The Global Language of Business

GS1 Foundation for Fish, Seafood and Aquaculture Traceability Implementation Guideline

provides guidance to the fish, seafood and aquaculture industry to implement GS1 standards.

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1 Introduction

The GS1 system of standards has created a common foundation for business by uniquely identifying, accurately capturing and automatically sharing vital information about products, locations and assets for use in many industry sectors including fish, seafood and aquaculture. The GS1 standards and application of the standards follow a theme called “Identify – Capture – Share – Use”.

The GS1 Implementation Guideline – Fish, Seafood and Aquaculture Traceability provides guidance to assist fish, seafood and aquaculture distribution channel participants and GS1 Member Organisations (MOs) in using the GS1 standards for Identify – Capture – Share - Use as applied to the traceability of fish.

In this guideline the term “fish” will be used to represent all fish, seafood and aquaculture trade items requiring unique identification for traceability.

To guide the audience to additional reference material e.g. other GS1 standards, ISO Standards and Industry Guidelines a list is provided in the Annex of this guideline under the heading Resources.

1.1 Purpose

Fish traceability is a business process that enables the fish distribution channel participants to follow products as they move through the supply chain. Each traceability partner must be able to identify the direct source and direct recipient of product. Traceability as a business process can be utilised for a range of business purposes, including but not limited to:

- Trade Item, Location and Asset Identification
- Fish and Ingredient Recalls
- Regulatory Compliance
- Sustainability Assurance

1.2 Scope

Use of GS1 standards for Identify – Capture – Share – Use for fish traceability enables a more efficient and effective supply chain process for all stakeholders that not only allows for the tracking and tracing of fish moving through a supply chain but importantly the flow of information about fish in internal systems and between trading partners.

“This document focuses on the “Identify” and “Capture” aspects (or product labelling) and on the “one step up, one step down” approach that are foundational for traceability.”

1.3 Audience

This guideline is intended to provide GS1 MOs and all members of the seafood industry with guidance in implementing the GS1 system of standards to develop and adopt business processes which provide traceability for fish within the entire seafood distribution channel, regardless of size or technological sophistication.

2 GS1 – An Overview

GS1 is a leading global organisation dedicated to the development and implementation of global standards and solutions to improve the efficiency and visibility of supply and demand chains, internationally and across sectors. The GS1 system of standards is the most widely used supply chain standards system in the world and encompasses the automatic identification of:

- Products
- Locations
- Parties
- Assets

- Logistic units
- Shipments
- Documents

The GS1 system also provides solutions for service relationships, order to cash transactions, tracking and tracing for business processes and associated message standards, global synchronisation of product master data, barcoding and Radio Frequency Identification (RFID) technologies and standards.

GS1 has over 40 years of experience in developing global standards and offers a portfolio of services and solutions to support the implementation of these standards. GS1 is a vendor neutral, not-for-profit global organisation with a network of over 110 GS1 Member Organisations worldwide. GS1 only develops standards for global use and applications. The standards are open and freely available. For more details, visit: www.gs1.org

2.1 What is the GS1 system?

In supply chains, business agreements are made between organisations who buy and sell, thereby establishing commercial conditions of their trade. The GS1 standards are built through a process of industry consensus and implementation is voluntary. The standards facilitate execution of commercial agreements that are often repetitive: for example, many orders a day are followed by numerous deliveries, invoices and payments using electronic messaging.

Ordinarily, trade items are identified using barcodes which provides some of the details about the trade item. The information contained in the codes needs to be communicated with trading partners and this is often referred to as master data alignment.

With an agreed, common understanding about what the codes are and what information is encoded in them they can be used in identifying items, ordering purposes, delivery, invoicing and payment (often referred to as the order-to-cash process). This process of Identify – Capture – Share - Use enables a more efficient and effective supply chain process for all stakeholders that not only allows for the tracking and tracing of items moving through a supply chain but importantly the flow of information about those items in internal systems and between trading partners, for example, the ability to know when Fish is delivered to a retailer.

2.2 The GS1 Foundations - Identify | Capture | Share | Use

- **Identify:** The globally unique / globally recognisable identification of trade items, products and locations using GS1 identification standards (i.e. unique numbering standards).
- **Capture:** Capturing the unique identification of trade items, products and locations using automatic data capturing technologies (i.e. barcode scanning, Radio Frequency Identifying technologies).
- **Share:** Sharing the information about trade items, products and locations internally within the business and with trading partners in a standardised manner using computer networks and messaging standards.
- **Use:** Applying the foundational standards to business processes.

2.3 GS1 Global Traceability Standard (GTS)

GS1 standards are often referred to as the *"common language of business"* that provides the framework required to support the traceability business process. This industry best practice implementation guideline is based on the GS1 Global Traceability Standard (GTS) which was developed by industry for industry. It is an application standard, whereby it specifies a particular set of technical standards to which end user systems must conform to meet traceability business requirements. This standard defines the minimum requirements for traceability to be achieved between trading partners.

The standard defines the globally accepted method for uniquely identifying the following:

- **Trading partners** - suppliers, customers (including internal), and third parties
- **Trading locations** - a trading entity or a physical functional location such as a warehouse, packing line, storage facility, receiving dock or store
- **Products** – items that a company manufactures, produces, supplies or uses
- **Logistic units** – distribution units that a company receives or ships; and
- **Shipments** – one or more logistics units handled together, both inbound and outbound

The GS1 Global Traceability Standard also defines essential information that must be collected, recorded and shared to ensure what is commonly referred to as "one step up, one step down" traceability. The standard is applicable to companies of all sizes and geography. The key elements in this standard are - terminology for roles and responsibilities of trading partners within the supply chain, traceability process flow and key business requirements and rules needed to perform traceability.

While the GS1 Global Traceability Standard may be implemented independently of any specific technology, best business practices require the adoption of barcoding on cases, pallets and consumer items. Businesses are further encouraged to adopt electronic messaging to exchange essential business information. To obtain a copy of the Global Traceability Standard visit *www.gs1.org/traceability-retail*

3 Identify

3.1 GS1 standards for Identification

GS1 *identification keys, represented as structured numbers* are the foundation for all GS1 standards. These keys are used to uniquely identify and distinguish items, products, logistics units, locations, assets and relationships across the supply chain from raw materials to consumer units. GS1 identification numbers provide the link between an item or location and the information about them.

The figure below illustrates an example of a GS1 identification key represented by the numbers below the barcode. In this example, the number represents a unique identifier for an item or a product and is known as a *Global Trade Item Number* (GTIN).

Figure 3-1 GTIN-13 encoded in an EAN/UPC (Example)

3.2 Global Trade Item Number (GTIN)

A Global Trade Item Number (GTIN) is the globally standardised and unique way to identify items or products traded in the supply chain. Where there is a requirement to accurately identify, order, invoice, price or receive a product, the GTIN is used to enable this. The GTIN is part of a series of unique identifiers that are used to establish what is often referred to as *a common language of business* to support multiple business practices, including traceability.

3.2.1 Specific GTIN Allocation Rules

The seafood supply chain has product characteristics that are different from general grocery items and therefore additional GTIN allocation guidance may be necessary. In addition to the general GTIN allocation guidelines, fish and ingredient suppliers and brand owners should allocate GTINs in accordance with the following specific rules:

- Assign a separate GTIN for each product/item.
- Assign a separate GTIN for each different packaging type such as carton-ready, tray-ready and store-processed product.
- Assign a separate GTIN for each primary refrigeration state in which a product is marketed (e.g., if a product is normally marketed in both a chilled and frozen state, then assign a different GTIN to each refrigeration state).
- Assign a separate GTIN to product lots that have different marketing claims or production methods when such characteristics are an important marketing feature to buyers (e.g. wild caught, farm raised, species, organic, etc.).
- Assign a separate GTIN for each different pallet and carton configuration.

For more information about GTIN allocation rules, visit www.gs1.org/1/gtinrules

3.2.2 Best Practice for GTIN Assignment of Case level / Upstream Fish Products

The GTIN identifies loose or pre-packed trade items at any stage of the supply chain up to the end consumer. In order to ensure traceability along the entire supply chain, the GTIN should be allocated as early as possible. In the fish sector, the GTIN is assigned by the party which brings the product into the market; this can be the producer/processor or wholesaler.

The table below presents, for each relevant stakeholder, a best practice recommendation on the criteria to take into account for the allocation of GTINs of the products in the supply chain (If one of the ticked criteria changes, then the product will need a new GTIN). The GTIN allocation criteria are not meant for products which will cross the point-of-sale, i.e. fixed or variable measure packaged products.

Table 3-1 Best Practice - Criteria for GTIN allocations

BEST PRACTICE - GTIN ALLOCATION CRITERIA			
Criteria	Fishing / Farming	Intermediate	Brand Owner
	Raw product	*Transformed product*	*Consumer product*
▪ Fishing or Aquaculture			
▪ Brand of the product (if relevant)			X
▪ The species (reference to the Latin name)	X	X	X
▪ Type of presentation (e.g. untreated, gutted/cleaned, filleted)		X	X
▪ Weight / Grade / Size (e.g. 200g or 500g) / Quantity (e.g. 4 pieces or 8 pieces)	X	X	X
▪ Type of packaging / container (vacuum plastic, polystyrene)		X	X
▪ Quality label (e.g. certification), if relevant)	X	X	X
▪ Language of the target market			X

The first step is to approach the local GS1 Member Organisation, apply for membership and a GS1 Company Prefix. The complete GTIN for each product and product variant will then be created and allocated.

Users of this guide who are not familiar with the process for allocating GTINs should consult their local GS1 Member Organisation for guidance. The assignment and allocation of GTINs is managed by a set of rules known as the GTIN Allocation Rules

3.3 Global Location Numbers (GLN)

A Global Location Number (GLN) is a globally unique identification number used to identify a legal entity, a physical or virtual location, or a function. A GLN is assigned by the owner of the GS1 Company Prefix.

The GLN can be used at a very high level to represent an entire corporation but can also be used at a granular level to represent a specific fishing vessel, a pond, a location within a processing plant, etc. It is recommended that participants in the seafood industry at least assign GLNs to all of their physical locations to provide unique location identification for their traceability processes.

To learn more about GLN assignment visit *www.gs1.org/1/glnrules*

3.4 Serial Shipping Container Code (SSCC)

The Serial Shipping Container Code (SSCC) is a unique identification code that can be used by companies to identify a logistic unit. An example of a logistic unit is a pallet or a combination of cases/cartons packaged together for storage and/or transport purposes. The SSCC enables track and trace options for logistic units to enable efficient order and transport management, automated delivery and receipt of goods.

The SSCC can be encoded into a barcode ensuring the logistic unit can be accurately and easily identified as it moves between trading partners through the supply chain.

When SSCC data is exchanged electronically, it allows supply chain partners to share important information about the status of logistic units during transit and provides a reliable link to important shipment information. As the SSCC provides a reference for each logistic unit, it can also be utilised as a look-up number to provide detailed information regarding the contents of the consignment and also as part of an Advanced Shipping Notice (ASN) or Despatch Advice (DESADV) process.

To learn more about Serial Shipping Container Code visit *www.gs1.org*

3.5 GS1 Application Identifiers (AIs)

In some circumstances, it is necessary to share detailed information on a trade item/in a data carrier such as a serial number. The GS1 identification system can provide for this requirement through the use and application of Application Identifiers (AIs). A list of the AIs used in this guideline is provided the Annex 8.3.

4 Capture

4.1 GS1 standards for data capture

In terms of capturing information encoded in a barcode or RFID tag GS1 Data Carriers are used for Automatic Identification and Data Capture (AIDC) purposes. This typically involves the use of a scanning device, usually a barcode scanner or RFID reader. The encoded data is the information that identifies the item or product and is used for different business processes and trading partner requirements. While uniquely identifying the item or product at every level of packaging, the data often provides additional product information such as batch/lot information allowing visibility of the item or product as it moves through the supply chain.

Note: The way to share data for fish traceability, including the use of GDSN, EDI, and EPCIS may be further detailed in future/additional documents.

4.1.1 GS1-128

GS1-128 barcodes can carry almost all GS1 Keys and most attributes, such as batch number, and they are used to share fixed and variable data between trading partners when used on the labelling of logistic units such as cases and pallets.

The type of information that can be encoded into a GS1-128 barcode include best before date, batch/lot number, serial number and a Serial Shipping Container Code (SSCC).which enhances the ability to track and trace products moving through the supply chain. The GS1-128 example below encodes the GTIN (01), Net Weight in Kg (3101), Best Before Date (15) and Batch/Lot Number (10).

Figure 4-1 GS1-128 barcode (example)

4.1.2 GS1 DataBar

A family of symbols that can be scanned at retail point-of-sale (POS), and can carry additional information such as batch number, best before dates, serial numbers etc. The effect of using GS1 DataBar is to encode information in less space than is generally possible with larger GS1 barcode symbols. Because GS1 DataBar can carry all GS1 keys such as the GTIN and attributes they can improve the in-store management processes for fresh produce, especially fish.

Use of the GS1 DataBar symbol is still in its early stages. It is important that companies understand the requirements or capabilities of their downstream (subsequent) trading partners.

The GS1 DataBar Expanded example below encodes the GTIN (01), Net Weight in Kg (3101), Best Before Date (15) and Batch/Lot Number (10)

Figure 4-2 GS1 DataBar expanded stacked barcode (example)

5 Share

5.1 GS1 standards for electronic data sharing

5.1.1 eCOM

The term eCom means *electronic communication* and is most commonly used for electronic business messaging between businesses. GS1 eCom is a form of electronic communication based on global data standards that allows rapid and efficient transmission of business information between trading partners. Examples include purchase orders, invoices, advance shipping notices and despatch advices.

GS1 has currently two sets of complementary eCom standards:

- GS1 EANCOM
- GS1 XML

5.1.2 EPCIS

EPCIS is a GS1 standard that enables trading partners to share information about the physical movement and status of products as they travel throughout the supply chain – from business to business and ultimately to consumers and detailed product information and thus goes beyond step-by-step traceability.

It helps answer the “what, where, when and why” questions to meet consumer and regulatory demands for accurate and detailed product information. 8.6 provides an Example of Traceability Event Tracking

To learn more about EPCIS visit www.gs1.org/epcis

6 Use – for Fish Traceability

6.1 Traceability Principles

Implementing a traceability system within a supply chain requires all parties involved to link the physical flow of products with the flow of information about them. For effective traceability implementation, the following principles should be considered: 1. Unique identification 2. Managing of batch/lots 3. Linking and maintaining traceability throughout the supply chain 4. Recording of minimum traceability information.

Adopting the GS1 system of standards along with industry standards for traceability processes ensures agreement about identification of the traceable items. This supports the visibility and continuity of information across the supply chain.

Critical tracking events along with key data elements for traceability of product movement in the supply chain include:

- Production
- Transforming
- Shipping
- Receiving
- Packing
- Unpacking
- Destroying
- Selling

6.2 Traceability

End-to-end traceability requires that the processes of external and internal traceability be effectively conducted. Each traceability partner should be able to identify the direct source and direct recipient of traceable items. This is the "one step up, one step down" principle. This requires that distribution channel participants capture and share traceability information. This is referred to as external traceability.

To have an effective traceability system across the entire supply chain, an internal traceability system must link the traceable items received with the traceable items being dispatched. Any item that needs to be traced forward or backward should be uniquely identified; and all distribution channel participants should implement both external and internal traceability systems. The implementation of internal traceability should ensure that the necessary linkages between inputs and outputs are maintained.

6.2.1 Internal Traceability

The processes that parties maintain within their organisations to link the batch identity of raw materials to the batches of the finished goods are those that enable internal traceability.

When a product is combined with others, processed, reconfigured, or re-packed, the new product must have its own unique product identifier (i.e., GTIN). The linkage (auditable function) must be maintained between this new product and its original inputs such as batters, breading, seasonings, marinades, salt, citric acid, packaging materials, and many others to maintain traceability. The label showing the batch/lot identification of the traceable input item should remain on the packaging until

that entire traceable item is consumed. This principle applies even when the traceable item is part of a larger packaging hierarchy.

6.2.2 External Traceability

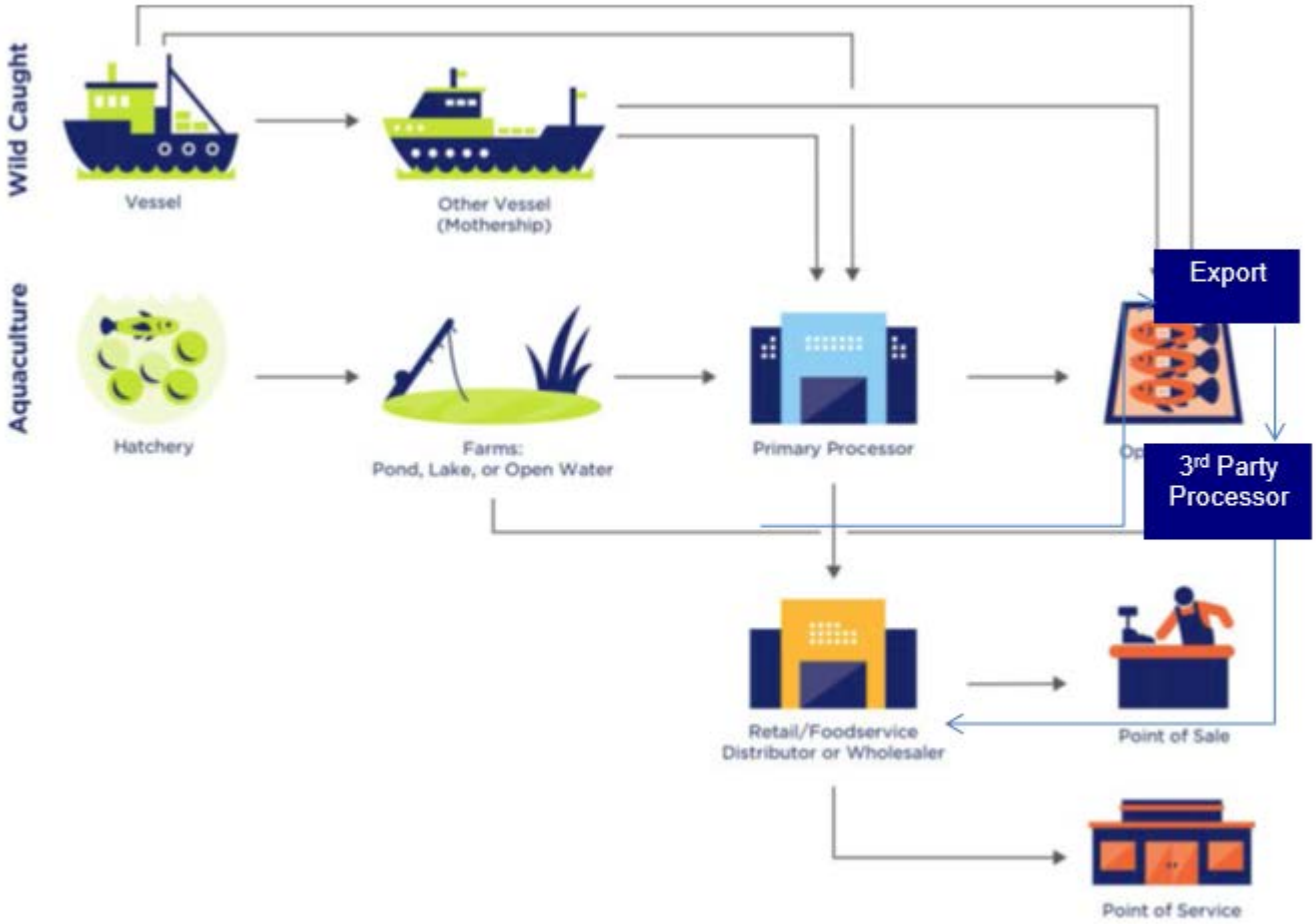
All traceable items must be uniquely identified and this information shared between all affected distribution channel participants. External traceability involves the communication of product identification and the transfer of product information data between trading partners. At a minimum, the identification of products for the purpose of traceability requires:

- The assignment of a unique GS1 Global Trade Item Number (GTIN); and
- The assignment of a batch/lot Number or Serial Number

To maintain external traceability, traceable item identification numbers must be communicated to distribution channel participants on product labels and means of data sharing (see chapter 4.1). This links the physical products with the information requirements necessary for traceability.

6.3 Fish Industry Supply Chain

Figure 6-1 Fish Industry Supply Chain



6.3.1 Fish Industry Supply Chain Roles

Figure 6-2 Fish Industry Supply Chain Roles

Role	Description
fishing crew	Catches fish and delivers it in bulk to the producer/processor
factory fishing vessel	A vessel equipped to catch fish, to perform some basic initial processing and to segregate and sometime grade the various species
fish processing vessel	A vessel with extensive on-board facilities for processing and freezing fish. It catches fish, processes and grades fish, packs fish in retail-ready packaging and freezes them
fish farmer	Feeds, grows and harvests fish for distribution to a processor
slaughtering house or slaughtering boat	Killing fish, sometimes removing the gut, and sometimes splitting
auction	Receives fish and confirms compliance with sanitary laws, prior to processing and entry into the commercial supply chain.
transport carrier	Transports caught and harvested fish between any trading partners, physically handles trade items (cases or pallets), maintains sanitary and temperature controls, and maintains accountability information (temperature, traceability, etc.)
producer/processor	Receives fish in bulk from fishing crew a factory fishing vessel or auction, then cleans and fillets the fish, packs into boxes and ships to a distribution centre
distribution centre	Receives fish from producer/processor, a fish processing vessel or fishing crew, then ships to other parties.
wholesaler	Receives product from distribution centre and ships to restaurant to order. These organisations are also referred to as “foodservice distributors”.
restaurant	Receives product from wholesaler and consumes it to make prepared food eaten on premises. (Includes food prepared in schools, hospitals, etc.)
retailer	Receives fish from upstream supplier and sells the product to consumers.

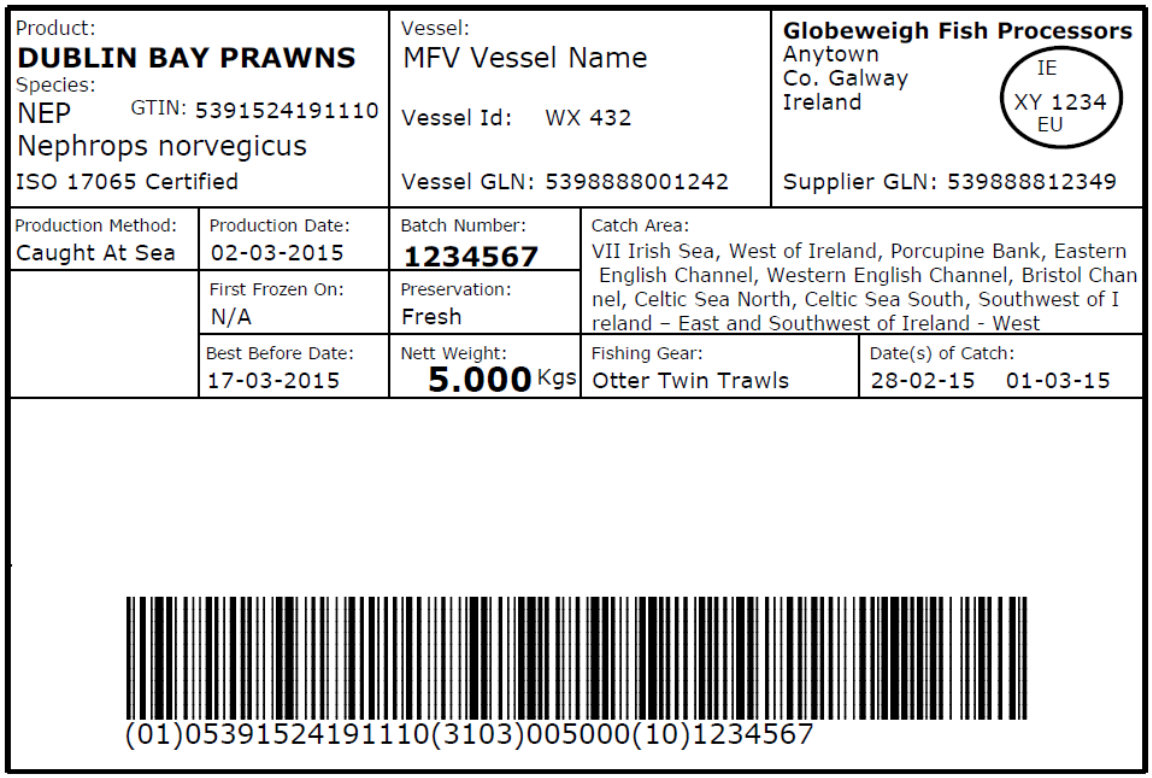
6.3.2 How each supply chain facility is uniquely identified

Use the GS1 Global Location Number (GLN) for company and location identification. Individual GLNs can be assigned to represent your company as well as any individual trading subsidiaries. GLNs are also be used to identify fishing vessels and production, storage, shipping or receiving locations within your company to identify physical locations associated with traceability processes. . If participants cannot assign a GLN for regulatory requirements, the location identification for the production of the lot must be encoded in the lot code number. This will allow participants to maintain confidentiality, while ensuring that the identity of production locations is available in human readable format on individual packages and in both human readable and machine readable format on cases, pallets and shipping documents.

6.3.3 Identifying Captured / Harvested Fish

The GS1 identification standards and human readable information provide traceability information for the capture or harvest of fish. The label shown in the figure below provides an example of the use of barcodes, GS1 identification keys, application identifiers and human readable information. The various data attributes such as expiry date, catch area, fishing gear and production method are considered variable data and can be recorded using GS1 AIs, which need to be linked to the GTIN.

Figure 6-3 Fish Capture Identification – Example *(this is an example of a national label)*



6.3.4 Retail / foodservice packaging scenarios

Within the seafood distribution channel, products may be segmented between fixed-weight and variable-weight products. A fixed-weight product is always produced and sold in the same weight. A fixed- weight product is priced per selling unit, rather than by weight. A variable-weight product is a specific product whose weight (and therefore price) varies from unit to unit. A variable-weight product is priced according to the net weight of the item. Final labelling for consumer sale can be done by the retailer.

Both fixed-weight and variable-weight case-level products are labelled with a GS1-128 barcode, which can encode the GTIN, batch/lot number, net weight (when appropriate) and possibly a serial number if required.

For products sold at retail point-of-sale a GS1 DataBar allows for additional item attributes to be processed when scanning the product.

Generally, products are delivered by suppliers to retailers, distributors, or foodservice operators in one of the following package types.

Figure 6-4 *Seafood Package Types*

Case Package Types	Definition	Product Examples
Fixed-Weight Units, Case or Shelf Ready	Food Service or Consumer level items ready for sale. Product is processed, packaged, and labelled for sale by supplier.	Breaded or un-breaded seafood, canned seafood, bagged frozen seafood, fresh seafood. Retail and Food Service
Variable-Weight Units, Case or Shelf Ready Pre-priced	Food Service or Consumer level items ready for sale. Product is processed, packaged, and labelled for sale by supplier.	Bulk shrimp, bulk frozen fillets, chilled shrimp and fillets. Retail and Food Service
Variable-Weight Units Un-priced	Processed, packaged, and partially labelled for consumer sale by supplier. Final labelling for consumer sale is done by the retailer.	Whole round fish or fillets fresh or frozen, bulk shrimp, crab clusters, bulk oysters or scallops. Retail only
Tray-Ready	Processed and bulk packed by supplier. Packaged for consumer sale and labelled by retailer.	Bulk shrimp, frozen fillets, chilled shrimp, lobsters and fillets. Retail only
Store Processed	Bulk packed from supplier and retailer is doing further processing, labelling and packaging.	Whole round fish or fillets fresh or frozen, bulk shrimp, crab clusters, bulk oysters or scallops. Retail only

When retailers, distributors, or operators ask suppliers for own-label products, they (the retailers, etc.) are the brand owner and are therefore responsible for identifying that product in the supply chain. The best practice is to identify these own-label items using the GS1 Global Trade Item Number (GTIN). In these cases, the retailers, distributors, or operators will provide the GTIN to use on the product's packaging.

If a company further processes and packages a product in the supply chain, such as the case with store-processed product, then that company becomes the manufacturer and is responsible for assigning a GTIN and traceability attributes. This may be achieved using a combination of human readable and scannable product information. This information should also be stored for future retrieval if necessary.

If a company modifies the basic characteristics of a trade item, a new GTIN is required. Retailers, distributors, and operators should be familiar with and use the same GTIN allocation rules that suppliers use if a GTIN is created.

6.3.5 Impact of batch/lot and serial numbers on traceability

Each partner in the supply chain shall provide and/or capture certain product information to enable forward and backward (one up/one down) traceability.

The supplier must establish product identification, using the GTIN and batch/lot number, at case level to enable effective traceability or product recall.

Using a serial number for each case, rather than a batch/lot number, is also acceptable; a batch/lot number or a serial number must be provided in addition to a GTIN.

If a batch number, AI (10), is present in the case barcode, the receiving partner should manage the traceability of the product using that value. However, if an AI (10) batch number is not present, then an AI (21) serial number must be present and that is the number the receiving partner must

record to track the product. If both numbers are present, as sometimes happens on fixed-weight product, the batch number, AI (10), takes precedence.

Table 6-1 Priority of Batch/Lot and Serial Numbers for Tracing Case-Level Packages

Case Barcode Contents		Number Used For Tracking Case
Batch/Lot AI (10)	Serial No AI (21)	
X		Batch/Lot Number
	X	Serial Number
X	X	Batch/Lot Number

6.3.6 Industry practice for product dating

Although the date is not used at the case/carton and logistic unit level for traceability, it is related to the product batch/lot number and for retail and food service the date is also critical for inventory management. Selection of the date type used by the type of product is related to the product type packaged.

Some industry practices for product dating by product type and date type are:

By product type:

- Minimally processed, refrigerated or frozen seafood – use the production date, AI (11).
- Further processed foods – If the process that you use alters the life of the product such as cooking or freezing a refrigerated product, the appropriate date is the packaging date, AI (13).
- Cutup and repacked seafood – Neither of these changes the useful life of the product. The original production date should be on the case label as described above. The process step of cutup or repack, however, should be traceable by the batch/lot Number, AI (10).
- Otherwise blended seafood – These blends, intended for use in other processes, should be identified with a use-by date, AI (17). By using a use-by date, the items can be produced to satisfy volume needs without regard for final use. The use-by date should be calculated based on the seafood used to produce the product.

By date type:

- **Production date** – Use the production date, AI (11).
- **Packaging date** – This should be used if the process, such as cooking or freezing a refrigerated product, alters the life of the product. Use the package date, AI (13).
- **Sell-by date or Expiry Date** – This dates, Sell by AI (16) / Expiry Date (17), should be used on product for end customers.
- **Use-Best-before date** – The Best-before-date, AI (15), should be used where product is going to be used in another process. Its advantage is that it shows the user the last date a product can be used.
- **Harvest Date –** The Harvest date, AI (7007), should be used when it is necessary to encode the date when, for example, a fish has been harvested.

6.3.7 Maintaining Traceability in sustainability assurance

The traceability guide has been designed for the purposes of complying with traceability requirements for food safety. The processes and information that are collected and maintained under a food safety traceability programme could also be utilised to provide sustainability information to stakeholders.

The seafood industry's best practice for organising sustainability-related information is to associate that information with the input lot at the point of first receipt, where it can be tracked through the supply chain. This information by input lot then is associated with the GTIN and Batch/Lot Number of the output product for which it is used and can be retrieved.

6.3.8 Seafood industry recalls

A primary objective of traceability is prompt and accurate product recall. Recall is the removal of distributed seafood products from the supply chain when there is reason to believe that such products are adulterated or misbranded under provisions of various food safety regulations. The overriding goal of any recall is to ensure that targeted product is quickly and easily removed from the supply chain and not consumed by consumers. A secondary goal is to minimise the amount of non-affected product that is also removed from the supply chain as part of a recall. Efficient trace or recall requests require that the target items are identified using their GTINs and attribute information such as batch/lot numbers. Recall is initiated with a recall notice which is a notification from a supplier to a participant in the supply chain that provides sufficient product identification information to allow the participant to effectively identify and remove target product from the supply chain.

6.4 Maintaining traceability throughout the product hierarchy

Use the GTIN and the batch/lot number or serial number. This information must be available in human readable format and in a barcode.

Products should be identified at all levels of the product hierarchy (consumer item, case/carton, logistics unit).

The table below identifies information that should be used to identify each level. Linking the GS1 Identification standards with electronically stored and/or human readable information ensures traceability.

Table 6-2 Table of Hierarchy Levels

Level	Information that should be used
Consumer Item	GTIN AND lot number or GTIN and Serial number. In addition Sell By Date, Best Before Date or Production Date if asked by regulation.
Case / Carton	GTIN and Batch/Lot Number AND/OR GTIN and Serial Number
Logistics Unit	Serial Shipping Container Code (SSCC) and possibly accompanied by an Advance Shipping Notice / Despatch Advice

6.4.1 Minimum requirements for consumer item traceability

This section details how retailers, distributors, or foodservice operators manage the minimum required traceability data for consumer items.

Consumer item traceability must allow consumers to identify suspect product, so human readable information is essential. Therefore, consumer item traceability requires the use of human readable information on all consumer items.

Fixed-weight consumer items using an EAN-13/UPC-A barcode includes a GTIN, but no additional traceability attributes. While the item reference provides the retailer with high-level information about the type of product sold, it fails to provide effective traceability with point of sale scanning. Therefore, retailers as well as consumers are largely dependent on the human readable information on the product label for consumer item traceability. Using a GS1 DataBar Expanded symbol provides the opportunity to encode additional data other than the GTIN, such as expiry date or lot number.

The party responsible for packaging, labelling, barcoding, and setting the shelf life date of the consumer items varies with the packaging type. The following section highlights for each packaging type whether the supplier or the retailer has responsibility:

Table 6-3 Responsible Party for Consumer Item Traceability Data

Packaging Type	Packaging		Label Placement		Item reference		Shelf Life Dating	
	Supplier	Retailer	Supplier	Retailer	Supplier	Retailer	Supplier	Retailer
Fixed-Weight Shelf Ready	X		X		N/A	N/A	X	
Variable-Weight Shelf Ready	X		X*	X*		X		X
Tray Ready		X		X		X		X
Store Processed (Full Service and Packaged)		X		X		X		X

** Pre-priced variable-weight shelf-ready product is labelled by the supplier in accordance with retailer instructions; Non pre-priced variable-weight shelf-ready product is labelled by the retailer*

Fixed-Weight consumer items are packaged and labelled by suppliers and the traceability information for this packaging type is always the responsibility of the supplier. Although shelf-ready consumer items are always packaged by the supplier, they may be pre-priced or un-priced when delivered to retailers. In either case, the retailer always determines the Sell-By Date. The following table shows those traceability elements required on consumer-item shelf-ready products that have barcodes:

Table 6-4 *Consumer Item Traceability Data Elements*

Data Elements	Scan Length	Case Ready		Tray Ready Store-Processed	
		Human Readable	Scan	Human Readable	Scan
Brand Owner/Company Name	N/A	X		X	
Consumer Item Product Description	N/A	X		X	
Lot Number as defined	N2+X..20	X	X	X	X
Global Trade Item Number (GTIN)	N2+N14	X	X	X	X
Best-Before-Date OR Sell-By-Date OR Use- By-Date OR Production-Date “Seafood Industry terminology is Lot Code/Date Code”	Not Applicable	X		X	

For shelf-ready fixed-weight items, the barcode contains the GTIN, which by itself, does not establish unique traceability. Therefore to enable product traceability, human readable data must be used in combination with scannable data.

The figure below shows a consumer label that meets all minimum traceability requirements for a shelf-ready fixed-weight product, including the use of GS1 DataBar.

Figure 6-5 Case Ready, Fixed Weight Consumer Item Label

The figure below shows a consumer label that meets all minimum traceability requirements for a shelf-ready variable-weight product, including use of GS1 DataBar.

Figure 6-6 Shelf-Ready Consumer Item Label

When retailers, wholesalers, distributors, or operators package and label store-processed and tray-ready consumer items, they must be able to associate the supplier's case GTIN and batch/lot number or case serial number with the consumer item's product name, item reference number, and sell-by date that they apply to the consumer package. Maintaining this association makes store-processed and tray-processed product traceability a greater challenge than shelf-ready consumer items where product is processed only by the original supplier.

Labelling traceability markings on store-processed and tray-ready variable-weight consumer items is always the responsibility of the retailer. The retailer must determine the Sell-By Date and associate it with the supplier's Batch/Lot Number or case Serial Number.

Once product from the manufacturer is removed from cases at the retail store and repacked by the retailer, risk management favours the simplest method of product withdrawal. The Sell-By Date creates a more user-friendly human-readable product identity reference for consumers than the Lot/Batch/Serial Number. Note that the use of GS1 DataBar on these package types would accommodate the inclusion of all of the human readable data, as depicted.

6.4.2 Minimum Requirements for Case-Level Packaging Traceability

The minimum requirements for case level packaging traceability rely upon the GTIN and Batch/Lot or Serial Number. The table below provides a summary of scannable and human readable traceability attributes.

Because of differences in production practices and barcode size constraints, traceability labelling practices vary depending on the type of fish product packaged. The primary difference is between variable-weight products and fixed-weight products, and between refrigerated and frozen or shelf-stable. These differences are summarised in the table below.

Table 6-5 summary of scannable and human readable traceability attributes

	Scan Length	Case- Ready/Fixed/Variable Weight		Tray Ready/ Store-Processed	
		Human Readable	Scan	Human Readable	Scan
Brand Owner/Company Name	N/A	X		X	
Consumer Item Product Description	N/A	X		X	
Lot Number as defined	N2+X..20	X	X	X	
Global Trade Item Number (GTIN)	N2+N14	X	X	X	X
Best-Before-Date Or Sell- By-Date Or Use-By-Date Or Production-Date	Data not in barcode. Information Human readable on label.	X		X	

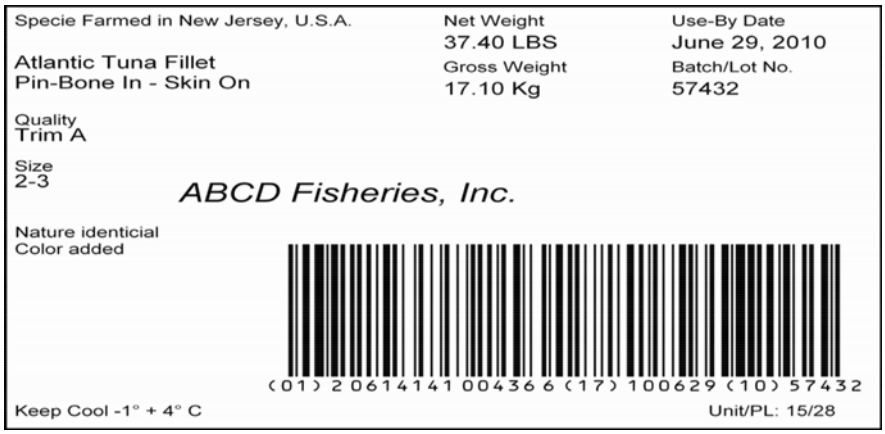
Both variable-weight and fixed-weight product cases must be clearly labelled with the same human readable core traceability information. Human readable numbers should be clearly labelled data elements such as the text "Batch Number" followed by the batch number value. Human readable numbers located below each GS1 barcode are not considered to meet the human readable requirement because they are not clearly labelled data elements. Even though logistics supply chain operators may be able to interpret Application Identifiers (such as AI (10) for the Batch/Lot number), the Application Identifier is not a substitute for a clearly labelled data element.

In addition, the GS1-128 barcode standards allow for the use of Application Identifiers (AI) to define different data elements in a barcode on each case. A fixed-weight product case should always

contain a Batch/Lot Number AI (10) within the case barcode. Optionally, a Serial Number AI (21) can also be included. If both are available, the Batch/Lot Number should still be used for the traceability of fixed weight products.

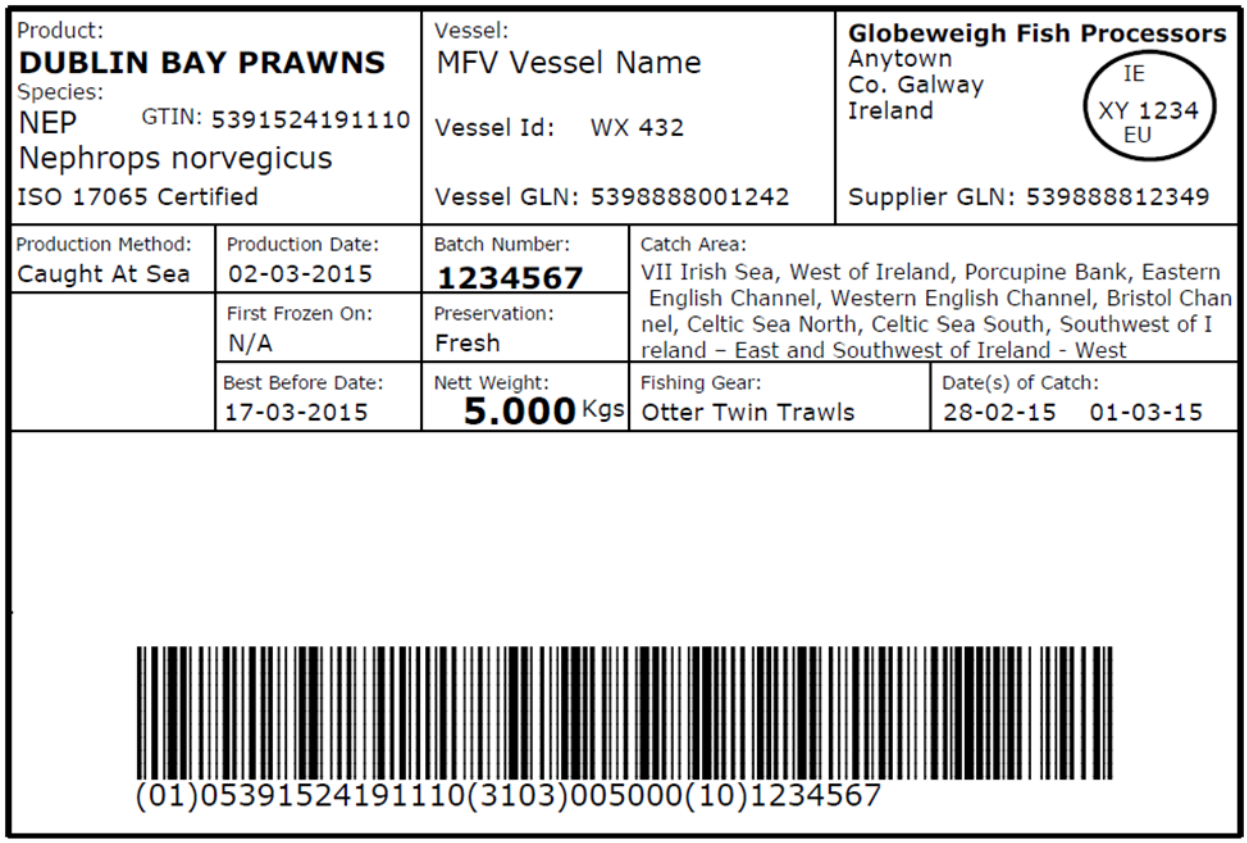
The figure below is an example of a fixed-weight case label that contains all of the required traceability information and additional information.

Figure 6-7 Fixed-Weight Case Label-Example



Some suppliers assign a serial number to each variable-weight case to ensure that cases are not scanned more than once when loading pallets. When serial numbers are present on variable-weight cases and used for traceability of product, include the case Serial Number AI (21) in the GS1-128 barcode. If Serial Numbers are not used for traceability, then include the Batch/Lot Number AI (10). Ideally, both data elements would be included in the barcode. But because of the limited data carrying capacity of the GS1-128 barcode (48 digits), both a Serial Number and a Batch/Lot Number cannot be included in the barcode along with the GTIN, net weight, and product date that are also required for logistics management of variable-weight cases.

Figure 6-8 *Variable-Weight Case Label-Example*



6.4.3 Requirements for Pallet Traceability

Use a GS1 Serial Shipping Container Code (SSCC) to identify 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 a barcode.

This SSCC, the shipment identification, exists only for the duration of the shipment between trading parties, as shipments are broken down upon arrival. Unique shipment identification information may be used as a reference, along with other document identification like Bill of Lading, Manifests, Shipping Notice, etc.

Each SSCC number is unique to the individual logistics unit and is based on your company's GS1 Company Prefix number.

The SSCC is typically part of a larger label affixed to the pallet. Additional information may be shown on the label, depending on the requirements of the trading partner. Most often the additional human readable information includes the shipper name and address, the carrier, and the delivery information.

The figure below is an example of a pallet label.

Figure 6-9 Logistics Unit - Example

To fully utilise the SSCC in a GS1-128 barcode, the barcode should be used in conjunction with an Advance Ship Notice (ASN) or Despatch Advice. The SSCC can then be used to refer to additional logistical information provided in the ASN or Despatch Advice.

6.4.4 Requirements for Shipment Traceability

The shipment information includes the capability to define relationships between the shipment, purchase orders, pallets, and cases present in the order and the traceability and logistical management data for each. These relationships should be clearly defined at the shipment level in each electronic message.

Paper-based documents such as Bills of Lading (BOL) and Manifests are created by a supplier or shipper and sent with a shipment or order to the product recipient. The Bill of Lading is the legal document summarising information about the goods being transported. The Manifest document describes individual order details such as product GTINs, individual case weights, etc. Advance Shipping Notices (ASNs) and Despatch Advices are electronic messages created by a supplier/shipper and sent to a product recipient using GS1 eCom and is used to communicate similar shipment information as the Bill of Lading and Manifest.

The traceability data elements required are the same for all seafood products. Best Practices are that the following data elements are included in the paper-based Manifest and the electronic ASN/Despatch Advice:

- Global Trade Item Number

- Serialised Shipping Container Code
- Batch/Lot or Serial Numbers
- Quantity shipped
- Shipping and Receiving Dates
- Ship From and Destination Locations
- In addition, other useful information such as the following may be included as appropriate for your records:
- Stock Keeping Unit (SKU) or other supplier product identification reference
- Production Date **IF** Product is for retail store-processing or foodservice use
- Sell-By Date OR Best-Before Date **IF** applicable
- Country of Origin Labelling Statement **OR** ISO Country Number(s), if applicable
- Labelling for wild caught or farm raised

6.5 Maintaining Traceability for Product from Live Seafood Providers

Live Seafood providers deliver product in various logistic units. Each logistics unit should be individually traceable. Information used to ensure traceability includes:

- Provider Identity
- Accurate farm/vessel information depending on species of the seafood received
- Purchase Order Number or Live Receiving Ticket of received seafood
- Date of Shipment and Receipt
- Carrier Name and Trailer Number
- Count of seafood.

Live animal/seafood product lots must be traceable. This is accomplished by associating each seafood lot identification number with the GTIN and Batch/Lot Number of the output product it is used to produce. Note that the data described is focused on key data elements that support the sharing of Critical Tracking Events.

6.6 Maintaining Traceability for Other Product Ingredients

Batters, breadings, seasonings, marinades, salt, citric acid, packaging materials and many other product inputs are used in the production process by suppliers. These product lots must be traceable. This could be accomplished by associating each product lot identification number with the GTIN and Batch/Lot Number of the output product it is used to produce.

Product sourced from other suppliers is recommended to be identified by the GTINs and Batch/Lot Numbers provided by the supplier. The assignment of GTINs for each product traded (i.e., all product configurations) is the responsibility of the brand owner and should be recorded in the supplier's internal systems prior to being processed or traded.

GTIN and Batch/Lot or Serial Number information is shown on individual case labels. The GTIN and Batch/Lot or Serial Number of each input product must be associated with the GTIN and Batch/Lot Number of the output product.

7 Best Practices

7.1 Best Practices for Maintaining Traceability

Traceability processes are only as good as the weakest link. Therefore it is important for suppliers, retailers, processors, distributors, wholesalers, and foodservice operators to understand the value of

collecting and maintaining product information that supports, at the very least, “one up/one down” traceability.

Best practices for maintaining traceability for the suppliers, retailers, processors, wholesalers, distributors, and foodservice operators is to capture all agreed to traceable information and store it within their systems by scanning the information directly from the case and/or consumer item barcodes. Scanning enables data to be captured, stored, and retrieved without the need to visually review the human readable information and manually key that information into systems.

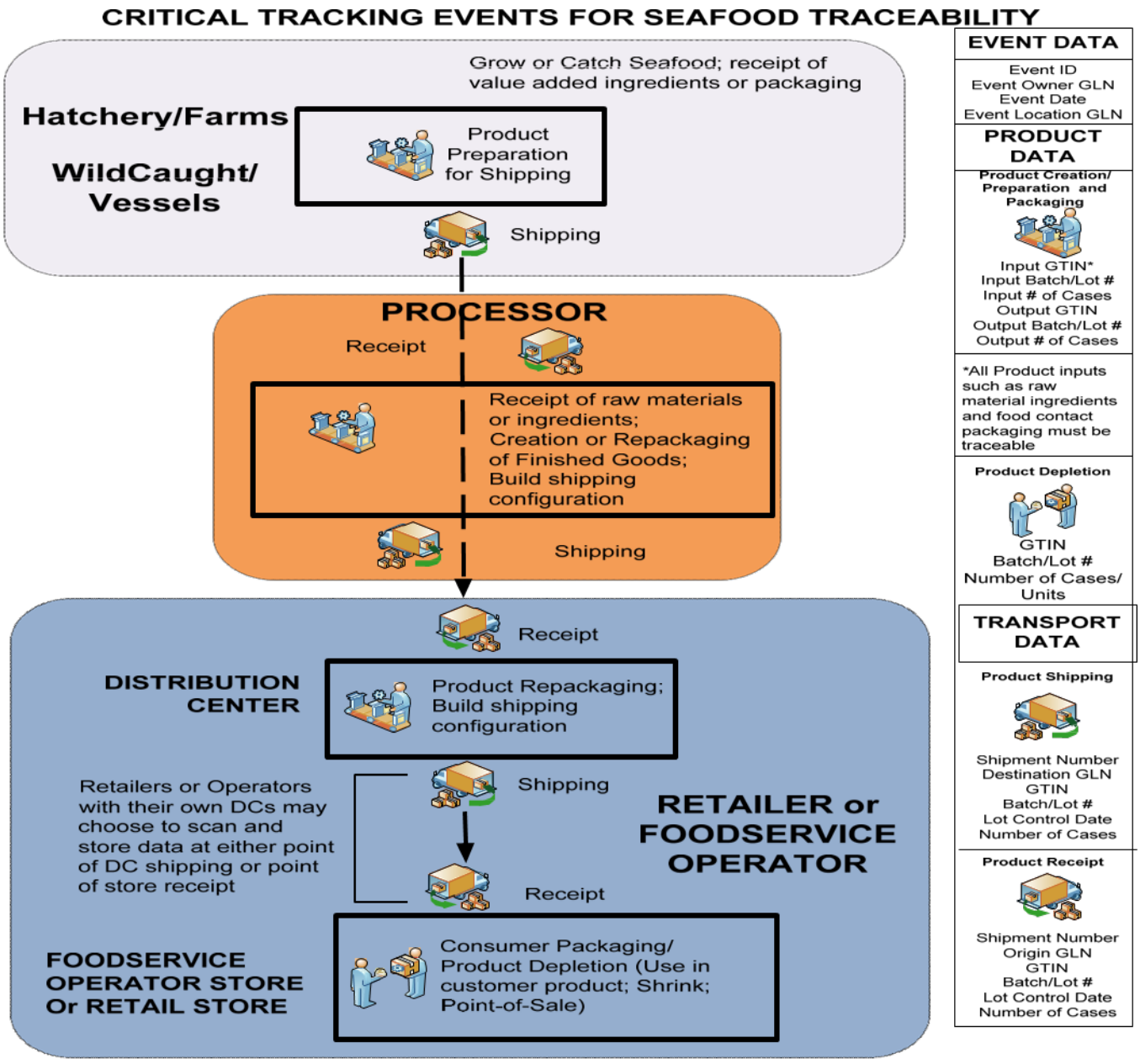
While the process of scanning cases outbound from distribution centre to a store or operator is the exception today, more and more retailers, processors, distributors and wholesalers are putting processes in place to collect and store at least the minimum product information required to support traceability. Product can be scanned for Critical Tracking Events e.g. as it enters a distribution centre; as it is shipped out of the distribution centre; as it is received at a retailer store or foodservice operator; or as it is opened for processing or consumer display.

Best practices would be for a retailer, processor, wholesaler, or distributor to duplicate the product information data requirements recommended for the supplier traceability best practices. The more holistic the view of the product flowing within the supply chain, the more accurate the information used in a traceability process.

“Event-based traceability is an emerging practice to share and access product traceability data across the chain. With this approach, the focus is on determining Critical Tracking Events at every step of the chain and defining Key Data Elements that shall be recorded for these events. It is a decentralised approach that enables access to a holistic view of the product flowing within the supply chain, without each actor having necessarily to duplicate the product information received from their suppliers until the point-of-sale. EPCIS is a suitable standard for such an approach”

Critical tracking events identify those core business processes where traceability data capture is vital to a successful traceability process. The figure below illustrates those key events for the seafood supply chain.

Figure 7-1 *Critical Tracking Events for Seafood Traceability*



7.2 Best Practices for Consumer Item Traceability

GS1 DataBar is a barcode d that allows up to 74 numeric characters or 41 alpha/numeric characters of information to be encoded. All product information required for traceability can be encoded into the barcode. The need to combine human readable information to the scannable information will no longer be necessary. Using the GS1 DataBar, the required traceability data can be included on each package.

The GS1 DataBar symbology at the consumer item level will greatly aid in the ability to capture traceability information electronically as product flows from a retailer to the consumer.

- Critical traceability data elements that should be encoded into a GS1 DataBar include:
- Global Trade Item Number AI (01); and
- Sell-By Date (AI “16”) OR Best Before Date (AI “15”) OR Batch or Lot Number

The table below summarises the information that must be present to enable traceability in human-readable form, in scannable consumer item GS1 DataBar, and in the electronic commerce Advance Shipping Notice:

Table 7-1 *Consumer Item Data Requirements*

X = Mandatory	Scan Length	Scan	ASN*
Global Trade Item Number (GTIN) AI (01)	N2+N14	X	X
Best Before (YYMMDD) AI (15) OR Sell By Date (YYMMDD) AI (16)	N2+N6	X	X
Batch or Lot Number	N2+X..20	X	X

Scan = Barcoded using the GS1 DataBar;

ASN* = Advance Ship Notice/Despatch Advice

AI = Application Identifier

The GS1 DataBar may contain other application identifiers such as the Batch/Lot Number, weight, and extended price. The Sell-By Date, however, is required for use in the GS1 DataBar, as it meets aggressive withdrawal objectives and provides the greatest assurance to suppliers and retailers that recalled product which reaches the point-of-sale register will not be sold to consumers.

7.3 Best Practices for Case Level Traceability

The minimum requirements for case level traceability rely upon a combination of the GTIN and Batch/Lot or Serial Number.

Best practices for case traceability for the retailer are achieved by electronically capturing the traceability information of the case and associating that information with all movements of that product across the supply chain. The case level traceability attributes that should be captured through the barcodes or ASN/Despatch Advices, electronically stored, and retrieved upon demand are:

Table 7-2 *Best Practice Case Level Traceability Requirements*

DATA ELEMENT	SCAN LENGTH	VARIABLE- WEIGHT		FIXED - WEIGHT	
		Scan	ASN	Scan	ASN
Global Trade Item Number AI (01)	N2+N14	X	X	X	X
Batch /Lot Number AI (10)	N2+X..20	X*	X	X	X
Serialised Case Code AI (21)	N2+X..20		X^	X^	X^

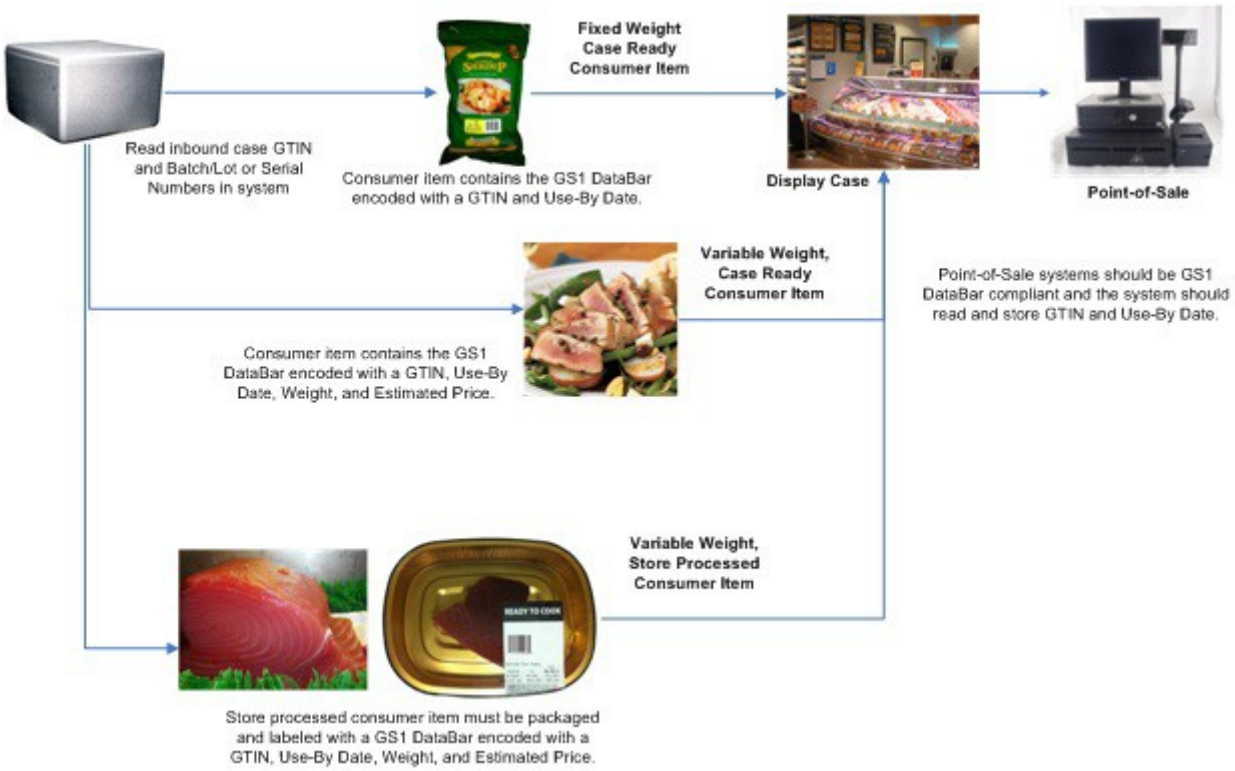
Scan = Barcoded; ASN = Advance Ship Notice/Despatch Advice; AI = Application Identifier

* = Use Serial Number when present on case and useful for traceability and use Batch/Lot Number if no Serial Number present on case.

^ = Include Serial Number when present on case and useful for traceability

The figure below shows the best practice flow of traceability information for seafood:

Figure 7-2 *Traceability Best Practices*



7.4 Capturing Supplier Product Data

Best practices are for retailers, processors, wholesalers, and distributors to capture logistics unit and product information electronically from their suppliers to maintain traceability and manage product inventory. The use of GS1 international standards for marking products (GTINs) and pallets (SSCCs) in the supply chain is a primary enabler for maintaining product visibility throughout the supply chain. The SSCC uniquely identifies each shipping unit. The electronic Advance Ship Notice (ASN)/Despatch Advice information, available from many suppliers, can be used to access information for all aggregated product on that shipping unit.

When full shipment quantities are shipped from the warehouse to the retail store or foodservice operator, scanning the SSCC from the shipping unit and using the information from the ASN/Despatch Advice provides traceability information for the processor, wholesaler or distributor. If that shipping unit has not been re-configured since it was received from the original information collected during the receiving process (i.e., the scan of the SSCC tied to the ASN/Despatch Advice information), it may be used to support traceability. It is the “owner” of the shipping unit configuration that is responsible for the accuracy and the attributes that are associated with the product configured on the shipping unit.

In the seafood industry the use of human readable information captured is used in conjunction with electronic scanning. As a result traceability processes are dependent on both electronic and human readable traceability information.

The best practice is to scan the case when breaking the product down to a consumer item in order to link the case to the consumer item.

7.5 Outgoing Product to Stores or Foodservice Operators

Retailers, processors, wholesalers and distributors should capture information about outbound product going from a warehouse to a store or foodservice operator. This information may be captured at any point in the product movement such as from the warehouse outbound to the store, at arrival at the store, or when the product is being broken down to a new consumer item or is

placed into self-service display cases; all examples of critical tracking events. To enable traceability, retailers, processors, wholesalers and distributors should identify the GTIN, Batch/Lot or Serial Number and quantity of cases in each order sent to a store or foodservice operator. This supports the “one up/one down” principle of tracing a product’s movement through the supply chain.

7.6 Advance Shipping Notice / Despatch Advice

The Advance Shipping Notice (ASN)/Despatch Advice is an electronic data file sent from suppliers to receivers to identify cases that make up a logistic unit. The ASN/Despatch Advice is an efficient alternate to case scanning. Retailers can process the ASN/Despatch Advice to capture information at the logistic unit level identified by a Serial Shipping Container Code (SSCC), the GTIN, the case Serial Number, if used, and/or Batch/Lot Number of each case in the logistic unit. When a shipment is received, retailers that use ASNs/Despatch Advices only need to scan the SSCC of each logistic unit in the shipment rather than each case in the shipment individually.

Similarly, distributors or retailers that break down shipping units and restack cases onto outbound shipping units should scan case barcodes and create a new ASN/Despatch Advice to be sent to the subsequent receiver of the product. In this way, the flow of traceability information for that product is always efficiently available to all partners in the supply chain.

8 Mapping GS1 standards to Regulatory Requirements

GS1 MOs may be required to map fish traceability attributes/key data elements against proposed or approved regulatory requirements. An example of the European Union recommended framework for the mapping is shown in the Annex.

A Annexes

A.1 Fishing Industry Glossary of Terms

Listed below are terms used by the fishing industry and their cross-references with the GS1 Glossary of Terms.

Sector Term	GS1 Glossary Term	Definition
▪ Each ▪ Base Unit ▪ Saleable Unit	Trade Item	Any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, ordered, or invoiced at any point in any supply chain.
▪ Case ▪ Traded Unit ▪ Bin ▪ Tote ▪ Pallet ▪ RPC ▪ Tray ▪ Crate	Trade Item Grouping	A standard composition of trade item(s) that are not intended for point-of-sale scanning.
▪ Pallet ▪ Non-Standard Mixed Case	Logistics Unit	An item of any composition established for transport and/or storage that needs to be managed through the supply chain.
Pallet	Unit Load	One or more transport packages or other items contained on a platform making them suitable for transport, stacking, and storage as a unit.
	Global Trade Item Number (GTIN)	The GS1 Identification Key used to identify trade items. The key comprises a GS1 Company Prefix, an Item Reference and Check Digit.
	Indicator Digit	The leftmost digit of a GTIN in a GTIN-14. The digit '0' indicates a base unit Global Trade Item Number, digits 1 to 8 are used to define a packaging hierarchy of a product with the same Item Reference, and digit 9 indicates a variable measure trade item.
	GS1 Company Prefix	A globally-unique number assigned to companies by GS1 Member Organisations to create the identification numbers of the GS1 System.
	Check Digit	A final digit calculated from the other digits of an element string, used to check that the data has been correctly composed or correctly keypunched.
	Item Reference Number	The part of the GTIN allocated by the user to identify a trade item for a given GS1 Company Prefix.
	Application Identifier (AI)	The field of two or more digits at the beginning of an element string that uniquely identifies its format and meaning within the GS1 System.

A.2 Glossary – GS1 Terms & Definitions

These GS1 terms & definitions originate from the *GS1 General Specification*. glossary. Please see *http://www.gs1.org/glossary* for the latest version

Term	Definition
Automatic Identification and Data Capture (AIDC)	A technology used to automatically capture data. AIDC technologies include barcodes, smart cards, biometrics and RFID.
barcode	A symbol that encodes data into a machine readable pattern of adjacent, varying width, parallel, rectangular dark bars and pale spaces.
Barcode Verification	The assessment of the printed quality of a barcode based on ISO/IEC standards using ISO/IEC compliant barcode verifiers.
Batch / Lot	The batch or lot number associates an item with information the manufacturer considers relevant for traceability of the trade item. The data may refer to the trade item itself or to items contained in it.
brand owner	The party that is responsible for allocating GS1 System Identification Keys. The administrator of a GS1 Company Prefix.
Check Digit	A final digit calculated from the other digits of some GS1 Identification Keys. This digit is used to check that the data has been correctly composed. (See GS1 Check Digit Calculation.)
Company Number	A component of the GS1 Company Prefix.
Customer	The party that receives, buys, or consumes an item or service.
data character	A letter, digit, or other symbol represented in the data field(s) of an Element String.
data field	A field that contains a GS1 Identification Key, an RCN, or attribute information
data titles	Data titles are the abbreviated descriptions of Element Strings which are used to support manual interpretation of barcodes.
EAN/UPC Symbology	A family of barcodes including EAN-8, EAN-13, UPC-A, and UPC-E Barcodes. Although UPC-E Barcodes do not have a separate symbology identifier, they act like a separate symbology through the scanning application software. See also EAN-8 Barcode, EAN-13 Barcode, UPC-A Barcode, and UPC-E Barcode.
EAN-13 Barcode	A barcode of the EAN/UPC Symbology that encodes GTIN-13, Coupon-13, RCN-13, and VMN-13.
Element	A single bar or space of a barcode.
Extension digit	The first digit within the SSCC (Serial Shipping Container Code) which is allocated by the user and is designed to increase the capacity of the SSCC.
Fixed Measure Trade Item	An item always produced in the same pre-defined version (e.g., type, size, weight, contents, design) that may be sold at any point in the supply chain.
Fresh Foods	Trade items in the following product categories: fruits, vegetables, meats, seafood, bakery and ready to serve food such as cheeses, cold cooked or cured meats, and salad, etc. Fresh Foods is defined as food that is not preserved by canning, dehydration, freezing or smoking.
General Distribution Scanning	Scanning environments that include barcoded trade items packaged for transport, logistic units, assets, and location tags.
Global Location Number (GLN)	The GS1 Identification Key used to identify physical locations or parties. The key comprises a GS1 Company Prefix, Location Reference, and Check Digit.
Global Trade Item Number (GTIN)	The GS1 Identification Key used to identify trade items. The key comprises a GS1 Company Prefix, an Item Reference and Check Digit.
GS1 AIDC data carrier	A means to represent data in a machine readable form; used to enable automatic reading of the Element Strings as specified for use by GS1.
GS1 Application Identifier	The field of two or more digits at the beginning of an Element String that uniquely defines its format and meaning.

Term	Definition
GS1 Company Prefix	Part of the GS1 System identification number consisting of a GS1 Prefix and a Company Number, both of which are allocated by GS1 Member Organisations. See also U.P.C. Company Prefix. GS1 Member Organisations assign GS1 Company Prefixes to entities that administer the allocation of GS1 System identification numbers. These entities may be, for example, commercial companies, not for profit organisations, governmental agencies, and business units within organisations. Criteria to qualify for the assignment of a GS1 Company Prefix are set by the GS1 Member Organisations.
GS1 DataBar Expanded Barcode	A barcode that encodes any GS1 Identification Key plus Attribute data, such as weight and “best before” date, in a linear symbol that can be scanned omnidirectionally by suitably programmed point-of-sale scanners.
GS1 DataBar Expanded Stacked Barcode	A barcode that is a variation of the GS1 DataBar Expanded Barcode that is stacked in multiple rows and is used when the normal symbol would be too wide for the application.
GS1 DataBar Omnidirectional Barcode	A barcode that encodes a GTIN. It is designed to be read by omnidirectional scanners.
GS1 DataBar Retail POS Family	The members of the GS1 DataBar Symbology family designed to be read in segments by omnidirectional scanners at retail POS: GS1 DataBar Omnidirectional; GS1 DataBar Stacked Omnidirectional; GS1 DataBar Expanded; GS1 DataBar Expanded Stacked.
GS1 DataBar Stacked Omnidirectional Barcode	A barcode that is a variation of the GS1 DataBar Symbology that is stacked in two rows and is used when the GS1 DataBar Omnidirectional Symbol would be too wide for the application. It is designed to be read by omnidirectional checkout scanners.
GS1 Global Data Dictionary	A repository tool used to record GS1 member standards agreements on business terms and definitions used by all business units.
GS1	Based in Brussels, Belgium, and Princeton, USA, it is the organisation that manages the GS1 System. Its members are GS1 Member Organisations.
GS1 Identification Key	A numeric or alphanumeric data field defined by GS1 to ensure the global, unambiguous uniqueness of the identifier in the open demand or supply chain.
GS1 Identification Keys	A globally managed system of numbering used by all GS1 Business Units to identify trade items, logistic units, locations, legal entities, assets, service relationships, consignment, shipments and more. Any identification number that combines GS1 member company identifiers (GS1 Company Prefix) with standards based rules for allocating reference numbers is a key.
GS1 Member Organisation	A member of GS1 that is responsible for administering the GS1 System in its country (or assigned area). This task includes, but is not restricted to, ensuring brand owners make correct use of the GS1 System, have access to education, training, promotion and implementation support and have access to play an active role in GSMP.
GS1 Prefix	A number with two or more digits, administered by GS1 that is allocated to GS1 Member Organisations or for Restricted Circulation Numbers.
GS1 System	The specifications, standards, and guidelines administered by GS1.
GTIN Application Format	A format for a GTIN-8, GTIN-12, or GTIN-13 used when a GTIN application uses a fixed field length, for example, when a GTIN-13 is encoded in symbology using Application Identifier (01).
GTIN-12	The 12-digit GS1 Identification Key composed of a U.P.C. Company Prefix, Item Reference, and Check Digit used to identify trade items.
GTIN-13	The 13-digit GS1 Identification Key composed of a GS1 Company Prefix, Item Reference, and Check Digit used to identify trade items.
GTIN-14	The 14-digit GS1 Identification Key composed of an Indicator digit (1-9), GS1 Company Prefix, Item Reference, and Check Digit used to identify trade items.
Human Readable Interpretation (HRI)	Human readable text located below a barcode symbol representing the characters encoded in the barcode.

Term	Definition
Leading Zero(s)	Digits (always zeroes) which must be placed in the leftmost position(s) of a data string when GTIN-8, GTIN-12, or GTIN-13 are encoded in an GS1 AIDC data carrier that requires 14-digits (see also GTIN Application Format) or when used for the same intent in other data structures such as but not limited to Extended Coupon Codes, GRAI.
Logistic unit	An item of any composition established for transport and/or storage that needs to be managed through the supply chain. It is identified with an SSCC.
Non-HRI Text	Human readable text on a label used for purposes other than representing the characters encoded in the barcode. (Examples: marketing information, nutritional information, country of origin, etc.).
point-of sale (POS)	Refers to the retail checkout where omnidirectional barcodes must be used to enable very rapid scanning or low volume checkout where linear or 2D matrix barcodes are used with image-based scanners.
Price check digit	A digit calculated from the price element of a Variable Measure Number encoded using the EAN/UPC Symbology. Used to check that the data has been correctly composed.
Serial Shipping Container Code	The GS1 Identification Key used to identify logistics units. The key comprises an Extension digit, GS1 Company Prefix, Serial Reference, and Check Digit.
Shipment	A grouping of logistics and transport units assembled and identified by the seller (sender) of the goods travelling under one despatch advice and/or Bill of Lading to one customer (recipient).
Trade item grouping	A standard composition of trade item(s) that is not intended for point-of-sale scanning. They are identified with a GTIN-14, GTIN-13, or GTIN-12.
Symbol	The combination of symbol characters and features required by a particular symbology, including Quiet Zone, Start and Stop Characters, data characters, and other auxiliary patterns, which together form a complete scannable entity; an instance of a symbology and a data structure.
symbol character	A group of bars and spaces in a symbol that is decoded as a single unit. It may represent an individual digit, letter, punctuation mark, control indicator, or multiple data characters.
Symbology	A defined method of representing numeric or alphabetic characters in a barcode; a type of barcode.
symbology element	A character or characters in a barcode used to define the integrity and processing of the symbol itself (e.g., start and stop patterns). These elements are symbology overhead and are not part of the data conveyed by the barcode.
symbology identifier	A sequence of characters generated by the decoder (and prefixed to the decoded data transmitted by the decoder) that identifies the symbology from which the data has been decoded.
trade item	Any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain.
Variable Measure Trade Item	A trade item which may be traded without a pre-defined measure, such as its weight or length.

A.3 Fishing Industry Business Terms

Listed below are business terms used by the fishing industry.

Term	Description
FAO Fishing Area Code	A coding system established by the Food and Agriculture Organisation (FAO) on the United Nations to identify inland and ocean water fishing area.
FAO Fishing Area Major Area	A two-digit code used to identify major inland and ocean water fishing areas.
FAO Fishing Area Sub Area	A roman numeral used to identify a sub area of a major inland and ocean water fishing areas.
FAO Fishing Area Division Area	A lower case letter used to identify a division of a sub area.
FAO Fishing Area Sub Division	A digit used to identify a sub division of division.
FAO 3Alpha Code	A three-letter code assigned by the FAO to identify fish and ocean species.

A.4 GS1 Application Identifiers

The tables of GS1 Application Identifiers are those used in this guideline. For a complete list of the GS1 Application Identifiers see the latest version of the *GS1 General Specification*.

A.4.1 AI Used For Unique Identification

AI	Data Content	Format	FNC1 Required	Data Title
00	SSCC (Serial Shipping Container Code)	N2+N18		SSCC
01	Global Trade Item Number (GTIN)	N2+N14		GTIN
02	GTIN of Contained Trade Items	N2+N14		CONTENT
10	Batch or Lot Number	N2+X..20	(FNC1)	BATCH/LOT
21	Serial Number	N2+X..20	(FNC1)	SERIAL

A.4.2 AIs Used For Attribute Information

AI	Data Content	Format	FNC1 Required	Data Title
11	Production Date (YYMMDD)	N2+N6		PROD DATE
12	Due Date (YYMMDD)	N2+N6		DUE DATE
13	Packaging Date (YYMMDD)	N2+N6		PACK DATE
15	Best Before Date (YYMMDD)	N2+N6		BEST BEFORE
16	Sell By Date	N2+N6		Sell By Date
17	Expiration Date	N2+N6		Expiration Date
240	Additional Item Identification	N3+X..30	(FNC1)	ADDITIONAL ID
30	Count of Items (Variable Measure Trade Item)	N2+N..8	(FNC1)	VAR. COUNT
310(n)	Net weight, kilograms (Variable Measure Trade Item)	N4+N6		NET WEIGHT (kg)
412	Purchased from Global Location Number	N3+N13		PURCHASE FROM

AI	Data Content	Format	FNC1 Required	Data Title
414	Identification of a Physical Location - Global Location Number	N3+N13		LOC No
703s	Approval Number of Processor with ISO Country Code	N4+N3+X..27	(FNC1)	PROCESSOR # s
7005	Catch Area	N4+X..12	(FNC1)	CATCH AREA
7006	First Freeze Date	N4+N6		FIRST FREEZE DATE
7007	Harvest Date	N4+N6..12	(FNC1)	HARVEST DATE
7008	Species for Fishery Purposes	N4+X..3	(FNC1)	AQUATIC SPECIES
7009	Fishing Gear Type	N4+N..10	(FCN1)	FISHING GEAR TYPE
7010	Production Method	N4+X..2	(FCN1)	PROD METHOD

A.5 Resources

The following is a list of helpful standards and guidelines. Please contact your local GS1 Member Organisation for assistance in obtaining the latest version of these documents.

1. GS1 General Specification
2. GS1 Global Traceability Standard
3. GS1 Fish Traceability In Europe Guideline
4. GS1 AIDC Implementation Guide for Fresh Foods Sold at Point-of-Sale
5. U.S Seafood Traceability Implementation Guide
6. ISO Standard 12875:2011 Traceability of Finfish Products (Captured Finfish)
7. ISO Standard 12877:2011 Traceability of Finfish Products (Farmed Finfish)

A.6 Examples of Attribute/Key Data Elements - Identify, Capture and Share

The following table provides an overview of how the relevant attributes/key data elements could be implemented using certain components (or combination of components) from the GS1 System portfolio e.g. AIDC, EANCOM, GS1 XML, EPCIS and GDSN.

Instance/Lot Master Data (ILMD) is data that describes a specific instance of a physical or digital object, or a specific batch/lot of objects that are produced in batches/lots. ILMD consists of a set of descriptive attributes that provide information about one or more specific objects or lots.

	Attribute / Key Data Element	AIDC	EANCOM DESADV	GS1 XML Despatch Advice	EPCIS	GDSN
1	GTIN	AI (01) GTIN or AI (02) CONTENT	SG17_LIN_7140	gtin	epcClass (urn:epc:class:lgtin: CompanyPrefix. ItemRefAndIndicator.Lot)	Gtin
2	Lot	AI (10) BATCH/LOT	SG17_PIA, 7143 = NB (Lot Number) [3]	lotNumber		
3	Quantity or Net Weight	AI (30) VAR.COUNT AI (310) NET WEIGHT (kg) AI (320) NET WEIGHT (lb)	SQ17_QTY	tradeItemQuantity	QuantityElement /quantity + uom	
4	Expiration or Best Before Date (dependent upon product of concern)	AI (17) Expiry or AI (15) Best Before Date	SG17_DTM, 2005 = 36 (Expiry date) SG17_DTM, 2005 = 361 (Best Before date)	itemExpirationDate bestBeforeDate	expirationDate bestBeforeDate	
5	Fishing Vessel GLN	AI (703s) PROCESSOR [1]	SG20_LOC, 3227 = 44E Fishing vessel [3]	fishingVessel (TransactionalParty/gln) [4]		
	Fishing Vessel Name		SG20_LOC_3224	fishingVessel (TransactionalParty/address/name) [4]	vesselName vesselID	
6	Production Unit GLN	AI (703s) PROCESSOR [1]	SG20_LOC_3227 = 19 (Factory / plant)	aquaCultureProductionUnit (TransactionalParty/gln) [5]		
	Production Unit Name	GLN master data [5]	SG20_LOC_3224	aquaCultureProductionUnit (TransactionalParty/address/name) [4]	GLN master data [5]	

	Attribute / Key Data Element	AIDC	EANCOM DESADV	GS1 XML Despatch Advice	EPCIS	GDSN
7	Fish Species	AI (7008) AQUATIC SPECIES [2]	SG17_PIA, 7143 = XZ5 (Fish species) [3]	aquaticSpeciesCode [4]	GTIN master data [6]	AVP speciesForFisheryStatisticsPurposesCode
	Scientific Name	GTIN master data [6]	SG17_IMD, 7081=SCT (scientific name) [3]	aquaticSpeciesName [4]	GTIN master data [6]	
	Commercial Designation	GTIN master data [6]	SG17_IMD, 7081=ANM (Commercial designation)	tradeItemDescription [4]	GTIN master data [6]	
8	Catch Area	AI (7005) CATCH AREA [2]	SG17_IMD, 7081=GEO (Geographical area) [3]	catchArea [4]	catchArea	AVP catchArea
9	Catch Date(s)	AI (7007) HARVEST DATE [2]	SG17_DTM, 2005 = X22 (Catch date/time) [3]	catchDateTime (DateTime) [4] catchEndDate (Date) [4] catchStartDate (Date) [4]	catchStartDate catchEndDate	AVP catchDateTime
10	Supplier GLN	AI (412) PURCHASE FROM	SG2_NAD, 3035 = SU (Supplier)	seller (TransactionalParty/gln)	readPoint	
	Supplier Name	GLN master data [5]	SG2_NAD	seller (TransactionalParty/address/name)	GLN master data [5]	
	Supplier Address	GLN master data [5]	SG2_NAD	seller (TransactionalParty/address)	GLN master data [5]	
11	Production Method	AI (7010) PROD METHOD [2]	SG17_IMD, 7081=PRO (Production method)	productionMethodForFishAndSeaFoodCode [4]		AVP productionMethodForFishAndSeafoodCode
12	First Freeze Date	AI (7006) FIRST FREEZE DATE [2]	SG17_DTM, 2005 = 91E (First freezing date)	firstFreezeDate [4]		
	Storage State Code		SG17_IMD, 7081=FRZ (Freezing information) [3]	storageStateCode [4]	storageStateCode	AVP storageStateCode
13	Fishing Gear Type	AI (7009) FISHING GEAR TYPE [2]	SG17_IMD, 7081=FGT (Fishing gear type) [3]	fishingGearTypeCode [4]		AVP catchMethod

	Attribute / Key Data Element	AIDC	EANCOM DESADV	GS1 XML Despatch Advice	EPCIS	GDSN
(*)	Fish Quality Grade		SG17_IMD, 7081=FQG (Fish quality grade) [3]	equalityGradeCode [4]		
(*)	Fish size		SG17_IMD, 7081=FSS (Fish standardised size) [3]	fishSizeCode [4]		
(*)	Fish presentation		SG17_IMD, 7081=FPC (Fish presentation code) [3]	fishPresentationCode [4]		
(*) expected attributes, already requested and implemented in some standards but not in AIDC		[1] AI available, work request to extend use of AI ratified. [2] GSCN ratified [3] Change request ratified [4] GS1 XML 3.2, eBallot approved			[5] GLN master data [6] GTIN master data [7] instance lot master data (ilmd)	

A.7 Example of Traceability Event Tracking

For **product traceability**, the following EPCIS event messages should to be captured:

Dim	Data Element	V1a	V1b	V2	V3
	Description	Manufacture raw product (e.g. fishing)	Manufacture raw product (e.g. farming)	Manufacture intermediate product (e.g. gutting, preserving)	Manufacture final product (e.g. creating consumer item)
	Event Type	Object Event	Object Event	Transformation Event	Transformation Event
	Action	ADD	ADD		
What	**EPC Quantity List**	GTIN A, Lot 12, 20 kg GTIN B, Lot 99, 15 kg	GTIN C, Lot 123, 410 kg		
	Input Quantity List			GTIN A, Lot 12, 20 kg GTIN B, Lot 99, 15 kg	GTIN D, Lot 555, 30 kg
	Output Quantity List			GTIN D, Lot 555, 30 kg	GTIN E, Lot 4321, 950 units
When	**Event Time**	15 July 2015, 10am	16 July 2015, 06am	17 July 2015, 11am	18 July 2015, 02pm
Where	**Read Point**	GLN of a fishing company's plant	GLN of aquaculture plant	GLN of processor's manufacturing plant	GLN of final processor's manufacturing plant
Why	**Business Step**	Commissioning (CBV)	Commissioning (CBV)	Commissioning (CBV)	Commissioning (CBV)
	Business Transaction List	*Type* po, inv, desadv (CBV) (optional)			
	ILMD: bestBeforeDate	x	x	x	x
	ILMD: expirationDate	x	x	x	x
	ILMD: storageStateCode	x	x	x	x
	ILMD: catchStartDate	x	x		
	ILMD: catchEndDate	x	x		
	ILMD: unloadingPort	x			
	ILMD: vesselCatchInformation[1]	x			
	ILMD: vesselID	x			
	ILMD: vesselName	x			
	ILMD: catchMethod	x			

Dim	Data Element	V1a	V1b	V2	V3
	ILMD: catchArea	x			
	ILMD: countryOfOrigin		x		
	ILMD: listOfFarms[2]		x		
	ILMD: farm		x		
	ILMD: firstFreezeDate			x	x
	1) Repeatable complex type element containing vesselID, vesselName, catchMethod, catchArea 2) Complex type element containing 1…n farm elements				

The table below illustrates some data attributes supply chain partners should consider in order to meet full **traceability** for the capturing of product movement and transformation i.e., receipt/issue and packing/unpacking:

Dim	Data Element	V4	V5	V6	V7
	Description	Shipping products/logistics units	Receiving products/logistics units	Putting products (or logistics units) into a (bigger) logistics unit	Removing products (or logistics units) from a (bigger) logistics unit
	Event Type	Object Event	Object Event	Aggregation Event	Aggregation Event
	Action	OBSERVE	OBSERVE	ADD	DELETE
What	**EPC List**	SSCC			
	EPC Quantity List	GTIN + Lot no. + quantities			
	Parent ID			SSCC	
	Child EPCs			SSCC	
	Child Quantity List			GTIN + Lot no. + quantities	
When	**Event Time**	19 July 2015, 9am	20 July 2015, 8am	21 July 2015, 7am	22 July 2015, 6pm
Where	**Read Point**	GLN of the company conducting the shipping process	GLN of the company conducting the receiving process	GLN of the company conducting the packing process	GLN of the company conducting the unpacking process
Why	**Business Step**	Departing (CBV) Consigning (CBV) – if there is a change of possession and/or ownership at the outbound side	Arriving (CBV) Receiving (CBV) – if there is a change of possession and/or ownership at the inbound side	Packing (CBV)	Unpacking (CBV)

Dim	Data Element	V4	V5	V6	V7
	Business Transaction List	*Type* po, inv, desadv (CBV) (optional)			
	Source	*Type* possessing_party (CBV) GLN of the company conducting the shipping process (mandatory)	*Type* possessing_party (CBV) GLN of the company which has conducted the shipping process (mandatory)		
	Source	*Type* owning_party (CBV) GLN of the company conducting the shipping process (mandatory only if the business step is “consigning”)	*Type* owning_party (CBV) GLN of the company which has conducted the shipping process (mandatory only if the business step is “receiving”)		
	Destination	*Type* possessing_party (CBV) GLN of the company expected to conduct the receiving process (mandatory)	*Type* possessing_party (CBV) GLN of the company conducting the receiving process (mandatory)		
	Destination	*Type* owning_party (CBV) GLN of the company expected to conduct the receiving process (mandatory only if the business step is “consigning”)	*Type* owning_party (CBV) GLN of the company conducting the receiving process (mandatory only if the business step is “receiving”)		

A.8 Examples for Mapping GS1 Attribute/Key Data Elements to European Union (EU) Regulations

The chart provides a framework for mapping GS1 System Attributes and Key Data Elements to regulations. This examples shows a mapping against two European Regulations for fish traceability: EC1224/2009 and EU1379/2013.

	Attribute / Key Data Element	EC 1224/2009	EU 1379/2013
1	**GTIN**	**Art. 58** Traceability **5:** minimum labelling and information requirements **(a)** the identification number of each lot	
2	**Lot**		
3	**Quantity or Net Weight**	**Art. 58** Traceability **5:** minimum labelling and information requirements **(e)** The quantities of each species in kilograms expressed in net weight or, where appropriate, the number of individuals	
4	**Expiration or Best Before Date** (dependent upon product of concern)		**Art. 35** Mandatory Consumer Information **1:** appropriate marking or labelling **(e)** The date of minimum durability, where appropriate
5	**Fishing Vessel GLN**	**Art. 58** Traceability **5:** minimum labelling and information requirements **(b)**The external identification number and name of the fishing vessel or the name of the aquaculture production unit	
	Fishing Vessel Name		
6	**Production Unit GLN**	**Art. 58** Traceability **5:** minimum labelling and information requirements **(b)**The external identification number and name of the fishing vessel or the name of the aquaculture production unit	
	Production Unit Name		
7	**Fish Species**	**Art. 58** Traceability **5:** minimum labelling and information requirements **(c)** The FAO alpha-3 code of each species	
	Scientific Name		**Art. 35** Mandatory Consumer Information **1:** appropriate marking or labelling **(a)** The commercial designation of the species and its scientific name
	Commercial Designation		
8	**Catch Area**		**Art. 35** Mandatory Consumer Information **1:** appropriate marking or labelling **(c)** The area where the product was caught or farmed, and the category of fishing gear used in capture of fisheries, as laid down in the first column of Annex III to this Regulation

	Attribute / Key Data Element	EC 1224/2009	EU 1379/2013
9	**Catch Date(s)**	**Art. 58** Traceability **5:** minimum labelling and information requirements **(d)** The date of catches or the date of production	
10	**Supplier GLN**	**Art. 58** Traceability **5:** minimum labelling and information requirements **(f)** The name and address of the suppliers	
	Supplier Name		
	Supplier Address		
11	**Production Method**		**Art. 35** Mandatory Consumer Information **1:** appropriate marking or labelling **(b)** The production method, in particular by the following words "… caught …" or "… caught in freshwater …" or "… farmed …"
12	**First Freeze Date**	**Art. 58** Traceability **5:** minimum labelling and information requirements **(h)** Whether the fisheries products have been previously frozen or not	**Art. 35** Mandatory Consumer Information **1:** appropriate marking or labelling **(d)** Whether the product has been defrosted
	Storage State Code		
13	**Fishing Gear Type**		**Art. 35** Mandatory Consumer Information **1:** appropriate marking or labelling **(c)** The area where the product was caught or farmed, and the category of fishing gear used in capture of fisheries, as laid down in the first column of Annex III to this Regulation
(*)	**Fish Quality Grade**		
(*)	**Fish size**		
(*)	**Fish presentation**		
(*) likely attributes, to be reflected in future regulations			