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## 10<sup>TH</sup> MEETING OF THE COMPLIANCE AND TECHNICAL COMMITTEE (CTC)

*Manta, Ecuador, 7 to 10 February 2023*

### CTC 10 – Doc 06

#### Implementation and Operation Report: Commission VMS

*Secretariat*

This report is provided pursuant to Paragraph 32 of CMM 06-2020 (VMS), which states: *“At each annual meeting of the Commission, the Secretariat shall provide the Commission with a report on the implementation and operation of the Commission VMS”*.

#### CTC10 is requested to:

- ***note** this implementation report and make any recommendations deemed appropriate;*
- ***consider** the inclusion of VMS data considerations as part of the overall SPRFMO database requirements;*
- ***consider** the amendments proposed to CMM 06 (VMS) and CMM 08 (Gillnets) (refer COMM11-Prop01 and COMM11-Prop02).*

#### 1. Introduction

For authorised vessels operating in the SPRFMO Convention Area, Article 27(1)(a) of the SPRFMO Convention requires that the Commission establish appropriate cooperative procedures for *“... the reporting of vessel movements and activities by a satellite vessel monitoring system that shall be designed to ensure the integrity and security of near real-time transmissions, including through the possibility of direct and simultaneous transmissions, to the Commission and flag State”*.

The application of the Commission VMS is specified in paragraph 2 of CMM 06-2020. *“The Commission VMS shall apply to vessels included in the Commission Record of Vessels Authorised to Fish in the SPRFMO Convention Area. It shall cover the area as defined in Article 5 of the Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean and have a buffer zone of 100 nautical miles outside the Convention Area. The buffer zone shall not apply to vessels flagged to adjacent coastal States fishing in waters under their jurisdiction”*.

The purpose of the Commission VMS is set out in paragraph 4 of CMM 06-2020 *“to continuously monitor the movements and activity of fishing vessels that are on the Commission Record of Vessels and are authorised by Members or CNCPs to fish for fisheries resources in the SPRFMO Convention Area in a cost-effective manner in order to, inter alia, support the implementation of SPRFMO CMMs”*.

#### 2. State of Reporting

Pursuant to CMM 06-2020 (Annex 2, Paragraph 7) each Member and CNCP shall designate a Point of Contact for the purposes of any communication regarding the VMS system (including data requests). These Points of Contact are listed on the VMS Point of Contact page on the website. Members and CNCPs (*except for Belize and Cuba, which had no vessels in SPRFMO*) have provided a VMS Point of Contact.



As per CMM 06-2020, Paragraph 9, each Member and CNCP shall require vessels flying its flag to report VMS data to the Commission VMS automatically either:

- (a) to the Secretariat via their Member or CNCP's FMC; or
- (b) simultaneously to both the Secretariat and its FMC.

The majority of the Members/CNCPs report their vessel's VMS positions via their FMC. Table 1 below provides an overview of the type of reporting for each Member and CNCP as the number of unique vessels that reported their presence inside the SPRFMO Convention Area during 2021 and 2022.

*Table 1: The current state of reporting for SPRFMO Members and CNCPs*

Flag	Type of Reporting (as applicable)	VMS Reporting in SPRFMO – Unique Vessel Count	
		2021	2022
Australia	Simultaneous	2	2
Belize	Via FMC	n/a	0
Chile	Via FMC	0	1
China	Via FMC	526	505
Cook Islands	Via FMC (FFA)	7	7
Cuba	-	0	0
Curaçao	Via FMC	1	4
Ecuador	Simultaneous	0	0
EU	Via FMC	5	4
Faroe Islands	-	0	0
Korea	Via FMC	0	0
Liberia	Via FMC	4	3
New Zealand	Simultaneous	9	9
Panama	Via FMC	82	82
Peru	Via FMC	0	2
Russian Federation	Via FMC	1	2
Chinese Taipei	Via FMC	7	2
USA	-	0	0
Vanuatu	Via FMC	0	0
<b>Total</b>		<b>644</b>	<b>623</b>

Annex 1 provides a listing, by Member/CNCP, of the vessels that have reported to Commission VMS at some point during 2022 calendar year as being in SPRFMO. Figures 1, 2 and 3 below depict the relative distribution by month of the unique vessels reporting to Commission VMS during 2021 and 2022. Vessel count is highest during the September to December period and largely influenced by the China and Panama fleet movement.



Figure 1: Fluctuation in Vessel Count by Month - 2021

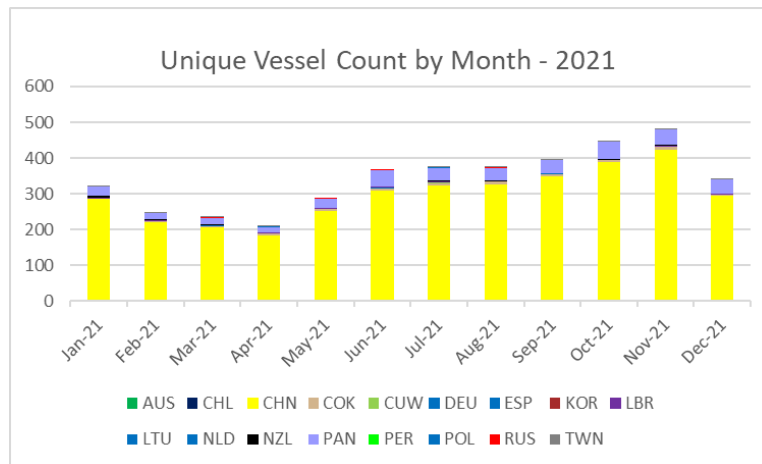


Figure 2: Fluctuation in Vessel Count by Month - 2022

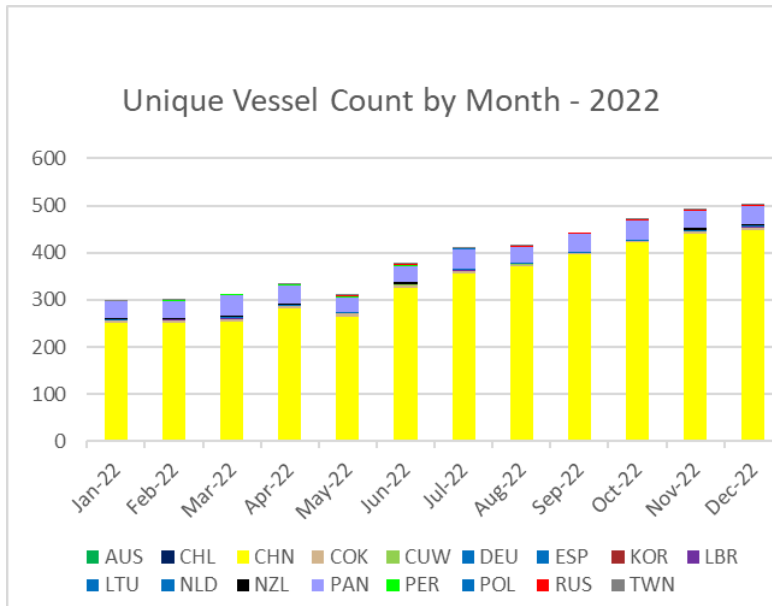
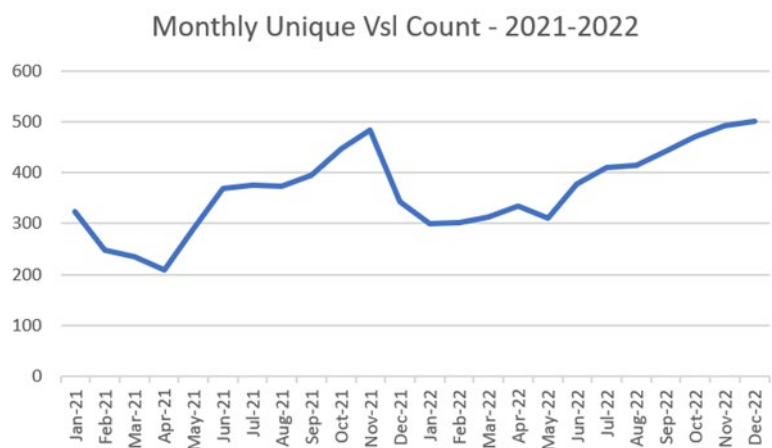


Figure 3: Fluctuation in Total Unique Vessel Count by Month (2-years)





### 3. Operation of the Commission VMS

#### 3.1. Personnel

The Commission VMS is largely overseen by the Compliance Manager.

#### 3.2. Day to day work processes

The Secretariat monitors the VMS system daily, including:

- Monitoring the number and movement of vessels reporting to the Commission VMS
- Monitoring for data gaps, disruptions, and stoppages to the VMS display on Commission VMS
- Monitoring VMS for compliance with zone entry requirements and other CMM obligations
- Investigating system-generated alerts such as:
  - Fishing without authorisation
  - New beacon identified, not yet associated with a vessel on the SPRFMO Record of Vessels
  - Bottom fishing outside open management areas
- Develop and maintain a file system to document, track, and report on VMS issues
- Ongoing communications with VMS points of contact to identify and resolve VMS issues as well as any file follow-up or support for issue resolution
- Regular communications and virtual meetings with the service provider (CLS) to facilitate product development and troubleshoot reporting or display issues
- Respond to requests for VMS data, geo-fence areas of interest for reporting and appropriate documentation and follow-up with Members and CNCPs
- Activating and de-activating polling for vessels<sup>1</sup> using Simultaneous reporting
- Reviewing of bi-monthly invoices covering charges for DNID Upload, Polling, Periodic Rate Change and Position Reports for vessels belonging to Members using simultaneous reporting.

### 4. Requests for VMS data

Pursuant to CMM 06-2020 VMS data may be obtained by a Member or CNCP for their own vessels (Paragraph 22), or under certain circumstances, either requiring or not requiring the consent of the Member or CNCP of the vessels involved.

Without the permission of the Member or CNCP, the Secretariat can provide VMS data for the exclusive purposes of:

- Planning for active surveillance operations (CMM 06-2020 Paragraph 24a)
- Active surveillance operations and/or inspections at sea (CMM 06-2020 Paragraph 24b)
- Supporting search and rescue activities subject to the terms of an arrangement between the Secretariat and the competent MRCC (CMM 06-2020 Paragraph 24c)

The Secretariat can also provide VMS data to a requesting Member or CNCP where the VMS data relates to vessels flagged to other Members or CNCPs that have provided prior written consent through their VMS Point of Contact for the data to be shared (Paragraph 21).

A template for data release under Paragraphs 21, 22 and 24 is available on the [non-public section](#) of the SPRFMO website.

VMS data may also be used by the Scientific Committee for analysis to support specific scientific advice requested by the Commission. A template for such requests is available on the [website](#) (Paragraph 8).

In total, 5 requests were received from 2 Members for access to VMS data during the reporting period Oct 2021-Sept 2022. Each request was received from the relevant VMS Point of Contact using the SPRFMO Request Template and containing the necessary information. All requests were made pursuant to Paragraphs

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<sup>1</sup> For Australia and New Zealand



24a and 24b (*Planning/Active Surveillance Operations and/or Inspections*). There were no requests for VMS data pursuant to Paragraph 24c (*Search and Rescue*). In all cases, in accordance with Annex 5, Paragraph 5, the Secretariat informed, no later than 7 days after the provision of VMS data, the relevant VMS Points of Contact representing the Member or CNCP of the vessel(s) whose VMS data was obtained.

## 5. Performance of the Commission VMS Service Provider

The Commission VMS service provider is the Collecte Localisation Satellites SAS (CLS) Group, a global company engaged in vessel satellite monitoring. The corporate headquarters and primary VMS Fisheries Monitoring support team are headquartered in France. In January 2021 the parent company transferred the contracts of its customers located in Oceania (*Australia, New Zealand and the Pacific Islands*) to its wholly owned Australian subsidiary, CLS OCEANIA. Invoicing and billing are processed through the Australian office and there are 2 points of contact in Australia to assist with SPRFMO VMS issues. This is in addition to the Fisheries Monitoring Technical Support team based at the France headquarters.

While there have been some changes at the CLS Technical Support team throughout the reporting period, the SPRFMO Secretariat, CLS Oceania representatives and CLS France representatives (VMS Fisheries Monitoring Support Team) continued with holding quarterly (or as needed) virtual meetings to facilitate the exchange of information on relevant VMS issues and/or future development needs. This continues to be effective manner to improve communications between the service provider and SPRFMO and having a positive effect on issue identification and resolution.

CLS uses a software known as THEMIS as the base of its Fisheries Monitoring/Management platform. THEMIS was introduced ~ 16 years ago and the software underwent a major update 2021 to modernize. At SPRFMO, the upgrade was implemented on 20 October 2021 with new access login and user manual. This was followed by a formal virtual training session for the Compliance Manager and the Data Manager as well as assistance on specific queries as in when needed. There were a few areas of functionality initially flagged by SPRFMO for attention, but these were subsequently addressed by the service provider.

CLS continues to move forward with developing an enhanced platform for the future. The new platform being developed is known as Astrée. As part of this process, CLS has been conducting client surveys and engaging clients for feedback on their specific needs. There have also been virtual group sessions with clients on specific topics (e.g., automatic reports and alerts) that SPRFMO (Compliance Manager and/or Data Manager) have participated in. Additional sessions are planned as the CLS project development continues.

The Service Level Agreement (SLA) stipulates that CLS shall provide a 99.7% fault tolerance for front office. This is calculated monthly and summarized for each 6-month period in the 2 Operating (Service) Reports per year. While there are minor monthly differences between the “real” service and “planned” service availability, CLS has consistently delivered on service availability. The Monthly SPRFMO SLA average was 99.80% for the period December 2021 – June 2022 and 99.91% from June to November 2022.

The major events (impacting availability) reported by CLS during this period for “Maintenance operations” were 2 x 30-minute software upgrades (one occurring 19 May 2022 and the other occurring 24 August 2022). On the “IT operations” side there were 3 events noted: a security patch (10 minutes) on 01 February 2022; CLS data base maintenance (4.5 hours) on 12 March 2022; and CLS network issue (2 hours 3 minutes) occurring on 28 October 2022.



## 6. Operational Performance of the Commission VMS

Overall performance has been good. Generally, the Commission VMS system is an effective tool for monitoring the Authorised vessels active in the SPRFMO Area on a “near real time” basis. Notwithstanding, there have been “lessons learned” and areas of improvement that have been identified for the betterment of, and to fine-tune, the overall operational performance of Commission VMS to enhance monitoring, reporting and/or better identify potential emerging issues. While CLS have been able to assist SPRFMO with some of the more minor requests to improve in areas of reporting or day to day delivery, other requests have been identified as a substantive change requiring dedicated development efforts (and funding) to achieve the deliverables expected.

Following discussion with CLS during 2021 the priority tasks were identified and submitted to CLS for costing analysis and quotes. We were then able to utilize this information as part of the project proposal options for the use of the NOAA Funds for SPRFMO MCS Enhancements. Following discussion with the USA there was agreement to advance the VMS enhancements in 3 key areas. Following this, a contract amendment was signed with CLS for the development and delivery of these enhancements by 30 June 2023. This includes:

- Development of an automatic report to identify when NAF messages are rejected by THEMIS (this is particularly helpful as Members/CNCPs are not aware if their submission are rejected by the system);
- Develop an automated Alert to identify if the VMS positional updates are not received while a vessel is within the SPRFMO area (while there are daily manual checks an automated system would permit 24-hour monitoring and minimize the chance of any VMS disruptions/stoppages being missed, creating extended data gaps or prolonged activity in the area without VMS monitoring in place); and
- Developing a more comprehensive arrangement of limitation/restrictions on user accounts (this is particularly useful for addressing requests for VMS data and/or focusing on geographic areas of interest).

## 7. VMS Issues Overview

The expectation is that the Commission VMS programme makes it possible to continuously monitor the movements of any vessel authorised by the Member/CNCP and included on the SPRFMO Record of Vessels in a “near real-time” basis. With millions of VMS positions being transmitted and received over the course of a year it is inevitable that there will be occasional disruptions, gaps, and data abnormalities (e.g., “flying vessels”) appearing on the Commission VMS display due to any number of factors.

Many of the disruptions and gap periods are isolated to individual vessels and are for relatively short periods of time with data resuming without any intervention from the Secretariat. These disruptions are an issue but, in isolation, have relatively minor impacts on the overall operations and effectiveness of the Commission VMS. While these do need to be documented and followed up with, the more significant issue is when vessels operate for potentially longer periods of time in SPRFMO without VMS being displayed on Commission VMS and/or enter the Convention Area without VMS transmission to Commission VMS.

During the reporting period, with the exception of a few situations, the majority of these incidents detected are of a relatively short duration, the VMS data has been recovered and individually the incidents have minimal impact on the overall operations of Commission VMS. As specified during CTC09/COMM10, specific VMS issues detected, and their causes, are outlined in the VMS section of the Compliance Assessment for review at CTC10.

## 8. VMS Data Analysis and Support to Other CMMs

In addition to near real-time monitoring of authorised vessels active in SPRFMO, Commission VMS is intended to support the implementation of other SPRFMO CMMs through verification of vessel positional data to corroborate, for example, fishing activity and transshipment data and to monitor compliance. To do



this, the Secretariat requires access to the full VMS database, which it does not currently have. The Secretariat has access to the VMS data primarily through the THEMIS platform. THEMIS is a valuable tool for near real-time monitoring of vessel activities; however, the utility erodes quickly when there is interest in time series of positions (even over a few days). It is not possible to query or access large data sets through the THEMIS mapping platform or through the location reports. This limitation poses real challenges for the Secretariat in carrying out their obligations and providing value-added VMS analyses for the Commission.

The Secretariat has been actively engaged with CLS to find an appropriate solution to this matter. No such solution has yet been developed. In the meantime, the workaround is to download small subsets of VMS data at a time (in .csv format) and store on the internal server. The Data and Compliance Managers have downloaded all VMS holdings to better support the implementation of SPRFMO CMMs and to provide summaries of these data for this report. The acquisition of these data has been valuable and has enabled preliminary analyses (e.g., the gap and delay analyses) that have not been possible in the past. However, there are limitations, caveats, and opportunities for improvement. Specifically, because these are static downloads, if new data are uploaded or existing data are edited (e.g., delayed reports), the data holdings that have been downloaded will be out of sync with the production database. In addition, it is a very slow and time-consuming process to download the VMS files given their size. Some data files must be downloaded on a weekly basis and can take several minutes per download. As a result, this is not an ideal nor long-term solution; however, it has enabled new analyses of the VMS data.

One viable solution would be to develop a database table, within the SPRFMO database schema, to sync with the production database that supports the THEMIS platform. This would require development to establish an appropriate syncing mechanism. We are only at the tip of the iceberg with respect to using the VMS data to their full potential. Full access to these data would have tremendous benefit for data queries, merging VMS data with other data holdings (e.g., fishing activity data, transshipment data), and monitoring compliance of SPRFMO CMMs.

## 9. VMS Performance Monitoring and Workplan

Overall, the time spent on VMS issues has been significant since the last SPRFMO Annual Meeting. To have an efficient and effective VMS system with reliable information and data it is necessary to minimize gaps and delays in positional information to Commission VMS and to keep abreast of other VMS issues requiring attention (e.g., duplicate vessels, erratic positions, alerts, missing information, etc.) and work closely with the VMS Service provider and the relevant VMS Points of Contact to resolve issues and enhance performance. While, over time, there is every expectation to see a decrease in serious or prolonged incidents requiring Secretariat intervention, Commission VMS will continue to require a dedicated focus, spot checks, and daily quality control to ensure it meets the threshold of continuous monitoring of SPRFMO vessels.

In 2022, the Secretariat prepared the “Commission VMS Implementation and Operation Report” (CTC9–Doc08) for the Annual Meeting which identified several VMS issues occurring during 2021 and outlined a workplan for 2022 (Annex 2 of CTC9-Doc08). The workplan focused on ensuring that the Commission VMS is operating as efficiently and effectively as possible and providing a timely and accurate report of vessel activity within the Convention Area. The workplan was split into six sections, each of which is discussed in detail below. Preliminary analysis has been undertaken. However, data access and other data issues delayed the commencement of this work; improvement and refinement of these analyses will continue in 2023.

### 9.1. Missing or Incomplete VMS Data

The identification and mitigation of missing data may be the most fundamental issue to ensuring a complete and accurate transmission of vessel VMS data within the Convention Area (and 100nm buffer zone). To assess the presence of data reporting issues we sought to determine when vessels: i) entered SPRFMO without VMS reporting; ii) stopped reporting while in SPRFMO; and iii) experienced disruptions to VMS reporting while in the SPRFMO reporting area. Over time, these reporting issues can be evaluated to identify patterns and trends



that could potentially identify underlying technical reasons causing these reporting issues. The individual VMS issues arising throughout the reporting period are noted and summarized by Member/CNCP for review at CTC10 as part of the Compliance Assessment for VMS. To the extent possible, feedback provided by the Member/CNCP as to the cause of the issue has been noted for each individual file (and additional information may be provided during CTC10 discussions).

The Compliance Manager regularly conducts “reporting gap analyses” to determine if there is missing or incomplete VMS data and once identified action is taken to “fill gaps” by updating missing VMS data to Commission VMS (where possible). Preliminary analysis of the frequency of VMS gaps for 2020 is relatively low. For 2021, the preliminary analysis suggests that the frequency of gaps higher than 2020 (this may be to improved oversight, but further investigations are needed). The overall current impact of identified VMS gaps is very low as less than 1% of all positional reporting is impacted by such disruptions.

## 9.2. Delayed Receipt of VMS Data

Delays in VMS reporting are identified by the position saved time stamp. This datetime is compared to the datetime of the reported position, and the difference between the two is the delay. The Secretariat has been focused on identifying delayed reports, working with Members/CNCPs to understand the cause of the delays, and then working together to mitigate these issues moving forward. Delays were evaluated based on thresholds ranging from 1 to 30+ days. Positions reported less than 24 hours after the location position were not considered here. Delays of 1 day up to 1 week, delays greater than 1 week and up to 1 month, and then delays greater than 1 month were assessed.

Not unexpectedly, the preliminary analysis identified correlation with the fleet size, the more vessels a Member/CNCP has active, the greater the number of delayed reports. Notwithstanding, there are also observations of Members with few vessels in the Area with significantly delayed reports. The Secretariat is seeking to improve its analyses so that the frequency and responsibility for delayed reports is more easily available to the CTC (as currently the information is considered as part of the CMS).

## 9.3. Other VMS Vessel Related Issues

In addition to the individual issues attributed to Members/CNCPs and referred to the Compliance assessment, there have been occasional glitches that are more related to in-house issues at the Secretariat, CLS and/or the THEMIS system. For example, last year some of the identified gaps in the Commission VMS were related to a system setting that had caused the VMS data to be “hidden” from the display. Actions were taken to remedy this situation for the vessels involved at the time and the matter has been resolved. However, during this reporting period, there was also a legacy carryover issue identified for another vessel from a different Member that was also detected and has since been corrected.

## 9.4. VMS System or Administrative Issues

Other issues included the continuation of ongoing challenges with respect to the VMS connectivity for vessels reporting simultaneously to the Secretariat and the FMC. Even with the intervention of CLS, there are delays in connecting/reconnecting vessels. This was particularly noticeable when ALC units were updated, service providers changed and/or a move away from Inmarsat-based units (e.g., Iridium or Skywave). In several cases temporary assistance was required from the relevant FMCs to assist in vessel monitoring until the issues were resolved. For example, there were delays identified in connecting several NZ-based fishing vessels that had switched to new Iridium based units. This was eventually fixed and fortunately there was minimal impact as the vessels had provided significant advance notification.





Also, it may be coincidence, but there have been issues identified in connecting with research vessels. In the case of New Zealand, the VMS reconnection to a research vessel, after a period of inactivity in SPRFMO, took multiple weeks to resolve and required a THEMIS update and reload of the DNID to establish connectivity (ultimately the planned trip was called off due to COVID issues, so the impact was minimal). In the case of the Australian research vessel, which was using a SKYWAVE IDP, connection was unable to be achieved and CLS advised at the time that the connection was only possible if the SPRFMO account was the only one to which the beacon reported. Again, there was no impact as the planned research trip was cancelled. Finally, while on the issue of research vessels, it has also come to light that a Peruvian research vessel is a Navy vessel, and as such does not report, nor is tracked by the FMC. Hence, there is no relay of VMS positional information (similar to there also being no relay of VMS information for patrol ships). These cases all illustrate the need to continue to fine-tune and adapt the VMS programme to address emerging issues as they arise.

### 9.5. Vessels operating without being displayed on Commission VMS

Again, this year, there have been several situations detected where authorised SPRFMO vessels began operating in SPRFMO, with functioning VMS units onboard, but for varying reasons their VMS was not displaying on Commission VMS (specific cases are identified in the VMS section of the Compliance report). While none of these incidents appear to be of nefarious intent it does highlight a potential weakness in the current vessel monitoring situation.

If a vessel is operating in SPRFMO with VMS activated and there is a disruption or cessation, there are several checks in place to detect this situation and to take action to restore the data feed within a short period of time. However, if a vessel enters SPRFMO without the VMS being sent or forwarded to Commission VMS it is very hard to detect these situations as there is no secondary vessel monitoring tool.

Often these situations come to light if the vessel later starts appearing on Commission VMS or during cross checks with other data sources. Examples from this reporting period include detection derived from “Port Call Request” information and cross-referencing during manual spot checks of “transshipment details”. More work is required in 2023 to automate and improve cross referencing of SPRFMO data holdings to better identify any potential deficiencies in VMS reporting (or other data issues).

### 9.6. Potential CMM VMS related updates

As follow-up to discussions at CTC9/COMM10, and in line with the approved workplan, the Secretariat has developed 2 proposals pertaining to VMS provisions for CTC consideration. Specific details can be found in:

- COMM 11-Prop 01 Proposal to amend CMM 06 (VMS)
- COMM 11-Prop 02 Proposal to amend CMM 08 (Gillnets)

## 10. CTC Considerations

In summary, much has been done or is in progress, to improve the accuracy, efficiency, and functionality of the Commission VMS, particularly with respect to the day-to-day monitoring. In addition to the proposed amendments to the VMS CMM, the next phase of focus would be to enhance data analysis and cross-referencing capabilities. This will require a methodology to automatically extract and update VMS positional data into a database outside of THEMIS and build the linkages to carry out, to the extent possible, automated reporting and analysis to support compliance with VMS and other CMMs. This component can be part of a broader focus on overall SPRFMO database needs and requirements (see also FAC10-Doc06.2). Hence, CTC10 is requested to consider the inclusion of VMS data considerations as part of the overall SPRFMO database requirements.



## ANNEX 1: VMS-UNIQUE VESSELS- JAN-DEC 2022

Australia	China	China	China
DIANA	FU YUAN YU 981	HAI FENG 4	HONG PU 2
PETUNA ENDEAVOUR	FU YUAN YU YUN 995	HAI FENG LONG 1	HONG PU 37
<b>Chile</b>	FU YUAN YU7611	HAI FENG LONG 2	HONG PU 5
PUERTO BALLENA	FU YUAN YU7612	HAI FENG LONG 6	HONG PU 57
<b>China</b>	FU YUAN YU7613	HAI LI 18	HONG PU 6
CHANG SHUN 6	FU YUAN YU7614	HAI LI 8	HONG PU 88
CHANG SHUN 7	FU YUAN YU7615	HAI LI LENG 6	HONG RUN 1
CHANG SHUN 8	FU YUAN YU7616	HAI LI LENG 7	HONG RUN 11
CHANG SHUN 9	FU YUAN YU7617	HAI XING 1	HONG RUN 16
CHANG SHUN NO.1	FU YUAN YU7618	HAI YANG 1	HONG RUN 18
CHANG SHUN NO.2	FU YUAN YU7619	HAI YANG 5	HONG RUN 2
CHANG TAI 801	FU YUAN YU7874	HAI YANG 6	HONG RUN 3
CHANG TAI 802	FU YUAN YU7875	HAI ZHI XING 801	HONG RUN 55
CHANG TAI 806	FU YUAN YU7876	HAIFENGLONG 5	HONG RUN 57
CHANG TAI 807	FU YUAN YU7877	HAN YI 107	HONG RUN 6
CHANG TAI 809	FU YUAN YU7890	HAN YI 21	HONG RUN 668
CHANG TAI 810	FU YUAN YU7891	HAN YI 3	HONG RUN 68
CHANG TAI 811	FU YUAN YU7892	HAN YI 6	HONG RUN 75
CHANG TAI 812	FU YUAN YU7893	HAN YI 611	HONGPU12
DAPINGYUYUN99	FUYUANYU7631	HAN YI 788	HONGPU16
DONG YU 1529	FUYUANYU7632	HAN YI 8	HONGPU17
DONG ZHOU 21	FUYUANYU7633	HAN YI 899	HONGPU31
DONG ZHOU 22	FUYUANYU7634	HANYI 22	HONGPU7
DONGZHOU17	FUYUANYU7635	HANYI17	HONGPU9
FENG CHENG 101	FUYUANYU7636	HANYI23	HUA LI 17
FENG CHENG 103	FUYUANYU7637	HANYI27	HUA LI 19
FENGHUI 9	FUYUANYU7638	HANYI78	HUA XIANG 801
FU YUAN YU 7601	FUYUANYU7669	HE BEI 8588	HUA YING 201
FU YUAN YU 7602	FUYUANYU7670	HE BEI 8589	HUA YING 205
FU YUAN YU 7603	FUYUANYU7671	HEBEI 8590	HUA YING 208
FU YUAN YU 7604	FUYUANYUYUN688	HEBEI 8598	HUA YING 209
FU YUAN YU 7605	FUYUANYUYUN878	HEBEI 8599	HUA YING 217
FU YUAN YU 7606	FUYUANYUYUN997	HENG HONG 9	HUA YING 261
FU YUAN YU 7884	GANG TAI 1	HENGXIN1	HUA YING 58
FU YUAN YU 7885	GANG TAI 8	HENGXIN15	HUA YING 78
FU YUAN YU 873	GUOHONG5	HENGXIN16	HUA YING 803
FU YUAN YU 875	GUOJI901	HENGXIN68	HUA YING 809
FU YUAN YU 876	GUOJI902	HENGXIN78	HUA YING 811
FU YUAN YU 877	HAI DE LI 703	HONG DA 1	HUA YING 813
FU YUAN YU 878	HAI DE LI 708	HONG DA 18	HUA YING 815
FU YUAN YU 879	HAI FENG 1	HONG DA 2	HUA YING 817
FU YUAN YU 880	HAI FENG 3	HONG PU 1	HUA YING 818



China	China	China	China
HUA YING 819	JU RONG YU 11	LUQINGYUANYU769	MINGXIANG828
HUA YING 87	JU RONG YU 12	LUQINGYUANYU770	MINGXIANG858
HUA YING NO.207	JULONGJIAYA12	LURONGYUANYU538	MINGXIANG878
HUAXIANG8	LIAO YU 5	LURONGYUANYU539	MINGXIANG889
JIA DE 1	LIAO YU 6	LURONGYUANYU582	NING TAI 1
JIA DE 12	LIAO YU ER HAO	LURONGYUANYU708	NING TAI 11
JIA DE 56	LIAO YU YI HAO	LURONGYUANYU709	NING TAI 12
JIA DE 6	LU LAN YUAN YU 689	LURONGYUANYU738	NING TAI 16
JIA DE 8	LU QING YUAN YU 161	LURONGYUANYU739	NING TAI 17
JIAD E 58	LU QING YUAN YU 162	LURONGYUANYU772	NING TAI 18
JIN HAI 688	LU RONG YUAN YU 195	LURONGYUANYU775	NING TAI 19
JIN HAI 701	LU RONG YUAN YU 277	LURONGYUANYU831	NING TAI 2
JIN HAI 709	LU RONG YUAN YU 585	LURONGYUANYU832	NING TAI 21
JIN HAI 711	LU RONG YUAN YU 586	LURONGYUANYU833	NING TAI 22
JIN HAI 715	LU RONG YUAN YU 602	LURONGYUANYU835	NING TAI 26
JIN HAI 716	LU RONG YUAN YU 715	LURONGYUANYU838	NING TAI 27
JIN HAI 717	LU RONG YUAN YU 728	LURONGYUANYU839	NING TAI 3
JIN HAI 718	LU RONG YUAN YU 729	LURONGYUANYUYUN009	NING TAI 35
JIN HAI 728	LU RONG YUAN YU 808	LURONGYUANYUYUN177	NING TAI 37
JIN HAI 758	LU RONG YUAN YU 881	LURONGYUANYUYUN898	NING TAI 38
JIN HAI 767	LU RONG YUAN YU 882	LUWEIYUANYU 018	NING TAI 5
JIN HAI 771	LU RONG YUAN YU 885	LUWEIYUANYUYUN 777	NING TAI 55
JIN HAI 777	LU RONG YUAN YU 887	MING WANG	NING TAI 58
JIN HAI 779	LU RONG YUAN YU 939	MING XIANG 801	NING TAI 59
JIN HAI 788	LU RONG YUAN YU YUN 678	MING XIANG 802	NING TAI 6
JIN HAI 824	LU RONG YUAN YU YUN 789	MING XIANG 803	NING TAI 61
JIN HAI 829	LU RONG YUAN YU YUN 888	MING XIANG 807	NING TAI 617
JIN HAI 856	LU RONG YUAN YU YUN 999	MING XIANG 809	NING TAI 62
JIN HAI 858	LU YAN YUAN YU 006	MING XIANG 816	NING TAI 65
JIN HAI 866	LU YAN YUAN YU 007	MING XIANG 817	NING TAI 66
JIN HAI 868	LU YAN YUAN YU 008	MING XIANG 818	NING TAI 69
JIN HAI 878	LU YAN YUAN YU 009	MING XIANG 819	NING TAI 7
JIN HAI 886	LU YAN YUAN YU 011	MING XIANG 857	NING TAI 71
JIN HAI 888	LU YAN YUAN YU 017	MING XIANG 868	NING TAI 75
JIN ZHOU	LULANYUANYU059	MING ZHOU 622	NING TAI 76
JING YUAN 601	LULANYUANYU068	MING ZHOU 8	NING TAI 77
JING YUAN 608	LULANYUANYU069	MING ZHOU 839	NING TAI 78
JING YUAN 626	LUQINGYUANYU 275	MINGXIANG805	NING TAI 8
JING YUAN 628	LUQINGYUANYU 276	MINGXIANG808	NING TAI 81
JU LONG JIA YA 14	LUQINGYUANYU 279	MINGXIANG811	NING TAI 83
JU LONG JIA YA 17	LUQINGYUANYU765	MINGXIANG821	NING TAI 85
JU LONG JIA YA 28	LUQINGYUANYU766	MINGXIANG826	NING TAI 86



China	China	China	China
NING TAI 87	PU YUAN 818	SHUNZE75	ZHE PU YUAN 37
NING TAI 89	PU YUAN 819	SHUNZE77	ZHE PU YUAN 58
NING TAI 9	PU YUAN 820	SHUNZE777	ZHE PU YUAN 67
NING TAI 97	PU YUAN 826	SHUNZE801	ZHE PU YUAN 77
NING TAI LENG 2	PU YUAN 827	SHUNZE805	ZHE PU YUAN 98
NING TAI LENG 5	PU YUAN 835	SHUNZE806	ZHEN FA 5
NING TAI LENG 6	PU YUAN 837	SHUNZE807	ZHEN FA 7
NING TAI LENG 7	PU YUAN 838	SHUNZE811	ZHONG JU 18
NING TAI LENG 8	PU YUAN 855	SHUNZE83	ZHONG YUAN YU 16
NINGTAI 15	PU YUAN 856	SHUNZE836	ZHONG YUAN YU 17
NINGTAI51	PU YUAN 868	SHUNZE85	ZHONGJU1
NINGTAI615	PU YUAN 877	SHUNZE86	ZHONGJU7
NINGTAI717	PU YUAN 878	SHUNZE87	ZHOU HONG YUAN 2
NINGTAI72	PU YUAN 885	SHUNZE98	ZHOU HONG YUAN 9
NINGTAI815	PU YUAN 887	SU YUAN YU 6	ZHOU PU 27
NINGTAI88	PU YUAN 898	TAO YUAN 605	ZHOU PU 5
OU YA 17	PUYUAN886	TAO YUAN 607	ZHOU PU 668
OU YA 18	RONG YUAN YU 168	TIAN SHUN	ZHOU PU 806
OU YA 7	RONG YUAN YU 169	TIAN XIANG	ZHOU PU 98
OU YA 8	RONG ZHOU	TIAN YUE 1	ZHOU YU 5
PU YUAN 707	RUN DA 601	TIAN YUE 2	ZHOU YU 6
PU YUAN 711	RUN DA 602	WAN XIN 7	ZHOU YU 7
PU YUAN 713	RUN DA 605	WAN XIN 76	ZHOU YU 8
PU YUAN 715	RUN DA 607	WANXIN32	ZHOU YU 901
PU YUAN 716	RUN DA 610	WANXIN38	ZHOU YU 902
PU YUAN 718	RUN DA 618	WANXIN87	ZHOU YU 905
PU YUAN 719	RUN DA 677	WEI YU 16	ZHOU YU 906
PU YUAN 720	RUN DA 806	XIN JI LI 15	ZHOU YU 907
PU YUAN 721	RUNDA 18	XIN JI LI 16	ZHOU YU 908
PU YUAN 755	RUNDA 25	XIN JI LI 56	ZHOU YU 915
PU YUAN 768	RUNDA 603	XIN JI LI LENG 6	ZHOU YU 916
PU YUAN 775	RUNDA 613	XING WANG 111	ZHOU YU ER HAO
PU YUAN 777	SHUN XING 17	XING WANG 222	ZHOU YU YI HAO
PU YUAN 802	SHUN ZHOU 811	XING WANG 333	ZHOUHONG YUAN 16
PU YUAN 803	SHUN ZHOU 815	XINHAILENG1	ZHOUHONG YUAN 7
PU YUAN 805	SHUN ZHOU 817	XINHAILENG2	ZHOUPU818
PU YUAN 806	SHUNHANG86	YING HAI 798	ZHOUYU917
PU YUAN 807	SHUNZE 958	YONG FA YUN 12	ZHOUYU918
PU YUAN 808	SHUNZE58	YUAN SHENG 6	ZHOUYU919
PU YUAN 811	SHUNZE6	YUANJIA1	ZHOUYU920
PU YUAN 816	SHUNZE677	ZHANHAI005	ZHOUYU921
PU YUAN 817	SHUNZE68	ZHANHAI006	ZHOUYU922



<b>China</b>	<b>Panama</b>	<b>Panama</b>	<b>Panama</b>
ZHOYOU925	ANDALUCIA CARRIER	KAI DE	TIARA 108
ZHOYOU926	ANGARA	KANO REEFER	TRITON REEFER
ZHOYOU927	ANGEL 101	KHANA	VIVA 106
ZHOYOU928	ANGEL 106	LADY TUNA	YONG XIANG 3
ZHOYOU929	ANGEL 118	LIAOYOU REEFER 1	YONG XIANG 9
ZHOYOU930	ANGEL 22	MABAH	ZHONG XIE 8
<b>Cook Islands</b>	ANGEL 29	MEITA MARU	<b>Peru</b>
AKANUI	ANGEL 33	MING HANG 5	CARACOL
B PACIFIC	ANGEL 38	MING HANG 7	COSTA DEL SOL
CHANG SHENG 36	ANGEL NO.1	MYLO	<b>Russia</b>
HAI SOON 26	ANGEL NO.2	NEW HARMONY	ADMIRAL SHABALIN
HAI SOON 39	ANGEL NO.6	NEW SMILE	KOMANDOR
HAI SOON 61	AT GLORY	NEW TAKATSUKI	<b>Chinese Taipei</b>
PROGRESS 10	AT LUCKY	NO. 1 BARON	SHENG HONG
<b>Curacao</b>	BAO LUCKY	NO. 2 POHAH	SHUN TIAN FA NO.168
ORANGE STREAM	BAO WIN	NO.1 POHAH	
PRINCE OF SEAS	BOYANG BERING	OCEAN CRYSTAL	
SIERRA LAUREL	CONCORD EXPRESS	OCEAN SPLENDID	
WATER PHOENIX	COOL GIRL	OCEAN STAR 86	
<b>European Union</b>	FENG YU	PROCYON	
TRONIO (ESP)	FRIO HELLENIC	PROSPERITY 12	
MARGIRIS (LTU)	FRIO IONIAN	QI HANG	
COOL EXPRESO (NLD)	FRIO MARATHON	RYOMA	
ANNELIES ILENA (POL)	FRIO STAR	SEA GLORY II	
<b>Liberia</b>	FULL KUO SHIN	SEA PEARL I	
ACONCAGUA BAY	GRANADA CARRIER	SEA REEFER	
HE SHUN	HAI FENG 618	SEA STAR V	
WEI NING	HAI FENG 668	SEA TRADER I	
<b>New Zealand</b>	HAI FENG 678	SHEN JU	
AMALTAL COLUMBIA	HAI FENG 718	SHIN HO CHUN NO. 101	
AMALTAL EXPLORER	HAI FENG 728	SHIN HO CHUN NO. 102	
JANAS	HAI GONG YOU 303	SHUN HANG	
MANAKAI	HAI GONG YOU 306	SHUN ZE LENG 6	
SAN AOTEA II	HAI GONG YOU 309	SHUN ZE LENG 7	
SAN ASPIRING	HAI JI LI	STAR SPIRIT	
SANTA MARIA	HARIMA	TAI FU NO. 1	
SARDA	HARU	TAI FU NO. 3	
TANGAROA	HE TAI	TAI NING	