 48 kg, again indicating a rapid growth rate.

An estimated 30 kg black marlin tagged off Port Stephens in March 2005 was recaptured after 1,145 days of liberty (just over 3 years), 1,165 nautical miles away, near Fiji – one of the first recaptures of a black marlin in these islands.

Another small black marlin, estimated at 45 kg, was tagged off Newcastle canyons and recaptured only three months later, again in the Solomon Islands, about 1,600 nautical miles from its point of release.

A black marlin about to be tagged. More than 46,000 of this important species have been tagged by recreational anglers off Australia and other nations in the region.

Blue marlin

In previous years, very few blue marlin recaptures had been reported. This year, two interesting recaptures of this species were recorded, both from the same region of Indonesia, having been tagged on either side of Australia.

The first of these, estimated at 160 kg, was tagged off Exmouth WA and is the first recapture of a blue marlin tagged in that State. The fish had been tagged in December 2006 and was recaptured nearly 17 months later in the Halmahera Sea, to the west of Irian Jaya. The fish was caught by handline on an anchored FAD, many of which are scattered through this region by large fishing companies which target skipjack tuna. Local fishermen are encouraged to fish for large yellowfin tuna around these FADs, and happily, have begun to report tags to Fisheries agencies.

The second blue marlin was recaptured just 145 nautical miles to the northeast of the first recapture, again by an artisanal handliner fishing on an anchored FAD. It had been tagged off Madang, PNG and had been at liberty for just over a year during its westerly journey of 930 nautical miles. This fish was estimated at only 70 kg at release but unfortunately, as was the case with the blue marlin above, it was not measured or weighed at recapture.

Bigeye tuna

Two of only three recaptures of bigeye tuna ever recorded on the tagging program were made in 2007/2008. While the identification of bigeye tuna can cause considerable problems, sometimes casting doubt on the true identity of tagged and recaptured tuna, it was able to be determined that these two recaptured fish were definitely bigeye tuna.

The first bigeye recapture was of a fish tagged off the Bermagui 12 mile reef in May 2005 and called a bigeye at the time. There was no estimated size at release, but when it was recaptured by an Australian longline vessel off Jervis Bay 15 months later, it weighed 40 kg. This was a confirmed bigeye tuna since it was identified as such upon recapture by the commercial captain as well as an on-board Government observer.

The second bigeye tuna was tagged on 9 March 2005 off Eden, NSW off the continental shelf. The fish was estimated at just 3.8 kg and was thought to be school yellowfin tuna. Nearly exactly three years later, and weighing a hefty 41 kg, the fish was recaptured by a commercial longliner off Noosa QLD. This fish was able to be identified as a true bigeye tuna from photos taken at both tagging and recapture.

This is an exciting recapture since it proved that juvenile bigeye tuna do occur, at least on occasion, off the southeast Australian coast, and also because the growth information on this fish is so useful and helping to confirm growth rates of this species estimated from examining growth rings on otoliths and fin spines.

Southern bluefin tuna

A southern bluefin tuna tagged off South Australia in April 2005 was recaptured two and a half years later by a Japanese longliner in the Southern Ocean, 800 nautical miles southwest of Cape Leeuwin WA, a distance travelled of 1,700 nautical miles. At tagging, the fish was estimated at just 11 kg. When recaptured, a weight was not taken, but its length of 130 cm would equate to about 45 kg.

A second southern bluefin, tagged off South Australia in April 2007, was recaptured by a Taiwanese longliner 147 days later, having travelled an impressive 2,757 nautical miles into the Indian ocean.

Yellowfin tuna

Showing the international nature of the tagging program, two yellowfin tuna tagged off Pacific Islands made particularly impressive journeys this year. The first, estimated at just 1 kg, was tagged off Lae, PNG in April 2006 and was subsequently recaptured 475 days later 1,043 nautical miles to the west, about 160 nautical miles north of Irian Jaya, Indonesia. The second fish was tagged off Vanuatu in May 2006 and recaptured 434 days later 1,426 nautical miles north in Micronesian waters. The size of this fish was not given at release, but weighed 29 kg at recapture.

Mako shark

A small mako shark weighing an estimated 12 kg travelled a distance of 1,110 nautical miles during its 162 days at liberty. It was tagged off Cape Schanck VIC in February 2007 and recaptured by a Japanese longliner about half way between Brisbane and Noumea. It weighed 10 kg at recapture.

Blue shark

A blue shark, estimated at 25 kg, was tagged off Westernport Victoria in February 2006. It was recaptured 16 months later in the Indian ocean, about 370 nautical miles south of Java, a straight line distance of 2,400 nautical miles from its release point.

Dolphin fish

Of the 200 dolphin fish that have been recaptured on the Program, the vast majority have been recaptured within a year of release, and have shown modest movements along the coast. The following recapture is therefore a major exception to the rule.

An estimated 2 kg dolphin fish tagged off Sydney in April 2006 was subsequently recaptured 499 days later near Ouvea Island, New Caledonia, a distance of 1,131 nautical miles. Of interest was its size at recapture – just 6.5 kg. Dolphin fish are known to have very fast growth rates, especially male fish. It is therefore likely that this was a female, although even so, this is still on the low side of growth rates for the species.

Dolphinfish grow fast and have short lives. Tagging has shown some undertake lengthy movements.

Cobia

Most of the above recaptures illustrate long distance movements by various species. Of course, this is not always the case. A tagged cobia at liberty for just over two years was recaptured only 6 miles from its release point at South West Rocks NSW. It was estimated at 8 kg on release and 6 kg (again, estimated) at recapture. It was re-released bearing the original tag.

Movements of striped marlin and southern bluefin tuna

As well as considering the highlights of the past two years of tagging, in this report, we take a closer look at the overall movements of two species for which considerable information has been gathered since the beginning of the program – striped marlin and southern bluefin tuna. Both of these are important commercially and recreationally and tagging by recreational anglers has revealed much about their movements over the course of the Program.

Since the Program began, there have been 17,463 striped marlin tagged (most of those since 1990) and 168 recaptured, while for southern bluefin tuna, there have been 5,427 tagged and 101 recaptured.

For each of these species, plots of minimum straight-line distance moved for different distance ranges are shown in each of three maps. These show all recaptures of fish that moved less than 100 nautical miles, 101 to 500 nautical miles and greater than 500 nautical miles. These are computer generated straight-line plots and sometimes show movement across land masses, which of course is an artefact. Green circles indicate release locations and red circles indicate recapture locations. All maps also show the number of days between release and recapture for most fish.

Striped marlin

Figure 6 shows the plots of minimum distances moved by tagged striped marlin that have been recaptured within 100 miles of their release points. It is perhaps not surprising that most of these fish had been at liberty for only relatively short periods of time – from 4 to 78 days. All of these fish, bar one, were tagged off New South Wales, between Forster and Eden, the other being released off Moreton Island. This shows that during the first first weeks after release, striped marlin tagged on or near the continental shelf tend to stay relatively near to the coast, with movement in both northerly and southerly directions indicated, with no obvious pattern.

Figure 6. Striped marlin movements < 100 NM.

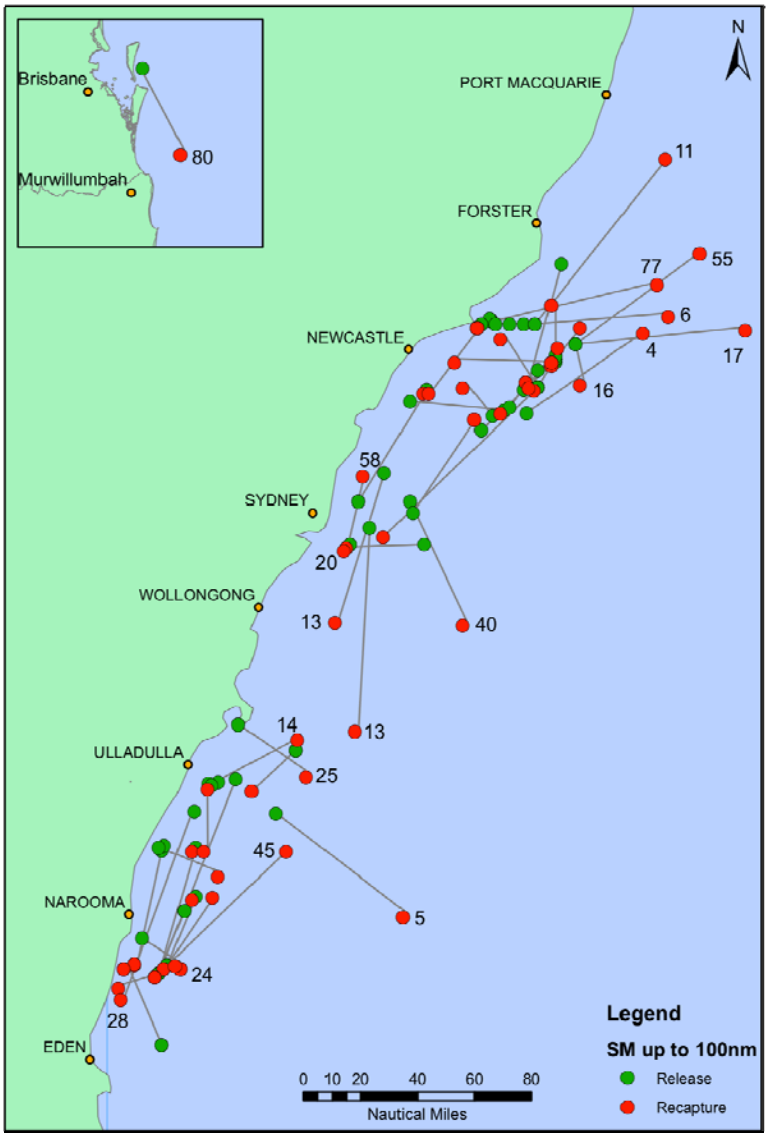
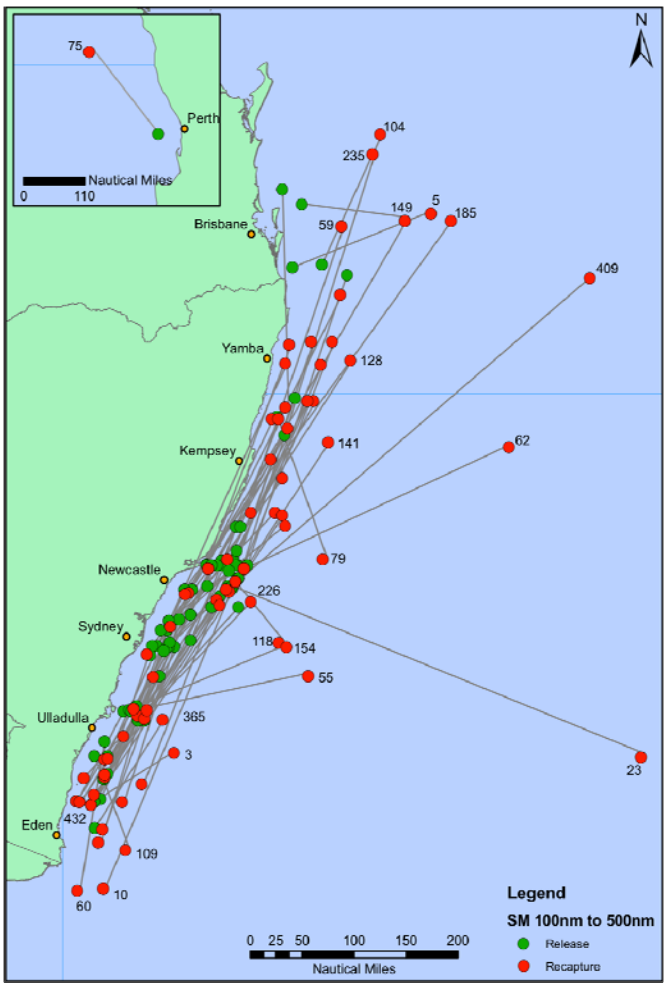


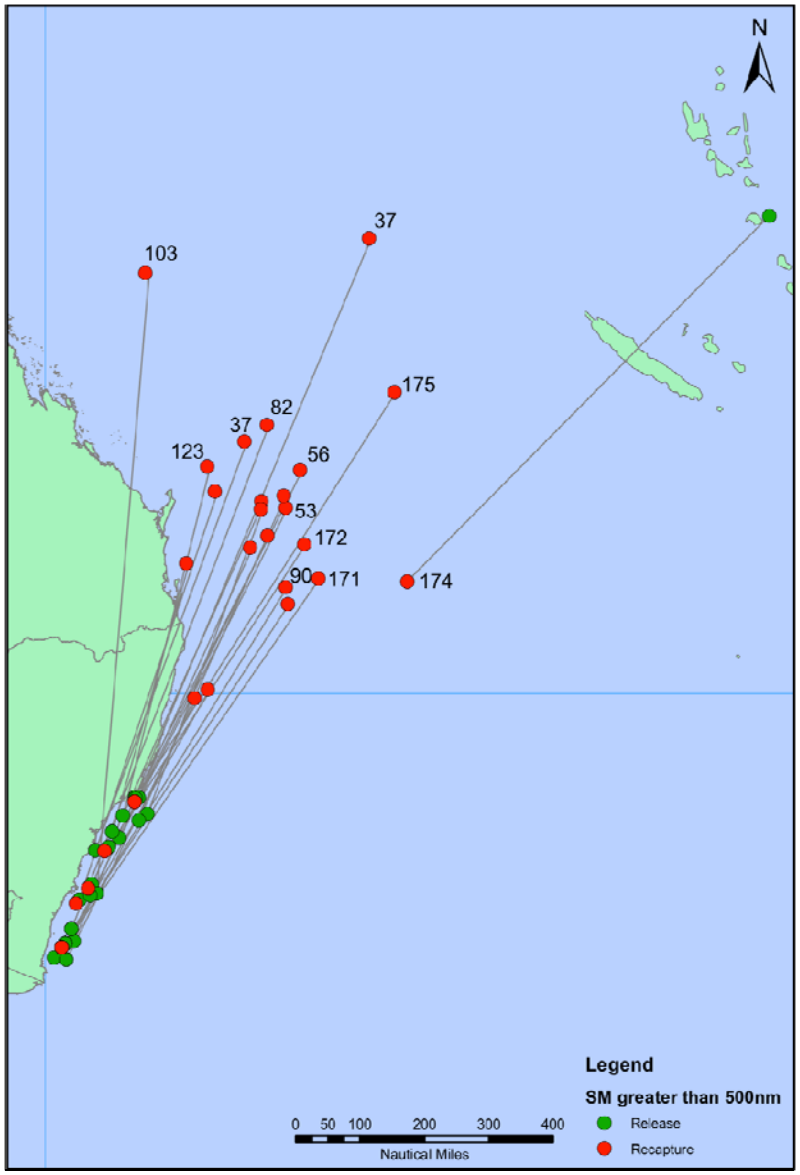
Figure 7 shows the plots of minimum distances moved by striped marlin that have been recaptured between 100 and 500 nautical miles of their release points. Interestingly, this shows that even though many fish have moved within this distance range, most of the movements were along the coast. Three exceptions were fish that moved east or northeast away from their points of release off NSW. One of these had been at liberty for 409 days (the longest time at liberty for a striped marlin on the program) but two had made this journey rapidly, one covering over 400 miles in just 23 days. (Of course, it must always be borne in mind that these are minimum distance moved and that actual movement paths could well be more convoluted, especially for those fish at liberty for longer periods). (Only one striped marlin tagged off Western Australia has been recaptured. That fish was tagged off Perth and recaptured well to the northwest after 75 days).

Figure 7. Striped marlin movements 101-500 NM.



The third map (Figure 8) shows the striped marlin that have moved more than 500 nautical miles. Other than the area off southern Queensland where the Australian longline fleet operates, there have been relatively few recaptures of any tagged striped marlin well wide of the coast. It is possible though that this is because there is relatively low fishing pressure in that general region so the chances of a recapture would be lessened.

Figure 8. Striped marlin movements > 500 NM.



Again there is one exception to all fish being tagged off NSW. A striped marlin tagged off Vanuatu moved towards Australia, or rather, towards the area that most of the Australian tagged fish also moved to.

The relatively short periods at liberty for many of these longer distance movements (most were recaptured within 6 months of release) indicate mainly rapid directed movements. This strong pattern of movements has all the hallmarks of purposeful

movement of the population from feeding grounds along the NSW coast (where we know they don't spawn) to possible spawning grounds wide of southern Queensland. Most striped marlin are tagged off NSW in late summer/early autumn. Some make the trek to the northeast within only a few weeks, while others have been recaptured on these grounds up to six months later. Early Japanese studies of striped marlin in the region indicated that spawning takes place in late spring / early summer above two extensive undersea ridges – one running between New Zealand and New Caledonia and the other extending northwards from Lord Howe Island for hundreds of miles.

Southern bluefin tuna

Figure 9 shows that, of 101 recaptured southern bluefin, only 10 have been recaptured within less than 10 miles of their release points. Six of those fish had been at liberty for relatively short periods, but four had been at liberty for between 8 and 26 months. It is highly likely that these four fish had moved well away from their areas of release and returned to the general vicinity. Tagging of southern bluefin with electronic tags by CSIRO has proven that such cyclic movements probably occur on a regular basis.

Figure 9. Southern bluefin tuna movements < 100 NM.

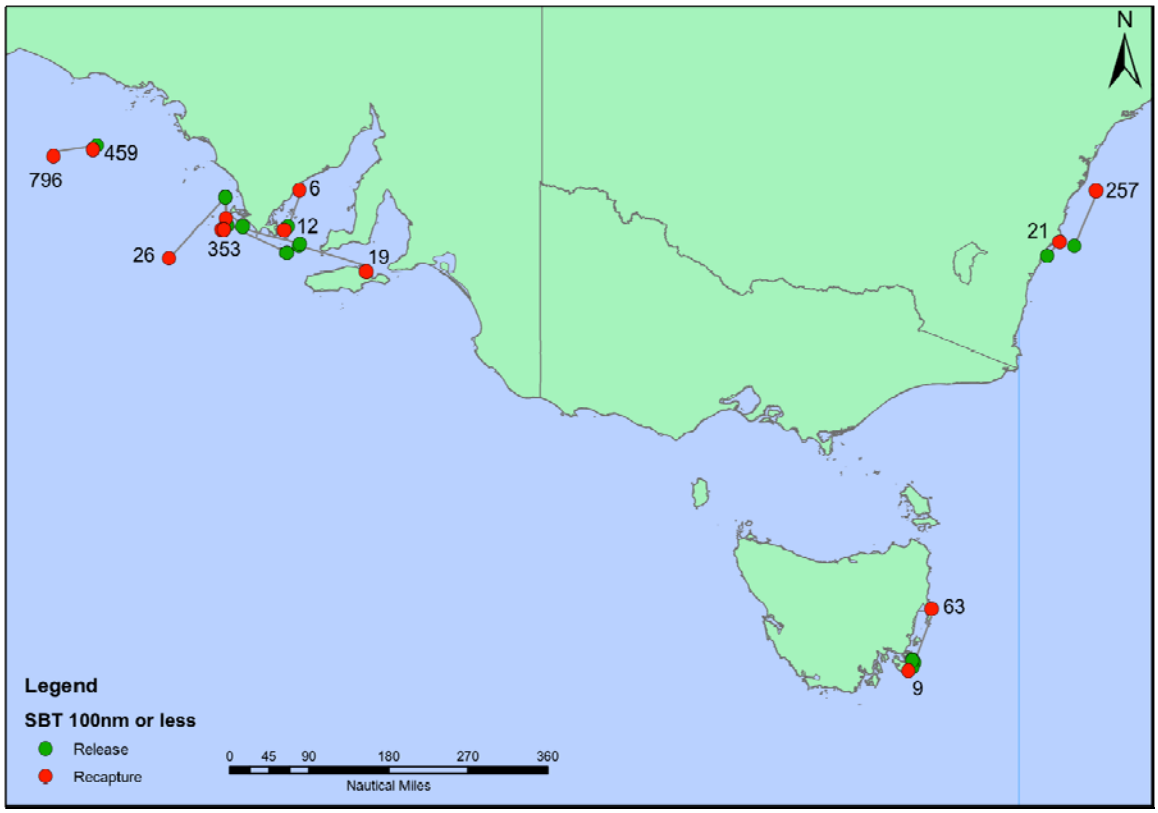
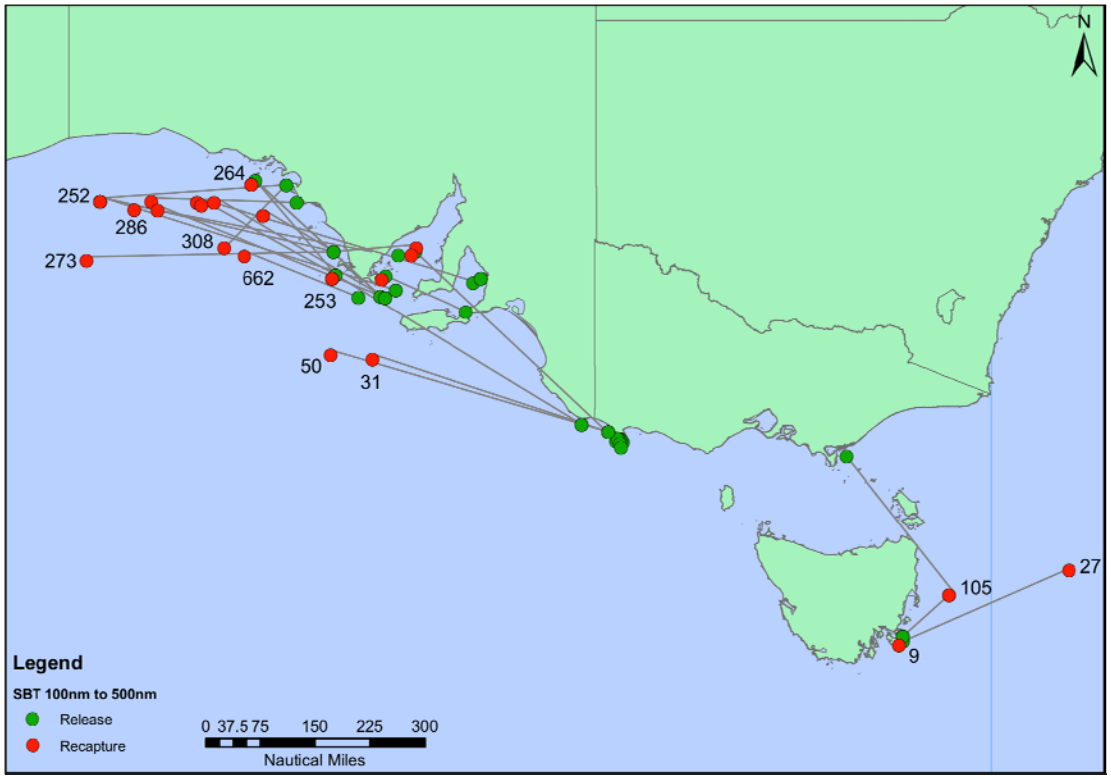


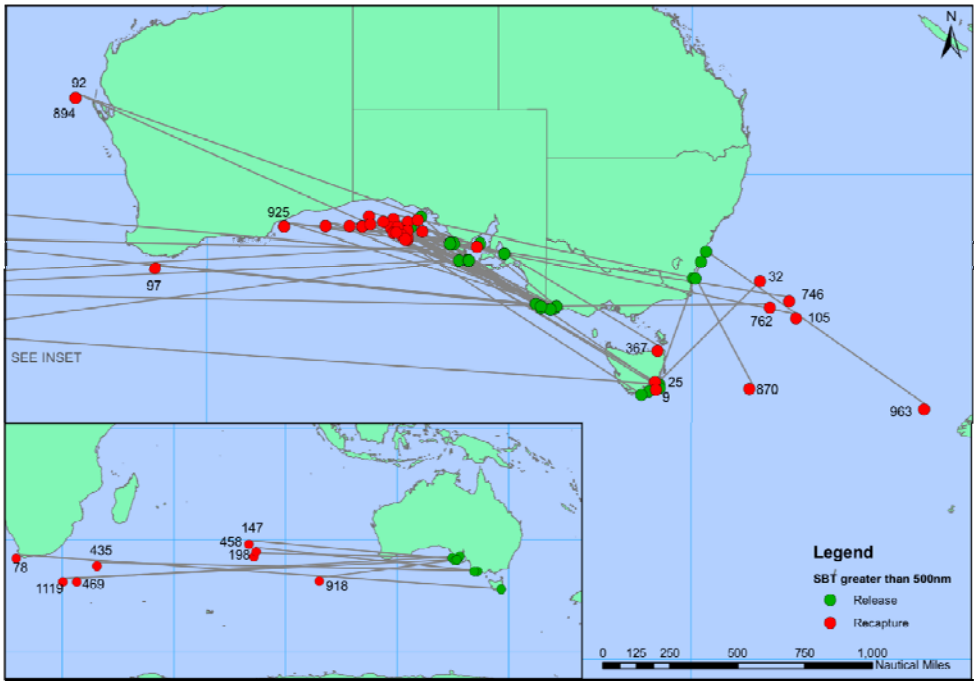
Figure 10, which plots the minimum paths of southern bluefin recaptured between 100 and 500 miles of their release points, shows that, while a small number of tuna in this category had been at liberty for a relatively short time (9 to 50 days), most were recaptured more than 8 months after release. This could indicate that these fish possibly moved to the Great Australian Bight and remained there feeding, where they were vulnerable to capture by the Australian commercial fishery operating there, although again, it is likely that at least some of these fish had made journeys away from the Bight, only to return at a later time.

Figure 10. Southern bluefin tuna movements 101-500 NM.



Lastly, all of the known long distance movements (ie, greater than 500 miles) of tagged southern bluefin are shown in Figure 11.

Figure 11. Southern bluefin tuna movements > 500 NM.



This map clearly indicates that the southern bluefin tuna is very mobile, often covering long distances in short times. For example, note the fish that was tagged off Tasmania and recaptured off South Africa after only 78 days. The movement well to the west by eight fish, some to the mid Indian ocean and some to South African waters, shows that the species forages very widely, but mostly stays within relatively narrow latitudinal bands, indicating preferences for temperate waters. All of these fish were recaptured by high seas longline vessels of either Japan or Taiwan, and reinforce similar results from tagging of much larger numbers of southern bluefin by CSIRO over many years.

As noted, nearly all of the long distance recaptures have taken place in southern latitudes. Two recaptures, however, were recorded off Shark Bay, Western Australia, possibly indicating fish moving towards their only known spawning grounds off Java, Indonesia. Even though this restricted spawning area is well known, no southern bluefin tuna tagged under the I&I NSW tagging program, or of the tens of thousands tagged by CSIRO, has ever been reported from the Javanese spawning grounds. In fact, it as not until adult southern bluefin were tagged in recent years with popup satellite tags that this link was proven. One fish, tagged off southern NSW did indeed make its way to these grounds, nevertheless still leaving the question open as to what proportion of the adult population makes this migration each year.

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 I&I NSW (or your fishing club recorder) as soon as possible, otherwise tagging is of no value.

How to tag small game/sport fish

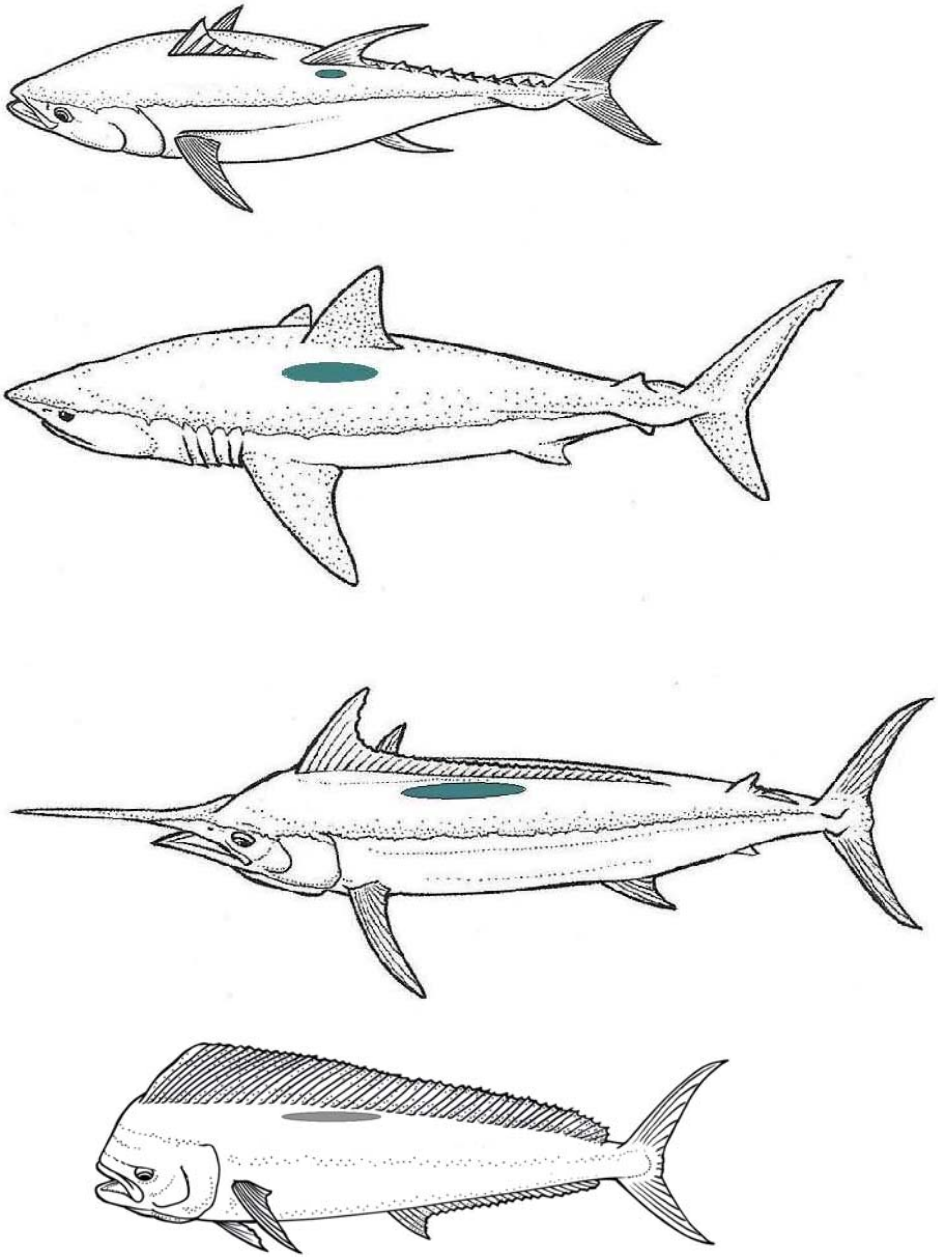
Smaller pelagic species may be removed from the water before tagging. This enables improved accuracy of tagging and may simplify hook removal. Often holding the fish on its back will lessen its 'flapping'. Try to prevent the fish damaging itself on hard, hot, or dry surfaces. A wet foam mat or similar 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 I&I as soon as possible.
- 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.

- Use non-offset circle hooks whenever possible when using live or dead baits. These hooks work well for billfish, sharks, tuna and other sportfish. They minimise deep hooking, foul hooking and bleeding and promote the survival of tagged fish.
- 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 you catch a fish that is already tagged and you can clearly read the tag in position, you may release the fish after having carefully recorded the tag number. This fish may also be re-tagged.

Ensure that you record the capture details immediately after release. If the tag is difficult to read, cut off the old tag and if possible, re-tag the fish with a new tag appropriate to that species of fish. Tags that look old or are covered in marine growth indicate that the fish is likely to have been at large for a long time and these long-term recaptures are particularly valuable to the program. However every recapture, no matter how insignificant you may think it is, provides the program with vital information into the biology and movements of game fish.

Please ensure that you accurately record the tag number, species, method of capture, location and GPS co-ordinates, date, estimated size (or actual size if landed) and condition of fish on release. Report the details as soon as possible. If you decide to take the fish, please carefully record and report the capture information as above. I&I NSW will provide details of the time and distance the fish travelled and its growth to the anglers who first tagged the fish and later recaptured it. A recapture certificate is also issued.

One other point regarding reporting recaptures of tagged fish should be kept in mind. In these days where a high proportion of game fish are released, 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 tag in place, and you are not able to retrieve the tag, you should still record the details (even though the tag number is unknown) and report the release to I&I NSW (Fisheries) at Cronulla as a genuine recapture. In this way, better statistics on actual recapture rates of game fish will be able to be maintained.

Contact the program

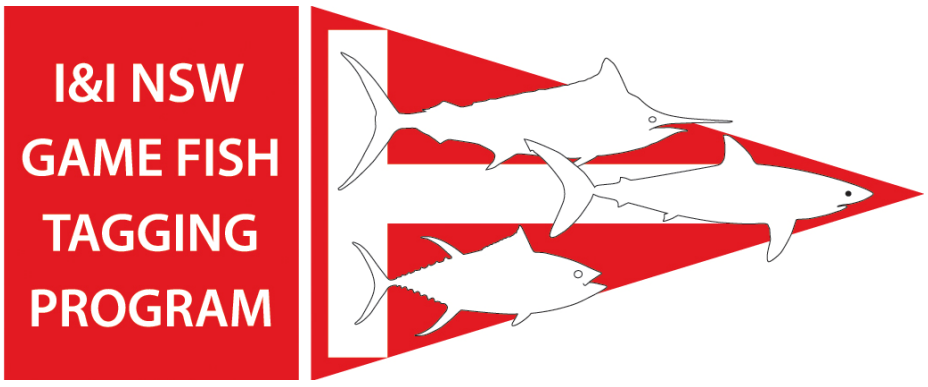
Additional information on the program can be found at:
www.industry.nsw.gov.au/fisheries

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 gamefish.tagging@industry.nsw.gov.au.

Acknowledgements

This report has been written by Dr Julian Pepperell of Pepperell Research & Consulting Pty Ltd. The following staff of I&I NSW have been especially helpful in the preparation of this report – Phil Bolton, Adam Welfare and Bryan van der Walt. Special thanks also to Sarah Martin (I&I NSW) for preparing the maps. All photos were provided by Phil Bolton (I&I NSW) with the exception of the dolphinfish image, which was kindly supplied by Alistair McGlashan.

Grahame Williams (GFAA) and Bob Lowe (GFAA Research & Development Foundation) have greatly assisted in distribution of billfish tags. It is also important to recognize the ongoing generous support of the program by the NSW Recreational Fishing Trusts, a fund derived from the NSW Recreational Fishing Fee. Finally, and as usual, thanks to the thousands of anglers, captains and crew who have tagged all the fish and reported their recaptures. Without the continued support of these unpaid field assistants, this program would not be possible.



Appendix I. All Recaptures for 2006/2007

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Snapper	13/12/06	Spencer Gulf SA	305	0	S
Snapper	16/05/06	Spencer Gulf SA	516	0	S
Snapper	1/09/07	Spencer Gulf SA	43	0	S
Snapper	16/05/06	Spencer Gulf SA	508	2	ENE
Snapper	30/04/06	Central Coast NSW	443	36	SSW
Black Marlin	28/08/06	Cape Bowling Green QLD	422	1142	NE
Striped Marlin	3/03/07	Port Stephens NSW	235	392	NNE
Yellowfin Tuna	13/04/06	Lae, PNG	475	1043	WNW
Yellowfin Tuna	23/05/06	Vanuatu	434	1426	NNW
Yellowtail Kingfish	17/02/08	Central Coast NSW	32	3	SW
Cobia	25/02/06	Grassy Head NSW	754	6	SSE
Southern Bluefin Tuna	6/03/08	Port Lincoln SA	12	102	WNW
Dolphinfish	10/01/08	Port Macquarie NSW	57	45	SSW
Bigeye Tuna	22/05/06	Bermagui NSW	462	122	NE
Samson Fish	17/11/06	Rottnest Island WA	310	233	SSE
Yellowtail Kingfish	11/11/06	Eden NSW	316	405	NNE
Mako Shark	18/02/07	Cape Schanck VIC	162	1110	ENE
Yellowtail Kingfish	19/02/06	Montague Island NSW	501	85	NNE
Yellowfin Tuna	28/12/06	Eden NSW	255	122	NE
Yellowtail Kingfish	9/04/07	Eden NSW	206	132	NE
Black Marlin	4/03/07	Port Stephens NSW	241	57	NNE
Whaler Shark	11/03/07	Catherine Hill Bay NSW	247	95	NNE
Yellowfin Tuna	31/03/07	Eden NSW	179	138	NNE
Yellowtail Kingfish	1/09/07	South Solitary Island NSW	53	0	N
Black Marlin	14/01/07	Moreton Island QLD	397	355	SW
Bonito	2/12/07	Caloundra QLD	53	343	SW
Yellowtail Kingfish	31/03/07	Eden NSW	325	272	SW
Yellowtail Kingfish	4/02/07	The Banks NSW	389	0	N
Australian Salmon	24/12/07	York Peninsula SA	9	4	NNE
Striped Marlin	16/02/08	Port Stephens NSW	21	29	W
Yellowtail Kingfish	28/01/08	Port Kembla NSW	47	2	E
Australian Salmon	25/11/07	Ulladulla NSW	108	1	NNW
Southern Bluefin Tuna	6/03/08	Dangerous Reef SA	6	3	ESE
Bigeye Tuna	9/03/05	Eden	1103	677	NNE
Australian Salmon	2/03/07	Tilba Beach NSW	133	16	NE
Hammerhead Shark	29/04/07	Coffs Harbour	76	222	N
Yellowtail Kingfish	13/11/05	Eden	634	812	NE
Cobia	19/01/06	South West Rocks	569	200	NE
Blue Shark	28/02/06	Kilcunda VIC	495	2401	WNW
Yellowtail Kingfish	9/11/06	Coffs Harbour NSW	272	11	W
Yellowtail Kingfish	8/03/06	Eden NSW	522	763	NE
Samson Fish	4/02/06	Rottnest Island WA	548	410	ESE
Mackerel Tuna	15/07/07	Moreton Island QLD	20	71	SE

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Striped Marlin	24/02/07	Port Stephens NSW	175	687	NNE
Dolphinfish	14/04/06	Sydney NSW	499	1131	NE
Cobia	16/06/07	Caloundra QLD	75	7	NW
Yellowfin Tuna	15/07/07	Kiama Canyons NSW	11	21	E
Australian Salmon	29/03/07	Tilba Beach NSW	226	43	NE
Yellowfin Tuna	15/07/07	Kiama Canyons NSW	57	106	NNE
Yellowtail Kingfish	16/10/07	Rottnest Island WA	26	0	N
Yellowtail Kingfish	24/02/07	Rottnest Island WA	262	14	SE
Australian Salmon	7/10/07	York Peninsular SA	33	2107	S
Snapper	1/09/07	Spencer Gulf SA	60	1500	WNW
Cobia	9/06/07	South West Rocks NSW	177	165	NE
Whaler Shark	30/03/07	St Helena Island QLD	249	53	NW
Black Marlin	27/01/07	Central Coast NSW	217	1734	NE
Yellowtail Kingfish	24/11/06	Jervis Bay NSW	349	7	NNE
Black Marlin	31/10/06	Onyx Reef QLD	395	129	NE
Yellowtail Kingfish	19/11/06	Sydney Shelf NSW	391	19	W
Black Marlin	27/09/06	Escape Reef QLD	438	813	ENE
Black Marlin	28/10/05	Great Barrier Reef QLD	730	19	ESE
Australian Salmon	4/07/07	Ulladulla NSW	98	2	WSW
Gummy Shark	26/04/06	Sensation Beach SA	591	46	NW
Striped Marlin	7/04/07	Jervis Bay NSW	265	221	NNE
Yellowtail Kingfish	15/12/07	Toothbrush Island NSW	12	1	E
Giant Trevally	30/10/06	Great Barrier Reef NSW	315	132	ENE
Bronze Whaler	4/01/08	Murray River Mouth SA	11	78	SSE
Yellowtail Kingfish	22/01/06	Eden NSW	720	1	N
Snapper	13/12/06	Spencer Gulf SA	378	1	N
Dolphinfish	8/01/08	Port Macquarie NSW	2	0	N
Mulloway	14/01/07	Spencer Gulf SA	378	0	S
Yellowtail Kingfish	11/11/06	Eden NSW	445	139	NNE
Yellowtail Kingfish	18/03/06	Eden NSW	681	5	ESE
Mulloway	15/09/07	Port River SA	62	2	NNW
Black Marlin	2/11/05	Great Barrier Reef NSW	725	903	ENE
Black Marlin	27/02/07	Seal Rocks NSW	340	132	NE
Yellowtail Kingfish	8/04/07	Green Cape NSW	293	247	SW
Striped Marlin	25/11/07	Groper Island NSW	70	196	SSW
Yellowtail Kingfish	26/01/08	Barrenjoey Head NSW	5	1	NW
Mako Shark	17/02/07	Kilcunda VIC	336	31	WSW
Yellowtail Kingfish	26/05/06	Eden NSW	609	1	NNW
Yellowtail Kingfish	8/03/06	Eden NSW	689	17	W
Striped Marlin	2/02/08	Newcastle NSW	0	12	NNE
Yellowfin Tuna	20/03/08	Grassy Head NSW	7	1	SW

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Striped Marlin	3/02/08	Newcastle NSW	19	19	NNE
Yellowtail Kingfish	23/03/08	Forresters Beach NSW	19	1	SE
Yellowtail Kingfish	1/10/07	Coffs Harbour NSW	174	16	W
Southern Bluefin Tuna	1/04/05	Cabbage Patch SA	918	1700	WSW
Giant Trevally	11/04/08	Airlie Beach QLD	16	0	S
Striped Marlin	24/02/08	Port Stephens NSW	59	348	NE
Sailfish	28/10/07	Fraser Island QLD	202	131	S
Yellowfin Tuna	14/01/07	Eden NSW	460	6	SSW
Yellowtail Kingfish	6/04/07	Montague Island NSW	334	54	SW
Yellowfin Tuna	14/10/07	Port Hacking NSW	225	11	WSW
Striped Marlin	27/03/08	Newcastle NSW	24	507	NNE
Striped Marlin	4/03/08	Jervis Bay NSW	53	666	NNE
Snapper	23/03/08	Port River SA	63	14	S
Yellowfin Tuna	25/11/06	Jervis Bay Canyons NSW	548	75	NNE
Yellowfin Tuna	2/03/08	Broughton Island NSW	98	191	SSW
Yellowfin Tuna	11/05/08	Bermagui NSW	23	78	NNE
Yellowfin Tuna	13/04/08	Eden NSW	51	124	NNE
Giant Trevally	30/04/08	Airlie Beach QLD	29	0	S
Broad Barred Mackerel	27/04/08	Airlie Beach QLD	13	2	N
Australian Salmon	3/03/08	Port Giles SA	89	1	N
Giant Trevally	19/04/08	Whitsundays QLD	45	4	SSE
Mackerel Tuna	5/05/08	Mooloolaba QLD	21	48	SSE
Yellowfin Tuna	24/02/06	Broughton Island NSW	829	166	SW
Yellowfin Tuna	18/01/08	Ulladulla NSW	136	32	ENE
Dolphinfish	25/05/08	Mooloolaba QLD	11	0	S
Cobia	27/04/08	Mooloolaba QLD	39	15	ENE
Striped Marlin	16/03/08	Norah Head Canyons NSW	40	552	NNE
Spanish Mackerel	19/04/07	Abrolhos Islands WA	396	11	ENE
Mako Shark	12/01/08	Cape Schanck VIC	106	0	N
Yellowtail Kingfish	29/04/08	Port Augusta SA	56	11	NW
Yellowtail Kingfish	13/04/08	Eden NSW	56	6	NW
Yellowfin Tuna	3/09/06	Kiama Canyons NSW	654	51	SE
Yellowfin Tuna	25/05/08	Shellharbour NSW	25	30	S
Yellowfin Tuna	20/01/07	Batemans Bay NSW	515	67	NNE
Yellowfin Tuna	2/03/08	Port Stephens NSW	99	109	SSW
Dolphinfish	2/02/08	Port Stephens NSW	33	98	SSW
Yellowfin Tuna	22/07/07	Huon Gulf PNG	242	511	NW
Black Marlin	13/03/05	Port Stephens NSW	1145	1662	ENE
Giant Trevally	31/05/08	Airlie Beach QLD	21	0	S
Mackerel Tuna	24/11/07	Lae PNG	192		
Blue Marlin	20/12/06	Exmouth WA	507	1619	NNE
Blue Marlin	28/01/07	Madang PNG	387	931	WNW
Black Marlin	2/03/08	Newcastle NSW	94	1621	NNE
Southern Bluefin Tuna	27/04/07	Tasman Island TAS	237	918	WNW
Southern Bluefin Tuna	4/05/06	Neptune Islands SA	625	213	WNW

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Southern Bluefin Tuna	28/04/07	Tasman Island TAS	308	958	WNW
Yellowfin Tuna	17/09/07	Lae PNG	152		
Yellowtail Kingfish	11/12/07	Split Solitary Island NSW	198	4	NW
Yellowtail Kingfish	8/12/07	Split Solitary Island NSW	78	3	NW
Yellowfin Tuna	25/04/08	Tathra NSW	64	197	NNE
Yellowfin Tuna	18/03/07	Lae PNG	411	0	
Southern Bluefin Tuna	6/04/07	Neptune Islands SA	147	2757	SW
Dolphinfish	7/01/08	Port Macquarie NSW	9	0	N
Dolphinfish	8/01/08	Port Macquarie NSW	8	0	N
Dolphinfish	7/01/08	Port Macquarie NSW	9	9	SW
Dolphinfish	7/01/08	Port Macquarie NSW	9	0	N
Yellowtail Kingfish	1/02/07	Eden NSW	181	139	NNE
Albacore	3/03/07	St Helens TAS	414	302	ESE
Yellowfin Tuna	7/06/08	Ulladulla NSW	4	40	E

Appendix II. All recaptures for 2007/2008

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Southern Bluefin Tuna	13/03/07	Rocky Island (sa)	105	1061	ESE
Snapper	25/03/06	Ardrossan (sa)	258	0	N
Striped Marlin	5/11/06	Nambucca Heads NSW	71	166	SSW
Sailfish	28/12/06	Port Stephens NSW	2	20	SW
Yellowtail Kingfish	1/12/06	Sydney Heads NSW	21	2	WSW
Southern Bluefin Tuna	11/04/05	Cabbage Patch SA	662	138	WNW
Southern Bluefin Tuna	2/05/06	Neptune Islands SA	337	36	NNW
Snapper	16/02/07	Adelaide SA	117	2	W
Spanish Mackerel	24/04/06	Abrolhos Islands WA	113	15	NE
Mako Shark	6/04/05	Tabourie Lake NSW	559	1568	NW
Yellowtail Kingfish	1/12/06	Sydney Heads NSW	27	1	N
Yellowtail Kingfish	24/11/06	Jervis Bay NSW	22	2	NNW
Black Marlin	10/06/05	Vanuatu	536	533	NW
Mackerel Tuna	20/12/06	Scarborough NSW	5	45	NW
Cobia	13/08/06	Caloundra NSW	127	17	NNE
Snapper	9/10/06	Arno Bay SA	65	26	ENE
Yellowtail Kingfish	4/02/06	Shellharbour NSW	342	52	WSW
Yellowtail Kingfish	15/04/06	Wybung Head NSW	276	47	SSW
Yellowtail Kingfish	26/01/03	Mowarry Point NSW	1438	215	NNE
Bronze Whaler	4/12/06	Whale Bay WA	43	5	ENE
Yellowtail Kingfish	25/02/07	Catherine Hill Bay NSW	10	1	SW
Yellowtail Kingfish	2/12/06	Newcastle NSW	64	0	N
Dolphinfish	14/01/07	Burleigh Heads QLD	9	48	SSE
Yellowfin Tuna	21/01/07	Tuggerah NSW	12	42	NNE
Black Marlin	18/12/04	South Stradbroke Is QLD	580	3286	E
Black Marlin	31/08/06	Cape Bowling Green QLD	6	10	SE
Black Marlin	18/09/05	Dampier WA	329	0	S
Yellowfin Tuna	16/02/05	South West Rocks NSW	566	277	SSW
Whaler Shark	24/08/06	Swansea NSW	26	6	NNE
Yellowtail Kingfish	15/12/03	Ulladulla NSW	1006	243	NNE
Yellowtail Kingfish	22/02/05	Eden NSW	572	18	ESE
Australian Salmon	28/06/06	Catherine Hill Bay NSW	66	13	SSW
Yellowtail Kingfish	29/08/06	Rottnest Is WA	18	15	SE
Australian Salmon	29/07/06	Wybung Head NSW	62	10	SW
Black Marlin	27/05/06	Cape Bowling Green QLD	90	10	NW
Yellowfin Tuna	13/08/06	Jervis Bay NSW	49	30	SSE
Giant Trevally	23/05/06	Vanuatu	82	0	S
Yellowtail Kingfish	17/09/06	Mooloolaba QLD	7	9	NW
Yellowtail Kingfish	21/02/04	Mowarry Point NSW	960	447	NNE
Yellowtail Kingfish	4/02/06	Eden NSW	171	132	NE
Yellowtail Kingfish	26/03/06	Currarong NSW	200	8	NE
Black Marlin	9/09/04	Cape Bowling Green QLD	681	1853	NW
Yellowtail Kingfish	2/04/06	Eden NSW	101	52	NW
Yellowtail Kingfish	12/03/05	Mowarry Point NSW	480	57	NW

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Yellowtail Kingfish	23/09/06	Catherine Hill Bay NSW	21	0	S
Snapper	16/05/06	Arno Bay SA	147	0	S
Snapper	8/03/05	Kangaroo Island SA	579	32	NNE
Australian Salmon	16/06/06	Ulladulla NSW	112	2	WSW
Yellowtail Kingfish	13/11/05	The Banks NSW	346	0	N
Yellowtail Kingfish	20/11/04	Mowarry Point NSW	711	139	NNE
Australian Salmon	16/06/06	Ulladulla NSW	139	20	SSW
Yellowtail Kingfish	4/02/06	Eden NSW	270	15	SW
Yellowtail Kingfish	2/05/04	Mowarry Point NSW	916	447	NNE
Yellowfin Tuna	27/11/04	Jervis Bay Canyons NSW	642	1841	NW
Spanish Mackerel	16/11/03	Mackay QLD	1079	95	NNW
Yellowfin Tuna	10/04/04	Eden NSW	904	142	NNE
Albacore	14/12/99	Burri Point	2471	1727	ENE
Samson Fish	7/01/07	Rottnest Trench WA	-54	5	ENE
Striped Tuna	17/09/05	Benalla Banks	396	628	SE
Yellowtail Kingfish	4/02/06	Shellharbour NSW	239	72	NW
Black Marlin	7/11/06	Cape Moreton Trench QLD	19	6	NNE
Yellowtail Kingfish	11/11/06	Central Coast NSW	14	0	N
Yellowtail Kingfish	13/08/05	Port Augusta SA	328	0	N
Hammerhead Shark	5/03/06	Port Stephens NSW	130	281	NE
Australian Salmon	20/05/06	Ulladulla NSW	51	1	W
Yellowfin Tuna	20/05/05	Green Cape NSW	411	72	NE
Yellowfin Tuna	25/11/05	Jervis Bay NSW	226	11	SE
Australian Salmon	27/05/06	Ulladulla NSW	44	25	NE
Australian Salmon	16/06/06	Ulladulla NSW	43	2	WSW
Australian Salmon	27/05/06	Ulladulla NSW	74	4	NE
Australian Salmon	24/04/06	Proper Bay SA	117	9	NW
Sailfish	11/12/05	Mooloolaba QLD	251	11	NNE
Yellowfin Tuna	20/06/06	Tilba Tilba NSW	61	148	NNE
Australian Salmon	16/06/06	Ulladulla NSW	65	1	W
Yellowfin Tuna	22/01/05	Bermagui NSW	533	1483	NE
Cobia	7/01/06	Hutchison Shoals QLD	228	11	NW
Yellowtail Kingfish	29/05/06	Port Augusta SA	85	0	N
Yellowtail Kingfish	22/01/06	Catherine Hill Bay NSW	209	1	W
Sailfish	4/06/06	Dampier WA	28	34	SW
Yellowfin Tuna	18/03/06	Broken Bay NSW	162	80	SW
Yellowfin Tuna	4/03/05	Jervis Bay Canyons NSW	543	20	SE
Yellowfin Tuna	6/11/05	Browns Mountain NSW	300	6	E
Black Marlin	3/08/06	Cape Bowling Green QLD	32	10	SE
Yellowtail Kingfish	4/12/05	Wybung Head NSW	254	17	SSW
Southern Bluefin Tuna	1/03/06	Greenly Island SA	198	2572	SW
Yellowtail Kingfish	17/02/05	Eden NSW	646	401	NNE
Whaler Shark	13/05/06	The Banks NSW	167	278	NNE
Barramundi	1/01/06	Karratha WA	344	0	S
Blue Shark	18/02/06	Cape Schanck VIC	290	2253	NW

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Yellowtail Kingfish	10/12/05	Mowarry Point NSW	373	11	W
Yellowtail Kingfish	24/04/06	Mowarry Point NSW	239	5	ESE
Yellowtail Kingfish	12/11/05	Comerong Island NSW	400	98	SSW
Yellowtail Kingfish	11/12/05	Mowarry Point NSW	360	5	ENE
Yellowtail Kingfish	19/04/06	Swansea NSW	234	1	E
Black Marlin	10/01/07	Gold Coast Seaway QLD	30	177	SW
Striped Marlin	3/02/07	Charlotte Head NSW	7	41	SW
Mackerel Tuna	8/04/06	Lae PNG	179	176	NNW
Striped Marlin	5/01/07	Swansea NSW	35	13	NNW
Yellowfin Tuna	26/08/06	Lae PNG	92	378	NW
Whaler Shark	10/02/07	Port Stephens NSW	3	3	NE
Black Marlin	5/09/06	Cape Bowling Green QLD	148	767	SSE
Yellowtail Kingfish	2/02/07	The Banks NSW	13	15	SE
Mako Shark	7/11/06	Coffs Harbour NSW	102	634	SSW
Black Marlin	21/01/07	Gold Coast QLD	28	295	SW
Yellowtail Kingfish	2/04/06	Mowarry Point NSW	325	204	NE
Black Marlin	20/08/06	Bramble Reef QLD	184	792	SSE
Yellowtail Kingfish	3/02/07	Coffs Harbour NSW	10	7	NNW
Yellowtail Kingfish	3/02/07	South Solitary Island NSW	10	0	N
Yellowtail Kingfish	24/11/06	Jervis Bay NSW	e	5	WSW
Sailfish	23/09/06	Mooloolaba QLD	62	8	WSW
Striped Marlin	27/01/07	Newcastle NSW	20	11	NNE
Yellowtail Kingfish	31/01/04	The Entrance NSW	1116	328	NNE
Striped Marlin	3/02/07	Norah Head Canyons NSW	21	32	NE
Black Marlin	5/02/07	Port Stephens NSW	13	8	SE
Yellowfin Tuna	15/04/06	Lae PNG	180	178	NE
Yellowfin Tuna	15/04/06	Lae PNG	180	178	NE
Black Marlin	4/02/07	Point Plomer NSW	23	68	SW
Australian Salmon	7/02/07	Kangaroo Island SA	17	3	NNE
Yellowtail Kingfish	4/03/06	Montague Island NSW	364	163	NNE
Yellowtail Kingfish	4/02/06	Eden NSW	334	199	NE
Snapper	7/10/06	Nuyts Reefs SA	145	1	S
Striped Marlin	18/02/07	Port Stephens NSW	12	198	SSW
Yellowtail Kingfish	10/02/06	The Banks NSW	388	139	SSW
Striped Marlin	10/02/07	Newcastle NSW	10	302	SSW
Yellowtail Kingfish	27/01/07	South West Rocks NSW	24	0	N
Striped Marlin	10/02/07	Port Stephens NSW	28	234	SSW
Bonito	16/02/07	The Banks NSW	32	0	N
Australian Salmon	3/03/07	Bermagui NSW	9	3	SW
Rainbow Runner	14/04/06	Huon Gulf PNG	120	516	NNW
Yellowtail Kingfish	16/02/07	The Banks NSW	15	3	WSW
Yellowtail Kingfish	31/03/06	Mowarry Point NSW	339	17	W
Yellowtail Kingfish	25/02/07	Catherine Hill Bay NSW	36	0	S
Dolphinfish	31/03/07	Kiama NSW	2	11	NW
Silver Trevally	10/03/07	Geographe Bay WA	17	4	SW

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Yellowtail Kingfish	15/01/07	Port Kembla Islands NSW	77	36	SW
Striped Marlin	25/02/06	Newcastle NSW	357	67	SW
Silver Trevally	10/03/07	Geographe Bay WA	28	4	SW
Yellowtail Kingfish	3/03/06	Montague Island NSW	394	0	S
Striped Marlin	3/01/07	Tuross Canyons NSW	101	210	NNE
Yellowtail Kingfish	10/02/06	The Banks NSW	430	0	N
Silver Trevally	12/01/07	Boston Bay SA	93	4	SSW
Trevally	12/01/07	Boston Bay SA	87	4	SSW
Striped Marlin	4/02/07	Norah Head Canyons NSW	44	223	SSW
Australian Salmon	27/03/07	Tilba Tilba NSW	7	3	SW
Australian Salmon	11/03/05	Cape Naturaliste WA	760	34	ENE
Australian Salmon	23/04/06	Proper Bay SA	313	25	NE
Striped Marlin	14/01/07	Port Hacking NSW	48	92	NE
Blue Shark	12/08/06	Eden Shelf NSW	227	882	SE
Striped Tuna	30/09/06	Lae PNG	140	467	NW
Yellowtail Kingfish	10/12/05	Eden NSW	481	436	NNE
Yellowtail Kingfish	25/11/06	Central Coast NSW	147	12	SW
Mako Shark	11/02/07	Port Stephens NSW	84	82	SSW
Yellowtail Kingfish	16/02/07	The Banks NSW	88	0	N
Yellowtail Kingfish	9/11/06	Coffs Harbour NSW	149	16	SW
Cobia	9/10/04	Mooloolaba QLD	949	202	S
Australian Salmon	25/04/07	Tilba Beach NSW	7	2	SSW
Blue Shark	4/02/06	Apollo Bay VIC	378	0	S
Yellowtail Kingfish	14/06/06	Mowarry Point NSW	262	17	W
Yellowtail Kingfish	5/02/06	Mowarry Point NSW	399	1	NNW
Black Marlin	14/04/07	Mooloolaba QLD	33	461	NW
Yellowfin Tuna	12/11/06	Bellambi Point NSW	158	395	NNE
Yellowtail Kingfish	9/05/04	Mowarry Point NSW	1084	0	S
Yellowtail Kingfish	4/06/06	Mowarry Point NSW	288	1	NNW
Striped Marlin	19/01/07	Batemans Bay NSW	109	91	SSE
Dolphinfish	31/03/07	Shellharbour NSW	21	10	NE
Yellowtail Kingfish	5/03/07	Mowarry Point NSW	17	0	S
Sailfish	19/08/06	Mooloolaba QLD	259	28	SSE
Black Marlin	5/09/06	Cape Bowling Green QLD	257	933	NNE
Dogtooth Tuna	1/11/06	Marion Reef QLD	186	0	S
Silver Trevally	9/03/07	Eagle Bay WA	29	8	SE
Yellowtail Kingfish	5/11/06	Coffs Harbour NSW	15	5	WNW
Snapper	2/10/04	Kangaroo Island SA	965	21	ENE
Tiger Shark	5/05/07	Unknown	48	973	NNE
Yellowtail Kingfish	11/02/06	Batemans Bay NSW	498	127	NNE
Yellowtail Kingfish	11/11/06	Mowarry Point	147	6	NW
Blue Shark	17/02/07	Woolamai (VIC	1	0	N
Yellowfin Tuna	23/11/06	Port Kembla Wide NSW	185	114	SSW
Mulloway	23/02/07	Glenelg SA	67	4	NNW
Yellowtail Kingfish	13/01/07	Five Islands NSW	105	1	SSW

Species	Release Date	Release Locality	Days at Liberty	Distance Moved NM	Direction
Yellowtail Kingfish	13/11/05	The Banks NSW	417	3	WSW
Black Marlin	3/03/07	Port Stephens NSW	59	1646	N
Yellowfin Tuna	20/11/05	Browns Mountain NSW	560	183	SSW
Yellowtail Kingfish	19/11/05	The Banks NSW	536	67	NE
Black Marlin	18/10/06	Young Reef QLD	195	815	NNE
Snapper	7/03/05	Kangaroo Is SA	696	3	WSW
Black Marlin	2/03/07	Port Stephens NSW	46	756	NNE
Striped Marlin	26/01/07	Port Stephens NSW	4	46	ENE
Yellowtail Kingfish	24/04/04	Barwon Banks QLD	970		
Blue Marlin	1/04/04	Cape Moreton Wide QLD	1134	612	SW
Yellowtail Kingfish	6/05/06	Mowarry Point NSW	333	11	NW
Yellowtail Kingfish	7/11/06	Coffs Harbour NSW	180	11	WSW
Mackerel Tuna	3/03/07	Mooloolaba QLD	73	38	SSW
Black Marlin	12/01/07	Yamba NSW	123	1079	ENE
Blacktip Shark	18/11/06	Woody Island NT	49	108	NNE
Southern Bluefin Tuna	1/05/06	Neptune Islands SA	293	282	WNW
Blue Shark	17/02/07	Phillip Island VIC	1	13	SSE
Blue Shark	17/02/07	Phillip Island VIC	1	13	SSE
Blue Shark	17/02/07	Phillip Island VIC	1	13	SSE
Southern Bluefin Tuna	10/03/05	Kangaroo Is SA	720		
Southern Bluefin Tuna	19/03/06	Port Lincoln SA	353	0	S
Southern Bluefin Tuna	5/05/06	Neptune Islands SA	228		
Yellowtail Kingfish	5/11/06	The Banks NSW	197	0	N
Mulloway	16/01/07	Adelaide SA	98	2	SSE
Albacore	21/05/06	Bermagui Shelf NSW	357	385	SSE
Black Marlin	19/12/06	Gold Coast QLD	185	1141	NW
Black Marlin	21/01/07	Jumpinpin QLD	146	1093	NW
Black Marlin	15/12/06	Gold Coast QLD	189	1141	NW