Chapter 11: Supplement to July 2006 Report - Draft

11.1 Overview

SEPTEMBER 20, 2006. Some brief summary text will be developed... For now, please see the Tables & Figures with their captions for the summary of the results.

11.2 Model Performance (re. Chapter 6)

11.2.1 Performance evaluation methods

In order to better summarize some of the information presented in the Model Performance Chapter 6 of the Documentation of the Everglades Landscape Model: ELM v2.5, we have added some further analysis on the spatial trends in the Model Performance statistics. Specifically, the ELM Peer Review Panel requested that we provide information associated with the transit distances for movements of total phosphorus (TP) and chloride (CL) from their approximate sources to their field monitoring sites in the surface water of marshes. This supplement involves spatial enhancements to the analysis of data presented in the Model Performance Chapter 6, Tables 6.1 and 6.3, and Figures 6.2 and 6.11.

11.2.1.1 Distance metrics

There is a range of spatial scales involved with the "water quality" monitoring network in the Everglades. Some sub-regions are the focus of transect-based monitoring programs at relatively fine spatial grain, while other areas have very sparse distribution of monitoring sites. For understanding flow paths and distances within the marshes, ideally we would have accurate knowledge of the sources associated with any marsh monitoring site. However, in most locations of the Everglades, the *apparent* point sources of inflowing water (and associated constituents) are actually more diffused or distributed than evident from the location of a point location of a water control structure. This is due to the water control structure's water flow being delivered into a receiving canal, which can rapidly distribute the water along the canal (vector) prior to its flow into the marsh.

In some cases, such as the marsh transect in Water Conservation Area 2A, the relationship between the major inflow water control structures, the receiving canal orientation, and the land surface gradients is such that the flow paths into the marsh are reasonably well defined for most conditions of flow and hydraulic gradients. In numerous other cases, the relationship among point water control structures, receiving canals, and land surface elevation gradients is such that the flow paths into the marsh are not always well defined. Water Conservation Area 1 (A.R.M Loxahatchee National Wildlife Refuge) is an example of a basin with relatively complex hydraulics along its perimeter. Inflows from high-capacity inflow structures are distributed along the perimeter of the (completely bounded) hydrologic basin by an uninterrupted canal (but which is commonly distinguished by the names "L-7", "L-40", and "L-39/Hillsboro" in different locations). Flows into and out of the interior marsh occur in different spatial locations depending on the relationship between local marsh stage, local canal stage, local land elevation, and the local presence of any lip/berm – and/or denser vegetation – along the interior section of the perimeter canal.

Rather than attempt to calculate an average "cost" associated with different flow paths (based on topographic gradients or average hydraulic gradients), we chose a simple approach of calculating the shortest distance between a marsh monitoring site and its nearest potential source water. Moreover, we calculated the raster model-distances, rather than the point/vector distances from the geographic coordinates of a marsh site and a canal reach vector itself. As discussed in the Model Structure Chapter 5, canal reach vectors exchange water and constituents with adjacent marsh grid cells in a raster-vector interaction that utilizes the geometry of exact vector coordinates overlying the regular grid of the model. In the absence of a levee on a side of a particular canal reach, the model identifies the assemblage (array) of grid cells which exchange matter with that canal reach vector (along with similar determinations of grid cells that interact with the canal via levee seepage). Those grid cells that iteratively interact with canal reaches via surface water flows were identified[1] for the source-water canal reaches of interest, and we used a GIS to create vector polygon boundaries around each assemblage of canal-cells. Likewise, vector polygons were created to bound each model grid cell that contained the point location of a field monitoring site[2]. The distance was calculated[3] from the centroid of each monitoring site's (cell) polygon to the nearest edge of the boundary of the polygon defining the assemblage of cells that directly interact (and nearly equilibrate) with the source canal reach (Figure 11.1). We made very broad categorizations of source-canals/cells to discriminate between very obvious source waters and those that were in closer proximity, but were extremely unlikely to serve as a source to a cell due to substantial elevational gradients. Otherwise, no attempt was made to modify the shortest-distance path. The distances reported in Table 11.1 and Table 11.2 added ½ of the grid cell width (0.5 km) to the result of that centroid-to-boundary distance calculation. Monitoring sites that fell within the assemblage of cells that directly interact with a canal reach were assigned a distance of 0.5 km; sites located in canals were assigned a distance of 0 km.

11.2.1.2 Statistical summaries

The Bias and RMSE model performance statistics used here are those that were reported in the Documentation of the Everglades Landscape Model: ELM v2.5 (July 10, 2006). The only new data are those of the distance measures associated with each monitoring site. The statistical summaries were calculated using SAS JMP 6.0.0.

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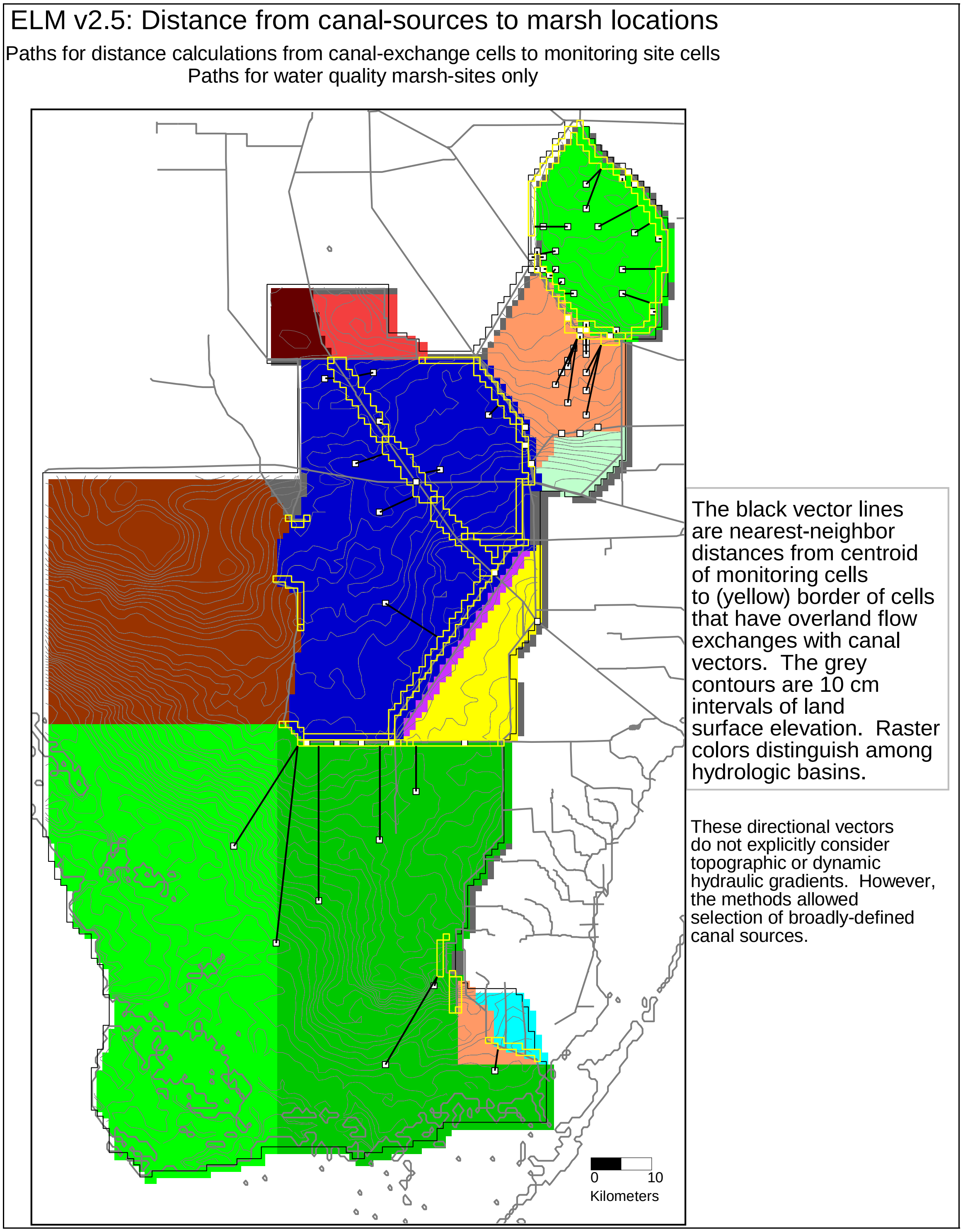
[1] Data were extracted from the CanalCells_interaction.txt file found in the ELM2.5 project's ./Output/Debug directory.

[2] For visualization-purposes only, monitoring sites within canals were included in this raster-to-polygon operation, even though simulated water quality data in canal reach vectors are true vector data, and thus the raster location of a canal site is for relative reference only.

[3] Using the GRASS GIS, with the v.distance operation. All GIS operations described here used GRASS 6.0.

Figure 11.1. Map of paths used to calculate distances from marsh monitoring site locations to nearest canal source waters.



11.2.2 Ecological performance

11.2.2.1 Surface water P concentration

SEPTEMBER 20, 2006. Some brief summary text will be developed... For now, please see the Tables & Figures with their captions for the summary of the results.

Table 11.1. Statistical evaluation of simulated vs. observed surface water phosphorus concentration, 1981 – 2000. Units of Bias (observed minus simulated) and RMSE are ug l^{-1} (ppb). The Distance to Source is defined as the distance from raster Sites to canal-based source waters; Sites in canals have distance of 0 km. (See text for details).

			Distance to	1981-2000				
Site	Basin	Site type	Source (km)	N	ObsMean	RelBias	Bias	RMSE
LOX4	WCA1	Marsh	0.5	12	10	-0.92	-9	11
LOX3	WCA1	Marsh	4.0	11	11	0.43	5	7
LOX5	WCA1	Marsh	7.5	13	10	0.32	3	5
LOX9	WCA1	Marsh	6.0	13	9	0.44	4	5
LOX10	WCA1	Marsh	2.0	12	10	0.53	5	6
LOX8	WCA1	Marsh	7.9	14	9	0.31	3	4
LOX7	WCA1	Marsh	3.4	14	8	0.32	3	3
LOX6	WCA1	Marsh	1.0	14	8	-0.43	-3	5
LOX11	WCA1	Marsh	6.0	14	9	0.46	4	5
LOX12	WCA1	Marsh	2.0	14	8	0.32	2	3
LOX13	WCA1	Marsh	5.2	14	9	0.45	4	5
LOX14	WCA1	Marsh	0.5	14	8	-1.22	-10	11
LOX15	WCA1	Marsh	0.5	14	8	-1.87	-14	16
LOX16	WCA1	Marsh	1.0	14	9	-0.70	-6	7
CA33	WCA3A	Marsh	3.0	14	13	-0.46	-6	8
CA35	WCA3A	Marsh	2.0	14	12	-1.74	-21	22
CA32	WCA3A	Marsh	2.6	14	8	0.13	1	2
CA36	WCA3A	Marsh	1.0	14	30	-0.13	-4	10
CA38	WCA3A	Marsh	5.2	14	9	-0.15	-1	4
CA34	WCA3A	Marsh	3.0	14	10	0.21	2	4
CA311	WCA3A	Marsh	6.5	14	6	-0.66	-4	5
CA315	WCA3A	Marsh	10.6	14	6	-0.11	-1	2
NE1	ENP	Marsh	8.0	29	10	0.43	4	7
P33	ENP	Marsh	16.0	30	8	-0.03	0	3
P34	ENP	Marsh	20.1	26	6	-0.91	-6	6
P36	ENP	Marsh	26.0	30	17	0.64	11	24
P35	ENP	Marsh	33.2	29	13	0.57	8	16
TSB	ENP	Marsh	2.1	30	8	-0.53	-4	6
P37	ENP	Marsh	17.3	28	6	-0.66	-4	5
EP	ENP	Marsh	4.0	27	6	-0.22	-1	3
X1	WCA1	Mar. Trans.	0.5	10	40	0.58	23	33
X2	WCA1	Mar. Trans.	1.0	10	16	0.22	3	7
X3	WCA1	Mar. Trans.	1.0	10	11	-0.40	-5	10
X4	WCA1	Mar. Trans.	3.0	9	10	0.44	5	5
Y4	WCA1	Mar. Trans.	1.2	10	12	0.31	4	13
Z1	WCA1	Mar. Trans.	0.5	10	42	0.07	3	14
Z2	WCA1	Mar. Trans.	0.5	9	14	-1.35	-19	23
Z3	WCA1	Mar. Trans.	0.5	10	10	-1.73	-17	19
Z4	WCA1	Mar. Trans.	1.2	10	9	0.34	3	6
E1	WCA2A	Mar. Trans.	1.0	13	65	0.24	15	30
E2	WCA2A	Mar. Trans.	2.0	12	58	0.33	19	29
E3	WCA2A	Mar. Trans.	3.0	12	39	0.28	11	21
E4	WCA2A	Mar. Trans.	5.6	13	15	-0.28	-4	7
E5	WCA2A	Mar. Trans.	8.4	13	9	-0.76	-6	8
F1	WCA2A	Mar. Trans.	0.5	14	120	0.27	32	72
F2	WCA2A	Mar. Trans.	2.1	13	67	0.49	33	47
F3	WCA2A	Mar. Trans.	4.3	13	29	0.30	9	13
F4	WCA2A	Mar. Trans.	5.2	13	19	-0.01	0	5
F5	WCA2A	Mar. Trans.	6.5	13	11	-0.51	-6	8
U1	WCA2A	Mar. Trans.	12.3	13	11	0.00	0	8
U2	WCA2A	Mar. Trans.	11.1	13	14	0.41	6	29
U3	WCA2A	Mar. Trans.	8.8	14	9	-0.45	-4	7

Table continued on next page...

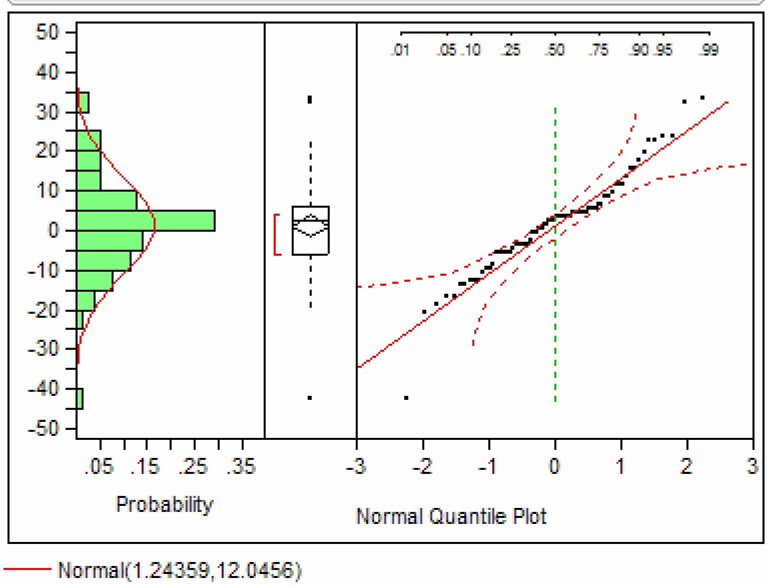
Table 11.1 continued. Statistical evaluation of simulated vs. observed surface water phosphorus concentration, 1981 – 2000. Units of Bias (observed minus simulated) and RMSE are ug l^{-1} (ppb). The Distance to Source is defined as the distance from raster Sites to canal-based source waters; Sites in canals have distance of 0 km. (See text for details).

			Distance to	**1981-2000**				
Site	Basin	Site type	Source (km)	N	ObsMean	RelBias	Bias	RMSE
L7	WCA1	Canal	0.0	8	118	0.04	4	54
L40-1	WCA1	Canal	0.0	20	62	-0.16	-10	34
L40-2	WCA1	Canal	0.0	20	84	0.16	13	30
S10A	WCA1	Canal	0.0	25	54	-0.79	-43	60
S10C	WCA1	Canal	0.0	26	81	-0.21	-17	41
S10D	WCA1	Canal	0.0	39	99	0.11	11	37
S10E	WCA1	Canal	0.0	23	88	0.17	15	40
X0	WCA1	Can. Trans.	0.0	8	53	-0.26	-14	26
Z0	WCA1	Can. Trans.	0.0	8	60	-0.10	-6	19
E0	WCA1	Can. Trans.	0.0	13	86	0.20	17	36
F0	WCA2A	Can. Trans.	0.0	12	93	0.23	22	35
S144	WCA2A	Canal	0.0	29	19	-0.56	-11	19
S145	WCA2A	Canal	0.0	35	16	-0.77	-13	19
S146	WCA2A	Canal	0.0	29	16	-0.78	-13	20
S11A	WCA2A	Canal	0.0	33	27	-0.49	-13	26
S11B	WCA2A	Canal	0.0	32	44	0.13	6	23
S11C	WCA2A	Canal	0.0	39	55	0.43	23	32
C123SR84	WCA2A	Canal	0.0	26	46	0.48	22	27
S151	WCA3A	Canal	0.0	40	27	0.29	8	19
S12A	WCA3A	Canal	0.0	39	16	0.33	5	20
S12B	WCA3A	Canal	0.0	39	14	0.19	3	14
S12C	WCA3A	Canal	0.0	40	14	0.09	1	7
S12D	WCA3A	Canal	0.0	40	14	0.14	2	6
S333	WCA3A	Canal	0.0	39	15	0.22	3	8
COOPERTN	WCA3A	Canal	0.0	20	11	0.35	4	5
S31	WCA3B	Canal	0.0	26	21	0.38	8	17
			Median All:	14	14	0.13	2	11
			Median Canal:	28	45	0.13	4	24
			Median Marsh:	14	10	0.10	2	7

Figure 11.2. Histogram (left) of the distribution of points of the (ELM prediction statistic of) Bias (TP concentration, ug L^{-1}). Box and whisker diagram (center) shows the 25^{th} and 75^{th} quantiles, median line, and other standard attributes. Normal quantile plot (right) shows the points falling approximately along the straight line of a normal distribution.

Distributions

Bias



Quantiles

100.0%	maximum	33.00
99.5%		33.00
97.5%		32.02
90.0%		17.20
75.0%	quartile	6.00
50.0%	median	2.50
25.0%	quartile	-6.00
10.0%		-13.10
2.5%		-21.55
0.5%		-43.00
0.0%	minimum	-43.00

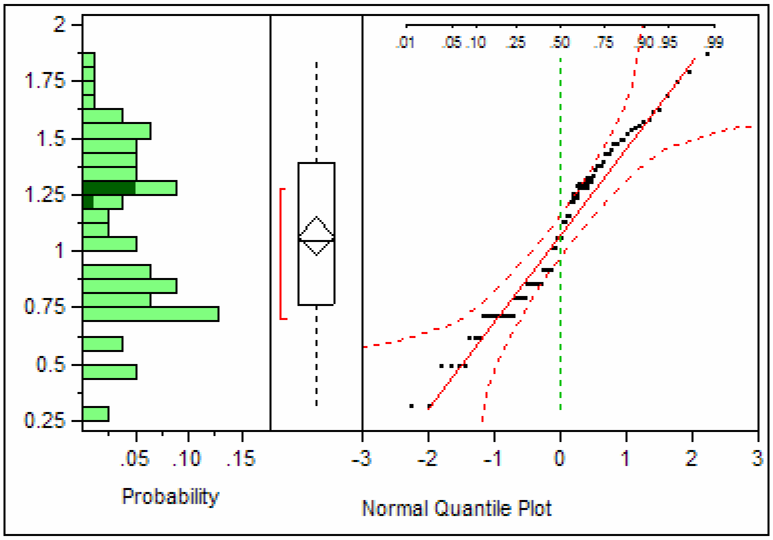
Moments

Mean	1.2435897
Std Dev	12.045569
Std Err Mean	1.3638921
upper 95% Mean	3.959446
lower 95% Mean	-1.472266
N	78

Figure 11.3. Histogram (left) of the distribution of points of the (ELM prediction statistic of) log-transformed RMSE (TP concentration, ug L^{-1}). Box and whisker diagram (center) shows the 25^{th} and 75^{th} quantiles, median line, and other standard attributes. Normal quantile plot (right) shows the points falling approximately along the straight line of a normal distribution.

Distributions

Log_RMSE



Quantiles

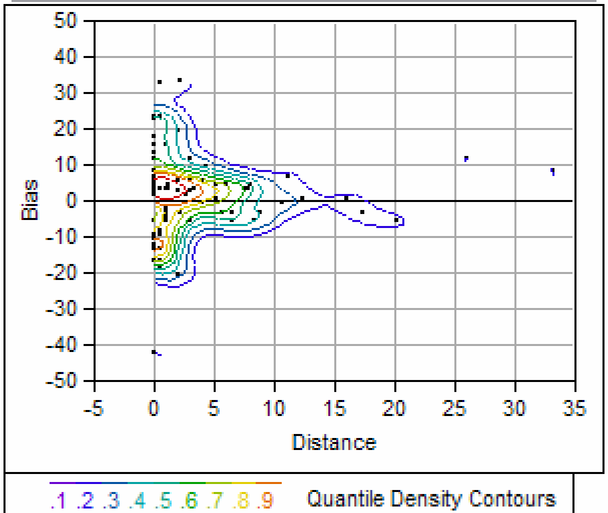
100.0%	maximum	1.8573
99.5%		1.8573
97.5%		1.7801
90.0%		1.5575
75.0%	quartile	1.3889
50.0%	median	1.0414
25.0%	quartile	0.7584
10.0%		0.6021
2.5%		0.3010
0.5%		0.3010
0.0%	minimum	0.3010

Moments

Mean	1.0673456
Std Dev	0.3810396
Std Err Mean	0.0431442
upper 95% Mean	1.1532567
lower 95% Mean	0.9814344
N	78

Figure 11.4. Plot of the points of the (ELM prediction statistic of) Bias (TP concentration, ug L^{-1}) with Distance (km) from the model canal sources. The Nonparametric Density estimate for these points is shown by colored quantile contours.

Bivariate Fit of Bias By Distance



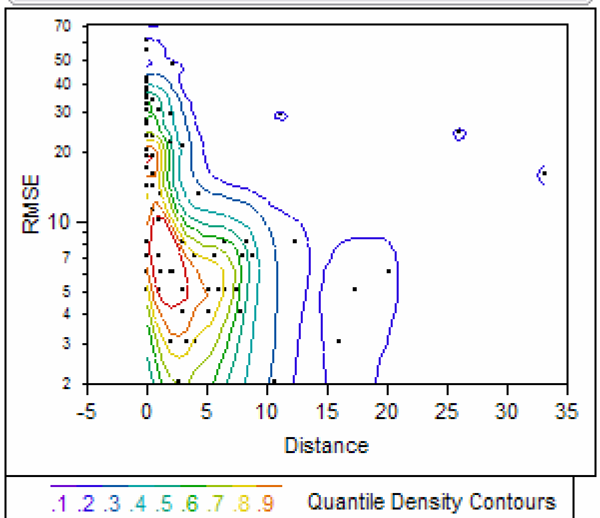
Nonparametric Bivariate Density

Variable	Kernel Std
Distance	1.458388
Bias	2.913723

Distance	Bias	Count
.	.	0
0	-43	1
0	-12.6	16
0	20.84	5
0.664	4.12	49
1.328	33	2
16.6	-1.96	1
17.264	-3.48	2
25.896	11.72	1
33.2	8.68	1

Figure 11.5. Plot of the points of the (ELM prediction statistic of) RMSE (TP concentration, ug L^{-1}) with Distance (km) from the model canal sources. The Nonparametric Density estimate for these points is shown by colored quantile contours.

Bivariate Fit of RMSE By Distance



Nonparametric Bivariate Density

Variable	Kernel Std
Distance	1.458388
RMSE	3.519389

Distance	RMSE	Count
.	.	0
0	18.8	20
0	31.4	10
0	56.6	2
0.664	72	1
1.328	7.6	39
11.288	28.6	1
16.6	3.4	3
25.896	24.4	1
33.2	16	1

Figure 11.6. Plot of the partitioning of the (ELM performance statistic of) log-transformed RMSE of TP predictions with distance from canal source waters in Water Conservation Area 1. The goodness of fit (R^2) of the partitioning the 32 data points into 4 bins was 0.87, split at distances of 1) ≥ 2.0 km 2) <2.0 – 1.0 km, 3) <1.0 – 0.5km, and 4) <0.5 km, with mean (untransformed) RMSE of 4.6 ug L^{-1}, 7.6 ug L^{-1}, 16.9 ug L^{-1}, and 35.9 ug L^{-1}, respectively.

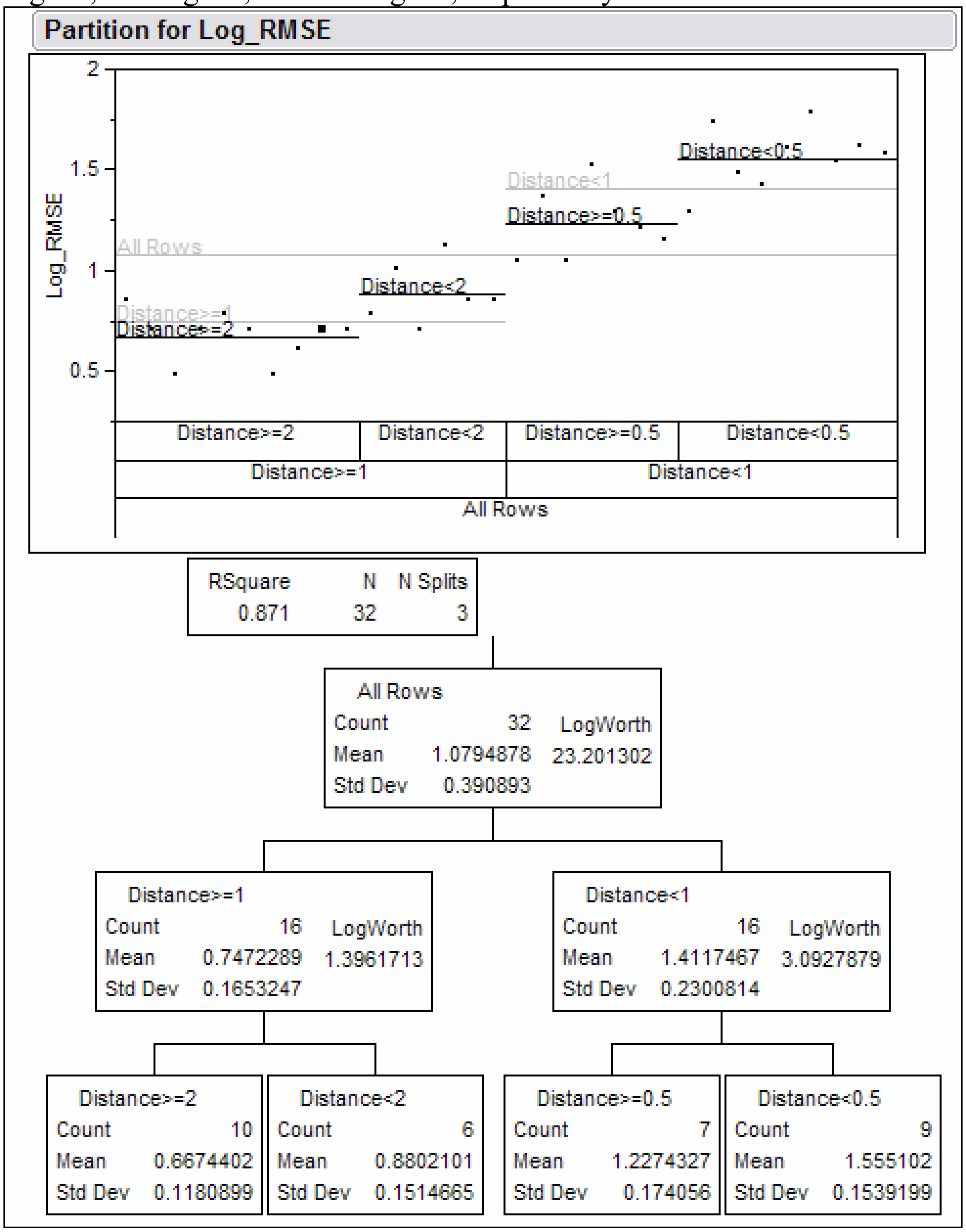


Figure 11.7. Plot of the partitioning of the (ELM performance statistic of) log-transformed RMSE of TP predictions with distance from canal source waters in Water Conservation Area 2A. The goodness of fit (R^2) of the partitioning the 15 data points into 2 bins was 0.71, split at distances of 1) >= 4.3 km and 2) 0 to <4.3 km, with mean (untransformed) RMSE of 9.1 ug L^{-1} and 36.0 ug L^{-1}, respectively.

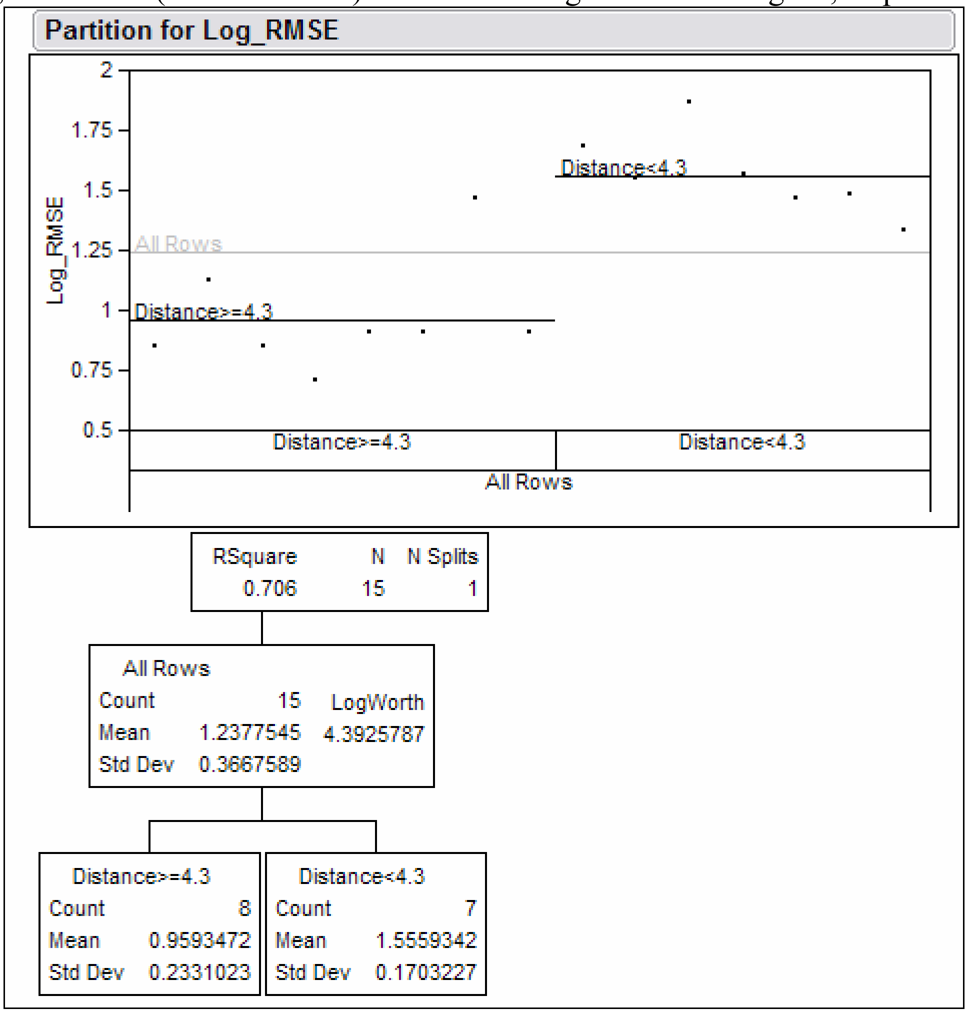
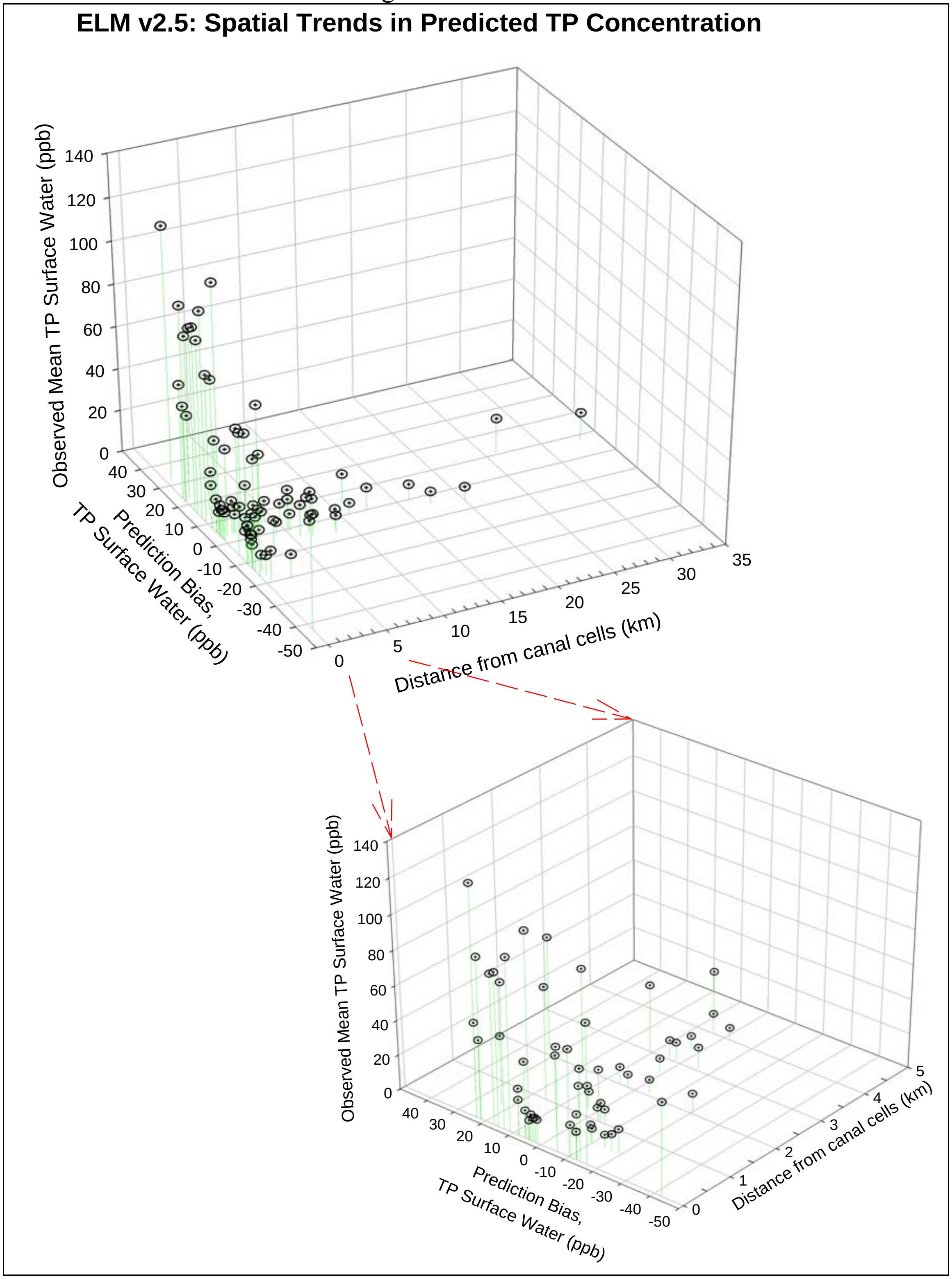


Figure 11.8. Plot of the ELM-prediction Bias for surface water phosphorus (TP) concentration at each of the 78 monitoring sites, in relation to its distance from the canal source cells and its long-term observed mean TP concentration.



11.2.2.2 Surface water CL concentration

SEPTEMBER 20, 2006. Some brief summary text will be developed... For now, please see the Tables & Figures with their captions for the summary of the results.

Table 11.2. Statistical evaluation of simulated vs. observed surface water chloride concentration, 1981 – 2000. Units of Bias (observed minus simulated) and RMSE are mg l^{-1} (ppm). The Distance to Source is defined as the distance from raster Sites to canal-based source waters; Sites in canals have distance of 0 km. (See text for details).

Site	Basin	Site type	Distance to Source (km)	N	ObsMean	RelBias (1981-2000)	Bias	RMSE
LOX4	WCA1	Marsh	0.5	25	68	-0.83	-57	77
LOX3	WCA1	Marsh	4.0	24	37	0.34	12	38
LOX5	WCA1	Marsh	7.5	26	18	0.34	6	12
LOX9	WCA1	Marsh	6.0	26	14	0.33	4	7
LOX10	WCA1	Marsh	2.0	24	28	-0.12	-3	29
LOX8	WCA1	Marsh	7.9	30	15	0.07	1	8
LOX7	WCA1	Marsh	3.4	30	29	-0.89	-26	35
LOX6	WCA1	Marsh	1.0	30	44	-1.20	-52	63
LOX11	WCA1	Marsh	6.0	29	13	-0.05	-1	7
LOX12	WCA1	Marsh	2.0	28	28	0.02	1	15
LOX13	WCA1	Marsh	5.2	29	12	0.01	0	6
LOX14	WCA1	Marsh	0.5	29	21	-2.97	-61	67
LOX15	WCA1	Marsh	0.5	29	48	-0.57	-28	42
LOX16	WCA1	Marsh	1.0	28	14	-3.60	-51	56
CA33	WCA3A	Marsh	3.0	38	53	-0.81	-43	56
CA35	WCA3A	Marsh	2.0	35	33	-0.79	-26	38
CA32	WCA3A	Marsh	2.6	46	50	-0.14	-7	43
CA36	WCA3A	Marsh	1.0	36	70	-0.10	-7	26
CA38	WCA3A	Marsh	5.2	51	31	-0.49	-16	28
CA34	WCA3A	Marsh	3.0	53	58	-0.29	-17	42
CA311	WCA3A	Marsh	6.5	45	29	-0.37	-11	26
CA315	WCA3A	Marsh	10.6	51	34	0.25	9	20
NE1	ENP	Marsh	8.0	107	78	0.25	20	32
P33	ENP	Marsh	16.0	113	71	0.21	15	29
P34	ENP	Marsh	20.1	69	22	-1.15	-26	39
P36	ENP	Marsh	26.0	108	72	0.26	19	34
P35	ENP	Marsh	33.2	103	131	0.48	63	223
TSB	ENP	Marsh	2.1	98	39	0.01	1	24
P37	ENP	Marsh	17.3	79	30	-1.59	-48	105
EP	ENP	Marsh	4.0	82	206	-64.21	-13229	17364
X1	WCA1	Mar. Trans.	0.5	55	122	0.12	15	29
X2	WCA1	Mar. Trans.	1.0	55	102	0.05	5	44
X3	WCA1	Mar. Trans.	1.0	55	86	-0.30	-26	55
X4	WCA1	Mar. Trans.	3.0	54	50	-0.19	-10	50
Y4	WCA1	Mar. Trans.	1.2	55	51	-0.86	-44	67
Z1	WCA1	Mar. Trans.	0.5	57	125	0.12	15	31
Z2	WCA1	Mar. Trans.	0.5	54	108	-0.09	-10	32
Z3	WCA1	Mar. Trans.	0.5	59	67	-0.55	-37	63
Z4	WCA1	Mar. Trans.	1.2	57	36	-0.92	-33	50
E1	WCA2A	Mar. Trans.	1.0	83	149	-0.01	-1	94
E2	WCA2A	Mar. Trans.	2.0	78	125	-0.24	-30	55
E3	WCA2A	Mar. Trans.	3.0	75	124	-0.23	-28	56
E4	WCA2A	Mar. Trans.	5.6	90	121	-0.26	-31	59
E5	WCA2A	Mar. Trans.	8.4	91	114	-0.32	-36	67
F1	WCA2A	Mar. Trans.	0.5	82	162	0.05	8	61
F2	WCA2A	Mar. Trans.	2.1	101	151	-0.11	-16	58
F3	WCA2A	Mar. Trans.	4.3	97	143	-0.12	-18	62
F4	WCA2A	Mar. Trans.	5.2	85	137	-0.12	-16	61
F5	WCA2A	Mar. Trans.	6.5	92	143	-0.08	-11	62
U1	WCA2A	Mar. Trans.	12.3	99	102	-0.28	-28	60
U2	WCA2A	Mar. Trans.	11.1	97	129	-0.05	-6	51
U3	WCA2A	Mar. Trans.	8.8	96	133	-0.10	-14	58

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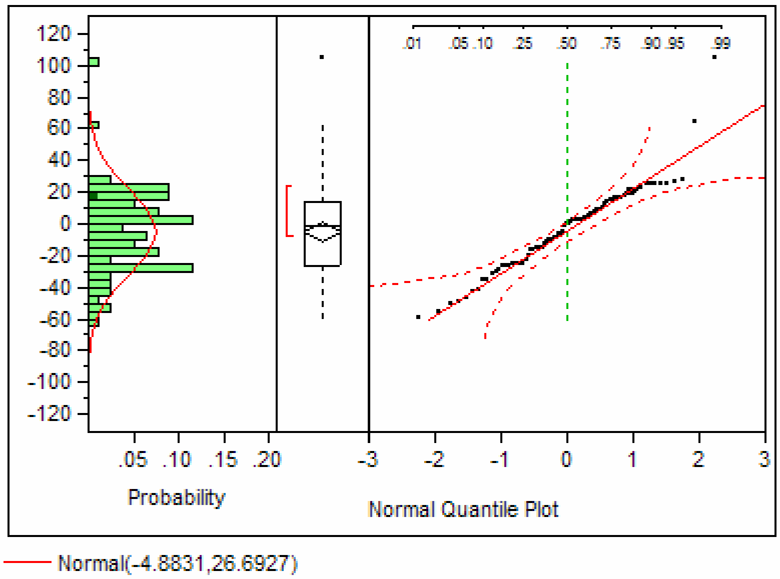
Table 11.2 continued. Statistical evaluation of simulated vs. observed surface water chloride concentration, 1981 – 2000. Units of Bias (observed minus simulated) and RMSE are mg l^{-1} (ppm). The Distance to Source is defined as the distance from raster Sites to canal-based source waters; Sites in canals have distance of 0 km. (See text for details).

			Distance to	1981-2000				
Site	Basin	Site type	Source (km)	N	ObsMean	RelBias	Bias	RMSE
L7	WCA1	Canal	0.0	53	228	0.45	103	167
L40-1	WCA1	Canal	0.0	119	132	0.20	26	54
L40-2	WCA1	Canal	0.0	118	80	-0.33	-26	59
S10A	WCA1	Canal	0.0	94	95	-0.22	-21	56
S10C	WCA1	Canal	0.0	100	131	0.11	14	53
S10D	WCA1	Canal	0.0	198	145	0.17	24	56
S39	WCA1	Canal	0.0	251	106	-0.17	-18	56
S10E	WCA1	Canal	0.0	80	141	0.17	24	50
X0	WCA1	Can. Trans.	0.0	60	131	0.18	24	38
Z0	WCA1	Can. Trans.	0.0	59	133	0.19	25	40
E0	WCA2A	Can. Trans.	0.0	108	128	0.01	1	37
F0	WCA2A	Can. Trans.	0.0	110	132	0.04	5	41
S144	WCA2A	Canal	0.0	165	127	0.08	11	45
S145	WCA2A	Canal	0.0	206	121	0.07	8	44
S146	WCA2A	Canal	0.0	164	117	0.02	2	45
S11A	WCA2A	Canal	0.0	171	118	0.16	19	43
S11B	WCA2A	Canal	0.0	192	122	0.18	22	44
S11C	WCA2A	Canal	0.0	258	117	0.15	18	41
C123SR84	WCA3A	Canal	0.0	97	75	0.19	14	24
S151	WCA3A	Canal	0.0	229	98	0.25	24	39
S12A	WCA3A	Canal	0.0	320	29	-0.81	-24	33
S12B	WCA3A	Canal	0.0	345	39	-0.33	-13	28
S12C	WCA3A	Canal	0.0	350	54	0.04	2	33
S12D	WCA3A	Canal	0.0	367	69	0.24	16	37
S333	WCA3A	Canal	0.0	319	77	0.31	24	40
S31	WCA3B	Canal	0.0	109	89	0.01	1	60
			Median All:	80	80	-0.05	-3	44
			Median Canal:	165	118	0.13	14	43
			Median Marsh:	55	62	-0.12	-12	47

Figure 11.9. Histogram (left) of the distribution of points of the (ELM prediction statistic of) Bias (CL concentration, mg L^{-1}). Box and whisker diagram (center) shows the 25th and 75th quantiles, median line, and other standard attributes. Normal quantile plot (right) shows the points falling approximately along the straight line of a normal distribution. Site “EP” excluded from analysis.

Distributions

Bias



Quantiles

100.0%	maximum	103.0
99.5%		103.0
97.5%		65.0
90.0%		24.0
75.0%	quartile	14.0
50.0%	median	-1.0
25.0%	quartile	-26.0
10.0%		-38.2
2.5%		-57.2
0.5%		-61.0
0.0%	minimum	-61.0

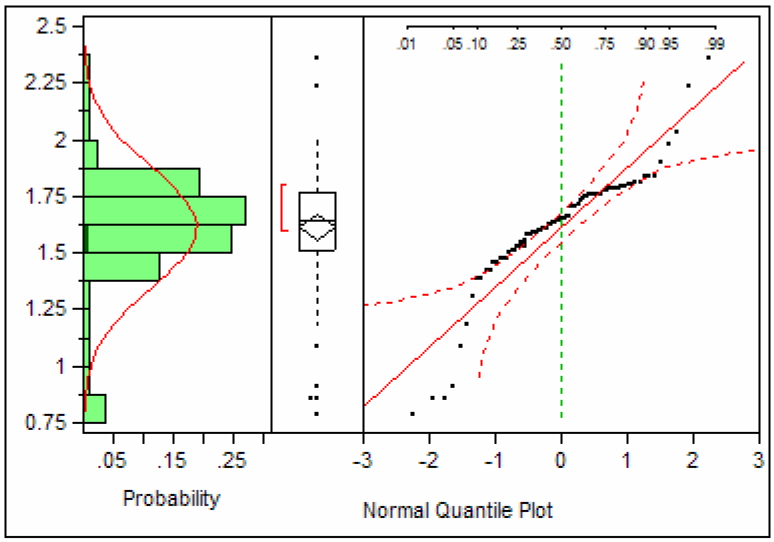
Moments

Mean	-4.883117
Std Dev	26.692683
Std Err Mean	3.0419135
upper 95% Mean	1.175379
lower 95% Mean	-10.94161
N	77

Figure 11.10. Histogram (left) of the distribution of points of the (ELM prediction statistic of) log-transformed RMSE (CL concentration, mg L^{-1}). Box and whisker diagram (center) shows the 25th and 75th quantiles, median line, and other standard attributes. Normal quantile plot (right) shows the points falling roughly along the straight line of a normal distribution. Site "EP" excluded from analysis.

Distributions

Log_RMSE



Normal(1.61288,0.26429)

Quantiles

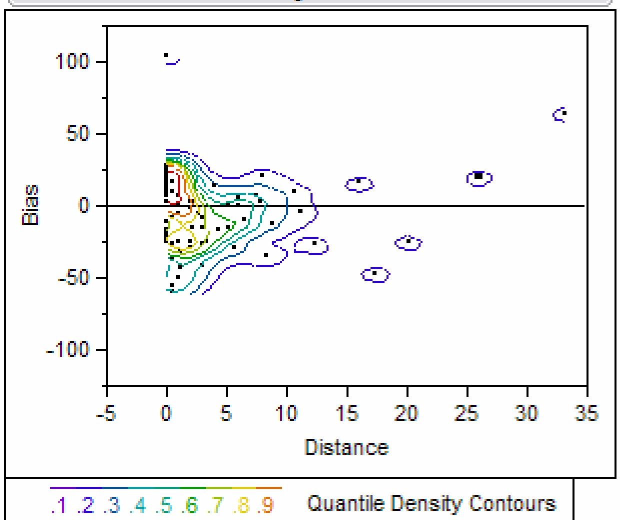
100.0%	maximum	2.3483
99.5%		2.3483
97.5%		2.2290
90.0%		1.8261
75.0%	quartile	1.7634
50.0%	median	1.6435
25.0%	quartile	1.5118
10.0%		1.3644
2.5%		0.8418
0.5%		0.7782
0.0%	minimum	0.7782

Moments

Mean	1.6128791
Std Dev	0.2642931
Std Err Mean	0.030119
upper 95% Mean	1.6728662
lower 95% Mean	1.5528919
N	77

Figure 11.11. Plot of the points of the (ELM prediction statistic of) Bias (CL concentration, mg L^{-1}) with Distance (km) from the model canal sources. The Nonparametric Density estimate for these points is shown by contours colored in quantiles (e.g., the 0.9 quantile has about 90% of the points below it). Site "EP" excluded from analysis.

Bivariate Fit of Bias By Distance



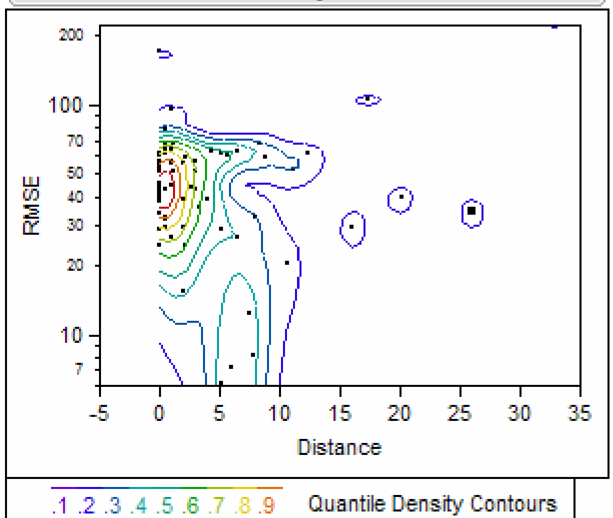
Nonparametric Bivariate Density

Variable	Kernel Std
Distance	1.471087
Bias	6.470638

Distance	Bias	Count
.	.	0
0	17.72	44
0	103	1
1.328	-51.16	4
1.328	-24.92	22
11.952	-28.2	1
15.936	14.44	1
17.264	-47.88	1
19.92	-24.92	1
25.896	17.72	1
33.2	63.64	1

Figure 11.12. Plot of the points of the (ELM prediction statistic of) RMSE (CL concentration, mg L^{-1}) with Distance (km) from the model canal sources. The Nonparametric Density estimate for these points is shown by contours colored in quantiles (e.g., the 0.9 quantile has about 90% of the points below it). Site "EP" excluded from analysis.

Bivariate Fit of RMSE By Distance



Nonparametric Bivariate Density

Variable	Kernel Std
Distance	1.471087
RMSE	7.418495

Distance	RMSE	Count
.	.	0
0	40.72	65
0	166.58	1
5.976	6	3
6.64	10.34	3
15.936	27.7	1
17.264	105.82	1
19.92	40.72	1
25.896	32.04	1
33.2	223	1

Figure 11.13. Plot of the partitioning of the (ELM performance statistic of) log-transformed RMSE of CL predictions with distance from canal source waters in Water Conservation Area 1. The goodness of fit (R^2) of the partitioning the 33 data points into 4 bins was 0.80, split at distances of 1) ≥ 5.2 km 2) <5.2 – 2.0 km, 3) <2.0 – 0.5km, and 4) <0.5 km, with mean (untransformed) RMSE of 7.8 mg L^{-1}, 31.0 mg L^{-1}, 49.0 mg L^{-1}, and 57.2 mg L^{-1}, respectively.

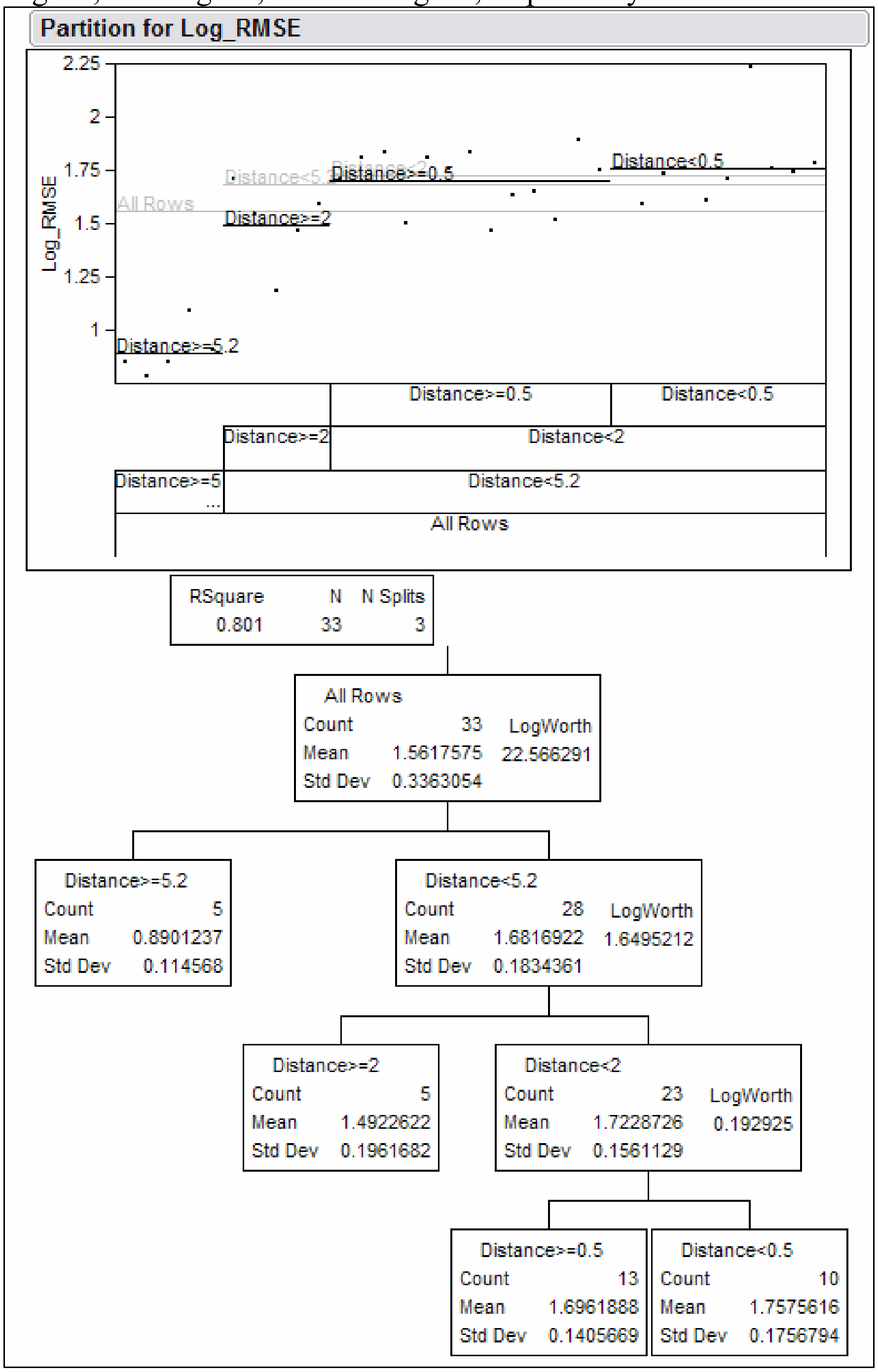


Figure 11.14. Plot of the partitioning of the (ELM performance statistic of) log-transformed RMSE of CL predictions with distance from canal source waters in Water Conservation Area 2A. The goodness of fit (R^2) of the partitioning the 15 data points into 2 bins was 0.04, (and thus marginally) split at distances of 1) >= 4.3 km and 2) 0 to <4.3 km, with mean (untransformed) RMSE of 58.9 mg L^{-1} and 55.0 mg L^{-1}, respectively.

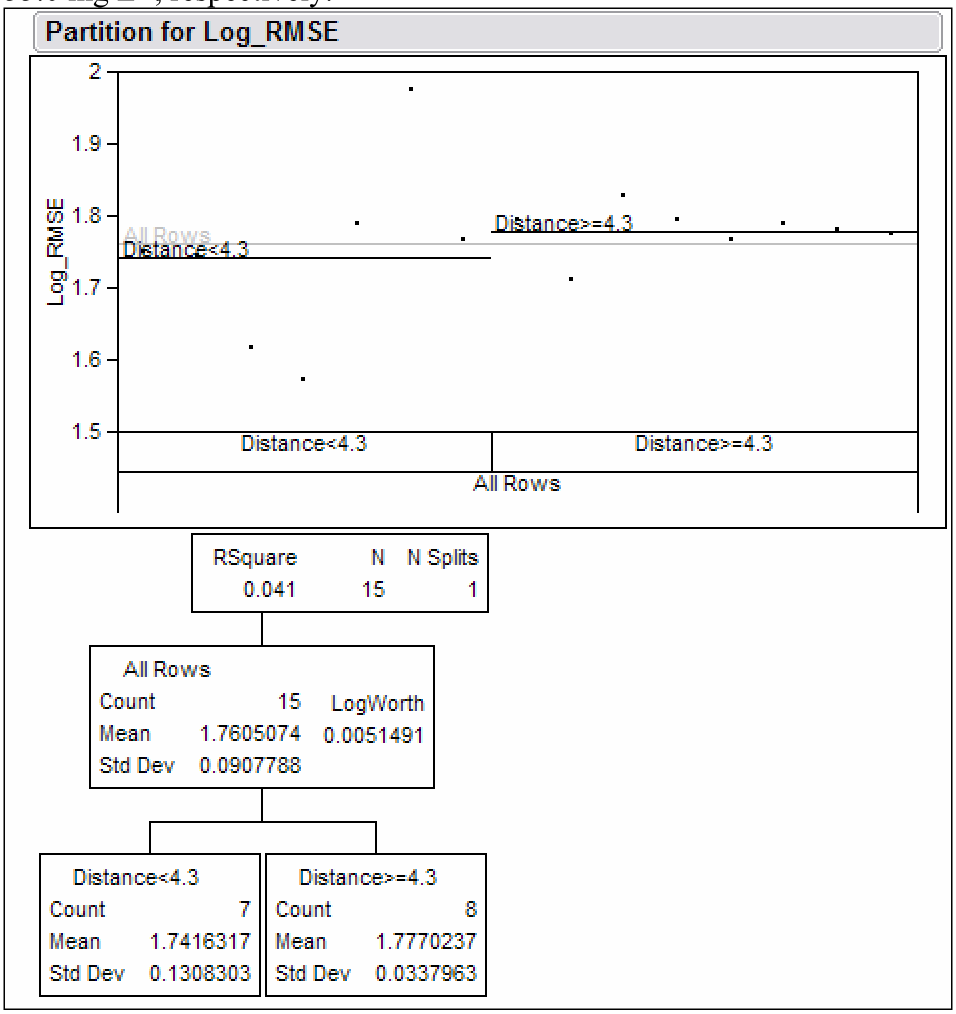


Figure 11.15. Plot of the ELM-prediction Bias for surface water chloride (CL) concentration at each of the 78 monitoring sites, in relation to its distance from the canal source cells and its long-term observed mean CL concentration. Sites "EP" and "L7" excluded from the plot.