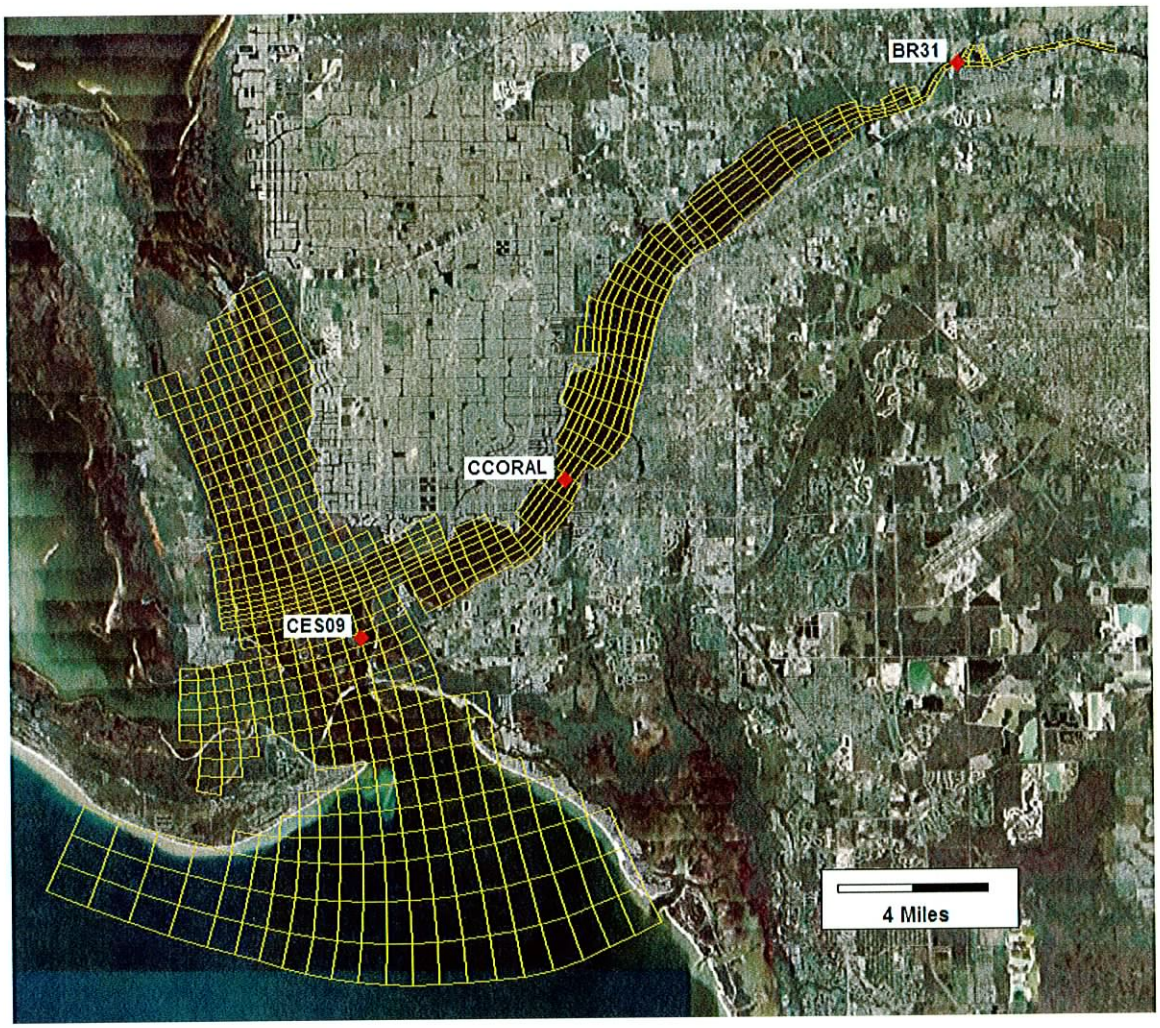

Figure 11 Stations used for hydrodynamic model calibration/validation.

5.3.4.3 Salinity Calibration

The **Figures 12-16** show the model-data comparisons for salinities in the Caloosahatchee model for the calibration year of 2003. The BR31 and CCORAL stations are fixed stations with two salinity probes mounted near the top and bottom of the water column. These data help determine the amount of salinity stratification at those locations, as well as a high resolution time series to pick up the variability of salinity at these locations.

At BR31 in the March-April time period, the model under predicts the salinity at both the top and bottom sensors. It was found that during this period the HSPF model was providing flows that were nearly double the measured flows at S79 (see Section 5.3.1.5.2). Later in the year, the model did a better job of picking up the salinity migration back up the estuary.

Table 5 contains a summary of the RMS (see Section 5.3.2 for a definition) error statistics for salinity. Overall, the model-data comparisons were considered very good.

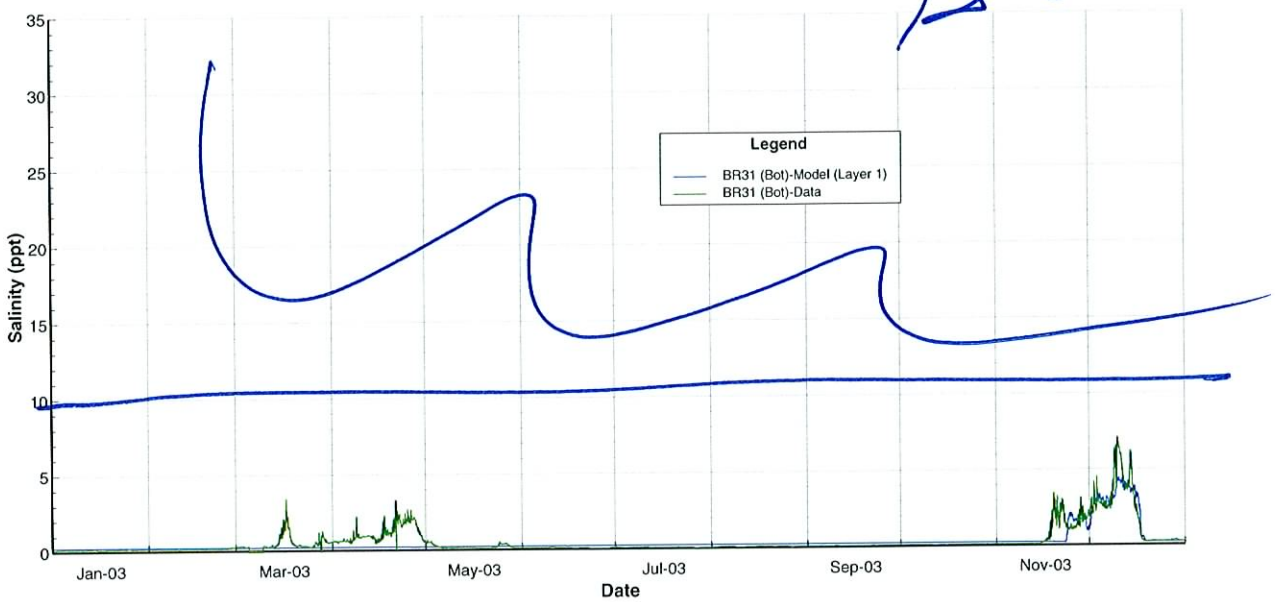

Figure 12 Salinity calibration at BR31 - Bottom

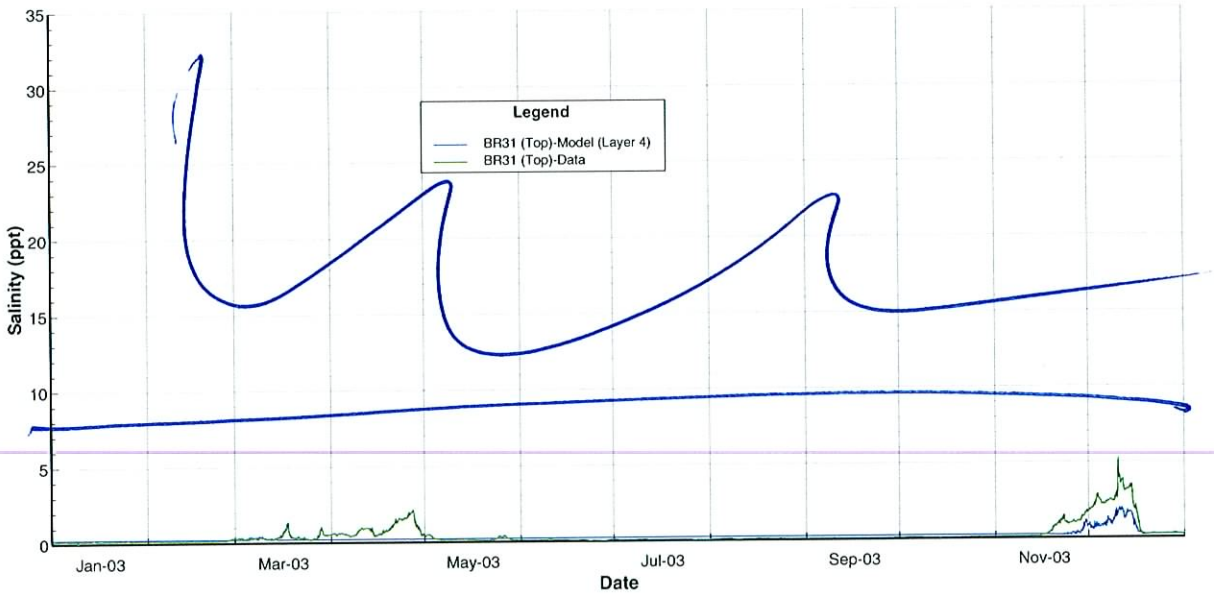

Figure 13 Salinity calibration at BR31 – Top

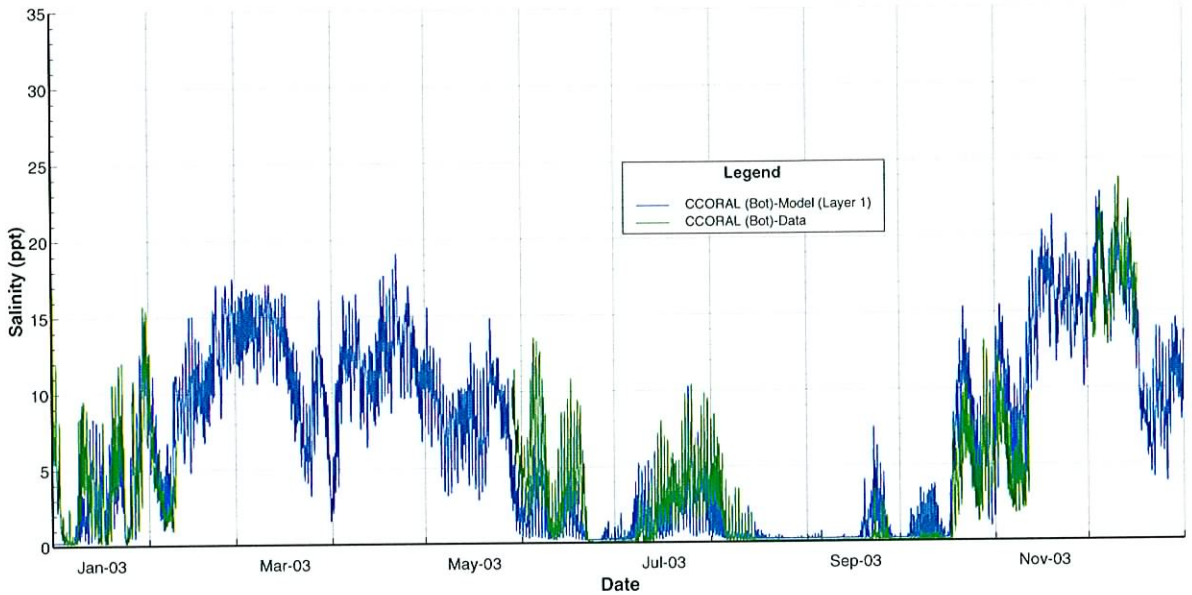

Figure 14 Salinity calibration at CCORAL - Bottom

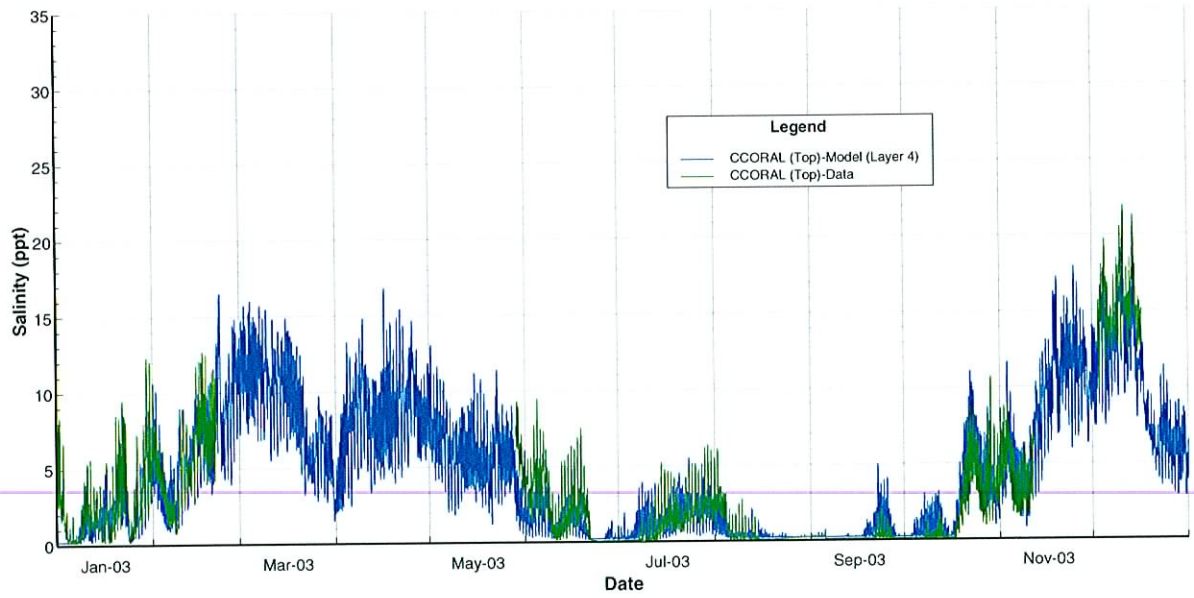

Figure 15 Salinity calibration at CCORAL – Top

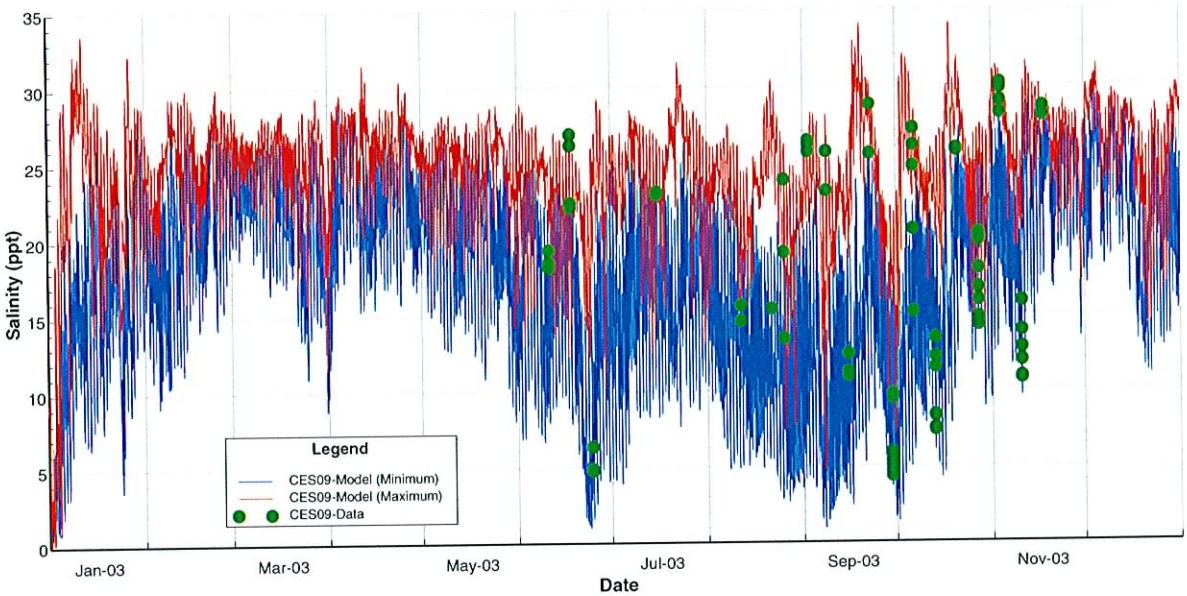

Figure 16 Salinity calibration at CES09.

Table 5 Calibration period summary statistics for Salinity (PPT).

Station ID	Layer/ Type	Starting Date/Time	Ending Date/Time	# Pairs	RMS	Data Average	Model Average
CES09	Minimum	10-Jun-03 16:10	17-Nov-03 09:37	19	5.197	17.429	15.694
CES09	Maximum	10-Jun-03 16:10	17-Nov-03 09:37	19	7.563	20.816	25.198
BR31 (Bot)	Layer 1	1-Jan-03 01:00	31-Dec-03 22:00	8758	0.506	0.476	0.416
BR31 (Top)	Layer 4	1-Jan-03 01:00	31-Dec-03 22:00	8758	0.449	0.383	0.297
CCORAL (Bot)	Layer 1	1-Jan-03 01:00	16-Dec-03 23:00	5290	2.211	3.525	3.478
CCORAL (Top)	Layer 4	1-Jan-03 01:00	16-Dec-03 23:00	4530	1.547	3.429	3.158
Composite				**27374**	**0.998**		

5.3.4.4 Water Temperature Calibration

The **Figures 17-20** show the model-data comparisons for temperatures in the Caloosahatchee model for the calibration year of 2003. The BR31 and CCORAL stations are fixed stations with two temperature probes mounted near the top and bottom of the water column. These data helped determine the amount of thermal stratification at those locations, as well as a high resolution time series to pick up the variability of temperatures at these locations. During the calibration period there were no data available from the CCORAL bottom temperature probe.

The BR31 station is significantly impacted by the flows from S79. This can be clearly seen when reviewing the both the top and bottom temperature plots for BR31 (**Figures 17 & 18**). The under prediction of temperatures during the March to May period can be directly related to the HSPF under prediction of temperatures and over prediction of flows for that same period. That said, the overall comparisons at BR31 are considered acceptable.

Table 6 contains a summary of the RMS (see Section 5.3.2 for a definition) error statistics for temperature. Overall, the model-data comparisons were considered very good.

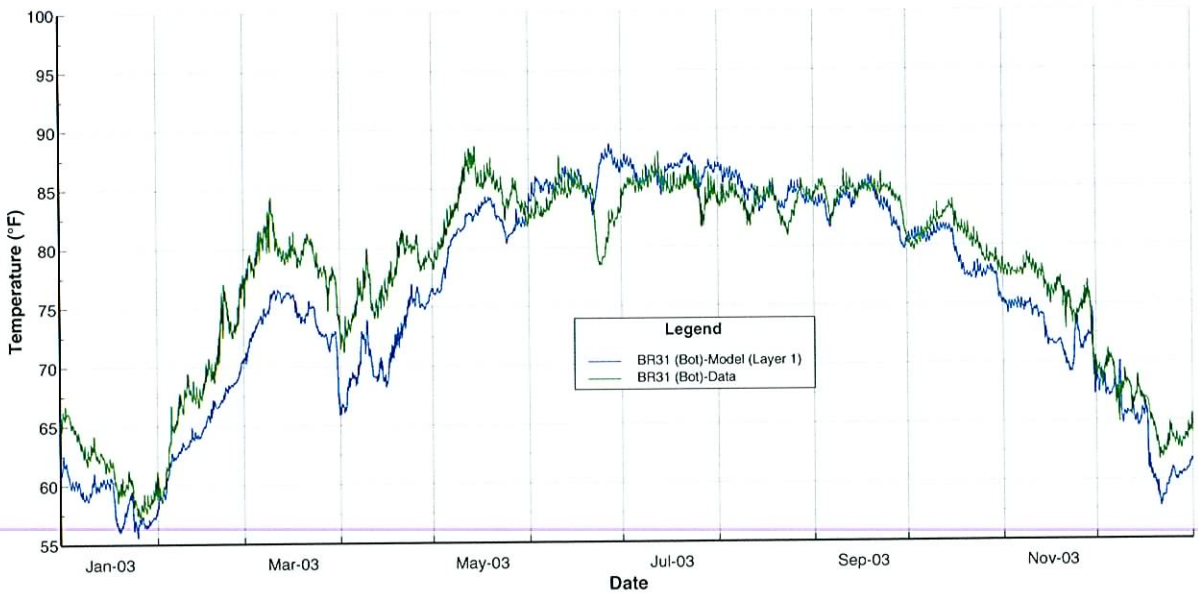

Figure 17 Temperature calibration at BR31 – Bottom.

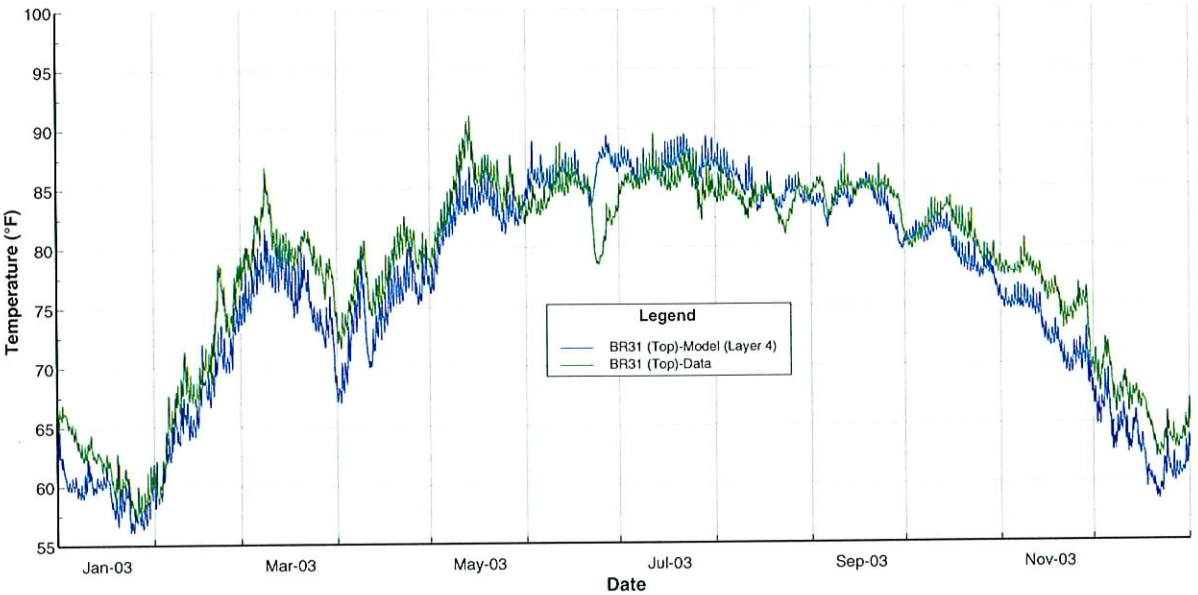

Figure 18 Temperature calibration at BR31 – Top.

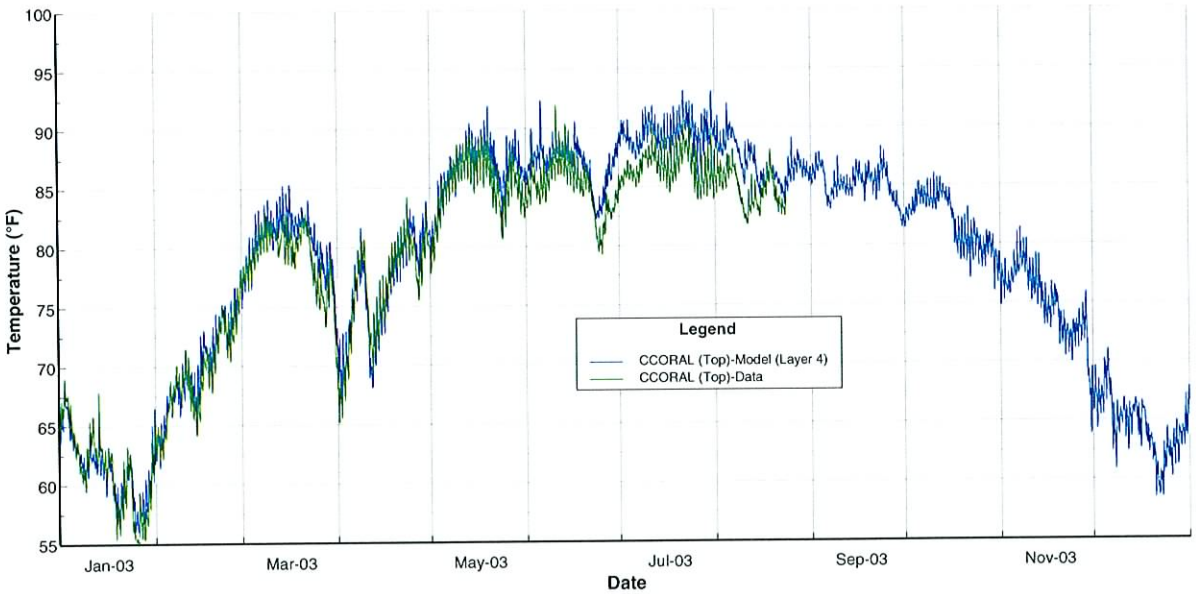

Figure 19 Temperature calibration at CCORAL – Top.

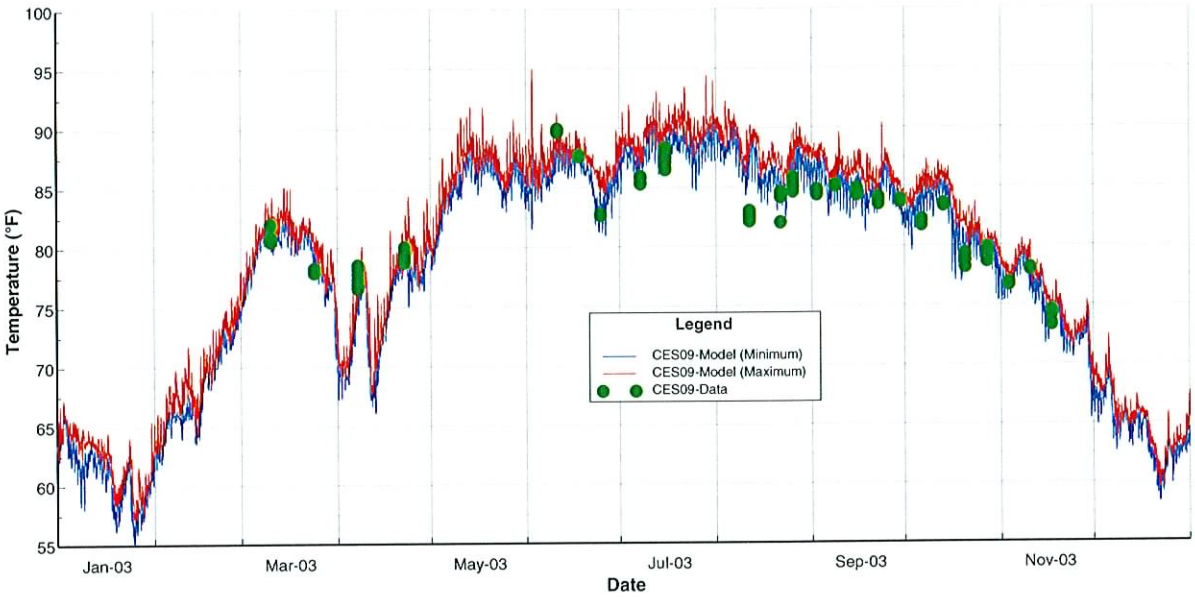

Figure 20 Temperature calibration at CES09.

Table 6 Calibration period summary statistics for Temperature (°F).

Station ID	Layer/ Type	Starting Date/Time	Ending Date/Time	# Pairs	RMS	Data Average	Model Average
CES09	Minimum	10-Mar-03 13:00	17-Nov-03 09:37	24	1.615	81.919	82.696
CES09	Maximum	10-Mar-03 13:00	17-Nov-03 09:37	24	2.006	82.715	84.072
BR31 (Bot)	Layer 1	1-Jan-03 01:00	31-Dec-03 22:00	8758	3.446	77.637	75.678
BR31 (Top)	Layer 4	1-Jan-03 01:00	31-Dec-03 22:00	8758	2.823	78.016	76.544
CCORAL (Top)	Layer 4	1-Jan-03 01:00	23-Aug-03 17:00	5541	2.002	78.315	79.605
Composite				**23105**	**2.860**		

5.3.4.5 Calibration Period Velocity Patterns

Another important component of the hydrodynamic conditions is the flow velocity. At this time, there is not any available flow or velocity data to calibrate to. However, the flow velocity patterns in this calibrated model are consistent with the basic conceptual model for the Caloosahatchee in terms of the velocity magnitudes and directions in response to tidal fluctuations. As examples of the Caloosahatchee velocities, **Figures 21 & 22** present velocity patterns in typical ebb (**Fig. 21**) and flood (**Fig. 22**) tide conditions

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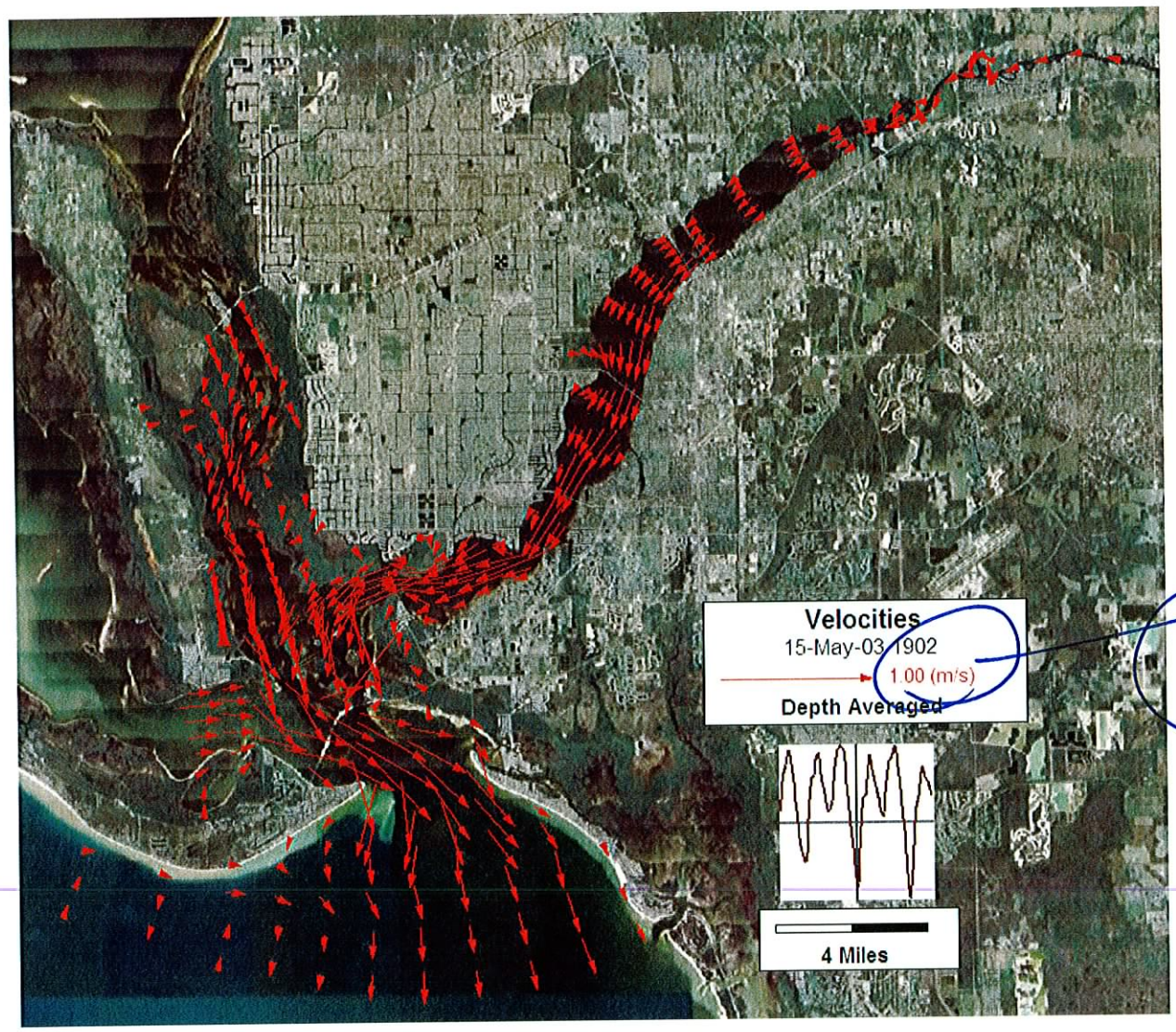

Figure 21 Velocity pattern near ebb tide on May 15, 2003.

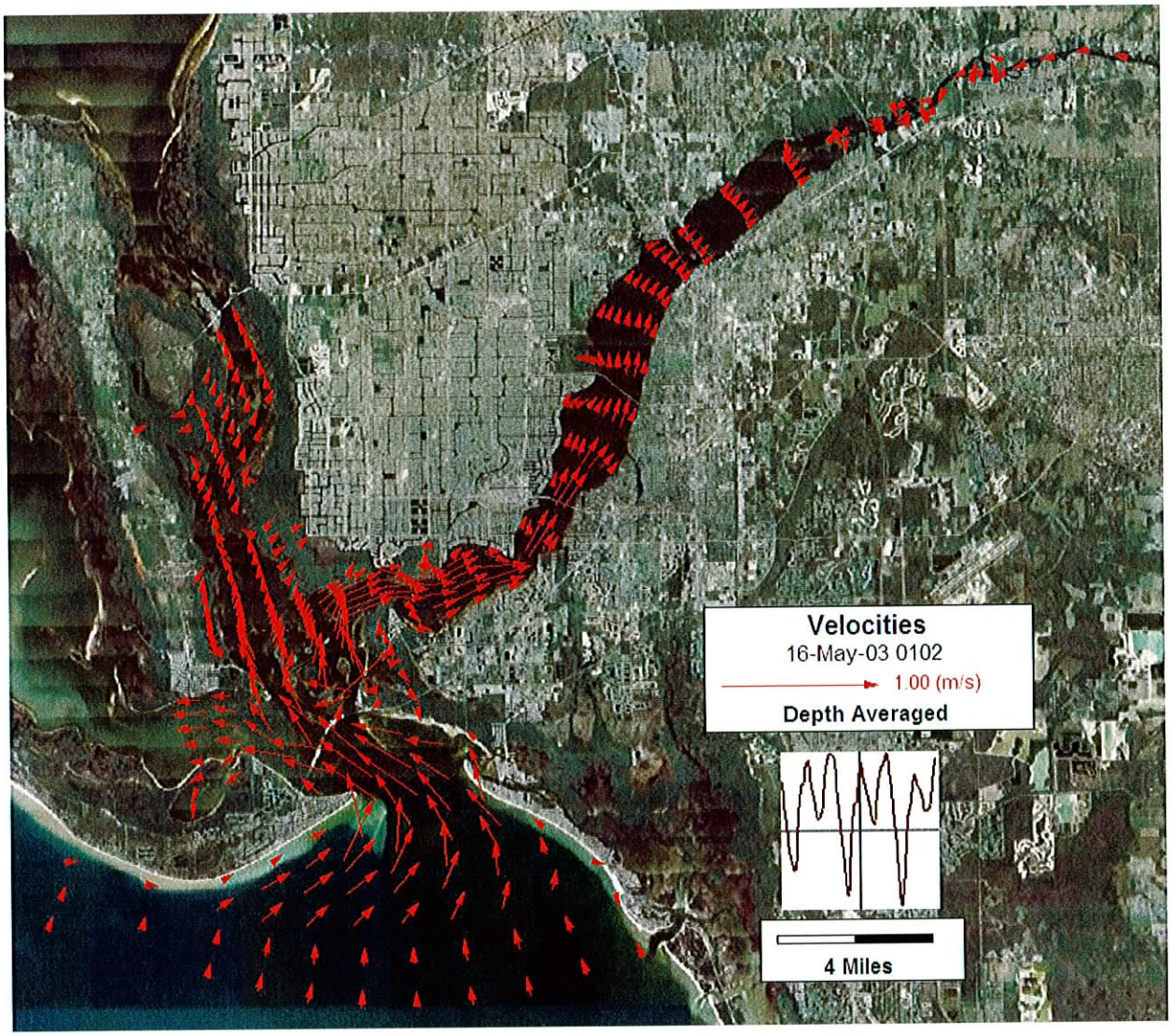

Figure 22 Velocity pattern near flood tide on May 16, 2003.

5.3.5 EFDC Model Validation

5.3.5.1 Model Simulation Period

The period selected for hydrodynamic model validation was from January 1, 2004 to December 31, 2004. This period has an adequate set of salinity, temperature, meteorology, and water quality data for setting boundary conditions and validating the model.

The model initial conditions and boundary conditions are discussed in Section 5.3.1. The EFDC hydrodynamic and water quality model calibration results are presented in Sections 5.3.4.3 for hydrodynamics and 5.3.4.3 for water quality. **Figure 23** provides a visualization of wind speed, direction and dry bulb temperature for the processed atmospheric data for the calibration period.

5.3.5.2 Salinity Validation

The **Figures 24-28** show the model-data comparisons for salinities in the Caloosahatchee model for the validation year of 2004. **Table 7** contains a summary of the RMS (see Section 5.3.2 for a definition) error statistics for salinity. Overall, the model-data comparisons were considered good, thought not as good as those for the calibration period. The RMS errors for CES09 are not good but they represent only a few data points as there were no salinity data available for this station later in 2004.

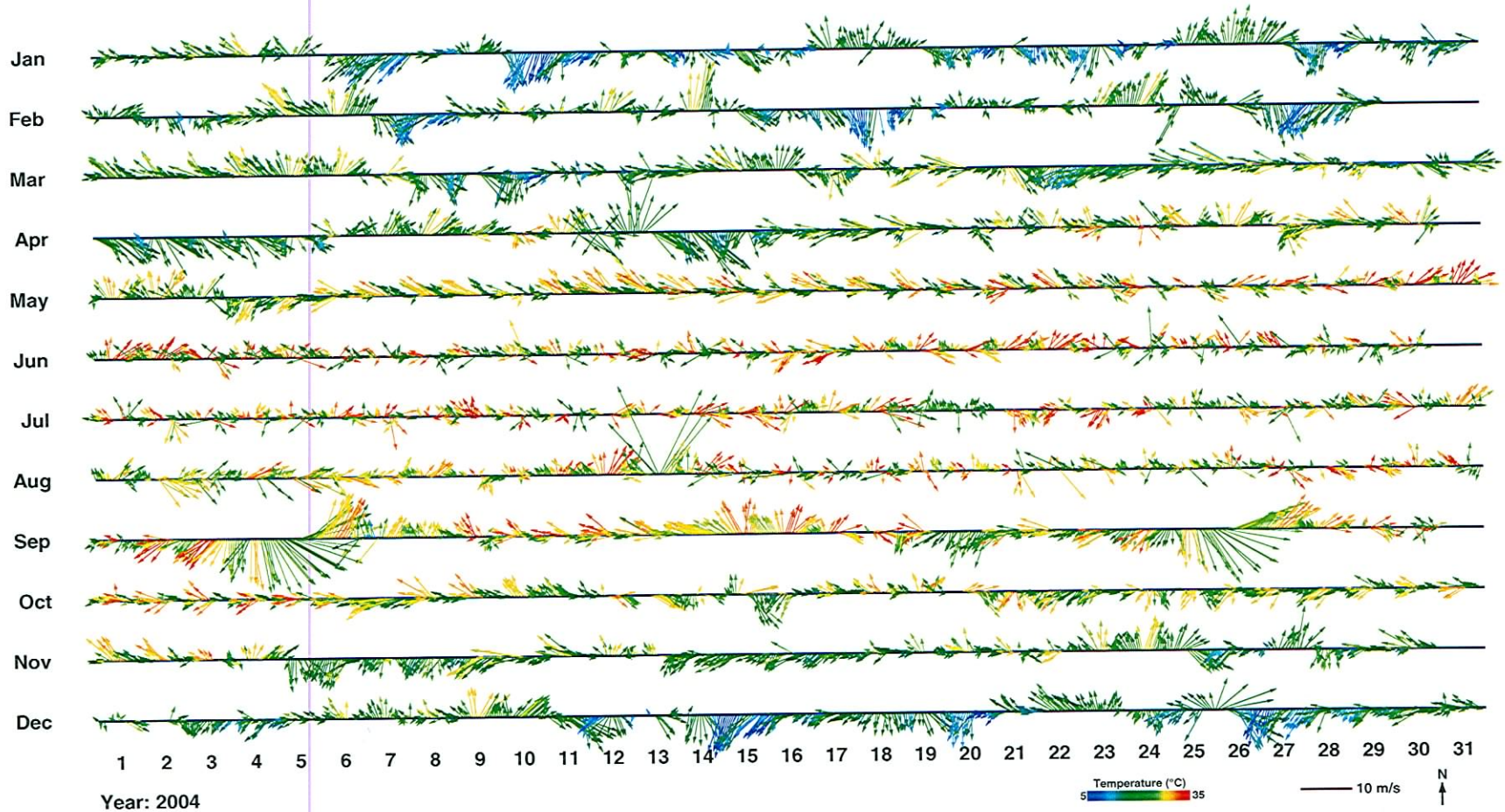

Figure 23 Ft Myers wind stick plot for 2004.

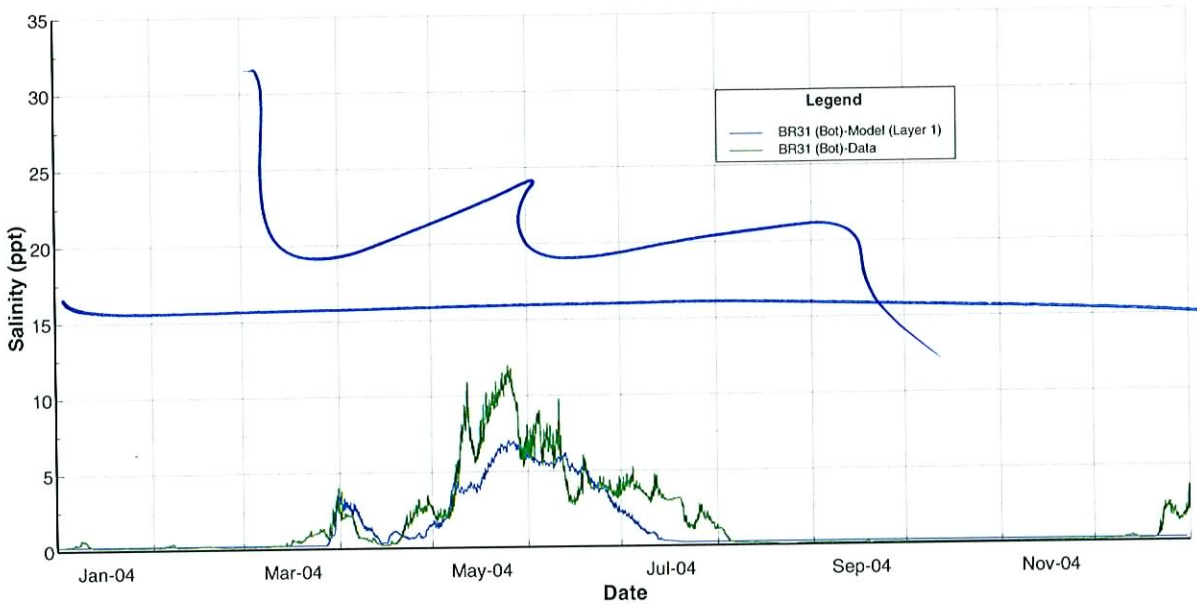

Figure 24 Salinity validation at BR31 - Bottom

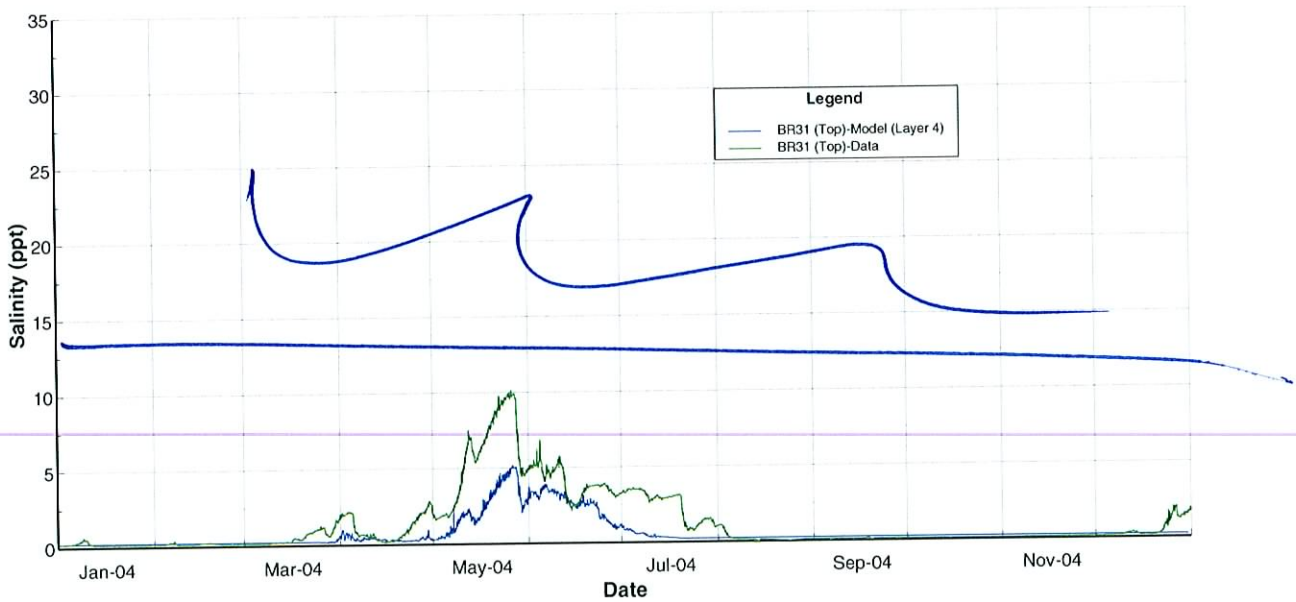

Figure 25 Salinity validation at BR31 – Top

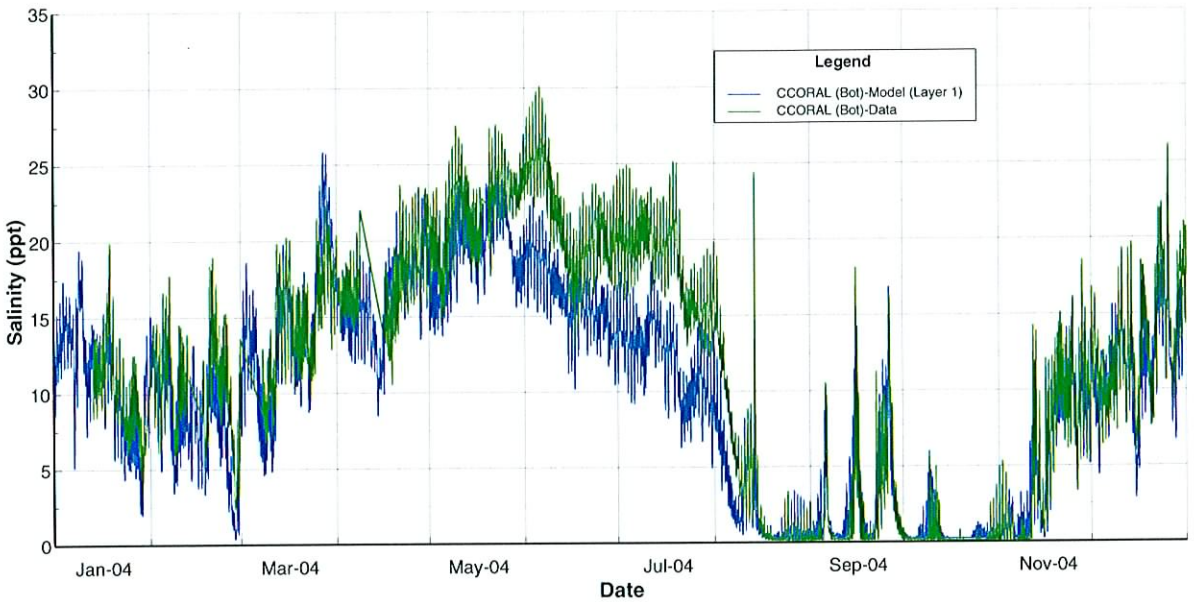

Figure 26 Salinity validation at CCORAL - Bottom

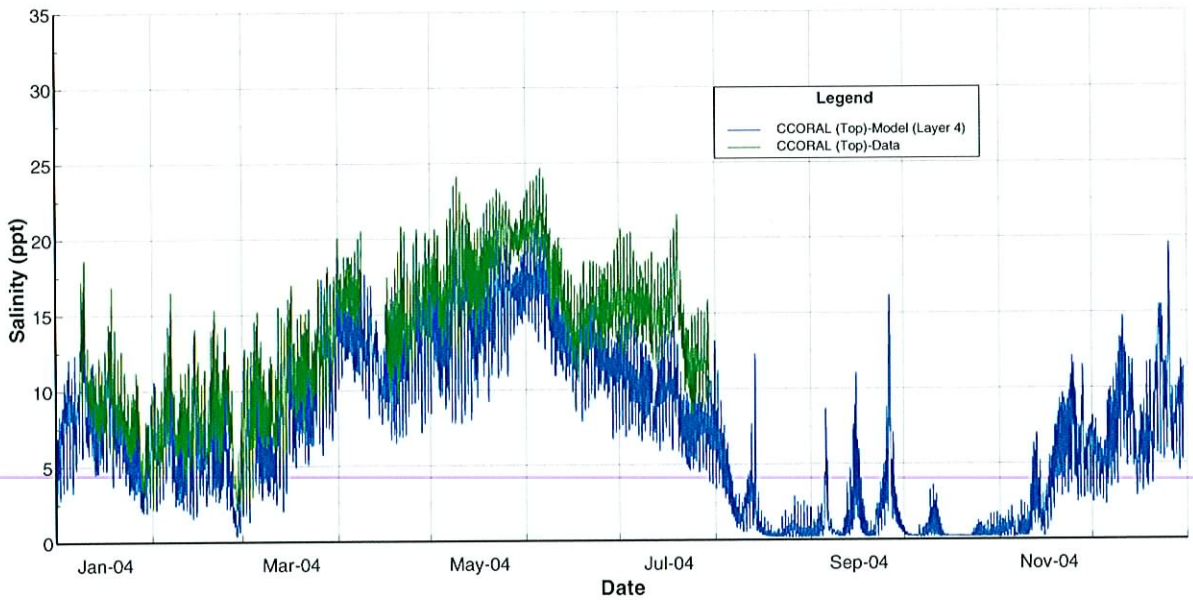

Figure 27 Salinity validation at CCORAL – Top

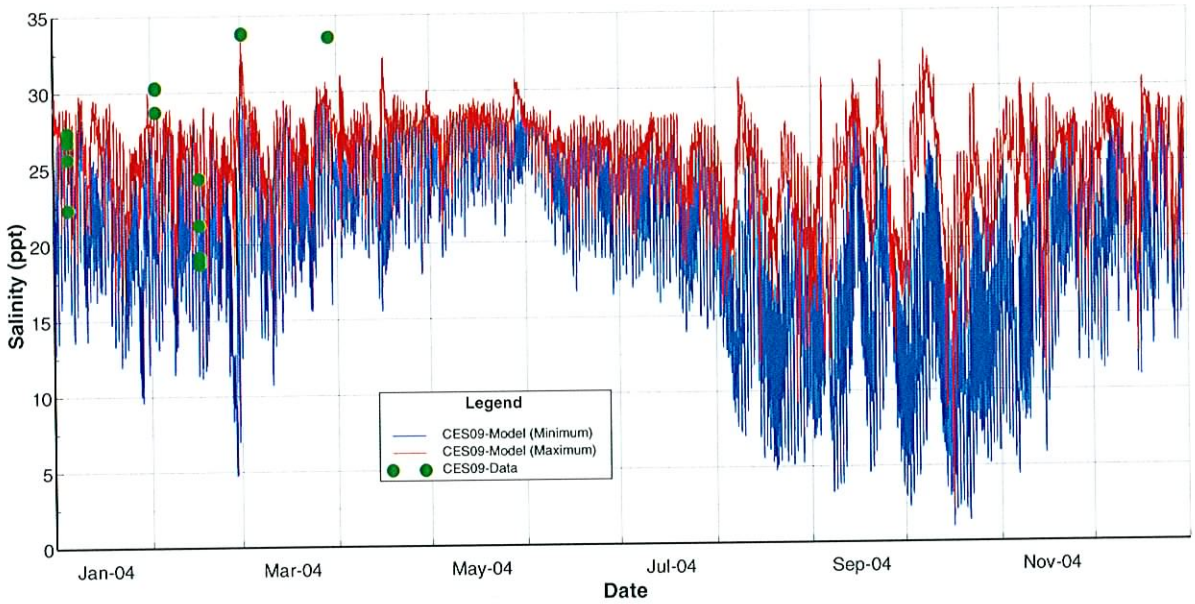

Figure 28 Salinity validation at CES09.

Table 7 Validation period summary statistics for Salinity (PPT).

Station ID	Layer/ Type	Starting Date/Time	Ending Date/Time	# Pairs	RMS	Data Average	Model Average
CES09	Minimum	5-Jan-04 11:02	29-Mar-04 10:15	5	6.609	27.432	21.462
CES09	Maximum	5-Jan-04 11:02	29-Mar-04 10:15	5	4.317	30.282	26.619
BR31 (Bot)	Layer 1	1-Jan-04 00:00	30-Dec-04 21:00	8757	1.234	1.566	1.136
BR31 (Top)	Layer 4	1-Jan-04 00:00	30-Dec-04 21:00	8757	1.385	1.292	0.656
CCORAL (Bot)	Layer 1	13-Jan-04 12:00	30-Dec-04 21:00	7878	3.397	11.499	9.618
CCORAL (Top)	Layer 4	8-Jan-04 13:00	30-Jul-04 02:00	4696	3.508	13.386	10.437
Composite				**30098**	**2.200**		