TABLE 1. Range of Percent Watershed Area by Land Cover Class for Streams Sampled.

Land Cover Classes*	Sampling Area: Salmon River	Neskowin Creek	Siletz River	Mary's Peak	Coast Streams	Alsea Watersheds
80-100 Percent Hardwood	7-33	5-15	11-34	0-18	0-21	9-22
21-80 Percent Conifer/Hardwood	15-43	14-33	24-32	5-21	5-23	21-31
80-100 Percent Conifer	15-73	43-78	32-50	49-91	49-94	36-56
Shadow/Burned Clearcut/Field	0-1	0	0-2	0-1	0-2	0-1
Open	0-4	0-2	0-9	1-3	0-4	0-5
Semi-Open/Shrub	3-22	2-8	0-16	3-15	0-10	0-4

*Based on interpretation of 1988 Thematic Mapper, Cohen *et al.* (1995).

streams located in the North Fork of the Siletz River drainage, whereas conductivities were highest in five of the six streams sampled in the Mary's Peak area (Table 2). Calcium and Mg^{2+} concentrations were particularly high in these streams.

ANC may be defined (Munson and Gherini, 1991) as:

$$ANC = \Sigma CB - \Sigma CA \quad (1)$$

where ΣCB = sum of base cation molarities times their equivalence charge; base cations are 2[Ca] + 2[Mg] + [Na] + [K] + $[NH_4]$; and ΣCA = sum of strong acid anions times the equivalence charge; acid anions are $2[SO_4]$ + $[NO_3]$ + [Cl] + Y[A], where A = organic acid anions and Y = charge of A. With the exception of K^+, all of the measured ions are important contributors to the acid-base status of the streams sampled in this study. The DOC concentrations of the study streams were quite low, and we did not attempt to estimate the ionic charge of DOC in this study. If we assume that the charge density of DOC is 5 to 7 μeq/mg (Wigington *et al.*, 1996), DOC in the study streams would contribute no more than 27 μeq/L of acidity to stream water, and usually the acidity contribution would be much lower (5 to 16 μeq/L).

Marine Influence

The influence of marine water on precipitation chemistry has been demonstrated for several areas in the Pacific Coast of the United States. McColl *et al.* (1982) found that the Cl^- concentrations of rainwater in northern California decreased abruptly with distance inland (up to 80 km) from the coast. Blew and Edmonds (1995) and Edmonds *et al.* (1995) also observed that concentrations of Cl^-, as well as SO_4^{2-}, Mg^{2+}, Na^+, and Ca^{2+}, were highest at sites near the Pacific Coast and decreased with distance inland. They noted that much of the change in precipitation chemistry occurred between 4 and 13 km of the coast. Bockheim and Langley-Turnbaugh (1997) reported similar patterns for precipitation and throughfall chemistry at forested sites along the southern Oregon coast.

For our study streams, we found stream water concentrations of Cl^-, Na^+, and K^+ decreased as distance from the coast increased (Table 3, PC-1). Chloride concentrations were especially high in water samples collected from streams very near the Pacific Coast and decreased markedly as the distance from the coast increased (Figure 3). The greatest changes occurred within 20 km from the coast. Our PCA, however, revealed that PC-1 was also negatively correlated with the elevation of watersheds and the percent of hardwood forests within watersheds. These relationships are probably a reflection of watershed elevation being higher and the percent of hardwood forest decreasing (Franklin and Dyrness, 1988) as distance from the coast increases.

The Cl^- values that we observed are likely to represent seasonal maxima. Feller and Kimmins (1979) reported streamwater Cl^- concentrations to be greatest during the fall and at a minimum during the spring. They hypothesized that accumulation of Cl^- from dry deposition during the dry summer months with subsequent washing by autumn rains was responsible for the seasonal patterns they observed in a small forested watershed in British Columbia.

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TABLE 2. Physical Characteristics and Water Chemistry for Study Streams. Chemical Units are μeq/L Unless Otherwise Specified.

Stream	Stream Order	Area* (km^2)	Elev.** (m)	Coast** Dist. (km)	Cond. (μS)	pH	ANC	Cl^-	NO_3^-	SO_4^{2-}	Na^+	K^+	Mg^{2+}	Ca^{2+}	DOC (mg/L)
Neskowin Creek															
Neskowin Creek (N1)	2	33.7	30	2.1	64	7.0	229	194	61	72	252	17	107	231	1.2
Neskowin Creek (N2)	2	28.4	30	3.6	62	7.1	217	182	60	75	240	17	103	224	1.3
Neskowin Creek (N3)	1	11.9	100	7.4	55	7.0	181	165	62	60	210	13	96	189	1.3
Sloan Creek (N4)	1	2.5	100	7.7	58	7.0	187	203	54	53	227	12	103	188	1.1
Neskowin Creek (N5)	1	6.4	150	9.1	51	7.0	170	151	64	56	195	12	95	173	1.7
Salmon River															
Salmon River (Sal9)	3	157.3	50	5.6	64	7.2	320	136	54	65	200	10	140	271	2.3
Salmon River (Sal8)	3	140.0	50	8.1	60	7.3	302	130	48	64	187	9	134	263	2.2
Salmon River (Sal6)	2	53.3	100	14.9	50	7.1	209	136	38	53	164	7	108	200	2.2
Salmon River (Sal3)	2	30.4	150	18.0	42	7.0	163	128	26	40	141	6	87	157	3.3
Little Salmon River (Sal2)	1	3.4	180	19.2	48	6.4	92	168	102	37	221	14	81	110	3.6
Slick Rock Creek (Sal5)	2	38.6	50	10.7	50	7.2	241	108	31	59	153	6	97	219	1.8
Bear Creek (Sal7)	2	13.4	50	8.6	79	7.4	470	140	67	56	261	16	202	320	1.4
Salmon Creek (Sal1)	2	9.0	30	4.7	82	7.0	155	259	165	114	289	18	182	228	1.3
Deer Creek (Sal10)	2	6.0	50	6.4	76	7.2	300	199	92	82	269	14	146	286	1.3
Deer Creek (Sal4)	1	3.6	100	15.0	84	7.4	414	134	42	170	210	10	161	438	2.2
Siletz River															
Siletz River (Sil1)	4	282.3	120	22.8	42	7.1	209	96	33	35	136	9	89	185	2.0
Siletz River (Sil3)	4	278.5	160	22.4	42	7.1	202	96	32	35	136	9	89	185	2.2
Siletz River (Sil8)	4	206.1	220	24.8	40	7.1	196	93	29	36	130	8	80	181	1.7
N. Fork Siletz River (Sil10)	4	107.7	240	25.4	31	7.0	146	86	11	24	104	6	52	127	1.5
N. Fork Siletz River (Sil1)	3	46.7	320	26.1	27	7.0	115	88	8	26	98	8	49	114	1.6
Boulder Creek (Sil12)	3	43.9	320	26.3	29	7.0	137	83	8	22	98	7	57	140	1.2
S. Fork Buck Creek (Sil2)	2	8.3	200	21.2	65	7.4	400	100	51	50	201	7	148	311	1.6
Holman Creek (Sil7)	1	4.3	240	22.4	79	7.6	574	94	69	21	184	7	311	335	2.2
Sunshine Creek (Sil4)	3	28.6	100	23.2	46	7.1	184	100	75	41	164	14	90	176	2.3
Sunshine Creek (Sil5)	3	25.1	200	25.0	46	7.1	183	98	75	42	166	13	85	176	2.8
Sunshine Creek (Sil6)	2	13.9	280	27.0	43	7.0	140	101	83	43	163	16	77	145	2.4
S. Fork Siletz River (Sil9)	3	71.5	240	26.2	45	7.1	197	102	44	58	163	14	87	186	2.8
Alsea Watersheds															
Deer Creek (AW1)	1	3.1	200	15.8	63	7.0	209	154	140	47	270	23	106	192	2.1
Needle Branch (AW2)	1	0.8	160	18.0	55	6.5	150	167	110	37	262	16	92	129	2.5
Flynn Creek (AW3)	1	2.3	180	17.8	63	6.9	194	147	172	34	248	27	118	189	1.9
Mary's Peak															
Crooked Creek (MA2)	2	21.5	200	43.8	89	7.6	629	106	72	39	214	12	298	376	3.0
Yew Creek (MA1)	1	8.1	230	44.1	98	7.6	732	104	69	30	262	7	225	467	2.6
Rock Creek (MR5)	2	37.9	120	51.2	106	7.7	872	116	8	36	238	9	284	514	3.1
S. Fork Rock Creek (MR2)	2	12.9	210	49.8	90	7.7	727	104	15	29	220	7	337	444	2.9
Griffith Creek (MR4)	1	4.9	140	46.5	78	7.6	633	96	0	26	241	6	370	396	3.2
M. Fork Rock Creek (MR3)	1	3.4	150	49.2	100	7.7	839	106	5	31	186	6	277	455	3.9

TABLE 2. Physical Characteristics and Water Chemistry for Study Streams. Chemical Units are μeq/L Unless Otherwise Specified (Cont'd.).

Streams	Stream Order	Area* (km^2)	Elev.** (m)	Coast** Dist. (km)	Cond. (μS)	pH	ANC	Cl^-	NO_3^-	SO_4^{2-}	Na^+	K^+	Mg^{2+}	Ca^{2+}	DOC (mg/L)
Coast Streams															
Cummins Creek (C1)	2	21.8	30	1.0	63	7.2	260	182	66	41	221	12	135	220	2.5
Little Cummins Creek (C2)	1	3.3	30	0.9	63	7.0	136	300	76	31	299	13	117	138	0.6
Gwynn Creek (C2)	1	2.7	30	1.0	89	7.1	204	427	51	71	414	18	153	212	1.3
Cape Creek @ C. Perpetua (C4)	1	4.6	30	0.7	76	7.1	199	334	48	60	346	14	136	178	1.5
Bob Creek (C5)	1	15.2	30	0.4	56	7.1	160	213	94	22	240	11	110	154	1.0
Ten Mile Creek (C7)	3	44.7	100	6.3	56	7.3	310	121	58	22	174	10	149	224	1.5
Ten Mile Creek (C6)	3	25.4	150	11.2	55	7.3	307	116	46	27	165	11	161	201	1.0
Rock Creek (C8)	1	15.0	50	0.6	62	7.2	239	198	60	42	242	12	112	209	1.1
Big Creek (C10)	2	31.2	50	4.3	52	7.2	222	139	65	29	191	12	109	181	1.2
Big Creek (C9)	2	17.1	150	8.3	49	7.1	223	123	67	25	179	12	111	173	2.1
China Creek (C11)	2	5.1	30	0.2	77	6.7	128	426	34	52	412	18	134	112	2.0
Cape Creek @ Heceta Hd. (C12)	3	30.8	30	1.3	55	7.0	196	215	28	37	243	13	101	150	1.8

*For watershed defined by sample location.
**For sample location.

TABLE 3. Principal Component Analysis Correlations for a Combination of Watershed and Stream Variables, n = 48 sites.

Variable	PC-1	PC-2	PC-3	PC-4
Stream Order	*	0.56	-0.53	
Elevation	-0.66			
Coast Distance	-0.80			
Watershed Area		0.50	-0.54	
Percent Hardwood	-0.64			
Percent Hardwood-Conifer	-0.73		0.50	
Percent Conifer	0.79			
Percent Semi-Open/Shrub				-0.69
Cl^-	0.90			
NO_3^-			0.74	
SO_4^{2-}				-0.84
Na^+	0.73	-0.53		
K^+	0.61		0.58	
Mg^{2+}		-0.90		
Ca^{2+}		-0.83		
ANC	-0.53	-0.82		
DOC	-0.60			
H^+				

*Correlations < 0.5 excluded.

For the streams within 2 km of the coast, streamwater Na/Cl ratios were slightly greater than that of seawater (0.86). Sodium concentrations decreased much less with distance inland than did Cl^- concentrations (Figure 4). As watershed distance from the coast increases, the importance of seawater as a source of Na^+ decreases and the importance of mineral weathering as a likely Na^+ source increases.

The Cl^- and Na^+ patterns we observed in our Oregon study streams were similar to findings of Eilers *et al.* (1993) for 70 lakes in the boggy terrain of the Kenai Peninsula, Alaska. The Na^+ and Cl^- concentrations in the Alaska lakes, however, were generally lower at a given distance from the ocean than in our study streams. The average Cl^- concentration of 80 μeq/L (Edmonds *et al.*, 1995) for West Twin Creek (32 km east of the Pacific Coast) in the Olympic Peninsula of Washington fits nicely with the pattern of data in Figure 3 for our study streams. The pattern of decreasing Cl^- concentrations with increased distance inland is reinforced by data from three streams in the Bull Run watersheds in the Oregon Cascades, more than 125 km from the Pacific Ocean, in which average Cl^- concentrations ranged from 34 to 38 μeq/L (Harr and Fredriksen, 1988).

Of what potential significance is sea-salt to the acid-base status of Oregon Coast Range streams?

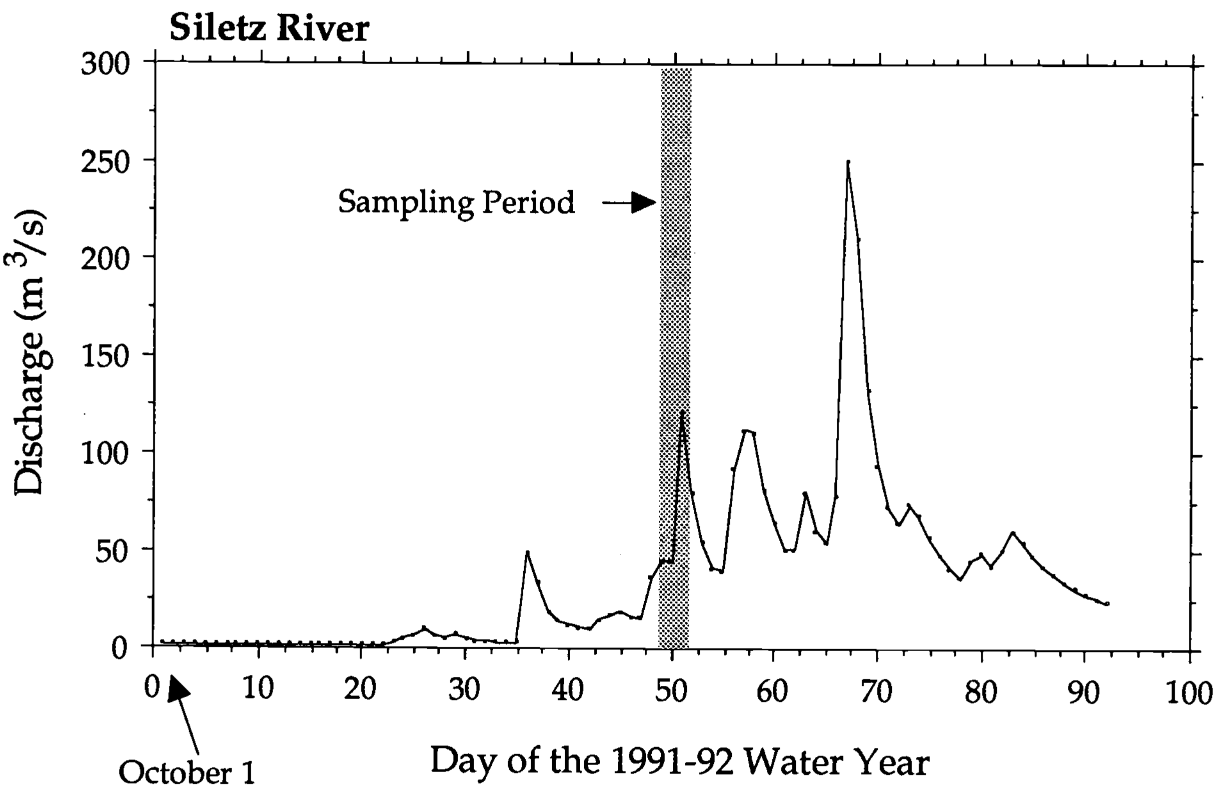

Figure 2. Siletz River Daily Hydrograph Showing Sampling Period.

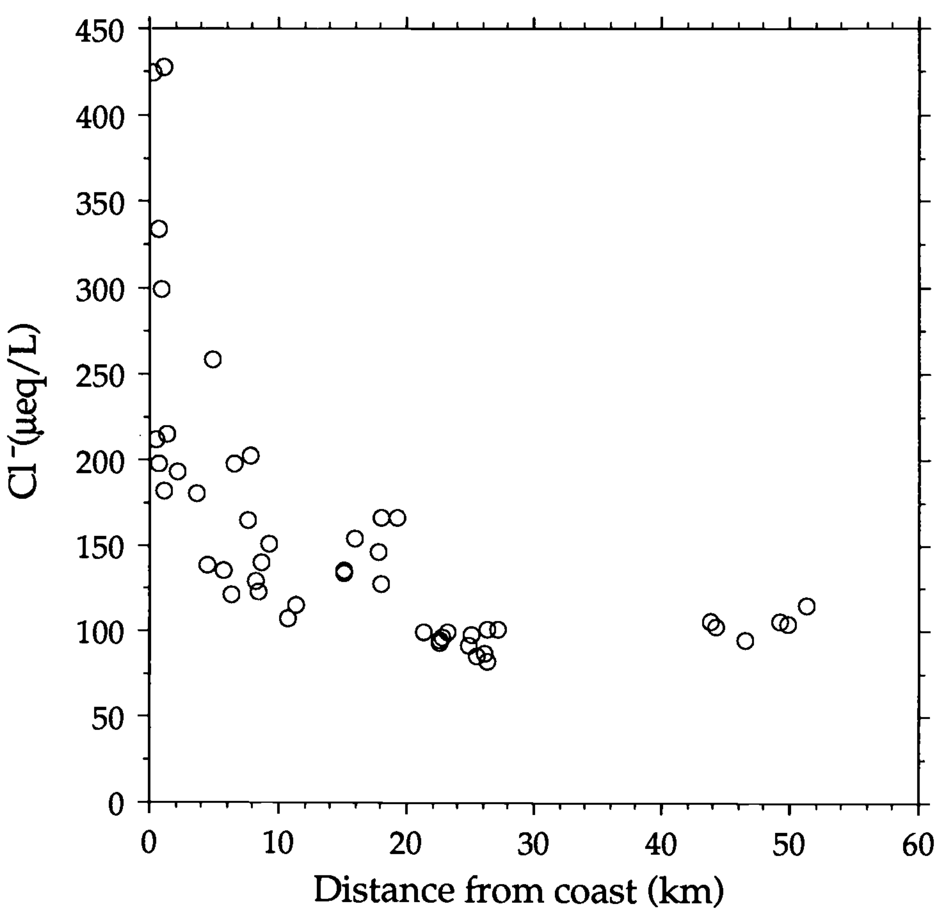

Figure 3. Relationship Between Cl- Concentration and Distance From the Pacific Coast.