

Fact Sheet Attachment 1

City of Petaluma
Ambient Hardness Calculation

Ambient Hardness Calculation							
No.	Date	Station	Hardness	Ln (hardness)	Salinity (measured)	TDS	Predicted Salinity using TDS
1	3/1/1994	C1	300	5.703782475		899	0.6
2	1/17/1995	C1	180	5.192956851		461	0.2
3	2/7/1995	C1	200	5.298317367		674	0.4
4	3/7/1995	C1	300	5.703782475		909	0.7
5	4/4/1995	C1	240	5.480638923		797	0.6
6	2/12/1996	C1	220	5.393627546		568	0.3
7	3/5/1996	C1	180	5.192956851		553	0.3
8	4/2/1996	C1	200	5.298317367		294	0.1
9	1/6/1997	C1	180	5.192956851		577	0.3
10	2/4/1997	C1	360	5.886104031		874	0.6
11	2/9/1998	C1	110	4.700480366		213	0.0
12	3/9/1998	C1	300	5.703782475		955	0.7
13	4/8/1998	C1	200	5.298317367	0.8	730	0.5
14	2/10/1999	C1	80	4.382026635		188	0.0
15	3/15/1999	C1	228	5.429345629		857	0.6
16	Apr-99	C1	138	4.927253685		373	0.1
17	2/16/2000	C1	144	4.9698133	0	593	0.4
18	3/15/2000	C1	192	5.257495372	0.5	758	0.5
19	3/6/2001	C1	200	5.298317367	0.8	962	0.7
20	Jan-02	C1	161	5.081404365	0.5	680	0.4
21	Jan-03	C1	283	5.645446898	0.8	1200	0.9
22	3/1/1994	C2A	260	5.560681631		943	0.7
23	1/17/1995	C2A	160	5.075173815		470	0.2
24	2/7/1995	C2A	204	5.318119994		668	0.4
25	3/7/1995	C2A	300	5.703782475		871	0.6
26	4/4/1995	C2A	240	5.480638923		834	0.6
27	2/12/1996	C2A	240	5.480638923		583	0.3
28	3/5/1996	C2A	160	5.075173815		541	0.3
29	4/2/1996	C2A	140	4.941642423		291	0.1
30	1/6/1997	C2A	200	5.298317367		598	0.4
31	2/4/1997	C2A	280	5.634789603		907	0.7
32	2/9/1998	C2A	112	4.718498871		204	0.0
33	3/9/1998	C2A	280	5.634789603		952	0.7
34	4/8/1998	C2A	200	5.298317367	0.8	722	0.5
35	2/10/1999	C2A	80.4	4.387014176		196	0.0
36	3/15/1999	C2A	216	5.375278408		803	0.6
37	Apr-99	C2A	143	4.96284463		378	0.2
38	2/16/2000	C2A	134	4.8978398	0	577	0.3
39	3/15/2000	C2A	186	5.225746674	0.5	773	0.5
40	3/6/2001	C2A	196	5.278114659	0.8	917	0.7
41	Jan-02	C2A	158	5.062595033	0.5	660	0.4
42	Jan-03	C2A	277	5.624017506	0.8	1200	0.9
43	3/1/1994	C2B	280	5.634789603		981	0.7
44	1/17/1995	C2B	160	5.075173815		463	0.2
45	2/7/1995	C2B	206	5.327876169		673	0.4
46	3/7/1995	C2B	280	5.634789603		904	0.7
47	4/4/1995	C2B	280	5.634789603		847	0.6
48	2/12/1996	C2B	240	5.480638923		599	0.4
49	3/5/1996	C2B	180	5.192956851		559	0.3
50	4/2/1996	C2B	160	5.075173815		304	0.1
51	1/6/1997	C2B	220	5.393627546		608	0.4
52	2/4/1997	C2B	280	5.634789603		864	0.6
53	2/9/1998	C2B	112	4.718498871		209	0.0
54	3/9/1998	C2B	280	5.634789603		900	0.6
55	4/8/1998	C2B	204	5.318119994	1	735	0.5
56	2/10/1999	C2B	86	4.454347296		188	0.0
57	3/15/1999	C2B	220	5.393627546		837	0.6
58	Apr-99	C2B	174	5.159055299		393	0.2
59	2/16/2000	C2B	136	4.912654886	0	590	0.4
60	3/15/2000	C2B	194	5.267858159	0.5	783	0.5
61	3/6/2001	C2B	198	5.288267031	0.8	955	0.7
62	Jan-02	C2B	156	5.049856007	0.5	690	0.4
63	Jan-03	C2B	284	5.648974238	0.8	1300	1.0
64	3/1/1994	CR	280	5.634789603		1062	0.8

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65	1/17/1995	CR	180	5.192956851		504	0.3
66	2/7/1995	CR	206	5.327876169		682	0.4
67	3/7/1995	CR	260	5.560681631		921	0.7
68	4/4/1995	CR	260	5.560681631		848	0.6
69	2/12/1996	CR	220	5.393627546		623	0.4
70	3/5/1996	CR	160	5.075173815		555	0.3
71	4/2/1996	CR	160	5.075173815		305	0.1
72	1/6/1997	CR	220	5.393627546		588	0.4
73	2/4/1997	CR	260	5.560681631		892	0.6
74	2/9/1998	CR	110	4.700480366		216	0.0
75	3/9/1998	CR	260	5.560681631		952	0.7
76	4/8/1998	CR	212	5.356586275	1	779	0.5
77	2/10/1999	CR	83	4.418840608		190	0.0
78	3/15/1999	CR	244	5.497168225		916	0.7
79	Apr-99	CR	142	4.955827058		420	0.2
80	2/16/2000	CR	138	4.927253685	0	589	0.4
81	3/15/2000	CR	196	5.278114659	0.5	829	0.6
82	3/6/2001	CR	200	5.298317367	0.8	994	0.7
83	Jan-02	CR	158	5.062595033	0.6	710	0.5
84	Jan-03	CR	314	5.749392986	0.9	1300	1.0

Equation:

$$\text{Salinity} = (\text{TDS}-220.98)/1044.7$$

count	84
Average	5.268837172
Stdev	0.33247477
St.Err	0.036275971
AGM	190.5

Note: Salinities that are missing for the hardness sampling days are projected using a linear regression between salinity and total dissolved solids. It generally shows good agreement between the observed salinity and the predicted salinity. All hardness that are 400 and below paired with salinity less than 1.0 ppt were used in the Adjusted geometric mean calculation.