RISE 3-W CRUISE

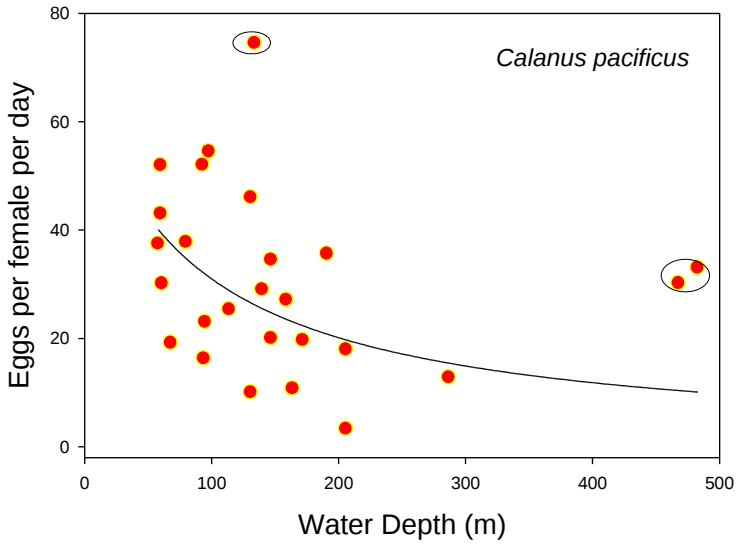
ZOOPLANKTON REPORT

Bill Peterson and Tracy Shaw

The zooplankton team participated in the first half of the cruise, from 4-14 August 2005. The team was composed of Bill Peterson (NOAA-NMFS, Newport OR), Tracy Shaw (Oregon State University, Hatfield Marine Science Center, Newport OR) and Natalie Román (REU Student from Emporia State University, Emporia Kansas – REU is Research Experience for Undergraduates funded by the National Science Foundation).

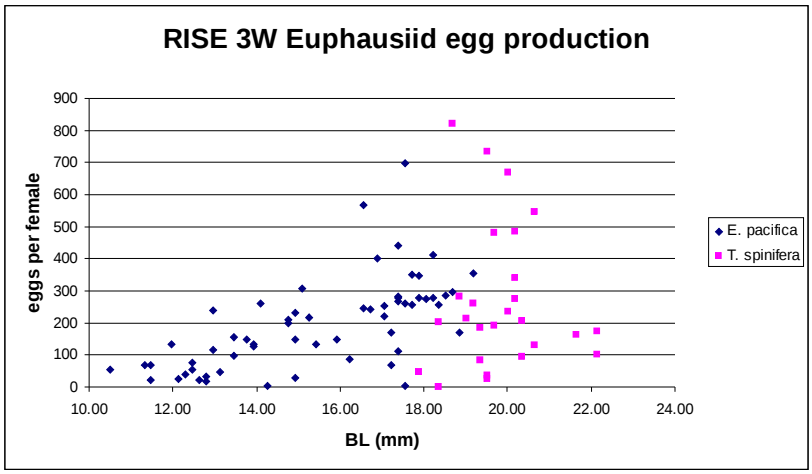
The zooplankton team worked the night shift. Thirty-five stations were occupied. Operations carried out at each station are shown in Table 1. We conducted a total of 35 vertical plankton net tows, 25 oblique Bongo net tows and 8 vertical live net tows. Live animals were incubated at many stations including 29 stations for egg production rates of Calanus pacificus, 10 stations for egg production by the euphausiid *Thysanoessa spinifera* and 9 stations for egg production by the euphausiid *Euphausia pacifica*. Sixty-nine of the *E. pacifica* females that spawned were frozen at -80ºC for later determination of their age using lipofuscin analysis. In addition, a limited number of egg production measurements were made on the copepod species *Acartia longiremis*, *Acartia tonsa* and *Calanus marshallae*.

Results



Egg production rates for the copepod *Calanus pacificus* are shown in the figure to the left. Rates were highest at the nearshore stations, declining to low levels at stations off the shelf. Three stations were "outliers": rates of 30 and 33 eggs per day were recorded at station Long Beach 7 and at a station just north of Astoria Canyon; a rate of 74 eggs per day was recorded at Long Beach 6. It is noteworthy that we also saw highest rates along the Long Beach line during the June 2005 RISE cruise. Maximum rates for this copepod species are on the order of 50-60 eggs per day, thus maximum rates were observed only rarely, indicating food limitation of egg production at most stations.

We observed high numbers of reproductively active euphausiids at many stations during this cruise. We were unable to conduct experiments on as many as we would have liked as we were limited by incubator space. *Euphausia pacifica* females produced an average of 193 eggs per female and *Thysanoessa spinifera* females produced an average of 279 eggs per female. For *E. pacifica*, the climatological average (based on incubations made chiefly off Newport during the past four years) is on the order of 130 eggs per female. During our routing sampling off Newport we do not catch very many *T. spinifera* so we do not have a good climatological comparison. The experiments we conducted during this RISE cruise have significantly contributed to the amount of egg production data we have for *T. spinifera*.



This figure shows the relationship between egg production and body length for the two species. One interesting result from the RISE cruise is the large number of females incubated which were small in size. Most of our past work has been with females in the 19-23 mm size class. Although this size class was present during this cruise, there were also a large number of small females that were spawning. This suggests that there was an unusually large number of small euphausiids in the population during July 2005. This is consistent with observations of warm and unproductive ocean conditions which have prevailed throughout the spring and early summer months in the Pacific Northwest. The delay in availability of sufficient food resources for reproduction may have resulted in animals becoming reproductively active at a smaller size than in years when upwelling begins earlier in the season.

Table 1. Summary of zooplankton sampling effort from August 4-14 on RISE-3W.

Station	Latitude	Longitude	Depth	Vertical Net	Bongo Net	Live Net	Copepod EPR	*E. pacifica* EPR (# incubated)	*T. spinifera* EPR (# incubated)
LB 3	46.5	124.2667	60	x	x		x		
LB 6	46.5	124.4333	140	x	x		x		1
LB 7	46.5	124.5333	483	x	x		x	1	
GH-8	47	124.975	206	x	x		x		7
GH-7	47	124.8867	172	x	x		x	14	
GH-5	47	124.625	94	x	x		x		
HR-6	45.83	124.6667	206	x	x		x		
HR-5	45.83	124.4167	159	x	x		x	10	4
HR-4	45.83	124.15	95	x	x		x		3
HR-2	45.83	124.0333	60	x		x	x		1
CM-5	45.5	124.3833	191	x	x		x	7	
CM-4	45.5	124.25	156	x	x				
CM-3	45.5	124.1167	98	x	x		x	7	9
CM-2	45.5	124.05	68	x		x	x		
CN-1	46.3	124.25	61	x		x	x		
CN-2	46.3	124.3333	93	x	x		x		
CN-3	46.3	124.4417	131	x	x		x		
CS-1	46.2	124.25	80	x		x	x		
CS-2	46.2	124.3333	114	x	x		x		4
CS-3	46.2	124.45	147	x	x		x		
CS-4	46.2	124.5333	287	x	x		x	14	3
CS-3 REP	46.21	124.45	147	x		x	x		
CT-1	46.22	124.45	217	x					
CT-3	46.26	124.45	468	x	x		x	14	
CT-4	46.28	124.45	177	x					
CN-3 REP	46.3	124.45	131	x		x	x		
LB-3	46.5	124.2667	58	x	x		x		3
LB-6	46.5	124.475	134	x	x		x	1	
LB-7	46.5	124.5333	164	x	x		x	11	
SM-3	45.9	124.6	170	x	x				
SM-2	45.9	124.53	128	x	x				
SM-1	45.9	124.45	157	x	x		x		
HR-4-REP	45.87	124.15	93	x		x	x		
HR-2-REP	45.87	124.0333	60	x		x	x		2