

Complex Gill Disease
Initiative (CGDI)



CGD Risk Factors

Intro

CGDI Team UPEI

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CGD Risk Factors (Project Activity 1)

Subject

Risk factors for complex gill diseases in BC

Objective

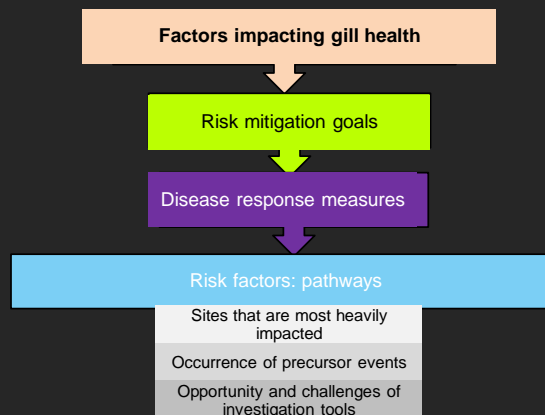
Profile and quantify risk factors correlated with CGD in BC salmon farms

Actions

Field data summary and data integration

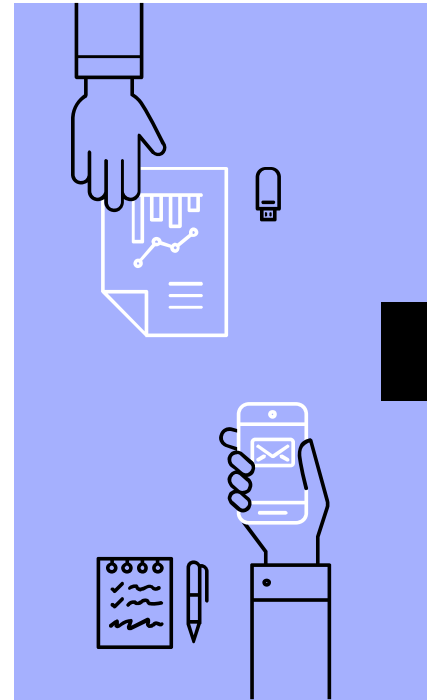
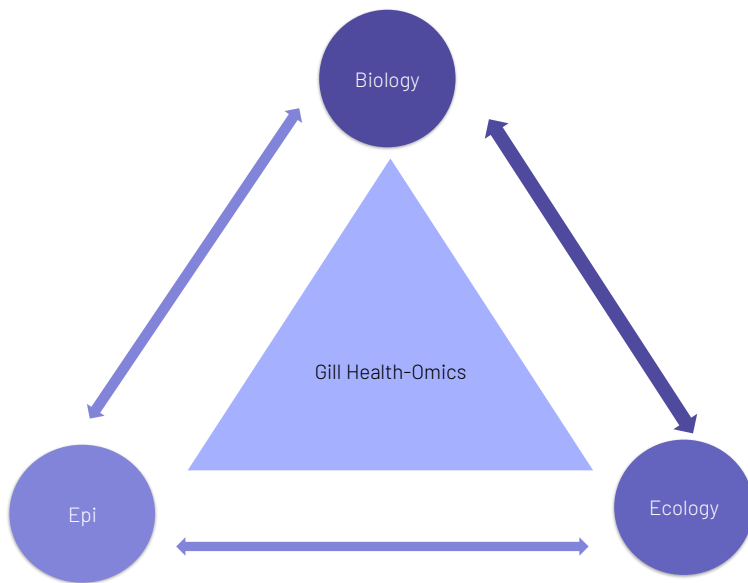
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Target summary



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Biology-Epidemiology-Ecology



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Consideration from 3 Angles

Proposed explorations and open for further improvement

Angle1: Distribution of CGD

Decompose spatial and temporal observations of CGD

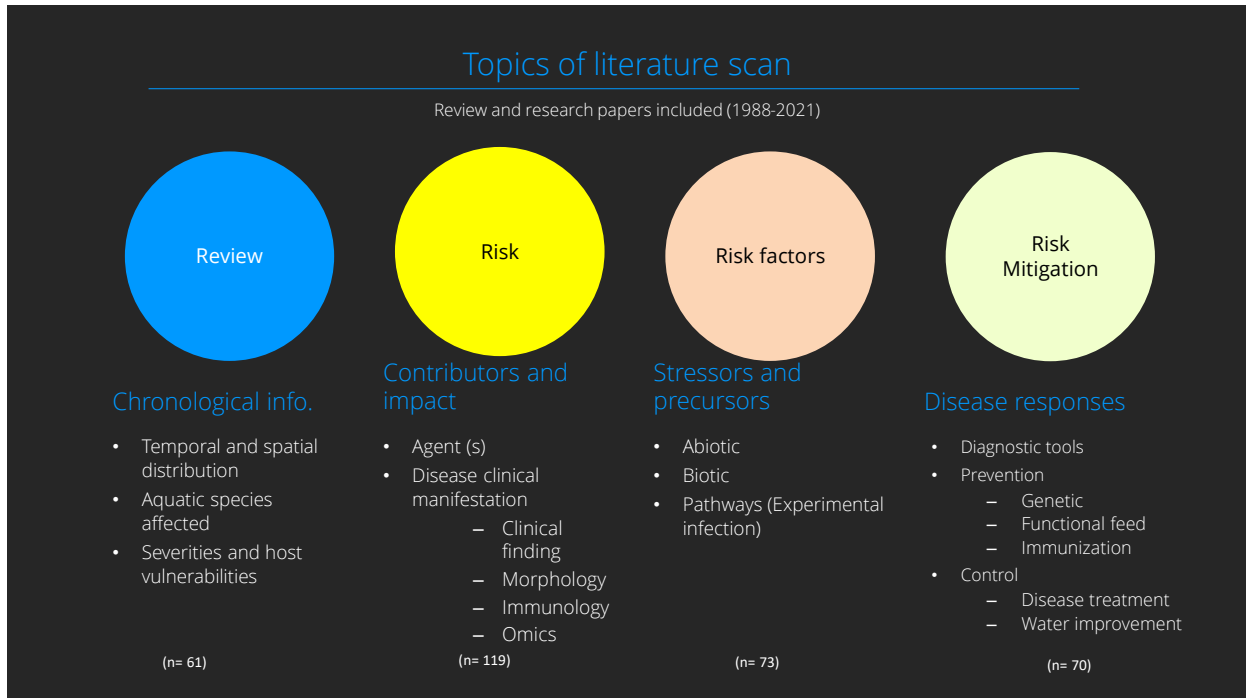
Angle2: Concurrence vs. causation

Describe environment and biotic conditions concurrent with CGD

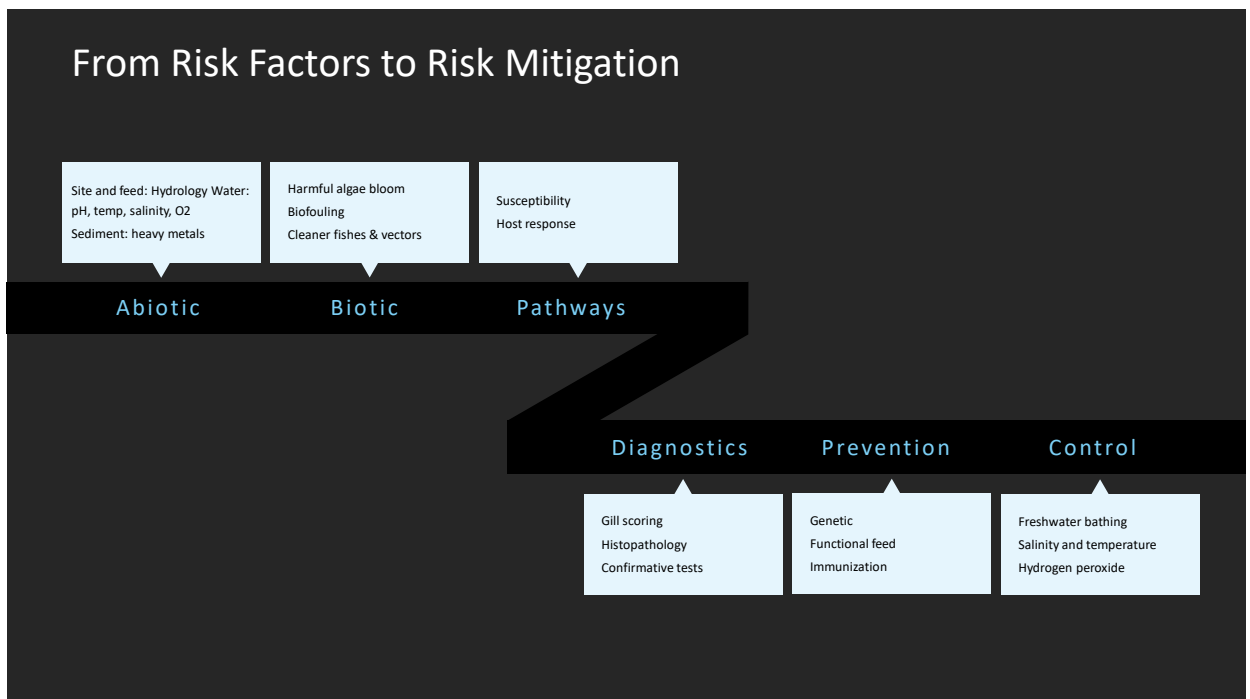
Angle3: Quantification and measurement

Develop indicators-biomarkers-index to profile risk factors associated with CGD and to predict risk of CGD

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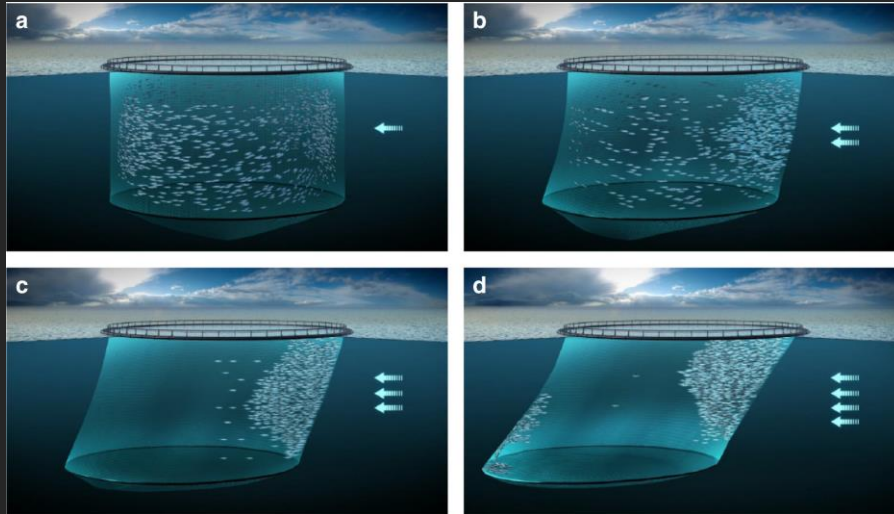


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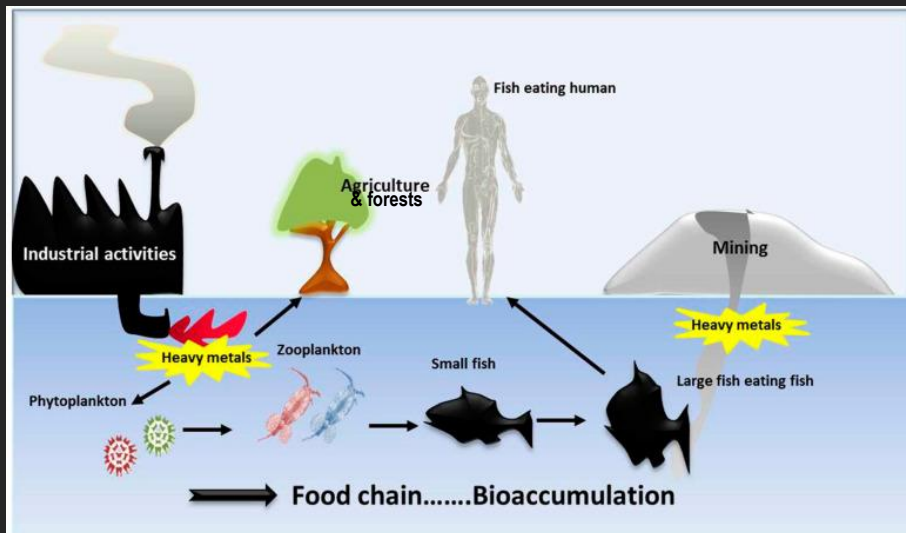
**Atlantic salmon group structure in sea cages
in response to increasing current velocities or fish handling**



<https://onlinelibrary.wiley.com/doi/full/10.1111/raq.12501>

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Bioaccumulation example of heavy metals due to mining industrial activities, and its effect on the aquatic food chain.



Adpated from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7278602/>

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Fish microbiome

Fish treatment
(e.g. antibiotics, KMnO₄, algaecides)

Infection
(bacteria, parasite, virus, fungi)

Fish microbiome

Aquaculture practices
(e.g. fish transfer, rearing density, starvation, diet)

Water quality
(e.g. pH, O₂, NH₃, salinity)

<https://onlinelibrary.wiley.com/doi/10.1111/raq.12375>

Parasite exposure and host susceptibility jointly drive the emergence of epidemics

(a)

		Parasite exposure?	
		0	>0
Host susceptible?	No	No epidemic	Transmission bottleneck
	Yes	No epidemic	Epidemic

<https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1002/ecy.3245>

(b)

Probability of infection

Parasite exposure

More susceptible:
Low susceptibility threshold

Less susceptible:
High susceptibility threshold

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Risk factors to consider

Marine Environment

- Site location: exposure history & hydrology
- Water: Physical & chemical
- Plankton: Phyto- & zoo- plankton

Anthropogenic factors

- Aquaculture management: Feed, handling, treatment, smoltification, freshwater-saltwater, density, net cleaning
- Non-aquaculture: Land use, i.e. forestry runoff

Others???

Open for discussion.

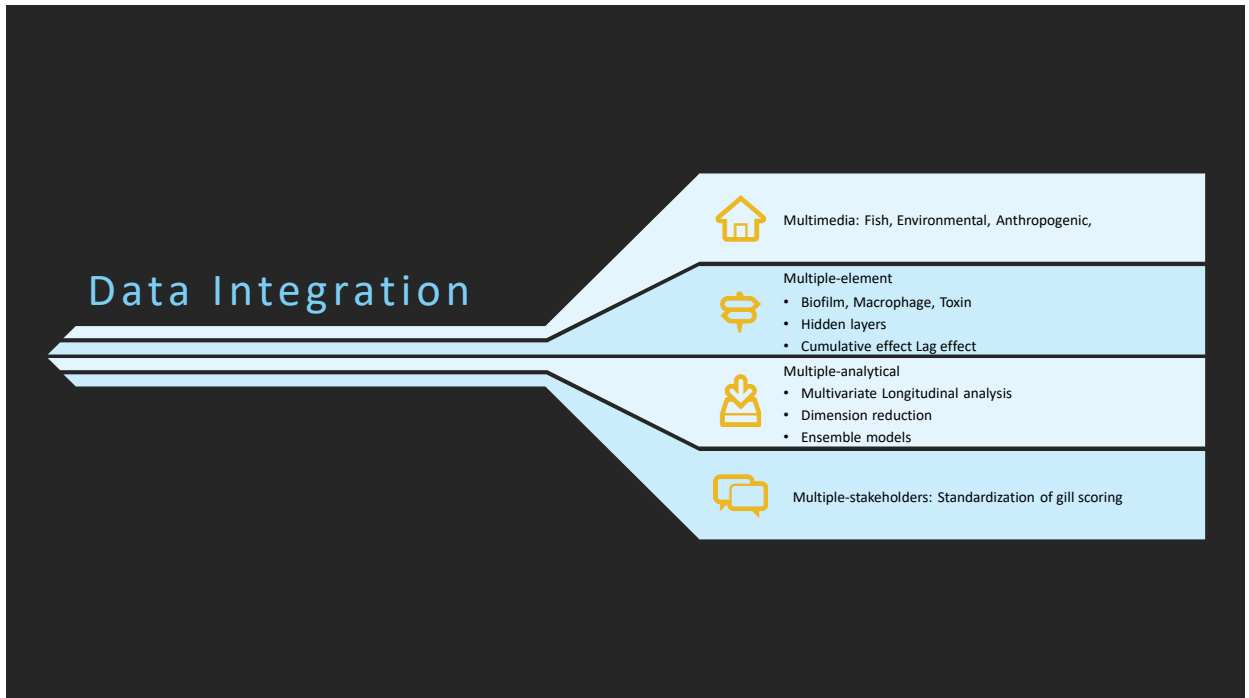
Fish

- Genetic factors: resistance
- General health: vulnerability

Pathogen

- Virulence and habituation

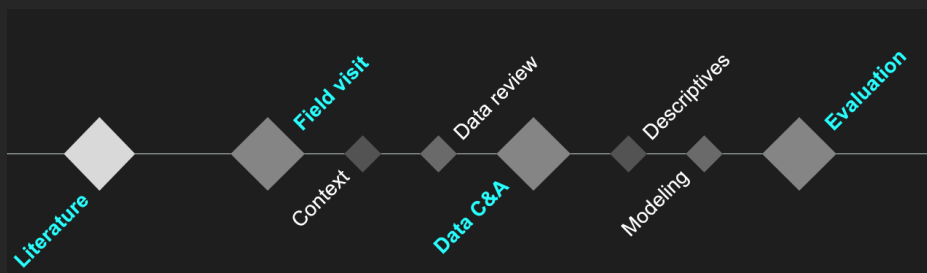
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What's next?

- Field visit
 - Better understanding of contextual situation and industry practices
 - Review of data availability and expected outputs of data summary
- Data compilation and analyses
 - Descriptive and spatial temporal analysis
 - Integrated model establishing
- Evaluation of model performances



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OPEN DISCUSSION