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Redevelopment of the Bycatch Management Information System (BMIS): status and future work plan including integrating regional bycatch data summaries

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Abstract

The WCPFC Bycatch Management Information System (BMIS) has been redeveloped as a global resource with funding provided by the FAO Common Oceans (Areas Beyond National Jurisdiction -ABNJ) Tuna Project. The new BMIS offers a broader range of curated material, retaining an emphasis on mitigation techniques and their efficacy, while expanding management topics to issues such as progress on data harmonisation, bycatch interaction rates, population-level assessments and fisheries management performance. It includes information on species identification, given its role in data quality and compliance, and on safe handling and release, which affects post-release survival rates. A logo, social media (Twitter) and a 'Bycatch Bytes' blog have been added. A new database platform improves data entry, real-time update and flexibility for future development. Additional content will be coming online through late 2018 including databases, maps and shark tagging meta-data.

The upgrade enhances the role of the BMIS in increasing and expanding knowledge of bycatch mitigation and management among those involved in tuna and billfish fisheries, thereby supporting the adoption and implementation of science-based management measures so that bycatch is managed comprehensively and sustainably.

The BMIS can be accessed at www.bmis-bycatch.org. Subscribe to the BMIS Twitter feed [@bmis_bycatch](https://twitter.com/bmis_bycatch). Provide feedback, report errors and send new content or ideas to info@bmis-bycatch.org.



1 Introduction

The Bycatch Management Information System (BMIS) was initiated by the Western and Central Pacific Fisheries Commission (WCPFC) in 2010 as an online resource for fisheries managers, scientists, fishers, educators and the public. The database consolidates information on the mitigation and management of species of special interest, including seabirds, sharks and rays, marine turtles and marine mammals, that are incidentally caught in oceanic fisheries targeting tuna and billfish. Initially the database focused on the tuna and billfish fisheries of the Western and Central Pacific Ocean (WCPO). With funding from the FAO Common Oceans (Areas Beyond National Jurisdiction -ABNJ) Tuna Project, the database has been redeveloped with a global focus. The rationale behind the BMIS and the different sections of the database are outlined below.

1.1 BMIS History

For an overview of the history of the development of the database, please refer to previous papers presented to WCPFC Scientific Committee meetings in 2007, 2010, 2011, 2012, 2013 and 2015 (Williams 2007; Fitzsimmons 2010, 2011, and 2012; and Fitzsimmons & Bunce 2013, Fitzsimmons et al. 2015).

The WCPFC has supported the BMIS financially since its inception. Between 2007 and 2010, in-kind contributions of information were received from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australia and the Pacific Islands Fisheries Science Centre (PIFSC) Honolulu. The BMIS received in-principle support from the Joint Tuna RFMO Technical Working Group on Bycatch (TWG-BYC) at its 2011 meeting. The TWG-BYC work plan included the objective of progressing information sharing among tuna-Regional Fisheries Management Organisations (t-RFMOs) through the BMIS (Anon. 2011).

The International Sustainable Seafood Foundation (ISSF) funded the overall running and update of the BMIS in 2013. It also funded content update in 2014. Funding to further develop the BMIS (project scoping and WCPFC SC11 paper) was provided to WCPFC and SPC by the Global Environment Facility (GEF)-funded, FAO-implemented Areas Beyond National Jurisdiction (ABNJ) Tuna Project in 2015. Subsequently existing and proposed BMIS features were reviewed and a program of development work was documented in the report "BMIS Functional Analysis and Specifications". A paper detailing the proposed redevelopment was produced for the 2015 WCPFC's 11th Scientific Committee meeting.

Eighty Options, a Tasmanian IT company, successfully tendered for the project and began the website and database upgrade in August 2016. Existing references in the BMIS (approximately 450) were transferred to the new database and loading of other content initiated. As of 31 December 2016, there were around 930 references in the BMIS, as of 30 June 2017 there were over 1200 references.

1.2 BMIS the Project

Drawing from international agreements such as the United Nations Fish Stocks Agreement, t-RFMOs conservation and management policies incorporate principles of sustainable management for both target and non-target species. These are prescribed in the WCPFC Convention text (Part II, Article 5) as follows:

- (d) "*assess the impacts of fishing, other human activities and environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks;*
- (e) *..."minimize...catch of non-target species, both fish and non-fish species"...[and]..."promote the development and use of selective, environmentally safe and cost-effective fishing gear and techniques"* and
- (f) "*protect biodiversity in the marine environment"*.

International agreements such as the 1995 FAO Code of Conduct for Responsible Fisheries (and its four international plans of action and strategy), CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) and the Convention on Migratory Species (CMS) also provide important context for the fisheries management framework by highlighting the importance of management for particularly vulnerable taxa which may be caught as bycatch in tuna fisheries.

Historically, development of the BMIS has been driven by a desire to help inform consideration of conservation and management proposals by building an understanding of bycatch mitigation among those involved in tuna and billfish fisheries. It is a place to demonstrate the science behind the regulations to policy- and decision-makers, while at the same time serving as a tool for the general public.

BMIS users are likely to interrogate the database in different ways, depending on interest. For example, the layperson may want to know what causes certain species to become bycatch and what is being done to reduce these problems. For them, the BMIS aims to demonstrate that research into bycatch mitigation and management is a dynamic field that is integrally linked to t-RFMO bycatch management. For the scientist who is a specialist in a particular area of bycatch mitigation, centralized access to curated bycatch references offers a time-saving way to browse literature in related specialties, enhance general knowledge and potentially discover insights into, for example, cross-taxa issues.

For the fisheries manager, BMIS makes it easier to consider past and present efforts to manage bycatch, to examine measures already in place, review their efficacy and identify gaps in knowledge. For example, it can help to answer questions such as 'How well do these mitigation measures work in practice, and are the mortality rates now low enough to allow bycatch populations to be sustained?'. This kind of exploration is facilitated by linking to information on the broad-scale implementation and evaluation of mitigation techniques, interaction rates and populations status.

1.3 Overview of Content

There are several modules in BMIS. The 'Management' section is entirely new and literature here provides context and rationale for developing bycatch conservation and management measures. Categories have been devised to make it easier to search. New categories will be added as required but at present include:

- Bycatch interaction rates
- Bycatch threats
- Data harmonisation
- E-monitoring
- Economic analysis
- Fisheries management performance
- Implementation & evaluation of mitigation techniques
- International & national management schemes
- Maps
- Policy development and knowledge exchange
- Post-release mortality
- Species identification
- Tagging studies

The new 'Population-Level Assessments' (PLA) section includes studies that describe the status of bycatch populations. Data-poor situations are common to bycatch populations and in the context of the BMIS, the types of studies included under PLA generally reference some form of ecological risk assessment (ERA) or abundance index. ERA provides a framework for estimating the vulnerability and stock status of bycatch populations, and evaluating potential consequences of fisheries management actions. Where traditional stock assessment are available they are also included.

BMIS descriptions of 'Mitigation Techniques' summarize their performance and refinement in experimental situations as well as their implementation in actual fisheries. 'References' is the entry point for searching all literature in the database, i.e., scientific and technical literature on bycatch mitigation and management. The 'Regulations' section covers the decisions, such as conservation measures and resolutions, of the five tuna Regional Fisheries Management Organisations (RFMOs). In keeping with the global focus of the BMIS, the new website includes pages dedicated to each tuna RFMO.

STAGIS (Shark TAGging Information System), a database of shark tagging studies from the Pacific Ocean (current to 2011 but to be updated), is another new addition to the BMIS.

The BMIS also holds information on Species Identification and Safe Handling and Release (SHR), including illustrated guides. These topics are introduced on the Home Page. The detailed discussion of species identification on the site notes its relevance to data quality and compliance. For SHR, more information about the impact on direct and post-release mortality will be added, noting that this is currently an area of rapid development with several recent studies and even more currently underway.

BMIS includes descriptions of Fishing Gear used in oceanic tuna and billfish fisheries. An overview of bycatch species groups is included under the 'Species' tab, while the 'Resources' tab links to other bycatch databases and organisations.

2 Technical specifications

The new BMIS system has been redeveloped using [Drupal 8](#), a robust and widely-used open source Content Management System (CMS) relying on recognised technologies such as the PHP programming language and MySQL databases.

The new website has been developed as a dedicated portal for entering and accessing bycatch management information. It is secure, stable, flexible and easy to extend. Furthermore, it facilitates more efficient data entry, reference management and general administration.

Providing ergonomic and user-friendly interfaces for a wide audience has been an essential aspect of the redevelopment of this information system. As well as being visually appealing, the new web interface is responsive and compatible with a variety of platforms and devices (e.g., phones, tablets and computers), and caters to the expanded scope of the BMIS.

The database resides on the WCPFC server and is accessed through the WCPFC website via the 'Science and Data' tab, under 'Bycatch Management'. While having its own visual identity and logo, the format and colour scheme of the BMIS is contiguous with that of the WCPFC. Considering the large amount of information available via this new portal, the site has been developed with its own domain name to improve accessibility and visibility via internet search engines (e.g. it is now more likely to be returned in web searches by a variety of users) and offers flexibility for future development. Initial site traffic reports appear to validate the choice of unique domain name. Over the first six weeks of operation, 35% of hits originated from google or other 'organic' searches, with 21% direct hits (user knows the address), 19% via WCPFC.int, 13.5% Twitter and 5.5% referred from FAO.

2.1 Zotero

BMIS literature is captured and stored in Zotero (<https://www.zotero.org>), an open source online reference manager, which operates as an extension in the Firefox web-browser. The Zotero icon sits in the browser bar. Zotero automatically senses content in a website; clicking the icon adds bibliographic data and related files, such as PDFs, images, audio and video files to a Zotero library. Zotero indexes the full-text content of a library, enabling searching via a single interface. The BMIS server keeps track of

changes to the Zotero library, using the web services provided by Zotero to maintain a copy of all bibliographic data.

Individual references, with their associated bibliographic data, can be assigned various keywords or "tags". Groups of tags, along with pre-defined logic, are used to connect items from the BMIS website to their associated items from Zotero, enabling them to be cross-referenced, searched and filtered.

Tags can also be used for purely administrative purposes, e.g., 'early view' or 'need pdf', dispensing with the need for MS Word or Excel files to assist with reference administration. The 'notes' feature allows more detailed comments to be stored (useful when multiple people are managing the literature). Literature that is useful for managing the BMIS but which should not appear online can also be stored in the same Zotero library.

Citations, footnotes and bibliographies can be generated in Zotero. The citation style used to present search results in the BMIS follows that of 'Reviews in Fish Biology and Fisheries' (styles can be selected from the 'Zotero style repository' and installed in Zotero).

Note that the 2015 Pacific shark life history expert workshop used Zotero to manage its references and was able to compile hundreds of references for its report in a matter of hours. This is one clear example of how the redevelopment BMIS can be of considerable benefit to users.

2.2 Copyright

Where possible, the BMIS provides both an option to download the PDF corresponding to a reference and the URL of the website where the PDF can be accessed. In the case of 'pay-to-view' journal articles, due to copyright restrictions, only a link to the journal page is provided. However, a [Google Scholar](#) link is also provided in such cases. Using this search engine can often turn up free access to PDFs because, for example, authors often publish PDFs of journal articles on personal or academic websites such as ResearchGate. In any case, the journal publishing scene will continue to evolve, with more and more journal articles being published as 'open access', and using Zotero will provide the flexibility to adapt with it.

2.3 Managing BMIS content

The new site structure (architecture and technology of the web portal) gives the BMIS coordinator flexibility to authorise others to login to the administrative screen to contribute to the database, either adding, editing or reviewing unpublished information. For example, an invited expert could add or edit material on a mitigation technique. Multi-level administration rights would also assist in peer review of content, as outlined in Section 4.2. See Section 5.6 for examples of how authorised RFMO staff could update the BMIS.

Another significant improvement with the new structure is the real-time update of content. Website explanatory text and regulations are updated within seconds, while references take just a few minutes.

3 New Features

3.1 Overview

As described above, the BMIS features a new website and database platform and linkages to reference management software (Zotero). Along with real-time update of content comes multi-level editing rights and multi-user access. New content sections include management information categories (including population-level assessments), species groups and fishing gear descriptions, pages for t-RFMOs and the

inclusion of STAGIS. Other new features include Twitter and Bycatch Bytes (discussed below). Additional features in development include bycatch mitigation technique summaries for each species group and the inclusion of cross-taxa effects in mitigation technique descriptions.

3.2 Social media, site promotion and traffic

The new website was launched by the WCPFC in May 2017 with a presentation at the IATTC Scientific Advisory Committee meeting in La Jolla and distribution of a flyer at the Forum Fisheries Committee meeting in Canberra. The launch was marked by a news item on the Common Oceans (Areas Beyond National Jurisdiction – ABNJ) Tuna Project website (see Appendix 1). Other promotional activities are planned and two features, Bycatch Bytes and Twitter, have been added to the home page to help extend the reach of the site.

A Twitter account was opened with the name of “#BMIS_bycatch” @bmis_bycatch. Twitter is increasingly used as a tool in scientific communication and the BMIS account will follow policy makers, fisheries scientists, regulators, NGOs, individuals etc who are posting about bycatch management and other relevant areas of conservation science). Twitter can be used as a tool to reach out to these groups and extend networks. Besides ‘tweeting’ (re-tweeting) the posts of others, it will be used to post updates or new additions to the BMIS. Also, sometimes Twitter will turn up new literature to add to the BMIS.

Bycatch Bytes is intended to showcase recent developments in bycatch management, e.g., new or improved mitigation technologies, new management measures adopted, or notable research projects underway. The aim is to add a new story each month, with stories appearing/disappearing automatically in sequence. If no new story is added within a six week period the most recently updated mitigation techniques description is displayed by default. This prevents news being stale and avoids the perception that the site is inactive.

Google analytics embedded in the BMIS website are being used to monitor site traffic and results will be reviewed periodically. For example, from a total of 437 unique users over the first six weeks of operation, most were from the US (36%), with others from India (15%), Australia (13%) and Spain (5%). Users from the UK, China, France, and Micronesia each accounted for 3% of unique visitors. The geographic distribution of unique visitors to the site is shown in Figure 1. In the short time the site has been open to the public (under 3 months), more than 600 unique users have already visited the web portal for a total of 3000 pages viewed and an average of 4 minutes and 30 seconds spent on the website. ‘Bycatch Bytes’ and Twitter will be evaluated over a six-month period both for their utility in BMIS communication and the resources required to maintain them. As detailed in Section 2, initial site traffic reports show that 13.5% of hits were referred via Twitter.

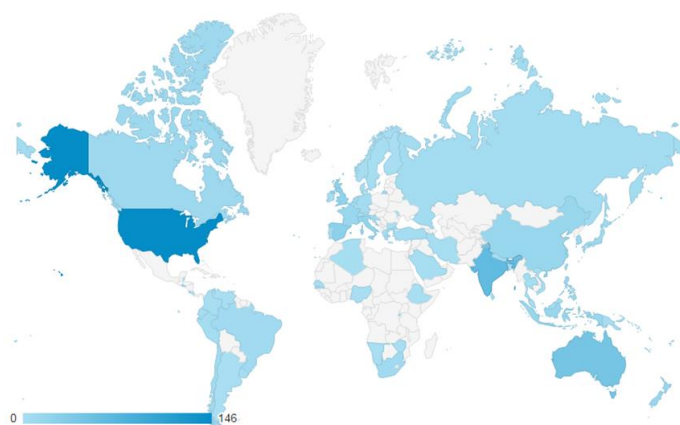


Figure 1. Distribution of unique visitors of the new BMIS portal. Grey is zero records, and dark blue the greatest number of records.

3.3 Functionality and new content

A key component of the continued development of BMIS will be the addition of new material to the database. Despite considerable effort in this area, there is always the chance of relevant technical publications not appearing in searches. Where users are aware of such material they can contact the site administrator directly from the landing page to identify such material for inclusion into BMIS. Similarly, where users identify technical issues with the function of the site, contact with the administrator (site manager) is encouraged via the landing page to report corrections or comments to the site manager. This functionality will remain in place indefinitely so that users can always seek improvements to the site (either in content or function).

4 Challenges

4.1 Ongoing maintenance

Keeping the BMIS current incurs ongoing costs. These include:

- Literature collection and curation
- Update of mitigation technique descriptions and cross-taxa effects
- Social media update - Twitter, Bycatch Bytes
- IT – website security updates, site administrator changes to web pages
- Zotero cloud storage fees. Zotero charges an annual fee of USD\$120 for unlimited storage (essential for the growing library, which already stands at 6MB).

Additionally, as more users become interested in BMIS, use the site and identify additional ways to improve BMIS, continuous addition of new bycatch species or topics becomes an issue for the existing funding. Maintaining BMIS beyond the end of the ABNJ Tuna Project will require a funding source to be identified which addresses all these issues.

4.2 Peer review

As BMIS is increasingly a key source of information for end users, peer review and quality assurance of the information therein becomes increasingly important. No matter how thorough attempts are to summarise references correctly, no one person can do so effectively across the range of BMIS content. Initially peer review has been focused on ensuring all elements of the website function as envisaged. That functional review is largely finished. Any new issues identified can be dealt with through the existing systems (e.g. Section 3.3). Further comments are welcome through the contact email (info@bmis-bycatch.org) and will be addressed as soon as possible by the design team.

On the peer review of content, there are two components, subject matter expertise and cross RFMO input. The intent is to have both subject matter experts across taxa and RFMOs review the content. There is a need for an initial review as well as ongoing periodic review.

In the initial phase a shark expert, a seabird expert and a turtle expert will be reviewing content. These reviewers will be selected on the basis of their ability to comment at a global scale rather than simply for the WCPFC area. Also in the initial phase input will be sought from each of the t-RFMOs.

Developing an ongoing approach to periodic review is more challenging. By way of example, Birdlife International (BLI) and ACAP seabird bycatch mitigation technique factsheets are used to complete mitigation technique descriptions in the BMIS. BLI/ACAP promote mitigation techniques as either 'best practice advice' or 'recommended deployment advice'. Factsheets are drafted by experts and subject to regular review, as research progresses. Changes in advice must first be approved by an expert panel at an ACAP Seabird Working Group (SBWG) meeting.

There is no comparable process for evaluating mitigation techniques for sea turtles, sharks or marine mammals. Furthermore, for all species the review process will need to explicitly consider economics, safety and cross-taxa effects. Literature reviews form the basis of descriptions of mitigation techniques for these species groups in the BMIS. However, peer review of these mitigation techniques would be beneficial because often analysis of the literature is complex due to conflicting results, cross-taxa effects, or where the need to consider their effect on a fishery by fishery basis is especially important. How to achieve this at a t-RFMO level remains a significant challenge.

As for the ongoing resourcing issues identified in Section 4.1, the joint t-RFMO engagement on BMIS and peer review of content will need support. There are a range of possible approaches, and these are discussed further below in the section on future developments.

5 Future developments and work plan

The work plan for the remaining development period of the BMIS (at present, through December 2018) is coalescing around a number of topics including the update of STAGIS, improvement of the Regulations and Species databases, presentation of bycatch summary data, peer review and securing future funding.

5.1 STAGIS

STAGIS is a database of shark tagging field studies conducted in the Pacific Ocean. It was developed to support stock assessments of key shark species and also, to assist in highlighting issues for further research, facilitating research collaboration, and identifying critical habitats. STAGIS data was imported from an existing MS Access database (last updated in 2011). The logic behind the database requires reworking to improve the relationship with Zotero and data entry before the content can be updated.

5.2 Bycatch summary data

Fitzsimmons et al. (2015) noted that the BMIS would be a useful, central location to present RFMO summary bycatch data, should this become available. The development of Bycatch Data Exchange Protocol (BDEP) tables (Williams et al. 2016) within several RFMOs also supports this. The feature depends on first being able to source the relevant data from the various RFMOs which may involve having agreements in place to be able to publish that data if it is not already in the public domain; plus being able to manipulate the data into a common format so that tables and graphs for exploring the combined datasets can be automatically generated. In the first instance it is recommended that the WCPFC BDEP tables (Williams et al., 2016; Williams et al. 2017)) also be made available via BMIS. As a next step it is suggested that the BMIS project team work with the IATTC Secretariat to provide a Pacific-wide summary using the publicly available data from both RFMOs. This would allow better consideration of bycatch information at a population scale.

5.3 Regulations

Revision of the data model for Regulations would increase its utility as a bycatch policy research tool. It would be useful to be able to do the following:

- Look at the full history of active and superseded documents for a regulation on one page, and
- Compare the status (or history) of the adoption/implementation of mitigation techniques across RFMOs. Improved search capabilities would be needed here so that a user could mine individual regulations for relevant clauses. For example, a user might want to look at what each RFMO requires its member to do regarding streamer/tori lines; the search would highlight the more advanced RFMO measures, and the technical specifications that are required.

This improved capability should help to answer questions such as: What would you point to as the most effective bycatch management measure in tuna longline fisheries and is this implemented consistently on an ocean basin scale?

5.4 Species

The BMIS species database could be improved with the addition of some extra fields to:

- denote the RFMO convention areas from which a species has been recorded as bycatch;
- record the species population range across RFMO areas; and
- create cross-linkages within the system for individual species, e.g., with bycatch summary data (see Section 5.2).

5.5 Mapping

Given the spatial and temporal scale of bycatch information, visual representations of the data can be particularly useful when attempting to understand management implications. Accordingly, maps are an important component of a comprehensive BMIS.

At the simplest level such representations could include population distributions. Ultimately BMIS should also hold information on interactions with fisheries (e.g., point maps of where interactions have occurred and interaction rates). Data links and reporting tools could be created along the lines of those currently developed by SPC for WCPFC member countries' fishing and observer data. These allow automated annual update of country reports once data have been uploaded.

For an example of the presentation of summaries of fishing effort, observer coverage, bycatch events and estimated total bycatch, readers are referred to the website of the New Zealand research provider [Dragonfly](#). The interactive website allows users to examine species, fisheries, areas and years of interest, highlighting where further research, observer coverage and management may be appropriate.

5.6 Future tuna RFMO engagement

There are a range of challenges to address when considering future cross RFMO engagement in BMIS. Presently the focus is on the WCPFC and t-RFMOs. There is arguably a clear need for a platform such as BMIS although there will inevitably be differing views on the best ways to present, maintain and access the relevant information.

One approach to obtaining better engagement across RFMOs is to seek, initially, a joint t-RFMO approach. Through that process a 'bycatch contact' could be identified at each RFMO with responsibility for communicating on BMIS and developing it, essentially forming a joint t-RFMO steering group. Through the new platform for BMIS we have the ability to provide layered administration rights. A person at each RFMO could join the Zotero group library and add in scientific meeting papers and new or revised regulations, or at least ensure all meeting documents have embedded meta-data to make entry in reference management software more efficient. Approaches such as this obviously have resourcing implications which will need to be addressed.

6 Recommendations

We invite WCPFC-SC13 to:

- note that Bycatch Management Information System (BMIS) was launched with an all new interface in May 2017 and the site provides a portal to >1000 curated references, species identification and safe release guides;
- visit the new site at www.bmis-bycatch.org and give feedback (errors, missing or out-of-date information) or make contributions to info@bmis-bycatch.org;
- discuss the future developments for BMIS proposed in this paper, and consider future WCPFC resourcing of BMIS; and
- follow @bmis_bycatch on Twitter now.

7 Acknowledgements

The authors would like to thank the Common Oceans (ABNJ) Tuna Project for its funding of the redevelopment of BMIS.

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Appendix One

Screenshot from the Common Oceans web page <http://www.fao.org/in-action/commonoceans/news>

Common Oceans - A partnership for sustainability in the ABNJ

Home Background Projects **News** Calendar Documents

WCPFC launches all-new Bycatch Management Information System (BMIS) web portal

4 May 2017 5 May 2017 | Pohnpei. On the eve of two major fisheries meetings for the Eastern and Western Pacific, the *Western and Central Pacific Fisheries Management Commission (WCPFC)*, with funding from the Common Oceans ABNJ Tuna Project, has launched an all-new web portal for exploring past and present efforts to tackle critical bycatch issues. The Bycatch Management Information System (BMIS) will be presented to participants in the Inter-American Tropical Tuna Commission's Scientific Advisory Committee (IATTC-SAC) in San Diego and the Forum Fisheries Committee (FFC) in Canberra, both meeting from 8-12 May 2017.

Bycatch in tuna fisheries is the collateral damage that is caused by fishing gear to non-target species such as seabirds, sea turtles, marine mammals and sharks. In many cases these species are already severely threatened from a variety of activities, creating an urgent need to manage and mitigate impacts from fishing. Streamer lines that deter seabirds, leader materials that allow sharks to bite through, and baits and hooks that are less likely to attract and injure sea turtles are currently deployed in some fisheries. How well do these mitigation measures work in practice? Are the mortality rates now low enough to allow bycatch populations to be sustained? Unfortunately, these questions remain largely unanswered in tuna fisheries and there are no universal quick fixes in sight.

Now enhanced with an engaging, user-friendly interface, today's new launch of the BMIS allows searching of over 1000 curated references by species group, fishing gear or mitigation technique, and provides pointers to species identification and safe release guides. The new BMIS also helps users – ranging from scientists to managers to fishers to the general public – explore management options by linking to information on interaction rates and population status. A built-in blog feature, 'Bycatch Bytes', provides an easy way to keep up-to-date on the latest developments in bycatch reduction.

Bycatch Management Information System

Learn about the issues and help find solutions by exploring the all-new BMIS at www.bmis-bycatch.org. Additional content will be coming online through late 2018 including databases, maps and shark tagging meta-data. User contributions in the form of information and feedback are always welcome and can be sent to the BMIS Coordinator at info@bmis-bycatch.org.

The BMIS has been developed for the Western and Central Pacific Fisheries Management Commission (WCPFC) by the Pacific Community (SPC) with the support of the Food and Agriculture Organization of the United Nations (FAO) under the Common Oceans ABNJ Tuna Project funded by the Global Environment Facility (GEF). This Project harnesses the efforts of a large and diverse array of partners, including the five tuna Regional Fisheries Management Organizations (RFMOs), governments, inter- and non- governmental organizations, and the private sector to achieve responsible, efficient and sustainable tuna production and biodiversity conservation.

Western and Central Pacific Fisheries Commission Pacific Community Communauté du Pacifique gef COMMON OCEANS