CAPE COD COMMERCIAL

FISHERMEN'S ALLIANCE

Small Boats. Big Ideas.

BUILDING A FISHERMEN-FIRST DATA ECOSYSTEM

JULY 2019

The accompanying report from Digital Public is the result of a collaborative effort among fishing advocacy organizations, New England groundfish fishermen, and fisheries scientists.

The Fishermen's Alliance's goal for fisheries dependent data is to have a system that empowers the fishermen to easily access and use their data to support their business decisions while improving data access for independent scientists to support data-driven fisheries management decisions. The Fishermen's Alliance is focused on bringing together fishermen, data experts, scientists and other interested parties to develop a plan for building a fishermen-first data ecosystem. The Fishermen's Alliance does not intend to build a database or host/curate fishermen's data – our role is to facilitate the planning process and set the stage for the industry-selected data plan to be implemented. In light of the accompanying report, our next steps include:

1. Convene fishermen to determine the specifics for their preferred data infrastructure, data standards and policies, and a data trustee.
2. Develop a request for proposals that could be used for building the database, including the necessary specifications based on industry preferences.
3. Identify funding mechanisms to support initial database creation and long term maintenance.

Please contact George Maynard with any questions or to become involved in the planning of an industry-controlled, fisheries-dependent data repository.

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Building a fishermen-first data ecosystem.

February 2019

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Prepared for Cape Cod Commercial Fisherman's Alliance

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Table of contents

Executive summary

This report presents opportunities and possible models for the New England groundfish community to own, control, manage, and use fisheries data, with a particular focus on governing electronic monitoring data. It is the product of two workshops organized by The Cape Cod Commercial Fishermen's Alliance and facilitated by Digital Public in the fall of 2018.

Among the fishing community, there is a sense that fishermen are on the outside of a data monopoly. As data collection systems modernize, fishermen have the chance to build a parallel data collection ecosystem. With independent access to data, the fishing community can support independent research, develop new business opportunities, and pursue additional uses for their data as they see fit.

The future of data management in New England groundfish fisheries has yet to be written. To better prepare the fishing community for that future, this report presents a menu of options: technical and legal models for how data projects may be architected and governed.

This report's technical models fall into three categories: standards body, clearinghouse, and repository. For each data project, the community's core choice is whether to hold data itself or to facilitate access to data.

This report's legal models focus on the relationship between a data project's manager and fishermen. It discusses trusts and organizations as possible legal homes for a data project, and outlines specific powers and duties for a project's manager.

About CCCFA

The Cape Cod Commercial Fishermen's Alliance has been working with fishermen for more than 25 years to create solutions for a balanced ecosystem and profitable fishing communities. We are fishermen, community members, public officials and scientists working together to build creative strategies, advocate for improved marine policies, protect the ocean ecosystem, and ensure the viability and future of Cape Cod's fisheries.

About Digital Public

Digital Public is a digital governance firm. We research, design, and build tools for communities to protect and govern their digital futures. We work with foundations, universities, governments, organizations, and communities to pioneer new governance structures for public interest digital resources.

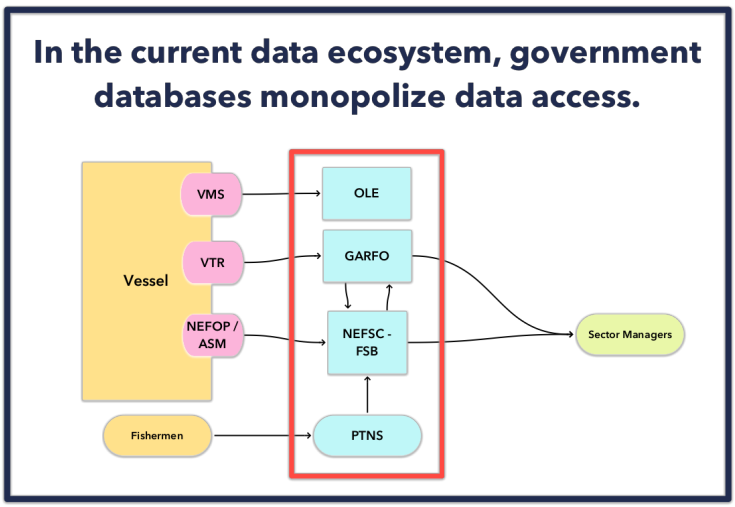
List of acronyms

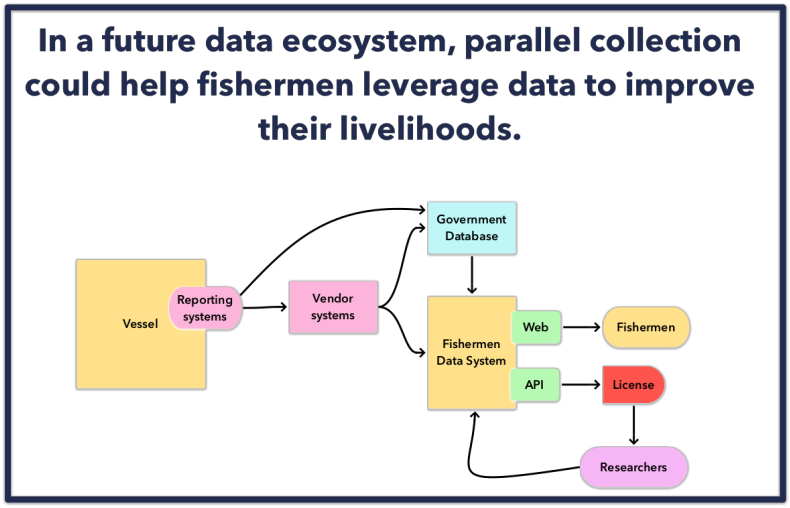
ACCSP – Atlantic Coastal Cooperative Statistics Program
API – Application Programming Interface
CCCFA – Cape Cod Commercial Fishermen's Alliance
EM – Electronic Monitoring
FDD – Fishery-dependent data
FSB – Fisheries Sampling Branch (NEFSC, NOAA)
GARFO – Greater Atlantic Regional Fisheries Office (NOAA)
LLC – Limited Liability Company
NEFOP – Northeast Fisheries Observer Program
NEFSC – Northeast Fisheries Science Center (NOAA)
NOAA – National Oceanic and Atmospheric Administration
OLE – Office of Law Enforcement (NOAA)
PDT – Plan Development Team
PTNS – Pre-trip notification system
QA/QC – Quality Assurance / Quality Control
SAFIS – Standard Atlantic Fisheries Information System (ACCSP)
SIMM – Sector Information Management Module
VMS – Vessel Monitoring System
VTR – Vessel Trip Report
eVTR – Electronic Vessel Trip Report

Introduction and background

This report presents opportunities and possible models for the New England groundfish community to own, control, manage, and use fisheries data, with a particular focus on governing EM data.

New England groundfish fishing is data-intensive. Nearly a dozen data streams, from human observers to dockside reports to paper forms to vessel electronics, inform fishery management, research, and law enforcement. By and large, these data streams are collected by or for government, and not for fishermen. Even though fishermen are closely monitored and tracked, they are unable to use the data collected about their own activities, on their own vessels. Moreover, the current data ecosystem is inadequate for researchers. Data that is usable is often available too late, is of poor quality, or is difficult to resolve with other data streams. Other data is locked behind conservative interpretations of confidentiality laws. All told, there is a sense within the community that fishermen are on the outside of a data monopoly.





Modernization provides an opportunity to change this. The community is at the beginning of a shift toward electronic monitoring (EM): networks of cameras and sensors on vessels. As data collection and management in fisheries digitizes and proprietary systems are connected to one another with web standards and databases, fishermen have the chance to build a parallel data ecosystem. Data previously sent only to government can now be sent to multiple destinations at once, each with an independent chain of custody. With independent access to data, the fishing community can support independent research, develop new business opportunities, and pursue additional uses for their data as they see fit.

CCCFA + Digital Public

In September 2018, Cape Cod Commercial Fishermen's Alliance (CCCFA) engaged with Digital Public to explore possible data governance models for New England groundfish community.

Digital Public conducted two workshops with community members in the fall of 2018. In the first workshop, we outlined the current data ecosystem: who is responsible for each data stream, in each stage of the data lifecycle, and what potential opportunities and threats arise from each stream. The second workshop focused on use cases and permissions: in a future system managed for fishermen, who should be allowed to use data, and for what purposes?

Digital Public produced two working draft memos, one after each workshop. This report synthesizes and incorporates work and feedback from both memos.[1]

Our engagement focused on three primary objectives.

1. Improve data availability and quality for fisheries research
2. Enable fishermen to access data collected on their vessel, while preventing other fishermen from accessing that proprietary data.
3. Broker requests for data access between data holders and data requesters.

In addition to these objectives, we touched on secondary opportunities for data collection, access, and use.

The current data ecosystem

Our engagement began with mapping the community's current data ecosystem.[2] In the first workshop, workshop attendees built a table of data streams. The table describes who is responsible for each data stream at each point in the data lifecycle. Here, the table is depicted in *Tables 1(a)* and *1(b)*.

Table 1(a) includes data streams for many of the traditional forms of data collection in New England groundfish. Nearly all of these streams

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[1] Special thanks to the workshop attendees for their participation and feedback, and to Kate Wing for her helpful feedback and comments on drafts of this report. Errors and omissions are the author's.

[2] Here, we built on the ecosystem mapping work of the Gulf of Maine Research Institute's Fisheries Dependent Data Visioning Project. See https://www.gmri.org/our-work/fishing-industry-innovation/data-improvement for more.

are controlled from end-to-end by government agencies. Of these, fishermen and vendors only even store data from one stream: electronic vessel trip reporting (eVTR) systems.

Table 1(b) includes data streams for electronic monitoring (EM) systems, divided into three categories: data collected from the video that is required for compliance purposes, raw video data, and all other data collected from the video or sensors. Here, the story is mostly of potential. EM is still being implemented, and opportunities to use EM data largely remain unexploited.

In contrast to traditional data streams, which are controlled by government, vendors are largely responsible for much of the EM data lifecycle, and data reporting is done electronically. Critically, this means that government is not the sole possessor of a usable dataset: vendors and fishermen have access to the original data as it was collected. This may provide an opportunity to make EM data more accessible to fishermen, from portals into vendor-stored data to parallel reporting streams from EM systems to a fishermen-controlled repository.

Table 1(a) – Traditional data streams

	Vessel Trip Reporting (VTR) & eVTR	Vessel Monitoring System (VMS)	Pre-trip notification system (PTNS)	Northeast Fisheries Observer Program (NEFOP)	At-Sea Monitors (ASM)	Dealer SAFIS
How important is it to the community?	High	Medium	High	High	High	High
Who collects the data?	Fishermen on paper or with software provided by NOAA or 3rd party.	Onboard Vendor equipment includes pings, emails, and hails.	Fishermen report to NEFSC - FSB	NOAA-contracted Vendor	Fishermen-contracted Vendor	Dealers Dockside Monitor
Who manages the data?	GARFO	OLE	NEFSC - FSB	Vendor sends to FSB	Vendor sends to FSB	ACCSP sends data to GARFO
Who stores the data?	GARFO (All data) Fisherman (Own data) Vendor (Some data) SIMM (Some data)	OLE	NEFSC - FSB	FSB SIMM (Partial Copy) GARFO (Partial Copy)	FSB SIMM (Partial Copy) GARFO (Partial Copy)	GARFO Dealer
Who uses the data?	Sector Manager Fishermen GARFO EM Vendor	OLE	Sector Manager Fishermen EM Vendor	NEFSC + GARFO Sector Manager (Discards) PDT (Council Staff) Fishermen Rule of 3 limitations apply to use		NEFSC + GARFO SM (Discards) PDT (Council Staff) Fishermen Traceability Vendor
Who is responsible for quality assurance and quality control?	GARFO Sector Manager OLE *EM Vendor**	OLE	NEFSC - FSB	FSB *Sector Manager***		GARFO *Sector Manager*
Who analyzes the data?	GARFO	OLE (Aggregate data released)	NEFSC - FSB	FSB	FSB	GARFO

** EM Vendor only has QA/QC role for EM pilot.*
*** Sector Manager unofficially can crosscheck data, flag NOAA errors, and request corrections.*

Table 1(b) – Electronic monitoring data streams

	Electronic Monitoring (required data)	Electronic Monitoring (raw video data)	Electronic Monitoring (non-required data)
How important is it to the community?	High	High	High
Who collects the data?	Vendor, sent via API to GARFO	Fishermen, via Vendor systems	Vendor
Who manages the data?	Vendor GARFO	Vendor	Vendor
Who stores the data?	Vendor GARFO ACCSP*	Vendor	Vendor
Who uses the data?	GARFO NEFSC Sector Manager (Discard data) Vendor (Feedback data)	Vendor Fishermen	Vendor 3rd party with Fishermen approval
Who is responsible for quality assurance and quality control?	Vendor GARFO FSB	FSB	
Who analyzes the data?	GARFO FSB	Vendor	

** Expected*

Opportunities

Better access to data, and access to better-quality data, would support a range of business and research opportunities for the New England groundfish community. In the first workshop, participants identified those opportunities, and the traditional and future data streams that they would relate to.

The full list of opportunities can be found in *Appendix A*. Generally, the opportunities focused on three thematic areas:

- *Improved research opportunities*. Better access to data would enable fishermen to contract independent analysis of data, which could be used in advocacy and management efforts. Fishermen can also participate in additional data collection opportunities.
- *Business opportunities*. Access to video and other data can support transparency and provenance efforts. Fishermen can also use video data to defend against lawsuits.
- *Fishery management*. More data, and more accurate data, can help paint a clearer picture of the health of fishery stocks.

The future

Realizing these opportunities is not a simple task. There is not a single path to achieve the community's objectives. Rather, there are a range of options and potential projects, from a simple common data standard for EM data to a repository for any and all data related to New England groundfish fisheries.

Whatever their form, these projects will require the community to grow and change. Technical infrastructure for collecting and managing new data streams on behalf of the community will need to be built. The community will need to select or establish a management structure for any new data projects, and overcome a culture of mistrust among fishermen. Relationships with vendors, outside researchers, and government will need to change or form anew. And, of course, any project will need ongoing funding, or a business case to support it.

The future of data management in New England groundfish fisheries has yet to be written. What follows is a menu of options for how future data projects might be architected and governed.

The report

Part I of this report focuses on **technical models**, and their potential application in the New England groundfish community. Three models are highlighted: a standards body, a clearinghouse, and a repository.

Part II focuses on **legal models** for governing a data ecosystem: trusts, organizations, licenses, and other agreements.

Part III focuses on **actionable next steps**. It contains action points for how the community can move forward and answers to miscellaneous questions posed during this engagement.

An appendix with additional workshop outputs follows.

Part I: Technical Models

Key Terms
Application Programming Interface (API) – A set of functions that allow access to a piece of software or a database. APIs allow software tools to communicate with one another.

This section presents three potential technical models for community-run data projects: a standards body, a clearinghouse, and a repository. For each data stream, the community will ultimately make a simple choice: to hold data itself or to facilitate access to data. In a sense, this is a choice between a technical challenge and a political one. The three models here represent a range of options for how that choice can be implemented.

These models are meant to be illustrative, not definitive. A project may not fit neatly into a single technical model—the community may end up holding some data, facilitating access to other datasets (such as government data), and supporting standards for still other datasets (such as vessel EM data). Nor are the models mutually exclusive: after all, a monolithic repository will effectively set standards for accessing its data.

Standards body

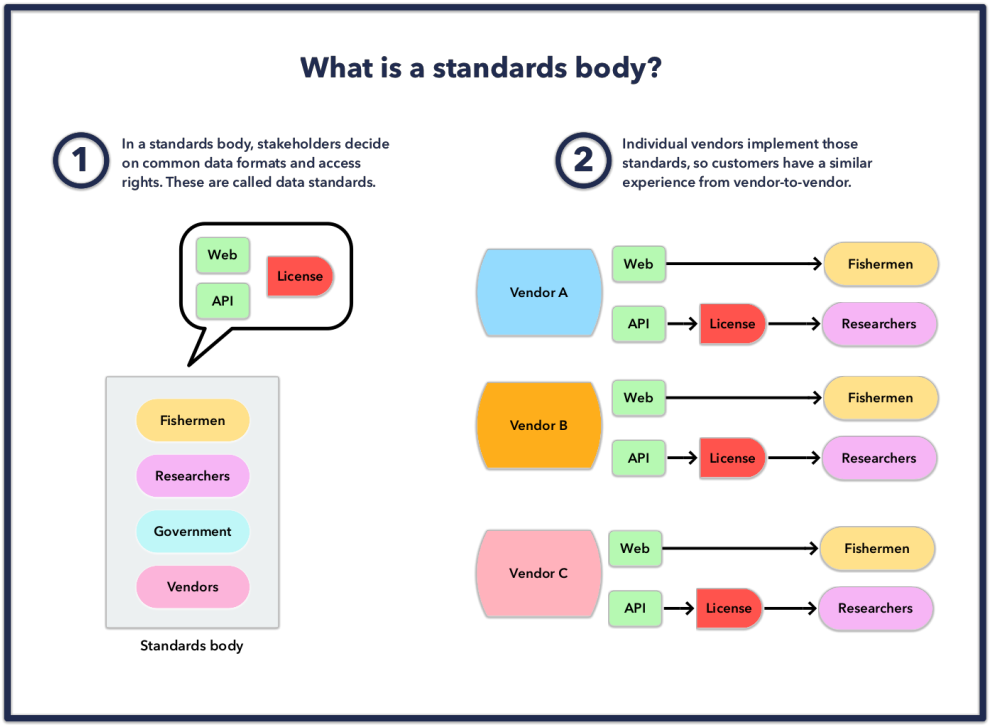
A data standard is a common format for data. It describes how data can be accessed, read, and written. A data standard may specify field names for individual data points (such as `vessel_name` to describe the common name of a vessel), the format of data (e.g., dates should be formatted `MM-DD-YYYY`, and time should include UTC time zones), and how to access data (e.g., individual trip data can be accessed via an API URL that ends in `/api/trip/[trip-id]`, while a list of trips can be accessed via `/api/vessel/[vessel-id]/trips`), among other things. Data standards improve interoperability: the ability to move data between different software systems, and the ability to write code that is compatible with multiple databases and software systems.

Data standards are typically governed by a standards body—a collaboration of data stakeholders. Here, community stakeholders could create a data standards body for EM or other fisheries data. The standards body would create and promulgate standard data formats for EM data, and mandate common storage and access requirements.

The standards body would not hold any data. Data would still be stored and managed on various vendor systems, but vendors would be

required to facilitate access to data for fishermen and stock assessment researchers via standard APIs and data formats.

A standards body may not be limited to setting data standards. It could also set common license terms, between vendors and fishermen, or fishermen and researchers. A standards body could eventually influence government: NOAA certification for EM vendors could require adherence to a data standard, for instance.



For a fisherman, this could mean that his data is more portable. If he switches vendors, he may be able to export his data from his old vendor's system, and import his data into the new vendor's system. If both vendors use the same data standard, this import and export may be relatively seamless, and vendors may be incentivized to build systems to facilitate this.

Government adoption of data standards (which could be separate from EM vendor standards) may help address data quality concerns from researchers and other community stakeholders. Given the wide variety of disparate data streams collected for each trip, simply adopting a common identifier across data streams (such as an eVTR trip id) may have a significant impact.

This technical model requires the community to build little additional technical infrastructure. Instead, the community will need to work with

vendors and researchers to create a common set of terms for using and managing data. Those terms could include:

- *Standardized data formats and API access across vendors*. Each vendor provides data in standard formats, via the same software requests.
- *Access rights*. Individual fishermen are able to access their own data via a web portal. A standard could define required data fields and a recommended time to availability.
- *Portability*. Fishermen are able to transfer their data from one vendor's system to another.
- *Sharing*. Fishermen are able to grant researchers or other third parties limited-scope access to data.
- *Retention*. Vendors are required to maintain records for a certain period of time, or provide for secure deletion.

Benefits

A standards body is inexpensive to implement: it requires relatively low buy-in from stakeholders, and little in the way of financial investment. For a community looking to build a data ecosystem anew, regularly convening a data standards working group may help facilitate a common culture around data use. If the standard is implemented, it may make data QA/QC easier, and make fisheries research easier to implement. Government adoption of data standards may make it easier to "mirror" government databases—i.e., create a private copy of the dataset to facilitate additional analysis.

Downsides

A standards body can be slow to implement and difficult to enforce. The investment that a standards body requires is political capital: vendors and government must be convinced to participate. To the extent that vendors build new systems to accommodate data standards, they may pass those costs on to fishermen. Finally, a standards body alone will not solve problems with data quality and availability.

Examples

- *Open Referral* – Open Referral supports data standards for social, health, and human services. It is responsible for the Human Service Data Specification, a format for data on service providers and directories of service providers. It is also responsible for the Human Service Data API, an open set of API specifications designed to make social service databases interoperable. Open Referral standards are currently in use by legal aid and social services providers in the United States. In 2018, the Alliance of Information and Referral Systems, a

membership group for social services providers, promoted Open Referral as its preferred standard for making databases interoperable.

Read more at https://openreferral.org

- *Open Civic Data* – Open Civic Data is an informally organized project to "define common schemas for gathering information on government organizations, people, legislation, and events". Perhaps its best known standard is the Open Civic Data Identifier, or OCD-ID. OCD-IDs describe geopolitical identifiers, such as county or jurisdiction. Google's Civic Information API uses OCD-IDs to help application developers build tools that identify government representatives and polling places for a particular residential address.

  Read more at https://opencivicdata.readthedocs.io/en/latest/index.html or https://developers.google.com/civic-information/

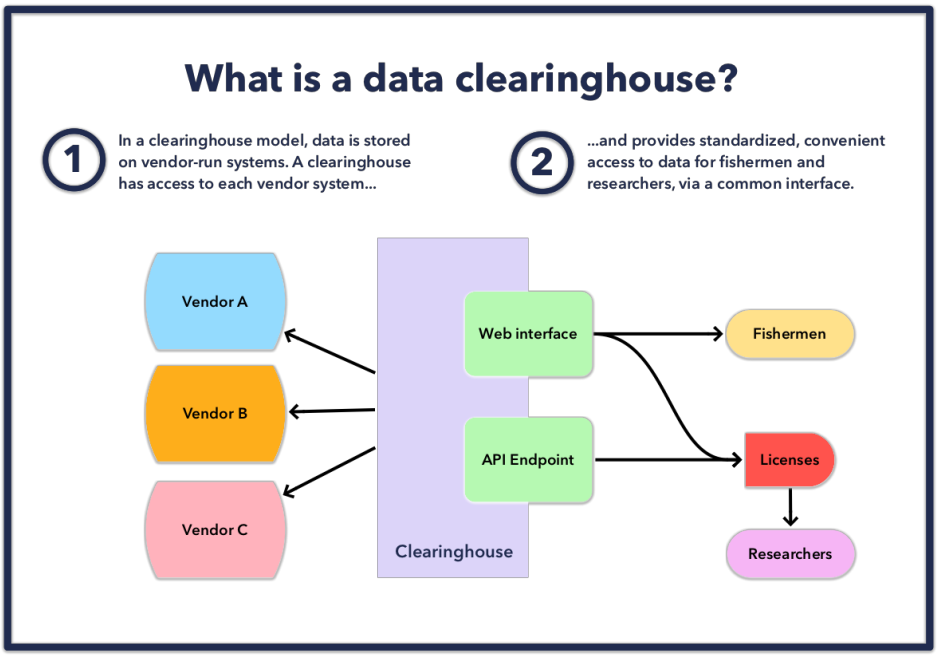
- *USDA Reporting Data Standards* — The USDA maintains open data standards and definitions for formatting, storing, and transmitting agriculture and food data. Their goal is to reduce the burden on food producers for participating in USDA-led programs.

  Read more at https://usda.github.io/data-standards/data-exchange.html

Clearinghouse

A data standards body defines a format for reading and accessing data, but relies on vendors and governments—the parties who actually hold the data—to build and maintain interfaces to datasets. Vendors and governments may not build new features or fix bugs at the same rate, or may not invest resources to support secondary use cases for data, such as research.

A clearinghouse model is designed to address these issues. A clearinghouse centralizes access to decentralized systems. In this model, most data is stored by vendors or government agencies. The clearinghouse negotiates special connections to these databases, and then makes them accessible to fishermen and researchers via a website and an API endpoint.



This could mean that every fishermen would use the same website to access their personal EM data, even if they used different system vendors. If a fisherman wanted to switch vendors, a clearinghouse could facilitate transfer of old data onto the new vendor's system, or the clearinghouse could store archival data itself.

For researchers, a clearinghouse model would provide access to multiple databases in one place. Where a clearinghouse cannot connect directly to an external data source, it could provide a link and information about the dataset. Researchers could connect their own datasets to the clearinghouse, to make it easier for others to access.

A clearinghouse could also act as a broker between data requestors and data holders. A clearinghouse could vet researchers, and send requests for data access to individual fishermen to be approved or rejected. This would enable new licensing models for voluntary research programs. For example, a researcher could create a "give data, get data" model for mapping bycatch hotspots, where a fishermen only receives analysis if he contributes his data. A clearinghouse could impose license requirements on a researcher or data requestor, such as restrictions on how data or analysis is used. Or, a clearinghouse could impose a "greedy" licensing requirement, where researchers are required to make their analysis available via the clearinghouse as a condition of accessing existing data.

Essentially, a clearinghouse is a way to organize a disparate collection of isolated datasets. Here, rather than copying every community dataset to one place, a clearinghouse builds connections to datasets. A clearinghouse could be a central hub for accessing fisheries data, without requiring the community to build a monolithic repository.

Benefits

A clearinghouse attempts to split the difference between a standards body and a full-on repository. To fishermen or a researcher, a clearinghouse would look much like a repository: they would use one platform to access data. To a vendor, a clearinghouse might look more like a standards body: they would still need to make their data available to the clearinghouse according to a specific data format, but they wouldn't be required to maintain independent access for fishermen and researchers.

Downsides

A clearinghouse requires more investment than a standards body, and is reliant on vendor and fishermen participation. A clearinghouse would need to separately account for the risks of losing access to vendor and government databases.

Examples

- *Government geographic databases* - Clearinghouses have become especially common for geographic (GIS) data. The Federal Geographic Data Committee runs a clearinghouse for geospatial data. It uses standard metadata to power a search engine for spatial data, services and applications.

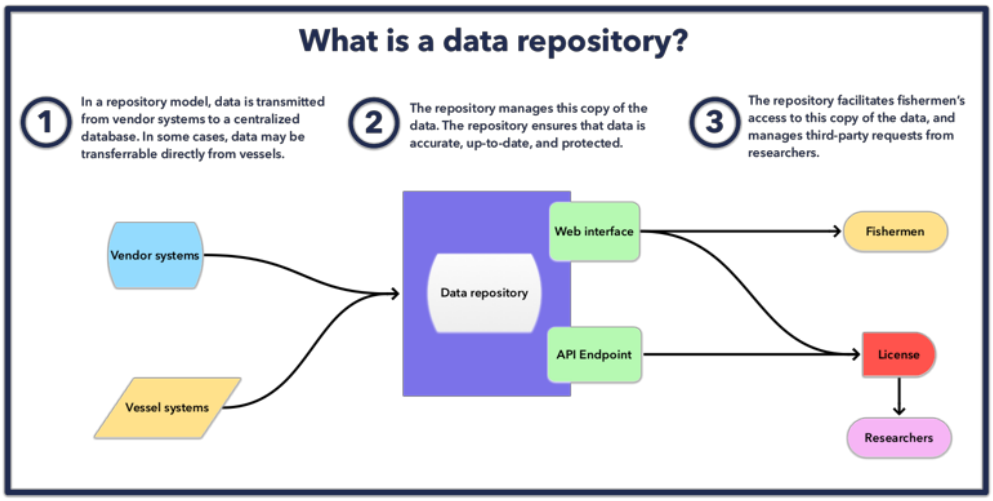
  Read more at
  https://www.fgdc.gov/dataandservices/clearinghouse_qanda

- *Oregon Department of Fish and Wildlife* uses a data clearinghouse to centralize access to datasets about Oregon's natural resources.

  Read more at
  https://nrimp.dfw.state.or.us/DataClearinghouse/default.aspx

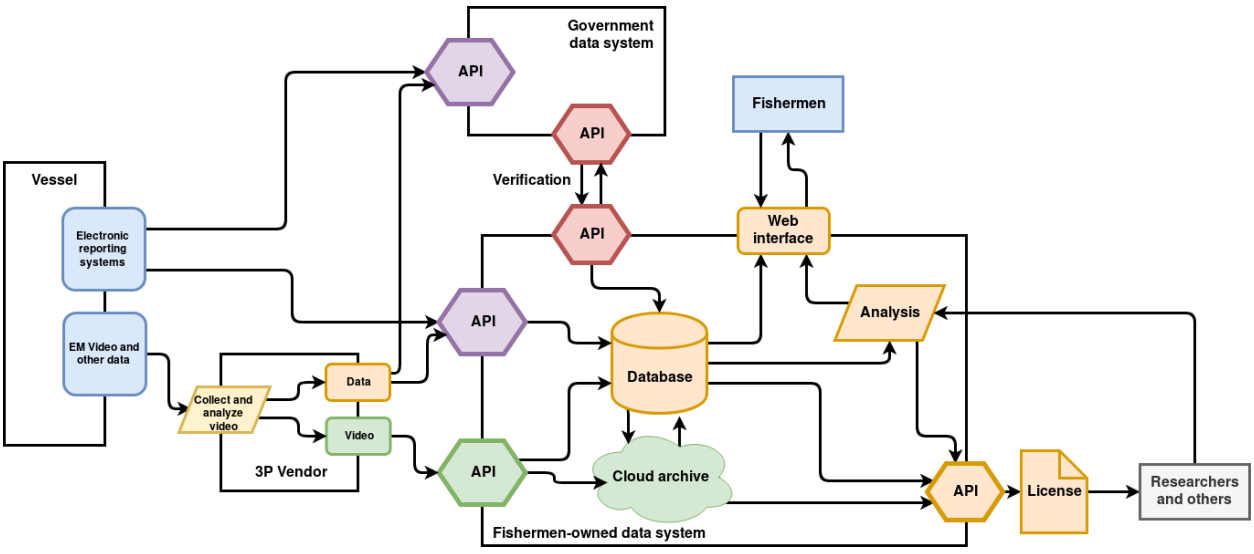
Repository Model

A repository centrally stores and manages data. A community-run repository would collect data from vessel EM systems, vendor systems, and other sources.



A repository gives the community complete control over how data is used. Just as in the clearinghouse model, a repository could make data available to fishermen, vet researchers, facilitate access to data, and manage licensing. Here, vendors would transfer data to the repository once, at the time of reporting. This may obviate the need for data standardization, and would only require vendors to send data to a repository.

A repository could facilitate a parallel data collection system for vessel-based EM data:



Here, vendor systems report data in parallel: to government systems and a fishermen-run repository. The fishermen-run repository makes data accessible to fishermen and researchers, and retains analysis that researchers produce. Legal agreements and technical standards help fishermen access their own data and facilitate connections to researchers. This repository isn't an island: it would likely require some connection to a government database to resolve discrepancies, incorporate official determinations, or gather additional fisheries-related data streams. In the above example, the connection to government databases is modeled as an API, but data resolution could also be done manually (and may need to be).

Under a repository model, the repository would become the primary data contact for fishermen. Fishermen would have a legal agreement with the repository manager about how their data can be used, and under what circumstances. A repository would give researchers an opportunity to not only request data from fishermen, but potentially to store sensitive research data of their own. Finally, a repository could mirror government datasets, storing a backup copy to ensure data continuity in the event of government shutdowns or policy change.

With this control comes increased responsibility. A repository manager would need to take an active role in ensuring that the data it holds is accurate, up-to-date, and secure.

Benefits

A repository model gives the community the most control over its data ecosystem, with the fewest dependencies on outside parties.

Downsides

A repository model is costly, and requires substantial ongoing investment in technical infrastructure and personnel. It isn't immediately obvious who in the community can take on this investment and responsibility, as well as earn the entire community's trust.

Examples

- *California Data Collaborative* (CaDC) is a data repository for water management in California. It is a collaboration between cities, water managers, and land planners. Participating agencies adhere to a set of technical standards and send data on actual metered usage to the Collaborative's data infrastructure. The CaDC contracts with Project ARGO, a data science 501(c)(3) to support real-time analytics and ongoing novel research.

Read more at: http://californiadatacollaborative.org/

- *StreamNet* is a repository of fish and habitat data in the Columbia River Basin. A collaboration of multiple agencies and organizations, StreamNet maintains regional data formats, facilitates coordination and training programs, and runs a secure data store.

  Read more at https://www.streamnet.org/about/what-we-do/

Part II: Legal models

Key Terms
Trust – A legal agreement for owning an asset on behalf of another party. In a trust, a trustee owns assets, but beneficiaries benefit from the asset's use. Trusts can be charitable or noncharitable, and do not always have to be registered with a state.

Organization – A legal entity created through a state's laws of incorporation or organization. An organization can include a nonprofit, a corporation, or an LLC.

Negligence – Failure to act with the level of care that an ordinary person might.*

Gross Negligence / Recklessness – Behavior that is an extreme departure from the level of care that an ordinary person might use.*

** Definitions of Negligence and Gross Negligence from Wex Legal Dictionary, Cornell Law School (*https://www.law.cornell.edu/wex/)

This section presents legal models for governing a community-run data project.

Any data project will rely on a manager: a person or organization responsible for day-to-day operations. This manager could be a trustee in a trust, a CEO or an executive director of an organization, or even a contractor hired to maintain technology. Of course, a project could have multiple managers, each responsible for different components of a project. Regardless of the management structure, this means that although a given data project could be designed to benefit (and be owned by) fishermen, fishermen will likely not be involved in the project's day-to-day management.

Fishermen may potentially serve two roles in a data project. First, they may be owners (in an organization) or beneficiaries (in a trust) of the project. As owners, the project's manager will owe fishermen fiduciary duties—legal duties of care, loyalty, and responsibility. Second, they may be users of a data project. As users, the legal obligations between a project and a fishermen will be defined by a contract. Contracts are extremely flexible legal tools, and will need to be tailored to a specific project and specific relationship.

This section will primarily focus on the relationship between a manager and the fishermen community as owners of data projects. First, it will

discuss the differences between trusts and organizations as legal entities to house a data project. Second, it will discuss specific powers that a manager of a data project could have, based on outputs from the second workshop. Finally, it will briefly discuss other legal infrastructure, including a potential set of data rights for fishermen to inform licenses and contracts.

Legal entities

Generally, a data project will need to be housed in a legal entity. Two possible entities are discussed here: organizations and trusts.

An organization is a legal entity that is created through state laws of incorporation. Organizational forms include corporations, nonprofit organizations (or nonprofit corporations in some states), and limited liability companies (LLCs). Corporations and nonprofits are governed by articles of incorporation and bylaws. They are governed by a board of directors, and run by officers. Officers and directors owe a fiduciary duty to a corporation's owners or shareholders. Nonprofit corporations do not have owners, and are typically regulated by the Attorney General of the state they are incorporated in.

LLCs have fewer formal governance requirements. They aren't required to have a board, and are owned by members instead of shareholders. An officer of an LLC has similar fiduciary duties to an officer in a corporation.

A trust is a legal entity to own something for the benefit of someone else. A grantor puts an asset into trust via a trust document, which also designates the trustee, beneficiaries, and governing rules. A trustee is responsible for the management of a trust. A trustee owes fiduciary duties to beneficiaries: a person or people who have the right to benefit from the trustee's management of the asset. Many trusts don't have to be registered with a state government, although charitable trusts may have registration requirements.

Trusts vs. organizations

American law around organizations and trusts is highly flexible. Here, this report describes **default** conditions of trusts and organizations. In many cases (but not all), those defaults can be overridden by the trust document or organizational bylaws. This means that a trust can look very much like an organization (such as having a board), and an organization can take on the additional duties and asset ownership of a trust.

Outside of what is explicitly defined in a governing document, trustees and organizational managers have a broad degree of tactical

autonomy: they can decide how to carry out their duties on behalf of the organization. Both organizational leaders and trustees have duties of loyalty: corporate officers must be loyal to an organization's shareholders or members, and trustees must manage the trust property to benefit beneficiaries.

Trusts and organizations differ in their default duties of care: the degree of legal responsibility that their managers bear. Generally, a trustee is held to a stricter standard than an officer or director in an organization. A trustee is obligated to manage a trust "as a prudent trustee" would—in other words, they must make decisions that a person of "ordinary prudence" would follow. This means that trustee can be found liable to beneficiaries for simple negligence, similar to tort law. It also means that any action a trustee takes can be challenged in court on prudence grounds. Finally, trustees are personally liable for the actions they take.

Officers in organizations are held to a less strict standard: a corporate officer must make an "informed decision", but that decision can be bad, or money-losing. Here, the legal standard for finding a corporate officer liable to shareholders is recklessness or gross negligence.

To put it another way, a trustee can be more easily found liable for the harm he does to the trust. A corporate officer is less easily found liable for the harm he does to the corporation.

One possible reason for this difference is that shareholders have greater freedom to leave a business—they can sell their shares, for example—whereas beneficiaries generally cannot leave a trust. As a result, beneficiaries and trusts deserve extra protection against a poor trustee.

Although these default responsibilities apply to fishermen as owners, this principle provides helpful guidance for how to assign responsibility in data projects. In general, if a project is practically difficult for an individual fishermen to leave, that project's manager should have stricter legal responsibilities. For some projects, a fisherman's ability to exit a data project may sit somewhere in the middle. Even if fishermen were restricted from removing their existing data from a system—for instance, once their data has been incorporated into analysis—they could still decline to add future data, and eventually wind down their participation over time.

Not all projects will need their own entity. In some cases, existing organizations can host projects, and create obligations to fishermen via contract. Other projects may not need an entity at all: a standards body could theoretically operate as an informal working group, or as an

agreement between the standards-setting parties. Without a legal entity or a strong set of legal agreements, decisions about a project's data use and control are likely to be less stable and predictable.

Powers and Permissions

What should a manager or trustee specifically be allowed to do with data? Here, a manager's responsibilities are expressed in terms of powers. These are usually defined in an organization or trust's governing documents.

A power describes an activity that a manager can do in the course of fulfilling their duties. They can be divided into three informal categories.

1. *Usually Allowed.* Managers and trustees are generally free to carry out some set of activities, without requiring any extra permissions. These activities are typically part of their day-to-day responsibilities of running an organization or trust.

   Example: A manager can act as an organization or trust's representative, and sign contracts on behalf of the organization or trust.

2. *Extra Permission Required.* Some activities may require additional permissions, either from the board, a beneficiary, or another affected stakeholder.

   Example: When an organization takes on substantial debt, board approval is often required before a manager can proceed. In a trust, activities that may reduce the value of the asset or involve disposing of the asset may need approval of beneficiaries.

3. *Prohibited*. Finally, some activities are prohibited. A manager may not engage in them. A governing document may list specific activities that a manager may not engage in, beyond ones that would violate a manager's existing legal or fiduciary duties.

   Example: A manager may be forbidden from divulging confidential information to the public.

Permissions Table

In the second workshop, participants described permitted and prohibited activities for a steward of fishermen's data. The output of this workshop is described in *Table 2*.

Table 2 – What should a data project manager be able to do?

Usually Allowed	Extra permission required	Prohibited
• Provide individual fishermen their own data and video on request. • Verify data from official sources. • Provide individual trip-level data to pre-approved sector manager. • Provide data to parties who have access to it. • Carry out real-time quota estimates. • Manage data licenses. • Collect fees for maintaining system. • Contract with third party to perform stock assessment research.	• Provide individual trip level data to others, only if permission is received from fisherman, and data is not shared beyond recipient.	• Disclose data to adverse parties. • Transfer ownership of data. • Grant unlimited licenses to data.

Based on this output, participants were primarily concerned about preventing individual trip-level data from being shared with outside parties without permission of the fisherman who took that trip. This suggests that a manager might also be obligated to limit individual trip-level data from being inferred from the sharing of other data. A successful data project, then, may depend on its ability to efficiently acquire permission from fishermen, if and when that permission is needed.

Other legal infrastructure: what would a terms of use look like?

As potential users or contributors to a data project, fishermen will also agree to a contract:a set of legal terms that govern what can and cannot be done with their data. This contract creates obligations between the operator of a project and their users. Although a complete terms of use will be specific to a particular project, possible terms for a fishermen-governed data repository might include:

- Fishermen have ownership rights over data collected on their vessel and submitted to the repository.
- The repository will host fishermen's data, in exchange for being able to run certain types of analysis on that data. (For instance, aggregate analysis, or research necessary for stock assessments.) The repository will own that analysis.

- Fishermen can "opt in" to other data-related opportunities, such as hotspot analysis or environmental assessments. Fishermen may receive benefits for an opt-in, such as access to analysis from their data.
- A repository could also offer opportunities for fishermen to run custom-built analysis on their own data. Fishermen would own analysis they run, and would be able to keep it confidential.
- The manager of a repository will make reasonable efforts to secure and protect data, and keep the repository up-to-date with industry best practices.
- Fishermen have some rights to elect that their data be securely deleted.

Part III: Next Steps

This part includes action points for the community, a checklist for building a data project, and answers to additional questions posed by community stakeholders.

Action points

The community can take steps now to better prepare for future data projects.

Identify a manager or managers.

The potential projects identified here do not all have obvious managers. Sector managers may have conflicts of interest due to their regulatory obligations, and may not have the resources to maintain a data project. Potential managers may need additional training to take on new data projects.

The community may not need to adopt a monolithic repository, governed by a single manager. A repository for federal fisheries data could be managed separately from a repository for individual trip-level data. Smaller projects may also help facilitate custom management structures: trip-level data will likely need stronger protections than aggregate research, for instance.

Decide on a risk management plan.

Stored data is a liability. The chance of a data breach or a legal subpoena can be reduced but not entirely eliminated. A data steward may be liable in the event of a privacy or security breach, or be caught in the middle of a legal request for data.

This risk can be partially mitigated through a variety of measures, including data breach insurance, cybersecurity audits, and written policies on data retention and disclosure. The community should begin to build a plan for managing risks and liabilities related to a data system. This may include training for fishermen: databases are commonly breached by phishing individual users—sending a fake email to defraud a user out of their credentials. Fishermen and administrators will need to be trained to recognize and avoid these kind of attacks.

This effort should include engaging with litigation counsel to build a strategy around handling subpoenas and other data requests. The selection of a legal entity will generally not prevent a subpoena from being issued, but there may be legal grounds to fight subpoenas, depending on the case and the data being requested.

Build vendor relationships around technical specifications.
The community should take advantage of EM's early stage of adoption to set standards for data reporting. Vendors will need to be incentivized to report data to a fishermen-owned system in addition to their required government reporting.

Building a data collection and management platform will require relationships with new vendors, particularly as technical needs evolve. It is likely that a final system will include components from multiple vendors communicating with one another via APIs.

Build the business case.
Fishermen face a heavy data collection burden and see little business return. Gaining fishermen buy-in on a new data system will require making a clear case that this system will justify the investment, and not add to their data collection burden. This is ultimately an organizing feat rather than a technical or a governance one: prioritizing small projects that deliver visible results or tangible benefits for fishermen, or that fulfill explicit requests for information or data.

Community stakeholders identified potential opportunities for starting to build the business case:

- using eVTR trip identifiers to unify and clean up data collected from other data streams, and;
- extra EM data collection on non-groundfish to support 3rd party analysis on recovering fluke population

Build capacity.
Regulatory and scientific needs have made fishing a data-driven industry. Advances in electronic monitoring and machine learning will make it even more so. As a result, effective advocacy for independent fishermen will require in-house data and technology expertise. Although the data projects described in this memo will likely be built by outside contractors, technology and data governance should be considered core competencies by fisheries stakeholders.

Building a data project, step by step.

The data projects contemplated in this report vary in scope. Helping fishermen easily access their EM data is substantially different from making existing federal fisheries data more available to researchers. The guide below walks through scoping and developing a hypothetical data project, from purpose to governance.

1. *Decide what the project's purpose is.* Justify the project's existence, and describe how it will work.
    a. Why does the project exist?
    b. What is the business case for it? Who will pay for start-up costs and ongoing maintenance?
    c. How will it function, in non-technical terms?
    d. What are comparable projects out in the world?
2. *Decide on the technical model.* Next, determine the project's technical and data needs.
    a. What data will need to be stored by the project? What data will need to be accessed from other databases?
    b. Given the purpose, what is the minimum level of technical infrastructure that the project requires?
    c. What technical infrastructure already exists to support the project?
    d. What new infrastructure will have to be built?
3. *Decide on membership, management, and oversight.* Decide who will run the project, and who will have ownership rights over the project.
    a. Who will own the project, or be entitled to benefit from it?
    b. Who will manage it? Who will oversee the manager?
    c. What will the manager's responsibilities be?
    d. Who will be able to use the project?
    e. What other stakeholders will engage with this project?
4. *Decide on the legal entity.* Pick a legal home for the project.
    a. Which legal entity is the best home for the project?
    b. Should the project live in a new entity or an existing entity?
    c. What additional protections should the legal entity have?
5. *Decide on other infrastructure.* Establish contracts, risk mitigation, etc.
    a. What other legal relationships does this project require?
    b. What should the terms of those relationships be?
    c. What are the risks of the project? How will they be mitigated?
    d. What else does the project need in order to run?

Frequently Asked Questions

This section answers questions from community members over the course of the engagement.

In each legal structure, who has final say over who can access the data?

By default, the manager running the legal structure has final say. A contract can obligate the manager to request permission from another party, such as a fisherman.

Fishermen want to hold different type of data for different amounts of time. Which legal and technical framework would be best for this sort of tiered approach that can be customized for each individual?

This approach could be executed under any of the legal or technical frameworks described in this report. The best approach would likely be that a project sets default terms for handling and deleting data that can then be overridden by users. So a user could select an option that says "automatically delete any data older than [x] months/years". A platform could also give users the option of deleting their data manually.

A project might alternately make the choice to delete data after a certain period of time. In that case, a user may have to pay to have the data stored for longer.

Will any of these legal or technical entities be better or worse at resisting a subpoena?

Generally, no. A subpoena can be targeted at any party who has access to documents or data. This could be a fisherman who has access via a web portal, or a vendor who hosts data on their system.

A subpoena against a non-litigating party can be challenged on a number of grounds, including relevance to the lawsuit and the threat of revealing confidential information. Although protecting business confidential information will not definitively block a subpoena, it may be a useful argument to make here. The success of these challenges will depend on the specific case at hand, and the community should engage with litigation counsel to develop a strategy for handling subpoenas and other legal requests for data.

Conclusion

Data is potential. Fishermen collect a wealth of data about what they do. Gaining control of that data can help fishermen understand what they do well, and what they can do better. Data can help researchers get a more accurate picture of a fishery's health. Most importantly, data gives fishermen agency: the freedom to pursue whatever opportunities arise.

That data can also cause harm. It can be leaked or subpoenaed. It can reveal under-performers, or that a fishery is less healthy than expected. Holding data creates new responsibilities that the community must be able to meet.

Good governance will not revitalize a fishery. It will not prevent a data breach. It will not build new technical capacity. But good governance can help build a better culture of managing and using data. It can create rules and structures that everyone understands and buys into. And it can help a data project earn a community's trust, and so the community can realize data's best potential.

Appendix A
Data Stream Opportunities

Participants from Digital Public/CCCFA's October 2018 workshop identified the following opportunities for using existing and future data streams.

*** - identified by participants as an important short-term opportunity.*
(x2) – identified by multiple participants

General Data Opportunities

Research

- Get third-party scientific analysis to support PDT/Council work.
- Fishermen can hire researchers for outside science.

Business Improvements

- Streamline data systems.
- Aggregate and analyze data to support business decisions (e.g., bycatch, hotspot).
- Use catch data for bycatch avoidance.
- Improved data sharing for bycatch / quota management.

Public Approval

- Improved public approval from better data transparency.
- Improved traceability, which can provide consumers with more confidence than seafood ratings.

eVTR Data Opportunities

- Use trip identifier to resolve multiple data streams.**
- Scientists are more likely to trust fishermen collected data.

VMS Data Opportunities

- Show fishing footprint to defend against other uses.
- Location data used to protect fishing grounds in mixed use scenarios.

Observer Data Opportunities

- More timely processing of data, for QA and requests.**

EM Data Opportunities

Research

- Fishermen can have more trust in science.
- EM data reduces observer effect, creates better fisheries-dependent data for science and management efforts.

Business Improvement

- Fishermen can use data for their own business decisions. (*x2*)
- Prevent data loss over time when fishermen change providers.
- Insurance company uses video to defend against lawsuits.

- Video used for marketing or transparency. (x3)

Fishery Management

- Better discard estimates.
- Improved catch per unit effort (CPUE) / standardized index (x2)
- Better data on catch trends in vs out of closed areas.
- Adjust trawl survey timing from updated temporal spatial fish patterns.
- Store metadata on protocol changes.

EM Video Opportunities

- Video used to build machine learning algorithm to handle monitoring.
- Better data for indicators of stress on stocks (skinny fish) or abundance).
- Analyze fish lengths for age structural analysis.
- Archival storage for future analysis.

Other Data Opportunities

- Extra science: sensors could be used to build temperature and bathy maps, to support other science and climate data (x3)
- Soak time of fixed gear could lead to better CPUE.

Appendix B
Workshop Attendees

Workshop 1 – October 10, 2018

1. Melissa Sanderson, CCCFA
2. George Maynard, CCCFA
3. Chris McGuire, The Nature Conservancy
4. Mark Hager, Gulf of Maine Research Institute
5. Jonathan Labaree, Gulf of Maine Research Institute
6. Dr. Steve Cadrin, SMAST, UMass Dartmouth
7. Cate O'Keefe, Mass Division of Marine Fisheries
8. Brooke Wright, SMAST, UMass Dartmouth
9. Alex Hansell, SMAST, UMass Dartmouth
10. Ben Martens, Maine Coast Fishermen's Association
11. Sean McDonald, Digital Public
12. Keith Porcaro, Digital Public (facilitator)

Workshop 2 – November 30, 2018

1. Melissa Sanderson, CCCFA
2. George Maynard, CCCFA
3. Chris McGuire, The Nature Conservancy
4. Mark Hager, Gulf of Maine Research Institute
5. Cate O'Keefe, Mass Division of Marine Fisheries
6. Brooke Wright, SMAST, UMass Dartmouth
7. Mary Hudson, Maine Coast Fishermen's Association
8. Hank Soule, Sustainable Harvest Sector
9. Sean McDonald, Digital Public
10. Keith Porcaro, Digital Public (facilitator)