TURTLE RESEARCH AND MONITORING DATABASE

A TREDS of summary Pacific turtle data recorded from 1970 to 2018

EUROPEAN UNION

Sweden
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PEUMP
Pacific-European Union Marine Partnership Programme

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SPREP
Secretariat of the Pacific Regional Environment Programme

PO Box 240, Apia, Samoa
T: +685 21929 E: sprep@sprep.org W: www.sprep.org

Our vision: A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures.

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FOREWORD

The datasets used in the generation of maps and tables, and figures were extracted from the Turtle Research and monitoring Database System (TREDS). Through mostly voluntary efforts from various government and non-government organisations, SPREP is able to generate turtle reports to update its members.

This report is published under the guidelines provided in the Data Sharing and Exchange Policy where SPREP is tasked to publish TREDS reports on a regular basis to inform its Members. The raw turtle data in its entirety is stored in TREDS and is managed and maintained by the Turtle Database and Conservation Officer. Ownership of the raw turtle data belongs to the various organisations who voluntarily submit their turtle data to TREDS.

This report's main objective is to inform, update and provide a summary of the turtle data stored in TREDS.

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1. INTRODUCTION

1.1. OBJECTIVE

The purpose of this report is to provide an overview of the data contained within TREDS since its development up until its upgrade to a web-based online database platform. The last TREDS Annual Report was published in 2009 with subsequent Country reports published until 2015.

The Tables and Figures generated from this dataset must be interpreted with the understanding that data submission is on a voluntary basis and that the data in TREDS for each country is from the contributions of various organisations conducting turtle conservation activities, often on a voluntary basis. Data available is highly dependent on this and many other factors, including capacity, capability, personnel and financial support.

1.2. BACKGROUND INFORMATION

The Turtle Research and monitoring Database System (TREDS) was developed in 1993, to allow members of the Secretariat of the Pacific Regional Environment Programme (SPREP) to store, collate, and organise their data for research, monitoring and reporting. This tool is intended to assist members in making informed decisions regarding turtle conservation in the region. The dataset extracted from TREDS is from 1970 to 2018 and has been manipulated for the chapters covered in this report. The difference in dates for the establishment of TREDS in 1993 and the beginning of the date of the dataset of 1970 is simply due to users submitting their existing turtle data from 1970 once the database was launched in 1993, since many users saw the importance of TREDS as a lepository for storing their historical turtle data that was probably stored in paper format or on computers that would be susceptible to corruption or crashes.

In recent years use of the database appeared to have declined and this was confirmed when a survey of TREDS Users was conducted. Results suggested that the database was not easily accessible, difficult to navigate and not user-friendly. In 2020, work commenced to upgrade the database from an offline-based Platform using MS Access, to a web-based Platform. The upgrade was intended to make the database more accessible, its features more streamlined and greatly improve the User Interface (UI) and User Experience (UX). It would remove any need for members to download and install a separate database onto their local systems, which may not have the capacity or capability to accommodate such a large database. Additionally, this could mean that the branch database would be prone to data loss due to deletion or computer malfunction. The online platform would be more streamlined, giving members the versatility to access, and extract data for further analysis from anywhere at any time with an internet connection and not be burdened with having to download large files or worry about data loss. As turtle tagging and monitoring surveys are conducted in some of the most remote places in the region with limited or no network coverage an Offline Data Entry Application was created, to allow accurate data recording and collation in the field. The App could be installed and is compatible with all handheld devices such as mobile phones, tablets, or laptops. Once turtle monitors are able to access the internet, they can synchronise the Offline Data Entry App to TREDS and upload their data without the need to re-enter it into the database. An additional feature of the app is to allow Users to save a backup of their data from the App to a storage device for safekeeping in the event the data on the app is lost before it is uploaded to TREDS.

It is worth noting here that tagging turtles is just one tool used for monitoring of turtles, their status, trends and conservation. SPREP has also recently produced a 'Sea Turtle Monitoring Manual: a guide to selecting appropriate tools for basic sea turtle research and monitoring in the Pacific Region'. Members are encouraged to read this before embarking on any new turtle monitoring activities.

1.3. HISTORY OF TREDS

1.3.1. EARLY ESTABLISHMENT

SPREP's Regional Marine Turtle Conservation Programme started in 1990 with one of its main objectives being to establish a regional marine turtle database for Pacific Island Countries and Territories conducting turtle conservation activities. The Turtle Research and monitoring Database System (TREDS) was created in 1993 with assistance from the Queensland Department of Environment and Heritage in Australia who then transferred TREDS to SPREP in 1994. The database has been incrementally upgraded with financial assistance from the Western Pacific Regional Fishery Management Council (WPRFMC), the South-East Asia Fisheries Development Centre (SEAFDEC), the Pacific Community (SPC), the Queensland Department of Environment, Science and Innovation, The US National Oceanic Atmospheric Administration (NOAA), the National Marine Fisheries Service (NMFS) and the Marine Research Foundation (MRF).

1.3.2. UPGRADE FROM MS ACCESS TO DRUPAL

On August 2020, SPREP in partnership with the consulting company Eighty Options started upgrading TREDS from its existing Microsoft Access platform to an online platform called Drupal. This made TREDS and online-based database system that was hosted at SPREP. The upgrade of TREDS was a result of an aging database that required advanced knowledge and skill to fully utilise and to incorporate feedback provided by TREDS users from a survey conducted in 2007 on the overall functionality of TREDS. This latest upgrade of TREDS was possible through funding from the European Union and Government of Sweden funded Pacific-European Union Marine Partnership (PEUMP) Programme through its By-catch and Integrated Ecosystem Management (BIEM) Initiative and the French Ministry of Foreign Affairs small Grants Programme, Fonds Pacifique.

The main objectives for the first stage were the:

- migration of all historical TREDS data from the old database to the new database enabling a continuation of data recording;
- Creation of an offline data entry application linked to TREDS to streamline data entry and mitigate the challenge of areas with no internet connection;
- Addition of new data capture, data management; and
- Improvement of data extraction functionality and features.

The new web-based database went Live and became accessible to all SPREP Members on 31 March 2021.

Following this, it was noted by SPREP that there was a need for additional features to be incorporated into TREDS, which would warrant a second stage to provide additional upgrades to TREDS and its Offline Data Entry Application. This would make it more intuitive, streamline the overall functionality of the database and improve its User Interface and User Experience. This second stage was completed and was incorporated directly into the live database on 30 March 2022.

1.4. Data Sharing and Exchange Policy (DSEP)

A TREDS Data Sharing and Exchange Policy (DSEP) was created under Action 8.1 outlined in the Regional Marine Species Programme (2008-2012) to ensure appropriate management of the database and protocols to access the data. The DSEP was to ensure a framework for data access, exchange and sharing between SPREP, its Members and any collaborative Partners involved.

The Policy respects and confers ownership of the turtle data stored in TREDS to its respective owners with SPREP's role to host, manage and maintain the database and facilitate any data sharing, exchanges, and provide technical support.

2. TAG INVENTORY

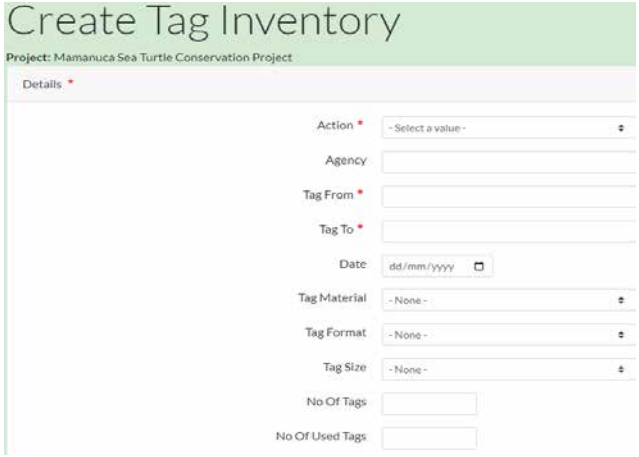
Within the new database there is now a Tag Inventory which has been designed to allow individual organisations to manage, maintain as well as audit their respective tag inventories ensuring their stock of tags is well managed. Previously, tags have been lost or deployed without their status being updated into the database, making the tracking of tags difficult. The Tag Inventory has been modified so that it is mandatory for organisations to input their Tag numbers into the database before they can upload any turtle data associated with that particular tag when it is deployed.

2.1. TYPES OF TAGS

Turtle tagging involves using some form of tag to be attached to the turtle to allow scientists or turtle monitors to identify a specific turtle when it is encountered and recaptured. Other tags allow researchers to track turtles via satellite to determine their movements so that scientists can have a better understanding of the journey turtles undertake. The types of tags used to identify turtles and additional information are quite diverse and are sometimes determined by other factors such as funding and availability of tags. Table 1 lists a few commonly used turtle tags that have been recorded in TREDS.

Table 1: Different types of tags used for tagging turtles during turtle monitoring surveys

Tag type	Tag Material	Other information
Electronic	**Metal/plastic**	A tag usually attached to the carapace of the turtle that has satellite tracking capability, sending signals to a satellite of the turtle's movement on a regular basis. Highly accurate tracking, but expensive.
Genetic sampling	**Animal DNA**	A newly developed way of tracking turtles by utilising DNA to track turtles. Cheaper than other forms of tagging, requires sophisticated knowledge and facilities to conduct analysis of DNA. However, collection is relatively easy.
Inconel	**Metal alloy**	A metal alloy used to tag mainly juvenile turtles as they are smaller in size. Applied to the flipper of a turtle using a set of pliers called an Applicator. Data dependent on repeat sightings, but cheaper than a satellite tracker.
Titanium	**Metal**	Tags mainly used for tagging adult turtles as they are larger in size. Attaches to the flipper of a turtle using an Applicator. Data dependent on repeat sightings, but cheaper than a satellite tracker.
Other	**Metal/plastic**	Other flipper tags made from different materials including plastic
Photo ID	**Pictures**	Scientists are also using Photo IDs to identify and track turtles by taking photos of the sides of the turtle's head. Each turtle has a distinct pattern on the side of its head making it easy to identify using photos. Easy and non-invasive, must be up close to the turtle in order to take photo, which is difficult if the turtle is in the water.



2.2. DATA ENTRY FOR TAGS

The new TREDS platform will now require organisations that receive tags to record their tags in the database before they are deployed for tagging turtles. If the tags are not recorded in TREDS, these tags and their corresponding turtle data will not be recognised and stored by TREDS. Figure 1 displays information that an organisation needs to complete to add their tags into their respective tag inventories.

Table 2 shows the total number of tags recorded by country in TREDS between 1970 – 2018. Most tags are unaccounted for in the database. A total of 4,609 (3.6%) tags have been recorded in TREDS as deployed (Table 2). It is likely that many of these tags including tags distributed by SPREP have been deployed for turtle monitoring but were not recorded in TREDS as "Tags Deployed". To assist with this challenge, the new set up within TREDS requires organisations to input tags to their Tag Inventory before the database can accept any data associated with the tags.

Table 2: A summary of tags recorded in TREDS by country divided into Tags received by each country and tags that have been recorded as used or deployed

Country	Number of Projects	Total Tags recorded	Total Tags deployed	Total Tags unused
American Samoa	1	918	281	637
Australia	1	215,811	91	215,720
Commonwealth of the Northern Mariana Islands	1	2,926	1,147	1,779
Cook Islands	2	1,626	46	1,580
Federated States of Micronesia	1	13,697	1,175	12,522
Fiji	6	5,401	646	4,755
French Polynesia	1	8,626	2,545	6,081
Guam	1	280	60	220
Hawaii	1	4,873	2	4,871
Kiribati	2	1,195	302	893
Nauru	0	0	0	0
New Caledonia	4	9,211	2,936	6,275
New Zealand	1	199	20	179
Palau	2	4,725	1,423	3,302
Palmyra Atoll (US)	1	437	210	227
Papua New Guinea	6	98,201	1,177	96,024
Philippines	1	18,600	6	18,594
Republic of the Marshall Islands	1	1,433	214	1,219
Samoa	1	1,666	457	1,209
Solomon Islands	4	11,699	2,279	9,420
Tokelau	1	150	0	150
Tonga	1	719	26	693
Tuvalu	1	950	90	860
Vanuatu	2	18,855	4,609	14,246
SPREP	3	124,465	53	124,412
TOTALS	**46**	**546,663**	**19,795**	**525,868**

3. Species Distribution and Status

3.1. Species distribution

Six marine turtle species are found in the Pacific region with the green and hawksbill turtles being the most widely distributed followed by loggerhead, leatherback, flatback and olive ridley turtles in decreasing abundance (Pilcher, 2021). In contrast, to green and hawksbill turtles, the flatback turtle is known to only nest in Australia and forage in Papua New Guinea (Table 3).

Table 3: Marine turtle species encounters in the Pacific region extracted from the Pacific islands marine species programme (PIRMSP) 2022-2026

Species	AS	AU	CI	FS	FI	FP	GU	KI	MI	NA	NC	NZ	NI	NM	PA	PG	SA	SI	TK	TO	TU	VA	WF
Flatback turtle *Natator depressus*		x														*							
Green turtle *Chelonia mydas*	x	x	x	x	x	x	x	x	x	*	x	*	*	x	x	x	*	x	x	x	x	x	x
Hawksbill turtle *Eretmochelys imbricata*	x	x	*	*	x	x	*	*	x	*	*	*	*	*	x	x	x	x	x	x	*	x	x
Leatherback turtle *Dermochelys coriacea*	*	x	*	*	*	*	*		*		*	*			*	x	*	x		*	*	x	*
Loggerhead turtle *Caretta caretta*		x	*		*	*			*		x	*	*			*	*		x	*	*	x	*
Olive ridley turtle *Lepidochelys olivacea*	*	x		*		*			*		*	*			*	x		x				*	

x = nesting; * = encountered in EEZ waters

3.2. Species status

Marine turtles are observed in the Pacific region and globally as species that must be conserved. The status of all marine turtles that are found in the Pacific are listed in the IUCN Red List as species that are threatened with extinction.

Table 4: IUCN Red List status for marine turtle species found in the Pacific region extracted from the Pacific islands marine species programme (PIRMSP) 2022-2026

Turtle species	IUCN Red List status
Flatback turtle *(Natator depressus)*	Data deficient (Global listing)
Green turtle *(Chelonia mydas)*	Endangered (Global listing)
Hawksbill turtle *(Eretmochelys imbricata)*	Critically Endangered (Global listing)
Leatherback turtle *(Dermochelys coriacea)*	Critically Endangered (Western Pacific Regional listing)
Loggerhead turtle *(Caretta caretta)*	Vulnerable (Global listing)
Olive ridley turtle *(Lepidochelys olivacea)*	Vulnerable (Global listing)

Additionally, the Convention for the International Trade of Endangered Species of Flora and Fauna (CITES) lists all marine turtles in the Pacific region in Appendix I, which states all international trade of marine turtles is prohibited.

The Convention for Migratory Species (CMS) also lists marine turtle species in Appendices I and II.

- Appendix I: 'migratory species that have been assessed as being in danger of extinction throughout all or a significant proportion of their range'
- Appendix II: 'migratory species that have an unfavourable conservation status and that require international agreements for their conservation and management, as well as those that have a conservation status which would significantly benefit from the international cooperation that could be achieved by an international agreement'

4. Genetics

The use of genetics is one of the new techniques utilised by scientists in conjunction with existing turtle databases to better trace the origins of marine turtles. Although it requires specialists and sophisticated infrastructure to conduct genetic analyses, more genetics-based research and monitoring activities are becoming prominent in the region. One of the uses for this technique is for tracing the origins of turtle products that are being illegally sold such as jewellery made from turtle shell. DNA analysis obtained from samples of turtle products can be used to trace where the turtle was illegally captured (Madden Hof and Jensen, 2022). The ShellBank project is at the forefront of utilising turtle DNA for such a purpose. https://shellbankproject.org/

The most common genetics data recorded in TREDS is tissue data, which have been conducted in-country and sent overseas for analysis. The countries that have recorded genetics data in TREDS between 1970 – 2018 are American Samoa, Federated States of Micronesia, Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu. Genetics is still a new avenue in turtle conservation, but it will likely increase as more countries become involved. Genetic sampling yields results within a matter of weeks or months as compared to conventional tagging, which can take a few years to yield the same results.

5. Nesting

Turtle nesting data is primarily collected and recorded by turtle monitoring teams conducting turtle surveys during their respective turtle nesting seasons. The data collected from these nesting surveys make up most of the turtle data recorded in TREDS. It should be taken into consideration that the nesting data recorded in TREDS is not continuous and may not reflect the actual number of nesting turtles in each country or in the region as a whole.

5.1. Data extraction

The dataset extracted from TREDS focuses on nesting encounters where the tagging status of the encountered turtle is labelled as P – Primary Tagged, no tag scars = 1st time tagged in TREDS. This refers to an encounter with a turtle during the survey where the turtle was tagged for the very first time. The objective of this data extraction is to minimise repetition of counting a nesting turtle more than once during the same or subsequent nesting seasons where the turtle was tagged and then recaptured during the same nesting season (turtles generally renest several times during a season).

The nesting maps should be interpreted with the following thoughts in mind. The number of nesting encounters submitted by countries to TREDS does not necessarily reflect the actual number of turtles that are nesting at that particular site or country. Long-term turtle monitoring cannot be sustained by Members due to numerous factors such as financial and technical support and staff capacity. Thus, the data submitted to TREDS reflects sampling effort.

5.2. Green turtle nesting

The green turtle nesting encounters that were submitted to TREDS indicates that a number of countries are destinations for green turtles during the nesting season (Figure 2). These countries include American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Palau, Papua New Guinea, Republic of the Marshall Islands, Solomon Islands, Tuvalu and Vanuatu. The Federated States of Micronesia and New Caledonia have more than 500 encounters of green turtles where they were tagged for the first time during the nesting season.

Maison et al. (2010) provides a comprehensive table and map of all nesting encounters for green turtles in the Pacific region and it follows a similar pattern to the nesting map generated using the TREDS data (Figure 2). Additionally, Maison et al. (2010) noticed that countries with full or strong legal protection for green turtles and are more developed countries generally have larger nesting numbers while countries with weaker or less effective regulations to protect green turtles have lower nesting numbers.

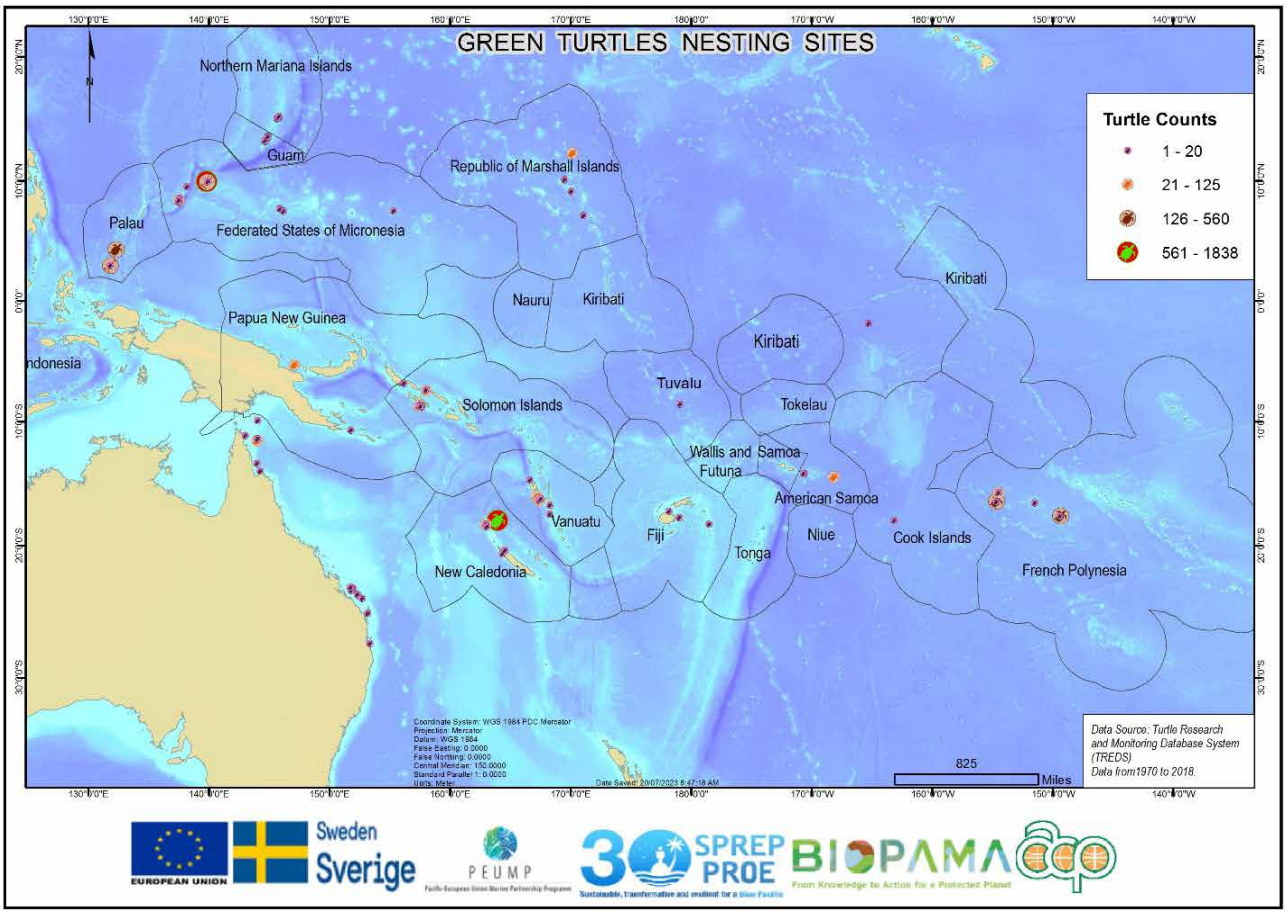


Figure 2: Green turtle nesting sites utilising geospatial data submitted to TREDS by different government and non-government organisations. The map is generated using encounters only recorded as 'P – Primary Tagged, no tag scars = 1st time tagged'.

5.3. Hawksbill turtle nesting

Mortimer & Donnelly (2008) stated that the hawksbill turtle has been recorded nesting in 70 different countries, in the tropical and sub-tropical regions. In the Pacific, the Solomon Islands has the largest number of nesting females in Melanesia (Mortimer & Donnelly, 2008) with signs of recovery since the establishment of the Arnavon Community Marine Conservation Area (Hamilton et al. 2015 in Jim et al. 2022).

The hawksbill turtle nesting encounters that were submitted to TREDS from 1970 – 2018 that fit the dataset criteria shows that the majority of the nesting encounters were recorded and submitted by Solomon Islands, Vanuatu and Fiji (Figure 3). All countries that recorded hawksbill turtles being tagged for the first time during the nesting season were American Samoa, Australia, Federated States of Micronesia, Fiji, Guam, Palau, Papua New Guinea, Samoa, Solomon Islands and Vanuatu.

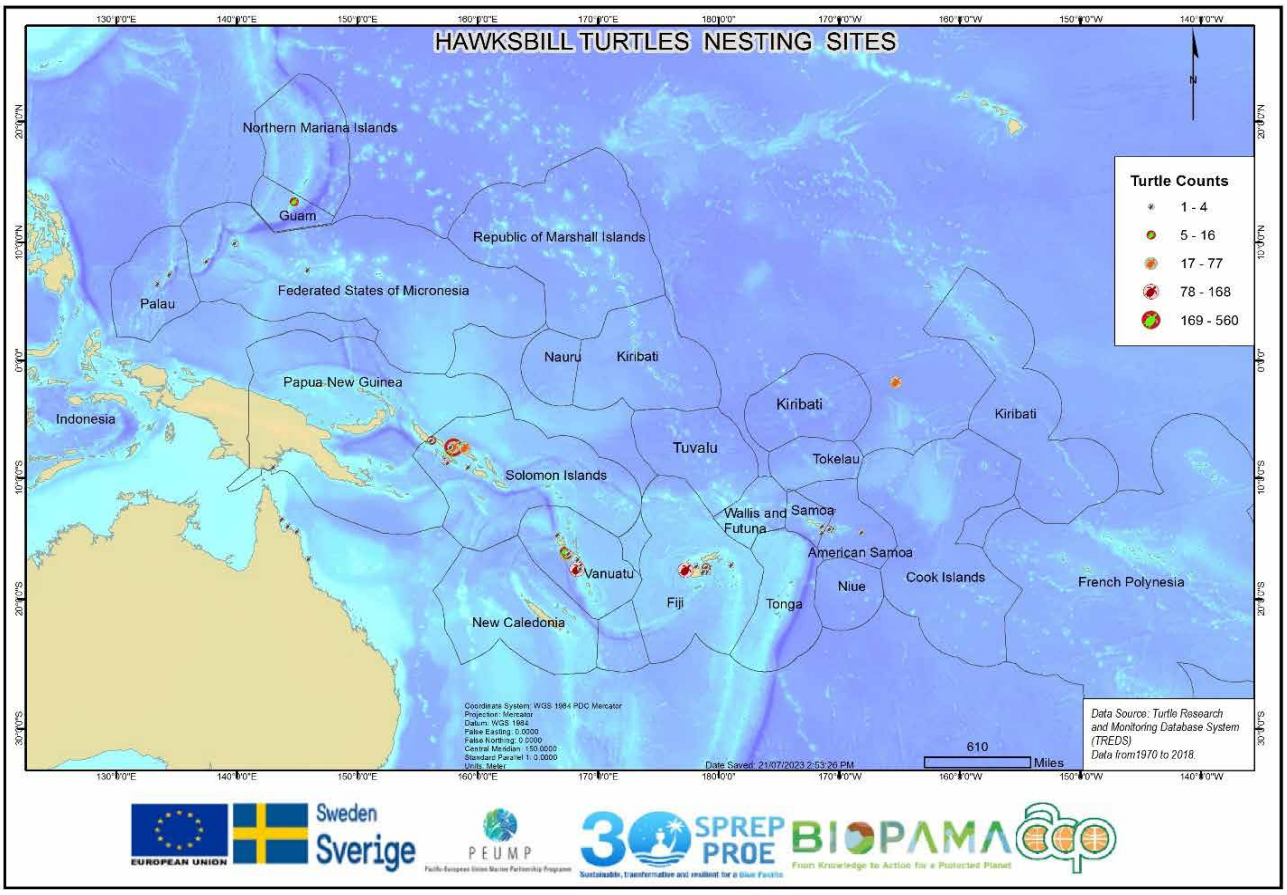


Figure 3: Hawksbill turtle nesting sites utilising geospatial data submitted to TREDS by different government and non-government organisations. The map is generated using turtle encounters recorded as 'P – Primary Tagged, no tag scars = 1st time tagged'.

5.4. Leatherback turtle nesting

The Western Pacific population of leatherback turtles is Critically Endangered due to a variety of anthropogenic impacts including by-catch in fisheries. Leatherback turtles that were tagged for the first time during the nesting surveys from 1970 – 2018 shows that Papua New Guinea, the Solomon Islands and Vanuatu are hotspots for leatherback turtle nesting with Papua New Guinea submitting the majority of these nesting encounters. No data is available for Australia or Indonesia, which Pilcher (2021), mentions are also other nesting sites for leatherbacks in the Western Pacific Regional Management Unit (RMU) and as indicated in Table 3. Work et al. (2020) stated that leatherback turtles not only nest in the northern coast of Papua New Guinea but have also nested along the southern coast. Work et al. (2020) also states that for the Solomon Islands there are three (3) major islands where leatherback turtles' nest, Sasakalo in Santa Isabel Island, Tetepare Island and Zaira beach in Vangunu Island, while the Votlo and Epi Islands in Vanuatu have been recorded as important nesting sites for leatherback turtles.

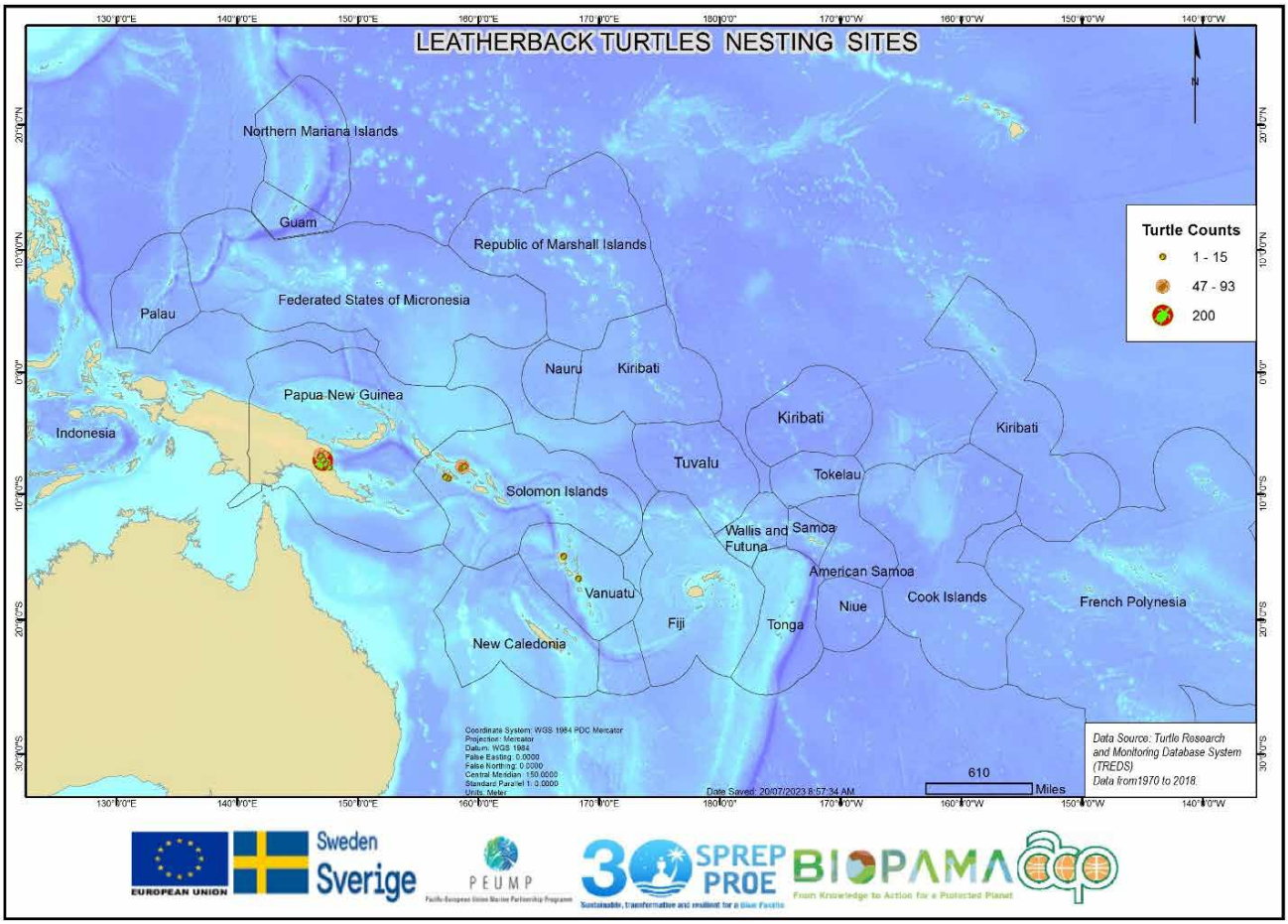


Figure 4: Leatherback turtle nesting sites utilising geospatial data submitted to TREDS by different government and non-government organisations. The map is generated using turtle encounters recorded as 'P – Primary Tagged, no tag scars = 1st time tagged.

5.5. Loggerhead turtle nesting

Loggerhead turtles that were encountered and tagged for the first time were recorded in the Solomon Islands and Australia (Figure 5). In Table 3, loggerheads are also known to nest in New Caledonia, Tokelau, and Vanuatu, which is corroborated by Work et al. (2020) on their summary of the South Pacific Regional Management Unit (RMU) *Caretta caretta*, South Pacific (CC-S PAC).

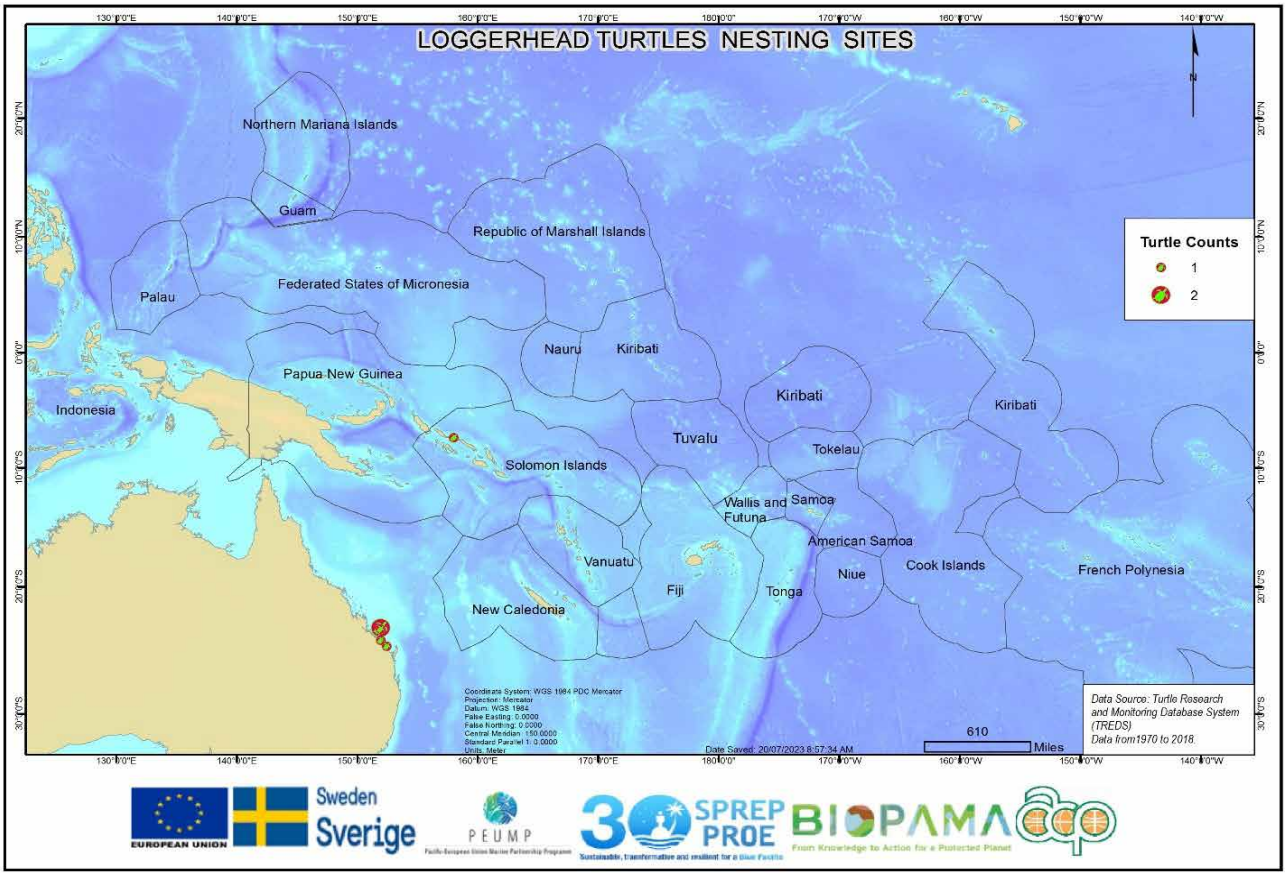


Figure 5: Loggerhead turtle nesting sites utilising geospatial data submitted to TREDS by different government and non-government organisations. The map is generated using turtle encounters recorded as 'P – Primary Tagged, no tag scars = 1st time tagged.

5.6. Olive ridley turtle nesting

Olive ridley turtles are known to nest more frequently in the eastern Pacific than in the western Pacific, (Pilcher, 2021). Countries where encounters of olive ridleys have been infrequently nesting include Australia, Papua New Guinea, and Solomon Islands. Additionally, Work et al (2020) mentioned nesting occurrences have been recorded in Kiribati and Vanuatu, but no trend of nesting activities is evident. Pilcher (2021) mentions that the Federated States of Micronesia, Republic of the Marshall Islands and the Philippines are where olive ridley nesting encounters have also occurred but likely amounts to single nesting encounters as compared to the mass nesting encounters observed in the eastern Pacific. The map (Figure 6) shows that only one encounter of an olive ridley nesting was recorded where the turtle was tagged for the first time in Vanuatu.

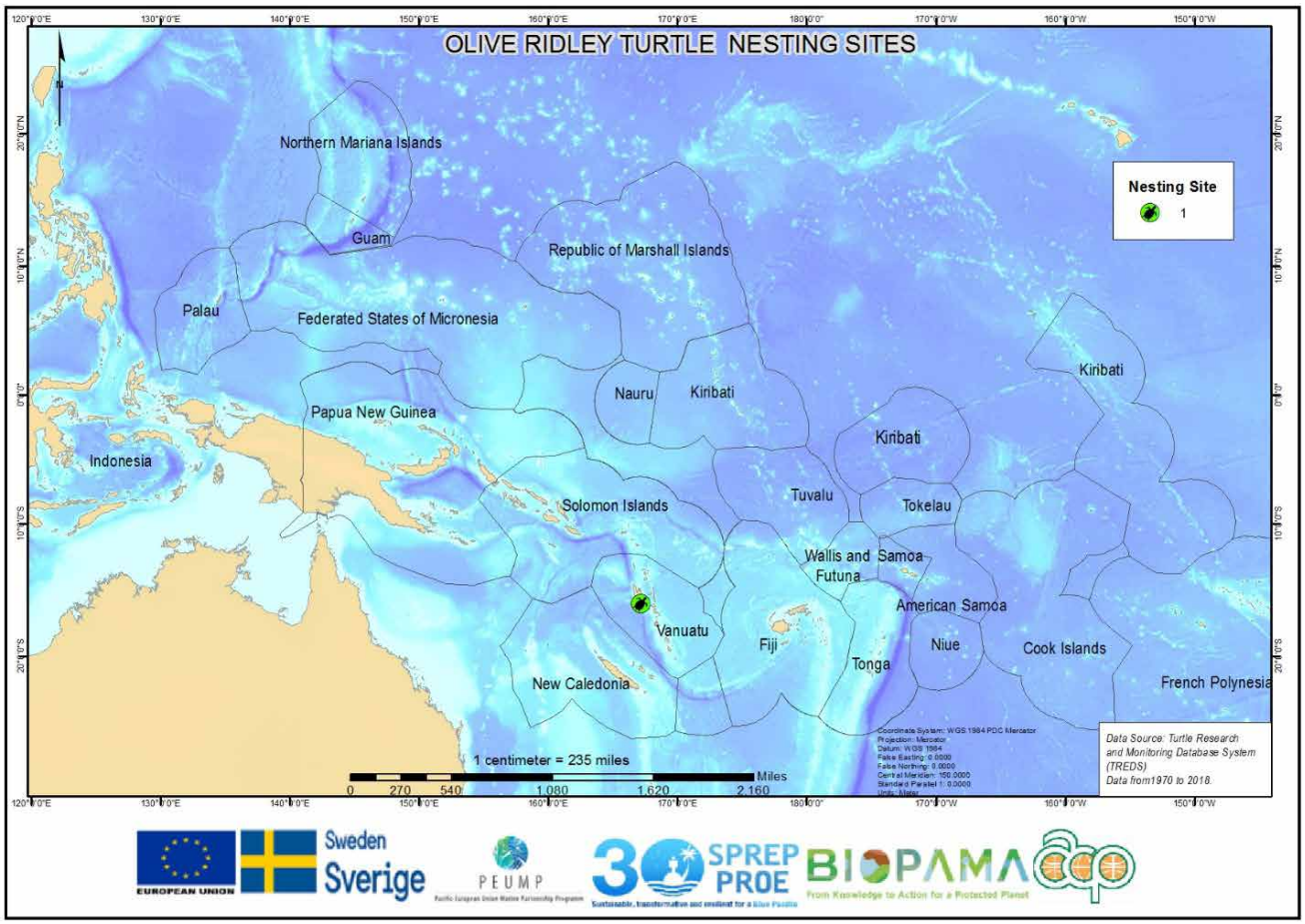


Figure 6: Spatial representation of olive ridley turtle nesting encounters recorded in TREDS where the turtle was tagged for the first time from 1970 – 2018.

5.7. Unidentified turtle nesting

Nesting encounters for turtles where the turtle was tagged for the first time but not positively identified, can be a gap in the database. Figure 7 shows where the majority of unidentified turtles were tagged for the first time during the nesting surveys from 1970 – 2018. Turtles that are not positively identified in the field can be related to many factors and can be interpreted as a need for further capacity building and development to ensure turtle monitors are able to identify turtles confidently, which may be mitigated with the availability of turtle IDs. Photographs taken at the time can also enable the turtle to be identified later.

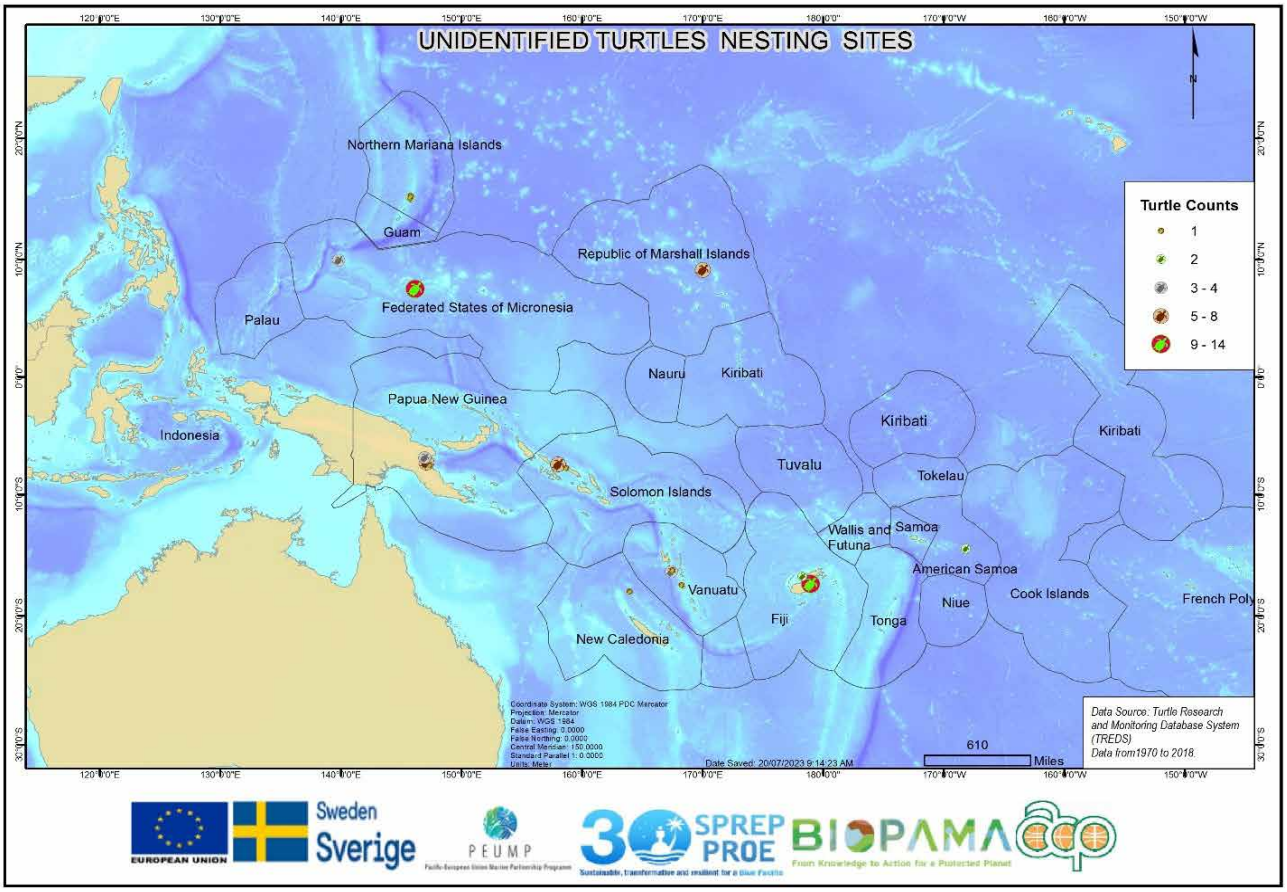


Figure 7: Geospatial representation of nesting encounters recorded in TREDS from around the region where identification of the turtles that were tagged for the first time was not recorded.

6. Foraging

Foraging data that has been recorded in TREDS is essentially turtle data collected through turtle monitoring surveys conducted outside of the turtle nesting season but does not include market surveys or where turtle encounters are unique. The difference between foraging encounters and unique encounters, is that foraging encounters are recorded by turtle monitors through turtle monitoring surveys or activities, while unique encounters are those encounters conducted on an ad-hoc basis.

6.1. Data extraction

Foraging encounters where the turtle encountered has a tagging status of the encountered turtle is labelled as 'P – Primary Tagged, no tag scars = 1st time tagged in TREDS'. This refers to an encounter with a turtle during the survey where the turtle was tagged for the very first time. The objective of this data extraction is to generate maps of the region and provide an indication of where the different species of turtles are foraging so that more informed decisions and conservation measures can be made.

As mentioned in the Nesting Chapter, it is not possible to rule out that the only species of turtles recorded in TREDS are the only species that will be found to occur or forage in a particular country's Exclusive Economic Zone (EEZ). For example, a country records two (2) species of turtles foraging in its EEZ from its turtle monitoring activities. The assumption that only these two species forage in this country's EEZ is not possible unless long-term and consistent monitoring has been conducted. Additionally, the number of foraging encounters at a certain site should not be interpreted as a site that is frequented by marine turtles. For example, a site with over 100 turtle encounters, does not necessarily mean there are more green turtles foraging there than at a site with 20 turtle encounters. This is because turtles will frequent multiple foraging grounds and sampling effort may vary between sites and countries.

6.2. Green turtle foraging

Green turtles are the most widely distributed turtles encountered in the Pacific region (Pilcher, 2021) with many Member countries designated as nesting or foraging grounds or both (Table 3). In terms of Regional Management Units (RMUs) green turtles are found in the eastern Pacific, north central Pacific, northwest Pacific, south central Pacific and the west Pacific-east Indian Ocean (Pilcher, 2021).

The majority of countries using TREDS have submitted numerous green turtle encounters (Figure 8), with countries like Fiji, French Polynesia, Indonesia, Northern Mariana Islands, Solomon Islands and Vanuatu submitting an excess of 300 encounters per site in 1970 – 2018.

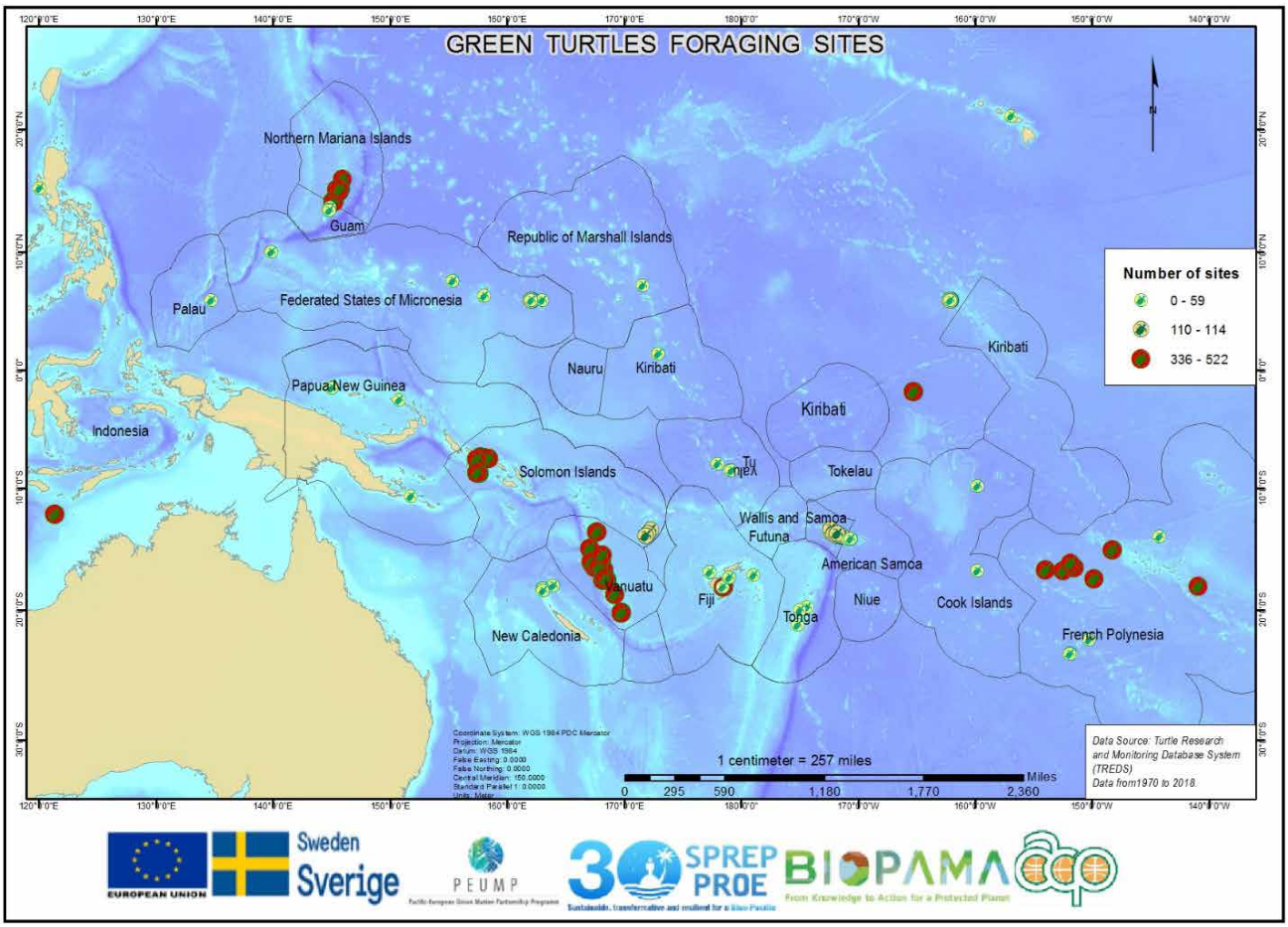


Figure 8: Almost every country from the eastern to the western Pacific has submitted green turtle foraging encounters to TREDS in the period 1970 – 2018 .

6.3. Hawksbill turtle foraging

Hawksbill turtles are the second most widely distributed species in the Pacific region after green turtles (Pilcher, 2021) with many countries designated as either nesting or foraging grounds or both for hawksbills (Table 3). The Regional Management Units for hawksbills are the north central Pacific, south central Pacific, west Pacific, west central Pacific, east Pacific and southwest Pacific RMUs (Pilcher, 2021). Fiji and Vanuatu submitted the most hawksbill foraging data (Figure 9) however, unlike green turtles, the majority of the hawksbill encounters recorded in TREDS are more centralised toward the equatorial region.

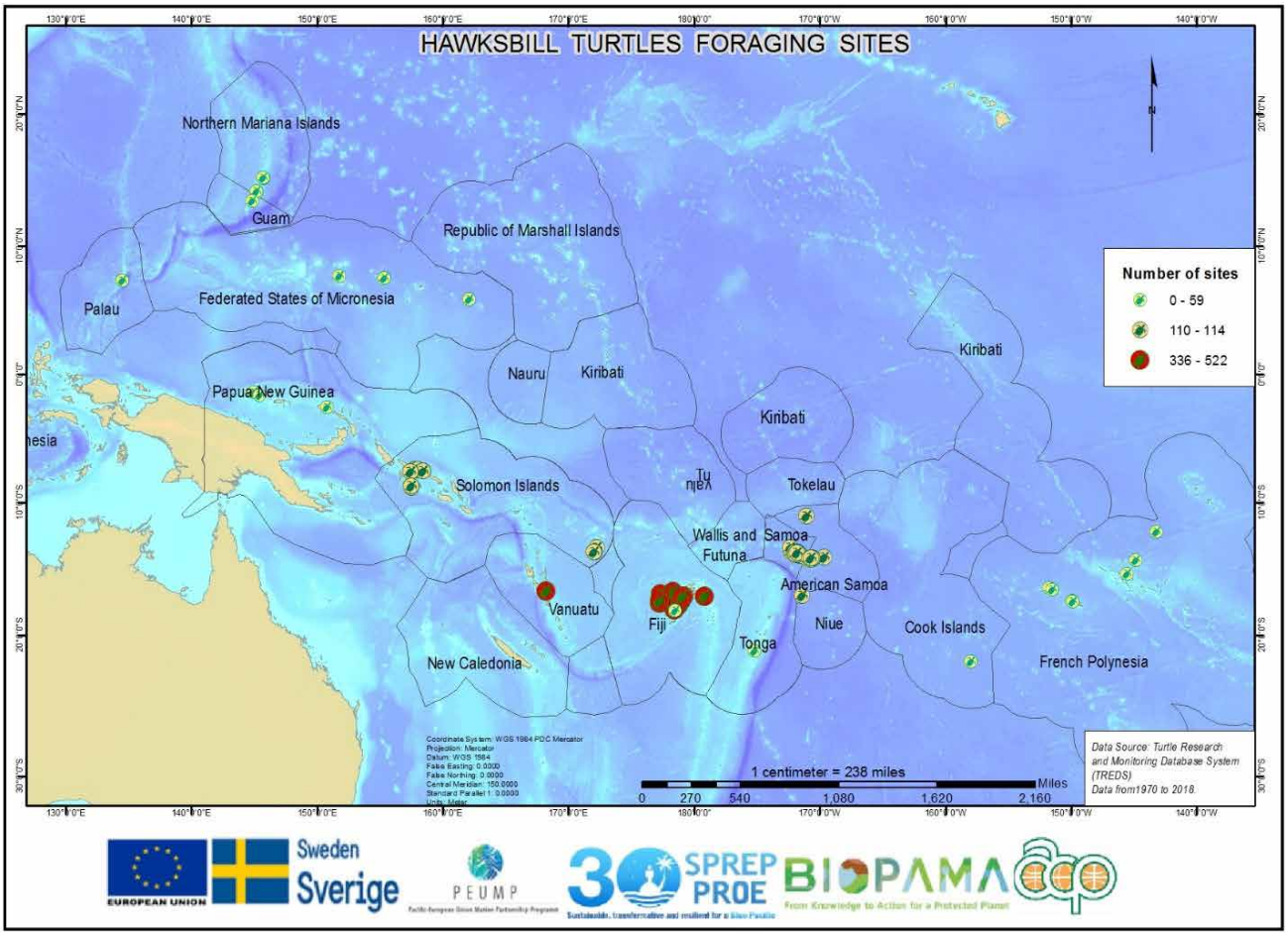


Figure 9: Foraging encounters for hawksbills being plotted to give a sense of distribution for hawksbill turtle foraging grounds according to the data submitted to TREDS by countries from 1970 – 2018.

6.4. Leatherback turtle foraging

Figure 10 depicts leatherback turtle foraging encounters recorded in TREDS, indicating that Vanuatu is the only country that recorded and submitted leatherback foraging encounters to TREDS. However, leatherbacks are known to forage in American Samoa, Palau and Vanuatu (Work et al. 2020). Additionally, leatherback occurrences have been recorded in the Cook Islands, Federated States of Micronesia, Fiji, French Polynesia, Guam, Marshall Islands, New Caledonia, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Wallis and Futuna in the Pacific region (Wallace et al. 2013). Recent by-catch and tracking data also indicate that leatherback turtles forage as far as New Zealand (Richard Hamilton pers. comm)

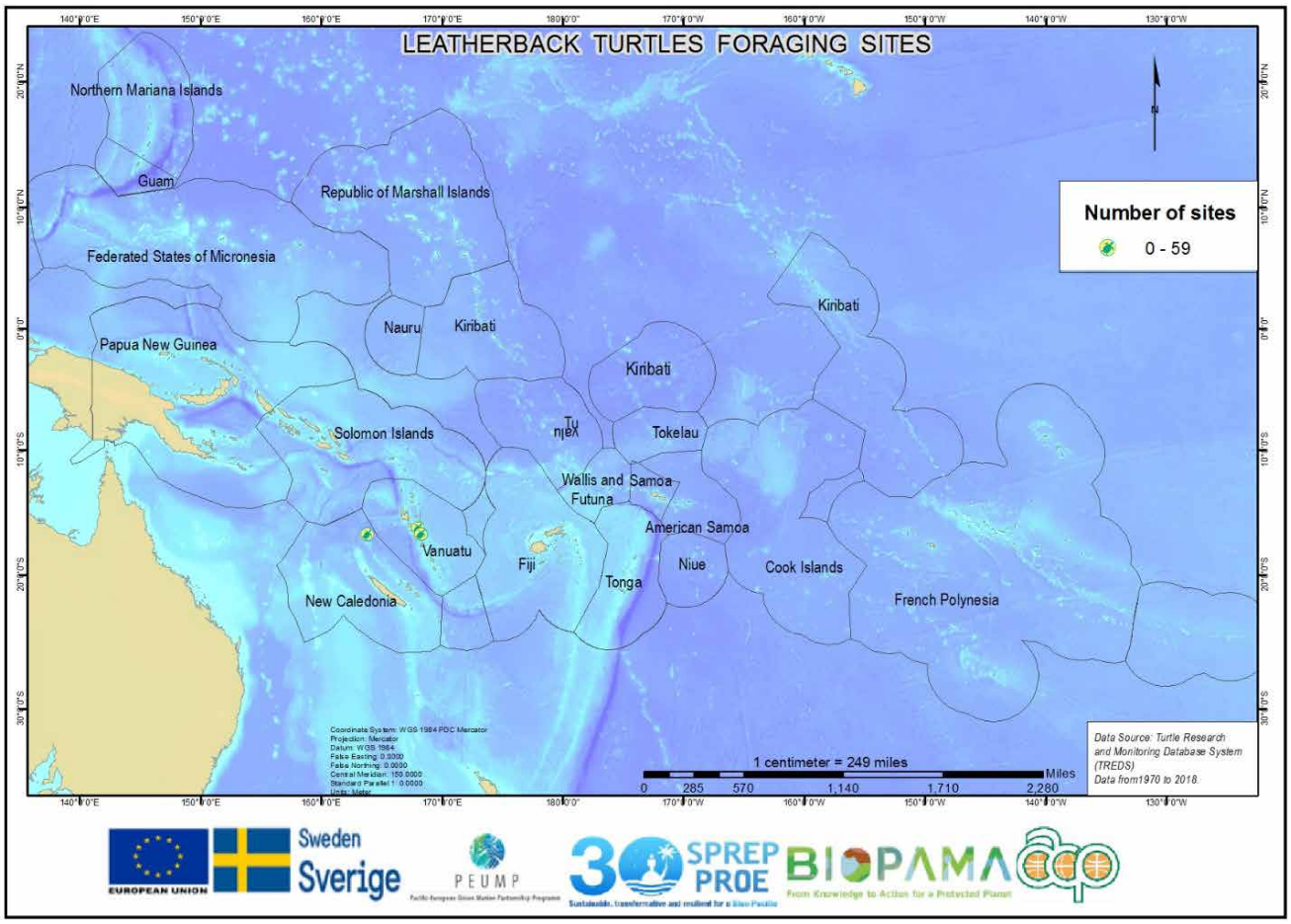


Figure 10 : Graphic representation of geospatial data extracted from TREDS to indicate foraging encounters for leatherback turtles submitted by countries from 1970 – 2018.

6.5. Loggerhead turtle foraging

Loggerhead turtles that were encountered during foraging surveys and recorded in TREDS were submitted by New Zealand, Palau and Vanuatu. Table 3 indicates that loggerheads have been encountered in the Cook Islands, Fiji, French Polynesia, Niue, Papua New Guinea, Republic of the Marshall Islands, Samoa, Tonga, Tuvalu and Wallis and Futuna, while Work et al. (2020) also includes Kiribati, Solomon Islands and New Caledonia as foraging grounds for loggerheads.

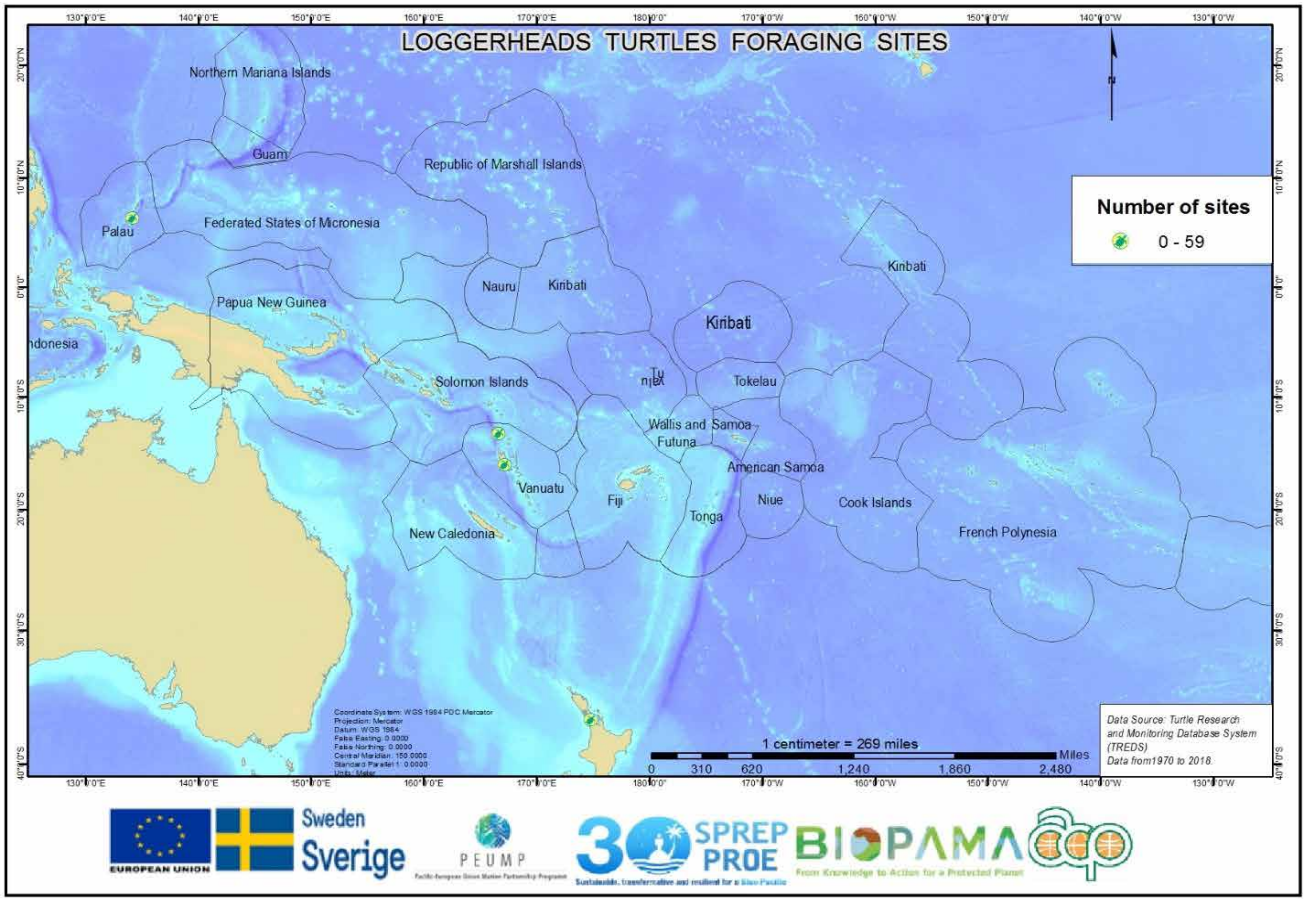


Figure 11: Graphic representation of geospatial data submitted to TREDS by countries of loggerhead turtles encountered during foraging surveys from 1970 – 2018.

6.6. Olive ridley turtle foraging

Olive ridley turtle occurrences excluding nesting occurrences (Table 3) have been reported in American Samoa, Federated States of Micronesia, French Polynesia, Marshall Islands, New Caledonia, New Zealand, Palau and Vanuatu with Palau submitting the most olive ridley foraging encounters to TREDS. Figure 12 shows olive ridley turtles encountered in the above-mentioned countries. Work et al. (2020) mentions Kiribati has olive ridleys foraging in its EEZ. As seen in the map and New Zealand , Papua New Guinea, Solomon Islands, Hawaii, and Palmyra Atoll, with pelagic foraging in the Federated States of Micronesia, New Caledonia, Republic of the Marshall Islands, Papua New Guinea, American Samoa, Hawaii and Vanuatu, while benthic foraging occurring in Kiribati, Palau and Vanuatu.

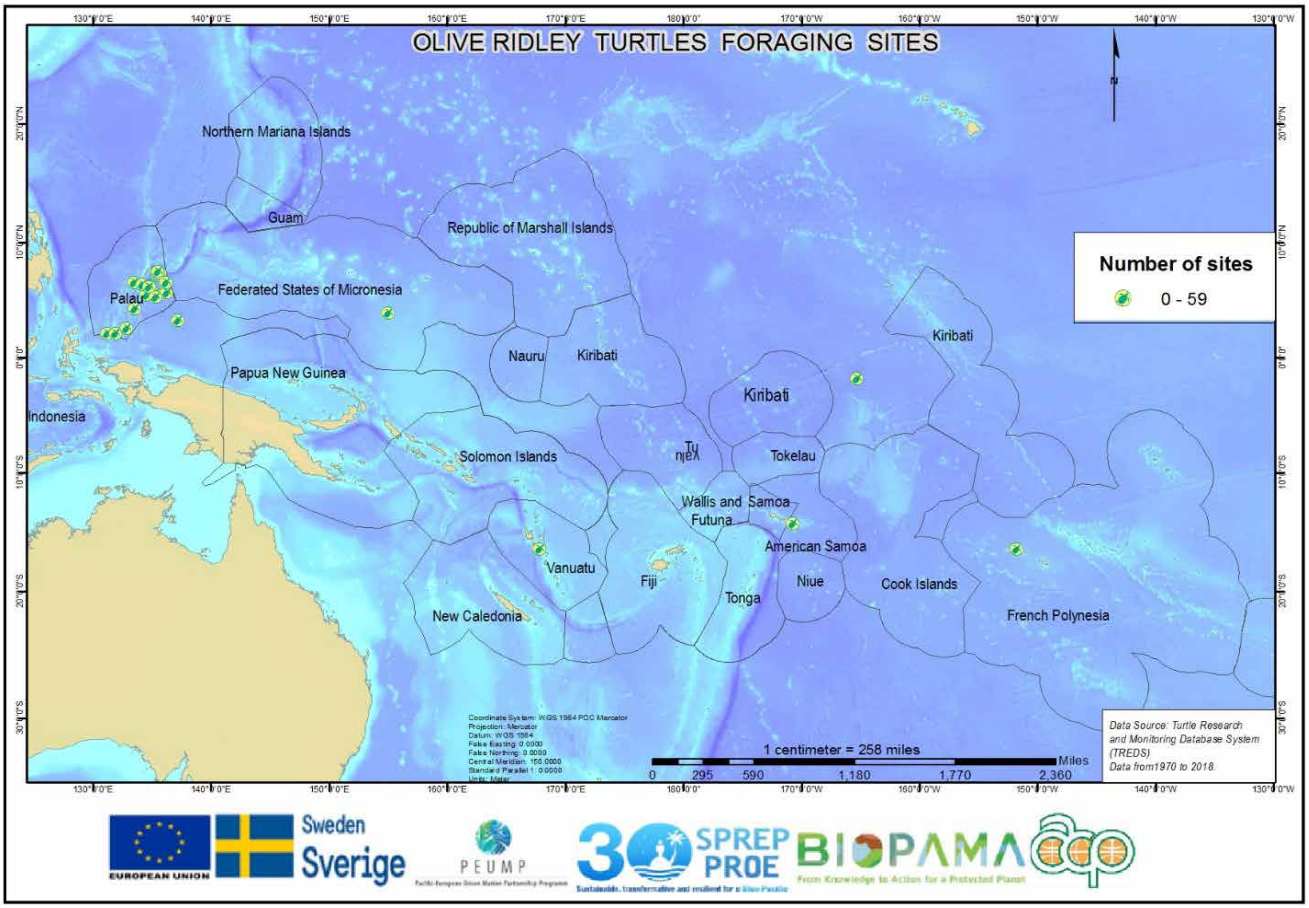


Figure 12: Graphic representation of geospatial data for olive ridley foraging data submitted to TREDS by countries from 1970 - 2018.

6.7. Unidentified turtle foraging

A number of foraging data submitted to TREDS by SPREP Member countries is recorded as unidentified turtle encounters. This could be for a range of reasons, which could include lacking the necessary capacity to confidently identify various turtle species, availability of turtle IDs, receiving reports from the general public with no evidence of the turtle or the state the turtle is found in, makes it impossible to identify. A solution that can contribute to minimising these types of encounters, is to provide readily available turtle IDs to turtle monitors and encourage the general public to submit turtle photos together with the encounter data to their responsible government departments. This will greatly assist data managers and the SPREP TREDS contact points to confidently verify the encounter data submitted.

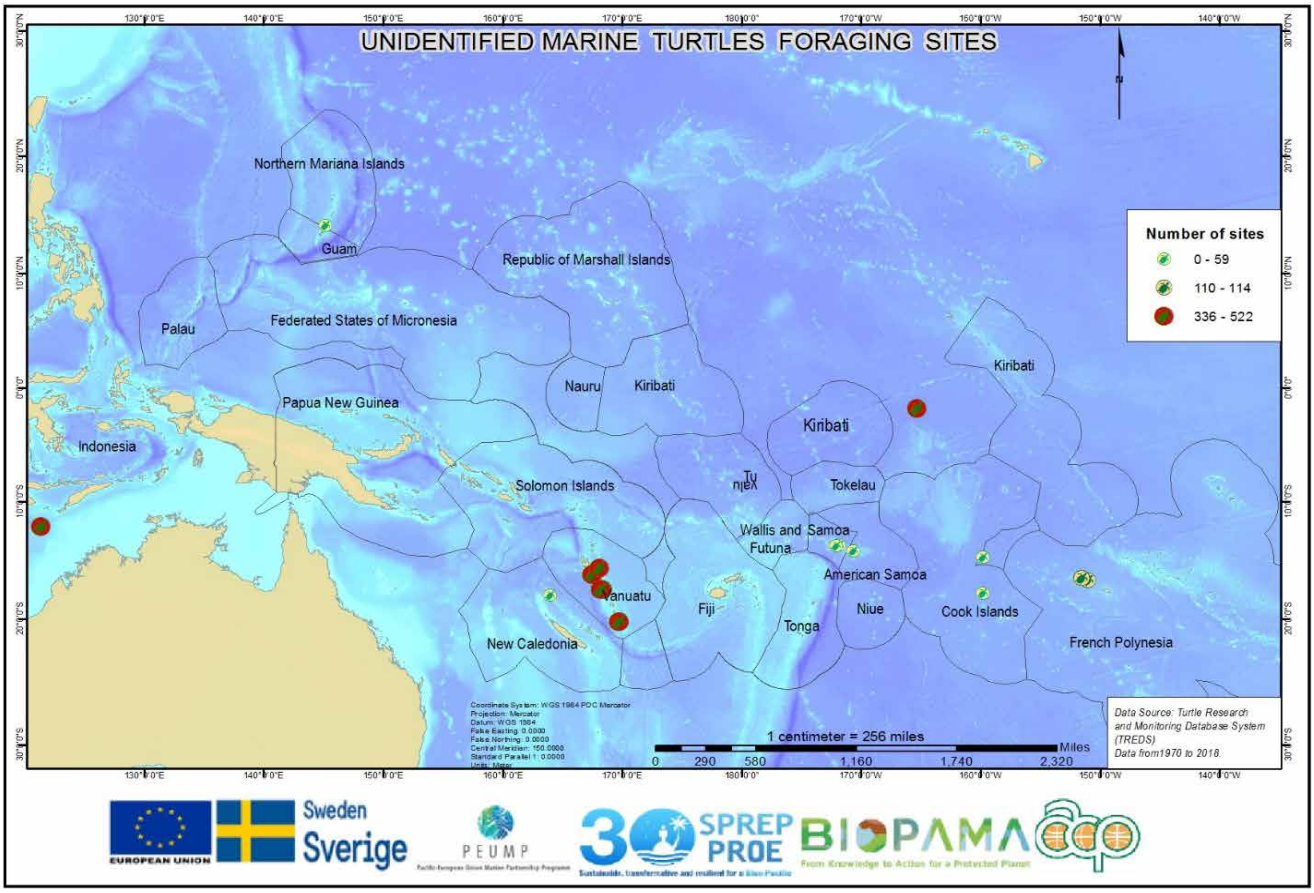


Figure 13: Graphic representation of turtle data for unidentified turtle species submitted to TREDS by countries from 1970 - 2018.

7. Migration/Recapture

Recapture data collected by turtle monitors gives a glimpse of the journeys marine turtles engage in throughout their lifespan between foraging and nesting grounds (Trevor, 2009). Recapture data is defined as another encounter with the same turtle at a different time and date. This data is recorded in TREDS for the same turtle that is usually identified through a tag such as a flipper tag.

The main objective for this type of dataset is to determine where turtles migrate to because turtles are highly migratory with foraging and nesting sites being thousands of kilometres apart (Pilcher, 2021). Thus, if scientists are able to determine these two sites, coordination of national conservation measures can be implemented at these locations so that turtles have a greater chance of survival.

7.1. Data extraction

The dataset extracted from TREDS focused on turtles that were encountered on multiple occasions. This dataset gives turtle monitors and scientists a good indication of foraging and nesting grounds for the different turtle species found in the Pacific region. Trevor (2009), stated in her reporting that TREDS had a total of 304 records of turtles migrating to various foraging and nesting grounds around the region. The dataset for this chapter covers encounters recorded from the 1970 – 2018 time period, which has since increased to a total of 2,259 recorded entries.

7.2. All Migration/Recapture

There are recorded entries in TREDS from the 1970 – 2018 time period are mainly of female turtles returning to their natal beaches. For entries of turtles that have been recorded foraging in a different territory or country, it is possible that this may not be the first or only foraging ground the turtle will visit before returning to its nesting beach.

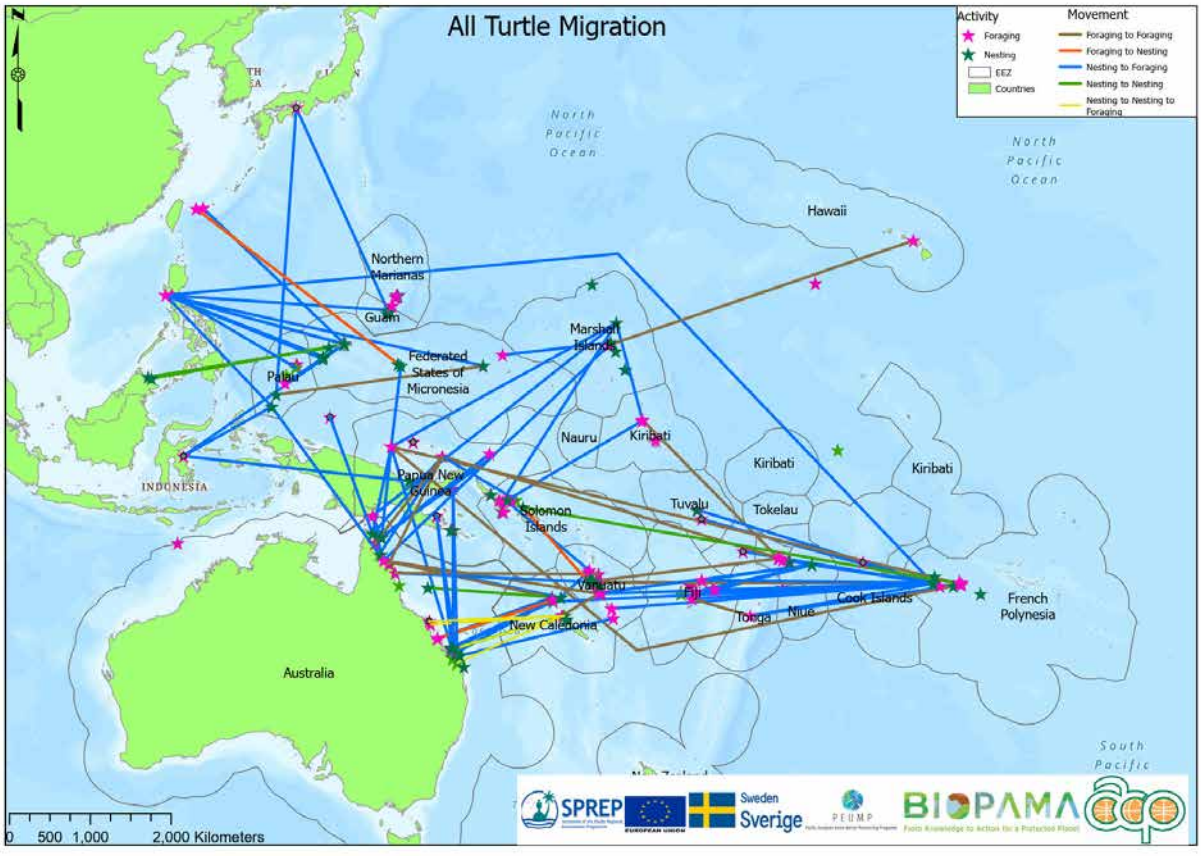


Figure 14: Graphic representation of all turtle migration (1970-2018).

7.3. Green turtle Migration/Recapture

The green turtle migration/recapture data is the largest migration/recapture dataset in TREDS, amounting to a total of 1,571 records compared to 208 records in the 2009 Annual Report (Trevor, 2009). According to this dataset, green turtles nest and forage in a wide range of countries in the Pacific region spanning thousands of kilometres apart (Pilcher, 2021).

Green turtles nesting in the eastern and central south Pacific region such as American Samoa, French Polynesia, show a general westward migration to reach foraging grounds in Fiji, Papua New Guinea and Vanuatu (Pilcher, 2021 & Trevor, 2009). Entries recorded in TREDS for turtles migrating from breeding grounds in American Samoa and French Polynesia, were recorded foraging in the Cook Islands, Fiji, Guam, New Caledonia, Papua New Guinea, Solomon Islands and Vanuatu as some of their destinations.

In contrast, green turtles migrating from countries where they breed in the southwestern Pacific region like Australia and New Caledonia for example, tend to either venture further westward or northward to the Federated States of Micronesia, Indonesia, Palau, Papua New Guinea, Philippines, Japan, Solomon Islands, and Vanuatu, and vice versa or in many cases remain in local foraging grounds (Pilcher, 2021 & Trevor, 2009). Not many green turtles venture eastward in search of foraging grounds although there are records in TREDS that have recorded turtles nesting in Australia to have been recaptured in Fiji (Pilcher, 2021).

The majority of green turtle migration entries recorded in TREDS were nesting encounters in Federated States of Micronesia with 560 entries. Out of all these entries a few green turtles were recaptured foraging in Australia (1), Indonesia (1), Japan (1), Malaysia (1), Marshall Islands (1), Palau (8), Papua New Guinea (2), and the Philippines (16), which included one (1) green turtle that was encountered first foraging in Taiwan and then in the Philippines. The remaining 529 recapture entries recorded were of green turtles returning to nest in Federated States of Micronesia throughout the 1970 – 2018 period.

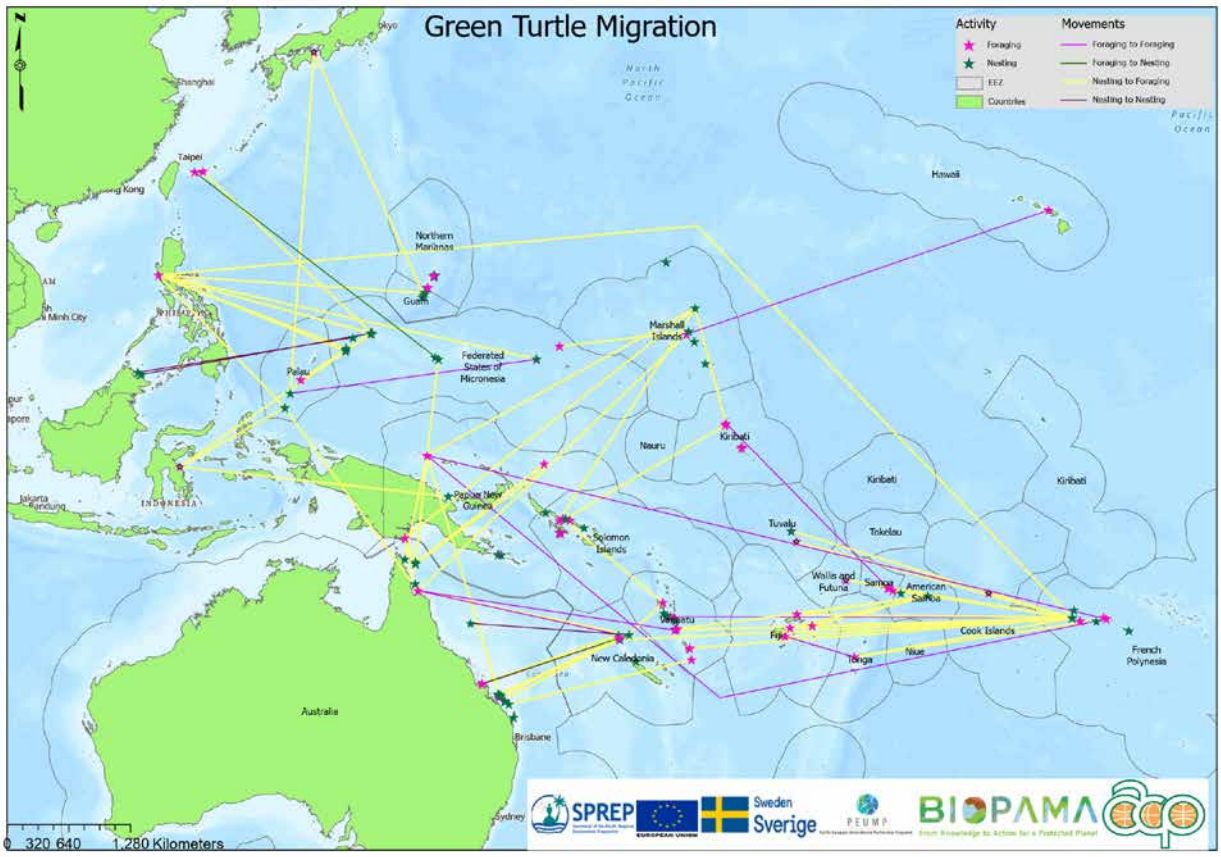


Figure 15: Graphic representation of green turtle migration (1970-2018).

7.4. Hawksbill turtle Migration/Recapture

The hawksbill turtle migration/recapture dataset is the second largest recorded in TREDS with a total of 443 records compared to 45 records in the 2009 Annual Report by Trevor (2009). The Solomon Islands and Vanuatu have the largest records of hawksbill migration/recapture data stored in TREDS with 261 and 120 records respectively. Other countries that recorded hawksbill migration/recapture entries in TREDS include American Samoa (4), Australia (10), Federated States of Micronesia (2), Fiji (11), French Polynesia (4), Northern Mariana Islands (9), Palau (11), Papua New Guinea (4), and Samoa (5). The majority of the records recorded in TREDS are returning nesting hawksbill turtles.

Pilcher (2021) observed that hawksbill turtles followed similar migration routes and habits of green turtles with those nesting in the southeastern and south central Pacific regions migrating westward to foraging grounds. For example, hawksbill turtles recorded in TREDS nesting in Samoa migrated westward to foraging grounds in Fiji, Papua New Guinea, and Vanuatu. In contrast, turtles nesting in countries in the western Pacific region such as Australia, New Caledonia, Papua New Guinea, Solomon Islands and Vanuatu, migrated to foraging grounds further westward, northward, southward or eastward but within the vicinity of these western Pacific territories or preferring local foraging grounds (Pilcher, 2021). This is supported by research conducted on 30 satellite tagged post-nesting hawksbill turtles from the Arnavon Community Marine Park in the Solomon Islands. The majority of these turtles (98.5%) migrated westward to foraging grounds in New Caledonia and to Australia (Hamilton et al. 2021). This is consistent with migration/recapture data recorded in TREDS for Australia, Palau, Solomon Islands and Vanuatu, where post-nesting hawksbill turtles from Australia migrated eastward but only recorded venturing as far as Vanuatu, post-nesting hawksbill turtles from Palau migrating northward to the Philippines, and post-nesting hawksbill turtles from Vanuatu migrating westward to Australia, New Caledonia and Solomon Islands.

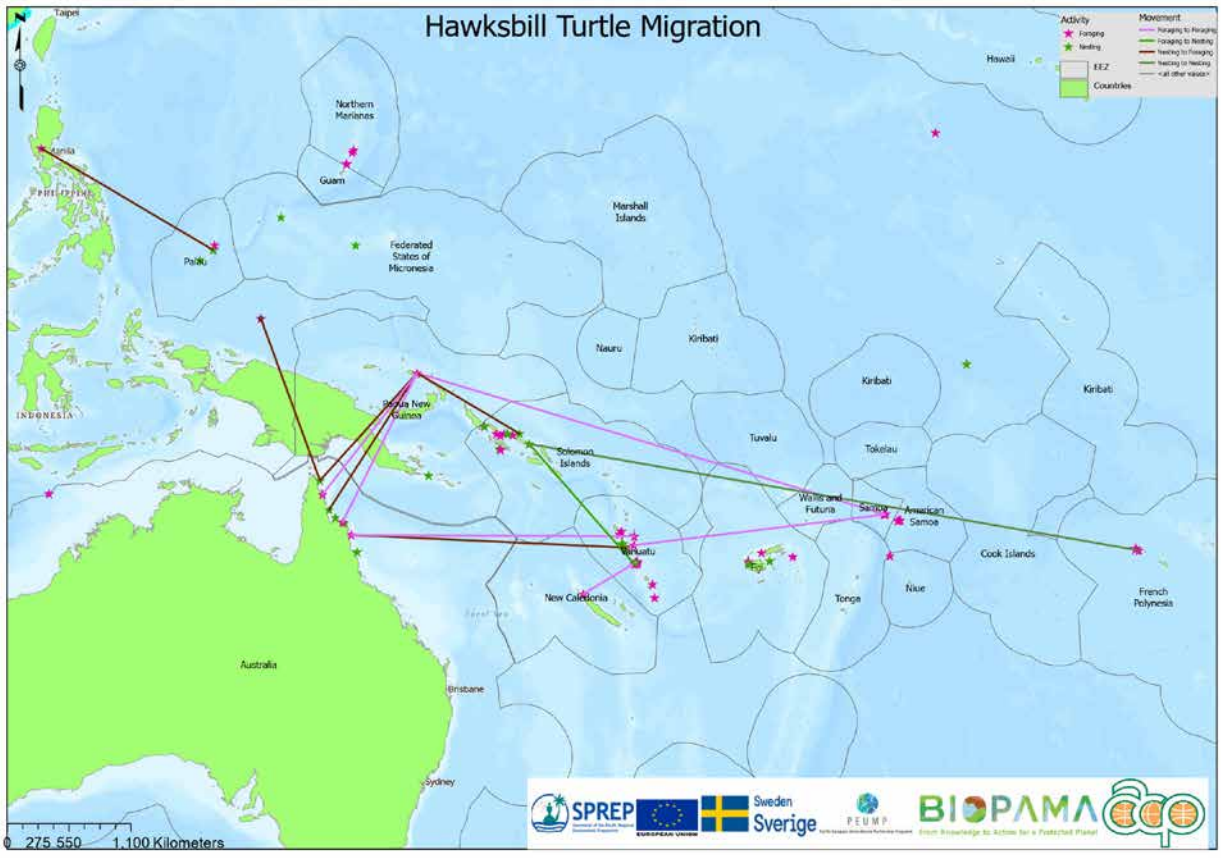


Figure 16: Graphic representation of hawksbill turtle migration (1970-2018).

7.5. Leatherback turtle Migration/Recapture

Dutton et al. (1999) identified two distinct leatherback turtle populations in the Pacific Ocean, with one population nesting in the eastern Pacific (Mexico, Costa Rica, Panama) and the other population nesting in the western Pacific (Indonesia, Papua New Guinea, Solomon Islands and Vanuatu).

The majority of the migration/recapture entries recorded in TREDS was submitted by Papua New Guinea and the Solomon Islands with a single encounter of a leatherback turtle foraging in Vanuatu making up a total of 240 recorded entries for the 1970 – 2018 time period. Papua New Guinea had the highest recorded entries of migration/recapture records for leatherback turtles with 173 entries, while 67 entries were recorded for the Solomon Islands and one entry of Vanuatu. The majority of this recorded data is of leatherback turtles returning to their natal beaches to nest after venturing out for thousands of kilometres to forage (Dutton et al. 1999), with leatherback turtles recorded to be foraging in the pelagic waters of American Samoa, Palau and Vanuatu (Work et al. 2020).

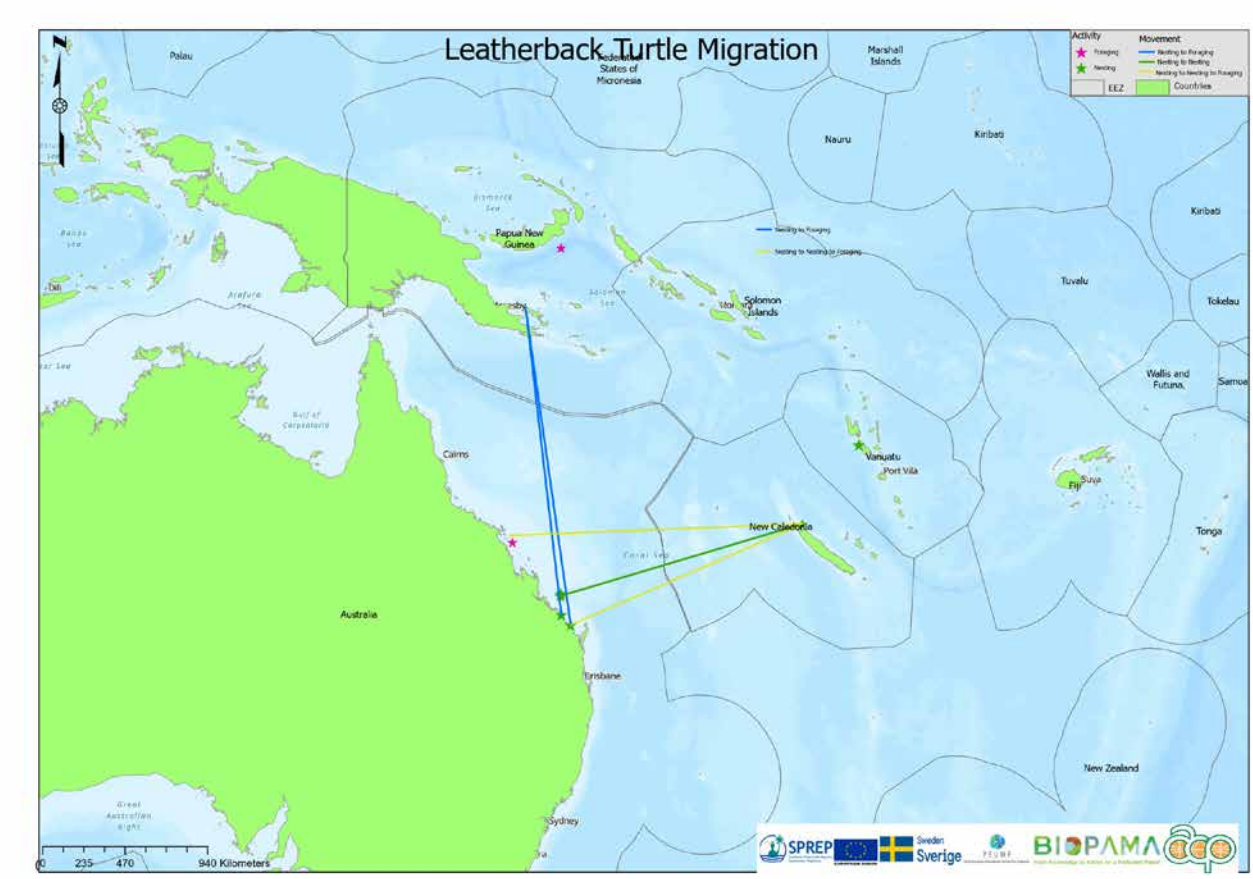


Figure 17: Graphic representation of leatherback turtle migration (1970-2018).

7.6. Loggerhead turtle Migration/Recapture

There are a total of five (5) loggerhead turtle migration/recapture entries recorded in TREDS and are all from Australia. Loggerhead turtles primarily nest in Australia, although there have been occasions where they would be encountered nesting in New Caledonia, Papua New Guinea, Tokelau and Vanuatu (Pilcher, 2021 & Work et al. 2020). This is consistent with the data recorded in TREDS where loggerhead turtles encountered nesting in Australia have been recaptured foraging in New Caledonia and Papua New Guinea. Pilcher (2021) mentions that this population that nests primarily in Australia, is separate from the northern loggerhead turtle population, which nests primarily in Japan. This loggerhead population in the northern Pacific spends the entirety of their life cycle in the northern Pacific, never venturing southward past the equator (Pilcher, 2021).

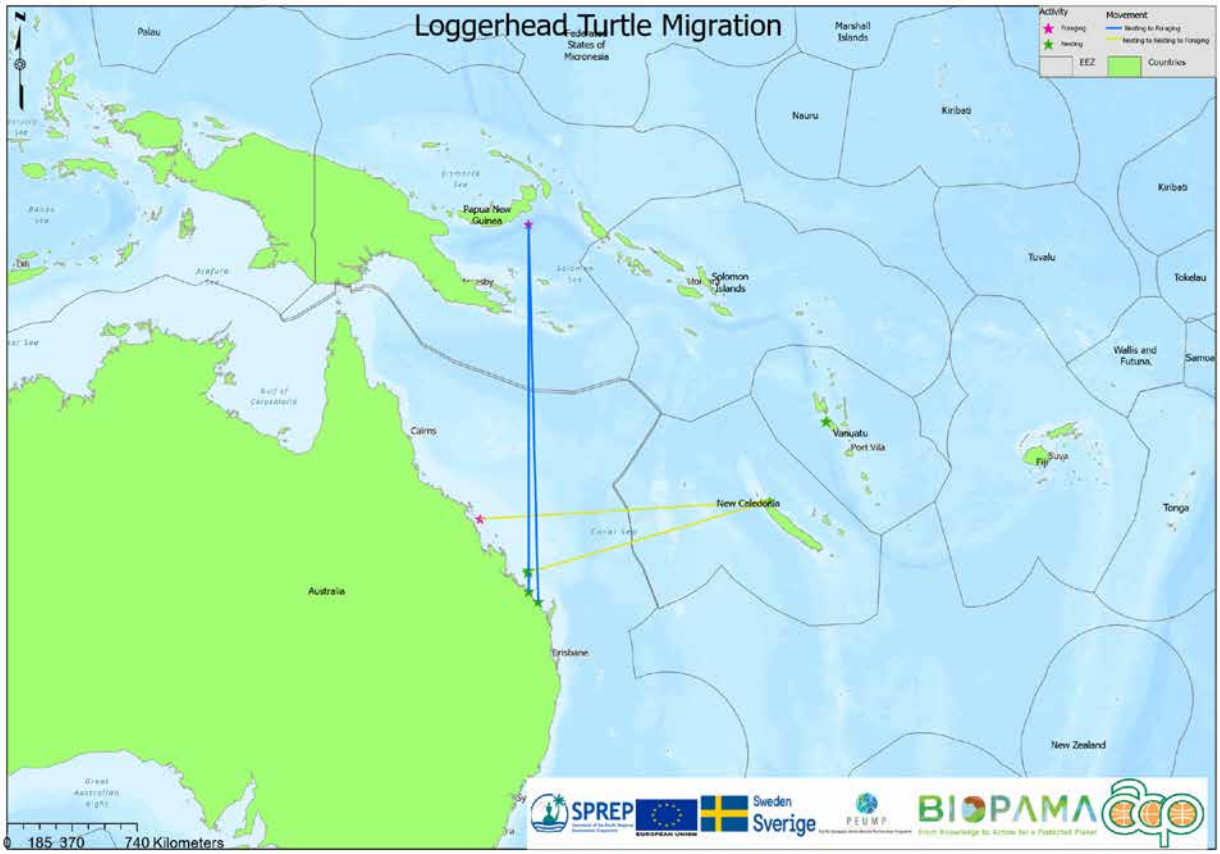


Figure 18: Graphic representation of loggerhead turtle migration (1970-2018).

7.7. Olive ridley turtle Migration/Recapture

Only two (2) entries of olive ridley turtle migrations/recaptures are recorded in TREDS throughout the 1970 – 2018 time period. One (1) entry is recorded by French Polynesia and the other entry (1) recorded by Vanuatu. Work et al. (2020) stated that nesting sites for olive ridley turtles are Kiribati, Solomon Islands and Vanuatu, although there have been no recent entries recorded in TREDS. Olive ridley turtles are known to forage in the pelagic waters of American Samoa, Federated States of Micronesia, Hawaii, Marshall Islands, New Caledonia, Palau, Papua New Guinea and Vanuatu (Work et al. 2020).

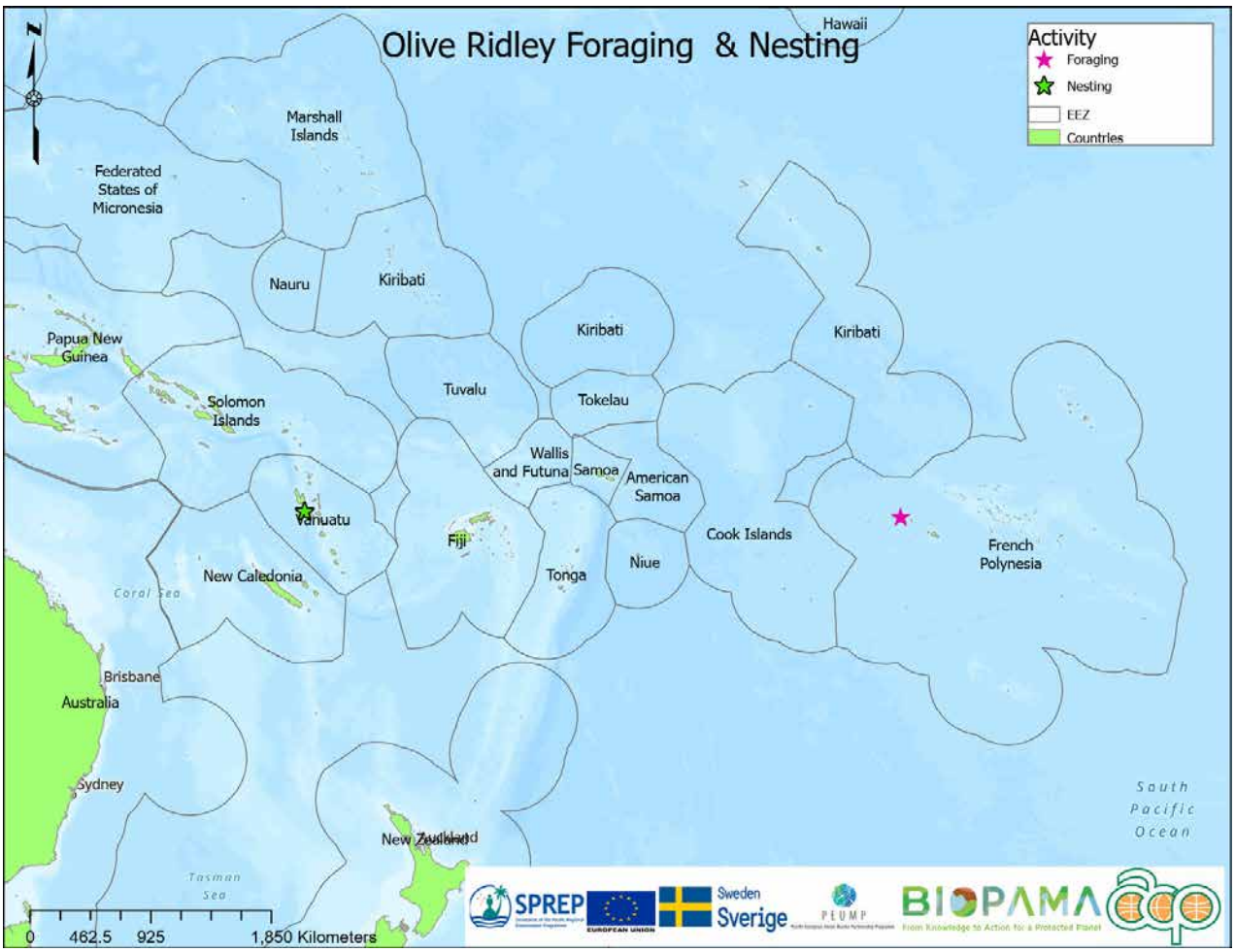


Figure 19: Graphic representation of olive ridley turtle migration (1970-2018).

8. Threats

A range of threats are recorded in TREDS that are affecting marine turtle populations in the Pacific. Assessments conducted by Seminoff (2004), Mortimer & Donnelly (2008), Wallace et al. (2013), Casale & Tucker (2017), and Abreu-Grobois & Plotkin (2008) for greens, hawksbills, leatherbacks, loggerheads, and olive ridleys respectively, identified the statuses of their respective populations for the IUCN Red List of Threatened Species as listed in Table 4. A combination of anthropogenic and natural impacts has contributed to the continuous decline in marine turtle populations in the Pacific (Pilcher, 2021). Such threats include but are not limited to direct take, fisheries by-catch, and habitat loss due to climate change. Seminoff (2004) stated that the greatest threat to green turtles is direct take or harvesting of eggs and turtles for consumption, while hawksbill turtles were mainly taken for the tortoiseshell trade where their shells are used to make handicrafts, jewellery, ornaments, and other utensils throughout Europe, America, and the Asia Pacific region (McLellan et al. 2005) (Mortimer & Donnelly, 2008), pushing the hawksbill population close to extinction. By-catch from both artisanal and commercial fisheries is an ongoing threat affecting all species of marine turtles and can contribute to severely affecting turtle populations. Pilcher (2021) mentions with large commercial fisheries operations set their fishing gear for long periods of time where turtles that are by-caught in them usually drown, while for artisanal fisheries, by-caught turtles usually end up being eaten.

Understanding and recording the threats in databases such as TREDS can provide a greater understanding of relevant threats affecting different turtle species in each country. This can assist Members to plan more relevant research and plan and implement mitigation measures to minimise the threats affecting marine turtles in their respective Exclusive Economic Zones (EEZ) (Pilcher, 2021). Also to develop and implement turtle conservation projects and activities that can contribute to supporting recovery of marine turtles in the region.

8.1. Data extraction

The two main categories of data extracted from TREDS to generate the Threats Maps by species in this chapter focused on the "Encounter Condition", the state in which the surveyor found the turtle and the type of "Encounter". Extra notes or comments provided by the surveyors were also utilised to differentiate what type of threat may have caused mortality to the turtle. Threats that caused mortality to turtles were categorised into five main types. These are direct take/fishing, by-catch, turtles in-captivity, pollution, and unknown threats. The categories of threats allowed the data to be consolidated more uniformly so that maps generated for each species would be uniform and easier to interpret. Natural threats to marine turtles such as habitat loss, natural predation and climate change were not recorded in TREDS as this is harder to determine compared to a turtle that has died due to the five categories mentioned in Table 5, thus, natural impacts threatening marine turtles are not included in the maps. Also note that for the threat posed by by-catch of turtles, data is collected directly through fisheries observers and recorded in national and regional databases. Further information on by-catch in industrial tuna fisheries can be found on the Western and Central Pacific Fisheries Commission website https://www.wcpfc.int/home. SPREP has also been undertaking further research on domestic use of turtles in Pacific countries and a report will be available on the SPREP website.

Table 5: Types of threats causing turtle mortality recorded in TREDS from 1970 – 2018, which have been categorised for ease of interpretation.

Threat Category	Threat type
Direct take/ fishing	Subsistence fishing Harvesting or intentional take Traditional take/fishing Stranded and taken to be eaten
Fisheries By-catch	Turtles caught from commercial fishing vessels Caught in nets where turtles are not the targeted species Entangled or hooked on longlines where turtles are not the targeted species
In-captivity	Kept for rehabilitation Kept as pets kept for tourism
Pollution	Chemical pollution (e.g. oil spills) Ghost nets Plastics
Unknown	No specific information recorded in TREDS Tag recovery only Stranded and dead Carcass stored in a freezer

The Cook Islands, Nauru, New Zealand, Niue, Tokelau, Tonga and Wallis and Futuna did not have any data recorded in TREDS on threats affecting turtles. The most common threat type recorded in TREDS to affect turtle populations was direct take/fishing in the form of traditional or subsistence use, which is common in many Pacific island countries (Hickey et al. 2023; Work et al. 2020). By-caught turtles from commercial fisheries have some chance of survival with some commercial fisheries taking responsibility to de-hook and disentangle turtles (Pilcher, 2021). Various other natural and anthropogenic threats may not be recorded but are occurring in the region, thus, it is greatly encouraged that TREDS contact points for each organisation provide as much information as possible of the likely causes of mortality to the turtles they encounter.

8.2. Threats affecting green turtles.

Seminoff (2004), Work et al. (2020), Pilcher (2021) and Hickey et al. (2023) state that direct take is one of the greatest anthropogenic threats impacting green turtles in all its life stage. This includes harvesting eggs and adults during the nesting season, and juveniles and adults from known foraging grounds. This corresponds with Figure 14 where direct take or fishing was the main threat to green turtles recorded across the region. Some countries have introduced legislation to limit or prohibit direct take of green turtles due to the alarming drop in green turtle populations in the region. However, it is clear that domestic take and consumption is still occurring. The other threats causing green turtle mortalities in the region include entanglement in fishing gear, bycatch, injuries from boat strikes, land degradation and habitat loss, and contamination from coastal development (Seminoff, 2004; Work et al, 2020). Guam reported green turtle mortalities caused by pollution, through oil spills from 1992 to 2002 (Figure 14). Pilcher (2021) mentions that predation is another threat severely affecting green turtle populations, where nests in Palau, Republic of the Marshall Islands and Solomon Islands are affected by different types of predators such as rats, lizards, wild pigs, crabs and dogs. It is likely that predation is also occurring in other countries but is mainly undocumented.

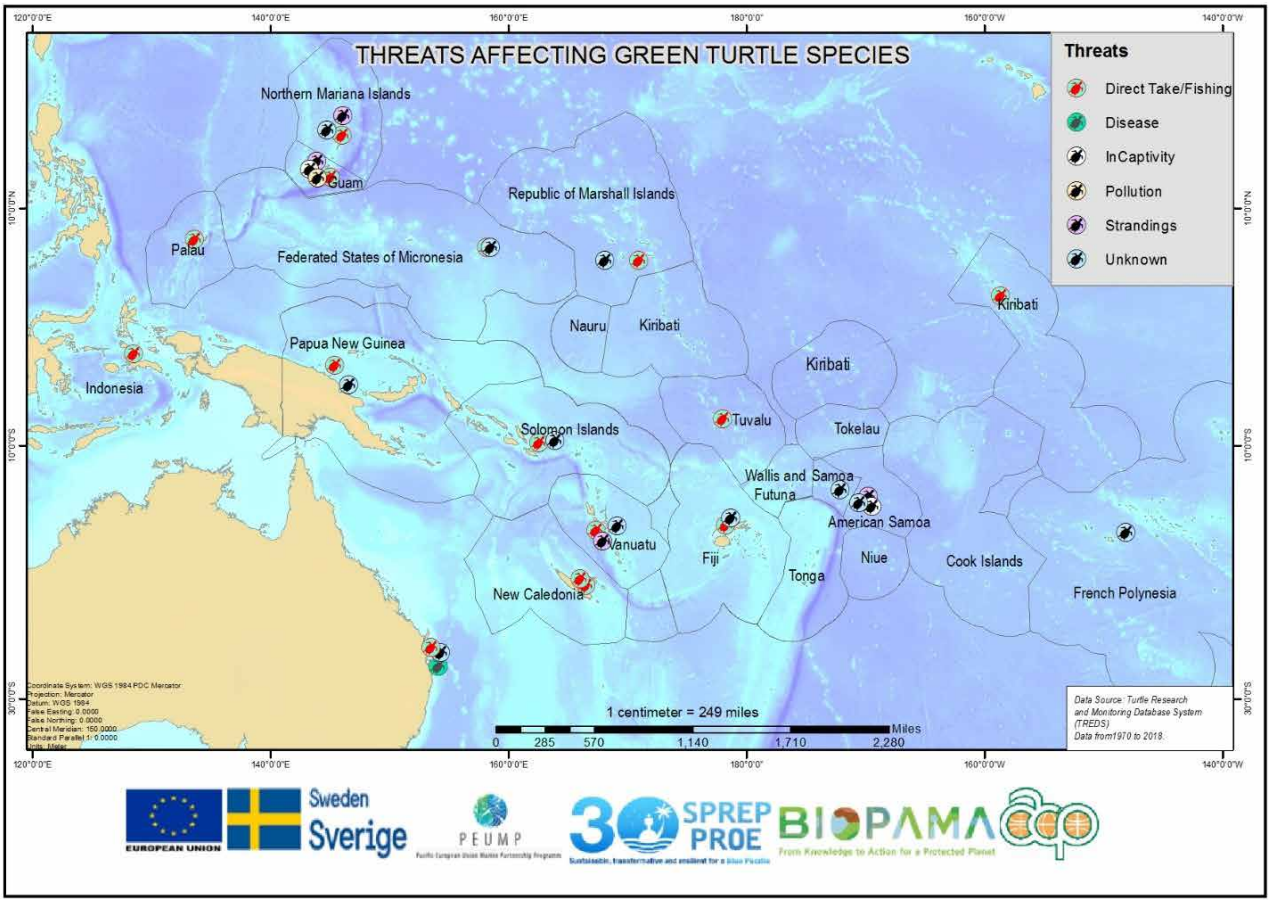


Figure 20: Data recorded in TREDS from 1970 -2018 of threats affecting green turtles submitted by countries in the Pacific region.

8.3. Threats affecting hawksbill turtles

Figure 15 indicates threats affecting hawksbill turtles in the Pacific region that were submitted to TREDS. The most common threat that was affecting hawksbill turtle populations was direct take of eggs and adults, which is the same threat that was commonly recorded to affect green turtles. Mortimer & Donnelly (2008) mention in their assessment that the greatest threat to hawksbill turtles is the tortoise-shell trade in the 20th and 21st centuries, which could be one of the reasons direct take is commonly recorded in many countries. In contrast to green turtles that were mainly hunted for consumption, hawksbill turtles were mainly hunted for their shells, which were used for handicrafts and jewellery. Other threats that Mortimer & Donnelly (2008), Work et al. (2020) and Hickey et al. (2023) recorded affecting hawksbill turtles included nesting and foraging habitat loss, by-catch, pollution, and climate change. Threats that were recorded in TREDS were direct take, strandings, in-captivity and by-catch (Figure 15).

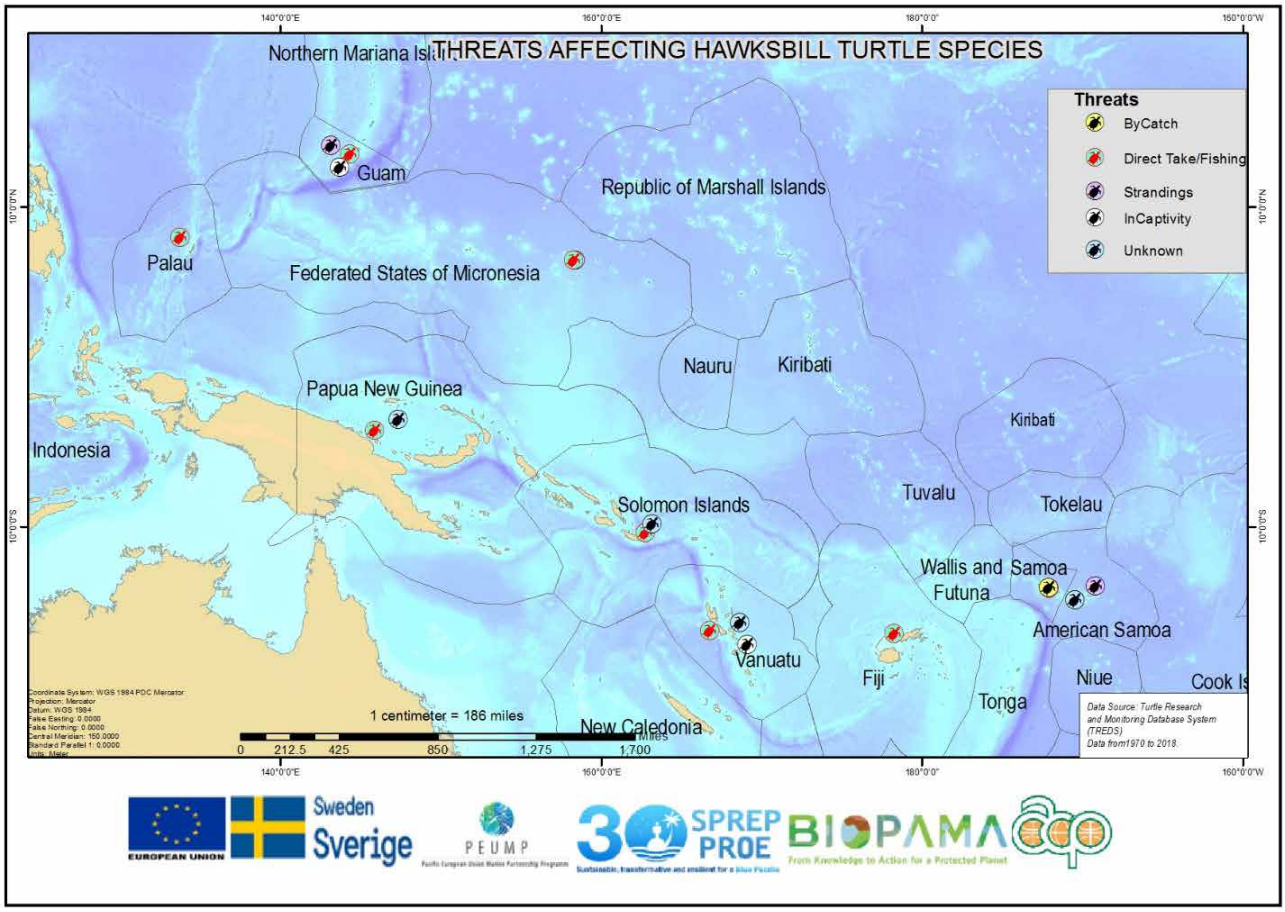


Figure 21: Data recorded in TREDS from 1970 - 2018 of threats affecting hawksbill turtles in the Pacific region.

8.4. Threats affecting leatherback turtles

Work et al. (2020) stated that direct take of turtles and eggs along with pollution and climate change are affecting leatherback turtles during nesting season in the western Pacific RMU. In addition to these threats, Wallace et al. (2013) mentions that by-catch and habitat loss through coastal development also contribute to the declining population in leatherback turtles with by-catch from fisheries activities being the greatest threat.

The countries that recorded threats affecting leatherback turtles in TREDS were American Samoa, Guam, Papua New Guinea, and Samoa (Figure 16). The by-caught leatherback in American Samoa was caught by a longline fishing vessel where one of the longline hooks caught and was embedded on the dorsal side of the turtle's left front flipper (Grant, 1994; Snover, 2020). The predation threat recorded in Guam does not mention whether the shark attacked the turtle while alive or when it was already dead. The leatherback turtles that were recorded in Samoa and Papua New Guinea had no additional information for Samoa and were tag recoveries for Papua New Guinea, with no further information provided.

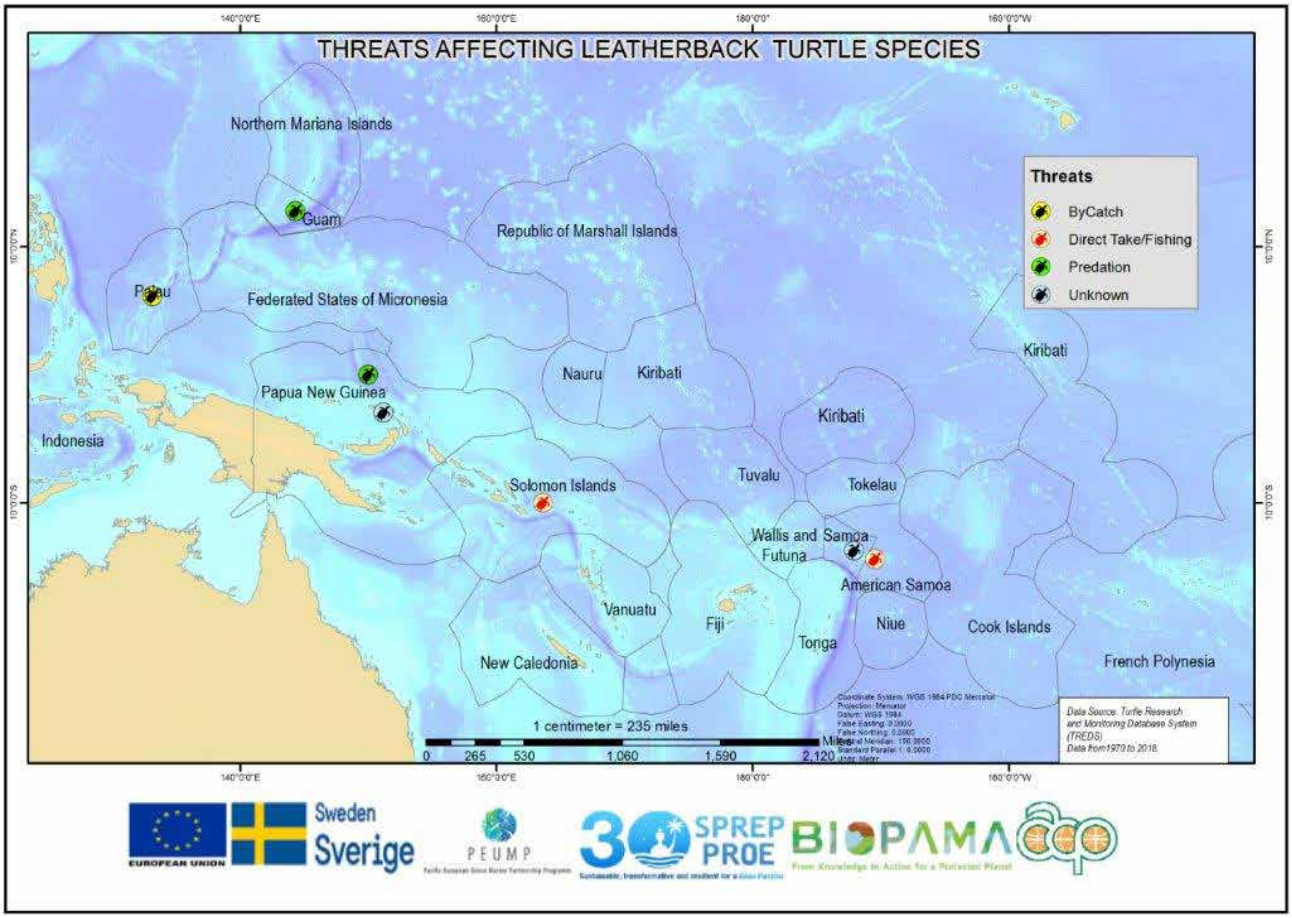


Figure 22: Data recorded in TREDS from 1970 -2017 of threats affecting leatherback turtles in the Pacific region.

8.5. Threats affecting loggerhead turtles

Loggerhead turtle data affected by threats are not well recorded in TREDS with one encounter lodged. Additionally, it is unknown what threat caused the mortality to this loggerhead with the data stating that it was a tag recovery.

Casale & Tucker (2017) provide insight with their assessment on what threats affect loggerhead turtles listing by-catch, direct take, coastal development, pollution and pathogens, and climate change. Fisheries by-catch was seen to be the greatest threat affecting loggerhead turtles globally (Casale & Tucker, 2017; Wallace et al, 2011; Work et al, 2021).

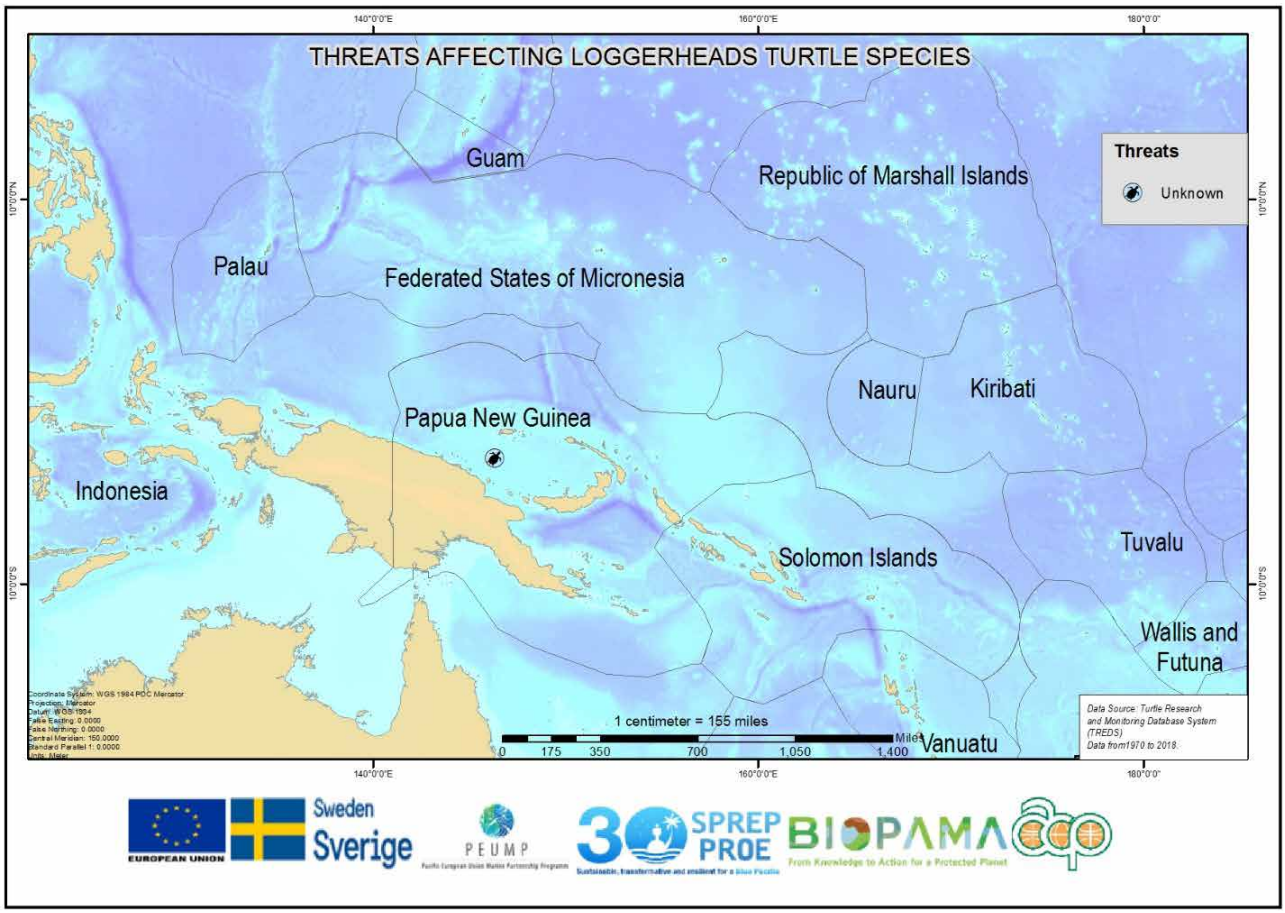


Figure 23: Threats affecting loggerhead turtles submitted to TREDS from 1970 - 2018.

8.6. Threats affecting olive ridley turtles

Two olive ridley turtle encounters were recorded in TREDS as threats with encounters reported as dead and beach washed in American Samoa (Figure 18). There is no additional information in the database to ascertain what may have caused these two recorded mortalities. Additionally, these were the only recorded encounters with olive ridley turtles, with very little data available for interpretation in TREDS since olive ridleys are known to occur mainly in Australia, Federated States of Micronesia, French Polynesia, New Caledonia, New Zealand, Palau, the Republic of the Marshall Islands, and Vanuatu.

Abreu-Grobois & Plotkin (2008) stated in their assessment that the harvesting of turtles and eggs and by-catch from artisanal and commercial fisheries are some of the key threats affecting olive ridley populations globally. Work et al. (2020) corroborates this statement mentioning that direct take occurs at nesting sites in Vanuatu, Solomon Islands, and Kiribati. In terms of by-catch, olive ridleys were assessed as the most highly by-caught turtles from tuna longline fisheries between 2003 to 2017 in the western central Pacific Ocean (Peatman et al. 2018).

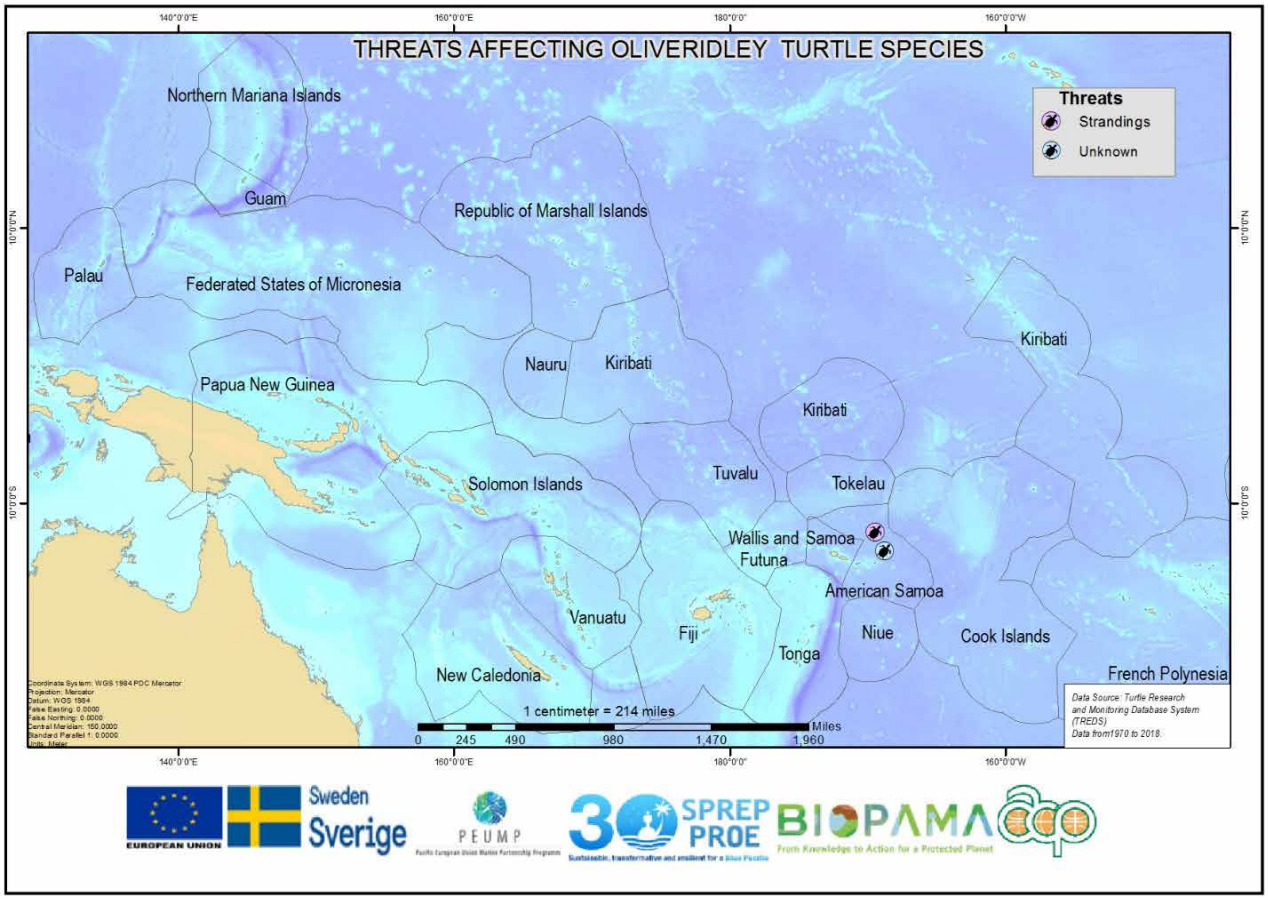


Figure 24: Threats affecting olive ridley turtles in the Pacific region recorded in TREDS from 1970 – 2018.

8.7. Threats affecting unidentified turtles

Some of the encounters recorded in TREDS for threats leading to mortality in turtles were reported where identification of the turtle species was not recorded. Direct take was the most common threat recorded in the dataset of unidentified turtles, with tag recoveries as the only evidence that a turtle was taken from the wild. Some turtles that were encountered in the wild were transferred to rehabilitation or veterinarian centres with turtles later dying. Although not much information is obtained on what may have caused the deaths of some of these turtles, a necropsy is performed on others to determine their causes of deaths. Such conclusions include a turtle dying due to a haemorrhage or severe blood loss, cause unknown.

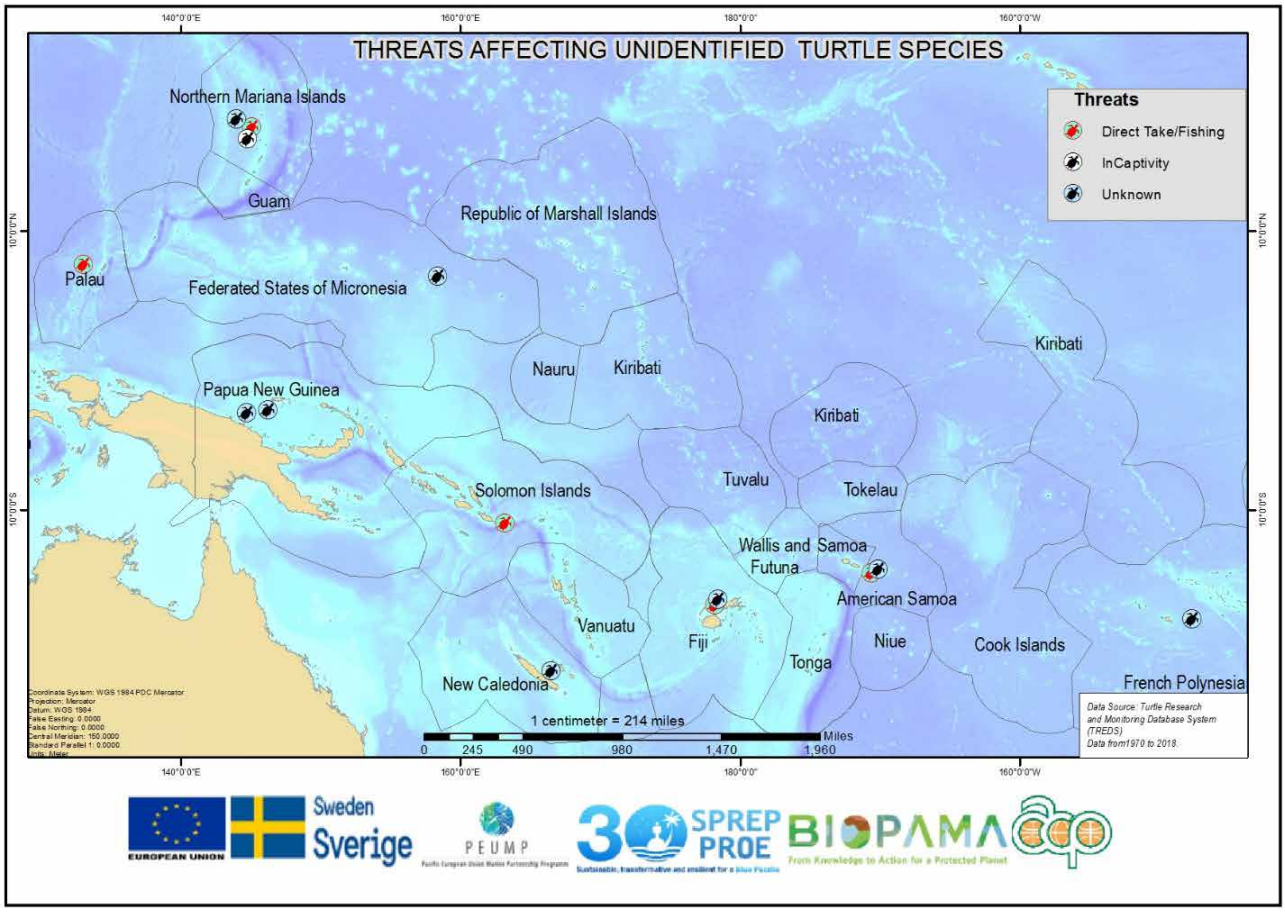


Figure 25: Threats affecting unidentified marine turtles encountered and recorded in TREDS from 1970 - 2018.

9. Country Reports

In this chapter, data submitted to TREDS by countries is summarised into sub-topics, Tag Inventory, Species Occurrence, Nesting Encounters, and Foraging Encounters. Countries with no turtle data in TREDS were not included in this chapter since there is no data to summarise. For the following sub-topics, the data from TREDS was interpreted in the following manner:

Tag Inventory	Gives a breakdown of tags recorded in TREDS by Country from 1970 – 2018 including how many tags were deployed, types of tags and how many tags are unaccounted for
Species Occurrence	Summarises turtle occurrences recorded in Chapter 3, Table 3 as well as species and number of encounters recorded in TREDS, by Country
Nesting Encounters	Nesting encounters that are recorded in TREDS and utilises all nesting encounters with a Tagging Status of *P – Primary tagging, no tag scars = 1st time tagged*. This information and graphs generated for each country can be interpreted as the number of new turtles encountered per year from 1970 – 2018.
Foraging Encounters	Gives a breakdown of foraging encounters recorded in TREDS per Country and utilises all foraging encounters with a Tagging Status of *P – Primary tagging, no tag scars = 1st time tagged*. This information and graphs generated for each country can be interpreted as the number of new turtles encountered per year from 1970 – 2018.

9.1. American Samoa

9.1.1. Tag Inventory

In total, 918 tags of various types, have been distributed to American Samoa including tags distributed by SPREP. 281 tags were recorded as deployed or used in TREDS from 1970 – 2018, while 637 tags have not been recorded in TREDS as deployed.

Table 6: Tabulated summary of tags recorded in TREDS for American Samoa from 1970 – 2018

Tag type	Tags recorded	Tags deployed/ used	Difference
Electronic	14	4	10
Inconel	230	20	210
Titanium	474	192	282
Other	200	65	135
Totals	**918**	**281**	**637**

9.1.2. Species Occurrence

Green and hawksbill turtles are the only two species known to nest in American Samoa while leatherbacks and olive ridley turtles have been sighted occasionally in American Samoa's EEZ (Table 3). 274 encounters were recorded in TREDS between 1970 – 2018 with hawksbill turtles being the most recorded turtle species, with 126 (46%) encounters recorded in TREDS. Green turtles were the second most encountered turtle species that was recorded in TREDS with a total of 113 (41.2%) encounters. Three (1.1%) encounters were recorded in TREDS for olive ridley turtles, and one (0.4%) encounter was recorded for a leatherback turtle for American Samoa on 16 August 1993. In total, 31 (11.3%) encounters were recorded where identification of the turtle species was not recorded.

9.1.3. Nesting Encounters

Out of the 274 encounters recorded in TREDS from 1970 – 2018, 100 encounters were recorded as nesting encounters in TREDS for American Samoa from 1970 – 2018. Forty-four of these nesting encounters were recorded where the marine turtle was tagged for the first time, 36 (81.82%) encounters of which were green turtles, 6 (13.64%) encounters were hawksbill turtles, and 2 (4.55%) encounters were unidentified species of turtles (Figure 20). The remaining 66 encounters were of turtles already tagged and were re-encountered.

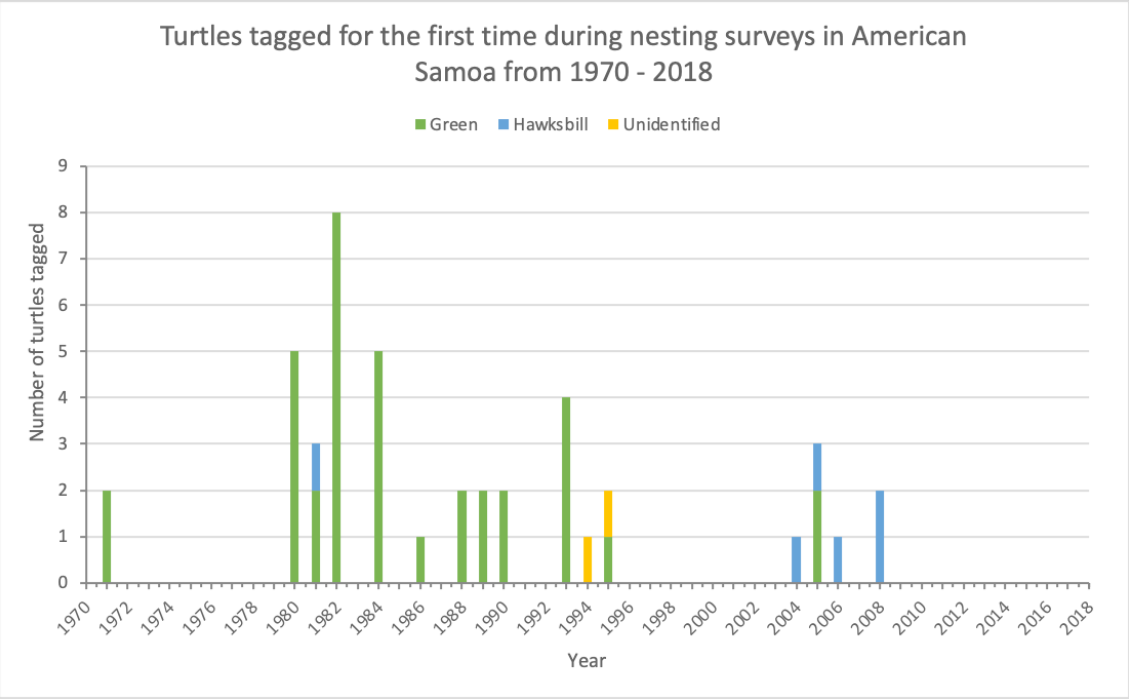


Figure 26: Turtles tagged for the first time during nesting seasons in American Samoa and recorded in TREDS from 1970 - 2018.

9.1.4. Foraging Encounters

Out of the 274 encounters recorded in TREDS from 1970 – 2018, 171 encounters were recorded as foraging data in TREDS, with 99 foraging encounters where turtles were tagged for the first time. Hawksbill turtles were the most recorded species with 66 (66.6%) encounters where the turtle was tagged for the first time during foraging surveys. This is followed by green turtles that were recorded with 30 (30.3%) encounters, while leatherbacks and olive ridley were recorded once (1%) respectively. Two (2%) unidentified turtles were recorded in TREDS as tagged for the first time during the foraging surveys from 1970 – 2018.

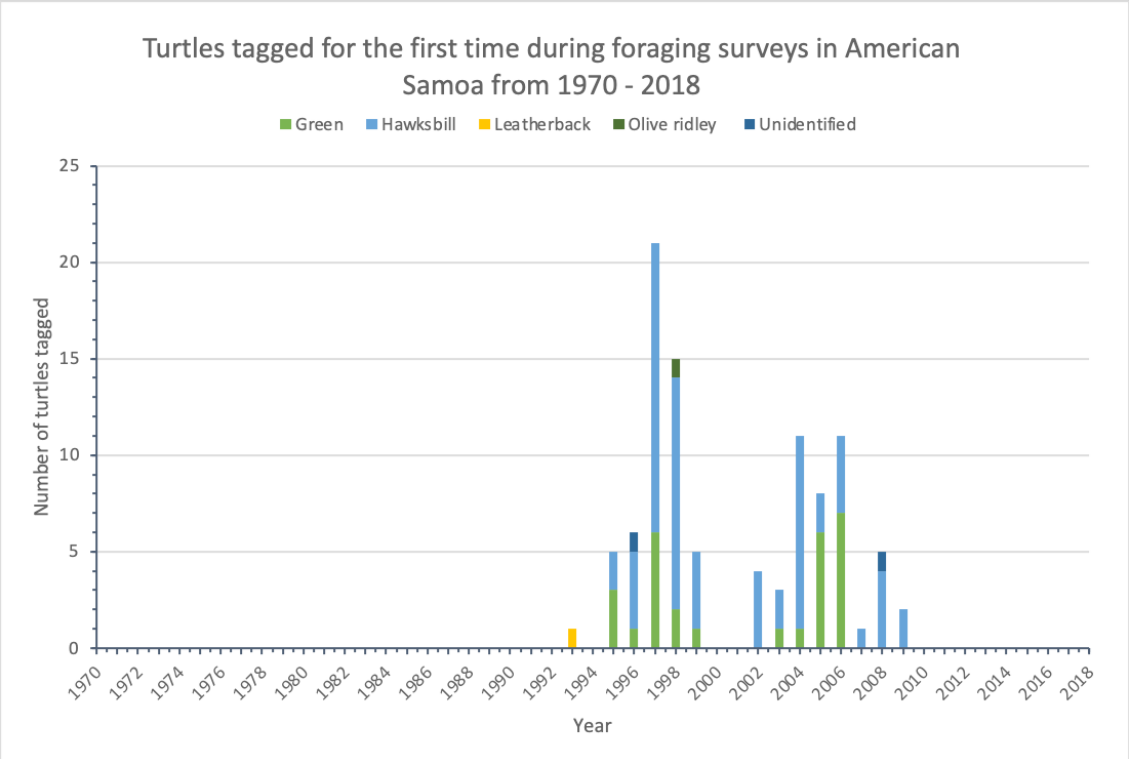


Figure 27: Turtles tagged for the first time during foraging surveys in American Samoa and recorded in TREDS from 1970 - 2018.

9.2. Australia

9.2.1. Tag Inventory

Australia recorded 215,811 tags in their Tag Inventory in TREDS and have recorded a total of 91 tags to have been deployed or used, leaving a total of 215,720 tags that are unaccounted for.

Table 7: Tabulated summary of tags recorded in TREDS for Australia from 1970 – 2018

Tag Type	Tags Recorded	Tags Deployed/ Used	Difference
Monel	45,002	13	44,989
Titanium	170,809	78	170,731
TOTALS	**215,811**	**91**	**215,720**

9.2.2. Species Occurrence

Australia is a well-known destination for foraging and nesting turtles with all six species of turtles found in the Pacific region recorded to be nesting there (Table 3). In TREDS, green, hawksbill and loggerhead turtles have been recorded to both nest and forage in Australia's EEZ.

160 encounters were recorded in TREDS for Australia from 1970 – 2018. Of these, 129 (80.6%) of these encounters are green turtles, 15 (9.4%) are hawksbill turtles, 13 (8.1%) are loggerhead turtles, and three (1.9%) are unidentified turtles.

9.2.3. Nesting Encounters

Green turtles were consistently tagged and recorded in TREDS as nesting encounters from 1970 – 2018 in Australia with hawksbills and loggerheads recorded occasionally (Figure 22). Out of a total of 79 encounters (tagged for the first time), 67 (84.8%) nesting encounters were green turtles, six (7.6%) encounters were hawksbills, and five (6.3%) encounters were loggerhead turtles.

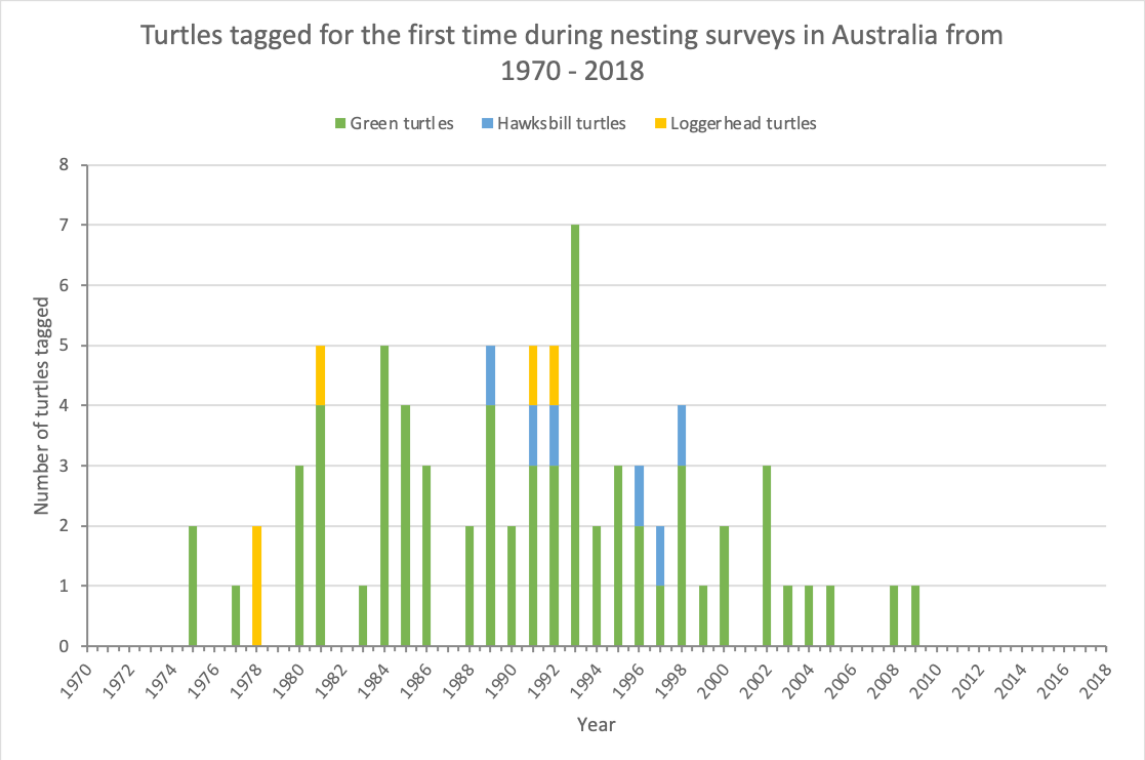


Figure 28: Turtles tagged during the nesting seasons from 1970 – 2018 in Australia and recorded in TREDS.

9.2.4. Foraging Encounters

The majority of turtles tagged and recorded as foraging encounters in TREDS for Australia were green turtles followed by hawksbill turtles and loggerhead turtles respectively. From a total 15 encounters, green turtles made up eight (53.3%) encounters, hawksbill turtles made up five (33.3%) encounters and the remaining two (13.3%) encounters were for unidentified turtles (Figure 23).

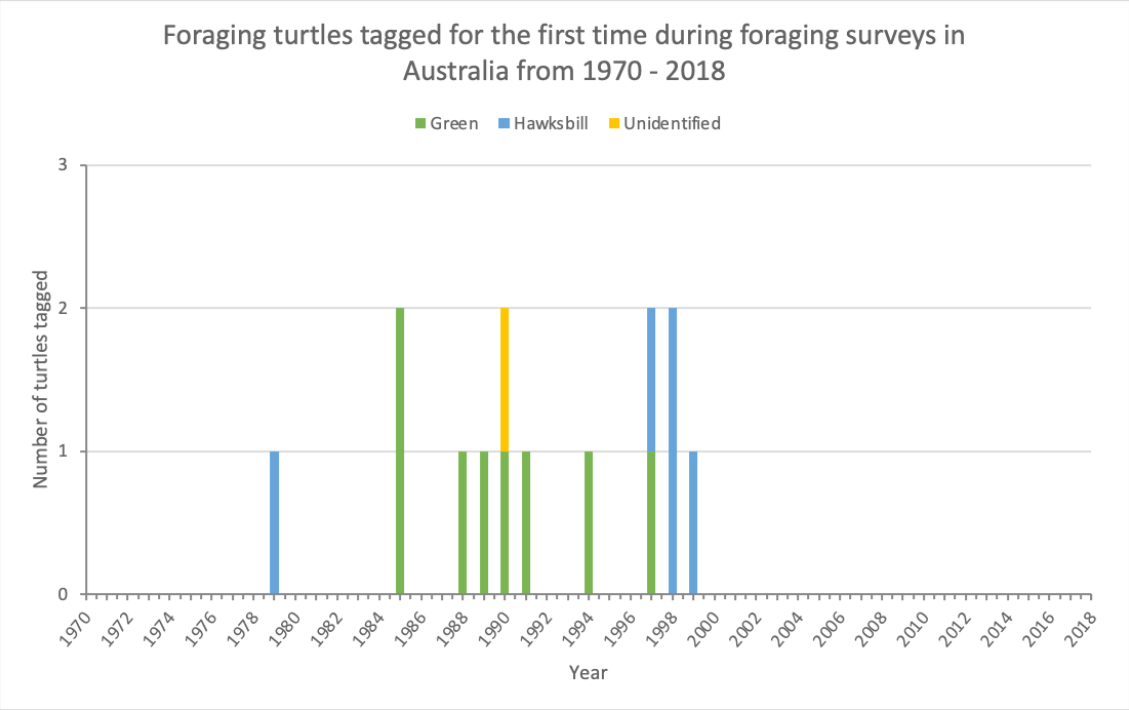


Figure 29: Foraging turtles tagged for the first time in Australia from 1970 - 2018 and recorded in TREDS.

9.3. Cook Islands

9.3.1. Tag Inventory

The Cook Islands have a total 1,626 tags recorded in their Inventory, with 46 (2.8%) tags recorded as deployed. The majority of tags are unaccounted for or have not been deployed. (Table 7).

Table 8:Tabulated summary of tags recorded in TREDS for the Cook Islands from 1970 – 2018.

Tag Type	Tags Recorded	Tags Deployed/ Used	Difference
Inconel	804	2	802
Titanium	800	22	778
Other	22	22	0
TOTALS	**1,626**	**46**	**1,580**

9.3.2. Species Occurrence

Green, hawksbill, leatherback, and loggerhead turtles have been encountered in the Cook Islands EEZ, with green turtles being the only species known to have a nesting occurrence there (Table 3).

There is a total of 169 encounters recorded in TREDS with a total of 135 (79.9%) encounters for green turtles, 29 (17.2%) encounters for hawksbill turtles, and six (3.6%) encounters for unidentified turtles.

9.3.3. Nesting Encounters

The nesting encounters recorded in TREDS from 1970 – 2018 for the Cook Islands where turtles were tagged for the first time, indicated that there are a total of 12 encounters recorded. All 12 encounters were of green turtles (Figure 24), which corresponds to Table 3.

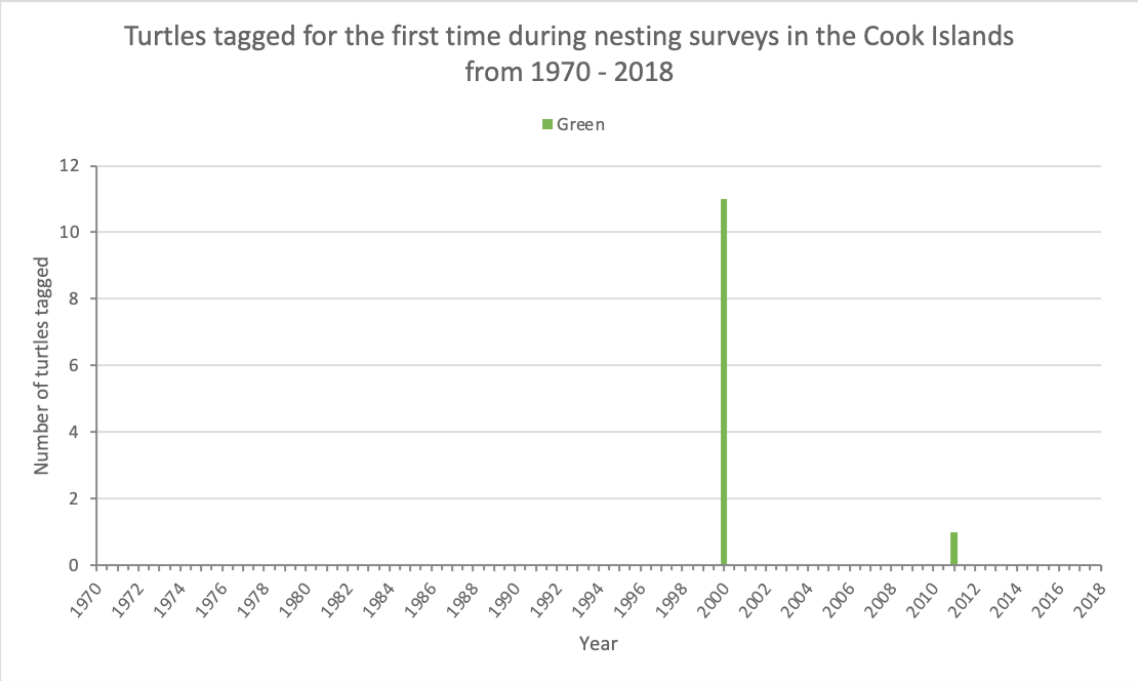


Figure 30: Turtles tagged for the first time during nesting seasons in Cook Islands from 1970 - 2018 and recorded in TREDS.

9.3.4. Foraging Encounters

TREDS holds a total of 157 encounters submitted by the Cook Islands as foraging encounters, of which 17 encounters are recorded as primary tagged encounters. Out of these 17 encounters where turtles were tagged for the first time, nine (52.9%) encounters were green turtles, four (23.5%) encounters were hawksbill turtles, and three (17.6%) encounters were unidentified turtles.

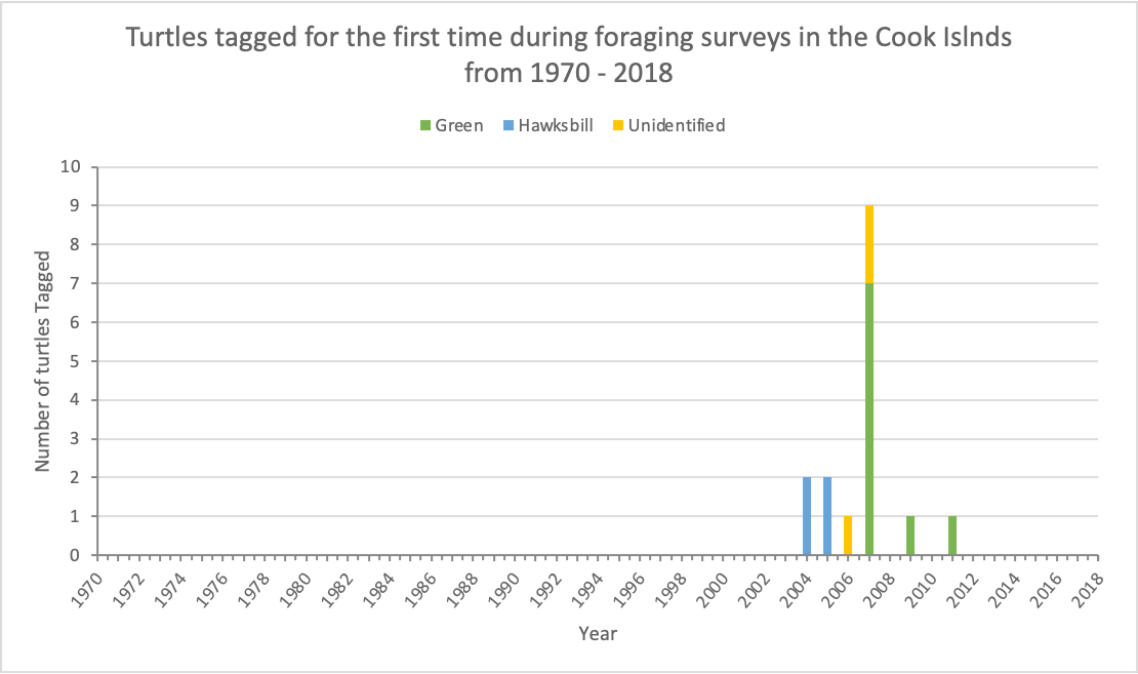


Figure 31: Foraging encounters recorded in TREDS of turtles tagged for the first time in the Cook Islands from 1970 – 2018.

9.4. Federated States of Micronesia

9.4.1. Tag Inventory

Federated States of Micronesia (FSM) recorded a total of 13,697 tags in their Inventory from the period 1970 – 2018. Out of this total 1,175 (8.6%) were recorded as tags deployed while a remaining 12,522 (91.4%) tags have an unknown status of whether they have been deployed, damaged, lost, or still in storage.

Table 11: Tabulated summary of tags recorded in TREDS for Federated States of Micronesia from 1970 – 2018.

Tag Type	Tags Recorded	Tags Deployed/Used	Difference
Electronic	1,152	1,131	21
Inconel	1,690	9	1,681
Monel	590	3	587
Steel	27	3	24
Titanium	10,155	25	10,130
Other	83	4	79
TOTALS	**13,697**	**1,175**	**12,522**

9.4.2. Species Occurrence

Green turtles are the only known species to nest on beaches in FSM, while other turtle species such as hawksbills, leatherbacks, and olive ridleys are known to forage in FSM's EEZ (Table 3).

4,890 encounters were recorded in TREDS from 1970 – 2018 for FSM. From this total, 4,789 (98%) encounters were recorded as nesting encounters, and 99 (2%) encounters were recorded as foraging encounters.

9.4.3. Nesting Encounters

From a total of 4,789 nesting encounters recorded in TREDS between 1970 – 2018, 2,501 encounters were recorded where the turtles were tagged for the first time. The majority of the turtles tagged were green turtles with 2,477 (99%) recorded encounters, while hawksbills and unidentified turtles recorded five (0.2%) and 19 (0.8%) encounters respectively.

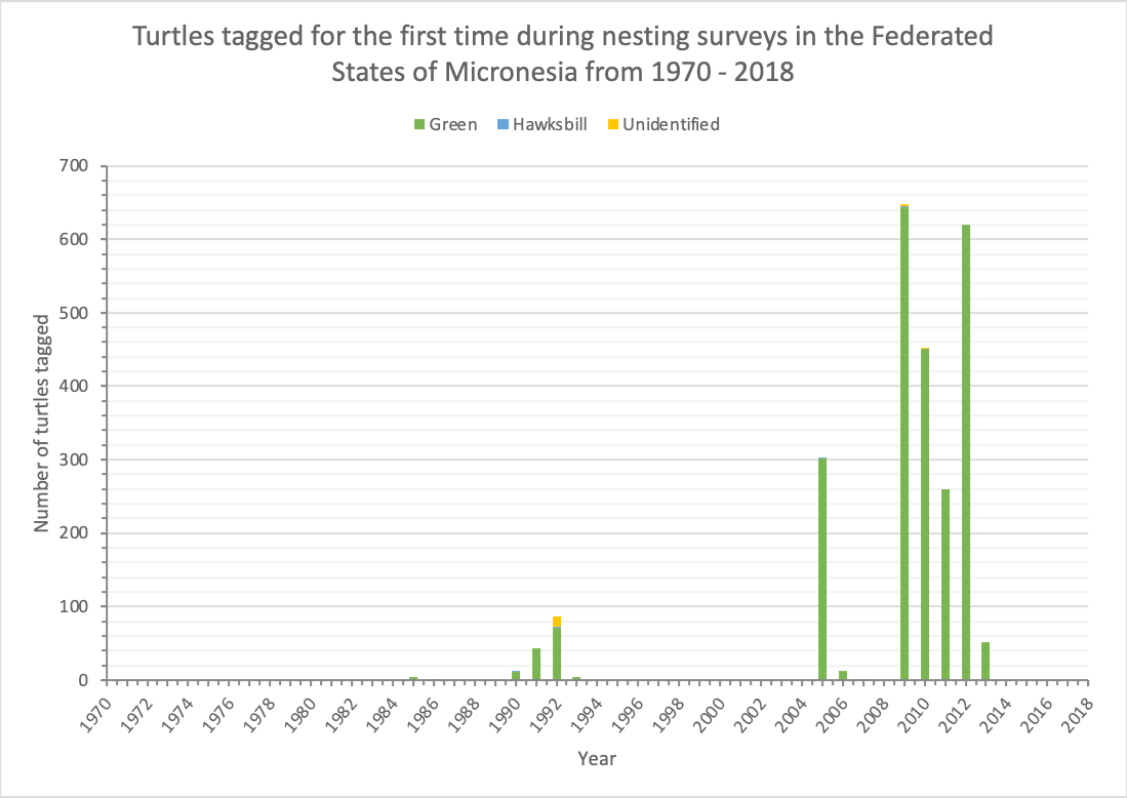


Figure 32: Turtles tagged for the first time during nesting season surveys conducted in the Federated States of Micronesia from 1970 - 2018. Data extracted from TREDS.

9.4.4. Foraging Encounters

99 encounters were recorded as foraging encounters for FSM from 1970 – 2018 of which, 81 of these encounters were of turtles being tagged for the first time. The majority of turtles tagged during foraging surveys were greens with 68 (84%) encounters, followed by hawksbills with 10 (12.3%) encounters, olive ridley with one (1.2%) encounter, and the remaining two (2.5%) encounters were unidentified turtles.

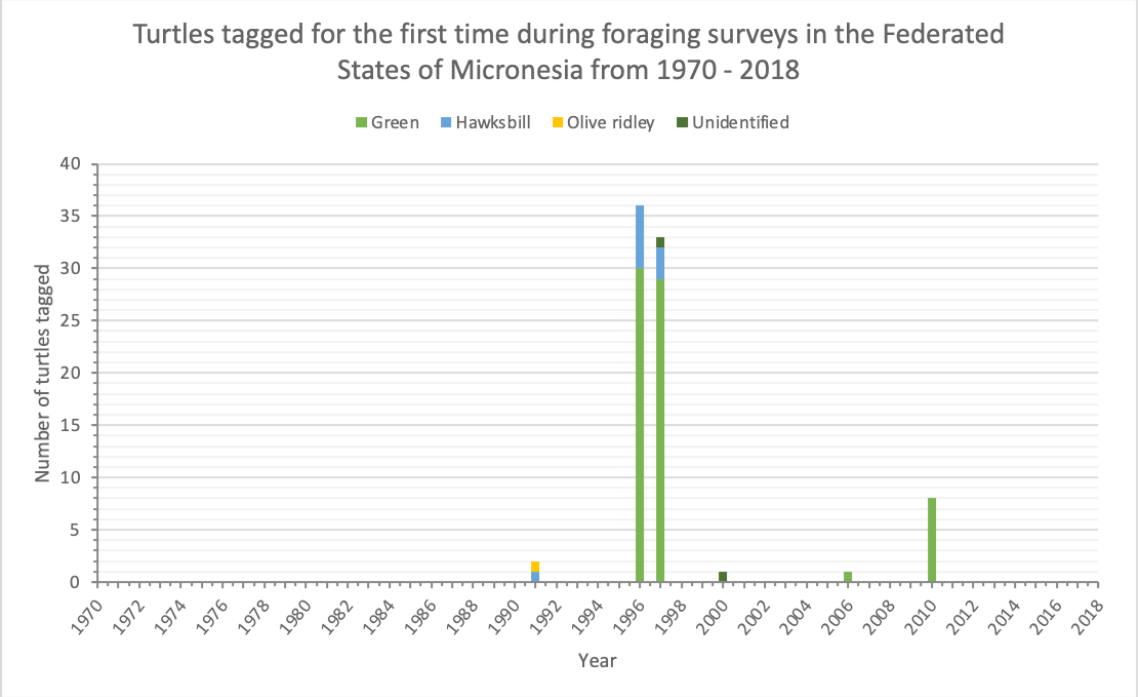


Figure 33: Turtles tagged for the first time during foraging surveys conducted in Federated States of Micronesia from 1970 - 2018. Data extracted from TREDS.

9.5. Fiji

9.5.1. Tag Inventory

A total of 5,401 tags of various types are recorded in TREDS for Fiji from 1970 – 2018 with 646 (11.9%) tags recorded as used or deployed, leaving 4,755 tags that are unaccounted for.

Table 9: Tabulated summary of tags recorded in TREDS for Fiji from 1970 – 2018

Tag Types	Tags Recorded	Tags Deployed	Difference
Electronic	5	5	0
Inconel	2,184	227	1,957
Steel	4	0	4
Titanium	3,129	342	2,787
Other	79	72	7
TOTALS	**5,401**	**646**	**4,755**

9.5.2. Species Occurrence

Fiji is known to have green and hawksbill turtles nesting occurrences while leatherbacks and loggerheads have been recorded within its EEZ (Table 3). The data recorded in TREDS from 1970 – 2018 reaffirms the information in Table 3 that green and hawksbill turtles do indeed nest on beaches in Fiji.

759 encounters were recorded in TREDS from 1970 – 2018 for Fiji, of which 241 (31.8%) are nesting encounters and 518 (68.2%) are foraging encounters.

9.5.3. Nesting Encounters

241 nesting encounters was recorded in TREDS from 1970 – 2018 for Fiji. Out of this, 229 encounters were recorded as turtles tagged for the first time. Green and hawksbill turtles are the two turtle species that were recorded in TREDS to be nesting in Fiji. Hawksbill turtles made up the majority of nesting encounters recorded in TREDS with 211 (92.1%) encounters, six (2.6%) encounters for green turtles, and 12 (5.2%) encounters where the turtles were unidentified.

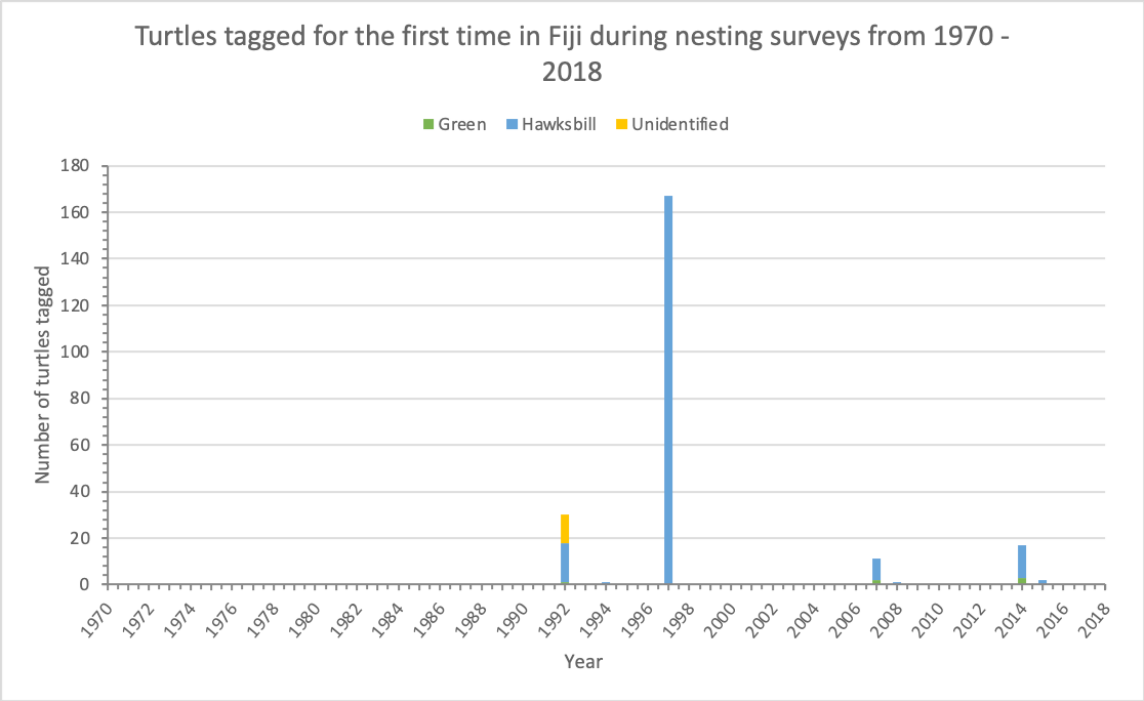


Figure 34: Turtles tagged for the first time during nesting surveys conducted in Fiji from 1970 - 2018. Data extracted from TREDS.

9.5.4. Foraging Encounters

A total of 518 foraging encounters was recorded in TREDS from 1970 – 2018 for Fiji. Out of this total, 361 encounters were recorded as turtles tagged for the first time. Green, hawksbill and loggerhead turtles have recorded foraging encounters with 81 (22.4%) encounters for greens, 271 (75.1%) encounters for hawksbills, four (1.1%) encounters for loggerheads and the remaining five (1.4%) encounters for turtles that were unidentified.

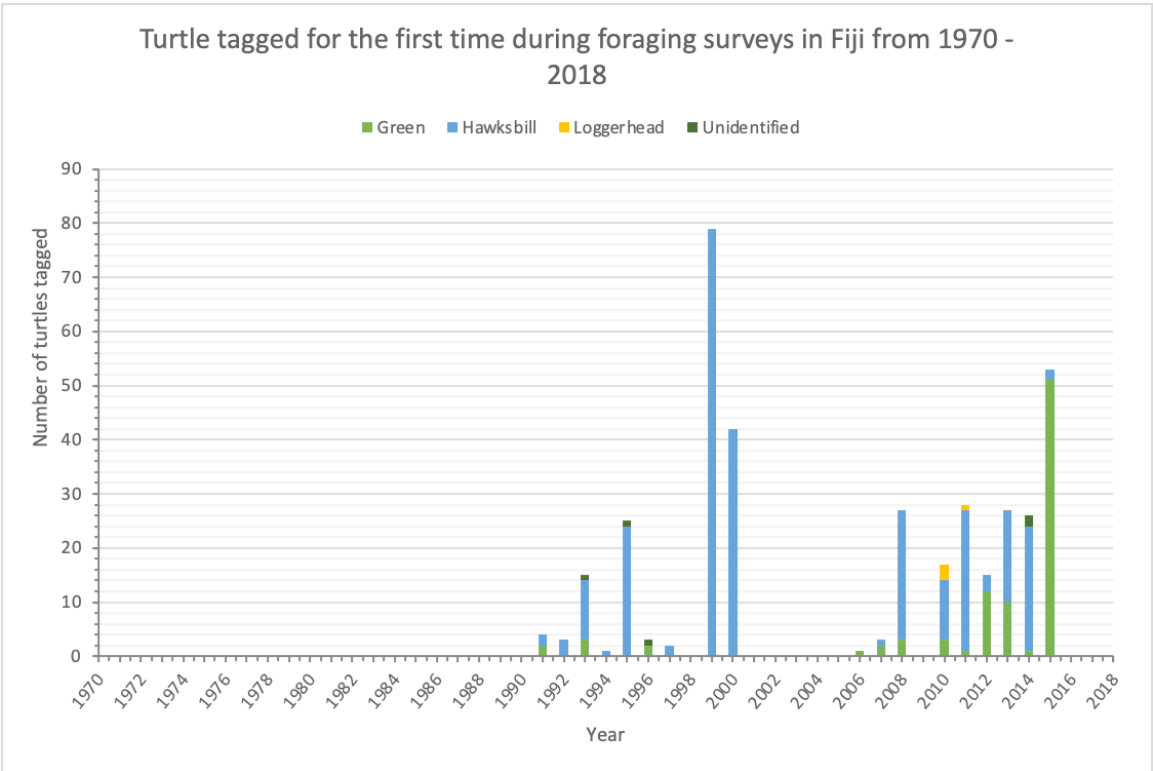


Figure 35: Foraging encounters recorded in TREDS from 1970 – 2018 where turtles were tagged for the first time. Data extracted from TREDS.

9.6. French Polynesia

9.6.1. Tag Inventory

A total of 8,626 tags is recorded in TREDS for French Polynesia's inventory from 1970 – 2018. A total of 2,545 (29.5%) of the tags have been recorded as deployed or used. This leaves a total 6,081 (70.5%) unused tags.

Table 10: Tabulated summary of Tags recorded in TREDS for French Polynesia from 1970 - 2018

Tag type	Tags Recorded	Tags Deployed/Used	Difference
Inconel	3,541	726	2,815
Monel	1,234	237	997
Titanium	3,562	1,381	2,181
Other	289	201	88
TOTALS	**8,626**	**2,545**	**6,081**

9.6.2. Species Occurrence

Green and hawksbill turtles are known to nest in French Polynesia (Table 3), while leatherbacks, loggerheads, and olive ridleys are known to frequent in its EEZ. In TREDS, 2,125 encounters were recorded, out of which, 1,214 (57.1%) of those encounters were recorded as nesting encounters, and 911 (48.9%) were recorded as foraging encounters.

9.6.3. Nesting Encounters

Out of a total of 1,214 nesting encounters recorded in TREDS 1,180 of these encounters were recorded where the turtle was tagged for the first time. From this 1,180 primary tagged encounters, green turtles accounted for the majority of encounters with a total of 1,153 (97.7%) with hawksbill turtles making up the remaining 27 (2.4%) encounters.

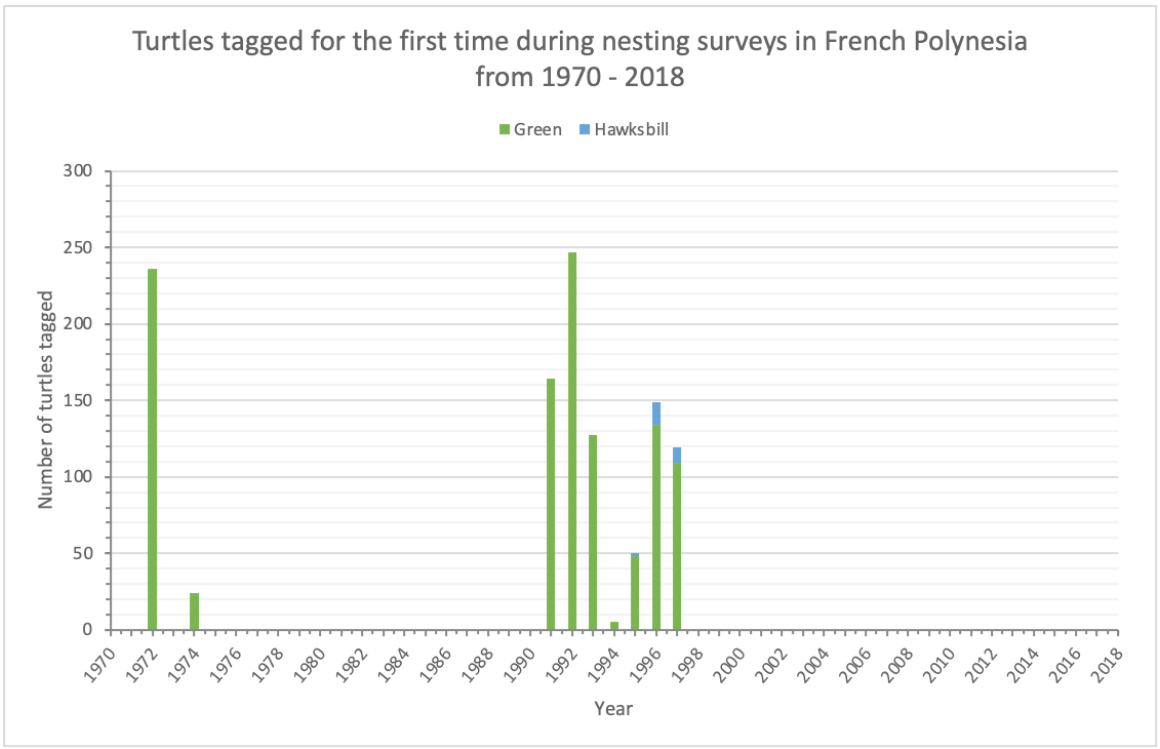


Figure 36: Turtles tagged for the first time in French Polynesia during nesting surveys from 1970 - 2018 and recorded in TREDS.

9.6.4. Foraging Encounters

911 encounters were recorded in TREDS for French Polynesia as foraging encounters. Out of this total, 866 of these encounters were recorded where the turtle was tagged for the first time. Similar to the nesting encounters, most of the foraging encounters were of green turtles with a total of 725 (83.7%) encounters. Hawksbills had 44 (5.1%) encounters, olive ridleys had two (0.2%) encounters and the remaining 95 (11%) encounters were for unidentified turtles.

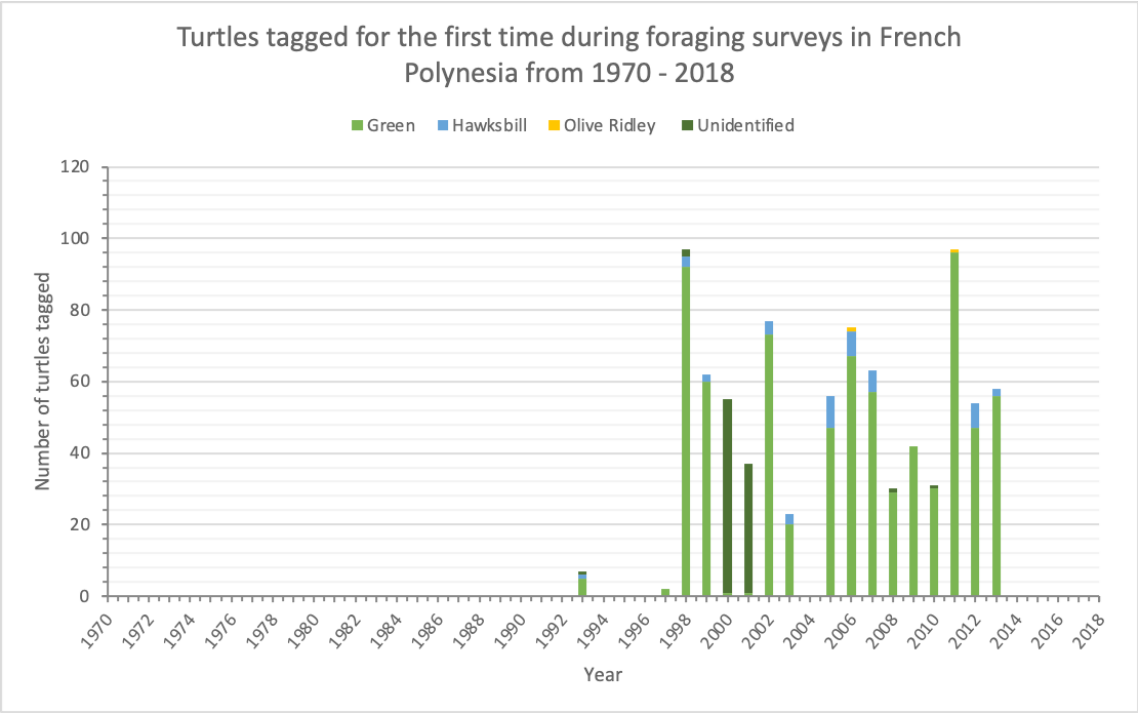


Figure 37: Turtles tagged for the first time during foraging surveys in French Polynesia recorded in TREDS from 1970 – 2018.

9.7. Guam

9.7.1. Tag Inventory

280 tags have been recorded in Guam's Inventory, and 60 (21.4%) tags have been recorded as deployed or used in TREDS, leaving a difference of 220 (78.6%) tags that have not been utilised or their status on TREDS not updated.

Table 12: Tabulated summary of tags recorded in TREDS for Guam from 1970 – 2018.

Tag type	Tags recorded	Tags deployed/ used	Difference
Electronic	20	15	5
Inconel	40	13	27
Titanium	208	20	188
Other	12	12	0
TOTALS	**280**	**60**	**220**

9.7.2. Species Occurrence

Green turtles are the only species previously recorded to nest in Guam, while hawksbills and leatherbacks are known to visit Guam's EEZ (Table 3). However, encounters of hawksbill turtles nesting in Guam were recorded in TREDS in the 1980's .

A total of 317 encounters was recorded in TREDS from 1970 – 2018 for Guam. Out of this total, 275 (86.8%) encounters are recorded as nesting encounters, while 42 (13.2%) encounters are recorded as foraging encounters.

9.7.3. Nesting Encounters

Guam recorded a total of 275 nesting encounters in TREDS from 1970 – 2018. Out of this total, 23 nesting encounters were recorded where the turtle was tagged for the first time. These 23 encounters were made up of 15 green turtle encounters and eight hawksbills encounters.

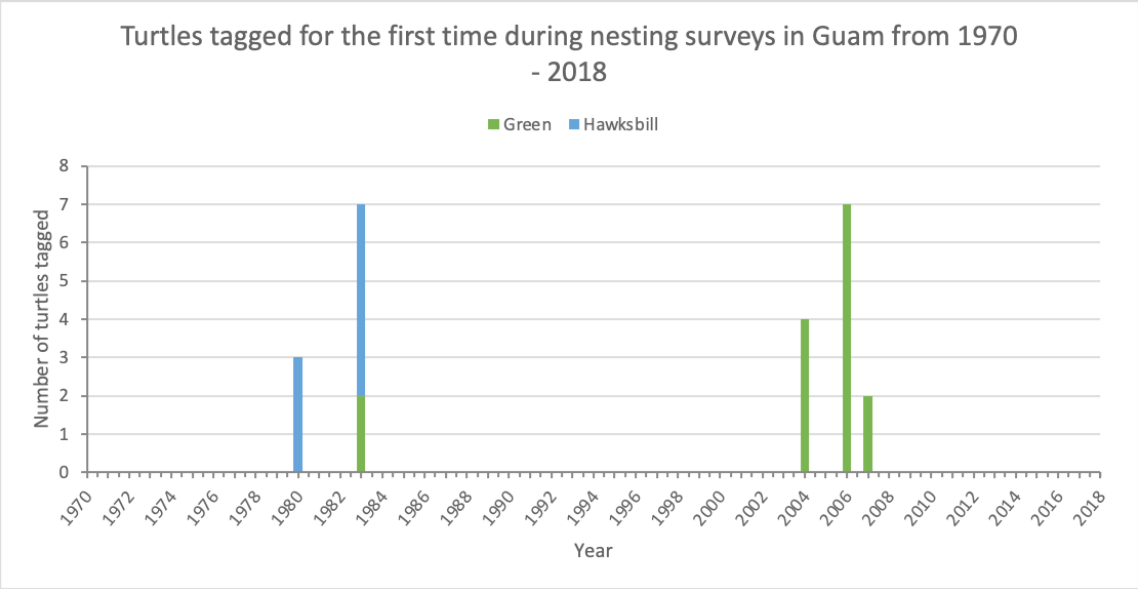


Figure 38: Nesting turtle encounters where the turtle was tagged for the first time in Guam during nesting surveys from 1970 – 2018 and recorded in TREDS.

9.7.4. Foraging Encounters

Guam recorded 42 foraging encounters in TREDS from 1970 – 2018 where 14 of these encounters were recorded to have a turtle tagged for the first time. The majority of the turtles tagged for the first time in foraging surveys were green turtles with 12 (85.7%) encounters recorded with the remaining two (14.3%) encounters were of hawksbill turtles.

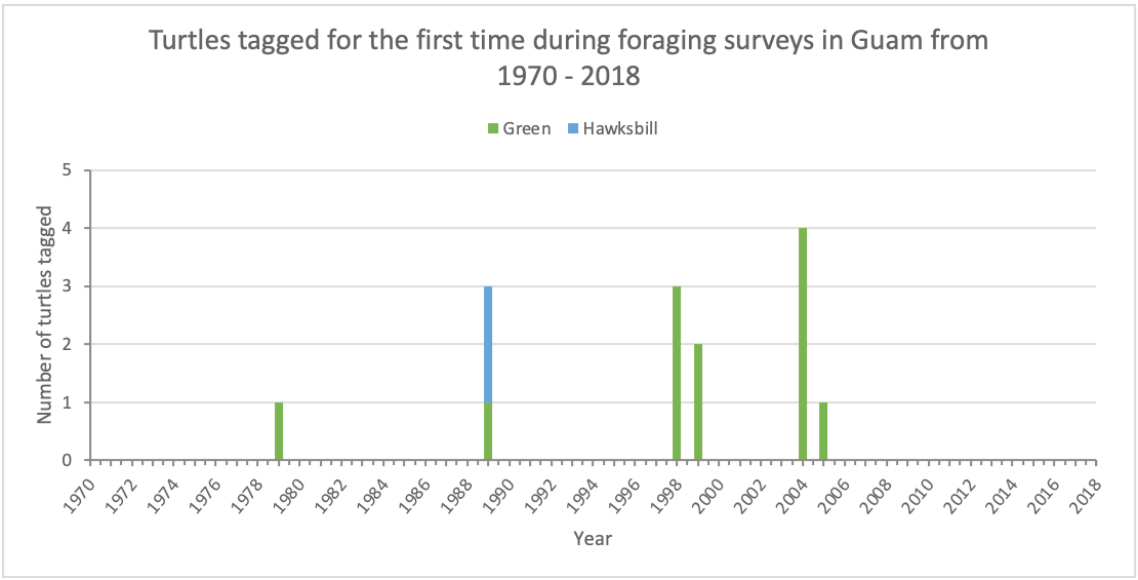


Figure 39: Distribution of turtles tagged for the first time during foraging surveys in Guam and recorded in TREDS from 1970 - 2018.

9.8. Kiribati

9.8.1. Tag Inventory

1,195 tags were recorded in the Tag Inventory for Kiribati with 302 (25.3%) tags recorded as being deployed or used and 893 (74.7%) tags that have not been used or their status has not been updated in TREDS.

Table 13: Tabulated summary of tags recorded in TREDS for Kiribati from 1970 - 2018

Tag type	Tags recorded	Tags deployed/ used	Difference
Inconel	100	0	100
Titanium	1095	302	793
TOTALS	**1195**	**302**	**893**

9.8.2. Species Occurrence

Kiribati is known to have occurrences of green turtles nesting on its beaches while hawksbills are only present there likely to forage (Table 3). 224 encounters were recorded from 1970 – 2018 for Kiribati, of which seven (3.1%) are nesting encounters and 217 (96.9%) foraging encounters.

9.8.3. Nesting Encounters

Out of the seven nesting encounters recorded for Kiribati from 1970 – 2018, only 3 nesting encounters were recorded where the turtle was tagged for the first time, which were all green turtle encounters.

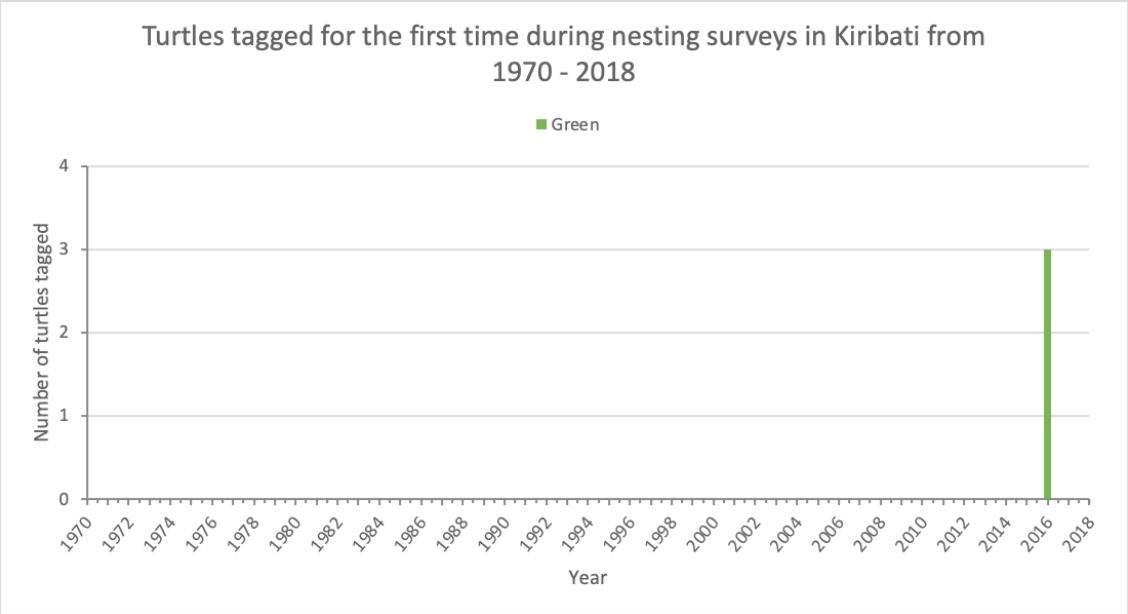


Figure 40: Green turtles were the only species recorded being tagged for the first time during nesting season surveys conducted in Kiribati from 1970 -2018.

9.8.4. Foraging Encounters

217 foraging encounters were recorded in TREDS for Kiribati from 1970 – 2018 and out of this total, 189 encounters were recorded where the turtle was tagged for the first time. Greens made up 187 (98.9%) encounters and hawksbills having only two (1.1%) encounters.

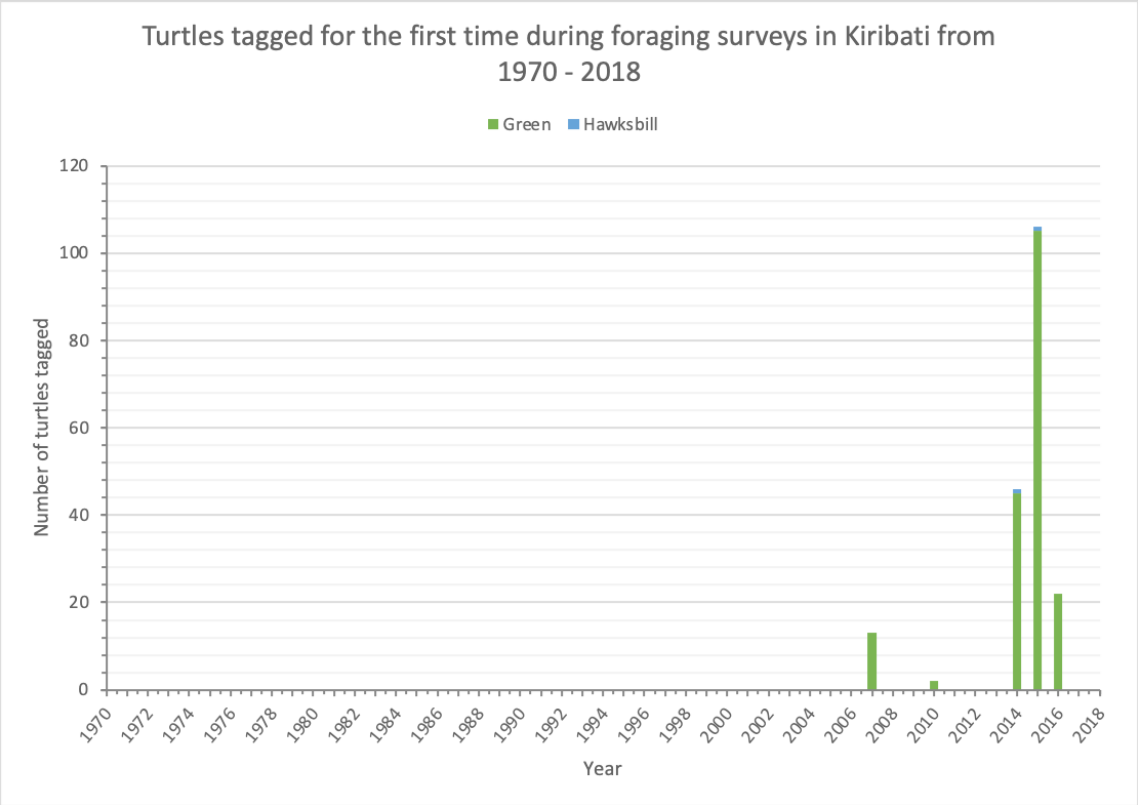


Figure 41: The majority of foraging encounters recorded in TREDS from 1970 - 2018 for Kiribati, where turtles were tagged for the first time were made up of green turtle encounters.

9.9. New Caledonia

9.9.1. Tag Inventory

The tag inventory for New Caledonia holds a total of 9,211 tags of which 2,936 have been recorded as deployed. The status of the remaining 6,275 tags is unknown on whether they have been deployed, damaged, lost or still in storage.

Table 15: Tabulated summary of tags recorded in TREDS for New Caledonia from 1970 - 2018

Tag Type	Tags Recorded	Tags deployed/ used	Difference
Inconel	25	8	17
Titanium	8,539	2,747	5,792
Other	647	181	466
TOTALS	**9,211**	**2,936**	**6,275**

9.9.2. Species Occurrences

Green and loggerhead turtles have been recorded to have nesting occurrences in New Caledonia, while hawksbill, leatherback, and olive ridley turtles have been known to have foraging occurrences in New Caledonia's EEZ.

In TREDS, there is a total of 1,969 encounters recorded for New Caledonia of which 1,810 are recorded as nesting encounters and 159 recorded as foraging encounters.

9.9.3. Nesting Encounters

Out of the 1,810 nesting encounters recorded in TREDS, 1,758 (97.1%) encounters were recorded where turtles were tagged for the first time. All these encounters were of green turtles.

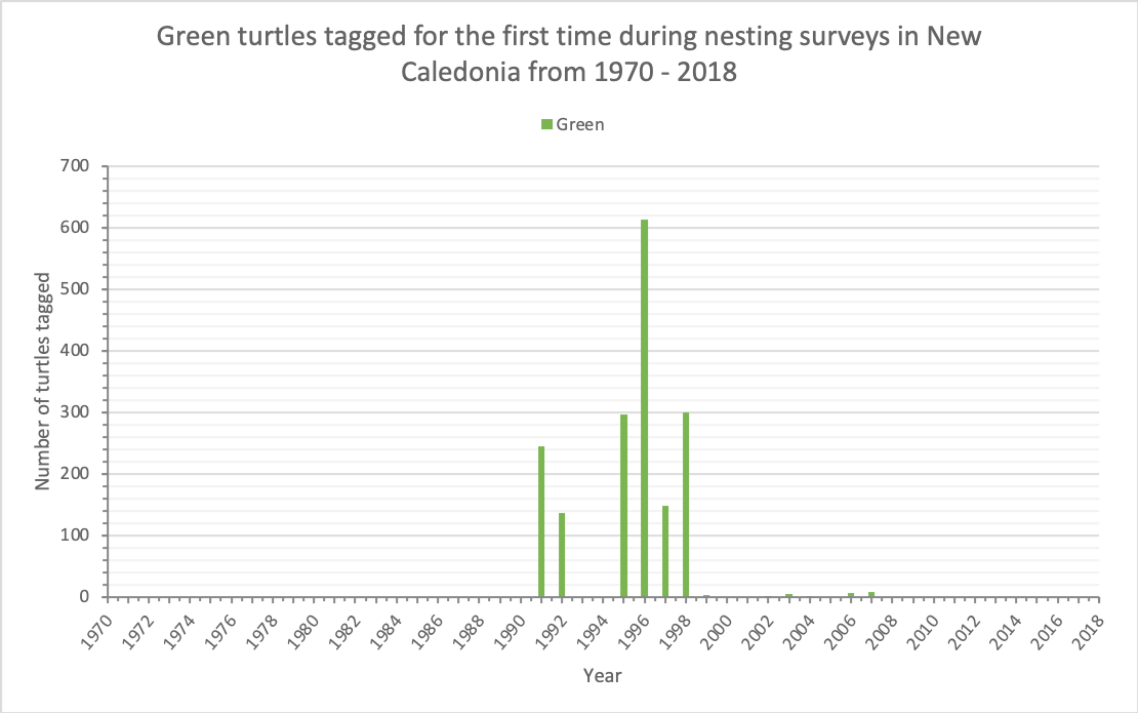


Figure 42: Nesting encounters from 1970 - 2018 that were recorded in TREDS where turtles were tagged for the first time in New Caledonia were only green turtles.

9.9.4. Foraging Encounters

Out of the 159 foraging encounters recorded in TREDS, 105 encounters were recorded as encounters where turtles were tagged for the first time. Green turtles were the most recorded with 100 (95.2%) encounters, followed by hawksbill turtles with three (2.9%) encounters and two (1.9%) encounters where the turtle species was unidentified.

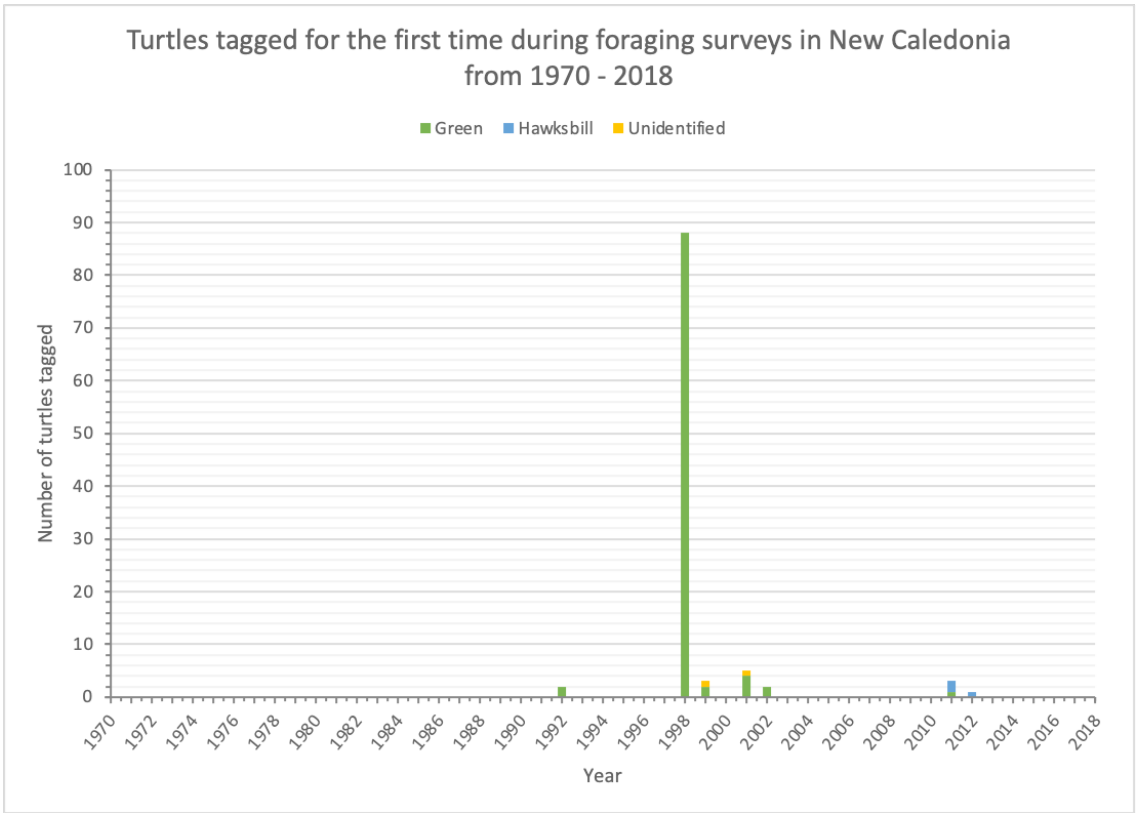


Figure 43: Number of turtles tagged for the first time during foraging surveys in New Caledonia from 1970 - 2018.

9.10. Palau

9.10.1. Tag Inventory

The total number of tags recorded in TREDS for Palau's Inventory is 4,725 tags, out of which, 1,423 tags have been recorded as deployed or used, leaving a difference of 3,302 tags that are unaccounted for as to whether they have been deployed, damaged, lost or remain in storage.

Table 17: Tabulated summary of tags recorded in TREDS for Palau from 1970 -2018

Tag type	Tags recorded	Tags deployed/ used	Difference
Inconel	400	0	400
Plastic	6	6	0
Titanium	4,318	1,416	2,902
Other	1	1	0
TOTALS	**4,725**	**1,423**	**3,302**

9.10.2. Species Occurrence

Green and hawksbill turtles are known to have nesting occurrences in Palau, while leatherbacks and olive ridleys are known to forage in Palau's EEZ (Table 3).

In TREDS, nesting encounters do include greens and hawksbills but also include olive ridleys, while loggerheads have been recorded to have foraging encounters. There are 2,484 nesting encounters and 89 foraging encounters recorded in TREDS for Palau from 1970 – 2018.

9.10.3. Nesting Encounters

2,484 nesting encounters are recorded in TREDS for Palau and from this total, 711 encounters included the turtle being tagged for the first time. Green turtles made up the majority of these encounters with a total of 687 (97.8%) encounters, followed by hawksbills with a total of 22 (3.3%) encounters and olive ridleys with two (0.3%) encounters.

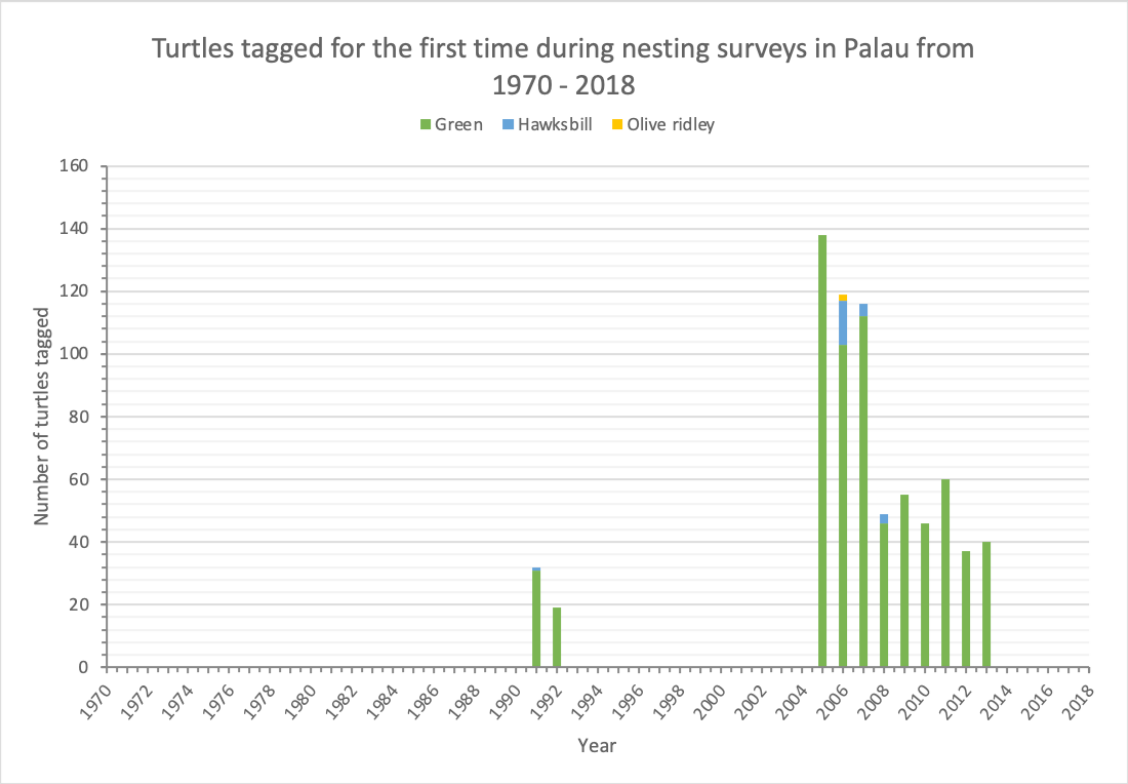


Figure 44: Nesting encounters that were recorded in TREDS from 1970 - 2018 in Palau where turtles encountered, were tagged for the first time.

9.10.4. Foraging Encounters

The total number of foraging encounters recorded in TREDS is 89 encounters; out of which, 68 encounters are recorded where turtles were tagged for the first time. The majority of these encounters are for olive ridley turtles with a total of 56 (82.3%) encounters. Other species recorded were the green turtle with three (4.4%) encounters, hawksbill turtle with seven (11.1%) encounters, loggerhead turtle with two (2.9%) encounters, and one (1.5%) encounter of a turtle that was unidentified.

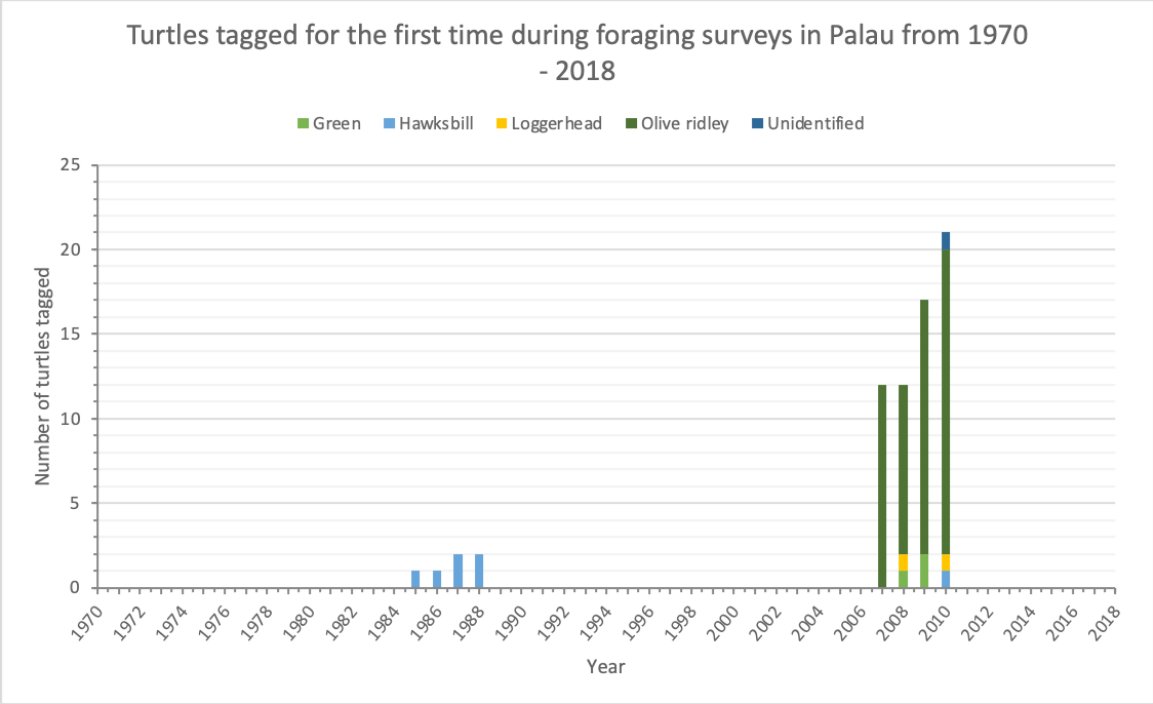


Figure 45: Turtles tagged for the first time during foraging surveys in Palau from 1970 - 2018 and recorded in TREDS.

9.11. Papua New Guinea

9.11.1. Tag Inventory

Papua New Guinea has recorded a total of 97,201 tags in its Tag Inventory from 1970 – 2018, with a total of 1,177 tags recorded as deployed. The status of the remaining 96,024 tags is unknown, as to whether they have already been deployed, damaged, lost or still in storage.

Table 16: Tabulated summary of tags recorded in TREDS for Papua New Guinea from 1970 - 2018

Tag type	Tags recorded	Tags deployed/Used	Difference
Electronic	35	225	-190
Inconel	600	0	600
Titanium	95,657	782	94,875
Other	909	170	739
TOTALS	**98,201**	**1,177**	**96,024**

9.11.2. Species Occurrence

Papua New Guinea is a hotspot for turtles with four of the six species found in the Pacific region nesting on its beaches. These are greens, hawksbills, leatherbacks, and olive ridleys, while flatbacks and loggerheads are known to frequent PNG's EEZ (Table 3).

The data in TREDS for Papua New Guinea from 1970 – 2018 records a total of 1,428 encounters of which 1,323 are nesting encounters and 90 are foraging encounters.

9.11.3. Nesting Encounters

The total number of nesting encounters recorded in TREDS for Papua New Guinea from 1970 – 2018 is 1,428. Out of this total, 816 of these nesting encounters involves a turtle being tagged for the first time. This total is made up of 393 (48.2%) green turtle encounters, 27 (3.3%) hawksbill turtle encounters, 373 (45.7%) leatherback turtle encounters and 23 (2.8%) encounters where the turtle was unidentified.

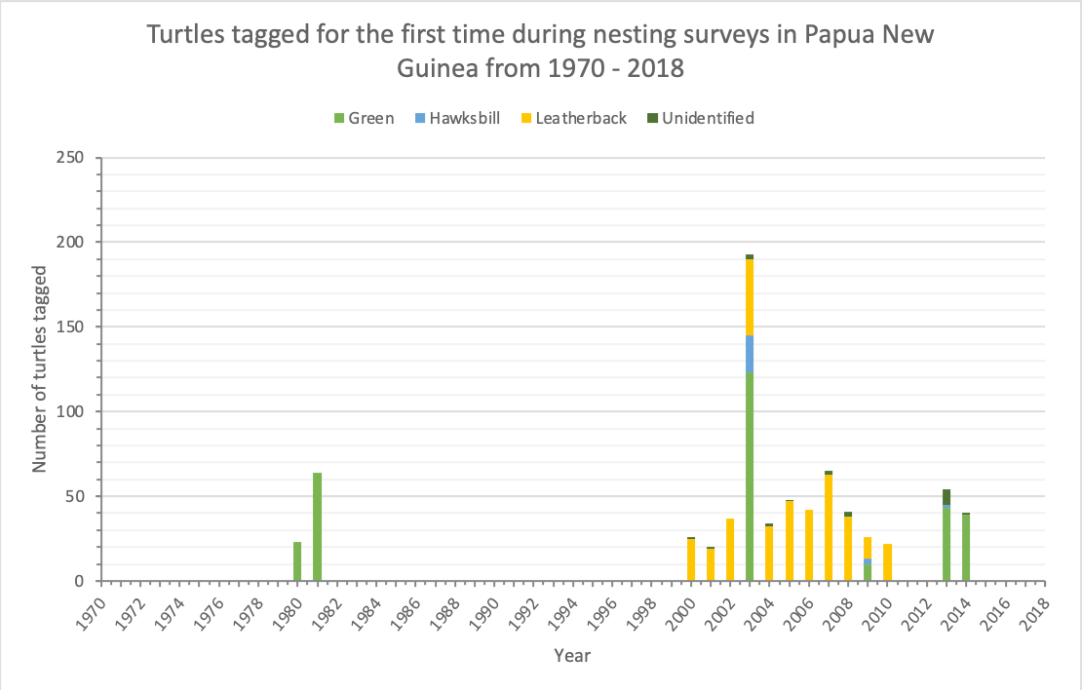


Figure 46: Turtles tagged for the first time during nesting surveys in PNG from 1970 - 2018 and recorded in TREDS.

9.11.4. Foraging Encounters

90 foraging encounters were recorded in TREDS from 1970 – 2018 for Papua New Guinea and out of this total, 29 encounters were recorded where a turtle was tagged for the first time. This is made up of 21 (72.4%) green turtle encounters, four (13.8%) hawksbill turtle encounters, three (10.3%) leatherback encounters, and one (3.4%) encounter where the turtle was unidentified.

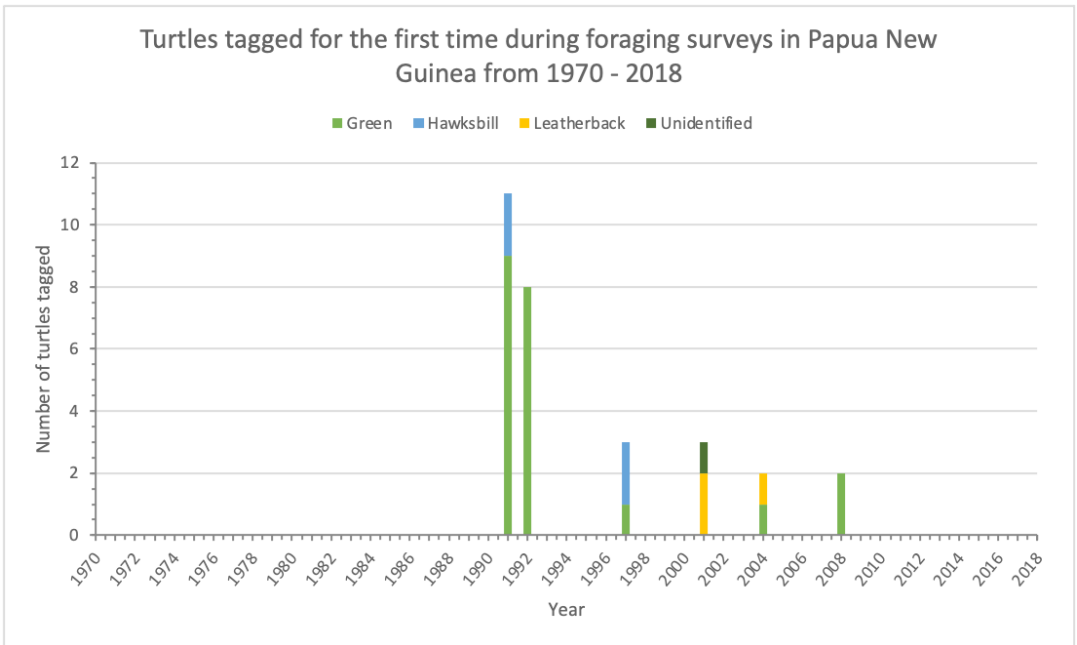


Figure 47: Turtles tagged for the first time during foraging surveys in Papua New Guinea from 1970 - 2018 and recorded in TREDS.

9.12. Republic of the Marshall Islands

9.12.1. Tag Inventory

1,433 tags were recorded in the Tag Inventory for the Republic of Marshall Islands from 1970 – 2018 with 214 of these tags recorded as deployed or used while 1,219 tags are unaccounted for and it is unclear if they have been deployed, damaged, lost or still in storage.

Table 14: Tabulated summary of tags recorded in TREDS for the Republic of the Marshall Islands from 1970 - 2018.

Tag type	Tags recorded	Tags deployed/ used	Difference
Titanium	1,431	212	1,219
Other	2	2	0
TOTALS	**1,433**	**214**	**1,219**

9.12.2. Species Occurrence

Greens and hawksbills are known to have nesting occurrences in the Republic of Marshall Islands with leatherbacks, loggerheads, and olive ridleys frequenting its EEZ (Table 3). the Republic of Marshall Islands recorded a total of 86 encounters from 1970 – 2018, which are made up of 71 (82.6%) nesting encounters from greens and hawksbills and 15 (17.4%) foraging encounters made up of greens and hawksbills as well.

9.12.3. Nesting Encounters

71 nesting encounters recorded in TREDS, 67 encounters were recorded where the turtle was tagged for the first time. From this total, 66 (98.5%) encounters were green turtles and one (1.5%) encounter was for a hawksbill turtle.

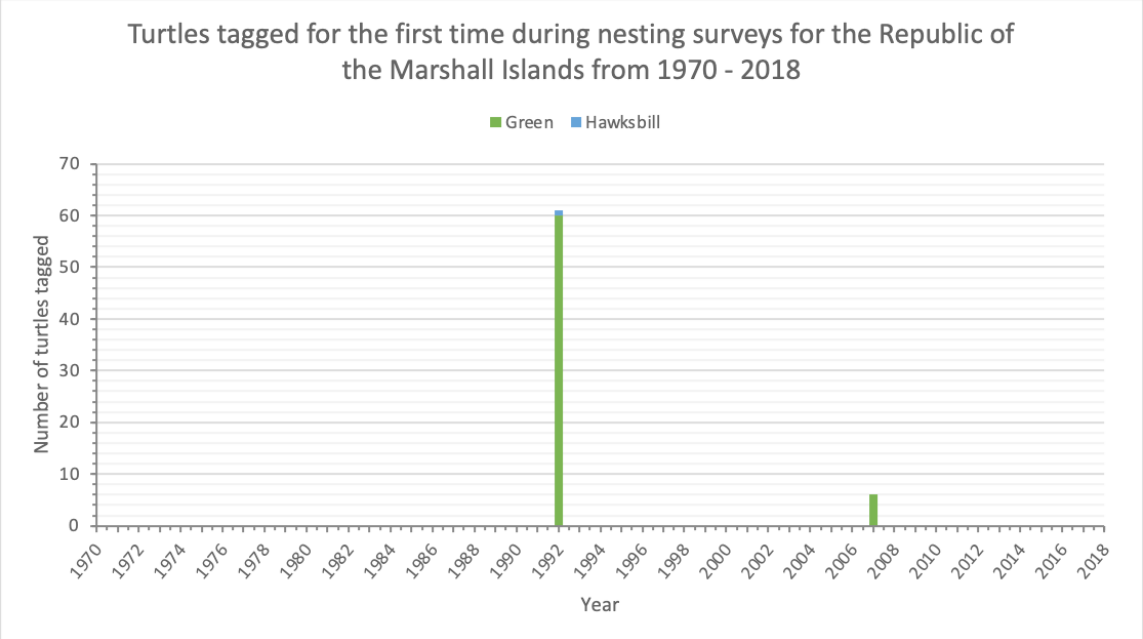


Figure 48: Nesting encounters recorded in TREDS for the Republic of Marshall Islands from 1970 - 2018 where the turtles were tagged for the first time.

9.12.4. Foraging Encounters

15 foraging encounters were recorded for the Republic of Marshall Islands in TREDS from 1970 – 2018, of which eight (53.3%) encounters were recorded where turtles were tagged for the first time. These 8 encounters, five (62.5%) were green turtle encounters, and three (37.5%) were hawksbill encounters.

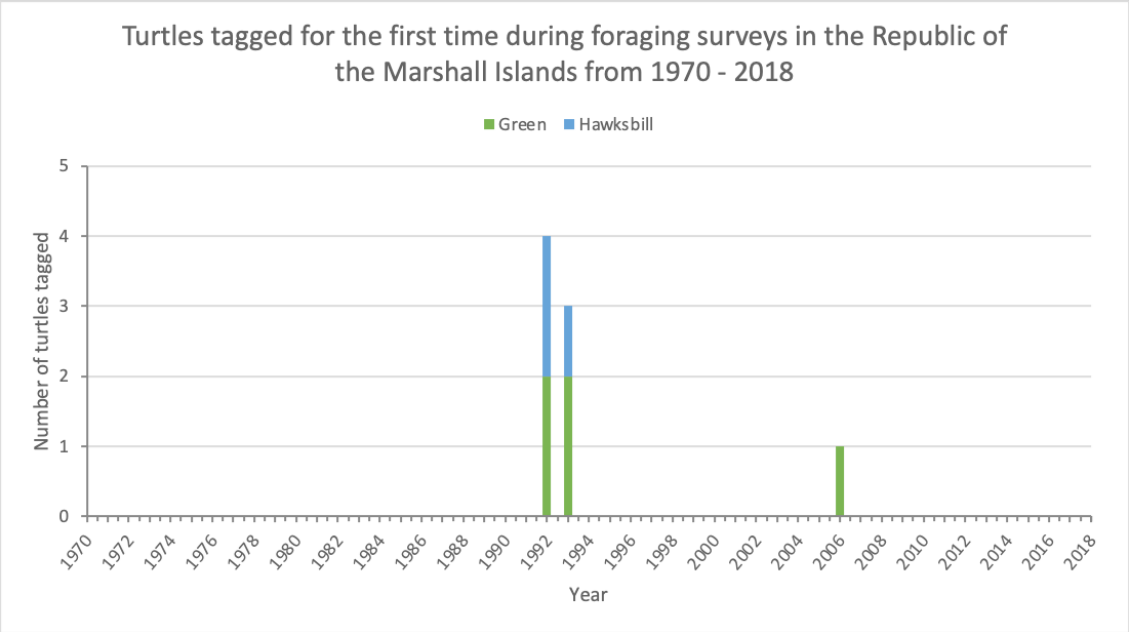


Figure 49: Turtles tagged for the first time during foraging surveys in RMI and recorded in TREDS from 1970 - 2018.

9.13. Samoa

9.13.1. Tag Inventory

Samoa recorded a total of 1,666 tags in its Tag Inventory from 1970 – 2018, with a total of 457 tags recorded as deployed or used, leaving 1,209 tags unrecorded and it is not known whether it has been deployed, damaged, lost or in storage.

Table 18: Tabulated summary of tags recorded in TREDS for Samoa from 1970 - 2018

Tag type	Tags recorded	Tags deployed/ used	Difference
Inconel	202	32	170
Titanium	1,364	423	941
Other	100	2	98
TOTALS	**1,666**	**457**	**1,209**

9.13.2. Species Occurrence

In Table 3, hawksbill turtles are the only species recorded to nest in Samoa, while greens, leatherbacks and loggerhead turtles are known to frequent Samoa's EEZ. In TREDS the data submitted by Samoa from 1970 – 2018 mirrors the information in Table 3 with only hawksbill turtles recorded nesting in Samoa while green turtles are only recorded to forage in Samoa's waters. The total number of encounters submitted to TREDS for Samoa is 314 encounters. From this total, there are 36 nesting encounters and 278 foraging encounters.

9.13.3. Nesting Encounters

From the total of 36 nesting encounters submitted to TREDS, two (5.6%) encounters were submitted where the turtles encountered were tagged for the first time. Both encounters were for hawksbill turtles.

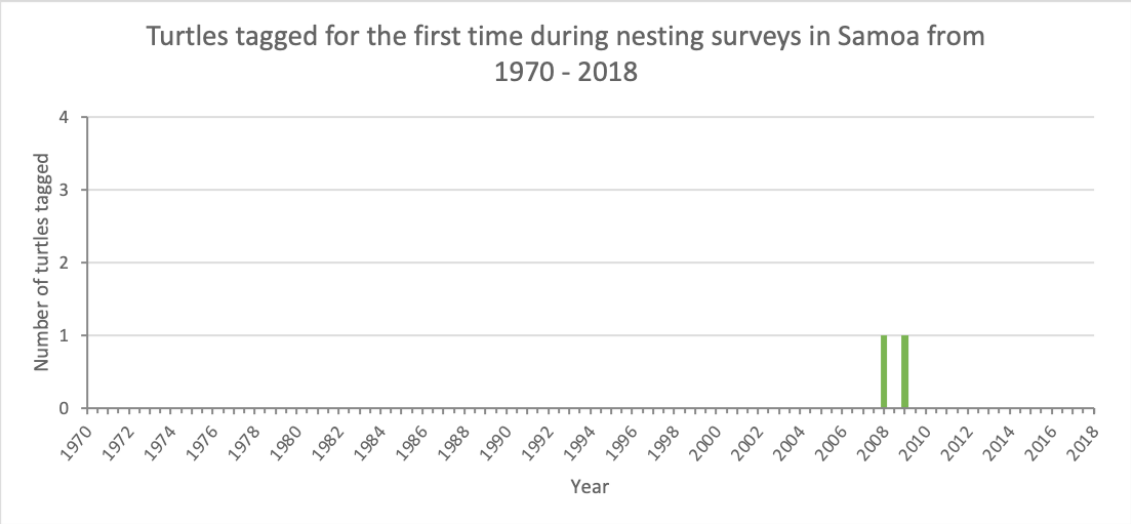


Figure 50: Turtle nesting encounters submitted to TREDS where the turtles were tagged for the first time from 1970 – 2018 in Samoa.

9.13.4. Foraging Encounters

From a total of 278 foraging encounters submitted to TREDS for Samoa, 251 encounters were recorded where a turtle was tagged for the first time. These 251 encounters are made up of 141 (56.2%) green turtle encounters, 105 (56.2%) hawksbill encounters and the remaining five (1.3%) encounters were for unidentified turtles.

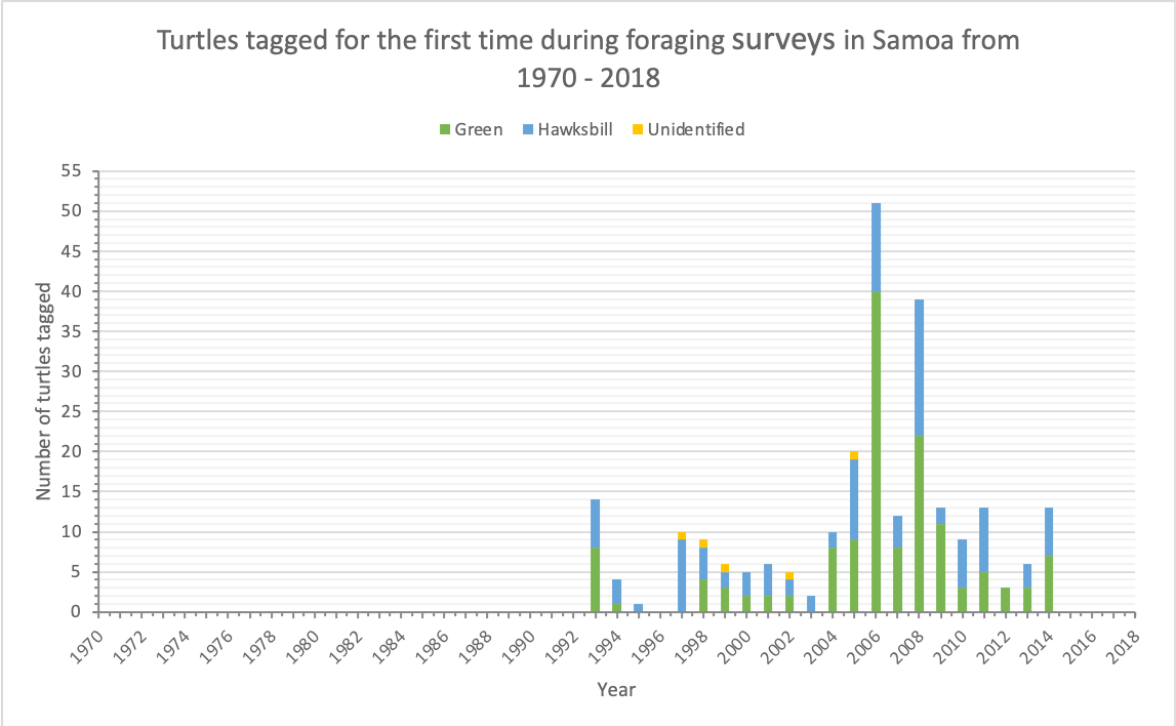


Figure 51: Foraging encounters submitted to TREDS where turtles were tagged for the first time during foraging surveys in Samoa from 1970 – 2018.

9.14. Solomon Islands

9.14.1. Tag Inventory

Solomon Islands recorded a total of 11,699 tags in its Tag Inventory and have recorded 2,279 tags as deployed or used. A total of 9,420 tags remains with no information as to whether these tags have been deployed, damaged, lost or are still in storage.

Table 19: Tabulated summary of tags recorded in TREDS for Solomon Islands from 1970 – 2018

Tag type	Tags recorded	Tags deployed/ used	Difference
Electronic	63	26	37
Inconel	1,404	236	1,168
Monel	283	91	192
Titanium	10,374	1,924	8,450
Other	75	0	75
TOTALS	12,499	2,277	10,222

9.14.2. Species Occurrence

Greens, hawksbills, leatherbacks and olive ridley turtles are all known to have nesting occurrences in Solomon Islands (Table 3).

In TREDS, 2,587 encounters are recorded for the Solomon Islands from the period 1970 - 2018, of which 1,775 encounters are recorded as nesting encounters and 812 encounters recorded as foraging encounters.

9.14.3. Nesting Encounters

Out of the 1,775 nesting encounters recorded in TREDS, 1,066 encounters have been recorded where the turtle encountered was tagged for the first time. From these 1,066 encounters, greens make up 122 (11.4%) encounters, hawksbills make up 774 (72.6%) encounters, leatherbacks make up 151 (14.2%) encounters, loggerheads make up one (0.1%) encounter, which was recorded in 1977, and 18 (1.6%) encounters for unidentified turtle species.

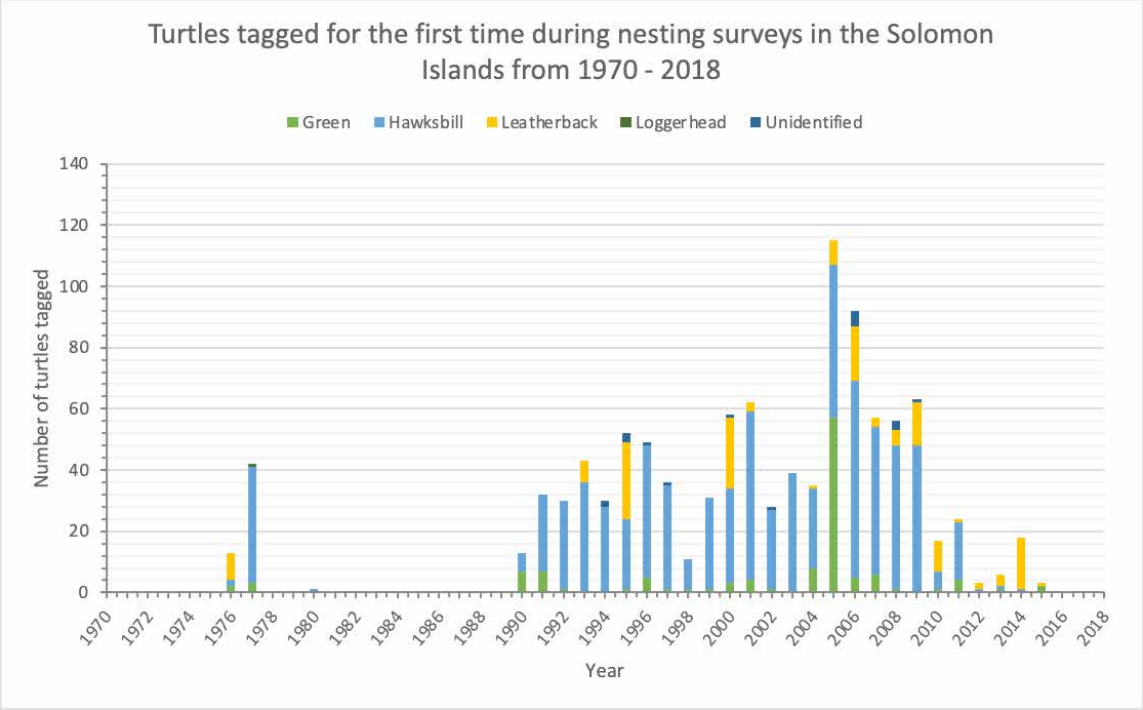


Figure 52: Turtle species tagged during nesting surveys conducted from 1970 - 2018 and recorded in TREDS for Solomon Islands.

9.14.4. Foraging Encounters

There are 812 foraging encounters recorded in TREDS of which 646 encounters are recorded where the turtle encountered was tagged for the first time. These 646 encounters consist of 526 (81.4%) green turtle encounters, 111 (17.2%) hawksbill turtle encounters, and nine (1.4%) encounters where the turtle species was not identified.

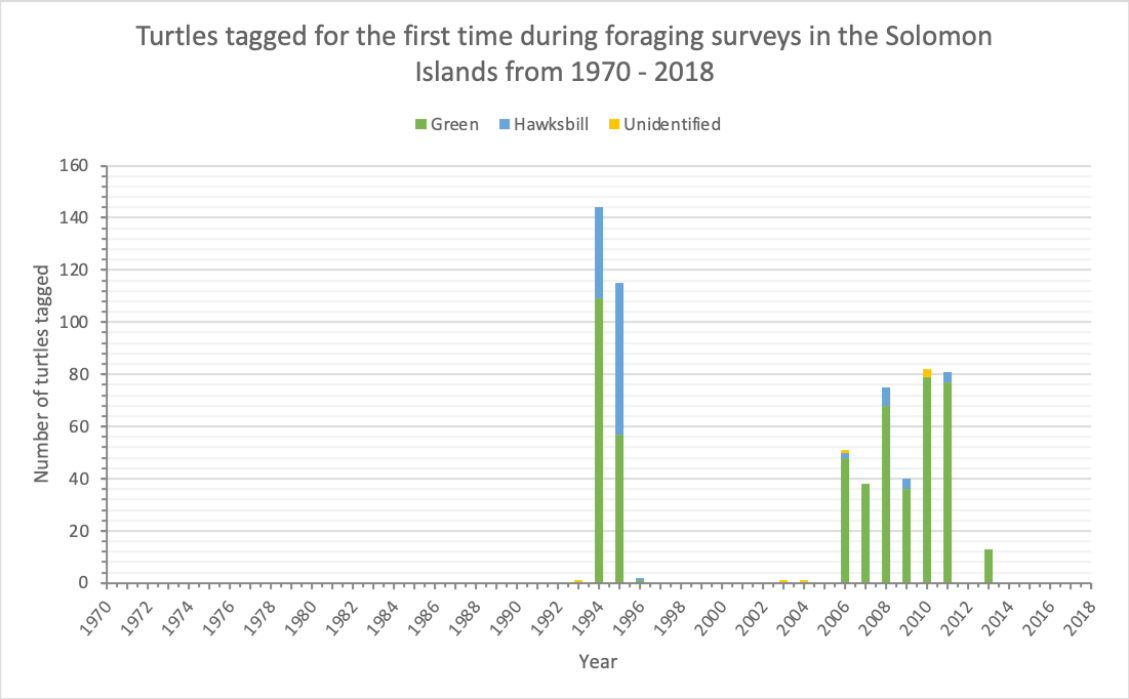


Figure 53: Foraging surveys conducted from 1970 - 2018 in Solomon Islands recorded green and hawksbill turtle occurrences in the Solomon Islands' EEZ.

9.15. Tonga

9.15.1. Tag Inventory

719 tags are recorded in Tonga's Tag Inventory out of which 26 tags have been recorded as deployed or used, leaving a remaining total of 693 tags that are either in storage, deployed but unrecorded, damaged, or lost.

Table 20: Tabulated summary of tags recorded in TREDS for Tonga from 1970 – 2018

Tag type	Tags recorded	Tags deployed/ used	Difference
Inconel	100	8	92
Titanium	618	17	601
Other	1	1	0
TOTALS	**719**	**26**	**693**

9.15.2. Species Occurrence

Green and hawksbill turtles are known to have nesting occurrences in Tonga with leatherback and loggerhead turtles known to forage in its EEZ.

Tonga has recorded a total of 33 encounters in TREDS all of which are foraging encounters with no nesting encounters recorded from 1970 – 2018.

9.15.3. Nesting Encounters

No nesting encounters were submitted to TREDS for Tonga from 1970 – 2018. This does not confirm that there are no turtles nesting in Tonga.

9.15.4. Foraging Encounters

All turtle encounters recorded in TREDS for Tonga from 1970 – 2018 were recorded as foraging encounters with 33 encounters in total. From this total, 22 encounters were recorded as encounters where the turtle was tagged for the first time. Out of these 22 encounters, 11 (50%) encounters were recorded for green turtles, 10 (45.5%) encounters were recorded for hawksbill turtles, and one (4.5%) encounter was recorded for a loggerhead turtle.

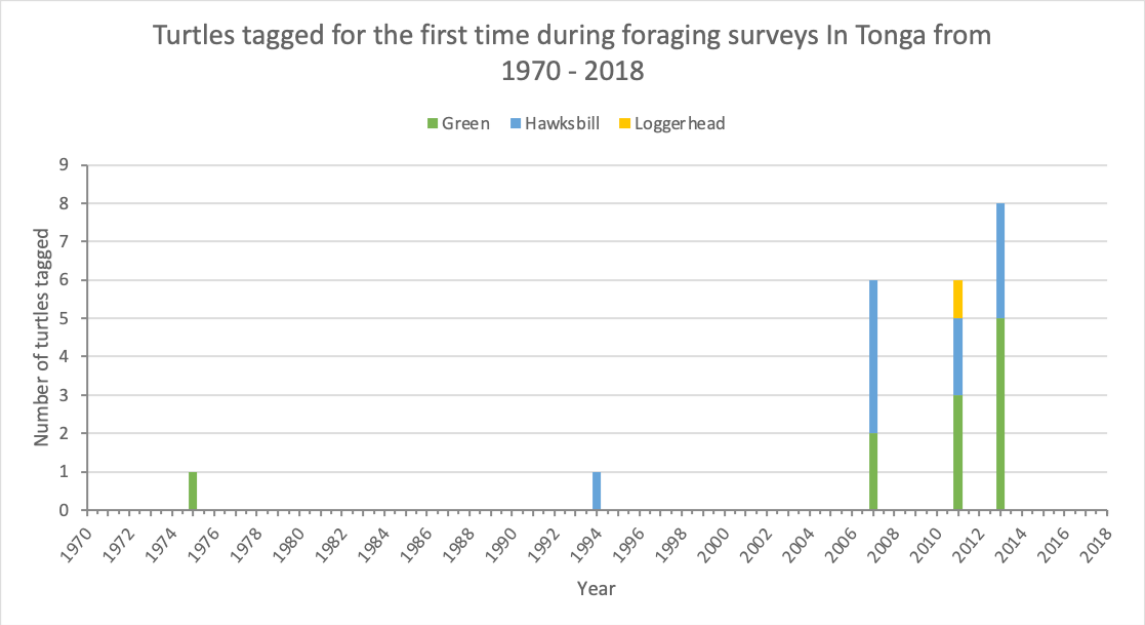


Figure 54: Foraging surveys conducted in Tonga from 1970 - 2018 recorded green, hawksbill and loggerhead encounters.

9.16. Tuvalu

9.16.1. Tag Inventory

Tuvalu has a total of 950 tags recorded in its Inventory in TREDS from 1970 – 2018 of which, 90 tags have been recorded as deployed. The status of the remaining 860 tags is unknown as to whether they have been deployed but unrecorded in TREDS, are damaged, are lost, or are still in storage.

Table 21: Tabulated summary of tags recorded in TREDS for Tuvalu from 1970 – 2018

Tag type	Tags recorded	Tags deployed/ used	Difference
Inconel	200	0	200
Titanium	750	90	660
TOTALS	**950**	**90**	**860**

9.16.2. Species Occurrence

Tuvalu has recorded nesting occurrences for green turtles (Table 3) while hawksbills, leatherbacks and loggerhead turtles are known to frequently pass through its EEZ.

In TREDS, a total of 98 encounters have been recorded for Tuvalu, out of which 19 encounters are recorded as nesting encounters and 77 are recorded as foraging encounters. The majority of these encounters were mainly green turtles.

9.16.3. Nesting Encounters

From the 19 nesting encounters recorded in TREDS between 1970 – 2018, two (10.5%) encounters were recorded as encounters where the turtle was tagged for the first time and both encounters were green turtles.

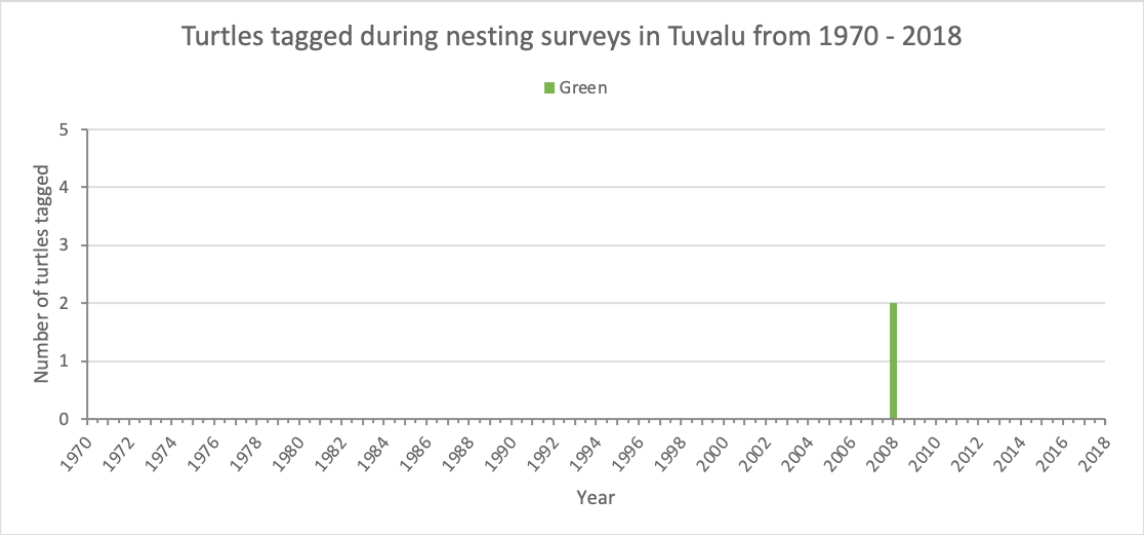


Figure 55: Turtles tagged for the first time during nesting surveys in Tuvalu from 1970 - 2018 and recorded in TREDS.

9.16.4. Foraging Encounters

Of the 77 foraging encounters recorded in TREDS for Tuvalu between 1970 – 2018, 42 (55.6%) encounters were recorded where the turtle was tagged for the first time. All 42 of these encounters were recorded as green turtle encounters.

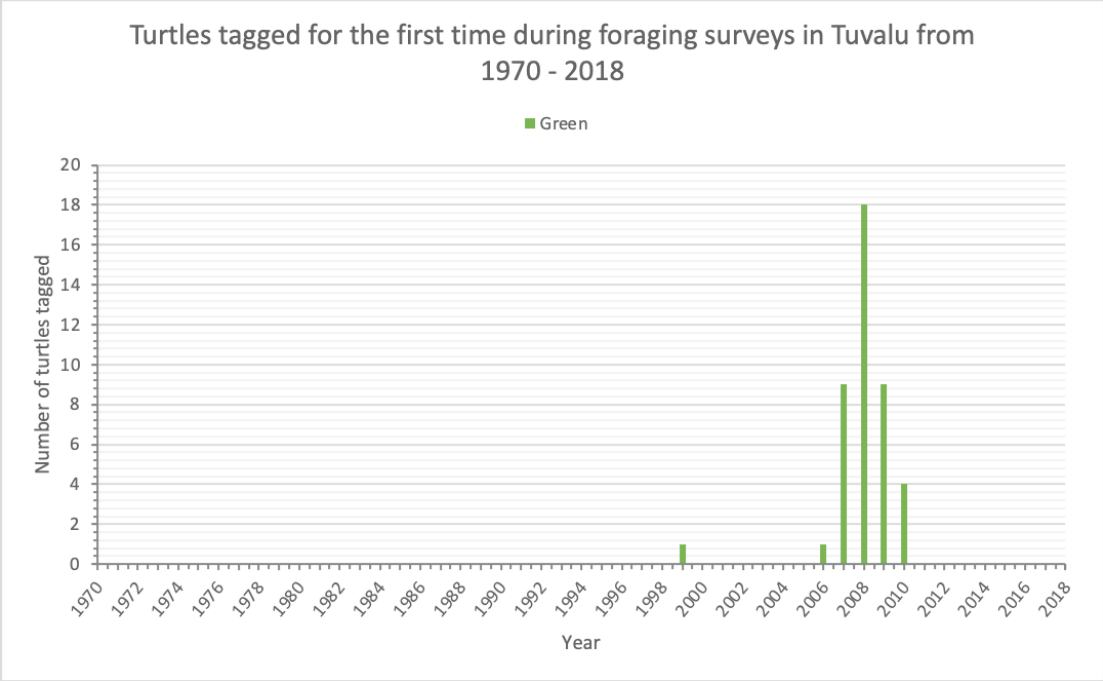


Figure 55: Turtles tagged for the first time during foraging surveys conducted in Tuvalu from 1970 - 2018 and recorded in TREDS. All encounters were green turtles.

9.17. Vanuatu

9.17.1. Tag Inventory

Vanuatu has recorded 18,855 tags in its Tag Inventory from 1970 – 2018 and of this 4,609 tags were recorded as tags deployed or used, which leaves 14,246 tags with no updated status of whether they have been deployed, have been damaged, lost or still in storage.

Table 22: Tabulated summary of Tags recorded in TREDS for Vanuatu from 1970 – 2018

Tag type	Tags recorded	Tags deployed/used	Difference
Inconel	8,632	1,402	7,230
Titanium	10,223	3,207	7,016
TOTALS	**18,855**	**4,609**	**14,246**

9.17.2. Species Occurrence

Vanuatu has recorded occurrences for five turtle species found in the Pacific region with four of these species traveling to Vanuatu to nest. These nesting species are greens, hawksbills, leatherbacks, and loggerheads, with olive ridleys only recorded to frequent in Vanuatu's EEZ to likely forage.

In TREDS, all five species have encounters recorded for Vanuatu, with a total of 3,004 encounters recorded, of which 731 of these are recorded as nesting encounters, and 2,239 as foraging encounters.

9.17.3. Nesting Encounters

Out of the 732 nesting encounters recorded in TREDS, 487 encounters recorded that the turtle was tagged for the first time. This is made up of 160 (32%) green turtle encounters, 306 (62.8%) hawksbill turtle encounters, six (1.2%) leatherback turtle encounters, one (0.2%) olive ridley turtle encounter, and 15 (23.7%) encounters where the turtle was not identified.

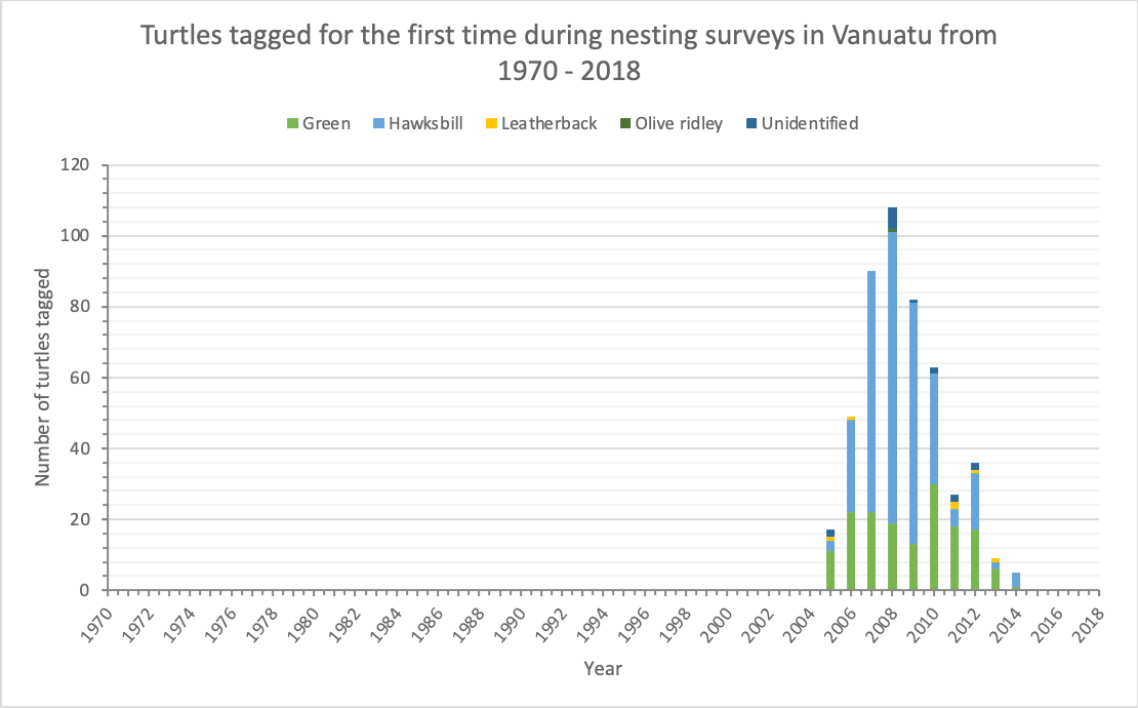


Figure 56: Turtles tagged for the first time in Vanuatu during nesting surveys from 1970 - 2018 and recorded in TREDS.

9.17.4. Foraging Encounters

Out of the 2,239 foraging encounters recorded in TREDS from 1970 – 2018, 2,069 foraging encounters were recorded where the turtle encountered was tagged for the first time. These encounters are made up of 494 (23.7%) green turtle encounters, 1,324 (66.7%) hawksbill turtle encounters, nine (0.4%) leatherback turtle encounters, eight (0.4%) loggerhead turtle encounters, three (0.1%) olive ridley turtle encounters, and 232 (11.2%) encounters where the turtle species was unidentified.

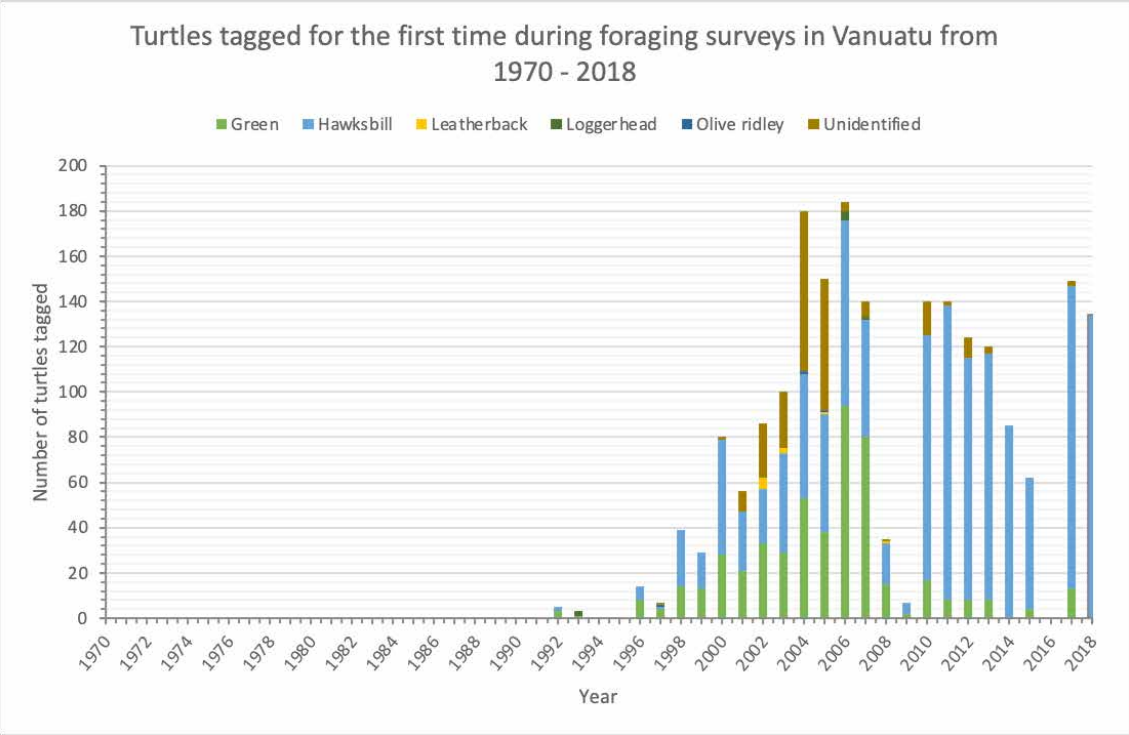


Figure 57: Turtles tagged for the first time during foraging surveys conducted in Vanuatu from 1970 - 2018 and recorded in TREDS.

10. Conclusion and Recommendations

10.1. Conclusion

TREDS has undergone major upgrades in recent years to allow it to be more practical and user-friendly. One of the main objectives of the database when it was developed and deployed was to allow all organisations in the Pacific region to contribute voluntarily to the submission of their respective turtle data so that better management and conservation solutions can be developed for the collective protection of turtles in the Pacific. Although TREDS was originally designed to be utilised by different organisations involved in turtle conservation activities in the Pacific, more organisations in countries outside the region are reaching out to seek registration with TREDS.

The original TREDS database was the principal database utilised by SPREP Members to record and store their data. However, its complexity, and the requirement of advanced knowledge and data analysis skills to navigate and thoroughly use the database made it difficult for different organisations to use it in their regular tasks. Additionally, for organisations to utilise the database, a branch database had to be downloaded by the organisation to input their turtle data and then later have this database synchronised with the master database that was hosted by SPREP. This would require large amounts of internet data and stable connectivity in order for the two databases to synchronised. These constraints slowly discouraged Users from using the database, finding more user-friendly alternatives to store their turtle data. Finally, this method of database management was highly prone to large amounts of data loss, when the device the branch database was stored on crashed. Upgrading TREDS from an MS Access platform to an online-based platform, the restructuring of the database itself to improve navigation and the removal of the need for a separate database to input data from different locations were some of the solutions developed to remove these constraints. Users can now easily access TREDS online using any device with internet connectivity, upload their data directly to TREDS without the need for another database, which minimises data loss, and can now easily extract the data they require for their reporting purposes.

The dataset time period for this report is from 1970 to 2018, which is the earliest data entry recorded in TREDS to the latest data entry before the database underwent the upgrade in 2020 and thus, all datasets extracted from the database for their respective chapters, followed this time period. The dataset is quite extensive and can be manipulated and analysed in infinite ways to suit the analyst's needs for reporting. This report's objective was to provide an overview of the data that is stored in TREDS since its creation in 1993. The addition of the Threats chapter is just one way this dataset has been interrogated to retrieve this type of data. The Country Reports chapter seeks to shed some light on possible trends of turtle occurrences in each country that has submitted turtle data to TREDS.

The continuous collaboration between organisations involved in turtle conservation activities and SPREP to utilise the database will allow for greater informed decisions when discussing conservation measures for these highly migratory species.

10.2. Recommendations

The turtle data stored in TREDS is quite vast covering well over 50 years of turtle monitoring in the region. Although the report covers a range of chapters utilising and manipulating the data in various ways, there is still much that could be done to utilise this collection of data.

1. TREDS Users are encouraged to ensure that the turtle data submitted is correct and is as comprehensive as possible, to ensure ease of reporting for future Users and thoroughness of reports.
2. TREDS Users are encouraged to perform regular data management on existing turtle data and assign at least one TREDS User who can liaise with the Secretariat on a regular basis, regarding data management, exchange and reporting.

Organisations looking to request tags from the Secretariat must be aware that the Secretariat may have requirements imposed before tags are released. This may include participating in capacity building in how to use TREDS and to agree to collaborate with the Secretariat in providing up to date information on the status of tags, provide turtle data that corresponds to the deployment of these tags and ensure that their turtle data is up to date. Use of tags as a tool for monitoring should be part of a well planned monitoring programme. Reference to SPREPs 'Sea Turtle Monitoring Manual' is recommended to assist with planning sea turtle monitoring.

3. Users are encouraged to liaise regularly with the Turtle Database and Conservation Officer or focal point within the Secretariat to ensure that they are able to fully utilise their turtle data being stored in TREDS for reporting purposes.

4. Users are encouraged to use TREDS as a repository for their historical turtle data so that their respective datasets are more comprehensive. The Secretariat facilitates TREDS training sessions based on demand and are usually conducted virtually.

5. To ensure continuation of data input to TREDS, current TREDS Users in their respective organisations should be encouraged to teach their colleagues on how to use TREDS regularly or to seek the assistance of the TREDS contact point in the Secretariat for a TREDS training session.

6. Users are encouraged to get in touch with the Turtle contact point in the Secretariat for any turtle related support that the Secretariat either may be able to provide or facilitate.

7. Users are encouraged to provide regular feedback on how the database can be improved for a more streamlined experience and to seek the assistance of the Secretariat in the compilation of a TREDS report for their reporting purposes.

If you have any queries regarding turtles, their conservation, management, and protection, or the Turtle Research and monitoring Database System (TREDS), please contact the Secretariat via email on sprep@sprep.org for details.

11. Appendix

11.1. Encounter sites by Country

11.1.1. American Samoa

Table 23: Tabulated encounter sites recorded in TREDS for American Samoa from 1970 - 2018

Encounter-Site Foraging	Encounter-Site Nesting
Maloata Village	Rose Atoll
Amaluia Village	Rose Island
Malaeloa Village	Utumea East Village
Afono Village	Utulei Village
Tula Village	Pago Pago Harbour
Avaio Village	Tula Village
Aua Village	Lauli'i Village
Fagasa Village	Aua Village
Nuuuli Village	Maloata Village
Pago Pago Harbour	Amalau Beach
To'aga Beach	Amouli Village
Lauli'i Village	
Afao Village	
Gataivai Village	
Aloau Village	
Satala Village	
Nuuuli Village Pala Lagoon	
'Au'asi Village	
Lion's Park, Nu'uli	
Leloaloa Village	
Se'etaga Village	
Masefau Village	
Vatia Village	
Fogagogo Village	
Malaeimi Village	
Fatumafuti Village	
Aoa Village	
Fagatogo Village	
Amouli Village	
Tafuna Village	
Pago Pago Village	
Utulei Village	
Fagaalu Village	
Faga'itua Village	
Vaitogi Village	
Swains Island	
Alao Village	

11.1.2. Australia

Table 24: Tabulated encounter sites recorded in TREDS for Australia from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Macdonald Point, Shoalwater Bay	Green Island
Shoalwater Bay	Heron Island, Capricornia
Wistari Reef, Capricornia	Wreck Island, Capricornia
Heron Island, Capricornia	Northwest Island, Capricornia
Erskine Island, Capricornia	Lady Musgrave Is., Capricornia
Clack Reef, Flinders Group	Erskine Reef
Un-Named Reef, Ngbr	Hoskyn Island, Capricornia
Howick Group	Tryon Island, Capricornia
Kay Reef, Northern Gbr, Qld	Lady Elliott Island
Sakeman Reef, Torres Strait	Coral Sea:Se Herald Cay
Northern Gbr	Mon Repos, Woongarra Coast
Australia	Wreck Rock
Piper Reef, Ngbr	Fraser Island
	Clack Reef, Flinders Group
	Milman Island, Ngbr
	Morris Island Reef, Ngbr
	Howick Island, Howick Gp.
	No.7 Sandbank, Ngbr
	Raine Island
	Moulter Cay (Ex Pandora Cay)
	Peel Island, Moreton Bay
	Dowar Island
	Northern Gbr:Raine Island
	Northern Gbr:Milman Island
	Australia

11.1.3. Cook Islands

Table 25: Encounter sites recorded in TREDS for the Cook Islands from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Palmerston Islet	Palmerston Islet
Surarrow	Surarrow
Arorangi	
Papua Passage	
Avana Passage	

11.1.4. Federated States of Micronesia

Table 26: Tabulated encounter sites recorded in TREDS for the Federated States of Micronesia from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Federated States Of Micronesia	Olimarao Atoll
Fananu Island	Falipiy Island, Olimarao Atoll
Weno	Olimarao Island, Olimarao Atoll
Yap Island	Oletal Island, Elato Atoll
Gielop Island, Ulithi Atoll	Sawatal Island
Ulithi Atoll	Elato Island
Ngulu Atoll	Gielop Island, Ulithi Atoll
Elato Atoll	Lethow Island, Ngulu Atoll
West Fayu	Ngulu Atoll
Falalop Island	Meseran Island, Ngulu Atoll
Loosiep Island, Ulithi Atoll	Elato Atoll
Oroluk Atoll	Pig Island, Ulithi Atoll
Pohnpei Island	Toas Island, Elato Atoll
Kosrae Island	Lemotrek Atoll
	Wottegai Island, Woleai Atoll
	Woleai Atoll
	Yap Proper
	Iar Island, Ulithi Atoll
	Loosiep Island, Ulithi Atoll
	Pikelot Island
	Oroluk Atoll

11.1.5. Fiji

Table 27: Tabulated encounter sites recorded in TREDS for Fiji from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Site Unknown	Treasure Island
Northwest Of Vanua Levu	Kia Island
Suva Harbour, Fiji	Nukuvadra Island
Yaduataba Island, Bua	Kavewa Island
Nakalou Village, Macuata	Yadua Island,Fiji
Raviravi Village, Macuata	Bounty Island
Yaqaga Island, Bua	Treasure Island Resort, Mamanuca Group
Yadua Island,Fiji	Malake Island
Druadrua Island, Macuata	Batiki Island
Yadua Islands,Fijii	Makogai Island
Naivaka	Lau Group
Yagaga	Levuka Town, Ovalau Island
Denimanu	Caqelai Island
Kavewa Island	Vanua Balavu

Sasa	Cakaulevu Beach, Nabuna, Koro Island
Mali	Labasa, Vanua Levu
Salevukoso Village, Macuata Province	Bua, Vanua Levu
Mana Island	Savusavu
Treasure Island	Sausau Island, Macuata
Makogai Island, Lomaiviti Group	Kavewa, Macuata
Likuliku Island	Yadua Taba Island
Vomo Island	Yadua Island
Rotuma	Kia, Macuata
Treasure Island Resort, Mamanuca Group	Mali, Macuata
Turtle Island, Yasawa Group	Rabi Island
Yaqeta Island, Yasawa Group	
Matacawa Levu Island, Yasawa Group	
Akuilau Island, Denarau	
Lami Point, Viti Levu	
Sigatoka, Viti Levu	
Toberua Is Resort, Drala Is, Viti Levu	
Cakau Sasi Reef, Ba	
Ba, Viti Levu	
Korovou, Tai Levu, Viti Levu	
Suva City, Viti Levu	
Verata, Tai Levu, Fiji	
Unknown	
Navadalevu Reef, Ovalau	
Batiki Island	
Nukulau Island, Viti Levu	
Qoma Island, Viti Levu	
Beqa Island	
Ono-I-Lau Island, Southern Lau Group	
Kadavu Island	
Malima Island	
Malima Island, Northern Lau Group	
Vanua Balavu	
Makogai Island	
Argo Reefs (Bukatatanoa), Lau Group	
Nairai Island	
Galoa Fisheries Station, Kadavu	
Leleuvia Island	
Rabi Island	
Labasa, Vanua Levu	
Natewa Bay, Savusavu	
Naweni Point, Savusavu	
Naiqaqi Village, Wailevu Province	
Udu Point, Yasawa, Vanua Levu	
Namenalala Island	
Denimanu, Yadua Island	
Vanua Levu	
Druadrua Island, Labasa	

Yaduataba Island - Yadua	
Tulacici, Yaqaga Island	
Koroinasolo	
Mali, Macuata	
Kavewa, Macuata	
Yadua Island	
Nakalou, Macuata	
Yaqaga Island	
Fisheries, Labasa	

11.1.6. French Polynesia

Table 28: Tabulated encounter sites recorded in TREDS for French Polynesia from 1970 - 2018

Encounter-Site Foraging	Encounter-Site Nesting
Tahaa, French Polynesia	Scilly Atoll/Manuae/Fenua Ura
Tahaa	Bellingshausen/Motu One
Tahiti, French Polynesia	Tahiti
Raiatea	Tahaa
Borabora	Moorea
Moorea	Raiatea
Tupai Island	
Mopelia/Maupihaa Atoll	
Tikehau	
Hao	
Mataia	
Lagoon Tiahura	
Huahine	

11.1.7. Guam

Table 29: Tabulated encounter sites recorded in TREDS for Guam from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Tumon Bay	Ipao Park
Ritidian Beach	Sella Bay
Airport	Cocos Island, West Side Government End
Agat	Tarague Beach
Pago Bay	Tagachang
Ipan	Togcha
Sinajana	Inarajan Bay
Cocos Island, West Side Government End	Urunao
Inarajan Bay	Nomna Bay
Talofofo Bay	Turtle Cove
Uog Marine Lab	Eod (Andersen Air Force Base)
Apra Harbor	Sumay Marina
Pacific Islands Club	Cetti Bay

Sasa Bay	Ritidian Beach
Capras	Falcona Beach
Gab Gab Beach	Castro Beach, Ritidian
Acho Bay	Acho Bay
Western Shoals	Jinapsan Beach
Marbo Cave	Sinajana
Merizo Pier	Ipan
	Jeff's Pirate Cove, Ipan

11.1.8. Kiribati

Table 30: Tabulated encounter sites recorded in TREDS for Kiribati from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Aranuka Lagoon	Taborio, Noto
Buariki North Tarawa	Kanton (Aba-Riringa) Island
Temakin	Tawanauareke
Temakin, Betio Islet	Buariki Vilabanei
Tengaruru	Toanrakau
Nukantewa, Marenanuka Islet	Tawaea Nikutoru
Betio	
Nooto Village	
Naa Buariki	
Buariki	
South Tarawa Eita	
Utiroa Village	
Eita	
Buota	
Taumwa	
Abemama Island	
Kuria Takariaria	
Kuria	
Kuria Oneke	
Abemama Bike	
Nonouti Islet	
Noumatong	
Nonouti	
Manoku, Nonouti	
Mataboou, Nonouti	
Tebobonga, Nonouti	
Tenanoraoi, Nonouti	
Autukin, Nonouti	
Marakei Rawannawi	
Beru	
Onotoa	
Aonteuwa, Onotoa	
Temwanoka, Onotoa	
Komotu, Onotoa	

Teeka, Onotoa	
Teramakoro, Onotoa	
Noumatong, Nonouti	
Matanikairaoa, Nonouti	
Buariki, Nonouti	
Teuabu, Nonouti	
Temotu, Nonouti	
Taniau	
Tabiteuea South	
Takarongainano	
Anikarawa	
Rooma	
Tuarabu	
Aranuka	
Booma Buariki	
Nukutiri	
Nikutoru	
Rooma Buariki	
Nukutoru	

11.1.9. New Caledonia

Table 31: Tabulated encounter sites recorded in TREDS for New Caledonia from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Nepoui	Huon Island, New Caledonia
North New Caledonia	Ile Huon
West New Caledonia	Ile Surprise
Baie D'harcour	Ile Fabre
Nehoue Bay	Ile Le Leizour
New Caledonia	Kaala-Gomen
Huon Island, New Caledonia	Roche Percee
Fabre Island, New Caledonia	
Prony Bay, South New Caledonia	
Sainte Marie Bay,Noumea	
Anse Vata Beach	
Goro	
Pouebo	
Ile Surprise	
Balabio Island	
Ile Huon	
Belep Island	
Kaala-Gomen	
Ile Le Leizour	
Ile Fabre	
Poum	
Southern Province	
Ile Des Pines	

Ouen Island	
Ilot Gi	
Nokanhui Atoll	
Puetege Reef, Yate	
Noumea	
Pointe Chaleix	

11.1.10. Palau

Table 32: Tabulated encounter sites recorded in TREDS for Palau from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Babeldaob Island	Palau
Palau	Ngerchur Island, Ngarchelong
Kayangel Island, Palau	Ngeruangel, Kayangel
Koror	Kayangel Island, Palau
Peleliu State	Ngeruangel
Iyai Reef, Peleliu West Coast	Ngerebelas Island, Palau
Aimeliik State	Koror
Ngaraard State	Malakal
Toachel Chol	Merir Island
Ngertuker Reef	Helen Island
Palau Eez (Within)	Helen Reef
	Tobi Island

11.1.11. Papua New Guinea

Table 33: Tabulated encounter sites recorded in TREDS for Papua New Guinea from 1970 – 2018

Encounter-Site	Encounter-Site
North Png Coast	Long Island
South Png Coast, East Of Fly R.	Saoko, Long Island
Papua New Guinea	Bare, Long Island
Port Moresby Area	Kouroko, Long Island
Wide Bay	Ariupa Beach, Long Island
Luirangrang, Saili Village	Toa, Long Island
Long Island	Bokuwana, Long Island
Saidor District	Sam, Long Island
Parama Reef	Jomba
Gemini Reef	Port Sororo, Long Island
Daru	Tangi, Long Island
Warrior Reef	Goodluck Beach, Long Island
Otamabu Reef	Purutawalo, Long Island
Ture Ture	Ice, Long Island
Torres Strait Coast	Setewa, Long Island
Aumowata Home Reef	Kasu, Long Island
Bristow Island (Kiwai Islands)	Bukia, Long Island

Panapompom Island	Managrum, Long Island
Fergusson Island	Kotugu, Long Island
Goodenough Area	Paipai, Long Island
Labi Island, Trobriand Islands	Launogate, Long Island
Normanby Island	Saokomatana, Long Island
Tobiki Island	Uligan, Long Island
Alotau	Kiaro, Long Island
Trobriand Islands	Salamanda, Long Island
Suau Island	Mak, Long Island
Misima Island	Pele, Long Island
Jomard Island	Iomba, Long Island
Eware Village	Warakalap, Long Island
Lababia	Salong, Long Island
Hermit Island	Mark, Long Island
Leabon Reef, Hermit Islands	Karkum
Makan Reef, Hermit Islands	Panarairai Island
Lou Island	Jomard Island
Lorengau	Tobiki Island
Horan Reef	Irai Island (Ilai)
Manus Island	Siva Island
Fisherman's Island	Lunn Island
Nawale Reef, Aroma Coast	Reef Island # 2
Umbukul Village, New Hanover, Kavieng	Pananiu Island
Kavieng	Punuan Enivala
Kung Island	Pananimunimu
Carteret/Tulun/Kilinailau Islands	
Off Saposa Island, Buka	
Gloucester	
Wangore Bay	
Kimbe	

11.1.12. Republic of the Marshall Islands

Table 34: Tabulated encounter sites recorded in TREDS for the Republic of the Marshall Islands from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Majuro Island	Erikub Atoll, Marshall Islands
Marshall Islands	Erikub Atoll
Likiep Island	Bikar Atoll
Ailuk Atoll	Jemo Island
Erikub Atoll	Majuro Island
Kaben Village, Bok Islet	Wotje Atoll

11.1.13. Samoa

Table 35: Tabulated encounter sites recorded in TREDS for Samoa from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Vini Beach, Nuutele	Vini Beach, Nuutele
Matautu	Vini Beach
Satitoa	Nuulua Island
Saina	Nuutele Island
Saleilua	Lalomanu
Matautu, Falealili	Saaga Beach, Safata
Lotofaga, Safata	
Solosolo	
Malua Theological Pond	
Salelesi	
Satoalepai	
Mulifanua	
Saanapu	
Sataoa	
Malie	
Falealili	
Apia Fish Market	
Apia	
Salamumu	
Mulinuu	
Fagaloa	
Leulumoega	
Manono	
Faleseela, Lefaga	
Vaitele	
Vaigaga	
Vaiala	
Vaiusu Bay	
Palolo Deep	
Aele Faleula	
Afega	
Fusi, Safata	
Tuaefu	
Salesatele	
Tafagamanu, Lefaga	
Faleula	
Leauvaa	
Fasitoouta	
Fagalii	
Lotofaga	
Vailele	
Malua Theological College	

Mutiatele, Aleipata	
Manono Uta	
Lotopa	
Vini Beach	
Faleolo	
Ulutogia, Aleipata	
Saleimoa	
Apia Park	
Vaitoloa	
Vaipuna	
Matautu, Lefaga	
Faleapuna	
Moataa	
Tuanai	
Lefaga	
Mulivai	
Tafitoala	
Malaela	
Lalomanu	
Tuamua	
Vailuutai	
Falelatai	
Lepea	
Samalaeulu	
Vaitoomuli	
Saleaula	
Faaala, Palauli	
Faala	
Auala	

11.1.14. Solomon Islands

Table 36: Tabulated encounter sites recorded in TREDS for Solomon Islands from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Solomon Islands	Solomon Islands
Wagina Island, Choiseul Province	Arohane Village, Wainoni Bay, Makira
Katupika	Litogahira Beach
Raro Island	Havila/Baniata
Kennedy Island	Wagina Island, Choiseul Province
Vonavona (Parara) Island	Choiseul Island
Sikopo Island, Arnavons Islands	Mariu Island, Here Bar Group
Arnavon/Maleivona Island, Arnavons Group	Kerehikapa Island, Arnavons Islands
Kia Village	Lilika Bay
Sire Bay	Kia Village
Kerehikapa Island, Arnavons Islands	Sikopo Island, Arnavons Islands
Maleivona Islands, Arnavon Group	Sasakolo Beach

Lilika Bay	Haevo Beach
Goveo Village	Honiara
Malaita Island	Yandina
Reef Near Nunubilau Village	Nelua/Santa Cruz Island, Temotu
Small Malaita, Abalolo Village	Nupani Island, Temotu Province
Off The Coast Of Abalolo Village	Baniata, Rendova Island
Honiara	Irivri, Rendova Island
Rendova Island	Rafarafa
Site No. 6	Gethsemane
Vasara	Toritoro
Nabo Nibao	Bruhaza
Naenae	Rise Teo
Dui	Tetepare Island
Sibaquasa	Site No. 6
Fiha Beach	Qeuru Beach
Soe	Site No.1
Site No. 5	Site No. 5
Sarevo Passage	Vasara
Mpa	Soe
Kolobanra	Sibaquasa
Tetepare Island	Karumu
Site No. 4	Livutana
Site No. 3	Sobu
Bataronga	Field Station
Field Station	Tofa Beach
Sobu	Mesa Point
Nabo Point	Nabo Nibao
Near Jetty	Rarumana
Peava Community	Obeani Island, Obeani Group
Biche	Bagora Island, Obeani Group
Kabo Tinoni Island	Piru Island, Obeani Group
Boromani Islands	Mamalohu Island
	Zaira Village, Vangunu Island

11.1.15. Tonga

Table 37: Tabulated encounter sites recorded in TREDS for Tonga from 1970 – 2018

Encounter-Site Foraging	Encounter-Site Nesting
Nuku'alofa	

11.1.16. Tuvalu

Table 38: Tabulated encounter sites recorded in TREDS for Tuvalu from 1970 – 2018

Encounter-Site	Encounter-Site
Fualafeke Islet	Tepuka Islet
Funafala Islet	Fualopa Islet
Matafenua	Fongafale Islet
Funafatu	Fuakea Islet
Funalefeke Islet	Telele
Tepuka Islet	Vancamp
Fuafatu Islet	Te Gasu
Vaasafua Reef	
Funafuti Island	
Papaelise Islet	
Tuvalu	
Fongafale Islet	

11.1.17. Vanuatu

Table 39: Tabulated encounter sites recorded in TREDS for Vanuatu from 1970 – 2018

Encounter-Site	Encounter-Site
Lutes Village	Port Vato
Pelongk Village	Lalinda Beach
Motalava Island	Aniwa Lagoon
Wiawi Village	Epau Village
Utanlang Village	Tasiriki
Tukutuku Ranch	Marou Village
Takara Village	Nelson Bay
Toa Lima	Votlo Research Site
Efate Island	Votlo Village
Tasipuariki	Namuka Island
Tanoliu Village	Vaipei Village
Sun Island	Port Olry
Siviri Village	Molboe
Emua Village	Hog Harbour
Tikilasoa Village	Bamboo Bay
Mangaliliu Village	Bennewur
Unakap Village	Nebure
Hat(Eretoka) Island	Levor
Vatupau	Weisir
Lelepa Landing	Malekula Island
Marou Village	Vakas Basis
Avunatari Village	Wiawi Village
Tarena	Letokas Village
Malapau Passage	Dixon Reef Village
Nagustare Point	Tumaris

Woralapa Village	Avunatari Village
Kakula Island	Vulai Island
Panuagisu Village	Tasiriki Village
Toa Lima Passage	Unakap Village
Champagne Beach	Worasiviu
Leosa Passage	Vasvasada
Mafilau Village	Litatra Village
Isavai Village	Batavusai
Bongovio Village	Behaveh
Lasoa	Totoglage Village
Nelson Bay	Ambeck
Napangoro	Vanuatu
Samoa Point	Mondoro
Emotu Passage	
Malo Pass	
Brisbane Village	
White Stone	
Tasiriki Village	
Port Olry	
Rovo Bay	
Motalava Village	
Aniwa Lagoon	
Wiana Village	
Sohbef	
Craig Cove	
Lanukarae	
Alack Reef	
Laukenasua	
Peskarus Village	
Sara Village	
Piliura Village	
Valesdir Village	
Freemantle	
Lolbiribirisulu Village	
Lausake Passage	
Manmol	
Asaola Village	
Nanuku Village	
Epau Village Reef	
Lateu Village	
Tavloel Village	
Tranquility Resort	
Rovoliu Village	
Tomman Village	
Volan Village	
Herelol Village	
Willes	
Namwarangiut Village	

Ngurua Village	
Halava	
Loltong Village	
Mantle-Lamb	
Lembu Bay	
Natapau Village	
Litatra Village	
Namoso	
Mele	
Nikaura Village	
Sakao Island	
Nuvi Village	
Nakere Village	
Wuro	
Latano Village	
Lembenwen Village	
Labo Village	
Lawa Village	
Votlo Village	
Akamb Village	
Port Vato	
Votlo Research Site	
Avok Island	
Neranehme Village	
Suhuruh	
Lausake Village	
Lelepa Village	
Binniho	
Lawia	
Semsahao	
Melip Village	
Lanusaroi Beach	
Lelepa Reef	
Matakove	
Saama Village	
Nekapa Village	
Ringdove Bay	
Namuka Island	
Port Qumie	
Lolowai Village	
Epi Island	
Okai Village	
Laman Bay	
Faroun Village	
Taloa Village	
Behaveh	
Tenmaru Village	
Fatupau	

Tongamea	
Finonge Village	
Nguna-Pele Conservation Area	
Leviamp Village	
Loltong Harbour	
Dixon Reef Village	
Vakas Basis	
Epau Village	
Rorbaeigk	
Maltou Village	
Ranvetlam	
Malekula Island	
Bamboo Bay	
Robunas	
Nagisutare Beach, Unakap Village	
Tahumben Village	
Ranon	
Toka Village	
Mginae Beach, Mangarongo Village	
Laken Napere	
Pango Village	
Varo Village	
Vaturana	
Vatukura	
Taikesa	
Mangarongo Village	
Kopesimaeto Village	
Anelgohat Village	
Tasmania Village	
Tonomeal Village	
Vulai Island	
Lungharigi	
Wiana Passage	
Mystery Island	
Pinapow Beach Inside The Burao Tenmaru	
Worarana, Finonge Village	
Telvet Village	
Sola Village	
Lawa Southwest Bay	
Vatmbeaf Village	
Launsaake Village	
Ngulely Lenga Point	
Lanuamoa Village	
Worasiviu	
Malapau Village	
Vatvako	
Ngonou	
Ambrym Island	

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