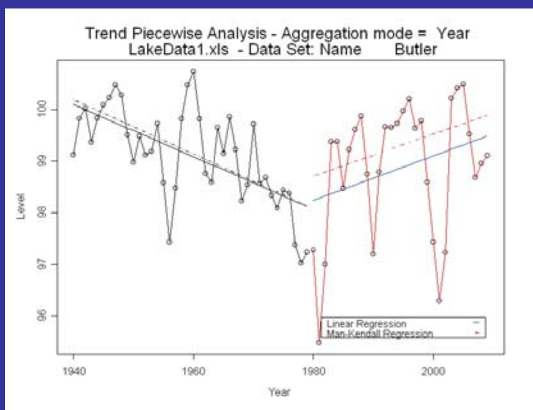
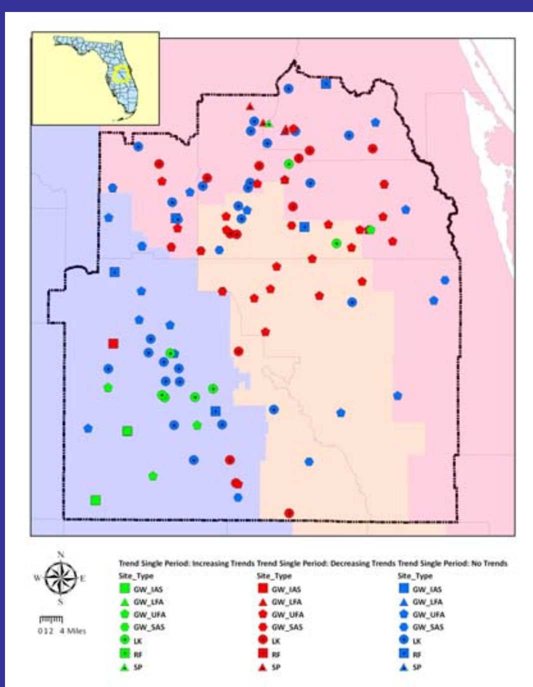
Final Report **Final Report** Final Report

Central Florida Coordination Area: Statistical Analysis





Prepared for:

The St. Johns River Water Management District And The Southwest Florida Water Management District

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List of Abbreviations

The following abbreviations appear throughout the text of this report:

AHCA	Agglomerative Hierarchical Cluster Analysis
CFCA	Central Florida Coordination Area
cfs	Cubic feet per second
ft	feet
GW_IAS	Groundwater- intermediate aquifer system
GW_LFA	Groundwater- Lower Floridan aquifer
GW_SAS	Groundwater- surficial aquifer system
GW_UFA	Groundwater- Upper Floridan aquifer
in.	inches
LOWESS	Locally weighted scatter plot smoothing
M	Monotonic trend
MS	Monotonic trend with slope change at specified break point
P	Piecewise trend (single break point)
POR	Period of Record
RF	Rainfall
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
SP	Spring
SWFWMD	Southwest Florida Water Management District
2P	Double piecewise trend (2 break points)

Glossary

The following terms refer to terminology utilized throughout this report. For the cases of statistical tests, definitions below refer to how these tests were applied to the CFCA analysis.

Agglomerative Hierarchical Cluster Analysis (AHCA)- A method of clustering data by building a hierarchy from the individual elements by progressively merging clusters based on a distance metric and a linkage type. All agglomerative cluster analyses conducted for this project utilized Euclidean distance and Ward's linkage.

Break Point- A point (date) in a time series identified by LOWESS which indicates a change in slope sign, slope magnitude, or a point of inflection in the time series.

Dendrogram- A chart with a tree structure identifying the relationships between items in the cluster analysis. The root of the dendrogram consists of a single cluster containing all observations, and the leaves correspond to individual observations. Items are clustered on the tree based on similarity.

Kolmogorov-Smirnov test- A nonparametric test of equality utilized to compare two samples and test the null hypothesis that there is no difference in the probability distributions of two sample data sets.

LOWESS- Abbreviation for locally weighted scatter-plot smoothing. A nonparametric regression which identifies break points in a time series due to inflection points, slope sign change or slope magnitude change.

Mann Kendall test- A nonparametric statistical test utilized to test the null hypothesis that there is no trend in the data over time.

Sen slope- The slope of the trend line which is calculated with the Mann Kendall results in order to determine the magnitude of trend in the data over time. A positive Sen slope indicates levels or measurements are increasing over time, while a negative Sen slope indicates that levels or measurements are decreasing over time.

t-test- A parametric statistical test utilized to test the null hypothesis that there is no difference in the means of two data sets. For the CFCA project, data from a single station was utilized with a specified break point. A positive test statistic indicated that the mean was higher during the first period.

Wilcoxon Rank Sum Test- A nonparametric statistical test utilized to test the null hypothesis that there is no difference in the means of two data sets. For the CFCA project, data from a single station was utilized with a specified break point. A positive test statistic indicated that the mean was higher during the first period.

Executive Summary

The St. Johns River Water Management District (SJRWMD), the Southwest Florida Water Management District (SWFWMD), and the South Florida Water Management District (SFWMD) are currently cooperating in order to conduct a regional water resources assessment to support water supply planning and decisions within the Central Florida Coordination Area (CFCA). As a part of this effort, statistical trend and cluster analyses were conducted as a joint effort of the SWFWMD and SJRWMD in order to determine trends in long term hydrologic data from each of the three participating districts. A comprehensive statistical analysis was performed on one hundred and twenty (120) hydrologic data stations throughout the CFCA. The analysis included rainfall stations, surficial wells, intermediate wells, Upper and Lower Floridan wells, lakes and springs.

The primary objective of this analysis was to perform a systematic regional analysis to determine if long-term statistical trends are present in groundwater levels, lake levels, spring discharge, and rainfall measurements. This was accomplished through the completion of an exploratory data analysis, a trend analysis, and a cluster analysis. INTERA previously developed algorithms in SPLUS to perform exploratory data analysis and trend analysis; these algorithms were applied when appropriate.

A confidence level of 80% was utilized for all statistical tests. At this confidence level, a total of 48 stations exhibited statistically significant decreasing trends for their respective periods of record, while 15 stations exhibited statistically significant increasing trends in the data. For the dry season (October through May), 41 stations exhibited statistically significant decreasing trends, while 15 stations exhibited increasing trends. For the wet season, 44 stations exhibited decreasing trends, while 12 stations exhibited increasing trends over their respective periods of record. Generally, many of the stations with increasing trends were located in Polk county, in areas where high historic groundwater withdrawals due to phosphate mining were prevalent (historic pumping was much greater than current water use due to recycling efforts).

An agglomerative hierarchical clustering algorithm was applied to data from 115 stations with records from 1984 through 2008. The results of the cluster analysis were consistent with the trend analysis, with stations with increasing levels generally clustering together, and likewise for stations with decreasing levels. Results of the cluster analysis can be utilized by the Districts in conjunction with other data (such as anthropogenic changes and water use) in order to determine the dominant hydrologic processes controlling the recorded data.

1.0 Introduction

The St. Johns River Water Management District (SJRWMD), the Southwest Florida Water Management District (SWFWMD), and the South Florida Water Management District (SFWMD) are currently cooperating to conduct a regional water resources assessment to support water supply planning and decisions within the Central Florida Coordination Area (CFCA). As a part of this effort, statistical trend and cluster analyses were conducted as a joint effort of the SWFWMD and SJRWMD in order to determine existing and historical trends in hydrologic data from each of the three participating districts. The objectives of the current analysis are: (1) to perform a systematic regional analysis to determine if long-term statistical trends are present in groundwater levels, lake levels, spring discharge, and rainfall measurements and (2) to coordinate these efforts between the water management districts. The objectives were accomplished through the completion of an exploratory data analysis, a trend analysis, and a cluster analysis. INTERA previously developed algorithms in SPLUS to perform exploratory data analysis and trend analysis. When appropriate, these algorithms were utilized for this analysis.

2.0 Methodology

Trend analysis and cluster analysis can assist in understanding the hydrologic behavior of a system and the associated spatial associations and hydrologic similarities between sites. Understanding the basic hydrologic behavior of lakes, wells, and springs within the CFCA is critical to the planning process. It is the objective of this project to identify trends, when present, and also examine clustering of sites. The current phase of this project does not include determining which forcing functions (i.e. pumping, anthropogenic changes, land use, depth to water table) these trends depend on.

This report is divided primarily into 3 sections: exploratory data analysis, trend analysis, and cluster analysis. The exploratory data analysis section presents basic statistics for each station studied, as well as locally weighted scatter-plot smoothing (LOWESS) results for each station. Break points for each station are also presented in this section. The trend analysis section presents the results of the trend analysis scripts. The trend analysis was performed using scripts previously written by INTERA in SPLUS (Aly and Biggs, 2007). The trend analysis is summarized in several sections (trend single period, trend seasonal single period, trend piecewise, trend seasonal piecewise). All trend analysis algorithms were run for the station period of record (as shown in Table 3). A series of tables are presented to guide the user in selecting the most appropriate test result(s) for each station. The cluster analysis section presents the results of the agglomerative hierarchical clustering algorithms which were utilized in order to group the stations into clusters with similar hydrologic behavior. Additionally, Sen slopes are presented with the cluster analysis results. These Sen slopes were calculated using the trend single period script for the cluster analysis period of analysis (1984 through 2008 and 1960 through 2008). Spatial associations for each of the clusters are also examined. Complete test results for each station are shown in detail in Appendix II.

In order to aid the user in understanding and interpretation of test results, a Glossary is provided at the beginning of this report, as well as a section describing the utilization and applicability of the different trend analysis tests (Section 4.0.1: Trend Analysis Hierarchy).

2.1 Site Selection

Data for a total of 120 sites was examined for this analysis. The site types included wells, lakes, springs and rainfall gauges located within the CFCA. Sites with more than 30 years of data but no more than two months of missing data per year were originally selected from the SWFWMD and SJRWMD databases. This first group was plotted on a location map to identify holes and clusters in the spatial distribution. In areas where multiple sites of the same type plotted near each other, the site with the less complete data record was removed. In areas where holes in the spatial distribution were identified, sites with between 25 and 30 years of data and/or with more than two months of missing data were selected for the evaluation. SJRWMD provided site information and time series data for 80 sites, and SWFWMD provided site information and time series data for 40 sites. All data was utilized as-is; that is, no data gaps were filled with statistical algorithms or other gap filling techniques. Table 1 shows the stations selected for the trend and cluster analysis.

Table 1 Selected Stations for the CFCA Trend and Cluster Analysis

Trend Analysis ID	Site ID	Site Name	Longitude (Degrees)	Latitude (Degrees)	Site Type	Data Provided by
1	2260800	Alligator	-81.18868	28.23168	LK	SJ
2	30003000	Apopka	-81.62815	28.56267	LK	SJ
3	2930258	Apshaw	-81.77333	28.59964	LK	SJ
4	BARTON-BIG	Barton Big	-81.315556	28.550833	LK	SJ
5	2263850	Bay	-81.55757	28.41362	LK	SJ
6	282528081340901	Bay Lake nr Windermere	-81.568962	28.424728	GW_UFA	SJ
7	7514	Bear	-81.446631	28.656858	LK	SJ
8	283249081053201	Bithlo 1	-81.092007	28.5475	GW_UFA	SJ
9	283249081053203	Bithlo 3	-81.092007	28.5475	GW_SAS	SJ
10	282051081183401	Boggy Creek Rd nr Taft	-81.309236	28.347787	GW_UFA	SJ
11	2263900	Butler	-81.53341	28.48834	LK	SJ
12	7522	Catherine	-81.12651	28.64299	LK	SJ
13	7524	Charm	-81.198454	28.678594	LK	SJ
14	2237370	Church	-81.83758	28.64555	LK	SJ
15	283314081455501	Clermont	-81.765076	28.554167	GW_UFA	SJ
16	1641	Clermont R	-81.723	28.455	RF	SJ
17	282341081040101	Cocoa A	-81.06673	28.395006	GW_UFA	SJ
18	282532081075601	Cocoa B	-81.132009	28.425839	GW_UFA	SJ
19	282533081082202	Cocoa C - Zone 1	-81.139231	28.426116	GW_LFA	SJ
20	282533081082206	Cocoa C - Zone 5	-81.139231	28.426116	GW_UFA	SJ
21	282531081095701	Cocoa D	-81.165621	28.425561	GW_UFA	SJ
22	282739081054501	Cocoa F	-81.095412	28.461192	GW_UFA	SJ
23	282847081013701	Cocoa H	-81.026728	28.480002	GW_UFA	SJ

Table 1, continued

Trend Analysis ID	Site ID	Site Name	Longitude (Degrees)	Latitude (Degrees)	Site Type	Data Provided by
24	282623081153801	Cocoa P	-81.260346	28.440005	GW_UFA	SJ
25	25339	COLEY DEEP	-81.52947222	27.74438056	GW_UFA	SWF
26	17567	COMBEE ROAD DEEP	-81.90821667	28.11831389	GW_IAS	SWF
27	CONWAY	Conway	-81.36833	28.48694	LK	SJ
28	23857	CROOKED LAKE NR BABSON PARK (R)	-81.55572222	27.80833333	LK	SWF
29	281722080543001	Deseret	-80.908115	28.289732	GW_SAS	SJ
30	282210081352601	Disney nr Vineland	-81.590352	28.36973	GW_SAS	SJ
31	24773	EAGLE LAKE (R)	-81.76058333	27.98155556	LK	SWF
32	282245081492602	Eva nr Clermont - SAS	-81.823889	28.379167	GW_SAS	SJ
33	282245081492601	Eva nr Clermont - UFA	-81.823889	28.379167	GW_UFA	SJ
34	24790	FORT GREEN SPRINGS INT	-81.95816111	27.69852222	GW_IAS	SWF
35	1270535	Geneva	-81.11885	28.71383	GW_UFA	SJ
36	5170970	Horsehead Pond - SAS	-81.73559	28.37712	GW_SAS	SJ
37	5170969	Horsehead Pond - UFA	-81.73559	28.37712	GW_UFA	SJ
38	LK043	Horseshoe	-81.47056	28.59583	LK	SJ
39	1762687	Howell	-81.31788	28.63706	LK	SJ
40	7583	Island	-81.36173	28.6885	LK	SJ
41	275609081132001	Joe Overstreet nr St Cloud	-81.222013	27.936133	GW_UFA	SJ
42	3840562	Johns	-81.64133	28.54152	LK	SJ
43	5310981	Johns Lake	-81.67991	28.52499	GW_UFA	SJ
44	LK048	Killarney	-81.381	28.601	LK	SJ
45	9652160	Lake Adair - LFA	-81.39302	28.55967	GW_LFA	SJ
46	283333081233502	Lake Adair - UFA	-81.392848	28.559446	GW_UFA	SJ
47	25229	LAKE ALFRED (R)	-81.73577778	28.09308333	LK	SWF
48	25227	LAKE ALFRED DEEP AT LAKE ALFRED	-81.72296667	28.09209722	GW_FAS	SWF
49	17652	LAKE ALFRED DEEP NR LAKE ALFRED	-81.73760556	28.16861389	GW_FAS	SWF
50	25307	LAKE ANNIE (R)	-81.60730556	27.99905556	LK	SWF
51	712932	LAKE ARBUCKLE	-81.37678889	27.66590833	LK	SWF
52	17658	LAKE ARIETTA (USGS) (R)	-81.80177778	28.09475	LK	SWF
53	24795	LAKE BUFFUM (R)	-81.66405556	27.80741667	LK	SWF
54	23836	LAKE CLINCH (R)	-81.53694444	27.74658333	LK	SWF
55	24818	LAKE GARFIELD (R)	-81.72347222	27.90075	LK	SWF
56	24846	LAKE HOWARD (R)	-81.75016667	28.01797222	LK	SWF
57	281714081093001	Lake Joel nr Ashton	-81.158121	28.287511	GW_UFA	SJ
58	17664	LAKE JULIANA (R)	-81.79544444	28.131	LK	SWF
59	660060	Lake Louisa State Park	-81.71667	28.42861	GW_UFA	SJ
60	24848	LAKE MARION NR HAINES CITY	-81.53062222	28.09918056	LK	SWF
61	24748	LAKE MCLEOD (R)	-81.75266667	27.97436111	LK	SWF
62	282202081384602	Lake Oliver nr Vineland - SAS	-81.645908	28.367508	GW_SAS	SJ
63	282202081384601	Lake Oliver nr Vineland - UFA	-81.645908	28.367508	GW_UFA	SJ

Table 1, continued

Trend Analysis ID	Site ID	Site Name	Longitude (Degrees)	Latitude (Degrees)	Site Type	Data Provided by
64	25371	LAKE OTIS (R)	-81.70797222	28.01780556	LK	SWF
65	24906	LAKE PARKER AT LAKELAND	-81.92252778	28.04994444	LK	SWF
66	712937	LAKE ROSALIE	-81.42348889	27.94369722	LK	SWF
67	25303	LAKE RUBY (R)	-81.66141667	27.97636111	LK	SWF
68	17573	LAKE SANITARY (MARIANA) (R)	-81.75535	28.06973611	LK	SWF
69	282738081341401	Lake Sawyer nr Windermere	-81.570351	28.460838	GW_UFA	SJ
70	25381	LAKE SMART (R)	-81.71034722	28.05251667	LK	SWF
71	25351	LAKE WALES (R)	-81.57919444	27.90311111	LK	SWF
72	284147081220201	Longwood	-81.367013	28.696663	GW_UFA	SJ
73	25144	LOUGHMAN DEEP	-81.58060278	28.25946111	GW_FAS	SWF
74	25145	LOUGHMAN SHALLOW	-81.58058333	28.25946944	GW_SAS	SWF
75	3980647	Louisa	-81.73382	28.49753	LK	SJ
76	LK052	Maitland	-81.35083	28.61667	LK	SJ
77	283204081544902	Mascotte - SAS	-81.913412	28.534721	GW_SAS	SJ
78	283204081544901	Mascotte - UFA	-81.913412	28.534721	GW_UFA	SJ
79	LK057	McCoy	-81.49694	28.68917	LK	SJ
80	281429081290501	Mercantile Lane nr Kissimmee	-81.484517	28.24168	GW_UFA	SJ
81	2234650	Miami Springs	-81.44257	28.71027	SP	SJ
82	282241081112801	Moss Park	-81.1909	28.378341	GW_UFA	SJ
83	25147	MOUNTAIN LAKE NWS	-81.59923611	27.93863056	RF	SWF
84	6628	Orlando	-81.3333	28.4333	RF	SJ
85	283253081283401	Orlo Vista	-81.475905	28.548335	GW_UFA	SJ
86	281937081245901	OS U.L.	-81.416182	28.327232	GW_UFA	SJ
87	713582	P-49 SURF NR FROSTPROOF	-81.31708889	27.80390278	GW_SAS	SWF
88	282835081305201	Palm Lake Dr nr Windermere	-81.507017	28.477782	GW_UFA	SJ
89	2234996	Palm Springs - Seminole	-81.39257	28.69111	SP	SJ
90	15470818	Prevatt	-81.48618	28.71518	LK	SJ
91	280905081270101	Reedy Creek Overlook	-81.450072	28.151682	GW_UFA	SJ
92	2234610	Rock Springs	-81.49924	28.75583	SP	SJ
93	282717081553101	ROMP 101 nr Bay Lake	-81.925079	28.455002	GW_UFA	SJ
94	24804	ROMP 45 AVPK	-81.78609722	27.764325	GW_FAS	SWF
95	24840	ROMP 59 HTRN	-81.86420278	27.88396944	GW_IAS	SWF
96	24838	ROMP 59 SWNN~AVPK	-81.86413889	27.88394444	GW_FAS	SWF
97	17974	ROMP 60 OCAL~AVPK	-81.98238333	27.89086944	GW_FAS	SWF
98	17696	ROMP 76 OCAL-AVPK	-81.83060833	28.18263611	GW_UFA	SWF
99	17530	ROMP 88 ROCK RIDGE	-81.90673889	28.30945	RF	SWF
100	LK070	Rose	-81.50444	28.53667	LK	SJ
101	7982	Sanford	-81.2686	28.8167	RF	SJ
102	2234991	Sanlando Springs	-81.39563	28.68889	SP	SJ
103	24897	SANLON RANCH FLDN	-81.923	28.00022222	GW_FAS	SWF
104	LK075	Sherwood	-81.4975	28.55083	LK	SJ

Table 1, continued

Trend Analysis ID	Site ID	Site Name	Longitude (Degrees)	Latitude (Degrees)	Site Type	Data Provided by
105	281559081260701	Shingle Creek nr Kissimmee	-81.435072	28.266679	GW_UFA	SJ
106	2263868	South	-81.53785	28.41279	LK	SJ
107	281456081171701	St Cloud Power Plant	-81.287847	28.249179	GW_UFA	SJ
108	2234997	Starbuck Spring	-81.3909	28.69694	SP	SJ
109	17568	STATE ROAD 33~COMBEE ROAD SHALLOW	-81.90827778	28.11819444	GW_SAS	SWF
110	711229	STATE ROAD 60 DEEP NR LAKE WALES	-81.65380556	27.90097222	GW_FAS	SWF
111	10770591	Sylvan	-81.3822	28.80261	LK	SJ
112	5038	TAFT_G	-81.371455	28.436115	GW_SAS	SJ
113	275852081030501	TH-10 Williams Rd nr Holopaw	-81.051175	27.98141	GW_UFA	SJ
114	15023026	TH-4 Deer Park nr St Cloud	-80.94222	28.23694	GW_UFA	SJ
115	TIBET-BUTLER	Tibet-Butler	-81.524	28.454	LK	SJ
116	2266239	Trout	-81.71647	28.45139	LK	SJ
117	713025	USGS 815149233 FLDN	-81.82459444	28.25948611	GW_FAS	SWF
118	25402	USGS P-48 SHALLOW	-81.53076944	27.70745556	GW_SAS	SWF
119	2234600	Wekiwa Springs	-81.45979	28.71222	SP	SJ
120	WHIP-POOR-WILL	Whip-Por-Will	-81.23611	28.38889	LK	SJ

3.0 Exploratory Data Analysis

Data for a total of 120 stations was examined for this analysis, as shown in Figure 1. The following were the objectives of the exploratory data analysis:

- To describe and summarize the data,
- To compile summary statistics for each data set,
- To determine the required level of data aggregation for further analysis,
- To develop locally weighted scatter-plots (LOWESS plots) for each data set, and
- To determine the appropriate LOWESS breakpoints to utilize for further analysis.

A description of the station types for each District is shown in Table 1. There were a total of 6 springs, 5 rainfall stations, 47 lakes, and 62 wells in the CFCA domain.

Table 2 CFCA Station Count

Station Type	Total Number of Stations Provided by SJRWMD	Total Number of Stations Provided by SWFWMD	Total Number of Stations Analyzed
Lake	27	20	47
Well	44	18	62
Spring	6	0	6
Rainfall	3	2	5
Total	80	40	120

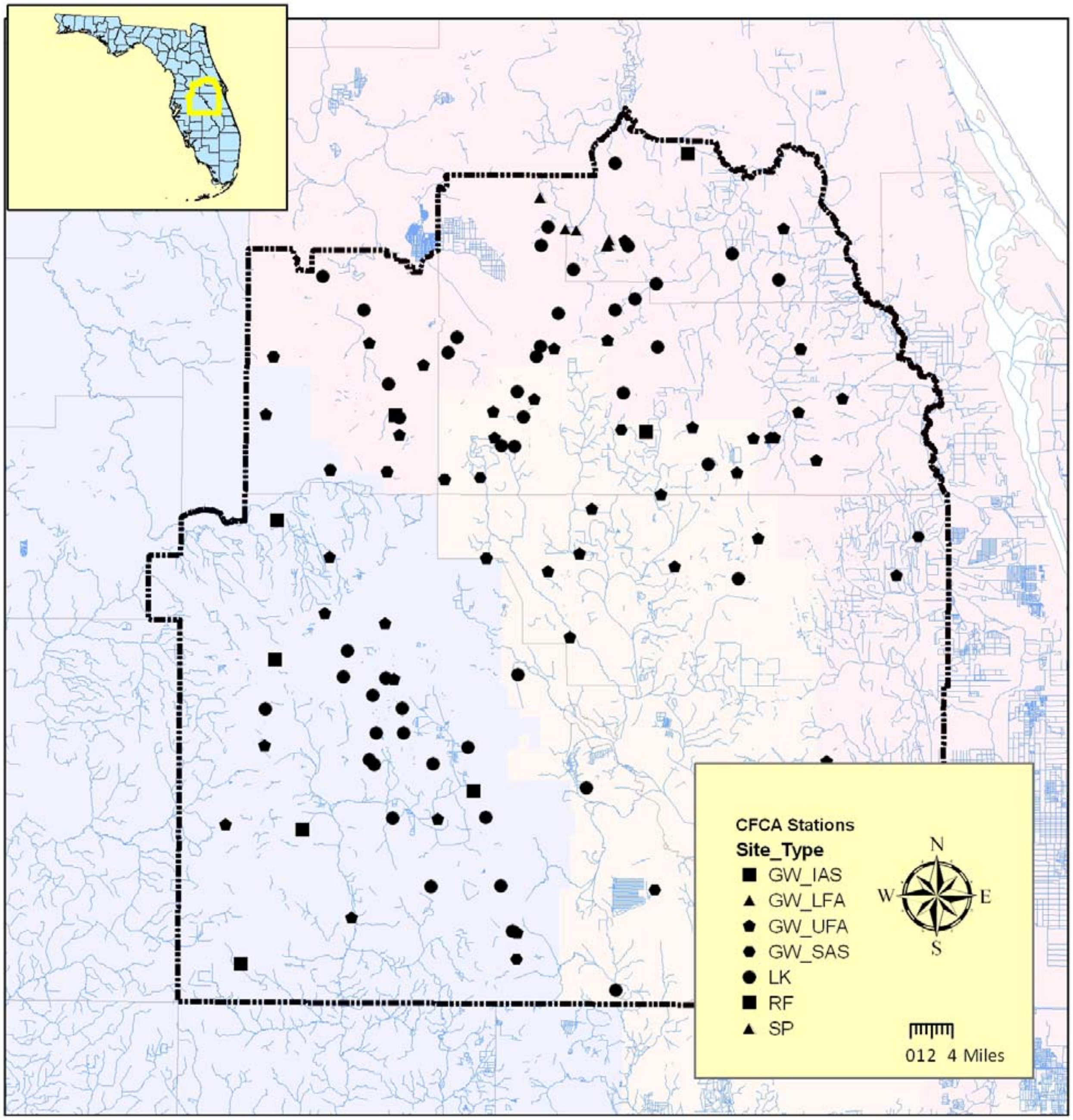


Figure 1 Stations of Study within the Central Florida Coordination Area (CFCA)

3.1 *Descriptive Statistics*

Descriptive statistics were compiled for the 120 stations, as shown in Table 3. Statistics were calculated on the raw data for each station; data was not aggregated prior to calculation of statistics. The percent complete was calculated based on a daily record and calculated as the percentage of days with data divided by the total number of days of record for the station. Figures 2 through 5 show the locations of each station by station type along with the identification number assigned to each station for the trend analysis.

Table 3 CFCA Descriptive Statistics

Trend ID	Site Name	Unit	Min. Value	Max. Value	Avg. Value	Min. Date	Max. Date	Count of Values	Percent Complete
1	Alligator	ft	58.31	66.81	62.90	11/1/1941	5/6/2009	23794	96.50
2	Apopka	ft	62.59	69.09	66.60	9/1/1942	1/5/2009	23743	97.98
3	Apshaw	ft	80.24	92.50	84.79	4/6/1953	12/22/2008	7228	35.52
4	Barton Big	ft	90.93	96.13	93.06	7/1/1959	1/5/2009	485	2.68
5	Bay	ft	92.40	94.94	93.98	1/1/1972	5/6/2009	13430	98.46
6	Bay Lake nr Windermere	ft	77.37	97.88	88.05	3/1/1966	5/11/2009	14739	93.42
7	Bear	ft	100.87	104.68	103.32	10/4/1978	1/28/2009	338	3.05
8	Bithlo 1	ft	28.70	40.89	35.78	1/3/1961	5/11/2009	17151	97.12
9	Bithlo 3	ft	54.08	64.36	60.76	3/26/1969	5/11/2009	939	6.41
10	Boggy Creek Rd nr Taft	ft	39.78	52.59	45.89	1/29/1980	5/11/2009	3128	29.25
11	Butler	ft	94.62	102.06	99.19	1/7/1940	3/30/2009	14845	58.71
12	Catherine	ft	49.15	55.83	53.38	10/5/1978	1/29/2009	313	2.83
13	Charm	ft	39.07	46.20	43.72	10/5/1978	1/29/2009	327	2.95
14	Church	ft	77.96	87.66	84.13	3/13/1970	4/28/2009	1936	13.55
15	Clermont	ft	74.65	86.04	82.43	5/17/1982	5/11/2009	8908	90.38
16	Clermont R	in	0.00	10.98	0.14	1/1/1930	12/31/2008	28855	100.00
17	Cocoa A	ft	29.01	43.59	36.24	3/9/1960	5/11/2009	17673	98.40
18	Cocoa B	ft	20.66	38.95	32.58	7/31/1968	5/11/2009	1069	7.18
19	Cocoa C - Zone 1	ft	25.67	40.33	33.52	2/24/1967	2/2/2009	444	2.90
20	Cocoa C - Zone 5	ft	26.52	42.18	33.47	2/24/1967	2/2/2009	443	2.89
21	Cocoa D	ft	20.66	38.95	32.58	7/31/1968	5/11/2009	1069	7.18
22	Cocoa F	ft	29.99	38.52	34.84	5/12/1970	2/2/2009	410	2.90
23	Cocoa H	ft	29.48	38.85	34.12	8/5/1971	5/17/2008	1094	8.14
24	Cocoa P	ft	34.45	52.93	45.37	3/5/1971	5/12/2009	12132	86.98
25	COLEY DEEP	ft	62.58	93.79	83.38	11/18/1949	11/4/2009	10720	48.95
26	COMBEE ROAD DEEP	ft	129.21	136.91	133.08	1/4/1974	10/26/2009	316	2.42
27	Conway	ft	81.38	89.04	85.52	3/1/1960	1/6/2009	502	2.81
28	CROOKED LAKE NR BABSON PARK (R)	ft	106.1	123.98	115.82	4/29/1945	10/27/2009	4032	17.12
29	Deseret	ft	26.32	33.99	30.36	10/1/1977	10/23/2007	10103	92.02
30	Disney nr Vineland	ft	92.46	99.94	96.75	1/18/1969	5/11/2009	13851	94.08
31	EAGLE LAKE (R)	ft	118.76	131.5	123.50	3/10/1965	10/29/2009	2309	14.16
32	Eva nr Clermont - SAS	ft	105.12	113.82	110.63	1/6/1972	6/22/2009	560	4.09

Table 3, continued

Trend ID	Site Name	Unit	Min. Value	Max. Value	Avg. Value	Min. Date	Max. Date	Count of Values	Percent Complete
33	Eva nr Clermont - UFA	ft	105.06	112.10	109.65	2/10/1966	6/22/2009	617	3.90
34	FORT GREEN SPRINGS INT	ft	25.76	82.38	57.88	8/31/1964	10/3/2008	384	2.38
35	Geneva	ft	14.83	24.18	20.18	5/7/1982	11/11/2009	10038	99.88
36	Horsehead Pond - SAS	ft	113.94	124.48	117.64	1/8/1984	1/29/2009	1346	14.71
37	Horsehead Pond - UFA	ft	111.27	119.24	114.75	1/3/1984	1/31/2009	1446	15.79
38	Horseshoe	ft	58.87	76.64	69.73	9/1/1980	10/2/2008	283	2.76
39	Howell	ft	51.17	56.58	53.10	10/10/1978	11/23/2008	300	2.73
40	Island	ft	78.62	84.17	81.56	10/9/1978	1/30/2009	313	2.83
41	Joe Overstreet nr St Cloud	ft	41.94	50.79	47.37	5/6/1977	3/26/2009	167	1.43
42	Johns	ft	85.52	99.47	92.48	9/7/1959	12/20/2008	4730	26.27
43	Johns Lake	ft	72.73	87.14	80.77	1/3/1984	1/31/2009	576	6.29
44	Killarney	ft	81.11	86.03	82.63	7/1/1959	10/3/2008	497	2.76
45	Lake Adair - LFA	ft	37.96	57.95	47.53	1/8/1976	1/31/2009	539	4.46
46	Lake Adair - UFA	ft	38.37	63.85	48.88	1/4/1978	10/31/2009	2149	18.49
47	LAKE ALFRED (R)	ft	122.4	132.76	127.02	3/30/1961	10/19/2009	4099	23.11
48	LAKE ALFRED DEEP AT LAKE ALFRED	ft	109.13	126.64	120.18	8/1/1945	8/6/2009	5759	24.63
49	LAKE ALFRED DEEP NR LAKE ALFRED	ft	119.85	131.62	127.03	7/1/1959	10/26/2009	16662	90.65
50	LAKE ANNIE (R)	ft	108.36	117.56	111.57	8/21/1970	10/29/2009	1879	13.13
51	LAKE ARBUCKLE	ft	51.15	58.36	53.62	12/1/1941	11/10/2009	24467	98.59
52	LAKE ARIETTA (USGS) (R)	ft	136.5	144.12	140.18	8/6/1970	10/28/2009	8435	58.87
53	LAKE BUFFUM (R)	ft	123.9	133	128.75	4/26/1972	10/27/2009	2118	15.46
54	LAKE CLINCH (R)	ft	100.1	110.21	103.92	1/31/1947	11/3/2009	3648	15.91
55	LAKE GARFIELD (R)	ft	97.38	105.91	101.95	10/1/1969	10/27/2009	1944	13.28
56	LAKE HOWARD (R)	ft	127.67	133.1	130.89	2/13/1946	10/29/2009	16939	72.80
57	Lake Joel nr Ashton	ft	36.30	47.35	43.36	1/1/1976	5/12/2009	11787	96.73
58	LAKE JULIANA (R)	ft	126.2	134.1	130.57	12/1/1961	10/26/2009	7365	42.10
59	Lake Louisa State Park	ft	100.26	111.57	105.51	1/3/1984	1/29/2009	3957	43.21
60	LAKE MARION NR HAINES CITY	ft	64.4	68.45	65.98	2/17/1958	11/10/2009	18481	97.81
61	LAKE MCLEOD (R)	ft	115.11	131.98	121.34	3/13/1965	10/29/2009	2778	17.04
62	Lake Oliver nr Vineland - SAS	ft	106.16	115.37	110.80	1/1/1974	5/11/2009	12003	92.95
63	Lake Oliver nr Vineland - UFA	ft	103.28	112.73	108.53	2/24/1959	5/11/2009	16897	92.14
64	LAKE OTIS (R)	ft	119.58	129.12	124.71	8/4/1954	10/28/2009	14353	71.15
65	LAKE PARKER AT LAKELAND	ft	126.76	132.4	129.96	5/2/1949	10/5/2009	17591	79.70
66	LAKE ROSALIE	ft	50.3	56.08	53.04	12/4/1941	11/10/2009	15656	63.10
67	LAKE RUBY (R)	ft	117.41	125.98	122.11	10/2/1971	10/29/2009	1686	12.12

Table 3, continued

Trend ID	Site Name	Unit	Min. Value	Max. Value	Avg. Value	Min. Date	Max. Date	Count of Values	Percent Complete
68	LAKE SANITARY (MARIANA) (R)	ft	132.08	138.58	136.17	2/26/1946	10/28/2009	2784	11.97
69	Lake Sawyer nr Windermere	ft	70.36	87.98	81.57	5/12/1980	5/11/2009	9327	88.07
70	LAKE SMART (R)	ft	122.43	129.96	127.45	3/1/1946	10/22/2009	6335	27.25
71	LAKE WALES (R)	ft	97.58	111.66	104.40	12/31/1951	10/7/2009	3503	16.60
72	Longwood	ft	30.11	55.80	42.95	10/25/1951	5/11/2009	17959	85.45
73	LOUGHMAN DEEP	ft	85.9	93.23	90.51	8/12/1960	10/26/2009	12769	71.05
74	LOUGHMAN SHALLOW	ft	88.4	95.79	91.36	8/15/1960	10/26/2009	4686	26.08
75	Louisa	ft	87.85	99.64	95.54	3/1/1957	12/20/2008	8930	47.19
76	Maitland	ft	62.47	67.23	66.12	1/1/1961	10/3/2008	490	2.81
77	Mascotte - SAS	ft	94.89	103.51	100.35	1/28/1959	5/11/2009	16858	91.79
78	Mascotte - UFA	ft	93.94	102.66	99.73	1/28/1959	5/11/2009	17132	93.28
79	McCoy	ft	52.43	62.49	59.51	3/1/1967	10/1/2008	333	2.19
80	Mercantile Lane nr Kissimmee	ft	55.90	68.19	62.95	5/7/1977	3/27/2009	168	1.44
81	Miami Springs	cfs	2.90	7.28	5.09	3/28/1972	8/17/2009	141	1.03
82	Moss Park	ft	35.40	45.90	40.91	5/15/1980	9/17/2007	66	0.66
83	MOUNTAIN LAKE NWS	in	0	12.52	0.14	1/1/1935	12/31/2008	27029	100.00
84	Orlando	in	0.00	8.43	0.14	1/1/1930	12/31/2006	28124	100.00
85	Orlo Vista	ft	48.32	80.78	61.49	8/1/1943	4/28/2009	21294	88.68
86	OS U.L.	ft	32.98	58.99	49.20	5/4/1977	9/16/2008	85	0.74
87	P-49 SURF NR FROSTPROOF	ft	98.61	105.45	102.52	4/1/1949	10/26/2009	18361	83.00
88	Palm Lake Dr nr Windermere	ft	57.07	78.55	67.37	1/22/1981	5/11/2009	9102	88.06
89	Palm Springs - Seminole	cfs	2.75	12	6.60	4/18/1972	8/19/2009	159	1.17
90	Prevatt	ft	46.87	59.18	54.82	1/1/1960	12/3/2008	1786	9.99
91	Reedy Creek Overlook	ft	55.06	66.50	61.79	5/7/1977	3/27/2009	173	1.49
92	Rock Springs	cfs	37.10	77.40	57.59	10/11/1968	8/17/2009	278	1.86
93	ROMP 101 nr Bay Lake	ft	92.26	100.61	97.44	7/7/1977	5/31/2009	11160	95.79
94	ROMP 45 AVPK	ft	31.75	84.44	62.95	8/21/1980	11/4/2009	10365	97.17
95	ROMP 59 HTRN	ft	75.24	101.03	85.28	2/2/1977	10/27/2009	5392	45.10
96	ROMP 59 SWNN~AVPK	ft	33.33	85.92	63.42	9/10/1976	10/27/2009	11816	97.65
97	ROMP 60 OCAL~AVPK	ft	25.9	87.07	60.66	2/8/1955	11/4/2009	13926	69.65
98	ROMP 76 OCAL-AVPK	ft	119.37	132.92	127.83	12/18/1966	11/4/2009	12960	82.75
99	ROMP 88 ROCK RIDGE	in	0	11.5	0.14	3/1/1976	11/4/2009	12201	99.19
100	Rose	ft	67.78	87.03	79.29	1/1/1960	10/2/2008	484	2.72
101	Sanford	in	0.00	8.80	0.14	1/1/1930	12/31/2006	28124	100.00
102	Sanlando Springs	cfs	8.99	32.90	19.52	4/18/1972	8/19/2009	160	1.17

Table 3, continued

Trend ID	Site Name	Unit	Min. Value	Max. Value	Avg. Value	Min. Date	Max. Date	Count of Values	Percent Complete
103	SANLON RANCH FLDN	ft	66.38	105.27	89.30	1/10/1970	10/27/2009	13196	90.79
104	Sherwood	ft	54.95	87.91	67.52	5/1/1960	10/1/2008	463	2.62
105	Shingle Creek nr Kissimmee	ft	49.47	63.50	57.32	5/3/1978	3/27/2009	168	1.49
106	South	ft	88.98	94.68	92.76	4/9/1969	5/6/2009	14347	98.02
107	St Cloud Power Plant	ft	37.28	53.4	44.97	5/14/1980	9/17/2008	76	0.73
108	Starbuck Spring	cfs	8.19	18.70	13.77	4/18/1972	8/19/2009	157	1.15
109	STATE ROAD 33~COMBEE ROAD SHALLOW	ft	129.16	136.97	133.88	1/4/1974	10/26/2009	561	4.29
110	STATE ROAD 60 DEEP NR LAKE WALES	ft	85.96	108.36	97.04	9/18/1975	9/18/2008	60	0.50
111	Sylvan	ft	33.99	43.02	39.59	10/13/1978	11/21/2008	281	2.56
112	TAFT_G	ft	92.36	97.69	94.62	6/10/1969	7/9/2004	12629	98.56
113	TH-10 Williams Rd nr Holopaw	ft	38.76	46.48	42.98	3/20/1980	3/26/2009	157	1.48
114	TH-4 Deer Park nr St Cloud	ft	34.55	42.89	39.29	11/5/1979	11/11/2009	2716	24.77
115	Tibet-Butler	ft	94.46	101.79	98.71	1/1/1961	10/8/2008	485	2.78
116	Trout	ft	85.98	98.78	93.00	3/16/1970	3/28/2009	2103	14.75
117	USGS 815149233 FLDN	ft	119.85	127.61	124.16	7/20/1960	5/18/2009	78	0.44
118	USGS P-48 SHALLOW	ft	67.61	104.79	98.71	1/5/1956	10/27/2009	8513	43.31
119	Wekiwa Springs	cfs	29.36	89.85	66.45	10/16/1968	8/20/2009	298	2.00
120	Whip-Por-Will	ft	60.86	66.73	64.76	8/1/1960	1/6/2009	498	2.82

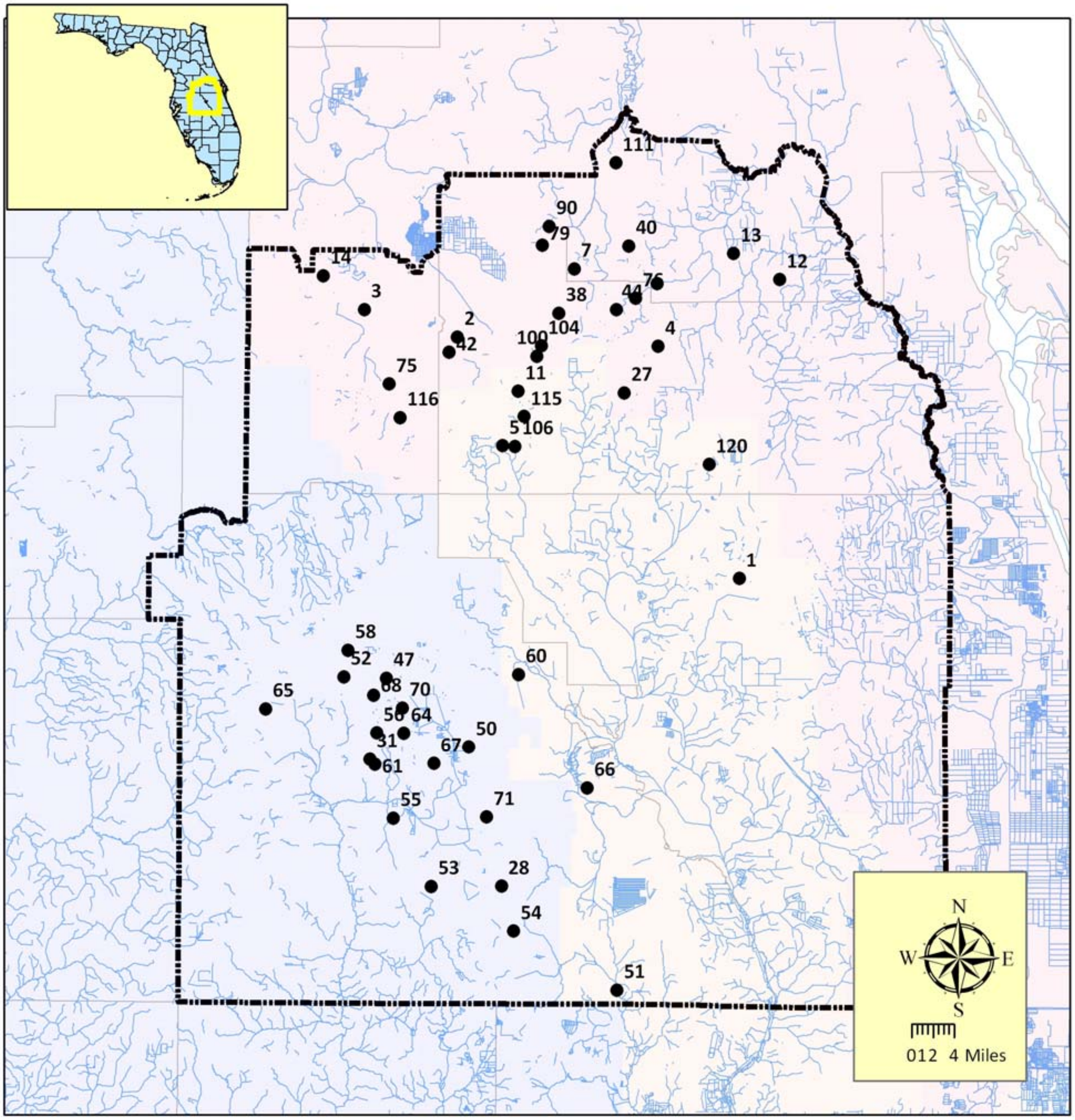


Figure 2 **CFCA Lakes**

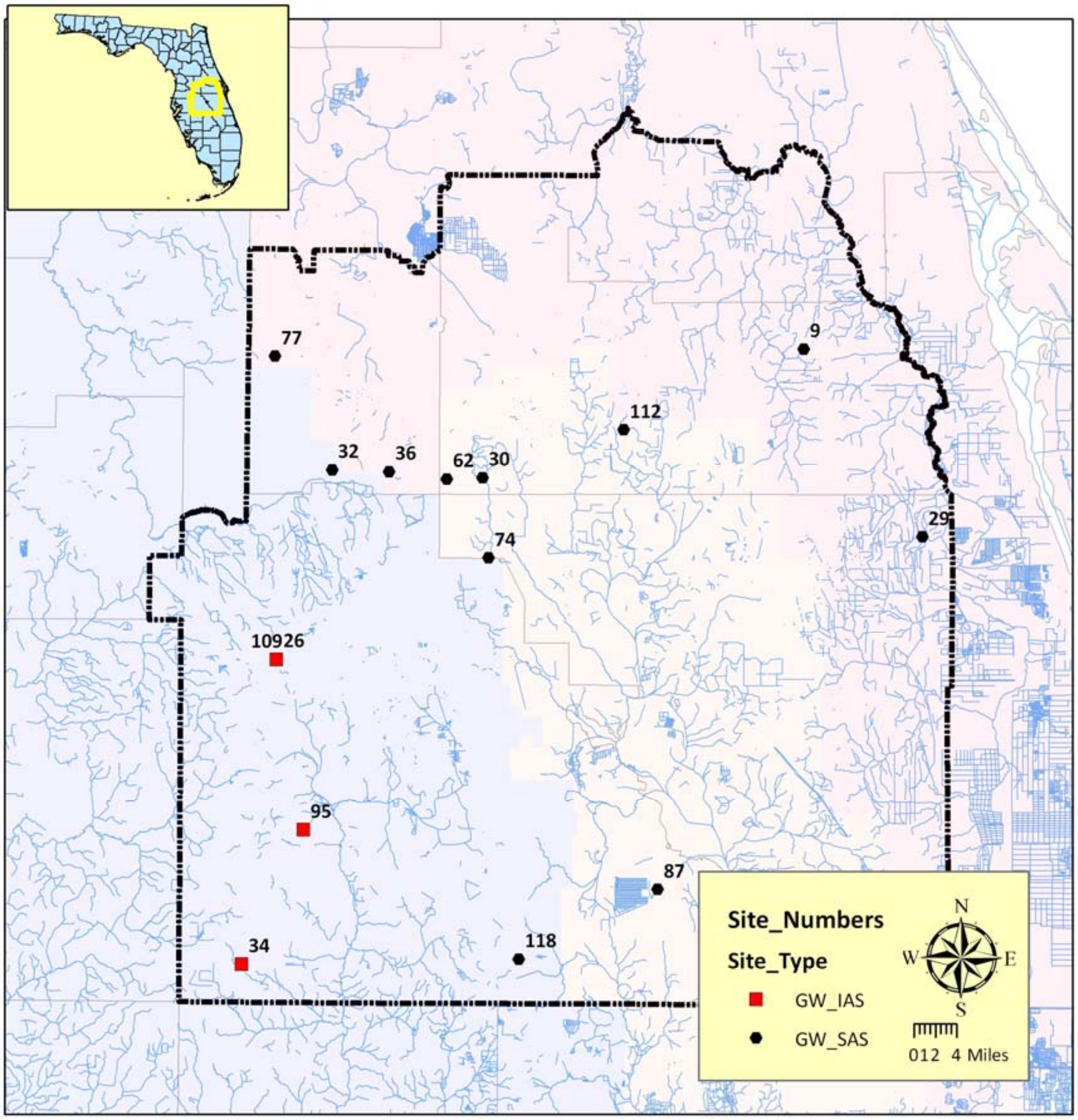


Figure 3 CFCA Surficial and Intermediate Wells

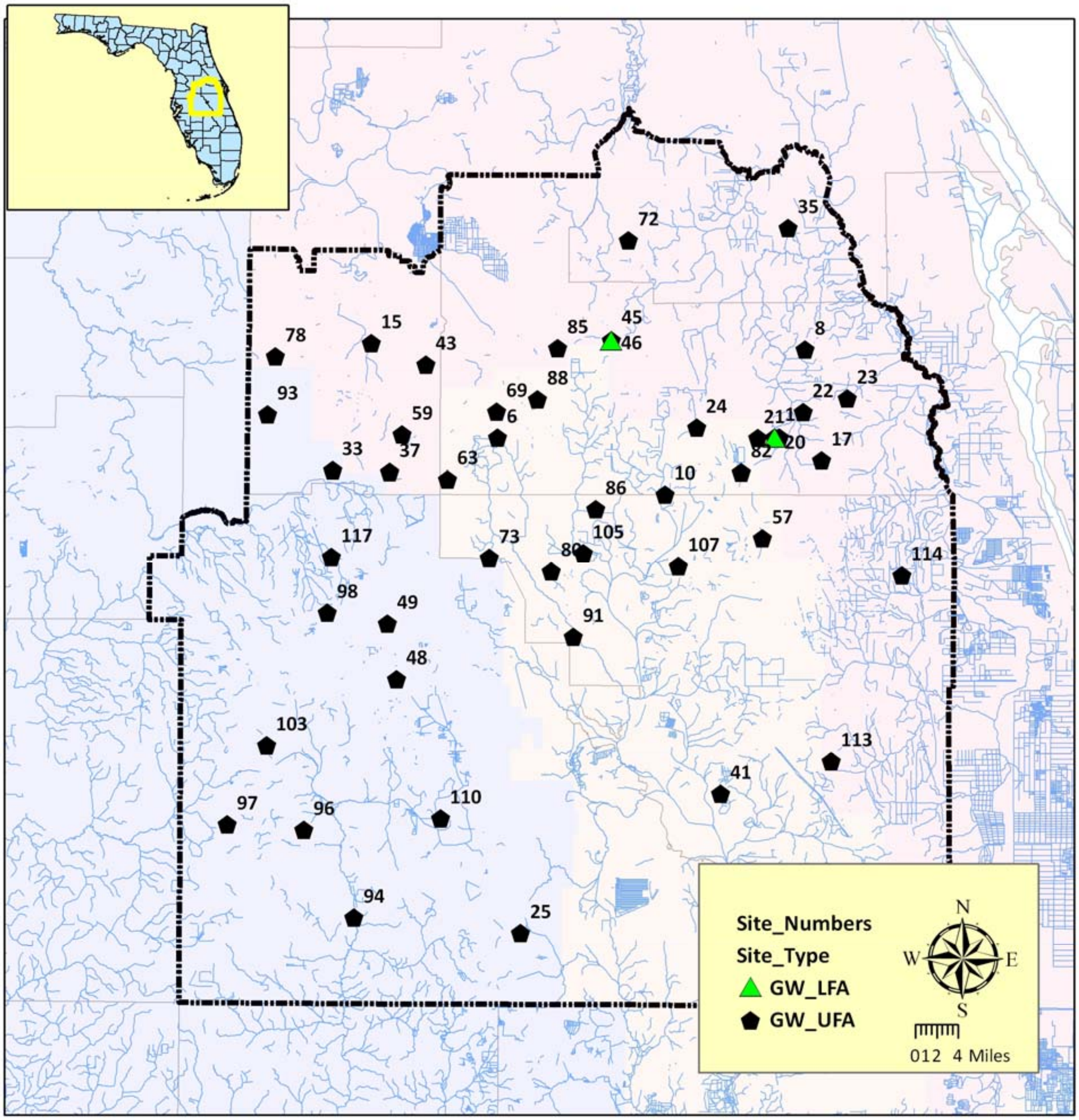


Figure 4 CFCA Upper and Lower Floridan Wells

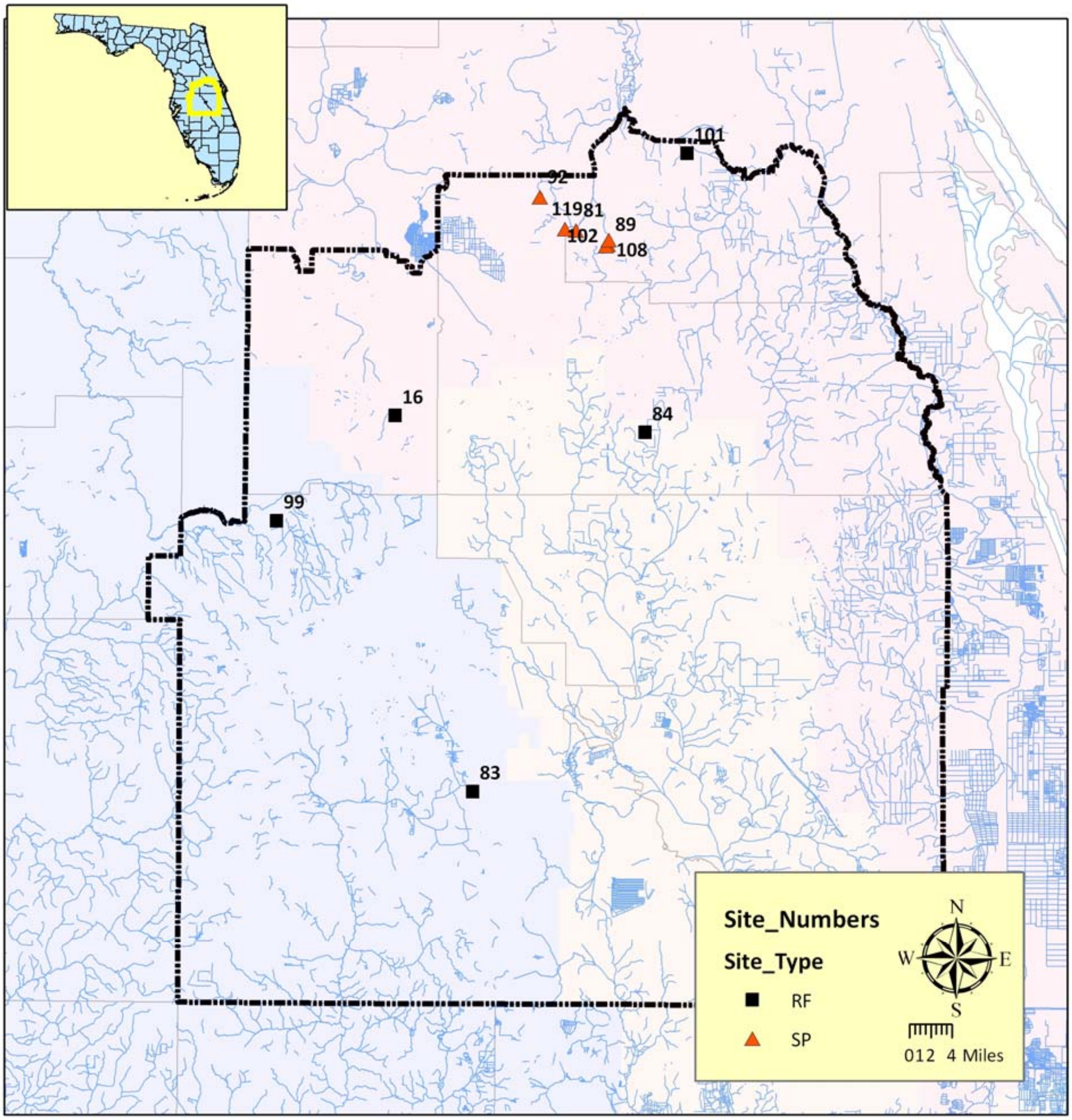


Figure 5 CFCA Spring and Rainfall Stations

3.2 LOWESS

Typically, trend analysis tests are based on the assumption that the trend is a monotonic trend and does not change from an increasing to decreasing trend (or vice verse) over the period of interest. This assumption can be visually tested by examining the time series, and also mathematically verified by plotting a LOWESS plot. LOWESS, or locally weighted scatter plot smoothing, is an algorithm which can mathematically identify times of change, or break points. The SPLUS script utilized for to develop the LOWESS plots contains several user specified inputs, including the degree of the polynomial and two values of a span parameter. A value of 1 is recommended for the degree (hence, a first order polynomial). While higher order polynomials may give a better fit, they may not result in the better identification of break points (Aly and Biggs, 2007). The span parameter is a number between 0 and 1 which indicates the percent of the data around the current data point that will be utilized for smoothing. A span value of 0.6, for example, results in a regression window that is adjusted to include 60% of the data. As the span is increased, the LOWESS fitted line becomes smoother and smoother. A small span will result in more break points, but will tend to overfit the data.

Running LOWESS is purely exploratory and is not a hypothesis test, but rather a means to determine the breakpoints to be used for further hypothesis testing. Since the script allows the user to input two values for the span, 0.3 and 0.6 were utilized as inputs. The LOWESS results were combined with visual inspection to choose the break points for further analysis. For each station, breakpoints which did not appear visually significant were eliminated. Additionally, break points were chosen based on the length of the trends. Since the focus of this study was on long-term trends, the break points selected for further analysis were generally at least 5 years apart. The LOWESS plots for each of the 120 stations can be found in Appendix I. The break points and the trend types identified for each station are shown in Table 4. Trends were generally grouped into 4 categories: monotonic (M), piecewise (P), monotonic with slope change (MS) and double piecewise (2P). Examples of each type of trend are shown in Figure 6.

Table 4 Trend Types and Break Dates (Grouped by Trend Type)

Trend Analysis ID	Station Name	Trend Type	Break Date 1	Break Date 2
7	Bear	2P	6/1/1991	5/1/1999
13	Charm	2P	6/1/1989	6/1/1999
32	Eva nr Clermont - SAS	2P	6/1/1988	1/1/1999
35	Geneva	2P	1/1/1993	6/1/2002
38	Horseshoe	2P	6/1/1988	7/1/2001
40	Island	2P	1/1/1993	1/1/1999
43	Johns Lake	2P	1/1/1994	6/1/2000
49	LAKE ALFRED DEEP NR LAKE ALFRED	2P	1/1/1977	6/1/1991
50	LAKE ANNIE (R)	2P	6/1/1988	6/1/2000
53	LAKE BUFFUM (R)	2P	1/1/1990	6/1/2000
56	LAKE HOWARD (R)	2P	6/1/1976	1/1/1990

Table 4, continued

Trend Analysis ID	Station Name	Trend Type	Break Date 1	Break Date 2
58	LAKE JULIANA (R)	2P	1/1/1976	6/1/1996
59	Lake Louisa State Park	2P	6/1/1992	6/1/2001
63	Lake Oliver nr Vineland - UFA	2P	6/1/1977	6/1/1990
68	LAKE SANITARY (MARIANA) (R)	2P	6/1/1965	3/1/1994
70	LAKE SMART (R)	2P	6/1/1973	6/1/1990
83	MOUNTAIN LAKE NWS	2P	1/1/1952	1/1/1979
84	Orlando	2P	1/1/1953	6/1/1981
108	Starbuck Spring	2P	8/1/1987	1/1/1997
116	Trout	2P	1/1/1981	6/1/1992
3	Apshaw	M		
5	Bay	M		
6	Bay Lake nr Windermere	M		
12	Catherine	M		
14	Church	M		
15	Clermont	M		
19	Cocoa C - Zone 1	M		
22	Cocoa F	M		
23	Cocoa H	M		
24	Cocoa P	M		
33	Eva nr Clermont - UFA	M		
36	Horsehead Pond - SAS	M		
45	Lake Adair - LFA	M		
46	Lake Adair - UFA	M		
51	LAKE ARBUCKLE	M		
60	LAKE MARION NR HAINES CITY	M		
67	LAKE RUBY (R)	M		
69	Lake Sawyer nr Windermere	M		
74	LOUGHMAN SHALLOW	M		
75	Louisa	M		
76	Maitland	M		
79	McCoy	M		
80	Mercantile Lane nr Kissimmee	M		
81	Miami Springs	M		
82	Moss Park	M		
85	OS U.L	M		
87	P-49 SURF NR FROSTPROOF	M		
91	Reedy Creek Overlook	M		
92	Rock Springs	M		
94	ROMP 45 AVPK	M		
96	ROMP 59 SWNN~AVPK	M		
102	Sanlando Springs	M		
103	SANLON RANCH FLDN	M		
105	Shingle Creek nr Kissimmee	M		
106	South	M		
107	St. Cloud Power Plant	M		

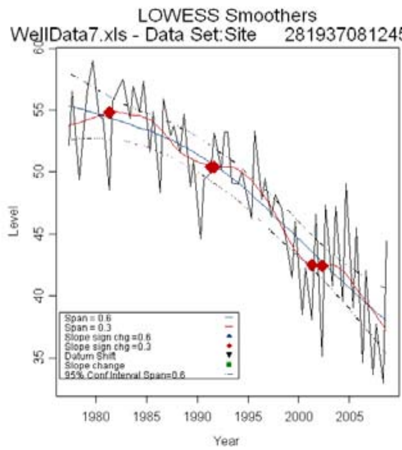
Table 4, continued

Trend Analysis ID	Station Name	Trend Type	Break Date 1	Break Date 2
114	TH-4 Deer Park nr St Cloud	M		
2	Apopka	MS	1/1/1985	
8	Bithlo 1	MS	1/1/1979	
9	Bithlo 3	MS	6/1/1978	
10	Boggy Creek Rd nr Taft	MS	6/1/1993	
17	Cocoa A	MS	1/1/1985	
39	Howell	MS	10/1/1999	
41	Joe Overstreet nr St Cloud	MS	6/1/1993	
47	LAKE ALFRED (R)	MS	6/1/1997	
57	Lake Joel nr Ashton	MS	1/1/1993	
72	Longwood	MS	6/1/1988	
73	LOUGHMAN DEEP	MS	6/1/1983	
85	Orlo Vista	MS	6/1/1985	
89	Palm Springs - Seminole	MS	1/1/1997	
95	ROMP 59 HTRN	MS	1/1/2001	
109	STATE ROAD 33~COMBEE ROAD SHALLOW	MS	1/1/1982	
110	STATE ROAD 60 DEEP NR LAKE WALES	MS	5/1/1987	
117	USGS 815149233 FLDN	MS	9/1/1991	
118	USGS P-48 SHALLOW	MS	1/1/1988	
119	Wekiwa Springs	MS	7/1/1984	
120	Whip-Por-Will	MS	1/1/1993	
1	Alligator	P	1/1/1971	
4	Barton Big	P	1/1/1989	
11	Butler	P	6/1/1979	
15	Clermont	P	1/1/1999	
18	Cocoa B	P	6/1/1982	
20	Cocoa C - Zone 5	P	6/1/1989	
21	Cocoa D	P	1/1/1995	
25	COLEY DEEP	P	1/1/1990	
26	COMBEE ROAD DEEP	P	1/1/1983	
27	Conway	P	6/1/1984	
28	CROOKED LAKE NR BABSON PARK (R)	P	6/1/1986	
29	Deseret	P	6/1/1998	
30	Disney nr Vineland	P	1/1/1984	
31	EAGLE LAKE (R)	P	6/1/1976	
34	FORT GREEN SPRINGS INT	P	1/1/1977	
37	Horsehead Pond - UFA	P	1/1/1993	
42	Johns	P	6/1/1981	
44	Killarney	P	6/1/1988	
48	LAKE ALFRED DEEP AT LAKE ALFRED	P	6/1/1997	
52	LAKE ARIETTA (USGS) (R)	P	1/1/1997	
54	LAKE CLINCH (R)	P	1/1/1988	
55	LAKE GARFIELD (R)	P	1/1/1990	
61	LAKE MCLEOD (R)	P	6/1/1976	

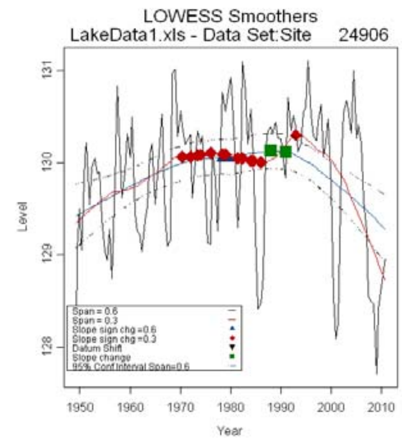
Table 4, continued

Trend Analysis ID	Station Name	Trend Type	Break Date 1	Break Date 2
62	Lake Oliver nr Vineland - SAS	P	1/1/1991	
64	LAKE OTIS (R)	P	6/1/1980	
65	LAKE PARKER AT LAKELAND	P	1/1/1991	
66	LAKE ROSALIE	P	1/1/1993	
71	LAKE WALES (R)	P	1/1/1987	
77	Mascotte - SAS	P	6/1/1986	
78	Mascotte - UFA	P	1/1/1986	
88	Palm Lake Dr nr Windermere	P	6/1/1990	
90	Prevatt	P	6/1/1979	
93	ROMP 101 nr Bay Lake	P	6/1/1986	
97	ROMP 60 OCAL~AVPK	P	6/1/1975	
98	ROMP 76 OCAL-AVPK	P	6/1/1995	
99	ROMP 88 ROCK RIDGE	P	1/1/1998	
100	Rose	P	1/1/1980	
101	Sanford	P	6/1/1975	
104	Sherwood	P	6/1/1985	
111	Sylvan	P	7/1/1989	
112	TAFT_G	P	1/1/1983	
113	TH-10 Williams Rd nr Holopaw	P	6/1/1994	
115	Tibet-Butler	P	7/1/1981	

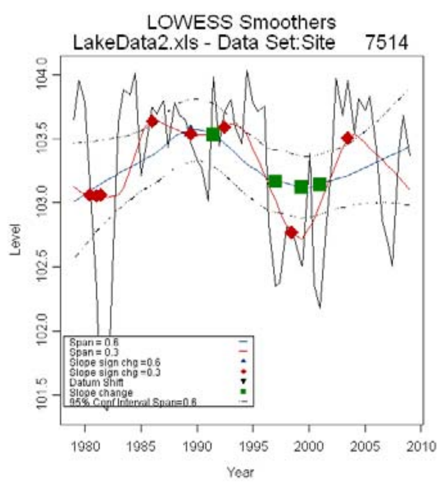
(a) Monotonic Trend (M): SJWRWM OS U.L. Well



(b) Piecewise Trend (P): SWFWMD Lake Parker at Lakeland



(c) Double Piecewise Trend (2P): SJRWMD Bear Lake



(d) Monotonic Trend with Slope Change (MS): SWFWMD Loughman Deep Well

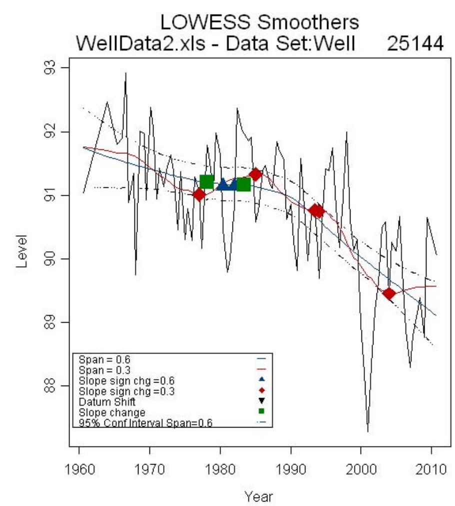


Figure 6 LOWESS Examples

4.0 Trend Analysis

While understanding the forces controlling hydrologic processes is important, there are uncertain factors which affect the ability to explain those processes. These factors include the inherent randomness of the driving process (usually precipitation), sampling error, and lack of available data (Maidment 1993). Since the data available to hydrologists is typically sporadic and infrequent, the use of small samples can have limited accuracy. Generally, the accuracy of the dataset grows as the number of samples increases. While proper understanding of the hydrologic process is vital, it is also important to be able to address the statistical accuracy associated with the available data in order to increase confidence in the data. Statistical analysis, specifically trend analysis, of hydrologic data can assist hydrologists understand the data set of interest by determining the likelihood that a trend in the data set exists within a specified confidence interval.

The general procedure for hypothesis testing is as follows:

1. Choose statistical test,
2. Setup null and alternative hypotheses,
3. Select the appropriate significance level and critical p-value (α),
4. Compute the test statistic and the p-value,
5. Determine test conclusion:
   - if $p < \alpha$: Reject Ho
   - otherwise: Fail to reject Ho

Analysis of the CFCA data focused on examining trends both annually and seasonally. The following four (4) trend analysis scripts were run when applicable to each data set:

- Trend_single_period.ssc
- Trend_seasonal_single_period.ssc
- Trend_piecewise.ssc
- Trend_seasonal_piecewise.ssc.

The first two scripts were run on all available stations, while the remaining two scripts were run on non-monotonic stations with a single break point. All data was interpreted using an 80% confidence level. For all scripts, the null hypothesis was that there was no trend in the data. Two-tailed p-values were calculated for each analysis. A p-value of less than 0.1 (the 2-tailed critical p-value, α, for an 80% confidence level) for any given hypothesis test resulted in a rejection of the null hypothesis and a conclusion that there was a trend in the data at an 80% confidence level. For stations with 2 break points (identified as 2P), the trend single period script was run multiple times: once over the entire period of record and 3 additional times for each time segment bounded by the breakpoints, as shown in Table 5 below.

Table 5 2P Station Trend Analysis Dates

Trend Single Period Script Run Number	Start Date	End Date
1	beginning of record	end of record
2	beginning of record	break point 1
3	break point 1	break point 2
4	break point 2	end of record

An 80 percent confidence level is an appropriate level for this initial analysis because it is stringent, resulting in confidence in the likelihood of a particular station towards exhibiting a trend, yet the critical p-value of 0.10 is relaxed enough to allow more rejections of the null hypothesis, resulting in a conservative approach that identifies stations with probable trends. The selection of a confidence level is purely at the discretion of the user, but should be based on several factors, such as screening level and intended application of the identified trends.

For all datasets in the trend analysis, the trend analysis scripts were run on the entire data record. Thus, the trend analysis period is different for each station (in accordance with the beginning and ending dates shown in Table 3). During the cluster analysis portion of this project, the trend single period script was run on the data for the period of the cluster analysis; the results of those tests are described in Section 6 of this report.

4.0.1 Trend Analysis Hierarchy

For each station, several trend analysis scripts were run in order to determine the presence of statistical trends. When many scripts are run, it is important for the user to understand the order in which the test results should be interpreted and whether or not a particular test result is valid for a particular station. The user should consult Tables 6 through 8 in order to determine which test results to utilize for a given station based on the station classification as monotonic (M), piecewise (P), monotonic with slope change (MS), or double piecewise (2P). For example, if the station selected is classified as a piecewise station with a trend present in the trend single period results, according to row 1 of Table 7, the trend single period and trend seasonal single period test results should be utilized for this station, and the trend piecewise and trend seasonal piecewise results can also be examined to see if there is a higher likelihood of a trend in a segment (a lower p-value) or if the trend is more drastic (an increased Sen slope when compared to the single period results).

Table 6 Monotonic (M) Test Interpretation

Condition	Trend Single Period	Trend Seasonal Single Period	Trend Piecewise	Trend Seasonal Piecewise
Statistical trend present in Trend Single Period	Utilize test results	Utilize test results	N/A	N/A
Trend and Correlations present in Trend Single Period	Utilize test results	Utilize test results	N/A	N/A
No Trend Present in Trend Single Period	Utilize test results	No need for this test to be run, but results can be examined	N/A	N/A

Table 7 Piecewise (P) and Monotonic Slope Change (MS) Test Interpretation

Condition	Trend Single Period	Trend Seasonal Single Period	Trend Piecewise	Trend Seasonal Piecewise
Statistical trend present in Trend Single Period	Utilize test results	Utilize test results	Results can be examined to see if there is a higher likelihood of a trend in a segment	Results can be examined to see if there is a higher likelihood of a trend in a segment
Trend and Correlations present in Trend Single Period	Utilize test results	Utilize test results	Results can be examined to see if there is a higher likelihood of a trend in a segment	Results can be examined to see if there is a higher likelihood of a trend in a segment
No Trend Present in Trend Single Period, Trend Present in Trend Piecewise	Test was run, but piecewise results should be examined	Test was run, but piecewise results should be examined	Utilize test results	Utilize test results
No Trend Present in Trend Single Period, No Trend Present in Trend Piecewise	All tests indicate no trend- utilize all results			

Table 8 Double Piecewise (2P) Test Interpretation

Condition	Trend Single Period	Trend Seasonal Single Period	Trend Single Period Segments
Statistical trend present in Trend Single Period	Utilize test results	Utilize test results	Results can be examined to see if there is a higher likelihood of a trend in a segment
Trend and Correlations present in Trend Single Period	Utilize test results	Utilize test results	Results can be examined to see if there is a higher likelihood of a trend in a segment
No Trend Present in Trend Single Period, Trend Present in a segment	Test was run, but segment results should be utilized	Test was run, but segment results should be utilized	Utilize test results

4.1 Trend Single Period

The trend single period script detects the likelihood of a trend over a single period of time by calculating both the linear regression and the Mann Kendall regression of the time series. The linear regression model is a parametric test, and as such, should be applied when the data has normally distributed residuals. Examination of residuals for each time series reveals that, in general, the hydrologic data utilized for this study are not characterized by normally distributed residuals. Therefore, all results discussed henceforth are Mann Kendall results. The Mann Kendall test is a non-parametric test and is suitable for the hydrologic data in this study. Non-parametric tests do not require the data to be of a particular distribution (such as a normal distribution). A confidence level of 80 percent was selected for this test.

The trend single period script was run for each of the 120 stations using a yearly aggregation interval. Of the 120 stations tested, 15 of the stations exhibited a likelihood towards an increasing trend (Tables 9 and 10). The MK Sen slopes are also shown in the table. The Sen slope is the slope of the trend line. An increasing trend is indicated by a positive slope and a decreasing trend is indicated by a negative slope. Units for the Sen slope are in station measurement units per year; the Sen slope units for lakes and wells are feet per year, spring units are cubic feet per second per year, and rainfall units are inches per year.

As shown in the Figure 7, a high percentage of the stations exhibiting increasing trends are located in the SWFWMD domain. Historically, withdrawals associated with phosphate mining have been located in the southwestern portion of Polk County. Since the 1970s, the phosphate industry has reduced their dependence on groundwater withdrawals through conservation, which is likely the reason for the increasing trends seen in this area.

Table 9 Trend Single Period: Increasing Trends

Site Type	Number of Stations
GW_IAS	2
GW_UFA	5
LK	7
SP	1

Table 10 Trend Single Period: Increasing Trend Stations

Trend Analysis ID	Site Name	Site Type	MK p-value	MK Sen slope	MK tau
18	Cocoa B	GW_UFA	0.0072	0.0809	0.289
31	EAGLE LAKE (R)	LK	1.56E-07	0.1884	0.571
34	FORT GREEN SPRINGS INT	GW_IAS	0.00598	0.2638	0.285
44	Killarney	LK	0.01452	0.0076	0.245
47	LAKE ALFRED (R)	LK	0.00481	0.0893	0.307
50	LAKE ANNIE (R)	LK	0.00712	0.079	0.297
61	LAKE MCLEOD (R)	LK	1.87E-09	0.2845	0.654
67	LAKE RUBY (R)	LK	0.00018	0.0923	0.42
81	Miami Springs	SP	0.00018	0.042	0.425
94	ROMP 45 AVPK	GW_UFA	0.02038	0.3844	0.301
95	ROMP 59 HTRN	GW_IAS	0.01632	0.2415	0.295
96	ROMP 59 SWNN~AVPK	GW_UFA	0.00376	0.4216	0.356
103	SANLON RANCH FLDN	GW_UFA	0.00018	0.2992	0.413
110	STATE ROAD 60 DEEP NR LAKE WALES	GW_UFA	0.04233	0.1778	0.316
120	Whip-Por-Will	LK	0.0196	0.0109	0.229

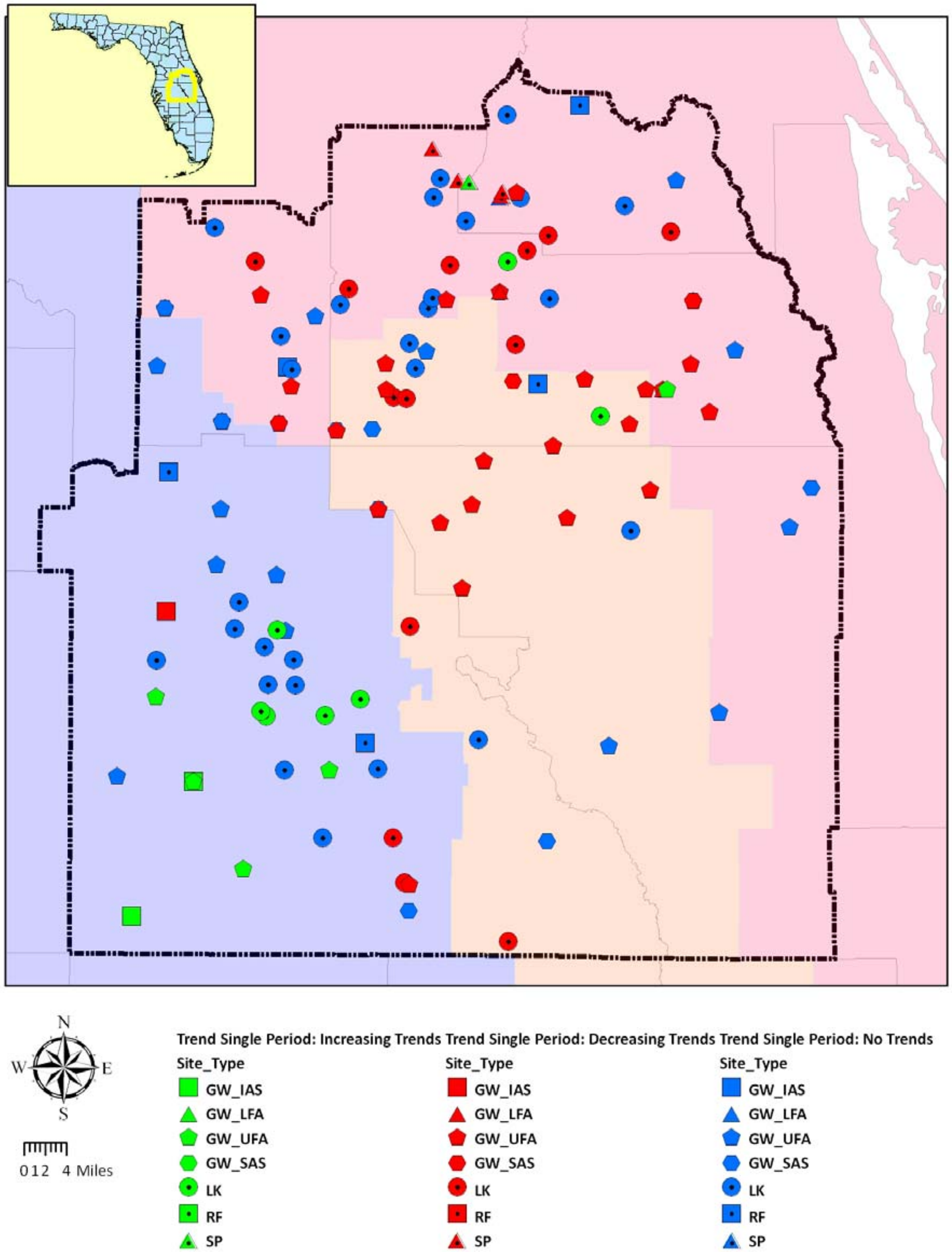


Figure 7 Trend Single Period Results

A total of forty-eight (48) of the 120 stations exhibited statistically significant decreasing trends over the entire period of record. Of the 48 stations with decreasing trends, twenty three (24) were Upper Floridan wells. Table 11 shows a breakdown of the stations by station type. The detailed results from each test are shown in Table 12. As shown in the tables, several stations exhibit trends which have large magnitudes over the period of record. These include Cocoa C-Zone 1, Horsehead Pond, Longwood, Bay Lake well, and Shingle Creek wells.

Table 11 Trend Singe Period: Decreasing Trends

Site Type	Number of Stations
GW_IAS	1
GW_LFA	2
GW_SAS	4
GW_UFA	24
LK	13
SP	4

Table 12 Trend Single Period: Decreasing Trend Stations

Trend Analysis ID	Site Name	Site Type	MK p-value	MK Sen slope	MK tau
2	Apopka	LK	0.01747	-0.0095	-0.198
3	Apshaw	LK	0.00368	-0.0545	-0.268
5	Bay	LK	0.00013	-0.017	-0.434
6	Bay Lake nr Windermere	GW_UFA	5.99E-11	-0.1923	-0.685
8	Bithlo 1	GW_UFA	1.72E-06	-0.0762	-0.473
9	Bithlo 3	GW_SAS	8.86E-05	-0.0553	-0.427
10	Boggy Creek Rd nr Taft	GW_UFA	0.00482	-0.1157	-0.366
12	Catherine	LK	0.07713	-0.0205	-0.222
15	Clermont	GW_UFA	0.00534	-0.1644	-0.376
17	Cocoa A	GW_UFA	2.59E-06	-0.0694	-0.46
19	Cocoa C - Zone 1	GW_LFA	1.74E-12	-0.1919	-0.748
20	Cocoa C - Zone 5	GW_UFA	0.0004	-0.0777	-0.375
21	Cocoa D	GW_UFA	0.07633	-0.2263	-0.5
22	Cocoa F	GW_UFA	0.01802	-0.0368	-0.262
24	Cocoa P	GW_UFA	7.99E-07	-0.1489	-0.552
25	COLEY DEEP	GW_UFA	4.83E-08	-0.1964	-0.48
26	COMBEE ROAD DEEP	GW_IAS	0.00218	-0.0413	-0.359
27	Conway	LK	0.01527	-0.0242	-0.238
28	CROOKED LAKE NR BABSON PARK (R)	LK	3.74E-06	-0.1239	-0.393
36	Horsehead Pond - SAS	GW_SAS	3.68E-06	-0.266	-0.649
38	Horseshoe	LK	0.06883	-0.0856	-0.241
39	Howell	LK	0.00531	-0.0294	-0.355
45	Lake Adair - LFA	GW_LFA	0.00249	-0.1151	-0.365
46	Lake Adair - UFA	GW_UFA	0.01195	-0.1213	-0.315
51	LAKE ARBUCKLE	LK	0.00236	-0.014	-0.251
54	LAKE CLINCH (R)	LK	0.04499	-0.0246	-0.174
57	Lake Joel nr Ashton	GW_UFA	0.02823	-0.0541	-0.266

Table 12, continued

Trend Analysis ID	Site Name	Site Type	MK p-value	MK Sen slope	MK tau
59	Lake Louisa State Park	GW_UFA	0.0641	-0.094	-0.262
60	LAKE MARION NR HAINES CITY	LK	0.0168	-0.007	-0.229
63	Lake Oliver nr Vineland - UFA	GW_UFA	0.02498	-0.028	-0.217
69	Lake Sawyer nr Windermere	GW_UFA	0.03849	-0.1139	-0.269
72	Longwood	GW_UFA	4.94E-14	-0.1729	-0.674
73	LOUGHMAN DEEP	GW_FAS	1.55E-06	-0.0492	-0.503
76	Maitland	LK	0.00308	-0.0071	-0.296
80	Mercantile Lane nr Kissimmee	GW_UFA	9.01E-08	-0.1777	-0.655
82	Moss Park	GW_UFA	0.00084	-0.1383	-0.45
85	Orlo Vista	GW_UFA	9.12E-13	-0.2024	-0.597
86	OS U.L.	GW_UFA	2.29E-10	-0.6072	-0.79
89	Palm Springs - Seminole	SP	8.57E-06	-0.0993	-0.505
91	Reedy Creek Overlook	GW_UFA	1.97E-06	-0.1417	-0.583
92	Rock Springs	SP	9.79E-06	-0.302	-0.475
105	Shingle Creek nr Kissimmee	GW_UFA	6.66E-08	-0.2536	-0.673
106	South	LK	0.00481	-0.0344	-0.307
107	St Cloud Power Plant	GW_UFA	0.02436	-0.1273	-0.298
108	Starbuck Spring	SP	0.02071	-0.0635	-0.263
109	STATE ROAD 33~COMBEE ROAD SHALLOW	GW_SAS	0.00028	-0.0557	-0.425
112	TAFT_G	GW_SAS	0.09933	-0.0151	-0.194
119	Wekiwa Springs	SP	0.00134	-0.2527	-0.345

4.1.1 Examination of Serial Correlation

The examination of a time series for correlation in the residuals will find repeating patterns that may have been previously hidden under noise. For a given time series, if Time α is correlated to Time (α +1), and Time (α +1) is correlated to Time (α +2), then Time (α +2) will show autocorrelation to Time α. Examination of the autocorrelation function for this station may show a decaying relationship as the time lag increases. The partial autocorrelation function is useful because it filters out these dependent relationships and shows correlation only for lags where true correlation exists. For each station, the partial autocorrelation function (PACF) of the residuals from the autoregressive model was examined in order to check for correlations at any time lag. Correlation at multiple lags indicates that repeating climatological patterns (such as El Nino/ La Nina) may be present at a particular station. The correlation results are shown in Tables 13 and 14. A value of “X” indicates that there was correlation at a single time lag. A value of “XX” indicates that there was correlation at 2 or more time lags. All 5 rainfall stations exhibited serial correlation at 2 or more time lags. Additionally, 15 lakes, 11 wells, 2 springs exhibited serial correlation at 2 or more time lags. The presence of correlations does not invalidate the trend single period results, but rather indicates long term cycles that a station may be experiencing.

Table 13 Correlations Present: Single Time Lag

Trend Analysis ID	Site Name	Correlations present at a single time lag (years)
4	Barton Big	X
6	Bay Lake nr Windermere	X
7	Bear	X
8	Bithlo 1	X
11	Butler	X
12	Catherine	X
13	Charm	X
14	Church	X
15	Clermont	X
17	Cocoa A	X
18	Cocoa B	X
19	Cocoa C - Zone 1	X
20	Cocoa C - Zone 5	X
25	COLEY DEEP	X
27	Conway	X
29	Deseret	X
31	EAGLE LAKE (R)	X
32	Eva nr Clermont - SAS	X
34	FORT GREEN SPRINGS INT	X
36	Horsehead Pond - SAS	X
37	Horsehead Pond - UFA	X
41	Joe Overstreet nr St Cloud	X
49	LAKE ALFRED DEEP NR LAKE ALFRED	X
50	LAKE ANNIE (R)	X
52	LAKE ARIETTA (USGS) (R)	X
55	LAKE GARFIELD (R)	X
56	LAKE HOWARD (R)	X
58	LAKE JULIANA (R)	X
59	Lake Louisa State Park	X
62	Lake Oliver nr Vineland - SAS	X
64	LAKE OTIS (R)	X
65	LAKE PARKER AT LAKELAND	X
66	LAKE ROSALIE	X
67	LAKE RUBY (R)	X
69	Lake Sawyer nr Windermere	X
73	LOUGHMAN DEEP	X
76	Maitland	X
79	McCoy	X
81	Miami Springs	X
89	Palm Springs - Seminole	X
90	Prevatt	X
95	ROMP 59 HTRN	X
97	ROMP 60 OCAL~AVPK	X
98	ROMP 76 OCAL-AVPK	X
103	SANLON RANCH FLDN	X

Table 13, continued

Trend Analysis ID	Site Name	Correlations present at a single time lag (years)
105	Shingle Creek nr Kissimmee	X
107	St Cloud Power Plant	X
110	STATE ROAD 60 DEEP NR LAKE WALES	X
113	TH-10 Williams Rd nr Holopaw	X
118	USGS P-48 SHALLOW	X
119	Wekiwa Springs	X
120	Whip-Por-Will	X

Table 14 Correlations Present: 2 or More Time Lags

Trend Analysis ID	Site Name	Correlation Present at 2 or more time lags (years)
1	Alligator	XX
2	Apopka	XX
3	Apshaw	XX
9	Bithlo 3	XX
16	Clermont R	XX
22	Cocoa F	XX
24	Cocoa P	XX
28	CROOKED LAKE NR BABSON PARK (R)	XX
33	Eva nr Clermont - UFA	XX
43	Johns Lake	XX
44	Killarney	XX
46	Lake Adair - UFA	XX
51	LAKE ARBUCKLE	XX
53	LAKE BUFFUM (R)	XX
54	LAKE CLINCH (R)	XX
60	LAKE MARION NR HAINES CITY	XX
63	Lake Oliver nr Vineland - UFA	XX
68	LAKE SANITARY (MARIANA) (R)	XX
71	LAKE WALES (R)	XX
72	Longwood	XX
75	Louisa	XX
83	MOUNTAIN LAKE NWS	XX
84	Orlando	XX
85	Orlo Vista	XX
87	P-49 SURF NR FROSTPROOF	XX
96	ROMP 59 SWNN~AVPK	XX
99	ROMP 88 ROCK RIDGE	XX
100	Rose	XX
101	Sanford	XX
102	Sanlando Springs	XX
106	South	XX
108	Starbuck Spring	XX
116	Trout	XX

4.1.2 Trend Single Period: 90% and 95% Confidence Level

Although an 80% confidence level was utilized throughout this project, it was desired to look at the difference in number of stations with statistically significant trends when the confidence level changes from 80% to 90% and 95%. The total station count of stations with statistically significant trends for each confidence level is shown in Table 15. As shown in the table, modifying the confidence level from 80% to 95% results in 1 less station with a statistically significant increasing trend and 8 less stations with statistically significant decreasing trends. These stations are shown in Table 16and Figure 8. As shown in the figure, these stations are spatially variable and not clustered in a particular area.

Table 15 Statistically Significant Trends Based on Confidence Level

Confidence Level	Increasing Trends	Decreasing Trends	Total Trends
80%	15	48	63
90%	15	43	58
95%	14	40	54

Table 16 Statistically Significant Trends at an 80% Confidence Interval

Site Name	Sen Slope	p-value
Catherine	-0.0205	0.0771
Cocoa D	-0.2263	0.0763
Horseshoe	-0.0856	0.0688
LAKE CLINCH (R)	-0.0246	0.0450
Lake Joel nr Ashton	-0.0541	0.0282
Lake Louisa State Park	-0.0940	0.0641
Lake Sawyer nr Windermere	-0.1139	0.0385
STATE ROAD 60 DEEP NR LAKE WALES	0.1778	0.0423
Taft_G	-0.0151	0.0993

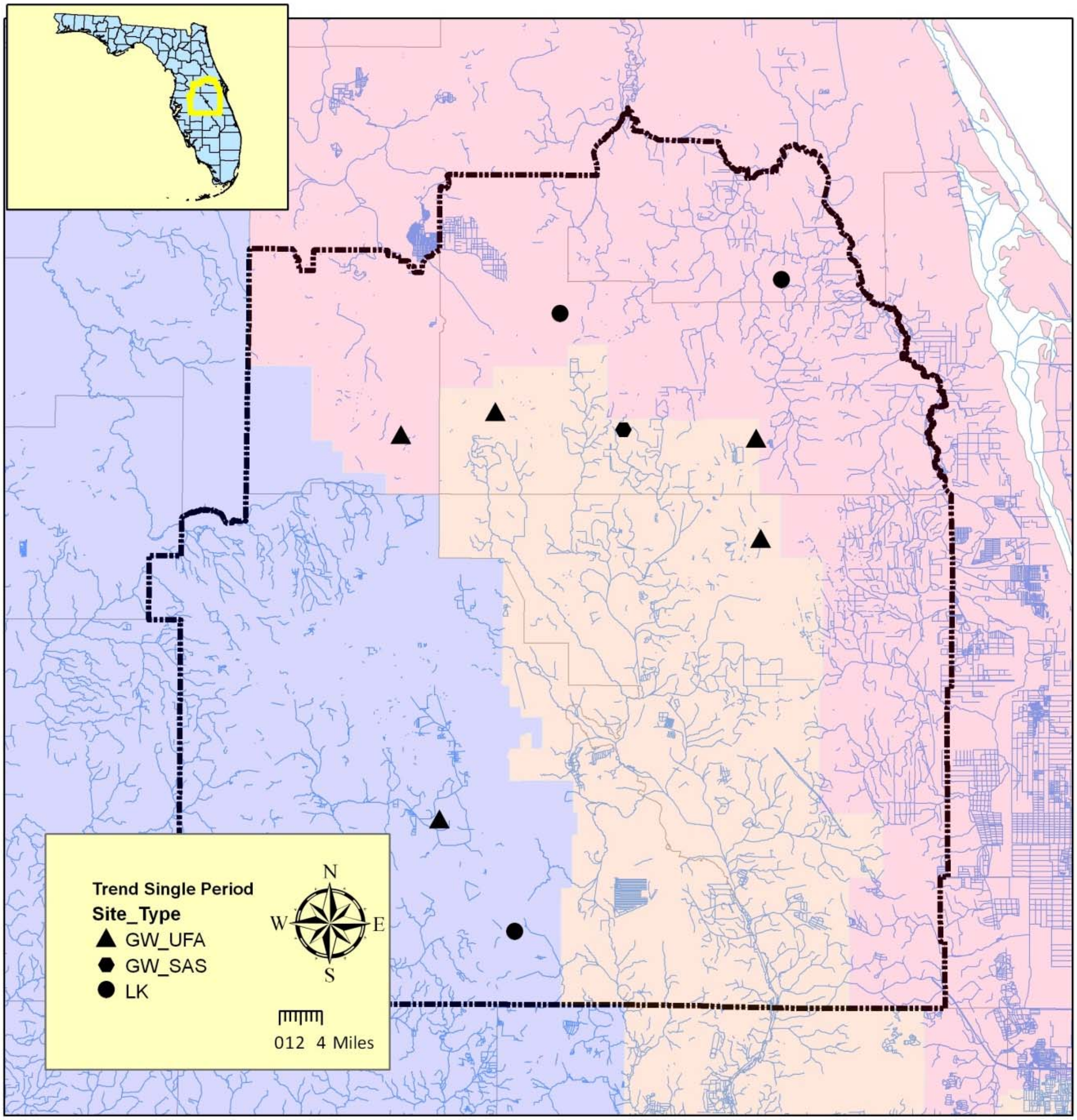


Figure 8 Statistically Significant Trends at an 80% Confidence Interval

4.2 Trend Seasonal Single Period

One of the disadvantages of the Mann Kendall test is that seasonality is not accounted for. After running the Mann Kendall test (in the trend single period script), the trend seasonal single period script was run in order to examine seasonal differences in each station. The trend seasonal single period script was run for the entire period of record for all stations using wet and dry seasons (June through September and October through May, respectively). Using the results of this script, the trends in each season can also be compared to each other. Since the separate calculation of the MK p-value for each season can cause false positive conclusions, this script also implements the Stepwise Bonferroni (Hochberg 1988) technique in order to identify seasons with statistically significant trends. For each station analyzed with this script, the following null hypothesis is tested:

H01: There is no statistically significant trend in any season.

The user specifies the desired critical significance level (alpha) based on the desired confidence interval. For this application, a confidence level of 80 percent was desired. Since the test is two-tailed, this results in a critical alpha of 0.1. The script output includes a value of true or false for the value of the Stepwise Bonferroni correction. A value of true indicates that the trend is significant at the specified alpha level of 0.1. Because the Stepwise Bonferroni correction is utilized to reject or fail to reject the null hypothesis for this test, the Mann Kendall p-values are not shown in the result tables below. The script does not result in a reportable p-value or statistic for the Stepwise Bonferroni correction, but rather a Boolean value of true or false. A value of true indicates that the null can be rejected (and there is a trend), while a value of false indicates that the null cannot be rejected.

Of the 120 stations utilized in this analysis, this script could not be run on four (4) of the stations due to insufficient data. The four stations that could not be analyzed were lakes located in the SJRWMD: Sylvan, Prevatt, McCoy and Sherwood. The seasonal trend analysis script was run on the remaining 116 stations. The dry season results are shown in Figure 9 and Tables 17 through 19. As shown in the figure, there is a cluster of stations located in the SWFWMD which exhibit statistically significant increasing trends at the 80 percent confidence level. Similarly, there is a cluster of stations located within the SJRWMD and the SFWMD which exhibit decreasing trends during the dry months. While a total of 41 stations over the domain exhibit a likelihood of having a decreasing trend over the period of record, only 15 stations exhibit a likelihood of having an increasing trend over the period of record.

Table 17 Dry Season Trend Station Count

Site Type	Number of Stations with Decreasing Trends	Number of Sites with Increasing Trends
GW_LFA	2	0
GW_SAS	3	1
GW_UFA	21	4
GW_IAS	1	2
LK	10	7
SP	4	1
Total	**41**	**15**

Table 18 Dry Season Statistically Significant Decreasing Trends

Trend Analysis ID	Site Name	Site Type	Dry Season (Season 1) Sen Slope
2	Apopka	LK	-0.009
3	Apshaw	LK	-0.054
5	Bay	LK	-0.017
6	Bay Lake nr Windermere	GW_UFA	-0.191
8	Bithlo 1	GW_UFA	-0.069
9	Bithlo 3	GW_SAS	-0.057
15	Clermont	GW_UFA	-0.138
17	Cocoa A	GW_UFA	-0.066
19	Cocoa C - Zone 1	GW_LFA	-0.182
20	Cocoa C - Zone 5	GW_UFA	-0.068
21	Cocoa D	GW_UFA	-0.159
24	Cocoa P	GW_UFA	-0.121
25	COLEY DEEP	GW_UFA	-0.199
26	COMBEE ROAD DEEP	GW_IAS	-0.051
27	Conway	LK	-0.023
28	CROOKED LAKE NR BABSON PARK (R)	LK	-0.111
36	Horsehead Pond - SAS	GW_SAS	-0.248
39	Howell	LK	-0.041
45	Lake Adair - LFA	GW_LFA	-0.119
46	Lake Adair - UFA	GW_UFA	-0.12
51	LAKE ARBUCKLE	LK	-0.011
57	Lake Joel nr Ashton	GW_UFA	-0.042
60	LAKE MARION NR HAINES CITY	LK	-0.008
63	Lake Oliver nr Vineland - UFA	GW_UFA	-0.03
69	Lake Sawyer nr Windermere	GW_UFA	-0.084
72	Longwood	GW_UFA	-0.171
73	LOUGHMAN DEEP	GW_FAS	-0.048
76	Maitland	LK	-0.004
80	Mercantile Lane nr Kissimmee	GW_UFA	-0.165
82	Moss Park	GW_UFA	-0.181
85	Orlo Vista	GW_UFA	-0.201

Table 18, continued

Trend Analysis ID	Site Name	Site Type	Dry Season (Season 1) Sen Slope
86	OS U.L.	GW_UFA	-0.66
89	Palm Springs - Seminole	SP	-0.112
91	Reedy Creek Overlook	GW_UFA	-0.121
92	Rock Springs	SP	-0.266
105	Shingle Creek nr Kissimmee	GW_UFA	-0.219
106	South	LK	-0.029
107	St Cloud Power Plant	GW_UFA	-0.129
108	Starbuck Spring	SP	-0.06
109	STATE ROAD 33~COMBEE ROAD SHALLOW	GW_SAS	-0.071
119	Wekiwa Springs	SP	-0.258

Table 19 Dry Season Statistically Significant Increasing Trends

Trend Analysis ID	Site Name	Site Type	Dry Season (Season 1) Sen Slope
18	Cocoa B	GW_UFA	0.087
31	EAGLE LAKE (R)	LK	0.182
34	FORT GREEN SPRINGS INT	GW_IAS	0.348
44	Killarney	LK	0.008
47	LAKE ALFRED (R)	LK	0.085
50	LAKE ANNIE (R)	LK	0.083
61	LAKE MCLEOD (R)	LK	0.278
67	LAKE RUBY (R)	LK	0.084
81	Miami Springs	SP	0.048
94	ROMP 45 AVPK	GW_FAS	0.393
95	ROMP 59 HTRN	GW_IAS	0.252
96	ROMP 59 SWNN~AVPK	GW_FAS	0.484
103	SANLON RANCH FLDN	GW_FAS	0.317
118	USGS P-48 SHALLOW	GW_SAS	0.026
120	Whip-Por-Will	LK	0.011

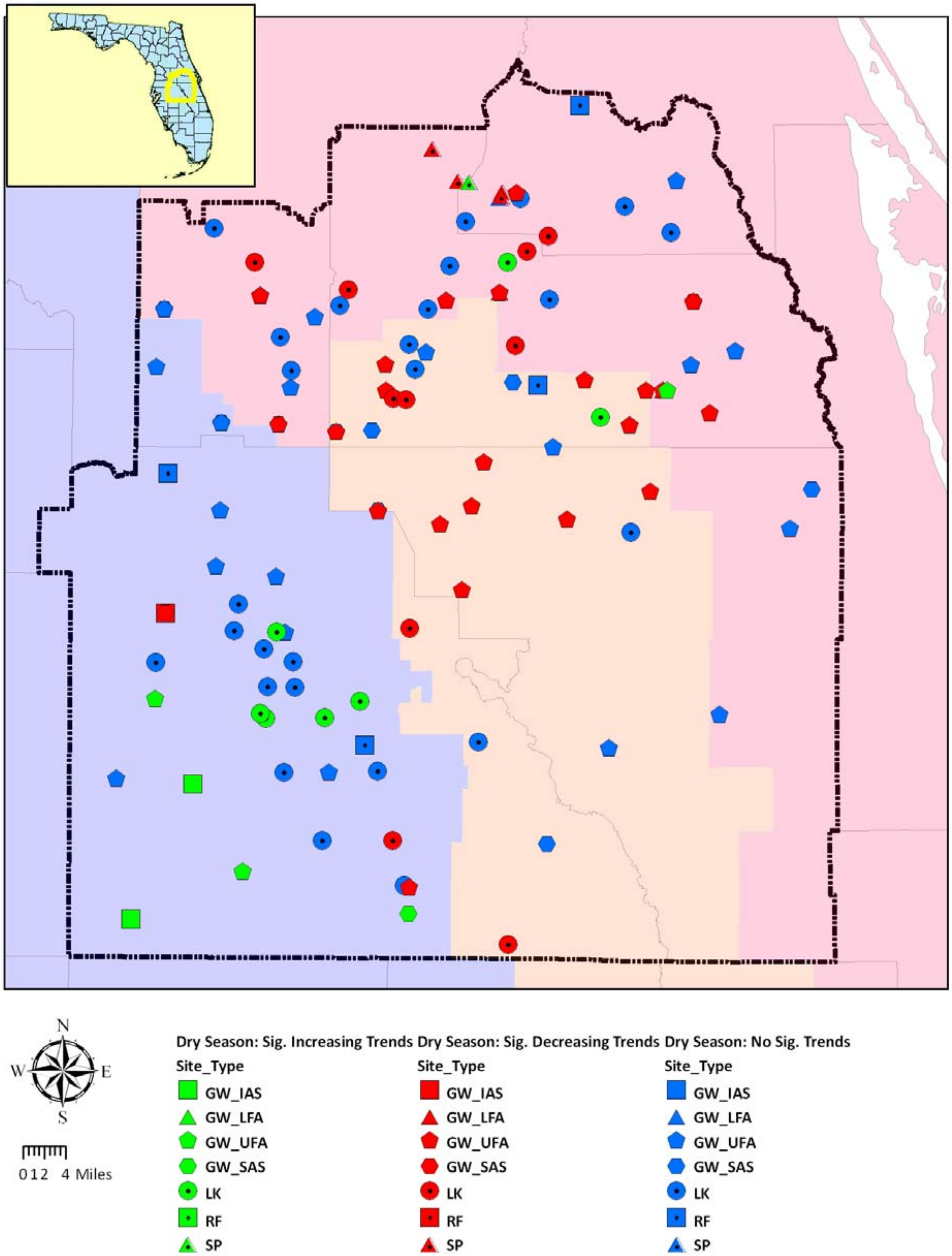


Figure 9 Statistically Significant Trends: Dry Season

The wet season results are shown in Figure 10 and Tables 20 through 22. As shown in the figure, similar to the dry season, there is a cluster of stations located in the SWFWMD which exhibit statistically significant increasing trends at the 80 percent confidence level. Additionally, there is a cluster of stations located within the SJRWMD and the South Florida Water Management District (SFWMD) which exhibit decreasing trends during the wet months. While a total of 44 stations over the domain exhibit a likelihood of having a decreasing trend over the period of record, only 12 stations exhibit a likelihood of having an increasing trend over the period of record.

Table 20 Wet Season Trend Station Count

Site Type	Number of Stations with Decreasing Trends	Number of Sites with Increasing Trends
GW_LFA	2	0
GW_SAS	3	0
GW_UFA	22	4
GW_IAS	1	2
LK	12	6
SP	4	0
RF	0	0
Total	**44**	**12**

Table 21 Wet Season Statistically Significant Decreasing Trends

Trend Analysis ID	Site Name	Site Type	Wet Season (Season 2) Sen Slope
2	Apopka	LK	-0.0085
3	Apshaw	LK	-0.0536
4	Barton Big	LK	-0.0072
5	Bay	LK	-0.0192
6	Bay Lake nr Windermere	GW_UFA	-0.2234
8	Bithlo 1	GW_UFA	-0.0828
9	Bithlo 3	GW_SAS	-0.0410
10	Boggy Creek Rd nr Taft	GW_UFA	-0.1802
15	Clermont	GW_UFA	-0.1574
17	Cocoa A	GW_UFA	-0.0790
19	Cocoa C - Zone 1	GW_LFA	-0.1993
20	Cocoa C - Zone 5	GW_UFA	-0.1015
21	Cocoa D	GW_UFA	-0.1763
24	Cocoa P	GW_UFA	-0.1498
25	COLEY DEEP	GW_UFA	-0.1835
26	COMBEE ROAD DEEP	GW_IAS	-0.0571
27	Conway	LK	-0.0314

Table 21, continued

Trend Analysis ID	Site Name	Site Type	Wet Season (Season 2) Sen Slope
28	CROOKED LAKE NR BABSON PARK (R)	LK	-0.1210
33	Eva nr Clermont - UFA	GW_UFA	-0.0271
36	Horsehead Pond - SAS	GW_SAS	-0.2628
39	Howell	LK	-0.0177
45	Lake Adair - LFA	GW_LFA	-0.1040
51	LAKE ARBUCKLE	LK	-0.0151
54	LAKE CLINCH (R)	LK	-0.0291
57	Lake Joel nr Ashton	GW_UFA	-0.0579
60	LAKE MARION NR HAINES CITY	LK	-0.0084
63	Lake Oliver nr Vineland - UFA	GW_UFA	-0.0273
69	Lake Sawyer nr Windermere	GW_UFA	-0.1115
72	Longwood	GW_UFA	-0.1809
73	LOUGHMAN DEEP	GW_UFA	-0.0491
76	Maitland	LK	-0.0081
80	Mercantile Lane nr Kissimmee	GW_UFA	-0.1907
82	Moss Park	GW_UFA	-0.1309
85	Orlo Vista	GW_UFA	-0.2029
86	OS U.L.	GW_UFA	-0.5125
89	Palm Springs - Seminole	SP	-0.1100
91	Reedy Creek Overlook	GW_UFA	-0.1524
92	Rock Springs	SP	-0.3261
105	Shingle Creek nr Kissimmee	GW_UFA	-0.2563
106	South	LK	-0.0386
107	St Cloud Power Plant	GW_UFA	-0.1196
108	Starbuck Spring	SP	-0.0679
109	STATE ROAD 33~COMBEE ROAD SHALLOW	GW_SAS	-0.0555
119	Wekiwa Springs	SP	-0.2295

Table 22 Wet Season Statistically Significant Increasing Trends

Trend Analysis ID	Site Name	Site Type	Wet Season (Season 2) Sen Slope
120	Whip-Por-Will	LK	0.0107
18	Cocoa B	GW_UFA	0.0743
50	LAKE ANNIE (R)	LK	0.0787
67	LAKE RUBY (R)	LK	0.0964
47	LAKE ALFRED (R)	LK	0.0980
31	EAGLE LAKE (R)	LK	0.1880
95	ROMP 59 HTRN	GW_IAS	0.1903
34	FORT GREEN SPRINGS INT	GW_IAS	0.2142
103	SANLON RANCH FLDN	GW_UFA	0.2585
61	LAKE MCLEOD (R)	LK	0.2925
94	ROMP 45 AVPK	GW_UFA	0.3259
96	ROMP 59 SWNN~AVPK	GW_UFA	0.3948

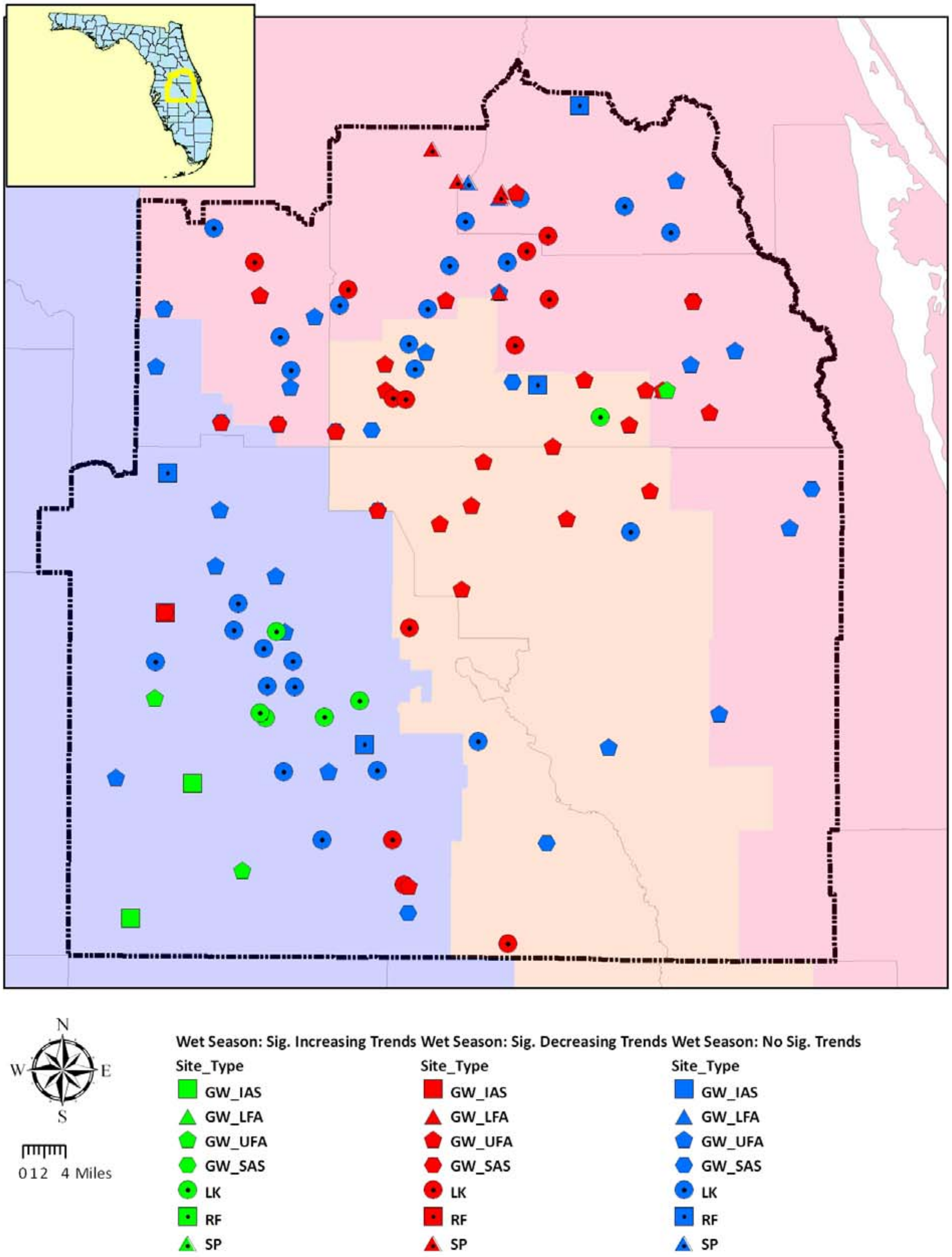


Figure 10 Statistically Significant Trends: Wet Season

4.3 *Trend Piecewise*

The trend piecewise script was run on stations with a single piecewise break point (stations classified as P and MS). This script is useful for stations which do not exhibit monotonic behavior over time. The null hypothesis tested in this script is that there is no trend in the data in either time period (not controlling for seasonality or autocorrelation). The null hypothesis can be rejected based on the Mann Kendall p-value for each segment in the time series. This script was run on a total of 63 stations. (For a discussion on how break points were selected, please see Section 3.2: LOWESS). Results for all stations are shown in Figure 11.

4.3.1 Decreasing Period 1 Trend and Increasing Period 2 Trend

Twelve (12) stations exhibited high statistical likelihoods of a decreasing trend that transitions to an increasing trend at the break date shown in Table 23.

4.3.2 Increasing Period 1 Trend and Decreasing Period 2 Trend

Seven (7) stations exhibited high statistical likelihoods of an increasing trend that transitions to a decreasing trend at the break date shown in Table 24.

4.3.3 Decreasing Period 1 Trend

Seventeen (17) stations exhibited high statistical likelihoods of a decreasing trend that transitions to a period with a low statistical likelihood of a trend at the break date shown in Table 25.

4.3.4 Increasing Period 1 Trend

Five (5) stations exhibited high statistical likelihoods of an increasing trend that transitions to a period with a low statistical likelihood of a trend at the break date shown in Table 26.

4.3.5 Decreasing Period 2 Trend

Ten (10) stations exhibited high statistical likelihoods of a decreasing trend beginning after the break date shown in Table 27.

4.3.6 Increasing Period 2 Trend

One (1) station exhibited a high statistical likelihood of an increasing trend beginning after the break date shown in Table 28.

4.3.7 No Statistically Significant Piecewise Trends

The remaining eleven (11) stations exhibited low likelihoods ($p > 0.1$, for an eighty percent confidence interval) of having statistically significant trends in both periods of the visible piecewise trend. Those stations are shown in Table 29.

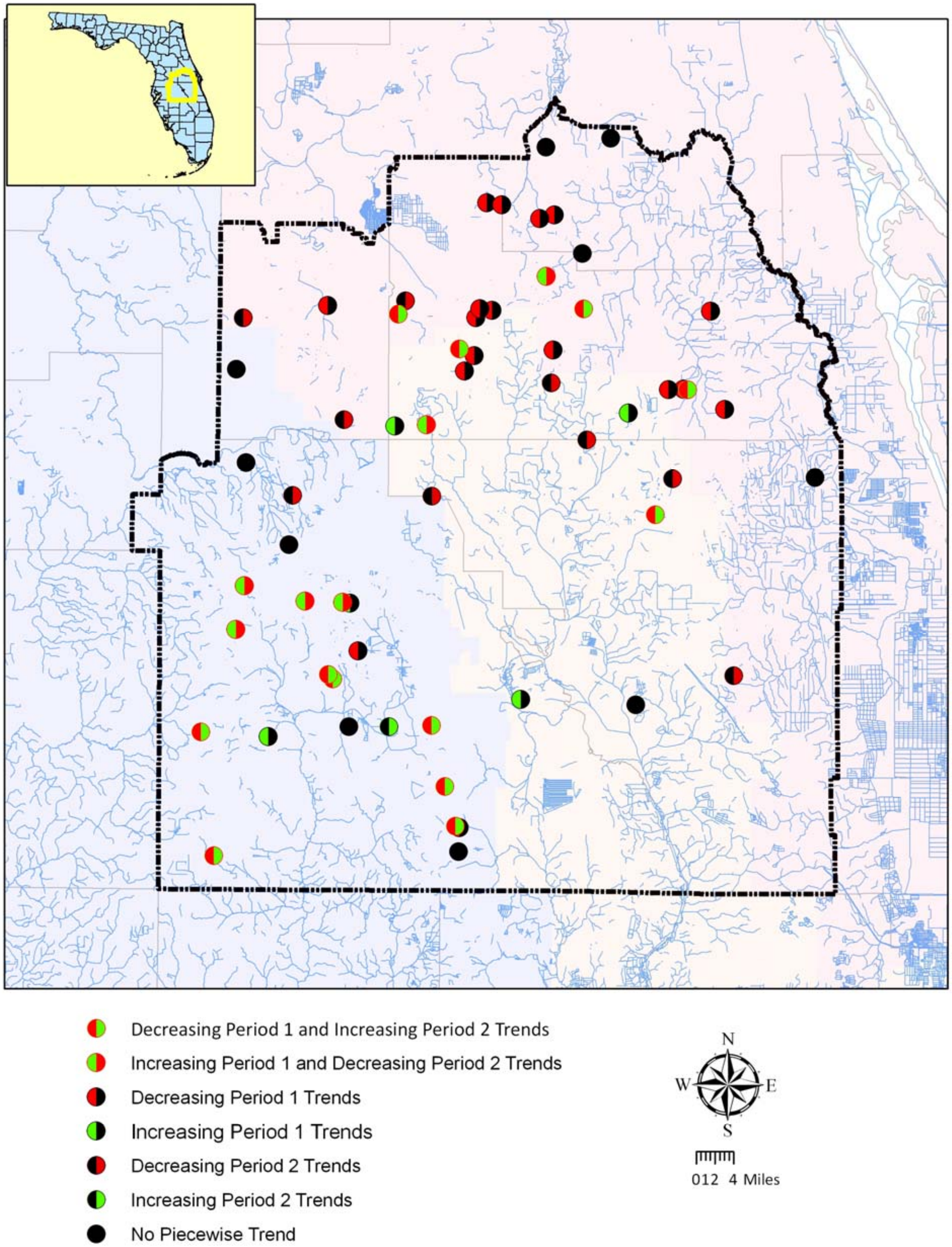


Figure 11 Trend Piecewise Results

Table 23 Decreasing Period 1 Slope and Increasing Period 2 Slope

Trend Analysis ID	Station	Break Date	MK Sen Period 1	MK tau Period 1	p-value Period 1	MK Sen Period 2	MK tau Period 2	p-value Period 2
1	Alligator	1/1/1971	-0.0743	-0.4538	0.0004	0.0127	0.2575	0.0236
4	Barton Big	1/1/1989	-0.0153	-0.3301	0.0126	0.0235	0.3526	0.0322
11	Butler	6/1/1979	-0.0528	-0.4641	0.0000	0.0406	0.2276	0.0804
18	Cocoa B	6/1/1982	-0.4223	-0.5429	0.0056	0.2084	0.5499	0.0001
28	CROOKED LAKE NR BABSON PARK (R)	6/1/1986	-0.2512	-0.7445	0.0000	0.5533	0.6443	0.0000
31	EAGLE LAKE (R)	6/1/1976	-0.6378	-0.8571	0.0044	0.2014	0.5227	0.0000
34	FORT GREEN SPRINGS INT	1/1/1977	-1.6621	-0.6264	0.0022	0.3378	0.3075	0.0158
42	Johns	6/1/1981	-0.3281	-0.6680	0.0000	0.1710	0.3333	0.0156
54	LAKE CLINCH (R)	1/1/1988	-0.0756	-0.4123	0.0001	0.2078	0.4762	0.0028
61	LAKE MCLEOD (R)	6/1/1976	-0.5709	-0.9286	0.0020	0.3169	0.6288	0.0000
71	LAKE WALES (R)	1/1/1987	-0.2428	-0.5000	0.0005	0.3258	0.4459	0.0040
97	ROMP 60 OCAL~AVPK	6/1/1975	-1.9598	-0.7333	0.0000	0.4386	0.3725	0.0020

Table 24 Increasing Period 1 Slope and Decreasing Period 2 Slope

Trend Analysis ID	Station	Break Date	MK Sen Period 1	MK tau Period 1	p-value Period 1	MK Sen Period 2	MK tau Period 2	p-value Period 2
26	COMBEE ROAD DEEP	1/1/1983	0.1767	0.6444	0.0123	-0.0759	-0.4708	0.0008
30	Disney nr Vineland	1/1/1984	0.1218	0.5667	0.0026	-0.0496	-0.4200	0.0035
44	Killarney	6/1/1988	0.0242	0.4709	0.0005	-0.0201	-0.4211	0.0104
47	LAKE ALFRED (R)	6/1/1997	0.1766	0.4138	0.0017	-0.3967	-0.3939	0.0865
52	LAKE ARIETTA (USGS) (R)	1/1/1997	0.0983	0.3757	0.0053	-0.2280	-0.4546	0.0467
65	LAKE PARKER AT LAKELAND	1/1/1991	0.0148	0.2425	0.0225	-0.0701	-0.4379	0.0124
109	STATE ROAD 33~COMBEE ROAD SHALLOW	1/1/1982	0.2184	0.6667	0.0165	-0.0849	-0.5442	0.0001

Table 25 Decreasing Period 1 Slope

Trend Analysis ID	Station	Break Date	MK Sen Period 1	MK tau Period 1	p-value Period 1	MK Sen Period 2	MK tau Period 2	p-value Period 2
8	Bithlo 1	6/1/1986	-0.1503	-0.5815	0.0000	-0.0440	-0.1225	0.4282
15	Clermont	1/1/1999	-0.1278	-0.3987	0.0230	0.1373	0.2000	0.4743
17	Cocoa A	1/1/1985	-0.1700	-0.6000	0.0000	-0.0163	-0.0870	0.5683
20	Cocoa C - Zone 5	6/1/1989	-0.2206	-0.6443	0.0000	0.0771	0.2000	0.2300
21	Cocoa D	1/1/1995	-0.2694	-0.7720	0.0000	0.0020	0.0109	1.0000
25	COLEY DEEP	1/1/1990	-0.3699	-0.6887	0.0000	0.0086	0.0175	0.9442
27	Conway	6/1/1984	-0.0977	-0.6133	0.0000	-0.0022	0.0000	1.0000
64	LAKE OTIS (R)	6/1/1980	-0.2109	-0.5100	0.0002	0.0387	0.1724	0.1956
72	Longwood	6/1/1988	-0.2401	-0.7496	0.0000	-0.0140	-0.0095	0.9759
85	Orlo Vista	6/1/1985	-0.3057	-0.6855	0.0000	-0.0599	-0.0942	0.5352
88	Palm Lake Dr nr Windermere	6/1/1990	-0.6375	-0.5556	0.0318	0.0194	0.0409	0.8337
89	Palm Springs - Seminole	7/1/1984	-0.3492	-0.7692	0.0003	-0.0307	-0.2200	0.1290

Table 25, continued

Trend Analysis ID	Station	Break Date	MK Sen Period 1	MK tau Period 1	p-value Period 1	MK Sen Period 2	MK tau Period 2	p-value Period 2
90	Prevatt	6/1/1979	-0.1276	-0.4103	0.0586	0.0734	0.1576	0.2373
100	Rose	1/1/1980	-0.1619	-0.2857	0.0748	0.0561	0.2222	0.1010
104	Sherwood	6/1/1985	-0.5065	-0.5200	0.0003	0.2671	0.1621	0.2908
115	Tibet-Butler	6/1/1985	-0.0943	-0.3933	0.0063	0.0045	0.0356	0.8327
119	Wekiwa Springs	7/1/1984	-1.0626	-0.5000	0.0058	-0.0419	-0.0733	0.6238

Table 26 Increasing Period 1 Slope

Trend Analysis ID	Station	Break Date	MK Sen Period 1	MK tau Period 1	p-value Period 1	MK Sen Period 2	MK tau Period 2	p-value Period 2
48	LAKE ALFRED DEEP AT LAKE ALFRED	6/1/1997	0.1148	0.3696	0.0122	-0.1385	-0.1212	0.6312
62	Lake Oliver nr Vineland - SAS	1/1/1991	0.1272	0.4902	0.0051	-0.1876	-0.2680	0.1297
66	LAKE ROSALIE	1/1/1993	0.0211	0.2190	0.0620	-0.0692	-0.2500	0.1917
95	ROMP 59 HTRN	1/1/2001	0.3774	0.3933	0.0063	-1.7962	-0.5000	0.1078
120	Whip-Por-Will	1/1/1993	0.0254	0.3333	0.0058	-0.0165	-0.3083	0.1047

Table 27 Decreasing Period 2 Slope

Trend Analysis ID	Station	Break Date	MK Sen Period 1	MK tau Period 1	p-value Period 1	MK Sen Period 2	MK tau Period 2	p-value Period 2
2	Apopka	1/1/1985	-0.0100	-0.1353	0.1990	-0.0501	-0.3768	0.0106
9	Bithlo 3	6/1/1978	-0.0011	-0.0222	1.0000	-0.0889	-0.4495	0.0004
10	Boggy Creek Rd nr Taft	6/1/1993	-0.1157	-0.2308	0.2736	-0.2956	-0.4833	0.0103
37	Horsehead Pond – UFA	1/1/1993	0.1002	0.2444	0.3711	-0.1510	-0.3333	0.0791
57	Lake Joel nr Ashton	1/1/1993	-0.0228	-0.0980	0.5959	-0.2092	-0.3833	0.0428
73	LOUGHMAN DEEP	6/1/1983	-0.0337	-0.1765	0.3247	-0.0955	-0.5446	0.0001
77	Mascotte - SAS	6/1/1986	0.0201	0.1481	0.2772	-0.0805	-0.2569	0.0910
112	TAFT_G	1/1/1983	0.0202	0.1238	0.5526	-0.0395	-0.2857	0.0748
113	TH-10 Williams Rd nr Holopaw	6/1/1994	0.0273	0.0476	0.8431	-0.1939	-0.3905	0.0478
117	USGS 815149233 FLDN	9/1/1991	-0.0050	-0.0095	1.0000	-0.1525	-0.3203	0.0690

Table 28 Increasing Period 2 Slope

Trend Analysis ID	Station	Break Date	MK Sen Period 1	MK tau Period 1	p-value Period 1	MK Sen Period 2	MK tau Period 2	p-value Period 2
110	STATE ROAD 60 DEEP NR LAKE WALES	5/1/1987	0.03375	0.1273	0.6404	0.62368	0.4545	0.046745

Table 29 No Statistically Significant Piecewise Trends

Trend Analysis ID	Station	Break Date	MK Sen Period 1	MK tau Period 1	p-value Period 1	MK Sen Period 2	MK tau Period 2	p-value Period 2
29	Deseret	6/1/1998	-0.0219	-0.2035	0.1946	0.1390	0.3889	0.1753
39	Howell	10/1/1999	-0.0063	-0.0823	0.6118	-0.0526	-0.1667	0.6022
41	Joe Overstreet nr St Cloud	6/1/1993	0.0220	0.0735	0.7108	-0.1207	-0.2833	0.1373
55	LAKE GARFIELD (R)	1/1/1990	0.0161	0.0996	0.5350	-0.0849	-0.1930	0.2629
78	Mascotte - UFA	1/1/1986	-0.0111	-0.1058	0.4410	-0.0792	-0.1858	0.2244
93	ROMP 101 nr Bay Lake	6/1/1986	0.2785	0.3778	0.1524	-0.0640	-0.1542	0.3156
98	ROMP 76 OCAL-AVPK	6/1/1995	0.1464	0.2680	0.1297	-0.2593	-0.2528	0.2284
99	ROMP 88 ROCK RIDGE	1/1/1998	0.0010	0.2016	0.1867	-0.0018	-0.2727	0.2758
101	Sanford	6/1/1975	-0.0001	-0.0396	0.7049	0.0007	0.1183	0.3587
111	Sylvan	7/1/1989	-0.1862	-0.3636	0.1148	0.1402	0.2353	0.2016
118	USGS P-48 SHALLOW	1/1/1988	-0.0173	-0.0720	0.5664	0.0476	0.2381	0.1390

4.4 Trend Seasonal Piecewise

The trend seasonal piecewise script is an extension of both the trend seasonal period and trend piecewise scripts. It performs linear regression and Mann Kendall regression on each of two segments of a non-monotonic time series with a user specified breakpoint. It is used in order to examine the seasonality of time series with single breakpoints. Like the trend piecewise script, this script was run on the 63 piecewise stations identified in the exploratory data analysis. For each of the two time segments (before and after the break point) analyzed in this script, the following hypothesis is tested:

H01: There is no statistically significant trend in any season.

For the CFCA analysis, the data was analyzed seasonally by dry season (May through October) and wet season (June through September). The script calculates the p-value of each Mann Kendall regression separately for each season. Since some trends might be expected to have high p-values by chance, this can cause false positive conclusions. In order to account for this, the Stepwise Boneferroni technique (Hochberg, 1988) is used to identify seasons with statistically significant trends. The user specifies the desired critical alpha based on the desired confidence interval. For this application, a confidence level of 80 percent was desired. Since the test is two-tailed, this results in a critical alpha of 0.1. The script output includes a value of true or false for the value of the Stepwise Boneferroni correction. A value of true indicates that the trend is significant at the specified alpha level of 0.1. The results of the 63 stations are shown in Table 30. Because the Stepwise Bonferroni correction is utilized to reject or fail to reject the null hypothesis for this test, the Mann Kendall p-values are not shown.

Table 30 Trend Seasonal Piecewise Results

Trend ID	Site Name	Break Date	Period 1 Dry MKSlope	Period 1 Dry Bonf	Period 1 Wet MKSlope	Period 1 Wet Bonf	Period 2 Dry MKSlope	Period Dry Bonf	Period 2 Wet MKSlope	Period 2 Wet Bonf
1	Alligator	1/1/1971	-0.0538	TRUE	-0.0648	TRUE	0.0153	TRUE	0.0100	FALSE
2	Apopka	1/1/1985	-0.0083	FALSE	-0.0042	FALSE	-0.0521	TRUE	-0.0452	FALSE
4	Barton Big	1/1/1989	-0.0099	FALSE	-0.0202	TRUE	0.0227	FALSE	0.0356	TRUE
8	Bithlo 1	1/1/1979	-0.2307	TRUE	-0.1381	TRUE	-0.0344	FALSE	-0.0297	FALSE
9	Bithlo 3	6/1/1978	-0.0359	FALSE	0.0267	FALSE	-0.0839	TRUE	-0.0562	TRUE
10	Boggy Creek Rd nr Taft	6/1/1993	0.0168	FALSE	-0.2227	TRUE	-0.2507	TRUE	-0.3115	TRUE
11	Butler	1/1/1979	-0.0475	TRUE	-0.0485	TRUE	0.0418	FALSE	0.0518	FALSE
15	Clermont	1/1/1999	-0.0751	FALSE	-0.1010	FALSE	0.2648	FALSE	0.1711	FALSE
17	Cocoa A	1/1/1985	-0.1910	TRUE	-0.1375	TRUE	-0.0087	FALSE	0.0213	FALSE
18	Cocoa B	6/1/1982	-0.3467	TRUE	-0.5889	TRUE	0.1781	TRUE	0.2585	TRUE
20	Cocoa C - Zone 5	6/1/1989	-0.1783	TRUE	-0.2402	TRUE	0.0322	FALSE	0.1397	FALSE
21	Cocoa D	6/1/1982	-0.3467	TRUE	-0.5889	TRUE	0.1781	TRUE	0.2585	TRUE
25	COLEY DEEP	1/1/1990	-0.4081	TRUE	-0.3142	TRUE	0.0988	FALSE	0.1377	FALSE
26	COMBEE ROAD DEEP	1/1/1983	0.1827	TRUE	0.1392	TRUE	-0.1052	TRUE	-0.0774	TRUE
27	Conway	6/1/1984	-0.1047	TRUE	-0.1046	TRUE	-0.0047	FALSE	-0.0105	FALSE
28	CROOKED LAKE NR BABSON PARK (R)	6/1/1986	-0.2349	TRUE	-0.2494	TRUE	0.5384	TRUE	0.5580	TRUE
29	Deseret	6/1/1998	-0.0129	FALSE	-0.0007	FALSE	0.1483	FALSE	0.1072	FALSE
30	Disney nr Vineland	1/1/1984	0.1239	TRUE	0.1960	TRUE	-0.0398	FALSE	-0.0411	TRUE
31	EAGLE LAKE (R)	6/1/1976	-0.6849	TRUE	-0.7088	TRUE	0.1879	TRUE	0.1795	TRUE
34	FORT GREEN SPRINGS INT	1/1/1977	-1.2887	TRUE	-1.6780	TRUE	0.4362	TRUE	0.3672	TRUE
37	Horsehead Pond - UFA	1/1/1993	0.1165	TRUE	0.2195	TRUE	-0.1131	FALSE	-0.1085	FALSE
39	Howell	1/1/1999	-0.0200	FALSE	-0.0101	FALSE	-0.0877	FALSE	-0.0987	FALSE
41	Joe Overstreet nr St Cloud	6/1/1993	0.0519	FALSE	-0.0463	FALSE	-0.0184	FALSE	-0.1433	FALSE
42	Johns	6/1/1981	-0.3090	TRUE	-0.3303	TRUE	0.2013	TRUE	0.1450	TRUE
44	Killarney	6/1/1988	0.0221	TRUE	0.0308	TRUE	-0.0238	TRUE	-0.0106	FALSE
47	LAKE ALFRED (R)	6/1/1997	0.1648	TRUE	0.1865	TRUE	-0.4069	TRUE	-0.3956	TRUE
48	LAKE ALFRED DEEP AT LAKE ALFRED	6/1/1997	0.1906	TRUE	0.0710	FALSE	-0.2013	FALSE	-0.0917	FALSE
52	LAKE ARIETTA (USGS) (R)	1/1/1997	0.1053	TRUE	0.0898	TRUE	-0.2988	TRUE	-0.3396	TRUE
54	LAKE CLINCH (R)	1/1/1988	-0.0717	TRUE	-0.0807	TRUE	0.1679	TRUE	0.1813	TRUE
55	LAKE GARFIELD (R)	1/1/1990	0.0615	FALSE	0.0592	FALSE	-0.0861	FALSE	-0.0835	FALSE
57	Lake Joel nr Ashton	1/1/1993	-0.0107	FALSE	-0.0851	FALSE	-0.1535	FALSE	-0.0741	FALSE
61	LAKE MCLEOD (R)	6/1/1976	-0.6377	TRUE	-0.6285	TRUE	0.3046	TRUE	0.2978	TRUE

Table 30, continued

Trend ID	Site Name	Break Date	Period 1 Dry MKSlope	Period 1 Dry Bonf	Period 1 Wet MKSlope	Period 1 Wet Bonf	Period 2 Dry MKSlope	Period Dry Bonf	Period 2 Wet MKSlope	Period 2 Wet Bonf
62	Lake Oliver nr Vineland - SAS	1/1/1991	0.1593	TRUE	0.1032	TRUE	-0.1673	FALSE	-0.1412	FALSE
64	LAKE OTIS (R)	6/1/1980	-0.2127	TRUE	-0.2213	TRUE	0.0356	FALSE	0.0567	FALSE
65	LAKE PARKER AT LAKELAND	1/1/1991	0.0164	TRUE	0.0118	FALSE	-0.0773	TRUE	-0.0795	TRUE
66	LAKE ROSALIE	1/1/1993	0.0193	FALSE	0.0118	FALSE	-0.0189	FALSE	-0.0755	FALSE
71	LAKE WALES (R)	1/1/1987	-0.2292	TRUE	-0.2181	TRUE	0.3027	TRUE	0.3141	TRUE
72	Longwood	6/1/1988	-0.2343	TRUE	-0.2282	TRUE	0.0105	FALSE	0.0467	FALSE
73	LOUGHMAN DEEP	6/1/1983	-0.0139	FALSE	-0.0347	FALSE	-0.0994	TRUE	-0.0770	TRUE
77	Mascotte - SAS	6/1/1986	0.0099	FALSE	0.0181	FALSE	-0.0689	FALSE	-0.1127	TRUE
78	Mascotte - UFA	1/1/1986	-0.0294	FALSE	0.0055	FALSE	-0.0556	FALSE	-0.0748	FALSE
85	Orlo Vista	6/1/1985	-0.3262	TRUE	-0.2839	TRUE	-0.0459	FALSE	-0.0388	FALSE
88	Palm Lake Dr nr Windermere	6/1/1990	-0.1530	FALSE	-0.8694	TRUE	0.0651	FALSE	0.0817	FALSE
89	Palm Springs - Seminole	1/1/1997	-0.2000	TRUE	-0.1986	TRUE	-0.0061	FALSE	0.0504	FALSE
90	Prevatt	6/1/1979	-0.1055	FALSE	-0.1736	FALSE	0.0131	FALSE	0.0502	FALSE
93	ROMP 101 nr Bay Lake	6/1/1986	0.2191	FALSE	0.2756	FALSE	-0.0496	FALSE	-0.0855	FALSE
95	ROMP 59 HTRN	1/1/2001	0.4279	TRUE	0.2738	TRUE	-0.8361	FALSE	0.0777	FALSE
97	ROMP 60 OCAL~AVPK	6/1/1975	-1.8786	TRUE	-1.8976	TRUE	0.4879	TRUE	0.3905	TRUE
98	ROMP 76 OCAL-AVPK	6/1/1995	0.0349	FALSE	0.0976	FALSE	-0.2720	FALSE	-0.2122	FALSE
99	ROMP 88 ROCK RIDGE	1/1/1998	0.0016	FALSE	0.0006	FALSE	0.0025	FALSE	-0.0128	FALSE
100	Rose	1/1/1980	-0.2029	FALSE	-0.1179	FALSE	0.0381	FALSE	0.0912	FALSE
101	Sanford	6/1/1975	0.0000	FALSE	-0.0004	FALSE	-0.0005	FALSE	0.0025	FALSE
104	Sherwood	6/1/1985	-0.4837	TRUE	-0.4887	TRUE	0.3209	FALSE	0.2107	FALSE
109	STATE ROAD 33~COMBEE ROAD SHALLOW	1/1/1982	0.2284	TRUE	0.1133	FALSE	-0.1112	TRUE	-0.0624	TRUE
110	STATE ROAD 60 DEEP NR LAKE WALES	5/1/1987	0.0500	FALSE	0.2600	FALSE	0.8083	TRUE	0.5300	FALSE
111	Sylvan	7/1/1989	-0.1369	FALSE	-0.1678	FALSE	0.2040	FALSE	0.1654	FALSE
112	TAFT_G	1/1/1983	0.0405	FALSE	0.0477	FALSE	-0.0567	FALSE	-0.0341	FALSE
113	TH-10 Williams Rd nr Holopaw	6/1/1994	0.1125	FALSE	-0.0309	FALSE	-0.0513	FALSE	-0.2608	TRUE
115	Tibet-Butler	7/1/1981	-0.1240	TRUE	-0.1326	TRUE	0.0293	FALSE	0.0100	FALSE
117	USGS 815149233 FLDN	9/1/1991	0.0000	FALSE	-0.0389	FALSE	-0.1400	FALSE	-0.1079	FALSE
118	USGS P-48 SHALLOW	1/1/1988	-0.0099	FALSE	-0.0231	FALSE	0.0598	FALSE	0.0423	FALSE
119	Wekiwa Springs	7/1/1984	-0.8097	TRUE	-1.2026	TRUE	0.0218	FALSE	-0.1572	FALSE
120	Whip-Por-Will	1/1/1993	0.0275	TRUE	0.0202	TRUE	-0.0201	FALSE	-0.0198	FALSE

4.5 *Trend Single Period Segments: 2P Stations*

A total of 20 stations, shown in Figure 12, had 2 break points identified for trend analysis. For each of these stations, the trend single period script was run on each segment in order to determine if there were statistically significant trends in any portion of the station record. Table 31 shows the results of the Mann Kendall regressions for each time segment. Segments with high statistical likelihoods of trends are shown in bold in the table. Test results were interpreted using an 80% confidence level and therefore a critical alpha of 0.1.

4.6 *Trend Analysis Summary*

The Table 32 is intended to provide the user with a quick reference summary of the interpreted test results for the trend single period, trend seasonal single period, and trend piecewise scripts. The data below is interpreted at the 80% confidence level. In the table below, Sen slopes are only reported where they are statistically significant. For detailed test results for each station, including seasonal piecewise results, please see Appendix II.

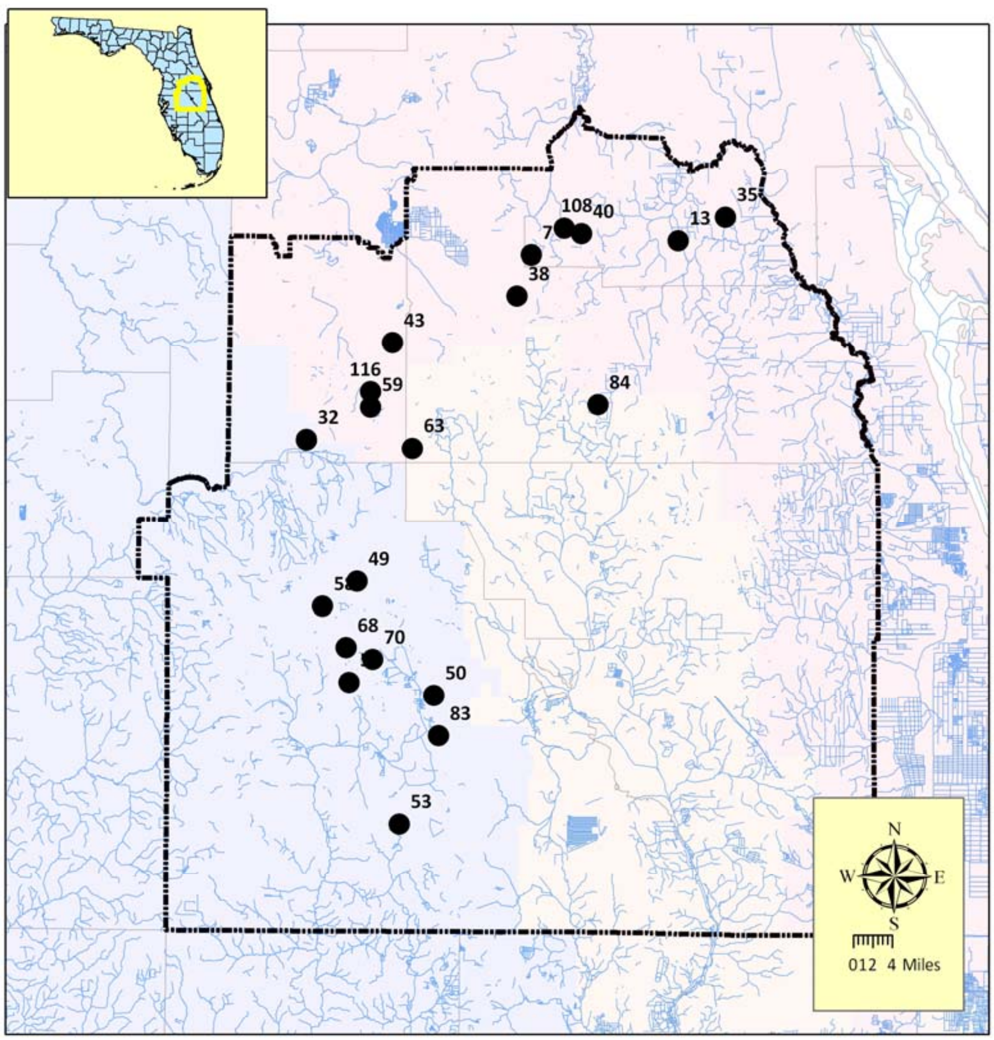


Figure 12 Stations with 2 Break Points

Table 31 Trend Single Period Segment Results (p<0.1 Segments in Bold)

Trend ID	Site Name	StartDate1	EndDate1	MK1_p	MK1_sen	StartDate2	EndDate2	MK2_p	MK2_sen	StartDate3	EndDate3	MK3_p	MK3_sen
7	Bear	1/1/1900	6/1/1991	0.584	-0.008	**6/1/1991**	**5/1/1999**	**0.063**	**-0.151**	5/1/1999	1/1/2030	0.755	0.032
13	Charm	**1/1/1900**	**6/1/1989**	**0.002**	**0.300**	6/1/1989	6/1/1999	1.000	-0.018	6/1/1999	1/1/2030	0.213	0.222
32	Eva nr Clermont - SAS	**1/1/1900**	**6/1/1988**	**0.053**	**0.103**	6/1/1988	1/1/1999	0.533	-0.032	1/1/1999	12/1/2030	1.000	-0.017
35	Geneva	1/1/1900	1/1/1993	0.193	0.191	**1/1/1993**	**6/1/2002**	**0.074**	**-0.353**	6/1/2002	12/1/2030	0.386	-0.276
38	Horseshoe	1/1/1900	6/1/1988	0.466	0.513	**6/1/1988**	**7/1/2001**	**0.029**	**-0.387**	7/1/2001	12/1/2030	0.902	0.032
40	Island	1/1/1900	1/1/1993	0.488	0.019	1/1/1993	1/1/1999	0.707	-0.006	1/1/1999	1/1/2030	0.119	0.103
43	Johns Lake	1/1/1900	1/1/1994	0.283	-0.140	1/1/1994	6/1/2000	0.764	-0.574	6/1/2000	12/1/2030	0.283	0.537
49	LAKE ALFRED DEEP NR LAKE ALFRED	**1/1/1900**	**1/1/1977**	**0.000**	**-0.197**	1/1/1977	6/1/1991	0.767	-0.022	6/1/1991	1/1/2030	0.294	-0.070
50	LAKE ANNIE (R)	1/1/1900	6/1/1988	0.441	0.056	**6/1/1988**	**6/1/2000**	**0.006**	**0.568**	6/1/2000	1/1/2030	0.721	0.062
53	LAKE BUFFUM (R)	1/1/1900	1/1/1990	0.820	-0.028	**1/1/1990**	**6/1/2000**	**0.005**	**0.606**	6/1/2000	1/1/2030	0.371	-0.347
56	LAKE HOWARD (R)	**1/1/1900**	**6/1/1976**	**0.005**	**-0.043**	6/1/1976	1/1/1990	0.921	0.021	1/1/1990	1/1/2030	0.163	-0.071
58	LAKE JULIANA (R)	**1/1/1900**	**6/1/1976**	**0.001**	**-0.248**	**1/1/1976**	**6/1/1996**	**0.000**	**0.167**	**6/1/1996**	**1/1/2030**	**0.029**	**-0.259**
59	Lake Louisa State Park	1/1/1900	6/1/1992	0.251	-0.127	6/1/1992	6/1/2001	0.152	-0.417	6/1/2001	12/1/2030	0.466	-0.170
63	Lake Oliver nr Vineland - UFA	**1/1/1900**	**6/1/1977**	**0.000**	**-0.206**	6/1/1977	6/1/1990	0.381	0.084	6/1/1990	12/1/2030	0.112	-0.113
68	LAKE SANITARY (MARIANA) (R)	**1/1/1900**	**6/1/1965**	**0.098**	**-0.034**	**6/1/1965**	**3/1/1994**	**0.002**	**0.026**	3/1/1994	1/1/2030	0.392	-0.025
70	LAKE SMART (R)	**1/1/1900**	**6/1/1973**	**0.035**	**-0.217**	6/1/1973	6/1/1990	0.325	0.020	6/1/1990	1/1/2030	0.381	-0.060
83	MOUNTAIN LAKE NWS	1/1/1900	1/1/1952	1.000	0.000	1/1/1952	1/1/1979	0.138	-0.001	1/1/1979	1/1/2030	0.521	0.001
84	Orlando	1/1/1900	1/1/1953	0.823	0.000	**1/1/1953**	**6/1/1981**	**0.075**	**-0.001**	6/1/1981	12/1/2030	0.860	0.000
108	Starbuck Spring	**1/1/1900**	**8/1/1987**	**0.053**	**-0.206**	8/1/1987	1/1/1997	0.283	0.368	**1/1/1997**	**12/1/2030**	**0.077**	**-0.224**
116	Trout	**1/1/1900**	**1/1/1981**	**0.001**	**-0.545**	**1/1/1981**	**6/1/1992**	**0.007**	**0.595**	6/1/1992	1/1/2030	0.820	-0.066

Table 32 Trend Analysis Summary

Site Name	Trend Single Period Results	Sen Slope	Dry Season Trend Results	Dry Season Sen Slope	Wet Season Trend	Wet Season Sen Slope	Break Date	First Segment Trend	Segment 1 Sen Slope	Second Segment Trend	Segment 2 Sen Slope
Alligator	None		None		None		01-Jan-71	Decr.	-0.0743	Incr.	0.0127
Apopka	Decr.	-0.010	Decr.	-0.009	Decr.	-0.0085	01-Jan-85	None		Decr.	-0.0501
Apshaw	Decr.	-0.055	Decr.	-0.054	Decr.	-0.0536					
Barton Big	None		None		Decr.	-0.0072	01-Jan-89	Decr.	-0.0153	Incr.	0.0235
Bay	Decr.	-0.017	Decr.	-0.018	Decr.	-0.0192					
Bay Lake nr Windermere	Decr.	-0.192	Decr.	-0.191	Decr.	-0.2234					
Bear	None		None		None						
Bithlo 1	Decr.	-0.076	Decr.	-0.069	Decr.	-0.0828	01-Jun-86	Decr.	-0.1503	None	
Bithlo 3	Decr.	-0.055	Decr.	-0.057	Decr.	-0.041	01-Jun-78	None		Decr.	-0.0889
Boggy Creek Rd nr Taft	Decr.	-0.116	None		Decr.	-0.1802	01-Jun-93	None		Decr.	-0.2956
Butler	None		None		None		01-Jun-79	Decr.	-0.0527	Incr.	0.0406
Catherine	Decr.	-0.021	None		None						
Charm	None		None		None						
Church	None		None		None						
Clermont	Decr.	-0.164	Decr.	-0.138	Decr.	-0.1574	01-Jan-99	Decr.	-0.1278	None	
Clermont R	None		None		None						
Cocoa A	Decr.	-0.069	Decr.	-0.066	Decr.	-0.079	01-Jan-85	Decr.	-0.1700	None	
Cocoa B	Incr.	0.081	Incr.	0.087	Incr.	0.0743	01-Jun-82	Decr.	-0.4223	Incr.	0.2084
Cocoa C - Zone 1	Decr.	-0.192	Decr.	-0.182	Decr.	-0.1993					
Cocoa C - Zone 5	Decr.	-0.078	Decr.	-0.068	Decr.	-0.1015	01-Jun-89	Decr.	-0.2206	None	
Cocoa D	Decr.	-0.226	Decr.	-0.159	Decr.	-0.1763	01-Jan-95	Decr.	-0.2694	None	
Cocoa F	Decr.	-0.037	None		None						
Cocoa H	None		None		None						
Cocoa P	Decr.	-0.149	Decr.	-0.121	Decr.	-0.1498					
COLEY DEEP	Decr.	-0.196	Decr.	-0.199	Decr.	-0.1835	01-Jan-90	Decr.	-0.3699	None	
COMBEE ROAD DEEP	Decr.	-0.041	Decr.	-0.051	Decr.	-0.0571	01-Jan-83	Incr.	0.1767	Decr.	-0.0759
Conway	Decr.	-0.024	Decr.	-0.023	Decr.	-0.0314	01-Jun-84	Decr.	-0.0977	None	
CROOKED LAKE NR BABSON PARK (R)	Decr.	-0.124	Decr.	-0.111	Decr.	-0.121	01-Jun-86	Decr.	-0.2512	Incr.	0.5533
Deseret	None		None		None		01-Jun-98	None		None	
Disney nr Vineland	None		None		None		01-Jan-84	Incr.	0.1218	Decr.	-0.0496

Table 32, continued

Site Name	Trend Single Period Results	Sen Slope	Dry Season Trend Results	Dry Season Sen Slope	Wet Season Trend	Wet Season Sen Slope	Break Date	First Segment Trend	Segment 1 Sen Slope	Second Segment Trend	Segment 2 Sen Slope
Eva nr Clermont - SAS	None		None		None						
Eva nr Clermont - UFA	None		None		Decr.	-0.0271					
FORT GREEN SPRINGS INT	Incr.	0.264	Incr.	0.348	Incr.	0.2142	01-Jan-77	Decr.	-1.6621	Incr.	0.3378
Geneva	None		None		None						
Horsehead Pond - SAS	Decr.	-0.266	Decr.	-0.248	Decr.	-0.2628					
Horsehead Pond - UFA	None		None		None		01-Jan-93	None		Decr.	-0.1510
Horseshoe	Decr.	-0.086	None		None						
Howell	Decr.	-0.029	Decr.	-0.041	Decr.	-0.0177	01-Oct-99	None		None	
Island	None		None		None						
Joe Overstreet nr St Cloud	None		None		None		01-Jun-93	None		None	
Johns	None		None		None		01-Jun-81	Decr.	-0.3281	Incr.	0.1710
Johns Lake	None		None		None						
Killarney	Incr.	0.008	Incr.	0.008	None		01-Jun-88	Incr.	0.0242	Decr.	-0.0201
Lake Adair - LFA	Decr.	-0.115	Decr.	-0.119	Decr.	-0.104					
Lake Adair - UFA	Decr.	-0.121	Decr.	-0.121	None						
LAKE ALFRED (R)	Incr.	0.089	Incr.	0.085	Incr.	0.098	01-Jun-97	Incr.	0.1766	Decr.	-0.3967
LAKE ALFRED DEEP AT LAKE ALFRED	None		None		None		01-Jun-97	Incr.	0.1148	None	
LAKE ALFRED DEEP NR LAKE ALFRED	None		None		None						
LAKE ANNIE (R)	Incr.	0.079	Incr.	0.083	Incr.	0.0787					
LAKE ARBUCKLE	Decr.	-0.014	Decr.	-0.011	Decr.	-0.0151					
LAKE ARIETTA (USGS) (R)	None		None		None		01-Jan-97	Incr.	0.0983	Decr.	-0.2280
LAKE BUFFUM (R)	None		None		None						
LAKE CLINCH (R)	Decr.	-0.025	None		Decr.	-0.0291	01-Jan-88	Decr.	-0.0756	Incr.	0.2078
LAKE GARFIELD (R)	None		None		None		01-Jan-90	None		None	
LAKE HOWARD (R)	None		None		None						
Lake Joel nr Ashton	Decr.	-0.054	Decr.	-0.042	Decr.	-0.0579	01-Jan-93	None		Decr.	-0.2092
LAKE JULIANA (R)	None		None		None						
Lake Louisa State Park	Decr.	-0.094	None		None						
LAKE MARION NR HAINES CITY	Decr.	-0.007	Decr.	-0.008	Decr.	-0.0084					

Table 32, continued

Site Name	Trend Single Period Results	Sen Slope	Dry Season Trend Results	Dry Season Sen Slope	Wet Season Trend	Wet Season Sen Slope	Break Date	First Segment Trend	Segment 1 Sen Slope	Second Segment Trend	Segment 2 Sen Slope
LAKE MCLEOD (R)	Incr.	0.285	Incr.	0.278	Incr.	0.2925	01-Jun-76	Decr.	-0.5709	Incr.	0.3169
Lake Oliver nr Vineland - SAS	None		None		None		01-Jan-91	Incr.	0.1272	None	
Lake Oliver nr Vineland - UFA	Decr.	-0.028	Decr.	-0.030	Decr.	-0.0273					
LAKE OTIS (R)	None		None		None		01-Jun-80	Decr.	-0.2109	None	
LAKE PARKER AT LAKELAND	None		None		None		01-Jan-91	Incr.	0.0148	Decr.	-0.0701
LAKE ROSALIE	None		None		None		01-Jan-93	Incr.	0.0211	None	
LAKE RUBY (R)	Incr.	0.092	Incr.	0.084	Incr.	0.0964					
LAKE SANITARY (MARIANA) (R)	None		None		None						
Lake Sawyer nr Windermere	Decr.	-0.114	Decr.	-0.084	Decr.	-0.1115					
LAKE SMART (R)	None		None		None						
LAKE WALES (R)	None		None		None		01-Jan-87	Decr.	-0.2428	Incr.	0.3258
Longwood	Decr.	-0.173	Decr.	-0.171	Decr.	-0.1809	01-Jun-88	Decr.	-0.2401	None	
LOUGHMAN DEEP	Decr.	-0.049	Decr.	-0.048	Decr.	-0.0491	01-Jun-83	None		Decr.	-0.0955
LOUGHMAN SHALLOW	None		None		None						
Louisa	None		None		None						
Maitland	Decr.	-0.007	Decr.	-0.004	Decr.	-0.0081					
Mascotte - SAS	None		None		None		01-Jun-86	None		Decr.	-0.0805
Mascotte - UFA	None		None		None		01-Jan-86	None		None	
McCoy	None		None		None						
Mercantile Lane nr Kissimmee	Decr.	-0.178	Decr.	-0.165	Decr.	-0.1907					
Miami Springs	Incr.	0.042	Incr.	0.048	None						
Moss Park	Decr.	-0.138	Decr.	-0.181	Decr.	-0.1309					
MOUNTAIN LAKE NWS	None		None		None						
Orlando	None		None		None						
Orlo Vista	Decr.	-0.202	Decr.	-0.201	Decr.	-0.2029	01-Jun-85	Decr.	-0.3057	None	
OS U.L.	Decr.	-0.607	Decr.	-0.660	Decr.	-0.5125					
P-49 SURF NR FROSTPROOF	None		None		None						
Palm Lake Dr nr Windermere	None		None		None		01-Jun-90	Decr.	-0.6375	None	
Palm Springs - Seminole	Decr.	-0.099	Decr.	-0.112	Decr.	-0.11	01-Jul-84	Decr.	-0.3492	None	
Prevatt	None		None		None		01-Jun-79	Decr.	-0.1276	None	

Table 32, continued

Site Name	Trend Single Period Results	Sen Slope	Dry Season Trend Results	Dry Season Sen Slope	Wet Season Trend	Wet Season Sen Slope	Break Date	First Segment Trend	Segment 1 Sen Slope	Second Segment Trend	Segment 2 Sen Slope
Reedy Creek Overlook	Decr.	-0.142	Decr.	-0.121	Decr.	-0.1524					
Rock Springs	Decr.	-0.302	Decr.	-0.266	Decr.	-0.3261					
ROMP 101 nr Bay Lake	None		None		None		01-Jun-86	None		None	
ROMP 45 AVPK	Incr.	0.384	Incr.	0.393	Incr.	0.3259					
ROMP 59 HTRN	Incr.	0.242	Incr.	0.252	Incr.	0.1903	01-Jan-01	Incr.	0.3774	None	
ROMP 59 SWNN~AVPK	Incr.	0.422	Incr.	0.484	Incr.	0.3948					
ROMP 60 OCAL~AVPK	None		None		None		01-Jun-75	Decr.	-1.9598	Incr.	0.4385
ROMP 76 OCAL-AVPK	None		None		None		01-Jun-95	None		None	
ROMP 88 ROCK RIDGE	None		None		None		01-Jan-98	None		None	
Rose	None		None		None		01-Jan-80	Decr.	-0.1619	None	
Sanford	None		None		None		01-Jun-75	None		None	
Sanlando Springs	None		None		None						
SANLON RANCH FLDN	Incr.	0.299	Incr.	0.317	Incr.	0.2585					
Sherwood	None		None		None		01-Jun-85	Decr.	-0.5065	None	
Shingle Creek nr Kissimmee	Decr.	-0.254	Decr.	-0.219	Decr.	-0.2563					
South	Decr.	-0.034	Decr.	-0.029	Decr.	-0.0386					
St Cloud Power Plant	Decr.	-0.127	Decr.	-0.129	Decr.	-0.1196					
Starbuck Spring	Decr.	-0.064	Decr.	-0.060	Decr.	-0.0679					
STATE ROAD 33~COMBEE ROAD SHALLOW	Decr.	-0.056	Decr.	-0.071	Decr.	-0.0555	01-Jan-82	Incr.	0.2184	Decr.	-0.0849
STATE ROAD 60 DEEP NR LAKE WALES	Incr.	0.178	None		None		01-May-87	None		Incr.	0.6237
Sylvan	None		None		None		01-Jul-89	None		None	
TAFT_G	Decr.	-0.015	None		None		01-Jan-83	None		Decr.	-0.0395
TH-10 Williams Rd nr Holopaw	None		None		None		01-Jun-94	None		Decr.	-0.1939
TH-4 Deer Park nr St Cloud	None		None		None						
Tibet-Butler	None		None		None		01-Jun-85	Decr.	-0.0943	None	
Trout	None		None		None						
USGS 815149233 FLDN	None		None		None		01-Sep-91	None		Decr.	-0.1525
USGS P-48 SHALLOW	None		Incr.	0.026	None		01-Jan-88	None		None	
Wekiwa Springs	Decr.	-0.253	Decr.	-0.258	Decr.	-0.2295	01-Jul-84	Decr.	-1.0626	None	
Whip-Por-Will	Incr.	0.011	Incr.	0.011	Incr.	0.0107	01-Jan-93	Incr.	0.0254	None	

5.0 Cumulative Distribution Function Comparison

The cdf compare script was utilized to test for differences in the statistics of a given time series over two time periods (before and after a user-specified break point). This script was run for all stations for which a single breakpoint was identified. The script was run with seasonal aggregation. This script compares the cdfs of the two time periods, and also performs a t-test, and a median and rank-sum test. The following hypotheses are tested:

- H01: There is no difference in the means of the two periods (tested using the Wilcoxon Rank-sum test or the t-test)
- H02: There is no difference in the probability distributions of the data over the two periods (tested using the Kolmogorov-Smirnov test), and
- H03: The data in each period are normally distributed.

The Wilcoxon Rank-sum and T-test results are shown in Table 33 for those stations with statistically significant differences in the means of the two periods (the null hypothesis for H01 was rejected). Prior to the interpretation of test results for H01, H03 test results were examined in order to determine if the data in each period was normally distributed. If the data was normally distributed, the t-test was utilized to evaluate H01; if the data was not normally distributed, the Wilcoxon Rank-sum test was utilized to evaluate H01. A positive test statistic indicates that the mean was higher during the first period (from the beginning of the analysis to the break point), while a negative test statistic indicates that the mean of the second segment of data (from the break point to the end of the analysis period) was higher than the mean of the first segment of data. As shown in the table, the majority of stations experience declines in the mean during the second segment (compared to the first segment). Conversely, several of the stations with negative test statistics are also stations that experienced positive trends over the entire period of analysis (a positive trend result from the trend single period script). This includes Cocoa B (18), Fort Green Springs Int. (34), Killarney (44), and Lake Alfred (47).

Table 33 Stations with Statistically Significant Differences in the Means of the Two Periods (Note: Positive Statistic Indicates a Decrease in the Mean from the First Period to Second Period)

Trend Analysis ID	StaName	BreakDate	Overall_Normal	Test used	P for H01	Statistic	H01
1	Alligator	1/1/1971	X	T-test	0.0359	2.1195	Reject
2	Apopka	1/1/1985	X	T-test	0.0041	2.9239	Reject
8	Bithlo 1	1/1/1979		Wilcoxon	0	5.5769	Reject
9	Bithlo 3	6/1/1978		Wilcoxon	0.0038	2.8924	Reject
10	Boggy Creek Rd nr Taft	6/1/1993	X	T-test	0.0227	2.3421	Reject
15	Clermont	1/1/1999	X	T-test	0	4.9471	Reject
17	Cocoa A	1/1/1985		Wilcoxon	0	4.806	Reject
18	Cocoa B	6/1/1982	X	T-test	0.0933	-1.6989	Reject
20	Cocoa C - Zone 5	6/1/1989	X	T-test	0.001	3.4138	Reject
21	Cocoa D	1/1/1995	X	T-test	0	4.5054	Reject
25	COLEY DEEP	1/1/1990		Wilcoxon	0.0001	4	Reject

Table 33, continued

Trend Analysis ID	StaName	BreakDate	Overall_Normal	Test used	P for H01	Statistic	H01
26	COMBEE ROAD DEEP	1/1/1983		Wilcoxon	0.0652	1.8437	Reject
28	CROOKED LAKE NR BABSON PARK (R)	6/1/1986		Wilcoxon	0.0002	3.6969	Reject
34	FORT GREEN SPRINGS INT	1/1/1977	X	T-test	0.0042	-2.9411	Reject
37	Horsehead Pond - UFA	1/1/1993	X	T-test	0.068	1.8655	Reject
39	Howell	10/1/1999	X	T-test	0.0004	3.7747	Reject
44	Killarney	6/1/1988	X	T-test	0.0366	-2.1204	Reject
47	LAKE ALFRED (R)	6/1/1997	X	T-test	0.0059	-2.8322	Reject
57	Lake Joel nr Ashton	1/1/1993	X	T-test	0.0483	2.0117	Reject
72	Longwood	6/1/1988	X	T-test	0	8.1155	Reject
73	LOUGHMAN DEEP	6/1/1983	X	T-test	0.0001	4.2177	Reject
85	Orlo Vista	6/1/1985	X	T-test	0	6.6532	Reject
89	Palm Springs - Seminole	1/1/1997	X	T-test	0.0004	3.7174	Reject
97	ROMP 60 OCAL~AVPK	6/1/1975	X	T-test	0.0967	1.6754	Reject
109	STATE ROAD 33~COMBEE ROAD SHALLOW	1/1/1982		Wilcoxon	0.0417	2.0367	Reject
115	Tibet-Butler	7/1/1981		Wilcoxon	0.0132	-2.4784	Reject
118	USGS P-48 SHALLOW	1/1/1988	X	T-test	0.0011	-3.3453	Reject
119	Wekiwa Springs	7/1/1984		Wilcoxon	0.0089	2.6162	Reject
120	Whip-Por-Will	1/1/1993		Wilcoxon	0.0261	-2.2251	Reject

In addition to testing for statistically significant differences in the means of the two periods, this script also tests for statistically significant differences in the cumulative distribution functions (CDFs) of the two periods. The results of the Kolmogorov-Smirnov test for those stations where the null hypothesis was rejected (therefore indicating a difference in the CDFs) are shown in Table 34. Several stations, such as Clermont (15), Cocoa A (17), Cocoa C- Zone 5 (20), Cocoa D (21), and Wekiwa Springs (119) are common to both Tables 33 and 34, indicating that there are statistically significant differences in the means and the CDFs of the time series before and after the break points. Further investigation into anthropogenic changes in the areas surrounding these stations may be helpful in order to determine possible causes of the statistical changes in the data.

Table 34 Stations with Statistically Significant Differences in the CDFs of the Two Periods

Trend Analysis ID	StaName	BreakDate	Kol-Smir_statis	Kol-Smir_p	H02
1	Alligator	1/1/1971	0.27515	0.00879	Reject
8	Bithlo 1	1/1/1979	0.49446	0.00001	Reject
9	Bithlo 3	6/1/1978	0.44652	0.0039	Reject
10	Boggy Creek Rd nr Taft	6/1/1993	0.32639	0.06603	Reject

Table 34, continued

Trend Analysis ID	StaName	BreakDate	Kol-Smir_statis	Kol-Smir_p	H02
15	Clermont	1/1/1999	0.58095	0.00013	Reject
17	Cocoa A	1/1/1985	0.45858	0.00003	Reject
20	Cocoa C - Zone 5	6/1/1989	0.39891	0.00141	Reject
21	Cocoa D	1/1/1995	0.50847	0.00005	Reject
25	COLEY DEEP	1/1/1990	0.45739	0.00001	Reject
28	CROOKED LAKE NR BABSON PARK (R)	6/1/1986	0.31845	0.00276	Reject
34	FORT GREEN SPRINGS INT	1/1/1977	0.30769	0.04243	Reject
37	Horsehead Pond - UFA	1/1/1993	0.40191	0.02893	Reject
39	Howell	10/1/1999	0.52137	0.00135	Reject
44	Killarney	6/1/1988	0.24329	0.08583	Reject
47	LAKE ALFRED (R)	6/1/1997	0.37037	0.01053	Reject
57	Lake Joel nr Ashton	1/1/1993	0.31515	0.05177	Reject
62	Lake Oliver nr Vineland - SAS	1/1/1991	0.33227	0.0299	Reject
65	LAKE PARKER AT LAKELAND	1/1/1991	0.24857	0.05529	Reject
66	LAKE ROSALIE	1/1/1993	0.25875	0.0639	Reject
72	Longwood	6/1/1988	0.66152	0	Reject
73	LOUGHMAN DEEP	6/1/1983	0.42593	0.00046	Reject
85	Orlo Vista	6/1/1985	0.51103	0	Reject
89	Palm Springs - Seminole	1/1/1997	0.5625	0.00002	Reject
97	ROMP 60 OCAL~AVPK	6/1/1975	0.26585	0.03718	Reject
115	Tibet-Butler	7/1/1981	0.31786	0.01178	Reject
118	USGS P-48 SHALLOW	1/1/1988	0.32604	0.00474	Reject
119	Wekiwa Springs	7/1/1984	0.40196	0.00271	Reject
120	Whip-Por-Will	1/1/1993	0.2951	0.03114	Reject

6.0 Cluster Analysis

During cluster analysis, sets of observations are assigned into subsets (clusters) such that objects in the same cluster can be described as similar. Cluster analysis is an unsupervised learning method and is a common statistical analysis technique utilized to determine similarities in datasets. Hierarchical clustering is a common clustering technique during which successive clusters are found using previously established clusters. Hierarchical cluster analysis (HCA) has been described as "an efficient means to recognize groups of samples that have similar chemical and physical characteristics," (Güler et al, 2002). HCA can be divided into 2 algorithms: agglomerative and divisive. Agglomerative cluster analysis begins with N clusters and combines the data into 1 cluster, while divisive cluster analysis begins with 1 cluster and gradually divides the data into N clusters. Both types of HCA will yield similar results. For the CFCA application, agglomerative hierarchical cluster analysis (AHCA) was selected for use.

The agglomerative hierarchical cluster analysis (AHCA) algorithm begins with each element (i.e. well, lake, spring, or rain gauge) as a separate cluster. Separate clusters are successively merged based on similarity and a method of linkage. The algorithm iteratively forms clusters until all samples are included in a single cluster. There are N-1 merges, where N is the total sample size of the analysis. The result of the analysis is a cluster tree or dendrogram, which is a graphical representation of the links and similarities of the datasets in relation to each other. Reading the dendrogram at a given height will give a clustering at a selected precision. An arbitrary height can be selected to form the groups; any subgroups below the threshold are considered distinct and labeled as different clusters. Cutting a tree at a given height will yield clustering at a selected precision. The lower the height, the more clusters will result. If a clear distinction between clusters is noticeable on the dendrogram, it is advisable to clip the dendrogram at that point.

After the dendrogram is clipped, clusters can be plotted to check for spatial associations, if present. It would be expected that there should be some degree of spatial association between stations in each cluster. In addition to stations clustering by location, other factors may affect clustering, including pumping rates, geomorphologic properties, anthropogenic changes, and land use. The explanatory variables which drive the hydrologic processes affecting individual station behavior (and therefore clustering) are outside the scope of the current study.

The results of HCA are sensitive to both the dataset and the algorithm used. The "agnes" algorithm performs this analysis in SPLUS and has several options including the selection of the distance measure and the linkage type. In HCA, the distance measure is a measure of similarity between datasets. For this application, Euclidean distance was utilized. Euclidean distance is the most commonly used distance measure for AHCA. Ward linkages were utilized in order to define the linkages to merge the clusters. Ward’s method (also called incremental sum of squares method) calculates the sum of squared errors as the sum of the Euclidean distances from each sample to the center of its cluster. Clusters are formed to minimize the sum of squared errors at each iteration. Euclidean distance and Ward’s method linkage are commonly used for AHCA and have been utilized by others for similar applications (Guler et. al, 2002 and Ryberg, 2006).

Data standardization is also vital to producing a cluster analysis which has meaningful results. For a constituent cluster analysis, the dimension of the analysis is pre-defined by the data (i.e. chloride, alkalinity, etc.). For the CFCA trend analysis, the dimension was carefully defined in order to produce meaningful results. The dimension of the analysis can be based on time windows, climate, or annual averages. Additionally, data must be standardized in order to ensure that all data receives equal weight in the analysis. Data gaps are also an issue in cluster analysis since the analysis requires that every sample contain values for each constituent or attribute.

For CFCA, the dimensions of the analysis were based on time. It was initially proposed that the data be divided up into three to five time windows based on periods of hydrologic similarity and the analysis be based on the trend slopes over those windows. Analysis of the break points the CFCA stations revealed that utilizing time windows may skew the analysis. A frequency analysis of all the breakpoints demonstrated that there are no clear time periods where there are more breakpoints than other periods, making it extremely subjective and difficult to identify periods of hydrologic similarity. Additionally, the break point distribution varies slightly depending on the station type, and separate analyses were desired for each station type as well as an analysis for all of the stations together. Although the data could arbitrarily be divided into segments every 5 or 7 years, using this technique may adversely affect the slope calculation for some stations. When dividing stations into time segments, the assumption would be that the trend at each station is monotonic over the time segment, which would not be true for all cases. For example, if 1995 through 2000 is selected as a time segment for slope calculation, there may be stations with sign change breakpoints in 1997. The slope calculation for those stations from 1995 through 2000 would not be accurately representing the data. For this reason, a normalized annual average reading (lake level, spring discharge, etc.) was utilized to create the dimensions of the analysis for clustering. The use of normalized data created a matrix of annual values for each station and eliminated the subjectivity of defining analysis windows, thereby resulting in a more robust cluster analysis. Only stations with complete data records were utilized, making it unnecessary to perform any gap-filling algorithms.

6.1 AHCA Procedure and Output

The following procedure was implemented in order to apply an agglomerative hierarchical clustering algorithm to the CFCA data:

1. The desired stations and the time period for the analysis were selected. Each station must have at least one reading for each year of the selected time period.
2. The mean value for each station over the entire period of analysis and the standard deviation of the data over the analysis period were calculated.
3. The mean annual values for each station for each year of the analysis were calculated.
4. For each year of the analysis, the mean annual value was normalized by the mean value for the entire period and the standard deviation. The normalized annual average reading was calculated as follows:

$$z_{annual} = \frac{x_{annual} - \bar{x}_{poa}}{s_{poa}} \qquad (1)$$

Where:

z_{annual} = normalized annual average

x_{annual} = annual average

$\bar{x}_{poa}$ = period of analysis mean

s_{poa} = period of analysis standard deviation

5. The result was a matrix of stations and years and associated normalized data. The entries in this matrix indicated of the condition of a station in a given year as compared to average conditions for that station.

6. The agglomerative hierarchical cluster analysis was performed on this matrix. The dendrogram was plotted and cluster information was stored. The dendrogram, in conjunction with spatial mapping and temporal analysis, produced important information regarding the placement of the data into clusters, the temporal characteristics of those clusters, and how the data sets in each cluster are spatially associated with one another.
7. A threshold height for clusters was determined from the dendrogram. Average temporal values for each year were calculated and plotted for each cluster in order to determine the temporally variability of the cluster.
8. Results were exported from SPLUS and imported to the GIS in order to examine the spatial associations of each cluster.

6.2 Cluster Analysis: All Available Data

There were a total of 6 separate cluster analyses of the entire data set. Each cluster analysis included a different group of stations in order to examine the clusters of each station type as well as clusters of all available hydrologic data. The 6 cluster analyses were as follows:

- All stations
- Lakes
- Surficial wells
- Intermediate and Floridan wells
- Rainfall stations
- Springs

Each cluster analysis utilized all available data for the established period of the analysis. While it is important to include as many stations as possible in the cluster analysis, the number of stations included in the analysis must be balanced with the available data years at each station. Table 35 shows the station counts by year for each station type. Recommended analysis years for each cluster analysis are highlighted in gray in the table and summarized in Table 36. As shown in Table 36, the cluster analysis was run from 1984 through 2008 for each of the 6 analyses. This resulted in the use of 115 of the 120 stations. Omitted stations are shown in Table 37. These stations were not utilized in the analysis due to insufficient data.

Table 35 Recommended Cluster Analysis Periods

	All Stations	Lakes	Surficial Wells	Intermediate and Floridan Wells	Rainfall	Springs
Total Number of Sites	120	47	12	50	5	6
Number of Available Sites for Cluster Analysis Period	115	46	11	47	5	6
Recommended Cluster Analysis Period	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008	1984-2008

Table 36 Available Stations by Year

	All Stations	Lakes	Surficial Wells	Intermediate and Floridan Wells	Rain	Springs
Total Station Count	**120**	47	**12**	**50**	**5**	**6**
1930	3	0	0	0	3	0
1931	3	0	0	0	3	0
1932	3	0	0	0	3	0
1933	3	0	0	0	3	0
1934	3	0	0	0	3	0
1935	4	0	0	0	4	0
1936	4	0	0	0	4	0
1937	4	0	0	0	4	0
1938	4	0	0	0	4	0
1939	4	0	0	0	4	0
1940	5	1	0	0	4	0
1941	8	4	0	0	4	0
1942	9	5	0	0	4	0
1943	10	5	0	1	4	0
1944	9	4	0	1	4	0
1945	10	5	0	1	4	0
1946	13	8	0	1	4	0
1947	14	9	0	1	4	0
1948	14	9	0	1	4	0
1949	16	9	1	2	4	0
1950	15	9	0	2	4	0
1951	18	11	0	3	4	0
1952	17	10	0	3	4	0
1953	17	10	0	3	4	0
1954	19	12	0	3	4	0
1955	19	11	0	4	4	0
1956	21	11	2	4	4	0
1957	22	12	2	4	4	0
1958	24	14	2	4	4	0
1959	31	17	3	7	4	0
1960	39	22	3	10	4	0
1961	42	26	3	9	4	0
1962	41	25	3	9	4	0
1963	41	25	3	9	4	0
1964	44	25	4	11	4	0
1965	47	27	4	12	4	0
1966	51	29	3	15	4	0
1967	54	30	4	16	4	0
1968	55	28	4	17	4	2
1969	61	31	7	17	4	2
1970	68	36	7	19	4	2
1971	73	38	7	22	4	2
1972	79	40	8	21	4	6

Table 36, continued

	All Stations	Lakes	Surficial Wells	Intermediate and Floridan Wells	Rain	Springs
Total Station Count	**120**	47	**12**	**50**	**5**	**6**
1973	78	40	8	20	4	6
1974	80	38	10	22	4	6
1975	85	40	10	25	4	6
1976	87	40	10	26	5	6
1977	95	39	11	34	5	6
1978	105	46	11	37	5	6
1979	106	46	11	38	5	6
1980	113	47	11	44	5	6
1981	114	47	11	45	5	6
1982	116	47	11	47	5	6
1983	115	47	11	46	5	6
1984	120	47	12	50	5	6
1985	119	47	12	49	5	6
1986	120	47	12	50	5	6
1987	120	47	12	50	5	6
1988	120	47	12	50	5	6
1989	120	47	12	50	5	6
1990	119	46	12	50	5	6
1991	120	47	12	50	5	6
1992	119	46	12	50	5	6
1993	120	47	12	50	5	6
1994	120	47	12	50	5	6
1995	120	47	12	50	5	6
1996	120	47	12	50	5	6
1997	120	47	12	50	5	6
1998	120	47	12	50	5	6
1999	120	47	12	50	5	6
2000	119	47	12	49	5	6
2001	119	47	12	49	5	6
2002	120	47	12	50	5	6
2003	120	47	12	50	5	6
2004	120	47	12	50	5	6
2005	119	47	11	50	5	6
2006	119	47	11	50	5	6
2007	117	47	11	50	3	6
2008	115	47	10	49	3	6
2009	95	34	10	44	1	6

Table 37 Stations Omitted from Cluster Analysis

Cluster Analysis Type	Stations Omitted (Missing Years)
Lakes	Sylvan (1990, 1992)
Surficial wells	Taft_G (2005-2009)
Intermediate and Floridan wells	State Road 60 Deep nr Lake Wales (2000-2001) Moss Park (2008) TH-4 Deer Park Nr St Could (1985)
Rainfall	None
Springs	None

6.2.1 Cluster Analysis: All Stations

An agglomerative hierarchical cluster analysis (AHCA) was performed on the normalized annual average data for all CFCA stations with available data for 1984 through 2008 (Figure 12). Examination of the dendrogram in Figure 13 reveals 4 distinct major clusters, shown in Figure 14. The clustering data was also mapped at 2, 4, 6, and 8 clusters as shown in Figure 17 in order to determine the sub-cluster spatial relationships and more coarse similarities at the 2 cluster level. The 4 clusters were identified as the major clusters because the linkage distance (height) at which they combine is relatively large, indicating large Euclidean distances between stations in Clusters 1, 2, 3, and 4. The spatial results for the 4 major cluster groups are shown in Figure 15. As shown in the figure, there is a good degree of spatial association between each of the clusters. If ellipses are superimposed on the clusters, the spatial clustering becomes more apparent, as shown in Figure 16. As shown in the Figure, spatial associations are present in many cases, with the exception of Cluster 4, which contains stations within the southwest portion of the CFCA domain, as well as in the northeast portion of the domain. Although the clustering does show some spatial patterns, the clusters show a degree of spatial overlap. Table 38 shows the count of the stations as well as the various station types using the results aggregated into 4 clusters. The table shows that the Floridan wells fell predominately in Clusters 1 and 2 while the lakes fell in Clusters 2 and 3. All the rainfall stations were in Cluster 1.

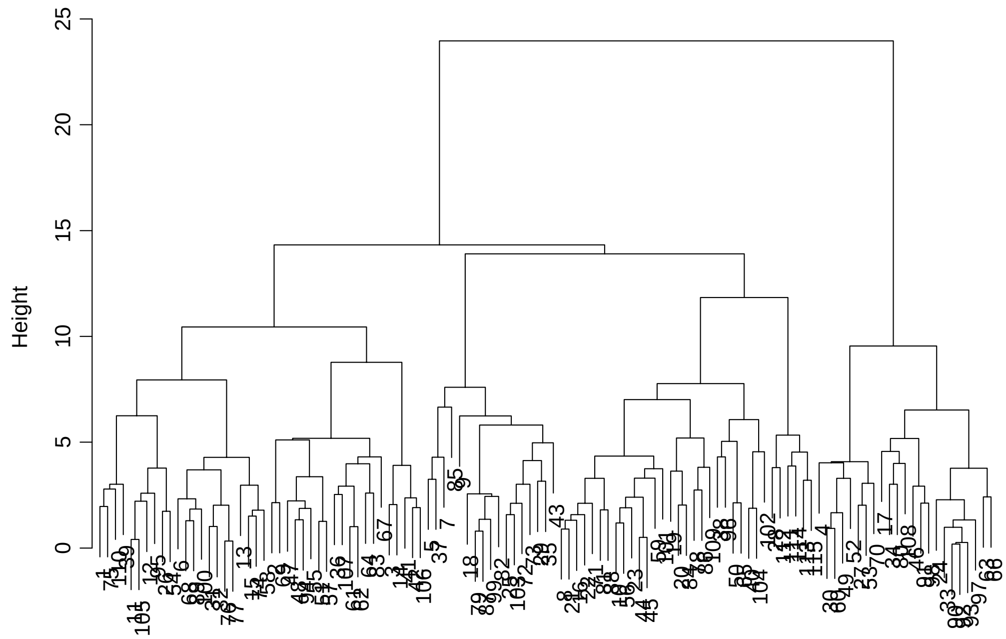


Figure 13 AHCA Dendrogram, All Stations

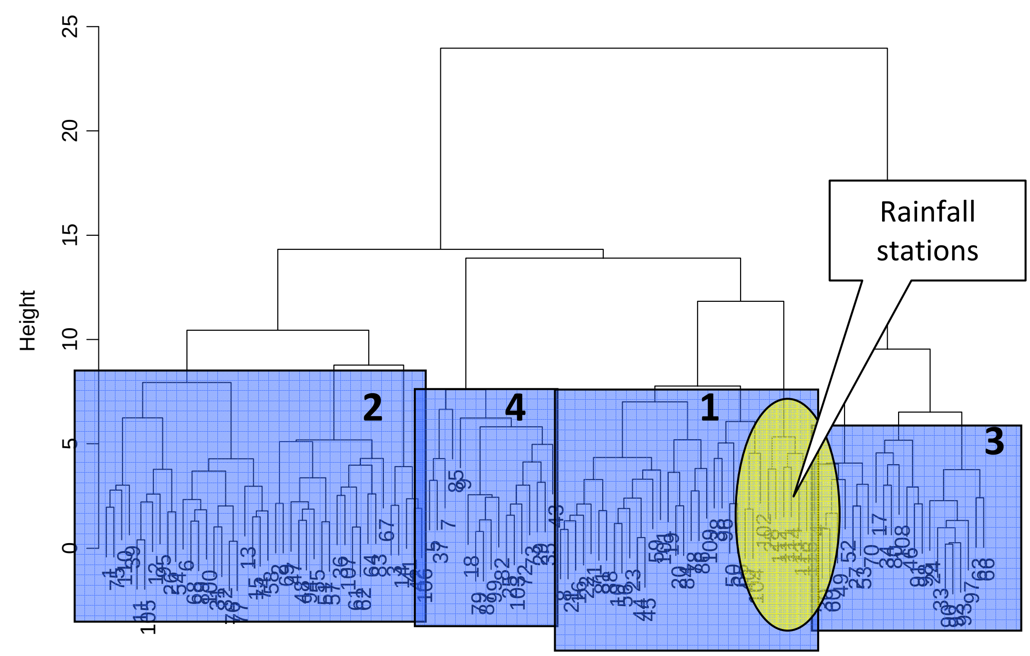


Figure 14 AHCA Dendrogram, All Stations (with Clusters)

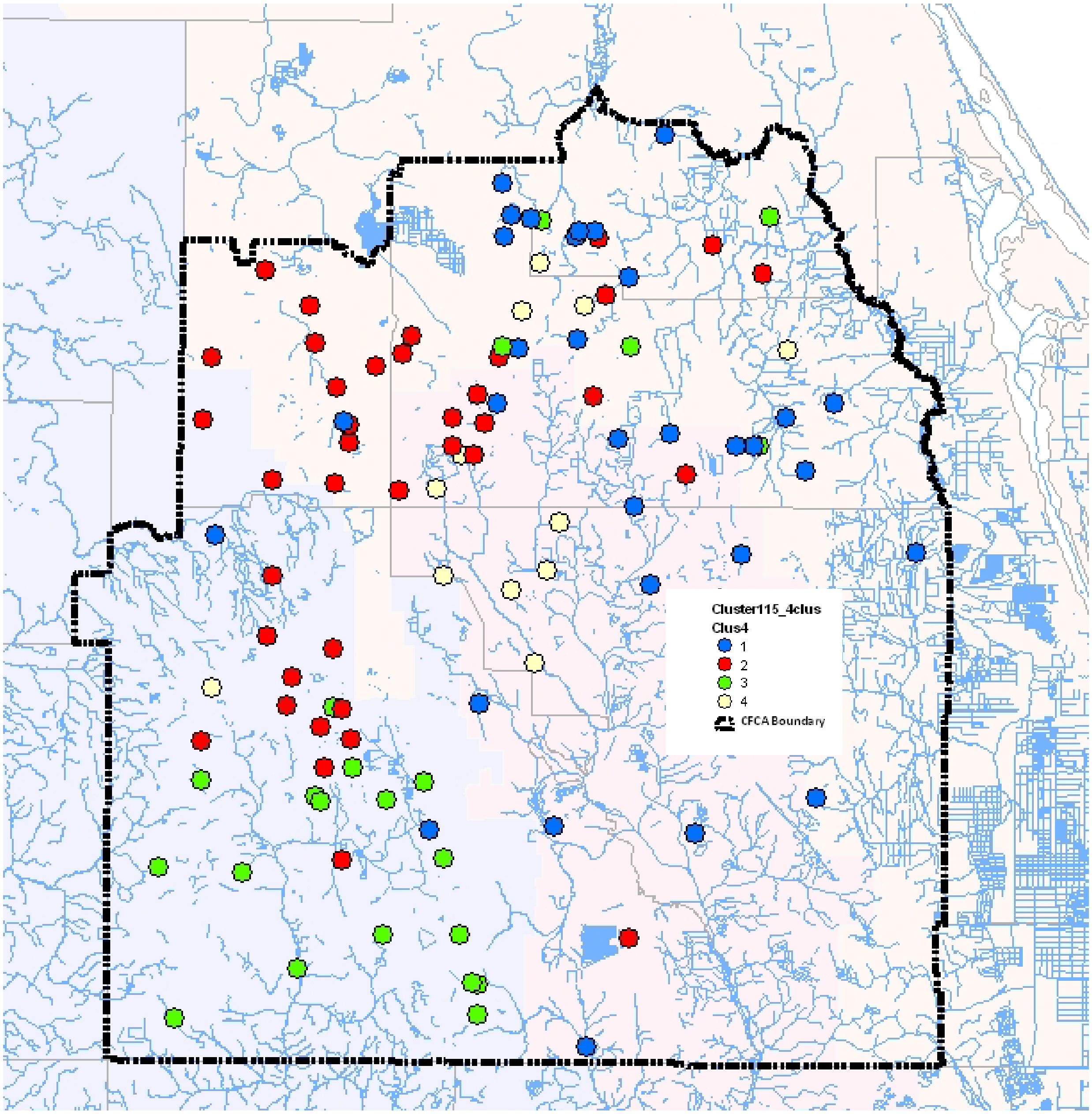


Figure 15 AHCA Spatial Associations, All Stations

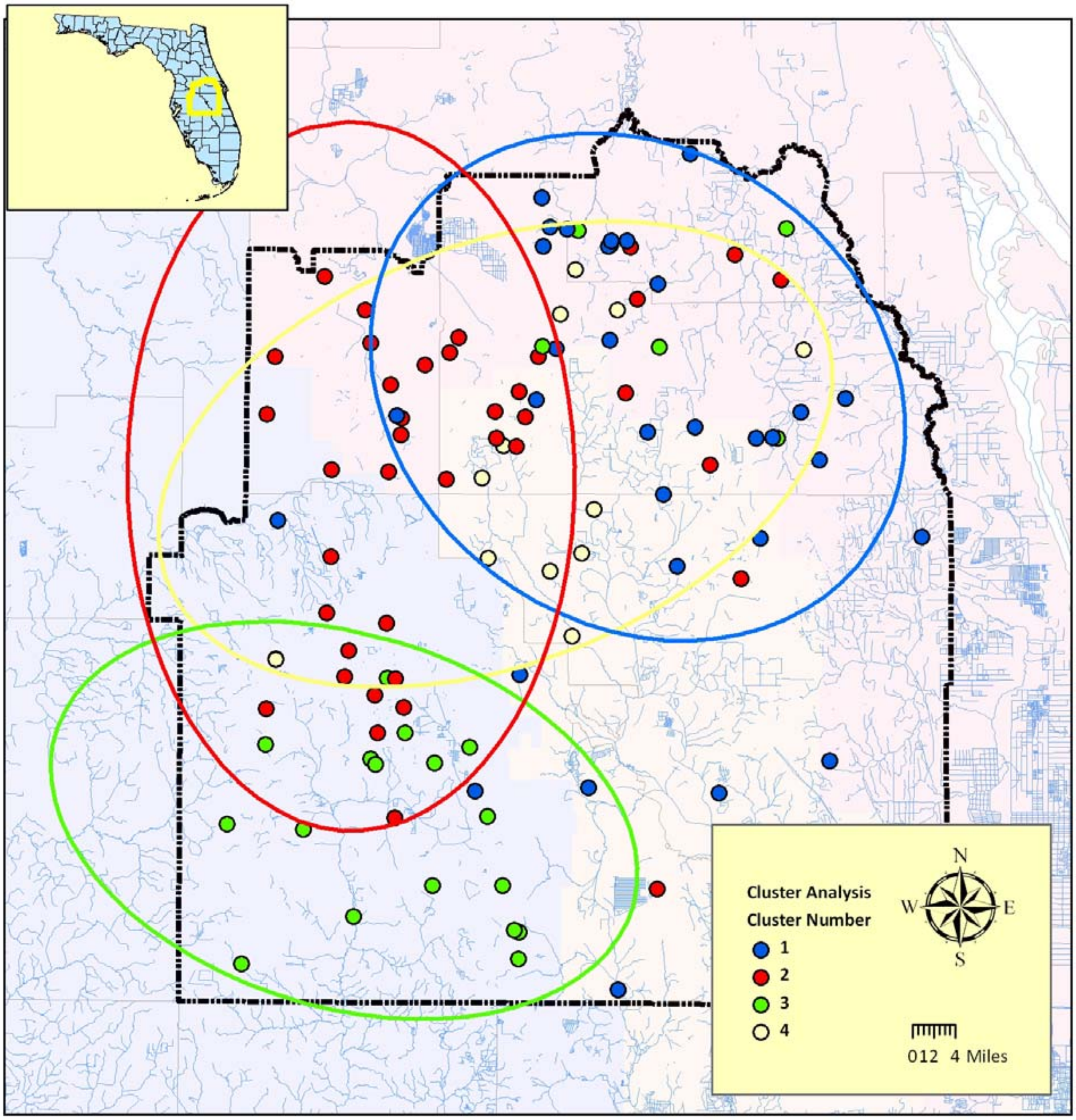


Figure 16 AHCA Spatial Associations with Ellipses, All Stations

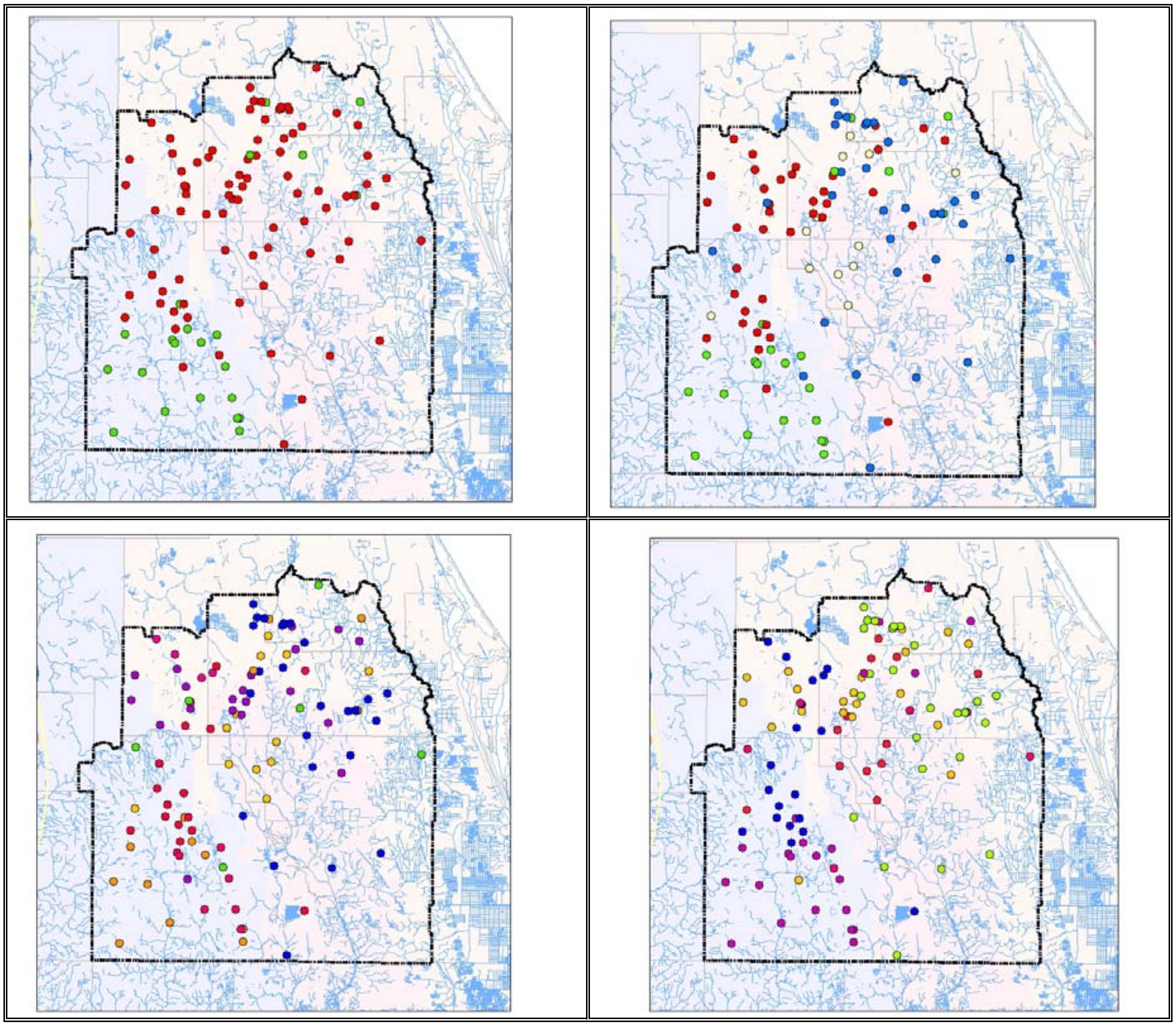


Figure 17 AHCA Results: 2 Clusters, 4 Clusters, 6 Clusters, 8 Clusters

Table 38 Station Type by Cluster

	Cluster Number			
Site Type	1	2	3	4
GW_IAS			2	1
GW_LFA	1			1
GW_SAS	1	4	1	5
GW_UFA	16	14	7	5
LK	6	24	12	4
RF	5			
SP	4		1	1
Total	33	42	23	17

In order to quantify the possible reasons for the spatial overlap of the clusters, the temporal characteristics of each cluster were further examined. The Mann Kendall slopes for each station in the cluster analysis were calculated for the analysis period (1984 through 2008). The results are shown in Table 39. The values shown in the table represent average Mann Kendall slopes for the non-normalized data, and hence, are averaged by station type. The p-values for all tests are shown in the individual cluster discussions which follow.

Table 39 Mann Kendall Sen Slope by Cluster

	Cluster Number			
Site Type	1	2	3	4
GW_IAS			0.33016	-0.0536
GW_LFA	-0.1131			-0.1617
GW_SAS	0.02079	-0.0293	0.07761	-0.0946
GW_UFA	-0.0396	-0.0489	0.2779	-0.2856
LK	-0.0098	0.00198	0.19025	-0.0407
RF	0.2717			
SP	-0.0798		0.04057	-0.0277

For each cluster, a temporal analysis was conducted by examining the normalized annual averages for each year as well as by examining the Mann Kendall slope for the period of analysis (1984 through 2008). For each cluster, the minimum, average, and maximum annual averages were determined and plotted in Figures 18 through 21. As shown in the figures, each cluster shows distinct temporal trends. Note that Cluster 3 shows increasing levels over the period of analysis. Cluster 3 is the only cluster with a consistent increase in levels as illustrated by both the temporal analysis and the average Mann Kendall Sen slope.

6.2.1.1 Cluster 1

Cluster 1 is composed of a total of 33 stations, as shown in Table 40. As shown in the table, this cluster is primarily comprised Upper Floridan wells. Additionally, all 5 rainfall stations utilized in the cluster analysis appear in Cluster 1.

Stations in Cluster 1 can be characterized by the following:

- Reduced levels in 1990, followed by several years of rebound,
- More pronounced reduced levels in 2000, followed by a rebound period, and
- Negative Sen slopes, with the exception of the rainfall stations and the surficial well, which exhibit positive slopes over the period of analysis.

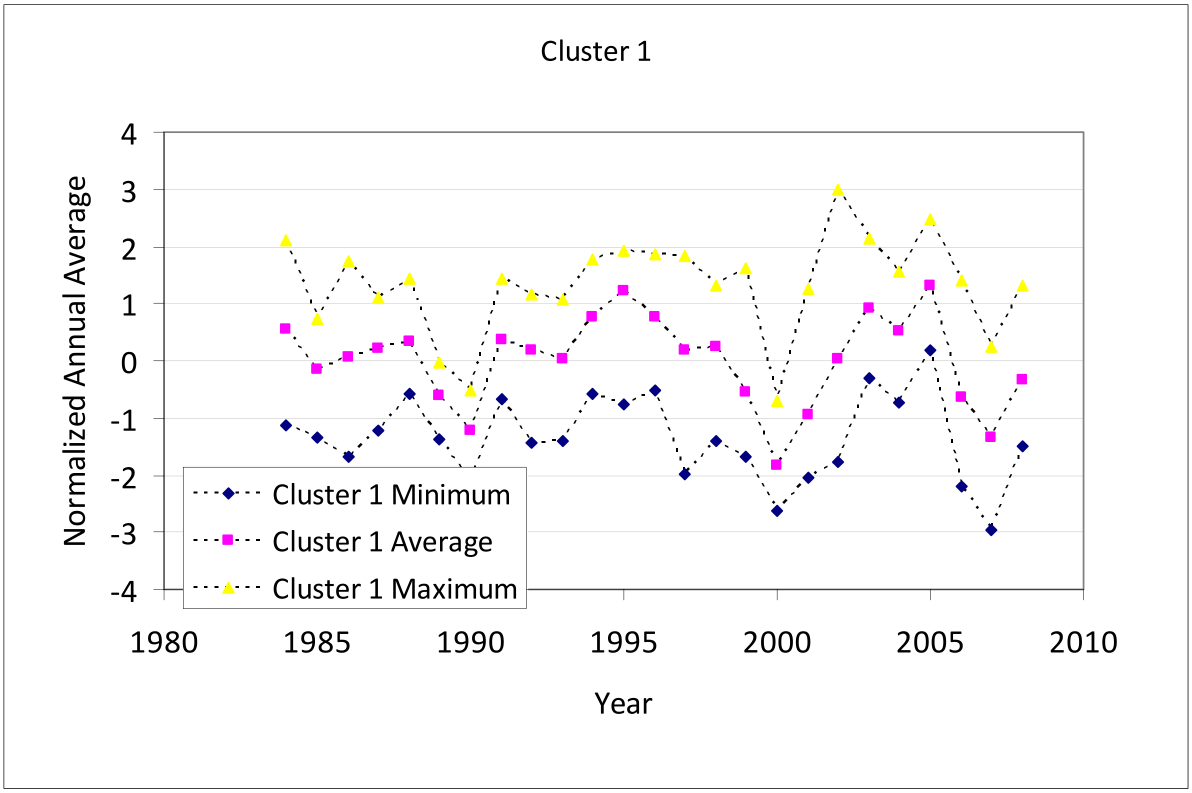


Figure 18 Cluster 1 Normalized Annual Averages

The majority of the stations in this cluster exhibit monotonic trends or piecewise trends with breakpoints prior to the beginning of the cluster analysis period. Additionally, although many of the stations in this cluster exhibit negative Sen slopes (as shown in Table 40), these slopes are only statistically significant at an 80% confidence level for 4 stations. Thus, it can be concluded that for the majority of the stations in this cluster, there is not sufficient information to determine that there is a trend in station levels over the cluster analysis period.

6.2.1.2 Cluster 2

Cluster 2 is composed of a total of 42 stations as shown in Table 41. The majority of the stations in this cluster are located in the northwestern portion of the CFCA domain. The cluster is primarily composed of lakes (24), followed by Upper Floridan wells (11), surficial wells (4), and Floridan wells (3).

Stations included in this cluster are characterized by:

- Low variability at the beginning of the period of analysis (1984 through 1996),
- A cyclic pattern as evidenced by the clear dry period, followed by a wet period, followed by an additional dry period in the latter portion of the analysis period, (shown in Figure 19), and
- Sen slopes over the period which are very close to zero.

Table 40 Cluster 1 Mann Kendall Regression Results

(Bold = Statistically Significant at 80% Confidence Level)

Dendro-gram ID	Site Name	Trend Type	TYPE	BreakDate 1	BreakDate 2	Mann Kendall p-value	Mann Kendall Sen Slope	Mann Kendall tau
8	Bithlo 1	MS	GW_UFA	1/1/1979		0.624	-0.024	-0.073
10	Boggy Creek Rd nr Taft	MS	GW_UFA	6/1/1993		**0.042**	**-0.105**	**-0.293**
16	Cocoa A	MS	GW_UFA	1/1/1985		0.761	-0.011	-0.047
19	Cocoa C - Zone 5	P	GW_UFA	6/1/1989		0.469	0.035	0.107
20	Cocoa D	P	GW_UFA	1/1/1995		0.559	-0.025	-0.087
21	Cocoa F	M	GW_UFA			0.498	-0.033	-0.100
22	Cocoa H	M	GW_UFA			0.559	-0.031	-0.087
23	Cocoa P	M	GW_UFA			**0.034**	**-0.122**	**-0.307**
28	Deseret	P	GW_SAS	6/1/1998		0.234	0.021	0.173
38	Howell	MS	LK	10/1/1999		0.199	-0.020	-0.187
40	Joe Overstreet nr St Cloud	MS	GW_UFA	6/1/1993		0.726	0.013	0.053
44	Lake Adair - LFA	M	GW_LFA			**0.088**	**-0.113**	**-0.247**
45	Lake Adair - UFA	M	GW_UFA			**0.097**	**-0.128**	**-0.240**
50	LAKE ARBUCKLE	M	Lake			0.498	-0.013	-0.100
56	Lake Joel nr Ashton	MS	GW_UFA	1/1/1993		0.183	-0.056	-0.193
59	LAKE MARION NR HAINES CITY	M	Lake			0.216	-0.013	-0.180
65	LAKE ROSALIE	P	Lake	1/1/1993		0.761	-0.011	-0.047
71	Longwood	MS	GW_UFA	6/1/1988		0.981	-0.003	-0.007
78	McCoy	M	LK			0.726	-0.029	-0.053
81	Orlo Vista	MS	GW_UFA	6/1/1985		0.726	-0.038	-0.053
84	Palm Lake Dr nr Windermere	P	GW_UFA	6/1/1990		0.944	-0.004	-0.013
86	Prevatt	P	LK	6/1/1979		0.624	0.027	0.073
88	Rock Springs	M	SP			0.441	-0.087	-0.113
96	Sanlando Springs	M	SP			0.981	-0.007	-0.007
101	St Cloud Power Plant	M	GW_UFA			0.148	-0.097	-0.210
102	Starbuck Spring	2P	SP	8/1/1987	1/1/1997	0.528	-0.031	-0.093
104	TH-10 Williams Rd nr Holopaw	P	GW_UFA	6/1/1994		0.963	-0.003	-0.010
109	Wekiwa Springs	MS	SP	7/1/1984		0.199	-0.195	-0.187
111	Clermont R	M	Rain			0.981	-0.024	-0.007
112	MOUNTAIN LAKE NWS	P	Rain	1/1/1952	1/1/1979	0.183	0.429	0.193
113	Orlando	2P	Rain	1/1/1953	6/1/1981	0.398	0.339	0.130
114	ROMP 88 ROCK RIDGE	P	Rain	1/1/1998		0.272	0.269	0.160
115	Sanford	P	Rain	6/1/1975		0.526	0.346	0.099

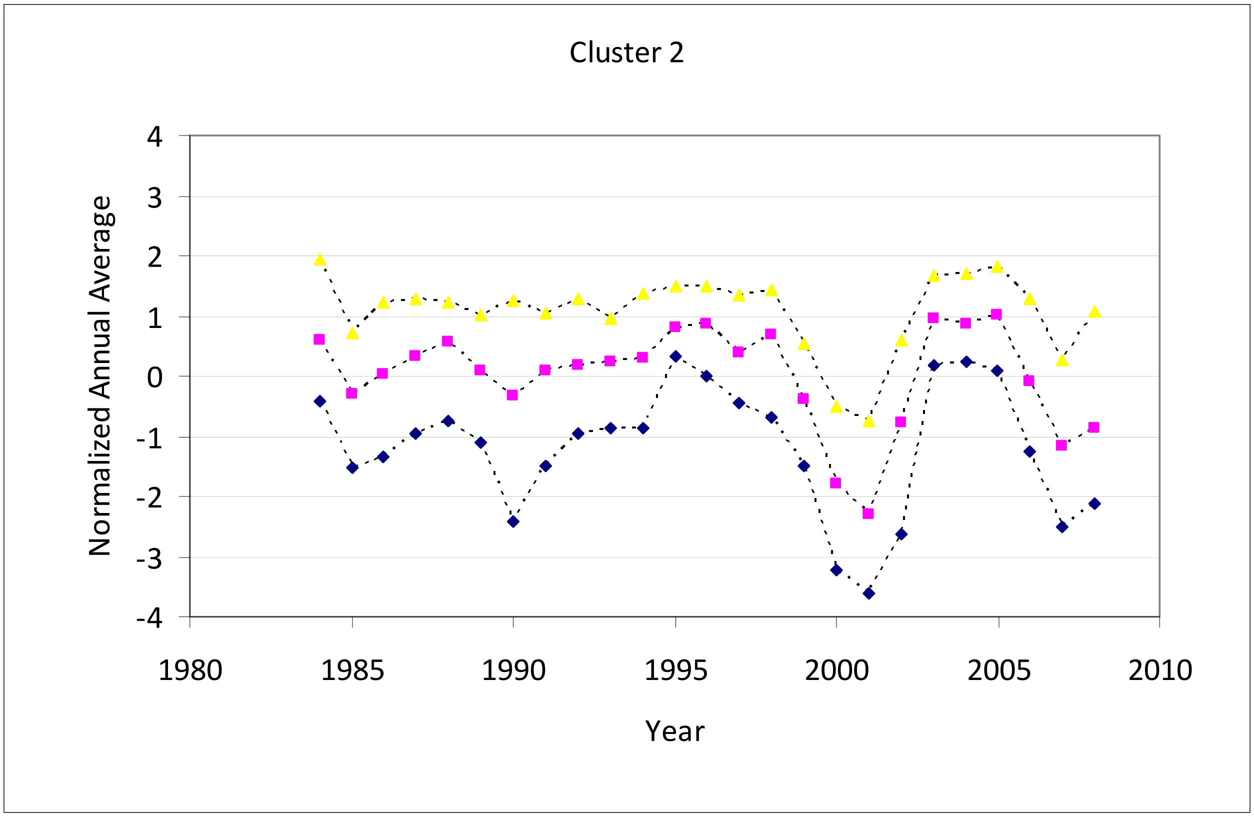


Figure 19   Cluster 2 Normalized Annual Averages

This cluster contains the majority of the stations with two break points (stations denoted as 2P in Table 41). While Sen slopes are close to zero for many of the stations in this cluster, this slope is statistically significant at an 80% confidence level for 7 of the 42 stations in this cluster. Thus, it can be concluded that for the majority of the stations in this cluster, there is not sufficient information to determine that there is a trend in measured levels over the cluster analysis period.

Table 41 Cluster 2 Mann Kendall Regression Results (Bold = Statistically Significant at 80% Confidence Level)

Dendro-gram ID	Site Name	Trend Type	TYPE	BreakDate 1	BreakDate 2	Mann Kendall p-value	Mann Kendall Sen Slope	Mann Kendall tau
1	Alligator	P	LK	1/1/1971		0.624	0.004	0.073
2	Apopka	MS	LK	1/1/1985		**0.047**	**-0.034**	**-0.287**
3	Apshaw	M	LK			0.388	-0.068	-0.127
6	Bay Lake nr Windermere	M	GW_UFA			**0.002**	**-0.197**	**-0.447**
11	Butler	P	LK	6/1/1979		0.469	0.018	0.107
12	Catherine	M	LK			0.388	-0.014	-0.127
13	Charm	2P	LK	6/1/1989	6/1/1999	**0.018**	**-0.074**	**-0.340**
14	Church	M	LK			0.761	-0.012	-0.047
15	Clermont	P	GW_UFA	1/1/1999		**0.027**	**-0.156**	**-0.320**
26	Conway	P	LK	6/1/1984		0.981	0.001	0.007
31	Eva nr Clermont - SAS	2P	GW_SAS	6/1/1988	1/1/1999	0.154	-0.033	-0.207
32	Eva nr Clermont - UFA	M	GW_UFA			0.252	-0.033	-0.167
36	Horsehead Pond - UFA	P	GW_UFA	1/1/1993		0.441	-0.022	-0.113
39	Island	2P	LK	1/1/1993	1/1/1999	0.797	0.003	0.040
41	Johns	P	LK	6/1/1981		**0.034**	**0.170**	**0.307**
42	Johns Lake	2P	GW_UFA	1/1/1994	6/1/2000	0.944	0.019	0.013
47	LAKE ALFRED DEEP AT LAKE ALFRED	P	Well	6/1/1997		0.375	0.053	0.130
48	LAKE ALFRED DEEP NR LAKE ALFRED	P	Well	1/1/1977	6/1/1991	0.498	0.026	0.100
51	LAKE ARIETTA (USGS) (R)	P	Lake	1/1/1997		0.870	0.008	0.027
54	LAKE GARFIELD (R)	P	Lake	1/1/1990		0.624	-0.012	-0.073
55	LAKE HOWARD (R)	P	Lake	6/1/1976	1/1/1990	0.691	0.011	0.060
57	LAKE JULIANA (R)	P	Lake	1/1/1976	6/1/1996	0.498	0.032	0.100
58	Lake Louisa State Park	2P	GW_UFA	6/1/1992	6/1/2001	0.129	-0.086	-0.220
61	Lake Oliver nr Vineland - SAS	P	GW_SAS	1/1/1991		0.498	-0.027	-0.100
62	Lake Oliver nr Vineland - UFA	2P	GW_UFA	6/1/1977	6/1/1990	0.338	-0.029	-0.140
64	LAKE PARKER AT LAKELAND	P	Lake	1/1/1991		0.870	-0.001	-0.027
67	LAKE SANITARY (MARIANA) (R)	P	Lake	6/1/1965	3/1/1994	0.981	0.000	0.007
68	Lake Sawyer nr Windermere	M	GW_UFA			**0.080**	**-0.123**	**-0.253**
69	LAKE SMART (R)	P	Lake	6/1/1973	6/1/1990	0.388	0.025	0.127
74	Louisa	M	LK			0.362	-0.064	-0.133
75	Maitland	M	LK			0.315	-0.008	-0.147
76	Mascotte - SAS	P	GW_SAS	6/1/1986		0.168	-0.051	-0.200
77	Mascotte - UFA	P	GW_UFA	1/1/1986		0.362	-0.046	-0.133
83	P-49 SURF NR FROSTPROOF	M	Well			0.944	-0.006	-0.013
89	Romp 101 nr Bay Lake	P	GW_UFA	6/1/1986		0.414	-0.042	-0.120
94	ROMP 76 OCAL-AVPK	P	Well	6/1/1995		0.870	0.007	0.027
95	Rose	P	LK	1/1/1980		0.469	0.040	0.107
100	South	M	LK			**0.065**	**-0.048**	**-0.267**
105	Tibet-Butler	P	LK	7/1/1981		0.591	0.016	0.080
106	Trout	2P	LK	1/1/1981	6/1/1992	0.469	0.058	0.107
107	USGS 815149233 FLDN	MP	Well	9/1/1991		0.141	-0.055	-0.213
110	Whip-Por-Will	MS	LK	1/1/1993		0.283	-0.005	-0.157

6.2.1.3 Cluster 3

Cluster 3 is composed of 23 stations which are primarily located in Polk County, in the southwest portion of the CFCA domain. This cluster contains 12 lakes, 1 spring, and 10 wells, as shown in Table 42. Of the 4 clusters, Cluster 3 is the least similar to the remaining 3 clusters, as shown by the high merge height with the remaining 3 clusters on the dendrogram.

Stations in this cluster are characterized by:

- Positive Mann Kendall slopes over the analysis period, indicating an increasing trend in the data, as shown in Figure 20,
- A period of reduced levels in 2000 which is not as pronounced as similar periods experienced by the other clusters.
- Increasing well levels, lake levels, and spring discharges over the analysis period.

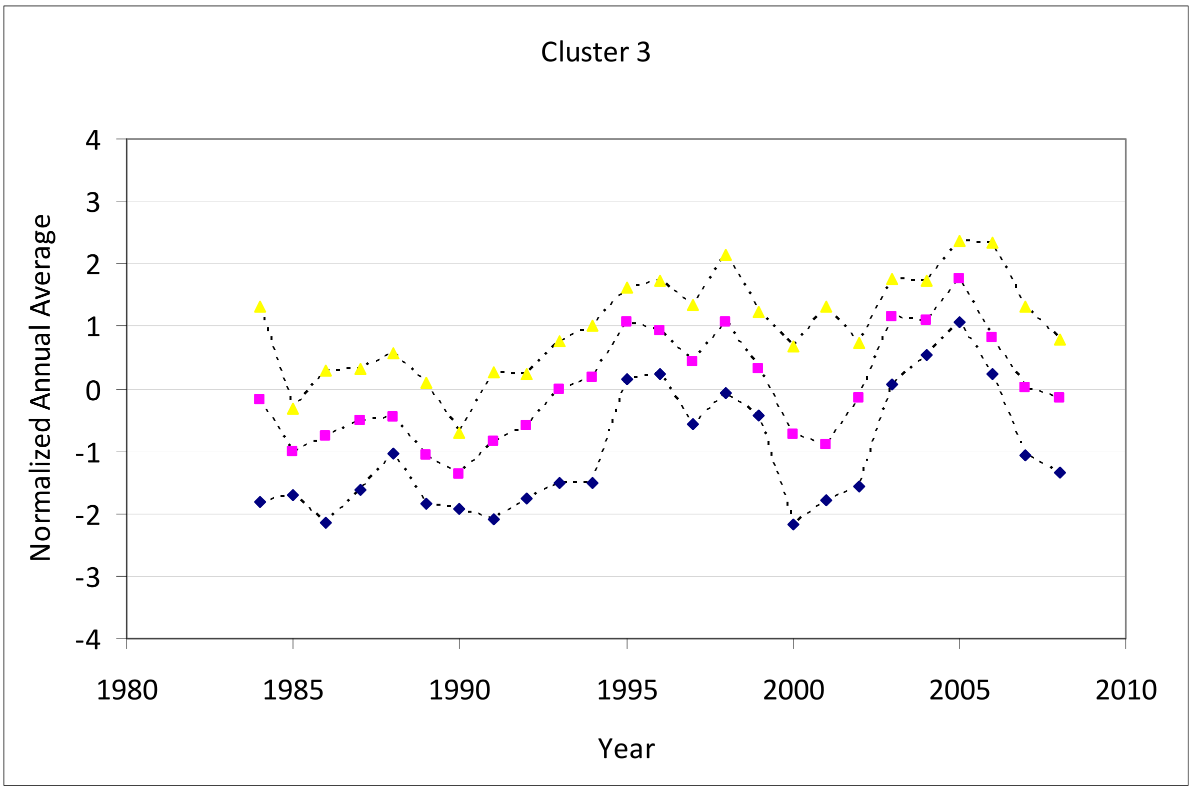


Figure 20 Cluster 3 Normalized Annual Averages

As shown in Table 42, Sen slopes were positive for all stations in this cluster. Additionally, these slopes were statistically significant at an 80% confidence level for 17 of the 23 stations in this cluster. Thus, it can be concluded that for the majority of the stations in this cluster, there is sufficient information to determine that levels are increasing over the cluster analysis period.

Table 42 Cluster 3 Mann Kendall Regression Results (Bold = Statistically Significant at 80% Confidence Level)

Dendro-gram ID	Site Name	Trend Type	TYPE	BreakDate1	BreakDate2	Mann Kendall p-value	Mann Kendall Sen Slope	Mann Kendall tau
4	Barton Big	P	LK	1/1/1989		**0.002**	**0.020**	**0.450**
17	Cocoa B	P	GW_UFA	6/1/1982		**0.000**	**0.223**	**0.573**
24	COLEY DEEP	P	Well	1/1/1990		**0.030**	**0.147**	**0.313**
27	CROOKED LAKE NR BABSON PARK (R)	P	Lake	6/1/1986		**0.000**	**0.512**	**0.660**
30	EAGLE LAKE (R)	P	Lake	6/1/1976		**0.006**	**0.200**	**0.393**
33	FORT GREEN SPRINGS INT	P	Well	1/1/1977		**0.047**	**0.389**	**0.287**
34	Geneva	2P	GW_UFA	1/1/1993	6/1/2002	0.272	0.066	0.160
46	LAKE ALFRED (R)	MP	Lake	6/1/1997		0.234	0.090	0.173
49	LAKE ANNIE (R)	MP	Lake	6/1/1988	6/1/2000	**0.011**	**0.185**	**0.367**
52	LAKE BUFFUM (R)	P	Lake	1/1/1990	6/1/2000	**0.030**	**0.127**	**0.313**
53	LAKE CLINCH (R)	P	Lake	1/1/1988		**0.000**	**0.185**	**0.507**
60	LAKE MCLEOD (R)	P	Lake	6/1/1976		**0.001**	**0.265**	**0.473**
63	LAKE OTIS (R)	P	Lake	6/1/1980		**0.088**	**0.100**	**0.247**
66	LAKE RUBY (R)	M	Lake			0.118	0.038	0.227
70	LAKE WALES (R)	P	Lake	1/1/1987		**0.008**	**0.258**	**0.380**
80	Miami Springs	M	SP			**0.038**	**0.041**	**0.300**
90	ROMP 45 AVPK	M	Well			**0.023**	**0.449**	**0.327**
91	ROMP 59 HTRN	MP	Well	1/1/2001		0.154	0.272	0.207
92	ROMP 59 SWNN~AVPK	M	Well			**0.023**	**0.454**	**0.327**
93	ROMP 60 OCAL~AVPK	P	Well	6/1/1975		**0.042**	**0.411**	**0.293**
97	SANLON RANCH FLDN	M	Well			0.234	0.196	0.173
98	Sherwood	P	LK	6/1/1985		0.154	0.303	0.207
108	USGS P-48 SHALLOW	MP	Well	1/1/1988		**0.016**	**0.078**	**0.347**

6.2.1.4 Cluster 4

Cluster 4 is composed of a total of 17 stations, shown in Table 43. This cluster is not dominated by a particular station type, but rather contains stations of every type with the exception of rainfall.

Stations in this cluster are characterized by:

- Visible decreasing levels over the period of analysis, as shown in Figure 21,
- The steepest negative Mann Kendall Sen slopes when compared to the remaining clusters,
- A number of stations with statistically significant decreasing trends of high magnitude, such as the OS U.L. well, with a slope of -0.705 feet per year over the analysis period, and
- Monotonic decreasing trends for a majority of stations.

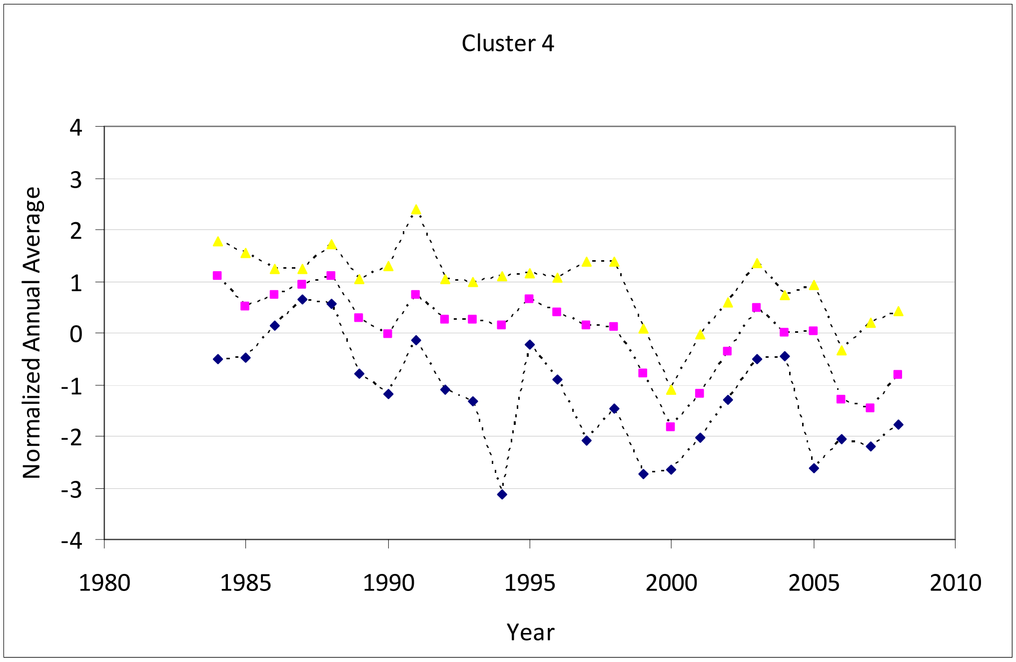


Figure 21 Cluster 4 Normalized Annual Averages

As shown in Table 43, Sen slopes were negative for all stations in this cluster. Additionally, these slopes were statistically significant at an 80% confidence level for 15 of the 17 stations in this cluster. Thus, it can be concluded that for the majority of the stations in this cluster, there is sufficient information to determine that levels are decreasing over the cluster analysis period.

Table 43 Cluster 4 Mann Kendall Regression Results **(Bold = Statistically Significant at 80% Confidence Level)**

Dendro-gram ID	SiteName	Trend Type	TYPE	BreakDate1	BreakDate2	Mann Kendall p-value	Mann Kendall Sen Slope	Mann Kendall tau
5	Bay	M	LK			**0.023**	**-0.020**	**-0.327**
7	Bear	2P	LK	6/1/1991	5/1/1999	0.154	-0.014	-0.207
9	Bithlo 3	MS	GW_SAS	6/1/1978		**0.065**	**-0.061**	**-0.267**
18	Cocoa C - Zone 1	M	GW_LFA			**0.000**	**-0.162**	**-0.533**
25	COMBEE ROAD DEEP	P	Well	1/1/1983		**0.003**	**-0.054**	**-0.427**
29	Disney nr Vineland	P	GW_SAS	1/1/1984		**0.010**	**-0.037**	**-0.373**
35	Horsehead Pond - SAS	M	GW_SAS			**0.000**	**-0.263**	**-0.647**
37	Horseshoe	2P	LK	6/1/1988	7/1/2001	**0.014**	**-0.117**	**-0.353**
43	Killarney	P	LK	6/1/1988		**0.012**	**-0.012**	**-0.360**
72	LOUGHMAN DEEP	MP	Well	6/1/1983		**0.000**	**-0.098**	**-0.547**
73	LOUGHMAN SHALLOW	M	Well			**0.065**	**-0.037**	**-0.267**
79	Mercantile Lane nr Kissimmee	M	GW_UFA			**0.000**	**-0.194**	**-0.620**
82	OS U.L.	M	GW_UFA			**0.000**	**-0.705**	**-0.793**
85	Palm Springs - Seminole	MS	SP	1/1/1997		0.199	-0.028	-0.187
87	Reedy Creek Overlook	M	GW_UFA			**0.000**	**-0.146**	**-0.507**
99	Shingle Creek nr Kissimmee	M	GW_UFA			**0.000**	**-0.285**	**-0.640**
103	STATE ROAD 33~COMBEE ROAD SHALLOW	MP	Well	1/1/1982		**0.001**	**-0.075**	**-0.487**

6.2.1.5 Cluster Comparison

A comparison of normalized annual averages by cluster is shown in Figure 22. As shown in the figure, the clusters exhibit similar cyclic behavior. The primary differences between Clusters 1, 2, and 4 are in the magnitude of the deviations from the mean. Cluster 3 deviated quite a bit from the others. Cluster 3 initialized below the mean (zero on the y axis) and below the other clusters, yet ended higher than all the other clusters. Cluster 3 represents the stations that were historically impacted by high groundwater withdrawals associated with phosphate mining but are now rebounding due to a significant change in the water use.

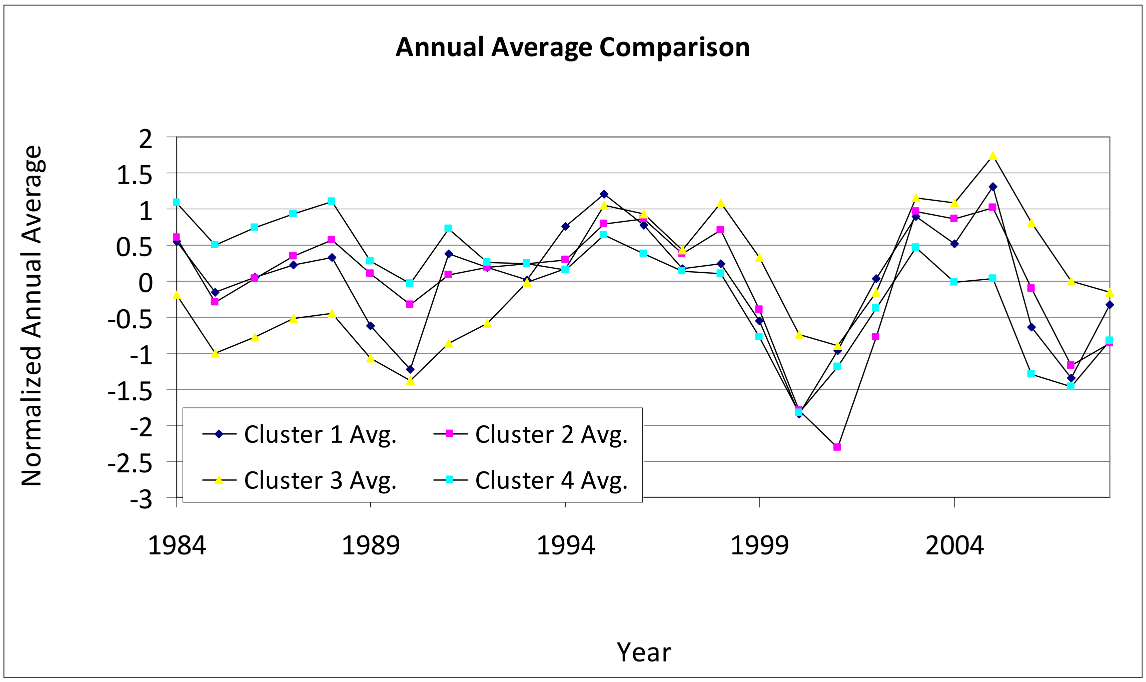


Figure 22 AHCA Annual Average Comparison

Figure 23 illustrates the cumulative average response of the various clusters. Again, Clusters 1, 2 and 4 have similar cumulative responses. Cluster 3, conversely, shows marked declines in the cumulative normalized annual average. The decline is related to the fact that the normalized values were below the mean for the first 8 years. There seems to be a significant change in the region in the early to mid 1990s that changed the trend of the Cluster 3 stations.

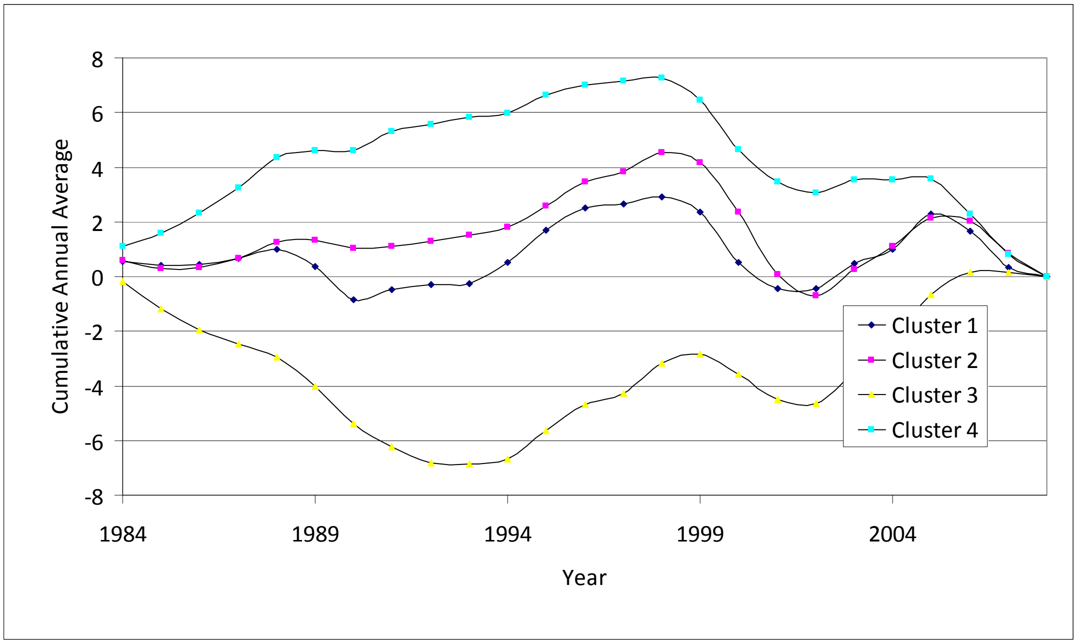


Figure 23 AHCA Cumulative Annual Average Comparison

6.2.2 Cluster Analysis: Lakes

A cluster analysis was performed on the 46 lakes with available data from 1984 through 2008. Similar to the analysis for all stations, the analysis was performed using an agglomerative hierarchical clustering algorithm with Euclidean distance and Ward's linkage between clusters. The resulting dendrogram is shown in Figure 24. The strength of the cluster is indicated by its height on the dengrogram. The lower the height, the stronger the relationship between the data sets. As shown in the dendrogram, Cluster 4 exhibits the most similarity between data sets in its cluster, followed by Cluster 3, Cluster 2, and Cluster 1. The spatial associations for each cluster are shown in Figure 25. As shown in the figure, there are clear spatial associations for each cluster, particularly Cluster 4.

6.2.2.1 Lake Cluster 1

Cluster 1 contains 21 lakes, as listed in Table 44. As shown in Figure 26, there is a large amount of spatial variability in this cluster, with stations in this cluster being located throughout the CFCA domain (where data was available). The normalized annual lake levels for stations in this cluster are shown in Figure 26. As shown in the figure, lakes in this cluster are characterized by:

- Average levels at the beginning of the period of analysis (through 1990),
- Increasing levels throughout the 1990s,
- Drastic declines in lake levels during the drought period (2000-2002),
- A post-drought recovery period, and
- A 2-year period of lower than average lake levels at the end of the analysis.

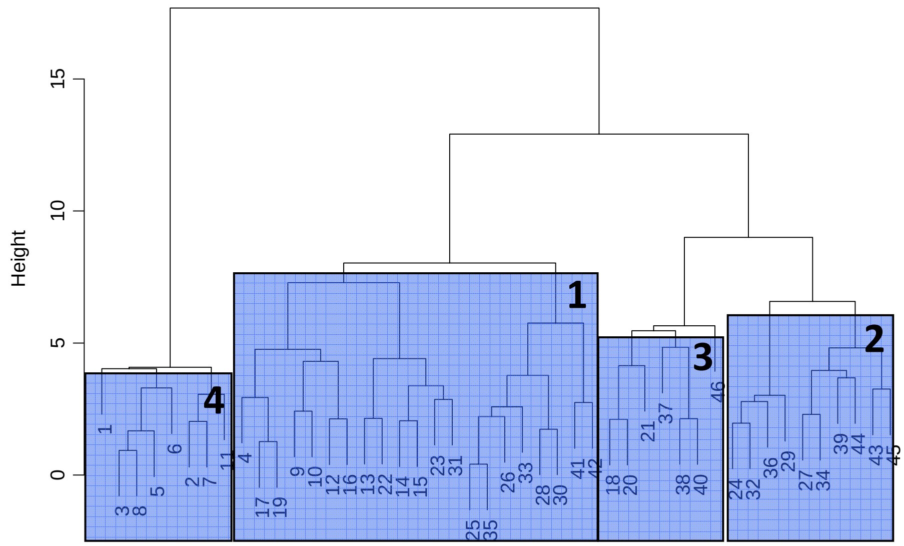


Figure 24 AHCA Dendrogram, Lakes

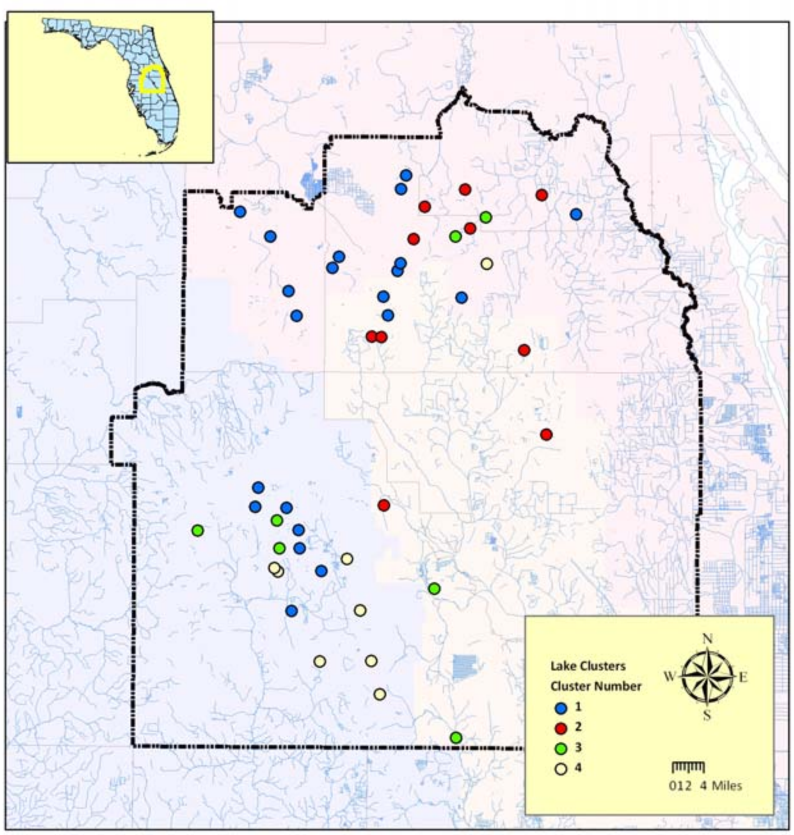


Figure 25 AHCA Spatial Associations, Lakes

Table 44 Lake Cluster 1

Dendrogram ID	Site Name	MK p-value	Sen Slope	MK Tau
13	Apopka	0.04713	-0.03449	-0.28667
14	Apshaw	0.38751	-0.06769	-0.12667
25	Butler	0.46906	0.01806	0.10667
26	Catherine	0.38751	-0.01364	-0.12667
15	Church	0.76142	-0.01161	-0.04667
28	Conway	0.98137	0.00102	0.00667
16	Johns	0.03356	0.16958	0.30667
4	LAKE ALFRED (R)	0.23361	0.09009	0.17333
17	LAKE ARIETTA (USGS) (R)	0.87014	0.00829	0.02667
30	LAKE GARFIELD (R)	0.62381	-0.01171	-0.07333
19	LAKE JULIANA (R)	0.49822	0.03156	0.10000
9	LAKE OTIS (R)	0.08821	0.10017	0.24667
10	LAKE RUBY (R)	0.11763	0.03770	0.22667
22	LAKE SMART (R)	0.38751	0.02478	0.12667
31	Louisa	0.36238	-0.06358	-0.13333
41	McCoy	0.72610	-0.02910	-0.05333
42	Prevatt	0.62381	0.02696	0.07333
33	Rose	0.46906	0.04020	0.10667
12	Sherwood	0.15426	0.30295	0.20667
35	Tibet-Butler	0.59115	0.01593	0.08000
23	Trout	0.46906	0.05849	0.10667

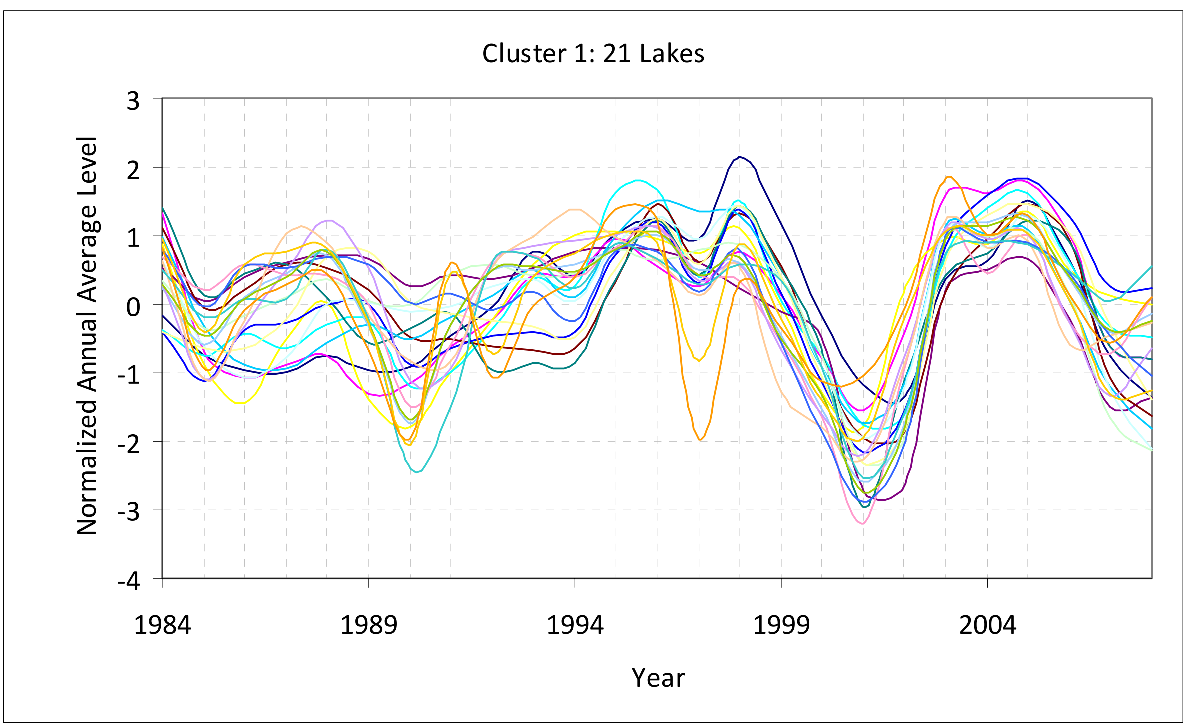


Figure 26 Lake Cluster 1 Normalized Annual Averages

6.2.2.2 Lake Cluster 2

Cluster 2 contains 10 lakes, as listed in Table 45. As shown in Figure 27, the majority of the lakes in the cluster are located in the SJRWMD, in the northern portion of the CFCA domain. The normalized annual lake levels for stations in this cluster are shown in Figure 28. As shown in the figure, lakes in this cluster are characterized by:

- Average levels (with some slight deviations) through 1996,
- Drastic declines in lake levels during the drought period (2000-2001)
- A post-drought recovery period, and
- A period of lower than average lake levels at the end of the analysis period.

Table 45 Lake Cluster 2

Dendrogram ID	Site Name	MK p-value	Sen Slope	MK Tau
24	Alligator	0.62381	0.00383	0.07333
43	Bay	0.02349	-0.01962	-0.32667
44	Bear	0.15426	-0.01396	-0.20667
27	Charm	0.01833	-0.07441	-0.34000
45	Horseshoe	0.01420	-0.11682	-0.35333
29	Island	0.79725	0.00340	0.04000
39	LAKE MARION NR HAINES CITY	0.21579	-0.01268	-0.18000
32	Maitland	0.31525	-0.00761	-0.14667
34	South	0.06503	-0.04796	-0.26667
36	Whip-Por-Will	0.28254	-0.00469	-0.15667

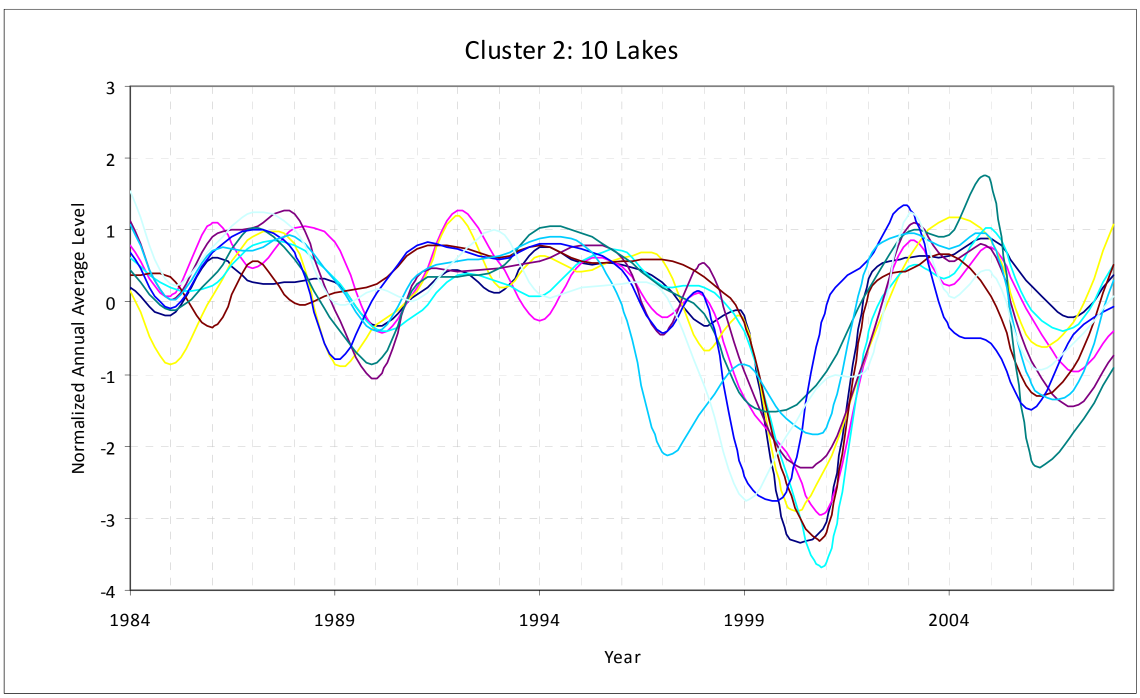


Figure 27 Lake Cluster 2 Normalized Annual Averages

6.2.2.3 Lake Cluster 3

Cluster 3 contains 7 lakes, as listed in Table 46. As shown in Figure 28, the majority of the lakes in the cluster are located in the SWFWMD. The normalized annual lake levels for stations in this cluster are shown in Figure 29. As shown in the figure, lakes in this cluster are characterized by:

- average levels (with some slight deviations) through 1999,
- declines in lake levels during the drought period (2000-2001) which were generally not as drastic as Cluster 2,
- a post-drought recovery period and,
- a period of lower than average lake levels at the end of the analysis period which was similar in magnitude to the 2000-2001 drought period.

As shown in Table 46, Sen slopes for lakes in this cluster were very close to zero. Additionally, p-values were high, which indicates a high likelihood that there is no trend in the data over the analysis period (the trend can be described by the mean).

Table 46 Lake Cluster 3

Dendrogram ID	Site_Name	MK p-value	Sen Slope	MK Tau
37	Howell	0.19896	-0.02011	-0.18667
46	Killarney	0.01246	-0.01224	-0.36000
38	LAKE ARBUCKLE	0.49822	-0.01342	-0.10000
18	LAKE HOWARD (R)	0.69134	0.01055	0.06000
20	LAKE PARKER AT LAKELAND	0.87014	-0.00108	-0.02667
40	LAKE ROSALIE	0.76142	-0.01056	-0.04667
21	LAKE SANITARY (MARIANA) (R)	0.98137	0.00024	0.00667

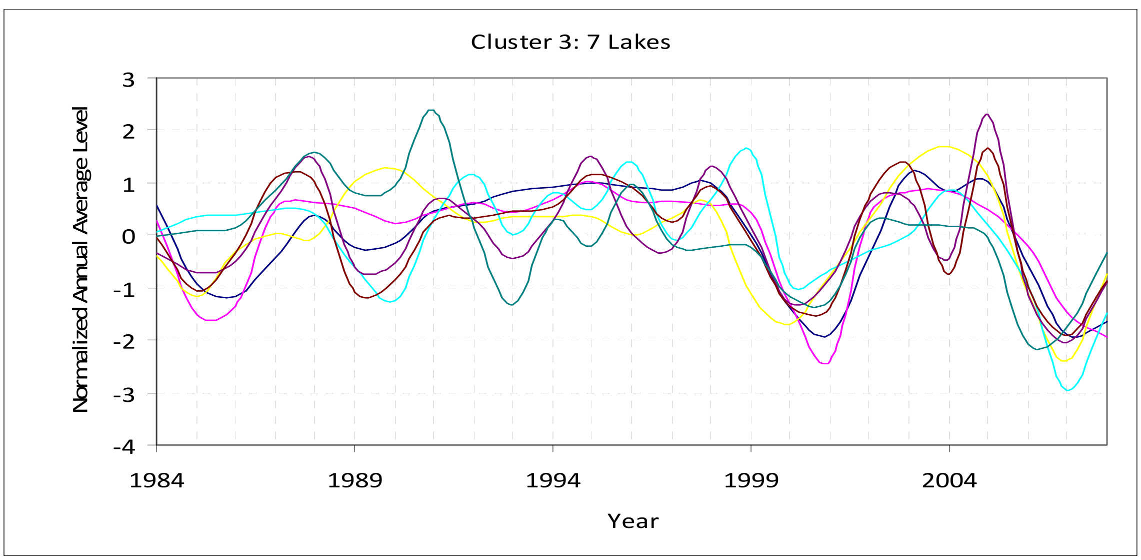


Figure 28 Lake Cluster 3 Normalized Annual Averages

6.2.2.4 Lake Cluster 4

Cluster 4 contains 8 lakes, as listed in Table 47. As shown in Figure 25, the 7 of the 8 lakes in the cluster are located in the SWFWMD. The normalized annual lake levels for stations in this cluster are shown in Figure 29. As shown in the figure, lakes in this cluster are characterized by:

- Below average levels through 1994, and
- A clear increasing trend levels over the period of analysis.

As shown in Table 47, Sen slopes for lakes in this cluster were positive, indicating increasing trends. Additionally, p-values were less than the critical p-value of 0.1, indicating that at an 80% confidence level, there is an increasing trend in the data over the analysis period.

Table 47 Lake Cluster 4

Dendrogram ID	Site Name	MK p-value	Sen Slope	MK Tau
1	Barton Big	0.00175	0.02039	0.45000
2	CROOKED LAKE NR BABSON PARK (R)	0.00000	0.51189	0.66000
3	EAGLE LAKE (R)	0.00628	0.20004	0.39333
5	LAKE ANNIE (R)	0.01091	0.18512	0.36667
6	LAKE BUFFUM (R)	0.02985	0.12708	0.31333
7	LAKE CLINCH (R)	0.00042	0.18495	0.50667
8	LAKE MCLEOD (R)	0.00099	0.26495	0.47333
11	LAKE WALES (R)	0.00831	0.25772	0.38000

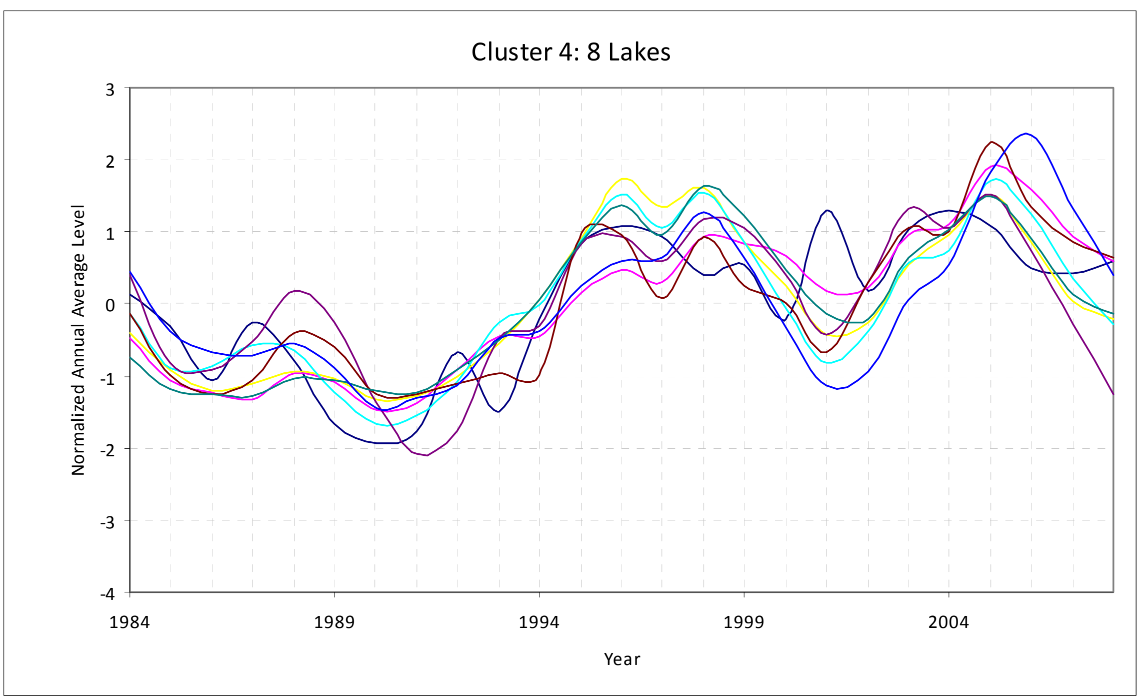


Figure 29 Lake Cluster 4 Normalized Annual Averages

6.2.2.5 Lake Cluster Comparison

Similarities can be seen between several clusters based on examination of the dendrogram and the associated spatial and temporal data. Average normalized annual lake levels by cluster are shown in Figure 30. As shown in the figure, there is a good degree of similarity between Clusters 1, 2 and 3. This similarity is confirmed by the dendrogram: Clusters 2 and 3 merge together, and are then merged with Cluster 1 to form a single cluster. The differences between these three clusters can be seen in both the magnitude of the variability (in terms of variability from the mean), and the temporal differences in this variability. Although all three clusters exhibit similar patterns, during various years in the analysis, the patterns are more pronounced by different clusters. All three clusters exhibit a cyclic wet/dry period at the beginning of the analysis, yet Cluster 2 is consistently wetter than average, while the Cluster 3 data exhibits a higher amplitude. Likewise, the data for these three clusters exhibits similar patterns during the drought period in 2000. Although each cluster clearly experiences a drastic decline in lake levels, the magnitude of the decline was not as drastic for Cluster 3. Lakes in this cluster appear slightly less affected by drought than the other clusters. Cluster 2 and 1 exhibit similar magnitudes of reduced levels, but there is a lag of approximately 1 year when comparing Clusters 1 and 2. Cluster 4 is distinctly different than the other 3 clusters in that it shows a clear trend of increasing lake levels throughout the analysis period. Furthermore, after 1994, the lakes in this cluster transition from having lake levels consistently below the mean average (<0) to above average (>0). Although lake levels in Cluster 4 do decrease during the drought period, lakes in this cluster are significantly less affected by the drought compared to the remaining 3 clusters.

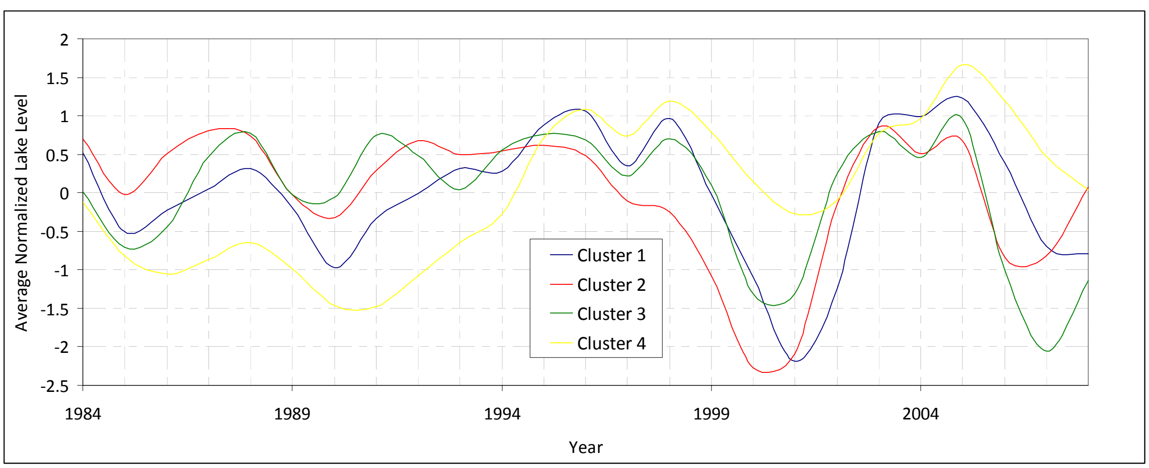


Figure 30 Lakes Average Normalized Comparison

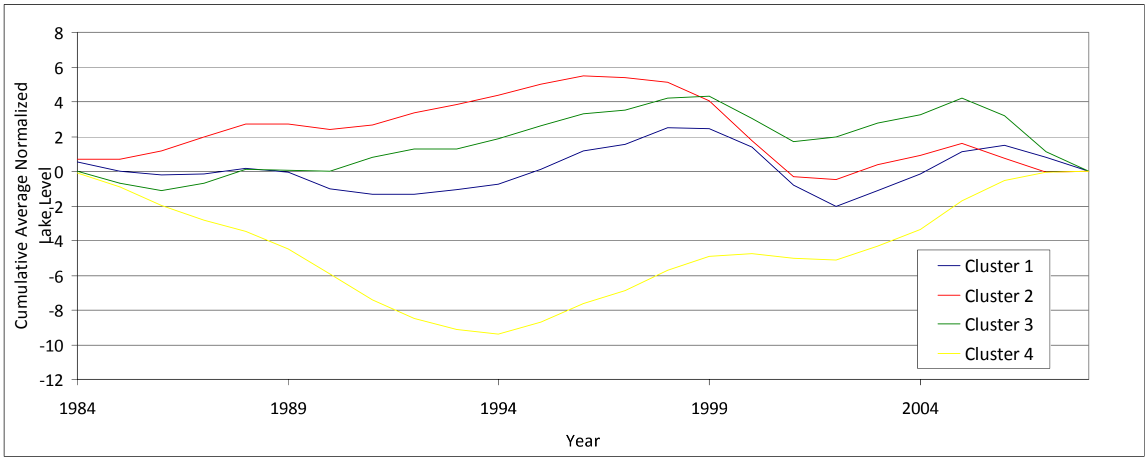


Figure 31 Lakes Cumulative Average Normalized Comparison

6.2.3 Cluster Analysis: Surficial Wells

A cluster analysis was performed on the 11 surficial wells with available data from 1984 through 2008. Similar to the analysis for all stations, the analysis was performed using an agglomerative hierarchical clustering algorithm with Euclidean distance and Ward's linkage between clusters. The resulting dendrogram is shown in Figure 32. As shown in the dendrogram, the wells were broken into 2 clusters: Cluster 1, containing 9 wells, and Cluster 2, containing 2 wells. The high merge height between Clusters 1 and 2 compared to other merges in the dendrogram indicates 2 distinct clusters.

6.2.3.1 Surficial Well Cluster 1

Cluster 1 contains 9 wells, as listed in Table 48. As shown in Figure 34, the surficial wells in this cluster are concentrated in the northern portion of the CFCA domain, with 1 outlier in the southern portion of the domain.

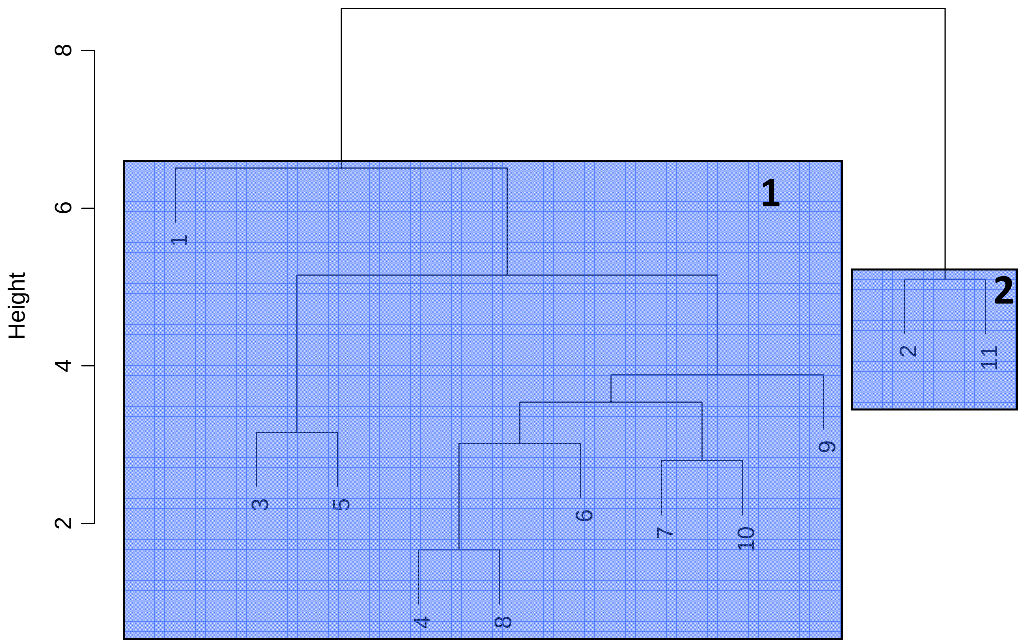


Figure 32 AHCA Dendrogram, Surficial Wells

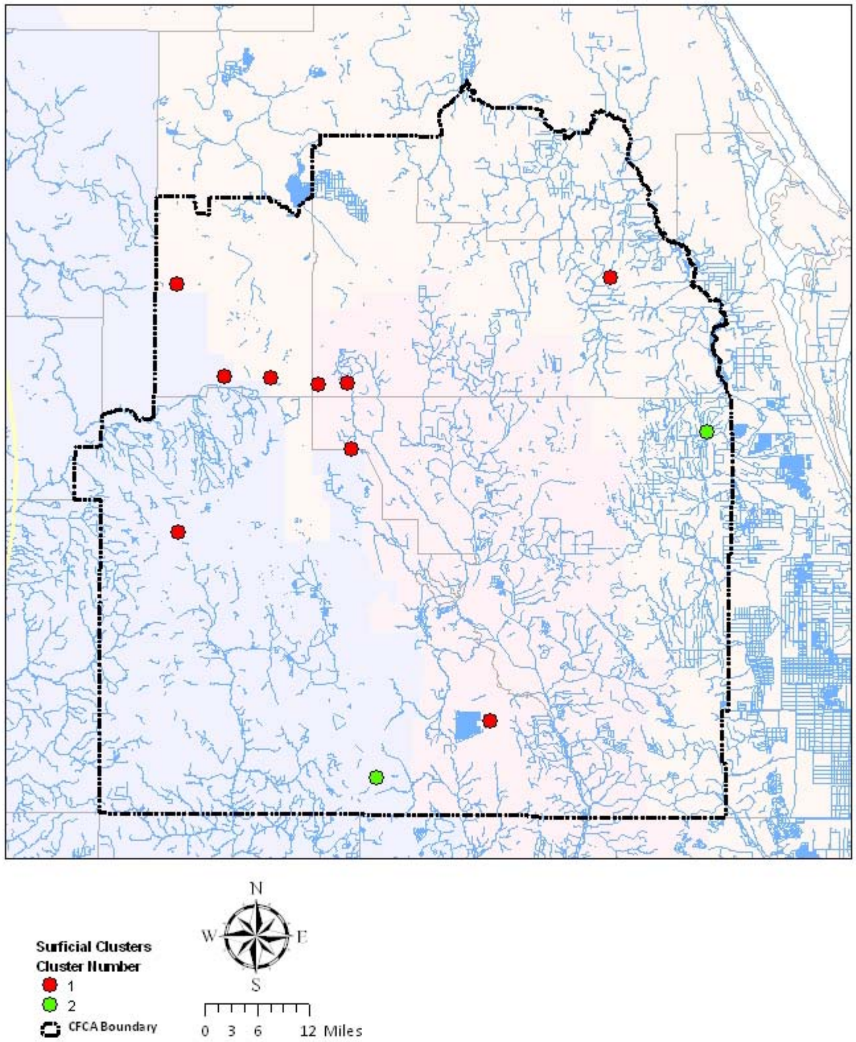


Figure 33 AHCA Spatial Associations, Surficial Wells

Table 48 Surficial Well Cluster 1

Number	Site Name	MK p-value	Sen Slope	MK Tau
1	Bithlo 3	0.065	-0.061	-0.267
3	Disney nr Vineland	0.010	-0.037	-0.373
4	Eva nr Clermont - SAS	0.154	-0.033	-0.207
5	Horsehead Pond - SAS	0.000	-0.263	-0.647
6	Lake Oliver nr Vineland - SAS	0.498	-0.027	-0.100
7	LOUGHMAN SHALLOW	0.065	-0.037	-0.267
8	Mascotte - SAS	0.168	-0.051	-0.200
9	P-49 SURF NR FROSTPROOF	0.944	-0.006	-0.013
10	STATE ROAD 33~COMBEE ROAD SHALLOW	0.001	-0.075	-0.487

Wells in this cluster are characterized by relatively small variability through 1998, followed by a drought period from 1999-2001.

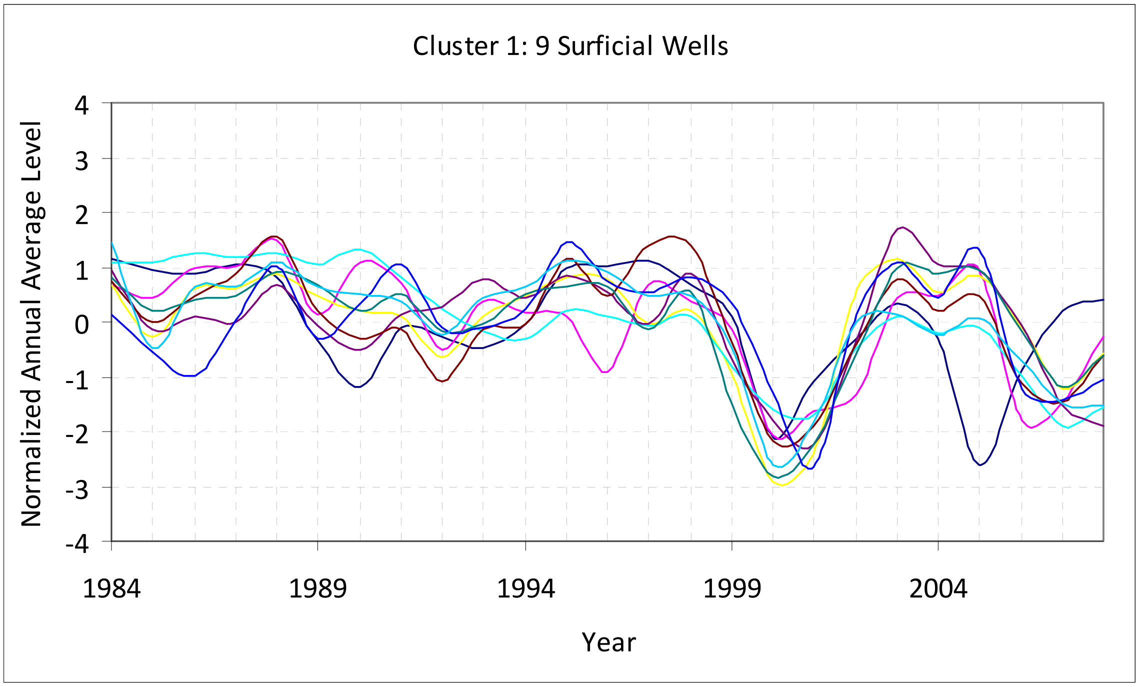


Figure 34 Surficial Well Cluster 1 Normalized Annual Averages

6.2.3.2 Surficial Well Cluster 2

Cluster 2 contains 2 wells: the Deseret well, located in the SJRWMD, and the USGS P-48 shallow well, located in the SWFWMD. As shown in Table 49, unlike Cluster 1, surficial wells in this cluster are characterized by positive Sen, indicating that they are exhibiting positive (increasing) trends over the period of analysis.

Table 49 Surficial Well Cluster 2

Number	Site Name	MK p-value	Sen Slope	MK Tau
2	Deseret	0.234	0.021	0.173
11	USGS P-48 SHALLOW	0.016	0.078	0.347

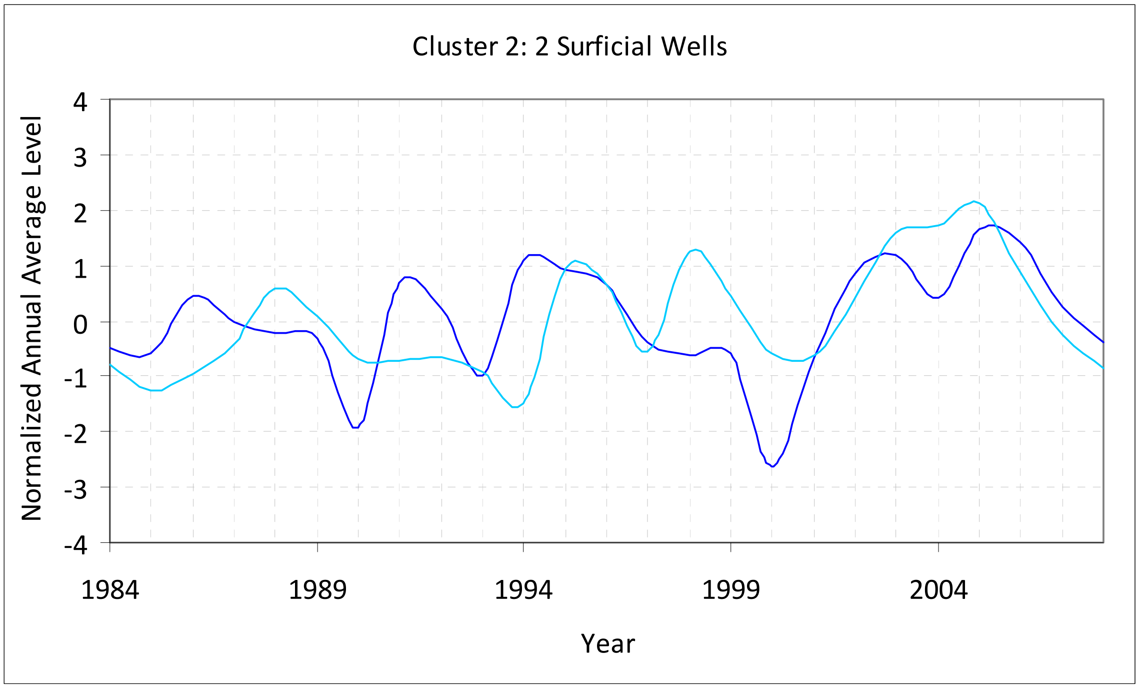


Figure 35 Surficial Well Cluster 2 Normalized Annual Averages

6.2.3.3 Surficial Well Cluster Comparison

Comparing the two clusters as shown in Figure 36 reveals that Cluster 1 exhibits a slight decreasing trend while Cluster 2 exhibits a slight increasing trend. This minor, yet distinct, difference is verified through comparison of the Sen slopes of the data. Cluster 1 contains 10 wells, all with negative Sen slopes. Cluster 2 contains 2 wells with positive Sen slopes. Figure 37 accentuates the trends since the data is shown in cumulative form.

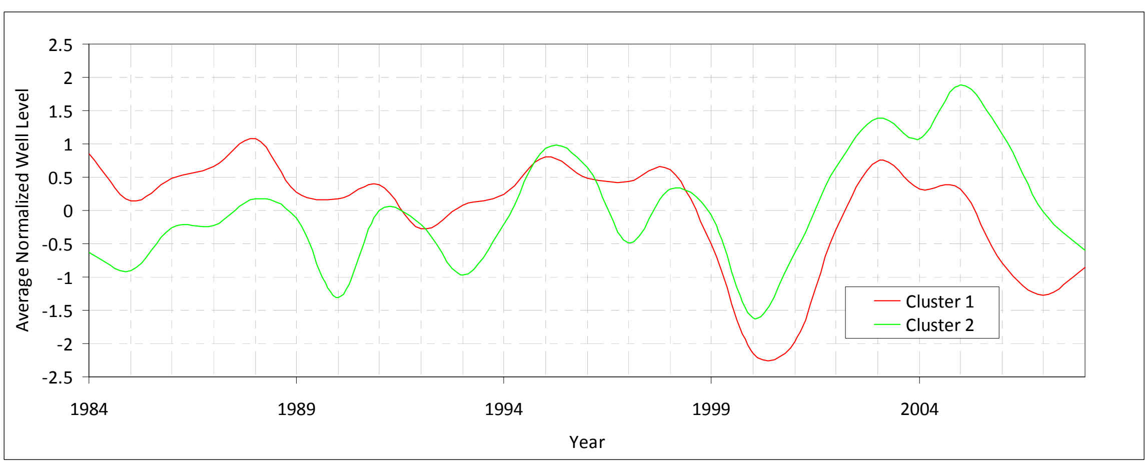


Figure 36 Surficial Wells Average Normalized Comparison

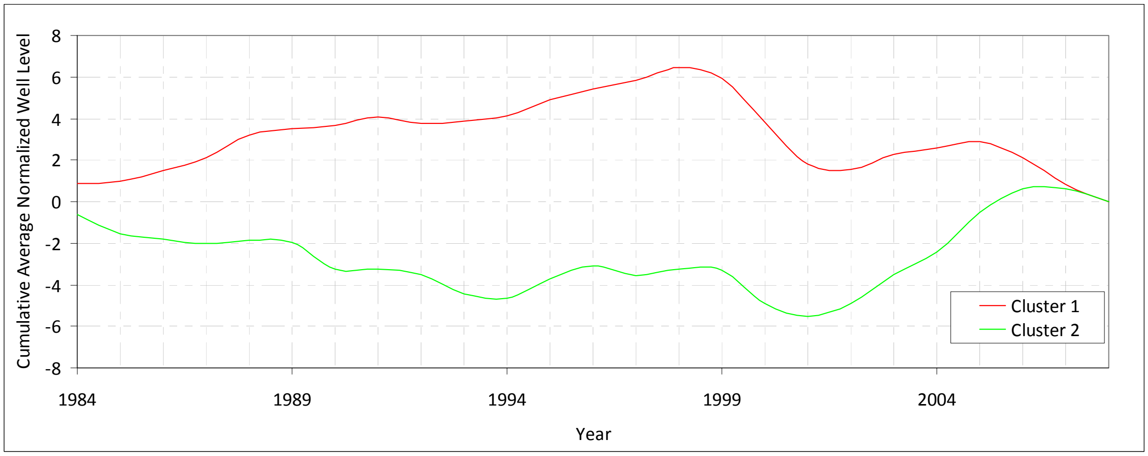


Figure 37   Surficial Wells Cumulative Average Normalized Comparison

6.2.4 Cluster Analysis: Intermediate and Floridan Wells

A cluster analysis was performed on the 47 intermediate and Floridan wells with available data from 1984 through 2008. Similar to the analysis for all stations, the analysis was performed using an agglomerative hierarchical clustering algorithm with Euclidean distance and Ward's linkage between clusters. The resulting dendrogram is shown in Figure 38. As shown in the dendrogram, the stations in Clusters 1 and 3 are more similar to each other than the other clusters. Cluster 2 is the most distinct cluster, as shown in the high merge height with the remaining 3 clusters.

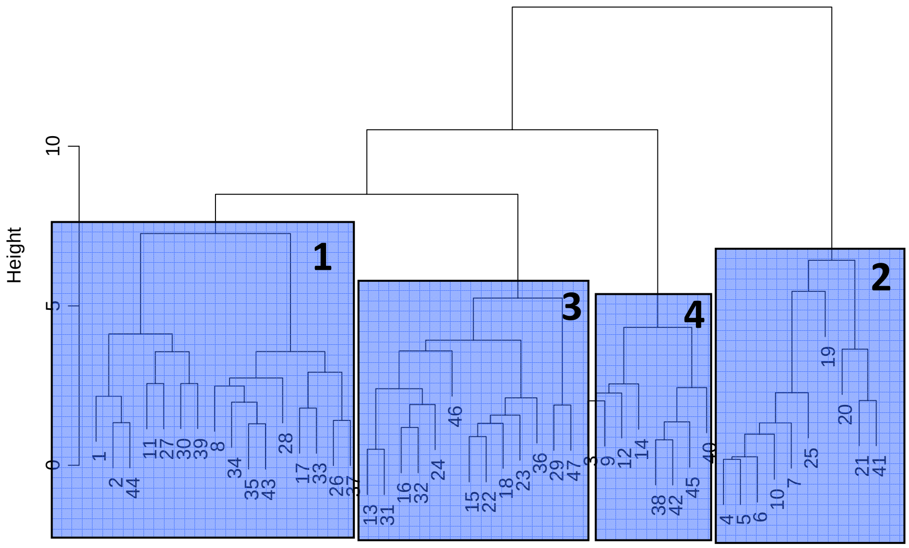


Figure 38 AHCA Dendrogram, Intermediate and Floridan Wells

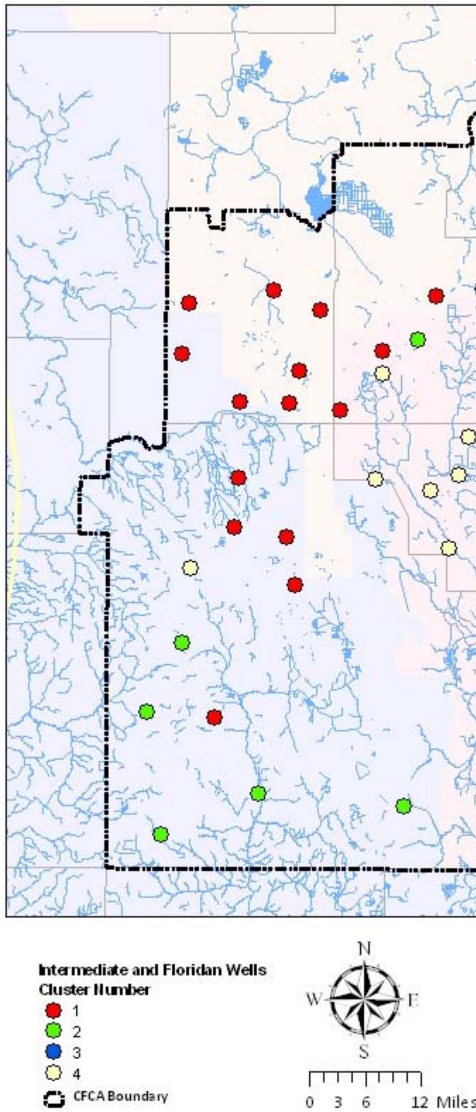


Figure 39 ACHA Spatial Associations, Intermediate and Floridan Wells

6.2.4.1 Intermediate and Floridan Cluster 1

This cluster includes a total of 16 intermediate and Floridan wells, as shown in Table 50. Stations included in this cluster are characterized by:

- Low variability at the beginning of the period of analysis (through 1993) as shown in Figure 40,
- A cyclic pattern as evidenced by the clear dry period, followed by a wet period, followed by an additional dry period in the latter portion of the analysis period, and
- Mann Kendall slopes over the period which are very close to zero.

Table 50 Intermediate and Floridan Well Cluster 1

Dendrogram ID	Site Name	Type	MK p-value	Sen Slope	MK Tau
17	Clermont	GW_UFA	0.026505644	-0.155613	-0.32
26	Eva nr Clermont - UFA	GW_UFA	0.252460504	-0.032832	-0.166667
27	Geneva	GW_UFA	0.272342712	0.065534	0.16
28	Horsehead Pond - UFA	GW_UFA	0.440876499	-0.022106	-0.113333
30	Johns Lake	GW_UFA	0.944142	0.018531	0.013333
1	LAKE ALFRED DEEP AT LAKE ALFRED	GW_FAS	0.3746855	0.05347	0.13
2	LAKE ALFRED DEEP NR LAKE ALFRED	GW_FAS	0.498219385	0.025583	0.1
33	Lake Louisa State Park	GW_UFA	0.128996012	-0.085703	-0.22
34	Lake Oliver nr Vineland - UFA	GW_UFA	0.338287855	-0.029328	-0.14
35	Lake Sawyer nr Windermere	GW_UFA	0.07983872	-0.123323	-0.253333
37	Mascotte - UFA	GW_UFA	0.362377699	-0.045849	-0.133333
39	Orlo Vista	GW_UFA	0.726095162	-0.037727	-0.053333
43	Romp 101 nr Bay Lake	GW_UFA	0.413686227	-0.042151	-0.12
11	ROMP 59 HTRN	GW_IAS	0.154257512	0.271598	0.206667
44	ROMP 76 OCAL-AVPK	GW_UFA	0.870136757	0.006685	0.026667
8	USGS 815149233 FLDN	GW_FAS	0.141192973	-0.054688	-0.213333

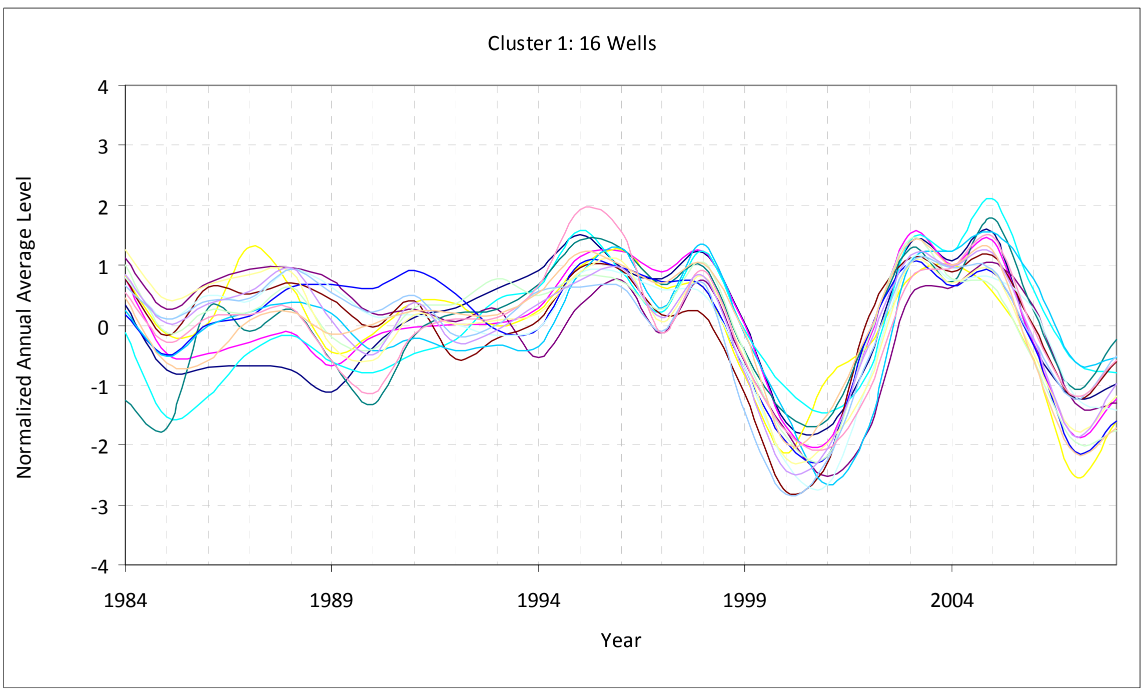


Figure 40 Intermediate and Floridan Well Cluster 1 Normalized Annual Averages

6.2.4.2 Intermediate and Floridan Cluster 2

This cluster includes a total of 10 intermediate and Floridan wells, as shown in Table 51. Stations included in this cluster are characterized by:

- Low variability at the beginning of the period of analysis (through 1993), as shown in Figure 41,
- A cyclic pattern as evidenced by the clear dry period, followed by a wet period, followed by an additional dry period in the latter portion of the analysis period, and
- Mann Kendall slopes that are generally positive, with many having statistically significant trends. All statistically significant slopes were positive, indicating increasing trends.

Table 51 Intermediate and Floridan Well Cluster 2

Dendrogram ID	Site Name	Type	MK p-value	Sen Slope	MK Tau
19	Cocoa B	GW_UFA	0.0001	0.2231	0.5733
20	Cocoa C - Zone 5	GW_UFA	0.4691	0.0353	0.1067
21	Cocoa D	GW_UFA	0.5593	-0.0248	-0.0867
25	COLEY DEEP	GW_UFA	0.0299	0.1466	0.3133
10	FORT GREEN SPRINGS INT	GW_IAS	0.0471	0.3887	0.2867
41	Palm Lake Dr nr Windermere	GW_UFA	0.9441	-0.0044	-0.0133
4	ROMP 45 AVPK	GW_FAS	0.0235	0.4491	0.3267
5	ROMP 59 SWNN~AVPK	GW_FAS	0.0235	0.4541	0.3267
6	ROMP 60 OCAL~AVPK	GW_FAS	0.0422	0.4106	0.2933
7	SANLON RANCH FLDN	GW_FAS	0.2336	0.1964	0.1733

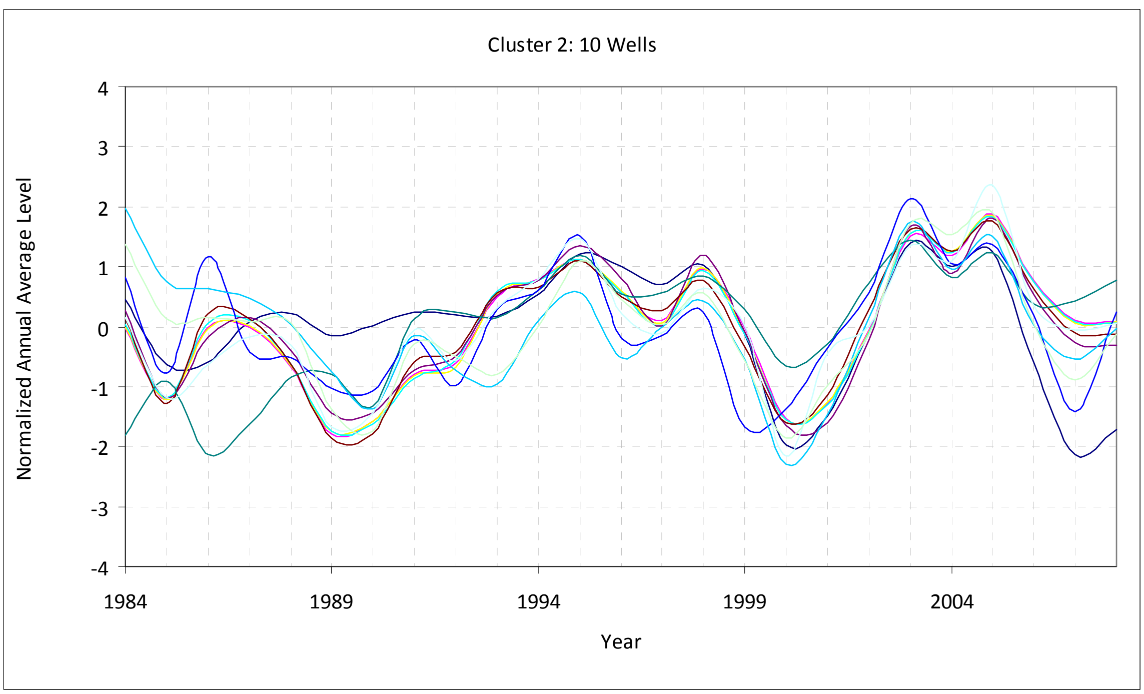


Figure 41 Intermediate and Floridan Well Cluster 2 Normalized Annual Averages

6.2.4.3 Intermediate and Floridan Cluster 3

This cluster includes a total of 13 intermediate and Floridan wells, as shown in Table 52. Stations included in this cluster are characterized by:

- A visible period of below average levels in 1990, as shown in Figure 42,
- A more drastic drought in 2000, and
- Negative Sen slopes.

Table 52 Intermediate and Floridan Well Cluster 3

Dendrogram ID	Site Name	Type	MK p-value	Sen Slope	MK Tau
15	Bithlo 1	GW_UFA	0.6238	-0.0243	-0.0733
16	Boggy Creek Rd nr Taft	GW_UFA	0.0422	-0.1048	-0.2933
18	Cocoa A	GW_UFA	0.7614	-0.0112	-0.0467
22	Cocoa F	GW_UFA	0.4982	-0.0334	-0.1000
23	Cocoa H	GW_UFA	0.5593	-0.0314	-0.0867
24	Cocoa P	GW_UFA	0.0336	-0.1216	-0.3067
29	Joe Overstreet nr St Cloud	GW_UFA	0.7261	0.0126	0.0533
13	Lake Adair - LFA	GW_LFA	0.0882	-0.1131	-0.2467
31	Lake Adair - UFA	GW_UFA	0.0973	-0.1279	-0.2400
32	Lake Joel nr Ashton	GW_UFA	0.1831	-0.0561	-0.1933
36	Longwood	GW_UFA	0.9814	-0.0033	-0.0067
46	St Cloud Power Plant	GW_UFA	0.1475	-0.0974	-0.2100
47	TH-10 Williams Rd nr Holopaw	GW_UFA	0.9627	-0.0029	-0.0100

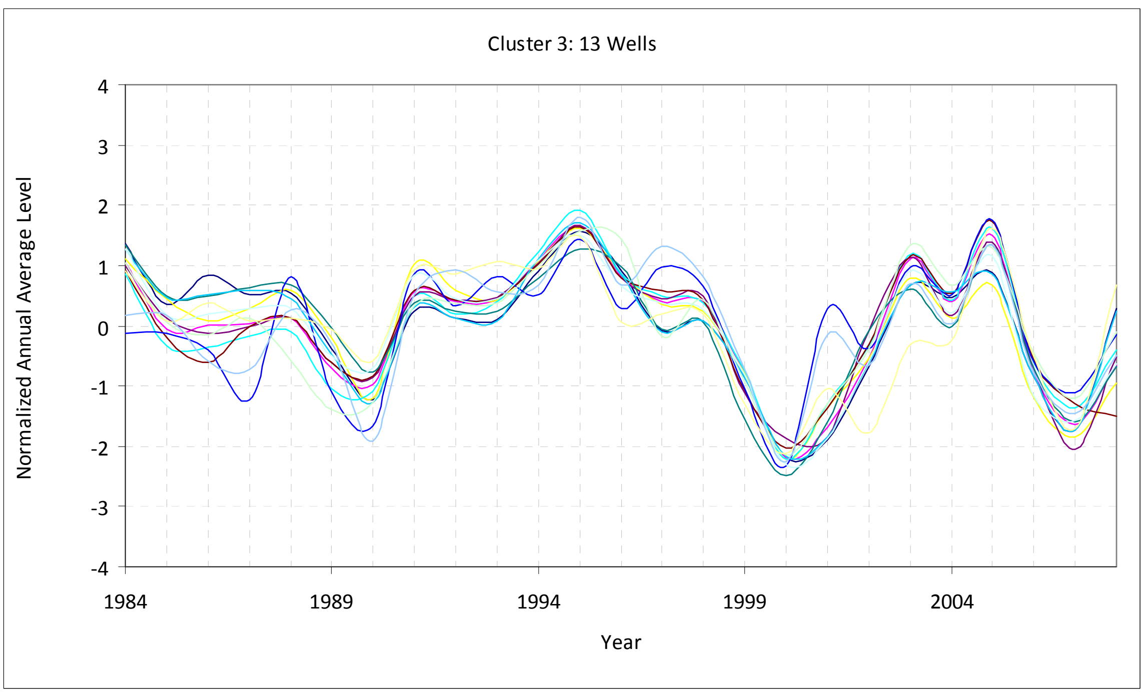


Figure 42 Intermediate and Floridan Well Cluster 3 Normalized Annual Averages

6.2.4.4 Intermediate and Floridan Cluster 4

This cluster includes a total of 8 intermediate and Floridan wells, as shown in Table 53. Stations included in this cluster are characterized by:

- A visible downward trend over the analysis period, as shown in Figure 43,
- Statistically significant negative Mann Kendall slopes (for all stations in this cluster), and
- Relatively low intra-cluster variability, as evidenced in Figure 43.

Table 53 Intermediate and Floridan Well Cluster 4

Dendrogram ID	Site Name	Type	MK p-value	Sen Slope	MK Tau
14	Bay Lake nr Windermere	GW_UFA	0.0019	-0.1967	-0.4467
12	Cocoa C - Zone 1	GW_LFA	0.0002	-0.1617	-0.5333
9	COMBEE ROAD DEEP	GW_IAS	0.0030	-0.0536	-0.4267
3	LOUGHMAN DEEP	GW_FAS	0.0001	-0.0977	-0.5467
38	Mercantile Lane nr Kissimmee	GW_UFA	0.0000	-0.1943	-0.6200
40	OS U.L.	GW_UFA	0.0000	-0.7049	-0.7933
42	Reedy Creek Overlook	GW_UFA	0.0004	-0.1460	-0.5067
45	Shingle Creek nr Kissimmee	GW_UFA	0.0000	-0.2854	-0.6400

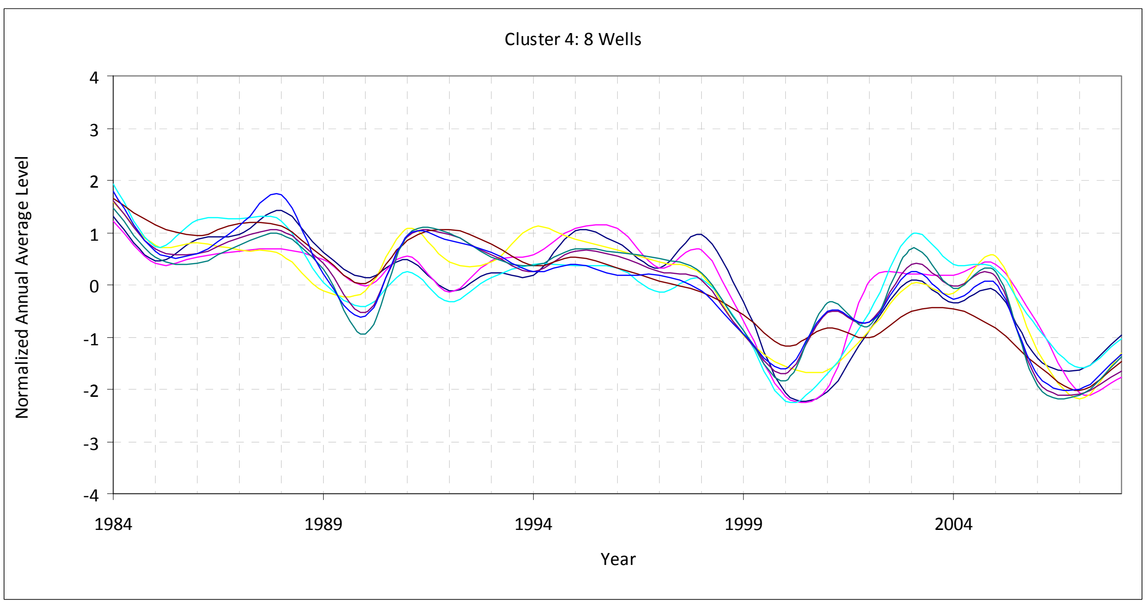


Figure 43 Intermediate and Floridan Well Cluster 4 Normalized Annual Averages

6.2.5 Cluster Analysis: Springs

A cluster analysis was performed on the 6 springs with available data from 1984 through 2008. Similar to the analysis for all stations, the analysis was performed using an agglomerative hierarchical clustering algorithm with Euclidean distance and Ward's linkage between clusters.

The resulting dendrogram is shown in Figure 44. The dendrogram shows 2 clear clusters. Spatial associations for the spring cluster analysis are shown in Figure 45. As shown in the figure, Cluster 2 contains 1 spring: Palm Springs- Seminole, while the remaining springs are located in Cluster 1.

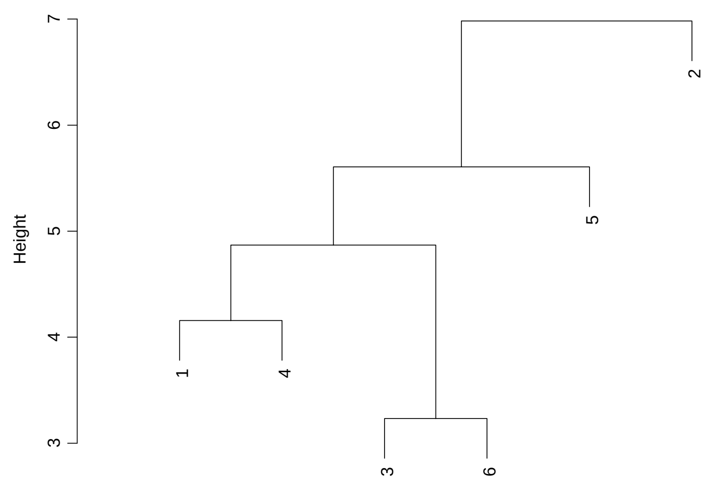


Figure 44 AHCA Dendrogram, Springs

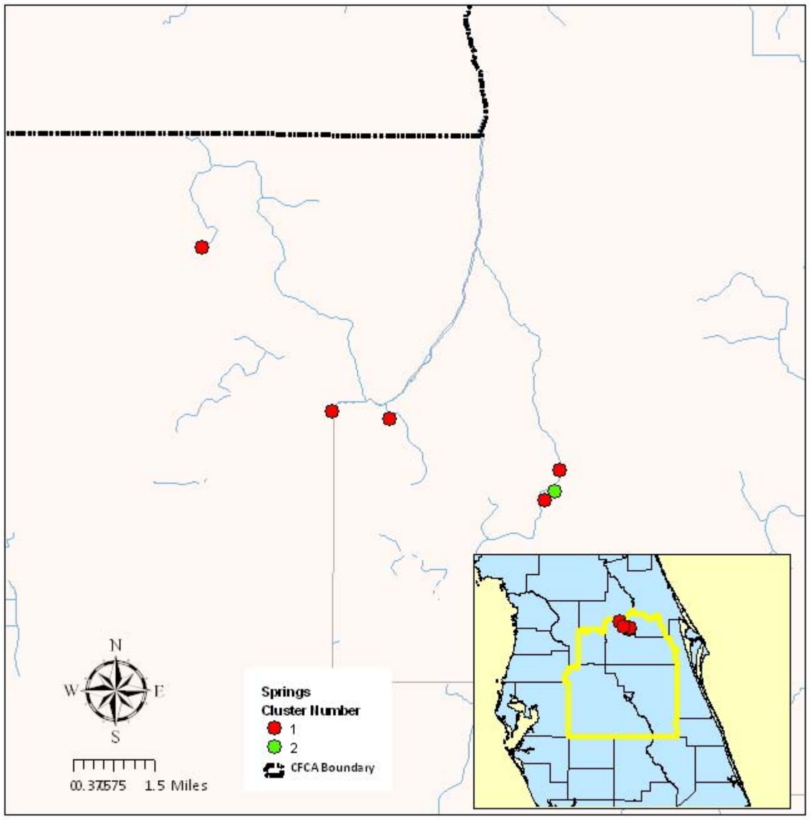


Figure 45 ACHA Spatial Associations, Springs

Table 54 Spring Clusters 1 and 2

Dendrogram ID	Site Name	p-value	Sen Slope	MK Tau	Cluster Number
1	Miami Springs	0.0377	0.0406	0.3000	1
2	Palm Springs - Seminole	0.1990	-0.0277	-0.1867	2
3	Rock Springs	0.4409	-0.0866	-0.1133	1
4	Sanlando Springs	0.9814	-0.0066	-0.0067	1
5	Starbuck Spring	0.5283	-0.0311	-0.0933	1
6	Wekiwa Springs	0.1990	-0.1948	-0.1867	1

The Mann Kendall results for all springs are shown in Table 54. As shown in the table, one station had a statistically significant trend: Miami Springs. The remaining slopes were close to zero (and not statistically significant), indicating that there is a small likelihood that there is a trend in the data. In order to identify the distinct differences between the clusters, the normalized annual average discharge and cumulative normalized annual average were examined, as shown in Figures 46 and 47.

As shown in Figure 47, the normalized annual average discharge from Palm Springs- Seminole, the Cluster 2 station, is distinct from the Cluster 1 stations. Accumulating the discharges (as shown in Figure 47) more clearly illustrates the difference in spring discharge between clusters.

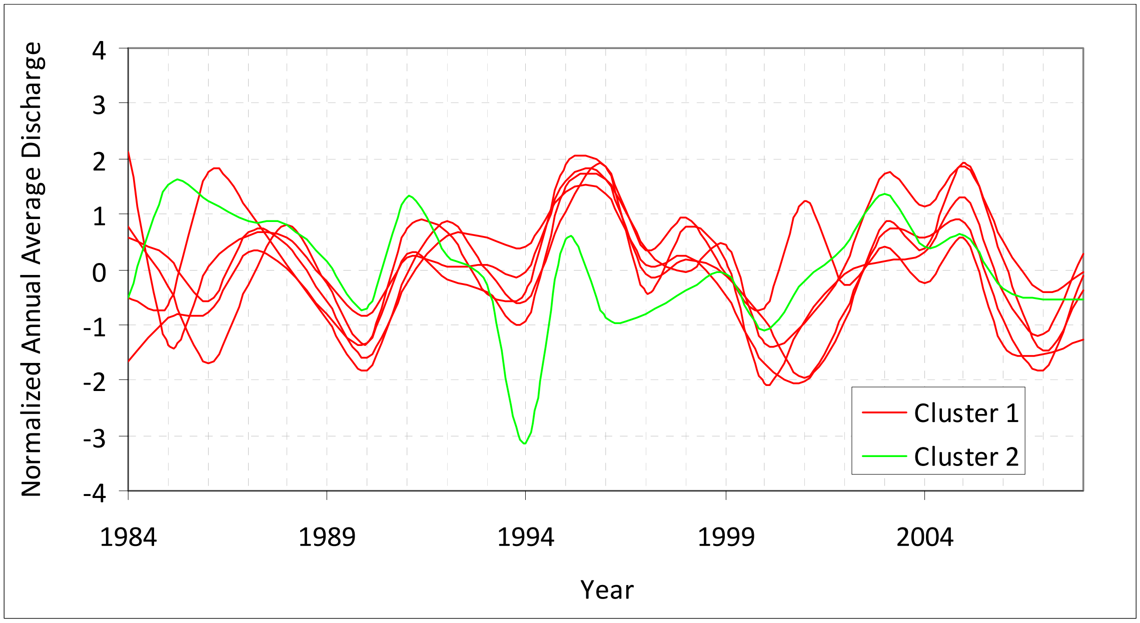


Figure 46 **Spring Clusters: Normalized Annual Average Discharge**

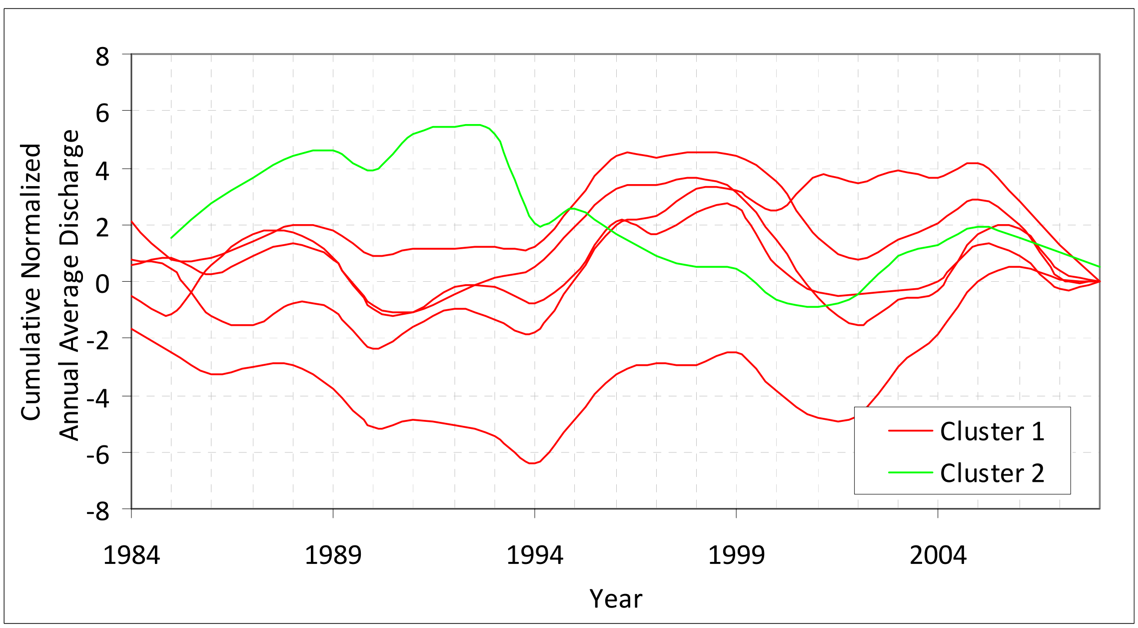


Figure 47 **Spring Clusters: Cumulative Normalized Annual Average Discharge**

6.2.6 Cluster Analysis: Rainfall Stations

A cluster analysis was performed on the 5 rainfall stations with data from 1984 through 2008. Similar to the analysis for all stations, the analysis was performed using an agglomerative hierarchical clustering algorithm with Euclidean distance and Ward's linkage between clusters. The resulting dendrogram is shown in Figure 48. As shown in the dendrogram, the data is clearly divided into 2 distinct clusters. The spatial associations for each cluster are shown in Figure 49. As shown in the figure, the clusters show clear spatial associations, with stations in Cluster 2 being located in the western portion of the domain, and Cluster 1 stations being located in the eastern portion of the domain. In order to draw significant conclusions regarding rainfall data and clustering, a more in-depth analysis of rainfall data (using additional stations and daily values) is recommended due to high spatial variability of rainfall and the coarse nature of the rainfall data utilized for clustering (annual totals).

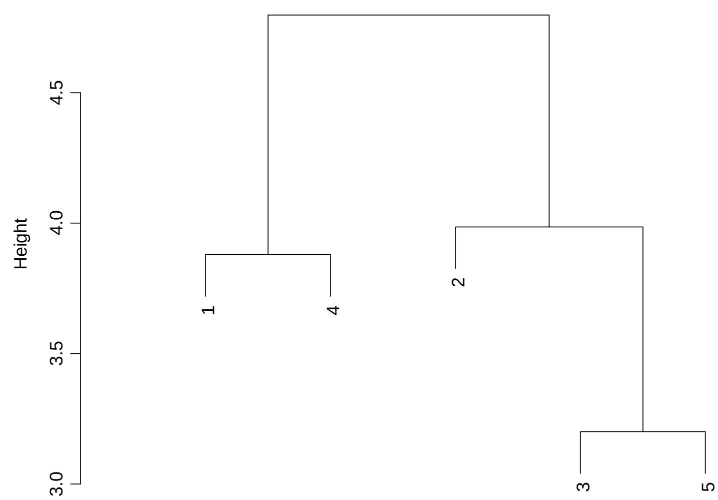


Figure 48 AHCA Dendrogram, Rainfall

Table 55 Rainfall Clusters 1 and 2

Dendrogram ID	Site Name	MK p-value	Sen slope	tau	Cluster Number
1	Clermont R	0.981	-0.024	-0.007	2
2	MOUNTAIN LAKE NWS	0.183	0.429	0.193	1
3	Orlando	0.398	0.339	0.130	1
4	ROMP 88 ROCK RIDGE	0.272	0.269	0.160	2
5	Sanford	0.526	0.346	0.099	1

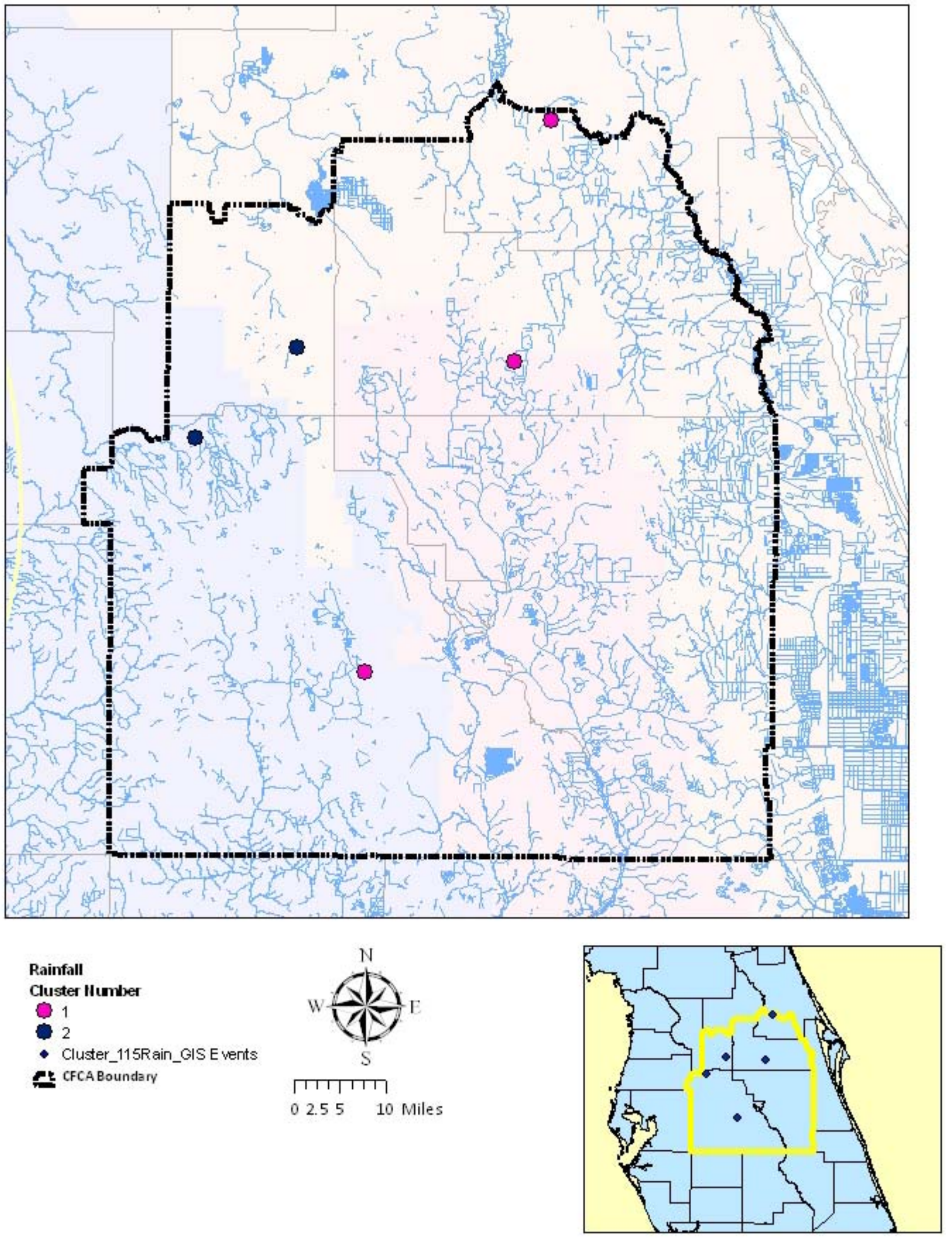


Figure 49 AHCA Spatial Associations, Rainfall

Normalized annual total rainfall by cluster is shown in Figures 50 and 51. As shown in the figures, all gauges experience similar wet and dry years. The average normalized average rainfall is shown annually and cumulatively in Figures 52 and 53. Based on these averages, there are only very slight distinctions between the clusters. It would be helpful to perform an additional cluster analysis on rainfall with additional stations and at a smaller aggregation interval (such as monthly or seasonally) in order to determine more precise distinctions between the rainfall clusters. Based on the cluster averages, Clusters 1 and 2 appear very similar, with slight exceptions in 1990 and 1991.

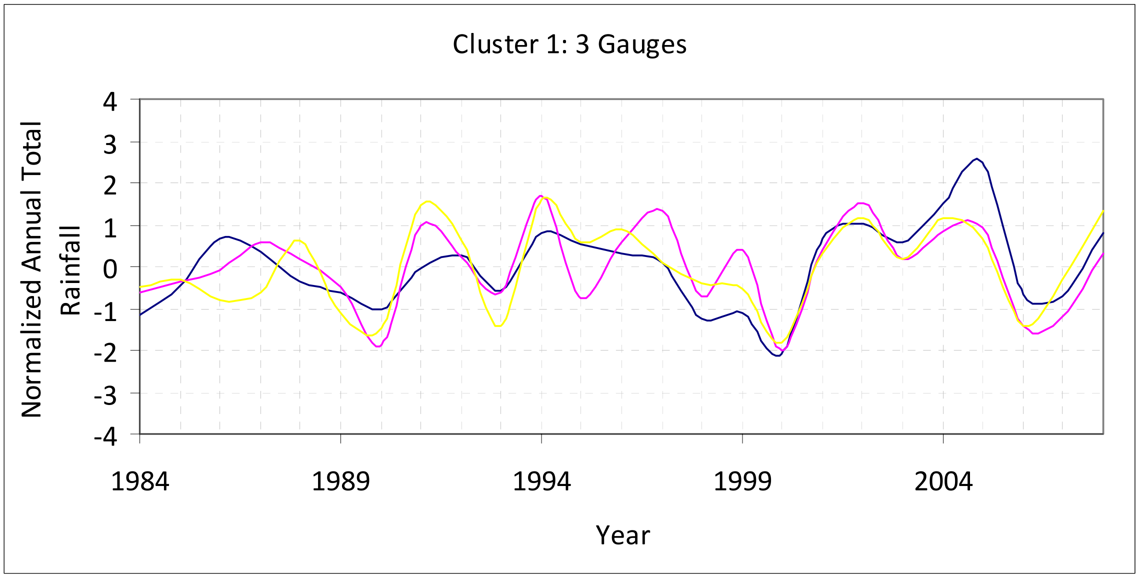


Figure 50 **Rainfall Cluster 1 Normalized Annual Totals**

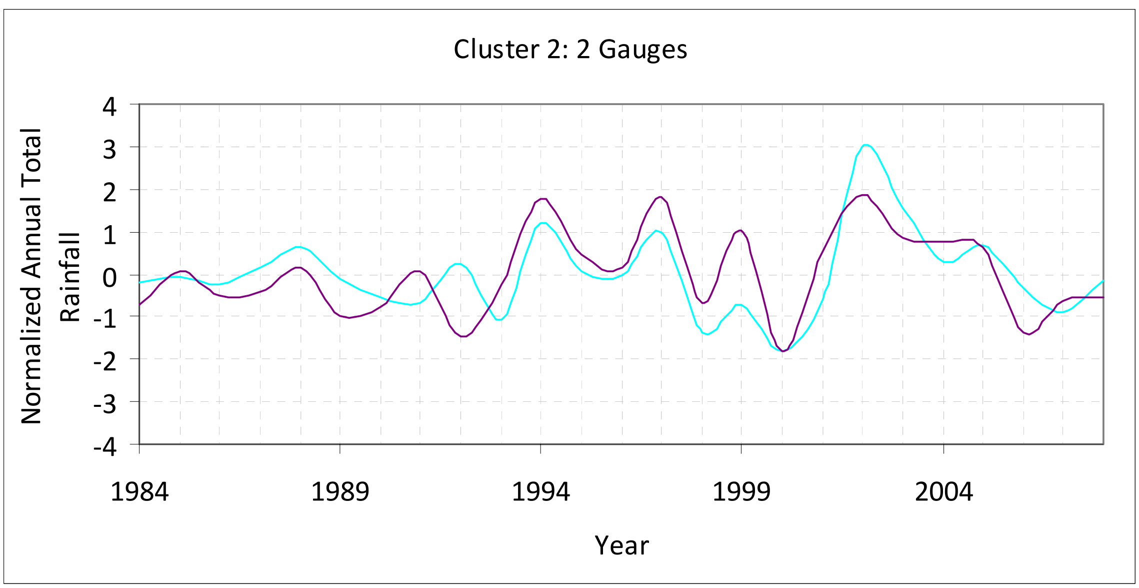


Figure 51 **Rainfall Cluster 2 Normalized Annual Totals**

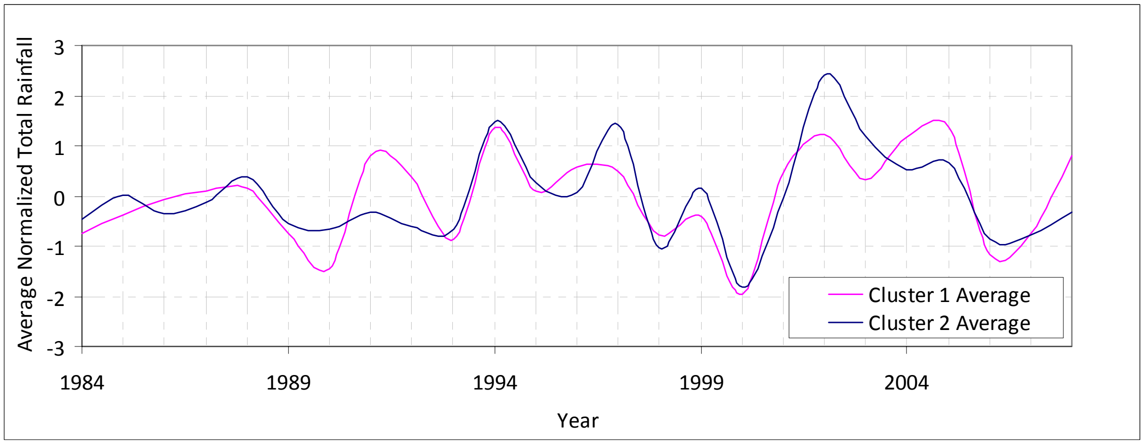


Figure 52 Rainfall Cluster Average Normalized Total Rainfall

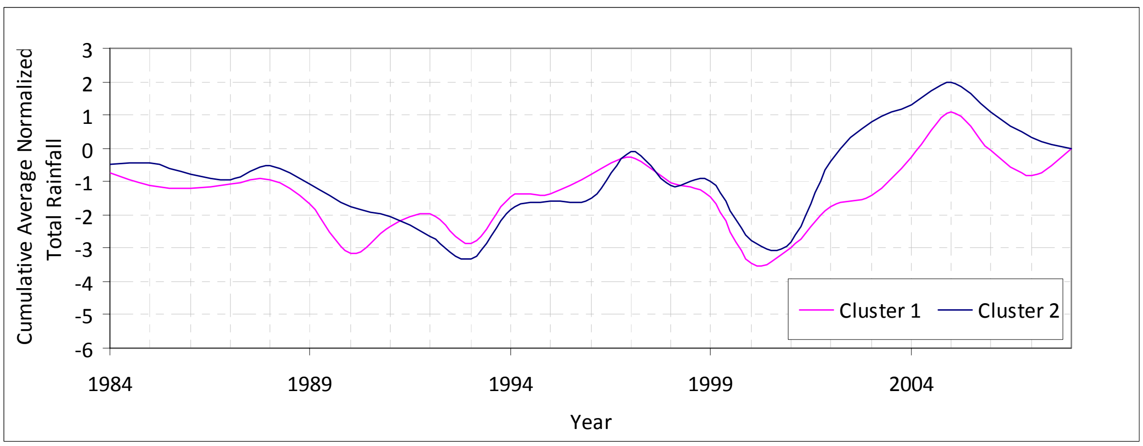


Figure 53 Rainfall Cluster Cumulative Average Normalized Total Rainfall

6.3 Cluster Analysis: 1960 through 2008

Of the 120 stations utilized for this study, 34 stations had complete data records from 1960 through 2008. The spatial distribution of these stations and the spatial associations of the clusters are shown in Figure 54. These stations cover a large portion of the CFCA domain. In order to examine the long term behavior of these stations and their relation to each other, an AHCA was performed on these 34 stations using all available data from 1960 through 2008. Normalized annual averages were utilized for each station.

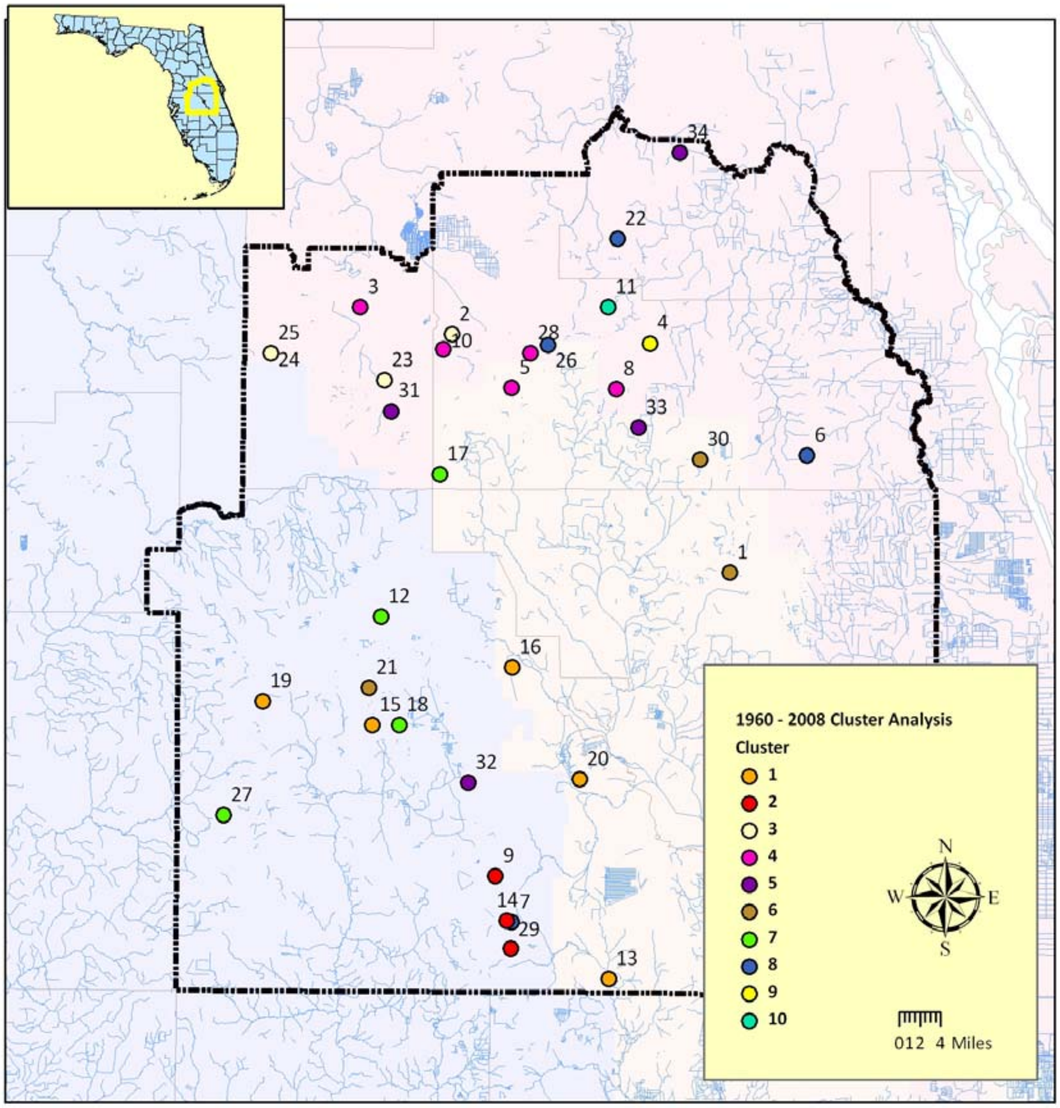


Figure 54 AHCA Spatial Associations, 1960-2008 Stations

Examination of the dendrogram in Figure 55 reveals that there are many branches of the dendrogram that are formed at approximately the same height. Clipping the dendrogram at this point results in 10 clusters. As a result, clusters are much smaller than with previous analyses, containing anywhere from 1 station (Clusters 9 and 10) to 5 stations (Clusters 1 and 4).

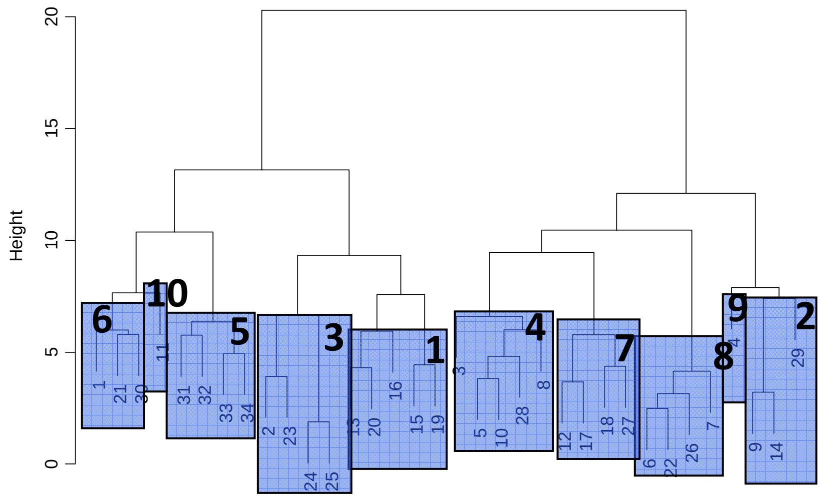


Figure 55 **AHCA Dendrogram, 1960-2008 Stations**

Cluster memberships and Mann Kendall results are shown for all stations in Table 56. Of the 34 stations tested, 14 had statistically significant Sen slopes (at an 80% confidence level). Cumulative average normalized annual averages are shown by cluster in Figures 56 and 57.

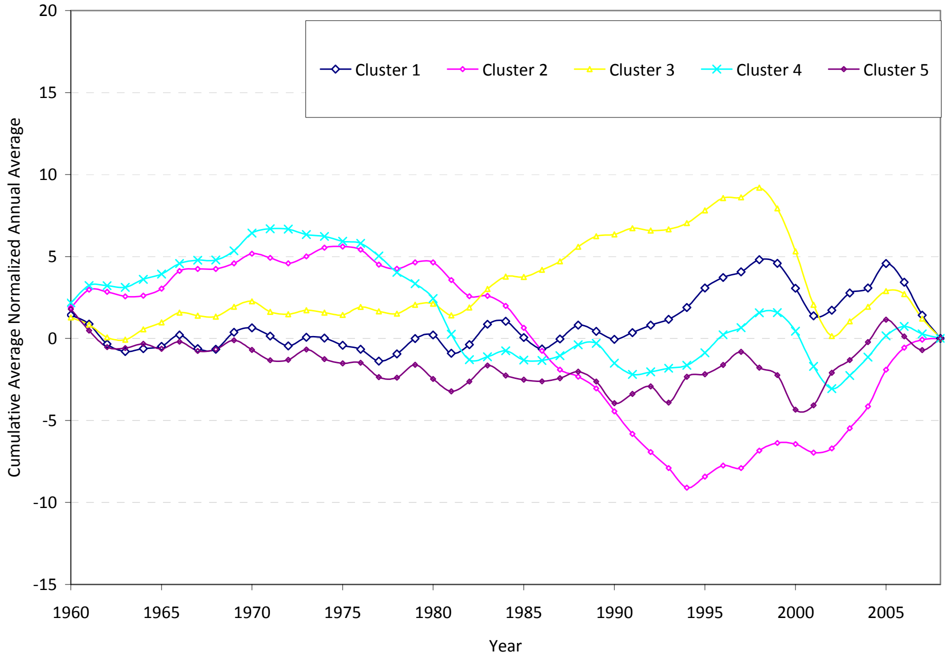


Figure 56 Clusters 1-5 Cumulative Average Normalized Annual Average

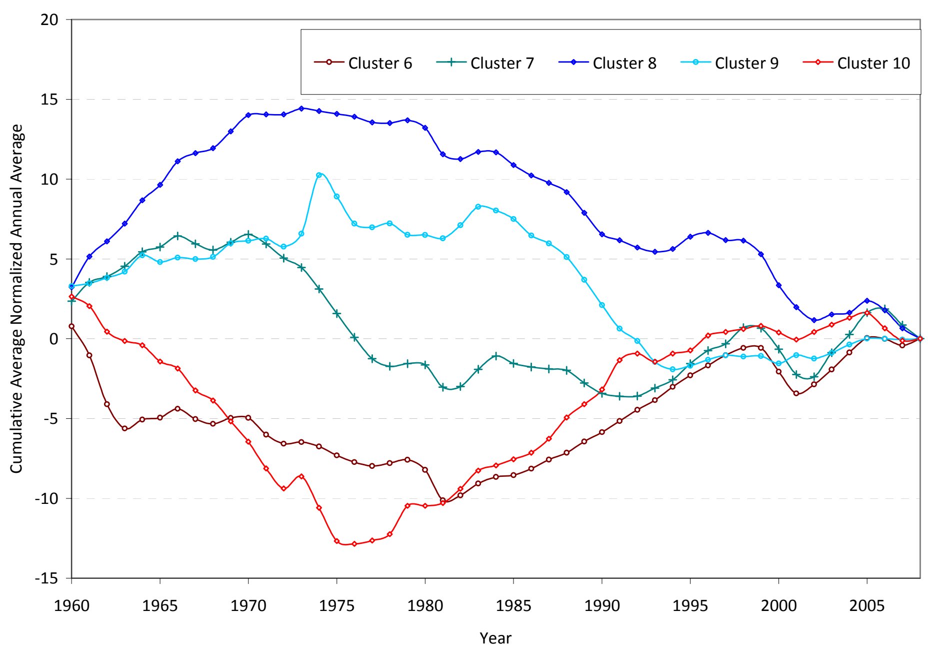


Figure 57 Clusters 6-10 Cumulative Average Normalized Annual Average

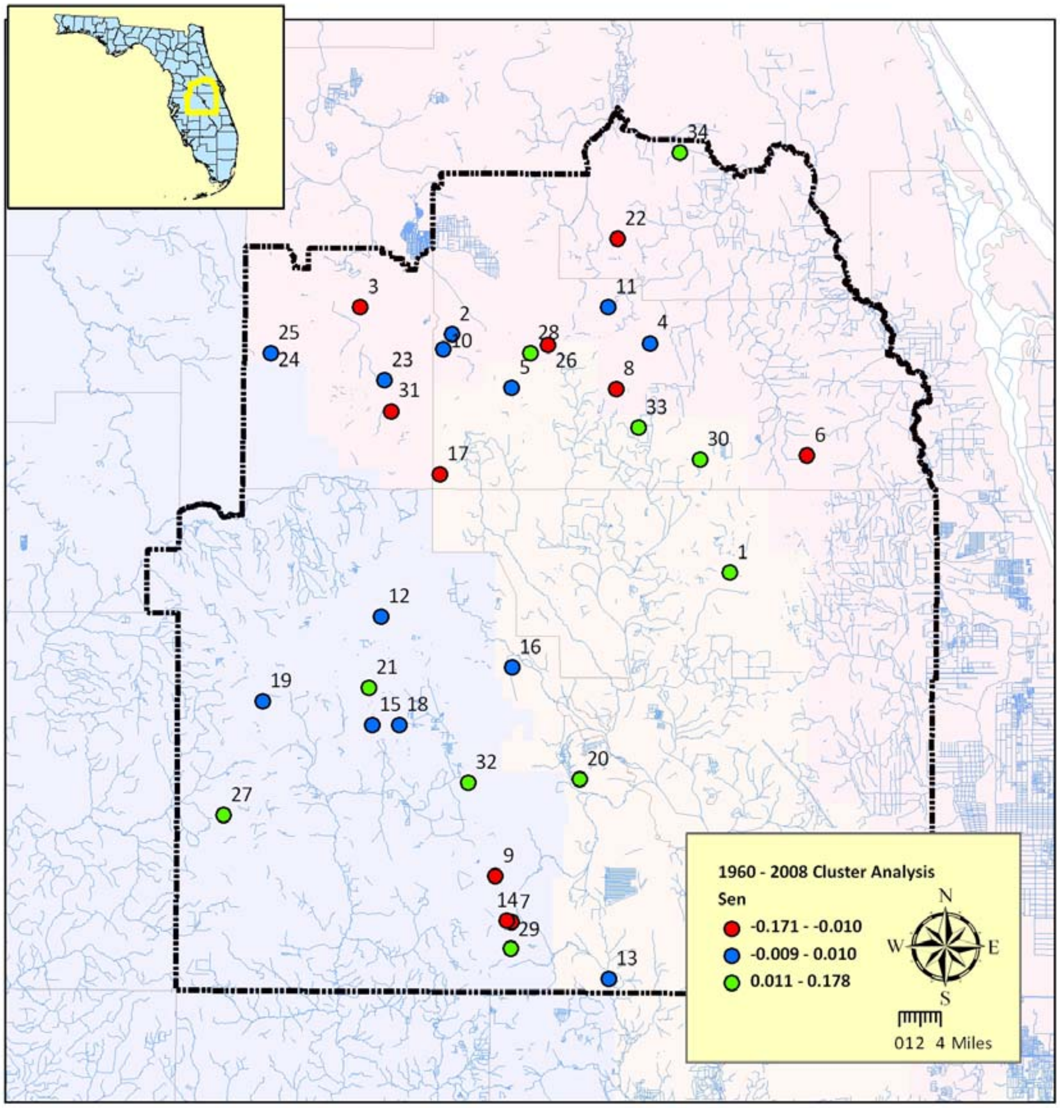


Figure 58 Sen Slopes, 1960 – 2008 Stations

Table 56 AHCA 1960-2008 Cluster Membership and Mann Kendall Results

Dendrogram ID	Site_Name	Cluster Number	MK p-val	Sen Slope	tau
13	LAKE ARBUCKLE	1	0.5405	-0.0054	-0.0612
15	LAKE HOWARD (R)	1	0.6602	0.0033	0.0442
16	LAKE MARION NR HAINES CITY	1	0.0378	-0.0063	-0.2058
19	LAKE PARKER AT LAKELAND	1	0.4637	0.0035	0.0731
20	LAKE ROSALIE	1	0.0638	0.0165	0.1837
9	CROOKED LAKE NR BABSON PARK (R)	2	0.0638	-0.0843	-0.1837
14	LAKE CLINCH (R)	2	0.3840	-0.0140	-0.0867
29	USGS P-48 SHALLOW	2	0.0504	0.0266	0.1939

Table 56, continued

Dendrogram ID	Site_Name	Cluster Number	MK p-val	Sen Slope	tau
2	Apopka	3	0.1872	-0.0079	-0.1310
23	Louisa	3	0.8160	0.0050	0.0238
24	Mascotte - SAS	3	0.5636	0.0042	0.0578
25	Mascotte - UFA	3	0.3840	-0.0075	-0.0867
3	Apshaw	4	0.0772	-0.0393	-0.1752
5	Butler	4	0.4637	0.0093	0.0731
8	Conway	4	0.0127	-0.0280	-0.2466
10	Johns	4	0.8428	0.0041	0.0204
28	Rose	4	0.3564	0.0201	0.0918
31	Clermont R	5	0.7563	-0.0257	-0.0315
32	MOUNTAIN LAKE NWS	5	0.3746	0.0952	0.0884
33	Orlando	5	0.2261	0.1213	0.1230
34	Sanford	5	0.3496	0.1224	0.0953
1	Alligator	6	0.0134	0.0151	0.2449
21	LAKE SANITARY (MARIANA) (R)	6	0.0013	0.0155	0.3180
30	Whip-Por-Will	6	0.0174	0.0115	0.2355
12	LAKE ALFRED DEEP NR LAKE ALFRED	7	0.8564	0.0022	0.0187
17	Lake Oliver nr Vineland - UFA	7	0.1228	-0.0181	-0.1531
18	LAKE OTIS (R)	7	0.9794	0.0003	0.0034
27	ROMP 60 OCAL~AVPK	7	0.1147	0.1776	0.1565
6	Cocoa A	8	0.0000	-0.0682	-0.4405
7	COLEY DEEP	8	0.0041	-0.1071	-0.2840
22	Longwood	8	0.0000	-0.1707	-0.6054
26	Orlo Vista	8	0.0001	-0.1304	-0.3912
4	Barton Big	9	0.4661	-0.0022	-0.0736
11	Killarney	10	0.0145	0.0076	0.2447

7.0 Conclusions and Recommendations

One hundred twenty stations, located in the SJRWMD, SWFWMD, and SFWMD were analyzed in order to determine if statistically significant trends were present in the time series. A confidence level of 80% was utilized for all statistical tests. At this confidence level, a total of 48 stations exhibited statistically significant decreasing trends for their respective periods of record, while 15 stations exhibited statistically significant increasing trends. For the dry season (October through May), 41 stations exhibited statistically significant decreasing trends, while 15 stations exhibited increasing trends. For the wet season, 44 stations exhibited decreasing trends, while 12 stations exhibited increasing trends over their respective periods of record. Generally, many of the stations with increasing trends were located in Polk County, in areas where large reductions in groundwater pumping due to changes in current phosphate mining practices are present.

An agglomerative hierarchical clustering algorithm was applied to data from 115 stations with records from 1984 through 2008. The results of the cluster analysis were consistent with the trend analysis, with stations with increasing levels generally clustering together, and likewise for stations with decreasing levels. Results of the cluster analysis can be utilized by the Districts in conjunction with other data (such as anthropogenic changes and water use) in order to determine the dominant hydrologic processes controlling the recorded data. In particular, clusters that exhibit clear increasing and decreasing trends, such as Lake Cluster 4 and Intermediate and Floridan Cluster 4, respectively, should be closely examined in order to determine potential explanatory variable for the hydrologic behavior of the stations in these clusters.

Since rainfall can be the dominant hydrologic process driving lake and well levels, a more detailed analysis of rainfall would be helpful in order to help determine whether or not rainfall is dominating over other processes, such as pumping. A more in-depth analysis of rainfall stations could include monthly trend and cluster analysis for all available rainfall stations within the CFCA domain. This analysis should be done in conjunction with additional analysis on both water use and anthropogenic changes. Water use can be aggregated using a predefined grid (such as a grid from one of the District's groundwater models). Time series of water use can be developed for specified grid cells. Trend analysis of the water use time series can be compared to nearby monitoring locations through cross correlation in order to examine the effect of water use on nearby lake, spring, and well levels.

Additional trend analysis is recommended for stream gauges located in the CFCA domain. Specific conductance has been demonstrated to be a baseflow signature in streams and rivers (Stewart 2007). Trend analysis is recommended on available specific conductance data in order to determine baseflow trends in the CFCA domain. This will create a more comprehensive analysis of all available data.

The results of the trend and cluster analysis are of particular interest for those stations which exhibited statistically significant trends. MFL lakes, specifically, should be examined more closely in the context of the trend analysis. Using the results of the trend analysis, trends could be extrapolated to a given year (like typical planning horizons such as 2030) in order to develop a predictive time series. The event occurrence frequency and duration methodology (Neubauer 2004) utilized by the SJRWMD could then be applied incrementally to the time series in order to determine if and when the MFL is projected to be violated. This information could prove vital to assisting the District for planning purposes.

For the 28 piecewise stations identified with statistically significant differences in their CDFs, further work is vital in order to determine the processes controlling the behavior at these stations. This could include evaluation of land use changes, water use impacts, and any other relevant anthropogenic changes. If similar trends can be found between forcing variables such as rainfall, pumping, and development and response variable such as lake stage, flow, aquifer head, then a link to the cause and effect or significant processes might be identified.

In addition to stations clustering by geographic location, other factors may affect clustering, including pumping rates, geomorphologic properties, anthropogenic changes, and land use. The explanatory variables which drive the hydrologic processes affecting individual station behavior (and therefore clustering) were outside the scope of the current study, but future work is recommended in order to determine the forcing functions for station and cluster behavior.

Additional work utilizing a soft data approach may give insight into the explanatory variables for cluster behavior. This approach could utilize available data in a GIS evaluation using a weighting/overlay method in order to examine relationships between water levels and explanatory variables, such as water use change by cell, thickness of confining unit, Floridan Aquifer top elevation, unsaturated zone thickness, closed basins, depth to water table, topography (or physiographic regions) and changes in land use.

The soft data approach could be further extended to a semi-supervised learning technique, such as a decision tree, in order to determine the combination of attributes (land use, pumping, etc.) that best explain the behavior for a given cluster. In a decision tree, a tree function is built from the input data to predict or explain outputs (Quinlan 1994). The most predictive input data is recursively selected based on the information gain for different levels of the input. The data is continuously split into subsets until the input information is exhausted, resulting in a tree showing the dependence of the output on the inputs as a hierarchy. Since input data can be either categorical or continuous, this would be appropriate to apply to the CFCA given the currently available data.

The statistical analysis revealed that there are 3 to 4 times as many stations with decreasing trends than increasing trends. While the increasing trends may generally be explained due to decreasing phosphate mining withdrawals, the dominant cause(s) for the decreasing trends have not yet been definitively determined. Future work, including the aforementioned analyses, could aide is establishing the causes of the decreasing trends, and assist in planning within the Central Florida Coordination Area.

8.0 References

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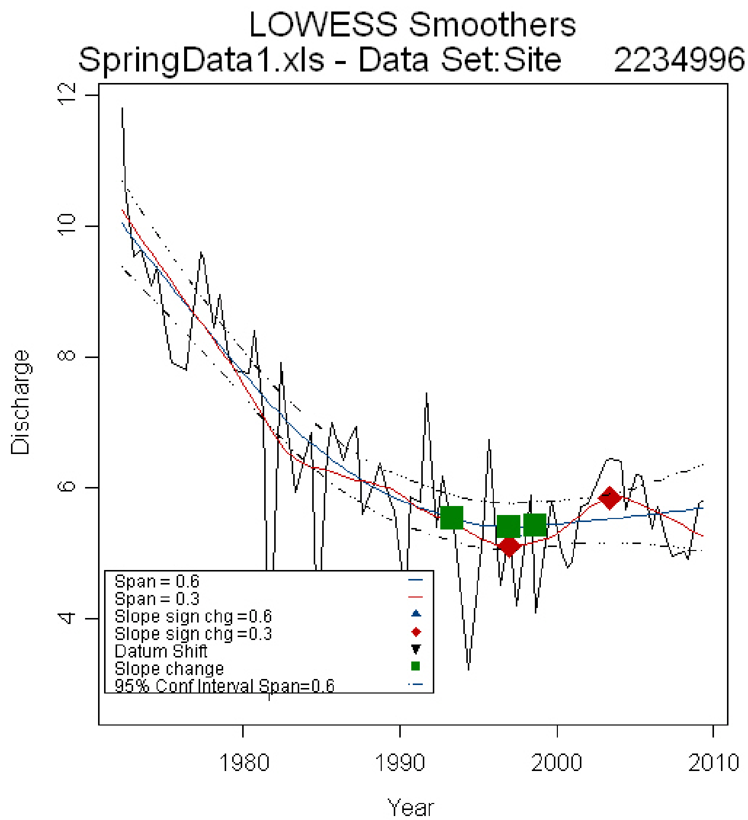
Appendix I: LOWESS Plots

SJRWMD-Springs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2010
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Slope sign chg =0.3
Datum Shift
Slope change
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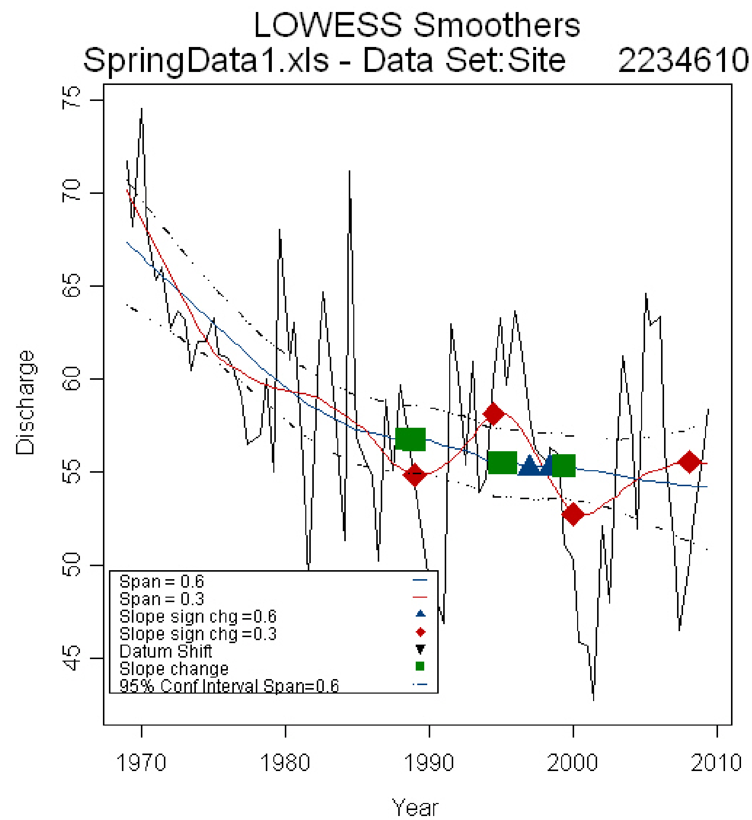
s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50
45
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2000
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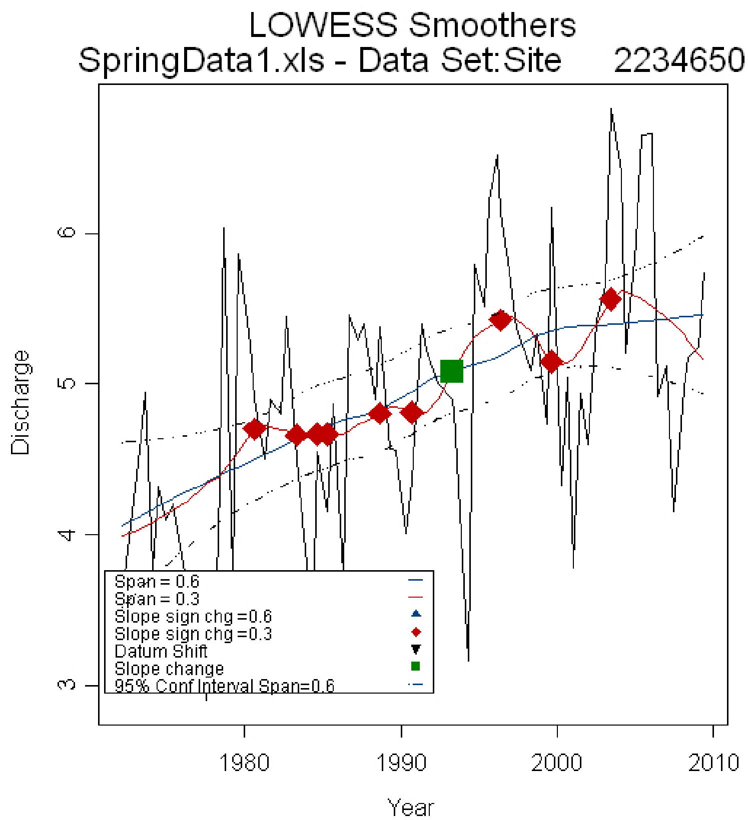

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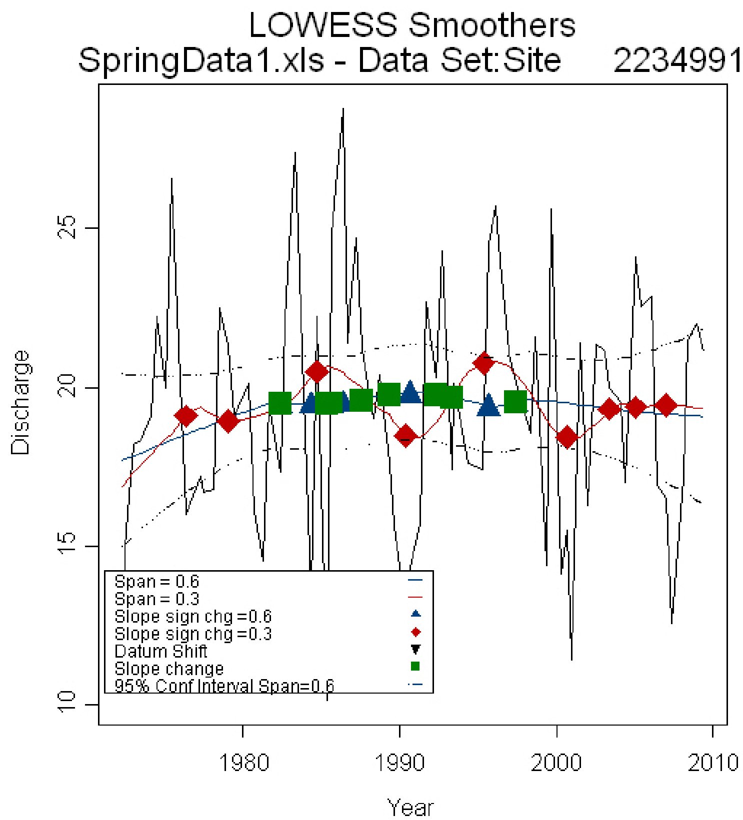

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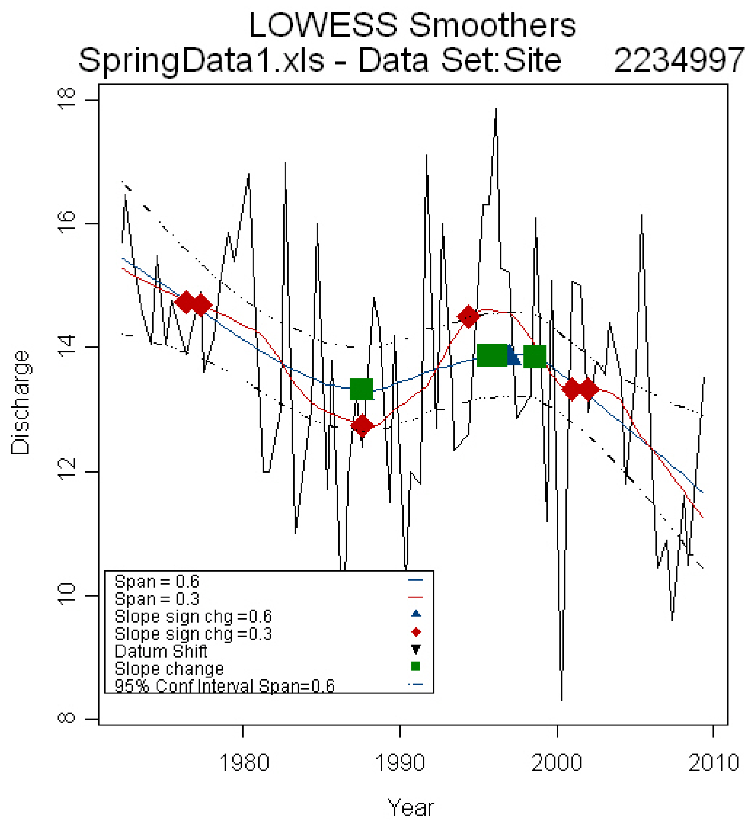
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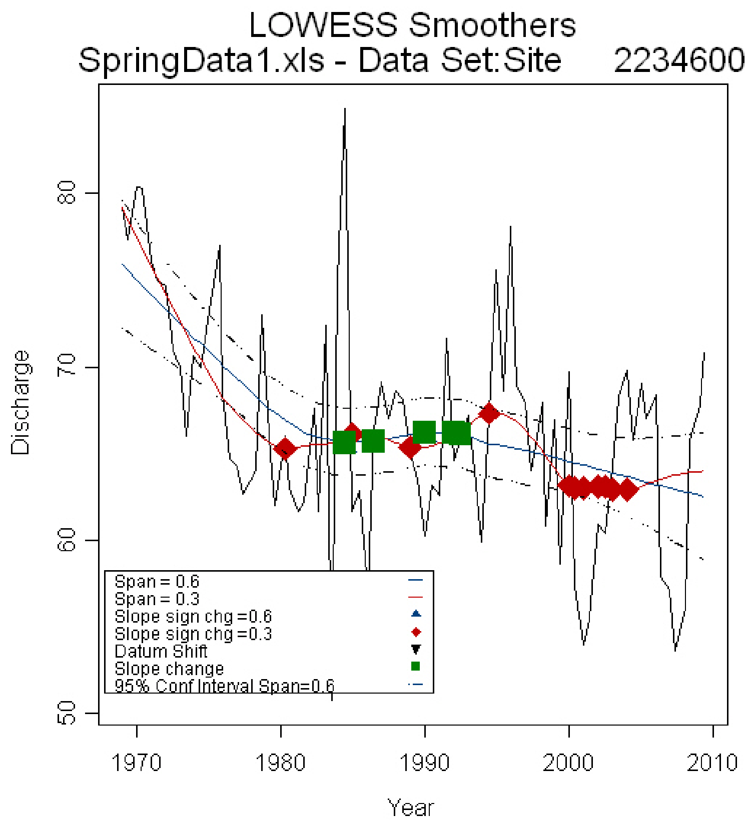
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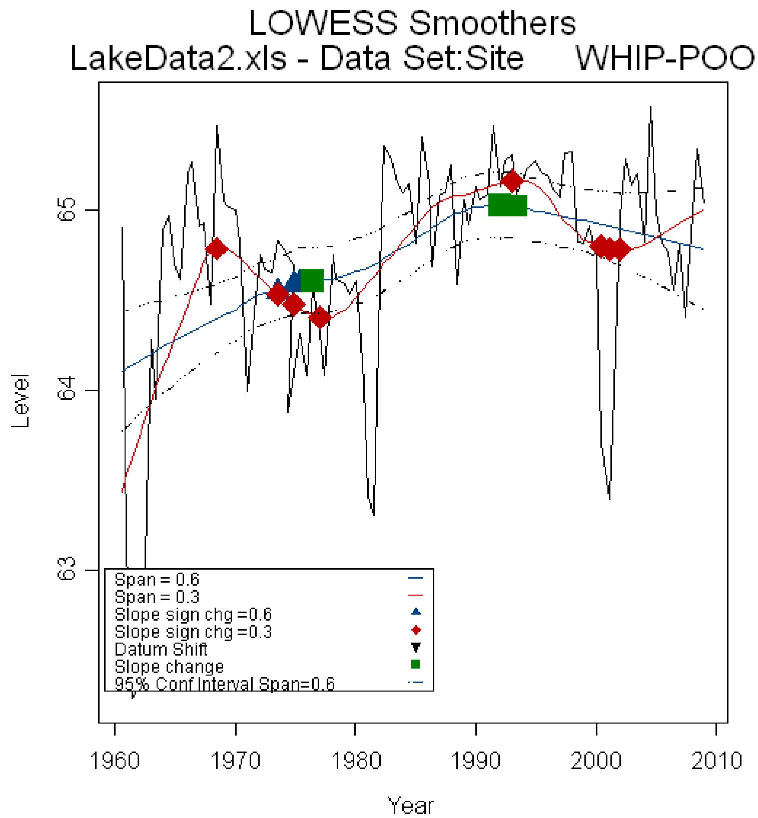
SJRWMD- Lakes



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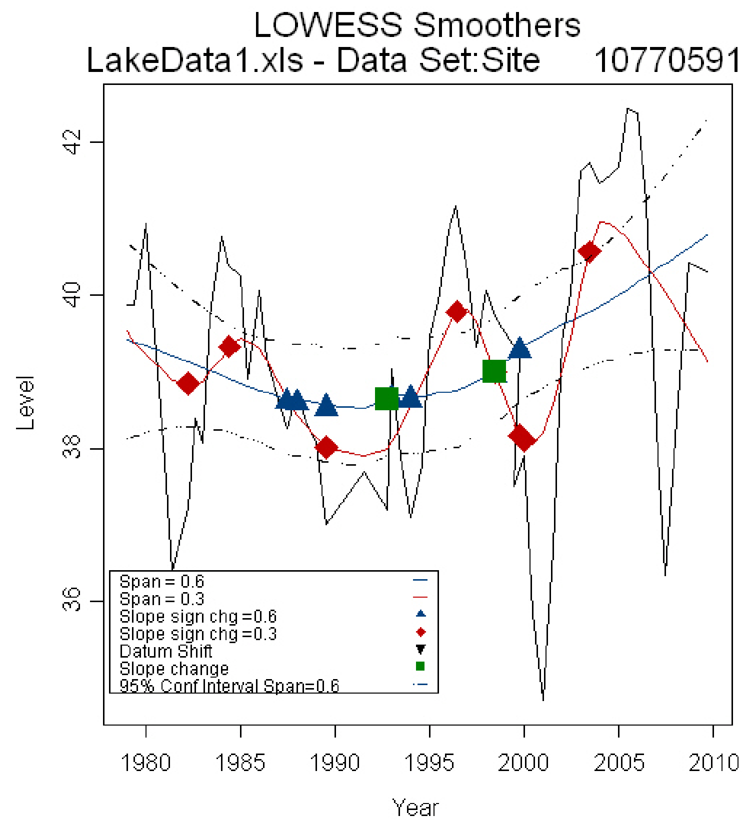
2000
2010
Year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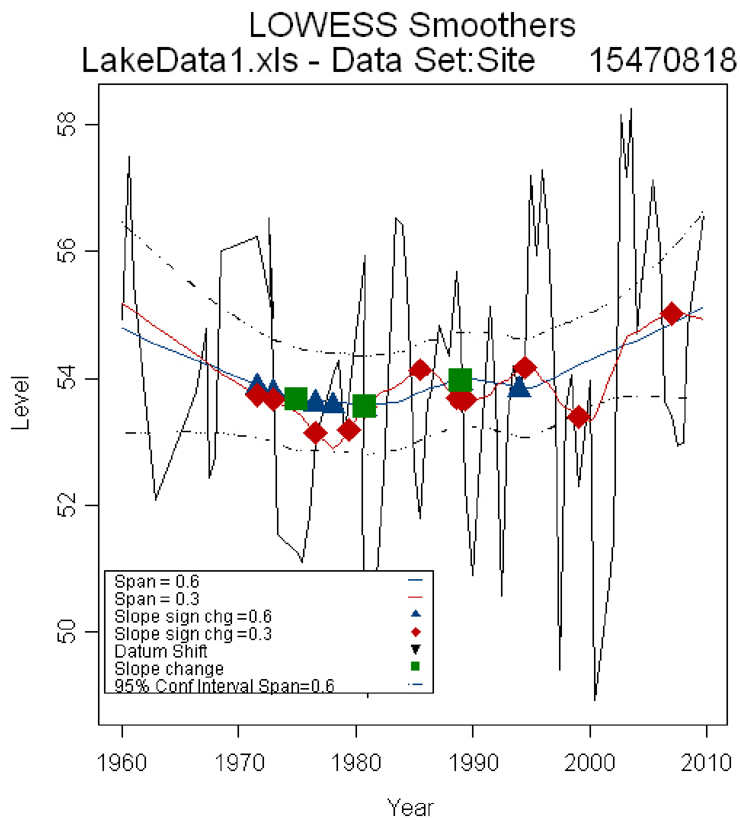
2000
2005
2010
Year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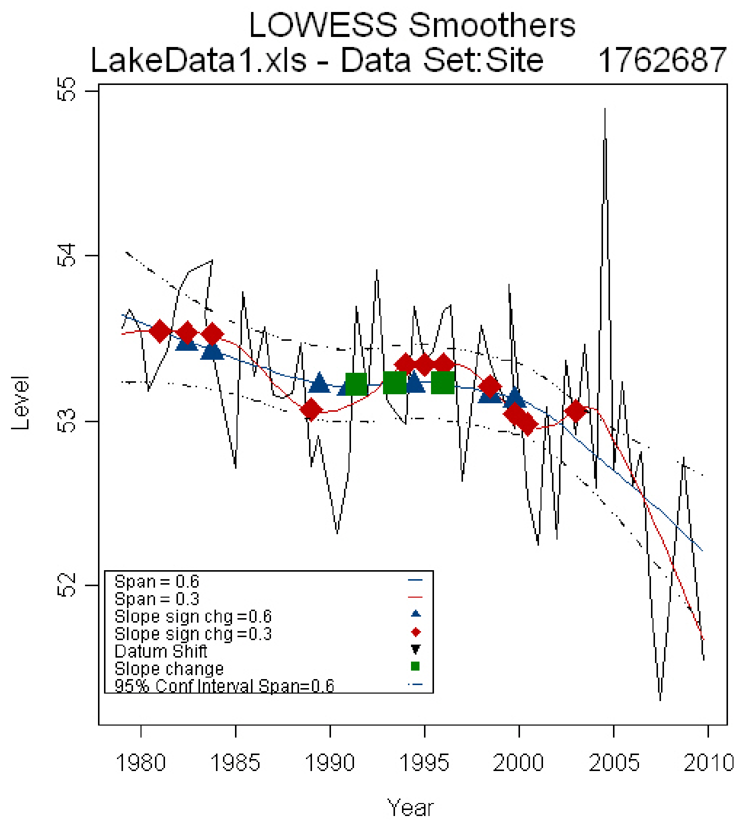

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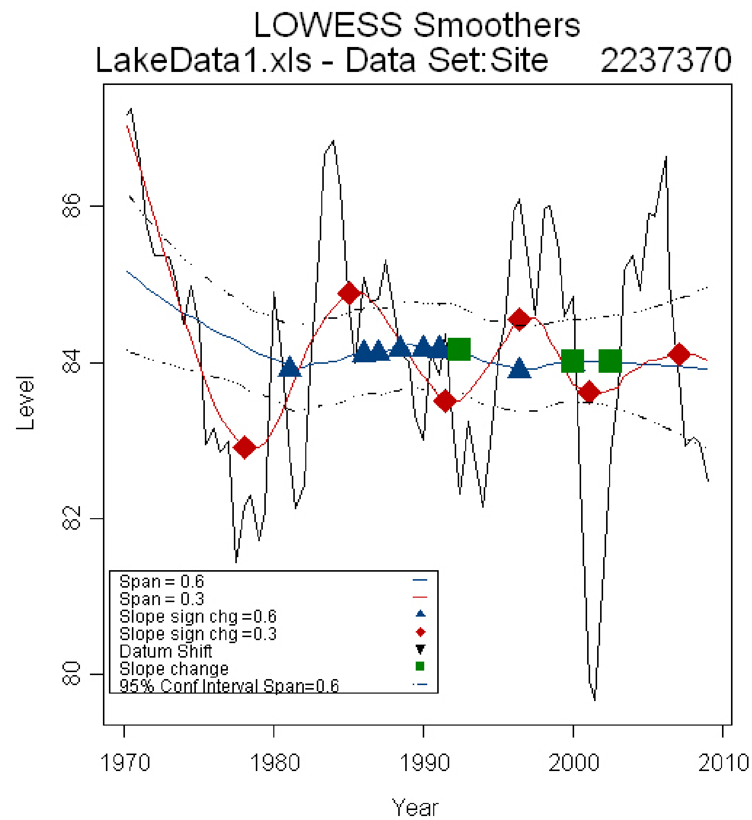
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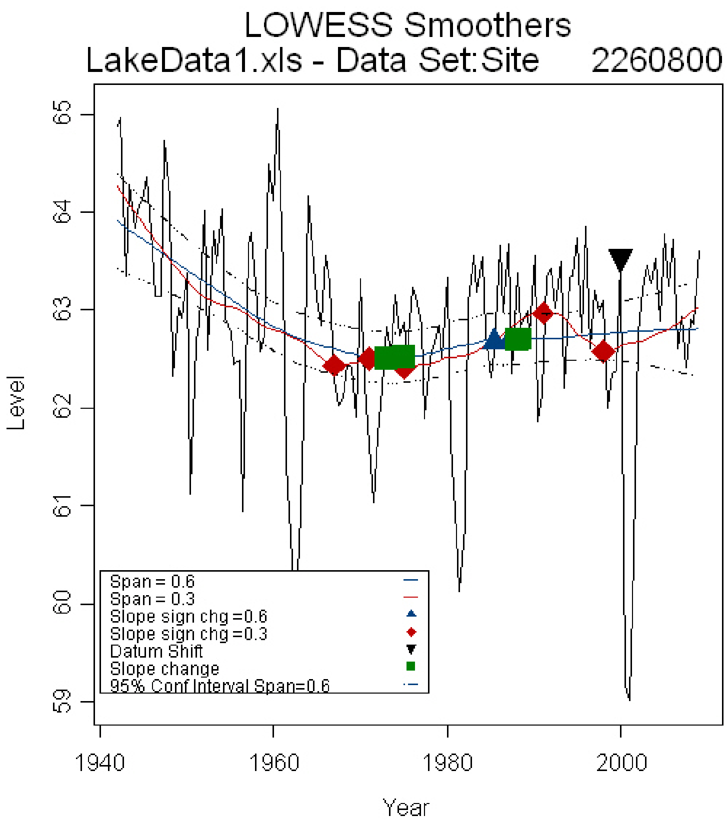

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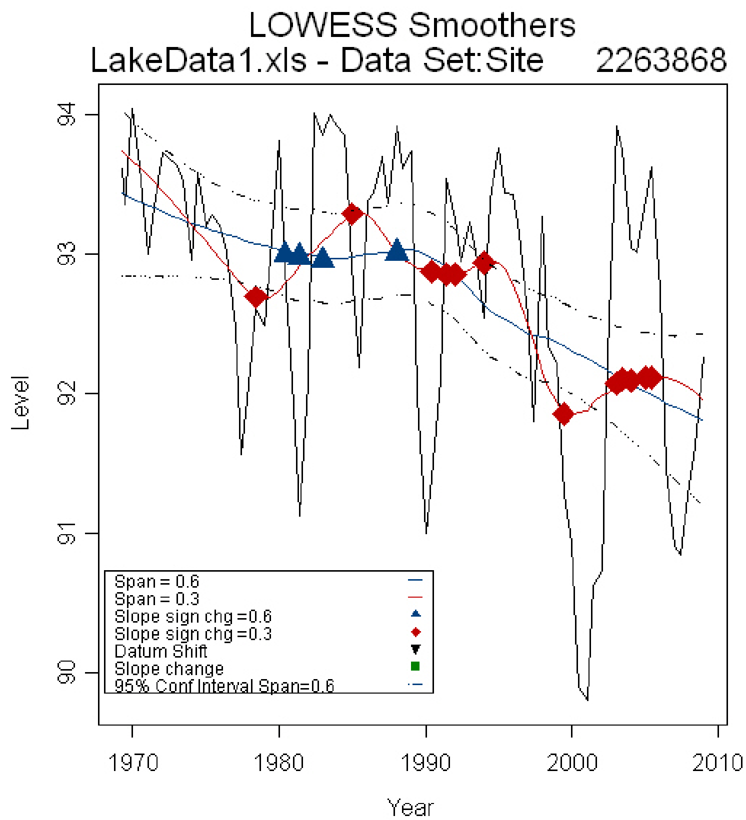

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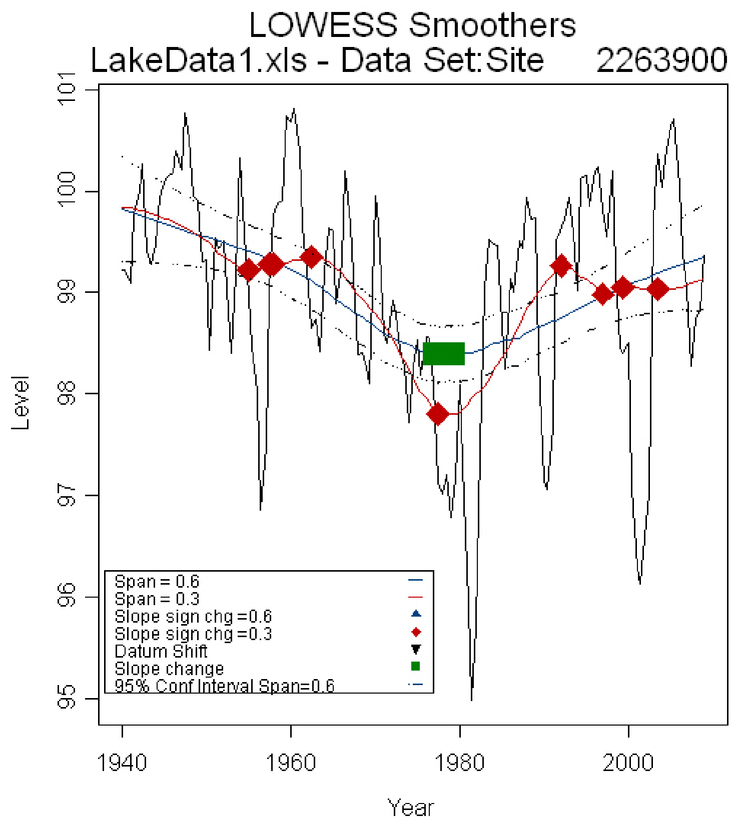
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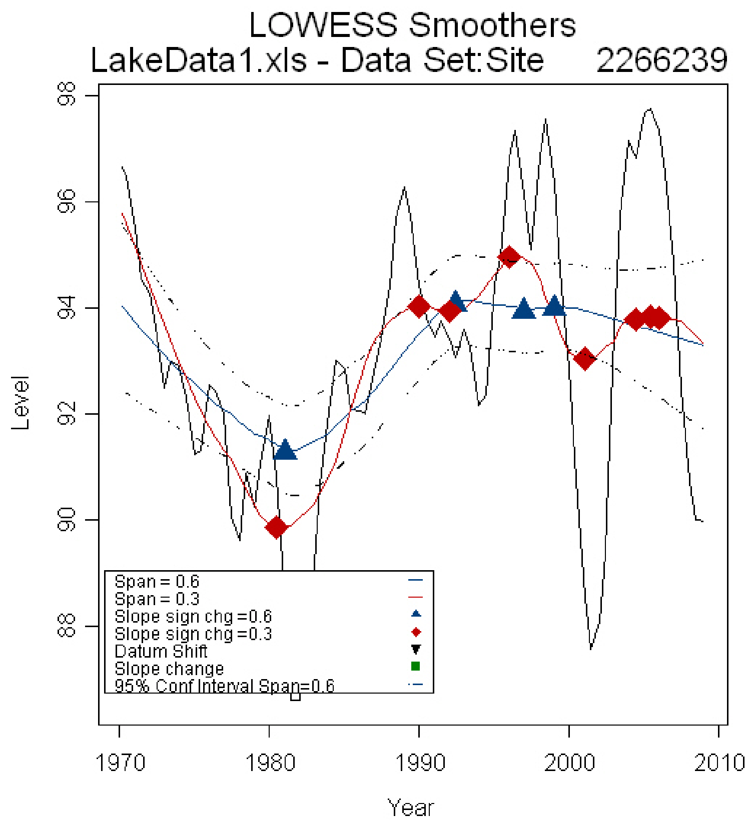
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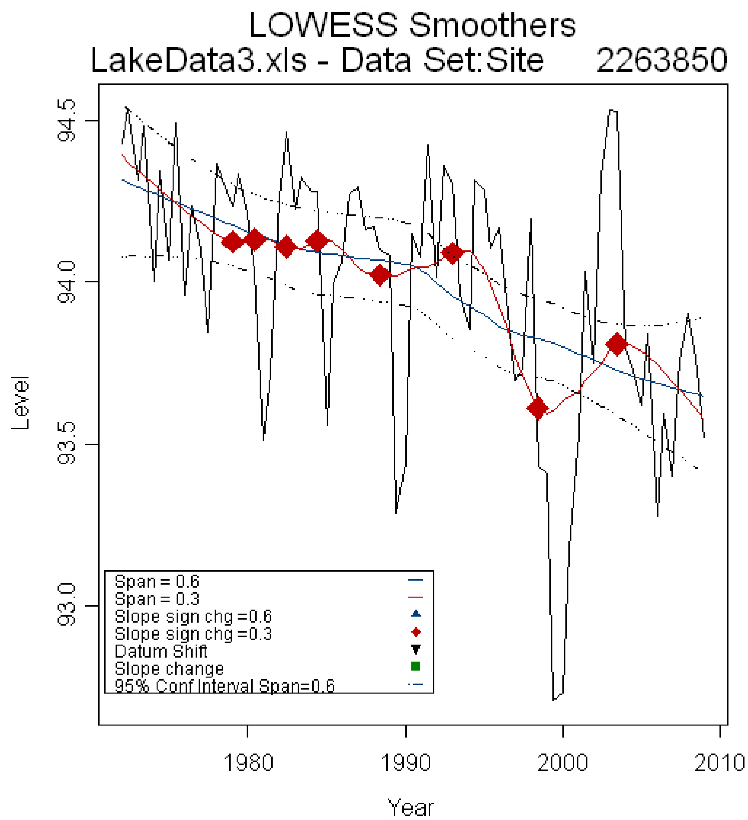
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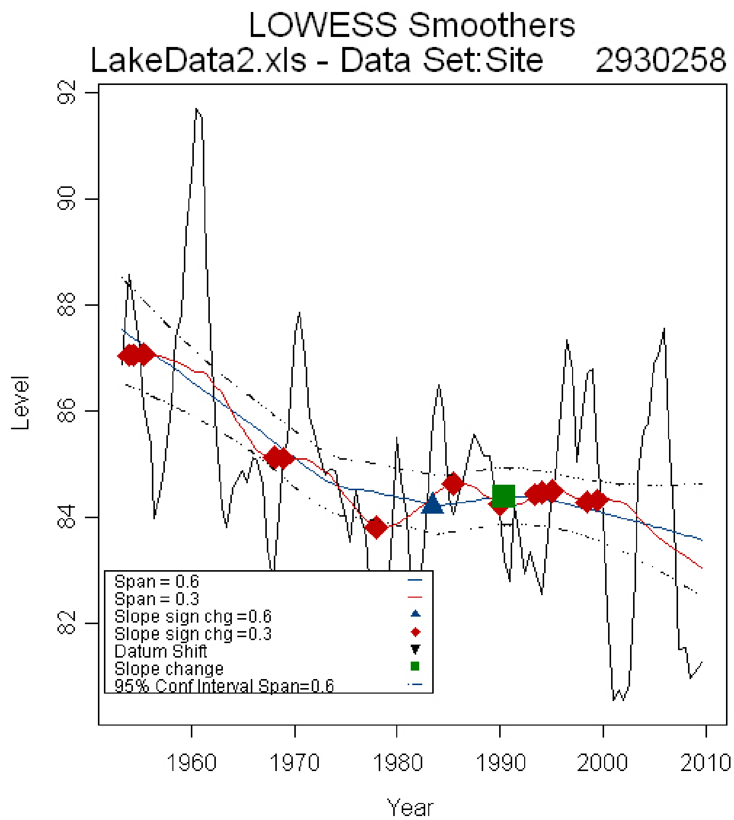
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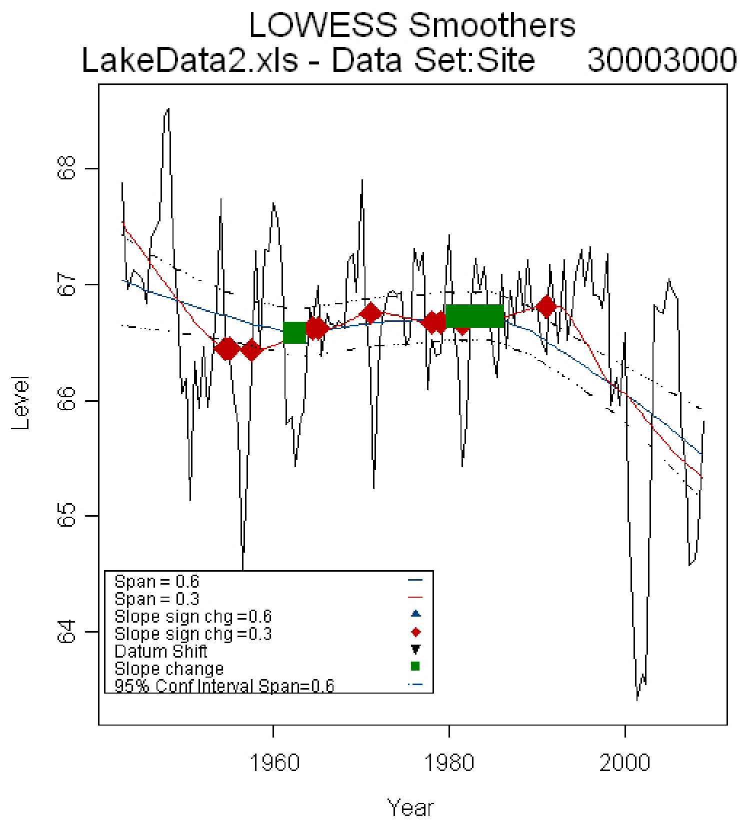
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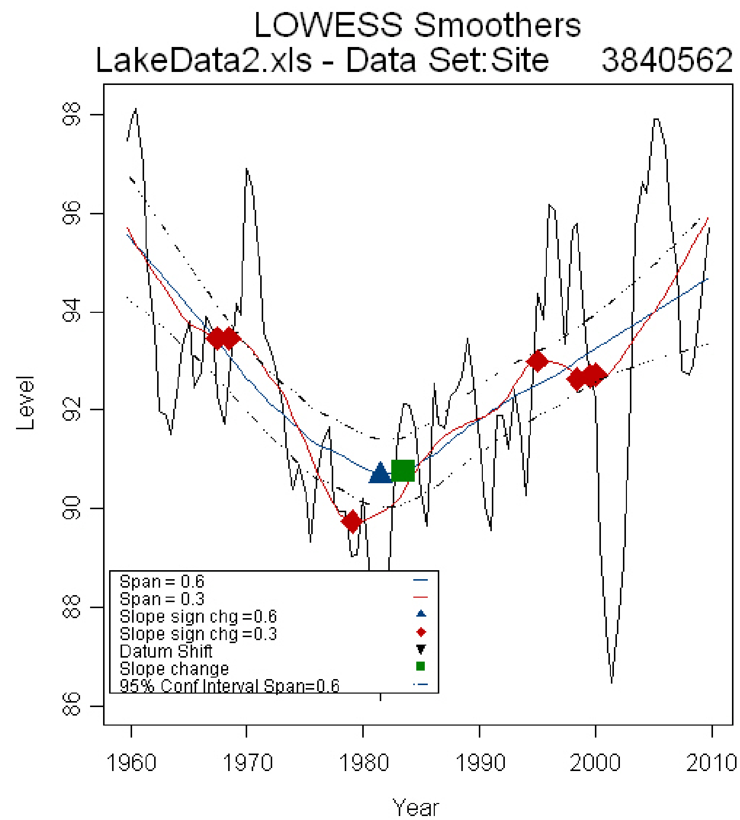
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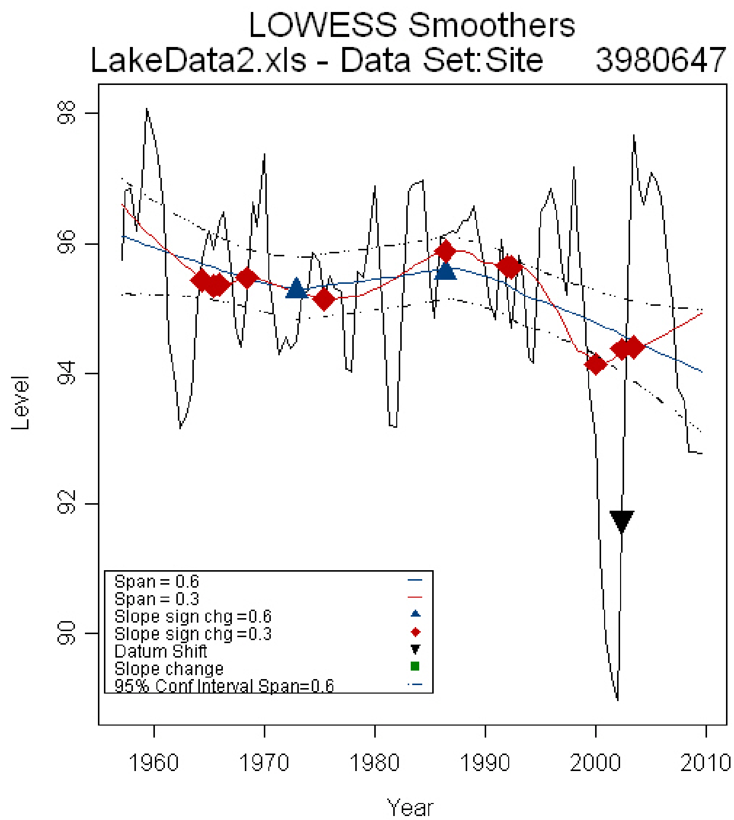

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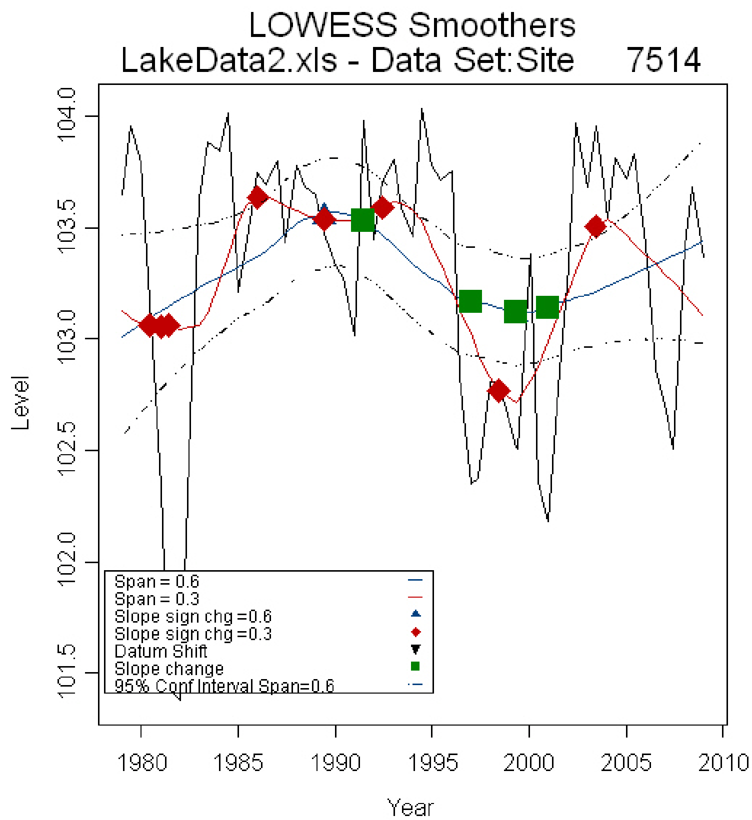
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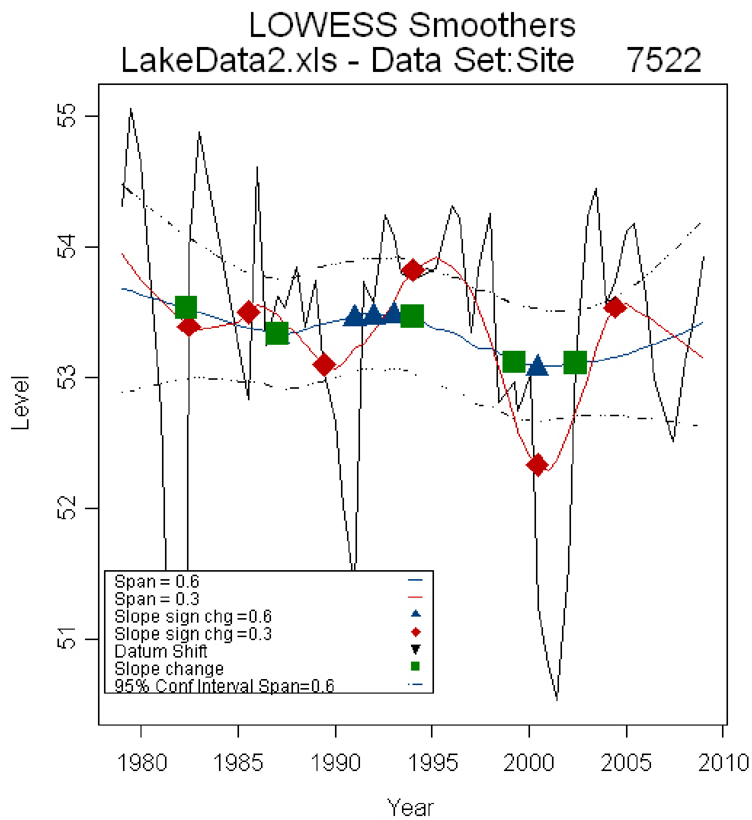
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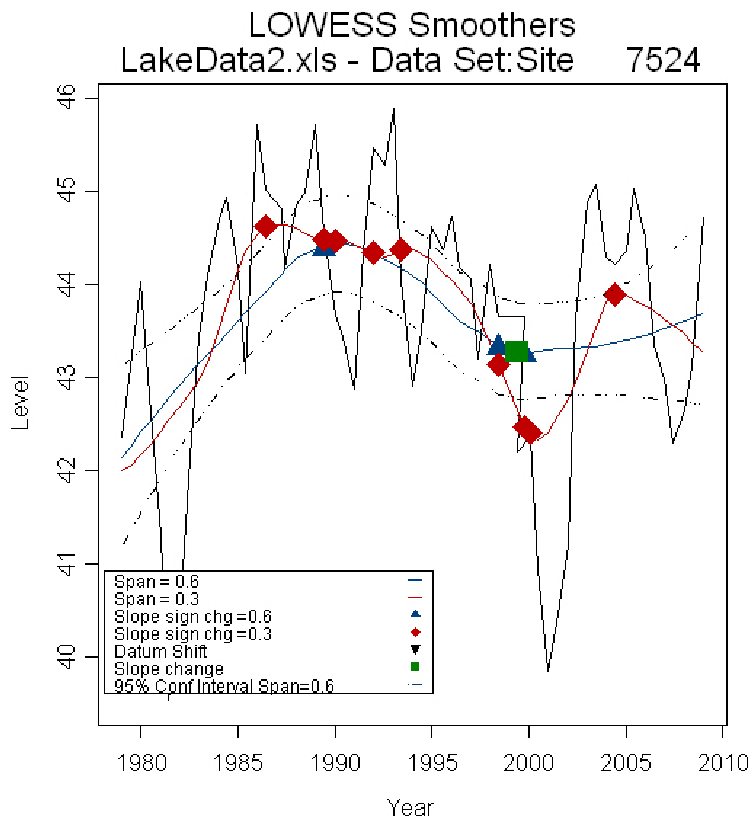
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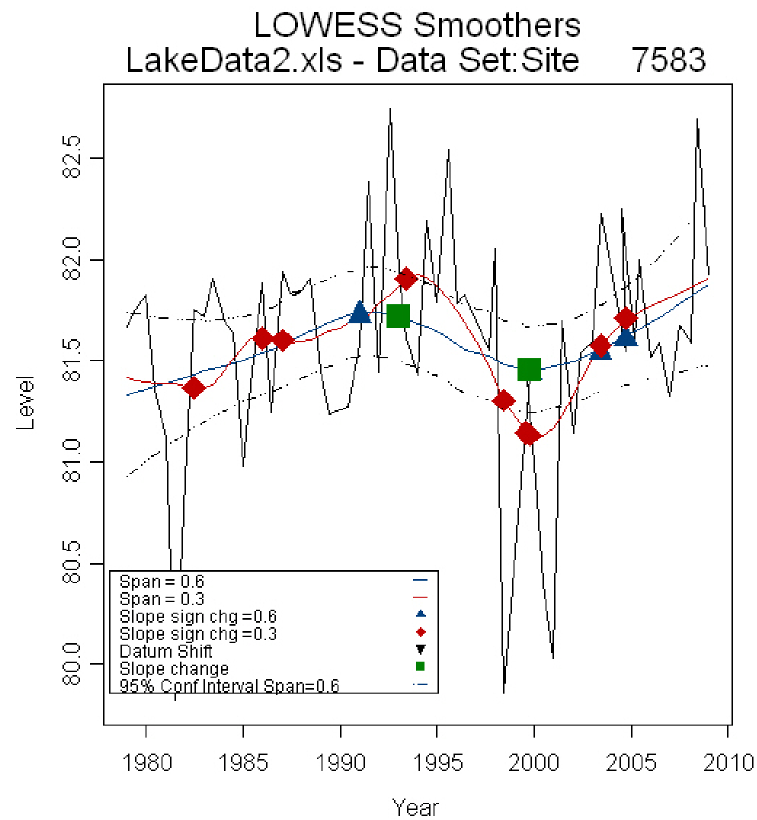

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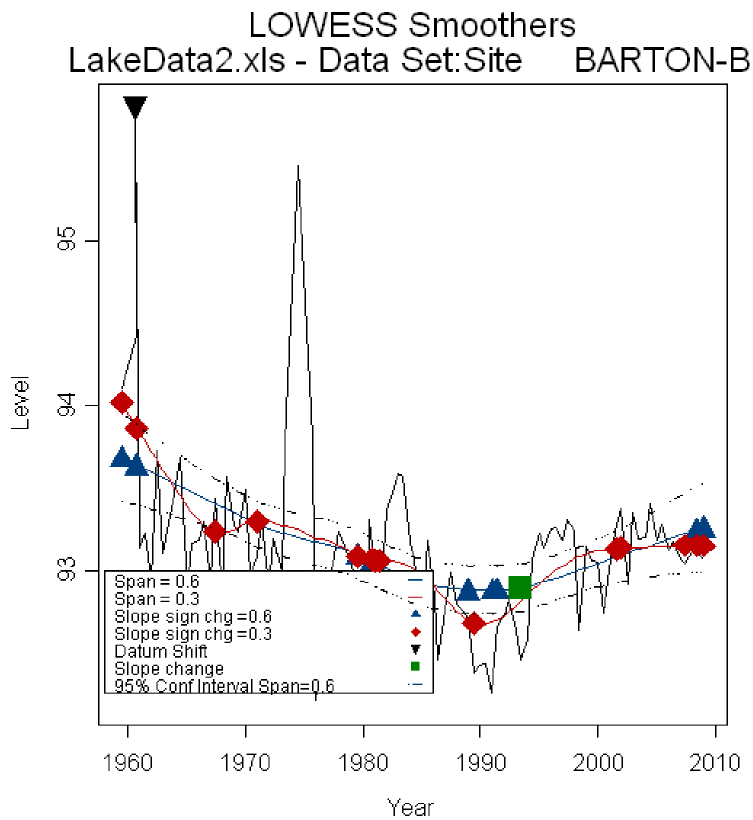
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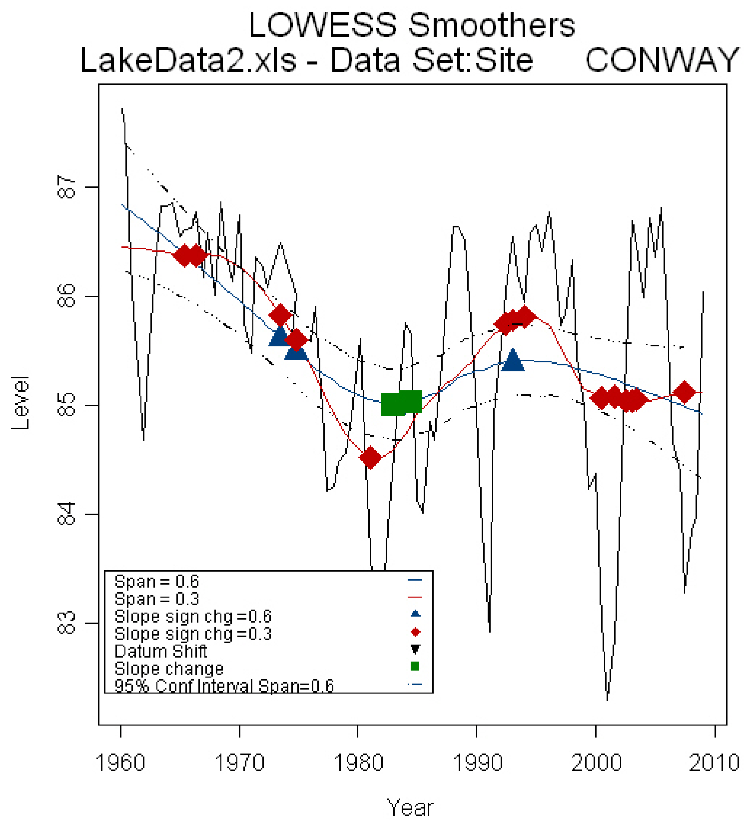
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Datum Shift
Slope change
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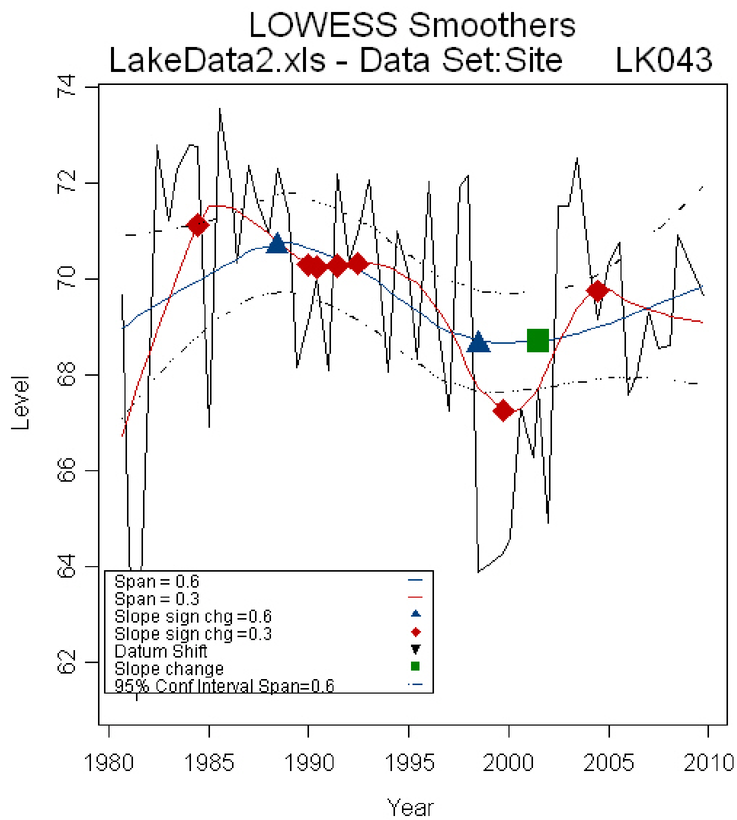
LOWESS Smoothers
LakeData2.xls - Data Set:Site LK043
Level
Year
74
72
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68
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64
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1980
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Datum Shift
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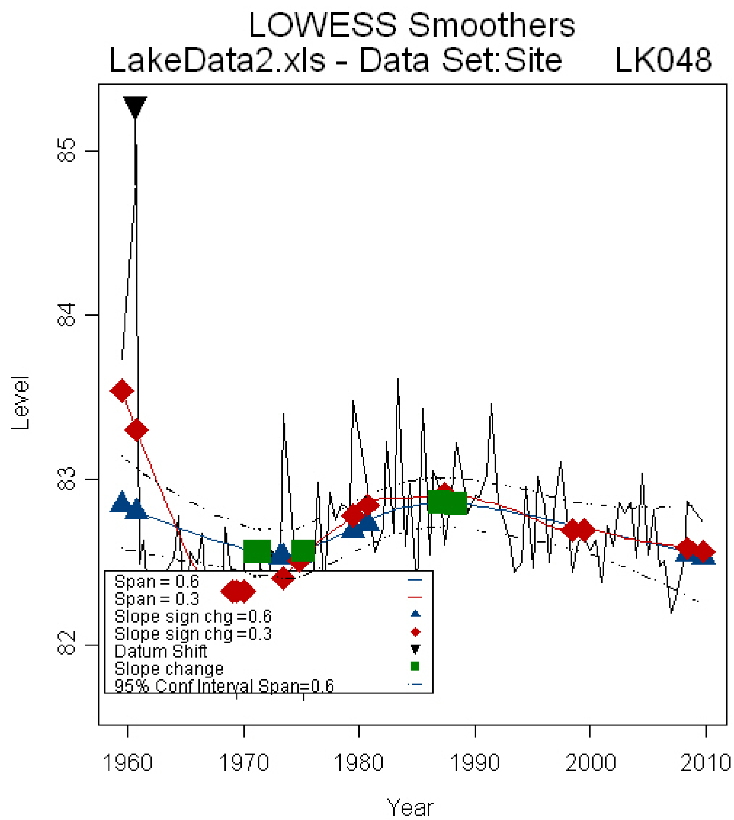

LOWESS Smoothers
LakeData2.xls - Data Set:Site LK048
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Datum Shift
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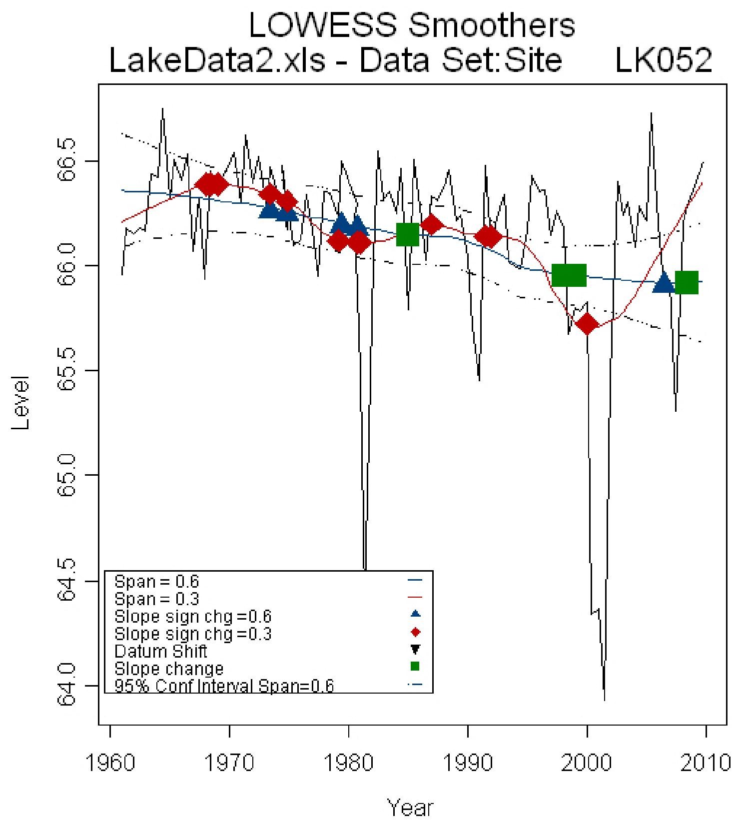

LOWESS Smoothers
LakeData2.xls - Data Set:Site LK052
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Year
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65.0
64.5
64.0
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Datum Shift
Slope change
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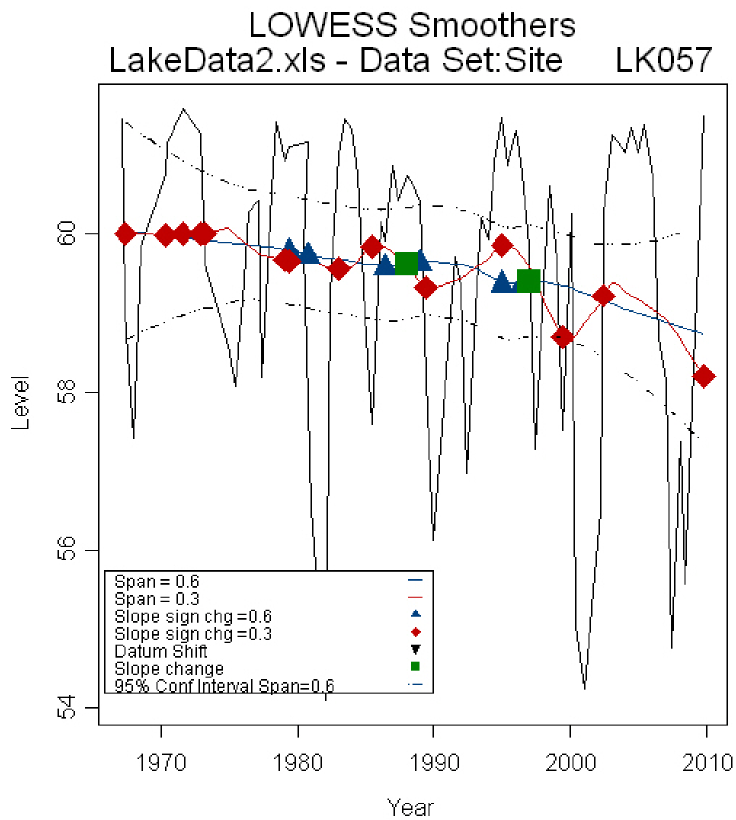
LOWESS Smoothers
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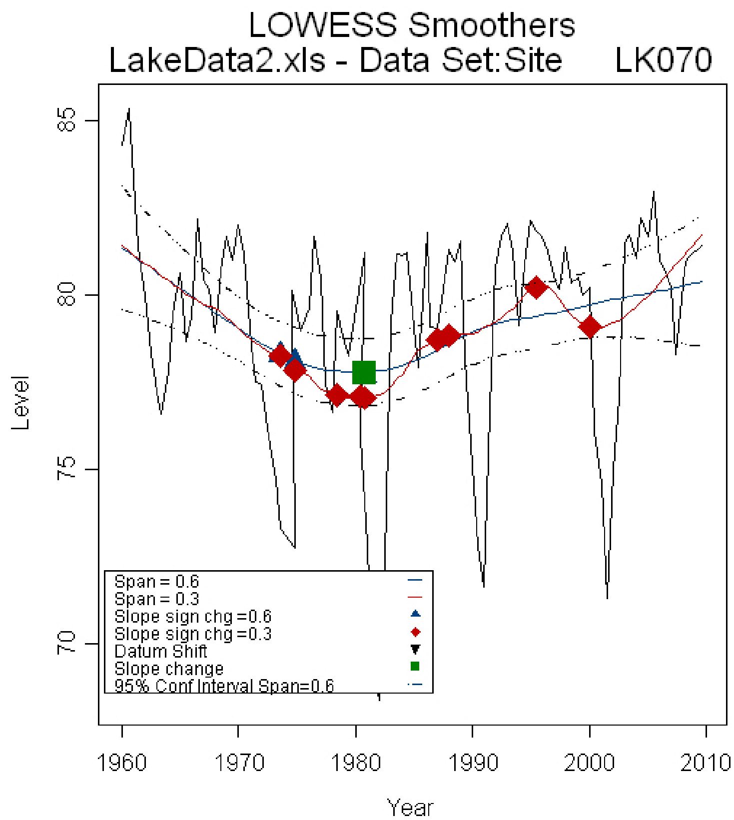

LOWESS Smoothers
LakeData2.xls - Data Set:Site LK070
Level
Year
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Datum Shift
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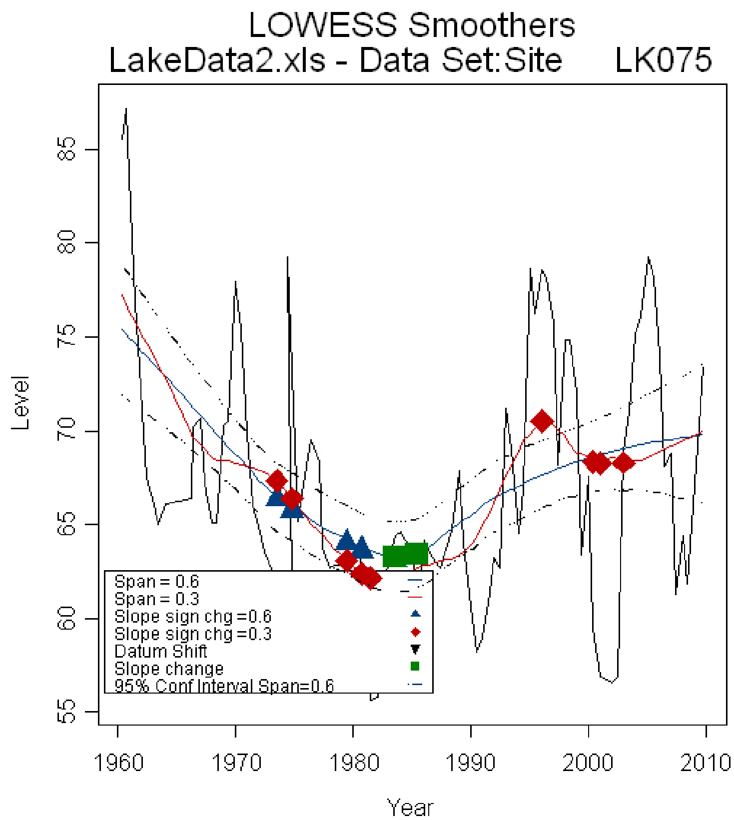
LOWESS Smoothers
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Year
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Datum Shift
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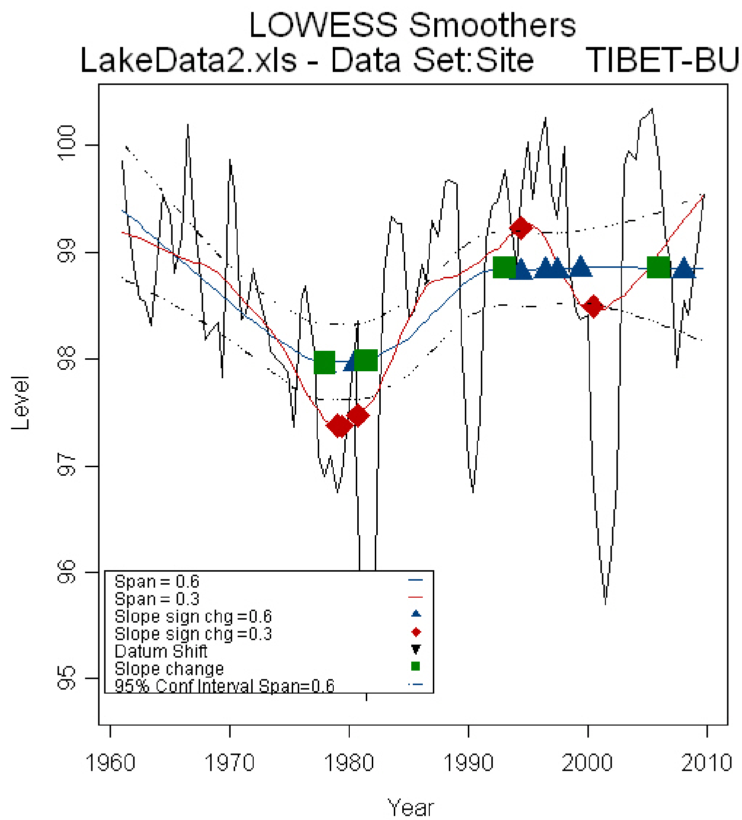
LOWESS Smoothers
LakeData2.xls - Data Set:Site TIBET-BU
Level
Year
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95
1960
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2010
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Datum Shift
Slope change
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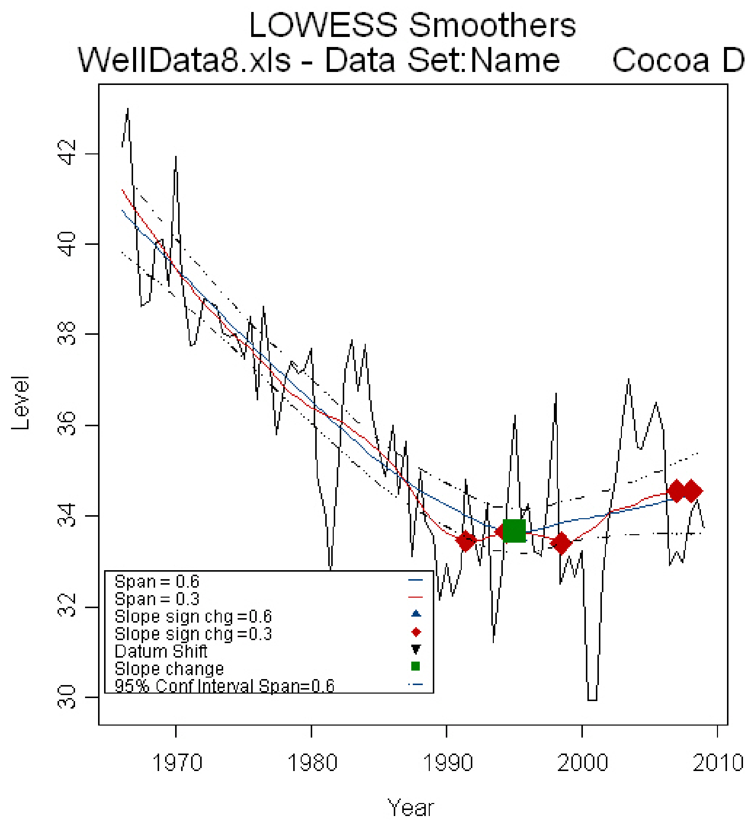
SJRWMD- Wells


LOWESS Smoothers
WellData8.xls - Data Set:Name Cocoa D
Level
Year
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40
38
36
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32
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1970
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2000
2010
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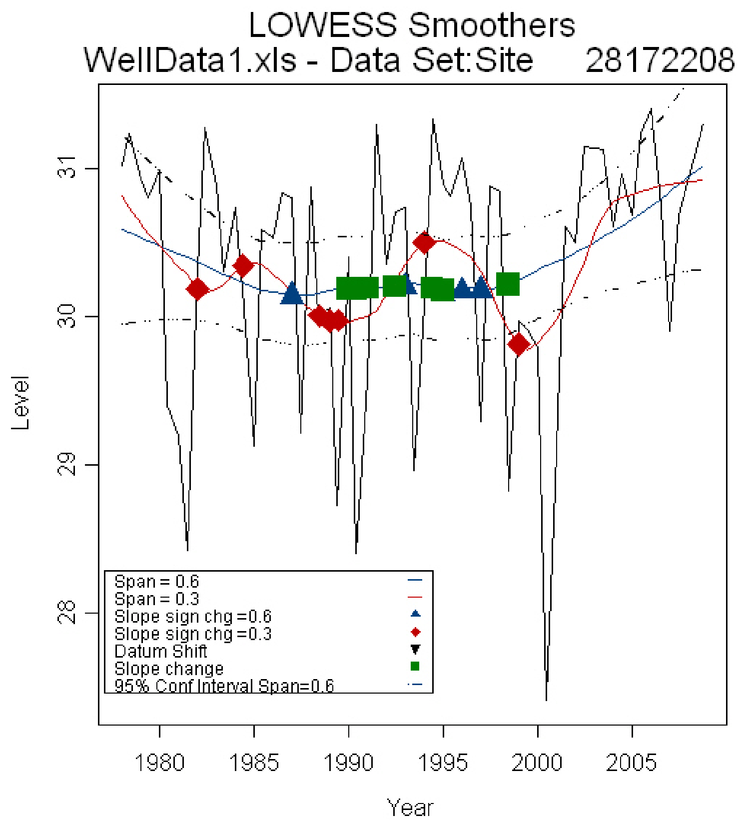
LOWESS Smoothers
WellData1.xls - Data Set:Site 28172208
Level
Year
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Datum Shift
Slope change
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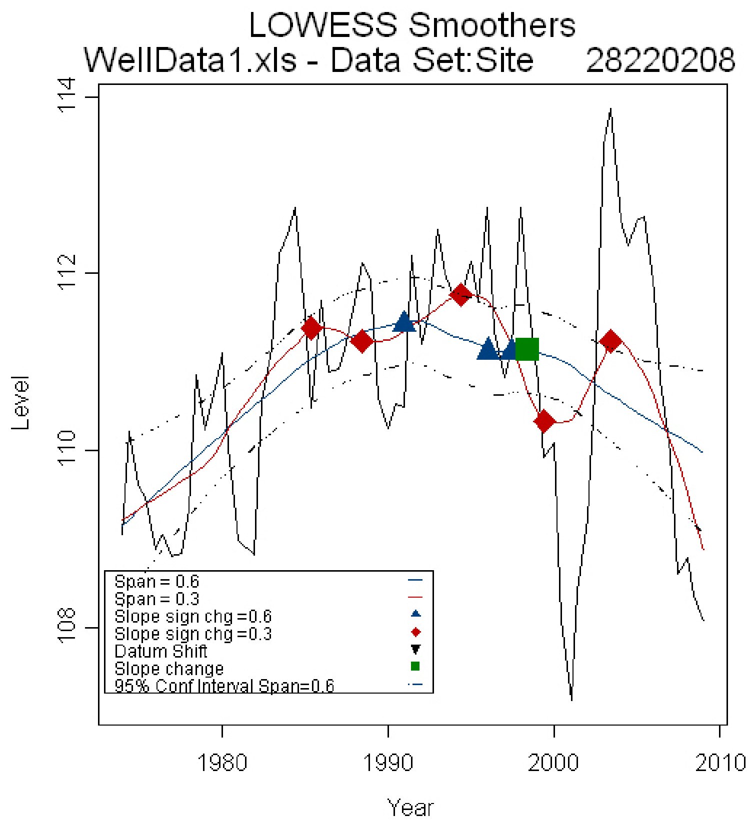
LOWESS Smoothers
WellData1.xls - Data Set:Site 28220208
Level
Year
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114
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2000
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Datum Shift
Slope change
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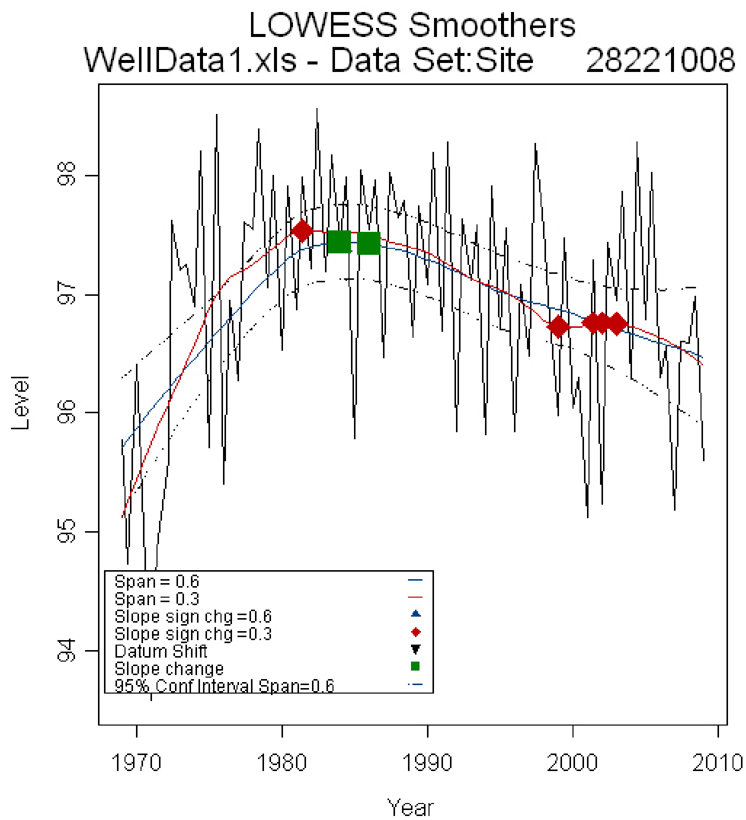

LOWESS Smoothers
WellData1.xls - Data Set:Site 28221008
Level
Year
94
95
96
97
98
1970
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1990
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Datum Shift
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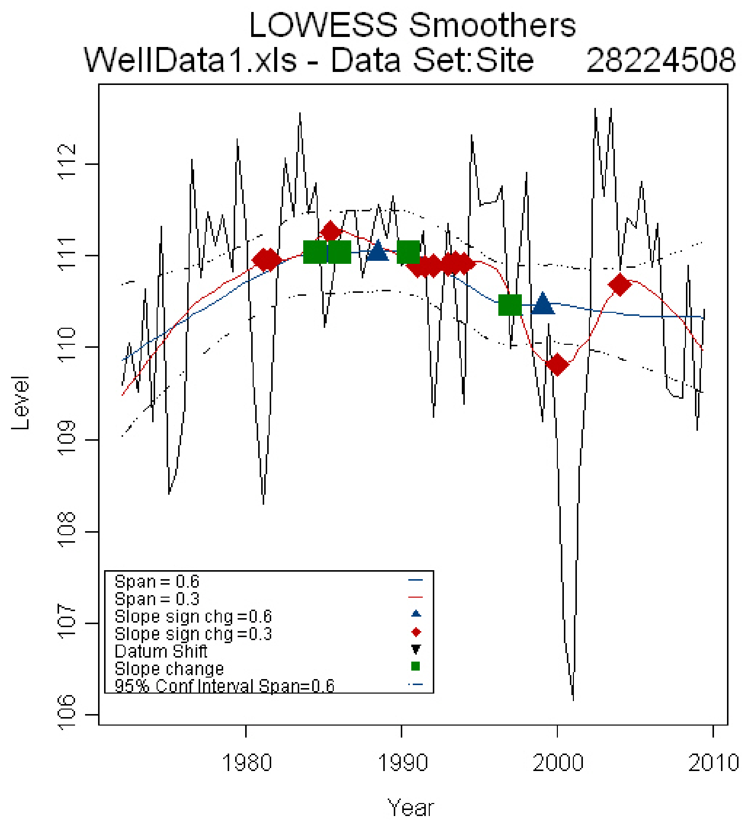
LOWESS Smoothers
WellData1.xls - Data Set:Site 28224508
Level
Year
106
107
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111
112
1980
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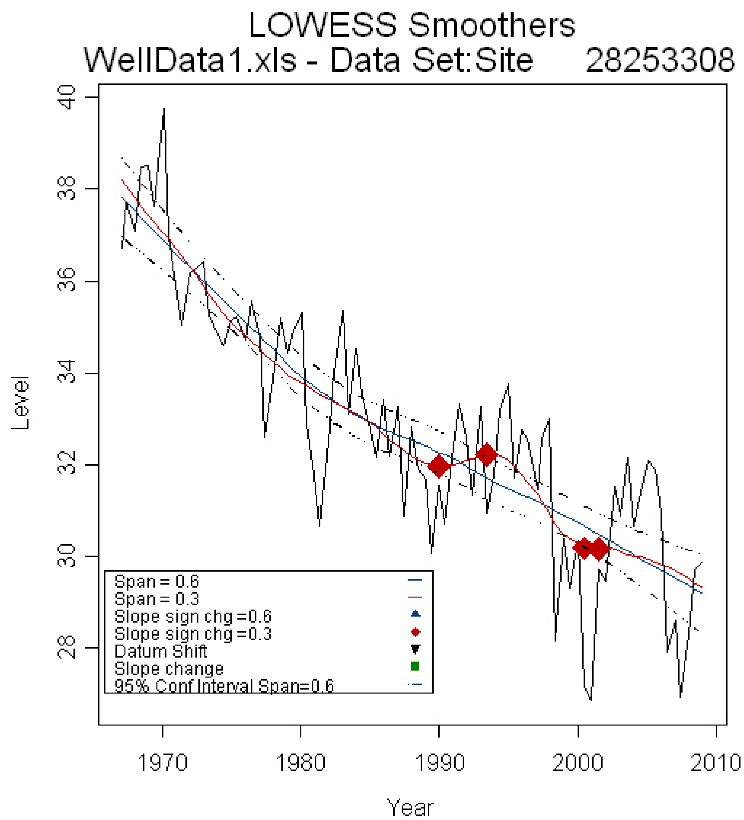
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData1.xls - Data Set:Site 28253308
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Year
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1970
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Datum Shift
Slope change
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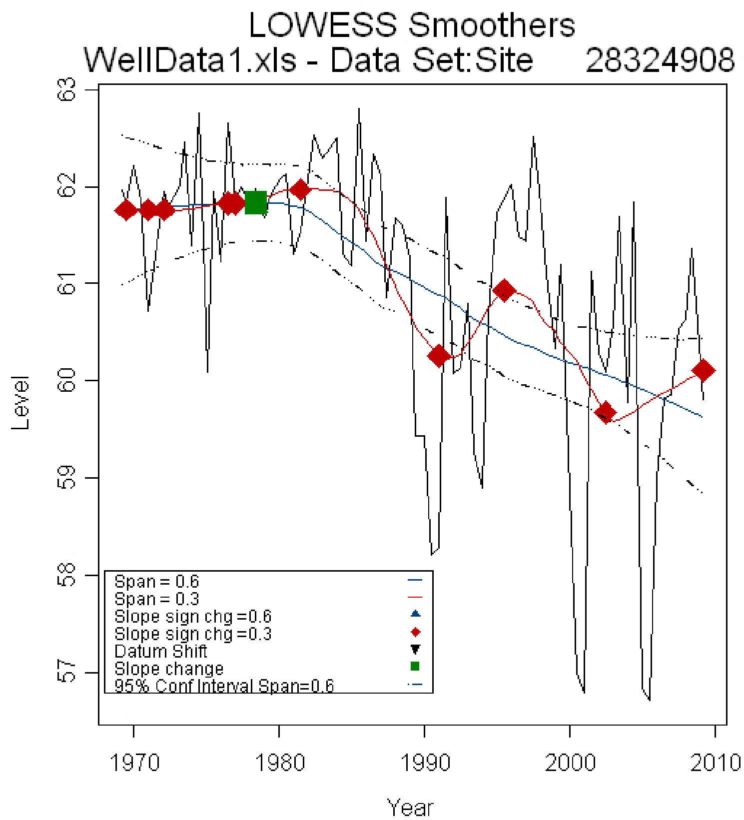

LOWESS Smoothers
WellData1.xls - Data Set:Site 28324908
Level
Year
63
62
61
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57
1970
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Datum Shift
Slope change
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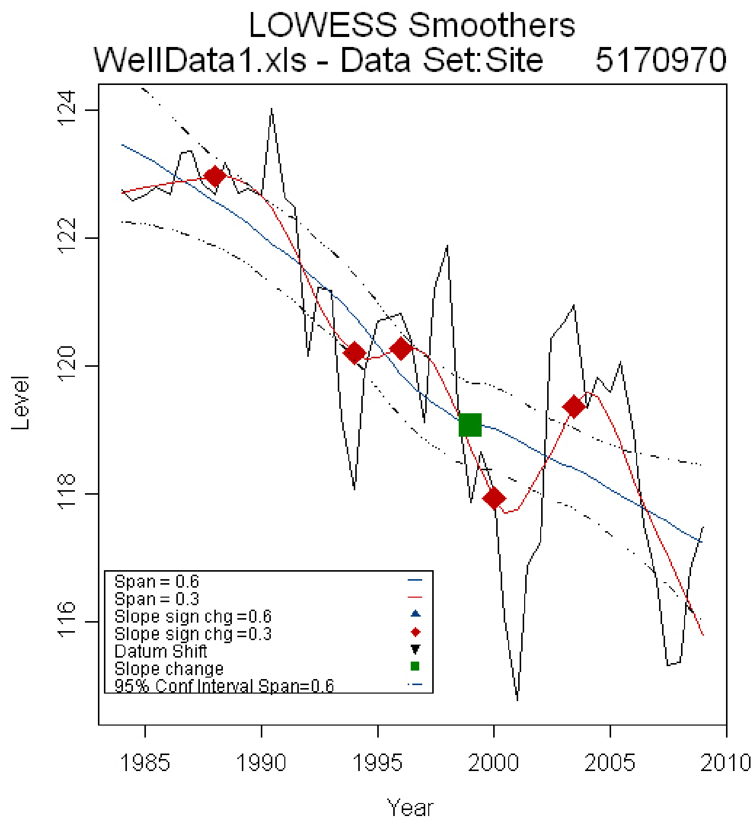
LOWESS Smoothers
WellData1.xls - Data Set:Site 5170970
Level
Year
124
122
120
118
116
1985
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Datum Shift
Slope change
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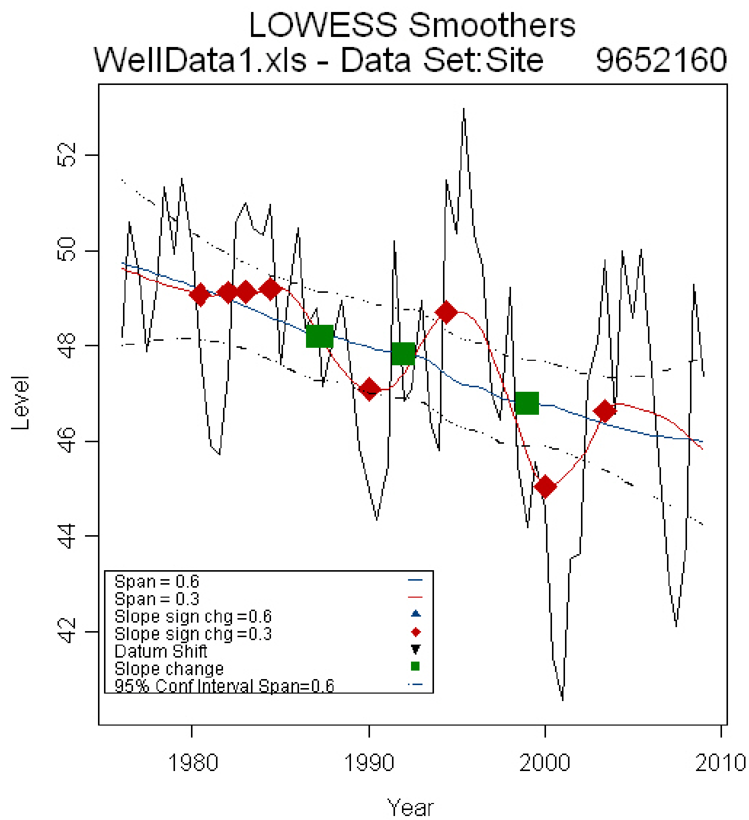
LOWESS Smoothers
WellData1.xls - Data Set:Site 9652160
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Year
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50
48
46
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42
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1990
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Datum Shift
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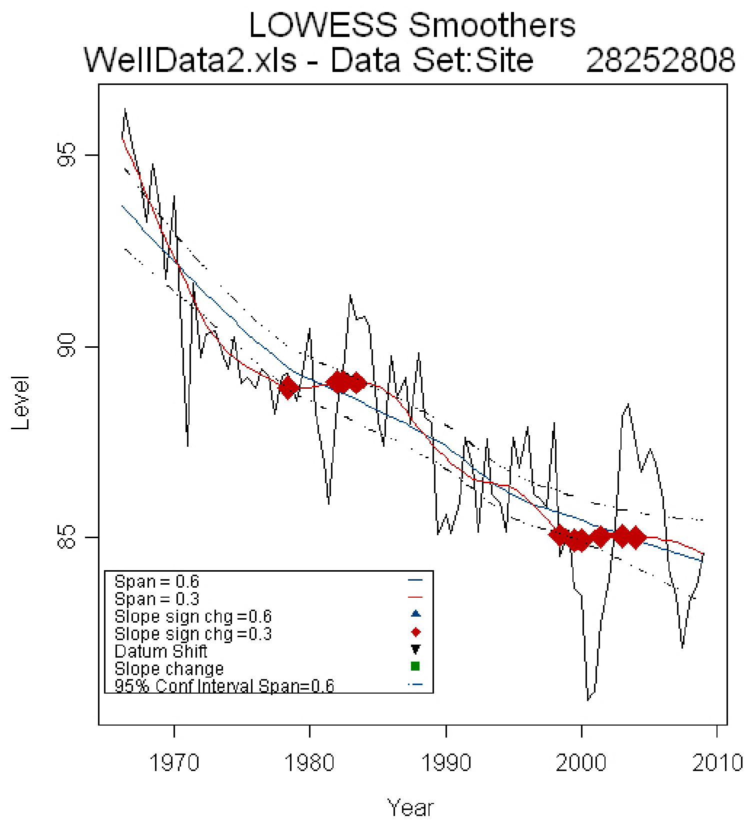
LOWESS Smoothers
WellData2.xls - Data Set:Site 28252808
Level
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90
85
1970
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1990
2000
2010
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Datum Shift
Slope change
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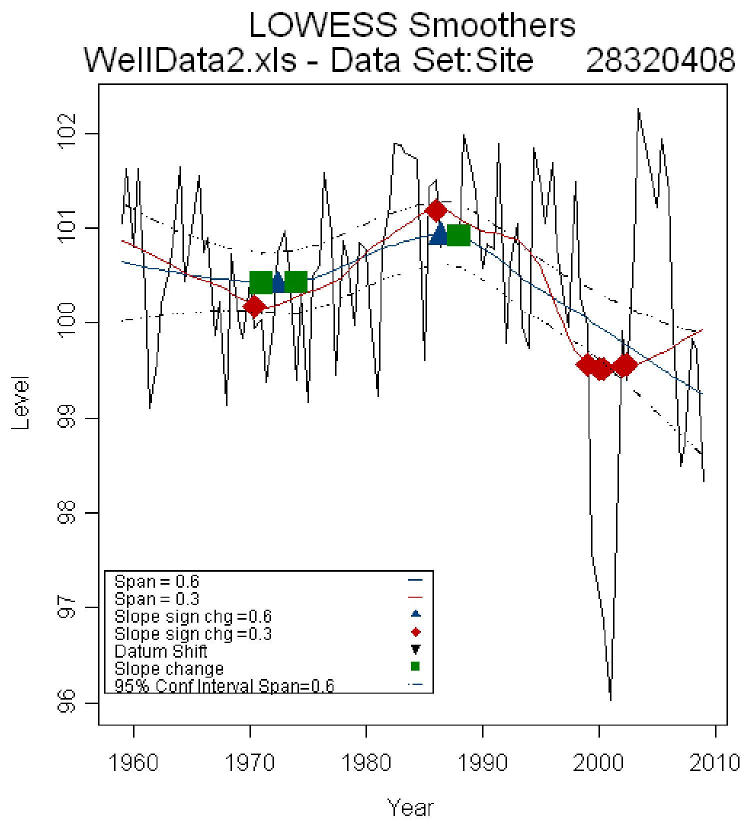
LOWESS Smoothers
WellData2.xls - Data Set:Site 28320408
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Datum Shift
Slope change
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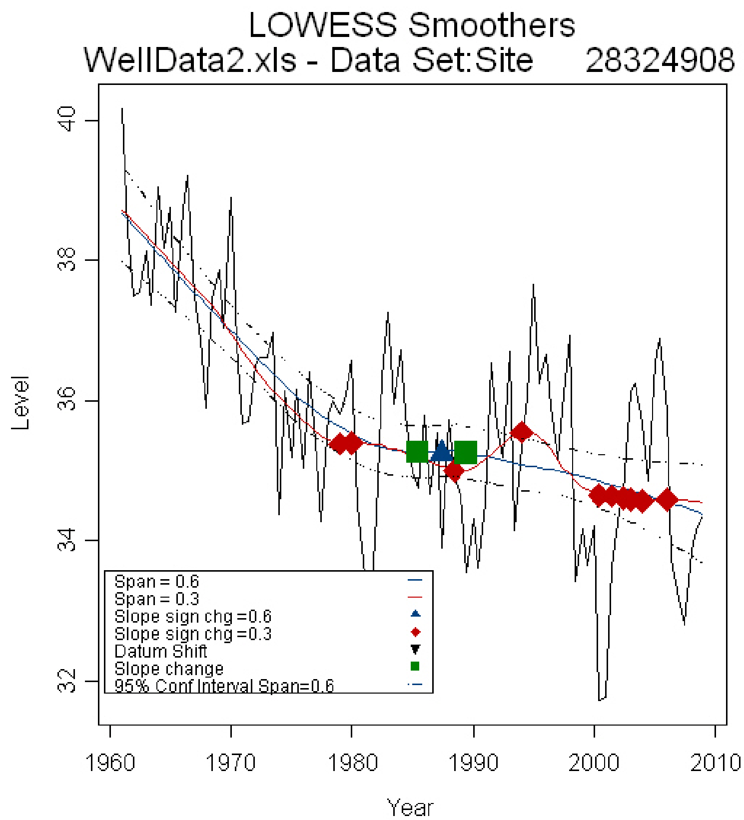

LOWESS Smoothers
WellData2.xls - Data Set:Site 28324908
Level
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38
36
34
32
1960
1970
1980
1990
2000
2010
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Datum Shift
Slope change
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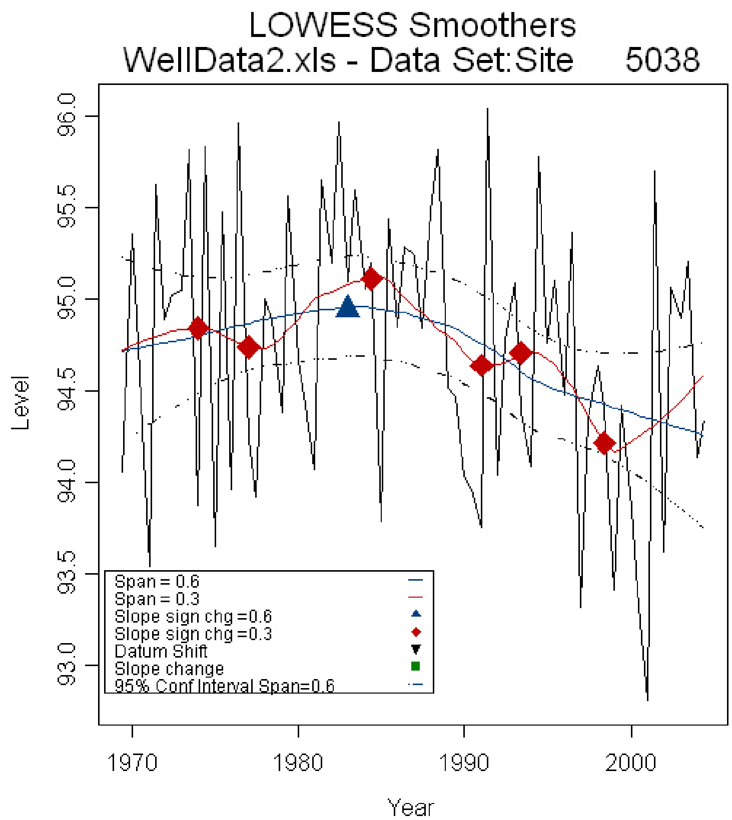

LOWESS Smoothers
WellData2.xls - Data Set:Site 5038
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Year
96.0
95.5
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93.5
93.0
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Datum Shift
Slope change
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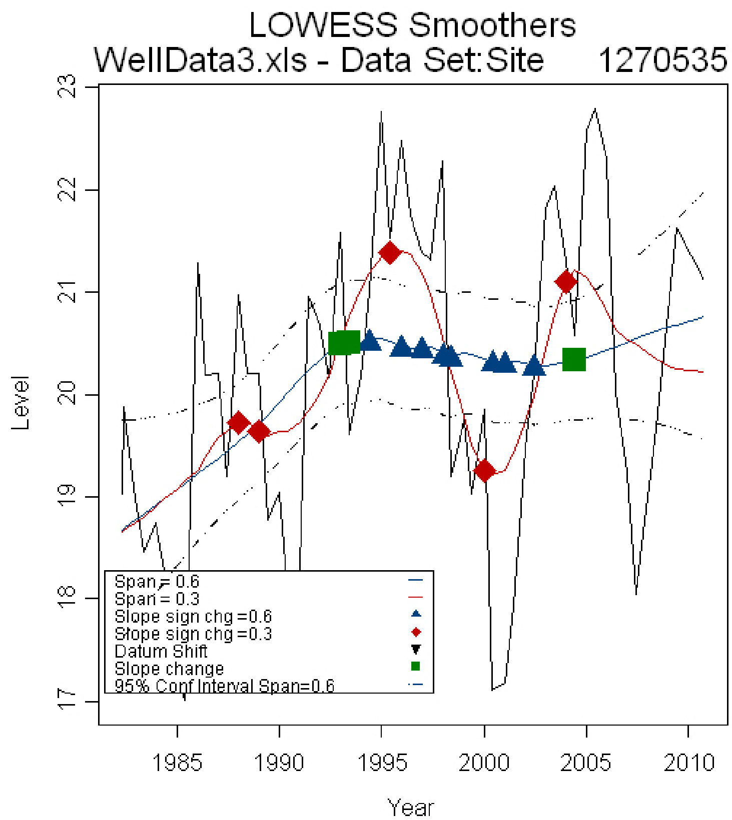

LOWESS Smoothers
WellData3.xls - Data Set:Site 1270535
Level
Year
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Datum Shift
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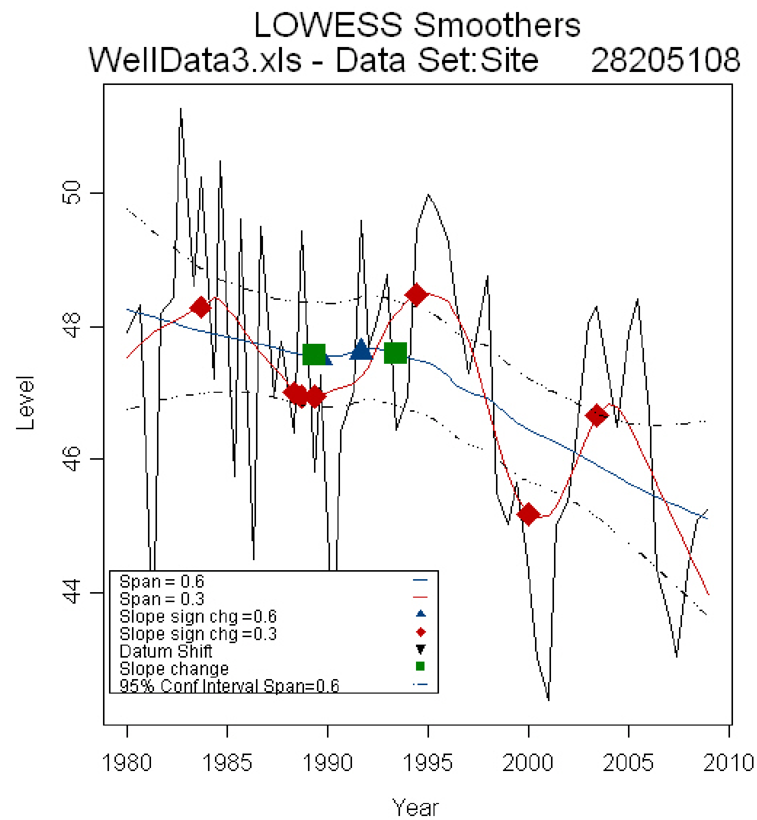
LOWESS Smoothers
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Level
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48
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44
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2000
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Datum Shift
Slope change
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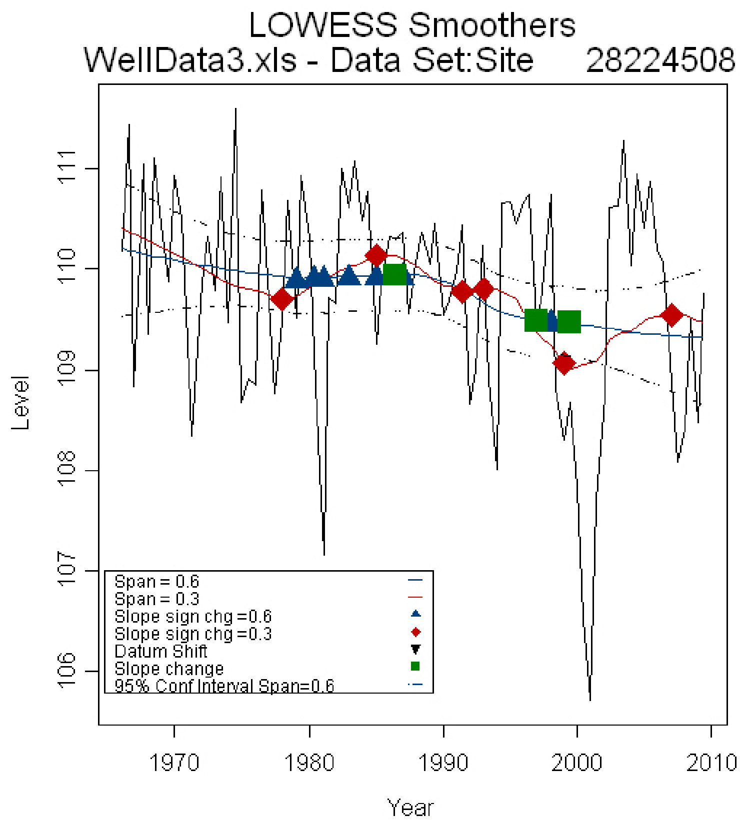

LOWESS Smoothers
WellData3.xls - Data Set:Site 28224508
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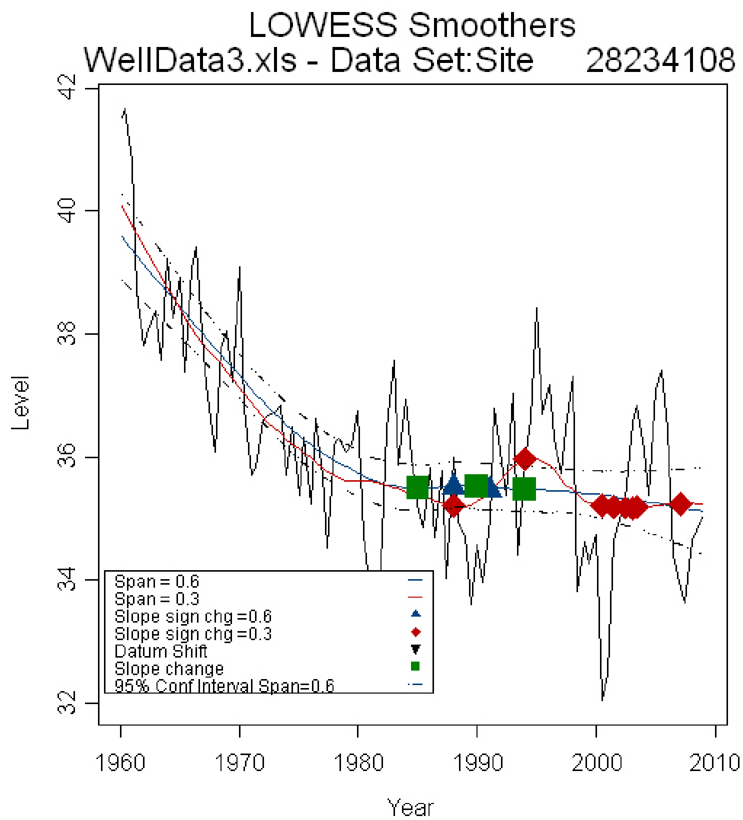

LOWESS Smoothers
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Datum Shift
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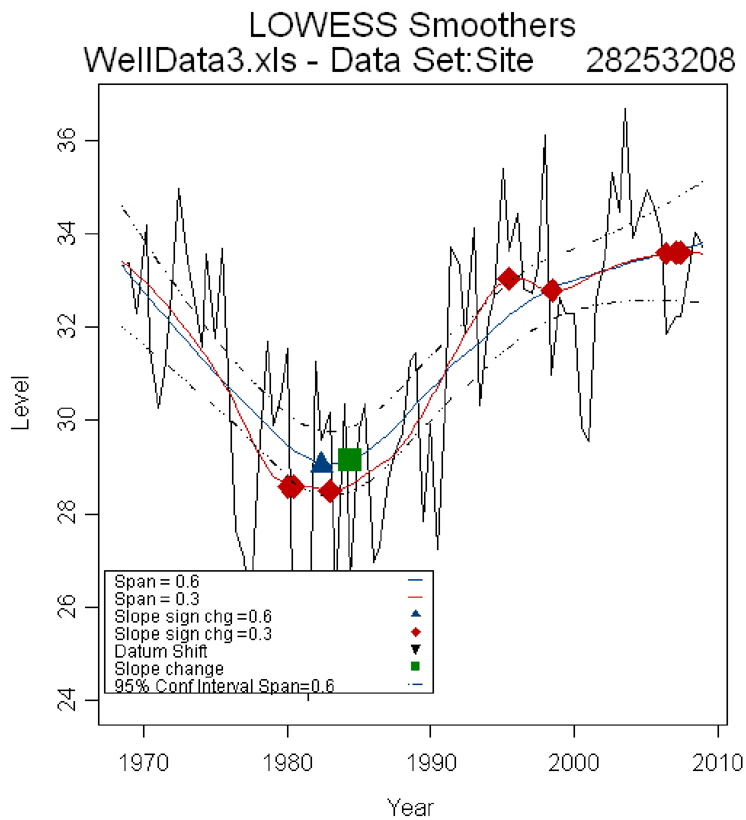
LOWESS Smoothers
WellData3.xls - Data Set:Site 28253208
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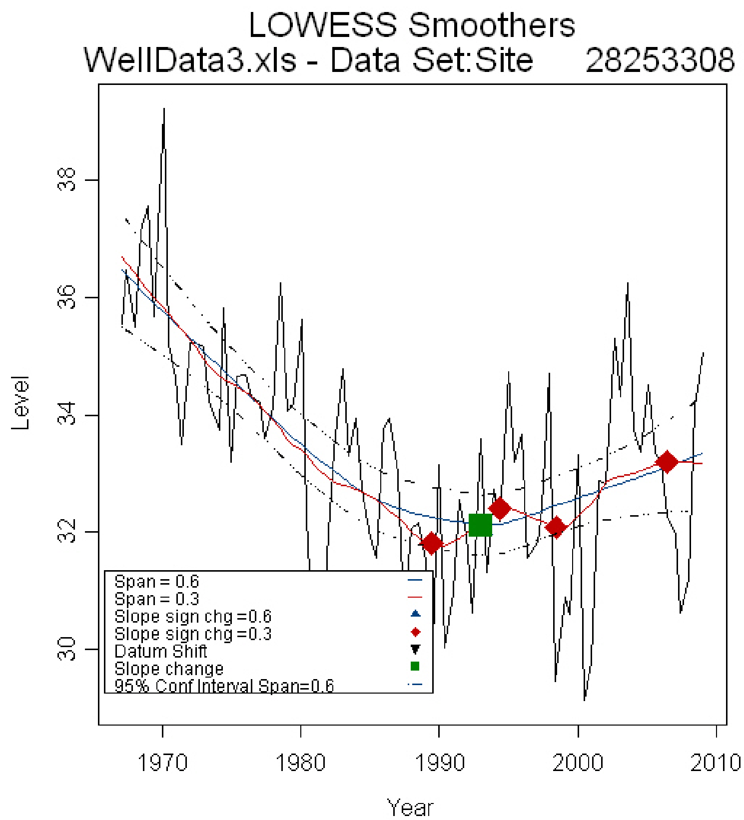

LOWESS Smoothers
WellData3.xls - Data Set:Site 28253308
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Slope change
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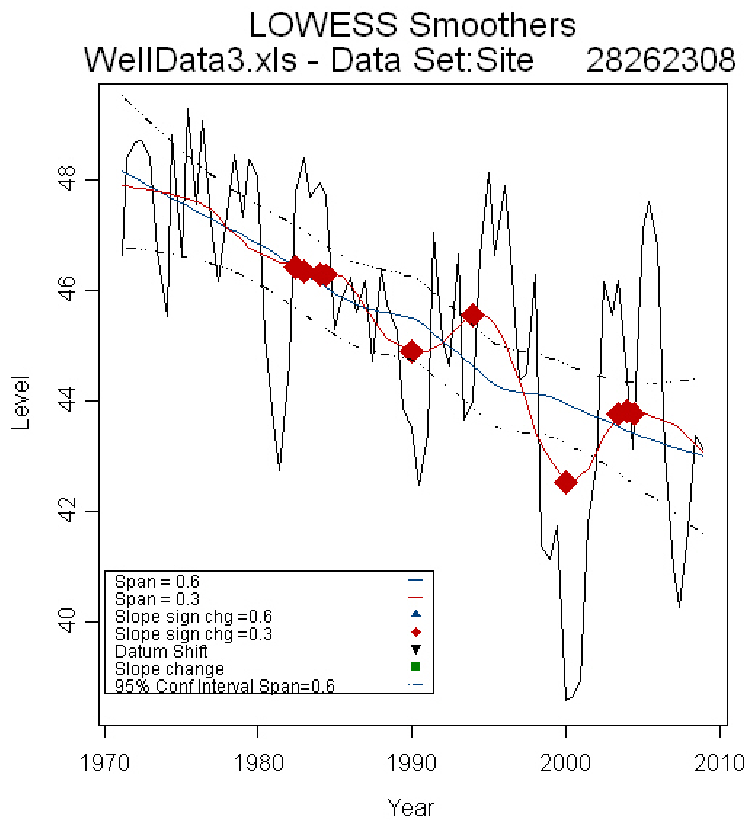
2000
2010
Year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42
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Datum Shift
Slope change
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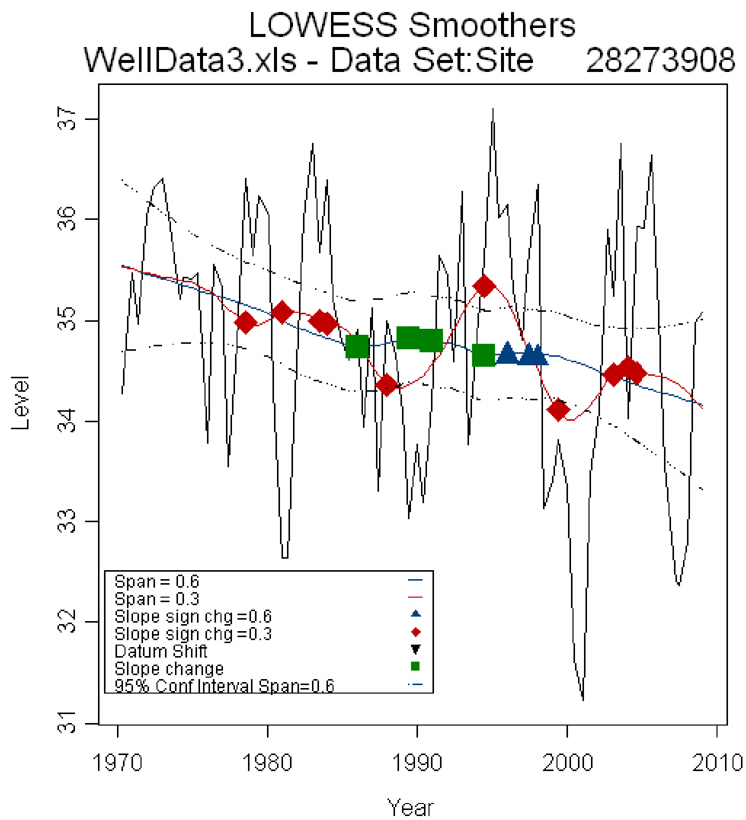
1980
1990
2000
2010
Year


LOWESS Smoothers
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Year
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Datum Shift
Slope change
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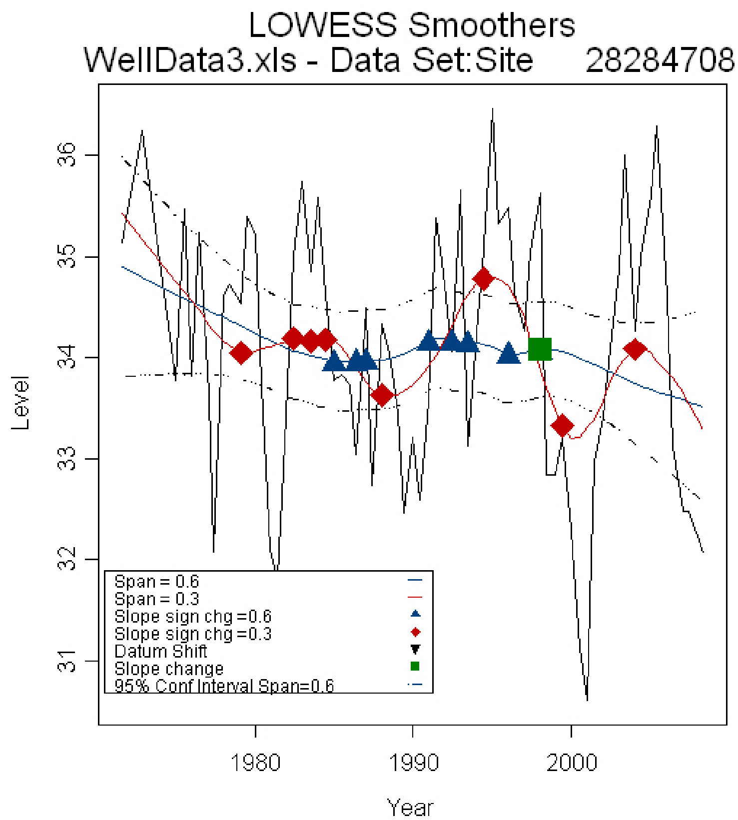

LOWESS Smoothers
WellData3.xls - Data Set:Site 28284708
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Year
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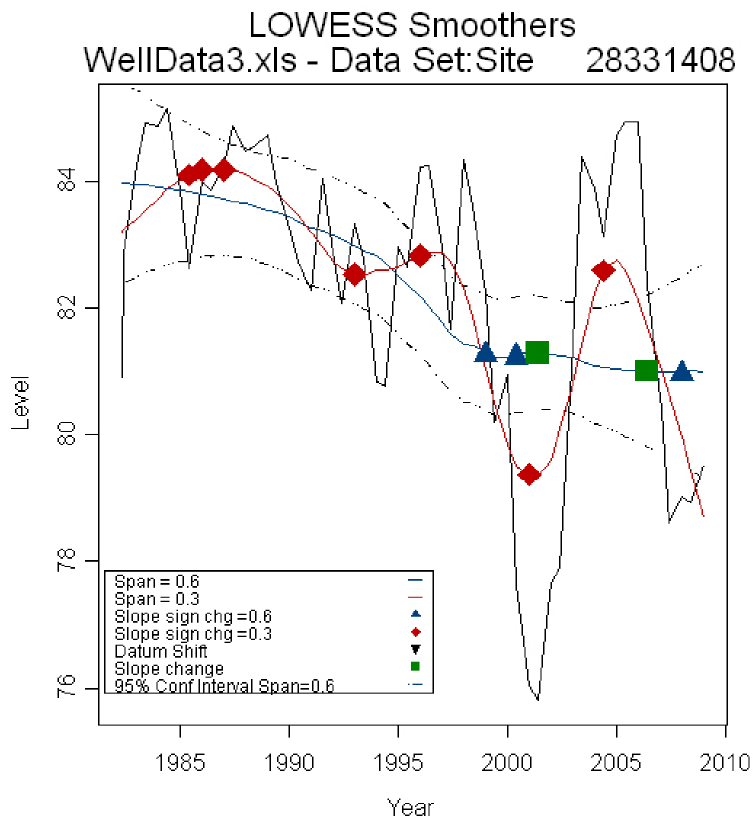
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData3.xls - Data Set:Site 28331408
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Datum Shift
Slope change
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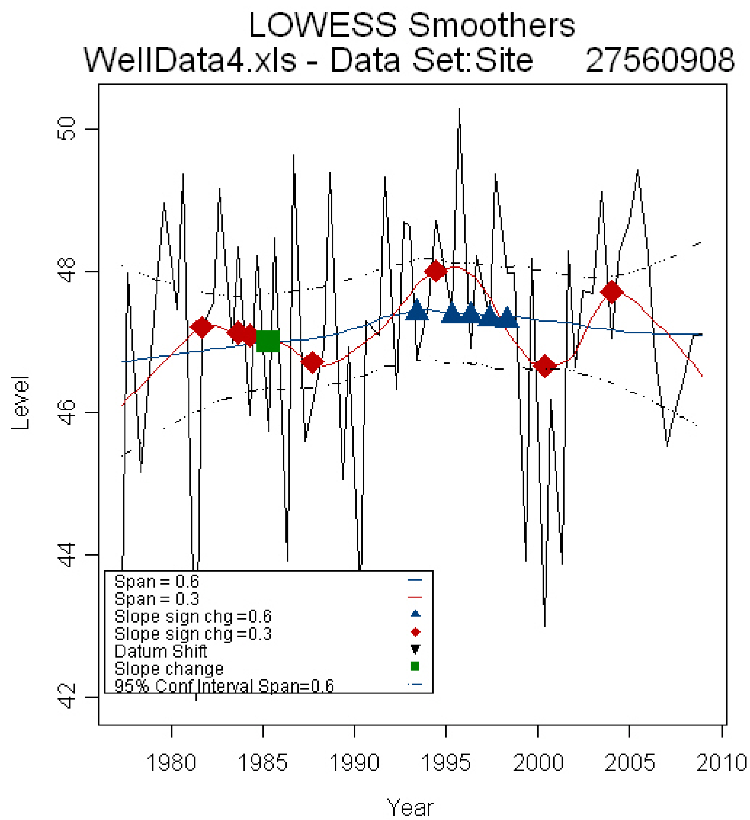

LOWESS Smoothers
WellData4.xls - Data Set:Site 27560908
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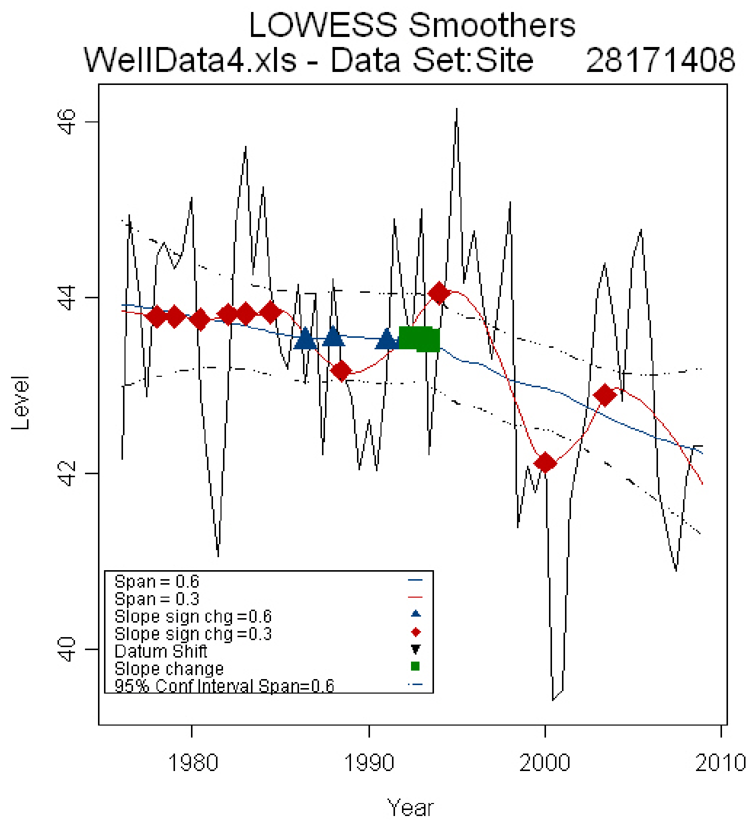
LOWESS Smoothers
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Level
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Datum Shift
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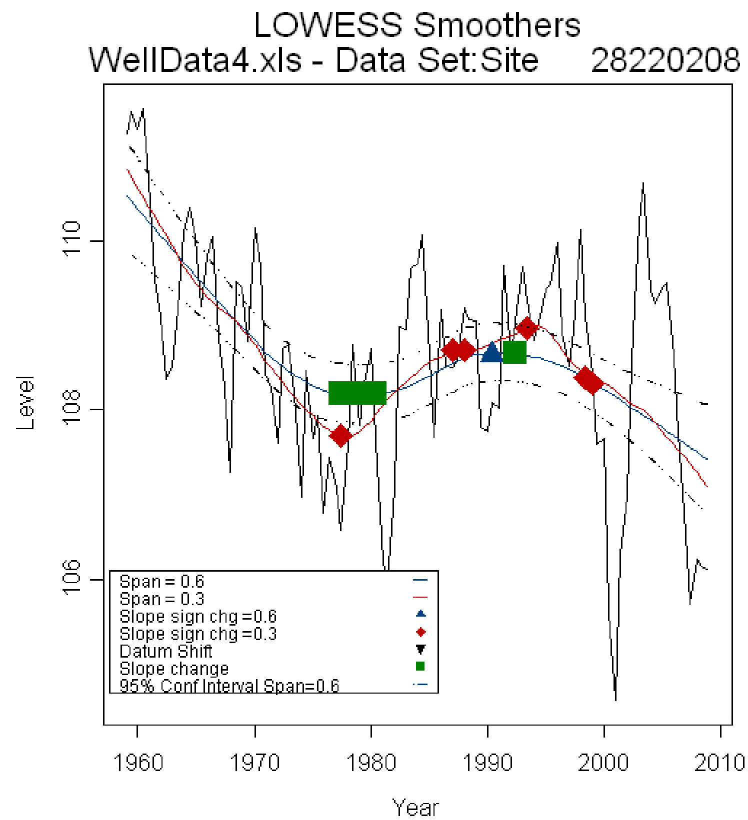

LOWESS Smoothers
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Level
110
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106
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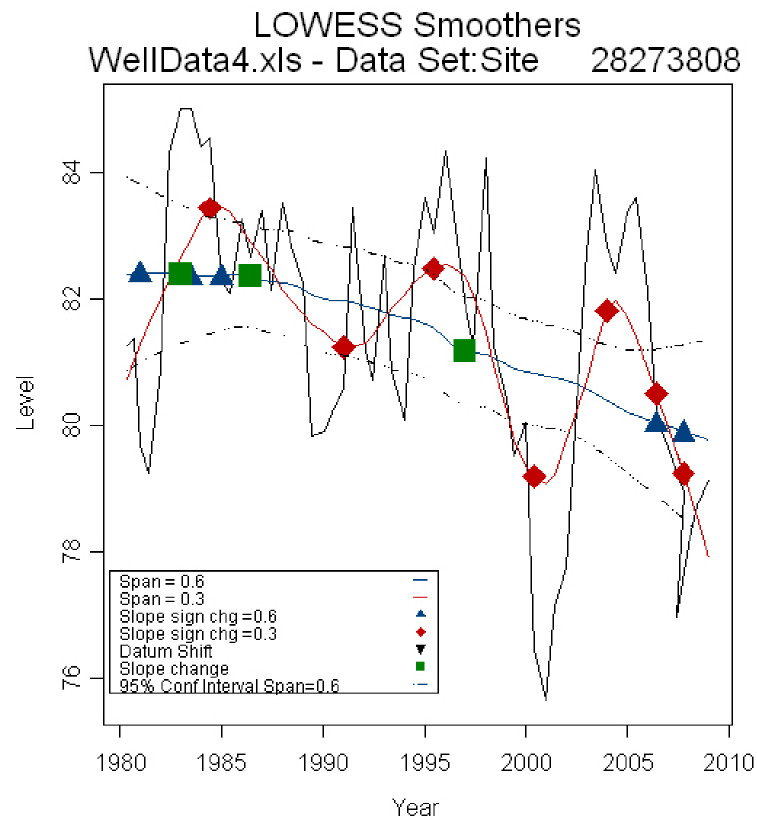
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData4.xls - Data Set:Site 28273808
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78
76
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Datum Shift
Slope change
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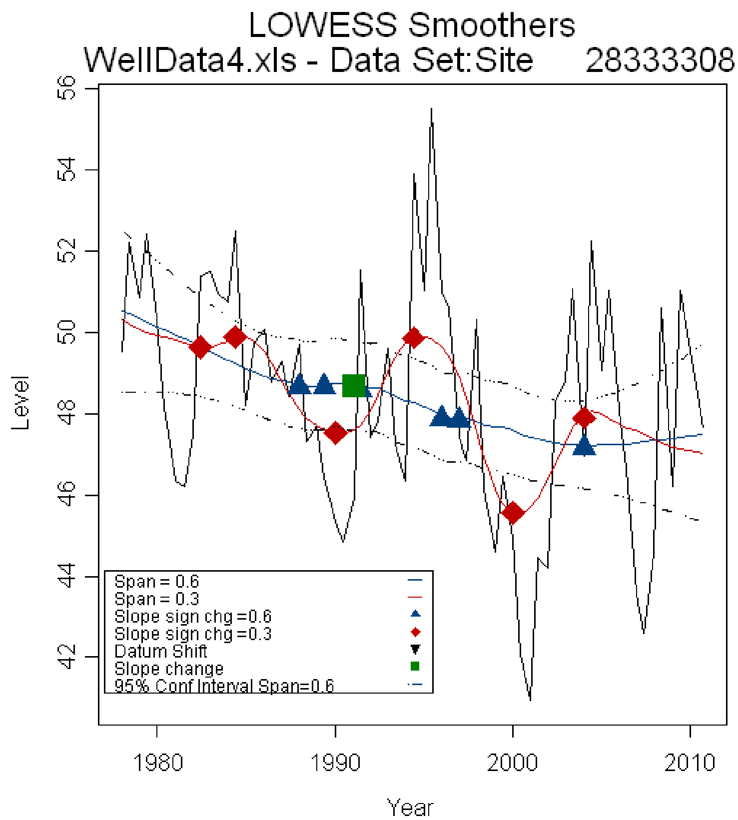

LOWESS Smoothers
WellData4.xls - Data Set:Site 28333308
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Datum Shift
Slope change
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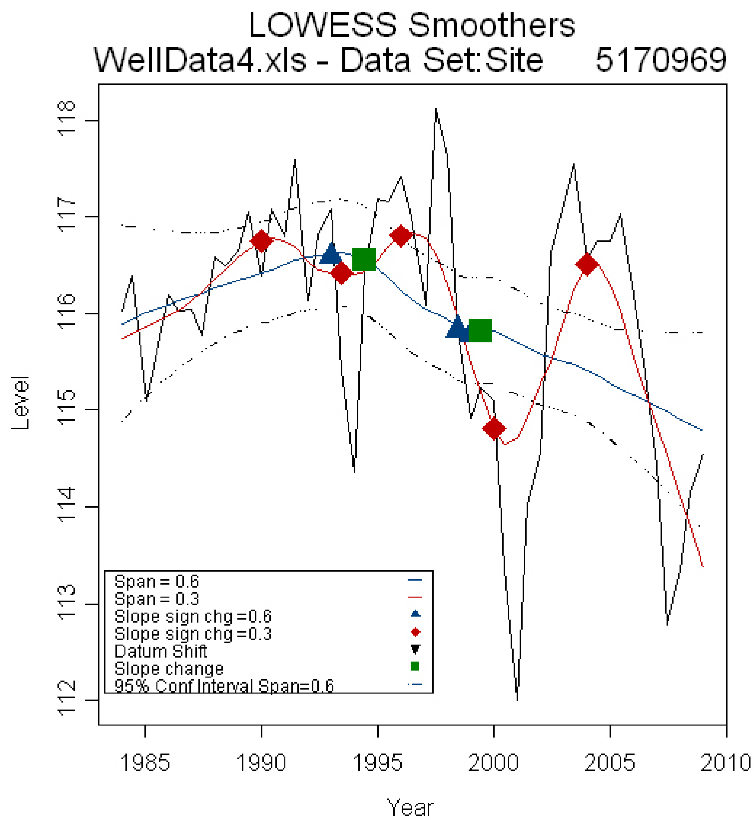

LOWESS Smoothers
WellData4.xls - Data Set:Site 5170969
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Datum Shift
Slope change
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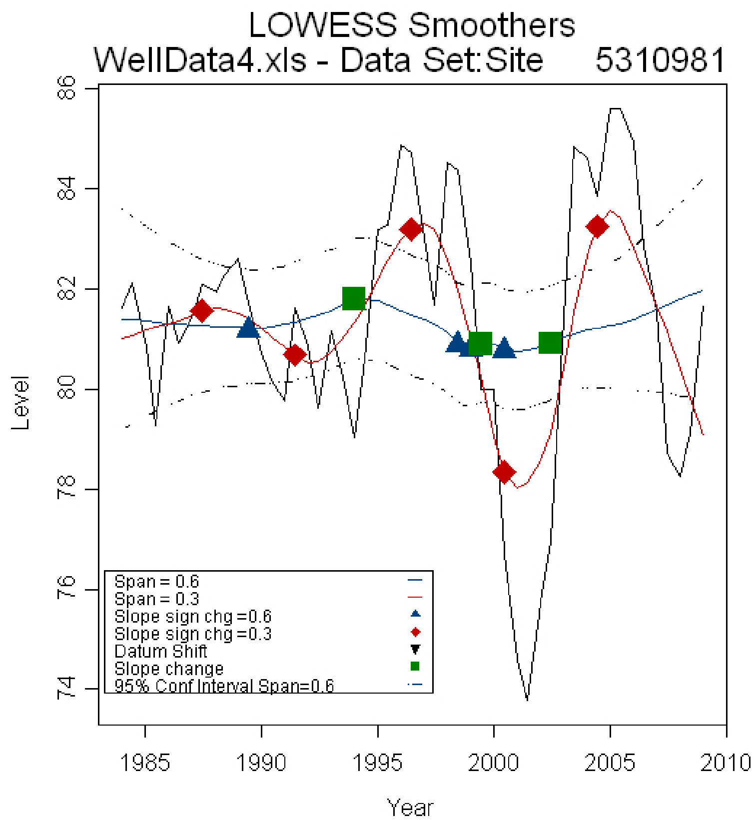
LOWESS Smoothers
WellData4.xls - Data Set:Site 5310981
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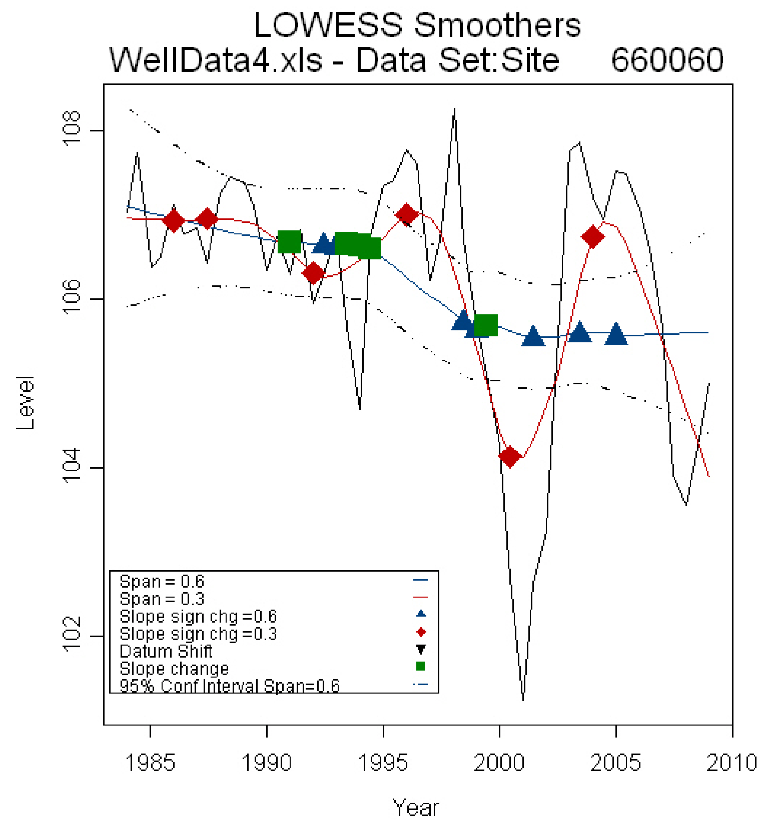
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData4.xls - Data Set:Site 660060
Level
108
106
104
102
1985
1990
1995
2000
2005
2010
Year
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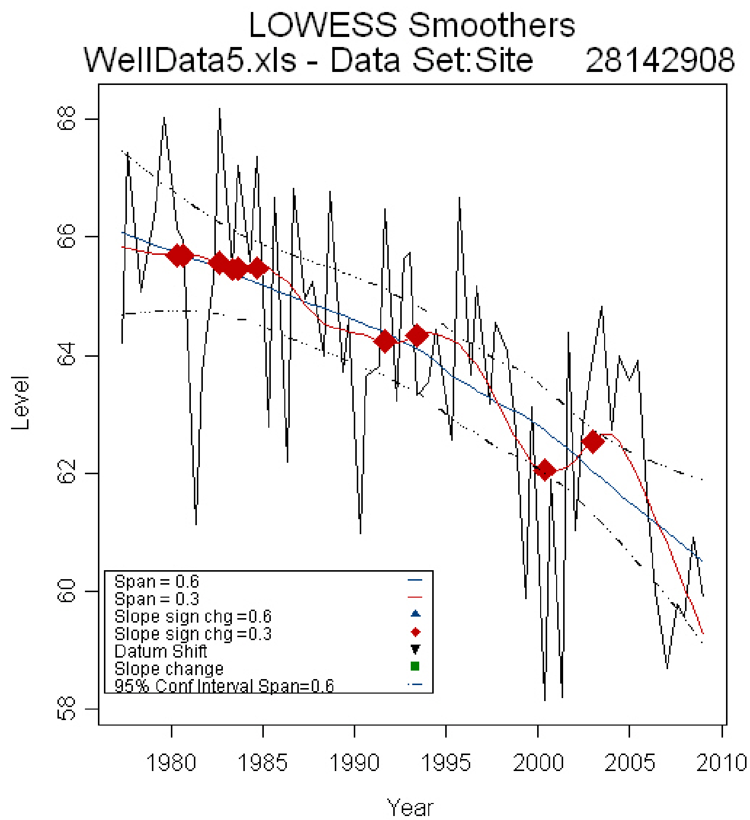
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData5.xls - Data Set:Site 28142908
Level
Year
68
66
64
62
60
58
1980
1985
1990
1995
2000
2005
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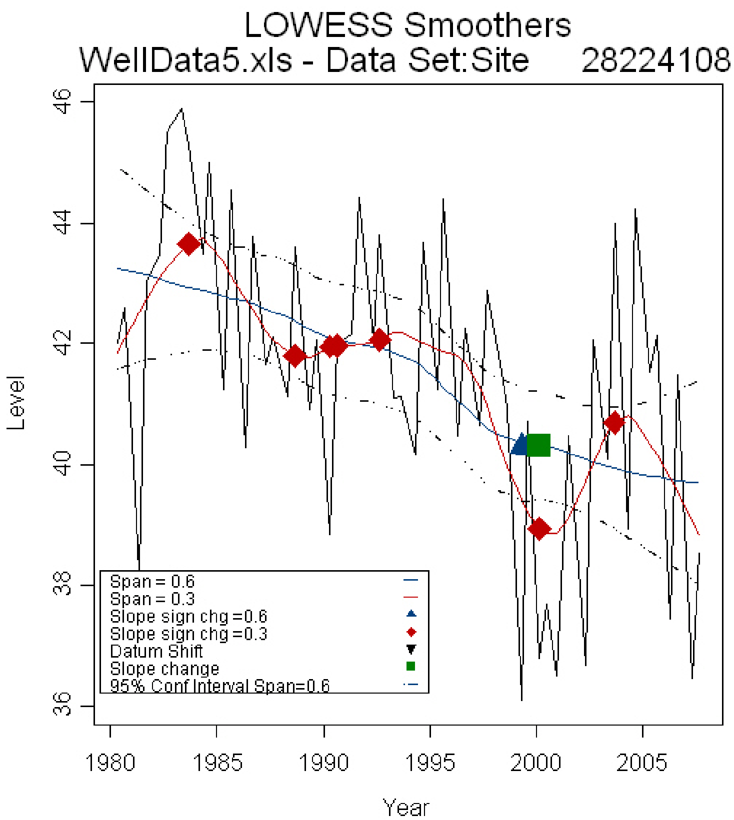
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData5.xls - Data Set:Site 28224108
Level
Year
46
44
42
40
38
36
1980
1985
1990
1995
2000
2005
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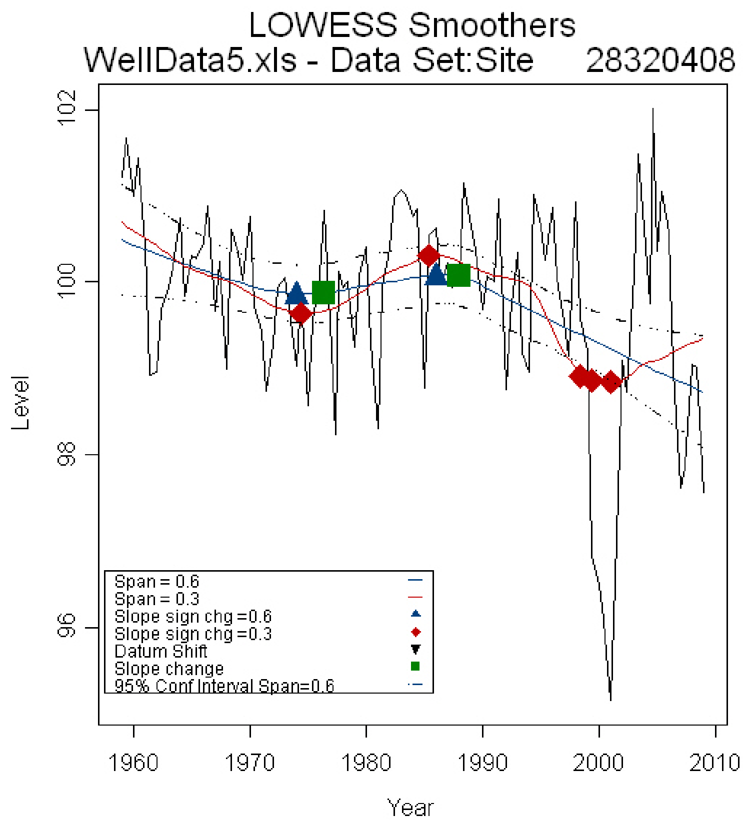
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData5.xls - Data Set:Site 28320408
Level
Year
102
100
98
96
1960
1970
1980
1990
2000
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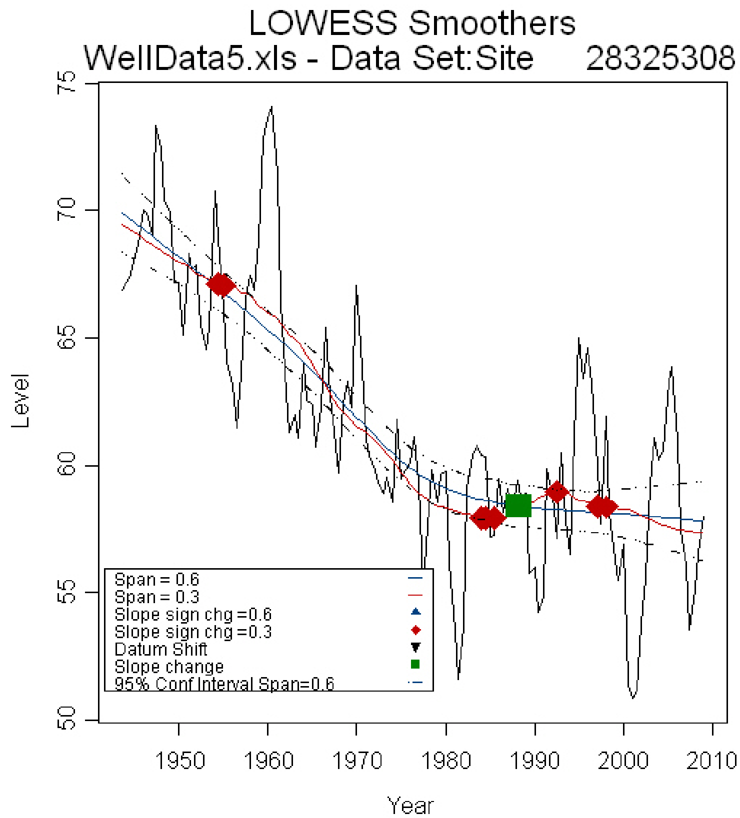
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData5.xls - Data Set:Site 28325308
Level
Year
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65
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75
1950
1960
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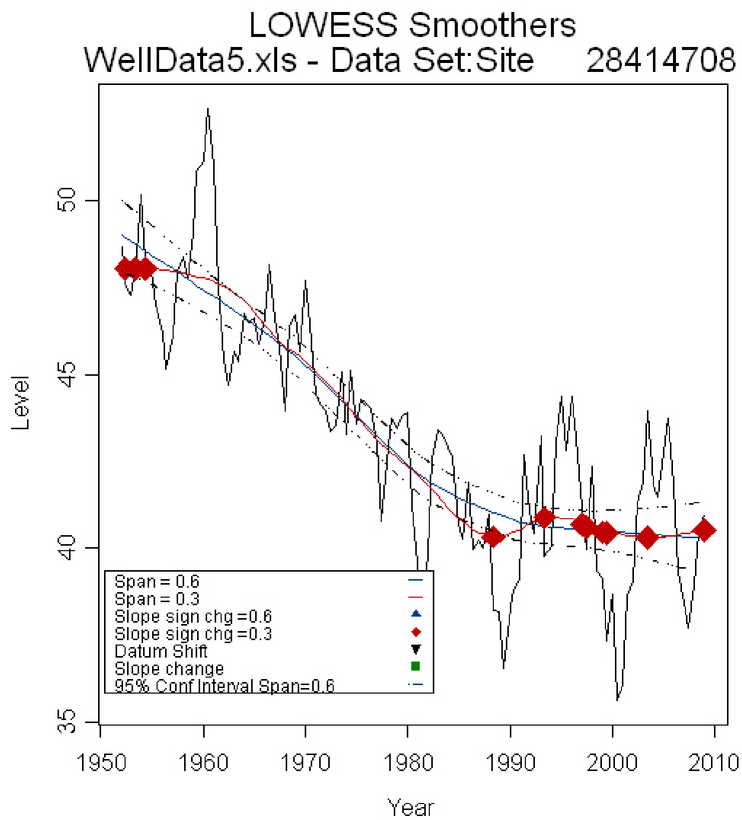
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData5.xls - Data Set:Site 28414708
Level
Year
50
45
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35
1950
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1970
1980
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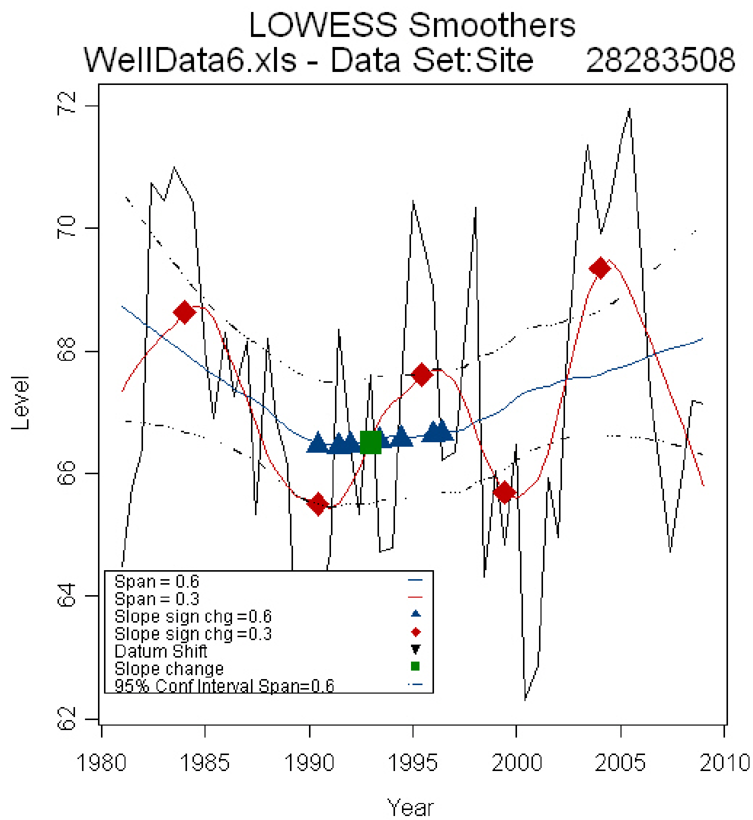
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData6.xls - Data Set:Site 28283508
Level
Year
62
64
66
68
70
72
1980
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1995
2000
2005
2010
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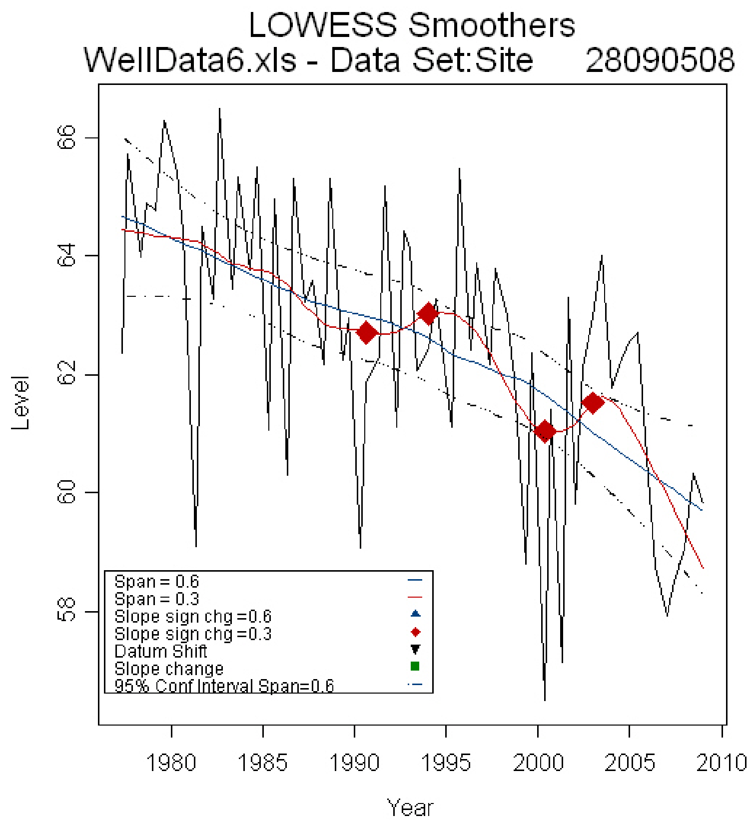
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData6.xls - Data Set:Site 28090508
Level
Year
66
64
62
60
58
1980
1985
1990
1995
2000
2005
2010
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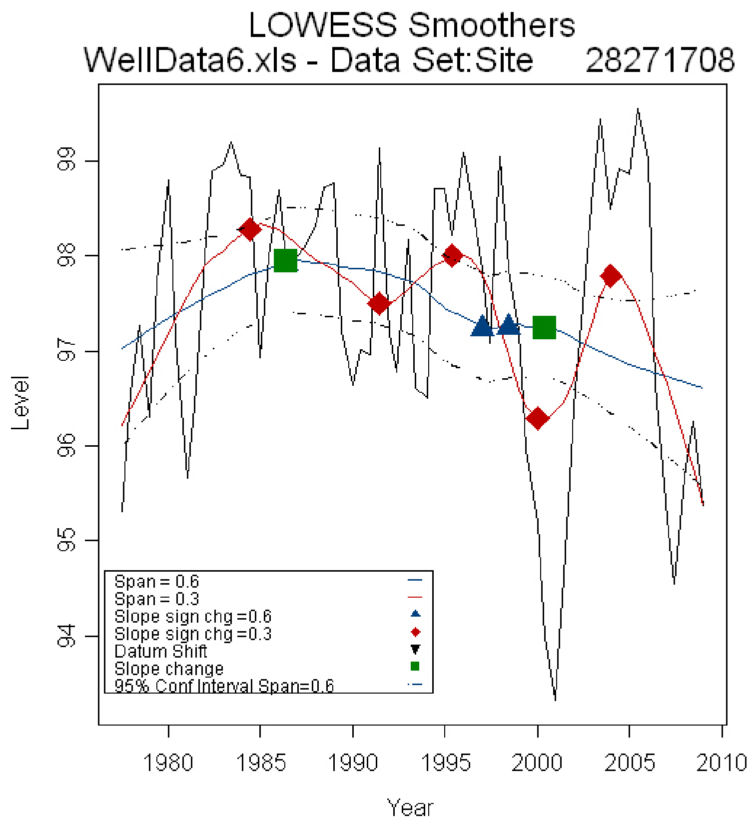
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData6.xls - Data Set:Site 28271708
Level
Year
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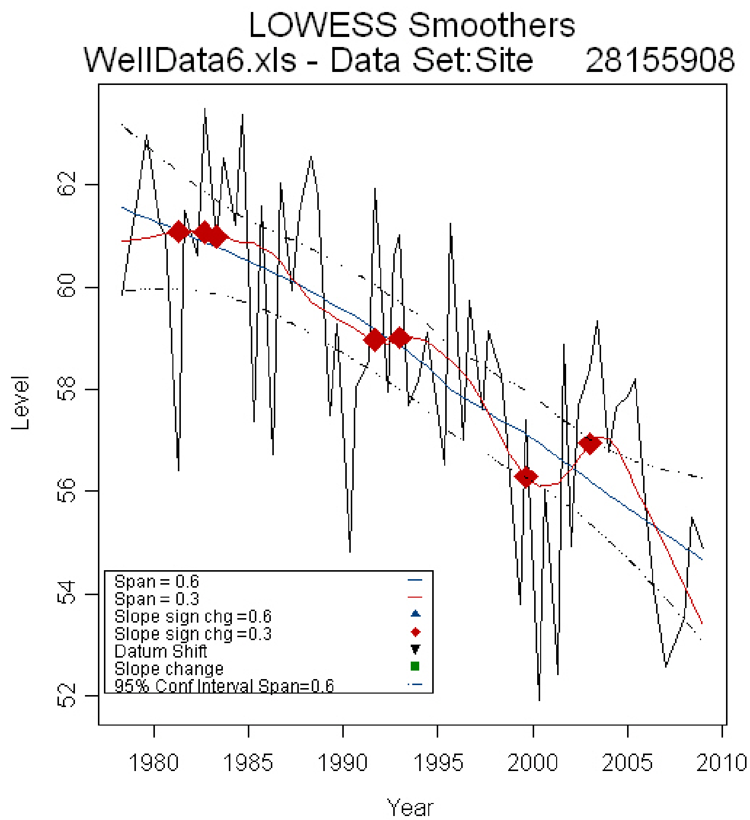
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData6.xls - Data Set:Site 28155908
Level
Year
52
54
56
58
60
62
1980
1985
1990
1995
2000
2005
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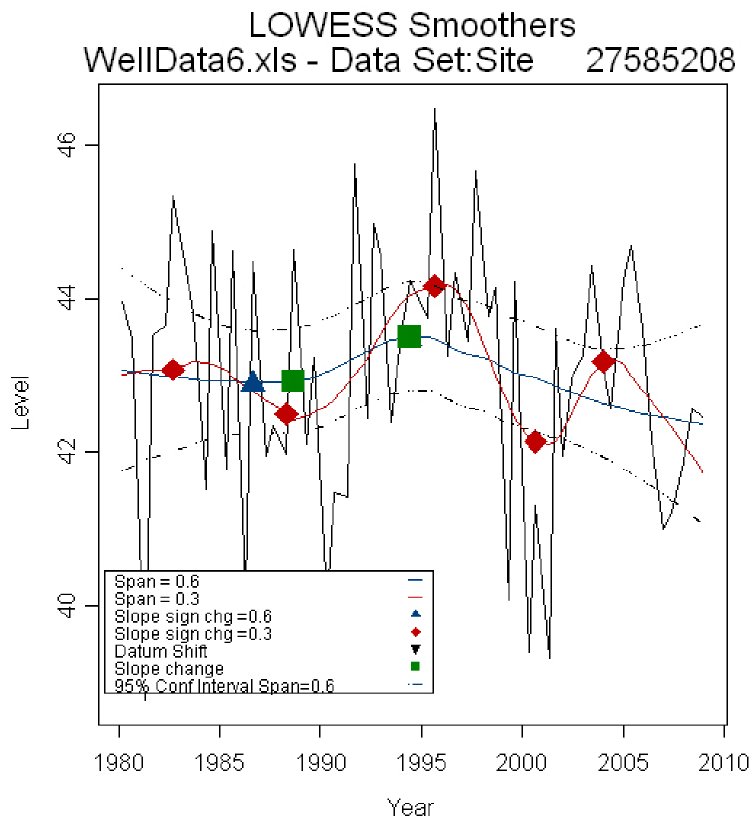
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData6.xls - Data Set:Site 27585208
Level
46
44
42
40
1980
1985
1990
1995
2000
2005
2010
Year
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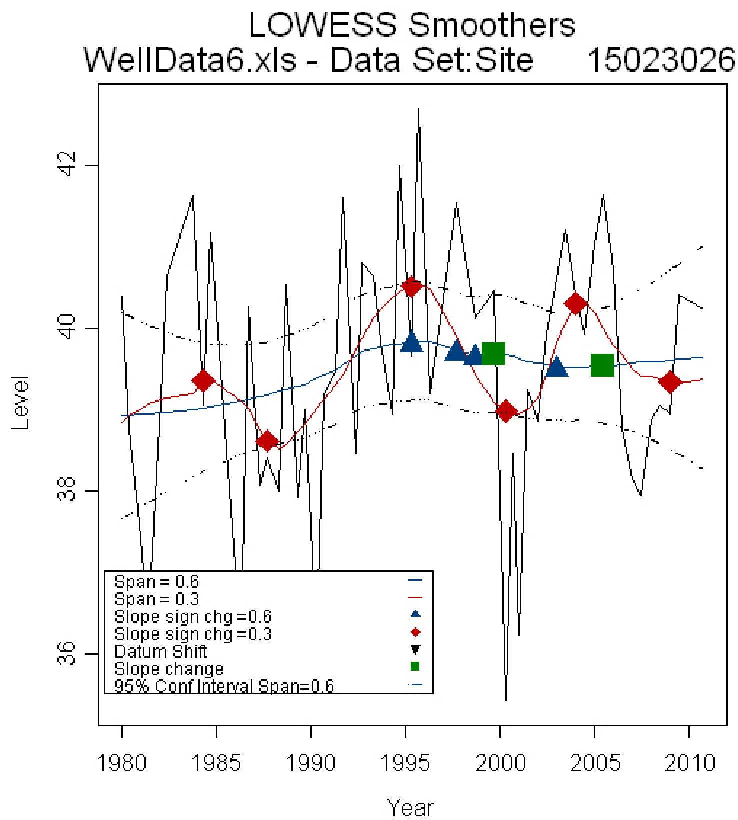
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData6.xls - Data Set:Site 15023026
Level
Year
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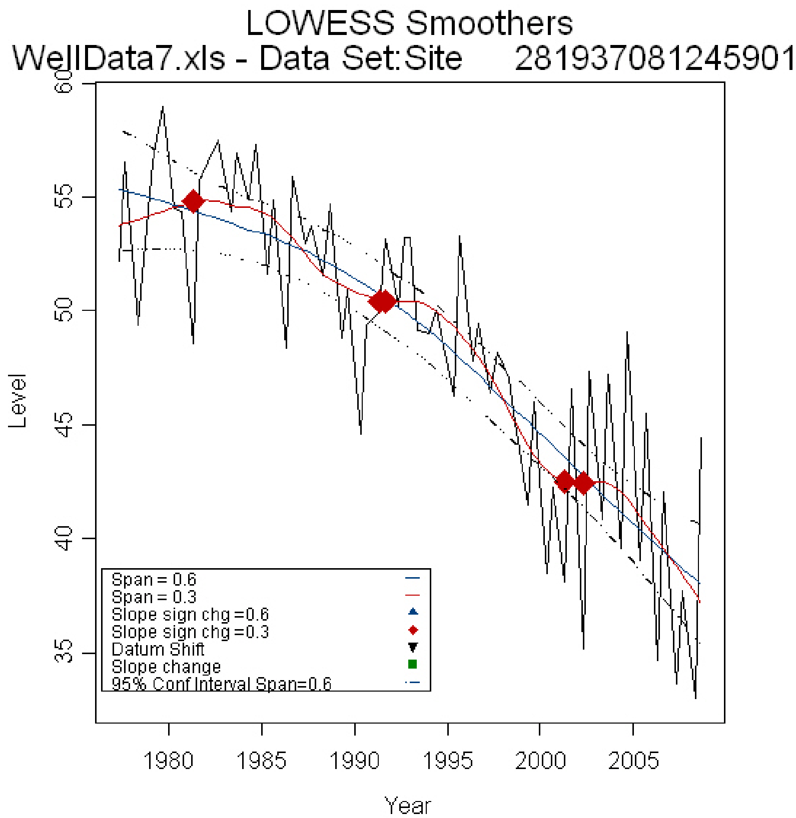
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData7.xls - Data Set:Site 281937081245901
Level
60
55
50
45
40
35
1980
1985
1990
1995
2000
2005
Year
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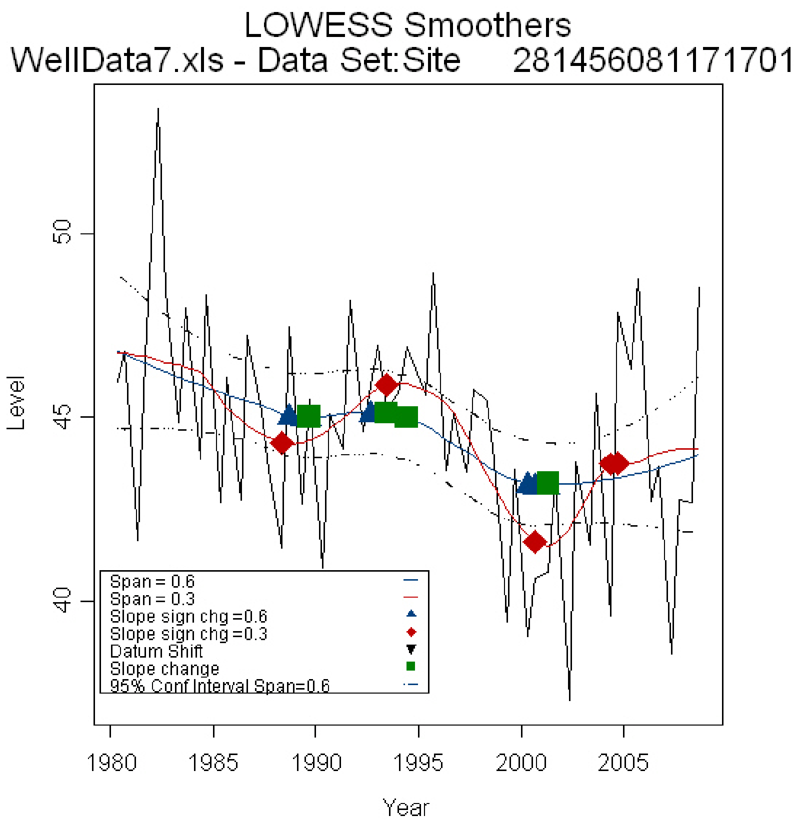
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData7.xls - Data Set:Site 281456081171701
Level
50
45
40
1980
1985
1990
1995
2000
2005
Year
Span = 0.6
Span = 0.3
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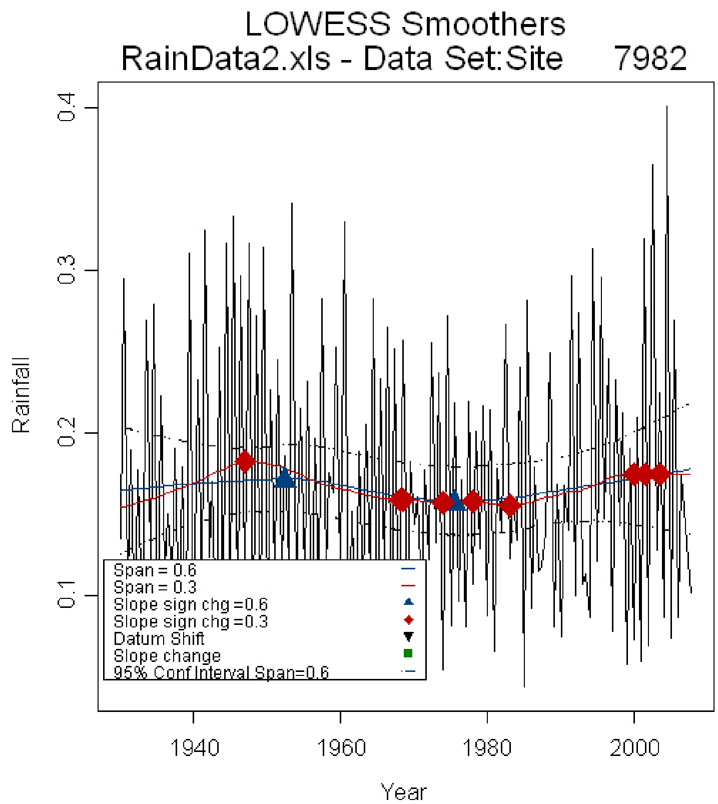
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6

SJRWMD- Rainfall


LOWESS Smoothers
RainData2.xls - Data Set:Site 7982
Rainfall
0.1
0.2
0.3
0.4
Year
1940
1960
1980
2000
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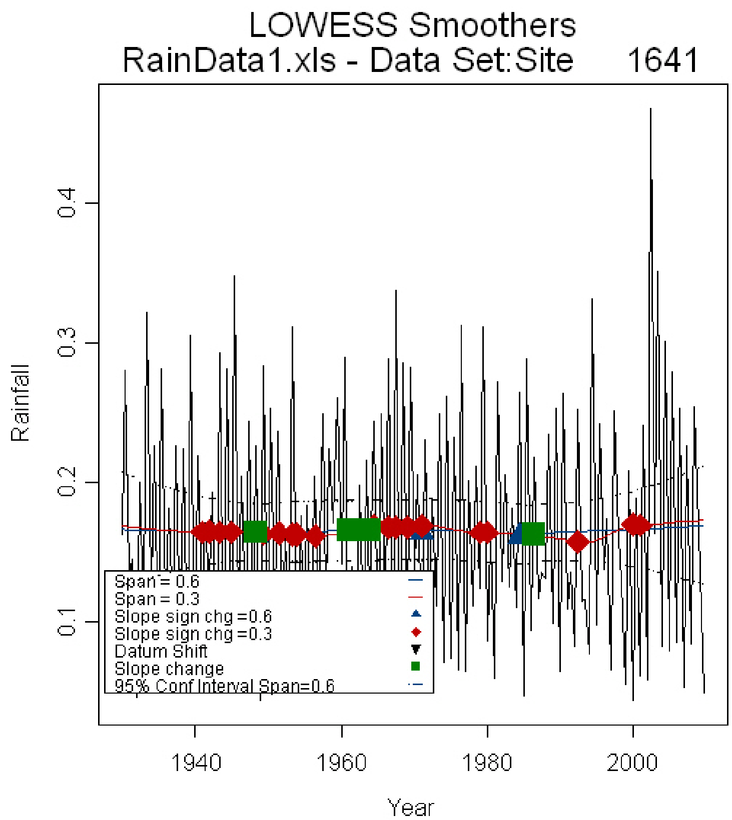
Span = 0.3
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
RainData1.xls - Data Set:Site 1641
Rainfall
0.1
0.2
0.3
0.4
1940
1960
1980
2000
Year
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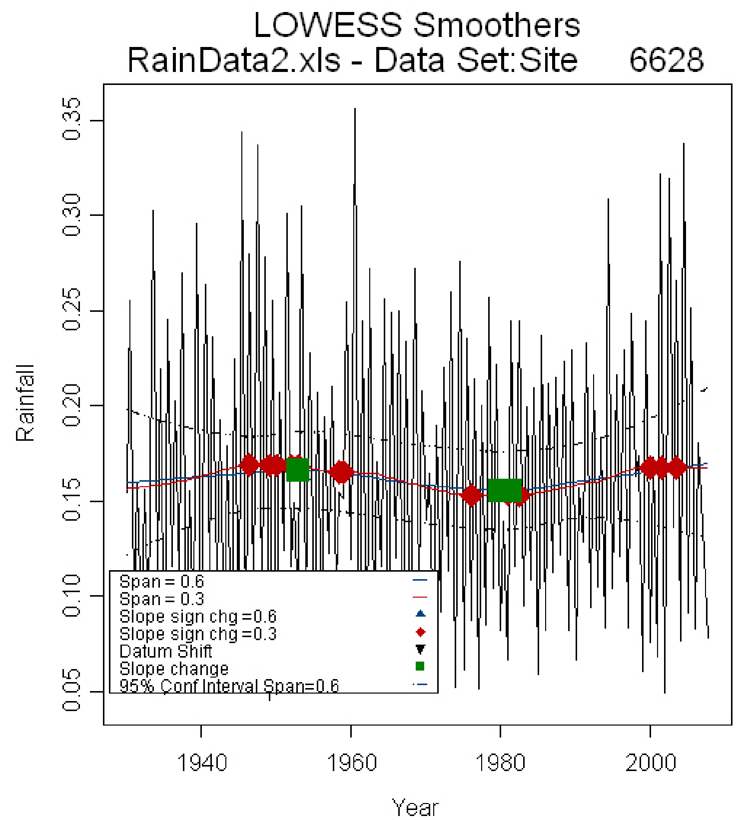
Span = 0.3
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
RainData2.xls - Data Set:Site 6628
Rainfall
Year
0.05
0.10
0.15
0.20
0.25
0.30
0.35
1940
1960
1980
2000
Span = 0.6
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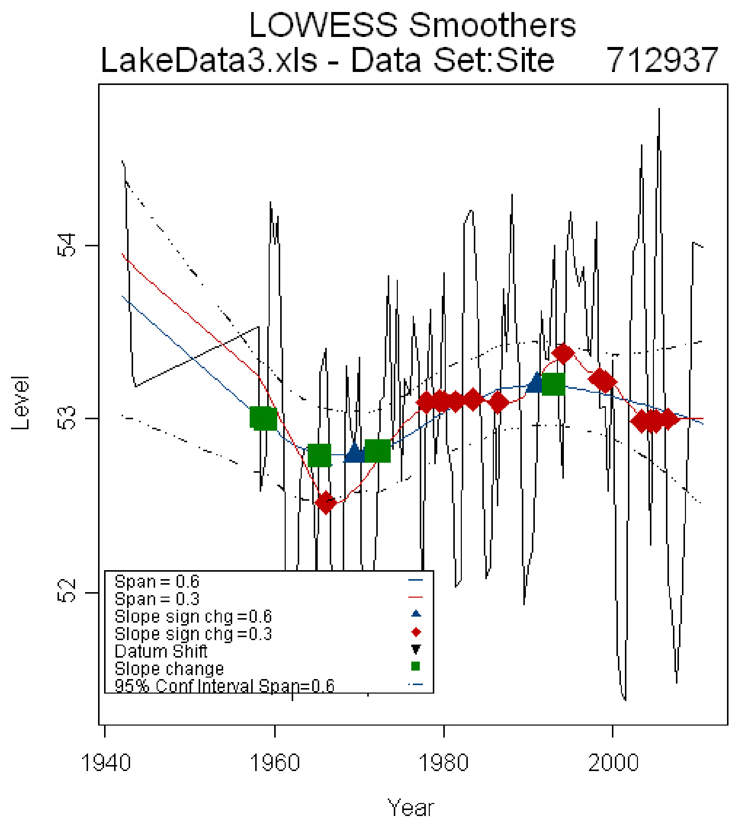
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6

SWFWMD- Lakes


LOWESS Smoothers
LakeData3.xls - Data Set:Site 712937
Level
54
53
52
1940
1960
1980
2000
Year
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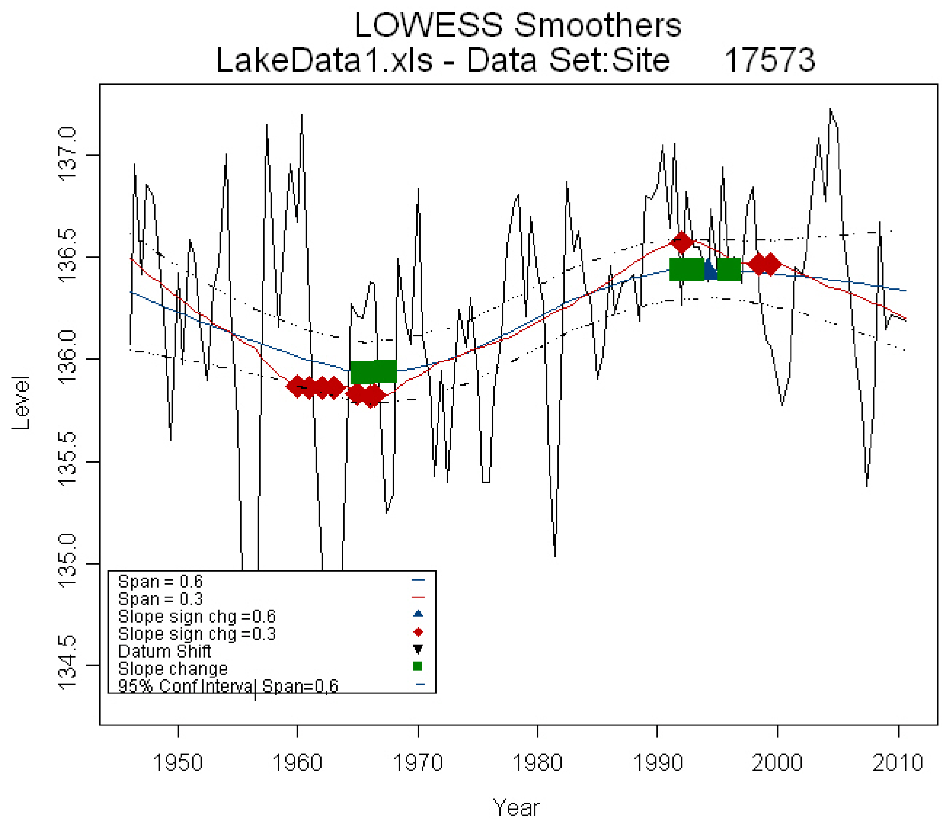
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData1.xls - Data Set:Site 17573
Level
Year
137.0
136.5
136.0
135.5
135.0
134.5
1950
1960
1970
1980
1990
2000
2010
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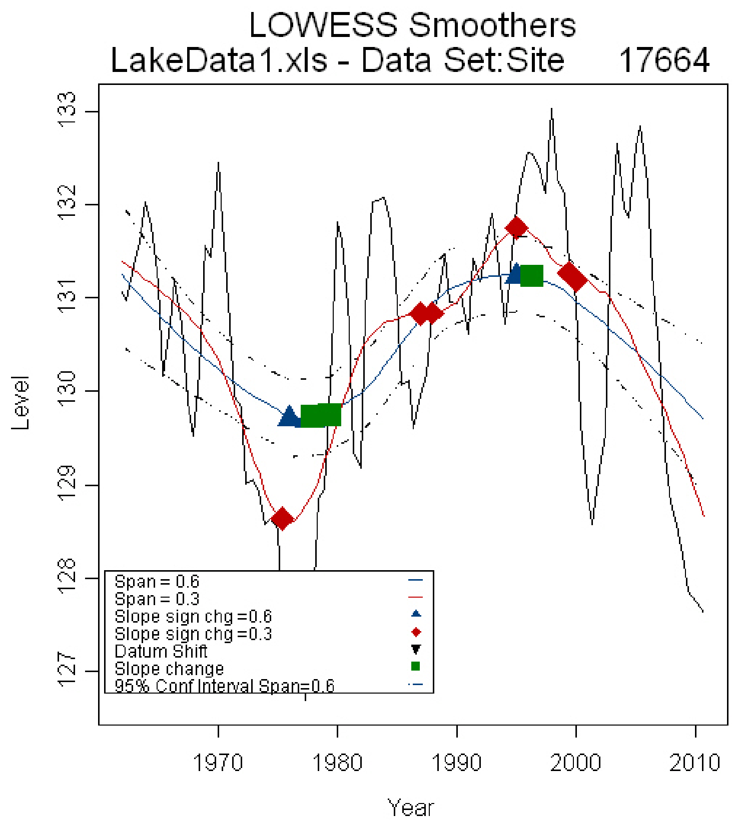
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
LakeData1.xls - Data Set:Site 17664
Level
Year
133
132
131
130
129
128
127
1970
1980
1990
2000
2010
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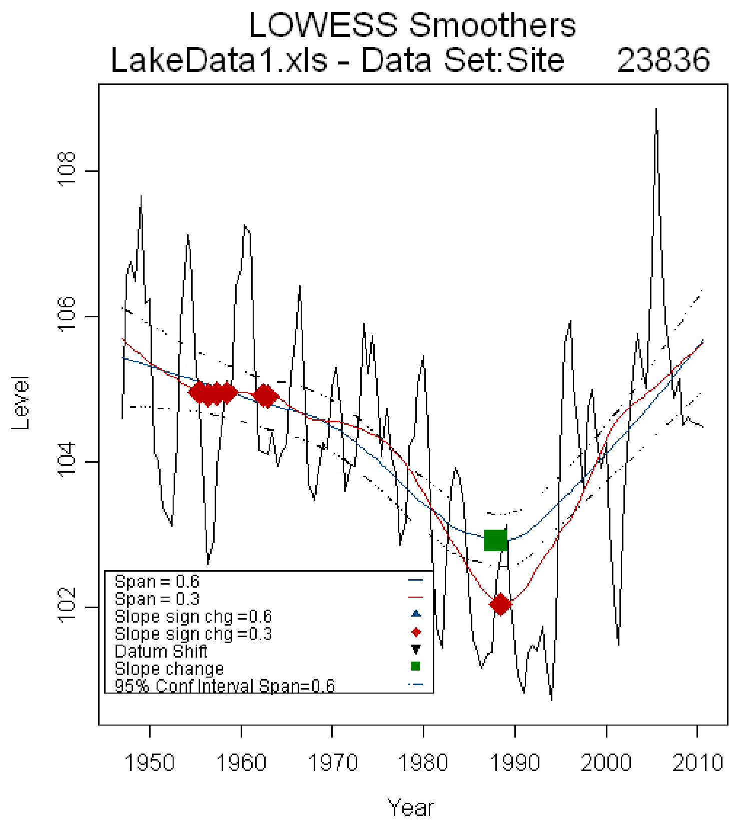
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData1.xls - Data Set:Site 23836
Level
108
106
104
102
1950
1960
1970
1980
1990
2000
2010
Year
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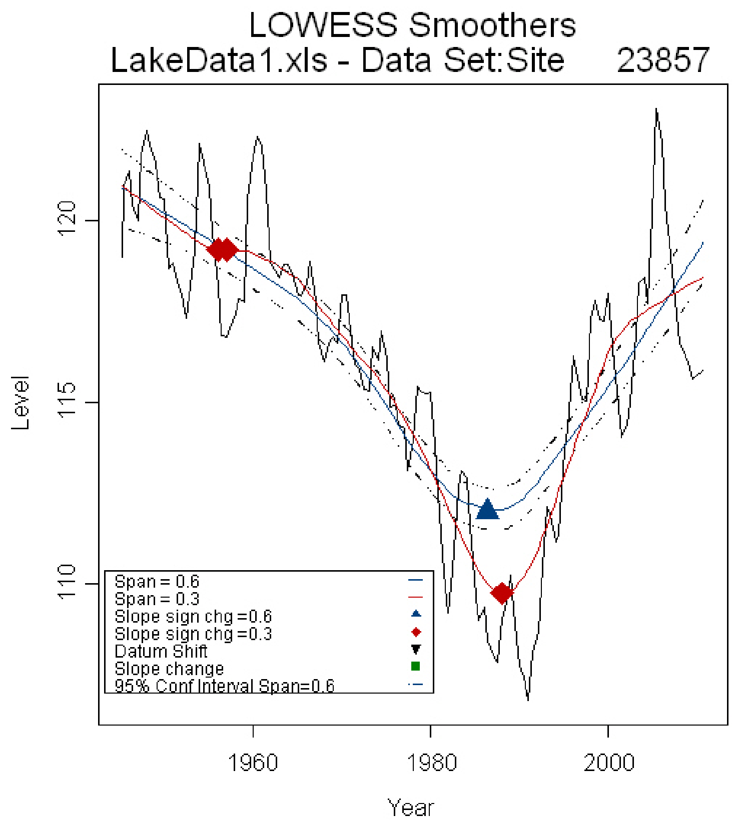
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData1.xls - Data Set:Site 23857
Level
120
115
110
1960
1980
2000
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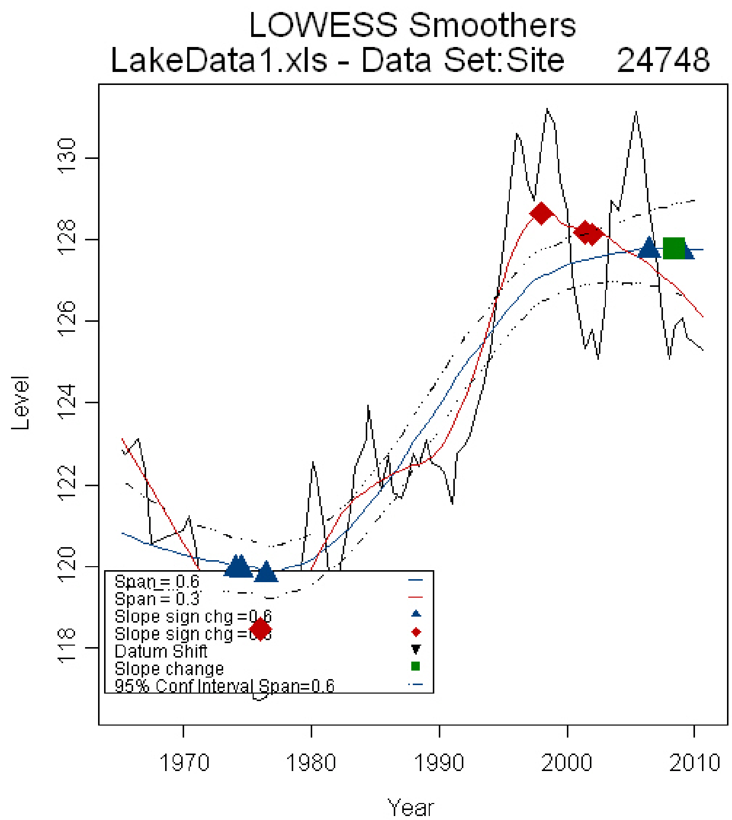
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
LakeData1.xls - Data Set:Site 24748
Level
Year
130
128
126
124
122
120
118
1970
1980
1990
2000
2010
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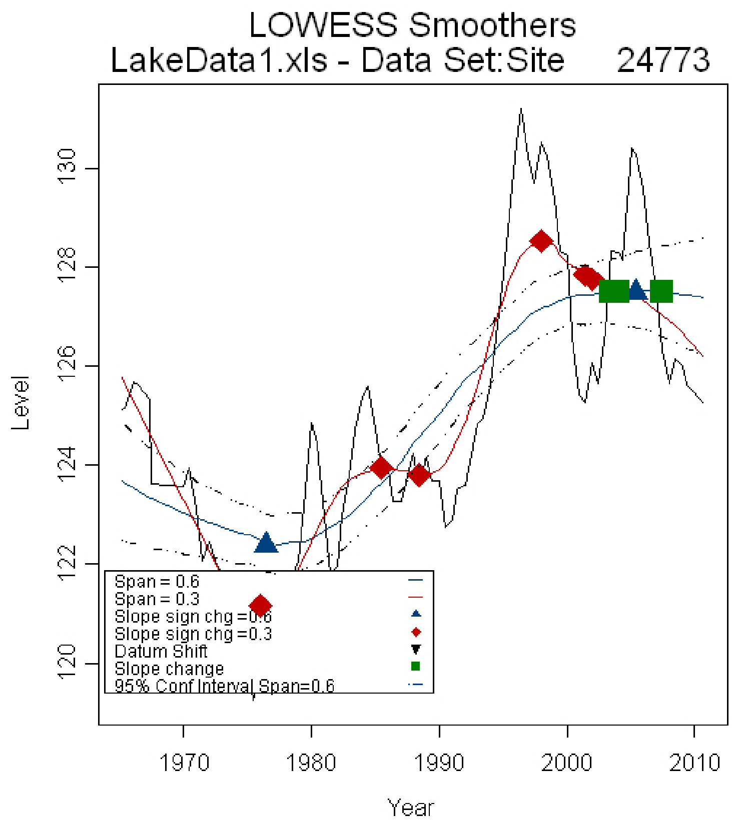
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData1.xls - Data Set:Site 24773
Level
Year
130
128
126
124
122
120
1970
1980
1990
2000
2010
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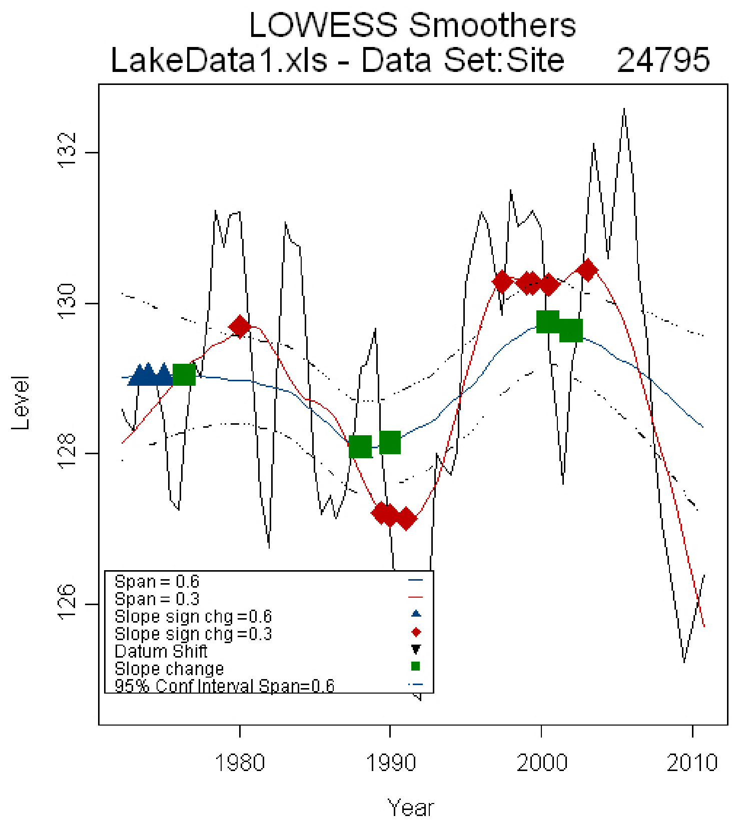
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
LakeData1.xls - Data Set:Site 24795
Level
Year
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130
128
126
1980
1990
2000
2010
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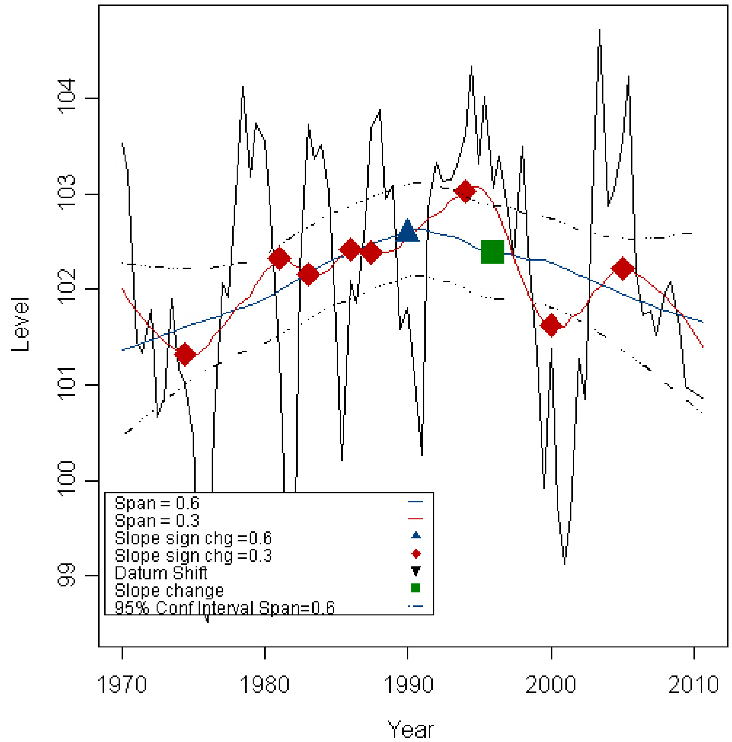
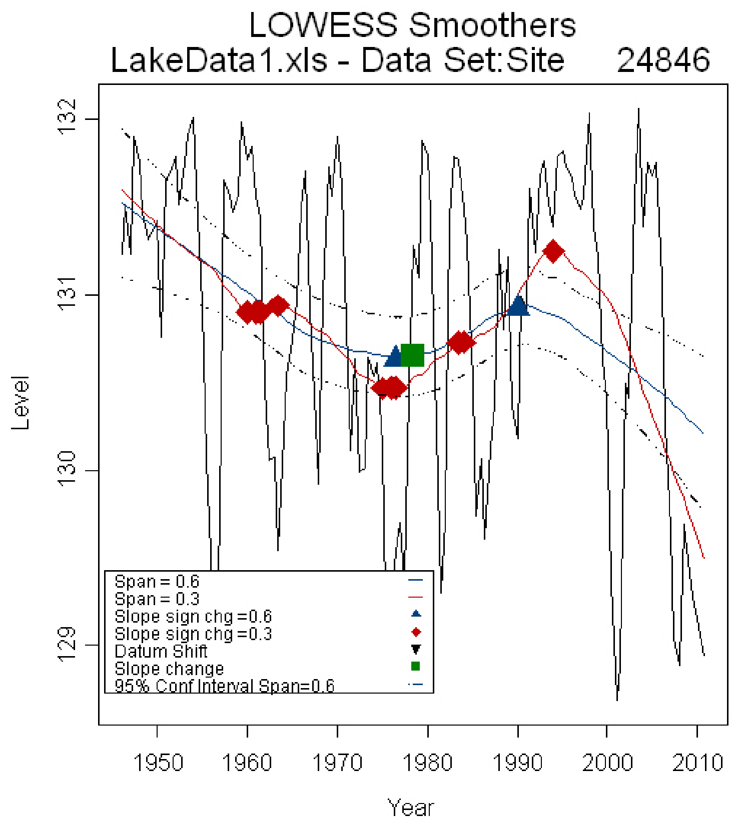
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6

LOWESS Smoothers
LakeData1.xls - Data Set:Site 24818




LOWESS Smoothers
LakeData1.xls - Data Set:Site 24846
Level
Year
132
131
130
129
1950
1960
1970
1980
1990
2000
2010
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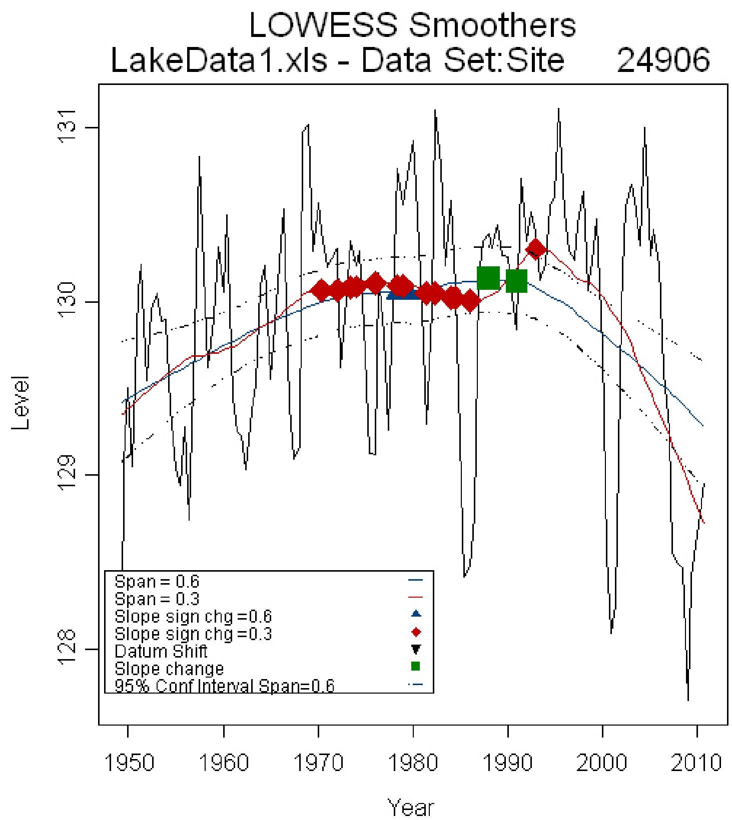
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData1.xls - Data Set:Site 24906
Level
Year
131
130
129
128
1950
1960
1970
1980
1990
2000
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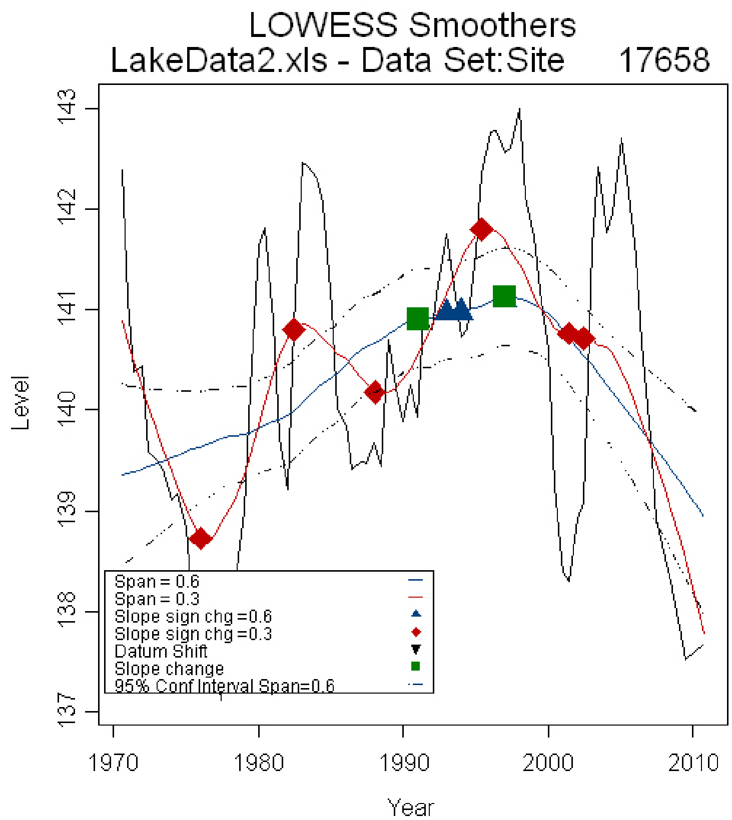
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
LakeData2.xls - Data Set:Site 17658
Level
Year
143
142
141
140
139
138
137
1970
1980
1990
2000
2010
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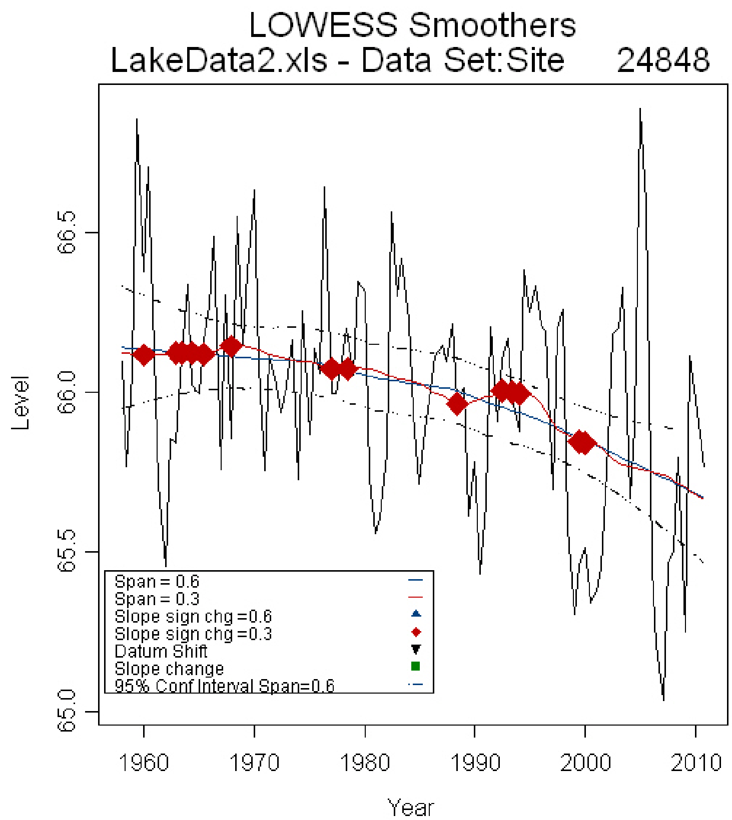
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
LakeData2.xls - Data Set:Site 24848
Level
Year
65.0
65.5
66.0
66.5
1960
1970
1980
1990
2000
2010
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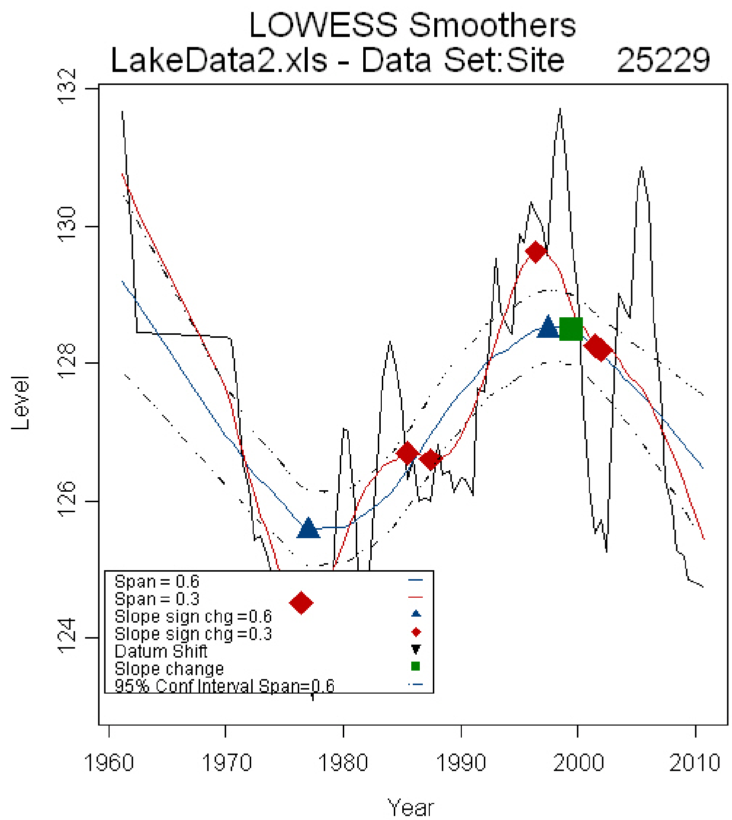
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
LakeData2.xls - Data Set:Site 25229
132
130
128
126
124
Level
1960
1970
1980
1990
2000
2010
Year
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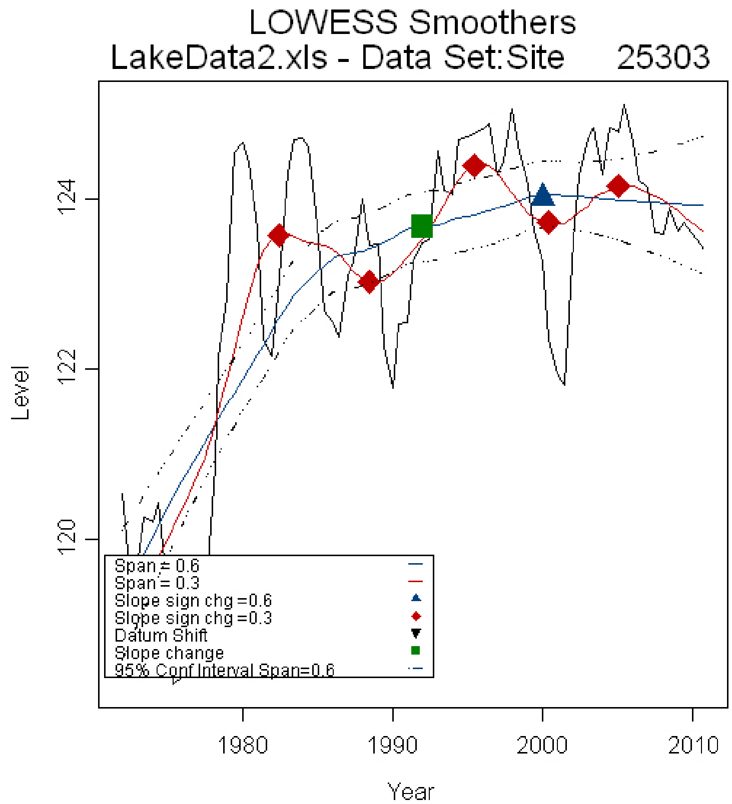
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData2.xls - Data Set:Site 25303
Level
Year
120
122
124
1980
1990
2000
2010
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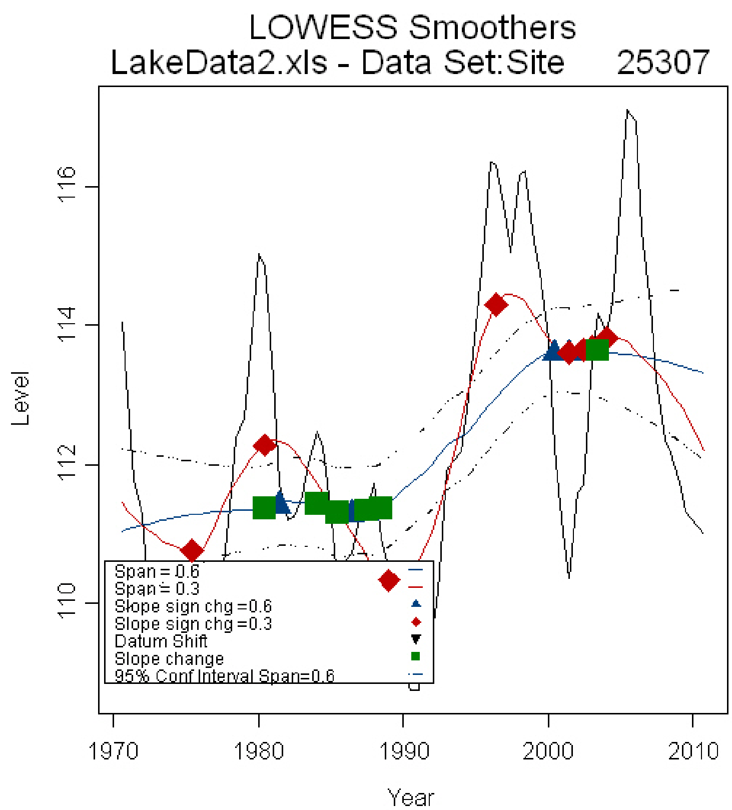
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
LakeData2.xls - Data Set:Site 25307
Level
116
114
112
110
1970
1980
1990
2000
2010
Year
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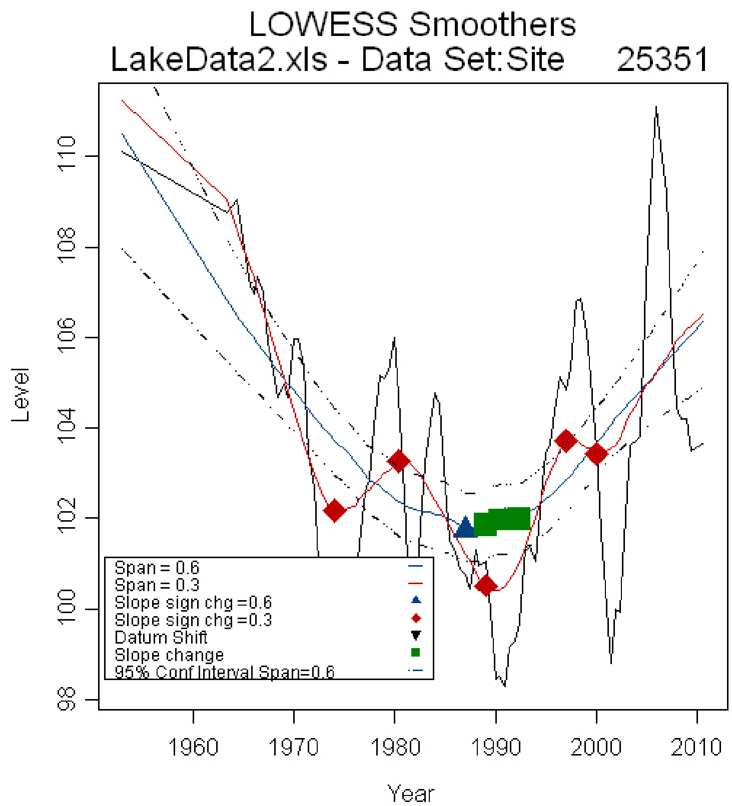
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData2.xls - Data Set:Site 25351
Level
Year
110
108
106
104
102
100
98
1960
1970
1980
1990
2000
2010
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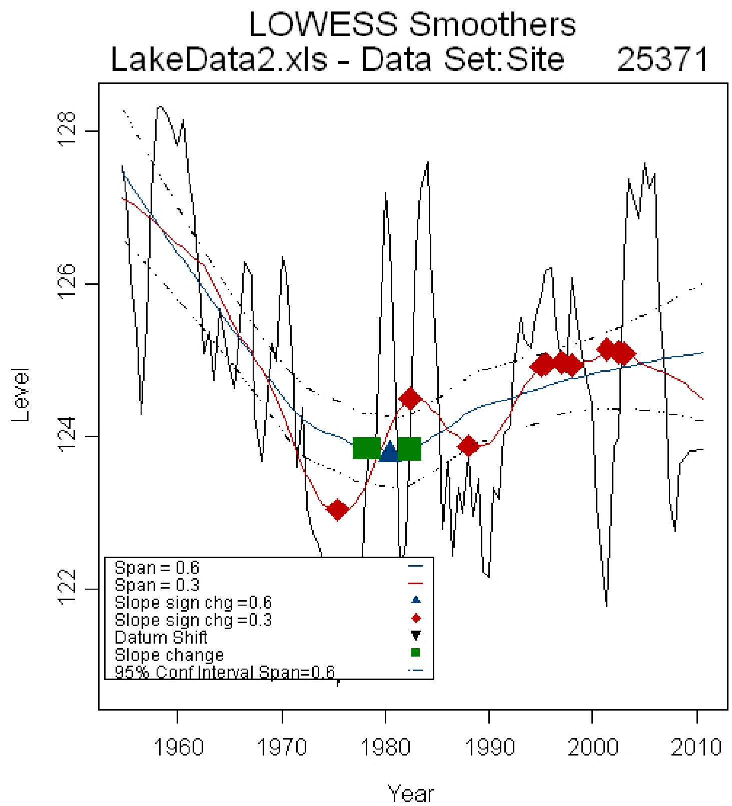
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData2.xls - Data Set:Site 25371
Level
Year
128
126
124
122
1960
1970
1980
1990
2000
2010
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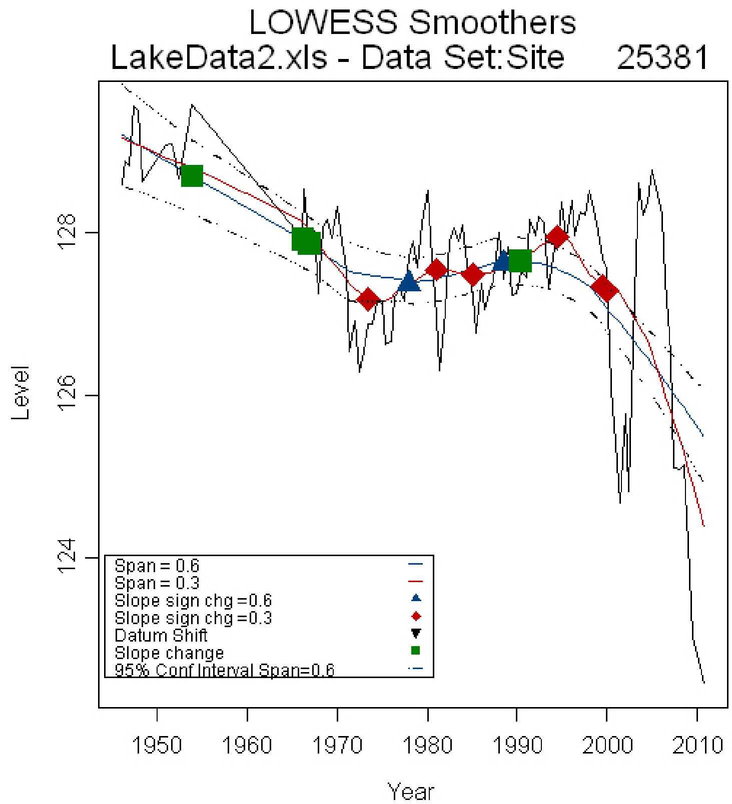
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData2.xls - Data Set:Site 25381
Level
Year
124
126
128
1950
1960
1970
1980
1990
2000
2010
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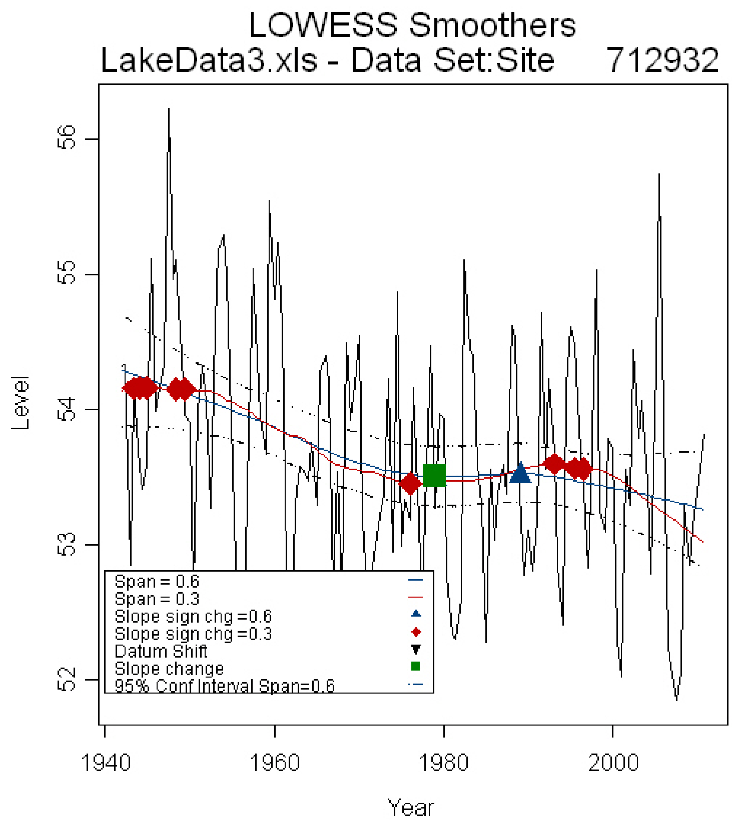
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
LakeData3.xls - Data Set:Site 712932
Level
Year
56
55
54
53
52
1940
1960
1980
2000
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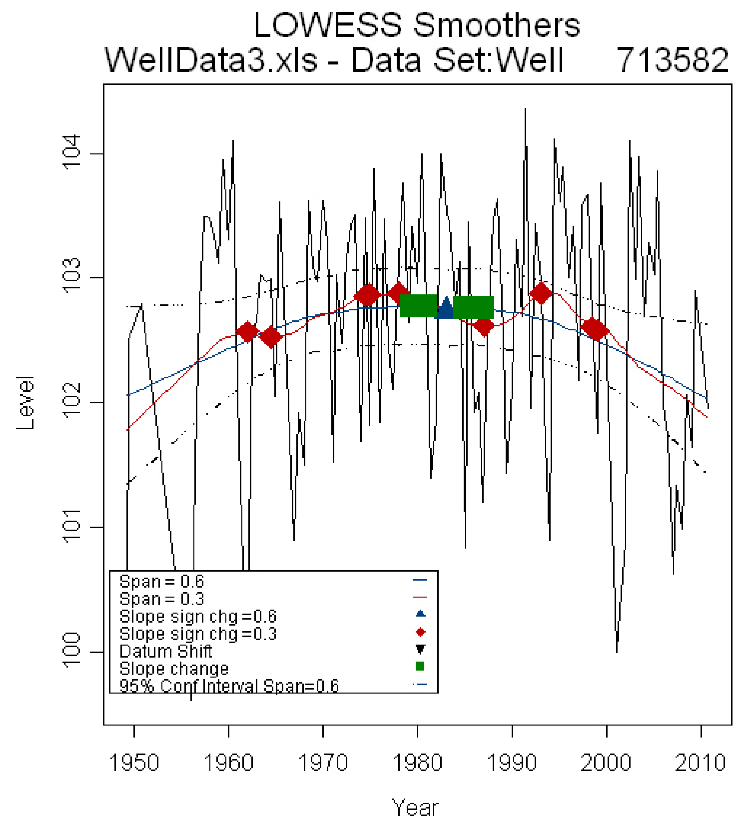
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6

SWFWMD- Wells


LOWESS Smoothers
WellData3.xls - Data Set:Well 713582
Level
104
103
102
101
100
1950
1960
1970
1980
1990
2000
2010
Year
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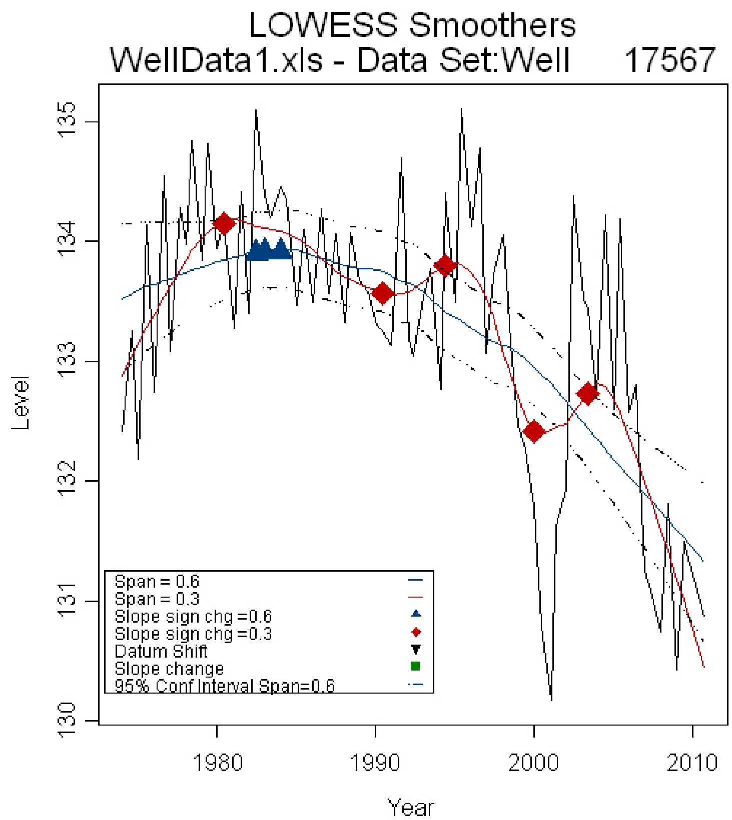
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData1.xls - Data Set:Well 17567
Level
Year
135
134
133
132
131
130
1980
1990
2000
2010
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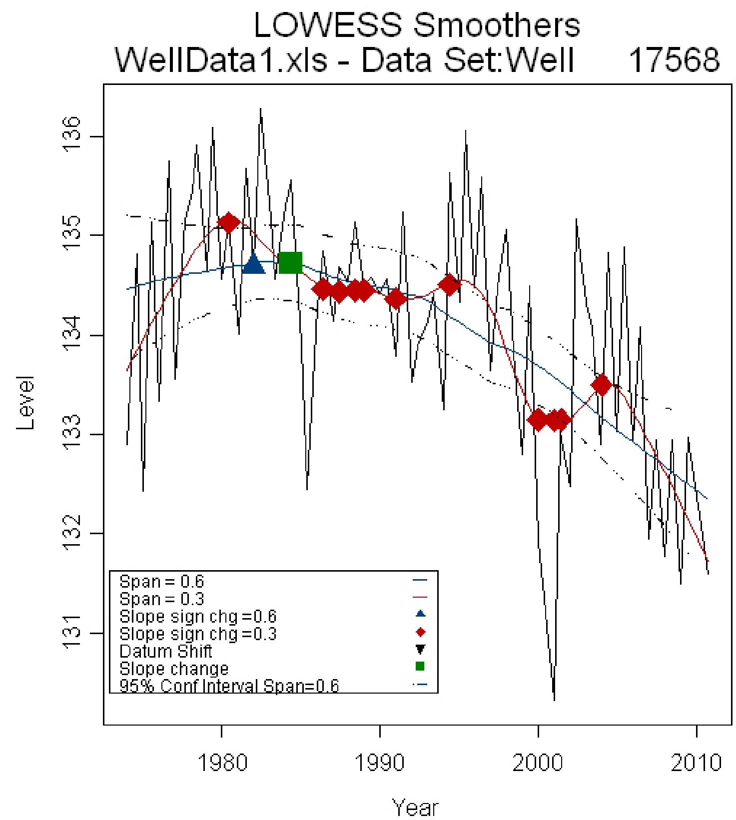
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6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WellData1.xls - Data Set:Well 17568
Level
Year
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Span = 0.3
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Slope sign chg =0.3
Datum Shift
Slope change
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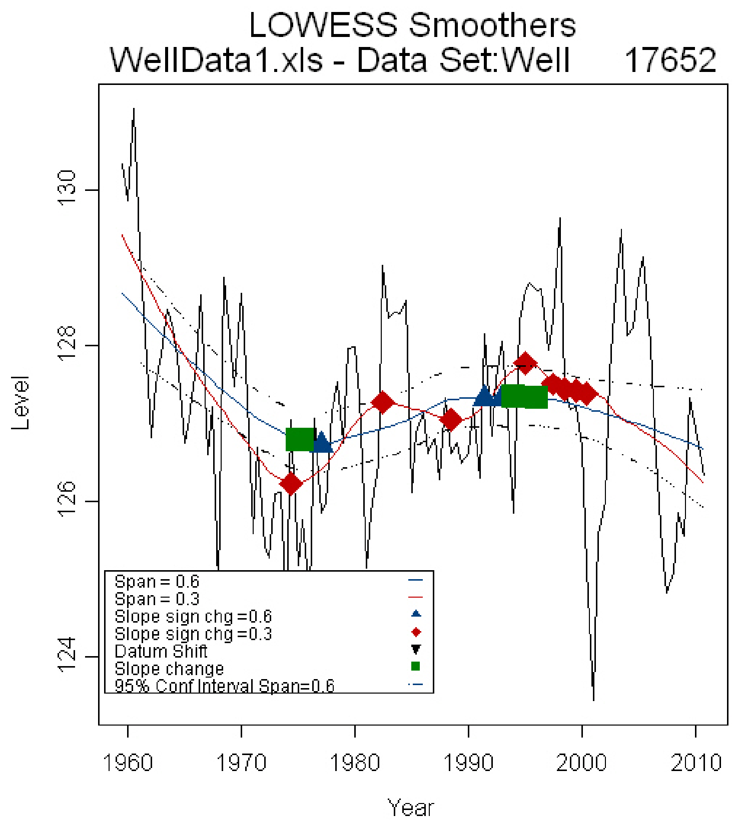

LOWESS Smoothers
WellData1.xls - Data Set:Well 17652
Level
Year
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Slope sign chg =0.3
Datum Shift
Slope change
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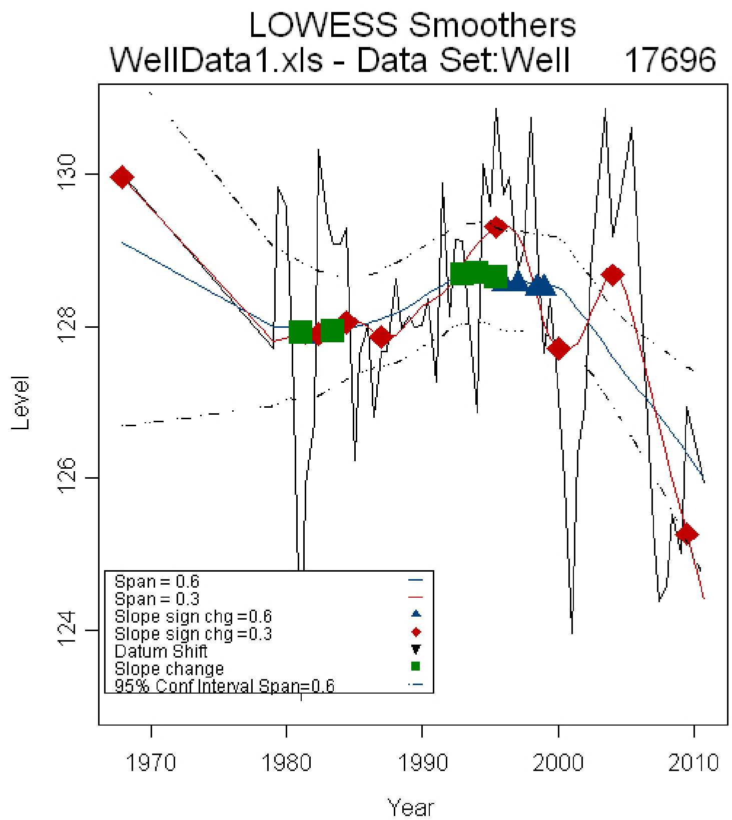

LOWESS Smoothers
WellData1.xls - Data Set:Well 17696
Level
Year
130
128
126
124
1970
1980
1990
2000
2010
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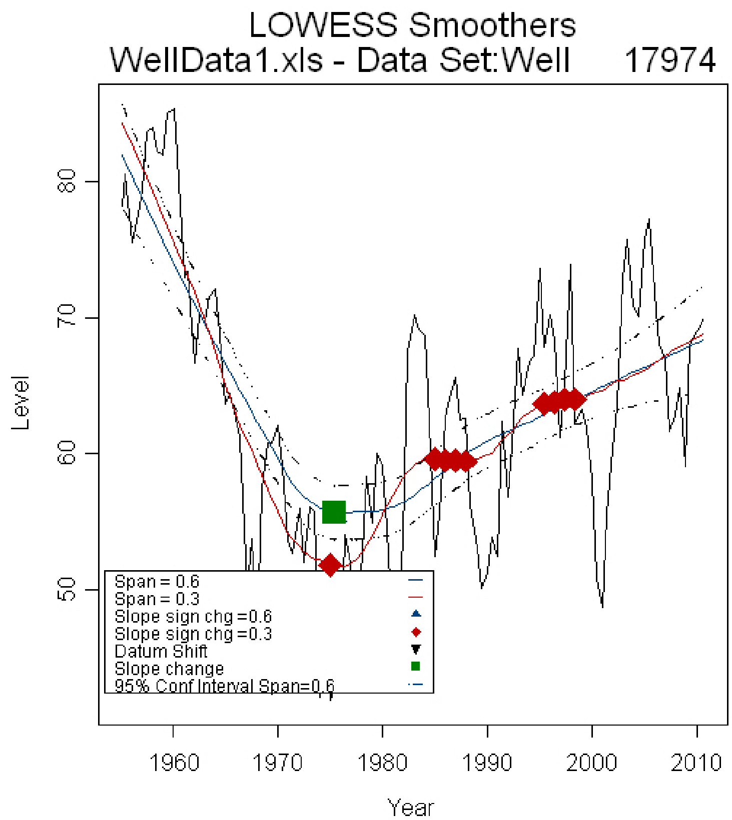
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData1.xls - Data Set:Well 17974
Level
Year
80
70
60
50
1960
1970
1980
1990
2000
2010
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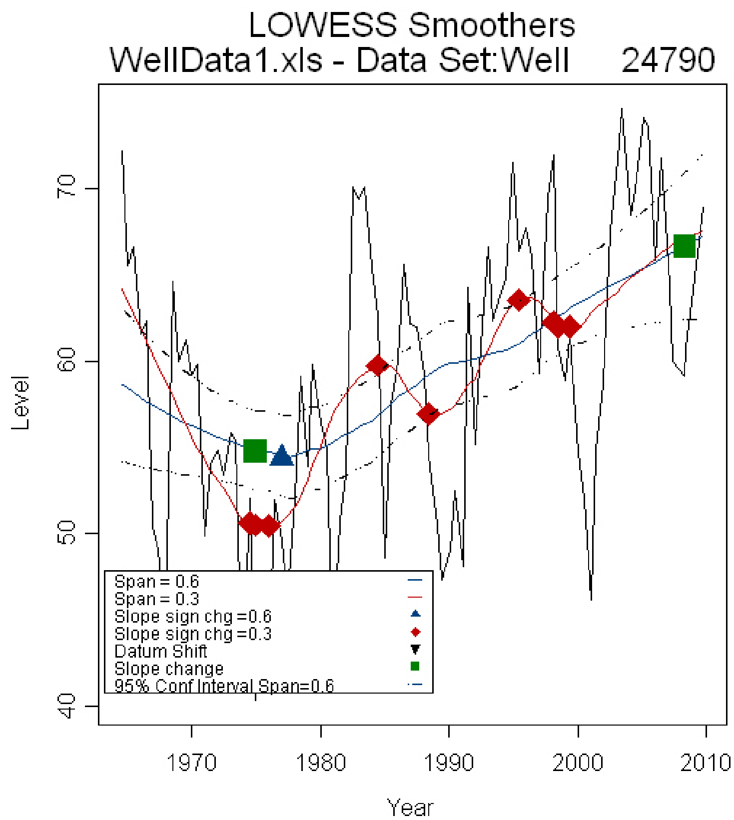
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData1.xls - Data Set:Well 24790
Level
Year
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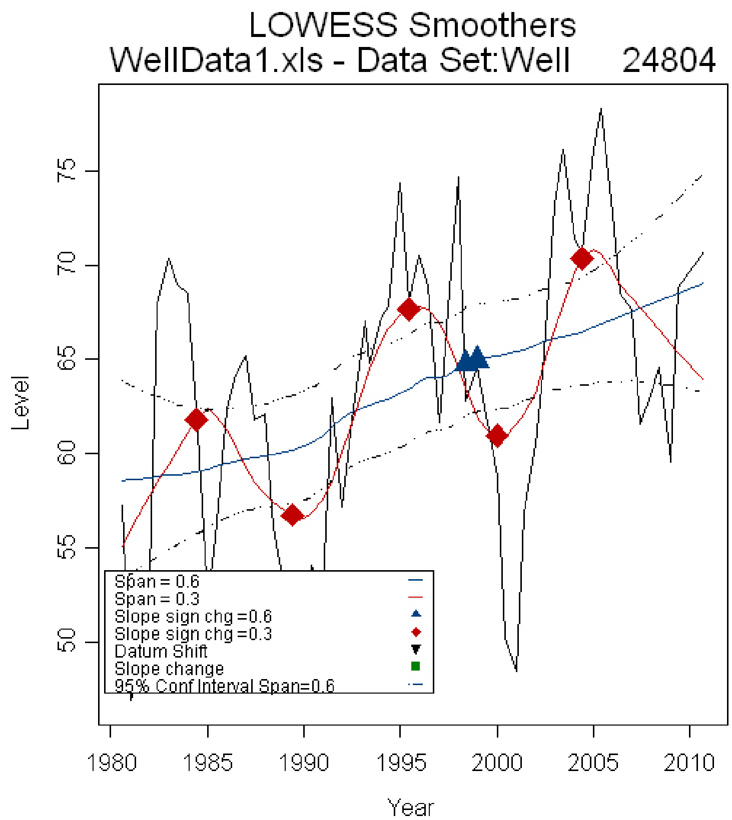
Span = 0.3
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6
40
50
60
70
1970
1980
1990
2000
2010



LOWESS Smoothers
WellData1.xls - Data Set:Well 24804
Level
Year
1980
1985
1990
1995
2000
2005
2010
50
55
60
65
70
75
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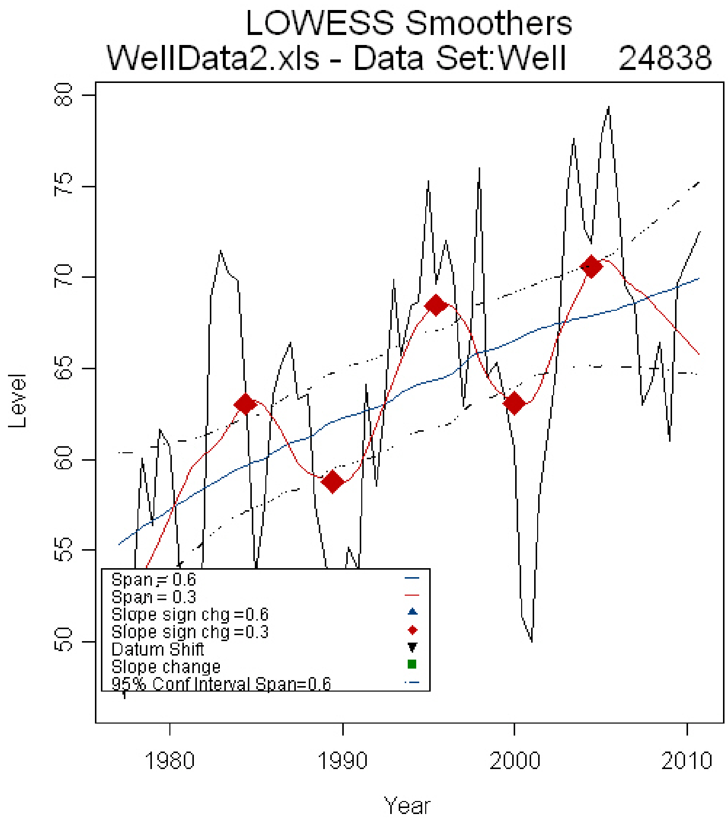
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData2.xls - Data Set:Well 24838
Level
Year
80
75
70
65
60
55
50
1980
1990
2000
2010
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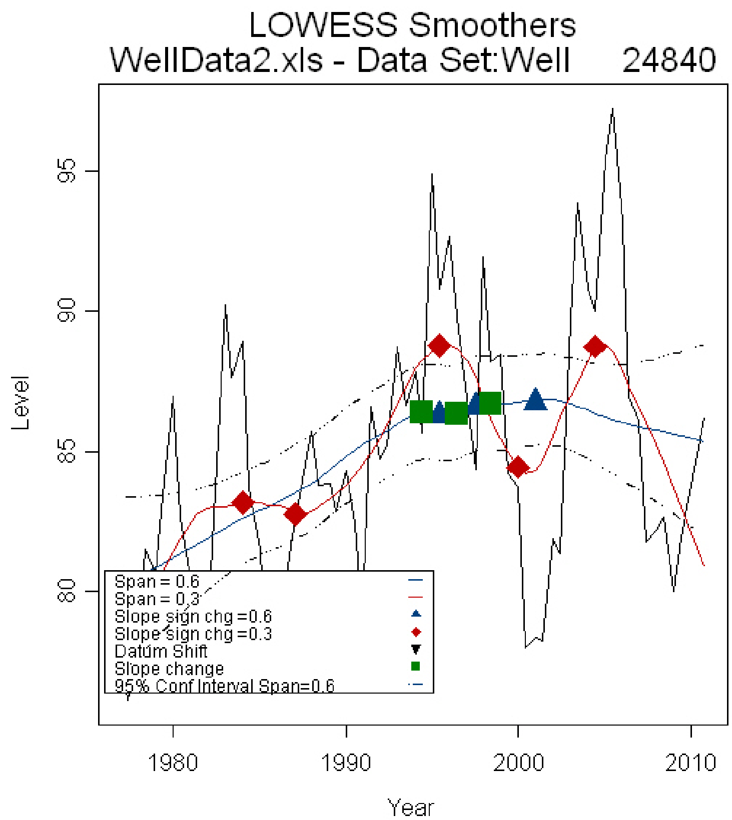
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData2.xls - Data Set:Well 24840
Level
Year
95
90
85
80
1980
1990
2000
2010
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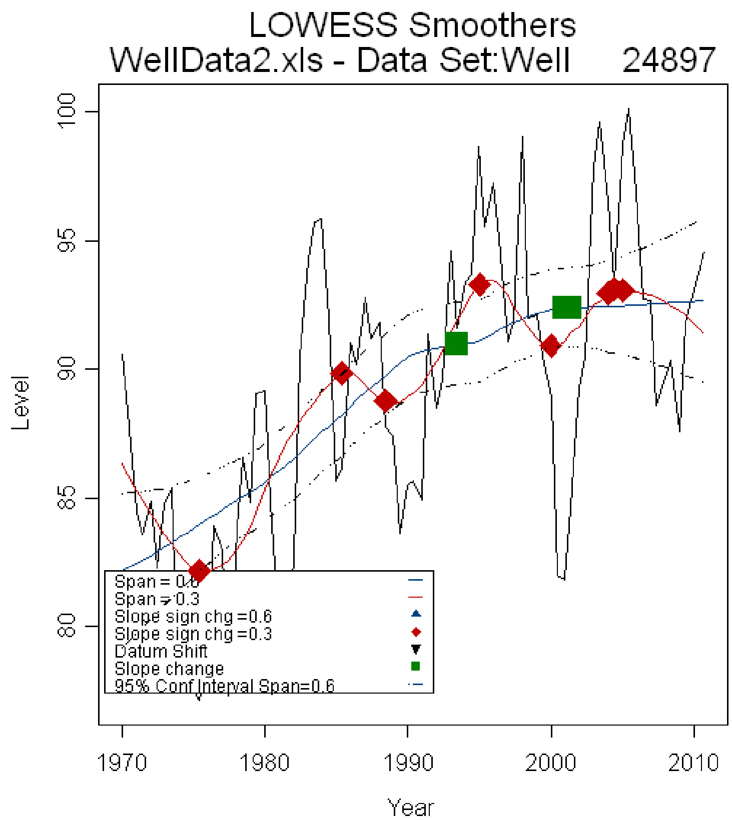
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData2.xls - Data Set:Well 24897
Level
Year
100
95
90
85
80
1970
1980
1990
2000
2010
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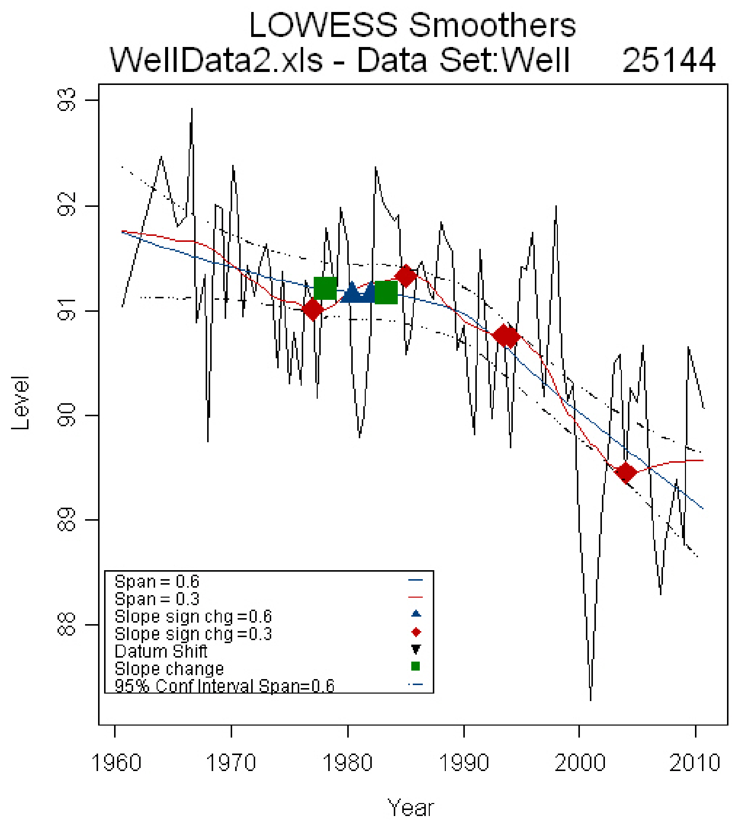
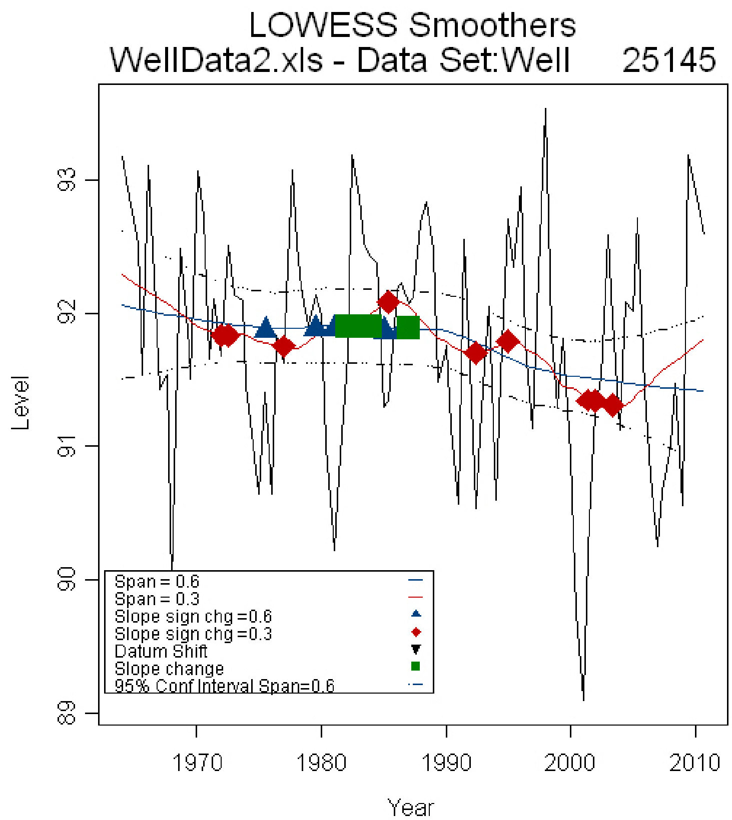
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData2.xls - Data Set:Well 25144
Level
Year
93
92
91
90
89
88
1960
1970
1980
1990
2000
2010
Span = 0.6
Span = 0.3
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData2.xls - Data Set:Well 25145
Level
Year
93
92
91
90
89
1970
1980
1990
2000
2010
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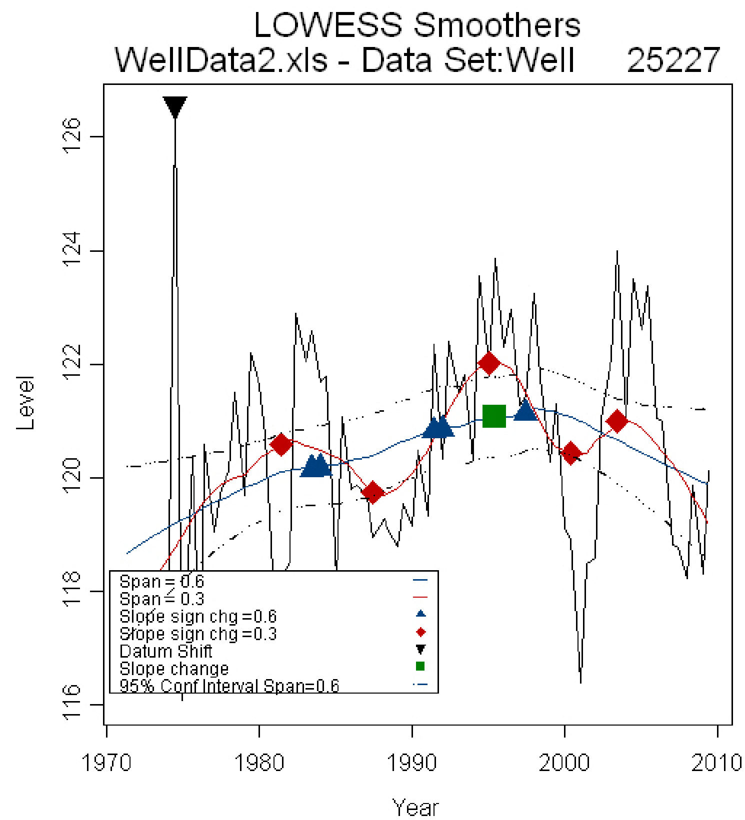
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData2.xls - Data Set:Well 25227
Level
Year
126
124
122
120
118
116
1970
1980
1990
2000
2010
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Datum Shift
Slope change
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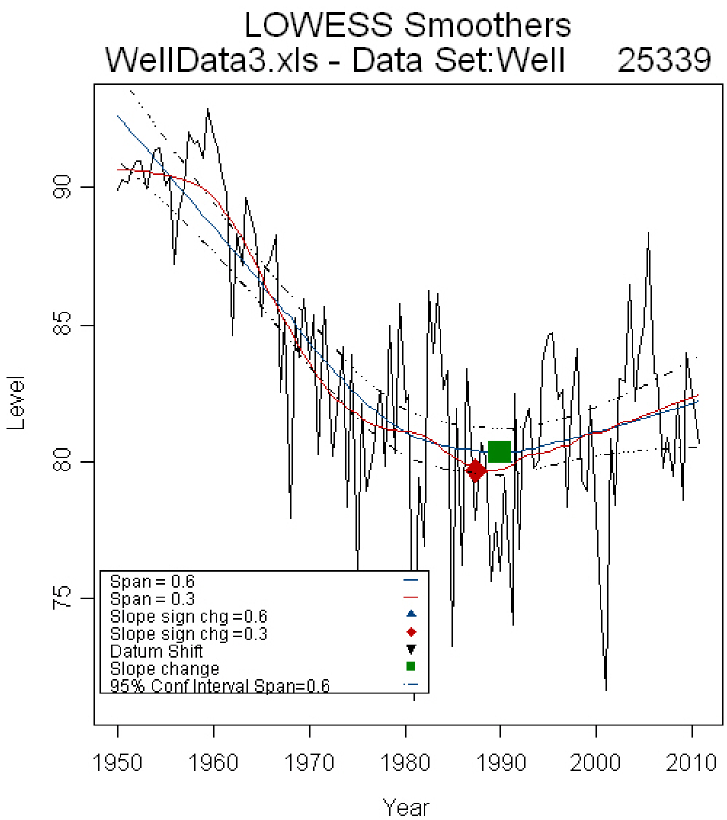

LOWESS Smoothers
WellData3.xls - Data Set:Well 25339
Level
Year
90
85
80
75
1950
1960
1970
1980
1990
2000
2010
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Span = 0.3
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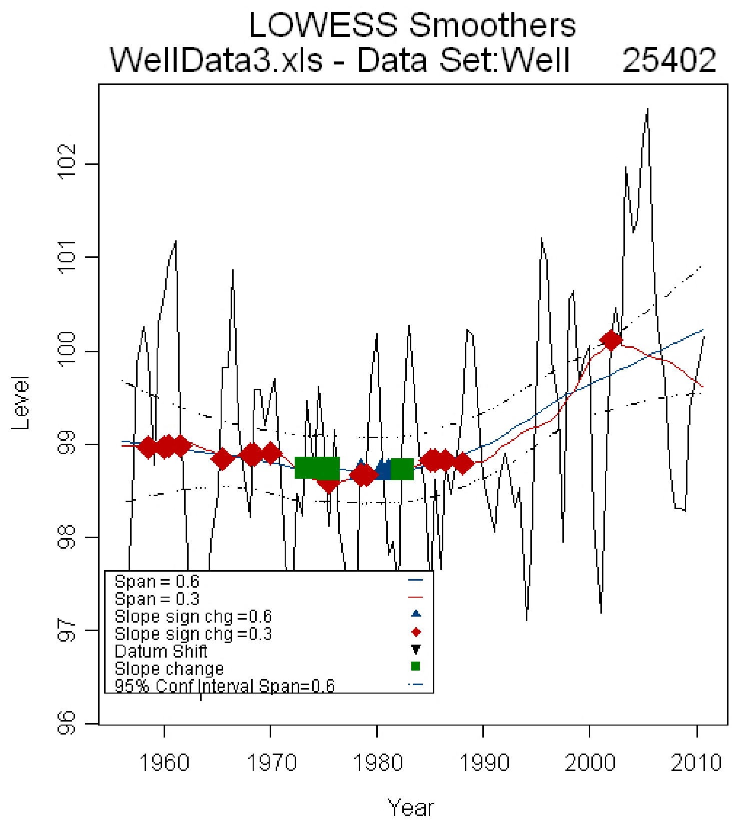
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6


LOWESS Smoothers
WellData3.xls - Data Set:Well 25402
Level
Year
96
97
98
99
100
101
102
1960
1970
1980
1990
2000
2010
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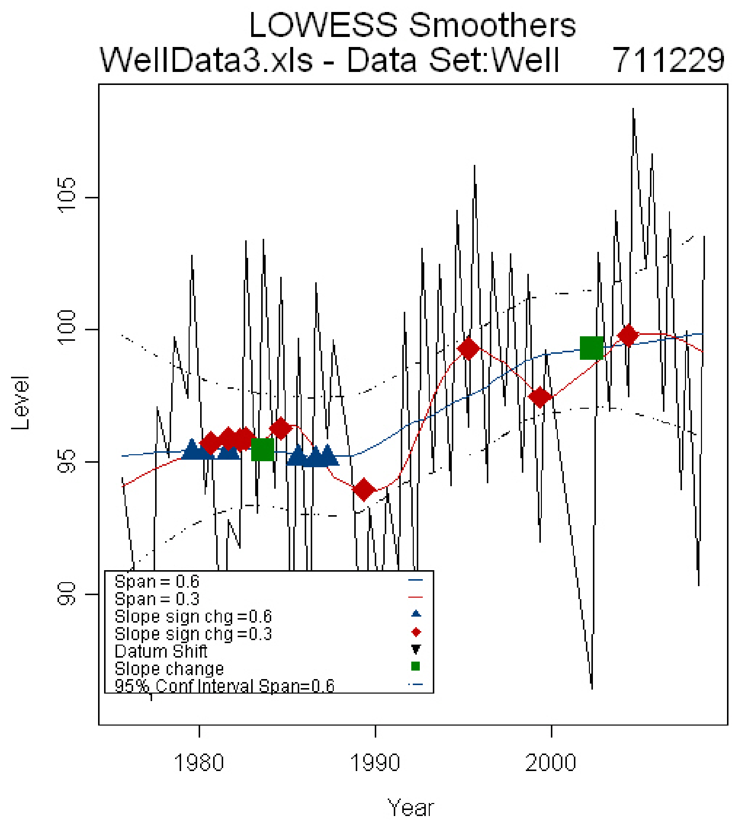
Span = 0.3
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData3.xls - Data Set:Well 711229
Level
Year
105
100
95
90
1980
1990
2000
Span = 0.6
Span = 0.3
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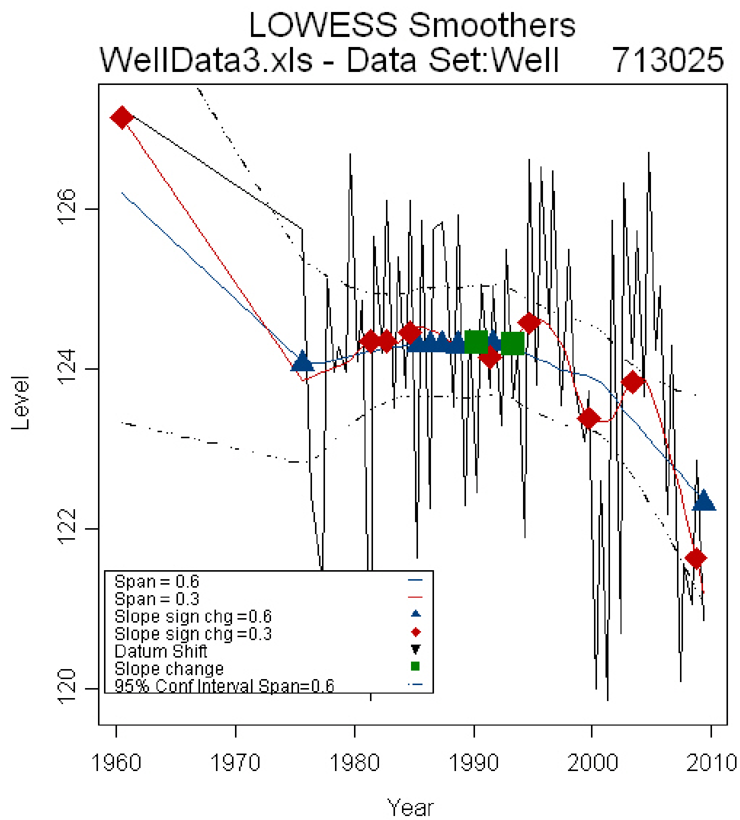
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
WellData3.xls - Data Set:Well 713025
Level
Year
126
124
122
120
1960
1970
1980
1990
2000
2010
Span = 0.6
Span = 0.3
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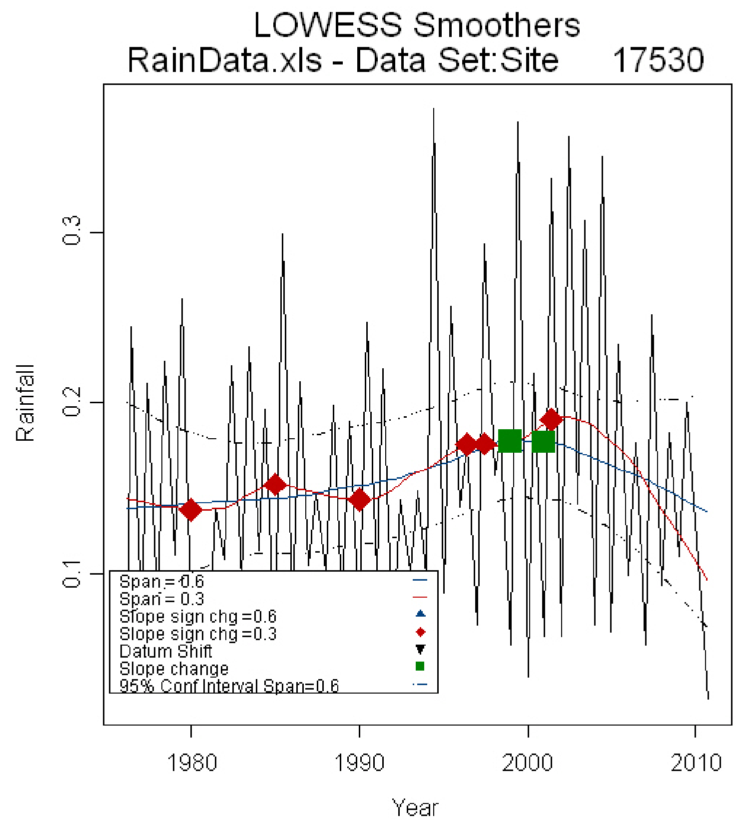
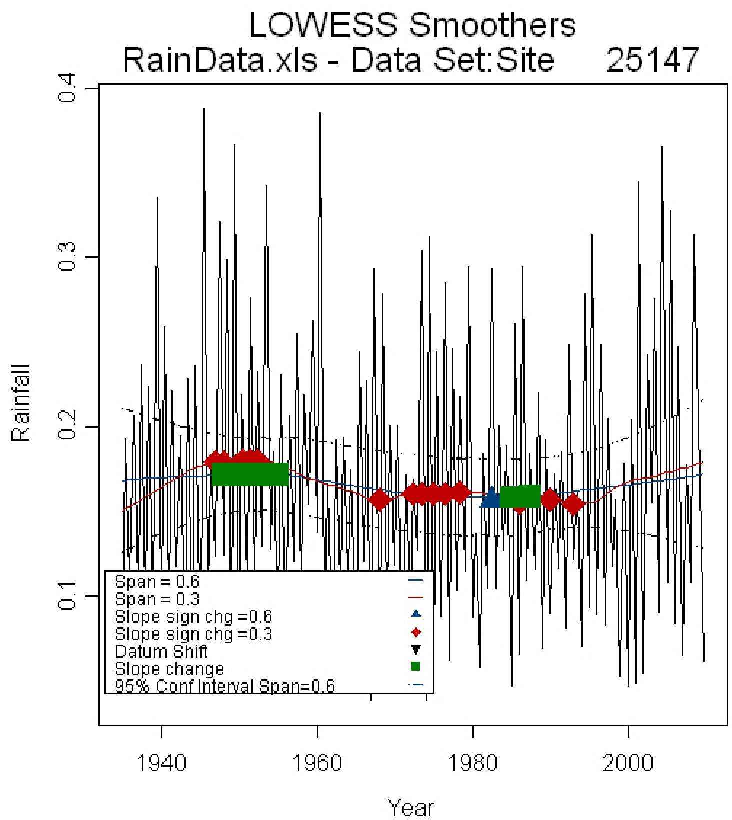
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6

SWFWMD- Rainfall


LOWESS Smoothers
RainData.xls - Data Set:Site 17530
Rainfall
0.1
0.2
0.3
1980
1990
2000
2010
Year
Span = 0.6
Span = 0.3
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6



LOWESS Smoothers
RainData.xls - Data Set:Site 25147
Rainfall
0.1
0.2
0.3
0.4
Year
1940
1960
1980
2000
Span = 0.6
Span = 0.3
Slope sign chg =0.6
Slope sign chg =0.3
Datum Shift
Slope change
95% Conf Interval Span=0.6

Appendix II: Individual Station Summaries

SITE NAME: Alligator

Site ID: 2260800 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1971	

Trend Analysis

Trend Analysis ID
1

Trend Single Period

Analysis Period: 11/1/1941 **to:** 5/6/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0064	0.2397	-0.0972

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0039	0.4241	0
Wet Season:	-0.0091	0.1659	0

Trend Piecewise

Break Date: 1/1/1971

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0743	0.0004	-0.4538
Segment 2	0.0127	0.0236	0.2575

Trend Seasonal Piecewise

Break Date: 1/1/1971

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0538	0.0034	-1
Segment 1, Wet Season	-0.0648	0.0172	-1
Segment 2, Dry Season	0.0153	0.0443	-1
Segment 2, Wet Season	0.0100	0.2179	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	1	1
Cluster Number	2	6
Mann Kendall p-value	0.6238	0.0134
Sen Slope	0.0038	0.0151
tau	0.0733	0.2449

SITE NAME: Apopka

Site ID: 30003000 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/1985	

Trend Analysis

Trend Analysis ID
2

Trend Single Period

Analysis Period: 9/1/1942 **to:** 1/5/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0095	0.0175	-0.1975

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0087	0.0476	-1
Wet Season:	-0.0085	0.0893	-1

Trend Piecewise

Break Date: 1/1/1985

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0100	0.1990	-0.1353
Segment 2	-0.0501	0.0106	-0.3768

Trend Seasonal Piecewise

Break Date: 1/1/1985

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0083	0.3681	0
Segment 1, Wet Season	-0.0042	0.7220	0
Segment 2, Dry Season	-0.0521	0.0211	-1
Segment 2, Wet Season	-0.0452	0.1303	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	2	2
Cluster Number	2	3
Mann Kendall p-value	0.0471	0.1872
Sen Slope	-0.0345	-0.0079
tau	-0.2867	-0.1310

SITE NAME: Apshaw

Site ID: 2930258 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
3

Trend Single Period

Analysis Period: 4/6/1953 **to:** 12/22/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0545	0.0037	-0.2675

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0536	0.0019	-1
Wet Season:	-0.0536	0.0048	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	3	3
Cluster Number	2	4
Mann Kendall p-value	0.3875	0.0772
Sen Slope	-0.0677	-0.0393
tau	-0.1267	-0.1752

SITE NAME: Barton Big

Site ID: BARTON-BIG **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1989	

Trend Analysis

Trend Analysis ID
4

Trend Single Period

Analysis Period: 7/1/1959 **to:** 1/5/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0027	0.3982	-0.0842

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0002	0.9433	0
Wet Season:	-0.0072	0.0312	-1

Trend Piecewise

Break Date: 1/1/1989

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0153	0.0126	-0.3300
Segment 2	0.0235	0.0322	0.3526

Trend Seasonal Piecewise

Break Date: 1/1/1989

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0099	0.1052	0
Segment 1, Wet Season	-0.0202	0.0335	-1
Segment 2, Dry Season	0.0227	0.1630	0
Segment 2, Wet Season	0.0356	0.0104	-1

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	4	4
Cluster Number	3	9
Mann Kendall p-value	0.0017	0.4661
Sen Slope	0.0204	-0.0022
tau	0.4500	-0.0736

SITE NAME: Bay

Site ID: 2263850 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
5

Trend Single Period

Analysis Period: 1/1/1972 **to:** 5/6/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0170	0.0001	-0.4339

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0175	0.0020	-1
Wet Season:	-0.0192	0.0006	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	5
Cluster Number	4
Mann Kendall p-value	0.0235
Sen Slope	-0.0196
tau	-0.3267

AHCA 1960-2008 (34 Stations)

SITE NAME: Bay Lake nr Windermere

Site ID: 282528081340901 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
6

Trend Single Period

Analysis Period: 3/1/1966 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1923	0.0000	-0.6850

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1914	0.0000	-1
Wet Season:	-0.2234	0.0000	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	6
Cluster Number	2
Mann Kendall p-value	0.0019
Sen Slope	-0.1967
tau	-0.4467

AHCA 1960-2008 (34 Stations)

SITE NAME: Bear

Site ID: 7514 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1991	5/1/1999

Trend Analysis

Trend Analysis ID
7

Trend Single Period

Analysis Period: 10/4/1978 **to:** 1/28/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0061	0.3070	-0.1290

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1991	-0.008417	0.584070	-0.120879
6/1/1991	5/1/1999	-0.151428	0.063487	-0.571429
5/1/1999	1/1/2030	0.031503	0.755497	0.090909

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	7
Cluster Number	4
Mann Kendall p-value	0.1543
Sen Slope	-0.0140
tau	-0.2067

AHCA 1960-2008 (34 Stations)

SITE NAME: Bithlo 1

Site ID: 283249081053201 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/1979	

Trend Analysis

Trend Analysis ID
8

Trend Single Period

Analysis Period: 1/3/1961 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0762	0.0000	-0.4728

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0688	0.0000	-1
Wet Season:	-0.0828	0.0000	-1

Trend Piecewise

Break Date: 6/1/1986

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.1503	0.0000	-0.5815
Segment 2	-0.0440	0.4282	-0.1225

Trend Seasonal Piecewise

Break Date: 6/1/1986

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.2307	0.0008	-1
Segment 1, Wet Season	-0.1381	0.0001	-1
Segment 2, Dry Season	-0.0344	0.2251	0
Segment 2, Wet Season	-0.0297	0.3724	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	8
Cluster Number	1
Mann Kendall p-value	0.6238
Sen Slope	-0.0243
tau	-0.0733

AHCA 1960-2008 (34 Stations)

SITE NAME: Bithlo 3

Site ID: 283249081053203 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	6/1/1978	

Trend Analysis

Trend Analysis ID
9

Trend Single Period

Analysis Period: 3/26/1969 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0553	0.0001	-0.4268

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0569	0.0002	-1
Wet Season:	-0.0410	0.0009	-1

Trend Piecewise

Break Date: 6/1/1978

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0011	1.0000	-0.0222
Segment 2	-0.0889	0.0004	-0.4495

Trend Seasonal Piecewise

Break Date: 6/1/1978

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0359	0.2831	0
Segment 1, Wet Season	0.0267	0.1524	0
Segment 2, Dry Season	-0.0839	0.0009	-1
Segment 2, Wet Season	-0.0562	0.0153	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	9
Cluster Number	4
Mann Kendall p-value	0.0650
Sen Slope	-0.0615
tau	-0.2667

AHCA 1960-2008 (34 Stations)

SITE NAME: Boggy Creek Rd nr Taft

Site ID: 282051081183401 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	6/1/1993	

Trend Analysis

Trend Analysis ID
10

Trend Single Period

Analysis Period: 1/29/1980 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1157	0.0048	-0.3655

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0358	0.3918	0
Wet Season:	-0.1802	0.0002	-1

Trend Piecewise

Break Date: 6/1/1993

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.1157	0.2736	-0.2308
Segment 2	-0.2956	0.0103	-0.4833

Trend Seasonal Piecewise

Break Date: 6/1/1993

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0168	1.0000	0
Segment 1, Wet Season	-0.2227	0.0285	-1
Segment 2, Dry Season	-0.2507	0.0649	-1
Segment 2, Wet Season	-0.3115	0.0600	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	10
Cluster Number	1
Mann Kendall p-value	0.0422
Sen Slope	-0.1048
tau	-0.2933

AHCA 1960-2008 (34 Stations)

SITE NAME: Butler

Site ID: 2263900 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1979	

Trend Analysis

Trend Analysis ID
11

Trend Single Period

Analysis Period: 1/7/1940 **to:** 3/30/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0089	0.1005	-0.1346

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0079	0.2199	0
Wet Season:	-0.0121	0.0601	0

Trend Piecewise

Break Date: 6/1/1979

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0527	0.0000	-0.4641
Segment 2	0.0406	0.0804	0.2276

Trend Seasonal Piecewise

Break Date: 6/1/1979

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0475	0.0005	-1
Segment 1, Wet Season	-0.0485	0.0002	-1
Segment 2, Dry Season	0.0418	0.0635	0
Segment 2, Wet Season	0.0518	0.1083	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	11	5
Cluster Number	2	4
Mann Kendall p-value	0.4691	0.4637
Sen Slope	0.0181	0.0093
tau	0.1067	0.0731

SITE NAME: Catherine

Site ID: 7522 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
12

Trend Single Period

Analysis Period: 10/5/1978 **to:** 1/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0205	0.0771	-0.2218

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0200	0.3008	0
Wet Season:	-0.0127	0.5047	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	12
Cluster Number	2
Mann Kendall p-value	0.3875
Sen Slope	-0.0136
tau	-0.1267

AHCA 1960-2008 (34 Stations)

SITE NAME: Charm

Site ID: 7524 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1989	6/1/1999

Trend Analysis

Trend Analysis ID
13

Trend Single Period

Analysis Period: 10/5/1978 **to:** 1/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0024	0.9096	0.0161

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1989	0.300006	0.002030	0.696970
6/1/1989	6/1/1999	-0.017963	1.000000	-0.022222
6/1/1999	1/1/2030	0.221500	0.212912	0.309091

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	13
Cluster Number	2
Mann Kendall p-value	0.0183
Sen Slope	-0.0744
tau	-0.3400

AHCA 1960-2008 (34 Stations)

SITE NAME: Church

Site ID: 2237370 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
14

Trend Single Period

Analysis Period: 3/13/1970 **to:** 4/28/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0161	0.4773	-0.0795

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0209	0.4214	0
Wet Season:	-0.0097	0.6987	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	14
Cluster Number	2
Mann Kendall p-value	0.7614
Sen Slope	-0.0116
tau	-0.0467

AHCA 1960-2008 (34 Stations)

SITE NAME: Clermont

Site ID: 283314081455501 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1999	

Trend Analysis

Trend Analysis ID
15

Trend Single Period

Analysis Period: 5/17/1982 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1644	0.0053	-0.3757

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1376	0.0380	-1
Wet Season:	-0.1574	0.0086	-1

Trend Piecewise

Break Date: 1/1/1999

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.1278	0.0230	-0.3987
Segment 2	0.1373	0.4743	0.2000

Trend Seasonal Piecewise

Break Date: 1/1/1999

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0751	0.2558	0
Segment 1, Wet Season	-0.1010	0.0638	0
Segment 2, Dry Season	0.2648	0.5915	0
Segment 2, Wet Season	0.1711	0.4743	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	15
Cluster Number	2
Mann Kendall p-value	0.0265
Sen Slope	-0.1556
tau	-0.3200

AHCA 1960-2008 (34 Stations)

SITE NAME: Clermont R

Site ID: 1641 **Site Type:** RF

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
16

Trend Single Period

Analysis Period: 1/1/1930 **to:** 12/31/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0000	0.7670	-0.0230

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0001	0.4826	0
Wet Season:	0.0001	0.7221	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	111	31
Cluster Number	1	5
Mann Kendall p-value	0.9814	0.7563
Sen Slope	-0.0245	-0.0257
tau	-0.0067	-0.0315

SITE NAME: Cocoa A

Site ID: 282341081040101 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/1985	

Trend Analysis

Trend Analysis ID
17

Trend Single Period

Analysis Period: 3/9/1960 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0694	0.0000	-0.4596

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0660	0.0001	-1
Wet Season:	-0.0790	0.0000	-1

Trend Piecewise

Break Date: 1/1/1985

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.1700	0.0000	-0.6000
Segment 2	-0.0163	0.5683	-0.0870

Trend Seasonal Piecewise

Break Date: 1/1/1985

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.1910	0.0002	-1
Segment 1, Wet Season	-0.1375	0.0000	-1
Segment 2, Dry Season	-0.0087	0.8233	0
Segment 2, Wet Season	0.0213	0.7471	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	16	6
Cluster Number	1	8
Mann Kendall p-value	0.7614	0.0000
Sen Slope	-0.0112	-0.0682
tau	-0.0467	-0.4405

SITE NAME: Cocoa B

Site ID: 282532081075601 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1982	

Trend Analysis

Trend Analysis ID
18

Trend Single Period

Analysis Period: 7/31/1968 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0809	0.0072	0.2892

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0869	0.0131	-1
Wet Season:	0.0743	0.0765	-1

Trend Piecewise

Break Date: 6/1/1982

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.4223	0.0056	-0.5429
Segment 2	0.2084	0.0001	0.5499

Trend Seasonal Piecewise

Break Date: 6/1/1982

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.3467	0.0160	-1
Segment 1, Wet Season	-0.5889	0.0175	-1
Segment 2, Dry Season	0.1781	0.0023	-1
Segment 2, Wet Season	0.2585	0.0004	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	17
Cluster Number	3
Mann Kendall p-value	0.0001
Sen Slope	0.2231
tau	0.5733

AHCA 1960-2008 (34 Stations)

SITE NAME: Cocoa C - Zone 1

Site ID: 282533081082202 **Site Type:** GW_LFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
19

Trend Single Period

Analysis Period: 2/24/1967 **to:** 2/2/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1919	0.0000	-0.7475

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1823	0.0000	-1
Wet Season:	-0.1993	0.0000	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	18
Cluster Number	4
Mann Kendall p-value	0.0002
Sen Slope	-0.1617
tau	-0.5333

AHCA 1960-2008 (34 Stations)

SITE NAME: Cocoa C - Zone 5

Site ID: 282533081082206 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1989	

Trend Analysis

Trend Analysis ID
20

Trend Single Period

Analysis Period: 2/24/1967 **to:** 2/2/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0777	0.0004	-0.3754

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0683	0.0009	-1
Wet Season:	-0.1015	0.0009	-1

Trend Piecewise

Break Date: 6/1/1989

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.2206	0.0000	-0.6443
Segment 2	0.0771	0.2300	0.2000

Trend Seasonal Piecewise

Break Date: 6/1/1989

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.1783	0.0001	-1
Segment 1, Wet Season	-0.2402	0.0000	-1
Segment 2, Dry Season	0.0322	0.5376	0
Segment 2, Wet Season	0.1397	0.0931	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	19
Cluster Number	1
Mann Kendall p-value	0.4691
Sen Slope	0.0353
tau	0.1067

AHCA 1960-2008 (34 Stations)

SITE NAME: Cocoa D

Site ID: 282531081095701 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1995	

Trend Analysis

Trend Analysis ID
21

Trend Single Period

Analysis Period: 7/31/1968 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.2263	0.0763	-0.5000

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1589	0.0000	-1
Wet Season:	-0.1763	0.0000	-1

Trend Piecewise

Break Date: 1/1/1995

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.2694	0.0000	-0.7720
Segment 2	0.0020	1.0000	0.0109

Trend Seasonal Piecewise

Break Date: 1/1/1995

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.3467	0.0160	-1
Segment 1, Wet Season	-0.5889	0.0175	-1
Segment 2, Dry Season	0.1781	0.0023	-1
Segment 2, Wet Season	0.2585	0.0004	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	20
Cluster Number	1
Mann Kendall p-value	0.5593
Sen Slope	-0.0248
tau	-0.0867

AHCA 1960-2008 (34 Stations)

SITE NAME: Cocoa F

Site ID: 282739081054501 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
22

Trend Single Period

Analysis Period: 5/12/1970 **to:** 2/2/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0368	0.0180	-0.2615

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0293	0.0868	0
Wet Season:	-0.0226	0.2373	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	21
Cluster Number	1
Mann Kendall p-value	0.4982
Sen Slope	-0.0334
tau	-0.1000

AHCA 1960-2008 (34 Stations)

SITE NAME: Cocoa H

Site ID: 282847081013701 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
23

Trend Single Period

Analysis Period: 8/5/1971 **to:** 5/17/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0217	0.3427	-0.1159

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0112	0.5335	0
Wet Season:	-0.0123	0.6757	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	22
Cluster Number	1
Mann Kendall p-value	0.5593
Sen Slope	-0.0314
tau	-0.0867

AHCA 1960-2008 (34 Stations)

SITE NAME: Cocoa P

Site ID: 282623081153801 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
24

Trend Single Period

Analysis Period: 3/5/1971 **to:** 5/12/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1489	0.0000	-0.5520

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1214	0.0004	-1
Wet Season:	-0.1498	0.0000	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	23
Cluster Number	1
Mann Kendall p-value	0.0336
Sen Slope	-0.1216
tau	-0.3067

AHCA 1960-2008 (34 Stations)

SITE NAME: COLEY DEEP

Site ID: 25339 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1990	

Trend Analysis

Trend Analysis ID
25

Trend Single Period

Analysis Period: 11/18/1949 **to:** 11/4/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1964	0.0000	-0.4798

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1986	0.0000	-1
Wet Season:	-0.1835	0.0000	-1

Trend Piecewise

Break Date: 1/1/1990

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.3699	0.0000	-0.6887
Segment 2	0.0086	0.9442	0.0175

Trend Seasonal Piecewise

Break Date: 1/1/1990

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.4081	0.0000	-1
Segment 1, Wet Season	-0.3142	0.0000	-1
Segment 2, Dry Season	0.0988	0.4555	0
Segment 2, Wet Season	0.1377	0.1273	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	24	7
Cluster Number	3	8
Mann Kendall p-value	0.0299	0.0041
Sen Slope	0.1466	-0.1071
tau	0.3133	-0.2840

SITE NAME: COMBEE ROAD DEEP

Site ID: 17567 **Site Type:** GW_IAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1983	

Trend Analysis

Trend Analysis ID
26

Trend Single Period

Analysis Period: 1/4/1974 **to:** 10/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0413	0.0022	-0.3587

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0509	0.0023	-1
Wet Season:	-0.0571	0.0008	-1

Trend Piecewise

Break Date: 1/1/1983

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.1767	0.0123	0.6444
Segment 2	-0.0759	0.0008	-0.4708

Trend Seasonal Piecewise

Break Date: 1/1/1983

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.1827	0.0200	-1
Segment 1, Wet Season	0.1392	0.0763	-1
Segment 2, Dry Season	-0.1052	0.0001	-1
Segment 2, Wet Season	-0.0774	0.0086	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	25
Cluster Number	4
Mann Kendall p-value	0.0030
Sen Slope	-0.0536
tau	-0.4267

AHCA 1960-2008 (34 Stations)

SITE NAME: Conway

Site ID: CONWAY **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1984	

Trend Analysis

Trend Analysis ID
27

Trend Single Period

Analysis Period: 3/1/1960 **to:** 1/6/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0242	0.0153	-0.2376

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0225	0.0474	-1
Wet Season:	-0.0314	0.0125	-1

Trend Piecewise

Break Date: 6/1/1984

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0977	0.0000	-0.6133
Segment 2	-0.0022	1.0000	0.0000

Trend Seasonal Piecewise

Break Date: 6/1/1984

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.1047	0.0002	-1
Segment 1, Wet Season	-0.1046	0.0003	-1
Segment 2, Dry Season	-0.0047	1.0000	0
Segment 2, Wet Season	-0.0105	0.8233	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	26	8
Cluster Number	2	4
Mann Kendall p-value	0.9814	0.0127
Sen Slope	0.0010	-0.0280
tau	0.0067	-0.2466

SITE NAME: CROOKED LAKE NR BABSON PARK (R)

Site ID: 23857 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1986	

Trend Analysis

Trend Analysis ID
28

Trend Single Period

Analysis Period: 4/29/1945 **to:** 10/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1239	0.0000	-0.3933

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1110	0.0000	-1
Wet Season:	-0.1210	0.0000	-1

Trend Piecewise

Break Date: 6/1/1986

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.2512	0.0000	-0.7445
Segment 2	0.5533	0.0000	0.6443

Trend Seasonal Piecewise

Break Date: 6/1/1986

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.2349	0.0000	-1
Segment 1, Wet Season	-0.2494	0.0000	-1
Segment 2, Dry Season	0.5384	0.0000	-1
Segment 2, Wet Season	0.5580	0.0000	-1

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	27	9
Cluster Number	3	2
Mann Kendall p-value	0.0000	0.0638
Sen Slope	0.5119	-0.0843
tau	0.6600	-0.1837

SITE NAME: Deseret

Site ID: 281722080543001 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1998	

Trend Analysis

Trend Analysis ID
29

Trend Single Period

Analysis Period: 10/1/1977 **to:** 10/23/2007

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0038	0.6833	-0.0538

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0017	0.9188	0
Wet Season:	0.0134	0.4118	0

Trend Piecewise

Break Date: 6/1/1998

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0219	0.1946	-0.2035
Segment 2	0.1390	0.1753	0.3889

Trend Seasonal Piecewise

Break Date: 6/1/1998

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0129	0.4503	0
Segment 1, Wet Season	-0.0007	1.0000	0
Segment 2, Dry Season	0.1483	0.0736	0
Segment 2, Wet Season	0.1072	0.3481	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	28
Cluster Number	1
Mann Kendall p-value	0.2336
Sen Slope	0.0208
tau	0.1733

AHCA 1960-2008 (34 Stations)

SITE NAME: Disney nr Vineland

Site ID: 282210081352601 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1984	

Trend Analysis

Trend Analysis ID
30

Trend Single Period

Analysis Period: 1/18/1969 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0117	0.2759	-0.1195

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0089	0.5821	0
Wet Season:	-0.0105	0.3220	0

Trend Piecewise

Break Date: 1/1/1984

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.1218	0.0026	0.5667
Segment 2	-0.0496	0.0035	-0.4200

Trend Seasonal Piecewise

Break Date: 1/1/1984

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.1239	0.0170	-1
Segment 1, Wet Season	0.1960	0.0075	-1
Segment 2, Dry Season	-0.0398	0.1412	0
Segment 2, Wet Season	-0.0411	0.0095	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	29
Cluster Number	4
Mann Kendall p-value	0.0095
Sen Slope	-0.0368
tau	-0.3733

AHCA 1960-2008 (34 Stations)

SITE NAME: EAGLE LAKE (R)

Site ID: 24773 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1976	

Trend Analysis

Trend Analysis ID
31

Trend Single Period

Analysis Period: 3/10/1965 **to:** 10/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.1884	0.0000	0.5707

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.1817	0.0000	-1
Wet Season:	0.1880	0.0000	-1

Trend Piecewise

Break Date: 6/1/1976

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.6378	0.0044	-0.8571
Segment 2	0.2014	0.0000	0.5227

Trend Seasonal Piecewise

Break Date: 6/1/1976

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.6849	0.0027	-1
Segment 1, Wet Season	-0.7088	0.0069	-1
Segment 2, Dry Season	0.1879	0.0000	-1
Segment 2, Wet Season	0.1795	0.0000	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	30
Cluster Number	3
Mann Kendall p-value	0.0063
Sen Slope	0.2000
tau	0.3933

AHCA 1960-2008 (34 Stations)

SITE NAME: Eva nr Clermont - SAS

Site ID: 282245081492602 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1988	1/1/1999

Trend Analysis

Trend Analysis ID
32

Trend Single Period

Analysis Period: 1/6/1972 **to:** 6/22/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0037	0.8603	-0.0213

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1988	0.103194	0.052861	0.352941
6/1/1988	1/1/1999	-0.032266	0.533417	-0.163636
1/1/1999	12/1/2030	-0.017277	1.000000	-0.018182

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	31
Cluster Number	2
Mann Kendall p-value	0.1543
Sen Slope	-0.0329
tau	-0.2067

AHCA 1960-2008 (34 Stations)

SITE NAME: Eva nr Clermont - UFA

Site ID: 282245081492601 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
33

Trend Single Period

Analysis Period: 2/10/1966 **to:** 6/22/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0169	0.1217	-0.1628

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0052	0.6932	0
Wet Season:	-0.0271	0.0127	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	32
Cluster Number	2
Mann Kendall p-value	0.2525
Sen Slope	-0.0328
tau	-0.1667

AHCA 1960-2008 (34 Stations)

SITE NAME: FORT GREEN SPRINGS INT

Site ID: 24790 **Site Type:** GW_IAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1977	

Trend Analysis

Trend Analysis ID
34

Trend Single Period

Analysis Period: 8/31/1964 **to:** 10/3/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.2638	0.0060	0.2848

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.3483	0.0034	-1
Wet Season:	0.2142	0.0419	-1

Trend Piecewise

Break Date: 1/1/1977

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-1.6621	0.0022	-0.6264
Segment 2	0.3378	0.0158	0.3075

Trend Seasonal Piecewise

Break Date: 1/1/1977

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-1.2887	0.0087	-1
Segment 1, Wet Season	-1.6780	0.0012	-1
Segment 2, Dry Season	0.4362	0.0187	-1
Segment 2, Wet Season	0.3672	0.0252	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	33
Cluster Number	3
Mann Kendall p-value	0.0471
Sen Slope	0.3887
tau	0.2867

AHCA 1960-2008 (34 Stations)

SITE NAME: Geneva

Site ID: 1270535 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1993	6/1/2002

Trend Analysis

Trend Analysis ID
35

Trend Single Period

Analysis Period: 5/7/1982 **to:** 11/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0695	0.1010	0.2222

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	1/1/1993	0.190637	0.192616	0.303030
1/1/1993	6/1/2002	-0.352865	0.073638	-0.466667
6/1/2002	12/1/2030	-0.276023	0.386476	-0.285714

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	34
Cluster Number	3
Mann Kendall p-value	0.2723
Sen Slope	0.0655
tau	0.1600

AHCA 1960-2008 (34 Stations)

SITE NAME: Horsehead Pond - SAS

Site ID: 5170970 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
36

Trend Single Period

Analysis Period: 1/8/1984 **to:** 1/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.2660	0.0000	-0.6492

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.2476	0.0000	-1
Wet Season:	-0.2628	0.0000	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	35
Cluster Number	4
Mann Kendall p-value	0.0000
Sen Slope	-0.2627
tau	-0.6467

AHCA 1960-2008 (34 Stations)

SITE NAME: Horsehead Pond - UFA

Site ID: 5170969 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1993	

Trend Analysis

Trend Analysis ID
37

Trend Single Period

Analysis Period: 1/3/1984 **to:** 1/31/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0338	0.2517	-0.1631

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0349	0.4023	0
Wet Season:	-0.0319	0.3875	0

Trend Piecewise

Break Date: 1/1/1993

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.1002	0.3711	0.2444
Segment 2	-0.1510	0.0791	-0.3333

Trend Seasonal Piecewise

Break Date: 1/1/1993

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.1165	0.0200	-1
Segment 1, Wet Season	0.2195	0.0286	-1
Segment 2, Dry Season	-0.1131	0.2241	0
Segment 2, Wet Season	-0.1085	0.3444	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	36
Cluster Number	2
Mann Kendall p-value	0.4409
Sen Slope	-0.0221
tau	-0.1133

AHCA 1960-2008 (34 Stations)

SITE NAME: Horseshoe

Site ID: LK043 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1988	7/1/2001

Trend Analysis

Trend Analysis ID
38

Trend Single Period

Analysis Period: 9/1/1980 **to:** 10/2/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0856	0.0688	-0.2414

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1988	0.512591	0.465512	0.222222
6/1/1988	7/1/2001	-0.387187	0.028539	-0.450549
7/1/2001	12/1/2030	0.032090	0.901539	0.071429

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	37
Cluster Number	4
Mann Kendall p-value	0.0142
Sen Slope	-0.1168
tau	-0.3533

AHCA 1960-2008 (34 Stations)

SITE NAME: Howell

Site ID: 1762687 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	10/1/1999	

Trend Analysis

Trend Analysis ID
39

Trend Single Period

Analysis Period: 10/10/1978 **to:** 11/23/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0294	0.0053	-0.3548

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0408	0.0000	-1
Wet Season:	-0.0177	0.0811	-1

Trend Piecewise

Break Date: 10/1/1999

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0063	0.6118	-0.0823
Segment 2	-0.0526	0.6022	-0.1667

Trend Seasonal Piecewise

Break Date: 10/1/1999

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0200	0.1727	0
Segment 1, Wet Season	-0.0101	0.4841	0
Segment 2, Dry Season	-0.0877	0.0736	0
Segment 2, Wet Season	-0.0987	0.2831	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	38
Cluster Number	1
Mann Kendall p-value	0.1990
Sen Slope	-0.0201
tau	-0.1867

AHCA 1960-2008 (34 Stations)

SITE NAME: Island

Site ID: 7583 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1993	1/1/1999

Trend Analysis

Trend Analysis ID
40

Trend Single Period

Analysis Period: 10/9/1978 **to:** 1/30/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0052	0.4268	0.1008

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	1/1/1993	0.018958	0.488422	0.142857
1/1/1993	1/1/1999	-0.006389	0.707114	-0.200000
1/1/1999	1/1/2030	0.103147	0.119471	0.381818

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	39
Cluster Number	2
Mann Kendall p-value	0.7973
Sen Slope	0.0034
tau	0.0400

AHCA 1960-2008 (34 Stations)

SITE NAME: Joe Overstreet nr St Cloud

Site ID: 275609081132001 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	6/1/1993	

Trend Analysis

Trend Analysis ID
41

Trend Single Period

Analysis Period: 5/6/1977 **to:** 3/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0016	0.8647	0.0227

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0446	0.2209	0
Wet Season:	-0.0288	0.2340	0

Trend Piecewise

Break Date: 6/1/1993

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0220	0.7108	0.0735
Segment 2	-0.1207	0.1373	-0.2833

Trend Seasonal Piecewise

Break Date: 6/1/1993

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0519	0.7731	0
Segment 1, Wet Season	-0.0463	0.6204	0
Segment 2, Dry Season	-0.0184	0.9641	0
Segment 2, Wet Season	-0.1433	0.0925	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	40
Cluster Number	1
Mann Kendall p-value	0.7261
Sen Slope	0.0126
tau	0.0533

AHCA 1960-2008 (34 Stations)

SITE NAME: Johns

Site ID: 3840562 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1981	

Trend Analysis

Trend Analysis ID
42

Trend Single Period

Analysis Period: 9/7/1959 **to:** 12/20/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0057	0.8671	-0.0171

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0092	0.7379	0
Wet Season:	-0.0032	0.9200	0

Trend Piecewise

Break Date: 6/1/1981

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.3281	0.0000	-0.6680
Segment 2	0.1710	0.0156	0.3333

Trend Seasonal Piecewise

Break Date: 6/1/1981

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.3090	0.0001	-1
Segment 1, Wet Season	-0.3303	0.0000	-1
Segment 2, Dry Season	0.2013	0.0042	-1
Segment 2, Wet Season	0.1450	0.0156	-1

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	41	10
Cluster Number	2	4
Mann Kendall p-value	0.0336	0.8428
Sen Slope	0.1696	0.0041
tau	0.3067	0.0204

SITE NAME: Johns Lake

Site ID: 5310981 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1994	6/1/2000

Trend Analysis

Trend Analysis ID
43

Trend Single Period

Analysis Period: 1/3/1984 **to:** 1/31/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0123	0.9648	0.0092

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	1/1/1994	-0.139583	0.283131	-0.288889
1/1/1994	6/1/2000	-0.573750	0.763891	-0.142857
6/1/2000	12/1/2030	0.537020	0.283131	0.288889

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	42
Cluster Number	2
Mann Kendall p-value	0.9441
Sen Slope	0.0185
tau	0.0133

AHCA 1960-2008 (34 Stations)

SITE NAME: Killarney

Site ID: LK048 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1988	

Trend Analysis

Trend Analysis ID
44

Trend Single Period

Analysis Period: 7/1/1959 **to:** 10/3/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0076	0.0145	0.2447

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0083	0.0105	-1
Wet Season:	0.0050	0.1836	0

Trend Piecewise

Break Date: 6/1/1988

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0242	0.0005	0.4709
Segment 2	-0.0201	0.0104	-0.4211

Trend Seasonal Piecewise

Break Date: 6/1/1988

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0221	0.0019	-1
Segment 1, Wet Season	0.0308	0.0033	-1
Segment 2, Dry Season	-0.0238	0.0034	-1
Segment 2, Wet Season	-0.0106	0.5376	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	43	11
Cluster Number	4	10
Mann Kendall p-value	0.0125	0.0145
Sen Slope	-0.0122	0.0076
tau	-0.3600	0.2447

SITE NAME: Lake Adair - LFA

Site ID: 9652160 **Site Type:** GW_LFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
45

Trend Single Period

Analysis Period: 1/8/1976 **to:** 1/31/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1151	0.0025	-0.3654

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1192	0.0033	-1
Wet Season:	-0.1040	0.0289	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	44
Cluster Number	1
Mann Kendall p-value	0.0882
Sen Slope	-0.1131
tau	-0.2467

AHCA 1960-2008 (34 Stations)

SITE NAME: Lake Adair - UFA

Site ID: 283333081233502 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
46

Trend Single Period

Analysis Period: 1/4/1978 **to:** 10/31/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1213	0.0120	-0.3145

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1205	0.0046	-1
Wet Season:	-0.0765	0.1890	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	45
Cluster Number	1
Mann Kendall p-value	0.0973
Sen Slope	-0.1279
tau	-0.2400

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE ALFRED (R)

Site ID: 25229 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	6/1/1997	

Trend Analysis

Trend Analysis ID
47

Trend Single Period

Analysis Period: 3/30/1961 **to:** 10/19/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0893	0.0048	0.3073

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0848	0.0115	-1
Wet Season:	0.0980	0.0046	-1

Trend Piecewise

Break Date: 6/1/1997

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.1766	0.0017	0.4138
Segment 2	-0.3967	0.0865	-0.3939

Trend Seasonal Piecewise

Break Date: 6/1/1997

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.1648	0.0025	-1
Segment 1, Wet Season	0.1865	0.0003	-1
Segment 2, Dry Season	-0.4069	0.0173	-1
Segment 2, Wet Season	-0.3956	0.0641	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	46
Cluster Number	3
Mann Kendall p-value	0.2336
Sen Slope	0.0901
tau	0.1733

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE ALFRED DEEP AT LAKE ALFRED

Site ID: 25227 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1997	

Trend Analysis

Trend Analysis ID
48

Trend Single Period

Analysis Period: 8/1/1945 **to:** 8/6/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0333	0.3134	0.1190

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0621	0.1204	0
Wet Season:	-0.0017	0.9783	0

Trend Piecewise

Break Date: 6/1/1997

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.1148	0.0122	0.3696
Segment 2	-0.1384	0.6312	-0.1212

Trend Seasonal Piecewise

Break Date: 6/1/1997

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.1906	0.0032	-1
Segment 1, Wet Season	0.0710	0.2750	0
Segment 2, Dry Season	-0.2013	0.3037	0
Segment 2, Wet Season	-0.0917	0.5371	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	47
Cluster Number	2
Mann Kendall p-value	0.3747
Sen Slope	0.0535
tau	0.1300

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE ALFRED DEEP NR LAKE ALFRED

Site ID: 17652 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1977	6/1/1991

Trend Analysis

Trend Analysis ID
49

Trend Single Period

Analysis Period: 7/1/1959 **to:** 10/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0081	0.6376	-0.0463

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	1/1/1977	-0.197259	0.000359	-0.602339
1/1/1977	6/1/1991	-0.022463	0.766525	-0.066667
6/1/1991	1/1/2030	-0.069978	0.293917	-0.181287

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	48	12
Cluster Number	2	7
Mann Kendall p-value	0.4982	0.8564
Sen Slope	0.0256	0.0022
tau	0.1000	0.0187

SITE NAME: LAKE ANNIE (R)

Site ID: 25307 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1988	6/1/2000

Trend Analysis

Trend Analysis ID
50

Trend Single Period

Analysis Period: 8/21/1970 **to:** 10/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0790	0.0071	0.2974

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1988	0.056217	0.441488	0.134503
6/1/1988	6/1/2000	0.567548	0.006044	0.589744
6/1/2000	1/1/2030	0.062250	0.720515	0.111111

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	49
Cluster Number	3
Mann Kendall p-value	0.0109
Sen Slope	0.1851
tau	0.3667

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE ARBUCKLE

Site ID: 712932 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
51

Trend Single Period

Analysis Period: 12/1/1941 **to:** 11/10/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0140	0.0024	-0.2506

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0113	0.0300	-1
Wet Season:	-0.0151	0.0147	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	50	13
Cluster Number	1	1
Mann Kendall p-value	0.4982	0.5405
Sen Slope	-0.0134	-0.0054
tau	-0.1000	-0.0612

SITE NAME: LAKE ARIETTA (USGS) (R)

Site ID: 17658 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1997	

Trend Analysis

Trend Analysis ID
52

Trend Single Period

Analysis Period: 8/6/1970 **to:** 10/28/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0304	0.2393	0.1308

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0288	0.2584	0
Wet Season:	0.0269	0.3573	0

Trend Piecewise

Break Date: 1/1/1997

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0983	0.0053	0.3757
Segment 2	-0.2280	0.0467	-0.4545

Trend Seasonal Piecewise

Break Date: 1/1/1997

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.1053	0.0059	-1
Segment 1, Wet Season	0.0898	0.0156	-1
Segment 2, Dry Season	-0.2988	0.0327	-1
Segment 2, Wet Season	-0.3396	0.0240	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	51
Cluster Number	2
Mann Kendall p-value	0.8701
Sen Slope	0.0083
tau	0.0267

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE BUFFUM (R)

Site ID: 24795 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1990	6/1/2000

Trend Analysis

Trend Analysis ID
53

Trend Single Period

Analysis Period: 4/26/1972 **to:** 10/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0288	0.2796	0.1238

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	1/1/1990	-0.028418	0.820217	-0.045752
1/1/1990	6/1/2000	0.606029	0.005069	0.672727
6/1/2000	1/1/2030	-0.347320	0.371093	-0.244444

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	52
Cluster Number	3
Mann Kendall p-value	0.0299
Sen Slope	0.1271
tau	0.3133

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE CLINCH (R)

Site ID: 23836 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1988	

Trend Analysis

Trend Analysis ID
54

Trend Single Period

Analysis Period: 1/31/1947 **to:** 11/3/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0246	0.0450	-0.1736

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0187	0.1219	0
Wet Season:	-0.0291	0.0221	-1

Trend Piecewise

Break Date: 1/1/1988

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0756	0.0001	-0.4123
Segment 2	0.2078	0.0028	0.4762

Trend Seasonal Piecewise

Break Date: 1/1/1988

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0717	0.0005	-1
Segment 1, Wet Season	-0.0807	0.0003	-1
Segment 2, Dry Season	0.1679	0.0019	-1
Segment 2, Wet Season	0.1813	0.0048	-1

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	53	14
Cluster Number	3	2
Mann Kendall p-value	0.0004	0.3840
Sen Slope	0.1850	-0.0140
tau	0.5067	-0.0867

SITE NAME: LAKE GARFIELD (R)

Site ID: 24818 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1990	

Trend Analysis

Trend Analysis ID
55

Trend Single Period

Analysis Period: 10/1/1969 **to:** 10/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0035	0.7961	0.0293

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0016	0.9373	0
Wet Season:	0.0116	0.6329	0

Trend Piecewise

Break Date: 1/1/1990

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0161	0.5350	0.0996
Segment 2	-0.0849	0.2629	-0.1930

Trend Seasonal Piecewise

Break Date: 1/1/1990

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0615	0.1742	0
Segment 1, Wet Season	0.0592	0.4957	0
Segment 2, Dry Season	-0.0861	0.1119	0
Segment 2, Wet Season	-0.0835	0.3145	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	54
Cluster Number	2
Mann Kendall p-value	0.6238
Sen Slope	-0.0117
tau	-0.0733

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE HOWARD (R)

Site ID: 24846 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1976	1/1/1990

Trend Analysis

Trend Analysis ID
56

Trend Single Period

Analysis Period: 2/13/1946 **to:** 10/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0070	0.1191	-0.1339

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1976	-0.042806	0.005313	-0.354839
6/1/1976	1/1/1990	0.020815	0.921159	0.028571
1/1/1990	1/1/2030	-0.070731	0.162984	-0.231579

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	55	15
Cluster Number	2	1
Mann Kendall p-value	0.6913	0.6602
Sen Slope	0.0105	0.0033
tau	0.0600	0.0442

SITE NAME: Lake Joel nr Ashton

Site ID: 281714081093001 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/1993	

Trend Analysis

Trend Analysis ID
57

Trend Single Period

Analysis Period: 1/1/1976 **to:** 5/12/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0541	0.0282	-0.2656

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0418	0.0910	-1
Wet Season:	-0.0579	0.0267	-1

Trend Piecewise

Break Date: 1/1/1993

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0228	0.5959	-0.0980
Segment 2	-0.2092	0.0428	-0.3833

Trend Seasonal Piecewise

Break Date: 1/1/1993

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0107	0.9396	0
Segment 1, Wet Season	-0.0851	0.1494	0
Segment 2, Dry Season	-0.1535	0.1373	0
Segment 2, Wet Season	-0.0741	0.5584	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	56
Cluster Number	1
Mann Kendall p-value	0.1831
Sen Slope	-0.0561
tau	-0.1933

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE JULIANA (R)

Site ID: 17664 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1976	6/1/1996

Trend Analysis

Trend Analysis ID
58

Trend Single Period

Analysis Period: 12/1/1961 **to:** 10/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0166	0.2309	0.1190

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1976	-0.248401	0.001391	-0.600000
1/1/1976	6/1/1996	0.167178	0.000411	0.561905
6/1/1996	1/1/2030	-0.259278	0.028539	-0.450549

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	57
Cluster Number	2
Mann Kendall p-value	0.4982
Sen Slope	0.0316
tau	0.1000

AHCA 1960-2008 (34 Stations)

SITE NAME: Lake Louisa State Park

Site ID: 660060 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1992	6/1/2001

Trend Analysis

Trend Analysis ID
59

Trend Single Period

Analysis Period: 1/3/1984 **to:** 1/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0940	0.0641	-0.2615

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1992	-0.126799	0.251452	-0.333333
6/1/1992	6/1/2001	-0.417045	0.152406	-0.377778
6/1/2001	12/1/2030	-0.169990	0.465512	-0.222222

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	58
Cluster Number	2
Mann Kendall p-value	0.1290
Sen Slope	-0.0857
tau	-0.2200

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE MARION NR HAINES CITY

Site ID: 24848 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
60

Trend Single Period

Analysis Period: 2/17/1958 **to:** 11/10/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0070	0.0168	-0.2293

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0078	0.0121	-1
Wet Season:	-0.0084	0.0312	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	59	16
Cluster Number	1	1
Mann Kendall p-value	0.2158	0.0378
Sen Slope	-0.0127	-0.0063
tau	-0.1800	-0.2058

SITE NAME: LAKE MCLEOD (R)

Site ID: 24748 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1976	

Trend Analysis

Trend Analysis ID
61

Trend Single Period

Analysis Period: 3/13/1965 **to:** 10/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.2845	0.0000	0.6537

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.2776	0.0000	-1
Wet Season:	0.2925	0.0000	-1

Trend Piecewise

Break Date: 6/1/1976

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.5709	0.0020	-0.9286
Segment 2	0.3169	0.0000	0.6288

Trend Seasonal Piecewise

Break Date: 6/1/1976

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.6377	0.0069	-1
Segment 1, Wet Season	-0.6285	0.0069	-1
Segment 2, Dry Season	0.3046	0.0000	-1
Segment 2, Wet Season	0.2978	0.0000	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	60
Cluster Number	3
Mann Kendall p-value	0.0010
Sen Slope	0.2650
tau	0.4733

AHCA 1960-2008 (34 Stations)

SITE NAME: Lake Oliver nr Vineland - SAS

Site ID: 282202081384602 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1991	

Trend Analysis

Trend Analysis ID
62

Trend Single Period

Analysis Period: 1/1/1974 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0342	0.2254	0.1429

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0507	0.1238	0
Wet Season:	0.0274	0.3580	0

Trend Piecewise

Break Date: 1/1/1991

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.1272	0.0051	0.4902
Segment 2	-0.1876	0.1297	-0.2680

Trend Seasonal Piecewise

Break Date: 1/1/1991

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.1593	0.0153	-1
Segment 1, Wet Season	0.1032	0.0529	-1
Segment 2, Dry Season	-0.1673	0.0956	0
Segment 2, Wet Season	-0.1412	0.1297	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	61
Cluster Number	2
Mann Kendall p-value	0.4982
Sen Slope	-0.0270
tau	-0.1000

AHCA 1960-2008 (34 Stations)

SITE NAME: Lake Oliver nr Vineland - UFA

Site ID: 282202081384601 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1977	6/1/1990

Trend Analysis

Trend Analysis ID
63

Trend Single Period

Analysis Period: 2/24/1959 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0280	0.0250	-0.2173

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1977	-0.206245	0.000037	-0.695906
6/1/1977	6/1/1990	0.084194	0.381074	0.186813
6/1/1990	12/1/2030	-0.113256	0.111887	-0.263158

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	62	17
Cluster Number	2	7
Mann Kendall p-value	0.3383	0.1228
Sen Slope	-0.0293	-0.0181
tau	-0.1400	-0.1531

SITE NAME: LAKE OTIS (R)

Site ID: 25371 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1980	

Trend Analysis

Trend Analysis ID
64

Trend Single Period

Analysis Period: 8/4/1954 **to:** 10/28/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0285	0.1056	-0.1494

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0258	0.1251	0
Wet Season:	-0.0274	0.1554	0

Trend Piecewise

Break Date: 6/1/1980

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.2109	0.0002	-0.5100
Segment 2	0.0387	0.1956	0.1724

Trend Seasonal Piecewise

Break Date: 6/1/1980

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.2127	0.0002	-1
Segment 1, Wet Season	-0.2213	0.0003	-1
Segment 2, Dry Season	0.0356	0.3918	0
Segment 2, Wet Season	0.0567	0.1595	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	63	18
Cluster Number	3	7
Mann Kendall p-value	0.0882	0.9794
Sen Slope	0.1002	0.0003
tau	0.2467	0.0034

SITE NAME: LAKE PARKER AT LAKELAND

Site ID: 24906 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1991	

Trend Analysis

Trend Analysis ID
65

Trend Single Period

Analysis Period: 5/2/1949 **to:** 10/5/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0060	0.1274	0.1344

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0070	0.1010	0
Wet Season:	0.0060	0.2929	0

Trend Piecewise

Break Date: 1/1/1991

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0148	0.0225	0.2425
Segment 2	-0.0701	0.0124	-0.4379

Trend Seasonal Piecewise

Break Date: 1/1/1991

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0164	0.0161	-1
Segment 1, Wet Season	0.0118	0.1654	0
Segment 2, Dry Season	-0.0773	0.0096	-1
Segment 2, Wet Season	-0.0795	0.0252	-1

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	64	19
Cluster Number	2	1
Mann Kendall p-value	0.8701	0.4637
Sen Slope	-0.0011	0.0035
tau	-0.0267	0.0731

SITE NAME: LAKE ROSALIE

Site ID: 712937 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1993	

Trend Analysis

Trend Analysis ID
66

Trend Single Period

Analysis Period: 12/4/1941 **to:** 11/10/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0134	0.1024	0.1569

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0131	0.0581	0
Wet Season:	0.0072	0.4163	0

Trend Piecewise

Break Date: 1/1/1993

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0211	0.0620	0.2190
Segment 2	-0.0692	0.1917	-0.2500

Trend Seasonal Piecewise

Break Date: 1/1/1993

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0193	0.1050	0
Segment 1, Wet Season	0.0118	0.4101	0
Segment 2, Dry Season	-0.0189	0.3870	0
Segment 2, Wet Season	-0.0755	0.4838	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	65	20
Cluster Number	1	1
Mann Kendall p-value	0.7614	0.0638
Sen Slope	-0.0106	0.0165
tau	-0.0467	0.1837

SITE NAME: LAKE RUBY (R)

Site ID: 25303 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
67

Trend Single Period

Analysis Period: 10/2/1971 **to:** 10/29/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0923	0.0002	0.4197

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0842	0.0005	-1
Wet Season:	0.0964	0.0002	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	66
Cluster Number	3
Mann Kendall p-value	0.1176
Sen Slope	0.0377
tau	0.2267

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE SANITARY (MARIANA) (R)

Site ID: 17573 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1965	3/1/1994

Trend Analysis

Trend Analysis ID
68

Trend Single Period

Analysis Period: 2/26/1946 **to:** 10/28/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0053	0.1459	0.1250

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1965	-0.033521	0.097994	-0.273684
6/1/1965	3/1/1994	0.025556	0.001524	0.418719
3/1/1994	1/1/2030	-0.024901	0.392314	-0.166667

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	67	21
Cluster Number	2	6
Mann Kendall p-value	0.9814	0.0013
Sen Slope	0.0002	0.0155
tau	0.0067	0.3180

SITE NAME: Lake Sawyer nr Windermere

Site ID: 282738081341401 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
69

Trend Single Period

Analysis Period: 5/12/1980 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1139	0.0385	-0.2690

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0838	0.0868	-1
Wet Season:	-0.1115	0.0688	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	68
Cluster Number	2
Mann Kendall p-value	0.0798
Sen Slope	-0.1233
tau	-0.2533

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE SMART (R)

Site ID: 25381 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	6/1/1973	6/1/1990

Trend Analysis

Trend Analysis ID
70

Trend Single Period

Analysis Period: 3/1/1946 **to:** 10/22/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0047	0.7233	0.0381

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	6/1/1973	-0.217467	0.035448	-0.642857
6/1/1973	6/1/1990	0.020363	0.324712	0.176471
6/1/1990	1/1/2030	-0.059767	0.381032	-0.147368

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	69
Cluster Number	2
Mann Kendall p-value	0.3875
Sen Slope	0.0248
tau	0.1267

AHCA 1960-2008 (34 Stations)

SITE NAME: LAKE WALES (R)

Site ID: 25351 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1987	

Trend Analysis

Trend Analysis ID
71

Trend Single Period

Analysis Period: 12/31/1951 **to:** 10/7/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0352	0.3220	-0.1008

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0166	0.7332	0
Wet Season:	-0.0200	0.5377	0

Trend Piecewise

Break Date: 1/1/1987

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.2428	0.0005	-0.5000
Segment 2	0.3258	0.0040	0.4459

Trend Seasonal Piecewise

Break Date: 1/1/1987

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.2292	0.0083	-1
Segment 1, Wet Season	-0.2181	0.0071	-1
Segment 2, Dry Season	0.3027	0.0043	-1
Segment 2, Wet Season	0.3141	0.0068	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	70
Cluster Number	3
Mann Kendall p-value	0.0083
Sen Slope	0.2577
tau	0.3800

AHCA 1960-2008 (34 Stations)

SITE NAME: Longwood

Site ID: 284147081220201 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	6/1/1988	

Trend Analysis

Trend Analysis ID
72

Trend Single Period

Analysis Period: 10/25/1951 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1729	0.0000	-0.6739

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1709	0.0000	-1
Wet Season:	-0.1809	0.0000	-1

Trend Piecewise

Break Date: 6/1/1988

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.2401	0.0000	-0.7496
Segment 2	-0.0140	0.9759	-0.0095

Trend Seasonal Piecewise

Break Date: 6/1/1988

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.2343	0.0000	-1
Segment 1, Wet Season	-0.2282	0.0000	-1
Segment 2, Dry Season	0.0105	0.9278	0
Segment 2, Wet Season	0.0467	0.7703	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	71	22
Cluster Number	1	8
Mann Kendall p-value	0.9814	0.0000
Sen Slope	-0.0033	-0.1707
tau	-0.0067	-0.6054

SITE NAME: LOUGHMAN DEEP

Site ID: 25144 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	6/1/1983	

Trend Analysis

Trend Analysis ID
73

Trend Single Period

Analysis Period: 8/12/1960 **to:** 10/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0492	0.0000	-0.5032

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0484	0.0001	-1
Wet Season:	-0.0491	0.0000	-1

Trend Piecewise

Break Date: 6/1/1983

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0337	0.3247	-0.1765
Segment 2	-0.0955	0.0001	-0.5446

Trend Seasonal Piecewise

Break Date: 6/1/1983

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0139	0.7049	0
Segment 1, Wet Season	-0.0347	0.2889	0
Segment 2, Dry Season	-0.0994	0.0003	-1
Segment 2, Wet Season	-0.0770	0.0009	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	72
Cluster Number	4
Mann Kendall p-value	0.0001
Sen Slope	-0.0977
tau	-0.5467

AHCA 1960-2008 (34 Stations)

SITE NAME: LOUGHMAN SHALLOW

Site ID: 25145 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
74

Trend Single Period

Analysis Period: 8/15/1960 **to:** 10/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0171	0.1322	-0.1546

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0161	0.0798	0
Wet Season:	-0.0111	0.2246	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	73
Cluster Number	4
Mann Kendall p-value	0.0650
Sen Slope	-0.0373
tau	-0.2667

AHCA 1960-2008 (34 Stations)

SITE NAME: Louisa

Site ID: 3980647 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
75

Trend Single Period

Analysis Period: 3/1/1957 **to:** 12/20/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0095	0.5753	-0.0543

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0120	0.3300	0
Wet Season:	-0.0138	0.4163	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	74	23
Cluster Number	2	3
Mann Kendall p-value	0.3624	0.8160
Sen Slope	-0.0636	0.0050
tau	-0.1333	0.0238

SITE NAME: Maitland

Site ID: LK052 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
76

Trend Single Period

Analysis Period: 1/1/1961 **to:** 10/3/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0071	0.0031	-0.2961

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0041	0.0945	-1
Wet Season:	-0.0081	0.0016	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	75
Cluster Number	2
Mann Kendall p-value	0.3153
Sen Slope	-0.0076
tau	-0.1467

AHCA 1960-2008 (34 Stations)

SITE NAME: Mascotte - SAS

Site ID: 283204081544902 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1986	

Trend Analysis

Trend Analysis ID
77

Trend Single Period

Analysis Period: 1/28/1959 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0000	1.0000	-0.0008

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0049	0.7128	0
Wet Season:	-0.0066	0.5636	0

Trend Piecewise

Break Date: 6/1/1986

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0201	0.2772	0.1481
Segment 2	-0.0805	0.0910	-0.2569

Trend Seasonal Piecewise

Break Date: 6/1/1986

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0099	0.5937	0
Segment 1, Wet Season	0.0181	0.2281	0
Segment 2, Dry Season	-0.0689	0.1019	0
Segment 2, Wet Season	-0.1127	0.0201	-1

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	76	24
Cluster Number	2	3
Mann Kendall p-value	0.1682	0.5636
Sen Slope	-0.0512	0.0042
tau	-0.2000	0.0578

SITE NAME: Mascotte - UFA

Site ID: 283204081544901 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1986	

Trend Analysis

Trend Analysis ID
78

Trend Single Period

Analysis Period: 1/28/1959 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0142	0.1114	-0.1545

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0187	0.0740	0
Wet Season:	-0.0180	0.1550	0

Trend Piecewise

Break Date: 1/1/1986

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0111	0.4410	-0.1058
Segment 2	-0.0792	0.2244	-0.1858

Trend Seasonal Piecewise

Break Date: 1/1/1986

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0294	0.2772	0
Segment 1, Wet Season	0.0055	0.8675	0
Segment 2, Dry Season	-0.0556	0.1696	0
Segment 2, Wet Season	-0.0748	0.1131	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	77	25
Cluster Number	2	3
Mann Kendall p-value	0.3624	0.3840
Sen Slope	-0.0458	-0.0075
tau	-0.1333	-0.0867

SITE NAME: McCoy

Site ID: LK057 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
79

Trend Single Period

Analysis Period: 3/1/1967 **to:** 10/1/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0167	0.5732	-0.0695

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:			0
Wet Season:			0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	78
Cluster Number	1
Mann Kendall p-value	0.7261
Sen Slope	-0.0291
tau	-0.0533

AHCA 1960-2008 (34 Stations)

SITE NAME: Mercantile Lane nr Kissimmee

Site ID: 281429081290501 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
80

Trend Single Period

Analysis Period: 5/7/1977 **to:** 3/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1777	0.0000	-0.6553

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1654	0.0001	-1
Wet Season:	-0.1907	0.0000	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	79
Cluster Number	4
Mann Kendall p-value	0.0000
Sen Slope	-0.1943
tau	-0.6200

AHCA 1960-2008 (34 Stations)

SITE NAME: Miami Springs

Site ID: 2234650 **Site Type:** SP

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
81

Trend Single Period

Analysis Period: 3/28/1972 **to:** 8/17/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0420	0.0002	0.4253

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0477	0.0002	-1
Wet Season:	0.0228	0.1195	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	80
Cluster Number	3
Mann Kendall p-value	0.0377
Sen Slope	0.0406
tau	0.3000

AHCA 1960-2008 (34 Stations)

SITE NAME: Moss Park

Site ID: 282241081112801 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
82

Trend Single Period

Analysis Period: 5/15/1980 **to:** 9/17/2007

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1383	0.0008	-0.4497

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1811	0.0013	-1
Wet Season:	-0.1309	0.0025	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

AHCA 1960-2008 (34 Stations)

Dendrogram ID
Cluster Number
Mann Kendall p-value
Sen Slope
tau

SITE NAME: MOUNTAIN LAKE NWS

Site ID: 25147 **Site Type:** RF

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1952	1/1/1979

Trend Analysis

Trend Analysis ID
83

Trend Single Period

Analysis Period: 1/1/1935 **to:** 12/31/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0001	0.4666	-0.0581

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	1/1/1952	0.000000	1.000000	0.006536
1/1/1952	1/1/1979	-0.001184	0.138410	-0.201058
1/1/1979	1/1/2030	0.000548	0.520693	0.085057

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	112	32
Cluster Number	1	5
Mann Kendall p-value	0.1831	0.3746
Sen Slope	0.4287	0.0952
tau	0.1933	0.0884

SITE NAME: Orlando

Site ID: 6628 **Site Type:** RF

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1953	6/1/1981

Trend Analysis

Trend Analysis ID
84

Trend Single Period

Analysis Period: 1/1/1930 **to:** 12/31/2006

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0000	0.7750	0.0226

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	1/1/1953	-0.000178	0.823349	-0.036232
1/1/1953	6/1/1981	-0.000752	0.074747	-0.236453
6/1/1981	12/1/2030	0.000164	0.860033	0.027692

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	113	33
Cluster Number	1	5
Mann Kendall p-value	0.3980	0.2261
Sen Slope	0.3393	0.1213
tau	0.1304	0.1230

SITE NAME: Orlo Vista

Site ID: 283253081283401 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	6/1/1985	

Trend Analysis

Trend Analysis ID
85

Trend Single Period

Analysis Period: 8/1/1943 **to:** 4/28/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.2024	0.0000	-0.5975

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.2011	0.0000	-1
Wet Season:	-0.2029	0.0000	-1

Trend Piecewise

Break Date: 6/1/1985

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.3057	0.0000	-0.6855
Segment 2	-0.0599	0.5352	-0.0942

Trend Seasonal Piecewise

Break Date: 6/1/1985

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.3262	0.0000	-1
Segment 1, Wet Season	-0.2839	0.0000	-1
Segment 2, Dry Season	-0.0459	0.6374	0
Segment 2, Wet Season	-0.0388	0.5612	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	81	26
Cluster Number	1	8
Mann Kendall p-value	0.7261	0.0001
Sen Slope	-0.0377	-0.1304
tau	-0.0533	-0.3912

SITE NAME: OS U.L.

Site ID: 281937081245901 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
86

Trend Single Period

Analysis Period: 5/4/1977 **to:** 9/16/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.6072	0.0000	-0.7903

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.6600	0.0000	-1
Wet Season:	-0.5125	0.0000	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	82
Cluster Number	4
Mann Kendall p-value	0.0000
Sen Slope	-0.7049
tau	-0.7933

AHCA 1960-2008 (34 Stations)

SITE NAME: P-49 SURF NR FROSTPROOF

Site ID: 713582 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
87

Trend Single Period

Analysis Period: 4/1/1949 **to:** 10/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0123	0.2328	-0.1274

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0053	0.5961	0
Wet Season:	-0.0004	0.9762	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	83
Cluster Number	2
Mann Kendall p-value	0.9441
Sen Slope	-0.0062
tau	-0.0133

AHCA 1960-2008 (34 Stations)

SITE NAME: Palm Lake Dr nr Windermere

Site ID: 282835081305201 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1990	

Trend Analysis

Trend Analysis ID
88

Trend Single Period

Analysis Period: 1/22/1981 **to:** 5/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0230	0.4877	-0.0936

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0020	0.9551	0
Wet Season:	-0.0032	0.9842	0

Trend Piecewise

Break Date: 6/1/1990

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.6375	0.0318	-0.5556
Segment 2	0.0194	0.8337	0.0409

Trend Seasonal Piecewise

Break Date: 6/1/1990

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.1530	0.5915	0
Segment 1, Wet Season	-0.8694	0.0318	-1
Segment 2, Dry Season	0.0651	0.6243	0
Segment 2, Wet Season	0.0817	0.5959	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	84
Cluster Number	1
Mann Kendall p-value	0.9441
Sen Slope	-0.0044
tau	-0.0133

AHCA 1960-2008 (34 Stations)

SITE NAME: Palm Springs - Seminole

Site ID: 2234996 **Site Type:** SP

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/1997	

Trend Analysis

Trend Analysis ID
89

Trend Single Period

Analysis Period: 4/18/1972 **to:** 8/19/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0993	0.0000	-0.5050

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1124	0.0000	-1
Wet Season:	-0.1100	0.0002	-1

Trend Piecewise

Break Date: 7/1/1984

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.3492	0.0003	-0.7692
Segment 2	-0.0307	0.1290	-0.2200

Trend Seasonal Piecewise

Break Date: 7/1/1984

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.2000	0.0000	-1
Segment 1, Wet Season	-0.1986	0.0002	-1
Segment 2, Dry Season	-0.0061	0.9453	0
Segment 2, Wet Season	0.0504	0.3601	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	85
Cluster Number	4
Mann Kendall p-value	0.1990
Sen Slope	-0.0277
tau	-0.1867

AHCA 1960-2008 (34 Stations)

SITE NAME: Prevatt

Site ID: 15470818 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1979	

Trend Analysis

Trend Analysis ID
90

Trend Single Period

Analysis Period: 1/1/1960 **to:** 12/3/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0625	0.2687	0.1448

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:			0
Wet Season:			0

Trend Piecewise

Break Date: 6/1/1979

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.1276	0.0586	-0.4103
Segment 2	0.0734	0.2373	0.1576

Trend Seasonal Piecewise

Break Date: 6/1/1979

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.1055	0.1926	0
Segment 1, Wet Season	-0.1736	0.4655	0
Segment 2, Dry Season	0.0131	0.8025	0
Segment 2, Wet Season	0.0502	0.4806	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	86
Cluster Number	1
Mann Kendall p-value	0.6238
Sen Slope	0.0270
tau	0.0733

AHCA 1960-2008 (34 Stations)

SITE NAME: Reedy Creek Overlook

Site ID: 280905081270101 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
91

Trend Single Period

Analysis Period: 5/7/1977 **to:** 3/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1417	0.0000	-0.5833

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1210	0.0023	-1
Wet Season:	-0.1524	0.0000	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	87
Cluster Number	4
Mann Kendall p-value	0.0004
Sen Slope	-0.1460
tau	-0.5067

AHCA 1960-2008 (34 Stations)

SITE NAME: Rock Springs

Site ID: 2234610 **Site Type:** SP

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
92

Trend Single Period

Analysis Period: 10/11/1968 **to:** 8/17/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.3020	0.0000	-0.4750

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.2655	0.0014	-1
Wet Season:	-0.3261	0.0003	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	88
Cluster Number	1
Mann Kendall p-value	0.4409
Sen Slope	-0.0866
tau	-0.1133

AHCA 1960-2008 (34 Stations)

SITE NAME: ROMP 101 nr Bay Lake

Site ID: 282717081553101 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1986	

Trend Analysis

Trend Analysis ID
93

Trend Single Period

Analysis Period: 7/7/1977 **to:** 5/31/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0197	0.5664	-0.0720

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0131	0.5703	0
Wet Season:	-0.0228	0.4460	0

Trend Piecewise

Break Date: 6/1/1986

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.2785	0.1524	0.3778
Segment 2	-0.0639	0.3156	-0.1542

Trend Seasonal Piecewise

Break Date: 6/1/1986

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.2191	0.3481	0
Segment 1, Wet Season	0.2756	0.1524	0
Segment 2, Dry Season	-0.0496	0.4282	0
Segment 2, Wet Season	-0.0855	0.2839	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	89
Cluster Number	2
Mann Kendall p-value	0.4137
Sen Slope	-0.0422
tau	-0.1200

AHCA 1960-2008 (34 Stations)

SITE NAME: ROMP 45 AVPK

Site ID: 24804 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
94

Trend Single Period

Analysis Period: 8/21/1980 **to:** 11/4/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.3844	0.0204	0.3011

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.3930	0.0385	-1
Wet Season:	0.3259	0.0269	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	90
Cluster Number	3
Mann Kendall p-value	0.0235
Sen Slope	0.4491
tau	0.3267

AHCA 1960-2008 (34 Stations)

SITE NAME: ROMP 59 HTRN

Site ID: 24840 **Site Type:** GW_IAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/2001	

Trend Analysis

Trend Analysis ID
95

Trend Single Period

Analysis Period: 2/2/1977 **to:** 10/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.2415	0.0163	0.2955

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.2521	0.0192	-1
Wet Season:	0.1903	0.0289	-1

Trend Piecewise

Break Date: 1/1/2001

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.3774	0.0063	0.3933
Segment 2	-1.7962	0.1078	-0.5000

Trend Seasonal Piecewise

Break Date: 1/1/2001

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.4279	0.0208	-1
Segment 1, Wet Season	0.2738	0.0043	-1
Segment 2, Dry Season	-0.8361	0.6022	0
Segment 2, Wet Season	0.0777	0.9170	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	91
Cluster Number	3
Mann Kendall p-value	0.1543
Sen Slope	0.2716
tau	0.2067

AHCA 1960-2008 (34 Stations)

SITE NAME: ROMP 59 SWNN~AVPK

Site ID: 24838 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
96

Trend Single Period

Analysis Period: 9/10/1976 **to:** 10/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.4216	0.0038	0.3561

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.4844	0.0040	-1
Wet Season:	0.3948	0.0031	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	92
Cluster Number	3
Mann Kendall p-value	0.0235
Sen Slope	0.4541
tau	0.3267

AHCA 1960-2008 (34 Stations)

SITE NAME: ROMP 60 OCAL~AVPK

Site ID: 17974 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1975	

Trend Analysis

Trend Analysis ID
97

Trend Single Period

Analysis Period: 2/8/1955 **to:** 11/4/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0371	0.7166	-0.0343

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0490	0.6871	0
Wet Season:	-0.0321	0.7203	0

Trend Piecewise

Break Date: 6/1/1975

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-1.9598	0.0000	-0.7333
Segment 2	0.4385	0.0020	0.3725

Trend Seasonal Piecewise

Break Date: 6/1/1975

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-1.8786	0.0000	-1
Segment 1, Wet Season	-1.8976	0.0000	-1
Segment 2, Dry Season	0.4879	0.0024	-1
Segment 2, Wet Season	0.3905	0.0027	-1

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	93	27
Cluster Number	3	7
Mann Kendall p-value	0.0422	0.1147
Sen Slope	0.4106	0.1776
tau	0.2933	0.1565

SITE NAME: ROMP 76 OCAL-AVPK

Site ID: 17696 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1995	

Trend Analysis

Trend Analysis ID
98

Trend Single Period

Analysis Period: 12/18/1966 **to:** 11/4/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0064	0.8840	0.0202

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0284	0.6615	0
Wet Season:	-0.0206	0.7339	0

Trend Piecewise

Break Date: 6/1/1995

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.1464	0.1297	0.2680
Segment 2	-0.2593	0.2284	-0.2527

Trend Seasonal Piecewise

Break Date: 6/1/1995

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0349	0.4838	0
Segment 1, Wet Season	0.0976	0.1082	0
Segment 2, Dry Season	-0.2720	0.0748	0
Segment 2, Wet Season	-0.2122	0.1889	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	94
Cluster Number	2
Mann Kendall p-value	0.8701
Sen Slope	0.0067
tau	0.0267

AHCA 1960-2008 (34 Stations)

SITE NAME: ROMP 88 ROCK RIDGE

Site ID: 17530 **Site Type:** RF

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1998	

Trend Analysis

Trend Analysis ID
99

Trend Single Period

Analysis Period: 3/1/1976 **to:** 11/4/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0008	0.1161	0.1907

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0003	0.5894	0
Wet Season:	0.0018	0.2476	0

Trend Piecewise

Break Date: 1/1/1998

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0010	0.1867	0.2016
Segment 2	-0.0018	0.2758	-0.2727

Trend Seasonal Piecewise

Break Date: 1/1/1998

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0016	0.2049	0
Segment 1, Wet Season	0.0006	0.7780	0
Segment 2, Dry Season	0.0025	0.4507	0
Segment 2, Wet Season	-0.0128	0.2437	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	114
Cluster Number	1
Mann Kendall p-value	0.2723
Sen Slope	0.2687
tau	0.1600

AHCA 1960-2008 (34 Stations)

SITE NAME: Rose

Site ID: LK070 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1980	

Trend Analysis

Trend Analysis ID
100

Trend Single Period

Analysis Period: 1/1/1960 **to:** 10/2/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0201	0.3564	0.0918

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0227	0.3075	0
Wet Season:	0.0121	0.5755	0

Trend Piecewise

Break Date: 1/1/1980

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.1619	0.0748	-0.2857
Segment 2	0.0561	0.1010	0.2222

Trend Seasonal Piecewise

Break Date: 1/1/1980

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.2029	0.0744	0
Segment 1, Wet Season	-0.1179	0.2342	0
Segment 2, Dry Season	0.0381	0.3177	0
Segment 2, Wet Season	0.0912	0.0633	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	95	28
Cluster Number	2	4
Mann Kendall p-value	0.4691	0.3564
Sen Slope	0.0402	0.0201
tau	0.1067	0.0918

SITE NAME: Sanford

Site ID: 7982 **Site Type:** RF

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1975	

Trend Analysis

Trend Analysis ID
101

Trend Single Period

Analysis Period: 1/1/1930 **to:** 12/31/2006

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0000	0.9754	0.0027

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0001	0.7042	0
Wet Season:	-0.0002	0.5066	0

Trend Piecewise

Break Date: 6/1/1975

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0001	0.7049	-0.0396
Segment 2	0.0007	0.3587	0.1183

Trend Seasonal Piecewise

Break Date: 6/1/1975

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0000	0.9095	0
Segment 1, Wet Season	-0.0004	0.5320	0
Segment 2, Dry Season	-0.0005	0.4082	0
Segment 2, Wet Season	0.0025	0.0892	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	115	34
Cluster Number	1	5
Mann Kendall p-value	0.5262	0.3496
Sen Slope	0.3463	0.1224
tau	0.0988	0.0953

SITE NAME: Sanlando Springs

Site ID: 2234991 **Site Type:** SP

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
102

Trend Single Period

Analysis Period: 4/18/1972 **to:** 8/19/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0269	0.5133	0.0754

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0441	0.4813	0
Wet Season:	-0.0125	0.8313	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	96
Cluster Number	1
Mann Kendall p-value	0.9814
Sen Slope	-0.0066
tau	-0.0067

AHCA 1960-2008 (34 Stations)

SITE NAME: SANLON RANCH FLDN

Site ID: 24897 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
103

Trend Single Period

Analysis Period: 1/10/1970 **to:** 10/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.2992	0.0002	0.4128

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.3174	0.0001	-1
Wet Season:	0.2585	0.0002	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	97
Cluster Number	3
Mann Kendall p-value	0.2336
Sen Slope	0.1964
tau	0.1733

AHCA 1960-2008 (34 Stations)

SITE NAME: Sherwood

Site ID: LK075 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1985	

Trend Analysis

Trend Analysis ID
104

Trend Single Period

Analysis Period: 5/1/1960 **to:** 10/1/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0231	0.7695	0.0321

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:			0
Wet Season:			0

Trend Piecewise

Break Date: 6/1/1985

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.5065	0.0003	-0.5200
Segment 2	0.2671	0.2908	0.1621

Trend Seasonal Piecewise

Break Date: 6/1/1985

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.4837	0.0002	-1
Segment 1, Wet Season	-0.4887	0.0004	-1
Segment 2, Dry Season	0.3209	0.1725	0
Segment 2, Wet Season	0.2107	0.4986	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	98
Cluster Number	3
Mann Kendall p-value	0.1543
Sen Slope	0.3029
tau	0.2067

AHCA 1960-2008 (34 Stations)

SITE NAME: Shingle Creek nr Kissimmee

Site ID: 281559081260701 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
105

Trend Single Period

Analysis Period: 5/3/1978 **to:** 3/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.2536	0.0000	-0.6734

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.2189	0.0003	-1
Wet Season:	-0.2563	0.0000	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	99
Cluster Number	4
Mann Kendall p-value	0.0000
Sen Slope	-0.2854
tau	-0.6400

AHCA 1960-2008 (34 Stations)

SITE NAME: South

Site ID: 2263868 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
106

Trend Single Period

Analysis Period: 4/9/1969 **to:** 5/6/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0344	0.0048	-0.3073

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0288	0.0285	-1
Wet Season:	-0.0386	0.0088	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	100
Cluster Number	2
Mann Kendall p-value	0.0650
Sen Slope	-0.0480
tau	-0.2667

AHCA 1960-2008 (34 Stations)

SITE NAME: St Cloud Power Plant

Site ID: 281456081171701 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
107

Trend Single Period

Analysis Period: 5/14/1980 **to:** 9/17/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1273	0.0244	-0.2980

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.1289	0.0310	-1
Wet Season:	-0.1196	0.0557	-1

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	101
Cluster Number	1
Mann Kendall p-value	0.1475
Sen Slope	-0.0974
tau	-0.2100

AHCA 1960-2008 (34 Stations)

SITE NAME: Starbuck Spring

Site ID: 2234997 **Site Type:** SP

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	8/1/1987	1/1/1997

Trend Analysis

Trend Analysis ID
108

Trend Single Period

Analysis Period: 4/18/1972 **to:** 8/19/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0635	0.0207	-0.2632

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	8/1/1987	-0.205833	0.052872	-0.366667
8/1/1987	1/1/1997	0.368000	0.283131	0.288889
1/1/1997	12/1/2030	-0.224226	0.076851	-0.384615

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	102
Cluster Number	1
Mann Kendall p-value	0.5283
Sen Slope	-0.0311
tau	-0.0933

AHCA 1960-2008 (34 Stations)

SITE NAME: STATE ROAD 33~COMBEE ROAD SHALLOW

Site ID: 17568 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/1982	

Trend Analysis

Trend Analysis ID
109

Trend Single Period

Analysis Period: 1/4/1974 **to:** 10/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0557	0.0003	-0.4254

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0712	0.0006	-1
Wet Season:	-0.0555	0.0005	-1

Trend Piecewise

Break Date: 1/1/1982

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.2184	0.0165	0.6667
Segment 2	-0.0849	0.0001	-0.5442

Trend Seasonal Piecewise

Break Date: 1/1/1982

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.2284	0.0476	-1
Segment 1, Wet Season	0.1133	0.1735	0
Segment 2, Dry Season	-0.1112	0.0000	-1
Segment 2, Wet Season	-0.0624	0.0168	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	103
Cluster Number	4
Mann Kendall p-value	0.0007
Sen Slope	-0.0747
tau	-0.4867

AHCA 1960-2008 (34 Stations)

SITE NAME: STATE ROAD 60 DEEP NR LAKE WALES

Site ID: 711229 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	5/1/1987	

Trend Analysis

Trend Analysis ID
110

Trend Single Period

Analysis Period: 9/18/1975 **to:** 9/18/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.1778	0.0423	0.3160

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.1300	0.1586	0
Wet Season:	0.1375	0.2673	0

Trend Piecewise

Break Date: 5/1/1987

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0337	0.6404	0.1273
Segment 2	0.6237	0.0467	0.4545

Trend Seasonal Piecewise

Break Date: 5/1/1987

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0500	0.8763	0
Segment 1, Wet Season	0.2600	0.5915	0
Segment 2, Dry Season	0.8083	0.0293	-1
Segment 2, Wet Season	0.5300	0.2001	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

AHCA 1960-2008 (34 Stations)

Dendrogram ID
Cluster Number
Mann Kendall p-value
Sen Slope
tau

SITE NAME: Sylvan

Site ID: 10770591 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	7/1/1989	

Trend Analysis

Trend Analysis ID
111

Trend Single Period

Analysis Period: 10/13/1978 **to:** 11/21/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.1861	0.1148	-0.3636

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:			0
Wet Season:			0

Trend Piecewise

Break Date: 7/1/1989

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.1861	0.1148	-0.3636
Segment 2	0.1402	0.2016	0.2353

Trend Seasonal Piecewise

Break Date: 7/1/1989

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.1369	0.6404	0
Segment 1, Wet Season	-0.1678	0.1611	0
Segment 2, Dry Season	0.2040	0.0765	0
Segment 2, Wet Season	0.1654	0.2016	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

AHCA 1960-2008 (34 Stations)

Dendrogram ID
Cluster Number
Mann Kendall p-value
Sen Slope
tau

SITE NAME: TAFT_G

Site ID: 5038 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	1/1/1983	

Trend Analysis

Trend Analysis ID
112

Trend Single Period

Analysis Period: 6/10/1969 **to:** 7/9/2004

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0151	0.0993	-0.1937

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0164	0.1914	0
Wet Season:	-0.0158	0.1306	0

Trend Piecewise

Break Date: 1/1/1983

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0202	0.5526	0.1238
Segment 2	-0.0395	0.0748	-0.2857

Trend Seasonal Piecewise

Break Date: 1/1/1983

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0405	0.3244	0
Segment 1, Wet Season	0.0477	0.2284	0
Segment 2, Dry Season	-0.0567	0.0852	0
Segment 2, Wet Season	-0.0341	0.1019	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

AHCA 1960-2008 (34 Stations)

Dendrogram ID
Cluster Number
Mann Kendall p-value
Sen Slope
tau

SITE NAME: TH-10 Williams Rd nr Holopaw

Site ID: 275852081030501 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	6/1/1994	

Trend Analysis

Trend Analysis ID
113

Trend Single Period

Analysis Period: 3/20/1980 **to:** 3/26/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0300	0.4220	-0.1057

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0244	0.5865	0
Wet Season:	-0.0459	0.1108	0

Trend Piecewise

Break Date: 6/1/1994

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0273	0.8431	0.0476
Segment 2	-0.1939	0.0478	-0.3905

Trend Seasonal Piecewise

Break Date: 6/1/1994

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.1125	0.3244	0
Segment 1, Wet Season	-0.0309	0.9212	0
Segment 2, Dry Season	-0.0513	0.5526	0
Segment 2, Wet Season	-0.2608	0.0160	-1

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	104
Cluster Number	1
Mann Kendall p-value	0.9627
Sen Slope	-0.0029
tau	-0.0100

AHCA 1960-2008 (34 Stations)

SITE NAME: TH-4 Deer Park nr St Cloud

Site ID: 15023026 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
M		

Trend Analysis

Trend Analysis ID
114

Trend Single Period

Analysis Period: 11/5/1979 **to:** 11/11/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0054	0.8533	0.0316

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0393	0.2973	0
Wet Season:	0.0025	0.9005	0

Trend Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	tau
Segment 1			
Segment 2			

Trend Seasonal Piecewise

Break Date:

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season			0
Segment 1, Wet Season			0
Segment 2, Dry Season			0
Segment 2, Wet Season			0

Cluster Analysis

AHCA 1984-2008 (115 Stations) AHCA 1960-2008 (34 Stations)

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID		
Cluster Number		
Mann Kendall p-value		
Sen Slope		
tau		

SITE NAME: Tibet-Butler

Site ID: TIBET-BUTLER **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
P	7/1/1981	

Trend Analysis

Trend Analysis ID
115

Trend Single Period

Analysis Period: 1/1/1961 **to:** 10/8/2008

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0091	0.3326	0.0975

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0130	0.1405	0
Wet Season:	0.0085	0.5829	0

Trend Piecewise

Break Date: 6/1/1985

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0943	0.0063	-0.3933
Segment 2	0.0045	0.8327	0.0356

Trend Seasonal Piecewise

Break Date: 6/1/1985

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.1240	0.0005	-1
Segment 1, Wet Season	-0.1326	0.0016	-1
Segment 2, Dry Season	0.0293	0.1607	0
Segment 2, Wet Season	0.0100	0.8025	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	105
Cluster Number	2
Mann Kendall p-value	0.5912
Sen Slope	0.0159
tau	0.0800

AHCA 1960-2008 (34 Stations)

SITE NAME: Trout

Site ID: 2266239 **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
2P	1/1/1981	6/1/1992

Trend Analysis

Trend Analysis ID
116

Trend Single Period

Analysis Period: 3/16/1970 **to:** 3/28/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0537	0.1959	0.1436

Trend Single Period by Segment

Start Date	End Date	Sen Slope	Mann Kendall p-value	tau
1/1/1900	1/1/1981	-0.545394	0.000614	-0.818182
1/1/1981	6/1/1992	0.595023	0.007488	0.606061
6/1/1992	1/1/2030	-0.066387	0.820217	-0.045752

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	106
Cluster Number	2
Mann Kendall p-value	0.4691
Sen Slope	0.0585
tau	0.1067

AHCA 1960-2008 (34 Stations)

SITE NAME: USGS 815149233 FLDN

Site ID: 713025 **Site Type:** GW_UFA

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	9/1/1991	

Trend Analysis

Trend Analysis ID
117

Trend Single Period

Analysis Period: 7/20/1960 **to:** 5/18/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.0450	0.1105	-0.1970

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.0331	0.2451	0
Wet Season:	-0.0477	0.1273	0

Trend Piecewise

Break Date: 9/1/1991

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0050	1.0000	-0.0095
Segment 2	-0.1525	0.0690	-0.3203

Trend Seasonal Piecewise

Break Date: 9/1/1991

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0000	1.0000	0
Segment 1, Wet Season	-0.0389	0.5857	0
Segment 2, Dry Season	-0.1400	0.2558	0
Segment 2, Wet Season	-0.1079	0.1275	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	107
Cluster Number	2
Mann Kendall p-value	0.1412
Sen Slope	-0.0547
tau	-0.2133

AHCA 1960-2008 (34 Stations)

SITE NAME: USGS P-48 SHALLOW

Site ID: 25402 **Site Type:** GW_SAS

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/1988	

Trend Analysis

Trend Analysis ID
118

Trend Single Period

Analysis Period: 1/5/1956 **to:** 10/27/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0175	0.1137	0.1488

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0261	0.0489	-1
Wet Season:	0.0132	0.2631	0

Trend Piecewise

Break Date: 1/1/1988

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-0.0173	0.5664	-0.0720
Segment 2	0.0476	0.1390	0.2381

Trend Seasonal Piecewise

Break Date: 1/1/1988

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.0099	0.6852	0
Segment 1, Wet Season	-0.0231	0.3553	0
Segment 2, Dry Season	0.0598	0.2363	0
Segment 2, Wet Season	0.0423	0.3669	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	108	29
Cluster Number	3	2
Mann Kendall p-value	0.0161	0.0504
Sen Slope	0.0776	0.0266
tau	0.3467	0.1939

SITE NAME: Wekiwa Springs

Site ID: 2234600 **Site Type:** SP

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	7/1/1984	

Trend Analysis

Trend Analysis ID
119

Trend Single Period

Analysis Period: 10/16/1968 **to:** 8/20/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	-0.2527	0.0013	-0.3449

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	-0.2576	0.0086	-1
Wet Season:	-0.2295	0.0231	-1

Trend Piecewise

Break Date: 7/1/1984

	Sen Slope	Mann Kendall p-value	tau
Segment 1	-1.0626	0.0058	-0.5000
Segment 2	-0.0419	0.6238	-0.0733

Trend Seasonal Piecewise

Break Date: 7/1/1984

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	-0.8097	0.0305	-1
Segment 1, Wet Season	-1.2026	0.0056	-1
Segment 2, Dry Season	0.0218	0.9070	0
Segment 2, Wet Season	-0.1572	0.3153	0

Cluster Analysis

AHCA 1984-2008 (115 Stations)

Dendrogram ID	109
Cluster Number	1
Mann Kendall p-value	0.1990
Sen Slope	-0.1948
tau	-0.1867

AHCA 1960-2008 (34 Stations)

SITE NAME: Whip-Por-Will

Site ID: WHIP-POOR-WILL **Site Type:** LK

Exploratory Data Analysis

Trend Type	Break Date 1	Break Date 2
MS	1/1/1993	

Trend Analysis

Trend Analysis ID
120

Trend Single Period

Analysis Period: 8/1/1960 **to:** 1/6/2009

Aggregation	Sen Slope	Mann Kendall p-value	tau
Y	0.0109	0.0196	0.2286

Trend Seasonal Single Period

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Dry Season:	0.0107	0.0043	-1
Wet Season:	0.0107	0.0475	-1

Trend Piecewise

Break Date: 1/1/1993

	Sen Slope	Mann Kendall p-value	tau
Segment 1	0.0254	0.0058	0.3333
Segment 2	-0.0165	0.1047	-0.3083

Trend Seasonal Piecewise

Break Date: 1/1/1993

	Sen Slope	Mann Kendall p-value	Bonferroni Correction
Segment 1, Dry Season	0.0275	0.0007	-1
Segment 1, Wet Season	0.0202	0.0578	-1
Segment 2, Dry Season	-0.0201	0.1628	0
Segment 2, Wet Season	-0.0198	0.6204	0

Cluster Analysis

	AHCA 1984-2008 (115 Stations)	AHCA 1960-2008 (34 Stations)
Dendrogram ID	110	30
Cluster Number	2	6
Mann Kendall p-value	0.2825	0.0174
Sen Slope	-0.0047	0.0115
tau	-0.1567	0.2355