



## Fishing for sustainable code

### Problem Statements

Participants of the 2014 Fishackathon may work to address one or more of the Problem Statements below. The Problem Statements revolve around challenges in:

- Collecting data at the location where fish is caught and brought to shore.
- Managing that data so it flows throughout government and seafood industry information systems.

The geographic scope of the problem statements gathered by the US Department of State includes the Philippines, Ghana and West Africa in general. The Monterey Bay Aquarium problem statement looks at the challenge of moving information through a global seafood supply chain.

Ultimately, better information about where and how fish is caught allows for more sustainable management - and a future with healthier oceans.

Fishery experts will be on hand during the Fishackathon in person and via Google Hangout.





**Title:** Catch the Catch Data: A call to enhance fisheries data generation and acquisition to support sustainable fisheries

**Proponent:** Philippines/USAID's Ecosystems Improved for Sustainable Fisheries (ECOFISH)

### Background

The Philippines is an archipelagic nation composed of 7,597 islands with a coastline that measures 36,289 km and a total territorial water area of 2,200,000 km<sup>2</sup>. In 2009, the country ranked 6th among the top fish producers in the world, with its total fisheries production amounting to 5.08 million metric tons of fishery products<sup>1</sup>. In general, the Philippine fisheries sector is characterized by a high degree of resource dependence and provides direct livelihoods for an estimated 2 million people<sup>2</sup>. Statistics show that the municipal fisheries sector, i.e. small-scale fisheries operating within municipal waters (15 km from the shoreline), directly employs an overwhelming 85% of the total number of fishing operators in the country<sup>3</sup>. Sustainable management of these fisheries, therefore, is crucial not only to marine biodiversity but to economic development and sustainability as well.

Many studies have presented strong evidence that exploitation of fisheries has resulted in changes in marine ecosystem structure and functioning<sup>4,5</sup> that ultimately affect the sustainability of fisheries with significant economic and social consequences. A major challenge to fisheries scientists and managers is to identify policy options for management in areas with limited fisheries data.

In the context of the Philippines, commercial fisheries landings are more easily monitored and recorded by efficient forms of catch data reporting (e.g. logbooks, fisheries observer program) in compliance with regional and international commitments. However, the small-scale fishing sector – which is primarily subsistence and artisanal in nature – remains largely undocumented. Where data may be available from independent sources, these are often difficult to consolidate due to differences in methodologies for data acquisition, differences in the geographic scale and

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<sup>1</sup> Bureau of Fisheries and Aquatic Resources. Philippine Fisheries Profile, 2010.

([http://www.bfar.da.gov.ph/pages/AboutUs/maintabs/publications/pdf%20files/2010%20Fisheries%20Profile%20\(Final\).pdf](http://www.bfar.da.gov.ph/pages/AboutUs/maintabs/publications/pdf%20files/2010%20Fisheries%20Profile%20(Final).pdf))

<sup>2</sup> Green, S.J., A.T. White, J.O. Flores, M.E. Carreon III and A.E. Sia. 2003. Philippine Fisheries in Crisis: A framework for management. Coastal Resource Management Project of the Department of Environment and Natural Resources, Cebu City, Philippines, 77p.

<sup>3</sup> Bureau of Fisheries and Aquatic Resources. Philippine Fisheries Profile, 2010.

([http://www.bfar.da.gov.ph/pages/AboutUs/maintabs/publications/pdf%20files/2010%20Fisheries%20Profile%20\(Final\).pdf](http://www.bfar.da.gov.ph/pages/AboutUs/maintabs/publications/pdf%20files/2010%20Fisheries%20Profile%20(Final).pdf))

<sup>4</sup> Jackson, J.B.C., Kirby, M.X., Berger, W.H., Bjorndal, K.A., Botsford, L.W., Bourque, B.J., Brackbury, R.H., Cooke, R., Erlandson, J., Estes, J.A., Hughes, T.P., Kidwell, S., Lange, C.B., Lenihan, H.S., Pandolfi, J.M., Peterson, C.H., Steneck, R.S., Tegner, M.J. and Warner, R.R. (2001) Historical overfishing and the recent collapse of coastal ecosystems. *Science* 293, 629–638

<sup>5</sup> Pauly, D., Christensen, V., Dalsgaard, J., Froese, R. and Torres Jr., F. (1998) Fishing down marine food webs. *Science* 279, 860–863.





data resolution, questions on the statistical validity, and uncertainties in data accuracy. All these inefficiencies contribute to large information gaps that make the formulation of adequate and appropriate management policies a difficult challenge for fisheries management in the Philippines.

The national government agency that is primarily responsible for the management of the country's fisheries resources formally initiated the National Stock Assessment Program (NSAP) in 1997 to conduct a standardized scheme for the collection of fisheries information to enable fisheries resource assessments that are fundamental in fisheries management. Local government units (LGUs) are given the jurisdiction and management responsibilities over the utilization of municipal waters and the resources therein. Unfortunately, LGUs generally have limited capabilities and resources to conduct regular and continuous collection of even basic fisheries data in their respective localities.

To reduce the uncertainties in fisheries resources management in the Philippines, there is therefore urgency to scale-up fisheries data acquisition and generation, foremost to estimate fish production to a high degree of accuracy. This entails: 1) expanding the spatial coverage of fisheries data collection; 2) increasing the number of capable fisheries data collectors; 3) enhancing the accuracy of fisheries data collected; and 4) engaging the local stakeholders (including but not limited to the local governments, local fishers organizations and councils, and local markets and industries) to participate in the collection of fisheries data that will have a direct utility to local fisheries management. In other words, the challenge is to “catch the catch data” from the capture fisheries sector – from the smallest to the largest producers – in order to promote more informed management for sustainable fisheries in the Philippines

### Problem Statement

To promote objective and informed governance for sustainable fisheries, the Department of Agriculture-Bureau of Fisheries and Aquatic Resources (BFAR) and USAID's Ecosystems Improved for Sustainable Fisheries (ECOFISH) Project in the Philippines outlines the following problem statement to provide context for a potential technology solution to capturing fish catch data:

**Collection of adequate catch data in the numerous small-scale fisheries in the Philippines is not reliable given inefficient techniques and lack of technology. Large information gaps render the formulation of adequate and appropriate management policies a difficult challenge.**

A solution is needed to enable data collectors in the field to collect accurate data more quickly and efficiently. The following further illustrates the context surrounding the problem of accurate fish catch data collection, and offers potential solution points.





- **Old technology informs current data collection.** Government-hired data collectors in the field rely on inefficient and out-of-date approaches to collect fish catch information. Current data collection is done with a weighing scale, a meter-long ruler, a field guide for species identification, and paper data sheets which are filled out by hand.
- **Inefficient collection is slow and sometimes inaccurate.** Catch data are fundamental to be able to assess the status of fisheries, but taking measurements and recording them can take a lot of time. One or two data collectors is assigned to five landing centers at which they monitor catch data 21 days per month, per site. Current data collection practices make it difficult for data collectors to accurately log all required information. In some locations the catch data is logged only 1-2 times per week.
- **Data collectors need to record basic information from a highly diverse fish catch.** Small-scale fisherfolk are hauling in nets with many different types of fish species, all of which must be documented. Crucial information must be monitored and recorded in order to provide accurate metrics on fish catches. Illustrative information to be collected includes catch time, vessel type, gear type, catch type, catch volume, catch length, and geographical area of fishing ground. A full list of the indicators list listed in Annex A – Sample Data Spreadsheet.
- **Numerous landing sites exacerbate the need for more efficient data collection.** Currently data collection surveys reach only 2% of identified landing sites in the country. It is difficult to reach all catch landing sites as they include stretches of beach, areas near the market, and other “unofficial” catch landing sites in addition to landing centers and fish landing sites. The goal is to increase comprehensive catch data collection to 20% of all landing sites in the country.
- **Data collection is done on the shore, not on the ocean.** In order to identify the location of a catch, data collectors ask fisherfolk to point to their fishing location on a map, but there is no way to verify location accuracy.

## Acronyms

DA-BFAR	Department of Agriculture – Bureau of Fisheries and Aquatic Resources
ECOFISH	Ecosystems Improved for Sustainable Fisheries
EEZ	Exclusive Economic Zone
LGU	Local Government Unit
NSAP	National Stock Assessment Program





### Example Data Spreadsheet

Ref No.	Body of Water, Fishing Ground	Sampling Date	Sampling Time	Municipality	Landing Site	Gear local name	Gear English name	Time set	Date set	Time hauled	Date hauled	No. hauls
Lo6-G01-0086	Lanuza Bay	8/29/06	7:10	Cantilan	CL	Pukot palagod	Bottom-set gillnet	4:30	8/29/06	5:00	8/29/06	1

No. of fishers	Vessel type	Engine	Hp	Length of boat (m)	Height of boat (m)	Width of boat (m)	Weight of catch (kg)	Weight of sample (kg)	Notes
2	M	Briggs	16	5.49	0.64	0.51	3.00		





**Title:** Development of an application to help reduce illegal trawling in Ghana's coastal waters

**Proponent:** Government of Ghana

### Problem Statement

Ghana's coastal waters are protected by law from bottom trawling for fish, which can both damage sensitive natural habitats needed to support the country's fisheries, and also come into direct conflict with small-scale fishing activities in the same area. To help address this problem, together with broader enforcement of fishing laws and regulations, the Government of Ghana recently established a Fisheries Enforcement Unit (FEU). While this unit has a number of patrol boats and surveillance tools available to it, perhaps none could be as effective as the thousands of small-scale fishers who are active on the water every day, and could serve as eyes and ears for the authorities - and who in fact have the most to gain from a reduction in illegal bottom trawling.

Neighboring countries have already begun to pilot such an approach, and in Liberia a 'trawler-spotter' application has been developed for use on analogue phones distributed to volunteer fishers, to take pictures of illegal trawlers, where the GPS location is automatically recorded when the photo is taken, and the information transmitted to authorities (and considered as evidence in a court). The challenge for Ghana would be to build on this pilot and experience, and for example to utilize the open source software already available such as ushahidi (<http://ushahidi.com/products/ushahidi-platform/>) to develop a specific application and forms for use on any kind of smartphone in Ghana, that fishers could use to take photos and record key information (e.g. time, date, location, what the vessel is doing, etc.) for use by authorities - and potentially civil society and the media - to prosecute and reduce illegal trawling. We expect that the challenge is not so much a function of writing new software code for this problem, but rather to utilize existing software and platforms to customize an application suitable for Ghana, that could help local fishers spot and communicate illegal trawling activities. This would probably not take a lot of time and volunteers, so perhaps the easiest way to do it may be through a webex communication between the resource persons and some dedicated volunteers at the event, over the course of several hours to develop a specific application and form that would be workable for Ghana (taking into account the time difference for the resource persons in Accra and Lyon).

It should of course be noted that the application is not the end of the story - i.e. the tech solution - the actual systems and process for communities and fishers to use this technology and report infractions must be linked to the next steps of what will happen with the information reported





(who will reports go to? what action will be taken to verify the report and act - by whom and by when? how will the report be responded to and by whom? how will reports be logged and used for monitoring?). Consideration will also be given to as many uptake mechanisms as possible in addition to smartphone applications, given the number of challenges that can arise with use of the app such as network coverage, phone credit, power supply, etc. Paper-based reporting and waterproof cameras with GPS may be used to supplement the app for some volunteers.

**Video Clip:** <https://www.youtube.com/watch?v=MLQ8bh---h4>

**Resource persons:**

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**Title:** West Africa Mobile Application for Sustainable Fishing Capacity Management

**Proponent:** West Africa Regional Fisheries Program, World Bank

### Background

West Africa has significant and valuable fish stocks and strong traditions and cultures of fishing. For instance, 13 West African coastal countries (from Mauritania to Nigeria) produce annually about 2.6 millions tonnes of fish (Lam, Cheung, Swartz and Sumaila, 2012) that are essential in terms of food security and income generation. Millions of people are dependent on the fisheries sector for their livelihoods. However, most of West Africa fish resources are heavily overexploited and the sector's profitability is declining. This reflects a situation where there are simply too many vessels fishing commercially, including both foreign and local industrial vessels, and thousands of small-scale fishing vessels that are highly mobile throughout the whole Sub-Region. A number of efforts are underway in the region to better manage these fisheries and particularly the industrial fisheries, but a growing challenge has been the management of highly mobile small-scale fleets that are also contributing in some cases to overexploitation. For this reason, many West African countries are now trying to develop fishing registration and licensing systems for small-scale fisheries, to help manage this part of the sector. Through the West Africa Regional Fisheries Program (WARFP) funded by World Bank, Cape Verde, Senegal, Sierra Leone, Liberia and Ghana are in the process of registering, licensing and monitoring the entire commercial small-scale fishing fleet representing at least 30,000 canoes.

Beginning to register the commercial small-scale fleet in West Africa, as a step towards better management of the fisheries, poses a number of challenges: (i) the Fisheries Administrations lack enough Technical Staff and logistics to cover the whole coast along which the commercial small-scale canoes are operating; (ii) this fleet is also characterized by a high level of spatial mobility with permanent or seasonal migrations at national and sub-regional scale; and (iii) there is a huge lack of infrastructure in terms of roads availability and quality that makes some coastal areas difficult to access. The use of mobile technologies could be a good way to help overcome some of these challenges and facilitate the registration, licensing and management of this large portion of the fishing fleet in West Africa.

Over the recent years, mobile technology penetration in West Africa has been growing very quickly through considerable investments of multinational telecom network providers such as MTN, Orange, Tigo, Airtel, Expresso and Vodafone. Nowadays those technologies have become very common communication tools even in rural areas including fishing communities where mobile phones are now playing a major role for example for fish trading. Moreover, there







has been recently an influx of Internet-enabled phones that make it possible to explore more mobile applications possibilities in the Sub-Region.

With regards to the above, the objective of this work would be to develop a mobile application that could serve as an interactive sub-regional platform for the Administrations and the Fishers to facilitate the registration of small scale fishing canoes, the licensing process and the wider implementation of the national fishing laws, policies and management measures. Due to the fact that the fisheries resources are shared among different countries, their management should also rely on sub-regional cooperation. Therefore the Sub-Regional Fisheries Commission (SRFC) which is coordinating the WARFP project has a considerable role to play. Beyond the initiative of supporting the West African countries, the SRFC intends to put in place a sub-regional dashboard that will enable to gather the basic data and indicators that are needed by the countries to monitor and manage the fishing capacity for sustainable development.

### Problem Statement

The challenge is to develop an application to enable any fisher, wherever he or she is located in the Sub-Region, to send a registration request by mobile phone. This request would then be received by a national and Sub-Regional platform through which the designated Technical Staff can very quickly examine the terms of the request regarding the required conditions of the countries and then give an approval decision. If the basic requirements are met, an authorization message with a registration ID number that will have to be written or embossed on the canoe is sent back to the fisher. In this case, complementary information that have to be input inside the national or regional database will be collected later by local Staff while the fisher is able to legally pursue his fishing activities. In case the fisher's request does not meet the required conditions, the Technical Staff should be able to get in touch with him to give advice on the process.

Like the registration, the same mechanism is also possible for the licensing process. In this case, the Technical Staff who receives the licensing request will have to check the conditions in terms of level of exploitation of target species, degree of harmfulness of the fishing gears, the ecological sensitivity of the fishing zones, etc. If the request is accepted, an approval message with the License ID number is sent back to the fisher. Otherwise advice about other licensing possibilities can be provided to the fisher.

In terms of compliance control, the application will considerably improve the effectiveness of the participatory surveillance that is being promoted in West Africa. The principle here is that the local stakeholders themselves (the fishers) should be involved in the surveillance of their own fishing areas. However, those local stakeholders do not have an official mandate to arrest anybody because of related security matter. In this case, a fisher who finds a vessel conducting





illegal or bad fishing practices will be able to use the application to inform the Administration by sending the canoe ID number by phone. When the national or local Technical Staff receives this message, it can immediately mobilize a maritime patrol that will take the required action. The Administration can also decide to wait until the canoe comes back to the landing site and then do an inspection or investigation on the issue. Therefore, the mobile application will make the surveillance more effective and encourage compliancy while reducing the related waste of time and money.

The major challenge of the production of this application will be to design and develop a very simple and friendly interface to facilitate the interactivity between fishers and national or regional Technical Staff. But the considerable progresses that have been recently made in some West African coastal countries constitute favorable conditions to facilitate the process. The available technical reports on the issue of registration, licensing and surveillance systems in the Sub-Region are also important inputs. Some of those systems (e.g. in Cape Verde, Senegal and Ghana) are even accessible online through web-based databases. Moreover, in the Sub-Region there are some specialists on the issue that are keen to share their experience and interact with the developers in order to effectively contribute to the process.

#### Resource Persons:

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**Title:** From Sea to Table: Tracking Data through the Seafood Supply Chain

**Proponent:** Monterey Bay Aquarium

### Background

A significant number of businesses and consumers want to purchase seafood from environmentally sustainable fisheries and aquaculture operations. The Monterey Bay Aquarium Seafood Watch program assesses the environmental performance of fisheries and aquaculture operations supplying the North American marketplace. It generates public seafood recommendations that can be found at [www.seafoodwatch.org](http://www.seafoodwatch.org) and on our Seafood Watch App.

We have learned, however, that vital information about seafood gets lost as it flows through the supply chain. As a result businesses and consumers don't always know what they are eating, where it is from, or how it was caught or farmed or if it is even legal.

### Problem Statement

We are interested in technological solutions that can help maintain a flow of consistent, accurate information throughout the supply chain from sea to table. Improved traceability of seafood can help inform consumers and businesses about the sustainability of their purchases (i.e. what is the corresponding Seafood Watch recommendation), and it allows for better monitoring and reporting on corporate commitments to sustainable seafood purchasing. Improved traceability also helps ensure that seafood items in the market come from legal sources.

We have found that there are a few areas in the seafood supply chain where information flow breaks down. This impedes our ability to understand where our seafood comes from, and therefore its sustainability status:

- Fishermen do not always report on common attributes when selling to the initial seafood buyer (wholesaler, processor, auction house, etc.). Many still use paper and don't capture all of the relevant attributes. **How can we use technology to make this process easier?**

#### Attributes

- Seafood common/market name
- Seafood scientific/Latin name
- Where the fish is caught or farmed (country/region)
- How the fish is caught or farmed (gear type of farming method)





- When seafood is processed, it loses many of these attributes and goes from 'Atlantic cod caught by gillnet off Georges Bank' to 'Beer-battered whitefish 4 oz portion'. **How can we better track information as seafood products change hands and product forms?**
- Seafood processors and distributors use different codes (e.g. lot numbers, manufacturer ID numbers) when selling finished products to retailers – and don't always maintain the four attributes described above in their databases. The retailers then assign their own codes (e.g. Stock Keeping Units or SKUs). **How can we track the original product information amidst the allocation of additional/new codes?**

Monterey Bay Aquarium will have sample datasets on hand so that Fishackathon participants can employ their skills and manipulate the data in ways that would inform the development of prototypes to help resolve some of these challenges. The resources below are also helpful in articulating the challenges around the flow of information throughout the seafood supply chain.

#### Resources:

Without a Trace: An Updated Summary of Traceability Efforts in the United States

[http://fishwise.org/images/fishwise\\_traceability\\_white\\_paper\\_august\\_2012.pdf](http://fishwise.org/images/fishwise_traceability_white_paper_august_2012.pdf)

Traceability for Seafood: US Implementation Guide

[http://www.aboutseafood.com/sites/all/files/FINAL%20Seafood%20Trace%20Guide\\_v1.1.pdf](http://www.aboutseafood.com/sites/all/files/FINAL%20Seafood%20Trace%20Guide_v1.1.pdf)

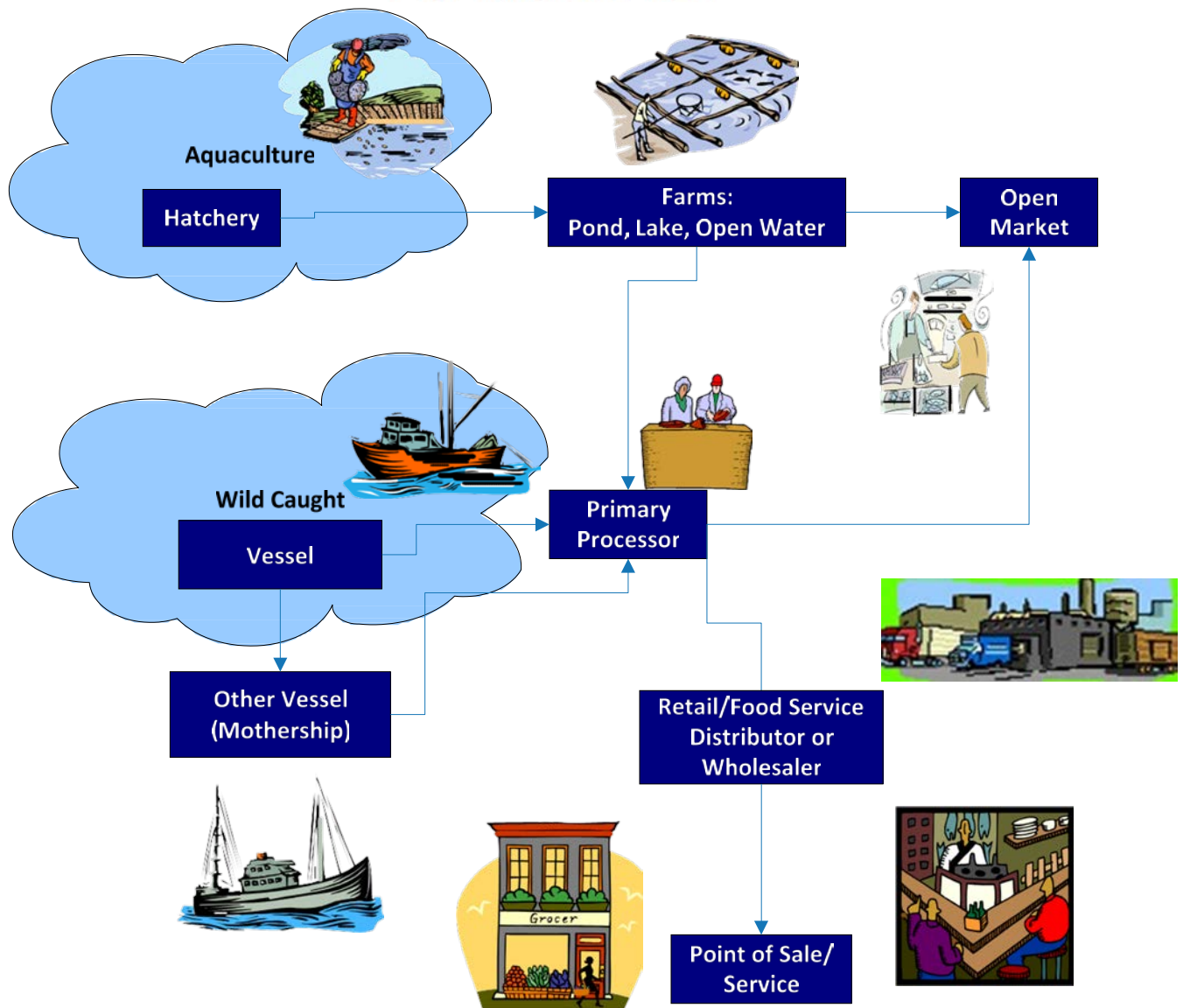
Fishing and Fish Farming Methods:

[http://www.seafoodwatch.org/cr/cr\\_seafoodwatch/sfw\\_gear.aspx](http://www.seafoodwatch.org/cr/cr_seafoodwatch/sfw_gear.aspx)

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# Fishackathon



## Seafood Supply Chain

(an excerpt from the *Traceability for Seafood: US Implementation Guide*

[http://www.aboutseafood.com/sites/all/files/FINAL%20Seafood%20Trace%20Guide\\_v1.1.pdf](http://www.aboutseafood.com/sites/all/files/FINAL%20Seafood%20Trace%20Guide_v1.1.pdf))