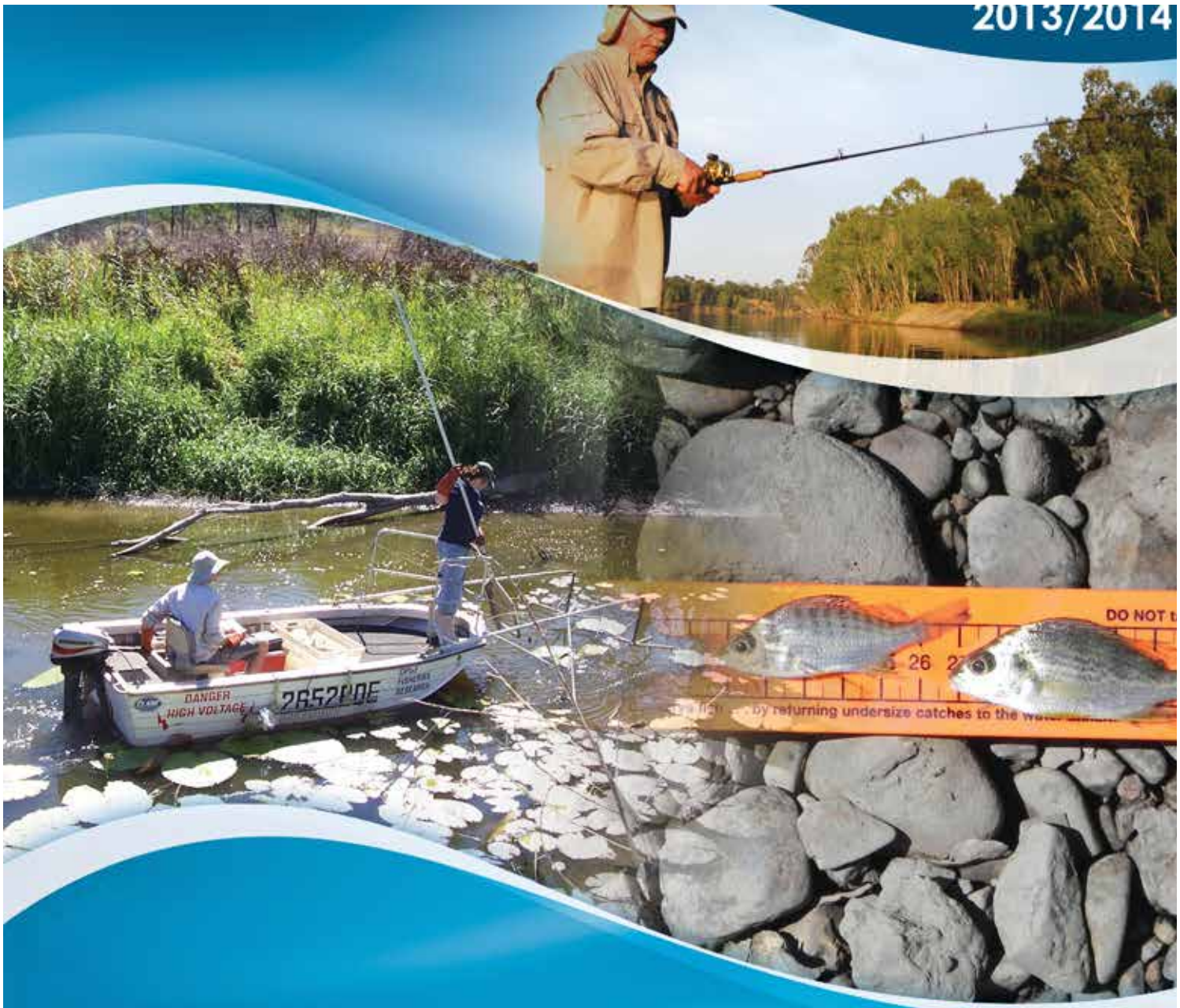
2013/2014



INFOFISH
CITIZEN SCIENCE & SUNTAG REPORT

infofish SUNTAG ANSA

Infofish Citizen Science and Suntag Report 2013/14

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Infofish Australia

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Table of Contents

List of Figures

Acronyms Used in the Report

AFTA: Australian Fishing Trade Association

AIMS: Australian Institute of Marine Science

ANSA: Australian National Sportfishing Association

ANSAQ: Australian National Sportfishing Association Qld Inc

Austag: ANSA Research Program

BIAQ: Boating Industry Association of Queensland

BOM: Bureau of Meteorology

CSIRO: Commonwealth Scientific and Industrial Research Organisation

DAFF: Department of Agriculture, Fisheries and Forestry

DAFFQ: Department of Agriculture, Fisheries and Forestry Queensland

DNRM: Department of Natural Resources and Mines

FQ: Fisheries Queensland

FRDC: Fisheries Research and Development Corporation

GAWB: Gladstone Area Water Board

GBRMP: Great Barrier Reef Marine Park

GBRMPA: Great Barrier Reef Marine Park Authority

JCU: James Cook University

MQ: Marine Queensland

PIRSA: Primary Industries and Resources South Australia

RBB: Rocky Barra Bounty

RA: Recfish Australia

RFCGP: Recreational Fishing Community Grants Programme

RUF: Recreational Use Fee

SEQwater: South East Queensland Water

Suntag: Citizen Science and Research Program

TAA: Tagging Achievement Award

TEA: Tagging Excellence Award

Acknowledgements

The running of a citizen science program to collect data on our fish species, and involvement in many research projects, is a major undertaking. The program would not be possible without the support of a wide range of organisations and individuals that have contributed either funding, in kind support or voluntary effort. It is appropriate to acknowledge all those that have contributed financially or provided in-kind support. The voluntary effort of all taggers is also acknowledged.

Suntag Gold Sponsors (over $20,000)

Department of Agriculture, Fisheries and Forestry (Fisheries Queensland)

Infofish Australia

Suntag Silver Sponsors ($5,000-$20,000)

QGC (part of larger project)
ANSAQ
Rockhampton Regional Council

One Pixel

Suntag Bronze Sponsors (up to $5,000)

Platypus Fishing Lines
Gladstone Sportfishing Club
BarraDave Sportfishing Services
Lively Lures
Glenlyon Dam Tourist Park (D&B Dare)
XXXX Gold
Bundaberg Regional Council

Suntag Funding for tags

The following organisations contributed funding for the purchase of tags for their projects.

SEQWater
Primary Industries and Resources South Australia
Griffith University
Holloways Beach Environment Education Centre
Captag
Brisbane Sportfishing Club
Bundaberg Sportfishing Club
Borumba Fishing Club
Cungulla Recreational Fishing and Social Club
Logan and Albert Fish Management Association
Fitzroy River Fish Stocking Group
North Queensland Dry Tropics
Burdekin Fish Restocking Association
Cairns Area Fish Stocking Group
Ingham Rod and Reel Club
Mackay Area Fish Stocking Group
Mackay Recreational Fishing Alliance
Emerald Fish Stocking Group

The following individuals contributed funding for the purchase of tags for their own use or made a donation to Suntag.

Billy Stringer
David Lindsay
Duncan Faichney

Projects partnering with Suntag

The following projects are undertaken in conjunction with Suntag.

Gladfish (Gladstone Qld)
Crystal Bowl (Predicting Barramundi stocks)
CapReef (Capricorn Coast Offshore)
McArthur Monitoring (McArthur River Northern Territory with King Ash Bay Fishing Club)
Westag (Tagging Western Australia)
Lake Awoonga (Gladstone Area Water Board tagging)
XXXX Island tagging (XXXX Gold)

Supporters of Suntag

The following organisations or individuals have provided support for Suntag or activities undertaken under Suntag.

Department of Defence
James Cook University
Fitzroy Basin Association
Hallprint Pty Ltd
Freshwater Fish Stocking Association of Queensland
Sunfish Queensland
Hook'd on Adventure
Fishing Monthly magazines - Steve Morgan/Steve Booth
Alternative Lighting – Kevin Hughes
Radio 4BC – Dave Downie
Radio Zinc - Andrew Phipps (Phippsy)
Wildlife and Fish Photographer- Graham Cumming

Participants in Suntag

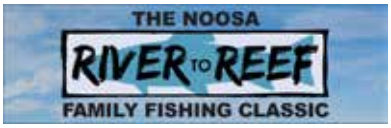
The following clubs and fish stocking groups have taken part in Suntag this year.

Suntaggers
Brisbane Sportfishing Club (Moretag)
Redcliffe Peninsula Game and Sportfishing Club
Kingaroy Sportfishing Club
Bundaberg Sportfishing Club
Gladstone Sportfishing Club
Captag
Keppel Bay Sportfishing Club
Southern Brisbane Sportfishing Club
Townsville Sportfishing Club
Burdekin Recreational Sportfishing Club
Townsville Saltwater Sportsman's Club
Cardwell Sportfishing Club
Tully and District Sportfishing Club
Cairns Sportfishing Club
Mossman Sportfishing Club
Bribie Island Sportfishing Club
Ipswich United Sportfishing Club
Weipa Sportfishing Club
King Ash Bay Fishing Club
Sunshine Coast Sportfishing Club
Cungulla Recreational Fishing and Social Club
Endeavour Sportfishing Club
Hinchinbrook Sportfishing Club
Lavarack Sportfishing Club
Mount Isa Fish Stocking Group
Gulf Barramundi Stocking Association
Richmond Fish Stocking Group
Cairns Area Fish Stocking Association
Burdekin Fish Restocking Association
Tablelands Fish Stocking Society
Twin Cities Fishing Stocking Society
Faust Dam Fish Stocking Association
Mackay Area Fish Stocking Association
Fitzroy River Fish Stocking Group
Callide Valley Native Fish Stocking Association
Baralaba Recreation and Fish Stocking Group
Borumba Fishing Club
Bundaberg Sportfishing Club Fish Stocking
Brisbane Valley Anglers Fish Stocking Association
Logan-Albert Fish Management Association
Gold Coast Sportfishing Club
Emerald Fish Stocking Group
Charters Towers and Dalrymple Fish Stocking Group

Fishing Competitions supported by Suntag

Suntag works with and supports the following fishing competitions by managing data on fish tagged during these events.

Rocky Barra Bounty
Boyne Tannum Hookup
Bundaberg VMR Family Fishing Classic
Gold Coast Flathead Classic
Noosa River to Reef Family Fishing Classic
King of the Pin Competition
Lake Moondarra Fishing Classic
Faust Catch and Release Fishing Tournament



The Infofish Australia Team

Infofish Australia manages Suntag in partnership with ANSAQ and manages data collection for a number of other organisations and clients. Suntag Queensland is a registered business name of Infofish Australia. The Infofish team all contribute to the delivery of Suntag and associated projects.

Bill Sawynok is the Manager of Infofish Australia which is based in Rockhampton. It was established in 1995 as Infofish Services and the name was changed in 2010. Through Infofish, Bill has managed Suntag since 1987 and has played a number of roles in fisheries research. He was manager of Recfishing Research 2005-2012, a past director of the Fisheries Research and Development Corporation and past board member of the Reef Cooperative Research Centre.

Stefan Sawynok joined Infofish Australia in 2012 however has provided the technology support for Suntag for many years through his One Pixel business. Stefan moved to Brisbane in late 2012 to take up a more active role in Infofish Australia. He developed the current Infofish 2012 database, Suntag Online and linked the database to Google Earth to improve information delivery.

Shirley Sawynok is the Finance Manager and joined Infofish Australia in 2005. Prior to that time she spent 10 years working for WIN television. Shirley manages Suntaggers that allows individual members to take part in Suntag. She also manages tag purchases and distribution, the Infofish shop and the Rocky Barra Bounty.

Wendi Parsons is based in Rockhampton and joined Infofish Australia in 2005. Wendi has an Aquatic Marine Management degree and is responsible for field data collection including water quality sampling, recruitment surveys and boat ramp surveys. She is also responsible for data entry and has worked on all Infofish projects including the McArthur River Monitoring project in the Northern Territory. Wendi is a keen recreational fisher and particularly enjoys fishing for Barramundi.

John Platten is based in Gladstone and has worked casually for Infofish Australia since 2005. John has a Marine Science PhD and is responsible for data analysis. In 2012 he took on a greater role in the Gladfish project and is responsible for data collection undertaking trailer counts, boat ramp surveys and recruitment surveys. John is also a keen recreational fisher in the Gladstone area.

1. What the Fishing Industry gets from Investment in Suntag

Suntag has been providing a service to the fishing industry for 27 years since 1986/87. Early In 2013/14 Suntag passed 1,000,000 fish records in the database. It is now likely to be the largest fisheries database in Queensland outside government and research institutions and the largest volunteer tagging database in the world. Over the 27 years of the program it is estimated that there has been $15-20m invested or provided in kind by government, other funders, researchers, taggers and stocking groups in the data stored in the database.

This year the Suntag grant of $40,000 by Fisheries Queensland was the catalyst for cash and in kind investments/contributions of $570,540 or $13.3 for every grant dollar. Infofish Australia and ANSAQ believe that there are few other examples of such a multiplier on investment within the Queensland fishing industry. The return on investment in improved knowledge of fish stocks is also substantial although not quantified.

Where Suntag is at has been achieved by providing a high quality service that is responsive to the industry's needs. The focus of Suntag and its various associated projects has shifted towards monitoring and being able to predict fish stocks into the future. This is through a Crystal Bowl approach, in a way that provides information to the industry that can be used to influence the level of future investment in a particular fishery. This commenced with Barramundi in the Fitzroy River, extended to Gladstone this year and is being extended to King and Blue Threadfin in the Fitzroy River. The aim is to develop the Crystal Bowl at as low a cost as possible, otherwise it will not be sustainable. To achieve this there has been an increased emphasis on collecting data on recruitment of key species.

Having a world-class data collection and storage system ensures that quality data are available however that data needs to be available in a variety of formats to the fishing industry and government to assist in dealing with real world issues that affect the industry and our fisheries.

A new more integrated approach to information sharing was introduced this year. Facebook pages for Suntag, Crystal Bowl, Gladfish and King Ash Bay became the media for reporting interesting recaptures in near real time. Suntag mini-reports, videos and interactive views of the data using Google Earth were introduced to the Suntag website and feature species, locations, timescales, issues or all of those to tell some of the interesting stories from the database. The Suntag News bulletin was revamped to an online eNews format to promote the mini-reports and other interesting information.

This report provides a summary of what Fisheries Queensland and other contributor's investment in Suntag provides to the fishing industry and the community.

Bill Sawynok
Infofish Australia

2. Highlights in 2013/14

- Total fish and crab records in the database now exceed 1.05 million fish records including 712,900 tagged fish, 281,400 fish from catches and 57,000 recaptures
- 101 Frequent taggers account for 278,000 (39%) of the total number of fish tagged while the remaining 9,300 taggers account for 298,100 (41.8%) of the fish tagged
- Fish stocking groups account for 95,300 (13.4%) of the fish tagged and researchers 41,800 (5.9%)
- Fishing trips with catch and effort details now total 40,150 (3,200 this year)
- A total of over 9,400 taggers (565 this year) have now participated in Suntag and 16,900 fishers (830 this year) have reported the recapture of a tagged fish
- A total of over 1,200 fishers contributed data to Suntag this year through tagging fish, reporting recaptures and catch
- Barramundi is the most tagged species with over 238,200 tagged and 17,500 recaptured (over 20,900 including multiple recaptures)
- The overall recapture rate for fish, excluding crabs was 6.6% with a 6.8% recapture rate for 2010-14
- The release rate of recaptured fish for the past 9 years was over 60% and over 70% from 2007/08 to 2009/11
- Mick Dohnt remains the top tagger overall having tagged a total of 24,780 fish
- Images of almost 1,700 tagged and recaptured fish are now stored in the database
- A total of over 86,500 fish have the location where the hook was lodged in the fish recorded with 10.8% of fish caught on bait being deep hooked (throat or gut) and 2.0% for fish caught on lures
- A total of 8 mini-reports were produced featuring a species, location, timeframe, issues or all of those with over 4,000 downloads from the website
- Suntag eNews was introduced as an online newsletter with 5 editions issued to around 800 subscribers
- Websites for Suntag and Crystal Bowl were revamped to be integrated with Suntag eNews and Suntag mini-reports

3. Infofish Citizen Science Activities

In recent years the scope of Infofish projects has extended well beyond fish tagging. It is now extensively involved in a range of activities focused on monitoring that comes under the broad term "citizen science". This involves collecting data on fishing activities and working collaboratively with government agencies, research bodies, corporate funders, fishing organisations and community groups. There are now 12 broad areas that Infofish is involved in:

- Fish tagging
- Community monitoring
- Predicting fish stocks
- Monitoring fish recruitment
- Monitoring stocked fish
- Monitoring fishing competitions
- Support for research projects
- Catch and effort
- Monitoring fish health
- Released fish survival
- Historical tagging records
- Support for overseas tagging

Infofish provides the framework, standards and a common database structure for the management and operation of separate programs/projects throughout Australia and eventually overseas. The program structure allows for the collection of a wide range of fisheries data, not only tagging data. Infofish programs in Australia are shown in *figure 1*. These are:

- Suntag Queensland
- Westag Western Australia
- McArthur Monitoring Northern Territory
- Crystal Bowl Fitzroy River Qld
- Gladfish Gladstone Qld
- CapReef Central Queensland

Figure 1: Infofish programs around Australia

4. Citizen Science Scope and Projects

Fish Tagging - Suntag and Westag

Suntag commenced in 1986/87 as a tagging program to obtain movement and growth of key recreational species. Suntag is now the primary repository of tagging data in Queensland for tagging carried out by Suntag taggers, DAFFQ researchers, fish stocking groups, government monitoring programs and some research institutions and universities.

Suntag is now a substantial dataset spanning a 27 year timeline and data have been used for a wide range of purposes including:

- Growth and movement
- Stock assessments
- Stock predictions (Barramundi)
- Assessing recruitment
- Assessing the effects of management plans and regulations
- Assessing local/regional fishing
- Fish survival
- Environmental impact assessments
- Ecosystem modelling
- Climate change
- Fish health

Westag commenced in 1998/99 managed by ANSA WA. Westag adopted the Infofish database in 2011 and Infofish has provided technical support since then. In 2014 Infofish submitted a proposal to the WA Recreational Fishing Grants program to run a workshop to look at the future of Citizen Science and tagging in WA, however at the timing of writing no advice on this was available.

Fishtag World

In 2013 Infofish received an enquiry from a small group of fishers in Malaysia that wanted to tag fish in their local lake. As a result of this it was decided to expand the service internationally. Fishtag World is being set up to allow groups anywhere in the world to set up their own local tagging projects. While the Malaysian project did not proceed it has been important to understand what is needed to operate internationally.

Community Monitoring

An important and growing role has emerged in providing support to community monitoring. Community monitoring involves collecting data to assist the community and government to deal with regional or local fisheries issues and extends well beyond tagging. Infofish has been involved in 5 community monitoring programs that were CapReef, Crystal Bowl, McArthur Monitoring, Gladfish and Mud Crabs in Thomatis Creek.

CapReef was set up in Central Queensland and ran from 2004/05-2011/12. CapReef collected data to monitor the effects of the rezoning of the Great Barrier Reef Marine Park and changes to the Reef Line Fishery Management Plan. CapReef collected data on catch and effort, fish movement through tagging, expenditure on fishing, attitudes to management changes and changes in fisher behaviour.

Gladfish is a community monitoring project that was established as a follow on to CapReef. Gladfish is monitoring trends in recreational fishing in Gladstone Harbour and adjacent waterways. It commenced in 2011 and will be completed in 2015. Data are being collected

through boat ramp surveys, trailer counts, tagging, recruitment surveys, attitudinal surveys, recording fish health and examining historical catches of fishing clubs.

McArthur Monitoring was a community monitoring project set up in the Northern Territory by the King Ash Bay Fishing Club to monitor Barramundi stocks in the McArthur River in the Gulf of Carpentaria. Infofish Australia and Suntag are providing support to the club. This project ran from 2009-2013 to provide the community and government with information on Barramundi stocks. Data collected included catch and effort from fishing trips, tagging, weather and environmental data. Tagging is continuing following the completion of the project.

Mud Crabs in Thomatis Creek is a community crab monitoring project being undertaken by the Holloways Beach Environmental Education Centre near Cairns that commenced in 1998 and is ongoing. Suntag has provided long term support for this project which involves students at the centre monitoring crabs in the Barron River and Thomatis Creek.

XXXX Island tagging is an initiative of XXXX Island to allow visitors to the island in the Keppel Island group to tag fish that they catch. This is a new project that commenced in 2014.

Crystal Bowl - Predicting Barramundi Stocks

The "Crystal Bowl" concept emerged at the end of 2007 when, at the end of a long drought period, Barramundi stocks in the Fitzroy River were considered to be at their lowest in decades. It was only through a wet period starting from 2008 with strong recruitment in 2008, 2009 and 2010 that a very serious situation was averted. The "Crystal Bowl" concept was developed in response to those circumstances. The idea was to be able to predict what Barramundi stocks would be like in the coming years so that fishers could respond to what to expect.

The first predictions were made in 2011 for Barramundi in the Fitzroy River. That was extended to Barramundi in the Gladstone area in 2013 and extension to Threadfin in the Fitzroy River is currently being examined. From 2007-2013 the process has constantly evolved as more data was collected, improved understanding of what was required and how to provide the information back to fishers.

The Crystal Bowl predictions started in 2011 with Barramundi in the Fitzroy River, extended to Gladstone in 2013 and currently expanding to Threadfin in the Fitzroy River.

Community Monitoring - Stocked Fish

Tagging of stocked fish commenced shortly after the introduction of the Recreational Fishing Enhancement Program in the 1980s. In the late 1990s stocking of larger Barramundi around 200-300mm commenced and since then the practice has been adopted by a number of stocking groups. A number of groups have tagged these batches or a subset to monitor them over time. This is an effective way of monitoring these fish as it provides data over a long period of time at little cost after the initial investment in tags.

Tagging has provided data on growth of fish in different impoundments, survival of Bass during low water levels during drought and the escapement of fish when dams spilled during flooding.

Community Monitoring - Fishing Competitions

There is a growing trend in fishing competitions to include the tagging of fish. The following fishing competitions have a tagging component supported by Suntag:

- Rocky Barra Bounty at Rockhampton (1999-2013)
- Boyne Tannum Hookup at Gladstone (2000-2014)
- Bundaberg VMR Family Fishing Classic (2007-2014)
- Rich Fish in Queensland competitions (2010-12)
- Lake Moondarra Fishing Classic (2012-14)
- Noosa River to Reef Family Fishing Classic (2011-14)
- King of the Pin competition (2013)

Catch and effort data from the first 2 competitions have also been collected as part of the CapReef, Crystal Bowl and Gladfish programs.

Many fishing clubs or groups are looking to use data they have collected over long periods of time, particularly during competitions, to assess trends in their local or regional fishing. This year an assessment was made of the following.

- Faust Catch and Release Fishing Tournament (2013)
- Bundaberg VMR Family Fishing Classic (2006-2014)
- Mackay Post Office Amateur Fishing Club (1998-2014)

Community Monitoring - Fish Health

Storing photographs of individual tagged or recaptured fish commenced in 2011. This was to supplement the textual data with image data. An early use for this facility has been in assisting to monitor fish health in Gladstone Harbour. Fish health issues in Gladstone Harbour surfaced around the middle of 2011 and were the subject of extensive investigations in 2011-12. Suntag has played a part in collecting data on the health of fish, particularly Barramundi, through getting taggers to photograph their tagged fish to provide a record of their health status and report any lesions or other health issues. A health assessment scale was provided by DAFFQ and is in use on Barramundi in that area and especially in the Boyne River.

Community Monitoring - Catch and Effort

Suntag has been collecting catch and effort data on catch rates of its members since the mid 1990s. Data collected by taggers was extended to include all fish caught, kept and released, and the time spent fishing. The catch rates of ANSA members may not reflect catch rates of the average recreational fisher as their skill level is generally higher however the trend in catch rates of ANSA members can be indicative of the trend in catch rates of the broader fishing population.

Released Fish Survival

The Released Fish Survival Program went from 2002/03 to 2007/08 as an initiative of the FRDC. The FRDC invested $2.4m out a total of $7.3m in 20 projects under that strategy. The survival rates were known for 4 species prior to the strategy and 21 at its completion. Since

then further work has been undertaken taking the number of species to 30 where survival rates have been determined (for some species from several experiments).

Research has shown that deep hooking of fish is a significant cause of fish mortality. Collecting data on hooking locations and the terminal gear used provides valuable information that can be used to assist in determining survival estimates and these data continue to be collected.

Suntag continues to promote best fishing practices by providing information to fishers recapturing fish or during presentations to clubs and in other forums.

Impacts of Climate Change

As Suntag data now spans over 27 years the database provides the opportunity to examine the effects of climate change, at least on a regional scale. The first use of data in relation to climate change was a report titled "Use of 12 Mile Creek by Barramundi: Effects of Local Climate 1984-2007". This year Suntag data were used to see if there were changes in the distribution of Golden Snapper over time, at the margins of its range in Central Queensland. This was part of a larger project examining the likely impacts of climate change on a range of species in tropical Australia.

Support for DAFFQ and Research Projects

Suntag provides support for tagging carried out by DAFFQ that is undertaken in many research and monitoring projects. DAFFQ does not maintain its own tagging database and uses Suntag for the management and long term storage of its tagging data.

ANSAQ members have for many years been involved in collecting biological samples such as fish frames for researchers through such programs as CapReef. ANSAQ members have assisted with collecting Barramundi fin clips for a genetics study. There have also been projects where ANSAQ has provided logistic support and assisted with sampling during field data collection eg support for tagging in Green Zones around the Keppel Islands in 2007/08 and in 2012.

Suntag has provided support to university researchers and students undertaking research work by assisting them with data collection on tagging where that is part of their research. Support has been provided to a number of projects tagging Sharks and to SEQwater and the Logan Albert Fish Management Association in monitoring fish in those river systems. Suntag is also managing tagging data being collected by the Department of Natural Resources and Mines (DNRM) and Primary Industries and Resources South Australia (PIRSA) in the Lake Eyre Basin and Mud Crab tagging by Griffith University on the Gold Coast.

Historical Tagging Data

Much of the tagging data that is collected is the responsibility of the individual researcher that has collected it. Once the data is used in the preparation of a technical report or scientific paper it can often become ‘lost’ over time as researchers move on or as technology changes making the data inaccessible. While the data has served its primary purpose it can be used in the future with other data or can be re-analysed to answer new questions. No further historical tagging data were added to the database this year.

5. Suntag Queensland Framework

Suntag is a partnership program between ANSAQ and Infofish Australia. Suntag receives a grant each year from DAFFQ to provide base funding for the program. This is supplemented by corporate support and funding from other sources. Suntag also incorporates data from a number of other organisations that undertake tagging and provides the framework for Infofish citizen science programs.

Suntag is structured around collection, storage, analysis, distribution of data and production of information products. *Figure 2* is a diagram of Suntag data flows from the initial collection of data to distribution through information products.

Figure 2: Diagram showing Suntag data flows from data collection to information products

A Suntag Manual is maintained which provides Work Instructions to manage all aspects of Suntag. The manual is available from the website www.suntag.org.au.

Suntag tagging is carried out through projects which are agreed annually by ANSAQ and DAFFQ and the current list of projects is available from the website.

Suntag Online

The Infofish web based database introduced in 2006 significantly improved the collection of tag, recapture, catch, effort and other data. During this year the database was further upgraded to Infofish 2014. Suntag Online was introduced in 2013 to allow taggers to access their own data (read only), monitor progress towards tagging awards and upload trip details to the database. Taggers access Suntag Online though a secure login. When they login they are automatically provided with an update of the top 10 taggers in the current month, the top 20 taggers for the year, top species tagged for the year and recaptures for the month as shown in *figure 3*.

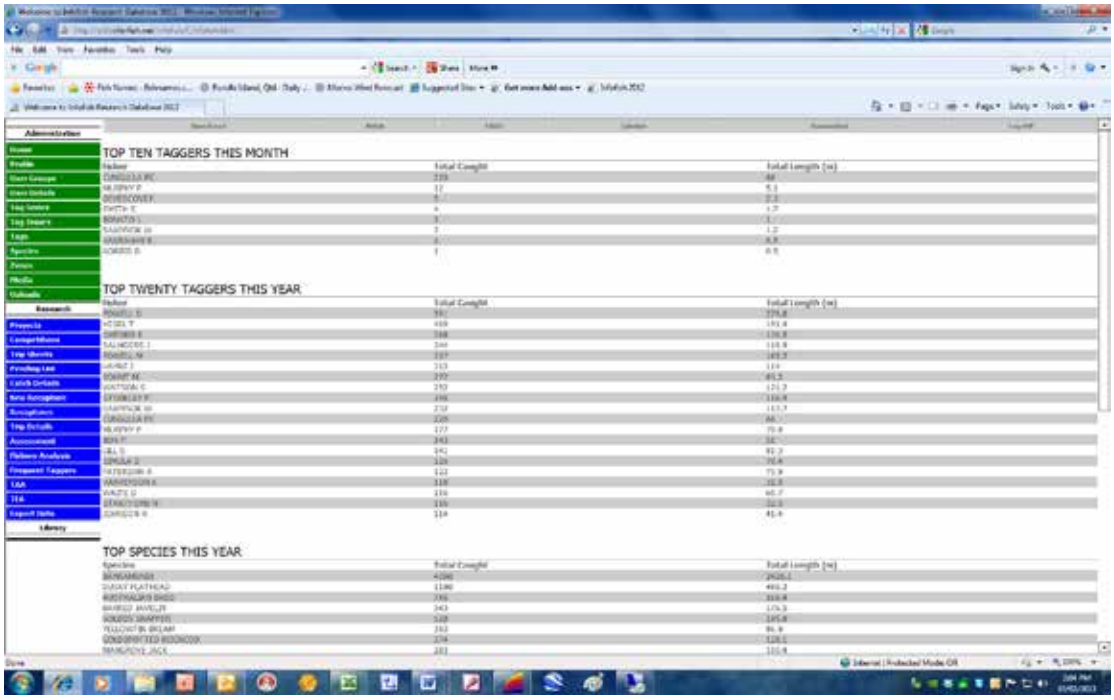


Figure 3: Initial screen when logged onto Suntag 2014

Added to the database in 2011 was the ability to store images and video of individual tagged and recaptured fish. The visual library is growing steadily to complement the textual database. *Figure 4* shows an image of a tagged fish stored in the database.

In 2013 the awards section of the database was upgraded for Tagging Achievement Awards (*figure 5*), Tagging Excellence Awards and Frequent Tagger Awards. Achievement Awards have been customised to include a photo of the species. Taggers registered for Suntag Online are notified by email when they have achieved an award and they can then print their own certificate.

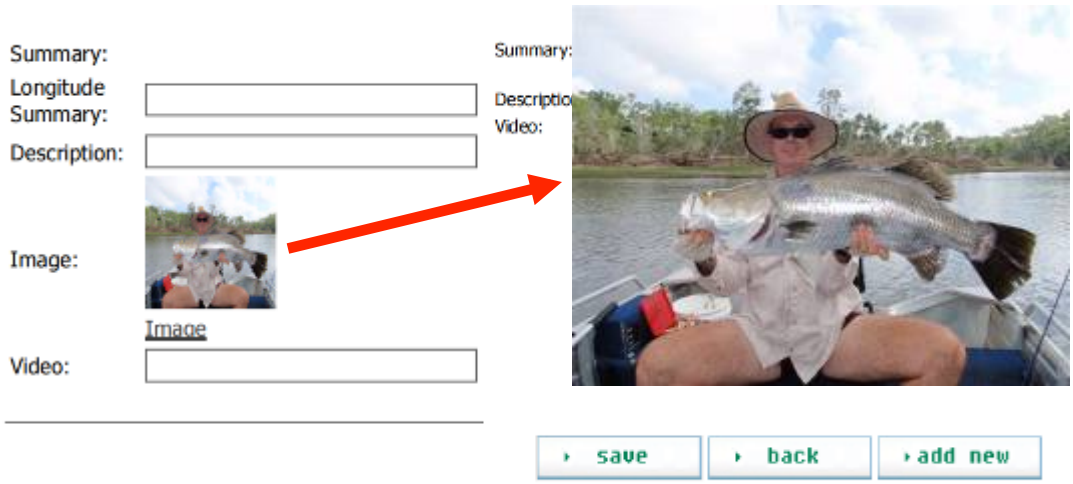


Figure 4: Images (photographs or video) of individual tagged or recaptured fish are now stored in the Suntag database

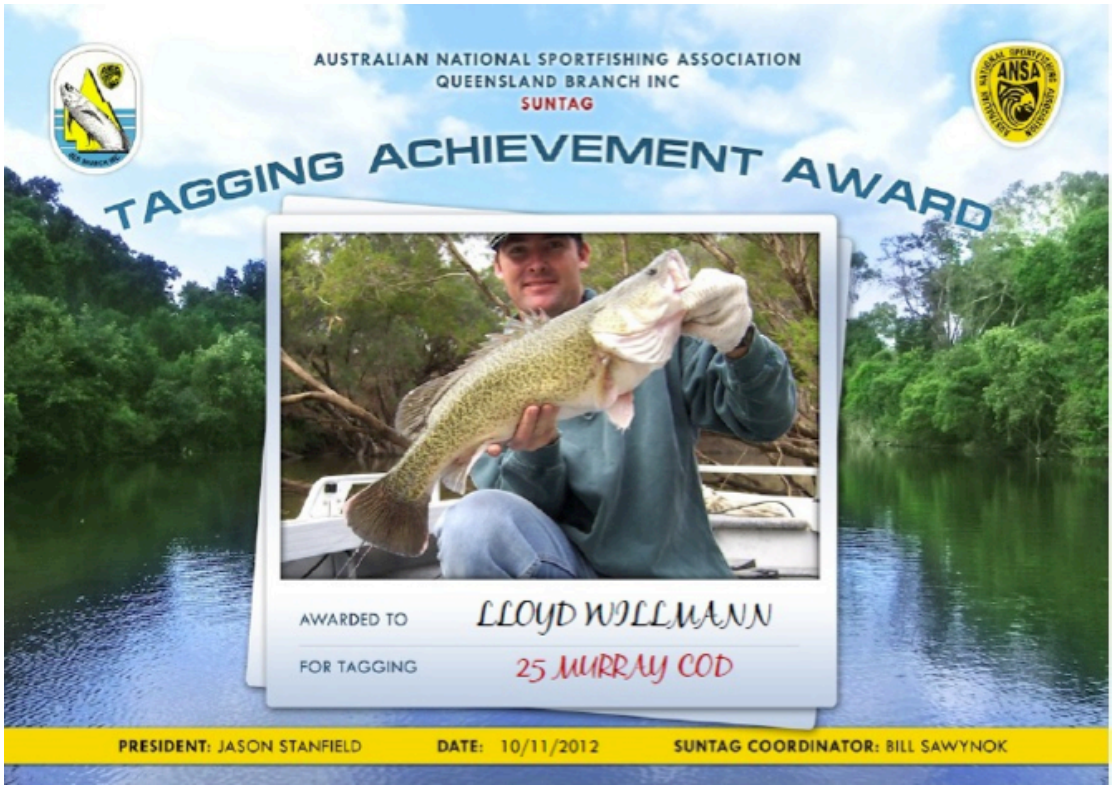


Figure 5: Tagging Achievement Award certificate introduced in 2013

Suntag Feedback on Recaptures

A very important aspect of Suntag is providing feedback to fishers, particularly about recaptures of fish. This service is continually being improved. Recapture details can be reported though:

- 1800 free call number printed on the tag
- Infofish websites
- Infofish etrip form
- Email
- Fax
- Mail

With the increased use of mobile phones more recaptures are being reported direct from the fishing location. With the instant world created by technology there is an expectation that feedback is available in real time. Feedback is provided in a number of ways.

- When reported by telephone the database is accessed on the spot and details of the fish are relayed verbally
- When details of a recapture are entered into the database, now that can include a photo of the fish, details of the history of the fish are generated automatically and certificates can be emailed to the both fishers that recaptured and tagged the fish as shown in *figure 6* (provided email addresses are available)
- When submitted by the website details are provided direct from the website as shown in *figure 7*

Figure 6: Gladfish project tag and recapture certificate

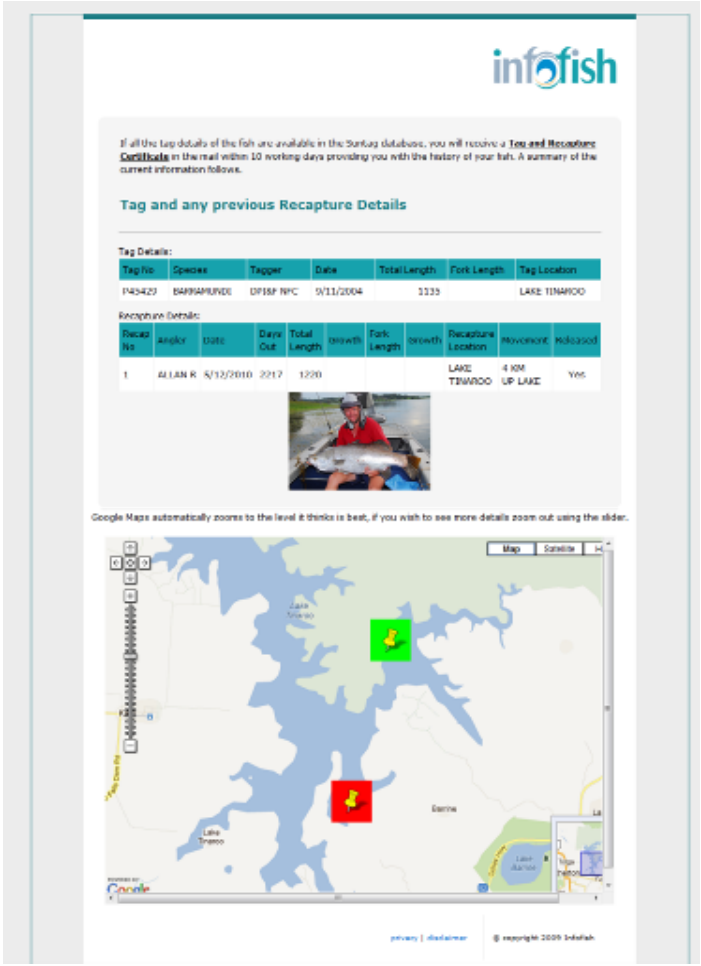


Figure 7: Feedback provided on recaptured fish when reported through the website

From 2011-14 the Gladstone Sportfishing Club has sponsored the Suntag Tag and Recapture certificates. With certificates generated electronically there are now a number of templates that can be used as backgrounds for the certificates. Customised templates can be made for any project. Specialised certificate templates are available for the Rocky Barra Bounty, Gladfish, McArthur Monitoring and XXXX Island projects as shown in *figure 8*.

Figure 8: Tag and Recapture certificate templates currently available

Infofish websites

Infofish has a series if websites that it maintains for its projects that all use the Suntag database to store their data. The website are:

Infofish Australia	www.info-fish.net
Suntag	www.suntag.org.au
Suntaggers	www.suntaggers.com.au
Westag	www.info-fish.net/westag
Gladfish	www.info-fish.net/gladfish
Crystal Bowl	www.crystal-bowl.com.au
McArthur River Monitoring	www.info-fish.net/king-ash-bay
Rocky Barra Bounty	www.rockybarrabounty.com
CapReef	www.info-fish.net/capreef

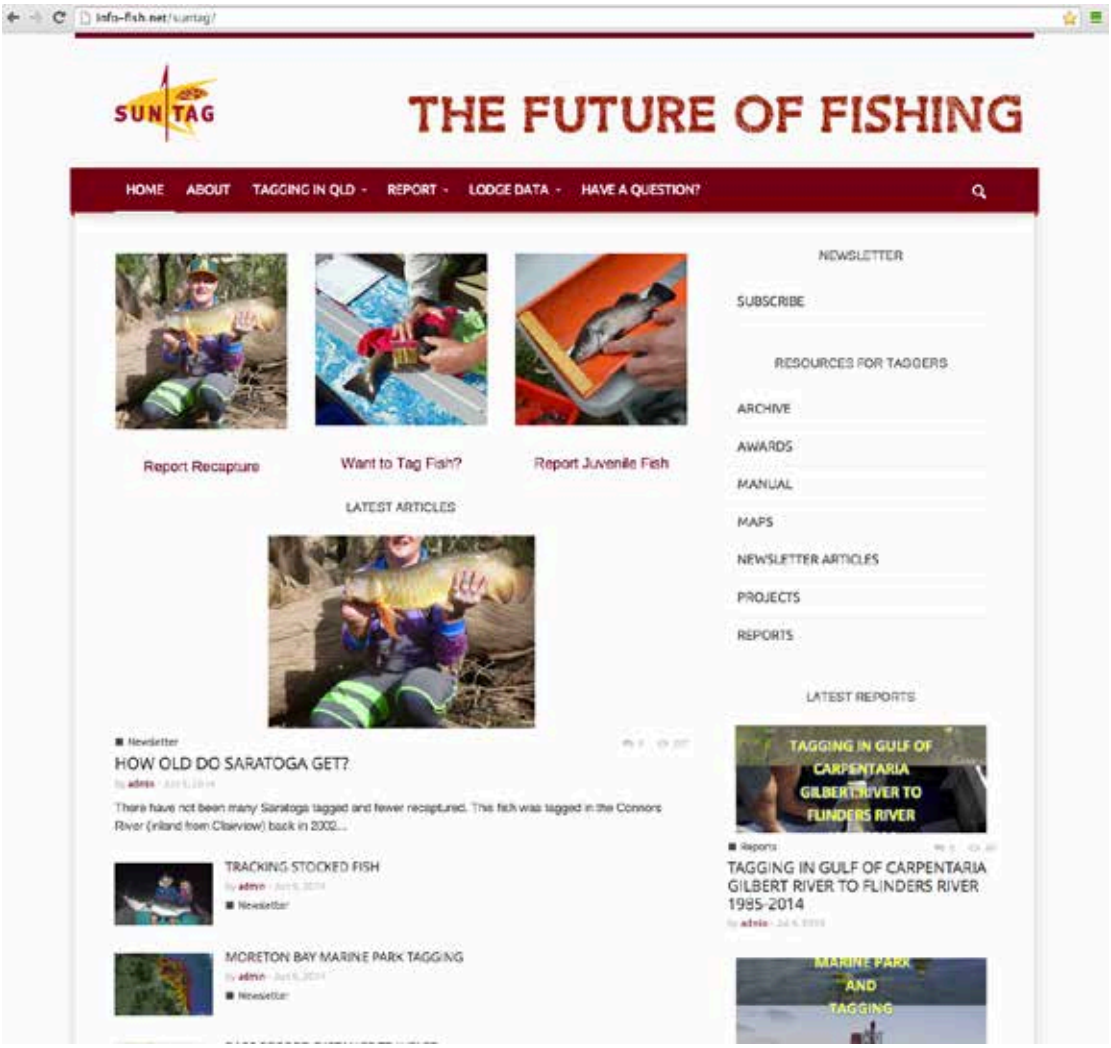


Figure 9: Suntag website homepage

Figure 9 shows the homepage for the Suntag website. The website provides the following on Suntag:

- Resources for taggers (maps, projects, awards, manual)
- Access to taggers own records (read only) through Suntag Online
- Taggers can load trip and tag data for inclusion in database (after validation)
- Taggers can monitor progress towards tagging awards and print certificates
- Improved reporting and feedback on recaptures
- Suntag reports
- Link to Suntag Facebook page
- Upgraded Infofish Shop for buying tagging equipment

Suntag linked to Google Earth

The Infofish database was linked to Google Earth in 2011 to provide improved visualisation of data within the database. Google Earth maps have continued to be developed. Standard maps are now stored in the database and can be regenerated and updated at any time to reflect new data. Google Earth maps can now be generated to display the following:

- Tag and recapture location of recaptured fish
- Tag locations showing extent of tagging using Suntag grid maps
- Extent of fishing effort in an area
- Time sequencing of tag locations showing changes over time
- Flyovers following fish from tag to recapture site
- Photographs, video, graphs and environmental data can be added to the maps
- Combined fishing effort and tagging (*figure 10*)

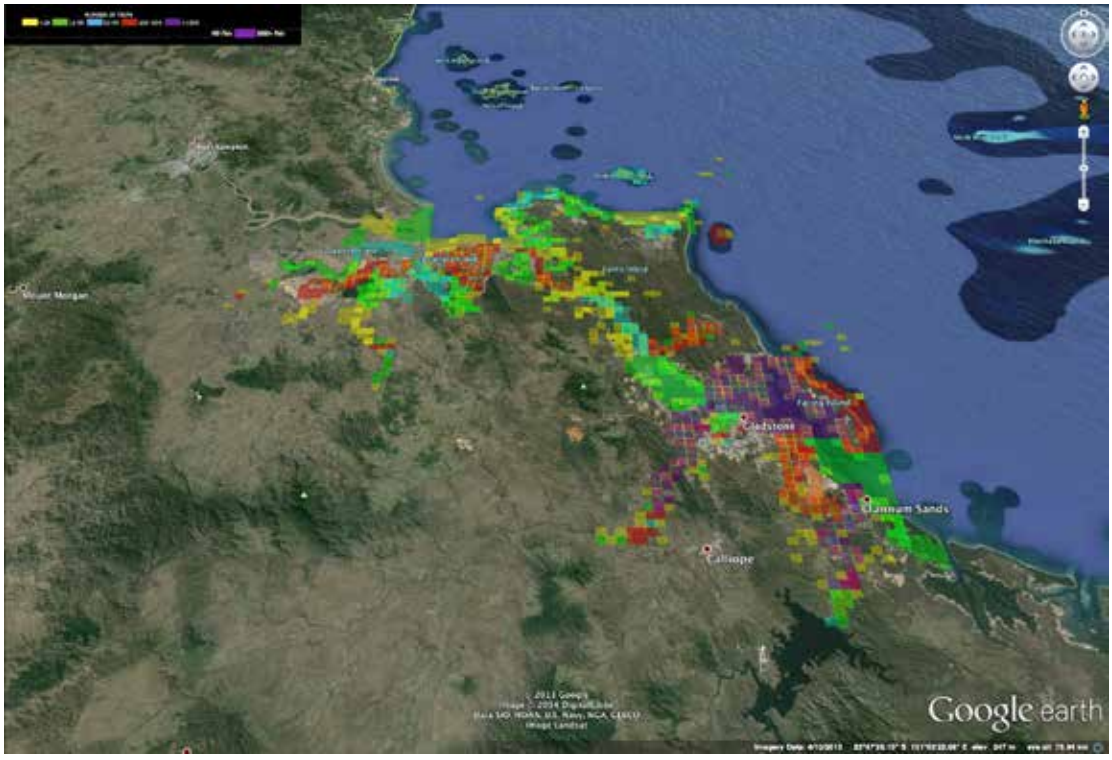


Figure 10: Fishing "intensity" in the Gladstone Ports Corporation area from Gladstone Harbour to Port Alma using a combination of boat ramp and tagging data

Sharing Suntag Information

Facebook has become the prime media for distributing Suntag information on Interesting recaptures or other information about Suntag. Posts are regularly provided through the page at www.facebook.com/Suntag.Queensland as shown in *figure 11*

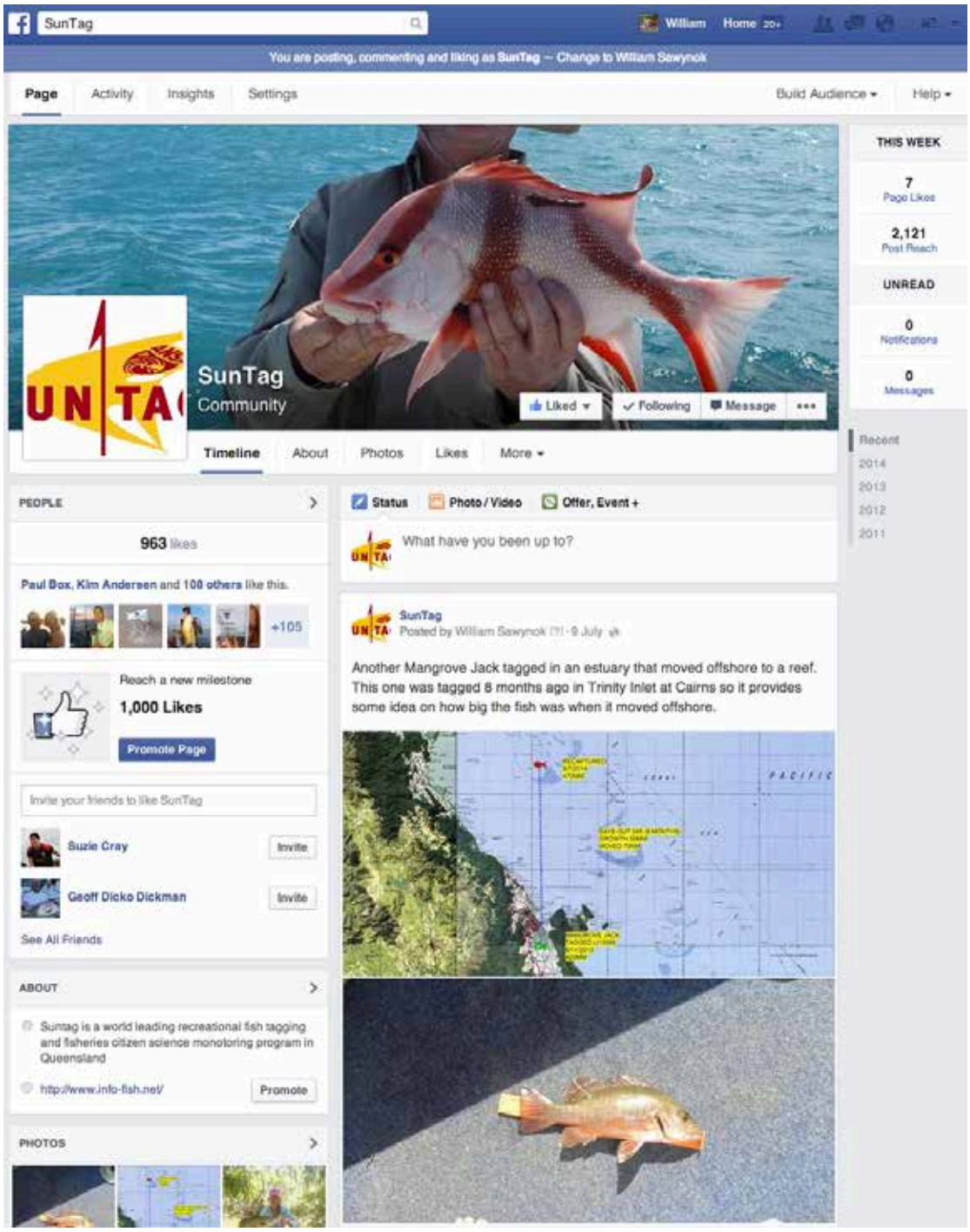


Figure 11: Suntag Queensland Facebook page

Figure 12: Suntag eNews bulletin introduced in 2014

This year, after 200 editions of Suntag News in its original format (one page on interesting recaptures), the bulletin was revamped to Suntag eNews (*figure 12*). The format now promotes stories from the database on species, locations, timescales or all those combined and is supported with links to Suntag mini-reports, Google Earth maps, videos and podcasts accessible through the Suntag website.

This year saw the introduction of Suntag mini-reports. These are short reports that provide information on species, locations, timescales or all of those combined. The reports can also provide an insight into issues of interest such as trends in recreational fishing in Pumicestone Passage in the past 18 years since the passage was closed to commercial fishing (*figure 13*).

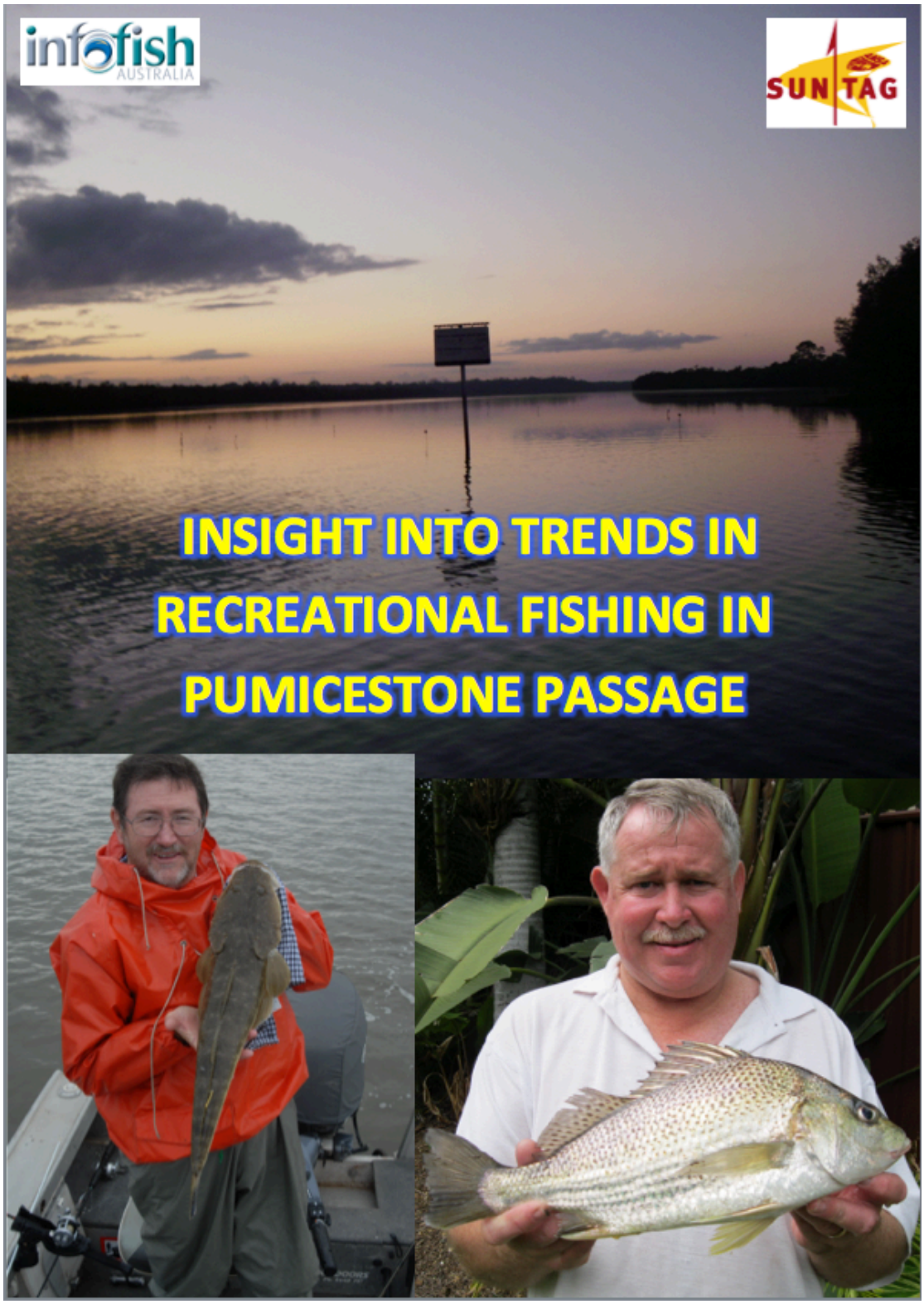


Figure 13: New Suntag Mini-Report introduced in 2014

6. Suntag Training

This year saw the introduction of Suntag Training Online. A 3-step accreditation process allows taggers to gain basic and more advanced accreditation. The process involves:

- A number of available courses on the tagging process requiring tests to be passed
- A Personal Tagging Plan
- Submission of 3 photos of tagged fish (to assess tag application)

All taggers that complete the process successfully become Accredited Suntaggers and are issued with an accreditation card. The training module will be added to for specialised tagging and refined as feedback is received.

Video clips showing tagging are available on YouTube and access is provided through the website and Facebook pages (*figure 14*). These videos are used are used to promote correct tagging procedures. In 2014 a new video on tagging reef fish was added. *Figure 15* shows the homepage of the Suntaggers website www.suntaggers.com where training is accessed.

Figure 14: YouTube video on Introduction to fish tagging

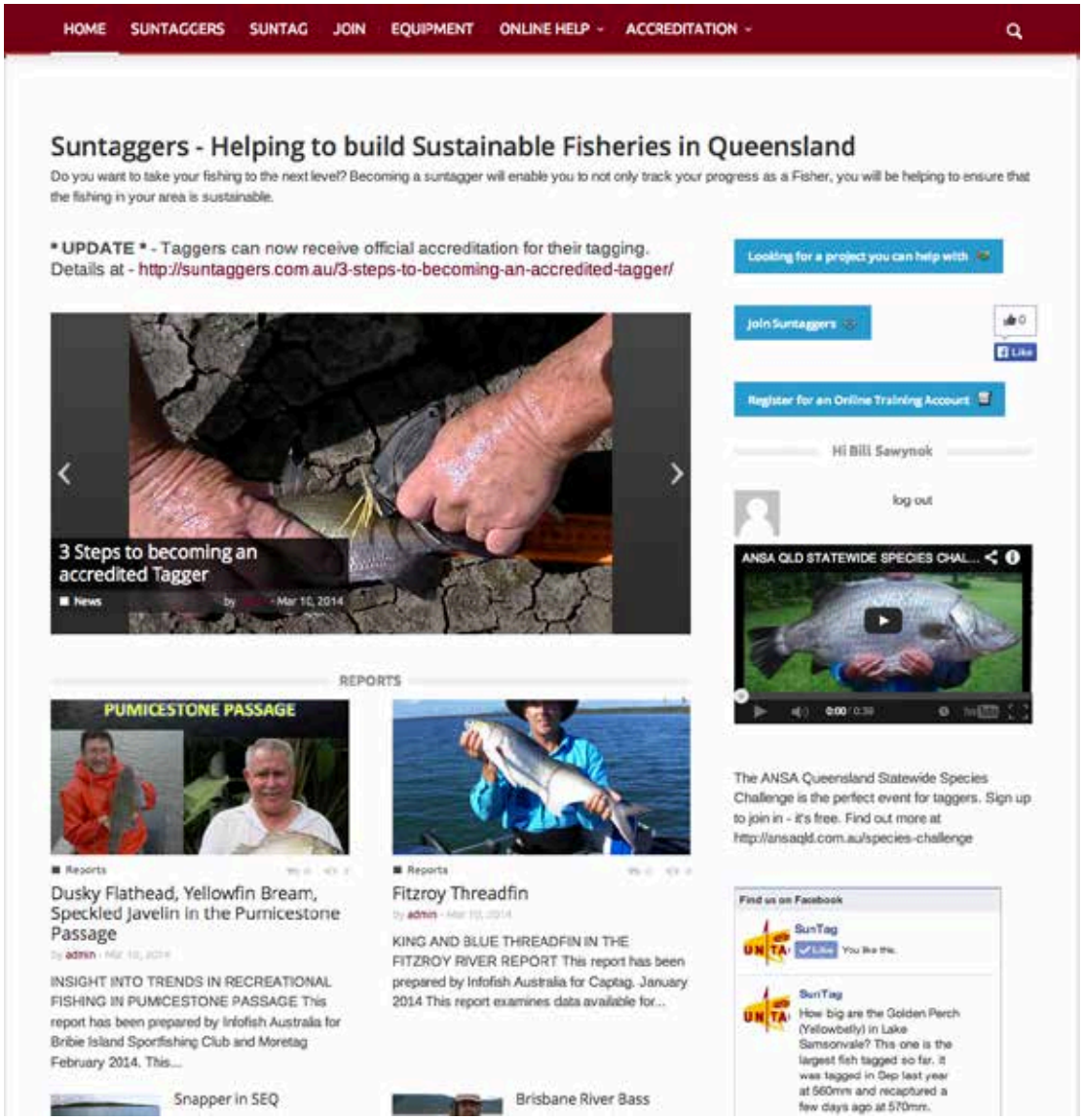


Figure 15: New Suntag Online training module introduced in 2014

7. Tags and Equipment

Tags used in Suntag

Tags used in Suntag are Hallprint tags obtained from Hallprint Pty Ltd of South Australia. The long-standing support of David Hall of Hallprint for Suntag is acknowledged. The two types of tags most commonly used in Suntag programs are the dart or spear tag and the anchor or gun tag (*figure 16*). Both these tags are used in a number of sizes.

The durability of these tags is demonstrated by recaptures of fish up to 20 years after tagging and having the number still able to be read.

Figure 16: Tags and tagging equipment used in Suntag

Suntag Equipment from Infofish Shop

A full range of tagging equipment is available from the Infofish Shop through the Infofish website. All the equipment required to tag is available including starter kits, tag applicators, record books, measuring rulers and other ancillary equipment. The shop includes a secure payment method for online purchases. *Figure 17* shows a part of the Infofish shop.

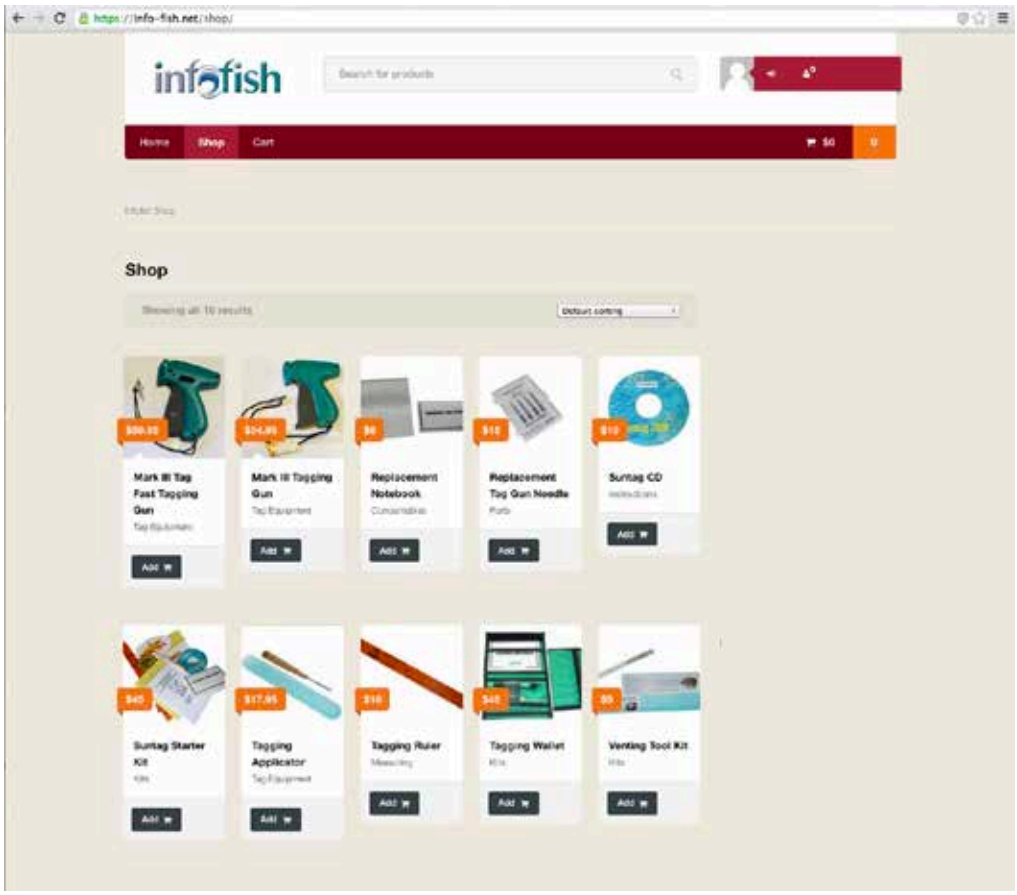


Figure 17: Infofish Shop page showing some of the tagging equipment and products that can be purchased online

8. Suntag in 2013/14

Suntag Highlights 2013/14 [1]

- Total fish and crab records in the database now exceed 1.05 million fish records including 712,900 tagged fish, 281,400 fish from catches and 57,000 recaptures
- 101 Frequent taggers account for 278,000 (39%) of the total number of fish tagged while the remaining 9,300 taggers account for 298,100 (41.8%) of the fish tagged
- Fish stocking groups account for 95,300 (13.4%) of the fish tagged and researchers 41,800 (5.9%)
- Fishing trips with catch and effort details now total 40,150 (3,200 this year)
- A total of over 9,400 taggers (565 this year) have now participated in Suntag and 16,900 fishers (830 this year) have reported the recapture of a tagged fish
- A total of over 1,200 fishers contributed data to Suntag this year through tagging fish, reporting recaptures and catch
- Barramundi is the most tagged species with over 238,200 tagged and 17,500 recaptured (over 20,900 including multiple recaptures)
- The overall recapture rate for fish, excluding crabs was 6.6% with a 6.8% recapture rate for 2010-14
- The release rate of recaptured fish for the past 9 years was over 60% and over 70% from 2007/08 to 2009/11
- Mick Dohnt remains the top tagger overall having tagged a total of 24,780 fish
- Images of almost 1,700 tagged and recaptured fish are now stored in the database
- A total of over 86,500 fish have the location where the hook was lodged in the fish recorded with 10.8% of fish caught on bait being deep hooked (throat or gut) and 2.0% for fish caught on lures
- A total of 8 mini-reports were produced featuring a species, location, timeframe, issues or all of those with over 4,000 downloads from the website
- Suntag eNews was introduced as an online newsletter with 5 editions issued to around 800 subscribers
- Websites for Suntag and Crystal Bowl were revamped to be integrated with Suntag eNews and Suntag mini-reports

Fish in Suntag Database

The Suntag database passed its most significant milestone with over 1 million fish and crab records in the database early this year. There are now 1.05 million records comprised of:

- 712,900 tagged fish and crabs
- 281,400 other fish from catch records
- 57,000 recapture records

As well as tagged fish, other fish from catch records are maintained. Catch records are provided by taggers when they provide details of all fish caught, not just those tagged, as well as fishing effort and from boat ramp surveys associated with various projects. Details are also maintained on all recaptures. Total fish added to the database each year is shown in *figure 18*. The most fish were added to the database in 2007/08 when 108,170 fish were added. In 2013/14 there were 34,365 fish added. The reduced numbers resulted from the loss of funding in 2012/13.

[1] All figures to 30 June 2014 in database as at 31 July 2014

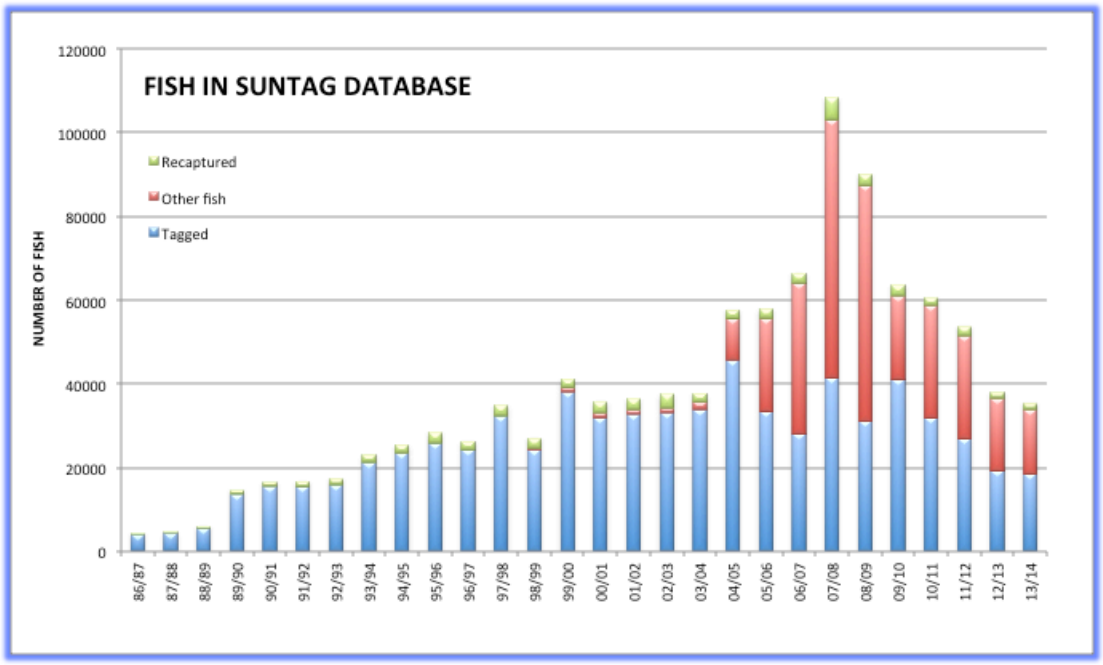


Figure 18: Total fish added to database each year from 1986/87 to 2013/14

Suntag Participation

Numbers participating in Suntag are shown in *figure 19.* A total of over 9,400 taggers have now participated in Suntag having tagged fish since 1986/87. In 2013/14 there were 565 fishers that tagged at least one fish. A total of over 16,900 fishers have participated in Suntag though reporting the recapture of a tagged fish. In 2013/14 there were over 830 fishers that reported the recapture of a tagged fish with many fishers recapturing more than one fish. A total of over 1,200 fishers contributed data to Suntag this year through tagging fish, reporting recaptures and catch.

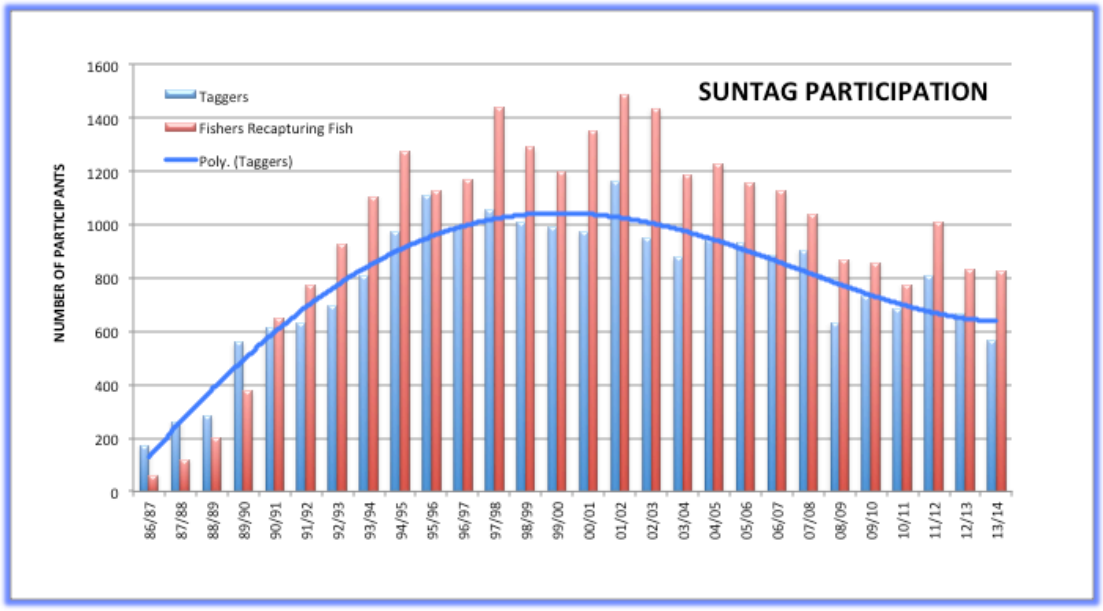


Figure 19: Summary of participation in Suntag from 1986/87 to 2013/14

The steady decline in fishers tagging from 2001/02 to 2008/09 reflects a general decline in participation in recreational fishing from 2000-2010[2]. Numbers participating in Suntag peaked from 1995/96 to 2001/02 when around 1,000 taggers tagged fish each year. This steadily declined to around 600 in 2008/09 and since then has fluctuated from 600-800.

The increased level in participation, from 2008/09-2011/12 is likely to be a result of the significant improvements in Suntag services over those years. The drop in 2012/13 was a result of the disruption caused by the loss of funding.

While participation declined over the 2000 decade the number of fish tagged has remained at similar levels as during the peak participation years. This indicates that the remaining taggers are more active and tagging more fish each year.

Suntag Fish Tagged and Recaptured

Figure 20 shows the number of fish tagged and recaptured each year since 1986/87. In 2013/14 there were 18,400 fish tagged and 1,525 recaptures (including multiple recaptures) recorded. Since 1999/2000 there has been over 25,000 fish tagged in each year except 2012/13 and 2013/14. The drop in numbers tagged is mostly due to the significant reduction in funding for the past 2 years. However numbers for this year will increase as late data are received and the total will likely be close to 20,000.

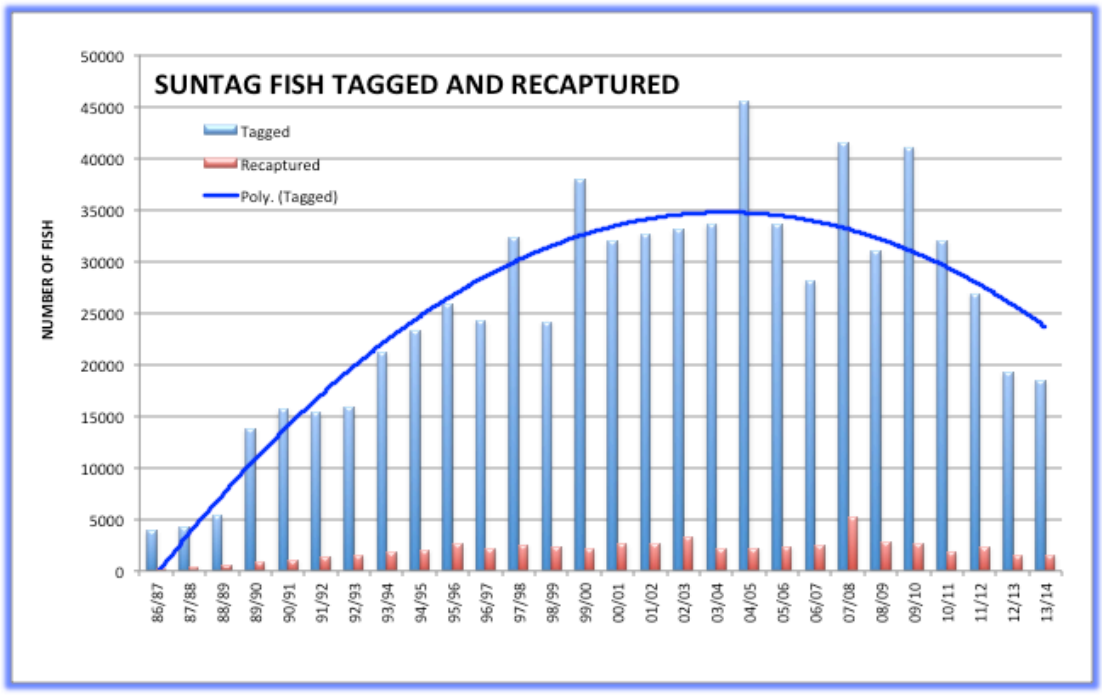


Figure 20: Fish tagged and recaptured each year from 1986/87 to 2013/14

Figure 21 shows the categories of taggers that have tagged fish. These are:

- Frequent taggers (tagged over 1,000 fish)
- Other Suntag taggers (tagged at least 1 fish)
- Stocking groups
- Researchers (DAFFQ and others)

[2] "Statewide Recreational Fishing Survey 2010 Results from Phase 1 - The telephone survey" fact sheet from www.daff.qld.gov.au

Just 101 Frequent Taggers account for 278,000 (39%) of the total number of fish tagged while the remaining 9,300 taggers account for 298,100 (41.8%). Fish stocking groups have tagged 95,300 (13.4%) and researchers 41,800 (5.9%).

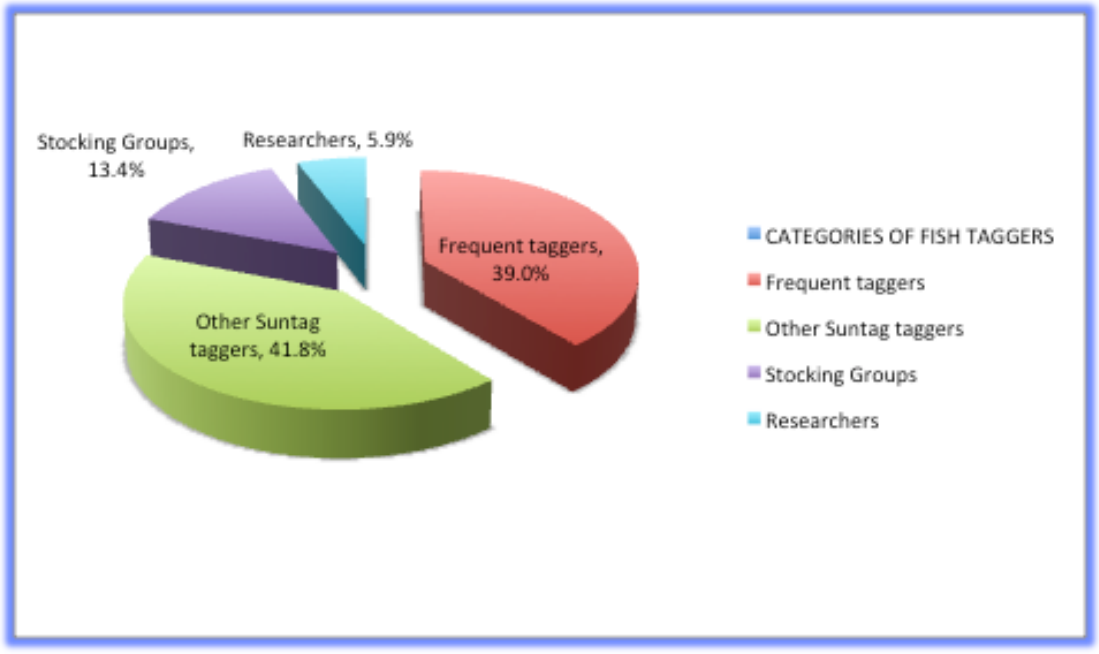


Figure 21: Categories of tagger participation in Suntag based on the total numbers of fish tagged

Suntag Key Species Tagged and Recapture Rates

Barramundi remains the most tagged species and was the first species where over 200,000 fish have been tagged. The total number of Barramundi tagged is now 238,213 with 17,518 recaptures of individual fish and 20,927 total including multiple recaptures. Numbers of Barramundi tagged were significantly boosted from 2004/05-2009/10 when fish stocking groups released large numbers of tagged Barramundi into impoundments and waterways. The overall recapture rate for Barramundi recaptured once is 7.4% however is as high as 17.4% in the Fitzroy River estuary and 20.7% in 12 Mile Creek in Central Queensland.

Australian Bass is the second most tagged species with 65,034 tagged and 4,931 recaptured once and a recapture rate of 7.6%. *Figure 22* shows the number of the top 20 species tagged with the corresponding recapture rate.

While many fish are recaptures several times the recapture rate here is based only on a single recapture of each fish. Species with over 4,000 fish tagged that have recapture rates above the average 6.9% include Dusky Flathead (8.6%), Goldspotted Rockcod (10.0%), Golden Perch (8.3%), Mud Crab (14.4%)[3], Red Emperor (12.3%) and Blackspotted Rockcod (12.2)%.

Species with recapture rates below 5% include Yellowfin Bream (3.9%), Barred Javelin (2.8%), Pikey Bream (4.6%), Speckled Javelin (2.0%), Giant Trevally (3.7%) and School Mackerel at (1.9%).

[3] Recapture rate for Mud Crab is high due to a lot of recaptures being made as part of research projects

Saddletail Snapper has the highest recapture rate at 13.7% of any of the fish species tagged. This result is interesting as the survival rate for released Saddletail Snapper from experimental work is 50% (see section 12) and one of the lowest survival rates for any species assessed. The difference most likely results from fish being tagged in shallow water (less than 20m) where barotrauma is less of an issue.

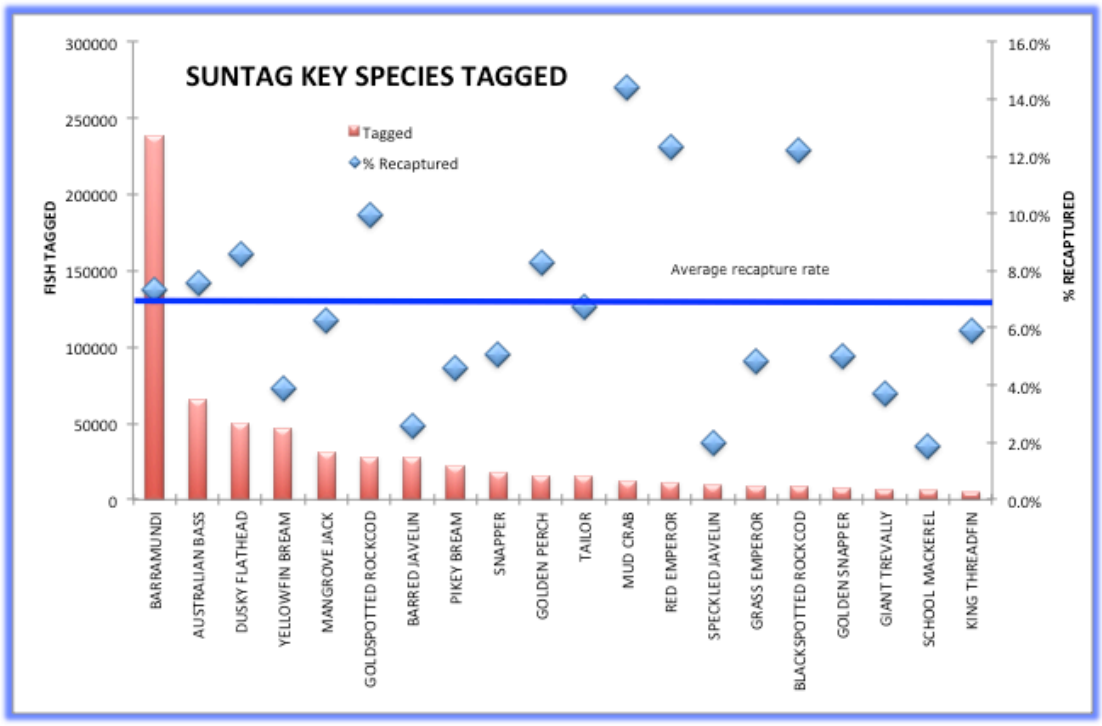


Figure 22: Total numbers of key species tagged and their recapture rate

Suntag Recapture Rate

The Suntag recapture rate has been used for a number of years as a coarse indicator of trends in fishing effort. While there are many factors that influence the recapture rate most of these are near constant from year to year or small in their effect on the recapture rate. The greatest variable is fishing effort and this can be demonstrated by comparing the recapture rate from heavily fished and remote lightly fished locations eg Barramundi recapture rate in Fitzroy River is 17.4% from 35,057 fish tagged and for Weipa is 1.7% from 35,897 fish tagged.

The recapture rate was simply calculated as the ratio of the total number of fish recaptured (once) over time compared with the total number tagged over that same time. Some data that were not typical of fishing effort were excluded.[4] The overall long-term recapture rate for all fish, excluding crabs, at the end of 2013/14 was 6.6%. The recapture rate for 2010-14 is 6.8% and is slightly above the long-term average.

Figure 23 shows the overall and 5 year recapture rates from 1985/90 to 2010/15 for all fish. This suggests that fishing effort peaked from 1990/95, fell significantly from 1995/2000 and

[4] Data from fish tagged in no fishing zones (green zones) in Keppel Bay in 2007/08 and 2011/12, Mud Crab and Northern Territory (McArthur River) tagging were not reflective of normal fishing effort and were excluded

has remained steady since then. The data for 2010/15 is still in progress and only represents 2010/14.

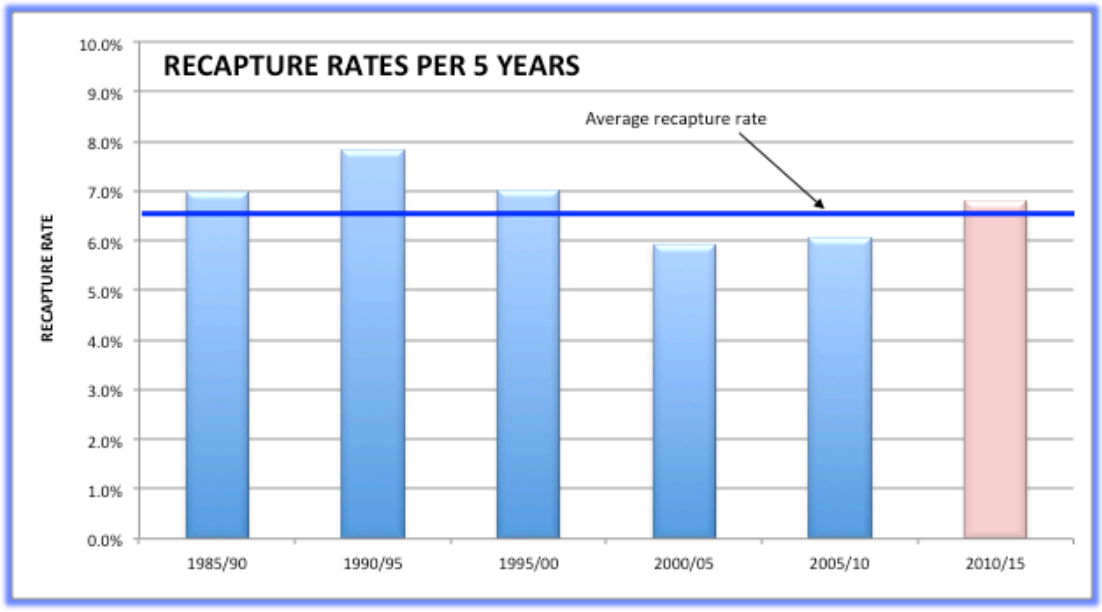


Figure 23: Recapture rate from 1985-2015 per each 5 year period

Figure 24 shows the number of participants and participation rates in recreational fishing as a percentage of the Queensland population from 1996-2010.[5] This shows a drop in participation from the mid 1990s to 2010. The trend in participation is also reflected in a reduction of fishing effort over the same time. A further survey was conducted in 2013 however the results are not yet available.

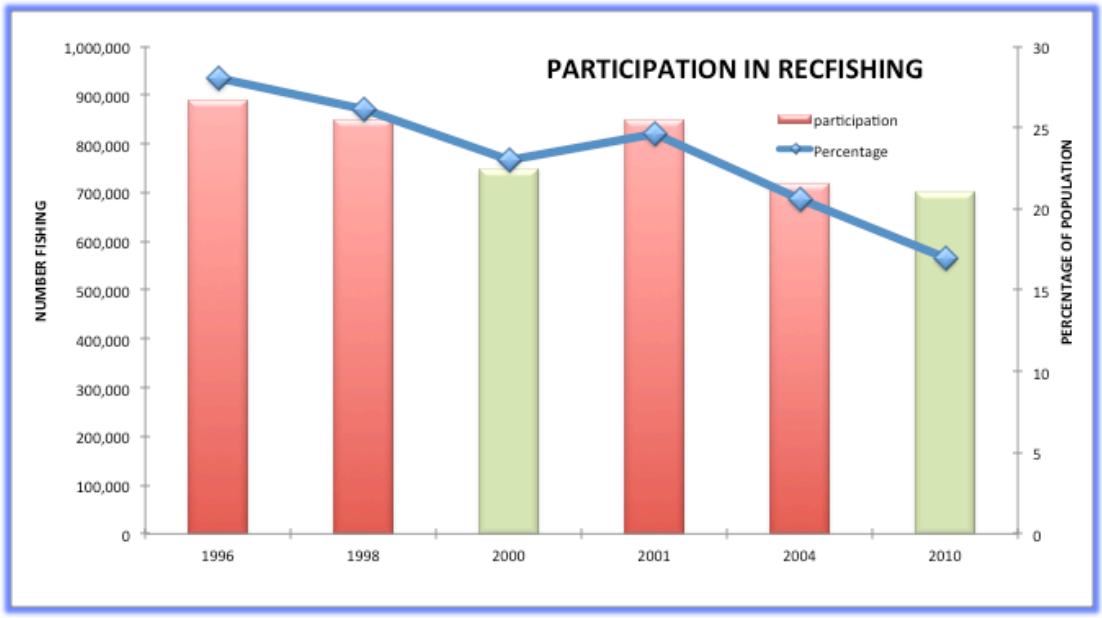


Figure 24: Participation rates in recreational fishing in Queensland from 1996-2010 - RFish surveys 1996-2004 and Statewide surveys 2000 and 2010

[5] Participation rates from DAFFQ RFish surveys 1996 to 2004 and Statewide Recreational Fishing Surveys 2000 and 2010

Suntag Released Fish Rate

The rate that recaptured tagged fish are released each year allows the trend in the numbers of fish released to be monitored over time. The released fish rate has been calculated by comparing the number of recaptured tagged fish that are released to the total number of recaptures each year for ANSAQ members and recreational fishers (non ANSAQ members), however the analysis does not take into account whether the fish was of legal size or not.

Figure 25 shows the release rates for ANSA members and recreational fishers. There is a clear trend among recreational fishers towards releasing more fish with the release rate for the past 9 years since 2004/05 at near or over 50%. ANSAQ members have had a consistently high release rate of tagged fish of over 90% almost every year since 1991/92. For the last 10 years since 2003/04 the overall release rate has been over 60%.

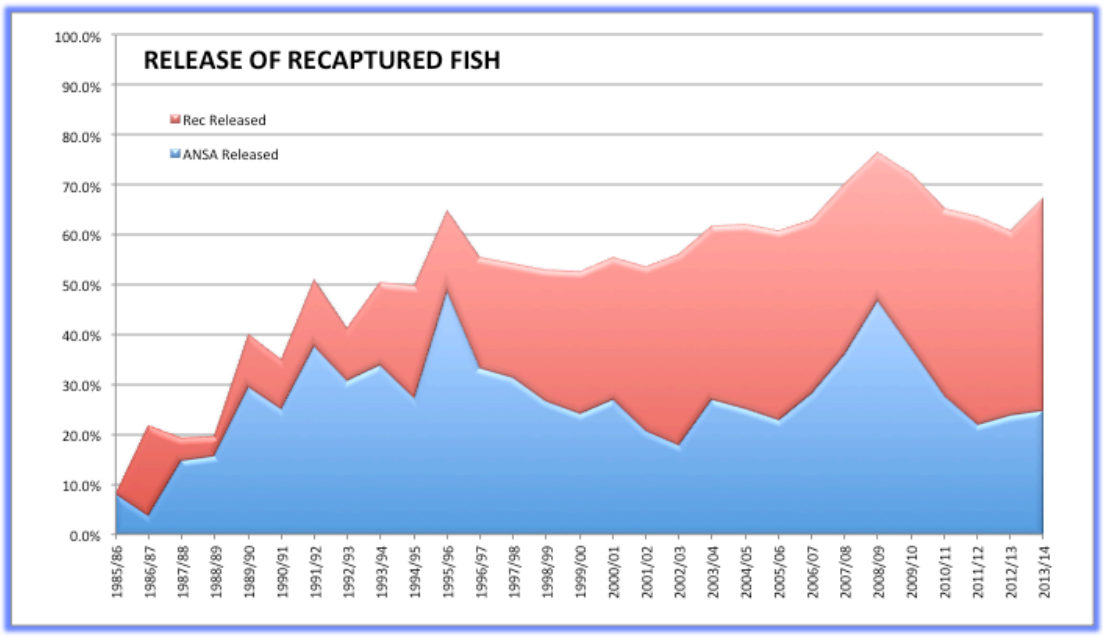


Figure 25: Percentage of recaptured tagged fish released by recreational fishers and ANSA members each year compared to total recaptures for each group

Reporting recaptures

The methods for reporting recaptures have changed significantly since Suntag started. *Figure 26* shows the different methods of reporting recaptures from 1985-2014 and the periods 1995-2000 (5 years) and 2010-2014 (4 years). A toll free phone for reporting recaptures has been in place for 27 years and remains the most common method used to report recaptures and 47.5% of all recaptures (47.5% in 2010-2014) have been reported by that method.

However, reporting by other methods has changed significantly. Reporting through trips sheets (paper records submitted by taggers), DAFFQ, mail, fax and tackle stores have fallen significantly with the shift to electronic lodging. From 1995-2000 these accounted for 42.1% of reported recaptures and have fallen to 6.8% from 2010-2014. Reporting through etrip forms (electronic trip sheets submitted by taggers), email and the website have increased significantly. From 1995-2000 these accounted for 5.6% of reported recaptures and rose to

40.7% from 2010-2014. There is no reference to the website on the tags yet from 2010-2014 9.2% of recaptures were reported through the website.

Reporting by commercial fishers (and processors) has also increased with the shift from reporting through logbooks to direct reporting through the 1800 number. This is more convenient for commercial fishers as it does not involve any paperwork and instant feedback on the fish is provided. Reporting by commercial fishers has risen from 0.6% in 1995-2000 to 5.1% in 2010-2014.

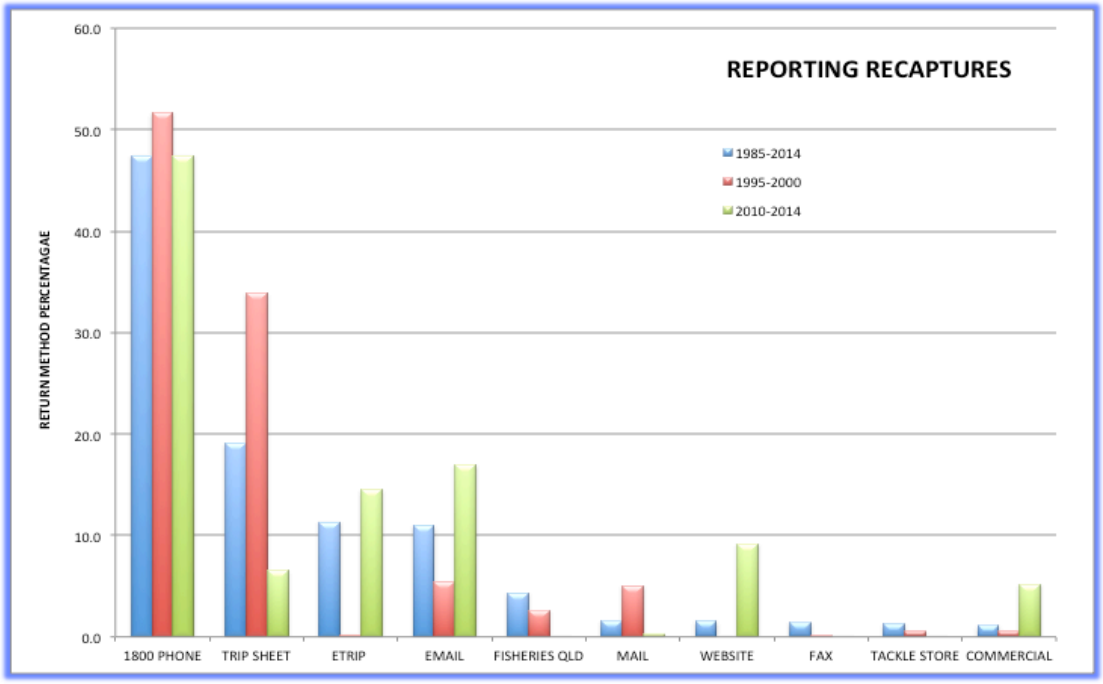


Figure 26: Methods of reporting recaptures from 1985 using a 5 year time span

Suntag Tagging Awards

Suntag provides a number of awards to recognise the efforts of it top taggers.[6] These awards are important in providing recognition for the contribution of individuals. The awards are:

- Tagging Excellence Award (tag a minimum number of fish for 2,000 points)
- Tagging Achievement Award (tag a minimum number of fish for 200 points)
- Frequent Tagger Award (tag a minimum of 1,000 fish)
- Phil Books Award (tag the most fish in any fishing year)

Suntag awards were simplified in 2011/12 with the number of fish tagged to achieve the Tagging Achievement Award being 25, 50, 75 and 100 depending on the species.

The process for awards was significantly improved last year. Awards are now automatically tracked in the database. When recipients reach the number of fish required to be tagged an email notification is provided to the recipient and a certificate send by email or smail. For

[6] Details of all Suntag awards and recipients are available from Suntag Online or from Infofish website www.info-fish.net

taggers that are registered for Suntag Online they can now print their own certificates or replacements for certificates that have been lost or damaged (*figure 27*).

Taggers can check on their status in relation to awards when they are registered for Suntag Online. A number of new awards will be introduced in 2014/15 to further challenge and recognise tagging achievements.

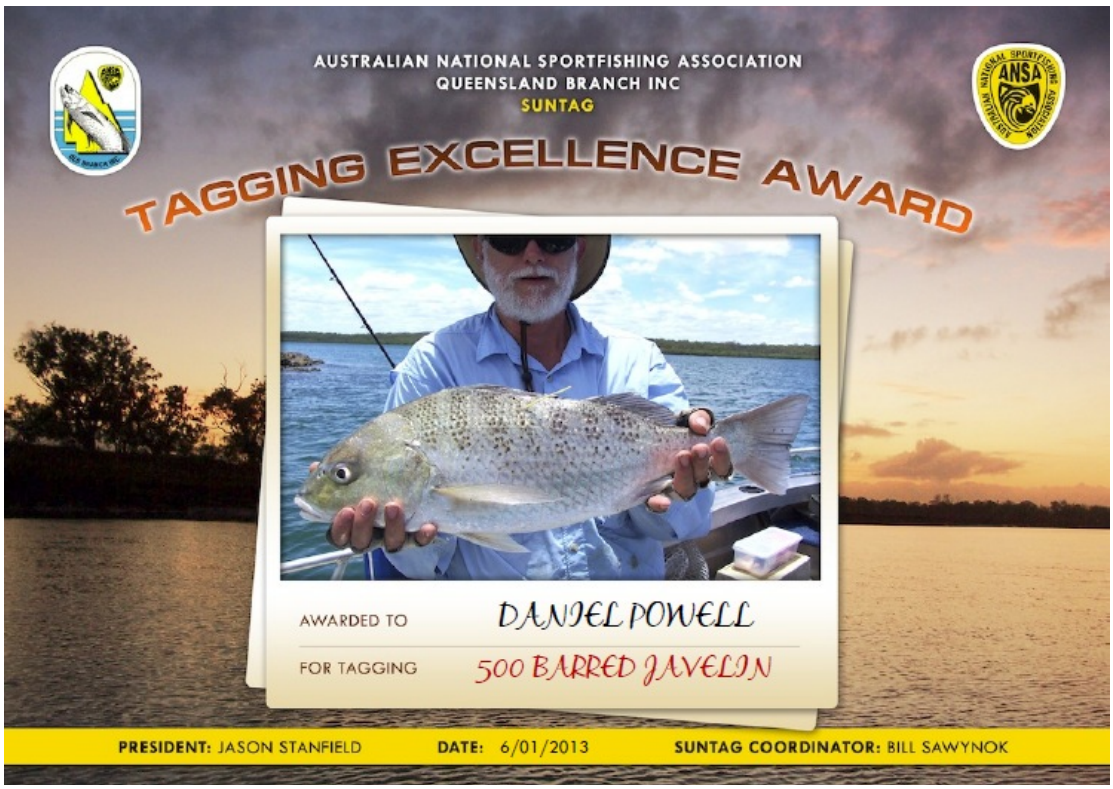


Figure 27: Tagging Excellence Award Certificate introduced in 2012/13

A total of 32 taggers qualified for Tagging Achievement Awards (TAA) during 2013/14. There have now been 1,539 TAAs achieved by taggers.

There were 2 Tagging Excellence Award (TEA) awarded in 2013/14. One was awarded to Helen Johnston for tagging 612 (required 500) Barred Javelin and the other to Patrick Murphy fro tagging 776 (required 750) Australian Bass. There have now been 101 TEAs achieved by taggers.

To date 101 taggers have reached the Frequent Tagger milestone of 1,000 fish tagged. Frequent taggers have collectively tagged 278,000 fish in total and that is around 39% of all fish tagged. This year there were 3 taggers joining this group being Ryan Paterson (1,055) from Gladstone Sportfishing Club, Warren Kidd (1,023) of Ipswich United Sportfishing Club and Nathan Robson (1,019) of Gladstone Sportfishing Club.

The Phil Brooks Memorial Award is in memory of Phil Brooks who was an avid supporter of Suntag. Each year this award is presented to the person that tags the most fish. No award was made in 2012/13 due to the loss of funding early in the year that caused problems in providing tags to taggers on an equitable basis. In 2013/14 Barry Oxford tagged the most fish with 785.

Mick Dohnt (*figure 28*) remains the top individual tagger overall having added 484 fish to his tally that is now 24,786 fish tagged. In 2008/09 Tony Stewart became the second tagger to have tagged over 10,000 fish having now tagged 10,613 fish. In third place on the list is Daniel Powell having tagged 9,184 fish.

Figure 28: Mick Dohnt (front left) is the top overall Suntag tagger

Suntag Data Requests, Reports and Scientific Publications

With the volume of data that is now in the Suntag database there are many significant datasets that are associated with specific projects. Every year there are requests for data from Suntag to be used in technical reports and scientific publications as well as reports associated with community monitoring projects. Many of those reports are produced in conjunction with other programs such as Crystal Bowl (*see section 12*), reports on monitoring of stocked fish (*see section 16*) and reports on fishing competitions (*see section 17*). This year there were a further 3 technical reports that were published that used Suntag data.

In 2013/14 there were 25 requests for subsets of data from the database ranging from tag and recapture data for Hinchinbrook, Bowling Green Bay and Fitzroy-Gladstone for a habitat assessment project, data for proposed Fish Habitat Areas in Central Queensland and King Threadfin tagging and recapture data for NT Fisheries. These data were used in a number of different ways and may end up in further technical reports.

9. Suntag Mini-Reports

Since the introduction of Suntag mini-reports in late 2013 there have been 8 reports[7] produced. These reports focus on a particular species, location, timeframe, issue or all of those. The reports have proven to be very popular with a total of over 4,000 downloads since they became available including over 1,000 downloads of the Pumicestone Passage report.

The reports are:

- Monitoring Australian Bass in Brisbane River 1990-2013
- Monitoring Snapper in South East Queensland
- King and Blue Threadfin in the Fitzroy River
- Insights into Trends in Recreational Fishing in Pumicestone Passage (*figure 13*)
- Barred and Speckled Javelin in Burnett River (*figure 29*)
- Tagging Stocked Fish in the Cairns area 2002-2013
- Tagging at Mary river and Tinana Creek Barrages 1989-2013
- Moreton Bay Marine Park and Tagging (*figure 29*)

Figure 29: Suntag mini-reports on Moreton Bay Marine Park and Javelin in the Burnett River

[7] Suntag mini-reports are available from the Suntag website www.suntag.org.au

10. Visualising Suntag through Google Earth

With the volume of data held in the Suntag database it was decided in 2010/11 to start the development of tools that would allow the visualisation of data using Google Earth. While that continues there are a number of map types that are in regular use. There are now 6 map types in regular use. Google Earth maps are produced in conjunction with mini-reports to allow the data to be viewed interactively and maps are available from the Suntag website along with the mini-reports.

Figures 30 shows numbers of fish tagged at each location in the Moreton Bay Marine Park before and after the park was established in 2009. This was used to assess the impact of no fishing green zones on tagging.

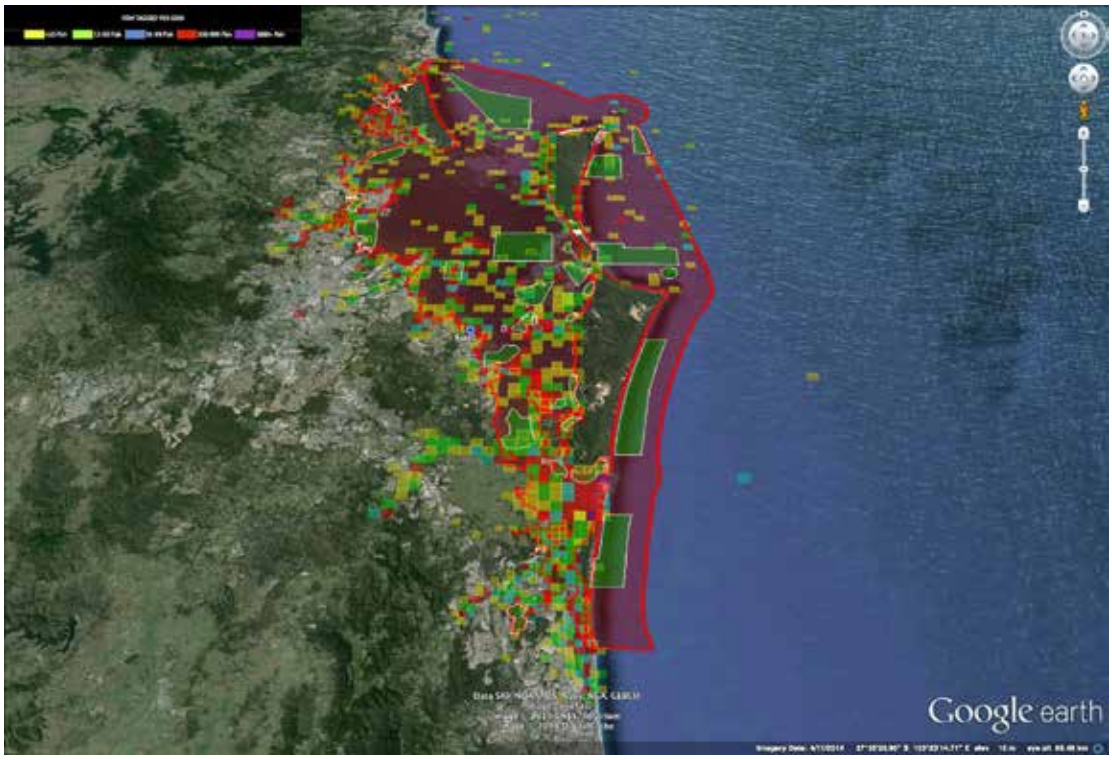


Figure 30: Where fish were tagged in Moreton Bay before and after the introduction of the Moreton Bay Marine Park in 2009

11. Westag in 2013/14

Westag Highlights for 2013/14

Westag tagging and fishing trip highlights[8] for the year were:

- A total of over 960 taggers have now participated in Westag and 760 fishers have reported the recapture of a tagged fish
- Total tagged fish in the database is now over 36,600 and over 1,320 recaptures
- Key species tagged with recapture rates were Samsonfish 10,060 (2.5%), Barramundi 4,080 (3.4%), Mangrove Jack 3,950 (3.1%), West Australian Dhufish 2,000 (9.5%) and Sailfish 1,880 (0.1%).

Westag Participation

A total of 974 taggers have participated in Westag having tagged fish since 1988/89. In 2013/14 there were 41 participants that tagged at least one fish. There have also been 787 fishers that have reported a recapture of a tagged fish.

Numbers participating in Westag peaked from 2004/05 to 2005/06 where over 100 taggers tagged fish each year. There were also over 150 taggers in 2010/11. Participation in Westag is shown in *figure 31.*

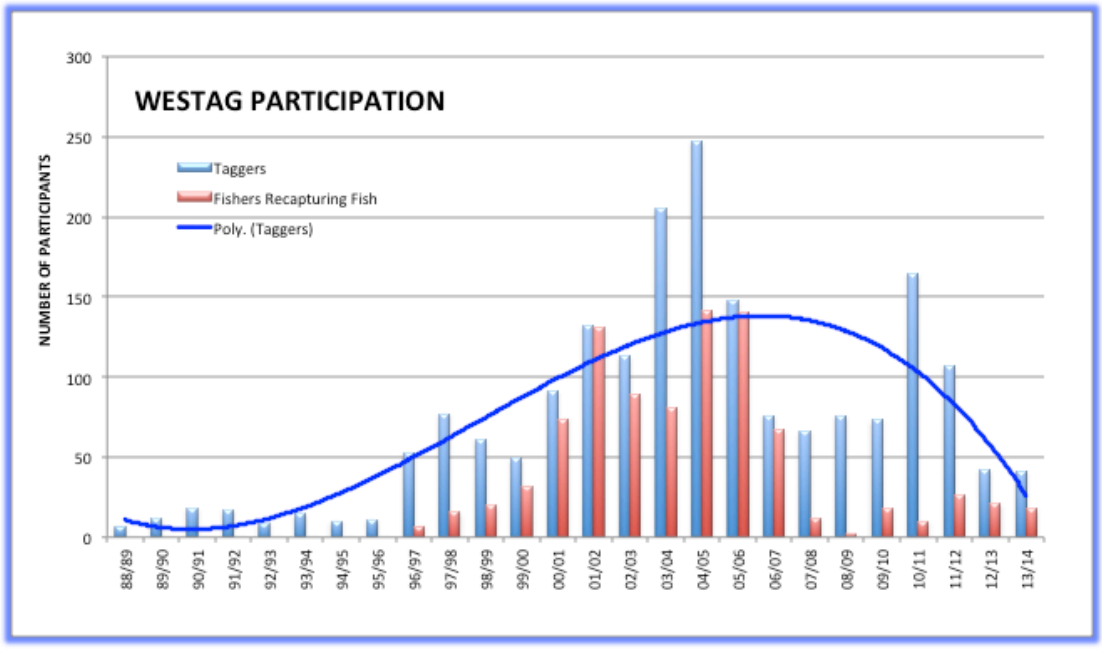


Figure 31: Summary of participation in Westag from 1988/89 to 2013/14

[8] All figures to 30 June 2014 in database as at 31 July 2014

Westag Fish Tagged and Recaptured

The Westag database now has over 36,600 tagged fish records. There have been over 1,320 recaptures over the same period. The overall recapture rate is 3.6%. *Figure 32* shows the number of fish tagged and recaptured each year since 1988/89. In 2013/14 there were 561 fish tagged and 21 recaptures recorded. From 2000/01 to 2009/10 there were over 1,000 fish tagged each year with a peak of 6,415 in 2004/05.

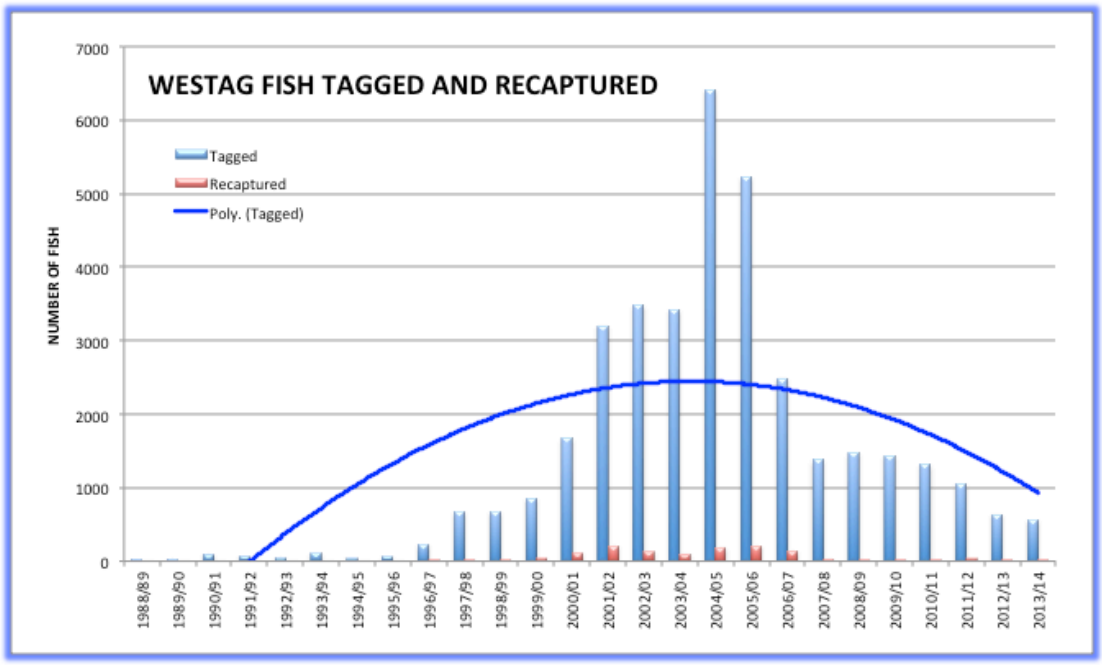


Figure 32: Westag fish tagged and recaptured each year from 1988/89 to 2013/14

Westag Key Species Tagged and Recapture Rates

Key species tagged and their recapture rates are Samsonfish 10,064 (2.5%), Mangrove Jack 4,579 (3.1%), Barramundi 4,082 (3.4%), West Australian Dhufish 2,033 (10.1%) and Sailfish 1,884 (0.1%).

While many fish are recaptures several times the recapture rates here are based only on a single recapture of each fish. Species with a recapture rate of over 5% were Mulloway with the highest recapture rate (18.9%) followed by West Australian Dhufish (10.1%), Pink Snapper (7.2%) and then Black Bream (5.5%).

Species with a low recapture rate of less than 1% were Black Marlin (0%), Sailfish (0.1%), Spangled Emperor (0.4%) and Coral Trout (0.8%).

Figure 33 shows the key species where over 500 fish have been tagged and their recapture rate.

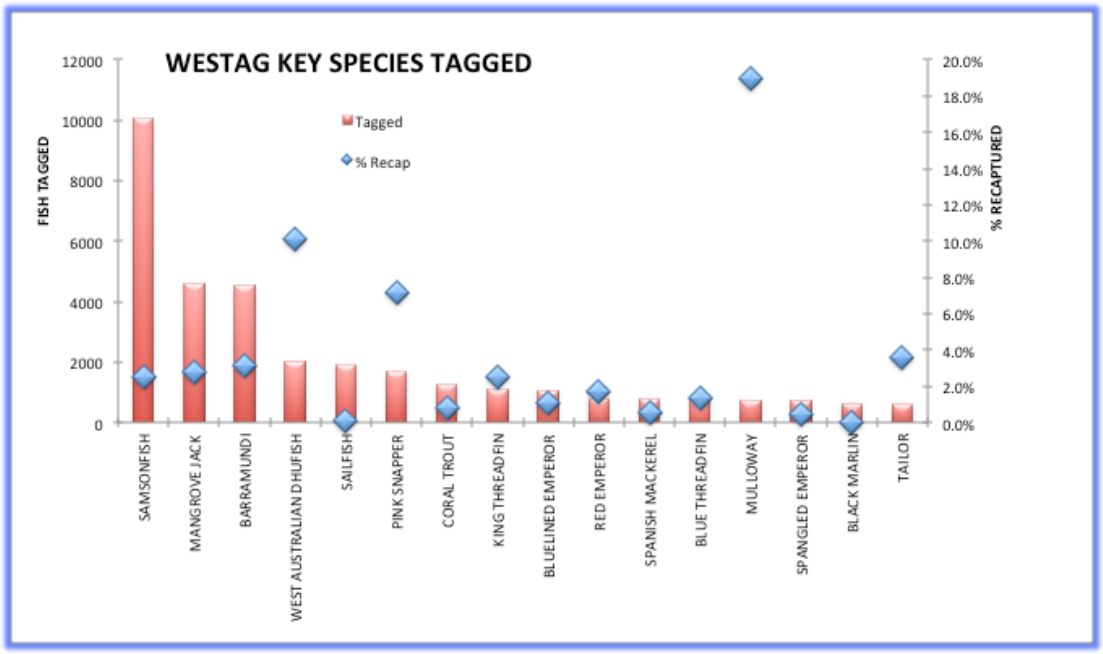


Figure 33: Westag key species tagged and recapture rates

Samsonfish

The Samson Science project from the mid 2000s resulted in over 10,000 fish tagged. Recaptures of these fish are continuing with a further 4 recaptures reported since Apr 2013. (all reported in 2013/14).

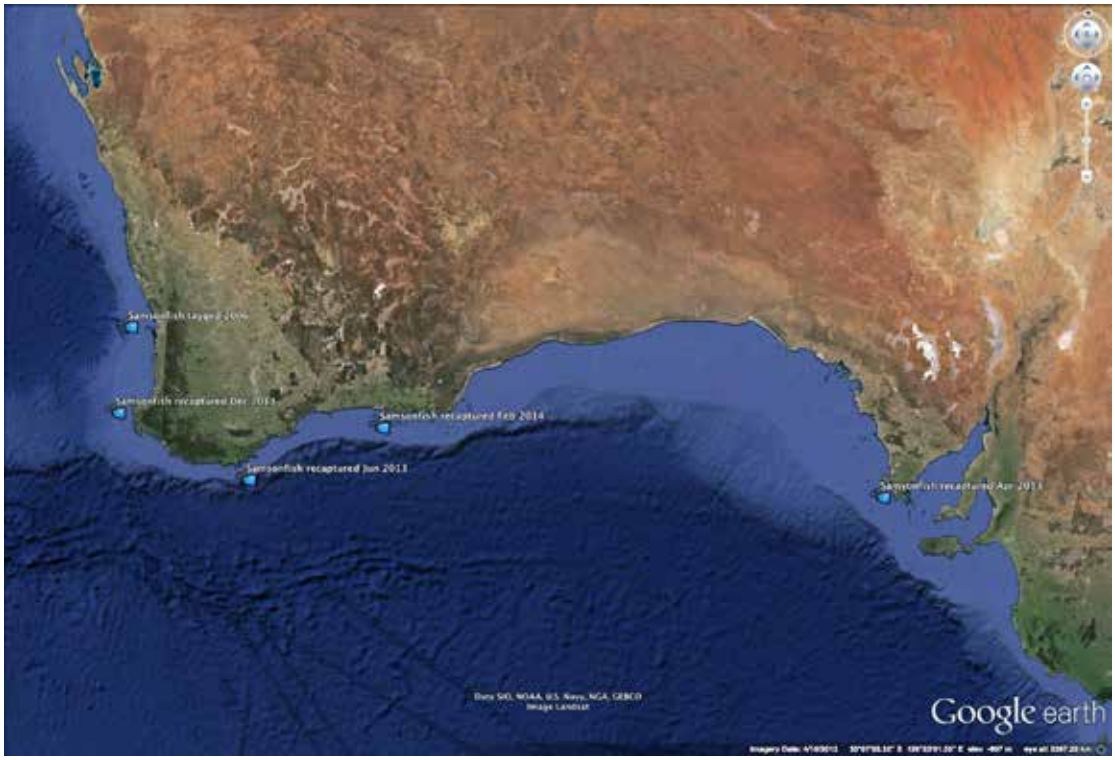


Figure 34: West Australian Dhufish tagged and percentage recaptured based on depth at tagging

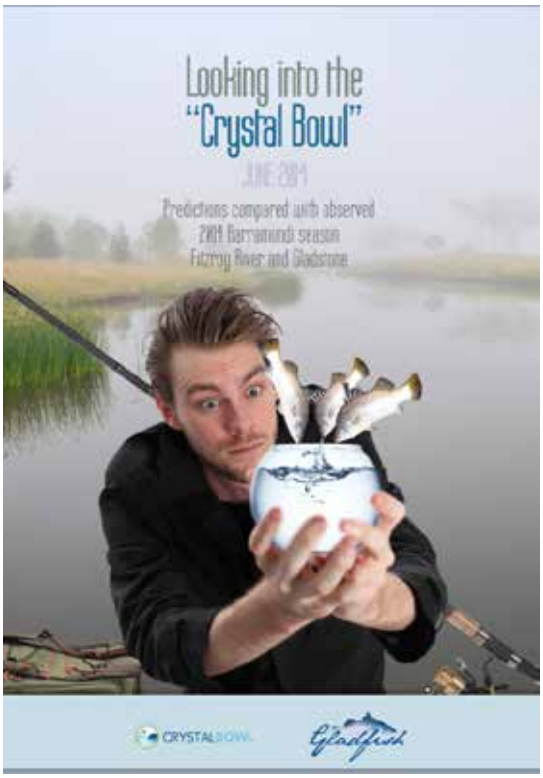
All 4 Samsonfish were tagged off Rottnest Island during 2006 (tag details for one fish were missing) and were recaptured to the south at Dunsborough (220km), south then east at Albany (650km) and Esperance (950km) and as far away as South Australia (2,160km). This supports a migration of these fish between Western and South Australia (*figure 34*).

During the Samson Science project a release technique of spearing the fish back into the water (*figure 35*) was developed to improve survival on release.

Figure 35: Spearing Samsonfish back into the water was considered to improve survival

12. Crystal Bowl - Predicting Barramundi Stocks

The 'Crystal Bowl' concept is evolving. It started out predicting Barramundi stocks in the Fitzroy River in 2011 and was extended to the Gladstone area in 2013.



Predictions for Barramundi are made towards the end of a season (Oct-Nov) for the coming season (Feb-Oct). Predictions are made for expected size ranges, catch rates, stock levels and recruitment.

Data used in assessing the predictions are:

- Size of fish from recreational catch
- Commercial catch
- Tag and recapture data
- Recruitment surveys
- River flows and rainfall
- BOM long range wet season forecast
- Stocked fish records

During the season data are collected that can provide a comparison between predicted and observed (*figure 36*). Two comparisons are made. The first review is mid-year at the end of the recruitment season (Jan-May) and the other at the end of the fishing season (Oct-Nov).[9]

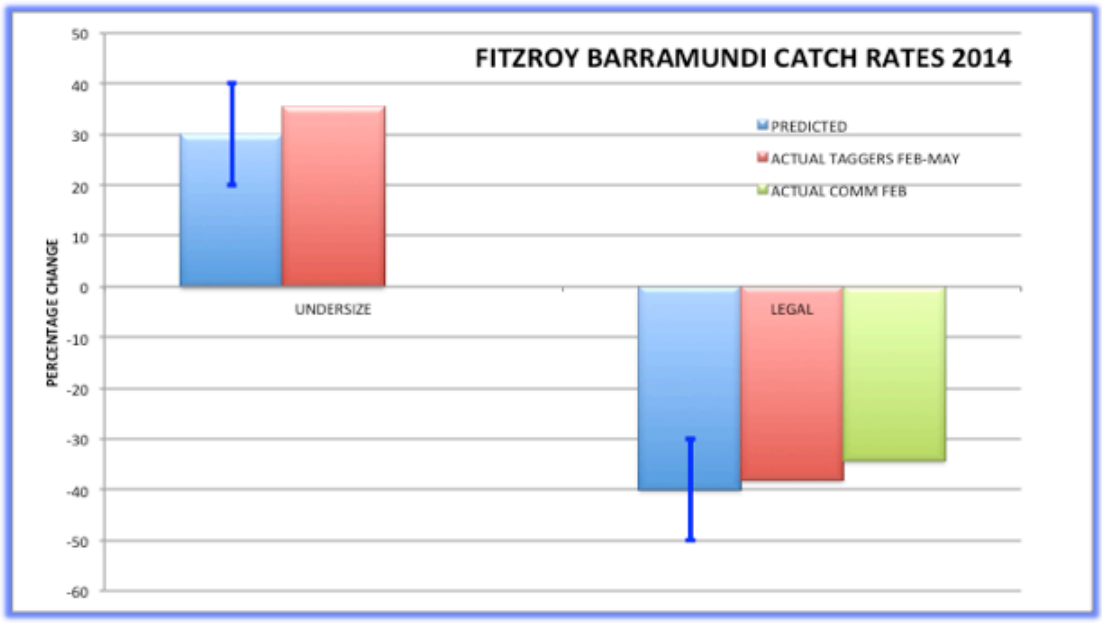


Figure 36: Predicted Barramundi catch rates in the Fitzroy River for 2014 compared with observed catch rates Feb-May 2014

[9] Report available from www.crystal-bowl.com.au

Barramundi recruitment[10] in 2014 was assessed in the Fitzroy River and Gladstone from Jan-May 2014. Results indicate moderate recruitment in the Fitzroy River and moderate recruitment in Gladstone as shown in *figure 37*. 12 Mile Creek at Marmor is used as the benchmark site for recruitment with *figure 38* showing use of that creek by Barramundi from 2000-2014.

Figure 37: Barramundi recruitment from 2011-2014 in the Fitzroy River and the Gladstone area

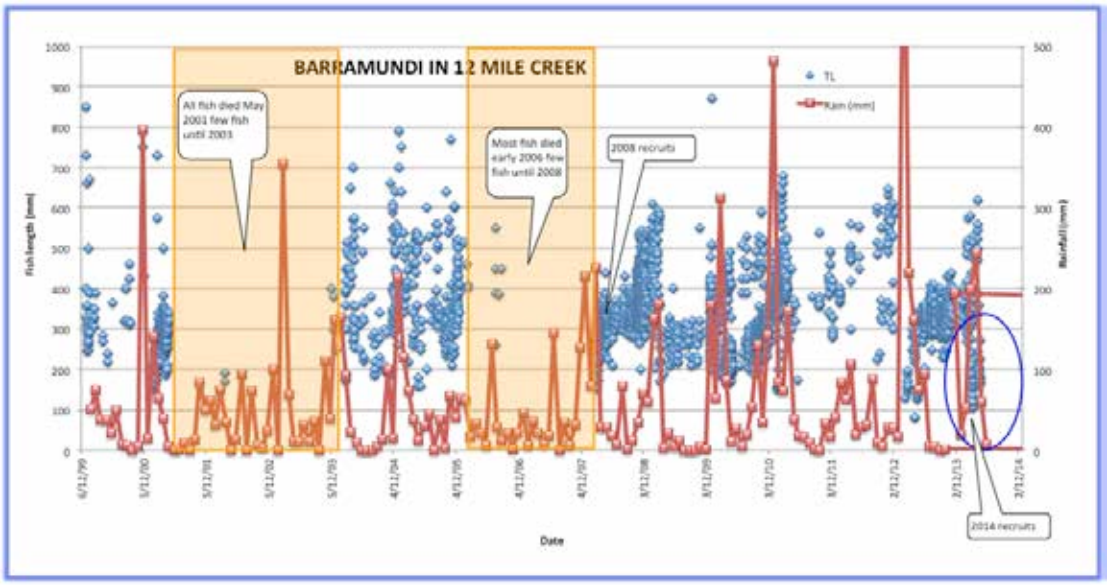


Figure 38: Barramundi in 12 Mile Creek 2000-2014

[10] Recruits here refer to fish in the first year after being spawned that range in size from 50-350mm from Jan-May each year

13. Community Monitoring - Gladfish

This project was established in 2011 and was extended through to 2015. The project is being funded by QGC as part of its Social Investment Management Plan and is collecting information on trends in recreational fishing in Gladstone Harbour and adjacent waterways.

The second report on this project titled "Gladfish 2013: Assessing trends in Recreational Fishing in Gladstone Harbour and Adjacent Waterways" is available covering the second year of the project.[11]

The spilling of over 20,000[12] large Barramundi from 2011 with further spills in 2012 and 2013 produced a huge change in fishing. The focus in fishing shifted from Gladstone Harbour where fish health issues dominated in 2011/12 to the Boyne and Calliope Rivers where many of the Awoonga fish ended up.

Figure 39 shows Barramundi recorded in the Boyne River from 1990-2014 with the influx of fish from Awoonga in 2011. There were 2 size ranges of fish from 400-600mm and 800-1200mm. Fish in the Boyne now are predominantly 400-800mm from the spills in 2012/13 with fewer larger fish.

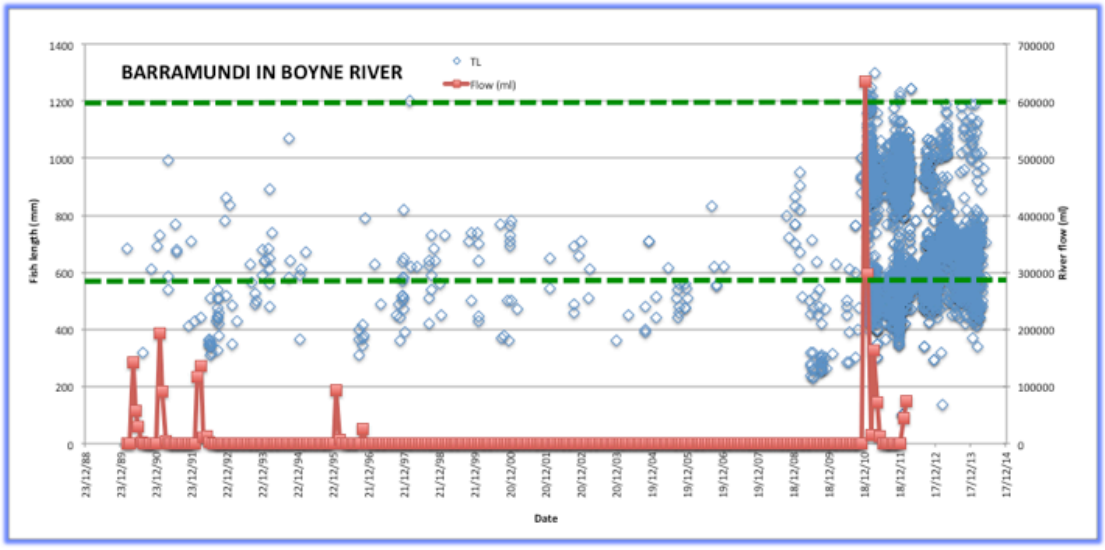
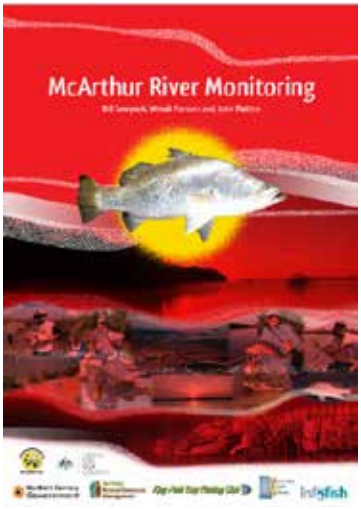


Figure 39: Barramundi in Boyne River from 1990-2014 showing influx of fish from Lake Awoonga

[11] Report available from www.info-fish.net/gladfish
[12] From Gladstone Area Water Board website www.gawb.qld.gov.au

14. Community Monitoring - McArthur River

This project to monitor Barramundi in the McArthur River in the Gulf of Carpentaria ran from 2009-2012. The project involved collecting catch and effort, tagging and recruitment data on Barramundi. While the project has been completed tagging has continued at a low level and recaptures continue.

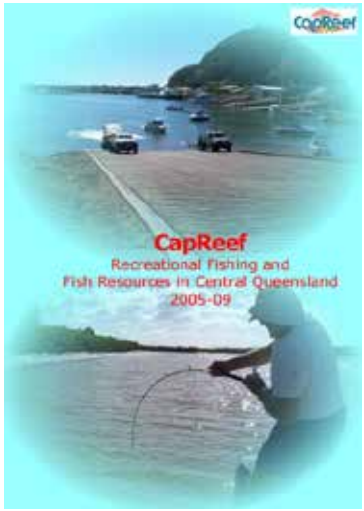


A report titled "McArthur River Monitoring" is available.[13] Visitors to the McArthur River account for 82.9% of fishing trips. Most trips are within the estuary with 7.7% of trips to offshore locations. It was estimated that there were 16,507 trips in 2010, 17,097 in 2011 and 18,835 in 2012. The indicative estimate of the overall catch of Barramundi was 41t in 2010, 53t in 2011 and 38t in 2012. This compares with an average commercial catch of 33t from the area adjacent to the river (there is no commercial fishing in the river).

Tagging is continuing on a limited basis and recaptures are still being recorded.

15. Community Monitoring - CapReef

This community monitoring project of recreational fishing following the rezoning of the Great Barrier Reef Marine Park and a new management plan for the Coral Reef Fin Fishery in 2004. The project ran from 2004-12 collecting data on recreational fishing in the Capricornia area.



Data on recreational fishing including catch and effort, social impact of change and expenditure on recreational fishing were collected in the 4 years to the end of 2008/09. Baited Remote Underwater Video (BRUV) was also used to collect fishery independent data and this included obtaining data in fishing and no fishing zones (under permit from GBRMPA).

Data collected through CapReef are maintained in the Suntag database. Fishing trip details were obtained for almost 16,000 trips from winter 2005 to autumn 2009.

There were 15 reports on various aspects of CapReef produced and at the end of 2008/09 a summary report covering all the data collected over the previous 4 years was produced. The report is titled "CapReef: Recreational Fishing and Fish Resources in Central Queensland 2005-09"[14].

[13] Report available from www.info-fish.net/king-ash-bay
[14] CapReef reports available from www.info-fish.net/capreef

16. Community Monitoring - Stocked Fish

In 2007/08 funding of $100,000 was provided by the Queensland government to assist stocking groups to increase monitoring of stocked fish through tagging and to produce a number of reports on stocked fish. That resulted in 3 reports:[15]

- Summary of tagging of stocked fish in impoundments and waterways of Queensland 1987-2007
- Growth, movement and survival of stocked fish in impoundments and waterways of Queensland 1987-2008
- Fish death events: Impact of on stocked fish - winter 2007

Tagging allows stocking groups to monitor their stockings in a cost effective way and provides data on growth, movement, survival and mixing with wild populations. That data can then be used to refine stocking practices in the future.

Tagged Barramundi stocked in Lake Tinaroo in batch releases (up to several thousand at a time) have been released at mostly 200-400mm in length, recaptured up to 10 years after release and have reached up to 1,000+m in length. Fish from this batch are still being caught. *Figure 40* shows the growth of a batch of Barramundi released into Lake Tinaroo in 2004-05. Details of tracking stocked fish through tagging in Lake Tinaroo and the Cairns area are available through a Suntag mini-report.[16]

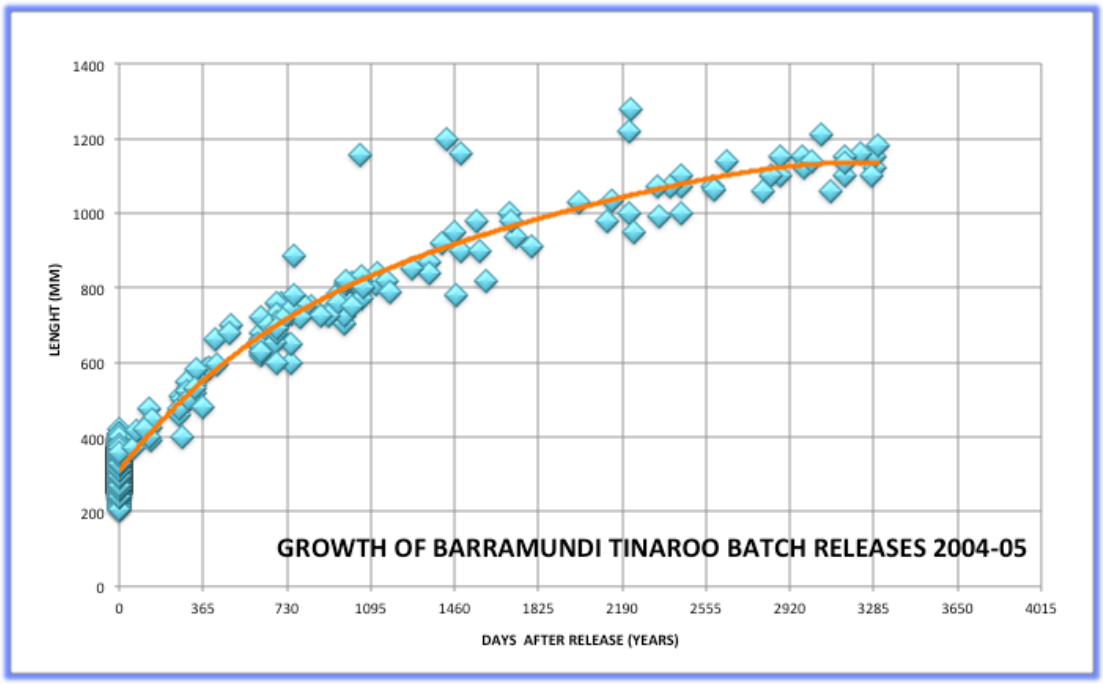


Figure 40: Growth of a batch of Barramundi released in Trinity Inlet in 2008

[15] Reports available from www.suntag.org.au
[16] Report "Tagging of Stocked Fish in the Cairns area 2002-2013" available from www.suntag.org.au

In Dec 2010 Lake Awoonga at Gladstone spilled for the first time since the dam wall was raised in 2002 and kept spilling until Jun 2011. Large Barramundi were observed going over the spillway in large numbers (see *figure 40*). It was estimated that over 20,000 fish spilled from the lake. It spilled again in 2012 and 2013 with more Barramundi going over the spillway. Since then 50 fish tagged in the lake have been recaptured below the dam and elsewhere. There were also fish tagged just below the dam in the Pikes Crossing area after they spilled from the dam. *Figure 40* shows the change in numbers of fish in the Boyne River after the fish spilled from the lake.

Since then fish have been recaptured in the Boyne River, Gladstone Harbour, Calliope River, Narrows, Fitzroy River and elsewhere. One fish was recaptured as far north as the Ross River at Townsville (760km) to the north and 6 fish have been caught to the south in the Burnett River at Bundaberg (180km).[17] *Figure 41* shows the locations where Barramundi stocked in Lake Awoonga have been recaptured.

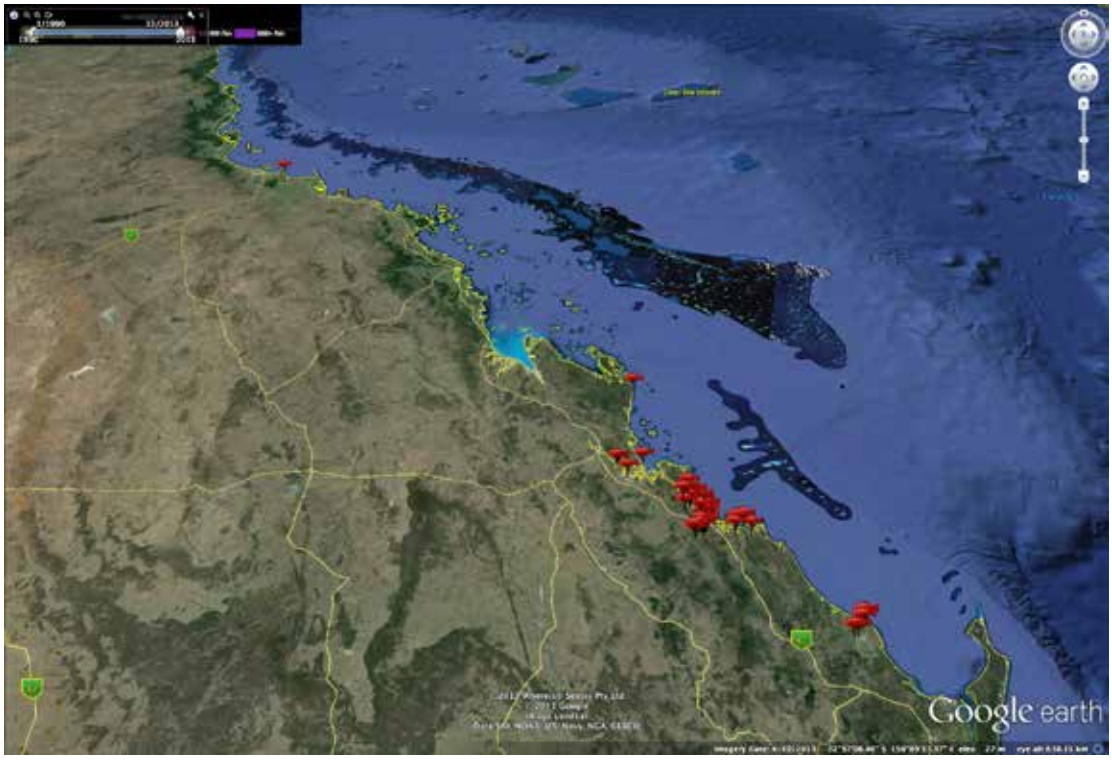


Figure 41: Locations where Barramundi stocked in Lake Awoonga have been recaptured

[17] From "Gladfish 2013 - Assessing trends in Recreational Fishing in Gladstone Harbour and adjacent waterways" available from www.info-fish.net/gladfish

17. Community Monitoring - Fishing Competitions

During 2013/14 there were 6 fishing competitions that included tagging as part of the competition or data were collected on the catch. These were:

- Rocky Barra Bounty in Fitzroy River
- Boyne Tannum Hookup at Boyne Island
- Bundaberg VMR at Burnett Heads
- Lake Moondarra Fishing Classic
- Noosa River to Reef Family Fishing competition
- Faust Dam Invitational Catch and Release Fishing competition

Figure 42: Fish tagged in the Rich Fish competitions were photographed for storing in the database

The Rocky Barra Bounty targets Barramundi in the Fitzroy River and has been held in Sep-Oct each year for the past 15 years. The Rocky Barra Bounty is a tag and release only event with fish tagged and released where caught with a photograph providing evidence of the catch as shown in *figure 42*. It has received a 5 star rating under the NEATFish competition accreditation system (see www.neatfish.com).

Further details of the event are available from www.rockybarrabounty.com. The event in 2013 was held in Sep and went for 2.5 days. In 2012 it required 4.6 hours of effort for each Barramundi caught while in 2013 this was 5.6 hours or an increase of 21.7% in effort. The result for 2010 is not comparable to other years due to fewer competitors, a shorter fishing

time and locations not including the river due to flooding. *Figure 43* shows the catch rate for Barramundi. A summary report on the results of the competition is available.[18]

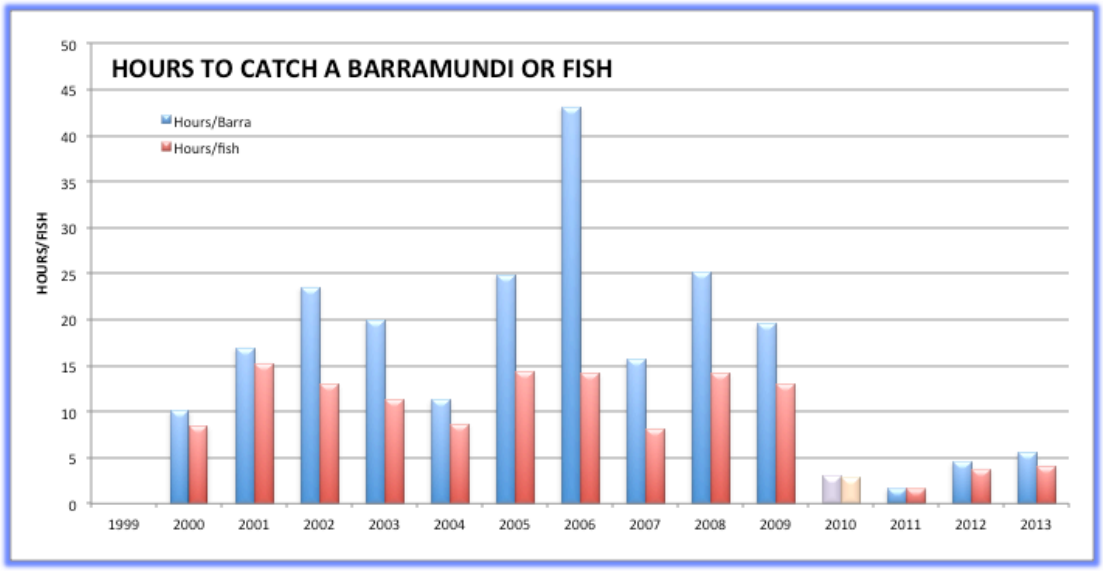


Figure 43: Hours to catch a Barramundi or fish in the Rocky Barra Bounty from 1999-2012

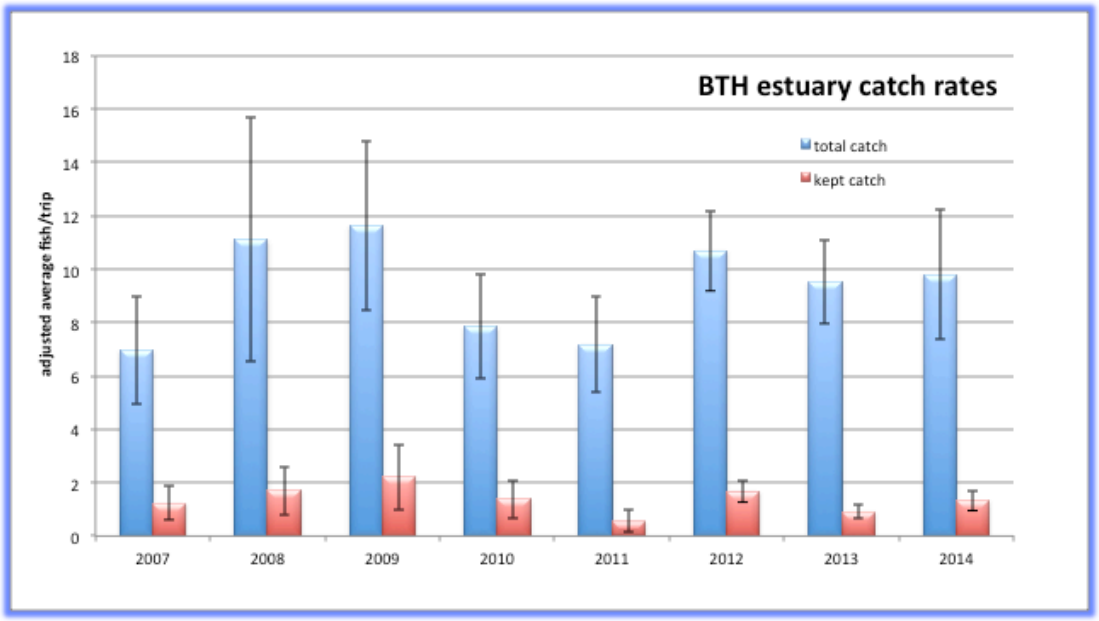


Figure 44: Catch rates for estuary trips in the Boyne Tannum Hookup from 2007 to 2014

The Boyne Tannum Hookup held in June each year, expect in 2013 and 2014 when the event was held in May, is one of the largest fishing competitions in Australia with around 3,000 participants. From 2005-2014 Infofish collected catch and effort data during the event and has collected details on 3,160 fishing trips. CapReef produced a report in 2009 on the event looking at the impact of the competition on local fish stocks.[19]

[18] "Rocky Barra Bounty Results 1999-2013" available from www.rockybarrabounty.com

[19] "CapReef - Recreational Fishing and Fish Resources in Central Queensland 2005-09" available from www.info-fish.net/capreef

An update on catch and effort is also available through Gladfish.[20] *Figure 44* shows the catch rates for both total fish caught and fish kept for each year of the Hookup from 2007-2014 for estuary trips during the Boyne Tannum Hookup.

Since 2000 the Gladstone Sportfishing Club has managed a live weigh-in component for this event with these fish being tagged. A total of 4,341 fish have been tagged in that event since 2000. *Figure 45* shows the number of fish tagged in each Boyne Tannum Hookup and the recapture rate of fish tagged each year. The overall recapture rate is 5.1%.

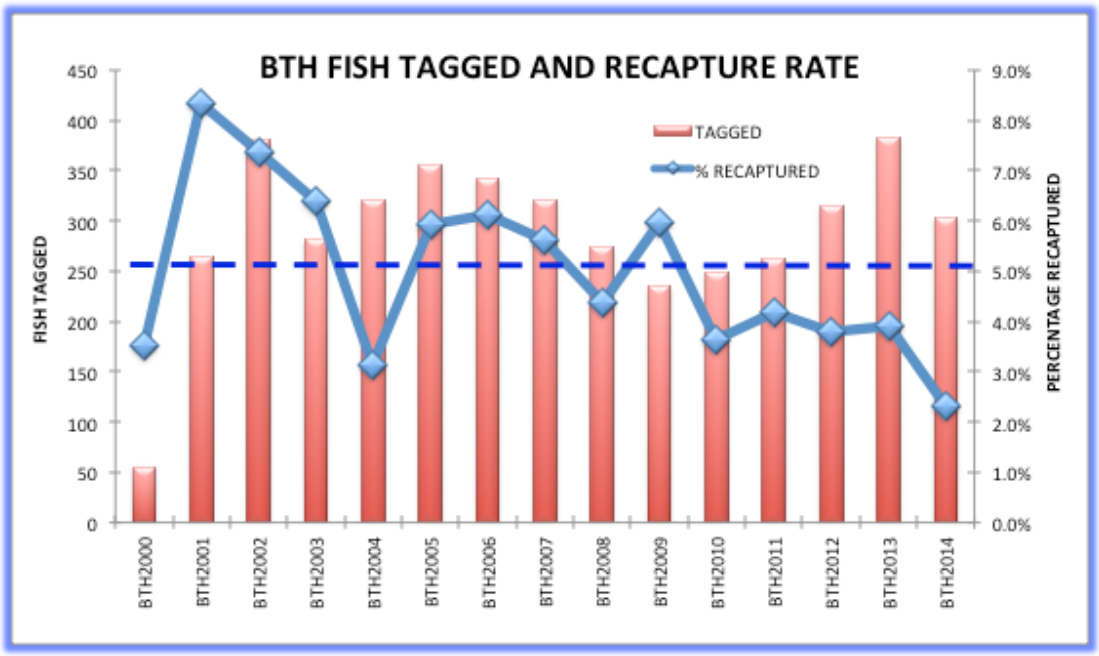


Figure 45: Numbers of fish tagged and percentage recaptured in each Boyne Tannum Hookup from 2000-13 (overall recapture rate 5.1%)

The Bundaberg VMR Fishing Competition held in June each year also has a live weigh-in section and for the last 6 years fish presented at the weigh-in have been tagged and released by the Bundaberg Sportfishing Club.

A total of 910 fish have been tagged in the 8 events. Key species have been Yellowfin Bream and Dusky Flathead although a number of other species have also been tagged. A total of 29 fish have been recaptured with an overall recapture rate of 4.6% to 2013. *Figure 46* shows the number of fish tagged in each competition and the recapture rate of fish tagged each year.

The Lake Moondarra Fishing Classic was held in Oct 2013 with 8 fish tagged. A cash prize of $50,000 was offered for the recapture of a specially tagged fish however this was not caught.

The Noosa River to Reef Family Fishing competition is held in May each year and fish have been tagged in the competition in 2010, 2012-2014. There have been 138 fish tagged for 14 (10.1%) recaptures.

The Faust Dam Fish Stocking Association hold an annual Invitational Catch and Release Fishing Tournament targeting Barramundi on Lake Proserpine. The event was held in Oct

[20] "Gladfish 2013 - Assessing Tends in Recreational Fishing in Gladstone Harbour and adjacent waterways" available from www.info-fish.net/gladfish

2013 with 100 fishers participating and 126 Barramundi and 2 Sooty Grunter caught. For the first time data from the competition was incorporated into the Suntag database. *Figure 47* shows the size range of Barramundi caught with more fish (17.5%) caught from 800:850mm than any other size range.

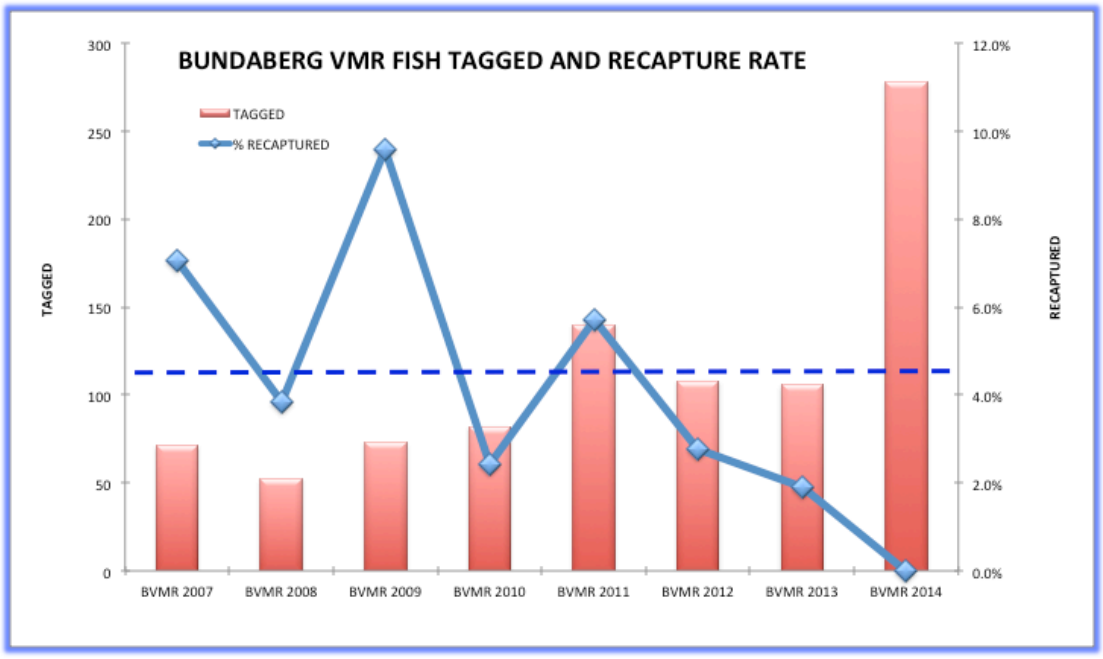


Figure 46: Numbers of fish tagged and percentage recaptured in each Bundaberg VMR competition from 2007-2014 (overall recapture rate 4.6%)

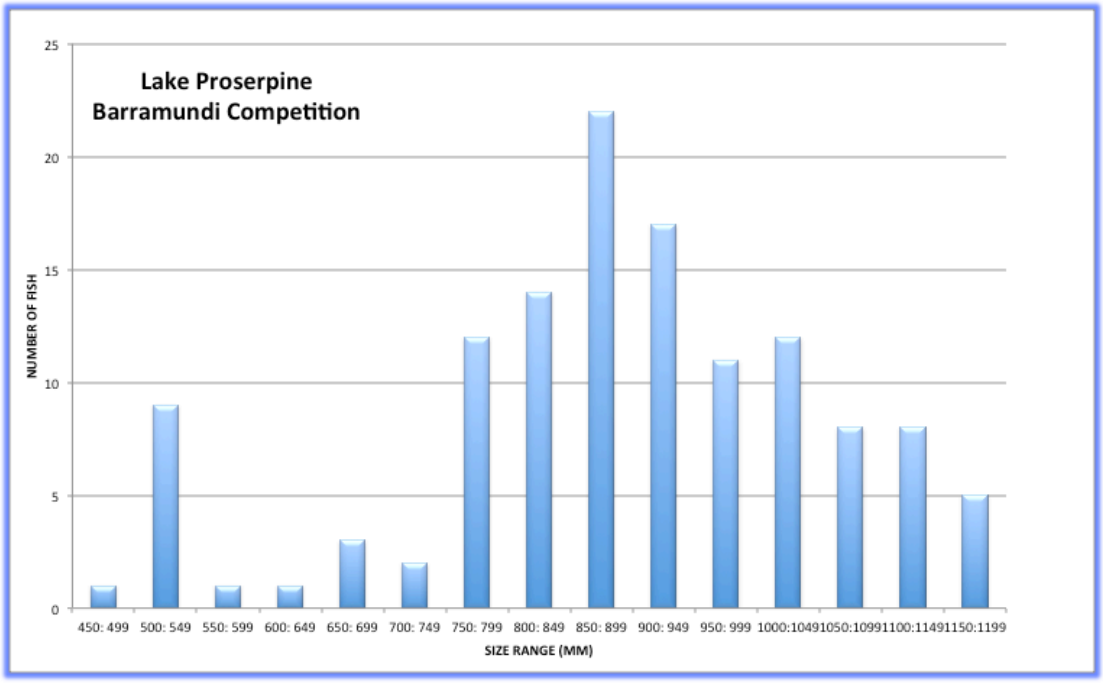


Figure 47: Numbers of fish in each size range caught in the Faust Dam Fishing Competition

18. Community Monitoring - Fish Health

Storing photos of individual tagged or recaptured fish was a new feature added to the database in 2011/12. An early use of these photos has been to track the health of fish as part of the Gladfish project in the Gladstone region, following fish health issues identified there. Taggers have been taking photos of tagged and recaptured Barramundi to monitor the extent of lesions and other visible health related issues. FQ provided a scale from 1-5 for assessing skin condition and *figure 48* provides an example of fish with SK1 and SK5.

Figure 48: Gladstone fish photos from the database showing SK1 fish (left) and SK5 fish (right)

In early 2014 reports were received of fish dying in the Boyne River from the Bruce Highway at Benaraby upstream to Manns weir. Over a period of several months to Mar 2014 there were up to 50 dead large Barramundi (eg *figure 49*) found in the area with small numbers of fish dying progressively. The area was surveyed and a report prepared in Jan.[21]

Figure 49: Dead Barramundi in the Boyne River Jan 2014

[21] Report "Fish Deaths in Boyne River near Gladstone- January 2014" available from Infofish Australia

19. Community Monitoring - Catch and Effort

From 1996/97 Suntag extended its data collection to obtain complete details of fishing trips undertaken by taggers. This covers estuary, offshore and freshwater fishing and provides catch and effort data for those participating. In 2005/06 with the introduction of the Infofish 2006 database this significantly improved the collection of catch and effort data. From that time the calculation of catch and effort has been confined to a number of clubs that have provided consistent data since then. Catch and effort is only assessed for the following clubs:

- Brisbane Sportfishing Club (Moretag)
- Captag
- Gladstone Sportfishing Club
- Ipswich United Sportfishing Club
- Bundaberg Sportfishing Club
- Suntaggers
- Brisbane Valley Anglers

Effort is measured by the total time at or on the water, which includes travel time on the water and any time spent collecting bait or doing other things. This is considered to be the simplest means of collecting time and has proven to provide consistent data. This provides a lower catch rate than if fishing time only were used.

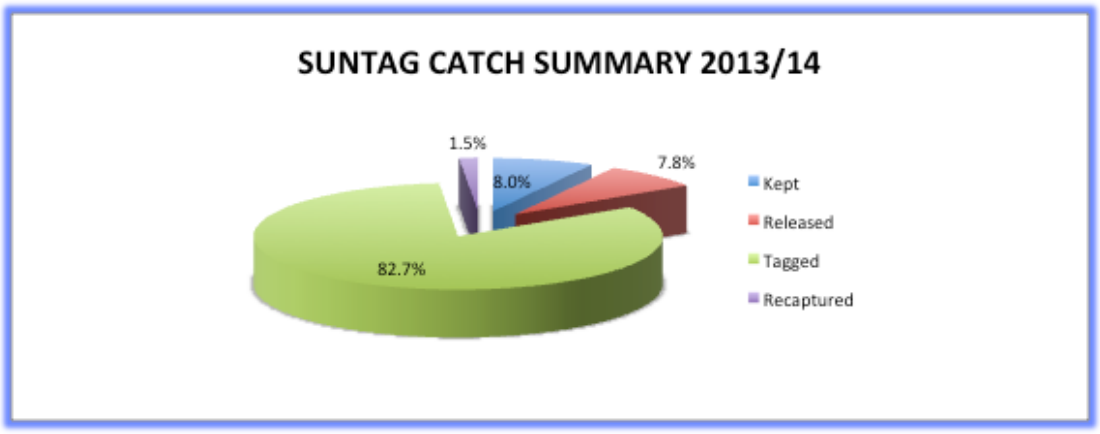


Figure 50: Summary of Suntag catch by fate of fish

A total of 21,075 trips have now been recorded for Suntag taggers providing trip details up to 2004/05 and for the participating clubs since then. The total time spent fishing is 185,245 hours for 238,493 fish caught or 1.3 fish per hour of effort.

In 2013/14 there were 1,414 trips recorded for 9871 hours of effort and 14,811 fish caught or 1.5 fish per hour of effort. The average Suntag tagger trip was 1.5 fishers fishing for 3.4 hours. On each trip there was an average of 10.5 fish caught of which 0.8 fish were kept.

Figure 50 shows the fate of fish caught by Suntag taggers in 2013/14. Of the fish caught 8.0% were kept, 82.7% were tagged and 7.8% were released without tags. There were 1.5% of fish caught that were recaptures with 94,1% of those re-released.

Figure 51 shows the overall catch per trip for participating taggers from 2006/07-2013/14. For the past 4 years the total number of fish caught per trip was lower than in the previous 4 years. The kept catch has remained consistently from 1-2 fish/trip for the past 7 years.

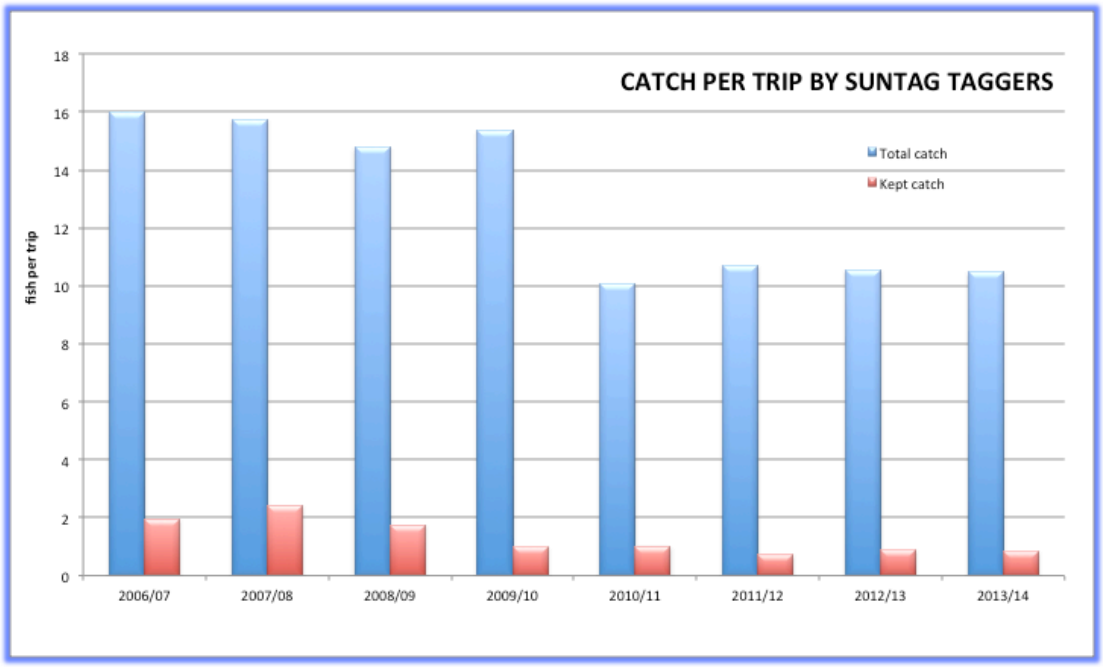


Figure 51: Fish caught and kept by Suntag taggers per Suntag trip

20. Released Fish Survival

There are now 30 species (*figure 54*) where the survival rate of released fish has been estimated from research experiments. The types of experiments have varied widely with many variations in results however the estimated survival rates are considered to be a reliable estimate.

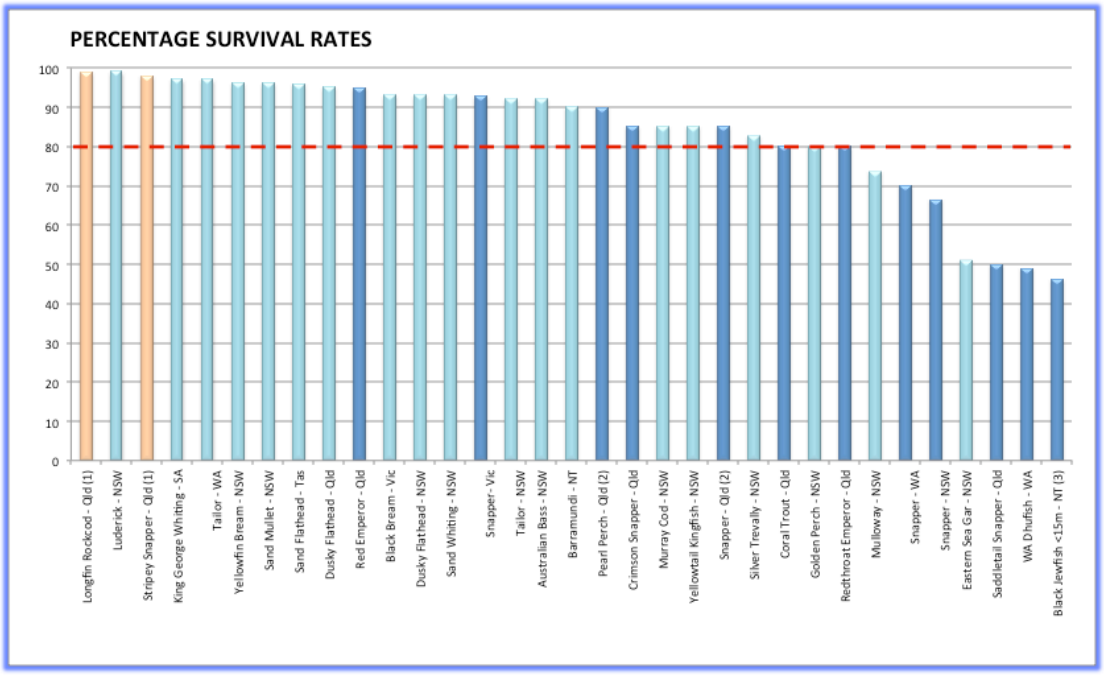


Figure 52: Survival rates from research for key Australian recreational fish species

In *figure 52* reef species are shown in brown and blue. These species when caught, particularly from depths greater than 15-20m, will show the symptoms of barotrauma.

(1) These are reef species caught in deep water however the survival rates are based on fish caught in shallow water <10m.
(2) Research indicates that the survival rate for fish from greater than 15m was near zero.

Deep Hooking

Deep hooking has been recognised as a major contributor to mortality of fish. Since 2003/04, Suntag has continued to collect data from taggers on hooking locations to assess the level of deep hooking. *Figure 53* shows how hooking locations are categorised in Suntag. Deep hooking is where hooks are lodged in the throat (or gills) or gut.

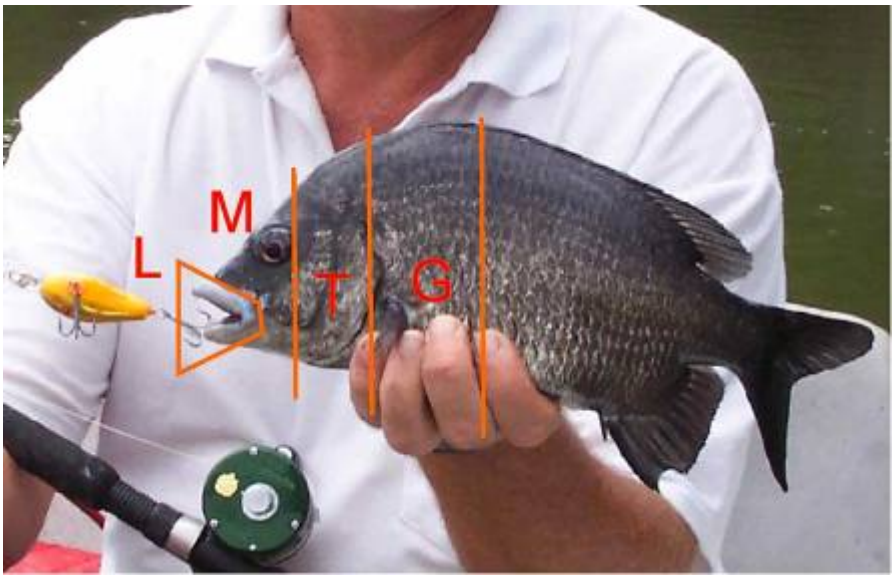


Figure 53: Recording of hook locations and where hooks are lodged in fish using bait and lure

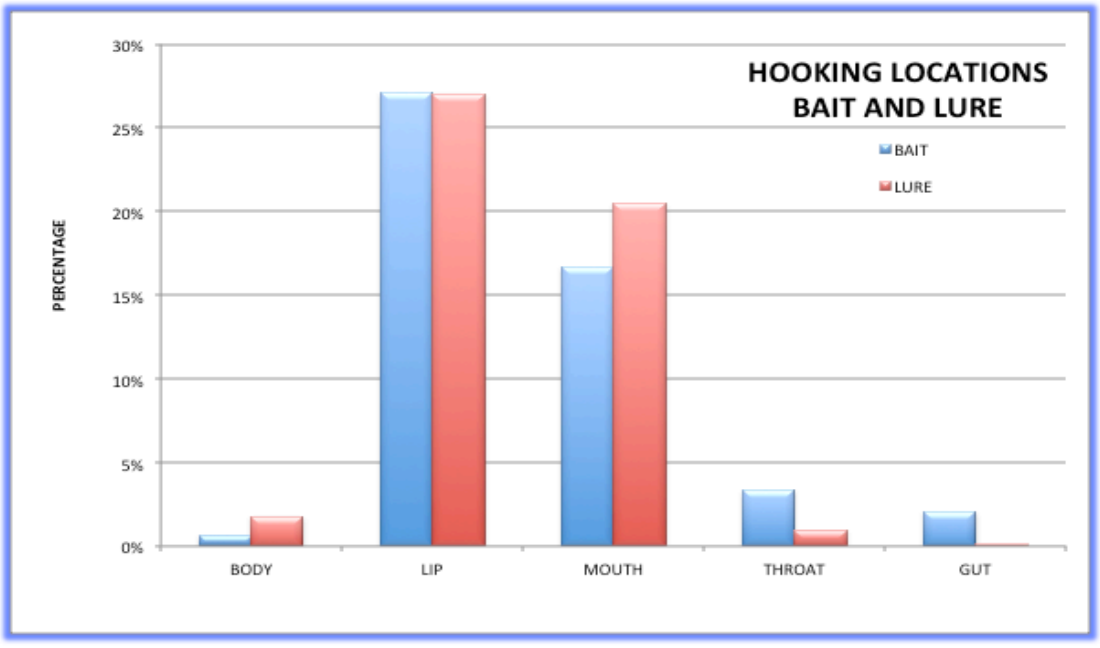


Figure 54: Summary of hooking location using bait or lure

A total of 86,566 hooking locations have been recorded to 2013/14. *Figure 54* provides a summary of hooking locations for using bait or lure. The overall rate of deep hooking is 6.5% while for bait it is 10.8% and for lure it is 2.0%. *Figure 55* provides a summary of hooking rates for a range of popular species caught on bait and lures.

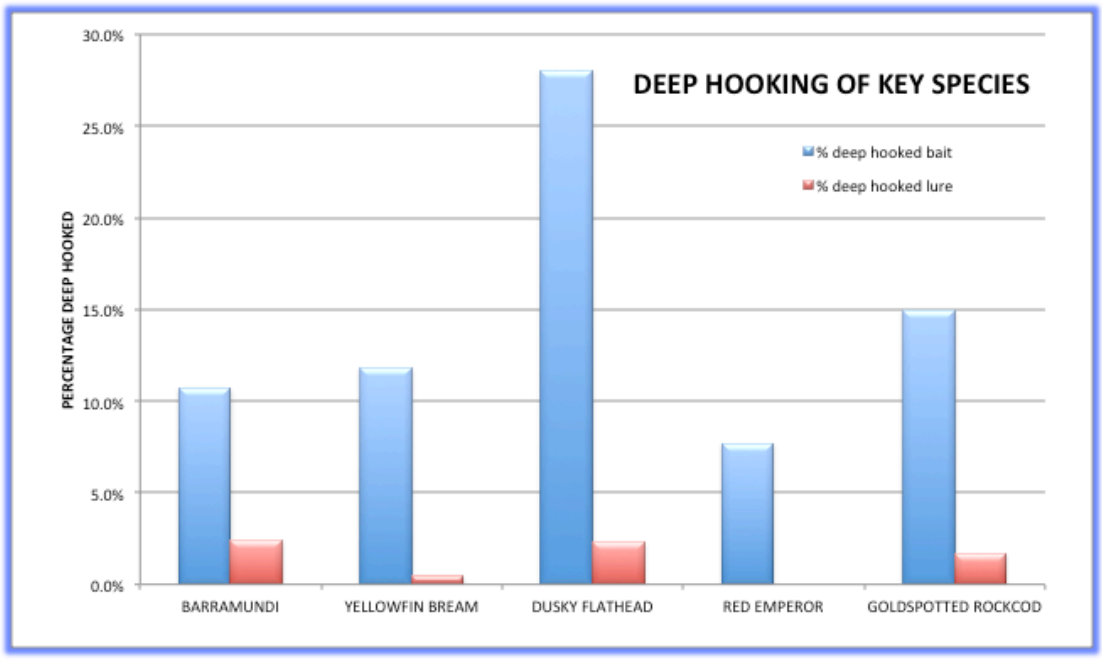


Figure 55: Deep hooking rates for a number of popular species on bait and lure

Dealing with Barotrauma

Barotrauma is also a major contributor to mortality. It affects fish caught in deep water and is mostly related to reef species but can affect fish caught at depth, even in freshwater lakes. Barotrauma symptoms generally can be observed in fish caught in depths of 15m or more. Symptoms of barotrauma are:

- Swollen and hardened stomach (mild symptom)
- Stomach protruding from mouth (severe symptom)
- Bulging eyes (severe symptom)
- Bubbles in the blood if the fish is bleeding (severe symptom)
- Raised scales standing out from body (severe symptom but only on some species)
- No symptoms visible (for fish from very deep water may indicate that the swim bladder has burst)

While there are differing views on dealing with barotrauma, and some of the research is inconclusive as to its benefits, fishers are still encouraged to deal with it (especially if they have the skills in the release methods). Methods for dealing with barotrauma:

- No treatment (generally OK for fish from shallow water <15m)
- Venting gases from swim bladder with a hollow needle (needs knowledge of where to vent).
- Use a release weight to get the fish back down to the bottom.
- Use a bottomless cage to return the fish to depth.

Equipment for venting, release weights and cages is available to a limited extent commercially however many fishers improvise, sometimes using inappropriate tools such as a fishing knife for venting.

21. Climate Change

During the year Suntag data were assessed as part of a project looking at the effects of climate change on tropical species. Tagging data for Golden Snapper were examined to determine any changes in the numbers tagged at the southern end of their range from 22°-26°S from 1985-2014. Data were assessed based on half degree latitude zones from 1 (Stanage Bay) - 8 (Fraser Island).

Figure 56 shows the percentage of Golden Snapper tagged compared to the total number of fish tagged. Golden Snapper have become more prevalent in fish tagged in southern zones 3-6 over time.

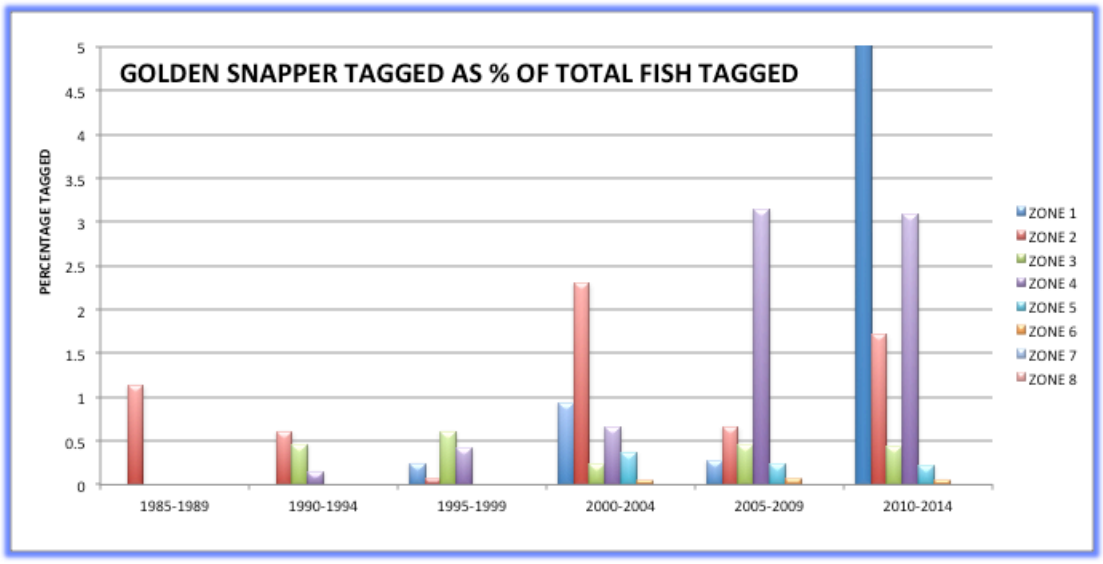


Figure 56: Percentage of Golden Snapper compared to total fish tagged in half degrees zones from 22°-26°S from 1985-2014

Shoalwater Bay is in zone 2 from 22.5°-23.0°S. Captag has undertaken organised trips there from 1999-2014 and have recorded catch and effort for all trips, providing additional data to assess changes in Golden Snapper catches. *Figure 57* shows the percentage of Golden Snapper in the catch compared with the total fish caught and the catch rate for each trip. There has been an upward trend in both the percentage of the catch and the catch rate over those years.

This would suggest that there may have been an increase in stocks at the southern end of their range based on the numbers of fish caught and fish being caught further south over time and this may be attributable to climate change, at least in part. In zone 3-5 Golden Snapper have now become a target species in the last few years whereas previously they were considered to be an incidental catch.

With Suntag data spaning over 28 years there are other opportunities to use the data to look at changes in stocks that may be related to climate change.

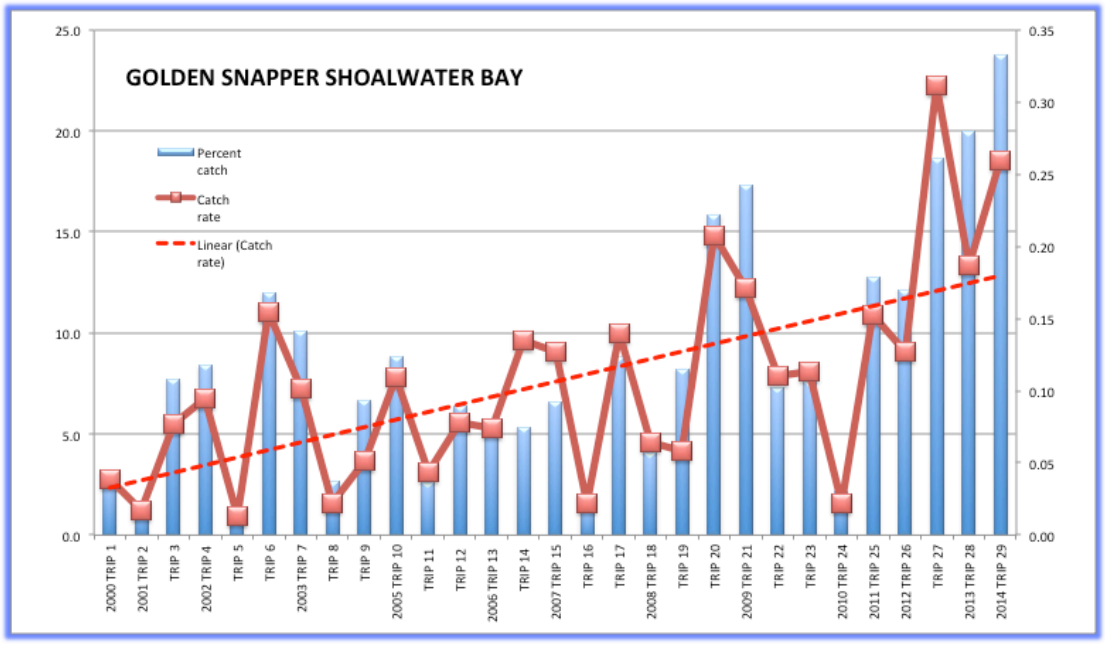


Figure 57: Golden Snapper as a percentage of the Captag catch and catch rates 1999-2014

22. Support for Research Projects

As well as the projects already mentioned Suntag in Queensland provides support to a number of research projects. That support is generally in the form of collecting tag and recapture data, long-term data storage, and in some projects assistance with the tagging.

In 2013/14 Suntag supported the following additional research and monitoring projects:

- Snapper, Teraglin and Pearl Perch research by FQ
- Mud Crab tag and recapture data in the Barron River by Holloways Beach Environment Education Centre
- Barramundi and Mangrove Jack in the Johnstone River by FQ
- Queensland Lungfish and other species being monitored in the Burnett River by FQ
- Stocked Bass in Lake Samsonvale at Brisbane by SEQwater
- Fish monitoring in Logan-Albert Rivers by SEQwater
- Environmental impacts of stocked Barramundi research in North Queensland by FQ
- Monitoring of Murray Cod in the Dumaresq River in South Queensland by FQ
- Mud Crab tagging on Gold Coast by Griffith University
- Fish tagging in the Lake Eyre Basin by DNRM/PIRSA

While a number of these projects have been completed fish tagged during them continue to be recaptured and that will continue for some years into the future.

23. Historical Tagging Data

No new historic data were added to the database this year

24. Where to in 2014/15?

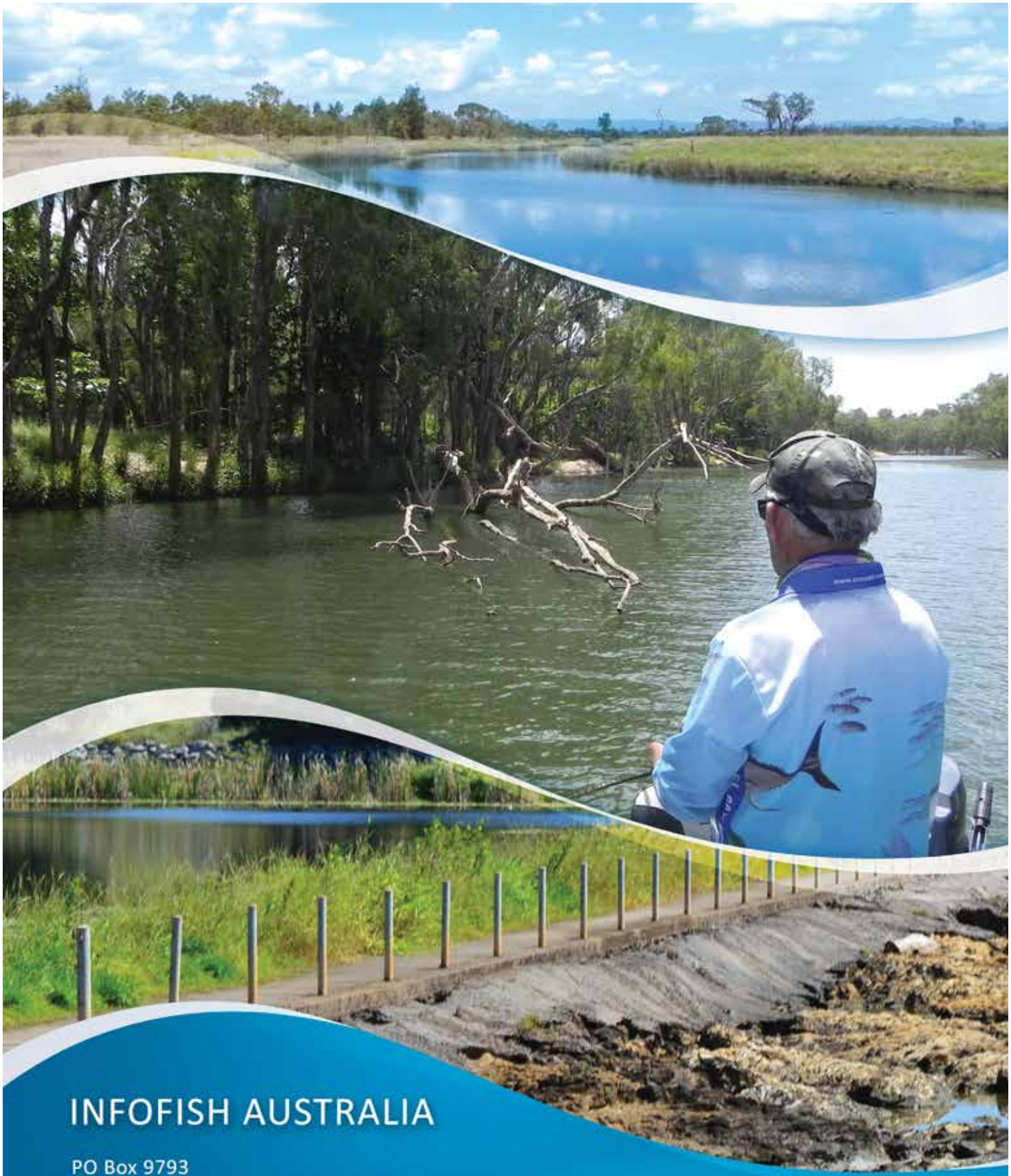
The year saw a continuing shift in focus from collecting data to providing an information service to industry and the community. As part of that process the Crystal Bowl concept for predicting Barramundi stocks was extended to Gladstone as part of the Gladfish project.

The introduction of Suntag mini-reports, revamped eNews bulletins, use of Google earth, Facebook and YouTube has significantly changed the delivery of information. The Suntag and other websites have become the repository of reports and more detailed information.

There are 5 main target areas for improvement in 2014/15:

1. Continued improvement in the use of technology to deliver an information service that is relevant to industry.
2. Continued development of the Crystal Bowl concept with extension to other species and other locations.
3. Integration of data collected during recruitment surveys into the Infofish database.
4. Continued expansion of intelligence gathering from the community, particularly in relation to recruitment of key species and fish deaths.
5. Improve training of taggers through Suntag Training Online.

Underpinning all that will be the need to continue the expansion of funding sources so that these developments can be realised.



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