July 27, 2023

NMFS Data Modernization Progress Report

Executive summary

Despite the importance of data to NMFS' mission, the agency does not publicly report on the state of its data infrastructure - the people, processes, policies, and products that enable NMFS to turn information into action. The Net Gains Alliance believes a critical part of supporting fisheries and ocean sustainability is making data infrastructure visible so it can be invested in and improved. This report assesses NMFS on 15 data modernization metrics, using information gathered through June 30, 2023. Of the 13 metrics we could evaluate, four are stalled, five are in progress, and four have been partially or fully achieved.

We describe each metric, discuss the challenges with current publicly available data, and make recommendations for future reporting on NMFS's data modernization. At a time when the federal government is undergoing a digital transformation, with an emphasis on data as a strategic asset, NMFS should be capitalizing on opportunities to invest in data infrastructure. This includes being transparent about priorities and challenges so the broader ocean and fisheries community can track and support improvements. Regular public reporting on data modernization would help NMFS achieve its conservation and management goals, which in turn would help the industries and communities that rely on sustainable fisheries.

Background

NMFS is responsible for the stewardship of the nation's fisheries resources and habitats throughout 4.5 million square miles of the ocean. NMFS' scientists and managers work with an extensive network of state, regional, tribal, and international partners to achieve their mission, connecting America's $117 billion fisheries industry to the global seafood supply chain, creating recreational opportunities, and contributing to ocean sustainability worldwide.

All of this work requires trusted, timely, and accessible data across a wide range of topics, including biological survey data along with information on catch, effort, fishing location, and sales. Like many government agencies, NMFS has been working to modernize its data infrastructure, support a data-savvy workforce, and improve its knowledge products. NMFS needs to position itself to take advantage of technology advances that could improve the agency's efficiency and capacity to fulfill its mission. Teams need to be able to work across organizational and information silos to address issues such as adapting to climate change impacts and coexisting with new Blue Economy activities like offshore aquaculture and energy development.

Data infrastructure is a combination of people and technology that's often invisible from the outside. It can be easily taken for granted until it breaks and, like the operating system on a laptop or a bicycle chain, it's better to invest in maintenance and upgrades before that happens.

The Net Gains Alliance believes making data infrastructure visible so it can be invested in and improved is an important part of supporting fisheries and ocean sustainability.

NMFS does not currently provide any public annual reporting on the state of its data infrastructure: people, processes, policies, products, or related impact goals. As a result, it can be difficult to understand why data investments are needed, where the needs are, and how past investments (or the lack of them) relate to current science and management capacity. In the absence of any agency-created metrics, we released a proposed set of progress metrics in August 2022, developed from expert interviews and a review of available NOAA and NMFS documents, including NOAA's Data Strategy. We then held discussions of the metrics with NMFS staff at the national and regional levels, as well as with other members of the fisheries community including industry and Fishery Management Councils. We asked NMFS to report its progress against these metrics by July 2023. Our 2023 assessment reflects information we were able to gather from the agency and other public sources by June 30, 2023.

July 2023 Data Modernization Progress Report

Data Governance		
Status	**Goal**	**Comments**
ACHIEVED	1. % of NMFS units (regions and science centers) with data governance programs in place	Almost all NMFS science centers and regional offices have cross-programmatic data governance teams in place and are developing data governance work plans and priorities. Our conversations with external data partners, such as Councils and FINs, indicated they were less familiar with the data governance program, its goals, and how it could affect their work with NMFS. As the governance teams set priorities they should consider expanding their outreach with these partners and how input from those partners can be considered in future plans.
ACHIEVED	2. Establishment of national data governance council within NMFS	
IN PROGRESS	3. Number and distribution of briefings and other activities with data partners, including Councils and Fishery Information Networks (FINs)	

Staffing and professional development

Status	Goal	Comments
IN PROGRESS	4. Number of new hires (FTEs and contractors) and distribution across regions and science centers 5. Trainings and resources provided consistent with needs identified in data skills assessments	Data Workforce Development is a priority for NMFS's Enterprise Data Management Program. NMFS has conducted internal data literacy and capacity reviews, consistent with federal frameworks like the Federal Data Maturity Matrix, and has made some hires in the last two years to support data modernization, including under the recently approved Data Scientist job category. NMFS is also supporting new Communities of Practice around data and programming through its Fisheries Information System (FIS) program. However, full staff counts are not publicly available and targeted trainings to address data skills gaps and increase data stewardship are still under development.

Advanced Science & Analytics

Status	Goal	Comments
STALLED	6. Release a publicly accessible, annotated fish image library for AI training	Despite NOAA's AI Strategy and the updated requirements on public release of publicly funded research data this project has stalled. We have not been able to determine why labeled images from NOAA research cruises cannot be made public and used to power automation in fisheries technology. Especially when Congress has regularly appropriated $2-3m per year to the National Fish and Wildlife Foundation's Electronic Monitoring and Reporting grant program, it is frustrating that NMFS cannot contribute its existing high quality imagery to these innovations.

Status	Goal	Comments
BETTER METRIC NEEDED	7. Improvements in data processing and management that increase staff capacity to deliver science and management products	We created this metric to encompass the wide range of NOAA products that require well organized and accessible fisheries data, such as Integrated Ecosystem Assessments and stock status reports. If NMFS had a national data strategy with time-bounded focus areas (e.g. a one-year investment in fast and accurate reconciliation across observer data and catch reports), these could become metrics. Alternately, NMFS could select some of the milestones in its fiscal year priorities list for a special data improvement focus, such as climate vulnerability assessments. Working from the fiscal year priorities could also allow NMFS to create a focus on common themes across offices, such as the development of new information portals.

Interoperability

Status	Goal	Comments
IN PROGRESS/ BETTER METRIC NEEDED	8. Progress toward universal trip IDs (UTIDs) by region/fishery	We originally focused on UTIDs as one way to demonstrate progress toward efficiently linking fishery-dependent data streams from multiple sources. While we believe UTIDs are desirable and achievable for some regions, we also recognize that UTIDs are one specific tool for achieving data integration. Several NMFS regions are laying the groundwork for data integration through foundational improvements to data systems and efforts to consistently identify the components of a fishing trip (i.e. people, vessels, starting and endpoints, locations).[1] Whether or not these steps eventually culminate in the adoption of UTIDs, they represent progress toward the same objective of more efficiently linking data streams from multiple sources.

[1] Examples of these efforts include: GARFO and NEFSC's development of the Catch Accounting and Monitoring System; an FIS proposal to create a shared federal vessel and permit registry across three separate East Coast permitting systems (SERO, GARFO, Atlantic HMS) and Pacific Fishery Effort Mapping work by WCR & PSMFC integrating data sources to provide a comprehensive spatial depiction of fishing effort and value.

Status	Goal	Comments
UNKNOWN	9. Increased metadata and documentation for files in InPort	InPort is a publicly-accessible metadata repository that connects to other ocean data platforms, including data.noaa.gov. Documenting projects and data in InPort supports collaboration across teams and makes NMFS data more FAIR (findable, accessible, interoperable, and reusable), which is a goal of the federal Open Data Policy and a data best practice. InPort is not set up to track trends over time, and we were unable to retrospectively analyze trends in documentation in a meaningful way. Going forward, InPort could set up a standardized annual activity report, both aggregated across NMFS and broken out by regions and science centers.
STALLED	10. National guidelines for EM service providers	See #13, which would have provided a forum to discuss and recommend national guidelines. This appears to no longer be a priority for the agency.

Improvements in data policy		
Status	**Goal**	**Comments**
STALLED	11. Updated data sharing policies released	We tracked the development of a new data confidentiality rule, which could have far-reaching impacts across all data systems, as well as policies around specific technologies such as VMS. While many of these policies seem to be under internal discussion, they have not been released for public review or through rulemakings.
IN PROGRESS	12. Public discussions held on key data management and access topics	NMFS is offering more data-focused content as part of NOAA's science seminar series, and data is a topic on NOAA special webinars on climate readiness. Fisheries were also a focus of this year's Environmental Data Management Workshop. One of the primary opportunities for these discussions is the release of draft policies, which has not yet occurred due to the delays discussed in #11.

STALLED	13. National stakeholder advisory panel created for electronic technologies performance standards	While multiple regions are developing standards for electronic monitoring and electronic reporting, including vendor certification programs, there remains no forum for fishers, vendors, managers, scientists, and regulators to discuss technology options and share lessons across regions. We continue to believe that a dedicated program for information-sharing would help the agency develop appropriate standards, avoid replicating procurement mistakes, and adopt emerging technologies responsibly.

Public commitments to data modernization

Status	Goal	Comments
PARTIALLY ACHIEVED	14. Articulate data modernization as a priority (including as related to other priorities like climate and equity and environmental justice)	Improved fisheries data and data systems were included as priorities in the Administration's Ocean Climate Action plan, and mentioned in NMFS' draft Equity and Environmental Justice Strategy. The NMFS Next Generation Data Acquisition Plan (NG-DAP) identified data governance and interoperability as high priorities in its initial survey.
PARTIALLY ACHIEVED	15. Dedicated/improved budget for data programs	Both the Build Back Better Act and the Inflation Reduction Act allocated significant funding for NMFS, including $145 million for data acquisition and management in the IRA. Since NMFS has been level-funded for more than a decade, this should allow the agency to tackle its backlog of data projects and demonstrate that future budgets should continue investing in data and information services. Since this is one-time, limited funding, dedicated annual funding will be needed for long-term objectives.

Discussion of the 2023 Assessment & Recommendations

We created fifteen metrics that both cover a range of aspects of data modernization issues and relate to NMFS' ability to deliver services and meet its science and management goals. Some of our metrics were designed for one-time use to recognize specific accomplishments -- for example, implementation of the regional data governance programs -- while other metrics such staffing and professional development should be tracked on an ongoing basis.

Of the 15 metrics we chose:
- 4 were partially or fully achieved
- 5 are in progress
- 4 have stalled
- 1 is unknown/status could not be determined
- 1 we determined to be too broad to be measurable

While some of our metrics would need refinement to be measurable and meaningful over time, we also discovered that even relatively straightforward metrics were often difficult to track with current public reporting systems. A common theme from our community discussions was that people could recognize *when* data systems weren't working but they could not always articulate *why*. NMFS' history of opacity around how its data systems work, their strengths and limitations, and the potential for future improvements has created frustration as well as missed opportunities to grow champions for data modernization.

Ultimately, any public report on NMFS' data modernization efforts relies on information generated and shared by the agency itself. Ideally, this would not be an additional agency reporting requirement but one that can draw from relevant metrics in existing programs, like the annual NMFS Fiscal Year Priorities reports or the forthcoming <u>Fisheries Modernization Strategy: From Data to Decisions</u> and Fisheries 2030 Vision. While the federated nature of NMFS regional offices and science centers means there will always be a variety of specific goals and capacity needs across the country, these national-level strategy documents can provide a standardized format for tracking data improvements and investments. For example, the agency could use its current focus on climate-ready fisheries to prioritize improved data workflows for using fisheries-dependent data in modeling, which would touch on improving data interoperability and data documentation and likely be implemented differently (but harmoniously) across regions.

While future data modernization metrics should tie to the impact goals and strategic priorities of documents like those listed above, we encourage NMFS to also look across those project-oriented goals for common data themes. The data governance committees should be a resource for those themes, as well as general principles like increasing FAIR data, improving data literacy, and providing transparency. Another source of regular public reporting could be the Fisheries Information System (FIS) program and its impact framework. FIS supports work both inside the agency as well as with FINs and state data partners, giving it a broad perspective on needs and priorities. FIS also supports internal capacity-building programs, like professional support groups on AI and data management. FIS would likely be a good long-term home for an annual public data modernization report.

This work by the Net Gains Alliance to identify and report against data modernization metrics is a one-time effort that we hope will inspire NMFS to take a more proactive approach to communicating its data modernization investments and needs. We are encouraged by the growing interest in and attention to NMFS' data assets and need for data stewardship. NMFS can demonstrate its recent investments in data infrastructure and new data strategies are not just passing interests by committing to regular public progress reports.