

**Distribution and Elevation calculations for 217 Chum redds mapped in the Ives Is. Complex during the 2006 Spawning Season
December 22, 2006.**

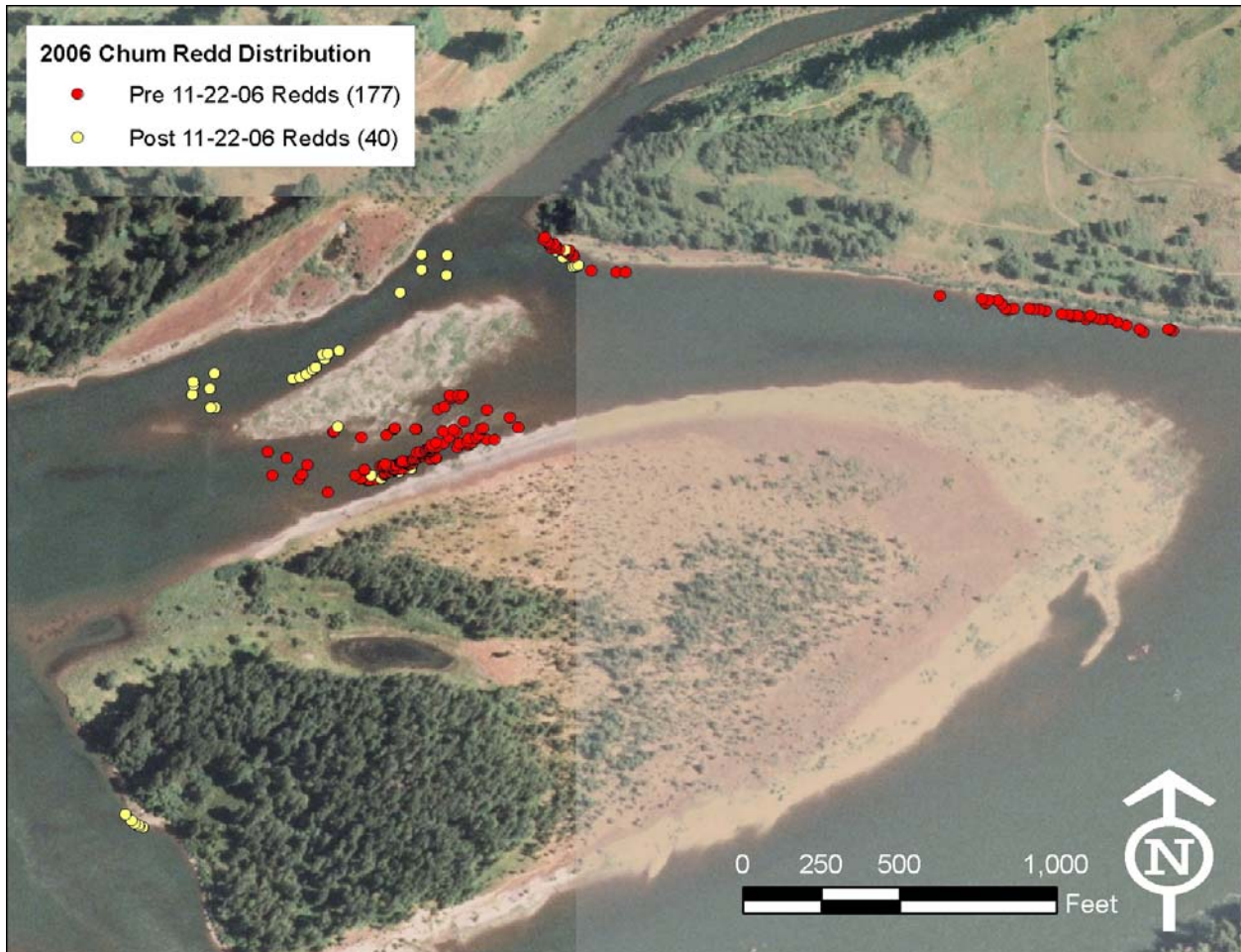


Figure 1. General distribution of all 217 chum redds excavated in the Ives Island complex below Bonneville Dam and mapped with GPS by ODFW/WDFW survey crews. An additional 40 redds were mapped after 11-22-3006. Note: this analysis does not include redds mapped at any of the downstream spawning areas including Multnomah and I-205.

Table 1. Computed redd elevations for all 217 Redds.

Redd Elevations							
7.10	8.89	9.43	9.63	9.80	10.08	10.51	11.35
7.34	8.91	9.43	9.63	9.82	10.09	10.51	11.37
7.73	8.92	9.44	9.63	9.83	10.10	10.51	11.39
8.05	8.95	9.44	9.63	9.84	10.13	10.54	11.41
8.20	8.97	9.45	9.64	9.85	10.17	10.56	11.42
8.30	8.97	9.45	9.64	9.85	10.17	10.58	11.43
8.32	9.01	9.46	9.65	9.86	10.17	10.63	11.43
8.33	9.04	9.47	9.65	9.86	10.17	10.68	11.47
8.33	9.05	9.47	9.66	9.87	10.19	10.69	11.63
8.37	9.08	9.48	9.67	9.88	10.19	10.69	11.71
8.38	9.09	9.49	9.68	9.88	10.20	10.71	11.72
8.48	9.09	9.50	9.68	9.88	10.20	10.74	11.75
8.48	9.12	9.52	9.68	9.88	10.21	10.75	11.78
8.55	9.13	9.54	9.69	9.90	10.21	10.76	11.80
8.59	9.13	9.55	9.69	9.91	10.24	10.76	11.87
8.60	9.15	9.55	9.69	9.92	10.27	10.84	11.93
8.61	9.17	9.55	9.69	9.93	10.27	10.96	11.96
8.62	9.18	9.56	9.69	9.94	10.30	10.96	11.99
8.68	9.18	9.56	9.70	9.94	10.30	10.99	12.19
8.70	9.22	9.56	9.71	9.97	10.31	11.05	12.23
8.75	9.27	9.56	9.71	9.98	10.33	11.06	12.43
8.75	9.28	9.57	9.74	9.99	10.37	11.08	
8.79	9.32	9.58	9.74	10.00	10.41	11.18	
8.81	9.33	9.58	9.74	10.01	10.41	11.20	
8.84	9.36	9.58	9.76	10.04	10.44	11.22	
8.86	9.37	9.60	9.77	10.05	10.44	11.29	
8.87	9.40	9.61	9.78	10.05	10.45	11.32	
8.88	9.42	9.62	9.78	10.08	10.50	11.32	

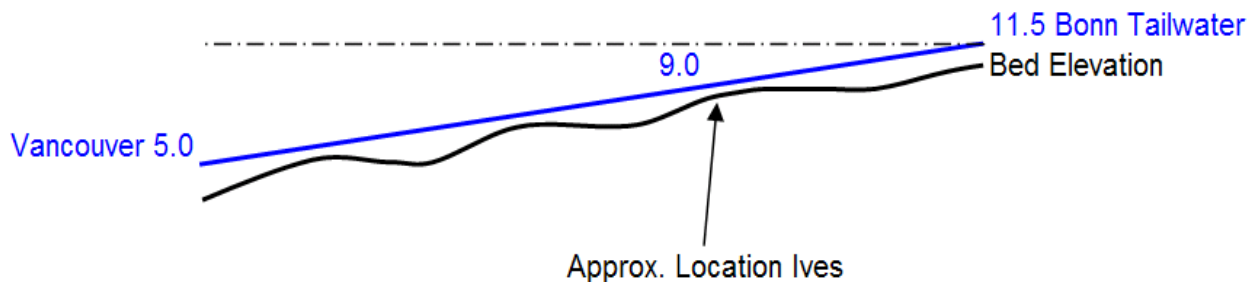


Figure 2. Graphic describing the relationship between the Bonneville tailwater and the chum spawning locations. Water flows downhill, it does not follow the dashed line in the figure above, which if it did would make managing by just redd bed elevations a snap! What we require is the relationship between the Bonneville tailwater and the water surface elevations over the redd spawning areas. Note that the redd elevations computed in Table 1 cannot be used solely as a bases for management.

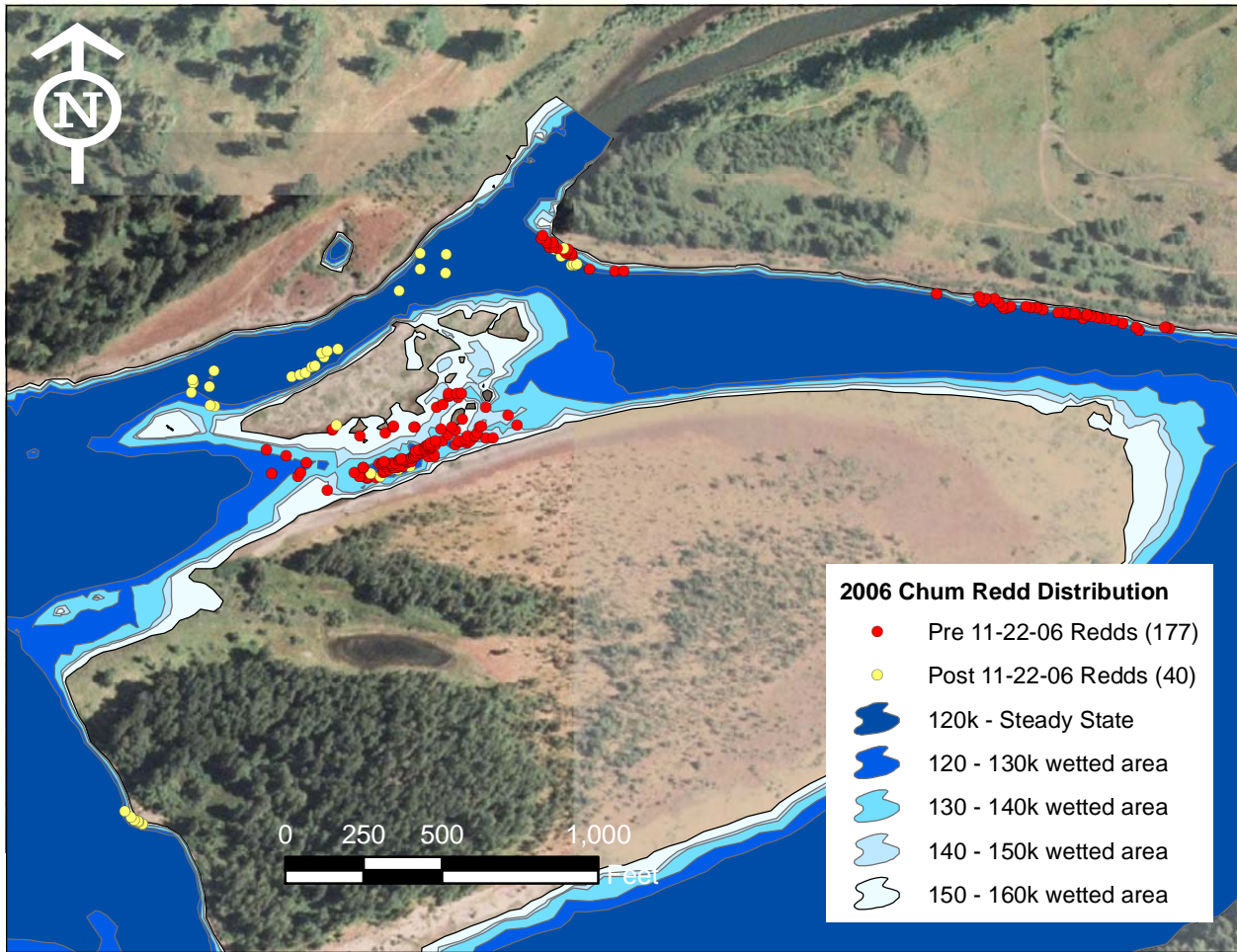


Figure 3. Distribution of chum redds, plotted on modeled wetted area simulations (flow bands) ranging from 120 to 160 kcfs at 10 kcfs intervals.

Table 2. Distribution of chum redds vs. 10kcfs flow band for both the original analysis conducted for 177 redds mapped through 11-22-2006 and all redds including the additional 40 redds mapped through 12-22-2006.

	Redds through 11-22-06			All Redds - 12-22-06			
	<i>Flow Band</i>	<i>Redds</i>	<i>% Total</i>	<i>Flow Band</i>	<i>Redds</i>	<i>% Total</i>	<i>Redd Delta</i>
	120 - steady	18	10.2%	120 - steady	42	19.4%	24
	120-130	67	37.9%	120-130	75	34.6%	8
	130-140	62	35.0%	130-140	66	30.4%	4
13.0 Bon.	140-150	15	8.5%	140-150	15	6.9%	0
Tailwater	150-160	12	6.8%	150-160	15	6.9%	3
	160-170	3	1.7%	160-170	4	1.8%	1
		177	100.0%		217	100.0%	

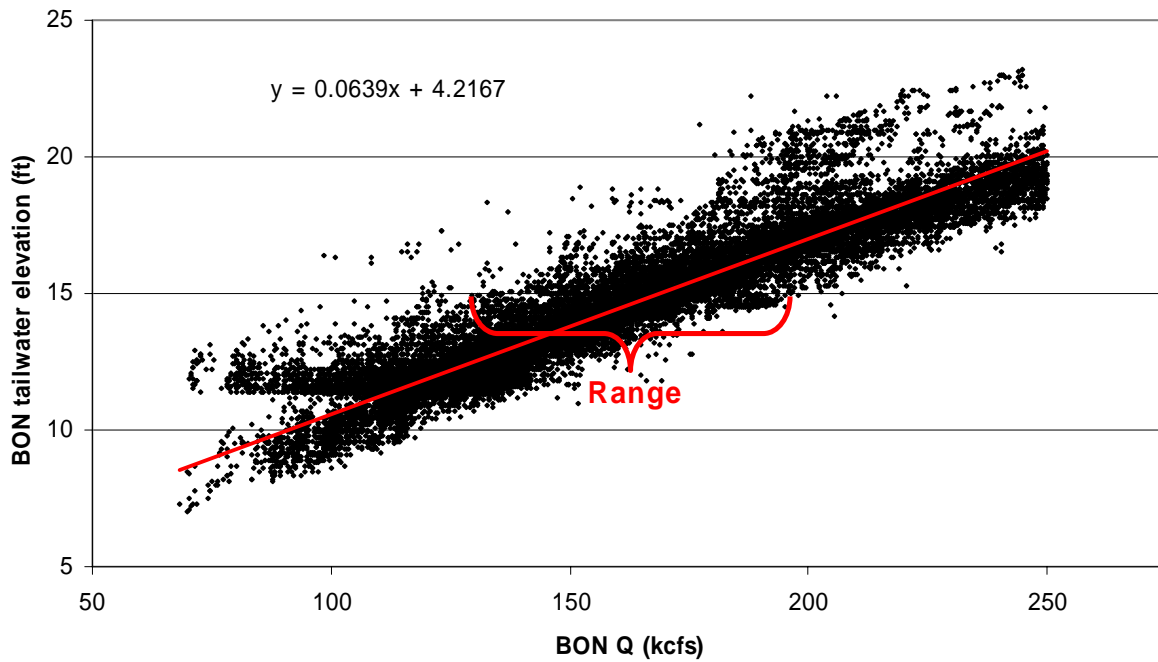


Figure 4. Stage discharge relationship between the USGS Bonneville tailwater gage and Bonneville Discharge using data from 2000 – 2006.

Table 3. This table is based on the relationship of the data in Figure 4 and describes the range of scenarios and problematic nature of managing flows/tailwaters for the Ives Island chum.

elevation	Avg Q (kcfs) necessary	Range	
		min Q	max Q
11.5	114	71	151
12.0	122	71	165
12.5	130	71	160
13.0	137	89	162
13.5	145	103	172
14.0	153	90	173
14.5	161	98	195
15.0	169	119	207
15.5	177	145	211
16.0	184	148	214