Without a Trace II

An Updated Summary of Traceability Efforts in the Seafood Industry

Mariah Boyle, M.Sc.
FISHWISE

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About FishWise

FishWise, founded in 2002, is a non-profit marine conservation organization based in Santa Cruz, California. FishWise promotes the health and recovery of ocean ecosystems by providing innovative market-based tools to the seafood industry. The organization supports seafood sustainability through environmentally responsible business practices. FishWise is a founding member of the Conservation Alliance for Seafood Solutions, with staff serving on the Environmental Stakeholder Committee of the International Seafood Sustainability Foundation (ISSF), the State of California Sustainable Seafood Initiative (CSSI) Advisory Committee and participating in a variety of other industry and marine conservation initiatives. FishWise is currently partnered with several of North America's largest retailers, including Safeway, Target, and Hy-Vee. Through its partnerships with retailers and suppliers, FishWise works with over 70 million pounds of seafood per year and more than 100 species from farmed and wild sources. Its partners maintain more than 3,900 storefronts in North America.

About this Document

The first version of this white paper was release in May of 2012. Since that time, further engagement with seafood stakeholders, survey responses to the original white paper, and additional research informed this second, revised and expanded, white paper.
It is hoped that this document will create connections across sectors and groups to spark conversation and action as to how the seafood industry can work together to eliminate illegal fishing and unacceptable social conditions from supply chains, reduce the rate of seafood mislabeling, and allow companies to track and communicate progress towards sustainable seafood commitments. If government, conservation organizations, funders, and the industry work together, significant progress on seafood traceability can be made and, in turn, the environmental and social aspects of the seafood industry improved.

It should be noted that while every attempt has been made to review the facts presented in this document with their sources, this paper has not been formally peer-reviewed and should only be used for guidance and informational purposes. Additionally, this document is not exhaustive – not all initiatives and groups are included.

Additional resources can be found at the end of this document, including links, contact information for the organizations mentioned, and full citations for referenced documents.

This version of the report should be cited as:

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Executive Summary

Issues associated with the illegal harvesting of seafood and the mislabeling of seafood products have become more prominent in recent years due to increased media attention and the efforts of industry, nongovernmental organizations (NGOs), and governments to combat these problems. Additionally, human rights concerns like human trafficking and forced labor are being documented throughout seafood supply chains and have been widely exposed via media and industry reports. Opportunities for fraud, such as knowingly mislabeling species name or catch method, are also increasing as new fisheries are developed and supply chains become more complex.

Increasingly, companies are publicly committing to sustainable seafood sourcing policies, and the challenge is now for those companies to be able to track the origin of raw material to ensure that species and sustainability attributes are communicated to the customer accurately. For companies that buy and sell seafood, the lack of product origin information and supply chain transparency can pose significant risks. In the past, focus has been primarily on food safety concerns. However, the increase in media coverage about the environmental, social, and legal issues associated with seafood has led to significant shareholder concerns, potential impacts on brand value, and challenges to the corporate social responsibility initiatives of companies. The recent attention to the topic also creates an opportunity for companies with full traceability to actively promote the many benefits of their products, such as social and fair trade compliance, engagement in fishery improvements, and support for entrepreneurial ventures in the developing world.

The first step towards mitigating and eventually eliminating these risks is to ensure comprehensive traceability systems are in place throughout the supply chain. This work is already underway with some companies that are instituting traceability policies and setting goals, often with the assistance of NGOs, government bodies, and technology companies. However, there is much more work that needs to be done. This paper provides suggestions for companies seeking to improve their traceability, such as incorporating seafood traceability into business plans and communicating expectations to supply chains. Suggestions for setting up electronic data systems to increase transparency, and verifying the information via audits, risk assessments, and vessel blacklist reviews are also provided. When companies working on these steps are met with challenges, they can be addressed by consulting with the contacts and groups provided in this paper.

This white paper aims to: 1) serve as a guide for seafood businesses seeking to improve the traceability of their supply chain and 2) improve the knowledge base and coordination of NGOs and other groups working on seafood traceability. It provides an overview of traceability in general, including the importance of traceability systems and current challenges, and then explores how more than seventy international and regional government programs, certification systems, conservation organizations, and industry groups are working on traceability issues. Companies can review the recommended next steps provided in this report to address traceability within their own business models.

Traceability Survey

A survey was sent to a diverse group of seafood stakeholders, asking those that read the first version of this white paper to provide feedback on the usefulness of the paper.

Fifty responses were collected over a period of several weeks. Of these respondents, most were from industry or the NGO sector, a few from government, while the remaining respondents were funders, consumers, marketing professionals, students, and consultants (Figure 1).

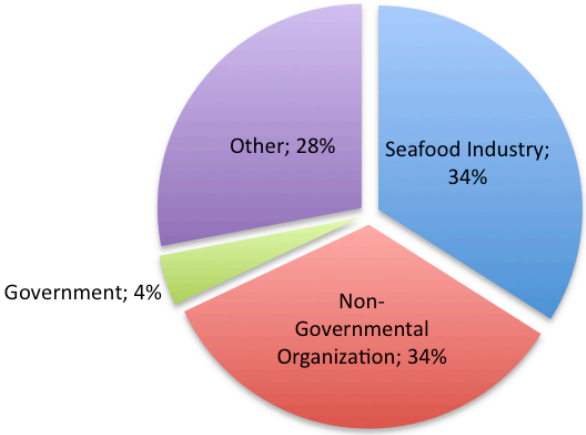


Figure 1: Self-declared affiliation for survey respondents.

Survey participants were then asked to rate the survey on a scale of 1-10, with 10 being the most useful. Of the 28 that answered this question, the average score was 7.25 +/- 2 (SD).

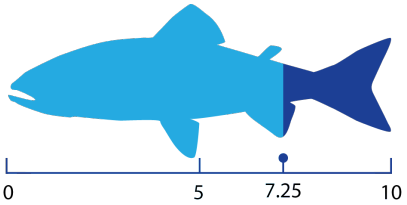


Figure 2: Average score of usefulness of white paper by survey respondents.

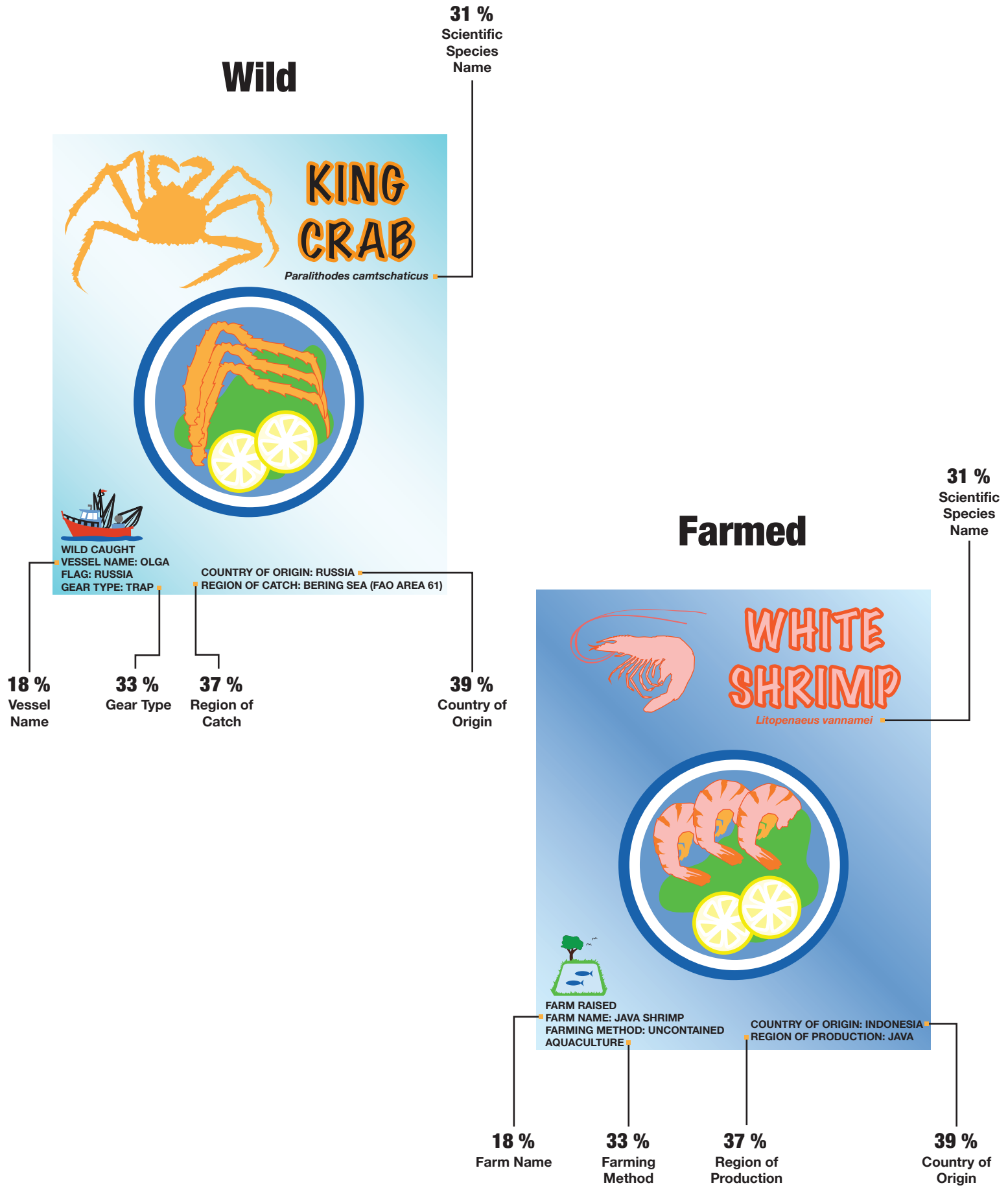
Respondents noted the Traceability Background Information, Seafood Certifications, and Traceability Companies Sections as the most useful. Respondents were also asked which parameters should be included on seafood packaging, since the need for greater transparency often comes up in seafood traceability discussions. A summary of those responses is provided in Figure 3.

Figure 3: Three most useful sections of white paper, per survey responses.

Respondents were also asked to provide feedback on how to improve the paper and provide contacts for companies or groups to be added to the paper. We have done our best to incorporate those suggestions in this second version of the white paper. Thanks to the respondents for their time and thoughtful feedback.

The feedback on this white paper was encouraging – a diverse stakeholder group found it useful and informative. Based on this feedback it would appear that the movement would benefit from similar reviews on other sustainable seafood topics in the future, as compiling such a paper builds a network of contacts and reaches across disciplines to make progress on a problem.

Figure 4: Survey respondents were asked which information should be displayed on-package for seafood products, as many are advocating for greater transparency. The suggested parameters, along with the percentage of respondents that would like to see that parameter displayed on the final consumer unit are shown for both wild and farmed product.



What is Seafood Traceability?

Definition

Traceability is defined as the ability to systematically identify a unit of production, track its location, and describe any treatments or transformations at all stages of production, processing, and distribution (Magera and Beaton, 2009). For seafood, full traceability also implies that a consumer unit of seafood at a restaurant or retailer can be traced throughout the supply chain back to its point of harvest by a vessel or on a farm. This is important for food safety, ensuring the legality of product, and for verifying sustainability. Full traceability is achieved through proper documentation and record keeping, along with proper handling protocols during processing, shipping, and receiving, to ensure that product can be tracked accurately.

History

Early concern over the origin of animal products is documented as far back at the 14th century during the major epidemics of human plague (Blancou, 2001). As early as the 18th century, human and livestock diseases in Europe brought about requirements for documentation when importing or exporting animals, quarantine processes before slaughter, and strict standards for slaughtering animals known to be infected (Blancou, 2001).

In more recent history, Congress passed the Federal Meat Inspection Act (FMIA) in 1906 due to public pressure over the sanitary conditions of slaughterhouses and packing plants. The FMIA requires “one up, one down” recordkeeping for in-country beef products and imports must be accompanied by a record of country of origin and plant of origin, along with proof that the products passed both USDA and customs requirements (FDA, 1906). While barcodes have been widely used in consumer-packaged goods since the 1970s, it has only been in the last couple of decades that the food industry has started using the 14 digit UPC codes that contain expanded information about the company, product, and origin (Uniform Code Council, 2003). It was not until 1991, that the US Food and Drug Administration (FDA) established the Office of Seafood and increased funding for seafood inspection (Foulke, 1993). After testing seafood for 10 years (1988–1997), the National Seafood Inspection Laboratory issued a press release indicating that 37% of fish and 13% of other seafood were labeled incorrectly (Tennyson, 1997). In 1994, a rigorous definition of food supply chain was provided by the International Organization for Standardization and supported by EU Regulation 178/2002. This defines traceability as “the ability to trace and follow a food, feed, food producing animal [or ingredients], through all stages of production, processing and distribution” (EU Regulation 178/2002). Only in this past decade — with developments in global markets, food recalls, and potential acts of bioterrorism — has traceability become an important issue affecting the entire food supply chain.

The US Farm Security and Rural Investment Act of 2002 required “country-of-origin” labeling (COOL) on all beef, lamb, pork, fish, perishable commodities, and peanuts by retailers (fish markets, exporters and food service establishments were excluded; USDA 2012). For fish and shellfish, a designation of wild or farmed was also required. The COOL labeling requirements does not apply to processed food items (fish sticks, cooked product, etc.). In the same year, the US Bioterrorism and Response Act of 2002 required the registration of all food facilities, domestic and foreign, supplying food to the United States. It addition, it mandates records to identify the

suppliers and recipients of all food products (FDA, Bioterrorism Act of 2002). For further reading, Thompson et al. (2005) provides a more in-depth review of the above legislation and seafood traceability in the US.

In 2002, in part due to outbreaks like that of foot-and-mouth disease, the European Union's General Food Law (Regulation 178/2002, Article 18) came into force requiring compulsory traceability for food and feed operators. EU Article 4, regulation 104/2000, also came into effect in 2002, mandating that all fishery products be labeled with commercial designation of the species, the production method (if farm raised), and the catch area or production location. European Community Commission Regulation 2065/2001, Article 8, pertains to detailed provisions for the application of EU regulation 104/2000 and requires that all chilled, frozen, smoked fish or fillets, and shellfish, when offered for retail sale, be labeled in accordance with EU 104/2000. In addition to these requirements, this information must be provided at each stage of the marketing chain, either by direct labeling or acceptable commercial documentation. In 2004, TRACES (Trade Control and Expert System) was implemented to control import and export of live animals and animal products to the EU.

Importance

If seafood is not fully traceable it is difficult to recall a product lot when it is found to be unsafe to eat, impossible to prove it is from legal sources, is accurately labeled, from sources that meet social and human rights standards, or meets the sustainable sourcing commitment of a company. Without the proper traceability documentation and protocols in place, this leaves the companies selling this product at a legal and reputational risk. However, it is not only risk avoidance that makes traceability important. The recent attention to these topics by the media creates an opportunity for companies with full traceability to actively promote their products' attributes such as social and fair trade compliance, engaging in fishery improvements, and supporting small-scale entrepreneurial ventures in the developing world.

Food Safety

Seafood, when not properly handled or from tainted waters, can cause many food-borne illnesses. From 2003-2008, the CDC estimates that finfish were the 8th highest in single food commodity outbreak occurrences, and mollusks were 11th (CDC, 2011). In 2010, the Gulf Oil Spill caused significant concerns about food safety (CDC, 2010). Traceability and the ability to communicate testing results became key to ensuring confidence in the seafood market from the region. This inspired an expedited launch of the then-piloting Gulf Wild® testing and tracking program, which discloses the general harvesting fishermen, vessels and locations for participating Gulf finfish. The program also uses Canadian laboratory Eurofins Scientific Inc. to randomly test samples for dispersant, cadmium, lead, mercury, arsenic and PAHs. Additionally, the oil spill encouraged the launch of a traceability program by the Gulf States Marine Fisheries Commission in 2011 called Gulf Seafood Trace (Seafood Source, 2011).

Mislabeling and Fraud

Fish, the most traded food commodity, was estimated at a first-sale value of $98.1 billion for capture fisheries and $119.4 billion for aquaculture production in 2010, globally (FAO, 2012). This valuable commodity is often fraudulently sold; investigations by Consumer Reports (2011) and the Boston Globe (2011) have reported mislabeling rates in seafood as great as 20% and 48%, respectively. More recently, Oceana found that 55% of seafood in Los Angeles was fraudulently

labeled (Warner, 2012) while 31% of seafood and 58% of sushi in South Florida was mislabeled (Oceana, 2012), and 36% of seafood samples in Monterey CA (from grocery, restaurant, and sushi) were mislabeled (Oceana, 2012b). In California markets, a genetic study by Logan et al (2008) reported that 60-63% of seafood sold as Pacific red snapper did not belong to any of the 13 rockfish species approved by the FDA but was instead identified to be true red snapper, tilapia, or other non-approved rockfish (*Sebastes*) species. Problems with seafood mislabeling are not limited to US markets but have also been reported in South Africa (von der Heyden, 2009), Europe (Garcia-Vazquez, 2011; Machado-Schiaffino, 2008; Miller, 2011), Australia (Food Standards Australia, 2003) and Hong Kong (Food Safety, 2007). Mislabeling and fraud may even occur within certified fisheries, as demonstrated by Marko et al. (2001) for Chilean seabass certified by the Marine Stewardship Council (MSC). In response to the latter study, the MSC attempted to validate Chilean seabass labeling but lack of supply chain information rendered these efforts inconclusive (MSC, 2011). MSC also conducts their own traceability testing, and a 2012 study found a 98% accuracy rate when DNA testing was conducted on certified products (MSC, 2012).

Illegal, Unregulated, and Unreported Fishing

High levels of illegal, unregulated, and unreported (IUU) fishing occur worldwide. Estimates of fishing losses to illegal activity range from $10-23.5 billion, representing 11-26 million tons of seafood (Agnew et al. 2009). Some countries suffer greatly (40% of West Africa's total catches may be illegal), and in others illegal fishing may double the documented harvest numbers (Agnew et al. 2009). An estimated 90% of the world's fish harvest is taken from Exclusive Economic Zones (EEZs) off coastal states; therefore, it is likely that a very significant proportion of IUU fishing also occurs within EEZs. Developing countries bear the brunt of IUU fishing through lost revenue, decreased food security, and loss of biodiversity (FAO, 2012). In an effort to change this trend and increase awareness and knowledge exchange around combating IUU fishing, the International Monitoring, Control and Surveillance Network (IMCS) recently launched the first *Stop IUU Fishing Award*. The competition is designed to encourage innovation and new ideas in the fight against IUU (IMCS, 2012).

Human Rights

In addition to undermining fisheries management, illegal fishing is often closely tied with human rights issues such as unsafe working conditions, little to no pay for fishermen, and trafficking of fishers and children, as highlighted in a UN Office on Drugs and Crime report on Transnational Organized Crime in the Fishing Industry (UN ODC, 2011). Fishing is already a dangerous occupation. According to an International Labor Organization (ILO) report from 2000, there are an average of 24,000 deaths and 24 million non-fatal accidents reported each year in the industry (ILO, 2000). Taking into consideration countries that do not submit statistics, informal fisheries, and IUU fishing (which account for anywhere from 13-31% of global catches) these figures are most likely underestimations (EJF, 2010). The fishing industry is vulnerable to organized crime because of the lack of governance and rule of law associated with fisheries work. Specifically, the lack of at-sea surveillance systems, in combination with a lack of transparency for vessel owners and vessel histories, creates an environment at sea in which human rights violations can occur with impunity.

Fishery Improvement Projects

Seafood that is certified as sustainable or that tops the 'green lists' of many NGOs have been actively sourced and promoted at the point of sale for years by seafood companies. Now, with attention shifting to focus on those fisheries that need to be improved in order to meet

sustainable sourcing commitments, and with the release of the Conservation Alliance for Seafood Solution's Guidelines for Fishery Improvement Projects (FIPs), verifying the traceability of FIPs is another immediate need of the sustainable seafood movement (Conservation Alliance for Seafood Solutions, 2012). Fisheries in improvement projects may have the additional traceability challenges of weak fishery management, being located in developing nations with limited access to technology, high rates of IUU fishing, limited fishery enforcement, and language barriers.

Marketing & Promotion
Consumers may identify more with the human element of seafood than the sustainability of the products, so the opportunity for story-telling at the point of sale about the source, fishermen, and farmers, may have significant sales potential. Fully traceable seafood would allow companies to tell better stories and with greater accuracy, and prove sustainability claims with real data if product was questioned. Several programs, such as Gulf Wild® and Thisfish, have built in greater transparency – allowing consumers to view where their seafood was harvested and even the biography of the fisherman that harvested it. Furthermore, promoting sustainable or certified product may indicate to the customers that product is healthy (e.g. fewer contaminants; Gerber et al. 2012) and from a source fishery in good health (e.g. recent MSC study found 74% of certified fisheries had biomass above maximum sustainable yield, compared with 44% of uncertified fisheries; Gutierrez, 2012).

Meeting Sustainability Commitments
A FishWise review of 26 companies within the top 75 North American grocers by revenue found that 24 grocers (92%) had some form of seafood policy on their website or had an affiliation with an NGO that works on seafood and ocean issues. A robust traceability system is key in allowing companies to track progress towards their commitments and verify that goals have been met. Greenpeace's most recent Carting Away the Oceans report (VI) noted that while it scores retailers on purchasing policies, red list sales, initiative participation, and transparency in supply chain and sustainability practices now, they plan to increase their focus on traceability in the future (Greenpeace, 2012).

Challenges

There are many reasons that the seafood industry does not have 100% traceable supply chains. These include geography, technology, resources, and business challenges and concerns.

- Seafood is a globally traded commodity, and language and technological barriers hinder the use of standardized electronic systems for full traceability within supply chains. Also, scale greatly varies in supply chains – from a single vessel or farm to a processor or importer that handles millions of pounds of seafood per year (see Figure 4). Because of these varying scales, one solution may not work best for all companies within one supply chain.

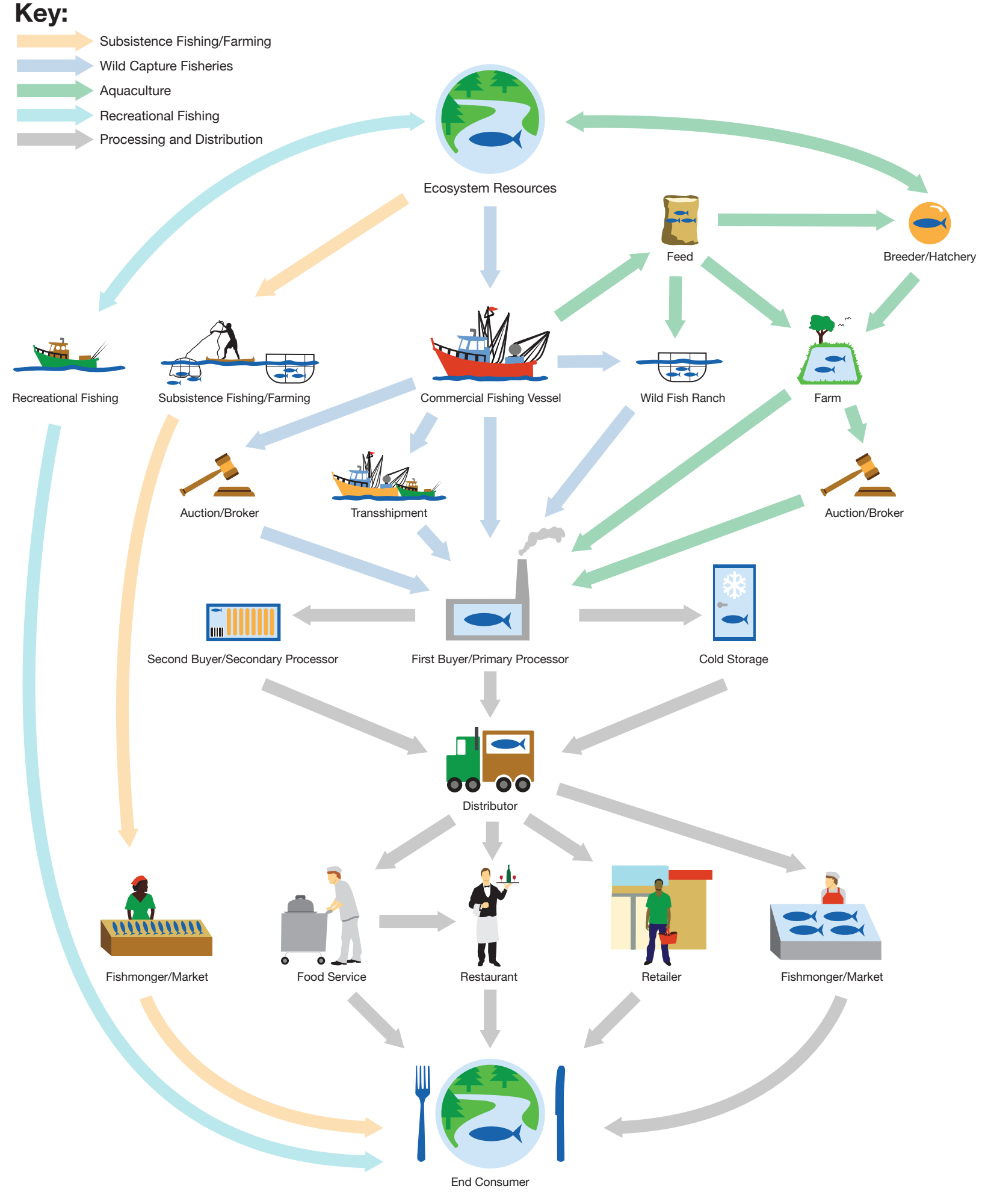
- Technical systems (databases, barcode scanners, etc.) need to be functional and up to date to meet traceability needs. Limitations in resources, database expertise, and IT staff often allow for IT systems to become antiquated and not effective for comprehensive traceability. For smaller companies, significant technology costs may also hinder progress. For companies that sell more than seafood, the seafood portion of the business is often

not the most profitable; therefore, other business areas may drive traceability or database decisions.

- The seafood industry has traditionally operated based on relationships and trust, and supply chain information is often closely guarded. The idea that full traceability allows for more transparency up and down the supply chain (to differing degrees) has some concerned about confidentiality and the use of information for competitor advantage.

- Many companies are reluctant to invest in costly systems now, as the United States' Food and Drug Administration (FDA) may mandate new regulations that could render some systems inefficient or obsolete under the Food Safety and Modernization Act. Companies are also concerned that a majority of the industry will adopt the same standardized system, which would pose a problem for the companies already invested in different traceability programs.

Figure 5: The seafood supply chain can be complex and involve many participants. This graphic depicts simplified supply chains that bring product to the end consumer.



Current Landscape

Most of the seafood industry in North America uses the 'one-up one-down' traceability model, in which a supplier has records of receiving or selling fish along with documentation on all processing and handling that occurred while in their possession. These documents are typically in the form of purchase orders (POs), invoices, and bills of lading with lot numbers referring to the raw material(s) and types of processing. If every step in the supply chain had accurate documentation and all product mixing was recorded, product would be traceable back to the source(s). However, in many supply chains, documentation is rarely requested to test if all steps in the chain have the proper protocols and procedures in place. The Chain of Custody (CoC) requirements of some certifications aim to do exactly that – verify via an on the ground site visit that proper product handling protocols and documentation systems are in place to allow for robust traceability.

Points of mixing within the supply chain pose the most difficulty when trying to achieve full traceability, such as processing or cold storage facilities, auctions, and at-sea transshipments (see Figure 4). Achieving full traceability can also be hindered by small fishing vessels in open access fisheries in which catches are unregulated, and therefore not documented at sea or upon landing. In some instances, documents are falsified to conceal illegally caught or mislabeled product. With a greater focus on IUU fishing, seafood fraud, and seafood safety, the seafood industry will likely be more proactive in ensuring that seafood can be traced to the point of harvest during all phases of the supply chain, thereby decreasing the dependency on suppliers to provide all necessary documentation.

Advances in traceability are being aided by studies aimed at improving supply chain accountability and traceability for businesses. These studies also serve consumers by providing data for making informed choices for seafood purchases. One such study was the April 2012 Oceana report that characterized seafood mislabeling in Southern California. In that study, an overall mislabeling rate of 55% was found for samples taken from grocery, restaurant, and sushi purveyors. The report drew specific attention to the 100% mislabeling of 'snapper', nearly 90% mislabeling of sushi, and the pervasive substitution of escolar for tuna in sushi restaurants. These results allow businesses to combat fraud by identifying which seafood items are high-risk products. Similarly, consumers can use these results to avoid purchasing high-risk seafood when shopping at establishments without transparent sourcing or purchasing policies. The Oceana report helped inform California Senate Bill 1486, which proposes legislation for seafood labeling in restaurants (more on SB 1486 in Governance section). Additional studies that provide actionable next steps for businesses and consumers alike are needed to improve traceability in seafood supply chains as well as to highlight the need for policy reform.

Advances are also being made as industry groups and standards setting bodies create guidance documents and standards for seafood traceability. For example, the National Fisheries Institute (NFI) worked with GS1 US to create a US Seafood Traceability Implementation Guide to define minimum requirements and best-practice recommendations. Similarly, in 2011, the International Organization for Standardization (ISO), created standards for the traceability of finfish products – specifications to be recorded in captured distribution chains (Standard 12875) and farmed distribution chains (Standard 12877).

In summary, efforts in seafood traceability by governments, companies, and organizations are varied and are often not developed in coordination. To help unify groups working on these issues and to facilitate the efforts of companies seeking traceability resources, the following initiatives have been summarized below. This report is not exhaustive, but an effort was made to reach out to many of the major players in the North American market, along with those suggested for inclusion in the paper by peers.

International Governance

The United Nations Convention on the Law of the Sea (UNCLOS) is an international agreement that defines the rights and responsibilities of nations in their use of the world's oceans and establishes guidelines for businesses, the environment, and the management of marine natural resources. The Convention is comprised of 320 articles and nine annexes, governing all aspects of ocean space, such as delimitation, marine scientific research, economic and commercial activities, transfer of technology, and the settlement of disputes relating to ocean matters. The Convention was enacted in 1994, a year after Guyana became the 60th state to sign the treaty. To date, 162 countries, along with the European Union, have joined the Convention, though notably the US has not signed the agreement. Today, it is the globally recognized regime dealing with all matters relating to the law of the sea (UNCLOS, 2012).

The United Nations Food and Agriculture Organization (UN FAO) approved the Agreement on Port State Measures to Prevent, Deter and Eliminate IUU Fishing on November 22, 2009. This treaty will go into effect pending ratification of the Agreement by 25 countries. As of August 2012, 22 nations and the EU have signed the treaty, and Sri Lanka, Myanmar (Burma), Norway and the EU have ratified the agreement (FAO, 2009). The US has signed, but not yet ratified the treaty. President Obama sent the Agreement to the Senate in the US for ratification on November 14, 2011 (US Department of State, 2011) and has been referred to the Committee on Foreign Relations. Countries that ratify the treaty must: 1) designate ports through which foreign fishing vessels may enter; 2) conduct dockside inspections following set standards; 3) block entry to vessels known or believed to have been involved in IUU or those on an IUU vessel list of a Regional Fishery Management Organization (RFMO); and 4) share information with the governments of vessels with IUU product, when discovered during inspection. While the PSMA is still awaiting ratification by 22 more countries, progress in some countries has been made to support implementation of the Agreement. For example, in April 2012, a global series of capacity-development workshops to support implementation of the Agreement was launched in Thailand, to cater to countries from Southeast Asia (FAO, 2012), and work is being done to compare current RFMO traceability requirements against those of the PSMA (e.g. Pew, Closing the Gap, 2011).

The FAO proposed 'Global Record of Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels' is intended to be a tool for improving global transparency and traceability in the fisheries sector (FAO, 2008). Fishing vessel registration and the maintenance of a comprehensive record of fishing vessels are fundamental for both effective fisheries management and effective collaboration, regionally and globally. The current lack of transparency and traceability in the fisheries sector enables perpetrators of IUU fishing to easily sell their products in legitimate markets. The Global Record of Fishing Vessels would help deter and eliminate IUU fishing by making it more difficult and expensive for vessels and companies acting illegally to do business (Lugten, 2008).

The Committee on Fisheries (COFI), a subsidiary body of the FAO Council, established a Sub-Committee on Fish Trade. The 13th session of the Sub-Committee was held in early 2012. During this meeting it considered the issue of best practice guidelines for traceability, among others. Future work was determined to include an analysis of the best practices and existing standards, identifying options for future work, and identification of current systems and standards to avoid duplication for future work (FAO Report No. 996, 2012).

IUU Blacklists
Currently, official IUU vessel lists are housed with Regional Fisheries Management Organizations (RFMOs), while some environmental NGOs and other government bodies also compile lists.

Official and Compiled IUU Blacklists:

- Combined IUU Vessel List (vessels from all 8 RFMO databases)
- Conservation of Antarctic Marine Living Resources (CCAMLR)
- Commission for the Conservation of Southern Bluefin Tuna (CCSBT)
- Inter-American Tropical Tuna Commission (IATTC)
- International Commission for the Conservation of Atlantic Tunas (ICCAT)
- Indian Ocean Tuna Commission (IOTC)
- Northwest Atlantic Fisheries Organization (NAFO)
- Northeast Atlantic Fisheries Commission (NEAFC)
- Directorate of Fisheries, Norway
- Western and Central Pacific Fisheries Commission (WCPFC)
- Southeast Atlantic Fisheries Organization (SEAFO)
- EU list of vessels engaged in IUU
- UN FAO Global Record of Fishing Vessels (in development)

Greenpeace also maintains an unofficial blacklist and the Pew Environment Group has created a Port State Performance project, which consolidates six years of movement data on IUU-listed vessels, tracking their port visits globally. The final data and findings for this list were uploaded on May 25th, 2010.

United States Governance

The Lacey Act was enacted in 1900 and is the oldest wildlife protection law in the United States (Lacey Act, 2011). The original intent of the law was to preserve threatened native game species by prohibiting interstate shipment of illegally taken wildlife and the importation of invasive species. Today, the Lacey Act is far broader and makes it unlawful to "import, export, transport, sell, receive, acquire or purchase any fish or wildlife or plant taken, possessed, transported, or sold" in violation of any federal, state, foreign, or Native American tribal law, treaty, or regulation (16 U.S.C. § 3372(a)). The law also imposes marking, labeling, and documentation requirements (16 U.S.C. §§ 3372(b, d, f). Protections for fish, which had previously been covered by a separate federal law (the Black Bass Act of 1926), were incorporated into the Lacey Act in 1981. The term "fish or wildlife" includes those bred, hatched, or born in captivity (16 U.S.C. § 3371(a)) so the Lacey Act also applies to aquaculture. There have been numerous cases that have used the Lacey Act to prosecute illegally imported fish (e.g. Tavernise, 2004; ELAW, 2012; US DOJ, 2012).

The National Oceanic and Atmospheric Administration (NOAA) oversees fisheries management in the United States. The NOAA Seafood Inspection Program (SIP) provides inspection services for fish, shellfish, and fishery products to the industry and offers a variety of inspection services on a fee-for-service basis. Product quality evaluation, grading and certification services, laboratory analyses, training, consultation and export certification services are also offered by the NOAA SIP Program (NOAA SIP).

NOAA's Office of Law Enforcement (NOAA OLE) enforces regulations pertaining to the conservation and protection of the United States' living marine resources and natural habitats. NOAA's Office of Law Enforcement is responsible for carrying out more than 35 federal statutes, though most cases fall under five key legislative acts: Magnuson-Stevens Fishery Conservation and Management Act, Marine Mammal Protection Act of 1972, Endangered Species Act of 1973, Lacey Act Amendments of 1981, and the National Marine Sanctuaries Act. For law enforcement, the agency utilizes a combination of approaches such as traditional investigations and patrols, partnerships with state and federal agencies, technological tools such as Vessel Monitoring Systems, and outreach and education strategies designed to enhance voluntary compliance. The NOAA OLE is also responsible for enforcing US treaties and international law governing the high seas and international trade (NOAA OLE).

The NOAA Fisheries Office of International Affairs (NOAA FOIA) works with both domestic and international partners to promote stewardship of living marine resources and ecosystems. Through their partnerships NOAA promotes ecosystem-based fisheries management, combats illegal, unreported and unregulated (IUU) fishing, and ensures food security. NOAA accomplishes their mission by conducting workshops on living marine resource issues and by building partnerships to improve marine conservation. NOAA also actively participates in regional fisheries management organizations, multilateral and bilateral environmental agreements, and free trade negotiations (NOAA FOIA).

The Food Safety and Modernization Act gave the Food and Drug Administration (FDA) greater authority to regulate food facilities, with the goal of shifting from reactive to proactive approaches to prevent contamination (FDA FSMA, 2011). The FDA also oversees the Hazard Analysis and Critical Control Points (HACCP) management system to address food safety concerns. Section 204 of the FSMA focuses on food traceability for improving responses to outbreaks of food-borne illnesses. Specifically, Section 204 requires the Secretary of Health & Human Services (HHS) to improve their ability to track and trace foods during food-borne illness events and to establish standards and timeframes for submitting information to the Secretary. Section 204 also calls for a publicly available list of high-risk foods and a pilot project to explore methods and technologies for tracking.

On September 7, 2011, the FDA announced that the Institute of Food Technologists (IFT) would carry out two new pilot projects (FDA FSMA, Product Tracing). According to the FDA: "The pilots will evaluate methods and technologies for rapid and effective tracing of foods, including types of data that are useful for tracing, ways to connect the various points in the supply chain, and how quickly the data are made available to the FDA." The pilots focus on tomatoes and frozen Kung Pao-style dishes. A third food type, jarred peanut butter and dry, packaged peanuts and spices, was added to the pilot as an example of a more complex supply chain. On March 1, 2012 the FDA released an Interim Final Rule on the Establishment, Maintenance, and Availability of Records: Amendment to Record Availability Requirements (FDA, 2012). On May 31, 2012 the FDA

announced that a proposed collection of information on "Improving Food Safety and Defense Capacity of the State and Local Level: Review of State and Local Capacities" had been submitted to the Office of Management and Budget for review and clearance (FDA HHS, 2012). In July 2012 the FDA accepted the final report on traceability submitted by IFT; once approved the report will be made public. Based on the report, the FDA must now create rules on recordkeeping requirements for high-risk foods, but first must define high-risk foods, taking into consideration foodborne illness data, potential risk for contamination and severity of illness (IFT, 2012).

In January 2011, Sen. Daniel Inouye introduced to Congress the Commercial Seafood Consumer Protection Act (S. 50) to strengthen Federal consumer safety programs and activities for commercially marketed seafood (GovTrack S. 50, 2011). This bill directs the Secretary of Commerce to strengthen federal activities to ensure commercially distributed seafood meets food quality and safety requirements. This bill would encourage interagency collaboration on seafood safety, fraud, and labeling, along with strengthening the testing of seafood imports and inspections of foreign facilities, among others. The bill also allows for the refusal of seafood imports that do not meet federal requirements and increased inspection of seafood from countries that lack certified laboratories. On June 8, 2011 this bill was reported on by Committee and is waiting for consideration by the House or Senate.

In January 2011, Sen. Daniel Inouye also introduced to Congress the International Fisheries Stewardship and Enforcement Act (S. 52) to establish civil and criminal penalties for violations of the High Seas Driftnet Fishing Moratorium Protection Act and other similar statues (GovTrack S. 52, 2011). This bill would increase enforcement and penalties for mislabeling of fish and the sale of illegally harvested fish. Additionally, this bill would strengthen existing provisions that identify nations responsible for IUU fishing and promote improved practices through international cooperation. On May 5, 2011 this bill was reported on by Committee and is waiting for consideration by the House or Senate.

In December 2011, the Obama Administration introduced to Congress the Pirate Fishing Elimination Act (S. 1980) to prevent vessels engaging in IUU fishing from entering US ports to offload. While current laws already prohibit foreign-flagged vessels from offloading at most US ports, this would extend to other types of vessels that may possess IUU cargo (NOAA, 2011b). On July 31, 2012, the bill was reported on by Committee and is waiting for consideration by the House or Senate. President Obama also submitted the Agreement on Port State Measures to Prevent, Deter and Eliminate IUU Fishing to the Senate on November 14, 2011 (see International Governance).

In July 2012, the House Natural Resources Committee passed the Illegal, Unreported, and Unregulated Fishing Enforcement Act of 2011 and reported to the House of Representatives (H.R. 4100; identical to S. 52), a bill that would provide the United States with critical tools to help combat illegal fishing and prevent the mislabeling of illegally caught seafood. If passed, the bill would strengthen resources to monitor and track illegal fishing activities, enforce penalties against pirate vessels, and keep mislabeled product out of US markets (GovTrack H.R. 4100, 2011). The bill is waiting for consideration by the House and the Senate.

US Reps Edward Markey and Barney Frank introduced legislation to the House, in July of 2012, aimed at minimizing the prevalence of seafood fraud. Called the Safety and Fraud Enforcement (SAFE) for Seafood Act (H.R. 6200), the bill would require full traceability for all seafood sold in

the United States. The bill also calls for greater cooperation between the US Food and Drug Administration and the National Oceanic and Atmospheric Administration (GovTrack H.R. 6200, 2012). In July 2012 the bill was referred out to Committee.

Senator Ron Wyden introduced the Fair Trade in Seafood Act, S. 3518, in August 2012. The Fair Trade in Seafood Act would establish the elimination of government fisheries subsidies as a principal negotiating objective of the United States in trade negotiations (GovTrack S. 3518, 2012). On August 2, 2012 the bill was referred out to Committee.

State Governance

California
The California Transparency in Supply Chains Act went into effect on January 1, 2012. This act requires large retailers and manufacturers in California to disclose what efforts they have taken to ensure their supply chains are not associated with slavery and human trafficking (S.B. 657, 2010). This applies to retailers with more than $100 million in annual worldwide gross receipts.

At the time of writing this report, Senate Bill 1486 has been proposed in California, with the purpose of protecting public health and the environment by giving consumers a better understanding of the seafood they purchase at restaurants, and has been passed by the Senate Health Committee (Lieu, 2012). The bill, sponsored by Oceana, would require retail-food outlets (restaurants) with 19 or more establishments to label seafood on the menu with species name, country of catch, and farmed or wild designation.

European Union Governance

The European Commission's Directorate-General for Health and Consumers (SANCO) is responsible for food safety in the European Union. All countries that export seafood to the EU must be certified, which involves having (in part): 1) a competent authority responsible for official controls throughout the production chain, 2) a control plan for metals, contaminants, pesticides and veterinary drugs, if an aquaculture product, and 3) imports only from approved vessels and establishments that have been inspected by the exporting country's competent authority.

In 2008, the EU established Council Regulation No 1005/2008 to create a Community System to prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing. In order to meet this regulation, all seafood imported to the EU must have a Catch Certificate, validated by the vessel's flag state, for each shipment. The certificate requests information about the product's catch vessel, transport vessel, scientific name, and FAO catch area, among others.

The European Commission's Directorate-General for Maritime Affairs and Fisheries (DG Mare) manages the European Union Common Fisheries Policy (CFP), which was undergoing reform as of July 2012. Sustainability and traceability to reduce IUU fishing is a core tenant of the proposed reform. To enforce CFP rules, a control system, established in 2009 (1224/2009; Article 58) and implemented in 2011 (404/2011), was designed to ensure that fish products can be traced back throughout the supply chain. At every point along the chain, for every consignment of fish, information must be provided that proves the legality of the catch. Since enforcement and verification at sea can be costly, checks at every point in the chain are conducted at ports of

landing or transshipment, during transport, and in processors and at markets. The control system applies to all fishing in EU waters, all fishing conducted by EU vessels in any waters, and recreational fishing on sensitive stocks and aquaculture regulated at the EU level (e.g. eel or bluefin tuna).

In August 2012, the Marine Management Organization (MMO) and Food Standards Agency (FSA) in the UK have come together to ask caterers to confirm that their seafood purchases can be traced to a legal source. The MMO, which is responsible for contributing to sustainable development in the marine area, has created a section on its website which includes legislation and guidance on responsible fish purchasing (MMO, 2012).

EU and US Collaboration

In September of 2011, European Union commissioner for maritime affairs and fisheries, Maria Damanaki, and NOAA Administrator, Dr. Jane Lubchenco, signed a statement pledging to cooperate in combating IUU fishing (NOAA, 2011). They met again in May of 2012 at an EU Parliament meeting to sign an agreement, review progress made so far, and identify the most effective tools for achieving their goals for sustainable and legal fisheries on a global scale. The agreement calls for exchanges of personnel, shared use of scientific infrastructure, support for joint research, access to laboratory facilities, scientific training and timely exchange of information (NOAA and European Commission, 2012). As the EU and the US are the first and third largest seafood importers in the world, respectively, this is an important step towards aligning global market expectations for legality. The EU and US plan to work together to support the adoption of effective management measures, promote tools that prevent IUU operators from benefitting from their activity, and exchanging information on IUU operators.

Other Nations

Canada

Sustainable Seafood Canada is a coalition of five leading Canadian conservation organizations (Canadian Parks and Wilderness Society, David Suzuki Foundation, Ecology Action Centre, Living Oceans Society and Sierra Club BC) working together via the SeaChoice program. This group wrote a report on “Traceability systems, certification, eco-labeling and standards for achieving sustainable seafood” in 2009, which is an excellent primer to seafood traceability (Magera and Beaton, 2009). This document highlights not only the traceability requirements in Canada but also notes those of the US, EU, Japan, and China.

Canada’s Catch Certification Program was created in response to the European Union’s Illegal, Unreported, and Unregulated fishing regulation implemented January 1, 2010. It requires that fish exports to the EU be accompanied by a catch certificate issued by the competent authority in the country of origin. The European Union also requires exporting countries to have an audit process in place to confirm the accuracy of the information provided in the certificate application. The Canadian Catch Certification Audit Office completes a target number of audits based on the percentage of certificates issued on an annual basis. The CCAO team applies a traceability process (consisting of a combination of data obtained from industry, DFO databases and open source information) to verify that the fish exported can be traced back to the vessel or vessel group identified in the certificate application as well as to the time and area of capture. The audit also includes an assessment of exporters, buyers, processors and harvesters involving a review of the DFO violations and inspection databases and any other information that acts as an indicator

of compliance (Fisheries and Oceans Canada, 2012).

The Canadian Food Inspection Agency (CFIA) has released draft guidelines that would create a single inspection approach to all Canadian food systems (CFIA, 2012). The proposed guideline would consolidate the Fish Inspection Act, the Canada Agricultural Products Act, the Meat Inspection Act and the Consumer Packaging and Labeling Act (Scott-Thomas, 2012). The draft is open for comments until October 12, 2012.

China
A TRAFFIC report "Understanding China's Fish Trade and Traceability Systems" from 2009 includes a description of China's fish-processing trade and presents findings on traceability and trade statistics (Clarke, 2009). Additionally, in September 2012, the 4th annual International Feed Safety Conference will convene in Beijing to discuss best practices and future challenges to the industry. The conference will cover traceability, along with risk assessment, legislation, and impact of feed on food safety (Feed Safety, 2012).

Japan
On July 11, 2012, the EU and Japan signed a joint statement of agreement to work together to fight IUU fishing by not importing seafood caught illegally. The agreement commits the countries to exchange information on IUU activities; promote management measures that strengthen control, monitoring, and enforcement; encourage other countries to ratify the Port State Measures Agreement of the UN FAO Committee on Fisheries; and promote the sustainable use of fisheries resources, while preserving marine biodiversity (European Commission, 2012).

Seafood Certifications

Many seafood certifications have requirements to reduce the chances of mixing and mislabeling of products from certified and uncertified fisheries. Certifications with traceability components were contacted and asked to provide an overview of their work.

Aquaculture Stewardship Council
The Aquaculture Stewardship Council (ASC) operates with Chain of Custody (CoC) certification to ensure traceability. The ASC has set up the CoC requirements and procedures with the Marine Stewardship Council (see more details under the MSC section of this report). The CoC certification for the ASC was launched in January 2012.

FAO-Based Responsible Fisheries Management
The FAO-Based Responsible Fisheries Management (RFM) certification program allows global fisheries to assure buyers, markets, and stakeholders that their industry is responsibly managed. In turn, the RFM Chain of Custody Standard ensures that seafood products bearing a statement "sourced from a certified Responsibly Managed fishery" can be directly traced back through the supply chain to the certified fishery. Every organization that takes ownership of RFM certified seafood – and each step from the point of first handling through to the consumer – must be risk assessed and certified to meet the Chain of Custody standard requirements. The RFM program offers independent, third-party certification of the management of major commercial fisheries against the FAO Code of Conduct for Responsible Fisheries and the FAO Guidelines for the Eco-labeling of Fish and Fishery Products from Marine Capture Fisheries.

Food Alliance

The Food Alliance launched its sustainability standard for farmed shellfish in 2010 and began certifying to that standard in 2011. The standard applies to North American shellfish farms that produce oysters, clams, mussels and geoducks. The program does not cover wild harvest. As with all Food Alliance Certified agricultural products, any shellfish product that carries the Food Alliance Certified seal must be certified from production through packaging. Handling facilities that pack or process Food Alliance Certified shellfish products undergo annual third party inspections that verify certification documentation for incoming products and ensure traceability, product integrity and proper labeling through receiving, processing, storage and shipping procedures. Retailers are only allowed to market unpackaged shellfish products (e.g. bulk mussels in the seafood case) as Food Alliance Certified if the package from which they came carried the certification.

Friend of the Sea

Friend of the Sea (FOS) is a non-profit organization and international certification for farmed and wild seafood. The FOS criteria are based on the FAO Guidelines for eco-labeling and include a traceability component to the program. The traceability audit checklist is available to download from the FOS website, and has three requirements: that a program must be in place to prevent product mixing with uncertified product, that there is clear identification of the origin and fishing method, and that the fishery uses all available interconnected traceability methods for larger boats as part of a marking system and non-forgeable document tracing system. The form also notes that one test at the beginning and end of a batch of finished product must be conducted, inspecting mass budgets, bills, invoices and other relevant documents for conformity to the standard. These audits are conducted by an independent Certification Body.

Global Aquaculture Alliance Best Aquaculture Practices

The Global Aquaculture Alliance (GAA) Best Aquaculture Practices (BAP) standards require systems for traceability that fully account for all inputs, production, and outputs that can be verified and meets the requirements of the standards. Systems can be online, paper, electronic or a combination, provided the system is robust and demonstrates full and accurate traceability at each step. Data from paper records must be transferred to an electronic system for transmission and verification. In all cases the raw data and paperwork must be retained. All audits include full traceability/CoC as part of the scope of the audit regardless of the type of facility, and traceability tests are done during the audits (both trace forward, and trace back). Systems are verified through paper, electronic and facility on site audits. Mass balance and Mock Recall tests are also part of the test and required both by the facility and during the audit. Audits are conducted annually by Independent ISO 65 Accredited Certification Bodies. Rules regarding proper traceability and use of the BAP Certification Mark are also established as part of the BAP Certification Mark Agreement. The minimum scope applied to the supply chain audit and tests is 1 up, 1 down, but it is usually more than that, depending on the type of facility and how many stars they are certified for. Traceability verification tests are also conducted in the marketplace through identifying product in stores, performing trace-backs on a routine basis and random unannounced audits.

GlobalG.A.P.

GLOBALG.A.P. is a private sector body that sets voluntary standards for the certification of production processes of agricultural products, including aquaculture, globally. The standard is designed to communicate to consumers a food was produced on a farm that minimized environmental impacts, reduced chemical inputs, and responsibly manages worker health and

safety and animal welfare. GLOBALG.A.P. Chain of Custody aims to ensure traceability and food safety, eliminate mixing of certified and uncertified products, and ensure appropriate animal welfare. Producers are encouraged to print their GGN on the consumer packaging. A consumer aquaculture website, www.my-fish.info, extends transparency all the way to the end consumer by accessing the GLOBALG.A.P. database using the GGN, sharing information about the supply chain and product origin with the consumer.

Marine Stewardship Council
The popularity of the Marine Stewardship Council (MSC) certification continues to increase, and with it the Chain of Custody (CoC) traceability that accompanies certified product. Companies that want to use the MSC ecolabel must obtain independent verification that the product originated from a certified fishery, which must be demonstrated by a CoC certificate held at each link in the chain. To use the MSC ecolabel companies must also have an MSC ecolabel license. The MSC CoC is an example of combining 'one-up one-down' traceability paper documentation and on the ground audits of traceability procedures and protocols.

Traceability Programs, Technology Solutions & DNA Testing Companies

Traceability programs, technology solutions and DNA testing companies working on seafood traceability in North American markets were contacted and asked to provide an overview of their work.

ACGT, Inc.
The goal of seafood traceability programs is to provide definitive evidence of the path seafood takes from water to fork. While it is possible to develop DNA fingerprints for individual fish or shellfish as they enter the supply chain then confirm each through testing at the end of their journeys, the expense and time consumed is too great for most applications. Exceptions would be high-value commodities such as bluefin tuna. Identification of species is far less complex than identification of individuals, and Seafood ID from ACGT, Inc. utilizes DNA analysis to identify seafood species on a routine basis. In a traceability program, a species snapshot of representative or "sentinel" fish or shellfish - not individuals - provides a valuable and economical spot verification of pre-existing validated processes. ACGT, Inc. welcomes the opportunity to work with seafood certification organizations and companies that perform supply chain oversight.

Applied Food Technologies
Sustainability requires knowing not only where a fish was caught, but what fish was caught. Applied Food Technologies (AFT) offers a DNA-based species identification service for seafood which meets FDA's guidance by relying on adequately authenticated samples rather than publicly available databases. Unlike other service providers, AFT compares all fish to a database generated from taxonomically identified references. Because the FDA's current guidance states that they will only make regulatory decisions based on identifications using adequately authenticated standards, AFT helps a firm comply with the FDA's guidance. AFT has been performing species identification work for the better part of a decade and clients for seafood species testing have included the FDA, NOAA, state governments, distributors, retailers, grocery store chains, and restaurants, among others.

European Traceability Institute

The European Traceability Institute (ETI) is an independent private institution based in Brussels, Belgium that assists organizations worldwide to implement traceability and profitably provide safe and sustainably made food and other products via efficient supply chains. Its services are designed to be used as tools that enable organizations, regardless of geography, size or sector, to introduce effective traceability and recall systems and build such capacity both within and outside the organization. ETI assesses existing needs and systems, helping organizations to understand their key strengths and weaknesses, and to implement traceability by integrating existing initiatives, removing duplication and identifying gaps. When fully implemented, the ETI Model, Trace-Certified™ program and associated Professional Services result in a traceability system that is capable to cost-efficiently support multiple business objectives such as consumer and patient safety, product differentiation, sustainability, supply chain management and brand protection.

Fish Trax

The Fish Trax™ system is a leading-edge electronic fishery information platform that revolutionizes the way fisheries information is collected, analyzed and shared. Envisioned initially by fishermen and scientists to track important resource data, Fish Trax™ has now expanded to serve as a tool for the seafood industry, allowing managers, scientists, regulators, and marketers to collect data and collaborate on ways to improve sustainable management practices.

Fish Trax™ maximizes the usefulness of collected data, eliminates redundant systems, and promotes efficient exchange of critical information. Fish Trax™ brings 21st century technology to fisheries managers, scientists, and marketers. It is based on the recognition that fishery management relies on the real-time cooperation of scientists, managers, and industry to sustain fishery resources. Its design helps industry and managers move from reliance on highly lagged and outdated data to information representing real-time events.

How it Works: At the heart of the Fish Trax™ system is a secure and robust database. Through the use of specially designed and easy-to-use "portals," the client can securely input and export data and information to meet the needs of a variety of audiences. The portals are designed with unique features to help translate raw data into valuable knowledge that help users maximize their real-time business, management, marketing, and purchasing decisions.

FXA Group

FXA has experience in food traceability for seafood from farm to manufacturer in both the private and government sectors. For the private sector, FXA has worked with Thailand's top 2 shrimp manufactures and one in Vietnam for fish, namely, Charoen Phokphan Food (CPF), Chantaburi Frozen Food (CFF), and Bianfishco (Binh An) who can declare the origin of farm and identify key manufacturing processes. On the farm level, we have worked with many Shrimp Farm Co-operatives to collect relevant farming information. This allows the exchange of farm data with the manufacturers enabling increased reliability of data. For the government sector, we have worked with the Department of Fisheries (DOF) of the Ministry of Agriculture for the Seafood Traceability Pilot project whose main objective is to control the correctness of shrimp movement such as chain of custody and reliability of information such as origin and product tests to issue the health certificates for seafood that are required to export to the USA, EU, and Japan.

GS1 & NFI: US Seafood Traceability Implementation Guide
In 2011, there was considerable focus on applying best practices for GS1 identification in barcodes to seafood, and using this as a traceability solution. The National Fisheries Institute worked with GS1 US to create a US Seafood Traceability Implementation Guide to define minimum requirements and best-practice recommendations for tracking seafood as it moves throughout the supply chain. The work so far has been done with a food safety focus, but it could be expanded to include sustainability details, such as harvest method and location. One of the strengths of this approach is that GS1 barcoding is already widely adopted in nearly all segments of retail (meat, shelf stable, dairy, bakery, etc.). While the traditional GS1-128 barcode is limited in the amount of information it can encode (48 characters), the Data Bar may be able to store more information, however technology would need to be upgraded to read the Data Bar. In addition, or as an alternative to Data Bars, the GS1-128 can include a reference number (Serial Shipping Container Code; SSCC) to an Advanced Shipping Notice (ASN) capable of capturing a variety of detailed data. This approach is currently being developed by some retailers for the meat industry, with the potential to carry over into seafood.

Gulf States Marine Fisheries Commission
The Gulf States Marine Fisheries Commission, Trace Register, LLC, MRAG Americas, Inc., and GCR, Inc. began a regional traceability program called Gulf Seafood Trace in 2011 aimed at ensuring confidence in the Gulf of Mexico seafood market (TraceRegister, 2011). The program seeks to increase confidence and demand in the marketplace by providing information and unique stories about Gulf of Mexico seafood sources. The program empowers Gulf seafood businesses by offering complimentary use of electronic traceability and marketing tools in addition to providing reviews and data analyses to confirm the validity of information being shared by businesses. Consumers can engage through Quick Response (QR) codes via smartphones and websites to learn where the seafood is from, where it was caught, and details about its journey through the supply chain.

Gulf Wild
Gulf Wild® offers unobstructed views inside their Gulf seafood suppliers, allowing consumers to track seafood back to its source - including the exact fishing vessel, location, and fisherman who landed it - with a uniquely numbered gill tag on every fish. A key criterion to Gulf Wild harvests is that all fish must be from continuously improving fisheries supported by innovative management with fishery improvement plans and/or projects. In delivering, all Gulf Wild fishermen agree to a robust set of voluntary conservation measures that guide how Gulf Wild seafood will be harvested. These unique “Conservation Covenants” exceed local or federal regulations for sustaining our nation's fisheries. The Gulf Wild program also incorporates periodic tests for PAH’s, heavy metals and other contaminants, above and beyond those conducted by NOAA and the FDA. The program features firm safety criteria with a verifiable sampling plan and clear testing protocol. The Gulf Wild® TransparenSea™ System puts all the information online for consumers to see their unique parcel of Gulf-caught fish and its entire back story in a real-time online confirmation system.

Open Ocean Trading
Open Ocean Trading's FYSH-X platform is the leading forward contract exchange for fresh, processed, and frozen seafood. The unique for-profit business model brings transparency, price discovery, and traceability to the seafood marketplace by allowing buyers to directly negotiate with vessels before they leave the dock. When you enter into a forward contract, you know in advance exactly what you're getting, how much it will cost, and what vessel will be fishing for you.

The FYSH-X platform improves supply chain efficiency by moving the sales process prior to production and increases vessel business stability under a quota based management style. Buyers using FYSH-X also gain insight into the entire supply chain from harvest through processing and distribution and can contract vessels days, weeks, or months in advance.

ScoringAg

ScoringAg is a complete interoperable database with *Site-Specific Recordkeeping™* and standardized records that includes food, feed ingredients, SSOP and HACCP as well as containers and machinery records in one world-wide working system. ScoringAg's database can integrate information from any other database including using the QR code. ScoringAg records start at the boat or farm and go all the way thorough the whole supply chain up to the retailer and consumer with an automatically created traceback code as an unique identifier. These unique SSI-EID traceback codes stay with the product from harvest throughout any processing and comingling process without losing its identity. The system can handle paper and electronic record-keeping and can generate labels for shipping or receiving. ScoringAg can be applied to other perishables such as produce or livestock.

Seasoft

Seasoft Seafood Processing and Distribution Software provides a comprehensive solution to the traceability requirements of for-profit seafood producers, processors, distributors and retailers. Seasoft includes a direct interface to Trace Register, a web-based tool to share product information through the supply chain. Seasoft can trace product from ocean to consumer with a click of a button—saving significant time and labor costs. The software stores information about a specific product's origin and MOP, so businesses can confidently promote their products as coming from sustainable fisheries utilizing environmentally sensitive harvesting practices. Seasoft is barcode-ready, helping distributors track product as it received, processed and moved through the supply chain. By barcoding COO, MOP and other information, seafood distributors have an efficient and accurate mechanism for quick and thorough product recalls.

Shellcatch

Shellcatch is an advanced traceability system that integrates cutting edge wireless technologies to trace fish from the boat, through the dock and production process. The traceability process can be adjusted for different fishing configurations or species. The solution is designed to verify seafood origin and species authenticity, as seafood retailers, restaurant chains, distributors and exporters need exact traceability in a precise and cost effective manner. This allows for a reduction of fraudulent fish in the supply chain, improved customer information, customer loyalty, international regulation compliance and potentially saves millions of dollars in product recall expenses.

Therion International, LLC

For over 20 years, Therion has been the leader in providing quality DNA testing of seafood products to verify species and stock identification for species of grouper, halibut, salmon, sea bass, snapper, tuna, walleye, crabs, shrimp, etc. Present and past clients have included the US Fish and Wildlife Service, NOAA, Greenpeace, Oceana, Bonefish Grill, Darden Restaurants and scores of importers, distributors and purveyors of seafood. Regardless of whether the seafood product came to the plate from the ocean, lake or aquaculture facility, it is essential to have knowledge of its identity, origin and food chain history in order to verify its safety for consumption. It is the opinion of Therion that DNA testing for both species and stock identification could be the ultimate tool for the verification of traceability systems, thereby

enhancing sustainability, enabling fraud detection, and ultimately providing better consumer protection. Therion stands ready to provide DNA testing or develop novel assays to address questions of seafood species or stock identification.

Thisfish

Thisfish is a seafood traceability solution that, to date, encompasses more than a dozen fisheries from North America's Atlantic and Pacific coasts and Europe. Seafood is identified with a unique code, which is linked to traceability data and uploaded to an online system at Thisfish.info. Using computers or smart phones, consumers use the code to trace a product's origins: who caught and processed the fish, when, where and how. Consumers can even send a message to their fisherman. Thisfish is currently a program of Ecotrust Canada, a charitable nonprofit based in Vancouver, Canada.

TraceAll

TraceAll provides comprehensive, real-time traceability in the international seafood market and other industries. Their mission, with respect to the seafood industry, is to eliminate IUU fishing and minimize waste in the supply chain. They envision a world with more robust fish populations, safer fishermen with better access to markets, higher quality products delivered at lower costs by businesses, and sustained marine diversity in ecosystems across the globe. Their secure, cloud-based technology connects stakeholders in the seafood supply chain from harvest through consumption. TraceAll customizes each of their five modular tools (eLog, Foodtrace, PIMS Track, PIMS Monitor and Supplier Exchange) to customers' specific needs in order to maximize value and ensure ease of use. Traceall's British Government Certified "eLog" software solution captures fishing vessels' activity data electronically. The system tracks a vessel's crew, location, date and time, fishing method, species caught or harvested (aquaculture), bycatch, and any other customizable data points of interest fulfilling and exceeding recognized traceability standards globally. This data can be used for Government, Scientists, industry regulation, improving business efficiencies, risk mitigation, and to ensure the safety of fisherman. The eLog system also allows consumers to know exactly when, where, and how their seafood was harvested at the original source. TraceAll's other software products supplement the eLog fishing data with processing and transportation data collected along the supply chain to deliver auditable meaningful full chain of custody information that businesses across the supply chain use to validate their sourcing and improve business efficiencies.

Trace Register

Trace Register, a software solution, enables all companies in the supply chain to capture and share information about a product as it moves through the supply chain. It is one of only three electronic traceability systems that successfully completed a complex mock recall scenario undertaken by the Institute of Food Technologists working on a project for the FDA. The system is very flexible and can accommodate a wide range of product data attributes including source fishery/farm information, test and inspection results, original documents, marketing information, certification details, etc. Data can be entered into Trace Register as the main database either manually or by automatically uploading data from existing in-house systems. If every step in the supply chain uses this system, it allows product to be traced back to the vessel or farm, as well as any ingredients that have been added during processing. Trace Register is not an audit or inspection company, however, the Trace Register system includes powerful automated reporting and analysis functionality that can be used by auditors and inspectors to manage the auditing process more efficiently and effectively. This functionality will be used by the auditors MRAG as part of a joint project being undertaken by Trace Register and MRAG for the Gulf States Marine

Fisheries Commission to implement electronic traceability for the Gulf of Mexico seafood industry. The Trace Register system also has powerful and flexible marketing functionality that uses consumer facing ID numbers or QR codes to can direct consumers to a website via a PC or a Smart Phone where they can learn more about the product, drawing on the database for those details.

TraceTracker
TraceTracker is a leading international specialist traceability solution provider with a powerful "Software as a Service" (SaaS) platform called GTNet® - the Global Traceability Network. GTNet® provides internal traceability to enterprises with complex products and processes, as well as external/whole-chain traceability to participants across entire supply chains. TraceTracker also provides traceability-enabled applications such as "Coffee Trader" for the production, processing and export of coffee and similar commodities, and "Asset" for the tracking and management of assets in the construction industry and other sectors.

Industry Groups

Industry groups working on seafood traceability in North American markets were contacted and asked to provide an overview of their work on the topic.

Food Marketing Institute
Food Marketing Institute (FMI) represents food retailers and wholesalers and develops and promotes policies, programs and forums supporting its members, their customers and supplier partners, and other industry stakeholders in many areas, including social, environmental and sustainability programs. A Sustainable Seafood Committee and its advisory councils, including non-profit organizations, have had several discussions surrounding traceability for wild and farmed seafood. In May of 2012, FMI released a Sustainable Seafood Toolkit, the purpose of which was to assist food retailers with the integration and implementation of seafood sustainability procurement policies and procedures by providing examples and calling out some components that may be taken into consideration when developing policies. The importance of traceability is cited in almost all examples in the Toolkit, based on meetings and discussions with members of the Sustainable Seafood Committee (SSC), interviews with industry leaders, and a review of industry best practices.

National Fisheries Institute
National Fisheries Institute (NFI) is a non-profit trade organization dedicated to education about seafood safety, sustainability, and nutrition. NFI collaborated with GS1 to create the recent Traceability Implementation Guide (available for download here). According to the website: "The Guide was developed in collaboration between NFI, GS1 US, and US seafood industry stakeholders to provide consistent, practical seafood-traceability voluntary guidance for industry-wide use. It defines minimum requirements and best-practice recommendations for tracking seafood as they move through the supply chain from farms to processors, suppliers, distributors, retailers, and foodservice operators."

Non-Profit Organizations

Non-profit organizations working on seafood issues were contacted and asked to provide an overview of their work on seafood traceability.

Ecotrust Canada
Ecotrust Canada is an enterprising nonprofit whose purpose is to build the conservation economy. The organization works at the intersection of conservation and community economic development promoting innovation and providing services for communities, First Nations and enterprises to green and grow their local economies.

Environmental Justice Foundation
Environmental Justice Foundation (EJF) is based in London and is a registered charity established in 2000 to empower people who suffer most from environmental abuses to find peaceful ways of preventing them. EJF provides film and advocacy training to individuals and grassroots organizations in the global south, enabling them to document, expose and create long-term solutions to environmental abuses. EJF campaigns internationally to raise awareness of the issues its grassroots partners are working to solve locally. EJF has campaigns that focus on Pirate Fishing and Bycatch along with the Impacts of Shrimp Farming. EJF's pirate fishing work focuses on illegal fishing activity off of Sierra Leone and Liberia, and the organization has also recently launched a Global Fisheries Transparency Project, an initiative aimed at promoting greater transparency amongst all stakeholders in marine fisheries. As part of this project, EJF is calling for the urgent development of a Global Record of fisheries vessels and an end to the exploitation of Flags of Convenience.

FishChoice
FishChoice.com is an online sustainable seafood product directory and resource center for businesses that buy and/or sell sustainable seafood. FishChoice aggregates multiple sustainable seafood rating and certification programs into a collection of matching products and suppliers. In order for suppliers to have products on the website, they must provide the scientific name of the species, the origin of where the product was fished or farmed, and the fishing or farming method(s) for each product. FishChoice.com currently includes traceability information for all of the certified products on its website by providing Chain of Custody numbers for Marine Stewardship Council certified products and certification identification numbers for Food Alliance Certified products. Additionally, FishChoice is currently investigating how to include more traceability information for its product listings.

FishWise
FishWise is a non-profit conservation organization that promotes the health and recovery of ocean ecosystems by providing innovative market-based tools to the seafood industry. FishWise has a comprehensive understanding of traceability systems available on the market today, as well as how to develop in-house solutions. The distribution of this white paper is a first step in sharing with stakeholders what it has learned on the issue. As a part of its traceability services, FishWise: 1) assesses seafood businesses' product tracking software & procedures, compares and contrasts existing systems with other options on the market and provides recommendations on how to improve traceability systems; 2) conducts Traceability Risk Assessments to identify products that are likely to be untraceable, come from illegal sources, or be at high risk for misinformation or fraud; and 3) contracts third-party audits of supply chains to validate legality and traceability for all seafood products.

Future of Fish
Future of Fish provides early-stage innovators with strategic planning and investment support so that their ideas can achieve real impact. They also help longtime industry players experiment with new technologies and business models that better serve them, and the fish. Some of these innovations focus on traceability solutions.

Greenpeace
Greenpeace's Ocean Campaign focuses on ocean threats including industrial fishing, bycatch, inequitable fisheries, corporate demand trends, and ineffective or non-existent fishery management. Larger issues such as global warming and pollution are also scrutinized but generally within the context of Greenpeace's Climate Campaign rather than an Oceans framework. Greenpeace also houses an unofficial blacklist on their website to help combat IUU fishing and advocates for seafood traceability in their tuna and retailer campaigns.

Gulf of Mexico Reef Fish Shareholders' Alliance
The Gulf of Mexico Reef Fish Shareholders' Alliance is a 501c(6) trade association, which represents the interests of catch share fishermen and associated dealers throughout the Gulf of Mexico who provide transparent consumer access to high-quality seafood year-round. The organization endorses on-board monitoring of all harvests, voluntary on-board cameras with GPS-enabled video monitoring systems, and other transparent practices. Members of the Alliance engineered the pioneering Gulf Wild® program, the Gulf's first trackable seafood system for finfish which focuses on recovering species under fishery improvement plans. More about the Alliance's signature transparency program, Gulf Wild®, is listed in the "Traceability Programs" section.

International Seafood Sustainability Foundation
ISSF is a non-profit global coalition that seeks to undertake science-based initiatives for the long-term conservation and sustainable use of tuna stocks. ISSF Resolution 09-04, which is mandatory for ISSF Participating Companies, began on January 1, 2010 and resolves to trace tuna from capture to plate by requiring companies to record "the name and flag of catcher and transshipping vessels, fish species, ocean of capture corresponding to tuna Regional Fisheries Management Organization (RFMO) area, fishing trip dates, fishing gear employed, date the company took ownership of the fish and each species by weight." The resolution also requires that product found to be IUU in origin must be withdrawn from the marketplace once the violation is discovered. According to ISSF, several auditing and verification mechanisms are in place to ensure member companies are compliant with Resolution 09-04.

Since 2010, ISSF has added several other components to improve the credibility of traceability schemes throughout tuna fisheries. Unique vessel identifiers – UVIs – help to track vessels throughout the world. These numbers, often an International Maritime Organization (IMO) number, stay with a vessel through changes in ownership, flagged nation and fishing region. As of May 2011, ISSF Participating Companies support only those vessels of a size subject to registry with a RFMO that have obtained an IMO number. That standard applies to all vessels as of January 2013.

At-sea transshipments often occur without proper observer coverage, creating credibility gaps in traceability data points. As of January 2012 all ISSF Participating Companies must refrain from transactions with purse seine vessels that transship at-sea.

Observer coverage is also fundamental to validating fishing practices onboard purse seine vessels. Currently, only the eastern Pacific Ocean has a historical record of 100% observer coverage, while the western and central Pacific Ocean has recently implemented the full coverage requirement. The Atlantic and Indian Oceans have very low numbers of observers. By January 2013, ISSF Participating Companies must refrain from transactions with any purse seine vessel that does not have onboard observer coverage.

To address traceability issues in longline fisheries, where space and time constraints make observer coverage less practical, ISSF is investing in validating electronic observer coverage with a goal of implementation by 2014. In May 2012, ISSF announced the launch of the ProActive Vessel Register (PVR), a new third-party audited database that will list vessels adopting best-in-class, responsible tuna fishing practices. MRAG Americas will serve as the independent auditor for the Register by performing on-site audits and regularly reviewing documentation and databases. The Register identifies which of more than two-dozen practices each vessel has adopted, including implementing strategies to increase supply chain transparency. Vessels will be audited to verify practices such as 100% observer coverage, participation in a global vessel monitoring system, obtaining a UVI (IMO), being flagged to a RFMO Member or CNM, submitting FAD logbooks to the relevant RFMO and full retention of catch.

The Nature Conservancy

The mission of The Nature Conservancy is to conserve the lands and waters on which all life depends. To that end, the Conservancy actively tests new harvesting techniques and models for sustainable fisheries, many of which benefit from emerging technology. One of the more difficult aspects of fisheries management is the collection of good data, particularly location data, in a manner that allows for in-season adaptive management. To address this need, the Conservancy created a web-based application called eCatch that provides a simple way for fishermen collect, map and share their harvest information. In the future this technology has the potential to complement traceability by providing a means to verify the location, content, and ecological context of catch information at sea.

New England Aquarium

New England Aquarium is a global leader in ocean exploration and marine conservation. Its innovative exhibits and educational programs aim to create the next generation of ocean protectors, while building widespread awareness for the need to live blue. The Aquarium's Sustainable Seafood Programs work with some of the world's largest seafood retailers and suppliers to encourage the sustainable development of farmed and wild-caught seafood resources. The Aquarium advises these companies on issues related to environmentally responsible seafood and facilitates proactive changes along their supply chains to favor marine conservation. Developing a variety of strategies and tools to enhance transparency and traceability is a critical component of the Aquarium's efforts with corporate partners and throughout their supply chains. Such guidance can help companies to meet their sustainability commitments by ensuring that seafood products are caught or farmed legally using environmentally responsible methods. Strategies range from species-specific improvements to broad engagement in support of policies to combat IUU fishing. The Aquarium is actively engaged with domestic and international management and enforcement bodies and works collaboratively with scientists, NGOs and industry representatives.

Oceana
Oceana has a Seafood Fraud Campaign and currently has a take action letter addressed to the FDA and NOAA that the public can sign on to, asking for the government to *"…take steps to ensure that the fish that we eat in the US is safe, legal and honestly labeled by requiring fish to be traceable and trackable throughout the supply chain. By tracking fish from vessel to plate, the US government can prevent mislabeling, provide consumers with important information, help keep illegal fish out of the market and improve seafood safety."*

Pew Environment Group
The Pew Environment Group's (PEG's) Global Campaign to End Illegal Fishing is working to set up a global fisheries enforcement system to combat IUU fishing. PEG is working to build the international capacity for generating critical analysis and intelligence on IUU fishing, developing ways for nations to share information about IUU fishing, and putting critical information and tools in the hands of enforcement authorities worldwide. PEG will continue to assist in efforts by national and international bodies, including Regional Fisheries Management Organizations, to implement the Port State Measures Agreement, create a global record of fishing vessels, and create minimum standards for flag state responsibility.

SeaChoice
SeaChoice, Canada's most comprehensive sustainable seafood program is about solutions for healthy oceans. SeaChoice works with Canada's leading retailers and seafood distributors to help guide robust traceability solutions in the Canadian marketplace. Launched in 2006, SeaChoice was created to help Canadian businesses and shoppers take an active role in supporting sustainable fisheries and aquaculture at all levels of the seafood supply chain. Working in collaboration with the Monterey Bay Aquarium's acclaimed Seafood Watch program, SeaChoice undertakes science-based seafood assessments, provides informative resources for consumers, and supports businesses through collaborative partnerships. The SeaChoice program is operated by the Canadian Parks and Wilderness Society, David Suzuki Foundation, Ecology Action Centre, Living Oceans Society and Sierra Club BC.

Sustainable Fisheries Partnership
Sustainable Fisheries Partnership engages and catalyzes the global seafood industry in improving the management and environmental performance of fisheries and aquaculture. The organization works through providing information via the public database FishSource.org, advising partners in the seafood supply chain and by convening fishery and aquaculture improvement projects. Robust and accurate traceability is an essential part of fishery and aquaculture sustainability and certainty over the species and source of products is essential for companies to manage and reduce risk. SFP supports partners in establishing traceability in their supply chains and provides assistance in risk assessment and devising improvement and mitigation strategies.

Wild Salmon Center
Founded in 1992, the Wild Salmon Center (WSC) is a science-based, international conservation organization with the mission of identifying, understanding and protecting the best wild salmon ecosystems of the North Pacific. They devise and implement practical strategies, based on the best science, to protect forever these extraordinary places and their biodiversity. The Sustainable Fisheries and Markets Program at WSC works to increase the value of legal and sustainable salmon products by promoting MSC fisheries and Chain of Custody certifications; creating traceability systems allowing seafood buyers to distinguish legal/sustainable products from illegal/unsustainable products; promoting the development of a separate, verifiably legal and

sustainable supply chain of salmon; and convincing major buyers to direct purchases only to sustainable sources.

Certification Bodies

Global Trust Certification
Global Trust is an accredited ISO 65 Certification and Standards services provider with seafood certification and traceability expertise. They have extensive and diverse hands-on experience with traceability standards, e.g. FAO and MSC chain of custody, and tracking systems throughout the world. Their clients range from small private companies to complex multi-nationals, and from associations to national Governments. Their solutions are customized or off the shelf (to suit client needs and requests). They are engaged with international and national traceability standard setting initiatives and multi-partner, multi-year traceability research programs. They are technology neutral and able to provide independent review of traceability software effectiveness and other product claims regarding traceability. They operate a wide range of international certification programs in fisheries, aquaculture, and seafood processing.

Intertek Moody Marine Ltd.
Intertek Moody Marine Ltd. is the leading accredited certifier of both large and small-scale fisheries against the Marine Stewardship Council (MSC) standard and is also an accredited MSC chain of custody certifier with clients in restaurant, retail, processing, wholesale and food service sectors.

MRAG
The three MRAG companies (MRAG Americas, MRAG Ltd., and MRAG Asia Pacific) provide traceability services to help companies ensure that seafood was caught legally and sustainably. MRAG has worked globally on these issues and has offices in Europe, North America, and Australia. Its services include: customized, confidential, and independent traceability audits of products from catch to consumer; confidential risk assessment to combat IUU fishing and ensure seafood has not been caught illegally; audits for the ISSF ProActive Vessel Register (PVR); MSC chain of custody and fishery assessments and certifications; and confidential third-party supply chain audits.

Scientific Certification Systems
Scientific Certification Systems (SCS) is a global leader in independent environmental assessments and certification. Founded in 1984, SCS spurs the private and public sectors toward more sustainable sourcing, policy planning, product design, management systems and production operations. SCS's seafood team works with the seafood supply chain, fishing associations, aquaculture producers, governments, non-governmental organizations and investment funds to move the sector towards certified best practices. Their independent verification of supply chain traceability, wild-capture fisheries, and aquaculture operations ensure that our clients' claims are credible, transparent and make the case for increased market access. SCS issued the first MSC fishery and chain of custody certificates and is a founding contributor of the ASC, with staff currently active the label's Technical Advisory Group. As a recognized leader in environmental certification for 25 years, and an international pioneer in responsible resource management certification, SCS has become a leading verifier of sustainable seafood.

Other Companies and Programs

Arnold & Porter LLP
Arnold & Porter LLP is at the forefront in advising global companies in high-risk industries on anti-corruption and supply chain security compliance and investigations. The firm's Natural Resources Trade practice is led by a former federal prosecutor who headed the highly publicized Lacey Act investigation and prosecution of the Arnold Bengis international smuggling ring. Their lawyers bring a depth of experience in US trade law, corporate compliance programs, environmental law and criminal and civil litigation.

FishPopTrace
FishPopTrace (FPT) is an international project that succeeded in constructing a Pan-European framework for product traceability and policy related monitoring, control and surveillance in the fisheries sector. While FPT started out following a fundamental and explorative research approach based on the broad range of expertise available within their consortium, FPT generated framework providing forensically-validated end-user tools in the areas of fish population analysis and fish (product) traceability by using both new and established technologies based on molecular genetics, otolith microchemistry and morphometrics. FPT focused on four fish species that differed in life-style and distribution: cod, hake, common sole and herring. FPT can now correctly assign fish to populations from more areas and with higher certainty than previously possible, reaching standards which can be used in a court of law. Based on use of the most highly distinct genes among populations FPT has already developed "minimum assays with maximum power" with from 10-30 SNPs. These assays have been developed to target some of the most pertinent needs for traceability tools in European fisheries management. For example, FPT now has fast, efficient and forensically robust tools to discriminate between cod from Canada, North Sea, Baltic Sea and Northeast Arctic populations, between North Sea and North Atlantic herring, between sole from the Irish Sea and Thames and between hake from the Mediterranean and Atlantic areas. The FPT consortium consisted of 15 partners with expertise in fish biology, population and conservation genetics, molecular biology and biochemistry, wildlife forensics, with representatives of the food industry and with strong links to European fisheries policy makers. Moreover a scientific advisor from the US National Oceanic and Atmospheric Administration (NOAA) is participating. By engaging with priorities of the European Common Fisheries Policy, FPT has enhanced awareness of IUU issues within the industry, academics, policy, makers and consumers.

Oceans 5 Alliance
Oceans 5 is a global funder's collaborative, comprised of new and experienced philanthropists, committed to protecting the five oceans of the planet. The group collectively focuses its investments and support on large-scale, opportunistic projects and campaigns aimed at significantly expanding marine reserves and constraining overfishing. The Alliance's Seafood Traceability Project seeks to strengthen the traceability and transparency of global fisheries regimes to combat illegal, unregulated and unreported fishing and to provide new accountability in dominant import markets, including the United States and European Union. Oceans 5 is supporting the dedicated work of four nonprofit organizations to achieve these objectives including World Wildlife Fund, Greenpeace, Oceana, and the Marine Fish Conservation Network.

Next Steps for Seafood Businesses

While the challenges are numerous, achieving full traceability in seafood supply chains is essential for reducing IUU fishing, allowing retailers to prove that they are making progress on sustainable seafood goals, and to reducing the mislabeling of seafood. Similarly, the incentives for seafood businesses are numerous and include the ability to differentiate product to the consumer to increase value and sales and reducing loss in the supply chains due to inefficient product tracking (e.g. recalls).

In order to ensure seafood supplies are traceable, and goals such as eliminating IUU fishing are achieved, recommendations for seafood companies of all types are included in the graphic on the following pages. This graphic lays out the steps that companies can take to build a robust and traceable supply chain, and also to act as leaders in the movement by furthering policy reform and sharing lessons learned with others in the movement.

To work towards establishing full seafood traceability in supply chains, companies should plan to incorporate traceability into their business plans and communicate expectations to their supply chains. Records can then be captured via electronic data systems and shared throughout the supply chain, increasing transparency. Challenges can be addressed by consulting with the contacts and groups provided in this paper. Once data is properly shared and all of the necessary fields are captured, verification of the system and data can take place via paper audits or mock recalls, on the ground audits, or vessel blacklist reviews, as prioritized by a risk assessment. Once those steps are completed, additional measures like supporting policy reform and capitalizing on achieving full traceability by communicating that competitive advantage will help both the greater movement and the company's sales and reputation in the industry.

Next Steps for the Movement

The burden of carrying out next steps within the movement does not belong entirely to the industry. Governments should play an important role by mandating traceability requirements and protocols, providing enforcement, and creating an even playing field by requiring these measures industry-wide. To expedite progress in combatting IUU fishing, governments can also keep the industry and NGOs more informed of IUU legislation and challenges, including alerting groups when critical policy reforms need additional outside support. NGOs can work with governments to forward relevant policy asks to the industry, helping companies communicate the legislation's intent and importance to their supply chains when asking for support. NGOs can also provide guidance to industry groups and the government about barriers to achieving traceability, raise awareness of the problems via consumer engagement, and provide advice and assistance to those companies seeking to improve their traceability. Lastly, all stakeholders can work together to identify and learn from other sectors that also require robust traceability – such as fair trade coffee, conflict free diamonds, and certified natural products.

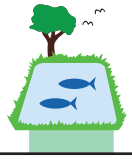
Figure 6: Traceability next steps for seafood businesses. This graphic depicts areas of work for seafood businesses within four broad categories. They range from initial steps and scoping exercises at the top of the list, to advanced steps like improved market strategies at the bottom of the second page. This list is not exhaustive, but may help as a guide to companies seeking to improve their traceability.

Fishing Vessel

RECORDS

Create system to track: catch location, date, total weight, and method of all harvest events (logbook and electronic capture, ideally).

Farming Operation



RECORDS

Create system to track: harvest location (cage or pond number), date, and weight of all harvest events (logbook and electronic capture, ideally).

Distributor/Processor

Retailer/Restaurant

COMMUNICATE EXPECTATIONS

Communicate traceability and legality expectations to supply chain (via specification sheets, commodity agreements, etc.). Survey each company for the tracebility measures they have in place and their company policy on traceability. Within survey, request details about supply chains - numbers of steps in the chain, level of traceability, number of source countries, etc. (see Risk Assessment).

CONFIGURE INFORMATION TRACKING SYSTEMS

Ensure database is able to receive and store all available information from previous steps in the supply chain (ideally electronically) and track all internal processing and handling. If modifications to the current database are not possible, reach out to traceability companies for review, technical support, or software. Request that all relevant information is electronically transferred, moving away from a "one-up one-down" system.

INFORMATION SHARING AND TRANSPARENCY

Communicate method, date, and location of harvest (and inputs) to buyer, ideally via an electronic system. Innovate and find ways to communicate traceability and sustainability information throughout supply chain to end buyer to differentiate product on the market and earn a higher price.

REVIEW AND ADDRESS SHORTCOMINGS

Review traceability shortcomings - which expectations are not being met by current vendors? For the unmet expectations (e.g. listing vessel name on invoices), identify the barriers (via vendor survey) and investigate systems that can address those barriers (e.g. language barriers, technology challenges, etc.) using the contacts in this paper, reaching out to peers, or consulting with a third party specialist.

RECORD KEEPING

Retain electronic and paper records of harvest (and inputs) for future recall and tracing exercises. Share copies of relevant permits, licenses, and Chain of Custody certifications with supply chain to prove legality.

VESSEL BLACKLIST REVIEW

Request Vessel Name(s) for all seafood and check the names against IUU fishing blacklists.

HANDLING PROTOCOLS

Ensure staff are trained on protocols around information tracking, proper handling to eliminate unintentional mixing, and shipping and receiving best practices.

SUPPORT POLICY REFORM

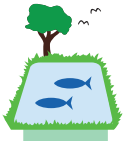
Support reform in your nation(s) of business and encourage supplying nations to support relevant local and international laws (e.g. ratifying the UN FAO Port State Measures Agreement).

FURTHER THE MOVEMENT

Share lessons learned and seek advice of others in the field to improve movement as a whole. Engage in certification consultation processes and attend meetings on seafood traceability organized by NGOs, RFMOs, government, and industry.

Fishing Vessel

Farming Operation



Distributor/Processor

Retailer/Restaurant

RISK ASSESSMENT

Conduct a risk assessment of products to determine those at the greatest risk for being illegal, fradulent, mislabeled, or having social concerns. Risk assessment inputs can be both quantitative (research of risk in various fisheries and systems) and qualitative (based on history and trust in the specific company and vendor survey results).

MOCK RECALLS

Conduct a mock recall of all Low and Medium Risk seafood items (as determined by Risk Assessment). Trace product back to the source and request copies of permits. For all certified product, keep Chain of Custody certifications on file.

AUDITING

Conduct on the ground audits for all High Risk items to ensure proper documentation and protocols are in place. For sources that cannot provide permits or vessel names after a set amount of time, switch to a source or company with better traceability. Conduct DNA testing to confirm accurate labeling.

TRANSPARENCY AND COMPETITIVE ADVANTAGE

Incorporate traceability into brands/company image and develop ways to capitalize on traceability and transparency in the long-term. Communicate traceability goals and progress to customers. Report on progress often. Promote traceable product and tell the story behind the seafood to customers to differentiate it and gain consumer confidence and trust.

Conclusion

Ensuring that seafood supply chains are fully traceable and that product is legal and accurately labeled is a large undertaking, but it is a challenge that must be met head-on if companies are to achieve sustainability goals. As government regulations and international media focus more on food safety and eliminating IUU fishing, it will be important that seafood companies are also proactive on this topic to further reduce global IUU fishing and seafood mislabeling. By better understanding and managing their supply chains, and developing the ability to track specific products back to their source, companies can address or eliminate high-risk items while maximizing inventory control. Investing resources into solutions now will help to protect brand value, build consumer trust, and eliminate these environmental and social issues.

There are many resources, from traceability programs, software solutions, DNA testing companies, to conservation NGOs, that can provide assistance to businesses looking to improve their supply chain traceability. There are also a few simple steps companies can take now to begin to improve supply chain traceability, including clearly communicating expectations to their suppliers, improving internal tracking systems, conducting risk assessments and auditing high risk items. The contact list at the end of this report should prove a helpful starting point for those in the industry looking to identify groups and companies to work with on seafood traceability.

The hope is that this second white paper will spur further collective action between government, non-profit, industry, funders, and other stakeholders to tackle seafood traceability issues. Actions may include encouraging nations to adopt the UN Port State Measures Agreement, working with Regional Fishery Management Organizations (RFMOs) to improve traceability and reporting mechanisms, working with developing nations to help them prevent IUU fishing in their waters, and ensuring government and industry are working together on effective and efficient traceability systems.

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About the Authors

Mariah Boyle, Project Director at FishWise, has summarized her research and learnings on seafood traceability in this document, for the purpose of assisting seafood companies and other stakeholders in the sustainable seafood movement. Mariah has a M.Sc. in marine science and focuses on the trophic ecology of fishes, solutions to seafood traceability and illegal fishing, community-based fishery management in developing nations, and business approaches to sustainable seafood. She has eight years of experience working in marine science, several publications on fish ecology, and has conducted field research on fishes in Sierra Leone and the Pacific Northwest. Mariah can be contacted at m.boyle@fishwise.org.

Research Fellow

Tami Weiss, Center for the Blue Economy Fellow, worked with Mariah over several months to conduct the research and outreach needed to update the white paper. Tami is currently earning a Masters in International Environmental Policy from the Monterey Institute of International Studies. Her interests include food systems, gender equity and sustainable business. Tami can be contacted at tweiss@miis.edu.

Graphic Design

The graphics in this report were created by Victoria Galitzine, Communications Program Manager at FishWise.

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Thanks also should be given to the many peers, mentors, experts and industry stakeholders that provided feedback in the survey and reviewed parts of this paper. The collaborative approach of this movement is encouraging, and gives hope that this difficult challenge can be addressed, and the associated environmental and social problems eliminated.

To be updated on future traceability work by FishWise, subscribe to FishWise's Traceability Mailing List at http://www.fishwise.org/contact-us.

IUU Blacklist Links

Combined IUU Vessel List
http://iuu-vessels.org/iuu/

Conservation of Antarctic Marine Living Resources
http://www.ccamlr.org/pu/e/sc/fish-monit/iuu-vess.htm

Commission for the Conservation of Southern Bluefin Tuna, Record of Authorized Vessels
http://www.ccsbt.org/site/authorised_vessels.php

Directorate of Fisheries, IUU List
http://www.fiskeridir.no/english/fisheries/iuu-list

European Union
http://ec.europa.eu/fisheries/cfp/illegal_fishing/index_en.htm

Greenpeace Blacklist http://www.greenpeace.org/international/en/campaigns/oceans/pirate-fishing/Blacklist1/Browse-Greenpeace-Blacklist/

Inter-American Tropical Tuna Commission, Current IUU Vessel List
http://www.iattc.org/VesselRegister/IUU.aspx?Lang=en

International Commission for the Conservation of Atlantic Tunas, IUU Vessel List
http://www.iccat.int/en/IUU.asp

Indian Ocean Tuna Commission, IUU List
http://www.iotc.org/English/iuu/search.php

Northwest Atlantic Fisheries Organization
http://www.nafo.int/fisheries/frames/fishery-iuu.html

Northeast Atlantic Fisheries Commission, IUU B List
http://www.neafc.org/blist

PEW Environmental Group, Port State Performance
http://www.portstateperformance.org/

Southeastern Atlantic Fisheries Organization, IUU Vessel List http://www.seafo.org/VesselList.html

Western and Central Pacific Fisheries Commission, WCPFC IUU Vessel List
http://www.wcpfc.int/vessels

United Nations Food and Agriculture Organization Global Record of Fishing Vessels
http://www.fao.org/fishery/global-record/en

Useful Links

ACGT Inc http://www.acgtinc.com/

Applied Food Technologies http://www.appliedfoodtechnologies.com/

Arnold & Porter LLP http://www.arnoldporter.com/

Aquaculture Stewardship Council http://www.asc-aqua.org/

Community Seafood Initiative www.communityseafoodinitiative.com/

Conservation Alliance for Seafood Solutions http://www.solutionsforseafood.org/

eCatch http://www.ecatch.org/

Ecotrust Canada http://ecotrust.ca/

Environmental Justice Foundation http://www.ejfoundation.org/

Eurofins Scientific, Inc. http://www.eurofins.com/en.aspx

European Traceability Institute http://www.traceability-institute.eu/

FAO Based Responsible Fisheries Management Certification
http://www.gtcert.com/fao-based/

FishChoice http://www.fishchoice.com/

FishPopTrace http://fishpoptrace.jrc.ec.europa.eu & http://mefgl.bangor.ac.uk/gary.php

Fish Trax™ www.fishtrax.org/

FishWise http://fishwise.org/

Food Alliance http://foodalliance.org/shellfish/

Food Marketing Institute http://www.fmi.org/

FMI Sustainable Seafood Toolkit http://www.fmi.org/industry-topics/sustainability

Friend of the Sea http://www.friendofthesea.org/

Future of Fish http://www.futureoffish.org/

FXA Group www.fxagroup.com/

Global Aquaculture Alliance Best Aquaculture Practices http://www.gaalliance.org/

GLOBALG.A.P. http://www.globalgap.org/

Global Trust Certification http://www.gtcert.com/

Greenpeace http://www.greenpeace.org/international/en/campaigns/oceans/

GS1 & NFI: US Seafood Traceability Implementation Guide
http://www.aboutseafood.com/about/us-seafood-traceability-implementation-guide

Gulf Seafood Trace http://www.gulfseafoodtrace.org/

Gulf of Mexico Reef Shareholders' Alliance http://shareholdersalliance.org/

Gulf Wild® http://mygulfwild.com/

International Organization for Standardization http://www.iso.org/

International Seafood Sustainability Foundation http://iss-foundation.org/

Intertek Moody Marine http://www.moodyint.com/mcs-marine.htm

Marine Stewardship Council http://www.msc.org/

MRAG http://www.mragamericas.com/services/seafood-traceability/

National Fisheries Institute http://www.aboutseafood.com/

The Nature Conservancy http://www.nature.org

New England Aquarium http://www.neaq.org

Oceana http://oceana.org

Oceans 5 Alliance http://www.oceans5.org/

Open Ocean Trading http://www.openoceantrading.com/

Pew Environment Group http://www.pewtrusts.org/our_work_detail.aspx?id=940

SeaChoice http://www.seachoice.org/

Seasoft http://www.caisoft.com/Solutions/Seasoft/overview.aspx

Scientific Certification Systems http://www.scscertified.com/

ScoringAg https://www.scoringag.com//scoringag/3/index.cfm?sfa=main.main

Shellcatch http://www.shellcatch.com/

Sustainable Fisheries Partnership http://www.sustainablefish.org and http://www.fishsource.org/

Therion International, LLC http://www.theriondna.com/

Thisfish http://thisfish.info/

TraceAll http://traceall.co.uk/

Trace Register http://www.traceregister.com/en/

TraceTracker http://www.tracetracker.com/

Wild Salmon Center http://www.wildsalmoncenter.org/

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Contact List

Organization/Company Name	Contact Name	Contact Phone	Contact Email
ACGT, Inc.	Edward Diehl	+1 847-520-9162	ed_diehl@acgtinc.com
Applied Food Technologies		+1 386-462-5611	
Aquaculture Stewardship Council	Bas Geerts	+31 30-230-5929	info@ascworldwide.org
Arnold & Porter LLP	Marcus Asner	+1 212-715-1789	marcus.asner@aporter.com
Ecotrust Canada	Tasha Sutcliffe	604-682-4141	tasha@ecotrust.ca
Environmental Justice Foundation	Steve Trent	+44 207-239-3310	steve.trent@ejfoundation.org
European Traceability Institute	Midrag Mitic	+32 497-530-336	info@traceability-institute.eu
FAO-Based Resp. Fisheries Man.	Mike Rose	+1 709-765-1000	mikerose@gtcert.com
FishChoice	Justin Boevers	+1 877-642-0008	justin@fishchoice.com
FishPopTrace	Gary Carvalho	+44 124-838-2100	g.r.carvalho@bangor.ac.uk
Fish Trax™	Heather Mann	+1 541-272-4544	hmann@fishtrax.org
FishWise	Mariah Boyle	+1 831-427-1707 x112	m.boyle@fishwise.org
Food Alliance	Roberta Anderson		roberta@foodalliance.org
Food Marketing Institute	Jeanne von Zastrow	+1 435-259-3342	jvonzastrow@fmi.org
Friend of the Sea	Paolo Bray	+39 02-8707-5167	paolobray@friendofthesea.org
Future of Fish	Cheryl Dahle	+1 415-742-8457	cdahle@futureoffish.org
FXA Group	Chatta Udomwongsa	+66 2640-8211	chattau@fxagroup.com
Global Aquaculture Alliance BAP	Lisa Goché	+1 425-582-0372	lisag@gaalliance.org
GLOBALG.A.P.	Valeska Weymann	+49 221-57-993 x25	weymann@globalgap.org
Global Trust	Mike Rose	+1 709-765-1000	mikerose@gtcert.com
	Mike Carroll	+1 617-640-8126	mikecarroll@gtcert.com

Contact List, continued

Organization/Company Name	Contact Name	Contact Phone	Contact Email
Greenpeace	John Hocevar	+1 202-319-2408	john.hocevar@greenpeace.org
	Casson Trenor	+1 415-255-9221 x 340	casson.trenor@greenpeace.org
Gulf Shareholders' Alliance	Tj Tate	+1 904-669-8894	Tjtate@shareholdersalliiance.org
Gulf States Marine Fisheries Comm.	Alexander Miller	+1 228-875-5912	amiller@gsmfc.org
Gulf Wild	Jason Delacruz	+1 727-639-6565	salty398@aol.com
Intertek Moody Marine	Paul Knapman	+44 133-254-4663	paul.knapman@intertek.com
ISSF	Susan Jackson		sjackson@iss-foundation.org
Marine Stewardship Council	Product Integrity Team	+44 207-246-8900	productintegrityteam@msc.org
MRAG Americas	Jodie Campbell	+1 727-563-9070	jodie.campbell@mragamericas.com
MRAG Asia Pacific	Duncan Souter	+617-3371-1500	dsouter@mragasiapacific.com.au
MRAG Ltd.	Emi Katoh	+44 (0)20 7255 7755	e.katoh@mrag.co.uk
National Fisheries Institute	Dr. Barbara Blakistone	+1 703-752-8880	
The Nature Conservancy/eCatch	Matt Merrifield	+1 415-281-0475	mmerrifield@tnc.org
New England Aquarium	Heather Tausig	+1 617-973-0274	htausig@neaq.org
Oceana	Margot Stiles	+1 202-833-3900	MStiles@oceana.org
Oceans 5 Alliance	Chuck Fox	+1 410-849-2789	chuck@oceansfive.org
Open Ocean Trading	Keith Flett	+1-978-515-7683	kbflett@openoceantrading.com
	Nancy Barrett		nancy.b@openoceantrading.com
Pew Environment Group	Joseph Zelasney	+1 202-540-6794	jzelasney@pewtrusts.org
Scientific Certification Systems	Jason Swecker	+1 510.452.8043	jswecker@scscertfied.com
Scoring Ag	William Kanitz	+1 941-792-6405	info@scoringsystem.com
Seasoft	Jim Levy	+1 800-422-4782	jlevy@caisoft.com
SeaChoice	Neil Radix	+1 604-685-7445 x24	corp.relations@seachoice.org

Contact List, continued

Organization/Company Name	Contact Name	Contact Phone	Contact Email
Shellcatch	Jimena Betancourt	+1 415-800-4172	jimena.betancourt@shellcatch.com
Sustainable Fisheries Partnership	Iain Pollard	+44 7505-122-728	iain.pollard@sustainablefish.org
Therion	William F. Gergits	+1 518-584-4300	gergits@theriondna.com
ThisFish	Eric Enno Tamm		eric@thisfish.info
TraceAll	Alan Steele	+44 7808-776-109	alan.steele@traceall.co.uk
Trace Register	Andy Furner	+1 206-621-1601 x115	afurner@traceregister.com
TraceTracker	Helge Th. Kittelsen	+1 519-241-0726	helge.kittelsen@tracetracker.com
Wild Salmon Center	Julie Kuchepatov	+1 503-358-5838	jkuchepatov@wildsalmoncenter.org

FISHWISE
PO Box 233
Santa Cruz CA 95061
(831) 427-1707
www.fishwise.org