

EVOS ANNUAL PROJECT REPORT

Project Number: 040624

Project Title: Acquisition and Application of Continuous Plankton Recorder data in the Gulf of Alaska

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Time Period Covered by Report: September 2004-August 2005

Date of Report: 25th July 2005

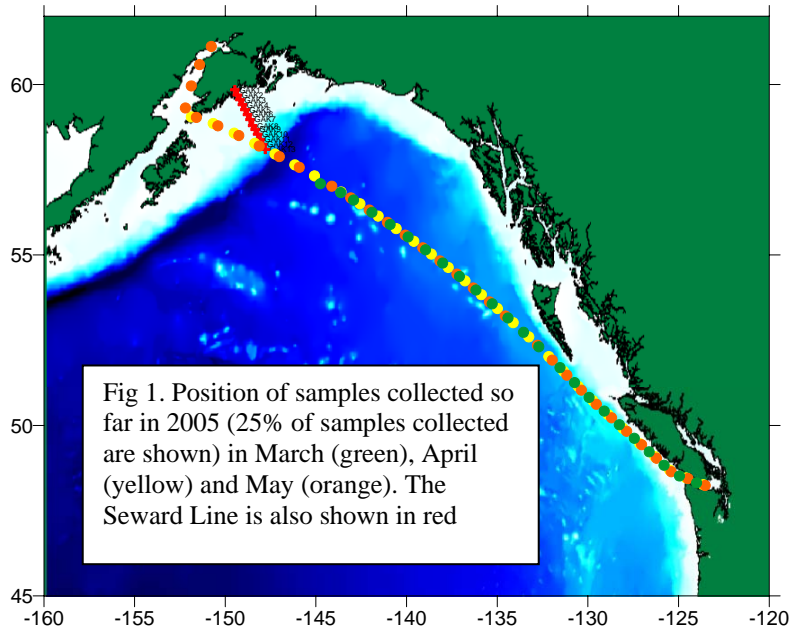
1. Work Performed:

There were four objectives described under our work-plan that was revised for FY05-06 and progress on each is described here:

i. Sample collection and processing on the transect from Cook Inlet to Puget Sound

This is our second year working with the volunteer ship *Horizon Kodiak* so communication and sampling is becoming more routine. The transect is remarkably consistent each month, an advantage in building up a time series. Figure 1 shows the samples that have been collected so far in 2005 and the table below describes the sampling details.

Data from the March and April sampling are posted on the project web site, and suggest that zooplankton are more abundant on the Alaskan shelf this year than at the same time last year, though offshore in the Gulf of Alaska is similar to last year.



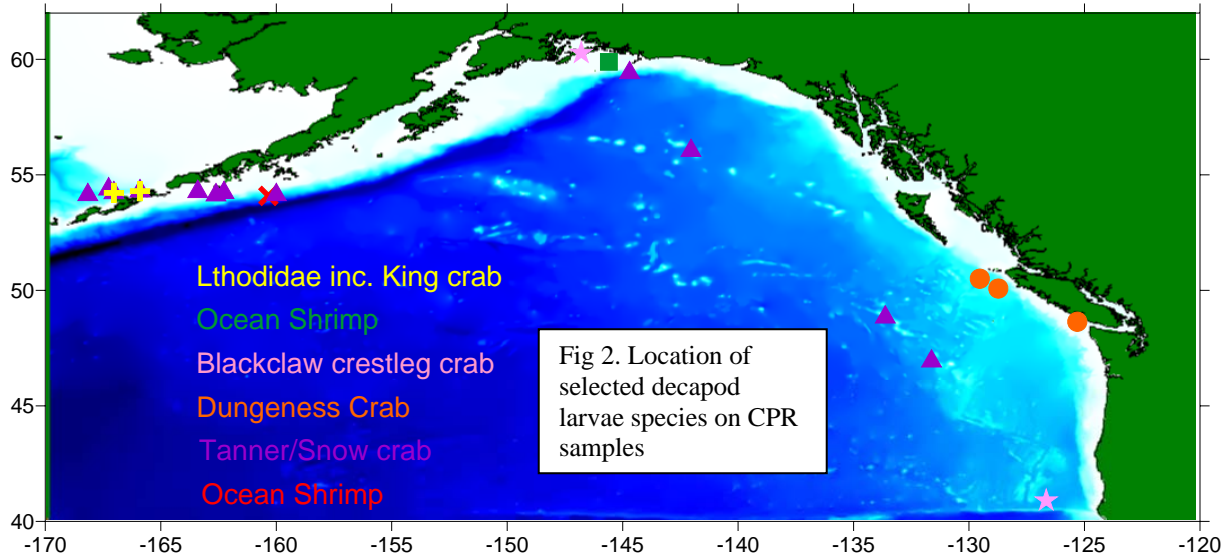
Date	Status of sample processing	Comments
17 th - 19 th March	Sub-set processed, results on web-site	Prop shaft broke so no sampling north of 57.4°N
28 th - 30 th April	Sub-set processed, results on web-site	No problems
28 th - 31 st May	Samples being processed	No problems
30 th June - 1 st July	Samples unloaded from 1/3 transect	Prop lost at 52°N. Spares sent to ship, CPR repaired and rest of transect sampled 22-24 th July
August	To be sampled	
September	To be sampled	

ii. *Euphausiid distribution/abundance*

Preliminary observations of CPR samples collected on the Alaskan shelf around the Aleutian Islands seasonally in 2002/03 suggested that the abundance of euphausiids increased as the transect approached the shelf, irrespective of time of year. Given that this region is an important foraging ground for juvenile salmon (into at least the late autumn) as well as for marine birds and mammals, we investigated the euphausiid distributions in more detail during the first part of 2005. Ordinarily every 4th sample is processed for plankton taxonomic abundance but between 150°W and 175°W (the centre of the Alaska Gyre to the deep waters of the southern Bering Sea) all samples were processed to measure euphausiid abundances. Six species of euphausiid were identified: *Thysanoessa inermis*, *T. longipes*, *T. inspinata*, *T. spinifera*, *Euphausia pacifica*, *T. rathii* (just one individual). Although the five most abundant species were found all along the transect, we found clear differences in species distribution. Our expectation, based on our original observations, was that there would be a negative correlation between water depth and euphausiid biomass in both the Gulf of Alaska and Bering Sea, so that highest biomass would be found in shallowest water, i.e. over the Aleutian shelf. While this held true for the Bering Sea it was not the case in the Gulf of Alaska - in the fall and winter the highest biomass of euphausiids in the Gulf of Alaska were off the shelf, over the deep waters of the Aleutian trench. Further work will be carried out to establish the implications and the possible causes of this distribution (eddies from the Alaskan Stream are one candidate that will be investigated), but an abstract has been submitted to the autumn PICES annual meeting (the session on Euphausiid ecology).

iii. *Decapod larvae taxonomy*

Recruitment is a key factor in the strength of commercial stocks of decapods such as red and blue king crab, Tanner crab, snow crab and Dungeness crab. Sources of larval populations may be far removed from the adult stocks and recruitment will be affected by environmental conditions as well as fishing effort. One mechanism which may contribute to the dispersal of decapod larvae is the anti-cyclonic eddies that are formed in winter along the eastern continental margin of the northeast Pacific. All CPR samples from 1997 and 2001-2003 in which Decapoda had been recorded in routine analysis were re-examined. Decapods were identified as far as possible to species or genus, developmental stage was noted and, where practical, measurements were made of carapace length (excluding rostrum), total length and length from the tip of the rostrum to the tip of the dorsal spine in the brachyura and total carapace length including rostrum for other decapods. Over 40 species/taxa were identified; most of the decapods in the survey are larvae of benthic species and *Cancer* spp were the most abundant of these. They occurred in greatest numbers in samples taken on the Alaskan shelf in July 2000 and June 2001, in the region of the Aleutian Islands in June 2001 and June 2003 and off Vancouver Island in June 2002. These areas were the main centres of occurrence of larvae of benthic species generally. Fig 2 shows the distribution of a few selected species. *Chionoecetes* spp. larvae (Tanner/snow crab) were found mainly on the Alaskan shelf and near the Aleutians (Fig 2) but there were also some recorded from deeper waters in the Gulf of Alaska (and also in the north-western Pacific but not shown here). Off-shelf records of larvae of benthic species are being examined further in conjunction with the results of routine analysis to find evidence from the CPR data of transport of shelf waters with their characteristic communities.



iv. *CPR:Bongo comparison*

During May 2004 we had the opportunity to deploy the CPR from a research ship (the *R/V Tully*) which was also collecting zooplankton samples off the west coast of Vancouver Island using a bongo net. The CPR was towed in between bongo stations and between transect lines. Although the two instruments have different sampling characteristics comparing the catches in these contemporary samples enabled an assessment of how such datasets may be merged or analysed together. The Bongo hauls were taken from depths of about 250m to surface in the deepest stations and about 40m to surface at the shallowest. The CPR is towed at a fixed depth, which is vessel and speed dependent and not measured from the *Tully*, but was likely to have been around 5-7m. Differences in catch varied by species and could be due to the depth distribution of the species (a surface bias gave higher numbers in the CPR, a deeper bias gave higher numbers in the Bongos), the mesh size of the filtering materials (270 μ m for the CPR, 236 μ m for the Bongo nets), the preservation characteristics (gelatinous plankton tend to be damaged by the CPR mechanism) and the patchiness characteristics of the species (although this diminishes with wide sample coverage by both instruments). All samples have been processed and although data analysis is ongoing initial conclusions can be drawn. With the exception of gelatinous and near-bottom taxa such as polychaete larvae it is clear that the two devices are sampling the same plankton community. The CPR gives more weight to larger plankton and the bongo to smaller taxa (partly explained by mesh size differences). Although merging of raw data would not be advised, merging of data 'products' such as interannual trends or seasonal cycles would be possible. This could be very useful in filling in gaps in time series or extending spatial information, for example the CPR transect crosses the outer edge of the Seward GAK-1 line (see Fig 1).

2. **Future Work:**

No changes to proposed work. Sample and data analysis will be ongoing, other objectives will continue.

3. **Coordination/Collaboration:**

We continue to collaborate with scientists from around the north Pacific coast, mainly through PICES (North Pacific Marine Science Organisation) activities. A presentation was given at last September's EPOC (East Pacific Oceanography Conference) meeting combining the plankton data with the thermosalinograph data from project 03614, data analysis is ongoing.

4. Community Involvement/TEK & Resource Management Applications:

Technicians from PWS Community College were trained in 2002 in CPR servicing/loading. Since then, they have been responsible for servicing the CPRs from the GEM funded transect in Valdez and sending the unloaded samples to the Institute of Ocean Sciences, BC for processing. The sampling success rate has been very high and we are very grateful for the involvement of PWSCC. The efforts of the officers and crew of the *Horizon Kodiak*, and the port agents in Anchorage and Tacoma have also made a great contribution to the success of this project.

5. Information Transfer:

a. Publications produced

Batten, S.D and Crawford, W.R. (2005). The influence of coastal origin eddies on oceanic plankton distributions in the eastern Gulf of Alaska. *Deep Sea Research II*, **52**, 991-1009.

Lindley, J.A., Batten, S.D., Coyle, K.O and Pinchuk, A.I. (2004). Regular occurrence of *Thysanoessa inspinata* (Crustacea: Euphausiacea) in the Gulf of Alaska. *Journal of the Marine Biological Association of the UK*, **84**, 1033-1037.

b. Conferences attended

September 2004, EPOC annual meeting, Sidney, Canada. Oral presentation '*Gulf of Alaska circulation and large-scale plankton distributions*', *Sonia Batten, Steve Okkonen, Tom Royer and David Welch*

October 2004, PICES XIII Annual Meeting, Honolulu, USA. Presentations to MONITOR Committee and CPR Advisory Panel.


January 2005. EVOS/NPRB joint annual meeting. Poster presentation '*Progress of the CPR-based survey in the Gulf of Alaska*', *Sonia Batten and David Welch*

c. Data/information products

Species lists and data summaries (e.g. total zooplankton biomass and abundance and comparisons with previous years) are posted on the project website at regular intervals.

6. Budget:

On schedule

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Project Web Site Address: http://www.sahfos.org/pacific_project.htm