

## **Appendix B: Sea Urchins Water Loss Studies**

**By: G. Krause, on behalf of the Pacific Urchin Harvesters Association (PUHA)**

D&D Pacific Fisheries Ltd. passed along the water loss data collected over the past couple of years for quick analysis. The analysis is needed to establish the presence of effects from the transport/holding times on packers and trucks respectively as well identify seasonal trends on the water loss characteristics of the urchins after they are harvested. Geo-referenced maps of the coast was used to estimate the distances from the fishing grounds to the unloading stations. These data were used to estimate the time spent by the catch on the packer en route to unloading. The on-road intervals were based on reported travel times over the routes. 179 and 541 records were counted for the South and North Coast respectively. All results indicating a greater than 50% weight reduction and all records indicating a weight increase were discarded. A total of 72 records were not used and are not included in the above total.

The averages for the North and South Coasts are presented for each month in the first two tables. It looks like the water loss increases between the dock and the plants from September through to January and then starts falling off again. The changes are not large and the dock to plant water losses average 12% and 13% for the North and South respectively. These are roughly comparable and are not significantly different. There are a couple of months where the averages come in higher (18- 20%) and a couple where they come in lower (8.5- 9%) but these have fewer samples and, even though they lie within 1 standard deviation of their mean, are considered outliers.

The losses occurring on the packers could only be estimated for the North. Apparent losses on the packers are, at about 11%, a bit lower than the truck losses but the accuracy of the weights – especially the net weights (less the bags) is probably more variable. It does not look like there is much correlation between the time in transit and the water loss. The apparent water loss on the packer does not seem to affect the subsequent water loss between the dock and the plant. Two tables looking at the correlations between the various ‘ages’ of the urchins and the weight reduction observed are presented. The ages in this case are estimated as the number of hours on the packer or the number of hours in transit from the dock to the plant. The greatest correlation found was for the North Coast data where a correlation coefficient of 0.26 was found for the relationship between the length of the drive to the plant to the difference between the dock and plant weights. Basically it means there is no relationship between the length of the trip and the weight reduction. When the data are broken out by month, significant negative correlations between the age and decline, indicating smaller weight declines with increasing age, are seen in Oct-04, Feb. 05 and Jan. 06 on the N. Coast packer results and in Dec. 05 on the S. Coast,. These data are counter-intuitive and hard to explain. The generally low correlations can be seen graphically in the scatter plots rounding the graphics presentation. The strongest relationships seem to be related to the date (of harvest) as opposed to any operational variable, although even these are looking pretty weak. There would seem to be a number of confounding factors at play here- orientation of the urchin for example will affect drainage. This is a variable that changes part way through the transport process when the bags are dumped on the dock and the process starts up in some urchins which were previously sideways or upside down even while it is arrested in others which are now upside down or sideways.

For a quick and dirty estimate- I think the data will support ~10% loss for now. More work is going to be required to get more details on what is happening. For example, using deliberately oriented (upside up, upside down and sideways) urchins would provide more detailed information on the drainage and provide some benchmark data which can be used to model the process(es). Orientation could also have other impacts on quality.

<b>Averages and Correlations: North Coast</b>								
	Packer to	Dock to	Total	Pack -Doc	Dock-Plant	Correlations		# of
	Dock Age	Plant Age	Age	Reduction	Reduction	Packer age	Total age	samples
Sep-04	15.00	24.00	39.00	10.91%	11.14%	P-D decline	total decli	6
Oct-04	10.22	24.00	34.22	7.22%	11.82%	-0.337	-0.514	49
Nov-04	6.86	24.00	30.86	12.77%	12.24%	0.196	0.268	92
Dec-04	14.79	23.74	38.53	12.31%	11.94%	0.080	0.097	187
Jan-05	15.66	18.92	34.58	10.70%	11.01%	-0.126	0.365	85
Feb-05	15.39	20.21	35.61	11.68%	8.57%	-0.651	-0.654	19
Dec-05	15.22	24.00	39.22	8.83%	13.26%	0.242	0.091	31
Jan-06	15.40	24.00	39.40	11.24%	18.53%	-0.586	-0.357	15
Feb-06	12.81	24.00	36.81	4.79%	12.05%	0.170	0.178	24
Mar-06	18.99	24.00	42.99	5.36%	11.87%	-0.023	-0.089	39
Apr-06	17.90	19.20	37.10	4.98%	19.78%			5
Avg	13.48	22.96	36.44	10.56%	12.05%			
Stnd Dev.	4.05	3.38	4.93	0.06	0.08			

Ages are in hours

<b>South Coast averages &amp; correlations</b>				
	Total	Wgt.	Age-Wgt	(North)
	Age	Decline	Corr.	
Sep-04	12.63	8.84%	-0.067	11.14%
Oct-04	16.00	11.31%	n/a	11.82%
Nov-04	16.48	12.01%	-0.136	12.24%
Dec-04	14.32	13.64%	0.005	11.94%
Jan-05	14.86	14.23%	-0.105	11.01%
Dec-05	12.25	15.16%	-0.508	13.26%
Jan-06	11.08	16.02%	0.464	18.53%
Avg	14.04	13.28%		
Stn. Dev.	3.33	5.63%		

**Correlations  
North Coast (All)**

	P-D Age	D-Pr Age	Total Ag	P-D Red'r	D-Pr Red'r
<b>P-D Age</b>	1				
<b>D-Pr Age</b>	-0.12902	1			
<b>Total Age</b>	0.73475	0.577875	1		
<b>P-D Red'n</b>	-0.12917	-0.03021	-0.1304	1	
<b>D-Pr Red'r</b>	-0.1147	0.262946	0.08547	0.09116	1

**South Coast (All)**

	Age	Wgt Red'
<b>Age</b>	1	
<b>Wgt Red'r</b>	-0.0638	1



