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# Marine pollution originating from purse seine and longline fishing vessel operations in the Western and Central Pacific region, 2003-2015

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**Marine pollution originating from purse seine and longline fishing vessel operations in the Western and Central Pacific region, 2003-2015**

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**Abstract**

This report examines more than ten years of collected data on more than 10,000 pollution incidents by purse seine vessels and more than 200 pollution incidents by longline vessels within the Exclusive Economic Zones (EEZs) of 25 Pacific countries and territories, and in international waters. The report finds that 71% of the reported purse seine pollution incidents related to Waste Dumped Overboard; 16% to Oil Spillages and Leakages; and 13% to Abandoned, Lost, or Dumped Fishing Gear. When the category "Waste Dumped" was examined further, Plastics were found to make up the largest portion of total purse seine pollution incidents (37%). Only 4% of the incidents occurred in International Waters, while the rest occurred in the EEZs of Papua New Guinea (44%), Kiribati (13%), the Federated States of Micronesia (12%), Solomon Islands (7%), Marshall Islands (6%), Nauru (6%), and 19 other countries and territories in the Western and Central Pacific Ocean.

While based on limited data, the report finds evidence that pollution from fishing vessels, particularly purse seine vessels, in the Western and Central Pacific Ocean is a serious problem and highlights the need for three initiatives: 1) increased monitoring, reporting, and enforcement of pollution violations by all types of fishing vessels, especially longliners, which currently have a very low (5%) mandatory observer coverage; 2) a regional outreach and compliance assistance programme on marine pollution prevention for fishing vessel crews, business operators and managers; and 3) improvements in Pacific port waste reception facilities to enable them to receive fishing vessel wastes on shore.

**I. Introduction**

Marine pollution is emerging as a significant global problem, and studies around the world caution that the problem is growing (Jambeck et. al. 2015, Katsanevakis 2008, Barnes et. al. 2009). While land-based sources of marine pollution receive the largest share of attention, there is increasing concern about ocean-based sources of marine pollution (UNEP/CMS 2014, Macfadyen et. al. 2009, Øhlenschlæger et. al. 2013). The Secretariat of the Pacific Regional Environment Programme (SPREP) recently investigated marine pollution incidents reported by fisheries observers from 2003-2015. While based on a limited selection of data from mostly purse seine vessels and some longline vessels, the information examined in this report suggests that fishing vessels are responsible for considerable amounts of marine pollution in the Western and Central Pacific Ocean. Action is urgently needed to curb this behavior.

This report provides the first consistent and substantive documented evidence about the nature and extent of ocean-based marine pollution in the Western and Central Pacific Ocean. These incidents were all reported by regional fisheries observers through use of the Secretariat of the Pacific

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Commission/Pacific Islands Foreign Fisheries Agency (SPC/FFA) Regional Observer Pollution Report Form GEN-6.

The pollution reports are overwhelmingly biased to the purse seine fishery, due to high levels of observer coverage in the fishery, which is mandated by the Western and Central Pacific Fisheries Commission (WCPFC). Prior to 2009, observer coverage for the purse seine fishery was around 5-8%, increased to 20% in 2009, and to 100% required coverage from 2010 to the present (P. Williams, personal communication, March 18, 2015, WCPFC, 2009). By contrast, observer coverage of the approximately 3,000 longline vessels operating in the Western and Central Pacific Ocean is only 5% for the entire fishery as of 2012 (WCPFC, 2014).

It is important to note that the coverage of observer data currently available is often not representative of the areas of activity and the active fishing fleets, particularly in regards to the longline fishery. For example, a significant amount of longline fishing activity occurs on the high seas, but observer coverage in these areas is very low compared to the EEZs. In the longline fishery, the data from some observer programmes have much higher coverage than others, and as a result, the presentations of pollution events in this paper are biased accordingly (P. Williams, personal communication, September 23, 2015). There is also likely to be some bias in observer reporting particularly through some observers not reporting MARPOL issues, although the extent of this bias is not yet known.

The report is structured in seven sections. Section II provides a background on ocean-based marine pollution. Section III describes the history and structure of the SPC/FFA Regional Observer Pollution Report Form GEN-6. Section IV describes and analyzes the pollution report data, including types, quantities and locations of pollution events. Section V importantly highlights that pollution incidents by fishing vessels are not isolated to the purse seine fishery, but there is limited information and data for pollution activities by other fisheries, particularly the longline fishery, due to extremely low to no observer coverage in other fisheries. Thus, the pollution data analyzed in this report likely represents only a portion or snapshot of total pollution incidents by fishing vessels throughout the region. Section VI addresses the need for revisions and updates to the current version of the SPC/FFA Regional Observer Pollution Report Form GEN-6, particularly the need for updates that more clearly communicate revisions to MARPOL Annex V which entered into force in 2013. Section VII concludes the report and provides recommendations designed for a variety of stakeholders and policymakers to reduce incidents of marine pollution by fishing vessels in the Western and Central Pacific Ocean. The report ends with suggestions for further data analysis and research.

**II. Background – Ocean-based Marine Litter**

Marine pollution, particularly in the form of marine litter, is an intergenerational and global environmental problem with lasting detrimental impacts on ocean and coastal environments, wildlife, economies, and ecosystems. The global environmental community continues to recognize marine plastic and microplastic pollution as priority issues of concern where more work is needed to decrease pollution amounts and sources and mitigate negative impacts (UNEA 2014, G7 Summit 2015, UNGA 2015). In the Pacific region, marine pollution impacts to coastal communities can be especially acute

and close to home given the reliance of Pacific island countries on marine ecosystems and associated services within their extensive EEZs and beyond. As has frequently been noted by many Pacific island leaders, these may be small island economies, but they constitute Large Ocean States (UNDP 2014, Brownjohn 2014, Jumeau 2013).

Impacts from marine litter include[3] entanglement of marine wildlife by abandoned, lost or discarded fishing gear (ALDFG);[4] ingestion of marine litter by wildlife with potential for associated toxic chemical transfers;[5] introduction of invasive species through use of marine litter as rafting habitats;[6] negative impacts to tourism and fishing dependent economies;[7] hazards to navigation and safety at sea through fouling of propellers and collisions with debris;[8] damage to important and fragile coastal ecosystems such as coral reefs and mangroves;[9] smothering of deep sea benthic habitats[10] and high financial costs of cleanup to coastal communities.[11]

Marine litter originates from both land and ocean-based sources. The bulk of marine litter is understood to originate from land-based sources, commonly estimated at 80% (GESAMP, 1991). Plastics are estimated to make up 50 to 80% of total marine litter (Barnes et. al., 2009). However, the data is variable and there are still information gaps about total land and ocean-based inputs of marine litter (Jambeck et. al. 2015, Watkins et. al. 2015, Øhlenschlæger et. al. 2013). Recent studies have attempted to quantify the amount of plastic waste inputs from land-based sources (Jambeck et. al. 2015), but little is known, particularly for the Western and Central Pacific region, about how much marine debris originates from ocean-based sources. Globally it's assumed that only around 27 percent of all ship wastes are delivered to reception facilities, with the majority of the rest either dumped or incinerated (Øhlenschlæger et. al. 2013). While historically dumping or accidental discharge of oil and bilge water were priority concerns for ship-generated waste (SGW), today there are increasing and wider concerns about impacts to marine ecosystems from other types of waste from ships including, importantly, litter (Øhlenschlæger et. al. 2013).

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the strongest and most important international regulation to prevent sea-based sources of pollution, including pollution of oil (Annex I) and garbage (Annex V), arising from operational or accidental causes (IMO MARPOL, 2015). Despite these regulations, there is limited actual monitoring of MARPOL, and, consequently, little information exists about illegal pollution activities by vessels at sea. One study in Australia did find that in 1992 and 1993, at least one-third of fishing vessels with onboard observers did not comply with

[3] The impacts of marine litter have been extensively researched since the late 1990s. Key studies include:
[4] Entanglement: (World Animal Protection 2014, Macfayden et. al. 2009, Coe, Rogers, Laist 1997);
[5] Ingestion: (Coe, Rogers, Laist 1997, Rochmann et. al. 2013, Van Cauwenberghe and Janssen 2014, Romeo et. al. 2015);
[6] Introduction of invasive species: (Barnes 2002, Coe et. al. 1997, Zettler et. al. 2013);
[7] Negative impacts to tourism and fishing dependent economies: (Hall 2000, Nash 1992, Balance et. al. 2000, Leggett et. al. 2014, IMO 2015, UNEP 2009);
[8] Costs to vessels: (Hall 2000, UNEP 2009);
[9] Destruction to important and fragile ecosystems: (Hall et. al. 2015, Donohue et. al. 2001, Bardi and Mann 2004);
[10] Smothering: (Gregory 2009, Schlining et. al. 2013); and
[11] High financial costs of cleanup: (Balance et. al. 2000, Leggett et. al. 2014, UNEP 2014).

MARPOL regulations prohibiting the dumping of plastics overboard (Jones, 1995). Of the 14 Pacific island countries who are SPREP members, 11 are Contracting Parties to MARPOL Annexes I/II and V, and therefore have specific responsibilities to implement this important treaty to prevent pollution from ships, particularly in the forms of oil and garbage (IMO Status of Conventions, 2015)[12] .

**III. Background – SPC/FFA Regional Observer Pollution Report Form GEN-6**

*History of the SPC/FFA Regional Observer Pollution Report Form GEN-6*

At the fourth SPC/FFA Tuna Fisheries Data Collection Committee in December 2000, SPREP submitted a request for fisheries observers to collect information on marine pollution. This resulted in the creation of the SPC/FFA Regional Observer Pollution Report Form GEN-6. Form GEN-6 was designed by SPREP in partnership with SPC and FFA as a tool to monitor fishing vessel violations to the International Convention for the Prevention of Pollution from Ships (MARPOL). Pollution categories were created based on MARPOL's Annexes I and V which provide regulations for the prevention of pollution by oil and garbage by ships, respectively.

SPC is responsible for maintaining and managing all observer data including the Form GEN-6 data which it started collecting in 2004. In March, 2015 SPREP requested access to the GEN-6 data from SPC and were provided with more than 10 years of data from 2003 through 2015. The data are overwhelmingly biased to the purse seine fishery due to mandatory observer coverage in the fishery. Prior to 2009, observer coverage for the purse seine fishery was around 5-8%, increased to 20% in 2009, and to 100% from 2010 to the present (P. Williams, personal communication, March 18, 2015, WCPFC, 2009). An almost threefold increase in pollution incidents reported in 2010 and 2011 is also a reflection of this increase in observer coverage.

*Content of the SPC/FFA Regional Observer Pollution Report Form GEN-6*

Form GEN-6 documents marine pollution incidents by fishing vessels in three categories: Waste Dumped Overboard, Oil Spillages and Leakages, and Abandoned or Lost Fishing Gear. Each category has its respective subcategories, and revisions have occurred to improve reporting over the years, such as the addition of the category Abandoned or Lost Fishing Gear in 2009. Subcategories reported here are from the most current form, revised in March, 2014. Subcategories under Waste Dumped Overboard include: Plastics, Metals, Waste Oil, Chemicals, and General Garbage. Subcategories under Oil Spillages and Leakages include: Vessel Aground/Collision, Vessel at Anchor/Berth, Vessel Underway, Land-based Source and Other. Subcategories under Abandoned or Lost Fishing Gear include Lost during fishing, Abandoned, or Dumped.

The form provides an area to report whether there was information posted on and around the vessel about compliance with the latest revisions to MARPOL, as an indicator of vessel and crew awareness of

[12] These 11 countries include Cook Islands, Kiribati, Marshall Islands, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. Of the 14 SPREP member Pacific island countries, only Fiji, Federated States of Micronesia and Nauru are not Contracting Parties to MARPOL Annex I/II and V (IMO Status of Conventions, 2015). Fiji, however, has draft legislation in place for MARPOL Annexes I, II, IV and V.

MARPOL regulations. It also includes a section for 'Other comments' where observers can add more details about the pollution event. The reverse side of the form provides notes which clarify definitions and reporting areas. At the bottom of the form it is clearly stated for the observer that under MARPOL regulations "It is illegal for any vessel to discard any form of plastics into the sea at anytime; It is illegal for any vessel to discard any form of oil into the sea at anytime and It is illegal for any vessel to dump any form of rubbish into the sea within 12 nautical miles of the seashore." Since recent revisions to MARPOL Annex V entered into force in 2013, dumping of almost all garbage types which were previously allowed beyond the 12 nautical mile zone referenced by this note are now prohibited (IMO, 2015). These revisions to MARPOL and recommendations to update the current Form GEN-6 are explored in greater depth in section VI.

Since its creation in 2000, the GEN-6 form has been revised four times, in 2004, 2007, 2009, and 2014. Prior to the 2009 revision, pollution in the form of fishing gear was documented under the subcategory Old Fishing Gear as part of the Waste Dumped Overboard category. In 2009 the form was revised to create a separate and new category of Abandoned and Lost Fishing Gear, with subcategories of Lost during fishing, Abandoned, or Dumped. These definitions resemble the frequently used marine debris/marine litter term Abandoned, Lost, or Discarded Fishing Gear (ALDFG). Despite the new category, fishing gear continued to be documented in both the old subcategory Old Fishing Gear under Waste Dumped Overboard in addition to the new Abandoned and Lost Fishing Gear category through 2013. In order to fully represent fishing gear as a single and separate category across all years of reporting without having some fishing gear reported under Waste Dumped Overboard and some under Abandoned and Lost Fishing Gear, both categories were combined in this analysis into the category Abandoned, Lost or Dumped Fishing Gear.

A copy of the most recent SPC/FFA Regional Observer Pollution Report Form GEN-6 is in Appendix I.

*Form GEN-6 Pollution Type Descriptions and Quantities*

In addition to comments, observers are provided an area on the Form GEN-6 to describe the different types of pollution per category and material (subcategory), as well as to describe quantities. There are no standard categorical options for observers to report quantities of pollution and quantities are reported as written comments by observers, which complicates data analysis.

Table 1 summarizes the most common written pollution descriptions and quantities by pollution and material types. Despite their categorization, there is some crossover between groups. For example, many observer comments for Metals dumped included oil drums with garbage inside (General Garbage). Likewise some reports of General Garbage dumped included garbage dumped within oil drums (Metals) that also went overboard. General Garbage reports also referred to a number of mixed garbage types, including plastics and fishing gear dumped overboard. There was also some overlap between the categories Oil Spillages and Leakages and the material (subcategory) Waste Oil from the category Waste Dumped.

While the numbers reported are representative on a broad scale, because of overlap between some categories during a pollution event and confusion by some observers over how to separately report

between pollution types, certain materials like Plastics, Metals, and Abandoned, Lost or Dumped Fishing Gear may also be underreported. Overlaps in reporting and misreporting reflect the need for a revision of Form GEN-6 that more clearly specifies categories and standardizes reporting options for observers. This is discussed in section VI.

*Table 1. Summary of Written Pollution Descriptions and Quantities as Reported by Observers*

| Pollution Type | Material | Pollution Description | Quantities per Incident |
|---|---|---|---|
| *Waste Dumped Overboard* | Plastics | Salt bags, bait boxes, bait wrappings, strapping bands, food wrappers, bags, bottles, sheets, foam, cartons, pallets, washing machines, raincoats, plates, cups, cutlery | Range 1-60+ assorted items per incident. Sometimes reported with mixed plastics dumped in bags or empty oil drums. |
| *Waste Dumped Overboard* | Metals | Empty oil drums, cables, engine parts, beverage cans, oil filters, tanks, washing machines, pipes, chains, air conditioning unit | Drums 1-90 per incident, cables 1-4,000 meters per incident. |
| *Waste Dumped Overboard* | Waste Oil | Lubricating oils, hydraulic oils, used oil/sludge, grease, fuel oils including diesel, gasoline and bunker fuels | Size and visual quality estimated by observer, often in reference to boat size, colour, thickness and depth. Measurements varied from cm to more than a half mile away from the boat. |
| *Waste Dumped Overboard* | General Garbage | Food wastes, plastics, metals, washing machines, clothing, netting from fishing gear, containers | 1-1000 assorted items per incident; weights reported varied up to 950kg, 80 lbs, 50 gallons, and lengths up to 70 m (e.g. netting from fishing gear) per incident. |
| *Waste Dumped Overboard* | Chemicals | Paints, turpentine, ammonia, detergents, batteries, brine salts, fluorescent light bulbs | Range mL to 100 L; 1-50 assorted items per incident. |
| *Oil Spillages and Leakages* | Fuel Oils | Fuel oils including diesel, gasoline, and bunker fuels | Size and visual quality estimated by observer, often in reference to boat size, colour, thickness and depth. Measurements varied from cm amounts to lengths more than a mile away from the boat and multiple days of a spill/leak. |
| *Abandoned, Lost, or Dumped Fishing Gear* | Fishing Gear | Nets, lines, Fish Aggregating Devices (FADs), rafts, beacons, floats, rope and line cuttings, ropes, drums full of pieces of gear, hooks, gloves, cables | Range mm to 30,000 m line, 1-10,000 m cable lengths, and weights up to 500kg. |

**IV. Pollution Data Analysis**

An examination of more than ten years of data from the SPC/FFA Regional Observer Pollution Report Form GEN-6 showed that the pollution incidents reported by fisheries observers were overwhelmingly biased to purse seine fishing vessels due to high levels of mandatory observer coverage in the purse seine fishery. This included more than 10,000 reported pollution incidents by observers aboard purse

seine vessels, compared to only around 200 reported pollution incidents by observers aboard longline vessels.

As was mentioned in the introduction, it is important to note and recall that the coverage of observer data currently available is often not representative of the areas of activity and the active fishing fleets, particularly in regards to the longline fishery. For example, a significant amount of longline fishing activity occurs on the high seas, but observer coverage in these areas is very low compared to the EEZs. In the longline fishery, the data from some observer programmes have much higher coverage than others, and as a result, the presentations of pollution events in this paper are biased accordingly. There is also likely to be some bias in observer reporting particularly through some observers not reporting MARPOL issues, although the extent of this bias is not yet known.

***Pollution Incidents by Purse Seine Vessels***

Purse seine support vessels with marine pollution incidents documented by observers include net boats, which use separate vessels to catch and store fish, and light aircraft for fish spotting. Due to the high required observer coverage aboard purse seiners, it was assumed that vessel types reported as NULL by observers were also purse seiners. Fisheries observers also reported pollution events aboard longline, troll, and trawler vessels, which combined comprised less than 2% of total pollution incidents reported by fisheries observers. This low reporting of incidents from other vessel types is likely due to the low number of required observers aboard these boats (only 5% for the longline fishery as of 2012).

*Composition of Purse Seine Pollution Incidents within Countries' and Territories' EEZ Boundaries, and in International Waters*

Forty-four percent of the pollution incidents occurred within Papua New Guinea's EEZ waters. The next highest number of reported incidents occurred in the EEZs of Kiribati (13%), the Federated States of Micronesia (12%), the Solomon Islands (7%), the Marshall Islands (6%) and Nauru (6%). Four percent of total pollution incidents occurred in international waters. See Table 2 for a complete ranked list of pollution incidents in all 25 countries and territories, and in international waters.

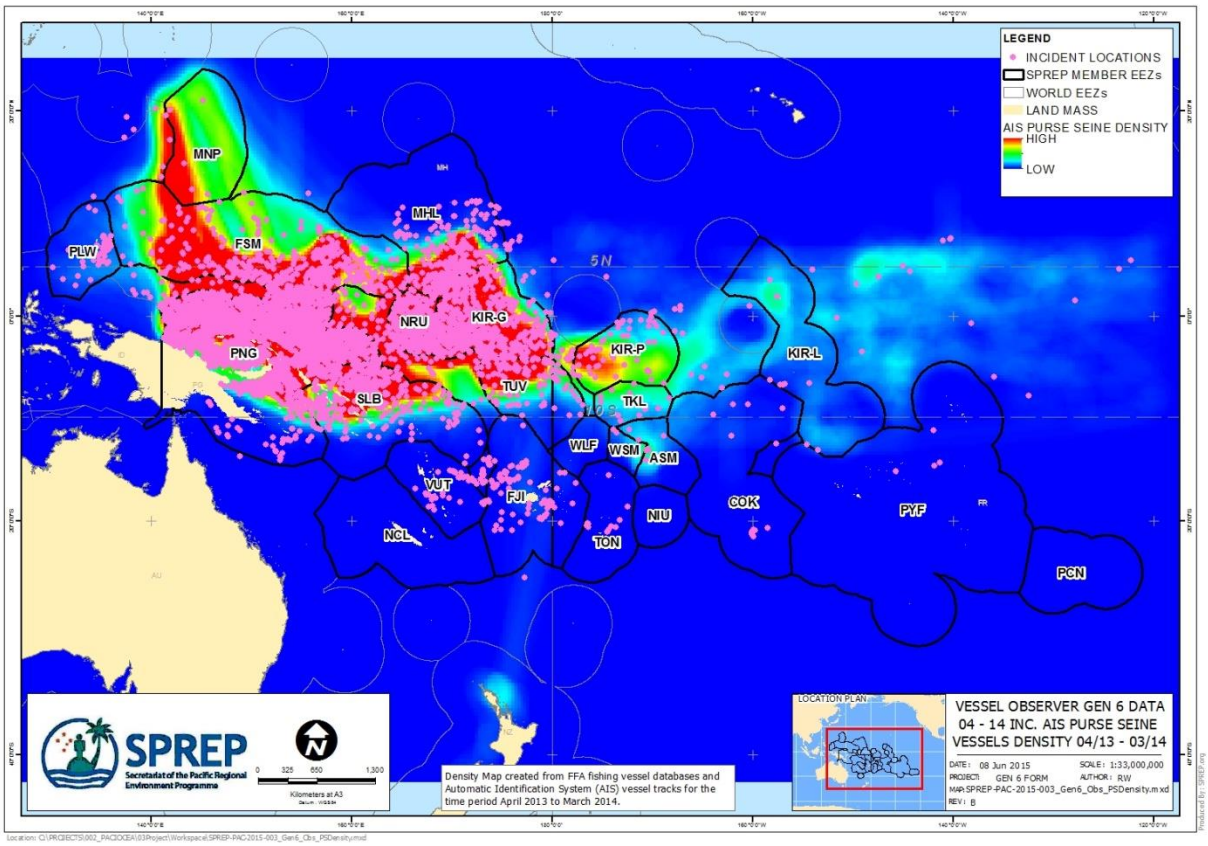
*Table 2. Pollution Incidents by Purse Seine Vessels 2003-2015*

| Exclusive Economic Zones (EEZs)* | Reported Incidents | Percent of Total Incidents |
|---|---|---|
| Papua New Guinea | 4706 | 44% |
| Kiribati | 1393 | 13% |
| Federated States of Micronesia | 1237 | 12% |
| Solomon Islands | 706 | 7% |
| Marshall Islands | 656 | 6% |
| Nauru | 629 | 6% |
| International Waters | 454 | 4% |
| Tuvalu | 286 | 3% |
| Fiji | 138 | 1% |
| Palau | 75 | 1% |
| Vanuatu | 56 | 1% |
| Japan | 53 | <1% |
| Cook Islands | 52 | <1% |
| Tokelau | 51 | <1% |
| American Samoa | 30 | <1% |
| Samoa | 15 | <1% |
| Northern Mariana Islands | 14 | <1% |
| Tonga | 13 | <1% |
| Indonesia | 12 | <1% |
| Guam | 11 | <1% |
| French Polynesia | 8 | <1% |
| Howland and Baker Islands (USA) | 6 | <1% |
| Philippines | 5 | <1% |
| Wallis and Futuna | 4 | <1% |
| Jarvis Island (USA) | 2 | <1% |
| Palymyra Atoll (USA) | 1 | <1% |
| **Total** | **10613** | **100%** |

*Source: SPC/FFA Regional Observer Pollution Report Form GEN-6 *While not an EEZ, International Waters was included in Table 2 for comparison purposes. Pollution events in international waters have the potential to end up in bordering EEZs. Data provided for 2010-2015 is still incomplete and thus is conservative at this point in time.*

Figure 1 shows the pollution incidents mapped by the latitude and longitude positions given by observers at the time of reporting. The incidents are overlaid on a colorized map that shows purse seine activity from April, 2013 through March, 2014, using FFA fishing vessel databases and Automatic Identification System (AIS) vessel tracks. The high numbers of incidents in these countries' EEZs, especially in Papua New Guinea, is consistent with the fact that these EEZ waters are also highly active purse seine fishing grounds. Purse seine fishery activity in the Western and Central Pacific Ocean is concentrated around the Equator, between 5N and 10S (SPC, 2010).

*Figure 1. Purse Seine Pollution Incidents Mapped by Latitude and Longitude*

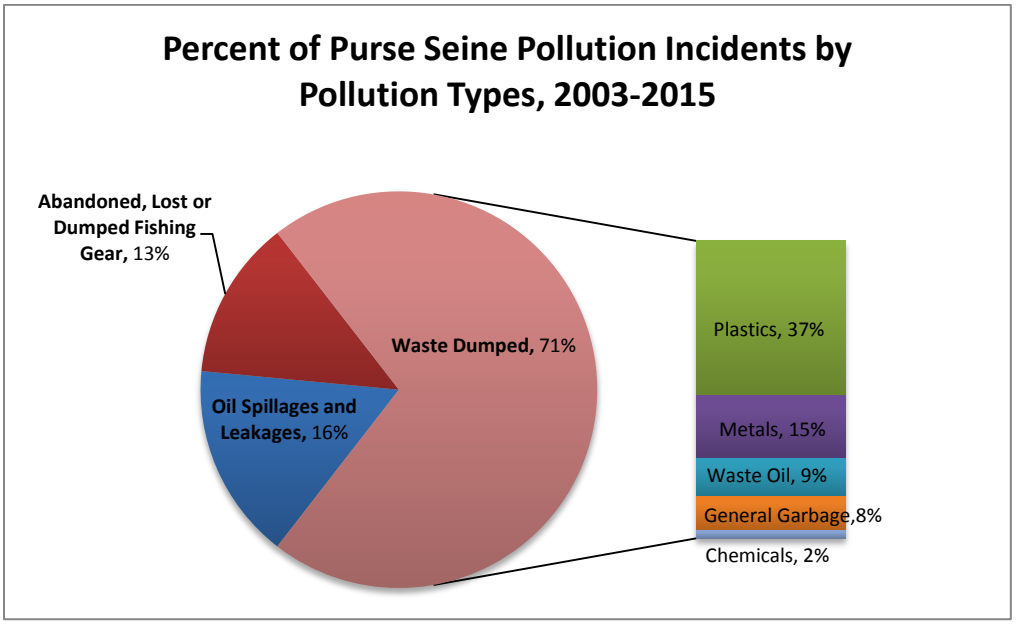



*Source: Secretariat of the Pacific Regional Environment Programme (SPREP), 2015*

*Composition of Purse Seine Pollution Incidents by Pollution Types*

Seventy-one percent of the purse seine pollution incidents were documented in the form of Waste Dumped Overboard, 16% as Oil Spillages and Leakages and 13% as Abandoned, Lost or Dumped Fishing Gear. When the subcategories under "Waste Dumped" were analyzed further and compared to total pollution incidents, Plastics were found to make up the largest portion of total pollution incidents at 37% followed by Metals (15%), Waste Oil (9%), General Garbage (8%), and Chemicals (2%). See Figure 2 for a summary of the composition of purse seine pollution incidents by pollution types.

*Figure 2. Percent of Purse Seine Pollution Incidents by Pollution Types, 2003-2015*




*Source: Secretariat of the Pacific Regional Environment Programme (SPREP), 2015*

*Purse Seine Observer Trips and Pollution Incidents*

A total of 8,799 observer trips were processed by SPC from 2002-2015. Required observer coverage by WCPFC increased from 20% in 2009 to 100% in 2010. This increase to 100% required observer coverage aboard purse seine vessels is reflected by the almost threefold increase in the number of purse seine observer trips processed by SPC from 2009-2010, and the corresponding threefold increases in both the number of observer trips with reported pollution incidents, and the total number of pollution incidents. See Table 3 for a summary of the purse seine observer trips and reported pollution incidents from 2002-2015. Figure 3 shows the overall increase in the number of pollution incidents reported by fisheries observers aboard purse seine boats from 2003-2014 (2015 data is still incomplete), which also corresponds with increases in required observer coverage aboard the purse seine vessels.

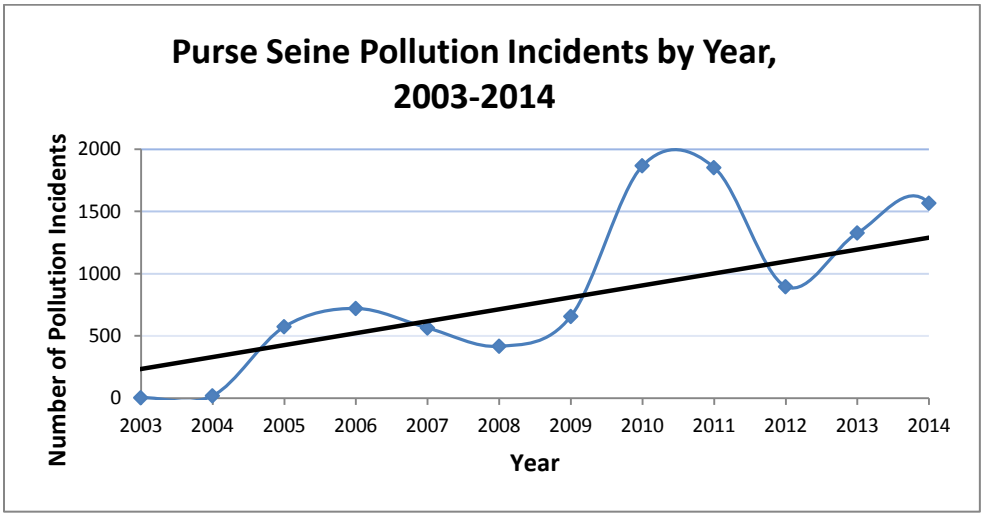
When total pollution incidents from 2002-2015 were compared against total observer trips during this time period (with and without reported pollution incidents), there was an average of 1.2 pollution incidents for every trip undertaken by an observer aboard a purse seine vessel during these years. When the total number of pollution incidents was compared more selectively against only observer trips with reported pollution incidents, there was an average of 3.2 pollution incidents for every observer trip with a reported pollution incident during this time period also. See Table 3 for a more complete summary and comparison of observer trips and pollution incidents annually from 2002-2015.

*Table 3. Purse Seine Observer Trips and Pollution Incidents, 2002-2015**

| Year | Total Observer Trips | Observer Trips with Pollution Incidents | Observer Trips with Pollution Incidents/Total Observer Trips (%) | Pollution Incidents | Pollution Incidents/Total Observer Trips (%) | Pollution Incidents/Observer Trips with Pollution Incidents |
|---|---|---|---|---|---|---|
| 2002 | 138 | 0 | 0% | 0 | 0 | 0 |
| 2003 | 152 | 3 | 2% | 4 | 0.03 | 1.33 |
| 2004 | 214 | 3 | 1% | 19 | 0.09 | 6.33 |
| 2005 | 247 | 68 | 28% | 573 | 2.32 | 8.43 |
| 2006 | 256 | 137 | 54% | 720 | 2.81 | 5.26 |
| 2007 | 283 | 181 | 64% | 563 | 1.99 | 3.11 |
| 2008 | 231 | 148 | 64% | 416 | 1.8 | 2.81 |
| 2009 | 469 | 214 | 46% | 657 | 1.4 | 3.07 |
| 2010 | 1236 | 623 | 50% | 1866 | 1.51 | 3 |
| 2011 | 1197 | 572 | 48% | 1852 | 1.55 | 3.24 |
| 2012 | 1261 | 300 | 24% | 896 | 0.71 | 2.99 |
| 2013 | 1607 | 460 | 29% | 1326 | 0.83 | 2.88 |
| 2014 | 1354 | 527 | 39% | 1566 | 1.16 | 2.97 |
| 2015 | 154 | 57 | 37% | 196 | 1.27 | 3.44 |
| **Total** | **8799** | **3293** | **37%** | **10654** | **1.21** | **3.24** |

**Data provided for 2010-2015 is still incomplete and thus a conservative estimate at this point in time.*

*Figure 3. Purse Seine Pollution Incidents by Year, 2003-2014*

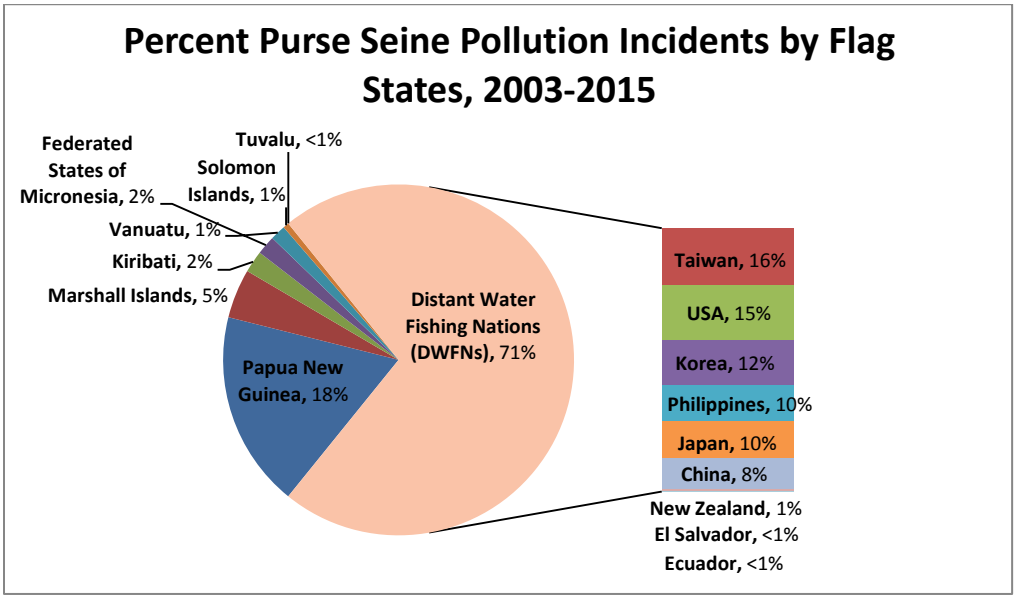



*Purse Seine Pollution Incidents by Flag States*

Seventy percent of the total pollution incidents from 2003-2015 were reported by purse seine fisheries observers aboard vessels from Distant Water Fishing Nations (DWFNs). Papua New Guinean flagged vessels comprised the greatest percentage of pollution incidents at 18%. It is interesting to note that

more than 85% of the pollution incidents by Papua New Guinean flagged vessels occurred within the Papua New Guinea EEZ. By contrast, the next highest number of pollution incidents occurred by vessels flagged to Taiwan (16%), USA (15%), Korea (12%), Philippines (10%), Japan (10%), and China (8%). Figure 4 summarizes the percent of purse seine pollution incidents by flag states from 2003-2015.

*Figure 4. Percent Purse Seine Pollution Incidents by Flag States, 2003-2015*




***Pollution Incidents by Longline Vessels***

*Composition of Longline Pollution Incidents within Countries' and Territories' EEZ Boundaries, and in International Waters*

Thirty percent of the pollution incidents reported by observers aboard longline vessels occurred within Fiji's EEZ waters. The next highest number of reported incidents occurred in the EEZs of Tonga (14%), Vanuatu (13%), Cook Islands (9%), Kiribati (8%), Federated States of Micronesia (7%), Solomon Islands (6%), and Papua New Guinea (4%). Seven percent of total pollution incidents occurred in international waters. See Table 4 for a complete ranked list of longline pollution incidents in all 12 countries and territories, and in international waters. It is important to note that observer coverage by the Fiji observer programme is much higher than observer coverage by other programmes, which likely leads to bias in the number of reported incidents both within the Fiji EEZ and by Fijian flagged vessels (P. Williams, personal communication, September 23, 2015).

*Table 4. Pollution Incidents by Longline Vessels 2003-2015**

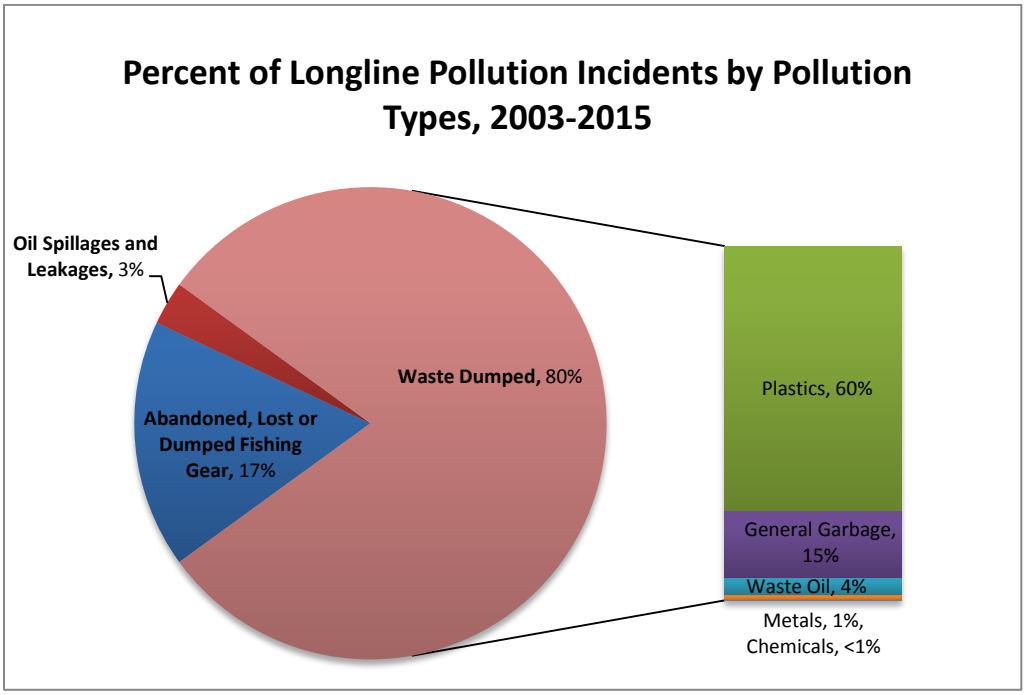
| Exclusive Economic Zone (EEZ) | Reported Incidents | Percent of Total Incidents |
|---|---|---|
| Fiji | 64 | 30% |
| Tonga | 30 | 14% |
| Vanuatu | 27 | 13% |
| Cook Islands | 19 | 9% |
| Kiribati | 17 | 8% |
| Federated States of Micronesia | 16 | 7% |
| International Waters | 15 | 7% |
| Solomon Islands | 13 | 6% |
| Papua New Guinea | 8 | 4% |
| Japan | 2 | 1% |
| Marshall Islands | 1 | <1% |
| Nauru | 1 | <1% |
| French Polynesia | 1 | <1% |
| **Total** | **214** | **100%** |

**Data provided for 2010-2015 is still incomplete and thus a conservative estimate at this point in time.*

*Composition of Longline Pollution Incidents by Pollution Types*

Eighty percent of the purse seine pollution incidents were documented in the form of Waste Dumped Overboard, 17% as Abandoned, Lost or Dumped Fishing Gear and 3% as Oil Spillages and Leakages. When the subcategories under "Waste Dumped" were analyzed further and compared to total pollution incidents, Plastics were found to make up the largest portion of total pollution incidents at 60%, followed by General Garbage (15%), Waste Oil (4%), Metals (8%), and Chemicals (<1%). See Figure 5 for a summary of the composition of longline pollution incidents by pollution types.

*Figure 5. Percent of Longline Pollution Incidents by Pollution Types, 2003-2015*




*Longline Observer Trips and Pollution Incidents*

A total of 1,940 observer trips aboard longline vessels were processed by SPC from 2002-2015. WCPFC mandated 5% observer coverage for the longline fishery beginning in 2012, although these coverage requirements have not always been met. It is interesting to note that total observer trips and observer trips with reported pollution incidents more than doubled from 2012-2013. See Table 3 for a summary of the longline observer trips and reported pollution incidents from 2002-2015. Figure 6 shows the overall increase in the number of pollution incidents reported by fisheries observers aboard longline boats from 2003-2015, which also corresponds with the increase in required observer coverage aboard longline vessels beginning in 2012.

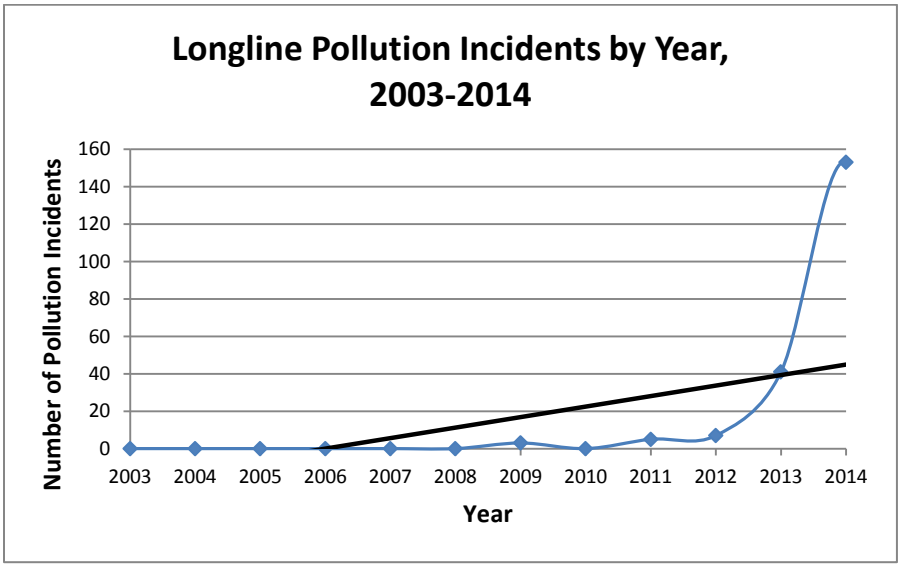
When total pollution incidents from 2002-2015 were compared against total observer trips during this time period (with and without reported pollution incidents), there was an average of 0.1 pollution incidents for every trip undertaken by an observer aboard a longline vessel during these years. When the total numbers of pollution incidents were compared more selectively against only observer trips with reported pollution incidents, there was an average of 2.6 pollution incidents for every observer trip with a reported pollution incident during this time period also. See Table 5 for a summary and comparison of observer trips and pollution incidents annually from 2002-2015.

*Table 5. Longline Observer Trips and Pollution Incidents, 2002-2015**

| Year | Total Observer Trips | Observer Trips with Pollution Incidents | Observer Trips with Pollution Incidents/Total Observer Trips (%) | Pollution Incidents | Pollution Incidents/Total Observer Trips (%) | Pollution Incidents/Observer Trips with Pollution Incidents |
|---|---|---|---|---|---|---|
| 2002 | 119 | 0 | 0% | 0 | 0 | 0 |
| 2003 | 104 | 0 | 0% | 0 | 0 | 0 |
| 2004 | 130 | 0 | 0% | 0 | 0 | 0 |
| 2005 | 110 | 0 | 0% | 0 | 0 | 0 |
| 2006 | 165 | 0 | 0% | 0 | 0 | 0 |
| 2007 | 132 | 0 | 0% | 0 | 0 | 0 |
| 2008 | 122 | 0 | 0% | 0 | 0 | 0 |
| 2009 | 155 | 2 | 1% | 3 | 0.02 | 1.5 |
| 2010 | 122 | 0 | 0% | 0 | 0 | 0 |
| 2011 | 96 | 1 | 1% | 5 | 0.05 | 5 |
| 2012 | 113 | 6 | 5% | 7 | 0.06 | 1.17 |
| 2013 | 235 | 21 | 9% | 41 | 0.17 | 1.95 |
| 2014 | 260 | 47 | 18% | 153 | 0.56 | 3.26 |
| 2015 | 77 | 7 | 9% | 10 | 0.13 | 1.43 |
| **Total** | **1940** | **84** | **4%** | **219** | **0.11** | **2.61** |

**Data provided for 2010-2015 is still incomplete and thus a conservative estimate at this point in time.*

*Figure 6. Longline Pollution Incidents by Year, 2003-2014*

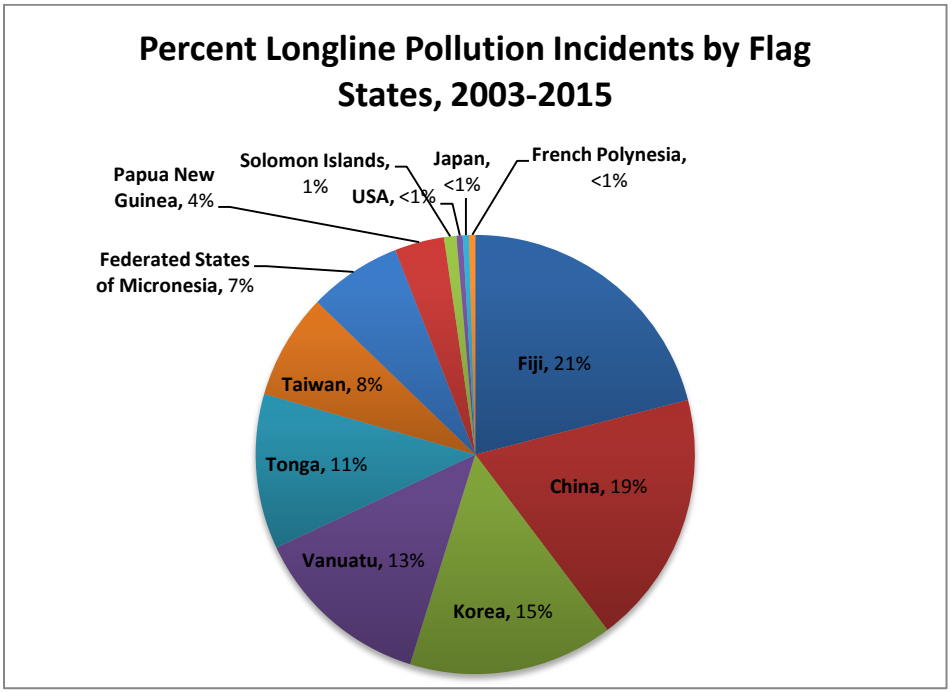



*Longline Pollution Incidents by Flag States*

Fijian flagged vessels comprised the greatest percentage of pollution incidents (21%) reported by fisheries observers aboard longline vessels from 2003-2015. All of the pollution incidents by Fijian

longliners were within Fiji's EEZ. It is important to recall again that observer coverage by the Fiji observer programme is much higher than observer coverage by other programmes, which likely leads to bias in the number of reported incidents both within the Fiji EEZ and by Fijian flagged vessels (P. Williams, personal communication, September 23, 2015). The next highest number of pollution incidents occurred by vessels flagged to China (19%), Korea (15%), Vanuatu (13%), Tonga (11%), Taiwan (8%), and Federated States of Micronesia (4%). Figure 7 summarizes the percent of purse seine pollution incidents by flag states from 2003-2015.

*Figure 7. Percent Longline Pollution Incidents by Flag States, 2003-2015*




**V. Likelihood of Unreported Pollution Incidents by Other Fisheries**

With more than 10,000 marine pollution incidents documented by fisheries observers over the last decade, there is cause for concern over purse seine fishing vessels as sources of marine pollution in the Western and Central Pacific Ocean. Purse seine fishing however makes up only one of four main industrial fishing methods in the WCPFC region. The other three are longline, pole-and-line and troll fishing (WCPFC Yearbook, 2013). Table 3 summarizes the number of active fishing vessels from 2004-2013 for the purse seine, longline and pole-and-line fisheries. The longline fishery, which is only mandated to have 5% observer coverage as of 2012, has more than twice the number of active vessels compared to the purse seine fishery. Despite the low level of observer coverage on the longline, troll and trawl vessels, the combined less than 2% of total reported pollution incidents by these vessels from the Form GEN-6 data indicates that fishing vessels other than purse seiners engage in pollution activities. The pollution data analyzed in this report may represent only a portion or snapshot of total pollution incidents by fishing vessels throughout the region. This is an area where further data and research is needed.

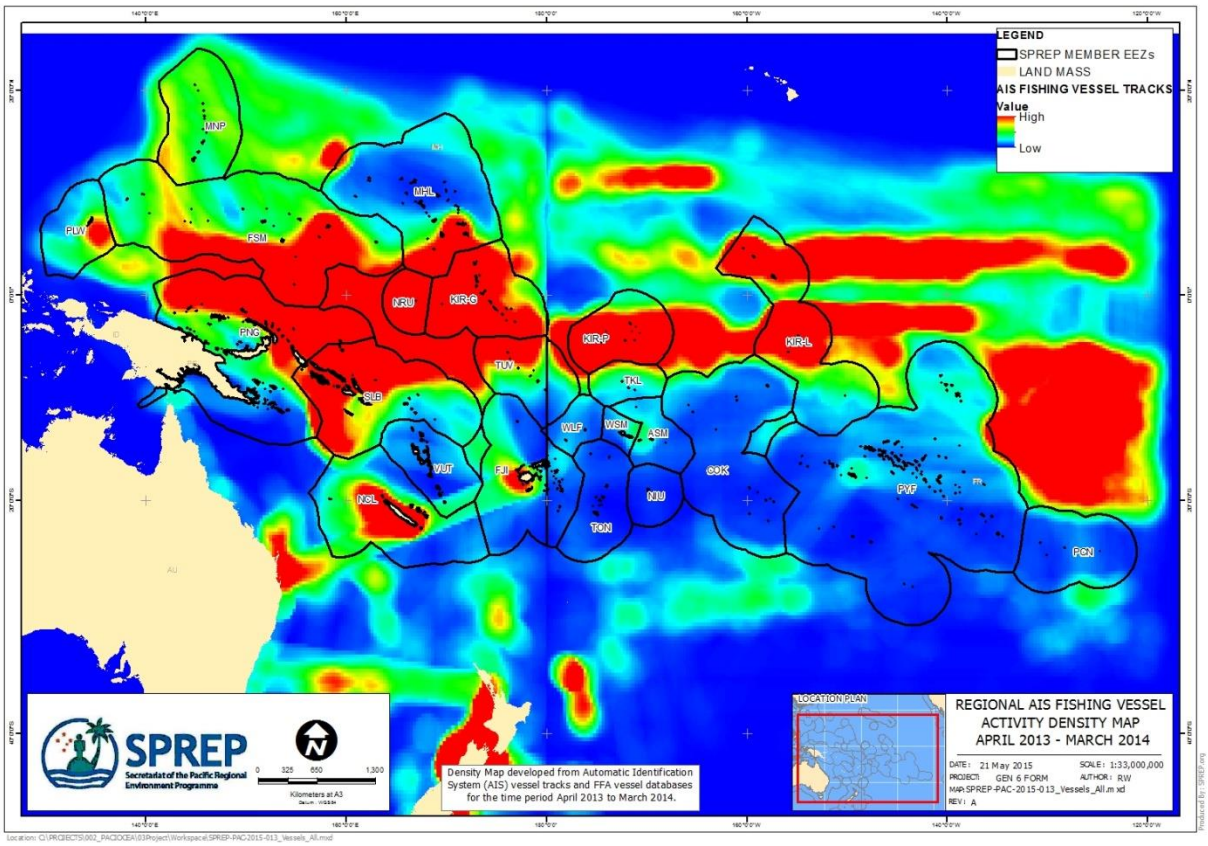
*Table 6. Number of vessels active in the Western and Central Pacific Fisheries Commission (WCPFC) Statistical Area*

| | **Vessels Active** | | | |
|---|---|---|---|---|
| **Year** | *Longline* | *Pole-and-Line* | *Purse Seine* | *Total* |
| 2004 | 4,288 | 573 | 1,512 | 6,373 |
| 2005 | 4,282 | 586 | 1,494 | 6,362 |
| 2006 | 4,011 | 538 | 1,436 | 5,985 |
| 2007 | 3,569 | 515 | 1,466 | 5,550 |
| 2008 | 3,443 | 497 | 1,401 | 5,341 |
| 2009 | 3,358 | 496 | 1,470 | 5,324 |
| 2010 | 4,557 | 493 | 1,482 | 6,532 |
| 2011 | 3,685 | 465 | 1,486 | 5,636 |
| 2012 | 3,054 | 422 | 1,492 | 4,968 |
| 2013 | 3,104 | 410 | 1,503 | 5,017 |

*Source: WCPFC Yearbook, 2013*

Figure 3 shows the density of fishing vessels within SPREP member country and territories' EEZs, and in international waters. Compared to Figure 1 Purse Seine Pollution Incidents Mapped by Longitude and Latitude, this map shows that there is still high fishing vessel activity outside purse seine fishing grounds including high seas areas, where other fisheries, particularly the longline fishery are more active, despite a lack of marine pollution incidents recorded in these areas. Observer coverage aboard other fishing vessels in these high density areas could provide more information about the amount and severity of marine pollution incidents which occur in and around other fishing grounds.

*Figure 3. Regional AIS Fishing Vessel Activity Density Map April 2013-March 2014*




*Source: Secretariat of the Pacific Regional Environment Programme (SPREP)*

**VI. Revisions and Updates to the SPC/FFA Regional Observer Pollution Report Form GEN-6**

The last revision to Form GEN-6 was in March, 2014. In 2013, MARPOL Annex V revisions entered into force which prohibited the dumping of any garbage overboard, including all plastics, fishing gear, glass, and metals, with some exceptions which are discussed below (IMO, 2015). Previously, dumping at sea was prohibited for all plastics, while many other types of garbage were permitted to be dumped beyond the 12 nautical mile zone. A supplementary note on the back of the current Form GEN-6 states that "Vessels may dump garbage as close as 3 nautical miles to the shore if they have a 'comminuter' onboard (a machine that shreds garbage to tiny pieces). Otherwise they cannot dump garbage within 12 nm of the coast. Report on all vessels dumping within 12 nm of the coast. We can check if they have a comminuter onboard later."

Currently the only types of garbage permitted for discharge beyond 3-12 nm are food wastes, non-harmful cargo residues, non-harmful cleaning agents contained in wash waters, and carcasses of animals carried onboard as cargo and which died during the voyage (IMO, 2015). Besides some food wastes and some cleaning agents, almost all of the marine pollution incidents reported were pollution types where discharge is totally prohibited. A revision to the supplementary note that clearly communicates which garbage types are allowed for discharge in certain areas, and that discharge of all other pollution types is

prohibited, even if beyond 12 nm and even if comminuted, would help clarify for observers the recent 2013 MARPOL Annex V revisions.

As was discussed earlier, pollution descriptions and quantities in Form GEN-6 are all written in by the observer. Based on Table 1, pollution descriptions and quantities should be revised and offered as categorical options for observers to choose from in order to standardize future reporting. Additional information beyond the options made available for observers could be clarified through the comments section.

To standardize future Form GEN-6 reporting, drop-down menus should be developed for all categories with commonly used reporting units. The section Other Comments provides an area for special circumstances and any additional information required to report an incident. With assistance from and collaboration between the IMO and other regional organizations, a specific metadata file should be developed for all data entries in Form GEN-6 to aid observers and data evaluators in managing the information compiled. Reporting requirements should additionally be made available in the languages used by observers in the Western and Central Pacific region.

**VII. Conclusions, Recommendations and Areas for Further Research**

This report provides the first consistent and substantive documented evidence about the nature and extent of ocean-based marine pollution in the Western and Central Pacific Ocean. With more than 10,000 marine pollution incidents by purse seine fishing vessels and more than 200 marine pollution incidents by longline fishing vessels reported within the Exclusive Economic Zones (EEZs) of 25 countries and territories and in international waters in the Western and Central Pacific Ocean from 2003-2015, it is clear that pollution from fishing vessels, particularly purse seine vessels, is a significant problem for the region. However, the existing pollution data is partial, limited, and dependent upon fisheries observer coverage.

Action is urgently needed to decrease the number and severity of pollution incidents by fishing vessels in the Western and Central Pacific Ocean through three major initiatives: 1) increased monitoring, reporting, and enforcement of pollution violations at sea by all types of fishing vessels, especially longliners, which currently have a very low (5%) mandatory observer coverage; 2) a regional outreach and compliance assistance programme on marine pollution prevention for fishing vessel crews, business operators and managers; and 3) improvement in Pacific port waste reception facilities to enable ports to receive fishing vessel wastes on shore.

The recommendations provided reflect and expand upon these three initiatives. They are designed for a variety of stakeholders, including intergovernmental organizations such as SPREP and SPC, regional fisheries managers and RFMOs such as WCPFC and FFA, national maritime and port authorities, national environment ministries, government leaders, policy makers, academics, and the private sector, particularly fishing vessel crews and business operators.

*Recommendations*

1. Increase observer coverage and more data

Increased observer coverage aboard other fishing vessels such as longline vessels would provide more information about the amount and types of pollution by other fisheries, which fish more heavily in other areas of the Pacific not covered by the purse seine fishery. The current SPC/FFA Regional Observer Pollution Report Form GEN-6 is designed for reporting of pollution incidents aboard any type of fishing vessel. After necessary revisions and updates, covered in section VI, this would continue to be an appropriate form for use by an expanded observer program. The primary challenges anticipated for expansion of fisheries observers programs are financial, technical, and human resource capacity constraints, especially for some observer programs that are already struggling to meet full coverage requirements each year. Future efforts to decrease marine pollution from fishing vessels should include all fisheries and vessel types within the Western and Central Pacific region.

2. Reporting

SPREP should report the Form GEN-6 pollution incidents to member countries where the pollution incidents occurred and to the flag States whose vessels are responsible for the pollution violations. This will allow port States and flag States to follow up with appropriate enforcement mechanisms such as fines and penalties. SPREP should also report incidents to the Noumea Convention to be shared at the biennial Conference of Parties (COP), and to the IMO's Marine Environment Protection Committee (MEPC). Data and incidents will need to be further organized, quality controlled, and standardized to the IMO's Global Integrated Shipping Information System (GISIS) reporting format.

3. Enforcement

Opportunities may exist for more effective enforcement of MARPOL and other anti-pollution regulations. If provided with documentation of marine pollution incidents and violations, member countries and port States, particularly those with high numbers of violations in their EEZ waters, could penalize violators through fines and restrictions. Countries could also prohibit operational dumping of wastes as a condition of their fishing licenses, with associated penalties and restrictions if pollution incidents do occur. This is another method to prevent pollution incidents from vessels by holding vessels accountable to their license requirements. Effective enforcement programmes send a message to fishing vessels that marine pollution is not acceptable.

Some fishing vessels, operators and crew may engage in especially severe pollution activities with full knowledge that such activities are illegal and harmful to the marine environment. In the case of particularly egregious or criminal polluters, a list of vessels and operators could be kept for records to ensure against repeat offenders. If certain vessels and operators prove to be repeatedly engaging in pollution events, steeper fines or criminal proceedings could be levied. Vessels could also be added to a marine pollution 'blacklist,' similar to the WCPFC's blacklist for vessels who have engaged in Illegal, Unregulated or Unreported (IUU) fishing activities (WCPFC, 2010). Such a blacklist system could both serve to stigmatize vessels and owners, in addition to providing opportunities for more stringent and

focused monitoring and regulation to ensure that such vessels do not continue to engage in illegal activities. A marine pollution blacklist could then be compared to the WCPFC's IUU blacklist, to determine range and regularity of illegal activities by particularly problematic vessels.

4. Outreach and Compliance Assistance Programme

An Outreach and Compliance Assistance Programme should be developed within the Western and Central Pacific region through coordination and collaboration between regional organizations including SPREP, the Regional Fisheries Management Organisations (RFMOs), fishing and maritime industry representatives and Non-Governmental Organisations (NGOs) in consultation with the United Nations Environment Programme (UNEP), the Food and Agriculture Organization (FAO) and the IMO. The Outreach and Compliance Assistance Programme should inform ship masters, mariners, and ports about the proper manner for disposal of all garbage, wastes and pollution types generated onboard fishing vessels in the Western and Central Pacific region and the adjacent high seas areas.

5. Invest in expanded capacity of port waste reception facilities

Most Pacific island countries and territories have few if any waste reception facilities for ships at their ports, and many of those which are in place are inadequate to meet the needs of ships using those ports (SPREP, 2014). Adequate reception facilities are defined by the IMO as those which "mariners use; fully meet the needs of the ships regularly using them; do not provide mariners with a disincentive to use them; and contribute to the improvement of the marine environment" (IMO, 2000). The facilities must also "allow for the ultimate disposal of ships' wastes to take place in an environmentally appropriate way" (IMO, 2000). This lack of port waste reception facilities could provide further incentives for ships to dump waste at sea rather than store their wastes without anywhere to later responsibly dispose of them.

Given these challenges, the locations and availability of existing port waste reception facilities should be clearly communicated to all fishing vessels, with input from the IMO. SPREP has taken important first steps in this area through its Regional Reception Facilities Plan, which recognizes five Pacific shipping hubs (Apia, Suva, Port Moresby, Noumea, and Papeete) as regional centers for safe offloading of wastes from ships (SPREP, 2014). Table 4 summarizes the waste streams that can be landed at each port that SPREP audited in its Regional Reception Facilities Plan. This plan is only a starting point however, and more detailed analysis and audits will be required to identify and communicate all available ports with adequate reception facilities to fishing and other vessels into the future.

*Table 4. Overview of the waste streams that can be landed at each port recognized in the Regional Reception Facilities Plan*

| Type of waste | Samoa | Fiji (Suva) | Port Moresby | Noumea | Papeete |
|---|---|---|---|---|---|
| Oil tankers: oily tank washings or oily ballast water | No | Limited | Yes | Limited | No |
| All ships: oily bilge water, sludge's, used lube oils | No | Yes | Yes | Yes | Yes |
| Chemical tankers: NLS + | No | No | No | No | No |
| Sewage | Domestic ships only | Yes | Yes | Yes | Yes** |
| Garbage - domestic vessels | Yes | Yes | Yes | Yes | Yes |
| Garbage - recyclables | Yes* | Limited types ++ | No | Limited types ++ | Yes |
| Garbage - fishing gear | Yes* | Yes | Yes | Yes | Yes |
| Quarantine waste – all garbage from international vessels | Yes | Yes | Yes | Yes | Yes |
| Ozone Depleting Substances | No | No | No | Yes | No |
| Exhaust gas cleaning system residues | No | No | No | No | No |

*Source: IMO Regional Reception Facilities Plan for the Small Island Developing States in the Pacific Region, 2015*

Port States could additionally mandate disposal of ship wastes at ports upon offloading of fish catch. Under MARPOL Annex V fishing vessels are required to offload all ship generated waste with the exclusion of sewage to shore reception facilities. However, they are not required to notify a harbor authority or terminal operator in advance, or to pay the mandatory charge (UNEP/CMS, 2014). This can result in a lack of monitoring and accountability to MARPOL compliance in this regard. Creation of waste reception facilities at ports where they do not currently exist and improvements in already existing reception facilities could decrease the dumping of wastes at sea by fishing vessels by providing to vessels appropriate locations to offload wastes.

SPREP recognizes that it is unreasonable to expect a country struggling to manage domestically generated wastes to also provide facilities for the reception and management of wastes generated by international vessels. There are a number of funding options to support the creation, improvement, and management of port waste reception facilities. Some options include the investment of international development funds, and/or fees and levies to be applied to foreign fishing vessels and distant water fishing nations (DWFNs) under the Polluter Pays principle. In order to avoid charging separate fees for waste disposal which might act as disincentives for vessels to offload wastes, fees for waste disposal could be included in standard port fees.

6. Regional funding mechanism for marine debris management

Regional capacity building initiatives such as the recommendations for port waste reception facilities and an outreach and compliance assistance programme will require significant financing and investment. The development of a regional funding mechanism for marine debris management, with a particular emphasis on fisheries-based management could support such initiatives. As an example, the Caribbean region responded to problems with wastewater as a significant source of localized marine pollution by developing the Caribbean Regional Fund for Wastewater Management (GEF-CReW, 2015). The Western and Central Pacific region could follow a similar model through development of a regional funding mechanism for marine debris management.

*Areas for Further Data Analysis and Research*

1. Specific pollution categories

Further data analysis should be undertaken of the specific pollution categories Waste Dumped Overboard; Oil Spillages and Leakages; and Abandoned, Lost or Dumped Fishing Gear. For example, an investigation into Oil Spillages and Leakages would likely offer a better understanding of how to improve data reporting fields and specific drop down menus to standardize observer descriptions and quantities of discharge during pollution incidents, in addition to a better understanding of conditions associated with spillages and leakages, and the number of oil spills which occur in fishing grounds. An investigation into the data collected on Abandoned, Lost, or Dumped Fishing Gear could include amounts of each subcategory which are lost, abandoned, or dumped, and types of gear per category, such as remnants of fishing gear discarded after repairs, and Fish Aggregating Devices (FADs).

2. Examination of the Abandoned, Lost or Dumped Fishing Gear incidents involving FADs

Within the comments and pollution description sections of the Abandoned, Lost or Dumped Fishing Gear category, numerous reports included the deliberate dumping of FADs either whole, discarding of damaged FAD nets, or retrieval of the GPS buoys before dumping of the old FAD. Lost or discarded FADs in the marine environment can be harmful to marine life through ghost fishing, entanglement and acting as habitat for the spread of invasive species (Davies et. al. 2014, Fonteneau et. al. 2013, Filmalter et. al. 2013, Macfadyen et. al. 2009), and have the potential to eventually wash ashore to coastlines and reefs as marine debris (Greenpeace 2015, Sagapolutele 2015). An area for further data analysis is an examination of the Abandoned, Lost or Dumped Fishing Gear incidents that involve FADs.

3. Survey fishermen, crews, vessel operators, port authorities and observers about causes behind and drivers for pollution incidents

Surveys could be conducted of fishermen, crew, vessel operators, port authorities and observers to better understand the drivers of pollution incidents from fishing vessels, and identify solutions that address underlying causes. For example, interviews with and surveys of crews and vessel operators could explore motivations for dumping of wastes at sea, such as issues around convenience, time, and costs associated with disposal on shore. Interviews with and surveys of port authorities could investigate adequacy of port facilities to receive wastes from vessels, human resource capacity constraints, and time pressures to process vessels quickly through ports.

4. Identify appropriate laws, regulations and procedures by which countries and territories can monitor and enforce penalties against pollution incidents by fishing vessels

Enforcement of pollution incidents will largely depend upon existing national laws and regulations within port States where the incidents occur. Procedures for differing levels of enforcement will need to be identified within national contexts, which may be more complicated than prosecution based upon an observer's report alone. Barriers to enforcement specific to different States can additionally be identified, as well as challenges experienced by vessels which may act as barriers to compliance. For

example, vessels may only carry gear they are licensed for, and might be hesitant to retrieve abandoned fishing gear if it doesn't meet their licensing requirements.

5. Overlay of purse seine marine pollution incidents with marine ecosystem information

Latitude and longitude data from the pollution incidents could be overlaid with regional and country specific marine ecosystem information such as ecologically and biologically important or unique areas, and migration routes for highly migratory, threatened, or endangered species. These overlays, such as between abandoned nets which can result in ghost-fishing and wildlife entanglement and highly migratory species like whales and turtles, could be used to show possible repercussions of the pollution incidents upon surrounding ecosystems and wildlife.

6. Fish sampling for plastic ingestion

Fish species consumed by Pacific islanders or sold commercially could be sampled for plastic ingestion to link plastic pollution with potential socioeconomic impacts, as much of the Pacific region is dependent upon healthy fish stocks for livelihoods and food security. This could identify an area of potential linkage between plastic waste dumped at sea and within fishing grounds by fishing vessels and ingestion by marine wildlife and fish later sold in commercial markets.

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**Appendix I. SPC/FFA Regional Observer Pollution Report Form GEN-6**

# SPC/FFA REGIONAL OBSERVER POLLUTION REPORT

**FORM GEN-6**

REVISED MARCH 2014

| OBSERVER NAME | VESSEL NAME | OBSERVER ID NUMBER | PAGE OF |
|---|---|---|---|
| | | | |

**- fill in one form for each pollution incident -**

## INCIDENT DETAILS

| Ship's DATE and TIME DD | MM | YY | hh | mm | LATITUDE (dd°mm.mmm') | N / S | LONGITUDE (ddd°mm.mmm') | E / W | EEZ / HARBOUR |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

| WIND DIRECTION | WIND SPEED | SEA CONDITIONS (C, S, M, R) | CURRENT : (knts and direction °) | OBSERVER'S VESSEL ACTIVITY |
|---|---|---|---|---|
| | | | | |

| NAME OF OFFENDING VESSEL | IRCS | TYPE OF VESSEL | YOUR POSITION FROM OFFENDING VESSEL Compass Bearing | Distance (nautical miles) |
|---|---|---|---|---|
| | | | | |

## WASTE DUMPED OVERBOARD

| Material | *Tick each box that applies* | Describe Type | Describe Quantity |
|---|---|---|---|
| Plastics | | | |
| Metals | | | |
| Waste oil | | | |
| Chemicals | | | |
| General garbage (*within 12 miles*) | | | |
| *describe:* | | | |

## OIL SPILLAGES AND LEAKAGES

| Source | *Tick each box that applies* | Visual Appearance / Colour | Describe Area and Quantity |
|---|---|---|---|
| Vessel Aground / Collision | | | |
| Vessel at Anchor / Berth | | | |
| Vessel Underway | | | |
| Land based source - Describe source | | | |
| Other - please specify | | | |

## Abandoned or Lost Fishing Gear

| Source | Activity | Describe Gear | Estimate Quantity |
|---|---|---|---|
| Lost during fishing | | | |
| Abandoned | | | |
| Dumped | | | |

*Other comments:*

*Were there any stickers/ posters displayed to remind the vessel about MARPOL Regulations?* **Y / N**

*Did you take any photos?* **Y / N**

*If yes, please state the number(s) of the photo frames or files.*

*MARPOL Regulations - state*

*It is illegal for any vessel to discard any form of plastics into the sea at anytime.*

*It is illegal for any vessel to discard any form of oil into the sea at anytime.*

*It is illegal for any vessel to dump any form of rubbish into the sea within 12 nautical mile of the sea shore.*

Revised March 2014

**Notes on FORM GEN-6**

## POLLUTION REPORT

*Remember - Fill in one form for each pollution incident. There might be more than one per day.*
*If forms run out, report this on the last form and continue recording pollution infringements in diary.*

| | |
|---|---|
| **Observer Name** | Put first name first, and your family name last. |
| **Vessel Name** | Record the full name of the vessel. Do not use any abbrevations. |
| **Observer ID Number** | Use the number assigned by the observer programme e.g. AA 03-01 |
| **Page of** | Number all GEN-6 pages in sequence from the start until the end of the trip |
| **Date of Incident (dd/mm/yy)** | Date pollution seen in day, month and year. *Use ship's time as defined in other observer data collection forms* |
| **Time (00.00 hrs)** | Report the time using the 24hr clock. |
| **Latitude / Longitude** | Record the GPS positon of the host vessel when the pollution was first seen. |
| **EEZ / Harbour** | Record the EEZ or, for shorebase staff, mark port or Harbour name here. |
| **Wind Direction** | The prevailing wind direction. Use degree eg. 90 degrees for an east wind |
| **Wind Speed** | Record the prevailng wind speed. |
| **Sea Conditions** | C- Calm, S- Slight, M- Moderate, R - Rough. |
| **Current (knts and direction)** | If the vessel has a current meter find out what the current strength is. |
| **Observer's vessel activity** | State the host (observer's) vessel activity at the time of the pollution incident.<br>Some activities to consider might be:<br>fishing; transhipping; bunkering; transitting; aground. |
| **Name of offending vessel** | Make an effort to record the complete and proper name of offending vessel. Be careful not to make any spelling mistakes which may make it difficult to prosecute the vessel if the report goes through legal proceedings. |
| **IRCS** | The international callsign is marked in large letters on the side of the boat. |
| **Type of vessel** | Consider the full vessel and aircraft codes on the front of Form GEN-1. |
| **Your positon from offending vessel.** | The radar can be used to get an exact distance in nautical miles. Otherwise give best estimate and note if it is the observer's or someone else's. |
| **WASTE DUMPED OVERBOARD** | |
| **Material** | Tick each correct box to show which types of materials were dumped.<br>Only tick two or more materials if vessel has dumped more than one material type over at the same time - e.g.: it dumped plastic and metal at 10:00hrs.<br>If plastic was dumped at 10:00hrs and metal at 16:00hrs - record separately. |
| **Describe type** | Give as good a description as possible of the type of dumped material.<br>E.g.: - plastic bags; bait boxes plastic strapping; bait boxes plastic bags; |
| **Describe Quantities** | Give a best estimate of the amount dumped. Sometimes this will be easy - e.g., 12 metal oil drums were dumped. At other times the material might be too far away to see the amount. If it is too far away then estimate the amount as well as possible and make note that it is only a rough estimate at |
| **OIL SPILLAGES AND LEAKAGES** | |
| **Source** | Tick to indicate where the spillage or leak came from |
| **Visual Appearance / Colour** | Describe the colour/ thickness/depth of the spill as well as able. |
| **Describe Area and Quantity** | Give a best estimate of the size of the spill.<br>The boat could be a size reference - e.g.: it was 4 times bigger than the boat. |
| **Abandoned or Lost Fishing Gear** | |
| **Lost during fishing** | Lost by host vessel. Describe activity when gear lost (setting/hauling/soak) |
| **Abandoned** | For any fishing gear abandoned by another vessel and found by host vessel |
| **Dumped** | For any gear dumped by host vessel, see above. |

**Supplementary notes on Marpol Regulations**

Note: Vessels may dump garbage as close as 3 nautical miles to the shore if they have a 'comminuter' onboard (a machine that shreds garbage to tiny pieces).

Otherwise they cannot dump garbage within 12 nm of the coast. Report on all vessels dumping within 12nm of the coast. We can check if they have a comminuter onboard later.

***Country Codes***

| | | | |
|---|---|---|---|
| AS | American Samoa | MH | Marshall Islands |
| AU | Australia | NR | Nauru |
| CK | Cook Islands | NC | New Caledonia |
| EC | Ecuador | NZ | New Zealand |
| FM | Fed. States of Micronesia | NU | Niue |
| FJ | Fiji Islands | MR | Northern Mariana |
| FR | France | PW | Palau |
| PF | French Polynesia | PG | Papua New Guinea |
| GU | Guam | PH | Philippine |
| ID | Indonesia | RU | Russia |
| IW | International Waters | SB | Solomon Islands |
| JP | Japan | TW | Taiwan |
| TO | Kingdom of Tonga | TK | Tokelau |
| KI | Kiribati | TV | Tuvalu |
| KR | Korea | US | United States |
| CN | Mainland China | VU | Vanuatu |
| MY | Malaysia | WS | Samoa |