

Original: English

Paper reference	Working paper 7
Title:	Integration of regional fisheries and aquaculture data
Author(s):	SPC FAME Secretariat

Summary/short description/key points:

The Pacific Fisheries Ministers at the 4<sup>th</sup> Regional Fisheries Meeting and the 15<sup>th</sup> SPC Heads of Fisheries emphasised the need for all stakeholders—including government agencies, non-governmental organisations (NGOs), civil society organisations (CSOs), and non-state actors (NSAs)—to collaborate and work towards bolstering national and regional-level efforts in fisheries and aquaculture data collection, analysis, and reporting.

This paper provides a summary of the work undertaken by SPC FAME over the last couple of years in the development of integrated data systems and tools that enhance members' access to their oceanic and coastal fisheries data and highlights specific areas of future work.

Recommendations:

- Discuss the preferred approach for collecting, curating, analysing, and disseminating data related to national coastal fisheries and aquaculture.
- Endorse the development strategy for a unified electronic application (e-application) dedicated to data collection from coastal fisheries, leveraging the strengths of Ikasavea and TAILS.
- Review the SPC data policy and confirm any necessary updates (annex 1).
- Endorse the approach to provide training for members upon launching the updated country webpages in the second half of 2024.

## Rationale

1. SPC's HoF15 supported SPC FAME to continue to invest in innovation and research that enhance capacity and capability of members in addressing critical issues in data collection and curation, analysis and dissemination.
2. The 6<sup>th</sup> Regional Technical Meeting on Coastal Fisheries and Aquaculture (RTMCFA6) underscored the importance of enhancing data integration systems and tools to bolster data collection, analysis, and management. Key actions directed at SPC FAME included the continuation of support for members in coastal fisheries data endeavours, scaling up the use of e-data tools, facilitating knowledge exchange among countries to share best practices, and improving regional monitoring.
3. Recommendations for the SPC Heads of Fisheries emphasised the development and implementation of annual workshops to bridge capacity gaps in data handling and the establishment of peer-to-peer exchanges to foster collaborative learning and knowledge sharing among Pacific Island countries and territories.
4. During the Fourth Regional Fisheries Ministers Meeting (RFMM4) in Majuro, Marshall Islands in 2023, ministers highlighted the critical need for improved data collection, analysis, and reporting mechanisms in fisheries and aquaculture. They underlined the essential role of traditional knowledge and management approaches in effective fisheries management. To enhance national efforts, ministers stressed the importance of collaboration among a wide range of stakeholders, including government agencies, non-governmental organisations (NGOs), and other non-state actors (NSAs) to enhance national efforts in data integration and utilisation. This collaborative approach is pivotal for the sustainable management of fisheries and aquaculture, facilitating the integration of data systems and tools utilising both modern and traditional practices, and ensuring the robustness and effectiveness of management strategies.

## Tuna fisheries data

5. The framework for tuna fisheries data collection and curation has been developed over time to ensure the requirements of assessment and management of the regional tuna fishery can be supported. Developments over the last few years have included the roll out of TUFMAN2 and 'retirement' of the Dorado system, thereby consolidating national data and queries into one platform accessible by all members that can be used to extract data and run pre-developed queries for data summaries.
6. TUFMAN2 reporting interface offers a unique way of searching for specific reports, using a set of keywords on gear type, data type, species, or specific predefined keywords.

TUFMAN 2 | Logsheet | Observer | EM | Port | Artisanal | VMS | Reports | ACE | Ref tables | Security | Logs | Tools | Help | emmanuel@spc.int | 19 Mar 2024, 13:54 | FM

Report definitions / List 326 + Create new report definition

Filter list of reports

Gear: ☐ #longline ☐ #purse-seine ☐ #pole-and-line ☐ #artisanal

Data type: ☐ #logsheet ☐ #observer ☐ #unloading ☐ #port-sampling ☐ #debriefing

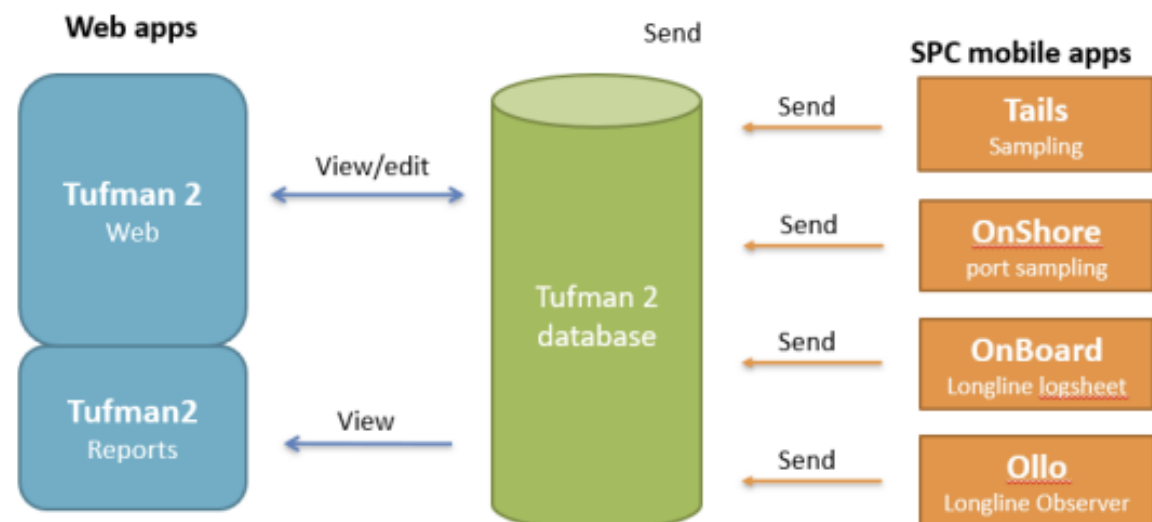
Species: ☐ #tuna ☐ #all-species ☐ #by-catch

Keyword: ☐ #my-EEZ ☐ #admin ☐ #coverage/missing-data ☐ #by-vessel ☐ #by-set ☐ #CMM ☐ #data-quality ☐ #compliance ☐ #e-reporting ☐ #e-monitoring ☐ #national-fleet ☐ #ACE ☐ #custom

Report #	Report title	Preview	Additional display	Enabled for...	Special DB	Required modules	Dorado ref	Entry by	Hide r...	Last edited	Last edit by	
3078	#artisanal ARTISANAL - Number of active vessels			MH, FM, CK, KI, TO, WS, PF, NR, NU, TV, VL	Artisanal		2	andrewh@spc	<input type="checkbox"/>	28 Mar 2023 11:2	andrewh@spc	
3306	#by-vessel, #national-fleet List of NATIONAL FLEET Vessels (Flag of Registration and Ch...			OFF, MH, FM, CK, UST, NC, KI, TO, WS, PF, I	VMS		0b	andrewh@spc	<input type="checkbox"/>	26 Oct 2021 12:0	brunod@spc	
3421	#debriefing, #observer DEBRIEFING - PS Score Summary by Year and Flag			OFF, MH, FM, CK, UST, NC, KI, TO, WS, PF, I	Observer	Observer	2	andrewh@spc	<input type="checkbox"/>	15 Nov 2021 17:3	colleyf@spc	
3424	#debriefing, #observer DEBRIEFING - LL Score Details by Year and Flag			OFF, MH, FM, CK, UST, KI, TO, WS, NR, PG	Observer	Observer	5	andrewh@spc	<input type="checkbox"/>	21 Mar 2022 08:2	colleyf@spc	
3423	#debriefing, #observer DEBRIEFING - PS Score Details by Year and Flag			OFF, MH, FM, CK, KI, TO, WS, NR, PG, TV, V	Observer	Observer	4	andrewh@spc	<input type="checkbox"/>	22 Mar 2022 10:0	colleyf@spc	
3378	#debriefing, #observer DEBRIEFING - PS Scores by categories			OFF, MH, FM, CK, UST, NC, KI, TO, WS, PF, I	Observer	Observer	1	andrewh@spc	<input type="checkbox"/>	13 Nov 2023 13:4	aureli@spc	
3422	#debriefing, #observer DEBRIEFING - LL Score Summary by Year and Flag			OFF, MH, FM, CK, UST, NC, KI, TO, WS, NR	Observer	Observer	3	andrewh@spc	<input type="checkbox"/>	18 Oct 2021 14:4	colleyf@spc	
3002	#logsheet, #api FFA LOGSHEET DATA API REPORT			MH, FM, CK, TO	Logsheet		77a	andrewh@spc	<input type="checkbox"/>	08 Oct 2021 14:1	brunod@spc	
3004	#logsheet, #api FFA LOGSHEET DATA API REPORT 2			MH, FM, CK, TO	Logsheet		77b	andrewh@spc	<input type="checkbox"/>	08 Oct 2021 14:1	brunod@spc	
3045	#logsheet, #artisanal, #by-vessel ARTISANAL - Total catch by vessel, landing site, vessel type...			MH, FM, CK, KI, TO, WS, PF, NR, NU, TV, VL	Artisanal		1	andrewh@spc	<input type="checkbox"/>	28 Mar 2023 11:1	andrewh@spc	
3330	#logsheet, #artisanal, #coverage ARTISANAL - Data collector report - tally of number of fish/I			FM, CK, TO, WS, NU, TV, VU, TK, FJ	Artisanal		99	andrewh@spc	<input type="checkbox"/>	06 Oct 2021 15:5	andrewh@spc	
3305	#logsheet, #by-vessel, #national-fleet List of NATIONAL FLEET Vessels (Flag of Registration and C...			OFF, MH, FM, CK, UST, NC, KI, TO, WS, PF, I	Logsheet/VMS		0	andrewh@spc	<input type="checkbox"/>	20 Apr 2023 10:0	brunod@spc	
3010	#logsheet, #CMM Part1 - Annual POLE AND LINE catch and effort estimates by			MH, FM, CK, UST, KI, TO, WS, NR, NU, PG, I	Live	Logsheet	11c	andrewh@spc	<input type="checkbox"/>	08 Jul 2022 10:55	benoitp@spc	
2972	#logsheet, #CMM Part1 - Table 1/Figure 1 - POLE AND LINE - Annual catch and		Chart	MH, FM, CK, UST, KI, TO, WS, NR, NU, PG, I	Live	Logsheet	1c	andrewh@spc	<input type="checkbox"/>	07 Apr 2022 12:0	benoitp@spc	
3435	#logsheet, #data-quality DQ1c - POLE and LINE logsheet - DUPLICATE trips			FM			1	andrewh@spc	<input type="checkbox"/>	18 Oct 2021 08:5	emmanuel@spc	

TUFMAN2 based reporting interface.

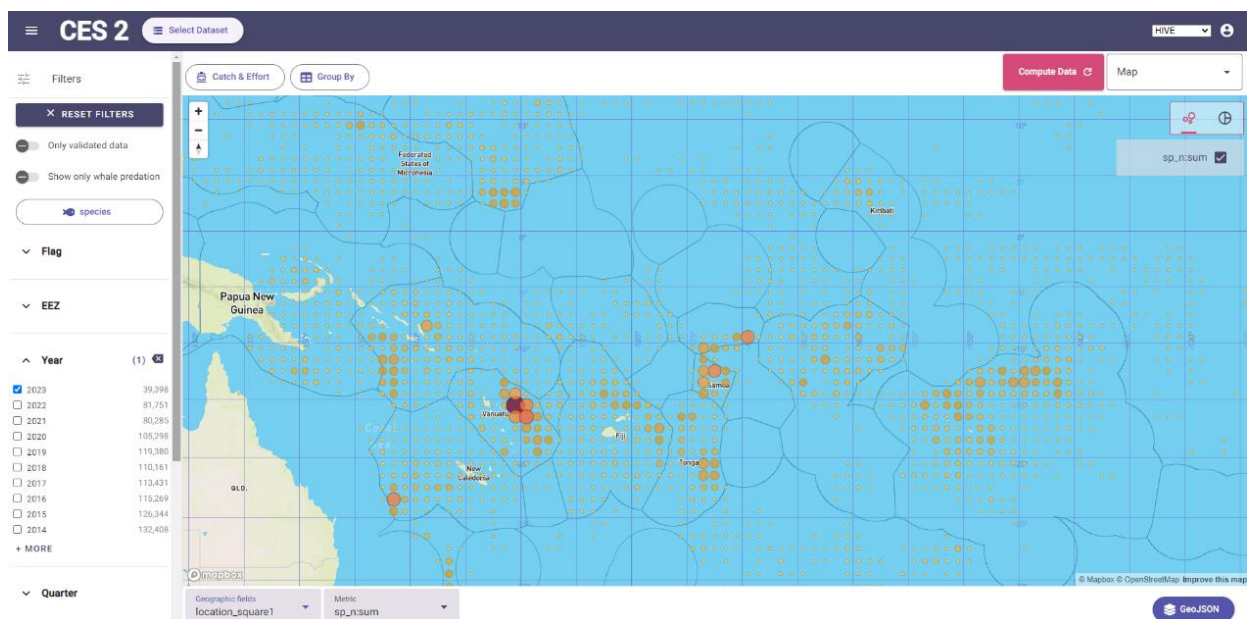
7. The framework has evolved with the growing use of electronic reporting systems for data collection, including those developed by SPC<sup>1</sup> (e.g. Onboard – e-reporting of logsheet data, Ollo – e-reporting of longline observer data, Onshore – e-reporting of port sampling data), and other regional systems (e.g. PNA FIMS).



Integration of various tools with TUFMAN2.

<sup>1</sup> Detailed description and functions of each application developed are SPC can we found in [Information Paper 2 – E-reporting. E-Monitoring AI, 14<sup>th</sup> SPC Heads of Fisheries Meeting](#)

8. TUFMAN2 is now receiving daily data from several Electronic Reporting (ER) providers (ex. IFIMS). We are currently working with them to automate the reception of more ER data in a near future (ex: Longline data)
9. SPC FAME has continued to update the Catch and Effort query System (CES2) to modernise the underlying platform. CES2 now incorporates a web-based approach to allow live data to be queried and displayed. More data sources have been added to the system, such as the Annual Catch Estimates. The web interface has been refined and now provides an upgraded mapping module, allowing to display geo-referenced data in various ways (graduated circles, pies). Finally, CES2 and TUFMAN2 have been interconnected, to allow the direct linking to TUFMAN2 logsheet trips, when possible.

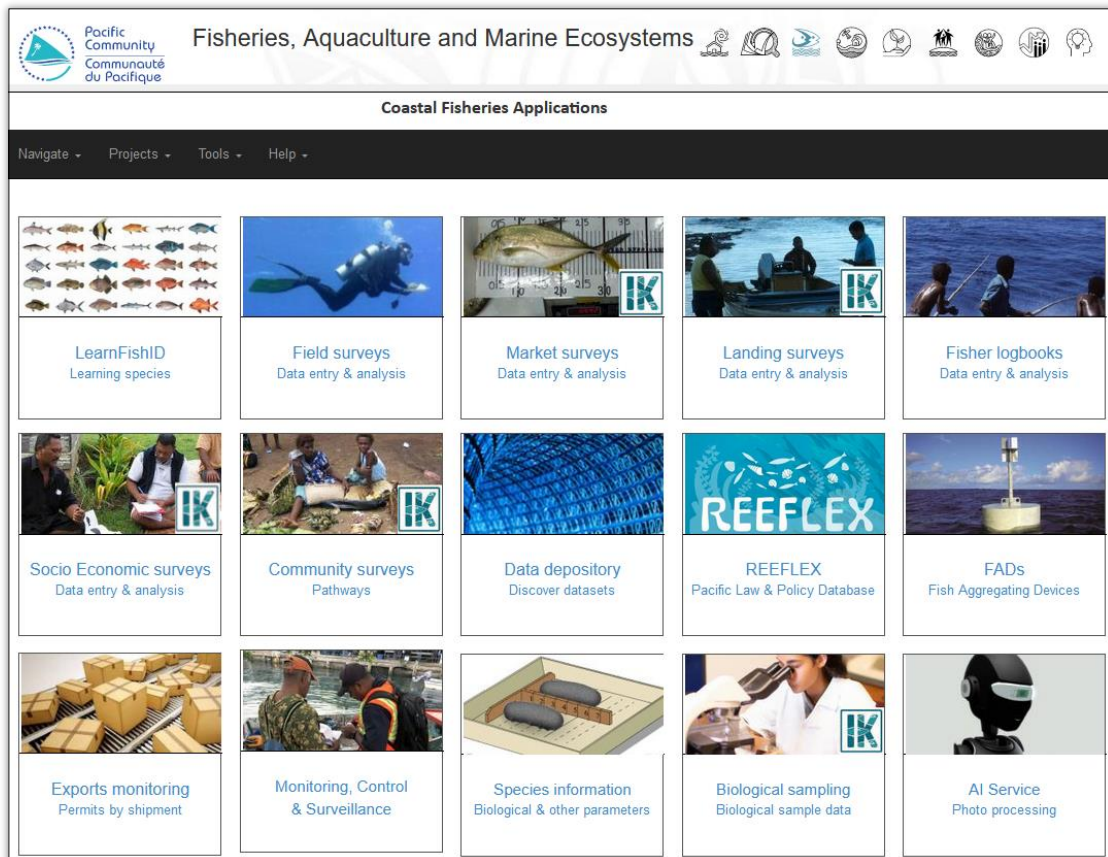


*CES2 Query interface and mapping module*

10. The calculation of Annual Catch Estimates has been refined and is now included as a separate module of TUFMAN2. This has enhanced the ability of Member Countries to evaluate their annual catches.

## Coastal Fisheries data

11. Coastal fisheries and aquaculture is a broad domain that encompasses hundreds of fish and invertebrate species but also other aquatic species such as seagrasses and cultured seaweeds, corals and even mangrove health assessments. Survey methodologies and software applications have been gradually developed over the last 20 years to collect fisheries dependent and independent data, from underwater stock assessments to fisheries catch and exports, but also biological sampling, monitoring controls and surveillance and socio-economic surveys.
12. All these types of surveys have been integrated into a single web application portal that provides different modules to authorised users for online data entry, validation and analysis through pre-defined queries and reports. It provides access to fisheries authorities and other entities (NGOs, universities, partners) to their respective current and legacy data (when curated by SPC) since 2001. Security is managed by authority and can be fine-tuned for individual users and/or surveys to restrict or allow access to data as requested by the data owner.



13. Along with the web application portal, the Ikasavea mobile application has been developed to ease fisheries and socio-economic offline data collection through the use of electronic forms and pictures of fishes and invertebrates on a measuring board or calibrated mat. Data are synchronised with the website at a later time and pictures analysed with the assistance of artificial intelligence: since 2019, more than 180,000 catch photos have been submitted and processed (115,000 photos just for 2023). Associated models are periodically retrained and improved to cope with new species and additional mat/photo types as used by our partners.
14. Existing modules continue to be extended when required to add extra fields and features. The landing survey module in particular is currently extended to include additional data fields currently available in TAILS but not in Ikasavea to allow for a future merge of the two applications. The coastal fisheries and aquaculture programme also works on extending visualisation and reporting capabilities of the portal and explores interfacing with third-party tools to transform size and catch data into management measures.
15. Finally additional online modules are in development for aquaculture (hatcheries and farms), FAD registration and buoys data and will be made available during the year to bridge some of the identified data gaps. Some new mobile applications are also planned to be developed, tailored for fishers and aquaculture farmers, to complement data collected by national authorities with Ikasavea.





16. It is important to note that SPC FAME provides long term support to these online and mobile applications in addition to the curation of member countries data, beyond the lifetime of donor funded projects. This is usually not the case for other solutions that are tied to projects and for which long term maintenance costs are not provisioned and supported by member countries. When such a system is adopted, we encourage national agencies to enquire about software maintenance, web hosting and equipment costs and long-term support but also about ownership and availability of the data during and after the end of the project, potentially with a fallback option using SPC FAME supported systems.

## SPC FAME data governance policy

17. The SPC FAME data governance policy (<https://purl.org/spc/digilib/doc/o4wf6>) was developed in collaboration with members to provide a framework for how SPC handles any fisheries, aquaculture and marine ecosystems related data, and covers data ownership, security, data sharing, integration and dissemination. It came into effect on 1 January 2022. One member requested that future HoF meetings be given the opportunity to provide feedback on the appendices of the policy after implementation with the expectation that they may need to evolve over time.

SPC FAME has reviewed the Appendices of the document, and three additional data sources have been added to Appendix A: FAD sonar data, Transshipment data, and cannery receipts.

SPC has started to receive and manage these data, and therefore, they have been added to Appendix A to provide members with a comprehensive view of the managed data assets as well as the risk and data sharing rules associated with each.

## Country webpages

18. The secure country webpages were developed around 10 years ago to house data summaries, national reports and other country-specific products in one password-protected location. These have been updated regularly to reflect the latest information available. However, their utility has been relatively limited, due to issues such as national staff turnover and lost passwords.
19. Under the GEF OFMP3 project, SPC has issued a tender for a consultant to enhance data-driven decision-making. SPC seeks to simplify reporting procedures and foster an analytical culture, favouring visualisation tools that are user-friendly and adaptable. This initiative will involve creating Power BI embedded web applications and cloud-based R-Shiny dashboards, empowering SPC members to personalise and analyse their country-specific data more independently in the long term.
20. SPC places a high priority on keeping its raw data on-premises within the current SPC ICT environment. This approach enables SPC to retain tight control over the infrastructure, ensuring the ease and speed of customising data models. Additionally, it allows SPC to manage the registration and authentication process for member portals. It is anticipated that training will likely be necessary for members once the new webpages are live, with the anticipated launch expected in the second half of 2024.

## Ikasavea and TAILS

21. CFAP and OFF have developed e-systems to enhance data collection from artisanal fisheries at markets and landing sites.
22. **Ikasavea** is a mobile application that allows authorised users to collect market, landing, community, socio-economic and biological sampling data in relation with coastal fisheries through electronic forms and pictures while offline and synchronise data with the coastal applications portal at later time for validation, analysis and reporting.
23. **TAILS** is a smartphone and tablet application that allows coastal fisheries staff to easily collect tuna and reef fish catch information from small-scale fishers in remote locations and send it instantly back to the main office for analysis, even when internet connectivity is limited. It utilises TUFMAN 2 to report on and manage the data.
24. The similarities in the usage case for these two applications was noted by SPC and has been raised by members. Following internal SPC FAME discussions, the decision has been taken to utilise the strengths of both applications and amalgamate them into one. The fields that exist in TAILS and not in Ikasavea such as fishing costs or FAD number will be added to the Ikasavea landing module, and FAD and artisanal boat registration will be transferred to the coastal fisheries applications' portal.



25. The joined landing survey electronic form will provide the possibility to enter the same data as with TAILS in Ikasavea but also allows for use of mat and measuring board pictures and retains the possibility to record detailed specimen information (multiple size measurements, weight, product type, maturity etc which are required for invertebrates and biological sampling).