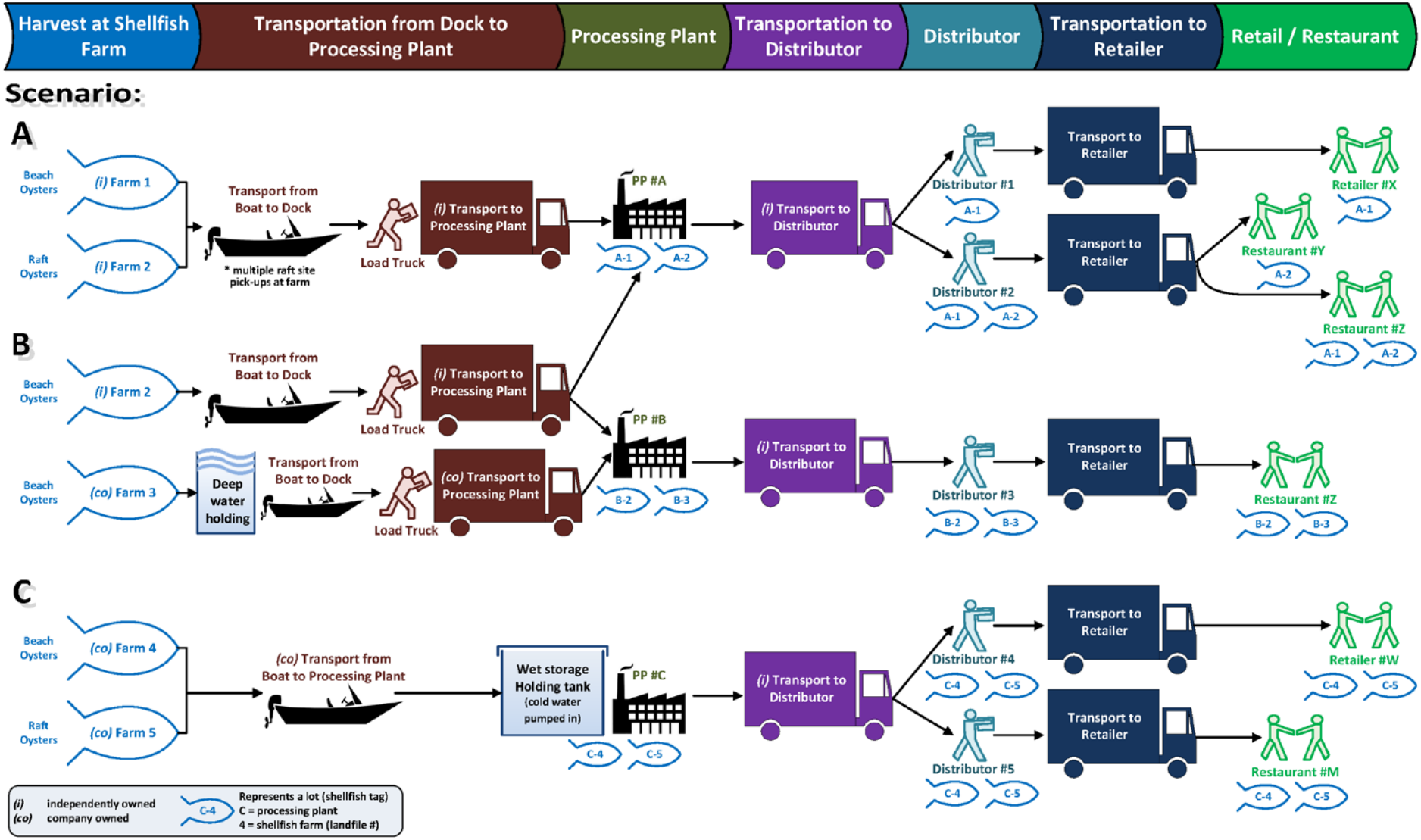
From Shellfish Farm to Retail – examples of shellfish distribution in BC



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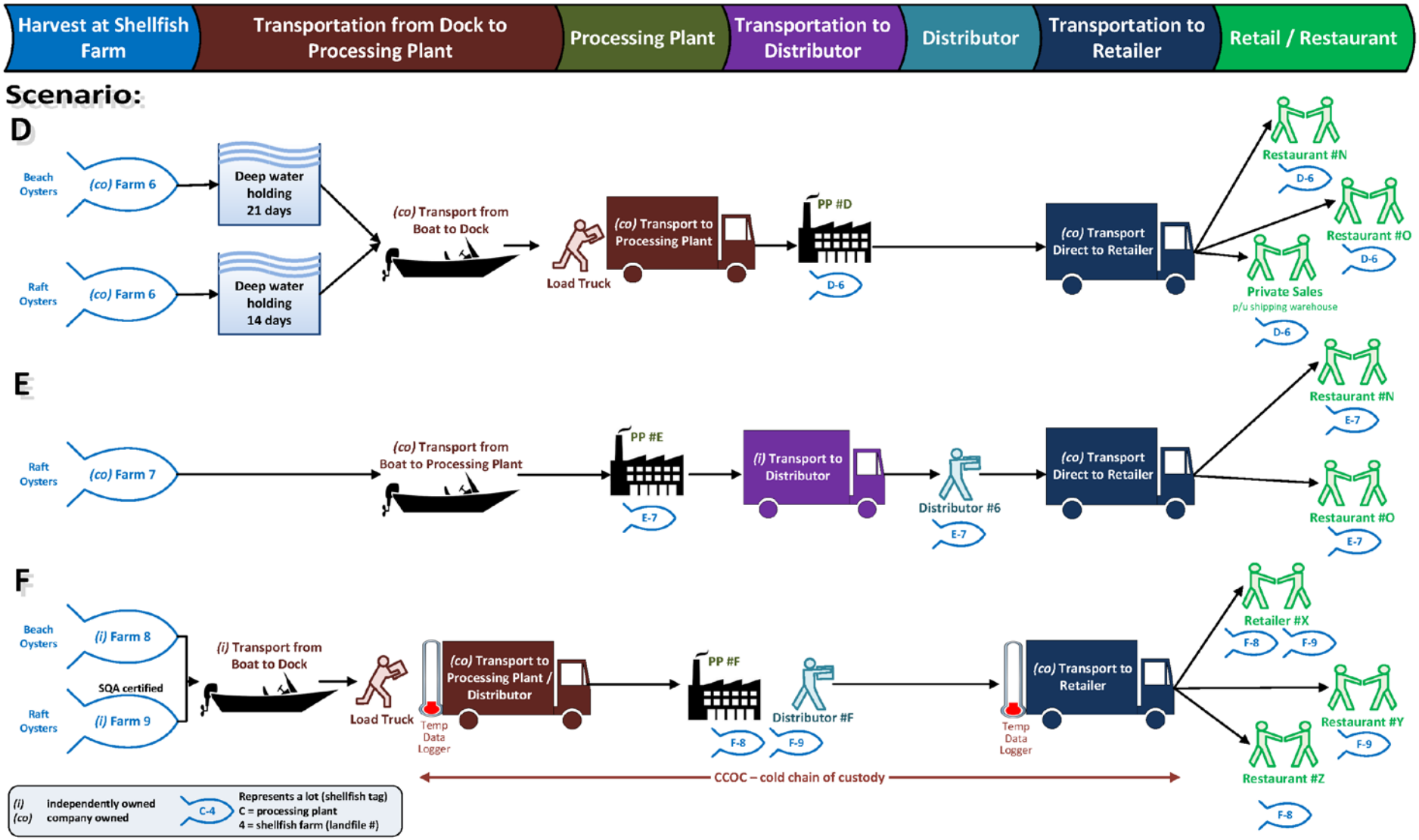

From Shellfish Farm to Retail – examples of shellfish distribution in BC and points of potential risk

Scenarios

A Independent farms supply a processing plant with beach and raft oysters and product is sent to multiple distributors who send on to multiple retailers. At the farm level, a single boat collects oysters from multiple raft sites within a farm, and between farms before unloading at the dock. In this scenario, retailers can receive the same farm oysters handled by different distributors.

B An independent farm supplies beach oysters (from the same farm as in Scenario A) to a trucking company that delivers to multiple processing plants. A company-owned farm – meaning a farm owned by the processor – harvest beach oysters and uses long-line wet holding below thermocline (at cold temperatures) before sending through to the processing plant. In this scenario, the same restaurant (restaurant *z*) may receive the same farm oysters handled by different processors (this restaurant receives 'farm 2' oysters in Scenario A from processor A and in Scenario B from processor B).

C The processor only receives oysters from shellfish farms they own, and the boat delivers directly to their site where they practice on-site wet storage holding (using cold water pumped in from deep ocean) to equilibrate oysters (removing excess *Vibrio parahaemolyticus* and reducing the temperature). This site is also the processing plant location for the oysters, which move from the holding area into the processing plant. Similar to Scenario A, multiple distributors and retailers receive the product.

D A company-owned farm harvests beach and long-line oysters, and practices deep water holding for 21 and 14 days respectively. The company owns their own delivery trucks and distributes directly to restaurants (by-passing distributor), maintaining temperature control of product through-out food chain. Private sales (via company owned internet site) are delivered to shipping companies with cold storage for pick-up by individuals.

E A company-owned farm collects product in a boat that transports directly to the processing plant.

F A major distributor is also a processor. They only accept product from SQA (supplier quality assurance) shellfish farms. At point of harvest, SQA farms are required to record water temperature and depth, oyster meat temperature, and harvest time. The trucks accepting product have data loggers that maintain cold chain at <10°C to the processing plant, and are required to report loading time. At processing plants temp is <4°C, and temperature control is maintained during distribution to retail/restaurant (at ≤4°C). This system is described as a comprehensive CCOC – cold chain of custody. NOT SHOWN IN DIAGRAM: Processor F also acts as a secondary processor/distributor by purchasing product from other processing plants. In this scenario, a restaurant may receive product from the same distributor originating from different processors.

Examples of potential risk in the system and control measures used to mitigate risk during harvest and delivery to processing plant

☐ **Shellfish farm harvesting practices - RISKS**

- Time of day as it relates to air temperature during harvesting (cooler times of day lower risk),
- Water temperature (lower water temperatures lower risk),
- Length of time to harvest (shorter harvesting periods lower risk),
- Exposure of shellfish to shallow water or beach conditions, where *Vibrio* levels are higher (in comparison to deeper/colder water conditions),
- Delay in lab reporting from sample to harvest, when oysters are sampled for Vp to provide assurance Vp numbers are low prior to harvest. For example, oysters sampled on Day 1, results are back from laboratory on Day 3, harvesting occurs on Day 3 or 4 based on samples collected 48 to 72 hours prior. Possibility that environmental conditions have since changed, and Vp levels have increased (increasing risk) or decreased (lowering risk).

☐ **Shellfish farm harvesting practices – CONTROLS**

- Testing of water temperature or oyster meat temperature at point of harvest,
- Various wet-holding methods at lower water temperatures,
- Testing of oysters for Vp prior to and at point of harvest,
- Farms are SQA (supplier quality assurance) certified,
- Farms are farming practices are inspected.

☐ **Transport chain time and temperature from farm to processing plant – RISKS**

- A single boat will pick-up shellfish from multiple raft sites (within a farm and between farms), potential delay in delivery to dock will increase risk,
- Lack of icing or temperature control of oysters on the boat: oysters transported /stored on the boat at ambient temperatures increase risk,
- The time a boat is waiting at the dock before the transport truck arrives to pick-up shellfish (longer time may increase risk in absence of temp control),
- The initial temperature of the transport truck and the initial temperature of the shellfish being loaded (lower temperatures, lower risk),
- Length of time to load the truck (shorter loading times, lower risk),
- Length of time for shellfish on the refrigerated truck to come under temperature control under a full load: goal is <10°C within 4 hrs (shorter times, lower risk),
- A truck may make several stops at different farms/dock sites before going to the processing plant. Opening and closing the door affects interior temperature.

☐ **Transport chain time and temperature from farm to processing plant – CONTROLS**

- Icing or refrigeration control on boat for oysters in totes. Layered ice, and top coating of ice to keep shellfish cold,
- Trucks are pre-chilled at loading dock,
- Mechanical refrigeration of trucks,
- Trucks have temperature data loggers, and/or drivers monitor temperatures,
- Trucks and trucking practices are inspected.

Examples of potential risk in the distribution system and at the processor, distributor and retail/restaurant and control measures used to mitigate risk

☐ **Delivery trucks during transport from processor to distributor and retailer – RISKS**

- Multiple stops, ferry transport (turning off reefer unit),
- Delays in delivery,
- Poorly functioning refrigeration capacity.

☐ **Delivery trucks during transport from processor to distributor and retailer – CONTROLS**

- Trucks have ability to maintain temperature control of product during transport,
- Trucks are pre-chilled at loading dock,
- Mechanical refrigeration of trucks,
- Trucks have temperature data loggers, and/or drivers monitor temperatures,
- Trucks and trucking practices are inspected.

☐ **Handling processes at processor, distributor and retailer/restaurant – RISKS**

- When product is delivered to either processor, distributor or retailer/restaurant, the length of time before product is unloaded and placed under temperature control (shorter time, lower risk),
- The interior temperature of the premises where shellfish are handled (lower temperatures, lower risk),
- The amount of time product is out of temperature control during handling (lower time, lower risk when interior temperature of premise is above 10°C),
- When product at restaurant is prepared for service, length of time before product is served to and eaten by consumer (shorter times, lower risk),
- When product is displayed at retail, shellfish are stored in poor quality tank water, or displayed incorrectly (e.g., placed cup side up on ice),
- Storage time and temperature of product prior to sale (shorter time, lower temperatures, are lower risk),
- At point of sale to retail consumer, packaging for temperature control.

☐ **Handling processes at processor, distributor and retailer/restaurant – CONTROLS**

- Temperature of product is checked on arrival and shipments are approved or rejected based on temperature,
- *Vibrio* levels are tested in product lots at processor level, and at retail level – either through a QMP program, or as part of verification/validation process,
- Cold chain of custody can be established,
- Processors, distributors and retailers are inspected.