**Research Proposal – Tom, Zohra, Javad, Erica, Sam, Mike**

**What do traits drive?** (effect)

-Approx. 10 sites with seasonality that can be compared

**Research question:** Can zooplankton traits explain variation in their predator’s survivability?

Rationale: Certain species may share trait(s; complexes) depending on their functions that are influencing the presence/abundance of fish predators. This may influence certain species to co-occur or impact abundance. By understanding how zooplankton species’ traits interact we can better assess how this affects the abundance of higher trophic level predators (fish).

Null Hypothesis: Fish abundance is independent of zooplankton abundance and traits.

Hypothesis 1: Fish abundance is dependent on zooplankton abundance only.

Hypothesis 2: Fish abundance is dependent on zooplankton traits only.

Hypothesis 3: Fish abundance is dependent on zooplankton abundance and traits.

Relevant Traits:

Zooplankton traits we hypothesize are important:

-size, trophic guild (%), depth, N:C ration, fat-mass content, food strategy/mode

Relevant variables:

-Environmental variables: temperature, salinity, pH, precipitation

-Fish-related variables:

-Phytoplankton-related variables: chlorophyll content

Methodology:

-Based on ‘Zooplankton variability in the Strait of Georgia and relationships with marine survival of Chinook and Coho’ paper; using anomaly data to predict fish predator survivability in SoG

-check correlation between predictor variables

-Residuals from PCA that includes ZP abundance vs. PCA that removes ZP abundance (traits only)

-Compare zooplankton abundance over the years to determine anomalies over time – use as predictor

-Compare trait complex anomalies in zooplankton over time – use as predictor

Herring/Salmon presence variable ~ biomass anomaly + trait anomalies + environment data

-AIC model selection to determine values of these ^^^ plus interactions

Questions we need answered:

-Fish species focus; one or multiple

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Traits with the most data (largest samples):

Traits.lvl1 – individual specific

-carbonWeight (n = 3996)

-dryWeight (n = 3133)

-respirationRate\_15C (n = 2051)\*

-excretionRateN\_15C (n = 1989)\*

-nitrogenPDW (n = 1611)

-carbonPDW (n = 1522)

-nitrogenTotal (n = 1363)

-ratioNP (n = 1269)

-ratioCN (n = 1159)

verticalDistribution (n = 1101)

-ratioCP (n = 1035)

-excretionRateP \_15C (n = 1017)

-trophicGroup (n = 1001)

-feeding mode (n = 969)

-myelination (n = 862)

-phosphorusPDW (n = 733)

-clearanceRate\_15C (n = 679)\*

-phosphorusTotal (n = 630)

-dielVerticalMigration

-habitatAssociation (n = 569)

-wetWeight (n = 519)

Traits.lvl2 – species specific

-bodyLengthMax (n = 3028)

-verticalDistribution (n = 909)

-trophicGroup (n = 760)

-reproductionMode (n = 747)

-feedingMode (n = 677)

-mylination (n = 550)

-habitatAssociation (n = 533)

-dielVerticalMigration (n = 501)

Traits:

-carbon weight

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