TERMS OF REFERENCE
AND TECHNICAL SPECIFICATIONS

I. General information

Assignment name	• Technical assistance for the management and interoperability of IOTC and SIOFA spatial information datasets • Support to the development of cartographic and interactive GIS products • Provision of statistical training on GIS fisheries data analysis
Beneficiary	• Indian Ocean Tuna Commission (IOTC) and targeted Contracting Parties (CPCs) • Southern Indian Ocean Fisheries Agreement (SIOFA) and targeted Contracting Parties (CCPs)
Country	Work to be performed remotely, with possible missions to: • Seychelles (IOTC) • La Réunion Island (SIOFA) • IOTC and/or SIOFA Contracting Parties of the Western Indian Ocean (WIO) region
Duration	The contract is concluded for a firm period of 26 months. It may be renewed for up to one additional period of 6 months.

II. Context and justification of the need

Expertise France (EF) is the French public agency for international technical cooperation. EF operates in the Western Indian Ocean region to support sustainable development, regional integration, ocean governance and environmental sustainability. Through partnerships with regional organisations and national institutions, the agency contributes to strengthening technical capacities, improving access to scientific information and promoting evidence-based decision-making.

The Sustainable Western Indian Ocean Programme (SWIOP) is a regional programme funded by the European Union and structured around complementary components supporting ocean governance, sustainable blue-economy development and ecosystem resilience.

Under SWIOP, Expertise France supports regional fisheries organisations in strengthening data systems, scientific information and decision-support mechanisms that contribute to sustainable fisheries governance. The present assignment aims to strengthen the capacity of Regional Fisheries Management Organizations (RFMOs) in the Western Indian Ocean region to use, develop and produce fisheries-related geospatial data products in support of activities falling within their respective mandates.

Rationale for the consultancy

Geospatial data is central to the work of Regional Fisheries Management Organisations (RFMOs), because fisheries management is fundamentally spatial. Virtually all RFMO decisions, including Conservation and Management Measures (CMMs), rely on information about where fishing takes place, where fish stocks are concentrated, where vessels operate and where vulnerable or sensitive ecosystems occur. The capacity to compile, manage, analyse and disseminate this information in robust geospatial formats is therefore essential for building sound scientific recommendations that can inform the respective policy-making decision processes of IOTC and SIOFA.
The consultancy will also help build the capacity of IOTC and SIOFA Contracting Parties (CPCs/CCPs) to perform GIS data analysis, which will contribute to strengthen the fisheries data shared by Contracting Parties with the IOTC and SIOFA Secretariats.

III. Objectives and desired results

The overall objective of the assignment is to strengthen the geospatial information management capacities of the Indian Ocean Tuna Commission (IOTC) and the Southern Indian Ocean Fisheries Agreement (SIOFA), in support of their respective mandates and fisheries management objectives.

The assignment comprises three closely related components, to be implemented for IOTC and/or SIOFA (for Component 1 & 2) as well as targeted Contracting Parties (for Component 3) while taking into account the specificities of their respective mandates, data workflows, requirements for geospatial products and the capacity-development needs of their members:

1. **Strengthening geospatial information management systems**: The assignment will support the improvement and, where relevant, harmonization of the geospatial information systems and workflows used by IOTC and SIOFA. This will strengthen their ability to integrate, manage, analyze and use geospatial data within their existing data and information management processes.
2. **Developing geospatial products**: The assignment will support the development and application of dedicated geospatial analyses and products tailored to the respective needs of IOTC and SIOFA. These products should support the organizations in transforming fisheries-related data into operational information that can contribute to scientific analysis, monitoring and decision-making.
3. **Building national capacity in geospatial analysis**: The assignment will deliver a regional training programme for national scientists from IOTC CPCs and SIOFA CCPs, focused on the use of R for processing, analysing, mapping and interpreting fisheries data into geospatial products.

IV. Description of the assignment

1) Activities

The activities outlined below constitute a tentative and indicative list of activities to be undertaken for both IOTC and SIOFA. Depending on the needs, priorities and availability of each organization, the technical assistance may cover all or only some of the components and tasks described below.

The assignment is designed to enable synergies between the work conducted for each Regional Fisheries Management Organization (RFMOs). Experience, methodologies, tools and deliverables developed for one Regional Fisheries Management Organization (RFMO) are expected to inform and, where appropriate, be adapted for use by the other. This approach will facilitate the reuse and adaptation of existing tools and deliverables to the specific context, data and requirements of each RFMO, while avoiding unnecessary duplication of work where it is simply not needed.

Component 1 – Strengthening geospatial information management systems of IOTC and/or SIOFA

Task 1 – Needs Assessment & Development of Geospatial Information Management Frameworks

The expert(s) shall, based on needs expressed by Expertise France and RFMOs:

- Review existing geospatial information management practices, datasets, repositories, workflows and dissemination mechanisms within IOTC and/or SIOFA;
- Identify technical gaps, duplication, constraints and opportunities related to data integration, interoperability, sharing and long-term maintenance of geospatial data for IOTC and/or SIOFA;
- Draft geospatial data management and interoperability frameworks for IOTC and/or SIOFA, covering scientific, compliance, fisheries, management and environmental data;
- Draft technical specifications and recommendations for the sustainable management, maintenance, exchange and reuse of regional geospatial resources respectively by IOTC and/or SIOFA;
- Draft recommendations and identify opportunities to strengthen the interoperability of geospatial data processes and products between IOTC and/or SIOFA, and with other relevant institutions.

Task 2 – Development, Strengthening and Harmonization of Geospatial Data Systems

The expert(s) shall, based on needs expressed by Expertise France and RFMOs:

a) Information-system architecture and metadata standards

- Provide technical recommendations for the redesign and migration of fisheries statistical and biological information systems;
- Review proposed database architectures and provide technical recommendations on data models, spatial database arrangements, geospatial services and interoperability mechanisms;
- Review and provide technical recommendations on the implementation of spatial database technologies (e.g. PostGIS), geospatial extraction workflows and standard exchange formats supporting the downstream dissemination and reuse of geospatial information products;
- Develop metadata standards and protocols covering:
    - metadata and documentation practices and technical specifications applied to geospatial datasets, services and analytical products;
    - standardized metadata templates and controlled documentation approaches aligned, where relevant, with internationally recognized standards;
    - quality-control and validation procedures for geospatial datasets and processing workflows;
    - procedures for dataset identification, version control, citation, traceability and persistent identification;
    - recommendations for metadata compliance with confidentiality requirements and applicable RFMO data-access and data-sharing policies;
    - publication and preservation workflows using appropriate repositories and catalogue systems, supporting the implementation of the FAIR (Findable, Accessible, Interoperable and Reusable) data principles.

b) Geospatial datasets, layers and tools

- Build and develop standardized geospatial tools and layers and the associated data-processing procedures, including documented quality-control and validation procedures;
- Compile and integrate RFMO datasets into geospatial tools and layers, including fisheries, environmental, compliance, management and any other relevant data, and ensure their interoperability;
- Recommend approaches for producing and maintaining standard geospatial outputs, services and exchange formats;
- Define consistent cartographic and visualization standards across participating institutions.

Component 2 – Spatial Analysis Support & Geospatial Products

Task 3 – Provision of Spatial Analysis Support

The expert(s) shall, based on needs expressed by Expertise France and RFMOs:

- Conduct geospatial analyses of fisheries and marine-resource information in support of scientific assessments, monitoring, compliance and management discussions;
- Produce decision-support outputs that can be interpreted by technical and non-technical audiences;
- Ensure that scripts, processing logic, data dependencies, and limitations are documented sufficiently for institutional reuse.

Task 4 – Development of Geospatial Products

The service provider shall, based on needs expressed by Expertise France and RFMOs:

- Produce analytical maps, thematic visualisations, and standard spatial layers;
- Recommend technical approaches for dissemination through catalogues, repositories, dashboards, web services, and interactive platforms;
- Support the production of communication products using geospatial data for technical or non-technical audiences.

Component 3 – Training & Capacity Building

Task 5 – Regional Training Programme on R for Geospatial Fisheries Analysis

This task will strengthen the capacity of national scientists from IOTC CPCs and SIOFA CCPs to independently process, analyse, map and interpret fisheries data, with a particular emphasis on the production of geospatial products. Statistical and geospatial literacy remains uneven across the Western Indian Ocean (WIO) region, limiting the ability of several national institutions to fully participate in the statistical work that increasingly underpin IOTC and SIOFA conservation and management measures. This activity therefore seeks to consolidate a common foundation of quantitative and geospatial skills to ensure that all SWIOP countries can contribute effectively to the scientific and decision-support processes led by IOTC and SIOFA.

The regional training programme will focus on the practical use of open-source tools, primarily R and RStudio, to manage, analyse, map, visualise and model fisheries datasets, with an emphasis on geospatial analysis in R (e.g. using the sf and terra packages).

The service provider is responsible for proposing a curriculum in its technical offer. The curriculum will combine conceptual and applied sessions. As an illustration, the curriculum could include:

Basic module (two - three days):

- Introduction to the geospatial datasets used by IOTC and SIOFA, including GeoNetwork, GeoServer and GeoInfo;
- Extraction of fisheries data from these platforms and from IOTC and SIOFA databases for analysis;
- Data cleaning and exploratory data analysis, including spatially referenced fisheries data (e.g. catch-and-effort, logbook, observer and vessel-monitoring data);
- Handling spatial data in R: vector and raster data, coordinate reference systems, spatial joins, gridding and aggregation of fisheries data;
- Creation of maps and thematic visualisation of fisheries and environmental data, following the cartographic standards developed under Component 1;

Advanced module (two – three days):

- Geospatial analysis of IOTC data in R (and of SIOFA data where relevant), applying the skills acquired in the common module to concrete fisheries management questions;
- Regression and time-series modelling, including spatial and spatio-temporal models (e.g. for CPUE standardisation);
- Estimation of uncertainty and sensitivity analysis;
- Treatment of incomplete or zero-inflated datasets.

The expert(s) shall, based on needs expressed by Expertise France and the RFMOs:

- Design the curriculum in consultation with IOTC, SIOFA and participating CPCs/CCPs, adapting the level and content of each module to participants' prior skills;
- Develop training materials in English, including presentations, reproducible R scripts and notebooks, worked exercises and anonymised or publicly available example datasets drawn, where possible, from IOTC and SIOFA data;
- Deliver the regional training programme through in-person workshops, combining conceptual sessions with hands-on practical exercises;
- Evaluate learning outcomes (e.g. pre- and post-training assessments, participant feedback) and provide follow-up technical support to participants after the sessions.

<u>Task 6 – Documentation, Handover & Knowledge Transfer</u>

The expert(s) shall, based on needs expressed by Expertise France and the RFMOs:

- Develop user documentation covering the geospatial data systems, workflows, templates, tools and products used by IOTC and SIOFA;
- Deliver technical demonstrations or working sessions on these systems, workflows, templates, tools and products for IOTC and SIOFA Secretariat staff;
- Support the handover and adoption of the standards, datasets, workflows and tools by Secretariat staff, including follow-up technical advice after training, to ensure effective knowledge transfer and long-term institutional capacity.

2) Expected deliverables

Deliverables will be defined in purchase orders, based on the specific tasks and needs expressed by IOTC and SIOFA. The table below provides a non-exhaustive list of deliverables that can be expected based on the different tasks identified for this assignment. Timing is indicative and may be refined upon request by Expertise France and the RFMOs.

Task	Deliverable	Description	Format	Indicative timing
Cross-cutting	**D0.1** Coordination and reporting	• Technical exchanges, incorporation of comments, final report, quarterly progress summary (status of each purchase order and deliverable, difficulties encountered, next steps)	Inception note; final report; quarterly progress summary (two pages maximum)	On request, months 1–26
Task 1 – Needs assessment & frameworks	**D1.1** Needs assessment, gap analysis and geospatial data management framework	• Review of existing geospatial practices, datasets, repositories, workflows and dissemination mechanisms; • Identification of gaps, duplication, constraints and opportunities (integration, interoperability, sharing, long-term maintenance); • Geospatial data management framework covering scientific, compliance, fisheries, management and environmental data, with technical specifications and recommendations for the sustainable management, maintenance, exchange and reuse of geospatial resources	One (1) report per RFMO, including the framework	Months 1–5
	D1.2 Cross-institutional interoperability and dissemination recommendations	• Recommendations and opportunities to strengthen interoperability of geospatial processes and products between IOTC and SIOFA, and with other relevant institutions; • Technical approaches for dissemination through catalogues, repositories, dashboards, web services and interactive platforms	One (1) joint technical note	Months 3–6
Task 2 – Geospatial data systems	**D2.1** Information-system architecture review and recommendations	• Recommendations for the redesign and migration of the statistical and biological information systems; review of database architectures, data models, spatial database arrangements (e.g. PostGIS), geospatial services, interoperability mechanisms, extraction workflows and exchange formats	One (1) technical report per RFMO with annexes (diagrams, proposed data models)	Months 2–8
	D2.2 Metadata standards and protocols	• Metadata templates and documentation practices; quality-control and validation procedures; dataset identification, versioning, citation and traceability; guidance on confidentiality and data access; FAIR publication and preservation workflows	One (1) package per RFMO: standards, templates, procedures (SOPs) and guidance	Months 3–8
	D2.3 Harmonised geospatial datasets, layers, tools and processing workflows	• Compiled and integrated RFMO datasets as standardised, interoperable layers, documented with metadata following D2.2, • Quality-control reports; • Documented processing scripts and tools to build and update the layers, with test data	One (1) package per RFMO: data with metadata records and catalogue, and code in an agreed version-controlled repository with technical documentation	Months 4–12
	D2.4 Geospatial templates and cartographic standards	• Approaches for producing and maintaining standard outputs, services and exchange formats; common cartographic and visualisation standards (symbology, palettes, layouts, templates)	One (1) guide per RFMO with reusable templates	Months 6–12
Task 3 – Spatial analysis support	**D3.1** Spatial analyses, and production of geospatial decision-support outputs	• Geospatial analyses supporting scientific assessments, monitoring, compliance and management discussions; outputs adapted to technical and non-technical audiences; • Scripts, processing logic, data dependencies and limitations documented for institutional reuse	Analytical notes or outputs, as requested in each purchase order, with documented code in the agreed repository	On request, throughout the assignment

Task	Deliverable	Description	Format	Indicative timing
Task 4 – Geospatial products	**D4.1** Maps, visualisations, standard spatial layers	• Geospatial products developed upon request – analytical maps, thematic visualisations and standard spatial layers for technical or non-technical audiences	Map and layer package (editable source files and exports) and geospatial products as specified in each purchase order	On request, months 5–24
Task 5 – Regional training programme (R for geospatial analysis)	**D5.1** Training curriculum and materials	• Curriculum with module outlines, learning objectives, presentations, reproducible R scripts and notebooks, exercises and example datasets for each module, with an emphasis on geospatial analysis in R	Training package (editable), including the curriculum, in the agreed repository	Months 3–10
	D5.2 Regional training sessions	• Delivery of the proposed training programme to national scientists from CPCs/CCPs, in person, with evaluation of learning outcomes and follow-up support to participants	One (1) session report by session and one (1) final evaluation note with recommendations for further capacity development (the final evaluation note is delivered with the last session ordered and is included in its price)	Months 8–24
Task 6 – Knowledge transfer & handover	**D6.1** Handover and follow-up support	• Documentation covering the systems, workflows, templates, tools and products used by IOTC and SIOFA; • Demonstration sessions for Secretariat staff and support for the adoption of standards, datasets, workflows and tools, including follow-up technical advice	Documentation package (editable) and one (1) handover note per RFMO	Months 8–24

All deliverables shall be submitted in English and in editable, reusable formats. Data, code, configurations and documentation shall be transferred in accordance with applicable confidentiality, ownership and access arrangements.
Deliverables whose content is defined above are ordered and paid at a lump-sum price covering all costs needed to complete them, including travel where applicable and any revisions required for their acceptance. Where the scope of a spatial analysis (D3.1) or of a geospatial product (D4.1) departs from the standard units defined in the financial offer, it may be ordered in GIS consultancy days (P-GIS) at the daily rate set out in the financial offer.

3) Coordination

The expert(s) shall designate a single contact person for project implementation purposes.

Mr. Théo GIRARD, Technical Coordinator for SWIOP 1.2 will be the service provider's sole contact person for Expertise France.

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To avoid ambiguity of roles, the service provider shall not:

- Represent Expertise France or IOTC or SIOFA vis-a-vis the European Union, States, partner institutions or stakeholders, unless expressly authorised for a specific technical purpose;
- Assume project-management, staff-management, procurement, contractual, budgetary or administrative responsibilities;

- Exercise decision-making, formal validation or arbitration authority on behalf of Expertise France or IOTC or SIOFA;
- Approve changes to scientific methodologies, official datasets, reporting requirements, reference code lists or data-access policies;
- Directly modify production data or deploy changes to production systems without the applicable authorisation, controls and acceptance procedures;
- Substitute for the SWIOP Project Coordinator, IOTC Secretariat staff, SIOFA Secretariat Staff, designated data owners or system owners.

V. Place, duration and terms of performance

1) Implementation period: December 2026 – January 2029 (initial period of 26 months; possible renewals as set out in Section I)

2) Location: Remote with field missions as needed

The service provider may deliver the technical assistance remotely, but field missions should be planned to perform the most critical stages of the work. Field missions to the IOTC and SIOFA Secretariats will be borne by the designated expert or team.

VI. Expected expertise and profile

Applications may be submitted by an individual expert or by a team of experts applying in consortium. Given the breadth and level of effort of the assignment, applicants shall demonstrate how all required competencies will be covered throughout implementation. Where a team is proposed, the application shall identify a lead expert responsible for technical coherence and overall quality oversight, and shall describe the allocation of responsibilities and deliverables for each expert involved in the assignment.

Academic qualifications

The proposed expert or team shall include advanced university-level qualifications, preferably at Master's degree level or above, in one or more relevant disciplines, such as:

- Geographic Information Systems, geomatics or geospatial information management;
- Computer science, information systems, data science or database management;
- Environmental science, marine science, fisheries science or natural-resource management;
- Statistics, quantitative ecology or quantitative fisheries science;

Additional training or certification in spatial data infrastructures, metadata management, interoperability standards, cartography, geospatial databases, scientific data management or related fields will be considered an asset.

Professional experience

The proposed expert or team shall demonstrate substantial professional experience relevant to the assignment.

The proposal should identify a lead technical contact with at least ten (10) years of relevant experience. Where additional experts are proposed, their experience should be proportionate to their assigned responsibilities.

Collectively, the proposed expertise shall cover several of the following areas:

- Design, implementation or management of geospatial information systems, spatial data infrastructures or scientific information systems;

- Development, integration, quality control and maintenance of geospatial datasets and spatial databases;
- Development of metadata frameworks, data documentation, controlled vocabularies, persistent identifiers, versioning and traceability arrangements;
- Application of internationally recognized geospatial, metadata or interoperability standards;
- Development of reproducible spatial analyses, automated processing workflows and decision-support products;
- Cartographic production, thematic visualization, dashboards, catalogues, web mapping, geospatial services or other dissemination platforms;
- Database architecture, data modelling, application integration or information-system modernization;
- Preparation of technical specifications, review of technical deliverables and quality assurance;
- Development of technical documentation, design and delivery of training (including hands-on training in R for statistical and geospatial analysis) and institutional capacity development.

The following will also be considered assets:

- Experience with Regional Fisheries Management Organizations and fisheries-related scientific institutions or international development programs;
- Experience with fisheries information systems, vessel activity information, observer data, marine ecosystems, vulnerable marine ecosystems or other marine spatial datasets;
- Experience with tuna fisheries or fisheries governance in the Western Indian Ocean;
- Experience designing and delivering statistical training on fisheries data, preferably in the Western Indian Ocean region;
- Experience supporting the practical implementation of FAIR data principles and scientific-data publication.

Technical competencies

The proposal shall demonstrate competence with an appropriate combination of tools, technologies and approaches, which may include:

- GIS software and geospatial analytical tools;
- Spatial databases and database management systems;
- Programming or scripting environments for reproducible data processing, including R (and its geospatial ecosystem, e.g. sf and terra), Python or equivalent;
- Geospatial web services, APIs and interoperability frameworks;
- Metadata catalogues, controlled vocabularies and metadata-management systems;
- Repositories, persistent-identification services and scientific-publication infrastructures;
- Web-mapping, dashboard and geospatial-visualization platforms;
- Open-source geospatial technologies.

Applicants are not required to use every technology listed above. The technical proposal should justify the proposed toolset in relation to the required outputs, maintainability, interoperability, security and institutional reuse.

Languages

- Fluency in English, both spoken and written, is mandatory.
- Good working knowledge of French will be considered a strong asset.

Professional competencies

- Strong analytical and problem-solving ability;

- Attention to detail and commitment to data quality and reproducibility;
- Ability to work independently while coordinating effectively with multiple institutions and technical counterparts;
- Strong technical writing, reporting and knowledge-transfer skills;
- Ability to translate complex technical requirements into practical, maintainable and user-oriented solutions;
- Ability to manage interdependent work streams and meet agreed deadlines.