NET GAINS ALLIANCE

**Communicating the Impact of a Data-Driven NMFS**

July 2022

---

## Introduction

A modern, data-driven fisheries information system is essential to achieving the mandates of the Magnuson-Stevens Act, supporting ocean based businesses, and meeting the growing information demands of managing fisheries in a changing environment. Building excitement, momentum, and investment in data modernization requires evidence of impact. However, it can be difficult to demonstrate impact in clear and accessible terms.

The Net Gains Alliance spoke with over 40 data system experts across regions and disciplines to ask about their experiences with the positive impacts of data modernization and the costs of not upgrading data systems. Our interviews confirmed that data modernization stories have immense power to illustrate impact and improve data literacy. These conversations also emphasized that modernizing fishery information systems requires strategy, leadership, and dedicated long-term support.

This report summarizes how experts talk about the positive impacts of data system investments, and includes brief examples to demonstrate how stories can illustrate these facets of impact. Some aspects of impact are readily apparent, especially time and cost savings. Other positive impacts are less visible, simply because it's easier to recognize when data systems aren't working well or meeting science and management needs. Not every data system investment will create impact in all of these ways, but all produce a suite of benefits that can be communicated more effectively. NGA developed this framework for experts and data modernization champions to talk about impact in a more comprehensive and structured way, while also building data literacy and understanding of how fishery information systems work.

This document is a resource for use by NGA, our partners, and other data modernization champions to continue the work of identifying and sharing stories that illustrate impact. We appreciate the contributions of data system experts with NOAA Fisheries, the regional fishery information networks, the regional fishery management councils, industry, NGOs, and our Net Gains Advisory Panel members who shared their perspectives.

## What impact looks like

### Time and expertise are used wisely and well.

Simplifying, streamlining, or automating the most time and labor-intensive data collection and management tasks–including integrating, reconciling, backing up, and publishing data streams–enables NMFS and partners to direct resources toward other priorities and skilled analytical work. Efficiency gains can be made across entire programs or regions, but efficiency gains can be highly impactful even at the individual level; for example, when an assessment scientist is able to spend more of their time on science and less time on data management. Data system investments can also positively impact individual well-being and staff retention when staff are able to innovate and apply their highest-value knowledge and expertise.

### Information systems consistently meet demands.

Impact can look like a data system that simply lives up to demands and doesn't impose unnecessary costs, delays, or barriers. A high-functioning fisheries information system needs to consistently connect data with people and purpose to inform fisheries science and management. This applies to routine business, such as an analyst being able to efficiently prepare data for a council briefing; periodic needs, such as compiling information for recurring needs like catch share program and Essential Fish Habitat reviews, and support for new and data-hungry needs such as real-time quota monitoring in a catch share program. In addition, inventories of existing data and metadata facilitate efficient data use and reuse so that data is readily accessible to analysts to meet multiple needs.

### Data systems support the timely and efficient flow of information.

Data modernization investments can enhance the efficiency of data flows by documenting and standardizing data handling procedures. This includes formalizing processes for requesting, providing, or aggregating data; improving transparency, and converting individual experience into shared knowledge. Vulnerabilities and bottlenecks can exist where the flow of information is highly dependent on one step in a process, or on the institutional knowledge and capacity of a person in a critical role. In these scenarios, positive impact comes from maintaining the timely flow of data, and reinforcing stress points that can lead to opportunity costs, such as delaying the decision-making process or keeping boats tied to docks.

### Data management and infrastructure keep pace with change.

A modern, data-driven fisheries information system requires up-to-date infrastructure. The opposite scenario describes a state of technical debt in which information systems and capacity are increasingly unable to keep up with the demands of science and management. At an enterprise level positive impact is evident through strategy, including leveraging strengths of the agency and its partners including the technical expertise of the regional Fishery Information Networks; and pulling in the same direction to not only keep up with infrastructure demands but doing so strategically and efficiently. Foundational investments such as implementing electronic reporting or upgrading a database can create impact by helping build the technical and strategic capacity to tackle more complex data challenges. Proactive planning is also essential to

accommodate new data streams, apply and model data in new ways, and to avoid constraining future uses.

### NMFS is a hub in an ocean data ecosystem.

The agency serves a critical role in linking people, data, and purpose in a broader ocean ecosystem context. NMFS and NOAA should be able to provide data that demonstrates the spatial footprint and value of fisheries, and empowers the agency and stakeholders to advocate for their fisheries conservation and management interests. Data modernization investments should also make it easier for the agency to use diverse data sources such as environmental observations and industry generated data.

### Data systems inspire credibility and trust.

Modern data systems help build trust and confidence in data quality, both internally and among external partners and stakeholders. While the positive impacts of credibility are not always apparent, the costs are clearly evident when it's lacking. Data modernization investments can create positive impact and enhance credibility in many ways including the public's perception that the agency is using up-to-date technology, positive stakeholder experiences with easy reporting and compliance, and clarity on authoritative data sources (for example, when there are parallel approaches to tracking data for different and valid purposes).

### Information systems contribute to improved data quality.

Data quality describes "fitness for purpose," or how well data serves its intended use based on factors that include timeliness, completeness, accuracy, and consistency. Investments in data systems can create impact through assuring and improving data quality, for example by facilitating timely submission and integration of data sources and efficient use of resources for quality assurance and quality control.

### Data systems help build data literacy and propel a cultural transformation.

Data modernization creates impact by motivating and rewarding staff and stakeholders for learning new skills and building their data literacy. Internally, progress can look like professional development as staff innovate, apply new technical skills, and build a higher baseline of data literacy and capacity. With greater data literacy staff are also better equipped to recognize opportunities to bring in targeted expertise, whether that's enlisting the help of a data scientist to articulate and work through a problem, or consulting with data experts in a structured process such as through a Plan Development Team. Among stakeholders, progress looks like data modernization can help build demand for transparency, accessibility, and user-focused tools.

### Data systems provide benefits and allow for value creation.

The positive impacts of data modernization within NMFS extend to stakeholders, including industry, the research community, and the private sector, that want to create value and knowledge by using data in innovative ways. For example, impact can be created through enabling the creation of sophisticated information products and services for fishing businesses, a competitive market for electronic technology service providers, and transparent, traceable

seafood products. These forms of impact can depend on the agency's use of modern data systems, clear policy guidance, and responsiveness to stakeholder requests.

## Impact stories

Through our interviews, NGA identified several examples of the data modernization stories that data system experts consider compelling examples of impact. These and other stories could be used in a variety of ways to communicate and build support for investing in data modernization, by tailoring the content and level of detail to the intended audience.

### Developing an industry data portal for the Western Gulf of Alaska pollock trawl fishery

Bycatch of Chinook salmon in the Gulf of Alaska pollock trawl fishery is closely monitored and limited under a hard cap that, if met, can trigger closure of the fishery. Industry is working with the Council and NMFS to use electronic monitoring to improve the precision of catch estimates and to reduce and avoid salmon bycatch. In the Western Gulf of Alaska the Aleutians East Borough, Chordata LLC, the Peninsula Fishermen's Coalition, and Saltwater Inc. collaborated to install electronic monitoring systems on vessels and create a data collection program including processors. In the first year of operations, this combined network of trained fishery partners and technology was able to improve the speed and accuracy of catch reporting. The industry data portal offered rapid notifications to the fleet of bycatch events, allowing captains to modify their fishing in real time. The data portal is already able to share information directly with NMFS, and in the future it could become the primary repository of catch data across business and the agency. This work demonstrates the utility of pooling industry data for business operations, contributing to a paradigm shift around data confidentiality and the industry's expectations and ability to leverage and derive value from the data they provide.

*Where we see impact: Industry leveraging data to improve business operations and contributing to a cultural transformation in how stakeholders expect to provide, share, and use fishery-dependent data*

### Northeast Regional Marine Fish Habitat Assessment and Data Explorer

NRHA Summary (June 2022) | NHRA Data Explorer (draft)

The Northeast Regional Marine Fish Habitat Assessment (NRHA) is a collaboration between the Mid-Atlantic and New England Fishery Management Councils, NOAA, the research community, and other partners that provide critical insight into connections between habitat, species distribution, and ecosystem change with a series of data-driven products that include a data inventory, species habitat profiles and narratives, modeling of species distributions and habitat use, and data visualization and decision support tools. This work supports routine needs, such as EFH designations, reviews, and consultations; and forward-looking efforts to incorporate ecosystem information into Council processes, including through annual "State of the Ecosystem" reports and ecosystem terms of reference for stock assessments. Several aspects of this project illustrate data modernization through facilitating data use and visualization.

Foundational to this work is creation of a data inventory and metadata catalog for available fishery-independent and habitat data sets, including a comparison of state and federal trawl surveys with information on gear, coverage, and other attributes. A major outcome is the creation of an R Shiny NRHA habitat data explorer that will enable users to share, explore, visualize data and products and sources, some of which will be linked to other data portals (MARCO, NROC, NOAA DisMAP).

*Where we see impact: Improving awareness and usability of habitat data, connecting data with management needs, enhancing public access to data and providing visualization tools, strengthening connections with ocean data aggregators*

### Streaming the development of Ecosystem and Socioeconomic Profiles for stock assessments in Alaska

FIS Proposal

The NMFS Alaska region recently developed Ecosystem and Socioeconomic Profiles as a framework for including socioeconomic and ecosystem information as an appendix[1] to stock assessments. Assessment scientists' ability to access and include this valuable information can depend on their individual knowledge of what data sets exist and in what format, and how to access them. Alaska Fisheries Science Center scientists are now working with the Alaska Fisheries Information Network to develop a streamlined process and application for data contributors and users to both upload and access these data sets. This work will more efficiently connect available data sets with potential users, improve the consistency and reproducibility of this process, improve data access by data submitters and partner agencies, and support ecosystem-based fisheries management priorities in the region.

*Where we see impact: A more efficient, timely process for connecting people with useful data, reduced time spent on bookkeeping and data management, encouraging use and reuse of available data*

### Electronic Vessel Trip Reporting in the Greater Atlantic Region

In late 2021 the NMFS Greater Atlantic Region completed the transition from paper to fully electronic vessel trip reports (eVTRs). EVTRs are a critical first step toward other data modernization efforts including one-stop reporting, customized logbooks with fishery-specific fields, and unique trip identifiers that can make it easier and more efficient to link data streams. Tackling the transition to EVTRs helped bring the inefficiencies of outdated systems into sharper focus and elevate the need for an updated data model that's more flexible to accommodate new data streams and be more responsive to management needs.

[1] For example, see Appendix 3C: Ecosystem and Socioeconomic Profile of the Sablefish Stock in Alaska

*Where we see impact: Laying the foundation for the region to tackle other data modernization priorities, overcoming technical debt and avoiding opportunity costs, building flexibility and responsiveness to support management needs.*

### Transitioning the Access Point Angler Intercept Survey from Paper to Tablets in the Greater Atlantic and Southeast Regions

The Atlantic Coastal Cooperative Statistics Program (ACCSP) is responsible for coordinating the Access Point Angler Intercept Survey, which generates information to inform recreational catch and effort estimates as part of the Marine Recreational Information Program. ACCSP's role includes working with states to coordinate port agent site assignments, receiving intercept data, aggregating and cleaning this data and transmitting to NMFS. In 2016 ACCSP implemented a modernized database structure that is more effective for tracking changes and facilitating data sharing with NMFS. This underlying database investment facilitated a transition from paper to tablet-based reporting and wireless transmission of completed intercept surveys. Database modernization in combination with tablet-based reporting enables ACCSP and states to administer the survey and execute the sampling protocol efficiently, saving staff time associated with data entry and mailing assignments and intercepts. Quality control is more efficient and targeted at all stages including at point of entry and through interviewer clarifications and targeted follow up.

*Where we see impact: Time and cost savings to ACCSP and state partners, benefits to data quality and survey methodology, enhanced public credibility through the use of up-to-date technology, sharing infrastructure across regions for standardization and efficiencies*

### FISHEyE Fisheries Economic Explorer Tool

The NWFSC FISHEyE tool provides an interactive portal for analysts and stakeholders to explore economic data and performance metrics for the West Coast groundfish trawl fishery. The tool was designed to improve the accessibility and utility of economic data, and to facilitate timely analysis of data by Council and agency staff, including for routine analysis and periodic needs such as 5-year program reviews. The publicly accessible FISHEyE interface enables the public and data submitters to access and directly interact with this large volume of aggregated economic data while maintaining individual privacy. The developers note in a 2018 tech memo that the application helps increase trust and transparency, and empowers users to explore their own questions and parameters. The application developers also share their experience using the R Shiny tool as a way to make data more "accessible, useful, and engaging," and note that this approach is feasible with basic knowledge of the R programming language.

*Where we see impact: NMFS staff developing new technical skills and sharing knowledge with colleagues, increasing public access to–and demand for–data, building credibility and transparency*

### Standardizing morphometric conversions to enhance stock assessment capacity in the Southeast Region

FIS Proposal

Preparing data for stock assessments is time consuming. Streamlining and standardizing these processes enables scientists to keep up with demanding stock assessment schedules, and spend more of their time on science and less on data management. The Southeast Data, Assessment and Review (SEDAR) stock assessment process is particularly complex and involves compiling data from a wide range of fishery dependent and independent sources from state and federal agencies and research institutions in the region. These data include critically important morphometric data such as length and weight measurements. SEFSC scientists are leading an effort to produce a database of standardized morphometric equations by species, which will be shared with regional data partners to support a more consistent, efficient, and reproducible approach to applying morphometric conversion factors to datasets. This work was identified as a priority at a 2020 Quality Management and Continuous Improvement exercise conducted at the SEFSC.

*Where we see impact: Improving efficiency and overcoming bottlenecks and pain points in data flows, improving stock assessment capacity, improving data usability*

### Pacific Fishery Effort Mapping

NMFS and PacFIN are undertaking a major data integration and visualization effort to better understand the spatial footprint and value of fishing effort on the west coast. Currently this information is available by fishery but varies in source, scale, and other attributes and is not aggregated or mapped across fisheries for a more comprehensive picture. Project partners plan to integrate and enable visualization of data across sources including fish tickets, logbooks, VMS, and observer data streams. While the momentum comes from offshore wind development and NMFS' responsibilities for coordination with BOEM as part of the offshore wind energy authorization process, ultimately this work will provide tools, capabilities, and permissions to meet the different needs of scientists, managers, and the public.

*Where we see impact: NMFS undertaking much-needed data integration work that help fishery stakeholders communicate their interests, and can provide value to all users through a more comprehensive data source; foundational work that can catalyze other data modernization investments to improve data usability.*