Winter mortality of Okhotsk Sea pink salmon in the ocean

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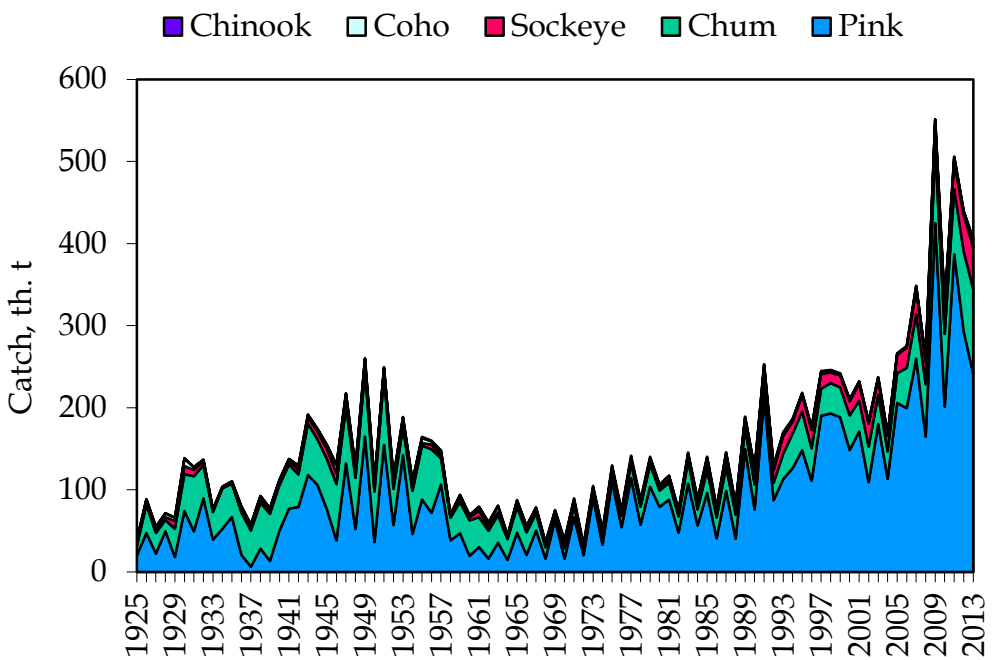
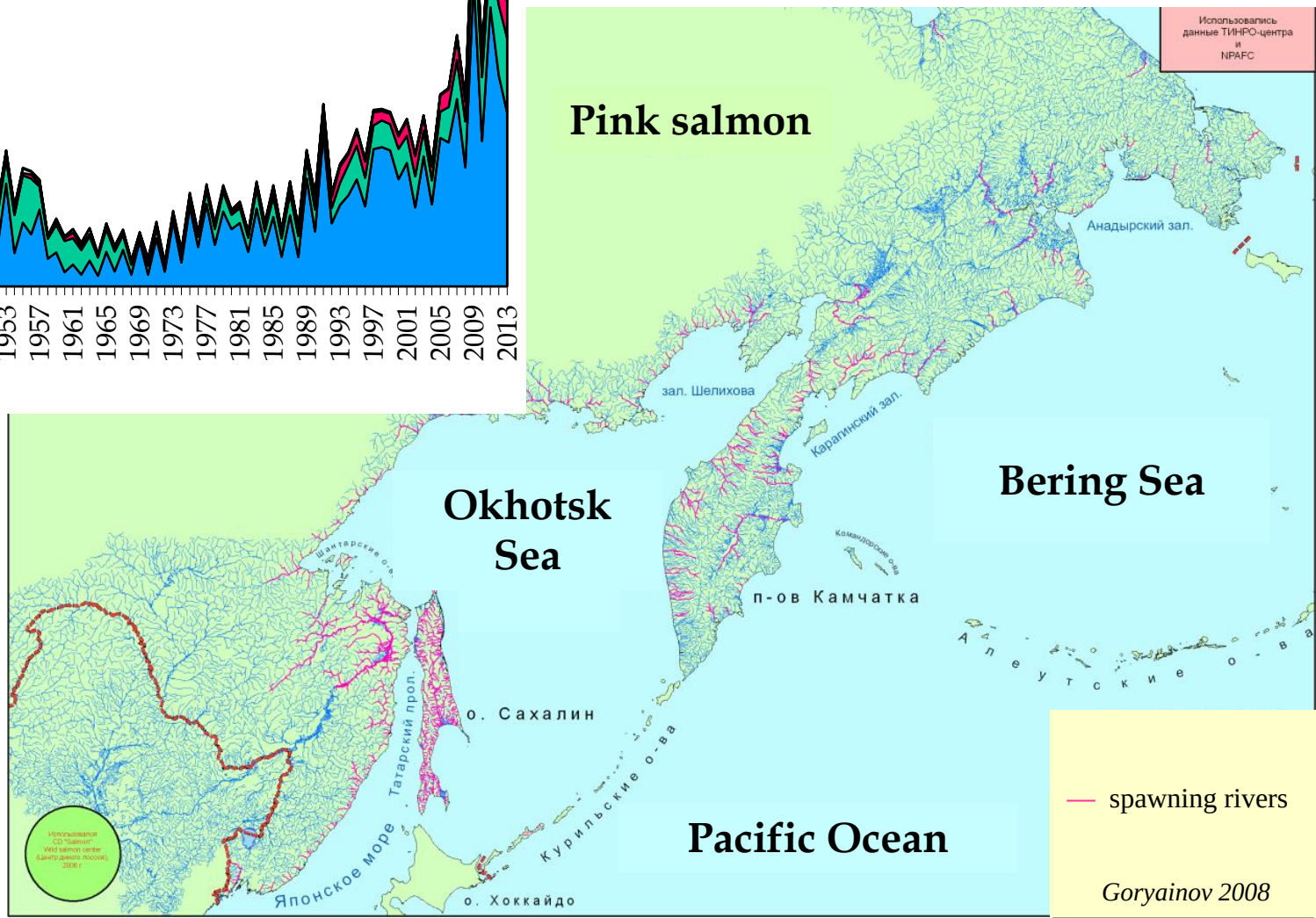
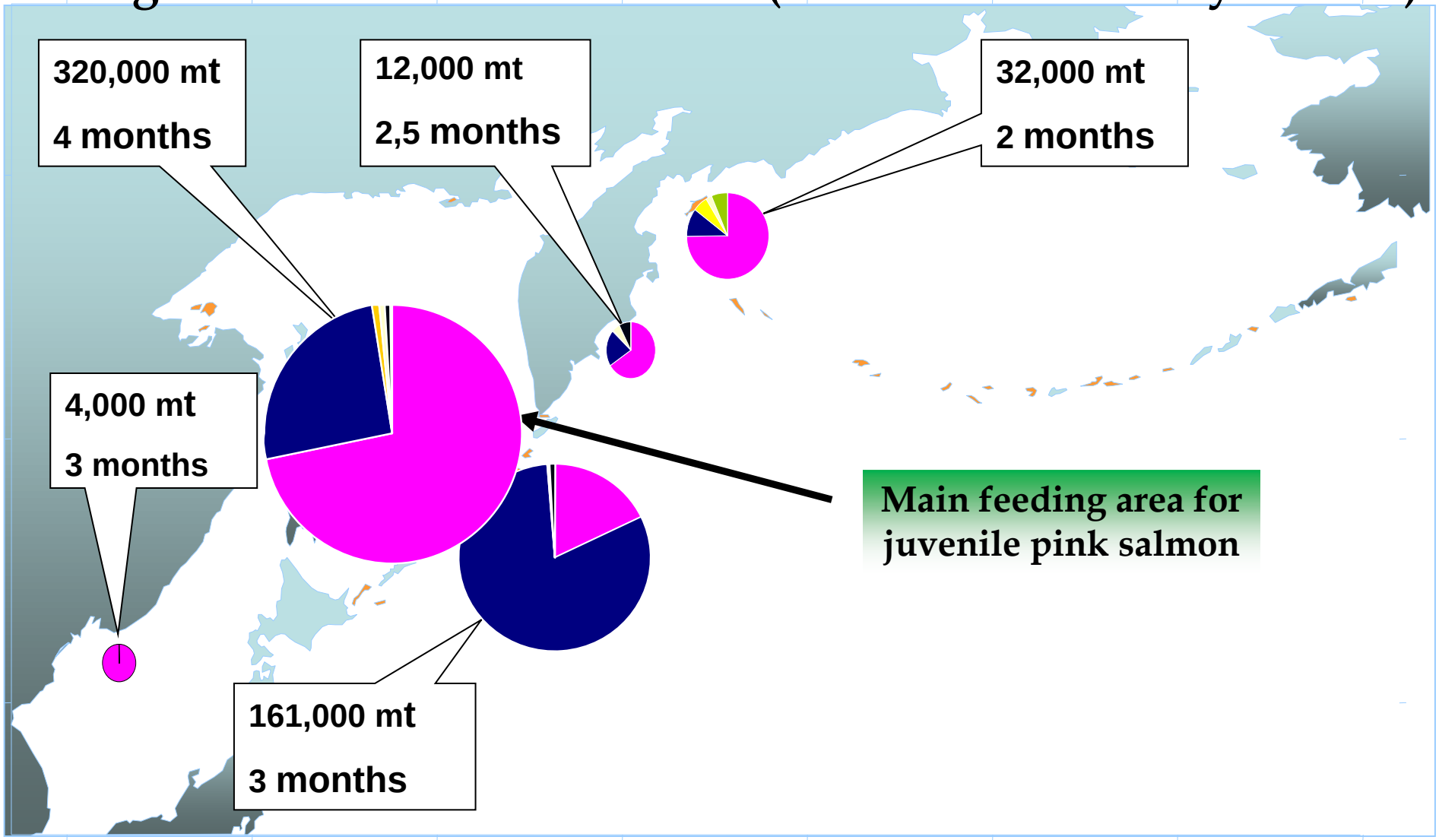
Commercial catch of Pacific salmon by Russia



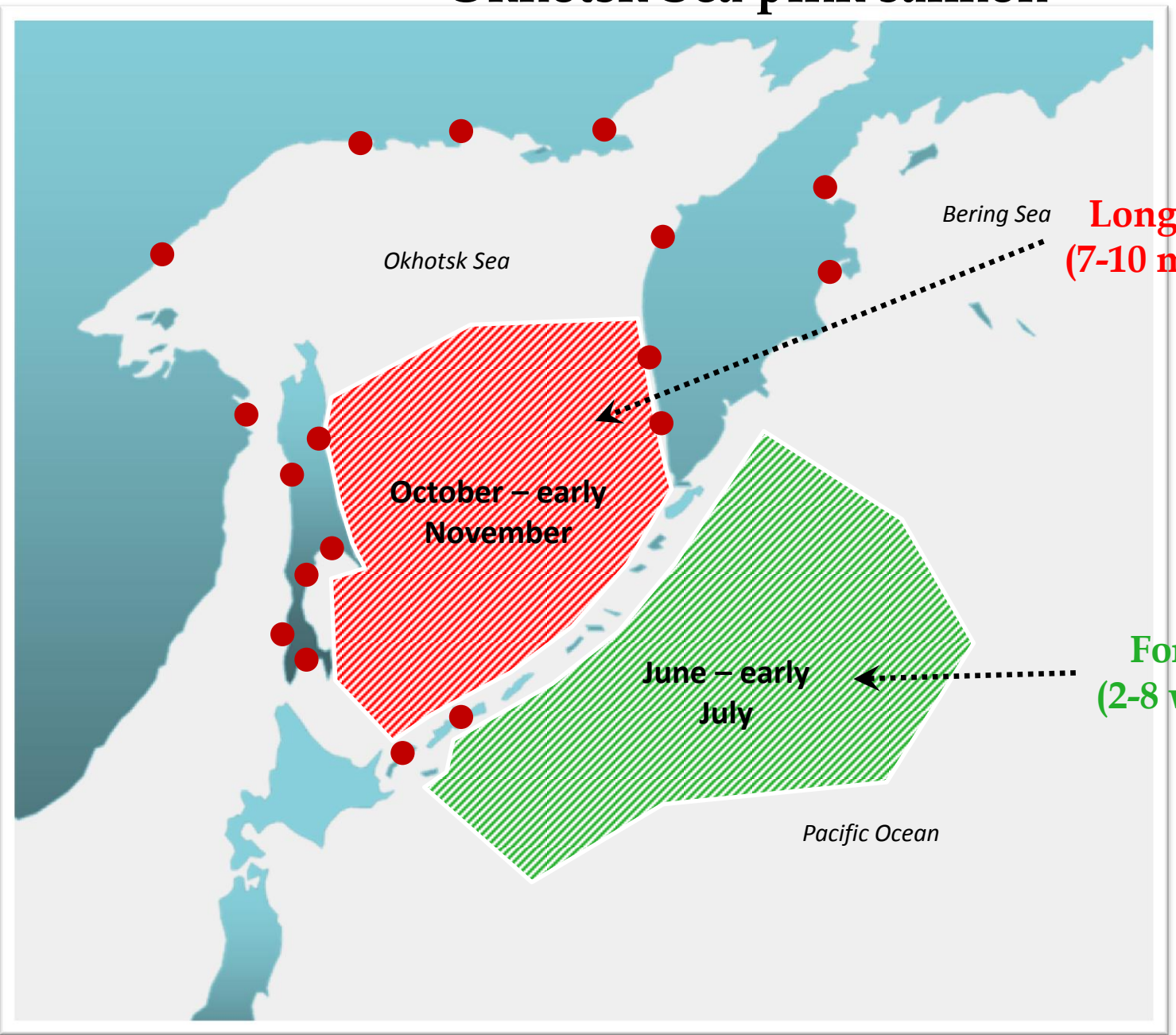
About 80% of Russian pink salmon originated from Okhotsk Sea



Composition, biomass and feeding migrations' duration of juvenile Pacific salmon in the Russian economic zone, average estimations for 1980-2006 (Shuntov and Temnykh 2008)



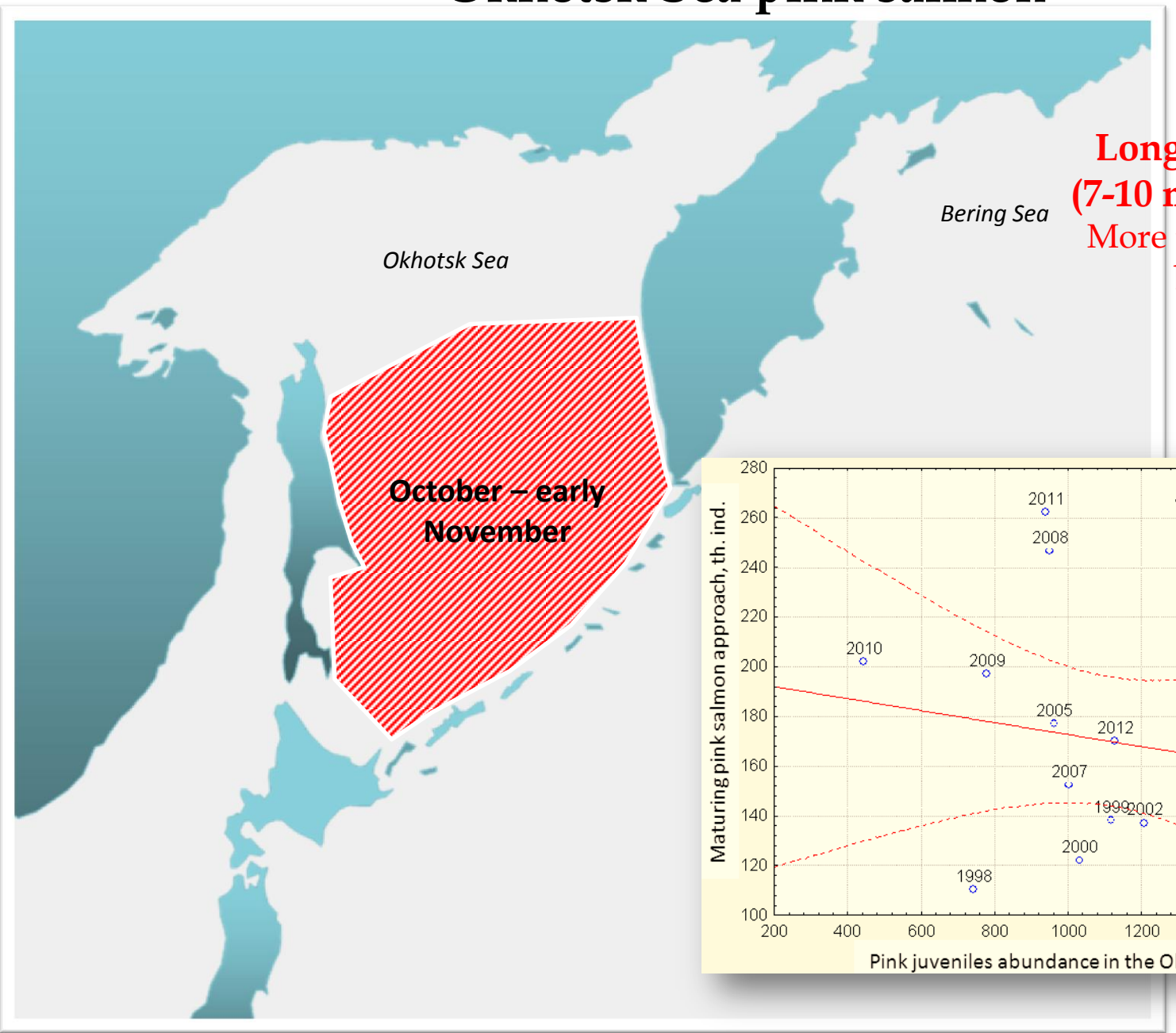
Survey areas for long- and short-term forecasting of Okhotsk Sea pink salmon



Long-term forecasting (7-10 months in advance)

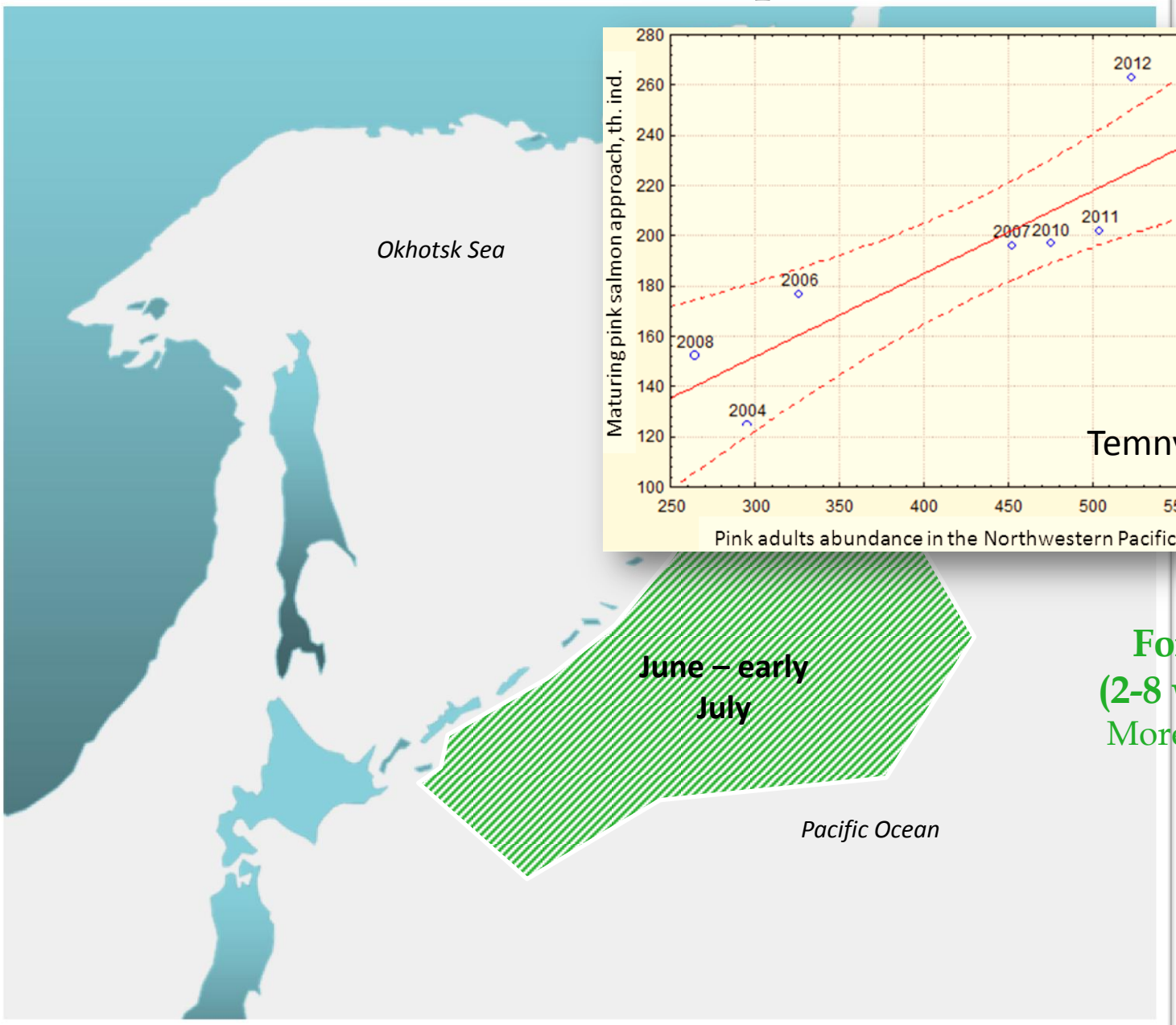
Forecast correction (2-8 weeks in advance)

Survey areas for long- and short-term forecasting of Okhotsk Sea pink salmon



Long-term forecasting (7-10 months in advance)
More useful for fishermen, but less precise

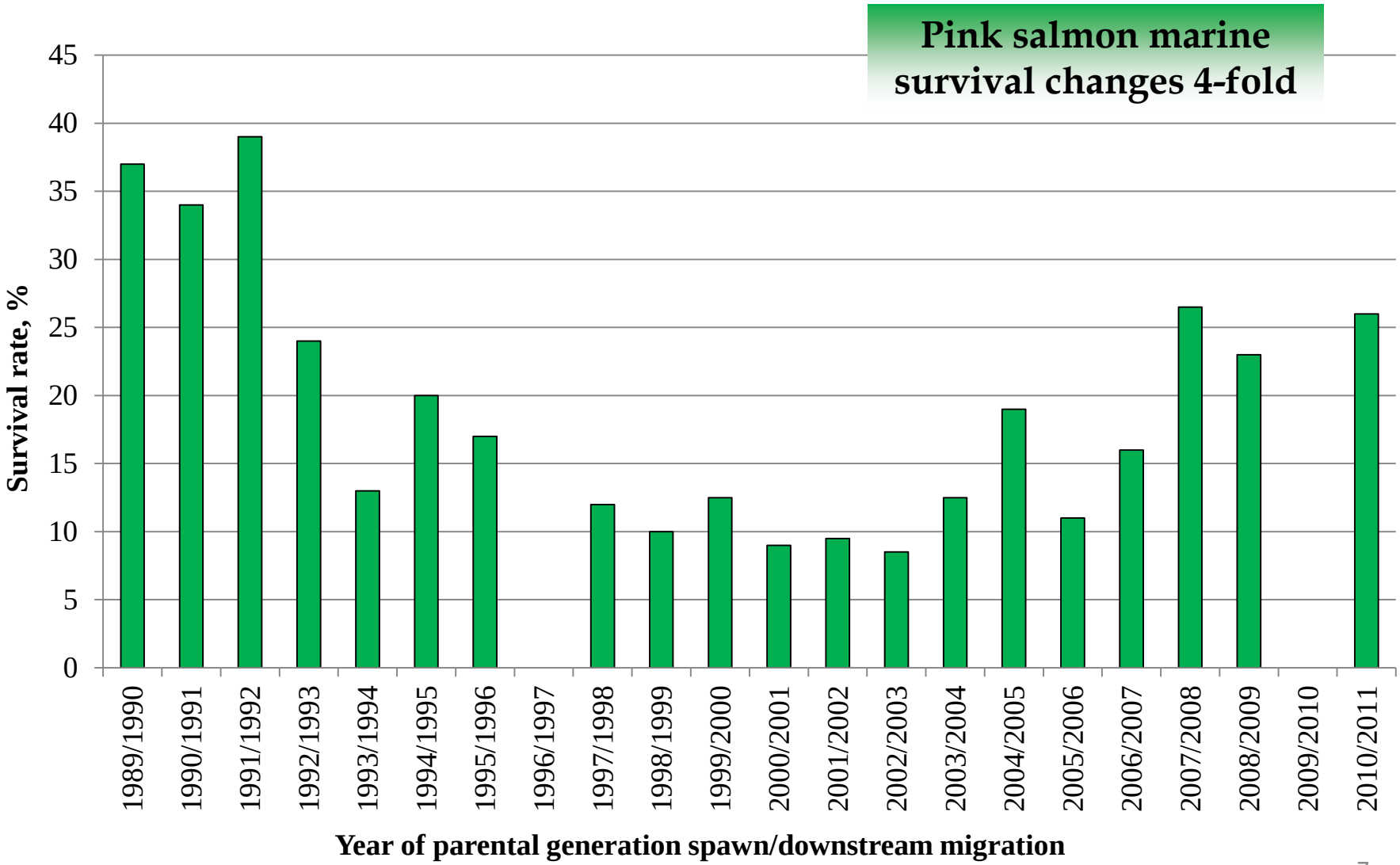
Survey areas for long- and short-term forecasting of Okhotsk Sea pink salmon



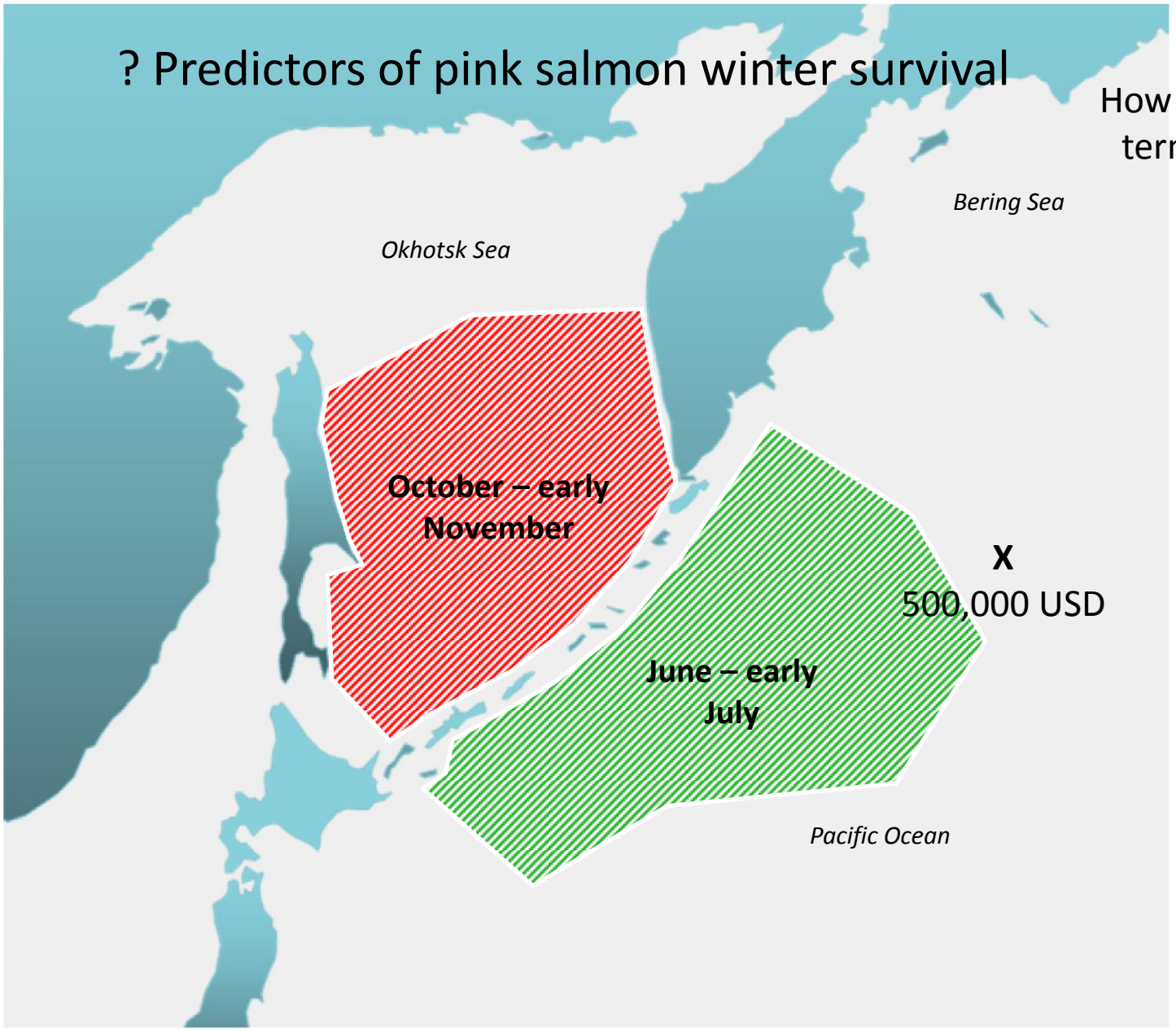
Forecast correction (2-8 weeks in advance)

More precise, but late for fishermen

Survival rates of pink salmon belonging to the Sea of Okhotsk stocks during period from fall surveys till prespawning approaches to coasts, 1989-2010 (Radchenko et al., 2013)



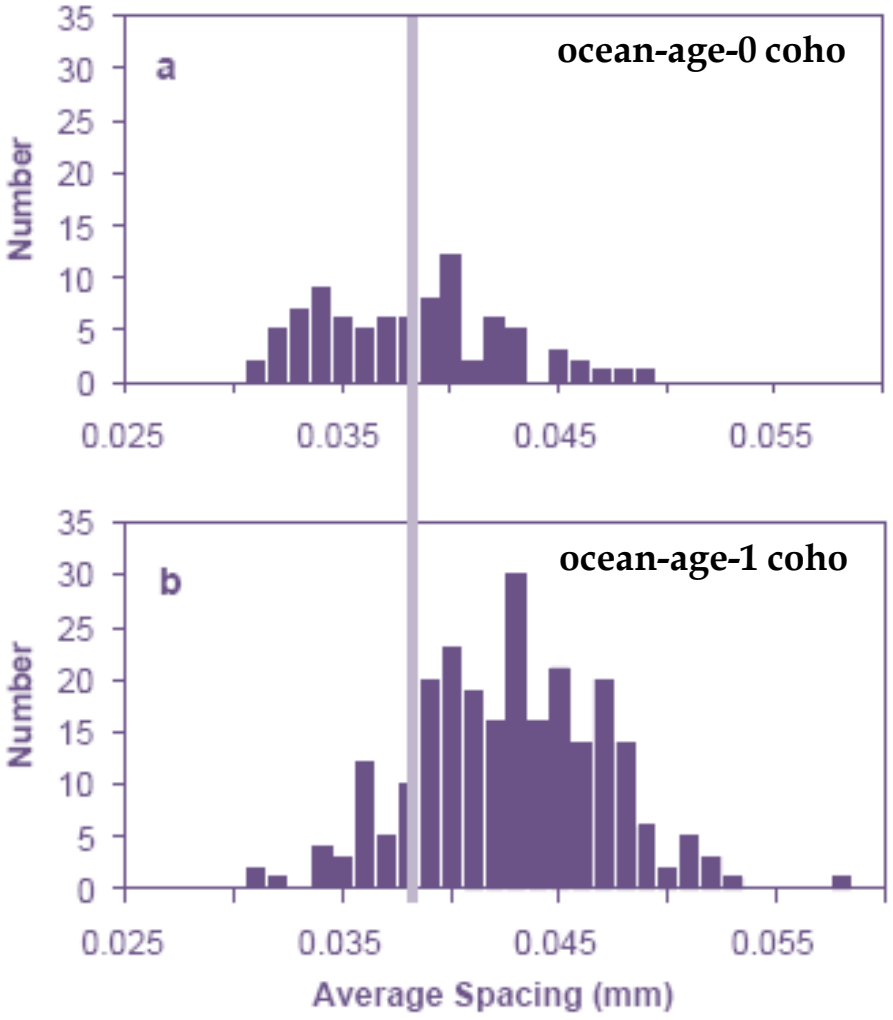
? Predictors of pink salmon winter survival



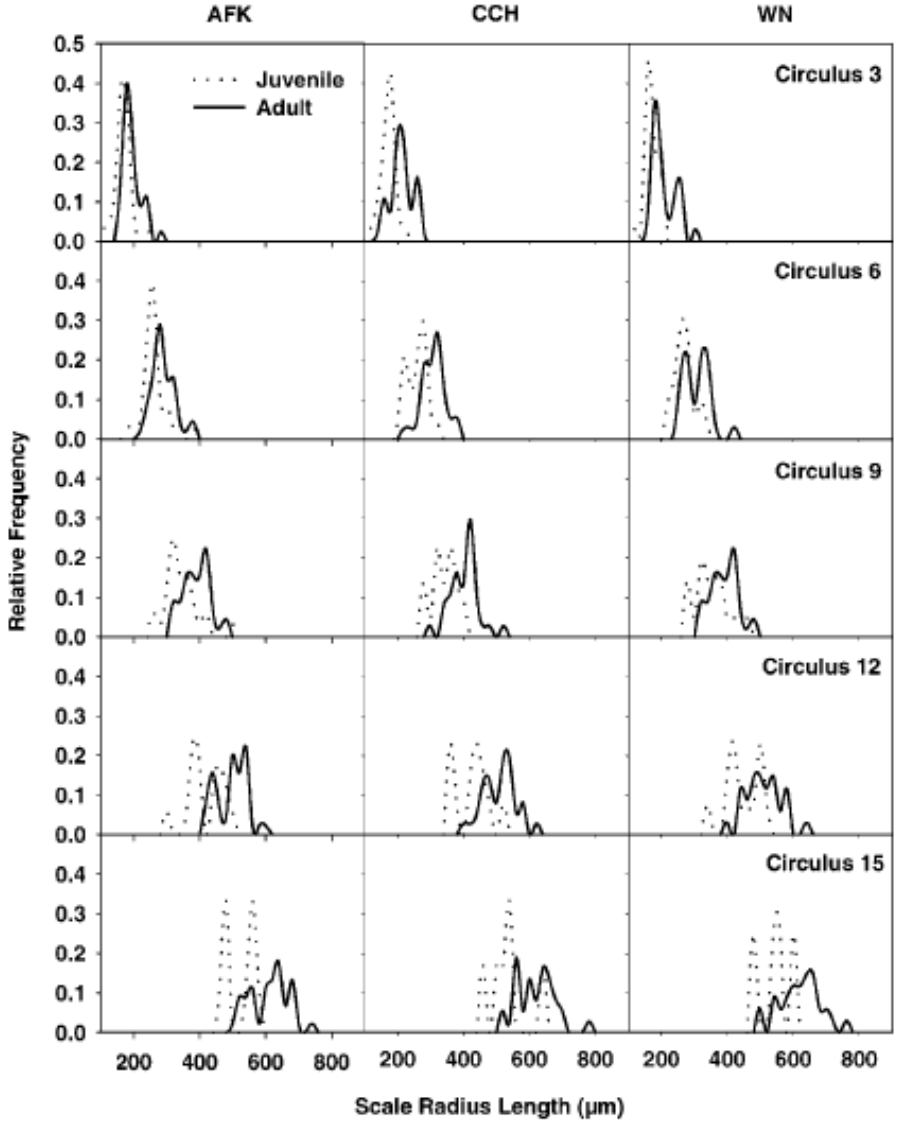
X
500,000 USD

How can we improve long-term forecasting of pink salmon returns?

Critical Size, Critical Period Hypothesis (Beamish and Mahnken 2001)



The distribution of the average circuli spacing of the first 10 saltwater circuli from (a) ocean-age-0 coho salmon collected in the Strait of Georgia in September and November, 2000 and (b) ocean-age-1 coho salmon collected in March, July, August, and September in the Strait of Georgia and from Chilliwack and Big Qualicum hatcheries.
(*Figure from Beamish et al. 2004*)



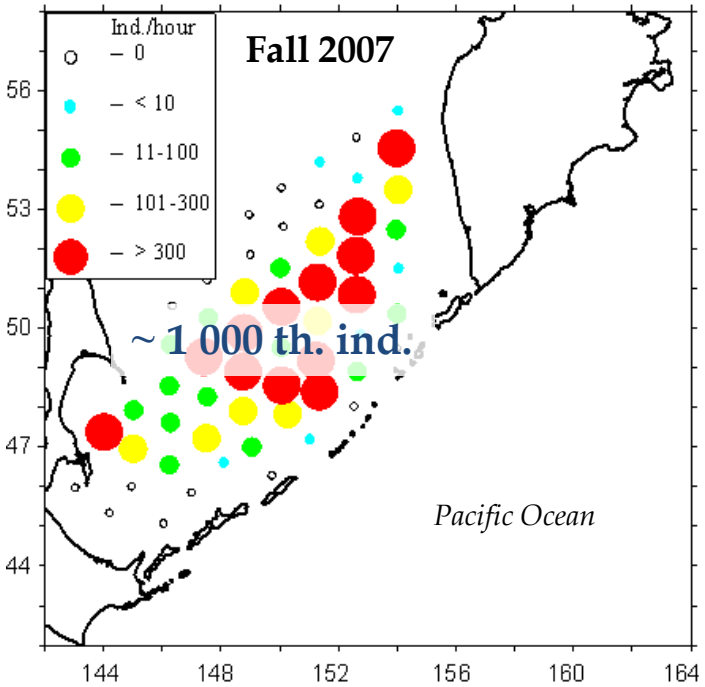
Relative frequencies of scale radius length to circuli 3, 6, 9, 12, and 15 for hatchery pink salmon juveniles (dotted lines) and individuals of that cohort returning the following year as mature adults (solid lines).
(*Figure from Moss et al. 2005*)

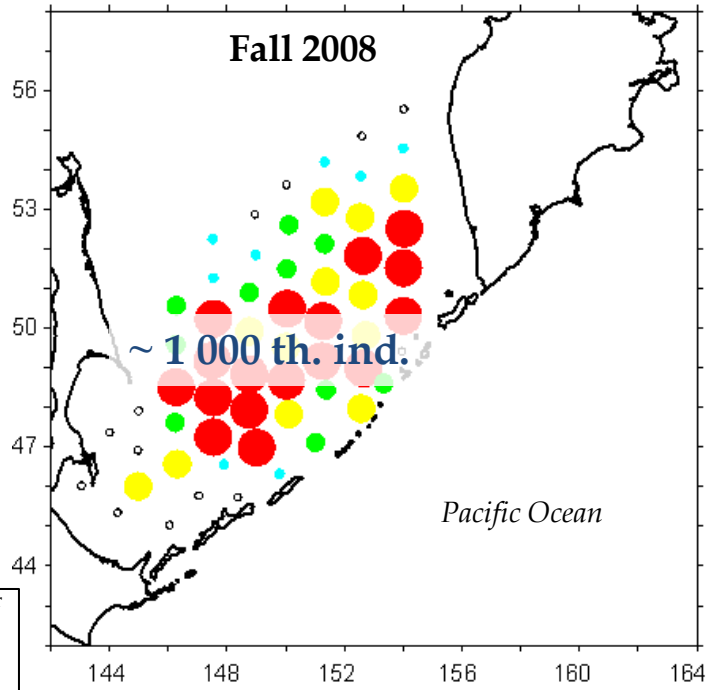
Goal:

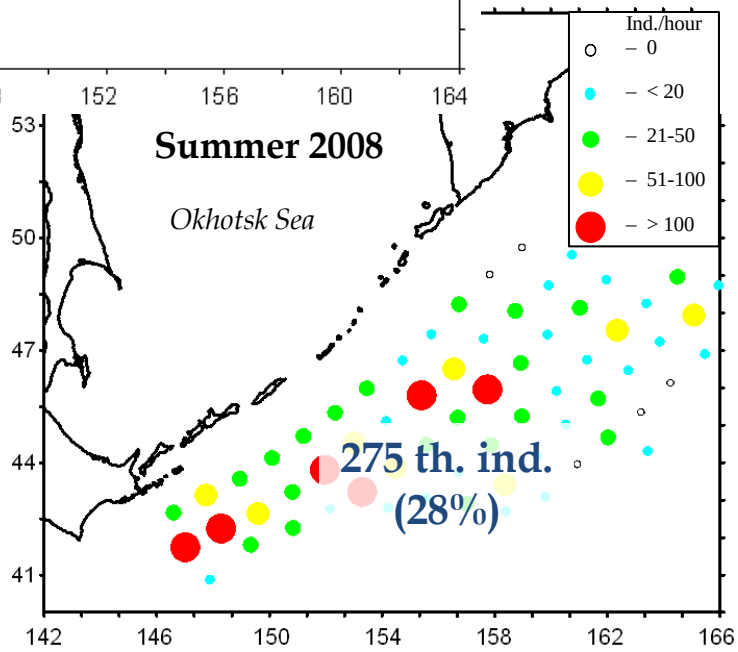
to test the hypothesis of critical size and critical period for Sea of Okhotsk pink salmon, and

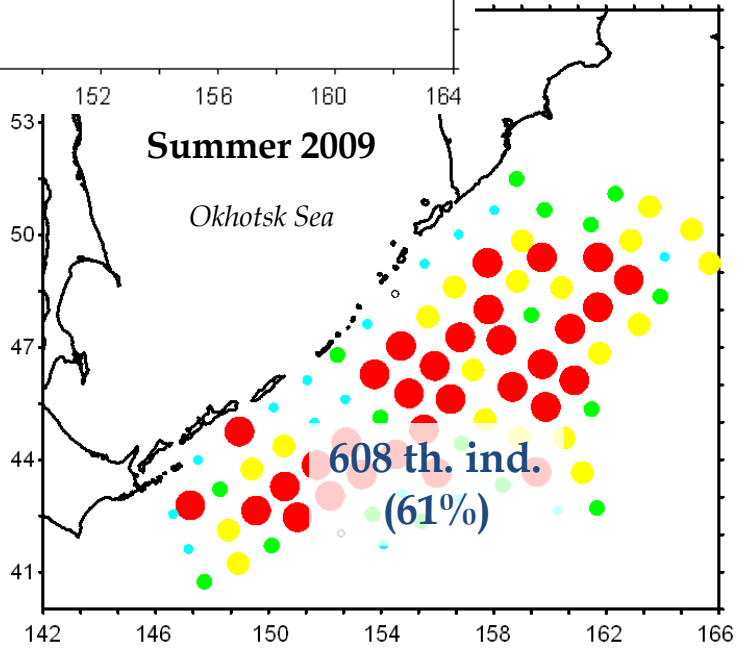
to evaluate the possibility of using the data on the growth and body size of juveniles for predicting their returns

Distribution and abundance of 2007 and 2008 pink salmon generations in the Okhotsk Sea and the Pacific Ocean

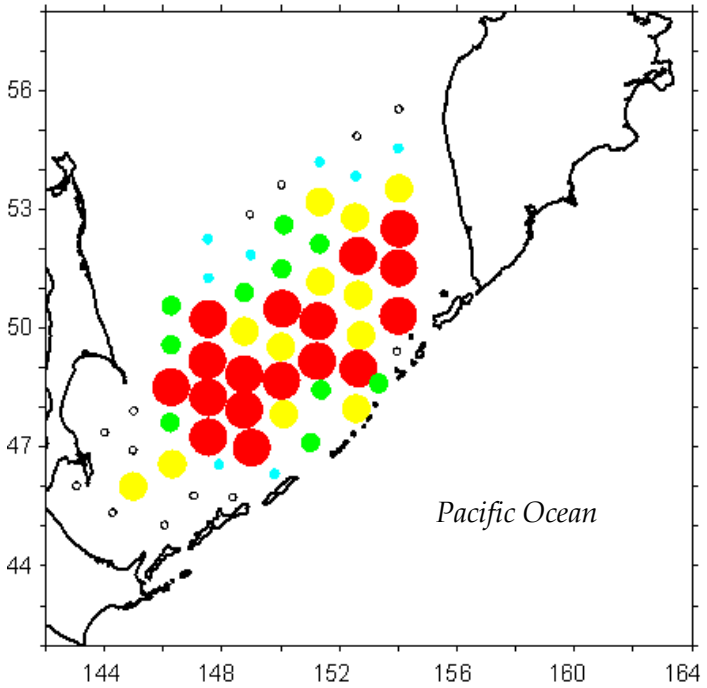


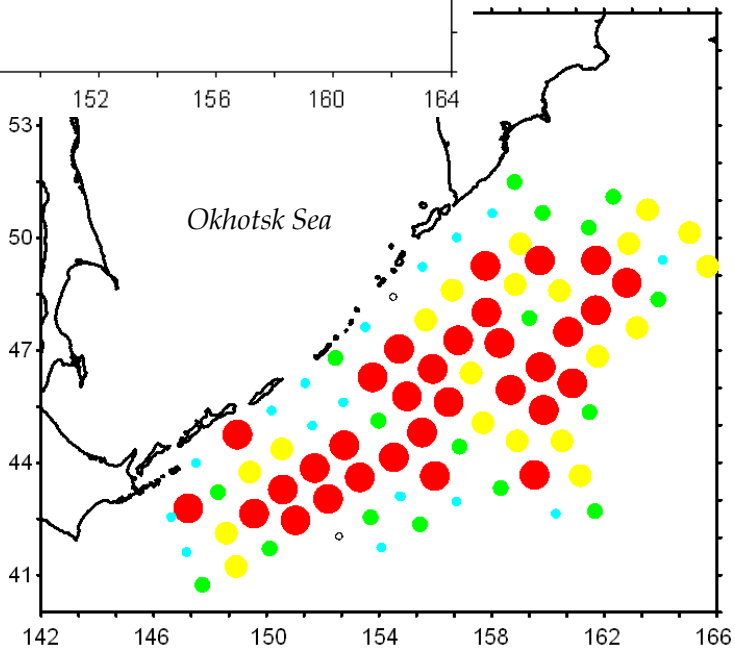






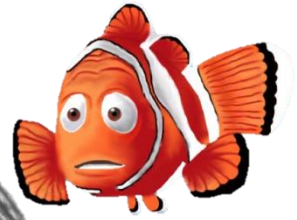
Scale measurements of juvenile and adult pink salmon caught in fall in the Okhotsk Sea and in summer in the Pacific Ocean

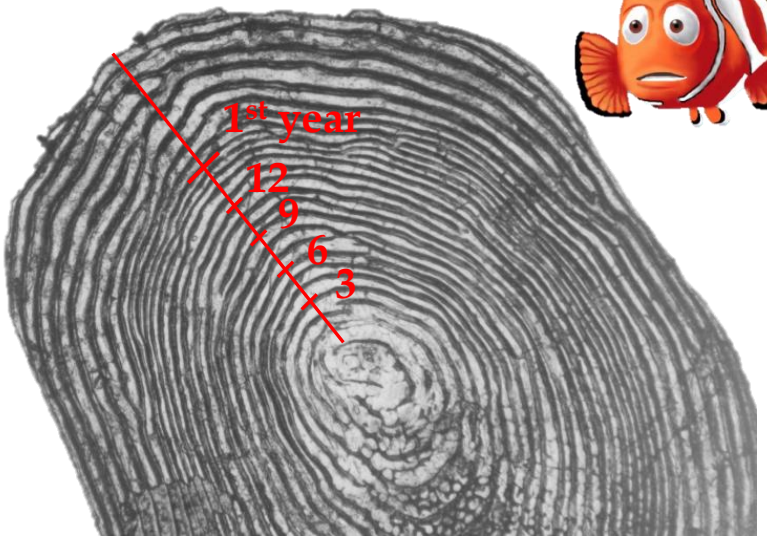




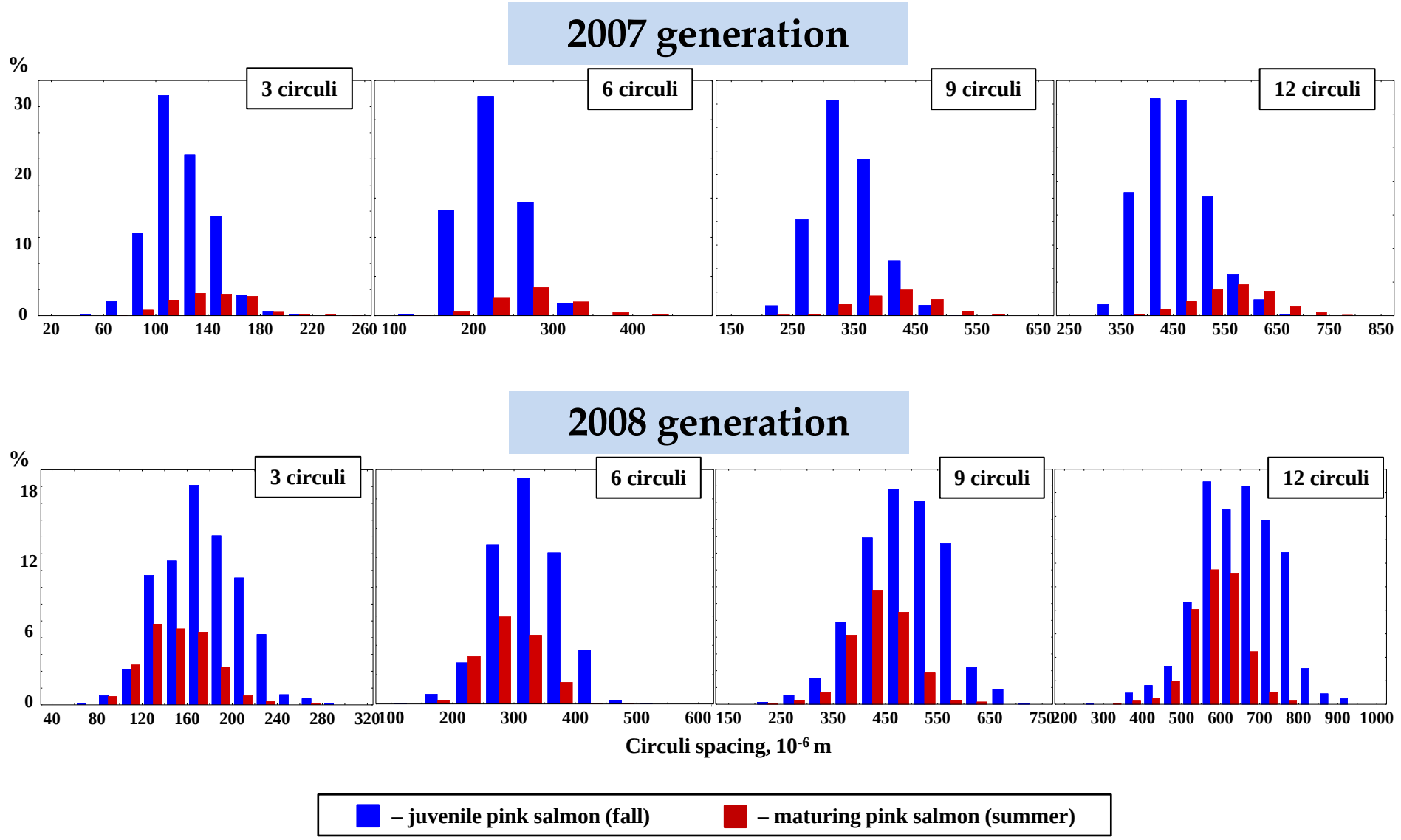
Juvenile

Maturing



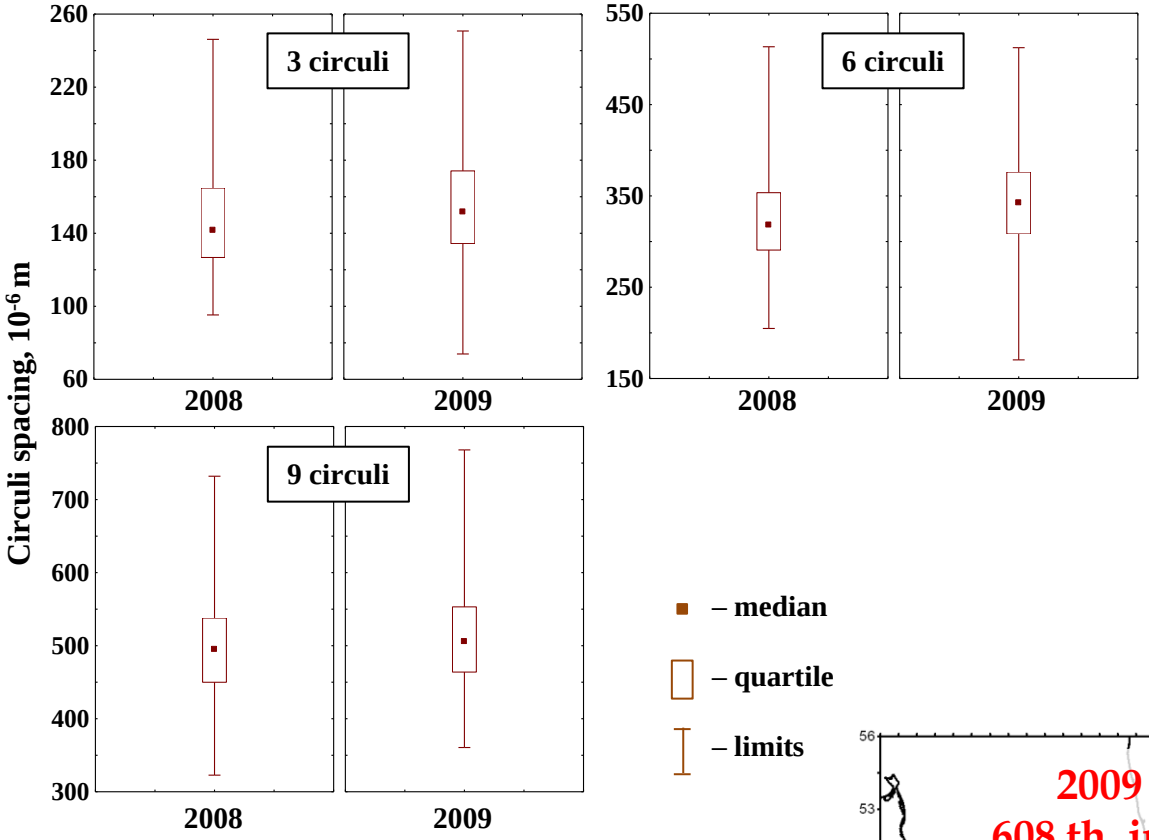


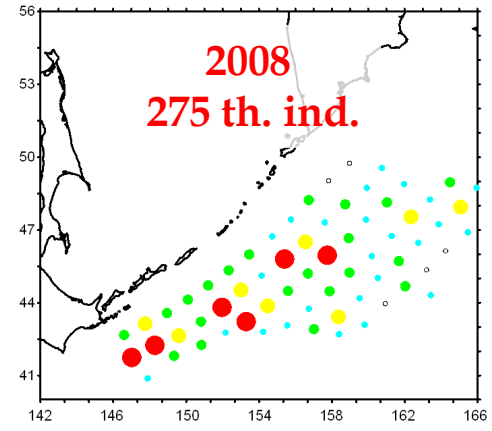
Average circuli spacing of the first 3, 6, 9 and 12 circuli from pink salmon of 2007 and 2008 generations

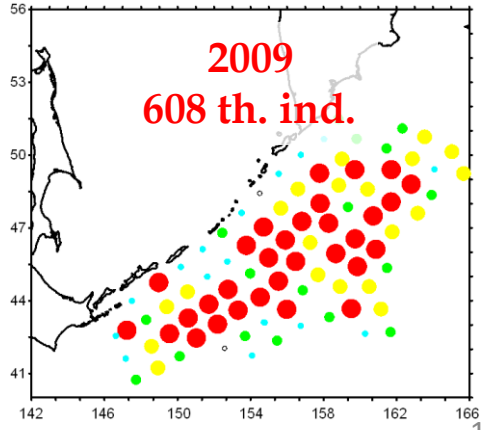


Average circuli spacing of maturing pink salmon in the second year of life

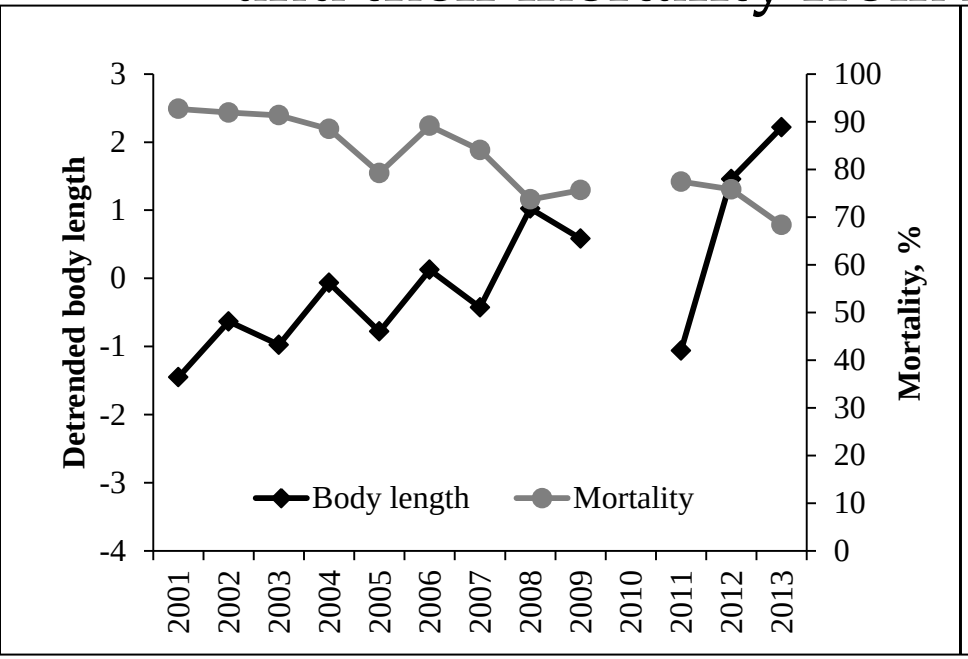
Second year growth was similar in 2008 and 2009

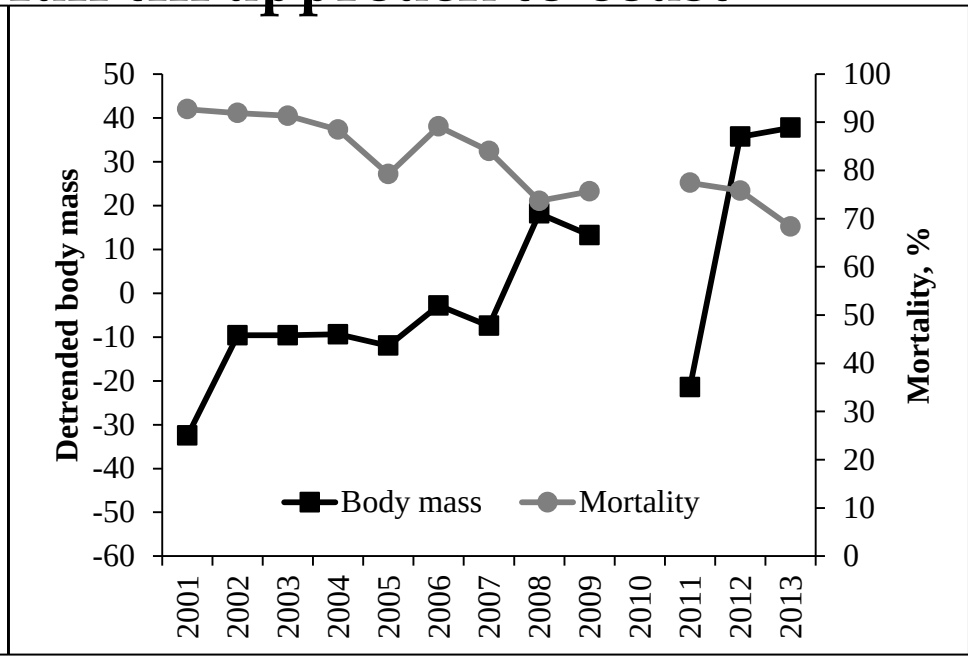


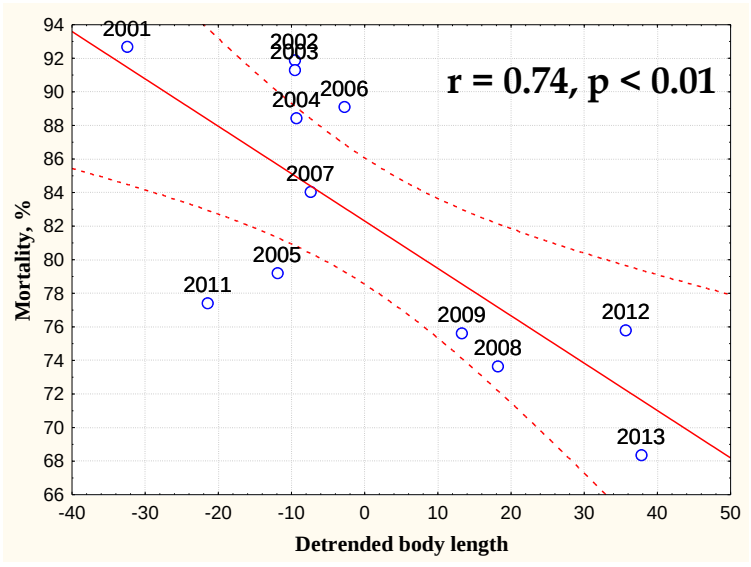


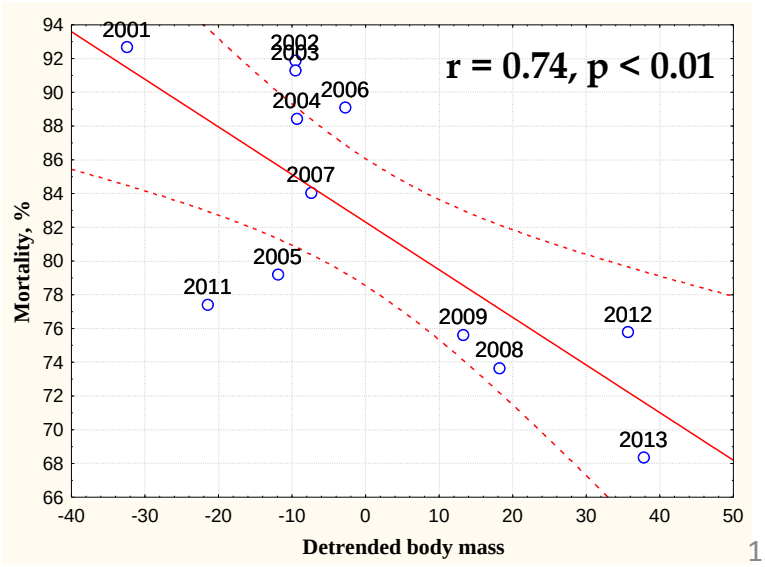


Changes in body size of juvenile pink salmon and their mortality from fall till approach to coast



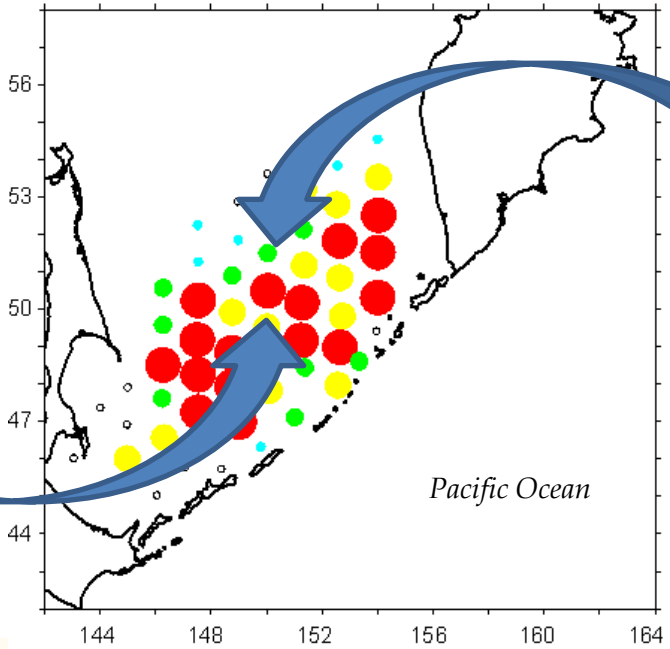




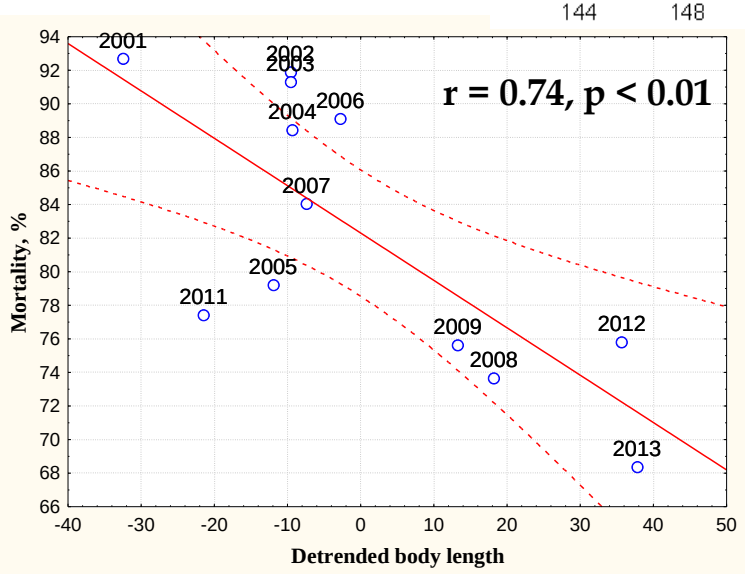


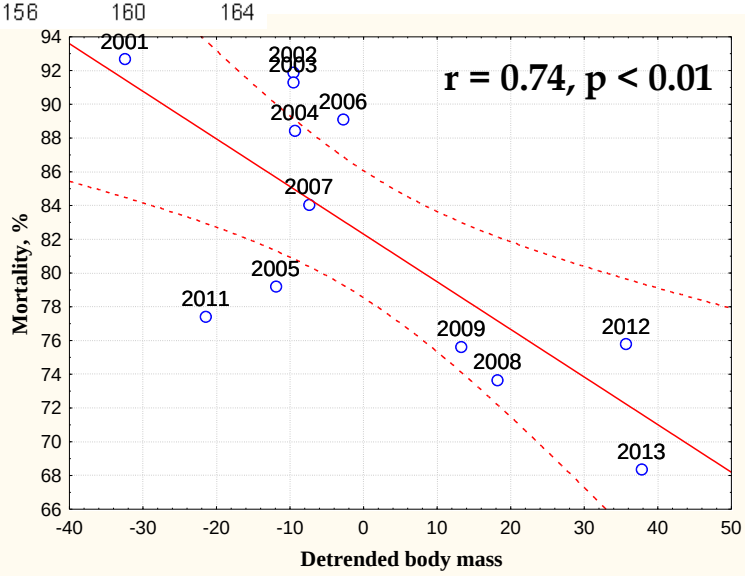
Changes in body size of juvenile pink salmon and their mortality from fall till approach to coast

EVEN YEARS
Dominance of relatively big juveniles

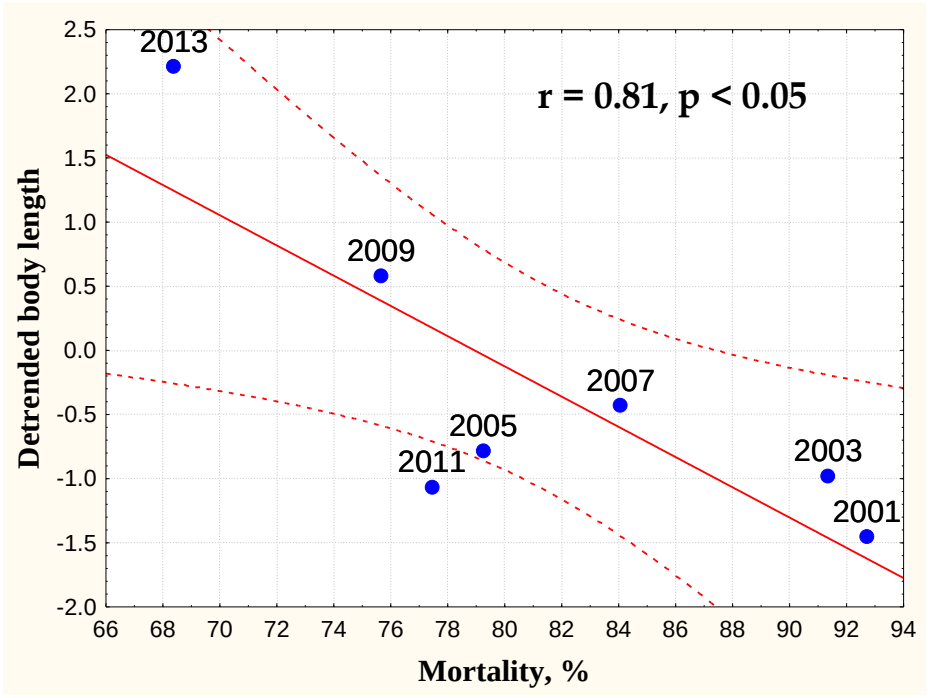


ODD YEARS
High abundance of relatively small juveniles

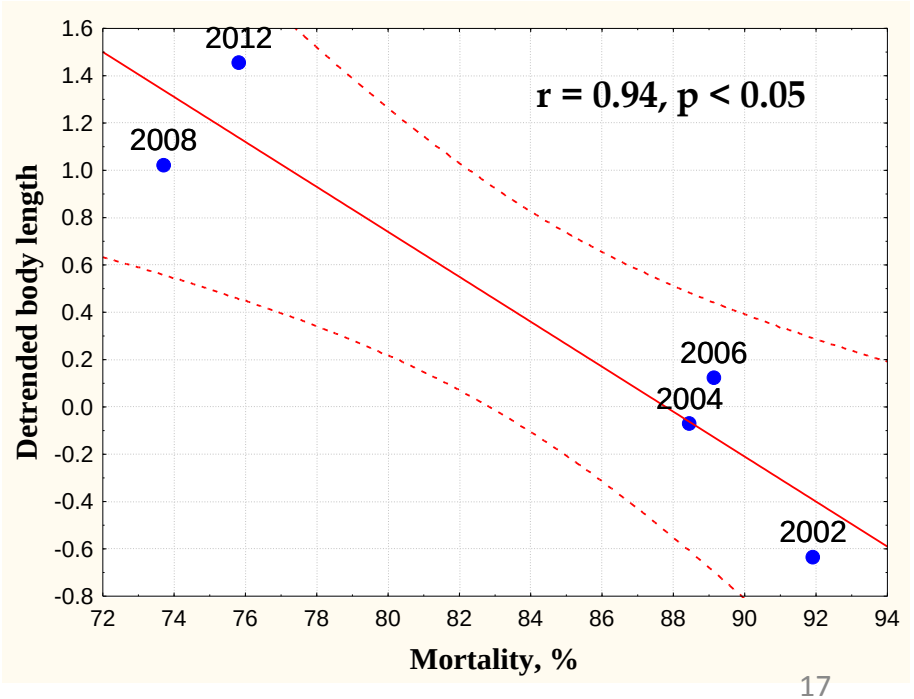




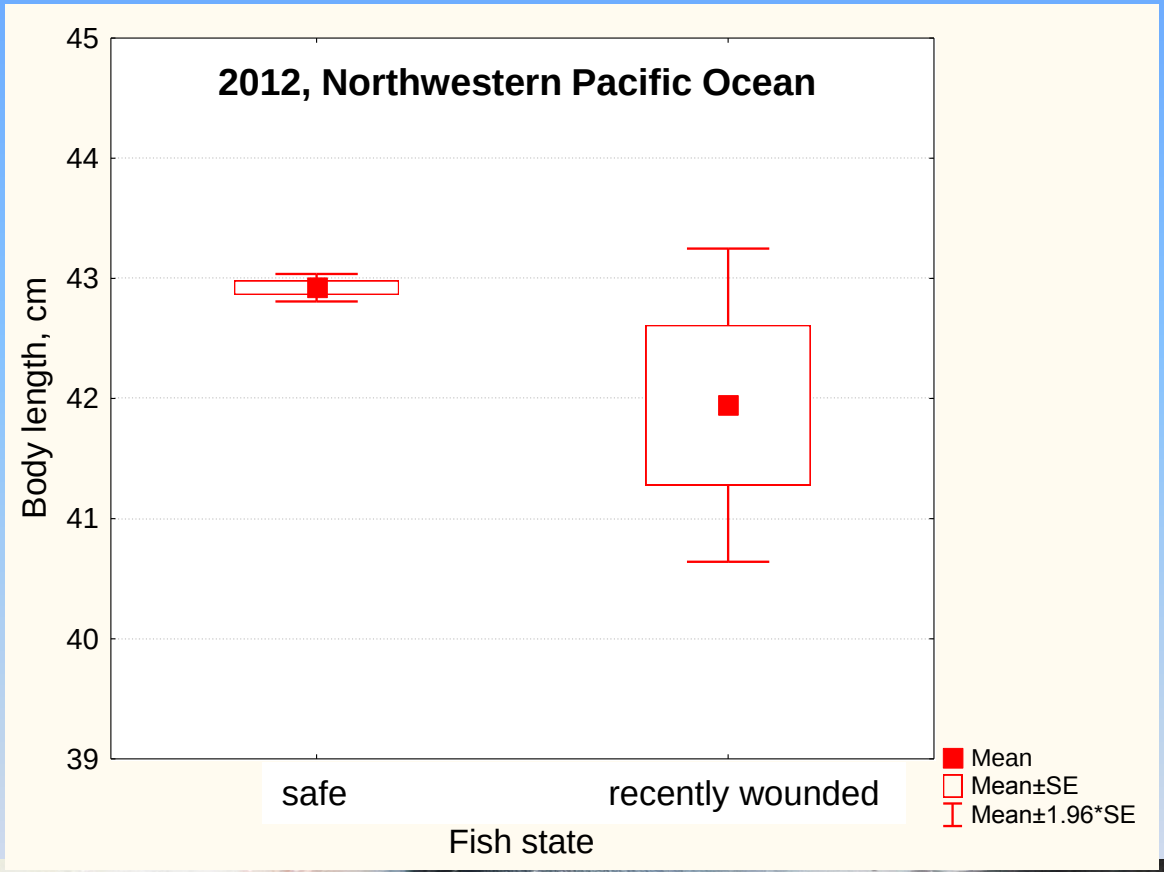
Changes in body length of juvenile pink salmon and their mortality from fall till approach to coast



Separate analyses of even and odd years improve fitting



Mean body length of pink salmon which were recently wounded by Daggertooth or Lancetfish in comparison with non-wounded fish



Conclusion

- ✓ **critical size and critical period hypothesis is confirmed for Sea of Okhotsk pink salmon**
- ✓ **data on body size of juvenile pink salmon can be useful for long-term forecasting of their returns**


Thank you!
Mather