

NEP-CCS Progress Report 2004

TITLE: GLOBEC GROWTH AND CONDITION OF JUVENILE SALMON IN THE NORTHERN CALIFORNIA CURRENT

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SCIENTIFIC OBJECTIVES

The objective of the proposed research is to identify mechanisms through which ocean conditions impact marine growth and survival of juvenile coho salmon and chinook salmon in the California Current System (CCS) of the Northeast Pacific. Based on the present state of knowledge we propose objectives to test the following main **hypothesis: growth and condition of juvenile salmon, which influence recruitment, is affected by climate/ocean variability predominantly through physical oceanographic features that lead to higher primary and secondary productivity increasing prey density for juveniles during their most critical ocean phase.** Also, temporal and spatial scales of variability superimpose such that 1) due to mesoscale physical differences in the nearshore off northern California and Oregon, growth and condition of juvenile salmon are different between north and south of Cape Blanco; 2)

growth and condition are greater in more productive environments influenced by fine-scale features, estuarine plumes or climactic events (regime shifts); 3) current growth rates are reduced compared to rates observed prior to the last regime shift; and 4) variability of isotope and radiocarbon will correlate with diet and ocean advection, and juvenile salmon health and condition.

1) Key objectives to our proposed study (from proposal):

- 1. To measure growth rates, bioenergetics and pathogen loads as indicators of condition and survival of juvenile salmon, and as indicators of the relative quality of the marine habitat in different regions of the CCS (north and south of Cape Blanco, Oregon).**
- 2. To compare retrospectively, current measures of growth and other condition indices of juvenile salmon to data obtained in the early 1980s.**
- 3. To compare spatially bioenergetic health and condition of juvenile salmon south of 44° N with data currently being acquired for juvenile salmon adjacent to the Columbia River plume, off British Columbia and Southeast Alaska.**
- 4. To measure stable isotope and radiocarbon spatial and interannual variability in the preceding fish to determine to what extent variations in diet and in ocean advection correlate with juvenile salmon health and condition.**

2) Papers or presentations that discuss the above hypotheses (in parentheses):

Presentations:

Casillas, E. Regional features affecting salmon distribution on performance - Keys to developing habitat metrics important to salmon; 4th Annual Juvenile Salmon Workshop, Santa Cruz, CA, March 2002 **(1, 3)**

Casillas, E., G.H. Rau², K.C. Jacobson. 2002. Linking Vertical Advection and Diet to Juvenile Salmon Condition and Parasite Load: A Study Using ¹⁴C, ¹³C, and ¹⁵N Natural Abundances. Poster, ALSO/AGU Ocean Sciences Meeting, Honolulu, HI.
<http://www.agu.org/meetings/os02top.html> **(4)**

Sandell, Todd, Marcia House, Kym Jacobson and Ed Casillas. "Growth, condition and pathogens of juvenile salmonids caught off the Oregon and Washington coasts." Ocean Salmon Meeting, Newport, Oregon. 2002. **(1, 3)**

Sandell, T., M. House, K. Jacobson and E. Casillas. Growth, Condition, and Pathogens of Juvenile Salmon Caught off the Oregon and Washington Coasts. Oregon Chapter AFS meeting, February 2002 (1, 3)

Rau, G.H., E. Casillas, K.C. Jacobson. 2004. Effects of Vertical Ocean Advection and Diet Variability on Juvenile Salmon Condition and Parasite Load: A Study Using ^{14}C , ^{13}C , and ^{15}N Natural Abundances. Poster, AGU Ocean Sciences Meeting, Portland, OR. <http://www.agu.org/meetings/os04/program.shtml> (4)

Sandell T.A., Jacobson K.C., Rudel N., Zielinsky C., and Bartholomew J. A Collaborative Study of *Ceratomyxa shasta* Prevalence Among Juvenile Salmonids in the Columbia River Estuary and Near-shore NE Pacific. The Center for Fish Disease Research Symposium, Oregon State University, March 2004. (1, 3)

Sandell TA, Jacobson KC, House M and Casillas E. Pathogens of Juvenile Salmonids in the Near-shore NE Pacific Ocean. *Eos Trans. AGU*, 84(52), Ocean Sci. Meet. Suppl., Abstract OS21J-05. January 2004. (1, 3)

Sandell, T., K. Jacobson, D. Teel and E. Casillas. "The distribution and prevalence of Bacterial Kidney Disease (*Renibacterium salmoninarum*) in juvenile Chinook and coho salmon in the Northeast Pacific Ocean." FIS_P-1853. North Pacific Marine Science Organization (PICES) 13th annual meeting, Honolulu, Hawaii, October 14-24, 2004. (1, 3)

Jacobson, K.C. and E. Casillas. Varying Climate-driven Ocean Conditions and the growth of juvenile salmonids in the California Current. North Pacific Marine Science Organization (PICES) 13th annual meeting, Honolulu, Hawaii, October 14-24, 2004. (1, 3)

Publications:

Casillas, E., G.H. Rau, K.C. Jacobson. 2002. Linking vertical advection and diet to juvenile salmon condition and parasite load: A study using ^{14}C , ^{13}C , and ^{15}N natural abundances. *Eos Trans. AGU*, Ocean Sci. Meet. Suppl., Abstract OS31D-61. (4)

Rau, G.H., E. Casillas, K.C. Jacobson. 2003. Affects of vertical ocean advection and diet variability on juvenile salmon condition and parasite load: A study using ^{14}C , ^{13}C , and ^{15}N natural abundances. *Eos Trans. AGU*, 84(52), Ocean Sci. Meet. Suppl., Abstract OS32B-13. (4)

Brodeur RD, Fisher JP, Teel D, Emmett RL, Casillas E, and Miller TW. 2004. Juvenile salmonid distribution, growth, condition, origin, and environmental and species associations in the Northern California Current. *Fish. Bull.* 102:25-46 (2)

3) Online status of data and model products.

No data from this project is currently online.

4) Papers and products to emerge by the Fall of 2005.

Pathogens of Juvenile Chinook and Coho Salmon in the California Current System off of Northern California – Southern Oregon.

Todd A. Sandell, Marcia House, Kym C. Jacobson, David Teel and Edmundo Casillas.

(1, 3)

Regional disparities in the prevalence of *Renibacterium salominarum* within the Northern California Current: the Columbia River as a pathogen point source? Todd A. Sandell, Marcia House, Kym C. Jacobson, David Teel and Edmundo Casillas **(1, 3)**

Vertical advection in the Northern California current and the diet, condition, growth rate and parasite load of juvenile salmon. G. Rau, K. Jacobson, J. Fisher, and E. Casillas **(4)**