IOTC dFAD REGISTER

Design Specifications

07/04/2025 10:03:00

Version incorporating CPC feedback (one CPC as of 03/04/2025): changes are tracked, while CPC feedback/questions pending agreement or answer are highlighted in yellow.

Introduction

At its 28th Session (Bangkok, May 2024), the *Indian Ocean Tuna Commission (IOTC)* adopted *Resolution 24/02*" *On Management of Drifting Fish Aggregating Devices (FADs) in the IOTC Area of Competence*". The Resolution tasks the IOTC Secretariat with the development and operation of the *dFAD Register*, an online system to serve as a registry of dFADs and a record of their deployment and operational status:

> *Paragraph 3 " –The IOTC Secretariat shall develop and maintain an electronic register for all instrumented buoys deployed in the IOTC area of competence (dFAD Register). The proper functioning of the dFAD Register shall be tested with a selection of vessels during the second semester of 2025. The dFAD Register shall be effective as of 1 January 2026."*

With the Register, the Resolution provides support for *Contracting and Cooperating Parties (CPCs)* to:

> *"collect the necessary data in order to evaluate and closely monitor the use of large-scale fish aggregating devices (FADs) and other devices, as appropriate, and their effects on tuna resources and tuna behaviour and associated and dependent species, to improve management procedures to monitor the number, type and use of such devices and to mitigate possible negative effects on the ecosystem."*

This document defines a set of specifications for the design of the dFAD Register, with the twofold goal of: *(i)* meeting its core requirements, and: *(ii)* readying it for a potential broader role within the scope of Resolution 24/02 and dFAD Management.

The specifications are intentionally *high-level*, in that the focus is on the value and capabilities of the system rather than the fine details of its features. Where interactions with the system are described or depicted, the goal is to illustrate key usage patterns, not prescribe the user interface. All Figures, in particular, serve as prototypes for an implementation and are provided for illustration purposes only. Technical details are omitted altogether, even where they contribute to shaping the specifications.

In this form, the specifications are ready to accommodate feedback from all relevant stakeholders. This reflects and aligns with the flexibility that Resolution 24/02 grants regarding the exact perimeter of the Register. Different capabilities may elicit varying degrees of support across stakeholders, or receive different priorities.

Specific questions identified during this analysis and that need feedback from CPCs are highlighted in this document at the end of each section.

Definitions and use of terms

- **CPCs**: Contracting parties and Cooperating non contracting Parties
  - **Flag CPC**: the State whose vessel deploys dFADs/buoys (Most IOTC Flag States are CPCs, but in the case of EU, it is the CPC, and its Member States are Flag States).
  - **Non Flag CPC**: a CPC not related to the vessel that deploys dFADs/buoys
  - **Costal CPC**: a CPC (or Member State thereof) which is a coastal state of the Indian Ocean
- **SEC**: IOTC Secretariat, maintains and manages the e-dFAD Register ("the Register")
- **SC** (and/or SEC Science/Data staff): extracts Register data and performs scientific analysis
- **dFAD**: a Drifting, man-made Fish Aggregating Device (FAD)

  CPC comment: We would prefer if the definitions are in line with Res 24/02 but if there is no time to change we can live with that.

  SECRETARIAT: the definition in 24/02, para 1b) includes logs under dFADs, while Annex 1, table 3 "Classification of Floating Objects" (for reporting purposes) clearly separates dFADs from Logs. In this document, we need to differentiate between dFADs and Logs, since dFADs need to be marked on deployment with an IOTC unique identifier, whereas logs do not (unless the intention of 24/02 is to treat Logs just like dFADs and also have them assigned a Unique IOTC dFAD Identifier.) ***This needs clarification from the Commission****.*
- **Log**: a floating object of natural source or accidentally lost from anthropic activities
- **Floating object (FO)**: A dFAD or Log.
- **Instrumented buoy**: an electronic device used to track dFADs and Logs
- **Buoy owner**: the owner/master/operator of a fishing vessel who is in charge of tracking an instrumented buoy and is authorised to request its activation and/or deactivation.
- **Buoy supplier company**: the company supplying a vessel with instrumented buoys and the relevant satellite communication service.
- **Active buoy**: an instrumented buoy from which the satellite communication service has been initiated and switched on, which has been deployed at sea on a dFAD or log and which is transmitting position.
- **Deactivation of a buoy**: the act of ending satellite communications service, which is done by the buoy supplier company at the request of the vessel owner or buoy owner
- **Activity**: any single activity related to a buoy, dFAD and/or Log (e.g. deployment, visit, retrieval…)
- **Operations**: a series of simultaneous or consecutive activities related to a buoy, dFAD and/or Log

- **Party**: a Party (or Tenant) is a CPC.
- **User**: a User is someone who can log in to the e-dFAD and perform tasks according to their privileges. A user can be associated to a Party (CPC user) or not (SEC user).
  - **External user**: a User managed by a CPC but part of the industry and in charge of reporting dFAD information (buoy owner).
- **Business rule (BR)**: a rule applied by the system to validate actions or information provided by a User.

State of play

Resolution 24/02 is due to enter into force on 2 March 2025, which means that, so far, no dFAD data has been submitted under this Resolution.

It is to be noted that reporting of dFAD information was covered until now by Resolution 19/02 (now superseded by 24/02), and that reporting relevant to the dFAD Register was made through the following e-MARIS requirements (or their predecessors), through the use of Excel templates):

- *Requirement 5.7 – FAD – Set on dFAD by type - Drifting floating objects (DFO) related activities*: this is about the details of each dFADs (construction etc), the activities of vessels on dFADs and the catches made on dFADs. Statistical Reporting form: 3DA. Deadline for reporting: 30 June, each year; but data is to be reported on a monthly basis.
- *Requirement 5.10 –Number of active FADs*: reporting information about active dFADs ("a) the geographical location (degrees, minutes and seconds); b) the date; c) the time; d) unique instrumented buoy reference number; e) the name and IOTC registration number of the vessels assigned to the instrumented buoy"). Statistical Reporting form: 3BU. Deadline for reporting: 30 to 60 days after deployment, each year.

IOTC CPCs that use dFADs in the Indian Ocean are (with number of their Purse Seiners in the e-RAV as of 11/03/2025):

CPC relevant to the Register	Number of their purse seiners on e-RAV
European Union (France, Spain)	22
Kenya	1
Korea (Republic of)	5
Mauritius	3
Seychelles	14
Tanzania	1
TOTAL	**46**

Since Resolution 19/02 has been in force since 1 January 2020, there are a few years worth of dFAD activity data accumulated at the Secretariat.

Actors, Data Flows and Capabilities

The following Actors, Data Flows and Capabilities have been identified.

- **IOTC Secretariat** maintains the dFAD Register, including CPC, User and Reference data management.
- **CPCs** (or Flag States for the EU) create and manage accounts for their own users.
- **Buoy owners**, obtain a unique IOTC dFAD identifier from SEC for each of their dFADs.
- **Buoy owners** declare, within 24hrs, any deployment of their dFADs, Instrumented buoys and/or Logs.
- **Buoy owners** declare, within 72hrs, any retrieval/deactivation/loss of dFADs, Instrumented buoys and/or Logs.
- ***Buoy owners*** *update additional information about their deployed dFADs, Instrumented buoys and/or Logs (visits and fishing activities) within 72hrs. [OPTIONAL~~AUXILIARY~~]*
- ***Buoy owners*** *provide daily location of their deployed Instrumented buoys [~~AUXILIARY~~OPTIONAL]*
- **Flag CPCs** verify and validate, at least once a year, data submitted by their national Buoy Owners
- **Flag CPCs** export data relevant to Annex I for reporting through e-MARIS.
- The **Coastal State CPC** and the relevant **Flag State CPC** receive a notification when an active buoy is deactivated within its EEZ.
- The **IOTC ~~Scientific Committee~~** or **Secretariat Science staff** accesses the Register data for scientific purposes, as per confidentiality rules set in 24/02.
- ***Non Flag CPCs*** *request access to dFAD data in the dFAD register through their focal point, subject to approval of the relevant Flag CPC. [OUT OF SCOPE]*
- Only **Users with an Active Account** can access the Register. There is **no public access section**.
- The dFAD Register will be available both in English and French.

Data confidentiality and security

The security model adopted by the Register will ensure that all confidentiality clauses defined in 24/02 are fully complied with.

Access to the Register will be restricted to users with an account. Accounts will be primarily created and managed by CPCs.

Only IOTC Secretariat staff with the proper permissions will have full access to all Register data, for administration, support and maintenance purposes.

On a technical level, all data will be stored in a secure database hosted by the current IOTC Cloud Provider, offering full backup and recovery features.

Core Capability: CPCs, Users, and Reference Data

CPCs

Each CPC has the following **properties** (more can be added as needed):

- **Name** (short, unique)
- **Description** (longer)
- **Country code** (ISO 3alpha)
- **Focal point**: one selected from the CPC's users, to be used as the main contact point)
- **State roles**: Flag State, Coastal State, Small Island Developing Coastal CPC (for paragraph 19 rule), etc.
- **Preferred language**: English or French, to be used as default application display language for users of the CPC (can be changed by each user)
- **Status**: Active or Inactive. An inactive CPC cannot participate anymore in the dFAD application processes (e.g. a CPC that leaves the IOTC altogether should be deactivated, but its past data preserved in the system).

SEC managers can:

- **Create** a new CPC.
- **Update** all fields of an existing CPC (except Name)
- **Activate/Deactivate** a CPC (deactivating a CPC deactivates all its users)
- **Delete** a CPC (this also deletes all its users).

CPC managers can:

- **Update** some fields of their CPC profile.

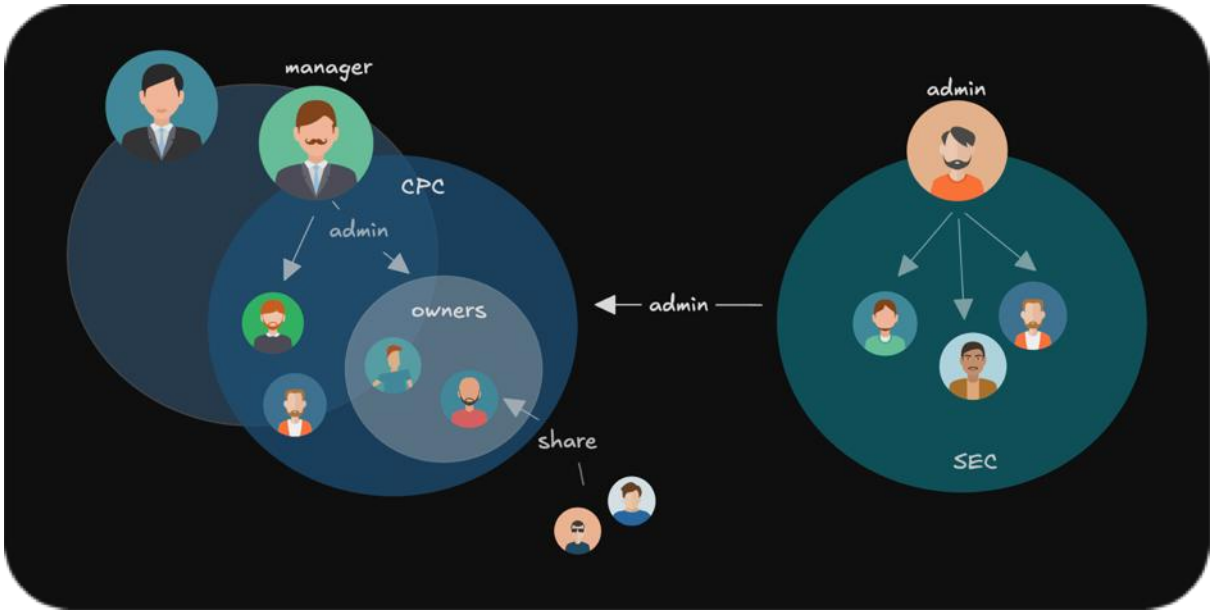
Users

There are three types of Users:

- **SEC users**: they are in charge of managing the Register and can do anything on any CPC data (subject to relevant permissions);

- **CPC users**: they are in charge of **managing** their own Party and Users and can **consult** (and possibly correct)**, but not submit**, data about the dFADs used by their own Flag Vessels.

- **Buoy Owners** (Owners, in short): they are CPC users with specific privileges that allow them to **submit dFAD records** but restrict their **visibility to their own dFAD records** and data. Owners have a **single account** to access the system. An owner that distributes management responsibilities to multiple individuals would need to share the account with all them, and their individual actions would not be separated within the system. Owners are **associated to Vessels**, for which they can report dFAD and Buoy activities. If the same individual owns **vessels from multiple flags**, then they will have **an account created for them by each relevant Flag CPC**.



The User model: Secretariat Users administer and manage the Register; CPCs manage their own Users and their Buoy Owners

Each User has the following **properties** (more can be added as needed).

- **Username**: identifier unique across all users (can be used to log in)

- **First name, Last Name**

- **Party**: the CPC the user is part of (none for SEC users)

- **Email**: unique across all users (can be used to log in)

- **Address**

- **Phone**

- **Preferred language**: English or French, to be used as application display language (defaults to the language set at CPC level)

- **Buoy owner/External User**: indicates a User who will have the specific role of Buoy Owner, declaring dFAD information in the application (vs a "standard" CPC user.)

- **Status**: Active or Inactive. An inactive User cannot access the e-dFAD application.
- **Permissions**: they define what a user can do in the application
  - **Manage Party**: the User is a Party manager and can create new Users for the Party (CPC.)
  - **Multi-manager**: for EU, allows to manage several Member States.
  - **Administrator**: the User can administer the e-dFAD application (for SEC Users only.)
  - **Manage Vessels**: Allows to associate one or more vessels to a user (Owner), which they can view, manage, report dFAD and Buoy activities on etc. These vessels are selected from the CPC's fleet declared in the e-RAV.
  - *[other permissions as required]*

Users can:

- **Update** some fields of their profile
- **Manage** their login password

Party managers can:

- Do all of the above
- **Manage** their own Party and Users

SEC managers can:

- Do all of the above
- **Manage** Parties, Users, Reference data, and act on behalf of Buoy Owners (according to their permissions)

SEC administrators can:

- Do all of the above.
- **Configure** the application settings

Questions about Buoy Owners

Q: Is a single user per owner acceptable, or should the system handle Owners as groups of users (for example, an Owner company, where the Vessel owner can manage all dFAD records from their vessels, and the individual Vessel master can only manage the records from their own vessel)?

CPC: The second is option is better and maybe more flexible. A buoy can be deployed by a supply vessel, officially followed by one vessel and another vessel might conduct fishing operations on the buoy (all of the same company). In that regard, a buoy/DFAD might be retrieved by another vessel and should be factored in.

Reference Data

Reference data (also referred to as Code Lists or Tag Categories) such as State Roles, dFAD types, etc. can be managed in the application by **SEC managers**.

The system allows SEC managers to:

- **Manage code lists**: create and activate new ones, update and deactivate existing ones;
- **Manage codes** in these code lists: create and activate new ones, update and deactivate existing ones.

Core Capability: dFAD Register & Activation Record

dFAD Records: Descriptions and Activities

The system's core information is composed of **dFAD Records**. Note that Logs[1] are also covered by the term "dFAD Record" in this document, but any specificity applying only to man-made dFADs or Logs will be explicitly mentioned. dFADs and Logs will be collectively referred to as Floating Objects (FO).

Each dFAD Record contains **descriptions** (metadata) about:

- The **dFAD/Log (FO) itself**:
  - **IOTC Unique dFAD Identifier, or UDI** (assigned by the Register; Logs don't have a UDI)
  - **Type of Floating Object** (*reference data*, Annex I of Resolution 24/02)
  - **Biodegradability Category** for a dFAD (*reference data*, Annex III of Resolution 24/02)
  - Potentially, additional information such as construction details mentioned in Annex I, Table 1, as agreed by the Commission.

    CPC: The ideal end product of the DFAD register would be that data could be reported directly into the register. A temporary solution could be that there is a functionality to import logbook data in the register and that there is an automatic match between this data and what is declared through the register, because in the end it is relevant for traceability. As of now, the way the Resolution is written, this information has to be declared through the logbook. Having this information reported in the Register would go beyond 24/02 and lead to double reporting. We are open to explore solutions (now or at a future stage) to have all the data together but this has to be faithful to the Resolution in force.

- The **Buoy Owner**: since the Buoy Owner is in charge of reporting dFAD information, all necessary information can be inferred from the Buoy Owner's User profile.
  - **Name**

[1] Add defined in Resolution 24/02: "floating object of natural source or accidentally lost from anthropic activities and that was not built and deployed for the purpose of aggregating and/or locating target tuna species for subsequent capture."

- The **Instrumented Buoy** attached to the FO:
  - **Unique instrumented buoy reference number** (assigned by the Buoy Manufacturer)
  - **Manufacturer**
  - **Model Name**
- The **Purse Seine Vessel** that is assigned to the instrumented buoy:
  - **IOTC Vessel Record number** (assigned by the IOTC RAV)
  - **Flag State** of the vessel (inferred from the IOTC Vessel Record number)
- **Activities**: Each dFAD Record also contains data on Buoy Activities and FO Activities (*reference data*, Resolution 24/02, Annex I, resp. Table 5 and Table 4), each with a set of metadata. These activities are linked to **Actions** triggered by the Buoy Owner (Activation, Deactivation, Transfer, Replacement, see further below). These activities relate to the following events, and must be reported with relevant information:
  - **Deployment of the FO and of the associated Instrumented Buoy:**
    - **Date and time** of deployment
    - **Location** of deployment (latitude/longitude, decimal)
  - **Loss or Abandonment of an Instrumented Buoy:**
    - **Date, Time, and Last known location.**
    - **Status of the dFAD** (Lost, Abandoned)
  - **Retrieval of an Instrumented Buoy:**
    - **Date and Time** of retrieval
    - **Decommissioning of the Buoy** (Yes/No) *[Note: this is a terminal state]*
    - **Status of the associated dFAD** (Retrieved, Discarded, Abandoned, Stranded, Lost)
  - **Transfer, i.e. "*replacement of the buoy owned by another vessel by a buoy of the vessel*":**
    - **Date and time** of transfer
    - **Location** of transfer (latitude/longitude, decimal)

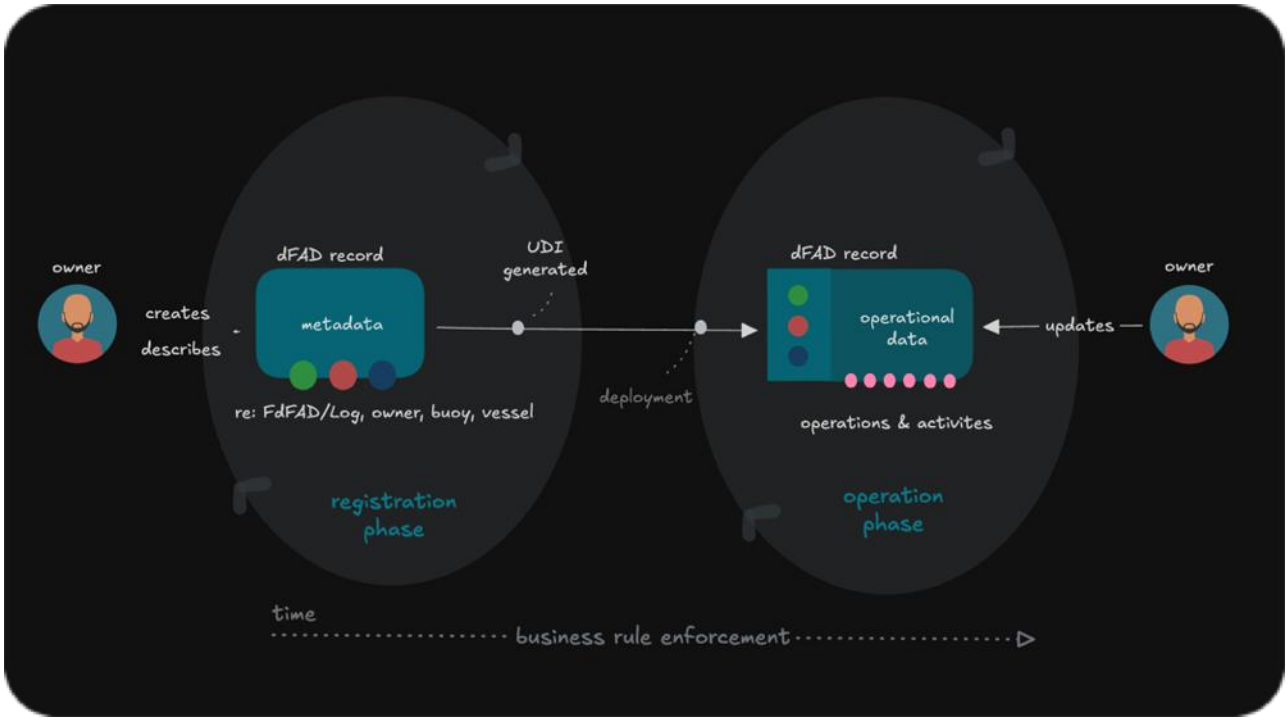
Questions about dFAD information

Q: Date and time information: should it be reported as UTC or local time with time zone?

Adding Records: Registration and Operational Phases

dFAD Records are **added and updated** by the relevant **Buoy Owner**.

dFAD Records live through two consecutive phases: the **Registration** Phase and the **Operations** Phase.



Main Reporting Flow: Before deployment: Buoy Owners add a record and provide metadata to describe all the relevant parts; eventually, if the FO is a dFAD, it is allocated a UDI. After deployment, owners report activities, possibly update metadata, and do not require supervision for this. BRs on record contents are enforced throughout the record's lifecycle.

Registration Phase : Descriptions and IOTC Unique dFAD Identifier Generation

Buoy Owners add dFAD Records in the system ahead of Operations (deployment at sea), and progressively add metadata about themselves, the FO, the associated buoy, and the vessel used to manage them.

For a given dFAD Record, information can be provided at any time ahead of deployment, and can be completed as more information becomes available.

FO description can be available well in advance, for example in port when loading the dFAD on board the vessel; or only right before deployment, for example in the case of a Log found at sea.

Buoy Owners provide the **mandatory Registration metadata** required by applicable Business Rules, and can then **Register the dFAD**.

When a **dFAD** is **Registered**, the system automatically assigns it an **IOTC Unique dFAD Identifier (UDI).** This UDI will follow the dFAD throughout its whole operational life.

[Note: See Appendix I for a dFAD numbering scheme proposal.]

Registration Records ("work in progress") are grouped in a dedicated part of the system, separated from the **Operations Records** (see below).

Validation for Registration

BR [error]: A new Record for an FO of type dFAD can only be Registered if the mandatory Registration metadata is provided.

BR [error]: Type of FO value must be in the "Type of FO" code list.

BR [error]: Biodegradability Category value must be in the "Biodegradability Category" code list.

BR [warning]: The dFAD's Biodegradability Category should be compatible with the conditions set in 24/02, paragraph 31.)

Questions about dFAD Registration

Q: Are there additional dFAD design/construction details to be provided when registering a dFAD, beyond Type (dFAD) and Biodegradability category, such as construction details mentioned in Annex I, Table 1, or maybe the vessel to which the dFAD will be assigned?

CPC: Above comment on Annex 1 Table 1 applies here.

Operations Phase: dFAD/Log and Buoy Activities

Buoy Owners provide the **mandatory Record metadata** required by applicable Business Rules, and the Record is **Ready to be Activated**.

Starting with **Deployment**, Buoy Owners may add **Activities** (for Buoy and/or FO) to dFAD records, through **Actions**, providing all the relevant Activity data. This occurs in unsupervised fashion, and can be repeated from the first action, Buoy Activation to Buoy Deactivation, and even beyond if the FO is equipped with a new buoy.

- **Activation**: This is composed of a **Buoy Deployment,** and a **dFAD Deployment**;
- **Deactivation**: This is composed of a **Buoy Retrieval, Abandonment or Loss**, and a **dFAD Retrieval, Abandonment, Discard or Loss.**
- **Transfer**: This is composed of a **Buoy Transfer.**
- **Replacement**: This is composed of a **Buoy Replacement.**

Reporting **Activities** triggers additional **Business Rules**, notably around **timeliness of reporting** and **limits on the number of Active Buoys**. Invalid data prevent submitting a record update.

- Reporting made outside of the 24hrs (activation) or 72hrs (deactivation) allows the submission but flags it as "late" and allows the Buoy Owner to provide a reason for lateness (e.g. Force majeure, e-DFAD application unreachable…). The Flag State will be able to view and search for Late submissions.

Validation for Operations

BR [error]: A new dFAD Record is Ready to be deployed only if it has been Registered and the following mandatory Record metadata have been provided and are valid: Unique instrumented buoy reference number, Manufacturer, Model name, IOTC Vessel record number [TBD].

BR [error]: A vessel can only be added to a dFAD Record if the Vessel is in the e-RAV.

BR [error]: A vessel can only be added to a dFAD Record if the Vessel Type in e-RAV is "Purse Seiner".

BR [error]: A vessel can only be added to a dFAD Record if the Vessel is associated with the Buoy Owner profile.

BR [warning]: A vessel can only be added to a dFAD Record if the Vessel is currently present in the e-RAV.

BR [error]: Any Activity can only be added to a dFAD Record if the relevant FO and Buoy haven't been marked as Decommissioned~~, Lost or Abandoned~~.

Deployment of the Buoy (Action: Activation)

Once a record is **Ready to be Activated**, the **Buoy Owner** can add a **Deployment of FO** and a **Deployment of Buoy** Activities**.**

The dFAD, if any, is then **marked as Deployed** in the system.

The Instrumented Buoy is then **marked as Active** in the system.

Reporting a deployment that **breaches a vessel's Active buoy quota** allows the submission but marks it as "**over quota**".

Validation for Deployment

BR [warning]: A Deployment can only be made if the total number of Active Buoys for the vessel hasn't been reached (as set in 24/02, paragraphs 16, 18, and 19.)

BR [error]: The date and time of deployment must be provided and valid.

BR [error]: The date and time of deployment must not be in the future.

BR [warning]: The date and time of deployment (i.e. of Instrumented Buoy Activation) must be within 24hrs of the date and time of submission.

BR [error]: The latitude of deployment must be provided and valid (number, between -90 and 90).

BR [error]: The longitude of deployment must be provided and valid (number, between -180 and 180).

BR [error]: For an Activation, both the Buoy Activity and the dFAD activity must be Deployed.

Questions about Deployment

Q: 24/02 indicates that "The DFAD Register shall not allow the registration of more active instrumented buoys per purse seine vessel than the limit provided for in paragraphs 16, 18 and 19", but the Register does not register Buoys (only dFADs); rather, it records Buoy activations/deactivations, as per 24/02.

CPC: In our view, the management of the buoys is more important than the management of the DFADs. The number of DFADs followed is always dependant on the buoys attached because it is easier to track. In this exercise of the register, management of the DFAD and the buoy go hand-in-hand. It is important to know which is deployed with what DFADs but a buoy will also live a life of its own (being deployed on multiple DFADs at time).

Does this mean that the Register should prevent reporting of an Activation if the vessel has reached its quota? Or should it rather flag the submission as over quota?

CPC: 24/02 mention that this should not be allowed.

SECRETARIAT: 24/02 mandates that this is not allowed, but since reporting in the Register is done within 24hrs of actual deployment, the Register cannot prevent the actual physical deployment

Reporting happens within 24hrs of deployment, so if an over quota buoy was effectively deployed at sea, blocking its reporting in the system could be counter-productive.

CPC: The number of buoys currently deployed should be available to prevent this kind of situation.

SECRETARIAT: A possible solution is that submissions be accepted, though marked as "over quota", and possibly notified to both the Owner and Flag State. This information can then be used by the CPC/Flag State to assess compliance of their vessels.

Retrieval of a Buoy (Action: Deactivation)

If an **Active Buoy** needs to be brought back on board the vessel, it is **Retrieved** and **should be Deactivated**.

The **Buoy Owner** opens the relevant dFAD Record and **adds a Buoy Retrieval Activity.**

The **Buoy Owner** provides information on the **associated dFAD** Activity, as well as whether the buoy was **Decommissioned**.

The **Buoy Owner** provides the **mandatory Retrieval metadata**, and if the applicable Business Rules are all met, can submit the Deactivation.

The **Instrumented Buoy** is then marked as **Retrieved** (and is not Active anymore.)

The **associated dFAD** is then marked according to the information provided in the dFAD Activity: **Retrieved**, **Discarded**, **Abandoned**, **Stranded** or **Lost.**

Validation for Retrieval

BR [error]: A Retrieval Activity can only be added to a dFAD Record that has an Active Instrumented Buoy.

BR [warning]: The date and time of Retrieval (i.e. of Instrumented Buoy Deactivation) must be within 72hrs of the date and time of submission.

BR [error]: If the Buoy Activity is Retrieved, the dFAD activity can only be Retrieved, Discarded, Abandoned, Stranded or Lost.

BR [error]: Decommissioning of the Buoy (yes/no) must be provided.

BR [error]: The date and time of Retrieval must be provided and valid.

BR [error]: The date and time of Retrieval must not be in the future.

Questions about Retrieval

Q: Is it possible to Retrieve a dFAD without retrieving the buoy?

CPC: Nothing in the Resolution prevents this. In any case, what would be the intention of the vessel? Either it is redeployed with another FO and this has to be reported or it is deployed without any FO and the buoy would serve no purpose.

Q: After retrieval of a buoy, Owners should report if it was decommissioned. Can dFADs also be Decommissioned?

CPC: This is not relevant as this is not included in 24/02. The DFAD can be redeployed with the same number, scrapped and its material reused to build another FAD, or even redeployed with a new number: it doesn't change anything. The importance is that the DFADs in the water have an identifier that allows them to retrace the vessel that deployed it.

Abandonment or Loss of a Buoy (Action: Deactivation)

In case of voluntary (abandonment) or involuntary (loss) end of use of an Instrumented Buoy without retrieving it, the **Buoy Owner** opens the relevant dFAD Record and **adds a Buoy Abandonment (resp. Loss) Activity**

The **Buoy Owner** provides information on the **associated dFAD** Activity.

The **Buoy Owner** provides the **mandatory Abandonment or Loss metadata** and submits the Activities.

The **Instrumented Buoy** is then marked as **Abandoned** or **Lost** (and is not Active anymore.)

The **associated dFAD** is then marked according to the information provided in the dFAD activity: **Discarded**, **Abandoned**, **Stranded** or **Lost**.

Any **Instrumented Buoy Deactivation happening in the EEZ** of a **Costal State** is **notified** by the system to the relevant **Coastal State** and **Flag State**. Determination of whether deactivation happened inside the CS EEZ is done automatically by the system based on the latitude/longitude reported for the deactivation.

Validation for Loss or Abandonment

BR [error]: An Abandonment or Loss Activity can only be added to a dFAD Record that has an Active Instrumented Buoy.

BR: Any Instrumented Buoy Deactivation has to be reported in the system within 72 hours of it happening at sea.

BR [error]: If the Buoy Activity is Loss or Abandonment, the dFAD activity can only be Discarded, Abandoned, Stranded or Lost.

BR [error]: The date and time of last known location must be provided and valid.

BR [error]: The date and time of last known location must not be in the future.

BR [error]: The latitude of last known location must be provided and valid (number, between -90 and 90).

BR [error]: The longitude of last known location must be provided and valid (number, between -180 and 180).

Transfer (Action: Transfer)

A **Transfer** is the **replacement of the buoy** ("Original buoy") **owned by another vessel** ("Original vessel") by a buoy ("New buoy") of the vessel ("New vessel").

CPC: The master of the vessel should be able to query the register to **check the nature** of a FAD to which he wishes to attach a buoy in order to verify the compliance of the FAD that he is appropriating in this way.

SECRETARIAT: is this about the Biodegradability Category of the dFAD?

For all intents and purposes, a Transfer is a Deployment by the Buoy Owner from the new vessel on a dFAD/Log already Deployed by the Buoy Owner of the original vessel.

When all required **mandatory Transfer metadata** have been provided (including the New Buoy and Vessel details), the Buoy Owner can proceed to the **Transfer**.

A Transfer **maintains** the dFAD's **existing UDI**.

A Transfer doesn't involve the retrieval of the dFAD.

The **New Instrumented Buoy** is then **marked as Active** in the system. The ~~Original Buoy~~Record is marked as **Transferred** (~~and is not Active anymore~~and the Original Buoy will have to be reported as Deactivated by the Original Buoy Owner.)

There are two different Transfer scenarios:

1. The new vessel belongs to the **same Buoy Owner** ("Original Buoy Owner").
2. The new vessel belongs to a **different Buoy Owner** ("New Buoy Owner".)

In case of a Transfer triggered by a New Buoy Owner:

- The associated dFAD is now the **responsibility of the New Buoy Owner**, who can add activities to it.
- The **New Buoy Owner** cannot see the dFAD Record content created by the Original Buoy Owner.
- The **Original Buoy Owner** cannot see the dFAD Record content created by the New Buoy Owner, but can see that the **Transfer occurred (no details) and when**.
- A **notification of Transfer** is sent to the **Original Buoy Owner**~~**Flag State of the Original Vessel**~~ (so they can request Deactivation of the buoy with their Provider and report it in the Register). This does not include any details about the new buoy, vessel, owner etc., only the dFAD/original buoy details and the date/time of transfer.

SEC Users can see the content of the dFAD Record created by both Buoy Owners (complete history).

Validation for Transfer

BR [error]: A Transfer Activity can only be added to a dFAD Record that is Active.

BR [error]: A Transfer activity must be provided with a new Buoy Identifier.

BR [error]: A Transfer activity must be provided with a new Vessel Identifier.

BR [warning]: Any Instrumented Buoy Transfer (as it involves a Buoy Activation) has to be reported in the system within 24 hours of it happening at sea.

Replacement

A **Replacement** is the **replacement of the buoy** ("Original buoy") **from a vessel** by a buoy of the **same vessel** ("New buoy").

This can happen for any reason, for example to replace a defective (but still trackable) buoy with a fully functional or better performing one.

When all required **mandatory Replacement metadata** have been provided (including New Buoy details), the Buoy Owner can proceed to the **Replacement**.

A Replacement doesn't involve the retrieval of the dFAD.

A Replacement doesn't involve a change of Vessel.

Validation for Replacement

BR [error]: A Replacement Activity can only be added to a dFAD Record that is Active.

BR [error]: A Replacement activity must be provided with a different Buoy Identifier.

BR [error]: A Replacement activity must be provided with the same Vessel Identifier.

Adding and Updating Records: Interactive and Bulk

The system will accept adding records both interactively (one by one) and in bulk (from a file).

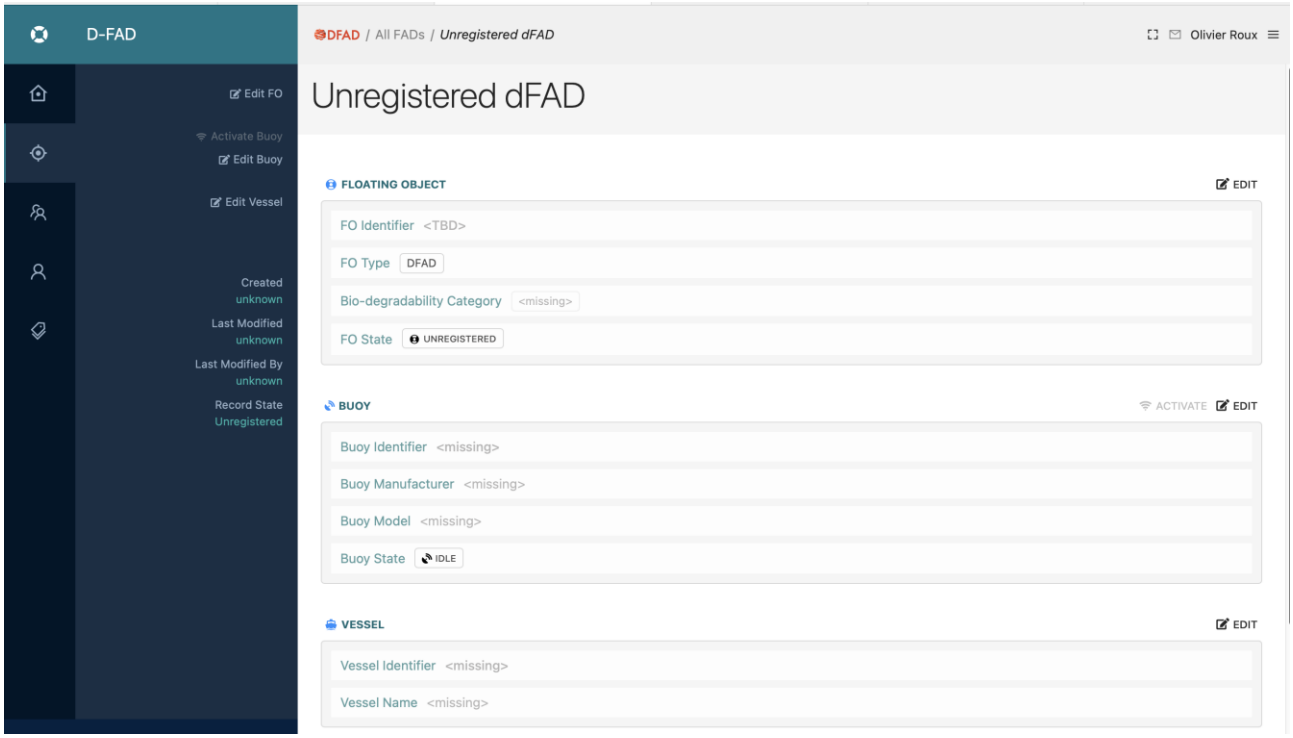
Interactive

Interactive Record creation and editing happens through a form-based User Interface (UI), where the Buoy Owner fills in information about the dFAD Record and, when all required information has been provided, can submit the Record.

During interactive registration and editing, live feedback is provided to the Owner about fields that are mandatory, about data entry errors etc.

Interactive Registration

Registration starts by the **Buoy Owner** electing to **Create a New record**, from the **Registrations** or the **Operations** side of the application.



Interactive dFAD Registration: a mockup of what the User Interface could look like for interactively registering a new dFAD.

A page for an **Unregistered FO** is displayed in the **Registrations** side, allowing the Buoy Owner to provide information on the **FO** itself, and, if available, on the associated **Instrumented Buoy** and **Purse Seine Vessel**.

To facilitate creation of several records in sequence, an option is offered to Create a new Record **based on a previous one** (thus avoiding having to enter again information that is the same across Records, such as the dFAD type and biodegradability, the vessel ID, etc.).

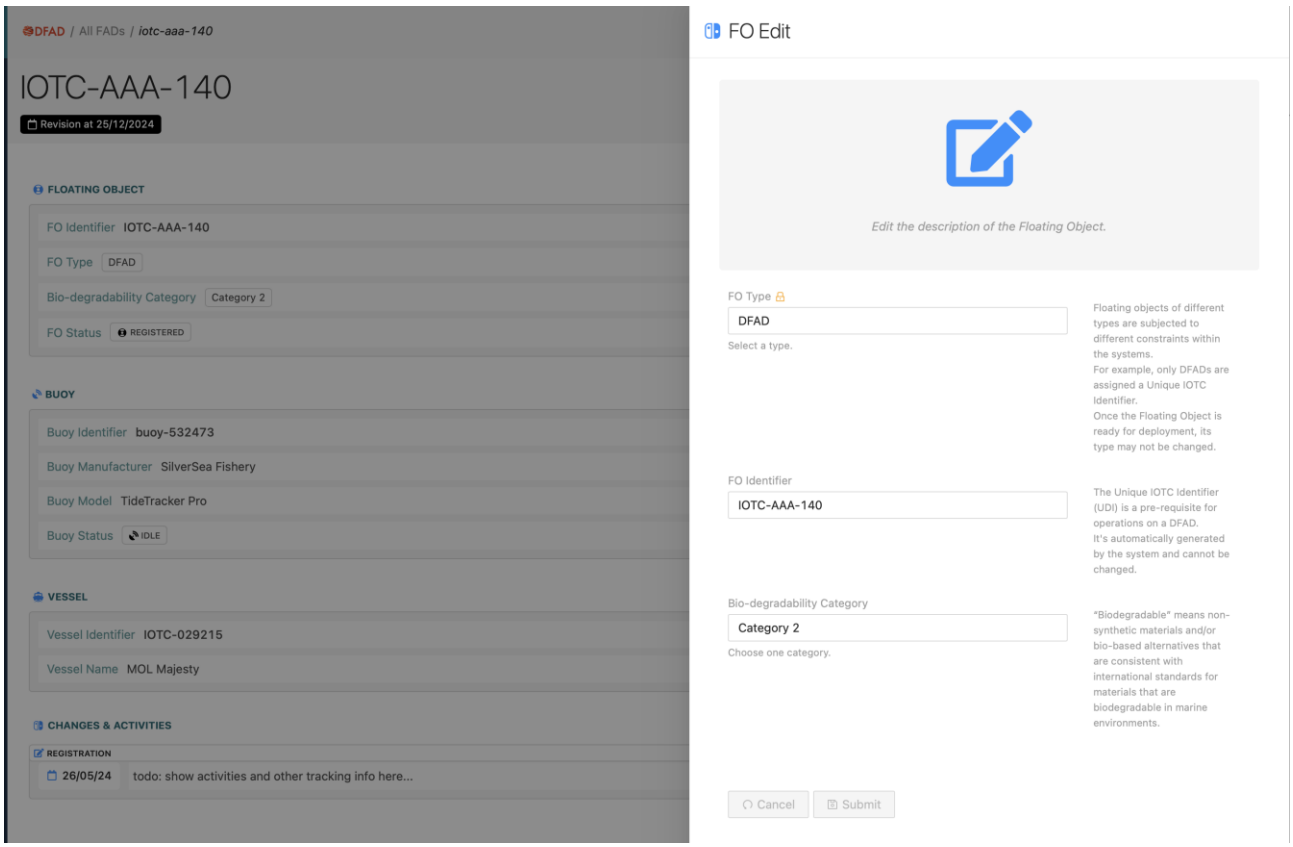
When all mandatory Registration metadata has been provided, the **Buoy Owner** can **Register** the FO. If the FO is a **dFAD**, it then gets assigned a **UDI**.

The newly Registered record is moved to the **Operations** side.

Interactive Operations

Interactive Operations are reported through **Actions**.

At any point in time, as needed, the Buoy Owner can **Search** for a Record, open it and **Edit** information, as well as select an **Action** to be applied to the Record: Activation (if the Record is not Active), Deactivation,



Interactive dFAD Edition: a mockup of what the User Interface could look like for interactively editing a new dFAD record's details.

Transfer, or Replacement (if the Record is Active.)

Each **Action** selected by the Buoy Owner opens a form where they can report the relevant **Buoy and FO Activities**. When all required information is provided, subject to validation rules, the Buoy Owner can **Submit** the Activities.

In case of a **Transfer by a New Buoy Owner**, the New Buoy Owner cannot see the relevant dFAD Record since it doesn't "belong" to them. So when they trigger a **Transfer Action from the Search page**, it allows them to search for the relevant dFAD Record (by dFAD UDI or Buoy identifier, which are both marked on the physical object). Once they have found the relevant Record, they can then initiate the Transfer. The

New Buoy Owner can only see partial information about the dFAD Record (e.g. details about the Original Buoy Owner and Vessel are not shown).

In case of a **Transfer by the Same Buoy Owner**, the Buoy Owner can initiate it from the Search page (as above) or from the relevant **FO Record page**.

In case of a Buoy **Replacement**, the Buoy Owner searches for the relevant FO Record in the Register, opens it, triggers a **Replacement Action** and must provide the **details of the New Buoy**.

Interactive Amendment

During the Operational phase, Buoy Owners can **Amend records** (FO, Buoy or Vessel details), in order to correct any potential errors etc.

Amendment of records is subject to business rules, to ensure that all mandatory Record metadata remain provided.

Amendments are **logged in the Record's history**, but do not add any Activities to it.

Questions about Interactive Operations

Q: Should the Register allow for amendment by the Buoy Owner of information they have already submitted?

CPC: The amendment should be allowed through a validation by the flag State.

> *SECRETARIAT: How would that materialize? Would it require a full change submission/validation/rejection process?*

File-based Bulk

Bulk registration of dFADs

Buoy Owners can prepare a **Bulk registration file**, using the template provided to that effect, and fill in the **minimum Registration metadata** for each dFAD in it, but can also provide all non-activity metadata, if known at that time.

The file is then uploaded in the Register, and a **Validation report** is produced and presented.

Records that are **Valid** are automatically **Registered** and moved to the **Operations** side, while records that are **Invalid** are **Rejected** ~~{~~or **stored as work in progress**, ready to be corrected and finalised using the interactive facility.~~}~~

The Register allows the Buoy Owner to download a file containing the list of Bulk registered dFADs, containing the **newly assigned dFAD identifiers (UDIs.)** This allows them to take all necessary disposition to ensure that the dFADs are properly marked with their matching UDI.

Additional validation for Bulk Registration

BR [error]: No UDI should be provided.

Bulk operations

Change events, in particular **Actions**, can be made in bulk for dFADs, requires it to be registered.

Buoy Owners can prepare a **Bulk Operations file**, using the template (or templates) provided to that effect, and fill in the **minimum Operations metadata** for each record in it.

The file is then uploaded in the Register, and a **Validation report** is produced and presented.

Records that are **Valid** are automatically **Submitted**, while records that are I**nvalid** are **Rejected.**

Additional validation for Bulk Operations

BR [error]: The UDI, if provided in a record, must exist in the system.

BR [error]: If a UDI is provided in a record, the related dFAD must be registered to the same Buoy Owner (except for transfer).

BR [error]: If a UDI is provided in a record, then the FO type must be dFAD.

BR [error]: A deployment can only be made if the relevant Record hasn't been deployed yet.

Data verification

Resolution 24/02, paragraph 10, provides that "CPCs shall verify the information provided by the buoy owner and validate them at least once a year."

There is no further details provided by the Resolution on what such a verification process might involve, or even whether it should be done in the Register at all.

The following use cases can be envisioned:

- **Verification for data quality**: CPCs should ensure that their nationals provide data in line with the Commission requirements, in terms of quality, timeliness etc.
- **Verification for validation** of data to be provided by CPCs as part of the IOTC compliance process: CPCs might want to formally mark data provided by their nationals as "validated" before they report it to the Commission (through e-Maris.)

Questions about Verification

Q: Should records be subject to CPC formal validation in the Register before they are made available to an integration/submission with e-Maris, or should a CPC submitting that information be considered formal validation?

CPC: The simpler/more automatic transmission the better. Verification and validation should not factor in. For validation we would imagine a feature that allows to either verify one by one or verify all.

Q: Should such a verification process involve CPCs being able to edit/correct any record that was submitted by their Buoy Owners?

CPC: Yes.

If so, should those edits be recorded as such and traceable?

CPC: Yes, with potential entry for justification

Q: If such a verification process is required, how would CPCs actually go through verifying thousands or tens of thousands of Buoy Owner records? In the Register itself, looking at individual records? In another application, using data exported from the Register?

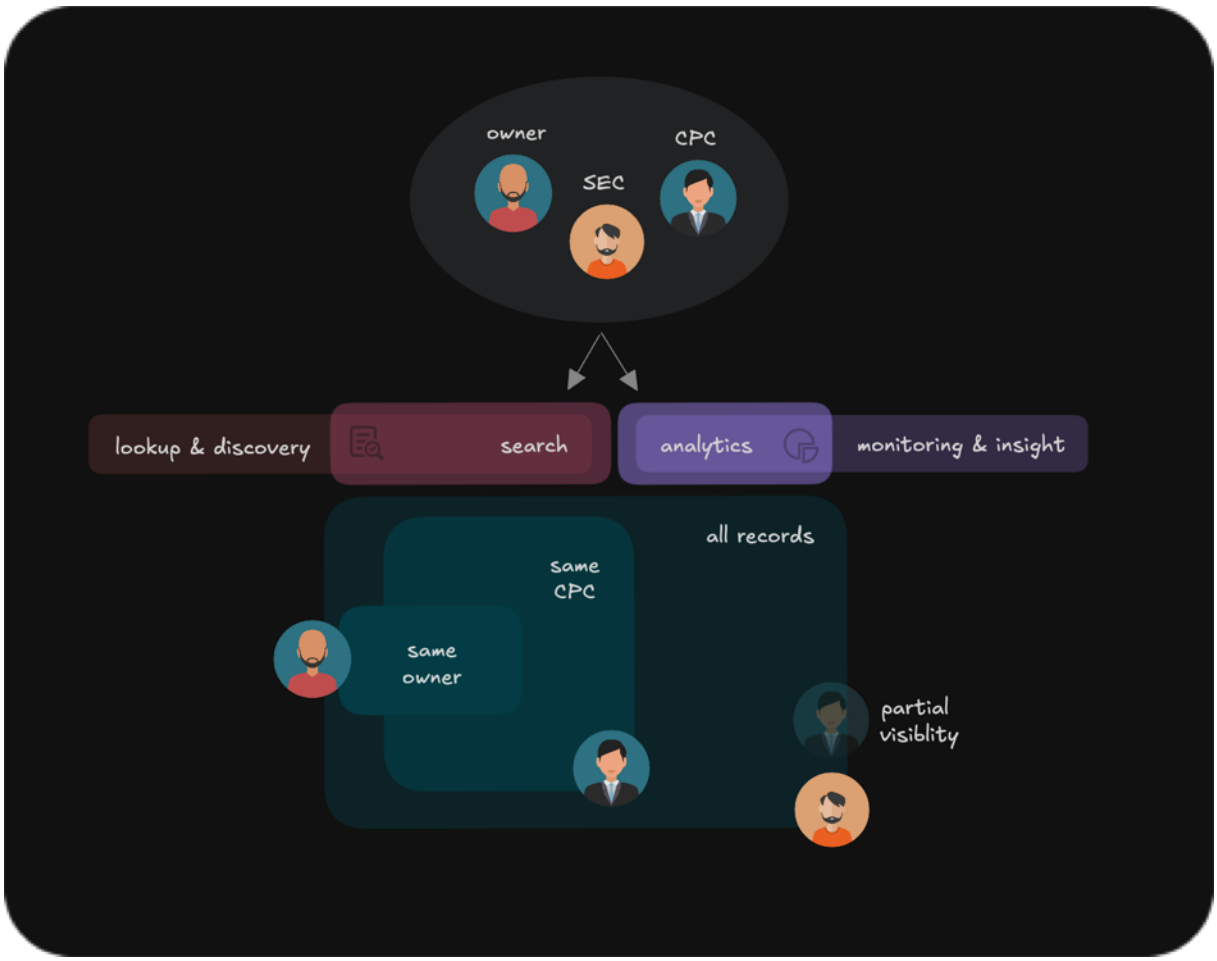
CPC: The verification is a formal process rather than a substantive one. It ensures responsibility of the flag state. We submit thousands of buoy positions every month in a similar way. Sorting by DFAD/buoy fate should be possible. Individual verifications should be possible for flag States. We would prefer an integrated process, so in the Register.

Data access: Lookup, Search, Consult (, and Monitoring)

There are two main cases for data access:

- **access-to-update**, where owners need to access dFAD Records to update metadata and/or add activities. This is applicable to both pre-registration and post-registration records.

- **access-to-discover-and-monitor**: where CPC and SEC users –typically non-owners– need to see how many buoys are active at any time, within or across Flag State boundaries. This is applicable to **only post-registration records**.



Search and Analytics: a search interface supports lookups and discovery to all users, but the scope of queries and the editability of results differ based on users. A dashboard interface supports monitoring and insights over aggregated data, including with visual charts.

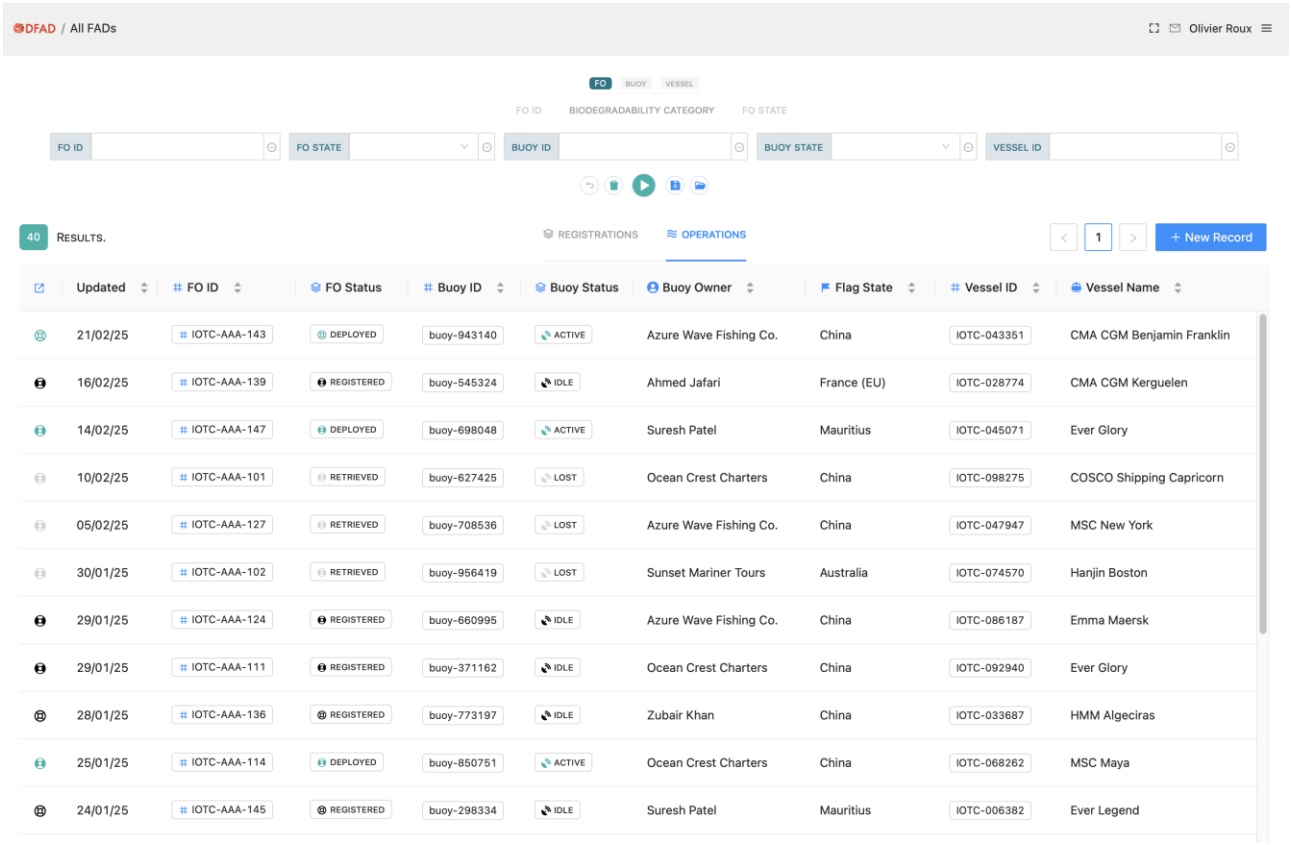
The system addresses both with a **search interface** over the records, showing by default a list of all Records, but:

- limits the scope for **Buoy Owner** so that only records **from the same Buoy Owner** are visible;

- limits the function for **CPCs** so that **results are read-only**, i.e. can be inspected but not updated (but possibly amended, see further down), and no new records may be added;

- limits the scope for **CPC** so that only records **from their Owners** are **fully visible**, but records **from other CPCs** are only **partially visible** (as per confidentiality rules established in paragraph 5 of Resolution 24/02: **IOTC number** of vessel, **Flag State** of vessel and **Location of deployment** are not visible;)

- **SEC** users will have full access, for administration, monitoring, user support etc.



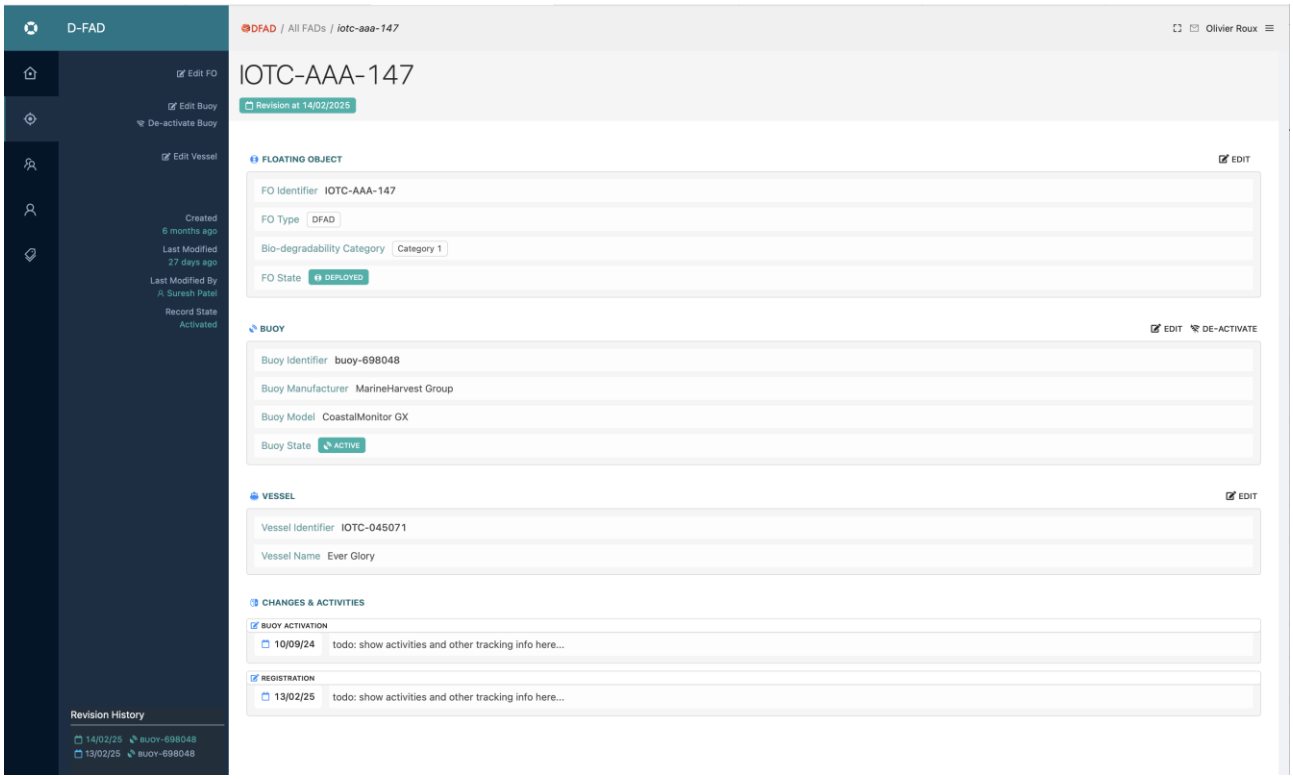
Lookup and Search: a mockup of what the User Interface could look like for searching dFAD records.

For all users the interface:

- supports various types of **filters** and multi-field **sorting** (e.g. filter by dFAD UDI, Buoy Identifier, Vessel IOTC# or name etc.; sort by Date last updated);

- allows to **Consult** individual Records to view their content (subject to confidentiality rules above);

- allows a CPC user to **switch modes** between seeing Records from **their Owners** or Records from **All CPCs**;



Lookup and Search: a mockup of what the User Interface could look like for consulting a dFAD record.

- allows to download matching records in bulk as a file.

Questions about Search and Lookup

Q: Should a CPC be able to see the pre-registration Records by their Buoy Owners, or only the Operational phase Records?

CPC: Pre-registration does not equal official submission. So we would say no.

dFAD-centric, buoy-centric, vessel–centric

By default, the Register is **dFAD-centric**: it tracks the life cycle of a given FO, and associated Buoy and vessel. It tracks dFAD/Logs from registration through Deployment to their end of life (retrieval, loss etc.). This means that, in Search results, when a User opens open a Record, they see the details about that dFAD, along with all the Activities that were reported for it. They can of course search/filter for Records by Buoy details (ID, manufacturer, model) or Vessel details (IOTC#, Name.)

The Register also offers a **Buoy-centric** presentation of records, a read-only view that shows all the operations over the same buoy, possibly across multiple dFADs or Vessels. This is accessed in the application by selecting a specific Buoy rather than on a dFAD record.

The Register also offers a **Vessel-centric** presentation of records, a read-only view that shows all the dFADs/Buoys tracked by the same vessel, across multiple dFADs and buoys. This is accessed in the application by selecting a specific Vessel rather than on a dFAD record.

These three views are scoped to the various users. For example, a Buoy Owner can see all their records from a dFAD- Buoy- or Vessel-centric point of view, but a CPC can only see another CPC's records as from a dFAD-centric or Buoy-centric point of view, since they cannot see another CPC's records' vessel details, as per confidentiality rules set in 24/02, paragraph 5.

Optional capability: Monitoring Dashboard

The Register **may** offer a **Dashboard interface** with charts of different types over the records at given scopes, such as summary tables, charts, maps etc.

Such Dashboards would be tailored to each type of users (Buoy Owners, CPC, SEC) and would allow to monitor dFAD and Buoys activities. For example,

- a Buoy Owner Dashboard could show a table indicating, for each of their vessels, where they are in terms of Active Buoys versus the total allowed per vessel (both active at any one time and purchased annually) by Resolution 24/02;
- a CPC Dashboard could offer the feature above feature across all their fleet, as well as a way to download synthetic data to be reported under Resolution 24/02.

Questions about a Monitoring Dashboard

Q: Should the Register offer a Monitoring Dashboard presenting analytics data?

CPC: yes but accessible under exactly the same conditions as the register and exactly to the same actors

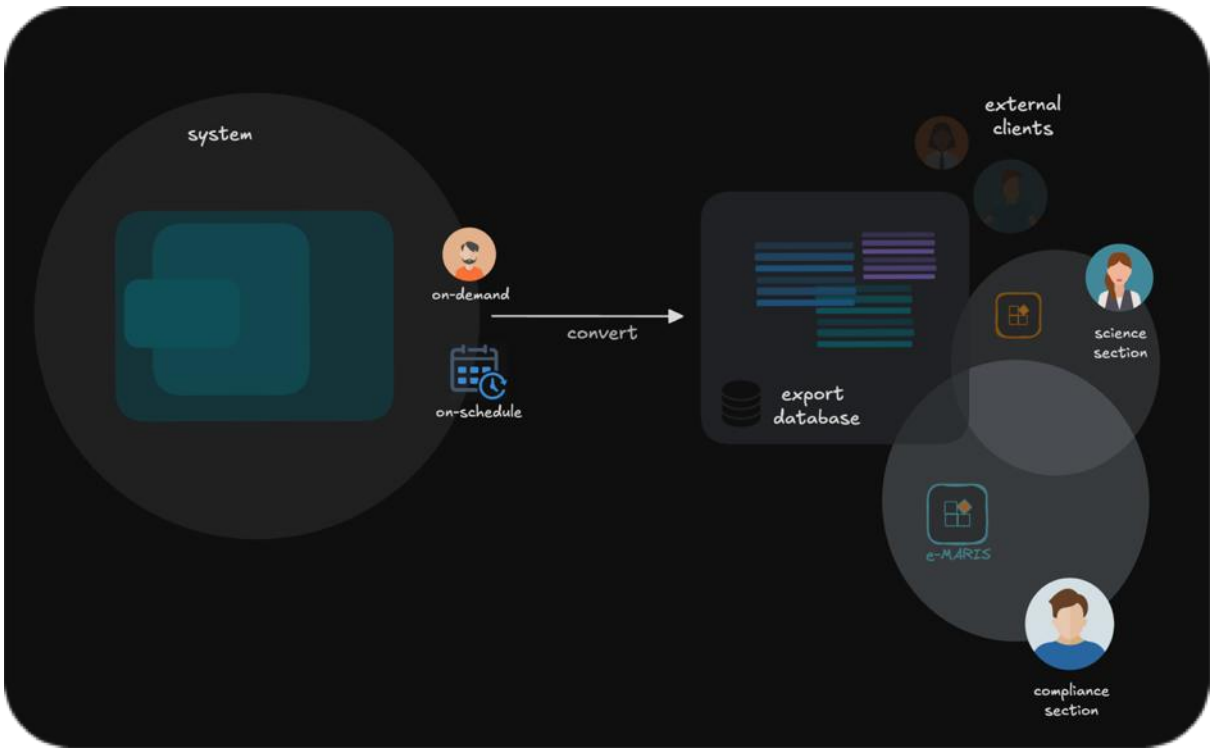
External Access

The Register can **export** all or some of its records for integration, either **on-demand** or on a **daily schedule**, to dedicated storage (an **external database**), where it may be consumed by a range of external clients without direct operational impact on the system.

In the export process, the system converts the data into a “public model” that is pruned of system internals and remains neutral with respect to processing requirements, for generality.

Target clients may be other IOTC applications and systems, but also external systems and stakeholders, if required.

Different clients would have **different visibility and privileges over the data**, with scoping constraints that resemble those enforced within the system across and among owners and CPCs and reflect the data sharing and confidentiality rules defined in 24/02.



Data Export: Records are exported — on demand or according to a daily schedule — to external storage. In the process, they're converted into process-neutral and external forms and exposed to a range of systems within IOTC and beyond.

Key targets for such external access are:

- Extraction of data by SEC staff in **response to Data Access Requests** provided under paragraph 5 of Resolution 24/02.
- Extraction of data by SEC Science staff ~~(or the Scientific Committee)~~ to **perform scientific analyses** and reporting on IOTC dFAD activities, as provided by paragraphs 48 & 49 of resolution 24/02. Any form of aggregation required by the IOTC data confidentiality rules will have to be performed outside of the Register.
- CPC: Another such use could be for the flag States to crosscheck data for compliance purposes (with 3BU data at IOTC level or with logbook and VMS at flag state level).
- **e-MARIS integration** for the annual reporting of dFAD activities for compliance assessment.

~~Auxiliary~~ Optional capabilities

Resolution 24/02 includes reporting of information related to dFADs and Instrumented Buoys, that is not covered by the scope of the dFAD Register.

Should the Commission decide so, such information could be reported through the Register, making it a central, unique place to report and consult all information related to dFADs and Instrumented Buoys. The extended Register could then provide export facilities of data to cater to the various dFAD data uses included IOTC CMMs, or as requested by the Scientific Committee etc.

CPC: We would strongly favour such approach but it must be in line with the current resolution. Therefore, the register must be flexible to adapt to future decision of the Commission and the Secretariat could provide technical input on potential amendment to streamline data submission of FAD related data.

Activity Record

Resolution 24/02 also covers reporting of information including **details of each dFADs** (construction, etc), the **activities of vessels on dFADs** and the **catches made on dFADs**. This information is currently provided to the Commission through submission of the **Statistical Reporting Form 3DA**.

The Register could, if required, be extended to allow such reporting of **All Activities**.

Location Record (dFAD Monitoring System)

Resolution 24/02 also covers reporting of information about active dFADs (*"a) the geographical location (degrees, minutes and seconds); b) the date; c) the time; d) unique instrumented buoy reference number; e) the name and IOTC registration number of the vessels assigned to the instrumented buoy*"), referred to as the "dFAD Monitoring System". This information is currently provided to the Commission through submission of the **Statistical Reporting form 3BU**.

The Register could, if required, be extended to allow such reporting of **Location**.

Questions about Optionale capabilities

Q: Should the Register be extended at some point to be a full Activity Record?

CPC: view previous comments on the extension

Q: Should the Register be extended at some point to be a full Location Record (dFAD Monitoring System)?

CPC: Yes, but without changing the reporting frequency and the essence of the requirement (it cannot extend what is required to the vessel or the CPC). Maybe 3BU could be reported directly into the register. Any simplification and enhance control is welcome. The legal aspects of it (and possible necessary amendments to the existing Resolutions) should be duly assessed

Annex 1: Proposed dFAD Numbering Scheme

As per IOTC-2024-WGFAD06-05, the cumulated number of Instrumented Buoys activated/deactivated in 2023 in the Indian Ocean was estimated around 100,000. Not all buoys are deployed on new dFADs, but any dFAD Numbering Scheme should consider **100,000 new numbers per year** as a target.

Future-proofing requires that the scheme can provide ("mint") new numbers for the foreseeable future, without running out of numbers and requiring recycling of old numbers.

Guidelines and recommendations on the marking of Fishing Gear (includign dFADs), such as FAO's, insist on the necessity to have a mark that is as much readable as possible while at sea, to facilitate identification of a dFAD's ownership.

Considering all this, the following dFAD Numbering Scheme is thus proposed: **3 letters followed by 3 digits**.

This allows for 17,576M unique numbers (or about 175K years with the hypothesis of 100,000 new dFADs per year), which largely covers any future needs.

For increased readability, the two sequences of the identifier could be separated by a dash and using only uppercase letters: **LLL–DDD**. Example **ABC–123**.

And for instant recognition of the origin of the number, the two sequences of the identifier could be prefixed with "IOTC–": **IOTC–LLL–DDD**. Example **IOTC–ABC–123**.

To improve usability of the assigned identifier at sea, the application could also generate a QR code linking to the dFAD's Record in the dFAD Register (subject to access permissions etc), that could be added to the marking. The application could then generate a PDF or image version of the label, ready to be printed/stamped.

Example of a possible label for dFAD marking: