Abstract:
The Seward Line in the Northern Gulf of Alaska has been the focus of multidisciplinary observations of physical oceanography, nutrients, phytoplankton, and zooplankton for 15 years. Over the study period we have observed years favorable and unfavorable to primary production and the local zooplankton populations, and observed the summer import of southern species during warm years. Changes in the abundance, composition and especially the size-structure of the zooplankton communities affect the availability of prey to higher species such as juvenile salmon. With cool oceanographic conditions anticipated for 2008, it is likely that large copepod prey will be abundant, and this should result in higher survival of juvenile salmon released during this year.

Methods:
From fall 1997-2004, 6 or 7 cruises were conducted annually under the GLOBEC program. During 2005-2007, NPRB funded cruises each early May and late September. Sampling during cruises consisted of 13 stations along the Seward Line stretching from the coast to well beyond the shelf break, and 3-5 stations in western Prince William Sound (Figure 1). Sampling during all cruises consisted of: A) profiles of temperature, salinity, nutrients and chlorophyll, B) stratified sampling of larger zooplankton and integrated sampling of smaller zooplankton, C) estimation of the community primary production and rates of secondary production for the dominant zooplankton. This contributes to the North Pacific Research Board's Ocean monitoring program (projects 520, 603 & 708) and the US GLOBEC program (jointly funded by the NSF and NOAA).

Results (physical):
To date the study period has encompassed the strong 1997/98 El Nino, the strong 1999 La Nina, the moderate 2002/03 El Nino, and the anomalously warm non-El Nino years of 2000 & 2005 (Fig 2a). Each of these events is apparent in the physical time series (Fig 2c), except for the 2007 El Nino. It is not apparent if a 1998/99 regime shift, as suggested by a change in PDO sign (Fig 2b), has occurred within the time-series. Although a long-term deep warming trend has been observed at the inshore station Gak1 (based on a 30-year physical time series), Spring 2007 temperatures were anomalously cold (Fig 5c), colder than any year since the early 1970s. Although surface water warms to more typical values during summer 2007, water below 100m remained colder than normal.

Results (biological):
Like all biological communities we can see changes in abundances of species between years. Of the large copepods that dominate the spring, the largest, Neocalanus cristatus, shows no significant pattern across years, while the slightly smaller N. plumchrus/flemingeri show significantly higher abundances in 3 years and lower abundances in 3 years (Fig 3), with tentative number for 2007 also high. Similarly, Eucalanus bungii, and Metridia spp., show significant variation between years, while Calanus marshallae shows large increases in abundance during 2005 (Fig 3). With cool oceanographic conditions anticipated for 2008, it is likely that large copepod prey will be abundant, and this should result in higher survival of juvenile salmon released during this year.

Expectations for 2008:
In general, large spring copepods such as Neocalanus appear to be more abundant in cool springs then in warm ones (provided there is not a complete mismatch between the timing of Neocalanus arrival and the spring bloom).