5.0 STATE OF READINESS REPORT

5.1 READINESS REPORT CARDS

"State of Readiness" report cards have been prepared for each of the major British Columbia wild fisheries as well as the finfish and shellfish aquaculture sectors (see end of Section 5 for individual reports). The purpose of these report cards is to:

1. Summarize the fishery or aquaculture sector from a water to buyer traceability perspective (management regime, product pathways, product form and markets),
2. assess traceability data issues (data gaps, accessibility, data transfer and mapping),
3. identify factors impeding and aiding the ability of the sector to meet traceability requirements, and
4. identify traceability goals and opportunities for each fishery or aquaculture sector.

The report cards provide an overall State of Readiness Rating (A, B, C, D) based on five rating categories:

1. Data Availability (taken primarily from Tables 4.1 – 4.8)
2. Use of Product Identifiers
3. Effective Data Transfer and Information Mapping
4. Industry Leadership
5. Processor Level Constraints

The first three categories reflect the basic elements of traceability as summarized in Figure 2.2:

1. Is the data being collected and is it accessible?
2. Can product units be identified?
3. Is the data effectively transferred along the water to buyer supply chain and is data mapping effective?

The last two categories identify important opportunities or constraints to achieving traceability.

1. The ability of industry to provide coordinated leadership to address this issue, and
2. outstanding issues at the processor level which might constrain traceability upstream of the water to buyer component.

Scoring criteria for each rating category are provided in Table 5.1. Ratings were done independently by three project team members who subsequently reviewed the ratings jointly, reaching consensus on an overall rating for each sector. Ratings for each sector are summarized in Table 5.2, with a lower overall rating indicating higher state of readiness.

Table 5.1 Scoring criteria for rating traceability readiness

Rating Category	Score	Criteria
Data Availability	1	All required product and business data is collected and can be accessed by industry
	2	Essentially all required product and business data is collected but data is not fully accessible to industry
	3	Significant data gaps and accessibility constraints
Product Identifiers	1	Product identifiers are used for all product units
	2	Product identifiers are used for some product units and could be developed for others
	3	Product identifiers are not used and/or significant barriers exist to implementing product identities
Effective Data Transfer and Information Mapping	1	Integrated electronic data system which permits rapid and effective product tracking
	2	Paper based systems and/or databases which permit relatively effective information tracking
	3	Poor or no linking of data records (paper or electronic) through the water to buyer supply chain
Industry Leadership	1	Coordinated industry association which does or can take responsibility for traceability data
	2	Moderate level of coordinated industry representation, may not be responsible for data programs
	3	Little or no coordinated industry association. Existing associations are not responsible for data programs
Processor Level Constraints	1	No impediments at the processor level to addressing harvest/producer level traceability
	2	Moderate impediments at the processor level to addressing harvest/producer level traceability
	3	Significant impediments at the processor level to addressing harvest/producer level traceability

While it is acknowledged that this assessment is "opinion based", a number of important observations can be made:

1. Salmon aquaculture sets the standard for traceability readiness
The BC salmon aquaculture industry is currently meeting all required traceability standards and can serve as a model to other sectors with respect to developing appropriate traceability data systems. In particular the finfish aquaculture industry can provide leadership on use of product identifiers and information technology systems.

2. Bivalve fisheries and shellfish aquaculture are well positioned due to Canadian Sanitary Shellfish Program (CSSP)
Due to public health and safety concerns about consumption of raw or cooked product, bivalve fisheries as well as oyster, clam and mussel aquaculture have the basic elements of upstream traceability to the harvest or grow-out site. Shellfish aquaculture still has problems tracing product to the hatchery and nursery level due to product pooling (Section 4.5) and both the wild

Table 5.2. State of readiness ratings for the major BC fisheries and aquaculture sectors. See individual report cards for further detail

Seafood Sector	Management Regime	Readiness Criteria					Overall Rating	
		Data Availability	Use of Product Identifiers	Information Mapping	State of Sector Leadership	Processor Constraints		
Sablefish	IQ	1	3	2	1	1	**8**	**B+**
Halibut	IQ	1	2	2	1	2	**8**	**B+**
Rockfish Hook and Line	Area/Species Quotas	2	3	3	2	2	**12**	**C**
Schedule II Fisheries	Area/Species Quotas	2	3	3	2	2	**12**	**C**
Groundfish Trawl	IQ	1.5	3	2	1.5	2	**10**	**B-**
Roe Herring	Pooled Quota	1	3	2	1.5	1.5	**9**	**B**
Herring Spawn on Kelp	IQ	1	1.5	1.5	1	1	**6**	**A**
Tuna		2	3	3	2	2	**12**	**C**
Salmon all gear types	Time and Area	2.5	3	3	2.5	3	**14**	**D**
Geoduck	IQ	1	2	2	1	1	**7**	**A-**
Prawn	Time and Area	2	2	2	1.5	1	**8.5**	**B+**
Red and Green Urchins	IQ	1	2.5	2	1	1	**7.5**	**A-**
Sea Cucumber	IQ	1	2.5	2	1	1	**7.5**	**A-**
Crab (trap)	Area, Time, size	2	3	3	2.5	2	**12.5**	**C**
Shrimp Trawl	Time and Area quotas	2	3	2	2	2	**11**	**C+**
Wild Fishery Totals		**23**	**39.5**	**34.5**	**23.5**	**24.5**		
Salmon Aquaculture	N/A	1	1	1	1.5	1	**5.5**	**A**
Shellfish Aquaculture	N/A	1	1.5	1.5	1.5	1	**6.5**	**A-**

and aquaculture sectors would benefit by improved information technology for data mapping.

3. Individual quota (IQ) fisheries are better positioned than non-IQ fisheries.

The overall State of Readiness ratings for the seven IQ fisheries range from 6.0 to 10.0 (mean of 7.7). Overall ratings for the eight non-IQ fisheries range from 9.5 to 14.0 (mean of 11.4). IQ fisheries rank higher primarily due to the presence of a verifiable landings data (dockside monitoring programs), better data accessibility (industry is an acknowledged partner in data collection and management in many, but not all, IQ fisheries), and the degree of industry leadership (all IQ fisheries are represented by a cohesive industry association). Non-IQ fisheries with relatively high ratings (herring roe and prawn) each have some management practices similar to IQ fisheries. Roe herring is managed by pooling fishing effort and vessel landings are tracked using independent dockside monitors. Most of the prawn catch is frozen at sea and packaging is labelled with a vessel identification code, facilitating traceability to the harvest level.

4. Almost all wild harvest fisheries need to develop or improve product identification, effective data transfer and information mapping.

Ratings for use of product identifiers as well as effective data transfer and information mapping were consistently poorer across all fisheries that other rating categories (see totals at the bottom of Table 5.2). Herring spawn-on-kelp was the only fishery with top ratings in each of these two categories, as it is the only wild fishery to use unique product identifiers on individual totes of spawn-on-kelp product.

5. Quality driven fisheries have fewer processor level constraints.

Fisheries where payment to the harvester is based on the quality of product leaving the processing plant face fewer constraints to traceability at the processing level (Section 3.6). Examples include sablefish, herring roe, herring spawn-on-kelp and groundfish trawl.

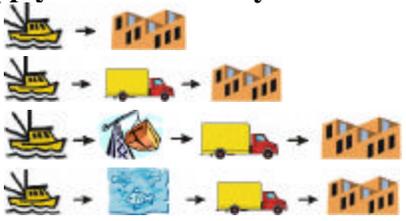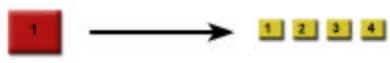### 6. Wild salmon fisheries have significant traceability issues

From a "Water to Buyer" perspective the wild salmon fishery in British Columbia, as currently practiced, faces significant traceability issues, including lack of verifiable landings data, poor documentation of product pooling at the packer level and the absence of a coordinated harvester association to address traceability issues. At the processor level excellent systems exist to trace canned product upstream from retailer to the processor and processing batch lot. In contrast, product grading and cold storage practices make it practically impossible to trace product upstream from the processor shipping gate to individual harvesters (or pools of harvesters) for fresh, frozen and canned product. It is clear that changes to product handling and management from packer to cold storage needs to occur in the wild salmon sector in order to meet the basic elements of traceability.

Traceability Readiness Report Card

Fishery: *Sablefish Trap and Longline*	State of Readiness Assessment: **Total Score =** **B+**

Fishery Overview:
- Individual vessel quota with dockside monitoring
- Open year round with effort driven by price and market demand.
- Fishing occurs in offshore areas of the BC coast
- Retained catch is sablefish
- Pooling of product does not occur
- Vessels are paid based on size, grade and quality.
- Batch=offload, Trade unit= totes of fish, Logistic unit=totes of fish
- One overall industry association – Canadian Sablefish Association (CSA)

Supply Chain Pathways	**Unit Transformations**
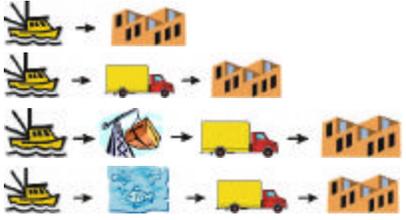
Markets:
- Market is primarily for frozen sablefish in Japan. Smaller markets in China, US and Canada also exist.
- Frozen at sea j-cut sablefish is delivered to buyers
- Product quality concerns are based on freezing quality, markings and freshness
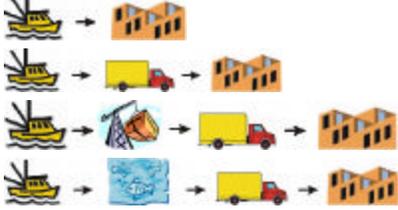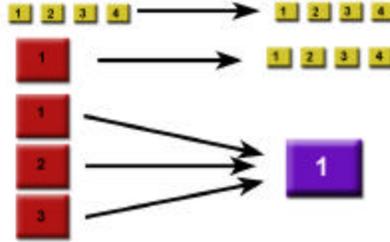- Japanese traceability regulations are not yet developed.

Data Availability from Fisheries Monitoring Programs: Traceability data is currently collected through the following processes.			**Score = 1**

Harvester	**Custom Offloader**	**Transporter**	**Buyer**
Harvest Log – skipper Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP Bill of Lading – transporter	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?

number of units in shipment, data access contact persons (data responsible party) for the harvester, transporter and buyer.

Is the data electronically accessible to the supply chain?

No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.

Is the data verifiable?

Yes, through 100% dockside validation

Product Identifiers: Unique trade and/or logistic unit identifiers are not used.	**Score = 3**

Data Transfer and Information Mapping: Current data systems are paper based with offload tallys sent to the buyer.	**Score = 2**

Industry Leadership: One well organized industry association	**Score = 1**

Processor Level Constraints: Minimal – product is traced for quality purposes through the processing plant	**Score = 1**

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
	• A data system is in place (DMP) and most of the required information is already collected. • Fish are large and handled individually • IQ fishery regime allows market driven fishing and time for specialized product handling • Single species fishery • Frozen at sea product is not as time sensitive as fresh • Limited number of sablefish buyers • Harvesters paid on quality basis

Opportunities:

Goal 1 - Traceability to an offload or container level.

Goal 2 – Good candidate fishery for a pilot project

- Identify containers with trade/logistic unit identifiers
- Integrate existing data systems and streamline data transfer through the supply chain for

Traceability Readiness Report Card

Fishery: *Halibut Hook and Line*	State of Readiness Assessment: **Total Score =** **B+**

Fishery Overview:
- Individual vessel quota system with dockside monitoring
- Open season March – November with effort driven by price and convenience of scheduling around other fishing activities.
- Fishing primarily occurs in offshore areas of the BC coast
- Bycatch includes other groundfish (rockfish, lingcod, dogfish, skate)
- Pooling of product prior to buyer is rare
- Batch=offload, Trade unit=individual fish or totes of fish, Logistic unit=totes of fish
- Fishers are generally paid a standard price. Differentials are occasionally paid based on size and/or chaulkiness.
- The Pacific Halibut Management Association (PHMA) represents industry

Supply Chain Pathways

Unit Transformations

Markets:
- Market is primarily for fresh halibut exports to the US. Domestic market is small.
- Primarily fresh dressed and iced halibut are delivered to buyers. Live and FAS occurs but is rare.
- Product quality concerns are based on freshness and chaulkiness.
- COOL and US Bioterrorism Act are the main traceability regulations of concern.

Data Availability from Fisheries Monitoring Programs: Traceability data is currently collected through the following processes.			**Score = 1**

Harvester	**Custom Offloader**	**Transporter**	**Buyer**
Harvest Log – skipper Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP Bill of Lading – transporter	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
number of units in shipment, data access contact persons (data responsible party) for the harvester, transporter and buyer.

Is the data electronically accessible to the supply chain?
No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.

Is the data verifiable?
Yes, through 100% dockside validation

Product Identifiers: Serial numbered fish tags are used (halibut only). Logistic unit identifiers are not used.	**Score = 2**
Data Transfer and Information Mapping: Current data systems are paper based with offload tallys sent to the buyer.	**Score = 2**
Industry Leadership: One well organized association represents industry	**Score = 1**
Processor Level Constraints Pooling of product can occur at the processor	**Score = 2**

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
	• An industry wide landings data system is in place through 100% dockside validation • Most of the required information is collected on paper and stored electronically. • Fish are large, handled individually and tagged with a unique serial number (identifies halibut as Canadian and validated). This is the only fishery that is traceable on a piece by piece basis to a specific offload. • Limited number of halibut buyers

Opportunities:
Goal 1 - Traceability to an offload or container level.
Goal 2 – Good candidate fishery for a pilot project
  • Identify containers with trade/logistic unit identifiers
  • Integrate existing data systems and streamline data transfer through the supply chain for more efficient and timely data communication.
  • Halibut tags could be coded with digitally readable information for partial piece by piece traceability or marketing purposes

Traceability Readiness Report Card

Fishery:	State of Readiness Assessment:
Rockfish Hook and Line	**Total Score =** **C**

Fishery Overview:
- Fishery managed through area and species Total Allowable Catches
- Open year round with time and area closures. Effort driven by competition and fishing opportunity.
- Fishing occurs in all areas of the BC coast
- Catch is a mix of several species of rockfish and other groundfish species
- Pooling from various offloads occurs for transportation, especially with live fish
- Vessels are paid a differential price primarily based on species and product form, not quality.
- Batch= offload, Trade unit = totes of fish, Logistic unit = totes of fish
- Several fleet based associations represent the industry

Supply Chain Pathways

Unit Transformations

Markets:
- Market is primarily for fresh and live fish in the US. A moderate domestic market exists
- Primarily fresh iced and live fish are delivered to buyers
- Product quality concerns are based on freshness.
- Rockfish are not accurately labeled by species but sold under aggregate names like snapper.
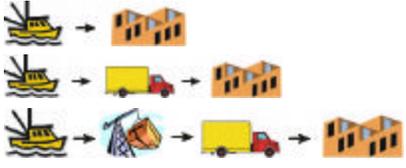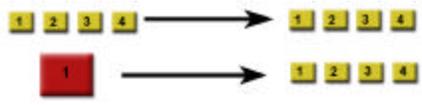- COOL and US Bioterrorism Act are the main traceability regulations of concern.

Data Availability From Fisheries Monitoring Programs:			Score = 2

Data Availability From Fisheries Monitoring Programs: **Score = 2**

Traceability data is currently collected through the following processes.

Harvester	Custom Offloader	Transporter	Buyer
Harvest Log – skipper Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP Bill of Lading – transporter	Validation Record – MSP Offload Tally – MSP and custom offloader Transit Slip – MSP Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
number of units in shipment, type of package, transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter.
Is the data electronically accessible to the supply chain?
No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.
Is the data verifiable?
Yes, through 100% dockside validation

Product Identifiers: Unique trade and/or logistic unit identifiers are not used.	**Score = 3**
Data Transfer and Information Mapping: Current data systems are paper based with offload tallys sent to the buyer.	**Score = 3**
Industry Leadership: No one association to represent industry.	**Score = 2**
Processor to Consumer Constraints: Product batching occurs in the transportation and storage of live product.	**Score = 2**

Factors impeding ability to meet traceability:	Factors aiding ability to meet traceability:
• Dockside monitoring contract is administered by DFO • A variety of species are harvested	• An industry wide landings data system is in place through 100% dockside validation • Most of the required information is collected on paper and stored electronically.

Opportunities:
Goal 1 - Traceability to an offload or container level
• Identify containers with trade/logistic unit identifiers
• Integrate existing data systems and streamline data transfer through the supply chain for more efficient and timely data communication
• Foster cooperation among businesses and a unified approach in addressing industry business and fisheries issues.

Traceability Readiness Report Card

Fishery:	State of Readiness Assessment:
Schedule II Lingcod, Dogfish and Skate Hook and Line	**Total Score =** **C**

Fishery Overview:
- Fishery managed through monthly limits and area Total Allowable Catches (TAC's)
- Open year round with some time and area closures. Lingcod effort driven by competition. Dogfish effort driven by market as TAC's are not a concern.
- Fishing occurs in all areas of the BC coast
- Catch is primarily lingcod, dogfish and skate (targeted separately)
- Pooling may occur during transportation, especially of live fish
- Vessels are paid a differential price based primarily on species and product form.
- Batch=Offload, Trade unit=totes of fish, Logistic unit=totes of fish
- Several fleet based associations represent industry

Supply Chain Pathways

Unit Transformations

Markets:
- Lingcod market is primarily for fresh and live fish in the US, while dogfish market is fresh and frozen to the UK.
- Fresh iced, live and frozen lingcod are delivered to buyers. Dogfish and skate are delivered fresh iced.
- Product quality concerns are based on freshness.
- COOL and US Bioterrorism Act are the main traceability regulations of concern.
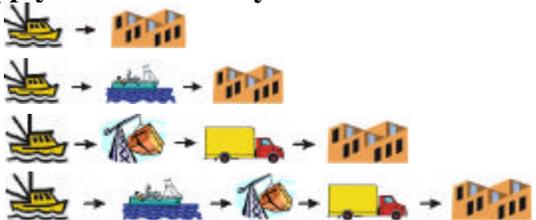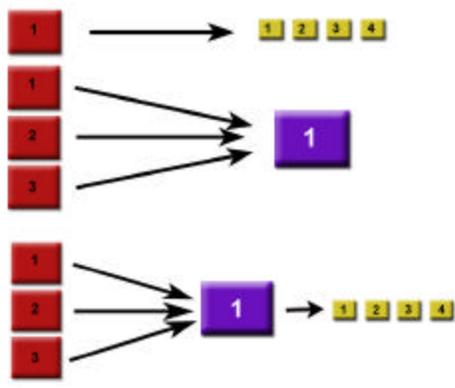
Data Availability From Fisheries Monitoring Programs: **Score = 2**

Traceability data is currently collected through the following processes.

Harvester	**Custom Offloader**	**Transporter**	**Buyer**
Harvest Log – skipper	Validation Record – MSP	Validation Record – MSP	Validation Record – MSP
Validation Record – MSP	Offload Tally – MSP and custom offloader	Offload Tally – MSP and custom offloader	Offload Tally – MSP and custom offloader
Offload Tally – MSP and custom offloader	Transit Slip – MSP	Transit Slip – MSP	Transit Slip – MSP
Transit Slip – MSP		Bill of Lading – transporter	Bill of Lading – transporter
			Delivery Record – buyer
			Processing Records – buyer
			Sales Records - buyer

What product or business data is missing?

number of units in shipment, type of package, transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter.

Is the data electronically accessible to the supply chain?

No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.

Is the data verifiable?

Yes, through 100% dockside validation

Product Identifiers: **Score = 3**

Unique trade and/or logistic unit identifiers are not used.

Data Transfer and Information Mapping: **Score = 3**

Current data systems are paper based with offload tallys sent to the buyer.

Industry Leadership: **Score = 2**

No one association to represent industry.

Processor Level Constraints: **Score = 2**

Product batching occurs in the transportation and storage of live product.

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• Dockside monitoring contract is administered by DFO	• An industry wide landings data system is in place through 100% dockside validation
• A variety of species are harvested	• Most of the required information is collected on paper and stored electronically.

Opportunities:

Goal 1 - Traceability to an offload or container level

• Identify containers with trade/logistic unit identifiers

• Integrate existing data systems and streamline data transfer through the supply chain for more efficient and timely data communication

• Foster cooperation among businesses and a unified approach in addressing industry business and fisheries issues.

Traceability Readiness Report Card

Fishery: **_Groundfish Trawl_**	State of Readiness Assessment: **Total Score =** **B-**

Fishery Overview:
- Individual vessel quota
- Open year round with effort driven by price and market demand.
- Fishing occurs in all areas of the BC coast
- Catch consists of dozens of species of groundfish (primarily rockfish, sole, hake and pollock)
- Pooling of product prior to buyer does not occur
- Vessels are paid a differential price based on quality and recovery.
- Batch=offload, Trade unit=totes of fish (entire offload for hake), Logistic unit=totes of fish
- The Canadian Groundfish Research Conservation Society (CGRCS) represents several fleet based associations

Supply Chain Pathways

Unit Transformations

Markets:
- Market is primarily for fresh fish exported to the US. Frozen thornyheads are exported to Asia and Hake is exported to the EU, Asia and the US. Fresh and live markets exist domestically.
- Fresh iced, live and frozen at sea fish is delivered to buyers
- Product quality concerns are based on harvest volume, trip duration (freshness) and damage.
- COOL, US Bioterrorism Act and EU Food Law are the main traceability regulations of concern.
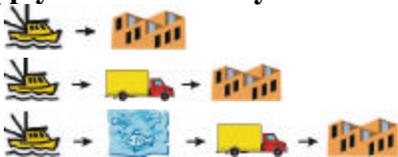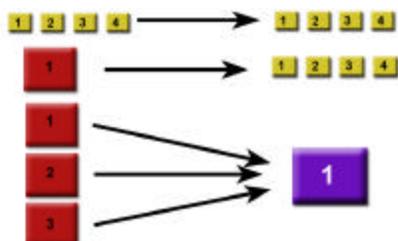
Data Availability from Fisheries Monitoring Programs: Traceability data is currently collected through the following processes.			**Score = 1.5**

Harvester	**Custom Offloader**	**Transporter**	**Buyer**
Harvest Log – skipper Validation Record – MSP Offload Tally – MSP and custom offloader	Validation Record – MSP Offload Tally – MSP and custom offloader	Validation Record – MSP Offload Tally – MSP and custom offloader Bill of Lading – transporter	Validation Record – MSP Offload Tally – MSP and custom offloader Bill of Lading – transporter Delivery Record – buyer Processing Records - buyer

What product or business data is missing?
number of units in shipment, type of package, transport firm, data access contact persons (data responsible party) for the harvester, transporter and buyer.

Is the data electronically accessible to the supply chain?
No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.

Is the data verifiable?
Yes, through 100% dockside validation

Product Identifiers: Unique trade and/or logistic unit identifiers are not used.	**Score = 3**

Data Transfer and Information Mapping: Current data systems are paper based with offload tallys sent to the buyer.	**Score = 2**

Industry Leadership: Two closely cooperating associations represent the majority of the industry	**Score = 1.5**

Processor Level Constraints: Species batching during processing accompanied by poor species documentation	**Score = 2.0**

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• Catch volumes are large • High diversity of species landed	• An industry wide landings data system is in place through 100% dockside validation • Most of the required information is collected on paper and stored electronically (MSP). • IQ fishery regime allows market driven fishing • Harvesters are paid on a recovery and quality basis

Opportunities:

Goal 1 - Traceability to an offload or container level.
- Identify containers with trade/logistic unit identifiers
- Integrate existing data systems and streamline data transfer through the supply chain for more efficient and timely data communication
- Provide more accurate information to sales team prior to processing. Selling product from skipper hails results in having to fill "order shorts" to compensate for inaccuracies.
- Improve species documentation including use of scientific names
- Foster cooperation among businesses and a unified approach in addressing industry business and fisheries issues.

Traceability Readiness Report Card

Fishery:	State of Readiness Assessment:
Roe Herring Seine and Gillnet	**Total Score =** **B**

Fishery Overview:
- Short openings with area Total Allowable Catches and pooled fishing effort
- Effort is based on competition and fishing opportunity (stock forecasts).
- Fishing occurs in specific nearshore areas throughout the BC coast
- Catch is primarily herring. There are no bycatch issues
- Pooling of product is infrequent for seine caught herring but common on packers for gillnet caught herring.
- Batch = offload, Trade unit = totes of fish, Logistic unit = totes of fish
- A differential price is paid based on quality (delivery for a single vessel or pooled packer load).
- One association represents industry – Herring Conservation and Research Society (HCRS)

Supply Chain Pathways

Unit Transformations

Markets:
- Market is primarily for salted roe to Japan. Domestic market is extremely small.
- Fresh iced herring is delivered to buyers
- Product quality concerns are based on freshness, size, texture and colour of eggs.
- Japanese traceability regulations are not yet developed, will also be of concern.

Data Availability from Fisheries Monitoring Programs:		**Score = 1**
Traceability data is currently collected through the following processes.		

Harvester	**Transporter**	**Buyer**
Validation Record - MSP Offload Tally – custom offloader	Validation Record – MSP Offload Tally – MSP and custom offloader Bill of Lading – transporter	Validation Record – MSP Offload Tally – custom offloader Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
units in shipment, type of package, transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter.

Is the data electronically accessible to the supply chain?
No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.

Is the data verifiable?
Yes through 100% dockside validation

Product Identifiers:	**Score = 3**
Unique trade and/or logistic unit identifiers are not used.	

Data Transfer and Information Mapping:	**Score = 2**
Current data systems are hail and paper based with validation records accompanying deliveries to the buyer.	

Industry Leadership:	**Score = 1.5**
One association represents industry	

Processor Level Constraints:	**Score = 1.5**
Minimal as pooled product is traced through the plant for quality monitoring	

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• No harvest log exists. Harvest information is hailed from the grounds to MSP which provides lack of verifiable harvest data during pooling.	• An industry wide landings data system is in place through 100% dockside validation • Most of the required information is collected on paper and stored electronically. • Japanese market is very quality oriented • Single species fishery

Opportunities:
Goal 1 - Traceability to a pool level
• Identify containers with trade/logistic unit identifiers
• Improve documentation of pooling for gillnet product
• Integrate existing data systems and streamline data transfer through the supply chain for more efficient and timely data communication

Traceability Readiness Report Card

Fishery:	State of Readiness Assessment:
Herring Spawn on Kelp	Total Score = A

Fishery Overview:
- Individual quota system for spawn on kelp produced
- Fishing occurs in the spring when herring are ready to spawn. Fish are caught and held in pens with kelp for spawning.
- Fishing and ponding occurs in specific harvest areas of the BC coast
- Herring are captured or directed to ponds for spawning and then released. *Macrocystis* kelp is harvested and placed in ponds. No bycatch issues
- Pooling of product is allowed from within harvest areas.
- Price determined by market demand and product quality.
- Batch =shipment, Trade unit=totes of SOK, Logistic unit=totes of SOK
- Spawn on Kelp Operators Association (SOKOA) represents industry
- Fishery operation is somewhat similar to finfish aquaculture in that product inputs (fish and kelp quantity, quality, environmental conditions) can be traced

Supply Chain Pathways

Unit Transformations

Markets:
- Market is primarily for brined spawn on kelp to Japan. Domestic market is extremely small.
- Fresh brined spawn on kelp is delivered to buyers
- Product quality concerns are based on temperature, salinity, kelp quality, size, texture and colour of eggs.
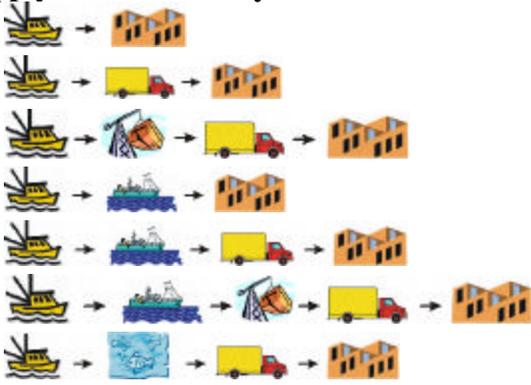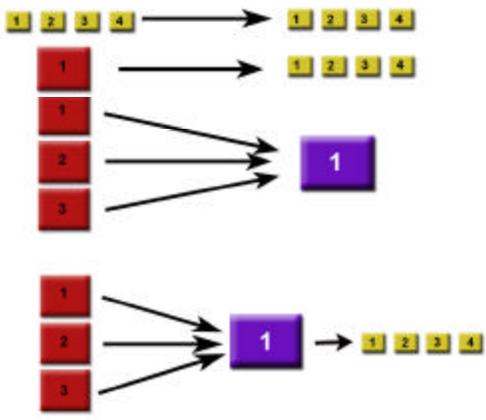- Japanese traceability regulations are not yet developed.

Data Availability from Fisheries Monitoring Programs:		**Score = 1**

Traceability data is currently collected through the following processes.

Harvester/Operator	**Transporter**	**Buyer**
Harvest Log – operator/MSP	Validation Record – MSP	Validation Record – MSP
Validation Record - MSP	Bill of Lading – transporter	Bill of Lading – transporter
Quality checklist – MSP/buyer		Delivery Record – buyer
		Processing Records – buyer
		Sales Records - buyer

What product or business data is missing?
transport firm, data access contact persons (data responsible party) for the harvester/operator, transporter and buyer.

Is the data electronically accessible to the supply chain?
No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.

Is the data verifiable?
Yes, through 100% on grounds and dockside validation

Product Identifiers:	**Score = 1**
Tote numbers and shipment numbers are used.	

Data Transfer and Information Mapping:	**Score = 1.5**
Current data systems are paper based with validation records accompanying deliveries to the buyer.	

Industry Leadership:	**Score = 1**
One association represents industry	

Processor Level Constraints:	**Score = 1.5**
Pooling of product for trimming, grading and packing	

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• Alaskan product landed and processed in BC	• An industry wide landings data system is in place through 100% dockside validation.
	• Most of the required information is collected on paper and stored electronically.
	• Japanese market is very quality oriented
	• Operators are paid based on quality
	• Tote labels with shipment number and tote number are mandatory (some form of batch numbering and trade unit identifier system already exists)

Opportunities:

Goal 1 – Traceability to a container level that provides data electronically to the supply chain.

Goal 2 – Good candidate fishery for a pilot project.

• Use of unique and digitally recognized product identifiers
• Integrate existing data systems and streamline data transfer through the supply chain for more efficient and timely data communication

Traceability Readiness Report Card

Fishery: *Tuna Troll*	State of Readiness Assessment: **Total Score = C**

Fishery Overview:
- Open season with no Total Allowable Catch
- Open year round with effort driven by market demand and weather.
- Fishing occurs in offshore areas of the Pacific Ocean
- Catch is primarily albacore tuna
- Pooling of product does not occur
- Vessels are paid a standard rate.
- Batch = offload, Trade unit = totes of fish, Logistic unit = totes of fish
- More than one association represents industry

Supply Chain Pathways
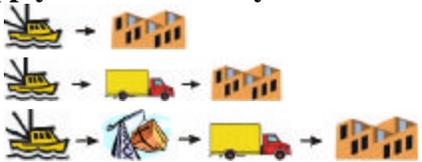
Unit Transformations

Markets:
- Markets include fresh, frozen, smoked and canned tuna in Canada, US, EU and Japan.
- Most tuna are delivered frozen at sea to buyers.
- Product quality concerns are based on freezing quality and freshness.
- COOL, US Bioterrorism Act and EU Food Law are the main traceability regulations of concern. Japanese traceability regulations are not yet developed.

Data Availability From Fisheries Monitoring Programs: **Score = 2**

Traceability data is currently collected through the following processes.

Harvester	Custom Offloader	Transporter	Buyer
Harvest Log – skipper	Harvest Log – skipper	Harvest Log – skipper	Harvest Log – skipper
Offload Tally – custom offloader	Offload Tally – custom offloader	Offload Tally – custom offloader	Offload Tally – custom offloader
		Bill of Lading – transporter	Bill of Lading – transporter
			Delivery Record – buyer
			Processing Records – buyer
			Sales Records - buyer

What product or business data is missing?

number of units in shipment, batch number, type of package, date and time of dispatch, place of dispatch, transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter

Is the data electronically accessible to the supply chain?

No. Paper harvest records are maintained by the harvester

Is the data verifiable?

No third party validation or audits are conducted.

Product Identifiers: **Score = 3**

Unique trade and/or logistic unit identifiers are not used.

Data Transfer and Information Mapping: **Score = 3**

Current data systems are paper based with poor transfer of data to the buyer.

Industry Leadership: **Score = 2**

The Canadian Highly Migratory Species Foundation represents industry

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Processor Level Constraints: **Score = 2**

Cold storage is common where grading and pooling of product may occur. The associated inventory management is poor.

Factors impeding ability to meet traceability:	Factors aiding ability to meet traceability:
• An industry wide data system for offloads does not currently exist	• Tuna are large, handled individually and frozen at sea
• Landings data is not verifiable (ie. Dockside Monitoring Program)	
• Canadian harvesters land tuna in Canada and the US	

Opportunities:

Goal 1 - Traceability to an offload or container level.

- Develop an industry wide landings data system from which business information is accessible, transferable, and verifiable.
- Identify containers with unique trade unit identifiers.
- Foster cooperation among businesses and a unified approach in addressing industry business

Traceability Readiness Report Card

Fishery: *Salmon Seine, Gillnet and Troll*	State of Readiness Assessment: **Total Score =** **D**

Fishery Overview:
- Derby style openings, generally of short duration (1-2 days) with area and species Total Allowable Catches. Troll openings are typically longer (up to several weeks)
- Generally, fishing opportunities are in the summer months but troll opportunities occur year round. Effort is based on competition and fishing opportunity (run forecasts).
- Fishing occurs in all areas of the BC coast
- Catch consists of five salmon species: chinook, coho, sockeye, pink and chum
- Pooling of product is common
- Fishers are not paid a differential price based on quality.
- Batch = offload, Trade unit = totes of fish, Logistic unit = totes of fish
- Many fleet based associations represent industry

Supply Chain Pathways

Unit Transformations

Markets:
- Market is diverse for fresh, frozen, canned and smoked product to the US, Asia, and EU. Domestic market is moderate for all product forms.
- Fresh iced and frozen at sea fish is delivered to buyers
- Product quality concerns are based on freshness, texture, colour and markings.
- COOL, US Bioterrorism Act and EU Food Law are the main traceability regulations of concern. Japanese traceability regulations are not yet developed.

Data Availability from Fisheries Monitoring Programs: Traceability data is currently collected through the following processes.			**Score = 2.5**

Harvester Harvest Log – skipper Offload Tally – custom offloader	**Custom Offloader** Harvest Log – skipper Offload Tally – custom offloader	**Transporter** Harvest Log – skipper Offload Tally – custom offloader Bill of Lading – transporter	**Buyer** Harvest Log – skipper Offload Tally – custom offloader Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
number of units in shipment, batch number, type of package, date and time of dispatch, place of dispatch, transport firm, data access contact persons (data responsible party) for the harvester, transporter and buyer.

Is the data electronically accessible to the supply chain?
No. Paper harvest records are maintained by the harvester

Is the data verifiable?
No third party validation or audits are conducted for landings.

Product Identifiers: Unique trade and/or logistic unit identifiers are not used.	**Score = 3**

Data Transfer and Information Mapping: Current data systems are paper based with poor transfer of data to the buyer.	**Score = 3**

Industry Leadership: Several area and gear based associations exist that have a lack of common vision for the fishery.	**Score = 2.5**

Processor Level Constraints: • Salmon are purchased by a large number of buyers • Grading and re-grading occurs at the buyer. • Cold storage is common and the associated inventory management is poor	**Score = 3**

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• An industry wide data system for offloads does not currently exist. Harvest data is entered into a DFO database and is not accessible to industry • Landings data is not verifiable (ie. DMP) • Product pooling is common on packers and may occur on trucks • The salmon fishery has the highest degree of water to buyer supply chain pathways and unit transformations • There is a lack of partnership in the historic salmon harvester/buyer relationship	• BC canneries are regarded as having advanced traceability back to the canning process through coded embossing on cans.

Opportunities:

Goal 1 - Traceability at an offload or container level

Goal 2 – Restructure the fishery operations and industry representation to facilitate traceability

- Develop an industry wide landings data system from which traceability information is accessible, transferable, and verifiable.
- Develop protocols for batching product during transportation and storage at the buyer
- Identify batches and label products with trade unit identifiers
- Improve product quality by facilitating differential price payment based on quality
- Foster cooperation among businesses and a unified approach in addressing industry business and fisheries issues.
- Fish tags could be used that are coded with digitally readable information for partial piece by piece traceability or marketing purposes

Traceability Readiness Report Card

Fishery:	State of Readiness Assessment:
Geoduck by Dive	Total Score = **A-**

Fishery Overview:
- Individual vessel quota
- Open year round with effort closely controlled by buyers and based on market demand
- Fishing occurs in all areas of the BC coast
- Catch consists of geoduck clam and incidental horse clams
- Pooling does not occur
- Batch =offload, Trade unit=cage, Logistic unit=cage
- One association represents industry – Underwater Harvesters Association (UHA)

Chain of Custody Pathways	Unit Transformations
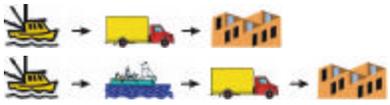
Market/s:
- Market is primarily for live clams in China. Domestic market is extremely small.
- Live clams are delivered to buyers in industry standard cages (plastic crates)
- Product quality concerns are based on skin colour, broken shell and survival.
- There are no traceability regulations of concern for exports to China.

Data Availability From Fisheries Monitoring Programs: Traceability data is currently collected through the following processes.		**Score = 1**

Harvester Harvest/Validation Record – skipper and MSP	**Transporter** Harvest/Validation Record – skipper and MSP Bill of Lading – transporter	**Buyer** Harvest/Validation Record – skipper and MSP Bill of Lading – transporter Delivery Record – buyer Sales Records - buyer

What product or business data is missing?
CFIA CSSP area designation, transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter.

Is the data electronically accessible to the supply chain?
No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.
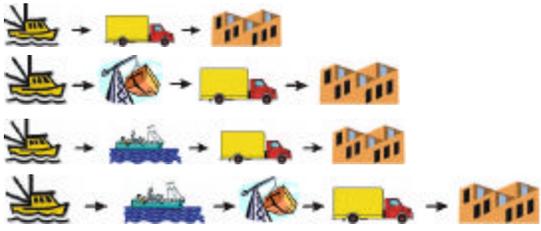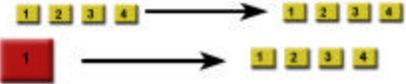
Is the data verifiable?
Yes, through 100% dockside validation

Product Identifiers: Unique trade and/or logistic unit identifiers are not used.	**Score = 2**
Data Transfer and Information Mapping: Current data systems are paper based with validation records accompanying deliveries to the buyer.	**Score = 2**
Industry Leadership: One well organized industry association represents industry	**Score = 1**
Processor Level Constraints: Batching for quality occurs at the buyer	**Score = 1**

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• Current export practices to mainland China do not support full chain traceability	• An industry wide landings data system is in place through 100% dockside validation • Most of the required information is collected on paper and stored electronically(MSP). • IQ fishery regime allows market driven fishing and time for specialized product handling • Primarily single species fishery • Number of geoduck buyers are limited • No unit transformations occur from water to buyer • Trade/logistic units can be readily identified through the use of standardized cages. • Cage tags are required on every cage transported • Each geoduck is banded and packed individually

Opportunities:
Goal 1 – Traceability to a cage level
Goal 2 – Good candidate fishery for a pilot project
• Identify cages with trade unit identifiers
• Integrate existing data systems and streamline data transfer through the supply chain for more efficient and timely data communication

Traceability Readiness Report Card

Fishery:	State of Readiness Assessment:
Prawn by Trap	Total Score = **B+**

Fishery Overview:
- Fishery is managed with trap limits, size limit and spawner index levels.
- Effort is based on trap fishing opportunity and markets.
- Fishing occurs primarily in nearshore areas of the BC coast
- Catch is primarily spot shrimp (prawn) with small catches of other shrimp species.
- Product pooling does not occur
- Vessels are paid on size and product form.
- Batch =offload, Trade unit=box, Logistic unit=case
- One association represents industry – Pacific Prawn Fishermen's Association (PPFA)

Supply Chain Pathways
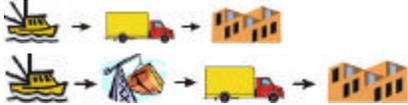
Unit Transformations

Markets:
- Market is primarily for frozen prawns in Japan. Domestic market is small.
- Fresh, frozen at sea and live prawns are delivered to buyers
- Product quality concerns are based on freshness and size.
- Japanese traceability regulations are not yet developed.

Data Availability from Fisheries Monitoring Programs			**Score = 2**
Traceability data is currently collected through the following processes.			

Harvester	**Custom Offloader**	**Transporter**	**Buyer**
Harvest Log – skipper	Harvest Log – skipper Offload Tally – custom offloader	Harvest Log – skipper Offload Tally – custom offloader Bill of Lading – transporter	Harvest Log – skipper Offload Tally – custom offloader Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
number of units in shipment, type of package, date and time of dispatch, place of dispatch, transport firm, data access contact persons (data responsible party) for the harvester, transporter and buyer.

Is the data electronically accessible to the supply chain?
No. Paper harvest records are maintained by the harvester

Is the data verifiable?
No third party validation or audits are conducted.

Product Identifiers:	**Score = 2**
Unique trade and/or logistic unit identifiers are not used.	

Data Transfer and Information Mapping:	**Score = 2**
Current data systems are paper based with poor transfer of data to the buyer.	

Industry Leadership:	**Score = 1.5**
One association represents industry	

Processor Level Constraints:	**Score = 1**
Minimal, most product delivered frozen and boxed, pooling of live or fresh product	

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• An industry wide data system for offloads does not currently exist • Landings data is not verifiable(e.g. dockside monitoring program)	• Primarily single species fishery • Most prawns are frozen in boxes at sea with a code identifying the date and vessel.

Opportunities:
Goal 1 - Traceability to an FAS box level.
- Develop an industry wide landings data system from which business information is accessible, transferable, and verifiable.
- Identify containers with unique trade unit identifiers. Replace box codes with digitally readable labels.
- Improved traceability for fresh product.
- Foster cooperation among businesses and a unified approach in addressing industry business and fisheries issues.

Traceability Readiness Report Card

Fishery: *Red and Green Sea Urchin by Dive*	**State of Readiness Assessment:** **Total Score =** **A-**

Fishery Overview:
- Individual vessel quota
- Red sea urchins are open year round and green sea urchins are fished in the winter. Effort is based on roe quality and market demand
- Fishing occurs in nearshore areas of the BC coast
- Catch consists of red and green sea urchins (separately licenced fisheries)
- Pooling does not occur
- Vessels are paid based on roe quality
- Batch =offload, Trade unit=tote, cage(green urchins), Logistic unit=tote, cage(green urchins)
- Pacific Urchin Harvesters Association (PUHA) represents the red sea urchin industry and West Coast Green Urchin Association (WCGUA) represents the green sea urchin industry

Chain of Custody Pathways

Unit Transformations

Market/s:
- Market is primarily for fresh roe to Japan. Small markets exist in France, US and Canada.
- Live sea urchins are delivered to buyers
- Product quality concerns are based on roe colour, size and texture.
- Japanese traceability regulations are not yet developed.

Product and Business Data Availability:			Score = 1
Traceability data is currently collected through the following processes.			

Harvester	Custom Offloader	Transporter	Buyer
Harvest/Validation Record – skipper and MSP	Validation/Harvest Log – skipper and MSP Offload Tally – custom offloader	Validation/Harvest Log – skipper and MSP Offload Tally – custom offloader Bill of Lading – transporter	Validation/Harvest Log – skipper and MSP Offload Tally – custom offloader Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter.

Is the data electronically accessible to the supply chain?
No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.

Is the data verifiable?
Yes, through 100% dockside validation

Product Identifiers:	Score = 2.5
Unique trade and/or logistic unit identifiers are not used.	

Data Transfer and Information Mapping:	Score = 2
Current data systems are paper based with validation records accompanying deliveries to the buyer.	

Industry Leadership:	Score = 1
One association represents industry	
Processor Level Constraints:	Score = 1

Factors impeding ability to meet traceability:	Factors aiding ability to meet traceability:
	• An industry wide landings data system is in place through 100% dockside validation
	• Most of the required information is collected on paper and stored electronically(MSP).
	• IQ fishery regime allows market driven fishing and time for specialized product handling
	• Single species fishery
	• Number of sea urchin buyers are limited
	• No unit transformations occur from water to buyer
	• Container tags are required on every container transported

Opportunities:
Goal 1 – Traceability to a container level
Goal 2 – Good candidate fishery for a pilot project
• Identify containers with trade unit identifiers
• Integrate existing data systems and streamline data transfer through the supply chain for more

Traceability Readiness Report Card

Fishery: *Sea Cucumber by Dive*	State of Readiness Assessment: **Total Score = A-**

Fishery Overview:
- Individual vessel quota
- Open September to November with effort based on fishing opportunity.
- Fishing occurs in specific nearshore areas throughout the BC coast
- Catch is sea cucumber
- Pooling does not occur
- Vessels are paid a standard price.
- Batch =offload, Trade unit=tote, Logistic unit=tote
- One industry association – Pacific Sea Cucumber Harvester's Association (PSCHA)

Chain of Custody Pathways
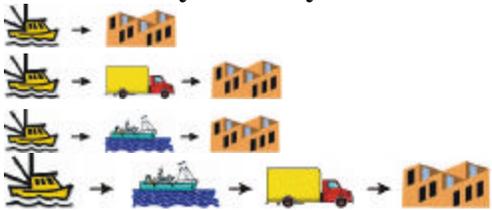
Unit Transformations

Market/s:
- Market is primarily for fresh and frozen meat and dried skins to China and Japan. Domestic market is extremely small.
- Fresh eviscerated sea cucumbers are delivered to buyers
- There are no product quality concerns.
- Japanese traceability regulations have are yet developed.

Data Availability From Fisheries Monitoring Programs: Traceability data is currently collected through the following processes.			**Score = 1**

Harvester	**Custom Offloader**	**Transporter**	**Buyer**
Harvest/Validation Record – skipper and MSP	Validation/Harvest Record – skipper and MSP Offload Tally – custom offloader	Validation/Harvest Record– skipper and MSP Offload Tally – custom offloader Bill of Lading – transporter	Validation/Harvest Record– skipper and MSP Offload Tally – custom offloader Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter.
Is the data electronically accessible to the supply chain?
No. Paper validation records are maintained by the harvester. A confidential electronic database is maintained by the MSP.
Is the data verifiable?
Yes, through 100% dockside validation

Product Identifiers: Unique trade and/or logistic unit identifiers are not used.	**Score = 2.5**

Data Transfer and Information Mapping: Current data systems are paper based with validation records accompanying deliveries to the buyer.	**Score = 2**

Industry Leadership: One association represents industry	**Score = 1**
Processor Level Constraints:	**Score = 1**

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
	• An industry wide landings data system is in place through 100% dockside validation • Most of the required information is collected on paper and stored electronically(MSP). • IQ fishery regime allows market driven fishing and time for specialized product handling • Single species fishery • Number of sea cucumber buyers are limited • No unit transformations occur from water to buyer • Container tags are required on every container transported

Opportunities:
Goal 1 – Traceability to a container level
Goal 2 – Good candidate fishery for a pilot project
• Identify containers with trade unit identifiers
• Integrate existing data systems and streamline data transfer through the supply chain for more

Traceability Readiness Report Card

Fishery:	State of Readiness Assessment:
Crab by Trap	**Total Score =** **C**

Fishery Overview:
- Fishery is managed with trap limits, size limits and non-retention of females.
- Open year round with some seasonal and area softshell closures. Effort is based on market demand and catch rates.
- Fishing occurs in all areas of the BC coast
- Catch is primarily Dungeness crab
- Pooling may occur for transporting live crab
- Vessels are generally paid a standard price.
- Batch = offload, Trade unit = tote, Logistic unit = tote
- Several area based industry associations.

Supply Chain Pathways
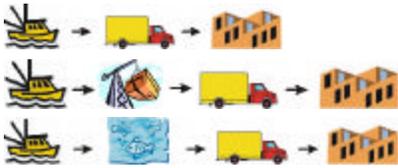
Unit Transformations

Markets:
- Market is primarily for live and fresh-cooked crab in the US. A moderate domestic market exists.
- Live crabs are delivered to buyers
- Product quality concerns are based on missing claws and legs, softshell and survival.
- COOL and US Bioterrorism Act are the main traceability regulations of concern.

Data Availability From Fisheries Monitoring Programs:	**Score = 2**

Traceability data is currently collected through the following processes.

Harvester	**Custom Offloader**	**Transporter**	**Buyer**
Harvest Log – skipper	Harvest Log – skipper Offload Tally – custom offloader	Harvest Log – skipper Offload Tally – custom offloader Bill of Lading – transporter	Harvest Log – skipper Offload Tally – custom offloader Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
Batch #, type of package, number of units in shipment, date and time of dispactch, place of dispatch, transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter.

Is the data electronically accessible to the supply chain?
No. Paper harvest records are maintained by the harvester

Is the data verifiable?
No third party validation or audits are conducted.

Product Identifiers:	**Score = 3**

Unique trade and/or logistic unit identifiers are not used.

Data Transfer and Information Mapping:	**Score = 3**

Current data systems are paper based with poor transfer of data to the buyer.

Industry Leadership:	**Score = 2.5**

No one association represents crab harvesters. Several area based associations exist that have varying levels of organization and leadership.

Processor Level Constraints:	**Score = 2**

- Product batching occurs in the transportation and storage of live product.

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• An industry wide data system for offloads does not currently exist • Landings data is not verifiable (ie. DMP)	• Primarily single species fishery

Opportunities:
Goal 1 - Traceability to an offload or container level.
Goal 2 – Restructure the fishery operations and industry representation to facilitate traceability
- Develop an industry wide landings data system from which traceability information is accessible, transferable, and verifiable.
- Develop protocols for batching product during transportation and storage at the buyer
- Identify batches and label products with trade unit identifiers
- Foster cooperation among businesses and a unified approach in addressing industry business and fisheries issues.

Traceability Readiness Report Card

Fishery:	State of Readiness Assessment:
Shrimp Trawl	**Total Score =** **C+**

Fishery Overview:
- Fishery is managed with area Total Allowable Catches.
- Open year round with some seasonal closures. Effort based on competition, market demand and catch rates.
- Fishing occurs in all areas of the BC coast
- Catch primarily consists of spiny pink, smooth pink, humpback, sidestripe and coonstripe shrimp
- Pooling of product does not occur
- Vessels are paid on recovered weight for fresh iced product.
- Batch = offload, Trade unit = tote, Logistic unit = tote
- The Pacific Coast Shrimpers' Cooperative Association (PCSCA) represents industry.

Supply Chain Pathways

Unit Transformations

Markets:
- Market is primarily for fresh-cooked shrimp in the US. A moderate domestic market exists which includes small volumes of live shrimp. FAS shrimp are sold to Japan
- Fresh iced, FAS, and live shrimp are delivered to buyers
- Product quality concerns are based on freshness and meat colour.
- COOL and US Bioterrorism Act are the main traceability regulations of concern.

Data Availability From Fisheries Monitoring Programs:	**Score = 2**

Traceability data is currently collected through the following processes.

Harvester	**Custom Offloader**	**Transporter**	**Buyer**
Harvest Log – skipper	Harvest Log – skipper Offload Tally – custom offloader	Harvest Log – skipper Offload Tally – custom offloader Bill of Lading – transporter	Harvest Log – skipper Offload Tally – custom offloader Bill of Lading – transporter Delivery Record – buyer Processing Records – buyer Sales Records - buyer

What product or business data is missing?
number of units in shipment, type of package, date and time of dispatch, place of dispatch, transport firm, data access contact persons (data responsible party) for the harvester, buyer and transporter.

Is the data electronically accessible to the supply chain?
No. Paper harvest records are maintained by the harvester.

Is the data verifiable?
Partially. Third party audits are conducted on less than 5% of the offloads.

Product Identifiers:	**Score = 3**
Unique trade and/or logistic unit identifiers are not used.	

Data Transfer and Information Mapping:	**Score = 2**
Current data systems are paper based with poor transfer of data to the buyer.	

Industry Leadership:	**Score = 2**
One association represents industry but industry members lack a common vision for the fishery.	

Processor Level Constraints:	**Score = 2**
Shrimp may be put into cold storage with poor inventory practices	

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• Landings data is not verifiable (ie. Dockside Monitoring Program) • Less than 50% of licence holders fish due to a lack of profitable markets • Up to seven species may be landed. Accuracy of species documentation is variable.	• A hail based industry wide data system for offloads currently exists • Price differential is paid based on quality and product form.

Opportunities:

Goal 1 - Traceability to an offload or container level.
• Develop an industry wide landings data system from which business information is accessible, transferable, and verifiable.
• Identify containers with unique trade unit identifiers.
• Improve species documentation including use of scientific names
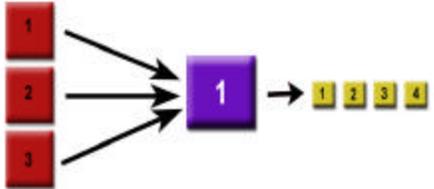
Traceability Readiness Report Card

Industry: *Finfish Aquaculture*	State of Readiness Assessment: Total Score = **A**

Industry Overview:
- Five salmon aquaculture companies comprise over 80% of BC farmed salmon production. One of these companies is Canadian owned, while the others are large European multinationals. All five companies farm salmon in other parts of the world such as Norway, Chile, UK, New Brunswick, and the US (Maine).
- Most product is sold on the commodity market. To achieve a competitive advantage, some companies are beginning to focus on product differentiation mechanisms e.g. 3rd party audited quality management programs, organic certification, higher value species.
- Production is primarily Atlantic salmon. Other species include chinook, coho, steelhead and sturgeon.
- Most BC finfish aquaculture businesses exhibit a high level of vertical integration; their involvement in many stages of the aquaculture supply chain allows them to implement effective traceability systems covering the entire upstream chain – from breeder to processor.
- Depending upon the specific stage in the supply chain, the identification of products within the finfish aquaculture supply chain is based upon batch numbers, tray numbers, tank numbers, pen numbers and lot numbers. These designations are applied in a manner that is readily equated to the EAN trade unit/logistic unit system.
- Pooling of product at both the hatchery and farm is common. The linkages between input units and pooled units is well maintained.
- Industry association – BC Salmon Farmers Association (BCSFA) & Canadian Aquaculture Industry Alliance (CAIA)

Chain of Custody Pathways

Breeder→Truck→Hatchery→Truck→Farm→Boat→Processor

Unit Transformations

Units may undergo multiple pooling and subdivisions between breeder and processor
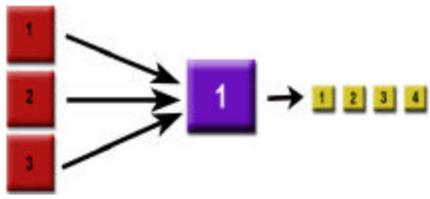
Market(s):
- Primary market is US.
- The majority of product is sold in fresh whole form - although processing of farmed salmon into fillets and portions is increasing.
- COOL and US Bioterrorism Act are the main traceability regulations of concern.

Product and Business Data Availability:	**Score = 1**

The BC finfish aquaculture industry records its traceability data elements in computer-based data recording systems. In some cases, paper-based records are also maintained. Examples of the computer-based traceability systems used in finfish aquaculture include NuTrace, FarmControl (now known as WiseFarming) and Superior Control. The underlying concept for some systems – e.g. NuTrace - is that of a data warehouse: data from each stage of the value chain is submitted on a continuous basis to a central server. The NuTrace software is designed to identify, link and cross link data to create a chain of knowledge from feeding and breeding to delivered product.

What product or business data is missing?

None. Finfish aquaculture companies collect a comprehensive set of product identity, business unit identity, product description, production history and transportation-related information

Is the data electronically accessible to the supply chain?

Yes. Most companies maintain computer information systems which contain traceability information. The implementation of a single traceability system by all units of a vertically integrated business provides managers with easy access to unit-specific information.

Is the data verifiable?

One company is certified by the ISO 9001 Quality Management Program. As part of this program, a third party auditor will verify its traceability system. Due to the competitive nature of the finfish aquaculture industry, it is likely that other BC companies will undertake similar certification in the future.

Product Identifiers: Unique trade and/or logistic unit identifiers are used.	**Score = 1**
Data Transfer and Information Mapping: Vertical integration and computer-based traceability systems facilitate the effective transfer of information	**Score = 1**
Industry Leadership Primarily one umbrella organization represents industry but other aquaculture groups exist	**Score = 1.5**
Processor Level Constraints Product is occasionally stored at cold storage warehouses with poor inventory management practices	**Score = 1**

Factors impeding ability to meet traceability:	Factors aiding ability to meet traceability: • Vertical integration of upstream supply chain • Computer based traceability systems • Good product unit identification • Good linkages between inputs and outputs • Comprehensive data collection • Good appreciation of benefits of traceability
Opportunities: • Maintain verifiable traceability information through third party audits. • Exchange traceability information with other supply chain partners using a globally recognized standard such as the EAN.UCC system.	

Traceability Readiness Report Card

Industry: *Shellfish Aquaculture*	**State of Readiness Assessment:** **Total Score =** **A-**

Industry Overview:
- The BC shellfish aquaculture industry is made up primarily of independent growers. Vertical integration within the industry is limited.
- Production is primarily oysters and clams. Smaller quantities of mussels and scallops are commercially farmed. Species being considered - or under early development – for culture in BC include: geoducks, abalone, sea cucumber, sea urchins and cockles.
- Most product is sold on the commodity market. There is a limited amount of product differentiation and value adding.
- Extensive pooling of product may occur at the hatchery, nursery and farm as a result of grading/sorting activities. The amount of product pooling associated with grading/sorting makes the mapping of identity relationships extremely difficult.
- The farm-to-processor link has a level of traceability associated with compliance with CSSP, QMP and Vp regulations.
- Industry association – BC Shellfish Growers Association (BCSGA); Canadian Aquaculture Industry Alliance (CAIA)

Chain of Custody Pathways

Hatchery➔Truck➔Nursery➔Truck➔Farm➔Truck➔Processor

Hatchery➔Truck ➔Nursery➔Boat➔ Farm➔Truck➔Processor

Unit Transformations

Units may undergo multiple pooling and subdivisions between hatchery and processor

Market(s):
- Market is primarily for fresh exports to the US Pacific Northwest. Smaller amounts of frozen half shell oysters are exported to Asia.
- COOL and US Bioterrorism Act are the main traceability regulations of concern.

CSSP=Canadian Shellfish Sanitation Program   QMP=Quality Management Program   Vp=*Vibrio parahaemolyticus*

Product and Business Data Availability:			**Score = 1**
Traceability requirements are currently available through the following systems.			

Hatchery	**Nursery**	**Transporter**	**Farm**
Invoices	Invoices	Bill of Lading	Invoices
Shipping documents	Shipping documents		Shipping documents
Sales Records	Sales Records		Sales Records
			Vp Program Bill of Lading
			CSSP tag

What product or business data is missing?
place of dispatch, CSSP area designation, disease records/history.
Is the data electronically accessible to the supply chain?
No. Paper records are maintained by supply chain partners. The accessibility of information upstream from the farm-processor link may be much more difficult to efficiently access.
Is the data verifiable?
Growing water classification and PSP status are verifiable through CFIA. There is no 3rd party verification of other data elements.

Product Identifiers:	**Score = 1.5**
Unique trade and/or logistic unit identifiers are not used.	

Data Transfer and Information Mapping:	**Score = 1.5**
Current data systems are paper based with data transferred to the buyer through harvest tags as required by CSSP, QMP and Vp Programs. The level of data transfer that exists upstream form the farm is limited to paper records (invoices, bills of lading etc.) passed from one business to the next.	

Industry Leadership:	**Score = 1.5**
Primarily one umbrella organization represents industry but other aquaculture groups exist.	

Processor Level Constraints	**Score = 1**

Factors impeding ability to meet traceability:	**Factors aiding ability to meet traceability:**
• Electronic information systems in which traceability information could be stored are not common among shellfish growers. • Hatchery to farm record keeping practices are poor.	• CAIA recognizes the necessity to achieve a 'Tracefish' level of traceability to ensure market access. Traceability is one of the pillars of its Brand Canada marketing strategy. • Most of the required traceability information is collected through CSSP, Vp and QMP programs.

Opportunities:

Goal 1 - Traceability to a container (sack, bag) level.

- Identify batches and label products with trade and logistic unit identifiers
- The upstream supply chain may not currently be in compliance with the record keeping and labeling requirements of the US COOL. Given the importance of the US market, an initiative should be undertaken to ensure compliance through improved traceability and labeling.
- To comply with the requirements of EC regulation 2003/804, the BC shellfish industry will need to implement a surveillance and recording system for documenting/verifying the incidence of mortality and disease on farms.
- Given the significant level of product sorting and pooling, protocols for mapping the relationships between input units and pooled units should be developed.
- Traceability would be beneficial as a production/marketing tool.

5.2 CONTRASTING AQUACULTURE AND WILD FISHERIES

Salmon aquaculture is an acknowledged leader in the implementation of product traceability in the seafood sector (Section 5.1 above). Why is this so? What can be learned from salmon aquaculture traceability practices which may be applied to the wild harvest sector? One important factor is that the finfish aquaculture industry has significant operational advantages over most wild fisheries; harvesting and processing is done on a well defined batch basis (net-pen batches of uniform sized, single species with a well documented husbandry data set). However there are also two important supply chain issues which have permitted the aquaculture sector meet traceability requirements more readily than the wild harvest sector.

A. The aquaculture supply chain is highly vertically integrated; the wild harvest supply chain is far less integrated.
Most BC finfish aquaculture businesses are global in scope and highly vertically integrated, with close business relationships along the entire supply chain from hatchery to retail. This enables a single company to track product through the supply chain by using integrated information technology (e.g. bar codes and proprietary traceability software). In contrast the wild harvest fisheries is far less integrated. Most harvesters are single business entities and may sell product to several processors. Most processing companies are small (on a global scale) and distribute to a complex network of wholesalers and distributors. In some cases the supply chain is intentionally de-linked as processors or distributors do not want their clients to obtain information about the source of product, for fear of being cut from the supply chain.

B. Aquaculture information systems are primarily market and business management driven; wild harvest information systems are primarily regulatory driven
While both the wild harvest and aquaculture sectors need to provide product information to regulators for management purposes, this is a far more important driver in the wild harvest sector. For wild fisheries this has led to an ever evolving and increasingly complex data collection programs (Section 4.3.1) initiated by regulatory agencies (primarily DFO). The information data set is multi-faceted and only poorly linked to the supply chain (Figure 5.1, upper section). In addition these data sets may not be readily accessible, both because of confidentiality issues and the fact that they are held by the regulatory agencies rather that members of the supply chain (see Section 5.3 below). In contrast the finfish aquaculture sector has used these information systems both to meet market information demands and as a production/management tool to develop more effective husbandry, processing and distribution practices (Section 4.4.3). To achieve these goals the product information systems must be closely linked to the supply chain (Figure 5.1, lower section).

While it is evident that the operational practices of finfish aquaculture provide a distinct advantage for traceability over wild harvest fisheries, there are opportunities for wild fisheries to move toward better supply chain integration to address the fundamental shortfalls for implementing traceability in the wild harvest sector, namely use of product identifiers and effective data transfer and mapping. The tools and integrated data management systems used within the finfish aquaculture industry can serve as a model for adaptation to wild fisheries. In other words wild fisheries need to move from the data mapping model outlined in the upper part of Figure 5.1 to the model shown in lower portion of the same figure. Moving this way in a non-

vertically integrated supply chain will require strong industry leadership at both the harvester and processor levels. Those fisheries with effective industry associations will be much better positioned to meet this challenge. In addition the wild harvest sector must re-examine the rationale for a de-linked supply chain model by asking "Are there still business reasons for one level in the supply chain to shield downstream links from upstream links?" This does not mean that the industry needs to fully integrate or move to a larger corporate model; rather better access to traceability information for both businesses and consumers may ultimately be more attractive from both a marketing and financial perspective (see Sections 3.0 and 5.4).
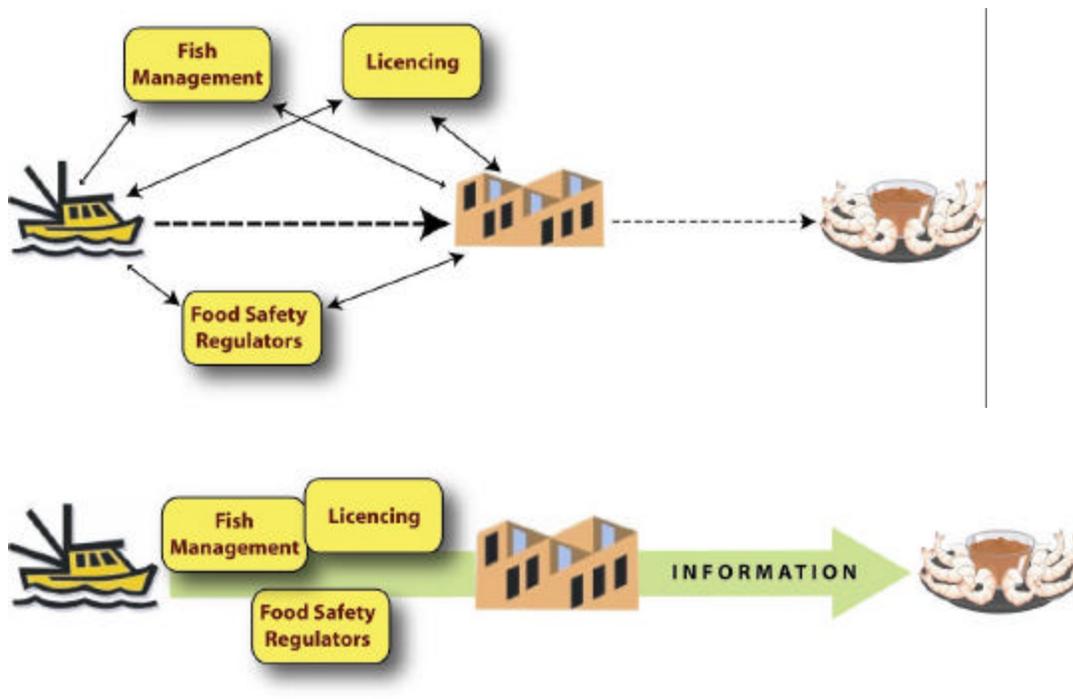
Figure 5.1.   Upper Figure - Regulation driven information pathway
**   Lower Figure – Supply chain driven information pathway**

5.3 CONSTRAINTS AND OPPORTUNITIES

5.3.1 Fisheries with Dockside Monitoring

Since 1989 seven British Columbia fisheries (Table 5.2) have adopted a individual quota (IQ) management system, whereby each licensed vessel is assigned a portion of a coastal wide or area quota. All these fisheries have dockside monitoring programs, with verification of landings by an independent, third party monitor. Some non-IQ fisheries, such as roe herring and rockfish hook and line, also use third party landings monitoring as a management tool. These fisheries are well positioned to meet traceability requirements in that:

1.   All harvest data is vessel/fishing event (a fishing trip) based, meeting almost all product description and business information requirements.
2.   The data is verifiable and is collected directly at offload and entered into data systems in a timely manner.
3.   These data systems can serve as sources for supply chain information flow (Figure 5.1).

4. IQ fisheries generally have cohesive and effective industry associations facilitating leadership and coordination of traceability initiatives within their sector.

In British Columbia dockside monitoring programs have matured over the past decade to a state where technological innovation can be readily accommodated. For example electronic data entry from dockside, likely over a web portal, will enable more timely and cost effective data entry into systems such as DFO's Fisheries Operations System (FOS). With the development of appropriate data confidentiality protocols, elements of this data set could also be logged directly into supply chain data systems, eliminating redundant data acquisition and entry. It is important to note that, although dockside monitoring programs are a requirement for IQ fisheries management, these programs can also be initiated in non-IQ fisheries for any purpose requiring third party landings verification. By example, there may be both business and fisheries management reasons for dockside monitoring in the wild salmon fisheries, without necessarily moving to individual quotas.

At Sea observer programs and, more recently, electronic monitoring programs are focused on catch monitoring and fisheries compliance monitoring, and are of limited value for traceability. At sea observers or electronic monitoring could possibly provide validation/information services for segregation of catch at sea (by species, date of harvest, by geographic area) but only when warranted by specific circumstances such as a harvest of MSC certified stocks, when other stocks of the same species could be taken in different areas.

A. Key Constraints
Lack of product identifiers
As noted in Table 5.2 the major constraint to traceability "readiness" for monitored fisheries is the lack of product identifiers. Currently the spawn-on-kelp fishery is the only monitored fishery using unique product identifiers at the logistic unit level. However many monitored fisheries could incorporate a unique product identifier at the logistic unit level with little change in operational practices. For example, currently each tote of landed halibut is labelled and initialled by the dockside monitor, certifying that the contents of the tote have been verified by a third party monitor. A unique number or bar code can easily be incorporated into the labelling process as a product identifier.

Lack of transport data
As noted in Section 4.3.3 transport data (name of transporter, location, time of receipt and delivery, truck identification) are poorly documented within existing fisheries monitoring programs, but are generally available in the processing plants with bill of ladling and delivery records. Transport information needs to be integrated into the supply chain data system to meet traceability standards.

Data confidentially and accessibility
Dockside monitoring programs were developed to manage fishing quota allocation and, historically, the data have been the property of the Department of Fisheries and Oceans with confidentiality protected under the Privacy Act (see Section 4.3.3). Accessibility is an issue for use of these data sets for traceability purposes, particularly any data related to an individual or business entity. In addition the perceived need for data confidentiality generates redundant

landings data acquisition and management effort. For many fisheries both dockside monitoring records and offload tally sheets are generated for each landing. These data are entered separately into DFO data sets and plant data logs.

Over the past decade the fishing industry has increasingly paid for the cost of dockside monitoring programs such that, today, in all seven IQ fisheries as well as ZN rockfish and roe herring, industry now pays 100% of the dockside monitoring program costs. Payment should impart some degree of data ownership and industry needs to become more involved in discussions with DFO as to how to access and use fisheries monitoring data in ways which serve business needs (including traceability). This will become an increasingly important issue given DFO's current initiative to revise and centralize the Fisheries Operations System (see Key Opportunities below).

B. Key Opportunities

Key opportunities for fisheries with dockside monitoring programs include:

Initiate discussions with DFO on the use of fisheries monitoring data for traceability purposes
DFO is currently revising and upgrading their internal centralized database, the Fisheries Operation System (FOS), which houses dockside and at sea monitoring data. One possible outcome of this process could be that harvest data will become increasingly difficult to access if monitoring service providers role in data management (as opposed to data acquisition and data transfer) is reduced. Alternatively, the FOS revision provides an opportunity to incorporate new technologies and efficiencies into monitoring data acquisition and information sharing. A conceptual model for more effective data sharing of dockside monitoring data is provided in Figure 5.2. In this model a single offload data set can be transferred, within appropriate confidentiality criteria, to a variety of potential users directly from dockside using web portals. It is important that industry inform and lead discussions with regulatory agencies (particularly DFO) as to the need to "add value" to the monitoring data set by ensuring that it is available for other regulatory and business purposes, including traceability.
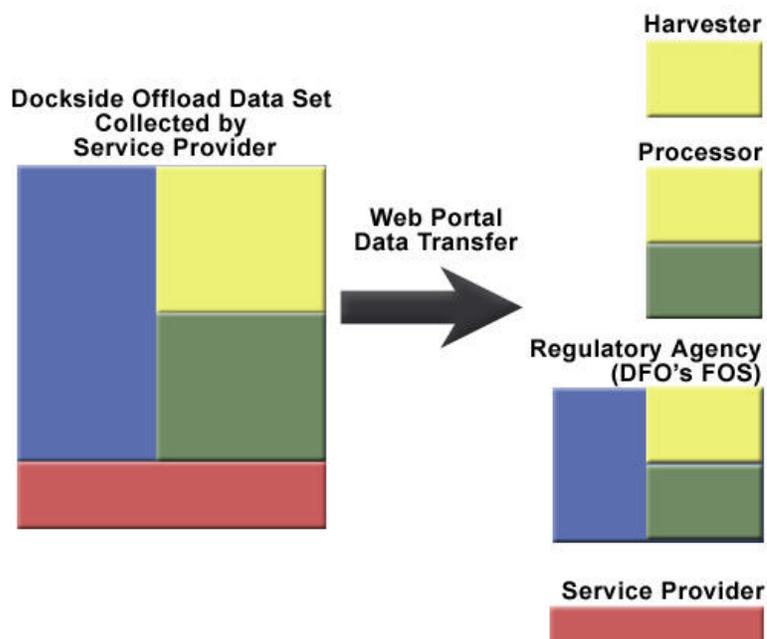
Figure 5.2.   Conceptual model for effective transfer of dockside monitoring data

Identify redundant data and streamline data acquisition and entry.
When interviewed many processors remarked about the time and cost of entering and submitting the same data to a growing number of regulatory and business information data sets. Although streamlining these information systems and reducing redundant data entry is a long term endeavour, traceability requirements and modern information technology provides an opportunity to identify and reduce, rather than add to, the effort and cost of redundant data systems.

Work with processors to identify appropriate logistic and trade units for product identification
As noted above, lack of product identifiers is a major gap for all wild fisheries, except spawn-on-kelp. For each fishery it will be important to identify logistic units (e.g. totes and pallets) as well as trade units (e.g. boxes) suitable for product identification. It is important that the units selected are suitable for offload, transport and processing operations.

Encourage and enable dockside monitoring service providers to improve information technology
Currently most dockside monitoring data is collected on paper forms at the dock, forwarded to the service providers for QA/QC processes and entered into a database which is forwarded to DFO. To enable efficient and effective supply chain information flow the landings data could be electronically entered at dockside, subject to QA/QC processes electronically and forwarded to both regulators and the supply chain (buyer) over the Internet. Monitoring service providers should be encouraged to adopt these technological improvements and industry should work with regulators to reduce or remove barriers to this approach.

Develop an operational pilot for one or two monitored fisheries
This group of fisheries is best positioned to implement a full traceability program. An operational pilot program for these fisheries should include one or two processing plants and implementation of one-up, one-down traceability at least from harvester to processor shipping gate level. The objective of the operational pilots should be to demonstrate a traceability system which can be implemented on a sector wide basis if desired. Likely candidate fisheries include halibut, sablefish, geoduck and sea urchins. The finfish aquaculture industry may provide suitable data models for these pilots (Section 5.2).

5.3.2 Fisheries without Dockside Monitoring
Fisheries without dockside monitoring programs, with several notable exceptions, have lower "state of readiness" ratings than fisheries with dockside monitoring programs (Section 5.1). The primary issue is that most of these fisheries do not have verifiable product and business information on a vessel/fishing event basis and there is no data system in place to manage the information. Certain fisheries (see specific readiness report cards) will have to make changes to operational practices (how fish are landed, transported, processed and stored) in order to reach a level of readiness where the basic structure of a traceability program (e.g. appropriate product identifiers, data management systems) can begin to be planned for.

A. Constraints
At the water to buyer level, major challenges exist with:
1. Lack of verifiable and timely landing records,
2. Documentation of product pooling by transporters (salmon packers, live crab and rockfish, gill net herring),
3. Lack of a data management system,
4. The complete lack of unique product identifiers.

Current product grading practices in processing plants, particularly for salmon, is a major constraint and cold storage inventory practices are an issue for both monitoring and non-monitored fisheries (Section 4.3.4).

B. Opportunities
In contrast to monitored fisheries, where opportunities exist to build and test pilot traceability models, the focus for non-monitored fisheries needs to be building a structure to support traceability initiatives, including making changes to operational practices in order to bring these fisheries to a state of readiness where pilot programs can be considered. These initiatives include:
Harvest Level -
1. Building verifiable, third party landings monitoring programs,
2. Segregation of catch at packer and transporter level,
3. Building a delivery system which can support use of product ID codes,
4. Building a coordinated industry response to traceability challenges and opportunities (improved industry leadership).

Primary Processor Level
1. Better product segregation at processing (grading salmon),
2. Product labelling and cold storage inventory management.

The readiness report cards provide detail on how these initiatives relate to specific fisheries.

It is unlikely that a sector-wide traceability pilot could be undertaken in any of these fisheries until the changes to operational practices outlined above (or in the readiness report cards) have been addressed. However there is value in conducting smaller scale pilots at both the harvest level (e.g. a component of the salmon troll fishery) or with a specific processor in order to better understand and then demonstrate the degree of change necessary to meet traceability standards.

THE CRISIS IN SALMON CATCH ACCOUNTING

Catch and landings monitoring is a cornerstone of sustainable fisheries in today's environmentally conscious world[1]. It is generally acknowledged that catch accounting in the recreational and First Nations salmon fisheries is deficient and that commercial catch accounting (primarily from fisheries hails) is not verifiable[2]. As stated by Pearse McRae "This need for accurate catch accounting converges with the growing pressure on producers of meat, fish and other foods to be able to trace production back to the producer".

In 1992, 1994 and 2004 a large number of sockeye salmon returning to the Fraser River were unaccounted for somewhere between the Mission counting fence and upriver spawning grounds. A series of reviews and enquiries[3] have repeatedly failed to verify or quantify potential causes, which include inaccurate upstream and spawning grounds counting, warm river water conditions, and/or illegal or unreported harvesting. Clearly improved catch accounting by all harvest sectors coupled with a supply chain traceability would resolve the question as to whether significant quantities of unreported sockeye were entering the seafood supply chain.

Accurate and verifiable catch accounting is a pre-requisite for full chain traceability and significant improvements to salmon catch monitoring, through dock monitoring programs or other means, will be required in order to meet the enforcement and sustainability benefits conveyed by traceability (see Section 3.9 and Appendix B).

[1] GSGislason and Associates 2004. British Columbia seafood sector and tidal recreational fishing; A strengths, weaknesses, opportunities and treats assessment.
[2] McRae and Pearse 2004. Treaties and Transition, Towards a sustainable fishery on Canada's west coast.
[3] Here we go again…or the 2004 Fraser River salmon fishery. Report of the Standing Committee on Fisheries and Oceans, March 2005.

5.4 BEYOND THE REGULATORY FRAMEWORK

Section 3.0 provides a business case for traceability that extends beyond the regulatory framework and includes supply chain management, improved product quality and business information, supporting audit and enforcement efforts (also see Appendix B), and verifying labelling claims. In essence traceability is about society's demand for product information, a demand which, particularly in the food industry, is growing.

It should be recognized that, at the water to buyer level, traceability is important component for supporting sustainable harvest and aquaculture practices, providing assurance for such claims as:
- legally harvested product (both licensed harvester and legal area)
- product from a verified, sustainable quota
- fish feed from sustainably harvested fisheries
- Product harvested with bycatch friendly fishing gear
- Eco-certified product (e.g. MSC)

Increasingly the "burden of proof" for these assurances is shifting to industry and traceability provides a vital information tool to address these assurances (see inset box, The Crisis in Salmon Catch Accounting).

Accommodating society's growing demand for product information conveys a market advantage and there is growing realisation that fisheries monitoring information can be used to address these holistic information requirements. To achieve this, a new integrated data management model emerges that is responsive to meeting societal demands for seafood that is caught sustainably, is safe and healthy to eat and is of a high quality (Figure 5.3). It is important to recognise that society including consumers, not regulators or fisheries managers, drive the information requirements in this kind of model. Inevitably society's demand for information will evolve, most likely increasing information demands. Traceability will remain a moving target, rather than an information endpoint, and players in the seafood industry who are willing and able to accommodate changing information demands will continue to be advantaged in the seafood marketplace.
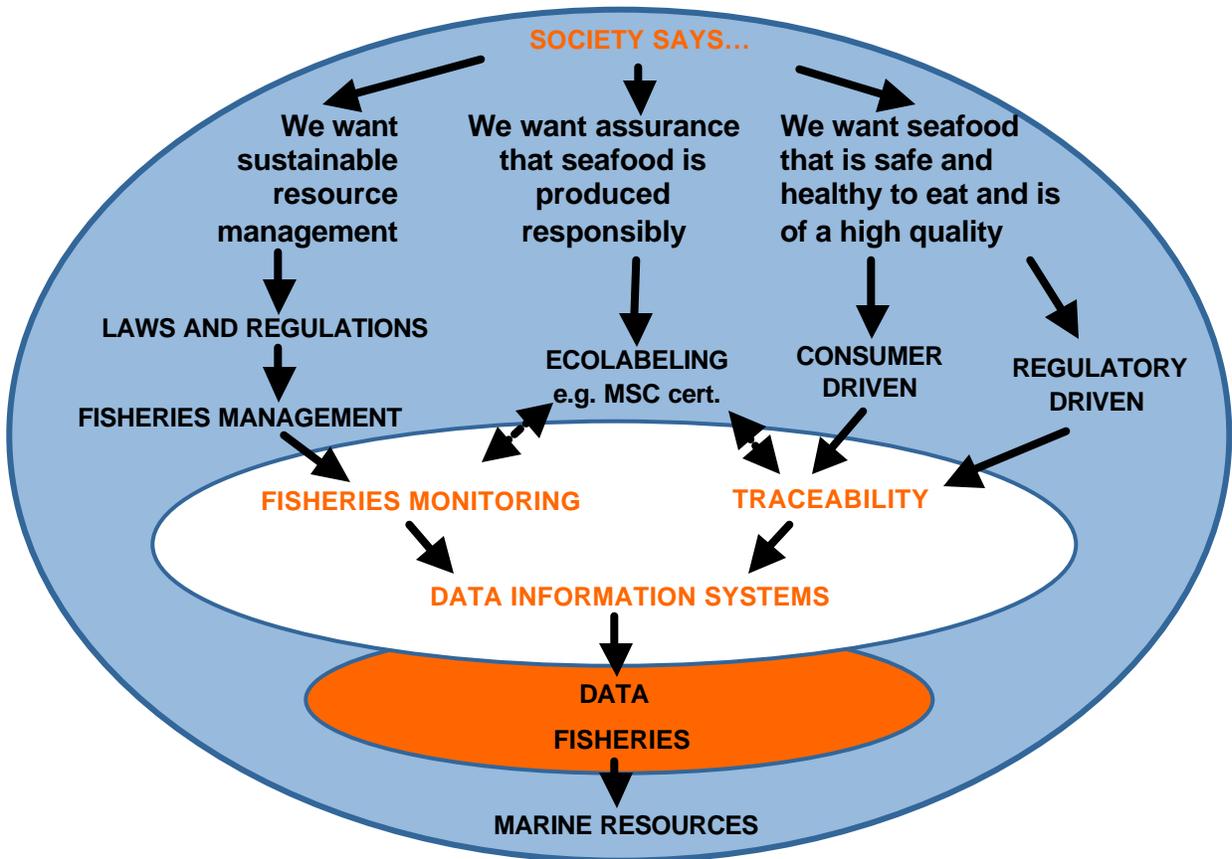
Figure 5.3.   A market driven model for fisheries information systems.