New Zealand
Seafood Standards Council

Traceability

A Guideline for the Seafood Industry

New Zealand Seafood Standards Council

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1.0 Scope & Purpose

The purpose of this guideline is to provide the New Zealand seafood industry with information and to recommend best practice to manage seafood traceability from harvest/catch to point of sale.

It is based on the use of GS1 standards, primarily the GS1 Global Traceability Standard (GTS) which defines a globally accepted method to uniquely identify businesses and the products they produce, use or create. The standard defines essential information that must be collected, recorded and shared to ensure effective traceability. The standard can be found here:
http://www.gs1.org/gsmp/kc/traceability

While the GS1 Traceability Standard may be implemented independently from any specific technology, best practice (and most common throughout global trade) is the use of bar coding or RFID tags and the adoption of electronic messaging to exchange essential information between trading partners. This guide focuses on the use of these technologies.

2.0 Traceability Legislation

The following is intended to be an outline of the current position but is in no way a definitive guide to the requirements of the law.

The objective of New Zealand's traceability system is to allow for the identification and tracking of product as it moves along the supply chain. For seafood this is from the point of harvest or catch through to retail sale (if consumed in New Zealand) or to the point of export. Seafood operators are required to have systems that allow product to be identified and tracked on a 'one up, one back' basis.

2.1 Legislation

Traceability of food in New Zealand is regulated under food safety legislation, specifically for seafood under the Animal Products Act 1999, and the Animal Products Regulations, 2000.

Animal Products Regulations

The Regulations specify the following traceability requirements:

- All operators of risk management programmes, all exporters, and all other categories of person required by specifications to do so, to have a tracking system that allows for the identification of animal material and animal product and enables the movement of that animal material or animal product to be traced (from origin or supplier, while it is under the businesses control and to the next recipient)

- Animal material and animal product must be labelled or identified or contain information that accurately describes or differentiates so as to identify the animal material or animal product to which it applies.

3.0 Traceability

Traceability refers to the ability to trace good along the supply chain. It requires critical information to be linked with the physical flow of product. Traditionally this has been provided by a combination of physical labelling on the packaging and associated documentation supplied with the product.

The traceability system required depends on the reason for which you are implementing it. Traditionally traceability systems in the seafood industry have been required for food safety. This has meant that companies have systems in place to identify the source of the product and to whom it was supplied, i.e. one-up and one-down.

However, introduction of new legislation in countries like the European Union and with a number of other countries reviewing their own traceability requirements, this means that processors and exporters supplying those market may need to reconsider the traceability systems used in practice – particularly if the requirements extend to product in market being traceable to its catching or harvesting event.

The following provides some guidance on how traceability systems can be introduced by New Zealand seafood companies if they need or wish to do so.

3.1 Key Data Elements and Critical Tracking Events

Critical Tracking Events (CTEs) are described as those **events** that must be recorded in order to allow for effective traceability of products in the supply chain, they are the instances where product is moved between premises, is transformed, or is otherwise determined to be a point where data capture is necessary to trace a product. Key Data Elements (KDEs) is the **information or data** that needs to be captured as part of the CTE and which is used to support product tracing. KDEs for seafood will include information such as:

- Identity of the vessel that caught the product
- Identity of the marine farm from where the product was harvested
- Dates of catch or harvest
- Lot numbers allocated to incoming product
- Identity of the premise that received, processed or stored the product
- Amounts of product processed or shipped

The traceability system described in this guide relies on a combination of human readable data (i.e. labelling), electronically encoded data, and standardised electronic exchange of information, provided across the supply chain.

3.2 Practical Considerations for Traceability

Companies will have various traceability systems already in place. The following is an outline of things that may need to be considered, if not already done so.

Those processing aquaculture shellfish will already be operating a system that identifies the shellfish back to its harvesting event, by the recording and labelling of the Marine Farm Number and Harvest Date, either directly on the pack or by the use of a Lot Number allocated to identify the Marine Farm Number and date of harvest.

For other seafood products, details of the catch event may not be recorded on pack in sufficient detail to allow that level of traceability. It is highly likely therefore that a lot or batch identification

system will need to be introduced to meet traceability demands. Product will need to be allocated an individual lot or batch code which is specific enough to allow traceability back to the catching event, this would either be allocated by vessel per trip (i.e all the species from one vessel, from one trip were allocated an individual lot number) or could be by the individual species per vessel per trip. This lot or batch code would then be used on all packs of that product. Regardless, associated with the lot or batch code, the following information will need to be captured:

- Species
- Vessel name and registration number; or marine farm number
- Catch or harvest date (or catch date range)
- Catch Location/Area

Consideration will need to be given to when and how lots are identified. For product caught by an inshore vessel (where only minimal processing and no packing occurs), it is likely that the 'lot' will be allocated by the first receiver or processor. For products that are caught by a Limited Processing or a vessel operating under a Risk Management Programme (RMP), and are processed (either partly or fully) and packed on board – the lot identification may be allocated by the vessel or by the processor.

For aquaculture shellfish and fin fish, it is likely that the 'lot' will be allocated by the first receiver or processor, unless the 'processing' company also has ownership or maintains control at the farm, in which case the lot may be identified at the point of harvesting.

4.0 GS1 System

The GS1 traceability system is based on the use of an integrated set of standards that provide a standardised approach to identification, capturing and sharing of critical information throughout the supply chain. The system requires companies to identify their product and locations using a standardised product identification method (unique numbering) and a standardised location identification method. Companies then capture the standardised identification in a common form, e.g. barcodes and/or EPC-enabled RFID tags, and finally the information is shared in a standardised format.

It provides for the use of unique numbers to identify physical things like goods, physical locations, assets, and logistic units and well as logical things like companies or relationships between traders. In addition, it provides for supplementary information, such as best before dates, serial numbers, and batch numbers, which can appear in barcode and/or EPC-enabled RFID tag form.

4.1 GS1 Traceability System

The GS1 traceability system provides a set of standards that allow for the identification, capturing and sharing of critical information. It works using a 3 step process:

1. **Identify**, product and locations using standardised methods
2. **Capture**, the identification in a common approach (i.e. barcodes, RFID tags)
3. **Share**, the product information with trading partners in a standardised manner

1. Identify

This requires companies to identify their product and locations using a standardised product identification method (unique numbering) and standardised location identification method**.**

Product Identity

The first step for any company to utilise the GS1 system is to approach GS1 New Zealand and apply for a GS1 company prefix (contact details for GS1 NZ are at the end of this section). The company

prefix is a unique number that identifies your organisation globally. The company prefix is used as the basis for each product allocated a Global Trade Item Number (GTIN), which is the GS1 identification number for product in trade.

A GTIN is the allocation of a unique number to product that has the same characteristics (e.g. species, pack type, weight in pack, refrigeration state) i.e. the same product line and where the information about the product is standardised, for example, a GTIN would be allocated to 10 kg Cartons of Frozen Hoki Fillets.

GTINs are allocated with the first part of the code being the company prefix, then the number that that company has allocated to the product, followed by a check digit, like this:

Prefix: allocated to a company by GS1, identifies the company
Product ID: the company can create any combination of digits in this part of the GTIN
Check Digit: the result of an algorithm that uses the preceding digits. The check digit serves a purpose in checking the accuracy of the software's decoding of the bar code.

However, identification of product by its GTIN alone is unlikely to be sufficient to meet the information and traceability demands of countries or customers that require product to be traceable back to its catching or harvesting event.

Companies will therefore need to introduce a lot or batch identification system, if not already doing so, such as a lot numbering system as discussed in the previous section (section 3.2). Information is then associated with the lot or batch code allocated:

- Vessel name and registration number; or marine farm number
- Catch or harvest date (or catch date range)
- Catch Location/Area

This information can be recorded in a database against each individual lot number (or code), and can follow the product through processing, packing and storage. The lot number should be included on the pack at the point of packing so it is human readable, and can then be encoded in the barcode (or EPC enabled RFID) along with the GTIN, so that it is machine readable by scanning.

The barcode encoded with a GTIN + Lot Number then carries more detailed traceability information, if using the example above, the barcode would tell us that the product is a 10 kg carton of frozen Hoki Fillets (the GTIN) and is Macruronus novaezelandiae, from the Tangaroa, L63996, caught from 06/07/14 to 16/07/14 from the Pacific Ocean, FAO 81 (from the Lot Number).

Additional information such as packing dates or best-before dates can also be encoded into barcodes (or EPC enabled RFID).

Location Identity
The Global Location Number (GLN) is a unique identification number that is used to identify a physical or legal entity. GLNs are allocated by GS1. The GLN can be used at a high level to represent an entire corporation but it can also be used to represent a single vessel, marine farm, processing plant etc. For the purposes of this guide, it is recommended GLNs are allocated to each physical location to identify production, storage, or shipping locations, and where relevant, marine farms and vessels.

2. Capture

The GS1 system uses barcodes and Electronic Product Code (EPC) enabled RFID tags to encode GS1 identification numbers. The barcodes and RFID tags are machine readable by scanning and the number is electronically extracted.

The bar code image (seen as vertical lines) allows a computer to quickly and reliably identify your product and look up information about the product from a database. The bar code is a representation of the GTIN (and other encoded information) in a machine-readable form, i.e. the bar code scanner will read and decode the vertical lines and spaces and then send the information back to the computer to interpret and process.

Numbers may be encoded in more than one type of bar code depending on the intended use of the package, retail or logistics, and on the amount and type of data involved. GTINs on their own require simpler bar code types (symbologies) than GTINs that have associated data, such as a lot number.

3. Share

The key to making the system work is the sharing of the product and transport information between the trading partners, i.e. linking the information required for traceability with the physical product. Essentially this is the electronic exchange of the data/information about the product that trading partners need to receive. Trading partners have two options for achieving this depending on the trading relationships and the strength of the communication channels between the parties;

- Units are individually identified in bar code or RFID and all associated data about the unit is sent ahead of it to be associated with the unit on receipt. At that time the receipt is acknowledged in a communication back to the sender. In this scenario the machine readable identification on the unit will contain only sufficient data to identify it.
- Units are labelled with all of the data that will be required by parties handling or receiving them and the parties take from the label any or all of the data according to their requirements. In this scenario labels may bear rows of bar code

Intermediate levels of detail between these two options may be agreed between trading partners, with some data being on labels and some being communicated separately.

Data to be shared comprises of Master Data, Transactional Data and Physical Event Data.

Master Data - is the source information for a specified product (i.e for seafood this will be the critical catch or harvest event information required for traceability). It is supported by the GS1 Global Data Synchronization Network (GDSN).

Transactional Data – provides evidence of the completion of a business transaction, i.e. the completion of the sale of the product from one business by another business, or the completion of the transfer of product, i.e. shipping and receiving. It is supported by GS1 Standards for transactional data, the Electronic Data Interchange (EDI) and Extensible Mark-up Language (XML) Business Message Standards.

Physical Event Data – this is the information relating to observations of physical events (i.e. the what, when, where and why).

There are standardised approaches for sharing information.

Electronic Commerce (eCom)
GS1 eCom stands for electronic communication using standard business messaging.
GS1 eCom is the GS1 term for Electronic Data Interchange (EDI): the interchange of structured data according to agreed message standards, by electronic means. In the GS1 System it is composed of 2 components: GS1 EANCOM and GS1 XML.

The GS1 Global Data Synchronization Network (GDSN)
The GS1 Global Data Synchronization Network (GDSN) is a network of 'data pools' certified by GS1. The network has the ability to handle a specified set of data elements formatted according to GS1 standards. To use the system you need to be connected to the GDSN and, as suppliers of product you can provide the product data (specifically formatted) to any or all of your trading partners that are also connected to the network (i.e. a business to business exchange of data).

However, not all of your trading partners will necessarily be connected to the GDSN. In this situation they are able to get relevant product information from GS1 Source (formerly known as Trusted Source of Data). This is a service that enables non-GDSN enabled suppliers to share their product data with trading partners and web/mobile application developers.

GS1 Electronic Product Code (EPC)
The Electronic Product Code, or EPC, forms the bridge between barcodes and Radio Frequency Identification (RFID). EPC provides a way of encoding GS1 identifiers in RFID tags.

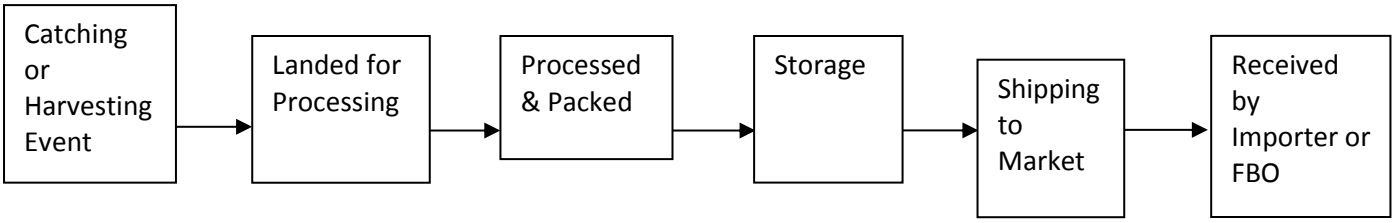
GS1 standards for electronic data interchange (EDI) allow transaction and master data to be communicated from point-to-point in a ways that supports automatic processing by the recipient.

Contact and Further Information
For more information about introducing the GS1 system and/or becoming a member contact, GS1 NZ at:

Contact: 0800 10 23 56
http://www.gs1nz.org/

5.0 Traceability System

5.1 Example of Traceability Process using Electronic Coding



Process	Information to be Captured	Traceability Components	
		Practical Considerations	**Information Requirements**
Caught & brought on board vessel or harvested at marine farm	Species Catch Area Vessel Name Vessel Licence Date of Catch (or date range) Estimate of Quantity Method of Catch/Gear used	Usually species are separated into bins but – no individual labelling of bins	Information is recorded for Fisheries Management purposes
Received on-board for processing (Limited or RMP Vessel) or received at land-based processor	Species Catch Area Vessel Name Vessel Licence Date of Catch (or date range) Quantity Method of Catch/Gear used	Need to introduce lot numbering system. Lot number allocated per species per vessel per trip or per vessel per trip. Species separation (if not done on vessel) Allocated Lot Numbers included on each bin (RFID/paper tagging) for physical identification	At receiver (i.e on board or at processor): Lot number allocated and captured manually or electronically by RFID or Barcode (GTIN + Lot ID) Information to be recorded for each allocated lot number in company database.
Grading, Processing and Packing	Product name (common name, scientific name, state) Lot Number Frozen on dd/mm/yy Packed date dd/mm/yy Best before date dd/mm/yy Net weight Storage instruction (i.e. keep frozen, keep chilled) Caught in Pacific Ocean, Area FAO 81 (NZ EEZ) Product of New Zealand Name, address and business identifier of Processor Name, address of Importer	Product processed by Lot Number – ensuring lot separation and traceability Lot number to be identifiable throughout processing and packing	GTIN allocated per species per pack type per refrigeration state Confirm GTIN + Lot Number encoded on a barcode (GS1 128) printed and applied to carton. Lot number to be printed/labelled on carton Remaining information required on label printed and applied.

Ship to Market And Received by Importer or FBO	Serial Shipment Container Code (SSCC) Lot IDs Quantity Shipped Other commercial and business transaction information		Bar code (GTIN + Lot number information) extracted from company database and provided to EU FBO or Importer via chosen method.

Terminology

GS1 Terminology

CTE	Critical Tracking Events
KDE	Key Data Elements
GTIN	Global Trade Item Number
GLN	Global Location Number
SSCC	Serial Shipping Container Number
EPC	Electronic Product Code

GS1 Bar Code Chart

GS1 Bar Code Chart					
Bar Code	**Display**	**Numeric Digits**	**Data Structure**	**Usage**	**Usage Examples**
EAN-8		8	GTIN-8	Used on small packages where the EAN-13 bar code would be too large. Also used by retailers to identify own-brand products sold only in their stores.	Used on retail items.
UPC-A		12	GTIN-12	Uniquely identifies a product for retail checkout.	Used on retail items that cross point of sale applications.
UPC-E		12	GTIN-12	Allows the use of U.P.C bar codes on smaller packages where the UPC-A may not fit. Compresses the GTIN-12 into a 6-digit format.	Used on retail items.
EAN-13		13	GTIN-13	Used for marking products often sold at retail point of sale and general distribution. It encodes the Global Trade Item Numbers (GTIN-13). Used on retail product worldwide and by retailers to identify own-brand products sold only in their stores.	Used on retail items that cross point of sale applications.
GS1-128		Up to 48 characters	Concatenated strings using GS1 Application identifiers	Uses a series of GS1 Application Identifiers (AIs) to include additional data such as Best Before Date, Batch/Lot Number, Quantity, Weight and many other attributes. It also encodes the SSCC (Serial Shipping Container).	Used for barcodes with GTIN + Lot number or other AIs
DATABAR EXPANDED		Up to 74 numeric or 41 alphabetic characters	Concatenated strings using GS1 Application identifiers	Used for marking products that cross point of sale applications. It encodes any of the GS1 Identification Numbers plus supplementary A1 Element Strings, such as Weight and Best Before Date, in a linear symbol that can be scanned omni-directionally by suitably programmed slot scanners.	Encodes information such as expiration date on fresh foods. Also used on coupons.

GS1 Bar Code Chart					
Bar Code	**Display**	**Numeric Digits**	**Data Structure**	**Usage**	**Usage Examples**
DATABAR EXPANDED STACKED		Up to 74 numeric or 41 alphabetic characters	Concatenated strings using GS1 Application identifiers	Used for marking products that cross point of sale applications. It encodes any of the GS1 Identification Numbers plus supplementary A1 Element Strings, such as Weight and Best Before Date, in a *stacked* linear symbol that can be scanned omni-directionally by suitably programmed slot scanners.	Encodes information such as expiration date on fresh foods. Also used on coupons.