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Summary/short description/key points:

This paper outlines work priorities for 2022 for the Pacific Community (SPC) Fisheries, Aquaculture and Marine Ecosystems (FAME) Division. Longer term strategic directions and emerging work areas are outlined in Working paper 3 (WP3) - draft FAME business Plan 2022–2027. This paper also outlines key work programmes in 2022 to address recovery from the impact of COVID-19 in the region. FAME notes that work programmes will continue to evolve as the region slowly opens its borders as it transitions from the COVID-19 mitigation responses.

Recommendations:

Members are invited to:

- review the priorities and emerging work areas for 2022;
- make suggestions where necessary; and
- endorse the priorities and emerging work areas.

## Introduction

1. The implementation of the new *Business Plan* for Fisheries, Aquaculture and Marine Ecosystems (FAME) will commence in 2022 after endorsement by the 14<sup>th</sup> SPC Heads of Fisheries Meeting to support the transition from the shocks of COVID-19, and inline with SPC's new *Strategic Plan 2022-2031* approved by the 51<sup>st</sup> CRGA in November 2021. The new Business Plan sets the higher-level outcomes expected from the Division's work, goals, objectives, and results for the period of 2022-2027. The overall goal is *that the fisheries and aquaculture resources of the Pacific region are resilient, and managed sustainably for economic growth, food security, cultural and environmental conservation.*
2. FAME continues to work towards this goal through the new *Business Plan* objectives:
  - Enhance strategic oversight, efficient operational systems, partnership, and collaboration with other SPC divisions, our members, and partners;
  - Provide, and facilitate access to and interpretation of fisheries, aquaculture, and marine ecosystems information and knowledge;
  - Enhance data collection and provide data management services for fisheries, aquaculture, and marine ecosystems.
  - Provide scientific research, analysis, and advice for evidence-based fisheries management;
  - Strengthen the contribution of Pacific islands aquaculture and fisheries toward sustainable, bio-secure, equitable and more secure food systems;
  - Identify diverse and sustainable livelihood options for SPC member PICTs; and
  - Support the development of national capacity and enhance capabilities in fisheries and aquaculture among PICTs.
3. The objectives provide the framework for development of workplans for the key programmes of FAME, the Coastal Fisheries and Aquaculture Programme (CFAP) and the Oceanic Fisheries Programme (OFP). The Office of the Director supports OFP and CFAP through the provision of information and knowledge management, communication, planning and monitoring, evaluation, and learning.
4. FAME supports members' needs by generating science and knowledge, innovation, enhancing individual and institutional capacity, and building trusted relationships through culturally and contextually responsive ways to support sustainable management of regional and national fisheries and aquaculture resources.
5. The ongoing impact from COVID-19 and slow re-opening of borders by the member countries has enable FAME to adjust its work programmes this year to respond better to member needs.
6. In this paper, we provide an outline of the key priorities to be addressed by FAME sections and units over the coming year inline with directions set out in the new *FAME Business Plan 2022–2027.*

7. The fisheries and aquaculture sector in the region is undergoing rapid changes due to both regional dynamics and global trends related to climate change, COVID-19, food security, population growth and a shifting geopolitical landscape. These changes require FAME to have strategic foresight and to position itself to serve the needs of members and navigate these challenges in support of national priorities, regional frameworks and SPC's strategic plan.
8. An emerging priority for FAME has been to plan for a post-COVID-19 world, including some forms of hybrid (virtual and in-person) approaches to delivering support to members, especially accounting for the variable rates of PICTs returning to the "new normal".
9. FAME has recently implemented a member request tracking and management system (Information Paper 8) that will ensure member requests are prioritised, tracked and responded to in a timely and efficient way.

## Key priorities of the FAME Director's Office

10. The FAME Director's Office (DO) provides strategic oversight of the Division's work, supports operational efficiencies, facilitation, and coordination of high-level stakeholder engagement, supports One SPC through integration, collaboration, communication, and partnership. In addition, the Director's Office, in partnership with SPC's Integration and Resource Mobilisation section, develops funding and partnership opportunities and ensures that FAME is well integrated with the rest of SPC through involvement in corporate-level planning and decision making. The Office incorporates two functions that work across the Division's two substantive programmes – the Fisheries Information and Knowledge Section, and the PMEL Unit (including communication, programme planning and resource mobilisation).

### *Fisheries Information and Knowledge Section*

11. The Fisheries Information and Knowledge Section supports objective 2 of the new draft *FAME Business Plan 2022–2027*. In summary, the Section develops and facilitates access to, and interpretation of fisheries information and knowledge products in collaboration with other FAME sections, as well as with, and for, all members. It also collects, organises and disseminates relevant fisheries information, mainly to assist members to achieve SDG14: Conserve and sustainably use the oceans, seas and marine resources.
12. The priority work being conducted by the Section includes:
  - The production of reference newsletters and information bulletins that provide a current look at some of the most exciting research and case studies on marine-related topics of interest to the region: the tri-annual *SPC Fisheries Newsletter* and two-yearly Information Bulletins (*Women-in-Fisheries* and *Beche-de-mer*).
  - The production of scientific and technical reports to assist members and other FAME sections, as well as other paper-based information tools such as posters, brochures, leaflets and manuals.

- The provision of fisheries-related information in response to specific needs expressed by members or as a response to needs identified at the regional level, using all available media, including Internet, web applications, social media, etc.
- The production of tailor-made information for communities, in line with the New Song recommendations, using a wide range of materials combining print with more interactive tools such as videos, animated films dubbed in local languages and social media.
- The production of training videos as pre-learning tools for online workshops aiming at reinforcing capacity of Pacific Island fisheries officers and associated networks.
- The elaboration of national information strategies in collaboration with member countries and territories to refine their communication strategies to enhance community engagement, elevate local voices, and support social and behaviour change efforts. The objective is to significantly increase the delivery of information on sustainable coastal fisheries management to communities. This approach has been undertaken in collaboration with the LMMA Network for the Melanesian countries.

### *Planning, Monitoring, Evaluation and Learning (PMEL) Unit*

13. The FAME PMEL Unit supports the FAME Division in MEL, communication and visibility, donor and corporate reporting, project scoping and design, strategic foresight and planning, resource mobilisation, budget tracking, facilitation and learning from within FAME as well as undertaking broader strategic planning and learning.
14. Priority work areas for FAME PMEL unit in 2022 includes:
  - **Internal MEL systems and support** is provided to enhance evidence generation on FAME's work areas and communicate results to members and stakeholders, while improving systems, tools, standards, and processes, building MEL capability and capacity within FAME. This includes supporting FAME's new *Business Plan 2022-2027*.
  - **Integrated MEL in One SPC:** The PMEL Unit supports and works with the broader SPC MEL focal points led by the Strategic Planning and Learning section in delivering integrated MEL services.
  - **Communication:** Priorities for communication include the development and implementation of the communication strategy for the Division, improved visibility, and communication of FAME's work areas to members and partners, enhancing the ongoing collaboration and network with CROP agencies, donors, and stakeholders. It also includes cohesive messaging on other common concerns for the region, such as the Food Systems, Climate Change, and the Blue Pacific.
  - **Programme Planning:** Priorities of this work includes facilitation, coordination, and oversight of high-level stakeholder engagements – such as the SPC Heads of Fisheries Meetings and the Regional Technical Meeting on Coastal Fisheries and Aquaculture (RTMCFA) and the Regional Fisheries Ministers Meeting (RFMM). Support annual and long-term planning within FAME sections, including the development and implementation of the *FAME Business Plan 2022-2027* and integrated programming within SPC. In addition, it supports FAME's overall budget tracking.

- **Resource Mobilisation:** Priorities of this work include grants and project tracking and document management, concept and proposal writing, and support to SPC's Integration and Resource Mobilisation Section.
- **Pacific Fisheries Leadership Programme (PFLP):** PMEL's work includes ongoing programme management, budget management and MEL oversight, facilitating learning and sharing, engagement and collaboration with participants, consortium members and the Steering Committee for the PFLP.

## Key priorities and emerging areas of the Coastal Fisheries and Aquaculture Programme (CFAP)

15. The Coastal Fisheries and Aquaculture Programme (CFAP) provides science and technical support to Pacific Island Country and Territory (PICT) governments and administrations to enhance the management of coastal fisheries, and the sustainable development of aquaculture and nearshore livelihoods. CFAP supports and implements all seven of the FAME Business Plan objectives.
16. CFAP priorities are captured in the recently completed CFAP 5-Year Plan and also guided by members requests and the frameworks and strategies in the "[New Song for Coastal Fisheries – Pathways to Change: The Noumea Strategy](#)", the coastal fisheries component of the "[Future of Fisheries: Regional Roadmap for Sustainable Pacific Fisheries](#)", [Pacific Framework for Action on Community-based Fisheries Management](#) and the "[Regional Framework on Aquatic Biosecurity](#)"<sup>1</sup>. Activities are supported by key donors, including Australia, New Zealand, European Union, Sweden and the United States, and implementation is frequently in partnership with non-government organisations, civil society organisations, communities, universities and, increasingly since COVID-19 related restrictions, locally and regionally based consultants.
17. CFAP will implement its new 5-year plan commencing in the second half of 2022. The 5-Year Plan guides CFAP's work to better support governments and administrations to effectively manage and equitably benefit from their coastal fisheries and aquaculture resources, though the use of emerging technologies, community engagement, evidence-based management, and people-centred approaches.
18. In the third quarter of 2021, the CFAP restructured into three sections: Aquaculture; Coastal Fisheries and Aquaculture Science; and Coastal Fisheries Management and Livelihoods. These sections are supported by two cross-cutting areas: Coastal Fisheries Information and Data – providing database and information service support and advice; and Coastal Fisheries Economics – providing economic advice, analysis and assessment of fisheries and aquaculture data and projects.
19. 2022 will be the first year of full implementation of the two Coastal Fisheries and Aquaculture flagship projects: Sustainable Coastal Fisheries and Aquaculture for Pacific Livelihoods, Food

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<sup>1</sup> [Links: <http://purl.org/spc/digilib/doc/b8hvs>; <http://purl.org/spc/digilib/doc/xnc9f>; and <http://purl.org/spc/digilib/doc/23nkb>]

and Economic Security (SCoFA); and the Pacific Coastal Fisheries Management and Compliance (PCFMC) project. These are in addition to the ongoing Australian and New Zealand Government's programme funding to FAME, and the coastal component of the current European Union/Sweden funded PEUMP Programme. This year CFAP will implement an interactive donor-project 'mapping' tool that clearly indicate what activities are actively supported by which donor(s), and to highlight where there are still gaps in support of priority activities.

20. The 4<sup>th</sup> SPC Regional Technical Meeting on Coastal Fisheries and Aquaculture (RTMCFA4), including the first Community-Based Fisheries Dialogue (CBFD), were held online using a virtual platform in October 2021. Full report on the outcomes and actions in HoF14 *Working Paper 5 and Background Paper 2*.

### *Coastal Information and Data*

21. The priority work areas the Coastal Fisheries Information and Data team for 2022 includes:
  - Support to PICTs through developing formal online training courses; providing training on market/landings/socio-economic surveys using Ikasavea and web modules; training on the Monitoring, Control and Surveillance module; and on the Reef Fisheries Integrated Database (RFID) and other web-based modules. Responding to member requests for country specific database support and training, including addressing legacy databases and migrating and decommissioning old databases.
  - Small-scale fisheries catch data collection through the use of photos and tablet applications (TAILS and Ikasavea). Further development is underway to facilitate the synchronisation of data between offline and online tools, and to provide access to outputs and results to participating members.
  - Using artificial intelligence and machine learning tools to analyse photos of fishes and invertebrates on a measuring board or on a mat to semi automatise data entry by predicting species, reading scales, and calibrating images for length measurements. As more images are acquired and validated, models will be able to recognize a larger number of species and be tuned to various settings
  - A web/tablet module has been further developed for invertebrate catch data specificities of invertebrate fisheries (seasonality and fishing habits; specific types of measurements). It will complement the online module for underwater surveys.
  - PICT specific fisheries and aquaculture related documents have continued to be scanned and remote support provided to several member-managed knowledge bases to promote the accessibility of scientific knowledge to national fisheries staff.
  - Current knowledge of the biology, exports and regulations of targeted species is being collated by experts and will be presented in an online database that is in development, along with tools derived from these parameters (such as, weight and length conversions between wet and processed product; suggested minimum size derived from species traits).

- In order to improve the mapping and monitoring of the benthic habitat in relation to coastal resources, large photographic underwater surveys have been conducted to complement classification from satellite imagery. Artificial Intelligent (AI) is being used for computer assisted image classification of both still and video images.
- A Monitoring, Control and Surveillance (MCS) online module to record infringements has been developed rolled out and is currently being trialled. With the increase in coastal fisheries activities in the region due to COVID-19 related restrictions, the ongoing development of this module is a high priority.
- Online training (data acquisition, entry and analysis) tools and access to the latest information continues to be developed on a fishery-by-fishery basis, to provide web-based self-service tools for the various stakeholders.
- An online module is in development to assist planning and deployment of anchored Fish Aggregating Devices (a-FADs), to complement the SPC manual on anchored FADs released in 2020.
- An emphasis on the development of web modules for quality control, predefined and customised queries, and statistical analyses to ease data flow between members and SPC, as well as the assessment and cleaning of data and accessibility to scientific outputs (self-service and expert advice).
- Tools and methodologies for to traceability of commercial products will be explored to improve the monitoring of levels of exploitation and allow enforcement of coastal fisheries-related quotas at a local scale. Processed sea cucumber species images will be used to produce training/support tools for enforcement officers in identifying processed product species.
- The trialling of underwater video for deeper sea cucumber species stock assessments, assisted by computer vision analysis of the videos.

## *Aquaculture*

22. The priority work areas for the Aquaculture section in 2022 include:

- Enhancing regional and national capacity in aquaculture policy, planning, MCS and legislation to facilitate the establishment of clear priorities for aquaculture to meet current and future needs, especially post COVID-19 impacts. This includes: conducting a Regional Aquaculture Assessment and initiating a process for the formulation of a Pacific Regional Aquaculture Strategy (see working paper 6); providing expertise and technical support to members on the development of new and a review of existing national aquaculture development and management plans; providing technical support to members on the development and/or review of commodity specific policy and action plans; and providing technical support to members in the area of aquaculture and aquatic biosecurity legislation/policy/plans.
- Providing direct (in Fiji and New Caledonia) and remote technical and analytical support for aquaculture to facilitate production and economic sustainability, including:



- Strengthening members' capacity and technical constraints in feed, seed and broodstock management, including further developing the 'cluster approach' to support small operators better manage coronavirus impacts on aquaculture.
- Providing technical support to improve aquaculture infrastructure.
- Supporting private sector development through capacity-building and technology transfer to increase efficiency of enterprises and up-scale their production.
- Improving remote networking and collaboration, technology, research, skills transfer and technical advice.
- Strengthening business skills, knowledge and information on aquaculture operations through mentoring and training.
- Strengthening economic and market assessments for viable aquaculture commodities and products, including identifying and facilitating the shift to domestic markets to compensate for COVID-19 trade impacts.
- Enhancing the management of aquatic biosecurity risks, including: supporting the application of the Regional Framework on Aquatic Biosecurity; supporting members to strengthen risk analysis capacity and assess their aquatic biosecurity needs and practices, especially as impacted by the COVID-19 related travel, trade and isolation restrictions; supporting members to improve aquatic biosecurity disease diagnosis, surveillance and reporting practices; strengthening national capacities of quarantine of live aquatic organisms; and supporting members to improve national infrastructure and operations for quarantine of live aquatic organisms.
- Developing online tools, training and support for improved governance in terms of policies, legislation, development and management plans. Absence of good governance and/or clarity on tenure slows development in aquaculture.
- Promote game-changing innovation and diversification in members' aquaculture production sectors by facilitating the acquisition of appropriate new technology and investments.
- Identify and foster aquaculture that is "climate-smart", by virtue of either being resilient to climate change or by helping to address climate change (such as by carbon sequestration).
- Expand current the 'cluster approach' to include supporting industry associations reach a critical mass through better information exchange, more efficient procurements, and coordinated marketing.
- Strengthen gender and social inclusion assessments to better understand family farming, especially the roles of women and youth in aquaculture.
- Provide support to members on web-based data applications to strengthen on-farm data collection and management.
- Improve engagement in aquaculture in the area of monitoring, control and surveillance, as well as capacity building in occupational health and safety in aquaculture farming operations.
- Strengthen leadership skills in commercial aquaculture farming operations.



- Target future work to support hatcheries for key commodities and low cost/low technology farming systems for livelihood aquaculture.

### *Coastal Fisheries Management and Livelihoods*

23. The priority work areas for Coastal Fisheries Management and Livelihood Section includes:

- Assisting members to strengthen coastal fisheries and aquaculture management arrangements, through support on reviewing and drafting policies, management plans, legislation and regulations, and training national fisheries officers and communities in Monitoring, Control, Surveillance and Enforcement activities.
- Expanding the coordination and support to members and partners in implementing effective CBFM scaling-up approaches within national contexts in line with the “Pacific Framework for Action on Scaling-up Community-based Fisheries Management”.
- On request, providing on-going support for reviewing and advising on CBFM programmes and projects.
- Providing oversight of the implementation of the PEUMP Programme LMMA Network CBFM activities in Melanesia.
- Developing and maintaining a Community-based Fisheries Management (CBFM) web portal to serve as an inclusive e-platform about CBFM in the region.
- Providing coordination, support, and promotion across the region for the scaling of community-based fisheries in PICTs.
- Supporting members with sustainable livelihoods opportunities, through strengthening national anchored FAD programmes and providing anchored FAD training workshops; capacity enhancement and support in safe, sustainable fishing methods; and developing non-extractive uses of coastal fisheries resources.
- Developing and maintaining an anchored-FAD web portal to improve members’ access to up-to-date anchored FAD design, development, deployment, monitoring and management information, tools, and training materials.
- Expanding current MCS training, capacity building and support activities at the national level to enable national fisheries MCS officers to train and support their counterparts in communities located on outer islands or in remote locations.
- Providing regular training and mentoring on legislative drafting for coastal fisheries and aquaculture, aimed at members’ fisheries policy and legal officers.

### *Coastal Fisheries and Aquaculture Science*

24. The priority work areas for Coastal Fisheries and Aquaculture Science section includes:

- Build the CFAP science capacity and capability to provide PICTS with requested support in:
  - Building the science foundations for a standardised, Pacific approach to sustainable, evidence-based coastal fisheries management.

- Utilising new tools (e-tools) and approaches for online data entry; standardised data collection; data and information quality control; and analysis and dissemination for use in management decision-making (see *Coastal Fisheries Information and Data* above).
- Working with members to assess and manage finfish and invertebrate resources and their associated habitats to inform management through resource assessments, data analysis, interpretation, training, mentoring and advice.
- Capacity enhancement support to members to conduct fisheries independent (in water surveys) and fisheries dependent (market and creel surveys) assessments, through developing online learning software and conducting virtual training for members' fisheries staff.
- Developing a series of “marine resource status” reports, similar to the recent [“Trochus in the Pacific Islands: a review of the fisheries, management and trade”](#) and [“Aquarium products in the Pacific Islands: a review of the fisheries, management and trade”](#), that can be maintained as easily-updatable web-based reports.

## Key priorities and emerging areas of the Oceanic Fisheries Programme (OFP)

25. The OFP supports objectives 3, 4, 6 and 7 of the draft *FAME Business Plan*. To summarise, OFP provides scientific advice on the status of stocks and impacts of fisheries and the environment on both target and non-target species and the pelagic ecosystem, conducts research on the biology and ecology of tuna and tuna-like species, provides technical support in the collection and management of data from fisheries, and provides capacity building opportunities to members across these fields of work.
26. OFP delivers its work to members both at the national level and through the various regional and sub-regional fisheries organisations of which they are members, including the Western and Central Pacific Fisheries Commission (WCPFC), the Pacific Islands Forum Fisheries Agency (FFA) and the Parties to the Nauru Agreement (PNA). In doing so, there is extensive collaboration with the Secretariats of these organisations, as well as with government fishery agencies many NGOs and universities.
27. Providing scientific advice to help maintain healthy oceanic resources and ecosystems continues to be a key OFP role, to ensure that both short-term and long-term options are informed by the best available scientific information. Following the COVID-19 outbreak, OFP has continued to reach out to its partners and worked collaboratively to identify emerging issues and deliver scientific advice to improve understanding and help develop effective mitigation strategies. In addition to being responsive to addressing emerging COVID-19 issues, OFP also continues to pursue work that will support sustainable management of tuna fisheries to help ensure longer-term benefits can be maintained. In turn, progressing work that will contribute to a better understanding of food security options, such as estimation of potential bycatch levels, further research into non-target species biology and data reporting tools (e.g. TAILS), aims to help provide scientific information to support decision making that may mitigate some ongoing COVID-19 impacts.

28. Organisationally, the work of the Programme falls into three sections – the Fisheries & Ecosystems Monitoring & Assessment (FEMA) section, the Data Management (DM) section and the Stock Assessment & Modelling (SAM) section – however, there is considerable integration across these areas in order to provide comprehensive services and support in oceanic fisheries to members.
29. One area that cuts across all sections in OFP is:
- National science capacity building to continue to build the region’s skill sets. Internally, OFP aims build on the Pacific Island Fisheries Professional programme with the examination of the feasibility of short-term placement opportunities and FAME mentorship activities. Through the development of stronger links with regional Universities and partners, the aim would also be to develop options for studies that lead to formal qualifications and the development of new skills and opportunities to fill gaps in curricula areas that foster specific skills of direct relevance to fisheries science (e.g. statistics, stock assessment, etc.).

### *Fisheries Ecosystem Monitoring and Analysis (FEMA)*

30. The priority work being conducted by the FEMA section includes:

- **Providing important biological inputs** for stock assessments and related scientific advice. This includes work on tuna age and growth, reproduction, movements, diet and trophic ecology. Key programmes in support of this work are:
  1. The Pacific Tuna Tagging Programme, with annual tag release cruises and the regional tag recovery effort now funded substantially through the WCPFC.
  2. Trophic ecology research voyages and associated laboratory analyses; and
  3. PIRFO, the Pacific Islands Regional Fisheries Observer programme, coordinated collaboratively with FFA to provide training and accreditation of tuna fisheries observers in the region.These programmes are undertaken with substantial collaboration and assistance from member fisheries offices, in particular national observer programmes. In addition to providing critical data for stock assessments, modelling the impacts of environmental variation and other management advice, they also provide opportunities for member fisheries scientists to enhance their capacity and skills through direct participation.
- **Modelling the impacts of environment variation, including climate change**, on tuna and the pelagic ecosystem. OFP pioneered the development of the SEAPODYM model, a key platform for understanding the interaction of environment and tuna, in the late 1990s, and we continue to collaborate with the French organisation Collecte Localisation Satellites (CLS) in this work. SEAPODYM integrates a variety of fisheries, biological and environmental data at a fine spatial scale, and it can be used to assess questions such as the efficacy of spatial management measures and the impact of environmental variation such as ENSO and climate change.
- **Monitoring the impacts of tuna fisheries on bycatch** and the pelagic ecosystem more broadly. FEMA conducts analyses of observer data to produce estimates of important

bycatch species, including species of special interest such as marine turtles and sea birds, and are reported periodically as regional- and national-level analyses. This information is increasingly important for the certification of fisheries by bodies such as the Marine Stewardship Council.

- **The application of new technology** to monitoring of fisheries. FEMA provides assistance to members in the development and implementation of video-based electronic tools for monitoring catch and effort by longliners, as well as rolling out electronic reporting tools, such as the longline e-log *OnBoard*, port sampling app *OnShore* and the *Tails* app for collecting small-scale fisheries data, all developed by the OFP Data Management Section.
- **Maintaining the Pacific Community Specimen Tissue Bank** that includes samples collected for the WCPFC Tissue Bank. It supports existing science programmes that support tuna stock assessments and biological material for developing new directions in tuna trophic ecology, methyl mercury, micro/nano-plastics and building the region's capacity in marine ecosystem science generally. Increasingly, the facility combines specimens for both coastal and oceanic science.
- **Fisheries genomics and molecular ecology.** Following HoF12, FEMA has increased its in-house capacity in the field of fisheries genetics, as well as strengthened its partnerships with key expertise within the Pacific region to support genetic work on tuna stock structure. Sampling protocols and techniques to improve the quality of samples underpinning analyses have been put in place. Current work is focusing on the potential application of close-kin mark recapture for estimating absolute abundance of each tuna stock and the application of genetic metabarcoding as a means for rapid identification of species from tissue and water samples to monitor ecosystem status. The methodological developments associated with this work is likely to have spin-off benefits for traceability monitoring and tuna provenance.
- **Enhanced climate change monitoring.** While the ongoing enhancements to SEAPODYM will further our understanding of the potential impacts of climate change futures on stocks at a variety of spatial and temporal scales, there is a need to develop indicators of climate change that allow us to identify which pathway the Pacific is on toward those potential climate-impacted futures. The development of those indicators and their provision to managers in readily accessible formats, including online dashboards for national reporting, and regional report cards, is underway.
- **Investigating wahoo and mahi mahi ecology,** as key species of importance to nearshore fisheries and critical to the success of the nearshore anchored FAD fisheries in the coming decades. Currently, there is limited information on their biology and ecology in the Western and Central Pacific. Age and growth, migratory patterns, and how these species may be impacted by climate change are key questions. This work would need to occur across OFP and CFP. Work has commenced to document the growth chronologies of mahi mahi through time, to understand the environmental drivers that influence productivity of this species.
- **Investigating the impact of methyl mercury and micro/nano-plastic** contamination of tuna and other fish stocks, including the health implications for Pacific Island human populations. Micro and nano-plastic contamination of fish and the oceans generally is

emerging as a new and serious threat for fisheries and human health. Sample collection has commenced in PNG and New Caledonia with a focus on skipjack and yellowfin tuna. Laboratory analyses are expected to be completed by December 2022.

### *Data Management (DM)*

31. The priority work being conducted by the DM section includes:

- **Enhancements and support for TUFMAN 2 and DORADO**, which enable member countries to manage/report on their integrated tuna fishery data. These systems now integrate all major tuna-fishery data types (including logbook, VMS, observer, port sampling, and unloadings data) and work will continue to focus on how to enhance capacity so that member countries have more control on processing, managing, reporting and analysing their data, through these systems. SPC will also continue its focus on using the *Slack* helpdesk to provide live support to members, noting that this system now has over 440 users, who have exchanged more than 550,000 messages since inception in 2016.
- **Enhancing E-Reporting (ER) tools** developed by SPC in response to member country requests. The Data Management section has developed several E-reporting tools in response to member country requests: the longline e-log *OnBoard* and the *TAILS* app for collecting small-scale fisheries data are now well-established systems and implemented in several member countries. The port sampling app *OnShore* is increasingly being used by member countries and presents considerable potential for the future of port monitoring. SPC has also trialled an ER system to acquire longline observer data at sea, in response to requests from several member countries (*OLLO*). All E-Reporting systems developed by SPC are fully integrated into the *TUFMAN 2* and *DORADO* systems. SPC remains attentive to future requests from member countries for new ER tools.
- **Data Management support to the WCPFC**, which also covers the direct support to member countries in satisfying their WCPFC reporting obligations, but also building capacity (through mechanisms such as the Regional Tuna Data Workshop) to enhance the ability of member countries to respond directly to WCPFC reporting obligations without SPC assistance.
- **Data standards, monitoring and auditing for regional tuna fisheries** continue to be enhanced and now extend beyond the requirements for science to include the requirements for Monitoring, Control and Surveillance (MCS), Economics and E-Monitoring process standards. SPC continues to have a key role through the SPC/FFA/PNAO Data Collection Committee (DCC) in coordinating meetings that review and update regional data standards (with other regional and sub-regional organisations, and member countries). As the region transitions to increasingly efficient data collection approaches, the DM Section will refocus on data auditing approaches, assisting members to ensure the quality of data collected from their fisheries is as high as possible.
- **Acquisition of E-Reporting and E-Monitoring data from third-party systems**, covers situations where member countries choose to adopt ER and EM systems developed and maintained by third-party technical service providers. SPC continues to work with member countries and their service providers, providing advice on data quality control and other

standards so that the data flow seamlessly into regional systems (e.g. the member country's *TUFMAN 2* database instance). SPC has a key technical role in the establishment of ER and EM standards in the region (through both the DCC and the WCPFC ER & EM Working Group), which have continued to progress in the past year with the agreement of a regional EM Policy and draft regional longline EM minimum data fields.

- **Support for new management systems required by member countries**, for example, Catch Documentation Systems (CDS) and Catch Management Systems (CMS). Most data already collected and managed through the *TUFMAN 2* and other national/regional systems, are fundamental input into proposed regional and national CDS and CMS systems. SPC will continue to have a key role in the provision of technical advice and support to the sub-regional agencies (e.g., FFA and PNA) overseeing these initiatives and to the individual members in the future.
- **Data visualisation, analysis and reporting including alerts**, is an area with considerable potential for tuna fishery data in the near future. The development of these 'business intelligence' systems could allow senior managers to access data 'dashboards' of for example year-to-date, cumulative data for their EEZ, or for their national fleet, through an app. Alerts are features of business intelligence systems (the 'push' philosophy, rather than the 'pull' philosophy of reporting systems) and there is significant scope to introduce this concept into the systems supported by SPC to provide additional functionality; for example, alerts to highlight particular data gaps and/or when approaching certain catch levels. This development area would cut across all OFP Sections.
- **Independent validation of at-sea longline transshipments** has been identified as a major data gap and SPC has initiated work in this area through a collaborative fact-finding study in collaboration with FFA in late 2019, with a follow-up study scheduled for late 2021. SPC will continue to advance this collaborative work and have a key role in the provision of technical advice in establishing an adequate, independent data collection system for at-sea longline transshipments, in collaboration with other sub-regional and regional agencies and interested members.
- The use of **artificial intelligence (AI) in electronic monitoring** has also been identified as a potential tool to enhance the efficiency in acquiring fisheries data but also remove any potential for errors related to the challenges humans have in collecting the data. SPC are investigating several areas where AI in electronic monitoring have clear benefits in acquiring fisheries data, and will continue to collaborate with member countries, regional agencies, NGOs and third-party service providers.

### *Stock Assessment and Modelling (SAM)*

32. The priority work being done by the SAM section includes:

- **Regional stock assessments of tuna, billfish, and sharks** to inform scientific advice on current stock status and fishery sustainability within the western and central Pacific Ocean. These assessments also provide the basis of analyses that examine the potential effectiveness of alternative regional management approaches to achieve fishery objectives of profitability and sustainability. The results feed into the Future of Fisheries Report Card for offshore fisheries, and the annual Tuna Fisheries Assessment Report



(TFAR). The 2022 stock assessments that OFP will be conducting, or overseeing, include skipjack tuna in the entire WCPFC convention area (WCPFC-CA) and the first assessment of mako shark in the southwest Pacific region of the WCPFC-CA. Other priorities for 2022 include a peer review of the 2020 yellow fin tuna assessment and follow-up analysis to refine the management advice from the 2021 southwest Pacific blue shark assessment. Other work is exploring ways to improve the accessibility, repeatability, and transparency of our stock assessment work.

- **Harvest strategy work for key tuna stocks and fisheries.** Following adoption of the harvest strategy approach by WCPFC members, the SAM section continues to develop the modelling and simulation frameworks to undertake this work. In 2022 they will continue to work with members to identify candidate harvest strategies, including harvest control rules, that best meet their objectives for their tuna fisheries. Decisions facing this year's Commission meeting (WCPFC19) (i.e., selecting management procedures for skipjack and south Pacific albacore) will place greater emphasis on our harvest strategy work at this year's WCPFC Scientific Committee meeting (SC18). To better prepare members for participating in the harvest strategy discussions and decision making, targeted workshops and capacity building will be a high priority in 2022. A key part of the harvest strategy development in 2022 will be the first WCPFC Science Management Dialogue (SMD) to be held shortly after the SC18. The SMD will bring scientists and fisheries managers together to discuss harvest strategies and work towards developing recommendations to support decision making at WCPFC19. A number of targeted subregional workshops, WCPFC seminars and other supporting materials will be provided to help prepare members for the SMD, and ultimately the WCPFC19. On the technical side, further development of a multispecies approach for testing harvest strategies will be a strong focus, along with refinements for the south Pacific albacore management strategy evaluation framework.
- **National-level advice based upon scientific analyses to address specific national requests and issues.** These activities include the development of new 'Issue-Specific National Reports' to address emerging issues of national importance, on-going bio-economic evaluations of national fisheries undertaken in partnership with FFA, assistance in development of Tuna and Shark Management plans, and provision of analyses in support of regional fisheries management. The analyses are supported by the frequently updated secure online national webpage for each member. Remaining responsive to national requests remains a critical component of the SAM section's activities. Travel to member countries remains restricted in 2022, thus capacity building will continue to take place primarily via online workshops. In 2021, the Stock Assessment training Workshops (SAWs) were completely revamped and delivered to over 100 participants across the two weeks of online delivery. The courses will be further refined for a second year of remote instruction. Work continues to redevelop and modernize the Country Web Pages, following a review of regional users and their data reporting and summary needs. The goal is to transform this tool into a modern interactive dashboard for country specific oceanic fisheries data. Regional support for FFA and PNA continues to be a priority task for the section in 2022, and we will again produce the Tuna Fisheries Assessment Report (No. 22).
- **Research and analysis on Fish Aggregation Devices (FADs)** is ongoing to increase our understanding of this fishing approach and support improved management and decision-



making on FAD related issues. Our FAD related work continues to grow due to the increased regional and global interest in the large-scale use of FADs in tuna fisheries. This year's top priority is the implementation of the WCPFC project to test Non-entangling and Biodegradable FADs (bioFADs) in the western and central Pacific purse seine tuna fishery. This project depends on collaboration with fishing companies, national fisheries organisation, and our FADs Focal Officer based in SPC's FSM regional office. We are also partnering on this work with the ISSF (International Sustainable Seafood Foundation). The first bioFADs should be in the water by the end of 2022 or early 2023. We will continue to work closely with the PNA on FAD related issue and support the PNA FAD tracking programme as requested to increase our understanding of the potential impacts and trends in the use of this fishing gear. The expanding use of acoustic buoys on FADs provides a potential new source of information, and the SAM section will continue to explore the potential to use these data to address data gaps and support stock assessments. We are also collaborating with ISSF, IATTC (Inter-American Tropical Tuna Commission) and the University of Hawaii on a Pacific wide project to assess the risks faced by Pacific Sea turtle populations from the use and loss of dFADs. Finally, we continue to support national initiatives encouraging public-led data gathering on FAD beaching events, and to curate and analyse the resulting information, including through a research project in 2022 led by a Masters student internship. This will contribute to increasing the information available on beaching events and ground-truth the outputs of other analyses. We are also increasing our outreach and awareness building of FAD use in the Pacific through community engagement activities linked to sea safety and support of anchored FADs programmes. This has been very successful in FSM thanks to our FADs Focal Office in Pohnpei, and we are looking to expand these efforts to other locations in 2022.

- **Novel use of Purse Seine CPUE data to inform stock assessments.** The SAM section continues to analyse catch rate data from the purse seine fishery with the aim of addressing emerging data challenges for the region's stock assessments and provide scientific information on the potential for effort creep within the region's most valuable fishery. Our work on purse seine CPUE analysis will be particularly important in 2022 as an input for the skipjack assessment.
- **Development of new stock assessment tools to ensure that regional WCPO assessments remain at the forefront of international best practice.** Continuous improvement of the MULTIFAN-CL software will continue, while the SAM section is also engaging with international partners to ensure plans for the next generation of stock assessment software will be appropriate to meet the specific needs and data types of the WCPO region. We will continue to improve our computing resources and effectiveness to ensure or stock assessment advances are not limited by computing power.