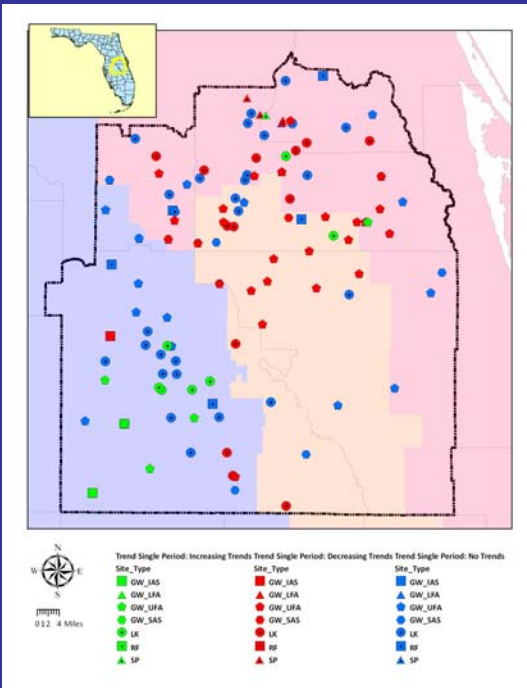
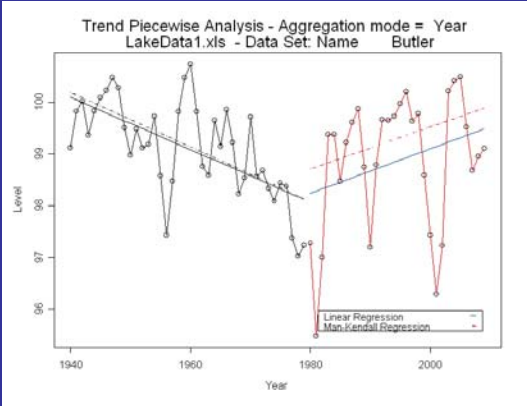
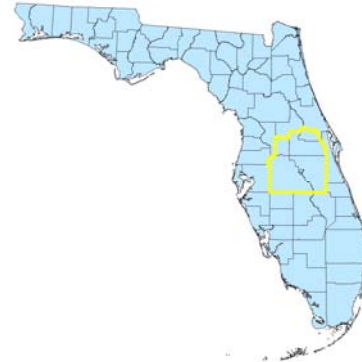


SPECIAL PUBLICATION SJ2010-SP13

**CENTRAL FLORIDA COORDINATION AREA:
STATISTICAL ANALYSIS**



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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TABLE OF CONTENTS

| | |
|--|------|
| LIST OF ABBREVIATIONS | vii |
| GLOSSARY..... | viii |
| EXECUTIVE SUMMARY | ix |
| 1.0 INTRODUCTION | 1 |
| 2.0 METHODOLOGY..... | 1 |
| 2.1 Site Selection | 2 |
| 3.0 EXPLORATORY DATA ANALYSIS..... | 5 |
| 3.1 Descriptive Statistics..... | 7 |
| 3.2 LOWESS..... | 15 |
| 4.0 TREND ANALYSIS | 20 |
| 4.0.1 Trend Analysis Hierarchy..... | 21 |
| 4.1 Trend Single Period..... | 22 |
| 4.1.1 Examination of Serial Correlation | 26 |
| 4.1.2 Trend Single Period: 90% and 95% Confidence Level..... | 29 |
| 4.2 Trend Seasonal Single Period | 31 |
| 4.3 Trend Piecewise..... | 38 |
| 4.3.1 Decreasing Period 1 Trend and Increasing Period 2 Trend..... | 38 |
| 4.3.2 Increasing Period 1 Trend and Decreasing Period 2 Trend..... | 38 |
| 4.3.3 Decreasing Period 1 Trend..... | 38 |
| 4.3.4 Increasing Period 1 Trend | 38 |
| 4.3.5 Decreasing Period 2 Trend..... | 38 |
| 4.3.6 Increasing Period 2 Trend | 38 |
| 4.3.7 No Statistically Significant Piecewise Trends | 38 |
| 4.4 Trend Seasonal Piecewise..... | 42 |
| 4.5 Trend Single Period Segments: 2P Stations..... | 45 |
| 4.6 Trend Analysis Summary | 45 |
| 5.0 CUMULATIVE DISTRIBUTION FUNCTION COMPARISON..... | 51 |
| 6.0 CLUSTER ANALYSIS | 53 |
| 6.1 AHCA Procedure and Output..... | 55 |
| 6.2 Cluster Analysis: All Available Data | 56 |
| 6.2.1 Cluster Analysis: All Stations | 59 |
| 6.2.2 Cluster Analysis: Lakes | 73 |
| 6.2.3 Cluster Analysis: Surficial Wells..... | 80 |
| 6.2.4 Cluster Analysis: Intermediate and Floridan Wells..... | 85 |
| 6.2.5 Cluster Analysis: Springs | 91 |

| | |
|---|------|
| 6.2.6 Cluster Analysis: Rainfall Stations | 95 |
| 6.3 Cluster Analysis: 1960 through 2008 | 98 |
| 7.0 CONCLUSIONS AND RECOMMENDATIONS | 103 |
| 8.0 REFERENCES | 106 |
| APPENDIX I: LOWESS PLOTS..... | I-1 |
| APPENDIX II: INDIVIDUAL STATION SUMMARIES | II-1 |

LIST OF FIGURES

| | | |
|-----------|---|----|
| Figure 1 | Stations of Study within the Central Florida Coordination Area | 6 |
| Figure 2 | CFCA Lakes | 11 |
| Figure 3 | CFCA Surficial and Intermediate Wells | 12 |
| Figure 4 | CFCA Upper and Lower Floridan Wells | 13 |
| Figure 5 | CFCA Spring and Rainfall Stations..... | 14 |
| Figure 6 | LOWESS Examples..... | 19 |
| Figure 7 | Trend Single Period Results | 24 |
| Figure 8 | Statistically Significant Trends at an 80% Confidence Interval..... | 30 |
| Figure 9 | Statistically Significant Trends: Dry Season | 34 |
| Figure 10 | Statistically Significant Trends: Wet Season | 37 |
| Figure 11 | Trend Piecewise Results | 39 |
| Figure 12 | Stations with 2 Break Points | 45 |
| Figure 13 | AHCA Dendrogram, All Stations..... | 60 |
| Figure 14 | AHCA Dendrogram, All Stations (with Clusters) | 60 |
| Figure 15 | AHCA Spatial Associations, All Stations | 61 |
| Figure 16 | AHCA Spatial Associations with Ellipses, All Stations | 62 |
| Figure 17 | AHCA Results: 2 Clusters, 4 Clusters, 6 Clusters, 8 Clusters | 63 |
| Figure 18 | Cluster 1 Normalized Annual Averages | 65 |
| Figure 19 | Cluster 2 Normalized Annual Averages | 67 |
| Figure 20 | Cluster 3 Normalized Annual Averages | 69 |
| Figure 21 | Cluster 4 Normalized Annual Averages | 71 |
| Figure 22 | AHCA Annual Average Comparison | 72 |
| Figure 23 | AHCA Cumulative Annual Average Comparison | 73 |
| Figure 24 | AHCA Dendrogram, Lakes | 74 |
| Figure 25 | AHCA Spatial Associations, Lakes | 74 |
| Figure 26 | Lake Cluster 1 Normalized Annual Averages | 75 |
| Figure 27 | Lake Cluster 2 Normalized Annual Averages | 76 |
| Figure 28 | Lake Cluster 3 Normalized Annual Averages | 77 |
| Figure 29 | Lake Cluster 4 Normalized Annual Averages | 78 |
| Figure 30 | Lakes Average Normalized Comparison | 79 |
| Figure 31 | Lakes Cumulative Average Normalized Comparison | 80 |
| Figure 32 | AHCA Dendrogram, Surficial Wells | 81 |
| Figure 33 | AHCA Spatial Associations, Surficial Wells..... | 82 |
| Figure 34 | Surficial Well Cluster 1 Normalized Annual Averages | 83 |
| Figure 35 | Surficial Well Cluster 2 Normalized Annual Averages | 84 |
| Figure 36 | Surficial Wells Average Normalized Comparison | 84 |
| Figure 37 | Surficial Wells Cumulative Average Normalized Comparison | 85 |
| Figure 38 | AHCA Dendrogram, Intermediate and Floridan Wells | 86 |
| Figure 39 | AHCA Spatial Associations, Intermediate and Floridan Wells | 87 |
| Figure 40 | Intermediate and Floridan Well Cluster 1 Normalized Annual Averages..... | 88 |

| | | |
|-----------|--|-----|
| Figure 41 | Intermediate and Floridan Well Cluster 2 Normalized Annual Averages..... | 89 |
| Figure 42 | Intermediate and Floridan Well Cluster 3 Normalized Annual Averages..... | 90 |
| Figure 43 | Intermediate and Floridan Well Cluster 4 Normalized Annual Averages..... | 91 |
| Figure 44 | AHCA Dendrogram, Springs..... | 92 |
| Figure 45 | ACHA Spatial Associations, Springs..... | 93 |
| Figure 46 | Spring Clusters, Normalized Annual Average Discharge | 94 |
| Figure 47 | Spring Clusters, Cumulative Normalized Annual Average Discharge | 94 |
| Figure 48 | AHCA Dendrogram, Rainfall..... | 95 |
| Figure 49 | AHCA Spatial Associations, Rainfall | 96 |
| Figure 50 | Rainfall Cluster 1 Normalized Annual Totals | 97 |
| Figure 51 | Rainfall Cluster 2 Normalized Annual Totals | 97 |
| Figure 52 | Rainfall Cluster Average Normalized Total Rainfall | 98 |
| Figure 53 | Rainfall Cluster Cumulative Average Normalized Total Rainfall..... | 98 |
| Figure 54 | AHCA Spatial Associations, 1960-2008 Stations | 99 |
| Figure 55 | AHCA Dendrogram, 1960-2008 Stations | 100 |
| Figure 56 | Clusters 1-5 Cumulative Average Normalized Annual Average..... | 101 |
| Figure 57 | Clusters 6-10 Cumulative Average Normalized Annual Average | 101 |
| Figure 58 | Sen Slopes, 1960 – 2008 Stations | 102 |

LIST OF TABLES

| | | |
|----------|--|----|
| Table 1 | Selected Stations for the CFCA Trend and Cluster Analysis..... | 2 |
| Table 2 | CFCA Station Count..... | 5 |
| Table 3 | CFCA Descriptive Statistics..... | 7 |
| Table 4 | Trend Types and Break Dates (Grouped by Trend Type)..... | 15 |
| Table 5 | 2P Station Trend Analysis Dates..... | 21 |
| Table 6 | Monotonic (M) Test Interpretation..... | 21 |
| Table 7 | Piecewise (P) and Monotonic Slope Change (MS) Test Interpretation..... | 22 |
| Table 8 | Double Piecewise (2P) Test Interpretation..... | 22 |
| Table 9 | Trend Single Period: Increasing Trends..... | 23 |
| Table 10 | Trend Single Period: Increasing Trend Stations..... | 23 |
| Table 11 | Trend Single Period: Decreasing Trends..... | 25 |
| Table 12 | Trend Single Period: Decreasing Trend Stations..... | 25 |
| Table 13 | Correlations Present: Single Time Lag..... | 27 |
| Table 14 | Correlations Present: 2 or More Time Lags..... | 28 |
| Table 15 | Statistically Significant Trends Based on Confidence Level..... | 29 |
| Table 16 | Statistically Significant Trends at an 80% Confidence Interval..... | 29 |
| Table 17 | Dry Season Trend Station Count..... | 32 |
| Table 18 | Dry Season Statistically Significant Decreasing Trends..... | 32 |
| Table 19 | Dry Season Statistically Significant Increasing Trends..... | 33 |
| Table 20 | Wet Season Trend Station Count..... | 35 |
| Table 21 | Wet Season Statistically Significant Decreasing Trends..... | 35 |
| Table 22 | Wet Season Statistically Significant Increasing Trends..... | 36 |
| Table 23 | Decreasing Period 1 Slope and Increasing Period 2 Slope..... | 40 |
| Table 24 | Increasing Period 1 Slope and Decreasing Period 2 Slope..... | 40 |
| Table 25 | Decreasing Period 1 Slope..... | 40 |
| Table 26 | Increasing Period 1 Slope..... | 41 |
| Table 27 | Decreasing Period 2 Slope..... | 41 |
| Table 28 | Increasing Period 2 Slope..... | 41 |
| Table 29 | No Statistically Significant Piecewise Trends..... | 42 |
| Table 30 | Trend Seasonal Piecewise Results..... | 43 |
| Table 31 | Trend Single Period Segment Results..... | 46 |
| Table 32 | Trend Analysis Summary..... | 47 |
| Table 33 | Statistically Significant Differences in the Means of the Two Periods..... | 51 |
| Table 34 | Statistically Significant Differences in the CDFs of the Two Periods..... | 52 |
| Table 35 | Recommended Cluster Analysis Periods..... | 56 |
| Table 36 | Available Stations by Year..... | 57 |
| Table 37 | Stations Omitted from Cluster Analysis..... | 59 |
| Table 38 | Station Type by Cluster..... | 63 |
| Table 39 | Mann Kendall Sen Slope by Cluster..... | 64 |
| Table 40 | Cluster 1 Mann Kendall Regression Results..... | 66 |
| Table 41 | Cluster 2 Mann Kendall Regression Results..... | 68 |
| Table 42 | Cluster 3 Mann Kendall Regression Results..... | 70 |

| | | |
|----------|---|-----|
| Table 43 | Cluster 4 Mann Kendall Regression Results..... | 71 |
| Table 44 | Lake Cluster 1..... | 75 |
| Table 45 | Lake Cluster 2..... | 76 |
| Table 46 | Lake Cluster 3..... | 77 |
| Table 47 | Lake Cluster 4..... | 78 |
| Table 48 | Surficial Well Cluster 1..... | 82 |
| Table 49 | Surficial Well Cluster 2..... | 83 |
| Table 50 | Intermediate and Floridan Well Cluster 1..... | 88 |
| Table 51 | Intermediate and Floridan Well Cluster 2..... | 89 |
| Table 52 | Intermediate and Floridan Well Cluster 3..... | 90 |
| Table 53 | Intermediate and Floridan Well Cluster 4..... | 91 |
| Table 54 | Spring Clusters 1 and 2..... | 93 |
| Table 55 | Rainfall Clusters 1 and 2..... | 95 |
| Table 56 | AHCA 1960-2008 Cluster Membership and Mann Kendall Results..... | 102 |

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 |

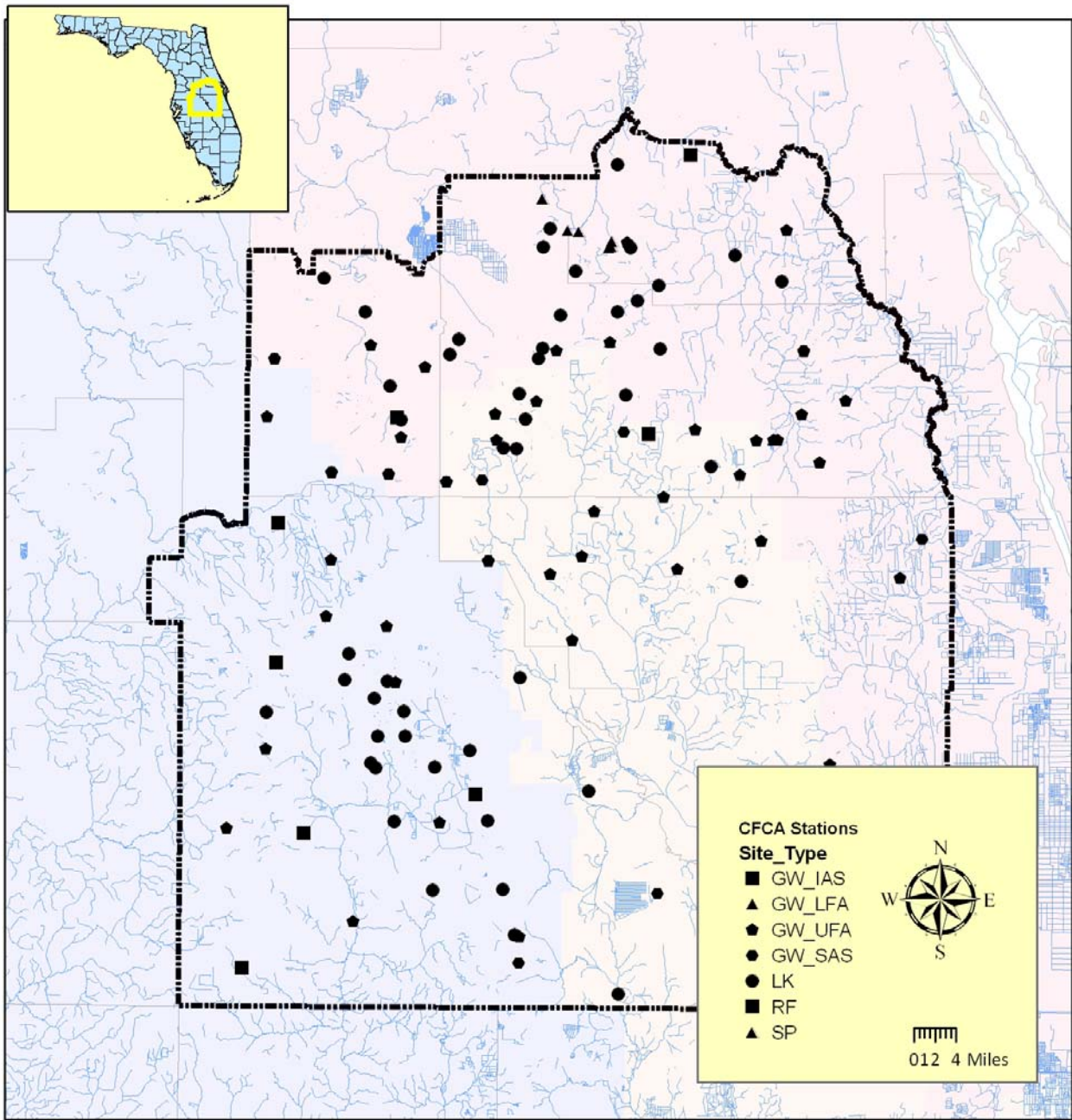


Figure 1 Stations of Study within the Central Florida Coordination Area (CFCA)

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 |

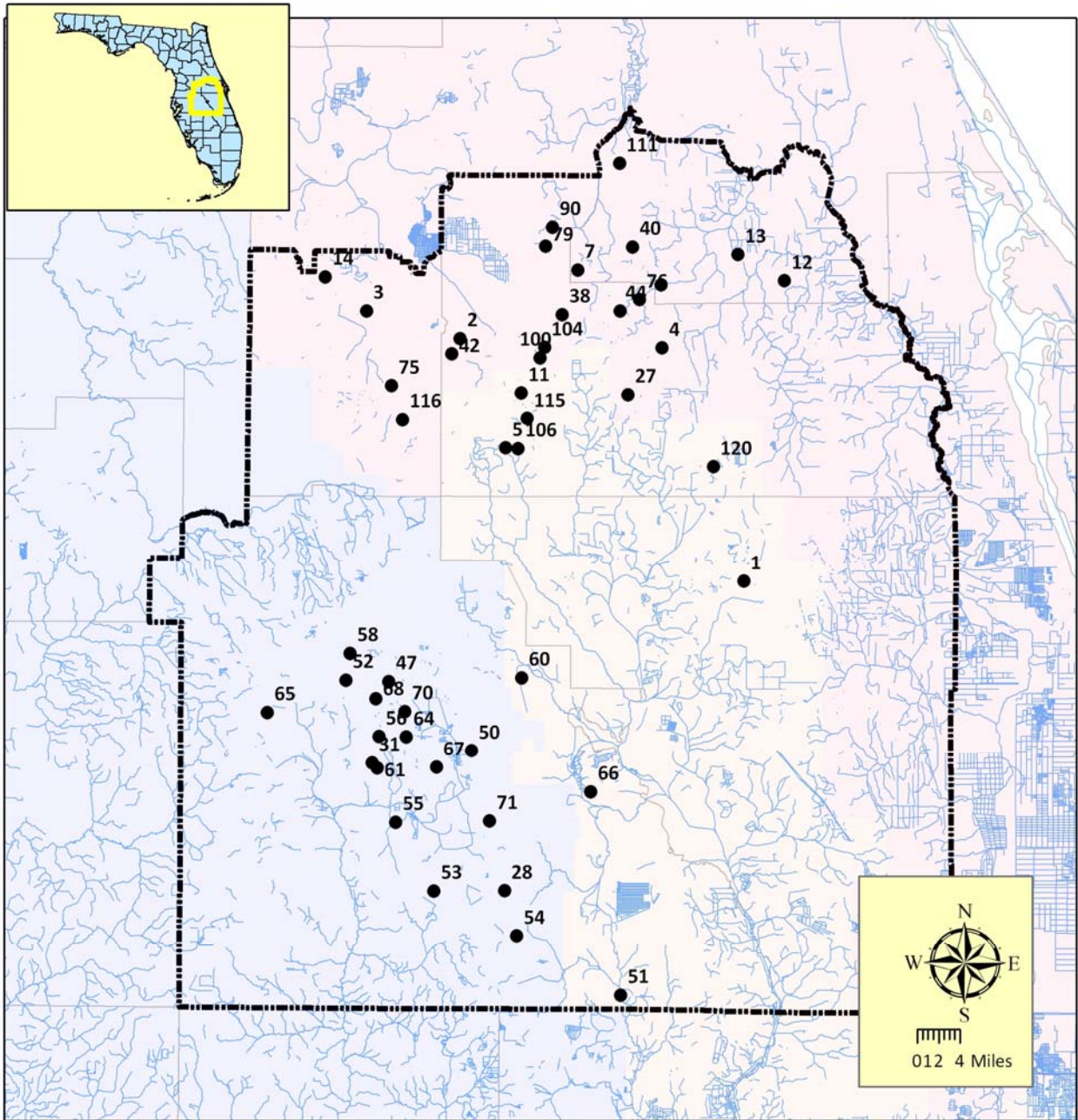


Figure 2 CFCALakes

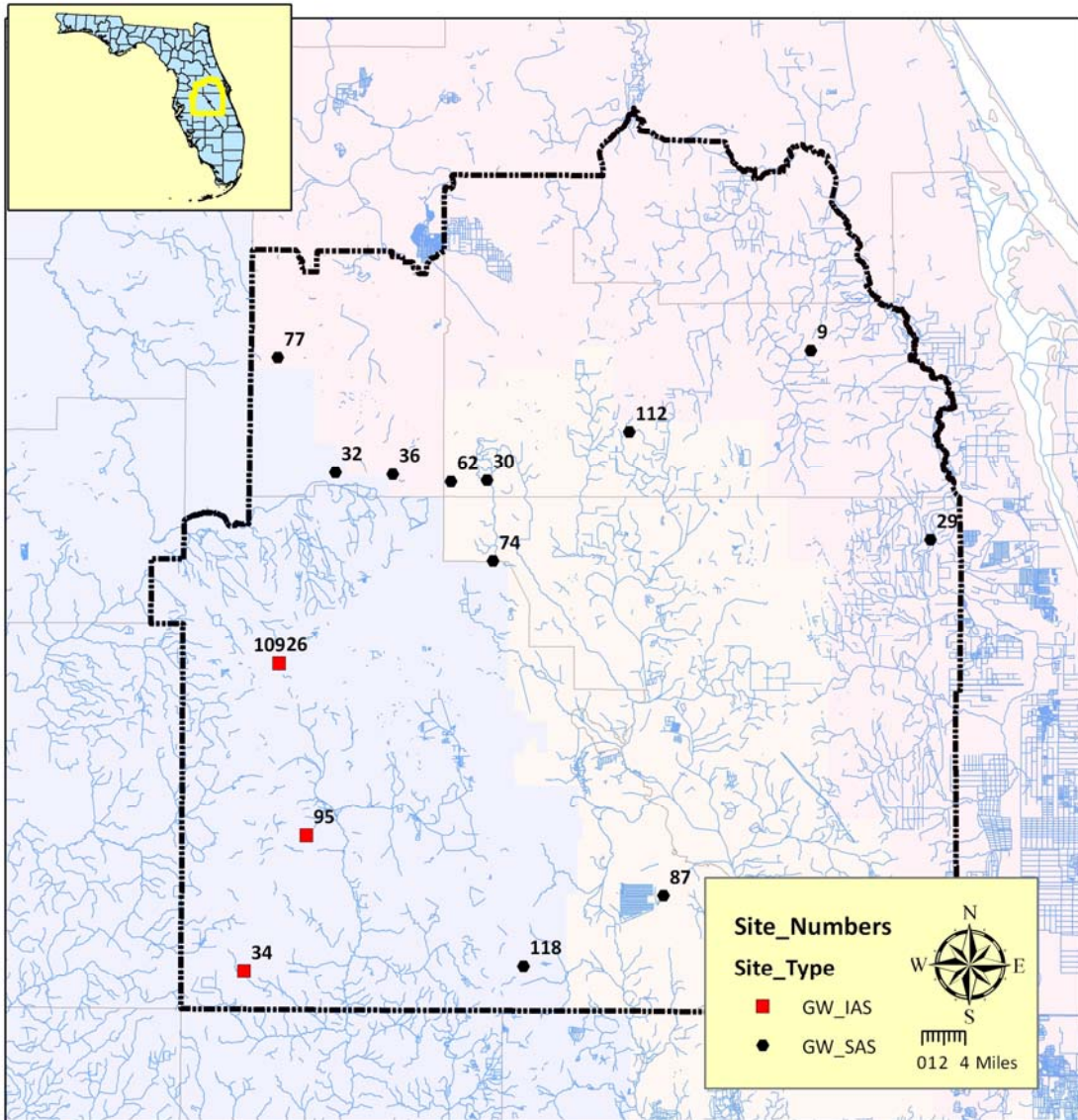


Figure 3 CFCAs Surficial and Intermediate Wells

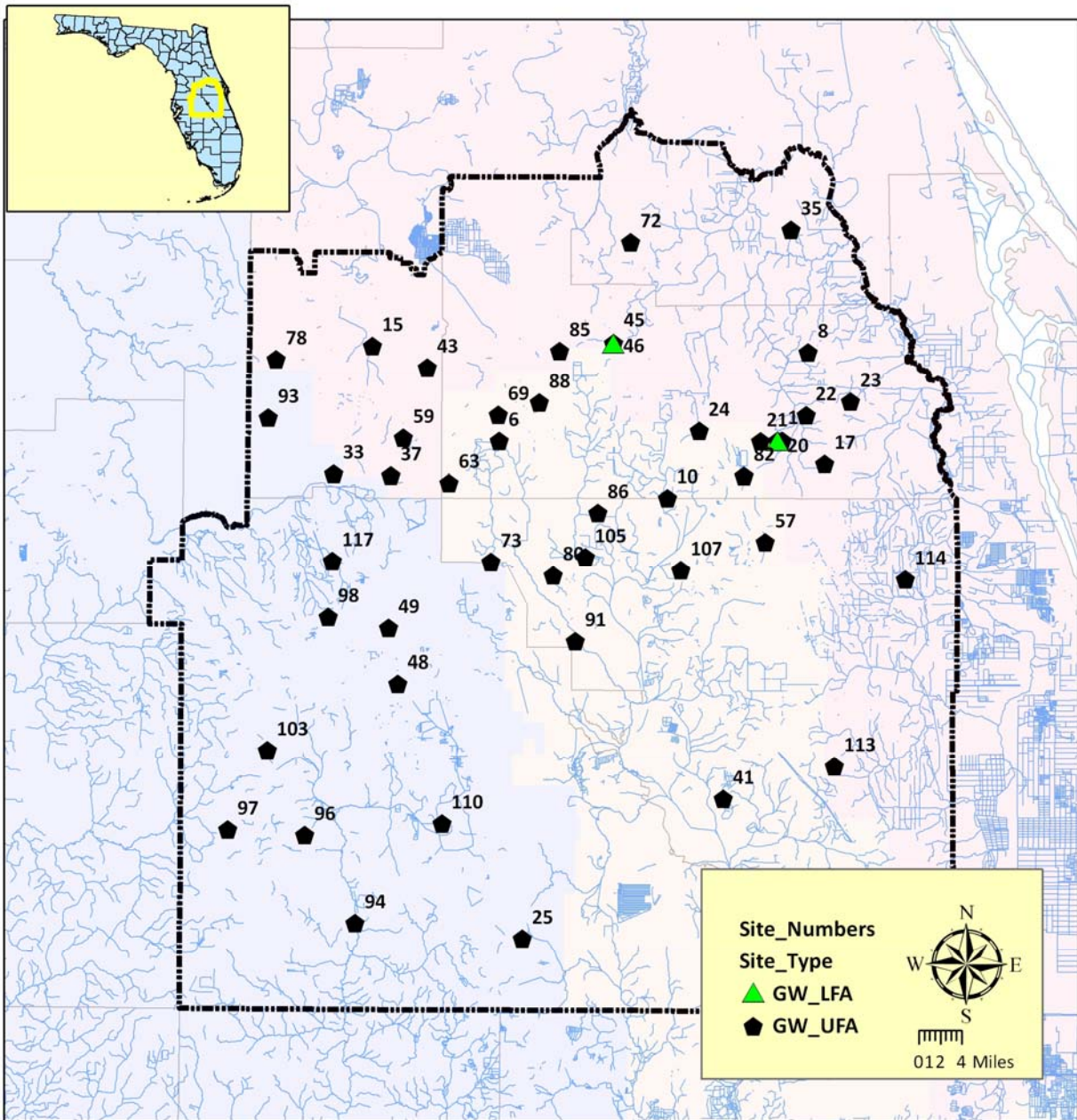


Figure 4 CFCFA Upper and Lower Floridan Wells

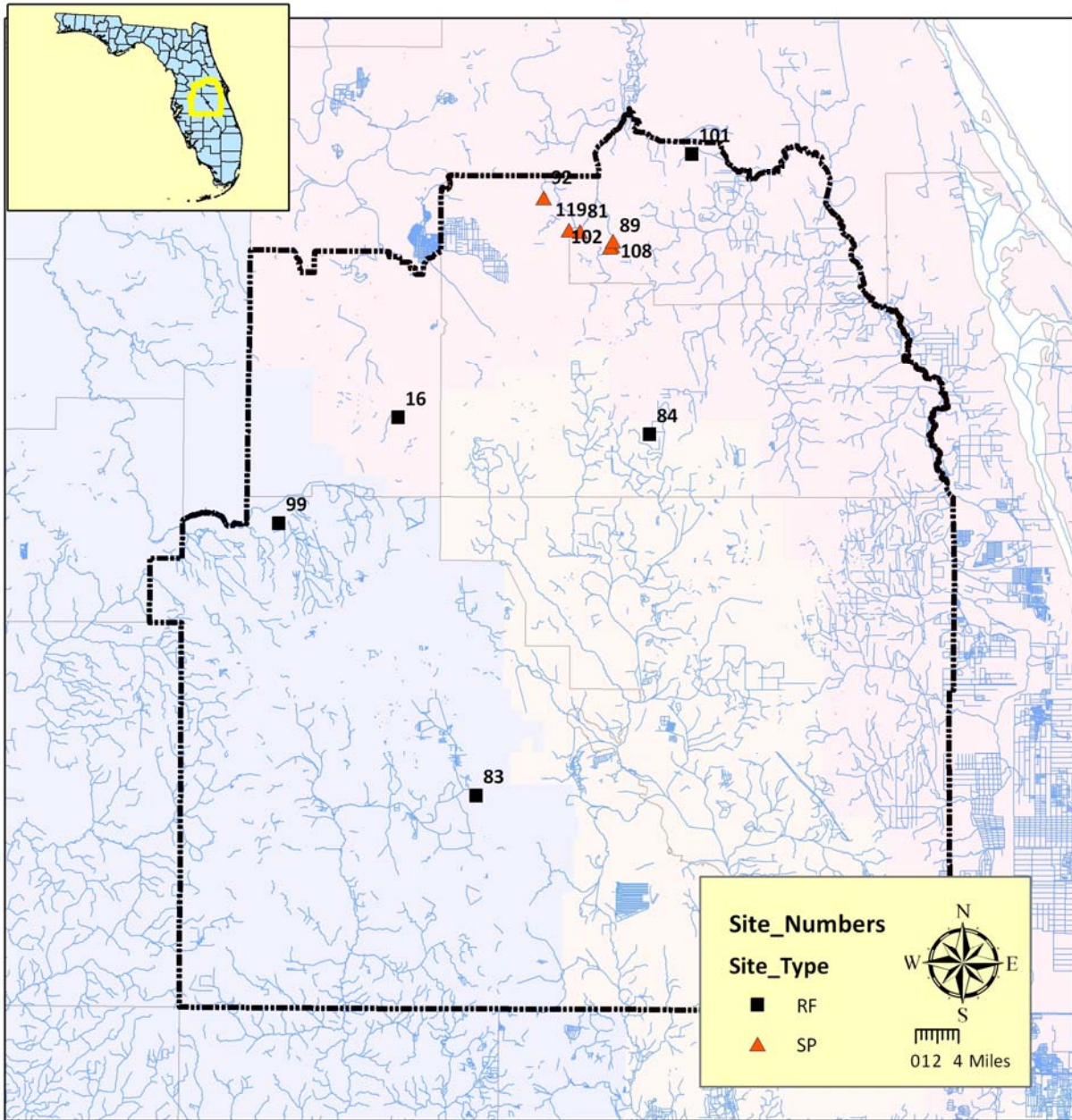


Figure 5 CFA Spring and Rainfall Stations

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 versa) 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 | |

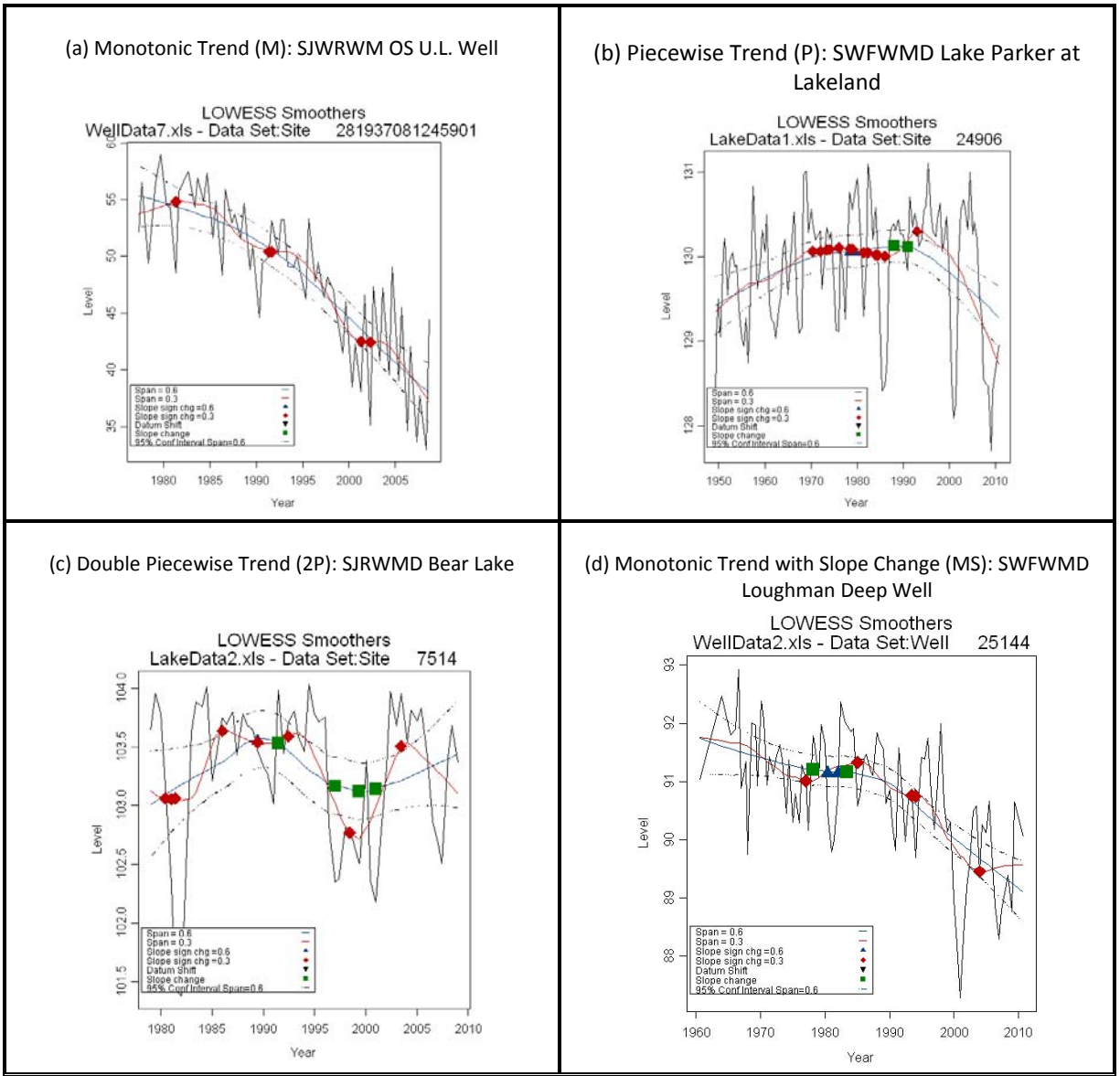


Figure 6 LOWESS Examples

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 H_0
 - otherwise: Fail to reject H_0

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.

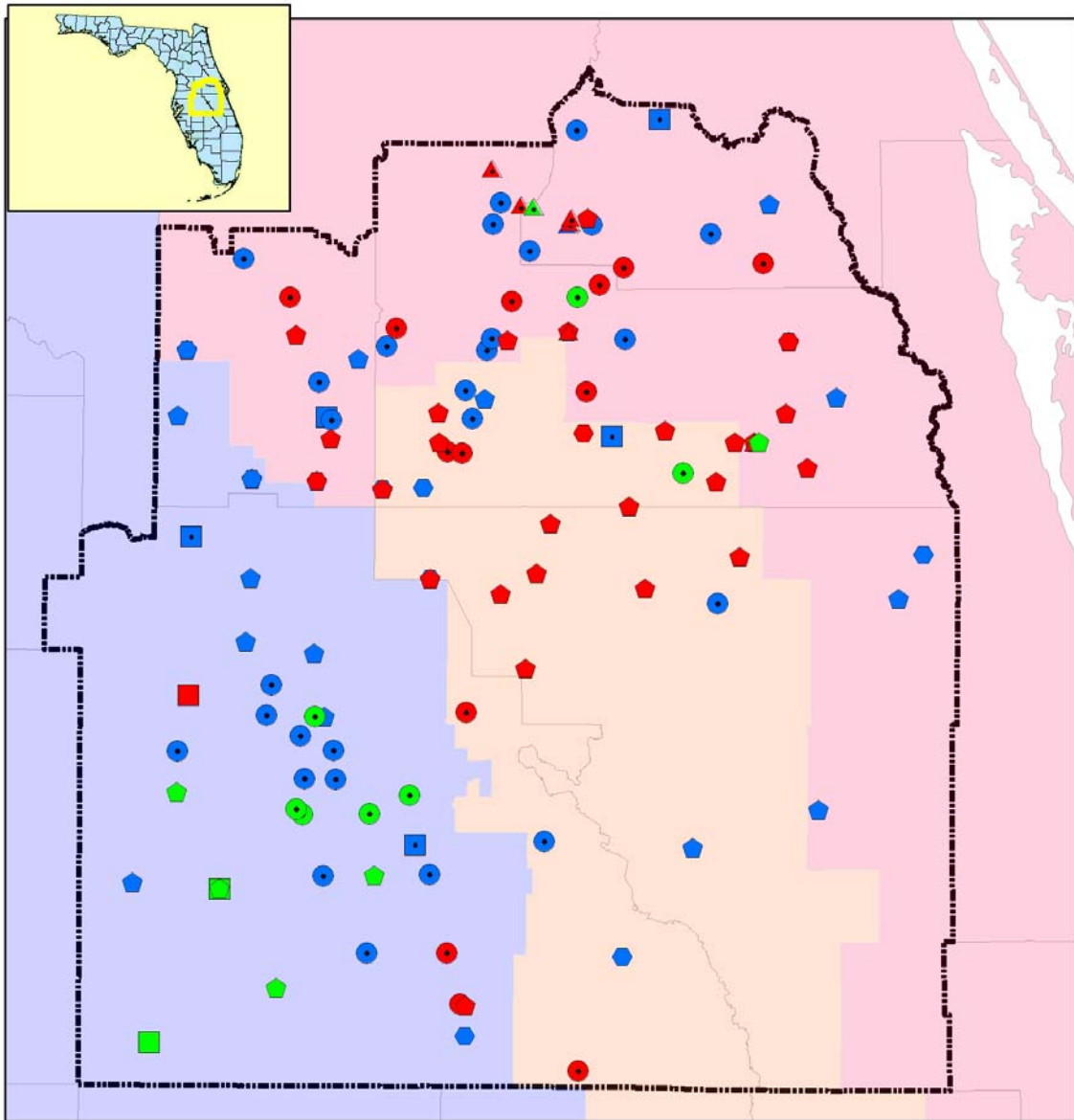
As shown in the Figure 7, a high percentage of the stations exhibiting increasing trends are located in the SWFWMD domain. Historically, withdrawals associated with phosphate mining have been located in the southwestern portion of Polk County. Since the 1970s, the phosphate industry has reduced their 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 |



| Trend Single Period: Increasing Trends | | Trend Single Period: Decreasing Trends | | Trend Single Period: No Trends | |
|---|---|--|--|--------------------------------|--|
| Site_Type | | Site_Type | | Site_Type | |
| ■ GW_IAS | ■ GW_IAS | ■ GW_IAS | | | |
| ▲ GW_LFA | ▲ GW_LFA | ▲ GW_LFA | | | |
| ◆ GW_UFA | ◆ GW_UFA | ◆ GW_UFA | | | |
| ● GW_SAS | ● GW_SAS | ● GW_SAS | | | |
| ○ LK | ○ LK | ○ LK | | | |
| ■ RF | ■ RF | ■ RF | | | |
| ▲ SP | ▲ SP | ▲ SP | | | |

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 Single 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 $(\alpha + 1)$, and Time $(\alpha + 1)$ is correlated to Time $(\alpha + 2)$, then Time $(\alpha + 2)$ 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 16 and 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 |

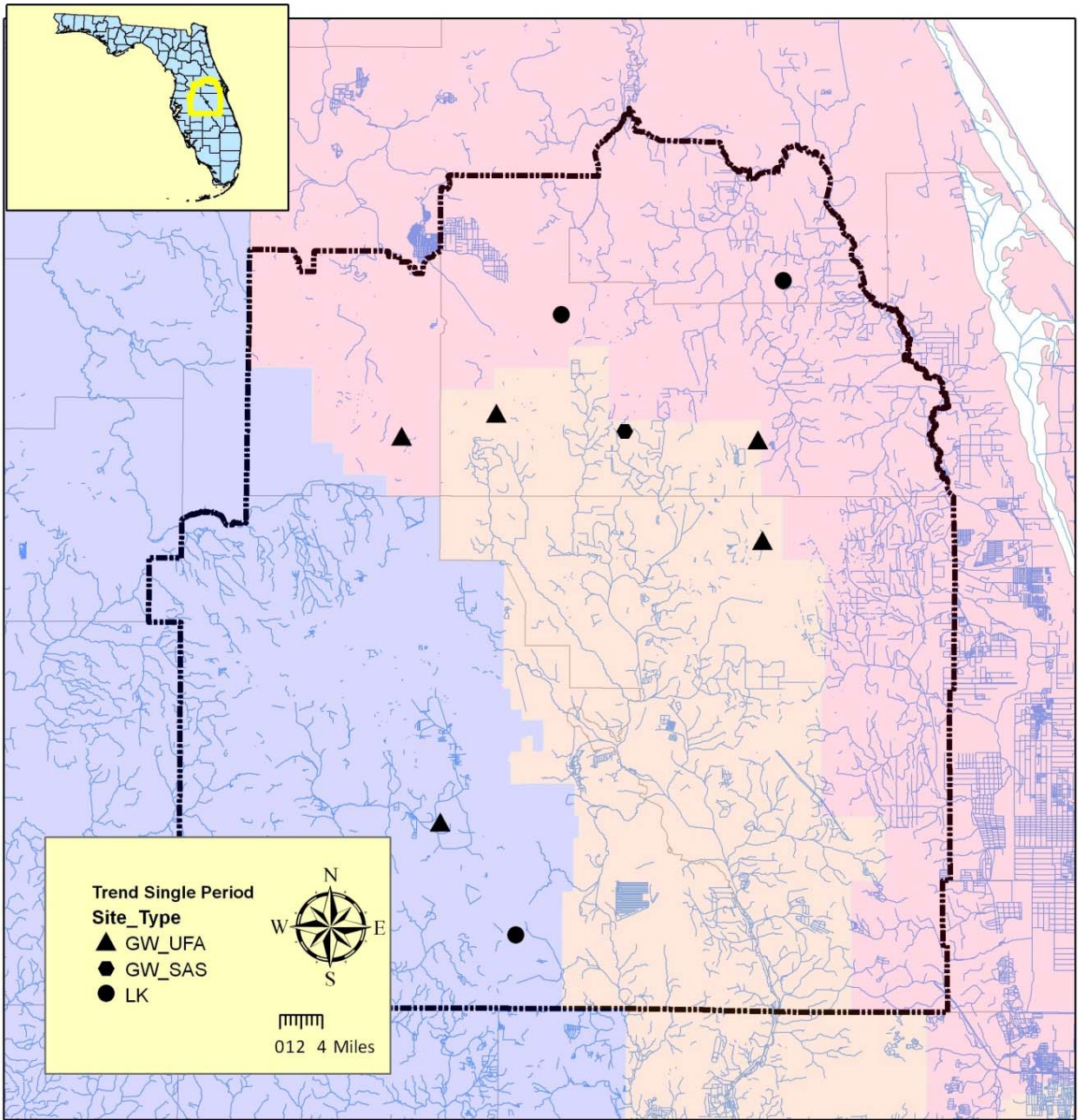


Figure 8 Statistically Significant Trends at an 80% Confidence Interval

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 (α) 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 α 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 α 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 |

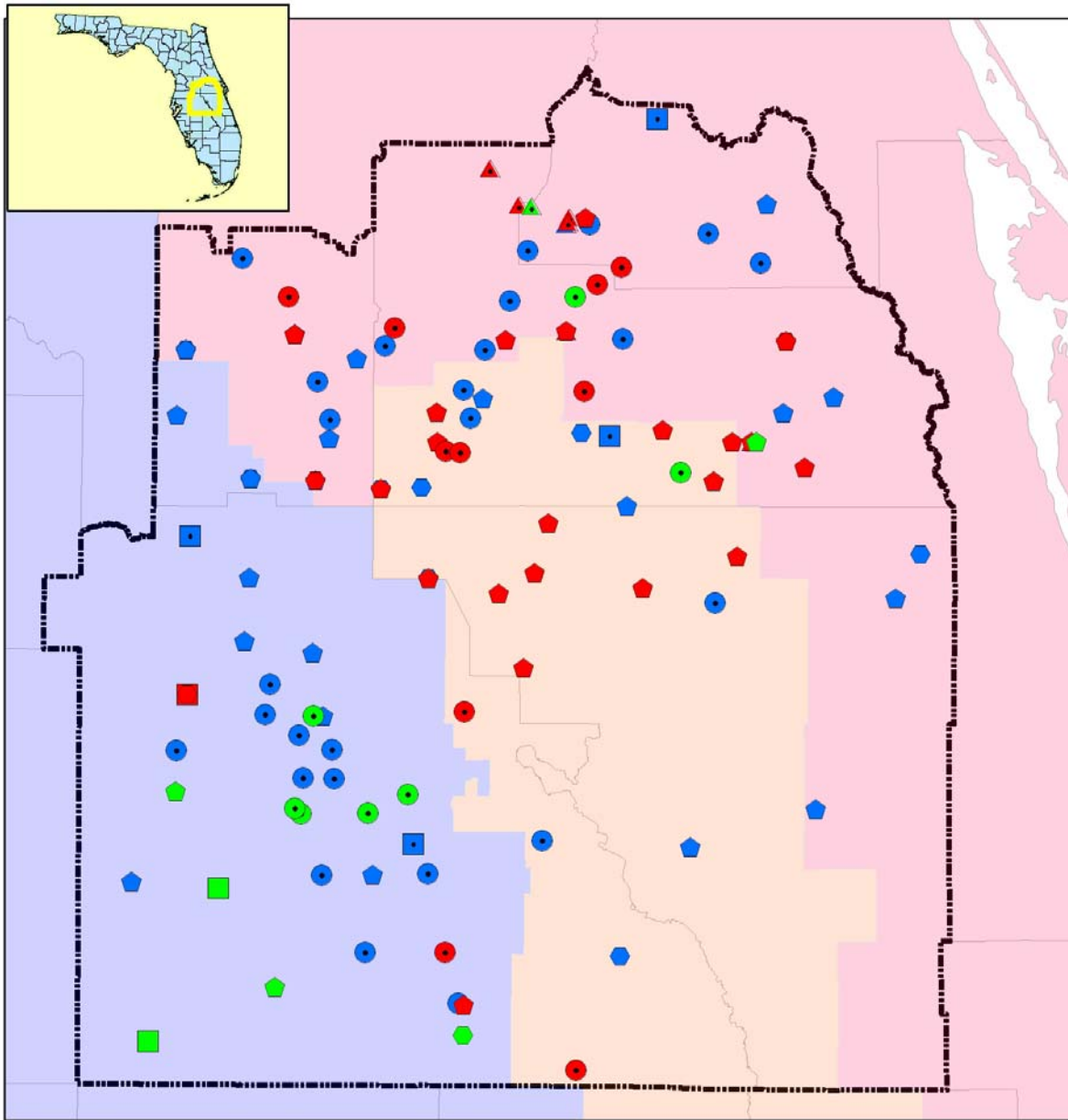


Figure 9 Statistically Significant Trends: Dry Season

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 (SFWM) 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 |

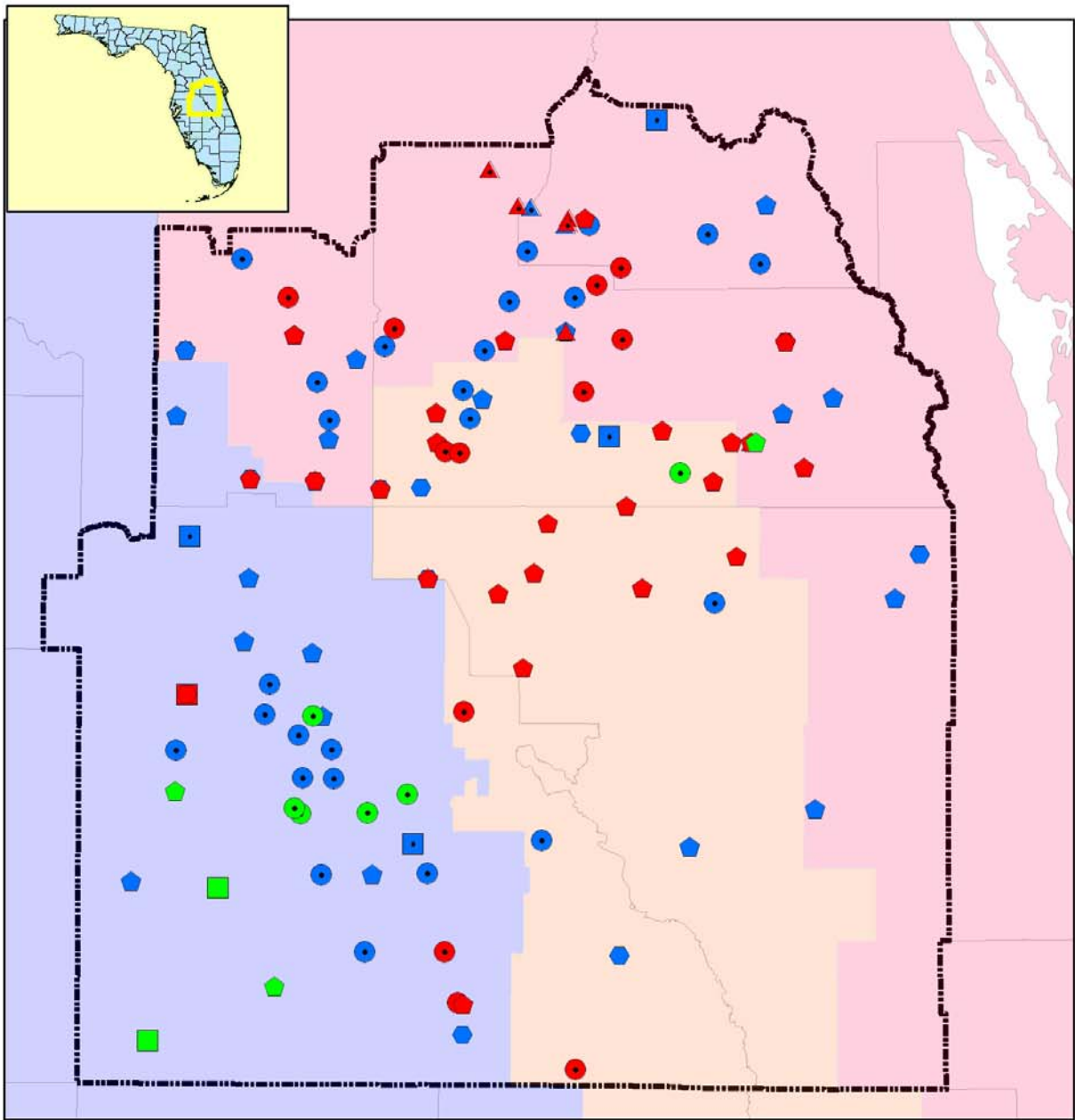


Figure 10 Statistically Significant Trends: Wet Season

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

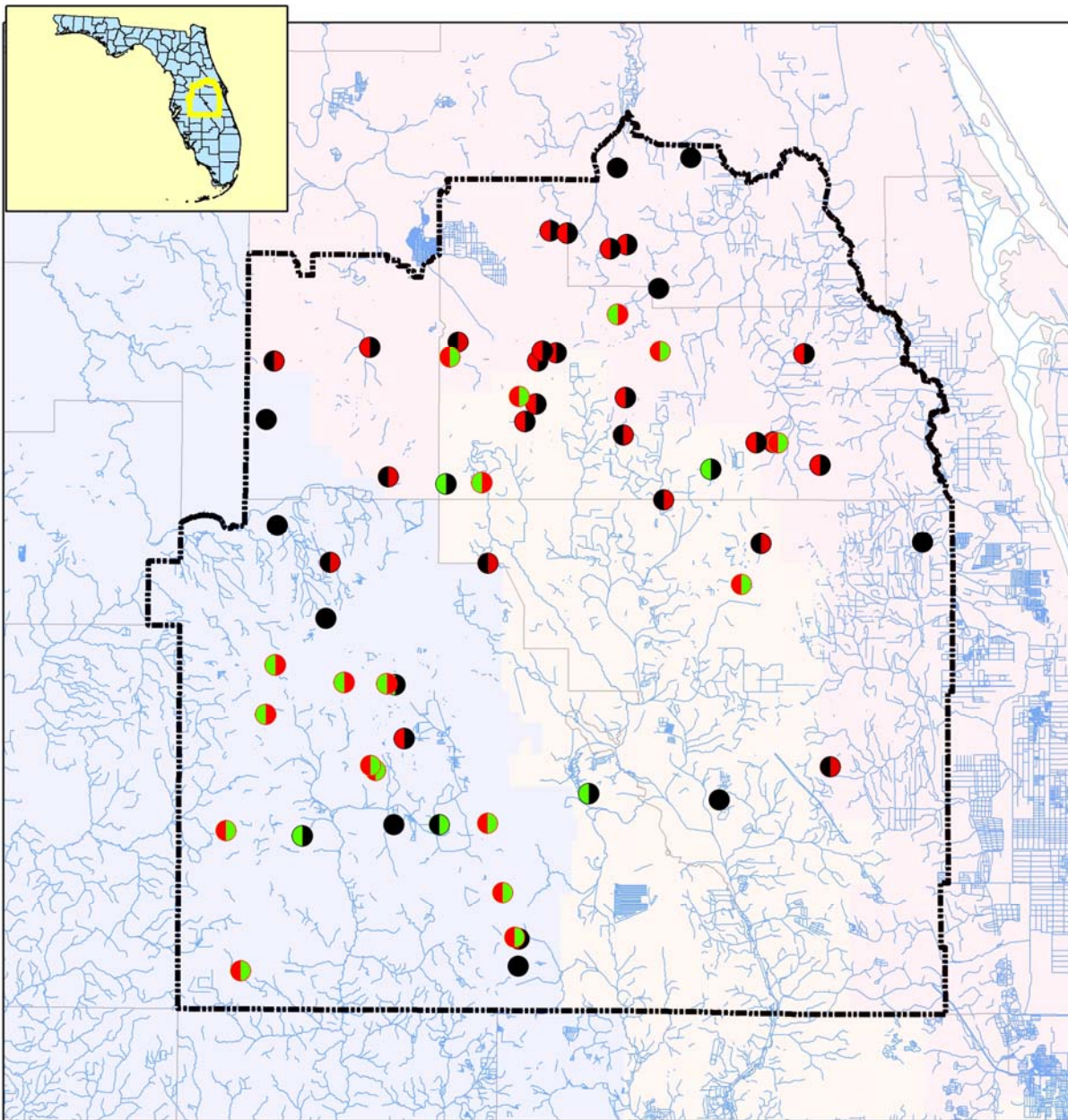
Ten (10) stations exhibited high statistical likelihoods of a decreasing trend beginning after the break date shown in Table 27.

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.



- ● Decreasing Period 1 and Increasing Period 2 Trends
- ● Increasing Period 1 and Decreasing Period 2 Trends
- Decreasing Period 1 Trends
- Increasing Period 1 Trends
- ● Decreasing Period 2 Trends
- ● Increasing Period 2 Trends
- No Piecewise Trend



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 Bonferroni 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 Bonferroni 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.

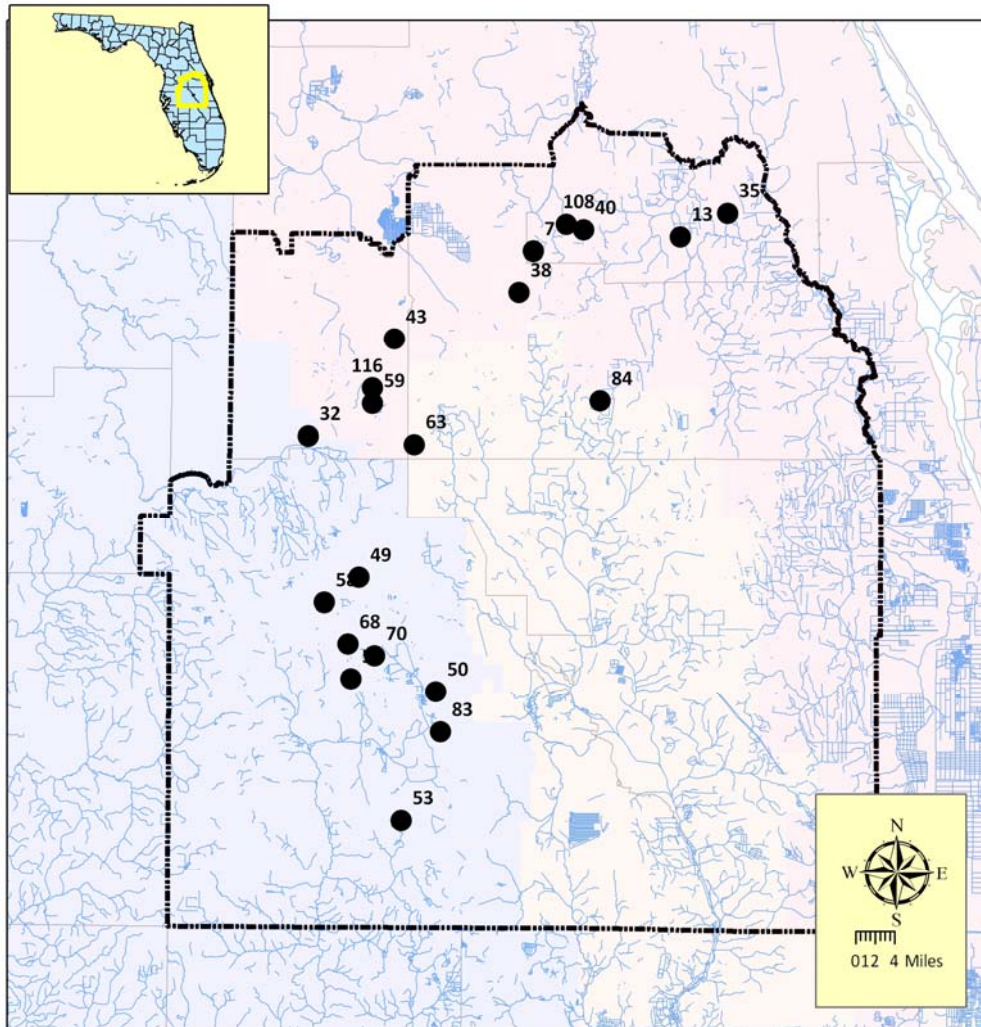


Figure 12 Stations with 2 Break Points

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_stat | 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:

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

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.

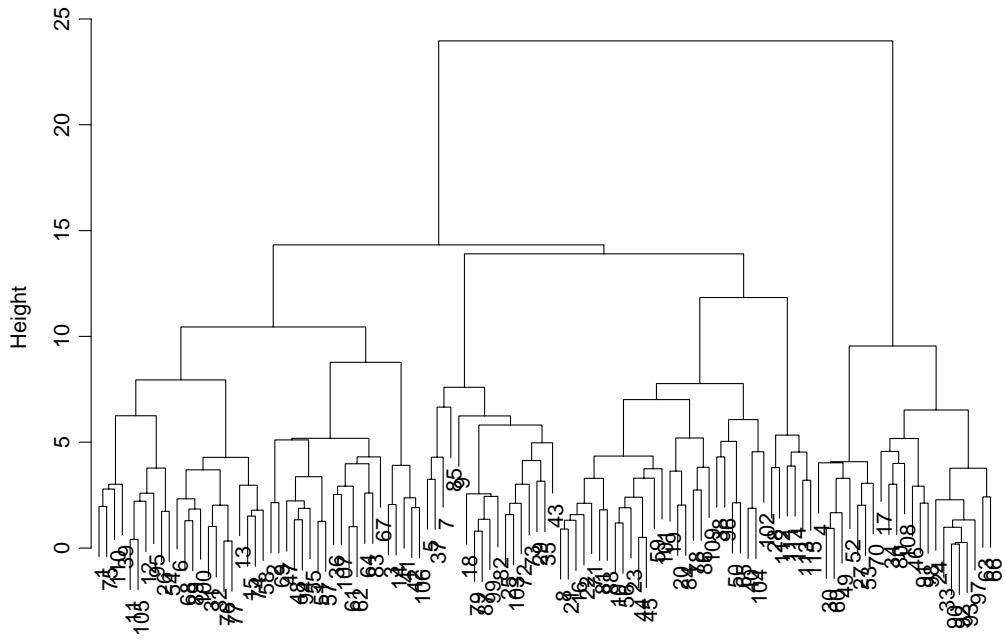


Figure 13 AHCA Dendrogram, All Stations

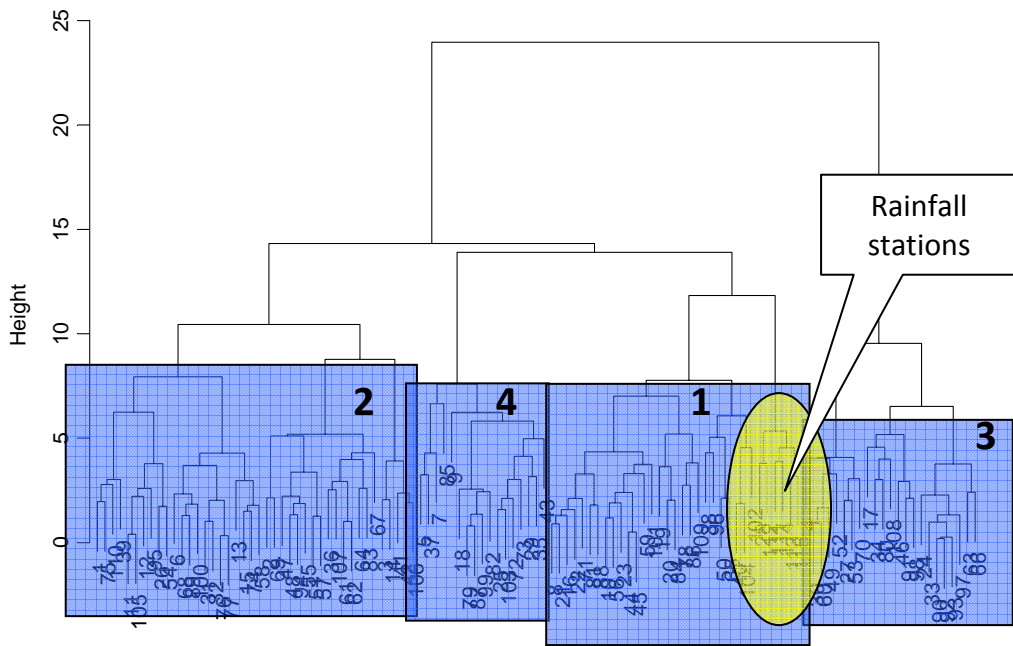


Figure 14 AHCA Dendrogram, All Stations (with Clusters)

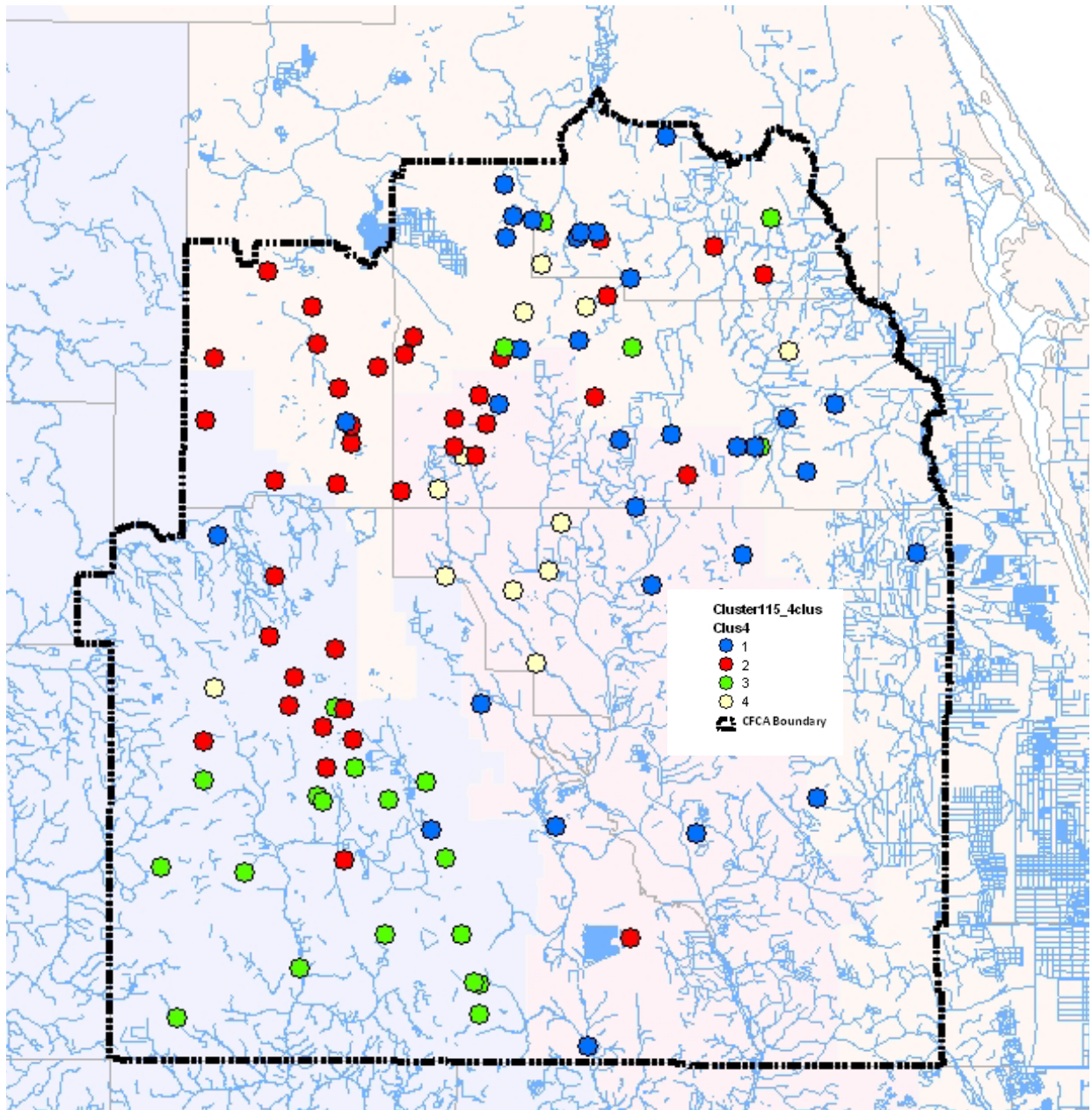


Figure 15 AHCA Spatial Associations, All Stations

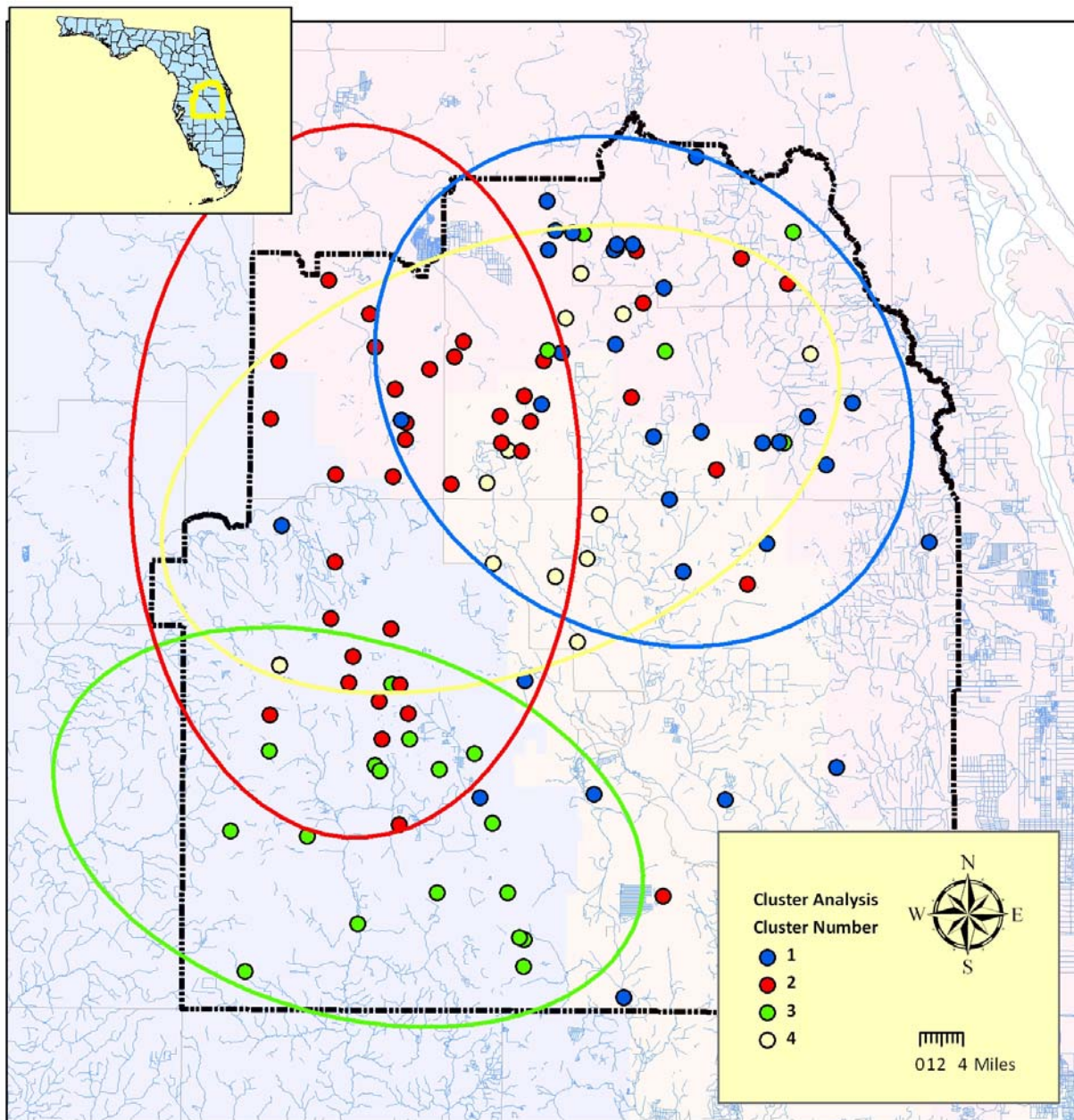


Figure 16 AHCA Spatial Associations with Ellipses, All Stations

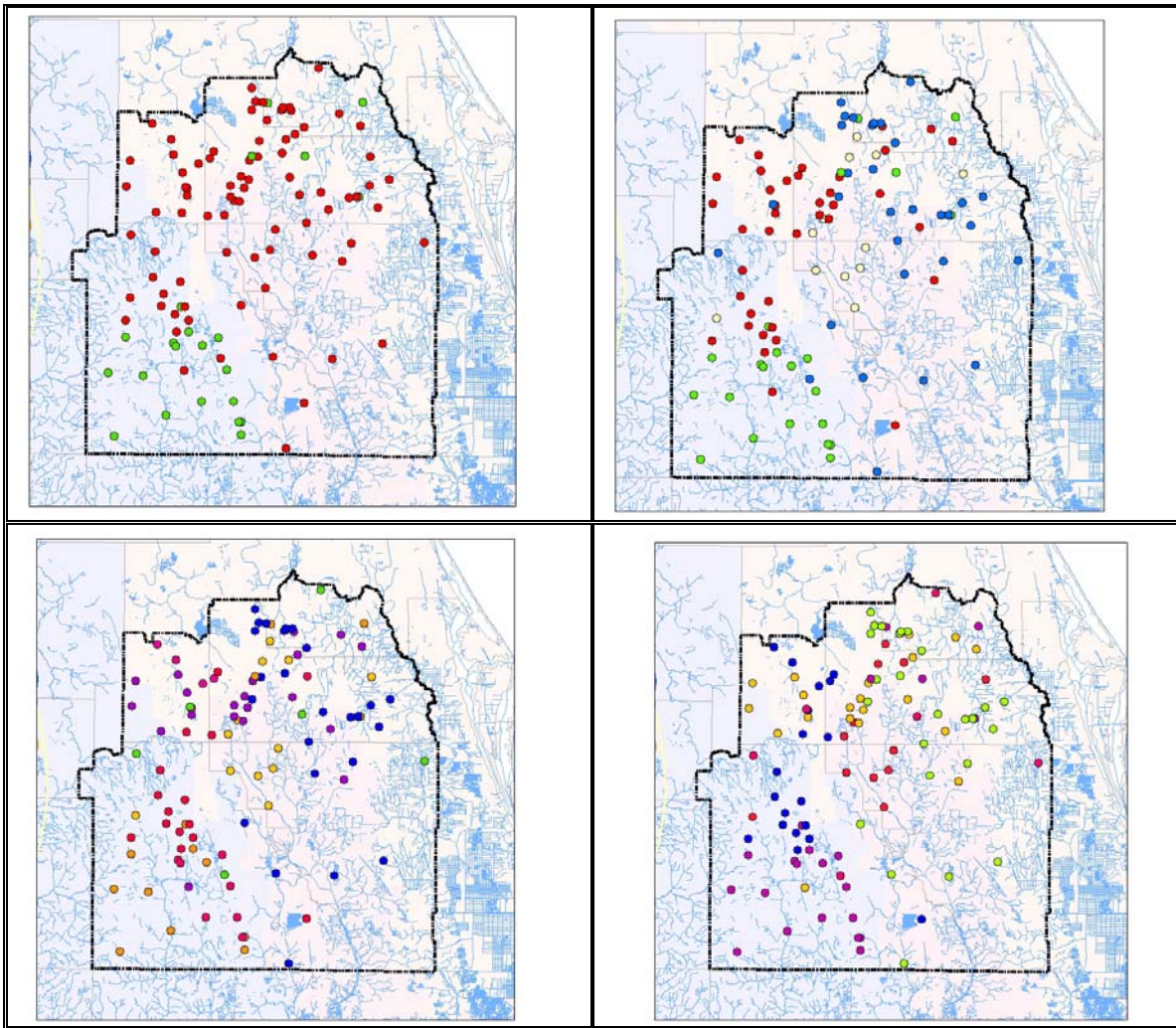


Figure 17 AHCA Results: 2 Clusters, 4 Clusters, 6 Clusters, 8 Clusters

Table 38 Station Type by Cluster

| Site Type | Cluster Number | | | |
|--------------|----------------|-----------|-----------|-----------|
| | 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

| Site Type | Cluster Number | | | |
|-----------|----------------|---------|---------|---------|
| | 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.

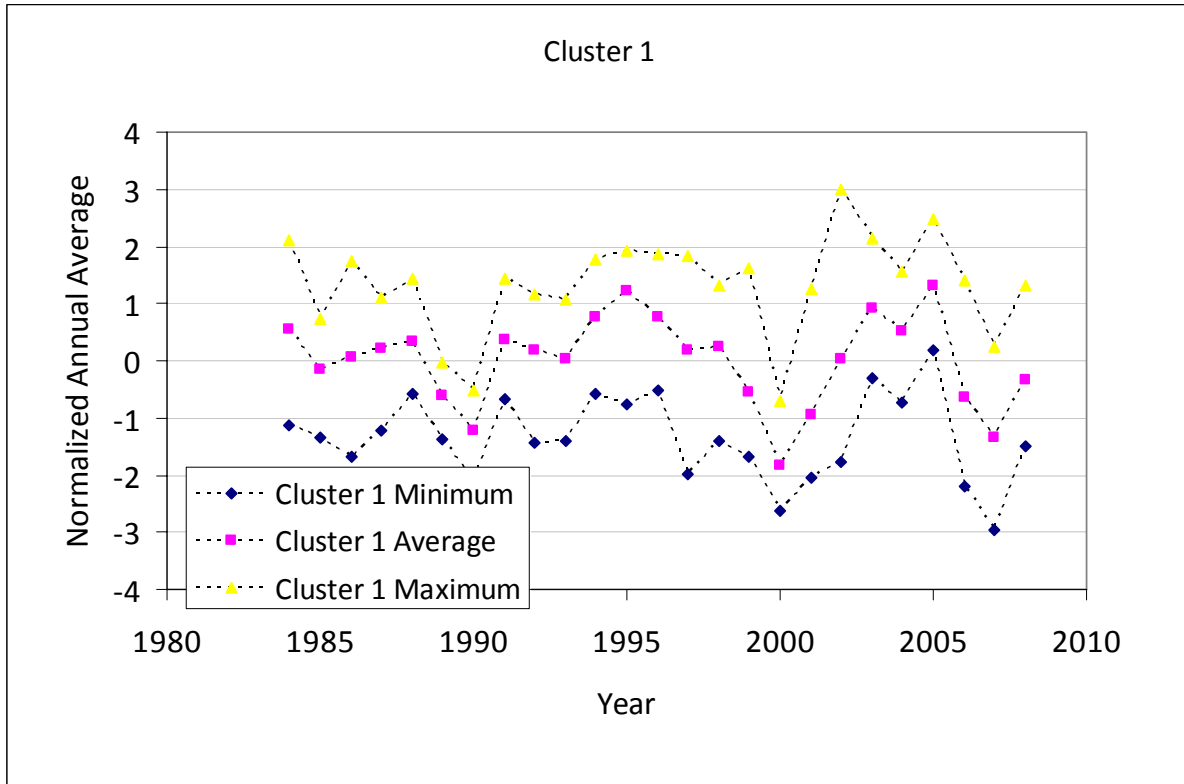


Figure 18 Cluster 1 Normalized Annual Averages

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 |

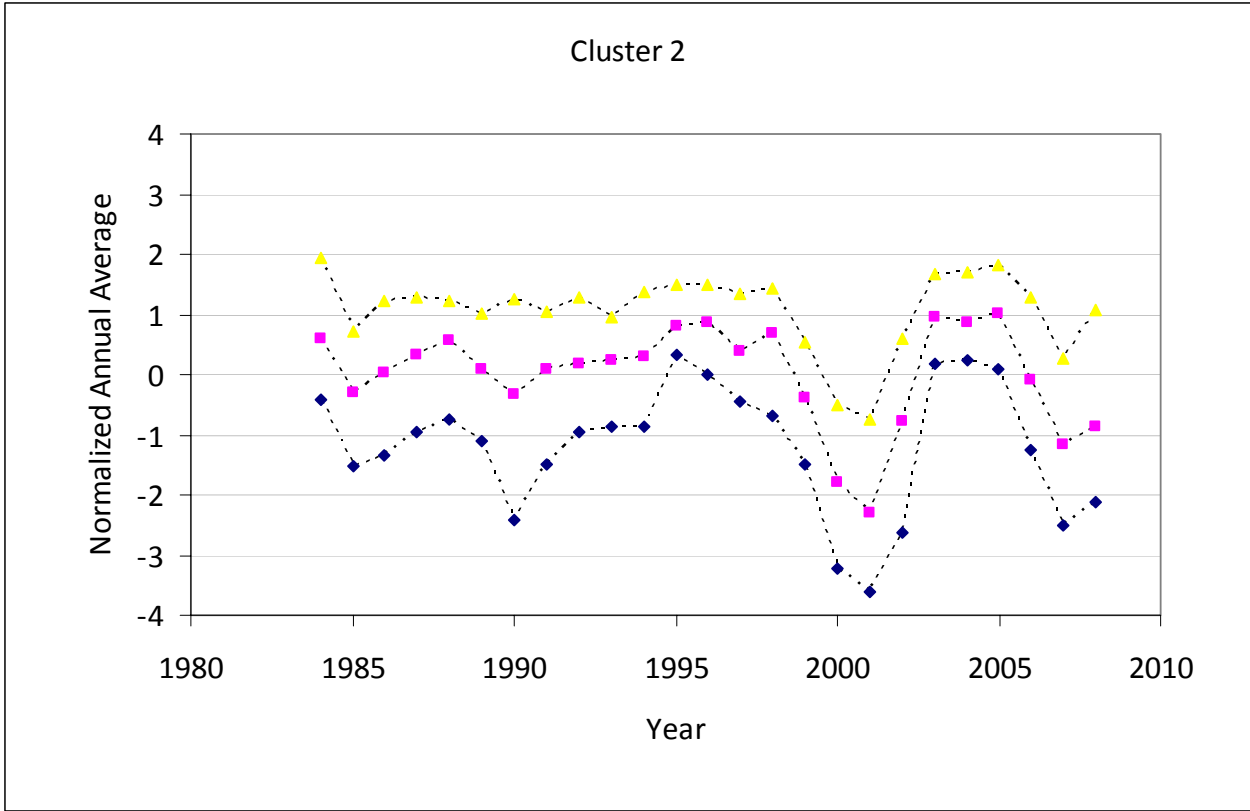


Figure 19 Cluster 2 Normalized Annual Averages

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)

| Dendrogram 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.

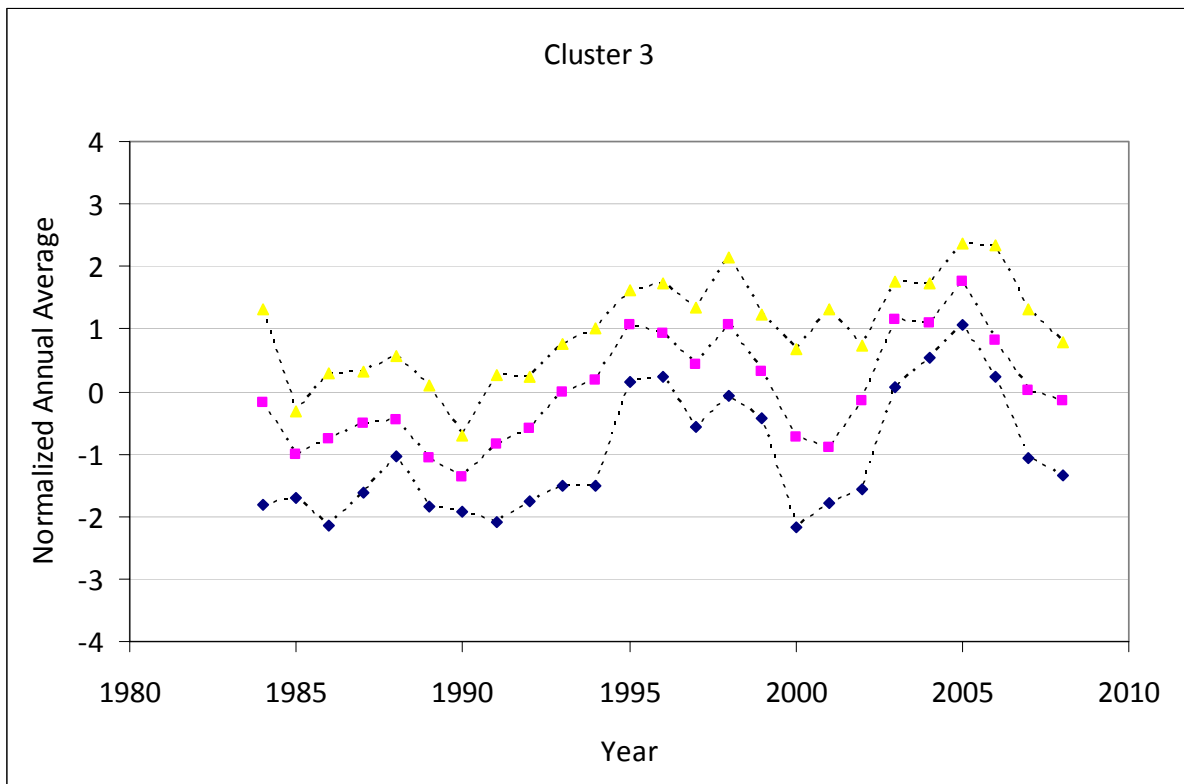


Figure 20 Cluster 3 Normalized Annual Averages

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)

| Dendrogram 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.

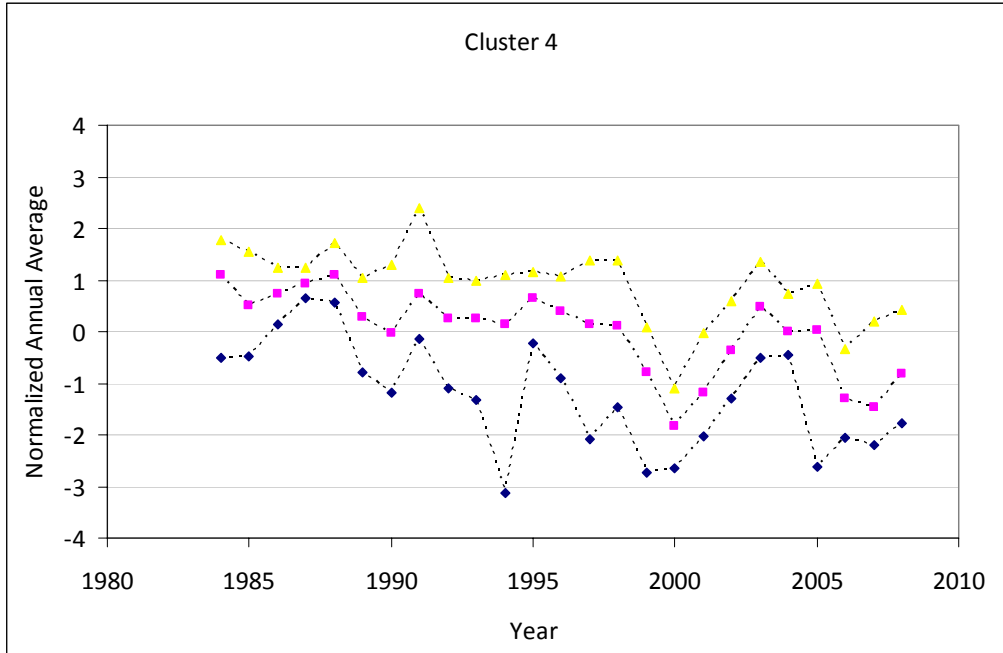


Figure 21 Cluster 4 Normalized Annual Averages

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.

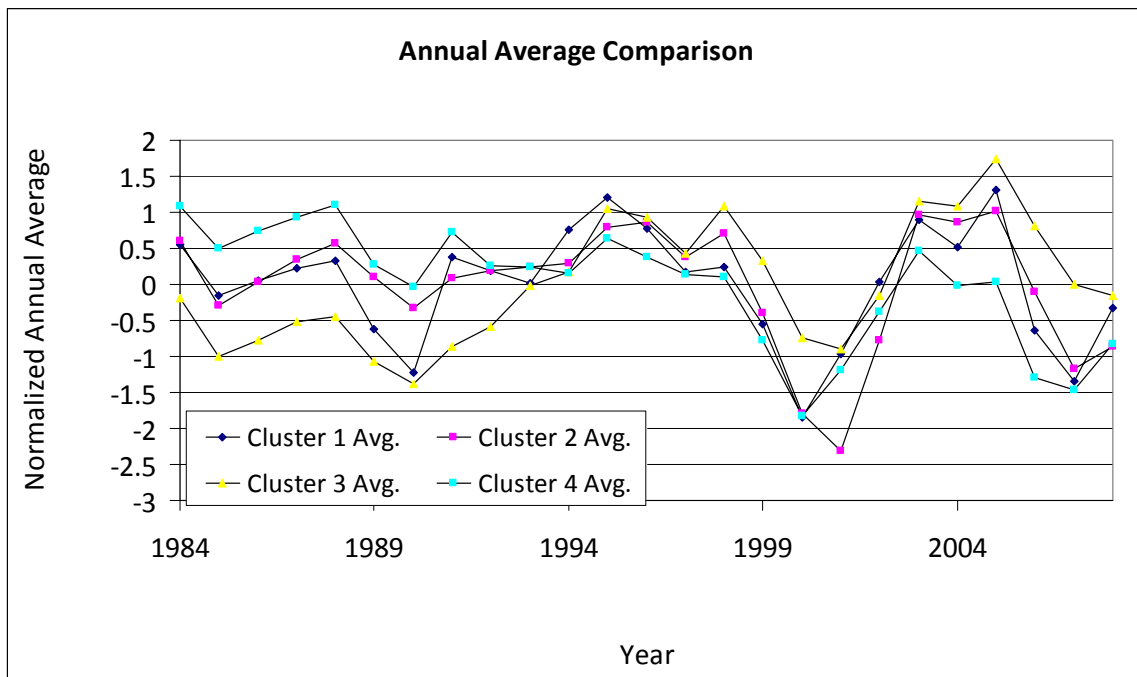


Figure 22 AHCA Annual Average Comparison

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.

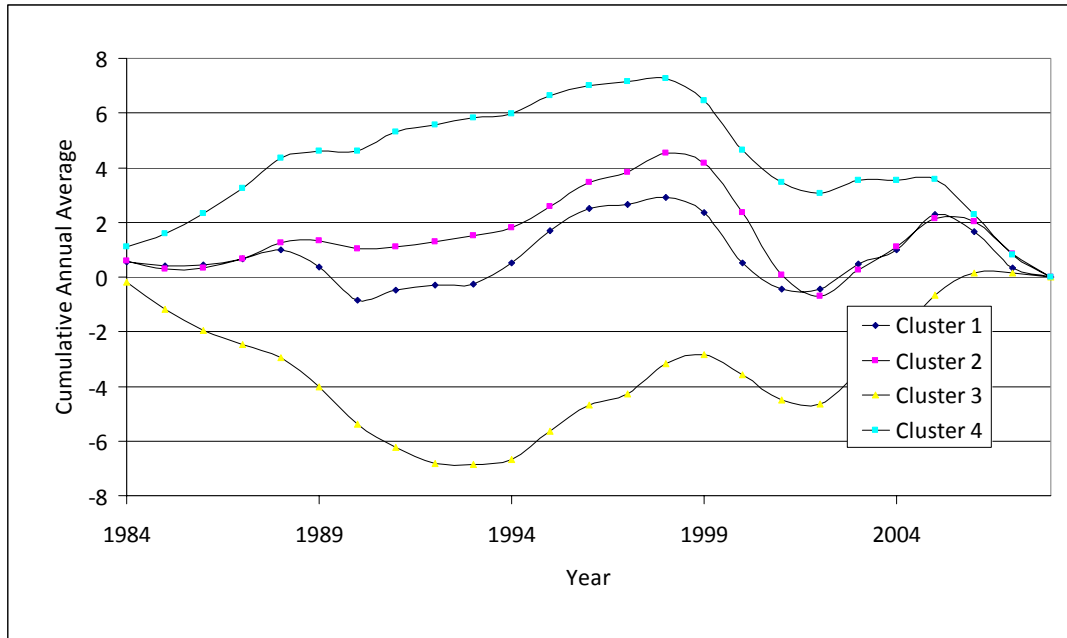


Figure 23 AHCA Cumulative Annual Average Comparison

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 dendrogram. 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.

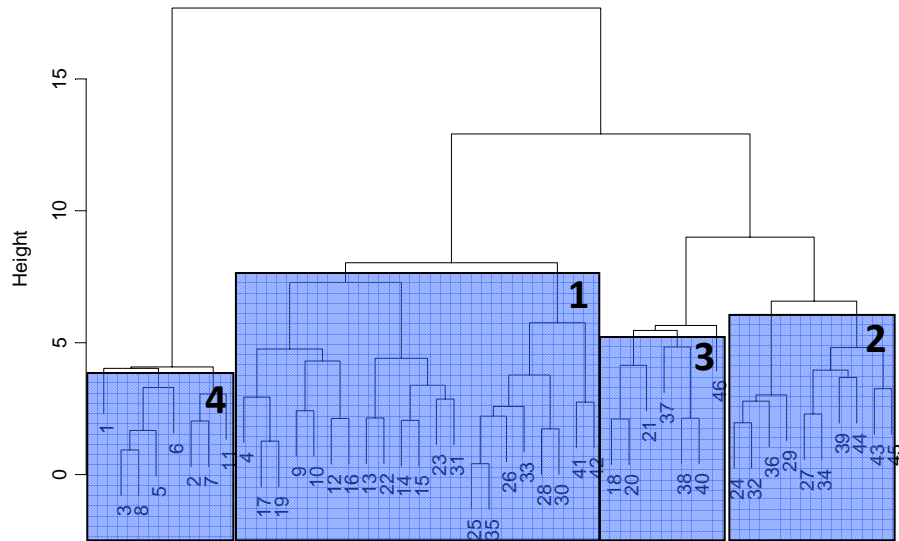


Figure 24 AHCA Dendrogram, Lakes

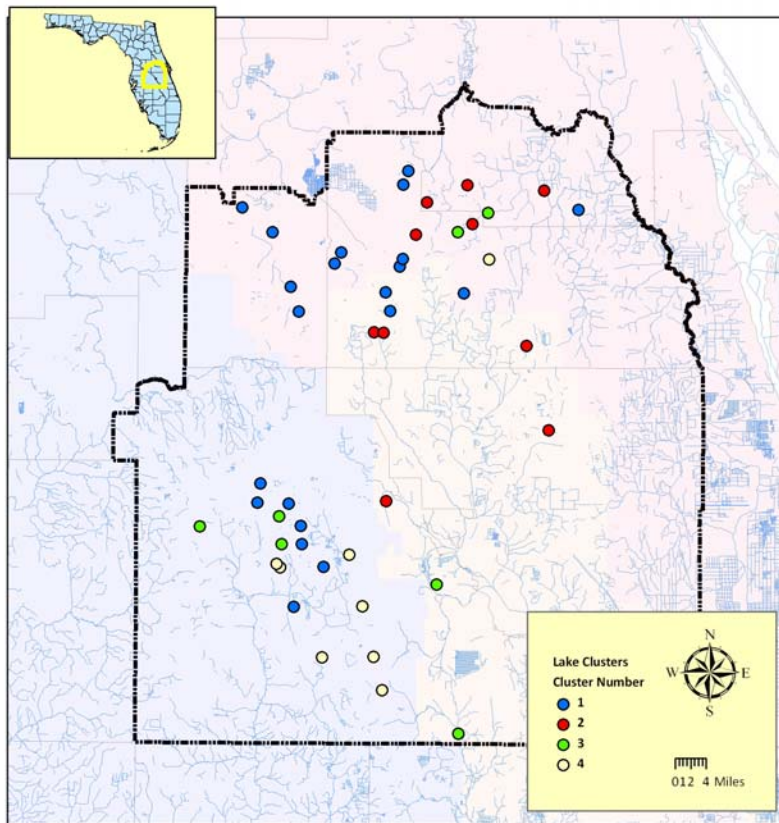


Figure 25 AHCA Spatial Associations, Lakes

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 |

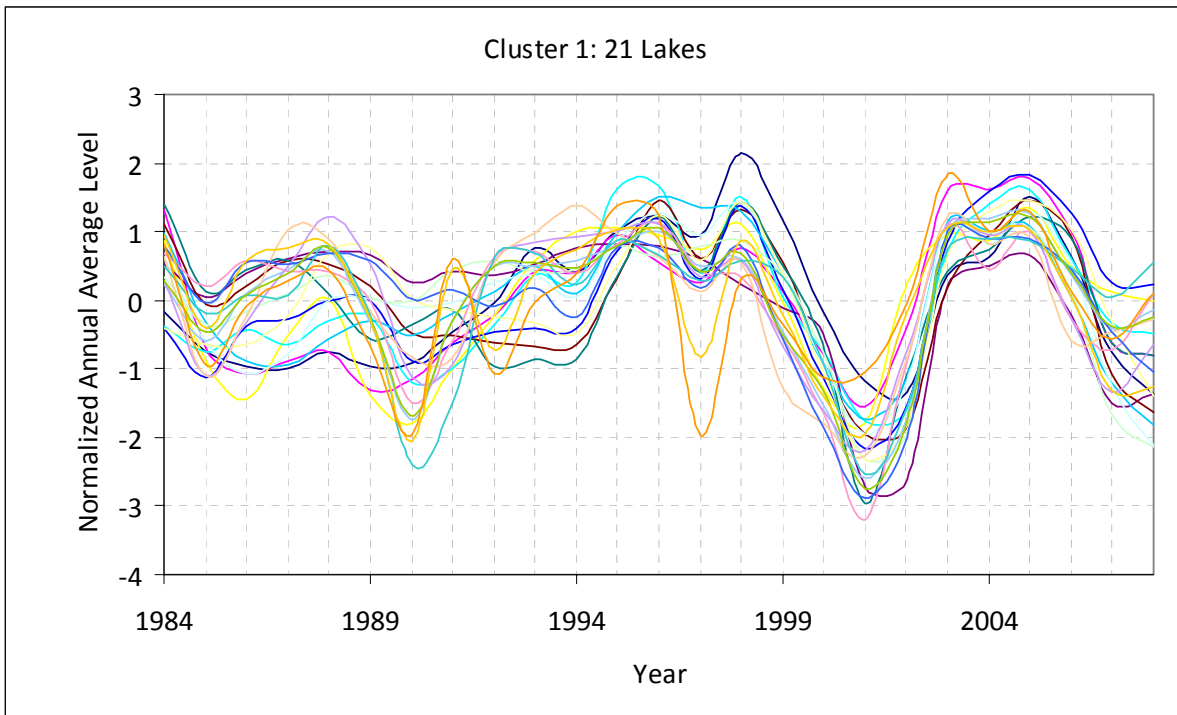


Figure 26 Lake Cluster 1 Normalized Annual Averages

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 |

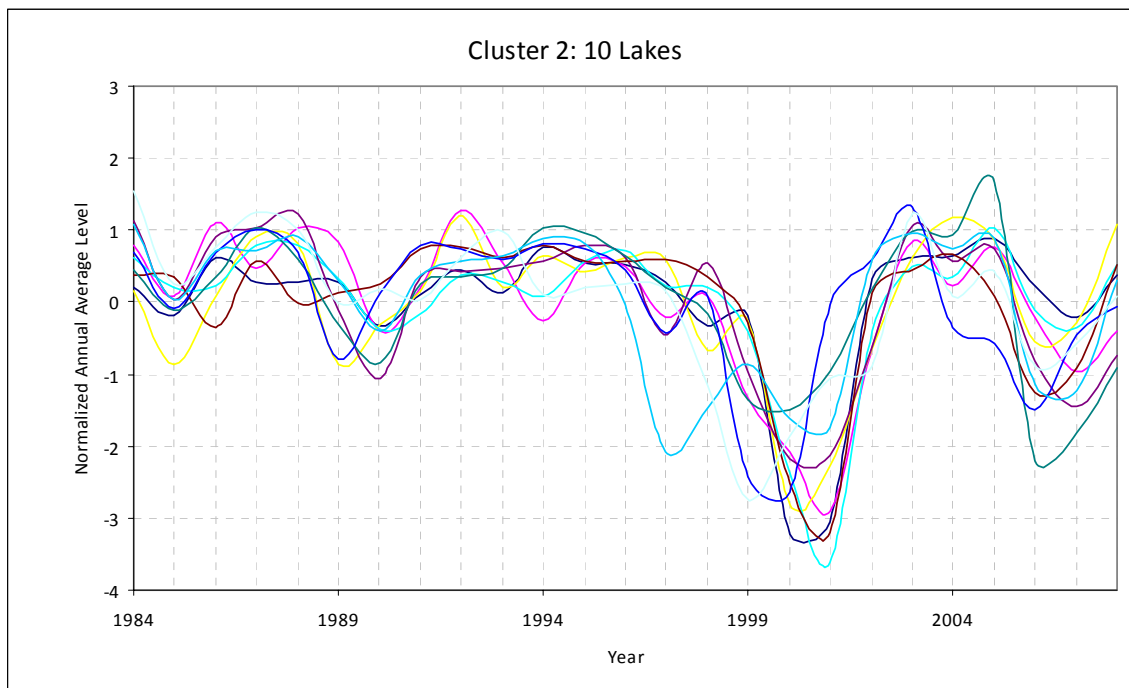


Figure 27 Lake Cluster 2 Normalized Annual Averages

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 |

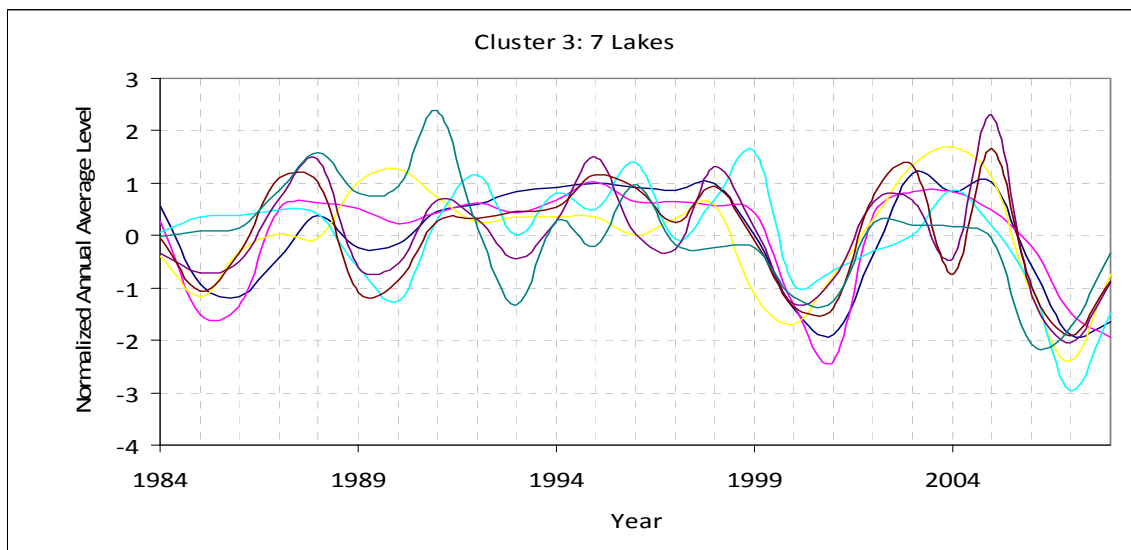


Figure 28 Lake Cluster 3 Normalized Annual Averages

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 |

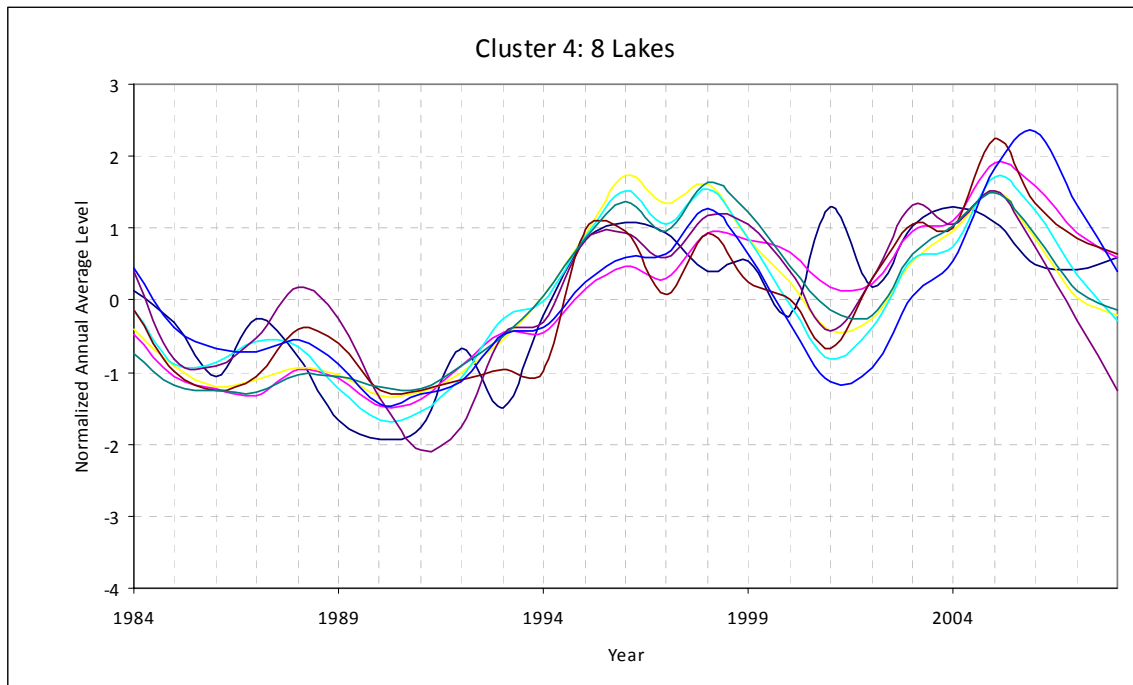


Figure 29 Lake Cluster 4 Normalized Annual Averages

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.

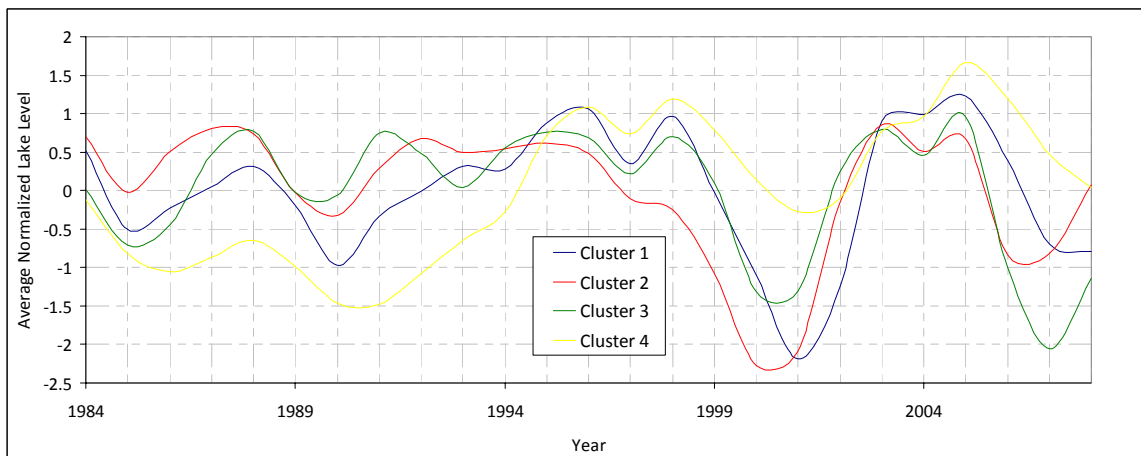


Figure 30 Lakes Average Normalized Comparison

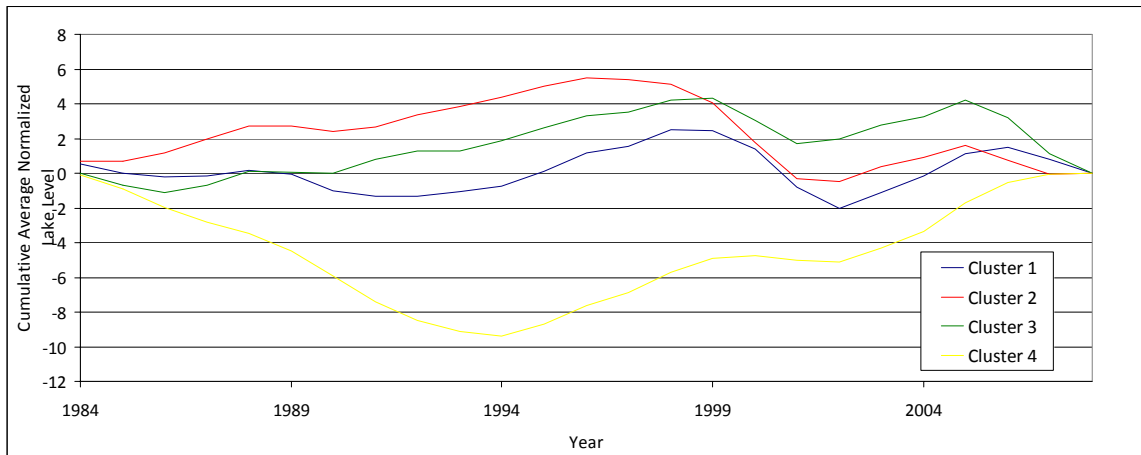


Figure 31 Lakes Cumulative Average Normalized Comparison

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.

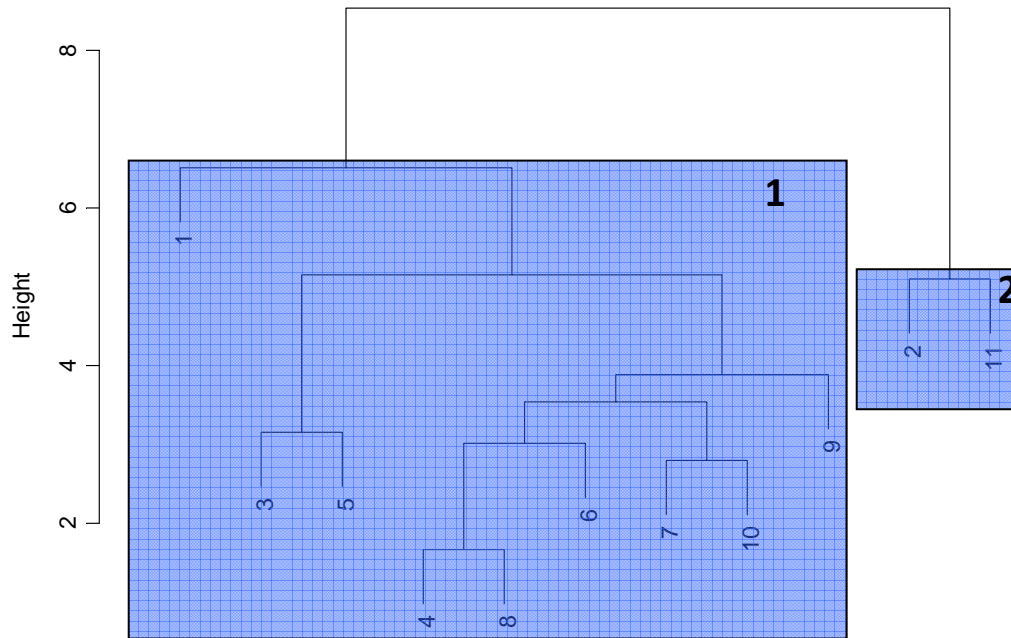


Figure 32 AHCA Dendrogram, Surficial Wells

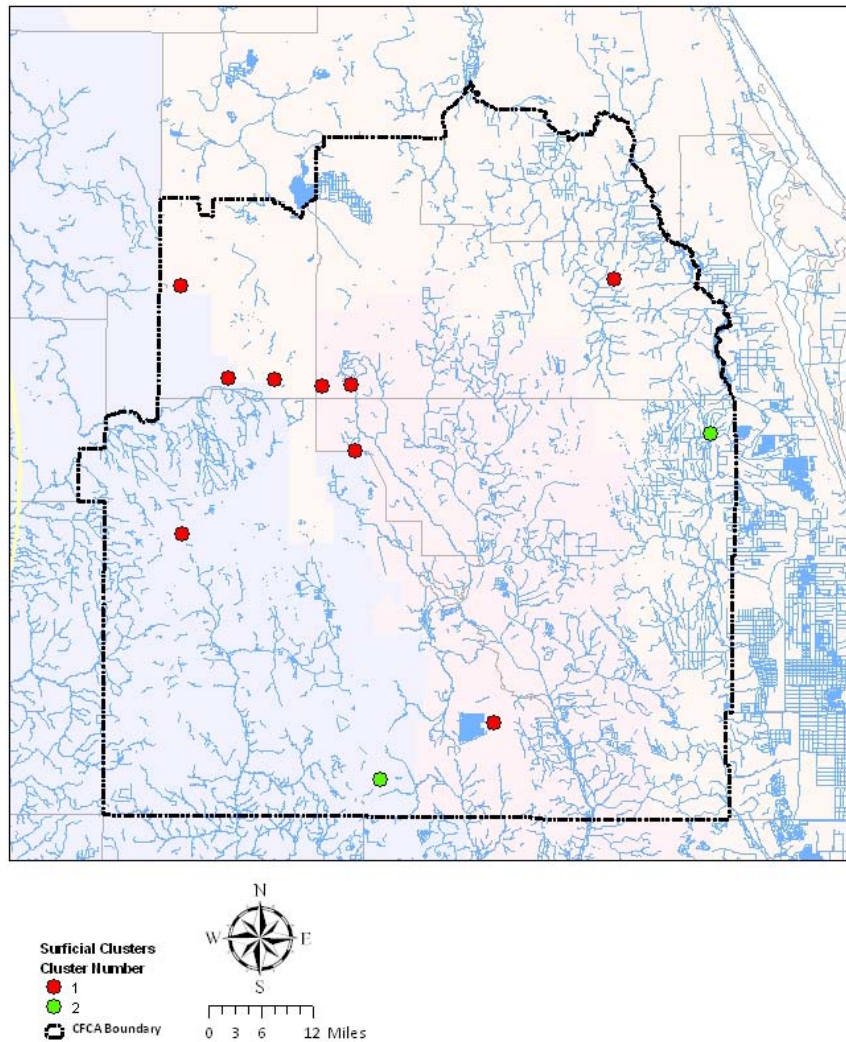


Figure 33 AHCA Spatial Associations, Surficial Wells

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.

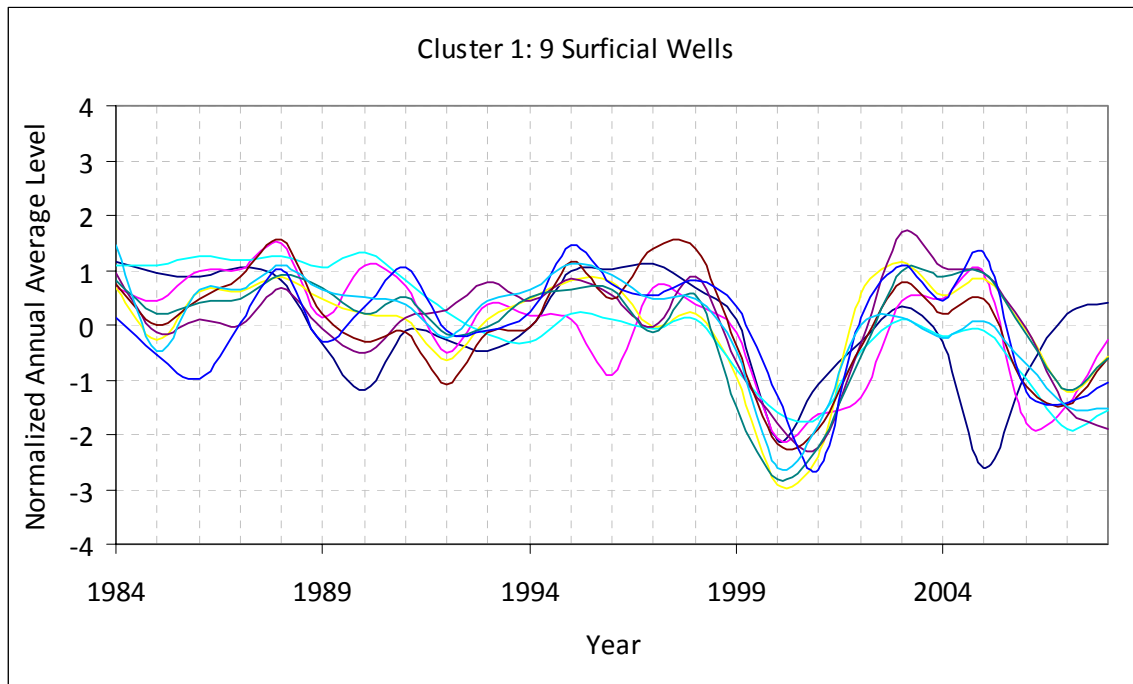


Figure 34 Surficial Well Cluster 1 Normalized Annual Averages

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 |

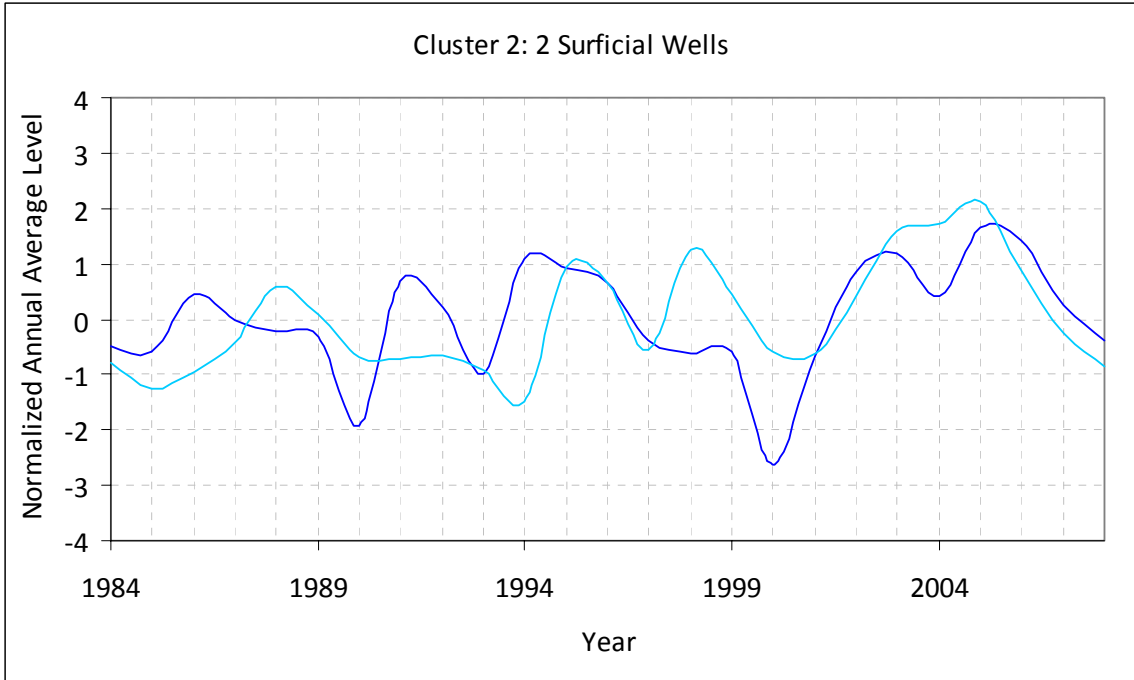


Figure 35 Surficial Well Cluster 2 Normalized Annual Averages

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.

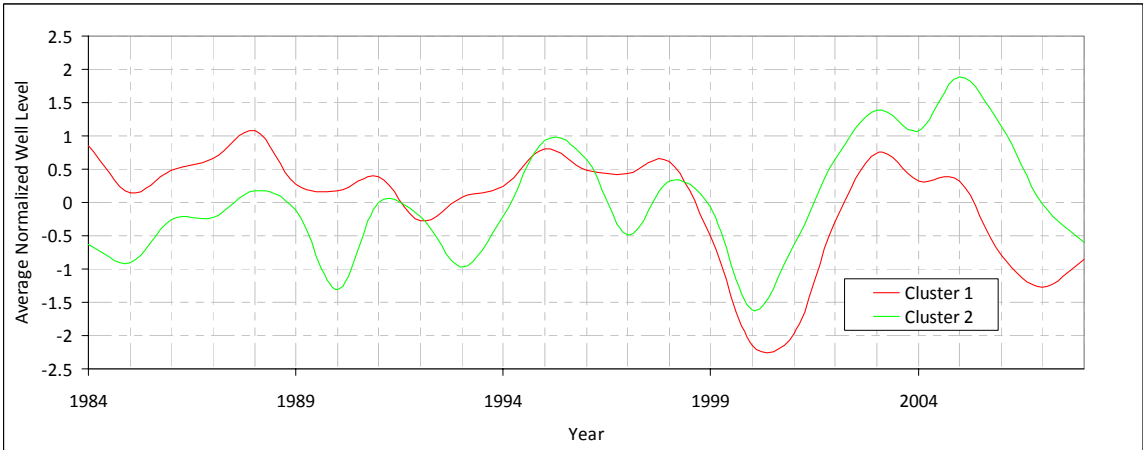


Figure 36 Surficial Wells Average Normalized Comparison

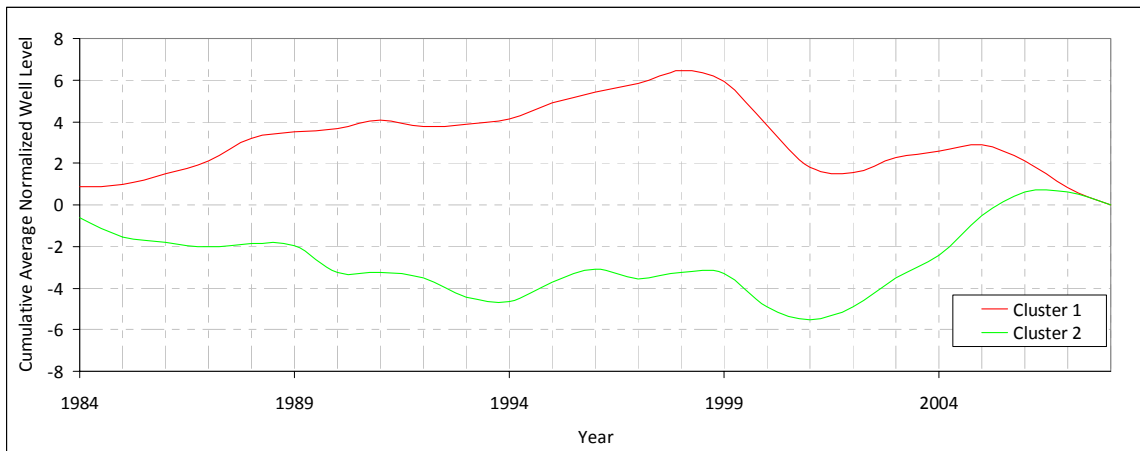


Figure 37 Surficial Wells Cumulative Average Normalized Comparison

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.

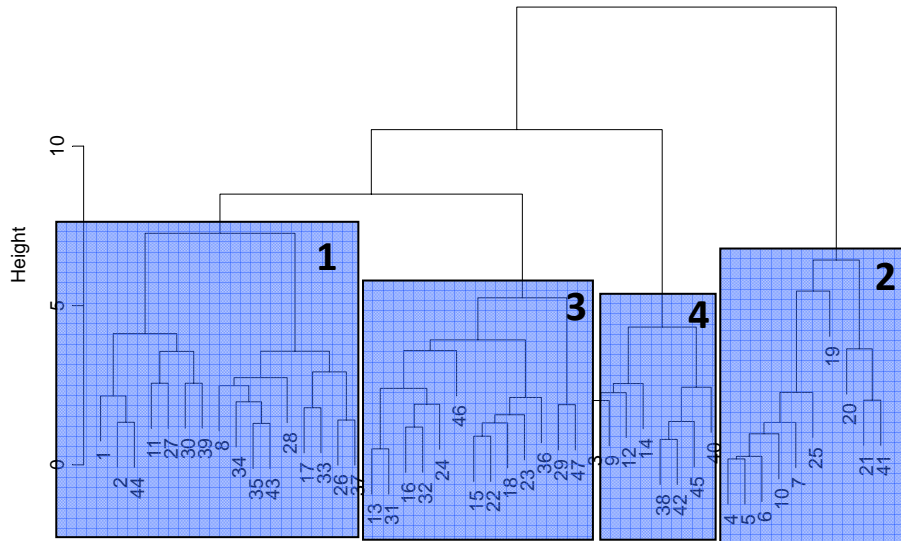


Figure 38 AHCA Dendrogram, Intermediate and Floridan Wells

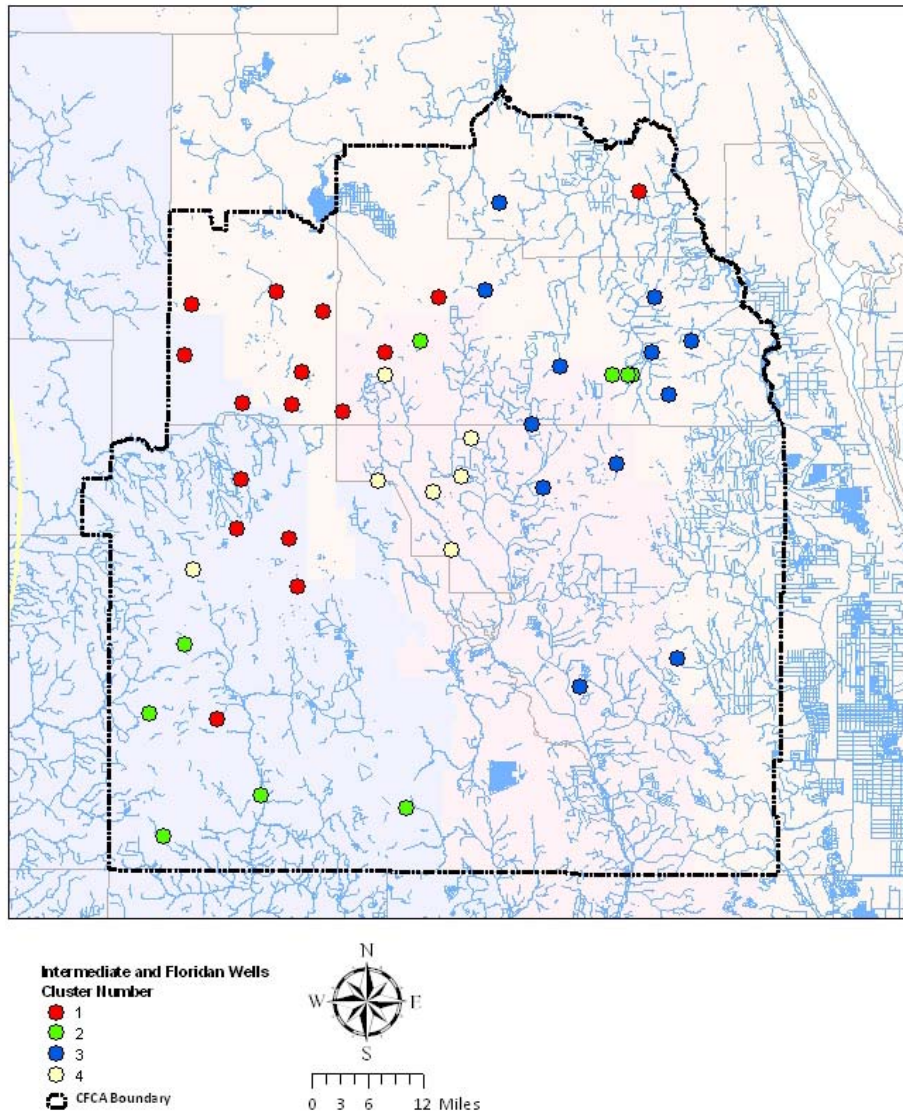


Figure 39 ACHA Spatial Associations, Intermediate and Floridan Wells

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 |

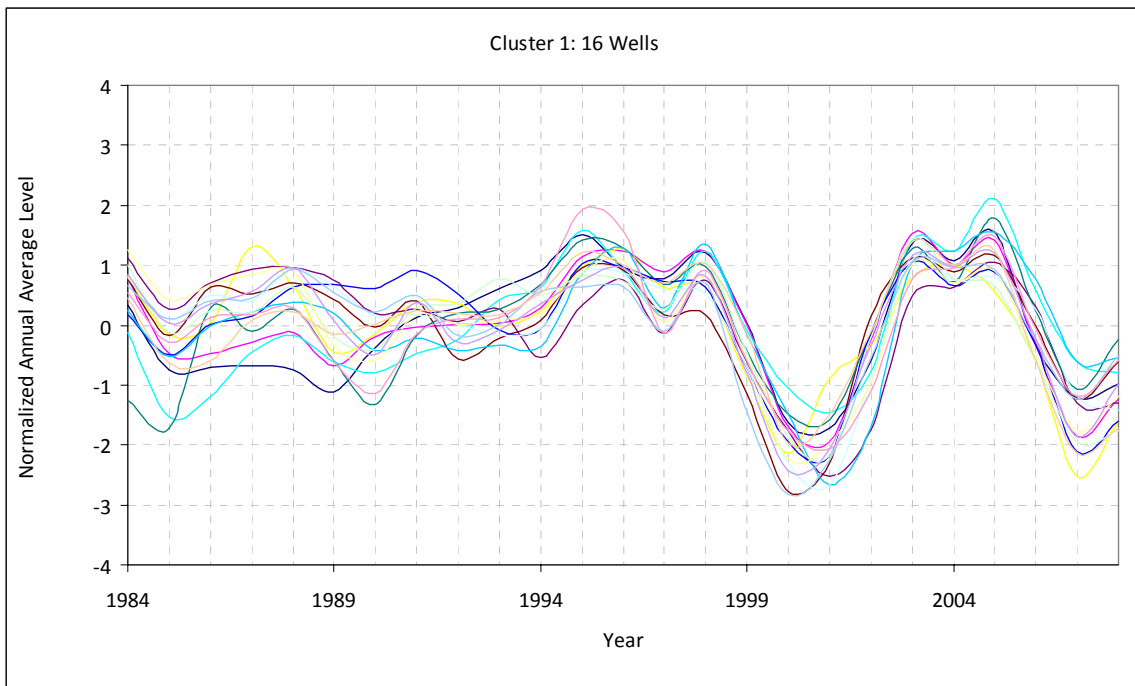


Figure 40 Intermediate and Floridan Well Cluster 1 Normalized Annual Averages

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 |

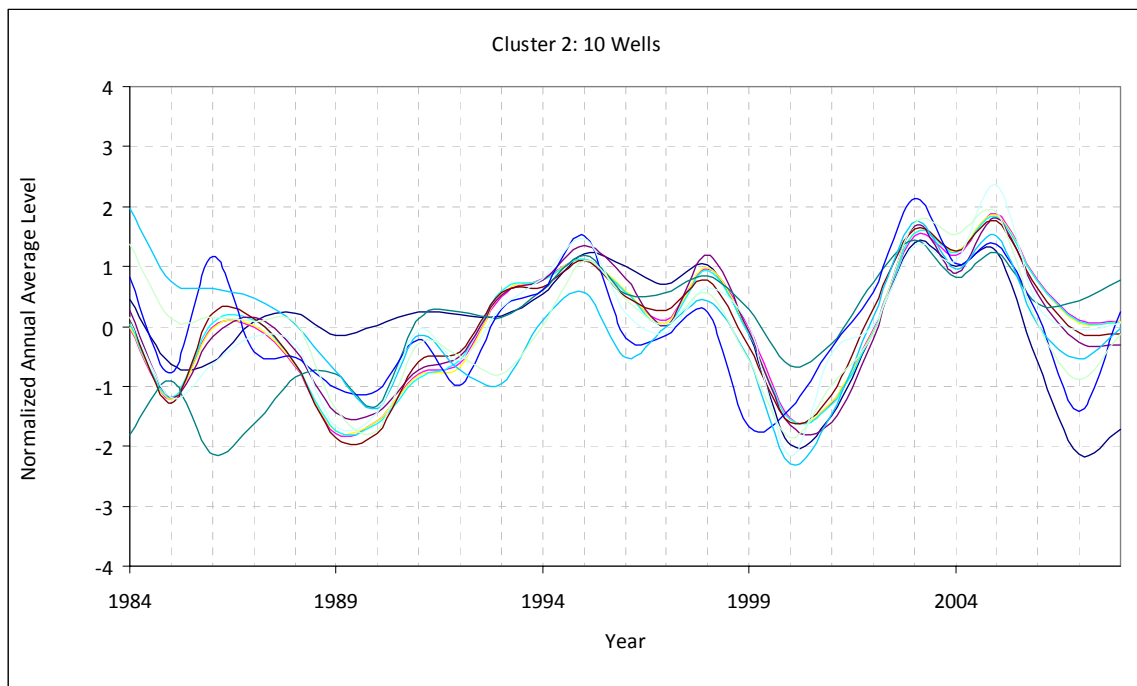


Figure 41 Intermediate and Floridan Well Cluster 2 Normalized Annual Averages

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 |

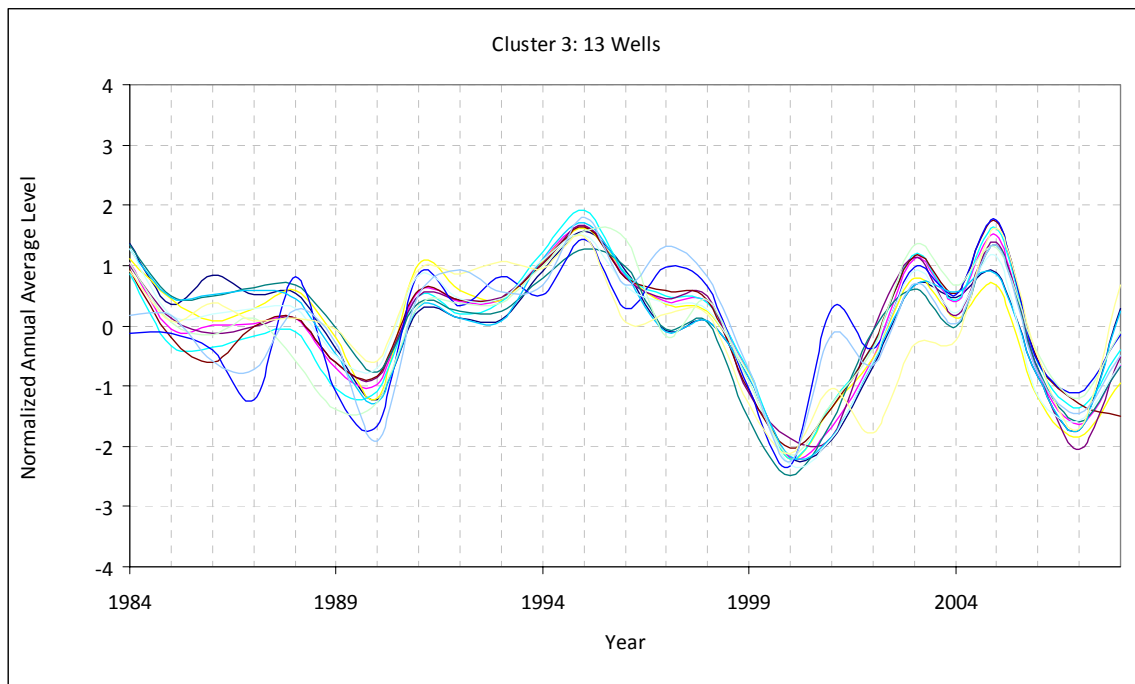


Figure 42 Intermediate and Floridan Well Cluster 3 Normalized Annual Averages

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 |

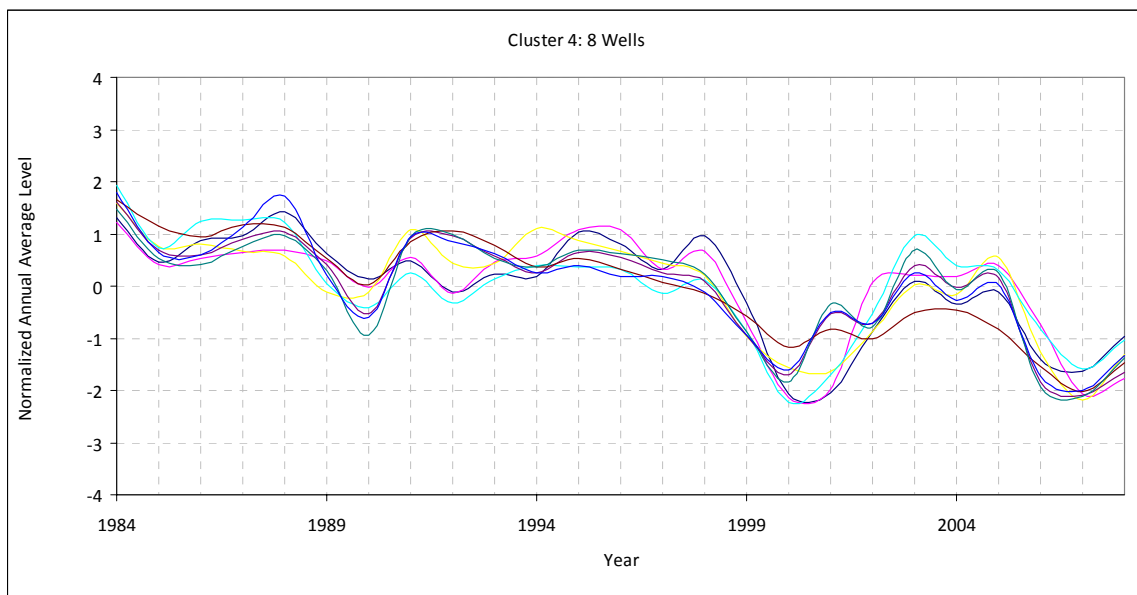


Figure 43 Intermediate and Floridan Well Cluster 4 Normalized Annual Averages

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.

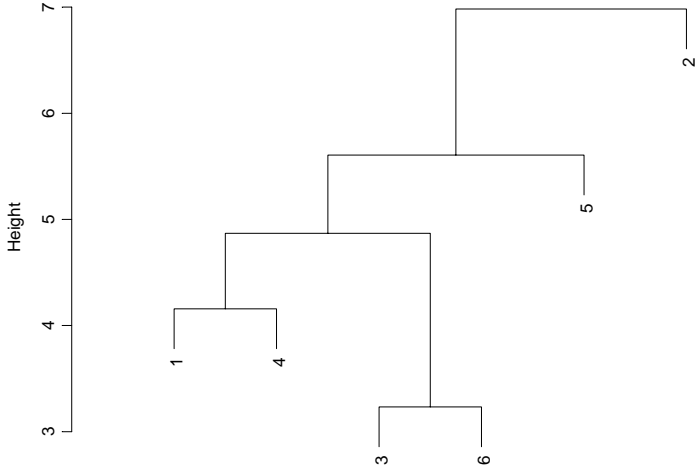


Figure 44 AHCA Dendrogram, Springs

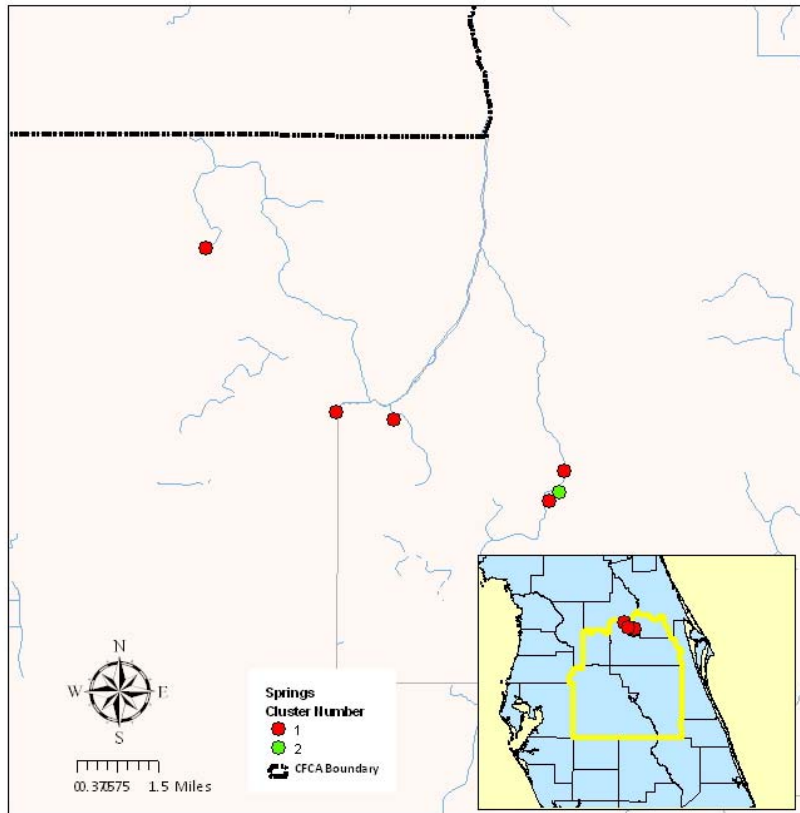


Figure 45 ACHA Spatial Associations, Springs

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.

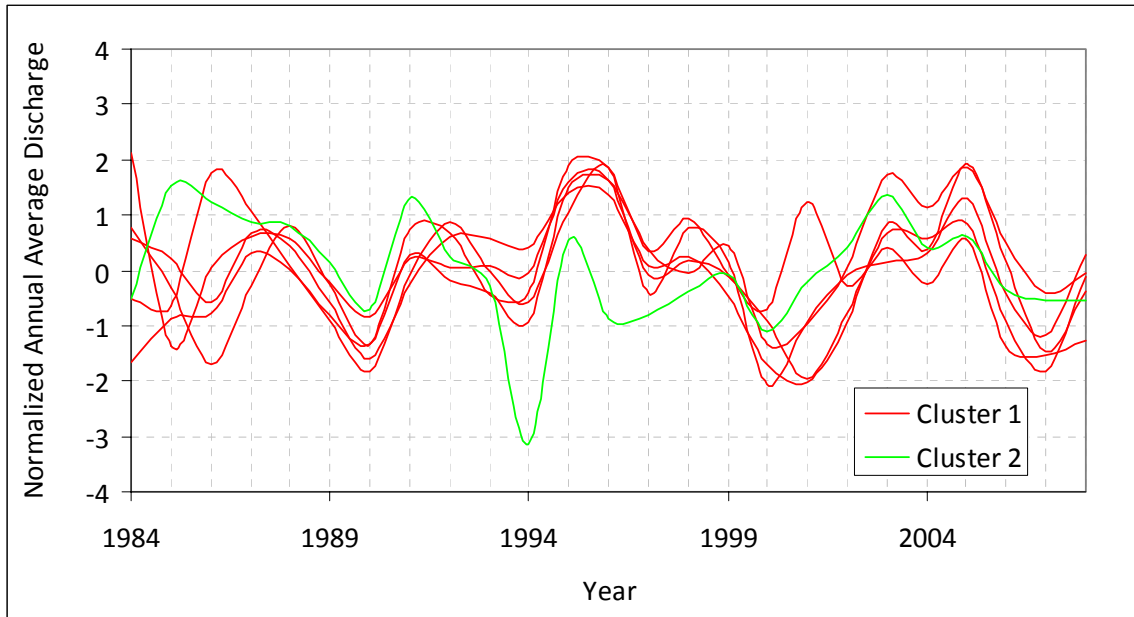


Figure 46 Spring Clusters: Normalized Annual Average Discharge

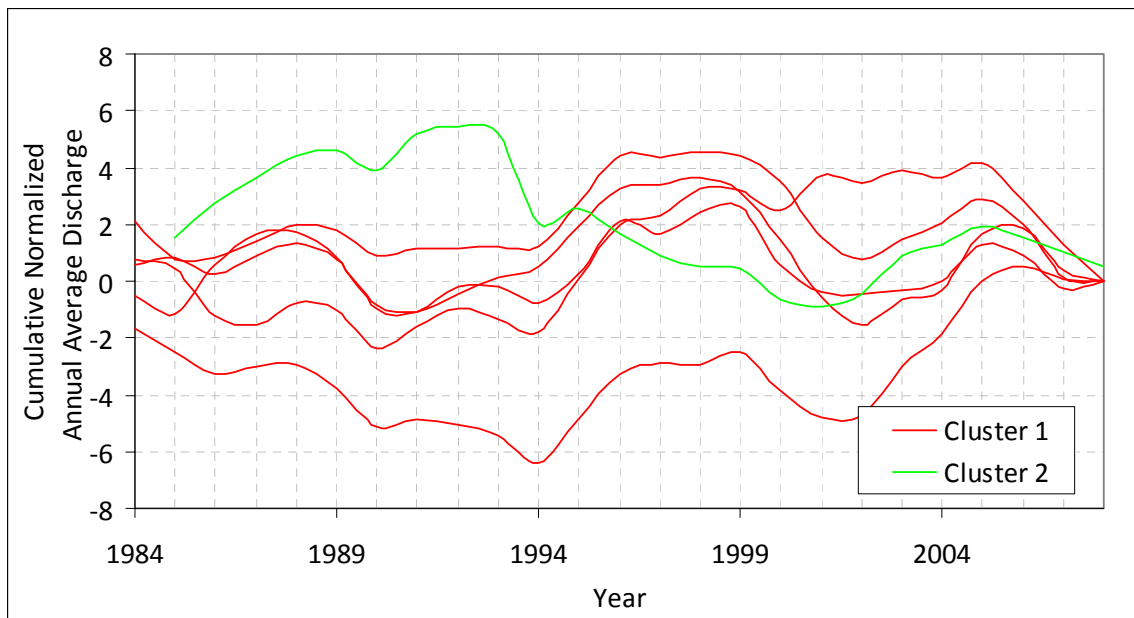


Figure 47 Spring Clusters: Cumulative Normalized Annual Average Discharge

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).

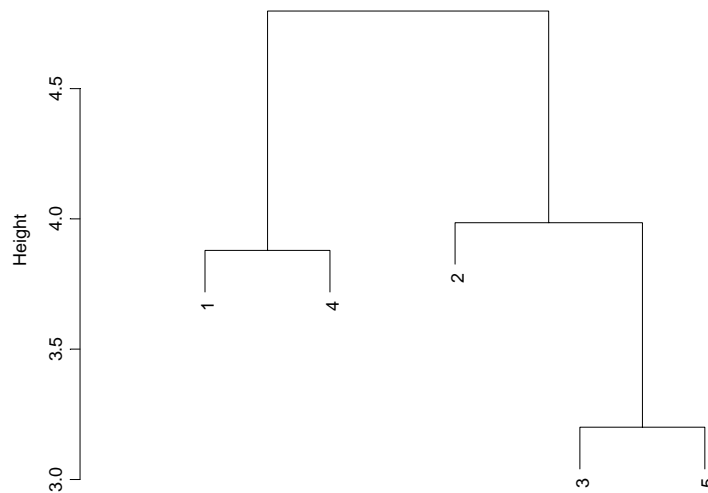


Figure 48 AHCA Dendrogram, Rainfall

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 |

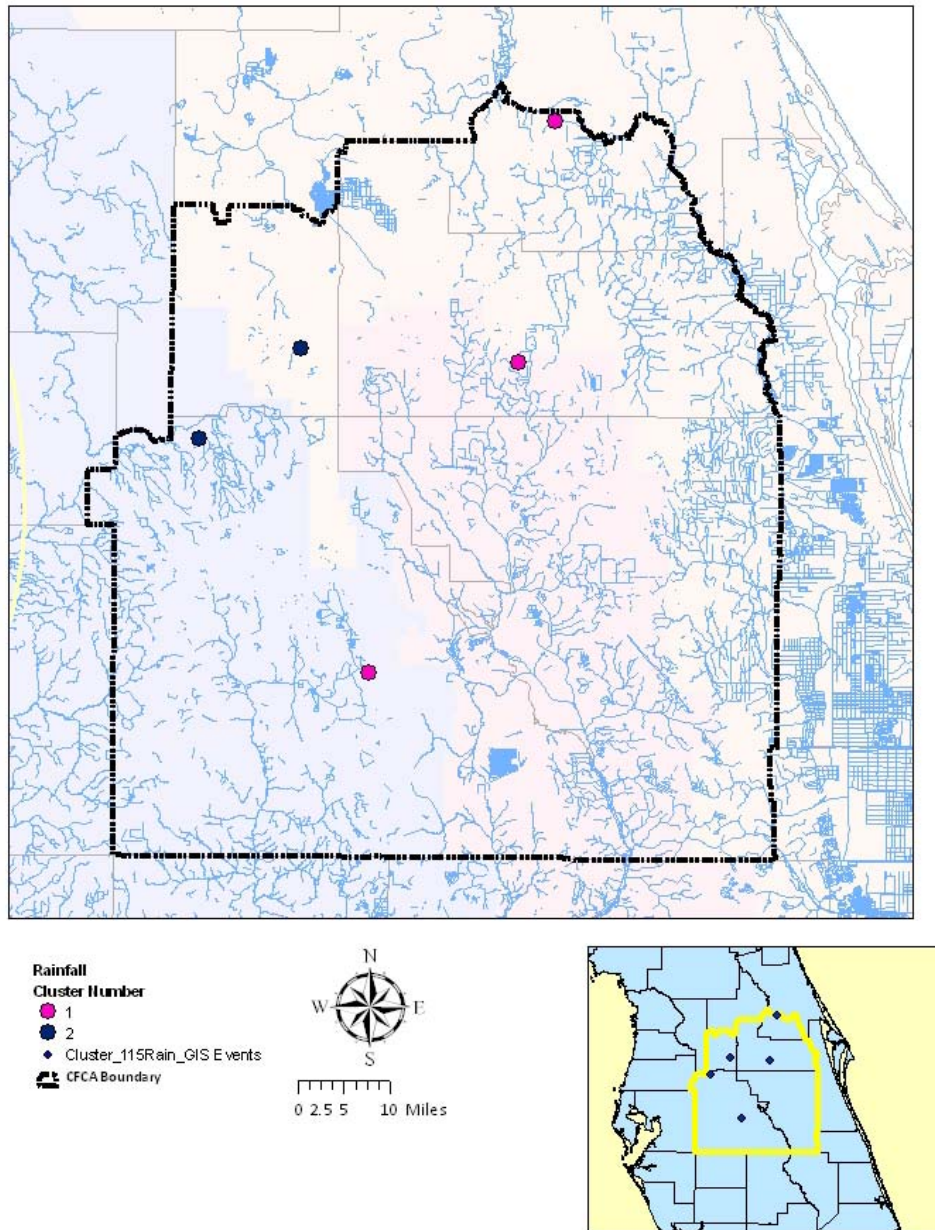


Figure 49 AHCA Spatial Associations, Rainfall

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.

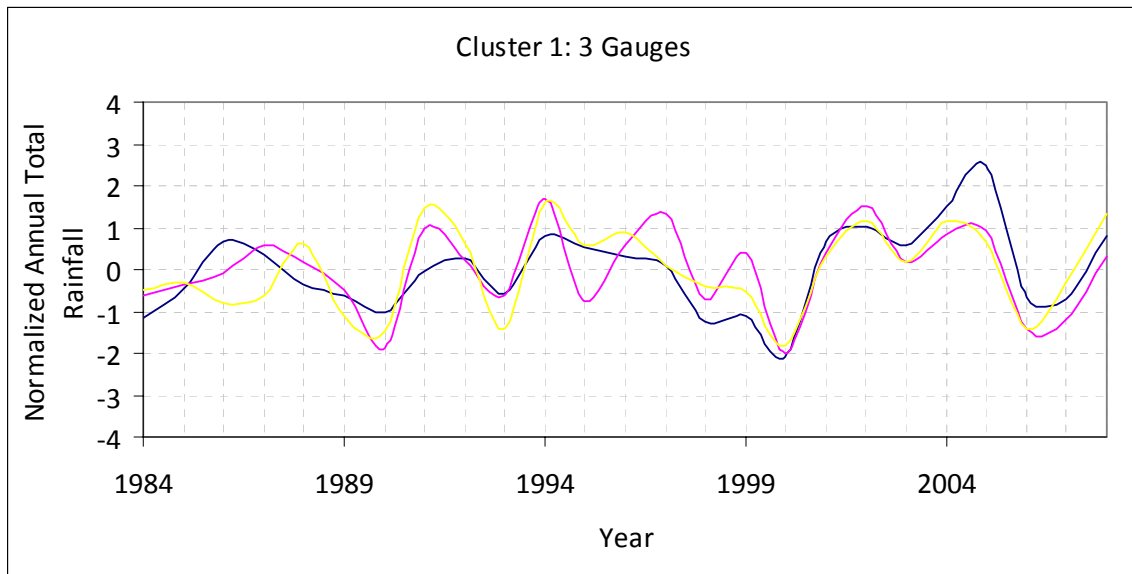


Figure 50 Rainfall Cluster 1 Normalized Annual Totals

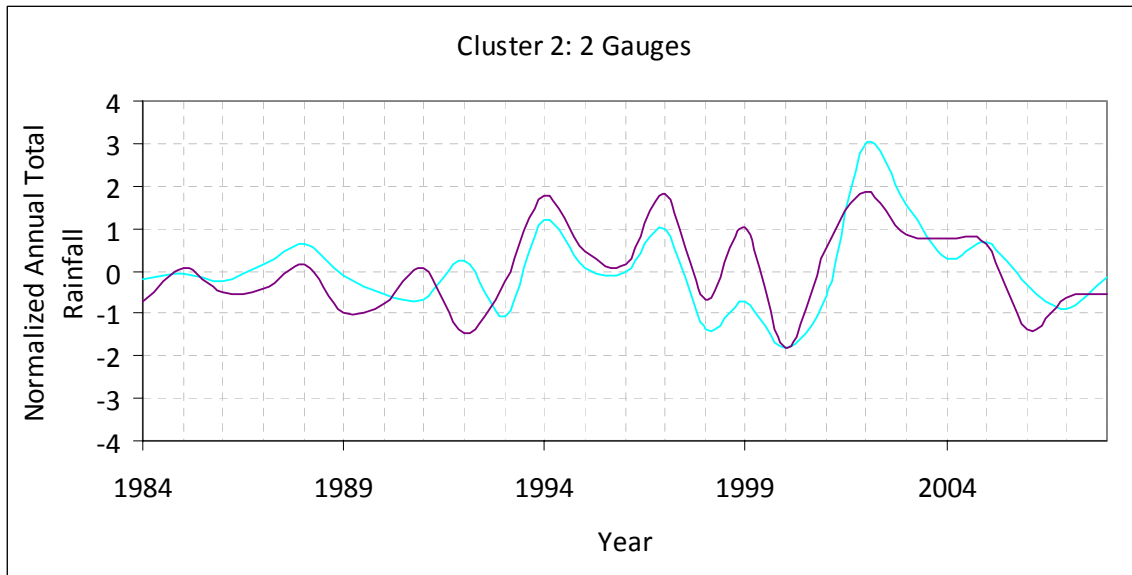


Figure 51 Rainfall Cluster 2 Normalized Annual Totals

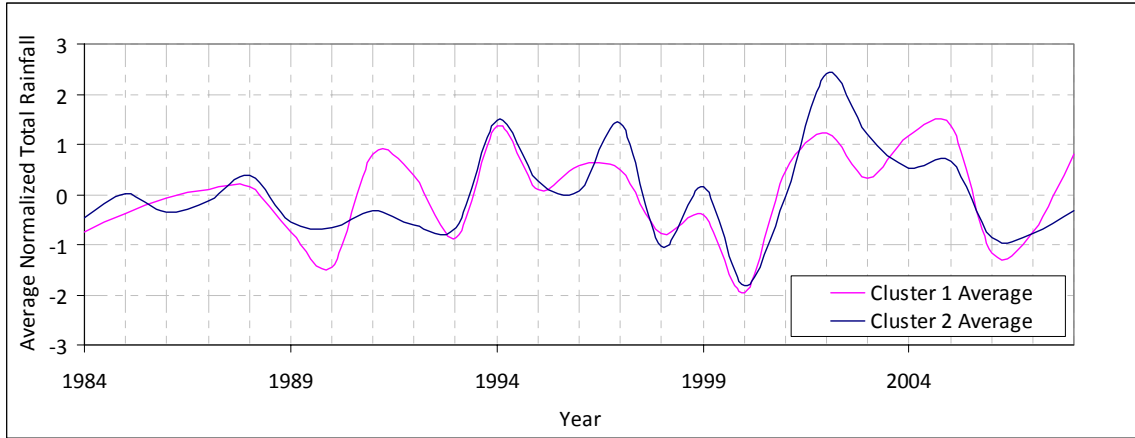


Figure 52 Rainfall Cluster Average Normalized Total Rainfall

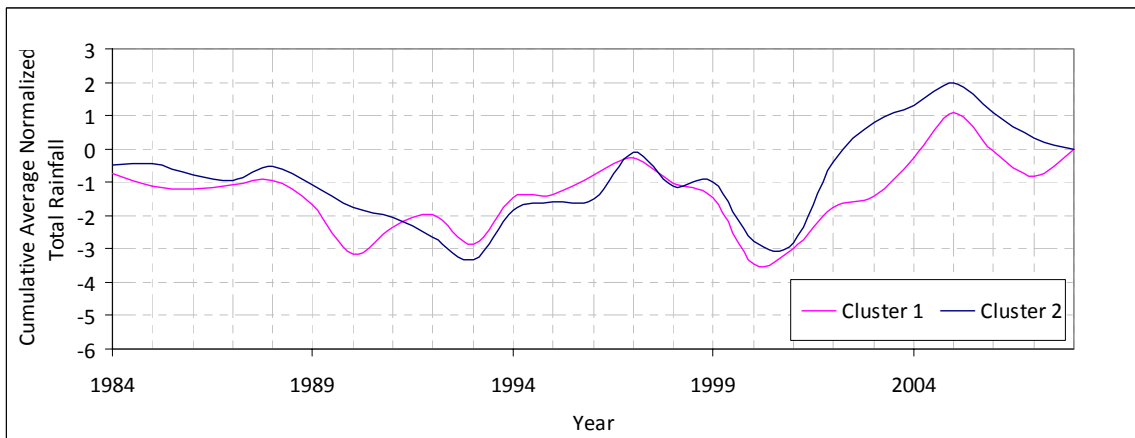


Figure 53 Rainfall Cluster Cumulative Average Normalized Total Rainfall

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.

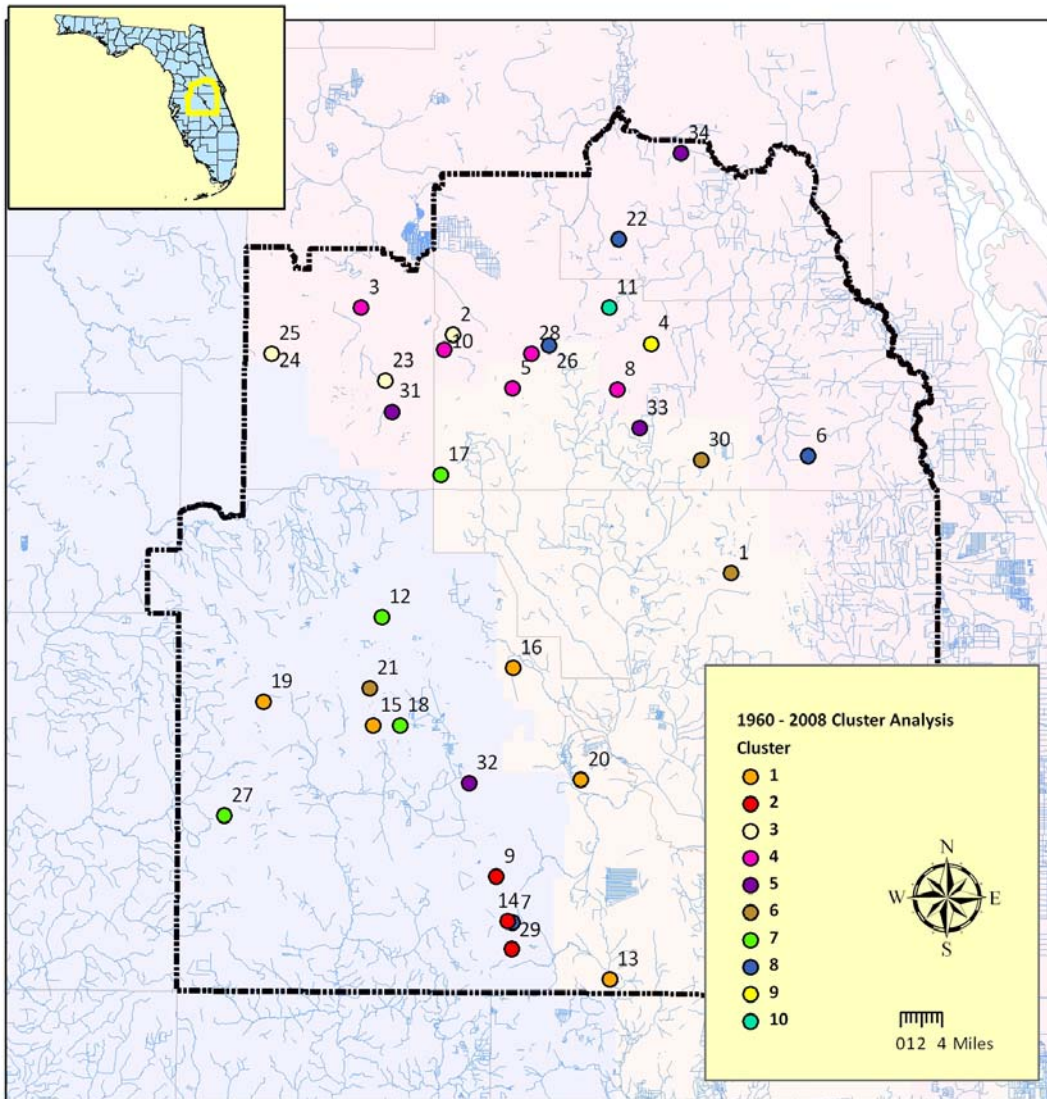


Figure 54 AHCA Spatial Associations, 1960-2008 Stations

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).

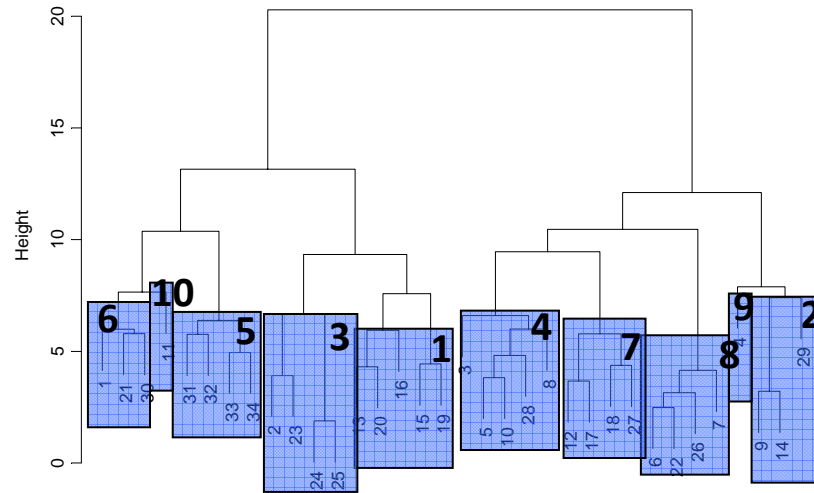


Figure 55 AHCA Dendrogram, 1960-2008 Stations

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.

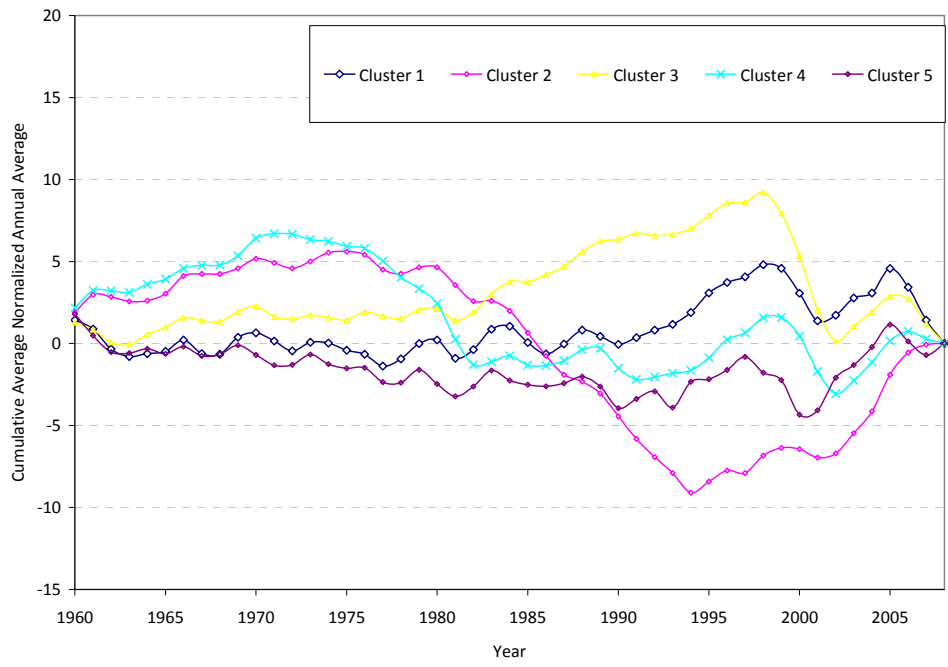


Figure 56 Clusters 1-5 Cumulative Average Normalized Annual Average

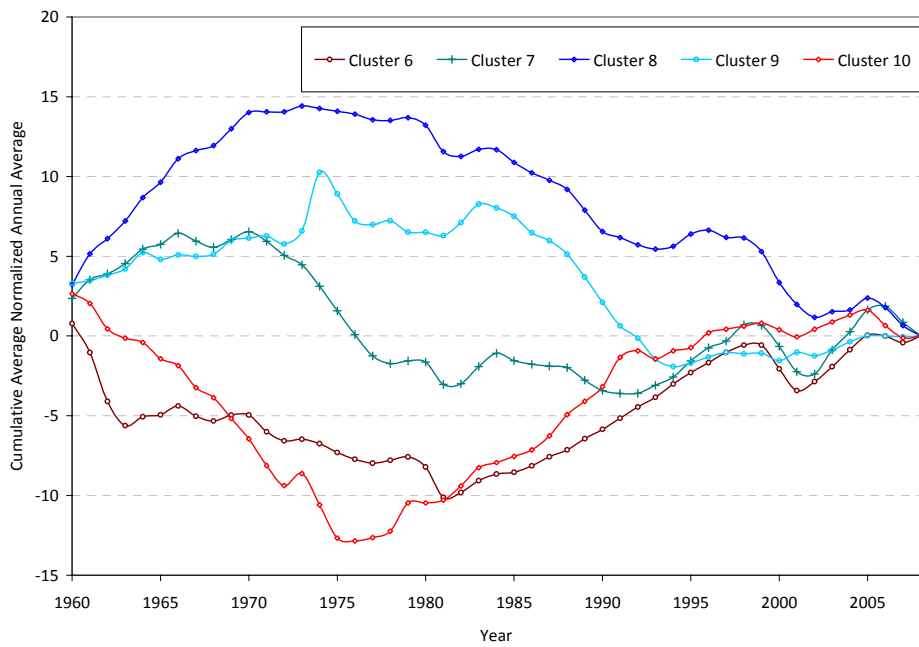


Figure 57 Clusters 6-10 Cumulative Average Normalized Annual Average

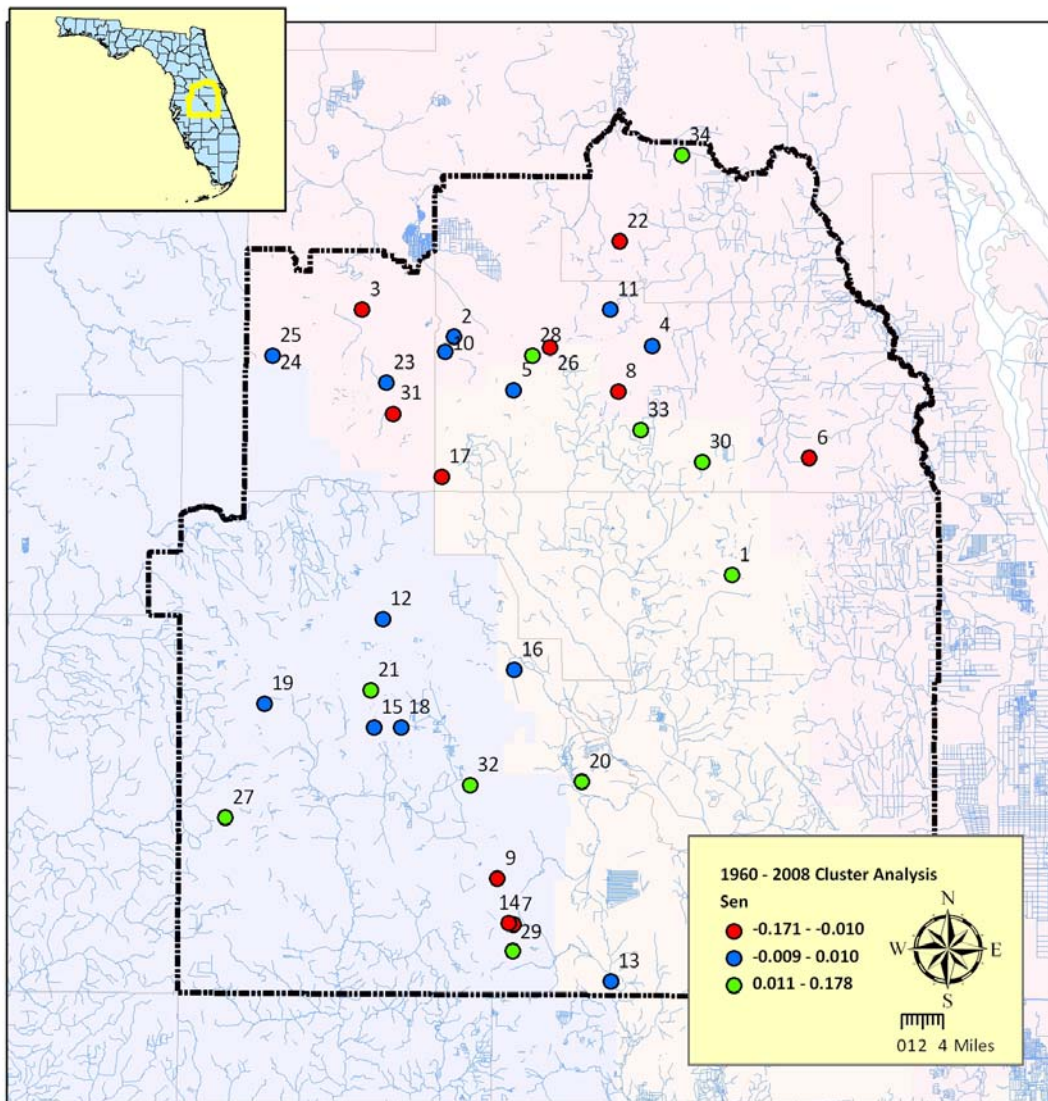


Figure 58 Sen Slopes, 1960 – 2008 Stations

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 CFCFA 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 aid in establishing the causes of the decreasing trends, and assist in planning within the Central Florida Coordination Area.

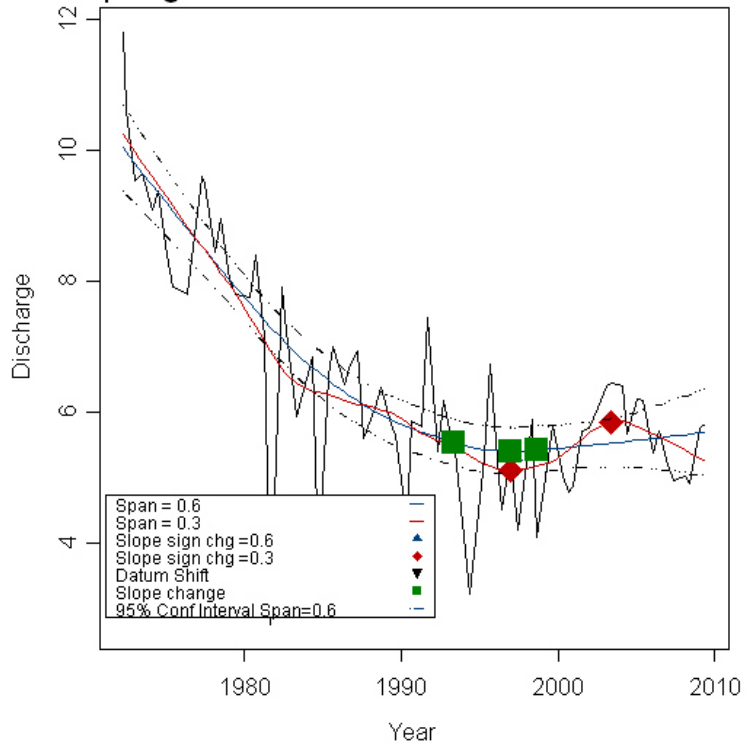
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Appendix I: LOWESS Plots

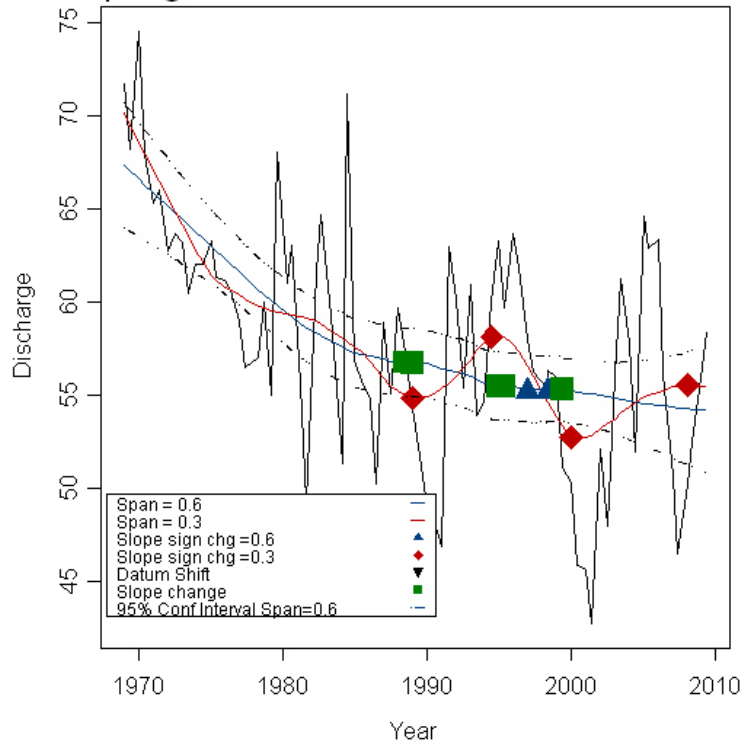
SJRWMD-Springs

LOWESS Smoothers
SpringData1.xls - Data Set: Site 2234996

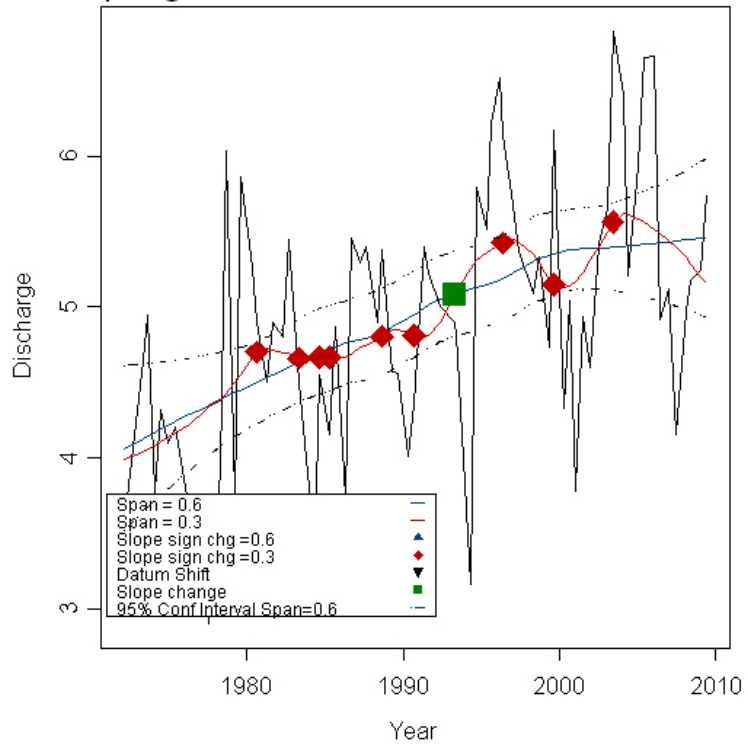


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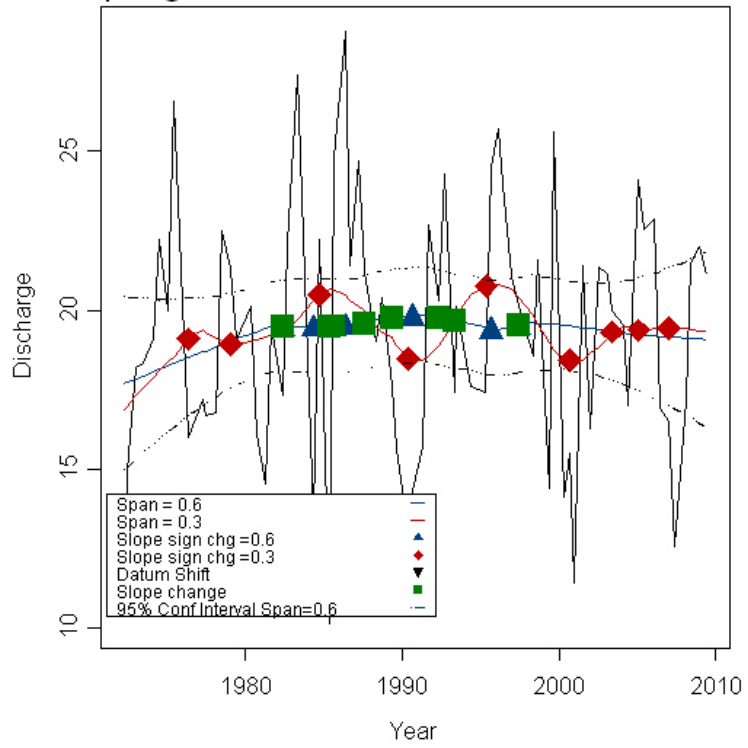
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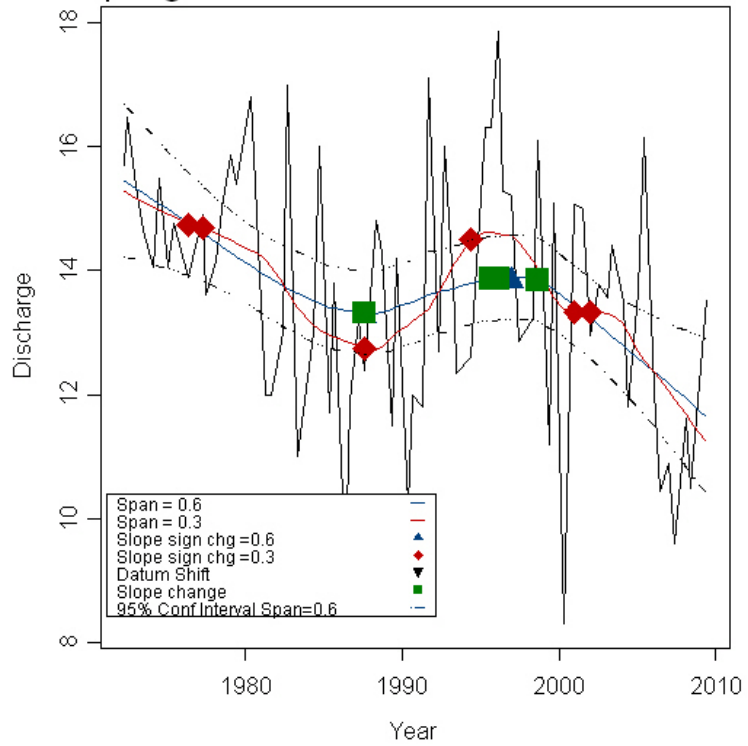
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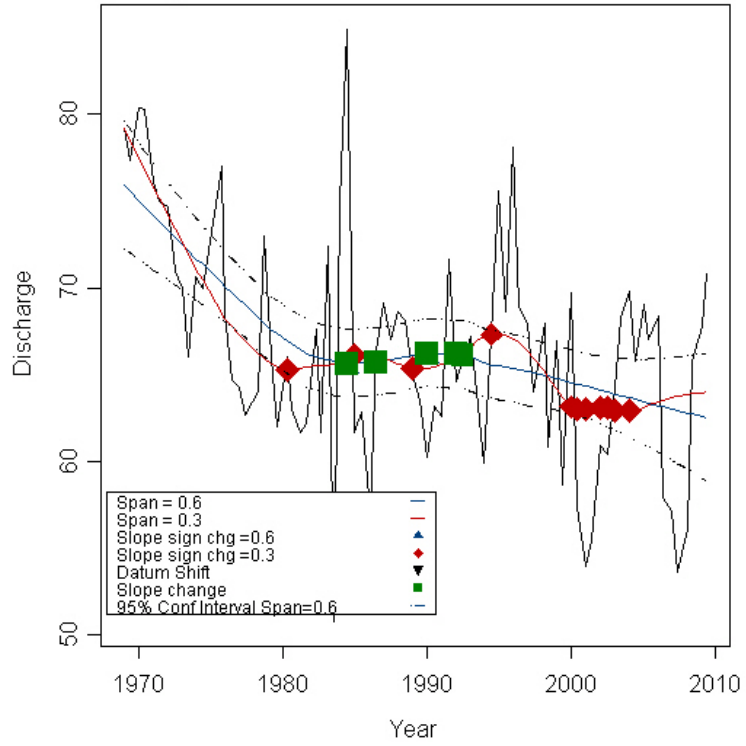
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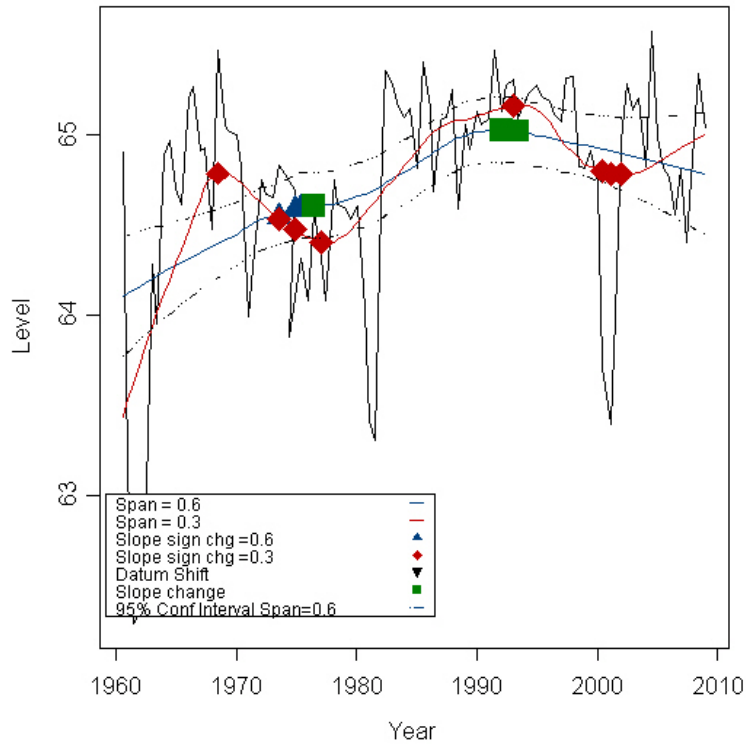


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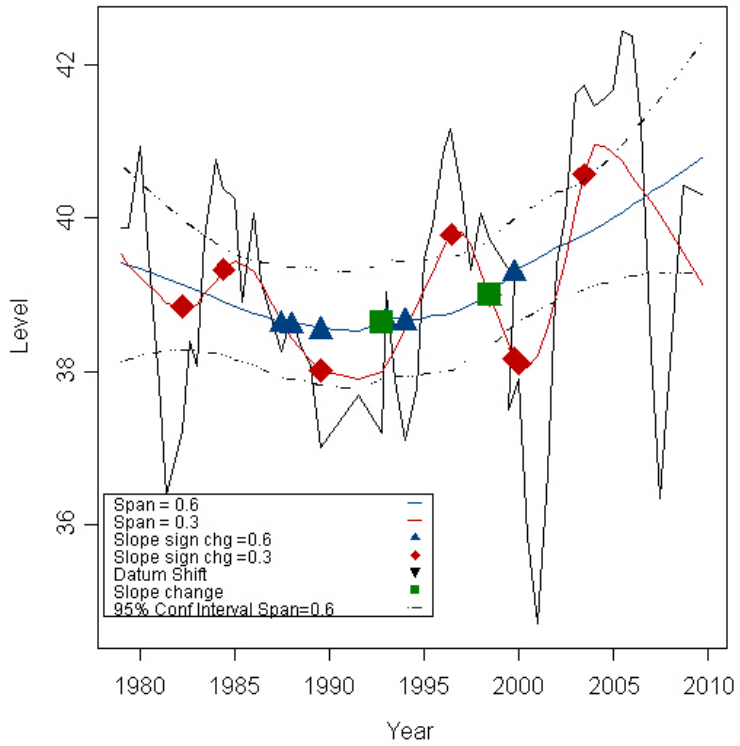


SJRWMD- Lakes

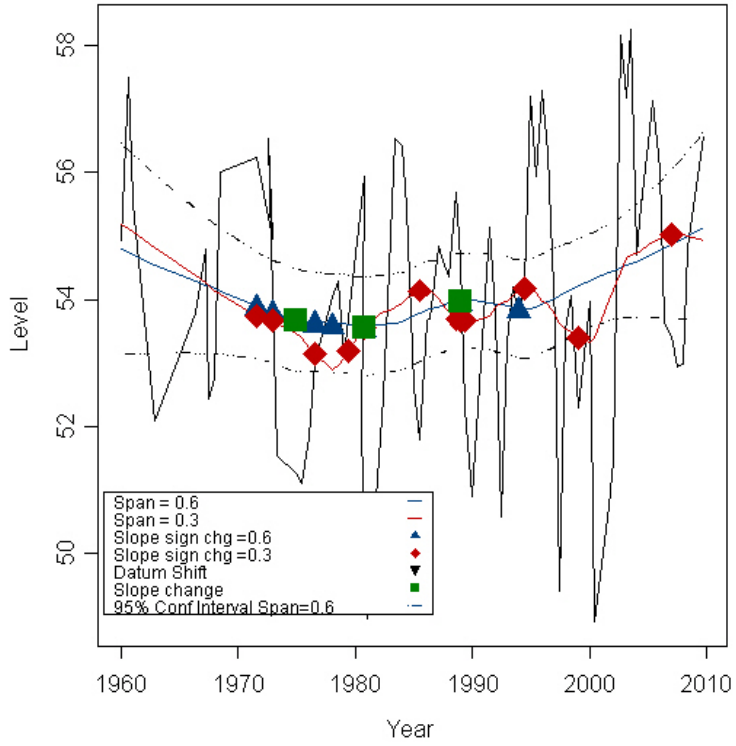
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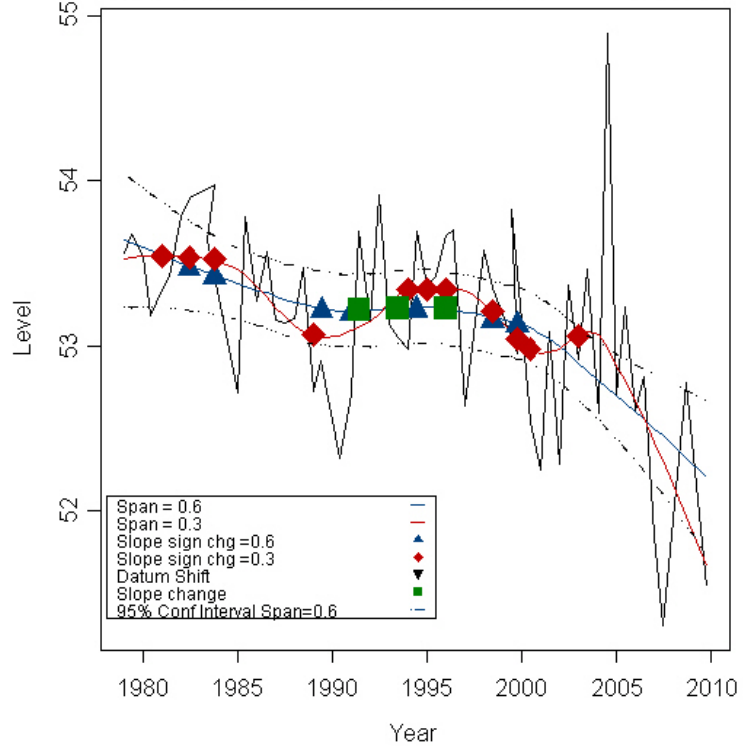
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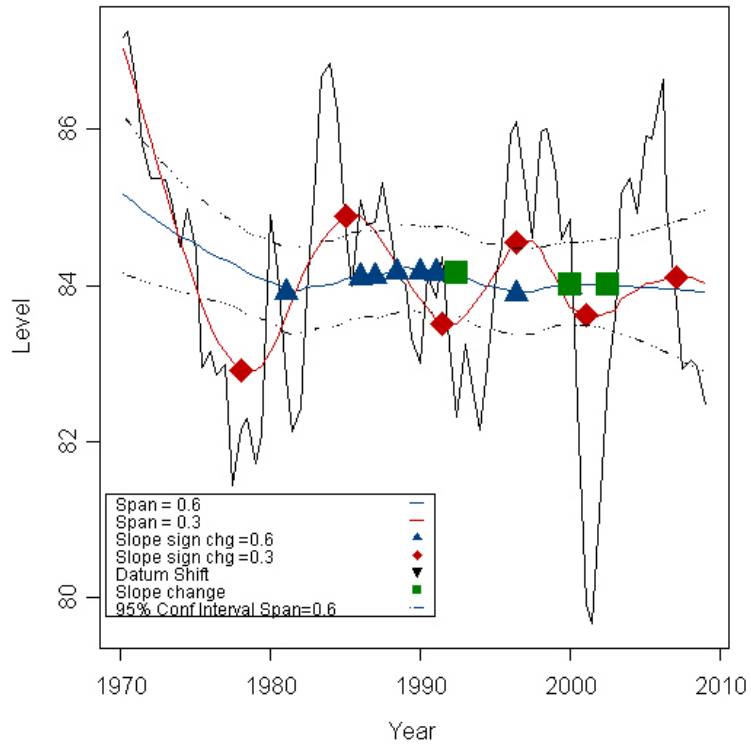
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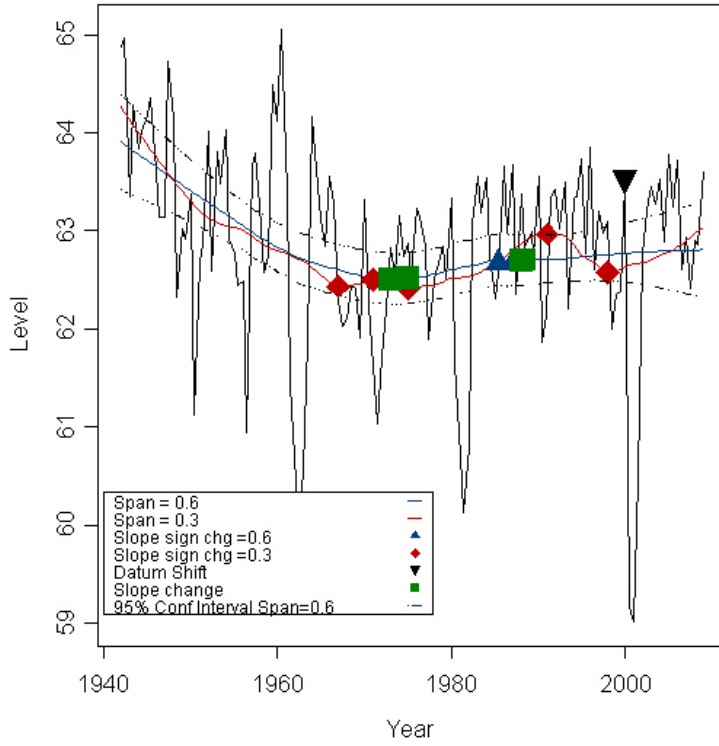
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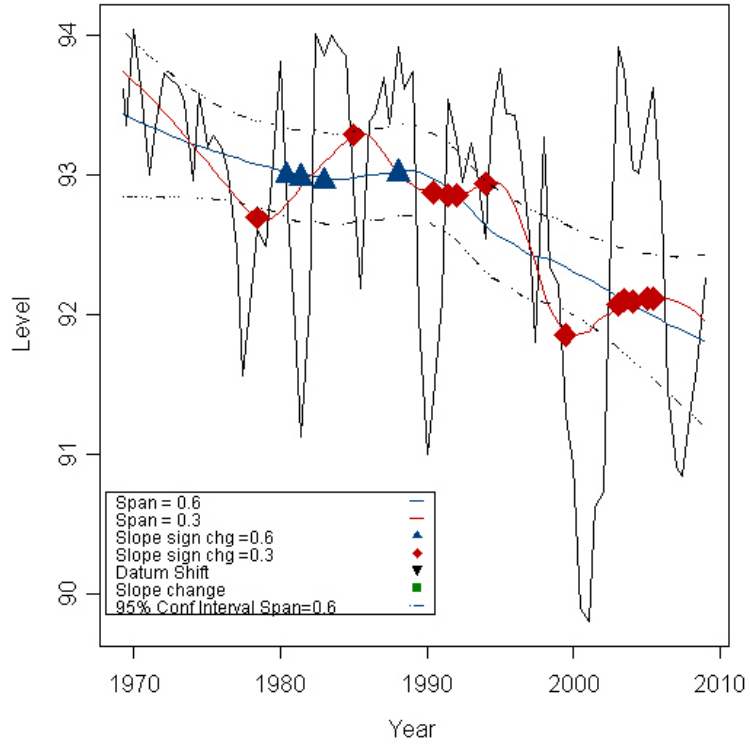
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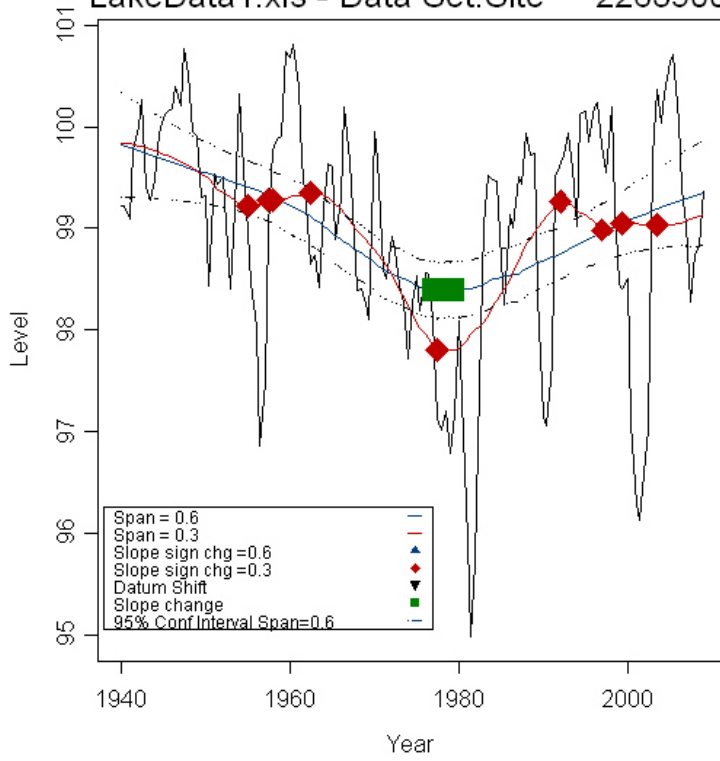
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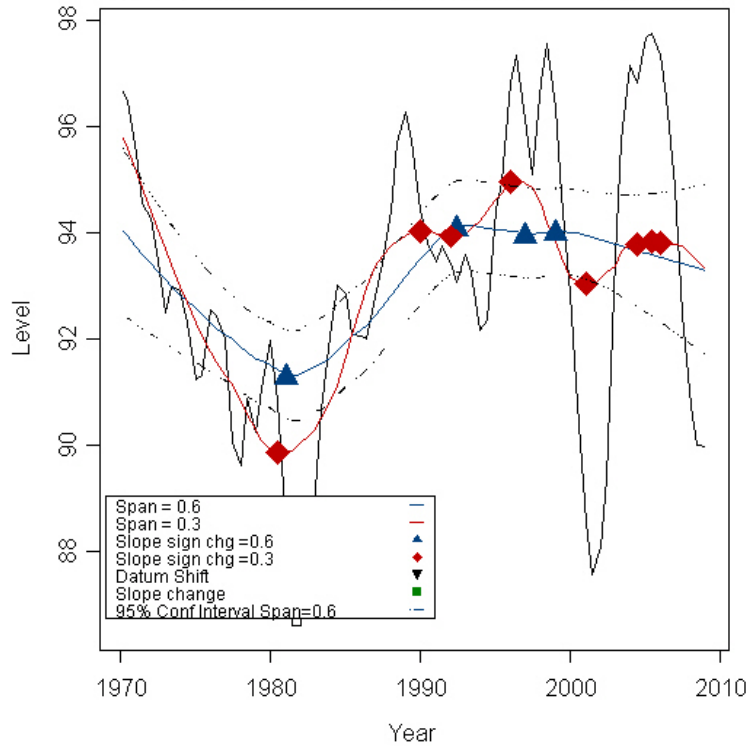
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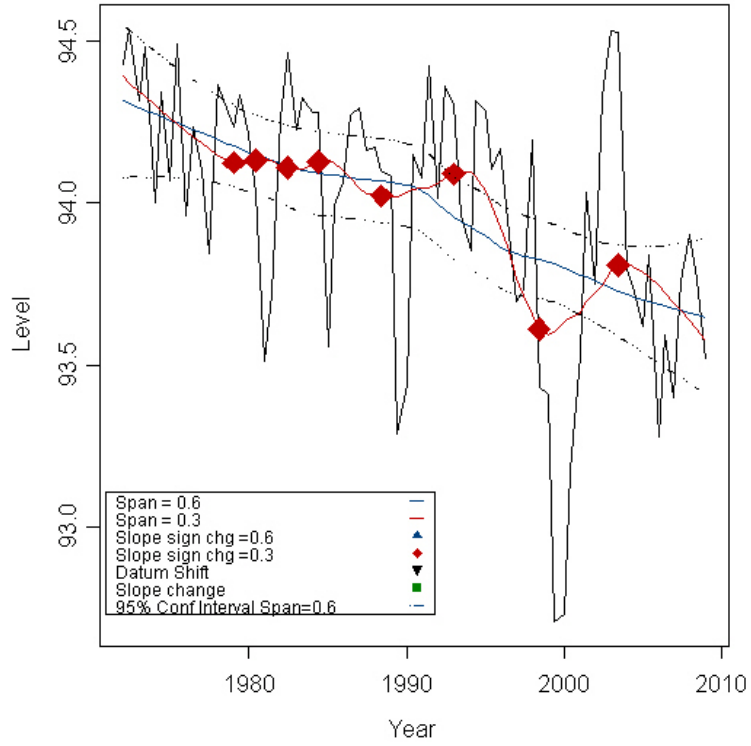
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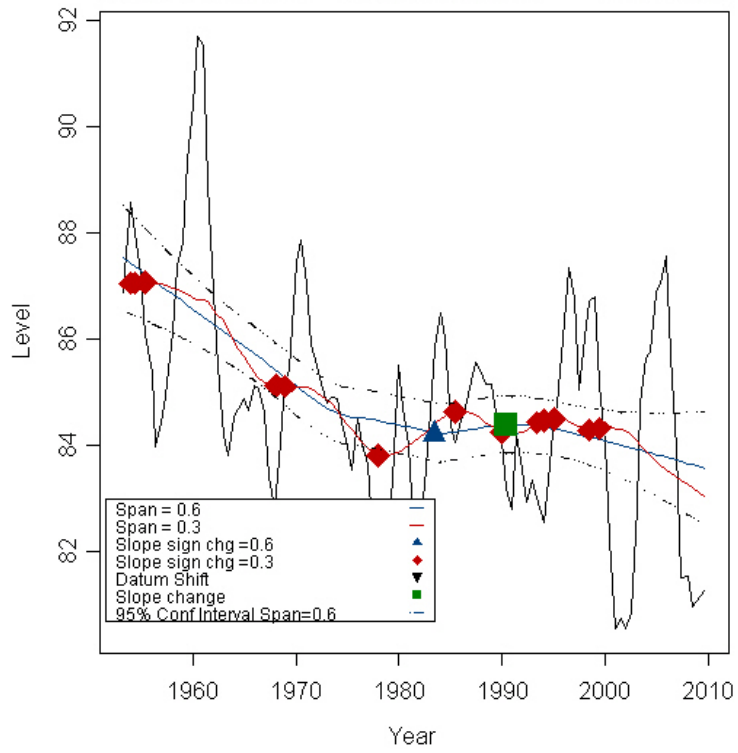
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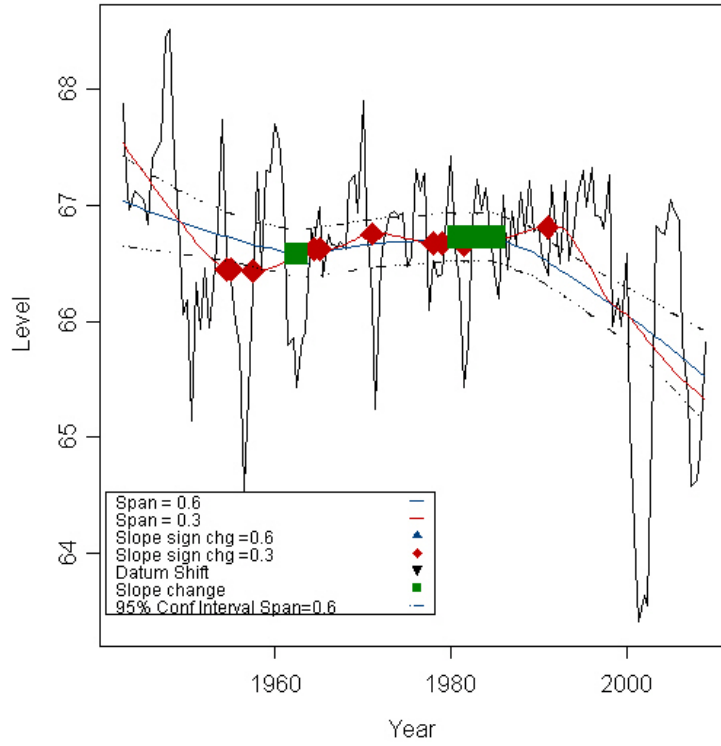
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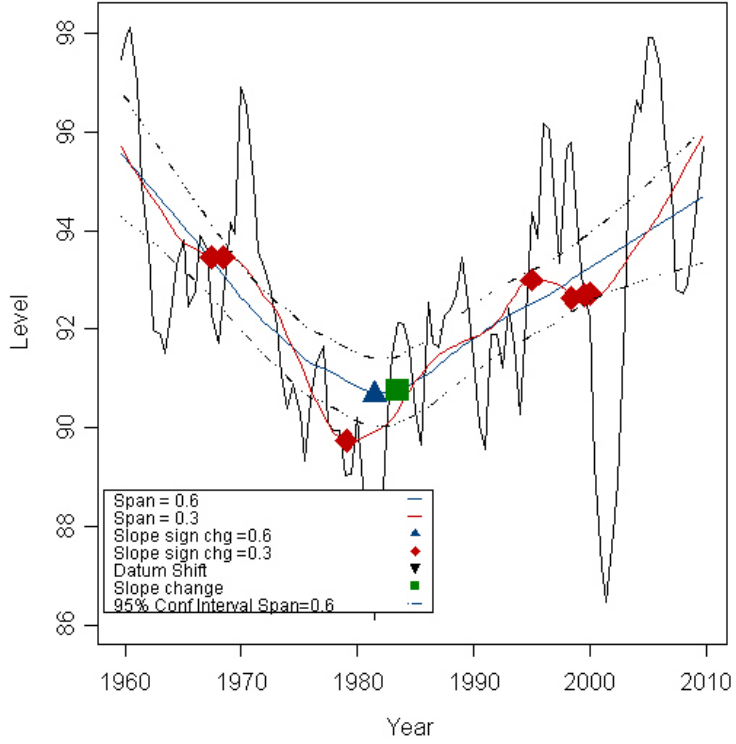
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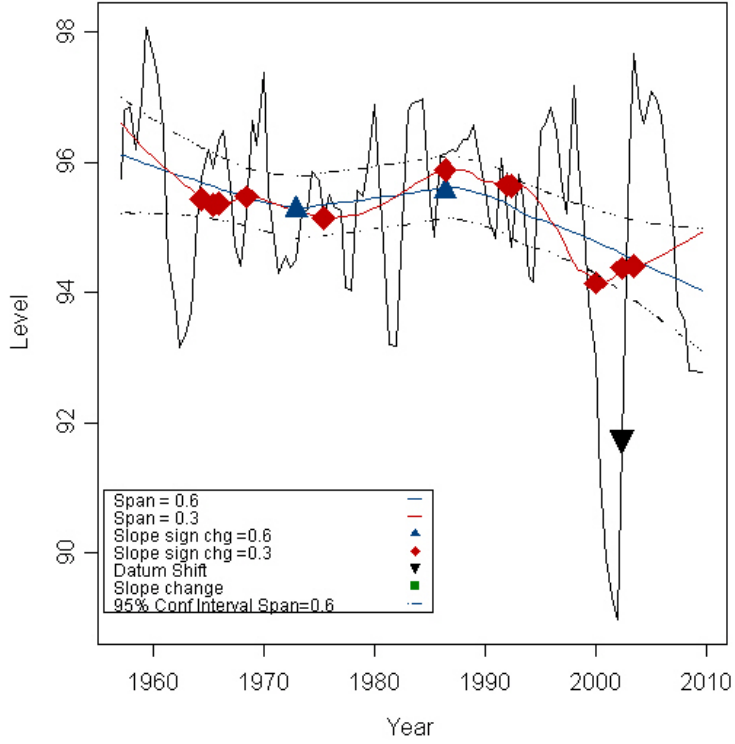
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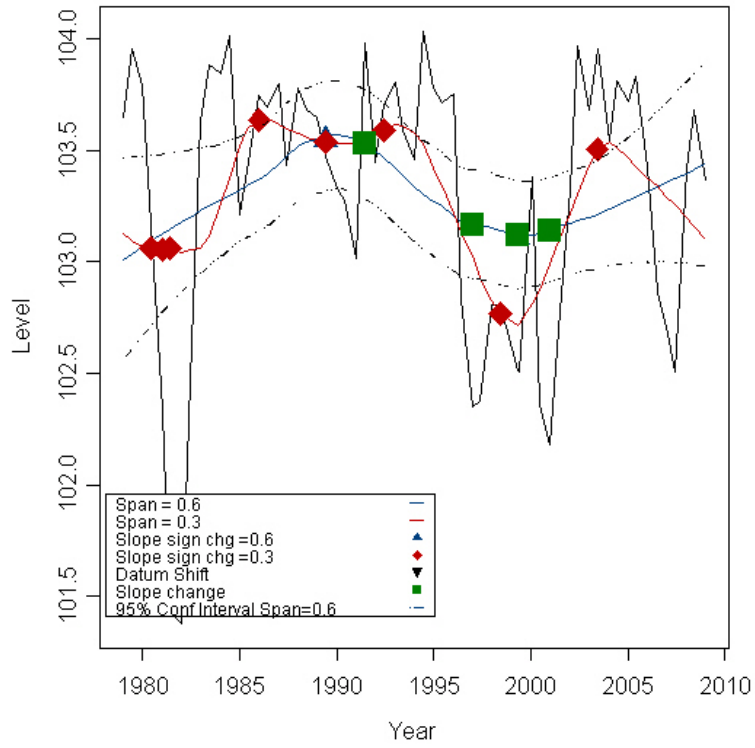
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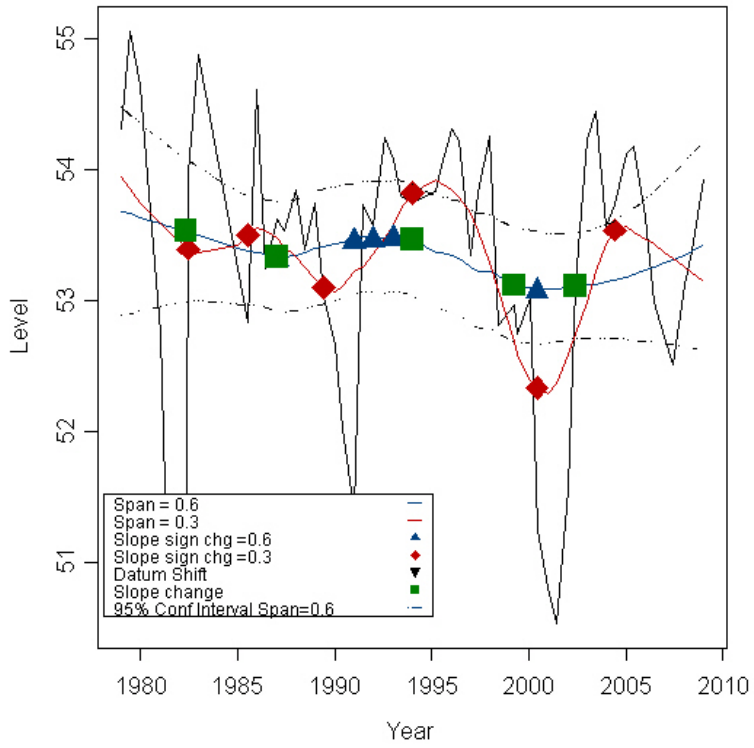
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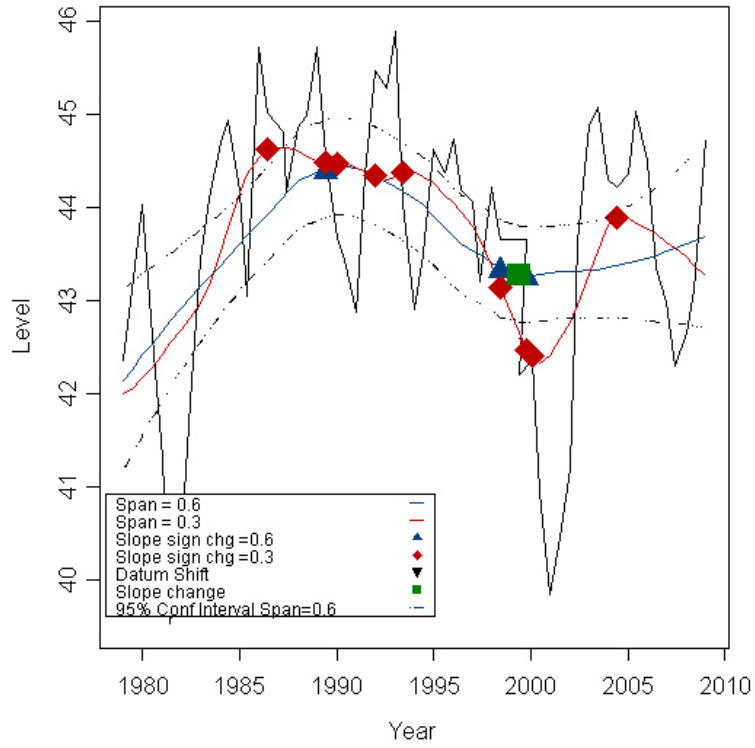
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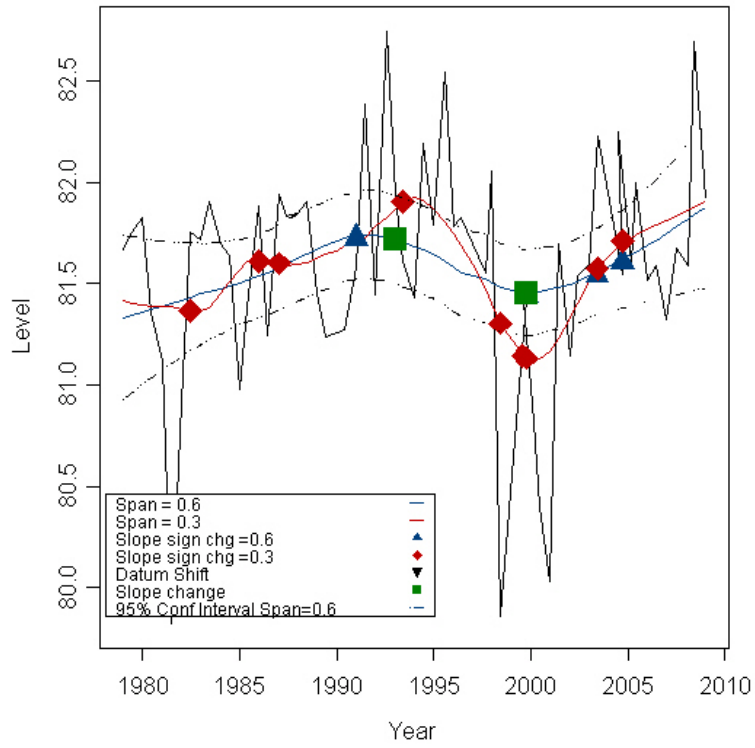
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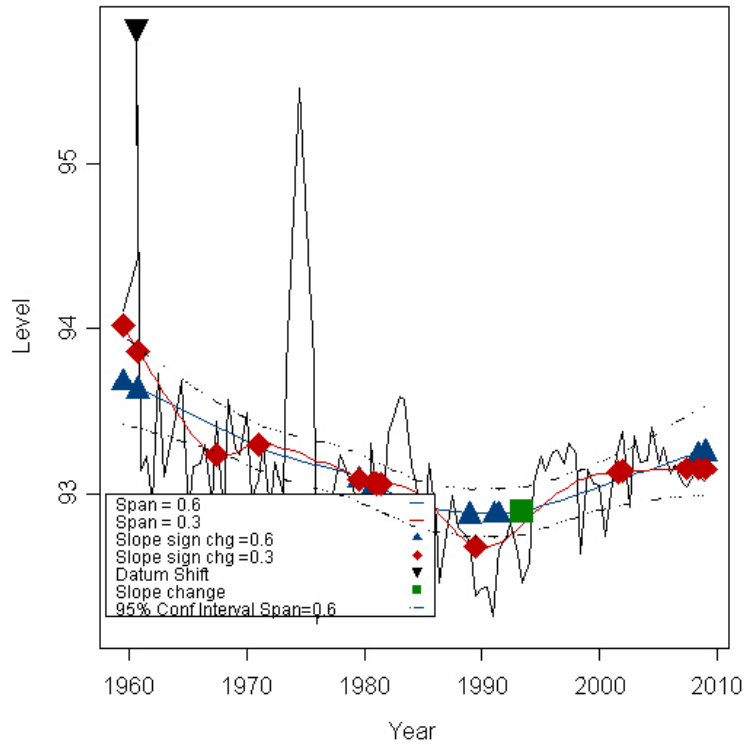
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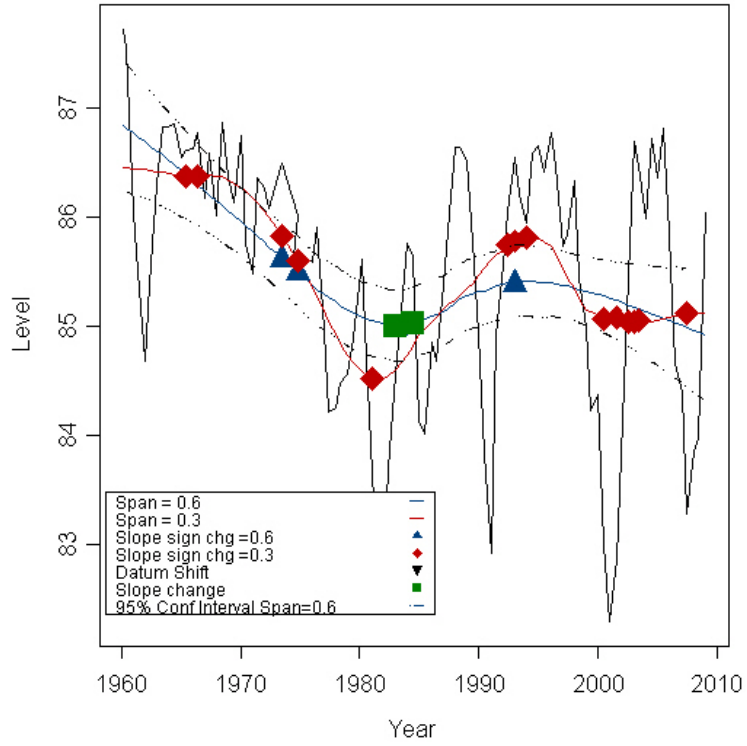
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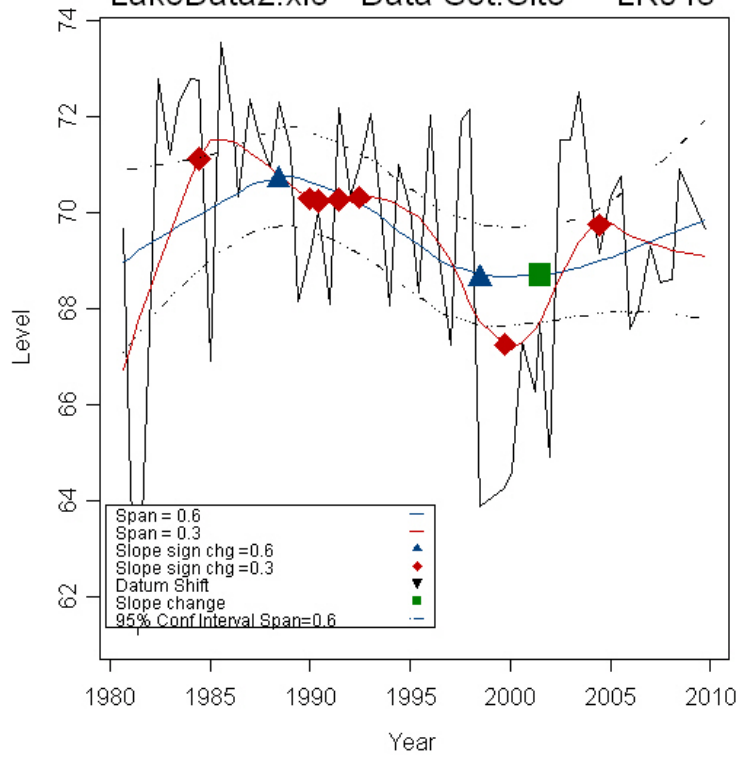
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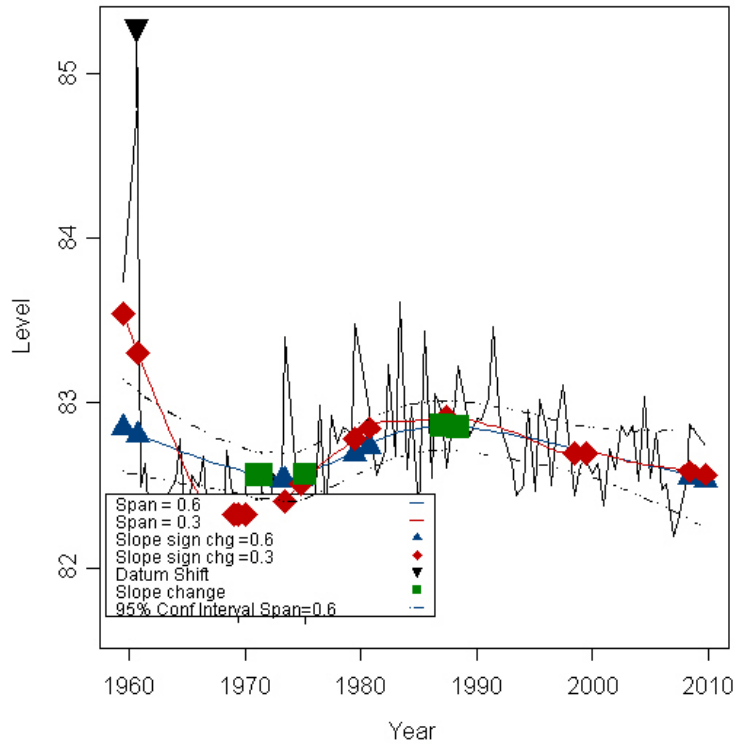
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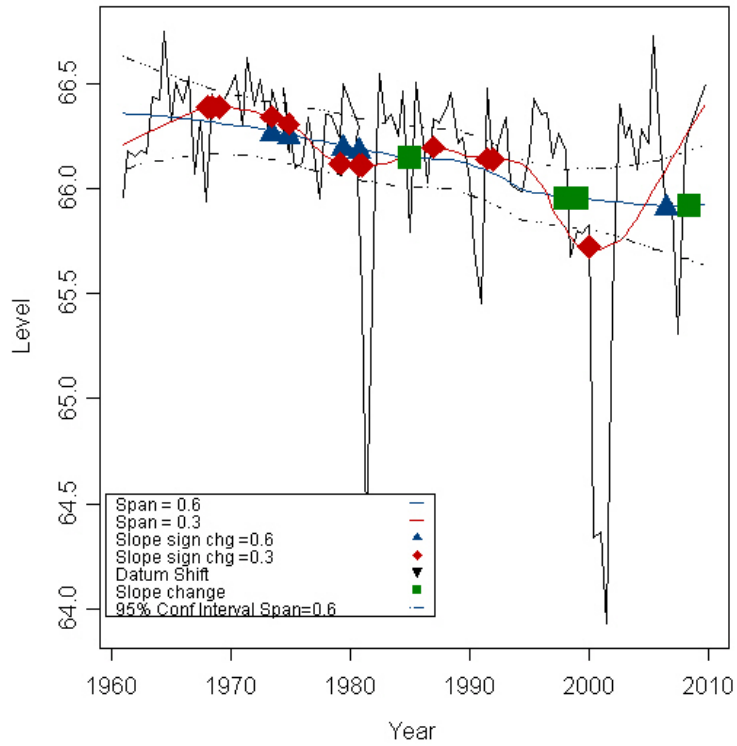
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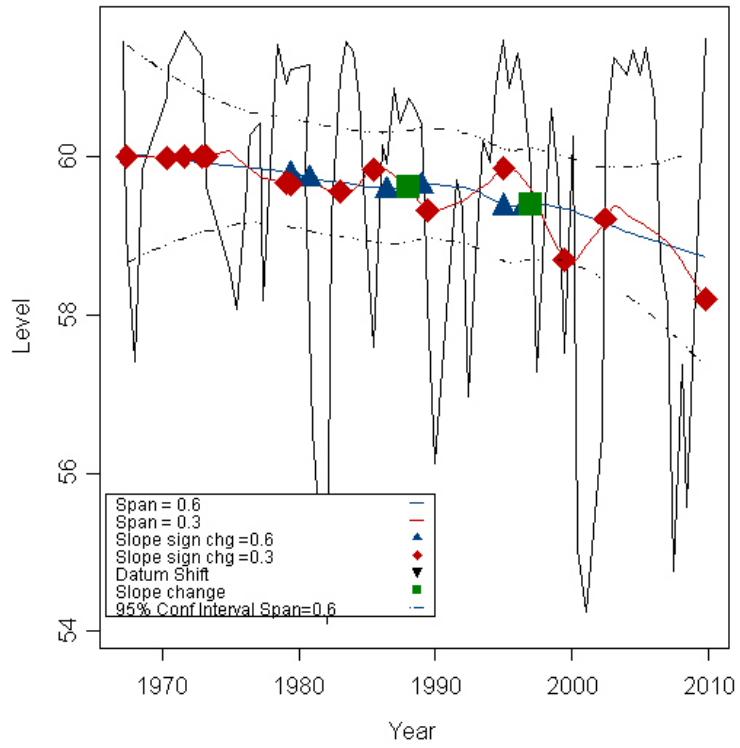
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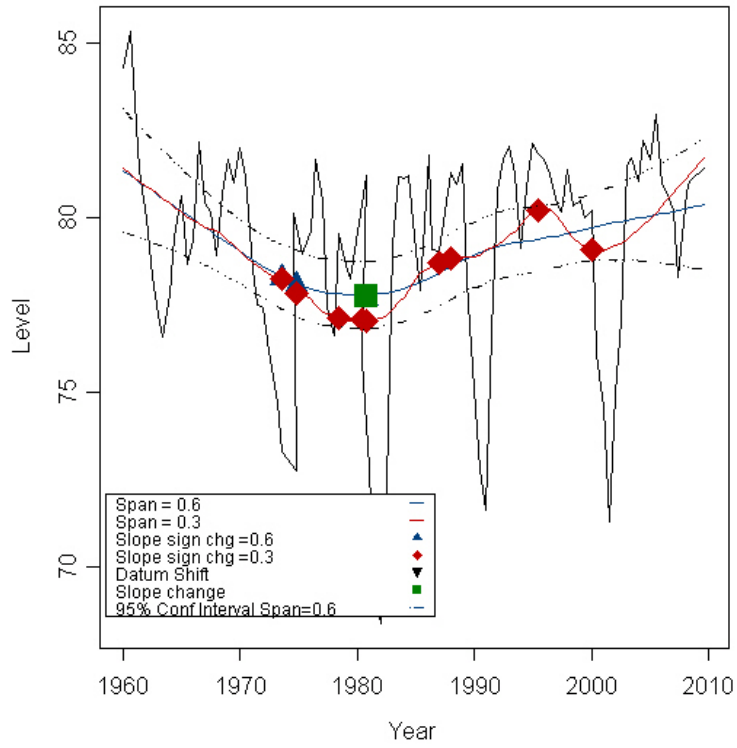
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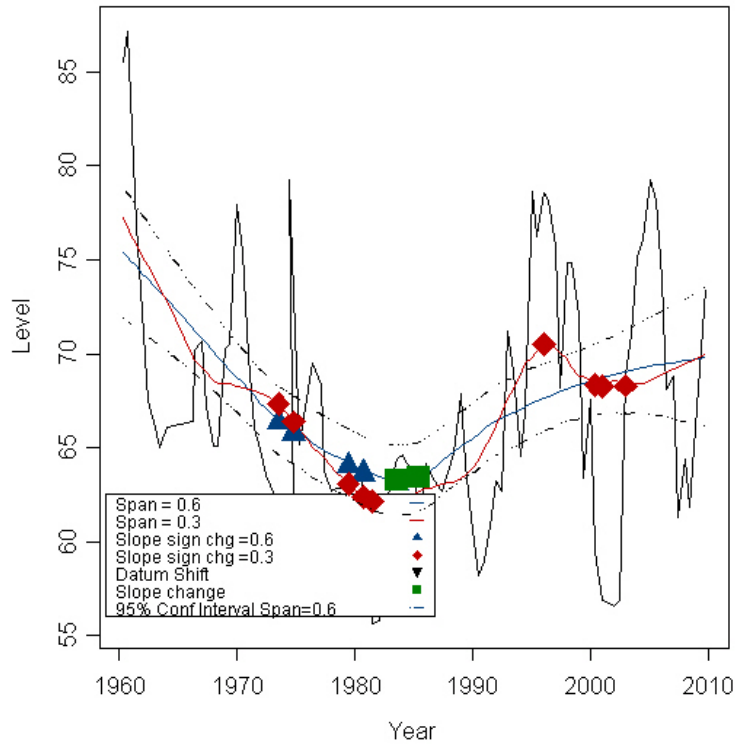
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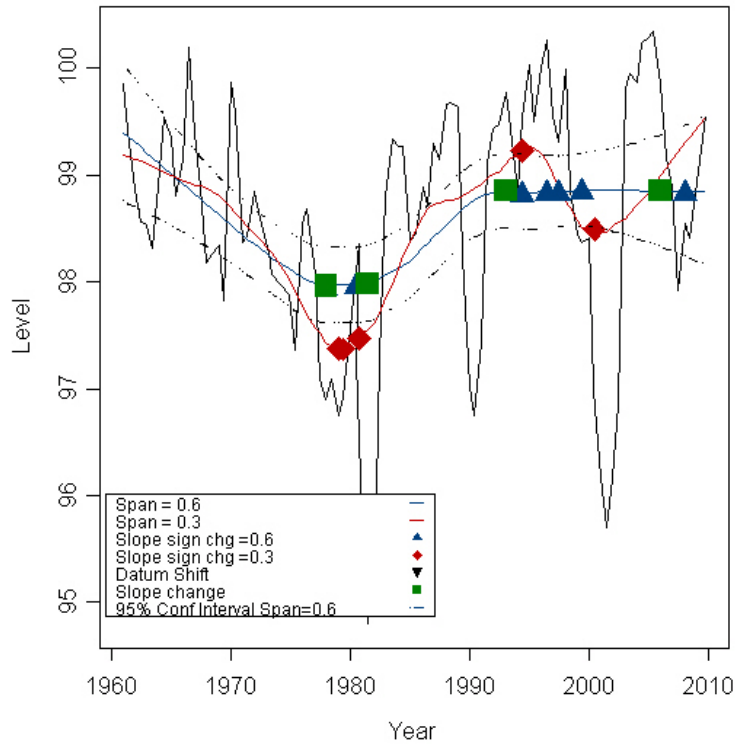
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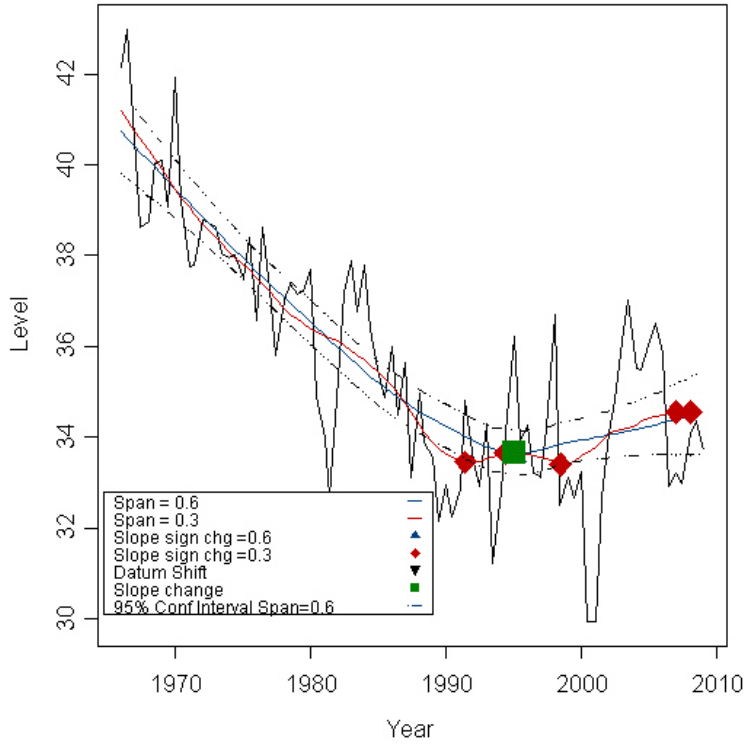


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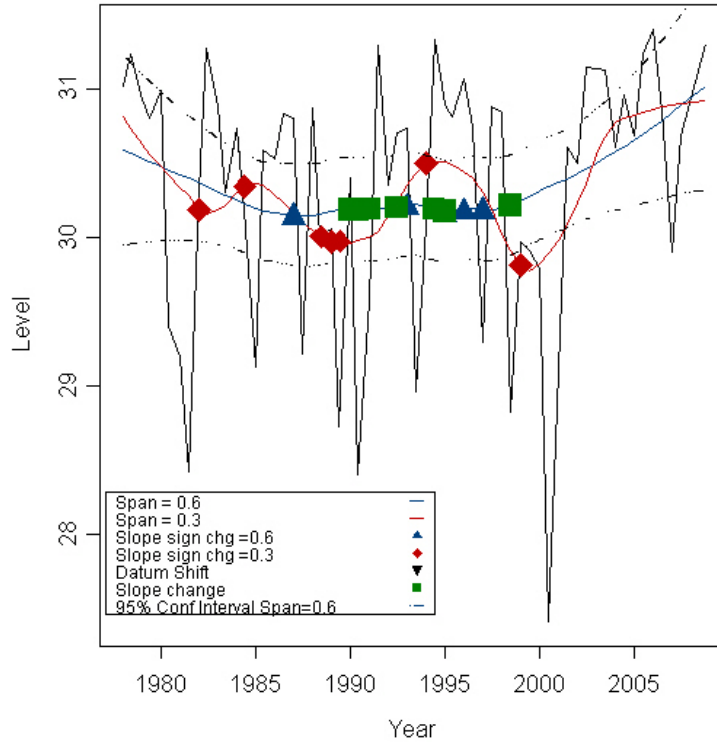


SJRWMD- Wells

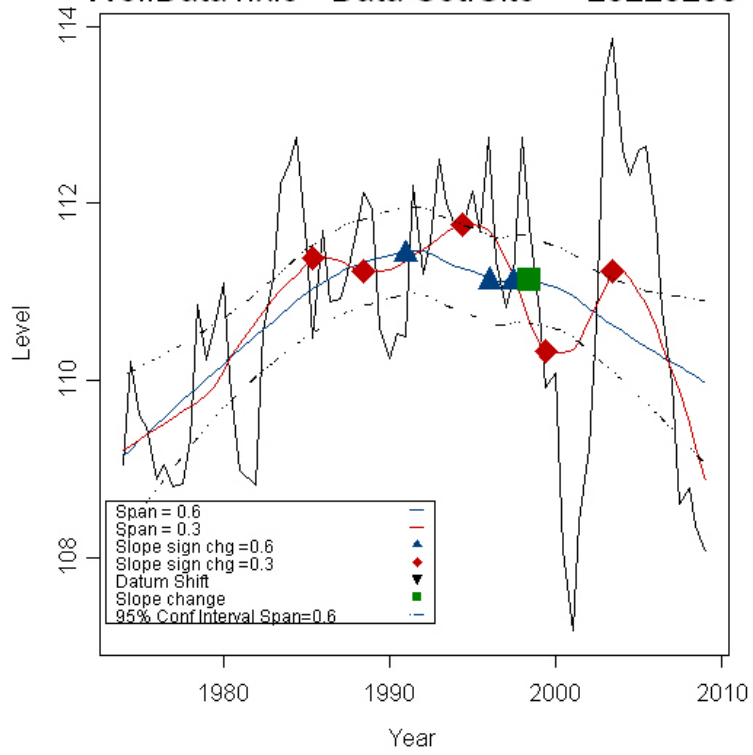
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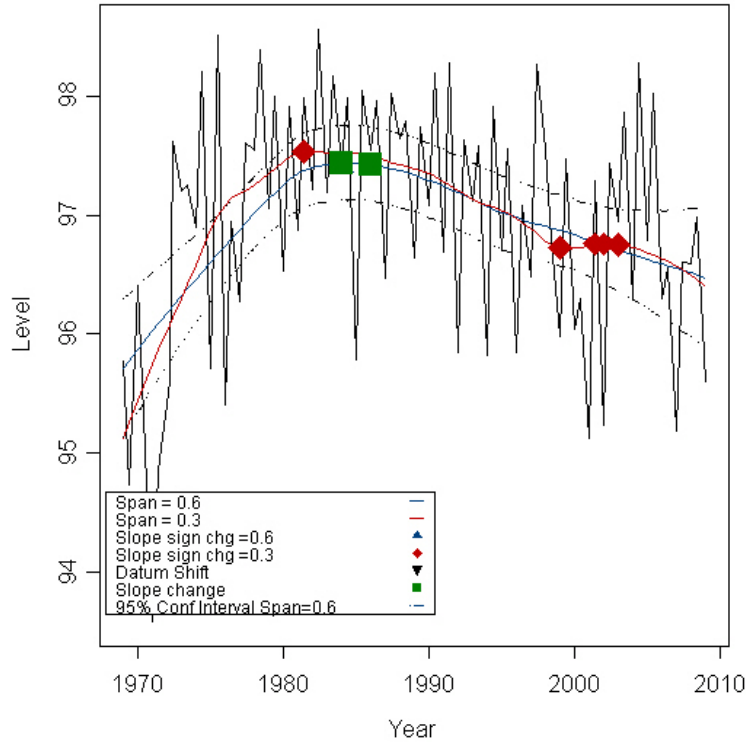
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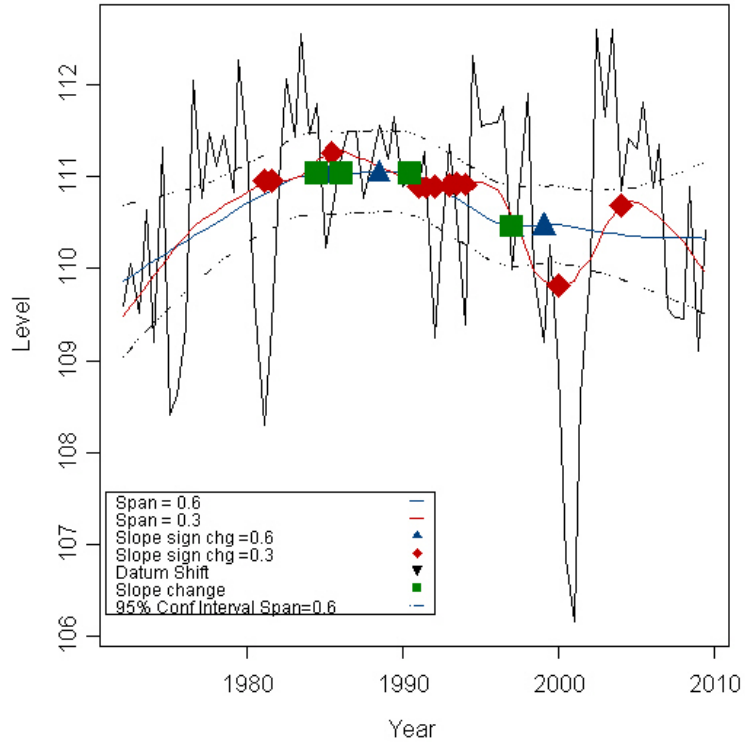
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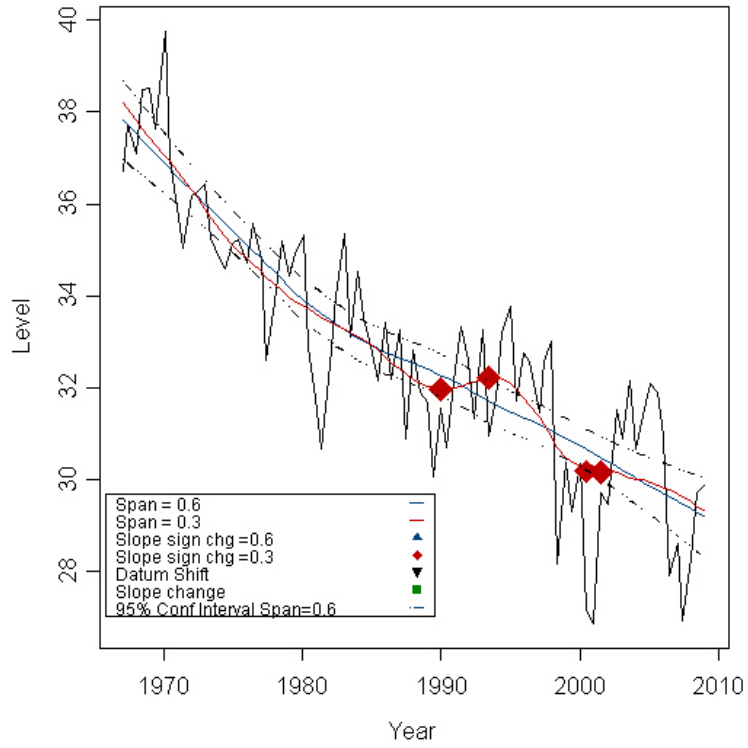
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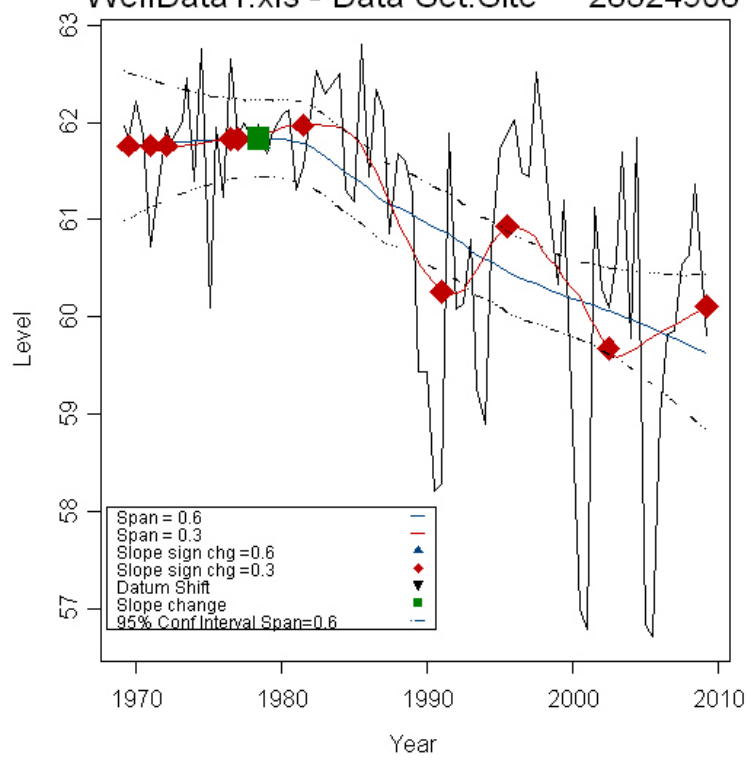
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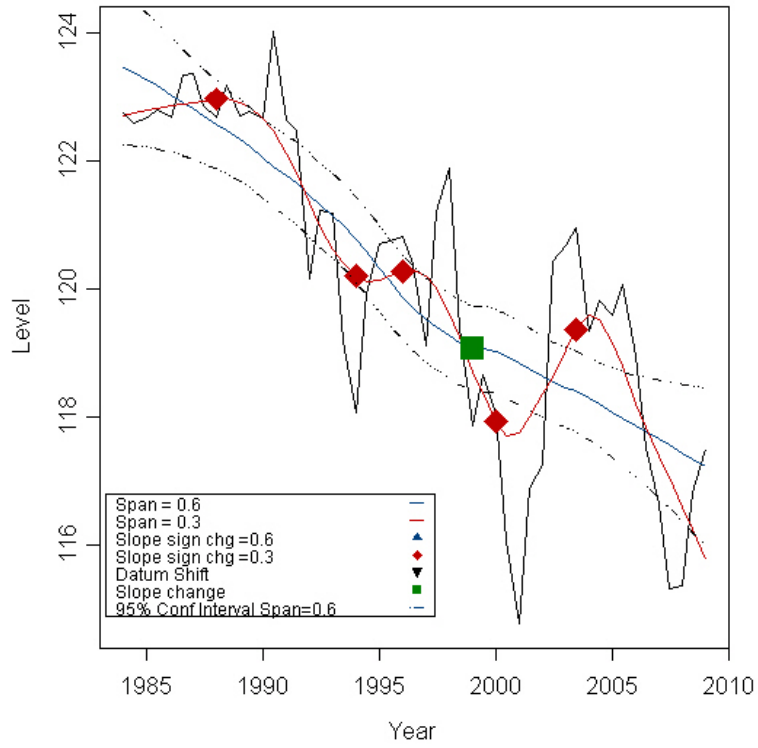
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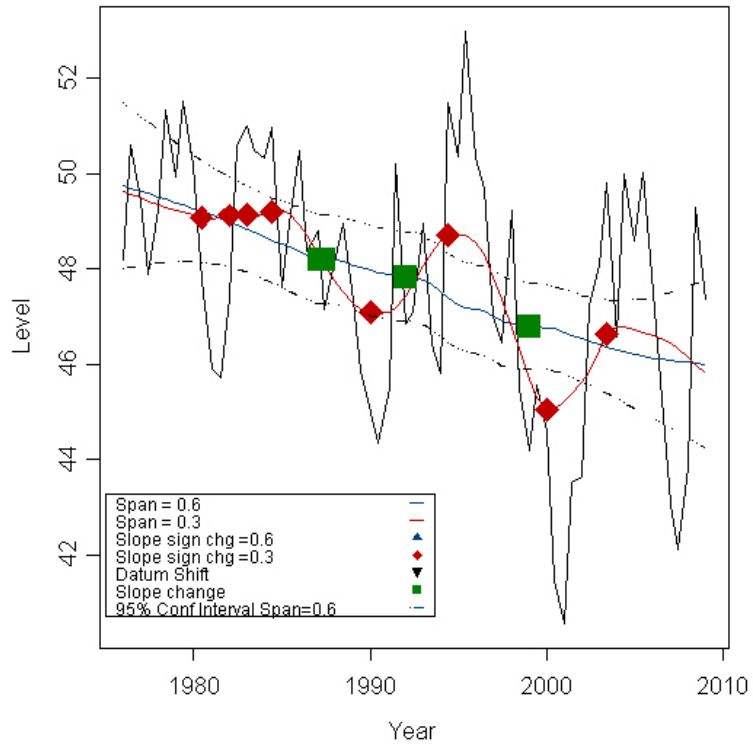
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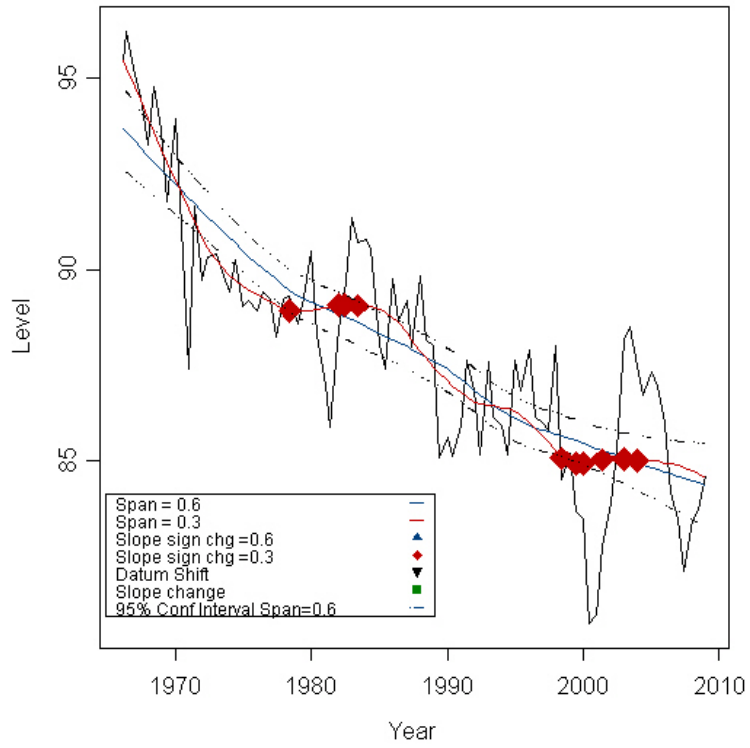
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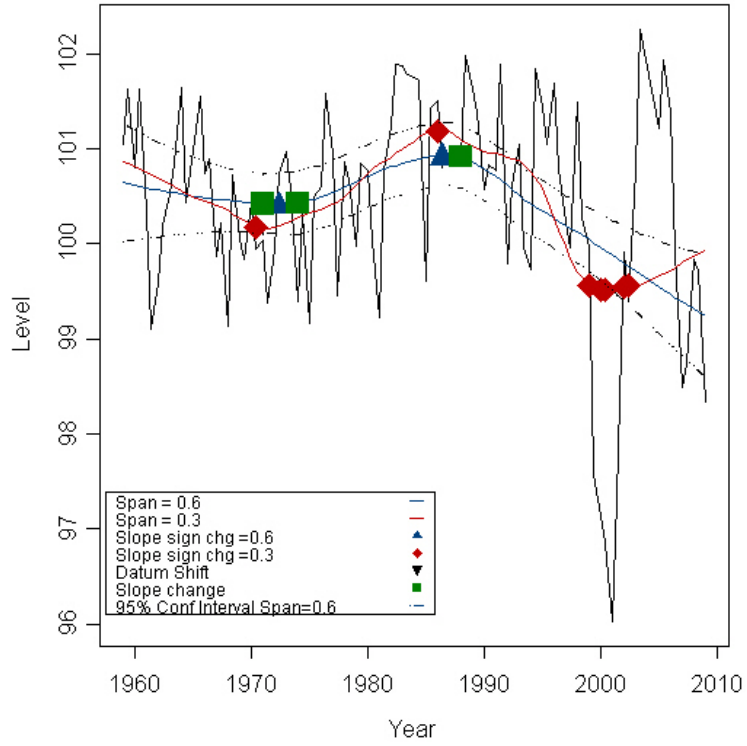
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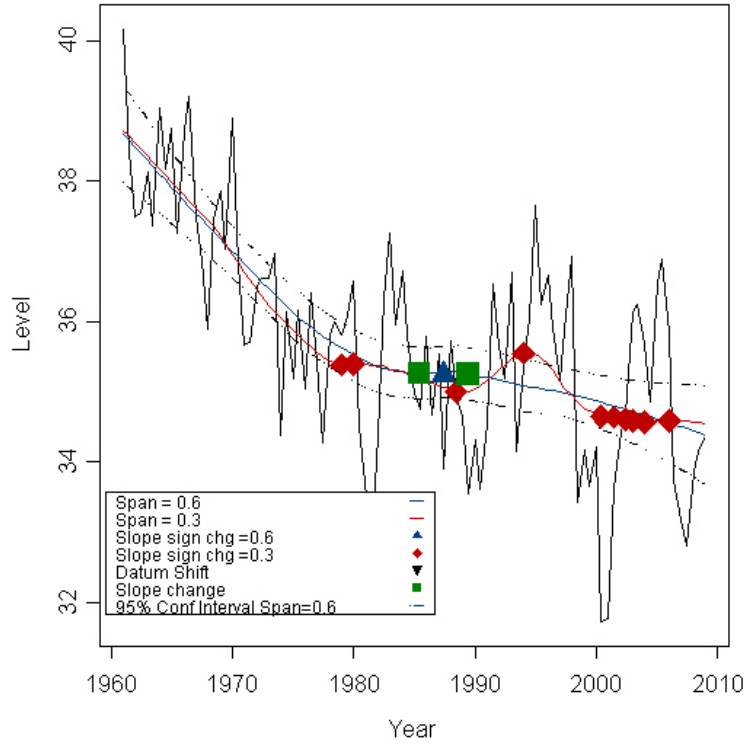
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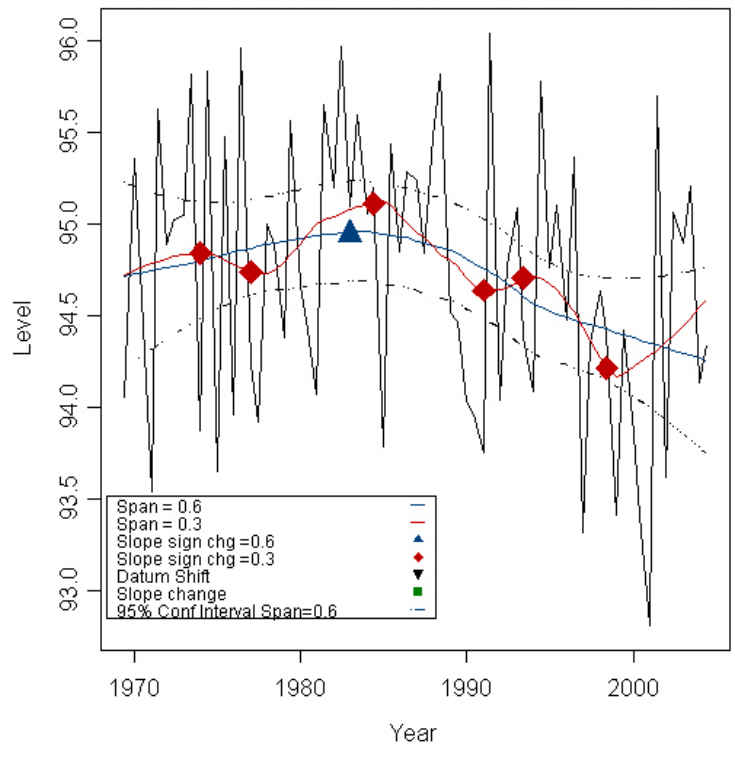
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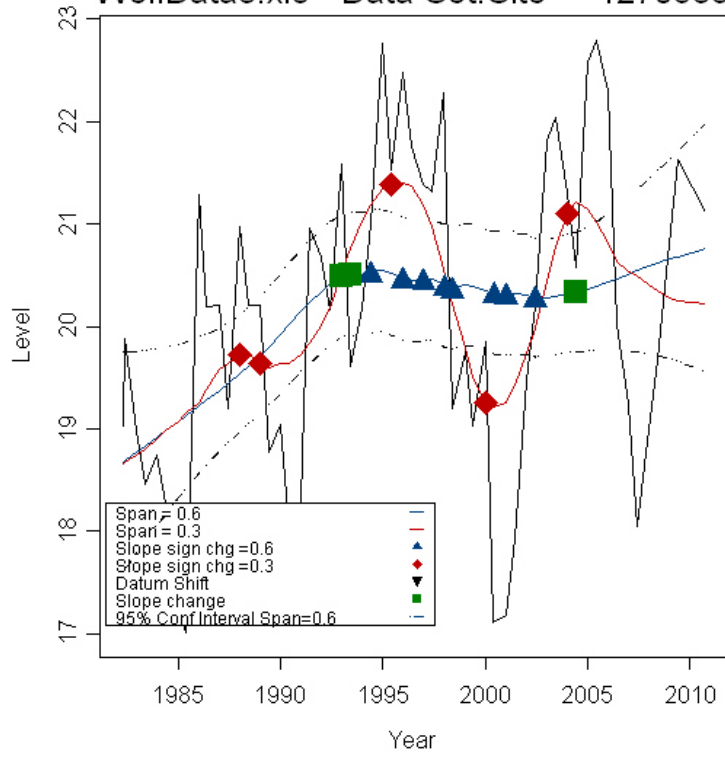
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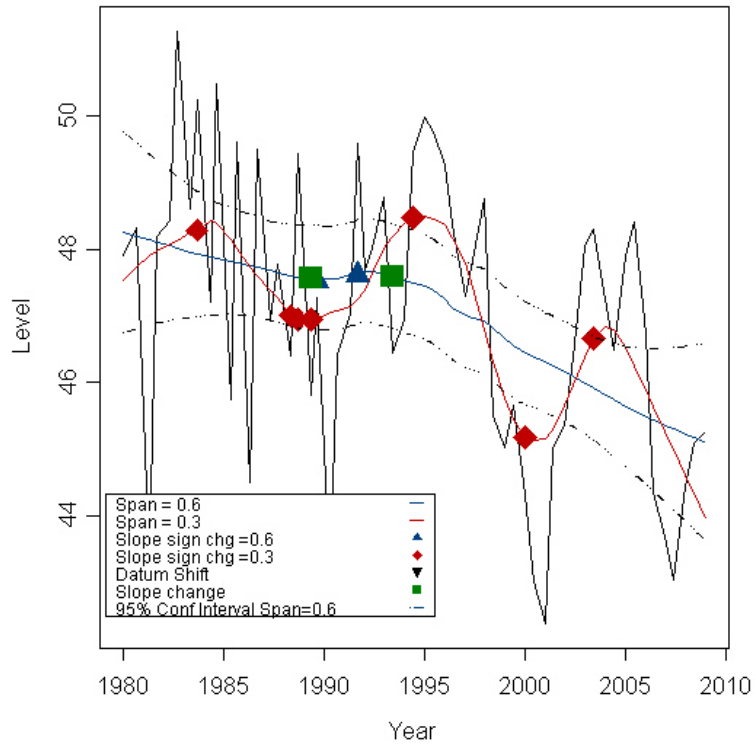
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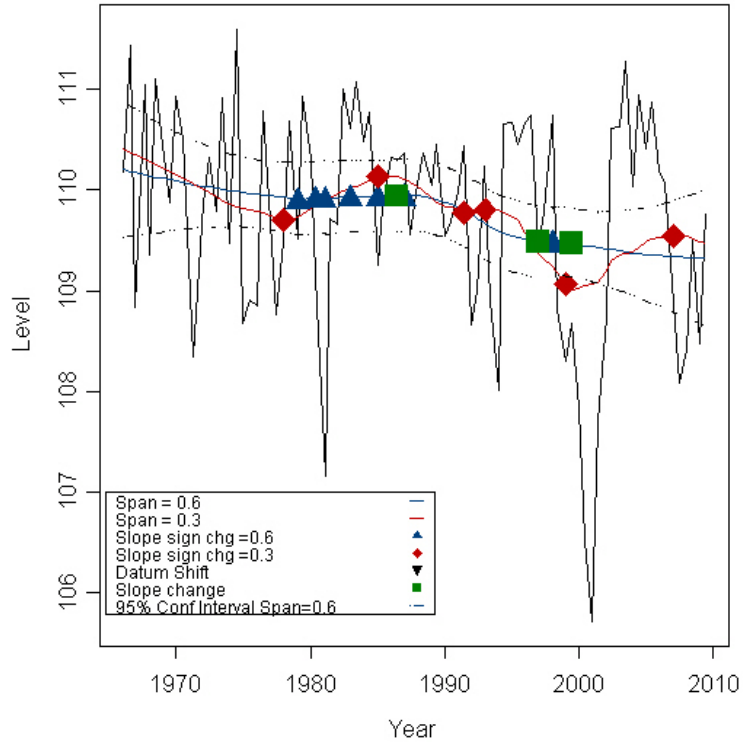
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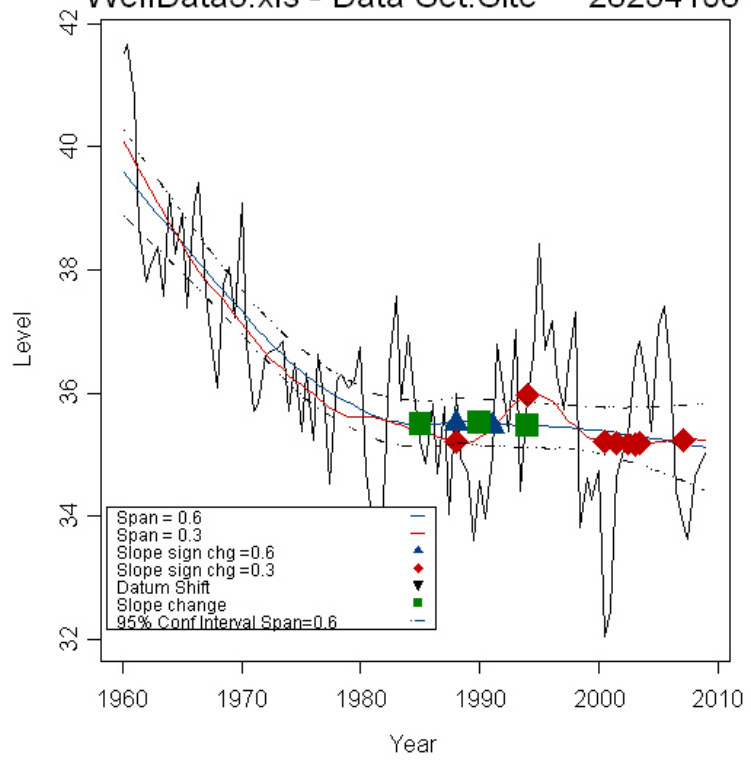
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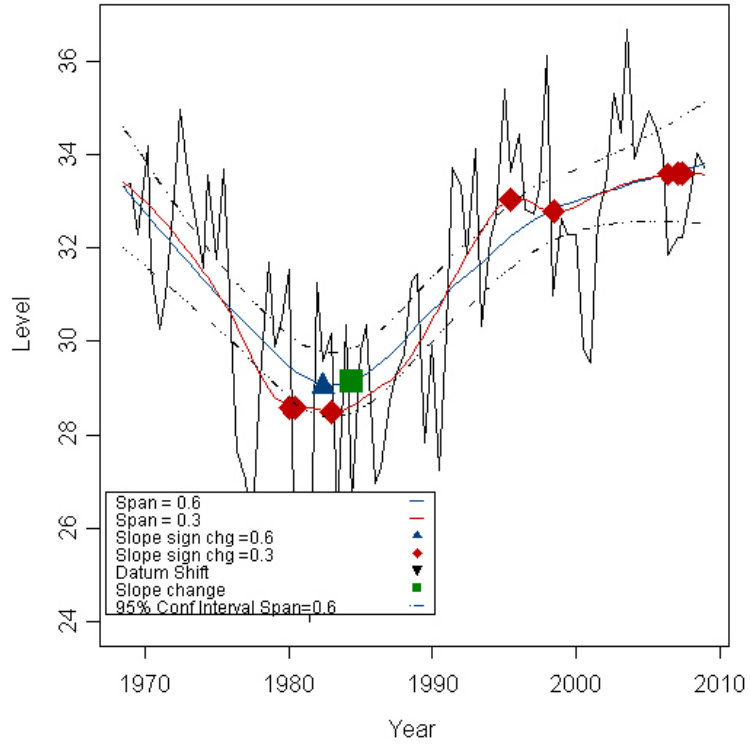
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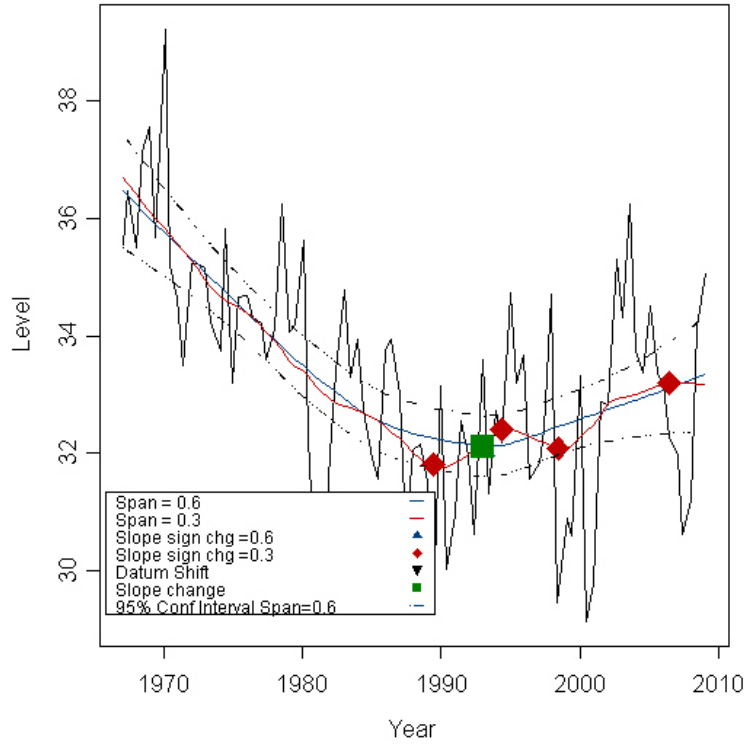
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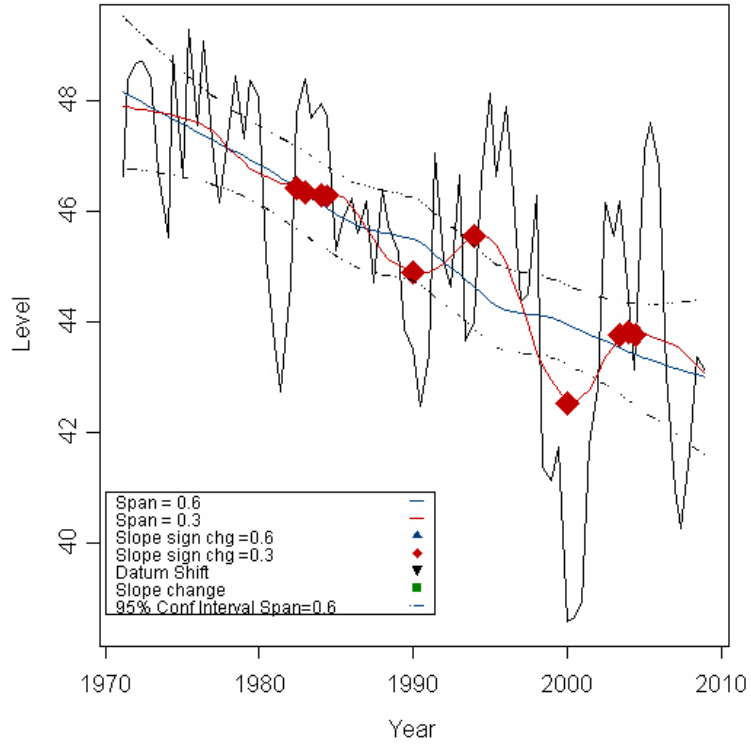
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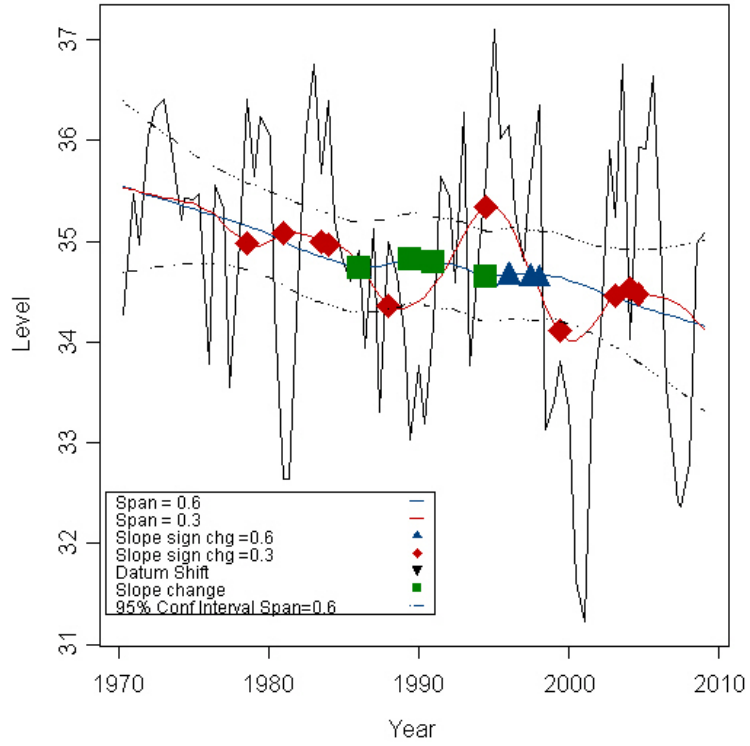
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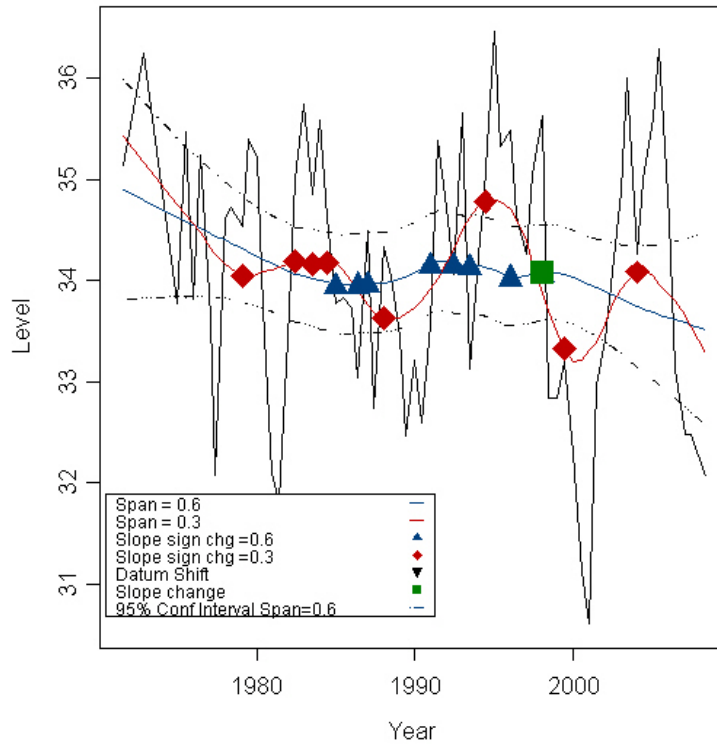
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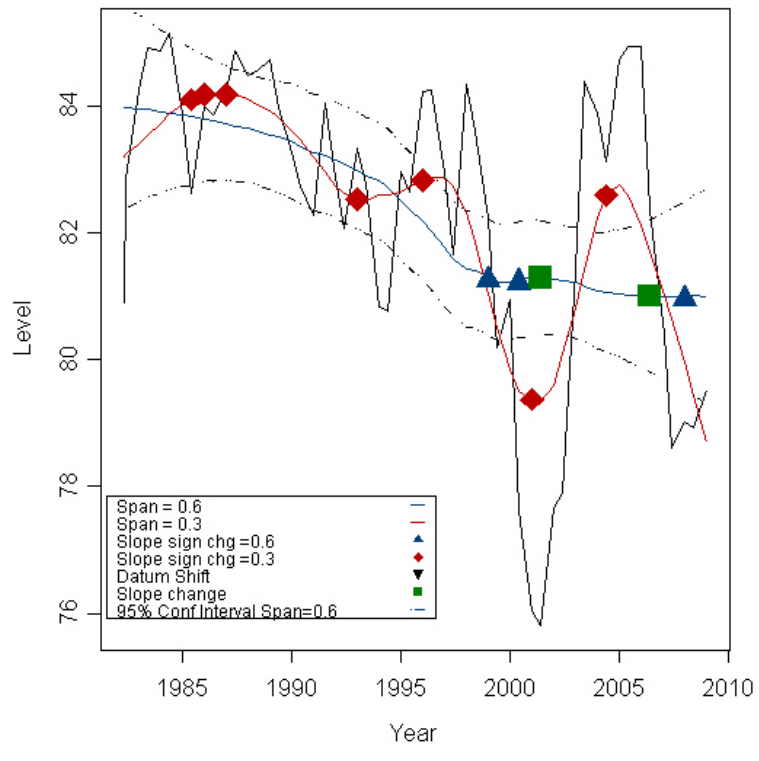
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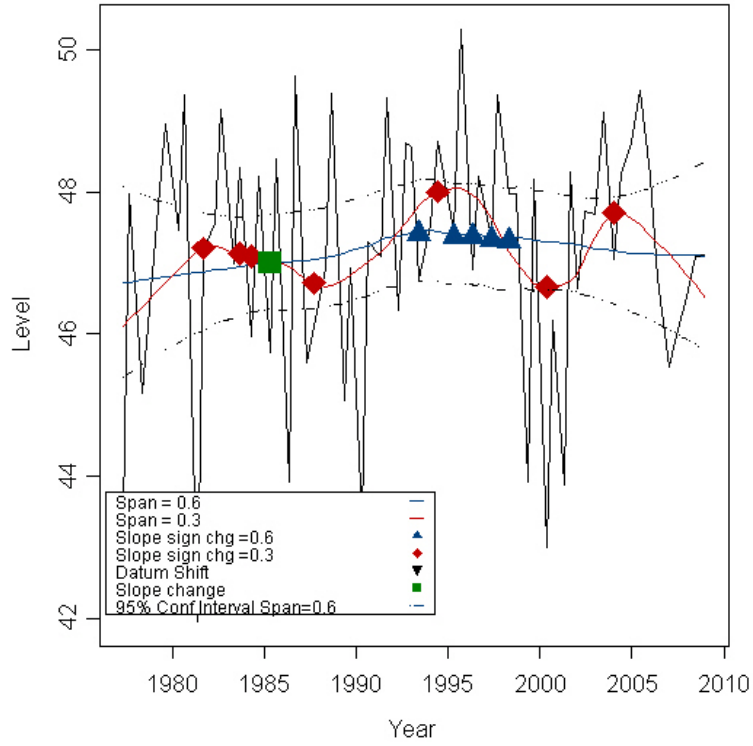
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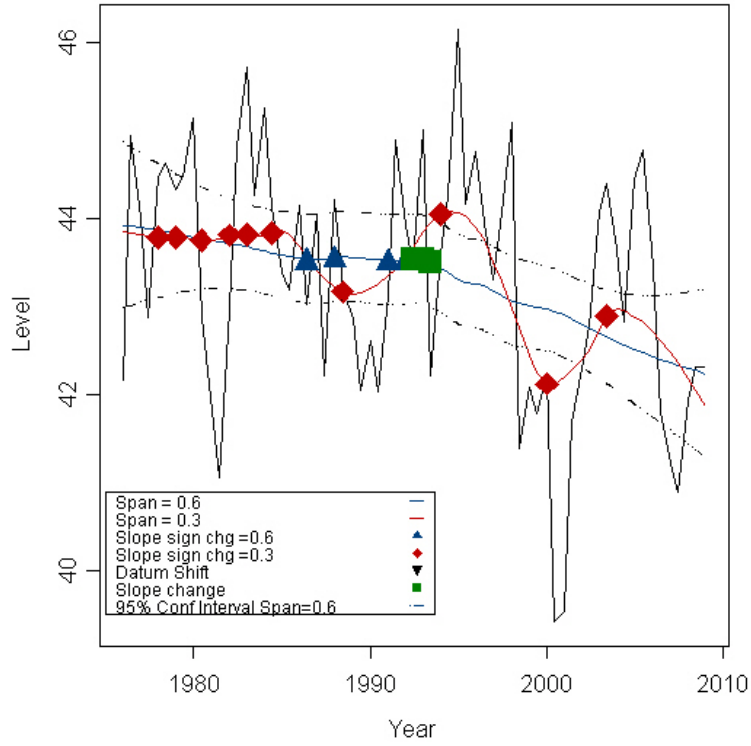
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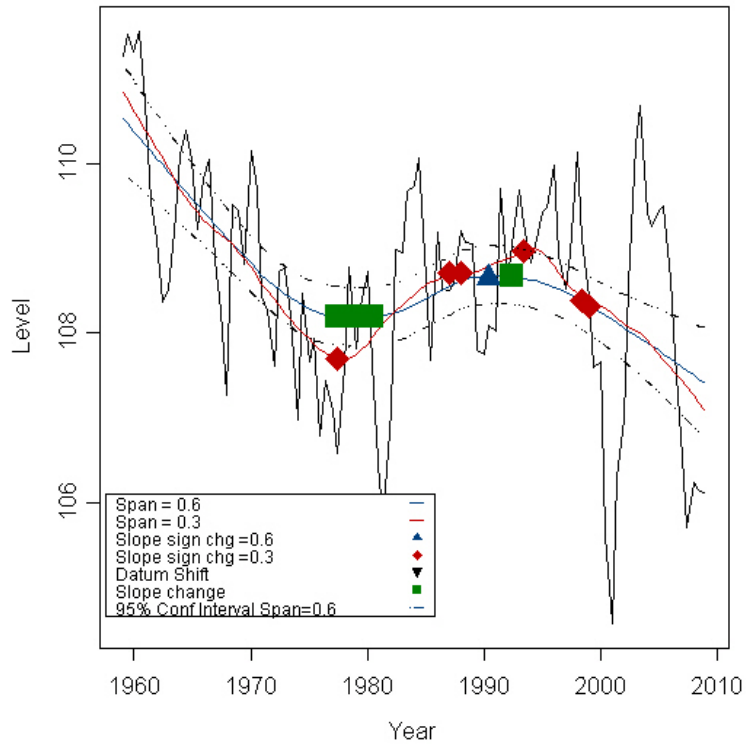
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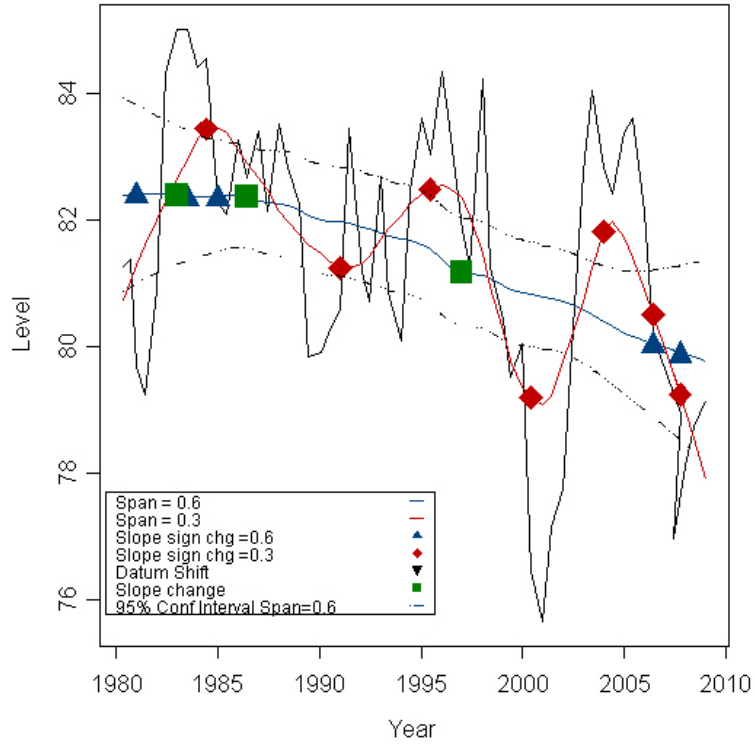
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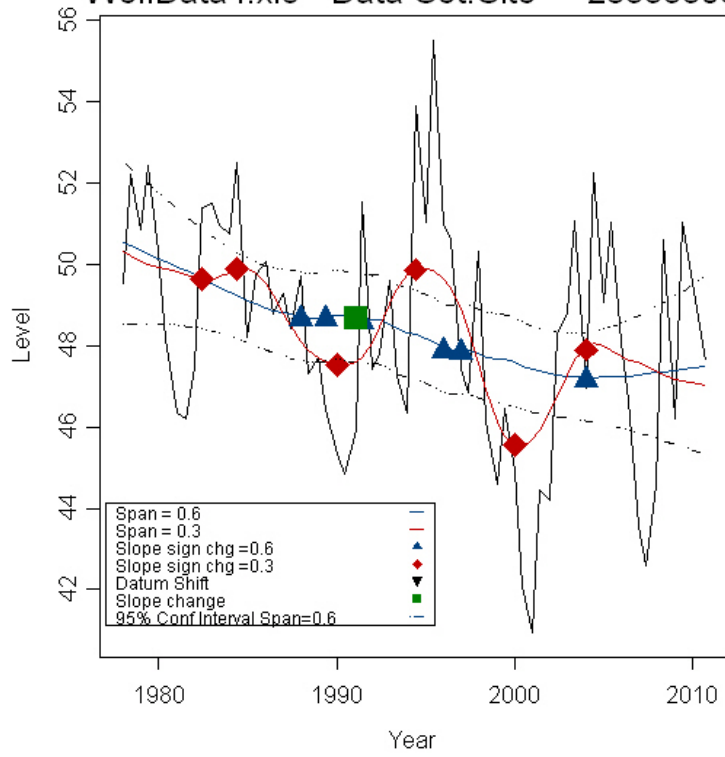
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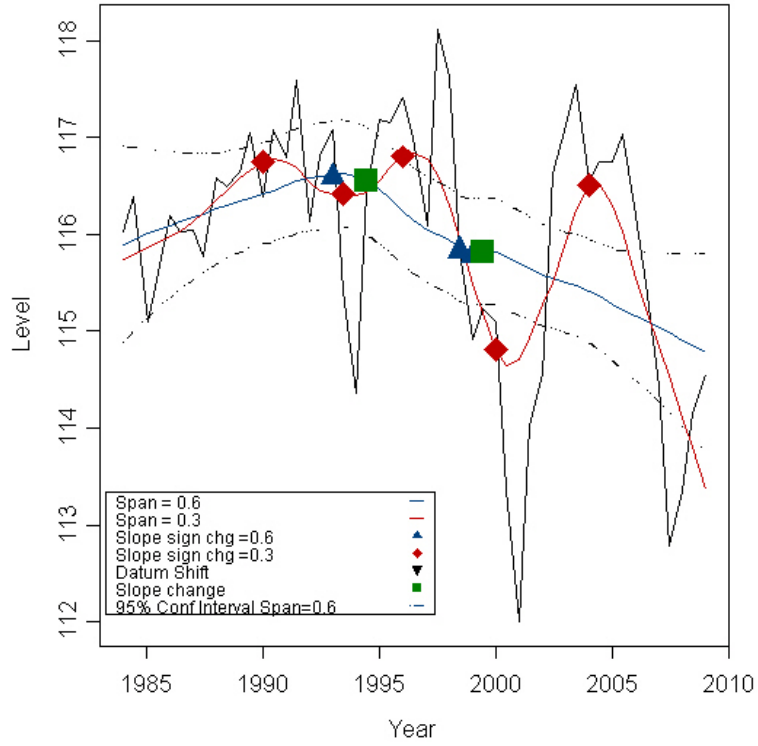
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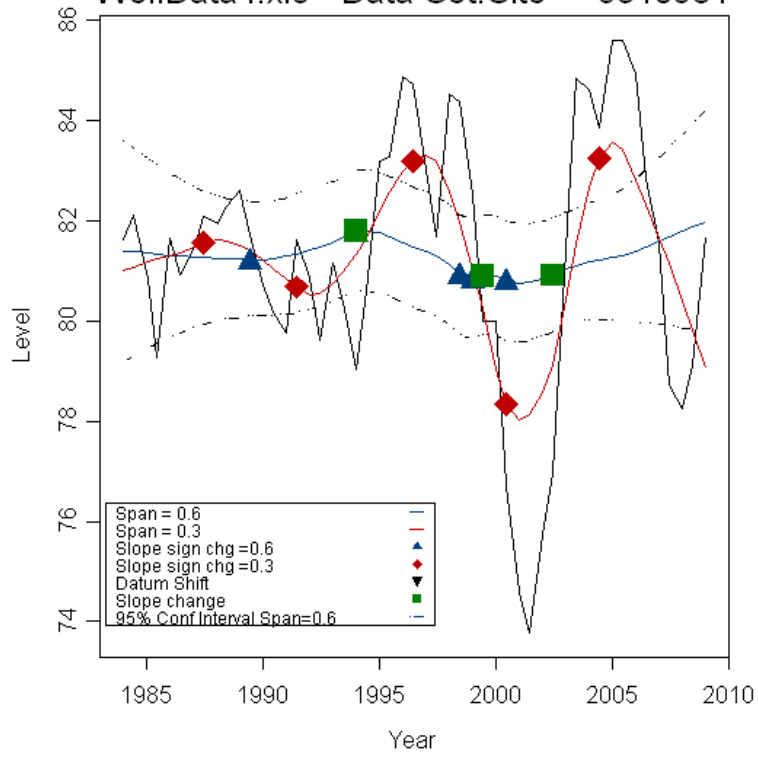
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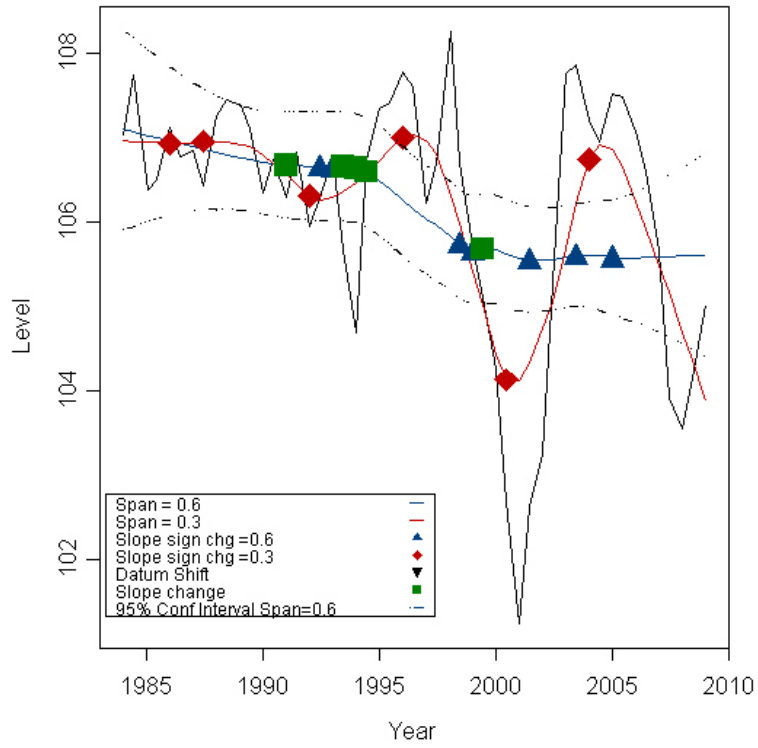
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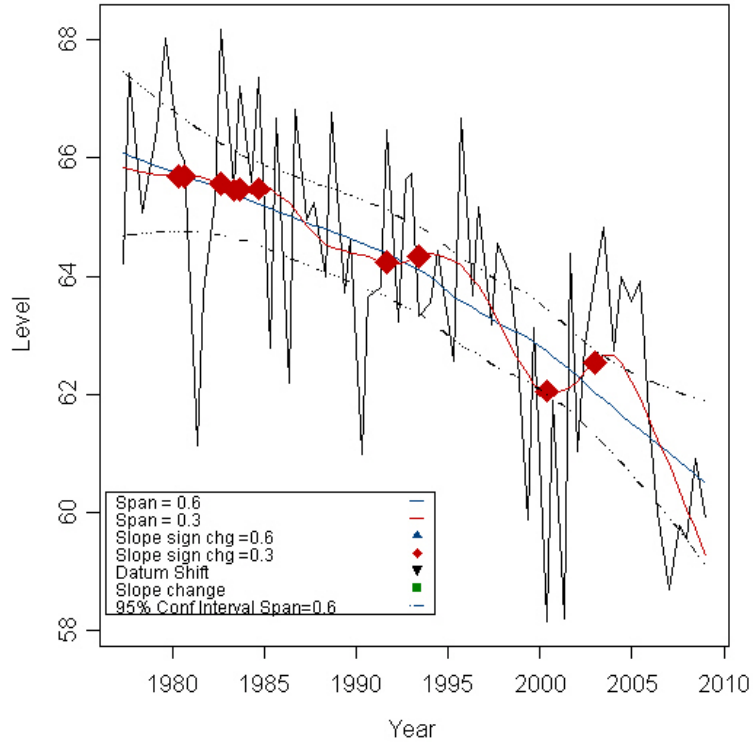
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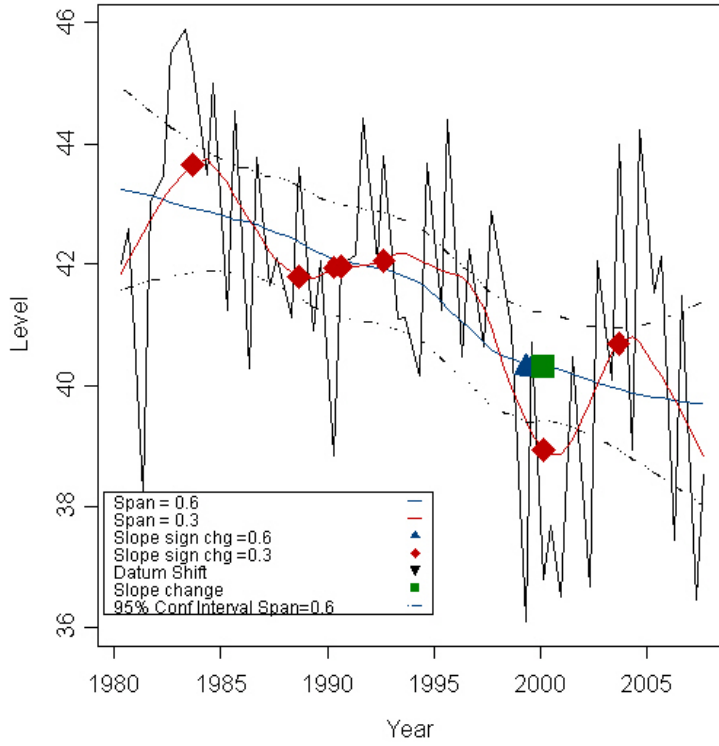
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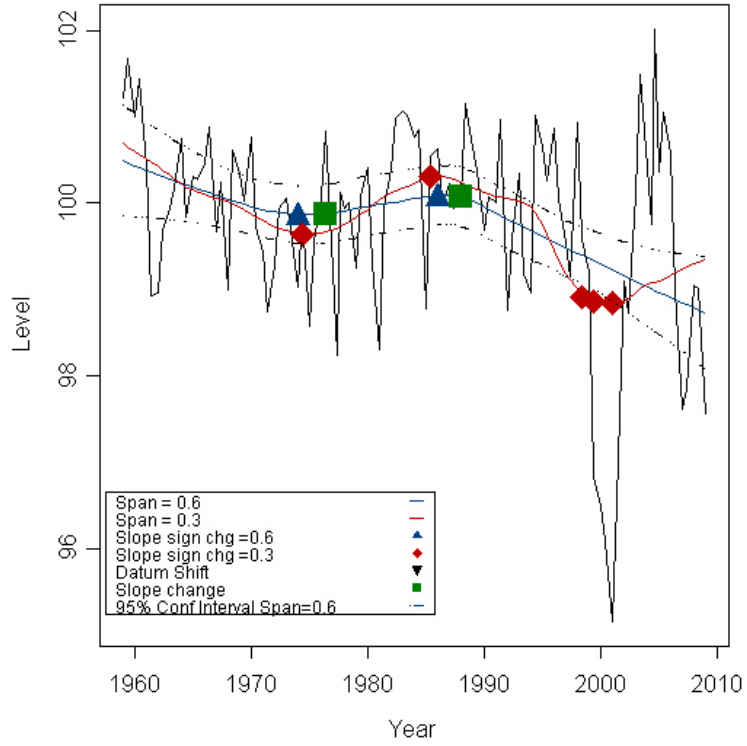
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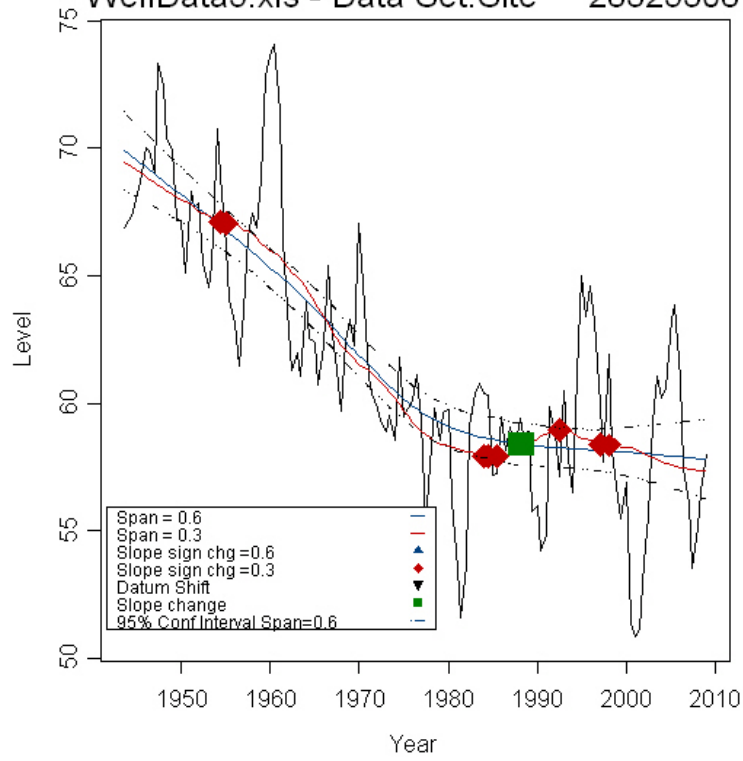
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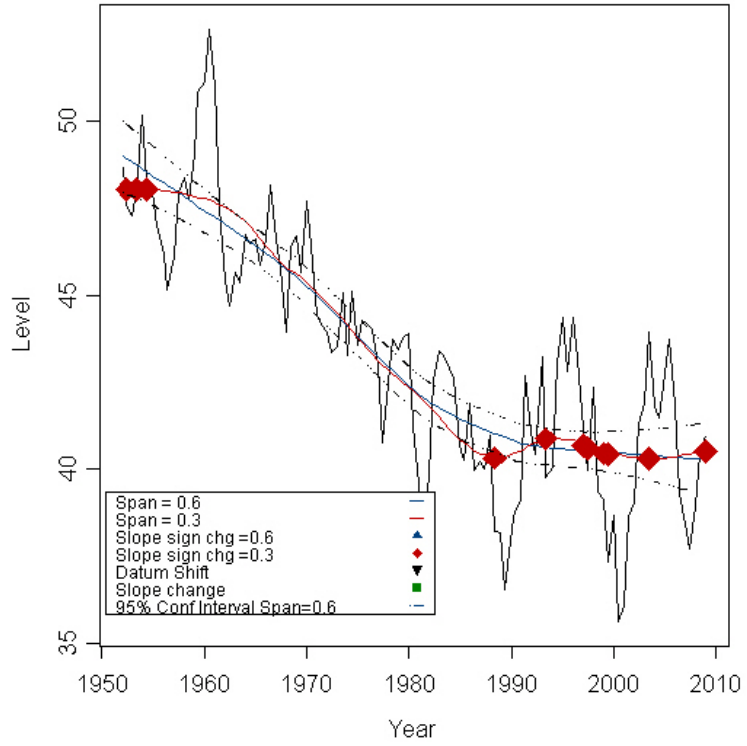
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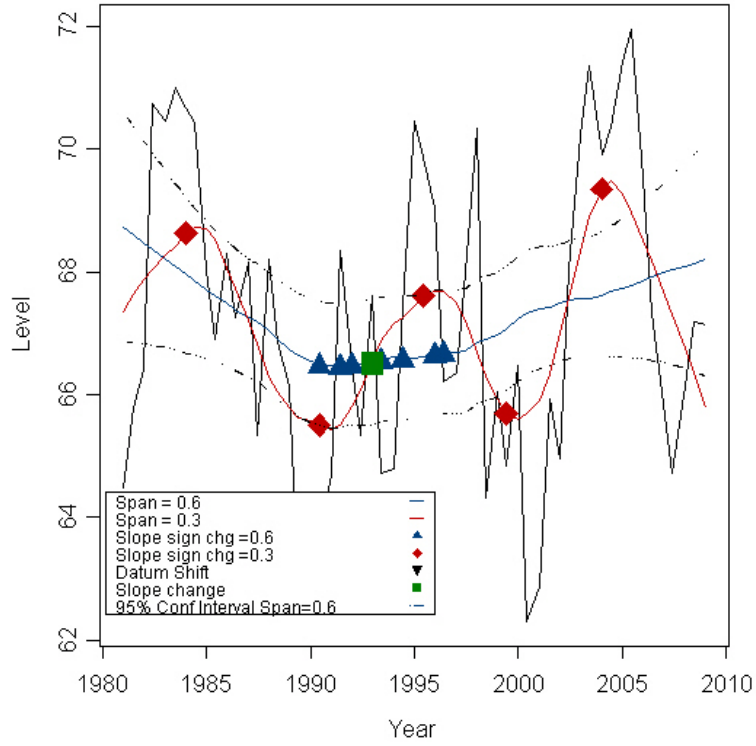
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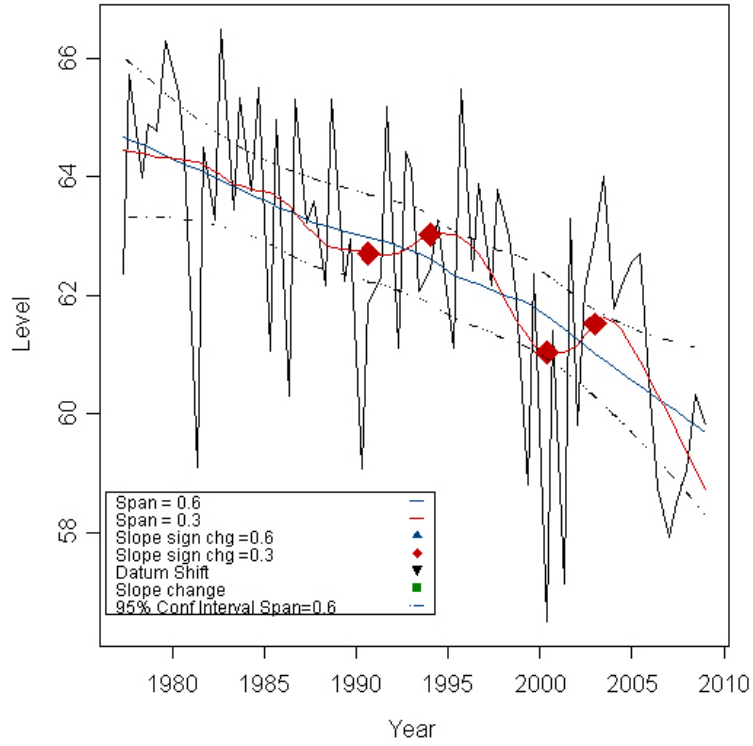
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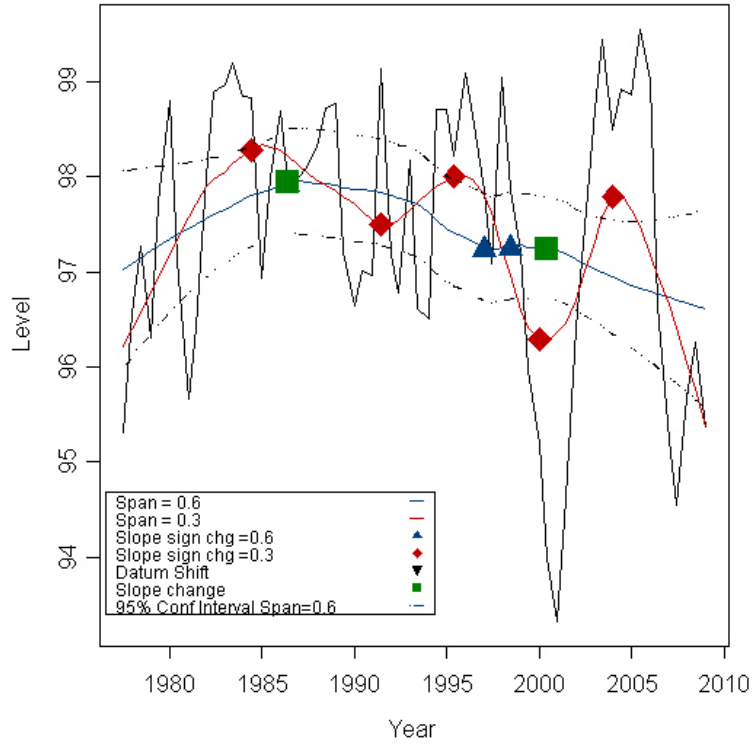
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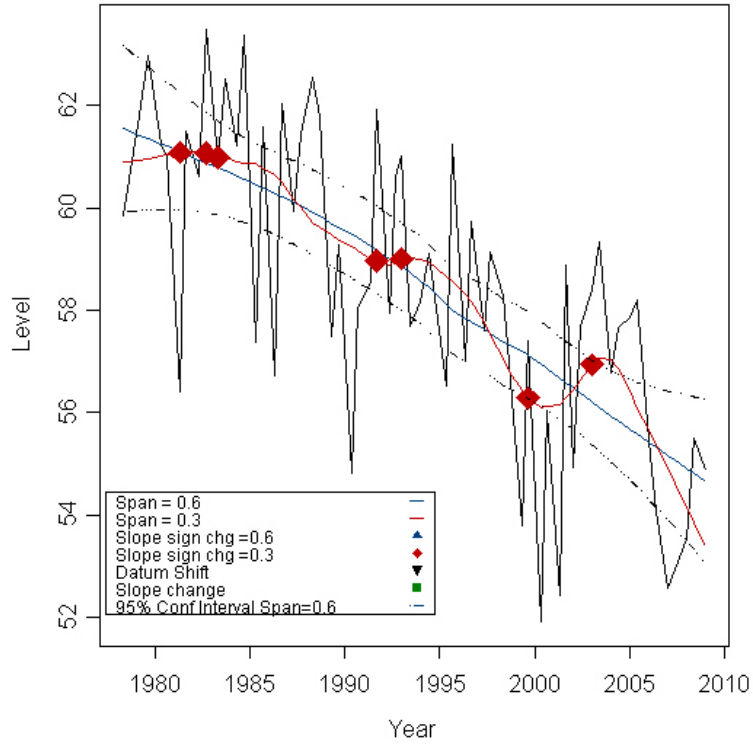
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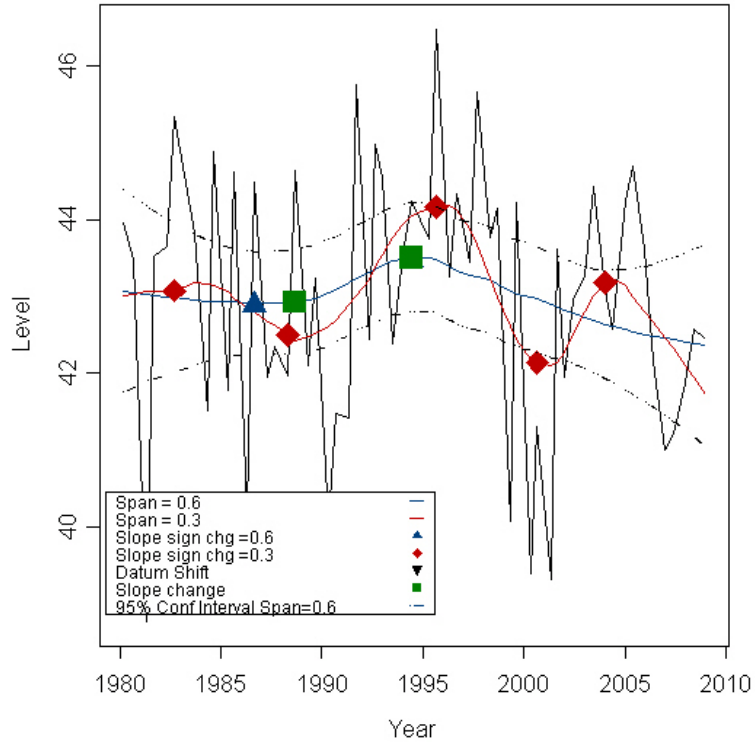
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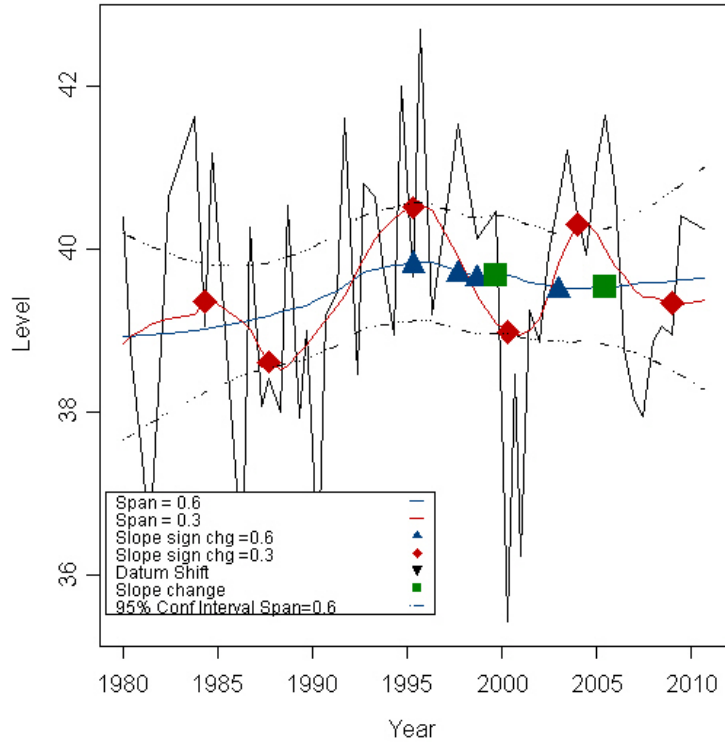
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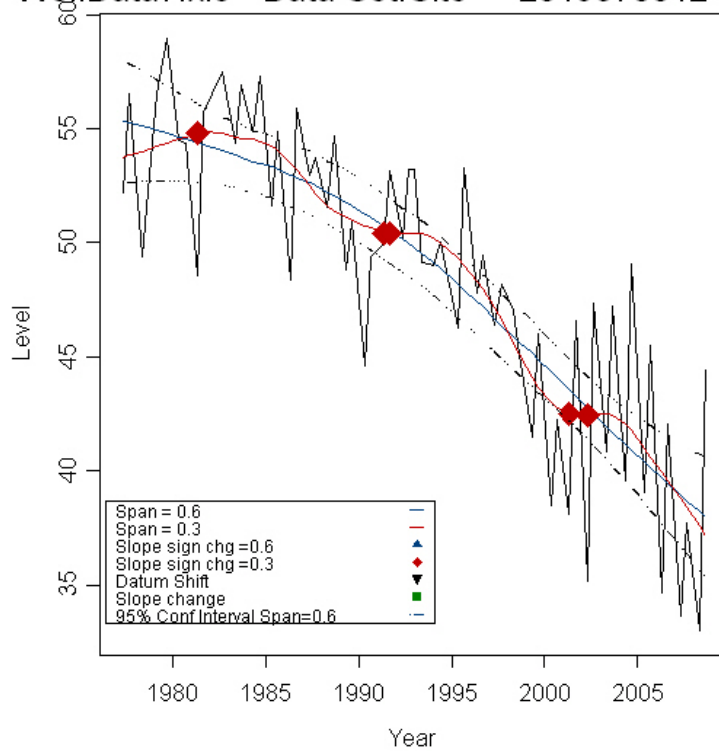
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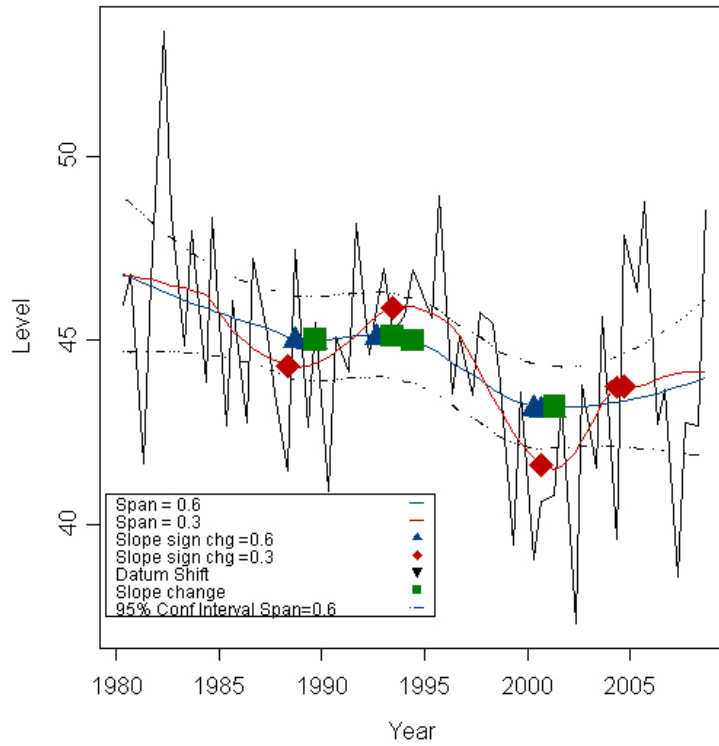
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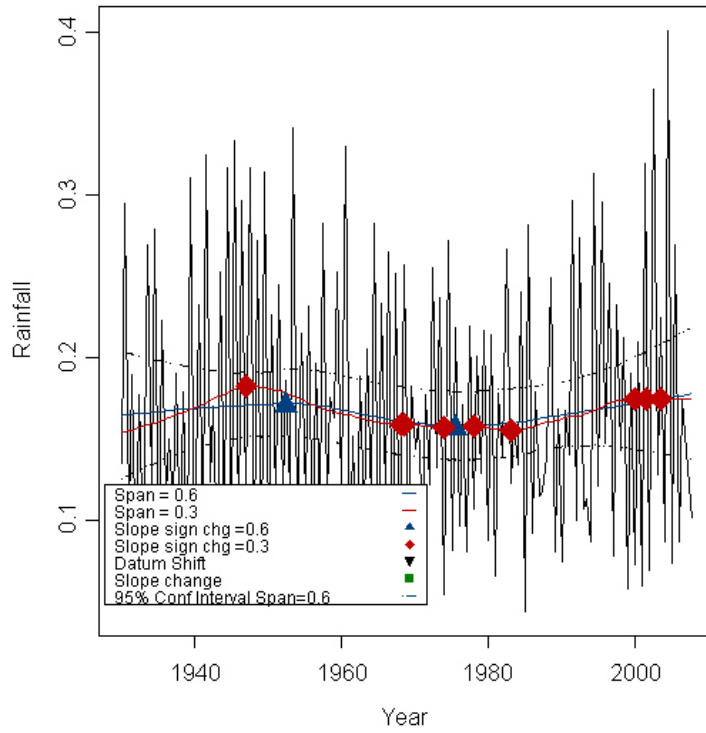


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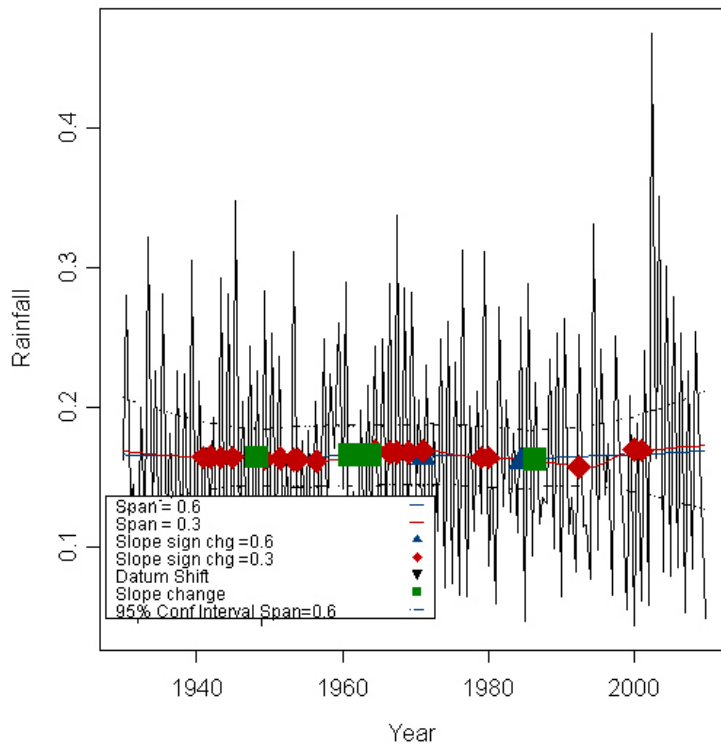


SJRWMD- Rainfall

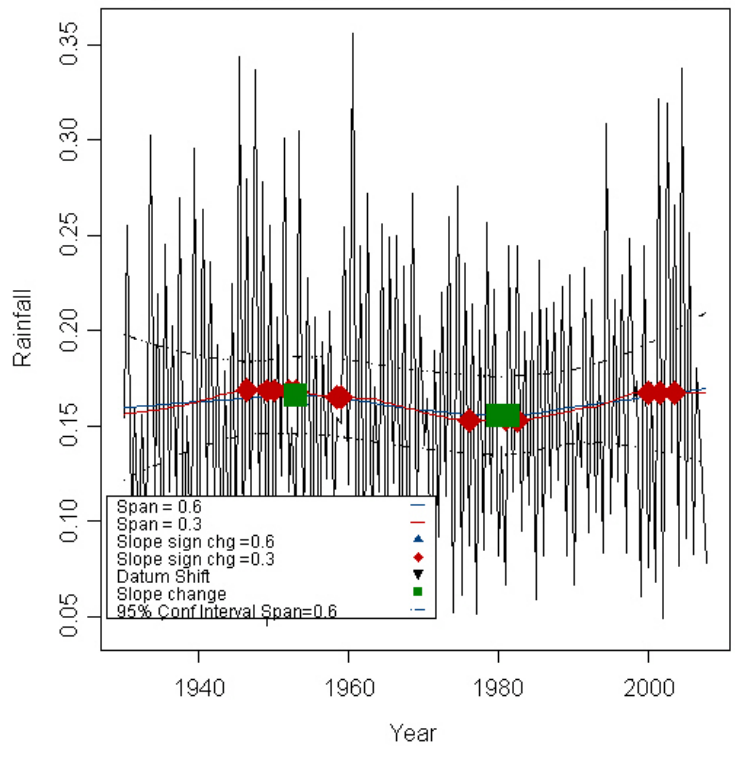
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RainData2.xls - Data Set: Site 7982



LOWESS Smoothers
RainData1.xls - Data Set: Site 1641

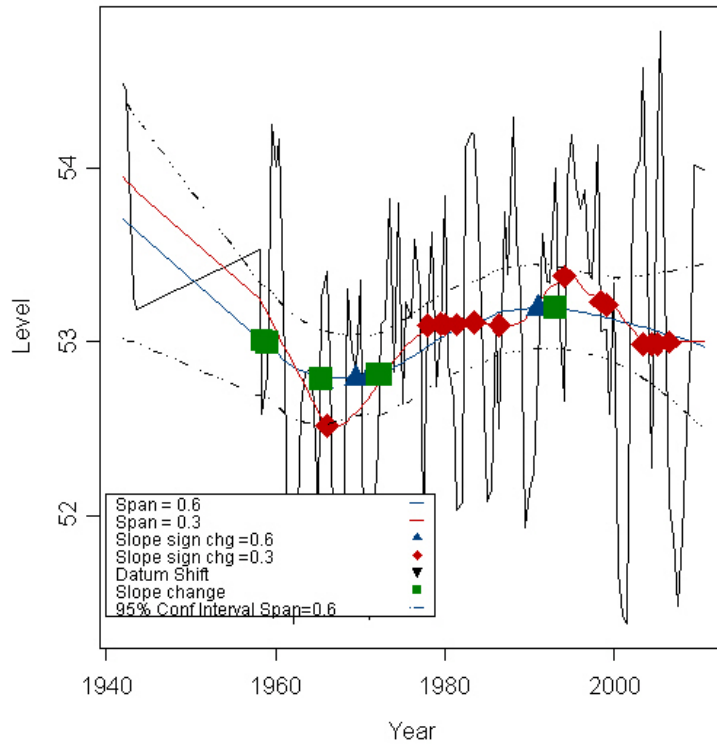


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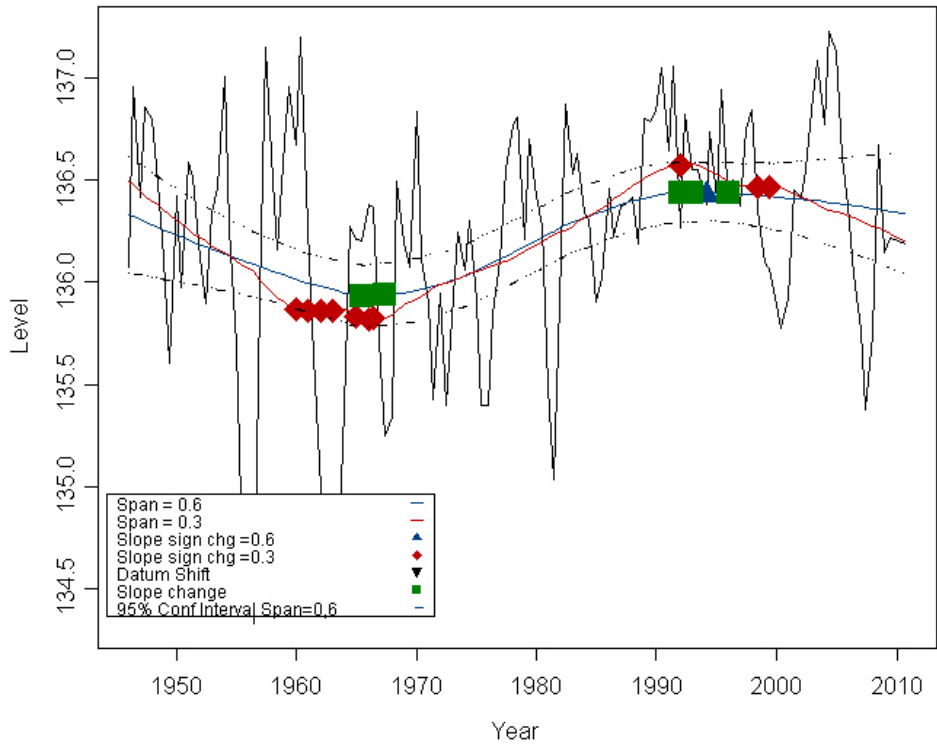


SWFWMD- Lakes

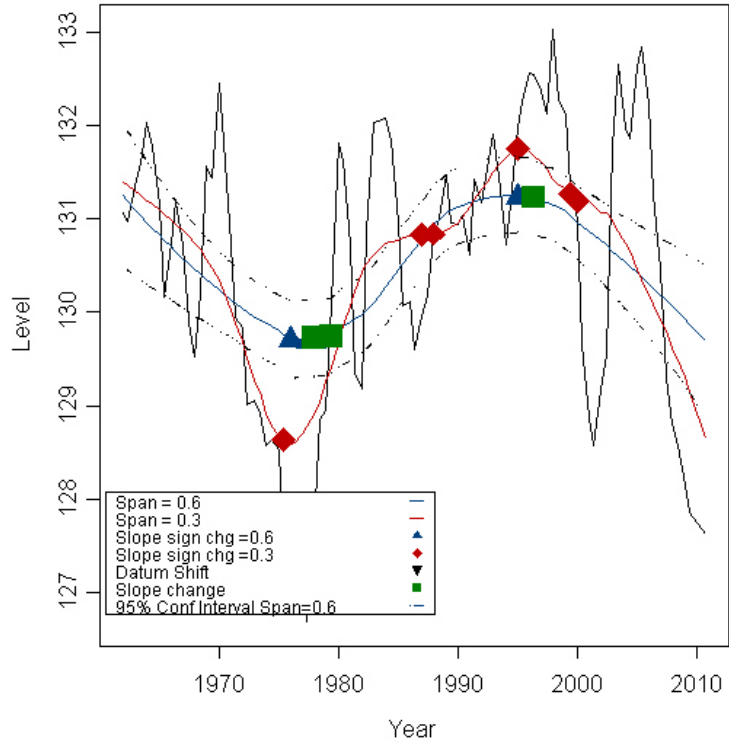
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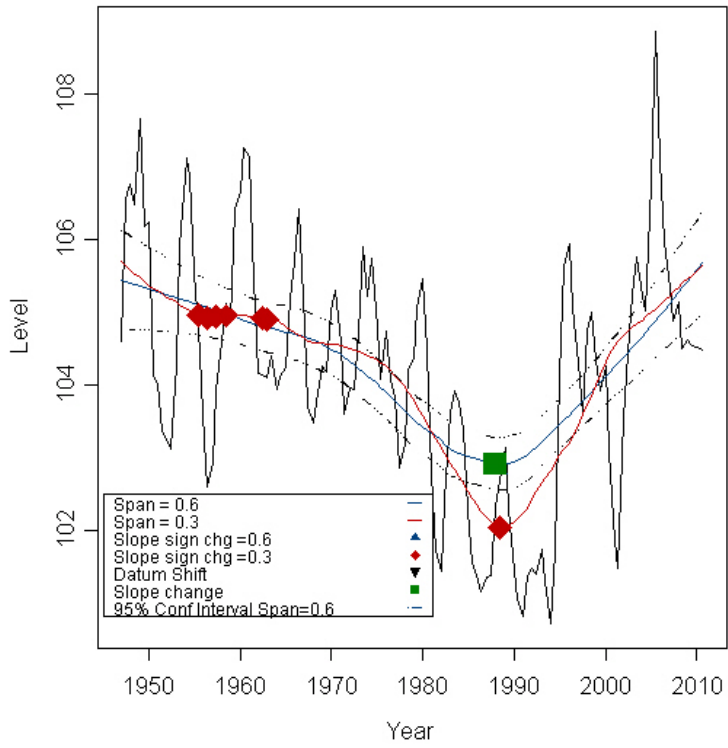
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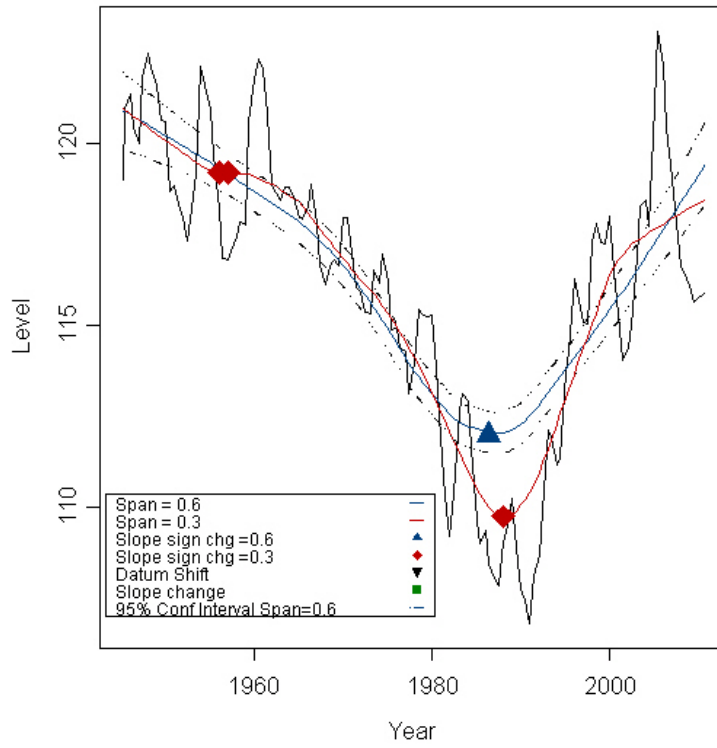
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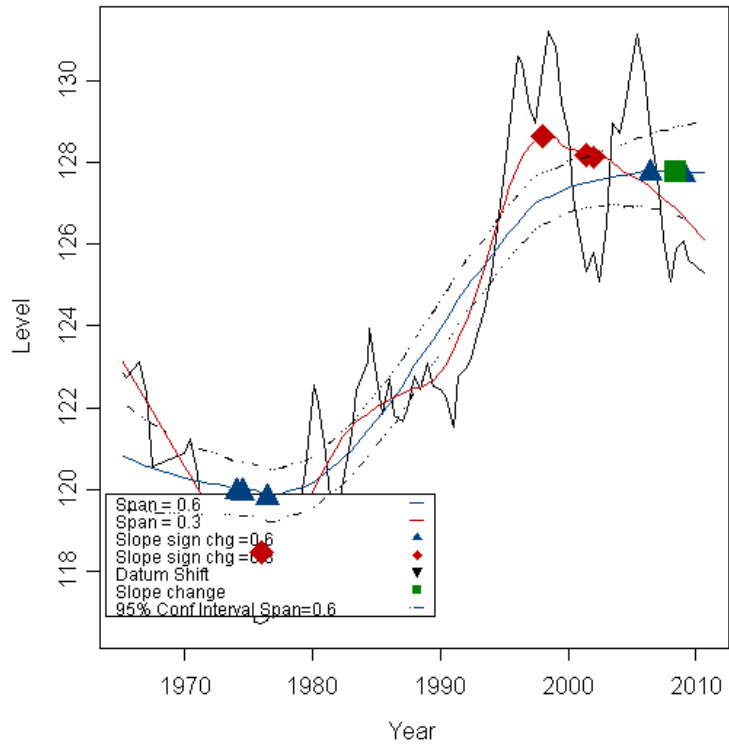
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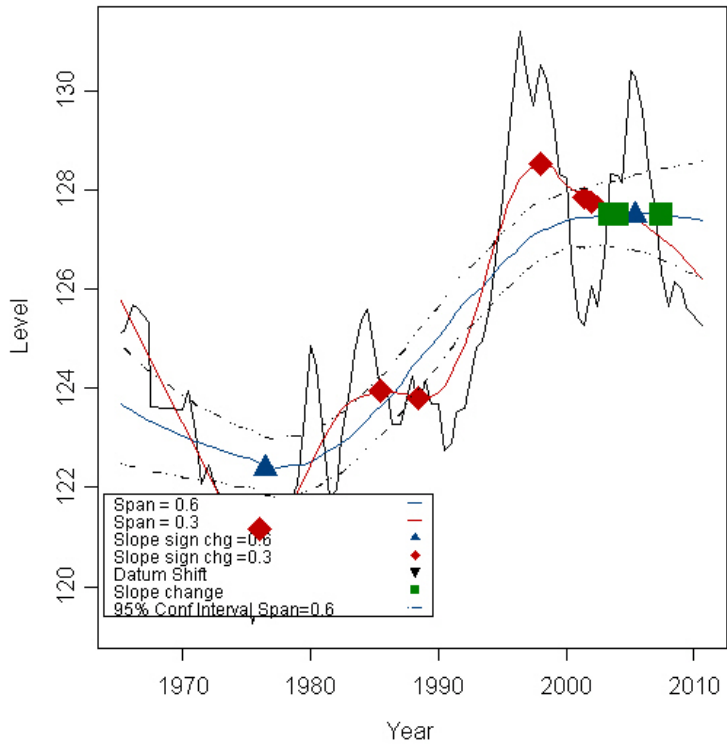
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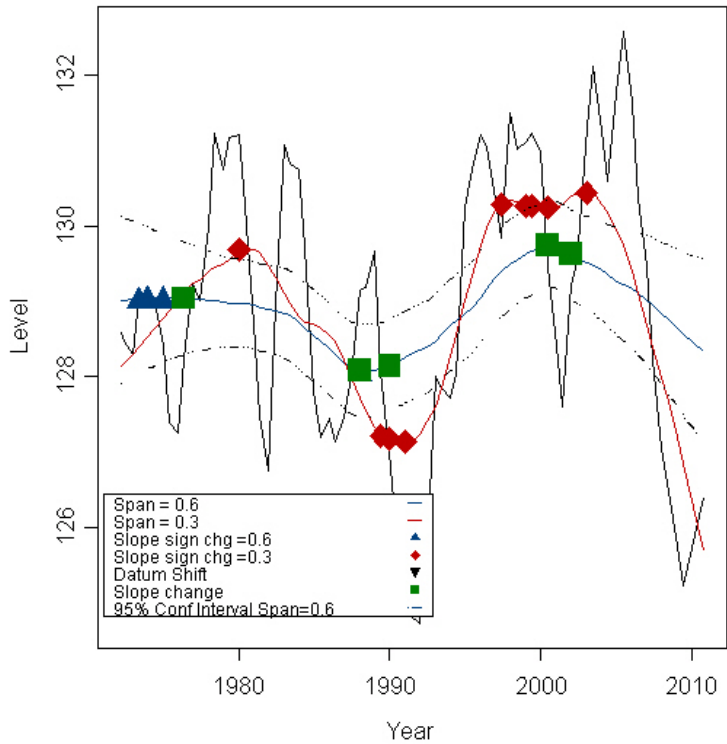
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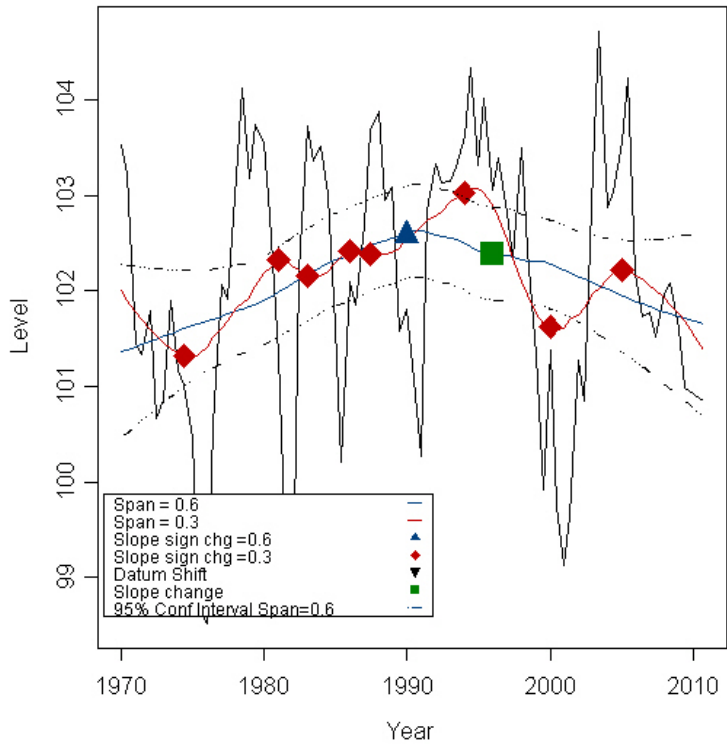
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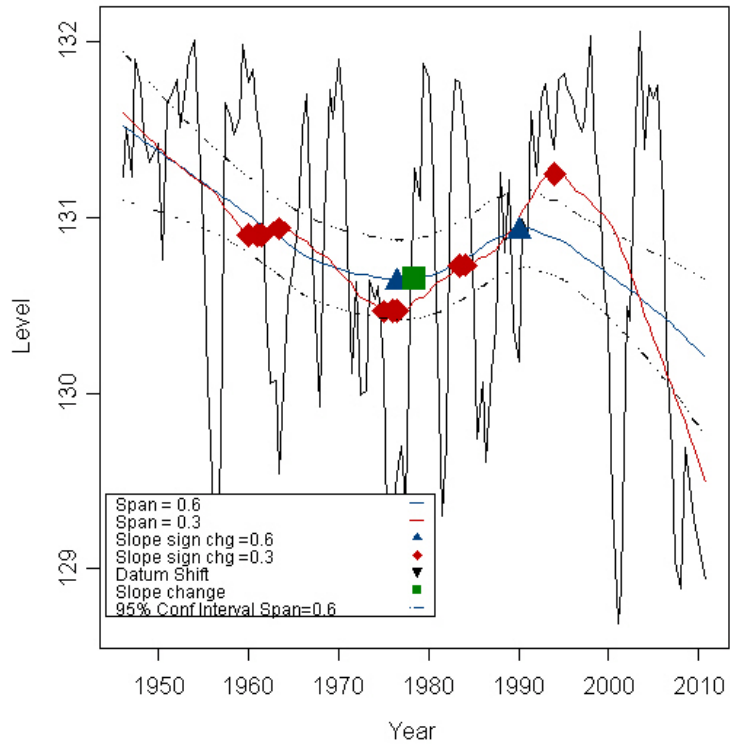
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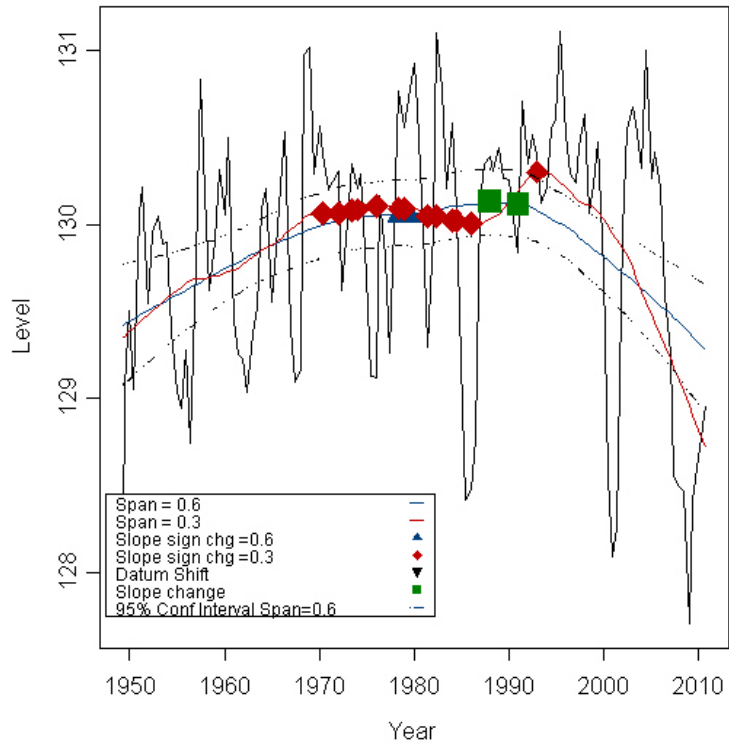
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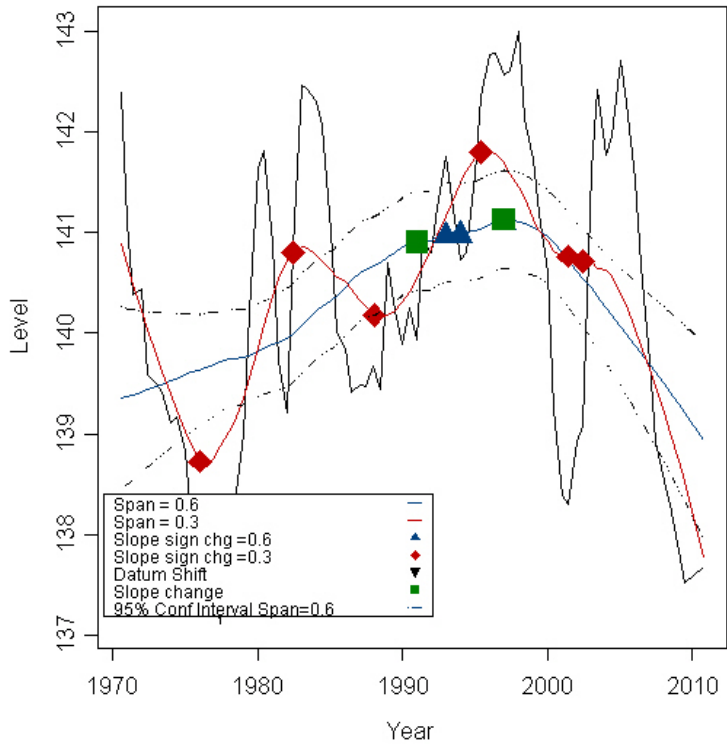
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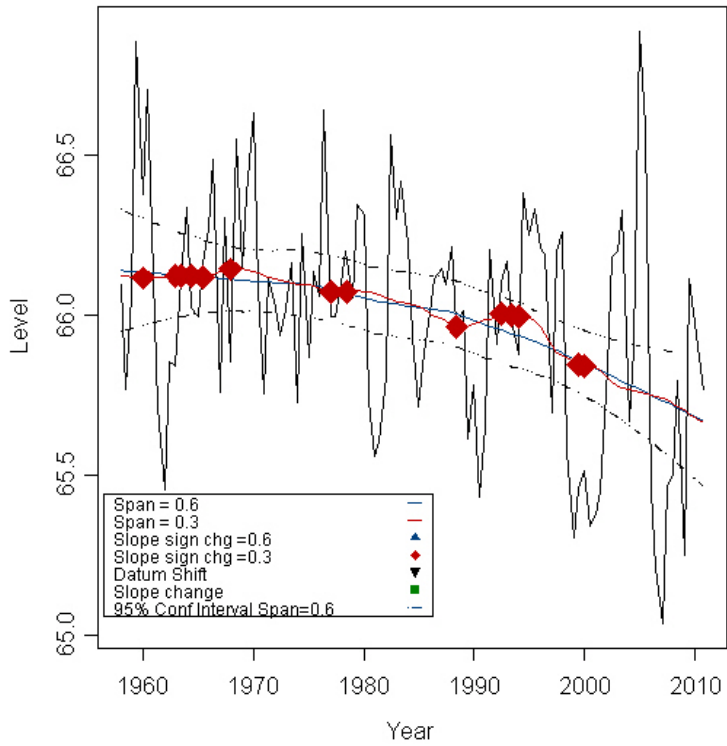
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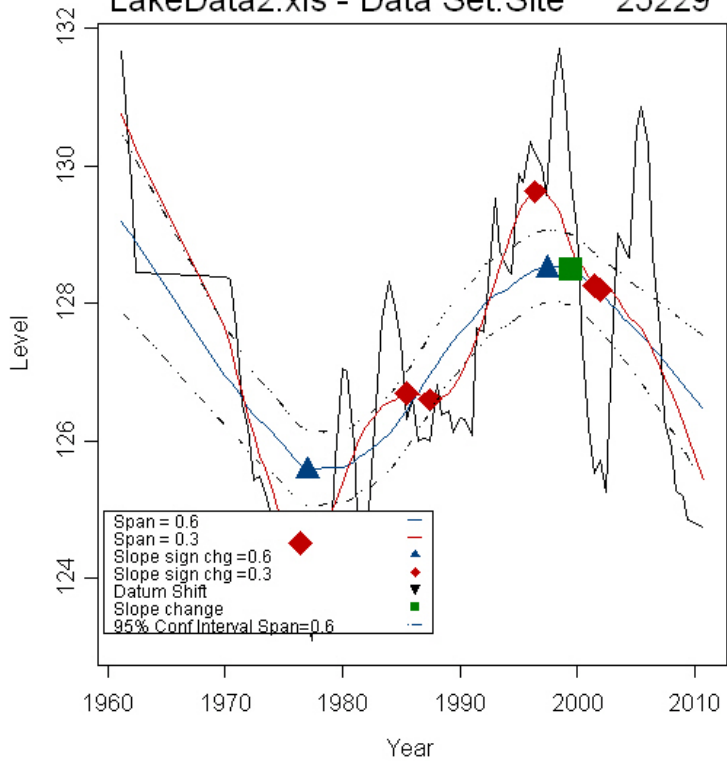
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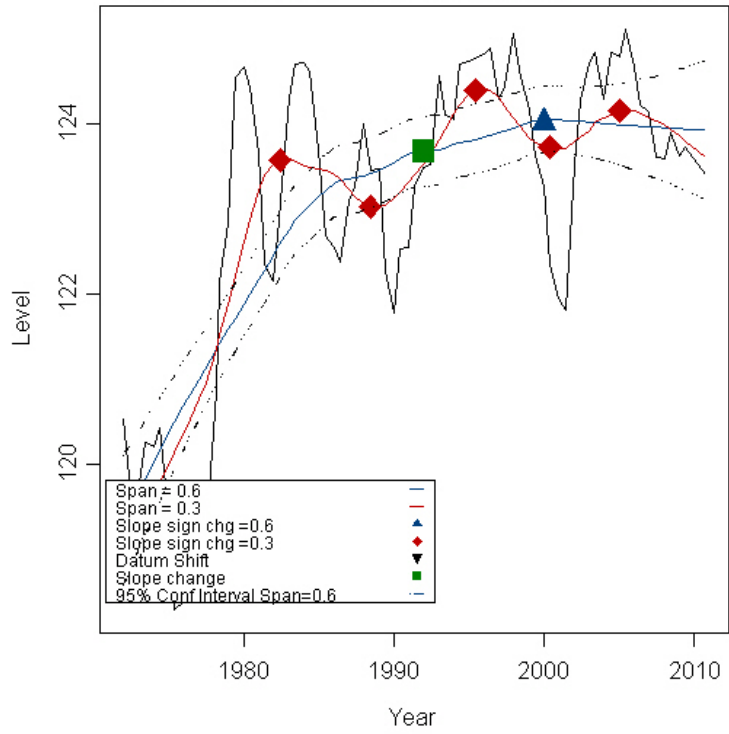
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LakeData2.xls - Data Set: Site 24848



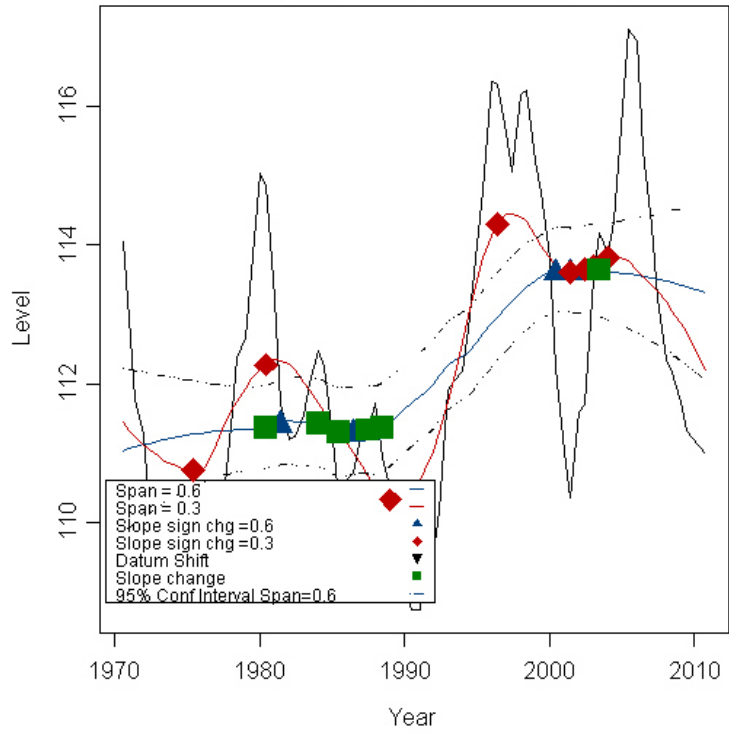
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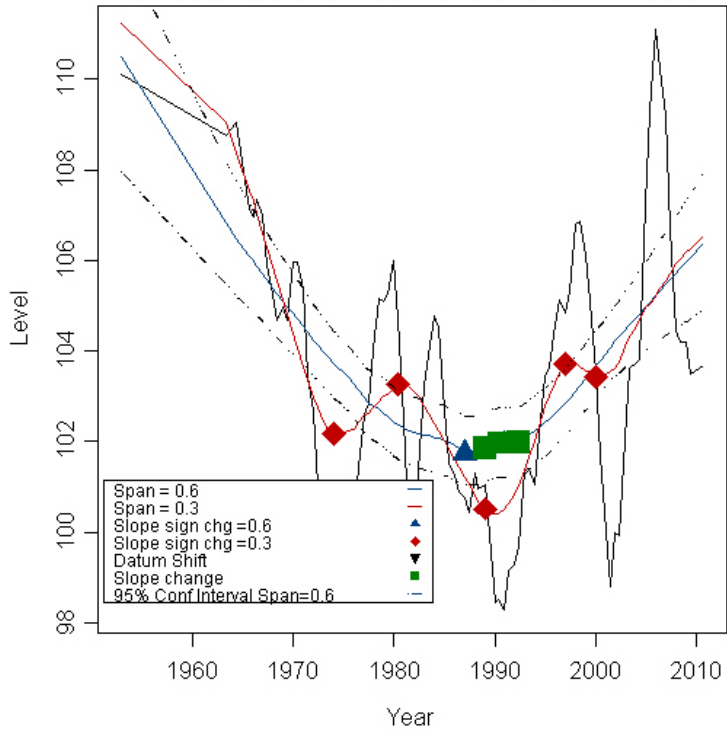
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LakeData2.xls - Data Set: Site 25303



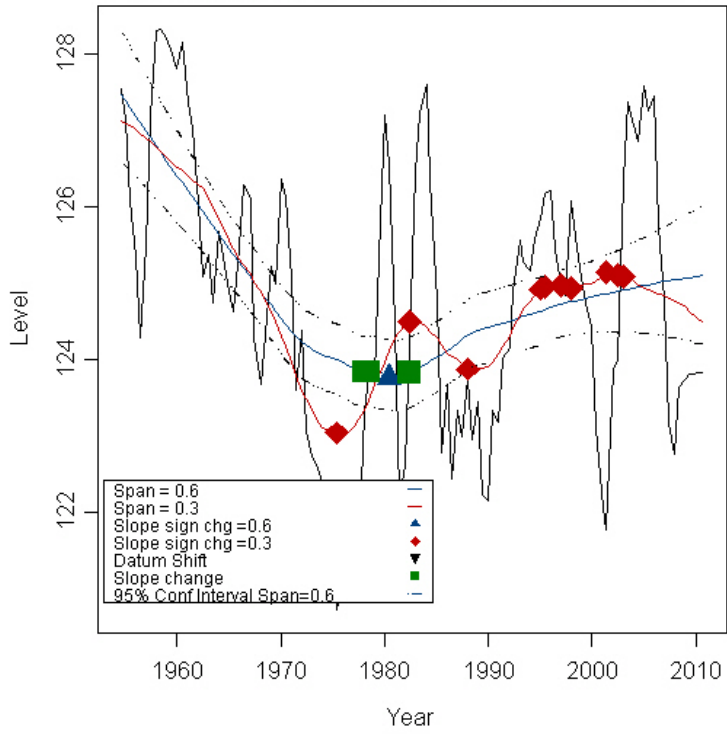
LOWESS Smoothers
LakeData2.xls - Data Set: Site 25307



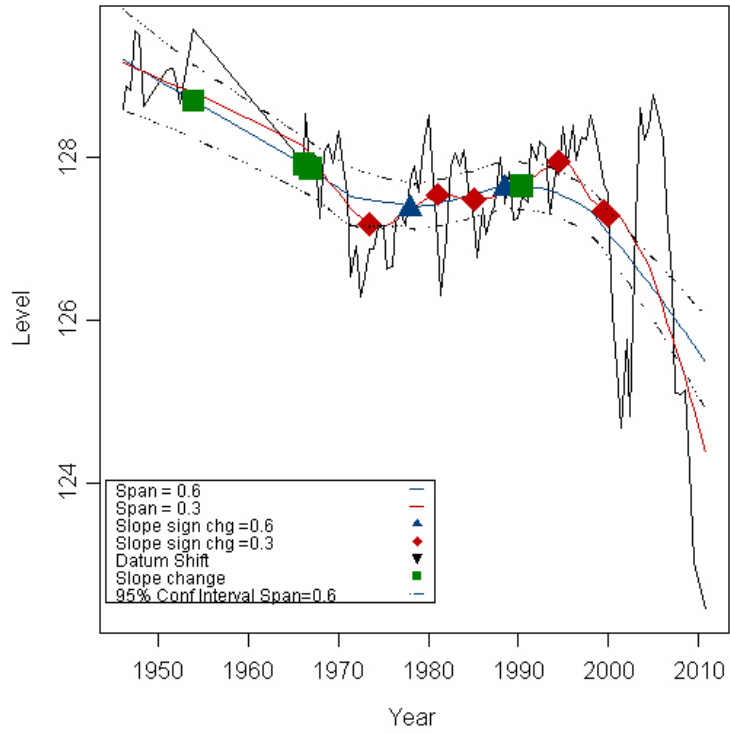
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LakeData2.xls - Data Set: Site 25351



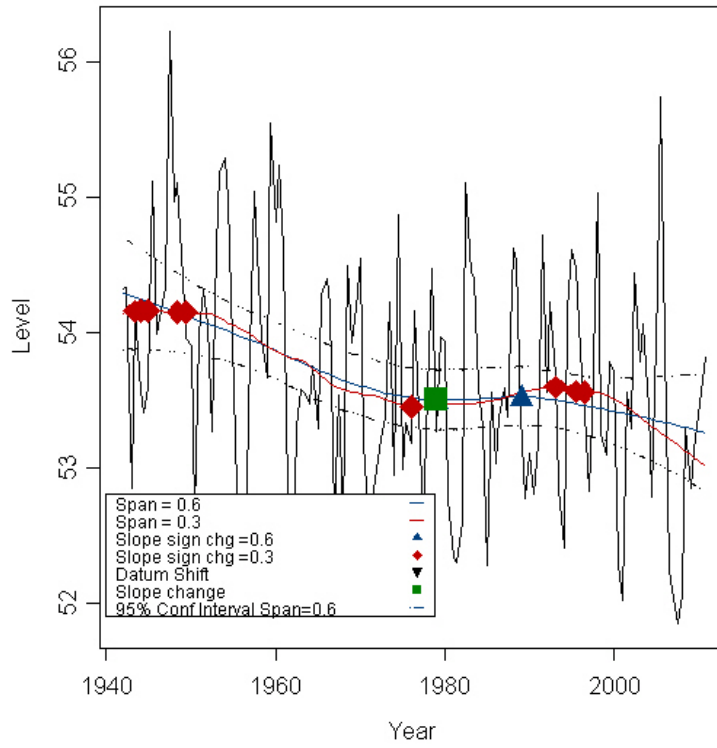
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LakeData2.xls - Data Set: Site 25371



LOWESS Smoothers
LakeData2.xls - Data Set: Site 25381

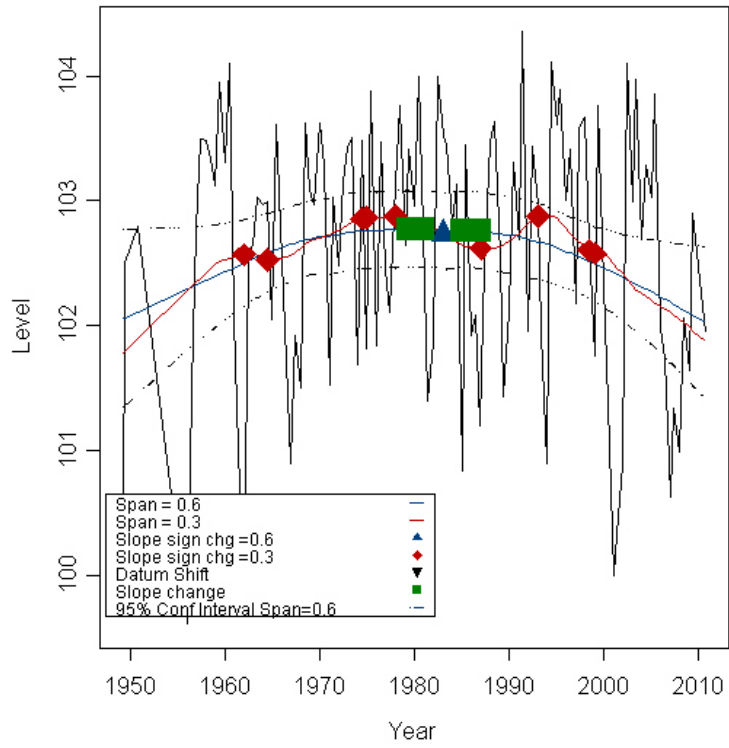


LOWESS Smoothers
LakeData3.xls - Data Set: Site 712932

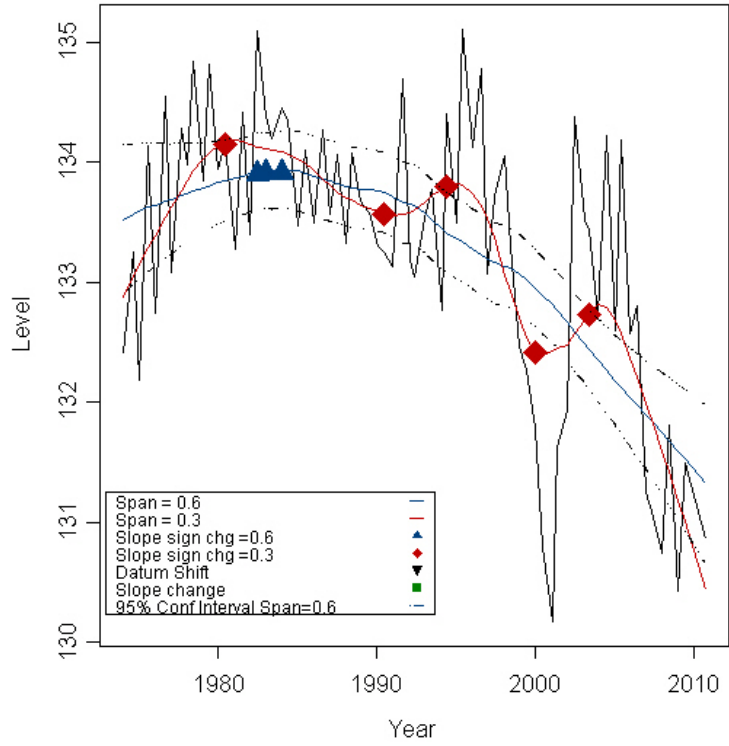


SWFWMD- Wells

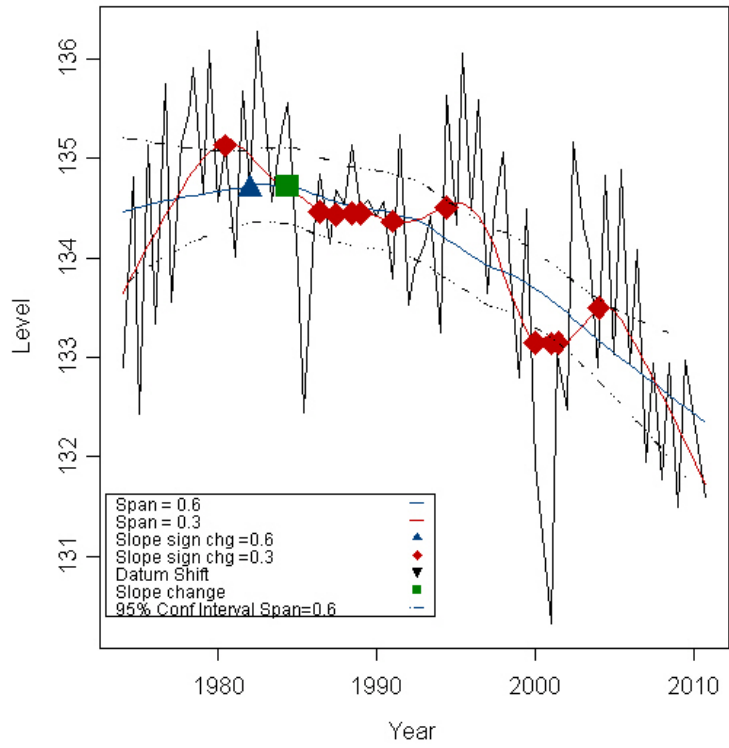
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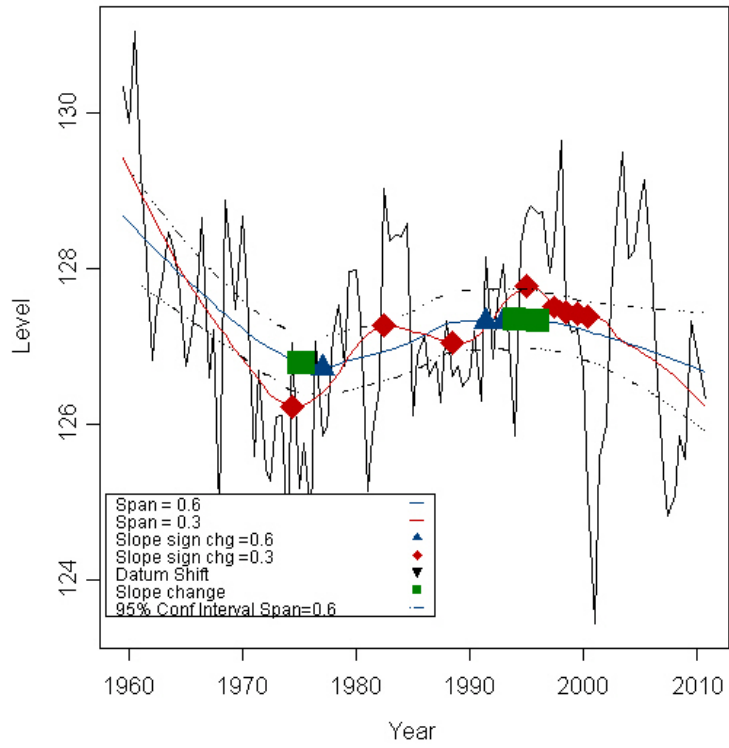
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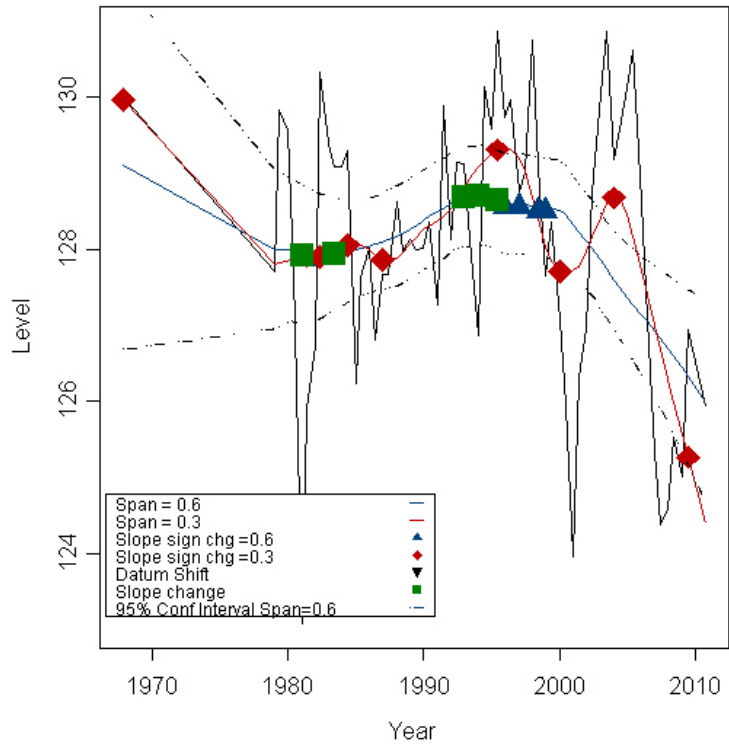
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WellData1.xls - Data Set:Well 17568



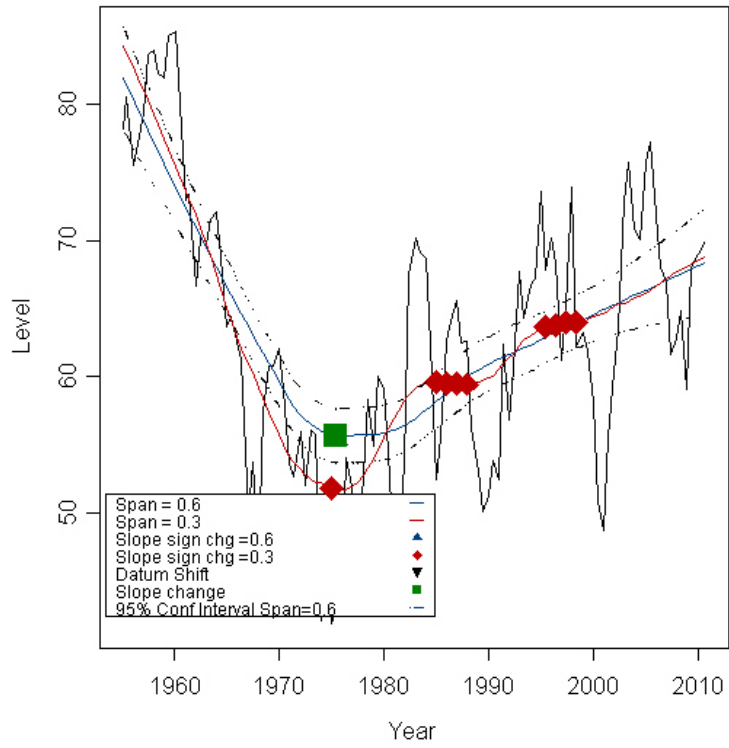
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WellData1.xls - Data Set:Well 17652



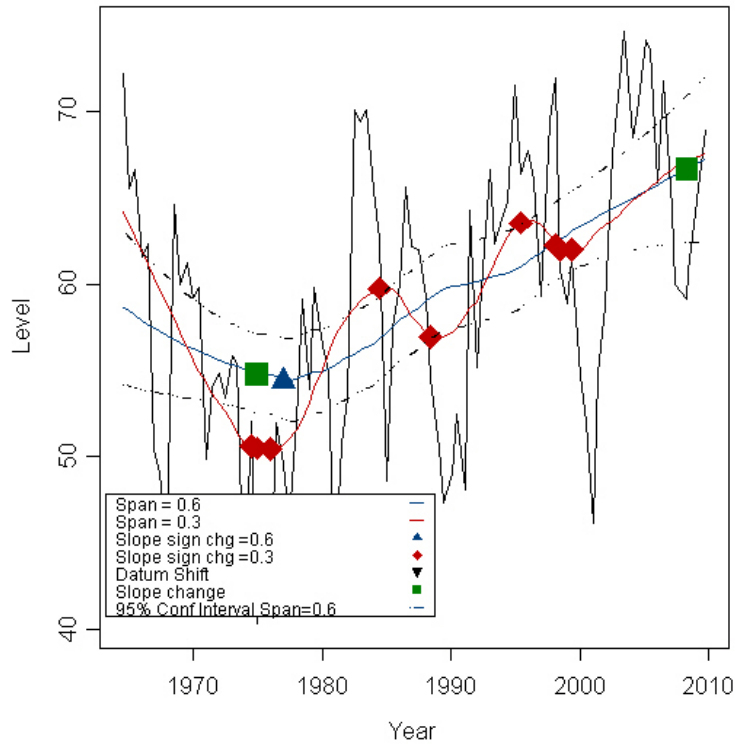
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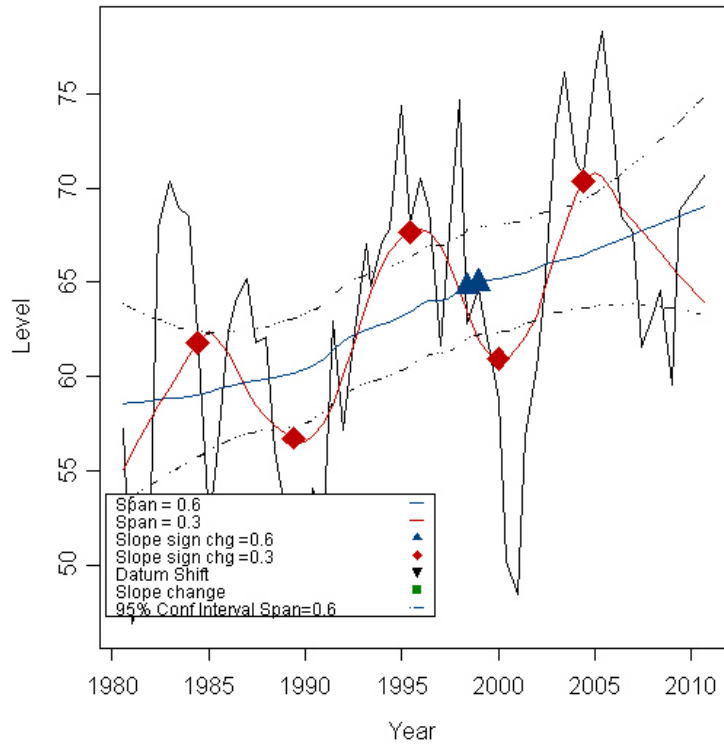
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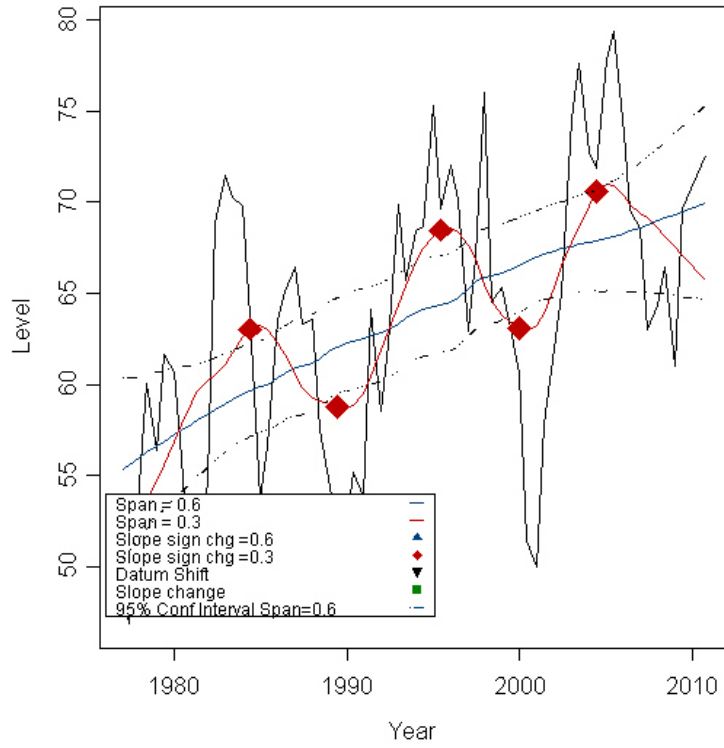
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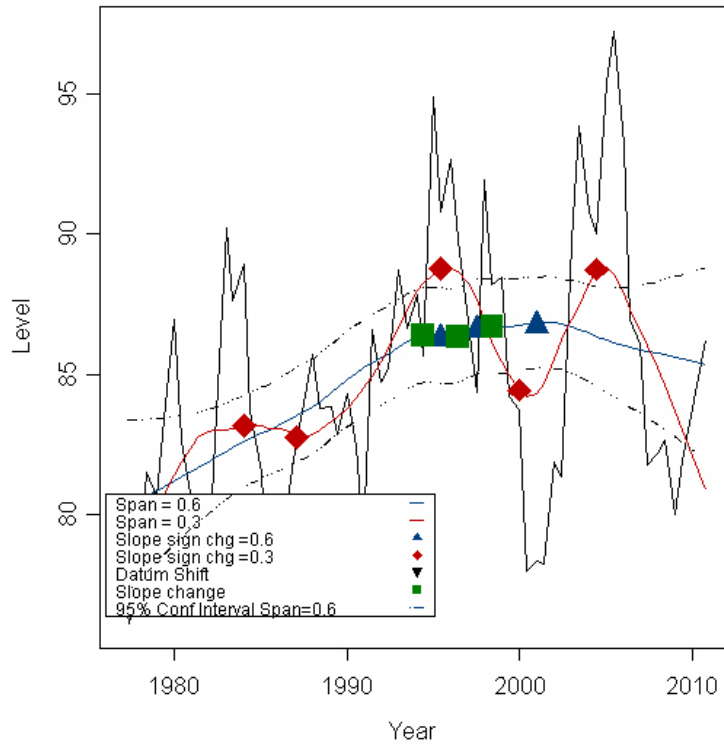
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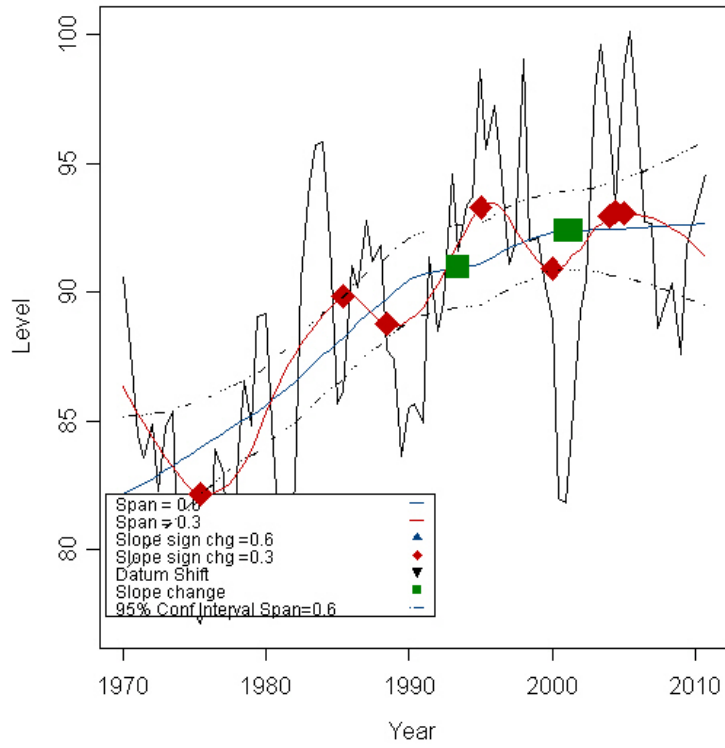
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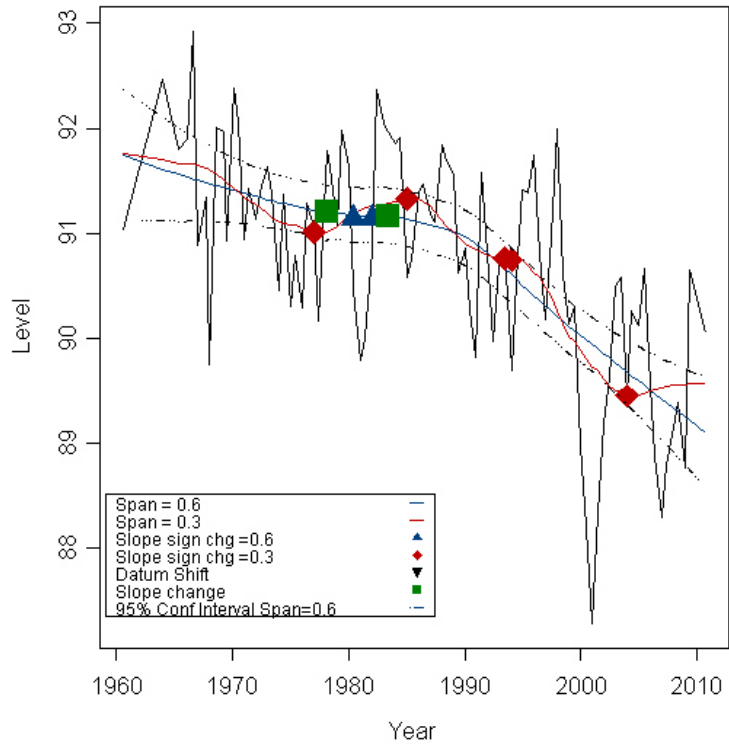
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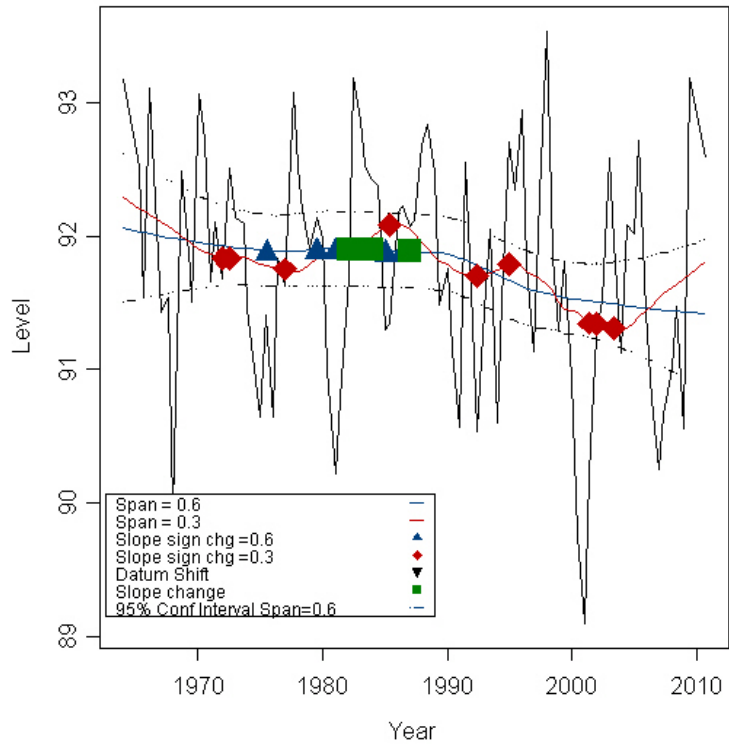
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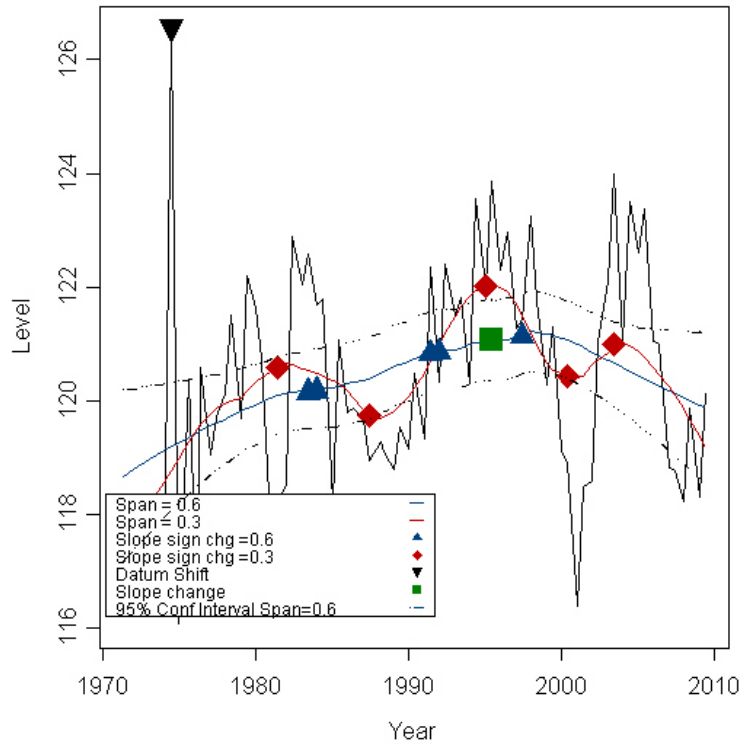
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WellData2.xls - Data Set: Well 25144



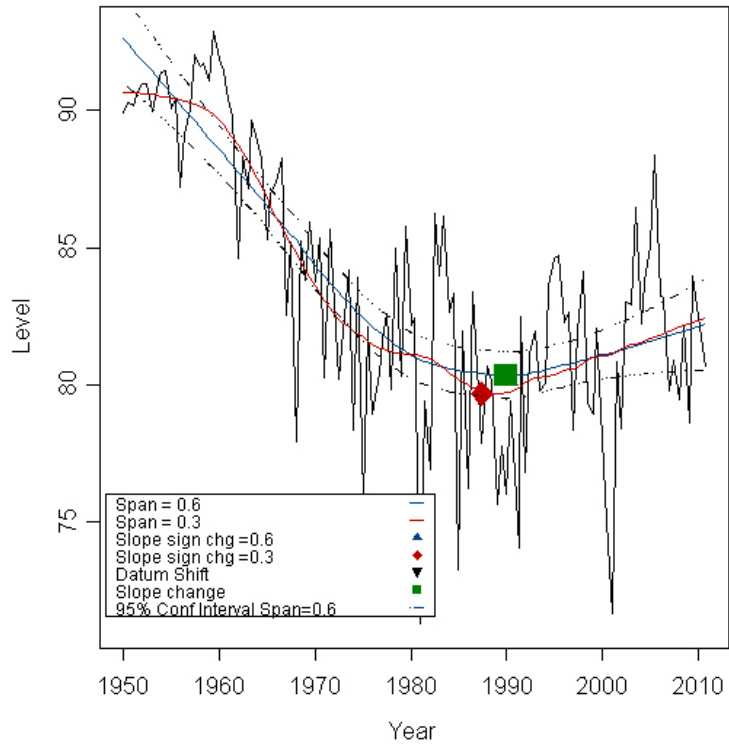
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WellData2.xls - Data Set: Well 25145



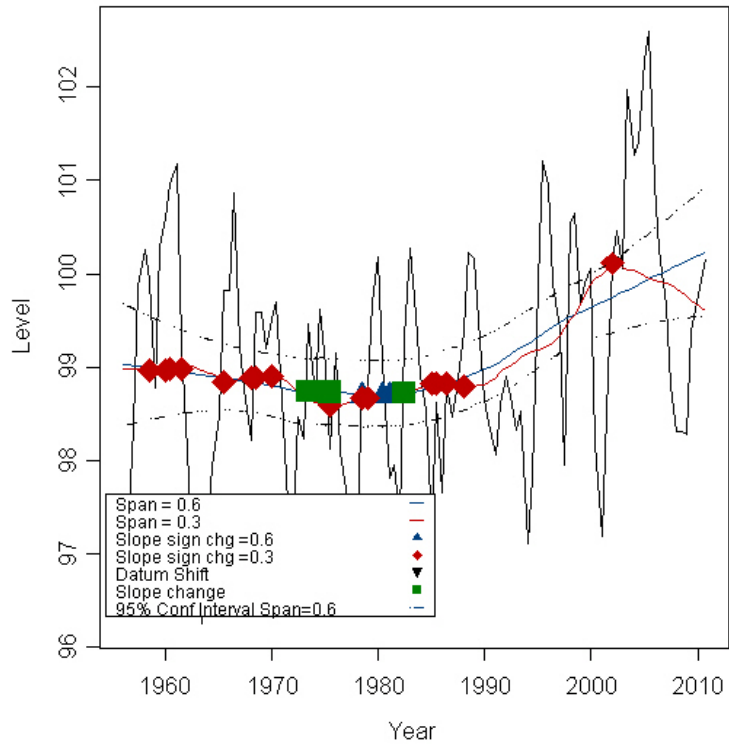
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WellData2.xls - Data Set: Well 25227



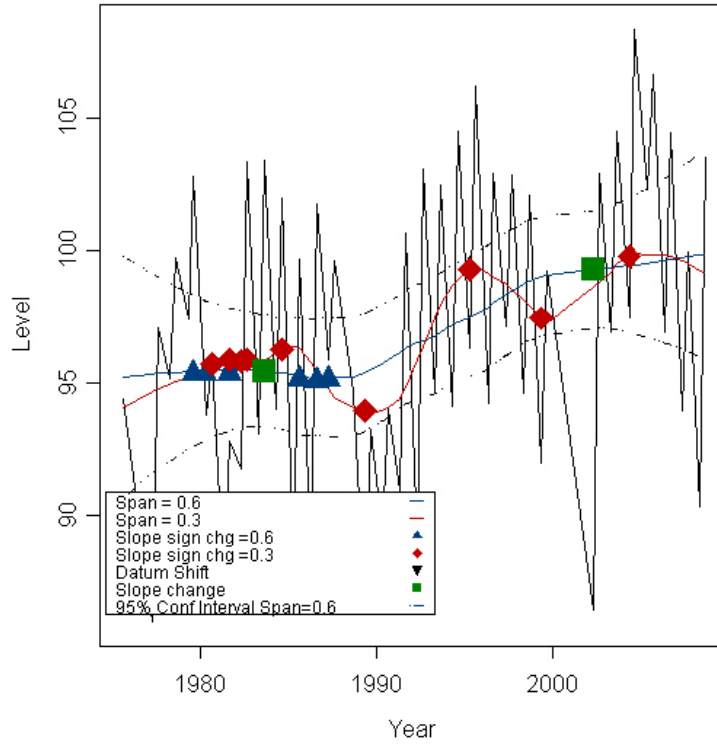
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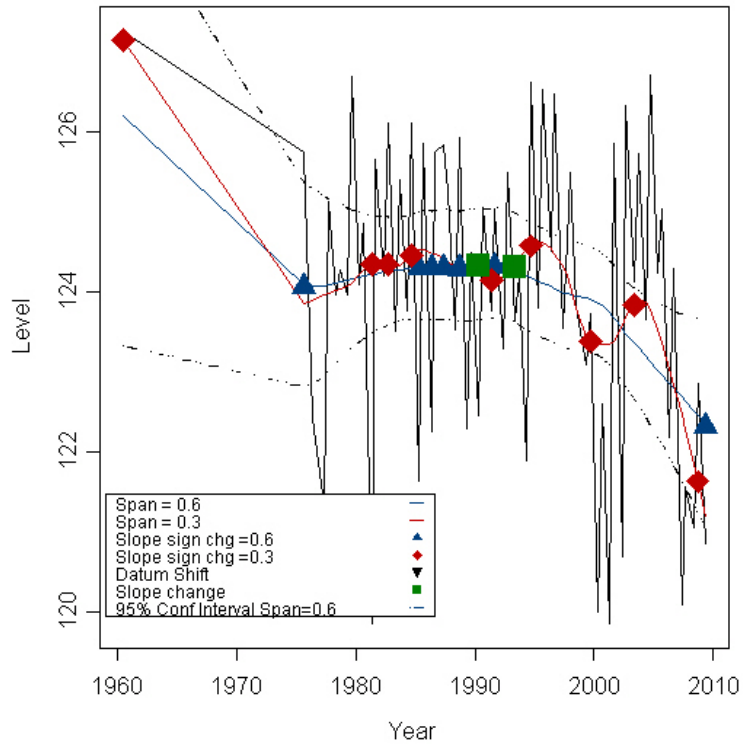
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WellData3.xls - Data Set: Well 25402



LOWESS Smoothers
WellData3.xls - Data Set:Well 711229

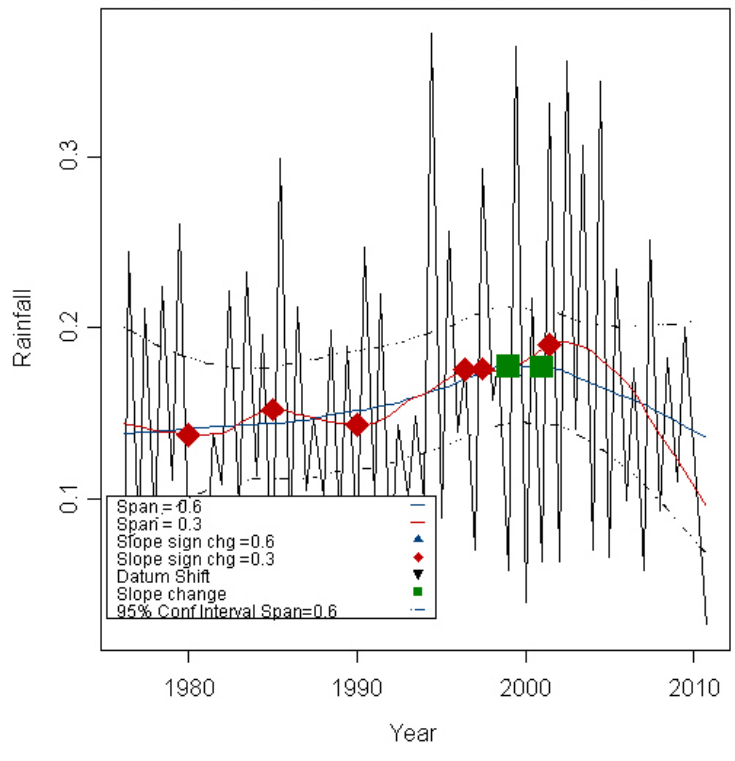


LOWESS Smoothers
WellData3.xls - Data Set:Well 713025

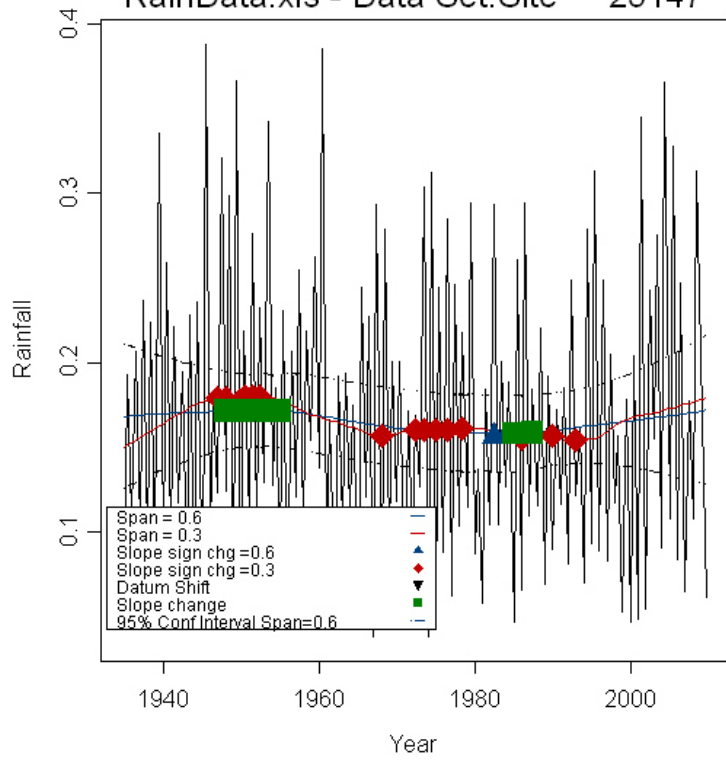


SWFWMD- Rainfall

LOWESS Smoothers
RainData.xls - Data Set: Site 17530



LOWESS Smoothers
RainData.xls - Data Set: Site 25147



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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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

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

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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

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

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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

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

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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

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

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

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)

AHCA 1960-2008 (34 Stations)

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

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

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

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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)

AHCA 1960-2008 (34 Stations)

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

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

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

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

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)

| | |
|----------------------|---------|
| Dendrogram ID | 62 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.3383 |
| Sen Slope | -0.0293 |
| tau | -0.1400 |

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 17 |
| Cluster Number | 7 |
| Mann Kendall p-value | 0.1228 |
| Sen Slope | -0.0181 |
| tau | -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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|--------|
| Dendrogram ID | 66 |
| Cluster Number | 3 |
| Mann Kendall p-value | 0.1176 |
| Sen Slope | 0.0377 |
| tau | 0.2267 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 68 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.0798 |
| Sen Slope | -0.1233 |
| tau | -0.2533 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 69 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.3875 |
| Sen Slope | 0.0248 |
| tau | 0.1267 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 70 |
| Cluster Number | 3 |
| Mann Kendall p-value | 0.0083 |
| Sen Slope | 0.2577 |
| tau | 0.3800 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 72 |
| Cluster Number | 4 |
| Mann Kendall p-value | 0.0001 |
| Sen Slope | -0.0977 |
| tau | -0.5467 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 73 |
| Cluster Number | 4 |
| Mann Kendall p-value | 0.0650 |
| Sen Slope | -0.0373 |
| tau | -0.2667 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 75 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.3153 |
| Sen Slope | -0.0076 |
| tau | -0.1467 |

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)

AHCA 1960-2008 (34 Stations)

Dendrogram ID 78
Cluster Number 1
Mann Kendall p-value 0.7261
Sen Slope -0.0291
tau -0.0533

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 79 |
| Cluster Number | 4 |
| Mann Kendall p-value | 0.0000 |
| Sen Slope | -0.1943 |
| tau | -0.6200 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|--------|
| Dendrogram ID | 80 |
| Cluster Number | 3 |
| Mann Kendall p-value | 0.0377 |
| Sen Slope | 0.0406 |
| tau | 0.3000 |

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

| Aggregation | Sen Slope | Mann Kendall p-value | tau |
|-------------|-----------|----------------------|---------|
| Y | -0.0001 | 0.4666 | -0.0581 |

Analysis Period: 1/1/1935 to: 12/31/2008

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

| Aggregation | Sen Slope | Mann Kendall p-value | tau |
|-------------|-----------|----------------------|--------|
| Y | 0.0000 | 0.7750 | 0.0226 |

Analysis Period: 1/1/1930 to: 12/31/2006

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 82 |
| Cluster Number | 4 |
| Mann Kendall p-value | 0.0000 |
| Sen Slope | -0.7049 |
| tau | -0.7933 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 83 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.9441 |
| Sen Slope | -0.0062 |
| tau | -0.0133 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 84 |
| Cluster Number | 1 |
| Mann Kendall p-value | 0.9441 |
| Sen Slope | -0.0044 |
| tau | -0.0133 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 85 |
| Cluster Number | 4 |
| Mann Kendall p-value | 0.1990 |
| Sen Slope | -0.0277 |
| tau | -0.1867 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 86 |
| Cluster Number | 1 |
| Mann Kendall p-value | 0.6238 |
| Sen Slope | 0.0270 |
| tau | 0.0733 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 87 |
| Cluster Number | 4 |
| Mann Kendall p-value | 0.0004 |
| Sen Slope | -0.1460 |
| tau | -0.5067 |

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)

AHCA 1960-2008 (34 Stations)

Dendrogram ID 88
Cluster Number 1
Mann Kendall p-value 0.4409
Sen Slope -0.0866
tau -0.1133

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 89 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.4137 |
| Sen Slope | -0.0422 |
| tau | -0.1200 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|--------|
| Dendrogram ID | 90 |
| Cluster Number | 3 |
| Mann Kendall p-value | 0.0235 |
| Sen Slope | 0.4491 |
| tau | 0.3267 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 91 |
| Cluster Number | 3 |
| Mann Kendall p-value | 0.1543 |
| Sen Slope | 0.2716 |
| tau | 0.2067 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|--------|
| Dendrogram ID | 92 |
| Cluster Number | 3 |
| Mann Kendall p-value | 0.0235 |
| Sen Slope | 0.4541 |
| tau | 0.3267 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 94 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.8701 |
| Sen Slope | 0.0067 |
| tau | 0.0267 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 114 |
| Cluster Number | 1 |
| Mann Kendall p-value | 0.2723 |
| Sen Slope | 0.2687 |
| tau | 0.1600 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 96 |
| Cluster Number | 1 |
| Mann Kendall p-value | 0.9814 |
| Sen Slope | -0.0066 |
| tau | -0.0067 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|--------|
| Dendrogram ID | 97 |
| Cluster Number | 3 |
| Mann Kendall p-value | 0.2336 |
| Sen Slope | 0.1964 |
| tau | 0.1733 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 98 |
| Cluster Number | 3 |
| Mann Kendall p-value | 0.1543 |
| Sen Slope | 0.3029 |
| tau | 0.2067 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 99 |
| Cluster Number | 4 |
| Mann Kendall p-value | 0.0000 |
| Sen Slope | -0.2854 |
| tau | -0.6400 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 100 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.0650 |
| Sen Slope | -0.0480 |
| tau | -0.2667 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 101 |
| Cluster Number | 1 |
| Mann Kendall p-value | 0.1475 |
| Sen Slope | -0.0974 |
| tau | -0.2100 |

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

| Aggregation | Sen Slope | Mann Kendall p-value | tau |
|-------------|-----------|----------------------|---------|
| Y | -0.0635 | 0.0207 | -0.2632 |

Analysis Period: 4/18/1972 to: 8/19/2009

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)

AHCA 1960-2008 (34 Stations)

| | |
|----------------------|---------|
| Dendrogram ID | 102 |
| Cluster Number | 1 |
| Mann Kendall p-value | 0.5283 |
| Sen Slope | -0.0311 |
| tau | -0.0933 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 103 |
| Cluster Number | 4 |
| Mann Kendall p-value | 0.0007 |
| Sen Slope | -0.0747 |
| tau | -0.4867 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 104 |
| Cluster Number | 1 |
| Mann Kendall p-value | 0.9627 |
| Sen Slope | -0.0029 |
| tau | -0.0100 |

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)

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 105 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.5912 |
| Sen Slope | 0.0159 |
| tau | 0.0800 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|--------|
| Dendrogram ID | 106 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.4691 |
| Sen Slope | 0.0585 |
| tau | 0.1067 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 107 |
| Cluster Number | 2 |
| Mann Kendall p-value | 0.1412 |
| Sen Slope | -0.0547 |
| tau | -0.2133 |

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)

AHCA 1960-2008 (34 Stations)

| | |
|-----------------------------|---------|
| Dendrogram ID | 109 |
| Cluster Number | 1 |
| Mann Kendall p-value | 0.1990 |
| Sen Slope | -0.1948 |
| tau | -0.1867 |

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 |