Growth and Changes in Body Composition Over Winter in YOY Pacific Herring (*Clupea pallasii*) from Prince William Sound

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Background

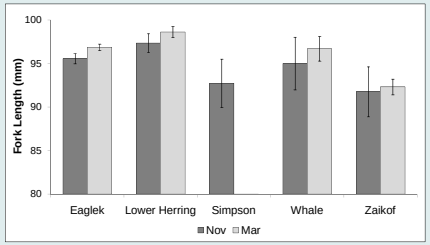
- **Overwinter survival during the first year of life can be vital in determining year-class strength of high latitude fish stocks.**
- **YOY (young-of-the-year) survival often depends on having energy stores sufficient to ensure survival until food abundance increases in spring. Individuals that grow most rapidly in fall are also likely better able to allocate lipids for overwinter energy needs.**
- **We hypothesize that growth rates in fall predict overwinter survival.**
- **Objective: determine how well fall growth rates and body composition indicate overwinter survival of YOY Pacific herring.**
- **This study is part of the larger PWS Herring Survey.**

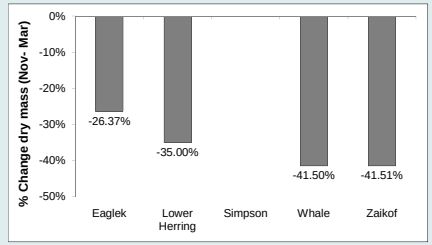
Methods

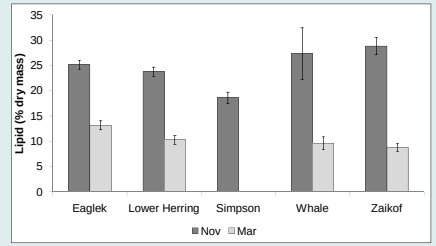
- **YOY herring collected from 5 bays in Prince William Sound in November 2009, March 2010.**
- **100 – 200 from each period analyzed for growth, diet, and energy allocation.**
- **Growth estimated by RNA/DNA analysis of muscle plugs.**
- **Body tissues analyzed for moisture, protein, and lipid content.**

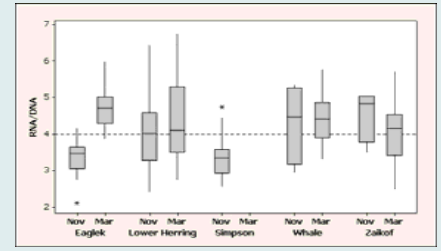
Summary of Findings

In this first year of our three-year study, we found that overwinter changes in size, growth (RNA/DNA ratio) and body composition of YOY herring differed among five bays in PWS. Bays with herring that had low RNA/DNA also appeared to experience high winter mortality.



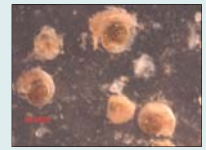






(Horizontal line shows threshold for positive growth in Pacific herring.)

- **Stomach contents were mainly euphausiids, with smaller numbers of pteropods and amphipods.**
- **Fish were scored as "foraging" if they had identifiable prey in their guts.**
- **Foraging success varied widely among bays in fall and spring**



	Nov		Mar	
Location	**Empty**	**Foraging**	**Empty**	**Foraging**
Eaglek	100%	0%	0%	100%
Lower Herring	73%	27%	73%	27%
Simpson	60%	40%	100%	0%
Whale	0	100%	100%	0%
Zaikof	83%	17%	0%	100%

- **YOY herring from four of five bays survived winter, but experienced size-dependent mortality. This was indicated by increased average lengths and decreased dry mass and lipid.**
- **Among fall samples, YOY in Simpson Bay had the lowest size, lipid and low RNA/DNA. Scarcity of YOY there the following spring suggests high overwinter mortality**
- **Low RNA/DNA and high proportions of empty stomachs in some bays suggest that YOY herring experience net energy losses by November**

These data demonstrate that fall growth, condition and the quality of over wintering habitat vary among bays indicating herring in different bays contribute disproportionately to recruitment

Acknowledgements: Funding provided by the EVOS Trustee Council (Project #10100132-D). We thank the Prince William Sound Science Center, Andrew Eller, Lawrence Schaufler, and Ashwin Sreenivasan for assistance with this project.