

Spearman's Correlation Analysis for S79 Flow versus Salinity at Continuously Recording Sites Downstream

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The following analysis was performed to provide a better perspective of the influence of variation in flow from S-79 on salinity values along a downstream gradient reaching into Pine Island Sound. This analysis is based upon data collected at 4 sites (Figure 1) which record salinity continuously at 30 minute intervals. The data was manipulated in MS Access to produce mean daily salinity values to compare with the mean daily S79 flowrate values obtained from SFWMD's DBHYDRO database. Spearman's rank correlation test (Minitab 13.1) was used on non-transformed data for this analysis. We analyzed data from January 1, 2009 through July 20, 2013.

Results of the analysis show a strong correlation between S79 discharges and salinity at the mouth of Tarpon Bay (RECON TB) and at the mouth of MacIntyre Creek (USGS Mac) (Table 1). Weaker (but significant) relationships were also noted in Pine Island Sound near Blind Pass (RECON BP) and near Redfish Pass (RECON RP). As expected, the analysis revealed the lag time (days) between S79 discharges and greatest effects on salinity decreased with increasing flows and with decreasing distance from S79 (Table 1). In general, correlation was stronger for higher flows and for stations nearer S79 (Figure 3). Significant but weak relationships were seen for the lowest flow class analyzed (100-500 CFS) and for the farthest station (SCCF RECON RP).

This analysis is intended to provide more insight into the effects of S-79 discharges on water near the Ding Darling National Wildlife Refuge. It shows that discharges from S79 do have a significant influence on conservative water quality parameters.

Figure 1. Sites used in this correlation analysis. All sites continuously record salinity as well as other water quality parameters.

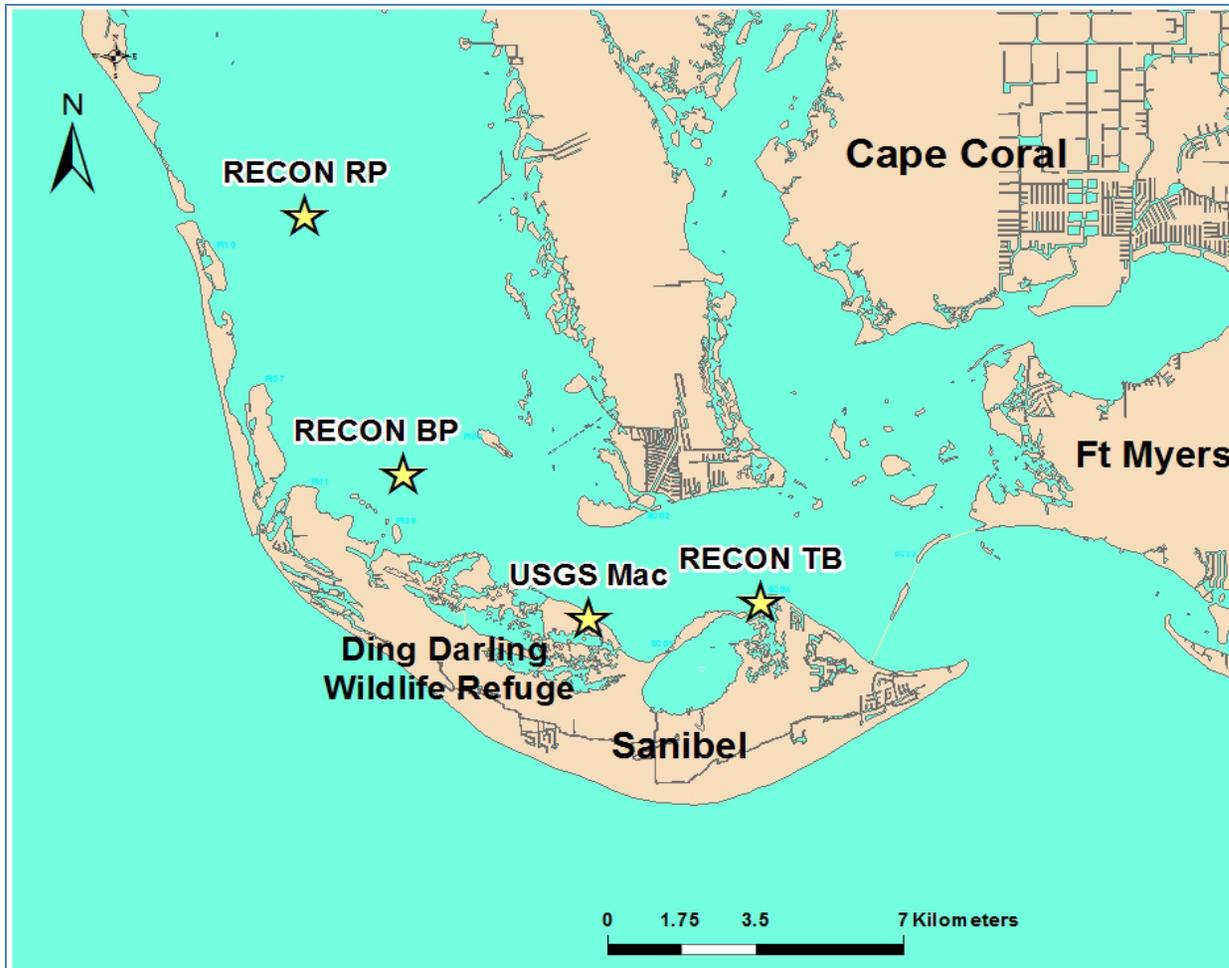


Table 1. Results of correlation analysis using Spearman's rank correlation test on non-transformed salinity data.

S79 Daily Discharge Rate	RECON Tarpon Bay 50.6 km Downstream				USGS MacIntyre Creek 54.3 km Downstream				Pine Island Sound near Blind Pass 60 km Downstream				Pine Island Sound near Redfish Pass 65.1 km Downstream			
	100-500 CFS	500-1000	>1000	>2500	100-500 CFS	500-1000	>1000	>2500	100-500 CFS	500-1000	>1000	>2500	100-500 CFS	500-1000	>1000	>2500
Best Discharge vs. Salinity Correlation	$r = -0.452$ $r^2 = 0.20$ $p < 0.001$	$r = -0.335$ $r^2 = 0.11$ $p < 0.001$	$r = -0.781$ $r^2 = 0.61$ $p < 0.001$	$r = -0.700$ $r^2 = 0.49$ $p < 0.001$	$r = -0.580$ $r^2 = 0.34$ $p = 0.002$	$r = -0.331$ $r^2 = 0.11$ $p < 0.001$	$r = -0.744$ $r^2 = 0.55$ $p < 0.001$	$r = -0.634$ $r^2 = 0.49$ $p < 0.001$	$r = -0.457$ $r^2 = 0.21$ $p < 0.001$	$r = -0.483$ $r^2 = 0.23$ $p < 0.001$	$r = -0.631$ $r^2 = 0.40$ $p < 0.001$	$r = -0.568$ $r^2 = 0.32$ $p < 0.001$	$r = -0.202$ $r^2 = 0.04$ $p = 0.002$	$r = -0.192$ $r^2 = 0.04$ $p < 0.001$	$r = -0.509$ $r^2 = 0.26$ $p < 0.001$	$r = -0.368$ $r^2 = 0.14$ $p < 0.001$
Lag Time for Best Correlation (Days)	11	8	5	4	12	8	5	4	16+	14	9	9	16+	14	9	9

Figure 3. Plots of Salinity vs. S79 Flow for lag time with best correlation at flows greater than 1000 CFS at each of four stations analyzed.

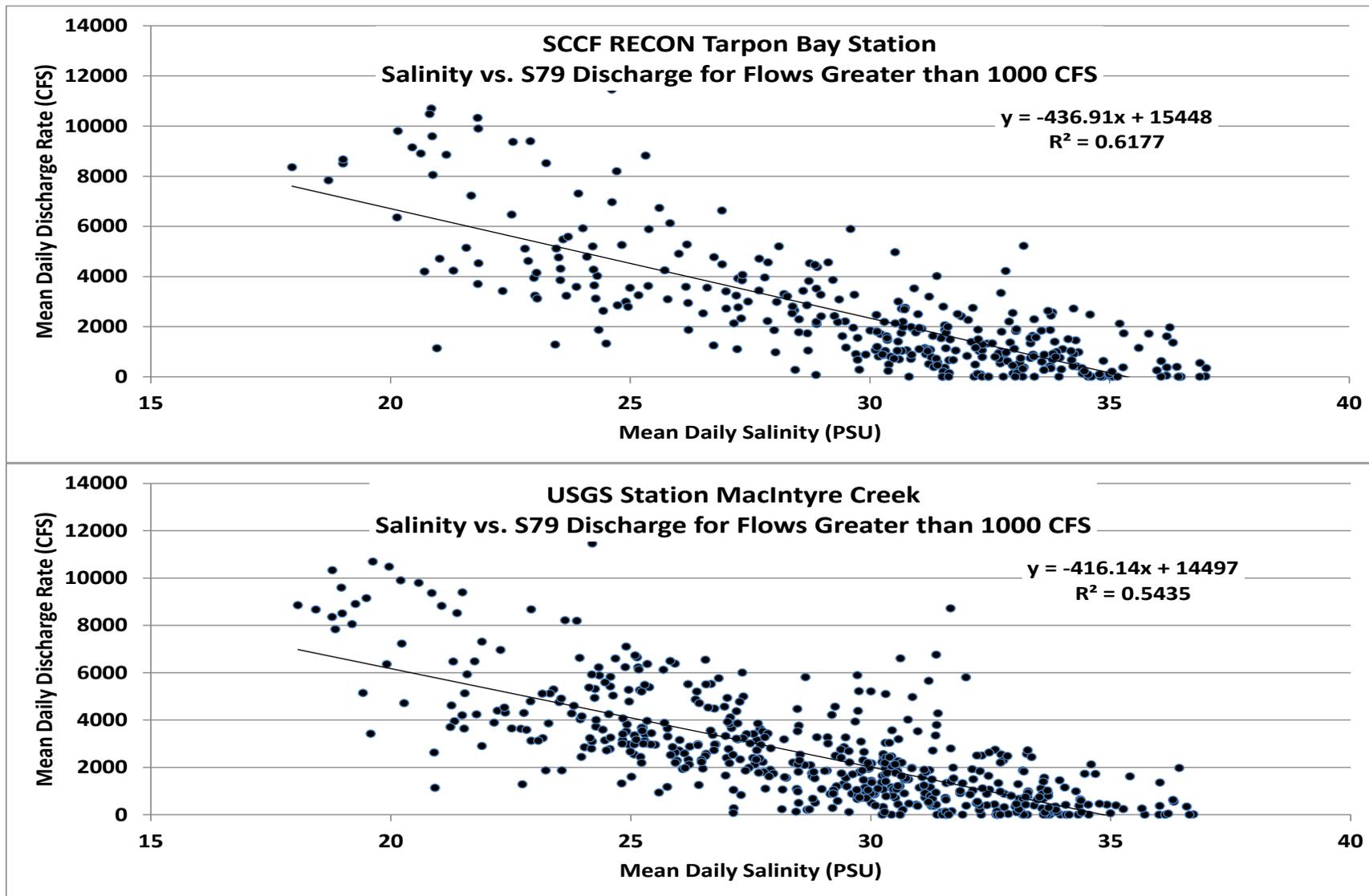


Figure 3 (cont). Plots of Salinity vs. S79 Flow for lag time with best correlation at flows greater than 1000 CFS at each of four stations analyzed.

