Appendix K - Suisun Marsh Channel Water Salinities

E.3.2 Salinity Control

Suisun Marsh exhibits increasing salinity gradients in soil and channel water from east to west and from north to south. Factors affecting the salinity in the sloughs of the Suisun Marsh include, but are not limited to tides, climate, delta outflow, Suisun Marsh Salinity Control Gate (SMSCG) operations, creek inflows, managed wetland operations (as allowed under current regulatory restrictions), urban runoff, and Fairfield-Suisun Treatment Plant effluent flows (**Figure 29**). The first five factors have the greatest impacts on slough water salinity, while the last three factors have temporary or localized effects. Pond water salinity tends to be directly related to slough water salinity, but many times there is a lag in pond water salinity response to changes in channel water salinity from months to a year.

Figure 29. Suisun Marsh Salinity Control Gate.

During times of high Delta outflow, the Suisun Marsh has a natural salinity gradient from east to west. The eastern Marsh, being closest to the Delta, will have lower channel salinities than the western Marsh. When Delta outflow is low, the operation of the Suisun Marsh Salinity Control Gates lowers the salinity in eastern marsh channels and maintains the east to west gradient. Without Control Gate operations during times of low Delta outflow, the salinity in the western Marsh may be lower than that at some eastern Marsh locations.

When Delta outflow increases, salinity in the eastern Marsh drops rapidly. However, the southwestern Marsh requires high outflow for a longer period of time to achieve a reduction in salinity. Field data and simulation modeling indicate that northwestern Marsh salinity is primarily affected by SMSCG operations and inflows from the watershed to the north and northwest, and by local drainage from managed wetlands. The Marsh also has a north-south salinity gradient, with the northern Marsh having lower channel salinity during wet months due to local runoff and creek flows.

E.3.2.1 Leaching Cycles

Rollins (1973) investigated the effects of applied water salinity on soil water salinity. He concluded that there was a significant relationship between applied water salinity and the soil water salinity and that leaching with low salinity water reduced soil water salinity.

The influence of applied water salinity on pond water salinity depends on the water management cycle. Water management actions may mask effects of applied water salinity on pond water salinity. During flood up (September and October, see Managed Wetland Conceptual Model Diagram), pond water salinity is often independent of applied water salinity because salts that accumulate on or near the surface of the soil during the summer are absorbed by pond water, causing pond water salinity to be substantially higher than the applied water salinity (DWR 2001). From December through February pond water salinity is close to the applied water salinity because circulation of pond water with slough water continually removes the more saline pond water while replacing it with less saline slough water (DWR 2001). The United States Department of Agriculture (USDA) (1977) stated that appropriate circulation of pond water and leaching of soil salts prevents increases in soil water salinity above natural levels for Suisun Marsh soils. During leaching cycles from February to May pond water salinity generally corresponds to applied water salinity except during the final drain due to a lack of water being applied to the pond coupled with the remaining water absorbing more salts from the soil,

Salinity Conversion Table

mS/cm	µS/cm	ppm	mg/l	ppt	psu	
<1	<1000	<500	<500	<0.5	<0.5	Fresh water
1	1000	550	550	0.6	0.6	
2	2000	1100	1100	1.1	1.1	
3	3000	1650	1650	1.7	1.7	
4	4000	2200	2200	2.2	2.2	
5	5000	2750	2750	2.8	2.8	
6	6000	3300	3300	3.3	3.3	
7	7000	3850	3850	3.9	3.9	
8	8000	4400	4400	4.4	4.4	
9	9000	4950	4950	5.0	5.0	
10	10000	5500	5500	5.5	5.5	
11	11000	6050	6050	6.1	6.1	Brackish water
12	12000	6600	6600	6.6	6.6	
13	13000	7150	7150	7.2	7.2	
14	14000	7700	7700	7.7	7.7	
15	15000	8250	8250	8.3	8.3	
16	16000	8800	8800	8.8	8.8	
17	17000	9350	9350	9.4	9.4	
18	18000	9900	9900	9.9	9.9	
19	19000	10450	10450	10.5	10.5	
20	20000	11000	11000	11.0	11.0	
>63.6	>63636.3	>35000	>35000	>35	>35	Saline water

Commonly used units of measurement

ppm = parts per million
mg/l = milligrams per liter
µS/cm = microSiemens per centimeter
mS/cm = milliSiemens per centimeter
psu = practical salinity units

Unit Conversions

µS/cm = (mS/cm * 1000), ppm = (µS/cm * .55), mg/l = ppm, ppt = (ppm / 1000), psu = ppt

Water is considered fresh < 0.5 ppt and saline at >35 pp

psu is temperature and pressure dependent, and can vary from ppt when comparing data with different temperatures and pressures. For this Table assuming similar temperature and pressure, psu = ppt