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MEMORANDUM OF UNDERSTANDING ON THE CONSERVATION AND MANAGEMENT OF MARINE TURTLES AND THEIR HABITATS OF THE INDIAN OCEAN AND SOUTH-EAST ASIA

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6 November 2026

11TH MEETING OF THE ADVISORY COMMITTEE
Bonn, Germany, 8-11 December 2026
Agenda Item 5.4

TOWARDS A GLOBAL SPATIAL DECISION SUPPORT TOOL FOR SEA TURTLES

(*Prepared by the Advisory Committee*)

Mandate:

- WP #58: *Encourage voluntary contribution of nesting abundance and distribution data to the existing format of the TurtleNet, and establish an AC-lead working group to explore future options i.e. to:*
  a) Expand the data collected and displayed in TurtleNet, and
  b) Maximize the use of the National Report information in the database.
- WP #59: *Identify suitable data repositories such as TurtleNet, ShellBank and "Report a Ghost Net" to facilitate region-wide information exchange and consider data sharing.*

Summary:

- Overview of a proposed federated global sea turtle data and decision-support hub based on a "contribute once, use many" approach, linking existing platforms while retaining data ownership and control.
- Assessment of current fragmentation, sustainability challenges and duplication across major sea turtle data platforms, and the opportunities created by recent advances in AI-enabled interoperability.
- Description of governance, data-sharing and technical arrangements for a shared information layer connecting existing regional and global sea turtle databases and tools.
- Outline of a proposed pilot initiative in the Red Sea and/or Australian Indian Ocean waters to test federated data integration, shared standards and decision-support applications.
- Consideration of the potential role of IOSEA, partner organisations, platform hosts and Signatory States in developing a scalable global sea turtle information infrastructure.

Action requested:

- Review the draft and provide comments
- Provide guidance on next steps

Concept Note: A Federated Data and Decision-Support Hub for Sea Turtle Conservation and Management

Ronel Nel (AC Member) & Mark Zimbicki (SHAMS, Saudi Arabia) & AI (Claude)

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Summary Purpose and Request

This document is an evolution on the concept of a global spatial decision support system for sea turtles that was catalised by the potential termination of TurtleNet, an IOSEA spatial tool produced and maintained by the Queensland Government Australia. The newer 2.0 proposal is as a result of the rapid advancement of AI processing capacity and rapid integration of information.

The Advisory Committee is invited to discuss the concept of a federated "contribute once, use many" approach to sea turtle data, beginning in the IOSEA region as a building block of a global system, and potentially launch a two-year pilot in the Red Sea and/or the Australian continental waters of the Indian Ocean.

Linking sea turtle platforms has been proposed before (in 2012). What has changed is that it is now practical. Advances in AI, in particular language and multimodal models, make it possible to link platforms and datasets without asking any host to re-engineer its data model. The need is also clearer: a 2026 survey of the main sea turtle platforms (summarised below from APPPENDIX I) found that none has funding secured for the next five years, that several new tools are being planned in parallel, and that the community leans towards connecting existing systems rather than building a single new one.

The proposal does not create another database; it is a proposal for an Information Hub that would not hold the data but will be a front-end only. Data stays with the existing platforms and owners who already have it, but the hub adds is a thin connecting layer with four jobs:

- helping data holders convert their records to standard formats;
- translating between platforms that describe turtle data differently;
- setting shared rules on access and credit; and
- turning the combined information into answers for managers of Signatory States and other interested parties.

In this way, Signatory States and data holders stop re-supplying and re-cleaning the same data for each new project.

Specific points to review are:

1. Endorse the principles in this note as the basis for IOSEA's data work.
2. Establish a small working group with the necessary expertise to scope the pilot and draft a data-sharing agreement.

3. Invite existing platform hosts, regional bodies and sister instruments such as the Inter-American Convention (IAC) to join the working group.
4. Consider the pilot workplan and its resourcing at the next Advisory Committee meeting.

Background: many platforms, the same data

Sea turtle data are held in many independent systems, regional and global, that overlap heavily in content and purpose. Each was built for a project, donor or agency, and each asks the same data holders for much the same records. The table below draws on a 2026 survey of platform leads on their purpose, maintenance, resourcing and views on a single global tool.

Platform	Main content	Host	Status (2026 survey)
State of the World's Sea Turtles (SWOT)	Nesting data from more than 4,000 sites and over 1,700 satellite tracks from nearly 800 providers; primary repository for RMUs, species distributions, habitat suitability layers and genetic stocks; Minimum Data Standards	Oceanic Society (fiscal sponsor), with IUCN MTSG; data served by OBIS-SEAMAP	Operating for 22+ years; datasets requested more than 3,500 times
OBIS-SEAMAP	Occurrence, nesting, telemetry and survey data; feeds OBIS and GBIF	Duke University	Maintained; public access point for SWOT
seaturtle.org (NestDB, STAT/Tracking, Maptool)	Nesting and stranding data, satellite telemetry, spatial and environmental analysis tools	seaturtle.org	Maintained, but relies largely on personally contributed time; no secured funding
TurtleNet	Nesting, migration and abundance data, satellite tracking and management datasets with spatial layers; open-access visualization of mostly Eastern Indian Ocean data.	TurtleNet team	Platform maintained, data provision needs updating; funding uncertain
MiCO	Connectivity among habitats for 109 migratory species, including sea turtles	GOBI consortium	Due to receive Blue Corridors connectivity data
Blue Corridors for Turtles	Temporary IMTA decision-support tool; connectivity baseline from aggregated contributed data	BC4T Research Consortium	Funded for 18–24 months; no lasting database; data to pass to SWOT and MiCO
IMTA e-atlas	Spatial representation of Important Marine Turtle Areas and proposed Areas of Interest	IMTA Task Force (IUCN MTSG)	Under development; resourcing to be decided
IUCN MTSG / Red List	Global status reports and Red List (and Green Status) assessments	IUCN MTSG	Website and reports only; no dedicated data interface
Movebank and other telemetry stores	Raw and processed tracking data	Various	—
IAC National Annual Reports	Index beach and bycatch data; national policies and activities	IAC Secretariat	—
IOSEA Online Reporting Facility	National implementation reports	IOSEA Secretariat	—

The survey points to four conclusions:

- **Sustainability is the common weakness.** No platform reported funding secured for the next five years. For example seaturtle.org depends largely on volunteered time, and the IMTA & Blue Corridors tools will close or be handed on within a short time to other projects.
- **New tools are multiplying.** A potential IOSEA-wide tool including TurtleNet, an IMTA e-atlas are all being planned on top of SWOT, MoveBank and others, which risks adding to the fragmentation they are meant to solve.
- **The global assessment process needs it.** IUCN MTSG, IOSEA and IAC have no dedicated information interface and relies on external systems to collate data for status reports and Red List assessments. It sees a federated system as a potential way to speed up those assessments.
- **Views on a single tool are mixed.** Some respondents support a single global tool. Others support global coordination but doubt that one centralised tool is the right architecture, pointing instead to interoperability, documented APIs, shared standards and sustained support for trusted providers (Kemp et al. 2026). A federated intelligence hub can serve both views: one global view for users, many systems underneath.

The costs of this fragmentation fall mainly on data holders and Signatory States:

- **Repeated requests.** Field teams answer the same data calls for several initiatives, often in different formats.
- **Repeated cleaning.** Each platform re-formats and quality-checks the same records, and corrections made in one rarely reach the others.
- **Conflicting numbers.** Assessments drawing on different copies can disagree, which weakens their use in policy.
- **Short lifespans.** Many project platforms lapse when funding ends, stranding the data they hold.
- **Gaps that stay hidden.** No single view shows which sites, species or threats are unmonitored as shared and published data are used over and over again creating biases.

Why now

The idea of linking these systems however is not new. In 2012 the SWOT and OBIS-SEAMAP teams already proposed closer collaboration with IOSEA (Halpin, OBIS-SEAMAP/SWOT/IOSEA). Earlier attempts required every platform to adopt a common schema or build bespoke connections to the others, which was costly, slow and politically difficult.

Advances in AI change the economics. Models can propose mappings between different data models, extract structured records from spreadsheets, reports and images, reconcile duplicates, flag errors, and answer questions across several systems with traceable sources, while each host keeps its own system. *A mandate, agreed rules and a lasting host are still essential, but the technical cost of linking falls sharply*.

There is also momentum. Federated infrastructures such as GBIF, OBIS, Movebank, DataONE and EMODnet show the model works at scale. More recently, EarthRanger and its Gundi integration network, MERMAID for coral reef data, and Amazon.ia (announced by Planet and partners in September 2026) show conservation communities organising around shared data and AI.

Proposed approach: federate, don't replace

The hub should be a federation of existing systems, not a new central database. A single (Global Decision Support tool 1.0) replacement platform would ask every host to give up control, credit and funding lines, and would likely become one more silo.

Under a federated model (2.0), data stays with its owners and is contributed once in an agreed format. *Any approved platform, assessment or national dashboard can then draw on the same records through a shared layer*. To users it can still work as one global tool, with one place to search, view and ask questions, while the data stays where it is.

Guiding principles:

- **Contribute once, use many.** A record is submitted, checked and corrected in one place, and every connected platform uses that version.
- **Owners keep ownership.** Data holders set access terms, including embargo periods, and can withdraw data.
- **Credit is visible.** Datasets receive persistent identifiers (DOIs) and are cited whenever they are used, including in AI-generated outputs.
- **Existing platforms keep their roles.** SWOT, OBIS-SEAMAP, seaturtle.org, TurtleNet, MiCO, the IMTA e-atlas and project tools continue as front ends, drawing on the shared layer.
- **Sensitive data is protected.** Exact nest and foraging locations are generalised or restricted where poaching or disturbance is a risk. Open access can be visualisation-only where owners prefer.
- **Open standards, no lock-in.** Every component uses published formats, so no single host or vendor is indispensable.

Components of the hub

The only new piece is a light shared layer between data providers and the platforms people already use. Everything above and below it already exists.

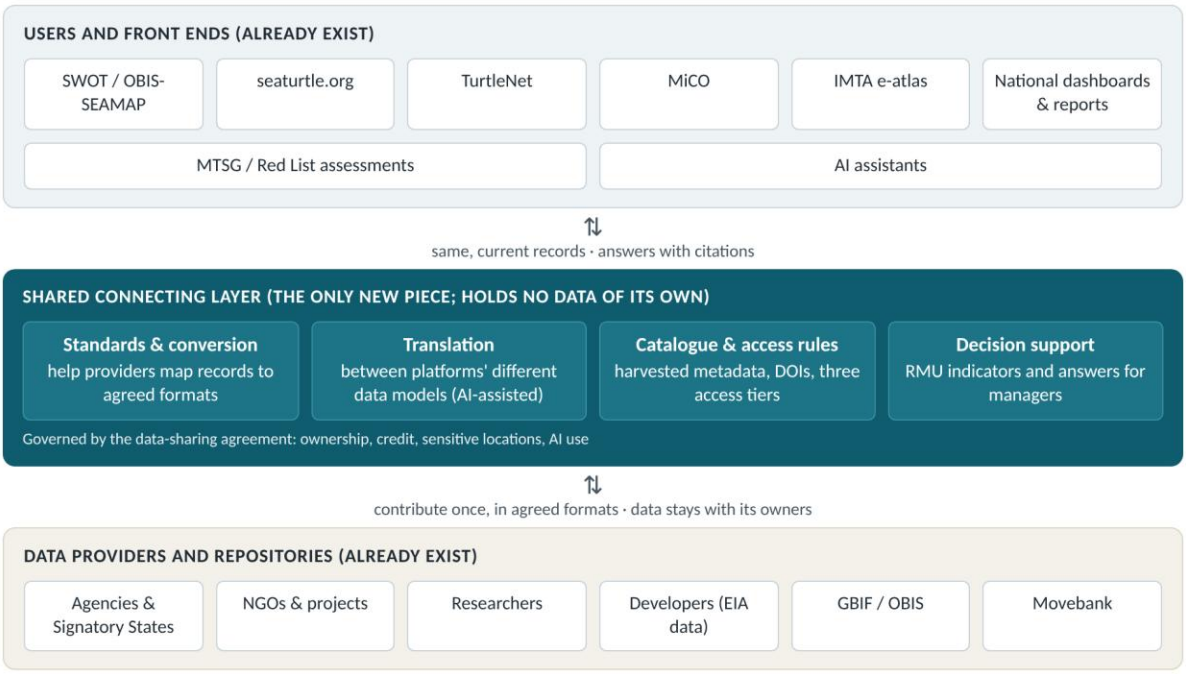

Figure 1. Providers submit data once in agreed formats; every connected platform reads the same, current records through the shared layer.

1. **Standards profile.** A short profile of existing standards, not a new one for example, the SWOT Minimum Data Standards for nesting beaches, Darwin Core for occurrences and strandings, and Movebank-compatible formats for telemetry. For flipper tagging and genetic stocks, where practice varies, the profile adopts the best existing conventions (for example, SWOT's RMU and genetic stock layers).
2. **Catalogue and DOIs.** A searchable catalogue of every dataset, its owner, coverage and access terms. To avoid duplicating GBIF, OBIS, Movebank and DataCite, it harvests metadata from those platforms and the turtle platforms, and issues DOIs only for datasets that have none. Its added value is the regional and global view: coverage, gaps, owners and access terms across all platforms in one search. AI tools can help generate metadata for legacy datasets and match duplicates across platforms.
3. **Access rules.** Three tiers (open, registered, restricted) and agreed generalisation of sensitive locations, applied automatically.

4. **Federated access and AI-ready interface.** One place where a person, a national system or an AI assistant can ask a question and get an answer assembled from several platforms, with citations to the source datasets. Platforms pull the same records through documented APIs[1] rather than holding diverging copies. Sending corrections back to the source dataset is desirable, but it needs rules on owner approval, versioning and who resolves disagreements; the pilot will test these.
5. **Decision-support outputs.** Indicators by Regional Management Unit: nesting trends, key habitats, connectivity, threats and monitoring gaps, ready for national reports, marine spatial planning and EIA screening.

Governance and roles

Governance matters more than technology here: the hub works only if data holders trust the rules. IOSEA can provide the intergovernmental mandate, with technical leadership shared with IUCN MTSG, SWOT and existing platform hosts (e.g. TurtleNet). Because the hub is intended to grow into a global system, sister instruments such as the IAC should be involved from the start.

Actor	Proposed role
IOSEA Advisory Committee	Endorses principles, oversees the working group, reports to Signatory States
IOSEA Secretariat	Convenes partners, links the hub to national reporting, seeks funds
Working group (5–7 members)	Drafts the data agreement and standards profile, steers the pilot
IUCN MTSG, including the IMTA Task Force	Scientific standards, RMU framework, links to global status and Red List assessments and the IMTA process
Platform hosts (SWOT/OBIS-SEAMAP, seaturtle.org, TurtleNet, MiCO, others)	Connect to the shared layer; continue their own services
Proponents of new tools (global spatial tool, IOSEA-wide tool, IMTA e-atlas)	Build new tools as front ends on the shared layer rather than as separate databases
Regional and national bodies (PERSGA; Australian national and state agencies; Nairobi Convention and its WIO Marine Turtle Task Force for later scaling)	Regional uptake and national focal points
Sister instruments (IAC, CMS)	Align reporting and standards; extend the model beyond the IOSEA region

[1] An API (Application Programming Interface) is an agreed way for one computer system to ask another for data or to do something, without a person having to go to a website and click around.

Actor	Proposed role
Data providers (agencies, NGOs, researchers, developers)	Contribute data; set access terms for their datasets
Signatory States	Use outputs in national reports, MSP and EIA; encourage national data to flow in

The data-sharing agreement should cover, at minimum:

- Ownership and the right to withdraw data.
- Access tiers: open (which may be visualisation-only), registered users, and restricted (owner approval).
- Embargo periods for unpublished data, for example up to two years.
- Attribution, DOIs and citation rules.
- Generalisation rules for sensitive locations.
- Permitted and prohibited uses, including commercial use and EIA.
- How disputes and corrections are handled.

It should also address AI-specific issues:

- Whether contributed data may be processed by AI tools, and by which services.
- Whether data may be used to train AI models.
- How AI services handle sensitive locations, for example applying generalisation before any AI processing.
- Attribution when an AI-generated summary or answer draws on a dataset.

Pilot: Red Sea and Western Indian Ocean and/or Australian Indian Ocean waters

A pilot will prove the model on a manageable scale before it is offered across the IOSEA region and beyond. Two areas are proposed. The working group would recommend running one or both, depending on partner interest and funding. Running both would test the model in contrasting settings: a multi-State region where shared data infrastructure is still emerging, and a single-State setting with established monitoring programmes.

Pilot scope:

- **Species:** the species of greatest management concern in each area first (for example green and hawksbill turtles in the Red Sea), adding others in year two.
- **Data types:** nesting site and beach monitoring, satellite tracking, flipper tagging, and strandings and bycatch, drawing on existing genetic stock and habitat layers from SWOT.

- **Partners:** two to four Signatory States and/or Australian national and state agencies, and at least two existing platforms (e.g. SWOT, TurtleNet, Red Sea Turtle Hub), connected through the shared layer.

Pilot deliverables:

1. An inventory of datasets and platforms in the pilot area, showing overlaps and gaps.
2. An early demonstration, by month 6, using public data to show a cross-platform view and answer a few management questions with citations.
3. A signed regional data-sharing agreement, including AI provisions.
4. A standards profile for the pilot data types, mapped to existing formats.
5. A working catalogue and shared data layer connected to at least two platforms.
6. An RMU-level dashboard of key indicators and worked examples for the pilot decisions.
7. A lessons-learned report and a recommendation on scaling across the IOSEA region and globally.

Draft recommendations for the Advisory Committee

The Advisory Committee may wish to recommend that the Signatory States:

1. **Endorse** the federated "contribute once, use many" principles in this note as the basis for IOSEA's work on marine turtle data, and as IOSEA's contribution to a global federated system.
2. **Establish** an intersessional working group on data integration, open to Advisory Committee members, IUCN MTSG, platform hosts, regional bodies and sister instruments such as the IAC.
3. **Request** the working group to draft a data-sharing agreement, including provisions on AI use, and a standards profile, and to scope a pilot in the Red Sea and/or Australian continental waters of the Indian Ocean.
4. **Invite** Signatory States in the pilot areas to nominate data focal points and to join the pilot.
5. **Request** the Secretariat to explore funding and a long-term host, and to report to the next Advisory Committee meeting.
6. **Encourage** partners to align existing and new data platforms with the agreed standards, and to build new tools on the shared layer rather than as stand-alone systems.

References

- State of the World's Sea Turtles (SWOT)
- OBIS-SEAMAP: the World Data Center for marine mammal, sea bird and sea turtle distributions
- Halpin, P. OBIS-SEAMAP, SWOT and IOSEA (presentation to IOSEA)

- Migratory Connectivity in the Ocean system, UNEP/CMS/ScC-SC4/Inf.5 (2019)
- MiCO reveals the marine megavertebrate migrations connecting the global ocean (GOBI, 2025)
- Sea Turtle Atlas: an interactive, interoperable platform for data-driven restoration (2026)
- Kemp, H. et al. (2026). The past, present, and future of online biodiversity knowledge systems. *Annual Review of Environment and Resources*. doi:10.1146/annurev-environ-121224-084200
- Federated data precedents: DataONE; EMODnet; EarthRanger; MERMAID; Planet announces Amazon.ia (September 2026)