

## **NEP-CCS Progress Report 2004**

### **GLOBEC MESOSCALE AND FINE-SCALE DISTRIBUTION OF JUVENILE SALMON AND ASSOCIATED BIOTA OFF OREGON AND NORTHERN CALIFORNIA**

**PRINCIPAL INVESTIGATOR:** Dr. Richard D. Brodeur  
Northwest Fisheries Science Center  
2030 Southeast Marine Science Drive  
Newport, Oregon 97365 USA  
E-mail: Rick.Brodeur@noaa.gov

**OTHER INVESTIGATORS:** R.L. Emmett, W.T. Peterson (Northwest Fisheries Science Center, Hatfield Marine Science Center, Newport, OR 97365), J.P. Fisher and W.G. Percy (Cooperative Institute for Marine Resource Studies, Oregon State University, Corvallis, OR 97331), E. Casillas (Northwest Fisheries Science Center, Seattle, WA 98112)

#### **PROJECT SUMMARY**

---

The opportunity exists to clearly identify the linkages between physical forcing, oceanographic conditions, the abundance and distribution of marine biota, and environmental characteristics that affect salmon survival and recruitment. We proposed to compare and contrast juvenile salmon distributions and the associated biological community and oceanographic conditions spatially by sampling north and south of Cape Blanco. We proposed to conduct two 12 day broad-scale surveys for juvenile salmon and other associated species during early June and August of 2000 and 2002. These cruises were conducted in conjunction with other sampling of the physics, nutrients, primary productivity, and zooplankton (net and acoustic sampling) carried out from other research vessels. Sampling stations were set along pre-determined transects running from Newport to Eureka. Following the broad-scale sampling, the vessel coordinated with other fine-scale process studies to examine juvenile salmon habitat utilization for an additional 8 day period each sampling time. The fine-scale sampling involved intense sampling at one or two locations and was done in conjunction with physical, acoustic, and other biological sampling for prey from another vessel working in tandem with the salmon trawler at regions of high productivity near Hecata Bank and within some of the offshore jets south of Cape Blanco. We also proposed to compare and contrast juvenile salmon distribution and the associated biological community and oceanographic conditions from a temporal perspective (current conditions to conditions in 1979-1985).

#### **A) Key major objectives to our proposed study (from proposal):**

- 1) Identify the temporal and spatial dynamics of juvenile salmon and their associated taxa (predators and forage fishes) in the coastal ocean off Southern Oregon and Northern California during the juvenile salmon outmigration period (spring) and following a period of ocean residence (fall)
- 2) Identify the abundance and distribution patterns of potential marine fish predators and competitors occurring in the vicinity of juvenile salmonids
- 3) Measure selected oceanographic conditions in the nearshore ocean at the time of our collections
- 4) Relate predator and forage fish distribution and abundance to oceanographic conditions and ocean survival of juvenile salmonids historically and to the present

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

**Presentations:**

Miller, T.W., R.D. Brodeur and R.L. Emmett. "Distribution and diet of the Pacific sardine (*Sardinops sagax*) off of Oregon and Washington." California Cooperative Oceanic Fisheries Investigations Annual Conference, November 2000, La Jolla, CA. **(2)**

Brodeur, R.D., R.L. Emmett, E. Casillas, J. Noskov, and J.P. Fisher "US GLOBEC research on juvenile salmon in the California Current ecosystem." International workshop on Juvenile Salmon in Marine Ecosystems, February 2001, Nanaimo, BC. **(1,2)**

Brodeur, R.D., J.P. Fisher, D.J. Teel, J.P. Noskov, R.L. Emmett, and E. Casillas. "Distribution, growth, condition, origin and associations of juvenile salmonids in the Northern California Current." PICES Annual meeting, October 2001, Victoria, BC. **(1,3)**

Brodeur, R.D., E. Casillas, J. Fisher, T. Miller, J. Noskov, and D. Teel "Distribution, growth, origin, trophic and species associations of juvenile salmonids in the northern California Current." Salmon Ocean Ecology Meeting, January 2002, Santa Cruz, CA. **(1,2,3)**

Brodeur, R.D., E. Casillas, J. Fisher, T. Miller, R. Emmett, and D. Teel. "Distribution, growth, origin, trophic and species associations of juvenile salmonids in the northern California Current." ASLO/AGU Ocean Sciences Meeting, February 2002, Honolulu, HI. **(1,2,3)**

Brodeur, R.D., W.G. Pearcy and S. Ralston. "Abundance and distribution patterns of nekton and micronekton in the Northern California Current Transition Zone." PICES Transition Zone Symposium, April 2002, La Paz, Mexico. **(4)**

Brodeur, R.D., J.P. Fisher, Y. Ueno, K. Nagasawa, and W.G. Pearcy. "An east-west comparison of the Transition Zone coastal epipelagic nekton of the North Pacific Ocean." PICES Transition Zone Symposium, April 2002, La Paz, Mexico. **(1,4)**

Brodeur, R.D., T.W. Miller, D.C. Reese, and R.L. Emmett. "Community structure of surface nekton and plankton in the Northern California Current in relation to oceanographic conditions." GLOBEC Open Science Meeting, October 2002, Qingdao, China. **(1,2,3)**

Pool, S.S., R. Emmett, and R. Brodeur. "Abundance and distribution of pelagic nekton from GLOBEC 2002 surface trawl surveys." GLOBEC-NEP CCS Scientific Investigators' Meeting, November 2002, Corvallis, OR. **(1,2)**

Pool, S.S. and D.C. Reese. "Interannual variability of ocean characteristics and its influence on salmonid distribution and abundance within the northern California Current." Salmon Ocean Ecology Meeting, February 2003, Newport OR. **(1,2,3)**

Reese, D., S. Pool, and R.D. Brodeur. "Community structure of surface neuston in the northern California Current in relation to oceanographic conditions." ICES/PICES International Symposium on Zooplankton, May 2003, Gijon, Spain. **(1,2,3)**

Reese, D., S. Pool, and R.D. Brodeur. "Community characteristics of surface nekton in the northern California Current in relation to oceanographic conditions." AGU Ocean Sciences meeting, January 2004, Portland, OR. **(1,2,3)**

Brodeur, R.D., J.P. Fisher, C.A. Morgan, R.L. Emmett, E. Casillas. "Species composition and community structure of pelagic nekton off Oregon and Washington under variable oceanographic conditions." AGU Ocean Sciences meeting, January 2004, Portland, OR. **(2,4)**

Brodeur, R.D., J.P. Fisher, C.A. Morgan, R.L. Emmett, E. Casillas. "Using community structure of pelagic nekton as an indicator of ecosystem response to changing oceanographic conditions." SCOR/IOC International Symposium on Quantitative Ecosystem Indicators for Fisheries Management, March 2004, Paris, France. **(2,4)**

Reese, D.C., and R.D. Brodeur. "Identifying and characterizing biological hot spots within the northern California Current." PICES 13th Annual Meeting, October 2004, Honolulu, HI. **(1,2,3)**

### **Publications:**

Brodeur, R.D., J.P. Fisher, Y. Ueno, K. Nagasawa, and W.G. Pearcy. 2003. An east-west comparison of the Transition Zone coastal pelagic nekton of the North Pacific Ocean. *J. Oceanogr.* 59:415-434. **(2,4)**

Brodeur, R.D., W.G. Pearcy and S. Ralston. 2003. Abundance and distribution patterns of nekton and micronekton in the Northern California Current Transition Zone. *J. Oceanogr.* 59: 515-534. **(2,4)**

Brodeur, R.D., K.M. Myers, and J.H. Helle. 2003. Research conducted by the United States on the early life history of Pacific salmon. *Bull. North Pacific Anad. Fish Comm.* 3: 89-131. **(1)**

Brodeur, R.D., J.P. Fisher, D. Teel, R.L. Emmett, E. Casillas and T.W. Miller. 2004. Juvenile salmonid distribution, growth, condition, origin, species and environmental associations of in the Northern California Current. *Fish. Bull. U.S.* 102:25-46. **(1,2,3)**

Reese, D.C., T.W. Miller, and R.D. Brodeur. 2005. Community structure of neustonic zooplankton in the northern California Current in relation to oceanographic conditions. *Deep-sea Res. II.* **(1,3)**

Suchman, C.L. and R.D. Brodeur. 2005. Abundance and distribution of large medusae in surface waters of an upwelling zone off coastal Oregon, USA. *Deep-sea Res. II.* **(1,2)**

Ressler, P.H., R.D. Brodeur, W.T. Peterson, S.K. Pierce, P.M. Vance, A.R. Røstad, and J.A. Barth. 2005. The spatial distribution of euphausiid aggregations in the northern California Current during August 2000. *Deep-sea Res. II.* **(2,3)**

Brodeur, R.D., J.P. Fisher, C.A. Morgan, R.L. Emmett, and E. Casillas. MS. Species composition and community structure of pelagic nekton off Oregon and Washington under variable oceanographic conditions. Submitted to *Mar. Ecol. Prog. Ser.* **(3,4)**

### **C) Online status of data and model products.**

#### **Posted online:**

- 1) Event Logs

#### **Ready to format for posting online:**

- 1) Chlorophyll *a*
- 2) Neuston
  - a) Concentrations and species
  - b) Biovolumes
- 3) Salmonids
  - a) Densities and species
  - b) Necropsy
  - c) Coded-wire tag numbers
- 4) Non-salmonids
  - a) Lengths (nekton)
  - b) Diameters (jellies)

#### **Processed, but pending validation of data:**

- 1) CTD profiles in 1-m intervals
- 2) CTD flowthrough
- 3) Non-salmonids densities, weights, and species composition

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

Reese, D.C., and R.D. Brodeur. 2005. Identifying and characterizing biological hot spots within the northern California Current. To be submitted to either *Progress in Oceanography* or *Deep-Sea Research II* as a special publication to the PICES 13th Annual Meetings “Biological Hot Spot” Topic Session in December 2004. **(1,2,3)**

Emmett, R.L., R.D. Brodeur, S. Pool, T.W. Miller, P. Bentley, and G. Krutzikowsky. In prep. Sardines in the ecosystem of the Pacific Northwest. *CalCOFI Reports*. **(1,2)**

Pool, S.S., and R.D. Brodeur. 2005. Neustonic macrozooplankton abundance and distribution in the northern California Current, 2000 and 2002. *NOAA NWFSC Tech. Memo.* (in review). **(2)**

Reese, D.C., C. Suchman, R.D. Brodeur and S. Pool. 2005. Distribution, abundance, and species interactions of nekton and jellies in the northern California Current. To be submitted to *Marine Ecology Progress Series* in February 2005. **(1,2,3)**

Reese, D.C. 2005. Persistence of biological hot spots within a highly variable ecosystem. To be submitted to *Ecology* in April 2005. **(3,4)**