Title: Lobster Traceability Pilot Project - Analysis Phase

For: Lobster Council of Canada

Date: August 29, 2011
Abstract

With a global wave of growing demand for seafood safety and sustainability, traceability systems are becoming a critical requirement. Formed in 2008, the Traceability Task Group (TTG) of the Canadian Council of Fisheries and Aquaculture Ministers (CCFAM) coordinated a series of three seafood traceability pilot projects, one in Ontario, one in British Columbia, and one in Eastern Canada. Each project focused on different species of seafood, but with shared common goals.

The focus of the Eastern Canada project is lobster. The project is being led by the Lobster Council of Canada and managed by the New Brunswick Department of Agriculture, Aquaculture and Fisheries (DAAF). Working with ten participants covering the full spectrum of activities in the lobster industry, including harvesters, buyers, processors, and brokers/exporters; the goal of the project is to implement and test a pilot system for the traceability in lobster supply chain.

The primary goals of this initial phase were to develop a gap analysis as well as recommendations for moving forward towards implementing a test system for the pilot project. During this phase, details were gathered from the participants on their current procedures and compared to existing traceability models, standards, and regulations. From this, it was concluded that industry is not fully ready to support traceability today. Some participants do meet more of the requirements than others. Depending on their current state, implementing a traceability system may require a combination new computerized data collection systems, new processes, changes to existing processes, and possibly additional equipment and electronics, especially for processors.

While this may seem daunting, participants do have an understanding of the benefits and risks and are willing to move forward with traceability systems. Many also have ideas and expectations for additional benefits that may be realized with the required changes. The challenge will now be to implement systems and processes that are effective and efficient while at the same time are simple to use and can be quickly integrated, with as little disruption to business as possible.

To meet this challenge, it is recommended that the pilot system take advantage of existing and proven technologies and processes, such as those used on the wharf in previous DFO pilot projects and those currently used in some processing plants. These can be leveraged to help maintain costs as well as shorten the development and implementation times to get the test system up and running. Following the pilot project, the results will be reviewed and recommended changes can be made prior to rollout of the final system.
Contents

Executive Summary ....................................................................................... 6
Introduction .................................................................................................. 8
Lobster Industry Analysis .............................................................................. 10
  Overview ........................................................................................................ 10
  Current Processes ........................................................................................... 10
    Harvesters .................................................................................................... 10
    Buyers .......................................................................................................... 10
    Processors .................................................................................................... 10
    Brokers/Exporters ....................................................................................... 12
Expectations .................................................................................................. 13
  Harvesters .................................................................................................... 13
  Buyers .......................................................................................................... 13
  Processors .................................................................................................... 13
  Brokers/Exporters ....................................................................................... 13
Traceability Organizations and Regulations ................................................. 14
  Overview ........................................................................................................ 14
  Global ............................................................................................................. 14
    Hazard Analysis and Critical Control Points (HACCP) ................................ 14
    ISO 22000 ................................................................................................... 14
    Global Food Safety Initiative (GFSI) .............................................................. 15
    Institute of Food Technologists (IFT) .......................................................... 15
  Canada ........................................................................................................... 15
    Canadian Food Inspection Agency (CFIA) .................................................. 15
  United States ................................................................................................ 16
    Food and Drug Administration (FDA) ........................................................ 16
    Food Marketing Institute (FMI) ................................................................... 16
    National Fisheries Institute (NFI) .............................................................. 16
  European Union ............................................................................................ 17
    Illegal, Unregulated, and Unreported (IUU) Fishing Regulation ................. 17
  Japan ............................................................................................................. 17
    Food Sanitation Act .................................................................................... 17
Traceability Models ....................................................................................... 18
  Overview ........................................................................................................ 18
  One Up, One Down ...................................................................................... 19
  Central Storage ............................................................................................. 20
Appendix A: Project Participants ................................................................. 39
  Harvesters .................................................................................................................. 39
  Buyers and Processors ............................................................................................... 39
  Brokers/Exporters ....................................................................................................... 40

Appendix B: Product Labelling ........................................................................ 41
  Bin Labelling ................................................................................................................ 41
  Package Labelling ........................................................................................................ 41
    Sample Package Label ............................................................................................. 42
  Case Labelling ............................................................................................................... 43
  Pallet Labelling ............................................................................................................. 43
    Sample Pallet Label .................................................................................................. 44

Bibliography .............................................................................................................. 47
Executive Summary

This report covers the initial analysis phase of the participants in the "Lobster Traceability Pilot Project" for the Lobster Council of Canada, managed by the New Brunswick Department of Agriculture, Aquaculture and Fisheries (DAAF). There are ten participants involved in this project covering different points in the lobster supply chain, including harvesters, buyers, processors, and brokers/exporters. Each project participant was visited and information was gathered on their current processes, as well as their expectations on traceability. This information was then compared to existing traceability models, standards, and regulations to develop a gap analysis and recommendations on the work required for the development and implementation of a pilot system for traceability in the lobster supply chain.

The report first looks at the participants’ current product and information flows. Our findings show that the majority of processors are still paper based, tracking all processes from receiving to product shipping on paper. Later, required data may be transferred into the accounting/billing system, but there is no electronic data to relate a finished product back to the receiving information, much less the product’s source of origin.

Also, most processors receive lobster from multiple sources simultaneously. In some cases, the producer processes lobster by batch as received. This does allow for the identification of the product source for any given batch, assuming the required data is captured. However, for many, products are received and processed in bulk from multiple sources and sometimes over multiple days. Additional tracking issues may arise within the plant when lobster is separated into pieces and/or mixed with additional ingredients. This means that the full traceability solution for processing plants may also require additional equipment and electronics.

Finished consumer products are identified by UPC barcode and packaging may also include labels with the date, product, and company information. While this can provide traceability back to the final processor, with issues including labels being printed in advance, as well as the batching and sourcing processes described above, traceability beyond this is difficult, if not impossible.

Next, the report covers traceability requirements and models based on government regulations and existing traceability programs. The primary requirement is implementation of a traceability program that can fully trace lobster, at any point in the supply chain, back to the source within 24 hours. The basic model for traceability, and the one enforced by The Bioterrorism Act in the United States, is known as “one up, one down”. This mandates that each organization in the supply chain must be able to identify from who, where, and when the product was received and to who, where, and when the product was sent. Additional requirements to support traceability include standards for batch sizing and sourcing, standardized product labelling, and data storage.

The requirements for the pilot project were chosen to provide a solid initial basis for traceability. It is acknowledged that it may not be perfect and that there may be other potentially beneficial requirements that should be considered for future implementations. These can be researched and considered following the pilot project, prior to a full system rollout.
The report then lists possible benefits and issues of a traceability system. There are definite benefits to be realized across the lobster supply chain, primarily focused on more accurate and efficient electronic record keeping with the reduction of paper use, as well as the introduction of lean manufacturing processes. There are also possible issues with involved, the biggest concern being around the impact of the implementation, in terms of cost and adaptation.

A gap analysis is then used, comparing the participants’ current processes with the requirements needed to attain the desired level of traceability across the lobster supply chain. This analysis shows that the industry’s current processes and automation levels are not fully ready to support traceability. While some businesses are close and the changes are relatively straightforward, the implementation could prove challenging to others, especially to the smaller players in the lobster supply chain.

Next, the report recommends high-level requirements for the development and implementation of the pilot system based on the gap analysis, as well as considerations for cost and time. This means that while a single automated system with centralized data storage that can service every organization in the lobster supply chain would be optimal in terms of traceability, it is not feasible for this project. Therefore, the recommendations primarily focus on tracking events at the wharf and at processors. There may also be additional requirements for distribution by brokers/exporters, however, as most products are shipped in consumer packaging directly from the processing plant, there is often no event to track.

Finally, as identified in the gap analysis, the report concludes that while the industry is currently not fully ready to support traceability; the aim is still to implement an effective and efficient pilot system using proven technologies and processes, with as little impact to business as possible.
Introduction

The "Lobster Traceability Pilot Project" is one of three Canadian seafood traceability pilot projects coordinated by the Traceability Task Group (TTG) of the Canadian Council of Fisheries and Aquaculture Ministers (CCFAM). Individual projects were launched in Ontario, British Columbia, and Eastern Canada. Each project focused on different species of seafood, but with shared common goals. The focus of the Eastern Canada project is lobster. The project is being led by the Lobster Council of Canada and managed by the New Brunswick Department of Agriculture, Aquaculture and Fisheries (DAAF).

These projects were created in response to the growing global demand for seafood safety and sustainability, traceability systems are becoming a critical requirement. Defining this basis and goals of this project, the DAAF prepared a paper in 2011 entitled Lobster Traceability Pilot Project, in which traceability and traceability systems are described as follows:

"Traceability is the ability to retrace the history, use or location of an entity by the means of recorded identification."

"In the case of fish and seafood, it is the ability to track products from initial production/landing onward through the value chain to the consumer. It also includes the ability to rapidly and consistently retrieve the information about a particular product, product lot or components, ingredients or packaging, and to do so from any point in the value chain back to the original components of inputs."

"Full traceability draws on the information of all steps of the value chain. For this to work effectively, all participants must exchange their product information in a common format, and in a timely manner."

"From an information management point of view, implementing a traceability system within a supply chain involves systematically associating a flow of information with a physical flow of trade items along the value chain. The objective is to be able to obtain pre-defined information concerning batches or groups of products (also pre-defined) at any given moment, using one or more key identifiers."

The project goal is also described in the same document as:

"The ultimate goal of this project is to test the implementation of a seafood traceability system with practical experience, with real-life situations and challenges, and with a small number of participants at each step of the lobster value chain (a small number of fishermen, a few processors, one or two distributors, etc.)."

To meet this goal, Cube Automation was selected to evaluate the current state of the lobster industry in Eastern Canada; examine traceability standards, regulations, existing tools, and processes; and recommend an effective and feasible solution for the implementation of a pilot system for traceability in the lobster supply chain.
As described above, in the project goal, the project is being done with the cooperation of several industry participants covering the full spectrum of activities in the lobster supply chain, including harvesters, buyers, processors, and brokers/exporters.

The ten participants are:

**Harvesters**
- Maritime Fishermen’s Union
- Tignish Fisheries Co-op Association

**Buyers and Processors**
- East Coast Seafood (Paturel International)
- Lobster’s R Us
- Pêcheries GEM
- Raymond O’Neill & Son Fishery
- Royal Star Foods
- Village Bay Sea Products

**Brokers/Exporters**
- Orion Seafood Group
- Trico Seafood

See “Appendix A: Project Participants” for the detailed list.

During this first phase, the analysis phase, each project participant was visited and information on their current processes as well as their expectations for the project was gathered. This report covers this initial phase of the project. The objectives included the development of a gap analysis as well as recommendations for moving forward towards implementation of a test system for the pilot project.
Lobster Industry Analysis

Overview

At the beginning of the project, in the spring of 2011, each of the ten lobster industry participants were visited onsite to see their operations and gather information for the project, including details on their processes, expectations, and understanding of possible traceability requirements. The following sections summarize the findings of these discussions, by participant group.

Current Processes

Harvesters

Currently, as expected, the processes on the fishing vessels are focused on the catch. There is no record keeping that would support traceability, with the exception of some sales receipt type information related to the catch, which is captured at the wharf or processing plant, depending on the buyer.

Buyers

At the wharf, the processes focus on getting the lobster catch to the processing plant. Again, there is minimal record keeping beyond catch receipts related to payment for the fishers.

Successful pilot projects have been done by the Department of Fisheries and Oceans (DFO) to capture lobster catch statistics electronically. This provides proof that mobile electronic data capture is possible, at least from the wharf, if not the fishing vessel.

Processors

Processing plants of the participants were visited and their current end-to-end processes were documented. As a summary, here are two examples seen during the analysis, the first considered “simple” and the second “complex”:

1. Product is received by truck load and processed individually, one truck load at a time. Traceability of product in this case is only possible by truck load and not the source. Only the fishing area is known (e.g. PEI lobster, received 06/20/2011, 10,000 lbs.). Once processing is completed, the product is identified by date, product type, and weight. There is rarely any link to relate what was received to the final product. Sometimes, this information may be tracked on paper.
2. Product received on the dock from the fishers is weighed and identified per fisher id number, fishing zone, date, etc. The product is then transported into holding tanks where it can remain for several days. All catch bins are identified at this point and information on each fisher is kept on paper and in accounting systems.

Products are later graded by weight. Depending on the processor’s needs, lobster from multiple fishers and multiple catch dates are mixed together. Other products are returned into the holding tanks, further mixing fisher and capture dates. Graded products go through the processing plant. Finished products are identified by production dates, product weight, type, etc. In this scenario there is no way of knowing where the product came from as the grading process does not get captured electronically or paper and products are mixed together.

The following are mappings of the typical production flows within lobster processing plants. The green database icons in the diagrams indicate points where traceability data should be captured. These points are called Critical Tracking Events (CTE). Coined by the Institute of Food Technologists (IFT),

“CTEs are those instances when product or ingredient is moved between premises, is transformed, or is determined to be a point where data capture is necessary for effective tracing.”

**Live Lobster**

- Data capture for Critical Tracking Events (CTE)
In most cases, processors receive the product and log information on paper from the source (e.g. truck shipment; fisher, if possible; etc.). Also, batches of product are often mixed together during the process and throughout out the day of production, meaning the source is actually a combination of many sources. During processing and transformation within the processing plants, the product goes through its gates with no traceability.

What is seen here is that processors do not electronically link the source of product to the finished product. While in some cases it may be possible to trace the source via paper recordkeeping, in most it would be impossible.

Brokers/Exporters

The processes of the brokers/exporters are typically administrative, involving brokering sales and arranging distribution, locally and globally, usually between a processor and the end user. These types of processes will not impact traceability in the lobster supply chain since there are no critical tracking events that are directly accountable to the broker/exporter.
Expectations

While most current processes are not yet ready to support traceability, participants are willing to move forward and do have an understanding of the benefits and risks. The following sections list the expectations, requests, desires, etc. that participants have identified that they would like to see as a result of a pilot project and the implementation of required traceability processes.

While some of these points are directly tied to traceability itself, others are fringe benefits that may be realized because of the system, process, and/or equipment changes that the traceability implementation brings.

Harvesters

- Would see tagging each catch bin as a realistic approach
- Would like a detailed report of their catch as the product is processed, including such information as distribution by weigh and quality
- Would like monthly and seasonal reports
- Would like data to be aggregated, to allow comparison of storage methods
  - i.e. Using ice or not for on-boat storage
- Would like to log other data for scientific study
  - i.e. The type of bait used versus the percentage of dead lobster at the plant

Buyers

- Would like harvesters to use a tagging system on the catch bins
- Would agree that projects have seen good levels of acceptance handheld units on the wharf

Processors

- Would like the industry to require the use of a tagging system on the catch bins
- Would prefer the minimum disruption to their current processes
  - Some who currently have collect traceability data will still require business process modifications to eliminate holes in their methodology
- Would prefer using the largest tracking area possible
  - i.e. The wharf or the fishing zone
  - Note that the rules for batch size state a maximum of one day and allow accepting lobster from multiple fishers, assuming that the buyer and fisher has a record of the day and location where the product was caught
- Would prefer to receive catch data on an hourly basis to gain benefit from EDI
  - i.e. The information needs to be at the processing plant before the product arrives
- Would like to trace the yield of the product while tracing the product in the plant

Brokers/Exporters

- Would like to have more processors at a higher level of traceability to provide more purchasing options, since primary drivers are determined by client needs
Traceability Organizations and Regulations

Overview

Countries worldwide are implementing traceability regulations for various reasons, including consumer safety, industry sustainability, and verification of product authenticity. As well meeting their own standards, global standards and the regulations of the importing country must also be met for countries who export products. Meeting all of these requirements often spans several business functions within an organization, such as purchasing, inventory, and quality control.

This section highlights several major worldwide organizations and seafood regulations that were referenced during the Lobster Traceability Pilot Project. Specific references to documents used to develop the project requirements can be found below in section “Pilot System Requirements”.

Global

Hazard Analysis and Critical Control Points (HACCP)

HACCP is an internationally recognized, science-based food safety system developed by the Codex Alimentarius Commission. It is based on seven principals that focus on the continuous prevention of physical, chemical, and biological hazards during processing over the inspection of finished product. The current standard was finalized in 1997.

A critical control point is point, step, or procedure where controls can be applied to prevent, eliminate, or reduce a food safety hazard.


ISO 22000

ISO 22000 is the international standard specifying requirements for food safety. It includes the HACCP principals. The current standard was finalized in 2005.

Global Food Safety Initiative (GFSI)

The GFSI is a non-profit Belgian foundation, created in 2000, whose framework benchmarks existing food standards against food safety criteria. It does not offer certification, but promotes current standards including:

- Safe Quality Food (SQF)
- British Retail Consortium (BRC)
- International Food Standards (IFS)
- Global GAP (HACCP based)
- ISO 22000


Institute of Food Technologists (IFT)

The IFT is an international, non-profit professional organization, founded in 1939, for the advancement of food science and technology. While the priorities change with time, food safety has been one of the constants.


Canada

Canadian Food Inspection Agency (CFIA)

The CFIA regulatory agency dedicated to protecting the environment and contributing to the health of Canadians through the safeguarding of food, animals, and plants.


Specific to the lobster industry, CFIA legislations include the Fish Inspection Act (1985) ([http://www.inspection.gc.ca/eng/insp/fisa/fispoie.shtml](http://www.inspection.gc.ca/eng/insp/fisa/fispoie.shtml)) which covers:

- Federal registration of processors
- Quality Management Program (QMP)
- Product labelling
United States

Food and Drug Administration (FDA)

The FDA is an agency within the US Department of Health and Human Services. Its responsibilities include protecting and promoting public health through the regulation and supervision of food safety. The FDA also has legal authority over several legislations, including The Bioterrorism Act (2002) and The Food Safety Modernization Act (2007).

Reference: http://www.fda.gov/

Food Marketing Institute (FMI)

FMI is an organization that represents food retailers and wholesalers. Formed in 1977, it develops and promotes policies, programs, and forums to support its members, their customers, suppliers, and other industry stakeholders. Their focus areas include food safety, sustainability, and government relations. They also manage a certification program called Safe Quality Food (SQF).


National Fisheries Institute (NFI)

The NFI is an American non-profit organization, founded in 1945, dedicated to education about seafood safety, sustainability, and nutrition.

Reference: http://www.aboutseafood.com/

One of the primary sources of information from the NFI is the Traceability for Seafood - US Implementation Guide. Published in March 2011, by the NFI, in association with GS1-US and with contributions from several large stakeholders in the US seafood industry, the document was designed to be a guide to implementing GS1 traceability standards in the U.S. Seafood industry. It establishes minimum requirements and recommends further voluntary best practices for identifying and tracking seafood throughout the entire supply chain.

GS1 is an international not-for-profit association dedicated to the design and implementation of global standards and solutions to improve the efficiency and visibility of supply and demand chains. Stakeholders included Darden Restaurants, Gorton’s, and Bumble Bee Foods.

Further information on the use of this guide for this project will be covered below in the section “Pilot System Requirements”.
European Union

Illegal, Unregulated, and Unreported (IUU) Fishing Regulation

The European Commission is the executive body responsible day-to-day running of the European Union, including the proposal legislation, such as the Common Fisheries Policy (CFP) and the IUU Regulation (2008) which is meant to prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing. This regulation includes the EU Catch Certificate.


Japan

Food Sanitation Act

Legislated under the Japanese Ministry of Health, Labour, and Welfare, the Food Sanitation Act (2007) sets standards for food safety, inspections, certifications, labelling, and marketing for all food produced and imported for sale in Japan.

Traceability Models

Overview

This section visually demonstrates how the product and information flows would work for two existing traceability models, when implemented in the lobster supply chain.

While both models are similar in process and purpose, they vary greatly in terms of implementation effort and expense, with a single enterprise-wide centralized storage system being far less feasible for the mostly small to medium size businesses that comprise the Eastern Canadian lobster industry.
The "one up, one down" model is the foundational traceability model. In this model, data is captured as the product moves from one party (e.g. harvester) to the next (e.g. processor) in the supply chain. The processor is "one up" from the harvester. The harvester is "one down" from the processor. Parallel to the physical flow of a product is the flow of data related to that product. The one up, one down data flow will happen for each step in the supply chain, recording from who, where, and when the product was received; and to who, where, and when the product was sent.
Central Storage

Large corporations with sufficient resources may implement an enterprise wide supply chain and product traceability software solution. This can provide full traceability from a single point by utilizing a central storage facility as well as integration with other corporate information systems. A current example of this model can be found at Yum! Brands, Inc.
Pilot System Requirements

Overview

This section covers the requirements for the scope of the initial pilot system. They were selected to provide a solid basis for a traceability system, after considering factors such as the current global regulations (primarily Canada, US, Europe, and Japan), existing traceability models, and best practices. Details and background on these factors are described above in the sections “Traceability Organizations and Regulations” and “Traceability Models”, as well as with the requirements themselves, below.

It was also determined that the pilot project should provide an end-to-end solution that meets the needs of government, buyers, and consumers, that can be implemented within a reasonable cost and timeframe, and which provides value to project participants with minimal impact to their business.

Meeting these requirements will mean different responsibilities at each level of the lobster supply chain and will also depend on the participants’ current situations. Also, while the industry wants to be proactive today, certain predictions will need to be made to try to define possible needs in three to five years.

It should be noted that some requirements do have dependencies on others. Also, there is no ranking to the list, in terms of importance, desirability, implementation costs, etc. Finally, it is acknowledged that the initial implementation may not be perfect and that there may be other potentially beneficial requirements that were not included as part of the pilot project, but should be considered prior to a full rollout.
Requirements Summary

The five major requirement areas for the pilot system are:

**One up, one down traceability**
- Maintaining records on who, where, and when product was received from
- Maintaining records on who, where, and when the same product was relocated, transformed, etc. (e.g. during processing)
- Maintaining records on who, where, and when that same product was sent to

**Batch sizing and sourcing**
- Batch size should be limited to at most a single day’s production
- All consumer products must be linked back to a production batch
- All batches must be linked back to one or more harvesters

**Standardized product labelling**
- The inclusion of a Global Trade Item Number (GTIN) data structure, such as Universal Product Code (UPC)
- Providing both machine readable and human readable information
- The inclusion of Batch Numbers
- The inclusion of Serial Numbers
- The inclusion of Global Location Numbers (GLN)

**24/4 hour traceability**
- Provide full information on where the product originated
- Provide the current location of all other products from the same batch

**Electronic data storage**
- Traceability information must be transferable via email
- Product traceability must be verifiable at any time via third-party audit
One up, one down Traceability

Background

The *US Public Health Security and Bioterrorism Preparedness and Response Act of 2002*, aka The Bioterrorism Act, authorizes the US Food and Drug Administration (FDA), to issue regulations to protect American food and drug supplies against bioterrorism and food-borne illness.

Section 414(b), “Maintenance and Inspection of Records”, states:

REGULATIONS CONCERNING RECORDKEEPING – The Secretary, in consultation and coordination, as appropriate, with other Federal departments and agencies with responsibilities for regulating food safety, may by regulation establish requirements regarding the establishment and maintenance, for not longer than two years, of records by persons (excluding farms and restaurants) who manufacture, process, pack, transport, distribute, receive, hold, or import food, which records are needed by the Secretary for inspection to allow the Secretary to identify the immediate previous sources and the immediate subsequent recipients of food, including its packaging, in order to address credible threats of serious adverse health consequences or death to humans or animals. The Secretary shall take into account the size of a business in promulgating regulations under this section.

The statement “to identify the immediate previous sources and the immediate subsequent recipients of food” has become known as “one step up, one step down” or just “one up, one down” traceability.

Batch Sizing and Sourcing

Background

A batch (also called a lot) is a defined quantity produced at a certain time and placed in a uniform manner. In a processing plant, a batch can be incoming loads of packaging, ingredients or raw material, or it can be a production batch produced at a certain time in the processing plant. The creation of batch numbers vary from company to company, but a batch number always identifies the production time and place. The production batch number, which is the cornerstone of any traceability system, is the entrance number to retrieve information about a particular product.

The size of an individual batch is important in reducing risk and liability for individual companies. A batch is the minimum amount of product that may need to be removed from the supply chain in the event of a recall. In general, the smaller the batch size, the lower the amount of product at risk for food safety or security issues. Best practices recommend limiting batch size to at most a single day’s production.

In the lobster industry, sourcing for batches refers to processors tracking the lobsters used within each batch back to the harvesters who supplied them. While it is permitted that one batch may contain lobster from multiple harvesters (multi-source batching), the processor must maintain control over the identification of all sources. That is, they must be able to link all products back to a fisher or group of fishers, via their batching process.
Standardized Product Labelling

Background

Labelling of seafood products has been mandatory in Canada since the 1992 establishment of the Quality Management Program (QMP). This Canadian Food Inspection Agency program requires all federally registered fish processing plants develop and implement a quality control program that covers safety, quality, and other issues.

In March 2011, the US National Fisheries Institute (NFI), in association with GS1-US, published the Traceability for Seafood - US Implementation Guide. The basis of this report was The Bioterrorism Act's "one up, one down" traceability requirement. Building on that,

"This guide recommends an additional voluntary approach in best practices for identifying and tracking of seafood from farm or vessel to point of sale."

The partnership with GS1, an international not-for-profit association dedicated to the design and implementation of global standards and solutions to improve the efficiency and visibility of supply and demand chains, promotes adoption of an existing and proven global traceability standard. This standard defines the required information to support "one up, one down" traceability. GS1 standards are supported by member organizations in over 100 countries worldwide.

The following sections give an overview of some of these standards.

Global Trade Item Number (GTIN)

Global Trade Item Number (GTIN) is the standardized and globally unique way to identify all items traded in the supply chain. Currently, the most common GTIN data structure implementation in North America is the Universal Product Code (UPC), a GS1 standard. GS1 member organizations support the framework for GTIN assignment.

Barcodes

The Universal Product Code (UPC) also provides a standard for barcode symbology. This allows for machine readable product identification via the use of scanners.

High-density barcode symbology, such as the GS1-128 barcode standard can encode all 128 ASCII characters in a machine readable barcode. This extends the UPC product identification to allow for the encoding of additional data, such as dates, batch numbers, quantities, weights, etc.

GS1 traceability standards define the rules and recommendations for labelling different types of containers throughout the supply chain. See “Appendix B: Product Labelling” for details and examples of machine readable and human readable information on product labelling.
**Batch Numbers and Serial Numbers**

As described above, under “Batch Sizing and Sourcing”, the batch number is a key component of product traceability, and as such should always be prominent in standardized labelling.

The use of serial numbers is also recommended within a batch. This number should just be a simple unique number, for example, sequential numbers starting at 1 for each batch. This will not only provide a unique identifier for each unit, but also provide tracking for the total number of units within each batch.

**Global Location Number (GLN)**

Global Location Number (GLN), another GS1 standard, is used to identify unique physical locations and legal entities globally, to improve electronic communications within supply chains. As with GTIN, GLN assignment is maintained by GS1 member organizations.

**24/4 Hour Traceability**

**Background**

As stated above, The Bioterrorism Act authorizes the US FDA to issue regulations to protect American food and drug supplies against bioterrorism and food-borne illness. On December 9, 2004, the FDA finalized regulation called the *Establishment and Maintenance of Records Under the Public Health Security and Maintenance of Records Under the Public Health Security and Bioterrorism Preparedness and Response Act of 2002*.

"SUMMARY: The Food and Drug Administration (FDA) is issuing a final regulation that requires the establishment and maintenance of records by persons who manufacture, process, pack, transport, distribute, receive, hold, or import food in the United States. Such records are to allow for the identification of the immediate previous sources and immediate subsequent recipients of food. The final rule implements the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act), and is necessary to help address credible threats of serious adverse health consequences or death to humans or animals. The requirement to establish and maintain records is one of several tools that will help improve FDA’s ability to respond to, and further contain, threats of serious adverse health consequences or death to humans or animals from accidental or deliberate contamination of food. In the event of an outbreak of foodborne illness, such information will help FDA and other authorities determine the source and cause of the event. In addition, the information will improve FDA’s ability to quickly notify the consumers and/or facilities that might be affected by the outbreak."

This regulation provided details on the required record keeping for one up, one down traceability, and also dictated that these records must be provided to the FDA, upon request, within 24 hours.

"Records must be made available as soon as possible, not to exceed 24 hours from the time of receipt of the official request."
It should be noted that the original proposal required records be provided with 4 hours. This was changed after being met with strong resistance, despite the reduction in benefits to the FDA. The objections were primarily around the time and costs required to locate access, compile, verify, and provide the necessary data, especially considering issues like offsite storage and weekends.

Third party auditors like NSF-Cook & Thurber and BRC (British Retail Council) are organizations who evaluate the food safety and quality practices of processors/distributors.

In the case of companies who have been audited and certified by NSF-Cook & Thurber, standards indicate that

“The company shall be able to trace all raw material product lots (including packaging) from their supplier through all stages of processing and dispatch to their customer and vice versa.”

Both BRC’s and NSF-Cook & Thurber standards manual state that full traceability should be achievable within four hours.

Sources:
• British Retail Consortium Global Standard for Food Safety, Issue 6, July 2011.
• Cook & Thurber, Product Safety, Quality and Defense Criteria for Manufacturing Facilities of Food Contact Packaging Materials, Food-Related Items, and Personal Care (Contact) Products, version 2.0, August 25, 2011.
Electronic Data Storage

Background

While not a legal requirement of any regulation or legislation, electronic data storage can greatly aid in meeting the one up, one down and 24 hours traceability requirements.

The core recommendations in the report *Traceability (Product Tracing) in Food Systems*, from a study by the Institute of Food Technologists (IFT) done for the US Food and Drug Administration (FDA), included the identification and recording of Critical Tracking Events (CTE) and key data elements (KDE).

CTE and KDE are terms that have been created by the IFT during their food traceability research. As previously described, CTEs are points where product data should be captured to support traceability. The IFT report *Product Tracing in Food Systems: Developing a Product Tracing Plan Using Critical Tracking Events and Key Data Elements* states:

“KDEs are those data required to successfully trace a product and/or its ingredients through all relevant CTEs. Each CTE must be carefully analyzed to ensure that sufficiently granular data are collected to permit traceability. The ability to trace product paths through the supply chain depends on logging KDEs associated with these events.”

Furthermore, the *Traceability (Product Tracing) in Food Systems* report goes on to list recommendations for best practices that include storing data electronically as well as ensuring that this data is third party auditable, allowing successful product traceability at any time. For those who insist on keeping paper records, the recommendation is to regularly have this data transferred to electronic files, even if this work is outsourced to a third party.
Benefits and Issues

Overview

This section lists possible benefits and issues that may be seen in the lobster industry with the implementation of traceability systems. Most benefits are related to more accurate and efficient reporting and improved processes due to electronic record keeping. While there are potential issues, they are not as tangible, primarily centering on the impact of the implementation, in terms of cost and adaptation.

Traceability Benefits

Participants will find benefits in implementing a traceability program. Although traceability is imposed by the market and is a cost of doing business, the following is a list of the possible benefits across the supply chain.

Harvesters
- Simplified accounting processes with detailed reports from their buyers
- Improved reporting and statistics, such of catch distributions, fishing methods, etc.

Buyers
- Reduced use of paper in processing their clients’ products
- Reduced administration cost by simplifying accounting and filling

Processors
- Reduced paper work at the receiving end of the factory
- Improved tracking of supplier’s quality and product weight distribution
- Improved quality of inventory control for many factories
- Reduced use of paper inside the plant
- Improved procedure for the “Global Quality Control Plan”
- Easier compliance with the Canadian Food Inspection Agency’s regulatory requirements for the Quality Management Program (QMP)
- Reduced errors in shipping
- Reduced impact and costs related to product recalls

Brokers/Exporters
- Improved supplier inventory systems
- Simplified inventory management
- Improved receiving and shipping procedures

End Users
- Easier identification of recalled products by wholesalers and retailers
- Improved consumer assurances (e.g. safety, authenticity, source sustainability, etc.)
Traceability Issues

There are also possible issues that participants may encounter in implementing a traceability program. It is certain that an adaptation period will be required in the industry. As previously described, processors do not link the receiving information to the finished product. Changes may include process and technology solutions to capture and link this information properly, as well as many other questions that may need to be addressed:

- Which standards do they need to follow?
- How will they adapt?
- How much investment will be required?
- Can they afford it?
- What other requirements/standards can impact the industry?

The lobster industry is composed of many small to medium sized businesses who work in a complex process that involves multiple levels of transactions in the value chain. Traceability solutions are not necessarily simple, however, nor are they overly complex.
Gap Analysis

Overview

This section compares the requirements for the implementation of the traceability pilot system, from section “Pilot System Requirements” above, to where the project participants currently stand today, from section “Participant Analysis” above. The following table summarizes the traceability requirements that are currently being met by the different project participant groups.
<table>
<thead>
<tr>
<th>Traceability Requirements</th>
<th>Participants Meeting Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Harvesters</td>
</tr>
<tr>
<td>One up, one down traceability</td>
<td>NA</td>
</tr>
<tr>
<td>➢ Maintaining records on who, where, and when product was received from</td>
<td>NA</td>
</tr>
<tr>
<td>➢ Maintaining records on who, where, and when the same product was relocated, transformed, etc. (e.g. during processing)</td>
<td>2/2</td>
</tr>
<tr>
<td>Batch sizing and sourcing</td>
<td>NA</td>
</tr>
<tr>
<td>➢ Batch size should be limited to at most a single day’s production</td>
<td>NA</td>
</tr>
<tr>
<td>➢ All consumer products must be linked back to a production batch</td>
<td>NA</td>
</tr>
<tr>
<td>Standardized product labelling</td>
<td>NA</td>
</tr>
<tr>
<td>➢ The inclusion of a Global Trade Item Number (GTIN) data structure, such as Universal Product Code (UPC)</td>
<td>NA</td>
</tr>
<tr>
<td>➢ Providing both machine readable and human readable information</td>
<td>NA</td>
</tr>
<tr>
<td>➢ The inclusion of Batch Numbers</td>
<td>NA</td>
</tr>
<tr>
<td>➢ The inclusion of Serial Numbers</td>
<td>NA</td>
</tr>
<tr>
<td>➢ The inclusion of Global Location Numbers (GLN)</td>
<td>NA</td>
</tr>
<tr>
<td>24/7 hour traceability</td>
<td>NA</td>
</tr>
<tr>
<td>➢ Provide full information on where the product originated</td>
<td>NA</td>
</tr>
<tr>
<td>➢ Provide the current location of all other products from the same batch</td>
<td>NA</td>
</tr>
<tr>
<td>Electronic data storage</td>
<td>NA</td>
</tr>
<tr>
<td>➢ Traceability information must be transferable via email</td>
<td>0/2</td>
</tr>
<tr>
<td>➢ Product traceability must be verifiable at any time via third-party audit</td>
<td>0/2</td>
</tr>
</tbody>
</table>
Analysis

As can be seen in the table above, there is still some work to be done to enable traceability in the lobster supply chain. There are currently gaps that must be filled, at all levels, to address this.

Harvesters

This is currently no electronic traceability information at the fisher or fishing vessel level. The only recorded information may be paper receipts from sales transactions on the wharf.

From a recall perspective, this is the very beginning of the supply chain, and there are few, if any, critical tracking events that occur here. That said, for sustainability and consumer verification, traceability to the source of the catch may be more important.

Buyers

The lack of electronic record keeping at the wharf is a primary weakness in the supply chain. Some information may be available from the broker or from the processor’s receiving records, but this would still provide only partial traceability.

In order to establish full traceability, there must be a means of identifying not only the fisher or fishing vessel, but also details about the catch itself and to where and whom it goes. To do this, lobsters or at least the catch bins, must be labelled to allow traceability for the next step in the supply chain, the processors.

Processors

Once again, the lack of electronic record keeping is one of the biggest impediments to successful traceability. Records are often paper based, and while they may be entered electronically, it is often for accounting or productivity measurement, not traceability.

Also, as described in section “Participant Analysis”, batch size, dating, and sourcing may be significant issues as batches may contain lobsters from various fishing vessels and/or catch dates, making identification difficult. Furthermore, as mentioned just above in the Buyers section, the link to allow for tracking back to the harvesters would also require labelling of lobsters or catch bins.

These issues apply to the batches of live lobsters received at the processing plant. Other issues can occur within the processing plant, especially when lobsters are processed. That is, they are separated into parts (tails, claws, etc.) and/or mixed with other ingredients during processing. This will require special attention to track the lobsters from the beginning of processing, fully through to the final packaging. These types of process changes go far beyond software and may require additional equipment and electronics as part of the solution. This could prove to be challenging for some harvesters and/or processors to implement.

Finally, labelling, although not meeting GS1 standards, is currently required for package and case level containers and is also often used on pallets for shipping. This does allow for certain a level of traceability, as products can be tracked back to the processor from the next step in the supply chain (one down), however, because of the batching methods, traceability beyond, or possibly even within, the processing plant is impossible.
**Brokers/Exporters**

As previously described, brokers/exporters often do not physically handle the product, but rather just control movement within the supply chain. This situation would not require any level of traceability as they are purely administrative tasks.

An example where traceability would be required is in the case where products are placed in storage. Then, similar to processing plants, product receiving and shipping must be tracked for “one up, one down” traceability. This may be done using the existing labelling, however, if there is any type of repackaging, such as changing shipping containers, then new labelling would also be a requirement.

**End Users**

There is typically already one down traceability for the end user – the product labelling on the consumer level packaging. This can be traced back to the processor or distributor that did that final packaging.

For this project, no traceability requirements will be implemented for end users.
Pilot System Recommendations

Overview

Based on the traceability requirements, existing traceability models, the current operations of project participants, timeframe, and feasibility, the following sections describe the recommended options for implementation of a traceability pilot system at each step in the lobster supply chain, as well as a section on the suggested outcomes of the pilot project as a whole.
Recommendations

Harvesters

For this pilot project, fishers would not capture any catch data on board the fishing vessel. This would not prevent full traceability as fisher and catch information will be captured by buyers on the wharf.

Other Department of Fisheries and Oceans Canada (DFO) projects do exist where catch data is recorded on board the fishing vessel, so it is something that could be considered in the future.

Buyers

Enable buyers to capture, store, and access traceability data on the wharf, including information about the fisher, vessel, and catch, as well as the sales transaction between the fisher and buyer.

For the pilot project, this could be done using DFO E-Log software. Two different, but similar, versions will be examined, one from the Pacific region and another from PEI.

Proposed work needed to implement traceability

Gather and document details for the DFO E-Log software, including:

- Full hardware and software requirements
- Options for software changes, if required
- Data file format and structure
- Data file processing
- Data storage and access requirements

Implementation of the E-Log software, data file processing, data storage, and data access requirements

Integration of E-Log software and storage for participants

Gather, document, and implement the lobster catch bin tagging requirements
**Processors**

Enable processors to capture, store, and access traceability data at the processing plant.

Minimum traceability for “one up, one down” means capturing and storing seller information at the point of receiving (as products enter the plant) and product buyer information at the point of shipping (as products leave the plant).

For a high level of traceability, the processor should implement a production monitoring and traceability system, providing integrated software within the plant. This will capture the seller information at receiving and the buyer information at shipping (“one up, one down”), and also monitoring and capture critical control point data during processing, for alignment with standards such as HACCP or ISO 22000.

This work covers requirements development only, as the processors will be responsible for the implementation costs.

<table>
<thead>
<tr>
<th>Proposed work needed to implement traceability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gather and document requirements for data capture, upload, storage, and access, including hardware and software, for minimal traceability</td>
</tr>
<tr>
<td>Gather and document requirements for additional data capture, upload, storage, and access for implementing a high level of traceability</td>
</tr>
<tr>
<td>Gather and document requirements for package and pallet labelling</td>
</tr>
</tbody>
</table>
Brokers/Exporters

Enable brokers/exporters to capture, store, and access traceability data.

Note that for products shipped directly from the processing plant to the end user, there are no additional traceability requirements for the broker/exporter, as package and/or pallet labelling done at the processing plant will remain.

Brokers/exporters who do warehouse storage or repackaging must maintain traceability, which would be very similar to that described above for processors.

<table>
<thead>
<tr>
<th>Proposed work needed to implement traceability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gather and document requirements for data capture, upload, storage, and access, including hardware and software</td>
</tr>
<tr>
<td>Gather and document requirements package and pallet labelling</td>
</tr>
</tbody>
</table>

End Users

Provide pallet level traceability for wholesale and retail end users receiving large scale quantities of product.

Provide package level traceability for consumer level end users purchasing individual product.

For the initial pilot project, at this time, no participants are end users.

Pilot Project Outcomes

The following are suggested outcomes targeted for the pilot project:

- Identify how to implement a traceability system as simply as possible
- Identify holes in the traceability process
  - e.g. Quality control testing, reprocessing of products, etc.
- Lower the burden of implementing such a system by integrating some QMP tasks, sustainability, inventory, and lean manufacturing processes
  - Verify the usability of such systems by all departments – plant floor personnel, accounting, shipping, etc.
- Ensure that companies follow best practices, such as having properly designed labels on boxes and on pallets
Conclusion

At the end of the analysis phase, as described in section "Gap Analysis" above, it is clear that the majority of the industry’s current processes and automation levels are not yet fully ready to support traceability. Meet the project goals may require computerized data collection systems, the establishment of new processes and changes to existing ones, and possibly additional equipment and electronics as well, especially in the processing plants.

At first, all of these changes could undoubtedly be seen as disruptive, however, the hope is that they would be adopted quickly, become routine, and start to provide benefits for the business implementing them and across the lobster supply chain. To help ensure this, existing and proven technologies and processes, such as those used on the wharf in previous DFO pilot projects and those currently used in some processing plants, should be leveraged to help maintain costs as well as shorten the required development and implementation times.
Appendix A: Project Participants

Harvesters

Maritime Fishermen’s Union
- New Brunswick members (specific groups to be confirmed)
- Lobster Fishing Areas (LFA) 23 and 25

Tignish Fisheries Co-op Association
- Tignish, PEI
- [http://royalstarfoods.com/](http://royalstarfoods.com/)

Buyers and Processors

East Coast Seafood (Paturel International)
- Deer Island, NB
- [http://www.myseafood.com/](http://www.myseafood.com/)

Lobster’s R Us
- Little Harbour, Lower L'Ardoise, NS
- [http://lobstersrus.ca/](http://lobstersrus.ca/)

Pêcheries GEM
- Saint-Simon, NB

Raymond O’Neill & Son Fishery
- Escuminac, NB

Royal Star Foods
- Tignish, PEI
- [http://royalstarfoods.com/](http://royalstarfoods.com/)

Village Bay Sea Products
- Richibouctou-Village, NB
- [http://www.villagebay.ca/](http://www.villagebay.ca/)
Brokers/Exporters

Trico Seafood
- Allison, NB

Orion Seafood Group
- Shedia, NB
- http://www.orionseafood.com/
Appendix B: Product Labelling

Bin Labelling

Bin labels are for the bins (also called totes, trays, or crates) that the raw catch is placed in on the fishing vessel for delivery to the wharf and to the processing plant. For lobster, this is typically a large plastic box and the label would be applied either on the fishing vessel or, more likely, on the wharf.

This requirement is not covered by the *Traceability for Seafood - US Implementation Guide*, however would be required to provide full traceability back to the fishers and the catch.

Package Labelling

A package label is for the consumer unit or item. For lobster, examples of packing would be a cardboard box of live lobster, a package of frozen lobster tails, or a can of lobster meat.

For traceability of consumer items, it is required that the information be human readable, as opposed to just electronic bar-coding.
From the **National Fisheries Institute (NFI) Traceability for Seafood – US Implementation Guide (2011)**, the minimum requirements include:

- Brand Owner / Company Name
- Consumer Item Product Description
- Batch Lot Number
- GS1 Global Trade Item Number (GTIN)
- Best Before Date, Sell by Date, Use by Date, or Production Date
  - Seafood Industry terminology is Lot Code / Date Code

Additional recommended information:

- GS1 Global Location Number (GLN)
- Serial Number (unique numbering within each batch)

**Sample Package Label**

```
Tracadie-Sheila 134/AN

4oz frozen lobster tail

Product code: 401011
Plant ID: 1234

Net Weight
30 LBS

Use-By Date
April 12, 2012

Gross Weight
15 Kg

Batch lot: 357744

Quality

Size
4oz

CUBE automation

(01)07612345000121(10)123ABC-3
```
Case Labelling

A case label is for a container unit that holds multiple packages or consumer units. For example, this might be a cardboard box containing several packages of frozen lobster meat, with each package having its own labelling also (see above).

The case labelling requirements are the same as listed above for Package Labelling. Cases may or may not be used. The shipping pallets may instead be loaded with consumer packages, depending on the product.

Pallet Labelling

A pallet label is for the shipping unit or container. For lobster, this would typically be a wooden shipping pallet containing many packages (consumer units) or cases of multiple packages.

It is again recommended that human readable information, such as shipper, carrier, and delivery details be included.

> The standard business practice is to assign a GS1 Serial Shipping Container Code (SSCC) to each pallet once all cases are in place. To manage product traceability at the pallet level, labels must be attached to the loaded pallet to provide a means of identifying that logistics unit to trading partners. The label must show a logistics unit identifier, such as the Serial Shipping Container Code (SSCC), in an easy-to-read human readable form as well as an optional scannable GS-128 bar code.

To ensure traceability, the GS1 SSCC number is based on your company's GS1 Company Prefix number and must be unique to each individual pallet. To maintain this uniqueness, the reuse of SSCC numbers must be managed to avoid conflict with pallets already in the supply chain. According to the NFI Guide, the best practice is to not reissue an SSCC number for a period of at least one year.

**Sample Pallet Label**

```
FROM:  
ABC Company  
1234, fish drive  
Tracadie-Sheila, NB  
E1X1A6  
Canada  

CARRIER: Transport services  
P.O.  
BOL#071908562723189  

TO:  
Client Name Inc.  
1234, street  
Tracadie-Sheila, NB  
E1X1A6, Canada  

Ship to Postal Code  
PO#:123456789  
DEPT#:  
CTL#:  

Product description  
Number of box per pallet  
Weight  

SSCC - Serial Shipping Container Code (SSCC)  
(00) 0 0718908 562723189 6  
```
Serial Shipping Container Code (SSCC)

The Serial Shipping Container Code (SSCC) is a standard identification number, used for the unique identification of logistic (transport and/or storage) units.
A logistic unit is an item of any composition established for transport and/or storage, which need to be managed through the supply chain.

Scanning the SSCC marked on each logistic unit allows the physical movement of units to be individually tracked and traced by providing an information flow. It also opens up the opportunity to implement a wide range of applications such as cross docking, shipment routing, automated receiving etc.

The SSCC is used to uniquely identify goods on the way from sender to final recipient, and can be used by all participants in the transport and distribution chain. Each shipping container or logistic unit, at the time of its creation, is uniquely identified by the sender with an SSCC. A label encoding the SSCC is applied to the logistic unit using the appropriate AI and the GS1-128 bar code.

The SSCC uniquely identifies the entity (i.e. the shipping container or logistic unit to which the SSCC is applied) for the lifetime of that unit. The SSCC can be used by all parties in the supply chain as a reference number or license plate to extract all the relevant shipping container information held in computer files within the receiver's information systems. The SSCC acts as a "reference Key" which unlocks the information in the computer systems.
GS1-128 REQUIREMENTS

Zone A: “From” field must contain vendor name and address.
Zone B: “To” field must contain NMG ship to address per Routing instructions.
Zone C: Carrier routing barcode or ship to postal barcode
Zone D: Carrier information
Zone D: Bill of Lading that corresponds with 856 ASN (if available at time of label generation)
Zone E: Purchase Order Number found in the 850 BEG03 segment
Zone E: Department Number found in the 850 DP qualifier REF*DP e02 segment
Zone E: NMG Division found in the 850 MR qualifier REF*MR e02 segment
Zone H: Store Number as detailed in the 850 SDQ03 segment
Zone I: GS1–128 barcode must be 20 digits
Zone I: GS1–128 carton number should be printed

All data on GS1-128 label must match 856 Advance Ship Notice/ Manifest
Label size should be 4” x 6”
Neiman Marcus prefers a GS1–128 label using subset C and print using 20mil. This allows a barcode just over 3” wide and 1.25” tall.
Bibliography


