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The effectiveness of vessel monitoring system in Fiji fisheries waters and areas beyond national jurisdiction (フィジー漁業水域及び国家管轄外域における船舶監視システムの有効性について)

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Master's Thesis

THE EFFECTIVENESS OF VESSEL MONITORING SYSTEM IN FIJI FISHERIES  
WATERS AND AREAS BEYOND NATIONAL JURISDICTION

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Graduate School of Marine Science and Technology  
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## **DEDICATION**

To my greatest assests, my inspiration and my blessings – my husband, Aminiasi and my beautiful children - Sakiusa, Sanaila, Aloesi, Ruth, Vasiti Lily-Ann and Makereta....This is for you.

## ACKNOWLEDGEMENT

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## **ABSTRACT**

For proper monitoring and surveillance of Fiji fishing vessels operating in Fiji Fisheries waters and areas beyond national jurisdiction, the use of Vessel Monitoring System (VMS) is an effective means of tracking these vessels as it provides powerful source of information regarding fishing areas, fishing effort and the provision of reliable fishing statistics. In an attempt to verify the extent of effectiveness of VMS, certain fishing activities such as Catch logs, Landings summary, Transshipment, Bunkering, Notification of intentions and the Observer infringements reports will be discussed in this paper. The United Nations Convention on the Law of the Sea (UNCLOS) establishes a number of important principles relating to the conservation and management of marine resources both within national jurisdiction and the high seas. Though it does not specify the use or requirement of VMS, it gives the option to coastal states to explore Monitoring Control and Surveillance (MCS) initiatives that could be engaged to address the conservation and management aspects. International instruments that follow recognizes the timely collection and exchange of data and the need to design systems of data verification. Regional efforts have led to the coordination and introduction of VMS to better police the fishing related activities in the national jurisdictions of member states in its effort to combat Illegal, Unreported and Unregulated (IUU) fishing. This research has dictated the kinds of research methods enlisted to collect the relevant data and information needed for the timely compilation. There were two phases of research conducted of which the use of the following methodologies was used, In-depth qualitative interviewing, collation of Documents and Archival data and the Primary and Secondary research.

The analysis of data collected is a reflection of how effective VMS is for verifying the occurrences of these fishing related activities in Fiji waters and areas beyond national jurisdiction.

The verification of Catch logsheet with VMS data was to verify the position, speed, date, time and the legality of catch. For the purpose of this study, logsheet data from 2014-2018, was calculated at 45,252.59mt. Landings on the other hand is the number of catch that is actually landed, total landed catch from 2014-2018 was 75,007mt. Unreported catch, (mis-reported and non-reported) was recorded at 29,754.41mt, 39.6% less of what was actually landed. The analysis of Observer Infringements, included selected ones that could be verified with VMS. It was noted that from 2014-2018, 93.3% of the infringements was committed by vessels fishing in the Exclusive Economic Zone (EEZ) and High Seas. For infringements such as fishing in areas not permitted to fish, this was committed by 13% of vessels fishing in the EEZ and High Seas and 30% by those fishing in the Archipelagic Waters (AW) and Territorial Sea (TS). For transshipment and bunkering, 80.3% of these fishing activities occurred in the EEZ and HighSeas and 60% occurred in the AWand TS. Other Infringements were minimal in occurrence throughout the five years and was issued with a warning to avoid similar offence in future.

Furthermore, Fixed Penalty Notices (FPN) that was issued as a violation to Regulation 39(2)(b) of failing to notify at least 48hours prior to entry into and departure from Fiji fisheries waters (Zone Entry and Exit) was verified and confirmed by VMS data for vessels violating this regulation. In 2016, 25% of FPN was issued for the offence, 33% was issued in 2017 and 40% was issued in 2018 for the same. For failing to notify a Port State at least 24hrs prior to the estimated time of entry into any port in Fiji [Regulation 39(2)(e)]. This was verified with VMS data and information to confirm the offence. In 2016, 75% of FPN was issued, 2017, 67% and in 2018, 60% was issued for the same offence.

The issuance of FPN against a person or offence committed under the OFMA, is a testament of Fiji's commitment to its international and regional obligation in the fight to prevent,

deter and eliminate Illegal, Unreported and Unregulated fishing. VMS provides relatively reliable and accurate information on the location of vessels and with a reasonable degree of probability of where the fishing activity takes place. Nevertheless, it can enhance the monitoring, control and surveillance of fisheries in a cost-effective manner.

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## ACRONYMNS

ALB - Albacore

ALC – Automatic Location Communicator

AW – Archipelagic Waters

BET – Bigeye

CMMs – Conservation Management Measures

DWFN – Distant Water Fishing Nation

EEZ – Exclusive Economic Zone

ETA – Estimated Time of Arrival

FFA – Pacific Islands Forum Fisheries Agency

FPN – Fixed Penalty Notice

IUU – Illegal Unreported and Unregulated

MCS – Monitoring, Control and Surveillance

OFMA – Offshore Fisheries Management Act

OFMR – Offshore Fisheries Management Regulation

TS – Territorial Sea

UNCLOS – United Nations on the Law of the Sea Convention

UNFSA – United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea (10 December 1982) Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks

UNODC – United Nations Office on Drugs and Crime

VMS – Vessel Monitoring System

WCPO – Western Central Pacific Ocean

WCPFC – Western Central Pacific Fisheries Commission

YFT – Yellowfin

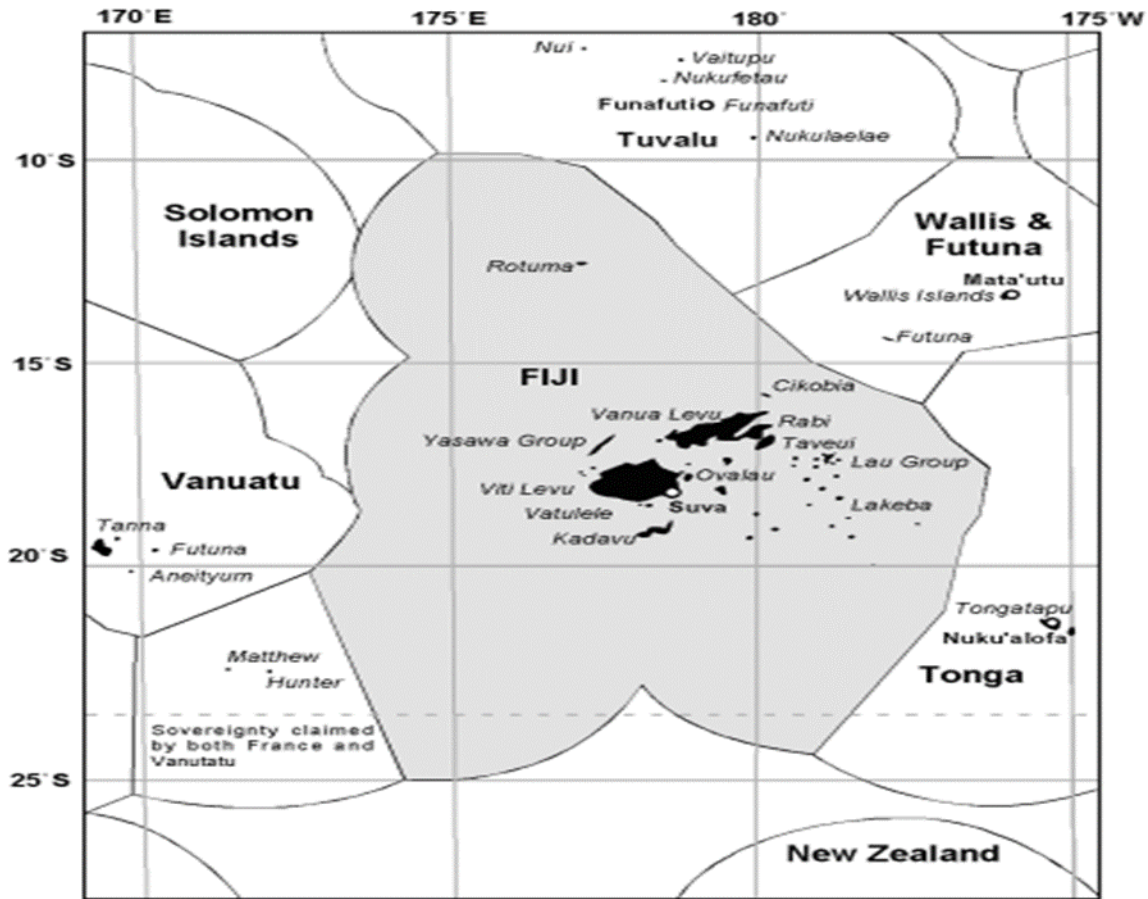
## CHAPTER 1

### INTRODUCTION

#### 1.1 **Background Study**

Fiji is a country in the South Pacific Ocean composed of 332 islands of which only 110 are inhabited and it has a tropical marine climate (Food & Agriculture Organisation of the United Nations [FAO], 2016) and a population of 884,887 (Ministry of Communications, 2019). It is located between 176° 53'E and 178° 12'W, and has a total land area of 18,274 square kilometers, and 1.29 million square kilometers of the ocean within its jurisdiction. The Exclusive Economic Zone (EEZ) borders five Pacific Island nations, Vanuatu to the west, the Solomon Islands to the north-west, Tuvalu in the north, Wallis and Futuna to the north-east and the Kingdom of Tonga to the south-east (Patterson, 2010).

Fiji is a democratically governed developing nation, and the government is operating on a Constitution adopted in 2013. Fish and fishing are extremely important to the economy of Fiji (FAO, 2020) as the former provides a staple supply of protein in the people's diet and the latter contributes to revenue, employment, and a source of livelihood for many people in Fiji. According, to the Ministry of Fisheries (MoF), Annual Report, 2016-2017, the contribution of the fisheries sector to the economy GDP is 1.8%.



**Figure 1.1** Map of Fiji's Exclusive Economic Zone **Source:** Secretariat of the Pacific Community

With a growing emphasis centred on the fisheries sector and the value of its resources, the need for conservation and management as always been a government priority. The implementation of the various monitoring, control and surveillance (MCS) mechanisms reflects Fiji's determination to ensure the sustainability of its marine resources. S.-K. Chang, 2011 believes that the implementations of a sophisticated VMS that recognizes and operationalizes its full potential will likely result in effective fisheries management and sustainable fishing practices. Over the years, as seen the progressive developments of these MCS tools for the prevention, detection, and elimination of IUU fishing. The common denominator here is the animal tuna, it is highly

migratory and is subject to moving, driven by ocean currents, changes in availability of their prey and other processes that vary naturally, the animal does not respect boundaries, so in theory if you want to track the fish/tuna you track the fishing vessels (D. Koroi, personal communication, March 5, 2019).

One of the MCS tools that will be discussed in great depth in this thesis is the VMS, a cost-effective satellite-based monitoring system which, at regular intervals, provides data to the fisheries authorities on the location, course, and speed of regulated or licensed fishing vessels. Discussed further into the paper (1.6.1 & 1.6.2) is the VMS portals used for monitoring, reporting and verification purposes both on a regional and national platform.

## 1.2 Objectives of the Study

In an attempt to verify the extent of effectiveness of VMS through the objectives set herein; this paper will further deliberate through incidences of unauthorised fishing related activities to gauge the effectiveness of VMS in verifying its occurrences out at sea.

- i. Landings and Catch Logs
- ii. Transshipment – the unloading of all or any of the fish on board a fishing vessel to another fishing vessel either at sea or in port.
- iii. Bunkering – the supplying of fuel for use by ships
- iv. Observer infringements and violations – any non compliance to national, regional and international instruments sighted and recorded by observers while on deployment out at sea
- v. Zone Entry and Exit notification report – the entry and exit of a fishing vessel into an EEZ or the crossing to or from an EEZ into or out of the High Seas.



- vi. Port Entry and Exit notification report – the notification to enter and exit a port state to utilize its port services for landing, transshipping, packaging or processing of fish or for other port services including inter alia, refuelling and resupplying

The research will endeavor to;

- Identify unauthorised fishing related activities that can be verified with the use of VMS data and information
- Explore the limitations of VMS as a surveillance mechanism
- Suggest possible recommendations on addressing internal processes within Offshore Fisheries that best serve the interest of the effective use of VMS.

### **Research Questions**

The following research questions will need to be addressed to achieve the objectives of the research.

1. What are the fishing related activities that warrant the use of VMS data and information for verification purposes?
2. What are some of the limitations scope of VMS as a surveillance mechanism?
3. Suggest possible areas and recommendations on how processes within Offshore Fisheries can be improved to best serve the objective of VMS

The first question will be addressed through the provision of landings and logsheet data, Infringements and violations recorded by Observers at sea, Entry and Exit Notifications, and Unauthorized and illegal fisheries activities such as transshipment and bunkering that can be verified by application of VMS data and information. These violations are conducted by licensed and authorized longline fishing vessels, fishing in Fiji fisheries waters and areas beyond national

jurisdiction. It will also look at uncertain observations during various fishing activities due to limitations presented by VMS information and data.

The second question will look at areas where the use of VMS is limited in terms of monitoring and surveillance of fishing vessels.

The third question will discuss limitations of study and suggest possible recommendations on how the internal processes within Offshore Fisheries can be best addressed to serve the best interest of VMS and its application as a MCS tool.

### **1.3 Significance of this Study**

Over the past years, similar studies have been done on the use of VMS data and information to generate reports for scientific, management, and conservation purposes, but no reviews have been done specifically on the extent of effectiveness of VMS in Fiji fisheries waters and areas beyond national jurisdiction. This dissertation will highlight the circumstances and areas that have proved the effectiveness of VMS. My interest in studying and exploring the effectiveness of VMS is mainly due to the fact that Fiji has its own domestic longline fleet that is licensed, flagged, and based in Fiji. With a vast area of ocean under Fiji's sovereignty and the need to appropriately manage its offshore marine resources, is of paramount importance to Fiji. More so, with over eighty vessels licensed to fish in Fiji's waters and authorised to fish beyond the national limits, the need to effectively monitor fishing vessels carrying out fishing and fishing related activities out at sea warrants a good and reliable MCS tool to capture all this simple but powerful information.

### **1.4 Structure of this Study**

The first chapter provides an introductory perspective on the background of VMS, the objective of this dissertation, the research questions that will be explored to achieve the goals set

herein, the significance and the structure of the paper. It also highlights the the historical development of VMS, the monitoring system used on a regional and national level, and the institutional and legal arrangements in place to support the administration of Fisheries in Fiji and national laws that regulate, conserve and manage Fiji's marine resources.

Chapter II will look at the various definitions of keywords used in this dissertation and the sightings of related literature and the different potential of VMS that have been explored by other researchers to generate reports for the benefit of their respective studies.

Chapter III will introduce the various methods used to collect information and data and elaborate on the types of data collected from the said methods and also the processes involved in the analysis of information and data collected.

Chapter IV will seek to provide the analysis and discussion of the information and data collected so far to determine the findings of this dissertation.

The final chapter, Chapter V, will highlight and share concluding remarks based on the findings of this dissertation and also offer possible recommendations on how the use of VMS in Fiji Fisheries can be improved to better address other fisheries related violations and infringements.

## **1.5 Historical Development of VMS**

The use of VMS in fisheries dates from the early 1990's when the first trials were implemented in Australia, Canada, European Union (EU), New Zealand, and the USA (Cacaud, 1998). Despite the fact that most of the trials were still in their early stages and therefore their level of success or failures were still unclear, more countries expressed their interest at developing their own VMS at either the national or regional level. The concept of a satellite-based vessel monitoring system (VMS) for the use of Forum Fisheries Agency (FFA) member countries in their Exclusive

Economic Zones (EEZ) was under discussion in the mid-late 80s, as an example of non-traditional hardware that may be used in the function of fisheries surveillance (Aldous, 1986). The basis of this approach was because FFA member countries were becoming mindful of the value of such systems in improving compliance, surveillance, and data retrieval in the area of fisheries management. Technical consultations on fishing vessel monitoring systems were held on a regular basis to determine national and sub-regional VMS programs to promote the standardization and harmonization of VMS as it is introduced to the commercial tuna fleet operating in the Western Central Pacific Ocean(WCPO). O'Shea and Thompson, 2006 stresses that these systems also allow the flag state or coastal state to remotely monitor fishing vessel activity (vessel identification, geographical position, the date and time of the position, vessel course and speed) within certain geographical boundaries.

After the requirement for the regulation of VMS was put in place in 2002, the only capacity required in implementing such initiative at the national level was to have a dedicated trained VMS officer and an office to house a Personal Computer (PC). In Fiji, the Fiji Navy was selected along with a Fisheries officer, as our first trained officer who was allowed to access the VMS data by going down to the Naval base (A. Raiwalui, personal communication, September 25, 2018). As the Ministry of Fisheries, built its own capacity and with a dedicated officer, the Offshore Fisheries Division then accessed the VMS data direct from FFA through a given password.

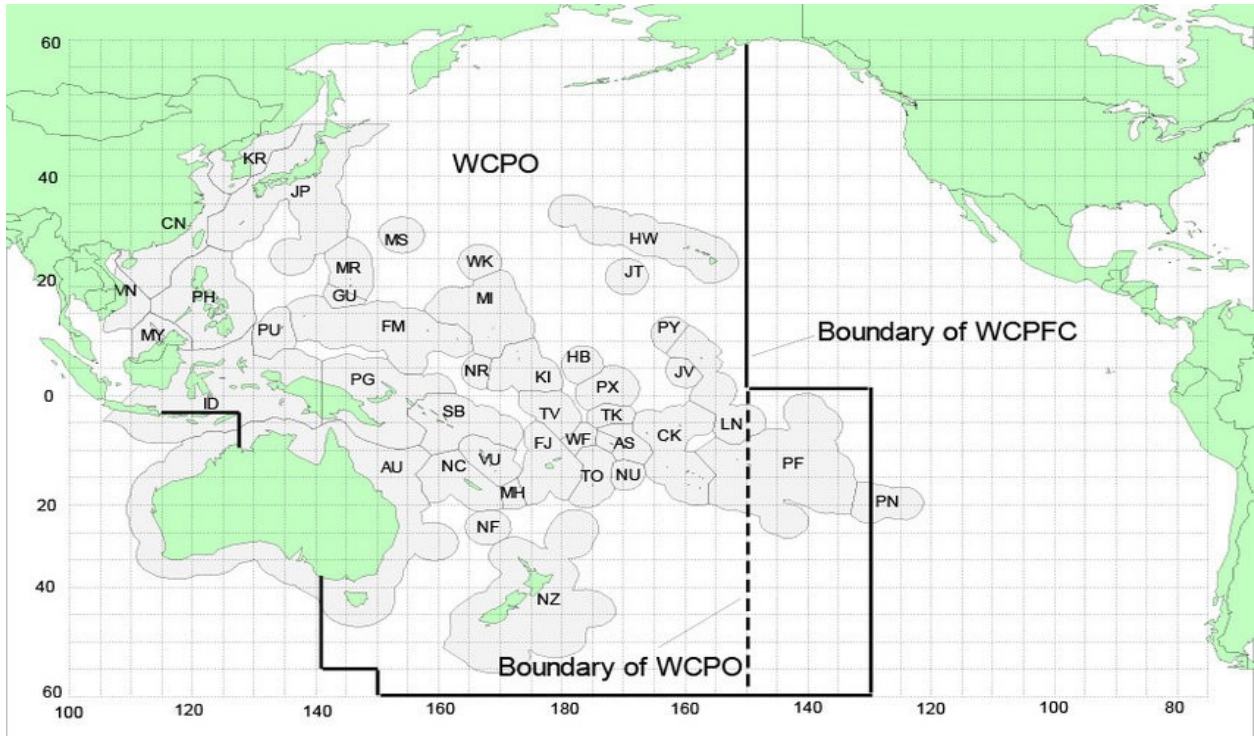
### **1.6.1 The Regional VMS**

The Pacific Islands Forum Fisheries Agency (FFA) coordinated and introduced the FFA VMS on 17 March, 1999 as a regional initiative to its members. It is an intergovernmental agency established on August 9<sup>th</sup>, 1979 to coordinate fisheries policies among island states and aid negotiation with Distant Water Fishing Nations (DWFNs) (DeMers and Kahui, 2012).

FAO, 1998 agrees that the success of VMS in the Pacific has resulted in the South Pacific Forum deciding to develop a sub regional system which, through the Forum Fisheries Agency (FFA), will serve the interests of the 16 member countries including many which are small, relatively poorly resourced and are classified as developing countries. FFA VMS provides a bird's eye view of fishing activities in FFA member country's Exclusive Economic Zone (EEZ), Closed Areas or even High Seas Pockets (D. Koroi, personal communication, March 3, 2019). Moreover, Cacaud, 1998 believes that for many small island nations, which derive substantial income from rights of access to their fisheries but do not have the adequate assets in personnel or equipment to enforce their fisheries regulations, VMS is a particularly attractive technological innovation, since it has the potential, at an affordable cost to improve the effectiveness of MCS schemes and by the same token secure a major sector of their economy.

In 2004, the Western Central Pacific Fisheries Commission (WCPFC) was established to manage tuna regionally. The WCPFC is responsible for ensuring the long- term sustainability of highly migratory fish stocks in the WCPO and the promotion of the optimum utilization of these stocks (DeMers and Kahui, 2012). In the effort to contribute to the objective of its establishment, the WCFC VMS came into operation in April, 2009. S.-K. Chang et al., 2010 highlights that, in the WCPFC Convention (Article 24) that each member of the Commission shall require its fishing vessels that fish for highly migratory fish stocks on the high seas in the Convention Area to use near real-time satellite position-fixing transmitters. All vessels fishing in the WCPO are required to maintain VMS transmission when they move into the part of the Convention Area bounded by 20°N and 175°E from elsewhere in the Convention area (WCPFC, 2019). The contracted system that provides VMS information to the FFA VMS and the WCPFC VMS system is referred to as

the “Pacific VMS”. The FFA and WCPFC VMS work in collaboration in the common effort to prevent, deter and eliminate IUU fishing and safe guard the interests of it members.



**Figure 1.2** Map showing EEZs region of the WCPO  
**Source:** © Alaska Sea Grant, University of Alaska Fairbanks

### 1.6.2 VMS in Fiji

In 2002, Fiji introduced regulations requiring the use of fishing vessel monitoring system to monitor the position and activities of fishing vessels in order to effectively manage its fisheries. The use of this tool is mandatory to all Fiji fishing vessels that are licensed to fish in Fiji fisheries waters and authorised in areas beyond Fiji fisheries waters, targeting highly migratory fish stocks in-zone and beyond our EEZ (L. Dranivesi, personal communication, October 15, 2018). The VMS relies on the installation of a device known as the Automatic Location Communicator (ALC) on the fishing vessel and satellites to transmit information back to the Forum

Fisheries Agency (FFA) and the licensing state (Manoa, 2006). The use of the FFA VMS is a requirement only to vessels that are twenty (20) meters and more in length and the validity of the use of this system is usually displayed through a FFA VMS Certificate which is renewed on a twelve (12) month basis depending on when the current certificate expires. The FFA VMS Registration year runs from 1 September in any year to 31 August in the following year (Richards, FFA Report 99/21). All fishing vessels requiring the use of VMS are to be installed only by the FFA approved service provider. The FFA sets the requirements for fishing vessels that report through the FFA VMS and determine the ALC units that are to be used for this purpose. Vessels licensed in Archipelagic waters (AW) and Territorial waters (TW) are exempted from using FFA VMS, however, they have their own VMS system which the Surveillance officer of the Ministry of Fisheries also has access to, for accountability of its fishing operations. Furthermore, all Fiji licensed and Fiji flagged fishing vessels that fish outside of Fiji waters are required to be on the Western Central Pacific Fisheries Commission (WCPFC) Record of Fishing Vessels (RFV) whereby their movement in the high seas is monitored by the Western Central Pacific Fisheries Commission (WCPFC) VMS.

Fiji currently engages the use of two types of FFA VMS portals namely Trackwell and the Regional Information Management Facility (RIMF). The primary portal is Trackwell, RIMF feeds of Trackwell (D. Koroi, personal communication, January 6, 2020). Vessels that do not poll or report on these systems can be viewed on Automated Information System (AIS), however they are required by law to report every Wednesdays and on a four hourly basis until they return to port or at any time their VMS has been rectified. The Offshore Service Centre, (formely the Offshore Fisheries Division), has a dedicated Surveillance Officer, who monitors fishing activities of Fiji

fishing vessels fishing in our waters and areas beyond national jurisdiction and houses a server that is directly linked to the main MCS center in Honiara, Solomon Islands.

## **1.7 Institutional and Legal Framework**

The Ministry of Fisheries, Fiji has the mandate to manage the country's living marine resources (FAO, 2009). The office housing the Ministry of Fisheries, now known as the Fisheries Support Centre, is located in Toorak, Suva and provides administrative services through the Minister responsible for fisheries, the Permanent and Deputy Secretary of Fisheries and the office of the Director Fisheries. The management of the Coastal fisheries is handled by the four (4) regional offices around the country while the Aquaculture, Offshore, Inshore and Research divisions is supervised by the various Functional heads [**See Appendix 1 for Senior Management Structure for Ministry of Fisheries**].

The Offshore Fisheries Division is tasked to implement MCS initiatives at national level to prevent, deter and eliminate IUU fishing (Pramod, 2018). There are 53 appointed positions within the division that look after the Data Unit, Enforcement and Surveillance Unit, Licensing and Permitting Unit, Monitoring and the Industry and Trade Unit and a dedicated officer responsible for the administration and financial affairs of the division [**See Appendix 2 for Organisational Structure for the Offshore Service Centre**].

The regulation of commercial fisheries in Fiji only began in the 1940s after the enactment of the first fisheries ordinance (Manoa, 2006). The domestic Offshore Fishery commenced operation a little before the demarcation of the archipelagic waters (AW), territorial sea (TS), and exclusive economic zone (EEZ) at the International Agreement on maritime spaces during the Third United Nations Conference on the Law of the Sea in 1979. Prior to that, the Taiwanese and Japanese flagged fishing vessels that were operating in the Western Central Pacific Ocean(WCPO)



and were landing their catch at the then Japanese owned cannery at Levuka (A. Raiwalui, personal communication, September 25, 2018). The main commercial target species for Fiji's longline industry, are albacore (*Thunnus alalunga*), yellowfin (*Thunnus albacores*), bigeye (*Thunnus obesus*) and skipjack (*Katsuwonus pelamis*). A variety of other non-target species (by-catch), some of considerable economic value, are also landed (Richards, FFA Report 99/21). The management of Offshore Fishery in Fiji is regulated under the Offshore Fisheries Management Act (OFMA), 2012, and its subsequent regulations (OFMR), 2014, and the Marine Spaces Act (Chapter 158 A). The OFMA and OFMR stipulates provisions for the management, development, and sustainable use of fisheries and living marine resources. The Marine Spaces Act (Chapter 158A) establishes the archipelagic waters of Fiji and a twelve nautical mile territorial sea. The Act also establishes a 200 nautical mile exclusive economic zone over which Fiji has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources of the seabed, subsoil and superjacent waters (FAO, 2009). Embedded in these national legislations are the international and regional commitments and obligations to Fiji as a coastal state, flag state and a port state. These Fisheries laws draws particular attention to the statutory and mandatory responsibilities of the Heads of Fisheries (Minister responsible for Fisheries, Permanent Secretary and the Director Fisheries). Moreover, also stipulated is the Licensing of Fiji fishing vessels, boarding and inspection of vessels that berth in our designated fisheries ports, monitoring, control and surveillance of Fiji fishing vessels in our waters.

## **1.8 Traditional and Conventional MCS Methods**

Anon, 1994 highlights that in complementing the use of VMS, FFA member countries have also adopted and implemented procedures such as air and sea surveillance in cooperation with

other island states, regional and observer programs, regional register of foreign fishing vessels and agreements in participation in surveillance between the FFA member countries. Established as a small navy squadron in 1978 with the main purpose of policing Fiji's newly declared 200 mile EEZ (Tarte, 2010), the Fiji Navy is responsible for maritime needs in border control such as watching over Fiji's EEZ and organizing task and rescue missions.

Fiji does not have adequate surveillance infrastructure such as patrol aircraft and patrol vessels and relies heavily on Australia, France, New Zealand, and the United States of America to carry out this important task for us (A. Raiwalui, personal communication, September 25, 2018). Cooperation in aerial surveillance with these governments commenced before 1990 and this has been affected by the series of a political crisis in 1987 and again in 2000, as a result, Australia and New Zealand suspended all its surveillance operations with Fiji. According to Tarte, 2010 the current defense bans on Fiji have left the Pacific patrol boats without adequate maintenance and technical support, together with the high operating costs, means the boats are no longer carrying out surveillance patrols of Fiji's EEZ.

In 2007 there was no aerial surveillance conducted due to Fiji's political status (A. Raiwalui, personal communication, September 25, 2018). This operation resumed in October 2014, where the French Armed Forces based in Noumea assisted the Fiji Navy in Aerial surveillance, and similarly, in 2015, the Royal New Zealand Air Force commenced its operation that was suspended since 2007. FAO (1998) believes that traditional MCS methods such as aerial and surface patrols are deployed randomly or based on assessments of historical activity and third party information, and sometimes the coverage of these traditional methods is relatively limited and an inefficient and expensive use of personnel and equipment. Cacaud, 1998 is adamant that VMS will

complement conventional MCS measures by making them more effective, but could also imply need for redesigning aerial and naval patrol schemes.

**Table 1.1** MCS components and Year of Operation

**Source:** Fiji's Fisheries legislations and Fisheries officials

<b>MCS components - Offshore Fisheries</b>	<b>Year of Operation</b>
Legislation	1977
Surface Patrols	1990's
Vessel Identification	1990's
Aerial Patrols/Surveillance	1970's
Observer Programme	2002
Vessel Monitoring System (VMS)	2002
Boarding and Inspection Procedures	2002
Licensing	1990
Entry and Exit Notification	2014

As to the dissemination of Fiji's VMS data and information, it is only made available to countries that have signed a Memorandum of Understanding (MoU) with Fiji, namely the Solomon Islands, Tuvalu, and Vanuatu. The member countries can also share access to each other's EEZ if they are authorised to do so, thereby increasing the monitoring and alerting capabilities of both parties (L. Turaga, personal communication, April 10, 2019). In areas of overlapping jurisdiction, the lack of VMS data sharing limits the potential usefulness of VMS to enable all members to monitor

fishing activities in the Convention area and could also be perceived as making a mockery of the proclamation of all RFMO's to have a commitment to deter and eliminate IUU fishing (P. Flewwelling, personal communication, December 10, 2019). Fiji partakes in MCS Operations organized by FFA where it can share VMS data and information only for the period of the proposed operation upon the approval of the Minister responsible for Fisheries, with participating member countries and the Quadrilateral Working Group (a committee with representatives from Australia, New Zealand, France, and the USA) who provide the patrol assets for the operation (M. Raicebe, personal communication, December 18, 2019). According to Manoa, (2006) regional cooperation has seen the introduction of a range of initiatives to regulate and monitor fishing activity and has facilitated the detection, arrest, and prosecution of illegal fishers.

**Table 1.2** International Conventions and Agreements regulating Fiji’s Offshore Fisheries  
**Source:** Fiji’s Fisheries Legislations

<b>International Conventions and Agreements regulating Offshore Fisheries in Fiji</b>	<b>Year Adopted</b>
United Nations Convention on the Law of the Sea (UNCLOS)	10 December 1982
United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA)	4 December 1995
Convention on International Trade in Endangered Species of wild Fauna and Flora (CITES) Washington Convention	3 March 1973
FAO Code of Conduct for Responsible Fisheries	31 October 1995
FAO International Plan of Action to Prevent, Deter and Eliminate IUU Fishing	2 March 2001
FAO Agreement to Promote Compliance with International Conservation and Management Measures (CMMs) by Fishing Vessels on the High Seas	24 April 2003
FAO Agreement on Port State Measures Agreement	28 February 2013
FAO Voluntary Guidelines on Flag State Performance	22 November 2009

**Table 1.3** Regional Conventions, Treaties and Agreements regulating Fiji’s Offshore Fisheries  
**Source:** Fiji’s Fisheries Legislations

<b>Regional Conventions, Treaties and Agreements regulating Fiji’s Offshore Fisheries</b>	<b>Year Adopted</b>
Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western Central Pacific Ocean	19 June 2004
Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific (Wellington Convention)	29 November 1989
The Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States of America (US Treaty)	2 April 1987
The Niue Treaty Agreement on cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific region	9 July 1992

**Table 1.4** National legislations and Management plan regulating Fiji’s Offshore Fisheries  
**Source:** Fiji’s Fisheries Legislations

<b>National Legislations and Management Plan regulating Fiji’s Offshore Fisheries</b>	<b>Year Adopted</b>
Marine Spaces Act (Cap 158A)	1977
Endangered and Protected Species Act (EPSA)	2002 (amendment 2017)
Environment Management Act (EMA)	2005
Offshore Fisheries Management Act (OFMA)	December 2012
Offshore Fisheries Management Regulations (OFMR)	6 June 2014
Fiji Maritime Transport Decree	2 July 2013
Surfing Decree	9 July 2010
Tuna Development Management Plan (TDMP)	2014-2018 (under review)

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Overview

The 1st FFA VMS Legal Workshop recommended that for its purpose VMS be defined as: “VMS can be defined as the satellite-based reporting system approved by FFA that is capable of monitoring fishing and related activities of fishing vessels, including, but not limited to, the determination of a vessel’s identity, GPS position, course and speed, and special codes” (Cacaud, 1998). According to FAO (2019), a fishing vessel monitoring system (VMS), is a program of fisheries surveillance, in which equipment that is installed on fishing vessels provides information about the vessels’ position and activity. Raykov et al. (2011) confirms that the implementation of the fishing vessels monitoring systems (VMS) is a powerful source of information regarding the fishing areas, fishing effort and also ensuring reliable fishing statistics.

The Offshore Fisheries Management Act (2012) defines VMS as; any system to monitor the position and activities of fishing vessels for the purpose of effective management of fisheries, furthermore, it defines Fiji fisheries waters as; the internal waters, the archipelagic waters, the territorial sea, the exclusive economic zone, and any other waters over which Fiji exercises its sovereignty or sovereign rights and includes the bed and subsoil underlying those waters.

The United Nations Convention on the Law of the Sea (UNCLOS 1982), Article 86, states that the high seas rules in the Convention apply to:

....all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State. Churchill and Lowe (1983) elaborated that the flag state, the state that has granted to a ship the right to sail

under its flag, has the exclusive right to exercise legislative and enforcement jurisdiction over its ships on the high seas.

The Law of the Sea (UNCLOS) is the principal convention governing the international use of the seas and ocean, Cacaud (1998) stresses that while it does not contain any provision that are directly related to the use of VMS, it establishes a number of important principles relating to the conservation and management of living resources, both within national jurisdictions and on the high seas. The basis for the use of VMS stems from UNCLOS recognizing the sovereign right of coastal states to explore, exploit, conserve and manage the natural living resources of the water column and that of the sea-bed and its subsoil. The 1995 United Nations Fish Stocks Agreement (UNFSA) was developed specifically to give practical effect to the provisions of Articles 64 and 65 of UNCLOS relating to straddling and highly migratory fish stocks and with the intention to establish a conservation and management regime for these two types of stocks. On a regional level, this commitment is reflected and emphasized through the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western Central Pacific Ocean which was adopted on the 19 June, 2004, hence the setting up of the WCPFC to oversee the implementation of this commitment. Noting the vast oceans encompassing the various member countries national jurisdictions, the need to have appropriate MCS mechanisms in place to police the various fishing activities within the region is crucial. Unlike, UNCLOS, the UNFSA stresses the vital importance of timely collection and exchange of data for both fisheries management and enforcement purposes and emphasizes the need to design systems of data verification, Cacaud (1998) believes that VMS is a suitable vehicle for the collection of catch data, particularly in terms of timely collection and as a means of verifying catch location.



Considering the reliability of this tool in the context of management and conservation of fisheries resources, S.-K. Chang (2011) says that VMS will not replace existing monitoring methods, but it will make them more effective by providing the authorities with the location of vessels suspected of having committed infringements. According to FAO (1998) from the vessel position and speed provided in a number of consecutive position reports, it is possible for the monitoring agency to draw conclusions about the activities of a vessel.

## **2.2 Potential uses of VMS**

VMS information and data has been used by researchers for a number of reasons namely for, management, scientific, and for maritime spatial planning for conservation purposes.

Lindegarth and Sköld (2013) further discusses that high-resolution fishery data such as VMS, especially when combined with logbooks, can make fishing information match in detail the information on biodiversity that is available from marine surveys or modeling. Therefore, VMS data is ideal for incorporating fishing effort into spatial planning processes. S.-K. Chang (2011) elaborates that the use and application of VMS can be further explored through the VMS mapping and can generate spatial and temporal explicit views of fisheries activities at a far greater resolution than traditional logbook statistics. The data generated can be used in fisheries stock assessment and for developing ecosystem management plans for sustainable fisheries. Gerritsen and Lordan (2011) highlights that over the years, VMS data have become widely available for scientific purposes, although access to such data often remains problematic because of legal and confidentiality constraints.

Moreover, VMS enables the fisheries management that requires detailed information on spatial movements of the fleet, especially relating to closed areas (e.g., MPA), marine spatial

planning, and management systems based on fishing effort quotas. The e-mail function of VMS or e-logbook systems can help reduce fisheries bycatch through fleet communication. S-K Chang (2011) further stresses that VMS data could also be used in the development of individual habitat quota systems, which were found to be more cost-effective than MPAs. These have demonstrated the potential of VMS to advance sustainable fisheries management. The analysis of VMS data can be a significant input for several modelling approaches combining VMS data with bathymetry, environmental and oceanographic data, fisheries data (catches, landings, discards) sea bottom types and habitats (PERSEUS, 2015).

In South Africa, VMS was introduced in the Traditional Fish Sector (TLFS) following reports of depleted stocks by its fisheries management authority. According to Tanci and Kristófersson (2009) in order to prevent the over-exploitation of fish stocks, governments should apply restrictive measures (regulations) and monitor compliance with such regulations. He further added that VMS is one important tool to allow governments to monitor fishing vessel activities in near real-time and detect infringements with regulations.

Though this project did not meet its objectives, he suggested that the implementation approach be reviewed as VMS has potential benefits to its commercial TLFS, such as better catch and effort estimation, improved management decision, stock recovery, and improved fishery benefits. Furthermore, S.-K. Chang et al. (2010) supported the idea that VMS is one important tool for fisheries management, as it allows fisheries management authorities to monitor vessel movements whereby the legality of catch with respect to the fishing area can be verified, and fishing effort can be more accurately estimated.

Jennings and Lee, 2012 analysed the VMS data on vessel identity, position and speed in an attempt to define fishing grounds to support marine spatial planning and management, he adds that

there are many ways to define fishing grounds and his analysis is intended to catalyse a necessary debate involving fishers, non-fishing sectors, planners and managers.

In Taiwan, the application of a vessel monitoring system to advance sustainable fisheries management have been beneficial to them in areas such as improved quantity and quality of logbooks recovered, obtaining access to a fishery-independent fishing effort estimation and prompt catch/effort reporting, enabling the possibility of regional management and understanding both fleet dynamics and vessel operation pattern, and increasing efficiency of surveillance patrols and vessel safety (S.-K. Chang, 2011).

### **2.3 Value of VMS**

Rapid technical progress of VMS has no doubt opened a new era in fisheries management and research (S.-K. Chang, 2011).

FAO (1998) stated that before VMS was introduced, fisheries management agencies have had to rely on information provided by vessel operators, information which may not be as reliable, with VMS it provides relatively reliable and accurate information on the location of vessels and with a reasonable degree of probability where the fishing activity takes place. While the technology has traditionally been used for vessel monitoring, S.-K. Chang (2011) believes that taking advantage of its various functions increases the utility of VMS; from the information it generates, important information such as catch and effort data can also be conveyed through this medium.

VMS can provide both national and international bodies with an essential monitoring capability for ensuring resource management as fisheries resources, although renewable, are not infinite and need to be properly managed to be sustainable.

Although VMS does not replace or eliminate conventional MCS measures such as aerial surveillance, at sea boarding via patrol boats, landing inspections, and documentary investigation, FAO (1998) states that many of these measures may need to be activated as a specific response to information received via VMS. Fishery agencies may devise appropriate measures based on the information received on illegal vessel activity at sea, this reduces the search and travel times and apprehension of the offenders is timely. However, depending on the availability of patrol assets for countries and fishery agencies then only can the response to such exercise be successful.

## CHAPTER 3

### METHODOLOGY

#### 3.1 Overview of Research Process

This research has dictated the kinds of research methods used in the gathering of relevant data and information needed for this paper. Allan and Randy (2005) insist that when conducting a research, methodology should meet the following two criteria:

1. The methodology should be the most appropriate to achieve objectives of the research, or;
2. It should be made possible to replicate the methodology used in other researches of the same nature.

Information collected for the purpose of this thesis has been gathered through qualitative and quantitative means. There were two phases of fieldwork study that was conducted. The first phase was carried out from 10 September to 5 October, 2018 and the second phase was carried out from the 12 September to 17 October, 2019. The results from both studies are discussed and deliberated in depth in this paper. Other relevant information used in this study are sourced from secondary sources such as scholarly articles, Fisheries related publications, Fisheries scientific reports and VMS data and information. The process engaged in this research include the use of interviews with relevant personnel and gathering of numerical (numbers and statistics) data from internal sources and scholarly articles and reports.

Qualitative means of data gathering included in depth qualitative interviewing, from the different units within the Offshore Service Centre, formerly known as the Offshore Fisheries Division. Data was gathered from the Data Unit, Enforcement and Surveillance Unit, Licensing

and Permitting Unit, Investigation and the Monitoring Unit. Retired and former personnel of the Offshore Service Centre were also interviewed. The use of Documents and Archival Data was also used under qualitative data collection.

On the other hand, Quantitative data were gathered through acquisition of Numerical data which was provided for by the personnel within the Data, Investigation, Monitoring, Licensing and Permitting and Enforcement and Surveillance Unit. This included data on Catch, Infringements and Violations, Observer coverage, License listing and number of Investigated cases, for the past five (5) years from 2014-2018.

### **3.2 Qualitative Research**

Under qualitative research the engagement of in depth qualitative interviewing, in which i) Internet interviews, ii) informal “talanoa” sessions and iii) semi structured interviews were enlisted as to provide a rich and detailed information from relevant personnel interviewed within the Offshore Service Centre, and former employees as well. Internet interview is useful in situations when one is trying to communicate with people who are either hard to reach due to geographical location or are not willing to talk in public. According to McCoyd and Kerson (2006), internet interviews were more private, gave the interviewees more time to think about the answers and also allowed them to hide their emotional responses. Listed below (Table 3.1) are those personnel that were part of this indepth interview and the information collected from them. The purpose of having an informal talanoa session is to allow the sharing of ideas and thoughts between two or more people, with the aim of establishing findings to answer questions developed in his study. Talanoa is the leading research methodology applies across the Pacific and is used most commonly in education research (Nabobo-Baba, Naisilisili, Bogitini, Baba & Lingam, 2012; Otsuka, 2005; Vaioleti, 2006). In Fiji, it is also a method proposed to disseminate information by local

government agencies, NGOs, village representatives, business representatives, and local agencies. It is recommended for collecting information from villages, leaders, and different government agencies, with the aim of using findings to formulate national policy proposals (Morrison, Vaioleti & Veramu 2002). Semistructured interview was also conducted during this process, this was where limited questions were prepared for certain issues of special interest and was directed at specific personnel and officers as seen below.

**Table 3.1** Indepth Interview, List of personnel and their affiliations to the research and information collected.

Type of Indepth Qualitative Interview	Name & Affiliation to the research	Information Extracted
Internet interview	<ol style="list-style-type: none"> <li>1. Mr Anare Raiwalui – former supervisor of the Offshore Fisheries Division</li> <li>2. Daniel Koroï – VMS Officer, FFA, Solomon Islands</li> <li>3. Meli Raicebe – Advisor to Minister of Fisheries, Ministry of Fisheries</li> <li>4. Leba Dranivesi – Fisheries Officer, Enforcement &amp; Surveillance Unit</li> <li>5. Losalini Turaga – Surveillance Officer, Enforcement and Surveillance Unit</li> </ol>	<ul style="list-style-type: none"> <li>• History of VMS</li> <li>• Transition phase of the Offshore Fisheries</li> <li>• Strengths of VMS as a MCS tool</li> <li>• MCS Components in place</li> <li>• IUU in Fiji and the Region</li> <li>• Aerial and Surface Patrols</li> <li>• Fiji Navy</li> </ul>

	<p>6. Raijieli Natadra – Fisheries Technical Officer, Licensing and Permitting Unit</p> <p>7. Shelvin Chand – Fisheries Officer, Data Unit</p>	<ul style="list-style-type: none"> <li>• Reconciliation Checks (Logsheet &amp; Landings)</li> </ul>
Informal “Talanoa” session	<p>1. Eric Ravulo – Technician Tec Air Communications</p> <p>2. Losalini Turaga – Surveillance Officer, Enforcement and Surveillance Unit</p> <p>3. Apenisa Sauturaga – Observer Debriefing, Monitoring Unit.</p>	<ul style="list-style-type: none"> <li>• Installation and removal of MTU</li> <li>• Verification Checks</li> <li>• Observer Infringements (GEN-3)</li> </ul>
Semistructured Interview	<p>1. Leba Dranivesi – Fisheries Officer, Enforcement and Surveillance Unit</p> <p>2. Losalini Turaga – Surveillance Officer, Enforcement and Surveillance Unit</p> <p>3. Arieta Naeqe – Investigation Officer, Investigation Unit.</p> <p>4. Hilda Lobendahn – Enforcement Officer, Enforcement and Surveillance Unit.</p> <p>5. Tevita Vereivalu – Fisheries Observer, Monitoring Unit</p> <p>6. Sunia Duwai – Fisheries Observer, Monitoring Unit.</p>	<ul style="list-style-type: none"> <li>• FFAVMS requirements – Fiji National fleet</li> <li>• Observer Reports &amp; Referral of Observer Infringements after debriefing</li> <li>• Standard Operating Procedures (SOPs) – Observer Infringements</li> </ul>



The purpose of having in-depth interviews was to establish a variety of information gathered from former employees (n=2), current officers (n=9) of the Offshore Fisheries and a FFA official (n=1). The information gathered was informative and thorough because it highlights the transition of events within the Offshore fisheries Division and how the changes such as introduction of VMS, the promulgation of the OFMA (2012) and its subsequent regulations and the regional cooperation in monitoring, control and surveillance activities has shaped the status and operational structure of the Offshore Fisheries today.

The officers interviewed included the Surveillance officer, Observers, Enforcement officers, Investigation officers and Licensing and Permitting officers. They also stressed how the processes have changed from the past in terms of dealing with infringements and violations to the national fisheries laws and the existing processes in place to prevent, deter and eliminate illegal fishing activities out at sea. The important role of the Surveillance officer in monitoring all fishing vessels fishing in Fiji Fisheries waters and areas beyond national jurisdiction and the challenges experienced from carrying out her duties was also emphasized.

The impact of the promulgation of the national fisheries laws has seen a more compliant national domestic longline fleet, in terms of reporting and submission of catch and landings documents and the adherence of the different processes in place such as application of various permits and authorisations and the timely submission of relevant documentation. The newly established Investigation Unit is responsible for the investigation of cases of infringements and violations identified by Observers at sea, illegal fishing activities and Vessel of Special Interest (VOI). Each of the identified infringements, provided insights and developments into the strengths and weaknesses of the VMS and how useful the system is in terms of monitoring and surveillance. While some would want the system to capture and provide more detailed information on fishing

activities out at sea such as transshipment, bunkering and provisioning, VMS has been seen as one of the effective MCS tool when it comes to using historical data to verify the occurrences of suspected illegal fishing activities out at sea.

One other avenue for acquiring information through qualitative research is through Documents and Archival data. Documents that already exist in a group or organization are called naturally occurring documents, that is, they exist without the involvement, facilitation or instigation of the researcher, on the other hand, Rubin and Rubin (2012) says that the kinds of data that already exist (often referred to as archival data or existing documents) serve to supplement the forms of data that the study precipitates through collection with study participants. Archival data is then divided into three parts, namely Personal documents (emails, letters, scrapbook and notes), Official documents (websites, mission statements, handbooks, press releases, training materials and brochures) and Popular culture documents or Publicly Accessed documents (books, magazines, photographs and films). Below in Table 3.2 is the different types of Document and Archival data and the various information extracted from the various sources. For the purpose of this dissertation, documents gathered through this avenue include, Offshore Fisheries Annual Reports, Ministry of Fisheries Annual Reports, Journals written on the effectiveness of VMS as an MCS tool in eliminating IUU fishing and how VMS data and information can be used to generate other valuable information for the purpose of conservation and management measures.

**Table 3.2** Type of Qualitative documents and Archival data and information extracted

Type of Qualitative Documents and Archival data	Type of Information Extracted	Content of Information
Personal Documents	<ul style="list-style-type: none"> <li>• Emails and Notes</li> </ul>	<ul style="list-style-type: none"> <li>• Verification of Number of licenses issued</li> <li>• Number of Illegal transshipments</li> <li>• Number of Illegal zone entries (Exit &amp; Entry)</li> </ul>
Official Documents	<ul style="list-style-type: none"> <li>• Websites, Handbooks</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="http://www.parliament.gov.fj/annual-reports-other-reports/#2017">http://www.parliament.gov.fj/annual-reports-other-reports/#2017</a></li> <li>• <a href="https://www.wcpfc.int/meetings/sc15">https://www.wcpfc.int/meetings/sc15</a></li> <li>• FAO handbooks/guidelines on IUU fishing, Overview of National Fisheries Sector (Fiji)</li> </ul>
Publicly Accessed Documents	<ul style="list-style-type: none"> <li>• Books</li> </ul>	<ul style="list-style-type: none"> <li>• Research Theoretical Methodologies</li> <li>• Horizontal Longline Fishing (Methods &amp; Techniques)</li> <li>• Publication Manual of the American Psychological Association (7<sup>th</sup> edition)</li> </ul>

### 3.3 Quantitative Research

All statistical data and reports gathered were tabulated, others were recorded on excel spreadsheets and on a research notebook, depending on the mode that it is best suited to. Wolcott (1994) states that “Everything has the potential to be data, but nothing becomes data without the intervention of a researcher, who takes note- and often makes note of some things to the exclusion of others. In primary quantitative research, data is collected from the source directly rather than

depending on data collected from previously done research, secondary qualitative research on the other hand is the use of already existing data (Bhat, 2020).

**Table 3.3** Data and information collected through Primary and Secondary Qualitative research

**Source:** Offshore Service Centre

Type of Quantitative Research Method	Information and Data collected
Primary	<ul style="list-style-type: none"> <li>• Observer Infringements (GEN-3) data</li> <li>• Logsheet data</li> <li>• Zone and Port Entry &amp; Exit Violations</li> <li>• Observer Placement Records(2014-2018)</li> <li>• Longline license listing (2014-2018)</li> </ul>
Secondary	<ul style="list-style-type: none"> <li>• Annual catch estimates (Annual Report-Part 1) – Landings information</li> <li>• Observer Placement Reports</li> <li>• License listing</li> </ul>

### 3.3.1 Collection of data and information through Primary Research

Observer Infringements and violations were recorded by Fisheries Observers while on deployment out at sea. These are non compliance observed and recorded by the fisheries observers as they are known to be independent and impartial, and not required to enforce any national laws whilst out at sea. Data for the past five years from 2014-2018 was collected through this avenue and was then tabulated as to reflect only the identified infringements that could possibly be verified with VMS data. Verification of these identified infringements can be cross checked with the application of historical VMS data given all the specific details, such as the date, time and vessel

position when the infringement occurred is available. The information was collected and provided for by the Monitoring Unit of the Offshore support centre.

Catch logsheet data for the past five years from 2014-2018, was also acquired and the total catch from the three main tuna species (Albacore, Bigeye and Yellowfin) and the other by-catch species was calculated. Catch Logsheets records the total catch by species, by weight and also records the catch, by species, by weight that has been discarded.

The number of unauthorised fisheries related activities was also collected. These activities are namely transshipment and bunkering. This information is accessed from the Licensing and Permitting Unit along with the license listing for the past five years that is from 2014-2018. Other supporting information that is also cross checked are the permits that are issued for carrying out these fisheries activities out at sea, such as transshipment, bunkering or provisioning. These activities should only be carried out once the approval is made. It becomes unauthorized if it occurs out at sea without first, soughting proper approval. The time the application is lodged for approval will also be taken into consideration, should the activity have taken place prior to when the approval was given. The time and date it occurred can be verified with VMS data and information, pending further investigation.

Other Statistical data collected was from Port and Zone Entry and Exit Notifications (Violation to Regulation 39(b) and Regulation 42). For fishing companies or agents that fail to apply for a zone entry notification or inform the Ministry of Fisheries, upon entering Fiji's EEZ or leaving Fiji's EEZ they are usually fined with a Fixed Penalty Notice(FPN) of \$2,000 or they have the option where they can go to court to present their case. The verification of this information can be cross-checked with VMS data as to the date, time and position of entering or exiting Fiji's EEZ

or the location of the vessel 24 hours before calling into port. This information was collated from the Enforcement and Surveillance Unit.

### **3.3.2 Collection of data and information through Secondary Research**

Data and information collected through this avenue include Landings summary. This was retrieved from the Part 1 Report (SC15-2019), Annual catch Estimates (2014-2018). Logsheet and Landings summary is usually reconciled with VMS data and information so as to ascertain and verify the information on vessel location (position) and fishing activity. Landings summary is the number of catch that is actually landed and what was discarded. This information is collated from the Data Unit housed at the Offshore Service Centre. Other information collected include Transshipment and Observer Coverage, this was accessed from the Offshore Fisheries Annual Reports for the past five years from 2014 – 2018.

### **3.4 Data Processing and Analysis**

In verifying the occurrence of these fisheries activities out at sea, the application of VMS data will also verify the date, time, position and speed of the fishing vessel to see the probability of these illegal and unauthorized activities taking place. The Surveillance Officer in monitoring the Fiji fishing vessels in zone and outside Fiji waters identifies suspicious activity occurring out at sea and cross checks with authorization or permits issued. However, suspicious behavior of fishing vessels warrants further investigation. Observer reports indicate the account of activities recorded out at sea and also confirms the allegation.

Port and Zone Entry Notification data was collected from the number of Fixed Penalty Notice (FPN) issued as a result of non compliance to the Regulation 39 (2)(b) and Regulation 39 (2)(e) of the OFMR (2014), of failing to notify the port state forty-eight and seventy-two hours

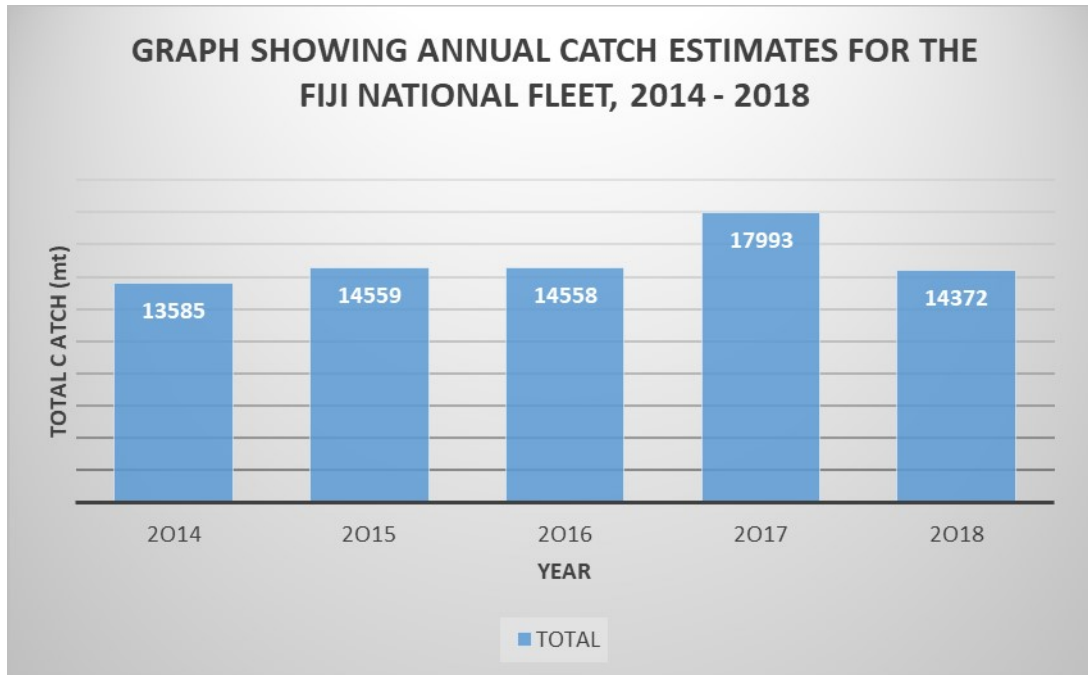
prior to entering Fiji's EEZ and a fisheries port. On instances where this has occurred, the application of VMS data is used to determine the date, time and vessel position, the vessel is supposedly have entered Fiji's EEZ. This is cross checked with the vessel operator's or agent's application on Port and Zone Entry Notification. The vessel can always face a fine should the checks prove that the vessel operator or agent's application is late and does not correspond to the estimated date, time and position of when the fishing vessel is suppose to have entered or left Fiji's EEZ.

Catch information was also tabulated and graphically represented as to show the catch trends over the years, and the difference arising from the total catch, that is, from landings data and that of logsheet. The difference between the two is usually the under-reported or mis-reported portion of the catch and discards or the non reporting of catch at all. Landings data is the summary of what is exactly landed in the fisheries ports, by species, by weight while the logsheet data is the record of what is caught out at sea, captures number of catch retained and those that are discarded as well.

## CHAPTER 4

### RESULTS AND DISCUSSION

#### 4.1 Landings and Log sheet Data



**Figure 4.1** Annual Catch Estimates for the Fiji National Fleet, 2014-2018

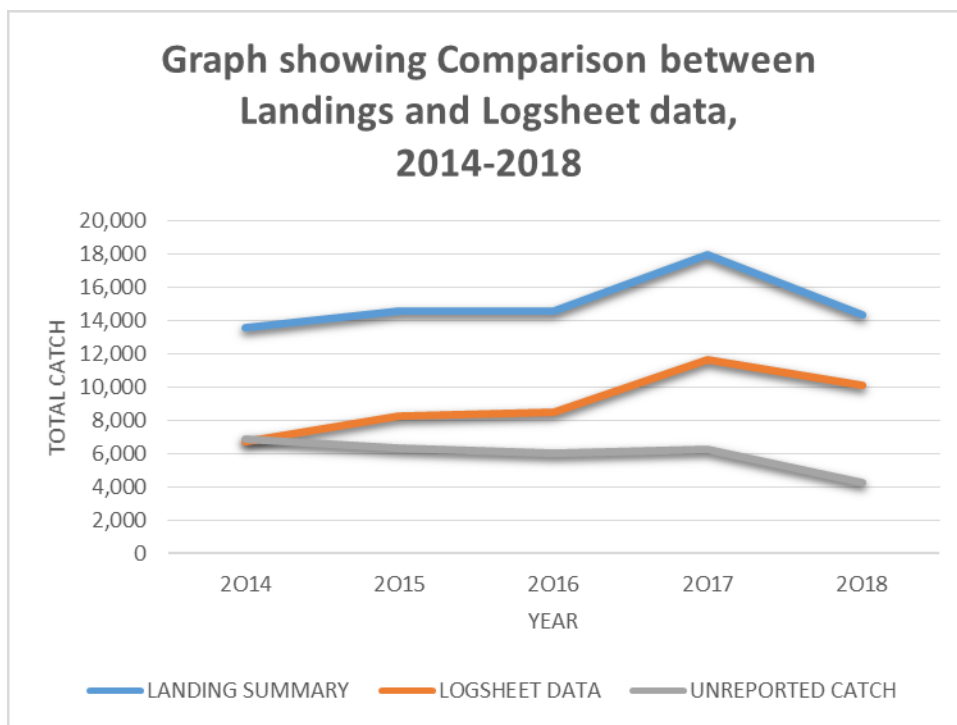
**Source:** Data Unit, Offshore Service Centre

The graph above (Figure 4.1) shows the total catch estimates of Tuna (Albacore, Big eye and Yellow fin) and Tuna like species caught in Fiji EEZ, High Seas and in neighbouring EEZs. Number of catch graphically represented in this graph is taken from the landings summary which is submitted by the fishing companies to the Offshore Service Centre for the processing of their landing permit. It contains the number of catch by species by weight that is landed in any of Fiji's designated ports. It should be noted that there was an increase in catch from 2015 as compared to the previous years. This was mainly because catch reports was based on landings, which is the actual number of catch landed in Fiji's designated ports as compared to the past years where catch reports was extracted from logsheet (Ministry of Fisheries, Part 1 Annual Scientific Report to WCPFC, 2016). Two years after, total catch estimates increased by 3,434mt, with total Albacore (ALB) catches of 9,837mt, the highest recorded since 2013 (Ministry of Fisheries, Part 1 Annual



Scientific Report to WCPFC, 2018). In 2018 the total catch estimates dropped by 3,621mt due to a drop in Albacore, Big Eye (BET) and Yellowfin (YFT) catches (Ministry of Fisheries, Part 1 Annual Scientific Report to WCPFC, 2019).

Logsheet data is often reconciled with VMS trips (data) as to ascertain the validity of the geographical position of fishing grounds in order to determine the legality of catch caught within these areas. Every logsheet should have a corresponding landings summary. On some instances, logsheet is not collected by Enforcement Officers because Vessel Operators or Agents fail to submit their notification of intentions such as Port and Zone Entry notification of their fishing vessels coming into one of Fiji’s designated ports either to land their catch or use other port services. As a result, these vessels are not boarded and logsheet is not collected, this is often identified during the reconciliation of landings and logsheet data or when it is realized that the vessel has berthed into port.



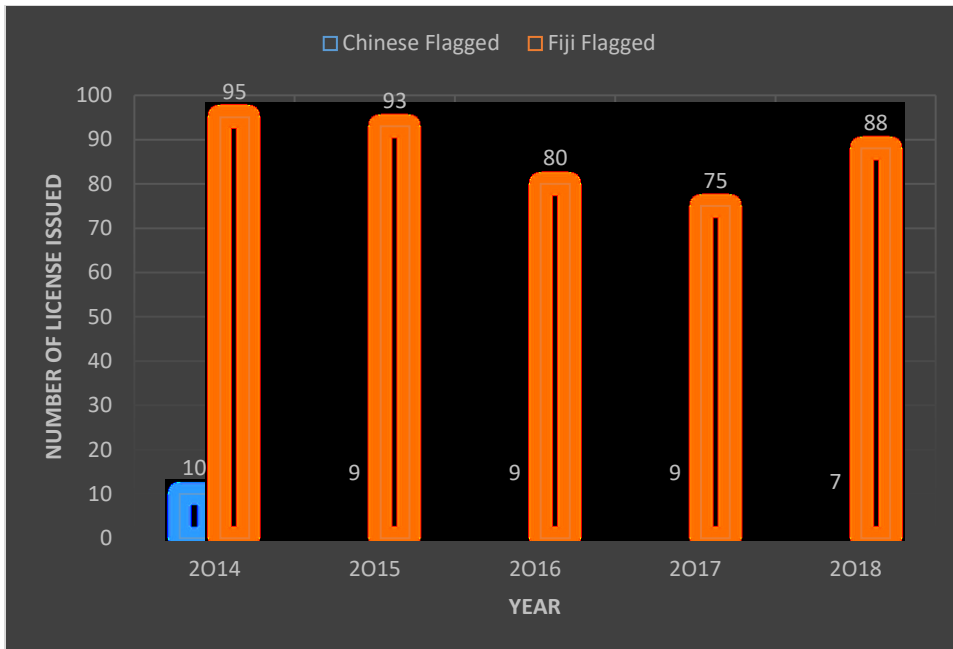
**Figure 4.2** Landings vs. Log sheet Data and Under-reported/Mis-reported Catch  
**Source:** Data Unit, Offshore Service Centre

The existence and extent of Illegal fishing in Fiji is low, it is more on the aspect of Unreported fishing. Figure 4.2 shows the difference between the landings summary or data and the catch data

extracted from the logsheet. As elaborated above, the reconciliation process of landings and its corresponding logsheet data can be graphically represented above as to show the Unreported (misreporting and non-reporting) portion of the catch. The total catch gathered from Landings data from 2014-2018 is 75,007mt, data from Logsheet is 45, 252.59mt and the total unreported catch, which includes the misreported and non reported catch is 29,754.41mt which is 39.6% of what is actually caught and landed. Unreported fishing which includes the misreporting of catch and discards or the non-reporting of catch.

#### **4.2 Fisheries Observer Infringements and Violations**

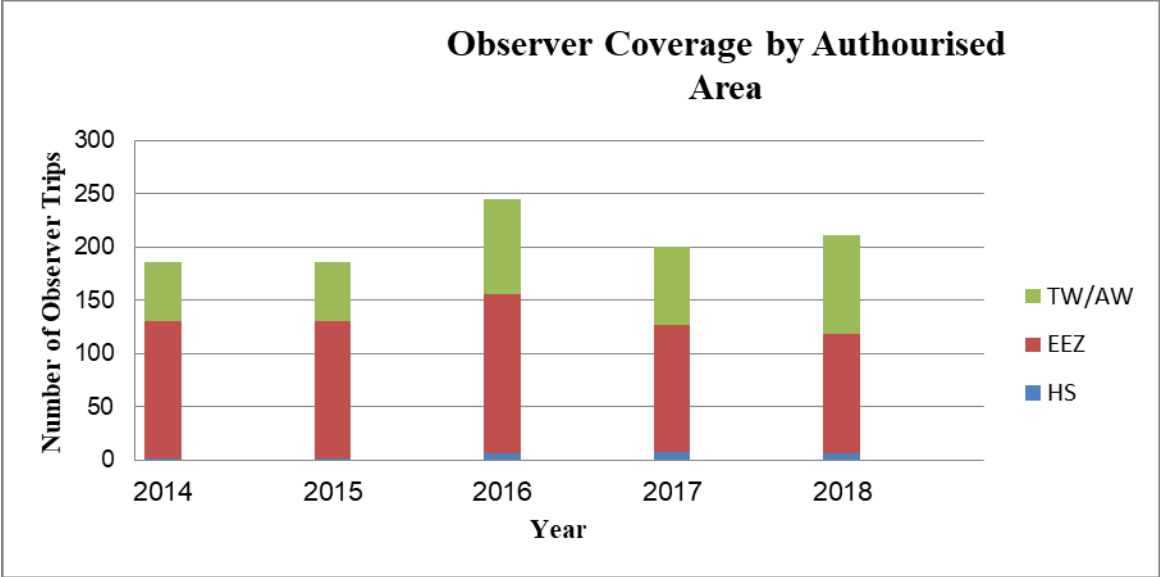
Fisheries Observers provide two distinct services, one is to collect data for stock assessment purposes and at sea monitoring of regulatory compliance as defined in the various national fisheries laws and ensuring that these regulations are adhered to. Observers are not required to enforce any fisheries laws at sea but should be seen as the “eyes and ears” of the fisheries authority through observation and recording of fishing related activities. It is a licensing requirement that all Fiji flagged fishing vessels deploy an Observer before they depart for fishing grounds. Infringements and violations observed are recorded in “Form Gen 3” of the Observer Workbook, and highlighted and discussed during debriefing sessions at the end of a placement trip. Depending on the degree and the magnitude of the violation, it is referred to the Surveillance unit to verify certain infringements via VMS information and other cases are referred to the Investigation Unit for further action.



**Figure 4.3** Longline licenses issued by flag from 2014-2018

**Source:** Licensing & Permitting Unit, Offshore Service Centre

The graph above shows the number of licenses issued by Fiji by flag from 2014-2018. It should be noted that all Chinese flagged fishing vessels operating in Fiji fisheries waters and areas beyond national jurisdiction are under the umbrella of Charter Arrangement. Vessels under the Charter Arrangement are Chinese flagged and owned fishing vessels that have entered into a Charter Agreement with the local indigenous operators, an initiative by the Fiji government to assist these operators in setting up their own business at the end of the Charter Agreement period. From 2014 – 2018 the license cap was kept at 60 vessels considering the sustainability of the fisheries resources. These vessels fish solely in Fiji fisheries waters (AW, TS & EEZ). In 2014, 43% of these Fiji flagged vessels was issued authorisation to fish in areas beyond national jurisdiction or high seas, reduced to 41% in 2015, further reduced to 33% in 2016, 29% in 2017 and 36.8% in 2018.



**Figure 4.4** Observer Coverage by Authorised Area

**Source:** Monitoring Unit, Offshore Service Centre

**Table 4.1** Types of Infringements and degree of occurrences recorded by Observers

**Source:** Monitoring Unit, Offshore Service Centre

<b>TYPES OF OBSERVER INFRINGEMENTS</b>					
<b>YEAR</b>	NR-a	NR-e	NR-f	LP-a	LP-b
2014	0	1	0	2	0
2015	1	14	7	1	0
2016	1	7	0	2	0
2017	5	7	1	0	1
2018	3	6	5	0	0

**KEY**

**NR-a** Fish in areas where the vessel is not permitted to fish

**NR-e** Transfer or transship fish from or to another vessel

**NR-f** Was involved in bunkering activities

**LP- a** Inaccurately record vessel position on vessel log sheet for sets, hauling and catch

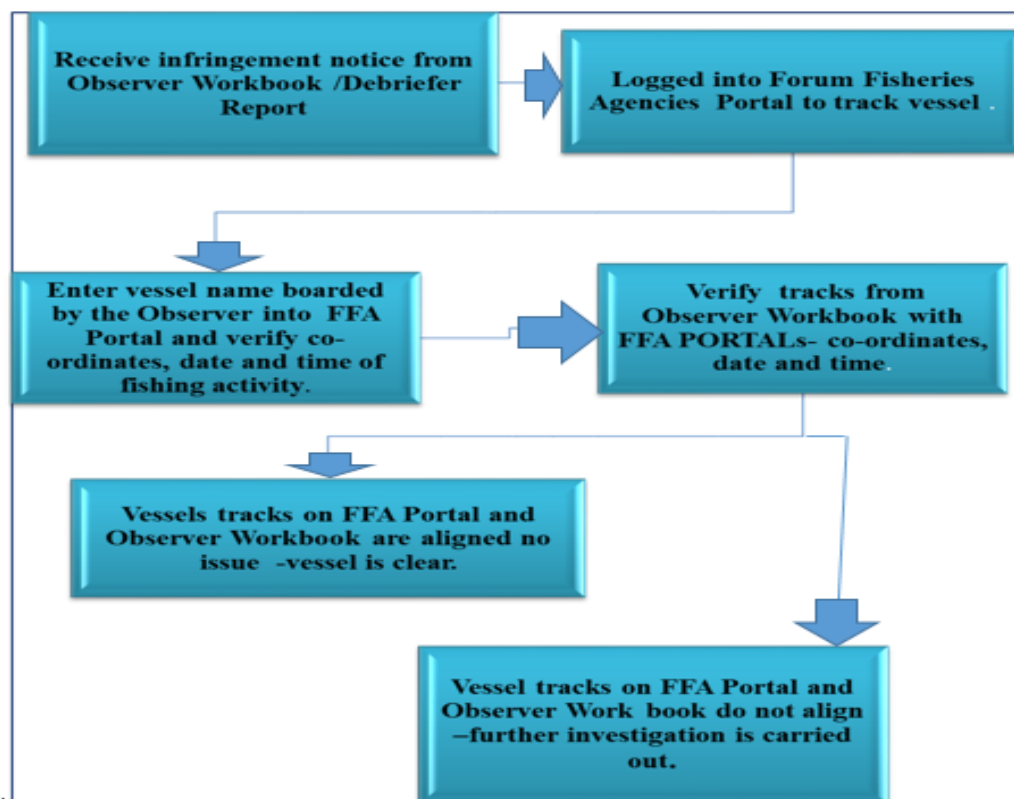
**LP-b** Failure to report vessel positions to countries, where required when entering and leaving an EEZ (crossing to or from an EEZ into or out of the High Seas)

Most of the Observer infringements recorded above were verified with VMS data after been debriefed by an Observer Debriefing Officer. It is noted that 93.3% of these infringements were committed by vessels fishing in the EEZ and High Seas. For infringement such as NR(a) about 13% of the infringements were committed by vessels fishing in the EEZ and HS and the other 30% by those vessels fishing in the AW/TS. VMS data (as the procedural verification shows in Figure 4.5 below) verified the occurrence of this fishing activity as fishing. Vessels are seen by Observers as stopping on identified seamounts to carry out dropline fishing. This is illegal as fishing vessels fishing in Fiji fisheries waters and authorised beyond national jurisdiction are licensed only to use longline. The recorded infringement of NR(e), showed that 63% of the infringements committed by vessels fishing in the EEZ and High seas, while 20% was committed by vessels fishing in the AW/TS.

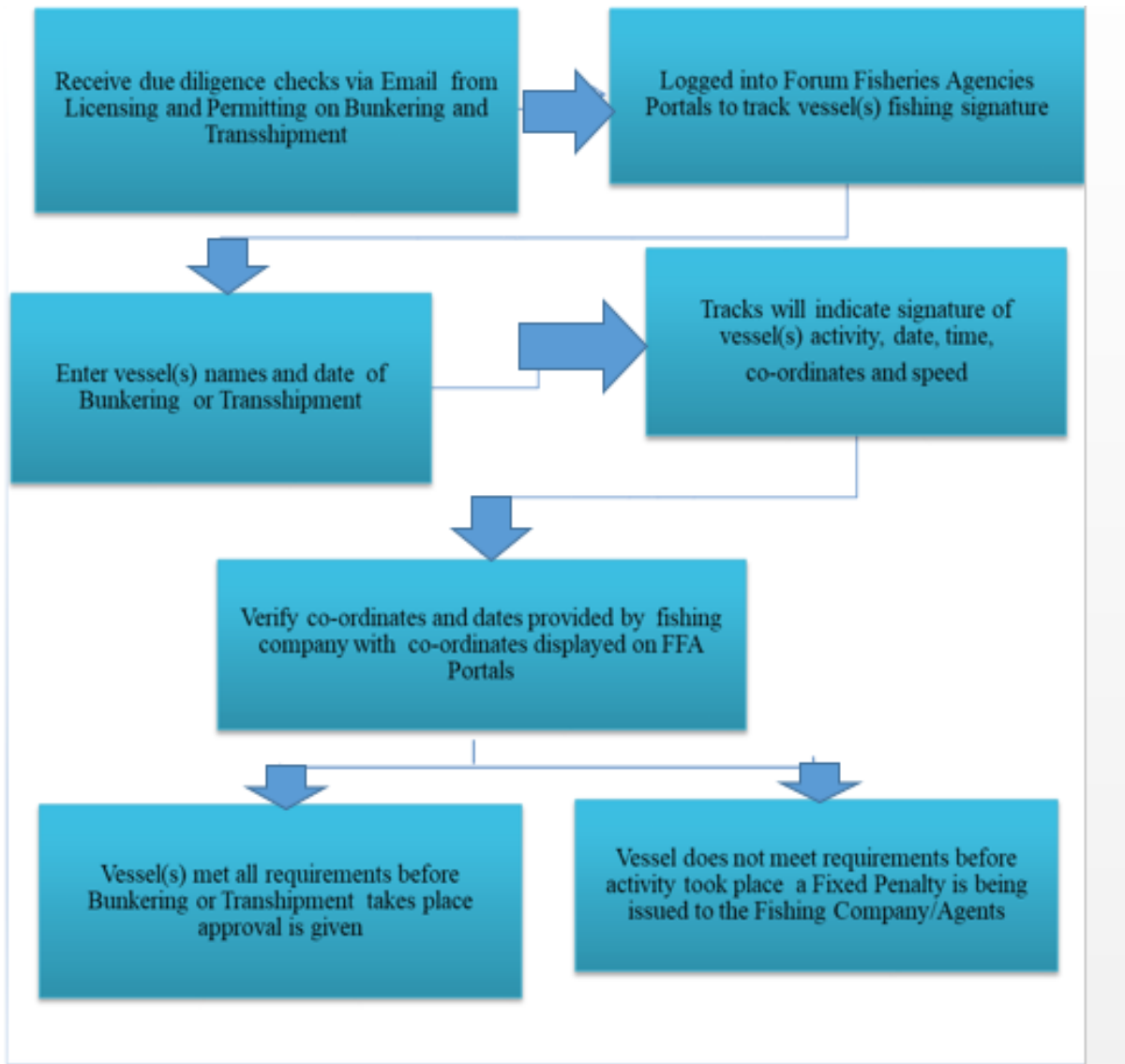
Vessels that committed this infringement, NR(f) was mostly those fishing in AW/TS (40%) and 17.3% was committed by those fishing in the EEZ and High seas.

In the absence of a provisional transshipment (Schedule 6I form) or bunkering authorisation (Schedule 6J form), within the fishing vessel, verification is conducted by the Surveillance officer. If the fishing activity is not authorised, a Fixed Penalty Notice (FPN) is issued and further investigation is carried out if the need be. If VMS historical data will show the fishing activity taking place prior to the company’s agents getting an approval from Fiji Fisheries, this is considered illegal and unauthorised. Moreover, infringements such as LP(a) and LP(b) were noted to have a minimal occurrence out at sea. For instances such as this, the Vessel Operator is issued a written warning first, should there be a repeat of this infringement then a FPN is issued.

### **Observer Infringements and Violations verification checks by Surveillance Officer via VMS Data**



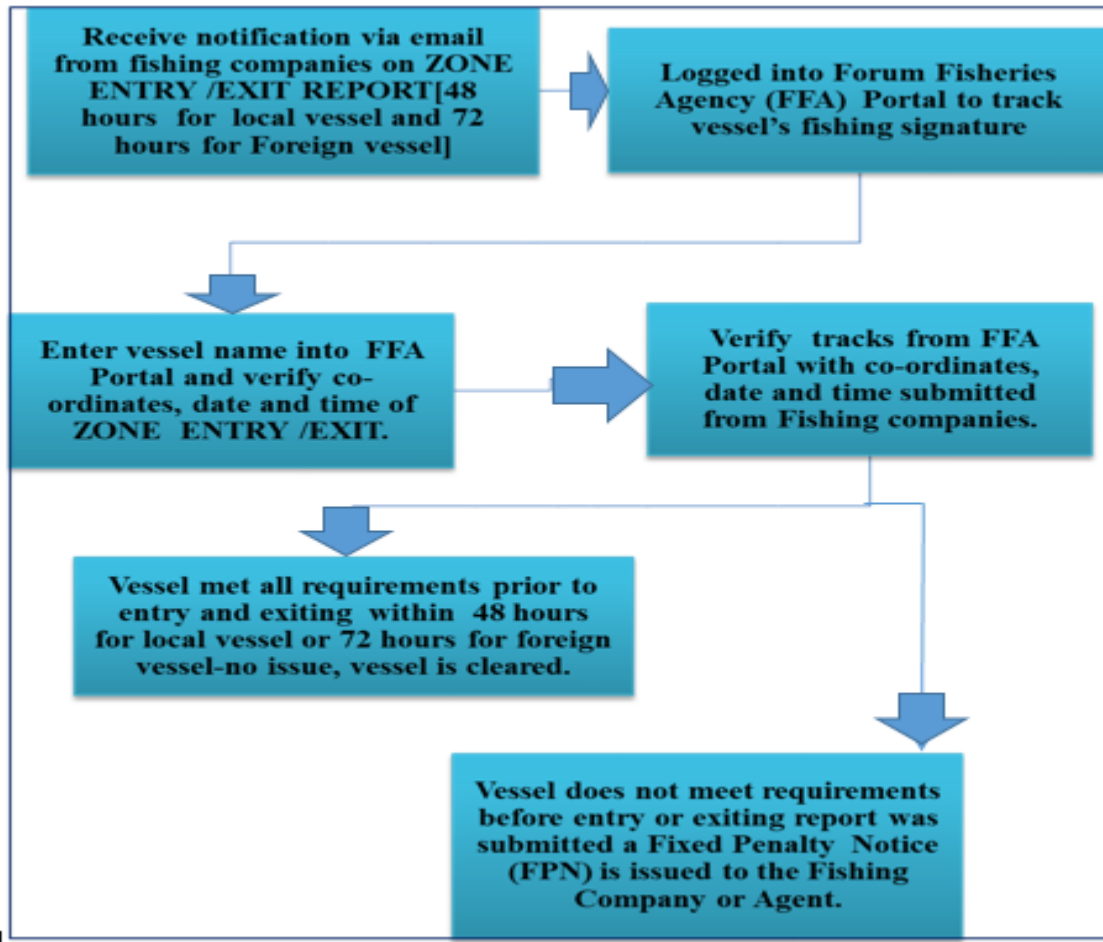
**Figure 4.5** Flow Chart of Procedural verification of Observer Infringements by VMS data



**Figure 4.6** Flow Chart of Procedural verification of Bunkering and Transshipment by VMS data

### 4.3 Zone and Port Entry and Exit Notification

Verification checks on Zone Entry and Exit Report by the Surveillance Officer via VMS data



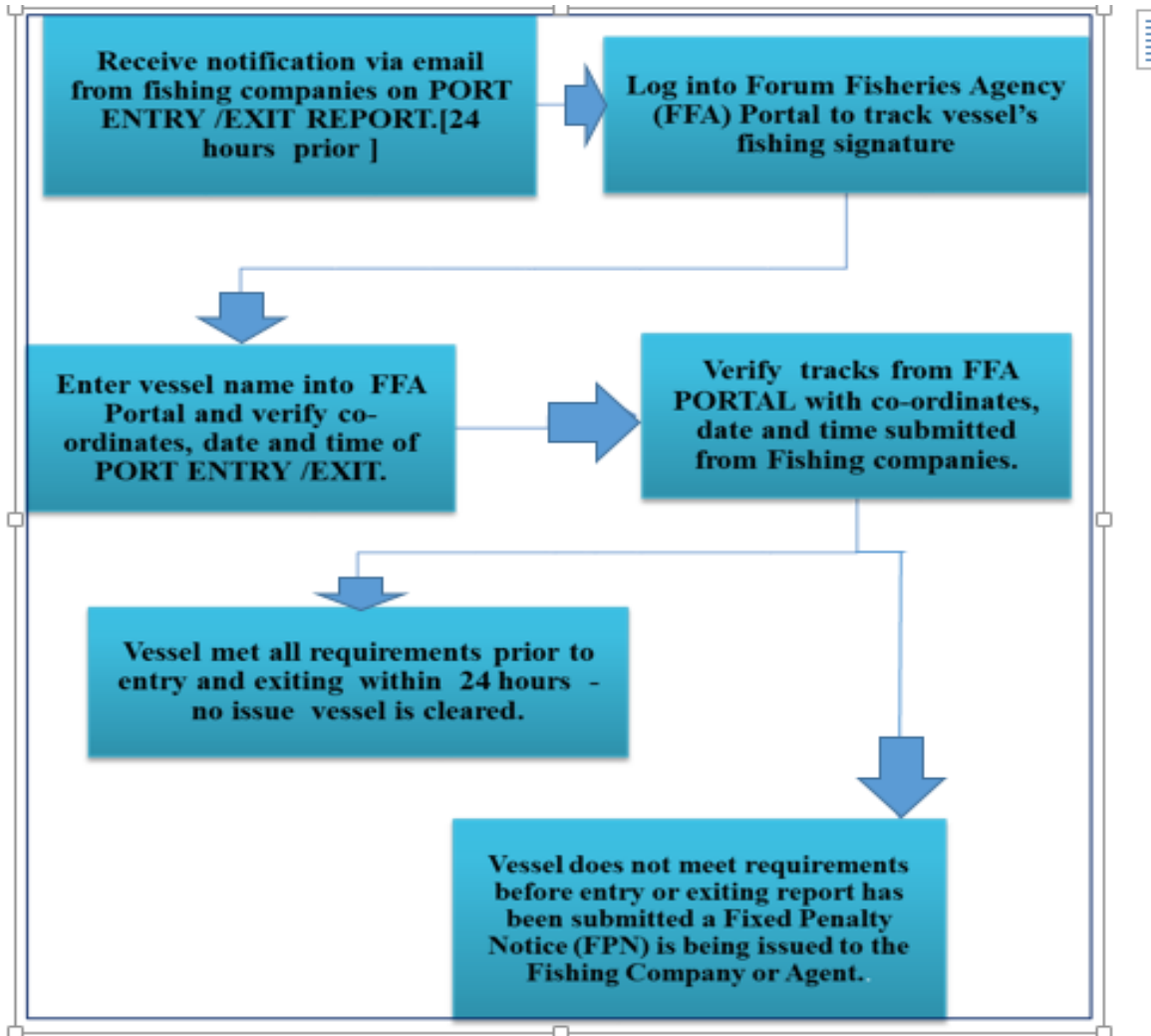
**Figure 4.7** Procedural verification of Zone Entry and Exit Notification by VMS data

The issuance of FPN began in 2016 after the promulgation of the OFMR in 2014, the operational arm of the OFMA(2012). Awareness on the OFMR and Capacity building for the Officers within the Offshore Fisheries were organized to allow more familiarization with these national fisheries laws. In 2016, after instilling enough knowledge and confidence in the Officers, the first FPN was issued on the 13<sup>th</sup> January, 2016. In 2016, a total of 8 FPN was issued, of which 25% was issued in violation of Regulation 39 (2)(b), failing to notify at least 48 hours prior to



entry into and departure from Fiji Fisheries waters. In 2017, 33% of the FPN was issued for the same offence and 2018, 40% of the FPN was issued for the same.

**Verification checks on Port Entry and Exit Report by the Surveillance Officer via VMS data**



**Figure 4.8** Procedural verification of Port Entry and Exit Notification by VMS data

In 2016, 75% of the FPN issued was in violation of Regulation 39 (2)(e), failing to notify at least 24 hours prior to the estimated time of entry into any port in Fiji. In 2017, 67% of the FPN issued was failing to submit notification of intention of Port entry and in 2018, 60% was issued for the same offence. It can be noted that the Offshore Fisheries was a bit too lenient in 2017 as there were

only 3 FPN issued for the year, this might be due to poor monitoring or issuance of verbal warnings to offenders, which should not be encouraged and this diminishes the integrity of Fisheries Officers when they are carrying out their authorised duties and responsibilities.

## CHAPTER 5

### CONCLUSION

#### 5.1 Effectiveness and Limitations of VMS

VMS is an excellent tool for the monitoring, control and surveillance (MCS) of Fiji fishing vessels that are regulated to conduct fishing activities in Fiji fisheries waters and areas beyond national jurisdiction. Through the use of VMS and the powers exerted by the provisions of the OFMA and OFMR, more infringements have been identified and verified as Fisheries Officers have been empowered under these fisheries laws to carry out search, seizure, arrest and issuance of FPN. The results discussed earlier, shows how powerful VMS is in verifying the occurrences for the various fishing activities and how important it is to know the magnitude of these fisheries infringements and the impact it will have on the management, development and sustainable use of the offshore fisheries resources. Cacaud (1998) insists that the primary role of VMS information is to trigger further investigation into suspicious fishing activities, as it can provide documentation of vessel activity and alleged violations. Though some may argue that VMS only provides an element of suspicion, it provides the platform that warrants further investigation into these activities. O'Shea and Thompson (2006) agrees that by providing automated surveillance, VMS offers cost-effective and efficient support to control authorities allowing the rapid identification of potential infringements that can be targeted for further investigation.

It is also noted from this study that even though VMS is an effective tool for monitoring fishing vessels in zone and in the high seas, it can only track participating vessels, since they are the only ones that carry the VMS equipment compared to other MCS conventional measures such as aerial and surface surveillance that can detect any vessels located within their operating range.

According to P.Flewelling (personal communication, December 10, 2019), a VMS only tracks those vessels willing to be tracked as part of the license agreement to be permitted to fish, many people think VMS gives the entire picture, it does not, it only tracks the “good guys”. It should be considered that the use of traditional and evolving technologies can complement and work hand in hand with VMS in eliminating IUU fishing.

## **5.2 Limitations of the Study**

- Changes in the chain of command within the Ministry of Fisheries; this has allowed the changes in internal processes. Request for the use of data is often delayed as there are certain procedures to be followed before the approval is given to access data within the Offshore Service Centre
- Inconsistent documentation of records of authorisations and permits issued; this is mainly due to the changes in Officers handling Permits and Authorisations within the Licensing and Permitting Unit, resulting in the inconsistent input of data and records
- Reluctance of Officers to assist in information and knowledge sharing

## **5.3 Recommendations**

- More collaboration work should be promoted between Fisheries, Fiji Navy and partners on surface patrols on Fiji’s EEZ and High Seas as VMS information is limited only to licensed fishing vessels that have VMS on board.
- The Enforcement and Surveillance Unit should consider the appointment of a second Surveillance Officer to assist in the monitoring and surveillance responsibilities as and when required

- More emphasis should be placed on the documentation/filing/recording processes of fisheries information within the Offshore Service Centre. This is to assist in the analysis of relevant fisheries information should the need be.
- Officers within the Offshore Service Centre should be more stricter rather than lenient to those violating the provisions of the OFMA and OFMR and issue FPNs as and when necessary to discourage the repetition of offenders in future.

#### 5.4 Future Study

Throughout the course of my research, I was challenged to do more with the analysis of VMS data but this was not possible because of the inconsistent recording and documentation of information and data available to support this initiative. It is recommended that in future a study can be carried out to identify the possible likelihood of transnational crimes or activities in areas beyond national jurisdiction and the High seas pockets close to Fiji. With the high number of bunkering and provisioning authorisations issued, it raises a lot of suspicion as it is the same vessels and same companies that are requesting to conduct these fisheries related activities out at sea. Fiji has been reported as being the hub for illicit drug trafficking, according to the Police Chief of Intelligence and Investigation, Henry Brown who confirms that Fiji is being used as a key distribution point for illicit drugs. The market is Australia and New Zealand and Fiji is being used as a port for repackaging and sending on (Radio New Zealand (RNZ), 2015). VMS Tracks can help identify hotspot areas where these fisheries related activities commonly occur, and raise suspicion targeting further investigation. According to P.Flewelling (personal communication, December 10, 2019), it has been formally recognized through United Nations Office on Drugs and Crime (UNODC) that IUU fishing is a transnational crime, often associated with other marine crimes such as slavery at sea, human and weapons trafficking and drugs. With Fiji implementing

tight border control measures in the various port of entries, RNZ (2015) reported that it believes the local authorities have proved their abilities with the recent drug busts but says they need to stay vigilant to combat transnational crimes. The use and analysis of VMS data and information can be used to plot areas of common bunkering and provisioning activities and employ the use of aerial and surface patrols through a collaborative exercise, should information suffice to warrant the surveillance operation. Nevertheless, this is a good opportunity for future study that can be undertaken to further explore the effectiveness of VMS.

## REFERENCES

- Allan, A. G. and Randy, L.J. (2005). Writing the Winning Thesis or Dissertation. A Step-by-Step Guide, Corwin Press, California
- Bhat, A. (2020). Quantitative Research: Definition, Methods, Types and Examples [https://www.questionpro.com/blog/quantitative-research/#Primary\\_Quantitative\\_Research\\_Methods](https://www.questionpro.com/blog/quantitative-research/#Primary_Quantitative_Research_Methods)- Retrieved from this website 4.1.2020
- Campbell, R.A., J.D. Prince, C.R. Davies, N.A. Dowling, and D.S. Kolody. (2017). An Empirical Decision Tree–Based Harvest Strategy for in-Country Management of a Shared Pelagic Resource. In: T.J. Quinn II, J.L. Armstrong, M.R. Baker, J. Heifetz, and D. Witherell (eds.), Assessing and Managing Data-Limited Fish Stocks. Alaska Sea Grant, University of Alaska Fairbanks. <https://doi.org/10.4027/amdlfs.2016.10>
- Cacaud, P. (1998). Legal Issues Relating to Vessel Monitoring Systems (GCP/INT/648/NOR) Kuala Lumpur: FAO/Norway Government Cooperative Programme
- Chang, S. K., Liu, K.Y. and Song, Y.H. (2010). Distant water fisheries development and vessel monitoring system implementation in Taiwan – History and driving forces. ELSEVIER Marine Policy, 34(3), 541-548
- Chang, S.K. (2011). Application of a vessel monitoring system to advance sustainable fisheries management – Benefits received in Taiwan. ELSEVIER Marine Policy, 35(2), 116-121
- Churchill, R.R. and Lowe, A.V. (1983). The Law of the Sea. Oxford, Manchester University Press.
- DeMers, A. and Kahui, V. (2012). An Overview of Fiji’s Fisheries development. ELSEVIER Marine Policy, 36(1), 174-179
- Food and Agriculture Organization of the United Nations. (2020). Fishery and Aquaculture Country Profiles – Republic of Fiji. <http://www.fao.org/fishery/facp/FJI/en> Retrieved from this website on 16.01.2020
- Food and Agriculture Organization of the United Nations. (2016). AQUASTAT Country Profile – Fiji. Food and Agriculture Organization of the United Nations (FAO). Rome, Italy
- Food and Agriculture Organization of the United Nations. (1998). Fishing Operations Vessel Monitoring Systems. Food and Agriculture Organization of the United Nations (FAO). Rome, Italy
- Food and Agriculture Organisation of the United Nations. (2002). Implementation of the international plan of action to prevent, deter and eliminate illegal, unreported and unregulated fishing. FAO Technical Guidelines for Responsible Fisheries. No. 9. Rome, FAO, 122p.

- Food and Agriculture Organisation of the United Nations. (2009). National Fishery Sector Overview – Fiji (FID/CP/FJI). Rome
- Food and Agriculture Organisation of the United Nations. (2016). AQUASTAT Country Profile - Fiji. Food and Agriculture Organisation of the United Nations (FAO). Rome, Italy
- Gillet, R. D. (2016). Fisheries in the Economies of Pacific Island Countries and Territories. Pacific Community (SPC), Noumea
- Gerritsen, H. and Lordan, C. (2011). Integrating Vessel Monitoring Systems (VMS) data with daily catch data from logbooks to explore the spatial distribution of catch and effort at high resolution. *ICES Journal of Marine Science*, 68(1), 245-252
- Jennings, S. and Lee, J. (2012). Defining fishing grounds with vessel monitoring system data. *ICES Journal of Marine Science*, 69(1), 51-63.
- Lindegarh, M. and Sköld, M. (2013). Using Vessel Monitoring System Data to Improve Systematic Conservation Planning of a Multiple-Use Marine Protected Area, the Kosterhavet National Park (Sweden). *AMBIO Journal of the Human Environment*, DOI 10.1007/s13280-013-0413-7
- Manoa, P.E. (2006). Judicial responses to illegal fishing prosecutions in Fiji. *Journal of South Pacific Law* [2006] Vol.10 (1)
- Ministry of Communications (2019). Fiji Bureau of Statistics Releases 2017 Census Results. Retrieved from <https://www.fiji.gov.fj/Media-Centre/News/Fiji-Bureau-of-Statistics-Releases-2017-Census-Retrieved> on 3.1.2020.
- Ministry of Fisheries, Fiji. 2016/2017 Annual Report. Parliamentary Paper No: 130 of 2018
- Ministry of Fisheries, Fiji (MoF), Offshore Fisheries Management Division, (2019). Annual Scientific Report to the Western and Central Pacific Fisheries Commission, Part 1: Information on Fisheries, Research and Statistics for 2018
- Ministry of Fisheries, Fiji (MoF), Offshore Fisheries Management Division, (2018). Annual Scientific Report to the Western and Central Pacific Fisheries Commission, Part 1: Information on Fisheries, Research and Statistics for 2017
- Ministry of Fisheries, Fiji (MoF), Offshore Fisheries Management Division, (2016). Annual Scientific Report to the Western and Central Pacific Fisheries Commission, Part 1: Information on Fisheries, Research and Statistics for 2015
- Morrison, S. L., Vaioleti, T. M., & Veramu, J. (2002). *Participatory approaches to learning and training*. Commissioned report for the European Commission, Soqosoqo ni Vakamarama, Nabua, Fiji.



Nabobo-Baba, U., Naisilisili, S., Bogitini, S., Baba, T., & Lingam, G. (2012). *Rural and remote schools in Udu, Fiji – Vanua, Indigenous knowledge, development and professional support for teachers and education*. Suva: Faculty of Arts, Law and Education, The University of the South Pacific and Native Academy Publishers, Fiji Institute for Indigenous Studies.

O’Shea, B. and Thompson, S. (2006). ICES CM 2006/N: 11. The Innovative Application of Vessel Monitoring Systems for the Effective Fisheries Monitoring Control and Surveillance. European Commission, Brussels

Otsuka, S. (2005). *Talanoa Research: Culturally appropriate research design in Fiji*: Paper presented at the International Education Research Conference, Parramatta, Australia.

Pacific Islands Oceanic Fisheries Management (2016). Fish stocks-Research and Training-Whole Region <http://www.sustainpacfish.net/fish-stocks-research-and-training/> Retrieved from this website 5.1.2020.

Patterson,P.(2010).Fishery Management. <https://fisherymanagement.fandom.com/wiki/Fiji?action=edit&section=18> – Retrieved from this website 29.12.2020

Pramod, G. (2018) Fiji – Country Report, 7 pages, In: Policing the Open Seas: Global Assessment of Fisheries Monitoring Control and Surveillance in 84 countries, IUU Risk Intelligence – Policy Report No. 1, Canada, 820 pages.

Policy-Oriented Marine Environmental Research in the Southern European Seas (PERSUS). (2015). Vessel Monitoring System (VMS): new ways to use its data. European Union.

Radio New Zealand, 2015. Fiji targeted as drug trafficking hub. <https://www.rnz.co.nz/international/pacific-news/279205/fiji-targeted-as-drug-trafficking-hub> - Retrieved 30.1.2020

Ravitch, S. M. and Carl, N.M. (2016). *Qualitative Research: Bridging the Conceptual, Theoretical and Methodological*. Thousand Oaks, CA: Sage

Raykov, V. ST., Bikarska, I., Panayotova, M. and Lisichkov, K. (2011). Fishing Vessel Monitoring System (VMS): Application and Challenges in Bulgarian Black Sea Coastal Waters. *Journal of Environmental protection and ecology*, 12(1), 2015-214

Richards, A.H. FFA Report 99/21. The FFA Member Countries’ Vessel Monitoring System (FFA VMS), Pacific Islands Forum Fisheries Agency, Honiara.

Rubin, H. J. and Rubin, I. S. (2012). *Qualitative Interviewing: The Art of Hearing Data*. Thousand Oaks, CA: Sage

Tanci, T. and Kristo'fersson, D. M. (2009). *Introducing Vessel Monitoring System in the Commercial Traditional Linefish Sector in South Africa (Final Project 2009)*. South Africa: University of Iceland.

Tarte, S. (2010) Fiji Islands security challenges and defense policy issues. In: Asia Pacific Countries Security Outlook and Its Implications for the Defense Sector. NIDS Joint Research Series (5). The National Institute for Defense Studies, Tokyo, Japan, pp. 67-84. ISBN 9784939034732

Trackwell Maritime. Trackwell VMS <https://vmsfisheries.com/trackwell-vms-in-the-pacific-ocean/> Retrieved on 19.12.2019.

Tsamenyi B. M. and Molenaar, E. J. (2000). *Satellite-based vessel monitoring systems International legal aspects and developments in state practice.*

Vaioleti, T. M. (2006). Talanoa research methodology: a developing position on Pacific research. *Waikato Journal of Education*, 12, 21-34.

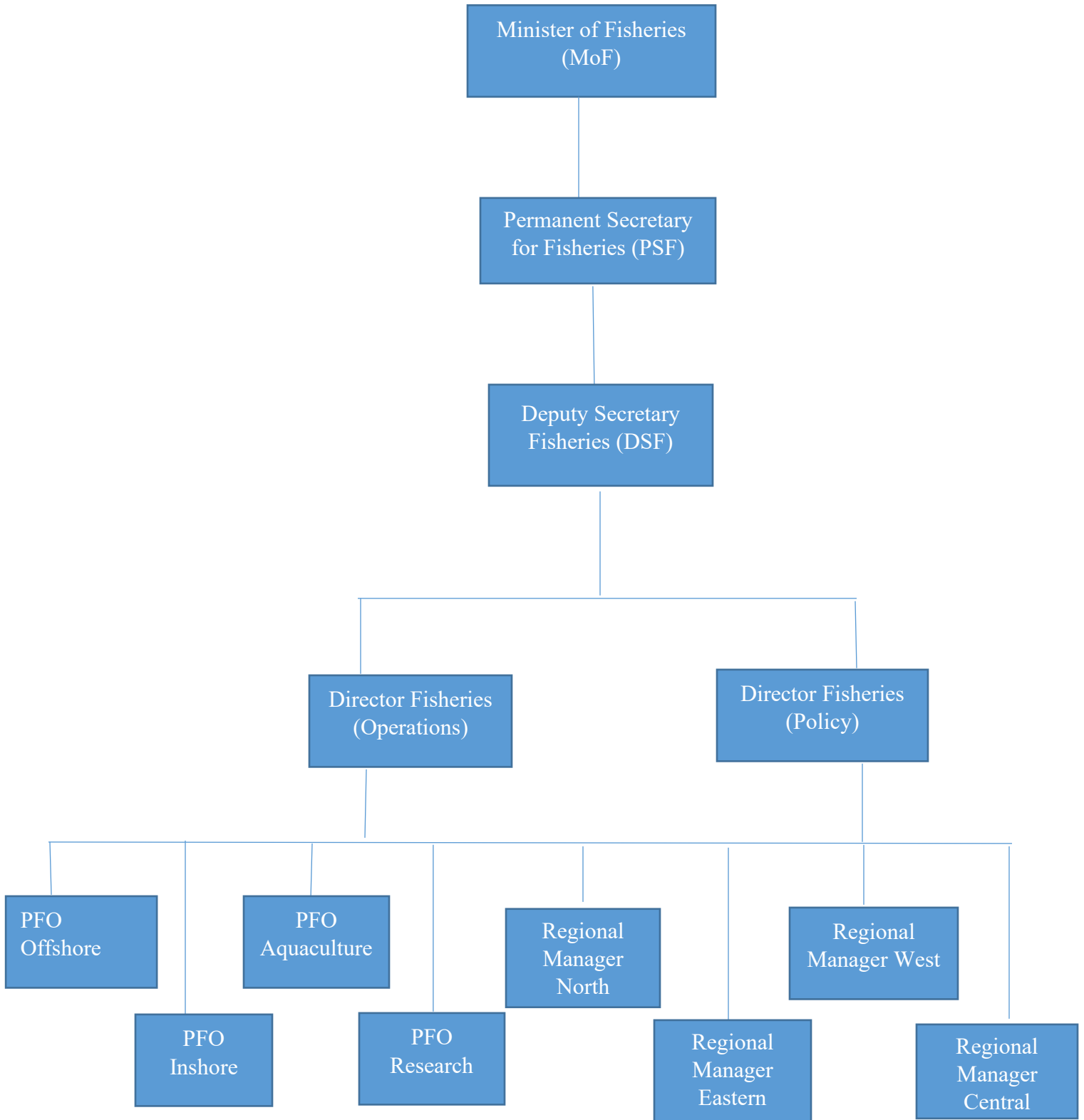
Weiss, R. S. (1994). Learning from strangers: The art and method of qualitative interview studies. New York, NY: Free Press

Western Central Pacific Fisheries Commission (2019). <https://www.wcpfc.int/vessel-monitoring-system/> Retrieved from this website 25.12.2019.

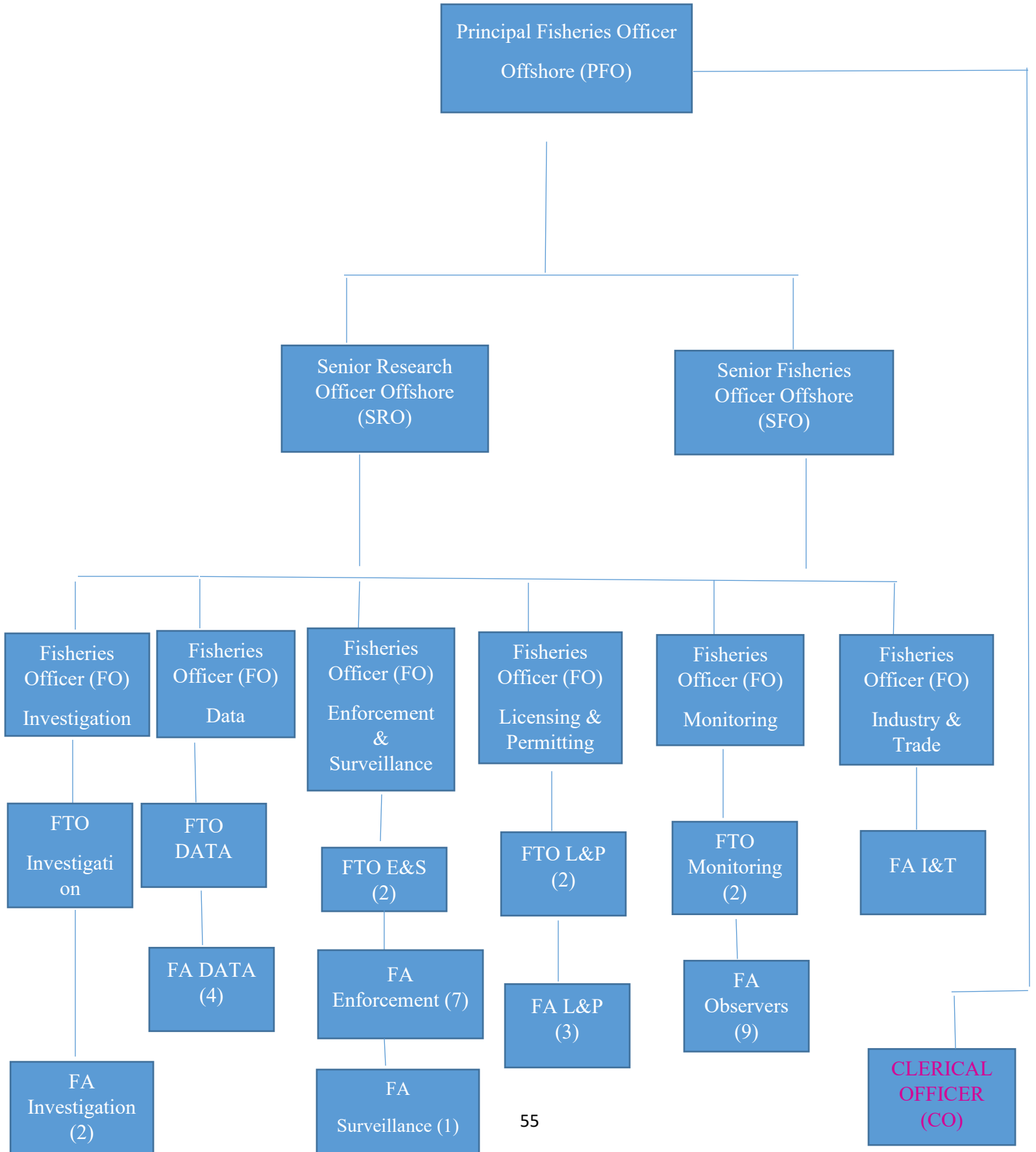
Western Pacific Regional Fishery Management Council (2019). International Fishing <http://www.wpcouncil.org/international-fishing/> Retrieved from this website 4.1.2020

Wolcott, H. F. (1994). Transforming qualitative data: Description, analysis and interpretation. Thousand Oaks, CA: Sage

**Appendix 1 - Senior Management Organizational Structure for Ministry of Fisheries**



## Appendix 2 - Organizational Structure for Offshore Service Centre



- (a) licensing of fishermen, fishing vessels and equipment, including payment of fees and other forms of remuneration, which, in the case of developing coastal States, may consist of adequate compensation in the field of financing, equipment and technology relating to the fishing industry;
  - (b) determining the species which may be caught, and fixing quotas of catch, whether in relation to particular stocks or groups of stocks or catch per vessel over a period of time or to the catch by nationals of any State during a specified period;
  - (c) regulating seasons and areas of fishing, the types, sizes and amount of gear, and the types, sizes and number of fishing vessels that may be used;
  - (d) fixing the age and size of fish and other species that may be caught;
  - (e) specifying information required of fishing vessels, including catch and effort statistics and vessel position reports;
  - (f) requiring, under the authorization and control of the coastal State, the conduct of specified fisheries research programmes and regulating the conduct of such research, including the sampling of catches, disposition of samples and reporting of associated scientific data;
  - (g) the placing of observers or trainees on board such vessels by the coastal State;
  - (h) the landing of all or any part of the catch by such vessels in the ports of the coastal State;
  - (i) terms and conditions relating to joint ventures or other cooperative arrangements;
  - (j) requirements for the training of personnel and the transfer of fisheries technology, including enhancement of the coastal State's capability of undertaking fisheries research;
  - (k) enforcement procedures.
5. Coastal States shall give due notice of conservation and management laws and regulations.

*Article 63*

*Stocks occurring within the exclusive economic zones of two or more coastal States or both within the exclusive economic zone and in an area beyond and adjacent to it*

1. Where the same stock or stocks of associated species occur within the exclusive economic zones of two or more coastal States, these States shall seek, either directly or through appropriate subregional or regional organizations, to agree upon the measures necessary to coordinate and ensure the conservation and development of such stocks without prejudice to the other provisions of this Part.

2. Where the same stock or stocks of associated species occur both within the exclusive economic zone and in an area beyond and adjacent to the zone, the coastal State and the States fishing for such stocks in the adjacent area shall seek, either directly or through appropriate subregional or regional organizations, to agree upon the measures necessary for the conservation of these stocks in the adjacent area.

*Article 64*

*Highly migratory species*

1. The coastal State and other States whose nationals fish in the region for the highly migratory species listed in Annex I shall cooperate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone. In regions for which no appropriate international organization exists, the coastal State and other States whose nationals harvest these species in the region shall cooperate to establish such an organization and participate in its work.

2. The provisions of paragraph 1 apply in addition to the other provisions of this Part.

*Article 65*  
*Marine mammals*

Nothing in this Part restricts the right of a coastal State or the competence of an international organization, as appropriate, to prohibit, limit or regulate the exploitation of marine mammals more strictly than provided for in this Part. States shall cooperate with a view to the conservation of marine mammals and in the case of cetaceans shall in particular work through the appropriate international organizations for their conservation, management and study.

*Article 66*  
*Anadromous stocks*

1. States in whose rivers anadromous stocks originate shall have the primary interest in and responsibility for such stocks.

2. The State of origin of anadromous stocks shall ensure their conservation by the establishment of appropriate regulatory measures for fishing in all waters landward of the outer limits of its exclusive economic zone and for fishing provided for in paragraph 3(b). The State of origin may, after consultations with the other States referred to in paragraphs 3 and 4 fishing these stocks, establish total allowable catches for stocks originating in its rivers.

3. (a) Fisheries for anadromous stocks shall be conducted only in waters landward of the outer limits of exclusive economic zones, except in cases where this provision would result in economic dislocation for a State other than the State of origin. With respect to such fishing beyond the outer limits of the exclusive economic zone, States concerned shall maintain consultations with a view to achieving agreement on terms and conditions of such fishing giving due regard to the conservation requirements and the needs of the State of origin in respect of these stocks.
- (b) The State of origin shall cooperate in minimizing economic dislocation in such other States fishing these stocks, taking into account the normal catch and the mode of operations of such States, and all the areas in which such fishing has occurred.
- (c) States referred to in subparagraph (b), participating by agreement with the State of origin in measures to renew

Appendix 4 – Regulation 34(2)(b) on Transhipment and Regulation 35(2)(b) on Bunkering of the OFMR (2014)

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*Confidentiality and authorised release of VMS information*

33.—(1) The ownership of all vessel monitoring system information generated in Fiji fisheries waters or by Fiji fishing vessels within or beyond Fiji fisheries waters vests in the State.

(2) Vessel monitoring system information shall be classified as confidential information.

(3) The Minister may authorise the release of vessel monitoring system information only in the following circumstances—

- (a) cooperation in monitoring, control and surveillance with other agencies of government including border control agencies;
- (b) discharge of international and regional obligations assumed by Fiji;
- (c) under agreements for the exchange of vessel monitoring system information for the purposes including but not limited to scientific purposes and to deter and eliminate illegal, unreported and unregulated fishing;
- (d) maintenance of law and order; or
- (e) safety of life.

*Transhipment*

34.—(1) The operator of a fishing vessel shall not tranship at sea under any circumstances except in a port authorised by the Director to an authorised carrier vessel which is in good standing on the Regional Register.

(2) The operator of a fishing vessel intending to conduct transhipment shall in accordance with sub-regulation (1)—

- (a) provide 72 hours' notice to the Director of a request to tranship any or all of the fish on board; and
- (b) provide such information required in the form set out in Schedule 6I including the name of the vessel, its international radio call sign, its position, the catch on board by species, the time and port where such transhipment is requested to occur, and an undertaking to pay all fees required.

(3) A fishing vessel authorised to conduct transhipment in accordance with this regulation shall—

- (a) only tranship at the time, port, and approved designated areas within Fiji fisheries waters authorised for transhipment by the Director;
- (b) submit full reports on transhipment in the form approved by the Director;
- (c) allow and assist any person identified as an observer to have full access to and use of facilities and equipment which the officer may determine is necessary to carry out his or her duties;
- (d) not assault, obstruct, resist, delay, refuse boarding to, intimidate or interfere with any such officer in the performance of his or her duties; and

(e) pay the relevant fees set out in Schedule 7 based on tonnage of fish transhipped to the receiving vessel upon completion of transhipment operations in a designated port or specified area within Fiji fisheries waters.

(4) The operator of a vessel shall comply with any condition imposed by the Director in the authorisation for transhipment.

(5) Transhipment in a designated area within Fiji fisheries waters shall only be authorised for Fiji fishing vessels transhipping fresh fish.

(6) An operator of a vessel who contravenes this regulation commits an offence.

#### *Bunkering*

35.—(1) The operator of a fishing vessel shall not conduct bunkering under any circumstances except where authorised by the Director and with an authorised bunker vessel which is in good standing on the Regional Register.

(2) The operator of a fishing vessel intending to conduct bunkering shall provide—

- (a) 72 hours' notice to the Director of a request to bunker; and
- (b) such information required in the form set out in Schedule 6J including the name of the vessel, its international radio call sign, its position, the time and port where such bunkering is requested to occur, and an undertaking to pay all fees required.

(3) An operator of a fishing vessel authorised to conduct bunkering shall—

- (a) only conduct bunkering at the time, place, and approved designated areas authorised for bunkering by the Director;
- (b) submit full reports on bunkering on the form approved by the Director;
- (c) allow and assist any person identified as an authorised officer to have full access to and use of facilities and equipment which the officer may determine is necessary to carry out his or her duties;
- (d) not assault, obstruct, resist, delay, refuse boarding to, intimidate or interfere with any such officer in the performance of his or her duties;
- (e) pay the relevant fees set out in Schedule 7 prior to the commencement of bunkering in a designated place in Fiji fisheries waters; and
- (f) comply with all laws of Fiji including laws for the protection and preservation of the marine environment, and labour laws.

(2) The operator of a vessel shall comply with any condition imposed by the Director in the authorisation for bunkering.

(3) An operator of a vessel who contravenes this regulation commits an offence.

#### *Provisioning*

36.—(1) The operator of a fishing vessel shall—

- (a) not conduct provisioning under any circumstances except where authorised by the Director and with an authorised fishing vessel;



Appendix 5 – Transhipment Authorisation Form (Schedule 6I) of the OFMR (2014)

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SCHEDULE 6I  
(Regulation 34(2)(b))



Fiji Government  
Fisheries Department

TRANSHIPMENT

**PART A – Owner’s details (additional form)**

1 Name of Company

2 Postal address  
  
 Postcode

3 Contact person’s name

Business phone   
 Mobile   
 Fax   
 Email address

**PART B – Master’s details**

1 Name of Master

2 Nationality   
 Passport no

**PART C – Carrier Vessel details**

1 Name of Vessel

2 Carrying Capacity [mt]

3 Call Sign

4 Flag

**PART D – Transhipment information**

1 Vessels to tranship catch from

Vessel Name	Call Sign	Area [port, EEZ]

**PART E – Declaration by Agent/Owner**  
**IMPORTANT**

I, the Owner detailed in Part A, apply for the grant of a Transhipment Authorisation in respect of the vessels described in Part D, and

- Declare that the information provided on this form is, to the best of my/our knowledge, true and correct.

Signature and date  DD/MMM/YY

Full name

Position held in the Company (if applicable)

Company seal (if applicable)

**PART F – OFFICIAL USE ONLY**

1. Status- approved/ note approved/ pending

2. Amount Received

3. Receiving Officer

4. Signature & date

5. Receipt No

Official seal

Republic of Fiji  
Department of Fisheries  
PH/FX

Appendix 6 – Bunkering Authorisation Form (Schedule 6J) of the OFMR (2014)

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SCHEDULE 6J  
(Regulation 35(2)(b))



Fiji Government  
Fisheries Department

**BUNKERING**

**1. PART A – Applicant details**

Name of Company	Postal address
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
Business phone <input type="text"/>	Mobile <input type="text"/>
Fax <input type="text"/>	Email address <input type="text"/>

**2. PART B- Vessel details**

Names of Vessel <input type="text"/>	Vessel type (e.g. longline, purse seine, pole and line) <input type="text"/>																						
IMO number <input type="text"/>	Vessel registration <input type="text"/>																						
International radio <input type="text"/>	Fish hold tonnage <input type="text"/>																						
Call sign <input type="text"/>	Carrying capacity <input type="text"/>																						
Current flag state <input type="text"/>	Freezer type <input type="text"/>																						
Previous name(s) <input type="text"/>	Engine power kw <input type="text"/>																						
and flag State(s) <input type="text"/>																							
Vessel Port State <input type="text"/>																							
Description of Vessel (e.g. size, colour, scheme, GRT)	Number of crew members on board																						
GRT <input type="text"/> Net Ton <input type="text"/>	<table border="1"> <thead> <tr> <th>Nationality</th> <th>Number</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	Nationality	Number																				
Nationality	Number																						
LOA <input type="text"/> Depth <input type="text"/>																							
Beam <input type="text"/> Colour <input type="text"/>																							
MTU details <input type="text"/>																							
Serial number <input type="text"/>																							
Model/Type <input type="text"/>																							
Inmarsat Mobile No <input type="text"/>																							

**3. PART C- Bunker Vessel / Provider**

Name of Company <input type="text"/>	<input type="text"/>
Names of Vessel <input type="text"/>	Vessel type (e.g. longline, purse seine, pole and line) <input type="text"/>
IMO number <input type="text"/>	Vessel registration <input type="text"/>
International radio <input type="text"/>	Fish hold tonnage <input type="text"/>
Call sign <input type="text"/>	<input type="text"/>
Current flag state <input type="text"/>	

**4. PART D- Intended Bunkering**

Total fuel estimated (ltrs) <input type="text"/>	Total oil (ltrs) <input type="text"/>
Intended Bunkering location <input type="text"/>	
Start Date <input type="text"/>	Time: <input type="text"/>
End Date: <input type="text"/>	Time: <input type="text"/>



**Fiji Government**  
**Fisheries Department**

**BUNKERING**

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**5. PART E- DECLARATION**

I, the applicant detailed in Part A:

- Applying for a landing permit, declare that the information provided on this form is, to the best of my/our knowledge, true and correct.
- Consent to comply with the Offshore Fisheries Management Decree 2012 and its Regulations and the Laws of Fiji.

Full name and signature

Company Seal

Date

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**6. PART F- OFFICIAL USE ONLY**

1. Status- approved/ note approved/ pending

2. Amount Received

3. Receiving Officer

4. Signature/date

Official seal

Appendix 7 – Regulation 39 (2)(b) and Regulation 39(2)(e) on Vessel Reporting Requirements of the OFMR (2014)

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(b) damage, destroy or attempt to damage or destroy the equipment, journal or documents of an observer.

(4) An observer exercising functions within Fiji fisheries waters or beyond such waters shall comply with his or her obligations set out in Schedule 10.

(5) Any person—

(a) who contravenes sub-regulation (3); and

(b) who while acting as an observer contravenes sub-regulation (2),

commits an offence.

*Vessel reporting requirements*

39.—(1) The operator of a Fiji fishing vessel, locally based foreign fishing vessel and foreign fishing vessel shall comply with the reporting requirements in the Decree and these Regulations and any other specific requirements imposed by the Permanent Secretary.

(2) The operator of a Fiji fishing vessel licensed or authorised pursuant to the Decree shall provide to the Director information relating to the position of, catch and observer on board, the vessel, in the form set out in Schedule 3A and in the manner as follows—

(a) each Wednesday;

(b) at least 48 hours prior to entry into and departure from the Fiji fisheries waters;

(c) at least 24 hours prior to entry into and departure from the waters under the jurisdiction of another State;

(d) at least 24 hours prior to entry into and departure from the port of another State;

(e) at least 24 hours prior to the estimated time of entry into any port in Fiji; and

(f) at least 24 hours prior to the estimated time of entry into and departure from high seas areas identified as special management areas by a regional fisheries management organisation to which Fiji is a member.

(3) The operator of a locally based foreign fishing vessel and foreign fishing vessel licensed or authorised pursuant to the Decree shall provide to the Director information relating to the position of, catch and observer on board, the vessel, in the format set out in Schedule 3 and in the manner as follows—

(a) each Wednesday whilst within Fiji fisheries waters;

(b) at least 48 hours prior to entry into and departure from the Fiji fisheries waters; and

(c) at least 24 hours prior to the estimated time of entry into any port in Fiji.

(4) The operator of a Fiji fishing vessel, locally based foreign fishing vessel and foreign fishing vessel shall also provide, after each fishing trip, landing and out-turn documentation, and landing and dock receipts to the Director.

Appendix 8 – Vessel Reporting Requirements Form (Schedule 3A) of the OFMR (2014)

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SCHEDULE 3A  
(Regulation 39)

VESSEL REPORTING REQUIREMENTS

(A) Weekly Reports (each Wednesday)

- (a) report type (WEEK);
- (b) date and time (GMT);
- (c) vessel name; or
- (d) international call sign or country (Flag State) registration number; or
- (e) licence number;
- (f) position (to one minute of arc);
- (g) catch on board by weight by species;
- (h) intended action; and
- (i) observer name and nationality.

as: WEEK/DDMMYY/TIME/VESSEL NAME/CALL SIGN/LICNO/LA 1111/  
LO11111/SJ xxx YF yyy OTH zzz/INTENDED ACTION/OBSERVER NAME  
AND NATIONALITY

(B) Zone Entry and Exit Reports

- (a) report type (ZENT for entry and ZEXT for exit);
- (b) data and time (GMT);
- (c) vessel name; or
- (d) international call sign or country (Flag State) registration number; or
- (e) licence number;
- (f) position (to one minute of arc);
- (g) catch on board by weight by species;
- (h) intended action; and
- (i) observer name and nationality.

as: ZENT (or ZEXT) DDMMYY/TIME/VESSEL NAME/CALL SIGN/LIC NO/  
LA 111/LO 11111/SJ xxx YF yyy OTH zzz/INTENDED ACTION/OBSERVER  
NAME AND NATIONALITY

(C) Port Entry (including for unloading) and Exit Reports

- (a) report type (PENT/PEXT);
- (b) date and time (GMT)
- (c) vessel name; or

- (d) international call sign or country (Flag State) registration number; or
- (e) licence number;
- (f) position (to one minute of arc);
- (g) catch on board by weight by species;
- (h) estimated time of entry into port (or time of exit) (GMT);
- (i) port name;
- (j) intended action; and
- (k) observer name and nationality.

as: PENT (or PEXT)/DDMMYY/TIME/VESSEL NAME/CALL SIGN/LIC NO/  
LA 1111/LO 1111/SJ xxx YF yyy OTH zzz/PORT/ETA (or ETD)/INTENDED  
ACTION/OBSERVER NAME AND NATIONALITY

(D) Another Port Entry and Exit Reports (Fiji fishing vessels only)

- (a) report type (APENT/APEXT);
- (b) date and time (GMT);
- (c) vessel name; or
- (d) international call sign or country (Flag State) registration number; or
- (e) licence number;
- (f) position (to one minute of arc);
- (g) catch on board by weight by species;
- (h) estimated time of entry into port (GMT);
- (i) port name;
- (j) intended action; and
- (k) observer name and nationality.

as: APENT (or APEXT) /DDMMYY/TIME/VESSEL NAME/CALL SIGN/LIC NO/  
LA 1111/LO 1111/SJ xxx YF yyy OTH zzz/PORT/ETA/INTENDED ACTION/  
OBSERVER NAME AND NATIONALITY

(E) Another Zone Entry and Exit Reports (Fiji fishing vessels only)

- (a) report type (AZENT for entry and AZEXT for exit);
- (b) data and time (GMT);
- (c) vessel name; or
- (d) international call sign or country (Flag State) registration number; or
- (e) licence number;
- (f) position (to one minute of arc);
- (g) catch on board by weight by species;