

Digital Public

**Part One of Two
Data Sharing Summary Report**

**Recommendations to improve data sharing
agreements for U.S. fisheries in the Pacific region**

**Prepared for Intertidal Agency
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Part One: Data Sharing Summary Report

Executive Summary

This report is Part One of a two-part package designed to support the ongoing cultural, legal, and technical negotiations surrounding the digital transformation of fisheries. This report describes priority issues that arise in the context of data sharing and management as identified through the lens of the U.S. National Oceanic and Atmospheric Association's (NOAA) National Marine Fisheries Service (NMFS) Highly Migratory Species Professional Specialty Group (HMS PSG).¹ Part Two of the package provides additional resources for data sharing discussions and includes an outline of key terms that are part of data sharing agreement creation and rights negotiations, a sample data sharing agreement, and a repository of data sharing language. The goal of this package of work is to make it easier to have complicated conversations about data sharing and rights by helping identify existing tensions, the related issues and approaches that often arise in data sharing relationships, and how to translate them into solutions for data sharing agreements.

Digital transformations create new opportunities and risks, many of which require new agreements, systems, and/or operational practices. The HMS PSG's current data sharing environment is primarily defined by regulatorily compelled reporting. That legal foundation is experiencing growing pains as it faces an increasing range of data intensive practices and opportunities, often emerging from third-party or commercial actors.

The HMS PSG experiences these tensions in a variety of contexts. Group members articulate the tensions as substantive concerns, including counterproductive data sharing restrictions, mis-prioritization of data policies and programs, and NMFS managers potentially losing the trust of fishermen. They also articulate them as procedural concerns, including ambiguities in how to help solve practical data and digital operations challenges, understanding different actors' authorities over digital policy decisions, and how to manage the transition from a largely informal data sharing legal architecture to the formality customary of the technology industry.

Beyond the HMS PSG and NMFS's infrastructure, a number of commercial fishing operations already maintain internal data collection infrastructure. Private sector data sharing systems are typically built on consent-based licenses where the specific uses of data are made clear to all parties involved in data sharing, which enables them to do a significantly wider range of things with the resulting data, from research to product development. The comparative flexibility that comes with private data sharing creates new opportunities for engagement with data, including the potential for organizing, using, and sharing data beyond the limits defined in state regulation and federal legislation (the Magnuson-Stevens Fisheries Conservation and Management Act).

¹ NOAA is the overarching agency that includes the line office of NOAA Fisheries, or NMFS, and the HMS PSG is a working group within NMFS. These entities have overlapping and interconnected data policies and systems; we have tried to point to the most directly relevant actor in these materials.

The opportunities and challenges related to data sharing and digital transformation are unique to the HMS PSG context but are structurally similar to those currently faced by a range of public institutions. Encouragingly, this means that there are comparable practices and known approaches to addressing these issues already in use, both in the short and long-term. At their core, new data sharing practices and authorities redefine and change, or at least clarify, new and existing relationships. In some cases, they intermediate a whole new type of organization. While NOAA has a clear and established mandate around regulating fishing and fisheries, there's less clarity around the role regulatory agencies will play in overseeing the new data generated by the fishing industry. Mandates often lack support for new data flows. Similarly, there are a range of beneficial data sharing relationships and uses constrained by a reliance on regulatory data licenses.

A significant number of the functions of the HMS PSG's (and NMFS more broadly) data sharing and management are publicly beneficial. It is possible that fishing industry stakeholders would voluntarily contribute to data systems negotiated under a different authority structure - a different power sharing arrangement. There are a range of approaches to architecting those systems. They can be independent commercial or non-profit structures, or they can be managed through existing institutions. Depending on the model, the assessment of new approaches will raise fundamental questions around the role of NMFS and the full range of actors in the ecosystem responsible for data collection, integration, storage, and access in the region and the country.

Two fundamental questions that should inform the assessment of a new approach are whether the organization is willing to (1) invest more heavily in clarifying authorities and operationalizing systems to enable stakeholders to digitize/share data within its regulatory mandate; and/or (2) invest in new ways to work with a growing private industry on the data sharing and digital tools that have a footprint in the HMS PSG's work, and NMFS's work more broadly.

The HMS PSG and NMFS are already actively engaged in designing operational approaches, defining digital reporting standards, interpreting existing terms with a bearing on data structures, and clarifying roles and authorities in data sharing ecosystems and NOAA recently published a data strategy.² There are a significant number of ongoing analyses of the decision-making processes for fisheries data, as well as significant internal momentum at NOAA, toward defining a streamlined data governance infrastructure and new processes to support it, including new ways to engage everyone from General Counsel to researchers to those that support day-to-day data management both early and often.

Legal agreements, like technologies, are most successful when designed as reflections of existing relationships, as opposed to determinants of them. This report and the accompanying resource guide are designed to make the current environment easier to navigate, future conversations easier to have, and to serve as a reflection on the status quo. These tools are designed to support - as opposed to advise or shape - the initiatives and negotiations of the HMS PSG, and the broader fisheries regulatory ecosystem.

² [NOAA Data Strategy: Maximizing the Value of NOAA Data \(July 2020\)](#).

The Challenge

There is a growing amount of complexity being introduced into the fisheries sector through digital transformation. This includes an increased amount of automated data sharing and use, a growing number of commercial software and hardware products being employed in ways that could impact data access, new technologies for surveillance of boats, and more. Each of these new advancements also creates issues related to data management, access, and use that should inform all data sharing thinking from here onward.

The fishing industry is unique as a data policy context in that its legal foundations are rooted in the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (“Magnuson”). Magnuson primarily understands data and information as trade secrets, and therefore focuses on protecting fishermen’s data from being shared with competitors so that their commercial interests can also be protected. As the ultimate data clearinghouse and regulator for the industry, NOAA is the primary legal interpreter of Magnuson’s informational authorities. NOAA is a public interest regulator, however, and has always had a range of mandated reporting requirements. Those reporting requirements have increased since the passage of the Open Data Policy³, which requires NOAA to republish data publicly that previously it was only responsible for collecting, sharing with select parties, and storing.

Therein lies one core tension within NOAA’s current data sharing context: data sharing under Magnuson is compelled under the condition of confidentiality and the sharing is limited to regulatory uses, whereas more recent data policy requires NOAA to openly publish, for public access, as much data as possible. Magnuson commits NOAA to treating data collected as trade secrets (‘confidentiality’), and then, per open data requirements, publishing it under an open license, which means anyone can access it for any purpose at no cost. The way that NOAA manages this tension is by achieving ‘confidentiality’ through anonymity, which is the idea that by publishing the data in certain ways fishermen or specific entities cannot be re-identified when their data is combined with other data. This often requires an inefficient, customized approach for each submission depending on the nuance. Most fishery managers understand the use of ‘the rule of three’ to achieve anonymity -- a practice of aggregating at least three records together -- but there is no universal standard. More fundamentally, anonymity is notoriously hard to achieve in practice and often runs counter to the reason data is collected in the first place.

The data collected through a government’s regulatory authority relies on its power as a quasi-law enforcement agency to compel fishermen to share data with the agency. Compelled action is not optional, and it is limited for all the reasons that the public limits government power. The problem with any compelled power is that it can create large misalignments between parties. For example, fishermen may be willing to voluntarily share data with the government for a range of mutually beneficial uses (to protect the environment where they fish, to enforce consistent regulations across the industry), but be uncomfortable with, or resistant to, being forced into sharing the same

³ Policy Memorandum: [Expanding Access to the Results of Federally Funded Research](#) (2013) and NOAA’s [subsequent plan for increasing public access to research results](#).

data for the same reasons. Often that comes from a worry that the data may be used against them. Some fishermen are regular participants in the regulatory process, some are eager to share information, and some worry about sharing it. Building systems through which fishermen can participate in overseeing the data sharing ecosystem and ensure it is effectively limited to the agreed upon uses are ways to expand the HMS PSG's authorities to use and share data. This structural issue is persistent in many regulatory spaces grappling with digital transformation and data sharing. And one of the best ways to improve relationships and trust is to build more participation into data sharing and the agreements that govern it.

The Opportunity

The fishing industry is still in the early days of benefitting from the full value of the data and capacities it produces. The HMS PSG's digital transformation efforts are still focused, primarily, and for good reason, at the infrastructural level. This includes aligning data formats, ensuring compliance, and monitoring fisheries -- all fundamental steps to cleaning up data and making sure it can be used more widely. A number of interviewees described inefficiencies and ambiguities in the data management practices underpinning existing data workflows, but with a commensurate optimism that they could be solved with relatively small, uncontroversial changes that are generally already underway. The primary opportunity in this regard is defining an accessible process through which relevant stakeholders can raise and pursue those changes. For example, NMFS could set data standards within its science centers and regional offices – but pushing those same standards into industry data systems and international data bodies requires broader conversations.

Nearly every request to change the details of data sharing, however, implicates the question of whether a government can compel that data change under its regulatory authorities. In other words - is it legal? Magnuson is the primary way that the HMS PSG and NMFS legally justify data collection – but it is not the only legal justification available. There are no restrictions on the organizations' ability to contract with fishermen and other data sources directly. Here, we refer to those as “directly granted data licenses,” – these data sharing agreements are by far the most common data sharing and rights management tools in the technology industry and often used among public institutions making digital transformations. And, at least inside major commercial fisheries, there are a range of early indicators of the potential for data and digital tools to improve fishing operations and reporting.

In an environment in which private licensing creates more, and more flexible, opportunities to use data than those available through legal compliance, it is likely that the volume and value of privately conferred data will compete with, if not outpace, regulatorily compelled data and government research. This means that private industry may outpace the data systems of the HMS PSG or NOAA, have better data, and not have to share it. This doesn't bode well for the public, for the industry, for the environment, and for a number of other actors. This exact pattern of behavior has already, in many ways, happened with a range of open and publicly produced data. For example, publicly produced mapping and property registry data are the foundational layers of a range of digital-first businesses, from mapping tools (Mapbox) built on OpenStreetMap to real estate tools (like Zillow and Redfin), among others. And, as has happened in a number of those

ecosystems, the information asymmetries confer power to those with the resources, data infrastructure, and technology, to move ahead of regulators - or to privilege their own interests over the needs of the public. And without an obvious point of coordination with fisheries regulators, or otherwise strong technology and data regulators, there's a real potential for bias, and worse, in fisheries management. This rationale for a strong public institutional data sharing and governance mandate focuses on preserving the public's access to, and role in, the digital transformation of fisheries. That may, however, also require the development of new services and lines of revenue – too often, amidst digital transformation, public institutions are increasingly expected to provide complex data infrastructures, often without resource support. This is an important consideration to factor into this conversation – it's important to have a revenue strategy to support data infrastructures.

This evolution, as part of the broad digital transformation of the industry, presents a growing opportunity and need to articulate and negotiate new data authorities with a range of new actors. The regulator and the public are best served when they are at the table in a way to share in the information related to environmental conservation efforts and proper regulatory oversight of commercial activity. The negotiation of the future data sharing authorities for Pacific fisheries is likely to occur within NMFS's regulatory mandate, as well as through new data licenses, as opposed to either/or. The primary difference is the focus and capacity of the organization in operationalizing each approach and their ability to shape and structure data supply chains.

Even more pressing, there is a growing need for clarity surrounding existing data sharing relationships. Magnuson is a broadly stated law that has remained largely unchanged or specified for decades and not only requires an update, but a mechanism for staying up-to-date. Even without clarification at the statutory level, fisheries organizations can begin to use its broad contracting authority to set up consent-based licensing. Rather than wonder if a certain type of data sharing is “ok” or not under their regulatory mandate, parties can negotiate a dedicated data sharing agreement that addresses the use in specific terms.

This opportunity is about seizing the moment to clearly define authority in relation to data sharing agreements, a goal stated and reinforced by NMFS's recently released Information Management Modernization report.⁴ When authorities are clear, data sharing parties can begin to evolve their relationships with confidence.

Data sharing agreements, beyond basic authorities, also require ongoing oversight and management. The natural evolution of data sharing relationships, norms, and opportunities all suggest that basic agreements are rarely enough to ensure the integrity of a data sharing relationship. They typically require mechanisms to monitor data use, conditions of data management, and the addition of data users. At a practical level, that often means data sharing agreements are responsible for designing the authorities and processes of data rights auditing infrastructure to make sure the agreements are being upheld and continuously monitored over time. At a practical level, this means that while organizations have the ability to negotiate and

⁴ NMFS [Fisheries Information Management Modernization Workshop](#) (Sept 2020)

agree on new data sharing relationships, without this ongoing operational support, even improvements to data sharing agreements deprecate over time.

In terms of process improvements, new approaches to data sharing also offer a way to increase and improve engagement within the organization. By identifying and convening stakeholders in the process from the beginning, parties can align incentives and build intra-organizational support throughout. For example, engaging the General Counsel (GC) at the start of a data sharing conversation makes it more likely that GC can become an advocate for new changes as opposed to an obstacle. Beyond individual power positions, it's also vital to include representatives from all the communities and levels of management necessary to ensure the success of a new data sharing relationship. This not only has the practical benefit of blending capacity building and engagement, but it appropriately frames governance decisions as organizational, rather than technical or legal, relationships to negotiate.

Whether the HMS PSG focuses on expanding the existing data sharing authorities conferred under Magnuson, engages more directly with fishermen and the private sector to negotiate data sharing, or both, it will require the organizational capacity to identify, formalize, and oversee those relationships and processes. Based on the in-person interviews and literature review we conducted, existing data management and sharing systems would immensely benefit from clarification and interpretation. Some of those systems can only be designed and managed inside the regulatory infrastructure of the HMS PSG, and there are already a number of initiatives underway to define and shape these mechanisms. In addition, there are a number of industry and ecosystem data sharing improvements that could be supported by direct engagement with fishermen and the technology sector. Many of those will require points of clarity and intersection with HMS PSG stakeholders and the broader regulatory ecosystem.

Translating HMS PSG Issues into Improved Data Sharing Practice

The opportunities and challenges raised through our interviews mentioned data and data sharing, but they were largely reflected in the language of the sector and the operational work of each stakeholder. While the key messages from stakeholders were quite clear about the challenges, they were not expressed using the kind of legal terminology required to solve them. In an effort to build a shared legal language, understanding, and a complementary approach to existing data sharing initiatives this package (Part One: report + Part Two: resources) translates the problems described in three ways:

Part One (this report) summarizes and synthesizes the key messages received in our stakeholder interviews. This helps reflect the types of challenges and opportunities that exist, how common or uncommon they are, and the elements of these challenges that relate to data sharing.

The report takes these key messages and performs a translation from interviewees statements into the frame of data sharing and management systems design. This maps individual effects and issues into structural and causal issues, identifying and prioritizing opportunities for future data sharing agreements. This translation also informs the process of moving data sharing activities

from general and high-level conversations to more specific and precise discussions and workflows.

Part Two, (the resources part of the package), provides practical resources that support and contextualize the use of data sharing terms and language. This section was designed to support ecosystem data sharing, management, and governance literacy. It's critical to keep everyone on the same page regarding what terms and ideas mean at a high-level, but also how they relate to the ways that members of the organization deal with data on a day-to-day basis. Investing in a common understanding of operations and terms pays dividends in the sustainability, accessibility, and resilience of data sharing relationships. This translation work is bolstered by two primary appendices: a sample annotated agreement and a data sharing language repository. Taken together, the language and terms can be translated from recognizable operational and real-life experiences into the ways these issues can be defined and managed through new approaches to data sharing.

Research Overview and Methodology

To inform this summary report and the resources developed in response to it, we conducted interviews with NOAA and NOAA-adjacent stakeholders. We began with an initial set of interviewees from the HMS PSG project team who were asked to suggest additional interviewees. The interviews were conducted by video or telephone call in May and June of 2020. The interviews were approximately 45 minutes each. In total, 13 interviews were conducted with 15 interviewees total (two interviews had multiple participants, one participant was interviewed twice). Ten of the interviewees were NOAA stakeholders, and five were NOAA-adjacent. NOAA stakeholders included members of the HMS PSG project team, NOAA staff that work with data, technology, and legal processes, and a handful of NOAA-adjacent stakeholders at organizations with knowledge of the fisheries ecosystem, such as EDF, the International Scientific Committee, and the Nature Conservancy.

All interviewees were asked the following five questions:

1. Can you tell us about how you interact with the broader data ecosystem [technically, legally, operationally]?
2. What are the [5] most important uses of data to your job/role?
3. What are the [5] greatest points of friction in the way data affects your position?
4. What are the most important opportunities/values that a well-governed data system could realize for HMS PSG?
5. What are the most likely or obvious risks of un- or badly regulated data?

Seven Key Messages from Stakeholder Interviews

1. **Overall, fisheries management best practice unifies and motivates stakeholders. There is significant enthusiasm specifically to support best practices in data stewardship.** Stakeholders were consistently aligned when describing the most important uses of data in their job or role. Almost everyone pointed to NMFS's stock assessments as the primary product of their

efforts to improve and maintain appropriate data sharing activities while a few focused on bycatch mitigation. All interviewees were motivated to build and maintain the best possible practices and tools for a robust data-sharing infrastructure across NMFS. Most interviewees expressed enthusiasm and support for best practices in data management. Almost all stakeholders were passionate about their responsibilities as good data stewards while being frank about perceived deficiencies and opportunities for improvement in the existing data sharing ecosystem.

Summary: There is broad-based support for well-designed processes to use digital transformation and data sharing practices to improve the HMS PSG's role in fisheries management.

Translation to data sharing practice: Stakeholders are willing to participate in systems that help them contribute to improving the clarity and standards of their digital work.

- 2. Current capacity constraints and resourcing limitations create operational challenges for data management operations.** Many interviewees (9/13) observed that the system has limited capacity and resources, with one interviewee noting that we “*don't have an army of data scientists and system engineers*” even though data sharing and data governance is evolving to be the “lifeblood” of the organization. The lack of data scientists and systems engineers is truly limiting as so many mandates come without the necessary resources to carry them out. About half of interviewees (7/13) hypothesized that an improved data sharing architecture and practices had been hindered by a lack of resources, inherited/iterated IT and historical under-investment and that these factors are inhibiting the institution's ability to evolve and iterate.

Summary: There are system design, skill, and culture gaps causing friction and exposing the need to negotiate new relationships, data workflows, and technical partnerships.

Translation to data sharing practice: Fisheries require modernized and supported data infrastructure.

- 3. Lack of clarity about the practical meaning of several key data sharing terms creates stress and uncertainty, particularly the terms privacy and confidentiality.** Almost all of the interviewees talked about problems related to ambiguity around the authority [authorities] associated with entering into and designing new data sharing agreements. In these conversations, many (8/13) mentioned challenges around interpretations of the term “confidentiality,” and the majority expressed frustration related to the uncertainty they have experienced when they were unable to share (either as a provider or a receiver) confidential information relevant to their work.

Summary: The need for clarifications across a range of issues is causing a current and growing backlog of operational inefficiencies.

Translation to data sharing practice: Specificity, transparency, and accessible decision-making are large outstanding needs in existing data sharing relationships.

- 4. Substantive tensions exist regarding the prioritization of data management issues within the organization.** About half of the interviewees identified a “disconnect” between NOAA's

leadership and those working directly with datasets that made it difficult to fully appreciate the challenges experienced by people working with information. Similarly, a few mentioned that strong IT or security focus often takes precedence over data-sharing practices (i.e. the security of information was privileged over its sharing).

Summary: There are system-wide concerns about how existing data sharing and rules systems are removed from the influence of stakeholders. This results in tensions about ‘what’ and ‘how’ to contribute to improving fisheries data management.

Translation to data sharing practice: Clarity about authority and supporting data sharing processes that involve a broader range of stakeholders may help address these issues.

- 5. Informal data sharing agreements based on historical relationships or tradition can create friction.** In addition to confusing ambiguity about terms like ‘confidentiality,’ almost all interviewees (11/13) mentioned ambiguity about decision-making authority as well, or who has the ability to sign off on data sharing programs. Many interviewees referenced the role of relationships as a determinative factor in their ability to share data (either as sender or receiver). About half of the interviewees described navigating vagueness and uncertainty around what information is confidential and what is not, in a fragmented decision-making system that works on a case-by-case basis and is highly relationship dependent, e.g. if you know the data holder personally you can contact them directly to resolve the issue. Many interviewees acknowledged institutional issues that were related to “turf” and associated political dimensions of the internal NMFS data-sharing architectures (8/13). Clarity is key for future data sharing approaches; no one wants an over-complicated system that is difficult to navigate.

Summary: Stakeholders do not have, or believe in, effective mechanisms to resolve data sharing issues related to historical relationships or tradition.

Translation to data sharing practice: Increasing the formality related to data sharing practice through the creation of data sharing agreements with highly specific terms, including those related to authority, is one approach to address this lack of clarity.

- 6. Uncertainty and lack of clarity about how data is managed contributes to mistrust within the fisheries community.** Several interviewees expressed concern that the overarching value proposition of reporting requirements is not always effectively communicated to fishermen (5/13) and a few (4/13) mentioned trust issues from fishermen that resulted from this lack of communication.

Summary: The negotiation of these relationships is political. Also, approaches to negotiating new digital authorities will require a parity and power sharing approach with fishermen that is unique in the culture of a regulatory data ecosystem.

Translation to data sharing practice: Voluntary consents often involve transparent incentives and equity in ways that traditional regulator relationships don’t.

- 7. Modernization and digital transformation are expected to create new data sharing challenges.** A few interviewees (4/13) mentioned more anticipatory challenges that were related to data storage in response to the growing adoption of electronic monitoring and the volume of

digital information it creates. While there was enthusiasm for the improved data collection that these technologies can contribute to, a couple of interviewees (2/13) anticipated that new ambiguities around the price of data storage and the question of “who pays” could be a barrier to continued adoption. When asked about the risks of “un” or “badly” regulated data, most interviewees described the harms related to poorly managed fisheries and half cited a loss of trust with fishermen. This is an important area to address as technologies are changing rapidly.

Summary: These data management issues are likely to grow, based on current trend lines and in reaction to digital transformation initiatives.

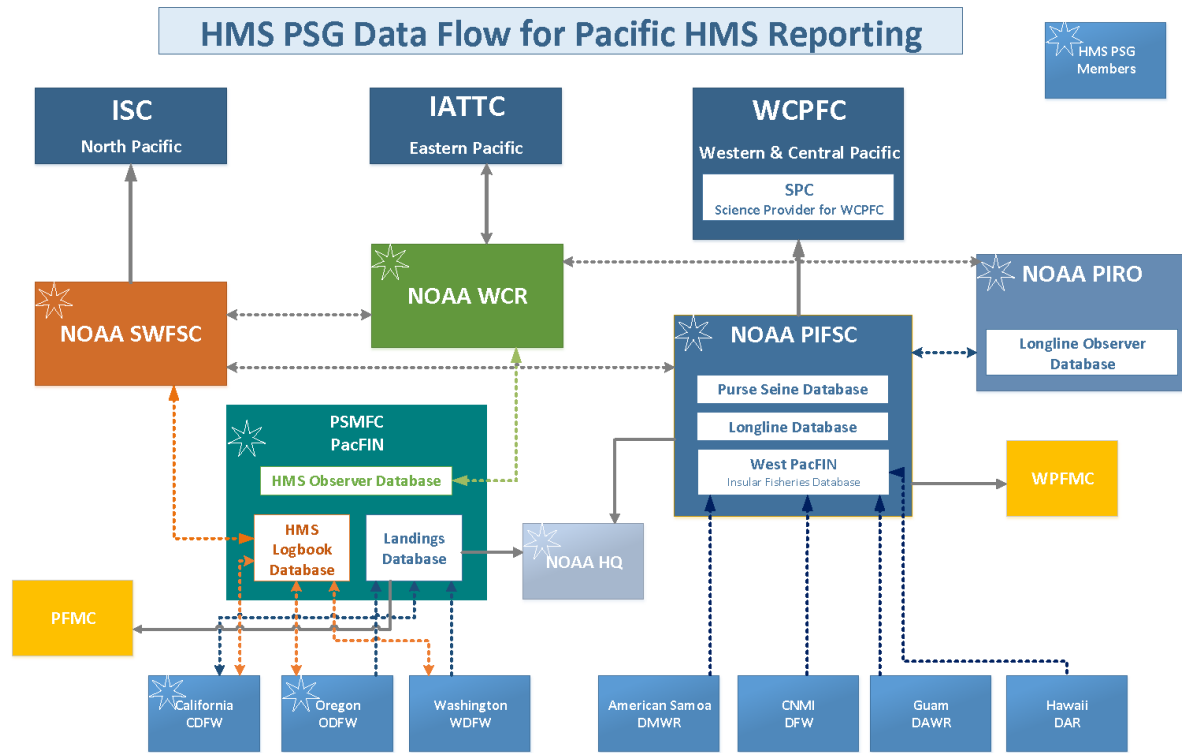
Translation to data sharing practice: Include and consider the uses of data that relate to novel technologies when creating new or revising existing data sharing agreements.

End of summary report. Figure one and two below relate to data flow and fishery area.
Please see Part Two of the package: Data Sharing Resources

Figure One

Highly Migratory Species Professional Specialty Group Data Flow for Pacific Highly Migratory Species Reporting

As evidenced by the data flow diagram below, provided by the HMS PSG, the HMS PSG data sharing ecosystem is complex, and includes both legal and policy compliance as a driver of data sharing, through a range of organizations, as well as data sharing for research and other uses.



ISC: International Scientific Committee for Tuna and Tuna-like Species

IATTC: Inter-American Tropical Tuna Commission

WCPFC: Western and Central Pacific Fisheries Commission

SWFSC: Southwest Fisheries Science Center

WCR: West Coast Region

PIRO: Pacific Islands Regional Office

PIFSC: Pacific Islands Fisheries Science Center

PFMC: Pacific Fishery Management Council

WPFMC: Western Pacific Fishery Management Council

PSMFC: Pacific States Fisheries Management Commission

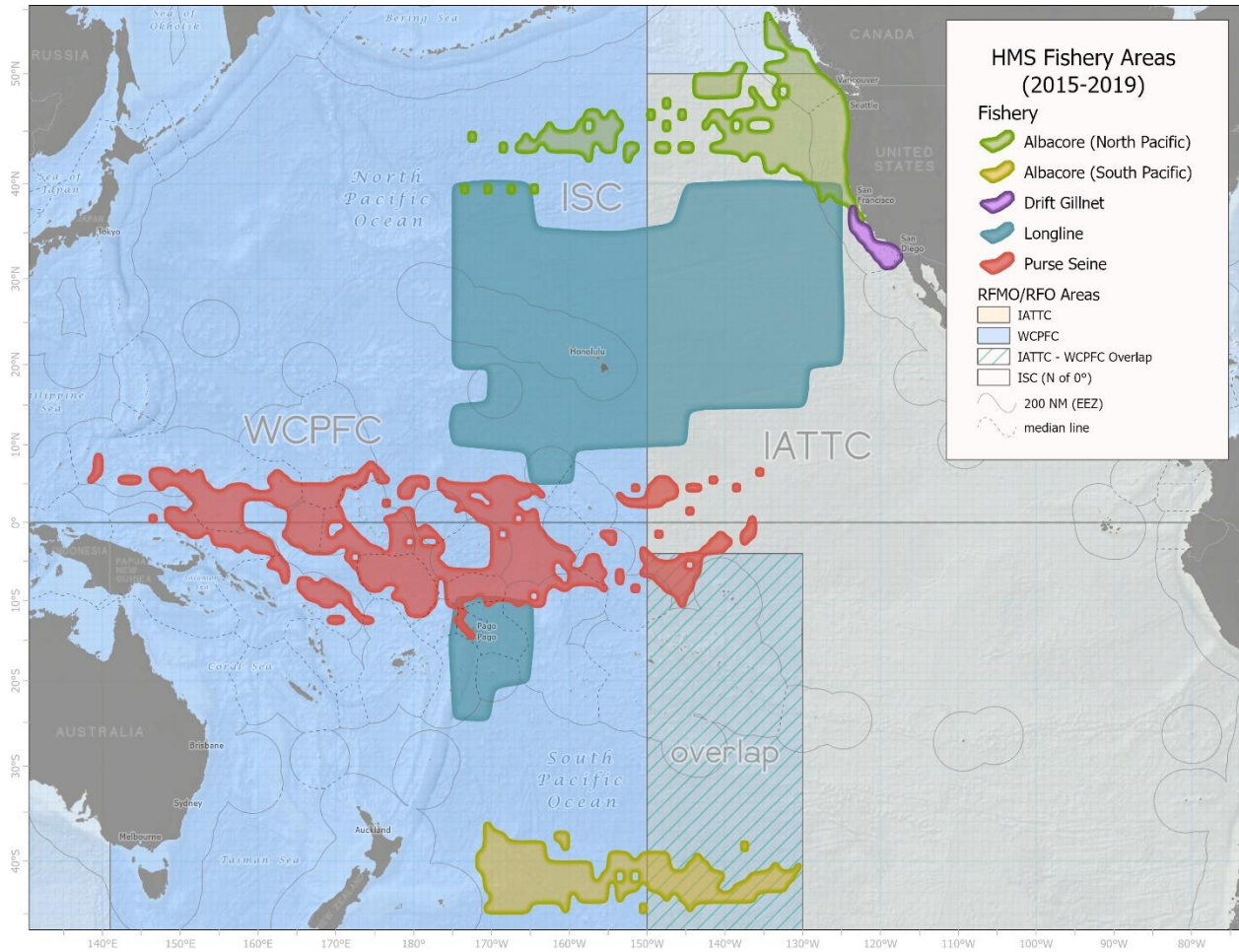
PacFIN: Pacific Fisheries Information Network

Blue boxes on bottom row represent state/territory fish and wildlife agencies

Figure Two

Pacific Highly Migratory Species Fishery Areas (2015-2019)

As this map illustrates, the above listed partners collaborate to collect, use, and share fisheries information across several jurisdictions. This creates significant complexity in data sharing.



End of summary report. Please see part two of the package: Data Sharing Resources