

An aerial photograph of a salmon farming operation in a fjord. Numerous circular net pens are visible in the water, connected by lines. A small boat is near the pens. The background shows steep, forested hills.

# Escapes and “Human Failure”

## The Atlantic Canadian Perspective

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# General Causes of Escape

- Structural Failure of farm infrastructure.
- Operational / Management Failure during routine operations.
- Biological Failure that includes predator attacks and vandalism

Acute losses - most often a combination of weather and equipment / structural failure

Ice may cause significant damage to the operation leading to an escape opportunity.





# HDPE Collar Elongation & Collapse

Single storm damage

Elongation of the HDPE collar to failure



# HDPE Pipe Damage



Permanent kinking of the  
HDPE pipe

HDPE surface pipe broken





# Operational “Human” Failure

- Saltwater Operations

*Critical operational points for the potential of Atlantic salmon escape.*

Broad Operational Categories	Specific Potential Escape Vectors	Possible Frequency of Occurrence	Chronic or Acute Escape	Possible Number of Net Pen Escapes per Event
Fish Handling	Hatchery Smolt Transfers	Once	Chronic → Acute	Up to Entire Truck Load (0-40,000)
	Weight Sampling & Sea Lice Counts	Monthly / Weekly	Chronic	Up to Entire Sample (0-30)
	Grading & Splitting Populations	Once	Chronic → Acute	Up to Entire Stock (0-120,000)
	Fish Health Treatments	Monthly	Chronic → Acute	Up to Entire Well Boat Load (0-40,000)
	Harvesting Stock	Once	Chronic → Acute	Up to Entire Harvest Number (0-50,000)

# Operational “Human” Failure

- Saltwater Operations

*Critical operational points for the potential of Atlantic salmon escape.*

Broad Operational Categories	Specific Potential Escape Vectors	Possible Frequency of Occurrence	Chronic or Acute Escape	Possible Number of Net Pen Escapes per Event
Farm Procedures	Net Changes	0-3 Times	Chronic → Acute	Up to 50% of Stock (0-60,000)
	Securing Vessels to Net Pens	Daily	Acute	Up to Entire Stock (0-120,000)
	Towing of Net Pens with Stock	0-2 Times	Chronic → Acute	Up to Entire Stock (0-120,000)
	Diver Entry for Mort Removal or Stock Inspections	Weekly to 3x/wk	Chronic	Low Likelihood for Large Escape (0-1,000)

# Reducing the Human Factor

- The causes for farmed fish escape are complex and varied
- “human error” not always on the part of site crew
  - QA/QC at net loft when seam let go on new net
  - Fishermen on “auto-pilot”













# Reducing the Human Factor

Can it really be eliminated?! No

- Training in procedures / equipment use
- Written SOPs
- 3<sup>rd</sup> party certifications
- Codes of Containment
- Daily operations planned to minimize the possibility for escape – tide, weather
- Work with service providers – net loft, divers

Daily attention to detail – hard to maintain / ensure

# Questions



# Thank you

