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STREAMLINING SCIENTIFIC DATA REPORTING TO THE COMMISSION

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Submitted by Jessica Leiria Schattschneider¹, Tim Jones², Tiffany Vidal¹

¹ Oceanic Fisheries Programme of the Pacific Community

² Western and Central Pacific Fisheries Commission

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Executive Summary

The Commission’s decision to adopt standardised SciData reporting templates ([WCPFC, 2026](#), para 260, item d) marks a significant step forward toward efficient data exchange and an investment toward improving the timeliness of scientific data to support the work of the Commission. Following adoption of the reporting templates, the SSP in collaboration with the Secretariat, developed comprehensive documentation and reporting guidelines aligned with the SciData, built efficient data pipelines connected to a web-based data submission portal hosted on the Commission website, developed multilevel data validation routines, and has ensured that all code is version-controlled for transparency. The implementation of this new reporting framework represents a marked shift from historical submissions which were sent via email in various formats, requiring extensive and manual intervention by the SSP to process the associated data.

Indications from the first year of implementation generally suggest success. Nearly all CCMs were able to submit their data through the portal in the proper formats, many without issue. This achievement is a testament to member engagement with the SSP to collectively forge a path forward. The process was not without challenges, and for some CCMs multiple revisions of their data files were required, necessitating several iterations of exchange through the portal’s communication feature and no doubt considerable effort to successfully validate data at all levels of the process. Due to some of these delays, we did not realise the anticipated gains in timeliness of data, and in fact, the data were made available quite late in the process. Even so, given the magnitude of change and adaptation required this year, we strongly believe that notable gains will be achieved as early as 2027.

The SSP has noted some of the obstacles faced this year and has engaged with CCMs to solicit feedback and different perspectives to target improvements in the upcoming year. Improving the SciData process is an iterative effort between the SSP, the Commission, and CCMs. The specific areas for improvement identified through this year’s feedback are detailed throughout this document, and the SSP will continue working with CCMs over the coming years to address them.

We sincerely thank all CCMs for their willingness to engage and support this initiative and for their efforts to bring it to fruition. We hope the reduction in manual processing will mean more time for value-added engagement around data and insights gleaned from them.

We invite SC22 to:

- NOTE the progress made over the past year on the implementation of standardised SciData reporting templates;
- CONSIDER desired improvements to systems or processes and engage with the SSP to continue to improve this process; and
- Continue to SUPPORT development of data systems to increase efficiency, timeliness, and accuracy of data used to support the work of the Commission.

1 Introduction

For several years, the challenges associated with the timeliness of the delivery of scientific results to the Scientific Committee (SC) has been raised as a growing concern (Pilling et al., 2026; Secretariat and SSP, 2025). Late provision of papers creates obstacles for effective participation in this forum, especially for Small Island Developing States (SIDS). One of the factors contributing to the late delivery of assessments and scientific papers is the data preparation process. In an effort to improve the efficiency of the SC, the Commission adopted standardised data submission templates for *Scientific Data to be Provided to the Commission* (i.e., SciData) (Vidal et al., 2025; WCPFC, 2025, 2026) as one potential way to increase the timeliness of the scientific data available to support the work of the SC.

One of the key bottlenecks to preparation of SciData on an annual basis has been the time the WCPFC’s Scientific Services Provider (SSP) spends on interpretation and reshaping of non-standard data submissions into a common structure. Prior to adoption of the data submission templates, CCMs (Commission Members, Cooperating Non-Members and Participating Territories) submitted data in a wide variety of formats and structures, and as a result, the SSP absorbed a significant burden of preparing data submissions before review of data quality could even begin. This process was bespoke and time-consuming and often left limited time to engage members on data quality issues, and even less time for scientists and the SC to carry out their analyses to support the assessment and management of key tuna, billfish, and shark stocks. The proposed data submission templates aimed to mitigate this manual intervention, but also enable the development of more robust systems to receive and validate data submissions given the consistent format, all of which were anticipated to have benefits both in terms of the timing of data availability and data quality.

This paper provides an update to the SC on the implementation of the standardised data submissions, the pipeline that has replaced the historical approach, and the results observed during the first reporting cycle. Based on the feedback from CCMs and observations throughout the process we propose several recommendations for further improvement, for the consideration of the SC.

2 Preparation for implementation

The move toward a new approach for data reporting required significant investment on the part of CCMs and the SSP. In order to ease the transition, the SSP first developed and socialised the GitHub data documentation repository, which was initially shared during TCC21 and later refined and presented during the WCPFC22. Beginning in February of 2026, the SSP circulated additional information related to the portal development and use with each of the monthly data call emails leading up to the 30 April submission deadline.

In addition to the email updates, a virtual meeting was held on 26 March, 2026 to socialise the launch of the SciData web-portal, with all CCMs invited. The meeting was well attended and a valuable opportunity to address issues/concerns raised by members. Following the virtual meeting tutorial videos were produced separately for Pacific Island Countries and Territories (PICTs) at https://www.youtube.com/watch?v=Skk_yNgQ1xE and non-PICTS at <https://www.youtube.com/watch?v=qVI7MMvFqYw>. CCMs were also provided with a training environment of the SciData portal and one-on-one meetings, when requested, to allow members to familiarise themselves with the new processes and test their data against the validation rules.

In February of 2026, a regional ‘Data Gaps’ workshop for Indonesia, Philippines, and Vietnam was held as part of the NZ-funded SPF-WPEA project. The main focus of this workshop was to work toward preparing aggregate catch and effort data submissions, in the absence of representative logbook coverage, and to develop data preparation routines for their SciData submissions.

In the lead up to the data submission deadline many CCMs reached out to the SSP for support during their preparations. Those that engaged directly seemed to have an easier time with their submissions, evidenced by fewer updates and a shorter time to finalise their data. The SSP remains available to support members to prepare for the next reporting cycle, based on their experience this year, as necessary.

2.1 Data pipeline development

Figure 1 provides an overview of the SciData workflow introduced this year and how its components connect. Each stage is described in detail in the sections that follow.

At a high level, the process begins with technical documentation that defines the SciData templates. This documentation underpins the development of an Application Programming Interface (API) that validates submissions automatically against the data format expected (templates). In the portal, once a submission passes this initial validation, the data are stored in a database (DB) and undergo a second, more detailed quality assessment (DQA Phase 2). Data that pass DQA Phase 2 are consolidated into the tables used for scientific reporting and stock assessment/harvest strategy work. Where errors are identified, SSP staff raise a revision request directly in the portal, and the member is asked to resubmit. Each new submission then passes through the full pipeline again.

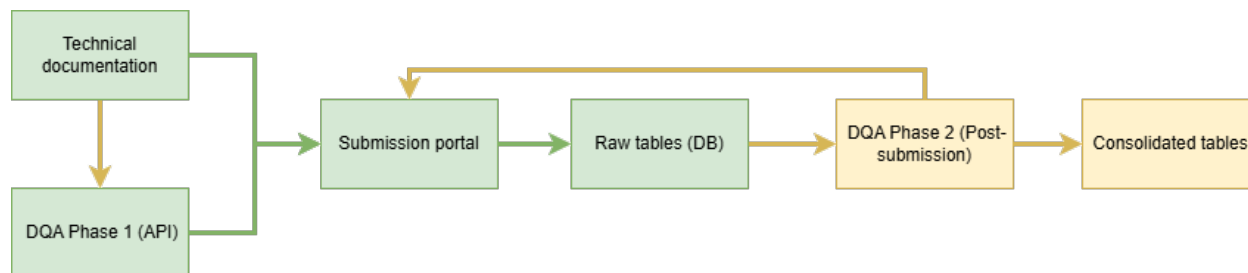


Figure 1: Overview of the data pipeline implemented this year for streamlining the SciData submissions. indicate the tools used to develop and maintain components and how they are connected. Green boxes identify components that are under version control and, use continuous integration and deployment (CI/CD). Components connected with a green arrows indicate they are fully integrated, meaning that one automatically triggers or uses the latest version of another.

2.2 Technical documentation

A key development for this annual reporting cycle was the production of technical scientific data documentation that translates the data reporting requirements detailed in the SciData into a detailed field-level specification, covering formats, value limits, conditions, allowed values, and reference tables for each of the submission types. The documentation (<https://pacificcommunity.github.io/scidata-standard/>) was developed through the GitHub platform to enable dynamic, version-controlled, and publicly available content. One of the benefits of explicitly specifying data standards is that it necessitates a review of the agreed standards themselves; a process that highlighted some potential gaps and ambiguities that the SC may

wish to consider in order to strengthen and add clarity to the SciData reporting guidelines (see SPC-OFP (2026)). Where discrepancies were found between the documented standards, their implementation in the submission portal, and members' own interpretations, these were resolved and the documentation updated accordingly. The repository now serves as the single reference point for CCMs preparing submissions and for the SSP when building and maintaining validation rules. It also underpins the portal checks and data quality assurance (DQA) process described in the sections that follow.

2.3 DQA Phase 1 (API):

While the SciData technical documentation is comprehensive, manually checking each file against the specifications before submission is time-consuming and prone to error that could only be picked up later in the process when consolidating the final datasets for the Commission's scientific work. To address this, the SSP developed an API that translates the documentation directly into automated checks, allowing members to validate their files programmatically, before or during submission.

The key advantage of defining data quality assurance (DQA) rules and checks in API endpoints is that it can be integrated into existing workflows. Members can use it to submit files in batches and receive immediate feedback identifying exactly which fields or values do not meet the specifications, rather than discovering errors only after uploading them to the portal. The SSP has developed R scripts that members can use to run these checks across all their data types simultaneously. The same API is also integrated into the SciData portal, where it runs automatically on every file upload (DQA Phase 1). This way, the API serves as a single source of truth, where the same rules that members can test against locally are the rules applied at the point of submission.

The checks currently cover data structure and format: required columns, data types, date formats, value ranges, categorical codes against reference tables, duplicate rows, and missing required fields. An important limitation of this approach is that checks operate on each file independently. Submissions such as operational logbook data span multiple linked files (i.e., trips, activities, and catches) and the validation checks in Phase 1 cannot verify consistency across these files (e.g., referential integrity). For example, it is not currently possible to verify whether every trip identifier in the catch file has a corresponding record in the trip and activity files. Cross-file consistency checks of this kind are addressed in DQA Phase 2, described in Section 2.5.

2.4 Submission portal

Prior to 2026, all 'non-standard' scientific data submissions were provided by email to the SSP. Email-based data exchange is challenging for many reasons, including emails being missed (e.g., funnelled into a junk/spam folder) or being sent to one individual without visibility across the team, potential security risks, and lack of automated data registration. It relied on staff diligently tracking the incoming submissions, multiple files and versions, and often iterative corrections. The web-based portal was designed to remove data exchange from email and create a secure authenticated log to submit and edit SciData submissions. The portal gives the SSP and CCMs clear visibility of the data requirements, progress towards them, and produces a detailed data registry including dates associated with specific submissions and updates. In addition, the portal was developed to include initial data validation procedures, as discussed in the previous section.

For each data type, members need to select one of three Data Provision Methods:

- file upload (a CSV file conforming to the standard for that data type);
- data provided via TUFMAN2 or through observer data provisions; or
- not applicable for that reporting period.

2.5 Post submission: Raw tables, data quality and processing

Once the data are submitted through the portal and passed the validation checks, the raw data are stored in appropriate tables in the SSP database to preserve the content of the original data submissions. The data are then subjected to a second round of checks and validation (referred as DQA Phase 2) which tests the referential integrity of linked files. Where applicable, and depending on the data source, further evaluation of data for consistency (e.g., comparison to previous years’ catch and effort) occurs. Once data have passed DQA Phase 2 validations the data are ‘staged’ into intermediate tables in preparation for consolidation into the final reporting tables.

3 Implementation

3.1 SciData Submissions

In 2026, nearly all CCMs¹ submitted their scientific data through the SciData portal, a total of 32 CCMs. Figure 2 illustrates that the majority of non-PICTs submissions were associated with “Not applicable” and “File upload” options, while most PICTs reported that “Data had been provided via Tufman2 (T2)” or “Not applicable”. Given that the SciData improvement reported in this paper was primarily targeted at non-PICTs submissions, this is an expected result. PICTs already submit the bulk of their data through T2 in a streamlined manner. The only exception among PICTs was Wallis and Futuna, which uploaded an additional file through the portal containing artisanal annual catch estimates (ACE), not currently captured in T2. A small number of non-PICTs also indicated that data were provided through T2. These were Vietnam, the Philippines, and the European Union (Spain). Vietnam and the Philippines submit through a T2 system adapted for their national use and Spain submits their size composition data directly into T2.

3.1.1 Non-PICTs submissions - file uploads

Non-PICTs primarily used the “File upload” option, as not all data are received via integrated e-reporting platforms yet. Following the initial submission deadline, members were able to submit revised files in response to data quality checks or SSP feedback. Only submissions that passed all DQA Phase 1 checks were ingested into the SSP system. Forty-six percent of submissions required no further edits after passing the first DQA Phase, which highlights the value of automated validation checks early in the submission workflow.

Beyond revision counts, the portal also enabled tracking of the time between the data of the first file submission (including cases that had not yet passed validation) and the date of the final accepted version, for each member. On average, members took 18 days from first submission to final accepted version, with a maximum of 70 days. This highlights that even when members meet the SciData deadline, the iterative process of validation, feedback, and resubmission represents a substantial time investment for both CCMs and the SSP.

¹Excepting one CCM for which no 2025 data have been received at the time this paper was prepared.

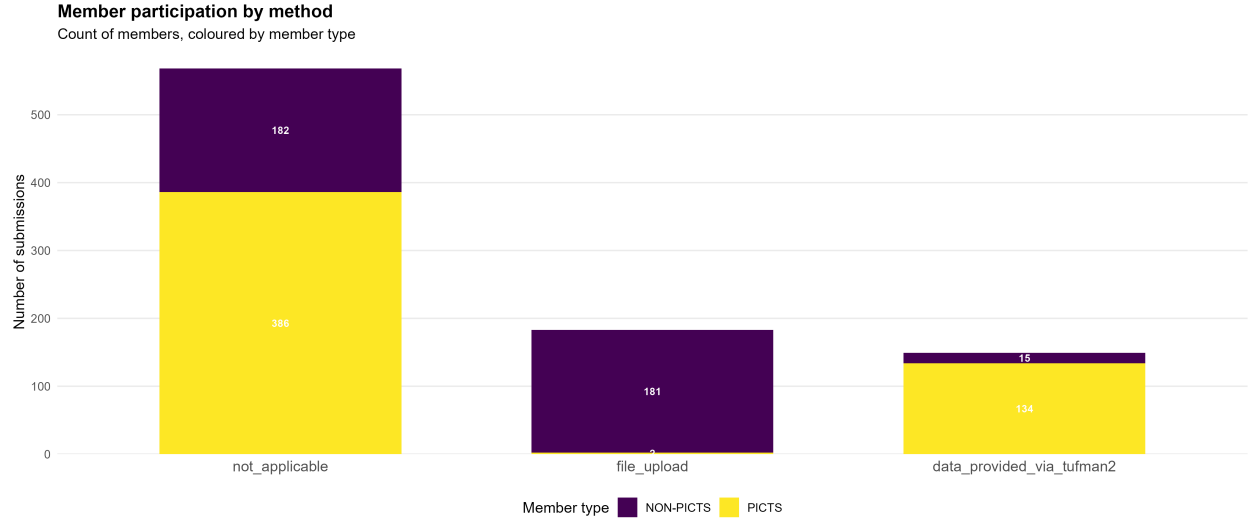


Figure 2: Data Provision Method selected by CCMs when submitting their 2025 SciData.

Figure 3 presents the time from first to last revision for each anonymised member and data type. The intent of this analysis is to investigate if there are members who may benefit from additional support in future cycles. Members M-1 and M-13 show consistently longer finalisation times across nearly all submission types, which may indicate a need for targeted assistance. Conversely, M-10 and M-2 completed most of the applicable submissions with notably short turnaround times.

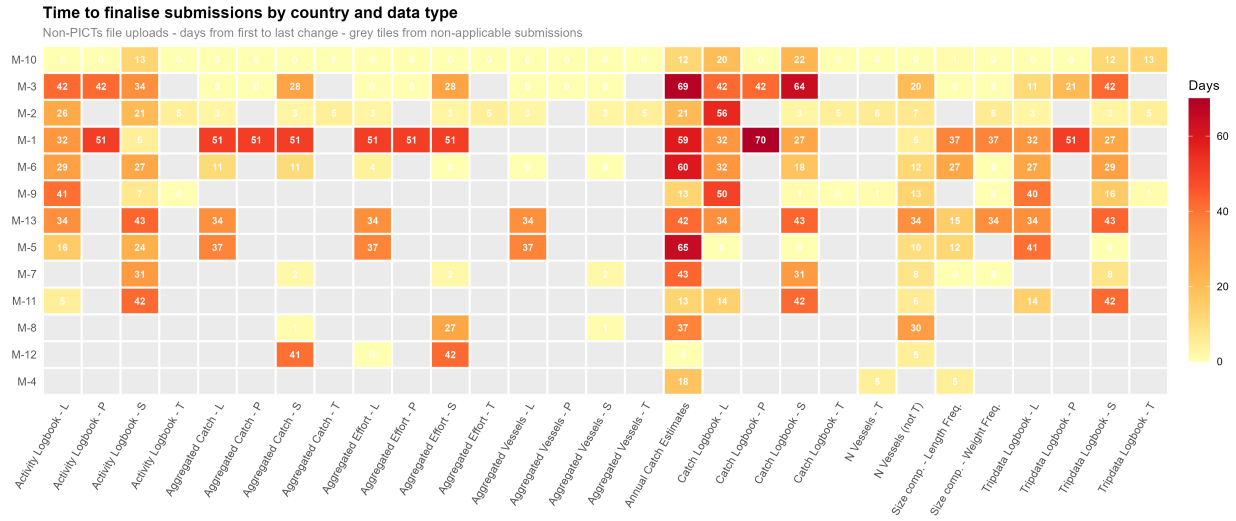


Figure 3: Heatmap showing the number of days spanned from the first to the last revision for each member and submission type. Gray boxes indicate submissions marked by members (M; y-axis) as “Not applicable”.

Finally, Figure 4 examines finalization time by broad data type category: ACE, logbooks, vessel numbers, size composition, and aggregated data. ACE submissions showed the greatest variability and were, on average, finalised latest in the submission cycle. Logbook submissions also showed moderate variability. Vessel number, size composition, and aggregated data types were generally finalised earlier and with lower variability. This

result suggest that ACE and logbooks might benefit from further clarification in the SciData documentation, and perhaps additional pre-submission diagnostic tools to mitigate the challenges encountered this year.

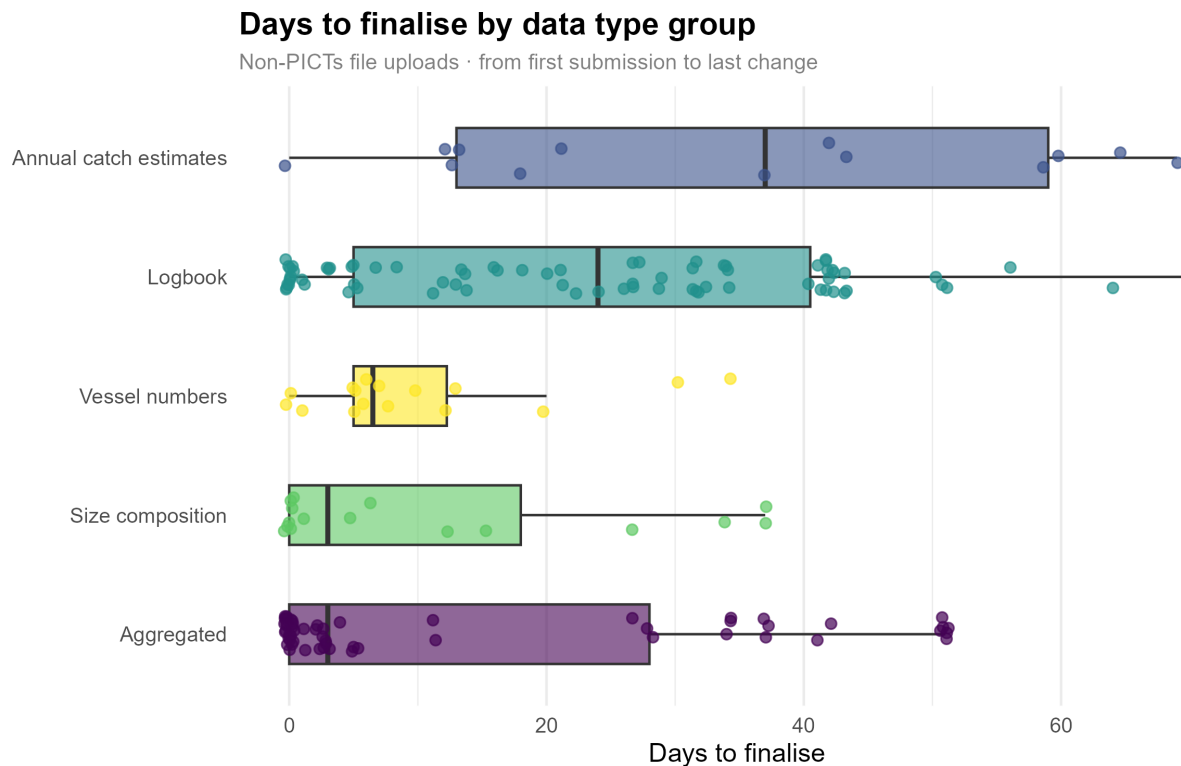


Figure 4: Number of days between the first and last revision for each submission grouped by broader data types (i.e.: Annual catch estimates, Logbook, Vessel numbers, Size composition and Aggregated).

4 Exchange of processed SciData

4.1 Compliance support

The SSP worked closely with the Secretariat in 2026 to improve a key data exchange process that occurs between the two organizations following SciData submissions. When requested, data to support the monitoring and evaluation of compliance with CMMs was compiled from the scientific data by the SSP and sent via email to the Secretariat. When submitted data were revised, a further process of data exchanges occurred via email. This year scripts were developed to generate standardised output that can be accessed from a shared environment accessible to both the SSP and the Secretariat. These outputs are reproduced when new data is submitted and contain versioning information allowing the Secretariat to programmatically extract the most up-to-date information and compare changes with previous outputs, reducing the time between data submission and use within the CMM evaluation process.

4.2 Part 1 Reports

A parallel improvement was made to data sharing with members for Part 1 reports. In 2025, the SSP worked to develop code-based Part 1 templates; however, systems were not yet in place to enable direct

access to the data to populate those reports. This year, API links were established to communicate with Tufman2 which enabled data access from the local R scripts to support streamlined Part 1 reporting, using the most up-to-date information. This reduces the risk of members working from outdated data and has been a great application for some of the R-based skills development training the SSP has been supporting. These improvements were presented during an in-country training in Espiritu Santo (Vanuatu) and at the annual Tuna Data Workshop (TDW) held in Fiji, and training materials were provided to support uptake. Training materials include a [video tutorial](#) summarising the steps to start using the Part 1 templates that are maintained by the SSP in a GitHub [repository](#).

5 Member Feedback on the SciData Transition

The SSP developed an online survey to capture member's experience with this year's changes to the SciData submission process. We shared the survey link with over 100 stakeholders involved in SciData submissions, following up with CCMs who had worked closely with the SSP through the data submission and revision process in 2026.

The survey was open for 15 days and could be completed anonymously. The survey comprised seven mandatory Likert-scale questions rating this year's process against the previous email-based approach, followed by three optional open-ended questions inviting more detailed feedback.

5.1 Response overview

Seven CCMs responded to the survey, with an average completion time of 25 minutes. Feedback was very positive overall, with six of seven respondents rating this year's process as an improvement on the previous email-based approach. All respondents reported improved support and availability from the SSP team, and positive experiences with the portal's data quality checks. Figure 5 presents the results of the Likert-scale questions.

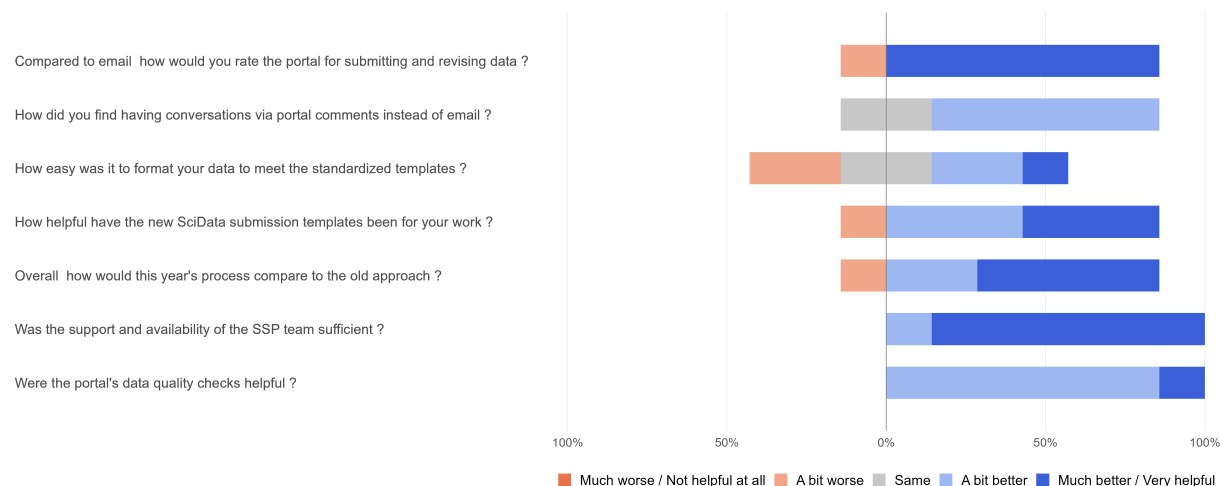


Figure 5: Summary of main survey questions related to member's experience with changes introduced in 2026 to the SciData submission process.

5.2 Templates and data formatting

Responses on the usefulness of the new SciData templates were positive, with three members rating them “Very helpful” and three “Somewhat helpful.” The question on ease of formatting data to the standardised templates received comparatively lower ratings, with two of seven members rating the process “A bit worse” than before. However, the open-text responses from these two members provided useful context. Both noted that the lower rating reflected the one-off cost of transitioning from a flexible to a standardised submission format, rather than dissatisfaction with the new approach itself. One member noted that although the shift required considerable work this year, including digitising data that had not previously been available in digital format, the process is expected to be easier in future, now that scripts and workflows are in place. One of the comments also emphasised that frequent changes to the templates are not desirable, but in case revisions are required, it’s important to provide sufficient time for CCMs to prepare accordingly.

Additional open comments reinforced this picture, with members describing the transition as an investment in improving the process and the quality of the data.

5.3 Support and portal experience

Feedback on SSP support and the portal’s validation checks was positive. Members valued the ability to validate their data using the R validation script developed by the SSP prior to uploading them to the SciData portal. Thus, several members noted that clearer explanations of data issues and how to resolve them had made the revision process smoother.

Members also highlighted the GitHub page as a valuable resource when transitioning their data into the SciData templates structure.

5.4 Areas for improvement

Members raised several suggestions for future refinement of the SciData process:

- **Access and update prior submissions:** allow members to reopen and amend previous years’ submissions where corrections are needed.
- **Review templates:** some members suggested changes/reviews to the templates, including: (1) allow NA values in some fields (no further detail was provided); (2) add a comment field to provide context where data cannot be supplied; (3) The SSP to review inconsistencies in column naming across gear types (e.g. n_vessels vs vessels_n) and ; (4) suggested merging some templates (no further detail was provided).
- **Validation transparency:** publish a list of the validation rules applied by submission (e.g. expected data types by column, accepted species codes), this could help members and reduce the back-and-forth with the SSP.
- **Additional training:** The SSP to provide further workshops covering data cleaning and preparation, to better support the transition to the new standards.

6 Summary

The 2026 reporting cycle demonstrated that the SciData portal served as an effective platform for coordinating scientific data submissions. The portal introduced transparency and accountability into a process that had previously relied heavily on email exchanges and manual registry of data. By centralising submissions, reviews, and communications, the SSP was able to monitor submission status in near real-time and act earlier where members were at risk of falling behind.

The adoption of the SciData portal also introduced the ability to analyse member engagement quantitatively. Metrics such as submission timing, revision frequency, comment volume, and time to finalisation were previously unrecorded and can now be extracted directly from portal data and used to inform evidence-based recommendations. The SSP anticipates that this analytical capacity will become increasingly valuable in future cycles, enabling year-on-year comparisons, earlier identification of members requiring support, and a more systematic basis for evaluating process improvements.

The SSP noticed that members who engaged with the SSP team early (prior to the portal launch and in the initial stages of preparation) tended to finalise their submissions sooner and required fewer rounds of revision.

Despite the deadline being met by most members, many submissions required multiple rounds of revision after initial DQA, and the overall time from first submission to final accepted version was significant. Given that the use of the templates was new and likely required CCMs to modify their workflows, this is not necessarily unexpected. However, we expect that in future years as these processes become more familiar and additional tools and systems are developed to review and visualise data prior to and after submission, these challenges will become fewer.

During the initial stages of the submission cycle, DQA Phase 2 rules (particularly those applied to logbook data) were developed with the intent of ensuring the highest possible data quality. However, it became clear that the strictness of some rules contributes to repeated submission failures and extended finalisation times considerably. A illustrative example is the validation of port codes against the WCPFC reference table: the rule was designed to prevent the ingestion of unknown or unrecognised ports, but in practice, vessels do land at ports that are not yet listed in the Commission’s reference data and which have not been formally reported. Requiring an exact match against the reference table in all cases therefore caused legitimate submissions to fail. This experience highlighted a trade-off between data quality and operational feasibility.

Part 1 report templates also required considerable revision in response to member feedback and specific needs. While these revisions were necessary and produced a more robust template, it required repeat communication with members to implement updates. The template is now considered stable and next year it should require substantially fewer changes.

6.1 Future enhancements

Based on the results and experience of the 2026 reporting cycle, the SSP will focus on lessons learned to improve the process for future submissions in the following ways:

1. **Strengthen early member engagement.** Members who look for support early and participated in pre-submission contact with the SSP finalised their data sooner and with fewer revisions. We recom-

mend a focus on early outreach, including dedicated pre-submission check-ins to understand how the SSP can support and address their needs.

2. **Streamline manual review processes.** Generating review reports for members at each revision round would reduce back-and-forth and make the review process more transparent and efficient. The API validation rules should also react to any updates in the technical documentation. This should be prioritised for implementation next year.
3. **Develop provisional results.** The current workflow requires all SciData submissions to be finalised before data preparation for the data analysed by the stock assessment to be available. Developing a provisional pipeline capable of ingesting and flagging partially validated data could reduce end-of-cycle pressure on the SSP data management and stock assessment teams.
4. **Review conditional validation rules.** The current SciData documentation includes rules that are conditional on other fields, which can allow missing or implausible values to pass unchecked. A review of these rules, together with clearer specification of how missing values should be represented (e.g. the use of *-999* or “*missing*” conventions), would improve data completeness and reduce the need for manual follow-up. ACE and logbook data types (which showed the longest and most variable finalisation times) should be prioritised in this review.
5. **Clarify SciData documentation for complex data types.** ACE and logbook submissions were associated with longer finalisation times and higher comment volumes, suggesting that members found these more difficult to prepare correctly. Targeted documentation improvements, including worked examples, field-level guidance for conditional requirements, and updated FAQ materials should be developed in consultation with members ahead of next year.
6. **Improve documentation of API validation checks.** Feedback from members indicated that a clearer description of the validation rules applied at each phase would allow them to identify and resolve issues in their own systems before formatting and submitting data. Providing members with an accessible summary of what each check tests and what failure means, would reduce the volume of queries directed to the SSP staff and support more self-sufficient data preparation. This could be incorporated into the existing technical documentation or provided as a standalone reference.
7. **Expand programmatic tools.** R scripts allowing members to validate all their data prior to submissions were available this year and were identified by members as a good tool for helping them prepare their final data submissions. These scripts should be more actively promoted ahead of the next cycle, including through direct communication with members, and inclusion in submission guidance materials. We will consider a public GitHub repo to build a community of practices around SciData submissions and ensure that all CCMs benefit from shared developments.
8. **Establish a pre-SciData workshop.** A targeted workshop for non-PICTs focused on data preparation (reshaping), pre-submission checks, and understanding how industry systems share data with members might be beneficial.
9. **Expand programmatic data access for members.** The T2 API links established this year for Part 1 report generation should be extended and documented to support members using R-based reporting workflows. As Part 1 templates stabilise, investment in member upskilling, through training materials,

recorded sessions, and where possible in-country support can improve the quality and timeliness of Part 1 outputs and potentially other reports.

We also take all members' suggestions received in the survey and continue the dialogue with them to ensure data reporting systems evolve toward minimizing burden while maximizing benefit for the work of the Commission.

Acknowledgments

We sincerely thank the membership of the WCPFC for supporting this important data improvement and efficiency initiative, and for the patience and sense of collaboration demonstrated throughout the process. We acknowledge and thank NZ-MFAT for their continued support of the SPF-WPEA Project which was instrumental in supporting the WPEA member countries with their SciData submissions, including the provision of aggregate catch and effort data in 2026. We thank Canada for their voluntary contribution to the Commission which assisted with the development of the web-portal user interface, carried out by the very talented team at Eighty Options. We also acknowledge the core SPC membership funding and the NZ SPF project for supporting the SPC staff.

Declaration of generative AI and AI-assisted technologies in the SC paper preparation process

The generative AI tool Claude 5 Sonnet was used to assist with code development, refactoring, and documentation, and with drafting and editing text in this document. The same model was also used when developing the outputs described in this document as improvements to the SciData workflow (API, R scripts and with reviewing technical documentation). All analytical choices, diagnostic interpretations, and conclusions are those of the authors, who reviewed and verified all AI-assisted output. The methodology and the scientific conclusions are the responsibility of the authors.

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