Tides of Transparency:
A First Mapping of Industrial Ocean Data Sharing

HUB Ocean accenture Microsoft

Ocean Data Action Coalition

An action group of HIGH LEVEL PANEL for A SUSTAINABLE OCEAN ECONOMY

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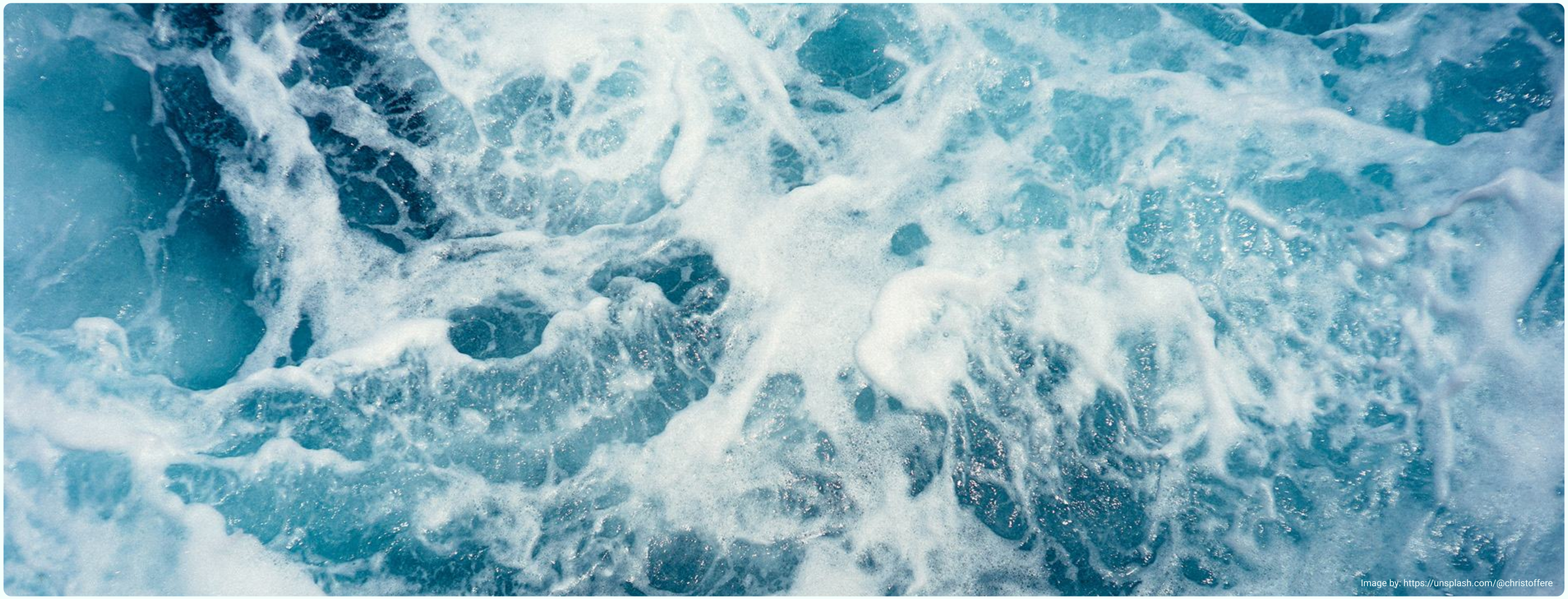

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The Tides of Transparency Report

Tides of Transparency: A First Mapping of Industrial Ocean Data Sharing serves as a call to action for corporate leaders to acknowledge the shifting tides of responsibility and commit to the transparent and public sharing of their ocean data. The report aims to provide evidence and recommendations for companies to help solve ocean biodiversity challenges by sharing data. With 75-90% of the estimated 1-2 million ocean species undiscovered[1] and over 80% of the ocean unmapped and unexplored[2], this data is essential for advancing our scientific understanding of the ocean. It also plays a vital role in shaping well-informed policies for a sustainable ocean economy and accelerating sustainable business development.

HUB Ocean, an independent non-profit foundation, is dedicated to changing the fate of the ocean by unlocking the power of data, technology and collaboration. Its primary goal is to become an ocean data collaboration hub for the world, advancing both ocean health and wealth. HUB Ocean plays an active role in two pivotal initiatives: The United Nations Decade of Ocean Science for Sustainable Development (aka the 'Ocean Decade') – through the work of its Corporate Data Group – and the High Level Panel for a Sustainable Ocean Economy (aka the 'Ocean Panel'). Together, we highlight the urgency of unlocking industrial ocean data for ocean health.

The Ocean Decade Corporate Data Group, co-chaired by UNESCO'S Intergovernmental Oceanographic Commission (IOC) and Fugro, a leading international geo-data specialist, unites leading companies, scientists and data experts to develop strategies, establish best practices, and create use cases about industrial data sharing – encouraging more companies to join this vital movement.

The Ocean Panel, which includes 19 Heads of State, has set a bold vision: to promote a globally shared data revolution, to support the sustainable management of 100% of the ocean area under national jurisdiction by 2030. HUB Ocean, together with Microsoft and Accenture, and guided by the Ocean Panel, leads the Ocean Data Action Coalition (ODAC) – urging global companies, governments and scientists to unlock and share ocean data for this mission.

HUB Ocean also supports the work of the UN Ocean Decade Special Emissary for Industrial Ocean Data, Kjell Inge Røkke - Norwegian industry leader and principal owner of Aker, advocating for transparency and data collaboration from ocean industries.

Under HUB Ocean's leadership, these different actors worked together, along with research and development support from Accenture, to deliver this report. This report also extends the call to action issued by the Ocean Decade Corporate Data Group in April 2024.

Message from Kjell Inge Røkke

UN Ocean Decade Special Emissary of Industrial Ocean Data

The vision of the UN Decade of Ocean Science for Sustainable Development (2021-2030) is "The science we need for the ocean we want."

It calls for a change in our relationship with the ocean, using tools we either have or can develop. Data-driven, scientific insights will be a key part of the solution.

In June 2022, I was formally endorsed as the UN Ocean Decade Special Emissary for Industrial Ocean Data. Since then, my team and I have been working diligently to break down siloes and advance the sharing of industrial ocean data. It is, at least, not less difficult than we expected, but we are making meaningful progress.

We have chosen to focus on ocean biodiversity in this report, as we have heard - loud and clear - that there is a critical gap in data felt by science, governments, and industry alike. I encourage companies to get engaged, and not hesitate to reach out to us. We stand ready to assist and collaborate on the journey to unlocking valuable ocean biodiversity and environmental data to measure and manage ocean ecosystems.

FOREWORD

Kimberly Mathisen, CEO, HUB Ocean

When I became CEO of HUB Ocean over two years ago, I joined a wonderfully innovative organization fueled by a transformative vision:

to use the power of ocean data to create a more transparent and informed world – a world where our ocean can heal and thrive, even amidst unprecedented pressures from human activity. From the very beginning, it was clear to me that industry holds the key to unlocking profound positive change. Yet without radically increasing data sharing and transparency, we cannot hope to effect that change.

Given industry's history of building assets in the ocean, we know that critically important data has been amassed inside these companies. Thus, the race is on, and the mission of HUB Ocean (and others) is clear and compelling: to bring industry players to the table, where they should have always been, to pool these insights.

The ocean is teeming with unexplored life, containing vital information for our human existence and the future of our planet. Understanding and protecting ocean biodiversity is crucial, especially as we look to the future, where our reliance on the ocean for food, for energy and other resources will only grow. In the past, we were content to see our industries advance, largely absent of any scientifically-sound guardrails on nature impact. This time around, as we build our future, we must do so with much more awareness and commitment to care-take our planet.

I believe we are entering a new era. The tides are turning in favor of transparency, with the forces of social accountability, mandatory data disclosures, and powerful incentives –from investor trust to customer loyalty –pushing the door wider open to engender progress. The companies that step through this door and embrace this shift now are lighting the way for others, while also positioning themselves to thrive as new paradigms take hold.

While **industry leadership** is the most essential element in succeeding with an overall shift, we also crave the "leapfrog" potential that lies in **governments taking decisive steps** to mandate data sharing, as some countries have already done. So many of the tasks to fund, regulate, and license use of a country's ocean territory depend on high-quality data. Industry must be counted upon to contribute to what should ultimately be better, holistic decisions.

There is substantial work that lies ahead. I hope this report inspires leaders to navigate the complexities and seize the opportunities in this emerging frontier of corporate sustainability. This means embracing accountability, advocating for and activating their organizations to more transparently share the data by which our most optimal ocean-impacting journeys can be steered.

As marine biologist and pioneering author, Rachel Carson once wrote "We stand now where two roads diverge. But unlike the roads in Robert Frost's familiar poem, they are not equally fair. The road we have long been traveling is deceptively easy, a smooth superhighway on which we progress with great speed, but at its end lies disaster. The other fork of the road –the one less traveled by –offers our last, our only chance to reach a destination that assures the preservation of the earth." — Silent Spring

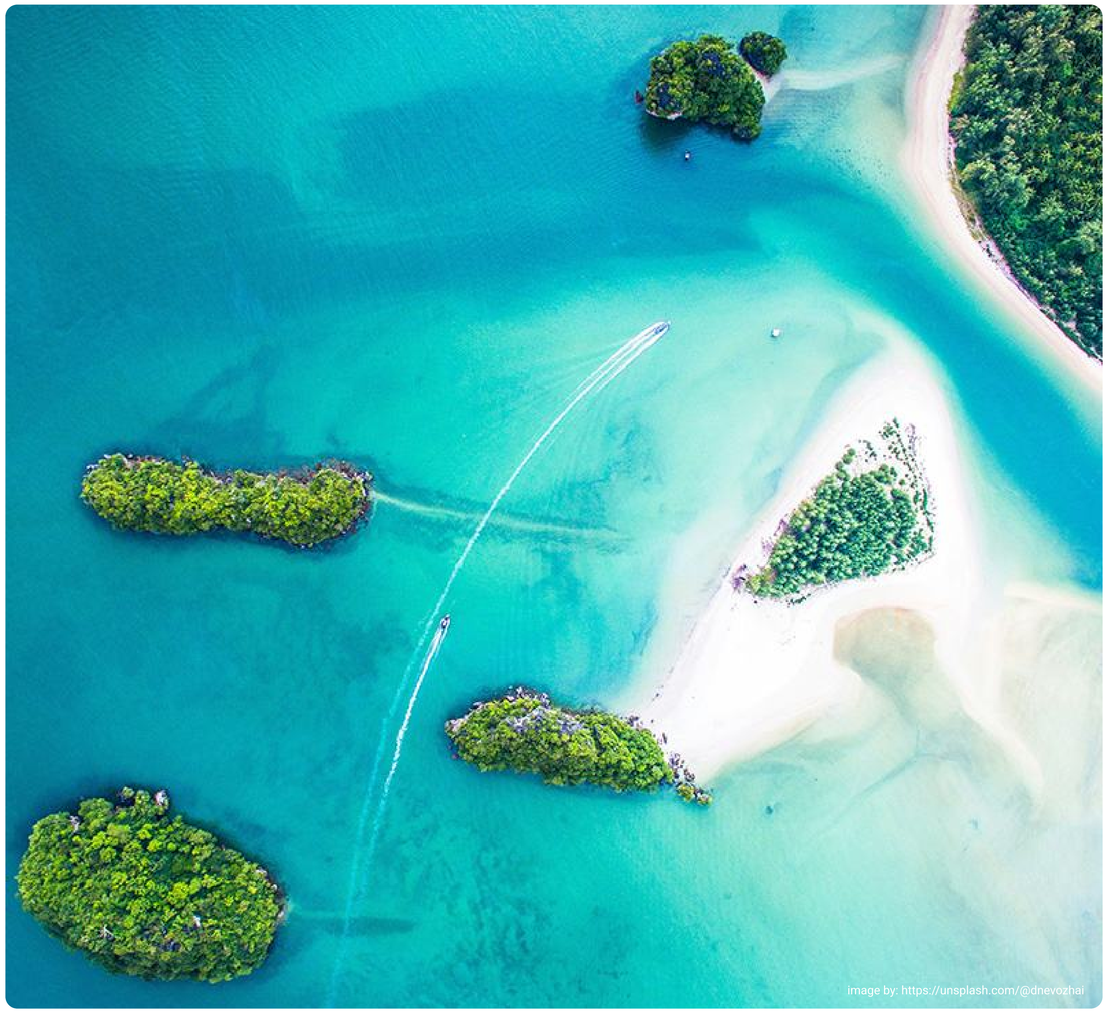
Executive Summary

The ocean is fundamental to life on Earth, yet its health is deteriorating under pressure from human activities.

To change the fate of the ocean, we need a revolution in ocean knowledge and accountability, with the private sector playing a key role. Nowadays, companies understand that their shareholders, customers and society expect them to contribute to a sustainable future. In 2024, these expectations extend to transparency, compelling companies to share data on their impacts. However, for ocean data to be truly impactful, it must be FAIR (Findable, Accessible, Interoperable, and Reusable)[3] and repurposed within the sustainable ocean economy. This proactive approach to data sharing is critical to bridging existing data gaps, deepening our understanding of ocean ecosystems, and driving effective, sustainable policies and industry practices.

Tides of Transparency: A First Mapping of Industrial Ocean Data Sharing marks a foundational effort by HUB Ocean and our partners to enhance this dialogue by bringing together new insights and the best of existing knowledge on industrial ocean data sharing. The primary focus areas of the report, which align with our section outline, include:

- The current state of ocean biodiversity data sharing in industry
- Leading company examples showing emerging best practices
- Industrial ocean data sharing challenges
- Recommendations for companies to begin sharing data



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This report focuses on the challenges involved in safeguarding ocean biodiversity and the corresponding data needs.

A thorough understanding and preservation of ocean biodiversity requires extensive data, including on the distribution of marine life, ecosystem dynamics, and human influences. To unlock more critical data, we champion a broad approach to data sharing and draw on diverse examples and insights throughout this report.

Part one uncovers a critical gap: despite extensive industrial presence in our ocean, private sector contributions to ocean biodiversity knowledge remain very low. For the biodiversity-specific repositories, the assessments showed that only 3% of the ocean data assembled in these flagship data repositories comes from private companies. While interpreting whether this percentage reflects a realistic expectation is complex, the fact that private sector contributions are 30-50% in some regions leads us to contend that there is significant potential for the private sector's contribution to far exceed 3%. This section details the key findings related to this gap.

Part two showcases several leading examples of companies demonstrating the multi-faceted potential of industrial ocean data sharing. Our focus includes **Ecowende, Equinor, Aker BP, TGS, TotalEnergies, IKM, PTTEP, and Aker BioMarine,** highlighting their motivations, methods, and the positive outcomes resulting from data sharing. Each case is presented within its specific context, offering varied lessons that others can learn from.

Countries can also take transformative action that surpasses what can be achieved by individual appeals and one-off data sharing by individual companies. We highlight the **United Kingdom's Crown Estate** and **Norway** and their undertakings in offshore activities, which demonstrate how regulations can produce step changes in transparency. Additionally, we highlight The Nippon Foundation-GEBCO Seabed 2030 Project and Fugro, which provide valuable insights into the significance and achievements around sharing bathymetry data, which is an essential data set for understanding ocean biodiversity.

Part three explores the common barriers companies face when it comes to data sharing. Part four outlines recommendations for companies to begin sharing data effectively. These insights are informed by HUB Ocean's experience in this field and through our collaboration with the legal company BAHR. They are summarized in the table below and further detailed in the report. They are intended to complement emerging guidelines and recommendations, including from the Ocean Decade Data and Information Strategy Implementation[4].

Key Area	Action Steps
Gaining control over the data and appointing data stewards	• Appoint an internal champion • Take an inventory of the data • Establish insights on ownership
Creating a thoughtful decision process	• Choose what to share • Set clear terms
Ensuring discoverability and interoperability	• Adopt FAIR principles • Aligning (meta) data with global standards • Share with public repositories and platforms
Collaborating strategically, and scaling impact	• Start with a straightforward use case • Partner strategically (e.g., Ocean Decade Corporate Data Group, ODAC) • Communicate successes to the world
Choosing to "Open by design"	• Make data sharing the new standard

As this report makes clear, it is early days for industrial ocean data sharing but embracing an "Open by Design" approach can be a transformative shift. This report emphasizes the unique opportunity industries like offshore renewables have. Over the next decade, many offshore assets will be designed, built, and deployed, unlocking unprecedented insights for ocean health and the sustainable ocean economy if data sharing is embedded as a core principle from the start.

Introduction:

Covering 71% of the Earth's surface, the ocean is home to an incredible range of biodiversity, including an estimated 1-2 million species.

Yet, fewer than 250,000 of those species have been documented[5]. In 2023 alone, we added 2,000 species to the World Register of Marine Species (WoRMS)[6], with each new discovery highlighting our progress while reminding us how much remains undiscovered.

The ocean is the cornerstone of life on Earth, producing half of our oxygen (mostly from phytoplankton[7]), and absorbing 25% of anthropogenic CO2 and 90% of the excess heat[8]. However, 59% of the ocean is facing increasing cumulative impacts from climate change, industrial fishing, land-based pollution and ocean sector impacts[9]. The pace of ocean warming and the rate of sea level rise have both doubled in the past 20 and 30 years respectively[10]. This has created untold damage on many core ecosystems like coral reefs, which could face extinction by 2050[11].

The international scientific community has raised the alarm, and there is a growing momentum for change. The Global Biodiversity Framework, adopted at the 2022 UN Biodiversity Conference, will safeguard 30% of the world's ocean by 2030, up from around 8% marine protected areas today[12]. Yet, as nations move to protect more space, a large portion of the green transition will take place at sea. By 2050, the demand for space from energy production and aquaculture is predicted to grow ninefold[13], potentially putting more pressure on marine ecosystems.

It is painfully obvious that we are at a critical juncture. We need to gain insights to manage the growth of human pressure on the ocean wisely. We must adopt science-based, data-driven solutions to reverse the decline and build a resilient, sustainable ocean economy. In our view, achieving this level of change will take a collective set of determined efforts from all sectors – **to improve the availability and accessibility of ocean data from both public and private entities.**

Ocean science data has long been siloed, held back by outdated practices and underutilized as a tool for change. Much of the existing publicly available data comes from government-led and/or scientific endeavours. However, private companies also collect crucial ocean data for their commercial operations, as well as for regulatory compliance and scientific research. We need these datasets to be shared in the public domain and repurposed for broader environmental applications in the ocean economy.

> "The most important learning we have had about the ocean is the magnitude of what we still don't know"
>
> – Sylvia Earle, Marine Biologist and Ocean Explorer and Advocate

Fortunately, a tide of transparency is emerging, and companies have greater expectations from their shareholders, customers, and society to move towards a nature-positive economy. Companies increasingly need a "license to operate" in the ocean, with schemes like the EU Taxonomy and CSRD requiring them to disclose material and biodiversity impacts and actively work to reduce these impacts. Investors are also demanding better ocean data for sustainability assessments[14], and companies that can prove they are more sustainable than their peers are increasingly becoming more attractive for investments and financing. Customers are increasingly looking for their suppliers to help them reduce their carbon footprint and nature impact. All these elements and more are having a positive effect on how industry relates to ocean health.

However, in many cases, even when data is made available, there are differences in how easily it can be reused or have real impact – especially when it is locked away in a report. Put simply, data comes with varying degrees of "openness", which directly affects the value it can create. The sustainable ocean economy requires this data to be FAIR[15] (Findable, Accessible, Interoperable, and Reusable) for optimum impact.

Crucially, the push for efficient data sharing between industry, governments and scientific communities is gaining traction, with initiatives like the United Nations Decade of Ocean Science for Sustainable Development and the High Level Panel for a Sustainable Ocean Economy leading the charge.

Several groups have already been formed to advocate data sharing within the private sector and identify practical solutions to make it real. Examples include the Ocean Decade Corporate Data Group, the Ocean Data Action Coalition (ODAC), the Ocean 100 Dialogues, the UN Global Compact's Ocean Stewardship Coalition, the Global Ocean Observing System's (GOOS) Dialogues with Industries and the Norwegian Ocean Data Forum to name a few. The UN Global Compact's report on improving knowledge-sharing in offshore renewable energy is a sector-specific example.

Some governments are also starting to embrace a "default to open" approach, making it clearer and easier for ocean-related data from private companies to be shared for the benefit of ocean health. Countries such as the United Kingdom, the Netherlands, Norway, and Brazil are already taking actions to design-in data sharing from industries operating in their waters.

In essence, this report joins an increasingly strong group of players advocating for companies to thoughtfully define pathways for sharing their relevant ocean data openly. The stakes are high, and we need to unite in using data, technology, and innovation to restore ocean health and secure a prosperous future.

MESSAGE FROM

Vidar Helgesen,
Executive Secretary of the Intergovernmental Oceanographic Commission
of UNESCO and Assistant Director-General of UNESCO

Despite notable increases in data availability and access, it is no secret that huge gaps in ocean data remain which limits our capacity to fully understand ocean processes and inform ocean management.

We can and must fill these gaps by collecting new data, but this will take time and require major investments and increased international cooperation. Given the urgency of the climate crisis we face, we must in parallel exploit the vast amounts of existing datasets that are locked away in unconnected databases. Both industry and national governments have a major role to play here.

A first task is to prioritise those datasets that will have the biggest immediate impact. The Ocean Decade provides a robust framework to determine where we should focus our efforts. The Vision 2030 process, in particular, identified the knowledge products and services we must develop by 2030, which will inform the underlying data needed.

Once these datasets are identified, we must make them discoverable and accessible. HUB Ocean and the Ocean Decade's Corporate Data Group are working towards this goal with industry and UNESCO's Ocean Data Information System programme led by IOC's International Ocean Data Exchange programme is also setting the foundations for a federated data ecosystem accessible to all users.

Yet the incentives for industry to share data are not always understood. At the same time, national governments can be reluctant to share ocean data, given the geopolitical context.

Therefore, I believe industry and governments must work together to establish pathways that facilitate data sharing and benefit both stakeholders equally. For example, governments could require data sharing as a mandatory step of the permitting processes for offshore operations, as is the case already in the UK.

We should also demystify data sharing. We can do this first by demonstrating how the benefits and impact of sharing data outweigh the perceived risks, and the efforts required to share.

Secondly, we must find ways to make data sharing as simple as possible, providing clear guidelines and automating the process as much as possible, aligning data producers and users around a common set of standards.
Finally, once the data is shared, increased visibility and acknowledgement of how and where the shared data is being used would also encourage further engagement.

I strongly believe that these combined efforts will not only help us move the needle in terms of ocean data sharing, but they will also enhance the impact of data sharing.

Part one

Analysis - the current state of ocean biodiversity data sharing in industry

The United Nations Convention on Biological Diversity defines biodiversity or biological diversity as: “The variability among living organisms from all sources, including [...] diversity within species, between species and of ecosystems”[16].

This report argues that a deep and broad spectrum of data contributions and contributors is needed to advance our understanding of ocean biodiversity, and that activating the potential of industry is key. We set out to investigate the scale of private sector contributions today and found a highly fragmented picture. To make a representative, self-consistent analysis we focused on two key, global repositories— OBIS (Ocean Biodiversity Information System) and GBIF (Global Biodiversity Information Facility).

This study reveals a significant gap: just 3% of ocean biodiversity data is contributed by the private sector. This suggests a tremendous opportunity for additional data sharing, which could support biodiversity conservation initiatives and foster sustainable business growth.

1.1 Estimating biodiversity data sharing in industry

One of the main challenges in understanding private sector contributions is accessing and locating existing data. To tackle this, we analysed contributions from major global biodiversity data aggregators: **GBIF** (Global Biodiversity Information Facility) and **OBIS** (Ocean Biodiversity Information System). Our goal was to estimate the proportion of ocean-related data originating from private companies.

GBIF: In August 2023, GBIF estimated that private sector contributions made up 0.3% of all records published[17]. This included both land and ocean data. Since this report focuses on the ocean, our reanalysis found that 3.0% of ocean data in GBIF (about 2 million out of 74 million geolocated datapoints) came from the private sector.

OBIS: This analysis required more independent derivation. Our method was to classify all OBIS contributors by organisation type with the result that **3.2% of the data in OBIS was found to come from the private sector** (about 4 million of 129 million datapoints). These come from 166 private contributors out of a total of about 2620.

In Appendix 1, we consider how the methodology could lead to under- or over-estimations of industry’s contribution share. However, the surprising consistency of the numbers from GBIF and OBIS (with different classification approaches) gives us confidence in the results.

1.1.1 Global Perspectives of Data Contributions

One of the main challenges in understanding private sector contributions is accessing and locating existing data. To tackle this, we analyzed contributions from major global biodiversity data aggregators: GBIF (Global Biodiversity Information Facility) and OBIS (Ocean Biodiversity Information System). Our goal was to estimate the proportion of ocean-related data originating from private companies.

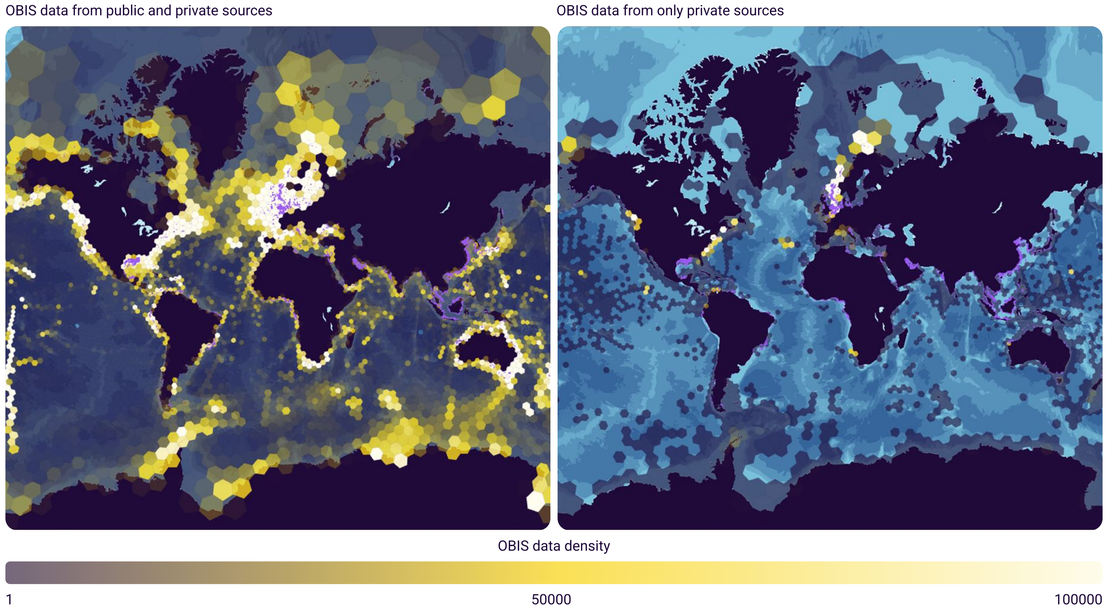


Figure 1: Total vs. private contributions to OBIS – A global perspective: OBIS data distribution globally: all data (left) and private only (right). The colour scale is the same for both and represents the number of datapoints in a cell of 87000km². Industrial assets are plotted in lilac (identified by Global Fishing Watch and Global Renewables Watch).

Figure 1 visualizes the stark contrast between private and public data contributions. It demonstrates again the sparse 3% share from the private sector. However, there are other aspects to note in this data as well. Private data contributions are concentrated in a few global hotspots, for example northern Europe, the US east coast and some notable countries like Colombia and Namibia (more analysis in the next section), while significant data gaps exist in OBIS around many marine assets, where one would expect that a significant amount of data exists. Further research is needed to understand these gaps, but two scenarios stand out:

Key observations:

- **Exclusive Economic Zones (EEZs)**: Data sharing in EEZs is influenced by company initiatives and country-specific policies, which can encourage, be neutral, or discourage sharing. We see significant variations in data volumes, even in neighbouring EEZs.

- **High seas:** Covering 40% of the Earth's surface and 64% of the ocean, data sharing here is free from country-policy constraints. Gaps are due to data availability and willingness to share. The Biodiversity Beyond National Jurisdiction (BBNJ) Treaty is expected to boost high seas data sharing in the future.

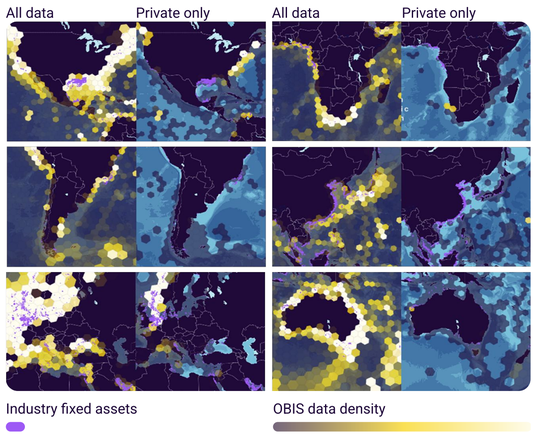


Figure 2. Total vs. private contributions to OBIS – regional pictures: all data (left panels) and private only (right panels). The colour scale is the same for all panels and represents the number of datapoints in a cell of 87000km². Industrial assets are plotted in lilac (identified by Global Fishing Watch and Global Renewables Watch).

Large differences in both total data and the data we can attribute to the private sector can be seen. This is both on a regional, country and intra-country level. It is fair to assume that OBIS may have disproportionately more data from certain countries, for example due to language barriers.

However, we also see large contrasts across borders of neighbouring countries and within countries. Several of these will be further discussed in the rest of this chapter.

1.1.2 Private Sector Data Sharing by Region

We ranked the top contributors by region, using EEZ data from Marine Regions[18]. **Tables 1-3** reveal three key insights:

- **Top Data Contributors:** Some of the largest countries by total datapoints contributed, such as Australia, Canada and the UK, appear to be below the average (3%) in their private sector contribution (in Australia it appears to be only 0.1%).
- **Private Sector Leaders:** Some countries with smaller total contributions, including Namibia, Portugal, Japan and Colombia, show a higher proportion of private contributions.
- **Potential for Growth:** Many countries exceed the 3% average for private contributions, suggesting room for improvement with better incentives, including from governments.

Top countries by total OBIS data contributions

Rank	Country	Total datapoints	Private datapoints	% private
1	Australia	24,936,225	26,665	0.1%
2	United States	16,333,126	651,146	4.0%
3	Canada	15,232,559	276,714	1.8%
4	United Kingdom	12,628,889	188,493	1.5%
5	Non EEZ	7,989,933	123,521	3.2%
6	Netherlands	4,094,888	135,394	3.3%
7	France	4,073,438	31,398	0.8%
8	Norway	3,822,198	2,079,028	54.4%
9	South Africa	3,507,710	3,668	0.1%
10	Denmark	2,770,049	12,098	0.4%

Table 1. Top countries by total OBIS data contributions: Ranking by total datapoints, reveals significant data volumes from several large countries. Notably, Australia stands out as the largest contributor, yet only 0.1% of its data comes from the private sector.

Top countries by private sector OBIS data

Rank	Country	Total datapoints	Private datapoints	% private
1	Norway	3,822,198	2,079,028	54%
2	United States	16,333,126	651,146	4.0%
3	Canada	15,232,559	276,714	1.8%
4	United Kingdom	12,628,889	188,493	1.5%
5	Netherlands	4,094,888	135,394	3.3%
6	Non EEZ	7,989,933	123,521	3.2%
7	Portugal	853,819	77,820	9.1%
8	Japan	1,345,659	50,137	3.7%
9	Colombia	2,435,375	44,188	1.8%
10	Namibia	120,506	40,278	33.4%

Table 2. Countries by private sector OBIS data: Ranking by private sector contributions, highlights countries with high private sector ratios like Namibia, Portugal, Colombia, and Japan.

Top countries by % of private sector OBIS data

Rank	Country	Total datapoints	Private datapoints	% private
1	Norway	3,822,198	2,079,028	54%
2	Malta	10,255	4,932	48.1%
3	Namibia	120,506	40,278	33.4%
4	Israel	30,716	6,993	22.8%
5	Italy	228,037	25,996	11.4%
6	Honduras	7,444	755	10.1%
7	Portugal	853,819	77,820	9.1%
8	Cambodia	606	45	7.4%
9	Malaysia	22,137	1,190	5.4%
10	Cyprus	6,367	336	5.3%

Table 3. Top countries by % of private sector OBIS data: Ranking by the percentage of private contributions, shows that many countries exceed the 3% average, showing the potential for much higher contributions under the right conditions.

1.1.3 Private Sector Contributors

One of the main challenges in understanding private sector contributions is accessing and locating existing data. To tackle this, we analyzed contributions from major global biodiversity data aggregators: GBIF (Global Biodiversity Information Facility) and OBIS (Ocean Biodiversity Information System). Our goal was to estimate the proportion of ocean-related data originating from private companies.

1. **Ocean Industries:** Offshore oil and gas, renewables, fishing and shipping companies.
2. **Consulting companies:** Providing domain expertise and services (for example ecological data acquisition).
3. **Other for-profit ocean organizations:** Travel, tourism, and leisure sectors.

Figure 3 shows that ocean industries are the largest contributors of private sector ocean biodiversity data, with energy companies accounting for most of this. Approximately 5% of the industry data is shared via the International Seabed Authority, which has a mandate to oversee activities such as seabed mining. Shipping and fishing are relatively small (under 1%), but we would expect that they might be better suited to contribute other types of data, such as meteorological or physical oceanographic data. A large portion of the contribution form "Other for-profit" organizations comes from tourism (approximately 14% of the total). Consulting companies play a large role, as they are involved in many data capture campaigns, both public and private.

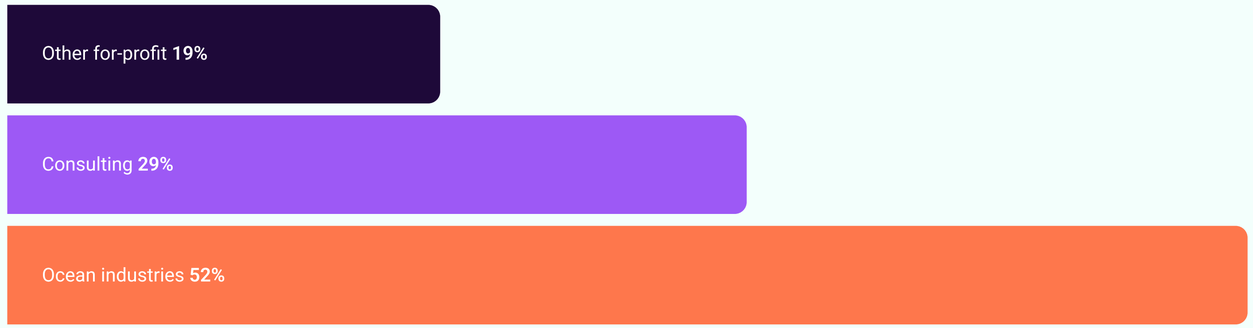


Figure 3. Type of private sector companies contributing data

1.1.4 Trends in Private Sector Data Sharing

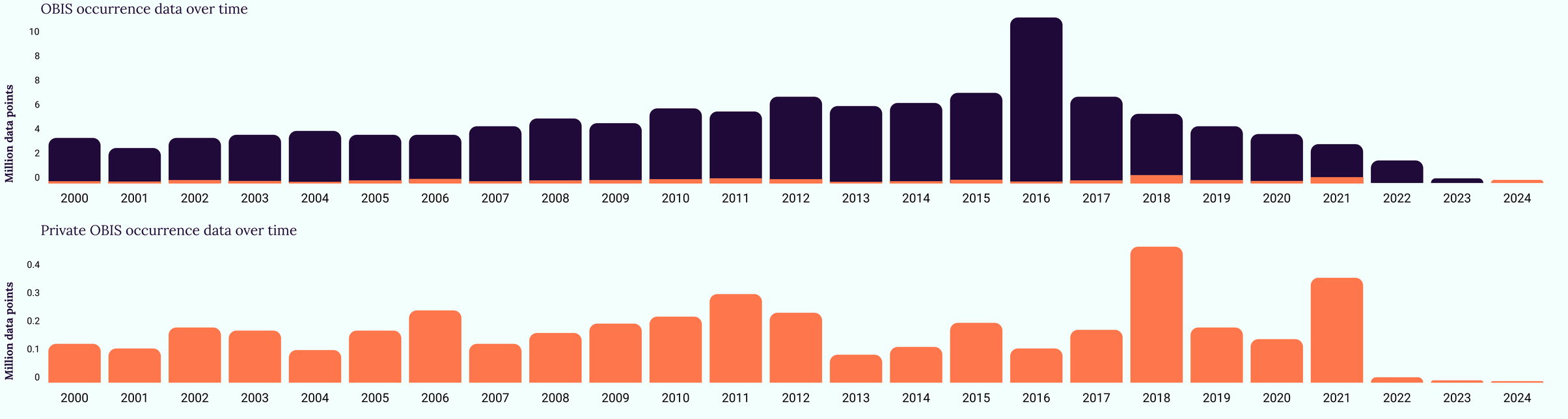


Figure 4. Private sector data sharing over time. Species occurrences data shared per year from private vs. public sources through OBIS 2000-2024.
Top: The combined contribution from public and private sources shown to-scale. Bottom: The private only contributions shown alone.

Figure 4 demonstrates a generally increasing trend of open biodiversity datapoints from 2000 to 2016, followed by a decline. This drop-off is likely due to a reporting time lag, affecting both public and private data. Private sector contributions remain relatively small (the orange sections) and exhibit more variability from year to year, reflecting overall the fewer contributors and datasets.

The bottom panel zooms in to show the private sector contributions alone. Compared to the combined data above in the top panel, it is less clear that there is a progressive trend towards increasing data over time.

1.2 The Relationship Between Data Sharing and Industrial Activity

This report seeks to shed light on how much data companies are sharing from their operations. We therefore looked at whether private data contributions align with the location of industrial activity. We examined Northern Europe, where offshore oil, gas, and wind operations are prevalent (Figure 5).

Various types of data can be gathered from these locations, including seafloor measurements, geological, environmental, and biological samples, and sensor data from sea and air. This data can significantly enhance our understanding of biodiversity and complex seascapes.

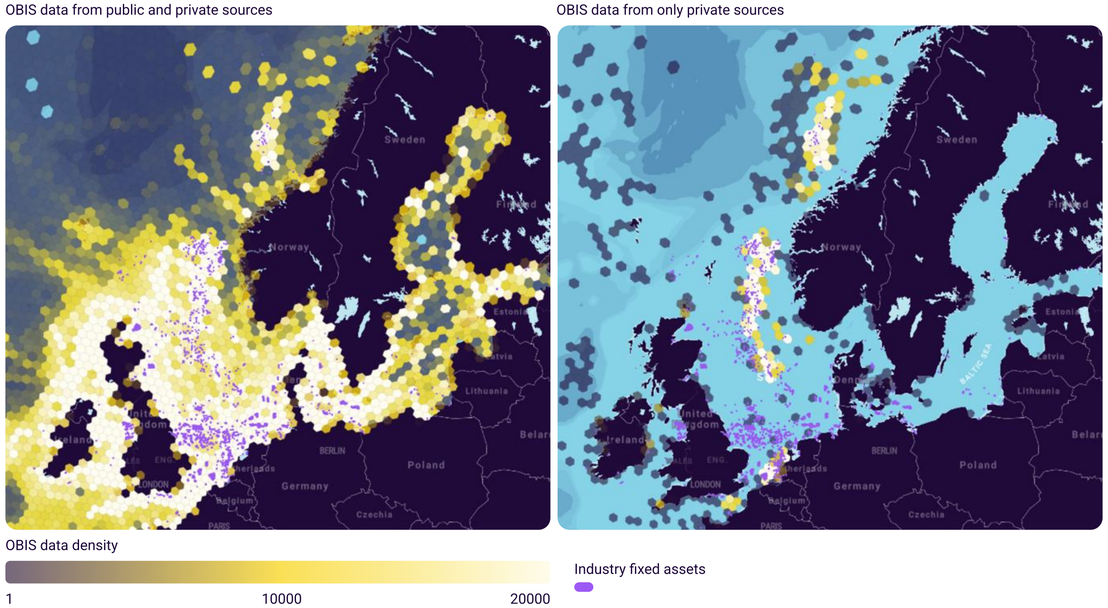


Figure 5. Public vs. private contributions to OBIS – A focus on Northern Europe: OBIS data distribution in Northern Europe: all data (left) and private only (right). The colour scale is the same for both and represents the number of datapoints in a cell of 1770km². The maps also include offshore infrastructure from oil and gas and offshore wind (lilac) sourced from Global Fishing Watch and Global Renewables Watch.

Key observations:

- **Oil and Gas Sector:** Private data sharing is evident around roughly half of the oil and gas asset locations in the North Sea.

- **Offshore Wind Sector:** In stark contrast, private biodiversity data sharing from offshore wind farms to OBIS appears almost non-existent.

- **Norway's Leadership in Mandating Data Sharing:** Norway is notable for enforcing private sector data sharing. A large portion of the private data in OBIS and GBIF comes from the Norwegian Environmental Monitoring Database[19] (MOD), which is made publicly available by DNV. Norway's policies mandate that oil and gas companies share environmental survey data, leading to a robust and accessible contribution from the private sector. The examples of the companies Equinor and Aker BP highlighted later in this report show how such policies can drive effective data sharing.

- **Contrast to Other Countries:** While the UK has similar types of industrial data as Norway, including decades of environmental survey data from oil and gas in the "UK Benthos Database", this data remains far harder to find, access and re-use.

  The data does not currently appear in global repositories like OBIS and GBIF, although we understand that OBIS-UK is working to process the data to make it widely available. As highlighted later in this report, the Crown Estate, which owns and manages the seabed around England, Wales, and Northern Ireland, requires offshore wind companies, amongst other industries, operating in these areas to share data through the Marine Data Exchange – a platform that does flow data onwards to other public repositories. This demonstrates that even within the same country, there are differences depending on sector and data types.

1.3 The Future: Industry Growth and the "Open by Design" Potential

The footprint of offshore industry is expanding rapidly, particularly in sectors like wind energy. This surge in industrial activity presents a key opportunity for the private sector to significantly increase its ocean data sharing efforts. If data sharing expands in parallel with industry growth, it could greatly enhance our understanding of marine ecosystems and support more sustainable ocean management.

We illustrate these changes using three snapshots: 1) existing offshore wind and oil and gas installations from 2017; 2) the present day; and 3) a future scenario based on current plans and projections for offshore wind installations in Europe. The distribution of the private sector's biodiversity data contributions is included as context for the correlation between data and assets (see Appendix 1 for more details).

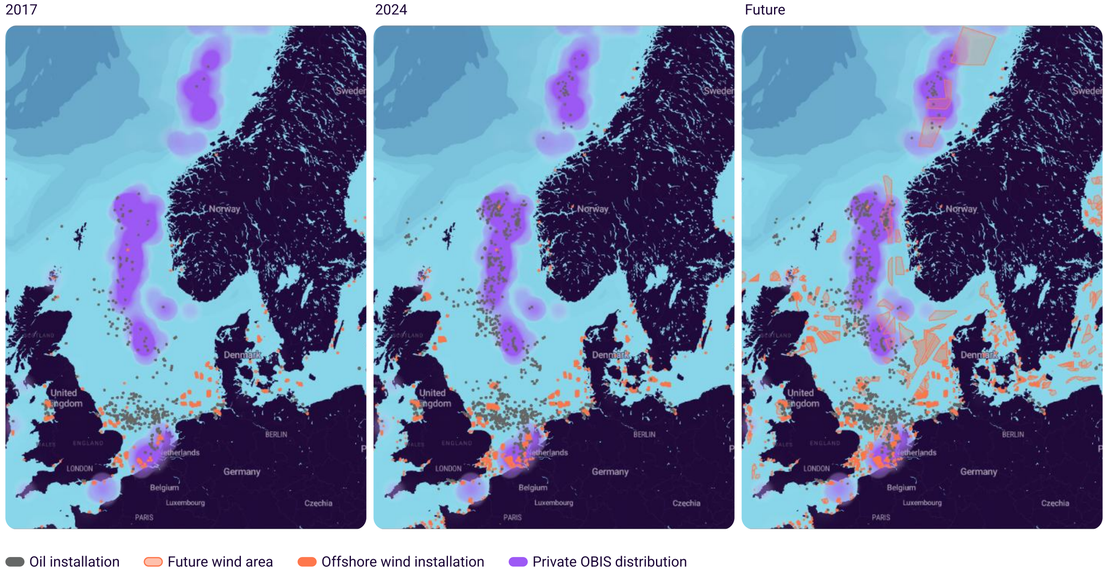


Figure 6. Past, present and future industry growth: Three panels showing industrial infrastructure in 2017, 2024 and a projected "Future" if all current potential windfarm areas are realized (approximately in line with the countries reaching their respective targets). Oil installations (grey), offshore wind (orange), future wind areas (transparent orange) have been overlaid on a private OBIS data distribution heatmap (lilac).

Figure 6 illustrates the dramatic increase in the area utilized for offshore activities over a relatively short time. The North Sea, like many other regions, is poised to become a hotspot of industrial activity in the coming decades. For example, in 2023, nine countries pledged to expand offshore wind capacity in the North Sea to 120 GW by 2030 and over 300 GW by 2050, up from just 30 GW today. This rapid growth presents both a significant opportunity and a challenge for ocean data transparency.

Opportunities: The vast amounts of data generated by these new industrial activities –if shared –could vastly improve our understanding of the environmental impacts of offshore developments. Designing data collection systems with the intention to share ("Open by Design") from the start will ensure that the data generated by these operations becomes publicly accessible and useful for conservation and research purposes.

1.4 Conclusion

1. Overall Volume: The private sector's volume of contributions to the two largest ocean biodiversity repositories is minimal, with an estimated 3% of the total data points coming from this sector.

2. Dominance of Few Contributors: A significant portion of private sector data points is contributed by a few stand-out entities. Notably, half of the private-sector data in OBIS originates from the Norwegian MOD database (it is the tenth largest of 5000 datasets on OBIS and accounts for nearly 2% of the total datapoints in OBIS). This is due to public legislation in Norway that mandates that oil and gas operators must share environmental data, which is then aggregated and made available by DNV.

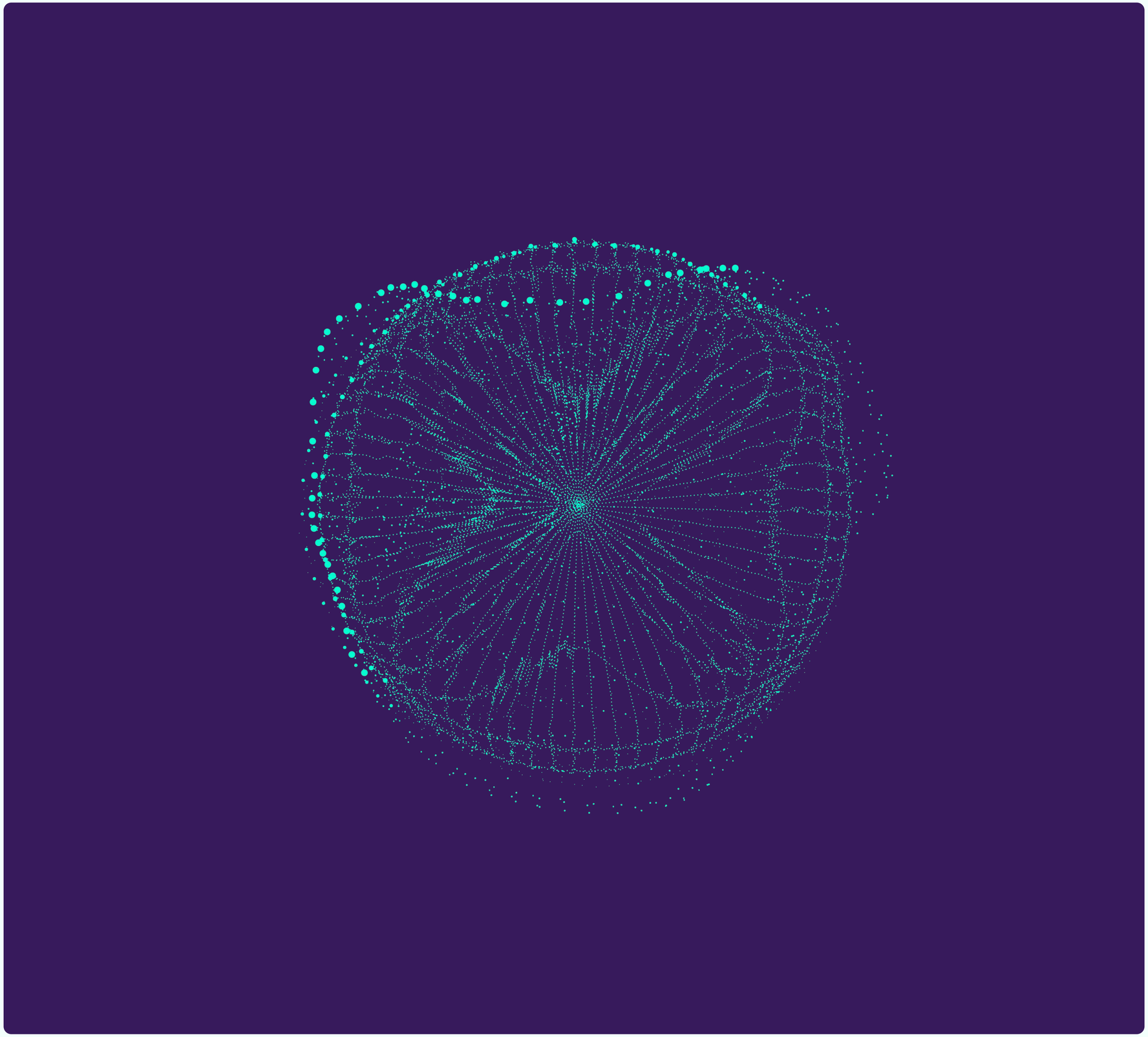
3. Country-Level Variations: There are notable differences in the proportion of private sector data contributions across countries. In Norway, over 50% of the data comes from the private sector, primarily due to the MOD database. Conversely, in Australia, the largest contributor of public data points, only 0.1% of the total data is from the private sector.

4. Trends Over Time: While there has been a gradual increase in the quantity of public data over time, there is no clear trend indicating an increase in private sector contributions. Recent years have seen a drop-off in public data, likely due to long reporting time-lags.

5. Correlation with Industrial Assets: The correlation between the locations of industrial assets and data contributions varies significantly. In some regions, such as Norway with the MOD database, the correlation is strong. However, in other contexts, like the UK oil and gas sector, there is far less data correlating with industrial assets. This discrepancy is partly due to existing data, such as the UK Benthos Database, not being integrated into aggregators like OBIS.

6. Changes in the Industrial Footprint: Since 2017, there has been a significant rise in industrial activity, with forecasts indicating even more substantial growth in areas such as the North Sea in the coming decades. This offers an opportunity to implement an "Open by Design" approach now, allowing data from these operations to enhance scientific knowledge of the ocean and improve its management.

On a final note, despite the considerable effort expended on performing this analysis, we acknowledge that there are no doubt inaccuracies due to the fundamental obscurity of data lineage. Even for subject matter experts, finding open ocean data is often cumbersome and complex, and finding private sector data, even more so. To truly create better insights, we not only need more data made openly available; we also see the need for better tools to point to and access existing private sector data.



Reflections from Louis Demargne

Data and Knowledge Management Officer at IOC-UNESCO & UN Ocean Decade Corporate Data Group

Organizations who collect and use ocean data in support of offshore energy exploration, marine infrastructure development or scientific research, typically use it once and then store it inaccessible systems. As a catalyst for collaborations between government organisations, private industry, academia and civil society, the Ocean Decade aims to address this issue and improve the availability and accessibility of ocean science data.

Launched in February 2023, the Ocean Decade's Corporate Data Group convenes private organisations across sectors to overcome barriers to data sharing and establish pathways to make the most relevant industry data publicly accessible. Over the past year, the group has focused on bathymetry and biodiversity data, with a third use case on metocean data in progress. An early success in the bathymetry use case involved processing offshore 3D seismic data from Uruguay to create a detailed bathymetric chart through the GEBCO Seabed 2030 programme.

For these use cases, we are drawing up step by step guidelines and showcasing how the shared data benefits science and ultimately impacts industry positively, creating an incentive. In parallel, we are also engaging international industry organisations, such as IOGP and IMCA, to help spread the practice and encourage others to share their data as part of normal business.

In April 2024, the group issued a 'Call to Action' at the 2nd Ocean Decade Conference, urging all ocean data producers and users to lift barriers to data sharing. One conclusion is that industry and national governments have an important role to play here and must work together to establish clear sharing pathways for making industry data discoverable and accessible to science.

Reflections from Stephanie Ockenden & Dr. Oliver Ashford

Deputy Head of Ocean Panel Secretariat/World Resource Institute & Ocean Program Associate at the World Resource Institute / Ocean Panel

The High Level Panel for a Sustainable Ocean Economy (Ocean Panel) is a global initiative of 19 world leaders working together towards a sustainable ocean economy. They govern over 50% of global coastlines and 45% of exclusive economic zones (EEZs), and are committed to 100% sustainable management of their EEZs. The Ocean Panel places knowledge at its core, having commissioned over 25 Blue Papers and Special Reports with input from 350+ experts from 54 countries.

The Ocean Panel's 2020 'Transformations Agenda' outlines actions for effective protection, sustainable production, and equitable prosperity of the ocean. It highlights the importance of transparent and open ocean data sharing to achieve a 2030 goal of globally shared data contributing to sustainable ocean management.

The Blue Paper 'Technology, Data and New Models for Sustainably Managing Ocean Resources' (Leape et al. 2020) underscores the potential of ocean data for advancing ocean resource management. It calls for a new era of open and automated data sharing to make data accessible and usable. The Ocean Data Action Coalition (ODAC), led by HUB Ocean, Microsoft and Accenture, was formed to support these goals. The 2024 Ocean Panel Progress Report[20] shows significant progress, with 17 of 18 members advancing on data sharing initiatives. The Ocean Panel continues to collaborate with stakeholders to enhance ocean data sharing.

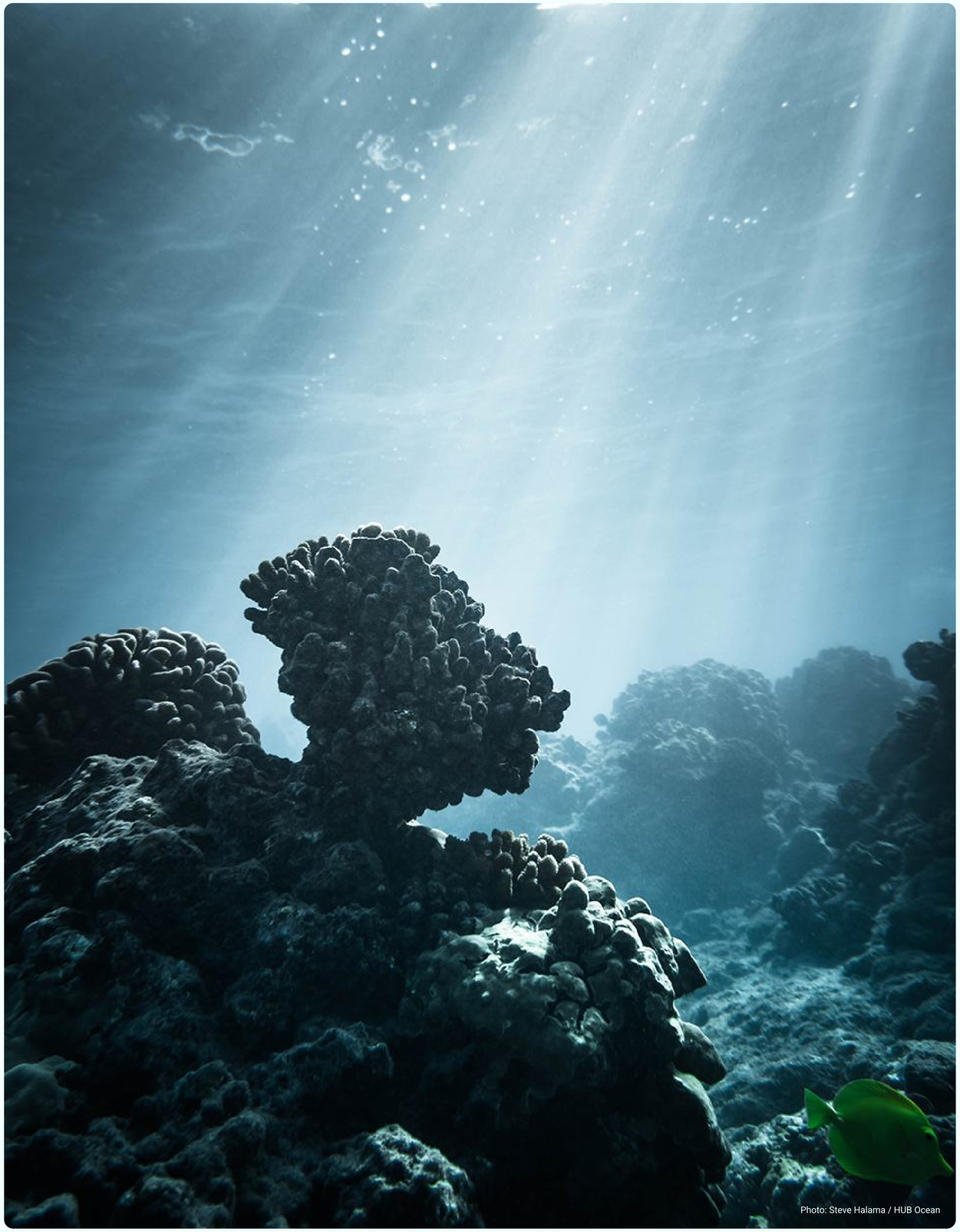


Photo: Steve Halama / HUB Ocean

SEABED 2030

Taking inspiration from SEABED 2030 and Bathymetry Data Sharing

Seafloor mapping has made substantial strides thanks to the Nippon Foundation-GEBCO Seabed 2030 project, which aims to map the entire global ocean floor by 2030. Seabed 2030 illustrates the powerful impact industrial data can have on ocean science.

Mapping the seafloor is crucial for safe navigation, resource management, undersea infrastructure development, and understanding marine geohazards like tsunamis. Accurate seafloor maps are essential for creating realistic ocean models and digital twins for ocean currents, biogeochemical processes, climate change, and sea-level variation.

Bathymetric data is crucial not only for navigation and infrastructure but also for understanding marine biodiversity and the complexity of seascapes.

With leadership and funding from The Nippon Foundation, Seabed 2030 builds on the General Bathymetric Chart of the Oceans (GEBCO) programme's legacy of ocean mapping. GEBCO operates under the auspices of the International Hydrographic Organisation (IHO) and UNESCO's Intergovernmental Oceanographic Commission (IOC).

Established in 1903, GEBCO had only mapped 6% of the ocean floor to modern standards by 2016 due to challenges like reliance on voluntary efforts, limited funding, and confidential legacy data held by defence and commercial entities. By May 2024, the percentage of the ocean mapped had increased to 26.1%, through commitments from governments, industry, and academia to share and upload previously unavailable bathymetric data.

Private sector data, especially from subsea contractors working on marine projects, has been pivotal in this progress.

"As a founding partner of Seabed 2030, Fugro is proud that over 2.6 million square kilometres of bathymetry data from our vessel transits have been contributed to the project since its inception. These 'in-transit' data contributions have inspired other companies to join the effort.

Our participation has led to numerous benefits, including operational efficiencies, and supporting our environmental-social-governance (ESG) goals. For a company that helps contribute to a safe and liveable world, in part through our work in and on the ocean, we strongly believe that industry plays a critical role in improving the health of the ocean and developing a sustainable ocean economy.

Sharing data is a corporate responsibility, and we are committed to making non-sensitive private sector ocean data publicly accessible through our support and co-chairing of the Ocean Decade Corporate Data Group."

– David Millar, Government Accounts Director, Americas, Fugro

Seabed 2030 has received in-transit data from a diverse array of sources in addition to Fugro. These sources include private sector survey company TGS, operators of the research vessel Laura Bassi, IB Oden, and RV Polarstern, as well as the Schmidt Ocean Institute and various other vessels, both large and small. Additionally, they are collaborating with the cable laying, pipeline survey, and offshore energy sectors to gather more in-transit data from an increasing number of companies. However, there are still challenges to industrial data sharing that must be overcome to help fill the remaining data gaps.

"Most bathymetric data is gathered by private sector contractors, primarily for purposes like safety of navigation, offshore energy development, and subsea engineering projects.

The clients of the contractors, who paid for the work, generally retain ownership of the data, especially beyond national boundaries, where there is no obligation to share it publicly, though it is shared with national mapping agencies within exclusive economic zones where this is a condition of licensing.

Seabed 2030 works with these contractors to encourage data sharing, even accepting lower-resolution data to protect commercial confidentiality and the location of critical subsea infrastructure."

– Steve Hall Head of Partnerships at Seabed 2030.

Key Takeaways:

- The private sector plays a pivotal role in mapping the seafloor, collecting most of the bathymetry data. Seabed 2030 demonstrates that industrial data sharing can scale rapidly when clear contractual terms and mutual incentives are in place.
- Fugro has led the way in in-transit bathymetry processes, supporting Seabed 2030's objectives while benefiting from the required technological advancements, and paving the way for other private companies to adopt similar practices.
- If biodiversity data can follow a similar path, with industries recognizing both the scientific and operational benefits from sharing their data, it could lead to more breakthroughs in understanding and managing marine life.

> "Industry collected bathymetry data and historic ocean data times series allow science to improve ocean models and forecasts, leading to more efficient offshore operations with lower risk of unexpected delays."
>
> – Louis Demargne, Ocean Decade, Corporate Data Group

Part two
Leading examples

Key field highlights showing emerging best practices

Summary

A growing number of companies are demonstrating that sharing extensive ocean data is both feasible and valuable. We showcase the multi-faceted potential of data sharing, providing encouragement toward a new era of openness and cooperation.

In the previous section we highlighted Fugro – a company that pioneered in-transit bathymetry processes helping to advance the goals of GEBCO Seabed 2030 programme, whilst also benefitting from the technology advances required to achieve this and opening the door for other private industry companies to follow suit.

In this section we highlight more companies, with the hope to surface more examples across sectors globally and stimulate all actors to engage. As highlighted, the motivations and pathways for sharing ocean data are diverse, ranging from a commitment to ocean science, to enhancing operational efficiency and meeting regulatory requirements. Often, a combination of different factors drives companies to share their ocean data publicly.

The first example presented here is **Ecowende**, a consortium including Shell, Eneco, and Chubu, which was awarded the right to build an offshore wind park in Hollandse Kust West Site VI in the Netherlands. The Dutch government formally included sustainability as a part of the bidding process, creating an incentive for bidders to submit proposals that would have a positive impact on the ecology and strengthen their bid to win the licence. Ecowende committed to a range of investments, including to openly sharing an unprecedented amount of ecological data. **Key learning:** This example illustrates the mutual benefits of including open data sharing in the context of offshore wind tenders.

The next case focuses on Norway's requirements for oil and gas companies operating on its continental shelf to share geological and biodiversity data and information to public databases. This policy has resulted in companies, including the two largest operators –**Equinor** and **Aker BP** contributing a considerable quantity of geological and biodiversity data to various public repositories, which is available for scientific and business consumption.

Key Learning: Countries can create the conditions for step-changes in the quantity and value of data sharing for ocean industries operating in their territory and enhance data flowing into the global biodiversity repositories like OBIS and GBIF.

Moving beyond good examples of countries requiring data sharing, we are encouraged to see companies that voluntarily pledge to open up their ocean insights for the benefit of a wide landscape of actors.

TGS is an energy data company that recently merged with PGS. More than a decade ago, PGS declared its commitment to voluntarily sharing valuable ocean data, collected in addition to their seismic surveys, as part of their overall sustainability pledges.

Key learning: This example shows the multiple positive impacts of sharing ocean data (in this case, mammal data) for marine life and for improving operations.

We share the work of **TotalEnergies**, **IKM** and **PTTEP** to highlight actions taken by these ocean-impacting actors that demonstrate a commitment to put more of their ocean data into the public domain and to encourage multiple industries co-existing in the same ocean space to all benefit from better ocean insights.

The final example presented in this section is **Aker BioMarine** from the fisheries industry.

Key Learnings: Ships equipped with sensors represent a major opportunity for increasing ocean intelligence at low-cost levels. Regarding fisheries, transparency and collaboration across industry, science, and regulators provides powerful safeguards for keeping fisheries sustainable.

We end this section by highlighting the role and activities of the UK's Crown Estate's, which requires various offshore industries operating in waters above the UK seabed to share data from their projects to the Marine Data Exchange open data repository, which is continuously improving the accessibility and impact of this data.

Key Learning: Countries can significantly advance the creation of valuable shared data resources. Over time, companies participating in this sharing have discovered many ways to derive value from the data.

ECOWENDE

2.1 Pioneering Open Data & Strengthening Competitiveness – Ecowende

CASE

Photo: Ecowende

This case highlights the mutual advantages of incorporating open data sharing in offshore wind tenders.

In the Netherlands, tender criteria to build offshore wind farms include data and knowledge sharing to contribute to industry advancement. The contest for Hollandse Kust West (HKW) site VI included the criterion “contribution to ecology in the North Sea” as a part of the tender, creating an incentive for bidders to submit proposals that stimulate innovation to develop solutions to benefit naturally occurring biodiversity, from both the wind farm at Site VI and future offshore wind farms. Ecowende won with a strong bid with innovative measures combined with data sharing and transparency.

The data shared by Ecowende will come from numerous sensors in its offshore installations and stand-alone surveys, and will be collected during baselining, construction and operations. These sensors monitor a variety of ecological and other oceanic parameters, both above and below the water, such as:

- Bird and bat observations, species, abundance, flux
- Abiotic data
- Fish, bat and songbird telemetry data
- Acoustic data

The data will be made available on HUB Ocean’s Ocean Data Platform and other public repositories such as ICES and EMODnet.

Ecowende is the first offshore wind developer that has committed to data sharing on this scale. Ecowende is contributing to ocean understanding, especially of the species and environmental factors in the North Sea. This data will be available to expert users from science, governments, wind farms and other industries. The data sharing will embrace the scientific FAIR standards (Findable, Accessible, Interoperable and Reusable), which enhances transparency, research efficiency and impact from the data.

Additionally, through sharing its data on the Ocean Data Platform and accessing other public data, Ecowende will be able to create new insights and fill knowledge gaps on the environmental impacts of offshore wind turbines and the effectiveness of their ecological innovations.

> “The platform that HUB Ocean has built, will help Ecowende draw a picture of the data in a wider sense, creating relations between different wind farms and making data more valuable for us and others.”
>
> - Hermione van Zutphen, Ecology Program Manager, Ecowende

> “The value of knowledge increases the moment you share it, because then the value multiplies.”
>
> – Douwe Visser, IT Manager, Ecowende

About Ecowende: Ecowende, a joint venture between Shell, Eneco, and Chubu, aims to set a new ecological standard for wind farms. Their wind farm on Hollandse Kust West (HKW) lot VI, 53 kilometres off the Dutch coast, is expected to be fully operational by end 2026 with strong respect for nature. Ecowende will use innovative features like bird corridors, extended hub heights, and noise mitigation systems to minimize disturbances to marine life and stimulate positive impacts on fish and benthic communities with biodegradable tree reefs and additional holes in the monopiles for fish. The goal is for future wind farms to have a “net positive impact” on the environment.

2.2 Open by Design in Norway - With Insights from Equinor and Aker BP

CASE

This example illustrates how countries can establish conditions that significantly increase both the volume and value of data sharing from ocean industries within their jurisdictions, while also boosting the flow of information into global biodiversity repositories.

As previously noted in this report, Norway is notable for its data sharing requirements for ocean industries. All operators on the Norwegian Continental Shelf, including oil and gas companies, are mandated by Miljødirektoratet /The Norwegian Environment Agency (NEA) to monitor the environmental impacts of their operations, typically every three years. This practice is akin to the UK's approach, where data is shared through the Crown Estate and subsequently integrated into the Marine Data Exchange (See Use Case 2.6 of this section).

Operators are obligated to submit survey data to central repositories. The reports are published, and environmental datapoints are incorporated into the Environmental Monitoring Database (MOD), which is managed by DNV.

The MOD database encompasses approximately 2.8 million species occurrences, along with chemical and geological data collected from areas surrounding oil and gas installations. Norway ensures good data flows beyond that point, with this repository significantly enhancing open databases like GBIF, for example.

Specific data shared by Equinor, Aker BP, and other operators on the Norwegian Continental Shelf includes:

- Metocean data: From specific operational assets is shared publicly via the Norwegian Met Office
- Bathymetry data: Provided for Norwegian assets through MAREANO and other geophysical data through Diskos
- Environmental monitoring data: Decades of data reported to the Norwegian Environmental Agency (NEA), also made available through MOD and GBIF
- Cold water corals and other geophysical data: Data from site-surveys for oil and gas installations through NEA and MAREANO, and Equinor.com
- Equinor's UK operations data: Shared through the Marine Data Exchange

Equinor

Equinor, partly state-owned, has a tradition of sharing data. Its influence and size make it a major contributor to public repositories. Equinor has also taken some additional steps to unlock more data directly for science. In 2018, Equinor released subsurface and production data from a Norwegian Continental Shelf field for research and study purposes. Additionally, Equinor shares data directly through GBIF and is a part of the Ocean Decade Corporate Data Group, with a broad commitment to advancing industrial ocean data sharing.

Aker BP

Aker BP, like Equinor, faces regulatory requirements to share operational data with national repositories. Aker BP is also recognized for its proactive approach in this domain, with a long history of advocating increased industrial data sharing, which they recognize as essential for their E&P operations and their global commitment to reducing their carbon footprint. Aker BP is currently working to realize their strong intention to share historical and real-time metocean data from all their offshore platforms via HUB Ocean's Ocean Data Platform, and thereby ensuring it is FAIR (Findable, Accessible, Interoperable, and Reusable).

> "Collect once, use many times, as most data has value and utility beyond their original purpose"
>
> – Arne Myhrvold, Senior Advisor Sustainability, Equinor

Key Takeaways and Ways Forward

Norway serves as a good example of a government that has contributed in a meaningful way to enabling data sharing and collaboration between industry and academia.

- **Contributions by Equinor and Aker BP:** Both companies have contributed substantial biodiversity and other data, supported by robust regulations, efficient data flows, and strong corporate commitment.
- **Development of the MOD Database:** Equinor and Aker BP have been instrumental contributors to the Norwegian MOD database, which contains a vast array of biodiversity data from industry surveys and environmental monitoring.
- **Key Learning:** Effective regulations and data flows, as seen in Norway, could greatly enhance the availability of data in global biodiversity repositories like OBIS and GBIF if adopted by other countries.

Nonetheless, there remains considerable potential for companies to choose to share much more ocean data and for enhancing the data flows from public repositories in Norway. Therefore, this report not only urges companies to adopt proactive strategies for voluntary data sharing, but also calls on governments to foster a facilitating environment for more data sharing.

About Equinor: Equinor is a multinational energy –primarily oil and gas --company headquartered in Norway with 67% of its shares owned by the Norwegian government. They are the largest supplier of energy to Europe and have a presence in 30 countries worldwide.

About Aker BP: Aker BP is an oil company that explores, develops fields and produces oil and gas on the Norwegian continental shelf. In terms of production, Aker BP is one of the largest independent listed oil companies in Europe.

2.3 Boosting Efficiency & Ocean Science – TGS

CASE

This example highlights the numerous benefits of industrial ocean data for both marine life and operational enhancements.

In Brazil, seismic vessels operating within defined mitigation zones must halt their operations if marine mammals are spotted. Therefore, understanding marine mammal movements inside these zones can minimize potential operational downtimes, reduce emissions from the vessels, and ensure compliance with environmental standards. TGS, which has operations along Brazil's coastline, partnered with HUB Ocean in February 2024 to mitigate negative impacts on marine life, advance scientific understanding, and improve operations.

TGS has voluntarily shared a wealth of data accumulated over the past the past fifteen years (from 2008 and 2023), including:

- Sightings of marine mammals and turtles,
- CTD profiles (e.g. temperature and salinity)
- Ocean current measurements at various depths (5, 15, 20m)

HUB Ocean helped TGS transform its data according to the FAIR standard, create metadata, standardize unstructured data and publish it on the Ocean Data Platform. This transformation enabled TGS to better understand its data, leverage it for further research, and unlock new opportunities.

TGS can integrate marine biota data with additional oceanographic data collected off the Brazilian coast. By combining these datasets, TGS will improve its understanding of marine mammal distribution patterns and enhance its operational models. These enhanced models will allow TGS to plan for efficient routes, reducing CO2 emissions, underwater noise and operational costs.

The data shared by TGS also provides valuable insights to support ocean science and is already being used by the scientific community. As the **Figure 7** shows, the private sector data from TGS significantly complements the public data in OBIS.

> "This collaborative effort has the potential to significantly enhance our models in the future, as the more data we have, the broader our understanding can be."
>
> – Laura Viana, Environmental Manager, TGS

> "We hope to inspire other companies to get involved in sharing data to support SDG14. Contributing to SDG 14 Life below water, is one of TGS' six key SDG goals, which our offshore crew is very proud of. The Ocean is our working environment and taking care of it is not only a priority, but our way to contribute to sustainable seas"
>
> – Sandy Spørck former SVP Sustainability and Quality in TGS.

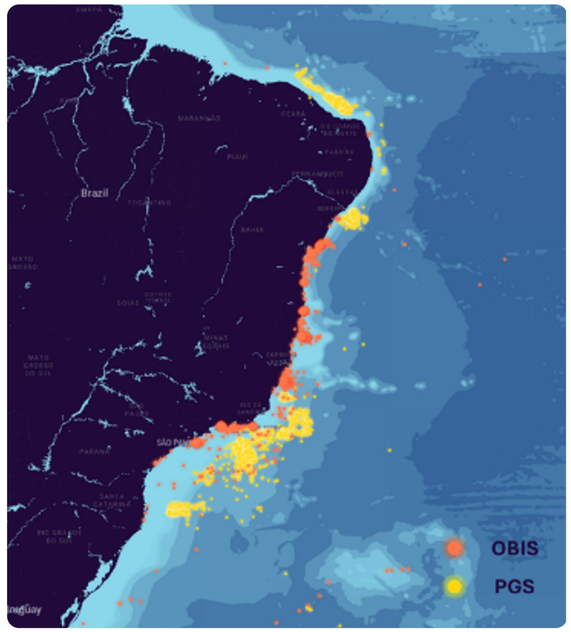


Figure 7. TGS mammal data complements and fills data gaps in OBIS

About TGS: TGS, a provider of advanced data and intelligence to the energy sector, merged with PGS in 2024 to form the new TGS entity. TGS has been an advocate for marine conservation, aligning with the UN Sustainable Development Goal 14 (Life Below Water) since 2013. Through their oceanic activities, TGS has been collecting and sharing marine data with several key ocean data repositories, including the Institute for Marine Research (IMR), SF Harvest, and Seabed 2030.

2.4 Advancing Ocean Data Transparency –TotalEnergies, IKM and PTTEP

CASE

We turn now to the actions taken by ocean impacting actors that demonstrate a commitment to, voluntarily, bring more of their ocean data into the public domain.

TotalEnergies

TotalEnergies, like Equinor, is also a part of the Ocean Decade Corporate Data Group. Recently, they have made commitments and taken encouraging steps towards biodiversity protection with data sharing being a key focus[21].

TotalEnergies shares a wide range of ocean data collected through various means such as satellite observations, in-situ sensors, and operational monitoring and surveys, including:

- Ocean biodiversity records
- Water quality measurements
- Meteorological data
- Data on currents and temperatures

TotalEnergies' biodiversity data is made publicly available through dedicated online platforms and databases, such as the Global Biodiversity Information Facility (GBIF). They ensure that the data is easily accessible to researchers, policymakers, and the public by providing user-friendly interfaces and comprehensive metadata.

The data can be used for a variety of purposes, including scientific research, environmental monitoring, policy-making, and educational projects. To ensure the data is utilized, TotalEnergies actively engages with the scientific community and other stakeholders to promote interest in this data. They also track the usage of their data through citations and partnerships to measure its impact.

IKM

IKM Group provides a wide range of services to the energy sector, including ROV inspections of offshore facilities. IKM responded to the need championed by HUB Ocean as a member of UNESCO-IOC's Corporate Data Group to help answer a specific request from scientists to unlock more sources of industry data from deeper in the water column, such as temperature, sound and current velocity.

Opportunities for regular data capture far beneath the surface are rarer and more expensive than at the surface, where vessels and satellites can help to fill gaps. Therefore, data from the sub-surface can be a valuable input to calibrate and improve the accuracy of physical ocean models. These models have a wide variety of use cases, from engineering safe and resilient offshore infrastructure to understanding the patterns of water circulation.

For service companies like IKM, data-sharing is subject to the permission of the contract-giver, for example the operator of the infrastructure they are monitoring, which can be a barrier. However, IKM successfully negotiated this to share data from the North Sea, over the Ocean Data Platform, with the potential to scale this to other contracts and locations in the future.

PTTEP

PTT Exploration and Production Public Company Limited (PTTEP) is Thailand's national energy company. PTTEP's Ocean for Life strategy leverages its offshore operations and technological capabilities to conserve and rehabilitate marine resources. In collaboration with partners, they developed the PTTEP Ocean Data Platform to provide access to critical marine science data, addressing information gaps relevant for multiple private and public actors in the Gulf of Thailand.

The types of data and information shared include:

- Meteorological and Oceanographic Data: Includes air temperature, humidity, atmospheric pressure, wind speed and direction, ocean currents, water level, seawater temperature, turbidity, dissolved oxygen, salinity, conductivity, and Chlorophyll A. Collected via offshore platforms, telemetry stations and ocean current mapping.

- Microplastic and Biodiversity Data: Includes underwater camera and AI for aquatic animal identification beneath PTTEP's offshore petroleum platforms, microplastics monitoring, blue carbon feasibility studies, coral bleaching and biodiversity monitoring.

- Coastal Community Development Information: Focuses on ocean waste management, coastal conservation, fish homes, and sea product development.

Value and Impact Creation:

PTTEP's Data Platform allows users to efficiently utilize data, fostering sustainable ocean conservation and offering several other benefits, including:

Seawater Level Variation Monitoring – an application developed in collaboration with the Hydro-Informatics Institute (HII), that uses meteorological data and water levels from natural water banks and offshore petroleum platforms. This app provides timely notifications of seawater level situations to pilot communities nearshore.

Microplastic Database Integration – using offshore petroleum platforms as sampling sites to collect seawater samples for microplastic level analysis, identifying types and origins. This data will improve Thailand's microplastic baseline, especially from offshore areas, enhancing ocean waste management.

Mathematical Model Calibration – the movement of buoys in the Gulf of Thailand is compared with water circulation patterns using models developed by Kasetsart University, to improve mathematical and hydrodynamic models.

About Total Energies: TotalEnergies is a global integrated energy company headquartered in France that produces and markets a variety of energies, including oil, biofuels, natural gas, green gases, renewables, and electricity. Their ambition is to be a world-class player in leading the energy transition and achieving carbon neutrality by 2050.

About IKM: IKM Group is a Norwegian industrial company that provides a range of engineering, construction, and service solutions, primarily for the oil, gas, and energy sectors. The group operates globally and offers expertise in subsea services, maintenance, engineering, and testing. IKM Group currently employs approximately 3,500 employees. The group subsidiary, IKM Subsea, is a specialist ROV and subsea operator carrying out operations globally.

About PTTEP: PTT Exploration and Production Public Company Limited (PTTEP) is Thailand's national energy company engaged in petroleum exploration and production, renewable energy, new forms of energy and advanced technology with a focus on sustainability and reducing greenhouse gas emissions. PTTEP's E&P operations span 10 countries, with major activities in Thailand, Malaysia, and Myanmar.

> "By tracking the citations, we understand that shared data has been instrumental in several research projects that could lead to significant scientific discoveries, such as new insights into marine ecosystems and climate change impacts."
>
> – Laurent Cazes Assistance to Operations – Delegate Environment – Social Projects, Biodiversity and Ocean, TotalEnergies.

Picture 1. Photo of Telemetry Marine Monitoring System

AKER BIOMARINE

2.5 Uniting to Sustain Ocean Ecosystems

CASE

mauinow1 from Getty Images Signature

Aker BioMarine, representing the fishing industry, recognizes that effective management of marine resources necessitates transparency and cooperation among industry stakeholders, scientists, and regulatory bodies.

Aker BioMarine

Antarctic krill is an integral species in the Southern Ocean, fuelling a web of marine life and driving biogeochemical cycles in the Southern Ocean. Beyond environmental benefits, krill is also rich in Omega-3 fatty acids sought for supplements and aquaculture feeds. Krill is thus harvested by the fishing industry. Aker BioMarine recognized the value of opening their data to enable a 3-way partnership with regulators and scientists to foster sustainability and best practices. To manage the complexities and maximize the value of this data, Aker BioMarine partnered with HUB Ocean through the Ocean Data Platform.

Aker BioMarine which operates fishing vessels equipped with echosounder devices, shared 10 years (over 170,000 files) of acoustic krill data. The data is made available on HUB Ocean's Ocean Data Platform where HUB Ocean transformed the data according to the FAIR standard in collaboration with scientific users.

Sharing this data openly with regulators and scientists allows for a transparent, data-driven approach to appropriately regulating the catch of this vital species. Further, they benefit from improved data processing and analysis as well as enhanced and transformed datasets that enable them to run their catch operations more effectively and sustainably.

The acoustic data helps scientists to see the krill swarms, their distribution patterns, migration pattern dynamics and even predator behaviour. Combining with other data that describe physical and chemical properties of seawater in the area, scientists study how climate change alters the ecosystem's health. The processed data will further be used for other exciting studies of the ecosystem in the Southern Ocean.

Recently, the data helped create KRILLSCAN, an open-source automated software that processes echosounder data to rapidly and transparently analyse backscatter data for target biomass calculation[i]. Researchers are also looking at the feeding behaviour of marine mammals and penguins in the area, and constructing an ecosystem model to predict future dependencies of ecosystem elements and climate change.

About Aker BioMarine: Aker BioMarine is a leading supplier of krill-derived products for the consumer health, wellness, and animal nutrition markets. As a biotech innovator, the company emphasizes the sustainable harvest of krill, operating within fully traceable supply chains. Aker BioMarine was the first krill company to earn Marine Stewardship Council (MSC) certification, reflecting its commitment to both human and planetary health.

In September 2024, Aker BioMarine finalized the sale of its Feed Ingredients business to American Industrial Partners (AIP).

Following the transaction, Aker BioMarine is a focused human health and nutrition company consisting of three business units:

1. Human Health Ingredients
2. Consumer Health Ingredients
3. Emerging Businesses.

"Antarctica is classified as a data poor area. To have the role we have, to be a harvester in Antarctica, you need to compensate for all the data that science is lacking. Industry has a major role to play there. It's important to share data because that's about conservation leadership on the ocean.

For us as an industry, it is fundamental to make sure that we have a sustainable activity that goes well into the future. And quite frankly, if you don't have the data, you can't prove your sustainability."

– Pål Skogrand, VP Policy and Impact
Aker BioMarine Antarctic AS

2.6 The Crown Estate – Safeguarding the Ocean

CASE

The Crown Estate's data-sharing clause is a pioneering approach that not only benefits offshore industries but also supports environmental research and global efforts to combat climate change and biodiversity loss. Through the Marine Data Exchange (MDE), valuable marine data is made accessible to a wide range of stakeholders, driving innovation and informed decision-making in the offshore sector. Over time, companies involved in data sharing have found numerous ways to benefit from it.

Background: The Crown Estate manages the seabed around England, Wales and Northern Ireland. It is responsible for leasing the seabed for offshore wind, wave and tidal energy, telecoms and interconnector cables, mineral resource extraction areas and carbon storage projects. These leases contain a 'data clause' which requires that all data collected from these offshore projects be shared with The Crown Estate. The data is delivered to the Marine Data Exchange (MDE), the Crown Estate's world leading marine data sharing platform. As of this year, Crown Estate Scotland have joined the collaboration, extending the MDE's reach to cover Scottish waters.

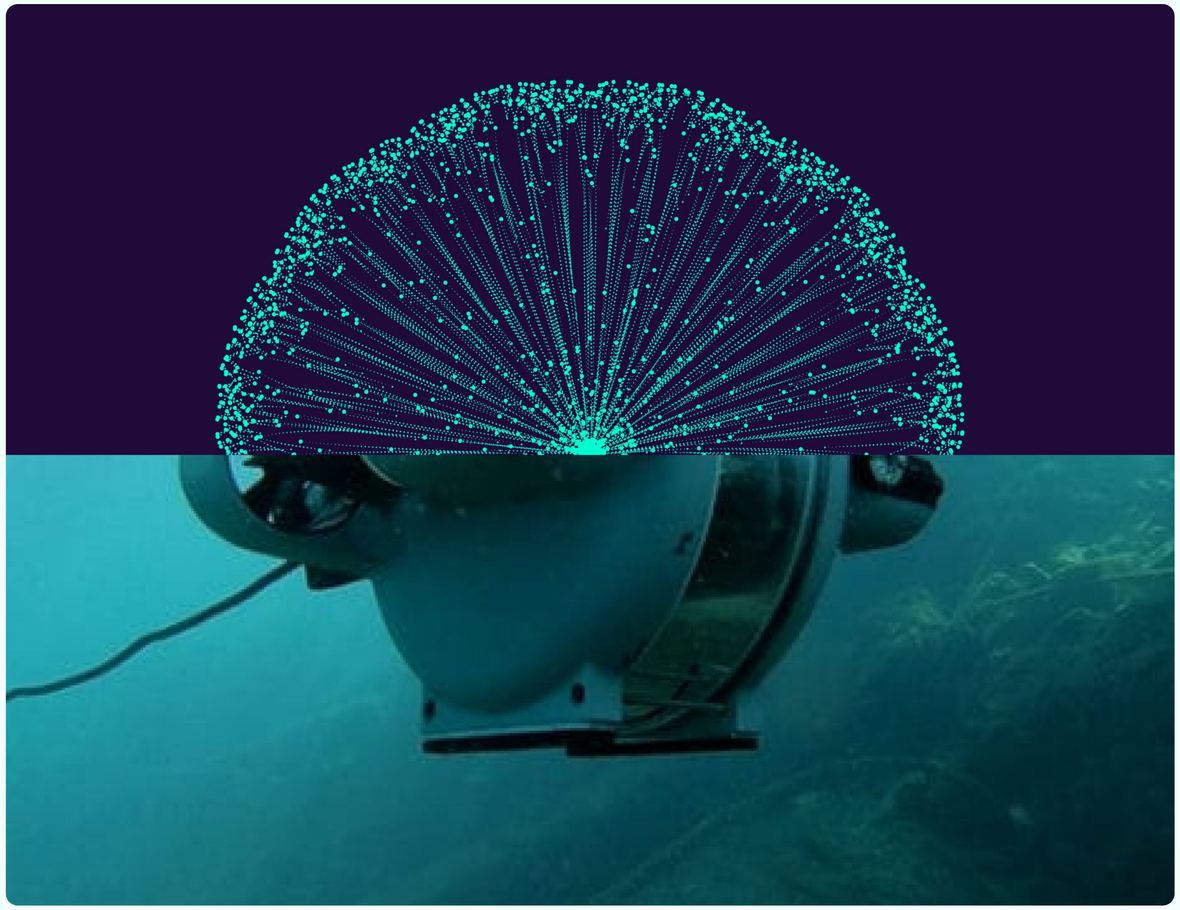
Origins and Evolution: The data clause was introduced during the UK's first offshore wind projects to safeguard valuable survey data in the event of project cancellations or denials of consent. This data was then utilised in early offshore wind research programs, providing valuable evidence around their environmental impact and was subsequently made available via the MDE from 2013. Since then, the MDE has provided a platform for sharing this data, ensuring that it contributes to broader research and development efforts, leading to the data clause being applied to wave and tidal energy, aggregates, cable and carbon storage leases.

Enforcement and Industry Compliance: The data clause is a binding contractual agreement between developers and The Crown Estate. A dedicated team ensures compliance, working closely with offshore developers to facilitate the smooth delivery of data to the MDE. The Crown Estate has implemented the data and metadata standards produced by the UK's Marine Environmental Data and Information Network (MEDIN), as well as streamlining the data delivery process, innovating around data delivery methods and metadata creation to make compliance as straightforward as possible for developers.

Public Accessibility and Use of Shared Data: Once data passes through confidentiality gateways, it is made publicly available on the MDE without barriers or costs. The Crown Estate is committed to ensuring that the data is FAIR (Findable, Accessible, Interoperable, and Reusable). The MDE is committed to improving the findability and accessibility of the data, along with ongoing efforts to enhance interoperability and reusability.

The shared data has been used in various ways, from increasing confidence in offshore project development to reducing the need for new surveys, supporting consent applications, contributing to environmental baseline projects, and being utilized in academic research. Notable use cases include the POSEIDON project, which is building a nationwide environmental baseline, and the Joint Cetacean Data Program, which uses marine mammal data to create standardized databases for novel analyses. Also, valuable bathymetry datasets have been made available via EMODnet –providing insight into a previously poorly mapped area.

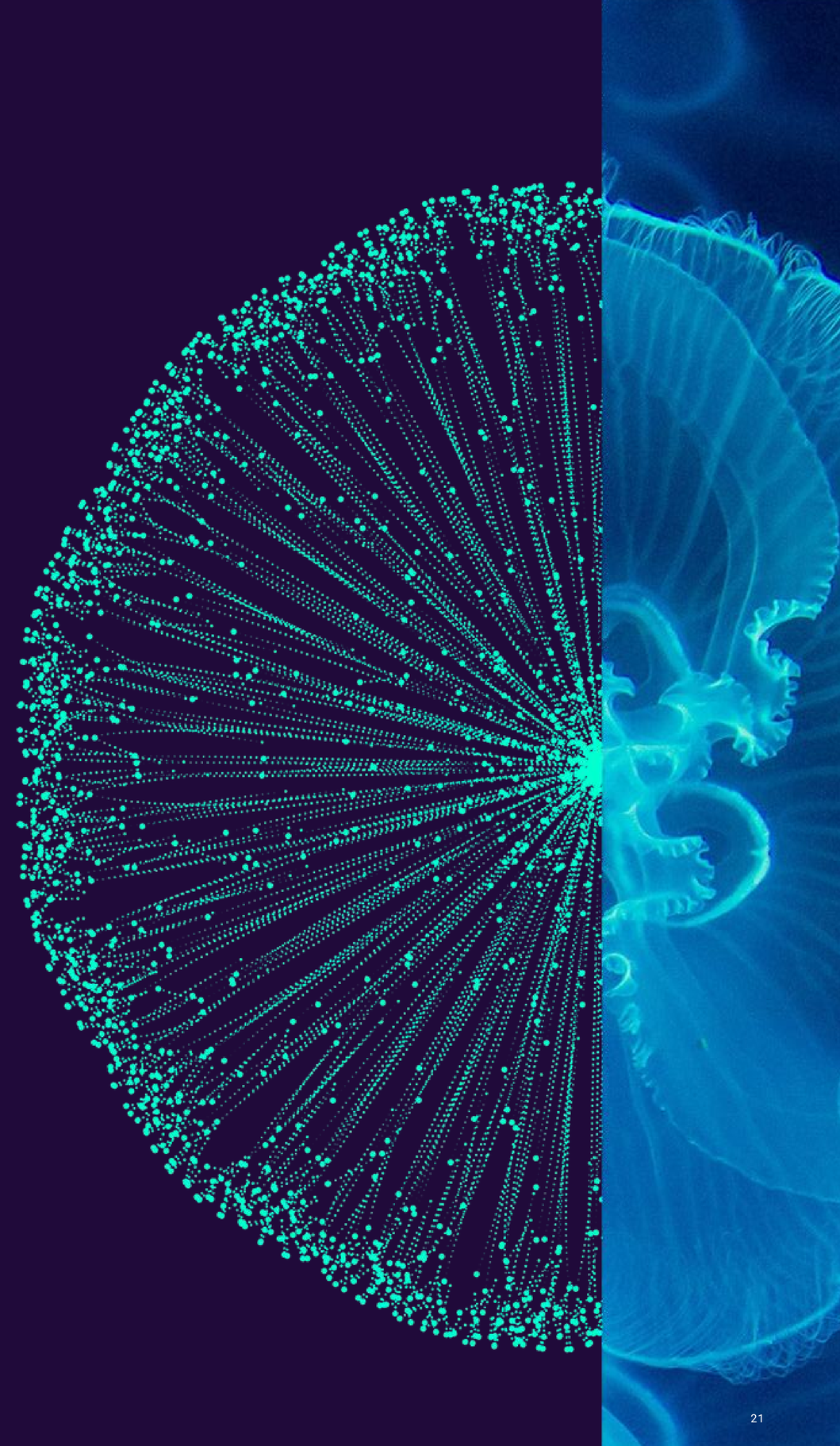
Global Influence and Future Prospects: The Crown Estate's data clause model has attracted international interest from countries including the US, Australia, Norway, and India. The initiative is seen as a potential model for similar regulations elsewhere.



Part three

Industrial ocean data sharing challenges

This summary was developed based on input HUB Ocean received through engaging various companies to share their ocean data since our inception in 2019. We believe it is important for companies to know what to expect when it comes to publicly sharing their ocean data - and we emphasize that many of these challenges can be overcome.



Summary

photo: mauinow1 from Getty Images Signature

3.1 Fear of liabilities and losing a competitive edge

- Many companies may hesitate to share ocean data out of concern that it might give competitors valuable insights into key research areas or influence strategic decisions and profitability.
- There is also the concern that data might be misinterpreted or highlight issues that could reflect poorly on the company, potentially damaging its reputation and exposing it to liability. For specific data sets that may be challenging to share in their original form, companies can often choose to share data in another form that is more risk-appropriate – for example time delayed, lower resolution, or jointly through industry association initiatives etc.

3. 2 Data management and ownership concerns

- In many companies, data is frequently siloed and may not be accessible internally across different parts of the organization. Some companies struggle with insufficient internal capacity to handle data effectively, or they perceive the investment in resources required to curate and share data to be too costly, and the incentive to be too weak. As a result, they have trouble gaining enough of an overview to take smart decisions regarding who can access their data.
- Determining ownership for datasets, sensitivities associated with sharing the data, and identifying decision-makers for opening data, are all non-trivial issues for organizations wishing to thoughtfully share more data. Conflicting internal interests may further complicate the decision-making process. For example, from an ESG perspective, sharing ocean data could enhance the company's reputation and commitment to sustainability, while legal teams may express concerns about the risks of misuse.
- Another very common impediment is unclear data ownership and sharing agreements, especially if organizations were sub-contracted to collect information. This can further complicate the sharing process, as ownership may lie with different parties with unclear terms, making it difficult to navigate the legal and logistical aspects of data sharing. That is why we advocate clear data sharing clauses between companies, to know who is allowed to share what, where and when.

3.3 Issues related to regulations and compliance

- Companies sometimes feel a lack of control once their data exists outside of the organization. This point is deeply tied to management and ownership issues, and can therefore be resolved through a better understanding of which data is safe to share.
- Sometimes data collected is connected to national security and companies require government approval if the data is collected inside an Exclusive Economic Zone (EEZ). To overcome this challenge, it is possible to share aggregated data or data at lower resolutions.

3.4 Harmonization and interoperability

- Companies can find it challenging to discern the appropriate ways to share their data. A myriad of standards and frameworks make it difficult to know where to start.
- Companies want to spend as little time and resources as possible to share the data, so we must find ways to demystify data sharing processes and work together with national governments to establish simple pathways for data sharing, while aligning with standardization initiatives driven by the Ocean Decade.
- The existence of standards, including for interoperability of data and metadata, will be crucial. Promising initiatives like the Crown Estate's data sharing clause, as well as the Ocean Decade's Data and Information Strategy, are powerful steps in the right direction.

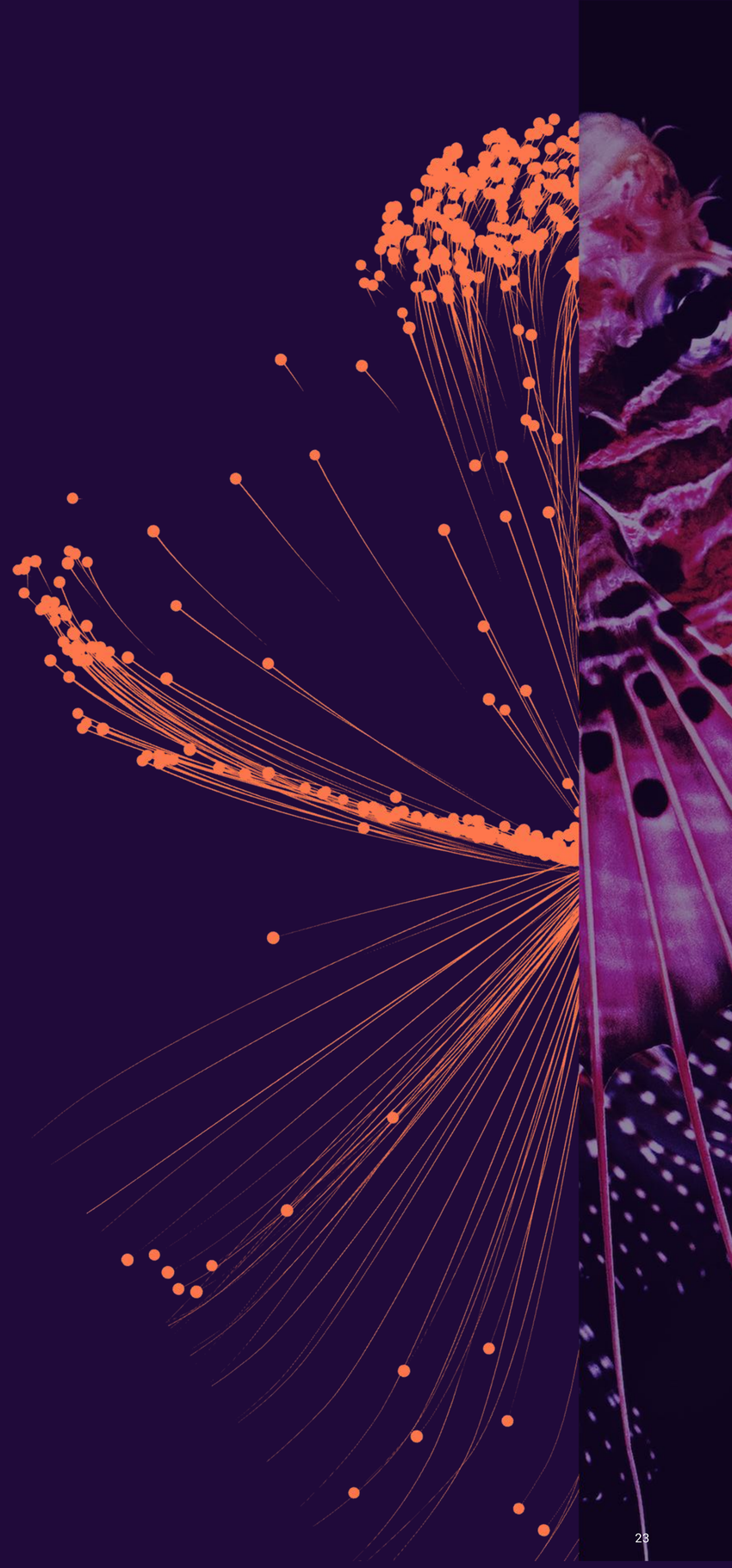
3.5 Lack of clarity around the data requested and the user

- The "ask" from science may be unclear. Asking for all ocean biodiversity data without being specific can make it difficult for companies to know how to engage and what to share. That is why it is important for the scientific community to clearly define to companies what data is useful to them to fuel their ocean biodiversity models.
- The use cases and users may also not be clear to the company, for example which scientific disciplines will work with the data to solve which challenges.

> "While there may be initial skepticism regarding the potential risks of data sharing, such as concerns about data misuse or competitive disadvantage, these concerns can be largely mitigated through robust data governance frameworks and clear data-sharing agreements."
>
> – Laurent Cazes Assistance to Operations – Delegate Environment – Social Projects, Biodiversity and Ocean

Part four

Recommendations for companies to begin sharing ocean data



4.1 Actionable Steps for Companies Starting their Data Sharing Efforts

We present recommendations for companies embarking on their data sharing initiatives. These suggestions are based on HUB Ocean's own experience, learnings from our partnership with the legal firm BAHR, and are also consistent with the Ocean Decade Corporate Data Group's call to action.

4.1.1 Gaining Control Over Data and Appointing Data Stewards

- **Appoint an Internal Champion:** The data sharing journey requires commitment and action from various internal stakeholders. Therefore, we recommended that companies appoint an internal champion to ensure accountability, efficiency and desired outcomes.

- **Know the Data:** The journey starts with an inventory of the data held by the organization within a specific domain, such as biodiversity or bathymetry. Many companies have not yet completed this step. It is a fundamental first step to empower data managers to create a map of the data detailing where each data asset is stored and how they interconnect.

- **Establish insight on Ownership:** Beyond understanding what data exists, it is essential to determine what is owned and controlled. Identifying datasets –whether linked to specific geographies, time frames, projects, or clients –that are legally and financially safe to share with the public is necessary. For data that may be jointly owned or subject to sharing agreements, mapping out these details can reveal actions to gain consent to share and reduce many of the risks and uncertainties associated with sharing sensitive data. It is also worth repeating that data can often be converted into alternative formats – like lower resolution or more aggregated forms to address security and/or competition concerns.

4.1.2 Creating a Thoughtful Decision Process

- **Choose What to Share:** It is time to move away from the "all or nothing" approach. A thoughtful decision-process, balancing rewards against risk is advisable. At the same time, we advocate an approach that deliberately "pushes the boundaries", as we have ample evidence that when companies recognize upcoming requirements and increasing expectations to share, that they can and should make decisions to share more.

- **Set the Terms:** Publicly sharing data does not mean relinquishing control. Specifying licenses or terms of use, such as those commonly used in Creative Commons models, sets boundaries for how data is used, while contributing to the greater good.

4.1.3 Ensuring Discoverability and Interoperability: An Imperative for Impact

- **Go FAIR and Align (meta) Data with Global Standards:** After determining what data is available and shareable, adopting the globally recognized FAIR principles (Findable, Accessible, Interoperable, and Reusable) should be the next step. Companies should also align their data and metadata with the international standards for sharing ocean data. Aligning data with these principles and standards ensures that shared data is visible, actionable, valuable, and ready for collaboration. Companies can find partners to help with the data preparation and management. Specialized organizations like HUB Ocean, for example, help companies transform their data according to the FAIR standard.

- **Share with Public Repositories:** Data is most useful when it is shared to existing public repositories. Major platforms like the Global Biodiversity Information Facility (GBIF) and the Ocean Biodiversity Information System (OBIS) are key players in collecting and aggregating biodiversity data. They accept data from all biodiversity data providers, with some predetermined requirements. For OBIS, familiarizing oneself with the OBIS manual and the five steps of data preparation is essential to streamline submissions and ensure data meets global standards. Other examples of data-sharing platforms include repositories like Seabed 2030, EMODnet, and the World Ocean Database. Additionally, data intermediaries like HUB Ocean also host data and ensure it is interoperable and flowing with major repositories.

- **Additional Resources:** The Decade Coordination Office for Ocean Data Sharing has developed a data-sharing toolkit that highlights major repositories. Another valuable resource for understanding the repositories that exist is the navigation from the Species Monitories Specialists Group.

4.1.4 Collaborate Strategically, and Scale Impact

- **Test and Scale:** Most companies entering this space of publicly sharing their ocean data are in the early stages, exploring without any defined roadmap. The learning process is hands-on, with each company forging its own path. Setting a bold target to share data in the near term, starting with straightforward use cases primarily focused on contributing to scientific knowledge, is recommended. Beginning small, by sharing only a portion of ocean biodiversity and environmental data, such as some observations or data from specific locations, can be a good starting point.

- **Choose Strategic Collaborations for Impact:** Collaboration is crucial for scaling impact. Partnering with organizations that aim to amplify success can establish a company as a frontrunner and thought leader. Joining forums that intersect science and industry can be extremely valuable. Engagement in these forums places companies at the forefront of meaningful innovation (See Box 1).

- **Communicate Success to the World:** To gain recognition for these important efforts, clearly communicate what data you have shared. This communication not only helps scientists know where to find the data, but also helps companies understand how it is being used. This communication can also encourage other companies to share more data and create new insights and opportunities.

4.1.5 Open by Design

- **"Open by Design":** Our analysis reveals a significant change in the industrial footprint from 2017 to today, with expectations of an even more dramatic increase in the coming decades. However, this growth has not been matched by a corresponding increase in data sharing from the private sector. "Open by Design" represents the transformative approach and powerful paradigm shift that we advocate.

Both established and emerging industries have the opportunity to make data sharing the new standard, setting a precedent that benefits both industry and the environment. Renewable offshore development, grid infrastructure, new aquaculture investments and vessels being retrofitted or newly built – are particularly well-suited for these initiatives, as many new projects will enter the design and build phase in the next decade.

Additional Resources:

To help companies remain informed, the Ocean Decade's toolkit will feature recommendations for industrial ocean data sharing. Additionally, its Corporate Data Group is formulating specific guidelines, such as those for bathymetry and biodiversity data, to assist companies in understanding how to share their data effectively.

Links to relevant multi-stakeholder initiatives

The Ocean Decade Corporate Data Group: Ocean Decade Corporate Data Group

The Ocean Data Action Coalition: The Ocean Data Action Coalition — HUB Ocean | Dedicated to Unlocking Ocean Data

The Ocean 1000 Dialogues: Home > Ocean 100 Dialogues | World Economic Forum (weforum.org)

The UN Global Compact's Ocean Stewardship Coalition: Ocean Stewardship Coalition | UN Global Compact

GOOS' Dialogues with Industry: Dialogues with Industry – Global Ocean Observing System (goosocean.org)

4.2 The Role of the Public Sector

As mentioned throughout this report, the availability of ocean data from the private sector also has implications for the public sector, policymakers, and the scientific community. This is a larger topic that deserves its own report, so here we refer to the Ocean Decade Corporate Data Group's call to action.

For research institutions and academia, there is a need to clearly define and communicate their priority ocean data requirements, such that industry and those working to support data sharing can better deliver to the need. Additionally, we see the need for increased funding and resources allocated to managing and sharing data. Establishing comprehensive data management and sharing plans is essential, and institutions should ensure that data and metadata are published and made accessible in a timely manner.

National government authorities are encouraged to identify and articulate their ocean data and information needs, particularly in ways that support both national and multilateral interests. Clear mechanisms should be established to authorize the sharing of ocean data collected within Exclusive Economic Zones (EEZs). Governments should also focus on connecting existing national ocean data repositories and further seeking to ensure national data flows to major international public data repositories, ensuring that these resources are visible, accessible, and used effectively.

4.2 HUB Ocean's Role

HUB Ocean is an independent non-profit foundation dedicated to changing the fate of our ocean by unlocking the power of data, technology and collaboration. At its core, HUB Ocean is building the Ocean Data Platform and a wealth of data products to advance both ocean health and wealth.

By partnering with scientific organizations, governments and industry leaders, HUB Ocean aims to unify the fragmented landscape of ocean data and bridge significant data gaps to accelerate ocean-friendly action-taking in all sectors.

At HUB Ocean, we serve as a pivotal connection point for ocean data. We assist organizations in aligning their ocean data with the FAIR principles (Findable, Accessible, Interoperable, and Reusable) and ensure it is appropriately housed. This may involve hosting data on our Ocean Data Platform or directing it to other suitable repositories.

Conclusion

Our ocean is in deep trouble, and the crisis in ocean biodiversity is particularly dire. We urgently need a new approach to industrial growth and usage of ocean resources. To steer decisions across governments and science, we need high quality, fit-for-purpose, scientifically based data that is FAIR (Findable, Accessible, Interoperable, and Reusable).

Examining the state of data that we have collected and made available for use today leads to the unhappy conclusion that – despite the high and intensifying industrial activity on our ocean – industry is not contributing significantly to the body of knowledge needed for a sustainable ocean economy. We have found that in the largest data repositories, only about 3% of the ocean biodiversity data comes from the private sector. This must change.

With mounting pressures on our ocean, the urgency for transparency in human activities and the need for more comprehensive data about the ocean has never been more critical. As this report highlights, there is a unique opportunity today to revolutionize our approach – to "Open by Design". This is especially true for those industries, like offshore wind, that will significantly scale up to support the green transition.

Thankfully, there is growing awareness and momentum pushing for change. Driven by many advocates of the Ocean Decade and the Ocean Panel and fuelled by organizations like HUB Ocean, the UN Corporate Data Group, and many other groups, ocean data sharing from industry is rising higher on the global agenda.

And we have a growing number of companies that demonstrate that sharing much more ocean data is doable, and moreover, valuable. We are seeing them emerge from all different ocean-related sectors with a willingness to improve the ocean, but also sometimes finding value that benefits them as well.

Encouraged onward by these forward-leaning examples, we describe barriers that they and others commonly face and offer concrete solutions to engender progress. We are buoyed by the positive action of a growing number of actors and see the surrounding environment increasingly aware and moving in the right direction.

The time for action is now. The ocean needs us urgently to help it continue to function as the single most important ecosystem on Earth. Industry must step up and unlock the wealth of ocean biodiversity data at its disposal.

APPENDIX 1: Methodology for data analysis

This appendix provides a more detailed description of the analysis process used in Part 1: Analysis –The current state of ocean biodiversity data sharing in industry. The definition used for this report was to classify data as "private" if coming from private for-profit companies. The intention is to understand the contribution of data resulting from profit-generating (typically industrial) activities.

Why is a methodology necessary?

Leading ocean data repositories typically identify the datasets and datapoints with a variety of rich metadata to allow consumers to understand the data and utilize it correctly and efficiently. This includes a description of the data source, and which organizations are responsible for publishing the data. However, it is not common practice to explicitly label anything that could help us discriminate between public and private sector sources, in the manner we need.

How and why did we design this approach?

It became quickly apparent that it would not be feasible to make meaningful conclusions about industry data sharing based on the fragmented and highly diverse range of ways industry data has historically been made available. There are numerous one-off initiatives, data releases on websites, often requiring signed agreements, each with different topics, contents, formats. This data would need to be standardized and then compared against some reasonably equivalent public set of data.

We therefore concluded the most robust comparison to make is to analyse the largest, global, best-known repositories in various fields and identify how much private data has flowed into these aggregators. We tested the feasibility with several of the these, and finally decided that the best approach to give meaningful results was to focus on biodiversity and two stand-out aggregators – GBIF and OBIS. Other options considered included the World Ocean Database (WOD), the "world's largest collection of uniformly formatted, quality controlled, publicly available ocean profile data", managed by NOAA. However, the WOD, like many other databases, lacks the meta-data necessary to identify the original source of data.

Very often these databases aggregate data from other aggregators, such as National Oceanographic Data Centres (NODCs) and Global Data Assembly Centres (G-DACs), so the first aggregation may have included some industry data, but by the time it reaches WOD this information about lineage is no longer accessible.

The methodology

GBIF (Global Biodiversity Information Facility) has previously investigated the main private sector contributions to GBIF[17]. This resulted in a list of the companies and datasets that contribute the most datapoints to GBIF. As a baseline and comparative reference to OBIS, we used their independent categorization. However, as GBIF covers both land and ocean, this would not be directly comparable.

We therefore took the additional step of restricting the classification to only the ocean. To achieve this, we needed to filter out all land-based points. We found no single classification that with 100% reliability categorizes GBIF data into land/ocean, however a combination of removing datapoints with a defined "Continent", followed by some spatial filtering and quality controls (removing points without geometry, and many void geometries e.g. 0,0) returned a good representation of just the ocean data on GBIF.

By utilising GBIF's list of private companies we could classify these GBIF ocean data points into private sector or not, and hence determine which fraction of the total ocean data was coming from the private sector.

OBIS (Ocean Biodiversity Information System) required more independent derivation to estimate the equivalent percentage that we got from GBIF. The first step was to extract a list of all datasets on OBIS and all the organizations listed as 'Data providers' to these datasets. With this list of organizations, we could begin to classify if they were private-sector (for-profit) or not. This required several iterations using different approaches:

1. Ocean Expert. Roughly a quarter of OBIS dataset providers have an Ocean Expert registration, in which the company self-defines their type, for example whether they are a "Governmental", "Private commercial" or "Private non-profit" organization, which was directly mapped to our classification.

2. Keyword. Non-classified organizations then went to a keyword search in which a curated dictionary of keywords was linked to certain outcomes. For example: "University" would not classify as private, but a variety of legal abbreviations that indicate businesses in different countries, e.g. "Ltd., LLC, AS, GmbH, S.A." would be private sector.

3. Retrieval Augmented Generation (RAG). The third step uses search engine results for the name of the organization and the top five results as context for a generative AI model (RAG) classification process.

4. Manual. For the few remaining organisations, a manual assigned was used, based on human interpretation of search engine results.

For each method and for the results, random samples were checked manually for their accuracy and reliability.

Having created this robust classification of OBIS "Data Provider" organizations, the next step was classifying individual datasets. As datasets can have many contributors, this required a definition of when to attribute a dataset as private sector sourced or not. Our basic assumption was to classify any datasets as such that had at least one organisation from the private sector.

This allowed us to create a table of all OBIS datasets by number of datapoints, the contributors, how many of these are classified as private, and therefore whether we define the dataset as private sector or not.
We carried out a manual verification at this step, focused on the largest datasets that were at this stage defined as being from the private sector. In general, whilst there are some grey areas in the definition, the classification appeared to be robust and working as expected. There was one highly significant outlier. This was the eighth largest dataset on OBIS, with 15 data providers, only one of which was classified as a private company (H.T. Harvey & Associates, an ecology consultancy). The remaining 14 providers were clearly research institutions and universities and the goal of the data collection had apparently no link to private sector activity. We chose to re-assign this dataset to be "public" rather than private. The manual checks of the remaining dataset classifications appeared robust

With this classification there were several derivative analyses: Global geo-spatial binning – this used the H3 geospatial index developed by Uber to bin the count of OBIS datapoints (both total and the private-sector sub-total) into H3 hexagons. This facilitates the geospatial visualizations of data distribution in equal area bins across the globe.

- Regional classification – to make some regional summaries of the state of sharing by different sovereign countries, the global geo-spatial binning was also classified into which Exclusive Economic Zone (EEZ) the data points belong too. The source for this data was the Marine Regions data, referenced below.

- Temporal classification – binning based on the year of the occurrence. This required filtering out data points without a valid timestamp, which was approximately 4% of OBIS entries.

- Type of private-sector industry – a sub classification of the private companies into which sector they come from.

These analyses are the basis for the figures and tables in the report. In addition to this data, multiple data sources were used for contextualization in some of the figures. For the correlation between data shared and human assets we leveraged universal identifications of human assets utilizing satellite techniques to identify fixed assets. This avoids issues with a huge variation in the quality of publicly available information in different regions and provides a consistent global picture. The sources used were Global Fishing Watch and Global Renewables Watch as referenced below. The Global Fishing Watch has time-based identifications, which allows snapshots from today and from previous periods back to 2017.

For the future views on the industrial footprint in the Northern European region, we used aggregated data from EMODnet supplemented with some country specific datasets. These exact areas covered in the visualization will not necessarily all be utilised, however the areas shown are representative of potential areas. For the countries involved to deliver on their ambitious targets of total GW from offshore wind in the future, the magnitude of the area visualized will need to be covered by offshore wind farms.

Data sources

GBIF.org (08 August 2024) GBIF Occurrence Download https://doi.org/10.15468/dl.m6kccj

OBIS (2024) Ocean Biodiversity Information System. Intergovernmental Oceanographic Commission of UNESCO. https://obis.org. Accessed on 08 August 2024 via "Full OBIS export 2024-07-23" parquet file from https://obis.org/data/access/)

Global Fishing Watch (2024) Fixed infrastructure detections from Sentinel-1 and Sentinel-2. Accessed on 14 August 2024 via "sar_fixed_infrastructure_202405.csv" from https://globalfishingwatch.org/data-download/datasets/public-fixed-infrastructure:v1.1 under CC BY-NC 4.0 license.

Global Renewables Watch (2024) Offshore wind detection dataset. Shared directly for use in the report.

EMODnet Human Activities (2024) Wind Farms. Accessed September 2024 via https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.search#/metadata/8201070b-4b0b-4d54-8910-abcea5dce57f

NVE (2024) Identifiserte områder for havvind 2023. Accessed September 2024 via https://nve.geodataonline.no/arcgis/rest/services/Havvind2023/MapServer

Länsstyrelserna (2024) LST Vindbrukskollen havsbaserad vindkraft. Accessed September 2024 via https://ext-geodatakatalog.lansstyrelsen.se/GeodataKatalogen/srv/api/records/GetMetaDataById?id=c290bc31-1af8-497e-a9a5-87fcec55d0ce under a CC0 1.0 license.

Flanders Marine Institute (2023). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 12. Available online at https://www.marineregions.org/. https://doi.org/10.14284/632

APPENDIX 2: Evaluation of the methodology

How reliable is the average 3% figure estimated for GBIF and OBIS?

There are arguments for why this approach might underestimate or over-estimate private input.

Under-estimation of private contribution

- It is only possible to see the organisations that are directly involved with submitting the data. For example, if data from an industrial company was aggregated in a public national repository and then shared to OBIS, it could be categorised as “public”.

Over-estimation of private contribution

- There are often several contributors to each dataset. This analysis called a dataset “private” if one or more contributors were classified as private. This has likely resulted in false positives.
- The consulting companies are for-profit, but if the client that owns and is sharing the data is a university, NGO or government, this should not be included in the intended definition of private sector data.

In summary, the number has limitations, and it is almost certain there are both false positives and false negatives in the classification. In addition, neither GBIF nor OBIS will contain all available private or public biodiversity data, but their significant size and dominance made them a statistically relevant sample.

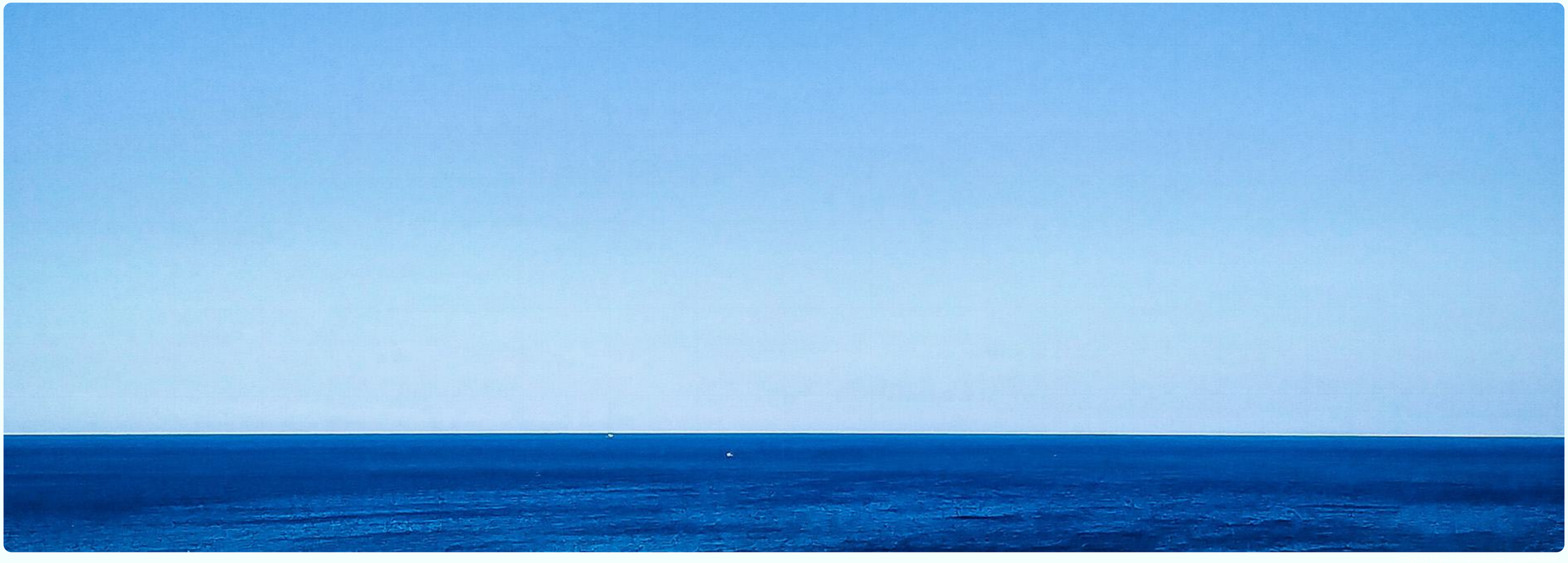
How reliable are the other analyses (geospatial visualizations, break-down by country, year)?

The more granular the sub-analysis, the more chance that there are some discrepancies. While the global average figure of 3% might balance out some false negatives and false positives, on a local scale these might be very apparent. There were some notable outliers identified by the analysis, such as:

- Australia being the largest overall (public) contributor, but having one of the smallest percentages (just 0.1%) of private data.
- The Norwegian oil and gas assets contributing vast amounts of data, whereas the UK side apparently does not.
- The lack of identified private sector data around some key areas of industrial activity, e.g. the Gulf of Mexico.

In each of these local cases it would not necessarily be surprising if there is missing information that could change this picture. We know, for example, that data from the UK oil and gas industry does exist, but it is not easily accessible or integrated into OBIS (at least, in no manner that we can find it even when we specifically search for it) and therefore does not feature in the classification. In the other cases, we have investigated manually to verify if the method used has mis-classified some key datasets.

However, with the metadata available to us we did not find specific evidence for this. As mentioned above (and the introduction to Appendix 1), it could be, for example, that in Australia all industry data gets aggregated into scientific data centres and we therefore we lose the attribution to any original industry sources. This is one of many interesting follow-up questions that has been raised as a result of the first level of analysis in this report, and which we hope to investigate.



Notes and References

[1] Ocean Census website, Ocean Census

[2] NOAA/NCEI. 2018. Mapping Our Planet, One Ocean at a Time | News | National Centers for Environmental Information (NCEI) (noaa.gov)

[3] The FAIR Guiding Principles for scientific data management and stewardship. Sci Data 3, 160018 (2016). https://doi.org/10.1038/sdata.2016.18

[4] Ocean Decade & Information Strategy: Ocean Decade Data & Information Strategy - Ocean Decade

[5] Ocean Census website, Ocean Census

[6] WoRMS website WoRMS - World Register of Marine Species

[7] NOAA. 2024. How much oxygen comes from the ocean? (noaa.gov)

[8] United Nations. 2024. The ocean – the world's greatest ally against climate change | United Nations

[9] Halpern, B. et al. 2019 Recent pace of change in human impact on the world's ocean | Scientific Reports (nature.com). Scientific reports.

[10] IOC/UNESCO. 2024. State of the ocean report, 2024 - UNESCO Digital Library

[11] United Nations. 2020. World could lose coral reefs by end of century, UN environment report warns | UN News

[12] Protected Planet website, Explore the World's Protected Areas (protectedplanet.net)

[13] DNV. 2020. Ocean's Future to 2050 (dnv.com)

[14] See for example Institutional investors seek better ocean-related ESG data | News | IPE

[15] The FAIR Guiding Principles for scientific data management and stewardship https://www.nature.com/articles/sdata201618

[16] See: Convention Text (cbd.int)

[17] GBIF. 2023. Guidance for private companies to become data publishers through GBIF: Who publishes data through GBIF

[18] Flanders Marine Institute (2023). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 12. Available online at https://.www.marineregions.org/ https://doi.org/10.14284/632

[19] Norwegian Environment Agency (2023). Environmental monitoring of petroleum activities on the Norwegian continental shelf

[20] See: Ocean Panel progress report 2024 - The second progress report from the High Level Panel for a Sustainable Ocean Economy. World Resources Institute.

[21] See for example: Brochure_biodiversite_EN_BD.pdf (totalenergies.com), Biodiversity: Total strengthens its ambition and commitments in biodiversity | TotalEnergies.com and for a larger review of ambitions: totalenergies_sustainability-climate-2024-progress-report_2024_en_pdf.pdf

[22] Menze, S et al. 2024. https://onlinelibrary.wiley.com/doi/10.1111/fme.12739

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