

A photograph of a worker in a hatchery, wearing a light-colored t-shirt and camouflage overalls, standing on a metal walkway overlooking a large, deep tank filled with thousands of salmon. The worker is holding a long, thin object, possibly a net or a tool, and appears to be managing the fish. The tank is made of metal with a perforated surface, and the water is dark and filled with fish. The background shows more of the hatchery structure under a bright sky.

Impacts of managed gene flow on disease resistance in hatchery Chinook salmon

Christopher Setzke¹, Charles Waters¹, Kenneth Warheit², David Fast³, Curtis Knudsen³,
William Bosch³, Maureen Purcell⁴, Kerry Naish¹

¹University of Washington, School of Aquatic and Fishery Sciences

²Washington Department of Fish and Wildlife

³Yakima Nation Fisheries

⁴USGS Western Fisheries Research Center

This information is preliminary and is subject to revision. It is being provided to meet the need for timely best science.

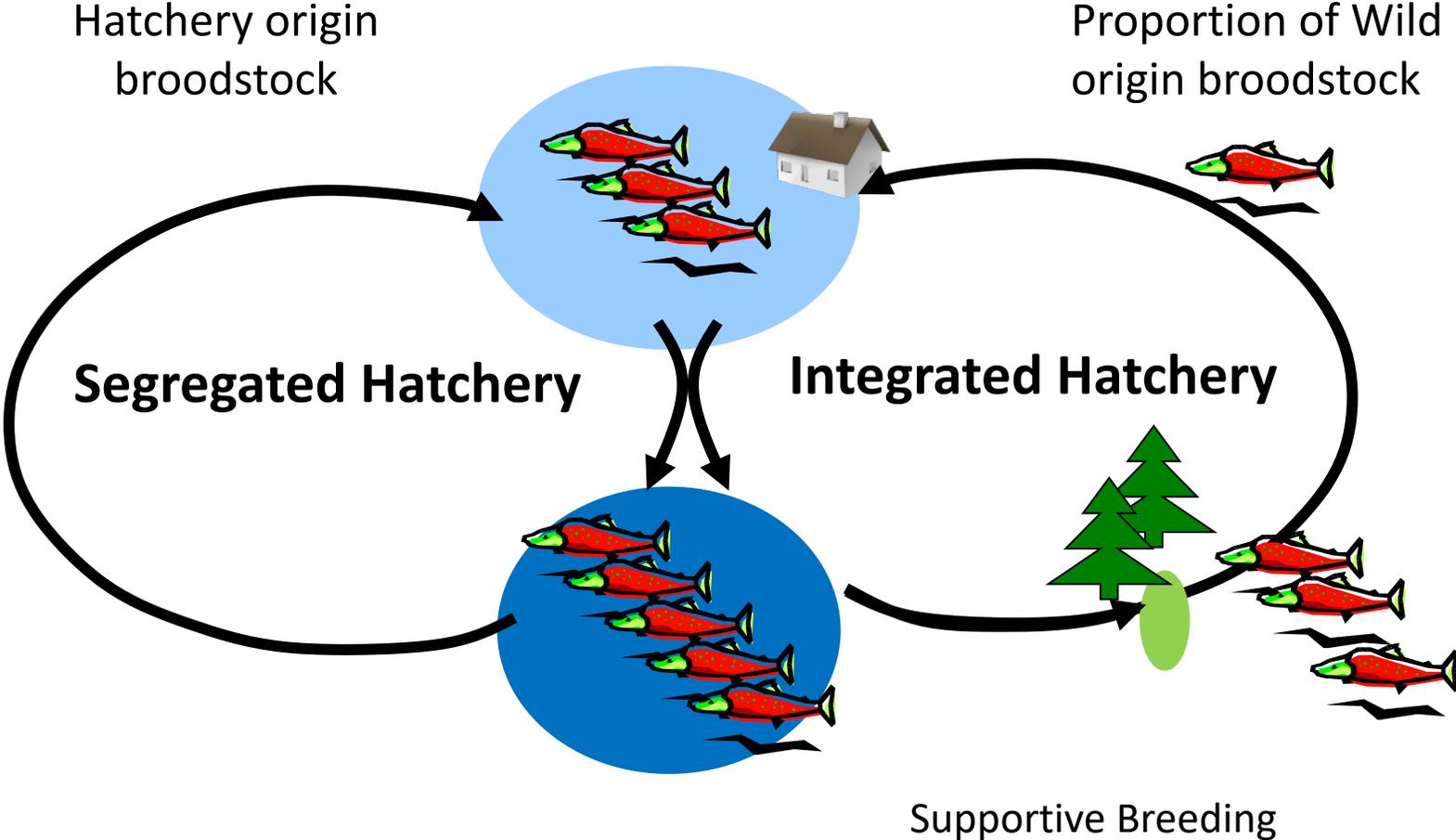
csetzke@uw.edu

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Hatchery Reform



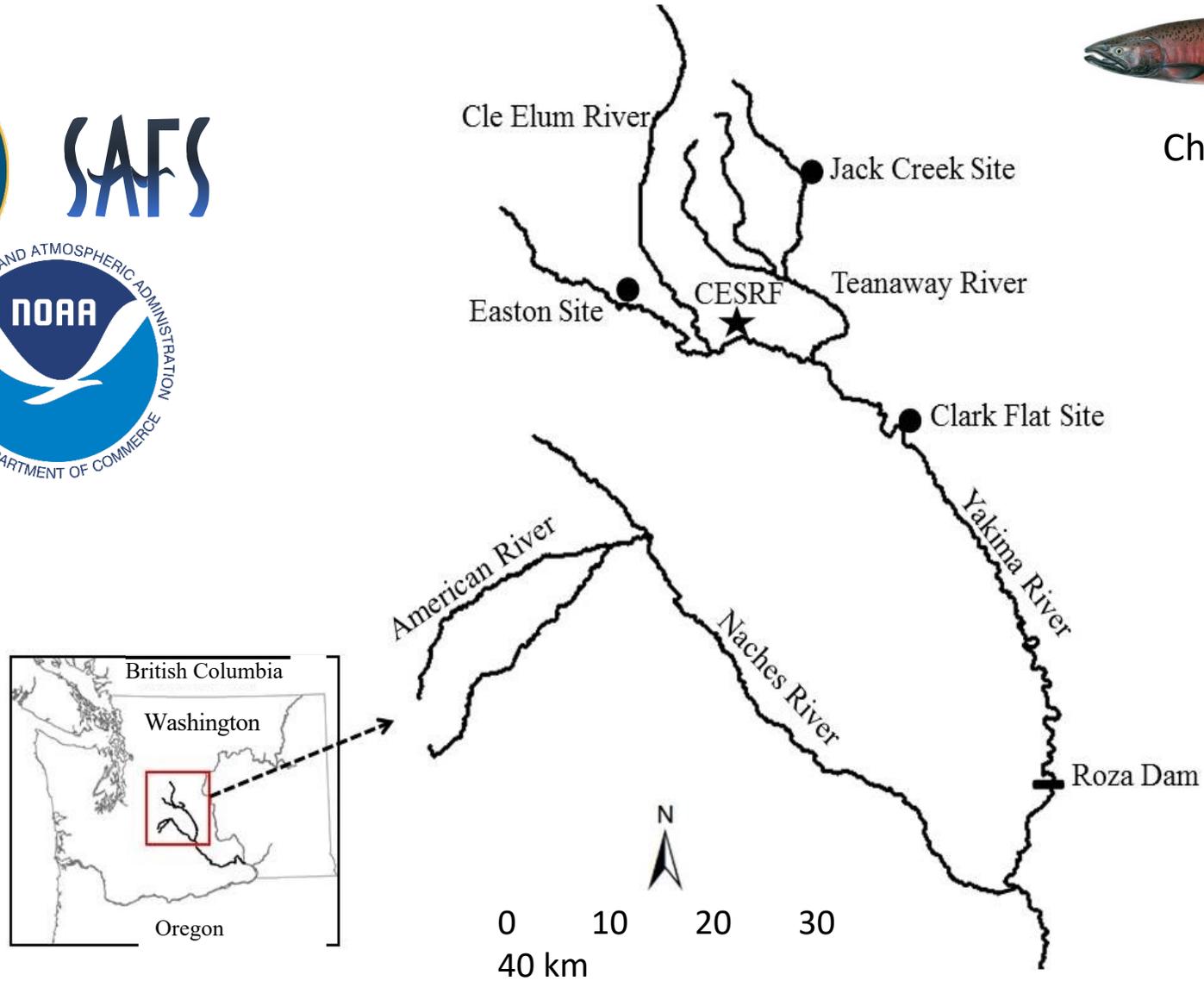
Experimental System



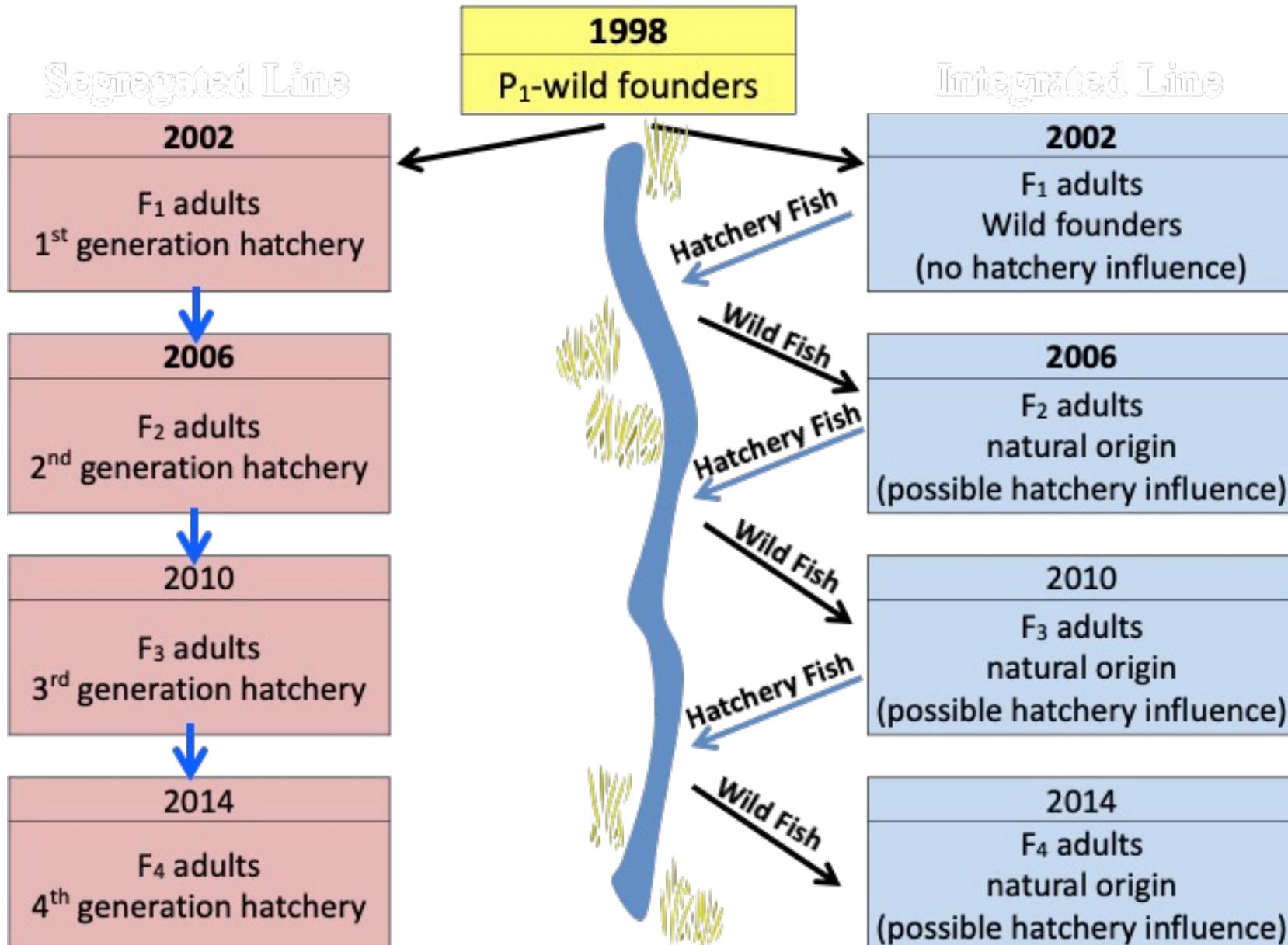
SAFS



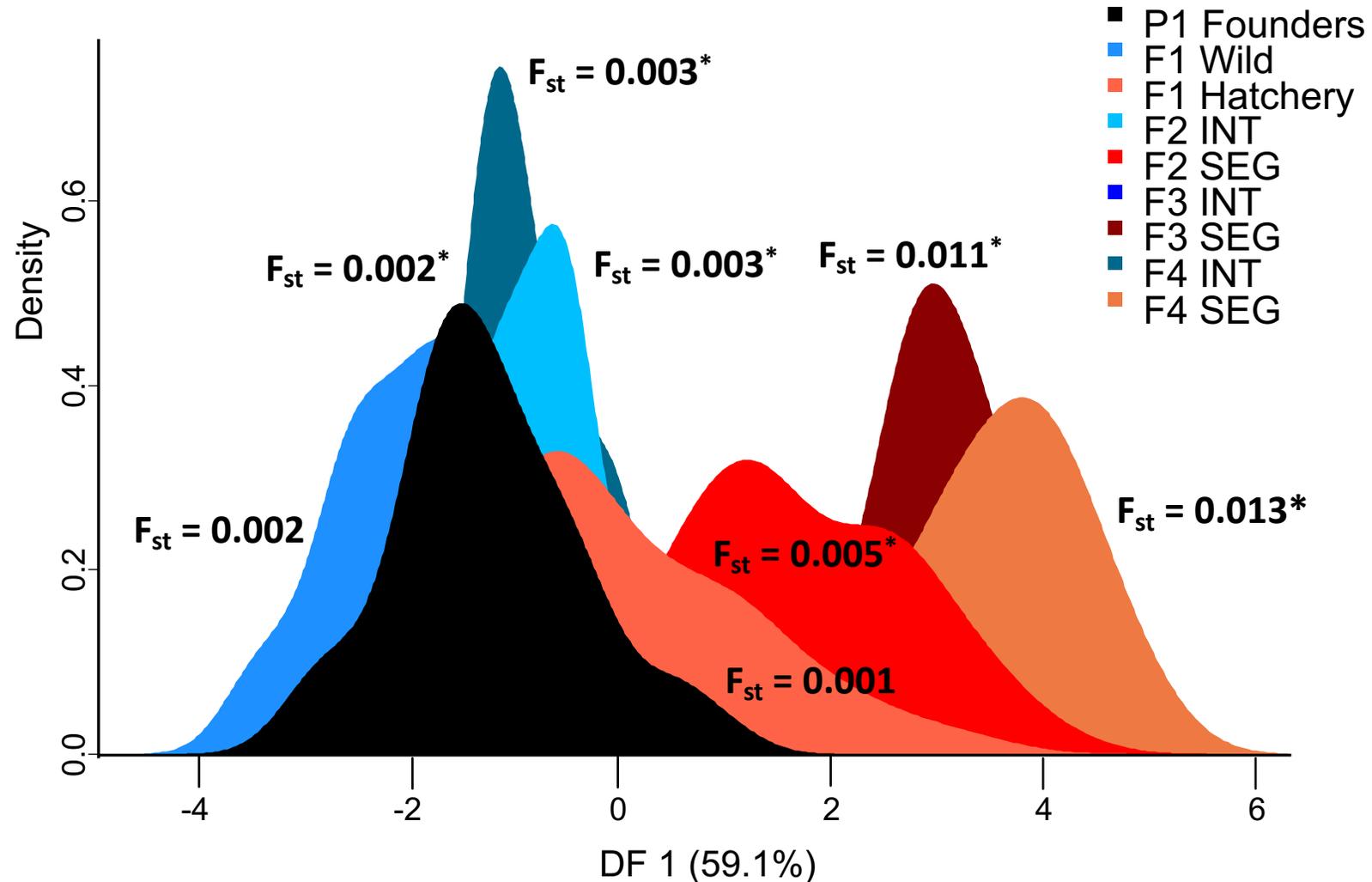
Chinook salmon



Experimental lines

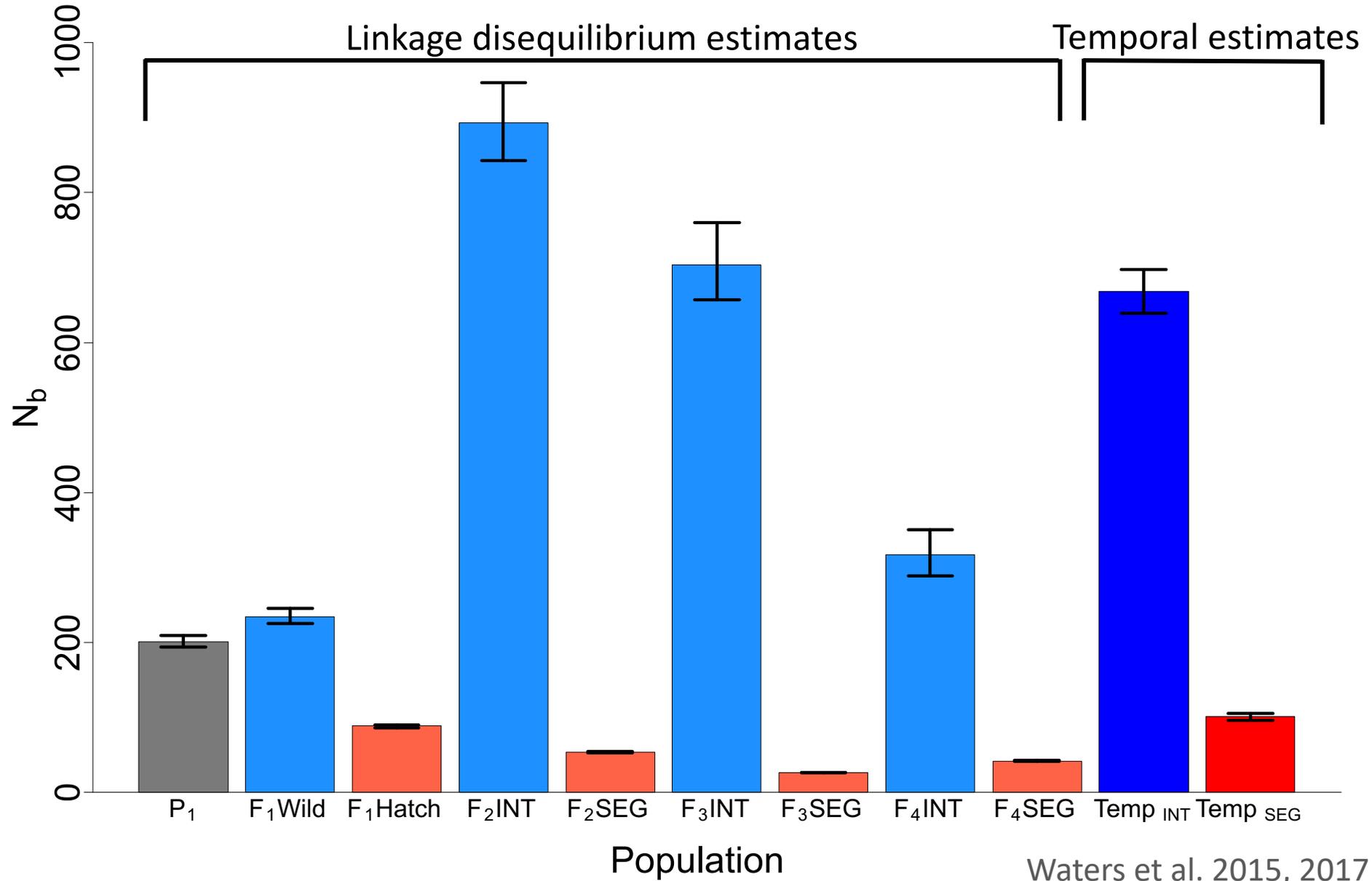


Temporal change in genetic variation



Density plot of individuals along the first discriminant function from the discriminant analysis of principal components (DAPC).

Effective number of breeders, N_b



Study question

- How do different hatchery management practices impact disease response in propagated populations?
- Specifically, how does high (integrated) or low (segregated) gene flow impact disease response in hatchery fish?
- CESRF represents an idealized, neutral system with best disease control practices

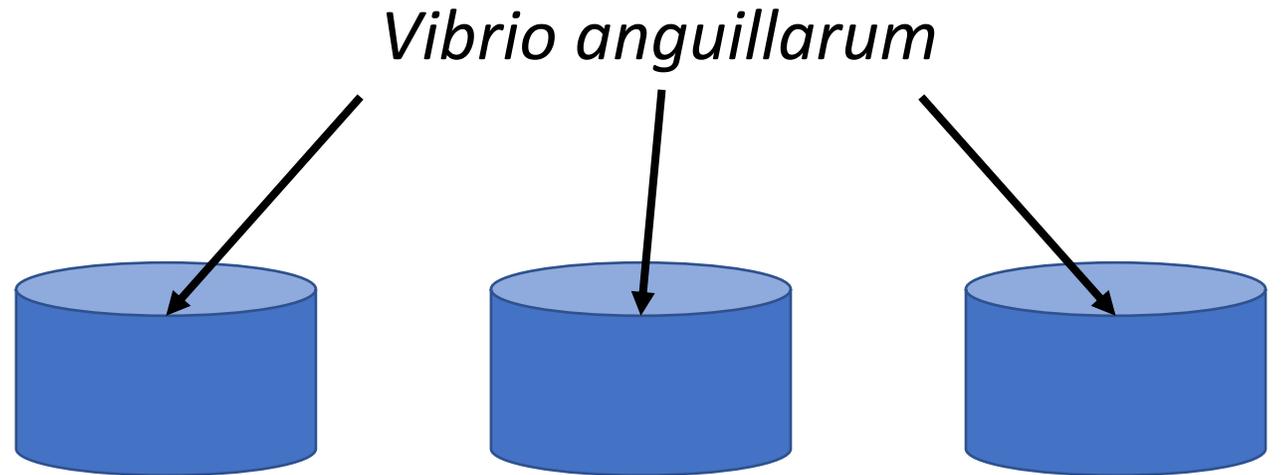
Experimental Design



Integrated Line
29 half-sib families



Segregated Line
28 half-sib families



1125 Fish (~375/tank)

Vibrio anguillarum

- Prevalent in Pacific Northwest
- Model bacterial pathogen
- Interested in generalized immune response to bacterial pathogens

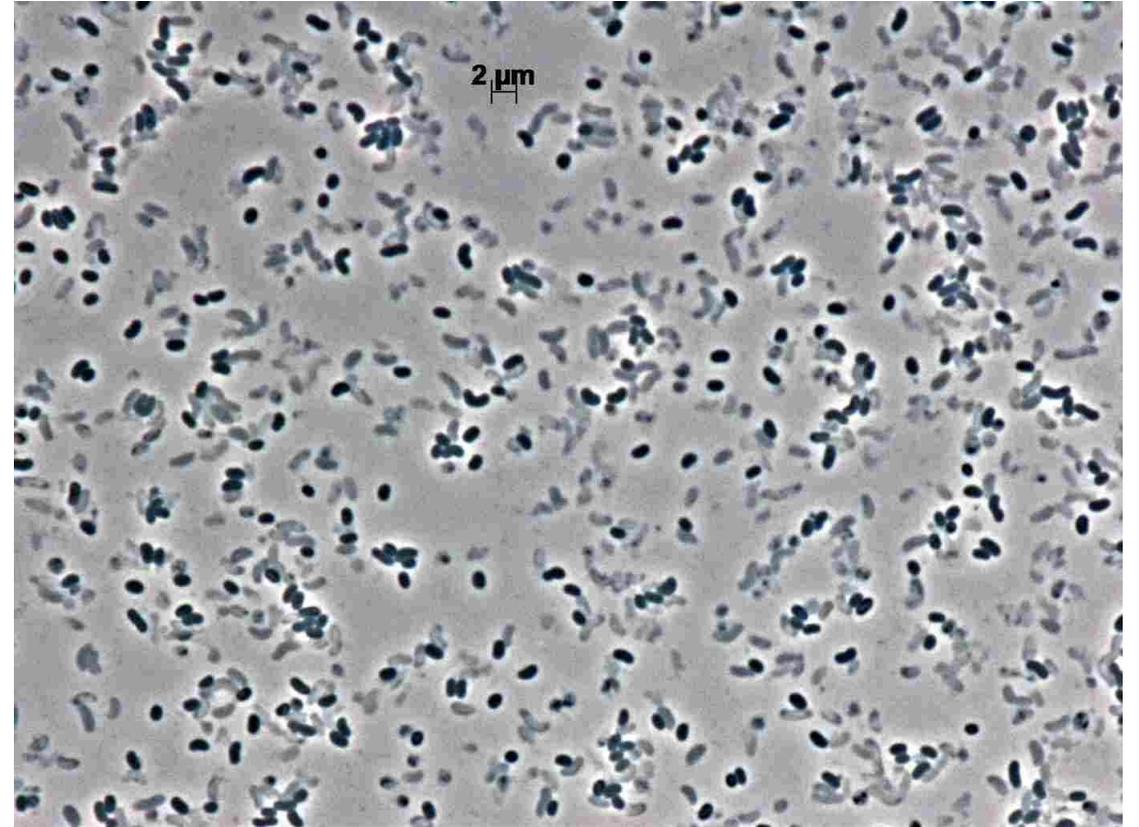
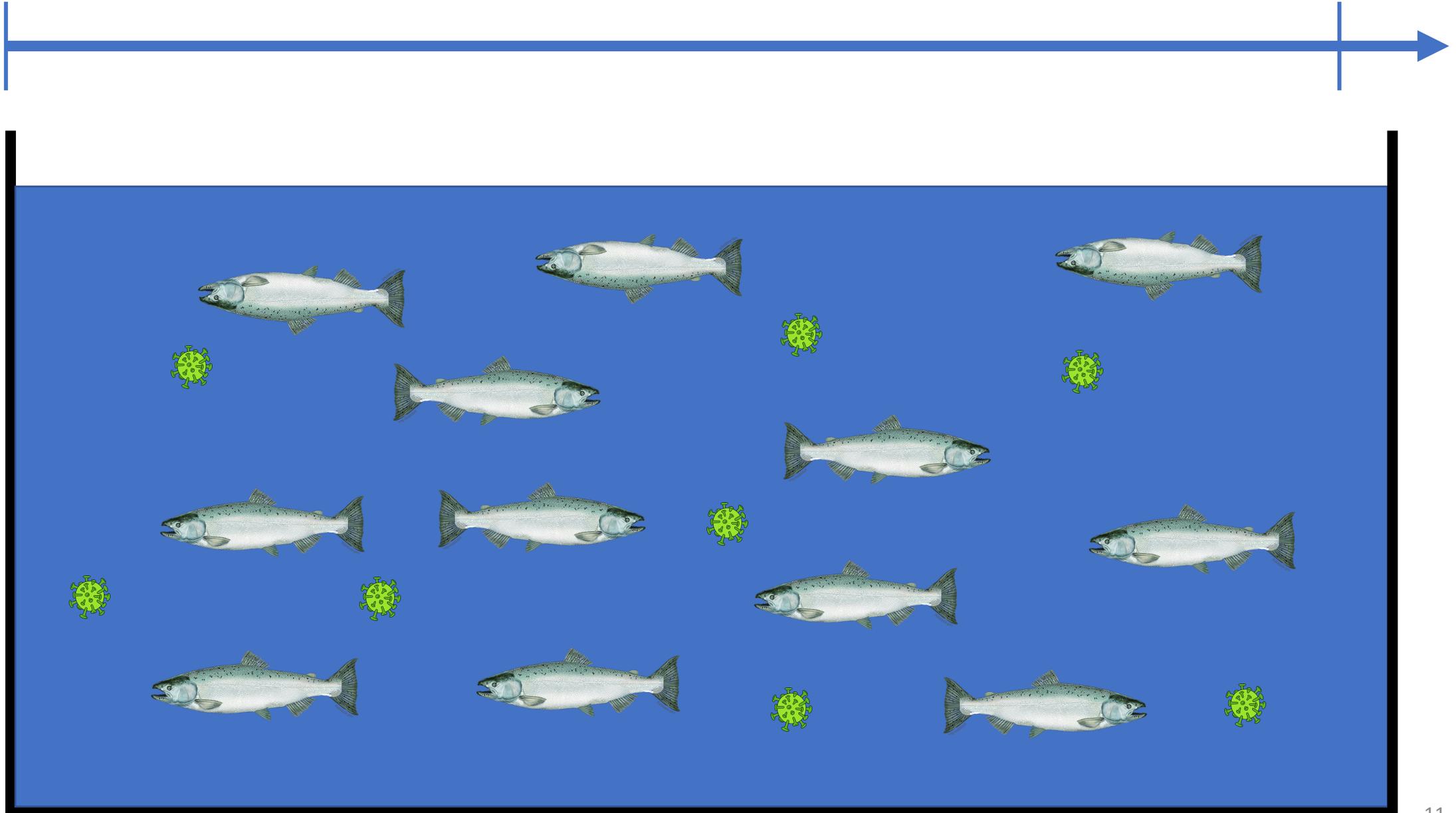
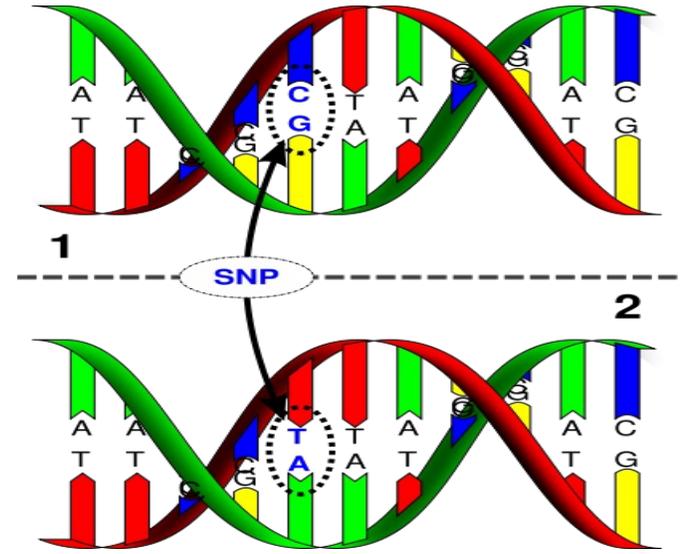
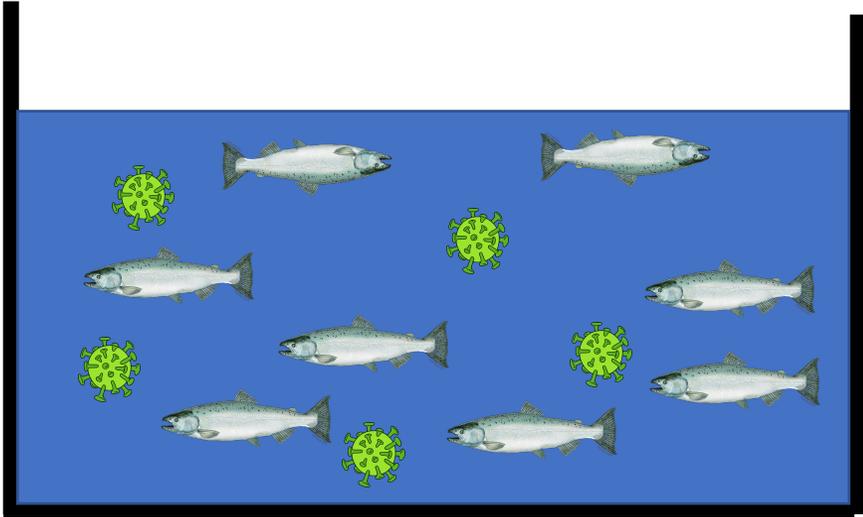


Image by Leibniz Institute DSMZ

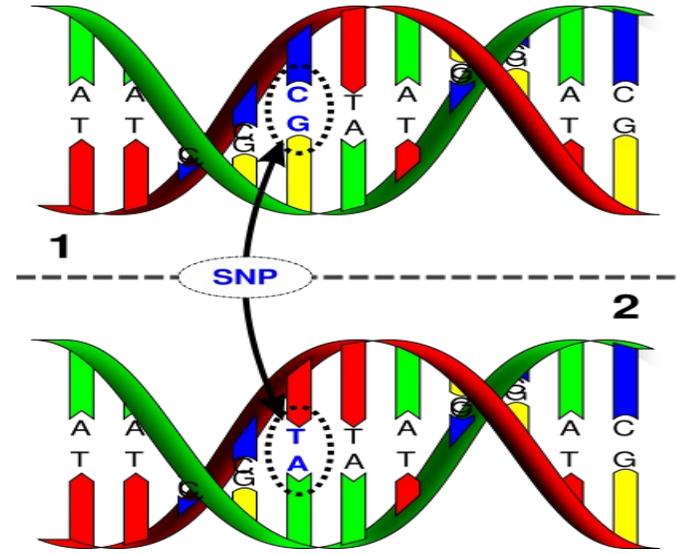
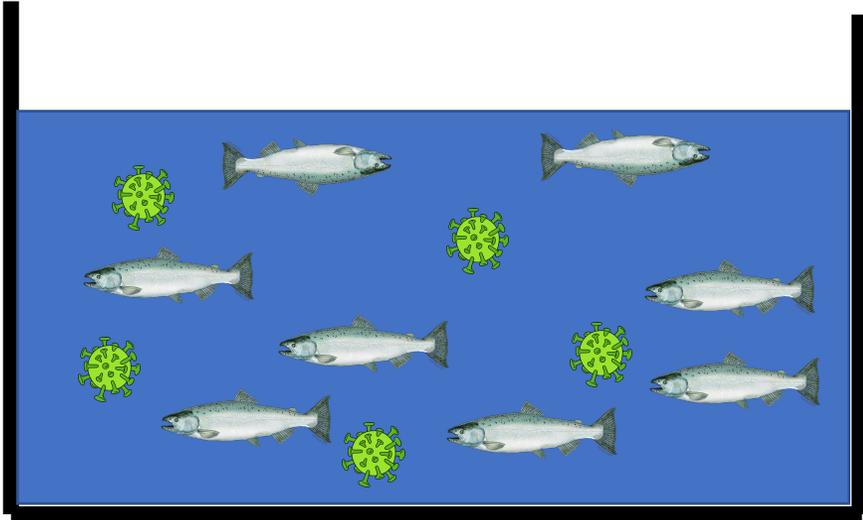
Day 0

Day 14

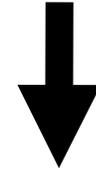




*RADseq



*RADseq



Integrated

Segregated

% survival

?

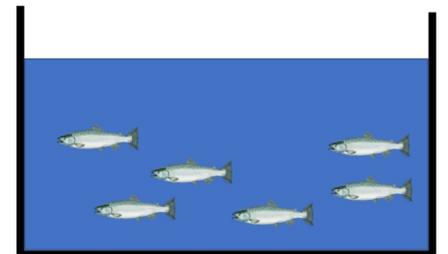
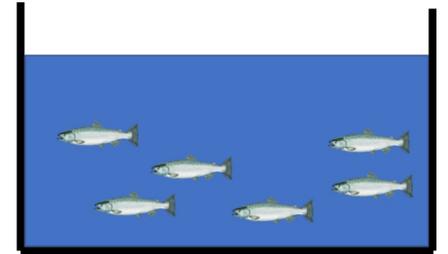
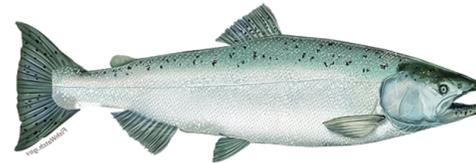
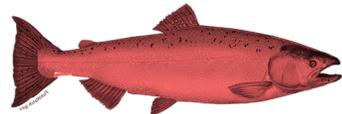
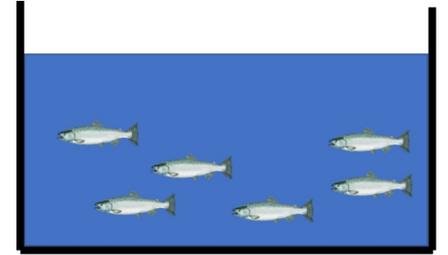
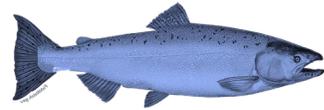
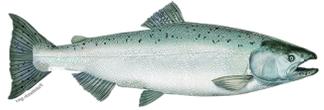
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% mortality

?

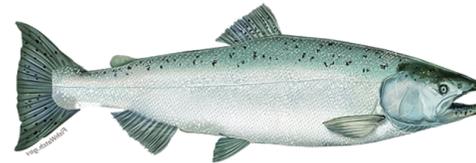
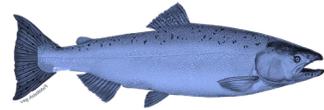
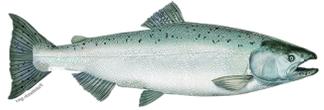
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Mortality \sim Line + Length + Tank

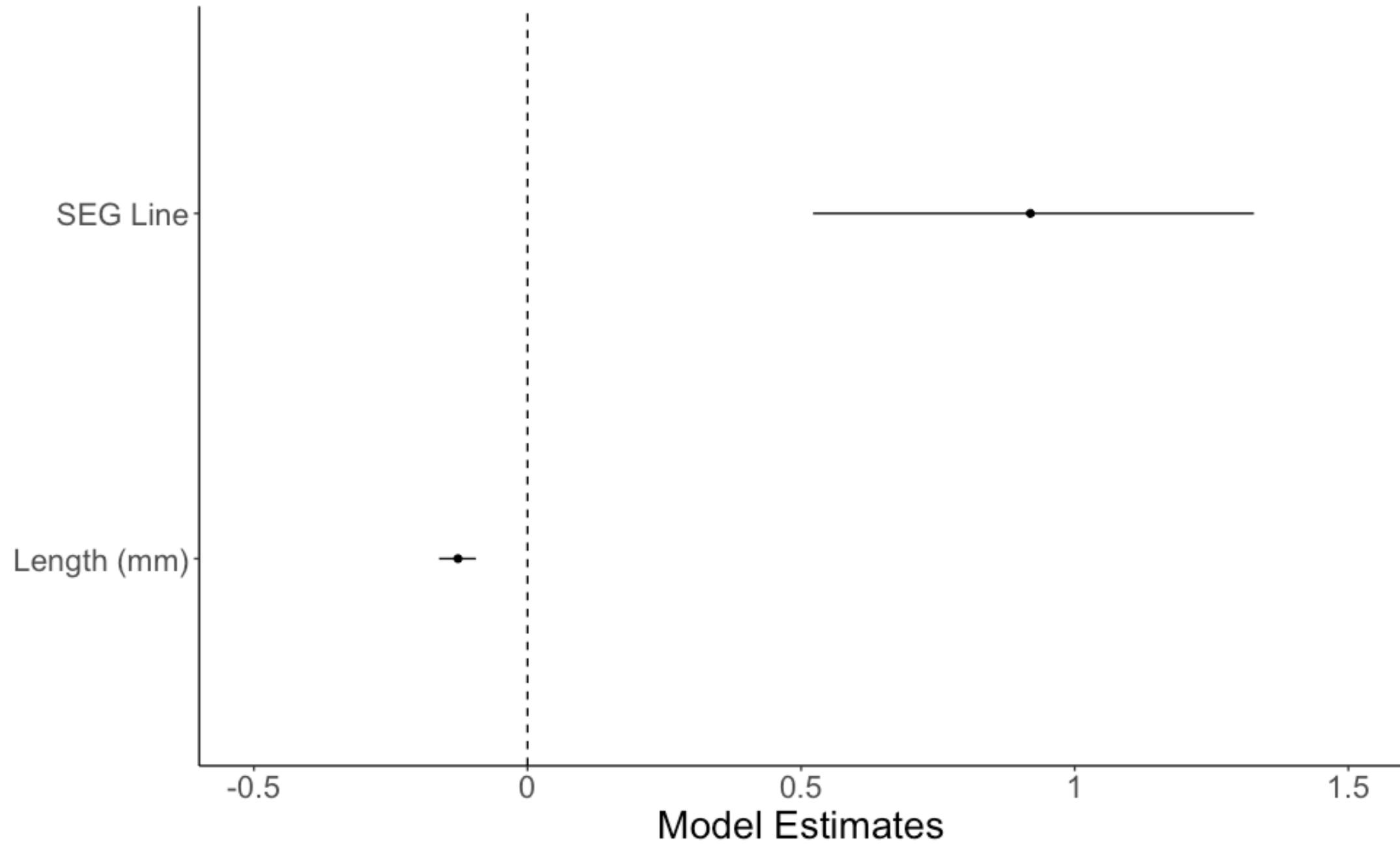


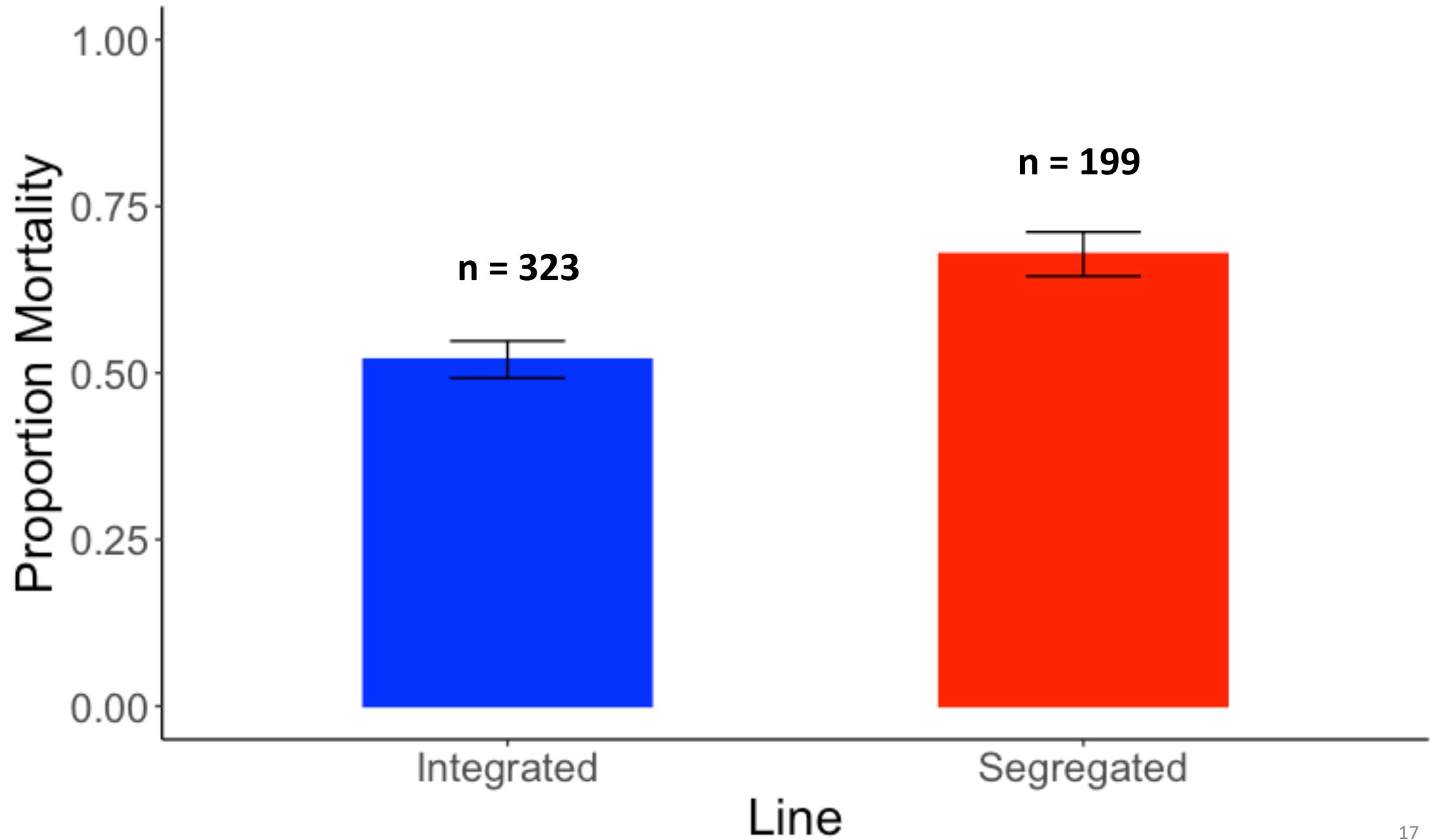
***Family included as random effect**

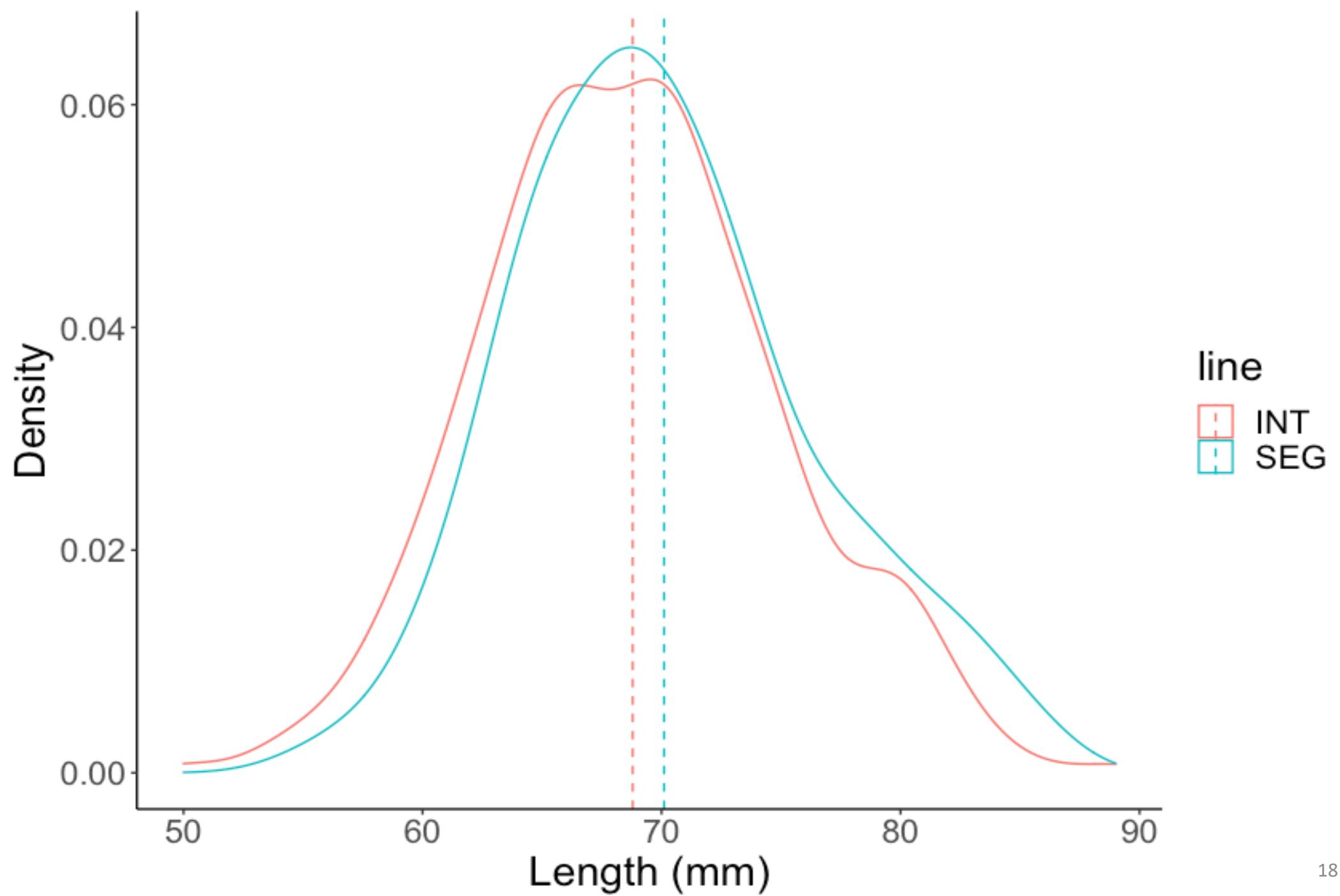
Mortality \sim Line + Length

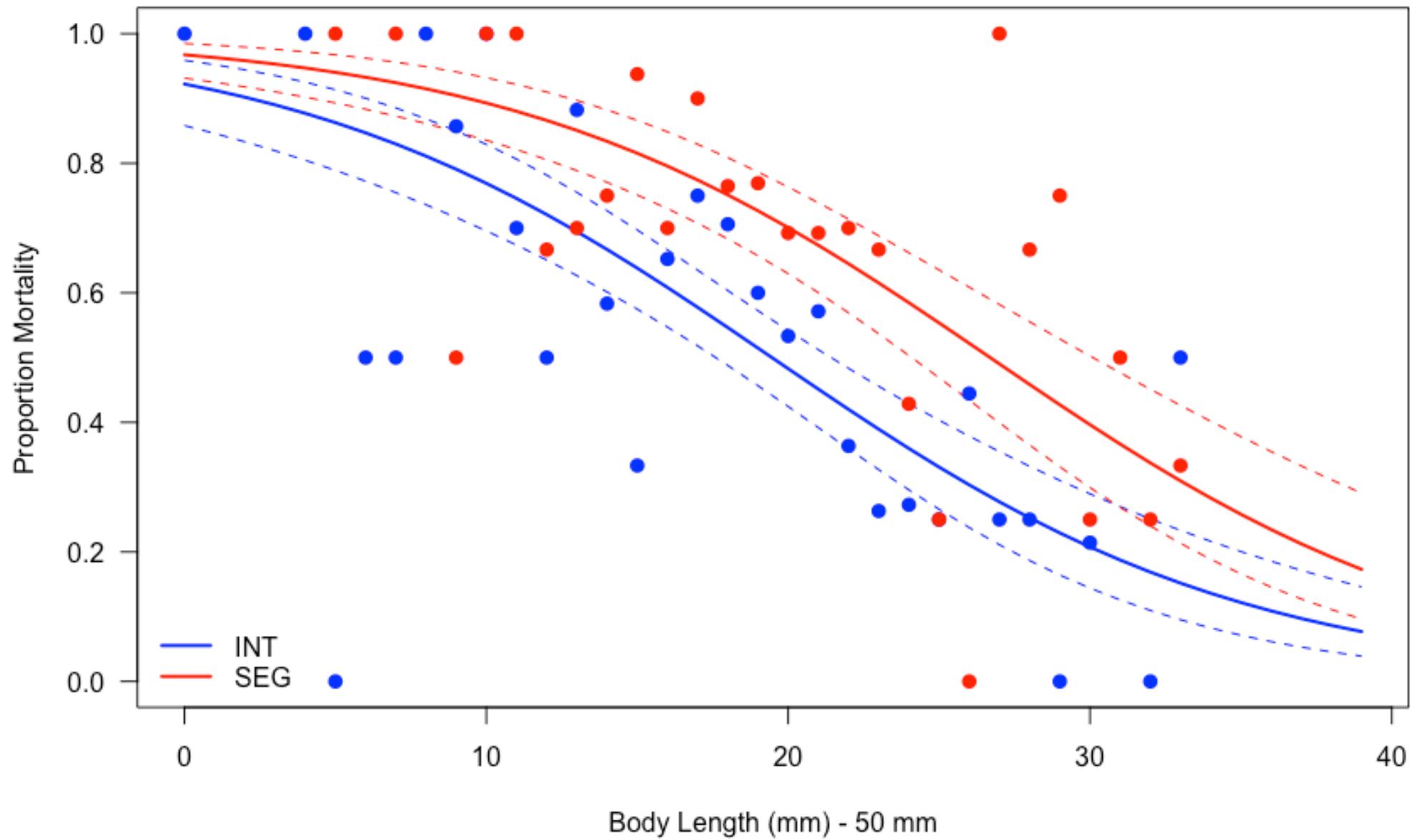


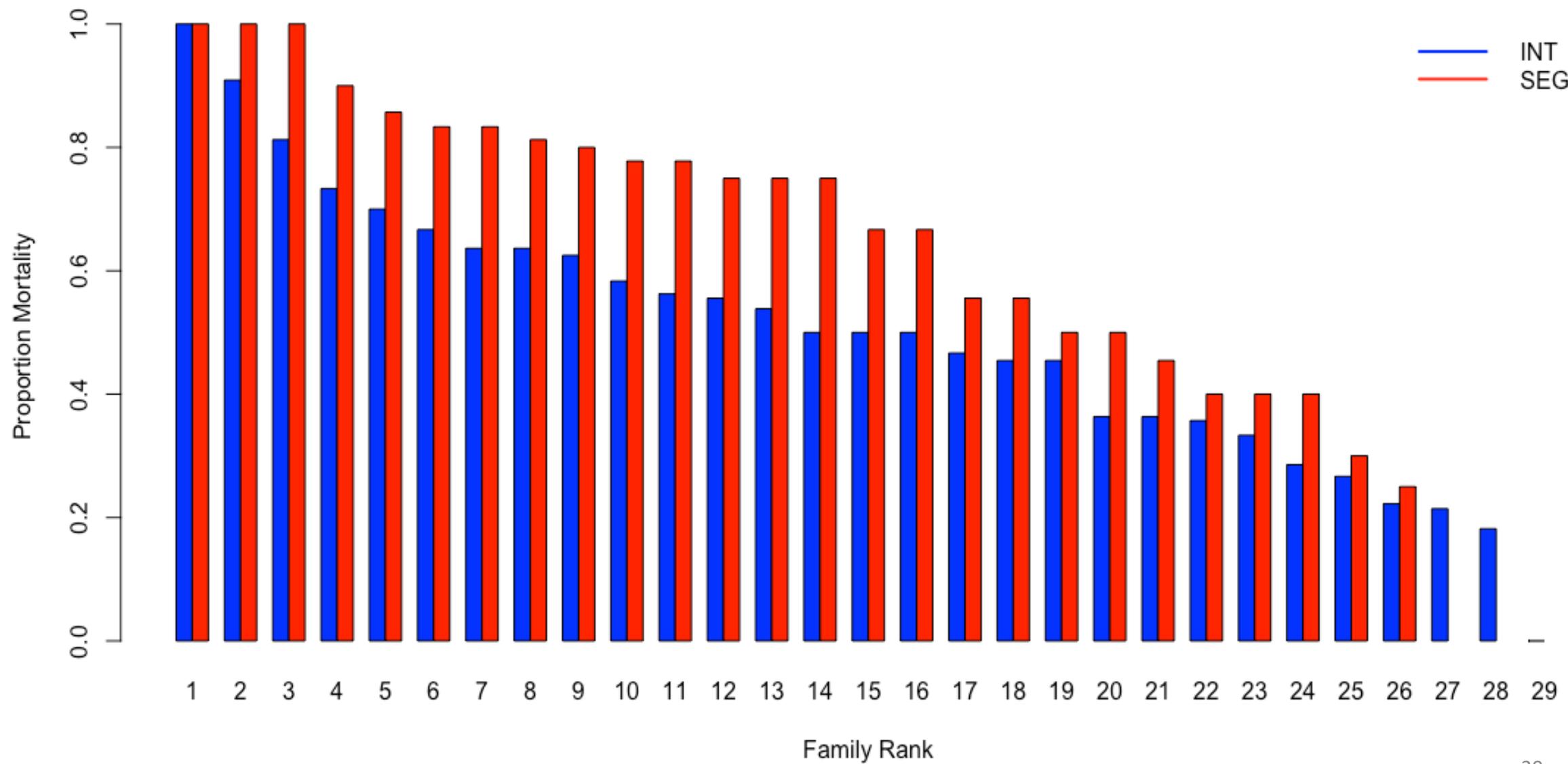
***Family included as random effect**











Conclusions and Implications

- Managed gene flow (integrated) reduces overall susceptibility to *V. anguillarum*
- Disease resistance is variable by family
- Larger fish may be more resistance to disease

Future Direction

1. Incorporate models using “Days to Death” as response variable
2. Identify genetic markers associated with disease resistance