

Marine Environmental Data and Information Network (MEDIN)

Data Archive Centre (DAC) Network Annual Report for 2022-23



'Measure once, use many times'

Executive summary

This report represents the continuing efforts of the distributed network of Marine Environmental Data and Information Network (MEDIN) Data Archive Centres (DAC) to underpin MEDIN's overall aim of facilitating access to UK marine data. While most of the report's content is derived from the portal it is also important to reflect on the achievements against the DAC Workstream (WS1).

All WS1 activities were maintained during the past year. There has been continued development of the common Application Programming Interface (API) and work has begun on understanding the use of Persistent Identifiers (PIDs) to support a DAC-wide approach to provenance. The coordination of multi-disciplinary data submissions through a single point of contact and triage system to notify all relevant DACs is now being introduced.

The uptake of the CoreTrustSeal accreditation scheme, which provides a globally-recognised framework for the accreditation of data repositories, fully aligned with the MEDIN DAC accreditation process, is continuing to increase. As existing MEDIN accreditation expires, the DACs are preparing submissions to CoreTrustSeal. It should be noted that the review process for CoreTrustSeal is outside the influence of MEDIN and can take a significant time to complete.

We continue to encourage direct access to data and some DACs are continuing to increase both the number, and proportion, of datasets within "2-clicks". The figures are somewhat distorted due to the wide range of granularity used for MEDIN records. The single largest number of records are from a single DAC, which does not provide 2-click access. However, their data *are* directly accessible online and significant improvements have been made across all the DACs in terms of discoverability and accessibility of data holdings. The DACs continue to provide the foundational infrastructure for the delivery of Findable, Accessible, Interoperable, Reusable (FAIR), open access to UK marine data and in the promotion of best practice in marine data management.

Summary highlights

MEDIN coordinates an operational network of seven linked marine Data Archive Centres (DACs) covering: bathymetry; fish and shellfish, fisheries, aquaculture and related samples; the historic environment; marine geology and geophysics; marine species and habitats; marine meteorology; water column oceanography. The DACs continue to archive data from MEDIN partners and third-party organisations to agreed individual programmes.

This is the fourth DAC annual report falling within the 5-year period of the current MEDIN [Business Plan](#). DAC metrics are now applied more consistently across the DAC network, being pulled directly from the MEDIN Portal, where possible.

The 2022-23 DAC annual reports show that:

- Almost 5.4 million¹ 'requests' for data were made to MEDIN DACs during the reporting year (29.4% increase since 2021/2).
- 70% of the datasets described in the MEDIN portal are available from the MEDIN DACs. That is 11,996 datasets managed, quality controlled and distributed by MEDIN's coordinated network of DACs.
- More than 95% of the datasets available from MEDIN DACs are accessible online (an increase of 494 since 2021) and 36% are downloadable within 2 clicks of finding them on the MEDIN portal.

¹ Figures are based on returns from DACs and do not include Met Office requests, which are unknown.

1 Introduction

MEDIN has established an operational network of linked marine Data Archive Centres (DACs) to provide secure long-term storage for, and access to, marine data. This network provides the capability for users to upload and retrieve data. Organisations archiving data at a MEDIN DAC have free access to their data, and DACs manage third-party access to these data according to the data provider's specification.

The required capabilities of DACs within the MEDIN framework are:

- To ensure the secure, long-term curation of key marine datasets, according to best practice and to relevant national and international standards.
- To make available clear, searchable information on their data holdings by the generation and publication of metadata on the MEDIN portal.
- To form the first point of call for expertise in the management of marine data.

In addition, MEDIN will, on request from the data provider, publish metadata records to data.gov.uk and hence the [INSPIRE](#) geoportal.

In order to maintain its status as a MEDIN Data Archive Centre, each DAC is required to provide a short annual report so that Sponsors can assess how well the DAC framework is operating.

The MEDIN Sponsors' Board has emphasised the following requirements:

- Provide a statement on funding and sustainability.
- Include Key Performance Indicators (KPIs), specifically measures of use (numbers of enquiries, numbers of downloads).
- Further information on dissemination – how is access to data currently served and how do the DACs see their interaction with the MEDIN portal?

This document provides a report on the current status of DACs in terms of metadata records in the MEDIN Portal where the DAC is custodian of the data, requests from users for data, and financial outlook. This is a summary of information from the individual DAC reports, which are available on request from enquiries@medin.org.uk

2 DAC Listing

There are currently seven DACs in the MEDIN DAC network, as listed in

Table 1. More details of each DAC are available through links on the DAC web pages of the MEDIN website at <https://www.medin.org.uk/data-archive-centres>. These pages include information on the data types held and top-level guidelines on how to submit data to, and access data from, each DAC.

Table 1: MEDIN Data Archive Centres

Name	Coverage	Contact Information	MEDIN Status
British Oceanographic Data Centre (BODC)	Water Column Oceanography data	enquiries@bodc.ac.uk 0782 512 0946	Accredited 2009; Re-accredited 2017; CTS under review 2023; operational.
British Geological Survey (BGS)	Marine Geology and Geophysics data	medin@bgs.ac.uk	Accredited 2009; Re-accredited 2017; CTS accreditation 2018; Reaccredited March 2022; operational.
The Archive for Marine Species and Habitats Data (DASSH)	Marine Species and Habitats data	dassh.enquiries@mba.ac.uk 01752 633291	Accredited 2009; Re-accredited 2017; CTS submission 2021; resubmission pending; operational.
Met Office	Marine Meteorology data	enquiries@metoffice.gov.uk	Accredited Dec 2011; Re-accredited 2018; CTS submitted 2023; operational.
United Kingdom Hydrographic Office (UKHO)	Bathymetry data	CustomerServices@ukho.gov.uk	Accredited 2009; Re-accredited 2017; operational.
FishDAC Cefas Marine Scotland Science (MSS) DASSH	Fisheries data - Fish and Shellfish, Aquaculture and related samples and environmental data	Cefas: data.manager@cefas.gov.uk	Accredited 2012; Re-accredited 2018; operational.
		Marine Scotland Science: jens.rasmussen@gov.scot	Accredited 2012; Re-accredited 2018; operational.
Historic Environment DAC Archaeology Data Service (ADS) Historic Environment Scotland (HES) Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW)	Marine Historic Environment fieldwork-derived data	Archaeology Data Service: help@archaeologydataservice.ac.uk	Accredited 2013; Re-accredited 2018; CTS accreditation 2020 operational;
		Historic Environment Scotland: peter.mckeague@hes.scot hannah.smith@hes.scot	Accredited May 2014; CTS accreditation 2021 Re-accreditation due 2024; operational.
		Royal Commission on the Ancient and Historical Monuments of Wales General: gareth.edwards@rcahmw.gov.uk Maritime: julian.whitewright@rcahmw.gov.uk	Accredited June 2016; Considering CTS Application operational.

3 DAC Performance

Each year, MEDIN asks the DACs to report on their performance using a standard set of metrics.

The metrics are now pulled directly from the MEDIN Portal where possible. They therefore show the number of metadata records in the portal where a DAC is the custodian of the data. This is not always directly representative of the number of datasets held at a DAC because of some variability in the granularity of metadata records. This is the fourth year of reporting using metrics from the MEDIN Portal.

The key metrics are as follows:

- Total number of metadata records present in the MEDIN Portal where each DAC holds the data. For some cases, particularly the Historical Environment DAC, there are records available in the portal where the DAC is the data holder but did not provide the MEDIN record. In these cases, there has previously been duplication of records. These have been removed this year, leading to an apparent reduction in records for these DACs.
- Number of new or updated records in the MEDIN Portal in reporting year where each DAC holds the data.
- Number of records where DAC holds the data, with:
 - A URL leading to online access to data
 - A URL allowing direct access to data (i.e. within 2 clicks)
 - A URL containing a Digital Object Identifier
- Number of requests for data for each DAC (using figures supplied by DACs as it is not possible to obtain this from the MEDIN portal).

3.1 DAC Metrics

The metrics for 2019-20 to 2022-23 are shown in Table 2.

Table 2: Annual metrics for the MEDIN DACs

Year	BGS	BODC	DASSH	UKHO	Met Office	Cefas	MSS	ADS	HES	RCAHMW
Total number of metadata records where DAC is custodian ²										
2019-20	857	1,107	710	4736	7	2,058	282	74	47	26
2020-21	857	1,107	723	4736	7	2,096	308	263	47	26
2021-22	857	1,143	724	6050	7	2,108	334	265	26	13
2022-23	936	1,144	745	6365	7	2,174	351	266	7	1
New/updated records in reporting year ³										
2019-20	22	45	496	0	1	536	54	74	25	13
2020-21	693	2	152	0	2	421	54	189	7	1
2021-22	1	1,029	118	4600	3	1,637	42	259	2	0
2022-23	0	1	45	5865	0	561	28	55	0	0
Records with online access to data										
2019-20	855	1,056	631	4736	2	1,914	240	74	17	0
2020-21	855	1,056	635	4736	2	1,958	254	153	17	0
2021-22	855	1,082	382	6049	2	2,108	278	155	9	0
2022-23	936	1,083	396	6,363	2	2,171	299	156	7	1

² These do not include records where the DAC compiled the metadata but is not custodian of the data.

³ Where number of new records is large compared to total number of records, this normally reflects replacement of records with updated versions

Year	BGS	BODC	DASSH	UKHO	Met Office	Cefas	MSS	ADS	HES	RCAHMW
Records with 2 clicks to data										
2019-20	694	997	165	0	1	1,914	57	73	12	0
2020-21	694	997	124	0	1	1,958	64	150	12	0
2021-22	694	1,013	178	0	1	2,108	69	152	6	0
2022-23	769	1,014	191	0	1	2,168	81	153	0	0
Records with DOI										
2019-20	0	54	1	0	0	101	49	73	12	0
2020-21	0	54	9	0	0	115	56	150	12	0
2021-22	0	80	15	0	0	115	61	152	6	0
2022-23	0	81	30	0	0	136	72	153	0	0
Data download requests										
2021-22	2,920,975	540,380	19,889	9,027	Unknown	3,541	39,332	17,284	2	619,043
2022-23	3,934,470	605,620	22,240 ⁴	471 ⁵	Unknown	4,609	80,804	18,651	2 ⁶	731,100

Please note that it is not advisable to compare absolute values between DACs, as the granularity of the metadata records varies significantly between (and even within) DACs. For instance, all the data held in the Met Office MEDIN DAC for marine meteorology data are held within 7 datasets, which are augmented each year with that year's new data and their associated metadata records updated accordingly.

⁴ DASSH recorded 14,827 dataset downloads over the past year. However, due to internal recording issues, data are missing for 4/12 months. Accounting for these missing months, the estimate for the period is 22,240 data requests

⁵ In 2022/3 requests were based on users that entered the order page, 2021/2 requests were based on user-selected downloads from the bathymetry and seabed mapping apps.

⁶ Most are self-serve from the website

Figure 1: Number of metadata records in the MEDIN portal per DAC.

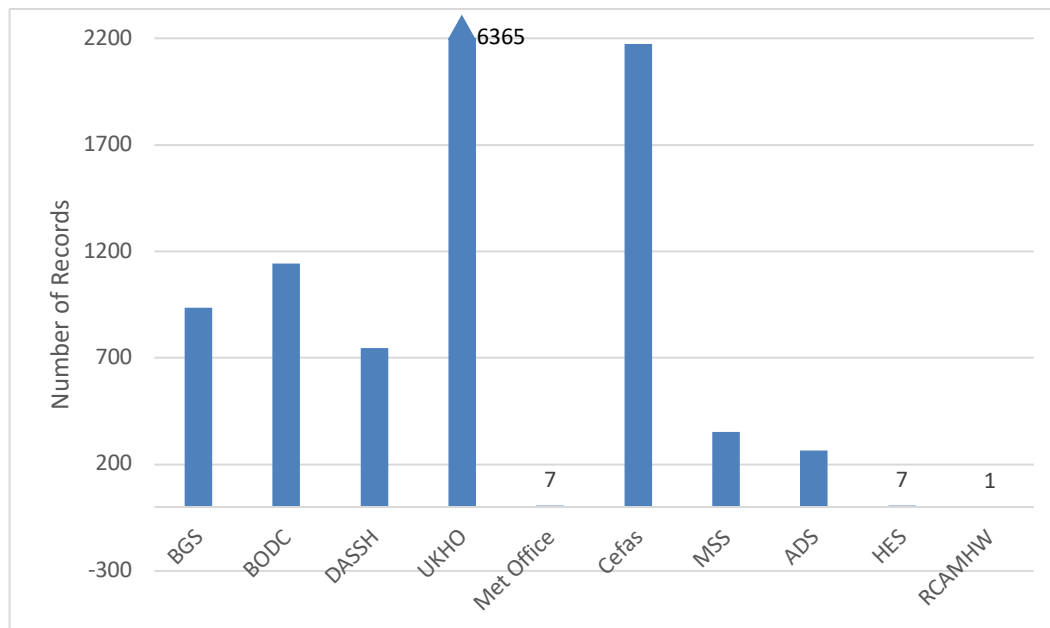


Figure 1 shows that the UKHO remains the DAC with the most metadata records in the MEDIN Portal, accounting for more than 55% of the total. However, as noted earlier, the difference in metadata granularity between DACs means a direct comparison between DACs is not appropriate (as noted above for the Met Office). One of the DACs, the UKHO, has updated or increased their metadata records in the MEDIN portal by over 90% in the past year (Figure 2). Some of this will relate to new datasets, or new data being added to existing datasets such as time series, and some to improving the quality of existing metadata. Note that any updates to existing metadata records count as changes in this metric.

Figure 2: Percentage of metadata records in the MEDIN portal per DAC that are new, or were updated, during 2022-23.

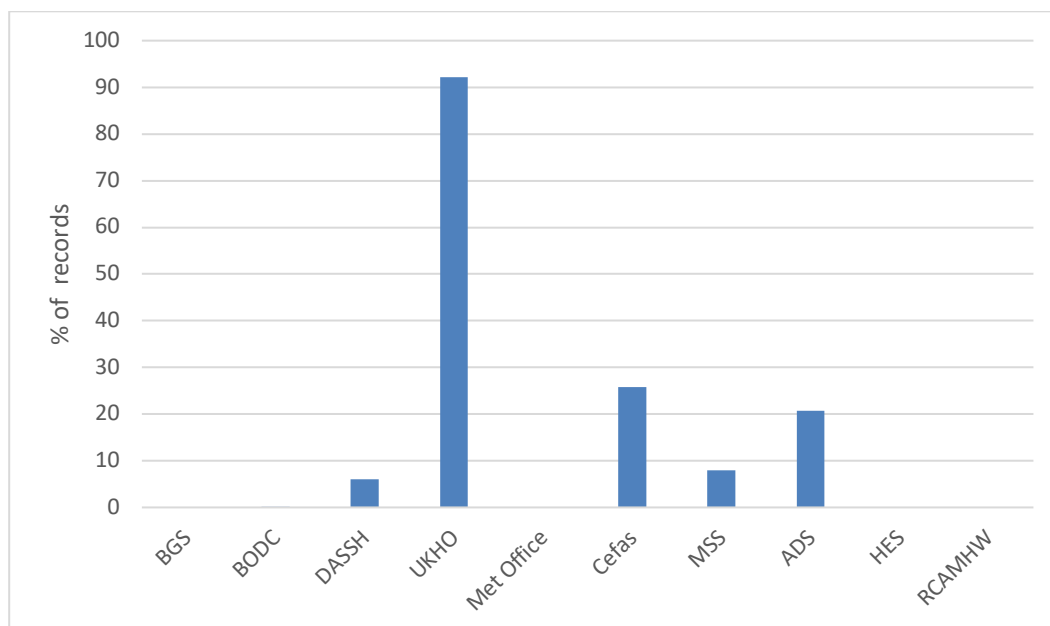


Figure 3 shows that seven MEDIN DACs have a Uniform Resource Locator (URL) leading to some form of online access to data (not necessarily 2-click access) for over 80% of the metadata records for data

they hold. In total this represents more than 95% of all metadata records in the portal. One way to provide direct access to data is by using a Digital Object Identifier (DOI) and the use of DOIs has increased again this year, although the proportion of records with a DOI has remained stable (Figure 4).

Figure 3: Percentage of metadata records per DAC in the MEDIN Portal with online access to data.

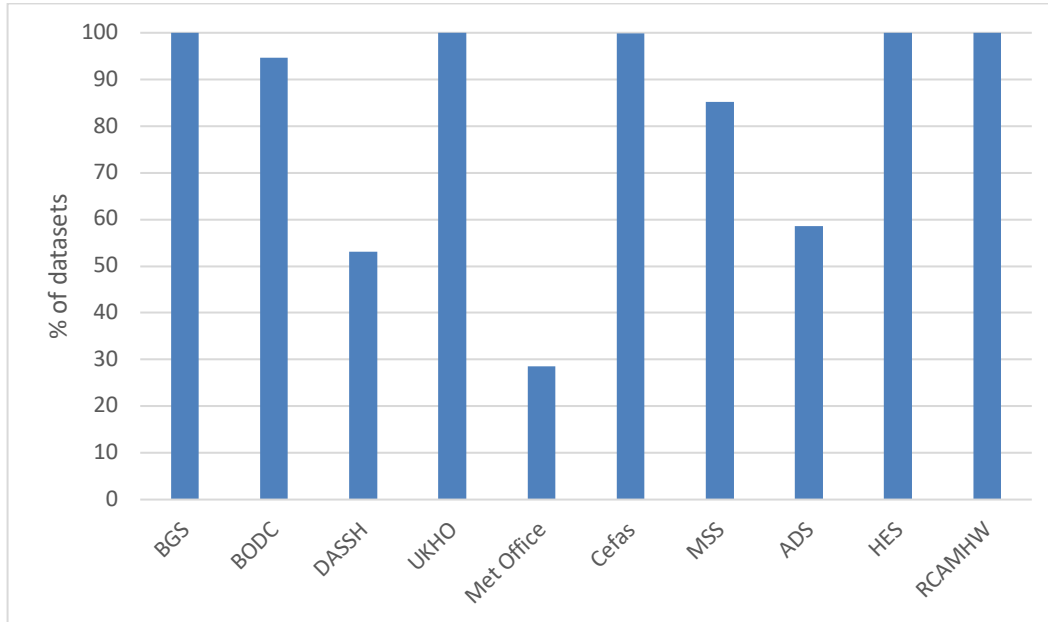
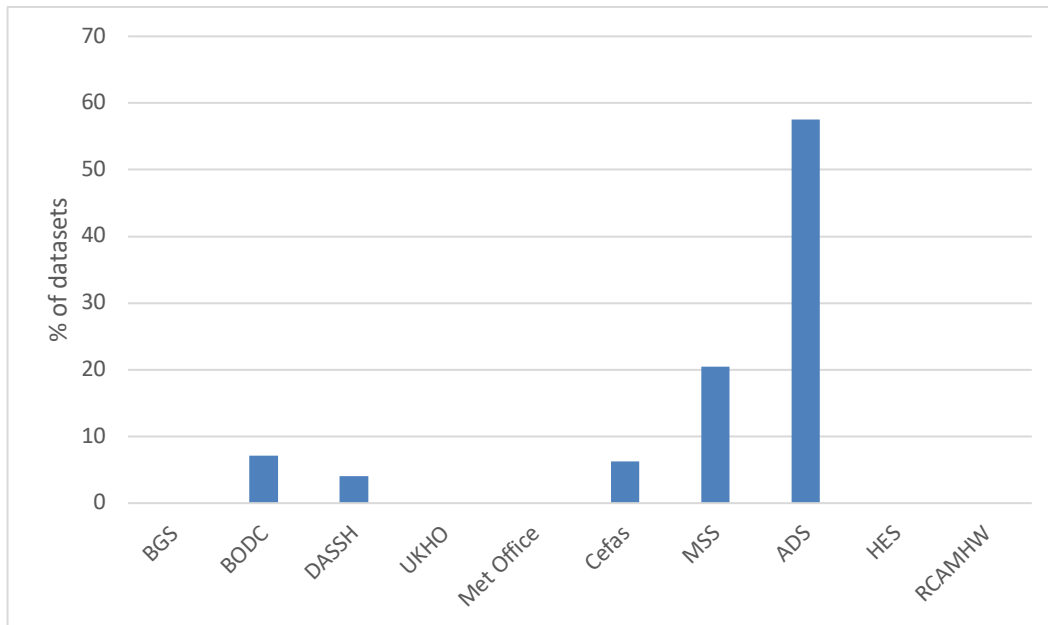
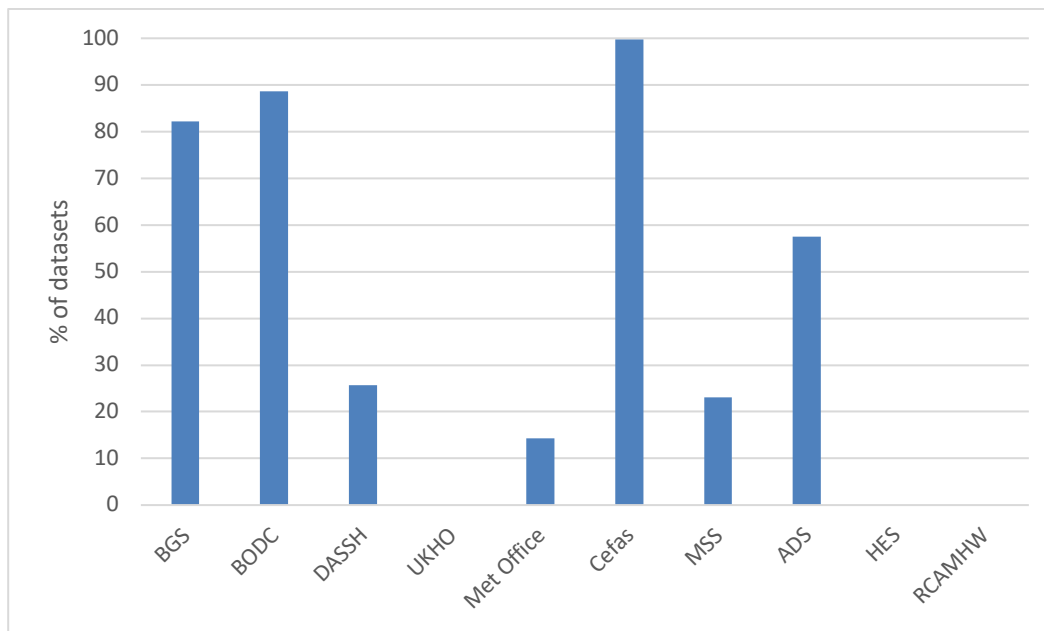


Figure 4: Percentage of metadata records per DAC in the MEDIN Portal with a Digital Object Identifier (DOI).



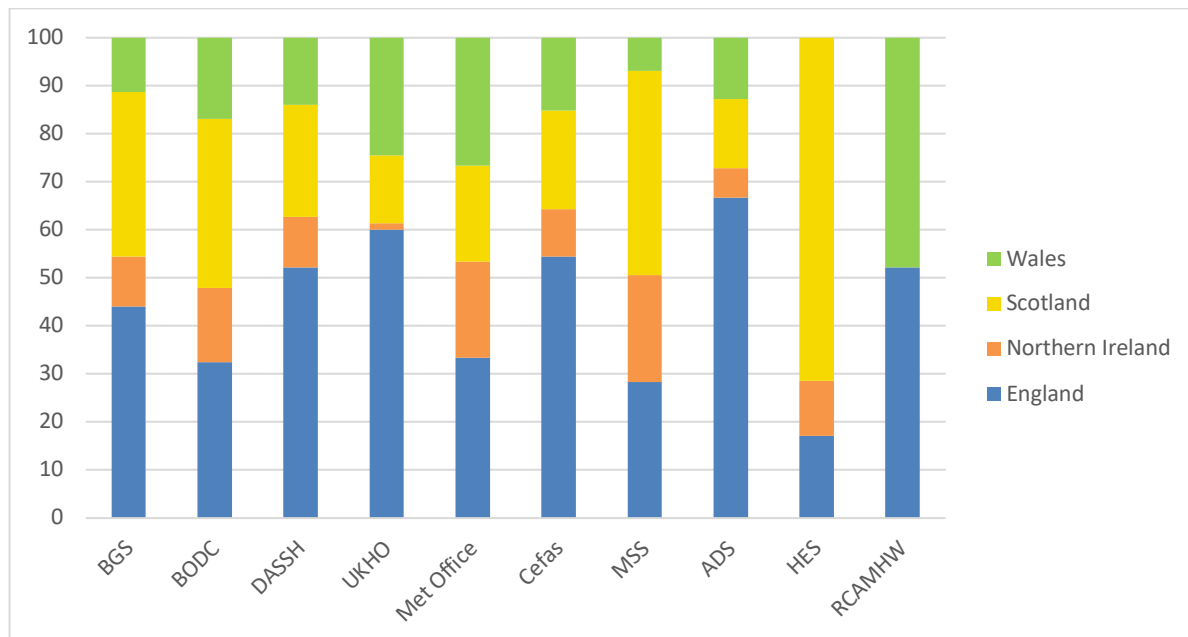
MEDIN continues to promote direct access to data, ideally within 2 clicks. The DACs are continuing to increase the number of metadata records providing data with '2-click' direct access, although the proportion of records remains similar to 2022 as new records are not all associated with 2-click download options. Three of the MEDIN DACs now provide direct access to data (within 2 clicks) from over 80% of their metadata records in the portal (Figure 5).

Figure 5: Percentage of metadata records per DAC in MEDIN Portal that offer 2-clicks to data.



The breakdown of country of origin for metadata records in the MEDIN portal where the DACs are custodian is shown in Figure 6.

Figure 6: Percentage of metadata records per DAC in the MEDIN Portal by country of origin.



3.2 New datasets

The MEDIN DACs continue to archive major new datasets. Table 3 summarises new datasets archived by each DAC during the financial year (FY) 2022-23.

Table 3: Summary of new datasets archived at MEDIN DACs during 2022-23.

Met Office	UKHO
<p>There are 7 datasets on the MEDIN portal, which together describe most in-situ marine meteorological observations collected by the Met Office. The Met Office differs from other DACs in that it doesn't add new datasets, instead it adds new observations to its existing datasets. The amount of data in the database increases daily.</p> <p>The Met Office is actively involved in international collaboration with WMO partners, with members of the DAC involved in WMO task teams. One of the goals of the collaboration effort is to increase the quantity of data and data suppliers to the WMO, which in turn would feed into the Met Office's datasets.</p>	<p>Surveys covering Ireland – permission granted to archive the Ireland surveys onto the DAC to increase coverage.</p> <p>Data depositors are increasing due to increase conversations with port authorities and other marine companies. Also, by making the upload of data more accessible and improving customer experience it makes it easier for depositors to upload their data</p>
DASSH	BODC
<p>17-year time series of fungal eDNA data</p> <p>All accessioned data are recorded and tracked via internal systems.</p> <p>Growth is aimed at academic and industry sectors through promotion and engagement.</p>	<p>During 2022/23, BODC received 195 accessions of data from 28 organisations in 5 countries as follows:</p> <ul style="list-style-type: none"> • 8 accessions from NERC laboratories (not including collaborative centres & NOC) • 31 accessions from UK universities • 1 accession from commercial organisations • 72 accessions from charitable organisations (including NOC centres) • 83 accessions from overseas laboratories <p>The data comprise physical, chemical, biological and geophysical observations in a variety of forms including profiles, time series and discrete samples.</p> <p>Datasets are prepared using MEDIN guidelines and are loaded into the NODB (either the BODC Series or the BODC Samples database) after re-formatting, usage metadata compilation, quality control (automatic tests and visual inspection), documentation and audit.</p> <p>During 2022 - 2023, an additional 45 datasets were added to the PDL and received a DOI. The PDL had 3077 active downloads from 494 published datasets.</p>
RCAHMW (Historic Environment DAC)	ADS (Historic Environment DAC)
<p>No new maritime archives added during 2022/23.</p> <p>Data was deposited relating to a major survey undertaken by MSDS Marine, on behalf of the RCAHMW-led CHERISH Project, of the Bronze Bell designated wreck site in Cardigan Bay.</p> <p>Ongoing marine planning work means that depositions will take place from 2023/4 onwards as digital surveys of historic assets take place as part of the marine licensing system.</p>	<p>Images from Archaeological Building Recording Work at Hendon Foreshore Barrier, Port of Sunderland, Tyne & Wear, January 2023 https://doi.org/10.5284/1105897</p> <p>Digital Data from Multiple Watching Briefs on the Boston Barriers Tidal Scheme, Boston, Lincolnshire, 2018-2021 https://doi.org/10.5284/1105642</p> <p>Digital Data from an Historic Building Recording Survey at Flamborough Head Lighthouse, June 2022 https://doi.org/10.5284/1103149</p> <p>Digital Archive from The Inner Humber Rapid Coastal Zone Assessment Survey Project, 2019 to 2021 https://doi.org/10.5284/1102111</p>

HES (Historic Environment DAC)	BGS
<p>Accessioned a report on Survey of Former Royal Navy Communication Centre (CCB&SO), Wee Fea, Lyness Orkney Islands</p> <p>Catalogued an outline survey of the Newshot Ships graveyard on River Clyde – formal definition of the site extent (HES internal archive)</p>	<p>New datasets archived during 2022-23 include:</p> <p>Further Civil Hydrography Programme backscatter and sample data received from UKHO.</p> <p>Some discussions with potential depositors (to be followed up), also via the EMODnet Ingestion Project. An article was included in the in the MEDIN Marine Data News. Some organisations confirmed that they have relevant data, but they have not deposited it yet.</p>
Marine Scotland Science (FishDAC)	Cefas (FishDAC)
<p>Aquaculture</p> <ul style="list-style-type: none"> • Scottish Fish Farm Production Survey Data (doi: 10.7489/1918-1) • Scottish Shellfish Farm Production Survey Data (doi: 10.7489/1917-1) • Sea Lice Data Shuna Sound Region (doi: 10.7489/12441-1) <p>Fisheries-dependent dataset</p> <ul style="list-style-type: none"> • 2021 Scottish Sea Fisheries Statistics - Fishing Effort and Quantity and Value of Landings by ICES Rectangles (doi: 10.7489/12419-1) • Crab and Lobster Fisheries in Scotland: Results of Stock Assessments 2016-2019 (doi: 10.7489/12451-1) <p>Fisheries-independent dataset</p> <ul style="list-style-type: none"> • Deepwater Chondrichthyes weight-length data 2005 -2021 (doi: 10.7489/12442-1) • Girnock and Baddoch fish trap data – annual updates (doi: 10.7489/1017-1, 10.7489/1588-1, 10.7489/1607-1) • National Electrofishing Programme for Scotland Fish Counts (doi: 10.7489/12201-2) • Herring Acoustic Survey 0822S (Submitted & accessible via ICES) • North Sea International Bottom Trawl Survey, Quarter 1 & Quarter 3, 0223S and 1022S (Submitted & accessible via ICES) • Rockall Haddock Trawl Survey 1122S (Submitted & accessible via ICES) • Scottish Monkfish Survey 0422S • West Coast International Bottom Trawl Survey, Quarter 1 & Quarter 4 0323S and 1722S (Submitted & accessible via ICES) • West of Scotland Sprat acoustic Survey 1522A 	<p>Cefas et al (2022). Volumes, dredged area measurements and estimated contaminants of material disposed at licensed offshore sites around the UK coast from 2000 to 2020. Cefas, UK. V1. doi: https://doi.org/10.14466/CefasDataHub.131</p> <p><i>This dataset provides a long time series of data from a large number of collaborating agencies including the MMO, NRW, Marine Scotland, Defra, Cefas and the governments of the Isle of Mann, Jersey and Guernsey. Although the data had previously been available in part on request, this is the first time it has been brought together to improve re-usability.</i></p> <p>Bolam et al (2023). Trait expression of marine benthic assemblages across the UK shelf modelled for the years 1976 to 2020. Cefas, UK. V1. doi: https://doi.org/10.14466/CefasDataHub.137</p> <p><i>These modelled data give new insights into the way in which benthic species respond in various ways to changes in environmental conditions and therefore have various potential uses in a range of topics including human impacts and climate change.</i></p> <p>Griffiths et al (2022). North Sea cod tagging data 1961 - 2015 and Plaice tagging data 1957 - 2005. Cefas, UK. V1. doi: https://doi.org/10.14466/CefasDataHub.132</p> <p><i>This dataset publication represents a long-term historical dataset being made openly available in a re-usable format for the first time. The collection spans over 50 years, making this a significant resource for those interested in long-term trends.</i></p>

4 Highlights

In addition to providing metrics, the DAC reports also detail highlights from the previous year, which together show levels of activity and examples of the utility of the DAC network and also indicate how nationally and internationally integrated the DAC system is. Several new developments and initiatives took place during 2022-23, enhancing the capability of the MEDIN DACs to the benefit of MEDIN's users.

4.1 New developments and capabilities:

Marine Species and Habitats DAC (DASSH): Archival of eDNA derived occurrence data, these are new data types and support the academic and policy sectors.

Point habitat data are now accessible for view and download via the DASSH mapper, this was a recommendation from the NatureScot SBIF Review.

OGC EDR API Test implementation, this is a proof of concept to enable cross-DAC querying of data.

Bathymetry DAC (UKHO): Currently developing a Data Upload portal, which will improve the incoming metadata and data received from Data Suppliers.

Fisheries DAC (MSS and Cefas)

MSS: The DAC has been operating strictly in a business-as-usual mode.

Cefas: The MEDIN pilot project helped Cefas introduce a new API infrastructure that allows the selection of datasets to be made available under the OGC EDR API standard. The usefulness of this infrastructure to end users is yet to be determined and will be affected by the potential uptake of the OGC EDR suite of standards as whole.

Cefas and MEDIN delivered a combined bespoke training event for Cefas staff in November. Attendees were introduced to MEDIN as a network and were trained in metadata standards and data guidelines.

Historic Environment DAC (RCAHMW, ADS, HES):

A major new project has been 'Unpath'd Waters: Marine and Maritime Collections in the UK', funded through the AHRC Towards a National Collection (TNC) scheme. UNPATH is a major collaboration between all UK heritage agencies (**ADS, HES and RCAHMW**) and organisations that hold records of heritage maritime data. The aim of the project is to develop a consistent approach to indexing maritime craft in national datasets prior to the publication of a virtual marine record for the UK (launched 23 April 2023).

RCAHMW: In response to the climate emergency, a formal rolling programme of digital survey of historic assets located in the inter-tidal zone and coastal margin has been started. In time, this will feed through to enhanced/upgraded records of maritime sites most at risk from the impact of climate change. This will include 3D digital datasets archived with the DAC as a baseline record of the site's condition.

'Known Wrecks' within the National Monuments Record of Wales (NMRW) have now been matched against their UKHO ID on the basis of geographic location and this process has been integrated into the NMRW metadata for each site. This should allow greater cross-referencing between NMRW and UKHO datasets for users.

Work started in late 2022/23 and will continue through 2023/24 on a major update to wreck identifications within Welsh waters, based on the "Echoes from the Deep" project. That work has corrected over 150 errors in wreck identification in the Irish Sea and provides updated survey information for 250+ wrecks. Information from the Echoes from the Deep project is being incorporated into NMRW wreck metadata as an ongoing piece of work. This will enhance metadata records through the provision of up-to-date survey info, as well as removing numerous existing errors in wreck identifications inherited from older UKHO datasets.

ADS: Work has now been completed on the new ADS website, which meets modern Accessibility requirements. Work is still proceeding on a replacement search facility.

New Organisations depositing data at ADS are York Archaeological Trust/York Archaeology, Archaeological Services at Durham University and Royal Haskoning DHV.

As in previous years, there is an increased emphasis on the use of the OASIS form for recording of projects in the maritime zone.

This year ADS have released the Unpath Data portal at <https://unpathd.ads.ac.uk/> This presents all the maritime archaeological records from across UK territorial waters. The final stage of this project is to convert this metadata into MEDIN-compliant XML, and upload it to the main MEDIN portal.

HES: HES contributed to a questionnaire from the Deutsches Schifffahrts Museum on marine terminologies.

Water Column Oceanography DAC (BODC): BODC work using Agile Scrum - generally with 2 week sprints. The following highlights have been carried out by BODC:

- Repaired/vastly improved workflow to enable BODC to send new/updated Cruise Summary Reports (CSRs) from the UK cruise inventory to the international CSR database, hosted by Ifremer/SeaDataNet. BODC will now be looking to work with UK partners to operationalise the flow to SeaDataNet.
- Laying the groundwork for building a pilot Digital Twin of the Haig Fras Marine Protected Area, as part of the 'Piloting an Information Management Framework for Environmental Digital Twins' project. Sprint 1 was successful in making cloud-optimised geotiffs (acquired by AUV in 2012) and their associated annotations data available via the JASMIN object store, with collections available to view in a STAC browser. Metadata was also created in the iFDO imaging standard format. Additional datasets were also added (GEBCO, EMODnet Bathymetry). Successful in creating a first-instance graphical interface for viewing the data, as well as creating code for further metadata creation, including generating Centre for Environmental Data Analysis (CEDA) YAML files from the iFDO standard metadata.
- BODC now have a new API management for all our APIs (APDS/GEBCO). This is replacing the older software (express-gateway), which has become unsupported. Improving the way in which BODC APIs are managed and those that use these services.
- BODC now have an established workflow for archiving HV data on CEDA as part of the NERC Big Data Store initiative. We recently received excellent feedback from a data submitter who said we have made the process extremely easy and quick and that we have been extremely helpful along the way in explaining the process and helping with the required metadata.
- BODC data submission tool operationalised and aligned to the BODC Published Data Library (PDL). This should improve the speed of data publication in the PDL. This work also allows users to obtain a basic metric for citation of their data allowing them to show impact.
- Successfully archived, processed & audited all expected SOLSTICE-WIO data within budget despite having the data management budget reduced due to government ODA cuts.
- As the Seabed 2030 Global Centre, BODC is acting as a Trusted Node for Crowdsourced Bathymetry (CSB) data. A web interface has been set up to streamline processing of raw CSB data to a form for submission to IHO DCDB.
- Initial coordination with AGU complex citations group has resulted in the Research Data Alliance setting up a working group on complex citations with outputs expected in 18 months.
- New authentication setup to improve BODC security and increase interoperability with other services.

Marine Geology and Geophysics DAC (BGS): Ongoing improvements/additions to the Offshore GeoIndex:

- OGC API <https://ogcapi.bgs.ac.uk/>
- 23 open offshore DAC data layers were made accessible using OGC API standards
- Delivered using OGC API – Features
- Direct access to data – improvement in data accessibility/interoperability
- Guidance for MEDIN and others who may want to implement OGC API
- OGC API - EDR also investigated

- Significant contribution to FOSS software (pygeoapi) benefitting the wider geospatial community
- Two other DACs (**Cefas** and **DASSH**) also worked in parallel with the same aims for their own data holdings

Marine Meteorology DAC (Met Office): SurfaceNet, the Met Office's next generation of observation processing software, has been deployed at almost all marine surface observation sites. This has led to improvements in data availability as well as improved software for real-time monitoring of network status. Overall this has improved the efficiency of the DAC at monitoring and quality controlling the Automatic Ship data.

The use of new PowerBI tools has improved oversight of the marine networks and has led to an increase in quality control efficiency. The use of Power Automate and collaboration with OceanOps has led to a much more efficient method of international sharing of metadata.

4.2 New funding streams

Some of the MEDIN DACs received new funding streams during 2022-2023.

The Marine Species and Habitats DAC (DASSH) has secured project funding linked to MARCO-BOLO (EU project designed to deliver operational dataflows into global reporting via Essential Variables) and EMODnet Biology (UK Node of OBIS, increased collaboration with European biodiversity data centres) projects from the EU and Horizon Guarantee Scheme.

Water Column Oceanography DAC (BODC) has secured new Net Zero Digital Research Infrastructure digital data funding, which has been approved by NERC as part of the Net Zero Oceanographic Capability programme. This will support the development of data processing systems for autonomous platforms including marine gliders and the AutoSub family of vehicles over the next 18 months.

Marine Geology and Geophysics DAC (BGS): received funding for the MEDIN OGC API project.

Marine Data Exchange geotechnical data standardisation, a collaborative project with The Crown Estate to review their geotechnical data holdings with a view to improving standardisation.

4.3 International meetings

Many of the DACs have a strong presence internationally, reflected in the broad spectrum of international meetings attended. Most international meetings have been held virtually during this period. A few examples from this reporting year include:

A variety of EMODnet meetings (e.g. Biology, Chemistry, Geology, Ingestion, Partners meetings and a Citizen Science Workshop) involving **Marine Species and Habitats DAC (DASSH)**, **Water Column Oceanography DAC (BODC)**, **Marine Geology and Geophysics DAC (BGS)**.

A number of International Council for the Exploration of the Sea (ICES) meetings and working groups were attended by the **Fisheries DAC (MSS and Cefas)** and the **Water Column Oceanography DAC (BODC)**.

The **Marine Species and Habitats DAC (DASSH)** attended the MARCO-BOLO kick-off in Paris and the IODE Conference in Paris.

RCAHMW (Historic Environment DAC): International Conference on Inter-tidal Shipwrecks, Wales/Ireland Harbourview Conference.

ADS (Historic Environment DAC): attended the Open Science South Asia Network Conference in Bangalore, India; the International Symposium Digital Transformation of Archaeological Data, South Korea; the Cultural Heritage and New Technologies (CHNT) 2022, Austria; Digital Archaeology Bern (DAB23), Switzerland.

HES (Historic Environment DAC), ADS (Historic Environment DAC) and MEDIN: co-organised a session on maritime archaeology at Computer Applications in Archaeology Amsterdam, Netherlands.

The **Fisheries DAC (MSS and Cefas)**. MSS attended the IODE Ocean best practises for marine data management, ICES Annual Science Conference.

Bathymetry DAC (UKHO): GEBCO.

Cefas attended OSPAR (including EIHA, ICG-Noise and ICG-QSR), the IODE 27th Committee and the International Ocean Data Conference II.

Marine Meteorology DAC (Met Office) attended the Ship Observations Team (SOT) Task Team on Key Performance Indicators, the OceanOps Metadata Webinar, a Workshop on Operational Measurements for Ocean Waves and the GOOS Observations Coordination Group (OCG) Data & Metadata Fall 2022 Roundtable: Automating metadata flows to OceanOPS and connections to external stakeholders.

Water Column Oceanography DAC (BODC) attended the International Digital Twins of the Ocean Summit, the IOC Oceanographic Data Exchange Policy Working Group, European Geosciences Union (with a presentation on Complex Data Citation Work), the Management Group of the UK Seabed Mapping Centre, the IODE Steering Group for the Ocean Data and Information System (ODIS), the FAIR-EASE Kick-off meeting, the Joint IHO-IOC Guiding Committee for GEBCO, the PLOCAN Glider School, FAIR-IMPACT Synchronisation Force, Blue-Cloud Conference, the Building the Open Global Data Citation Corpus, the International Oceanographic Data Conference (IODC) II, the Intergovernmental Oceanographic Commission (IOC)-UNESCO International Oceanographic Data and Information Exchange (IODE) Committee meeting, CloudExpo 2023, as well as various project meetings for GEOTRACES and Argo.

4.4 Data Access and Sharing

Data from most of the MEDIN DACs are made available under open licences such as the UK Open Government Licence (OGL) for data. Most data from MSS, NERC (e.g. BGS and BODC), Met Office and Cefas are made available under this licence. UKHO data are made available under the UKHO Bathymetry Data Licence, which allows users (with caveats) to copy, publish, distribute and transmit the information; adapt it or exploit it commercially, for example, by combining it with other Information or by including it in their own product or application. For data centres accepting data from non-government or Research Council sources, there may be additional constraints applied to the license agreements.

DASSH licensing is assigned in consultation with the data provider. All data are made “as open as possible, as closed as necessary”. DASSH promote CC-BY or OGL as the preferred license but in some cases, data are deposited under CC-BY-NC, restricting reuse to non-commercial purposes.

The DACs’ data access mechanisms are described below, along with improvements made during the reporting year:

Bathymetry DAC (UKHO): Datasets are accessible from the UKHO via the Seabed Mapping Service at <https://seabed.admiralty.co.uk>, which provides a geospatial viewer and search query, supported by complete MEDIN 3.1 metadata records completed this year. The MEDIN 3.1 metadata is also available from the UKHO web-accessible folder – <https://medinexport-data.ukho.gov.uk/>

The UKHO 100m Web Map Service (WMS) is a simple HTTP interface for requesting georeferenced map images of the seabed around the UK, derived from over 5,000 open bathymetric datasets, which have been conflated into a single 100m resolution gridded surface.

The data are licenced under OGL and are also made available through third-party portals such as data.gov.uk, EMODnet and the International Hydrographic Office (IHO) Data Centre for Digital Bathymetry (DCDB). Datasets can also be requested from the UKHO via Customer Services.

Marine Species and Habitats DAC (DASSH): Datasets are ingested into DBOSSH, the internal DASSH database, converted to Darwin Core format and then published on the IPT (Integrated Publishing Toolkit) for EMODnet (European Marine Observation and Data Network) and EurOBIS/OBIS (Europe/Ocean Biodiversity Information System) to download and publish/collate. Datasets are also shared regularly with NBN (National Biodiversity Network). On a DASSH level, individual species records are made available on the DASSH Mapper (<https://www.dassh.ac.uk/data/search-data> - this URL will change with the new MBA website launch), and whole datasets are made available through MEDIN Discovery Metadata published on the MEDIN portal, where a download link to the geoserver hosting the dataset will be provided in the resource locator.

Over the last year, they have created an OGC EDR API end point, which allows DASSH holdings to be queried in a novel way and integrated with other OGC API developments. A significant number of datasets have been exported to a Darwin Core version and been published via the DASSH IPT platform to provide onward access via the Ocean Biodiversity Information System (OBIS) and Global Biodiversity Information Facility (GBIF).

Fisheries DAC (Cefas and MSS):

MSS: For repeated annual surveys coordinated internationally through ICES working groups, the data are submitted to the ICES Database for Trawl Surveys ([DATRAS](#)), while metadata is sent to MEDIN with direct links to the DATRAS system. For nationally-coordinated surveys or other datasets, data are uploaded to the Marine Scotland Open Data portal (<https://data.marine.gov.scot>) and made available with a DOI. Metadata containing the DOI are submitted to MEDIN.

Cefas: Metadata and datasets are made available via the Cefas Data Portal, with no registration or sign-in required. All data can be downloaded from the website in .csv or shapefile format, additional spatial data is available via WMS/WFS direct feeds. Public APIs are available to access all metadata and data.

Following [Cefas Data Management Policy](#), data are made openly available on the Cefas Data Portal by default, except where there is a good reason to restrict e.g. commercially sensitive or personal data.

All *metadata* is automatically exported to MEDIN and data.gov.uk via Web Accessible Folders (WAFs) and all metadata that include a DOI are also served to the Defra Shared Services Platform. Such third-party data portals direct external users to the Cefas Data Portal to access the data. Selected biodiversity timeseries datasets are published on the Cefas Data Portal and distributed by DASSH to the EurOBIS/OBIS data systems, which are in turn made accessible via the GBIF and EMODnet data portals.

Historical Environment DAC (ADS, HES and RCAHMW):

ADS: Datasets are available for download directly from the ADS website. Datasets are normally grouped by collections that reflect the project carried out by the originator, such as a survey or monitoring project. Each collection has a DOI. Grey literature reports are disseminated as individual records within an application known as the ADS Library. Each report has its own DOI.

Among other improvements, data are available through the following portals: [Unpath](#), [ARIADNE](#), [Keepers Registry](#), [Heritage Gateway](#) and the [NERC Data Catalogue](#).

HES: Public access is provided through the online portal (Canmore) and map-based search (PastMap). Users may select and download up to 1,000 records in .csv or .kml formats under an Open Government Licence.

HES Public Services are the principal point of contact for bespoke data requests and downloads. They do not distinguish between terrestrial and marine data requests. Seven marine data requests were forwarded to the Data Management team.

HES spatial datasets and services: Historic Marine Protected Areas, Scheduled Monuments (for Intertidal and wrecks), Listed Buildings (for Coastal built heritage) and Canmore – National Record of the Historic Environment, are available to download and access as view and download services from the

[HES spatial downloads page](#) and through the Scottish Government metadata portal. Records are harvested to data.gov.uk but, following Brexit, no longer appear on the INSPIRE Geoportal. Data are also provided through Marine Scotland's [National Marine Plan Interactive](#) portal and through [SEWeb](#). A copy of the Canmore record is provided periodically to the Archaeology Data Service for uploading onto [ArchSearch](#) and for onward use in the [ARIADNEplus](#) portal.

RCAHMW: Data are mainly accessed via the dedicated [Coflein](#) online database, which is OGC compliant, and through Historic Wales, the collaborative historic environment portal for Wales. The Coflein data access system is published using ArcGIS Online with compliant metadata standards. The full maritime dataset is available on the Welsh Government's 'Data Map Wales', which is being upgraded in 2023. Data downloads are available on request from the [RCAHMW enquiry service](#) and archives can be accessed in a public reading room. A growing selection of our digital maritime surveys are also disseminated to the public in the form of a 3D model, freely available to view, through the [SketchFab portal](#).

Water Column Oceanography DAC (BODC): The BODC National Oceanographic Database (NODB) delivery system (https://www.bodc.ac.uk/data/online_delivery/nodb/) now gives access to 149,000 data series, a 8% increase in the number of series available online last year. Data are available in a fashion that allows users to search across cruises, time, location, originator, parameter etc. Services offer users the choice of a one-click download (for publicly accessible data) or 'online shopping' with a basket and checkout mechanism. Data are available in various data formats under secure access control methodologies, which include user request tracking of auto-downloads.

The BODC tally sits at 267 data collection aggregations and 835 cruise collection aggregations. Where appropriate, these discovery metadata records carry a URL within the online resource metadata that leads directly to the data. The URLs are of two types:

- If a dataset has an associated DOI, the URL resolves to a landing page within the BODC Published Data Library that incorporates a one-click download service.
- For non-DOI datasets, a URL resolves to a pre-filtered search result set in the BODC online web user interface (UI) specific to the data or cruise collection. The UI incorporates a one-click download service.

BODC have made further improvements to access arrangements through continued development of ERDDAP instances, sensor web enablement schema and Google's schema.org. All metadata records in the PDL have been published with schema.org. These improvements are ongoing pieces of work within BODC, who will continue to provide improvements to DOI/PID services.

Data are made available through a number of international third-party portals including: SeaDataNet CDI; SeaDataCloud; EMODNET Chemistry via SeaDataNet; ICES; Marine Scotland Science (MSS) and CEFAS (MERMAN data assessment level cleaned data); GEBCO; ARGO GDAC; Everyone's Gliding Observatories (EGO); Global Sea Level Observing System (GLOSS); Global Ocean Acidification Observing Network (GOA-ON).

Marine Geology and Geophysics DAC (BGS): Data are made available through several portals:

- [OGC API](#)
- [The Offshore GeoIndex](#) (also available as a Web Map Service)
- [Offshore GeoIndex Web Map Service](#)
- [Offshore Products Web Map Service](#)
- [SEA Data Portal](#)
- [BGS Deposited Data Search](#)

Additional services provide access to the DAC holdings:

- Geological maps created from data are incorporated into EMODnet map products and made available through the EMODnet Geology Portal.
- Web Map Services are used in various portals (e.g. BGS Offshore map products).

Marine Meteorology DAC (Met Office) Datasets are requested through email/telephone enquiry. The request may be passed to their Data Provisioning team, who then provide a quote for the extraction of the data and information requested. Additionally, there are data available on the Met Office public website for moored platform data for the previous 24 hours. Moored platform data for the previous 24 hours are also available, either in full or in part, on the Cefas WaveNet webpage and the National Data Buoy Centre portal run by the US National Oceanic and Atmospheric Administration (NOAA), as well as other weather websites such as Windy.com. Furthermore, Voluntary Observing Ship data and shipborne automatic marine observations are available through ICOADS. Data are also available from CEDA.

Data are also shared in real time through the World Meteorological Organisation (WMO) Global Telecommunications System and development is ongoing to make metadata access through OceanOps much more efficient.

4.5 Data Standards and data quality

Use of MEDIN guidelines by depositors using the MEDIN DACs is variable across the DACs. DASSH and ADS promote the MEDIN guideline formats with their depositors to standardise the data being submitted.

Some DACs, such as Cefas and MSS only receive data from staff in their own organisations. The MEDIN metadata standard is followed but the use of the guidelines is not widespread within their organisations.

BODC and BGS receive data from a wide range of originators and in many formats and it is not known whether the MEDIN guidelines are used by their depositors. DACs such as UKHO, RCAMHW, Met Office and HES promote the use of specific standards relevant to their communities.

5 DAC Sustainability and Funding

An important aspect of the DAC network is the assurance of long-term sustainability and continuity of service provision. The MEDIN DAC network achieves this by requiring that the core capability of each DAC is underwritten by an organisation or group of organisations (usually the host organisation) that itself has a business requirement to manage data of a particular theme. This approach forms the backbone of the funding/cost model for the MEDIN DACs (see box below). Current status of the individual DACs is as follows:

Funding for the **Bathymetry (UKHO)** and **Marine Meteorology (Met Office)** DAC activities has been incorporated into operational plans and is considered part of business as usual. Funding for the Bathymetry DAC is built into future plans at UKHO and investment is increased each year to ensure continued and increased availability of bathymetry data.

Species and Habitats DAC (DASSH) funding situation is relatively stable, with continuing support from Defra, the Scottish Government and MEDIN for the operation of core DAC functions. DASSH are working with Defra to streamline and improve the mechanism for DASSH funding. This is augmented by funding secured from EMODnet Biology until 2025 and MARCO-BOLO and DTO BioFlow funding, until 2026. Additional small project funding (<1 year) continues to be acquired, each year to complement the overall DASSH work plan.

Funding for the **Water Column Oceanography (BODC)** and **Marine Geology and Geophysics (BGS)** DACs appears secure in the short term with no reductions (although this is not inflation-proofed). Both data centres had their NERC Data Centre National Capability evaluation and commissioning process approved in 2023 for a further 5-year funding cycle. NERC remains committed to data management for the

medium and long term. For **Water Column Oceanography (BODC)** there is further funding from EU projects.

FishDAC: Cefas operates under a yearly funding cycle and funding is approved to support data management activities in FY22/23. For **MSS**, the funding situation is stable, with Marine Scotland funding a full-time data management post with responsibility for the MEDIN DAC function. However, the post is also involved in numerous other projects, so time for DAC functions is limited.

Historic Environment DAC: The ADS is hosted by the University of York, Department of Archaeology, as a Cost Centre. The ADS' long-term business plan is under constant review and is monitored by the ADS Management Committee. The ADS 5-year plan currently runs to July 2026. This was reviewed by the Management Committee, on which MEDIN is represented. The plan covers aims and objectives for the coming period as well as an assessment of the external environment in which the ADS operates. This report is compiled in conjunction with a Risk Register. Both documents are made available to the MEDIN representative on the ADS Management Committee. Over the last 12 months, the ADS has also received funded for infrastructure development via the UKRI.

The other two components of the Historic Environment DAC (**HES** and **RCAHMW**) are funded through the Scottish and Welsh Governments respectively, which are committed to ensuring that they are properly resourced in the current, short term and medium-long term. Historic Environment Scotland receives additional revenue from its Commercial and Tourism arm. The impact of Coronavirus pandemic has had a significant impact on income from HES Properties in Care. This is likely to impact on the wider organisation over the next couple of years.

Additionally, the UKRI-funded Unpath'd Waters project is supporting data standards tasks until the end of June 2024.

Acronyms and Glossary

ADS	Archaeology Data Service
AGU	American Geophysical Union
AHRC	Arts and Humanities Research Council
APDS	Autonomous Platform Data System
API	Application Programming Interface
ARGO	Array for Realtime Geostrophic Oceanography
AUV	Autonomous Underwater Vehicle
BGS	British Geological Survey
BODC	British Oceanographic Data Centre
CC-BY	Creative Commons License (Credit must be given to the creator)
CC-BY-NC	Creative Commons License (Credit must be given to the creator, only non-commercial uses of the work are permitted)
CDI	Common Data Index
CEDA	Centre for Environmental Data Analysis
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CHNT	Cultural Heritage and New Technologies
CSB	Crowdsourced Bathymetry
CSR	Cruise Summary Report
CTS	CoreTrustSeal
DAC	Data Archive Centre
DASSH	The Archive for Marine Species and Habitats Data
DATRAS	Database for Trawl Surveys
DBOSSH	internal DASSH database
DCDB	Data Centre for Digital Bathymetry
DEFRA	Department for Environment, Food & Rural Affairs
DOI	Digital Object Identifier
EDR	Environmental Data Retrieval
EGO	Everyone's Gliding Observatories
EIHA	Environmental Impacts of Human Activities
EMODNet	European Marine Observation and Data Network
ERDDAP	Environmental Research Division's Data Access Program
EU	European Union
EurOBIS	European node of the Ocean Biodiversity Information System (OBIS)
FAIR	Findable, Accessible, Interoperable, Reusable
FAIR-EASE	Horizon Europe project - Building Interoperable Earth Science & Environmental Services
FAIR-IMPACT	Horizon Europe project - expand the use of FAIR-enabling solutions across the European Open Science Cloud
GBIF	Global Biodiversity Information Facility
GDAC	Global Data Assembly Center
GEBCO	General Bathymetric Chart of the Oceans
GEOTRACES	International study of the Marine Biogeochemical cycles of trace elements and their isotopes
GLOSS	Global Sea Level Observing System
GOA-ON	Global Ocean Acidification Observing Network
GOOS	Global Ocean Observing System
HE	Historic Environment
HES	Historic Environment Scotland
HTTP	Hypertext Transfer Protocol
ICES	International Council for the Exploration of the Sea
ICG-Noise	Intersessional Correspondence Group on Underwater Noise
ICG-QSR	Intersessional Correspondence Group on managing the Quality Status Report
ICOADS	International Comprehensive Ocean-Atmosphere Dataset
iFDO	image FAIR Digital Object
IHO	International Hydrographic Office
INSPIRE	INfrastructure for SPatial Information in Europe

IOC	Intergovernmental Oceanographic Commission
IODC	International Oceanographic Data Conference
IODE	International Oceanographic Data and Information Exchange
IPT	Integrated Publishing Toolkit
JASMIN	The UK's data analysis facility for environmental science
MBA	Marine Biological Association
MEDIN	Marine Environmental Data and Information Network
MERMAN	Marine Environment Monitoring and Assessment National database
MSS	Marine Scotland Science
NBN	National Biodiversity Network
NERC	Natural Environment Research Council
NMRW	National Monuments Record of Wales
NOAA	National Oceanic and Atmospheric Administration
NOC	National Oceanography Centre
NODB	National Oceanographic Database
OASIS	Online system for reporting archaeological investigations and linking research outputs and archives
OBIS	Ocean Biodiversity Information System
OceanOPS	International Center of Excellence for Coordination and Monitoring of Meteo-Oceanographic Observing Systems
ODA	Open Document Architecture (format)
ODIS	Ocean Data and Information System
OGC EDR API	Open Geospatial Consortium Environmental Data Retrieval Application Programming Interface
OGL	Open Government Licence
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PDL	Published Data Library
PID	Persistent Identifiers
RCAHMW	Royal Commission on the Ancient and Historical Monuments of Wales
SeaDataNet	Pan-European Infrastructure for Ocean and Marine Data Management
STAC	Spatio-Temporal Asset Catalogue
TNC	Towards a National Collection
UI	User Interface
UNESCO	United Nations Educational, Scientific and Cultural Organization
UK	United Kingdom
UKRI	UK Research and Innovation
UKHO	United Kingdom Hydrographic Office
UNPATH	Unpath'd Waters: Marine and Maritime Collections in the UK
URL	Uniform Resource Locator
WAFS	Web Accessible Folders
WMS	Web Map Service
WMO	World Meteorological Organisation
XML	Extensible Markup Language

MEDIN DAC Cost Model

The DAC cost model proposed and adopted in November 2010 identifies four aspects of the DAC function: Core Capability, MEDIN Coordination, Additional Archiving, and Data retrieval / distribution, as described below:

Core DAC Capability

“Core” DAC capability includes infrastructure costs and some routine data archiving. It is expected that core DAC funding is provided by organisations with a strategic interest in a national DAC capability for specific data types. MEDIN acts to provide an overview and to consider whether funding of this core capability is secure or at risk.

Funded by the organisation hosting the DAC or, in the case of DASSH, by a consortium of organisations.

MEDIN co-ordination

MEDIN acts to ensure common standards and service provision across the MEDIN DAC network. The cost of MEDIN coordination activities is shared between MEDIN Sponsorship funds and the DACs themselves.

Funded by MEDIN Sponsor funds and DACs through in-kind effort

Additional Archive Costs

In the general case, the costs of archiving newly collected data should be funded by the data providers, in the form of one-off fees to the DACs in return for the services provided. This data archiving cost is not currently included in the overall budget of many monitoring and research programmes.

Funded by data suppliers

Data retrieval / distribution

MEDIN DACs will provide data access to the original data provider at no cost and will manage third party access to datasets according to terms agreed with the data provider. If no constraints are required by the owner, data will be made available to third parties at no cost, beyond any necessary to cover costs of retrieval / provision.

No cost