**SCUFNF36-08.1A**

## Decision Paper for Consideration by SCUFN 36

Update on Undersea Feature Names Project Team (UFNPT)

And on the Detection of Undersea Features (DUF), an Ocean Decade project

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| --- | --- |
| ***Submitted by:*** | Canadian Hydrographic Service of Fisheries and Oceans Canada, Undersea Feature Names Project Team |
| ***Executive Summary:*** | This document reports on the progress made by the Undersea Feature Names Project Team (UFNPT) and the project of Detection of Undersea Features during the years 2020-2023 |
| ***Related Documents:*** | *B6 Standardization of Undersea Feature Names, Cookbook for Generic Terms of undersea feature names*, SCUFN29-140, SCUFN 32-8.2, SCUFN33-08.1A, HSSC11-07.1C, Terms of Reference of UFNPT |
| ***Related Projects:*** | Standardization of the undersea features, Ocean Decade Detection of Undersea Features |

## Introduction / Background

1. The creation of the Undersea Feature Names Project Team (UFNPT) was approved in 2016, at SCUFN 29-140. The objectives of this team have not changed since then and are:
2. Consider the development of an S-100 Product Specification for Undersea Feature Names and register SCUFN terms in the IHO GI Registry.
3. Establish procedures for the managing and registering of undersea feature names approved by SCUFN and the management of proposals made to SCUFN.
4. Provide recommendations to SCUFN on the managing of undersea feature names and using registers to record the proposals made to SCUFN and the names approved by the Sub-committee.
5. Membership of the UFNPT as of August 2023:

|  |  |  |
| --- | --- | --- |
| **Member** | **Country** | **E-Mail** |
| Britt Lonneville (Chair of S-130PT) | Belgium | britt.lonneville@vliz.be |
| Alper Celebi  | Australia | alper.celebi@defence.gov.au |
| Mike Coffin (Chair of the Horizontal Resolution Project Team) | Australia | mike.coffin@utas.edu.au |
| Anna Hendi (Chair UFNPT) | Canada | anna.hendi@dfo-mpo.gc.ca |

1. The update of the last work plan presented atSCUFN33-08.1A for the period 2019-2020 follows:

**Status of Work Plan 2019-2020**

| **Task** | **Work Item**  | **Priority****H-High****M-Medium** | **Start Date** | **End Date** | **Status****O-Ongoing****C-Completed** | **Contact Person (s)****\*Indicates leader** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Request from the Intergovernmental Oceanographic Commission [(IOC)](http://www.ioc-unesco.org/) support and/or approval to use one of their S-3XX specification numbers under which to develop the standard for undersea features  | H | June 2021 | September 2021 | Not successful | UFNPT\* and Chair of SCUFN |
| 2 | Expand the UFN data model from Korea to show which scientific attributes would apply to each undersea feature  | M | May 2021 | September 2021 | Not pursued | UFNPT\* and Chair of Generic Terms WG |
| 3 | Request from the HSSC support and/or approval to use a specification number to develop the standard for undersea features. | H | October 2021 | October 2021 | A request was completed for HSSC12 and sent, this was not included in the agenda to address other priorities | UFNPT and Chair of SCUFN |
| 4 | Prepare pdated report and presentation for SCUFN34  | M | August 2020 | October 2020 | Not pursued | UFNPT and Generic Terms WG |

1. Official updates were not prepared for the periods 2020-2021, 2021-2022, nor 2022-2023.
2. Since the establishment of the UFNPT in 2016, the **development of a draft S-100 product specification for undersea features**, and the steps necessary for its completion, were addressed by the UFNPT between 2018 and 2019. A request to the Hydrographic Service Standards Committee (HSSC) for a number to develop the specification for undersea features, was prepared twice between 2018 and 2021 for HSSC11-07.1C, and HSSC 12 (Annex 1). This last attempt was, regretfully, left out of their agenda. We still need to be granted a number to develop this standard. Given that objectives b and c of the current objectives of the UFNPT are associated with the development of this standard, they will be on hold for as long as the development of the standard for undersea features is on hold.
3. In parallel, and indirectly associated with the improvement of the definitions of undersea features in *B6*, Canada has been testing methods of **Detection of Undersea Features** from GEBCO bathymetric data and has updated SCUFN 32-8.2 and SCUFN33-08.1A on the progress. We have achieved different degrees of success, and the additional detail provided to, and from, the *Cookbook for Generic Terms of undersea feature names* has the potential to improve future results for the organizations and teams worldwide that are also developing their methodologies to detect ocean floor details.
4. For example, Canadian expeditions to the Northeast Pacific offshore, endorsed through Ocean Decade, have developed detection methods and have confirmed them by discovering many seamounts and other undersea features where they were predicted. Some of them have been officially named in Canada, and given that this data already resides in the Data Centre for Digital Bathymetry (DCDB) at IHO, they are soon be proposed to SCUFN, for international recognition.
5. Cataloguing new undersea features and their biological environment is of great value to Ocean Decade. In addition, it increases the volume of data used for training the detection analysis through machine learning. However, the official naming of all of the newly discovered features collected from Canada or elsewhere as a component of Ocean Decade projects is a time consuming process that hinders the advantages of making these features known in a timely manner.

1. We would like to introduce a modified version of “b” and “c”, from the current objectives of the UFNPT, to explore the management of a **database/catalogue of unofficially named (or unnamed) undersea features**, detected from the existing data (and metadata) in the DCDB, and that would qualify for official naming, when/if a proposal was sent to SCUFN.

With these 3 parallel projects in mind (standards, detection, and cataloguing of unnamed undersea features), the Department of Fisheries and Oceans in Canada, in partnership with SCUFN and TSCOM, proposed the Ocean Decade project of Detection of Undersea Features. Ocean Decade endorsed it from September 2022 until December 2023, and an extension was requested until December 2026.

1. The deliverables from the Ocean Decade project of Detection of Undersea Features are:
* S-100 specification for undersea features (following the steps established by the IHO).
* Developed methodology for detecting 40 types of undersea features (accessible through a public repository).
* Database of unnamed undersea features (detected from data residing in the Data Centre of Digital Bathymetry (DCDB) and accessible through a public catalogue).
1. During the first year of this Ocean Decade project, we consulted with partners from the Technical Sub-Committee on Ocean Mapping (TSCOM) and the Sub-Committee on Undersea Feature Names (SCUFN). We drafted a project plan (Annex 2) for the Ocean Decade project of Detection of Undersea Features. Through these two groups under GEBCO, there is a potential to engage other hydrographic offices and members of the IOC community.

## Analysis/Discussion

1. The **development of the S-100 standard for undersea features** doesn’t seem to be of concern to the IHO Hydrographic Service Standards Committee (HSSC), while they are focused on S-100 for navigation. Without the development of this specification, it isn’t clear if the objectives initially assigned to the UFNPT are still valid. The development of this standard was included in the objectives of the Ocean Decade project of Detection of Undersea Features (end date 2026) in hopes that between now and 2026, the scope of interest at the HSSC will include the interests of Ocean Decade.
2. The progress of the Detection of Undersea Features and the digital analysis of seafloor types, have resulted in manual, semiautomated or automated methods of analysis, as well as machine learning. However there is a lack of examples of official undersea features that could be used for training the algorithms for machine learning. Thus the volume of official or catalogued undersea features available as training data needs to be increased.
3. Feel free to contact Anna Hendi (Canada), to learn more about these methodologies. We have found that it is challenging to find or contact those who are developing new methods for analysis. It would be advantageous and efficient to share these methods through a **Repository of Methods of Analysis for Detection of Undersea Features**. The repository of contacts for collaboration and communication of lessons learned has the potential to improve the descriptions in the *Cookbook*, and continue to feed into improving the detection methods. An associated benefit of publicizing the detection methods is the potential for crowdsource analysis of public bathymetric data.
4. The last goal of the project of Detection of Undersea Features is to design and find a home for an **Unofficially Named Undersea Features** database, were they can be catalogued until the national geographical naming authorities, and SCUFN officially name them. Such a catalogue is being considered in Canada, where, in addition to the seamounts that have been discovered and documented in the Pacific offshore of Canada by the Northeast Pacific Deep Sea Exploration Project (NEPDEP), hundreds of other undersea features that might support valuable ecosystems, are still to be named. This naming process could take years, and cataloguing ocean features with a number ID until a conventional name is approved (as per the Principles set by SCUFN) is worth looking into, especially concerning ocean management.
5. As the Ocean Decade projects deliver more data to the DCDB, there is potential for analysing it to identify undersea features that could be catalogued as unnamed or unofficially named. We want to explore the management of a database/catalogue of unofficially named undersea features detected from the DCDB. The metadata stored in the DCDB has the information necessary to fill out a proposal form at SCUFN, when/if the time comes to officially name them. The advantages of making this catalogue public, include the engagement of non-scientific organizations in the naming process (coastal communities, schools, others).
6. With these initiatives in mind, We would like to request that the objectives of the UFNPT be re-assessed to:
7. Develop S-100 Product Specifications for UF and register SCUFN terms in the IHO GI registry in collaboration (or merger) with the Horizontal Resolution Project Team.
8. Design a repository for methods of detection of undersea features (accessible through a public repository).
9. Explore managing a database/catalogue of undersea features detected from the DCDB and that qualify for official naming but have yet to be named.
10. In alignment with this request, this is the proposed work plan for the UFNPT for the period 2023-2024

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| **Task** | **Priority** | **Start Date** | **End Date** | **Status** | **Contact Person (s) \*Indicates leader** |
| H-High | O-Ongoing |
| M-Medium | C-Completed |
| 1. Update objectives, as per the direction given by SCUFN
 | H  | Nov-23 | Dec-23 |   | TBD |
| 1. Update Terms of Reference of the UFNPT, as per direction from SCUFN
 | H | Nov-23 | Dec-23 |   | TBD |
| 1. Work with the Horizontal Resolution Project Team
 | M  | Aug-23 | TBD | O  | Mike Coffin |
| 1. Collaborate with Ocean Decade project of Detection of Undersea Features, as per the Project Plan
 | M  | Jan-24 | Dec-24 | O  | A. Hendi |
| 1. Update the UFNPT website to show all of the documents shared to date
 | M  | Jun-24 | Oct-24 |   | TBD |
| 1. Create an update for SCUFN 37 and plan for 2025
 | M  | Jun-24 | Sep-24 |   | TBD |
| 1. Select a new Chair for the UFNPT
 | H  | TBD  | SCUFN 37 |   | SCUFN 37 |

## Recommendations

* That the specification of undersea features is put on hold until the IHO and/or IOC can consider it and support it. A new request to be brought to the attention of the HSSC will be prepared when the time is right.
* That the new objectives for the UFNPT are approved.
* That SCUFN partner with the Ocean Decade project of Detection of Undersea Features.
* That SCUFN assigns the UFNPT to comment on the Draft Project Plan for the Detection of Undersea Features in Annex 2.
* That SCUFN Chair signs the Project Plan as a partner once the Draft Project Plan for the Detection of Undersea Features is final.
* That SCUFN approves the work plan for the period 2023-2024.

## Justification and Impacts

There will be no impact on existing named features.

## Action Required of SCUFN36

* Reassessment of the current objectives of the UFNPT
* Approval of new objectives for the UFNPT
* Assign the UFNPT to work on behalf of SCUFN in the Ocean Decade project of Detection of Undersea Features
* Approval of the Work Plan for 2023-2024
* Any other actions that SCUFN will find helpful

**Annex 1**

**HSSC xx-xx**

## Paper for Consideration by HSSC 12

## Specification Number for S-100 compliant Undersea Features

|  |  |
| --- | --- |
| ***Submitted by:*** | Sub-Committee on Undersea Feature Names (SCUFN); Undersea Feature Names Project Team (UFNPT), Canada, Australia, Korea, Belgium and China. |
| ***Executive Summary:*** | GEBCO Committee, through SCUF is developing a standard for undersea features that will be compatible with the S-100 standard. This proposal is to request a specification number under which to establish the standard for Undersea Features.  |
| ***Related Documents:*** | GEBCO Guiding Committee meeting 33 (GGS33/12), SCUFN28-06B, Technical Sub-Committee on Ocean Mapping (TSCOM) Terms of Reference (TOR), HSSC11-07.1D |
| ***Related Projects:*** |  GEBCO Technical Sub-Committee on Ocean Mapping (TSCOM) and Sub-Committee on Regional Undersea Mapping (SCRUM) |

## Introduction / Background

The GEBCO Guiding Committee has tasked SCUFN with developing an S-100 Product Specification for Undersea Feature Names and register SCUFN terms in the IHO GI Registry.

The ideal of having a pushbutton solution to transfer undersea feature data within and from a proposer country to the proposal database to the gazetteer database can be achieved if there is a standard that all proposer countries can follow. The Sea Area feature in S-101 fulfils the safety to navigation requirements of the ENC. However, some scientists are required to have access to more names of undersea features than the few that are added to an ENC. Furthermore, requirements include: grouping the 49 types of undersea features, in sub-types according to their morphological characteristics. Also some would like to see information about the proposer and the approved status; examples of other requirements are if the feature is of volcanic origin and active.

## Justification and Impacts

This information is already available in most Gazetteers, the standard would identify a method to organize the data, so that the information required will not be embedded in long text fields and will be easily filtered for analysis. The morphological characteristics will be valuable to scientists who already be using other S-100 standards (S-100, 200, 300 …) for research and correlation to additional marine information available for their studies. Further justification and impacts include:

* Undersea Features are significant and could extend over the sovereign waters of two or more countries. Discussing issues about a feature, would be easier if everyone was looking at the data with the same standardize data model.
* It would be easier to interpret proposals for naming from different countries if all datasets followed the same standard.
* If the standard for undersea features was compatible with the S-100 standard, it could be displayed with other marine data developed with the same model.
* New standards could find data gaps in the previous dataset of names.

The object Sea Area, where the Undersea Feature Names are currently stored, would not be changed. Both Sea Area and UFN could co-exist. Sea Area would be used for nautical charts, and the standardized UFN Gazetteer would be used for storing undersea features, their attributes and their name. The attribution of interest to the scientific community and irrelevant for safety to navigation, is listed in B-6. This is an example of a potential classification criteria that standardized Gazetteer would follow.



There are minimal costs associated with the development, other than the work time dedicated to conference calls, and travel to sporadic workshops, when required by the SCUFN work plan.

The work is expected to be completed by 2021, guidance from the S-100 WG will be sought, through the S-100 WG representatives that are national colleagues of the SCUFN’s Undersea Feature Name Project Team members.

This work could be considered of medium priority, given that it is optional for safety to navigation. However, it shouldn’t be regarded as low priority, because many undersea features are discovered increasing our ability to make wise decisions to care for our oceans and the life that depends on their health. [Seabed 2030 Project](https://seabed2030.gebco.net/) is expected to increase the number of unnamed undersea features that will be discovered and stored into Gazetteers. A good target would be an operational international standard for gazetteers, by when GEBCO will map 80% of the Oceans.

## Conclusions

Some scientists wish to have standardized information about undersea features. The required information is often included in the text fields of Gazetteers. The development of an Undersea Feature standard will consist of finding suitable specifications for the storage, maintenance and retrieval of Undersea Feature information required by the science community, who are consumers of this information. New terms included in the development of this standard will be listed in the IHO GI Registry.

## Recommendations

We recommend that the HSSC12 supports the development of a product specification for Undersea Features and provide a number under which SCUFN could develop such specification.

## Action Required of HSSC12

HSSC12 is invited to consider this request and take any other actions that HSSC12 would deem necessary to provide a product specification number to advance the development of the S-100 compliant specification for undersea features.

**Annex 2**

**Draft Project Plan for Detection of Undersea Features**





# VERSION HISTORY

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| --- | --- | --- | --- |
| **Version #** | **Implemented****By** | **Revision****Date** | **Reason** |
| 1.0 | Anna Hendi | 29 August 2023 | First draft.  |
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# Ocean Decade Canada-GEBCO Project Implementation Plan

# Detection of Undersea Features

# Project Description

**Name of Project: Detection of Undersea Features (DUF)**

UFs: Undersea Features

**Start and End Date**: January 2022 – December 2023

An extension is being requested from January 2024 to December 2026, with a possibility of further extension.

**Geographic area**: North Atlantic Ocean, Arctic Ocean, North Pacific Ocean

**Brief Summary of Project:** There are more than 40 types of undersea features, each with its characteristics. Their detection has the potential to provide insight into underwater ecosystems and inform area-based management. As the Seabed 2030 projects keep updating GEBCO’s global bathymetry grid, the detection of submarine features using GIS, geomatics, and deep learning will become increasingly viable.

All of the undersea features in the GEBCO database are publicly available to build a digital inventory of training bathymetric data that can be used to detect more undersea features with deep learning analysis. Other methods of analysis of multilayered data, such as remote sensing and geological data, could also complement the results.

The findings will be shared with the Undersea Feature Names Project Team (UFNPT) to inform the Product Specification development process for the development of a digital standard for undersea features (under the “S100” umbrella). The International Hydrographic Organization (IHO) is already overseeing the structure, design and development of the standardization of marine data standards to make the data findable, accessible, interoperable and reusable.

As the Ocean Decade research progresses and the detection from GEBCO bathymetry provides some confidence in the existence of some features, we envision the creation of a growing database of unnamed undersea features.

Students in earth-related studies will continue to assist developing of detection methods.

The key outputs will be:

a) **Methodology for detecting undersea features** and a repository of these methods that could be used and re-used by other Hydrographic Offices and by the larger science community to uncover UFs from digital data.

b) Criteria for the application of Deep Learning and to further contribute to the **development of an S-100 specification for undersea features.**

c) A database of **unnamed undersea features**.

# Project Scope

This project contributes to the following Ocean Decade intentions:

**Ocean Decade Outcomes**

Outcome 6: An accessible ocean with open and equitable access to data, information, technology and innovation.

Outcome 7: Engaging the public by supplying educational sources to understand the values of ocean sciences in connection to human wellbeing and sustainable development.

**Ocean Decade Challenges**

Challenge 8: Through multi-stakeholder collaboration, develop a comprehensive digital representation of the ocean, including a dynamic ocean map, which provides free and open access for exploring, discovering, and visualizing past, current, and future ocean conditions in a manner relevant to diverse stakeholders.

Challenge 9: Ensure comprehensive capacity development and equitable access to data, information, knowledge and technology across all aspects of ocean science and for all stakeholders.

**Ocean Decade Objectives**

Objective 1: Identify critical ocean knowledge; strengthen existing or new partnerships across nations and/or between diverse ocean actors, including users of ocean science.

Objective 2: Build capacity and generate knowledge; is co-designed and/or co-delivered by knowledge generators and users, thus facilitating the uptake of ocean knowledge for policy, decision-making, management and innovation.

Objective 3: Increase ocean knowledge. Ensure that all data are provided in an open-access and discoverable manner. Collaborate and engage with local and Indigenous knowledge holders.

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# Key Activities and Deliverables

1. Develop a **methodology for the detection** of 40 types of undersea features.
* Continue the development of digital automated methods of detection of UFs.
* Start an inventory of methods for the automation of detection of UFs.
* Decsribe the metadata for each method that is stored.
* Communicate opportunities to improvement the definitions of generic terms in the IHO *Cookbook* *for generic terms of undersea* feature names.
* Share progress and findings with SCUFN, UFNPT, and partners.
1. S-100 **specification for undersea features**.
* Obtain a number under which to develop the standard.
* Expand on the Product Specification draft built in 2018.
* Engage with the S-130 Project Team, to contribute their experience.
* Follow the process established by the Hydrographic Services and Standards Committee (HSSC) until the specification is approved.
* Share progress and findings with SCUFN, UFNPT, and partners.
1. Database of **unnamed undersea features**.
* Design the numeric convention for the IDs of the unnamed UFs.
* Design the link between the IDs and the metadata stored in the GEBCO DCDB.
	+ Find a dataflow and IDs allowing SCUFN to accept this data as authoritative and the feature names as official.
* Create records of newly detected undersea features.
* Find a home for this database.
* Share this information.

# Outcomes and Performance Indicators

* Developed **methodology for the detection** of 40 types of undersea features.
	+ - A repository of detection methods, presentations and papers about the DUFs that are publicly available; the parameters tested for detection will inform the specification for undersea features.
* S-100 **specification for undersea features**.
* A product specification for Undersea Features, within the open access, sharing and discoverability manner of the S-100 standard for marine information, has been started by the Undersea Feature Names Project Team from SCUFN.
* Database of **unnamed undersea features**.
* Records of undersea features detected through georeferenced data analysis - exist in a publicly accessible location.

The speed at which we were able to work on this project from January 2022 to December 2022 has proven that to fulfill all key activities and deliverables, the UFNPT will need an extension beyond December 2023.

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# Budget

Each partner will secure staff, software, hardware, courses, and travel.

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# FTE’s

Supported by each partner.

Minimum requirement:

* 1 Project Lead to oversee the general Project Implementation of the 3 subprojects: Detection, Standard development, and Unnamed Undersea Features.
* 3 students, 1 for each of the 3 subprojects

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# Risks and Responses

 Table 1. Risks and Responses

|  |  |  |
| --- | --- | --- |
| RISK | LEVEL | MITIGATION |
| A specification number is not granted | Moderate | Apply a second time. |
| Lack of resources | Moderate | Plan to assess availability and constraints and secure them in advance. |

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# Training

Supported by each partner.

# Communication and Engagement

The members will communicate by email and teleconferences when necessary.

There is a potential to engage other hydrographic offices and members of the Intergovernmental Ocean Committee (IOC) by presenting papers and presentation updates to the Technical Sub-Committee on Ocean Mapping (TSCOM) and the Sub-Committee on Undersea Feature Names (SCUFN).

Materials to reshare on our social media channels can be found on the Ocean Decade [Trello Board](https://trello.com/b/Oozo52UM/oceandecade-launch).

# Timelines for Implementation: Milestones, Activities and Action

|  | **Milestones** | **Description** | **Due Date** |
| --- | --- | --- | --- |
| **Detection of Undersea Features** | Confirm work and schedule | Plan work and define deadlines | 2023 / 2024 |
| Sign Project Plan | Circulate to partners for signature | Start of 2024 |
| Request extension to Ocean Decade, December 2023 - December 2026 | Submit proposal with Project Plan | Start of 2024 |
| Develop **methodologies for the detection** of the 40 types of undersea features | Make an inventory of methods public | Ask Ocean Decade for a location | 2024 |
| Select metadata to be stored  | Should match SCUFN proposal form | 2024 |
| Develop 4 or 5 methods of detection  | 4 or 5 methods per year are added to the repository  | Ongoing |
| Update Cook Book | Add new parameters for detection, if necessary  | Ongoing |
| Share progress and findings with SCUFN, UFNPT, and partners | Provide a project update at SCUFN and TSCOM meetings | Ongoing |
|   |   |   |   |
| S-100 **specification for undersea features** | Obtain an S-100 number  | Send HSSC a paper for Action  | 2025 |
| Expand on the Draft Product Specification draft built in 2018 | Engage the S-130 Project Team to contribute their experience | 2025 |
| Send HSSC a final product Specification | Follow the process established by HSSC | 2026 |
| Share progress and findings with SCUFN, UFNPT, and partners | Provide a project update at SCUFN and TSCOM meetings | Ongoing |
|   |  |  |  |
| Database of **unnamed undersea features**. | Design the data model and numeric convention for IDs - linked to GEBCO DCDB | Consider:- The use of existing national codes - How many existing features there are- How many features are estimated to be detected in the future- Validation method to be used for new, changed or deleted features- Explore quality control before and after storage in the DCDB database- Timing of updates to the database- What data would need to be stored with the features  | 2024 |
| Find a dataflow from this new database that will allow SCUFN to accept this data as authoritative and the feature names as official | Complete a test case  | 2025 |
| The database is public | Involve SCUFN and Ocean Decade  | 2026 |
| Share this information | Provide a project update at SCUFN and TSCOM meetings | Ongoing |
|  |  |   |   |
|  Request project extension | Create a new project plan and have it signed by all partners | Submit a proposal and new project plan to Ocean Decade | 2026 |

# Reporting

Ocean Decade progress reports are requested by email from Ocean Decade on their schedule.

# Change Control

Changes to the scope, deliverables, timeline and budget will be requested from the Project Lead and made available in the Change Request Log upon approval.