



Seafood Traceability:

A Practical Guide for the U.S. Industry

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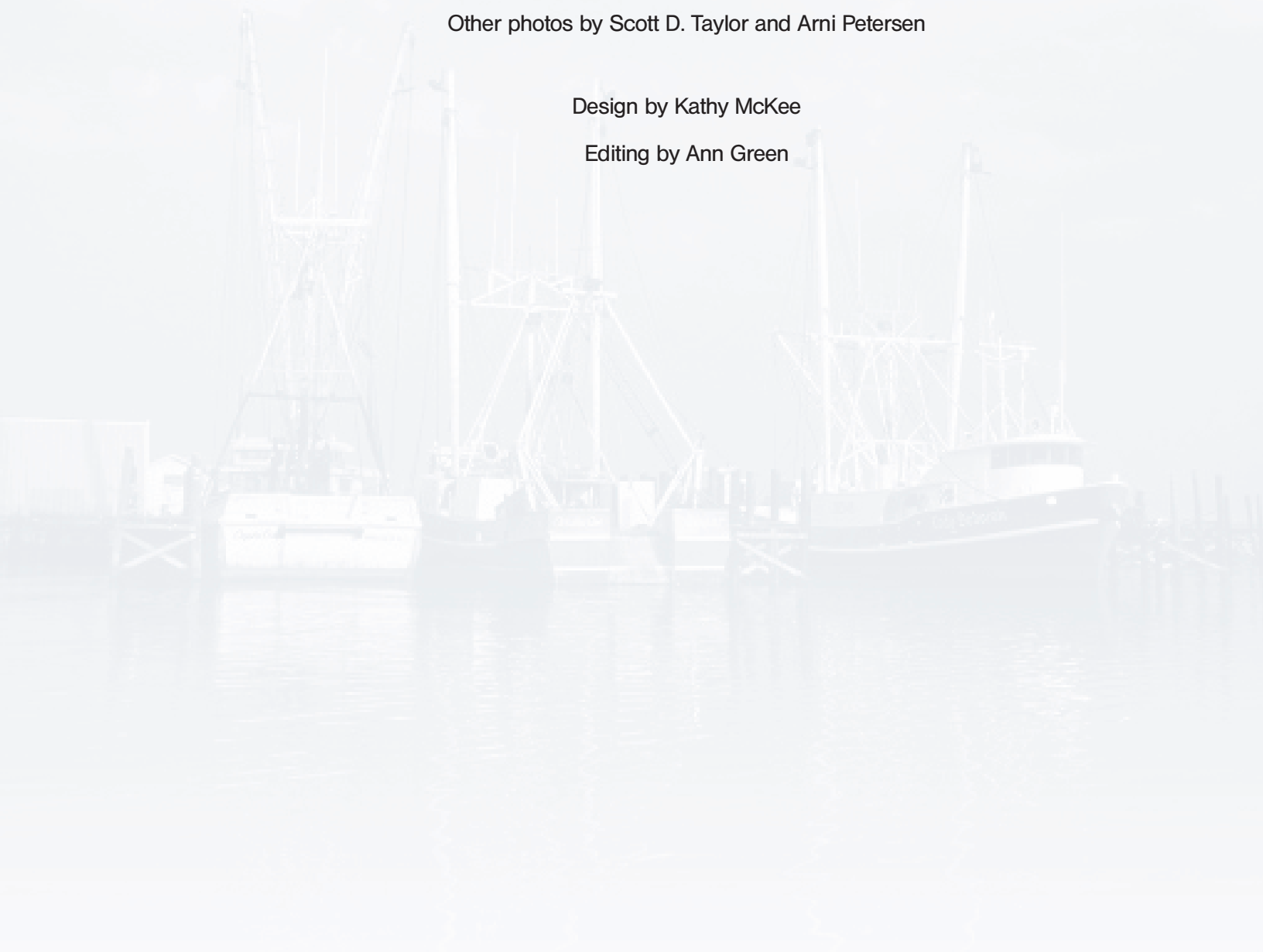


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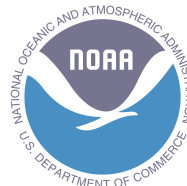
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I. Introduction

Food production and distribution in the United States have been dramatically reshaped in the last three decades. A network of small, self-sufficient businesses and local trade has grown to a large-scale industry competing in markets that are increasingly international in scope. With transportation advancements, food products today commonly contain ingredients that originate from many parts of the world. And those products, often produced in a single central location, are distributed to an increasing number of consumers worldwide.

These trends benefit both producers and consumers in many ways. But they also hasten the spread of health threats and economic disruptions caused by food-borne incidents – whether accidental or intentional – over a much greater area. Therefore, ensuring the safety and defense of our food supply chain is more critical than ever before.

One out of every three people in developed countries may be affected by a food-borne illness each year, according to the World Health Organization (WHO). In the United States, food-borne diseases are estimated to cause 76 million illnesses, 325,000 hospitalizations and 5,000 deaths each year. The cost of treatment and lost productivity due to food-borne diseases in 2000 was likely more than \$7 billion.

Traceability is an effective tool to reduce the impact of food-borne illnesses by fast and precise product recalls. It is defined in several different ways internationally (See Box 1). Generally, however, traceability is considered the ability to document all ingredients and packaging used in a product, where the ingredients and packaging came from and where the product was sold.

Traceability, to some degree, is nothing new to the industry. Most food manufacturing facilities keep track of where raw materials and products are within the company. Mandatory procedures also have been established to reject or recall products that present a food safety hazard. But it was not until the last decade – with developments in global markets, food scandals, and potential acts of bioterrorism – that traceability has become an important issue affecting the entire food supply chain.

The U.S. initiated traceability in the food supply chain after the terrorist attacks on the World Trade Center on Sept. 11, 2001. In 2002, Congress passed the Public Health Security and Bioterrorism Preparedness and Response Act, resulting in the U.S. Food and Drug Administration issuing a final ruling in December 2004 on Section 306. The ruling requires all links in the food supply chains and transporters of food to establish and maintain records to trace and track their suppliers and buyers by Dec. 9, 2006. The implementation began with the largest companies in 2005.

Other countries that export to the U.S. market, such as Japan, Canada, and the European Union (EU), have passed similar legislation mandating traceability in all or some of their food supply.

Free-market forces also are driving the push for increased traceability. The recent growth in large retail chains has resulted in preventing stock-outs – in which the product is sold out or

Box 1: Traceability Definitions

European Union: *'Traceability' means the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution.*

Codex Alimentarius: *Traceability / product tracing is the ability to follow the movement of a food through specified stage(s) of production, processing and distribution.*

International Organization of Standardization (ISO):

The ability to trace the history, applications, or location of that which is under consideration. When considering a product, traceability can relate to the:

- *origin of material and parts;*
- *processing history; and*
- *distribution and location of the product after delivery.*

in the back of the store — and overstocking — in which the store has bought too much inventory. Both are important competitive parameters. Monitoring of the supply chain needs to be ongoing. It is estimated the retail industry loses are between \$180 to \$300 billion annually due to poor chain management.

One of the newest initiatives in this area is implementation of Radio Frequency IDentification (RFID) technology. RFID involves small electronic tags on the product that can send information — like the price of a product — automatically to a reader/check-out point. Large retail chains and several U.S. government agencies began requiring their suppliers to implement the use of RFID tags, starting in 2005.

Besides being a legislative requirement and a tool for fast recall of food products, full-chain traceability can be used for competitive

advantage. As consumers become more sensitive to environmental concerns, fish can bring higher prices if marketed according to where, when and how they were caught. The authenticity of claims or certifications, such as wild fish harvested only from sustainable stocks or dolphin-safe tuna, also depends upon proper documentation throughout the supply chain. For producers of seafood, traceability enables more precise selection in choosing suitable raw material for each product.

This booklet is a practical guide and a resource on traceability in the U.S. seafood industry. It covers legal issues and explains common terms used in regard to traceability. The final chapter describes current use and maintenance of records in seafood businesses in North Carolina, and considerations when implementing traceability in seafood supply chains.



II. Legal Basis of Traceability

The issue of food safety and food defense received a lot of attention after the terrorist attacks on Sept. 11, 2001. Food defense covers the readiness to prevent and act upon deliberate contamination of food. Congress passed a response to the terrorist attacks, the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, also known as the Bioterrorism Act that has five parts (See Box 2).

Title 3: “Protecting Safety and Security of Food and Drug Supply” is important for traceability in the food supply chain.

The Food and Drug Administration (FDA) issued Section 306 of Title 3 on Dec. 9, 2004. This section addresses “establishment and maintenance of records.” It requires producers, distributors, importers, transporters and packers of food in the U.S. to establish and maintain records, sufficient to identify the immediate previous sources and immediate subsequent recipients of food. It also mandates that these records must be made available to the FDA, when there is a: *“reasonable belief that a food is adulterated or presents a threat of serious adverse health consequences or death to humans or animals.”*

Who Keeps Records

All producers, distributors, importers, transporters and packers of food are required to establish and maintain records, sufficient to identify the immediate previous sources and immediate subsequent recipients of food. There are a number of exemptions in Section 306 of the Act. The primary exemptions and requirements are given in Table 1.

Recordkeeping

Recordkeeping is applied differently for non-transporters and transporters. Nontransporters are defined as persons who own, hold, produce, pack, import, receive, or distribute food for purposes other than transportation (e.g., processing plants, importers, distribution centers, etc). Transporters are persons who have possession, custody or control of an article of food in the U.S. for the sole purpose of transporting the food, whether by road, rail, water or air.

Box 2: Five Parts of Bioterrorism Act

- Title 1) National Preparedness for Bioterrorism and Other Public Health Emergencies;
- Title 2) Enhancing Controls on Dangerous Biological Agents and Toxins;
- Title 3) Protecting Safety and Security of Food and Drug Supply;
- Title 4) Drinking Water Security and Safety; and
- Title 5) Additional Provisions

Nontransporters

The following records **shall be** kept by non-transporters when **receiving** food:

- Records sufficient to identify the immediate previous sources (nontransporters) of all foods received, whether domestic or foreign by:
 - Name of firm, address, telephone number, and (if available) fax number and e-mail address;
 - Type of food, including brand name and specific variety (e.g., brand X Atlantic Salmon, not just Salmon);
 - Date received;
 - For persons who manufacture, process, or pack food: lot or code number or other identifier (to the extent such information exists);
 - Quantity and type of packaging (e.g., 25-lb carton, 1 tank load); and
 - Immediate previous transporter including: name of the firm, address, telephone number, and (if available) fax number and e-mail address.

The following records **shall be** kept by non-transporters when **releasing** food:

- Records sufficient to identify the non-transporter’s immediate subsequent recipient, domestic or foreign, and the transporter’s immediate subsequent recipient of the food by:

Table 1: Complete and Partial Exclusions from Traceability Requirement

<p><i>The following are exempt entirely from Section 306 in the final rule:</i></p> <ul style="list-style-type: none">• Farms, including aquaculture farms where the harvest is consumed within the farm, and not sold from the farm;• Restaurants;• Foreign persons who do not transport food in the U.S.;• Persons performing covered activities where the food is within the exclusive jurisdiction of the U.S. Department of Agriculture (USDA);• Persons who have food for personal consumption;• Persons who receive or hold food on behalf of others (e.g., a hotel concierge or a reception desk); and• Persons who make or hold the outer packaging. (Outer packaging being the packaging that does not come in contact with the food. For example, the paper packaging of Corn Flakes packaging, where the plastic packaging is the inner packaging, and the paper packaging is the outer packaging)
<p><i>The following are exempt from the final rule’s recordkeeping requirements, but subject to its record access requirement:</i></p> <ul style="list-style-type: none">• Retail food establishments that employ 10 or fewer full-time equivalent employees;• Manufacturers of food packaging (both inner and outer packaging);• Persons who produce, pack, transport, distribute, receive, hold, or import food contact substances;• Fishing vessels not engaged in processing; and• Nonprofit food establishments.
<p><i>The following are exempt from maintaining records of immediate subsequent recipients:</i></p> <ul style="list-style-type: none">• Persons who distribute directly to consumers (e.g., bakeries, retail stores).

Adapted from: “What You Need to Know about Establishment and Maintenance of Records, 2004.”

- Name of firm, address, telephone number, and (if available) fax number and e-mail address;
- An adequate description of the type of food, including brand name and specific variety;
- Date the food was released;
- For persons who manufacture, process, or package food: lot or code number or other identifier (to the extent such information exists);
- Quantity of food and how it is packaged;
- The name of the firm, address, telephone number, and (if available) fax number and

- e-mail address of the transporters immediate subsequent recipient; and
- Information reasonably available to identify the specific source of each ingredient used in each lot of finished product.

Some records are **specifically excluded** from inspection. These include recipes, financial, pricing, personnel, research, and sales data (other than shipment data regarding sales). For instance, the FDA must have access to records of all ingredients used in the product, including those not required to be on a label, but not the recipe that is considered proprietary information.

* A food contact substance is “any substance intended for use as a component of materials used in manufacturing, packing, packaging, transporting, or holding food if such use is not intended to have a technical effect in such food.” In general terms, a food contact substance is an ingredient of the packaging material.

Transporters

Transporters are required to maintain records for food transported in the U.S. Depending on the mode of transportation, transporters can use one of the following five alternatives. The reason for alternatives is that existing rules require record-keeping by the transport sector (Methods 2 to 4 below). Also, there are small differences in required records for transport by road, water or air.

Transporters are required to use one of the five recordkeeping methods.

1. Establish and maintain the following information:
 - Names of the transporter's immediate previous source and immediate subsequent recipient;
 - Origin and destination points;
 - Date shipment received and date released;
 - Number of packages;
 - Description of freight;
 - Route of movement when food was transported; and
 - Transfer point(s) of shipment.
2. Establish and maintain records containing the following information currently required by the U.S. Department of Transportation's Federal Motor Carrier Safety Administration for roadway interstate transporters (49 C.F.R. §§373.101 and 373.103) as of Dec. 9, 2004:
 - Names of consignor and consignee;
 - Origin and destination points;
 - Date of shipment;
 - Number of packages;
 - Description of freight;
 - Route of movement and name of each carrier involved in the transportation; and
 - Transfer points of shipment.
3. Establish and maintain records containing the following information required by the Department of Transportation's Surface Transportation Board for rail and water interstate transporters (49 C.F.R. §§1035.1 and 1035.2) as of Dec. 9, 2004:
 - Date received;
 - Received from;
 - Consigned to;
 - Destination;
 - State of;
 - County of;
 - Route;
 - Delivering carrier;
 - Car initial;
 - Car number;
 - Trailer initials/number;
 - Container initials/number;
 - Number of packages; and
 - Description of articles.
4. Establish and maintain records containing the following information required by the Warsaw Convention of 1929 for international air transporters on airway bills:
 - Shipper's name and address;
 - Consignee's name and address;
 - Customs reference/status;
 - Airport of departure and destination;
 - First carrier; and
 - Description of goods.
5. Establish an agreement with the nontransporter of immediate previous source in the U.S. and/or the nontransporter of immediate subsequent recipient in the U.S. to maintain the information in 1, 2, 3, or 4 above. The agreement must contain the following elements:
 - The effective date;
 - Printed names and signatures of authorized officials;
 - Description of records to be established and/or maintained;
 - Provision for the records to be maintained in compliance with this final rule (if agreement includes maintenance of the records);
 - Acknowledgement of legal responsibility by the nontransporter for establishing and/or maintaining the records; and
 - Provision that, if the agreement is terminated in writing by either party, responsibility for compliance with the final rule reverts to the transporter as of the date of termination.

Time Period for Records

Records must be created at the time of receipt or release of food, except to the extent the required information is already contained in existing records. The record retention period depends on the perishability of the food and is between six months and two years (See Table 2).

Records/Inspection

Upon request from FDA, records shall be made available to FDA for inspection and copying “as soon as possible,” but no more than 24 hours after receiving an official request from FDA.

Record Format

Records can be kept in any format, including paper or electronic records, provided such records contain all required information. Abbreviations and codes may be used in required records, provided they can be readily explained to FDA officials upon request. The records must be kept on site at the establishment, where the covered activities occurred or at a reasonably accessible location.

Compliance

The implementation deadlines for this final rule

depends upon the size of the company:

- Businesses with **more than 500** full-time equivalent employees had to comply by **Dec. 9, 2005**;
- Businesses with **more than 10, but fewer than 500** full-time equivalent employees had to comply by **June 9, 2006**; and
- Businesses with **fewer than 10** full-time equivalent employees have to comply by **Dec. 9, 2006**.

Traceability in Major U.S. Seafood Export Markets

In 2004 the major export markets for U.S. seafood products were: Japan (29% of total U.S. seafood export), EU (22%) and Canada (19%). The only one of these three markets that has mandatory traceability requirement for seafood products (and all other food) is EU. However, Japan and Canada have limited requirements for traceability of beef products. It is expected that requirements will be passed for traceability of other products, including seafood in these two countries. The current status of traceability regulations for seafood export by U.S. companies is summarized below.

Table 2: Specifications for Traceability Record-Retaining Periods

Type of food	Record retention period for nontransporters	Record retention period for transporters or persons keeping records on their behalf
Food having significant risk of spoilage, loss of value, or loss of palatability within 60 days	6 months	6 months
Food having significant risk of spoilage, loss of value, or loss of palatability occurring after a minimum of 60 days, but within 6 months	1 year	1 year
Food having significant risk of spoilage, loss of value, or loss of palatability occurring no sooner than 6 months	2 years	1 year
Animal food, including pet food	1 year	1 year

Adapted from: “What You Need to Know about Establishment and Maintenance of Records, 2004?”

Japan

Japan has no mandatory traceability requirements for seafood products. However, it has mandatory traceability requirements for beef found in the *“Law for Special Measures Concerning the Management and Relay of Information of Individual Identification of Cattle”* (Law No. 72 of 2003), locally called the “Beef traceability law.” Even though there are no mandatory traceability requirements for seafood, there are other requirements for keeping records of seafood.

The *“Food Sanitation Law”* (Law No. 55 of 2003) has requirements for effective recalls. Importers are requested to have records for each lot imported including:

- Name of the product;
- Name and address of the processor;
- Lot identification;
- Date of import;
- The number of import notice given to the government;
- Ingredients and food additives used in its manufacture; and
- Any inspection records related to the lot.

The *“Quality Labeling Standard for Perishable Foods”* (Notification No. 514 of the Ministry of Agriculture, Forestry and Fisheries of March 31, 2000), requires country of origin labeling to be shown for all unprocessed seafood products. The regulation also requires that fish be labeled: wild or farmed, as well as fresh, frozen or thawed.

The *“Quality Labeling Standard for Processed Foods”* (Notification No. 513 of the Ministry of Agriculture, Forestry and Fisheries of March 31, 2000), requires the country of origin for materials used in the production of certain processed foods. The processed seafood items that require country of origin labeling are:

- Simple dried seafood, salted, dried seafood, boiled and dried seafood and kelps, and dried seaweeds;
- Salted fish and salted seaweeds;
- Cooked seafood and seaweeds;
- Blanched or steamed seafood and seaweeds;
- Seafood with its surface roasted; and
- Battered and breaded seafood.

When processed seafood has materials from more than one country, the country of origin has to be designated for each material, in the order of the higher percentage in weight of the material used. If more than two countries are involved, the remainder can be grouped under “other.”

European Union (EU)

The European Union has mandatory traceability requirements for all food and feed, including seafood. The requirements are found in the “Regulation (EC) No 178/2002 of the European Parliament and of the Council of Jan. 28, 2002, laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety,” also known as the “General Food Law” (Regulation 178/2002) articles 11, 12, 16, 17, 18, 19 and 20. The requirements on mandatory traceability found in Reg. 178 came into effect on Jan. 1, 2005, and require all producers of food and feed to keep records sufficient to identify the immediate previous supplier and the immediate subsequent buyer. This principle is called “one up–one down.”

The general food law does not have an extraterritorial effect outside the EU. This means that a U.S. company exporting to EU countries is not required by the food law to be able to trace its product before entering the EU. However, the EU importer has to be able to identify its immediate previous supplier (the last U.S. company) and make sure that the imported product complies with other relevant requirements in the EU food law (e.g., food standards, labeling standards, country of origin standards etc.). Some EU food business operators request trading partners to meet the traceability requirements and even go beyond the “one up–one down” principle. This is a common business practice for some business operators and not a requirement established by the EU regulation. Furthermore, EU importers are encouraging third country suppliers to set up a bar coding system used for internal EU purposes, such as GS1 (EAN-UCC).

Canada

Canada has no specific requirements regarding traceability of seafood products. Fish and fish products are subject to the *“Fish Inspection Act and Regulations”* (R.S. 1985, c. F-12) that contains requirements for wholesomeness, labeling, packaging, grading and health and safety. The Canadian Food Inspection Agency’s Fish Inspection Directorate (FID) administers Canadian regulatory requirements for imported fish and fish products.

The Canadian importers of fish products must have an import license issued by the Canadian Food Inspection Agency and must notify the closest Canadian Food Inspection Agency fish inspection office in writing when they import fish.

Importers are required to notify FID prior to import, stating:

- Type and quantity of product;
- Name of the producer;
- Country of origin; and
- The storage location for each product in a shipment.

Other important Canadian packaging and labeling requirements for fish and fish products are:

- Shipping containers for fresh or frozen fish must be stamped or stenciled on one end with all code markings that identify the packer and date of packing; and
- General labeling requirements for fish and fish products in consumer packages include, but are not limited to:
 - Mandatory information in both French and English;
 - List of ingredients (including additives);
 - Name and address of the packer or distributor;
 - Common name of the product; and
 - Weight (in metric units).

U.S. Import Requirements

Importers of seafood into the U.S. are required by law to notify the FDA prior to receiving a shipment. Most of the requirement is data usual

ly provided by importers or brokers to the Bureau of Customs and Border Protection (CBP). When foods arrive in the U.S., the prior notice must be submitted electronically within five days and two hours before arrival, depending upon transportation method. The notice must contain the following information:

- Identification of the submitter, including name, telephone and fax numbers, e-mail address and firm name and address;
- Identification of the transmitter (if different from the submitter), including name, telephone and fax numbers, e-mail address and firm name and address;
- Entry type and CBP identifier;
- The identification of the food article, including complete FDA product code, the common or usual name or market name, the estimated quantity of the smallest package size to the largest container, and the lot or code numbers or other identifier (if applicable);
- The identification of the shipper, except for food imported by international mail;
- The country from which the food is shipped or, if the food is imported by international mail, the anticipated date of mailing and country from which the food is mailed;
- The anticipated arrival information (location, date, and time) or, if the food is imported by international mail, the U.S. recipient (name and address);
- The identification of the importer, owner and ultimate consignee, except for food imported by International mail or shipped through the U.S.;
- The identification of the carrier and mode of transportation, except for food imported by international mail; and
- Planned shipment information, except for food imported by international mail.

III. Common Traceability Terms

Internal/External Traceability

Traceability is grouped into two main categories (levels) of traceability, internal and external traceability (See Figure 1).

Internal traceability refers to the ability to keep track of what happens to a product, its ingredients and packaging *within a company* or production facility.

External traceability refers to the ability to keep track of what happens to a product, its ingredients and packaging in the entire or part of a *supply chain*. **Downstream** refers to looking backwards in the supply chain towards an earlier link, while **upstream** refers to forward direction in distribution (See Figure 1).

Traceability Systems

You can have paper or electronic traceability systems. However, most traceability systems are a mixture of paper and electronic systems. The size of the company is often a key factor in determining the type of traceability systems.

Paper Traceability Systems

Paper traceability systems are widespread and have been used for a long time throughout supply chains. If the company has a limited quan-

tity of products, this is a good solution. Paper traceability systems are cheap, and changes can easily be made. However, if the number of records becomes too large, it will be time-consuming to retrieve records in the system. A paper traceability system also requires a lot of storage space. (See Table 3 for more advantages and disadvantages of paper-based traceability systems).

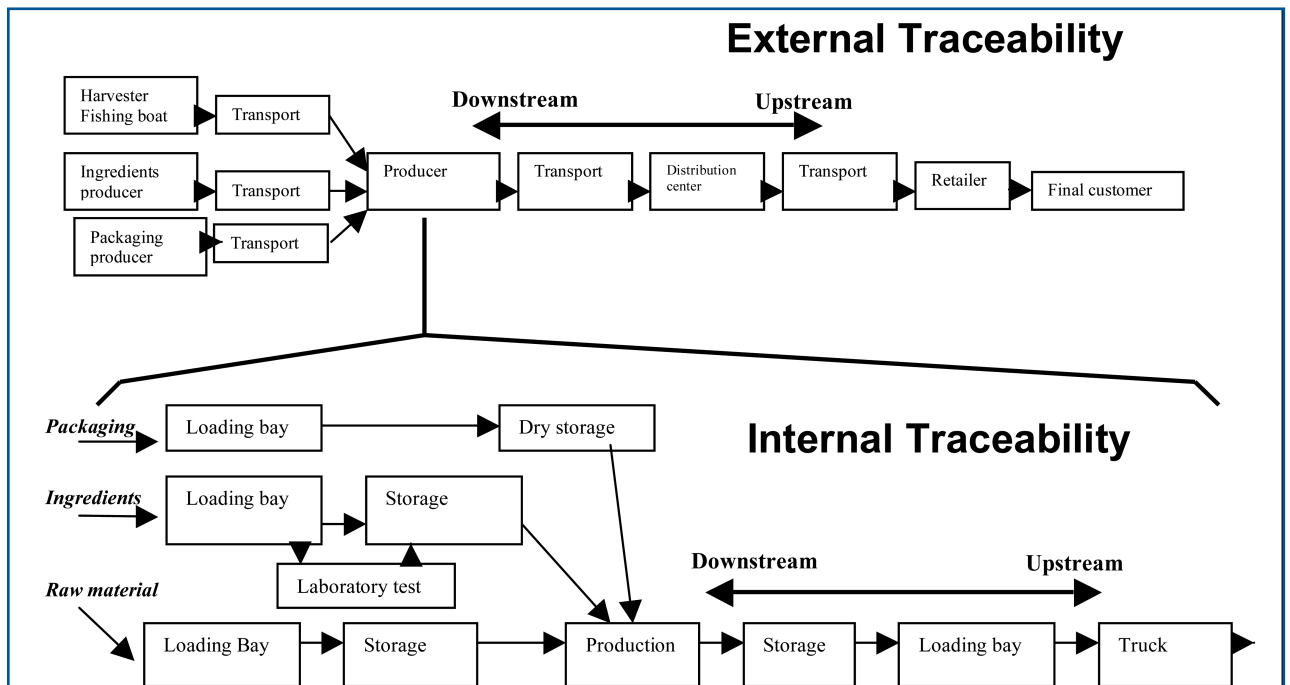
Electronic Traceability Systems

Electronic traceability is divided into bar code systems and the more recent Radio Frequency Identification (RFID) systems.

Bar code systems have been in use since the 1970s and are well established in the food industry. RFID technology uses tags that send identification codes electronically to a receiver when passing through a reading area. The tags do not have to be in line-of-sight, and many tags can be read simultaneously. This makes it possible to scan a whole pallet in seconds while passing through a reader area. However RFID technology can be expensive, and it is a less widely used technology than bar code technology.

One advantage of electronic traceability systems is their ability to handle large amounts of data in a precise manner. An example is that

Figure 1: External Versus Internal Traceability



The double-headed arrows indicates downstream and upstream traceability.

records and reports regarding traceability can be adapted to a specific situation, a recall of a specific lot.

Traceability systems also can be categorized in multi-database systems or single database systems. Most internal traceability systems are single database systems and external traceability systems are more often multi-database systems.

Multi-database Systems

Multi-database systems – in relation to external traceability systems – refer to individual databases being used throughout the supply chain (See Figure 2).

The advantage of multi-database systems is that each link has a complete record of information in its system and controls who has access to the information. The disadvantage is that different standards in recordkeeping can be used, making communication between links in the supply chain difficult.

Multi-database systems can also be found in traceability systems within a company when e.g.,

different systems are used by the procurement department and the sales department.

Single Database Systems

Single database systems refer to information in the supply chain that is kept in a single database (See Figure 3). The advantage of a single database systems is that it is based on a common standard, which makes it easier and faster to retrieve information between the various links in the supply chain. An example of a single database system used for internal traceability is an ERP system (Enterprise Resource Planning).

Units and Batches

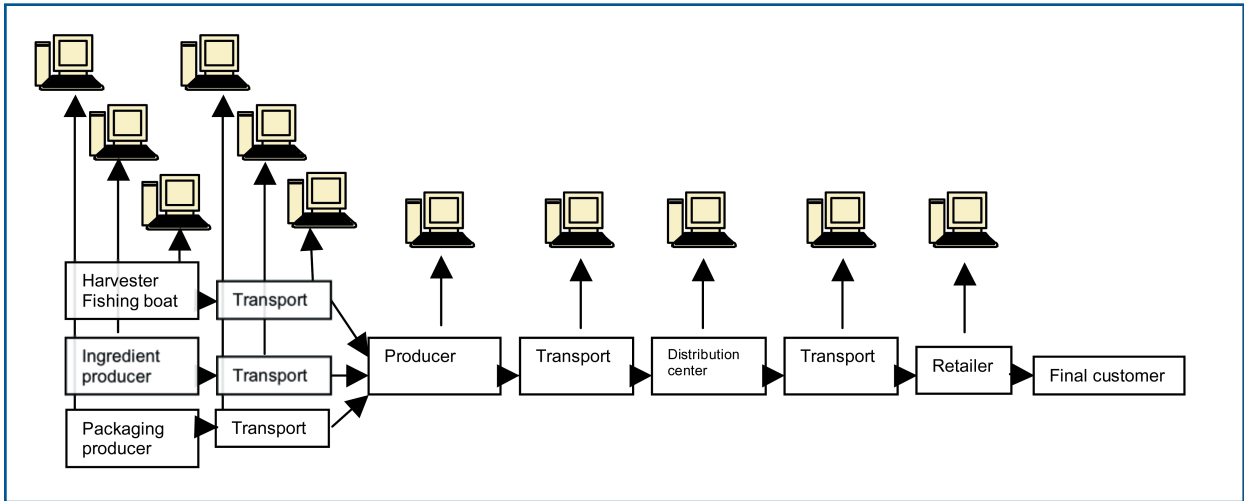
Units refer to at what “level” products in the supply chain are packed. Different types of packaging are used to make transport and handling of the products more convenient at the various stages in the supply chain. The three most common types of units that are important in the food supply chain are: retail trade units, nonretail trade units and logistic units.

Table 3: Comparison of Traceability Systems

	Paper-based traceability systems	Electronic traceability systems
Advantages	<p>Based on existing quality assurance/stock control documentation systems.</p> <p>Inexpensive to implement.</p> <p>Flexible in terms of the processing systems to which it can be applied.</p> <p>Data input is easy and precise.</p>	<p>Data input can be made automatically.</p> <p>Easy to link additional information, e.g. temperature.</p> <p>Real-time availability of information.</p> <p>Records and reports can be made quickly and adapted to the situation.</p> <p>Easy transmittance of information to other links in the supply chain.</p>
Disadvantages	<p>Manually intensive.</p> <p>Reliant on correct procedural operations.</p> <p>Trace-back of information is time-consuming and difficult.</p> <p>Records are not easily reviewed.</p>	<p>Expensive equipment.</p> <p>Paper bar codes are easily damaged in moist and harsh production environments.</p> <p>RFID technology is not yet so widespread, and reading rates are not yet 100%.</p>

Advantages/Disadvantages Of Paper-Based, Electronic Traceability Systems.

Figure 2: Multi-database Traceability System



Each link in the food supply chain keeps the traceability information in a proprietary system.

An example of a retail trade unit is a one-pound bag of frozen shrimp, taken by the customer from a freezer in a supermarket and scanned at the cash register. The supermarket staff takes the one-pound bag of frozen shrimp from a cardboard box filled with 20 one-pound bags of frozen shrimp and puts the bag in the freezer. The cardboard box is an example of a nonretail trade unit. The whole lot is transported on a pallet stacked with cardboard boxes. The pallet is an example of a logistic unit. (See Figure 4).

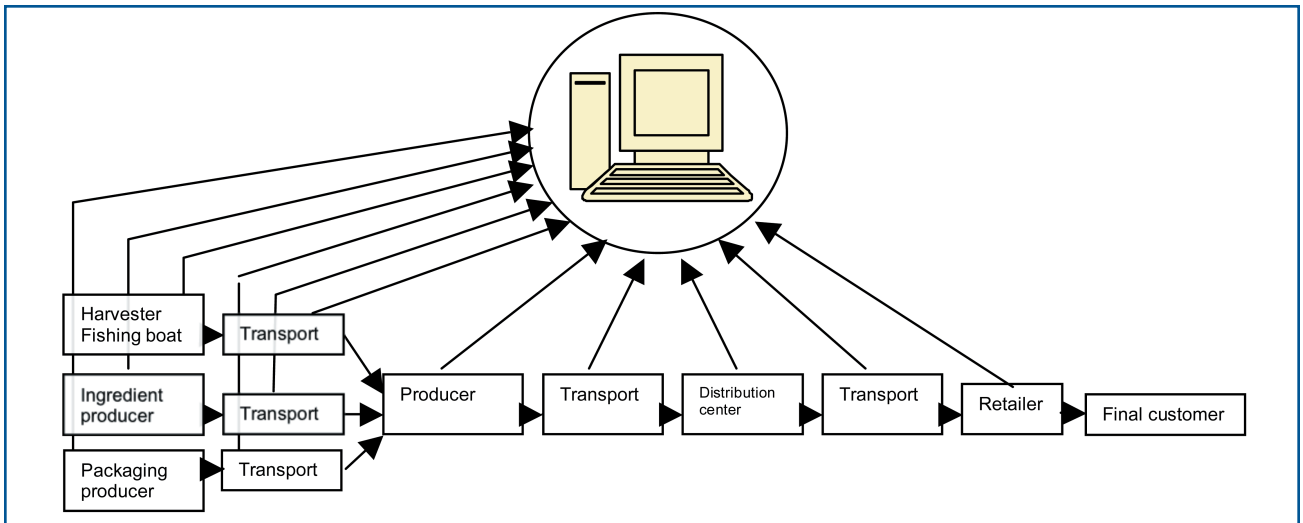
Batches

A batch or 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 a batch number is proprietary and varies from company to company, but a batch number is always linked with 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. A batch can be an hour’s, a day’s or even a year’s production. The size of an individual batch is important in reducing risk and

Figure 3: Single Database Traceability System



Each link in the food supply chain sends traceability information to a central database.

Table 4: Comparison of Traceability Systems

	Multi-database traceability system	Single database traceability system
Advantages	Full control over data for each company.	Common standard. Easy and fast to retrieve information. Single standard used for the entire chain.
Disadvantages	Different standards can be used in different databases.	Each individual company may not have full control over data.

Advantages and disadvantages of multi- and single database traceability systems.

liability for individual companies. In general, the smaller the batch size, the lower the amount of product at risk for food safety or security issues.

Identifiers, Carriers and Readers

In order to sustain a traceability system, it is necessary to register, tie and maintain various data. Three essential objects for a traceability system are: identifiers, data carriers and readers.

Identifiers

Identifiers, also called symbologies or code systems, are the “language of traceability.” These are the code systems used in the supply chain to register data. All identifiers consist of a digit- or alphanumeric-based code or string of codes. The identifier is attached to a carrier that is scanned through a reader and sent to a central database.

Identifiers can be generated within a company (proprietary) or by outside providers. GS1 is the most widespread identifier used in the food supply chain. The GS1 symbology is a joint venture of the former European Article Numbering (EAN) and Uniform Code Council (UCC).

Proprietary identifiers also exist, but these are generally only recognized by the individual firms or member institutions under the proprietary agreement.

Data Carriers

Data carriers are physical entities that are attached or directly marked on the unit. Carriers can be scanned automatically or visually read. The most widespread data carriers used in the food industry are bar codes and more recently Radio Frequency Identification (RFID) tags.

Bar Codes

Bar codes were first introduced to retail units in 1974. Today bar codes are well known and widely used in the supply chain. More than 1 million firms in more than 140 countries use bar codes across more than 23 industries. Each year somewhere between 5 and 10 trillion bar codes are printed. The present price for one bar code is 0.2 cents (U.S.).



There are several identifiers established for bar codes. On retail trade units, the most commonly used identifier is the well-known UPC bar code. For larger units, other identifiers are used.

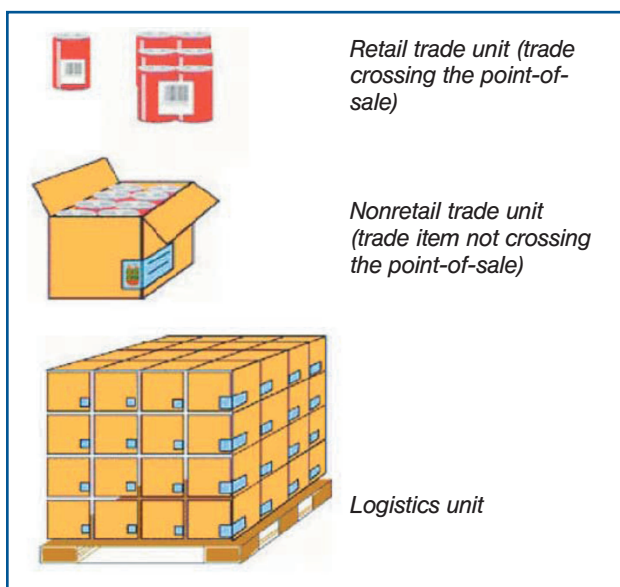
Radio Frequency Identification

RFID technology has been used since World War II. However, the technology was not used in the food supply chain until the last few years. Carriers in RFID technology consist of small tags. Readers are used to transmit information from the tags to a database. In contrast to bar codes, RFID tags are not required to be in the line of sight, and several tags can be scanned simultaneously. Pallets with several boxes can be scanned within seconds through a reader area.

RFID tags can be active or passive. Active RFID tags contain a power supply that enables it to transmit the code to a reader. Passive tags contain no power supply, but instead receive power from an RFID reader. When activated by a reader, a passive tag transmits a code to a reader. Passive RFID tags are more commonly used in the food supply chain. Passive tags can at the most be scanned within a few yards distance, while the range for active tags can be up to a mile.

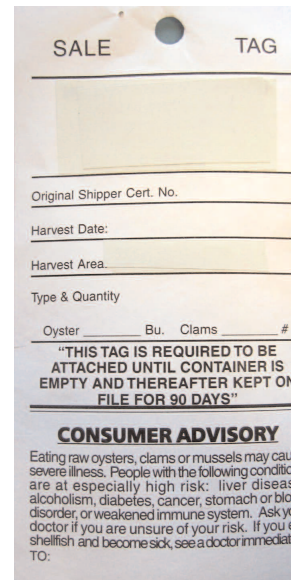
The price for a passive RFID tag is around 20 cents. Prices as low as 9 cents a tag have been reported (June 2005). As the use of passive RFID tags increases, the cost is expected to go down.

Figure 4: Various Units



Courtesy of GS1

Figure 5: Example of Paper Record



This paper record was used in the shipment of live shellfish.

Most retailers don't want to pay more than 5 cents a piece for RFID tags used at the retail trade unit level.

Readers

In order to retrieve information from a carrier, a reader is needed. Readers can be either stationary or hand-held devices. Hand-held readers are used for larger units throughout the supply chain, while stationary bar code readers typically are

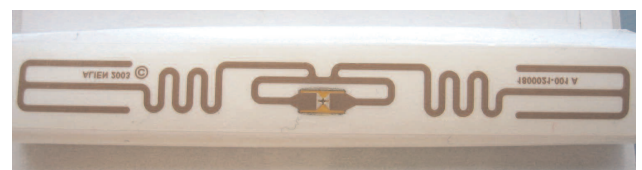
used at the point-of-sale e.g., in a supermarket. Hand-held RFID readers are used in a similar way as hand-held bar code readers, while stationary RFID readers often are mounted in strategic doorways (e.g., loading doorways) where each unit can be registered as it passes by the station.

Identifier Providers

Printing and reading of bar codes can be performed within any company if they have the right technology. The same is true with RFID technology. The limitation with proprietary systems is that they can only be used within the proprietary domain.

In order to support free trade among businesses and retailers, worldwide standards for bar codes and RFID technology exist. In the food supply chain, the most widespread standards are GS1 (merge of former EAN and UCC) for bar codes and EPCglobal for RFID.

Figure 6: Example of RFID Tag



GS1

GS1 is a nonprofit international organization that has developed standardized identifiers for use in the supply chain. As a member of GS1, a seafood company will be allocated a series of unique numbers for product identification.

GS1 is comprised of 101 member organizations, including GS1 US, and represents more than 103 countries around the world. GS1 has more than 1 million member companies in 155 countries. GS1 U.S. represents more than 260,000 companies in 25 different U.S. industries.

EPCglobal

The Electronic Product Code (EPC) is the most widespread identifier for RFID in the food supply chain. EPC is managed by EPCglobal that is a joint venture between GS1 and GS1 U.S. EPCglobal is a neutral, consensus-based, nonprofit standards organization. EPCglobal issues unique numbers to be used in RFID tags for identifying products in the supply chain.

Hardware

Paper-Based Systems

To keep a paper-based traceability system, you need to fill in paper forms, distribute the data and archive the forms. Paper forms can be proprietary or standardized. Proprietary forms can

be made with a spreadsheet on a computer. Standardized forms e.g., trip tickets can be made by an agency and sent to links in the supply chain.

To distribute data to appropriate links in the supply chain normally, mail, e-mail or faxing is used. Ring binders or file cabinets are commonly used to archive traceability forms.

Bar Codes

The hardware for bar code labeling includes: labels, label printers, scanners and computer systems. The cost of this equipment varies, depending on the type of equipment and equipment brand. In general a certain quantity of the product needs to be labeled to justify an investment in a bar code system.

Another consideration to take into account is whether an open standard like GS1 or a proprietary standard will be used.

RFID

The hardware needed for implementation of RFID includes: RFID tags, labeling devices, antennas (readers) and computer systems. The cost of hardware for RFID varies, depending on equipment type and equipment brand. Compared to hardware for bar codes, it is more expensive.

Table 5: Bar Codes Versus RFID

	Bar codes	RFID
Advantages	<p>Inexpensive to implement and use.</p> <p>Widely used and tested technology.</p> <p>Data can be read even if the bar code cannot be scanned.</p>	<p>Several tags can be read simultaneously</p> <p>It can withstand harsh environments.</p>
Disadvantages	<p>Have to be in line of sight when scanned.</p> <p>Are easily damaged by wet and moist environment.</p>	<p>It is more expensive than bar codes.</p> <p>The technology is still new and not widespread.</p>

Advantages and disadvantages of bar codes versus RFID.

Software

There are several software providers who specialize in traceability, including ones who specialize in a single food commodity e.g., seafood, while others are more generic. Some systems are so specialized that they can only support one link in the food supply system; while other are able to

support an entire chain. Below is a table and a list of some providers (See Table 6). Some software providers only supply software, while others also consult and sell hardware for bar code and RFID technology.

Table 6: Examples of Traceability Providers

Software Brand Name	Wisefish	Catellae™	Trace 2000	Astra System
Developed by	Maritech, Norway, Iceland	Lyngsoe Systems, Denmark	C-trace, UK	Astra Information System Inc., Fla., USA
U.S. support	Maritech, Seattle, WA	Lyngsoe Systems, Frederick, Mass.	None advertised	Astra Systems, Fla.
Designed application	Designed specifically for the seafood industry	Generic to the food industry	Specific to fishing vessel operations. System is essentially an electronic log-book solution	Designed for the seafood industry
Major Clients	Clearwater Seafoods, Pan Fish, Marine Harvest	McDonald's, Europe Target Stores Sears	Not known	MCFresh, Poesidon, Crocker and Windsor, Captain Ed
Can it accommodate boat – to – buyer stages?	Yes. By using Wisefishing and Wisetrawler modules	Yes	Yes, designated specifically for this stage of the supply chain.	Yes
URL	www.wisefish.com	www.lyngsoesystems.com	http://fish.jrc.cec.eu.int/sheel/partnership/c-trace.htm	www.astrainfo.com



Other suppliers of traceability software include the following providers*:

- Net.Yield™ (MA, USA)
<http://netyield.com/netyield/index.asp>
- TraxWare by SystemConcepts (NC, USA)
<http://www.sysconcepts.com/pages/sysconcepts.htm>
- Seasoft by Computer Associates Inc. (RI, USA)
<http://www.caisoft.com/>
- Parity Pro™ and Food Enterprise System™ by Parity Corporation (WA, USA)
<http://paritycorp.com/>
- FishMonger™ Seafood Software by Disc Design & Data (IL, USA)
<http://www.fishmonger.com/>
- AkvaSmart (Europe/Norway)
<http://www.akvasmart.com/start.htm>
- Poesidon by De Haan Automatisering (EU/Netherlands)
<http://www.dha-software.com/eng/>
- Intenia (EU/Sweden)
<http://www.intenia.com/>
- TraceTracker™ (Europe/Norway)
<http://www.tracetracker.com/>
- Prediktor (Europe/Norway)
<http://www.prediktor.no/>
- Tracingserver (EU/France)
<http://www.elit.fr/>
- European Seafood Safety & Traceability Organisation (ESSTO) provides a long list of traceability solution providers in the food industry (EU)
<http://www.essto.org/>

**This is not a complete list of suppliers for traceability software.*

IV. Practical Basis of Traceability

Current Documentation in Supply Chain

The gathering of records and recordkeeping is an important aspect of any traceability system. Because of legal or company requirements, certain records are kept in the seafood supply chain. The following section looks at the records currently being gathered in the food supply chain – from fishing vessel to retailer – with the North Carolina requirements as an example. A model supply chain (Figures 7, 10), is used for the description of the links. It should be kept in mind that some seafood supply chains differ from the model used.

In North Carolina, the N.C. Division of Marine Fisheries (DMF) regulates fisheries in coastal waters within three miles offshore. From three to 200 miles offshore, the South Atlantic Fishery Management Council oversees regulations. However, in North Carolina, all fishery permits, both within and outside the three-mile zone, are managed through DMF. The distinction between state and federal registrations of fisheries varies from state to state. In general the states from North Carolina to Florida are managed through the state authorities. There is more distinction between the state and federal authorities in the states north of North Carolina and along the Atlantic coast.

Fishing Vessel

Commercial harvesters in North Carolina must

obtain a fishing license to sell their catch to registered dealers. If the fish is harvested by a boat, a fishing vessel registration is also necessary (See Figure 8). These licenses can be obtained from DMF (<http://www.ncdmf.net/>). The price for a fishing license depends on several factors, including vessel size and residency status.

Fishing Vessel/Dealer

When a fishing vessel delivers its catch to a fish dealer, a receipt of the landing is obtained from the fish dealer stating:

- Name and address of fish dealer;
- Identification of fishing boat or fisherman;
- Species landed;
- Quantity landed; and
- Price received for catch

The receipt is a proprietary document kept by the owner of the fishing vessel and the fish dealer.

Fish Dealer

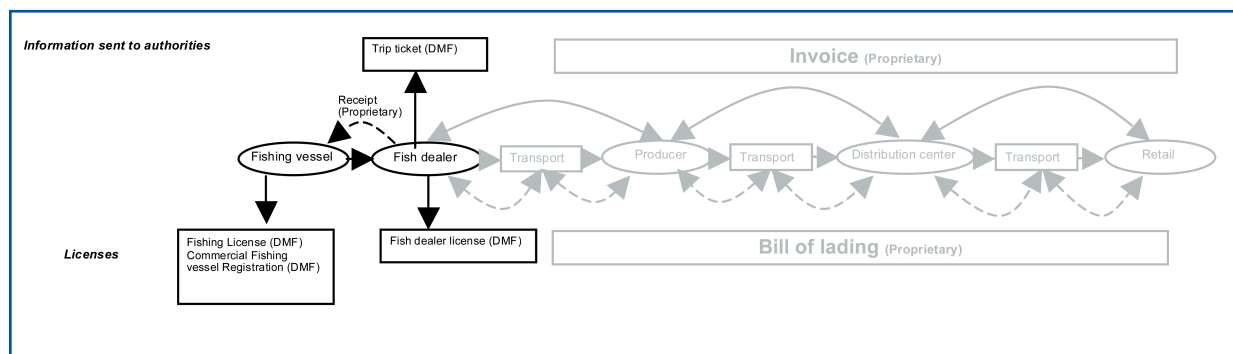
In order to buy and sell fish in North Carolina, a fish dealer must hold a state or federal license issued by DMF. The price of a fish dealer license varies according to the fish species.

Fish dealers are required to report on vessels used and type of species received. A trip ticket – a standard form obtained by DMF – has to be used by fish dealers to report commercial landings. Data gathered from trip tickets helps ensure

Figure 7: Model of Supply Chain

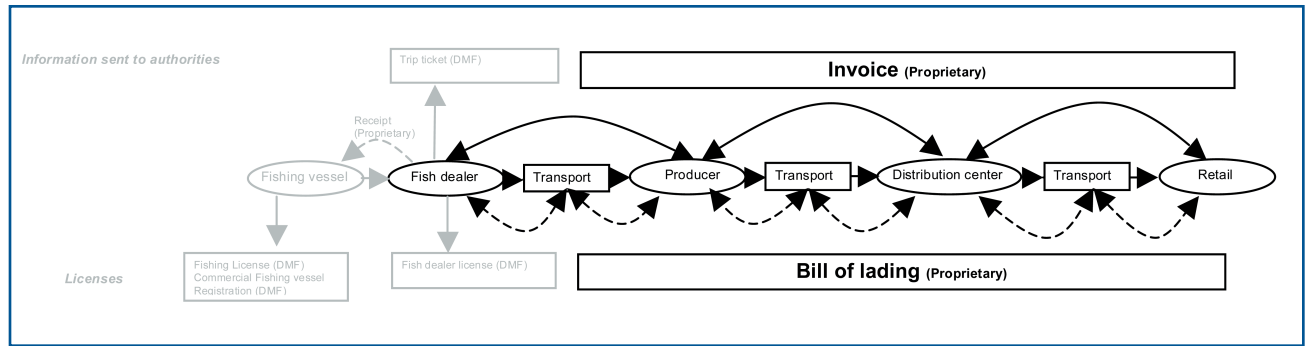


Figure 8: Authority/License Information



The information for authorities and licenses needs to be obtained during the early links of a seafood supply chain.

Figure 9: Invoice/Bill of Lading



The main documents recorded and kept in the seafood supply chain are invoice and bill of lading.

that North Carolina’s marine resources are well-managed and sustainable.

Trip tickets information includes:

- Fisherman’s name;
- Fish dealer number;
- Fisherman’s license number;
- Fishing vessel registration number;
- Trip start date;
- Unloading date;
- Number of crew;
- Gear used;
- Location where fish was caught; and
- Fish species, including;
 - Pounds caught;
 - Unit price; and
 - Total price.

The trip tickets include four-part forms with copies for the fisherman, the fish dealer and two for DMF. The unit price and total price is not shown on the DMF copies. A fish dealer must retain copies of trip tickets for at least three years.



Trip ticket data is confidential. DMF may compile statistical information in a summary form that does not disclose the licensee identity. The data is used for program administration, enforcement and determination of conservation policies.

Fish Dealer/Producer/Distributor/Retailer

When a product is sold between links in the food supply, you need certain documents for the sale. There is no standard for these documents. However, the most important records are an invoice and a bill of lading (See Figure 9).

An **invoice** is a written account or itemized statement made by the seller and sent with the purchased item. An invoice normally contains (at least):

- Name and address of the seller;
- Description of the item;
- Quantity of the purchased item;
- Price of the purchased item; and
- Other information regarding the sale, (e.g., how it should be paid).

The invoice is a proprietary document kept by the seller and the buyer.

A **bill of lading** is issued by a transporter as evidence of receipt of the goods. A bill of lading normally contains:

- Name and address of sender;
- Name and address of receiver;
- Name and address of transporter;
- Identification of transporter (e.g., truck making the transport);
- Description of route;
- Date of shipping;

- Date of receiving;
- Description of item (may include lot numbers);
- Quantity of item;
- Signature of transporter; and
- Signature of receiver.

The bill of lading is a proprietary document kept by the shipper, the transporter and the receiver.

Recall

A product is recalled if it is found unsafe for consumption or mislabeled. A recall is a voluntary action by a manufacturer or distributor of food products to remove products from commerce. Two authorities oversee food recalls in the U.S. The United States Department of Agriculture’s (USDA) Food Safety and Inspection Service (FSIS) oversees food recalls of meat, poultry and processed egg products, and the U.S. Food and Drug Administration (FDA) oversees all other foods.

Recalls are classified in three categories based on the relative risk to human health (See Box 3).

Since recalls are voluntary, the FSIS or FDA cannot order a company to recall its product. However, FSIS and FDA can request a company to make a recall, and seize products in the marketplace if a voluntary recall is not instituted.

Certain records must be kept in order to track the product and make a voluntary recall. Each company decides what records to keep. However, the regulation requires: *“Sufficient coding of regulated products to make possible positive lot identification and to facilitate effective recall of all violative lots. Maintain such product distribution records as are necessary to facilitate location of*

Box 3: Three U.S. Recall Classes

Class I: Class I recall involves a health hazard situation in which there is a reasonable probability that eating the food will cause health problems or death.

Class II: Class II recall involves a potential health hazard situation in which there is a remote probability of adverse health consequences from eating the food.

Class III: Class III recall involves a situation in which eating the food will not cause adverse health consequences.

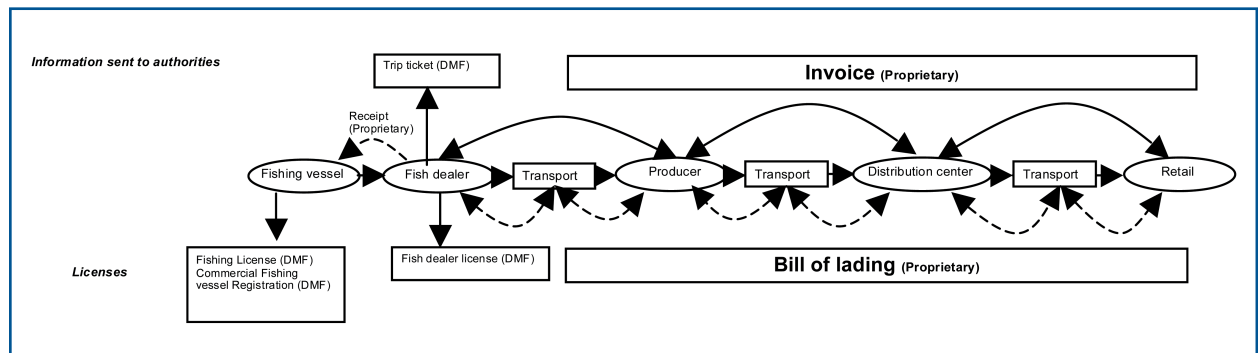
products that are being recalled.” The records have to be maintained for a period of time that exceeds the shelf life and expected use of the product.

The company recalling a product is responsible for communicating the recall to any subsequent links. Information about the product, its size, lot number(s), code(s), serial number(s) and any other pertinent descriptive information that provides accurate and immediate identification of the product is required. If the product in question has been sold, all subsequent links must notify its customers about the recall. Recalls can initially be made by telephone, but they must be put in writing. Generally, public announcements may be issued either by the affected company or public health agency.

Future Demands from Retailers & Federal Agencies

Large retailers in the U.S., such as Wal-Mart,

Figure 10: Records



Records currently produced and kept in food supply chain.

Albertsons and Target, are currently rolling out programs that require suppliers to implement Radio Frequency Identification (RFID) technology. Retailers want to make the supply chain more streamlined and efficient. RFID technology makes it easier to monitor the supply chain, to be more precise when ordering supplies, thus avoiding overstocking or stockouts. Implementation has started at the nonretail trade unit and logistic unit level and will eventually be implemented at the retail trade unit level.

In the U.S., Wal-Mart is primarily responsible for implementation of RFID technology in the food supply chain. Other large retailers like Albertsons and Target are following up, and smaller retailers are expected to follow when RFID technology becomes more widespread.

Implementation programs for the retail stores below started in early 2005, with pilot programs at a few distribution centers and retail stores in the Dallas/Forth Worth.

Wal-Mart and Target plan to have full implementation of RFID technology at all levels in the food supply chain by 2007 (See Table 7).

Several federal agencies are using or plan to use RFID technology in one or several of their applications. The major initiatives include physical and logical access control, as well as tracking various objects such as shipments, luggage on flights, documents, radioactive materials, evidence, weapons, and assets.

The U.S. Department of Defense (DOD) implemented an important food supply chain initiative. By January 2005, all new food supply rations sent to distributions depots in Susquehanna, Penn., or San Joaquin, Calif., were required to implement their cases and pallets with RFID tags. DOD plans full implementation of RFID technology by 2007 (See Table 7).

It is hard to predict the effect of RFID on food suppliers. However, it is expected that large companies will be the first to implement RFID tags on

Table 7: Retail and Federal Agencies

Key figures			
Company	Acceptable tag standards /identifier provider	Implementation level	RFID implementation plan
Wal-Mart	Class 0, Class 1, EPC Gen 2 /EPC Global	Logistic units and non-retail trade units	<p>Jan. 2005: Top 100 suppliers, 1 DC, 104 stores June 2005: Top 100 suppliers, 6 DC, 250 stores Oct. 2005: Top 100 suppliers, 12 DC, 600 stores Jan. 2006: Top 300 suppliers, 12 DC, 600 stores Jan. 2007: All 20,000 suppliers to be engaged in RFID technology</p>
Albertsons	Class 0, Class 1, EPC Gen 2 /EPC Global	Logistic units and non-retail trade units	<p>April 2005: 100 largest suppliers 1 DC in Dallas/Fort Worth, TX Oct. 2005: All suppliers to 1 DC in Dallas/Fort Worth, TX</p>
Target	Class 0, Class 1, EPC Gen 2 /EPC Global	Logistic units and non-retail trade units	<p>Late fall 2004: Selected suppliers, 1 DC, 10 stores in Dallas/Fort Worth, TX June 2005: Selected suppliers, 1 DC, 50 stores Spring 2007: Full implementation of RFID technology</p>
Department of Defense	Class 0, Class 1, EPC Gen 2 /EPC Global	Logistic units and non-retail trade units	<p>Jan. 2005: Passive RFID tags on 6 supply classes to 2 distribution depots Jan. 2006: Passive RFID tags on 12 supply classes to 34 distribution depots Jan. 2007: Full implementation of RFID</p>

RFID implementation plans for some U.S. retail chains and Department of Defense (DOD) Distribution Center (DC). TX-Texas.

goods delivered to major retail chains and DOD. And in a couple of years, it is expected that RFID technology will be as widespread as bar codes.

Implementing Traceability System

Currently, seafood companies keep records and need to ask these questions.

Are the documents sufficient to comply with the new requirements and market expectations in the near future? The short answer is “yes.” Current registrations (bill of lading, invoices etc.) meet the legal requirements in the U.S. Bioterrorism Act. However, retailers are calling for a more widespread use of bar code/RFID systems and better traceability to make the supply chain more efficient. The industry has already seen consumer expectations change relative to the seafood supply. Some changes include: wild versus aquaculture products, country of origin labeling and seafood harvested from sustainable fisheries.

In the future, producers will have to supply more information to satisfy retailer and consumer demands. Innovative seafood companies and international suppliers are quickly adopting these new traceability systems to assist in marketing their products worldwide.

Advantages

Advantages of a traceability system are:

- Ensures a fast product recall, when necessary, protecting the consumer;
- Ensures a precise recall, of e.g., one lot instead of a whole day’s production;
- Enables company to demonstrate that its product is not implicated in a given recall by ensuring proper segregation and clear identification of product;
- Addresses concerns of food terrorism or tampering of the food supply chain;
- Strengthens consumer confidence through the industry’s ability to promptly identify and recall potentially unsafe product;
- Provides internal logistical and quality-related information, improving efficiency;
- Creates a feedback loop to improve product quality, condition and delivery;
- Provides transparency in distribution route,

improving supply chain efficiencies and trading partner collaboration; and

- Provides reliable information to:
 - Business-to-business;
 - Consumers;
 - Government inspectors; and
 - Financial or technical auditors.
- Establishes the responsibility and liability for a certain problem; and
- Facilitates protection of company and/or brand name.

NC Industry Considerations

North Carolina seafood dealers and importers need to consider several issues before implementing any traceability system. For a systematic approach, consider the breadth, depth and precision of each traceability system.

Breadth describes the amount of information recorded in the traceability system. Questions to consider: What should be recorded? Is current practice sufficient or should additional information be recorded and passed on to your buyers? Examples of additional information include: date of catch and fish temperature, the name of the fish dealer, as well as date of fish processing.

The amount of information that can be transferred in a supply chain – from fishing to retail – is enormous. The more that is recorded, the more expensive the system will become. It also will require more cooperation from the individual links in the chain in terms of records and communication.

Depth of a traceability system refers to how far forward and backward information is conveyed in the system.

Questions to consider: Should this be all the way back to the individual fishing vessel or even back to the individual haul? Or should it only be back to the producer of the seafood product? The further back or forward the traceability systems goes, the more expensive it gets. Again, what are the legal requirements and what is required from your buyer/market? What benefits your business the most?

Precision reflects the degree of assurance that the traceability system can pinpoint a particular food product’s movement or characteristics.



Precision is determined by the batch sizes used in the supply chain, as well as the acceptable error rate. In other words, can the traceability system be traced back to an individual packet of a seafood product picked up at a retail store or on the pallet or production batch level? As precision increases in a traceability system, the cost of the traceability system increases. However, a more precise trace-

ability system is better for limiting the impact of a recall. Systems that have large tracking units that include only a day's production will have poor precision in isolating safety or quality problems.

When considering breadth, depth and precision, think of regulations and cost versus benefits of a traceability system.

Glossary

Batch: (Similar words: lot, production run). A quantity of a product that has undergone production under practically the same conditions.

Bill of lading: A document issued by a carrier that is evidence of receipt of the goods, and is a contract of carriage.

Carrier: (Similar words: data carrier). Physical entities that are attached or directly marked on a unit. E.g., a bar code or a RFID tag.

CBP (Bureau of Customs and Border Protection): Agency under the U.S. Department of Homeland Security enforcing the regulations of customs and border protection.

DMF (N.C. Division of Marine Fisheries): North Carolina state agency responsible for the stewardship of the state's marine and estuarine resources.

DOD (U.S. Department of Defense): Federal department in charge of ensuring national security and regulating the military.

EAN (European Article Numbering): Former European identifier provider for bar codes and now merged with UCC to GS1.

EDI (Electronic Data Interchange): The exchange of structured data in standardized message formats via electronic means between computer applications of trading partners.

Electronic traceability systems: Traceability systems in which records and data are captured and kept by electronic means, including bar code systems or RFID systems.

EPC (Electronic Product Code): Identifier used for RFID tags.

EPCglobal: Identifier provider for RFID technology. Subsidiary of GS1.

FDA (U.S. Food and Drug Administration): Federal agency under U.S. Department of Health and Human Services that is responsible for all food products and ingredients, with the exception of

meat, poultry and egg products. The agency also regulates the labeling of food and related items such as medicine and cosmetics.

FID (Canadian Food Inspection Agency's Fish Inspection Directorate): Official agency enforcing the legislation on import of seafood to Canada.

FSIS (Food Safety and Inspection Service): Public health agency in the U.S. Department of Agriculture that is responsible for ensuring the country's commercial supply of meat, poultry and egg products is safe, wholesome and correctly labeled and packaged.

GS1: Worldwide identifier provider for bar codes. Resulted from the merge between EAN and UCC.

Identifier: (Similar words: symbology, code system). The system of codes used to identify batches. E.g., UPC is an identifier, while the UCC/EAN 128 code system is another identifier.

Invoice: A written account or itemized statement made by the seller and sent with the purchased item.

Logistic unit: (Similar word: pallet). A quantity of product packed for transport and/or storage in the supply chain. E.g., pallet or container.

Nonretail trade unit: (Similar words: traded unit, nonretail trade item). A quantity of product packed for use in the back of a store or supermarket. A nonretail trade unit cannot be scanned at the point-of-sale. E.g., a cardboard box of product from a pallet.

Paper traceability systems: Traceability system in which all records and data are captured and kept in paper format.

Reader: (Similar word: interrogator) A device for reading bar codes or RFID tags.

Retail trade unit: (Similar words: consumer unit, retail trade item). Any quantity of product that can be scanned at the point-of-sale. E.g., a can of tuna.



Tracking: (Similar word: traceforward). The capability to follow the path of a specified unit and/or batch of trade items downstream through the supply chain, as it moves between trading partners.

Tracing: (Similar word: traceback). The capability to identify the origin of a particular unit located within the supply chain by reference to records held upstream in the supply chain.

UCC (Uniform Code Council): Former North American

identifier provider for bar codes that merged with EAN to GS1.

USDA (U.S. Department of Agriculture): Federal agency responsible for food products such as meat, poultry and egg products. USDA also is responsible for overseeing farm and foreign agricultural services, as well as food nutrition and consumer services, food safety, marketing and regulatory programs, natural resources, and environment and rural development.

References and Sources

Legal Basis of Traceability

Bioterrorism Act

Official FDA Web site on the Bioterrorism Act of 2002. Includes latest updates on requirements.
<http://www.fda.gov/oc/bioterrorism/bioact.html>

Section 306

FDA booklet: *“What You Need to Know about Establishment and Maintenance of Records”*
<http://www.cfsan.fda.gov/> (Under FDA documents, click on “Guidance Documents” and then on “Small Entity Compliance Guides.”)

Additional information released from FDA on protecting the food supply. Includes fact sheets, guidance for industry and press releases.
<http://www.cfsan.fda.gov/> (Click on “Food Defense & Terrorism.”)

Foreign Markets

Official Web site for foreign agricultural markets. Includes reports on foreign legislation on food imports.
<http://www.fas.usda.gov/> (Under Search FAS type in a country)

EU

Guidance report for EU producers on how to understand and implement the EU traceability regulations.
http://europa.eu.int/comm/food/food/foodlaw/guidance/guidance_rev_7_en.pdf

A report from USDA Foreign Agricultural Service on EU traceability requirements
<http://www.fas.usda.gov/gainfiles/200501/146118543.pdf>

Japan

A report from USDA Foreign Agricultural Service on Japanese import regulations and standards
<http://www.fas.usda.gov/gainfiles/200404/146106101.pdf>

Canada

A report from USDA Foreign Agricultural Service on Canadian import regulations and standards.
<http://www.fas.usda.gov/gainfiles/200508/146130545.pdf>

Imports

Official FDA Web site on seafood, including export and import requirements.
<http://www.cfsan.fda.gov/seafood1.html> (Scroll down to “Inspection, Compliance, Imports and Exports.”)

Booklet published by FDA on: *“What You Need to Know about Prior Notice of Imported Food Shipments.”*
<http://www.cfsan.fda.gov/> Under FDA documents, click on “Guidance Documents” and then on “Imports and Exports.”)

Practical Basis of Traceability

Bar Codes

GS1 U.S.

Princeton Pike Corporate Center
1009 Lenox Drive
Suite 202
Lawrenceville, NJ 08648

Phone: 609/620-0200
Fax: 609/620-1200

Web site: <http://www.gs1us.org>
Email: info@gs1us.org

Bar Code Technology Suppliers

There are several suppliers of hardware and software for bar code technology. It is not possible to make a complete list but here are some good sources found on the web.
<http://www.scanonline.com/>
<http://www.barcodehq.com/G2/index.html>
<http://www.barcodesupplies.com>

RFID Technology

EPCGlobal

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RFID Technology Suppliers

There are several suppliers of hardware and software for RFID technology. It is not possible to make a complete list, but here are some good sources found on the Web.

<http://www.rfidusa.com/>
<http://rapidtp.com/transponder/supplier.html>
http://www.umd.com.au/rfid/links_rfid_vendors.html

Traceability Software

A list of traceability software providers is given in the chapter on software on pages 17-18.

Practical Basis of Traceability

NC Division of Marine Fisheries DMF Headquarters

P.O. Box 769
Morehead City, NC 28557

Phone: 252-726-7021
Toll free phone: 800-682-2632

Web site: <http://www.ncfisheries.net/>

Recall

Official U.S. website on recalls
<http://www.recalls.gov/>

Prior Notice

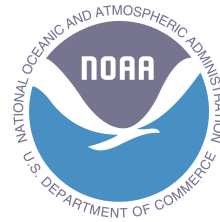
Official U.S. web site on prior notice
<http://www.fda.gov/> (Click on "Prior Notice of Imports")



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