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FEMA Lake Ontario Wave and Surge Modeling

June 28, 2012
11338.201

Navigating New Horizons

FEMA Lake Ontario Wave and Surge Modeling

Prepared for

Federal Emergency Management Agency

Prepared by

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11338.201

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1.0 INTRODUCTION

Coastal counties around the Great Lakes are vulnerable to coastal flooding. The Federal Emergency Management Agency (FEMA) commissioned the RAMPP Joint Venture to evaluate wave and storm surge levels on Lake Ontario by undertaking the following tasks:

A. Long-Term and Seasonal-Scale Water Level Variation Analyses

B. Short Time-Scale Event Definition for Storm Surge

C. Development of Statistical Analysis Approach to Select Extreme Storms

D. Wind and Pressure Field Generation for Lake Ontario

E. Evaluation of Ice Field

F. Wave and Storm Surge Modeling (Pilot Study Simulations)

G. Wave and Storm Surge Production Simulations

H. Participation in the Technology Transfer Group Meetings

I. Facilitate Independent Quality Assurance/Quality Control (QA/QC) of work products

W.F. Baird & Associates (Baird), a part of the RAMPP team was commissioned to perform the above tasks for Lake Ontario.

1.1 Study Area

Lake Ontario borders Canada on the north side of the lake and the United States of America (USA) on the south side. There are seven American coastal counties on Lake Ontario including from west to east: Niagara, Orleans, Monroe, Wayne, Cayuga, Oswego and Jefferson as shown on Figure 1.1.

Figure 1.1 American Coastal Counties on Lake Ontario

Lake Ontario is the furthest downstream lake in the Great Lakes watershed and receives the majority of its flow from the Niagara River. The lake drains into the St. Lawrence River at Cape Vincent, and ultimately empties into the Gulf of St. Lawrence and the Atlantic Ocean.

1.2 Numerical Model Selection

The main task of the present study was to perform numerical modeling of wave heights and storm surge on Lake Ontario during extreme events. The surge on Lake Ontario is relatively small (refer to Section 3.0) and therefore the surge generally has little effect on wave generation in the nearshore zone. Consequently, two separate models were selected to simulate the wave and surge (as opposed to a coupled modeling approach). SWAN was selected to model waves and the ADvanced CIRCulation model (ADCIRC) was selected to model storm surge. The advantage to using SWAN in conjunction with ADCIRC is that they both can utilize the same irregular triangular mesh, which is generated using the Surface-water Modeling System (SMS).

SWAN is a third-generation stand-alone (phase-averaged) wave model for the simulation of waves in waters of deep, intermediate and shallow depths. SWAN simulates wave propagation in time and space, shoaling, refraction due to current and depth, frequency shifting due to currents and nonstationary depth; wave generation by wind; nonlinear wave-wave interactions (both quadruplets and triads); whitecapping, bottom friction, and depth-induced breaking; and blocking of waves by currents.

ADCIRC is a two-dimensional hydrodynamic circulation model. The model was developed using traditional hydrostatic pressure and Boussinesq approximations that have been discretized in space using the finite element (FE) method and in time using the finite difference (FD) method. ADCIRC was used to simulate the currents and water surface elevation generated by wind and pressure on Lake Ontario.

1.3 Purpose of Report

The purpose of this report is to document the methodology utilized to complete tasks A through I (refer to Section 1.0) and summarize the results generated with the wave and storm surge simulations.

2.0 PHYSCIAL DATA

A number of temporal and spatial data sets were utilized for the present study. Details pertaining to each data set are provided herein.

2.1 Spatial Data

Bathymetry data were compiled from a number of sources with the main being USACE NetCDF bathymetry data. Other sources of data were utilized for areas where the NetCDF bathymetry did not provide coverage. Primarily, this included the embayments and the upper end of the St. Lawrence River, past Cape Vincent. For these areas, NOAA Electronic Navigation Charts were used for bathymetry in most embayments and the Ministry of Natural Resources Seamless Bathymetry data was used for the upper St. Lawrence River. The composite bathymetry data used for both wave and surge modeling is shown in Figure 2.1.

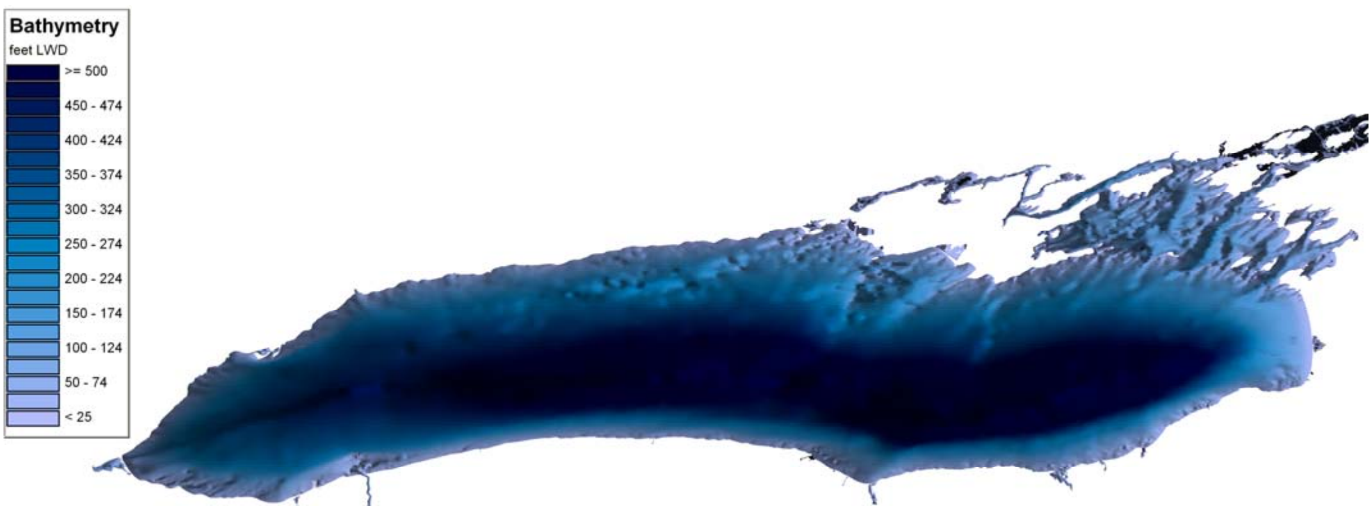

Figure 2.1 Lake Ontario Bathymetry Compilation (Legend in Feet, LWD)

Horizontal and vertical datums adopted for this project include Geographical, NAD 83 and feet Low Water Datum (LWD = 243.44 ft), respectively.

2.2 Temporal Data

2.2.1 Water Level Gage Data

Water level data on Lake Ontario were obtained from the National Oceanic and Atmospheric Administration (NOAA) and the Canadian Hydrographic Service (CHS). All available Lake Ontario gage data locations are shown in Figure 2.2.

Figure 2.2 Lake Ontario Gage Locations

The outflow of Lake Ontario to the St. Lawrence River is controlled by the current regulation plan at the Moses Saunders Power Dam (1958D with deviations). This plan has been in effect since 1960, and thus 1960 is the ideal starting time for all lake level analyses in this report, since prior to this period the lake level range was different and fluctuated naturally. This ensures the US gages have 51 years of data (1960-2010), except for Olcott (1967-2010). The temporal coverage of each water level gage on Lake Ontario is shown in Figure 2.3.

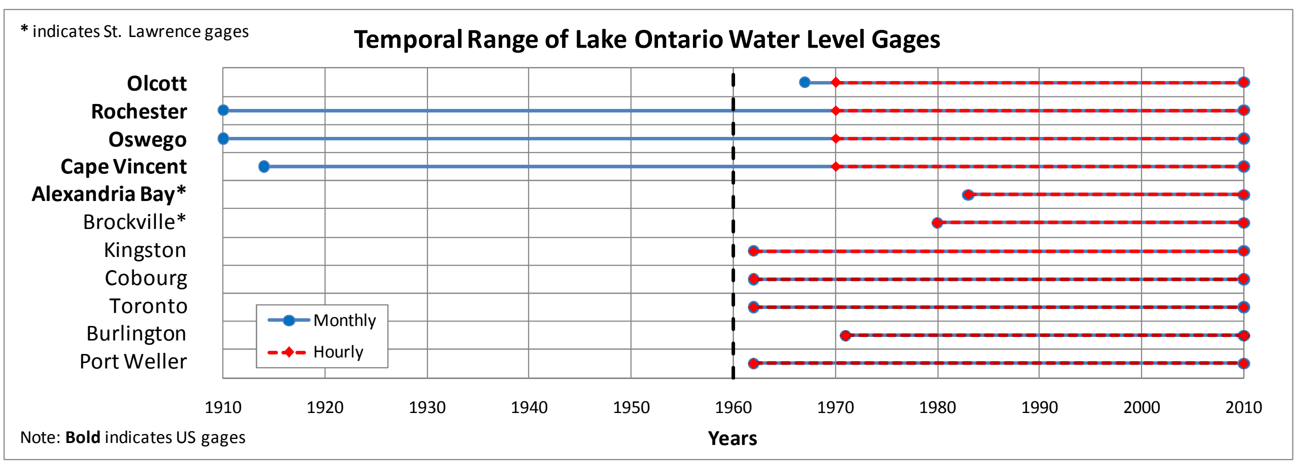

Figure 2.3 Available Lake Ontario Gage Data (US and CND gages)

Considering that the study focuses solely on flooding hazards for the United States shoreline, the NOAA gages were the focus of this study, including Olcott, Rochester, Oswego, and Cape Vincent as illustrated in Figure 2.4. Detailed long-term and seasonal scale analysis of these water level gages is provided in Section 3.0.

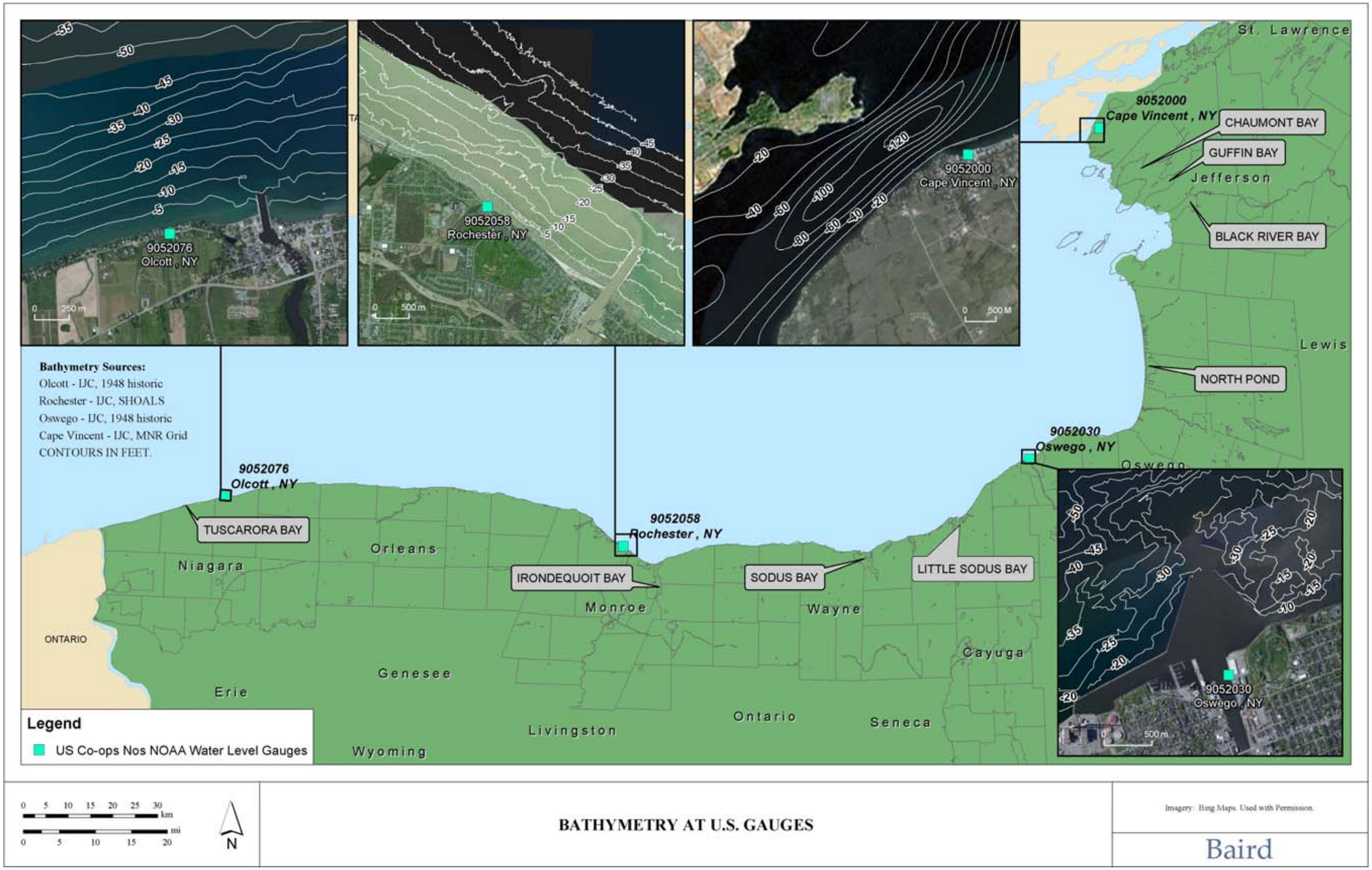

Figure 2.4 Lake Ontario and Nearshore Bathymetry for the NOAA Water Level Gages

2.2.2 Wind and Pressure Data

Two sources of wind and pressure data were utilized for the present study, including:

- Measured wind and pressure data from meteorological stations and airports around Lake Ontario from 1961 to 2010; these data were converted into a gridded product using the Natural Neighbor (NN) routines developed by NOAA-GLERL; and

- The National Center for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) wind data from 1979 to 2010.

Details pertaining to the two different data sets are provided in the following sub-sections and an in-depth discussion regarding the comparison between them is provided in Section 5.3.

2.2.2.1 Meteorological Stations and Airports for Natural Neighbor

Meteorological data were available from two main sources: the Meteorological Service of Canada (MSC) and the National Data Centre (NDC), NOAA. The quality of the wind data varied in both space and time because the data were recorded with different instruments for different periods. Figure 2.5 shows the location of the meteorological stations around Lake Ontario.

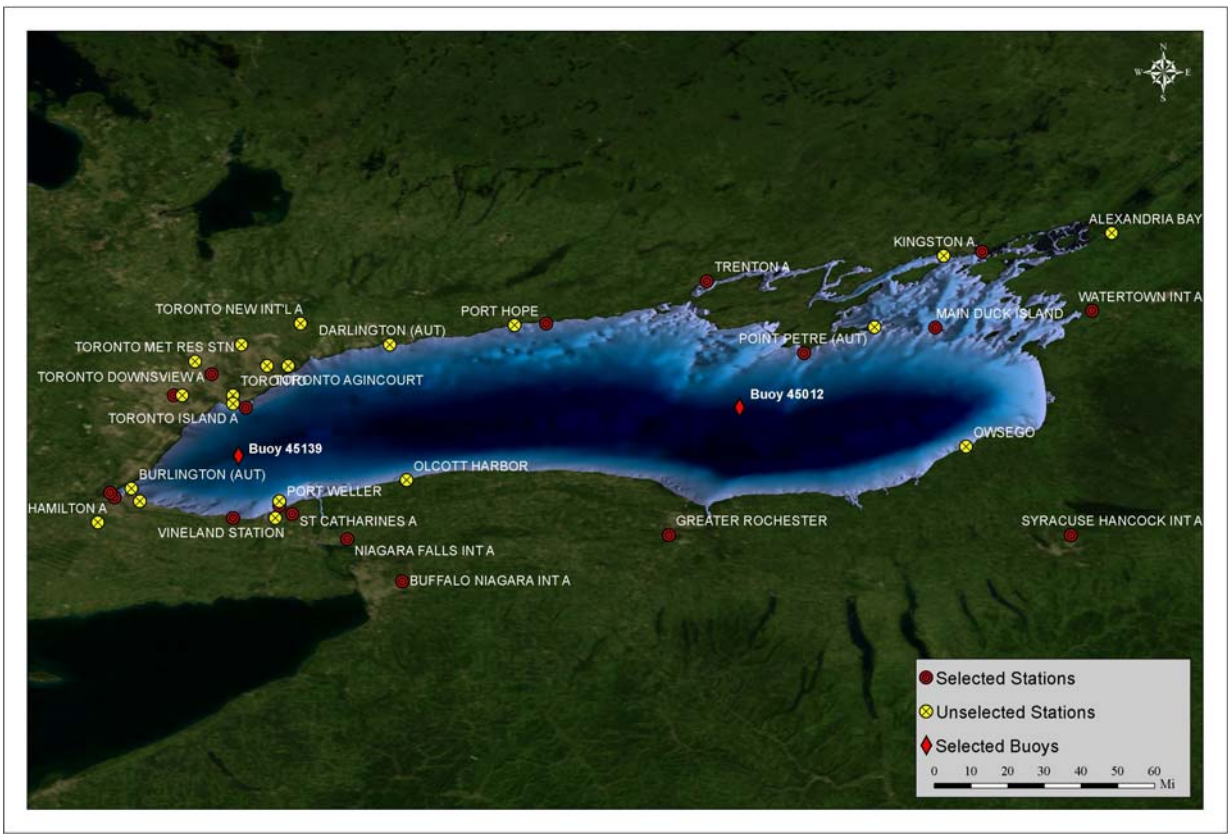

Figure 2.5 All Meterological Stations Near Lake Ontario

After analyzing available wind data, twenty-eight stations (including two buoys) were chosen to generate the Natural Neighbor wind field. These stations are shown in Figure 2.6.

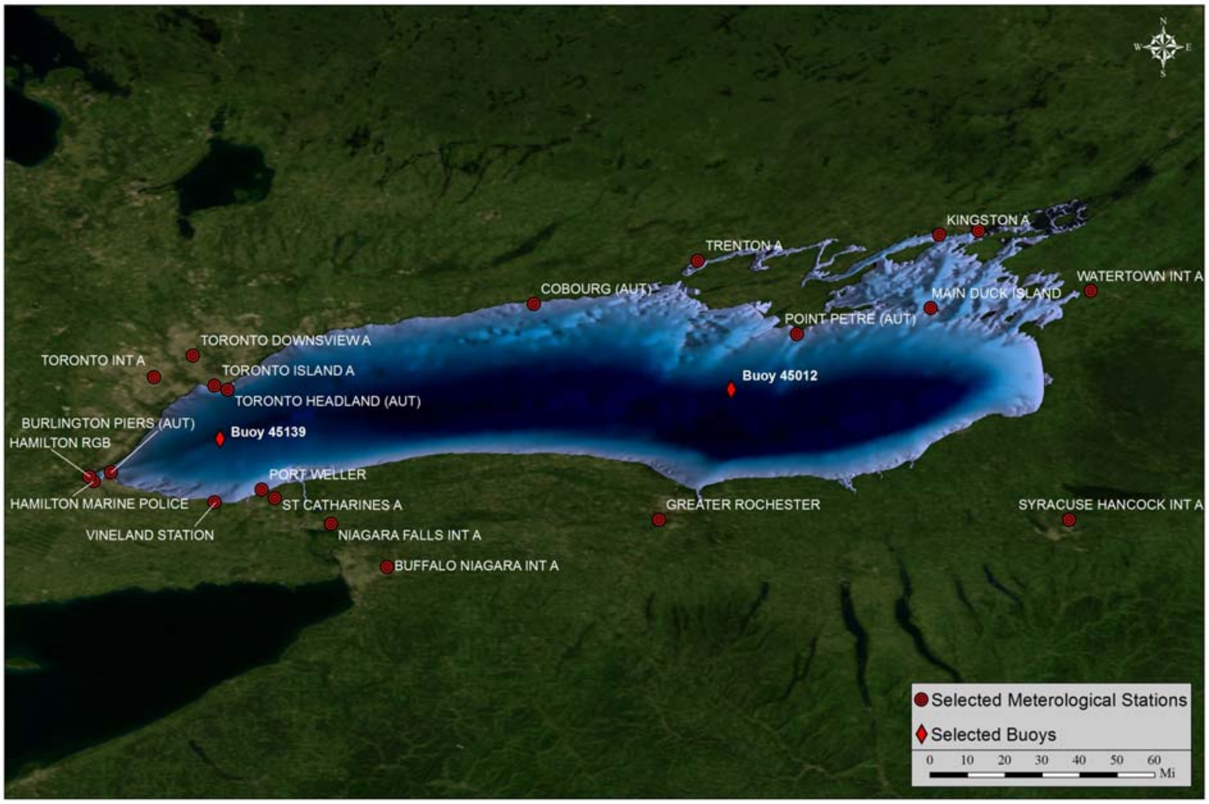

Figure 2.6 Selected Meterological Stations

Of twenty-eight stations, nine include pressure data as follows: Burlington Piers, Kingston Airport, Niagara Falls International Airport, Point Petre, Greater Rochester, St. Catharines Airport, Toronto Airport, Trenton Airport and Watertown International Airport. These nine stations were used to generate the Natural Neighbor pressure fields.

The data were interpolated to create a wind and pressure field covering all of Lake Ontario using the Natural Neighbor Interpolation Technique as described in Sambridge et al. (1995). Natural Neighbor Interpolation is a weighted average of the functional values associated with data, which are natural neighbors of the point at which interpolation is being made.

2.2.2.2 Gridded Wind and Pressure Data (NCEP CFSR)

The National Centers for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) is a coupled atmosphere-ocean-land surface-sea ice system. It currently provides wind and pressure data over a 31-year period from 1979 to 2009. CFSR atmospheric, oceanic, and land surface output products are available on an hourly basis at a horizontal resolution of 0.5° latitude × 0.5° longitude (Saha et. al., 2010).

Due to the coarse resolution of the CFSR data relative to Lake Ontario, particularly in the north-south direction, the CFSR grid points located in or along the perimeter of the lake were compared against measured wind data at two buoy locations. Figure 2.7 shows the location of the buoys and the CFSR data points considered in the analysis. This was done to determine how well the model predicts wind speed over water. The CFSR points located in the blue box were compared against Buoy 45012 and those located in the red box were compared against Buoy C45139. Correction factors were applied to each grid location based on a comparative analysis of wind speed by directional quadrant (8 quadrants in total). The purpose of the correction was to adjust the CFSR wind speeds to be more representative of conditions over water. Figures 2.8 and 2.9 illustrate this process by showing a comparison of the uncorrected and corrected wind speeds for all quadrants of the CFSR grid point closest to Buoy 45012 (refer to Figure 2.7). A review of the uncorrected data showed that the interpolated wind field was underestimated for the stronger wind speeds, which are important for the storm modeling completed for this study. As expected, the corrected data showed a stronger statistical correlation with the measured data. This analysis was completed for each (CFSR) grid point highlighted as blue squares in Figure 2.7. The corrected CFSR wind data was then interpolated to the model mesh in order to drive both the ADCIRC and SWAN models.

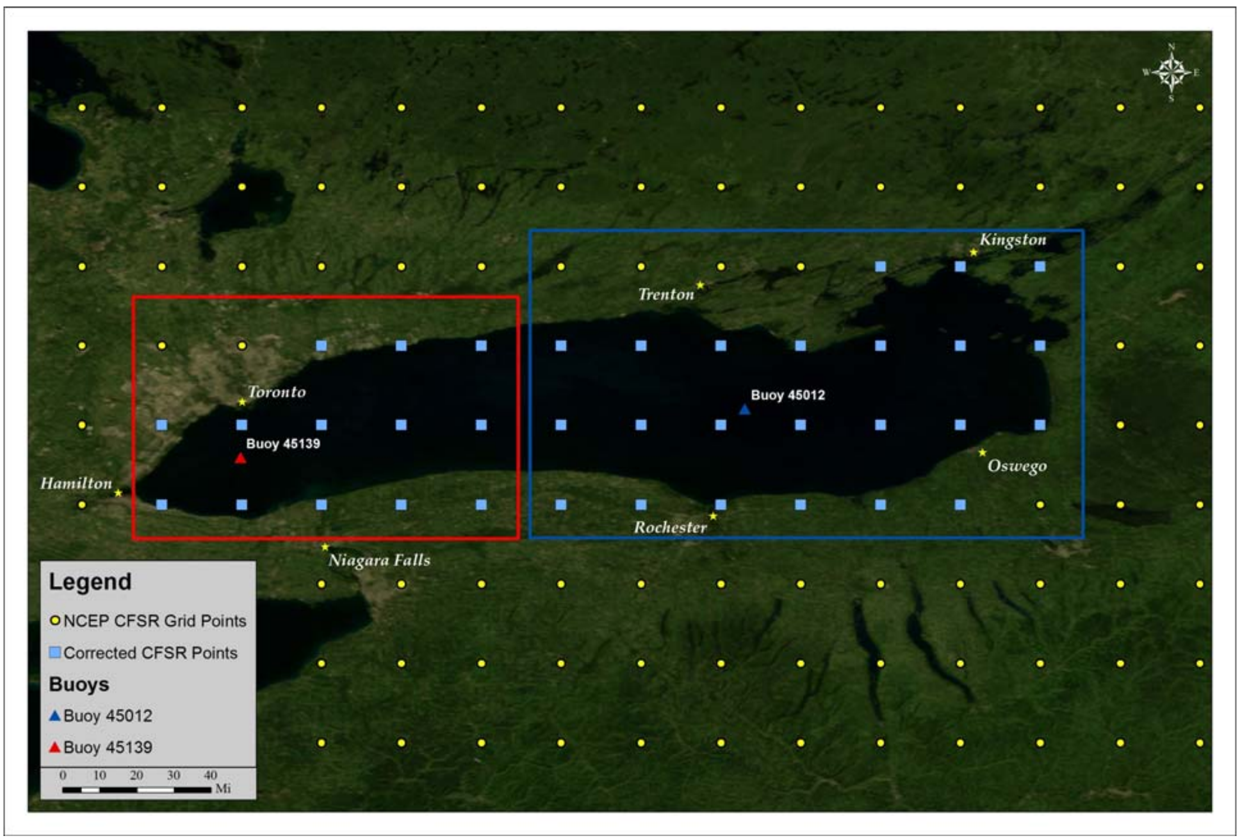

Figure 2.7 NCEP CFSR Data Points and Corresponding Buoy for Wind Speed Corrections

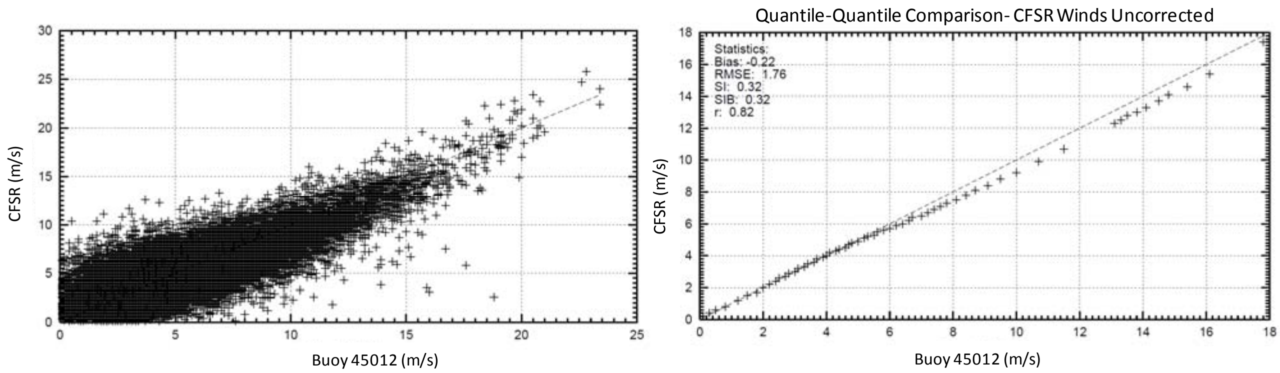

Figure 2.8 Comparison of uncorrected CFSR Wind Speed at One Grid Point to Buoy 45012

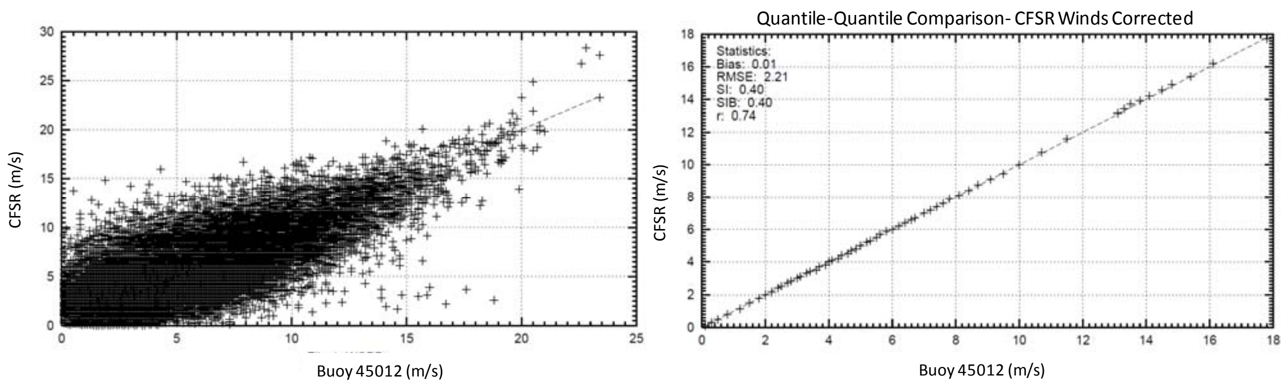

Figure 2.9 Corrected CFSR Wind Speed at One Grid Point to Buoy 45012

Note, Quantile-Quantile (Q-Q) plots were also used to evaluate the data statistically. A Q-Q plot is a graphical technique for assessing whether two data sets are statistically equivalent. In this approach the quantiles (percentages of data points below a given wind speed value) were plotted against the quantiles of the second data set. If equivalent quantiles provide equivalent wind speed, the data sets are statistically similar, as is the case in Figure 2.9.

2.2.3 Historical Ice Cover Data for Lake Ontario

According to available records, Lake Ontario has never completely frozen. Rather, ice cover tends to concentrate in shallower nearshore areas and in calmer sheltered areas, such as eastern Lake Ontario. It is possible to have some ice coverage on Lake Ontario from November through April.

A database of Lake Ontario ice concentration consisting of 51 years (1960-2010) was compiled from various sources. Data from 1960 to 1972 were synoptic ice charts from an ice concentration climatology database developed by Assel et al. (1983). Data post 1972 were polygonal digital ice data compiled by GLERL.

The data consists of a percentage of ice coverage on Lake Ontario for various spatial and temporal periods. The time between ice maps varies in the order of weeks to days and the older datasets tend to be incomplete. The grid resolution has also been refined with time as shown in Table 2.1 and Figure 2.10.

Table 2.1 Summary of Ice Coverage Maps' Grid Resolution

Ice Coverage Map Temporal Extents	Grid Resolution (Number of Gridpoints within Extents of Lake Ontario)
1960 - 1972	758
1973 - 2006	2,804
2007 - 2010	11,187

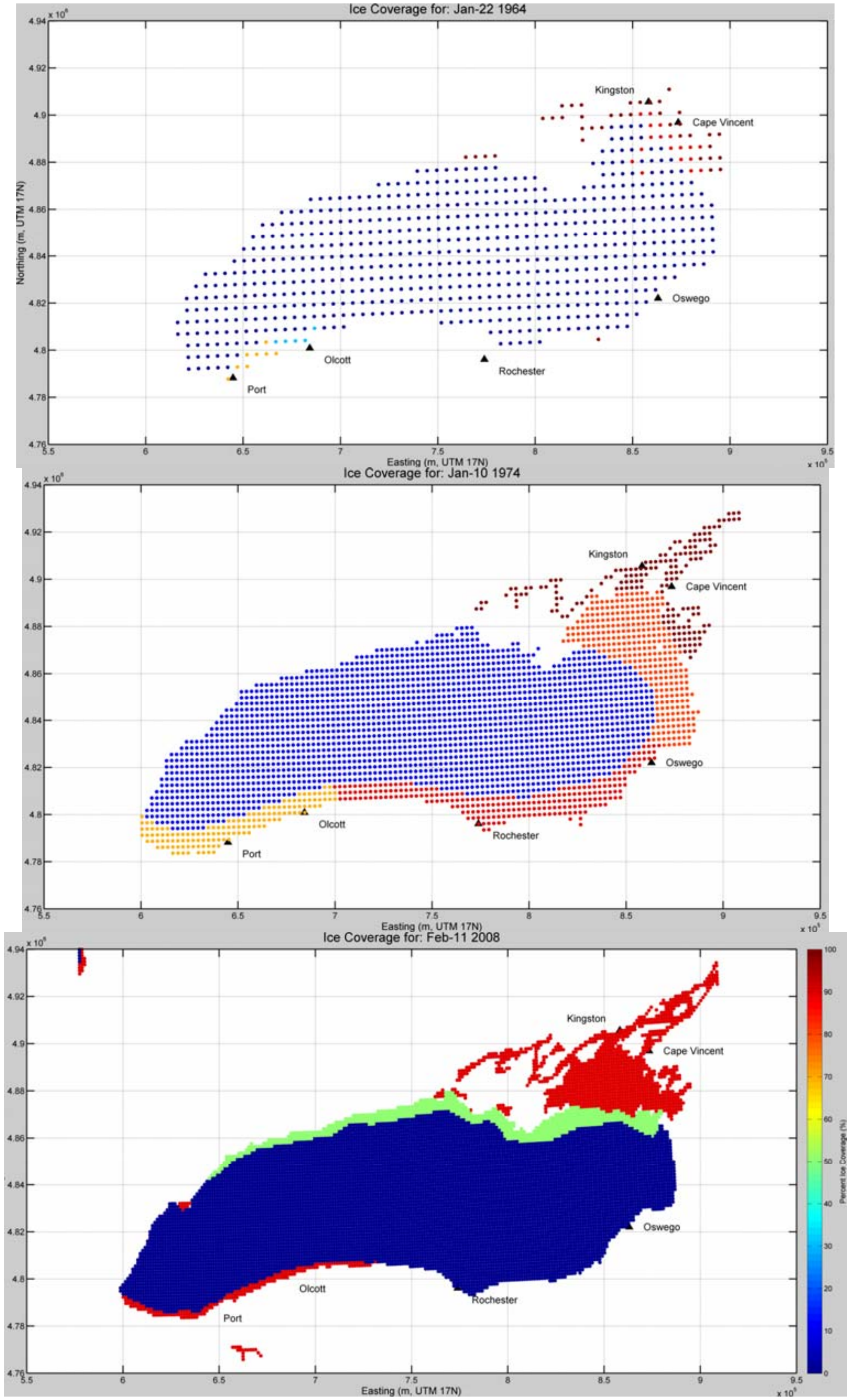

Figure 2.10 Example of Three Ice Coverage Maps with Different Grid Resolution 1964 (top), 1974 (middle), 2008 (bottom)

2.2.4 Flow Data for the Niagara and St. Lawrence Rivers

The Niagara River, which flows north from Lake Erie, is the main source of water entering Lake Ontario. Flow from Lake Ontario is discharged through the St. Lawrence River to the Atlantic Ocean. Parts of these two rivers were included in the ADCIRC model domain as flow boundaries.

The flow that is discharged through the St. Lawrence River is a combination of the flow entering from the Niagara River combined with many smaller tributaries. Therefore, the discharge flow through the St. Lawrence River exceeds the inflow from the Niagara River. However, for the purpose of modeling, small tributaries were omitted and the flow entering through the Niagara River was set equal to that discharge through the St. Lawrence River so as not to bias the storm surge predictions. Data used to define the flow boundaries were obtained from NOAA's Great Lakes Environmental Research Laboratory (GLERL) for the period of 1960 to 2005, and then from Environment Canada for the period of 2005 to 2011. A compilation of the data is shown in Figure 2.11.

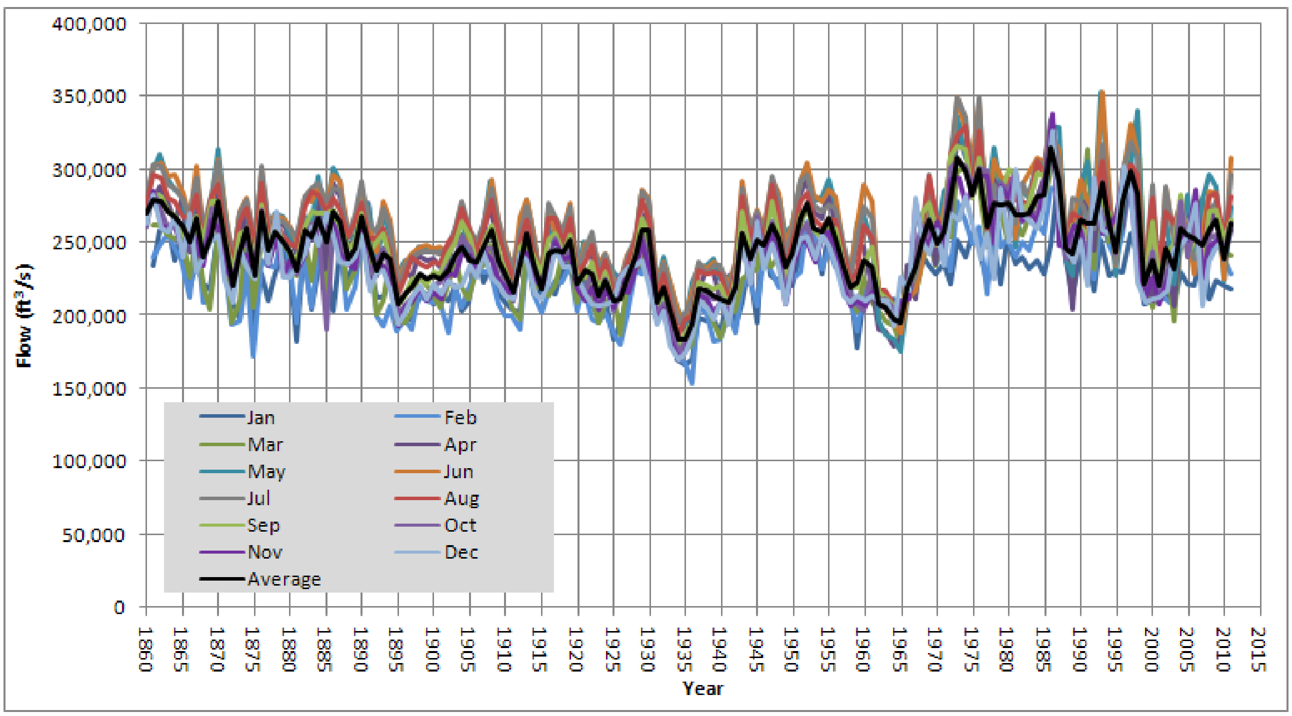

Figure 2.11 St. Lawrence River Monthly Average Flow

2.2.5 Wave Buoy Data

Waves have been measured in Lake Ontario using buoys at twelve locations, as shown in Figure 2.12. There are several inconsistencies in the recorded wave and wind data; the period and duration of the parameters varied considerably. In addition, the buoys are removed during winter (November to March). The long-term data are biased due to the lack of recorded winter storms that often produce some of the largest and most severe wave conditions. Finally, there was a considerable change in the type and pay loads of the two long-term buoys (C45135, C45139) after 1996. Initially, data were recorded by 3 m diameter buoys from 1988 to 1996. However, after 1996 the data were recorded by large 12 m discus buoys which do not respond well to short period wave conditions. These various factors were considered when using the measured wave data to verify the SWAN model outputs.

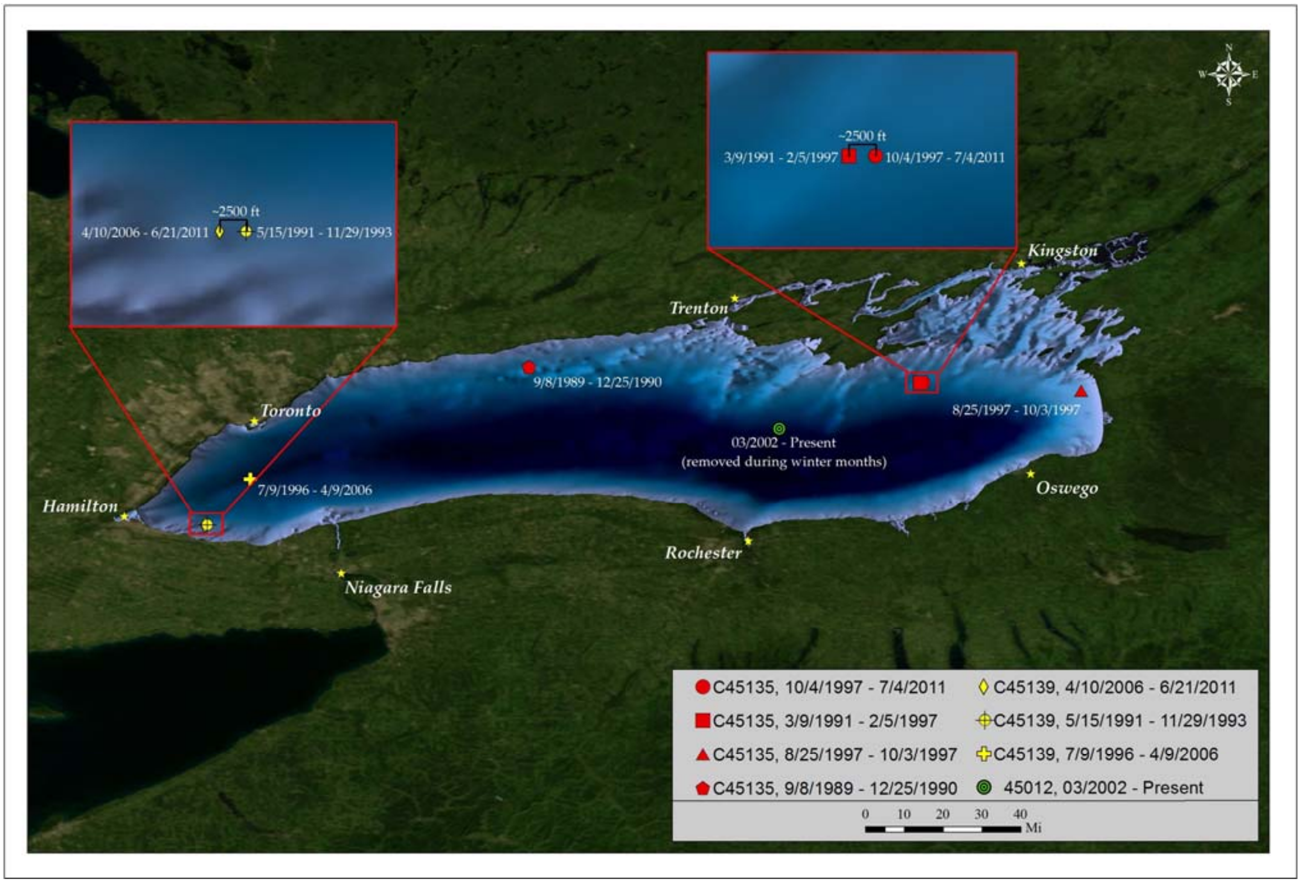

Figure 2.12 Lake Ontario Buoy Locations

2.3 Previous Studies

Several previous studies were utilized during the investigation and are briefly summarized.

2.3.1 Revised Report on Great Lakes Open-Coast Flood Levels – Phase 1

The measured historical water level gage data for the US shoreline of the Great Lakes were analyzed in 1988 to establish extreme values for return periods of 10, 50, 100 and 500 years. For each lake, different elevations were reported for segmented geographic regions (USACE, 1988).

2.3.2 Baird 2003 WAVAD Hindcast on Lake Ontario

Baird completed a wind-wave hindcast on Lake Ontario for the International Joint Commission (Baird, 2003). The original hindcast was completed with WAVAD, a second generation spectral wave model used for wind-wave hindcasting. The temporal duration of the analysis was 1961 to 2000. Recently, the hindcast was extended to the end of 2010 for an industrial client. The data is proprietary but Baird has the authority to use the waves for analytical purposes, which we did for this study. The raw time series data cannot be transferred or distributed.

3.0 WATER LEVEL ANALYSIS

Section 3.0 of the report describes the analysis of long- and short-term water level trends on Lake Ontario.

3.1 Evaluation of Gage Locations

The location of the water level gages used in the analysis was evaluated to determine the site conditions, such as degree of exposure and distance of the intake pipe from the shoreline. Background information was collected during a literature review and in direct conversation with NOAA officials to understand the unique site conditions at each gage. Figure 3.1 depicts a cross-section of a typical NOAA gage house on Lake Ontario. Note that this section only depicts the water level measurement techniques, not meteorological data.

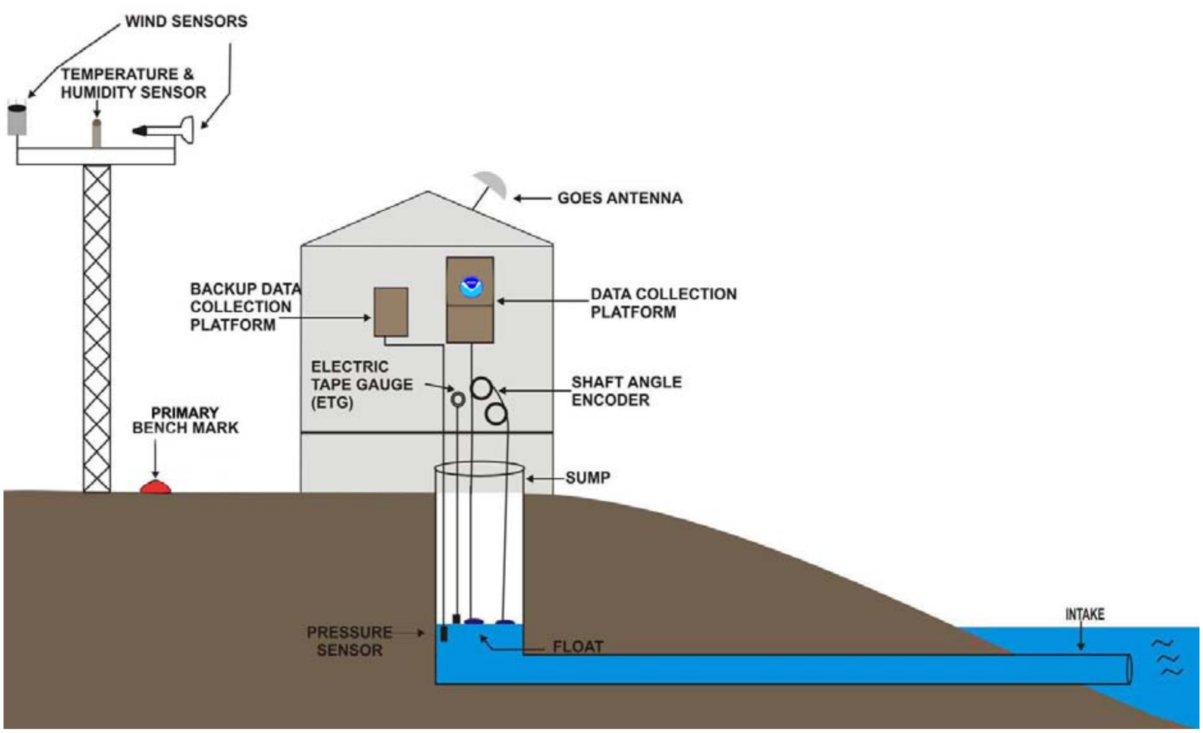

Figure 3.1 Definition Sketch of a Typical NOAA Gage House

The intake pipe typically extends some distance into the lake from the gage house, as seen in Figure 3.1. The lake level is determined by measuring the travel time of a reflected signal from a downward facing acoustic sensor in the well, which is connected to the intake pipe. With the aid of a calibrated reference point, the water surface is accurate to 0.1 ft (NOAA, 2005). The acoustic sensor is mounted inside a PVC protective well, which is more open to the local lake dynamics than the traditional stilling well and does not mechanically filter much of the wind waves or chop (NOAA, 2005).

The location of each gage was mapped and is noted with a blue X in Figure 3.2. At Olcott and Rochester, the gage house and intake pipes are located west of the harbor structures. Conversely, at Oswego and Cape Vincent, the instruments are located inside existing buildings within the harbor and somewhat sheltered from the open lake.

The intake pipes at Olcott, Rochester and Oswego are located offshore from the actual instruments that measure water levels in the wells, as noted in Table 3.1. For example, at Rochester the intake pipe is located 1,160 feet offshore from the gage house, which is located at the shoreline.

Table 3.1 NOAA Gage Intake Distances

NOAA Gage	Intake Distance (ft)
Olcott	900
Rochester	1160
Oswego	500
Cape Vincent	0

Cape Vincent is the one exception for the US gages on Lake Ontario, as the instruments are located in the wharf and there is no pipe that extends into the lake (refer to Figure 3.2). The information in Table 3.1 will be used to extract water level information from the ADCIRC grid when calibrating the storm surge predictions in Section 5.0.

Figure 3.2 NOAA Gage Houses (from Top to Bottom: Olcott, Rochester, Oswego, Cape Vincent)

3.2 Long-Term Water Level Analysis

To assess the long-term water level trends on Lake Ontario since regulation (1960), the monthly means were collected and statistically analyzed. Table 3.2 presents the mean, maximum, minimum, and standard deviation for the water level gages on Lake Ontario, including the Canadian gages. The values are nearly identical for all gages, especially the mean water level. There are two exceptions, Burlington and Olcott, which featured shorter record lengths. Refer to Figure 2.3. Specifically, these two gauges were not collecting data for most of the 1960s when lake levels were low. Therefore, the long term mean level is slightly higher than the other gages in Table 3.2.

Table 3.2 Long-Term Lake Level Statistics (by Gage) using the Monthly Means (ft, IGLD'85)

Station	Mean	Maximum	Minimum	Standard Deviation
Burlington	245.6	248.4	243.7	0.9
Cobourg	245.4	248.5	242.2	1.0
Kingston	245.4	248.4	242.3	0.9
Port Weller	245.4	248.5	242.1	1.0
Toronto	245.4	248.5	242.2	1.0
Cape Vincent	245.4	248.4	242.2	0.9
Oswego	245.4	248.4	242.3	0.9
Rochester	245.4	248.4	242.2	1.0
Olcott	245.5	248.4	243.7	0.9

The Oswego gage has the longest operational history on Lake Ontario and is considered the 'benchmark' gage for lake. Refer to Figure 3.3 for a plot of the monthly means at Oswego from 1960 to 2010. Monthly mean plots for the other gages are in Appendix A.

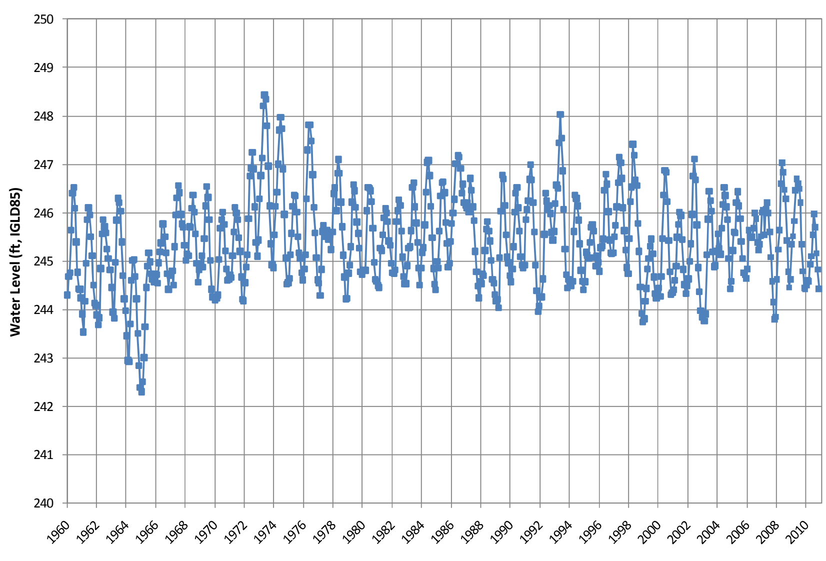

Figure 3.3 Monthly Means at the Oswego Gage (9052030) from 1960-2010

The most obvious trend in the long-term monthly mean data on Lake Ontario is the relatively narrow water level range (generally from 244 to 248 ft). This narrow range is due to the operating procedures for the Moses-Saunders Power Dam in Massena, New York, which attempt to keep the lake between 243.3 and 247.3 ft. In 1964 and 1965 the net basin supplies in the Great Lakes watershed were very low and the lake dropped below the desired operating range (243.3 ft). Shortly after these lows in the mid-1960's, very high net basin supplies resulted in several consecutive years of very high lake levels from 1973 to 1976. In 1993, the monthly mean level exceeded 248, which is above the desired operating range.

The long-term lakewide average monthly means were compiled and plotted in Figure 3.4 to assess how the maximum and minimum water levels vary by month. Note that the maxima and minima were determined by month, meaning the dashed red and blue lines do not represent a single year.

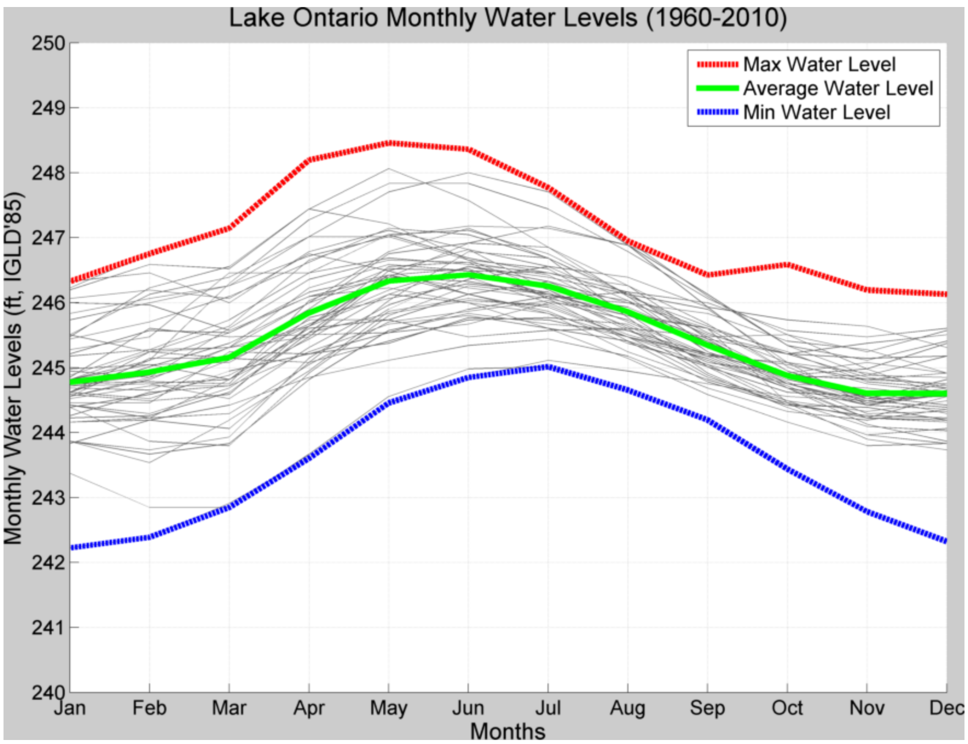

Figure 3.4 Lakewide Monthly Mean Statistics from 1960-2010

A statistical analysis was performed on the long-term monthly mean lake levels for each gage to identify extreme water levels. The annual maximum series (AMS) was assembled from the 51-year record of monthly means (1960 to 2010). This approach for determining extreme values was used in the USACE report on *Great Lakes Open-Coast Flood Levels* (1988). The 1988 results are included in Table 3.3 along with the statistics completed for this investigation. Both analyses used the Log Pearson III (LP3) distribution to predict both the 1% and 0.2% chance exceedance water levels. The only difference between the two results is that the USACE used an earlier temporal dataset, from 1935 to 1986.

Table 3.3 Exceedance Events by Gage by Baird (1960 to 2010) and USACE (1935 to 1986). The US Gages are Highlighted in Bold Text

Station	1% Exceedance Water Level (ft, IGLD'85)		0.2% Exceedance Water Level (ft, IGLD'85)	
	Baird	USACE (1988)	Baird	USACE (1988)
Brockville	246.9	-	247.4	-
Burlington	248.5	-	249.1	-
Cobourg	248.4	-	249.0	-
Kingston	248.4	-	249.0	-
Port Weller	248.4	-	248.9	-
Toronto	248.6	-	249.3	-
Alexandria Bay	247.5	-	247.9	-
Cape Vincent	248.4	-	249.0	-
Oswego	248.4	248.4	249.0	249.1
Rochester	248.4	248.3	248.9	249.0
Olcott	248.6	248.1	249.2	248.8

Interestingly, even though the temporal periods for the analysis are different for the present analysis and the USACE (1988) study, the 1% and 0.2% exceedance water levels are very similar for the Oswego, Rochester and Olcott gages.

3.3 Seasonal Scale Analysis of Lake Levels

Seasonality for lake levels is important for later steps in this study when selecting storm events for the surge and wave modeling. For example, very large storms can cause little to no flood damages if they occur during months that typically have low water levels (e.g. January). Figure 3.4 plots the general trend in monthly water levels for Lake Ontario. During the winter months of December and January, the lake typically reaches its seasonal low. During the spring freshet, runoff into the lake increases and the water level typically starts its seasonal rise. The operational rules for the dam also call for below average flow, which also increases the level of the lake. This increasing trend continues in the spring due to high precipitation levels and lower than average evaporation losses from the lake surface. By May or June, Lake Ontario typically reaches its seasonal peak.

In the late summer and fall, inflow to the lake from runoff and precipitation are lower than average, evaporation losses are high and thus the lake begins its seasonal decline. This decline is aided by the operational rules for the dam, which attempt to purposely lower the lake level to create storage capacity for the spring freshet in the coming year.

Monthly variability plots for the other gages are in Appendix A.

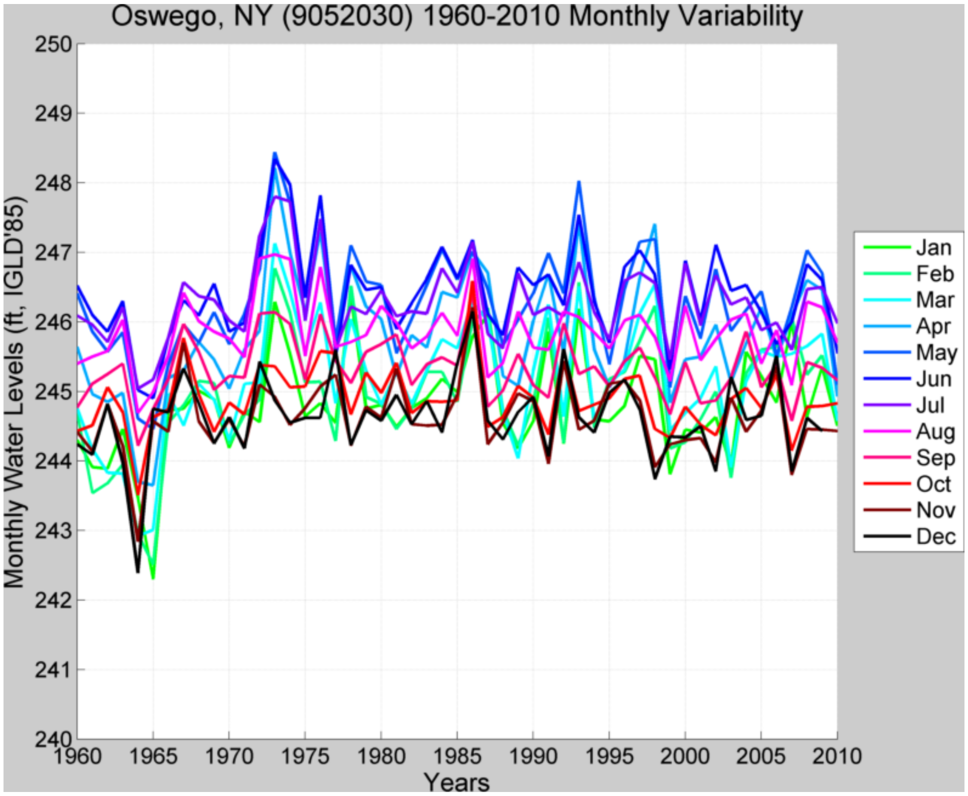

Figure 3.5 Monthly Time Series Water Levels at the Oswego Gage (9052030) from 1960-2010

Seasonal variability was also analyzed at each gage by plotting all 51 years of monthly means on a single plot, as shown in Figure 3.7 for Oswego. The 1% and 0.2% chance exceedance water levels were calculated for each month and included on the figure as red and blue diamonds, respectively. The AMS analysis presented in Table 3.3 was also added to evaluate the difference between long-term maximums and monthly maximums. The LP3 distribution was used (Figure 3.6) to predict the extreme monthly water levels to maintain consistency for the annual maximum analysis described in Section 3.2. This plot provides a clear picture of how much the lake can fluctuate in any given month and throughout the year. Seasonal exceedance plots for the other gages are provided in Appendix A.

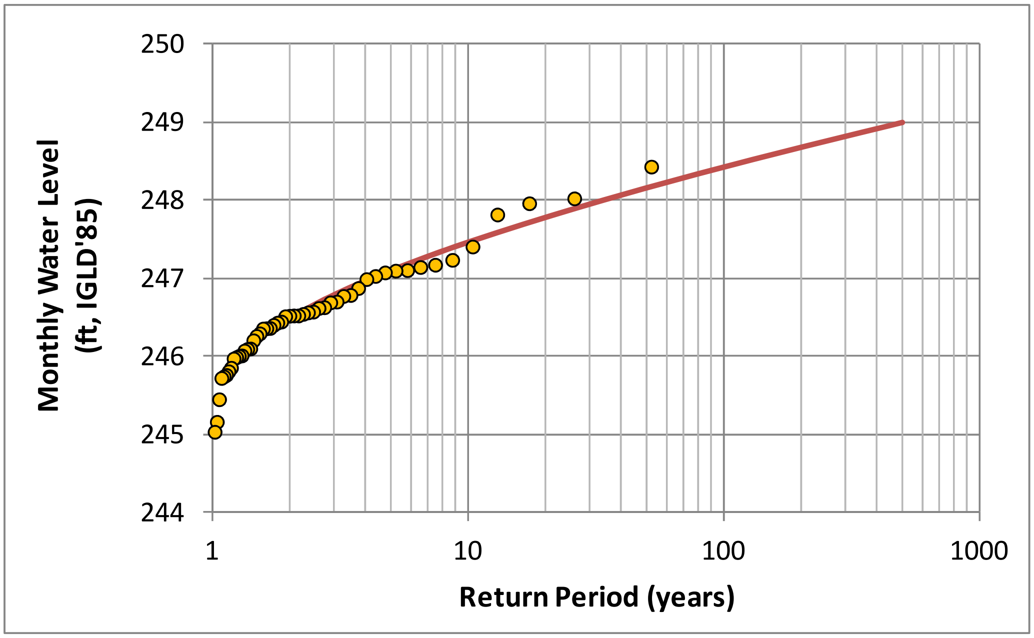

Figure 3.6 Extreme Monthly Water Levels at the Oswego Gage (9052030) using a Log Peason III (LP3) Distribution

This analysis highlights the importance of timing for large storm events. For example, a large storm event that happens in January when the lake is at 244 ft will not likely result in any flooding impacts. Conversely, if a storm of similar magnitude occurs in the late spring storm season in April, the water levels could be 4 ft higher. Previous analysis on the timing of historical flooding events in the Great Lakes (Baird, 2010) indicates that the most damaging storms are not in-phase with the June peak in lake levels; but rather occur during the shoulder months of March/April and September/October. These findings will influence the storm selection methodology developed in Section 4.0 of this report.

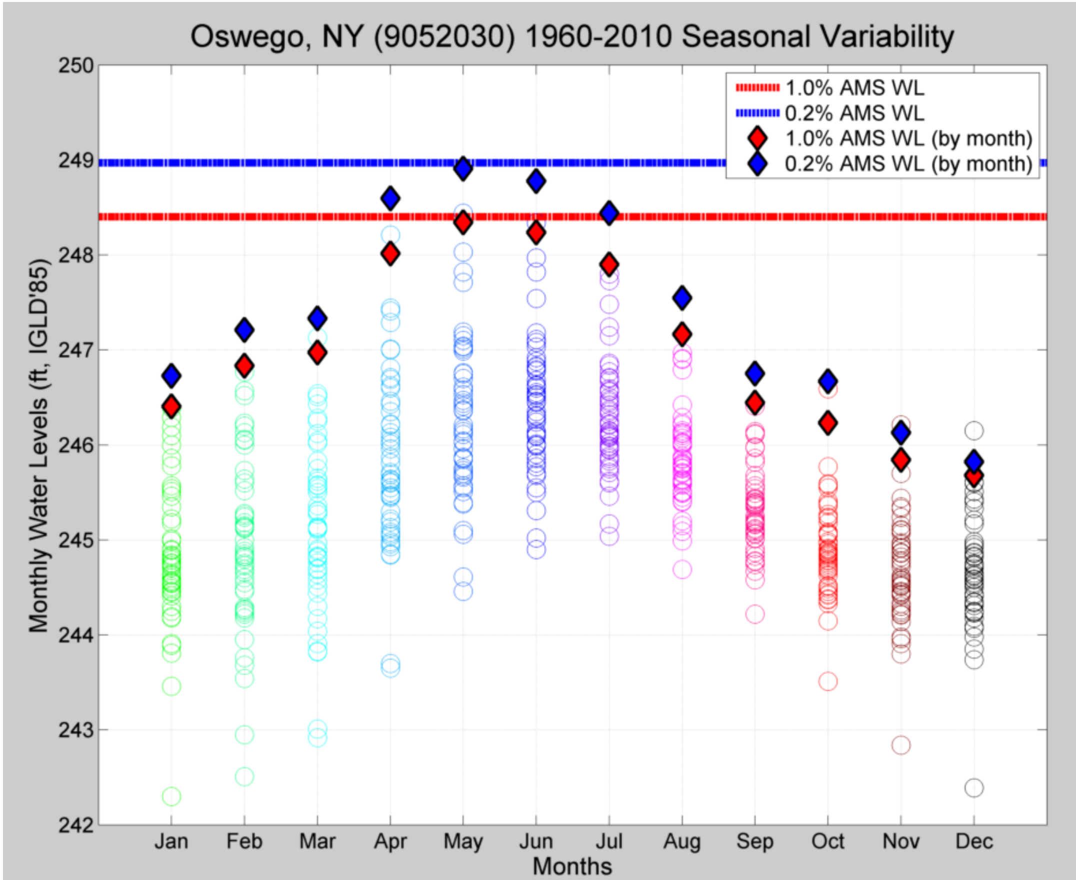

Figure 3.7 Monthly Means and Exceedance Levels at the Oswego Gage (9052030) from 1960-2010

3.4 Storm Surge Calculations (short-term water level fluctuations)

From 1960 to present, there are a variety of water level data available for Lake Ontario. Prior to 1970, only monthly statistics were available for the US gages. Post-1970 both monthly statistics and hourly water levels are available. Therefore, different methodologies for calculating storm surge were developed for the monthly and hourly data, as described in the following sections.

3.4.1 Storm Surge Calculations with Hourly Lake Levels

Historical storm surge events were extracted from the hourly water level data at the Lake Ontario water level gages. Specifically, the still water level (or static level) was subtracted from the individual hourly records, which are influenced by wind and waves. For example, the hourly lake levels at the Oswego gage from 1970 to 2010 are plotted in the top panel of Figure 3.8. A moving average of the hourly data was generated with a Gaussian smoothing algorithm, which was set at 30 days to remove the effects of storm surges on the static level. The 'smoothed' long-term still water lake level is plotted as the black line in the top panel of Figure 3.8. The difference between these two hourly records is the estimated storm surge, plotted as the red line in the bottom panel.

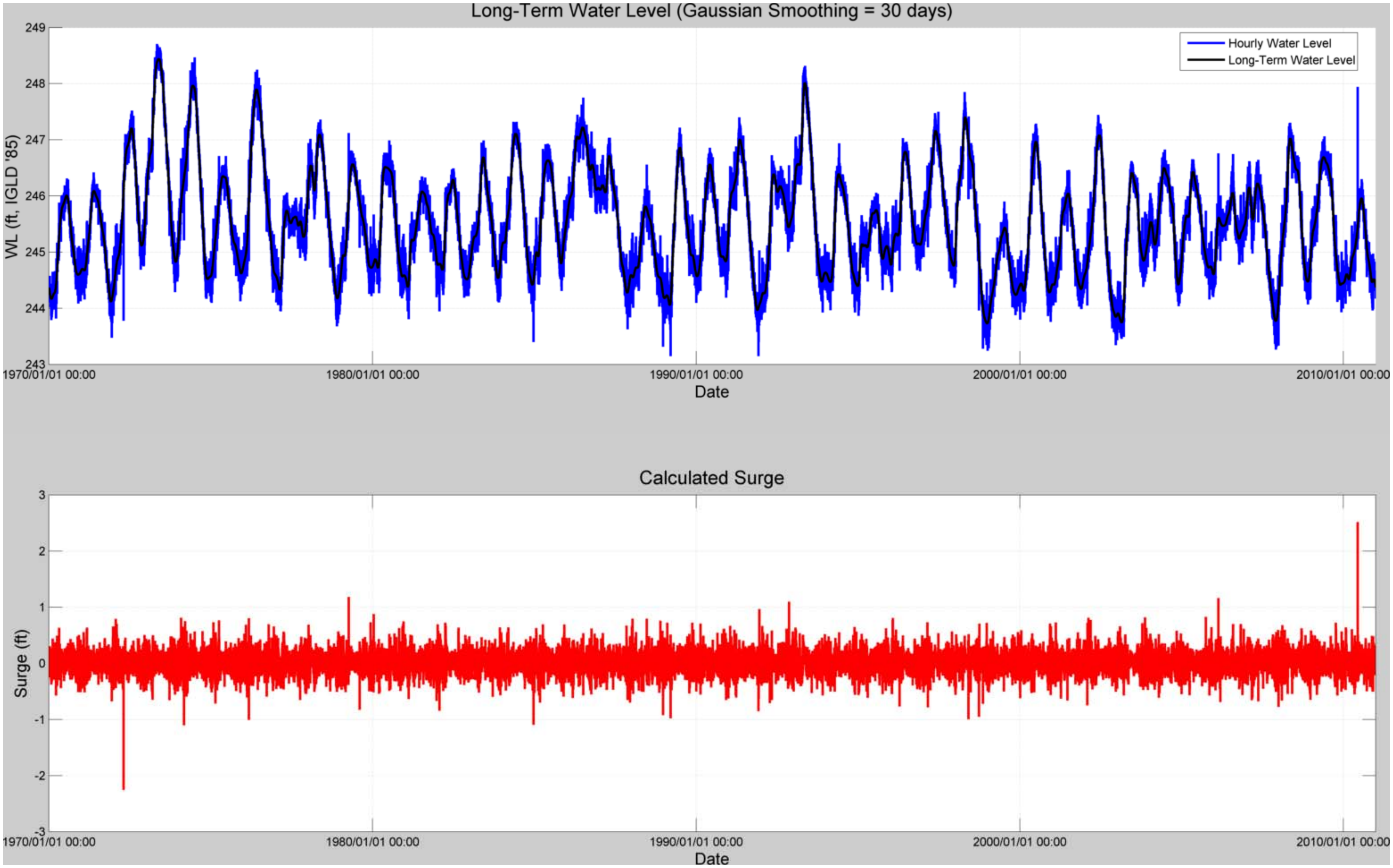

Figure 3.8 Hourly Water Levels and 30 Day Gaussian Average (top) and Calculated Hourly Storm Surge at the Oswego Gage (bottom)

A peak over threshold (POT) analysis was performed on the surge data to determine extreme events in the dataset. The POT analysis relies on the following user defined parameters to identify unique extreme events exceeding a specific threshold (values used in this analysis are in parentheses).

- *Lamda* – number of selected events per year (10)
- *Threshold* – based on z-score, number of standard deviations above the mean value (3)
- *Inter-event time lag* – maximum time that a storm can temporarily drop below the threshold to still be considered a single unique storm (24 hours)
- *Minimum duration* – final check to screen data of single hour spikes (2 hours)

The top 20 storm events from the POT analysis were plotted on the probability of exceedance (POE) curve for all of the hourly surge data. This step ensures that the top storms are selected from the 'tail' of the curve; where values are most extreme (large surge values) and least likely (low frequency). The POE curve is shown in Figure 3.9 for the Oswego Gage. The 2.5 ft surge event is a single hour event and thus was not selected since it did not satisfy the minimum duration requirement (i.e., all events must be > or = 2 hrs). This event is a significant outlier in the storm surge population, suggesting it is likely a sampling error.

Each storm was visually inspected to ensure it did not have two peaks occurring within the inter-event time. It also provided a good check to make sure the blue dots in between the 1st and 20th red dots are either hourly records from single hour events or a part of a higher ranked surge event.

An example is presented in Figure 3.10, where the top storm's 2nd largest peak is the 4th largest record in the dataset (Figure 3.9). Since this surge value is not a part of the top 20 storm series (red), it means that it was not 'double counted' as an independent storm.

Refer to Appendix A for the POE plots for the remaining US gages on Lake Ontario.

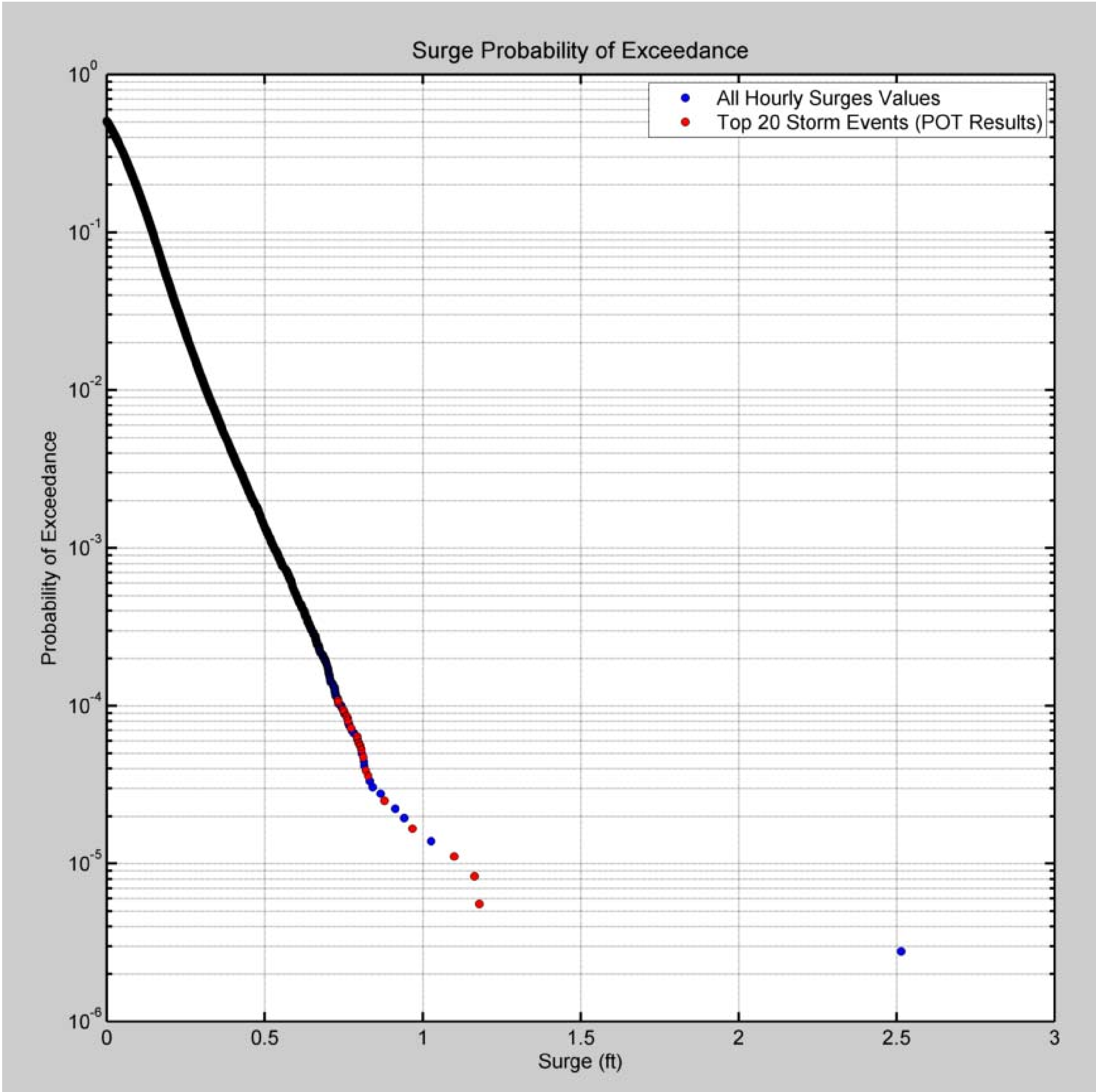

Figure 3.9 Probability of Exceedance (POE) Curve for the Oswego Gage (note: the 2.5 ft surge event is a bad data point and was not selected in the analysis)

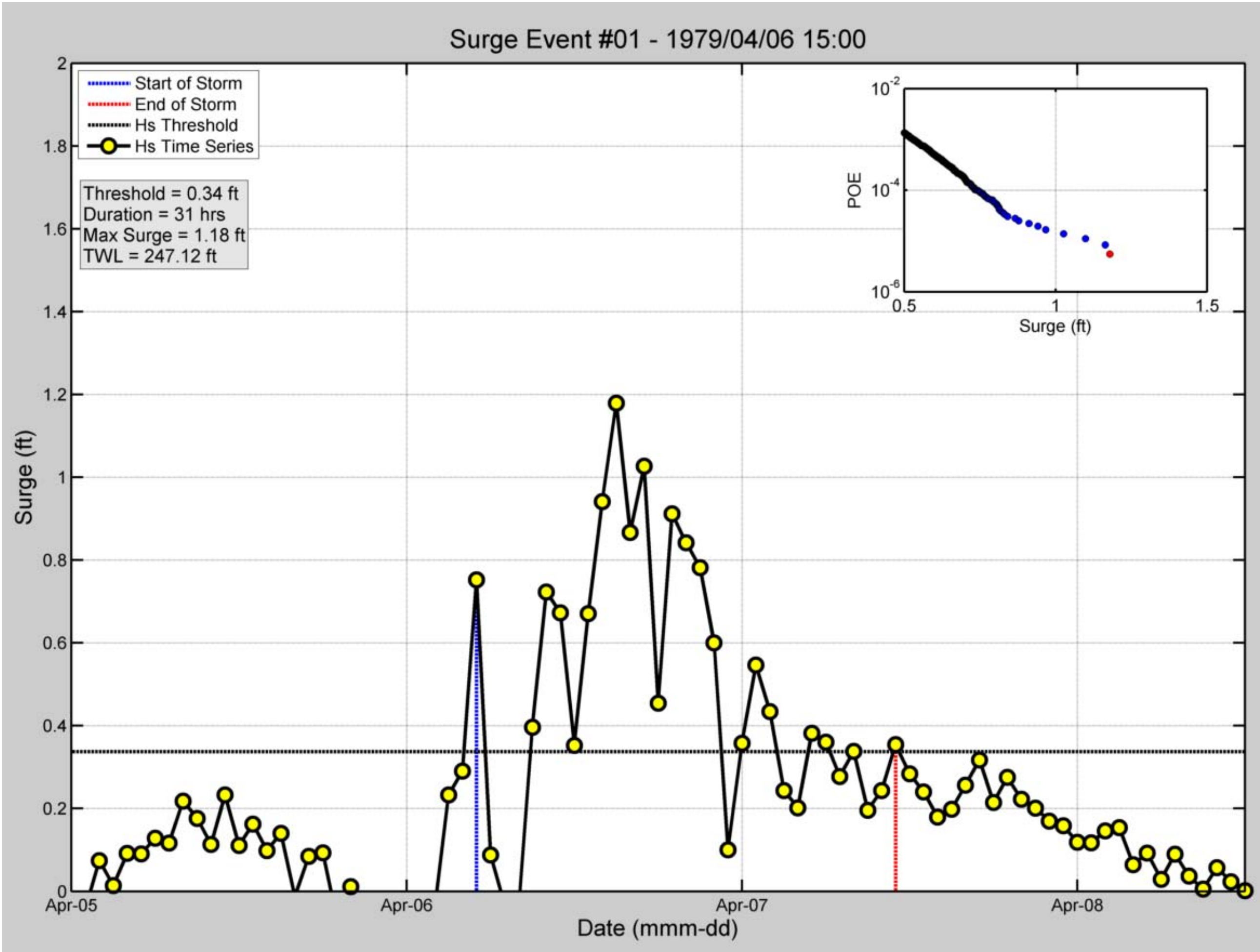

Figure 3.10 Largest Surge Event Recorded at the Oswego Gage

3.4.2 Storm Surge Calculations with Monthly Mean and Monthly Max Lake Levels

As stated previously, prior to 1970 only month statistics were available for the US gages on Lake Ontario, including the mean water level and the maximum water level for the month. Based on initial guidance received from the USACE/FEMA, a monthly storm surge value could be calculated by subtracting the monthly mean from the monthly max. The method assumes that the resulting difference is the largest storm surge on the lake for that month.

To test the validity of this approach, a series of calculations were completed using the hourly and monthly data from May 1974. The reported monthly mean and maximum for the Oswego gage in May 1974 are plotted in the top panel of Figure 3.11, along with the hourly records. Since the lake was in a rising trend in May 1974, the mean lake level (247.71 ft) intersects the hourly time series data roughly in the middle of the month. A large surge event also occurred mid-month and resulted in the highest hourly water level record for the month (248.24 ft), which also corresponds to the monthly maximum level.

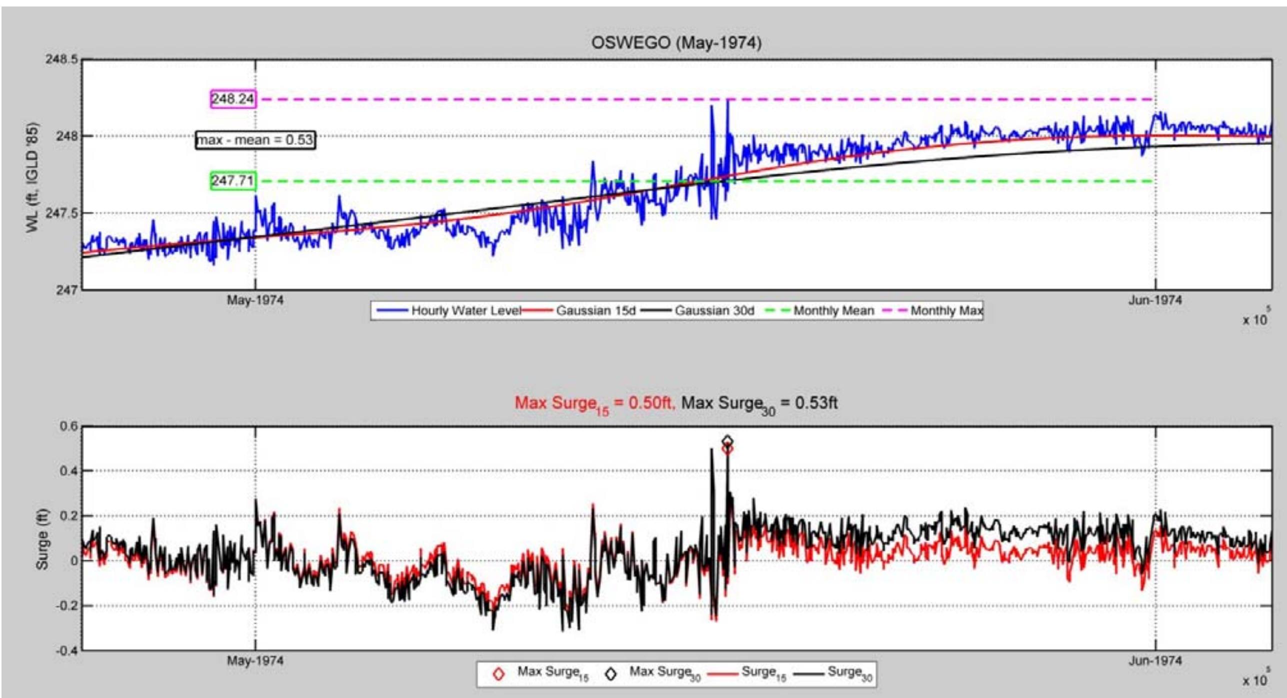

Figure 3.11 May 1974 Surge Analysis at the Oswego Gage

Hourly surge values for May 1974 were also calculated at the Oswego Gage following the procedures outlined in Section 3.4.1 and plotted in the bottom panel of Figure 3.11. With the 30 day Gaussian smoothing routine, which is plotted in the top panel as the black line, the largest hourly surge for May 1974 was 0.53 ft. Therefore, the two methods give the identical result. However, as will be shown, this is the exception not the norm for this method of calculating storm surge.

A second example for Oswego is presented in Figure 3.12 for April 1984. Again, the lake is in a rising trend which is typical for the spring season. The monthly mean of 246.43 occurs roughly in the middle of the month as in the previous example. The difference, however, in these two storms is the timing of the peak monthly surge calculated with the hourly data. If occurs right at the end of the month and was 0.31 ft based on the 30 day Gaussian filter. The peak surge for this event also represents the maximum monthly level. When the monthly mean is subtracted from the monthly maximum, a storm surge of 0.68 ft is estimated, which is more than twice the actual value calculated from the hourly data. The methodology breaks down in this example when the peak storm surge doesn't occur in the middle of the month.

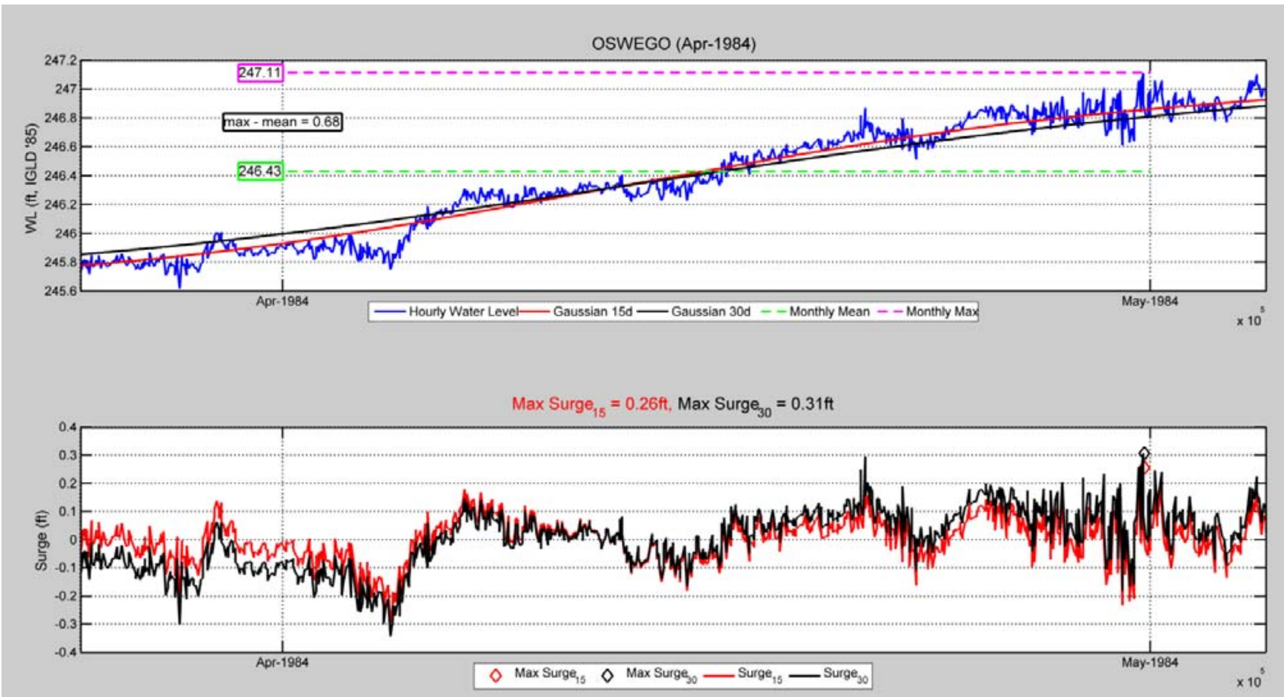

Figure 3.12 April 1984 Surge Analysis at the Oswego Gage

Additional examples of inaccurate surge calculations with the monthly mean minus the monthly maximum approach are presented in Appendix A.

The positive bias introduced by calculating storm surges with the monthly maximum minus the monthly mean approach is further demonstrated for the entire population of storm surges from 1960 to 2010 at the Oswego gage in Figure 3.13. The blue dots for the monthly maximum surge events are clearly higher than the red bars from 1970 to 2010 when estimating the same events. Further, the population of storm surges from1960 to 1969 are biased high relative to the population of storm surges from 1970 to 2010 calculated with the hourly water level records. This positive bias is further exemplified in the quantile-quantile plot in Figure 3.14, since the majority of the dots are located above the dashed black line. Based on these results, the storm selection approach described in Section 4.0 will focus only on the hourly water level data from 1970 to 2010 (41 years).

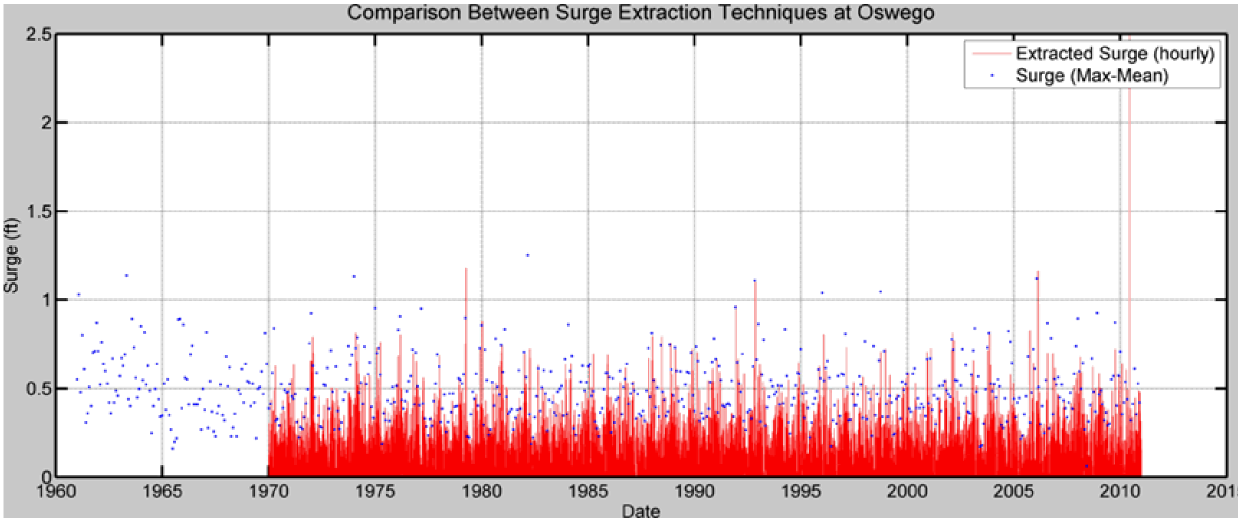

Figure 3.13 1960 to 2010 Comparison of Monthly Maximum minus Mean Lake Level versus Hourly Surge Calculations at Oswego

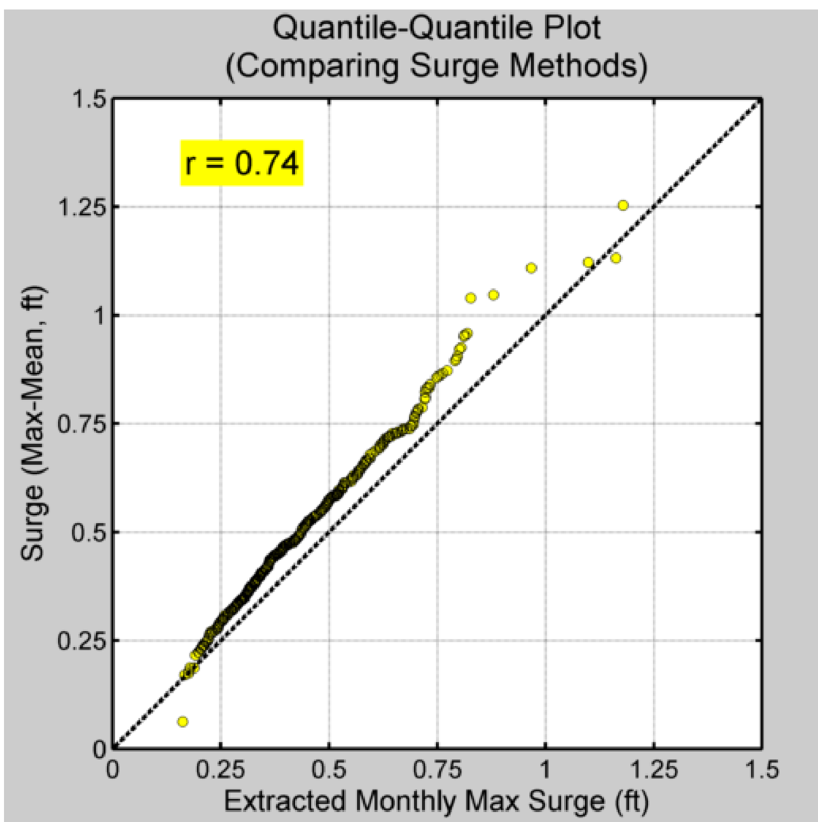

Figure 3.14 Quantile – Quantile Plot of Max-Mean Surge versus Maximum Hourly Surge per Month

4.0 STATISTICAL APPROACH FOR COMPOSITE STORM DATABASE

This section outlines the steps taken for creating a composite storm database for Lake Ontario, including investigating three storm selection techniques and testing the sensitivity of using or ignoring data from the 1960's. The end result of this section is a compiled list of the top 150 lakewide storms. The composite storm database will recreate extreme levels throughout the lake since it is a function of each gage's top storm events.

4.1 Spatial Distribution of Water Level Gages

The extents of the study area include the south shore of Lake Ontario, from the Niagara River to the St. Lawrence River. The closest US gages to either boundary are Olcott and Cape Vincent, respectively. To best represent storms near either boundary, the closest Canadian gages were also analyzed. Olcott was compared with Port Weller to see whether storms near the Niagara River (closer to the Canadian gage) are included at the US gage. Figure 4.1 shows a map of these gage locations.

Figure 4.1 Location of Closest US and CND Gages to Niagara River Boundary

The similarity of the measured water levels at the two gages near the Niagara River was quantified by plotting a direct comparison and a quantile-quantile plot, shown in Figure 4.2, for the period 1970 to 2010. The hourly water levels are very similar with a correlation coefficient of 1, while the surge does not show the same agreement (r = 0.57).

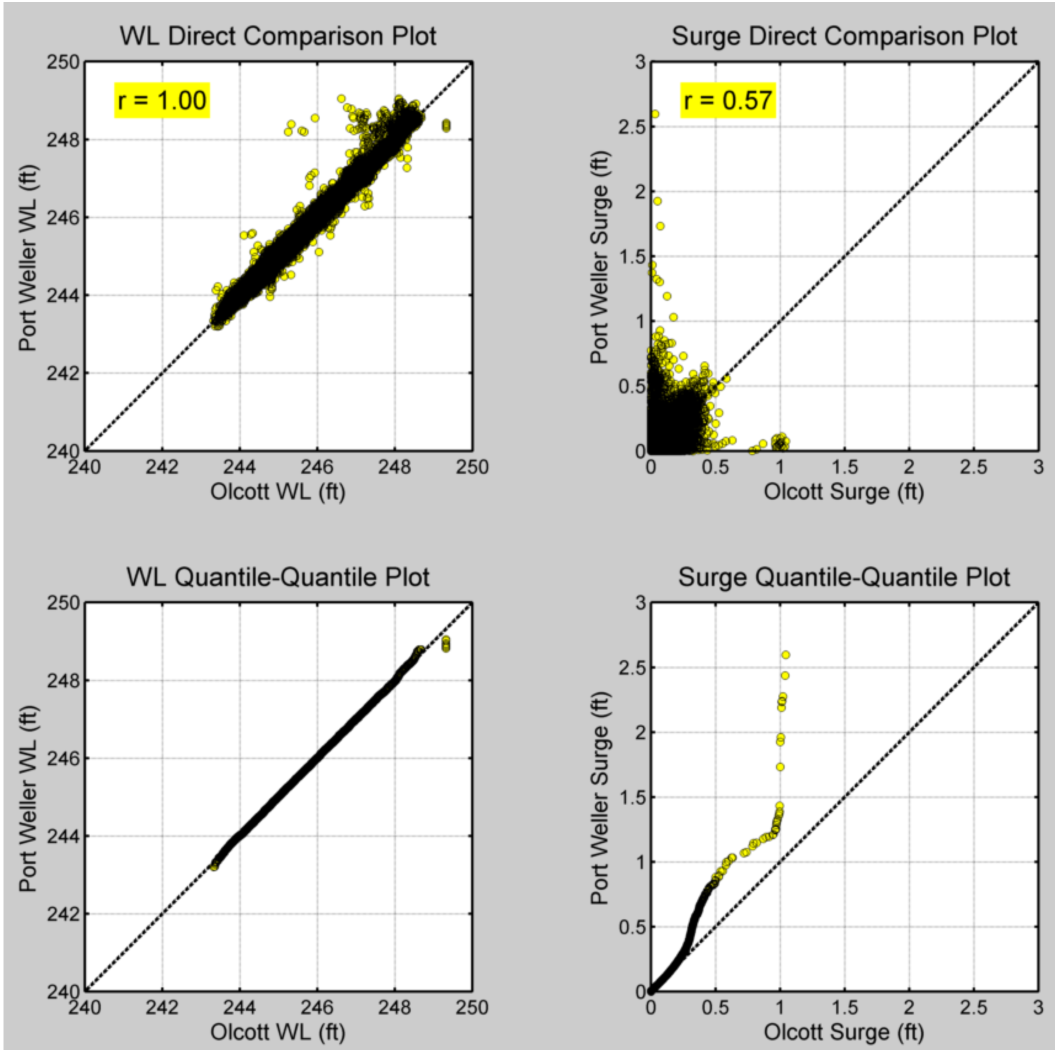

Figure 4.2 Direct Comparison and Quantile-Quantile Plots for Hourly Water Levels at the Olcott and Port Weller Gages (1970 to 2010)

The relationship is non-linear with a substantially lower correlation coefficient, mainly due to the top measured surge event recorded at the Olcott gage (see Figure 4.3). This event was not included in future analyses since the water level is fluctuating unrealistically (not identified at other gages), but is the main reason for the weak correlation between the Olcott and Port Weller gage (included all measured water levels in the QQ-plot).

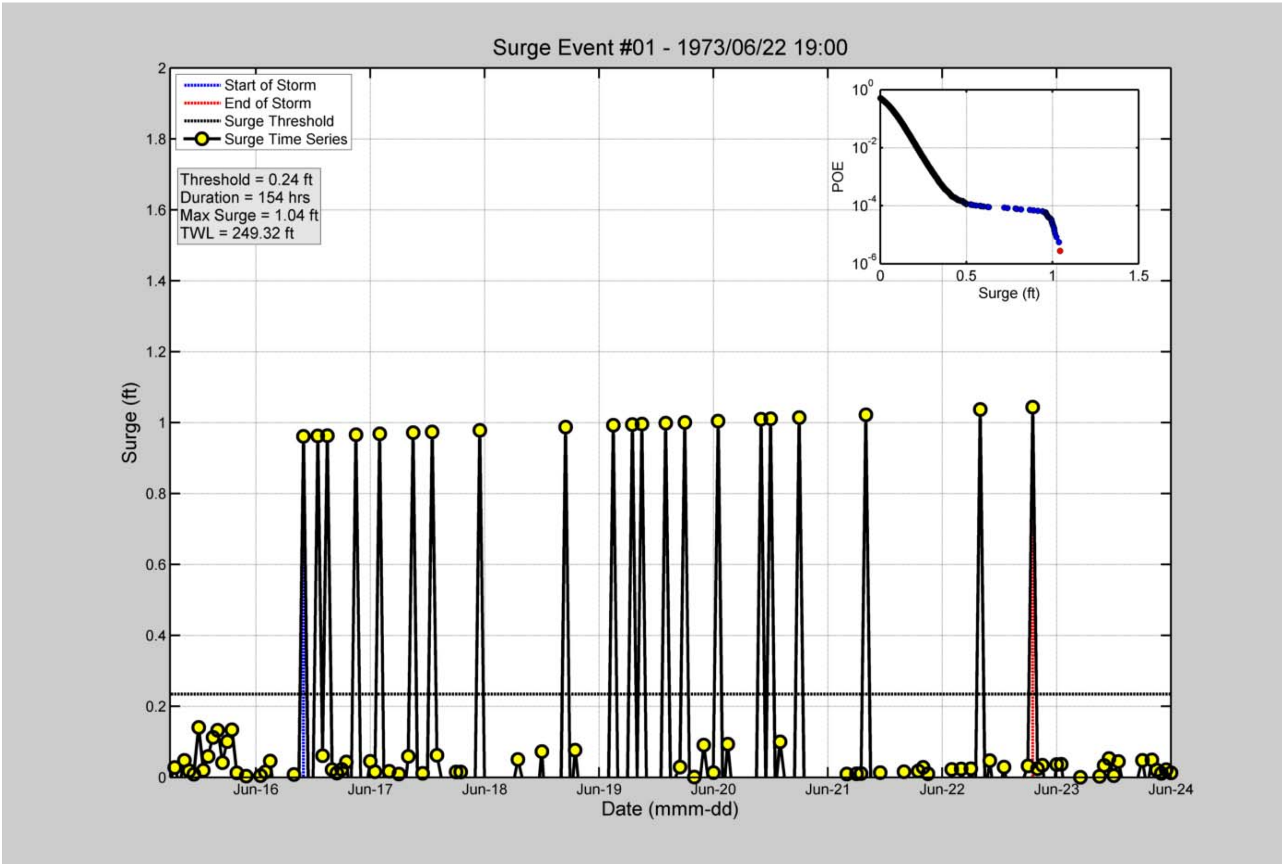

Figure 4.3 Top Ranked Surge Event at Olcott Gage

Essentially, the hourly water levels are similar at each gage, while the surges are much larger at Port Weller potentially due to the longer fetch for westward traveling storms. Therefore, we concluded it was prudent to select some storms from the Port Weller gage to ensure the extreme events near the mouth of the Niagara River are well represented.

The St Lawrence River drains Lake Ontario and is located between the Cape Vincent and Kingston gages. Refer to Figure 4.4. The same gage comparison was completed at this boundary to decide if some storms from Kingston should be included in the composite database. Unlike the Niagara River, the two gages showed a high correlation to each other for both hourly water levels and storm surges as illustrated by the water level and surge QQ-plots in Figure 4.5.

Figure 4.4 Location of Closest Gages to St. Lawrence River Boundary

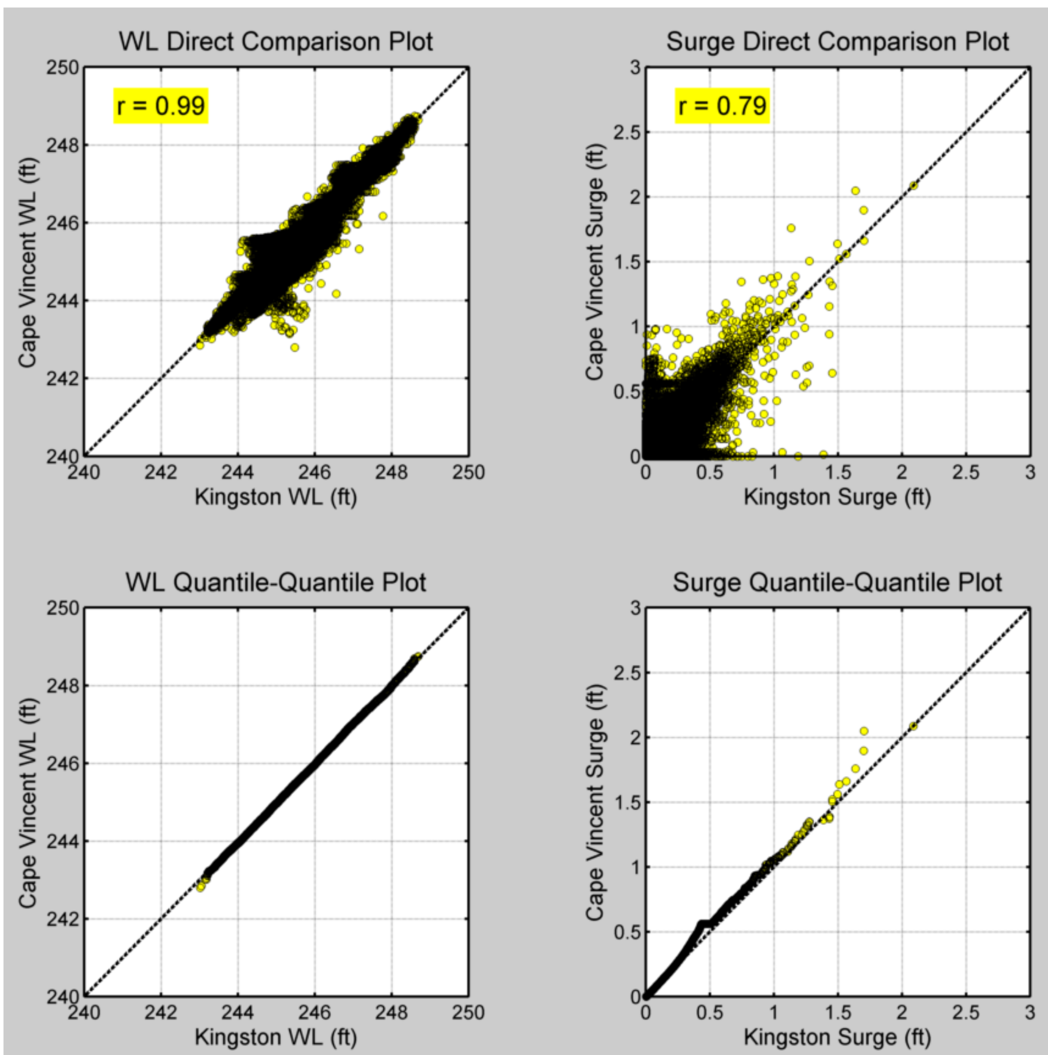

Figure 4.5 Direct Comparison and Quantile-Quantile Plots for Hourly Water Levels at the Kingston and Cape Vincent Gages (1970-2010)

Based on the comparison of gages near the study boundaries, it was deemed necessary to include some events from both Port Weller and Kingston. The composite storm database for Lake Ontario will be populated based on the distribution of storms in Table 4.1. A total of 10 storms are selected from the Kingston gage and 20 storms are selected from the Port Weller gage for inclusion in the composite database.

Table 4.1 Distribution of the 150 Storms for the Lake Ontario Composite Database

Gage	Number of Storms Selected
Port Weller	20
Olcott	30
Rochester	30
Oswego	30
Cape Vincent	30
Kingston	10
Total	*150*

4.2 Evaluation of Storm Selection Methodologies

For simplicity, all discussions in Section 4.2 and 4.3 are focused on the Cape Vincent gage to illustrate the differences between the three storm selection methodologies, while Section 4.4 contains the final approach. The three storm selection methodologies are as follows:

- *Method A – Extreme Storm Surge and Wave Height Events*;
- *Method B – Storm Surge, Wave Height and Storm Water Level*; and
- *Method C – Total Water Level (including runup)*.

In this initial assessment of storm selection techniques, the effect of ice cover was ignored. Also note that this work was completed prior to our findings outlined in Section 3.4.2, therefore monthly surges from the 1960's are included in these results.

4.2.1 Method A - Extreme Storm Surge and Wave Height Events

For Method A, 50% of the storms at a gage are selected based on the largest surges and 50% based on the largest wave height events.

Extreme surge events from a POT analysis were compiled for each gage. The same methodology explained in Section 3.4.1 was followed. For information purposes, the top 10 unique surge events at the Cape Vincent gage are shown in Table 4.2 (the actual list includes the top 100 events).

Table 4.2 Top 10 Surge Events at the Cape Vincent Gage (NOAA ID 9052000)

Rank	Maximum Time	Maximum Surge (ft)	Storm Water Level (ft, IGLD85)	Duration (hrs)
1	1992/11/13 02:00	2.09	247.52	13
2	2006/02/17 09:00	2.05	247.59	26
3	1979/04/06 06:00	1.90	247.77	44
4	2008/01/30 09:00	1.52	246.43	10
5	1991/12/14 19:00	1.50	245.50	15
6	2002/03/10 00:00	1.39	246.70	24
7	2004/12/23 16:00	1.39	246.02	3
8	2003/11/13 08:00	1.37	246.23	17
9	2002/02/01 15:00	1.35	246.13	9
10	1997/02/22 12:00	1.31	247.06	3

The most representative WAVAD node (see Section 2.3.2) for each NOAA water level gage was chosen to analyze the deep water wave climate from 1961 to 2010. Each white box indicates which WAVAD node (red triangles) was matched with which NOAA gage (yellow pushpin). A POT analysis was performed on each of the selected WAVAD points highlighted by a white box in Figure 4.6, plus the most representative point near the Kingston and Port Weller Canadian Gages.

Figure 4.6 Location of Extracted WAVAD Points (red triangle) for each Water Level Gage (yellow pushpin)

The POT analysis was completed on 50 years of hourly waves (1961-2010), with the top 10 unique wave heights presented in Table 4.3 for information purposes (the top 100 were analyzed). The same POT technique used to extract surge events on the water levels was applied to the wave data. This ensures consistency throughout the analysis.

Table 4.3 Top 10 Storms by Wave Heights near Cape Vincent (WAVAD Pt 4641)

Rank	Maximum Time	Maximum H_o (ft)	Tp (s)	Direction (deg, from N)	Duration (hrs)
1	1971/02/28 17:00	18.64	10.15	241	23
2	2002/03/10 19:00	18.54	8.90	261	31
3	2000/12/18 08:00	17.81	10.15	255	22
4	2003/11/13 16:00	17.65	10.15	256	18
5	1975/02/26 18:00	17.62	10.15	248	46
6	1982/01/11 13:00	17.26	10.15	237	18
7	2009/12/11 08:00	17.09	10.15	254	44
8	1972/01/25 17:00	17.06	8.90	252	19
9	1992/11/13 16:00	16.73	10.15	256	22
10	1970/11/23 23:00	16.70	8.90	242	25

Once the individual surge and wave height events were isolated at each gage, the next step in developing the composite storm database is to compile the required number of unique storms at each gage, as identified in Table 4.1. A duplicate event occurs when both the surge and wave height storm listing identify a storm with the same date. A buffer on the date was implemented since it is unlikely that surge and waves will peak on the exact same hour during a storm due to differences between the two driving forces. The buffer was set at 48 hours, meaning that no two event peaks (i.e., surge or wave height) can fall within that time. If they do, the lesser ranked event within its respective storm listing is discarded. An example of a duplicate event is the 1st ranked surge and the 9th ranked wave height (highlighted in orange) in Tables 4.2 and 4.3 respectively. In this case the 9th ranked wave event is thrown out. After discarding any duplicate storms, the top events at each gage were assembled according to Method A. As mentioned previously, this method uses an even split between surge and wave events at each gage, as detailed in Table 4.4.

Table 4.4 Distribution of Composite 150 Storms from the Lake Ontario Gages for Method A

Gage	Number of Surge Events Selected	Number of Wave Height Events Selected
Port Weller	10	10
Olcott	15	15
Rochester	15	15
Oswego	15	15
Cape Vincent	15	15
Kingston	5	5
Total	*75*	*75*

Similar to the analysis at the individual gages, another buffer is necessary to ensure events from each gage are unique across the lake. The main difference in using the buffer of 48 hours for the composite storm database is that the lesser ranked event was discarded and replaced with the next highest ranked storm (from the same population as the discarded event – i.e., surge or waves). For example, if the 1st ranked surge event at Oswego is the same storm (within the buffer time) to the 2nd largest wave event at Cape Vincent, then the wave event is discarded and replaced with the next highest wave height event not previously selected. Following this example and referring to Table 4.4, Cape Vincent requires 15 wave height events meaning the 16th largest event needs to be included since it is the next highest ranked storm. This process is iterative in nature since a newly replaced wave height storm has the potential to be a duplicate with a surge event. The top 150 composite events were systematically screened for duplicates according to this methodology.

4.2.2 Method B - Storm Surge, Wave Height and Storm Water Level

Method B is a hybrid that allocates 1/3 of the events at a gage to storm surge, wave height events and extreme high lake levels. A secondary surge storm listing was completed with an extremely low threshold and sorted by storm water level (the max. hourly water level). This isolated surge events at high lake levels, as noted in Table 4.5, which lists the events by storm water level (SWL).

This is different than looking only at the largest surge events, which is done independently of the static lake level. The remaining 2/3 of the events at each gage were split between the largest storm surges and largest wave height events, as outlined for Method A.

Table 4.5 Top 10 Storm Water Level Events at the Cape Vincent Gage (NOAA ID 9052000)

Storm Water Level Rank	Surge Rank	Maximum Time	Maximum Surge (ft)	Storm Water Level (ft, IGLD85)	Duration (hrs)
1	374	1993/04/17 22:00	0.45	247.84	2
2	124	1972/08/09 16:00	0.69	247.82	3
3	360	1998/04/17 14:00	0.46	247.74	6
4	172	1986/05/01 14:00	0.62	247.66	13
5	209	2000/06/25 11:00	0.59	247.51	2
6	339	1986/04/21 12:00	0.47	247.49	3
7	349	1986/08/11 03:00	0.46	247.45	5
8	138	1984/04/30 19:00	0.67	247.44	18
9	202	1998/06/02 23:00	0.59	247.44	2
10	73	1976/03/27 23:00	0.8	247.43	7

The same technique explained in Method A was performed for distinguishing between duplicate events by gage and for the 150 storm composite database. However, the events were allocated differently. Method B introduces storm water level into the selection criteria for building the composite storm database, as outlined in Table 4.6. The total number of events at each gage is now based on selecting events with three criteria.

Table 4.6 Distribution of 150 Composite Storms from the Lake Ontario Gages for Method B

Gage	Number of Surge Events Selected	Number of Wave Height Events Selected	Number of Storm Water Level Events Selected
Port Weller	7	7	6
Olcott	10	10	10
Rochester	10	10	10
Oswego	10	10	10
Cape Vincent	10	10	10
Kingston	3	3	4
Total	*50*	*50*	*50*

4.2.3 Method C - Total Water Level (including runup)

Method C is quite different than both A and B since it does not involve selecting storms based on a particular driving force (i.e., waves, surge, and storm water level). The concept with this method is to find events based on the peak total water level response. The following steps were completed.

The hourly total water level (TWL) was calculated over the entire temporal record (1961-2010) using the hourly wave record and the hourly water level record. Total water level is the combination of storm water level (SWL) which is the hourly recorded level at gage and runup, as shown in Figure 4.7. Hourly runup was calculated using a mild 1:30 beach slope and the Mase equation and superimposed atop the hourly water level at each gage. The offshore deep water waves were not transformed to the nearshore (i.e., through refraction, shoaling, etc.) since the mild 1:30 slope is assumed to extend directly to the WAVAD point. Lastly, wave direction was filtered (± 90° shore normal) to ensure waves propagating offshore were excluded from being selected as an event (at least by that gage).

A POT storm listing was completed on the total water level in the same fashion previously described for waves and surge; to find the events with the greatest flood risk. Instead of dividing the prescribed number of events based on a particular driving force, the top TWL events by gage were compiled as specified in Table 4.1. Prior to finalizing the composite database based on Method C, the same iterative approach for discarding duplicates was followed (discussed for Method A).

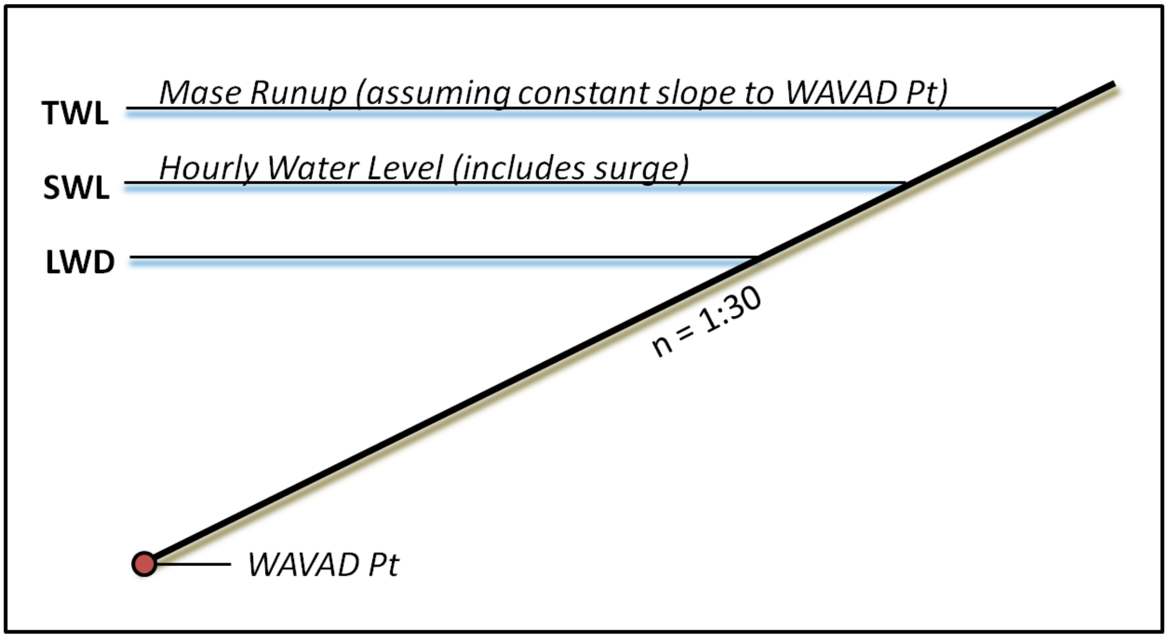

Figure 4.7 Schematic for Calculating Total Water Level for Method C

4.3 Preliminary Composite Storm Databases from 1961 to 2010 (50 years)

A preliminary composite storm database was generated for the three selection methods (A to C). The extreme distributions for SWL and TWL are compared in the following sections to evaluate the three methods for selecting storms.

For each of the three composite databases of 150 events, the appropriate maximum SWL and TWL for each event was calculated for each gage. Since a lag can exist between gages for the maximum response to each event, another buffer was implemented. For example, a lag occurs when a recorded storm in Olcott travels east and does not show a response at Cape Vincent until several hours later. The maximum hourly water levels were determined using a buffer time of 24 hours (i.e., 24 hours on either side of the event) and referred to as SWL. The TWL was determined in a similar fashion but included runup as explained in Method C. The maximum response of the TWL using the same 24 hr buffer was also found for all events by gage.

4.3.1 Method A to C Results for Storm Water Elevation

After compiling SWL and TWL for each storm database, several distinct differences between the three methods were noted. For example, the plot in Figure 4.8 provides a comparison between the top 50 storm water levels at Cape Vincent for Method A, B, and C. The shape of the Generalized Pareto Distribution (GPD) is quite different, especially for Method C. The GPD is used for all analysis given its concave down tendency (more representative of physical limits) and since it is used in ERDC's revision to Appendix D.3 (FEMA's Great Lakes Coastal Guidelines). Water levels from the USACE report on extreme lake levels (USACE, 1988) were also included in Figure 4.7. In reality the two datasets are not the same, in that the SWL calculated for this study are merely the water level at the time of the top 50 events at the gage, while the USACE levels represent a multivariate extreme value analysis between surge and static monthly water levels. Therefore, it is not surprising that the USACE levels exceed the top 50 at the gage. The results also help determine whether the methods predict the same extreme values and whether they share the same distribution (i.e., GPD fit).

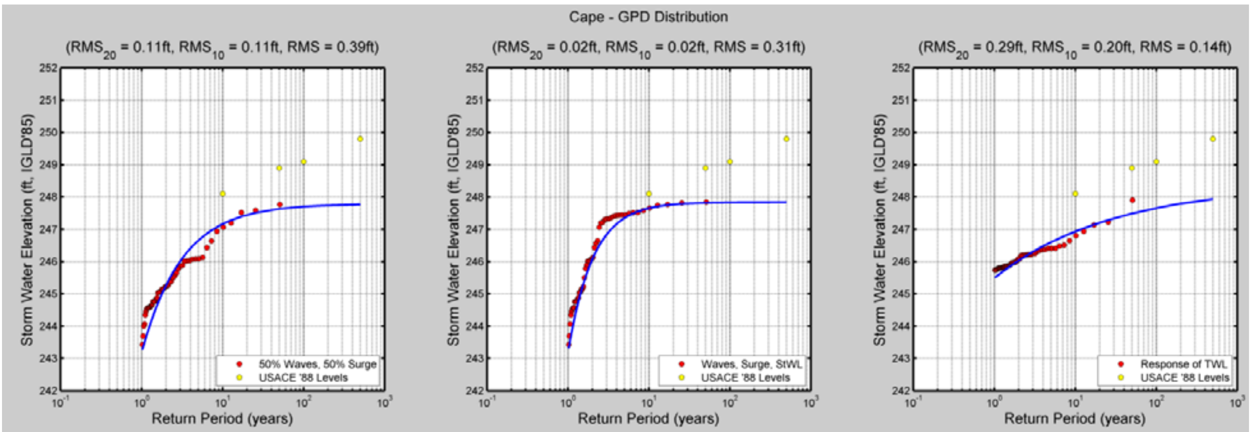

Figure 4.8 Storm Water Level Results for Method A (far left), B (middle) and C (far right) at Cape Vincent

The two main differences are that Method A and B vary in the number of high lake level events, (with Method B having more), while Method C does not match either A or B. The first observation is obvious and expected since Method B includes 1/3 of the events selected by storm water levels, therefore more events occurring at a high lake level are included. Method C does not match either since the events are being selected based on the response of TWL which tends to favor events at higher lake levels. To best compare the three methods, the Generalized Pareto Distribution fits were plotted together in Figure 4.9. Based on SWL, it is evident that the results for all three methods are very similar (based on the GPD fits) for the low frequency events (i.e., Return Period of 10^2). Refer to Appendix B for the results at the other gages.

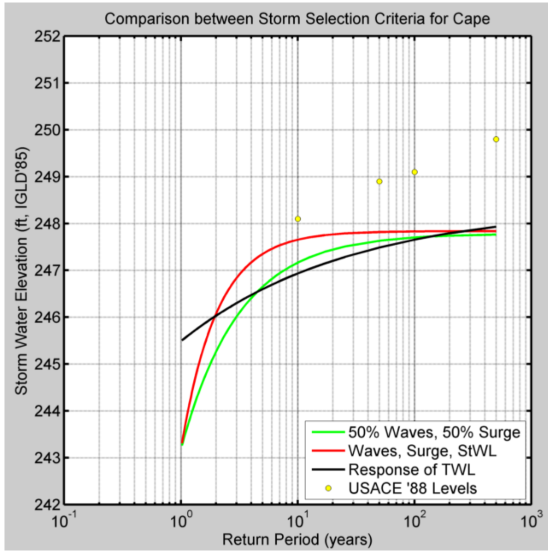

Figure 4.9 Storm Water Level Comparison between Method A to C for Cape Vincent

To better understand how the three methods are sampling storms, the temporal distribution of the top 50 events at the Cape Vincent gage are plotted in Figure 4.10. The plots for the other gages are provided in Appendix B. Method A (top pane) shows that most of its storms are being picked at average to low water levels. This is attributed to the fact that the largest surges and wave heights tend to happen between the fall and early spring when the lake levels are at their lowest point seasonally. Method B (middle pane) has more events at higher lake levels due to one third of the events being attributed to SWL. Method C (bottom pane) consists of a completely different selection process (TWL) and thus the temporal distribution of the events is different. Surprisingly, even though the three methods sample differently and the temporal distribution of the storms varies, the SWL for an event with a 100 year return period is basically identical.

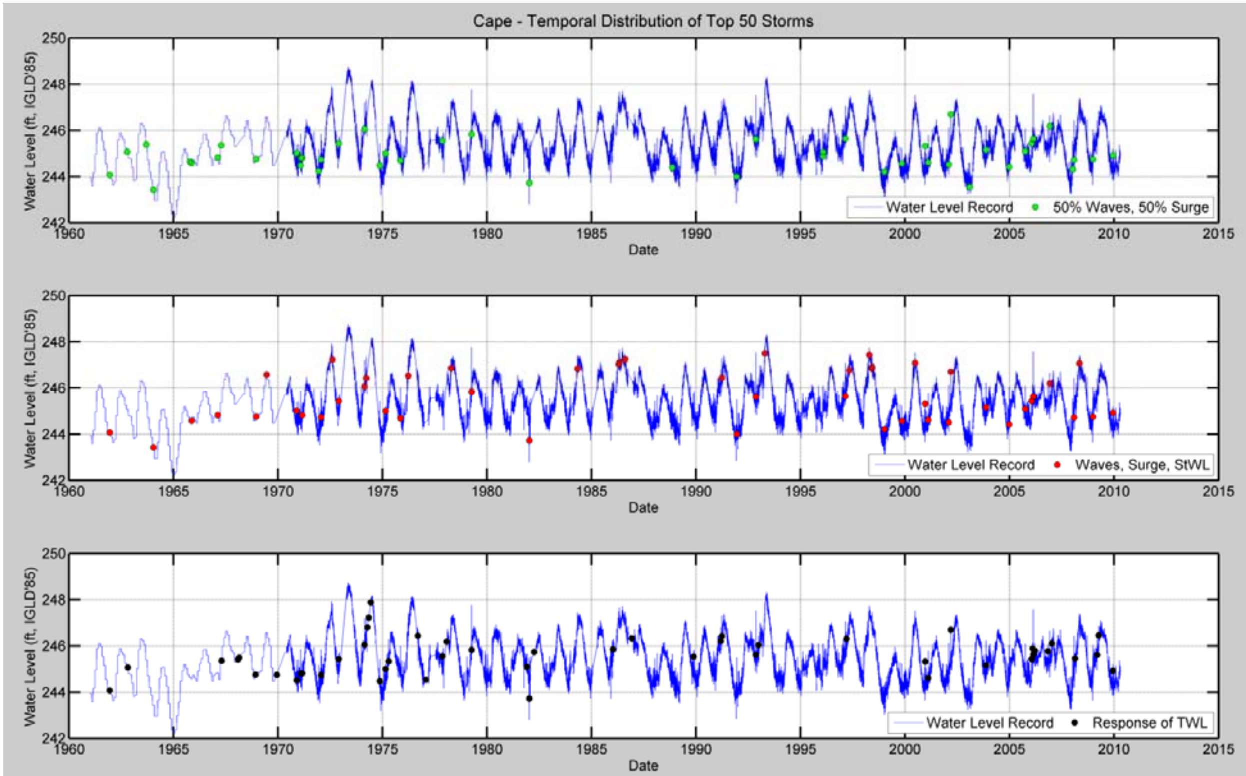

Figure 4.10 Temporal Distribution of Top 50 Storms at Cape Vincent (by Method)

4.3.2 Method A to C Results for Total Water Level (TWL)

The plot in Figure 4.11 presents the Top 50 TWLs for the Cape Vincent gage. The results are similar to the SWL results in the previous section. Regardless of the selection method, the GPD fits show good agreement with the data and with each other for events with a return period of one in ten to one in a hundred. It is worth noting that Method A and B are practically identical while their SWL distributions were slightly different (refer to Figure 4.7). TWL does a much better job at estimating actual flooding hazards when compared to the SWL for the event. For example, a storm selected by wave height can occur at a lower lake level. The SWL will under-predict potential flood damage (since it is simply the maximum hourly lake level at the time of the event), while TWL accounts for the increase in lake level associated with wave setup and wave runup (the true flood risk). Refer to Appendix B for the results at the other gages.

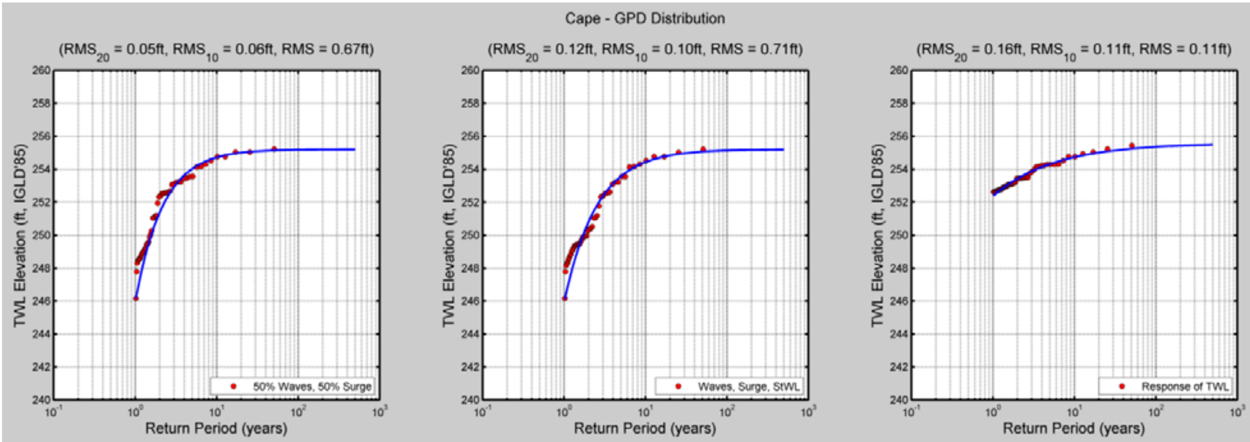

Figure 4.11 Total Water Level Results for Method A to C at Cape Vincent

4.3.3 Verification of Composite Database against the Top 50 at each Gage

It is apparent from the SWL and TWL results for Cape Vincent (and the other gages in Appendix B) that regardless of the selection technique (Method A, B or C), they all predict very similar results for the 100 year and 500 year lake level. The final verification is to check that the distribution for the top 50 by gage matches the top 50 from the composite storm database. This step is necessary to ensure the lakewide selection is representative of each gages' top events. The same procedure was followed to generate SWL and TWL results for the top 50 at each gage from the composite database. These results were compared to the top 50 events selected solely by the gage (presented previously in Figure 4.7). The top 50 from the gage and composite is presented in Figure 4.11 for Methods A to C. If the distributions match well, it suggests that the top storms at the gage are being well represented by the composite database.

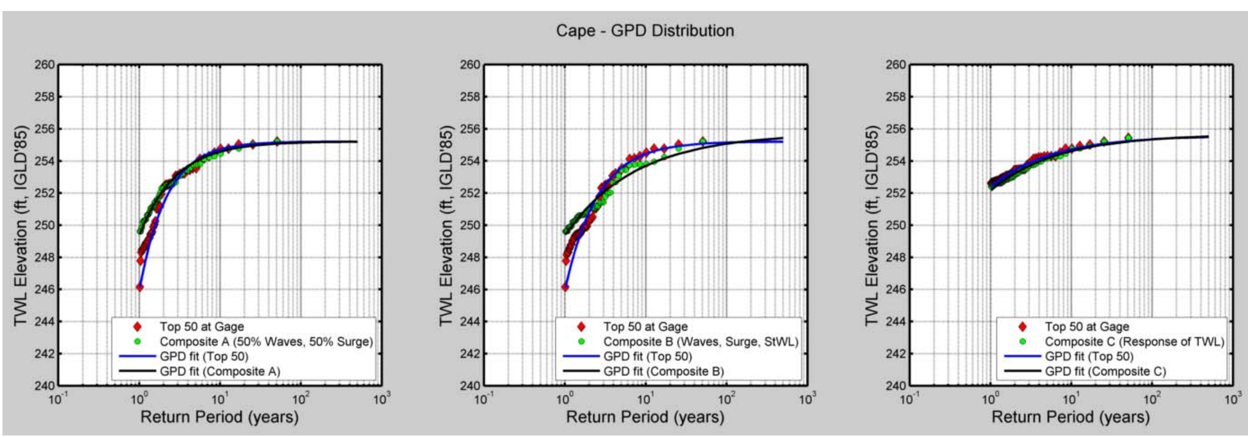

Figure 4.12 Verification of Composite Database Total Water Level at Cape Vincent

The verification shows that the Cape Vincent gage is being represented well by each of the lakewide storm databases for the extreme events (e.g. Return Period of 10 to 100 years). Based on the above results and to remain consistent with the process followed on the other lakes, Method A was selected to generate the final composite storm database on Lake Ontario.

4.4 Final Composite Storm Database from 1970 to 2010 (41 years)

The methodology followed for the final storm selection is detailed in this section, and focuses on the results from the Cape Vincent gage. The rest of the Lake Ontario gages are included in Appendix B. Note that this final composite storm database was developed after investigating data quality issues with the monthly 1960s data. Therefore, only hourly data from 1970 to present was included in the analysis, as explained in Section 3.4.2.

All datasets were revised to only include hourly data from 1970 to 2010. The storm listings based on surge and wave heights were recreated by gage since the temporal length of the files had changed. Ice was included in this selection. The main role of ice in storm selection is to discard top events that occur during “ice-covered” periods. An ice-covered period is defined here as an ice polygon with 70% coverage. A more in-depth explanation is presented below.

The ice database described in Section 2.2.3, which consists of 51 years of ice data was used to define the ice coverage over Lake Ontario. A script was written to extract a defined polygon near each gage and build a daily time series of ice coverage. The spatial extent of the polygons are shown in Figure 4.13. Although the ice coverage maps are not daily, the extracted time series files were extrapolated. For days without coverage maps, the preceding coverage map was used (up to a maximum of 30 days since older maps were not as frequent). As a final check, the extracted time series files were filled with no ice cover (represented by zeros) between the months of April and November. The daily ice coverage time series was then used to determine whether surge and wave height events (from the previously mentioned storm listings) are real or “ice-covered” based on a set threshold. The ice threshold was set at 70% meaning that if the daily ice coverage (at peak time of event) exceeded the threshold – then the storm was removed from that particular gage. In case the ice cover is localized, the event can still be selected for the composite database assuming it is “ice-free” and highly ranked at another gage.

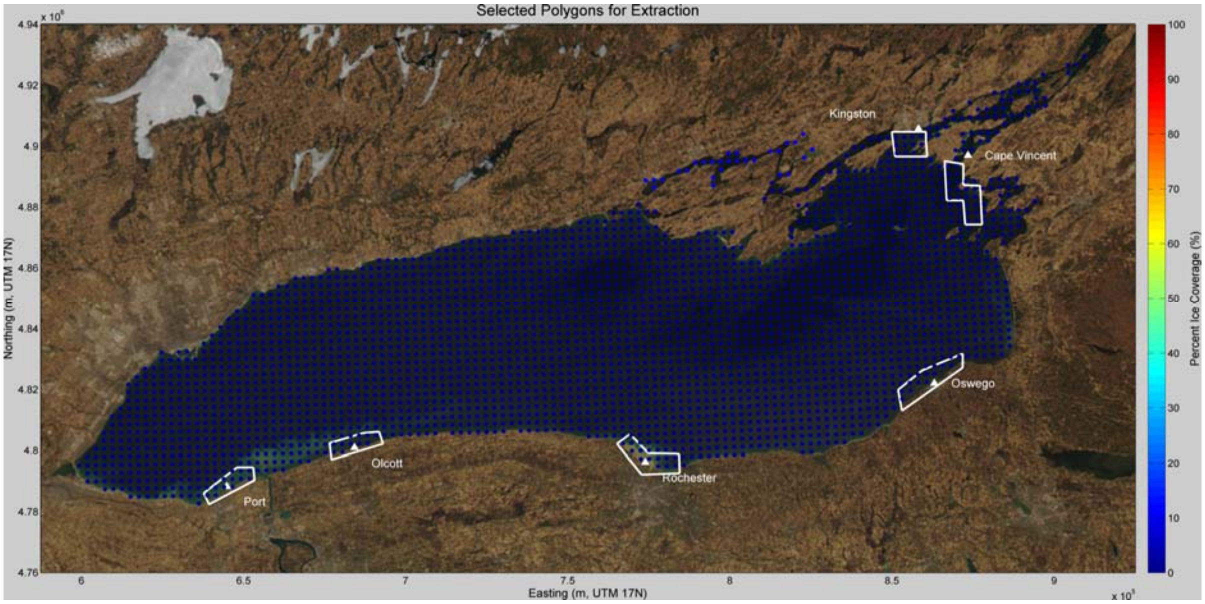

Figure 4.13 Defined Polygons for Extracting Ice Coverage

A sensitivity analysis was completed to investigate the selected threshold value and other potential percentages. The ice coverage threshold was tested from 0 to 100% using the top 50 events by both surge and wave heights for the six gages in our analysis; see Figure 4.14 and Figure 4.15 for the results.

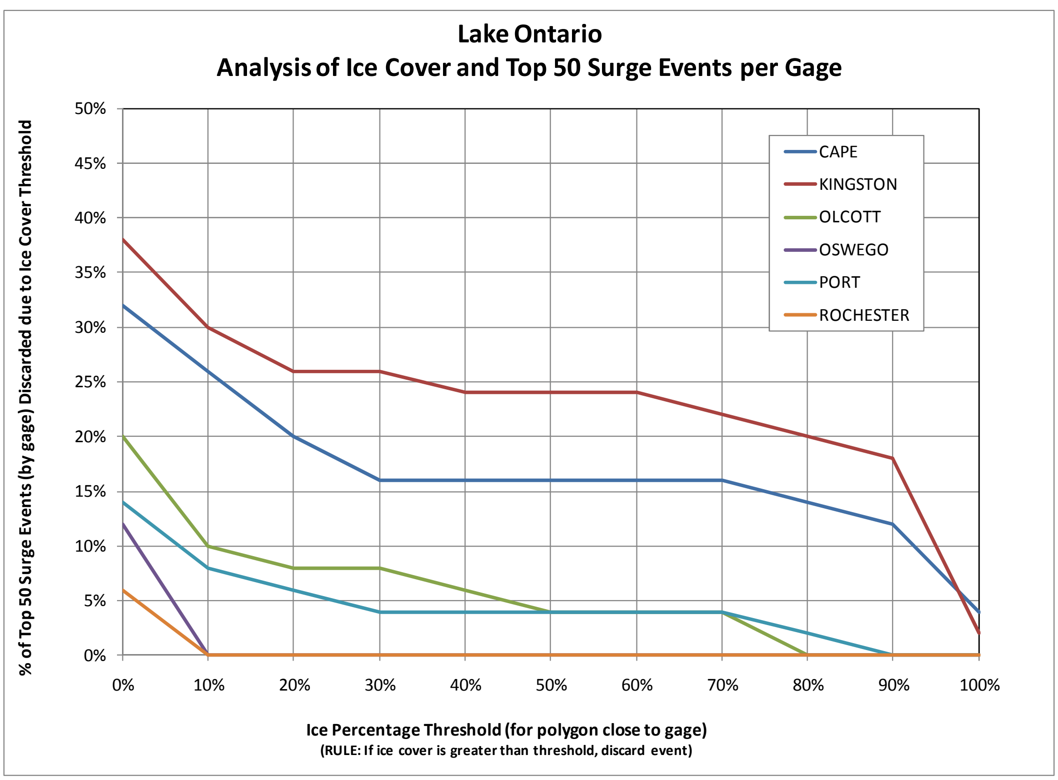

Figure 4.14 Sensitivity Analysis of Threshold Value and Number of Top 50 Surge Events Discarded due to Ice Cover by Gage

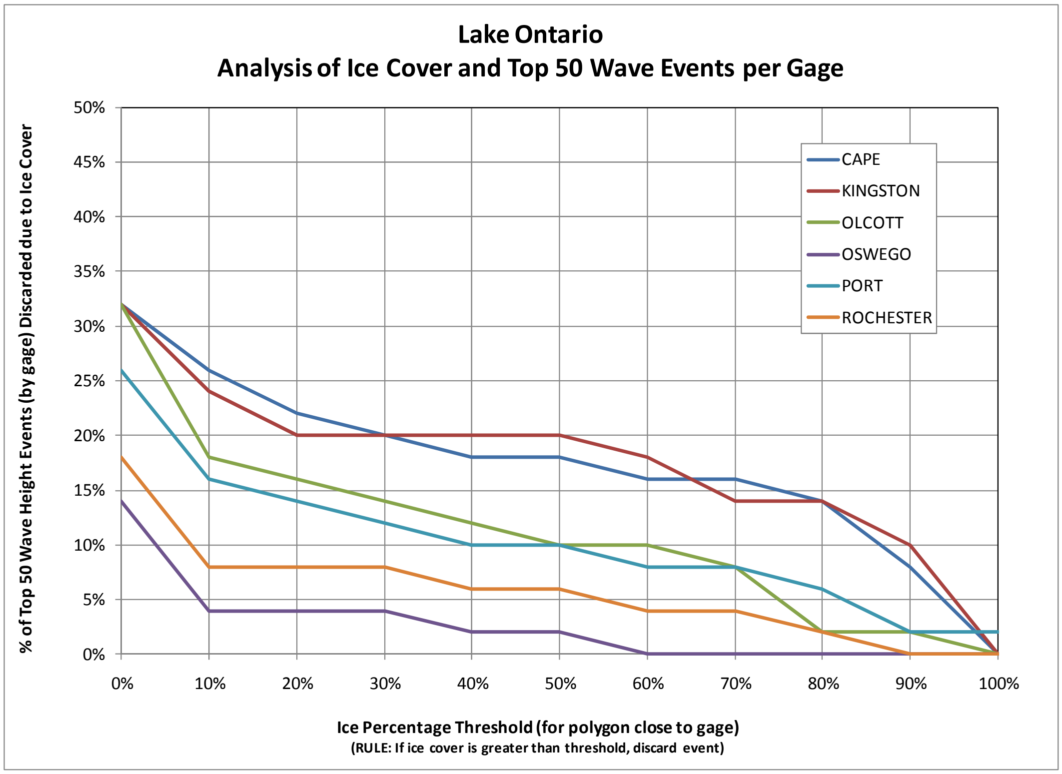

Figure 4.15 Sensitivity Analysis of Threshold Value and Number of Top 50 Wave Events Discarded due to Ice Cover by Gage

The sensitivity analysis shows that for the Cape Vincent and Kingston gages the slope of the line (primarily for surge) is quite flat between 30 and 70%. This suggests that the number of storms discarded from the gage is quite insensitive between those ice coverage threshold values. This trend is mainly due to the geographic location of Cape Vincent and Kingston. The shallow bathymetry and "narrowing" shoreline towards the St. Lawrence River influences the periodic ice coverage in this area. Ice coverage maps tend to show a binary result for ice coverage in this area; either 0 (ice-free) or 100% (ice-covered). This shows that the ice coverage threshold is not very influential on the number of storms discarded since regardless of the selection between 30 and 70%, approximately the same number of storms is dropped.

An example of a discarded event is shown below at the Olcott gage. Figure 4.16 is a plot of the 2nd largest wave event near Olcott occurring on January 14th, 1999. Two ice coverage maps are presented in Figure 4.17 and Figure 4.18. The average of the representative polygon near Olcott shows that on January 12th (just prior to the start of the storm) the ice coverage was at 100%, and remained ice covered on January 15th. Since this location is covered in ice and exceeds the set threshold value; this storm was dropped from the top 50 at the Olcott gage.

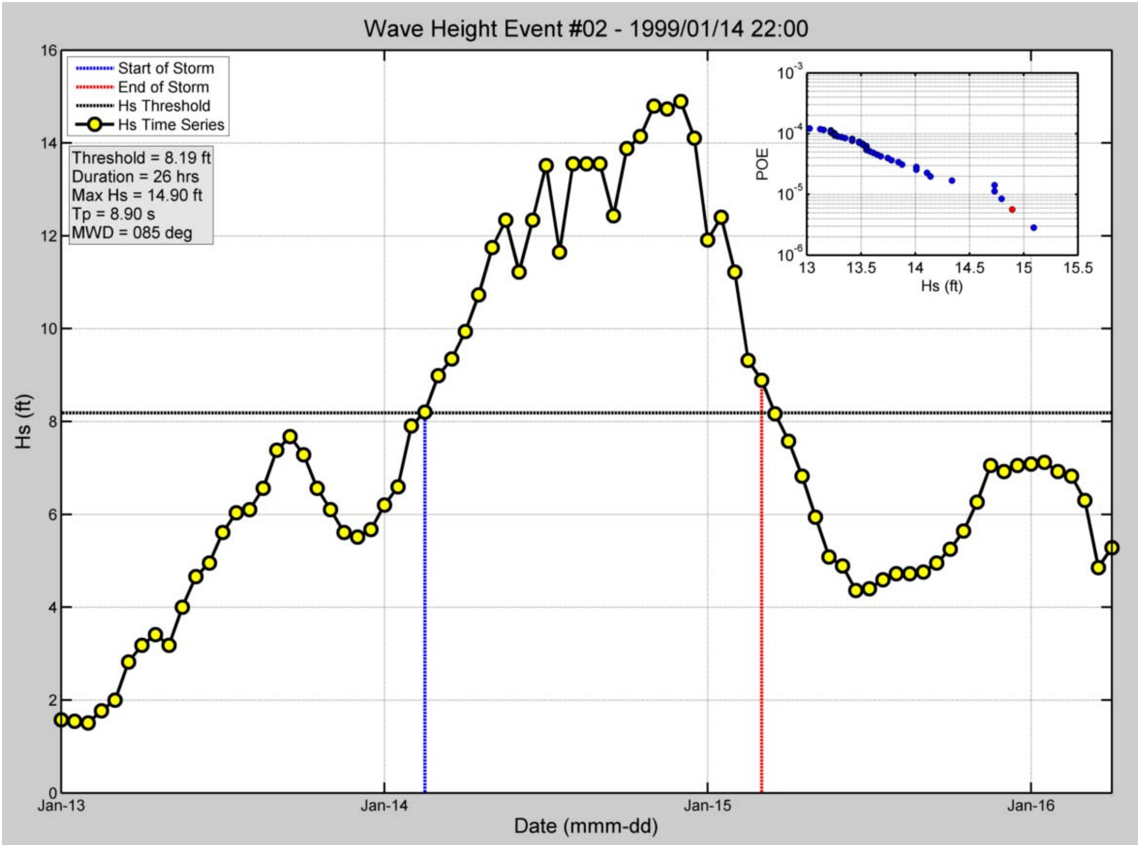

Figure 4.16 Example of Ice Covered Wave Event (2nd Ranked Wave Height Event at Olcott)

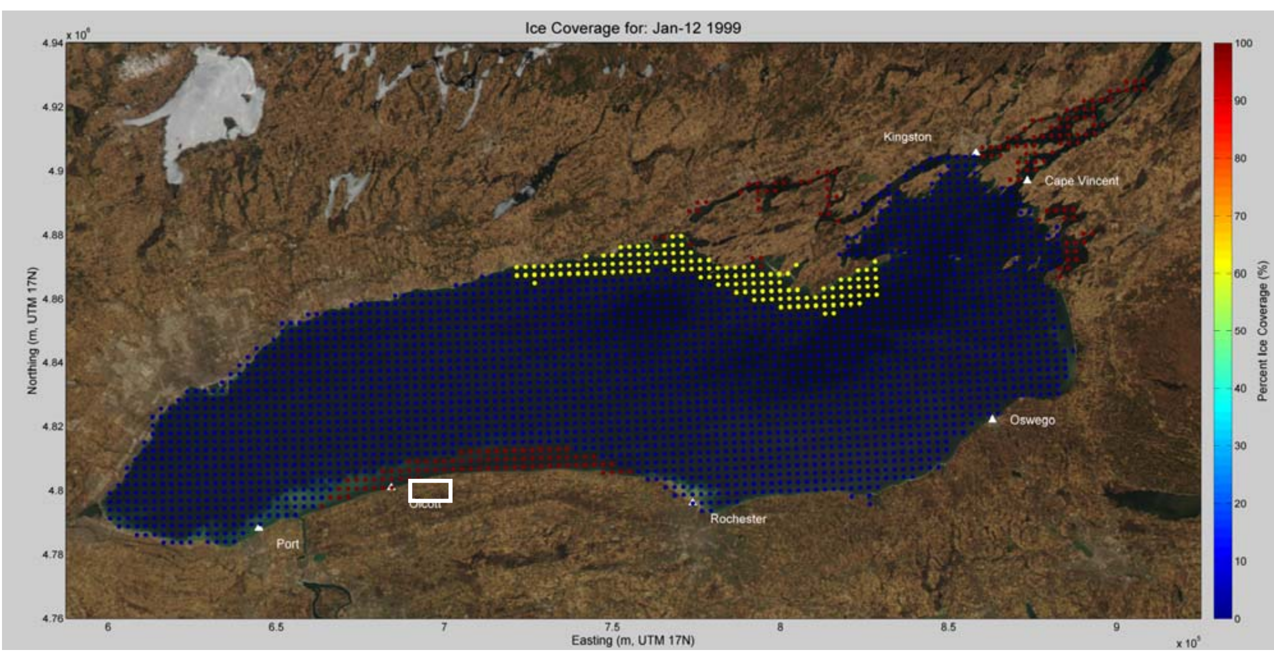

Figure 4.17 Ice Coverage Map for January 12th, 1999 (Note Olcott is 100% Ice Covered)

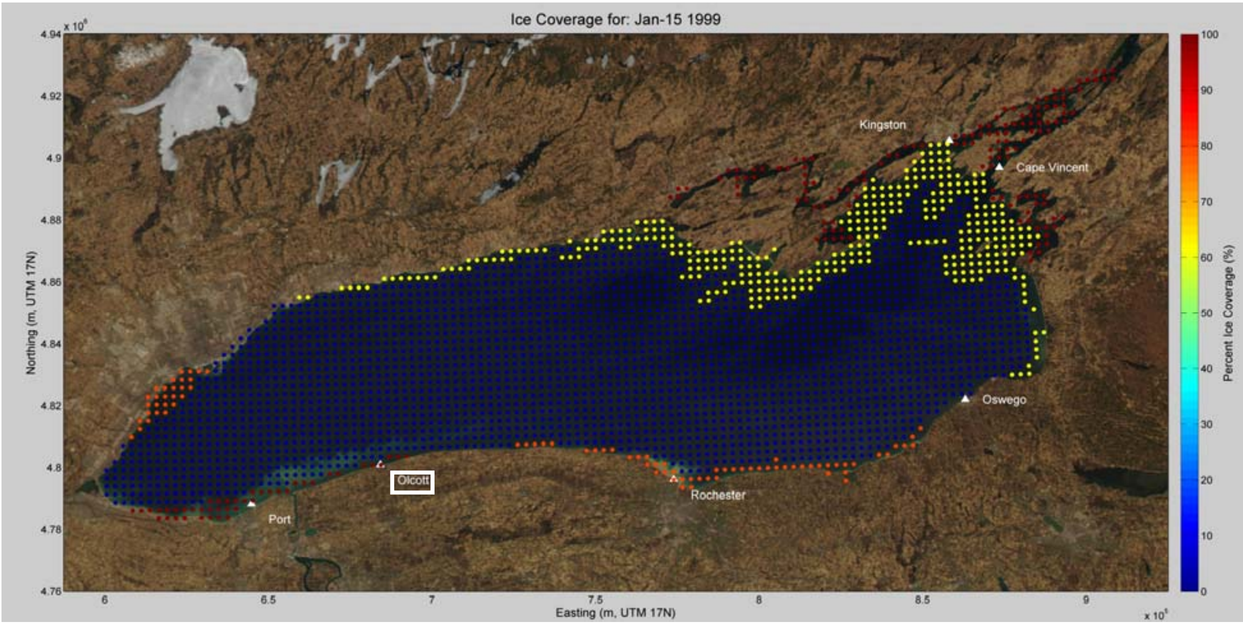

Figure 4.18 Ice Coverage Map for January 15th, 1999 (Note Olcott is 100% Ice Covered)

After removing the ice covered events, each individual gage was screened for duplicate surge and wave events as detailed in Method A and compiled into the lakewide composite storm database. To verify the accuracy of the composite database to this version of Method A, the same comparison of SWL and TWL completed previously was repeated. Figure 4.19 shows the resulting fit between the response at Cape Vincent to its own top 50 storms and to the selected composite storms. The results for the remaining gages are found in Appendix B.

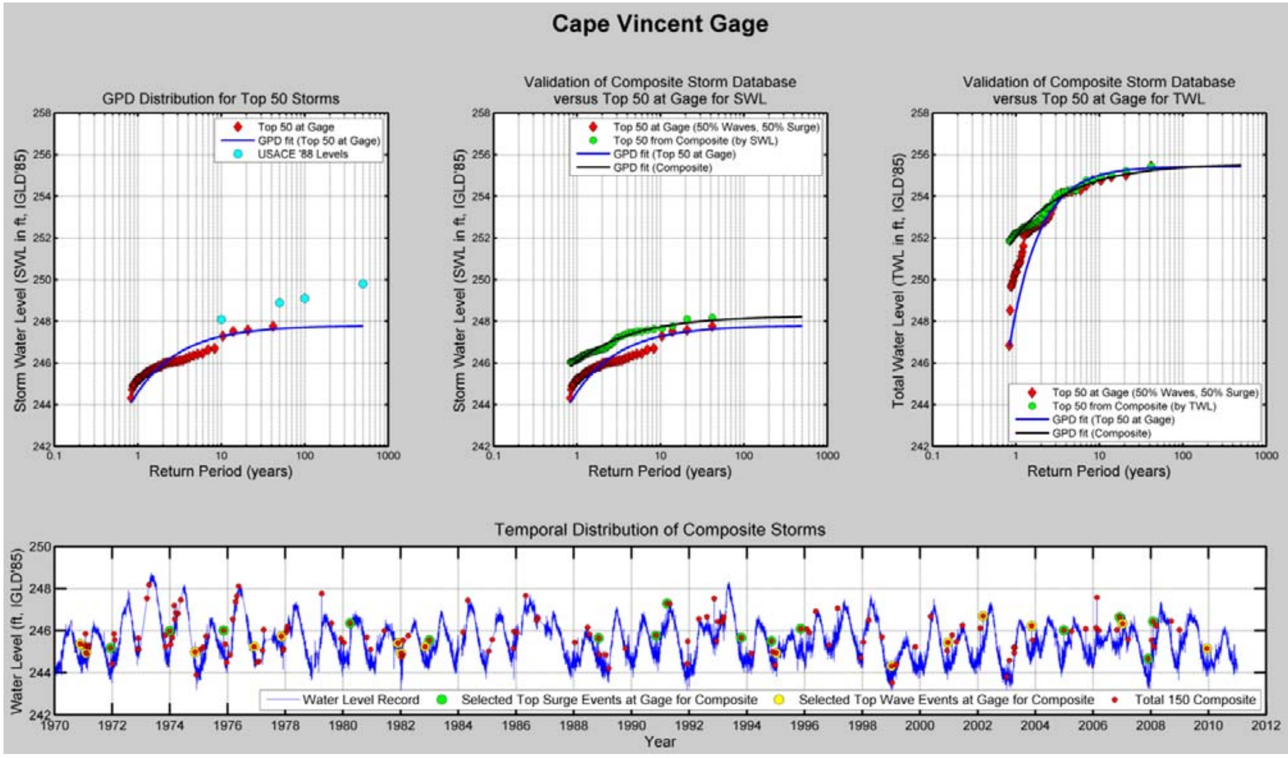

Figure 4.19 Validation of Composite Selection at the Cape Vincent Gage

The above plots all help to reinforce the validity of the selection method. The first plot (top left) acts as a visual for quickly comparing against the previously published USACE extreme levels. The top middle plot compares the SWL for the two storm populations. The top 50 at the gage (in red) were screened solely on the largest 25 surge events and the largest 25 wave height events.

Although storms during 70% ice cover were screened out of the gage record, the largest storms producing the largest waves often occur in the winter months – when the lake is at its annual low. This results in lower SWL. The composite series (in green) is the top SWL at the Cape Vincent gage for the top 50 events. The difference between the two SWL distributions is that it attributes to the fact that the top 50 SWL from the composite could be based on storms from other gages that have small waves and surges at Cape Vincent, but occurred during high lake levels. These high lake levels equate to high SWL. This is further demonstrated in Figure 4.20 and in Table 4.7. Essentially, the top 2 events in the composite database would not have been selected for the top 50 at the Cape Vincent gage (since the wave and surges are very low) but the SWL was quite high (248.12 and 248.18 ft.).

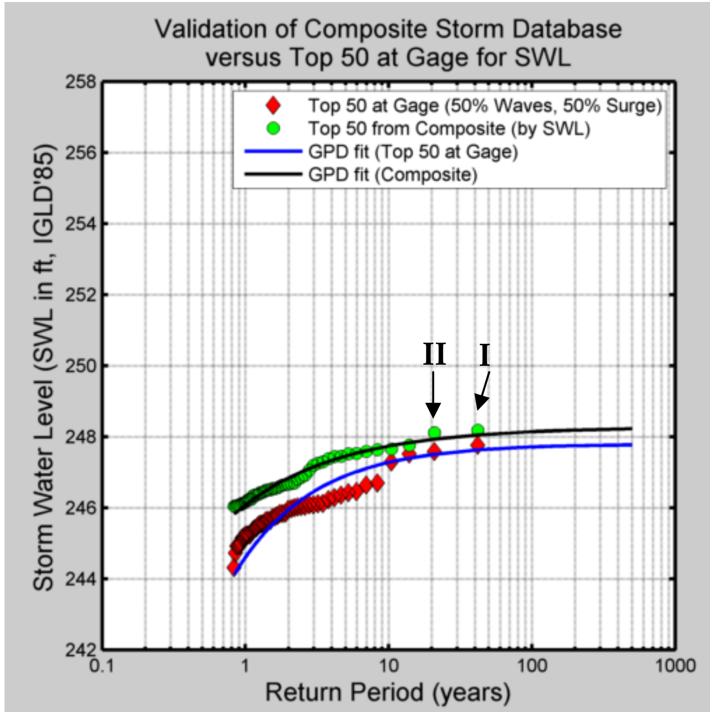

Figure 4.20 Top 2 Events from the Composite Series (identified as I and II)

Table 4.7 Difference between Top Two Composite Storm Database Events & the Top 50 at Gage (by SWL)

Point	Date/Time	Composite SWL (ft, IGLD'85)	Hs near Gage (ft)	Surge at Gage (ft)
I	1973/04/11 00:00	248.18	6.20	0.09
II	1976/05/19 20:00	248.12	6.33	0.30

25th Ranked Hs and Surge at Cape Vincent =	14.11	1.05

As explained earlier, comparing SWL does not necessarily depict how similar the two storm populations are due to the influence of waves on runup and ultimately TWL, which is a better indicator of flood risk than SWL. To better grasp whether the two storm populations feature the same external characteristics, the TWL distributions were evaluated and plotted. The proof that the lakewide composite method works to characterize the individual gages is seen in the top right panel of Figure 4.19. The two storm populations share nearly identical top events when plotting by TWL.

Finally, the bottom plot (of Figure 4.19) helps illustrate the temporal distribution of the composite events, noted by the red series. It is interesting to compare which of the top events at the gage were selected for the composite. In this case, Cape Vincent had most of its top storms replaced by other gages since the duplication process is order sensitive and Cape Vincent was first. Although many of the top events at Cape Vincent were discarded when compiling the composite database (see Table 4.8), the TWL fit is still very good since the composite population still contains these top storms. They were just included in the composite population from another gage.

Table 4.8 Final Top 15 Storm Surge and Wave Height Storms at Cape Vincent after Substitution

Top 15 Storm Surge Events at Gage Selected for Composite after Substitution (no duplicates at other gages)	Top 15 Wave Height Events at Gage Selected for Composite after Substitution (no duplicates at other gages)
4	1
6	2
8	5
13	7
14	8
15	9
19	10
20	12
23	13
24	15
25	17
27	21
28	22
29	23
30	25

See Appendix B for the final composite storm database analysis for the rest of the Lake Ontario gages.

4.5 Implications for Omitting the 1960s Data from the Analysis

The implications of discarding the measured lake level and modeled wave data from 1962 to 1969 was investigated to ensure the population of storms from this period was not substantially different than the events from 1970 to 2010. Note that this analysis only extends back to 1962 (instead of 1961) since there is no earlier water level data for Canadian water level gages – which are crucial to filling the Olcott gage (only extends to 1967). In order to compare between the two temporal datasets, two independent extreme value analyses on hourly wave heights were performed. The comparison between the 1962 to 2010 period and the 1970 to 2010 period is presented in Figure 4.21 for Oswego, and for all gages in Table 4.9.

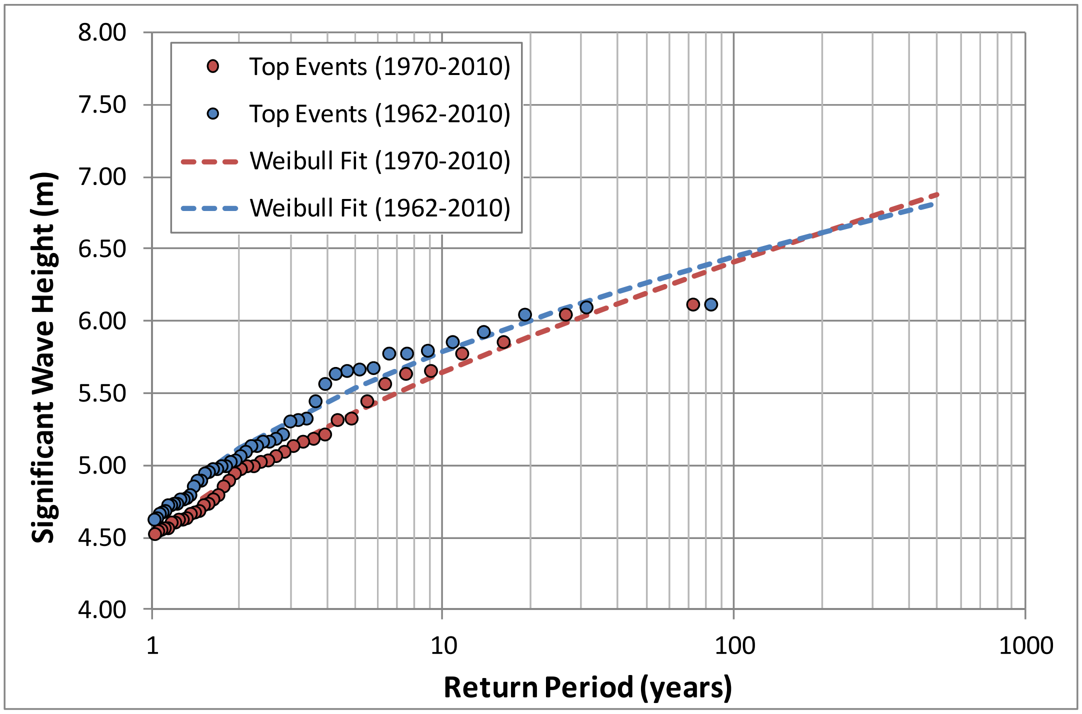

Figure 4.21 Significant Wave Height Return Period at Oswego (1962 to 2010 and 1970 to 2010)

Table 4.9 100 year Wave Height for all Gage Locations for both Datasets (1962 to 2010 and 1970 to 2010)

	100 year Significant Wave Height (m)					
	Cape Vincent	Kingston	Olcott	Oswego	Port Weller	Rochester
1962 - 2010 Dataset	5.97	4.66	4.67	6.44	4.45	4.96
1970 - 2010 Dataset	6.09	4.72	4.73	6.41	4.49	4.85

The influence of selecting storms from the two temporal periods on the SWL and TWL distributions at Oswego were compared using Method A to select the storms. Storm surge events were extracted from 1970 to 2010 for both datasets for two reasons: 1) the max minus mean surge method for the data from 1962 to 1969 does not provide reliable information, and 2) we wanted to isolate the influence of the two temporal periods and the associated wave climate on TWL. The results are presented in Figure 4.22 below. The distributions for SWL are almost identical. When TWL was evaluated, only small variations occur for the low frequency events (e.g. the 100 year TWL was 0.2 ft higher for the Composite database that selected wave height events from 1962 to 2010). Given this minimal difference in the TWL and the uncertainty introduced into the analysis by relying on the max-mean surge estimates from 1962 to 1969, the temporal duration of our analysis will extend from 1970 to 2010.

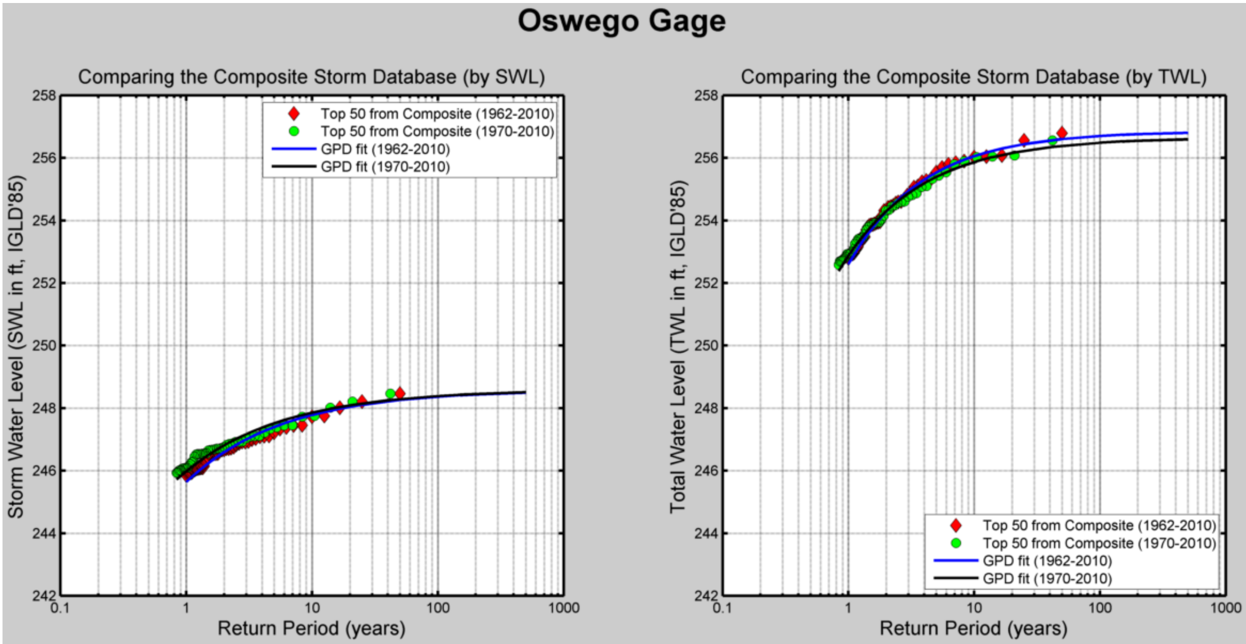

Figure 4.22 Comparison of Composite Storm Database from 1962 to 2010 and 1970 to 2010 for SWL & TWL

5.0 MODEL INPUTS

Section 5.0 introduces the primary model inputs, namely: the DEM, lake levels, wind and pressure time series, and historic ice coverage.

5.1 Digital Elevation Model

An unstructured mesh was generated in SMS using the scalar paving function. The mesh density was derived based on two main factors including, depth and location. For the open waters of Lake Ontario, the element length was based on the lake depth below Chart Datum (CD), as shown in Figure 5.1. An element length of 150 m was used for depths less than 2 m LWD and 3,000 m was used for depths greater than 150 m. Linear interpolation was used to determine the maximum element length for depths between 2 m and 150 m. A coarser mesh was applied to the Canadian shoreline, with a 500 m minimum element length, since detailed model output was not required from this portion of the grid.

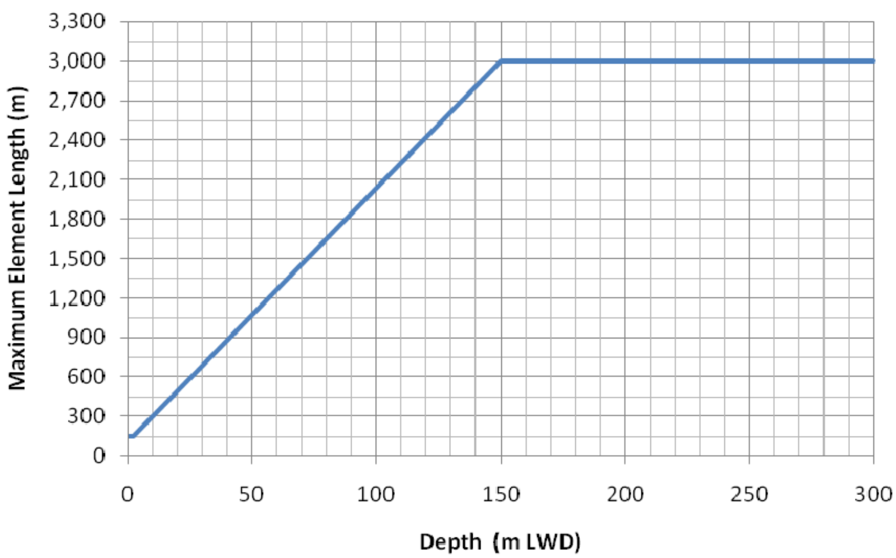

Figure 5.1 Scalar Paving Density Function by Depth

A much finer mesh was required for the embayments included in the modeling domain, such as Sedus Bay. The mesh density for these areas with much more complex bathymetry was also a function of depth, however with much smaller limits. For depths less than 2 m, an element size of 20 m was applied and for depths greater than 10 m, an element size of 50 m was applied. For depths between 2 m and 10 m a linear interpolation was applied. Further mesh modifications were conducted to include a minimum of three mesh elements across the width of all embayment entrances.

Figure 5.2 presents the mesh for various portions of the lake to visually evaluate the influence of the scalar function on mesh size.

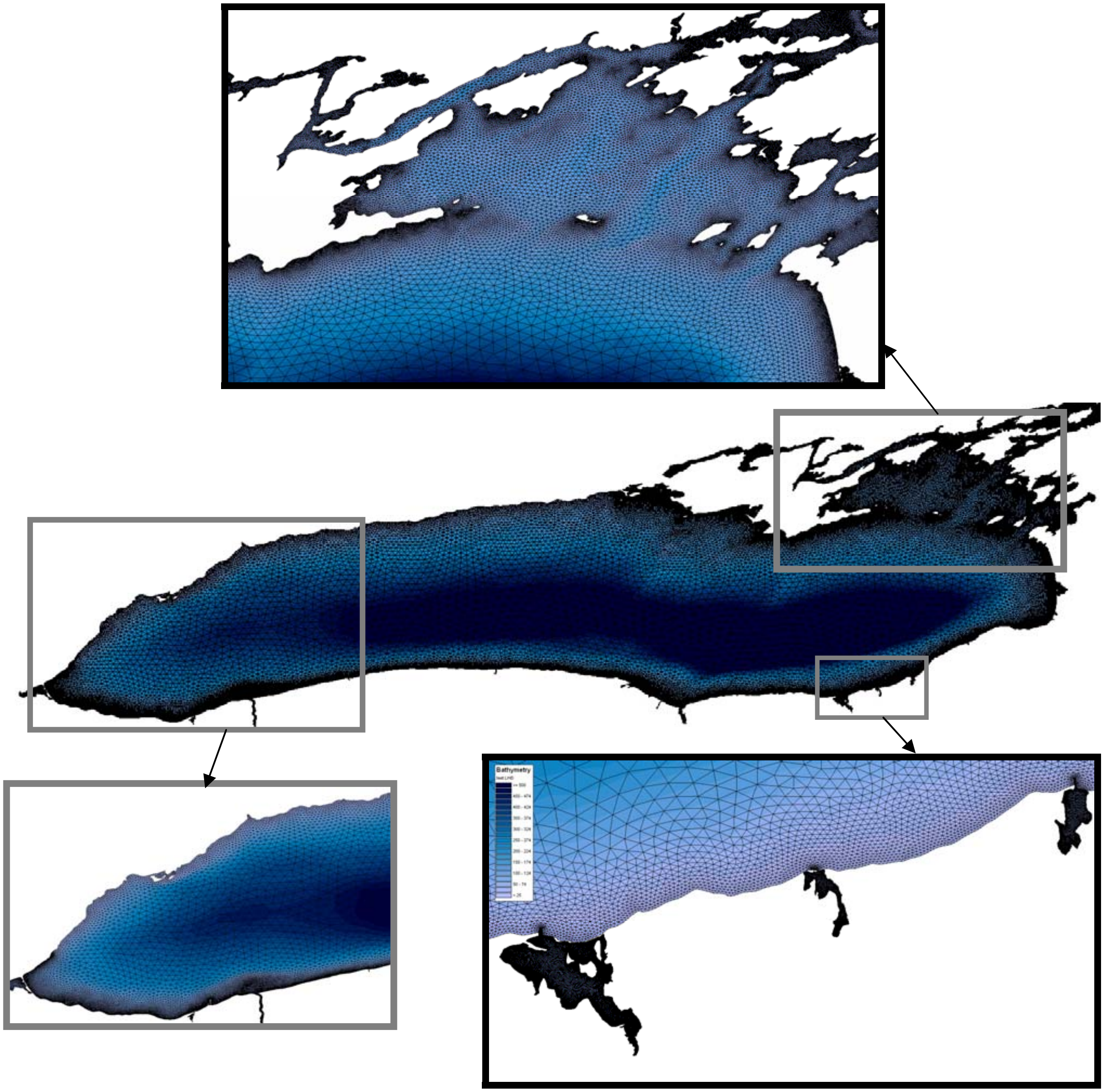

Figure 5.2 Lake Ontario Mesh for SWAN and ADCIRC

The final digital elevation model (DEM) or mesh assembled for use in both ADCIRC and SWAN consists of 307,824 elements and 165,290 nodes.

5.2 Lake Levels

The starting water level for all simulations was set to the actual water level on Lake Ontario at the start of the storm. The lake level was calculated by taking the average of the four US water level gages used for the present study, as discussed in Section 2.2.1. The depth was adjusted in the bathymetry input file (fort.14) to account for the initial lake level in the models. The initial water level used for each simulation was documented in the metadata file (README.txt) generated for each simulation.

5.3 Wind and Pressure

The surge and wave conditions on Lake Ontario are largely dependent on the regional wind conditions. Therefore, accurate representation of the wind conditions will results in better wave and surge model results. As previously discussed in Section 2.2.2, two wind and pressure data sets were assessed for the present study, including:

- Natural Neighbor (NN) winds and pressure generated from meteorological stations and airports around Lake Ontario from 1961 to 2010; and

- The National Center for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR) wind and pressure data from 1979 to 2010.

The two data sets were compared by simulating seven different storm events in ADCIRC and observing the difference in the surge predictions. Details pertaining to the calibrated ADCIRC model used to generate these results are discussed later in this report, in Section 6.3. The November 2003 storm event is shown below in Figure 5.3, while the rest can be found in Appendix C. In general, the effect on the modeled surge using either NN or CFSR wind is minor except for the largest winds. For example, the largest difference is observed during the storm peak, when the NN winds tend to under estimate the magnitude of the storm surge. As seen in Figure 5.3, the peak surge at Cape Vincent is under estimated for this particular storm.

The results for all six storms are summarized in Figure 5.4, where individual scatter plots are presented for the modeled versus measured data at the four US water level gages. The results with the CFSR winds tend to have less scatter, suggesting the predictions are more accurate.

In summary, the NN and CFSR winds generally result in similar estimates of surge, however the NN winds have a tendency to under estimate the storm peak based on an analysis involving seven different storms. Consequently, the production runs for the present study have been done primarily using CFSR winds, except prior to 1979, where CFSR data is not available.

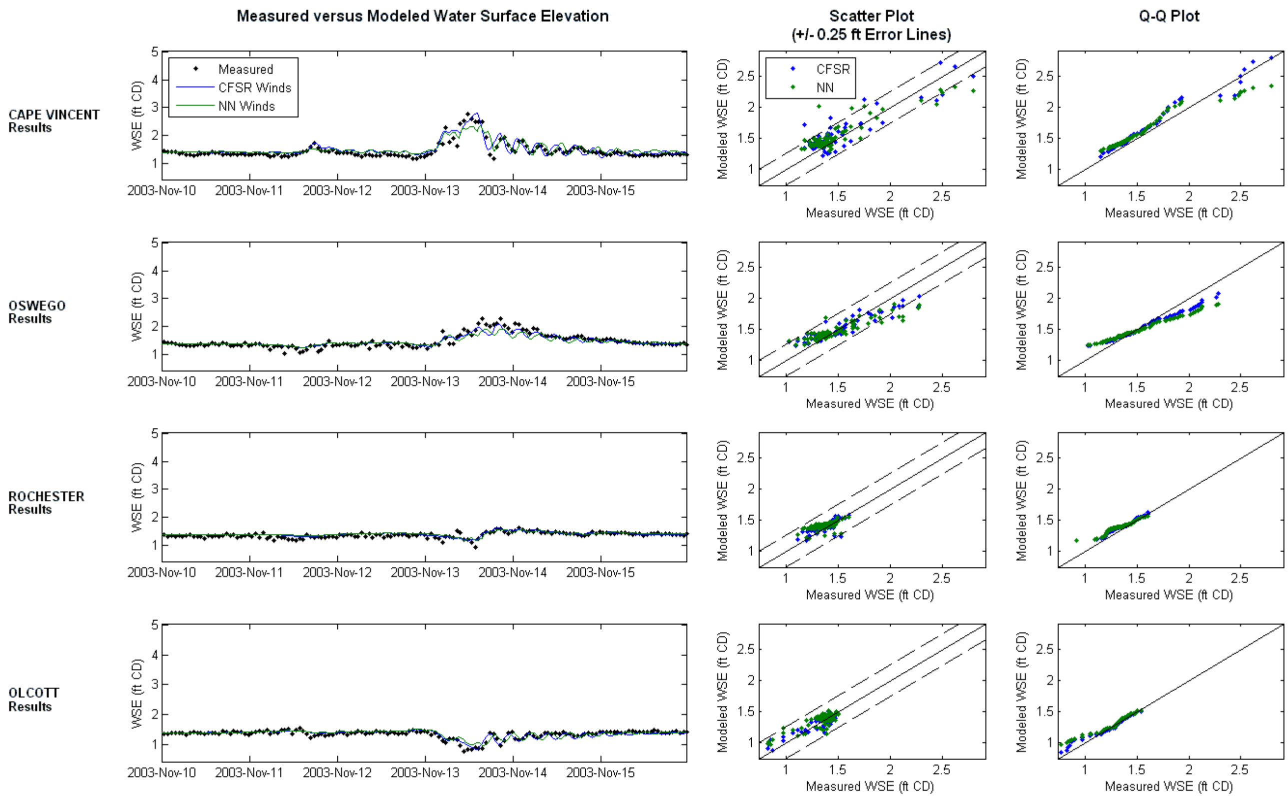

Figure 5.3 Water Surface Elevation at Gages using ADCIRC with NN Compared to CFSR Winds for a Storm in November 2003

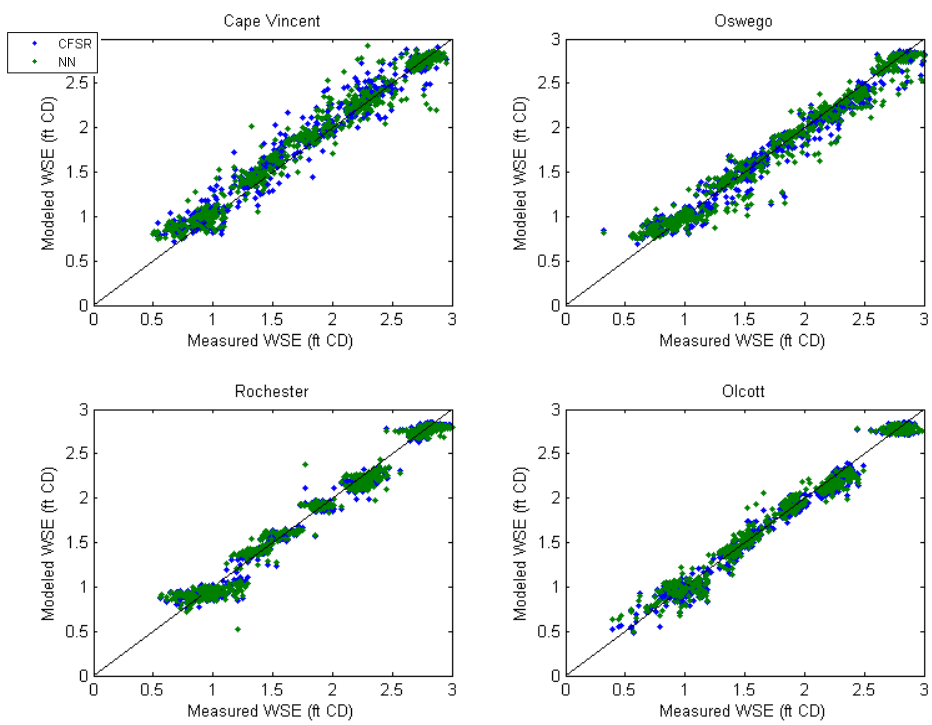

Figure 5.4 Scatter Plot of Water Surface Elevation Estimated at Gages using ADCIRC with NN Compared to CFSR Winds for 6 Storms (refer Appendix C for individual storm plots)

5.4 Ice Coverage

On Lake Ontario, ice tends to concentrate in the shallow nearshore areas and in sheltered areas. Historically, there has been some ice coverage on the lake between November to April (refer Section 2.2.3). The effect of ice on the generation of storm surge and waves is different. In terms of waves, ice can directly dampen the wave energy by means of a physical barrier or obstacle to both the generation and propagation of waves. Whereas, for the generation of storm surge, ice has the potential to increase the drag coefficient on the lake surface and increase the shear stress that the winds transfer to the water. As a result of these differences, ice has been incorporated into ADCIRC differently than in SWAN. The process by which ice has been incorporated into the modeling is discussed in detail in Sections 6.1.3 and 7.0, respectively.

Ice data were obtained from a variety of sources and were reduced to observed ice charts, while the interpolated ice charts were not considered. Comparisons were made between different data sets and showed that significant differences could exist between ice on the same day from two different agencies. Therefore the selected ice concentration on the lake was based on the National Ice Service data, unless the storm date was outside the period of record for this data set.

For both surge and wave modeling, ice was assumed to be stationary for the six day duration of the simulation as our review of the data indicated the ice coverage was generally not dynamic over a short six day period. In other words, it was not necessary to incorporate dynamic ice coverage within one six day model simulation. The ice date closest to the peak of the storm was considered representative for the duration of the storm. In addition, with only limited ice information for the old storms, there is insufficient data to change the ice coverage. Finally, much of the ice in Lake Ontario is limited to a narrow shore-fast band and therefore, consistent in its coverage for longer periods of time.

Ice coverage in the SWAN and ADCIRC inputs was defined by treating the ice chart data as a triangular mesh, and interpolating the ice value at each node in the computational mesh.

6.0 SURGE MODELING

Storm surge on Lake Ontario was estimated using the ADvanced CIRCulation model (ADCIRC). ADCIRC is a finite element hydrodynamic model used to simulate coastal circulation and storm surge in two and three dimensions.

6.1 Implementation of Input Parameters

The input parameters used in ADCIRC are those discussed in Section 5.0. Details specific to the implementation in ADCIRC are discussed below.

6.1.1 Initial Water Level

The initial water level in the model domain, set to the average lake level at the start of the storm (refer Section 5.2) was implemented in ADCIRC by adjusting the depth in the bathymetry file (fort.14). The initial water level used for each storm was documented in the metadata file, which can be found in each storm folder, labeled as README.txt.

6.1.2 Wind and Pressure Field Generation

The CFSR and NN winds are gridded wind fields on a coarser grid than the computational mesh. Custom tools were developed using FORTRAN to interpolate the CFSR or NN wind and pressure data for each mesh node for the duration of the storm simulation. Input files for the custom tools include a bathymetry file (fort.14) and start and end dates defined in a stormdate.in text file. The wind databases and the ice database were also required to define the input winds.

For storms prior to 1979, the tool developed for NN wind and pressure was applied. For all other storms (1979 to 2010), the tool developed for CFSR wind and pressure was applied.

6.1.3 Ice Coverage Implementation

Wind drag coefficients are defined in ADCRIC V49.64 as the greater of the standard Garrett ice formulation (C_{DN}) and the ice dependent (wind independent) relationship (C_{DF}), which is a function of the fraction of ice coverage (IC) shown below:

$$C_{DN} = (0.75 + 0.067\, U_{10})\, 10^{-3}$$

$$C_{DF} = [0.125 + 0.5\, IC\, (1.0 - IC)]\, 10^{-2}$$

These formulations were implemented by ERDC based on data from sea ice in regions such as the Beaufort. However, the majority of the ice on Lake Ontario is shore-fast ice, rather than ice that floats in the middle of the Lake and moves easily with the wind. To accommodate the specific condition of shore-fast ice, the effects of ice on the drag coefficient were considered in a pre-processor outside ADCIRC. The pre-processor used these equations to define a wind correction that was applied as needed in ice covered areas of the wind file. Where the ice coverage was greater than 99%, the wind speed (and hence the wind friction) was set to zero.

Review of the ice data from the American and Canadian sources showed significant discrepancies in the coverage values, and highlighted the fact that the ice coverage charts represent a best approximation of the ice conditions on the lake. Therefore, the influence of the ice sheet on the lake was extracted from the ice database for the period of time that was closest to the peak of the storm. These ice conditions were held constant throughout the ADCIRC simulation.

6.2 Boundary Conditions

Boundary conditions were applied in ADCIRC to define the internal and external land and water interaction and the inflow and outflow in Lake Ontario. In ADCIRC the boundaries are defined through the variable IBTYPE defined in the bathymetry file (fort.14).

The external and internal land boundaries were defined using the following conditions:

- External land (shoreline):

  "IBTYPE = 10, external boundary with no normal and no tangential flow as essential boundary conditions. This is applied by zeroing the normal boundary flux integral in the continuity equation and by setting the velocity = 0 rather than solving momentum equations along the boundary. This boundary condition should satisfy no normal flow in a global sense and zero velocity at each boundary node. This type of boundary represents a mainland boundary with strong no normal flow and no tangential slip conditions." (Luettich and Westerink, 2010)

- Internal land (islands):

  "IBTYPE = 11 internal boundary with no normal and no tangential flow as essential boundary conditions. This is applied by zeroing the normal boundary flux integral in the continuity equation and by setting the velocity = 0 rather than solving momentum equations along the boundary. This boundary condition should correctly satisfy no normal flow in a global sense and zero velocity at each boundary node. This type of boundary represents an island boundary with strong no normal flow and no tangential slip conditions." (Luettich and Westerink, 2010)

- The Niagara River, which flows north from Lake Erie is the largest source of water entering Lake Ontario. Flow from Lake Ontario is discharged through the St. Lawrence River to the Gulf of St. Lawrence and ultimately the North Atlantic Ocean. These two rivers were included in the model domain as flow boundaries. The flow that is discharged through the St. Lawrence River is a combination of the flow entering from the Niagara River combined with other gauged and un-gauged tributaries, and rainfall over the lake. Therefore, the discharge flow through the St. Lawrence River exceeds the flow from the Niagara River.

For the purpose of the surge modeling and not introducing a bias in the lake surface elevation, the flow entering through the Niagara River was set equal to the discharge through the St. Lawrence River. The consequence of this assumption is higher flows through the Niagara River than actually occur, which cause larger velocities in and around the river mouth. However, considering the Niagara River is located along the long axis of the lake, it was considered more important to accurately represent the flow through the St. Lawrence River where significant surges occur at the end of the lake. Details of the data used to define the flow boundaries were discussed in Section 2.2.4. The specific boundary type used in ADCIRC to define the flow boundaries is defined below:

> "IBTYPE = 12 external boundary with non-zero normal and zero tangential flow as an essential boundary condition. This is applied by specifying the non-zero contribution to the normal boundary flux integral in the continuity equation and by setting the non-zero normal velocity and zero tangential velocity rather than solving momentum equations along the boundary. This boundary condition should correctly satisfy the flux balance in a global sense and the specified normal/zero tangential velocity at each boundary node. This type of boundary represents a river inflow or open ocean boundary in which strong normal flow is specified with no tangential slip." (Luettich and Westerink, 2010)

It is important to note that the boundary used to define the flow through the St. Lawrence River was a main factor in the model calibration and therefore is discussed in more detail in the following section (Section 6.3).

6.3 Model Calibration and Verification

The ADCIRC model was calibrated using measured water level data at Cape Vincent, Oswego, Rochester and Olcott. Details pertaining to the data used from these stations were provided earlier in this report in Section 2.2.1.

The model calibration process was an iterative procedure whereby input parameters were adjusted until reasonably consistent results were obtained. The main challenge on Lake Ontario was modeling a portion of the St. Lawrence River to capture the Cape Vincent water level gauge. The hydrodynamics in the St. Lawrence River are driven by the large outflows through the St. Lawrence River, which can range from 150,000 - 350,000 ft^3/s. ADCIRC includes two different flow boundaries but neither is specific to an outflow boundary. Using the available flow boundary conditions in ADCIRC, including IBTYPE of 12 (for strong flow conditions) and 22 (for weak flow conditions), the model would cause significant set-down in the St. Lawrence River. This is consistent with modeling challenges with ADCIRC applied to other strong river flows. ADCIRC was developed as an ocean model and the application in a river environment has limitations. When using a numerical model, it is not un-common to have effects from the boundary conditions. Therefore the objective is to mitigate these effects on the portion of the model that is of interest. For the present study, model results upstream of Cape Vincent are of interest. To mitigate this phenomenon affecting the model results at Cape Vincent, located at the north east end of the lake, various modifications to the model were tested, including:

- Using a water level boundary instead of a flow boundary. However, the water level boundary resulted in model instabilities;
- Extending the model domain incrementally, eventually to the levee at Iroquois, located over 80 miles downstream;
- Exaggerating the depth at the downstream end of the model domain to decrease the velocity of the flow;
- Decreasing the timestep;
- Decreasing the mesh size;
- Decreasing the flow through the St. Lawrence River; and
- Creating a large pool of water at the end of the domain to decrease the velocity of the flow even further.

After testing the above model modifications, the latter two attempts were successful at decreasing the velocity through the boundary to reduce the set-down in the lower part of the river and to accurately simulate the water levels at Cape Vincent. Physically decreasing the flow through the boundary is a simple solution, however adopting this modification would also alter the velocities at the Niagara River, since the inflow has to remain equal to the outflow to avoid changing the mean water level in the lake. As a result, creating a large pool of water at the end of the domain was adopted to mitigate the set-down at Cape Vincent from the large outflow boundary. The final model domain is shown in Figure 6.1, including the artificial lake.

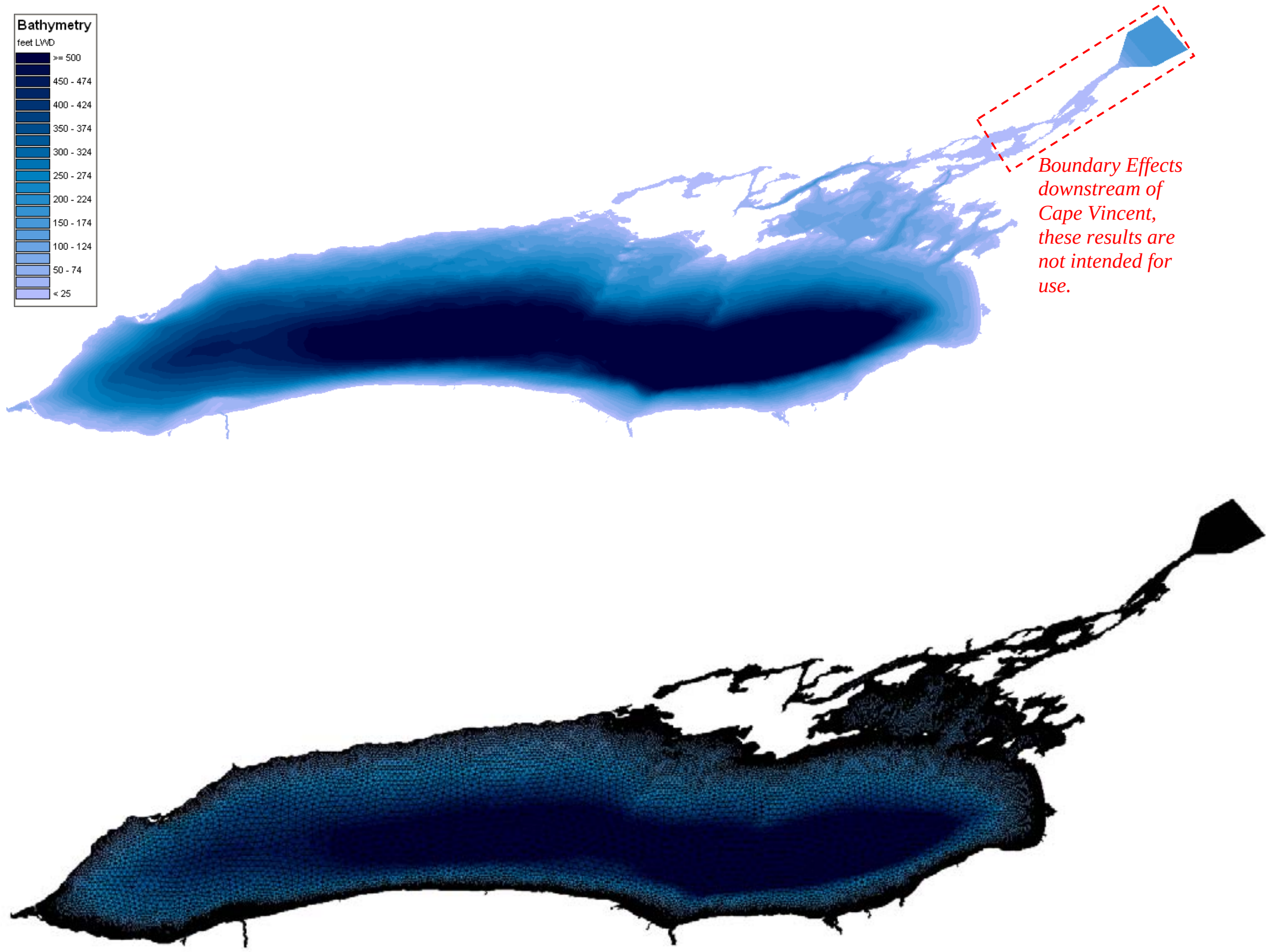

Figure 6.1 ADCIRC Model Domain (Top) and Final Mesh (Bottom)

It is important to note, that model results downstream of Cape Vincent are **not** intended for use and post processing should include a routine to remove these results prior to further distribution to the floodplain mapping contractors.

A number of pilot storms were used to verify the calibrated ADCIRC model under various storm conditions taking into account directionality (easterly and westerly storm events), magnitude (small and large storms) and during ice conditions. Standard plots for all pilot storms are provided in Appendix D. Examples of the results are shown below in Figure 6.2 and Figure 6.3 for one of the largest surge events on Lake Ontario that tracked towards Cape Vincent, located in the north-east of the lake. Figure 6.4 and Figure 6.5 are example results for a storm travelling from west to east.

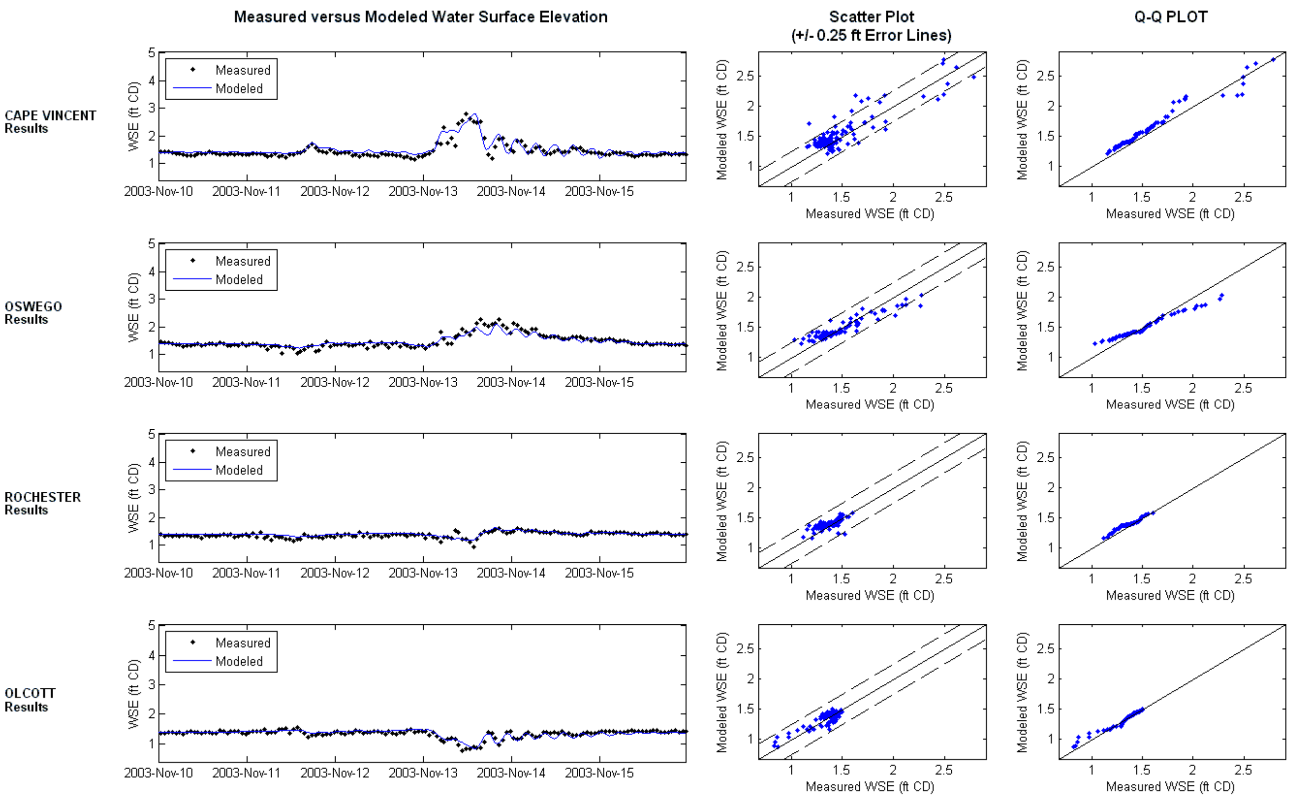

Figure 6.2 Time Series ADCIRC Water Surface Elevation Results During a Storm on November 13, 2003 Compared to Measured Data at Cape Vincent, Oswego, Rochester and Olcott Water Level Gages

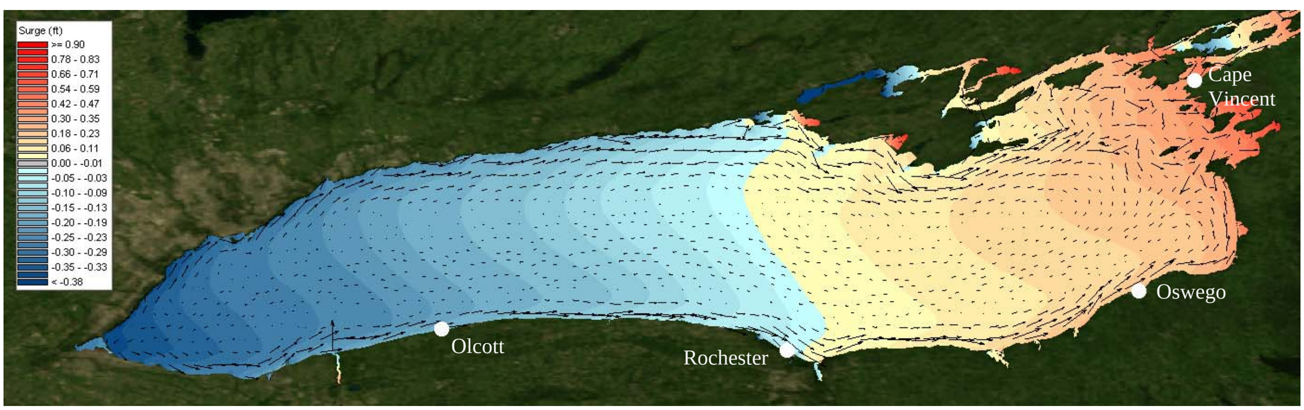

Figure 6.3 ADCIRC Surge Results during Storm Peak on 13 November 2003

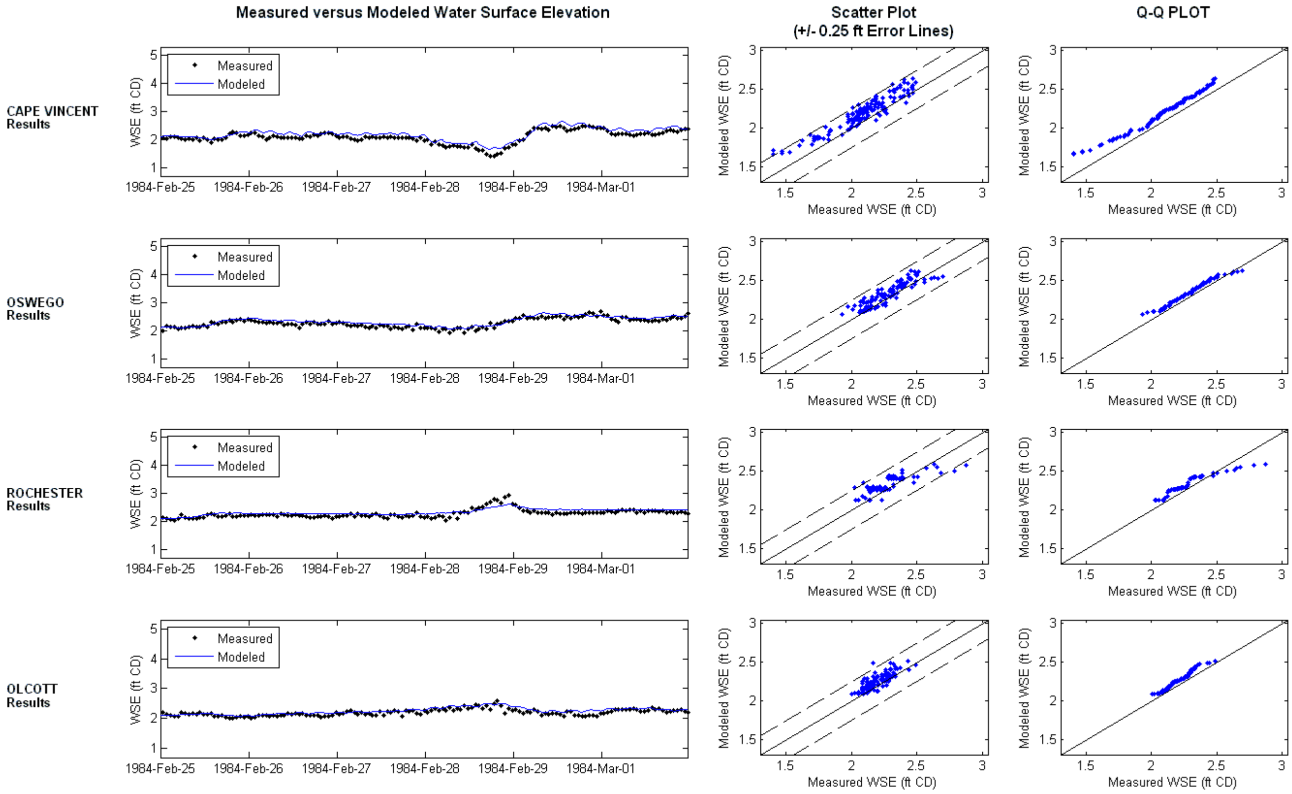

Figure 6.4 Time Series ADCIRC Water Surface Elevation Results During a Storm on February 28, 1984 Compared to Measured Data at Cape Vincent, Oswego, Rochester and Olcott Water Level Gages

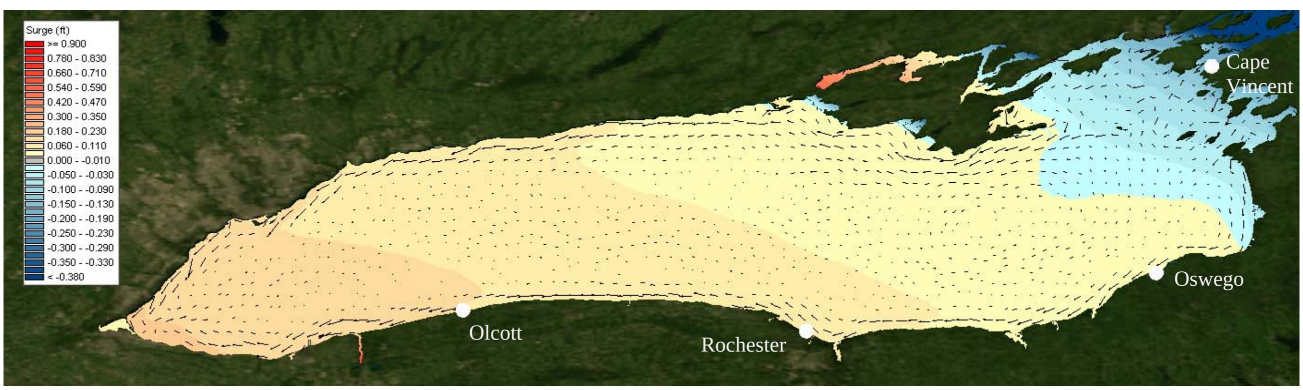

Figure 6.5 ADCIRC Surge Results During Storm Peak on February 28, 1984

6.4 Production Storms

ADCIRC was run for the productions storms discussed in Section 4.0 for six day durations, three days before midnight on the day of the storm peak and three days after. Input files for the production storms were generated using a custom MATLAB program, specifically developed to provide consistent file formats for the model results so they can be incorporated into the USACE's CSTORM database. Details pertaining to the ADCIRC input and output file structure are provided in Sections 6.4.1 and 6.4.2, respectively.

All 150 storms were compared to available measured data at Cape Vincent, Oswego, Rochester and Olcott and show relatively good agreement as shown in Figure 6.6. Comparison plots for each individual production storm similar to those shown in Figure 6.2 and Figure 6.4 are provided in Appendix D.

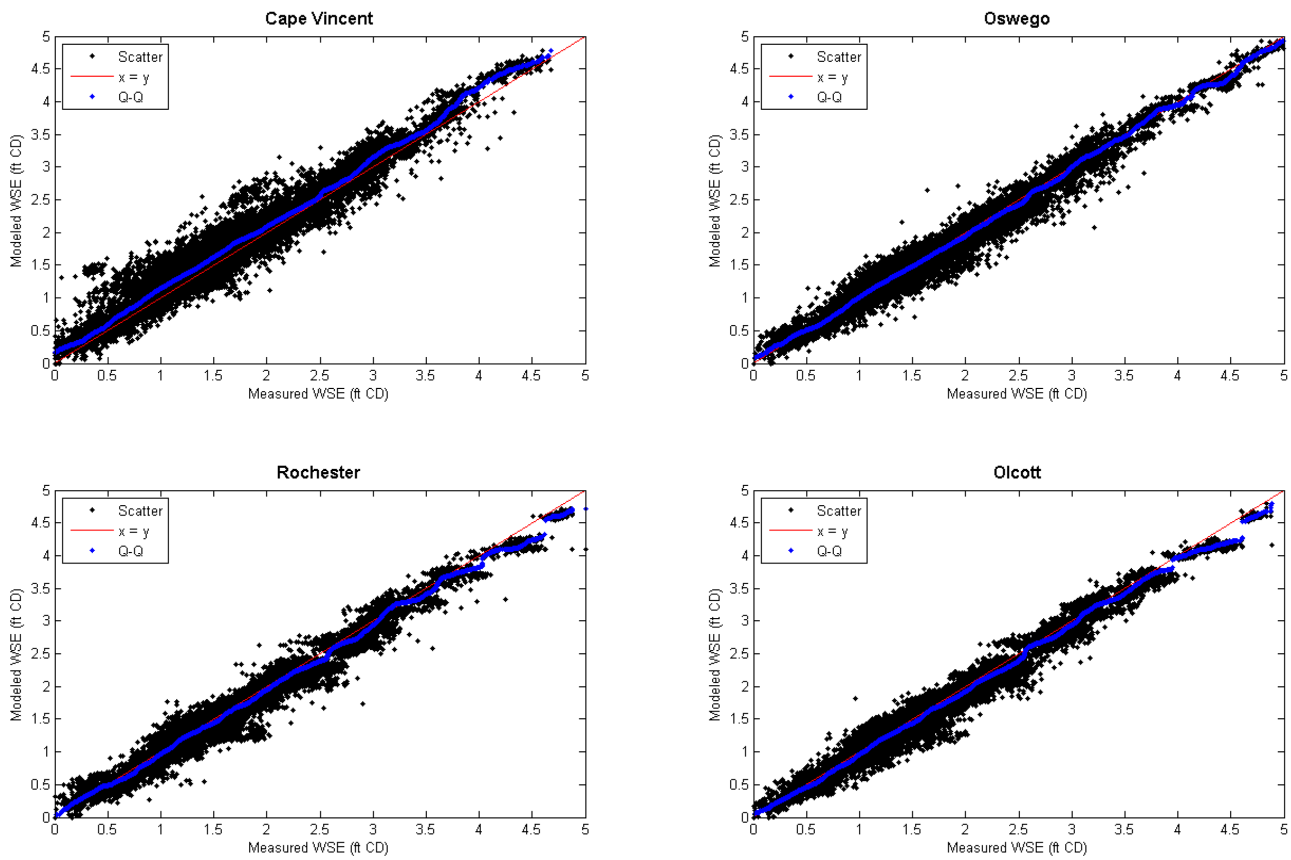

Figure 6.6 Scatter Plot Comparing Measured versus Modeled Water Surface Elevation for all 150 Production Storms

6.4.1 Input File Structure

Input files required for ADCIRC include:

- Fort.15: ADCIRC steering file;
- Fort.14: Bathymetry and boundary file;
- Fort.20: Flow boundary file; and
- Fort.22: Wind file.

Additional input files required for Baird custom tools included:

- Stormdate.in: Input file required to generate wind file (fort.22); and
- LOntarioADCIRC.bat – ADCIRC execution program.

Information pertaining to each run has been documented in the ADCIRC steering file (fort.15) in the first two lines, with the first line including the lake name (Lake Ontario), followed by the storm number. In the second line, the year, month, day, and time of the identified storm peak, as requested by the USACE in a document titled Great Lakes Model Data received on September 28, 2011.

6.4.2 Output File Structure

Output files generated by ADCIRC include:

- Fort.16: General Diagnostic Output;
- Fort.61: Timeseries water surface elevations at Cape Vincent, Oswego, Rochester and Olcott water level gage locations used for model calibration and verification;
- Fort.63: Area water surface elevations;
- Fort.64: Area depth averaged water velocity components;
- Fort.73: Pressure;
- Fort.74: Wind velocity components; and
- Fort.33: Iterative solver diagnostic output file.

Additional output files generated by Baird custom tools included:

- README.txt: Metadata file containing information pertaining to the details of each storm;
- LOntario.log: Run information file with start and end times of simulation;
- Fort_NoIce.22: Wind before adjustments for ice;

- CapeVincent_DATA.txt: Measured and Modeled Water Surface Elevation at Cape Vincent water level gages in FEET interpolated to a common time series based on available measured data;
- Oswego_DATA.txt: Measured and Modeled Water Surface Elevation at Oswego water level gages in FEET interpolated to a common time series based on available measured data;
- Rochester_DATA.txt: Measured and Modeled Water Surface Elevation at Rochester water level gages in FEET interpolated to a common time series based on available measured data;
- Olcott_DATA.txt: Measured and Modeled Water Surface Elevation at Olcott water level gages in FEET interpolated to a common time series based on available measured data; and
- Measured_vs_ADCIRC.bmp: Model verification image comparing model results to four water level gages.

7.0 WAVE MODELING

The SWAN wave model was used to simulate wind generated wave conditions on Lake Ontario for the events selected as part of the storm selection analysis. Developed by Delft University of Technology, SWAN (Simulating WAves Nearshore) is a physics based third-generation wave model that can simulate the propagation and decay of short-crested wind generated waves in coastal regions and inland waters. SWAN uses an unstructured mesh to discretize the bathymetry and is able to simulate various physical phenomena, including:

- wave propagation in time and space
- wave growth due to wind
- non linear wave interaction
- wave dissipation due to white capping and bottom friction
- wave refraction
- wave shoaling
- wave breaking

Diffraction is not explicitly modeled in SWAN but diffraction effects can be simulated by applying directional spreading of the waves. Reflections are not included in SWAN and are not considered a critical process for the purposes of this study.

7.1 Model Setup

Key components of the SWAN model setup included the development of a model mesh, generation of the wind fields, and the definition of numerical parameters to describe the physical processes. These are discussed below.

The SWAN model utilized the ADCIRC mesh that was developed for the surge modeling component of the study (refer to Figure 6.1). Use of the same mesh for both models provided a level of consistency with respect to the output locations and allowed for more detailed wave information near shore and in embayment's.

Wind is the dominant forcing mechanism driving the wave model. Test simulations conducted during model calibration showed that both the CFSR and NN wind fields generated similar results at the three wave buoy locations in the lake. This provides a level of confidence in the wave model during the production run phase, as the CFSR winds will be used for those storm events between 1979 and 2010; the NN wind fields will be used for those events which occurred prior to 1979.

Lake Ontario is approximately 193 miles (344 km) in length with the long axis of the lake oriented east-west, which is similar to the general synoptic scale weather patterns. The average depth of Lake Ontario is approximately 283 ft (86m) with a maximum depth of 802 ft (244 m). The Long fetch lengths and deep water can generate significant sea state conditions. With respect to the model setup, the above considerations imply that the deepwater source terms for wind, whitecapping dissipation and non-linear wave interactions should be considered. In shallow regions near shore and in embayments, shallow water effects will play a role in the evolution of the wave field, as a result, shallow water dissipation source terms such as bottom friction and breaking should also be activated. These parameters were considered during model calibration.

7.2 Model Calibration

Calibration of the SWAN model involved several steps. Test simulations were initially carried out to examine the difference in predicted wave conditions using both the CFSR and NN wind fields; these sensitivity runs were completed early on in the study using a coarser mesh and second generation physics in the SWAN model. The model was then calibrated against six independent storm events using the fine mesh and third generation physics; these results are presented below.

The model results were compared against three wave buoys as shown in Figure 7.1. The buoys are deployed at various locations in the lake and provide a comprehensive cross-section of deepwater wave information at select locations. Both C45139 and C45135 are owned and maintained by Environment Canada's Department of Fisheries and Oceans (DFO); these buoys are non-directional and their deployment locations have changed over the years. Buoy 45012 is a directional buoy owned and maintained by NOAA's National Data Buoy Center (NDBC). Measured data extends back as far as 1989 (at Buoy 45135) and the period of coverage typically ranges from spring to late fall as the buoys are removed during the winter months.

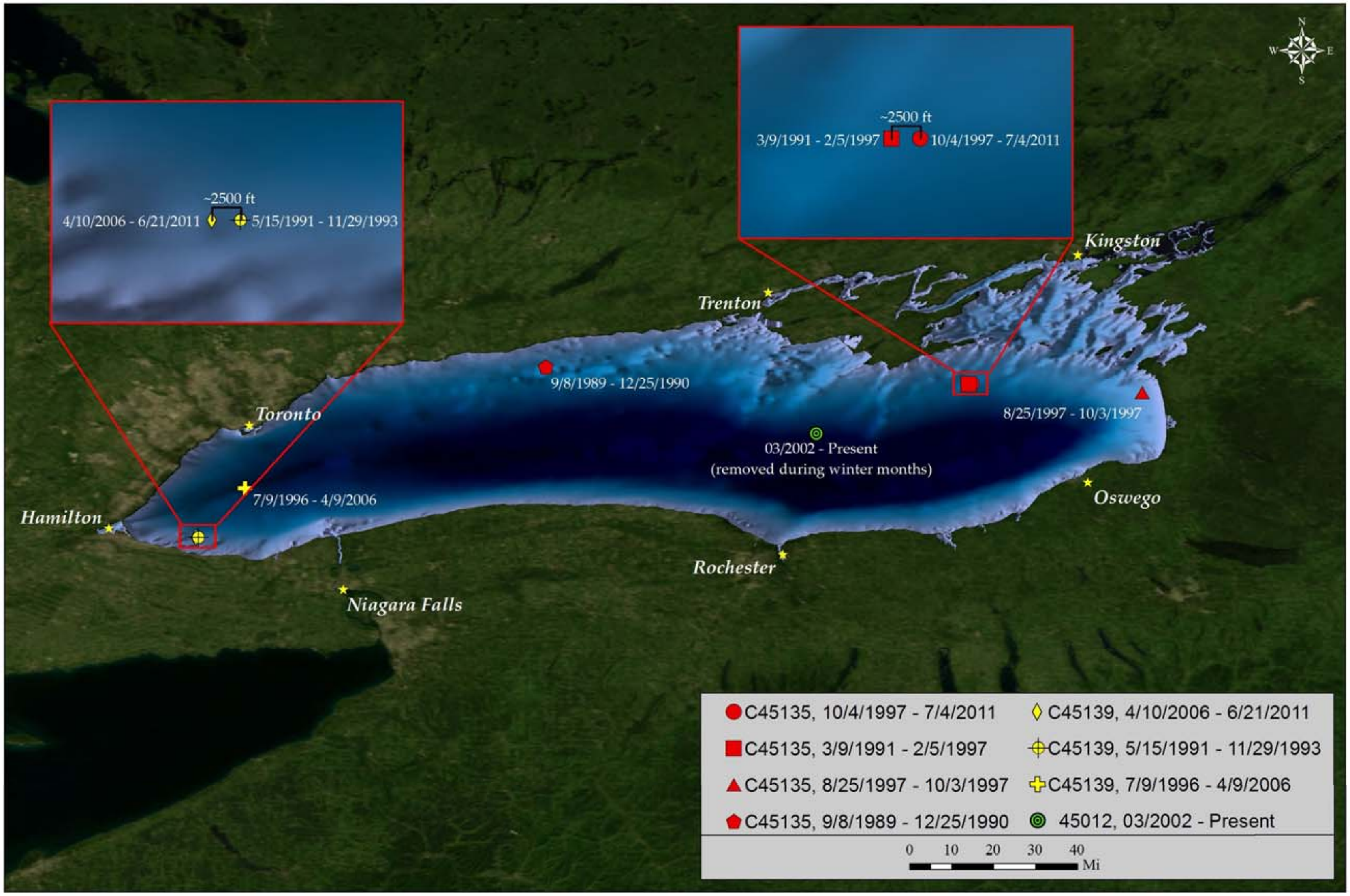

Figure 7.1 Wave Buoy Locations on Lake Ontario

7.2.1 Assessment of CFSR and NN Winds on Waves

The SWAN model was used to examine the difference in wave conditions generated by both the CFSR and NN wind fields. The results from the surge modeling showed that the CFSR winds produced a better comparison with measured water level data; as a result, the objective of this analysis was to determine if the (same) corrected CFSR winds are appropriate to use for the wave model simulations as well.

Three storm events were used in the analysis; two of the wind events are from the (prevailing) west and one is from the east. Figure 7.2 provides a statistical summary in the form of scatter and quantile plots of the predicted wave heights using the corrected CFSR and NN winds. Note that a quantile plot is a technique for determining if two data sets come from populations with a common distribution. Quantile plots are constructed using the inverse of the cumulative distribution function (or exceedence). Timeseries comparisons of predicted and measured wave heights for all three storm events are presented in Appendix E. Note that these early SWAN model runs were based on second generation physics, however, this should not influence the relative trends observed between the wind fields.

In general, similar trends were observed in the wave conditions predicted by both the CFSR and NN wind datasets as the correlation coefficients were greater than 0.9 at all three buoy locations. Figure 7.2 shows that the CFSR winds tend to produce slightly larger wave heights; this was particularly evident in the west end of the lake at Buoy C45139 as peak wave heights were approximately 44% larger than those predicted using the NN wind fields. The average difference at Buoys 45135 and 45012 were determined to be 13% and 4%, respectively.

A review of the statistical summary provided in Figure 7.2 shows that the CFSR winds generated larger waves in the west end of the lake at Buoy C45139 (by as much as 25% for more extreme storms). Wave conditions were more similar at the other buoy locations. The findings from the assessment provide a level of confidence in both datasets, which is important as the CFSR wind fields only extend back to 1979, therefore, the NN winds will be required for those storm events that occurred prior to 1979.

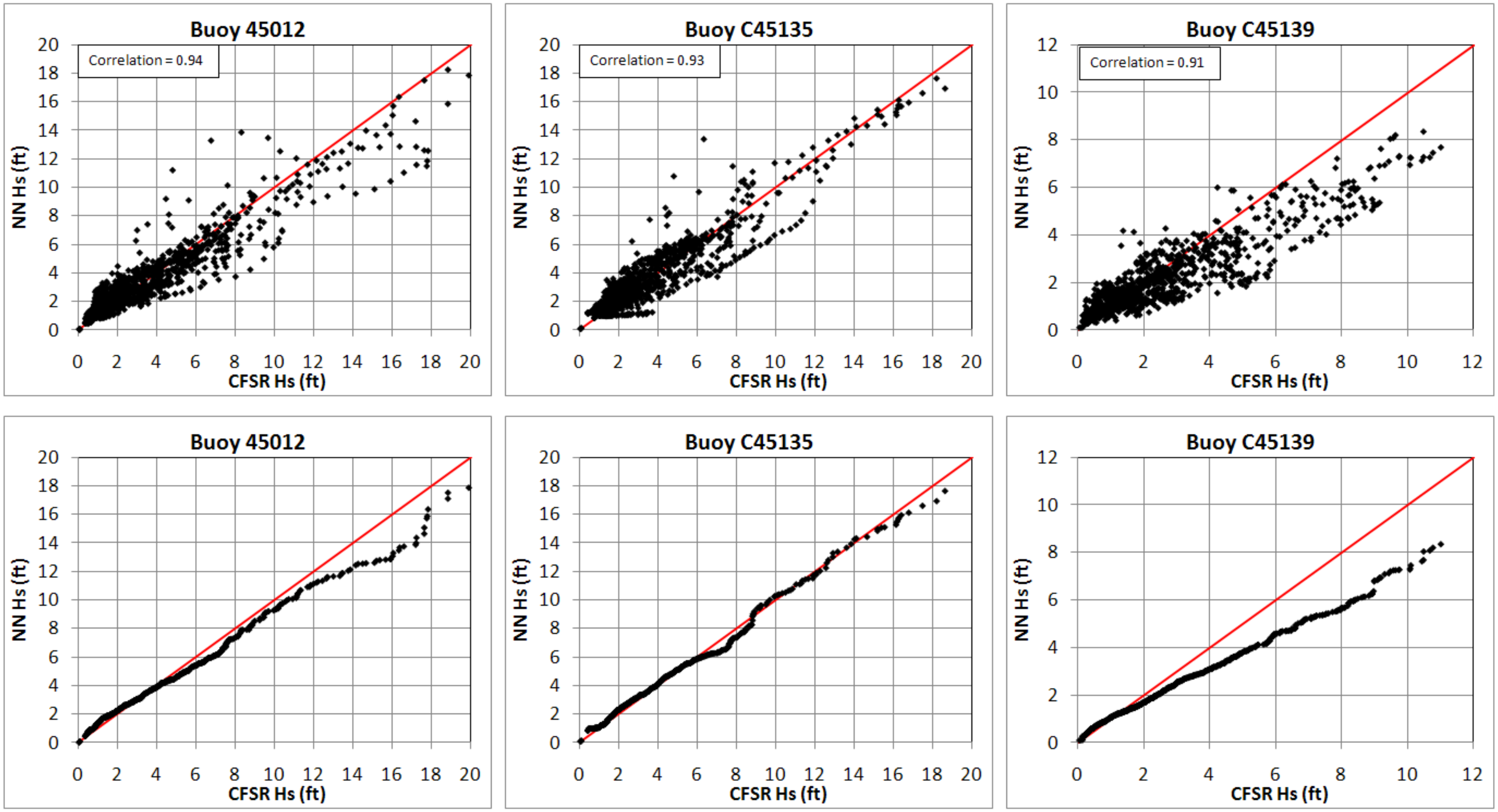

Figure 7.2 Statistical Summary of Predicted Wave Heights using CFSR and NN Winds

7.2.2 Calibration of the Wave Model

The SWAN model was calibrated against six storm events using the corrected CFSR wind fields; these are summarized in Table 7.1. With the exception of the September 2003 event, all storms were from the west and occurred in the late fall or early winter. The calibration was carried out using the fine mesh which uses a variable resolution ranging from approximately 3 km in the middle of the lake to 180 m along the shore and 30 m in embayments. Figure 7.3 shows the model mesh.

Table 7.1 Summary of Storm Events used for Model Calibration

			Peak Wave Height (ft) of Storm event		
			Buoy 45139	Buoy 45135	Buoy 45012
Start Date	End Date	Time of Peak Event	Measured	Measured	Measured
2000/12/15 00:00	2000/12/22 00:00	2000/12/18 05:00	ND	16.70	ND
2003/09/16 00:00	2003/09/23 00:00	2003/09/19 12:00	13.02	5.28	9.55
2003/11/10 00:00	2003/11/17 00:00	2003/11/13 16:00	9.42	16.54	24.84
2006/10/26 00:00	2006/11/02 00:00	2006/10/29 10:00	4.82	17.42	19.23
2007/10/25 00:00	2007/11/01 00:00	2007/10/28 05:00	4.43	10.10	11.91
2009/10/04 00:00	2009/10/11 00:00	2009/10/07 17:00	3.77	13.39	14.11

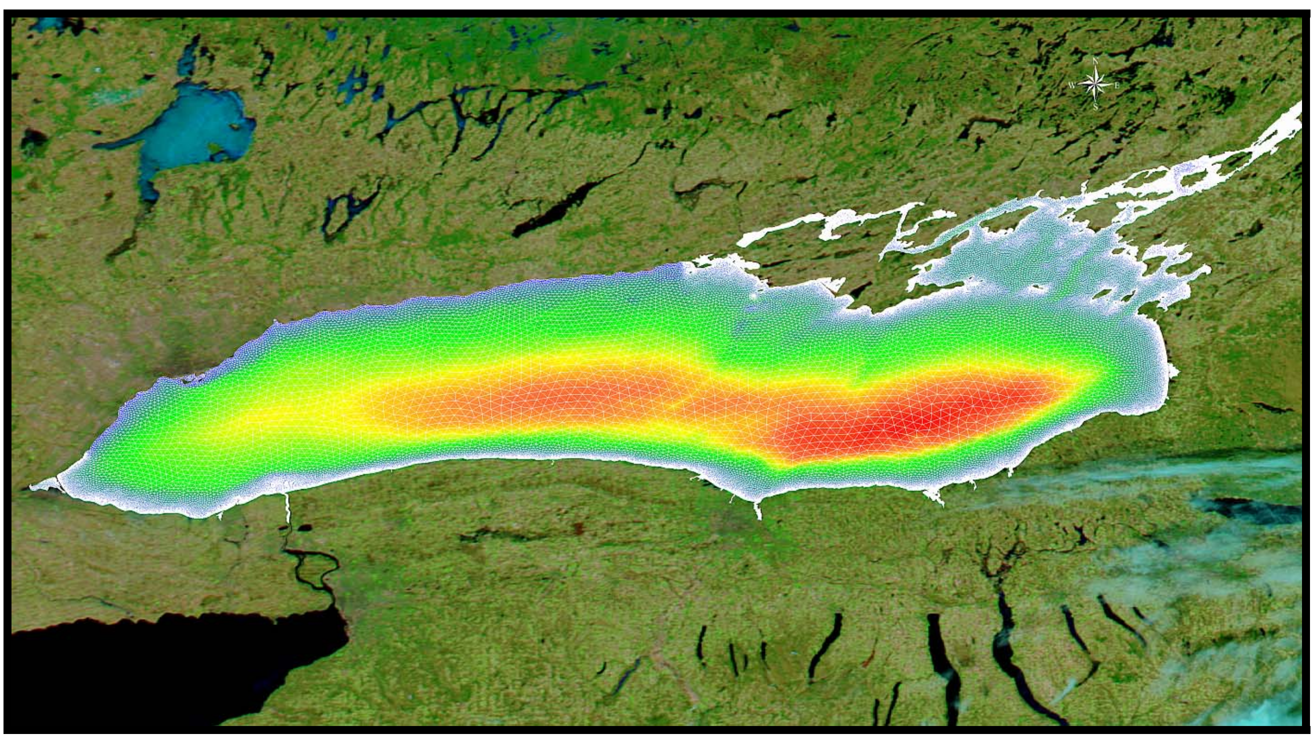

Figure 7.3 Overview of SWAN Model Mesh for Lake Ontario

The calibration process considered second and third generation physics as well as other processes such as wave breaking, friction, and white capping. Model results were compared against measured data recorded at the three buoy locations around the lake. Ultimately, the third generation physics were used for final calibration along with breaking and friction, although these parameters did not have a significant impact on the waves at the buoy locations, due to their location in deeper water. Note that correcting the winds (to represent conditions overwater) generated the most significant improvement to the model calibration. Table 7.2 provides a summary of the predicted and measured peak wave heights for each storm event; timeseries comparisons for the six storms are shown in Appendix F. A statistical summary of the model's ability to predict wave heights is provided in Figure 7.4.

Table 7.2 Comparison of Peak Wave Heights for Six Storm Events used in Model Calibration

			Peak Wave Height (ft) of Storm event					
			Buoy 45139		Buoy 45135		Buoy 45012	
Start Date	End Date	Time of Peak Event	Measured	Modeled	Measured	Modeled	Measured	Modeled
2000/12/15 00:00	2000/12/22 00:00	2000/12/18 05:00	ND	8.46	16.70	17.72	ND	17.70
2003/09/16 00:00	2003/09/23 00:00	2003/09/19 12:00	13.02	10.31	5.28	5.99	9.55	7.00
2003/11/10 00:00	2003/11/17 00:00	2003/11/13 16:00	9.42	9.85	16.54	20.21	24.84	21.48
2006/10/26 00:00	2006/11/02 00:00	2006/10/29 10:00	4.82	5.20	17.42	15.02	19.23	15.50
2007/10/25 00:00	2007/11/01 00:00	2007/10/28 05:00	4.43	4.22	10.10	9.48	11.91	10.06
2009/10/04 00:00	2009/10/11 00:00	2009/10/07 17:00	3.77	4.57	13.39	11.25	14.11	10.92
Maximum Relative Difference			21%		22%		-14%	
Minimum Relative Difference			-21%		-16%		-27%	
Mean Relative Difference			2%		1%		-20%	

ND - No data available

Percent Relative Difference = (Modeled - Measured)/Measured x 100

The results in Table 7.2 showed that the model overestimated some peaks and underestimated others as the relative difference ranged from 21% to -27%. At Buoys C45139 and C45135, the model overestimated peak wave heights approximately 50% of the time. At Buoy 45012, the model consistently underestimated the wave heights by 20% on average. However, the results in Figure 7.4 show a strong relationship between the predicted and measured wave heights for the entire duration of the storm.

Note that the SWAN model runs are computationally intensive due to the size and resolution of the mesh used to resolve the bathymetry in Lake Ontario, especially since all the large navigation channels and embayments were included in the model domain. It takes approximately 72 hours to complete a six day simulation on a dedicated modeling computer.

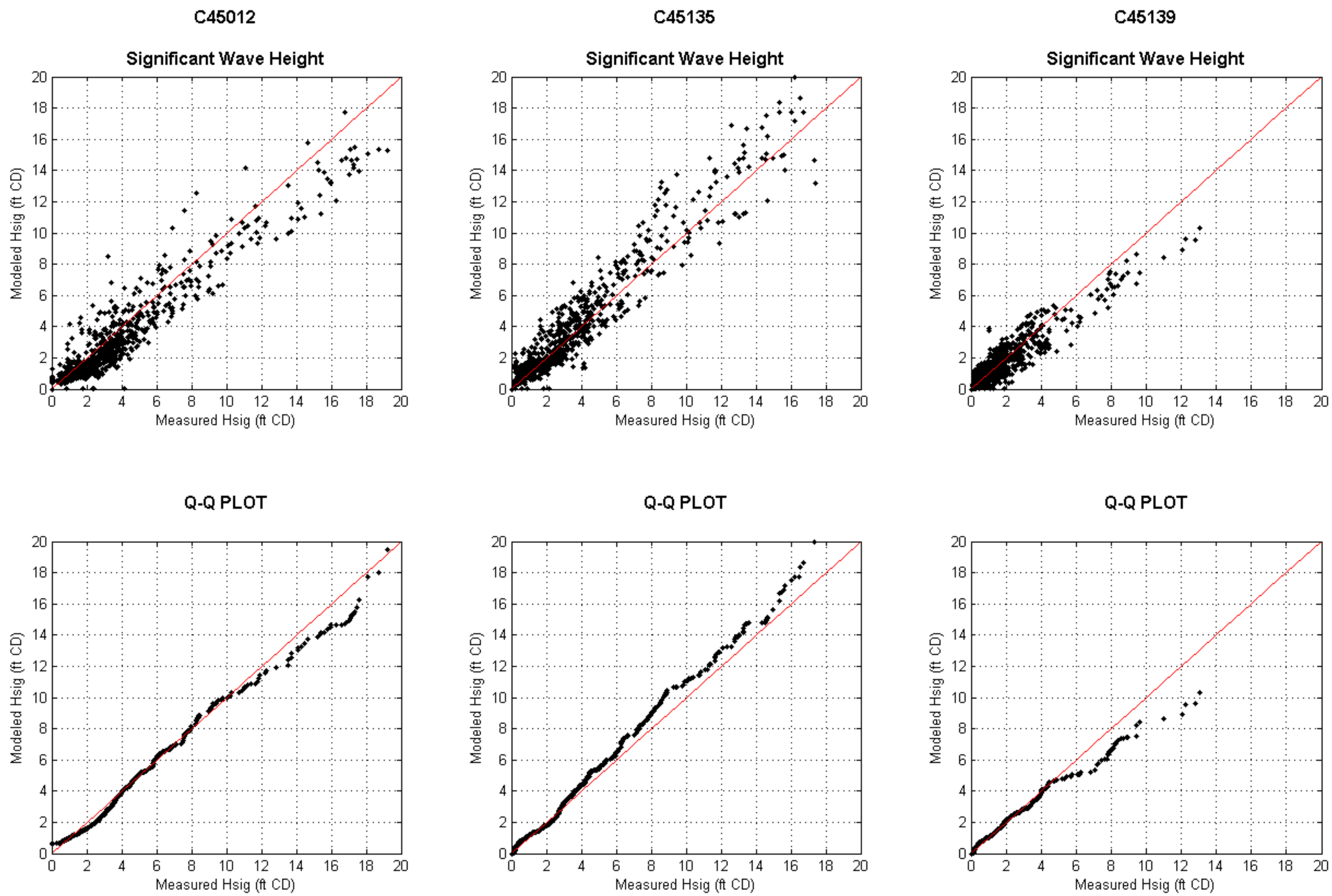

Figure 7.4 Statistical Summary of Model Performance based on Six Calibration Runs

Figure 7.5 shows a typical 2D plot of the predicted wave field under an easterly and westerly wind condition. The vectors show wave direction and have been filtered in order to see the wave height map more clearly, particularly in the near shore.

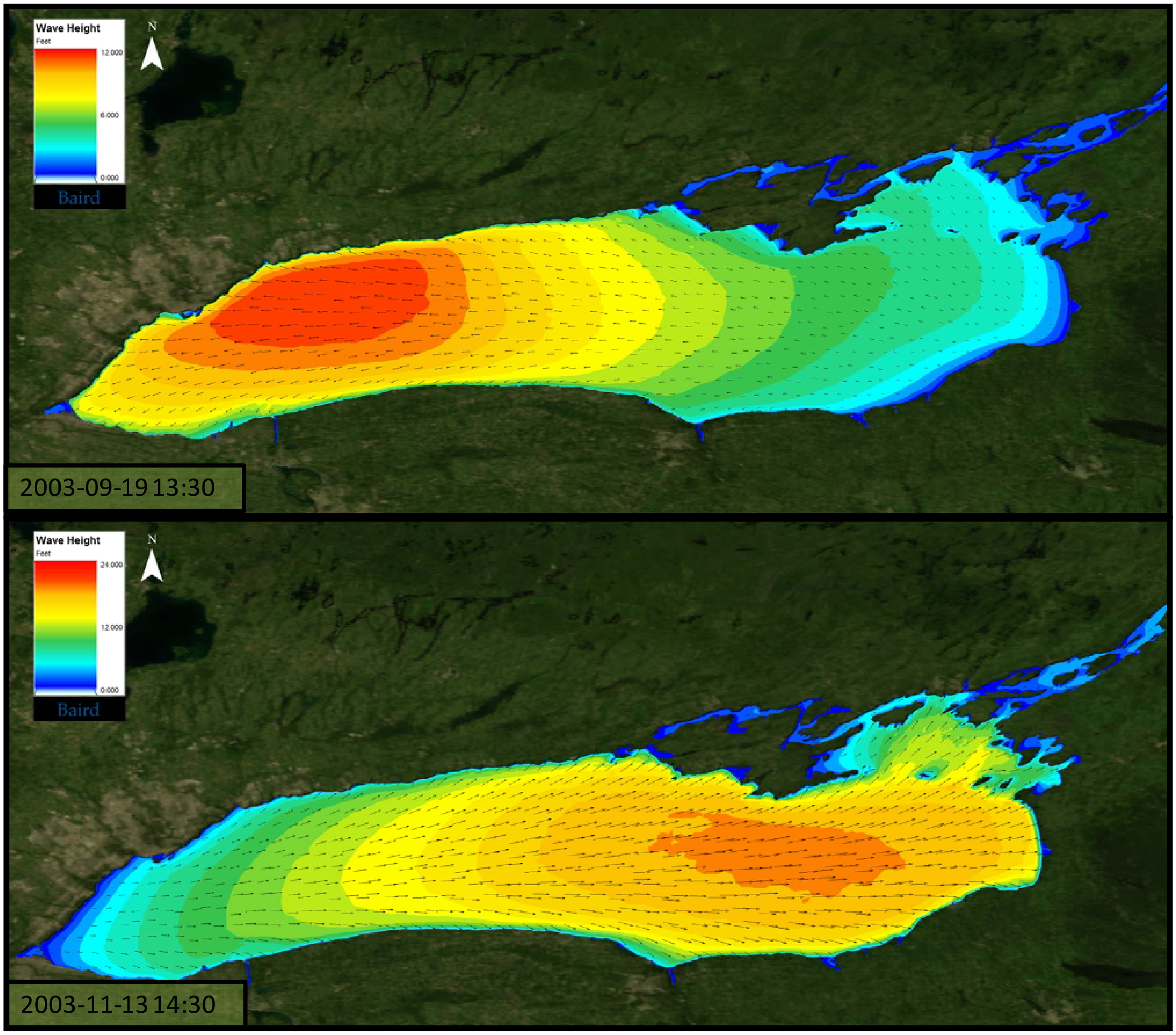

Figure 7.5 Map of Predicted Wave Heights for an East (top) and West (bottom) Storm Event

A review of the timeseries comparisons in Appendix F showed that the model does capture the trends observed in the measured data, which again provides a level of confidence in the wind fields that are used to drive the model estimates. Note that the wave periods compared well throughout the simulation and in particular during the peak of the storm event when the energy is typically well defined in the frequency spectrum.

7.2.3 Impact of Ice on Waves

Model calibration was carried out on storm events that occurred during ice free periods. This represents the majority of the 150 storm events that have been selected for production simulations. Typically, the wave buoys are removed from the lake during the winter months to avoid damage and thus none of the calibration storms were selected from the winter (since there are no measurements in the winter). For reference, Lake Ontario does not experience the same ice coverage patterns as the other Great Lakes, such as Lake Erie which historically has been completely ice covered in the winter. However, some of the storms in the composite database were selected from the winter when ice was present on the lake and thus a methodology was required to account for ice.

For this study, an OBSTACLE was defined in the SWAN model to represent the historical ice cover conditions. An obstacle is a polygon that defines the perimeter of the ice field, which for this study is any region that experienced at least 70% ice coverage. As waves cross any point along the obstacle, wave energy is reduced to zero. Re-generation does occur within the polygon itself; but this energy is removed during a post-processing step once the simulation is complete. It should be noted that although wave growth does occur within the OBSTACLE, no energy can cross the barrier and it does simulate the sheltering effects on the leeward side of a mobile ice sheet (if one were to occur). Figure 7.6 provides an example of a regulation ice-free SWAN simulation and the same storm with the inclusion of an ice OBSTACLE. The corresponding influence on adjacent wave conditions is clearly seen in the lower panel with the ice OBSTACLE.

Figure 7.7 shows the spatial extent of the ice coverage for the January 10, 1988 storm, which is one of the most severe ice conditions in the 150 storm composite database. The maximum wave height for the peak of the storm is also plotted in Figure 7.7 for this east to west tracking event. Wave heights are zero where the ice concentration exceeds 70%.

7.2.4 Production Runs

Model simulations are now complete for the 150 storm composite database. Approximately 110 storms were complete at the time this report was originally issued. For those storm events with available measured data at the buoys, the predicted wave heights were compared to the measured data in order to assess the overall performance of the model. A total of twenty storms featured measured data and were available for the analysis. A statistical comparison in the form of scatter and quantile-quantile plots is provided in Figure 7.8. In general, the model compares well against measured data as a strong relationship was observed in the scatter data. A review of the quantile plots showed that the model tends to underestimate the largest waves at Buoy 45012 slightly and marginally overestimates wave heights at C45135 and C45139. These findings provide a level of confidence in the wind fields and with the model's ability to predict wave conditions on the lake.

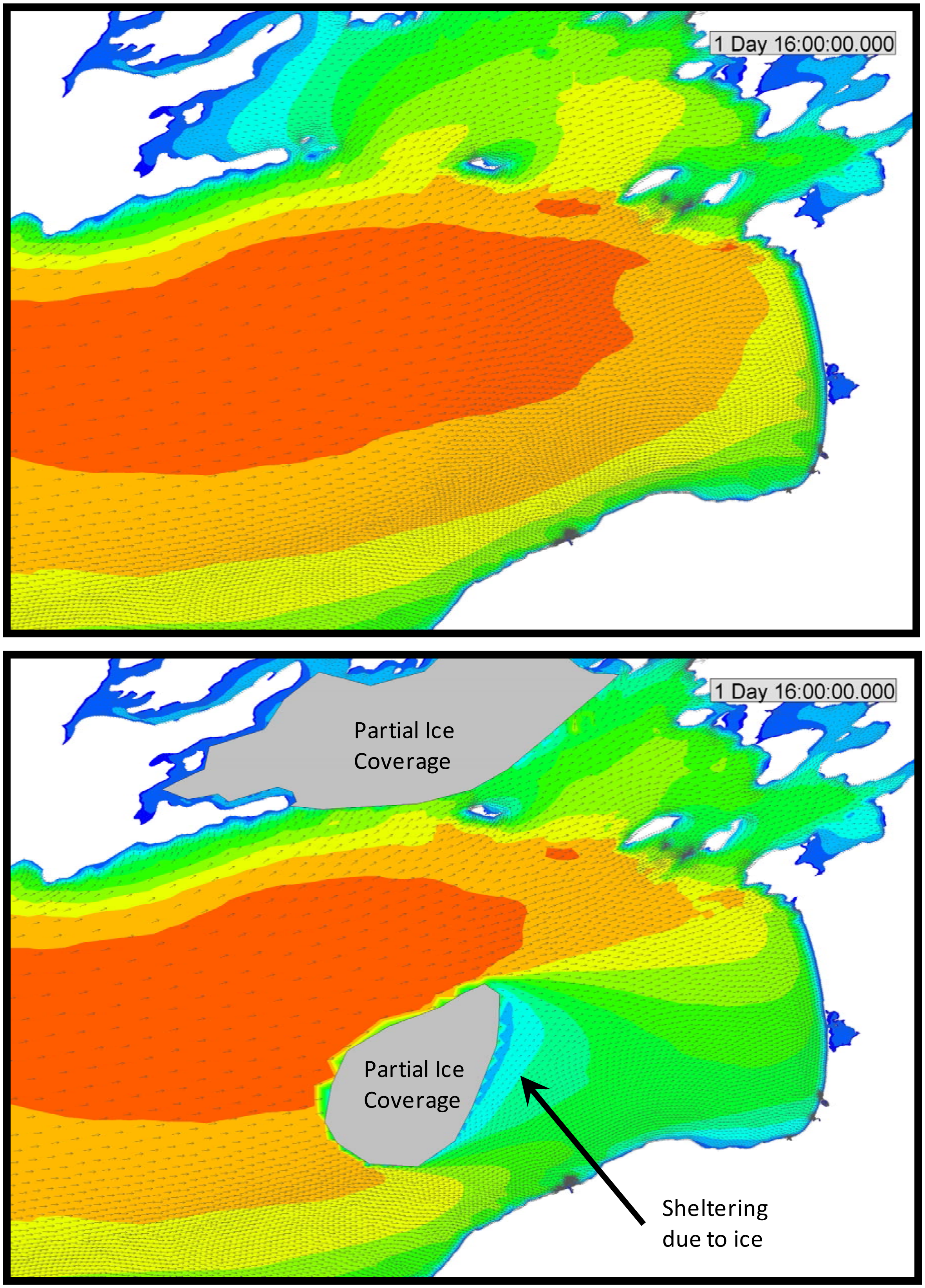

Figure 7.6 Example of Wave Predictions for an Ice Free Condition and Ice Cover Obstacle in SWAN

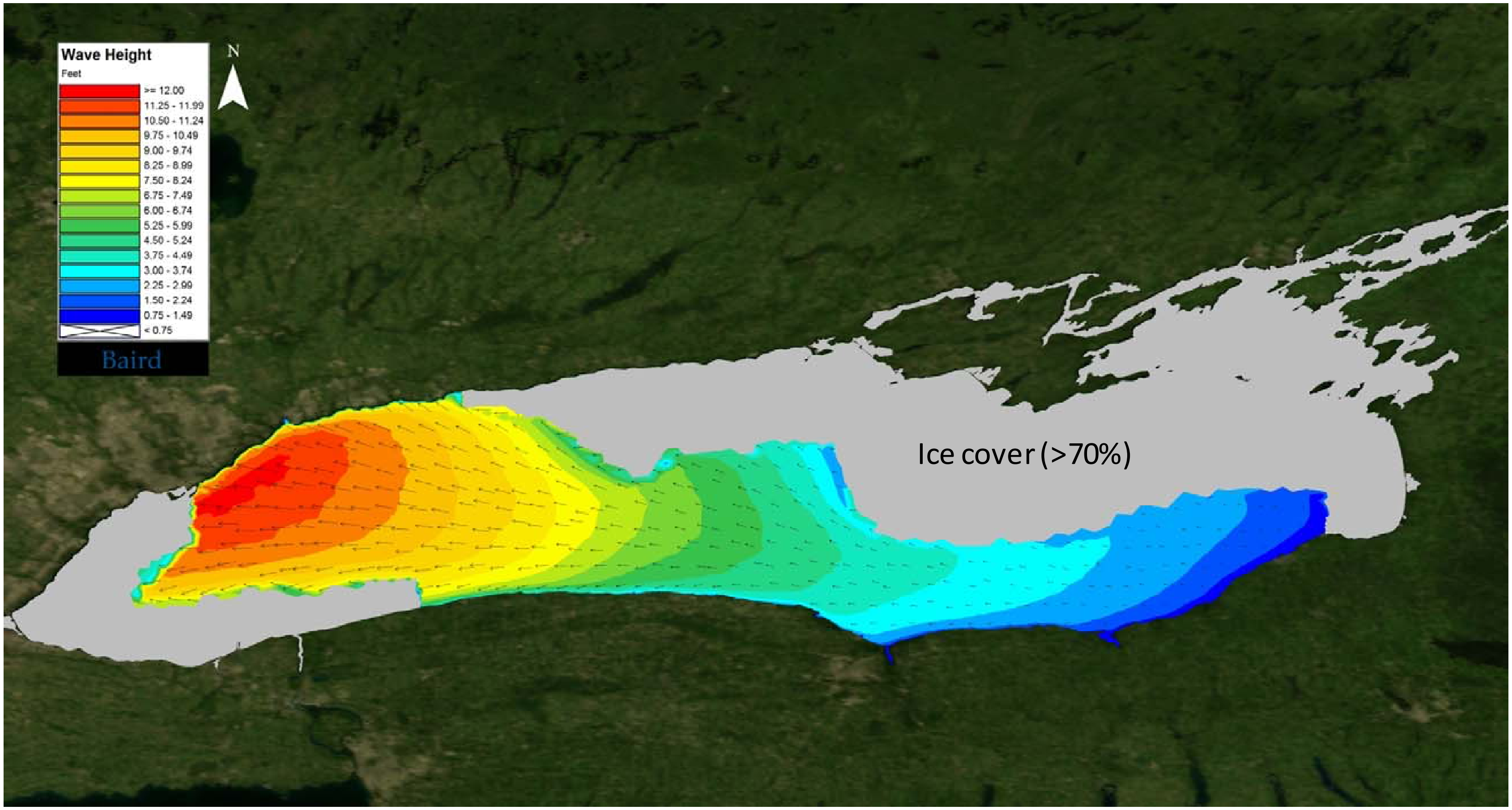

Figure 7.7 Predicted Wave Field and Extent of 70% Ice Coverage for the Storm Event on January 10, 1988

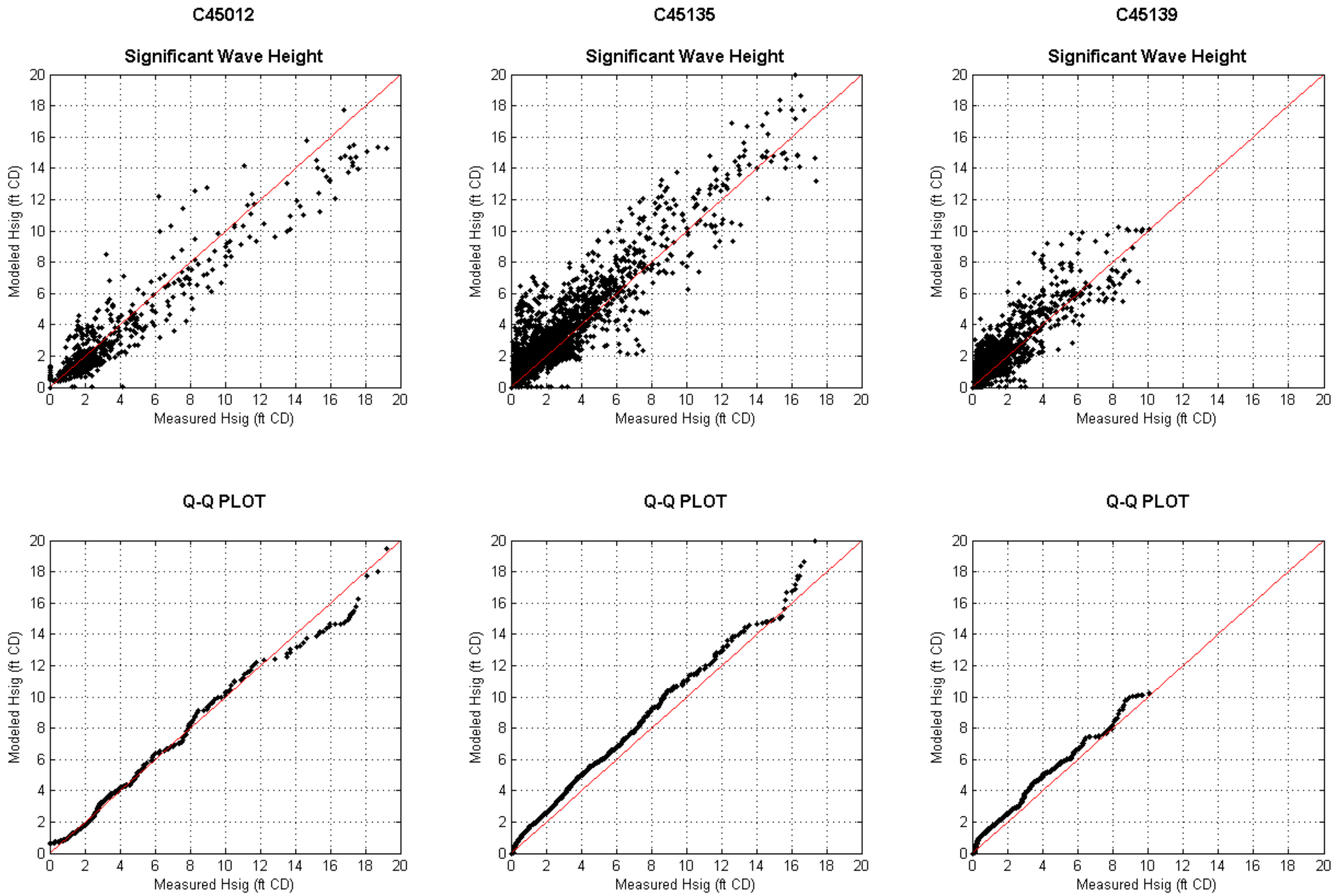

Figure 7.8 Statistical Summary of Model Performance based on Production Storm Events

8.0 PRODUCTION RUNS AND FILE TRANSFER

Section 8.0 of the report describes the production runs and the file transfer protocol.

8.1 150 Production Runs

The 150 production storms selected for the composite database are summarized in Table 8.1. Refer to Section 4.4 of this report for a discussion of the storm selection methodology. ADCIRC and SWAN simulations where completed for all of these storms.

Table 8.1 List of 150 Lake Ontario Production Storms

Storm Number	Date of Storm Peak		Storm Number	Date of Storm Peak
1	1979/04/06 18:00		76	1998/03/21 14:00
2	1980/01/12 09:00		77	1998/09/07 00:00
3	1981/06/09 00:00		78	1999/01/04 19:00
4	1982/01/11 10:00		79	2000/05/13 11:00
5	1982/02/01 01:00		80	2000/12/06 03:00
6	1984/02/28 20:00		81	2001/02/10 19:00
7	1984/04/30 16:00		82	2001/04/07 18:00
8	1985/01/21 04:00		83	2003/01/02 03:00
9	1985/11/28 20:00		84	2003/04/04 15:00
10	1985/12/02 17:00		85	2003/04/07 20:00
11	1986/05/01 18:00		86	2003/04/17 13:00
12	1991/04/30 16:00		87	2003/11/28 08:00
13	1991/12/03 03:00		88	2005/04/02 18:00
14	1991/12/14 19:00		89	2005/09/29 09:00
15	1992/05/02 22:00		90	2006/02/06 23:00
16	1992/08/11 01:00		91	2006/03/15 20:00
17	1992/11/13 02:00		92	2006/10/29 13:00
18	1992/12/11 18:00		93	2006/12/02 01:00
19	1993/03/04 20:00		94	2007/01/09 02:00
20	1993/03/14 02:00		95	2007/03/18 18:00
21	1993/10/18 00:00		96	2007/11/27 19:00
22	1996/05/21 04:00		97	2008/01/09 10:00
23	1997/02/22 12:00		98	2008/03/08 22:00
24	1999/01/14 22:00		99	2008/09/15 05:00
25	1999/03/06 18:00		100	2008/12/28 12:00
26	1999/11/04 01:00		101	1970/11/23 23:00
27	2000/12/18 08:00		102	1971/01/27 19:00
28	2001/06/20 05:00		103	1971/01/30 04:00
29	2002/02/01 15:00		104	1971/02/06 12:00
30	2002/03/10 19:00		105	1971/02/13 23:00
31	2003/02/05 06:00		106	1971/02/28 17:00
32	2003/11/13 16:00		107	1971/03/04 22:00
33	2004/12/23 16:00		108	1971/12/11 08:00
34	2006/02/17 10:00		109	1971/12/30 15:00
35	2008/01/30 09:00		110	1972/01/25 20:00
36	2008/02/06 22:00		111	1972/02/04 22:00
37	2009/12/11 08:00		112	1972/11/15 02:00
38	1979/08/07 13:00		113	1972/11/27 18:00
39	1979/12/08 07:00		114	1972/12/05 01:00
40	1974/03/24 21:00		115	1973/03/18 06:00
41	1980/10/26 19:00		116	1973/04/11 00:00
42	1980/12/14 14:00		117	1973/11/02 02:00
43	1981/11/28 03:00		118	1973/11/06 19:00
44	1982/01/05 09:00		119	1973/12/29 11:00
45	1982/01/23 10:00		120	1974/01/11 13:00
46	1982/04/06 04:00		121	1974/01/31 17:00
47	1982/11/06 06:00		122	1974/02/23 17:00
48	1982/12/29 00:00		123	1974/03/05 07:00
49	1985/03/04 19:00		124	1974/03/17 16:00
50	1986/01/09 14:00		125	1974/04/14 20:00
51	1986/09/15 22:00		126	1974/05/18 09:00
52	1986/10/04 17:00		127	1974/11/15 23:00
53	1988/01/13 08:00		128	1974/12/02 14:00
54	1988/06/22 12:00		129	1975/01/26 16:00
55	1988/07/17 05:00		130	1975/02/26 18:00
56	1988/11/10 15:00		131	1975/04/03 15:00
57	1988/11/20 21:00		132	1975/11/10 16:00
58	1989/02/08 17:00		133	1975/12/01 20:00
59	1989/03/18 06:00		134	1975/12/21 03:00
60	1989/10/14 18:00		135	1976/02/02 18:00
61	1990/11/06 08:00		136	1976/03/05 12:00
62	1991/03/28 08:00		137	1976/04/11 06:00
63	1992/12/26 13:00		138	1976/04/27 04:00
64	1993/02/12 02:00		139	1976/05/19 20:00
65	1994/02/23 19:00		140	1976/11/30 20:00
66	1994/11/06 18:00		141	1977/01/10 11:00
67	1994/11/22 21:00		142	1977/01/29 07:00
68	1994/12/24 07:00		143	1977/03/18 20:00
69	1995/01/06 05:00		144	1977/04/02 16:00
70	1995/11/11 22:00		145	1977/11/12 02:00
71	1996/01/28 02:00		146	1977/12/06 02:00
72	1996/03/04 01:00		147	1977/12/09 22:00
73	1996/11/08 16:00		148	1978/01/14 17:00
74	1997/12/11 03:00		149	1978/01/20 15:00
75	1998/01/15 16:00		150	1978/01/26 06:00

8.2 File Transfer Protocol

As part of the scope of work, all input and output data files from both ADCIRC and SWAN production simulations were ultimately delivered to the USACE on an external hard disk. The purpose of this report section is to summarize to the file organization and naming convention.

The hard disk contains 150 folders, one for each production storm. Storm number and date are listed in Table 8.1. Within each Storm folder are two sub-folders, ADCIRC and SWAN. The input and output files for both ADCIRC and SWAN are provided within the corresponding folders. A sample of this folder structure is illustrated below:

```
LAKE ONTARIO
        \Production Runs
                \Storm001_1979040300
                        \ADCIRC
                        \SWAN
                ..
                ..
                ..
                \Storm150_1979012300
                        \ADCIRC
                        \SWAN
```

9.0 QUALITY ASSURANCE / QUALITY CONTROL

The production run phase included an extensive QA/QC process. The modeling team for Lake Ontario was responsible for verifying basic run completion and generation of appropriate files. The team then created a collection of files and plots useful in assessing run performance. Specifically, plots of modeled versus measured water levels and waves were generated (similar to the outputs in Section 6.0 and 7.0). Wave conditions at the time of peak wave height were calculated and plotted. Selected output files and the plots were then forwarded to an independent RAMPP contractor for a technical review. This review process consisted of analyzing model outputs from both the ADCIRC and SWAN models, including:

- Input files for all models;
- ADCIRC output:
    - maxele.63 peak water surface elevation
    - maxvel.63 peak water velocity
    - maxwvel.63 peak wind velocity
    - minpr.63 minimum atmospheric pressure
    - measured vs. modeled water surface elevation time series plots
- SWAN output:
    - swan_HS_max.63 peak zero moment wave height
    - swan_TM01_atHSmax.63 spectral mean wave period at peak wave height
    - swan_TPS_atHSmax.63 spectral peak wave period at peak wave height
    - swan_DIR_atHSmax.63 spectral peak wave direction at peak wave height
    - measured vs. modeled wave height time series plots

Other specific enquires were addressed as required following the review of the standard plots for each of the 150 storms and additional analysis was completed as necessary. Any issues identified by the independent reviewers were logged in standardized QC forms, as shown in Figure 9.1. The forms were then passed back to Baird to review and respond to the issues identified. Once both the independent review team and Baird were satisfied, the QC forms were signed by the review team. Refer to Appendix G for a copy of the completed forms.

ADCIRC REVIEW			
Storm:			
Reviewer:			
Organization:	Choose an item.		
Date Checked:			
Was the max water surface elevation file checked for anomalies?			Choose an item.
Was the max current velocity file checked for anomalies?			Choose an item.
Was the max wind velocity file checked for anomalies?			Choose an item.
Was the minimum pressure file checked for anomalies?			Choose an item.
Were the water elevation time series checked for anomalies?			Choose an item.
Issues			
File	Comment	Resolution	Verification
Animations generated for selected storms			
Does the water surface elevation animation show any anomalies?			Choose an item.
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:			
Date:			

SWAN REVIEW			
Storm:			
Reviewer:			
Organization:	Choose an item.		
Date Checked:			
Was the max wave height file checked for anomalies?			Choose an item.
Was the wave period at max wave height file checked for anomalies?			Choose an item.
Was the wave direction at max wave height file checked for anomalies?			Choose an item.
Issues			
File	Comment	Resolution	Verification
Animations generated for selected storms			
Does the wave height animation show any anomalies?			Choose an item.
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:			
Date:			

Figure 9.1 Standard ADCIRC and SWAN QC Forms

10.0 REFERENCES

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U.S. Army Corps of Engineers. (1988). "Revised Report on Great Lakes Open-Coast Flood Levels - Phase I". Detroit District, Detroit, Michigan 1988

APPENDIX A - WATER LEVEL VARIATION ANALYSIS

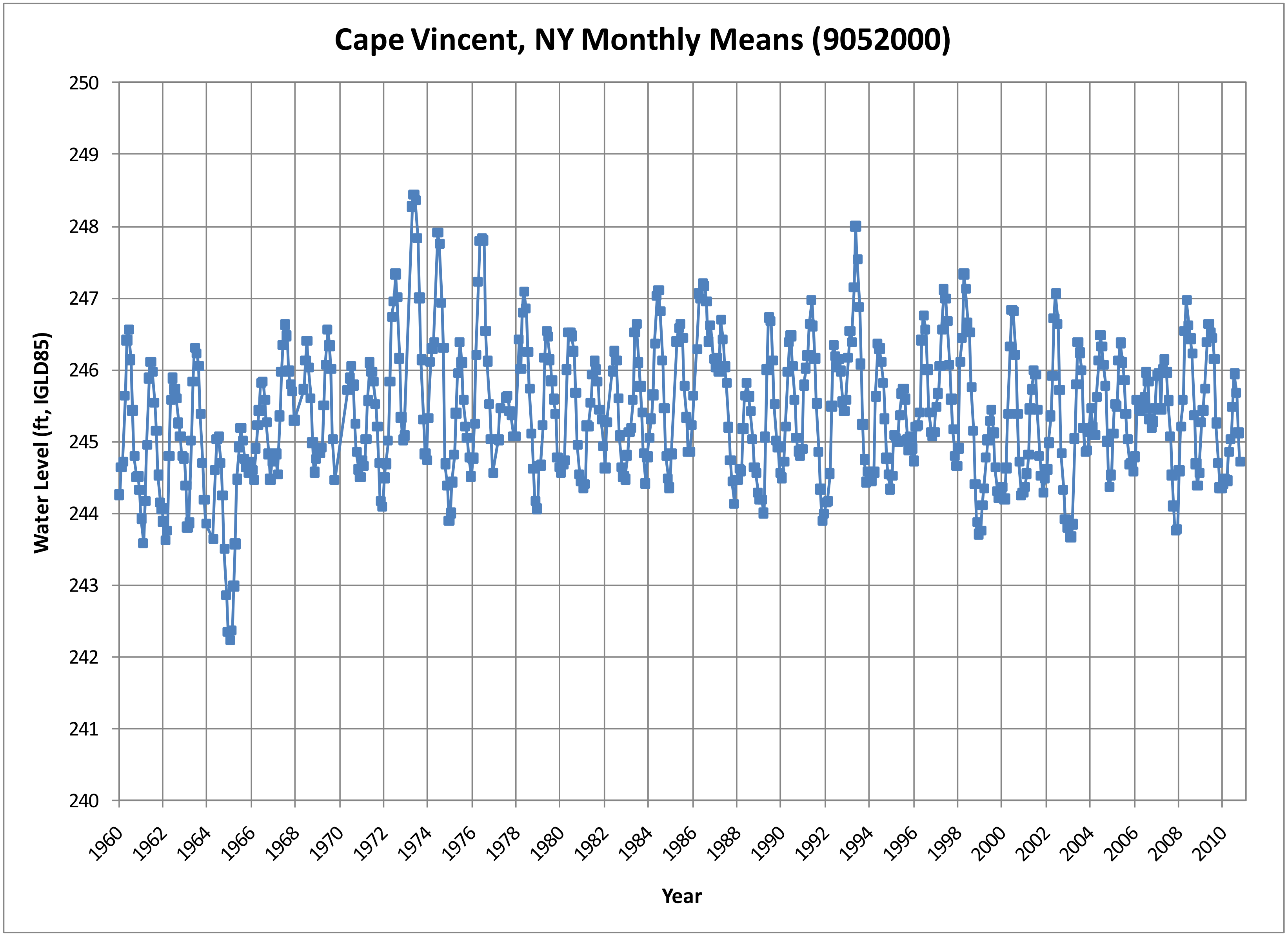


Figure A.1 Monthly Means at the Cape Vincent Gage (9052000) from 1960-2010

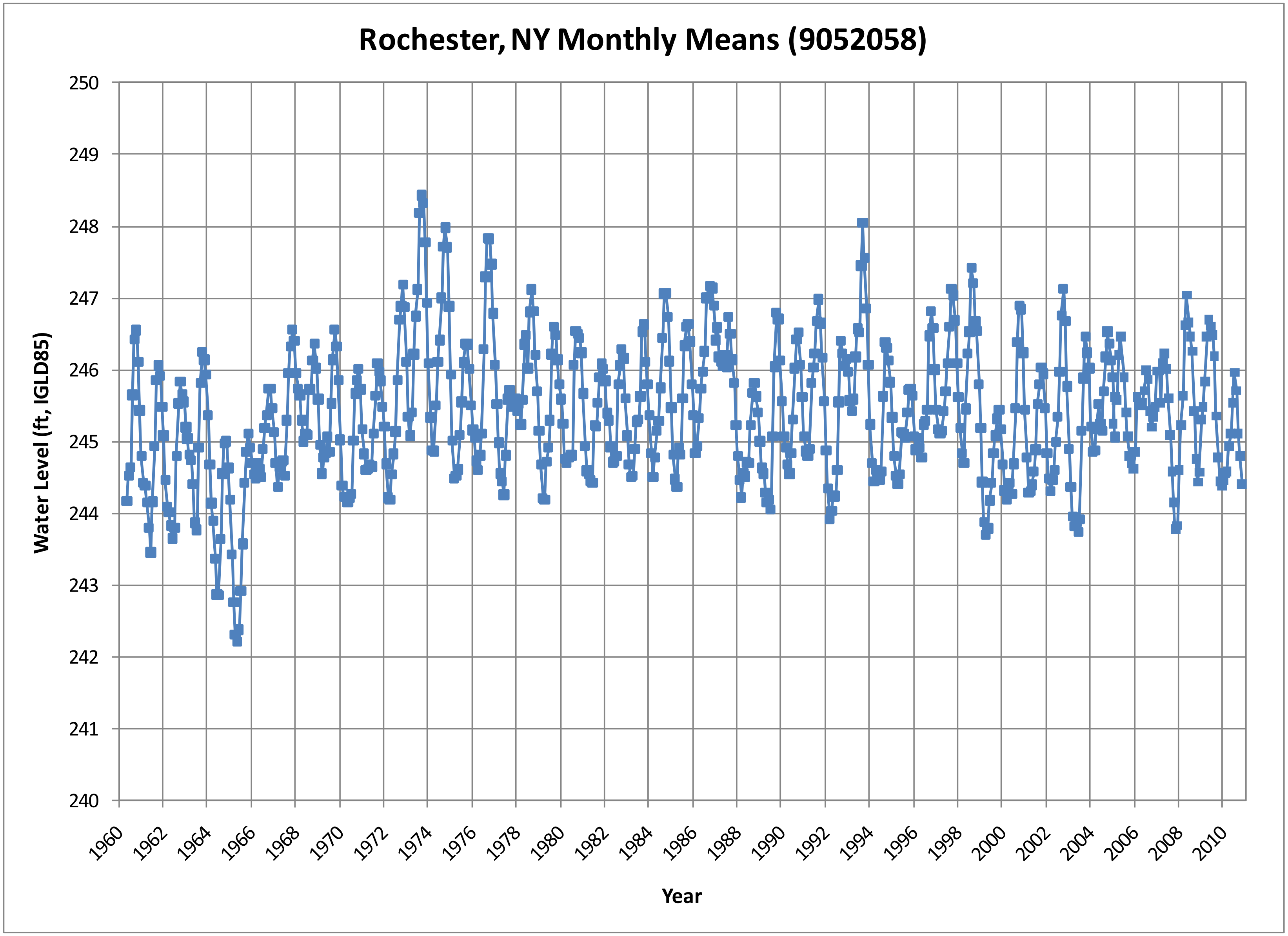


Figure A.2 Monthly Means at the Rochester Gage (9052058) from 1960-2010

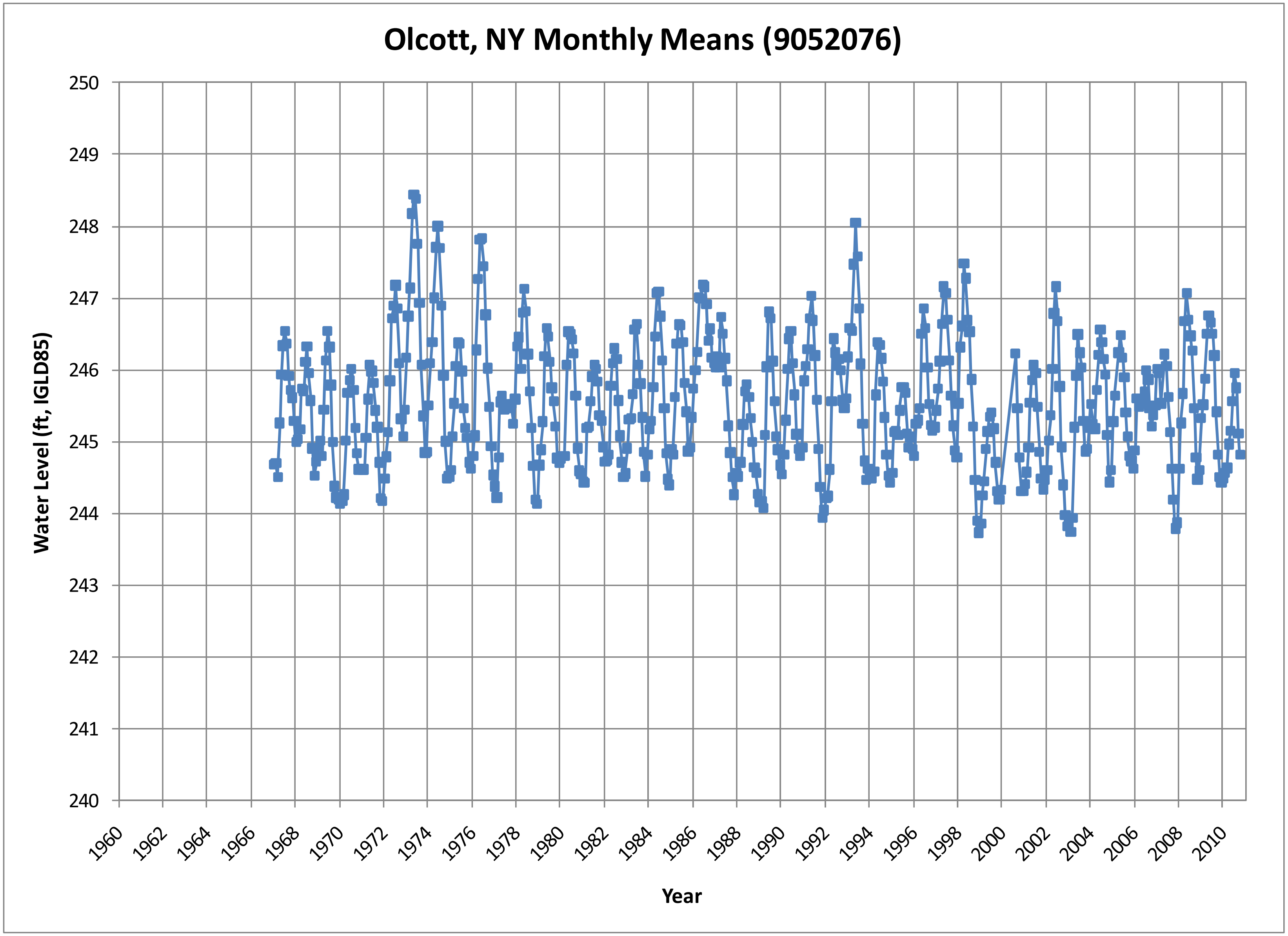


Figure A.3 Monthly Means at the Olcott Gage (9052076) from 1960-2010

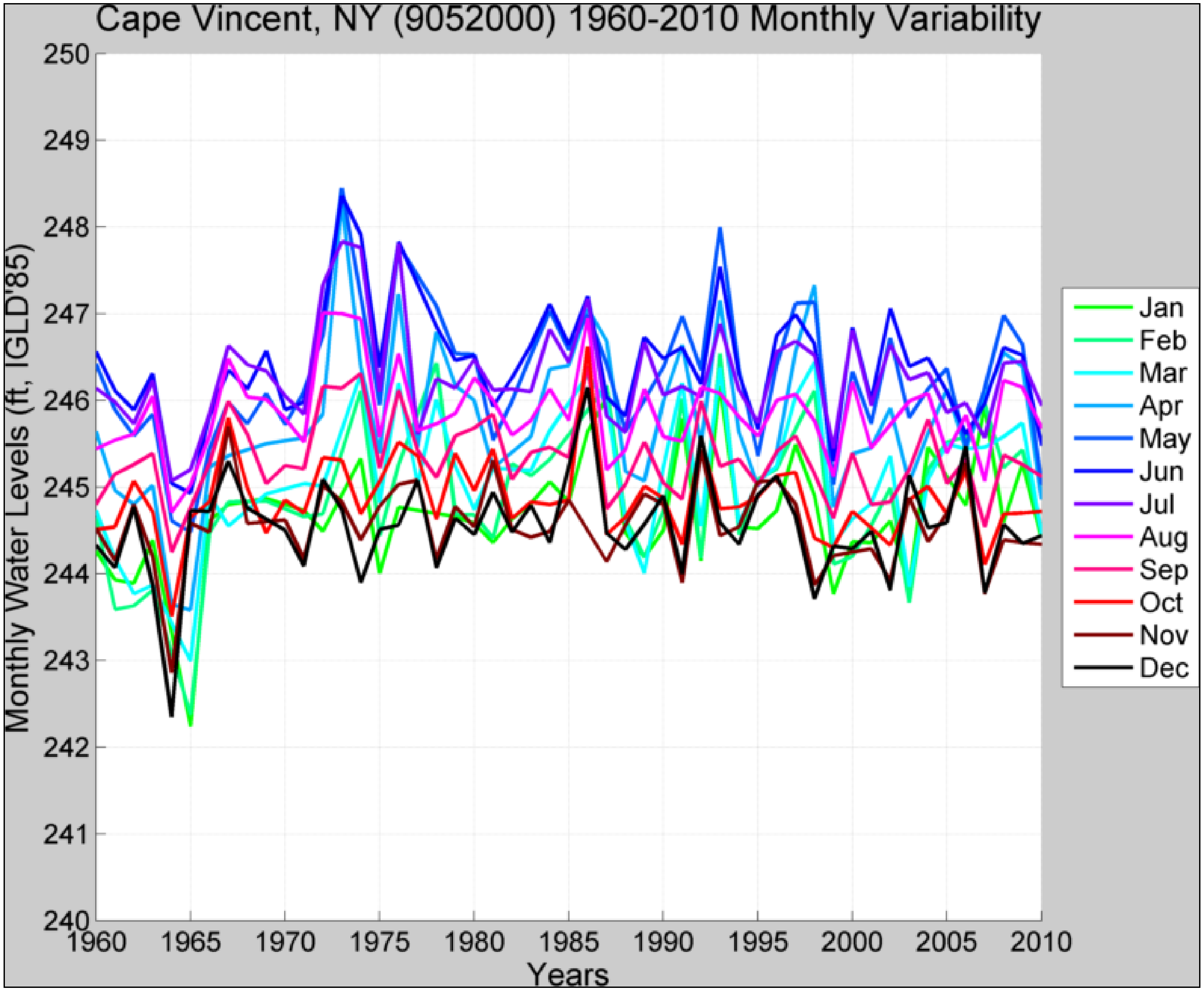


Figure A.4 Monthly Variation at the Cape Vincent Gage (9052000) from 1960-2010

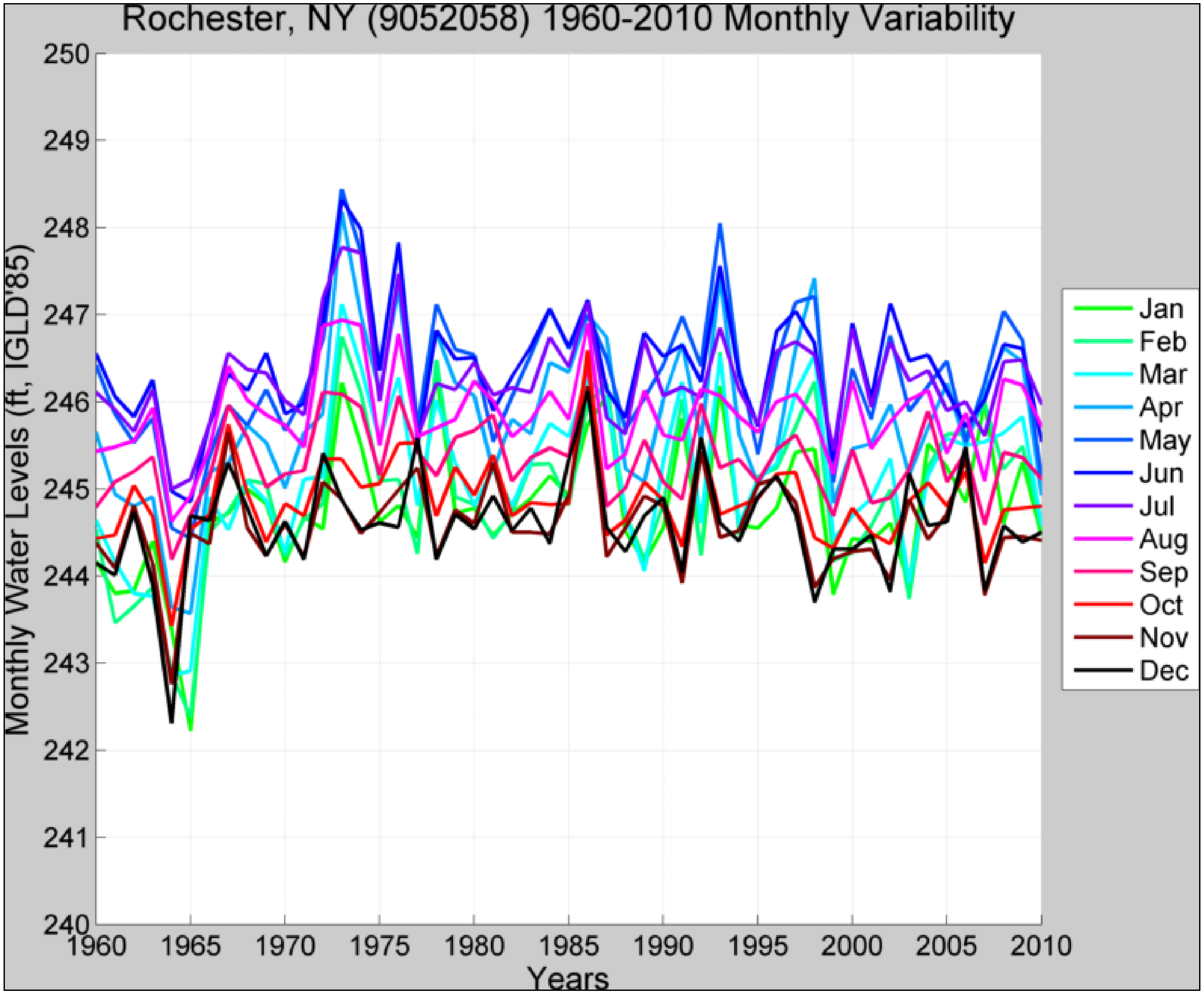


Figure A.5 Monthly Variation at the Rochester Gage (9052058) from 1960-2010

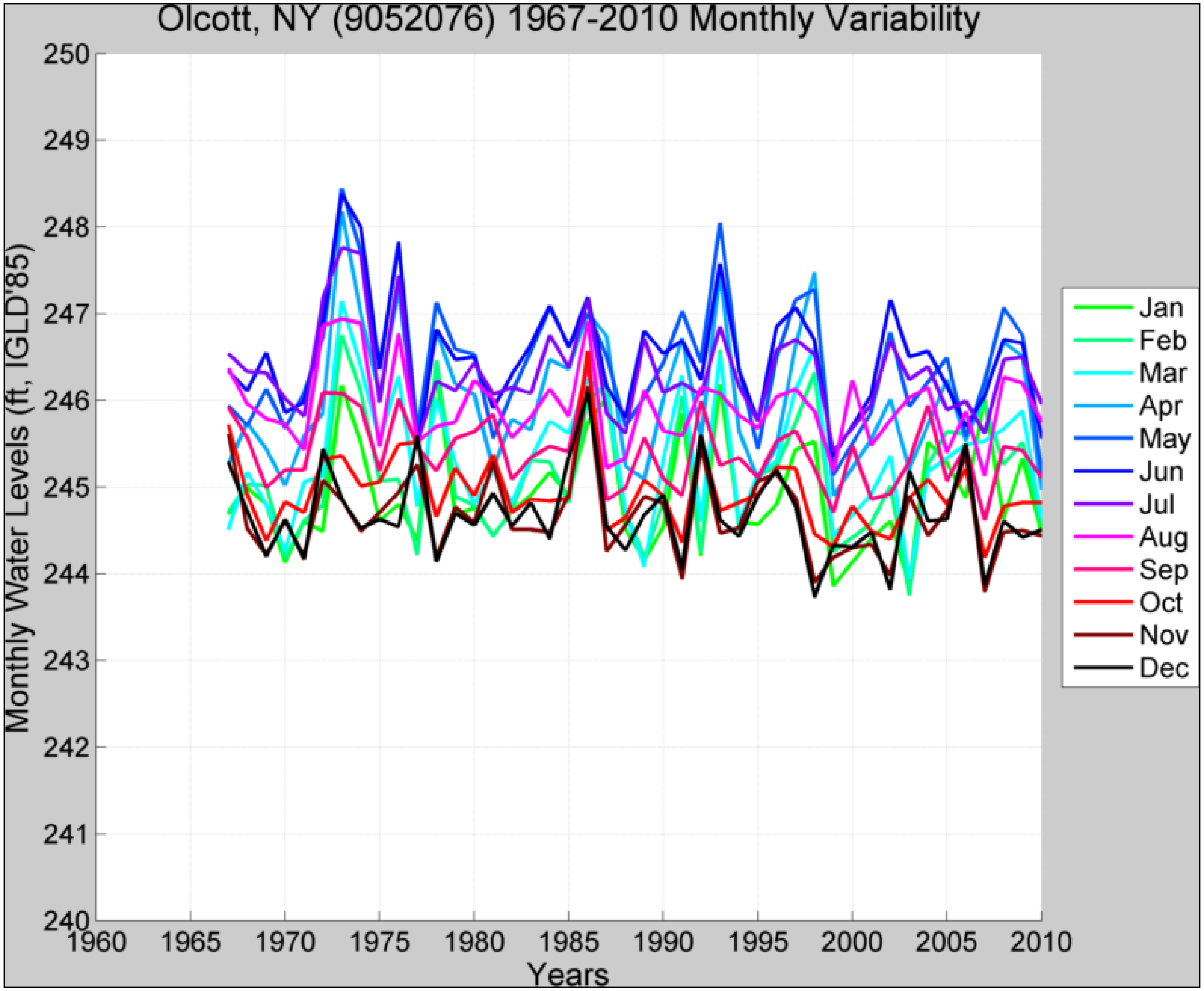


Figure A.6 Monthly Variation at the Olcott Gage (9052076) from 1960-2010

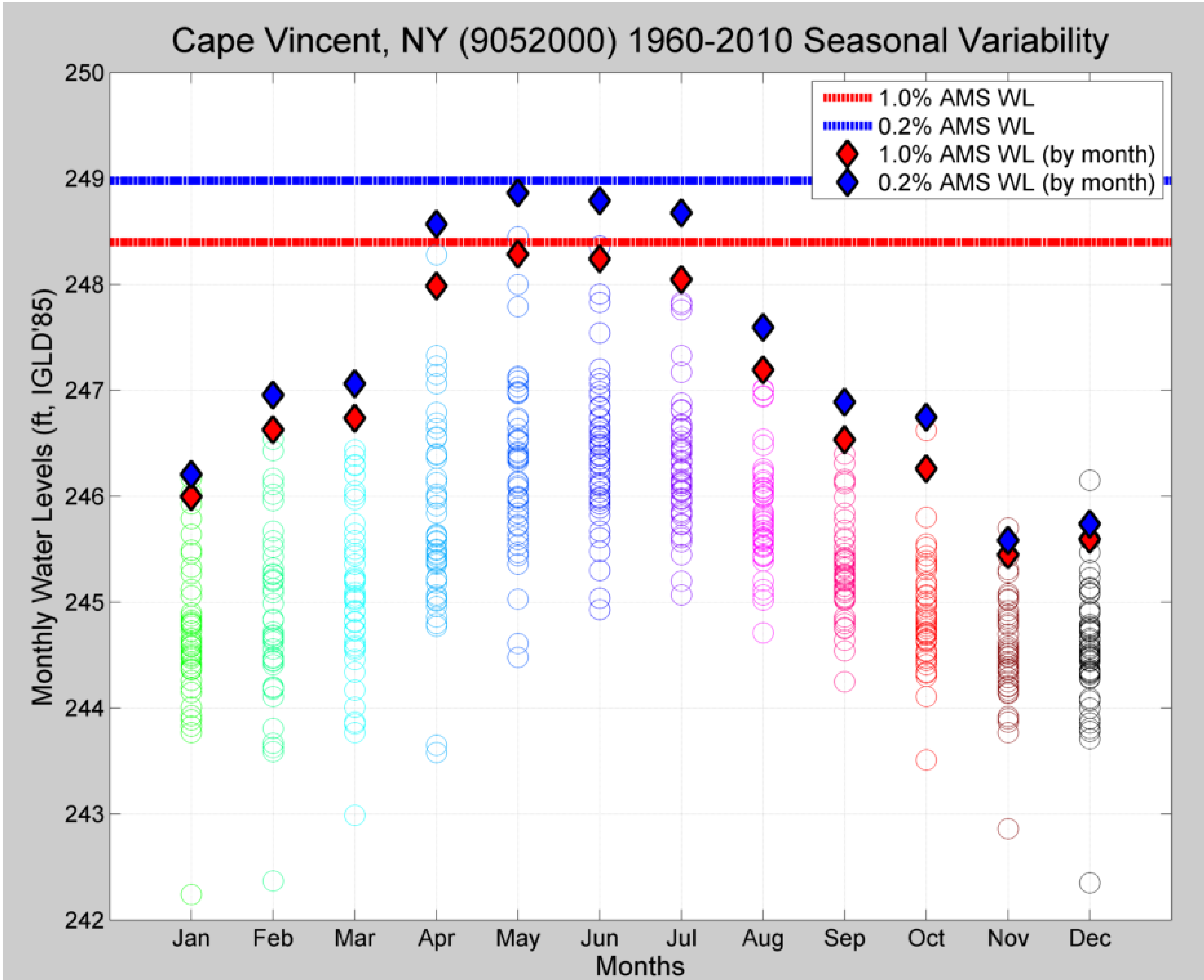


Figure A.7 Seasonal Exceedance Events at the Cape Vincent Gage (9052000) from 1960-2010

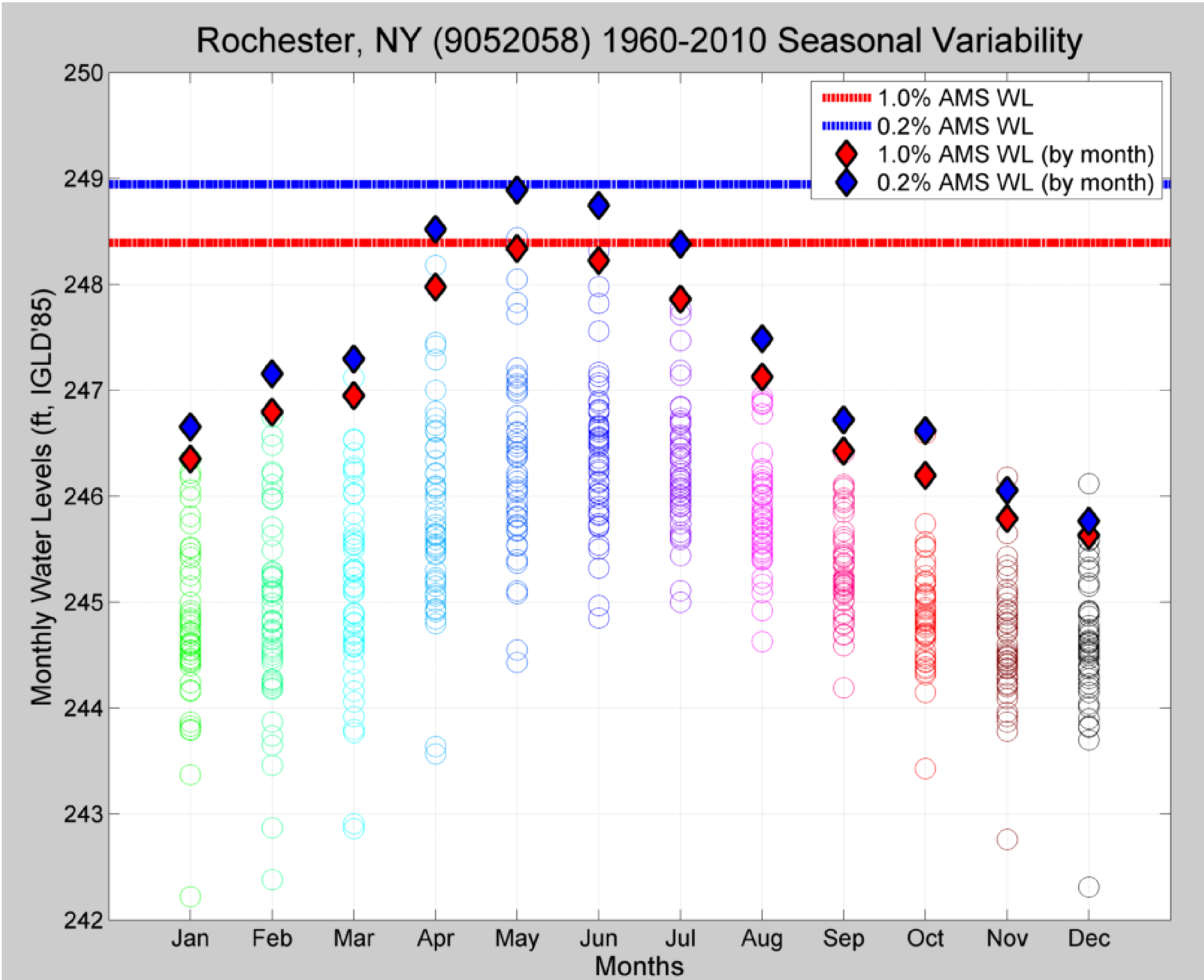


Figure A.8 Seasonal Exceedance Events at the Rochester Gage (9052058) from 1960-2010

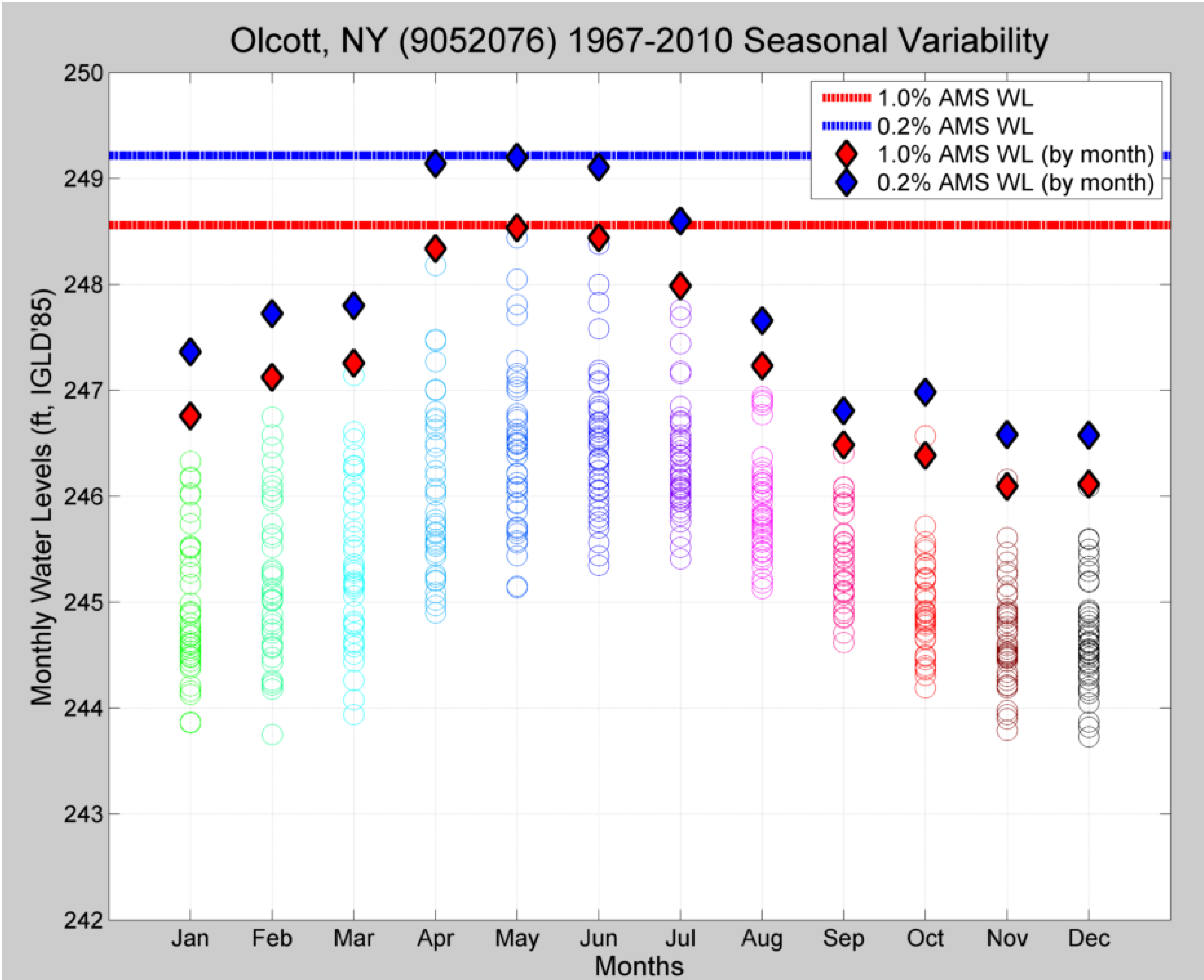


Figure A.9 Seasonal Exceedance Events at the Olcott Gage (9052076) from 1960-2010

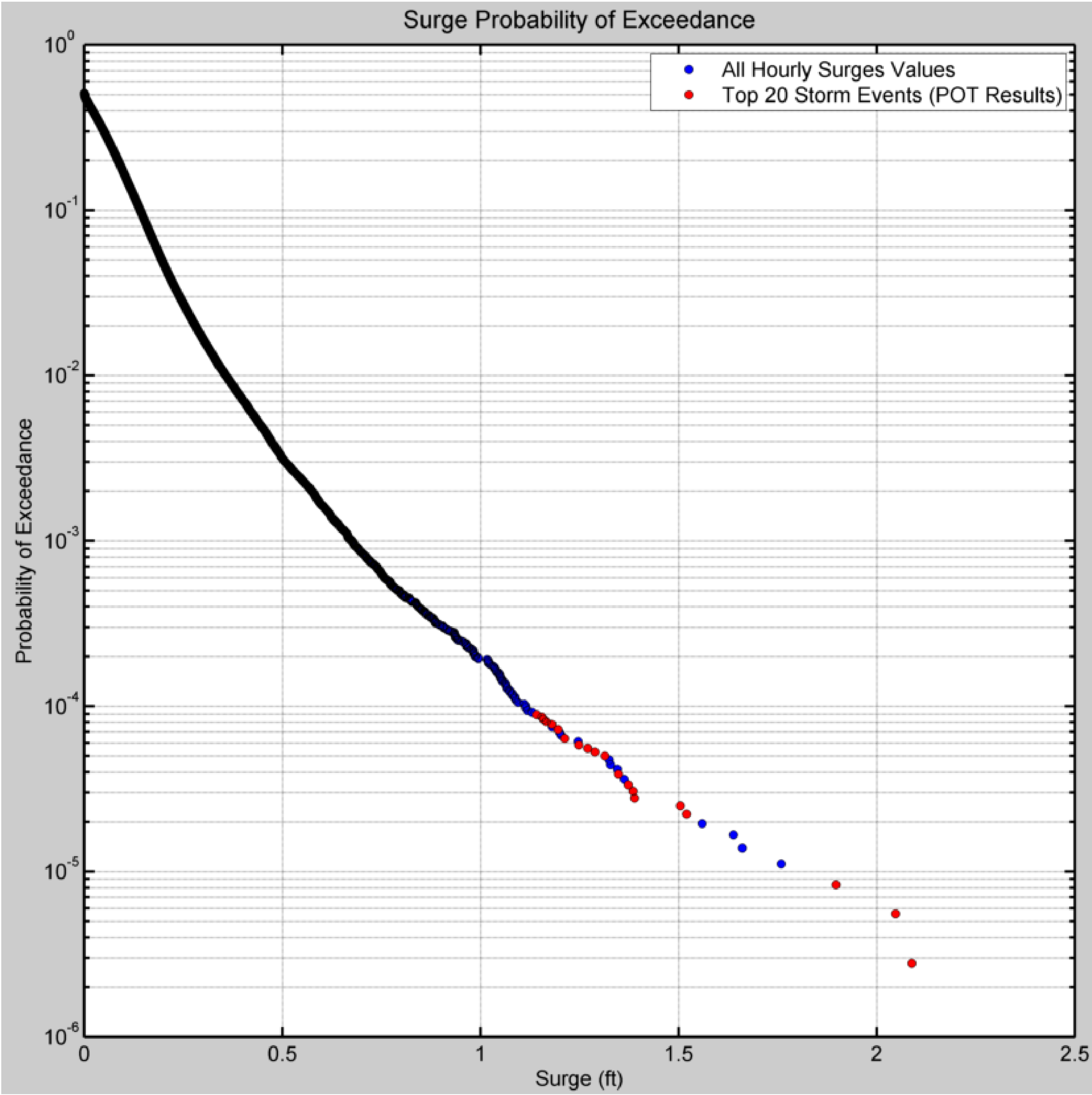


Figure A.10 Probability of Exceedance Curve for the Cape Vincent Gage from 1970-2010

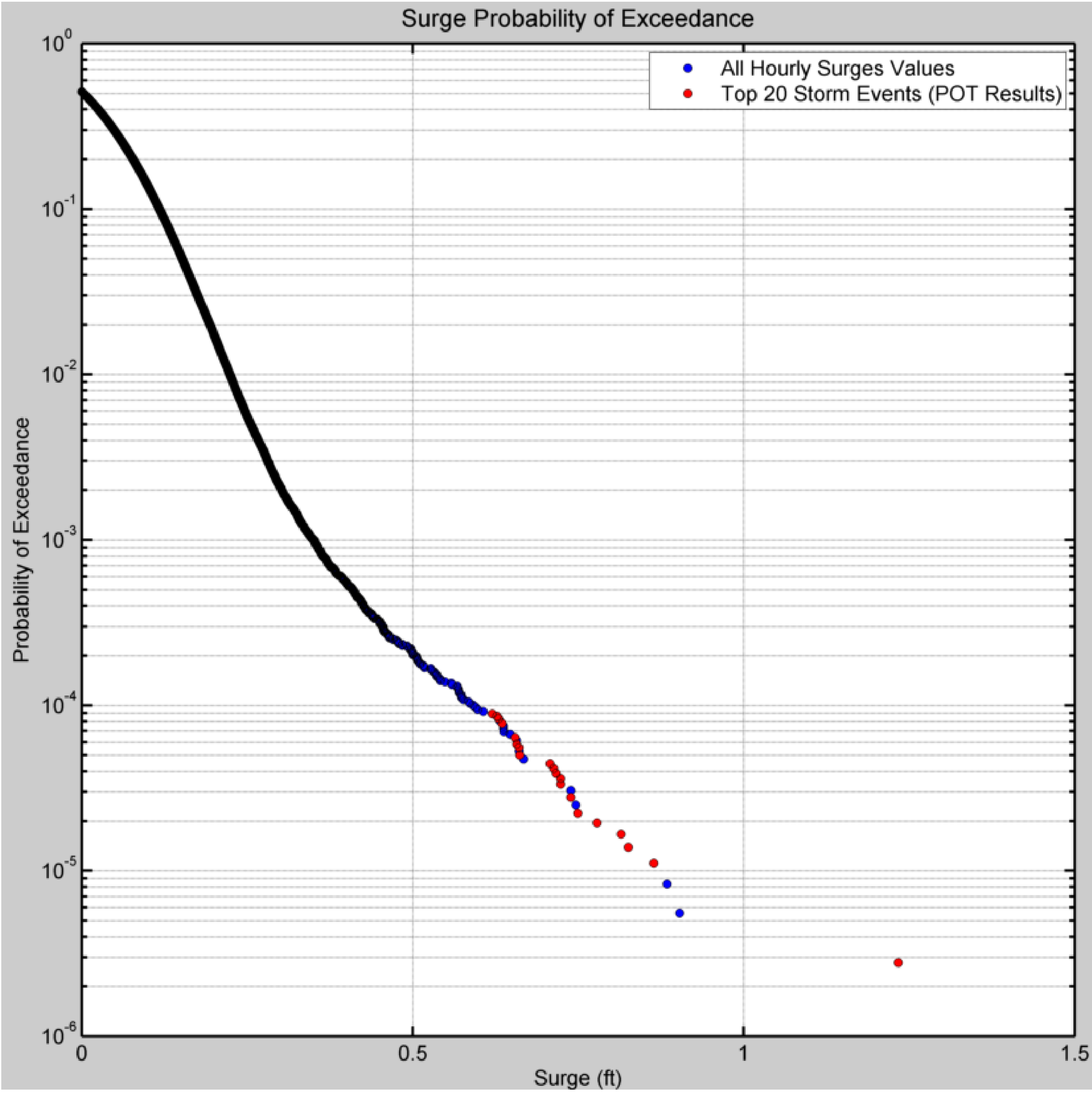


Figure A.11 Probability of Exceedance Curve for the Rochester Gage from 1970-2010

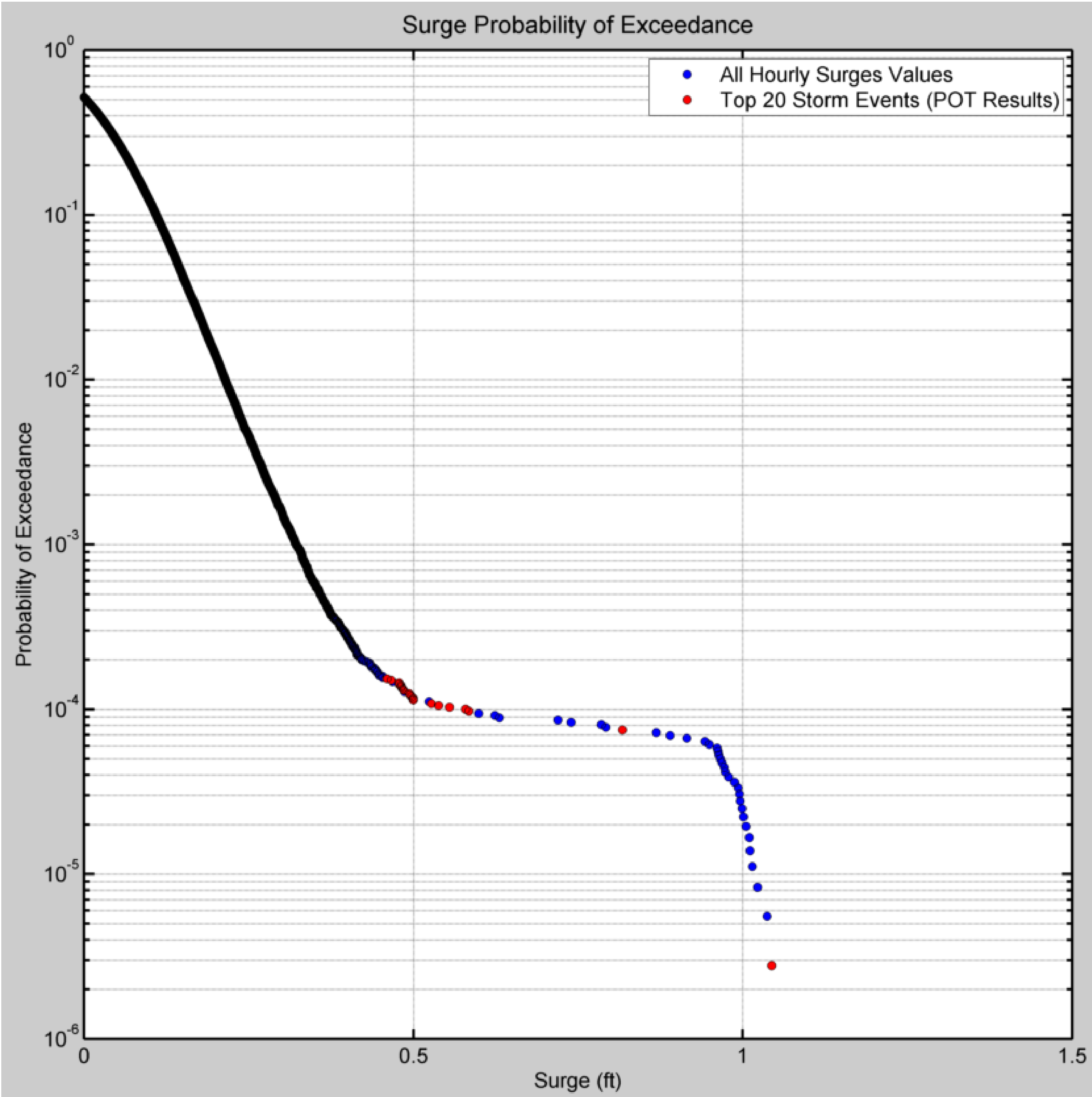


Figure A.12 Probability of Exceedance Curve for the Olcott Gage from 1970-2010

Figure A.13 Monthly Maximum minus Mean versus Hourly Surge Calculations for April 1983

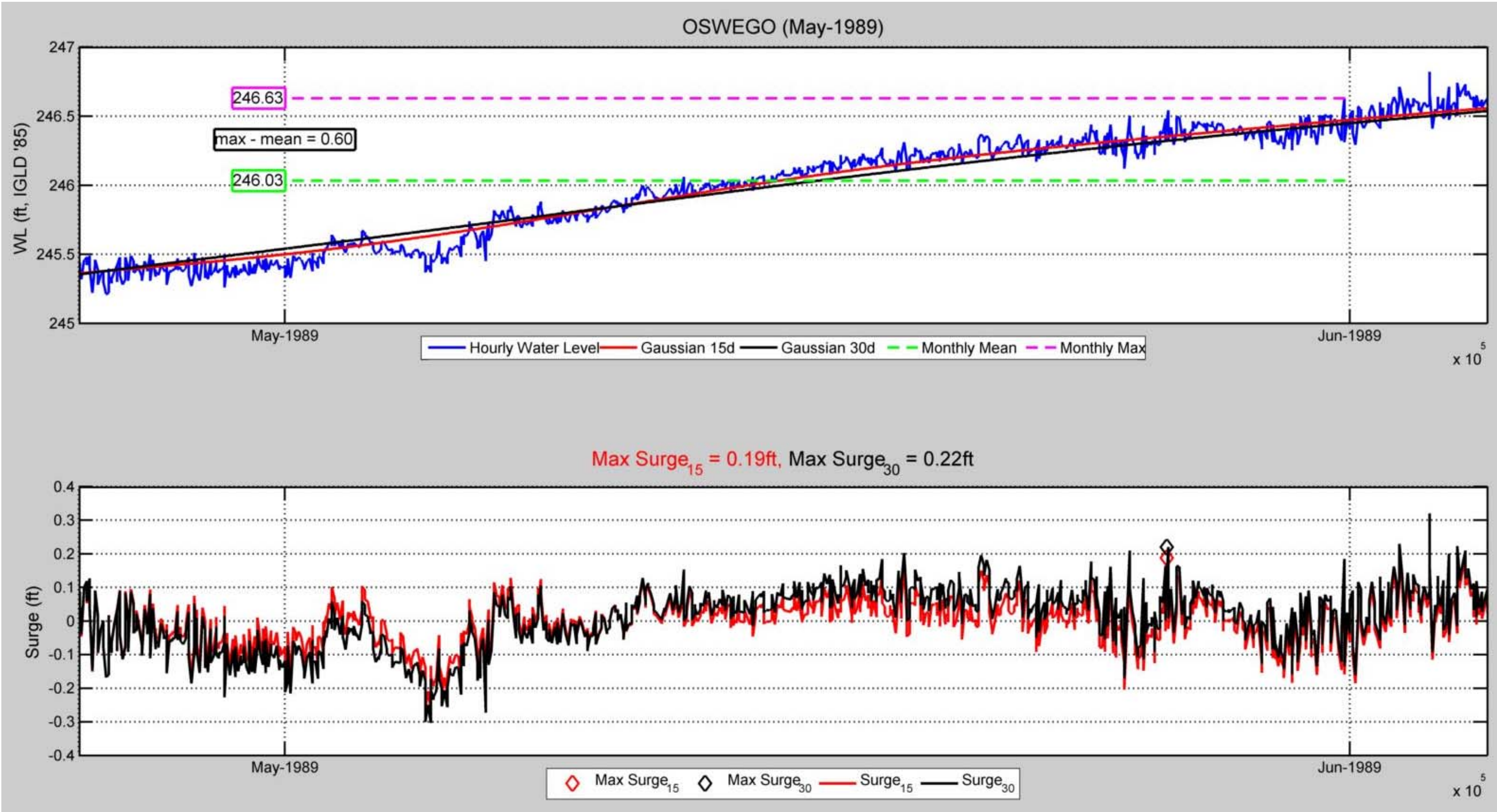


Figure A.14 Monthly Maximum minus Mean versus Hourly Surge Calculations for May 1989

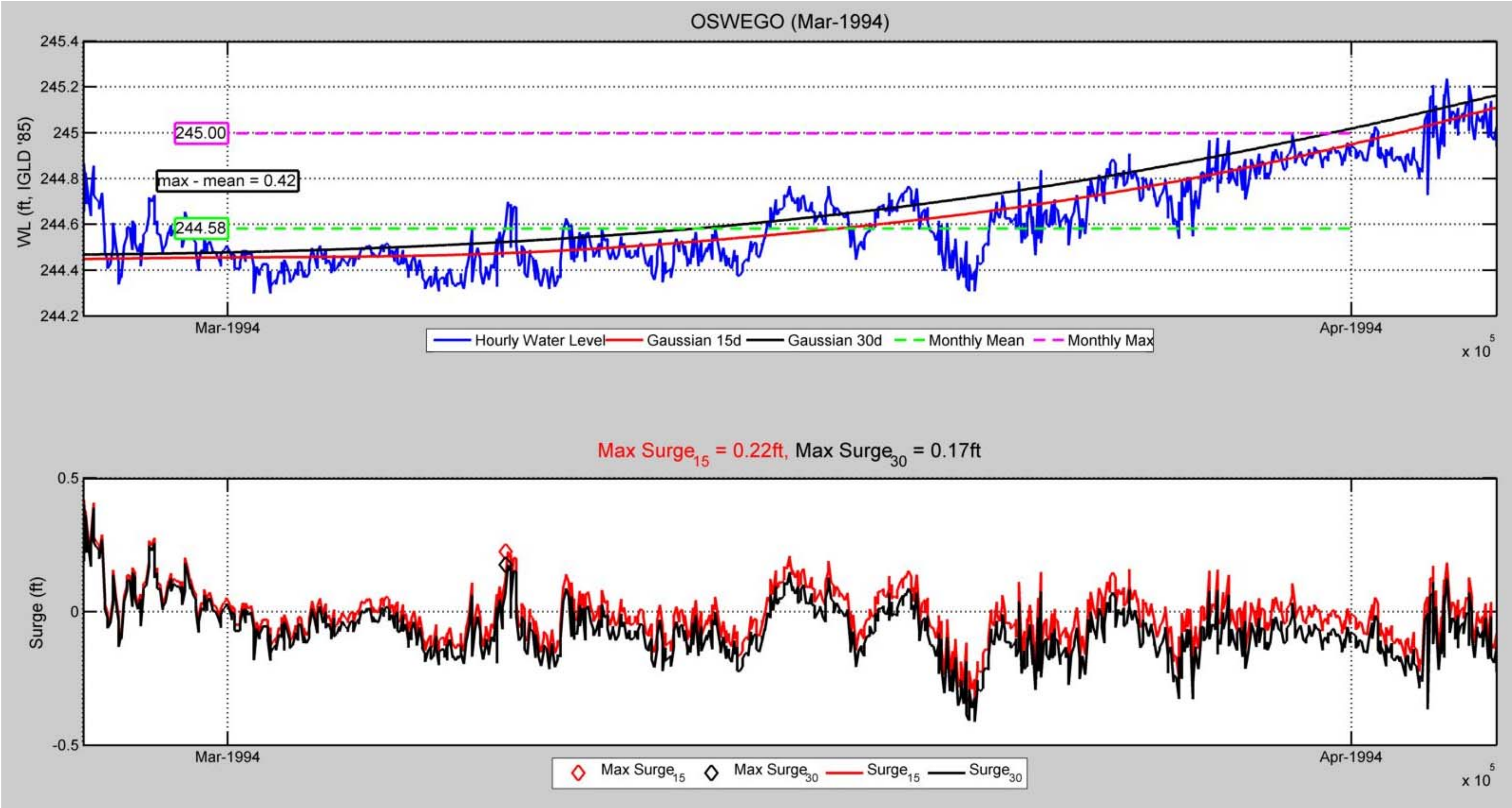
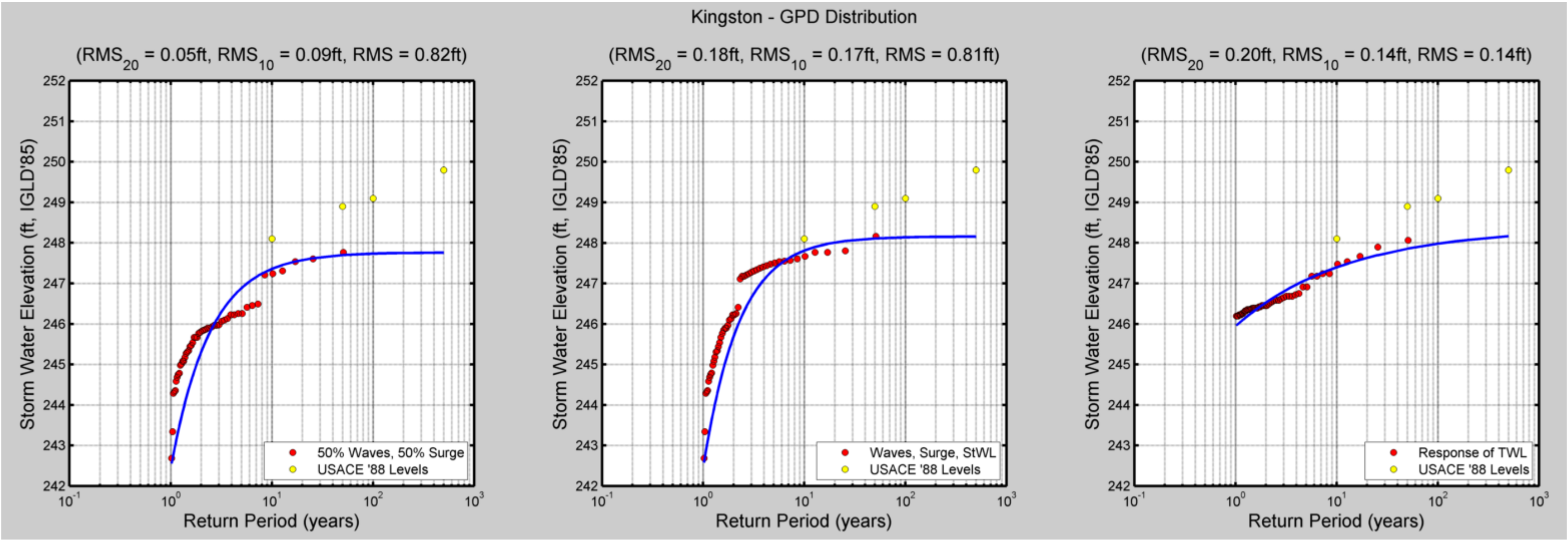
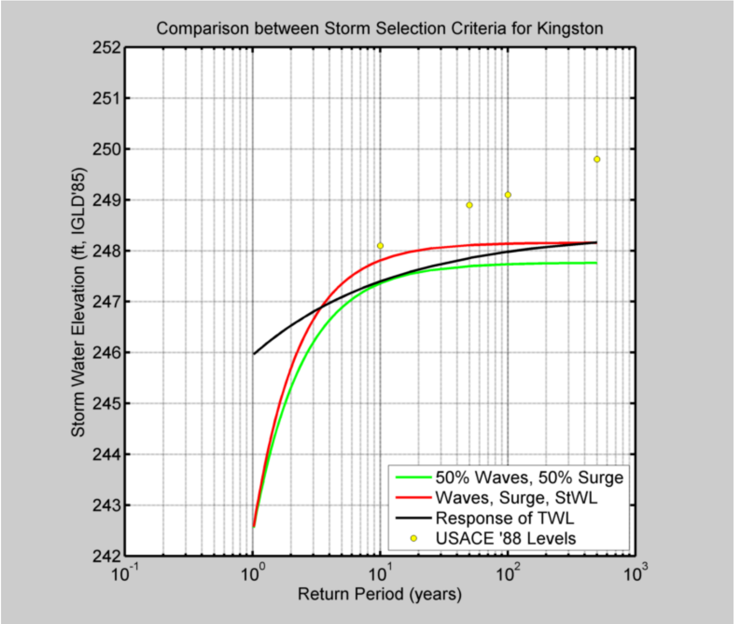
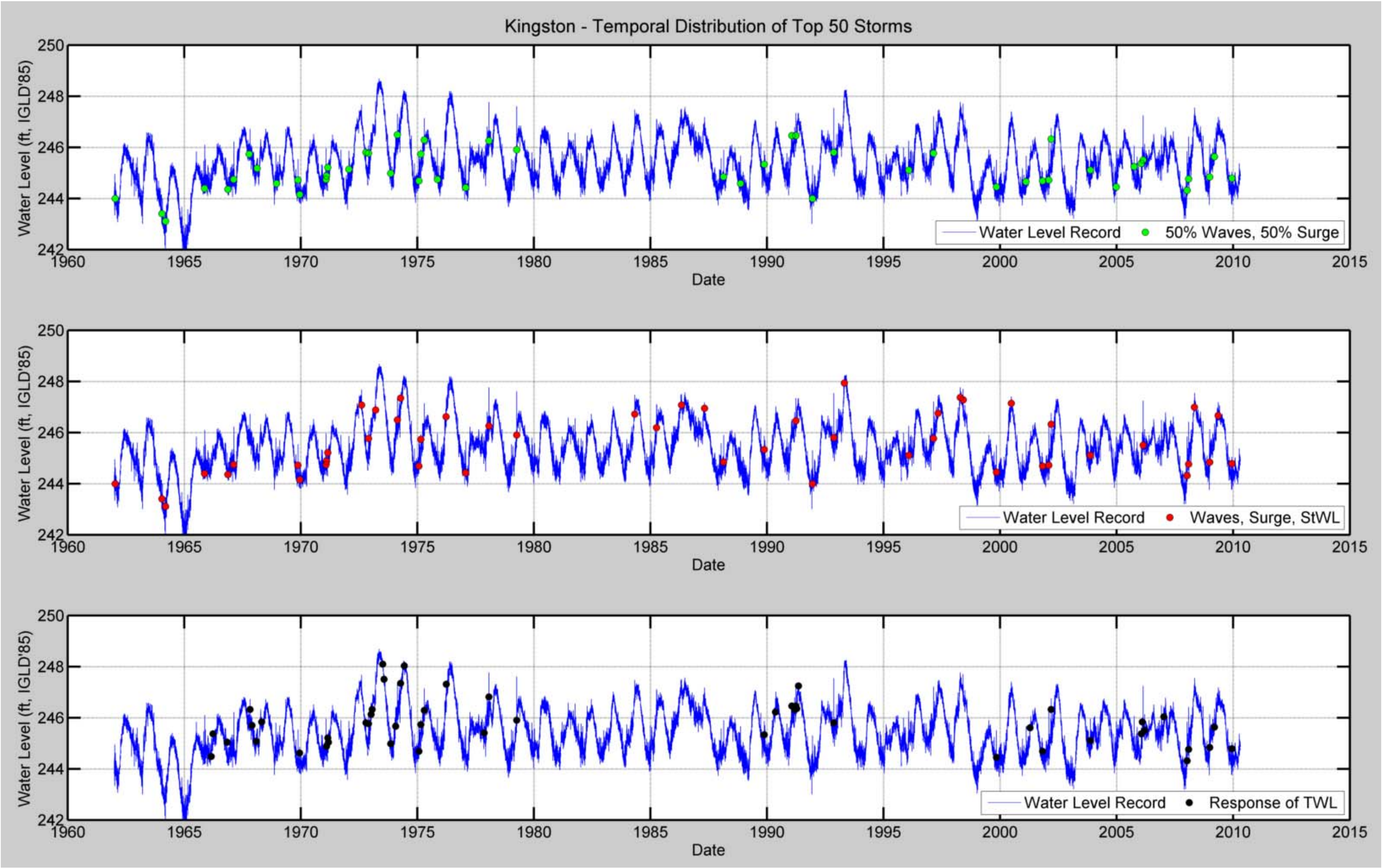


Figure A.15 Monthly Maximum minus Mean versus Hourly Surge Calculations for March 1994

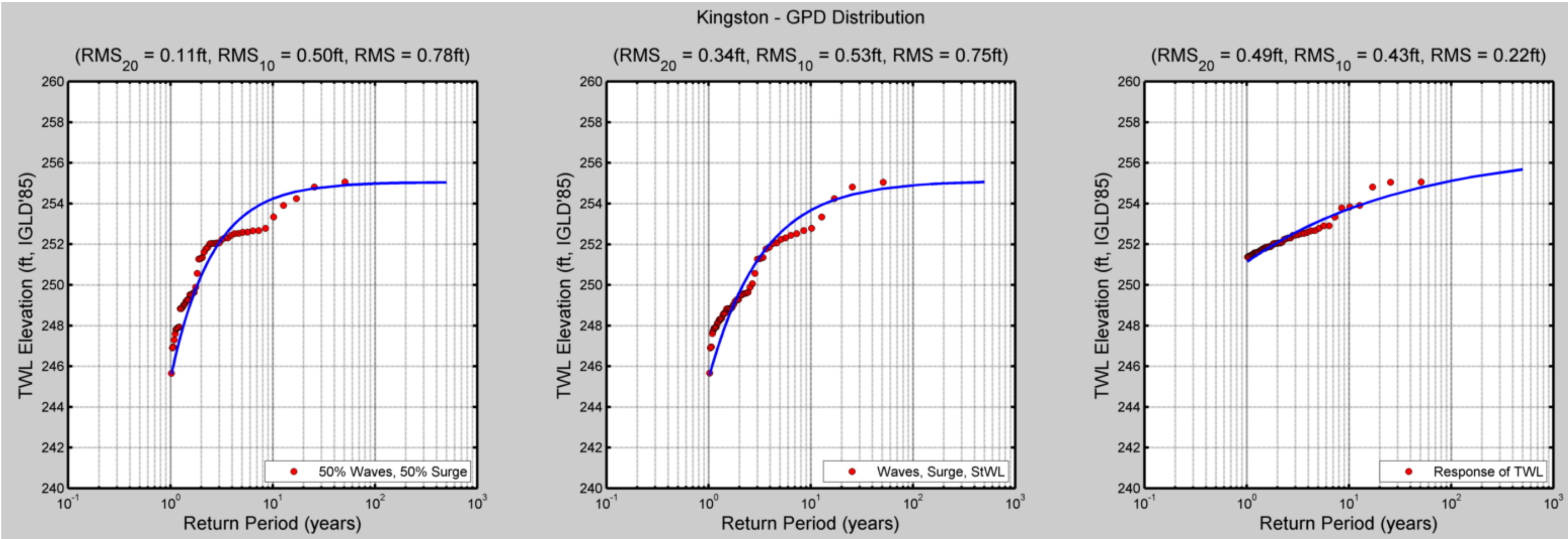
APPENDIX B - STORM SELECTION ANALYSIS

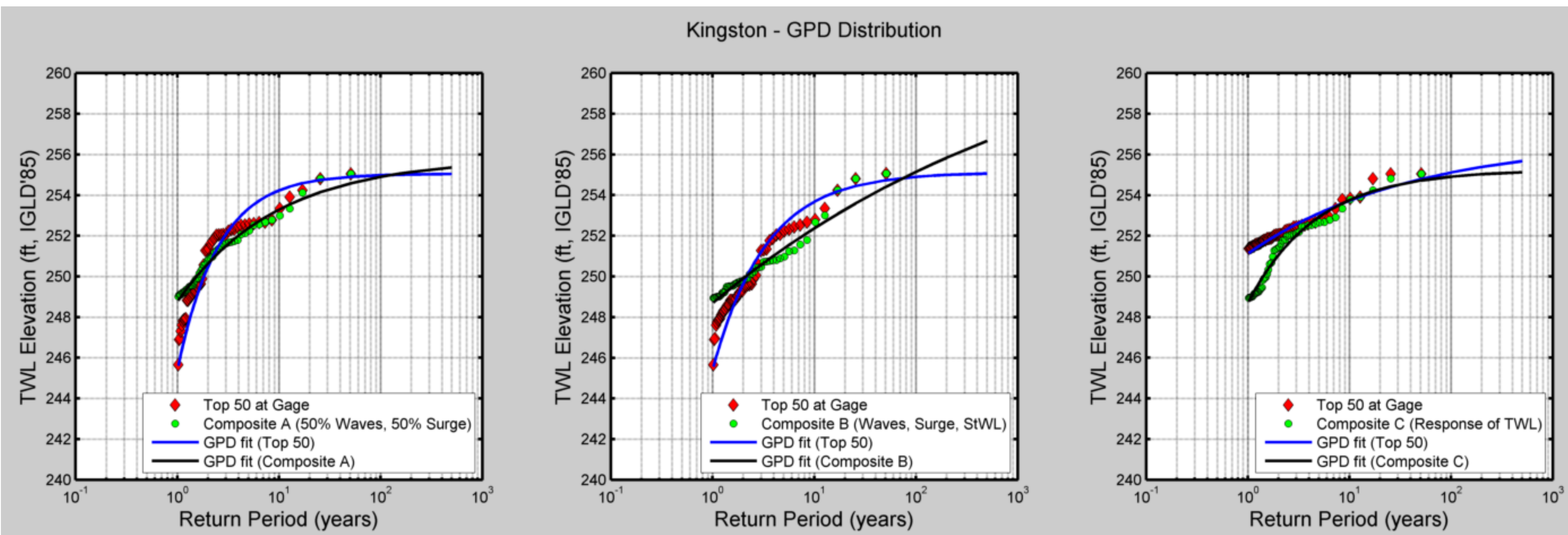

Kingston - GPD Distribution
(RMS20 = 0.05ft, RMS10 = 0.09ft, RMS = 0.82ft)
(RMS20 = 0.18ft, RMS10 = 0.17ft, RMS = 0.81ft)
(RMS20 = 0.20ft, RMS10 = 0.14ft, RMS = 0.14ft)
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
USACE '88 Levels


Comparison between Storm Selection Criteria for Kingston
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
USACE '88 Levels

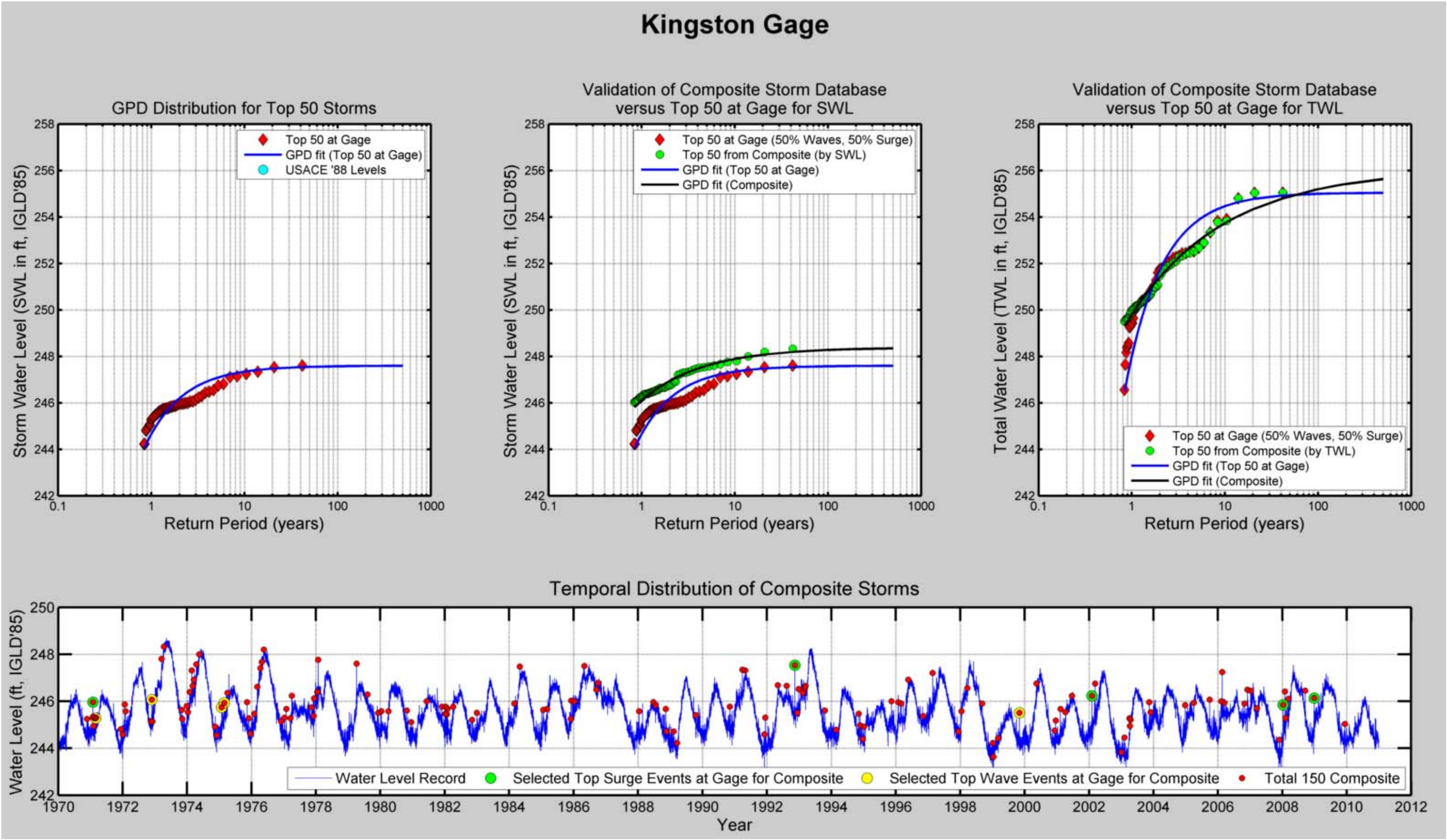


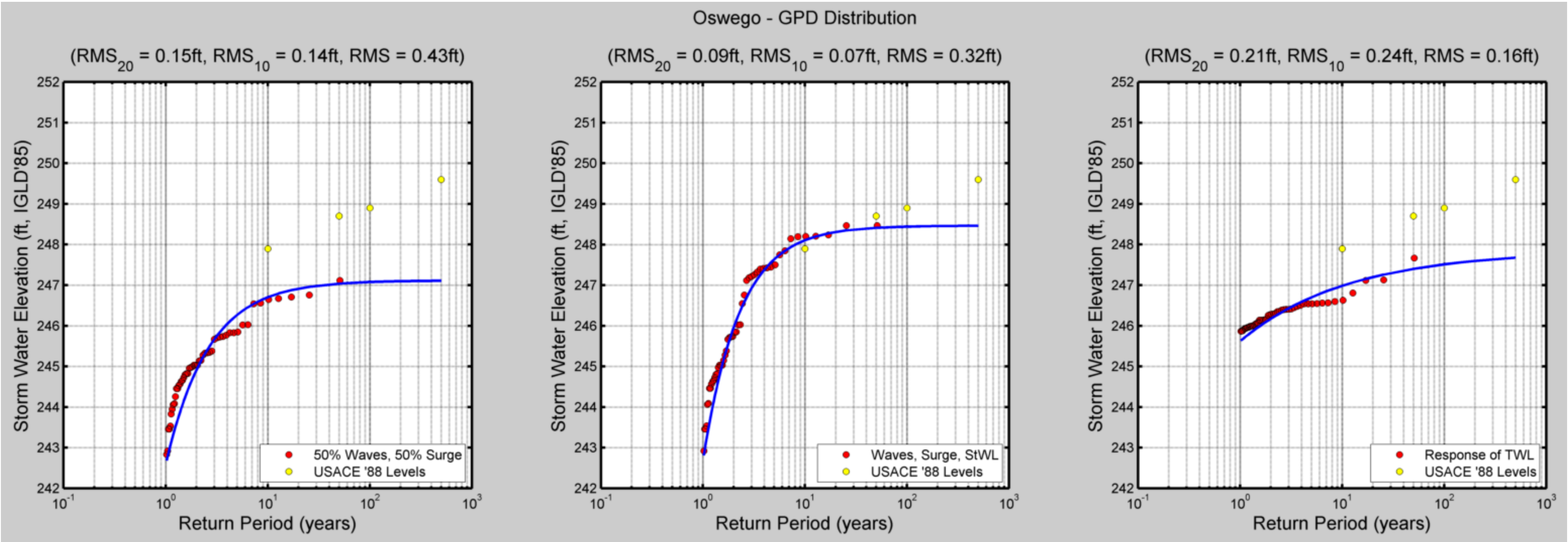
Kingston - Temporal Distribution of Top 50 Storms
Water Level (ft, IGLD'85)
Date
Water Level Record
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
250
248
246
244
242
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015


Kingston - GPD Distribution
(RMS20 = 0.11ft, RMS10 = 0.50ft, RMS = 0.78ft)
(RMS20 = 0.34ft, RMS10 = 0.53ft, RMS = 0.75ft)
(RMS20 = 0.49ft, RMS10 = 0.43ft, RMS = 0.22ft)
TWL Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL

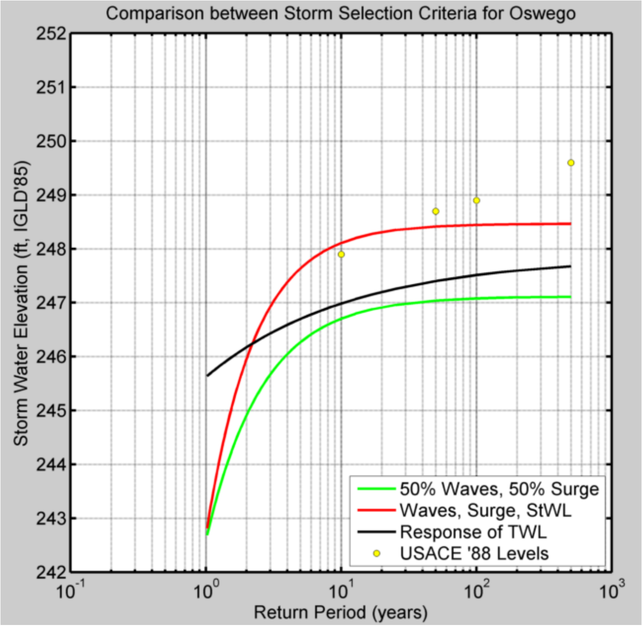

Kingston - GPD Distribution
TWL Elevation (ft, IGLD'85)
Return Period (years)
Top 50 at Gage
Composite A (50% Waves, 50% Surge)
GPD fit (Top 50)
GPD fit (Composite A)
Composite B (Waves, Surge, StWL)
GPD fit (Composite B)
Composite C (Response of TWL)
GPD fit (Composite C)

Final Analysis at Kingston

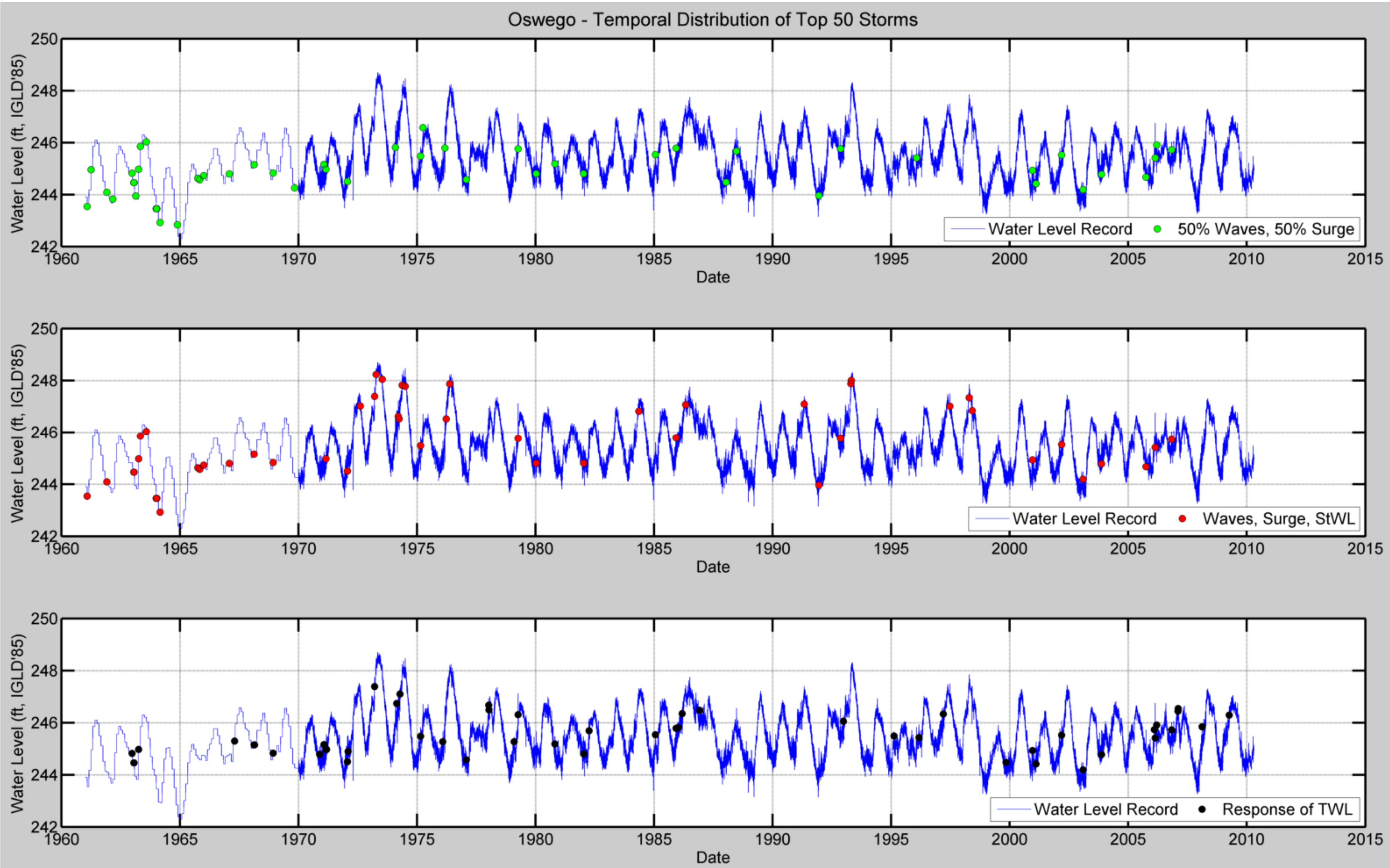


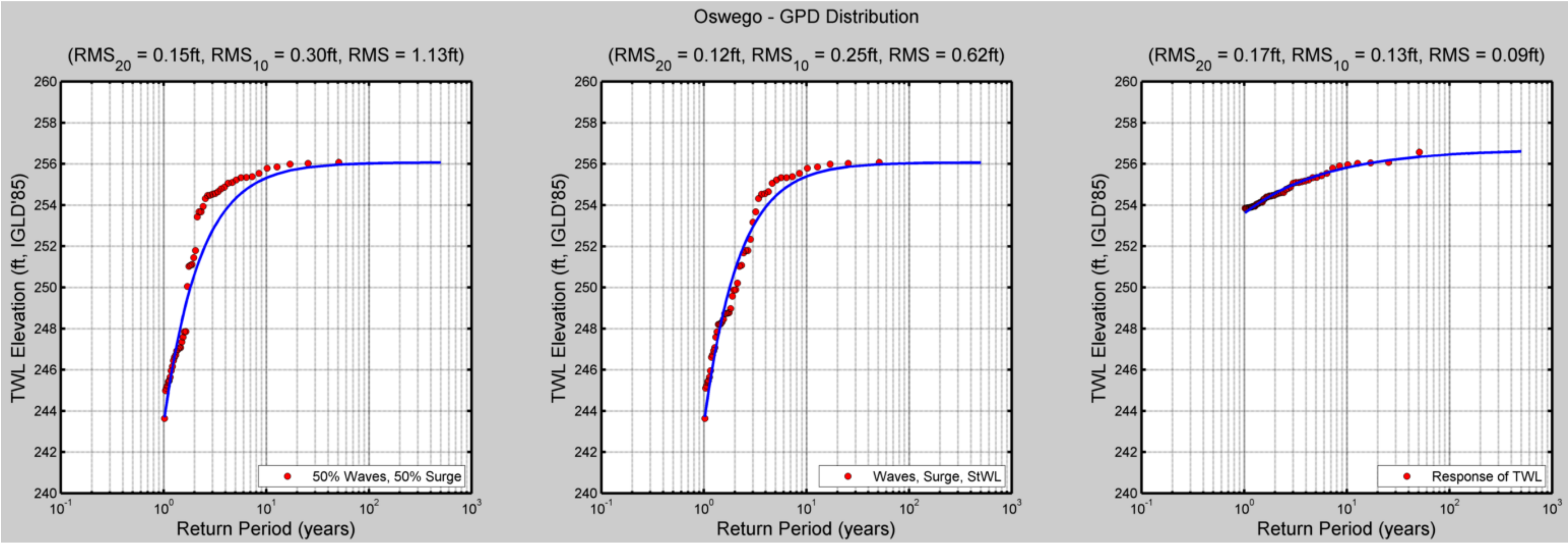


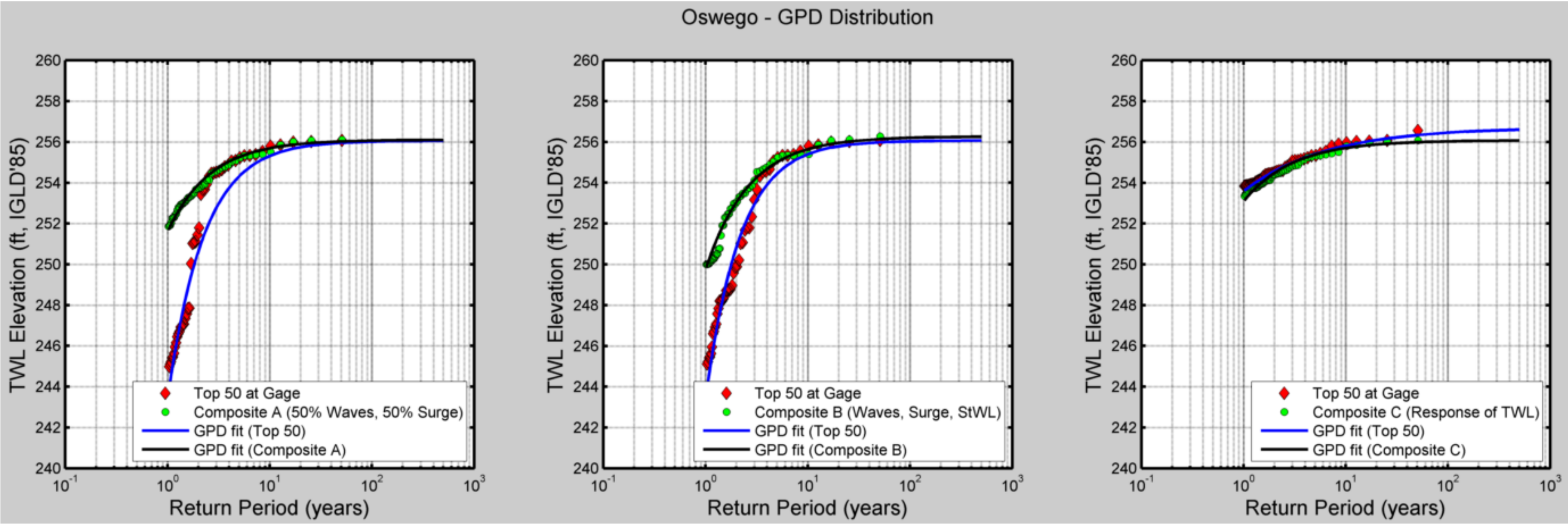
Oswego - GPD Distribution
(RMS_{20} = 0.15ft, RMS_{10} = 0.14ft, RMS = 0.43ft)
(RMS_{20} = 0.09ft, RMS_{10} = 0.07ft, RMS = 0.32ft)
(RMS_{20} = 0.21ft, RMS_{10} = 0.24ft, RMS = 0.16ft)
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
USACE '88 Levels
Waves, Surge, StWL
Response of TWL



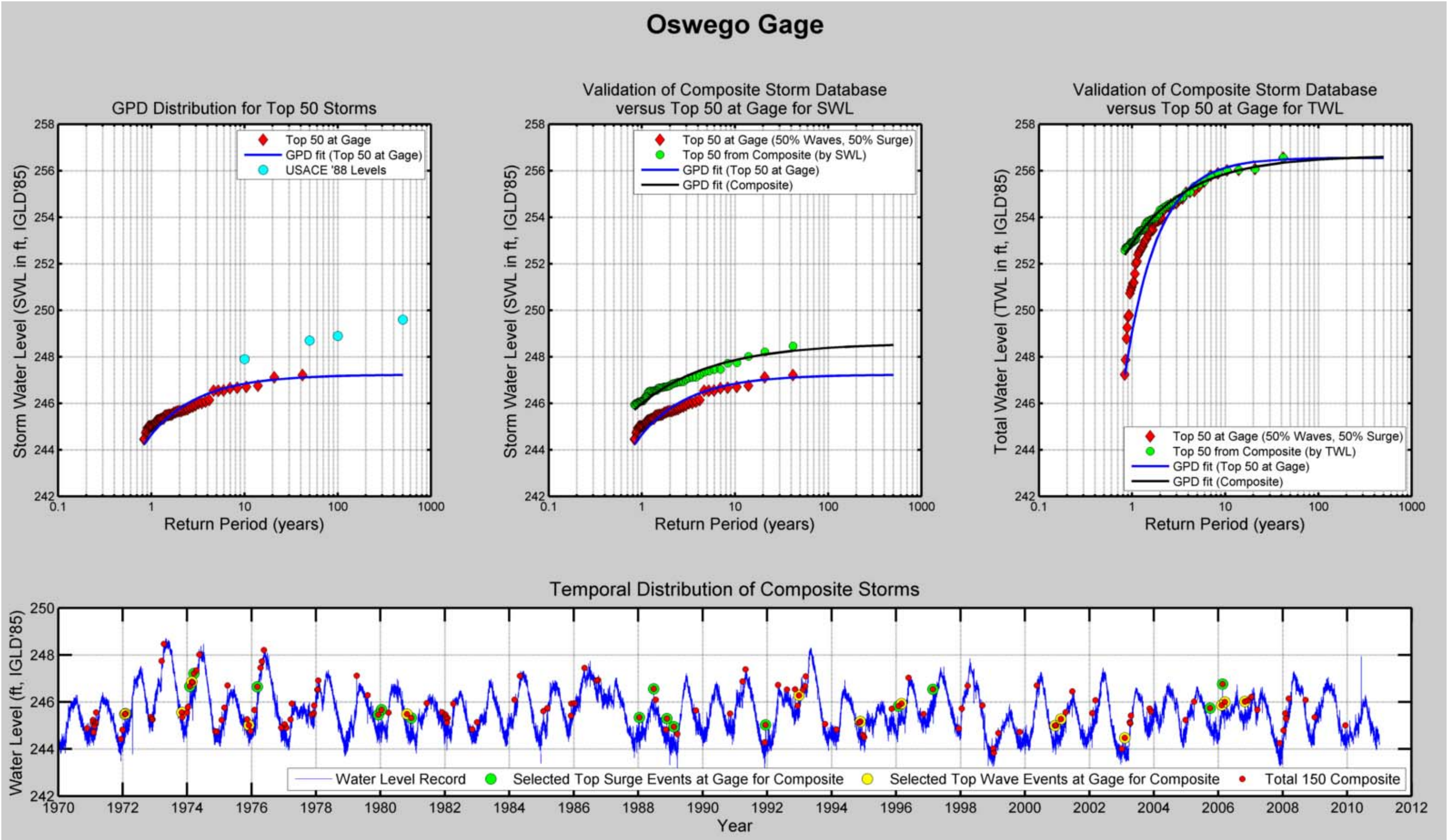
Comparison between Storm Selection Criteria for Oswego
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
USACE '88 Levels

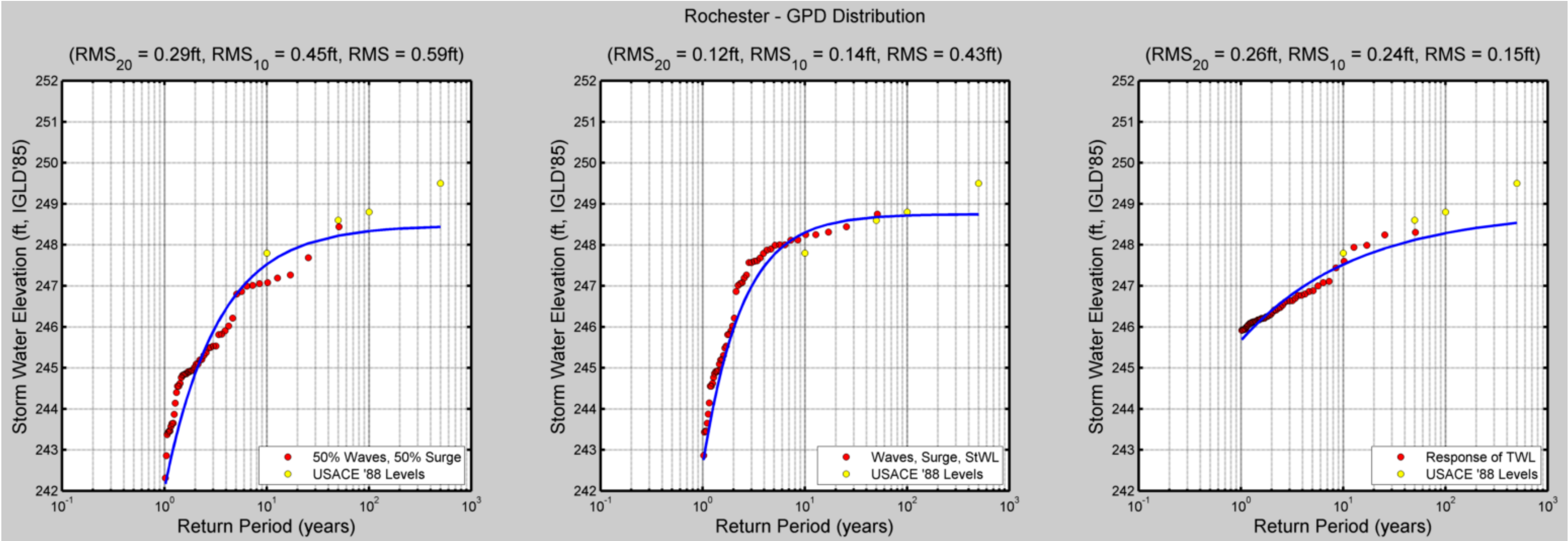

Oswego - Temporal Distribution of Top 50 Storms
Water Level (ft, IGLD'85)
Date
Water Level Record
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL

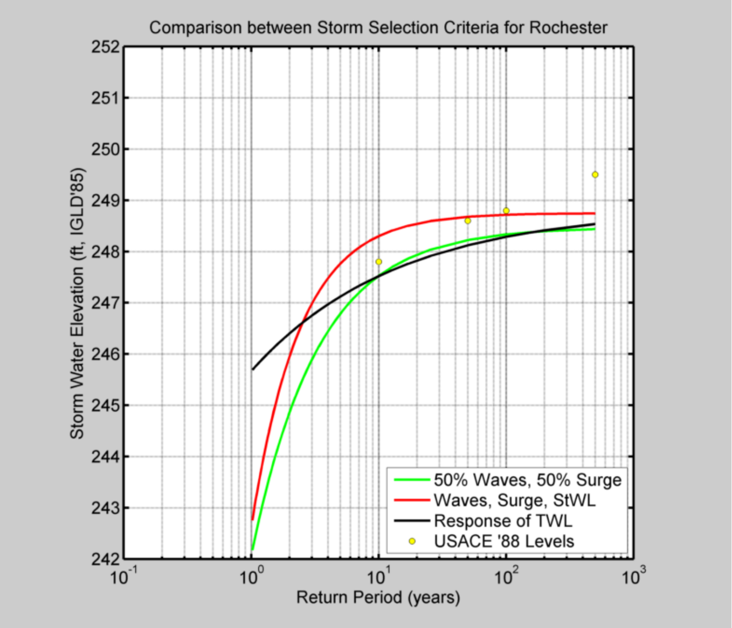

Oswego - GPD Distribution
(RMS20 = 0.15ft, RMS10 = 0.30ft, RMS = 1.13ft)
(RMS20 = 0.12ft, RMS10 = 0.25ft, RMS = 0.62ft)
(RMS20 = 0.17ft, RMS10 = 0.13ft, RMS = 0.09ft)
TWL Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL

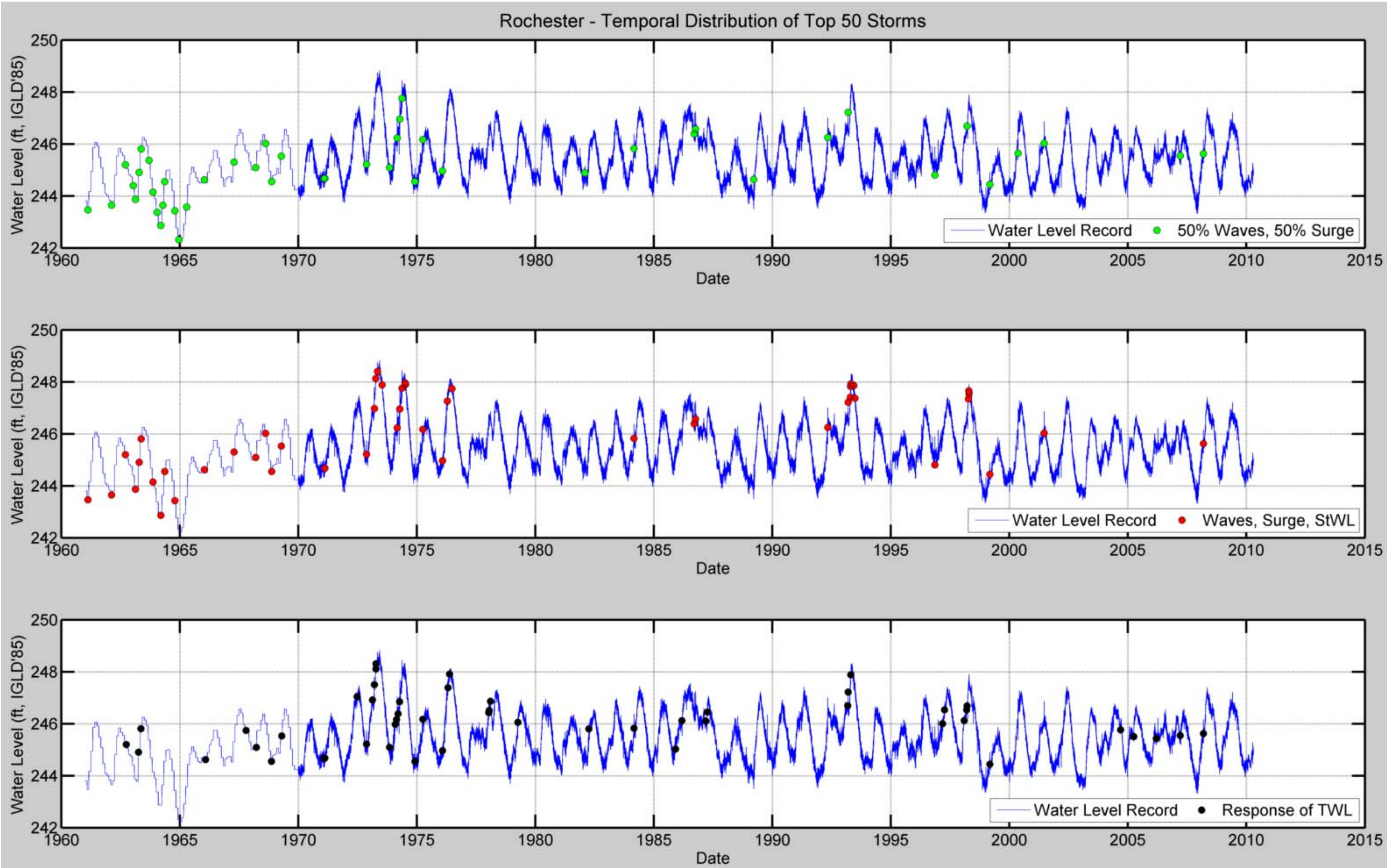

Oswego - GPD Distribution
TWL Elevation (ft, IGLD'85)
Return Period (years)
Top 50 at Gage
Composite A (50% Waves, 50% Surge)
GPD fit (Top 50)
GPD fit (Composite A)
Composite B (Waves, Surge, StWL)
GPD fit (Composite B)
Composite C (Response of TWL)
GPD fit (Composite C)

Final Analysis at Oswego

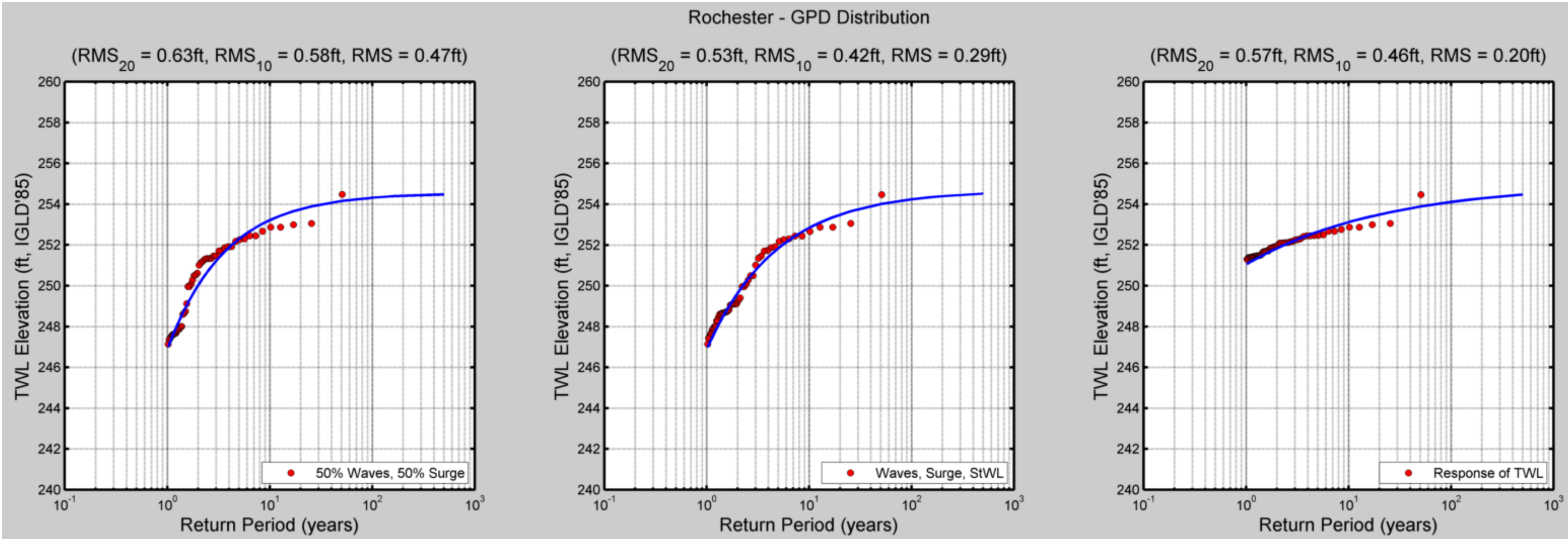


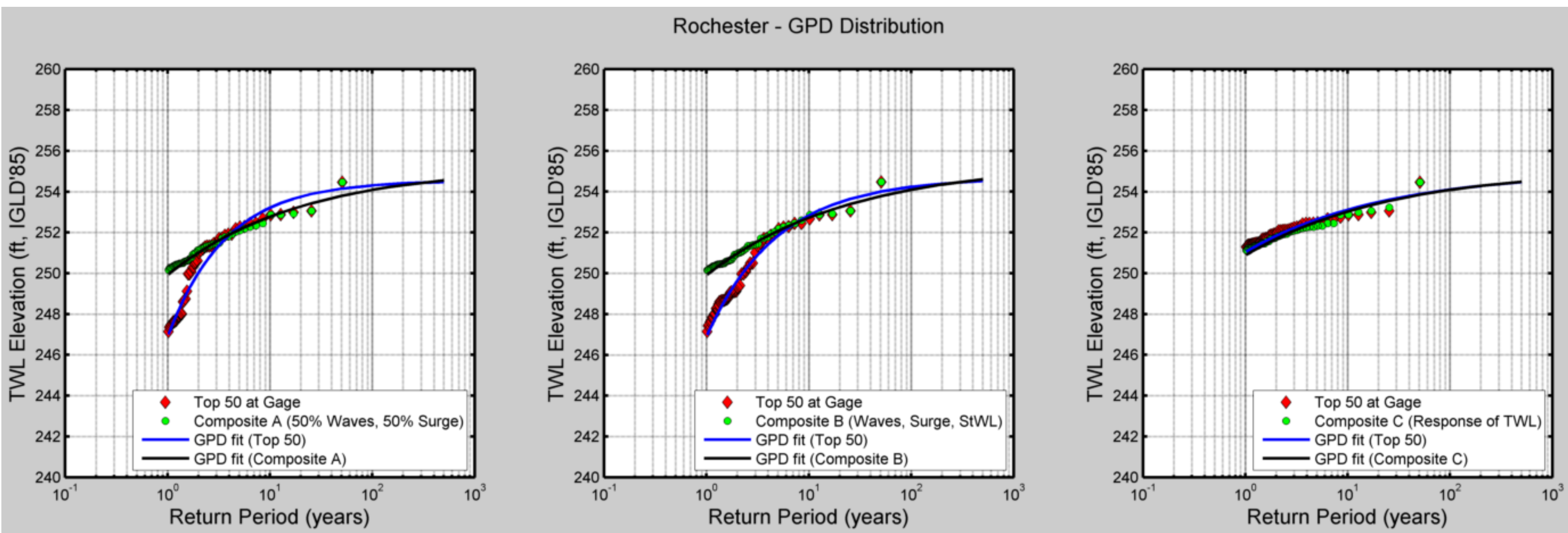

Rochester - GPD Distribution
(RMS20 = 0.29ft, RMS10 = 0.45ft, RMS = 0.59ft)
(RMS20 = 0.12ft, RMS10 = 0.14ft, RMS = 0.43ft)
(RMS20 = 0.26ft, RMS10 = 0.24ft, RMS = 0.15ft)
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
USACE '88 Levels
Waves, Surge, StWL
Response of TWL


Comparison between Storm Selection Criteria for Rochester
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
USACE '88 Levels

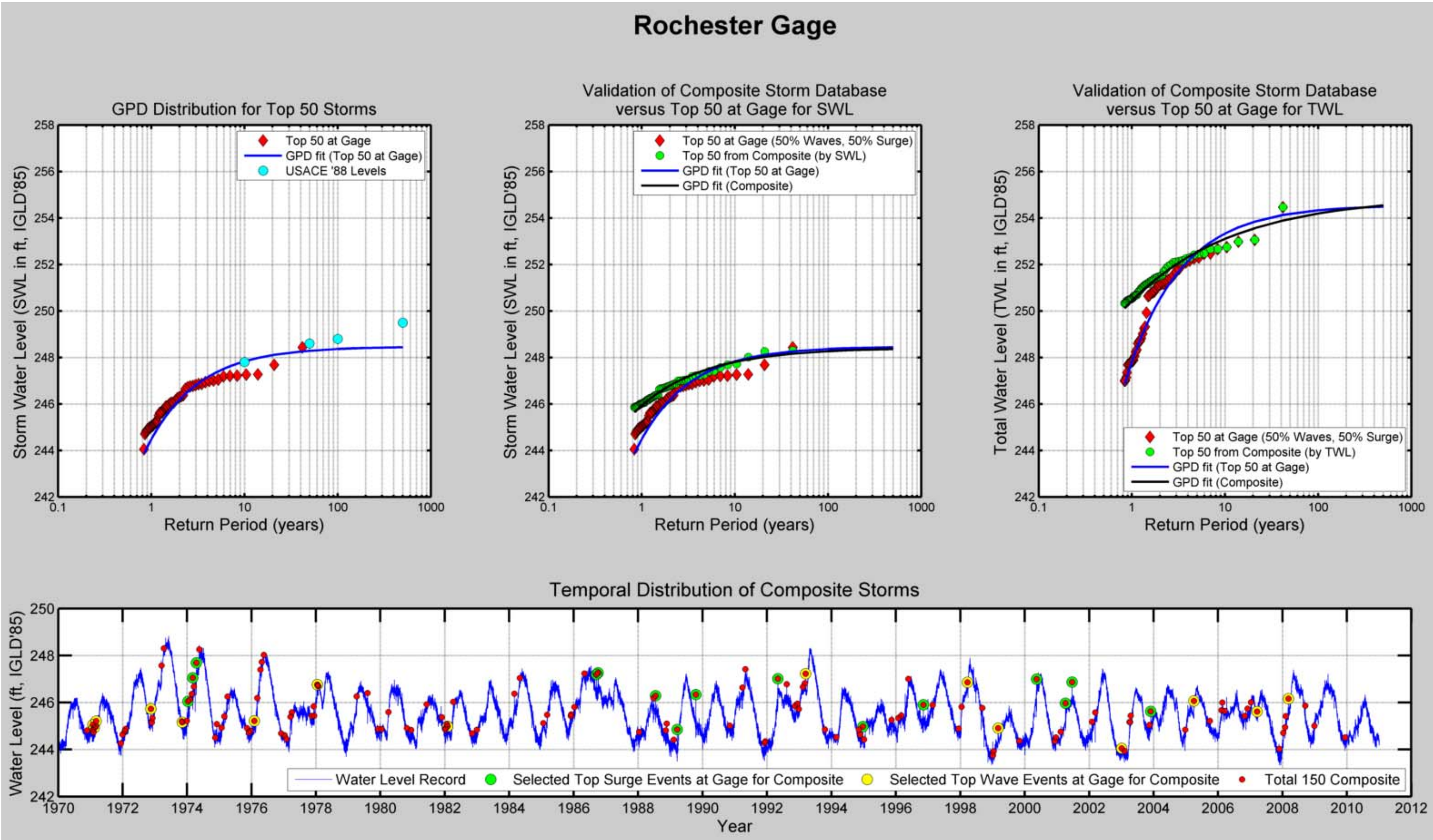


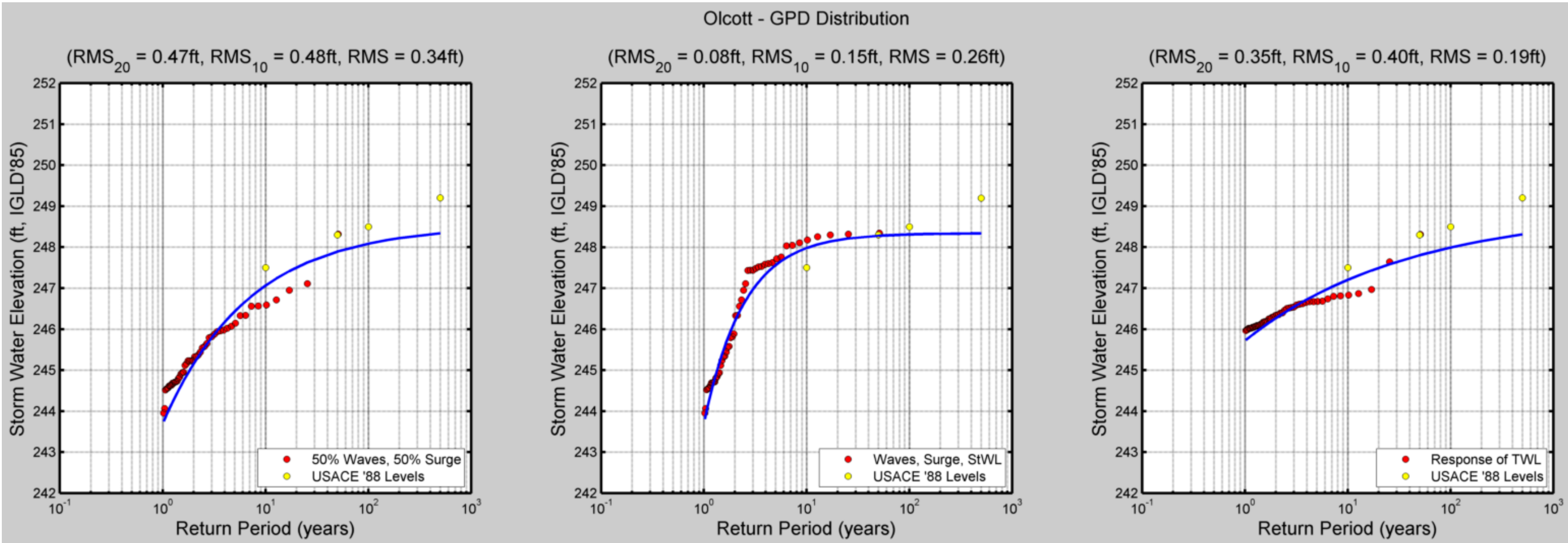
Rochester - Temporal Distribution of Top 50 Storms
Water Level (ft, IGLD'85)
250
248
246
244
242
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Date
Water Level Record
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL


Rochester - GPD Distribution
(RMS20 = 0.63ft, RMS10 = 0.58ft, RMS = 0.47ft)
(RMS20 = 0.53ft, RMS10 = 0.42ft, RMS = 0.29ft)
(RMS20 = 0.57ft, RMS10 = 0.46ft, RMS = 0.20ft)
TWL Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL

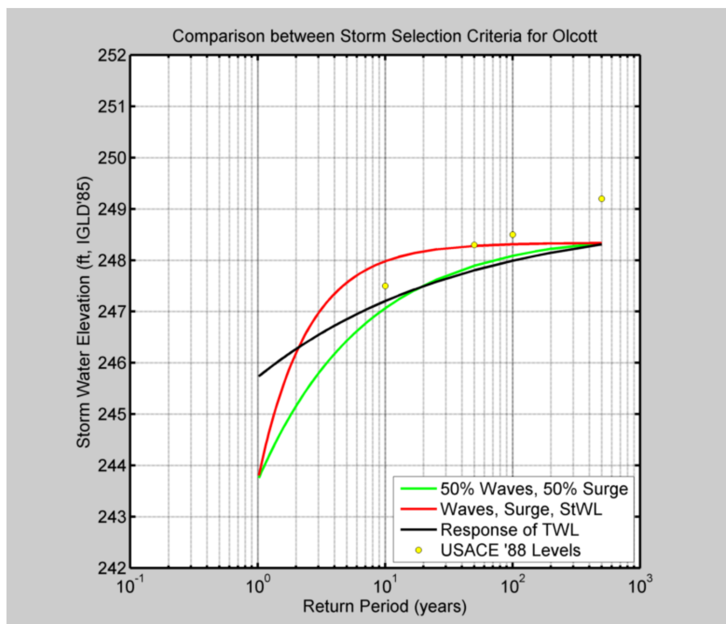

Rochester - GPD Distribution
TWL Elevation (ft, IGLD'85)
Return Period (years)
Top 50 at Gage
Composite A (50% Waves, 50% Surge)
GPD fit (Top 50)
GPD fit (Composite A)
Composite B (Waves, Surge, StWL)
GPD fit (Composite B)
Composite C (Response of TWL)
GPD fit (Composite C)

Final Analysis at Rochester

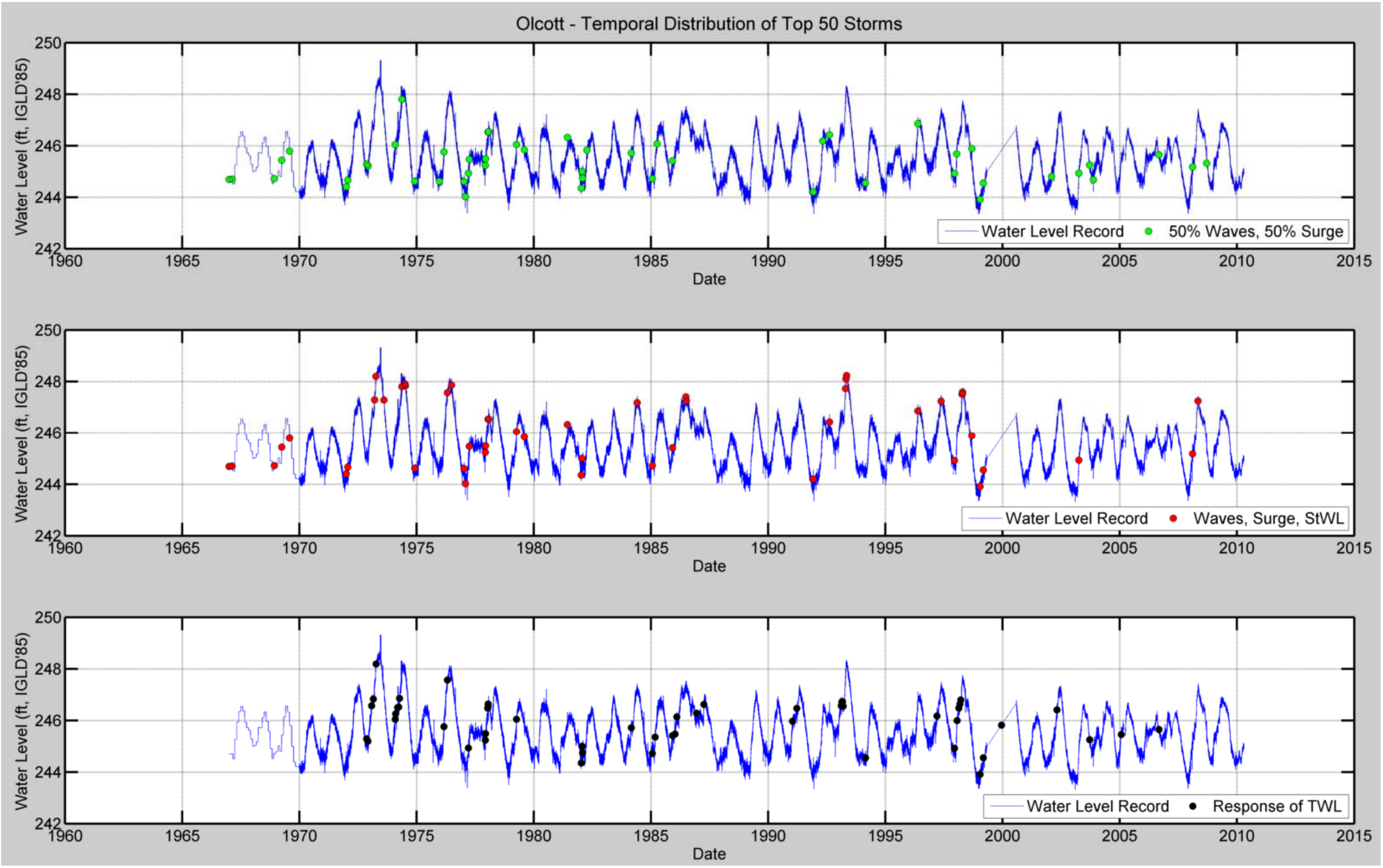


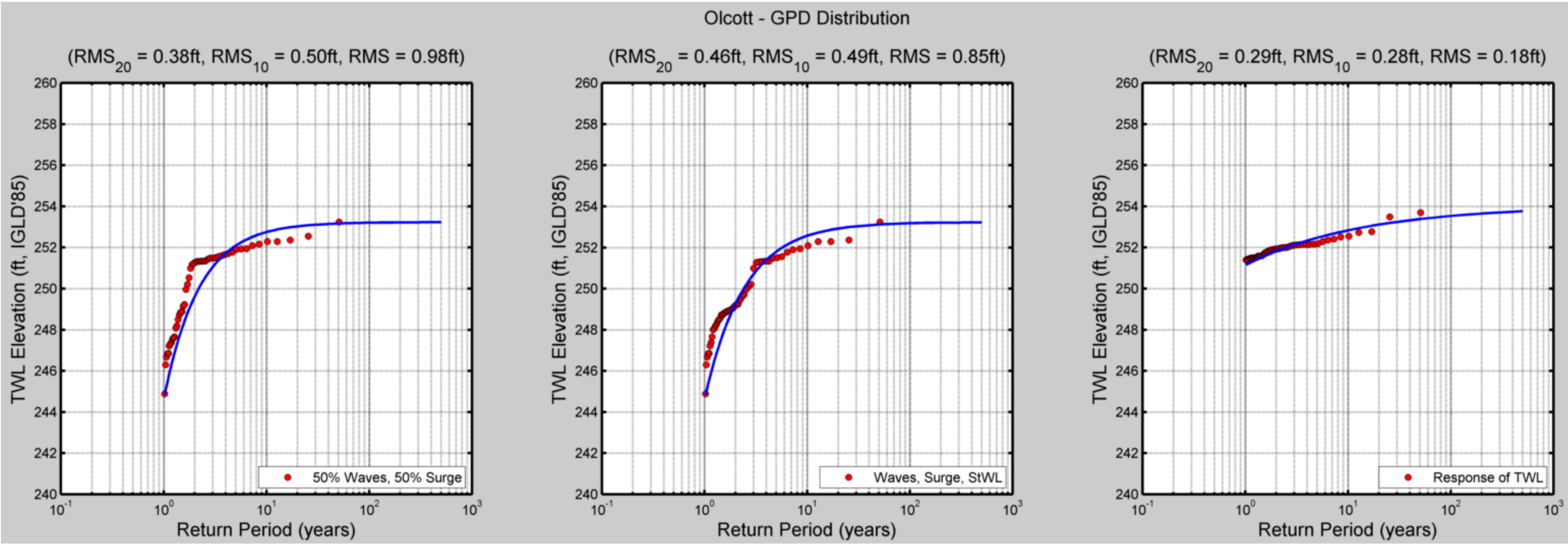


Olcott - GPD Distribution
(RMS20 = 0.47ft, RMS10 = 0.48ft, RMS = 0.34ft)
(RMS20 = 0.08ft, RMS10 = 0.15ft, RMS = 0.26ft)
(RMS20 = 0.35ft, RMS10 = 0.40ft, RMS = 0.19ft)
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
USACE '88 Levels

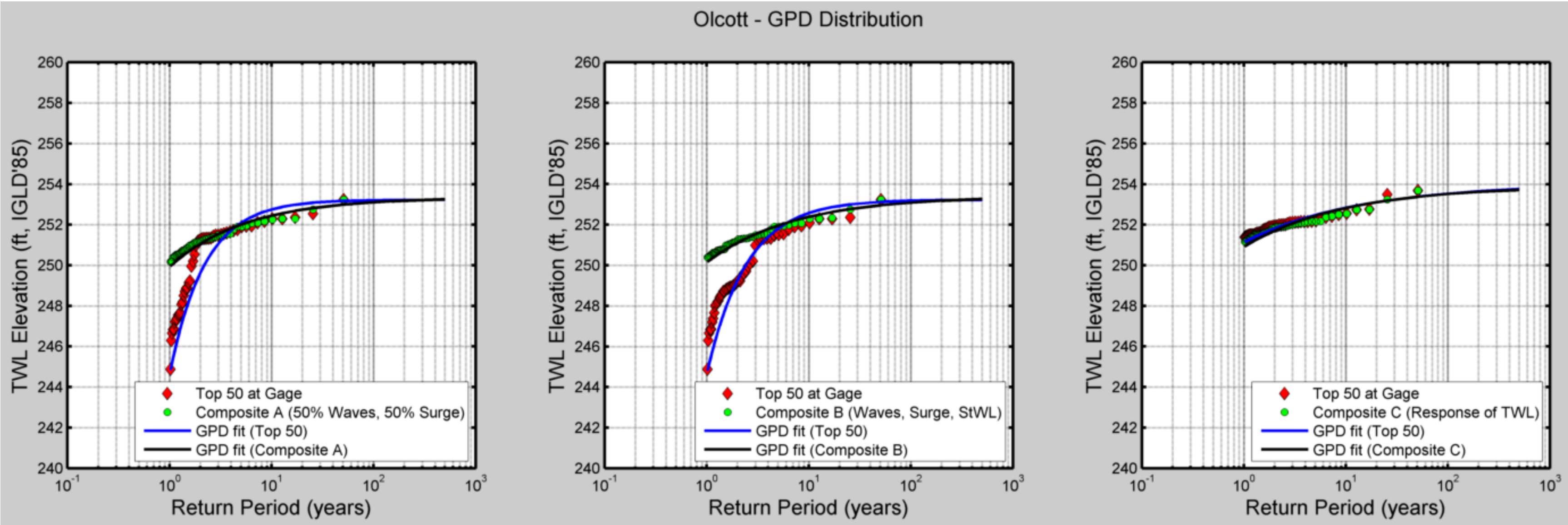


Comparison between Storm Selection Criteria for Olcott
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
USACE '88 Levels


Olcott - Temporal Distribution of Top 50 Storms
Water Level (ft, IGLD'85)
250
248
246
244
242
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Date
Water Level Record
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL

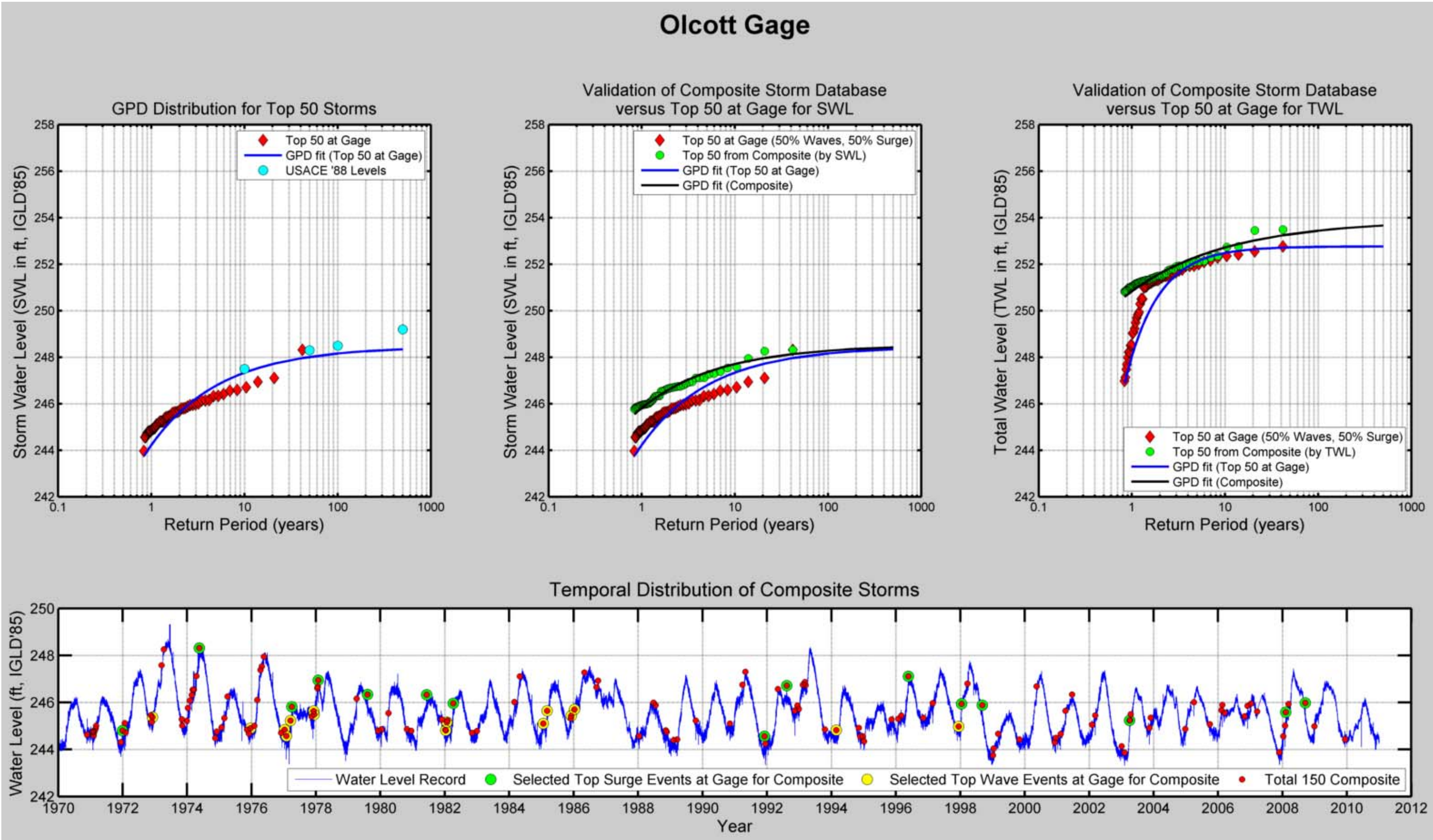


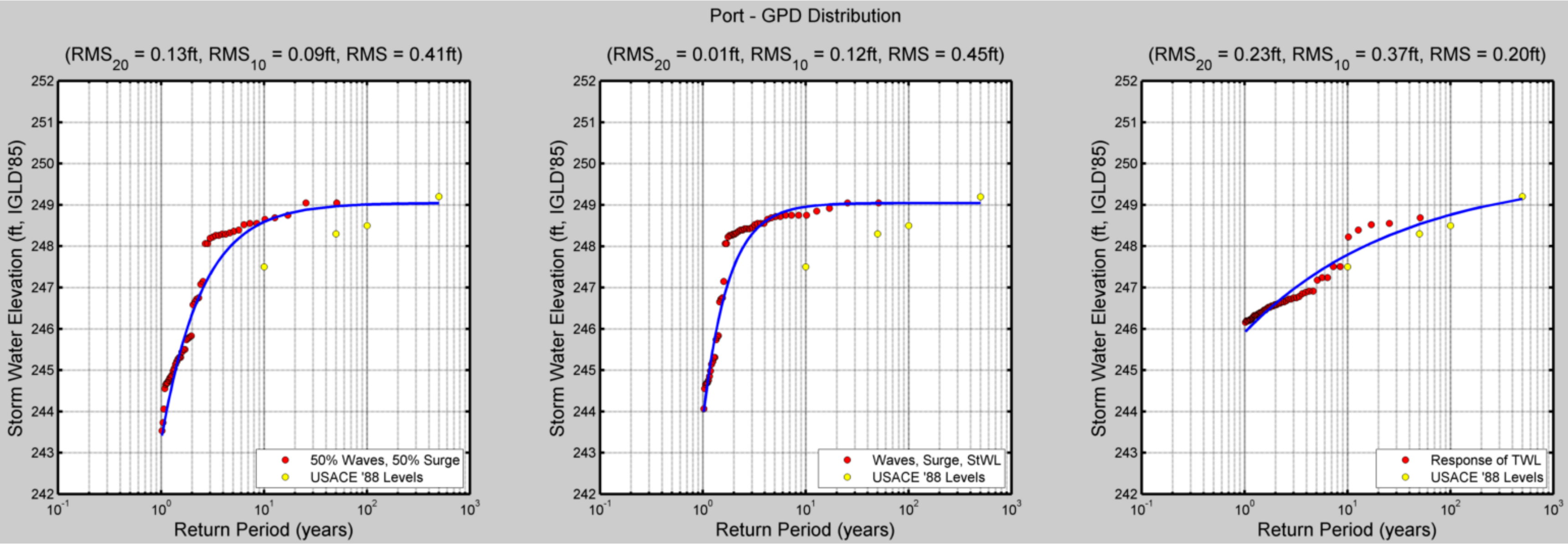
Olcott - GPD Distribution
(RMS20 = 0.38ft, RMS10 = 0.50ft, RMS = 0.98ft)
(RMS20 = 0.46ft, RMS10 = 0.49ft, RMS = 0.85ft)
(RMS20 = 0.29ft, RMS10 = 0.28ft, RMS = 0.18ft)
TWL Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL

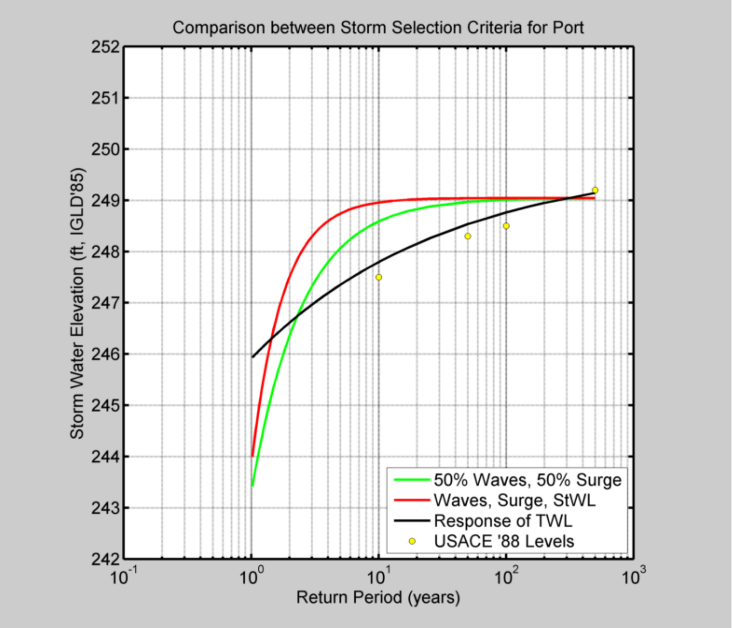


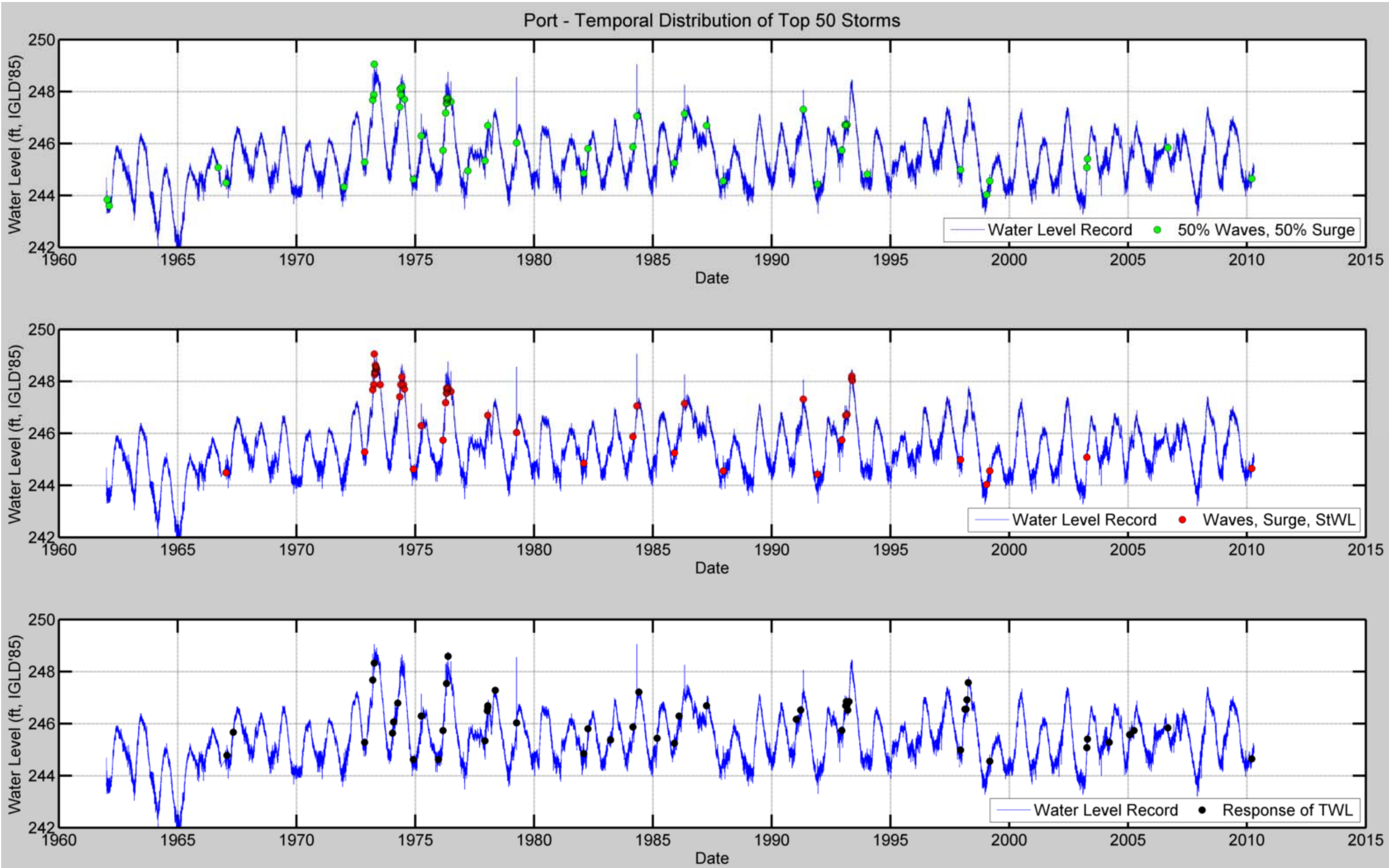
Olcott - GPD Distribution
TWL Elevation (ft, IGLD'85)
Return Period (years)
Top 50 at Gage
Composite A (50% Waves, 50% Surge)
GPD fit (Top 50)
GPD fit (Composite A)
Composite B (Waves, Surge, StWL)
GPD fit (Composite B)
Composite C (Response of TWL)
GPD fit (Composite C)

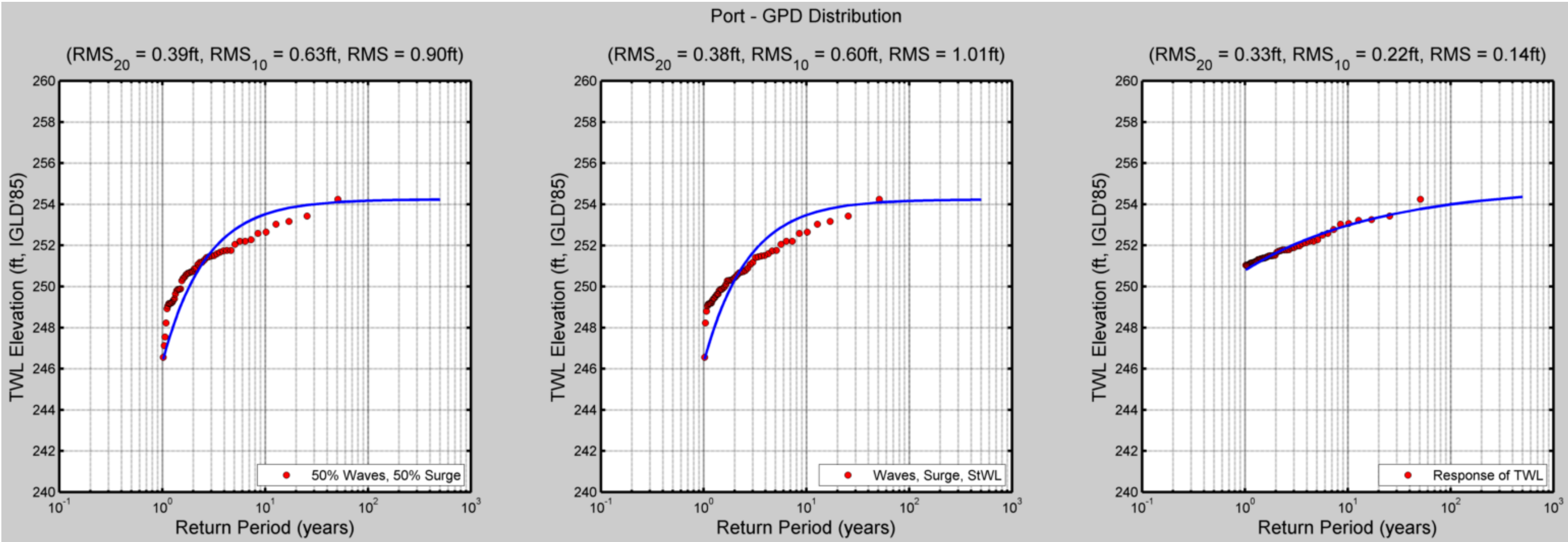
Final Analysis at Olcott

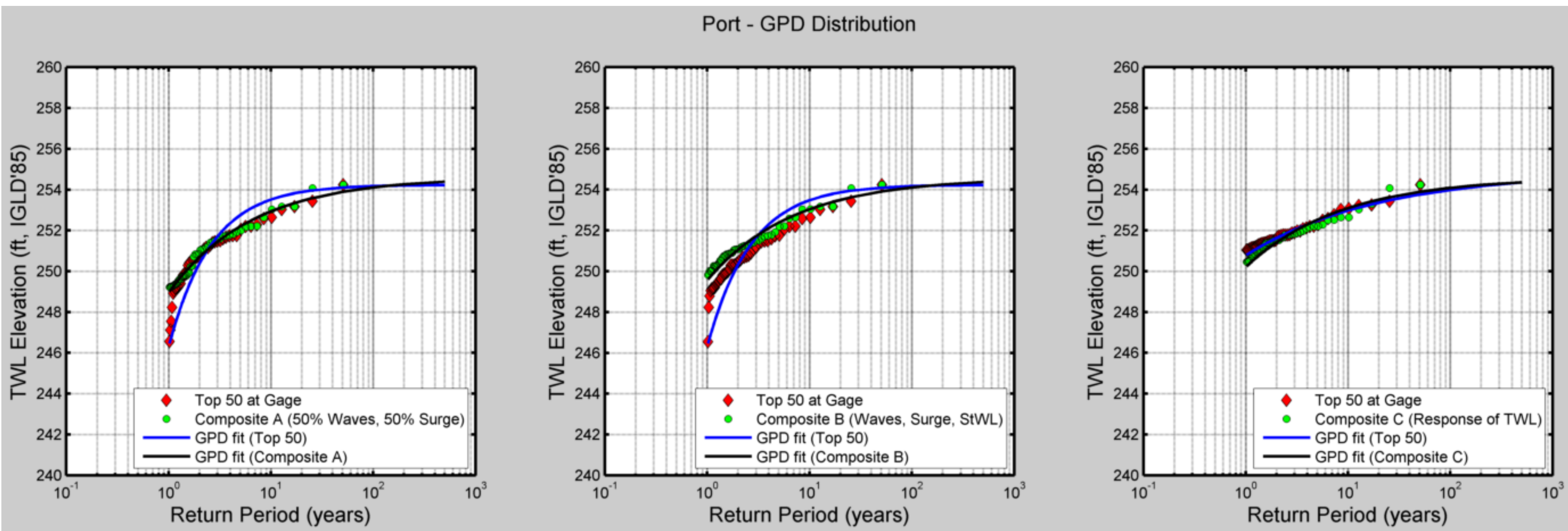



Port - GPD Distribution
(RMS20 = 0.13ft, RMS10 = 0.09ft, RMS = 0.41ft)
(RMS20 = 0.01ft, RMS10 = 0.12ft, RMS = 0.45ft)
(RMS20 = 0.23ft, RMS10 = 0.37ft, RMS = 0.20ft)
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
USACE '88 Levels

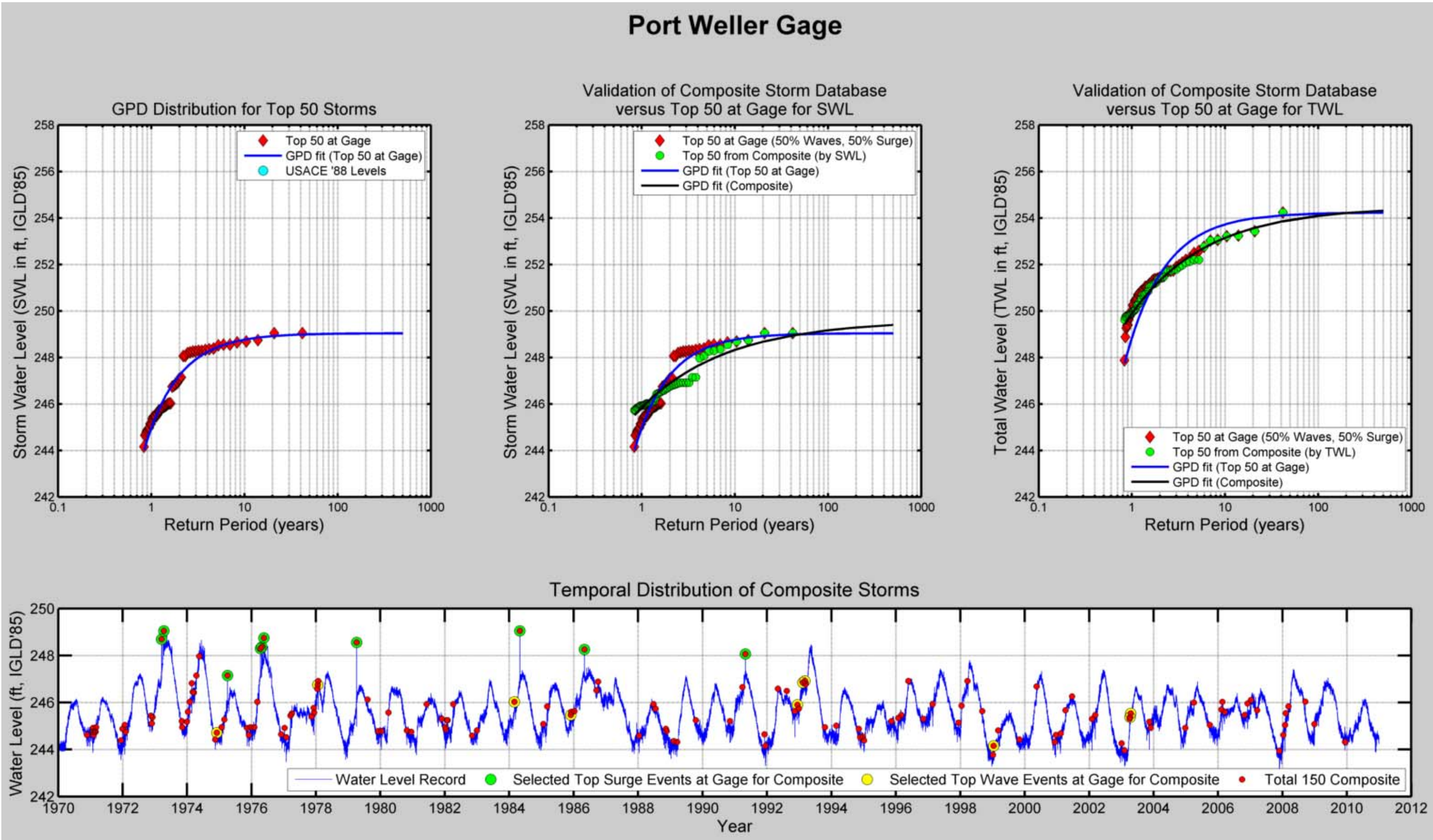

Comparison between Storm Selection Criteria for Port
Storm Water Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL
USACE '88 Levels


Port - Temporal Distribution of Top 50 Storms
Water Level (ft, IGLD'85)
250
248
246
244
242
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Date
Water Level Record
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL

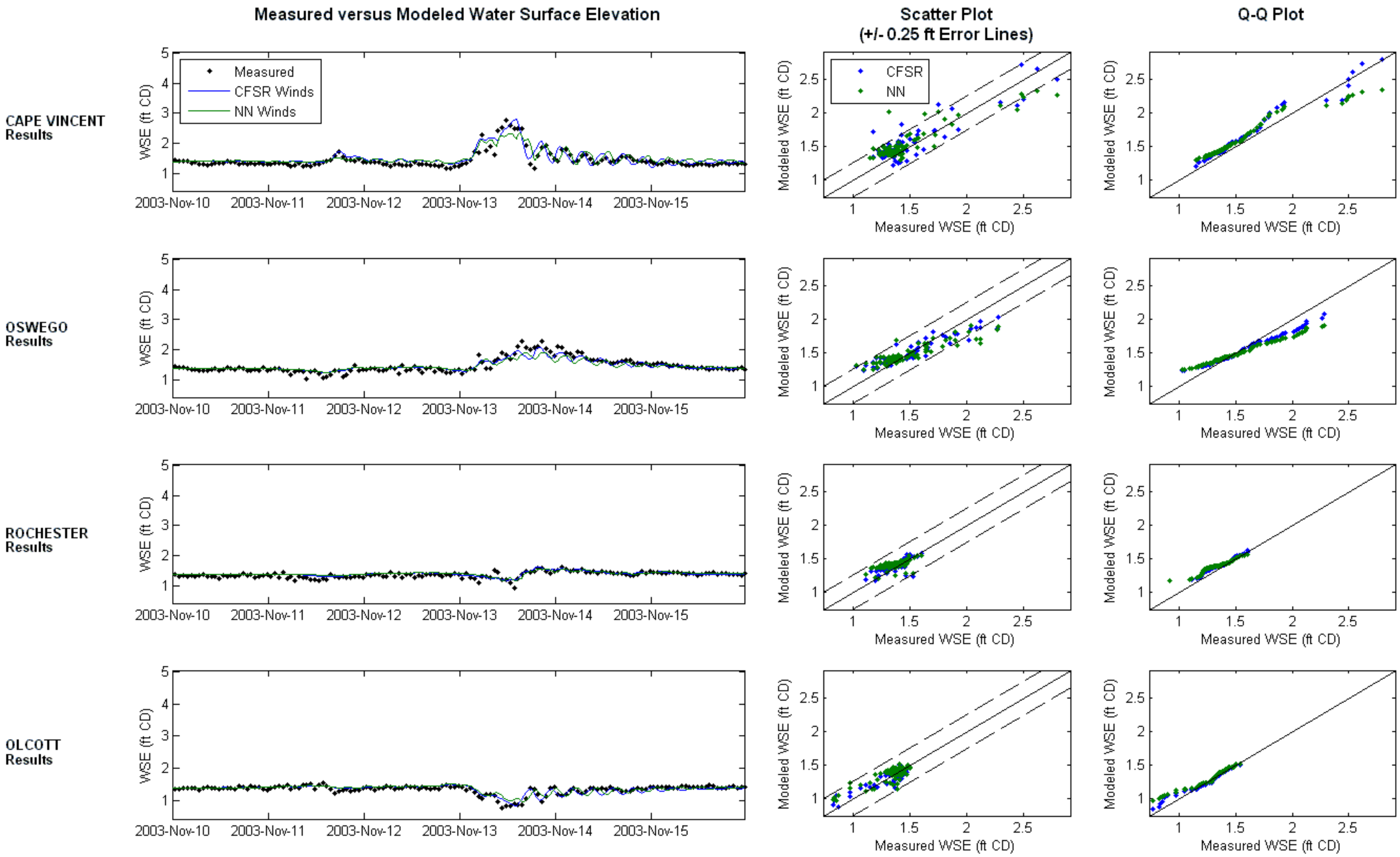

Port - GPD Distribution
(RMS$_{20}$ = 0.39ft, RMS$_{10}$ = 0.63ft, RMS = 0.90ft)
(RMS$_{20}$ = 0.38ft, RMS$_{10}$ = 0.60ft, RMS = 1.01ft)
(RMS$_{20}$ = 0.33ft, RMS$_{10}$ = 0.22ft, RMS = 0.14ft)
TWL Elevation (ft, IGLD'85)
Return Period (years)
50% Waves, 50% Surge
Waves, Surge, StWL
Response of TWL

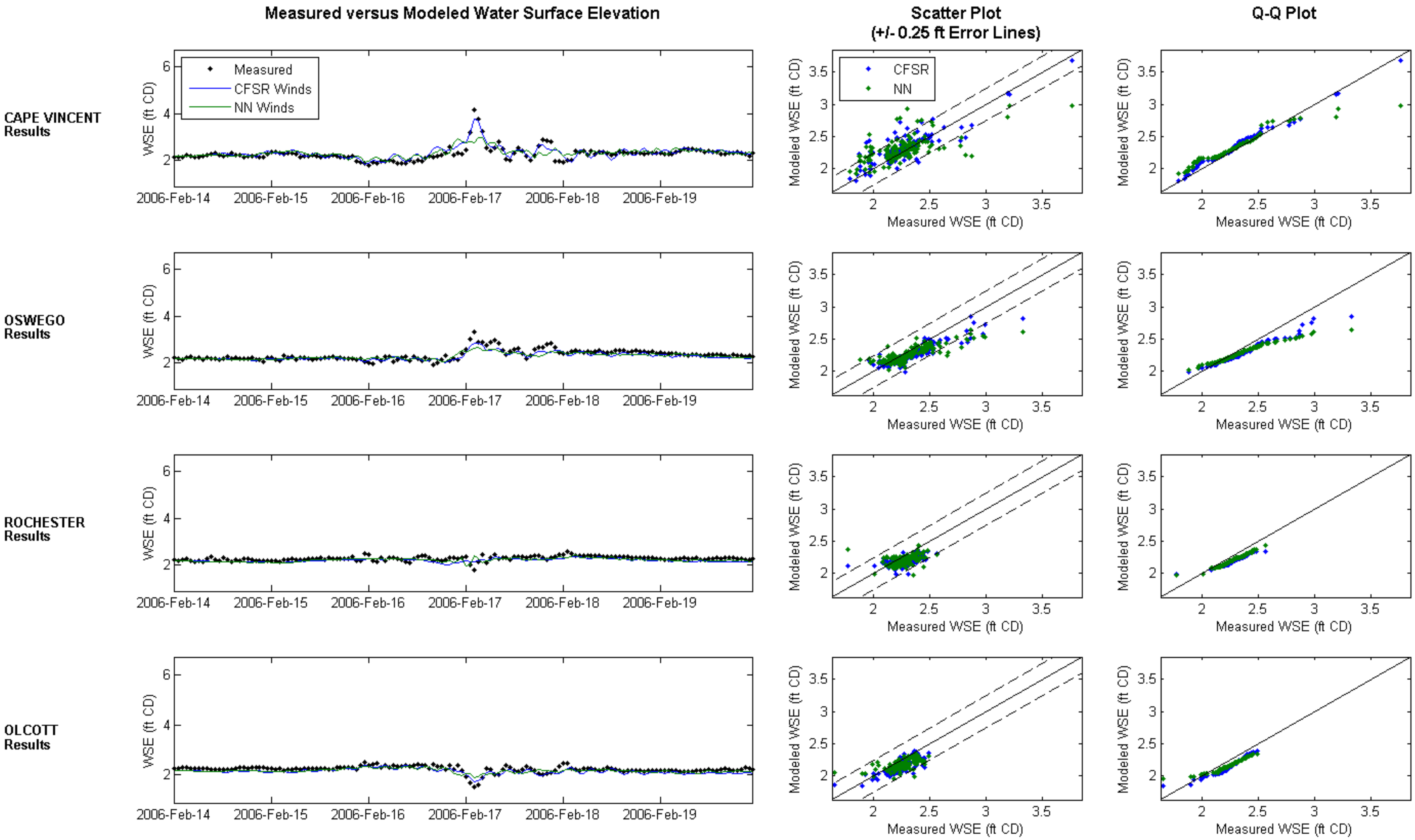

Port - GPD Distribution
TWL Elevation (ft, IGLD'85)
Return Period (years)
Top 50 at Gage
Composite A (50% Waves, 50% Surge)
GPD fit (Top 50)
GPD fit (Composite A)
Top 50 at Gage
Composite B (Waves, Surge, StWL)
GPD fit (Top 50)
GPD fit (Composite B)
Top 50 at Gage
Composite C (Response of TWL)
GPD fit (Top 50)
GPD fit (Composite C)

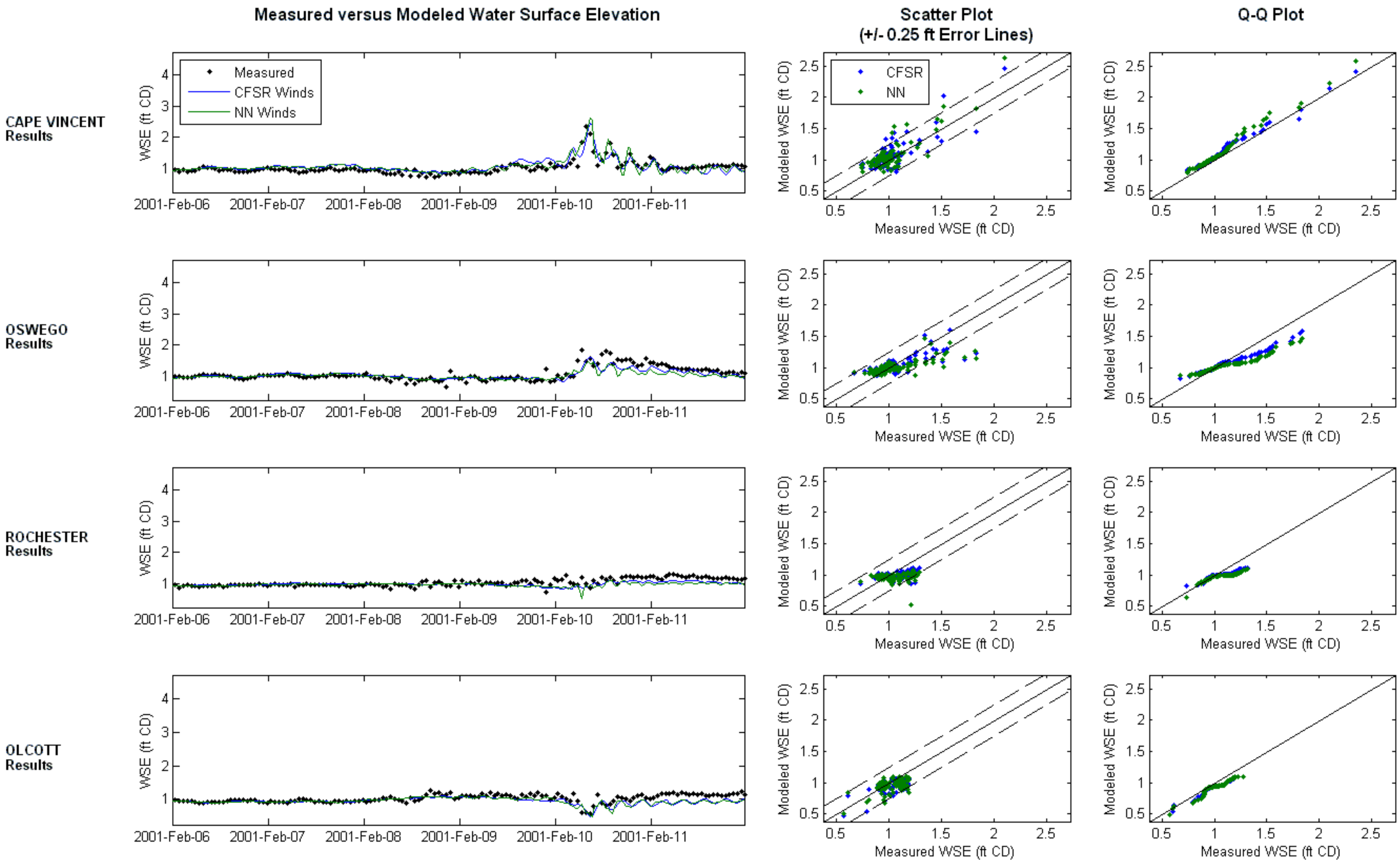
Final Analysis at Port Weller

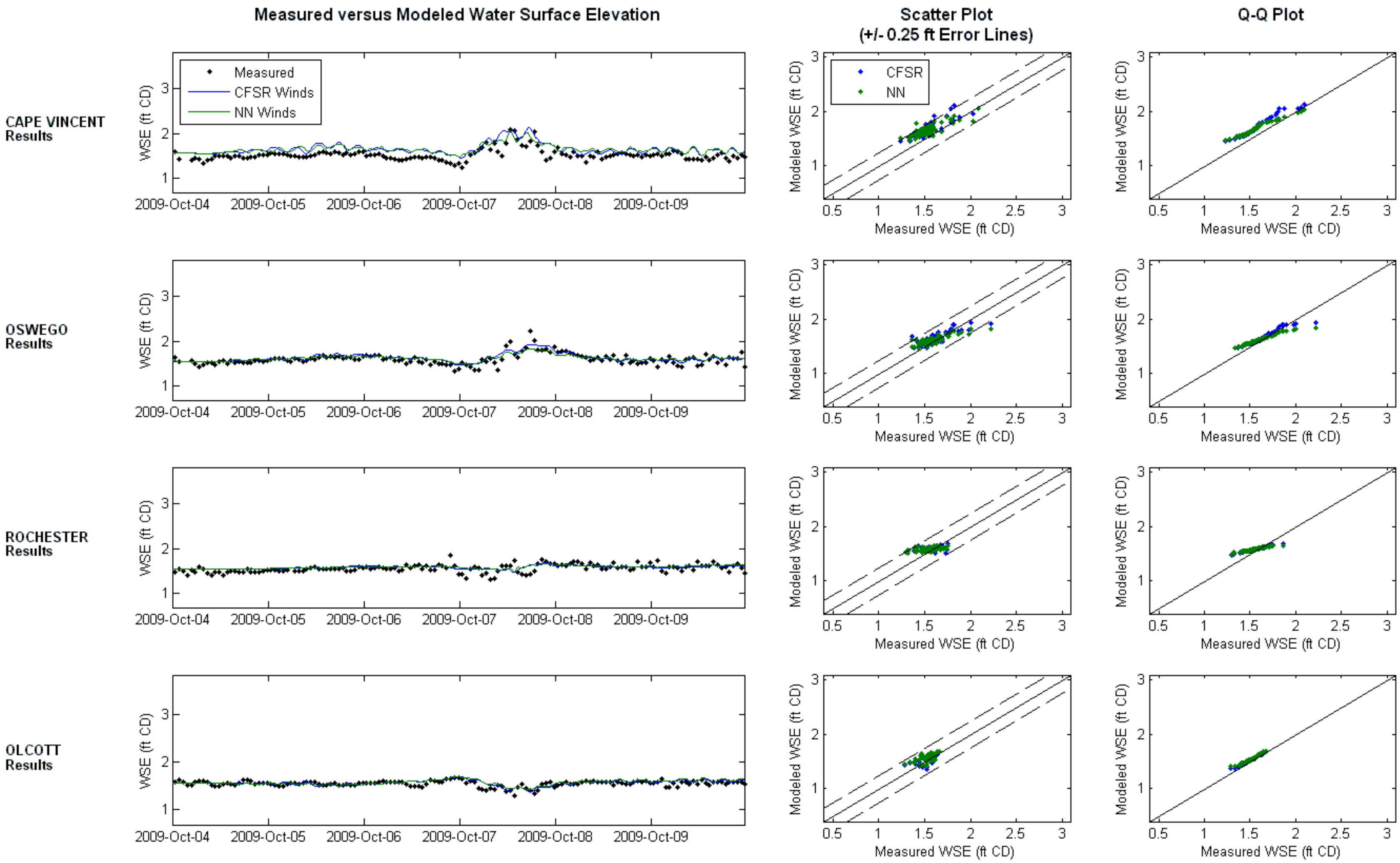


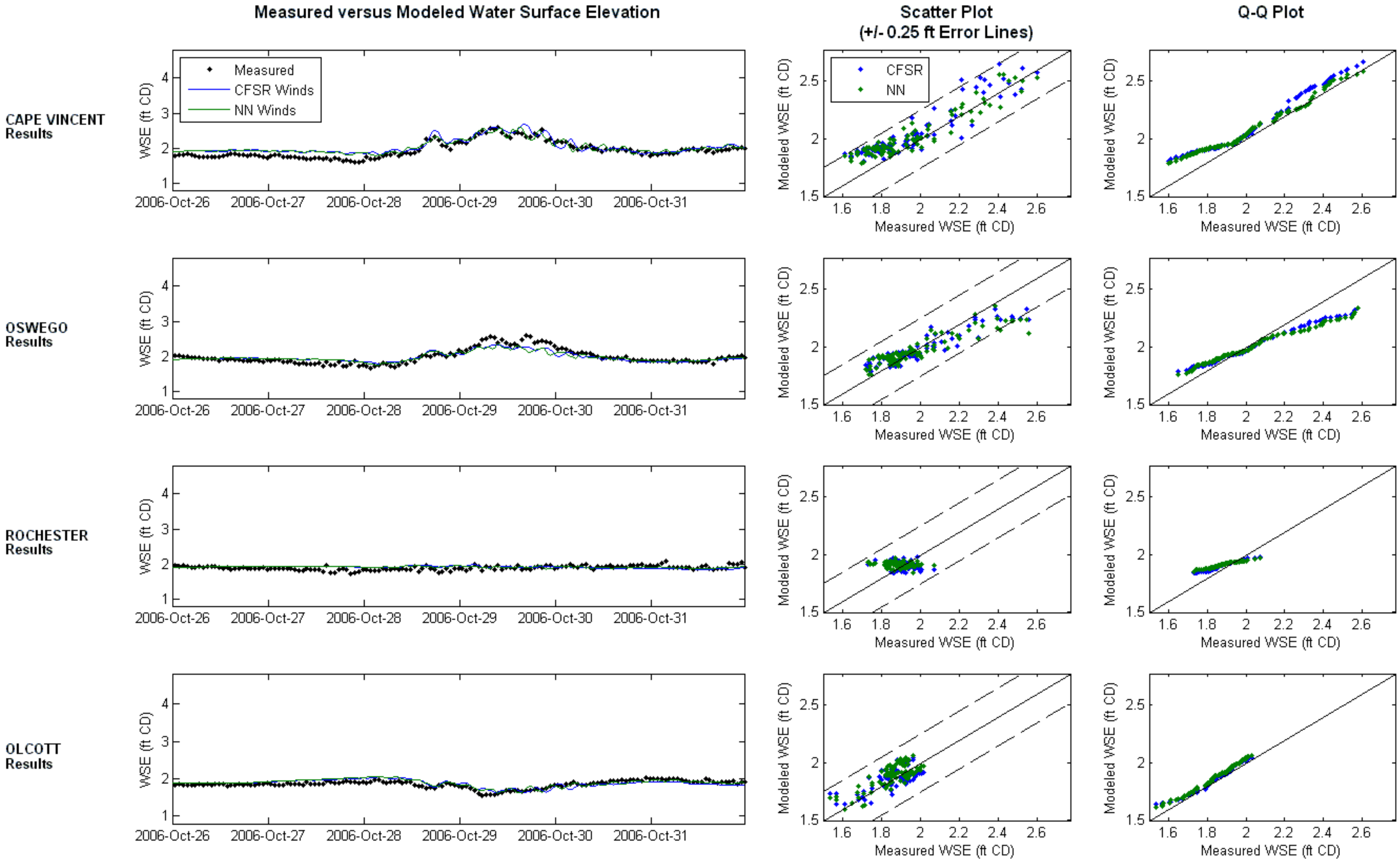
APPENDIX C - NATURAL NEIHBOR COMPARED TO CFSR WIND DATA

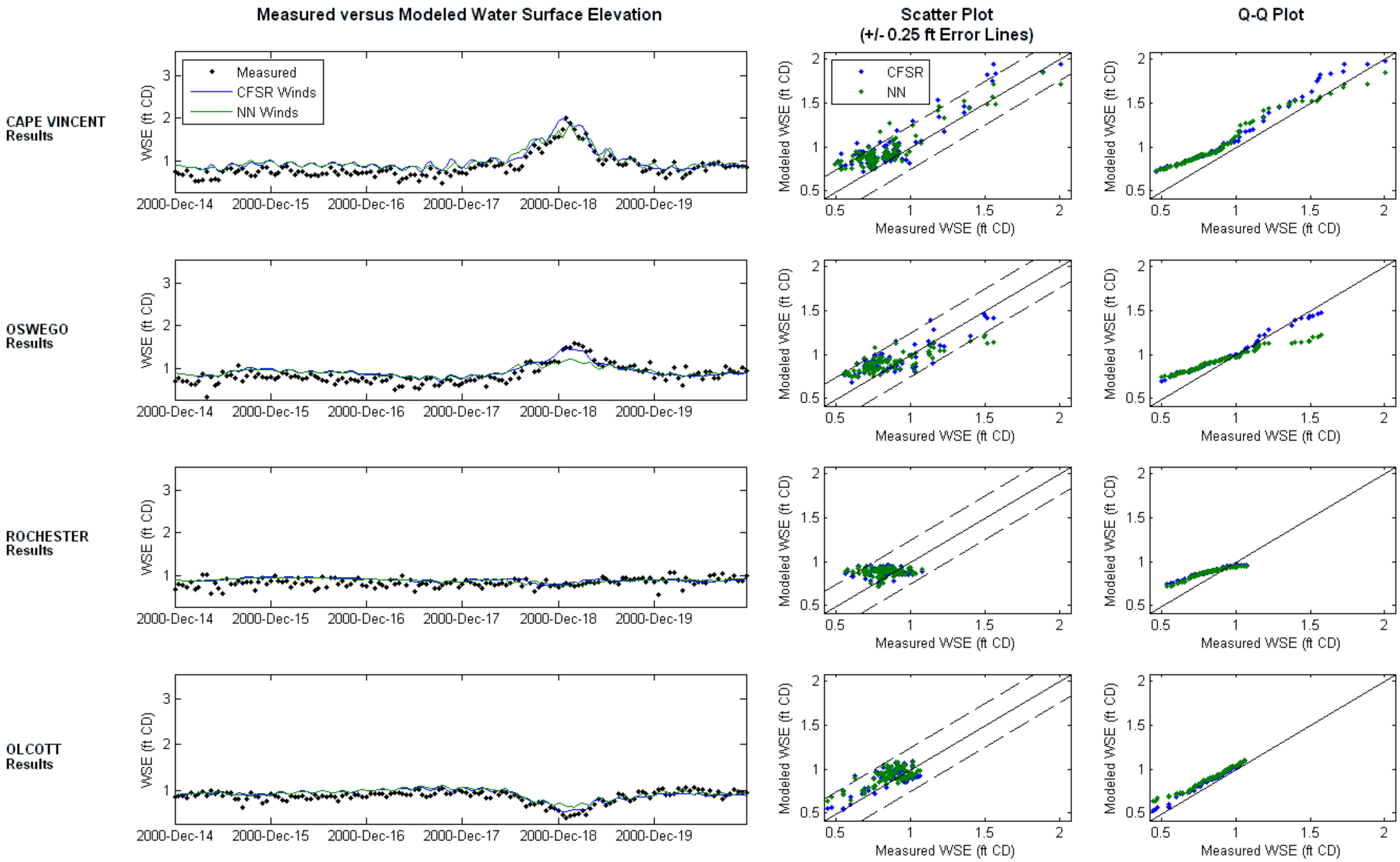

Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q Plot
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
CFSR Winds
NN Winds
CFSR
NN
WSE (ft CD)
Modeled WSE (ft CD)
Measured WSE (ft CD)
2003-Nov-10
2003-Nov-11
2003-Nov-12
2003-Nov-13
2003-Nov-14
2003-Nov-15


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q Plot
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
CFSR Winds
NN Winds
CFSR
NN
WSE (ft CD)
Modeled WSE (ft CD)
Measured WSE (ft CD)
2006-Feb-14
2006-Feb-15
2006-Feb-16
2006-Feb-17
2006-Feb-18
2006-Feb-19

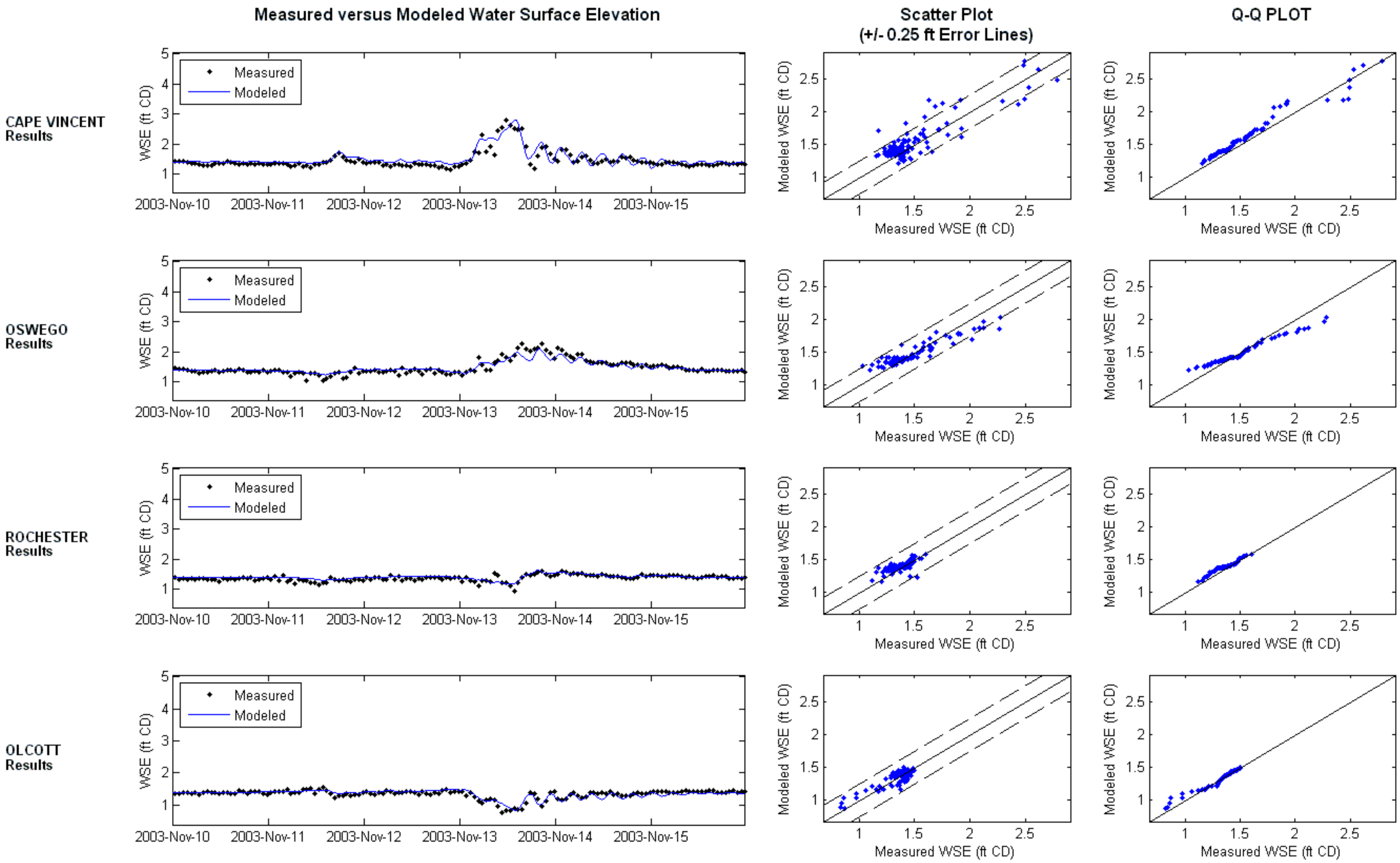

Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q Plot
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
CFSR Winds
NN Winds
CFSR
NN
WSE (ft CD)
Modeled WSE (ft CD)
Measured WSE (ft CD)
2001-Feb-06
2001-Feb-07
2001-Feb-08
2001-Feb-09
2001-Feb-10
2001-Feb-11

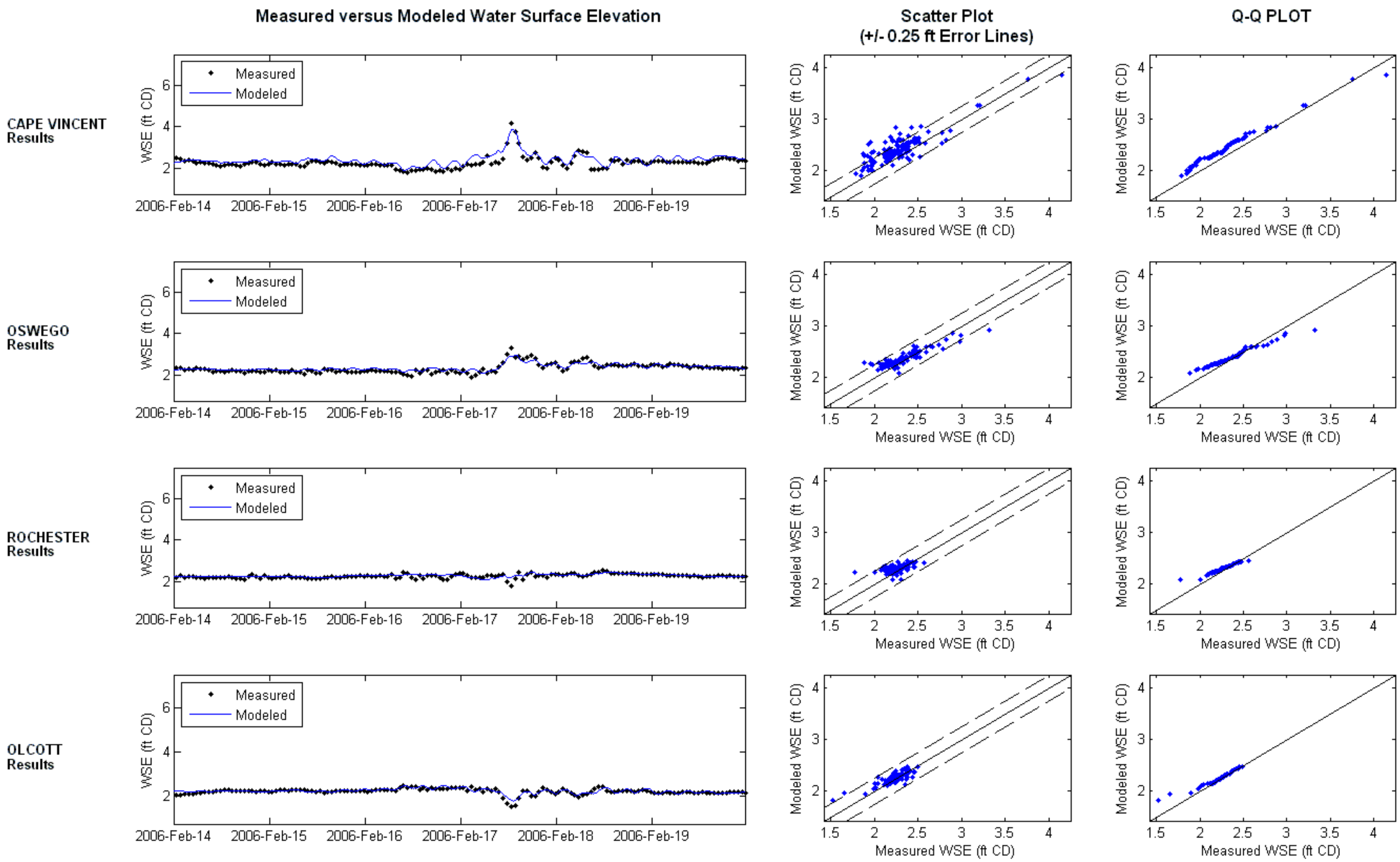

Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q Plot
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
CFSR Winds
NN Winds
CFSR
NN
WSE (ft CD)
Modeled WSE (ft CD)
Measured WSE (ft CD)
2009-Oct-04
2009-Oct-05
2009-Oct-06
2009-Oct-07
2009-Oct-08
2009-Oct-09

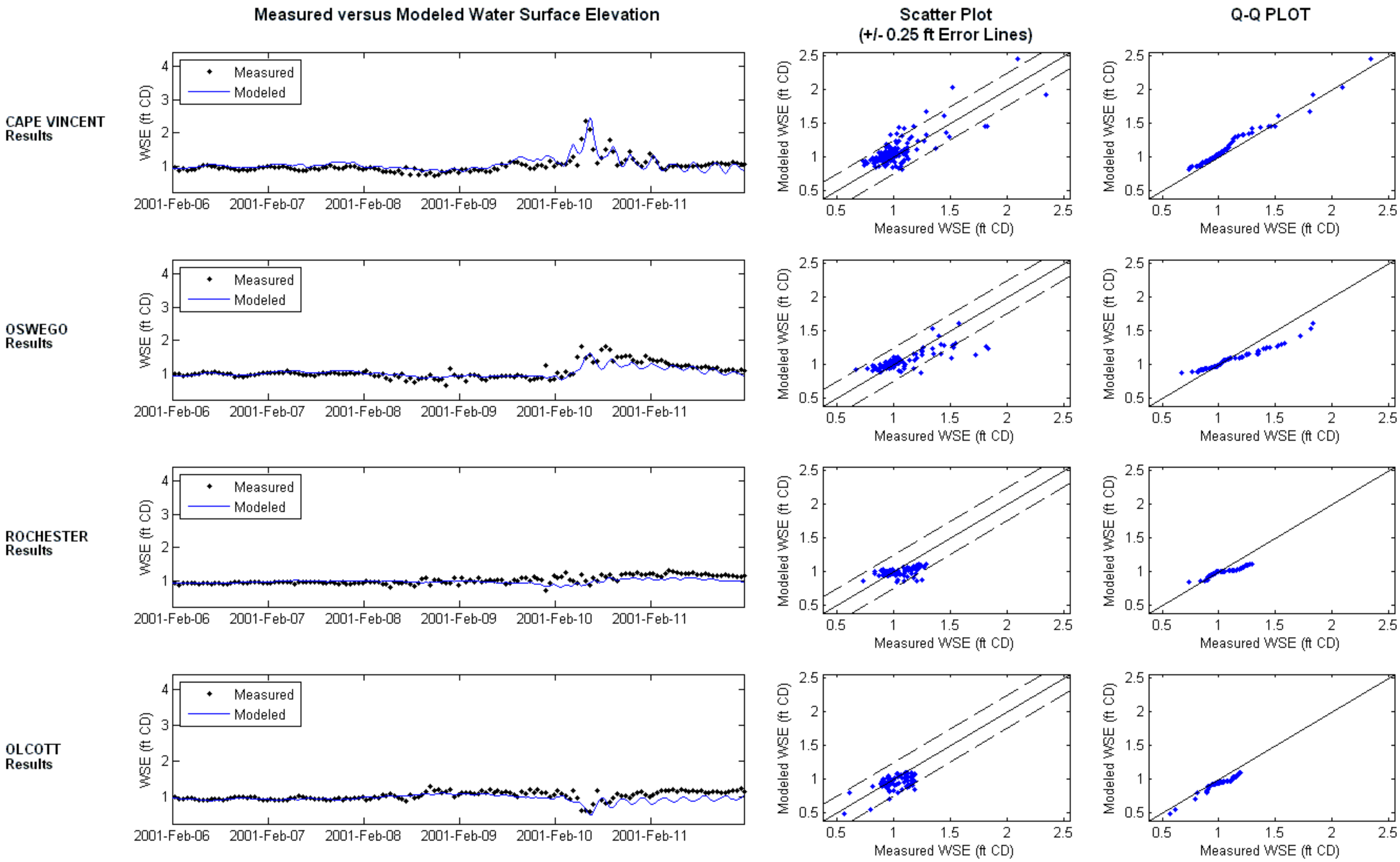

Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q Plot
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
CFSR Winds
NN Winds
CFSR
NN
WSE (ft CD)
Modeled WSE (ft CD)
Measured WSE (ft CD)
2006-Oct-26
2006-Oct-27
2006-Oct-28
2006-Oct-29
2006-Oct-30
2006-Oct-31


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q Plot
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
CFSR Winds
NN Winds
CFSR
NN
WSE (ft CD)
Modeled WSE (ft CD)
Measured WSE (ft CD)
2000-Dec-14
2000-Dec-15
2000-Dec-16
2000-Dec-17
2000-Dec-18
2000-Dec-19

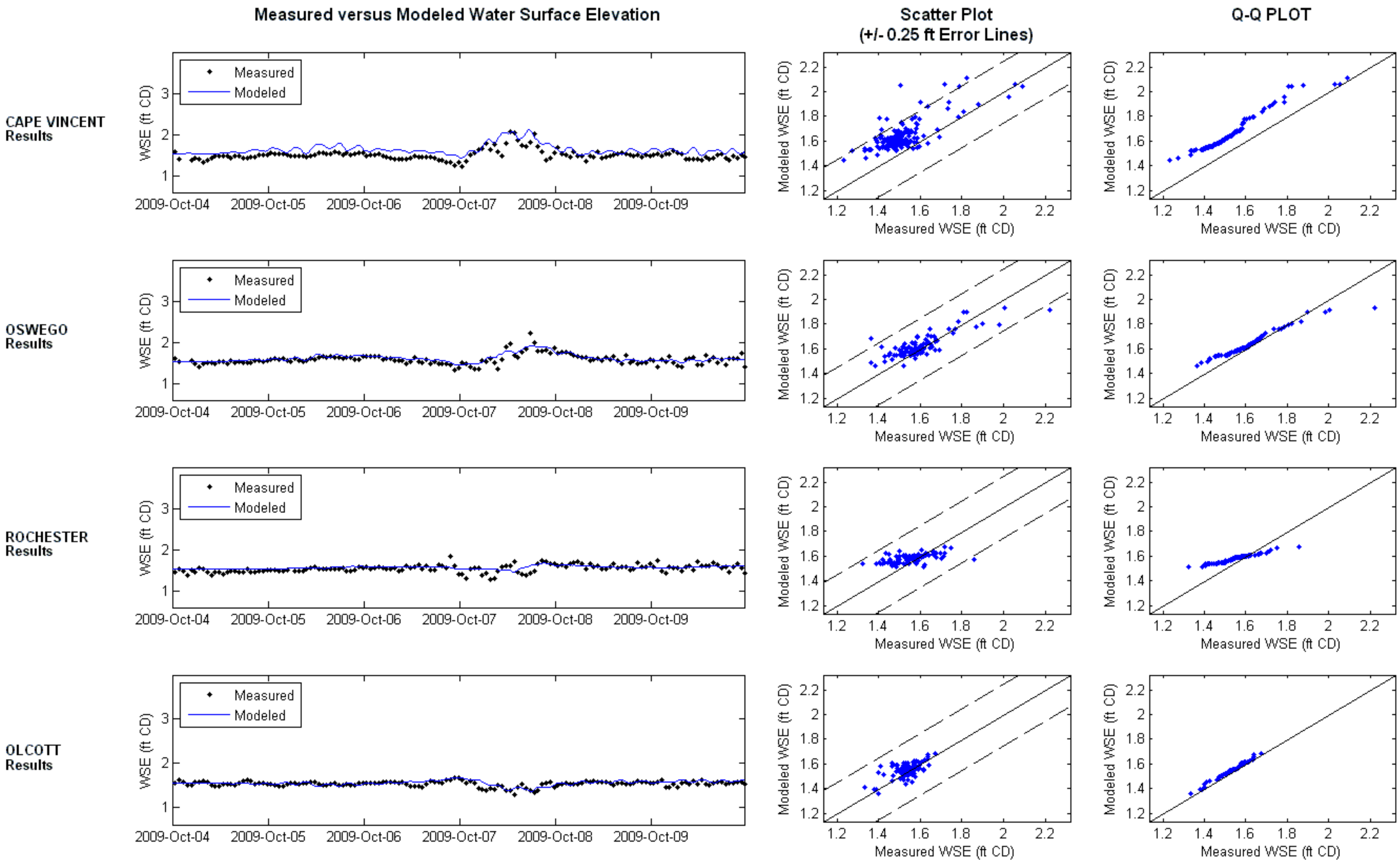
APPENDIX D - ADCIRC RESULTS

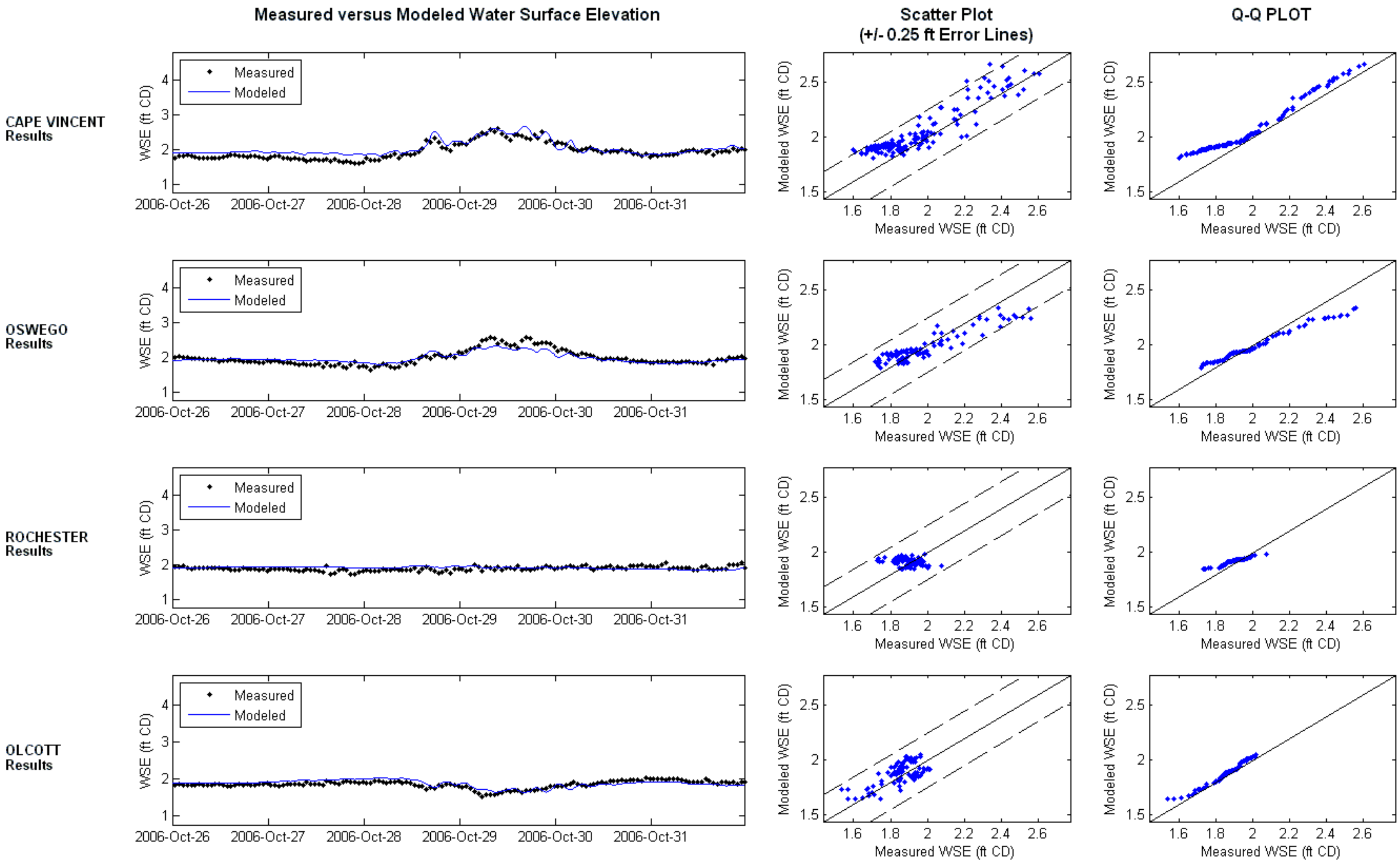

Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
Modeled
WSE (ft CD)
2003-Nov-10
2003-Nov-11
2003-Nov-12
2003-Nov-13
2003-Nov-14
2003-Nov-15
Modeled WSE (ft CD)
Measured WSE (ft CD)

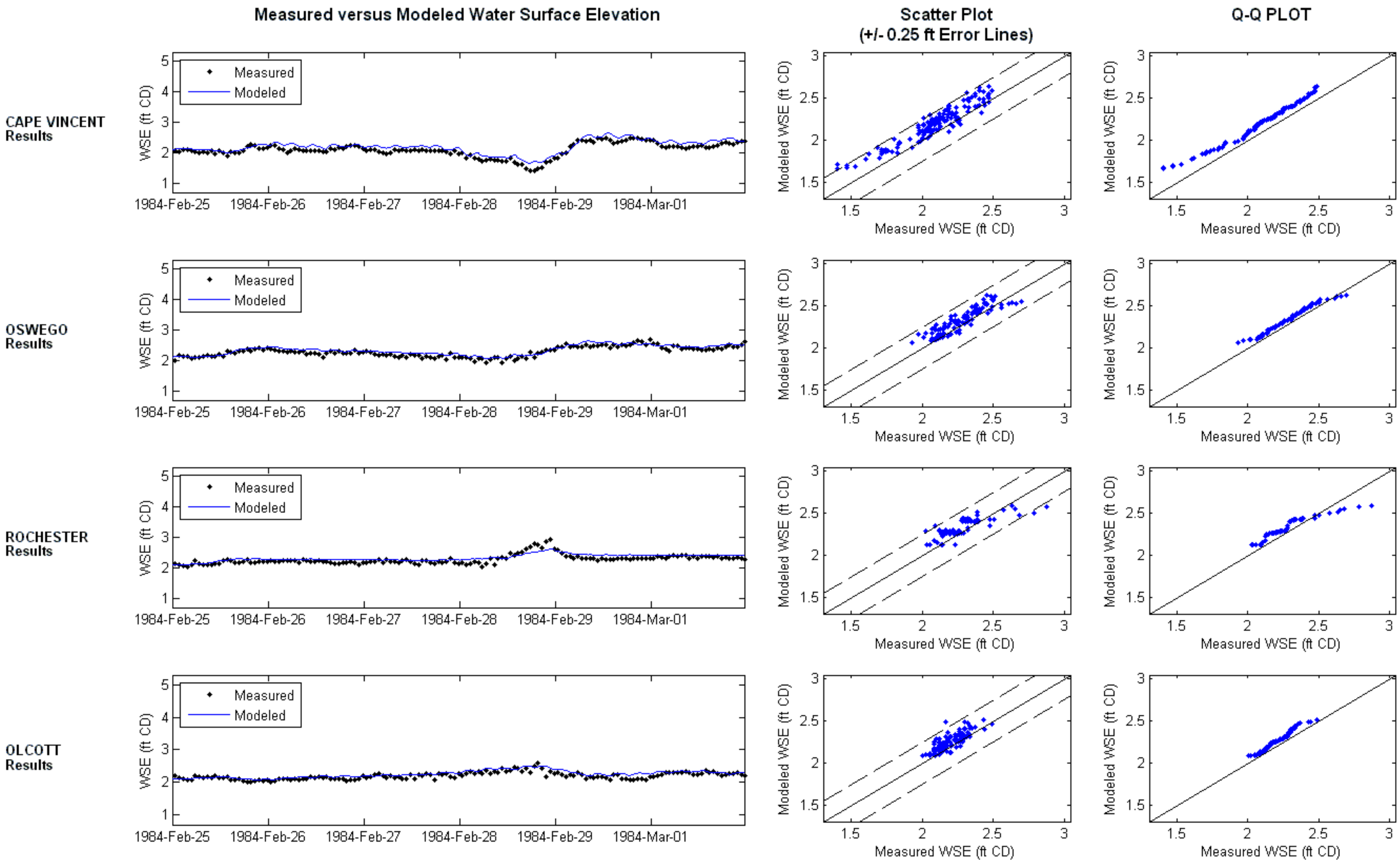

Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
Modeled WSE (ft CD)
Measured WSE (ft CD)
2006-Feb-14
2006-Feb-15
2006-Feb-16
2006-Feb-17
2006-Feb-18
2006-Feb-19



Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
2001-Feb-06
2001-Feb-07
2001-Feb-08
2001-Feb-09
2001-Feb-10
2001-Feb-11
Modeled WSE (ft CD)
Measured WSE (ft CD)

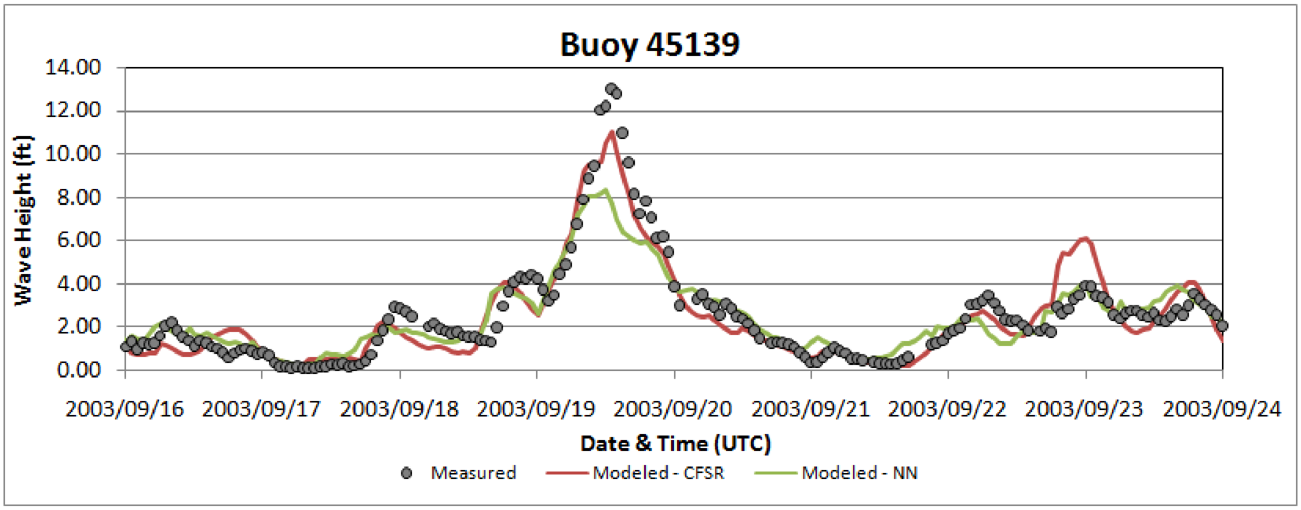

Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
2009-Oct-04
2009-Oct-05
2009-Oct-06
2009-Oct-07
2009-Oct-08
2009-Oct-09
Modeled WSE (ft CD)
Measured WSE (ft CD)

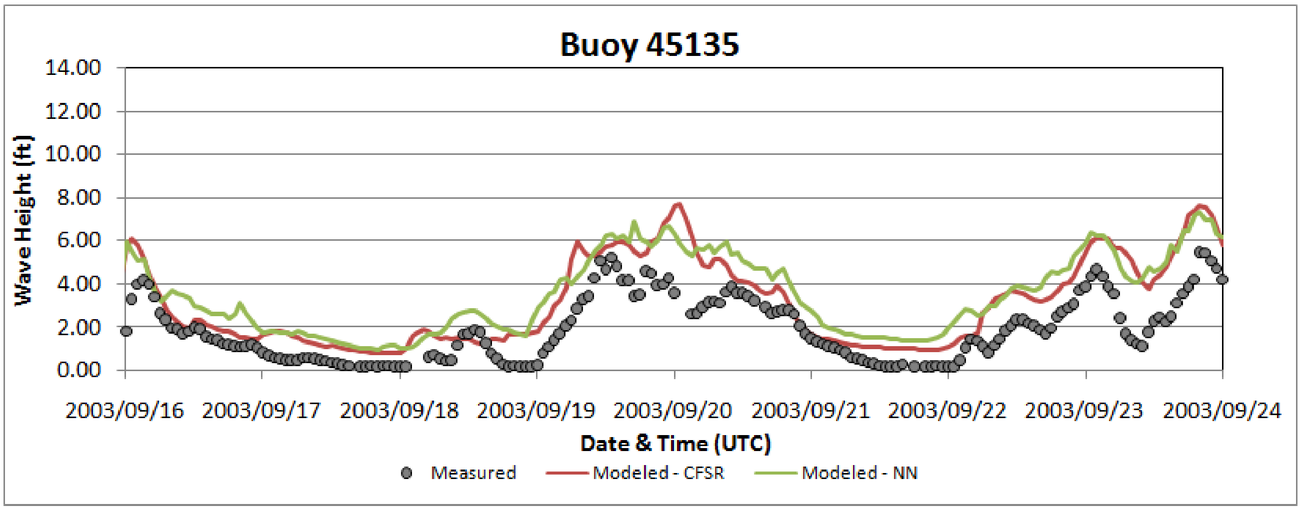

Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
2006-Oct-26
2006-Oct-27
2006-Oct-28
2006-Oct-29
2006-Oct-30
2006-Oct-31
Modeled WSE (ft CD)
Measured WSE (ft CD)



Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
1984-Feb-25
1984-Feb-26
1984-Feb-27
1984-Feb-28
1984-Feb-29
1984-Mar-01
Modeled WSE (ft CD)
Measured WSE (ft CD)

APPENDIX E – SWAN MODEL RESULTS USING CFSR AND NN WINDS





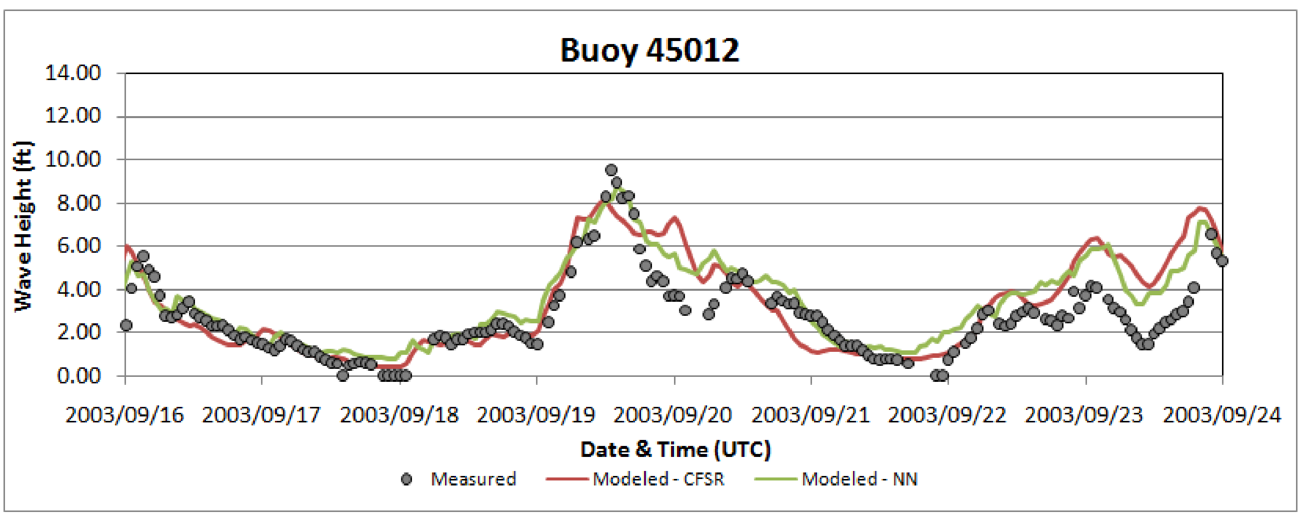
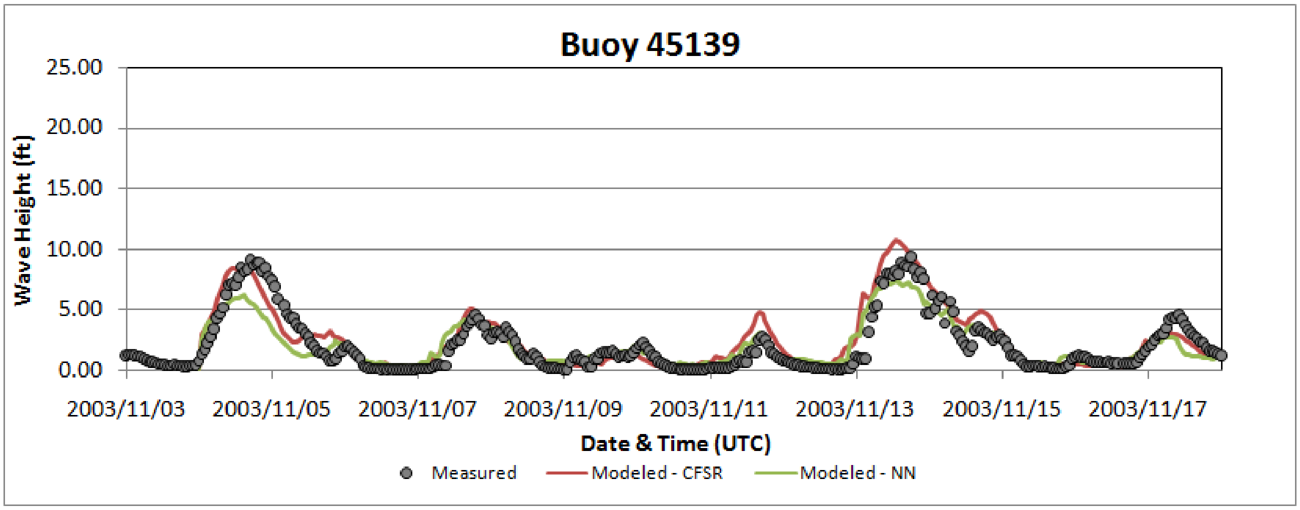
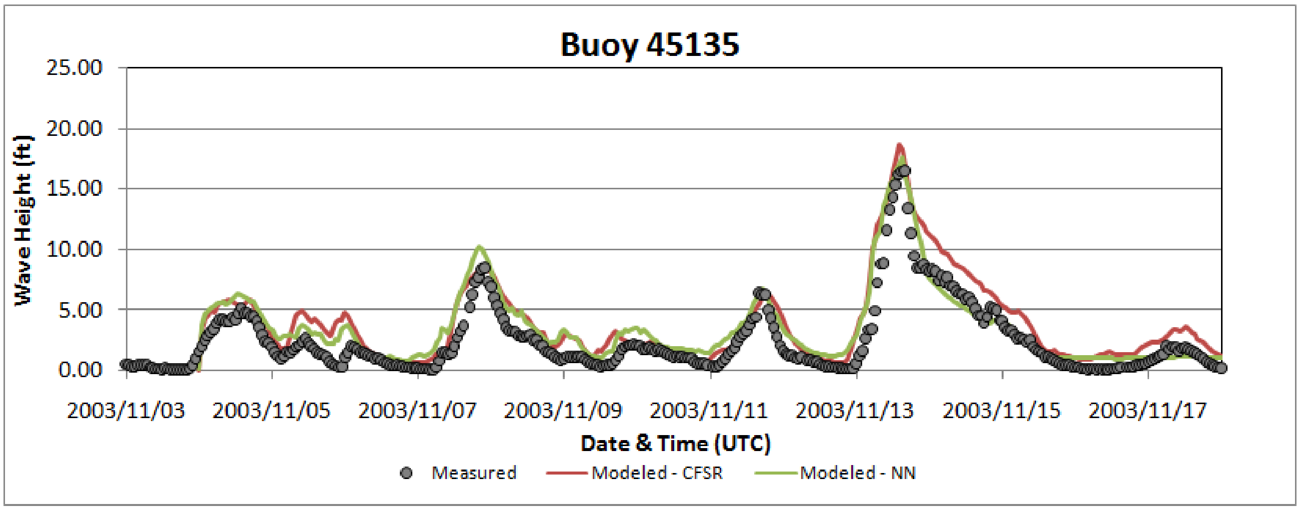


Figure A.1 Comparison of Predicted and Measured Wave Heights for the September 19, 2003 Storm Event





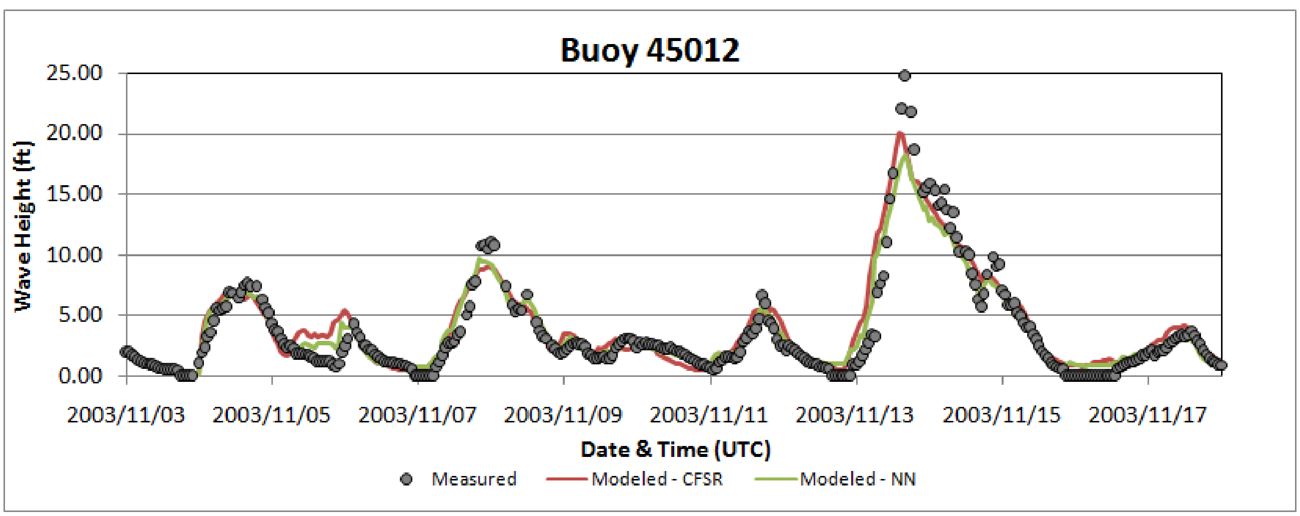


Figure A.2 Comparison of Predicted and Measured Wave Heights for the November 13, 2003 Storm Event

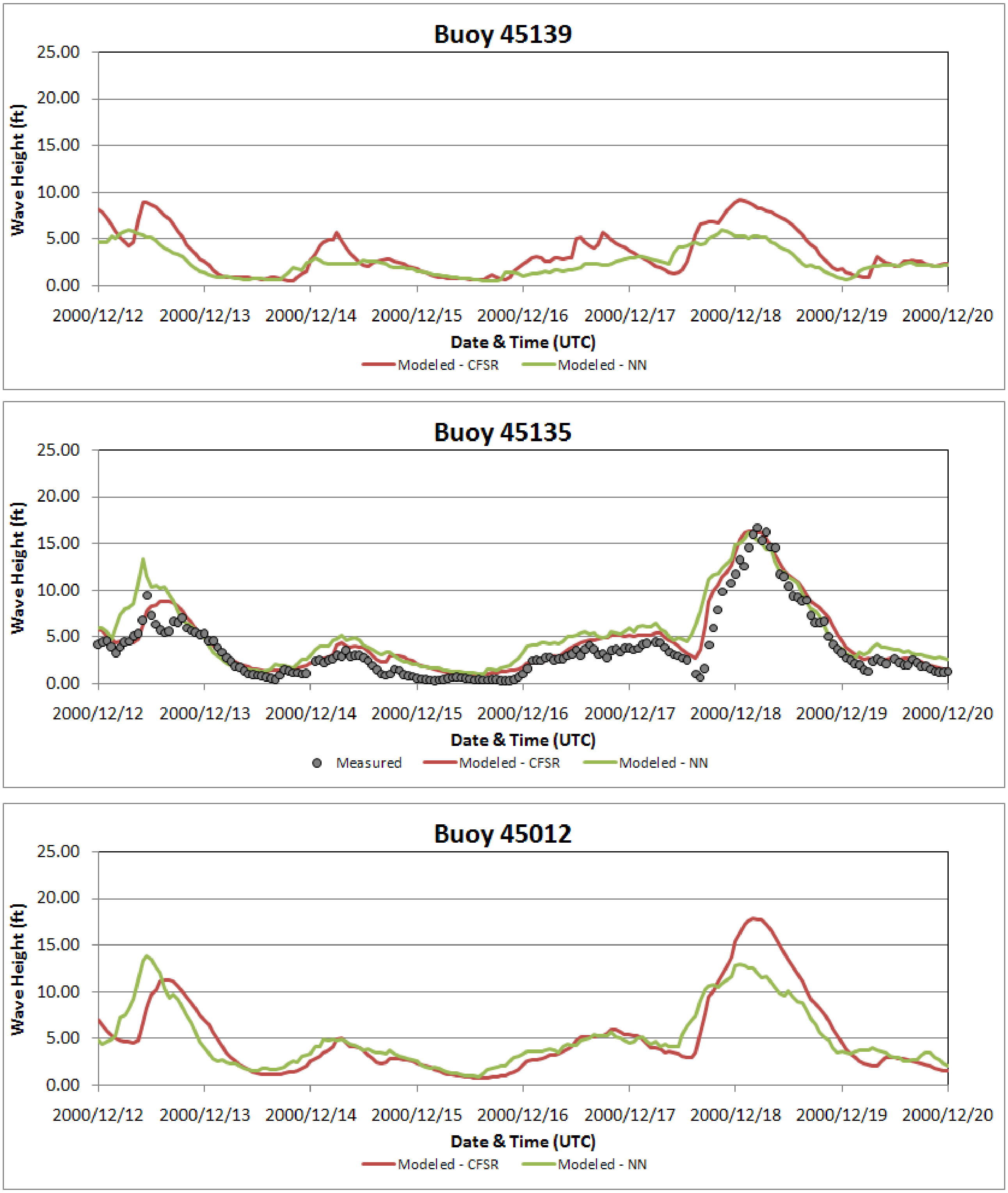


Figure A.3 Comparison of Predicted and Measured Wave Heights for the December 18, 2000 Storm Event

APPENDIX F - SWAN MODEL CALIBRATION PLOTS

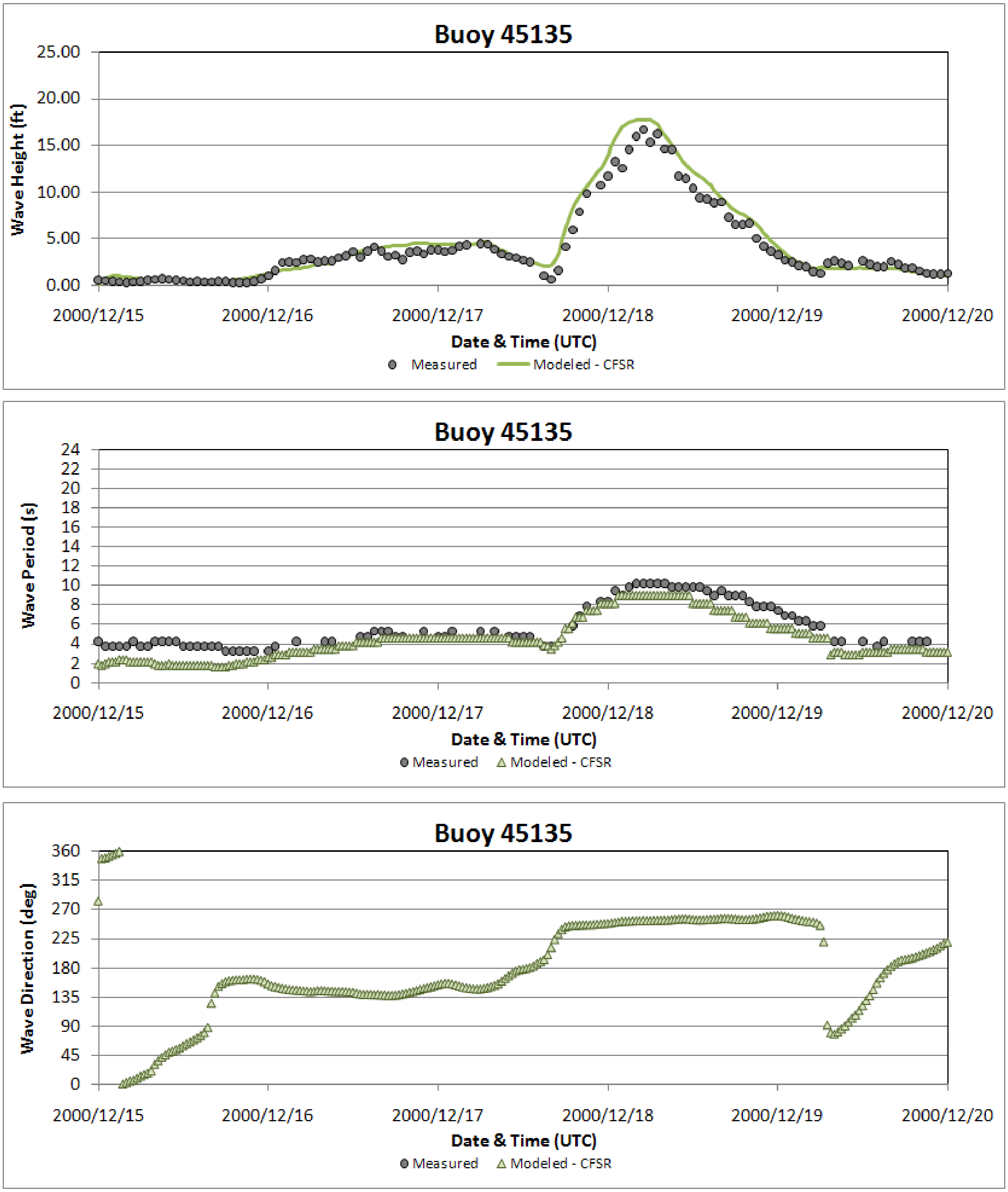
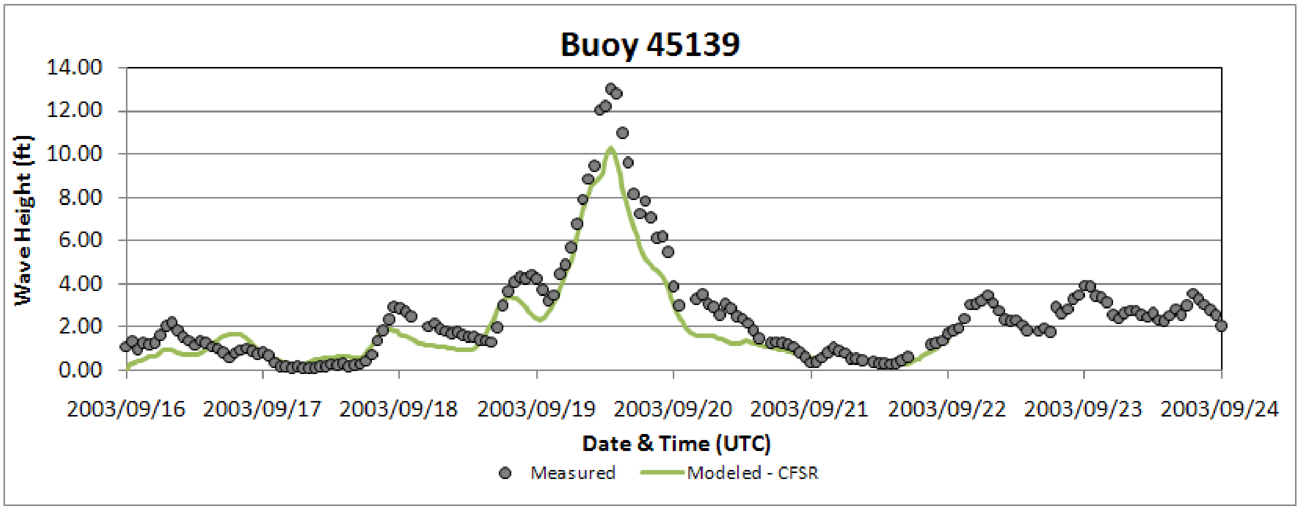
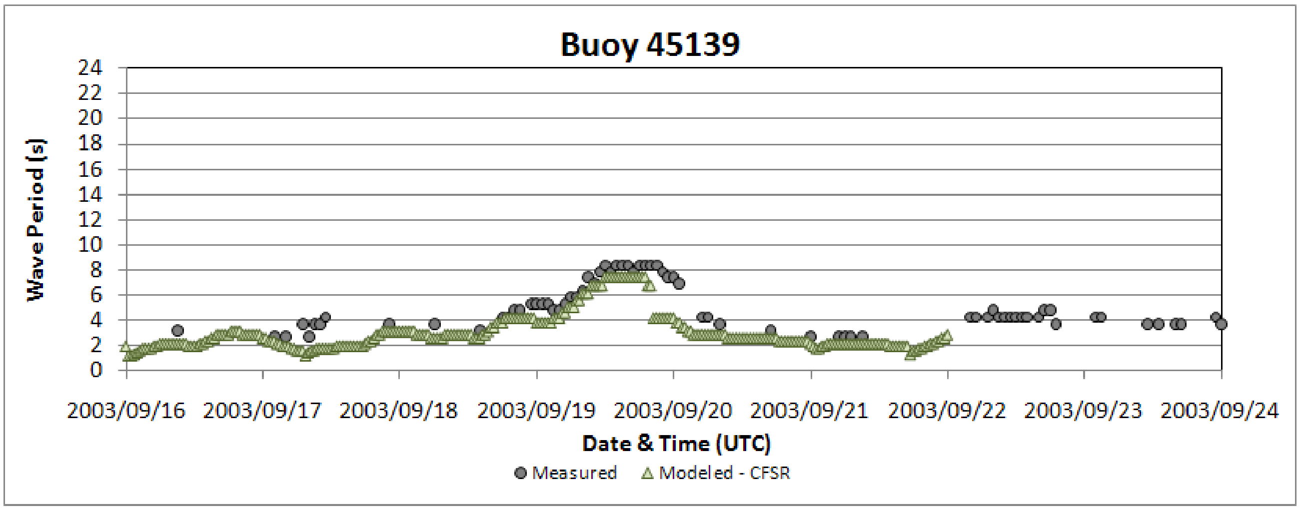


Figure B.1 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45135 (Storm Event: December 18, 2000)





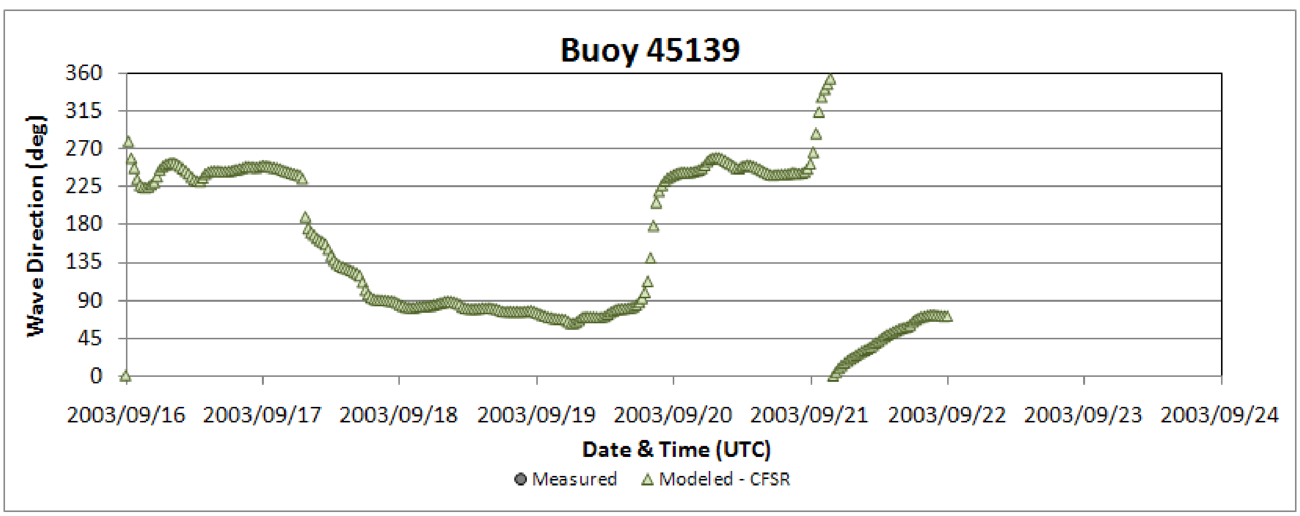


Figure B.2 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45139 (Storm Event: September 19, 2003)

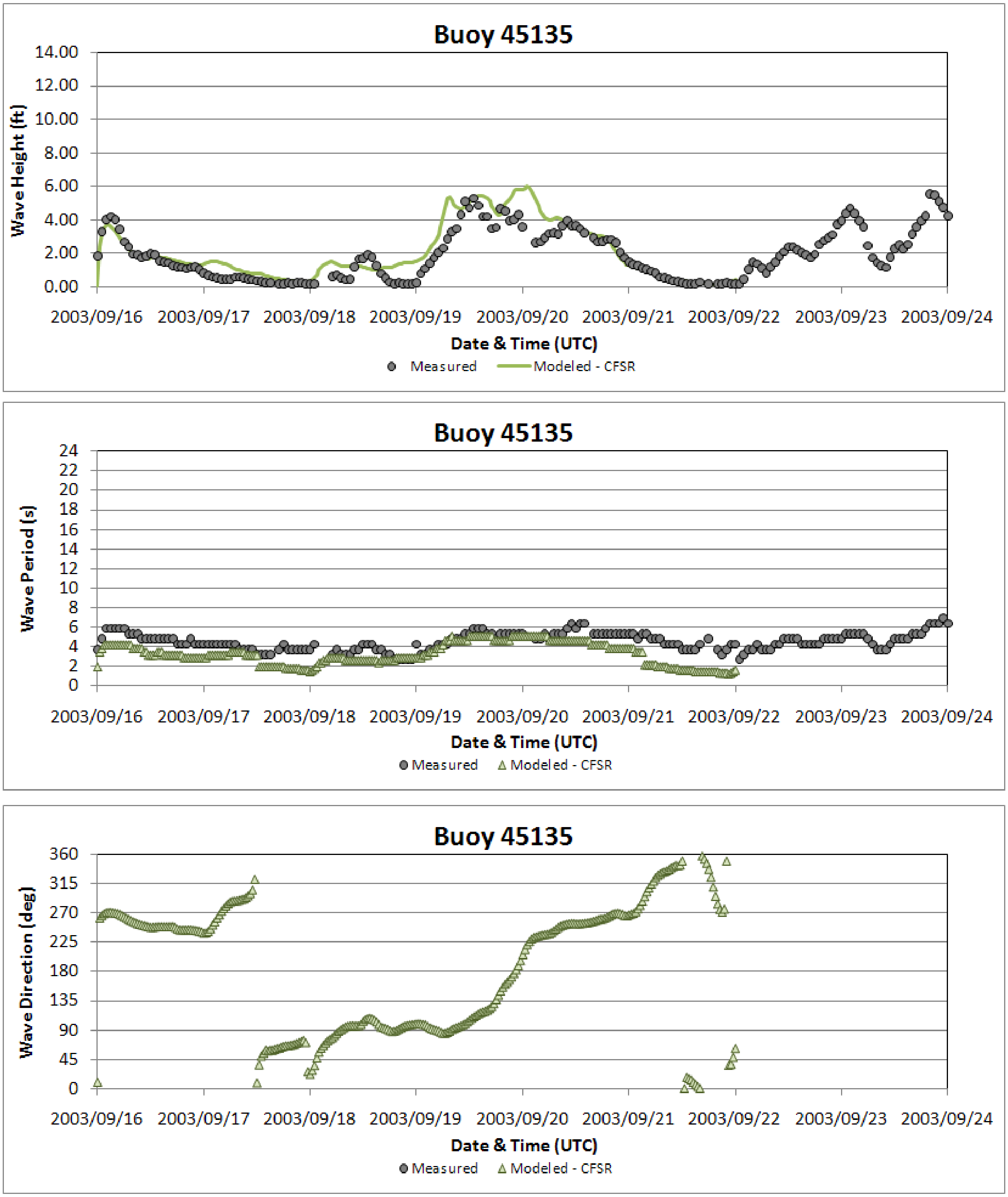


Figure B.3 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45135 (Storm Event: September 19, 2003)

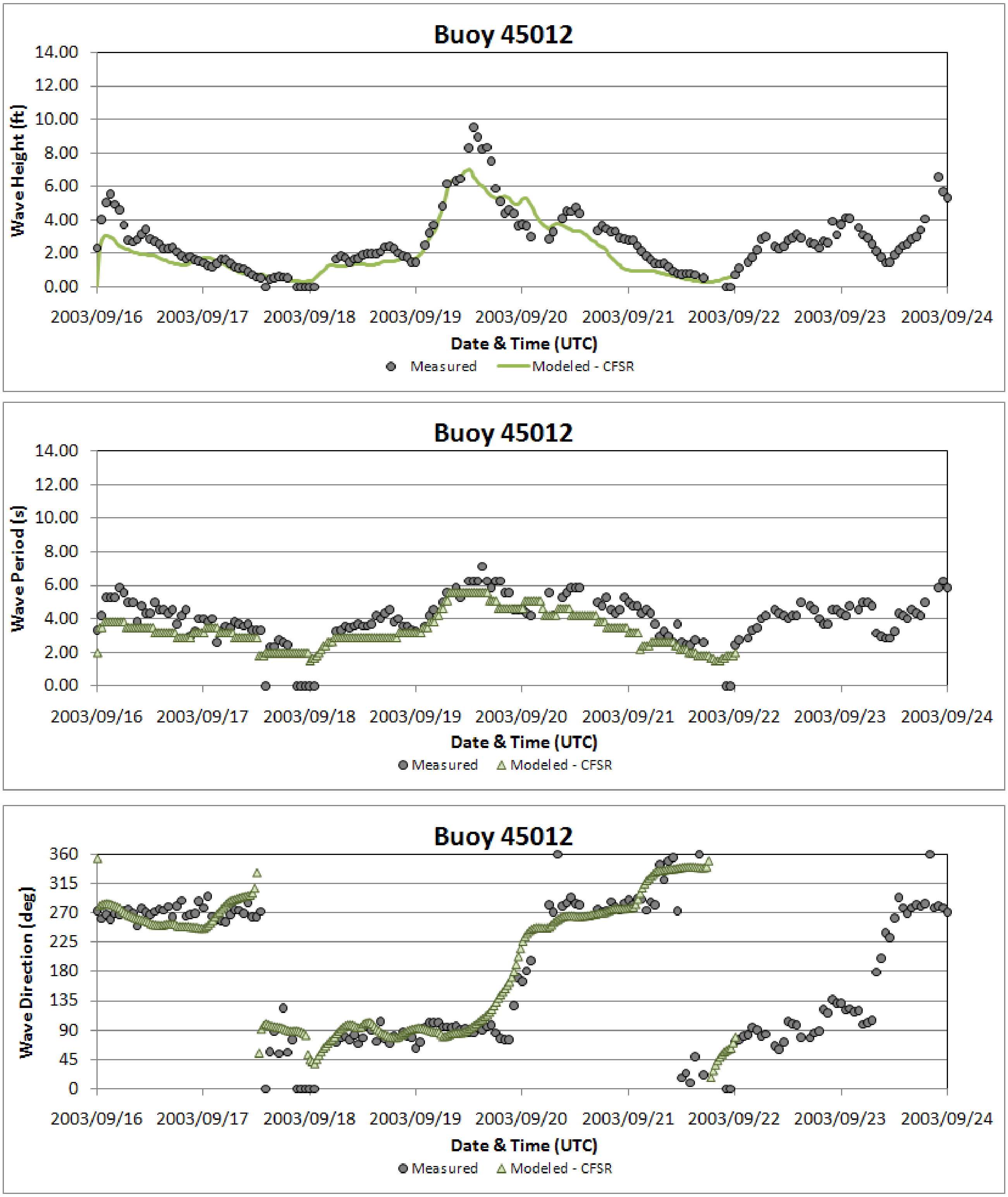
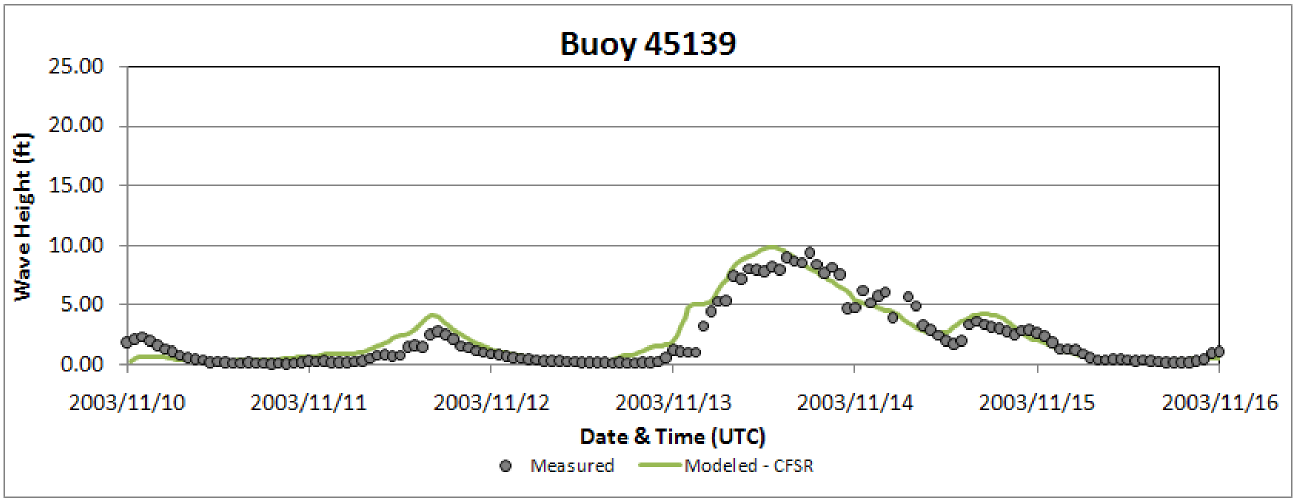
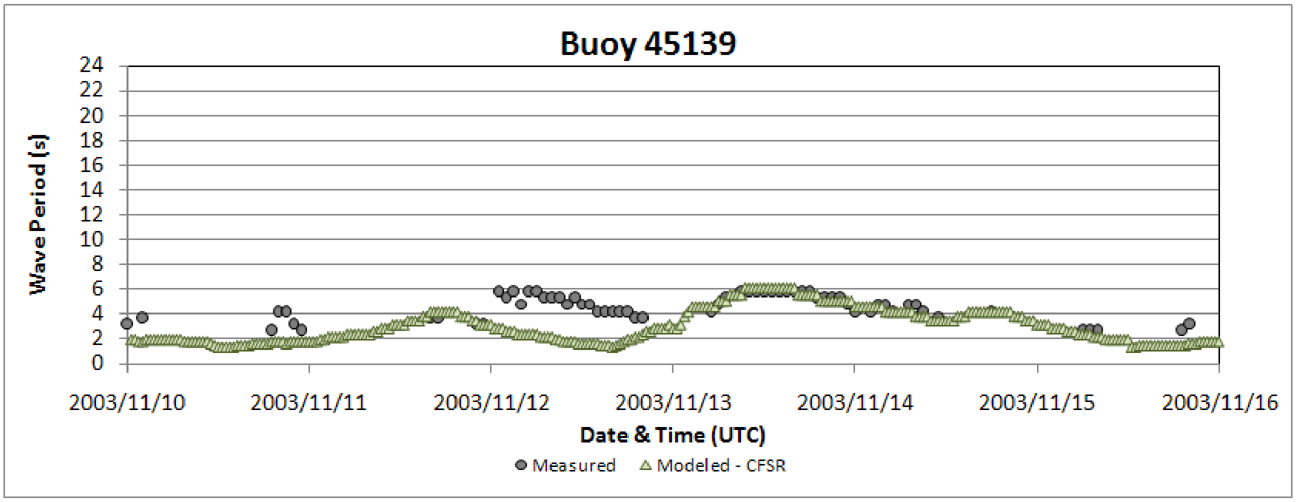


Figure B.4 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45012 (Storm Event: September 19, 2003)





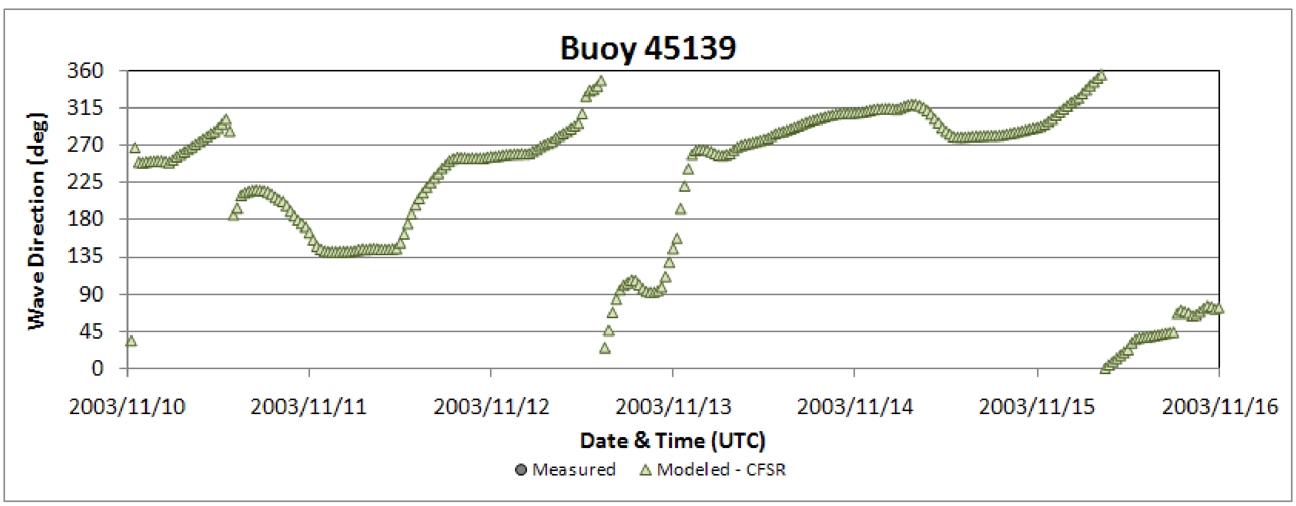


Figure B.5 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45139 (Storm Event: November 13, 2003)

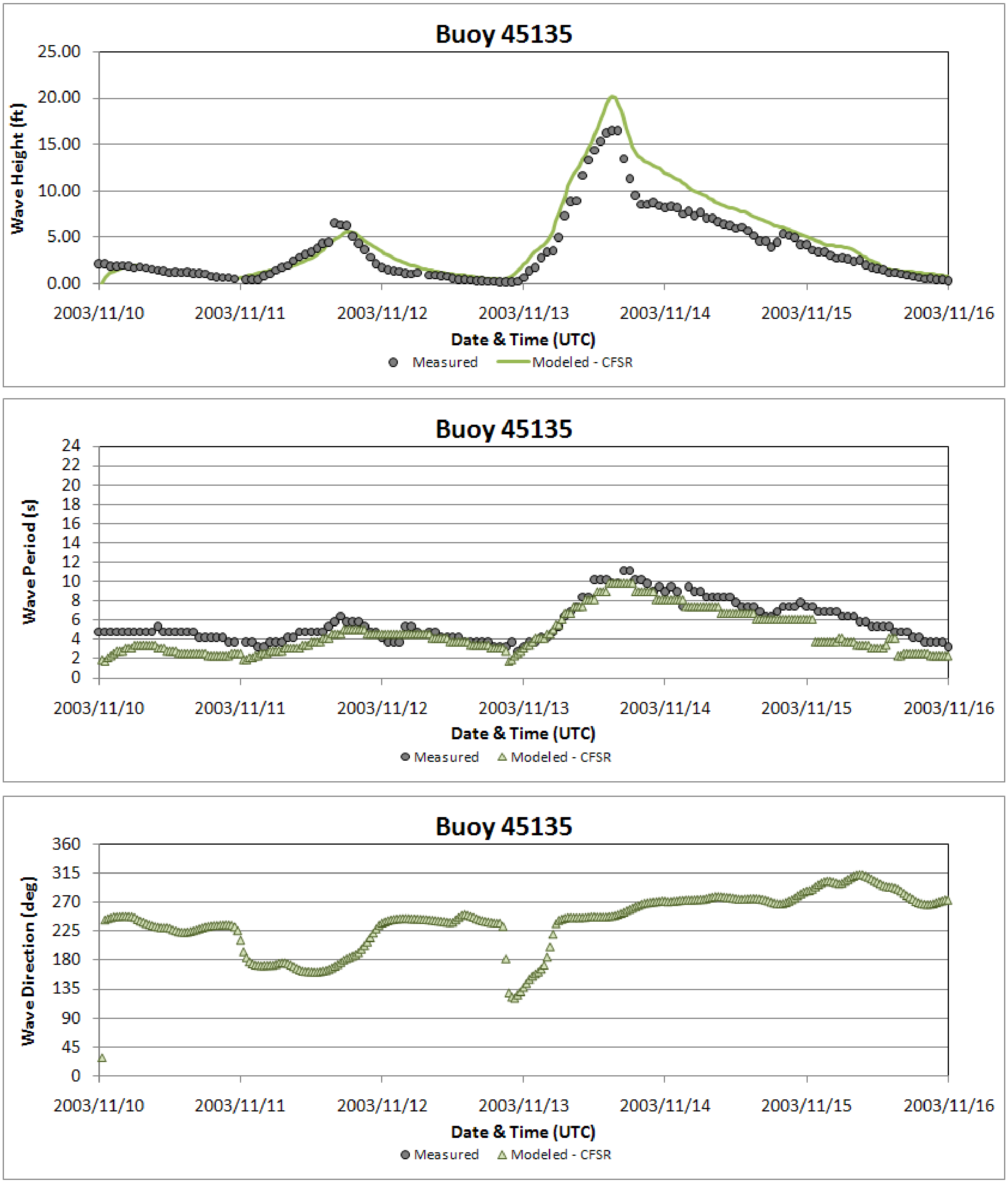
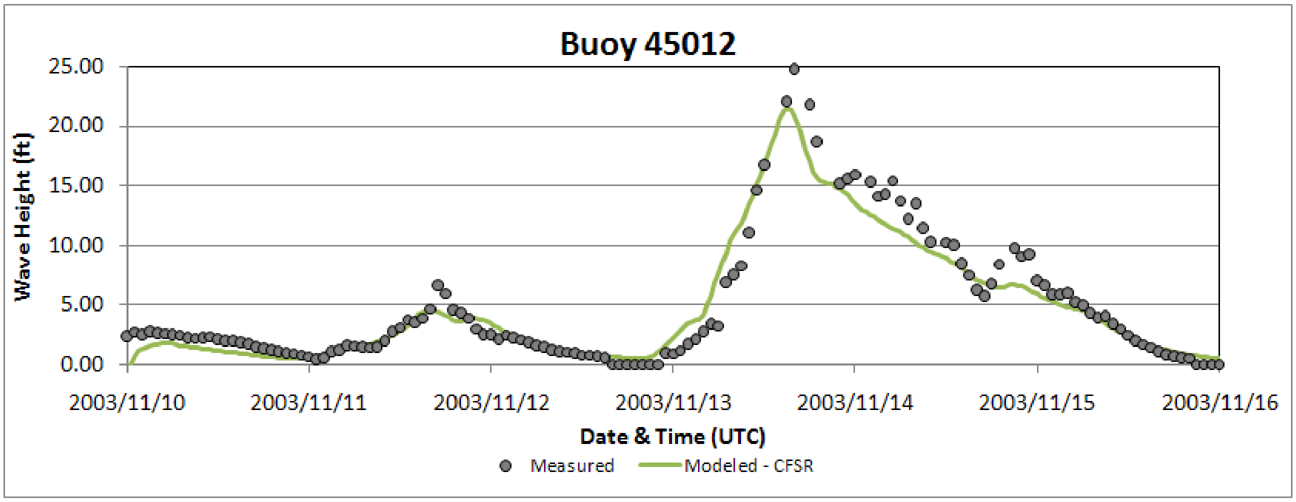
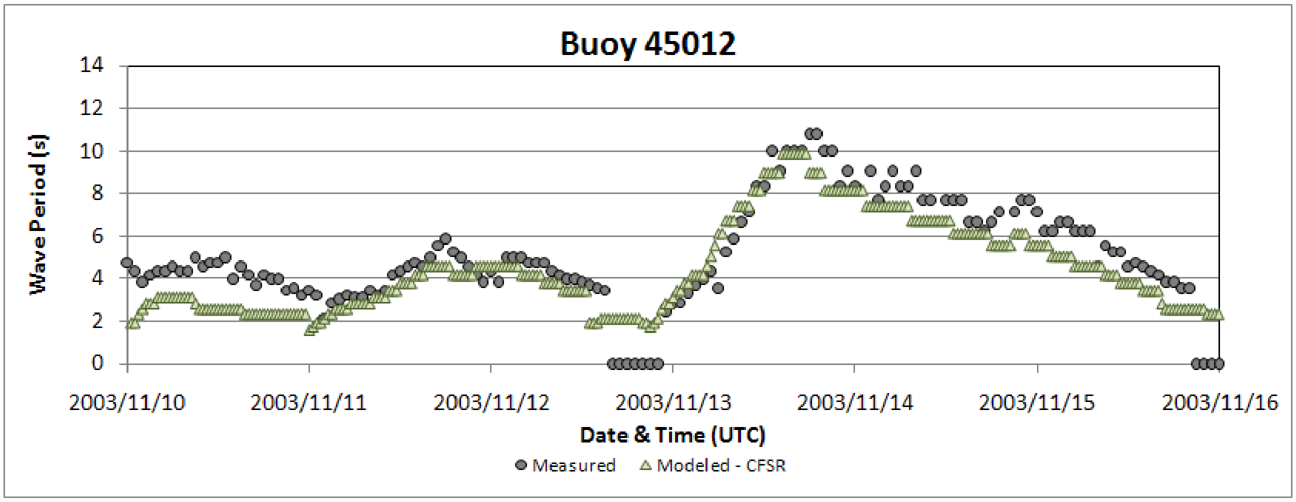


Figure B.6 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45135 (Storm Event: November 13, 2003)





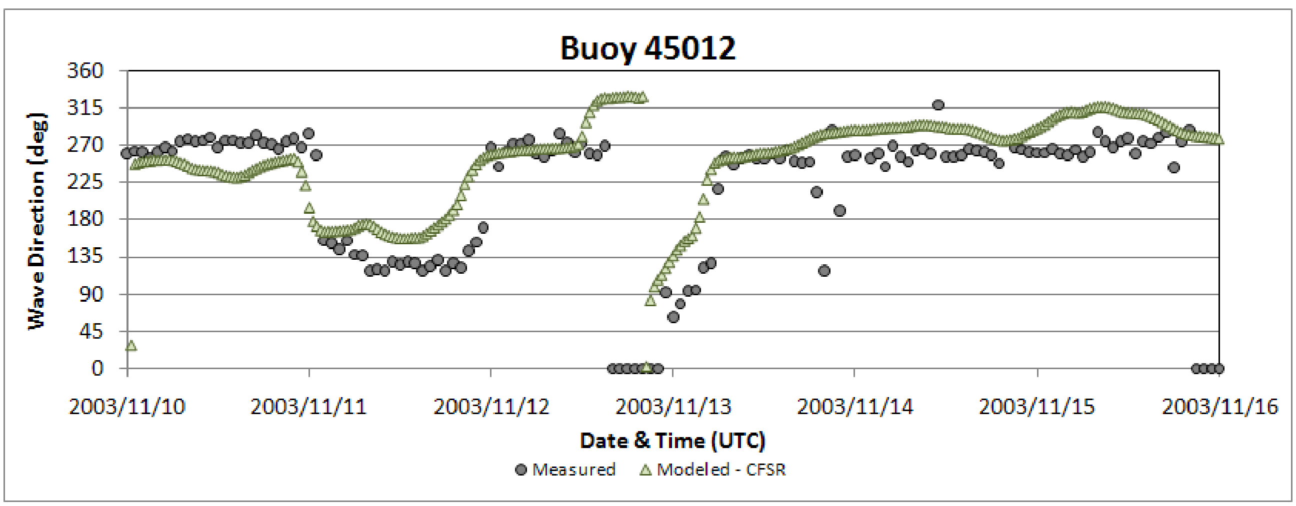


Figure B.7 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45012 (Storm Event: November 13, 2003)

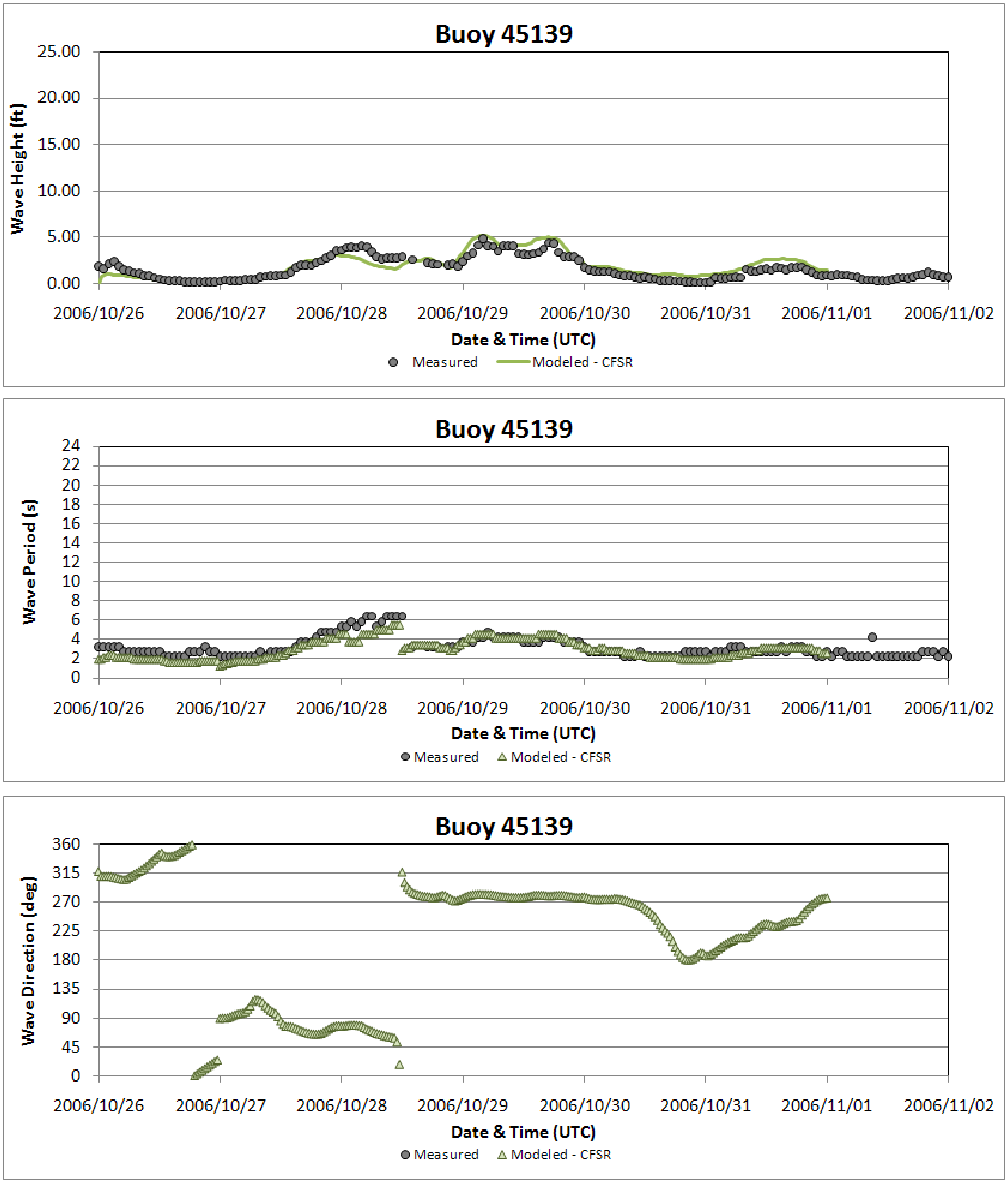


Figure B.8 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45139 (Storm Event: October 29, 2006)

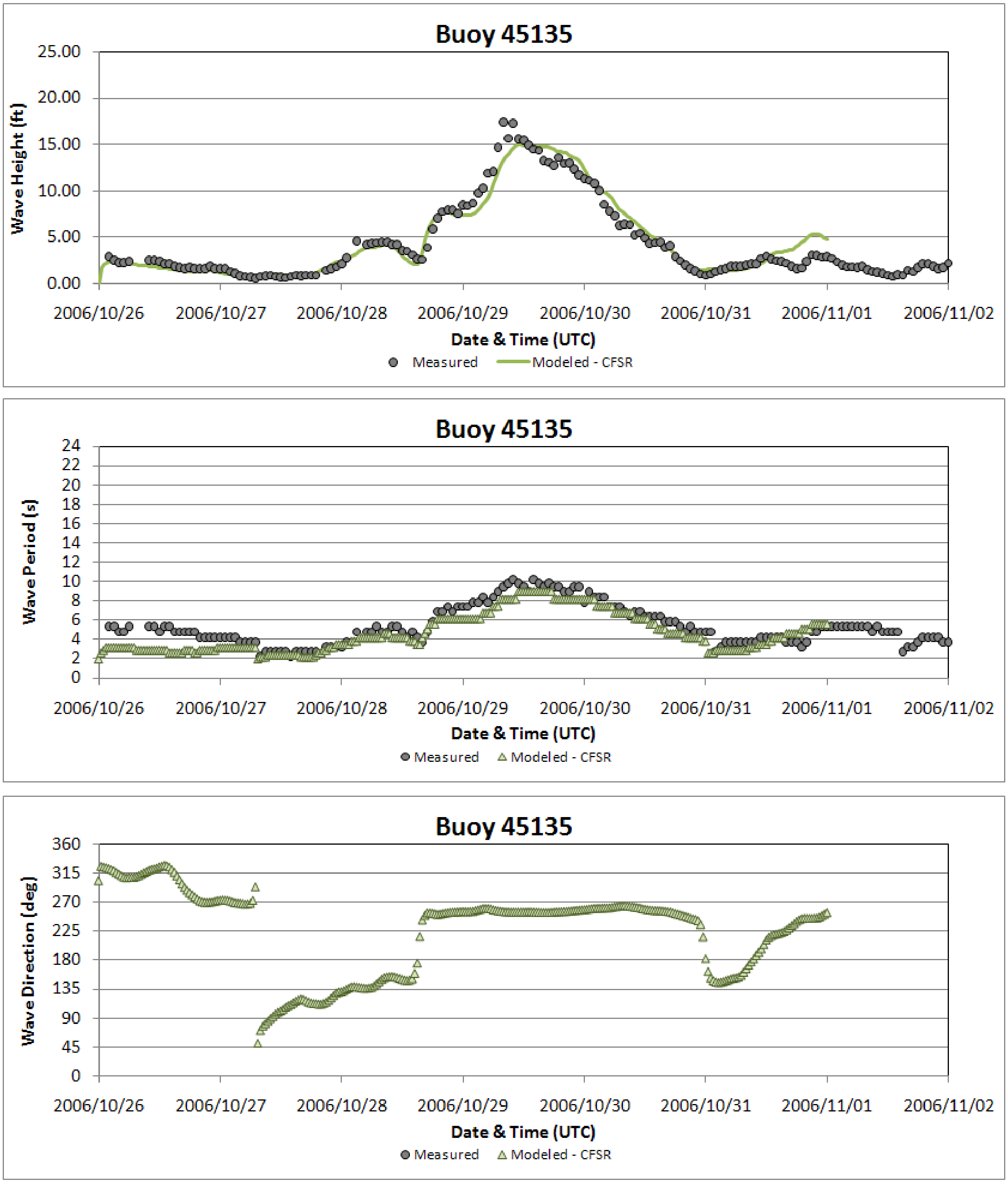


Figure B.9 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45135 (Storm Event: October 29, 2006)

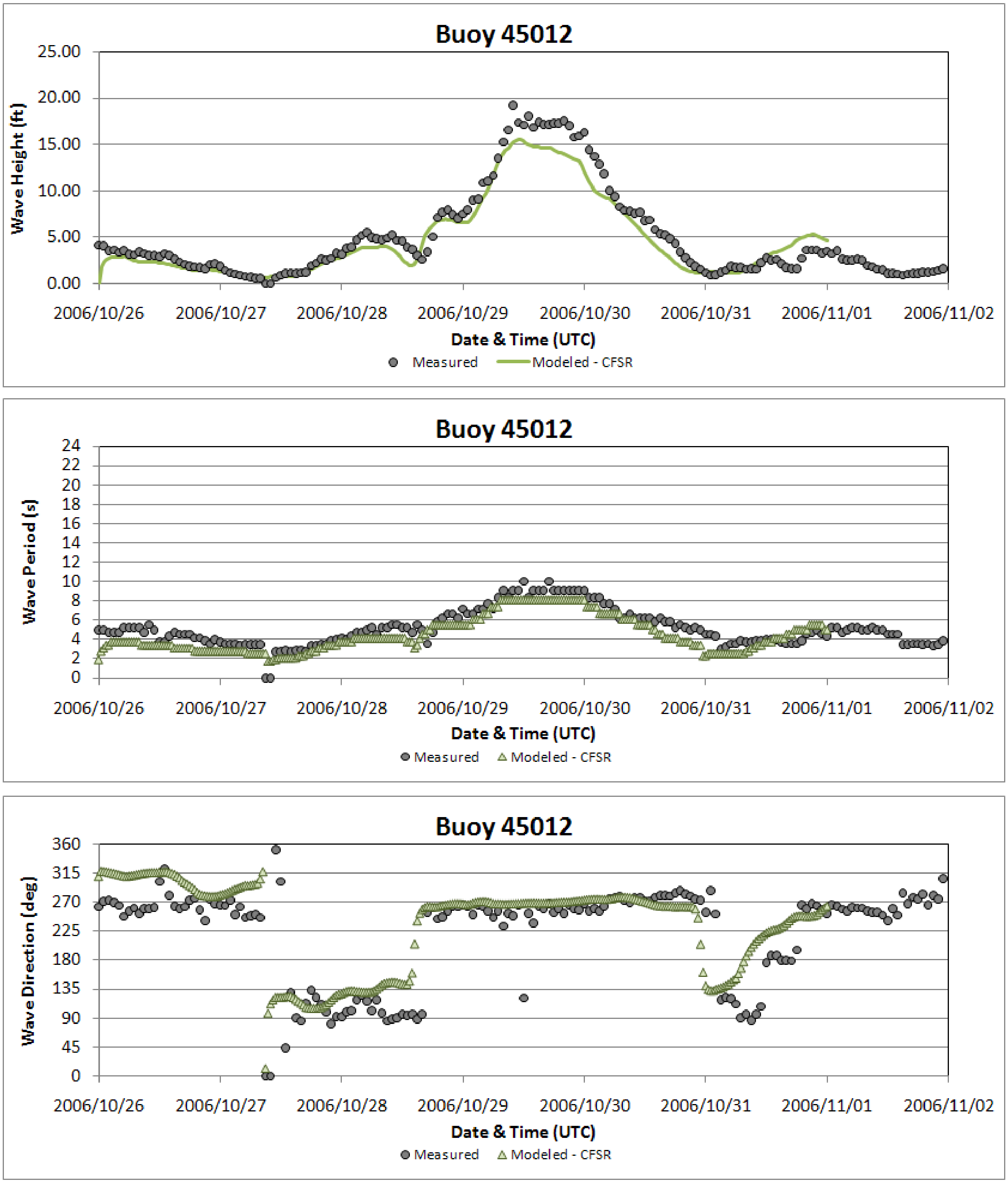
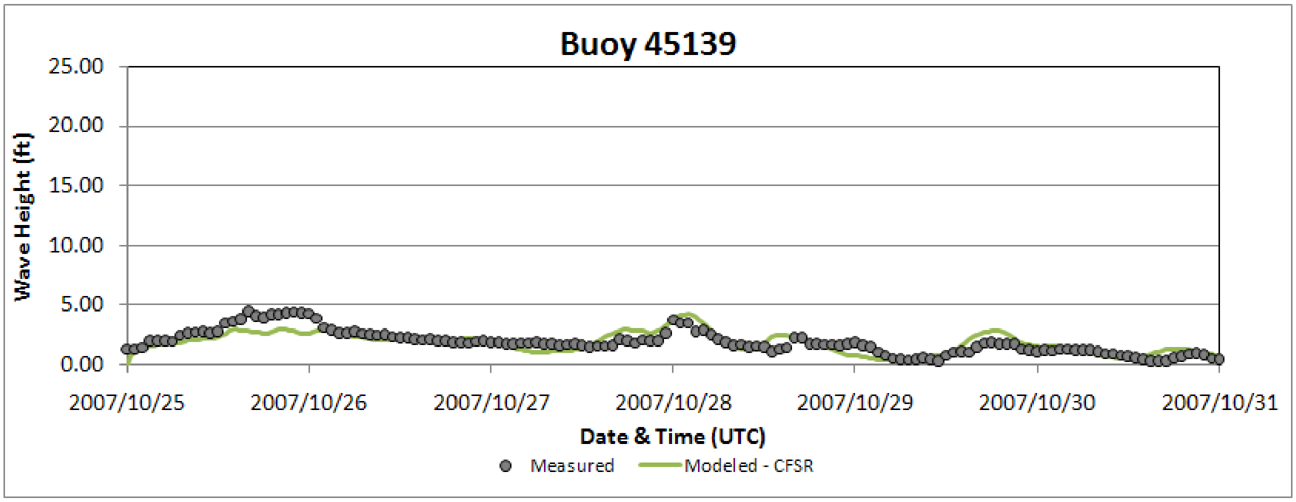
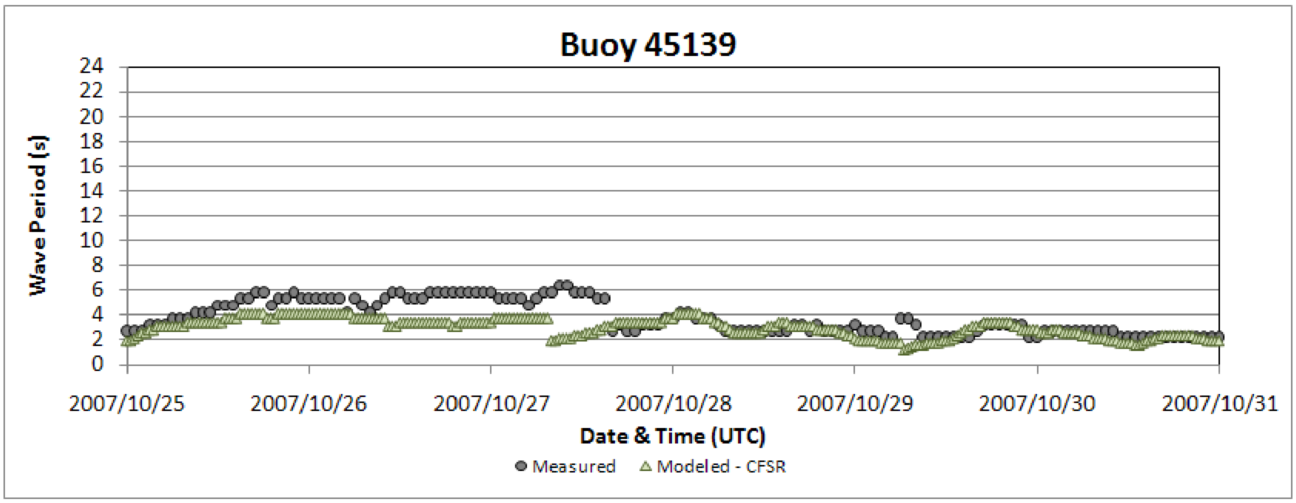


Figure B.10 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45012 (Storm Event: October 29, 2006)





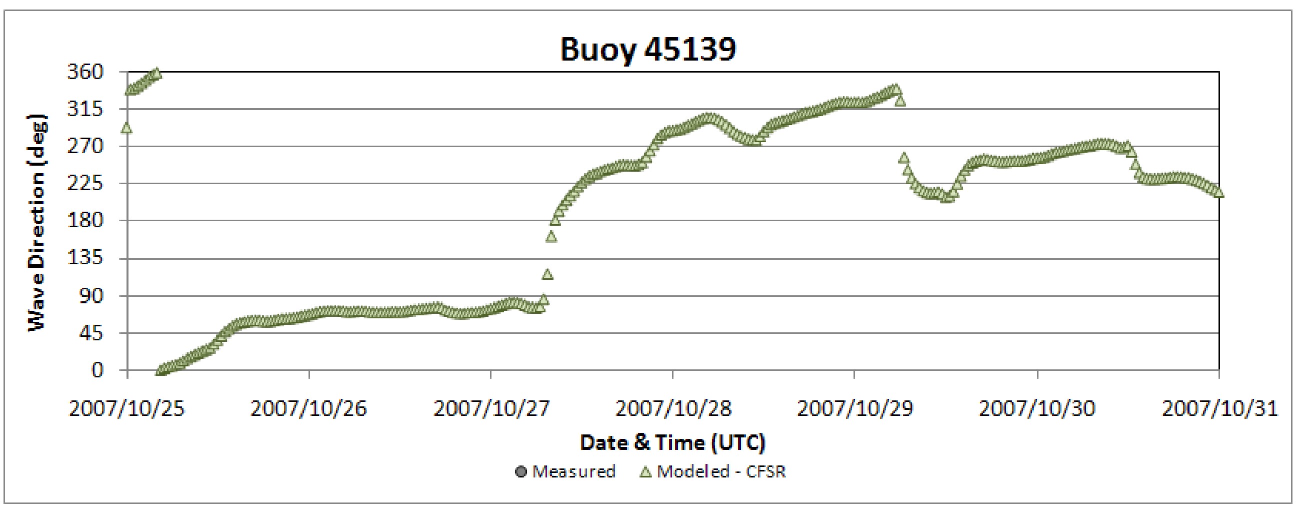
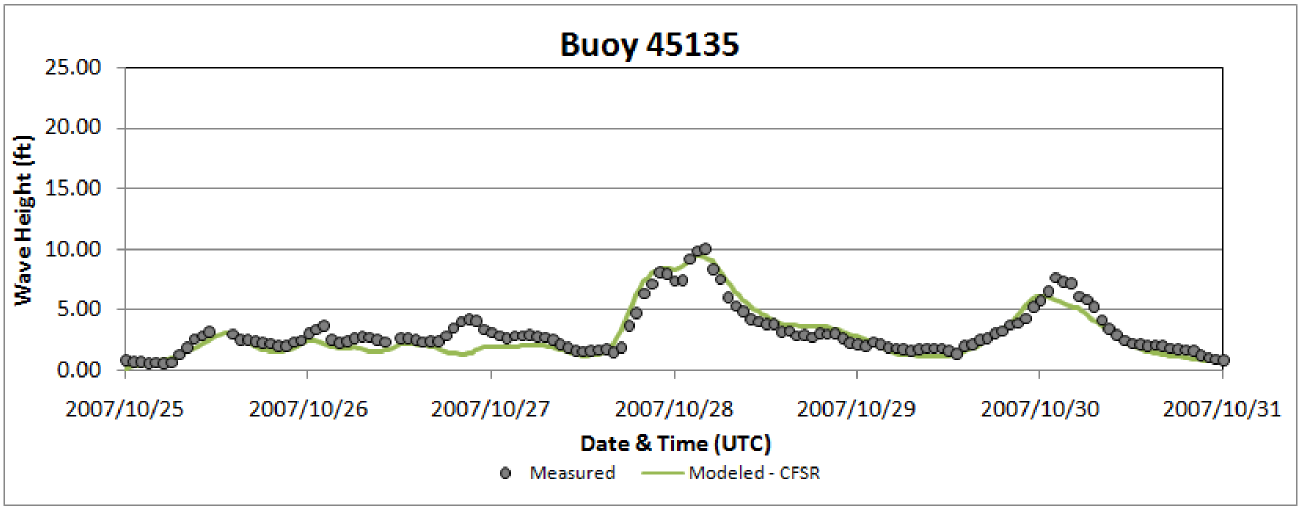
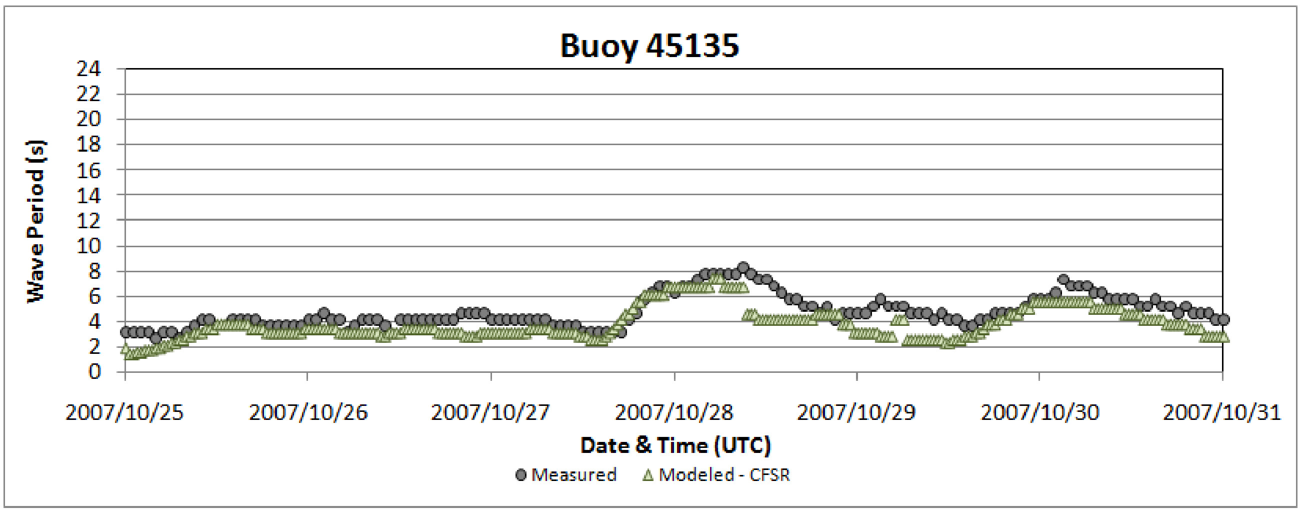


Figure B.11 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45139 (Storm Event: October 28, 2007)





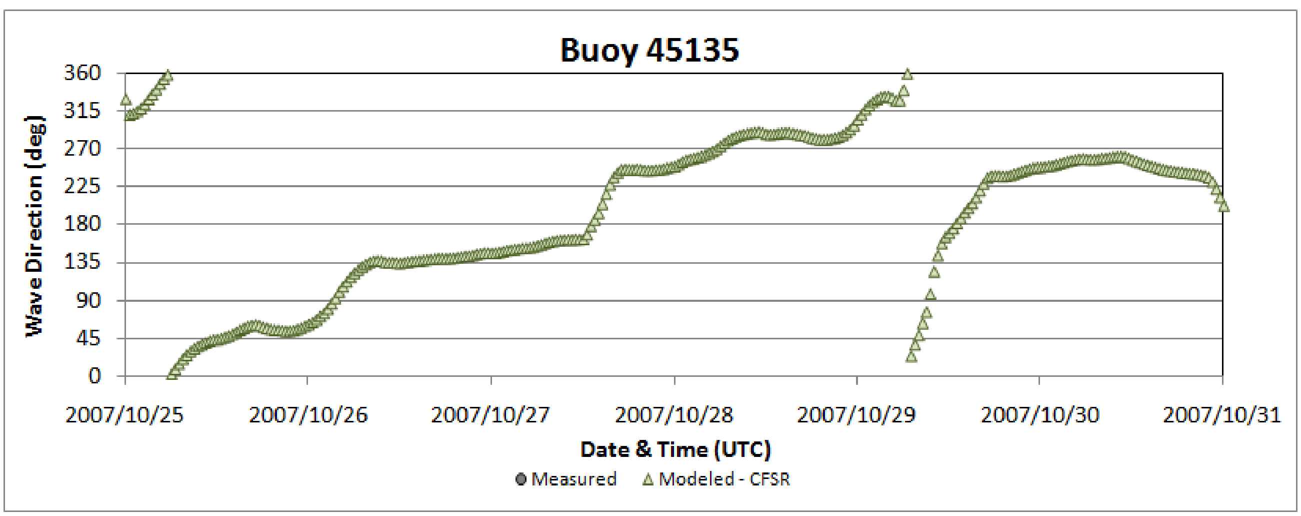
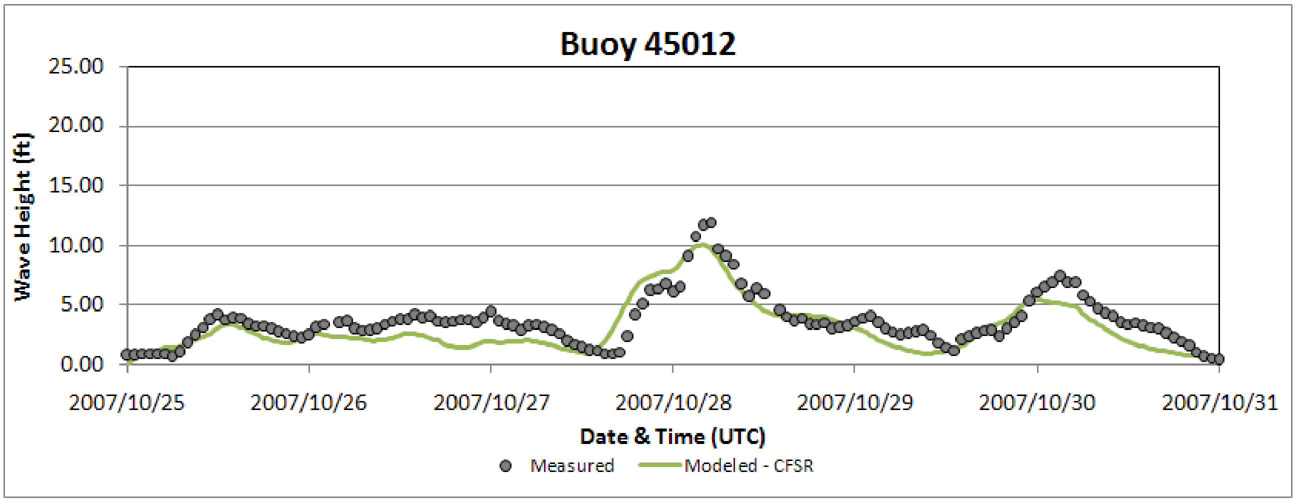
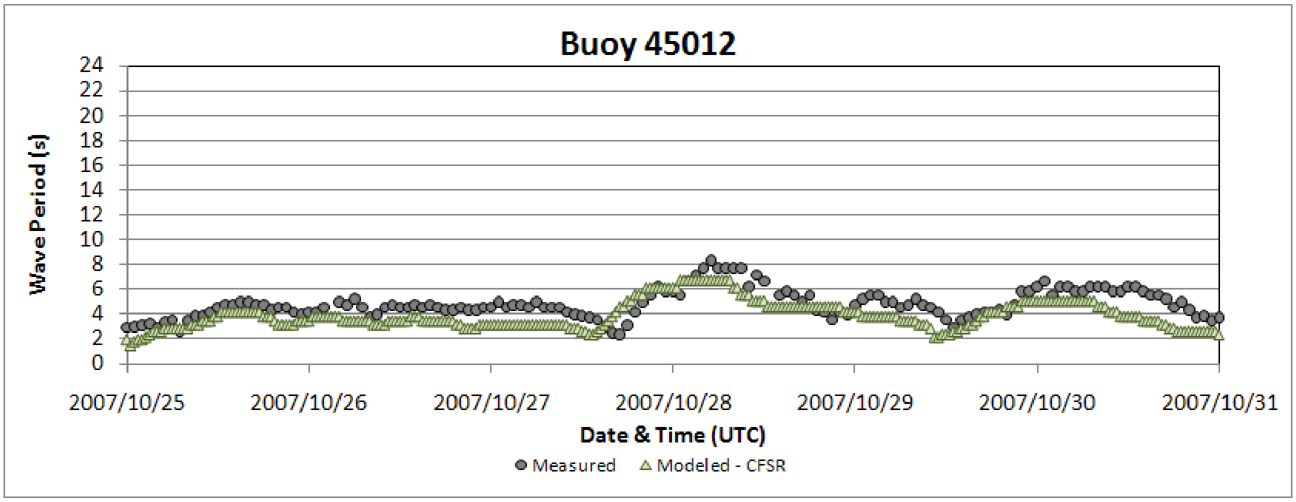


Figure B.12 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45135 (Storm Event: October 28, 2007)





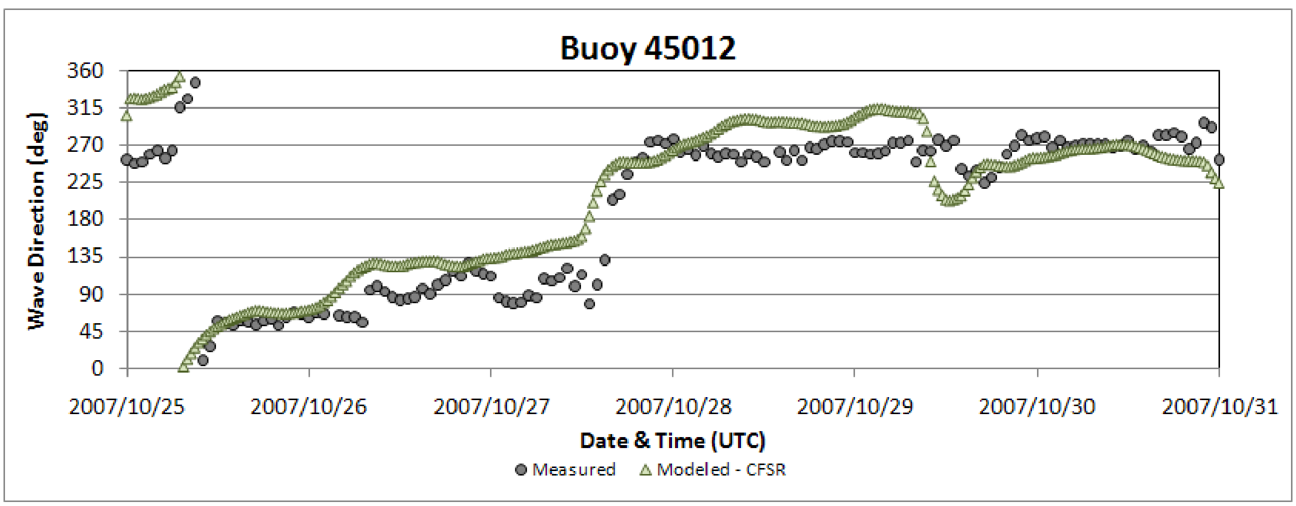


Figure B.13 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45012 (Storm Event: October 28, 2007)

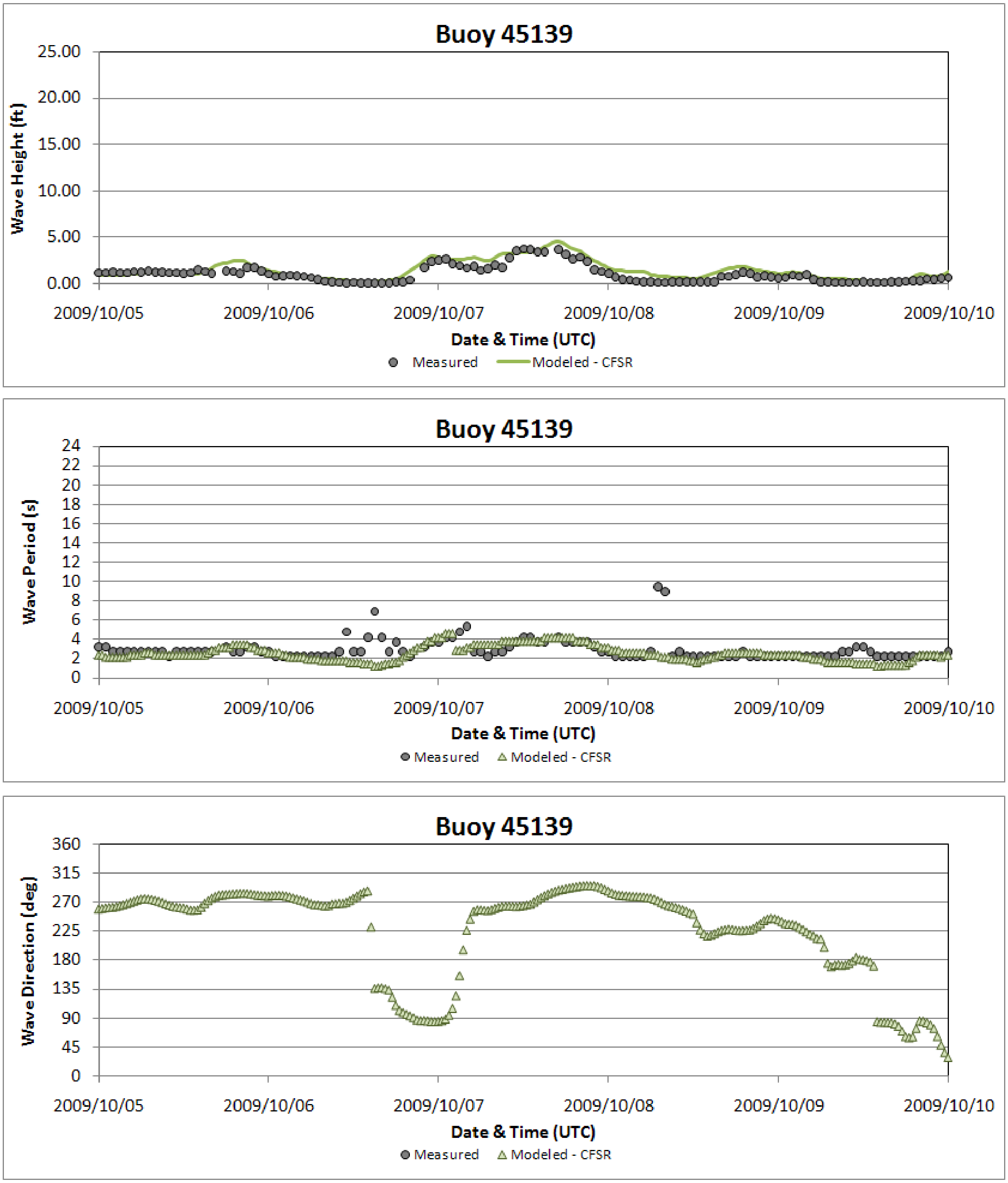
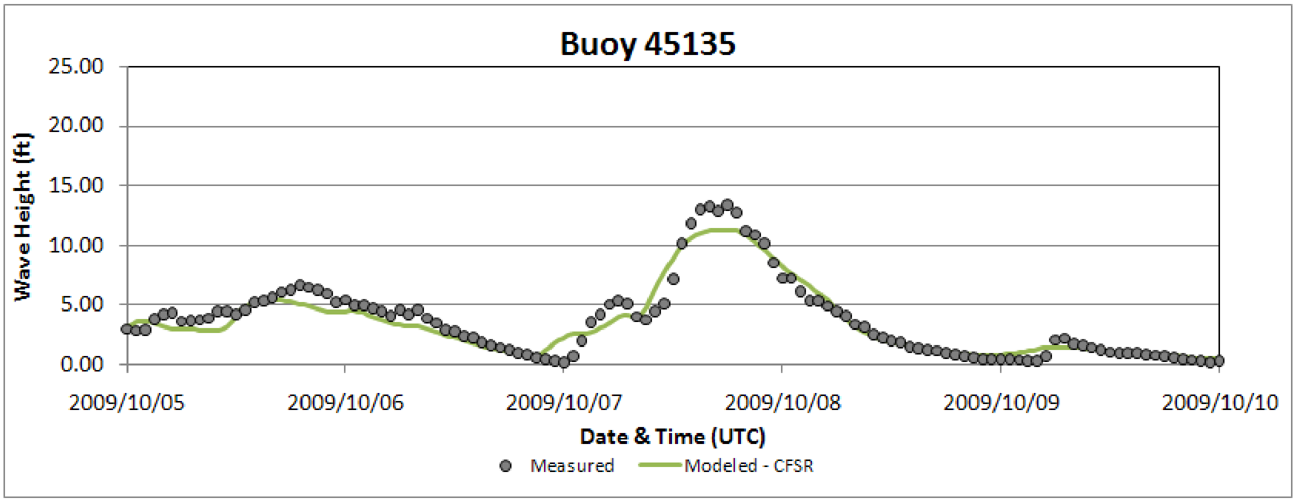
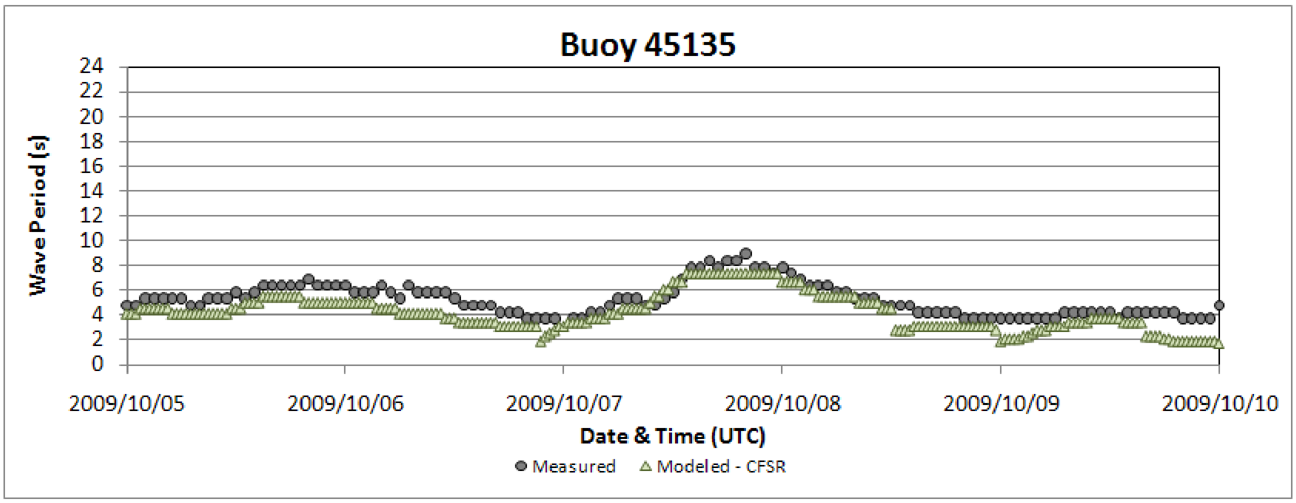


Figure B.14 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45139 (Storm Event: October 7, 2009)





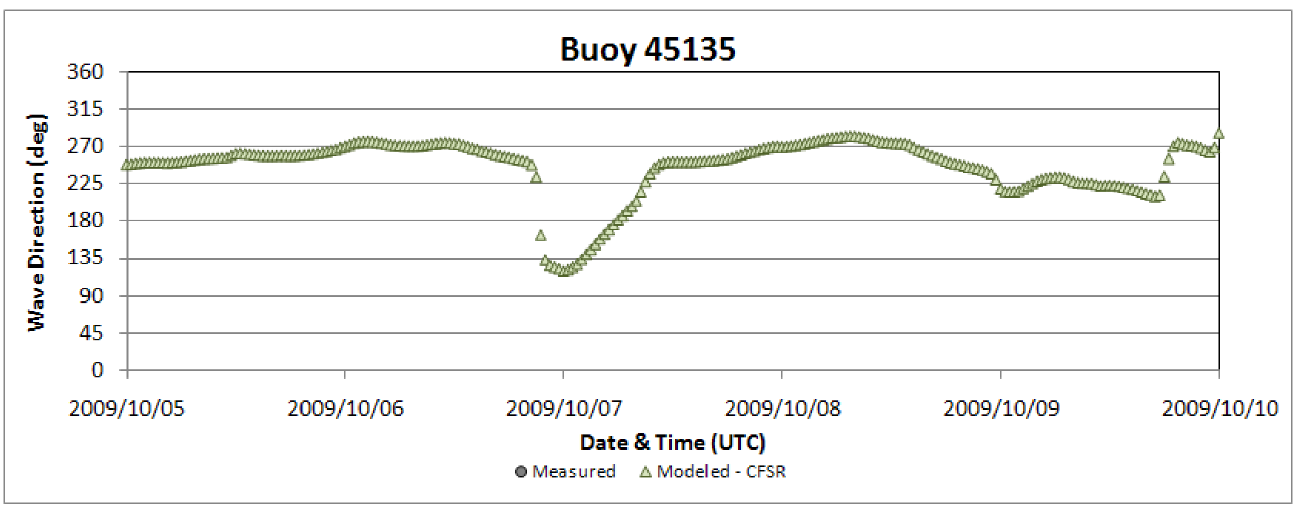
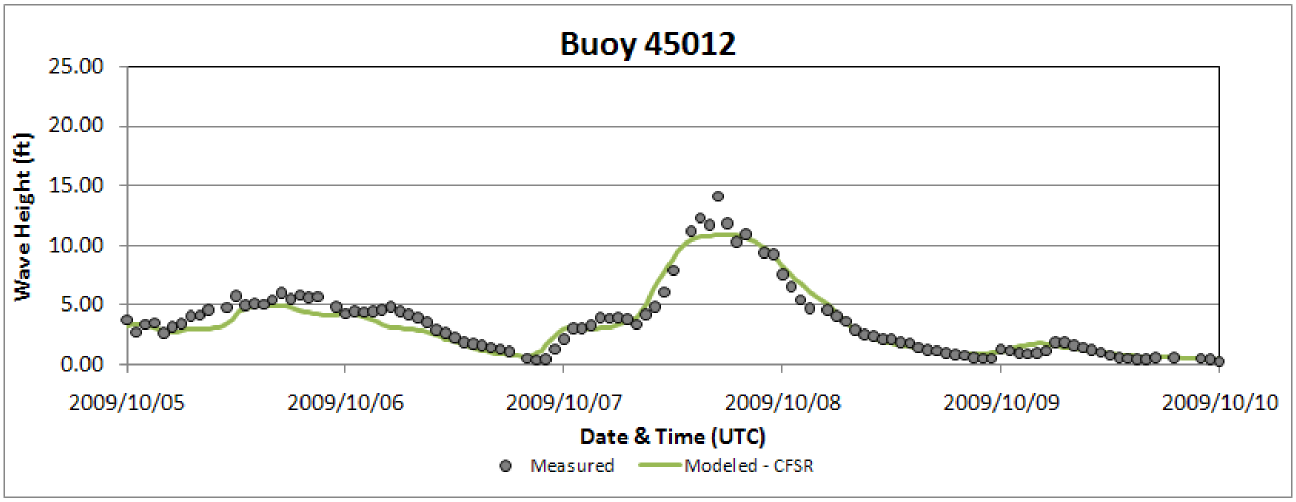
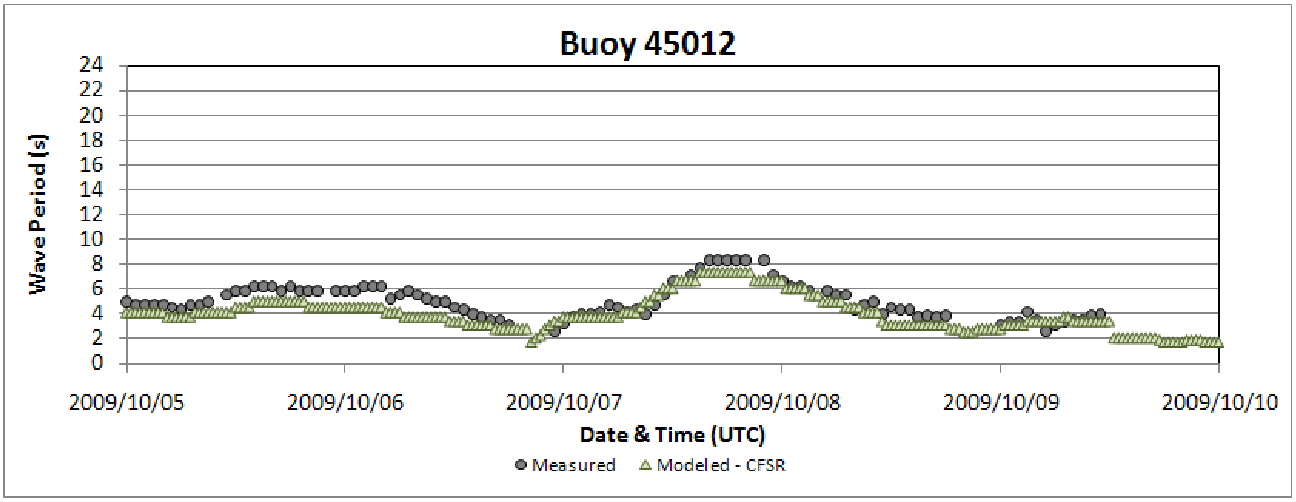


Figure B.15 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45135 (Storm Event: October 7, 2009)





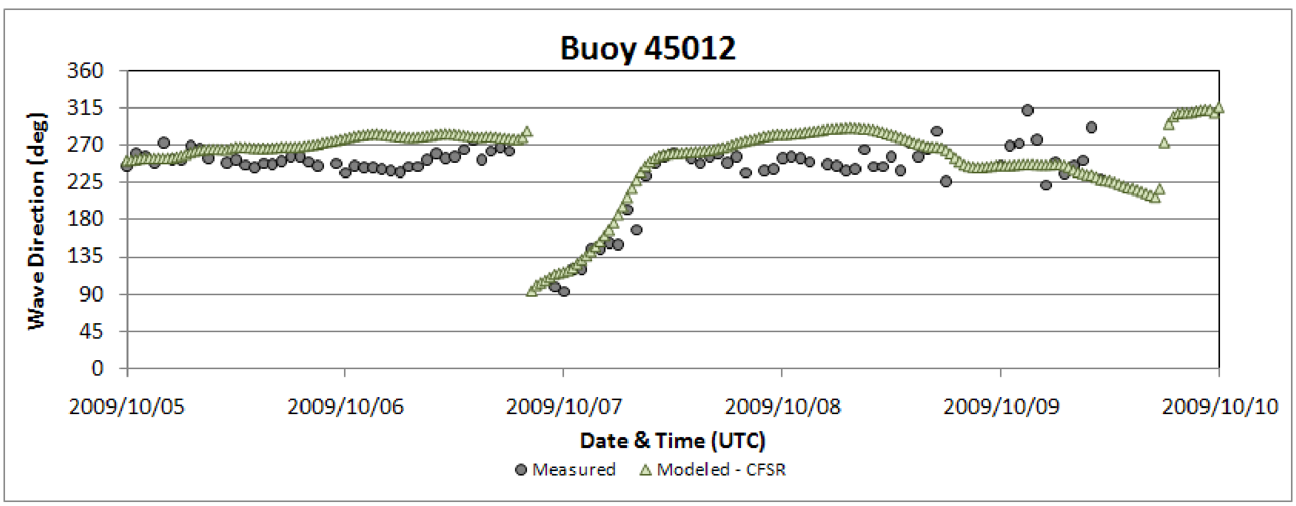


Figure B.16 Timeseries Comparison of Predicted and Measured Wave Conditions at Buoy 45012 (Storm Event: October 7, 2009)

APPENDIX G – QAQC FORMS

ADCIRC REVIEW	
Storm:	Storm001_1979040300
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/4/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

<table>
<tr><th colspan="4">Issues</th></tr>
<tr><th>File</th><th>Comment</th><th>Resolution</th><th>Verification</th></tr>
<tr><td>Maxele.63</td><td>High surface elevation/velocity along the Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>Maxele.63</td><td>Noisy at the shoreline along Wayne and Monroe Counties (New York)</td><td>The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.</td><td>BSH</td></tr>
<tr><td>Maxwvel.63</td><td>Sharp gradient in wind velocity along the eastern edge of the lake</td><td rowspan="3">Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>Maxwvel.63</td><td>Anomalous gradient just west of the Niagara River – not as pronounced as other storms</td><td>BSH</td></tr>
<tr><td>Maxwvel.63, minpr.63</td><td>Sharp gradients in the Irondequoit and Sodus Bays</td><td>BSH</td></tr>
</table>

<u>Additional Comments on Detailed Check</u>

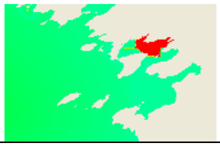
Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

RUN NAME:

ADCIRC REVIEW	
Storm:	Storm002_1980010900
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/5/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

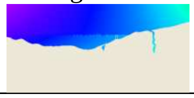
File	Comment	Resolution	Verification
Maxele.63	High surface elevation/velocity along the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxele.63	Some noise at the shoreline, appears to be low at “headlands” and higher in embayments	The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	BSH
Maxwvel.63	Area with zero wind 	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
Maxwvel.63	Horizontally oriented gradient in the western end of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Meas v model	Model appears to be over predicting in the Cape Vincent area	The starting water surface elevation in the model is set to the average of all four gauges. In this storm it appears that the water level at Cape Vincent at the start of the storm was lower than the other gauges causing an overprediction in SE. Note that, Cape	BSH

		Vincent is located in the St. Lawrence River where water levels can be influenced by downstream conditions that are not included in the model. Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td colspan="2">Storm:</td><td colspan="2">Storm003_1981060600</td></tr>
<tr><td colspan="2">Reviewer:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Organization:</td><td colspan="2">RAMPP</td></tr>
<tr><td colspan="2">Date Checked:</td><td colspan="2">4/5/2012</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><td>File</td><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td>Maxele.63</td><td>High values in Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>Maxele.63</td><td>Some noise at the shoreline in the SE</td><td>The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.</td><td>BSH</td></tr>
<tr><td>Maxwvel.63, minpr.63</td><td>Sharp gradients in the Irondequoit and Sodus Bays</td><td>Gradient in wind is caused by extrapolation routine; the difference is about 4% in Irondequoit Bay and 2% in Sodus Bay. The gradient has been found to have negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>Maxwvel.63, minpr.63</td><td>Sharp gradient just west of Niagara River
</td><td rowspan="2">Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>Maxwvel.63</td><td>Sharp, very vertically oriented gradient at the east end of Lake:
</td><td>BSH</td></tr>
<tr><td colspan="4"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td colspan="2">Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="2">Reviewer Signature:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Date:</td><td colspan="2">6/5/2012</td></tr>
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ADCIRC REVIEW	
Storm:	Storm004_1982010800
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/5/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxele.63	High values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxele.63	Some noise at the shoreline, appears to be low at "headlands" and higher in embayments	The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	BSH
Maxwvel.63	Area with zero wind in the north: 	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
Maxwvel.63, minpr.63	Anomalous gradient just west of the Niagara River – not as pronounced as other storms	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxwvel.63	Artificial gradient at the Irondequoit Bay	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

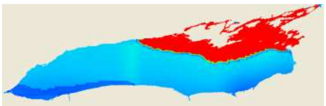
<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm005_1982012900
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/5/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

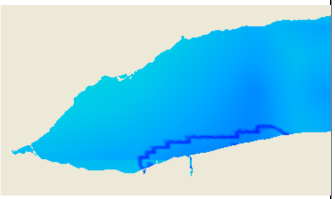
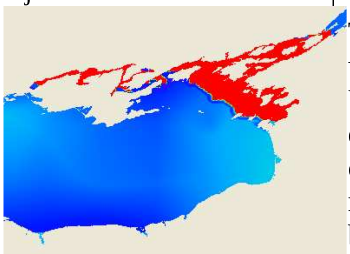
Issues

File	Comment	Resolution	Verification
Maxele.63	Anomalous values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Maxele.63	A small amount of noise at the shoreline, appears to be low at “headlands” and higher in embayments	The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	BSH
Maxwvel.63	Very sharp gradient where the wind goes to zero in the northeast 	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
Maxwvel.63	Another sharp gradient in the southwest	The Modified Garratt Formulation	BSH

<table>
<tr><td></td><td>(see screenshot above)</td><td>(MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.</td><td></td></tr>
<tr><td>Maxwvel.63</td><td>Horizontal gradient in the west</td><td rowspan="3">Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>Maxwvel.63</td><td>Vertical gradient in the east</td><td>BSH</td></tr>
<tr><td>Maxwvel.63, minpr.63</td><td>Anomalous in the Irondequoit Bay</td><td>BSH</td></tr>
</table>

<table>
<tr><td colspan="3"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW			
Storm:	Storm006_1984022500		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	4/11/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
Maxwvel.63	Line of anomalous high data near the west end of lake 	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
Maxwvel.63, minpr.63	Horizontal gradient that has appeared in other runs on west end of lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Area with zero wind and sharp line of high data adjacent to it 	Ice fields of 100% are represented by areas of zero wind. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
Maxele.63	High values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that	BSH

		predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Maxwvel.63 minpr.63	Anomalous in the Irondequoit and Sodus Bays	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Meas v model	Model is slightly overpredicting in the Cape Vincent area plots	Cape Vincent is located in the St. Lawrence River where water levels can be influenced by downstream conditions that are not included in the model. However, discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

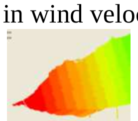
<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm007_1984042700
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/11/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel.63	Vertical gradient visible in the eastern end of lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Horizontal gradient that has appeared in other runs on west end of lake		BSH
Minpr.63	Sharp gradients that match up with gradient in wind velocity: 		
Maxele.63	High values in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxwvel.63	Node 92151 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at node 92161 (not 92151), which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Maxwvel.63	Anomalous in the Irondequoit and Sodus Bays	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Minpr.63	Anomalous in the Irondequoit bay		BSH

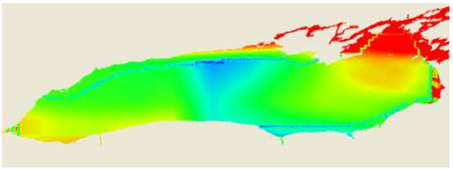
Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm008_1985011800
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/11/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxele.63	Some noise at the shoreline, appears to be low at “headlands” and higher in embayments – most noticeable on the SE shoreline	The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	BSH
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxwvel.63	Large area with zero wind – ice?	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
Maxwvel.63	Appears to be a line of nodes circling the lake with wind velocity 1-2 units higher than adjacent nodes, the rest is very uniform, color gradient set to exaggerate difference below: 	This line circling the lake occurs for storms with shore fast ice around the perimeter of the lake. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag	BSH

		coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	
Maxwvel.63, minpr.63	Horizontally oriented gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Vertically oriented gradient in the east		BSH
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

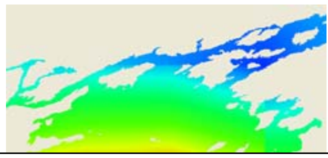
ADCIRC REVIEW			
Storm:	Storm009_1985112500		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	4/11/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
Maxwvel.63, minpr.63	Horizontally oriented gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Vertically oriented gradient in the east		BSH
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Maxwvel.63	Anomalous in the Irondequoit Bay and Sodus Bay	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Minpr.63	Anomalous in the Irondequoit Bay	Gradient in pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Meas v model	Model is overpredicting slightly in the Cape Vincent and OLCOTT plots	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative	BSH

		analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td>Storm:</td><td colspan="3">Storm010_1985112900</td></tr>
<tr><td>Reviewer:</td><td colspan="3">Betsy Hicks</td></tr>
<tr><td>Organization:</td><td colspan="3">RAMPP</td></tr>
<tr><td>Date Checked:</td><td colspan="3">4/11/2012</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><td>File</td><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td>Maxwvel.63</td><td>Horizontally oriented gradient in the west</td><td rowspan="3">Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>Maxwvel.63</td><td>Vertically oriented gradient in the east</td><td>BSH</td></tr>
<tr><td>Maxwvel.63</td><td>Horizontally oriented gradient in the northeast:
</td><td>BSH</td></tr>
<tr><td>Maxwvel.63</td><td>Node 92161 higher than adjacent nodes</td><td>This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.</td><td>BSH</td></tr>
<tr><td>Maxwvel.63, minpr.63</td><td>Anomalous in the Irondequoit bay</td><td>Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>Maxele.63</td><td>Anomalous data in the Niagara river</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>Maxele.63</td><td>Slightly noisy values at the shoreline in the southeast</td><td>The variations in SE along the shore are the</td><td>BSH</td></tr>
</table>

		result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	
Meas v model	Model is underpredicting in the OSWEGO plots	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW			
Storm:	Storm011_1986042800		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	4/11/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
Maxwvel.63, minpr.63	Horizontally oriented gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxele.63, Minpr.63	Anomalous in the Irondequoit and Sodus Bays	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Meas v model	Model is slightly overpredicting in all plots	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When	BSH

		analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm012_1991042700
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/11/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel.63	Vertically oriented gradient in the east	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxwvel.63	Slight horizontal oriented gradient in the west – not as pronounced as other storms	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH

Maxwvel.63, minpr.63	Anomalous data in the Irondequoit and sodus bays	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm013_1991113000
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/11/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel.63, minpr.63	horizontally oriented gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Node 92161 much higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxwvel.63, minpr.63	Anomalous data in the sodus bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm014_1991121100
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12Stor/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel.63	horizontally oriented gradient in the west	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Vertically oriented gradient in the east		BSH
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxele.63	Some noise at the shoreline, appears to be low at "headlands" and higher in embayments	The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	BSH
Maxwvel.63, minpr.63	Anomalous data in the Irondequoit bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm015_1992042900
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel.63, minpr.63	horizontally oriented gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxwvel.63	Anomalous data in the Irondequoit and sodus bays	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Minpr.63	Anomalous data in the Irondequoit bay	Gradient in pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm016_1992080800
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Choose an item.

Issues

File	Comment	Resolution	Verification
Maxwvel.63, minpr.63	horizontally oriented gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	vertically oriented gradient in the east		BSH
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxwvel.63, minpr.63	Anomalous data in the Irondequoit and sodus bays	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Node 92161 higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm017_1992111000
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxele.63	Anomalous data in the Niagara river	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Maxele.63	Slightly noisy at the shoreline in the southeast	The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	BSH
Maxwvel.63, Minpr.63	Horizontally oriented gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
Maxwvel.63	Node 92161 has very high wind velocity ~118.5	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
Maxele.63	Anomalous data in the Irondequoit and Sodus bays	No anomalies in Irondequoit or Sodus Bay identified in Maxele.63 file. More information is required to comment.	BSH
Minpr.63	Anomalous data in the Irondequoit bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm018_1992120800
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/11/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

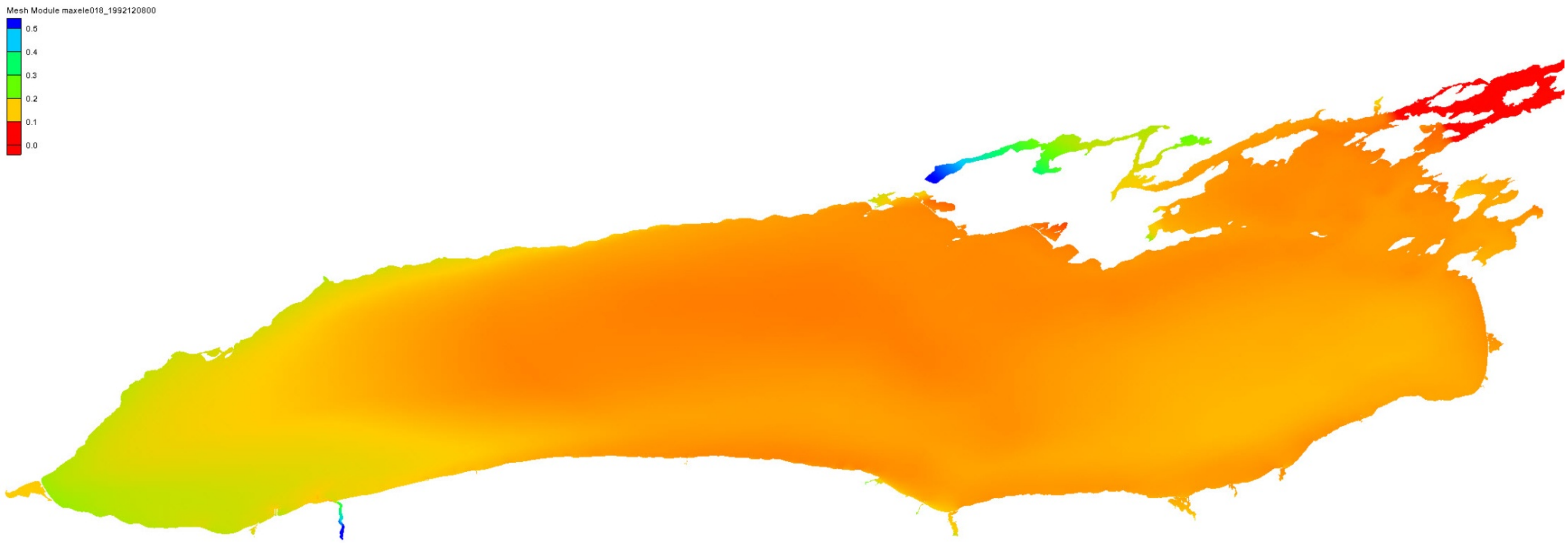
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Abnormal wind gradient on western lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Anomalous in Irondequoit Bay		
minpr	Abnormal pressure gradient on western lake		
minpr	Anomalous in Irondequoit Bay		
minpr	Anomalous in Sodus Bay		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	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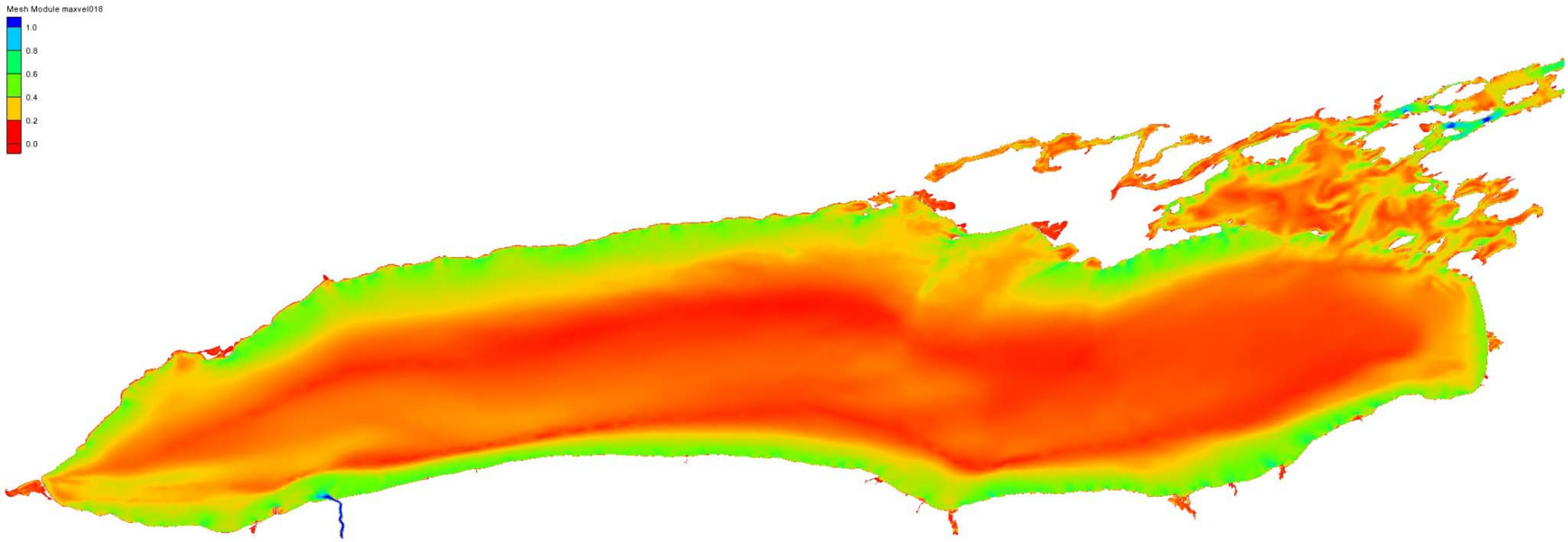
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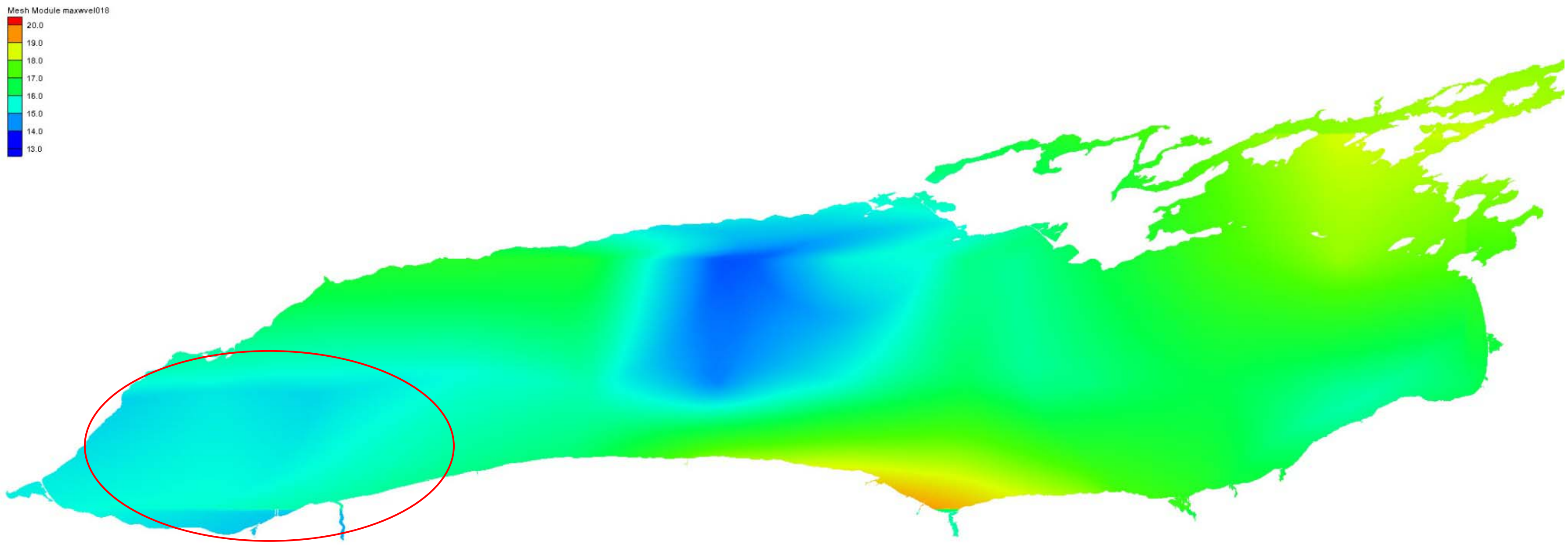
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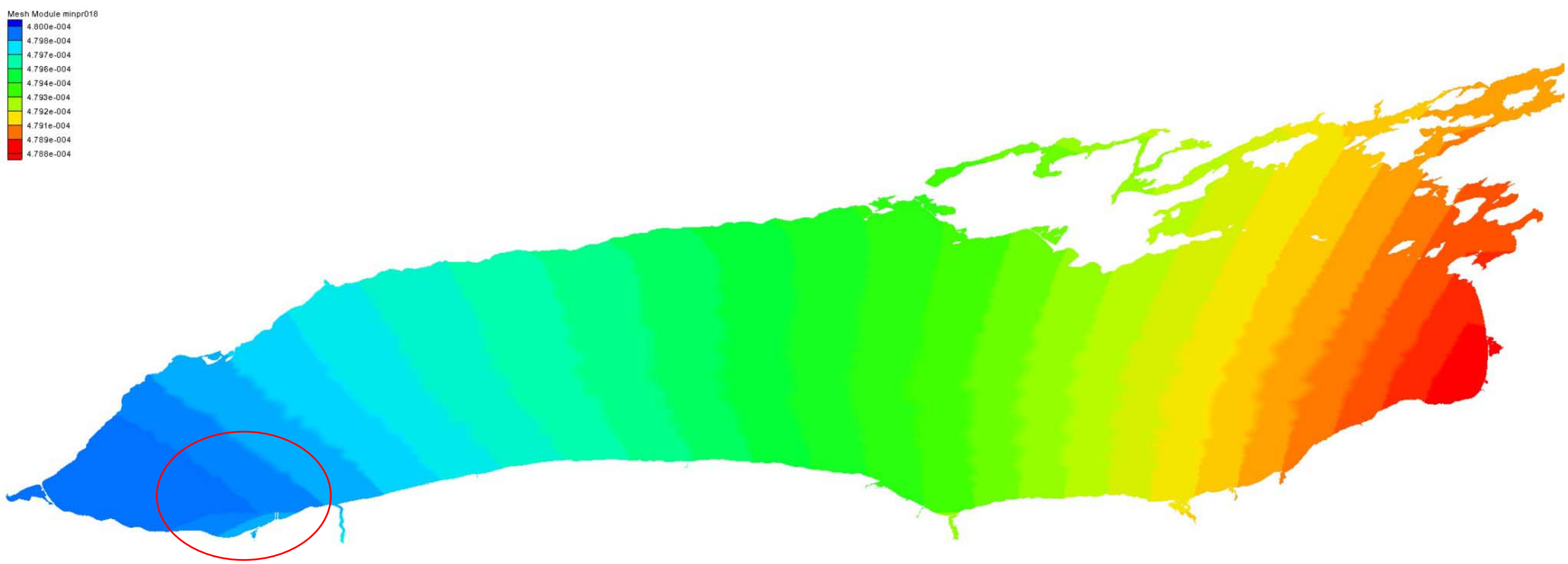
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<tr><td>Storm:</td><td colspan="3">Storm019_1993030100</td></tr>
<tr><td>Reviewer:</td><td colspan="3">Sara C. Davis</td></tr>
<tr><td>Organization:</td><td colspan="3">RAMPP</td></tr>
<tr><td>Date Checked:</td><td colspan="3">04/13/2012</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><th>File</th><th>Comment</th><th>Resolution</th><th>Verification</th></tr>
<tr><td>maxele</td><td>Niagara River anomalous</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td></td></tr>
<tr><td>maxwvel</td><td>Abnormal wind gradient on western lake</td><td rowspan="7">Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td></td></tr>
<tr><td>maxwvel</td><td>Vertical gradient in the east</td><td></td></tr>
<tr><td>maxwvel</td><td>Anomalous in Irondequoit Bay</td><td></td></tr>
<tr><td>maxwvel</td><td>Slightly anomalous in Sodus Bay</td><td></td></tr>
<tr><td>minpr</td><td>Abnormal pressure gradient on western lake</td><td></td></tr>
<tr><td>minpr</td><td>Anomalous in Irondequoit Bay</td><td></td></tr>
<tr><td>minpr</td><td>Anomalous in Sodus Bay</td><td></td></tr>
<tr><td colspan="4"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><th colspan="2">Comment</th><th>Resolution</th><th>Verification</th></tr>
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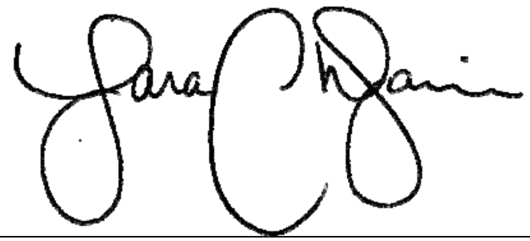
Reviewer Signature:	
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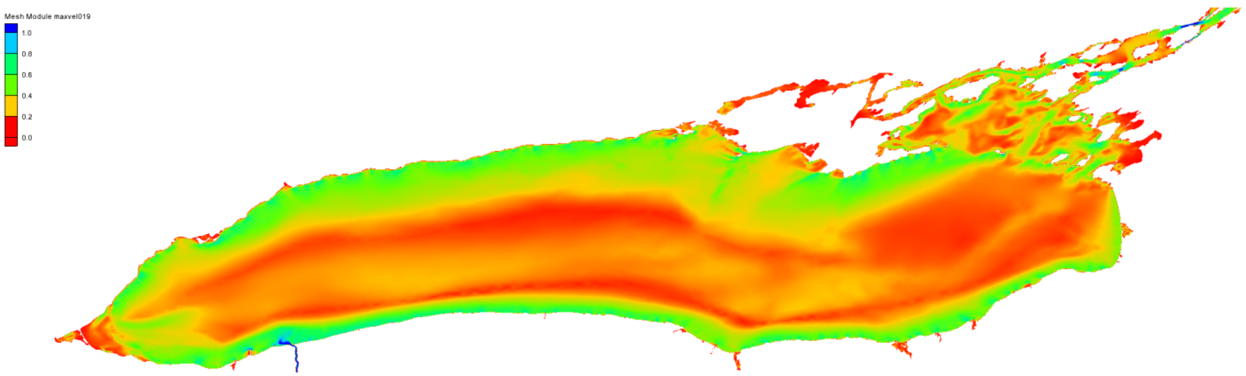

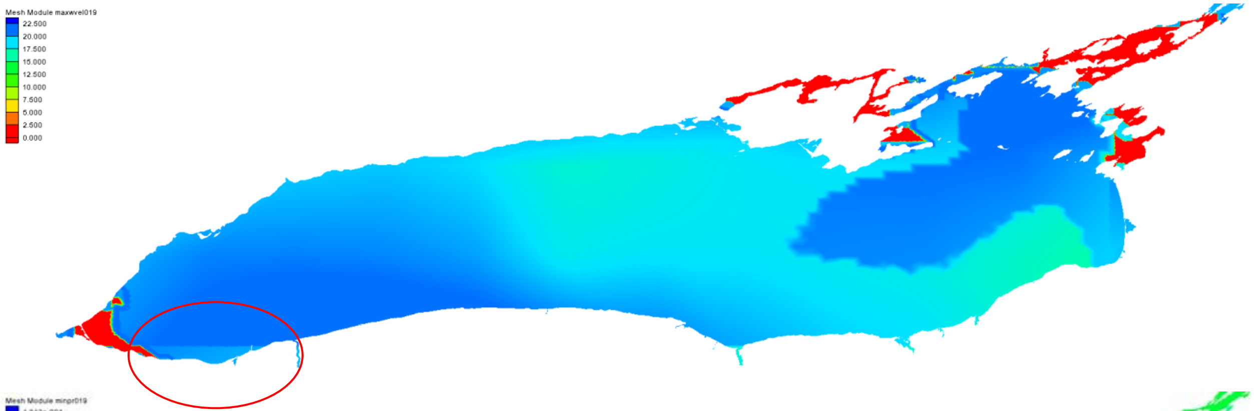
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Mesh Module minpr019
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ADCIRC REVIEW	
Storm:	Storm020_1993031100
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Slight horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Vertical gradient in the east		
maxwvel	Slightly anomalous in Irondequoit Bay		
minpr	Slightly abnormal pressure gradient on western lake		
minpr	Anomalous in Irondequoit Bay		
minpr	Anomalous in Sodus Bay		

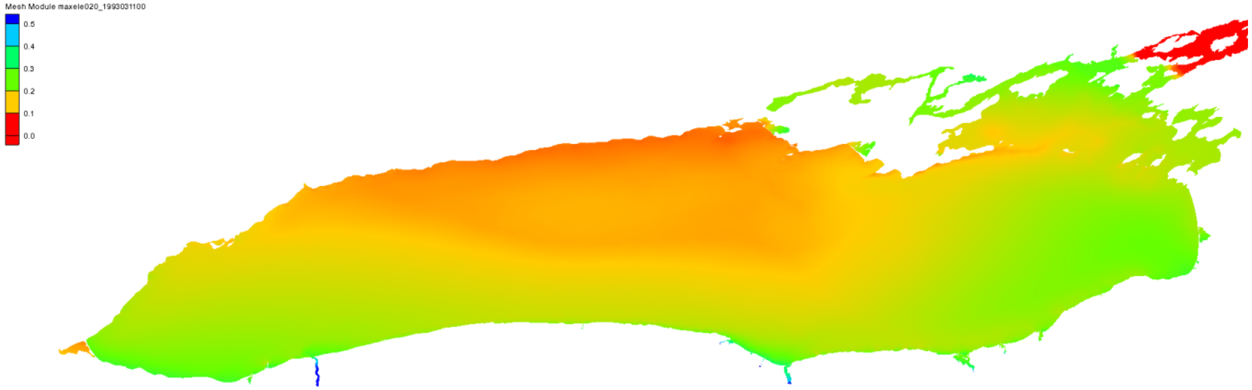
Additional Comments on Detailed Check

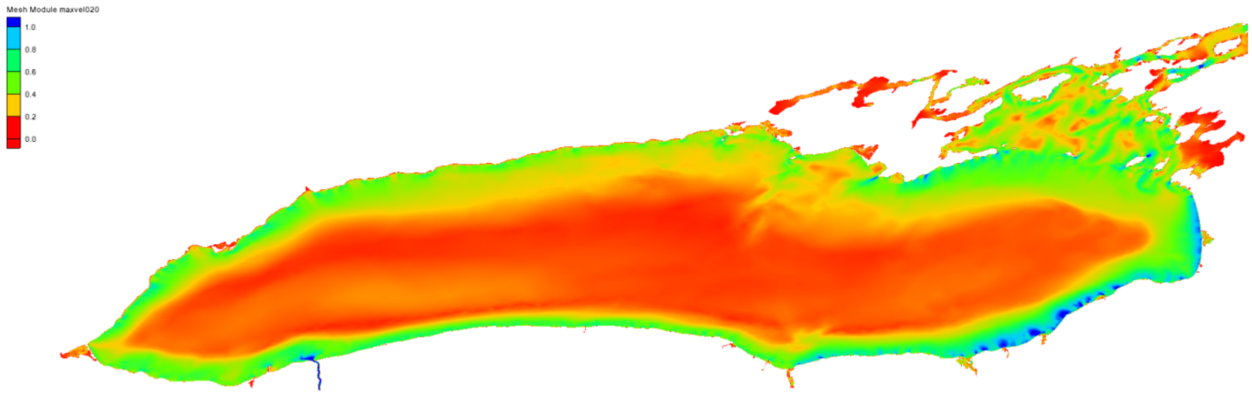
Comment	Resolution	Verification

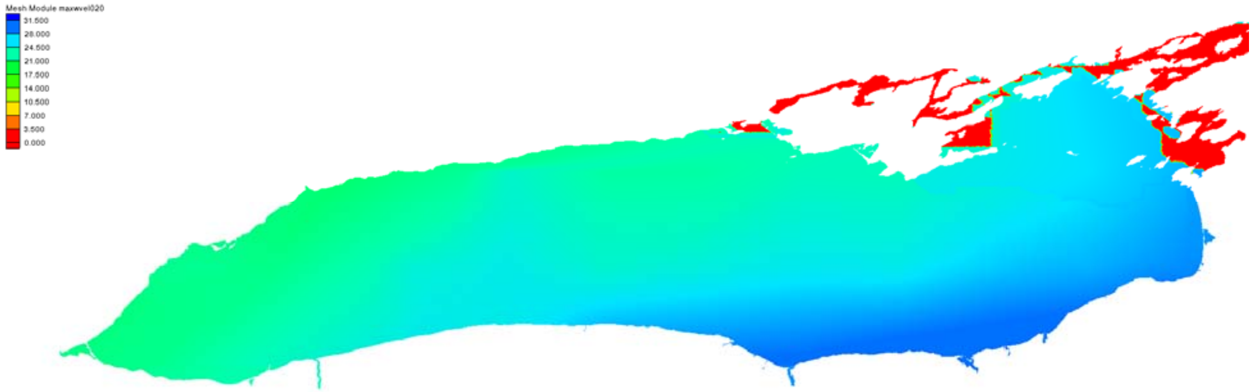
Reviewer Signature:	Sara C Davis

Lake Erie Lake Ontario Production Run QA/QC Form

Date:	



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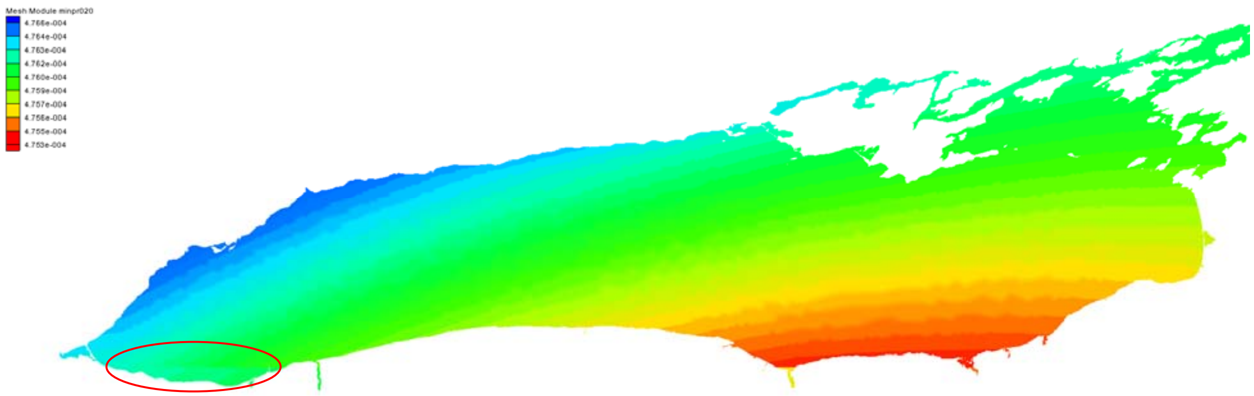
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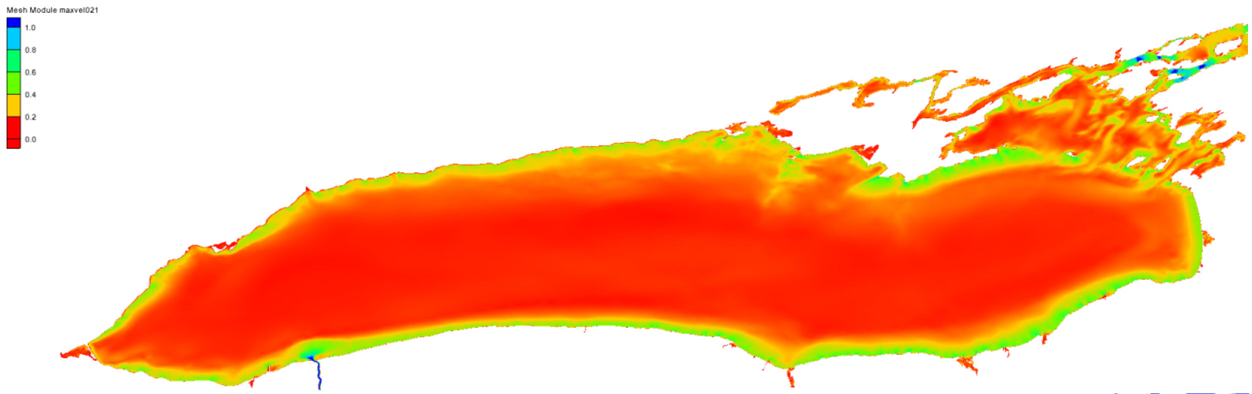
ADCIRC REVIEW			
Storm:	Storm021_1993101500		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	04/13/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Abnormal wind gradient on western lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Vertical gradient in the east		
maxwvel	Node 92161 abnormal max wind vel	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	
maxwvel	Anomalous in Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Anomalous in Sodus Bay		
minpr	Abnormal pressure gradient on western lake		

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	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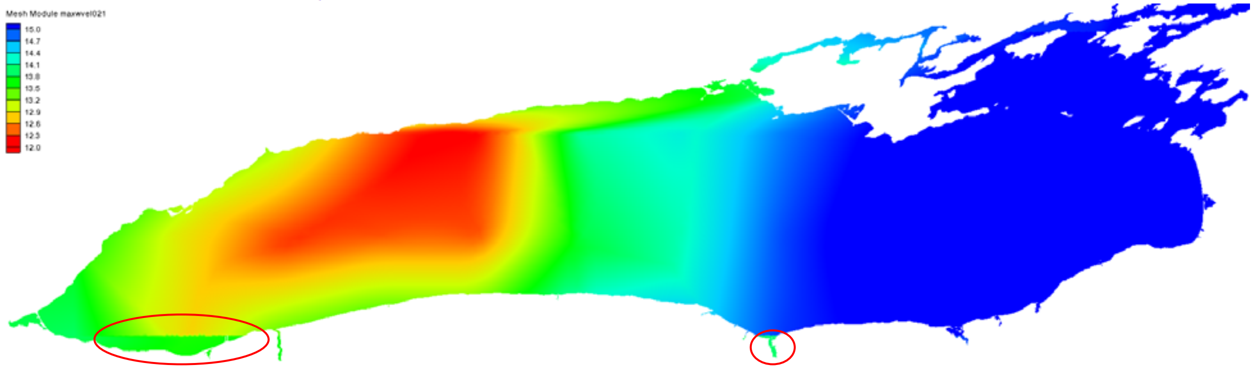
0.4
0.2
0.0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12.6
12.3
12.0


Mesh Module mingr021
4.830e-004
4.829e-004
4.828e-004
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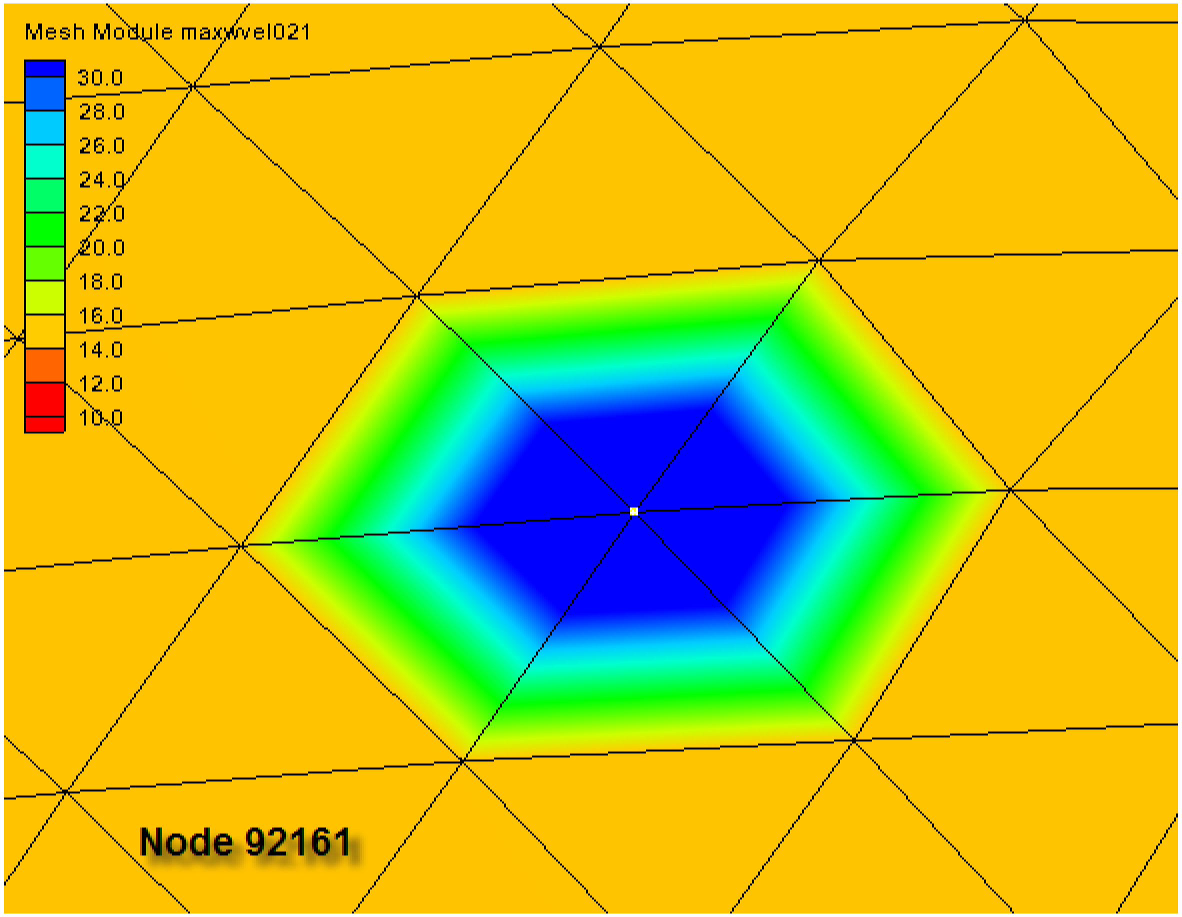
4.827e-004
4.826e-004
4.825e-004
4.825e-004
4.824e-004


Mesh Module maxwvel021
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26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
Node 92161

ADCIRC REVIEW	
Storm:	Storm022_1996051800
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

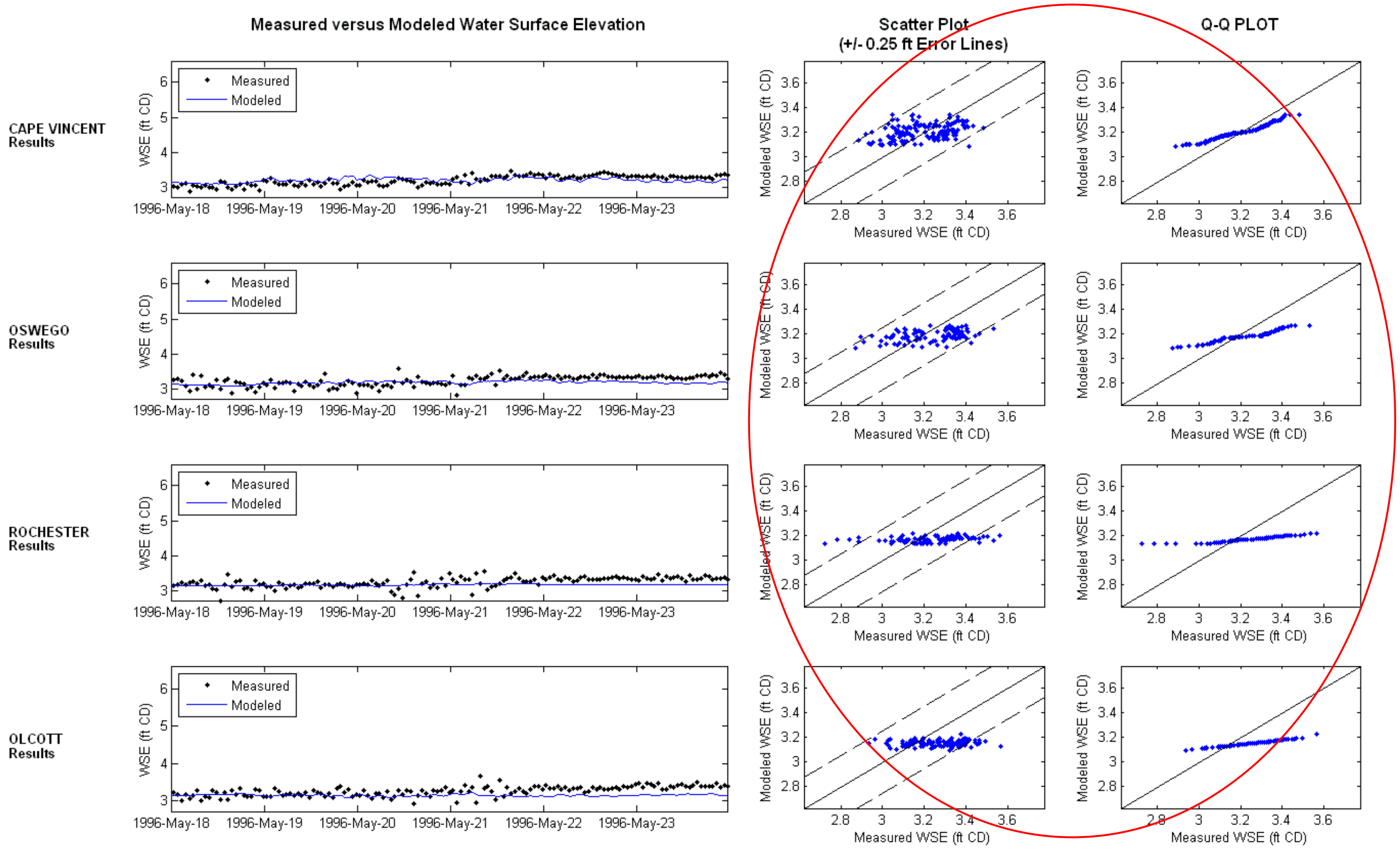
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Abnormal wind gradient on western lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Node 92161 abnormal max wind vel	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	
maxwvel	Anomalous in Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Anomalous in Sodus Bay		
minpr	Abnormal pressure gradient on western lake		
minpr	Anomalous in Irondequoit Bay		
minpr	Anomalous in Sodus Bay		

Additional Comments on Detailed Check

Comment	Resolution	Verification
Abnormal Measured vs. ADCIRC plots	Discrepancies between modeled and measured data are expected,	

	particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	
Reviewer Signature:		
Date:		


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
1996-May-18
1996-May-19
1996-May-20
1996-May-21
1996-May-22
1996-May-23
Modeled WSE (ft CD)
Measured WSE (ft CD)

ADCIRC REVIEW	
Storm:	Storm023_1997021900
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/13/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Node 92161 abnormal max wind vel	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	
maxwvel	Anomalous in Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Anomalous in Sodus Bay		

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

ADCIRC REVIEW	
Storm:	Storm024_1999011100
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

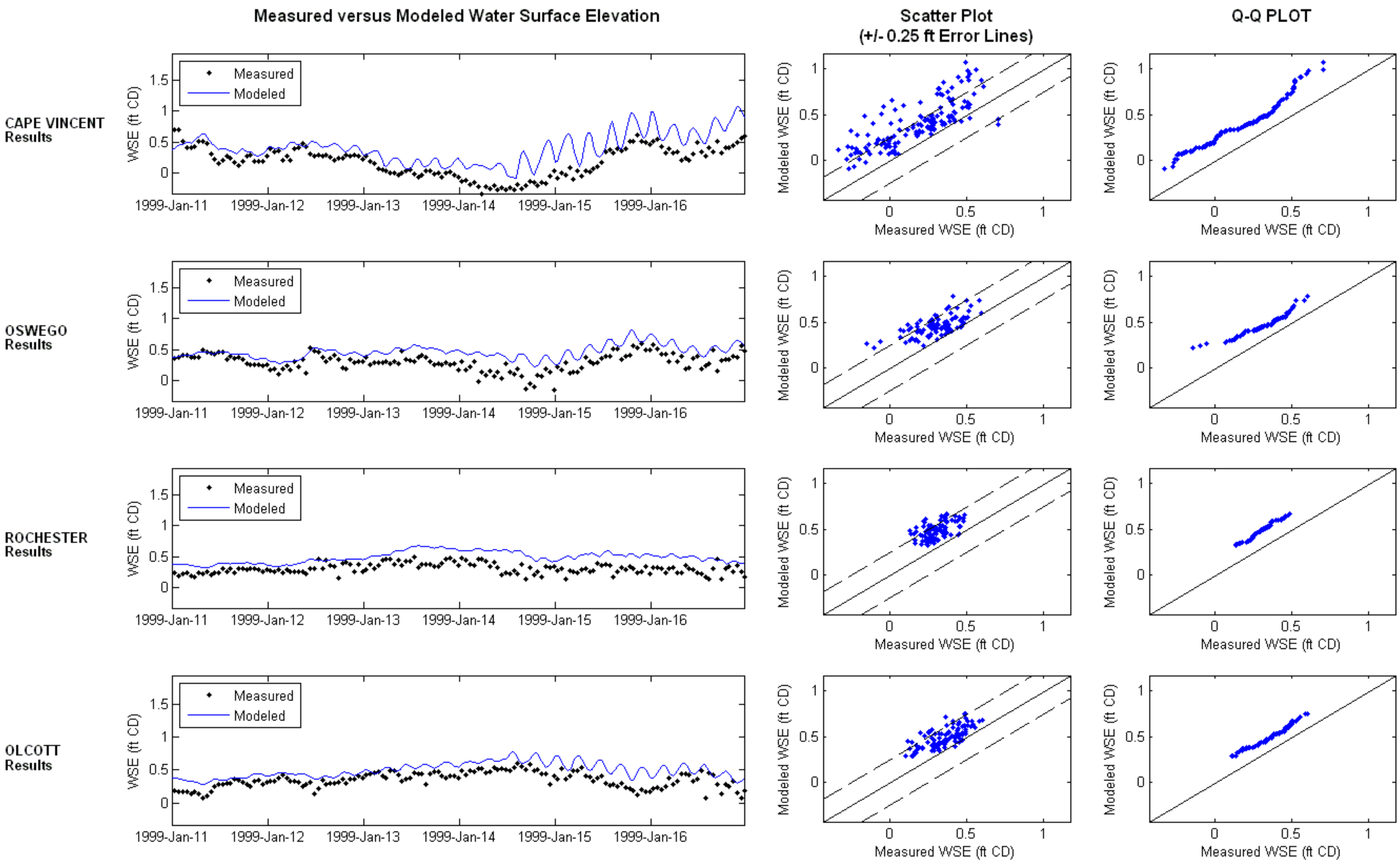
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Horizontal gradient in the west	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Node 92161 slightly abnormal max wind vel	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	
minpr	Horizontal gradient in the west	Gradient in pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
minpr	Anomalous in Irondequoit Bay		

Additional Comments on Detailed Check

Comment	Resolution	Verification
Abnormal Measured vs. ADCIRC plots	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	

Reviewer Signature:	Sara C Davis
Date:	


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
Modeled
WSE (ft CD)
1999-Jan-11
1999-Jan-12
1999-Jan-13
1999-Jan-14
1999-Jan-15
1999-Jan-16
Modeled WSE (ft CD)
Measured WSE (ft CD)

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm025_1999030300
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/13/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Node 92161 slightly abnormal max wind vel	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	
maxwvel	Anomalous in Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Anomalous in Sodus Bay		
minpr	Anomalous in Irondequoit Bay		
minpr	Abnormal pressure gradient west lake		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm026_1999110100
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/13/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Abnormal wind gradient west lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Vertical gradient in the east		
maxwvel	Anomalous in Irondequoit Bay		
maxwvel	Slightly anomalous in Sodus Bay		
minpr	Slight horizontal gradient in the west		
minpr	Anomalous in Irondequoit Bay		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm027_2000121500
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/16/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxele	Slightly noisy at shoreline	The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	
maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
minpr	Horizontal gradient in the west		
minpr	Anomalous in Sodus Bay		
minpr	Anomalous in Irondequoit Bay		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Sara C. Davis
Date:	

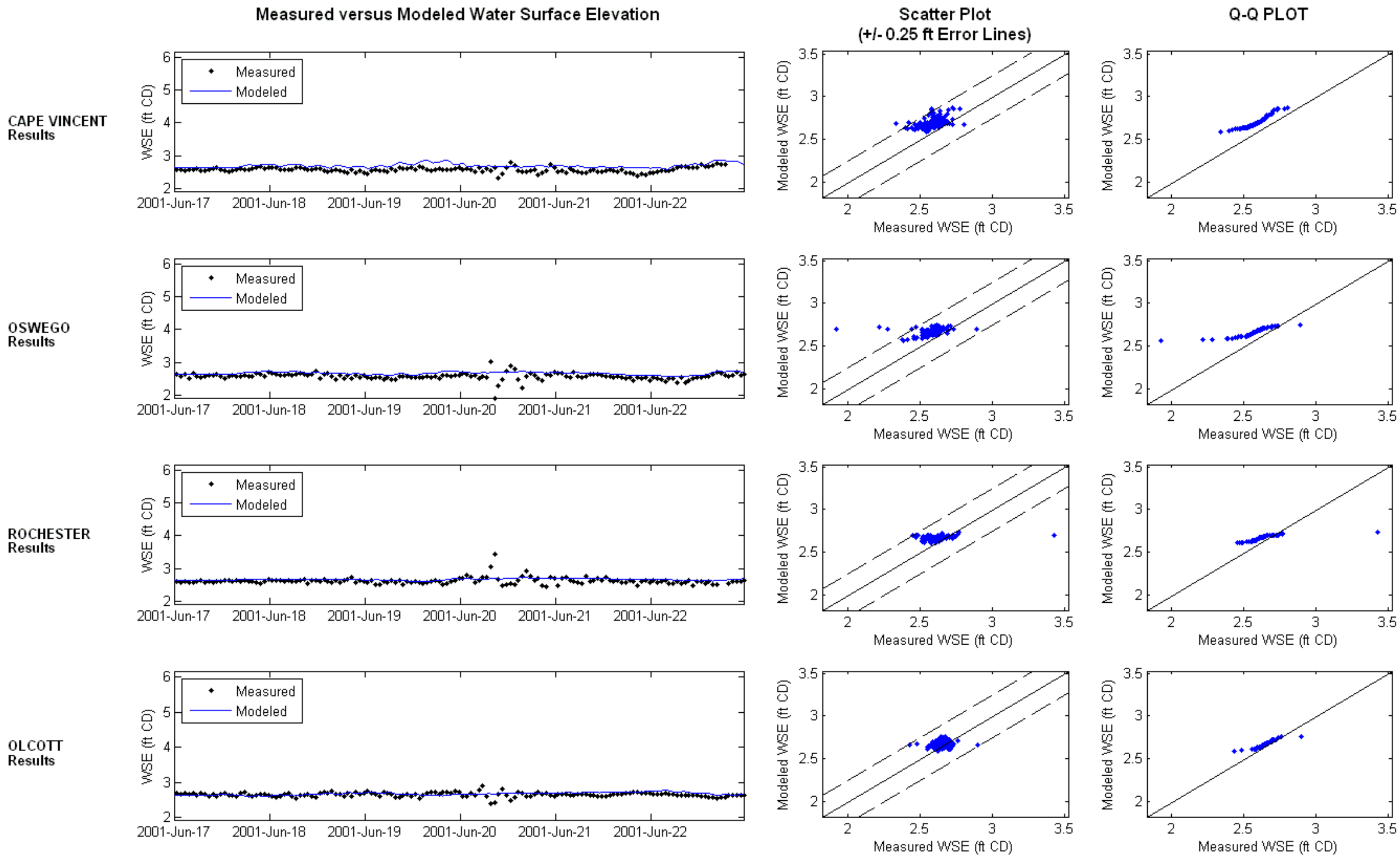
ADCIRC REVIEW			
Storm:	Storm028_2001061700		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	04/16/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes

Issues			
File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Horizontal gradient in the west	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Vertical gradient in the east		
maxwvel	Node 92161 abnormal max wind vel	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	
maxwvel	Anomalous in Sodus Bay	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Anomalous in Irondequoit Bay		
minpr	Horizontal gradient in the west		

Additional Comments on Detailed Check		
Comment	Resolution	Verification
Abnormal Measured vs. ADCIRC plots	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	

Lake Erie Lake Ontario Production Run QA/QC Form

Reviewer Signature:	
Date:	



ADCIRC REVIEW	
Storm:	Storm029_2002012900
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/16/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Anomalous in Sodus Bay		
maxwvel	Anomalous in Irondequoit Bay		
minpr	Horizontal gradient in the west		
minpr	Slightly anomalous in Irondequoit Bay		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm030_2002030700
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/16/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Horizontal gradient in the west	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Node 92161 slightly abnormal max wind vel	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	
maxwvel	Anomalous in Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
minpr	Anomalous in Irondequoit Bay		

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW			
Storm:	Storm031_2003020200		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	04/16/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes

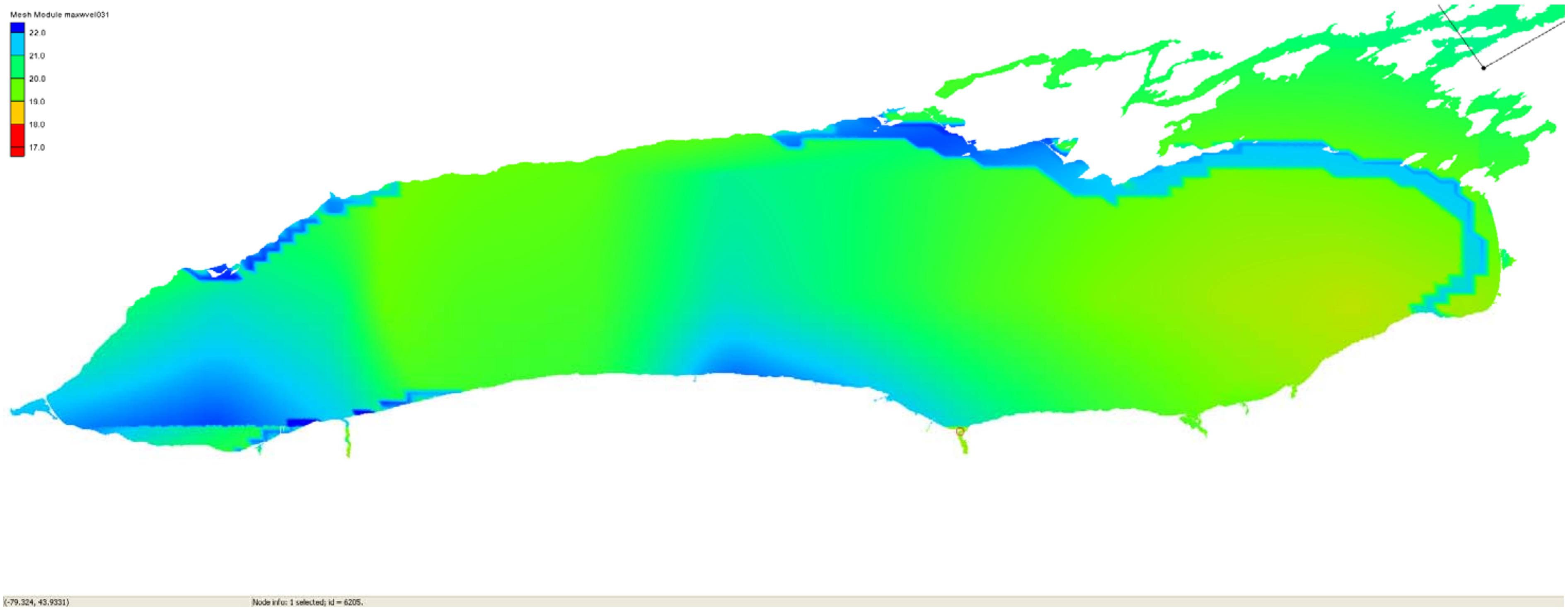
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Very odd wind gradient near shoreline	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	
maxwvel	Anomalous in Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
minpr	Slightly anomalous in Irondequoit Bay		
minpr	Horizontal gradient in the west		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	



Very odd wind gradient near shoreline in east and west.

ADCIRC REVIEW	
Storm:	Storm032_2003111000
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/16/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Vertical gradient in the east		
maxwvel	Anomalous in Irondequoit Bay		
maxwvel	Anomalous in Sodus Bay		
minpr	Anomalous in Irondequoit Bay		
minpr	Anomalous in Sodus Bay		

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

ADCIRC REVIEW	
Storm:	Storm033_2004122000
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/16/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Vertical gradient in the east		
maxwvel	Anomalous in Irondequoit Bay		
maxwvel	Slightly anomalous in Sodus Bay		
minpr	Anomalous in Irondequoit Bay		
minpr	Anomalous in Sodus Bay		
minpr	Horizontal gradient in the west		

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm034_2006021400
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	04/16/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

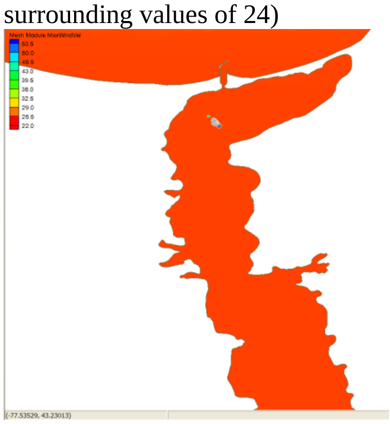
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxele	Slightly noisy at shoreline	The variations in SE along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	
maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel	Vertical gradient in the east		
maxwvel	Slightly anomalous in Irondequoit Bay		
minpr	Anomalous in Irondequoit Bay		
minpr	Anomalous in Sodus Bay		

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td>Storm:</td><td colspan="3">Storm035_1982012900</td></tr>
<tr><td>Reviewer:</td><td colspan="3">Amelia Vincent</td></tr>
<tr><td>Organization:</td><td colspan="3">RAMPP</td></tr>
<tr><td>Date Checked:</td><td colspan="3">4/6/12</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><td>File</td><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td>Maxele.63</td><td>Anomalous values in the Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>AV</td></tr>
<tr><td>Maxwvel.63</td><td>Anomalous wind velocity in Irondequoit Bay (52 compared to surrounding values of 24)

</td><td>This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.</td><td>AV</td></tr>
</table>

<table>
<tr><td colspan="3"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Reviewer Signature:	Amelia Vincent
Date:	6/19/12

ADCIRC REVIEW	
Storm:	Storm036_2008020300
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/16/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		
maxwvel.63	horizontally oriented gradient line in the northeastern side of the lake		
minpr.63	anomalous data in the Irondequoit Bay		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

ADCIRC REVIEW		
Storm:	Storm037_2009120800	
Reviewer:	Betsy Hicks	
Organization:	RAMPP	
Date Checked:	4/12/12	
Was the max water surface elevation file checked for anomalies?		Yes
Was the max current velocity file checked for anomalies?		Yes
Was the max wind velocity file checked for anomalies?		Yes
Was the minimum pressure file checked for anomalies?		Yes
Was the model time series output compared to the measured gage data?		Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	node 92161 is considerable higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	area with zero winds	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm038_1979080400
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	node 92161 is considerable higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
minpr.63	anomalous data in the Irondequoit Bay	Gradient in pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
measure vs. model	model over predicts the WSE in comparison with the measured data in all areas	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm039_1979120500
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

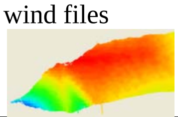
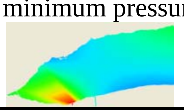
Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	node 92161 is considerable higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63, minpr.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	anomalous data in the Sodus Bay		BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW			
Storm:	Storm040_1974032100		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	4/12/12		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	file looks very coarse/gridded in comparison with other max wind files 	For storms prior to 1979 CFSR winds are not available and therefore natural neighbor winds are used. Refer to Section 2.2.2 of Baird Lake Ontario report.	BSH
minpr.63	file looks very smooth in comparison with other minimum pressure files 		BSH
meas v model	model overpredicts in Cape Vincent and underpredicts in Rochester	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm041_1980102300
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	node 92161 is considerable higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63, minpr.63	anomalous data in the Sodus Bay		BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW			
Storm:	Storm042_1980121100		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	4/12/12		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes

Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	node 92161 is considerable higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	slightly anomalous data in the Sodus Bay		BSH

meas v model	model over predicts the WSE in comparison with the measured data in all areas	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm043_1981112500
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	node 92161 is considerable higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	slightly anomalous data in the Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63, minpr.63	anomalous data in the Sodus Bay		BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm044_1982010200
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

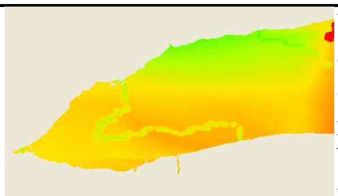
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	node 92161 is considerable higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	slightly anomalous data in the Sodus Bay		BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW			
Storm:	Storm045_1982012000		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	4/12/12		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	large area with zero winds	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
maxwvel.63, minpr.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
minpr.63	anomalous data in the Sodus Bay		BSH
maxwvel.63	two lines of anomalous data towards the west end:	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields.	BSH

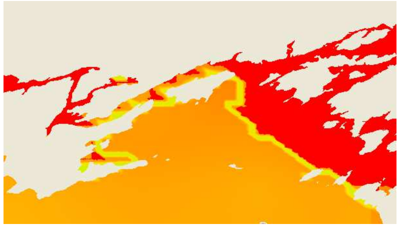
		Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW			
Storm:	Storm046_1982040300		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	4/12/12		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	area with zero winds	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
maxwvel.63, minpr.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is	BSH

maxwvel.63, minpr.63	anomalous data in the Sodus Bay	caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	Bands of higher winds in the northeast: 	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm047_1982110300
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

<table>
<tr><th colspan="4">Issues</th></tr>
<tr><th>File</th><th>Comment</th><th>Resolution</th><th>Verification</th></tr>
<tr><td>maxele.63</td><td>high values in the Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>maxwvel.63, minpr.63</td><td>horizontally oriented gradient line in the western side of the lake</td><td>Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>node 92161 is considerably higher than adjacent nodes</td><td>This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.</td><td>BSH</td></tr>
<tr><td>maxwvel.63, minpr.63</td><td>anomalous data in the Irondequoit Bay</td><td rowspan="2">Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>maxwvel.63, minpr.63</td><td>anomalous data in the Sodus Bay</td><td>BSH</td></tr>
<tr><td>meas v</td><td>model under predicts the WSE in</td><td>The average difference between all</td><td>BSH</td></tr>
</table>

model	comparison with the measured data in all areas	gauges measured vs. modeled is 1 inch. The maximum instantaneous difference was at Cape Vincent with 5 inches. Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm048_1982122600
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	4/12/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation in this area. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	node 92161 is higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63, minpr.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation in this area. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

Additional Comments on Detailed Check

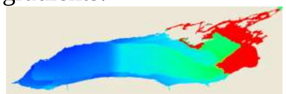
Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW		
Storm:	Storm049_1985030100	
Reviewer:	Betsy Hicks	
Organization:	RAMPP	
Date Checked:	4/12/12	
Was the max water surface elevation file checked for anomalies?		Yes
Was the max current velocity file checked for anomalies?		Yes
Was the max wind velocity file checked for anomalies?		Yes
Was the minimum pressure file checked for anomalies?		Yes
Was the model time series output compared to the measured gage data?		Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	large area with zero winds	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
maxwvel.63, minpr.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible	BSH

		effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel.63	wind surface is not very smooth or uniform, many instances of strange gradients: 	Ice fields of 100% are represented by areas of zero wind. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH

<u>Additional Comments on Detailed Check</u>

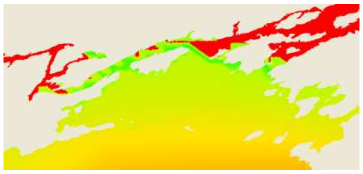
Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW			
Storm:	Storm050_1986010600		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	4/12/12		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63, minpr.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	area with zero winds	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
maxwvel.63	anomalous data in the Irondequoit Bay	Gradient in wind and pressure is	BSH

		caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	
maxwvel.63	bands of nodes with higher wind velocities in the northeast: 	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
meas v model	model over predicts the WSE in comparison with the measured data in Cape Vincent	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/5/2012

ADCIRC REVIEW	
Storm:	Storm051_1986091200
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/21/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012	BSH
maxwvel.63	slight vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	anomalous data in the Irondequoit Bay		BSH
maxele.63, maxwvel.63	node 92161 is considerably higher than adjacent nodes (wvel=302) creates a 0.1 increase in the SWEL surface in the same location	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td colspan="2">Storm:</td><td colspan="2">Storm052_1986100100</td></tr>
<tr><td colspan="2">Reviewer:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Organization:</td><td colspan="2">RAMPP</td></tr>
<tr><td colspan="2">Date Checked:</td><td colspan="2">5/21/12</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><td>File</td><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td>maxele.63</td><td>high values in the Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>slight horizontally oriented gradient line in the western side of the lake</td><td rowspan="3">Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>slight vertically oriented gradient line in the eastern side of the lake</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>anomalous data in the Irondequoit Bay</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>node 92161 is slightly higher than adjacent nodes</td><td>This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.</td><td>BSH</td></tr>
</table>

<table>
<tr><td colspan="3"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm053_1988011000
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/22/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

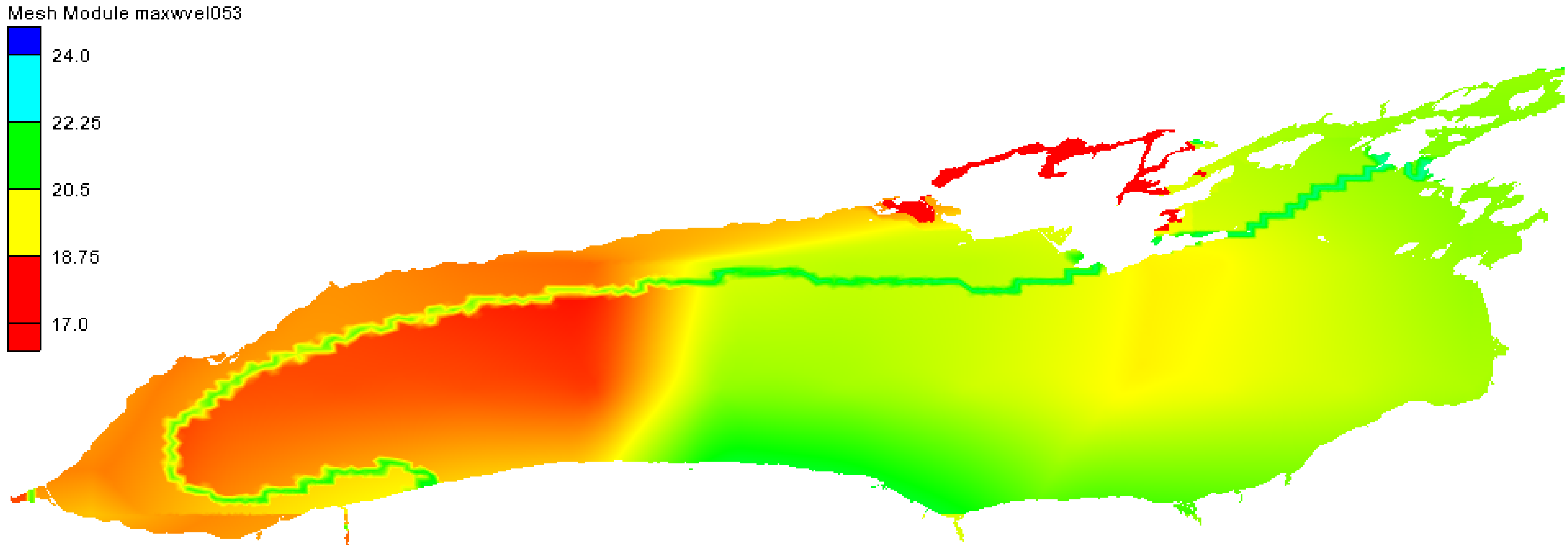
Issues

File	Comment	Resolution	Verification
maxwvel	Anomalous at node 92161	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD
maxwvel	Abnormal gradient across lake	This band in the wind data is caused by the transition in ice coverage from 80% to 10%. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with about 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology. The spatially and time varying wind file (fort.22) was checked and no abnormal patterns were observed across the Lake.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C. Davis
Date:	6/26/2012


Mesh Module maxwvel053
24.0
22.25
20.5
18.75
17.0

ADCIRC REVIEW	
Storm:	Storm054_1988061900
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/21/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	slight vertically oriented gradient line in the eastern side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW	
Storm:	Storm055_1988071400
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/21/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW	
Storm:	Storm056_1988110700
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/21/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	slight horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW		
Storm:	Storm057_1988111700	
Reviewer:	Betsy Hicks	
Organization:	RAMPP	
Date Checked:	5/21/12	
Was the max water surface elevation file checked for anomalies?		Yes
Was the max current velocity file checked for anomalies?		Yes
Was the max wind velocity file checked for anomalies?		Yes
Was the minimum pressure file checked for anomalies?		Yes
Was the model time series output compared to the measured gage data?		Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	slight horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td colspan="2">Storm:</td><td colspan="2">Storm058_1989020500</td></tr>
<tr><td colspan="2">Reviewer:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Organization:</td><td colspan="2">RAMPP</td></tr>
<tr><td colspan="2">Date Checked:</td><td colspan="2">5/21/12</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
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<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
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<tr><td>maxwvel.63</td><td>horizontally oriented gradient line in the western side of the lake</td><td rowspan="3">Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>vertically oriented gradient line in the eastern side of the lake</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>anomalous data in the Irondequoit and Sodus Bays</td><td>BSH</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
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<table>
<tr><td colspan="3"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><th>Comment</th><th>Resolution</th><th>Verification</th></tr>
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<tr><td></td><td></td><td></td></tr>
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Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW	
Storm:	Storm059_1989031500
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/21/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	anomalous data in the Sodus Bay	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	band of high wind nodes in the NE	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW	
Storm:	Storm060_1989101100
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012

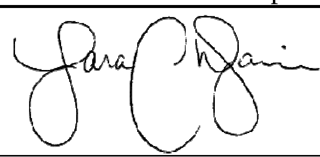
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

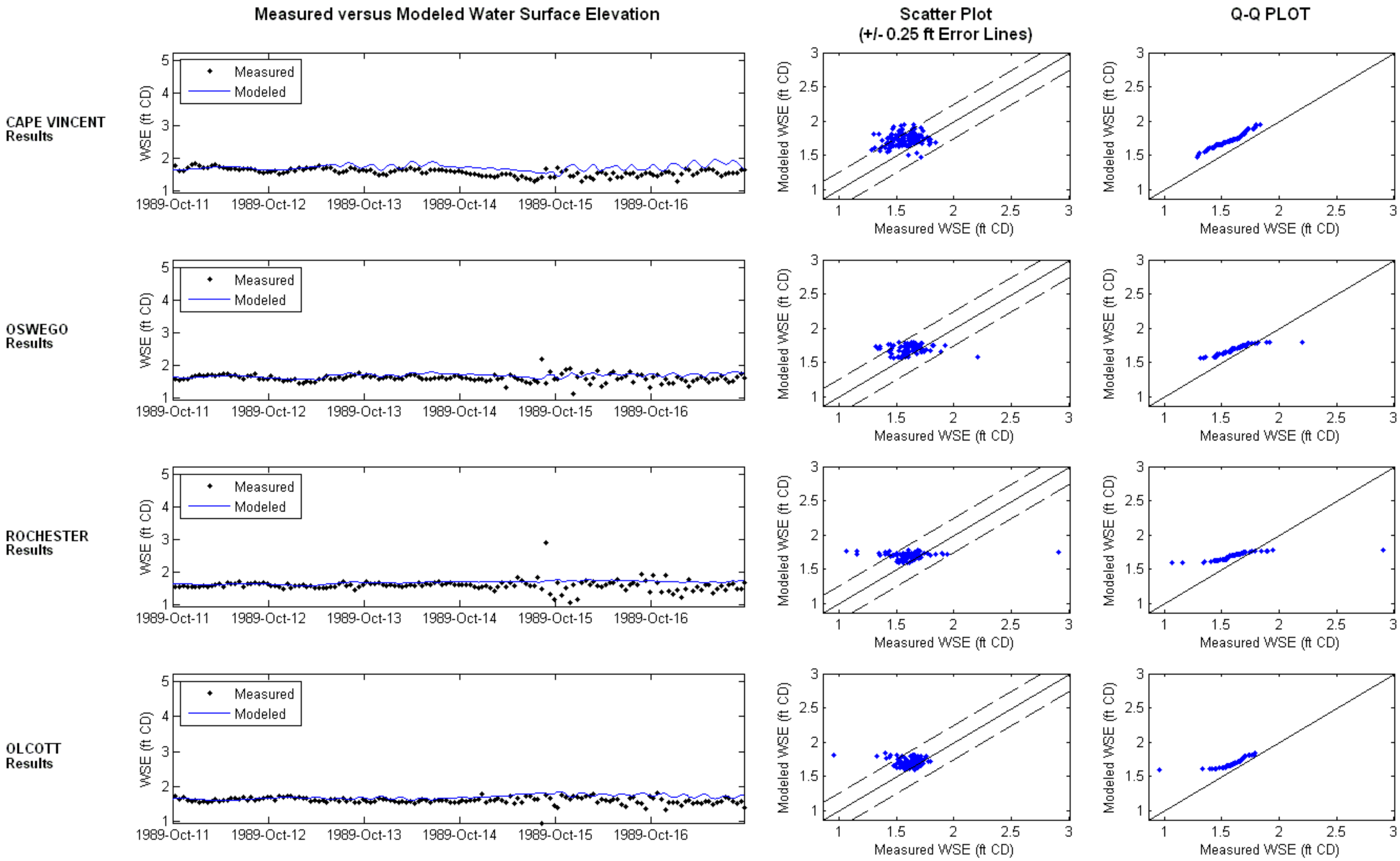
Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification
Measured vs. ADCIRC time series and scatter plots anomalous (see below).	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD

Reviewer Signature:	
Date:	



Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
Modeled WSE (ft CD)
Measured WSE (ft CD)
1989-Oct-11
1989-Oct-12
1989-Oct-13
1989-Oct-14
1989-Oct-15
1989-Oct-16

ADCIRC REVIEW	
Storm:	Storm061_1990110300
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm062_1991032500
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxwvel	Anomalous maximum of 45.9 at node 6205	This is an isolated anomaly in the wind dataset at Node 6205, which is located far downstream in the St. Lawrence River. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. The data in the downstream end of the St. Lawrence River was removed from the fort.63 and fort.64 files as the results are influenced by the St. Lawrence River boundary as explained in the README file.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm063_1992122300
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel	Anomalous maximum of 150 at node 92161	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD
Maxwvel	Horizontal gradient in the west	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

ADCIRC REVIEW	
Storm:	Storm064_1993020900
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

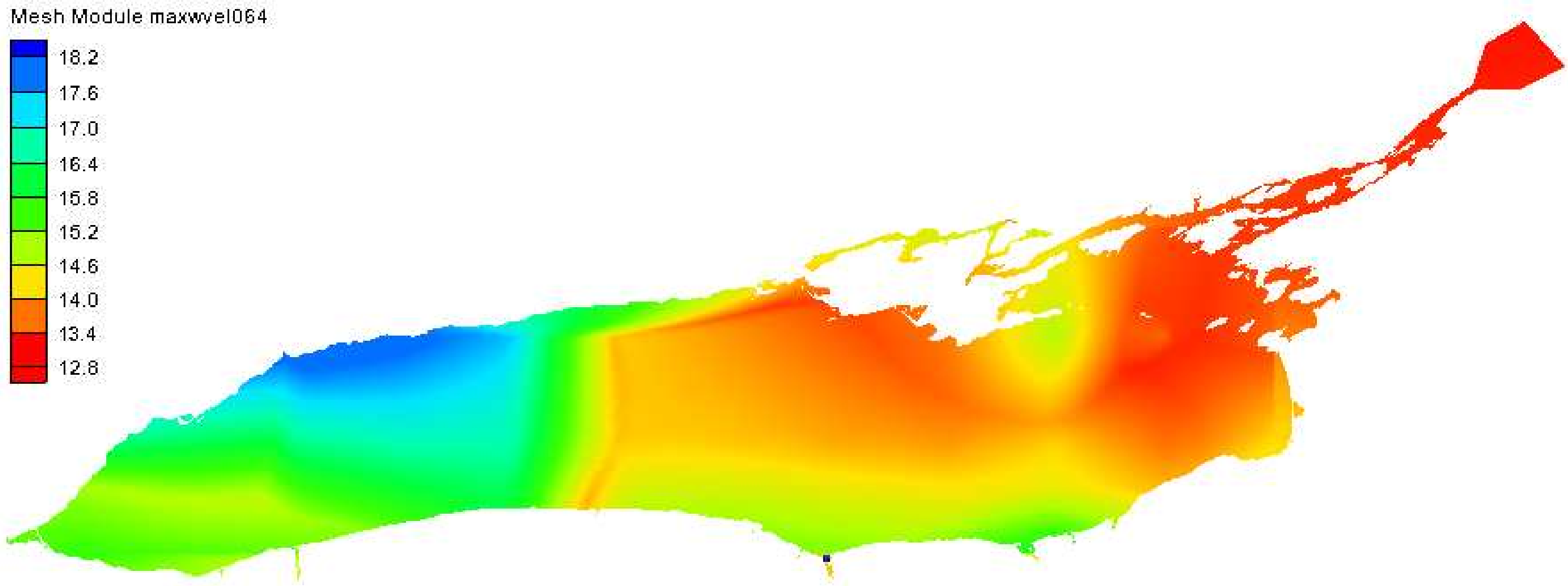
Issues

File	Comment	Resolution	Verification
maxwvel	Horizontal gradient in east, vertical gradient in west, abnormal pattern across lake.	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012. The spatially and time varying wind file (fort.22) was checked and no abnormal patterns were observed across the Lake. However, this particular storm does change direction and is therefore the cause of the pattern seen across the Lake in the maximum wind speed file.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012


Mesh Module maxwvel064
18.2
17.6
17.0
16.4
15.8
15.2
14.6
14.0
13.4
12.8

ADCIRC REVIEW	
Storm:	Storm065_1994022000
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel	Horizontal gradient in the west	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

ADCIRC REVIEW	
Storm:	Storm066_1994110300
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
Maxwvel	Anomalous maximum of 40.7 at node 92161	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

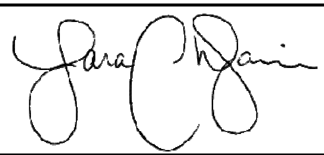
ADCIRC REVIEW	
Storm:	Storm067_1994111900
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

ADCIRC REVIEW	
Storm:	Storm068_1994122100
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

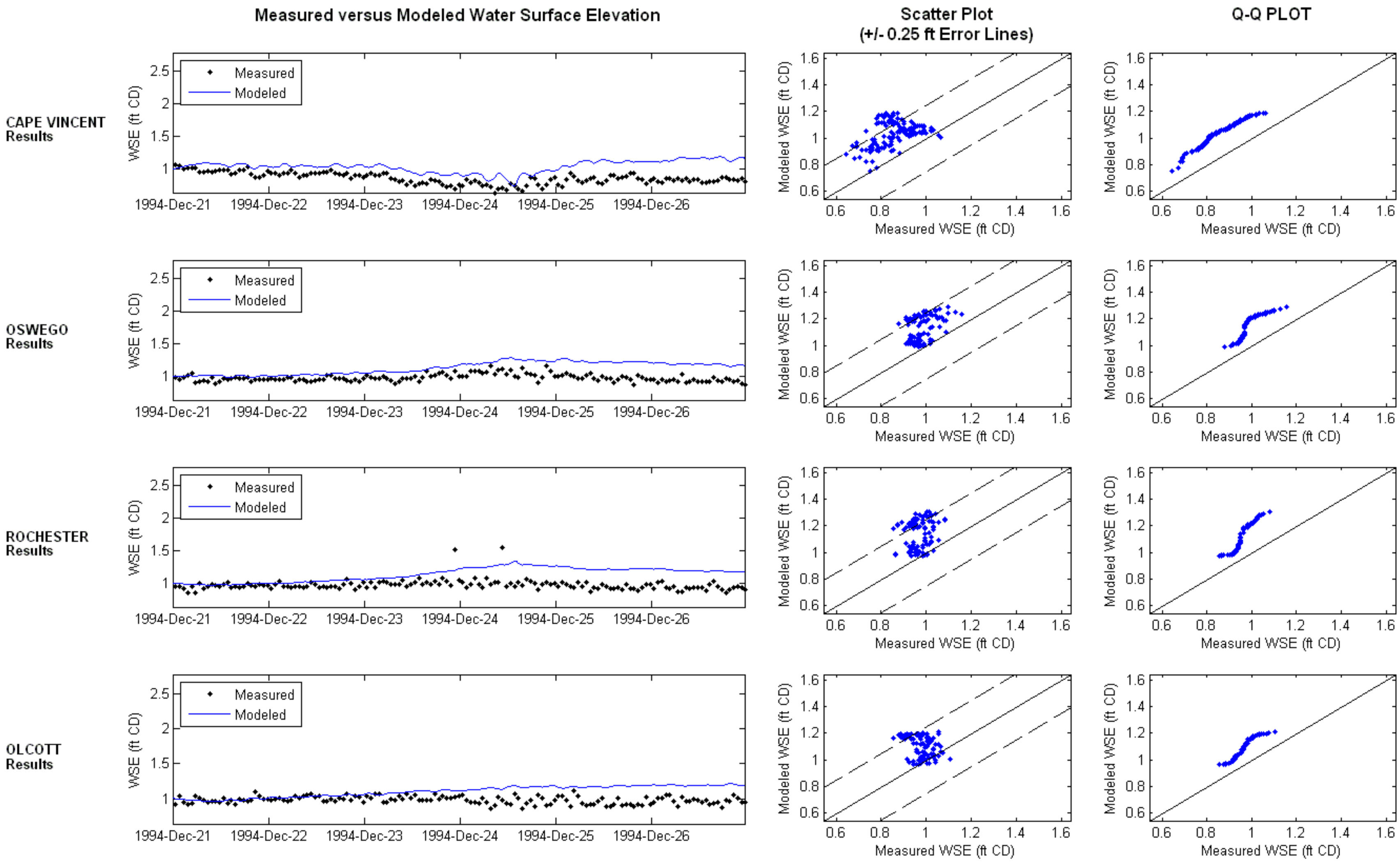
Issues

File	Comment	Resolution	Verification
Maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification
Measured vs. ADCIRC time series and scatter plots anomalous (see below).	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD

Reviewer Signature:	Sara C Davis
Date:	


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
1994-Dec-21
1994-Dec-22
1994-Dec-23
1994-Dec-24
1994-Dec-25
1994-Dec-26
Modeled WSE (ft CD)
Measured WSE (ft CD)

Lake Erie Lake Ontario Production Run QA/QC Form

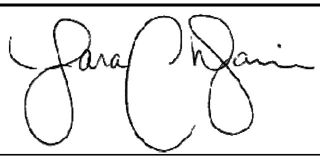
ADCIRC REVIEW	
Storm:	Storm069_1995010300
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
Maxwvel	Anomalous maximum of 49.4 at node 92161	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD
Maxwvel	Horizontal gradient in the west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

ADCIRC REVIEW	
Storm:	Storm070_1995110800
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/22/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

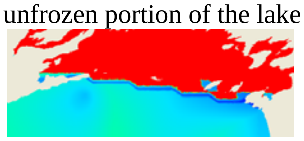
Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
meas v model	model over predicts the WSE in comparison with the measured data in Cape Vincent, Rochester and Olcott	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks	
Date:	6/7/2012	

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td colspan="2">Storm:</td><td colspan="2">Storm071_1996012500</td></tr>
<tr><td colspan="2">Reviewer:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Organization:</td><td colspan="2">RAMPP</td></tr>
<tr><td colspan="2">Date Checked:</td><td colspan="2">5/22/12</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><td>File</td><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td>maxele.63</td><td>high values in the Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>slight horizontally oriented gradient line in the western side of the lake</td><td rowspan="2">Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>anomalous data in the Irondequoit and Sodus Bays</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>band of anomalous nodes in the northeast between the zero wind/ice area and the unfrozen portion of the lake
</td><td>The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.</td><td>BSH</td></tr>
<tr><td colspan="4"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td colspan="2">Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="2">Reviewer Signature:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Date:</td><td colspan="2">6/7/2012</td></tr>
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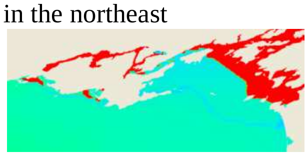
ADCIRC REVIEW	
Storm:	Storm072_1996030100
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/22/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	slightly anomalous data in the Sodus Bay	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	band of anomalous nodes in the northeast 	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the	BSH

		strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	
meas v model	model slightly over predicts the WSE in comparison with the measured data in Cape Vincent	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW	
Storm:	Storm073_1996110500
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/22/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	slight horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	slight vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
meas v model	model over predicts the WSE in comparison with the measured data in Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW			
Storm:	Storm074_1997120800		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	5/22/12		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	slight vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
meas v model	model over predicts the WSE in comparison with the measured data in all areas	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms,	BSH

		the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	

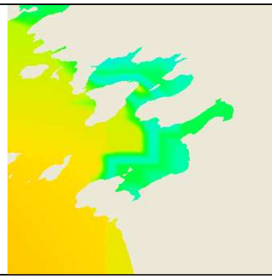
Additional Comments on Detailed Check		
Comment	Resolution	Verification

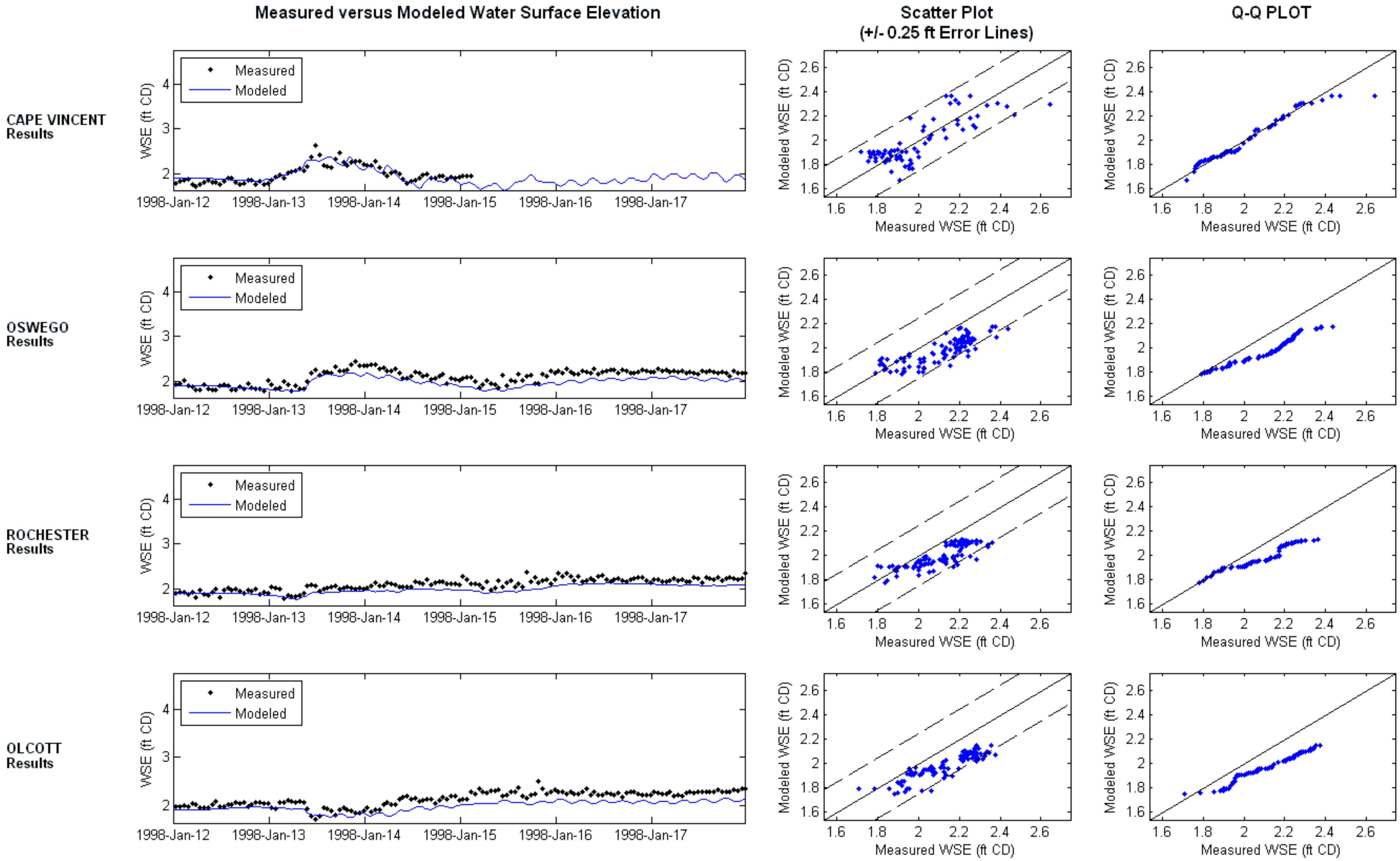
Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW			
Storm:	Storm075_1998011200		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	5/22/12		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			No

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	noisy data in the northeast	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice	BSH

<table>
<tr><td></td><td></td><td>with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.</td><td></td></tr>
<tr><td>meas v model</td><td>no plot available for QC</td><td>Provide below</td><td>BSH</td></tr>
<tr><td colspan="4"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td colspan="2">Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
<tr><td>Reviewer Signature:</td><td colspan="3">Betsy Hicks</td></tr>
<tr><td>Date:</td><td colspan="3">6/7/2012</td></tr>
</table>


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
1998-Jan-12
1998-Jan-13
1998-Jan-14
1998-Jan-15
1998-Jan-16
1998-Jan-17
Modeled WSE (ft CD)
Measured WSE (ft CD)

ADCIRC REVIEW	
Storm:	Storm076_1998031800
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/22/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	slight horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH
maxwvel.63	node 92161 is slightly higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
meas v model	model over predicts the WSE in comparison with the measured data in Cape Vincent	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW	
Storm:	Storm077_1998090400
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/22/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

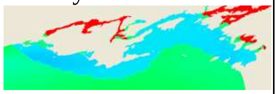
Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	slight horizontally oriented gradient line in the western side of the lake	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
meas v model	model over predicts the WSE in comparison with the measured data in all areas	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check		
Comment	Resolution	Verification
Reviewer Signature:	Betsy Hicks	
Date:	6/7/2012	

ADCIRC REVIEW	
Storm:	Storm078_1999010100
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/22/12
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	node 92161 is slightly higher than adjacent nodes	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH
maxwvel.63	sharp change in wind velocity in the northeast 	Ice fields of 100% are represented by areas of zero wind. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice	BSH

		implementation methodology.	

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW	
Storm:	Storm079_2000051000
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	5/22/12

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	horizontally oriented gradient line in the western side of the lake	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	BSH
maxwvel.63	vertically oriented gradient line in the eastern side of the lake		BSH
maxwvel.63	anomalous data in the Irondequoit and Sodus Bays		BSH
maxwvel.63	node 92161 is considerably higher than adjacent nodes, results in anomaly in the SWEL as well	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/7/2012

ADCIRC REVIEW	
Storm:	Storm080_2000120300
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012

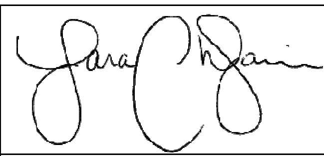
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
Maxwvel	Horizontal gradient in the west	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012

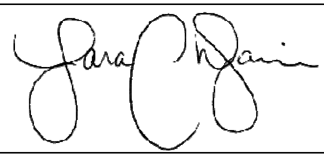
ADCIRC REVIEW	
Storm:	Storm081_2001020700
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
maxwvel	Anomalous maximum of 125.05 at node 92161	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

ADCIRC REVIEW	
Storm:	Storm082_2001040400
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

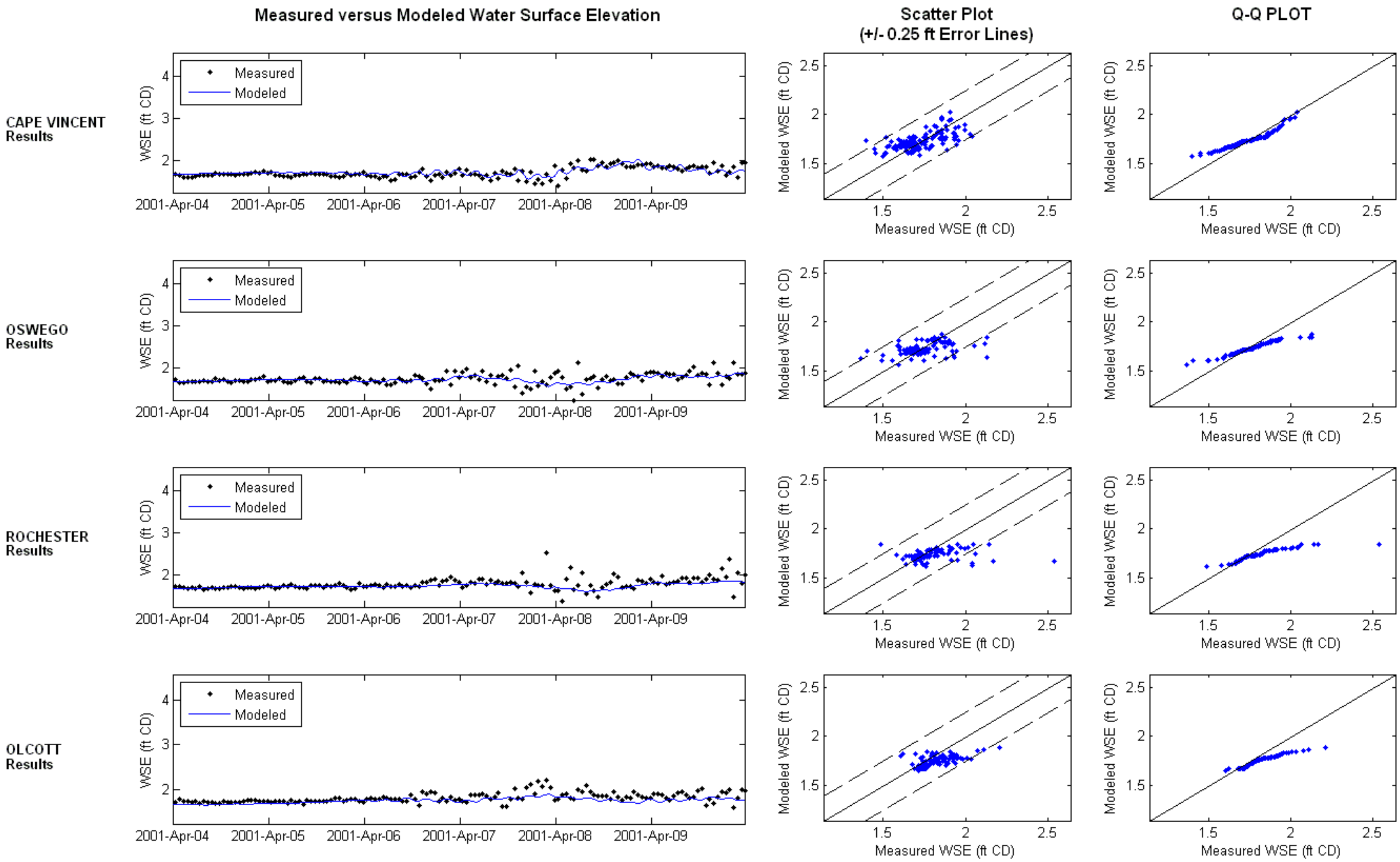
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification
Measured vs. ADCIRC time series and scatter plots slightly anomalous (see below).	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD

Reviewer Signature:	
Date:	


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
Modeled
WSE (ft CD)
2001-Apr-04
2001-Apr-05
2001-Apr-06
2001-Apr-07
2001-Apr-08
2001-Apr-09
Modeled WSE (ft CD)
Measured WSE (ft CD)

ADCIRC REVIEW			
Storm:	Storm083_2002123000		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	05/22/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes

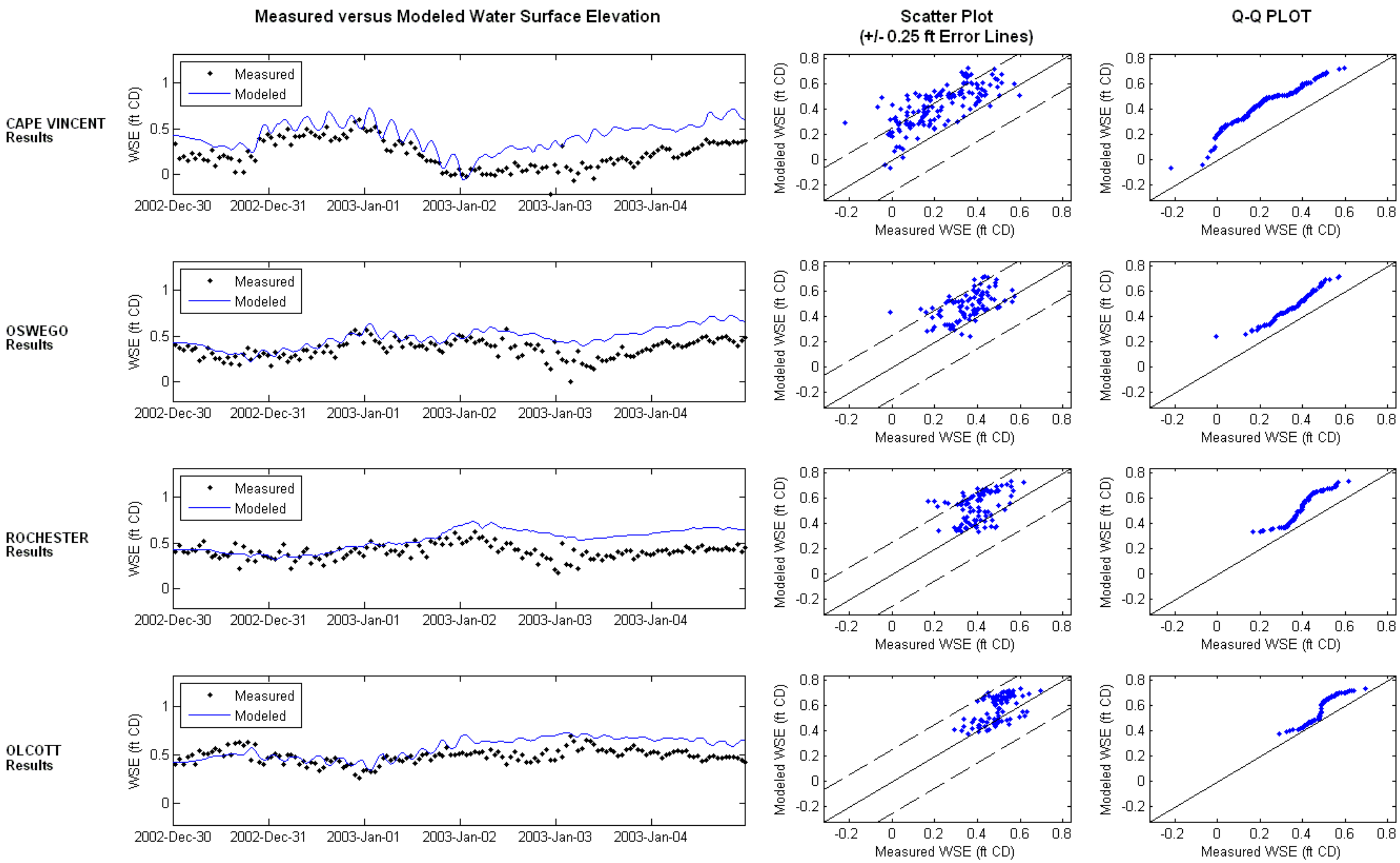
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
maxwvel	Anomalous maximum of 77.09 at node 6205	This is an isolated anomaly in the wind dataset at Node 6205, which is located far downstream in the St. Lawrence River. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. The data in the downstream end of the St. Lawrence River was suppose to be removed from the fort.63 and fort.64 files as the results are influenced by the St. Lawrence River boundary as explained in the README file. However, this storm was missed by the post processing routine. New fort.63 and fort.64 files have been provided to rectify this.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification
Measured vs. ADCIRC time series and scatter plots anomalous (see below).	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD

Reviewer Signature:	Sara C. Davis
Date:	


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
Modeled
WSE (ft CD)
2002-Dec-30
2002-Dec-31
2003-Jan-01
2003-Jan-02
2003-Jan-03
2003-Jan-04
Modeled WSE (ft CD)
Measured WSE (ft CD)

ADCIRC REVIEW	
Storm:	Storm084_2003040100
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

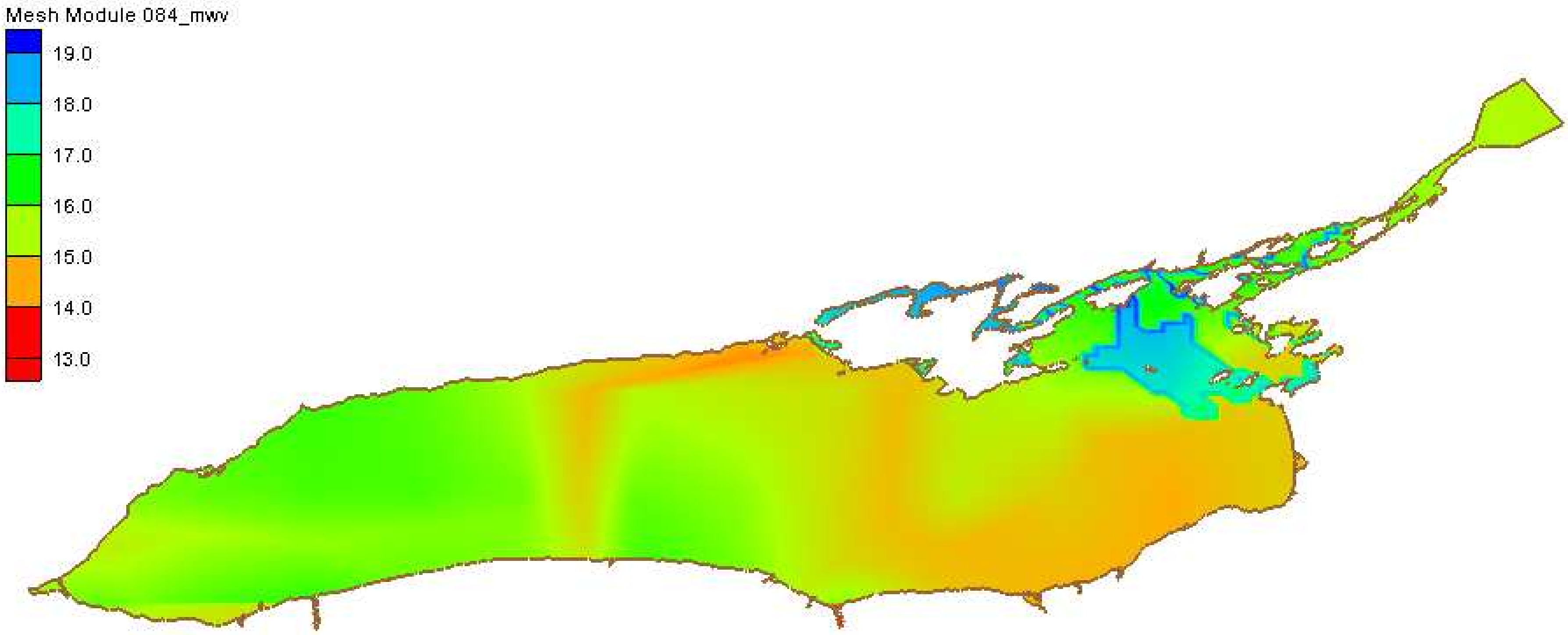
Issues

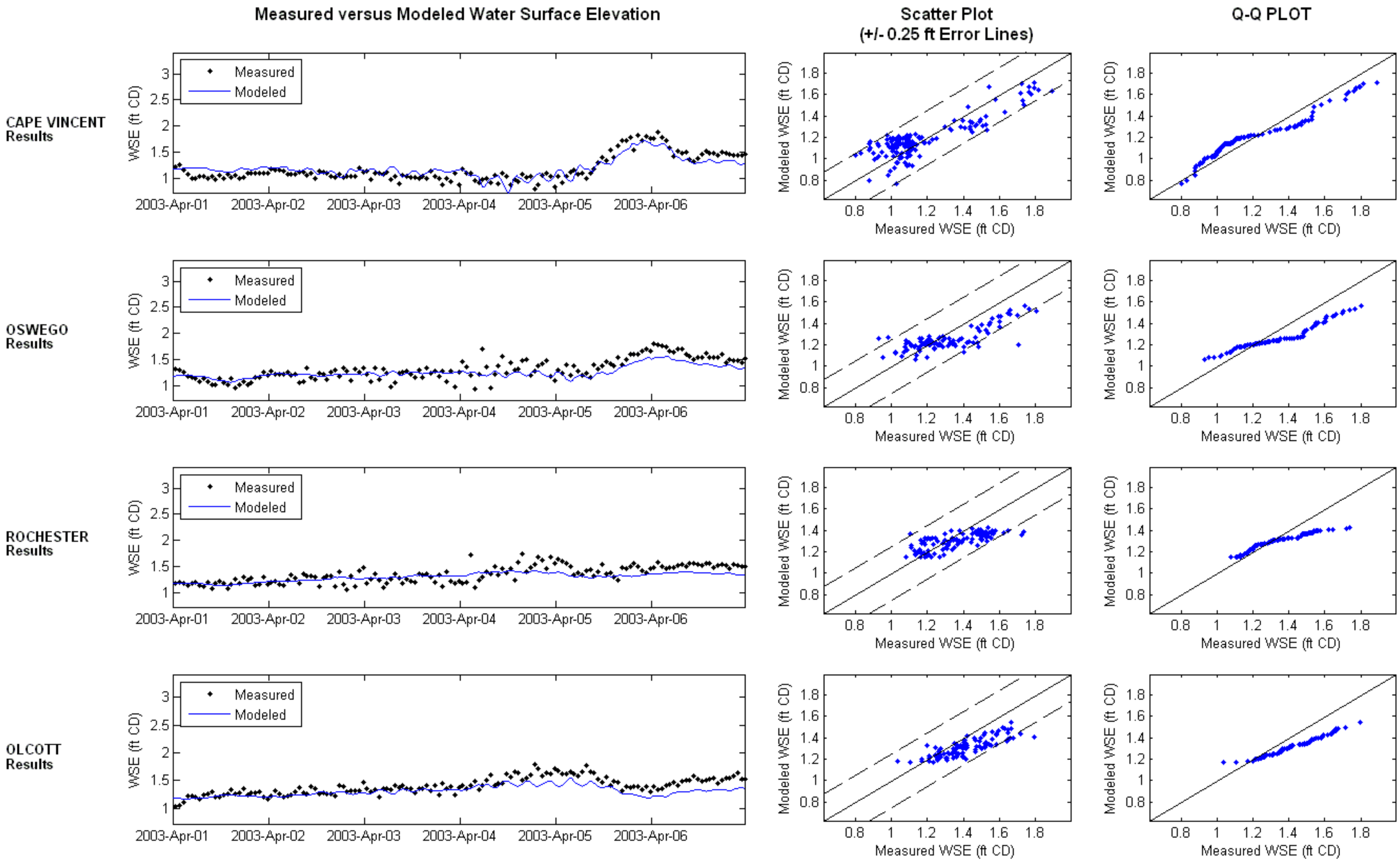
File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
Maxwvel	Horizontal gradient in west	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
Maxwvel	Abnormal gradient in east		SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification
Measured vs. ADCIRC time series and scatter plots slightly anomalous (see below).	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD

Reviewer Signature:	Sara C Davis
Date:	


Mesh Module 084_mwv
19.0
18.0
17.0
16.0
15.0
14.0
13.0


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT Results
OSWEGO Results
ROCHESTER Results
OLCOTT Results
Measured
Modeled
WSE (ft CD)
2003-Apr-01
2003-Apr-02
2003-Apr-03
2003-Apr-04
2003-Apr-05
2003-Apr-06
Modeled WSE (ft CD)
Measured WSE (ft CD)

ADCIRC REVIEW	
Storm:	Storm085_2003040400
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012

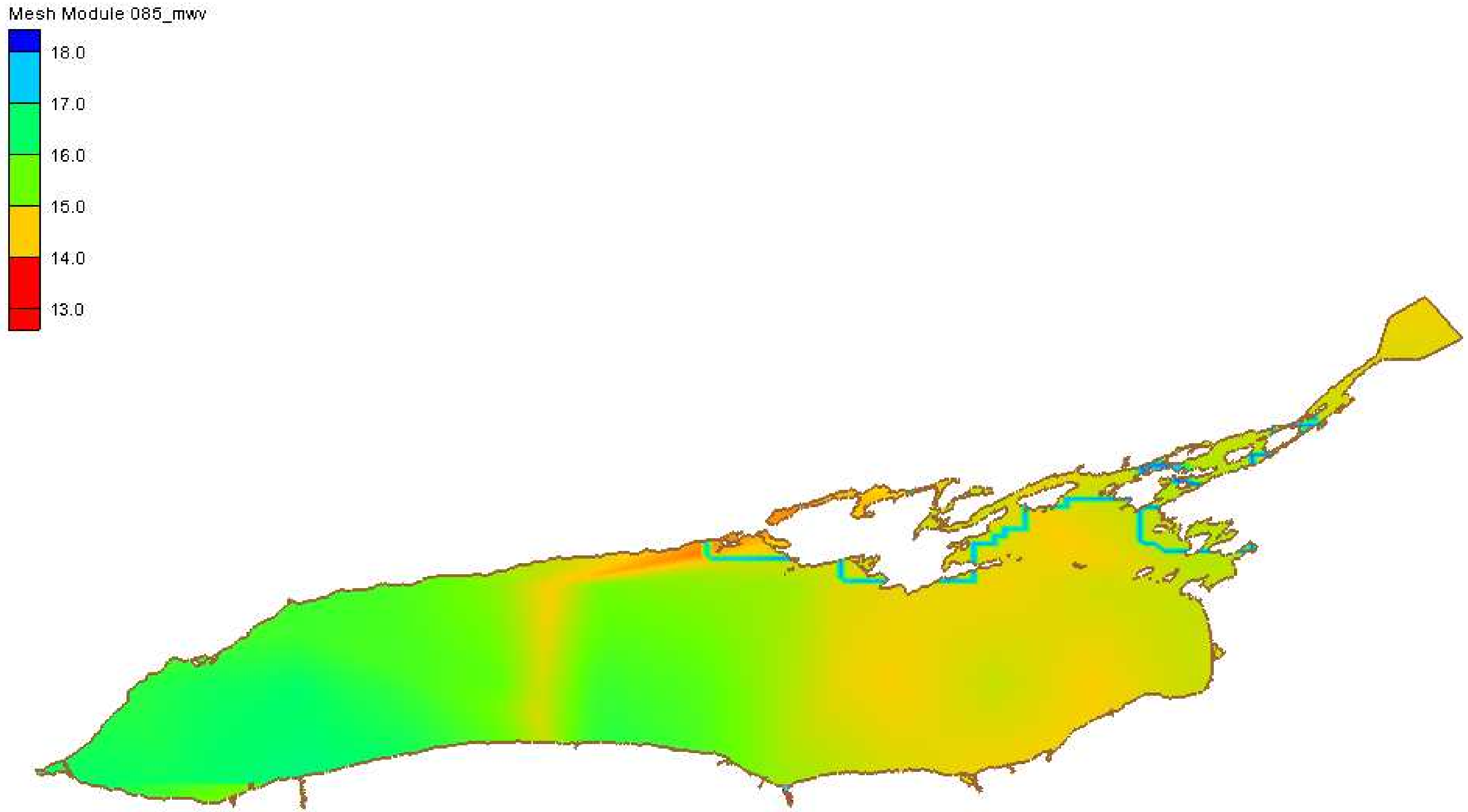
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

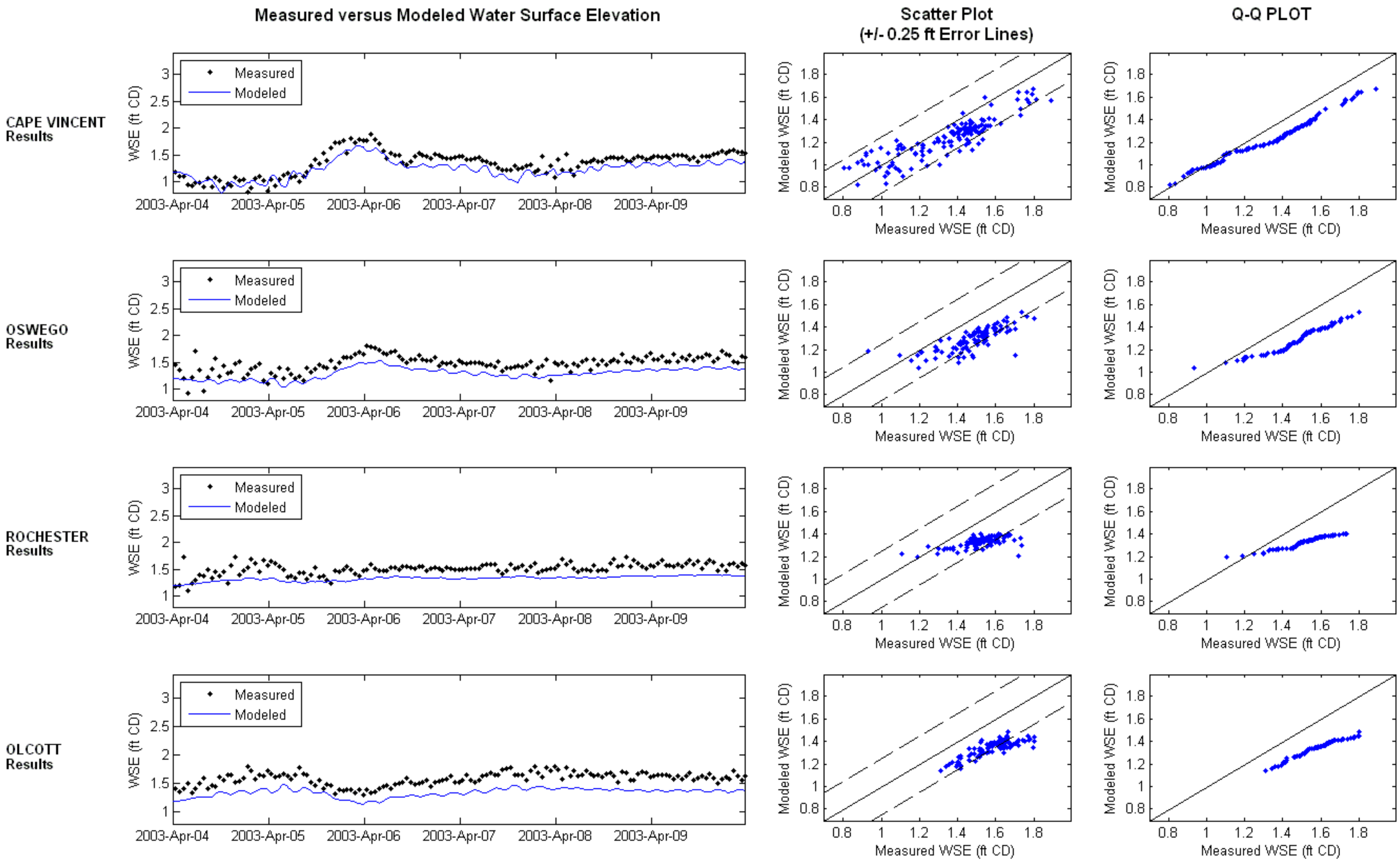
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
Maxwvel	Horizontal gradient in west/south	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
Maxwvel	Abnormal gradient in east		SCD
maxwvel	Anomalous maximum of 29.44 at node 92161	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification
Measured vs. ADCIRC time series and scatter plots slightly anomalous (see below).	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD
Reviewer Signature:	Sara C Davis	
Date:		


Mesh Module 085_mwv
18.0
17.0
16.0
15.0
14.0
13.0



RUN NAME: Storm085_2003040400

ADCIRC REVIEW			
Storm:	Storm086_2003041400		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	06/13/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxwvel	Anomalous at node 92161	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:	Sara C. Davis		
Date:	6/25/2012		

ADCIRC REVIEW	
Storm:	Storm087_2003112500
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

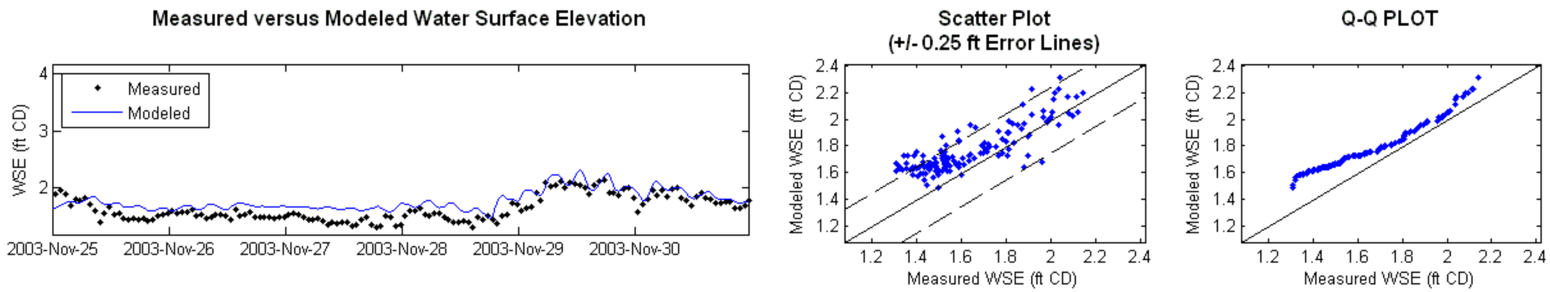
File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
Maxwvel	Horizontal gradient in west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

Additional Comments on Detailed Check

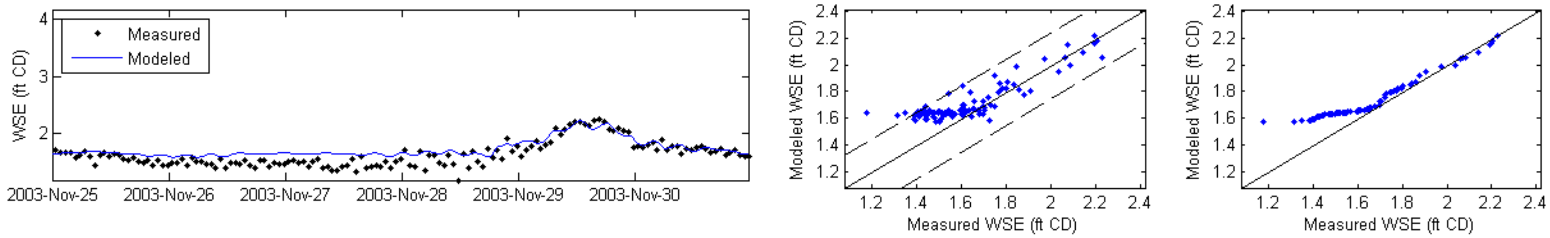
Comment	Resolution	Verification
Measured vs. ADCIRC time series and scatter plots slightly anomalous (see below).	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD

Reviewer Signature:	Sara C. Davis
Date:	

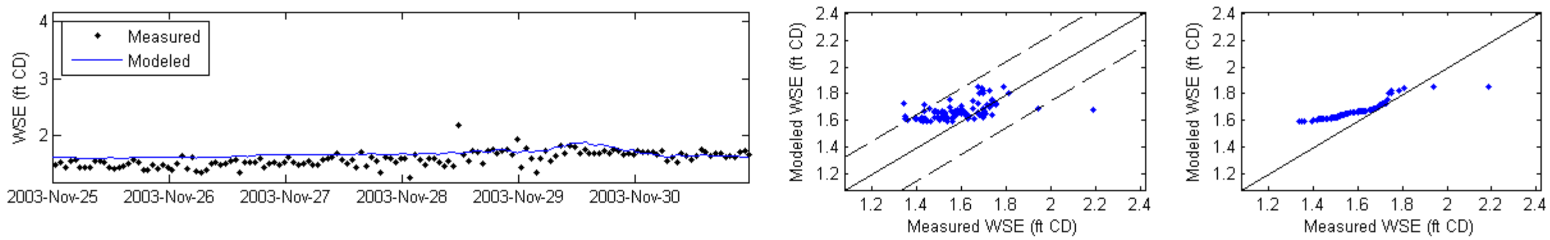
CAPE VINCENT Results



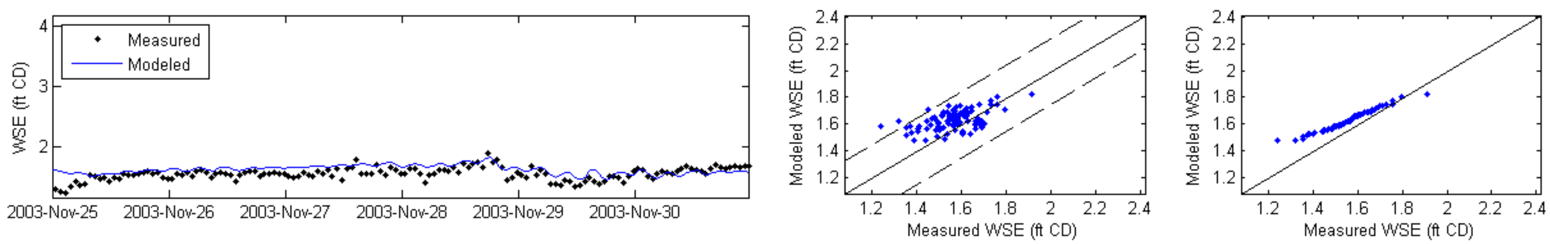
OSWEGO Results



ROCHESTER Results



OLCOTT Results



ADCIRC REVIEW	
Storm:	Storm088_2005033000
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

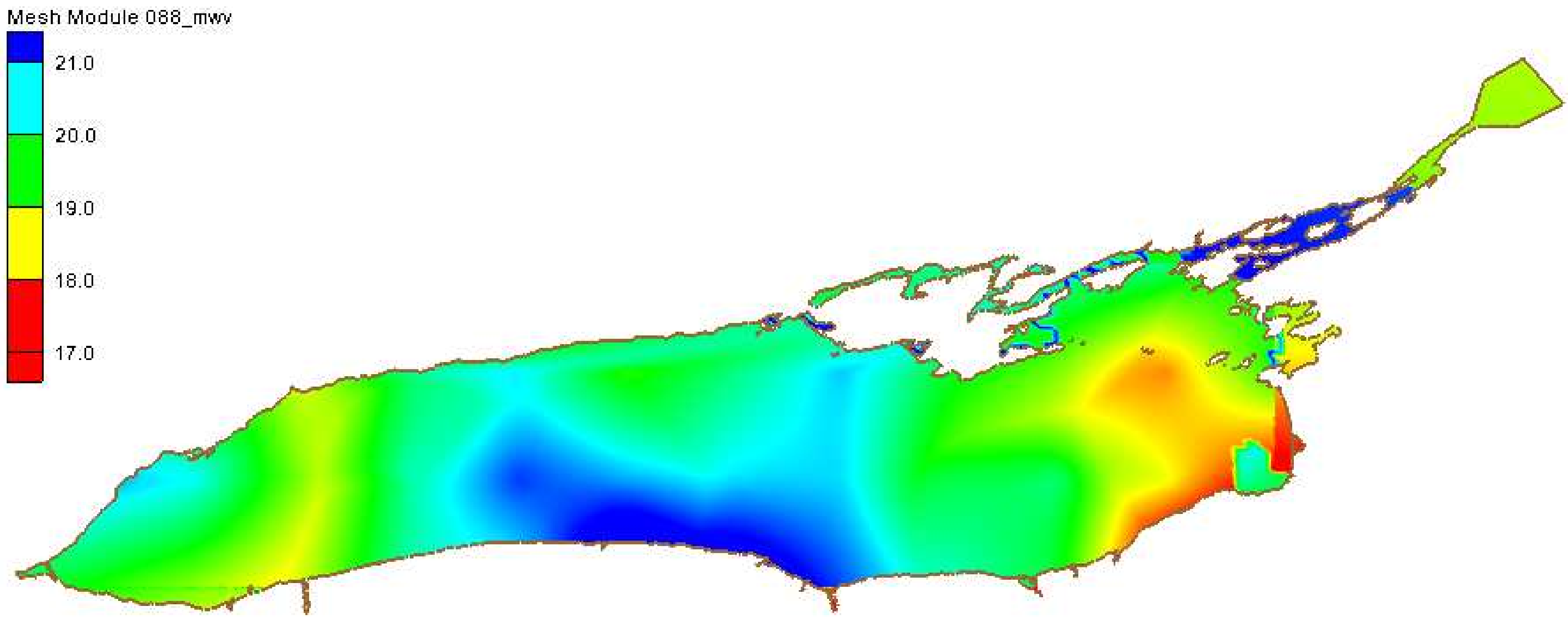
Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
Maxwvel	Horizontal gradient in west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
Maxwvel	Abnormal gradient in east		SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	


Mesh Module 088_mwv
21.0
20.0
19.0
18.0
17.0

ADCIRC REVIEW	
Storm:	Storm089_2005092600
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

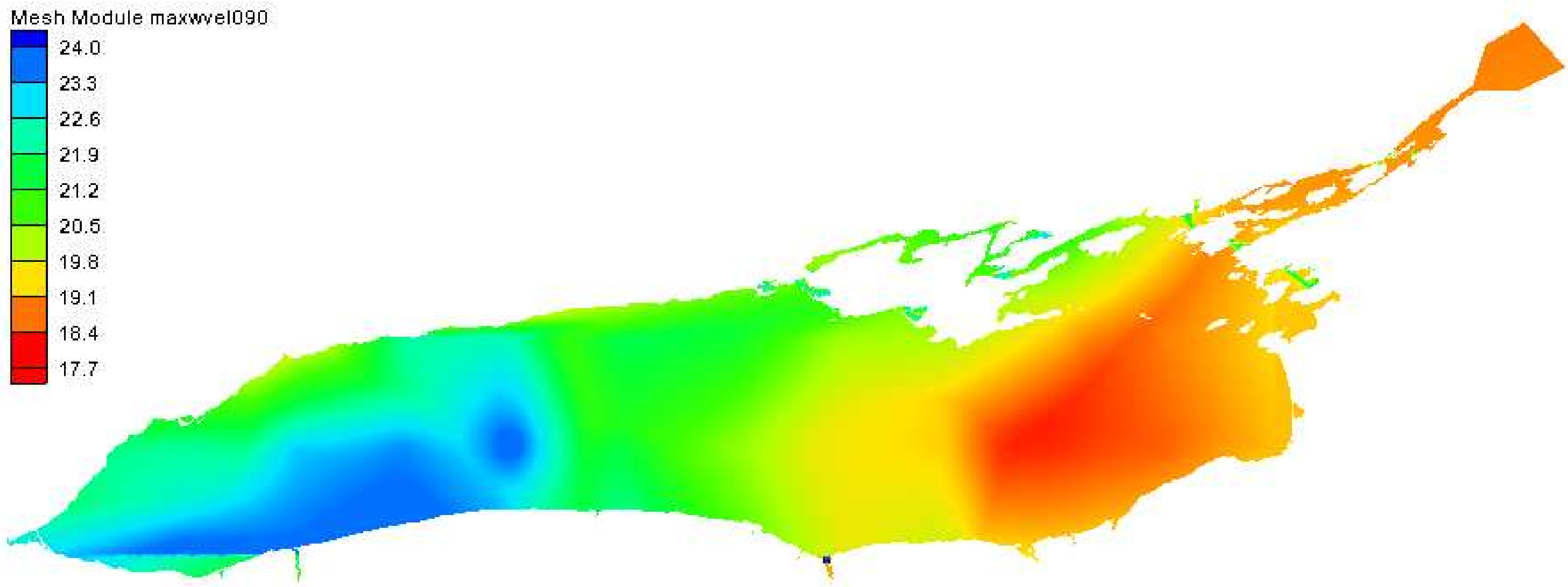
File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

ADCIRC REVIEW			
Storm:	Storm090_2006020300		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	06/13/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxwvel	Horizontal gradient in east. Vertical gradient in west.	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:	Sara C Davis		
Date:	6/25/2012		


Mesh Module maxwvel090
24.0
23.3
22.6
21.9
21.2
20.5
19.8
19.1
18.4
17.7

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm091_2006031200
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
maxwvel	Horizontal gradient in west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
maxwvel	Vertical gradient in east		SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	

Lake Erie Lake Ontario Production Run QA/QC Form

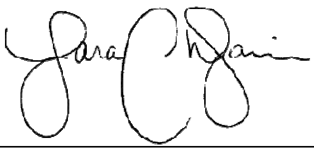
ADCIRC REVIEW	
Storm:	Storm092_2006102600
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
maxwvel	Horizontal gradient in west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
maxwvel	Vertical gradient in east		SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

ADCIRC REVIEW	
Storm:	Storm093_2006112900
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

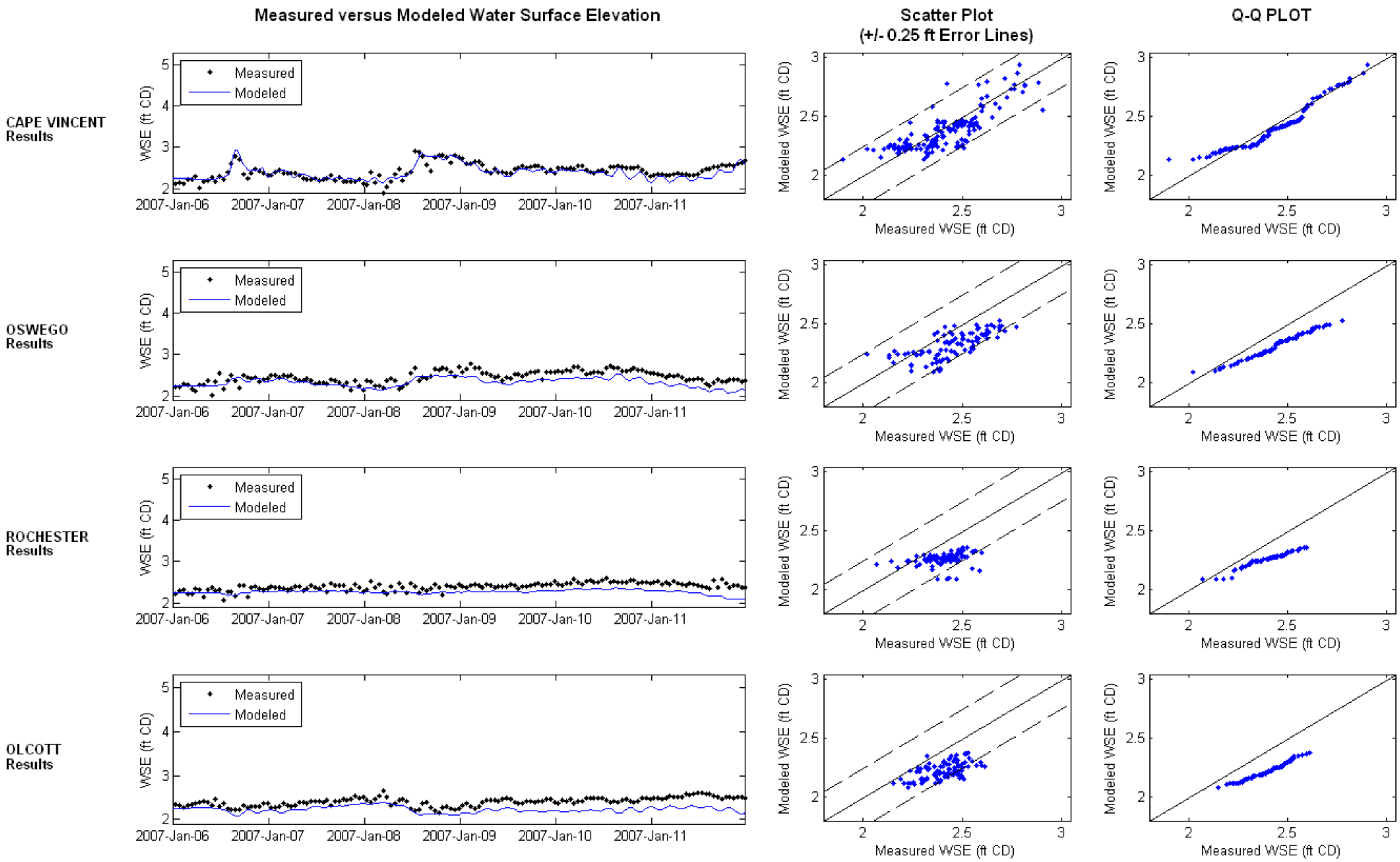
File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
maxwvel	Horizontal gradient in west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
maxwvel	Anomalous maximum of 49.75 at node 92161	This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	

ADCIRC REVIEW			
Storm:	Storm094_2007010600		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	05/22/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
maxwvel	Horizontal gradient in west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Measured vs. ADCIRC time series and scatter plots slightly anomalous (see below).		Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD
Reviewer Signature:	Sara C Davis		
Date:			



RUN NAME: Storm094_2007010600

ADCIRC REVIEW	
Storm:	Storm095_2007031500
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

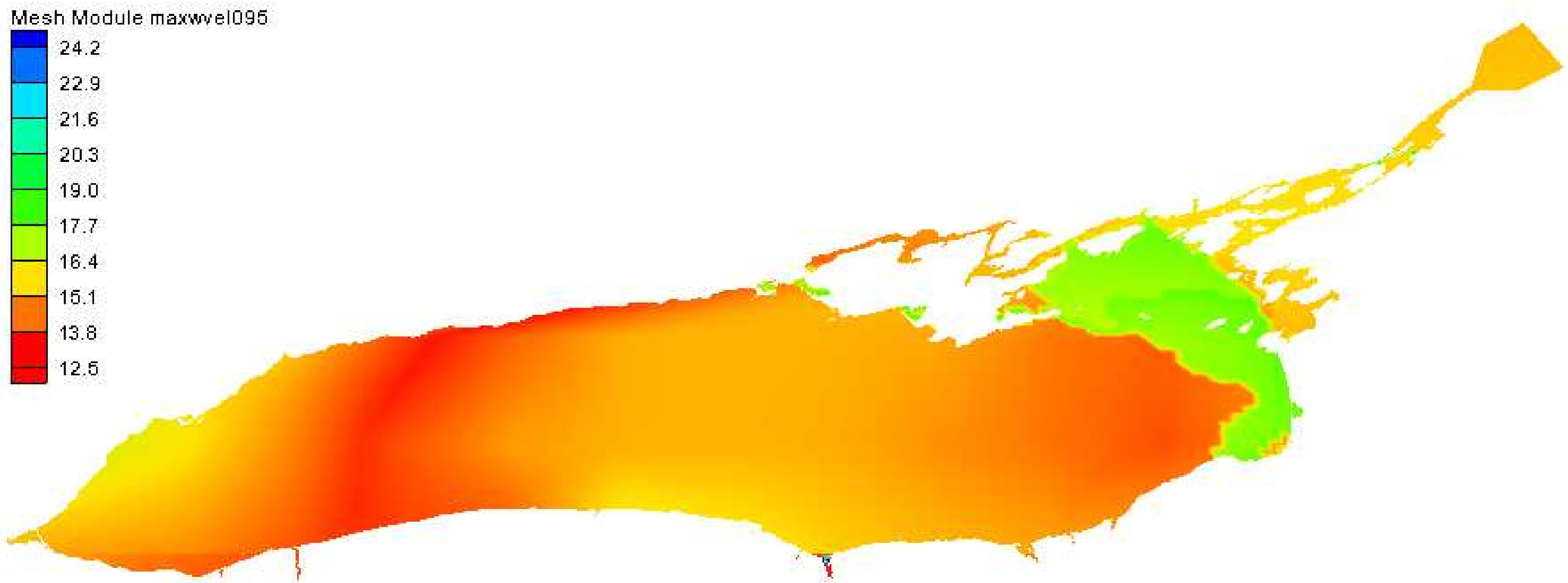
Issues

File	Comment	Resolution	Verification
maxwvel	Horizontal gradient in west. Abnormal pattern in east.	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012. Pattern in the east is due to ice implementation. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012


Mesh Module maxwvel095
24.2
22.9
21.6
20.3
19.0
17.7
16.4
15.1
13.8
12.5

ADCIRC REVIEW	
Storm:	Storm096_2007112400
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	05/22/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

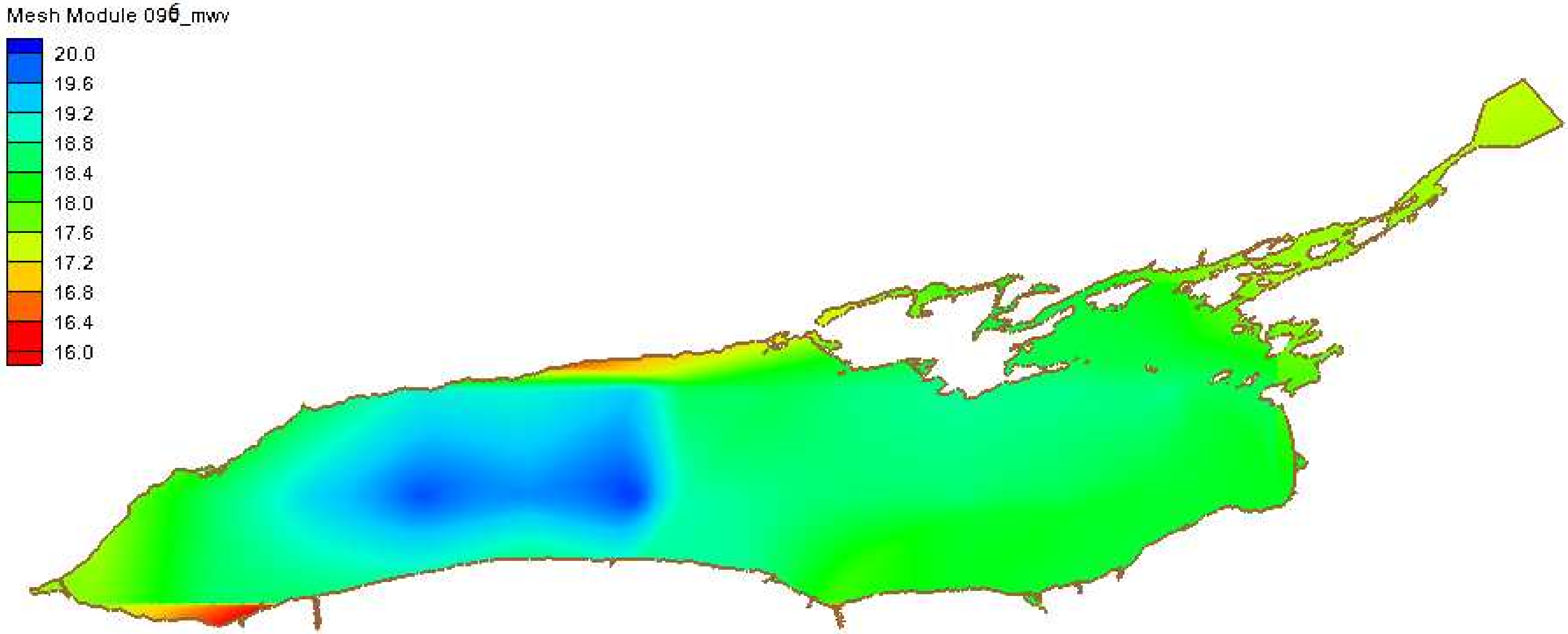
Issues

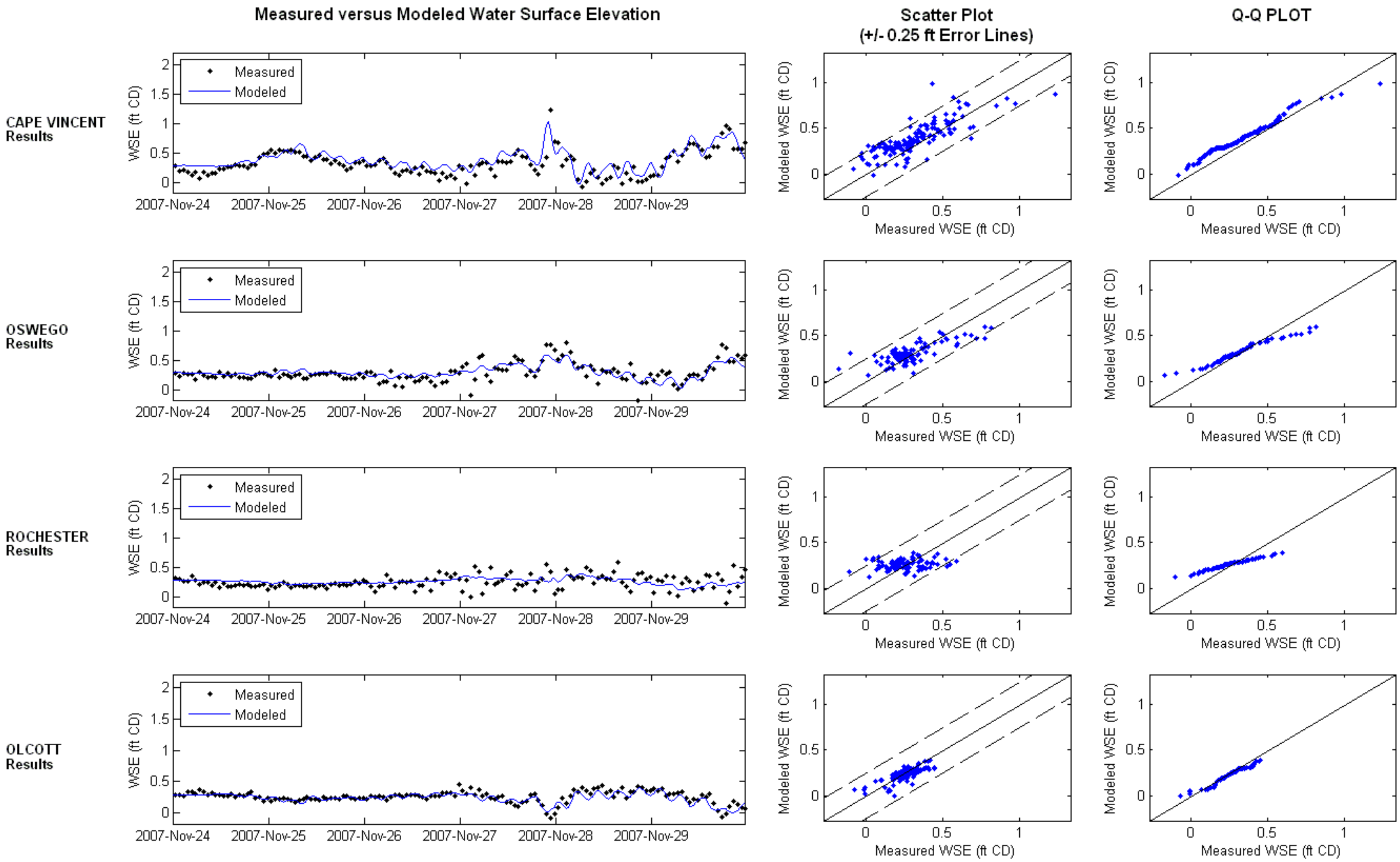
File	Comment	Resolution	Verification
maxele	Niagara River anomalous	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	SCD
Maxwvel	Horizontal gradient in west	Gradient in wind and pressure is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD
maxwvel	Horizontal gradient in north		SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification
Measured vs. ADCIRC time series and scatter plots slightly anomalous (see below).	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	SCD

Reviewer Signature:	
Date:	


Mesh Module 096_mwv
20.0
19.6
19.2
18.8
18.4
18.0
17.6
17.2
16.8
16.4
16.0


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
Modeled
WSE (ft CD)
2007-Nov-24
2007-Nov-25
2007-Nov-26
2007-Nov-27
2007-Nov-28
2007-Nov-29
Modeled WSE (ft CD)
Measured WSE (ft CD)

ADCIRC REVIEW	
Storm:	Storm097_2008010600
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

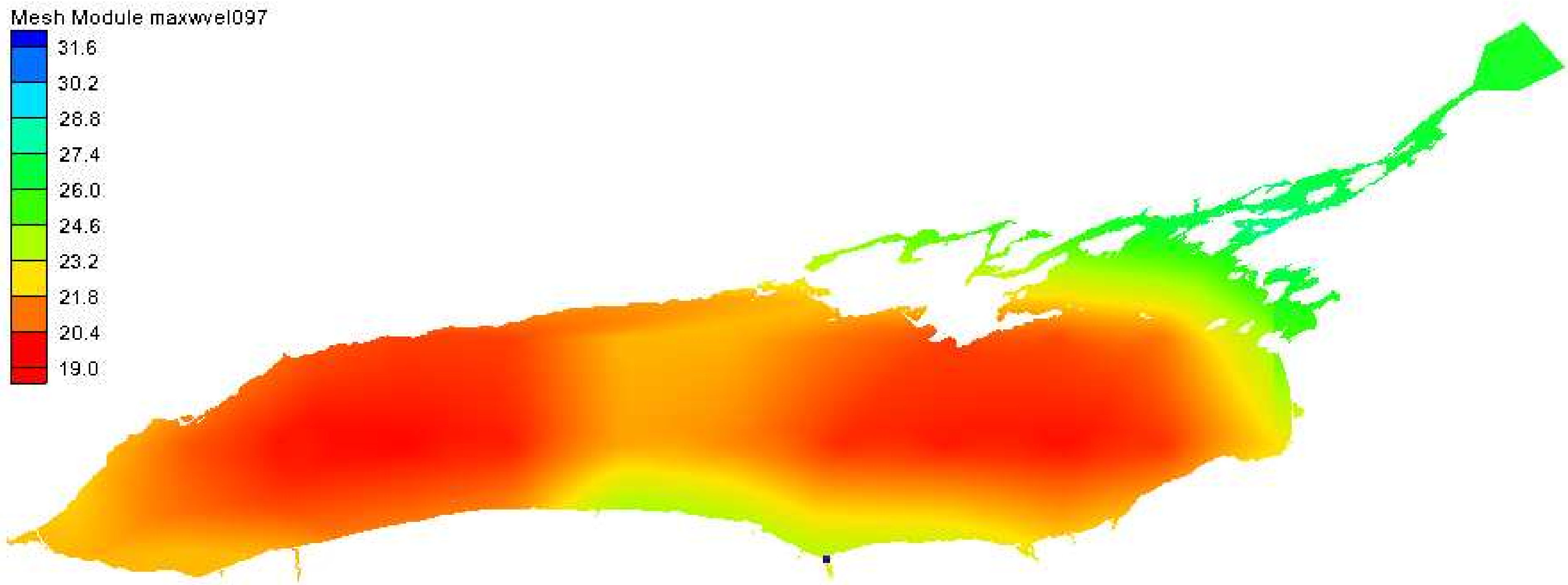
Issues

File	Comment	Resolution	Verification
maxwvel	Vertical gradient in east.	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012


Mesh Module maxwvel097
31.6
30.2
28.8
27.4
26.0
24.6
23.2
21.8
20.4
19.0

ADCIRC REVIEW	
Storm:	Storm098_2008030500
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxwvel	Vertical gradient in east.	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C. Davis
Date:	6/25/2012

ADCIRC REVIEW		
Storm:	Storm099_2008091200	
Reviewer:	Sara C. Davis	
Organization:	RAMPP	
Date Checked:	06/13/2012	
Was the max water surface elevation file checked for anomalies?		Yes
Was the max current velocity file checked for anomalies?		Yes
Was the max wind velocity file checked for anomalies?		Yes
Was the minimum pressure file checked for anomalies?		Yes
Was the model time series output compared to the measured gage data?		Yes

Issues

File	Comment	Resolution	Verification
maxwvel	Vertical gradient in east.	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm100_2008122500
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

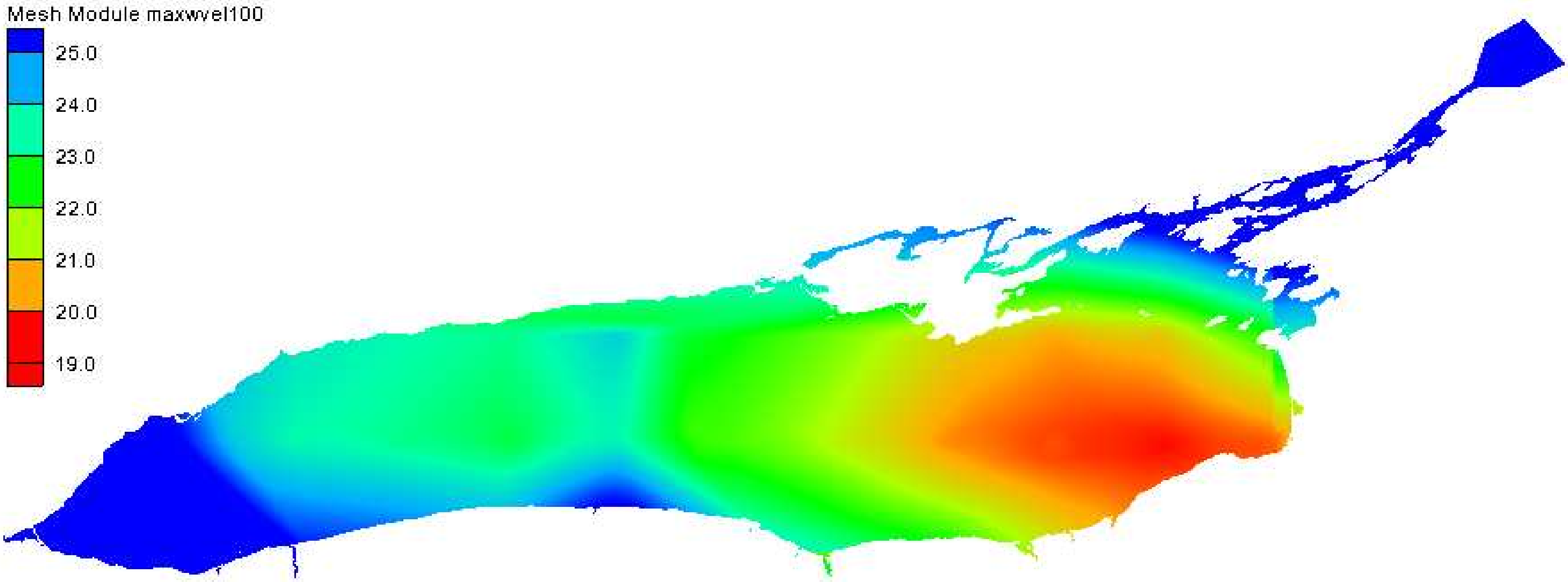
Issues

File	Comment	Resolution	Verification
maxwvel	Vertical gradient in east. Abnormal pattern across lake. Anomalous at node 92161.	Gradient in wind is caused by extrapolation routine. Testing has shown that this gradient has a negligible effect on the water surface elevation. Refer to Baird/RAMPP email correspondence titled Run QC dated May 2012. The spatially and time varying wind file (fort.22) was checked and no abnormal patterns were observed across the Lake. However, this particular storm does change direction and is therefore the cause of the pattern seen across the Lake in the maximum wind speed file. This is an isolated anomaly in the wind dataset at Node 92161, which is located in the middle of Irondequoit Bay. This anomaly occurs periodically throughout the simulation and is relative to the surrounding winds, so that the maximum difference observed in the maxwvel.63 plot occurs only at one time step. A review of the results has shown that the anomaly has a localized influence on the neighboring grid cells only and has negligible impact on surge results in Irondequoit Bay.	SCD
maxvel	Noisy at shoreline.	The variations along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	6/25/2012


Mesh Module maxwvel100
25.0
24.0
23.0
22.0
21.0
20.0
19.0

ADCIRC REVIEW	
Storm:	Storm101_1970112000
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

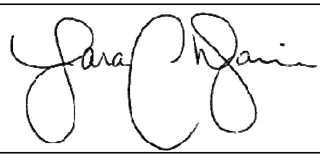
Issues

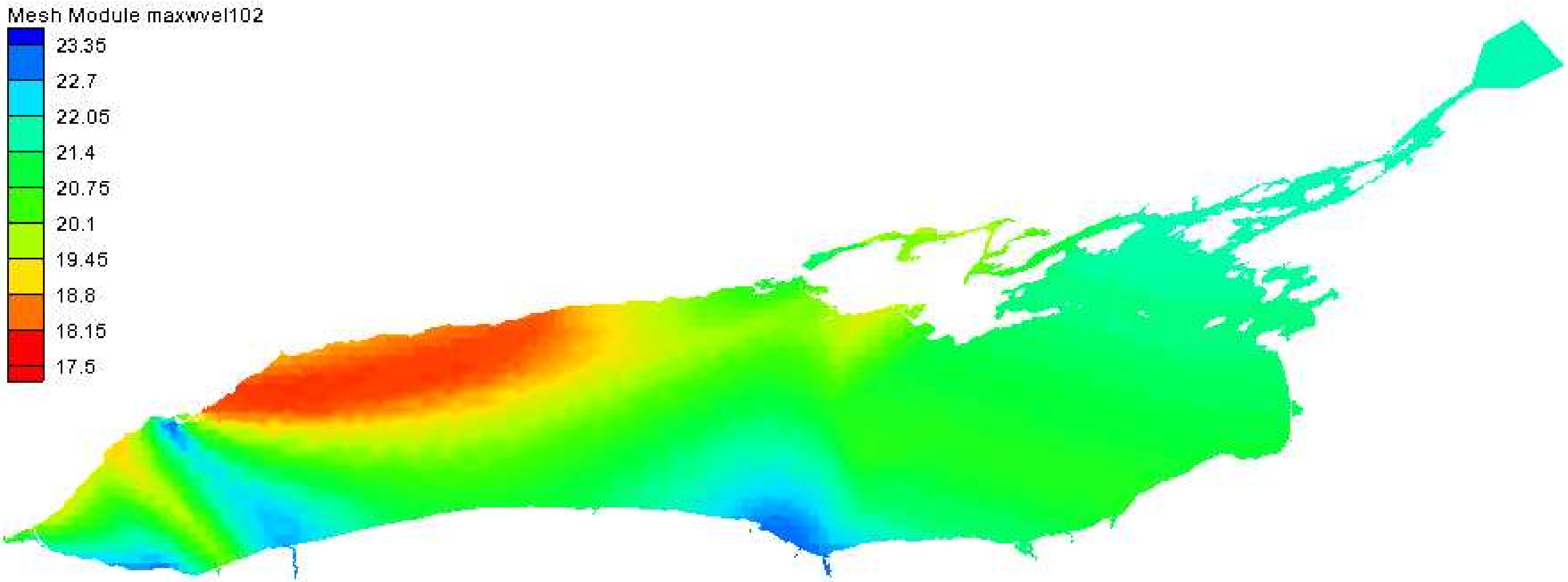
File	Comment	Resolution	Verification
	none		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	06/13/2012

ADCIRC REVIEW			
Storm:		Storm102_1971012400	
Reviewer:		Sara C. Davis	
Organization:		RAMPP	
Date Checked:		06/13/2012	
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxwvel	Abnormal pattern across lake.	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, the winds are representative of measured data. The spatially and time varying wind file (fort.22) was checked and no abnormal patterns were observed across the Lake. However, this particular storm does change direction and is therefore the cause of the pattern seen across the Lake in the maximum wind speed file.	SCD
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:			
Date:		6/25/2012	


Mesh Module maxwvel102
23.35
22.7
22.05
21.4
20.75
20.1
19.45
18.8
18.15
17.5

ADCIRC REVIEW	
Storm:	Storm103_1971012700
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/18/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
	none		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	06/18/2012

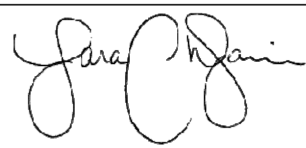
ADCIRC REVIEW	
Storm:	Storm104_1971020300
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/18/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
	none		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	06/18/2012

ADCIRC REVIEW	
Storm:	Storm105_1971021000
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/18/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

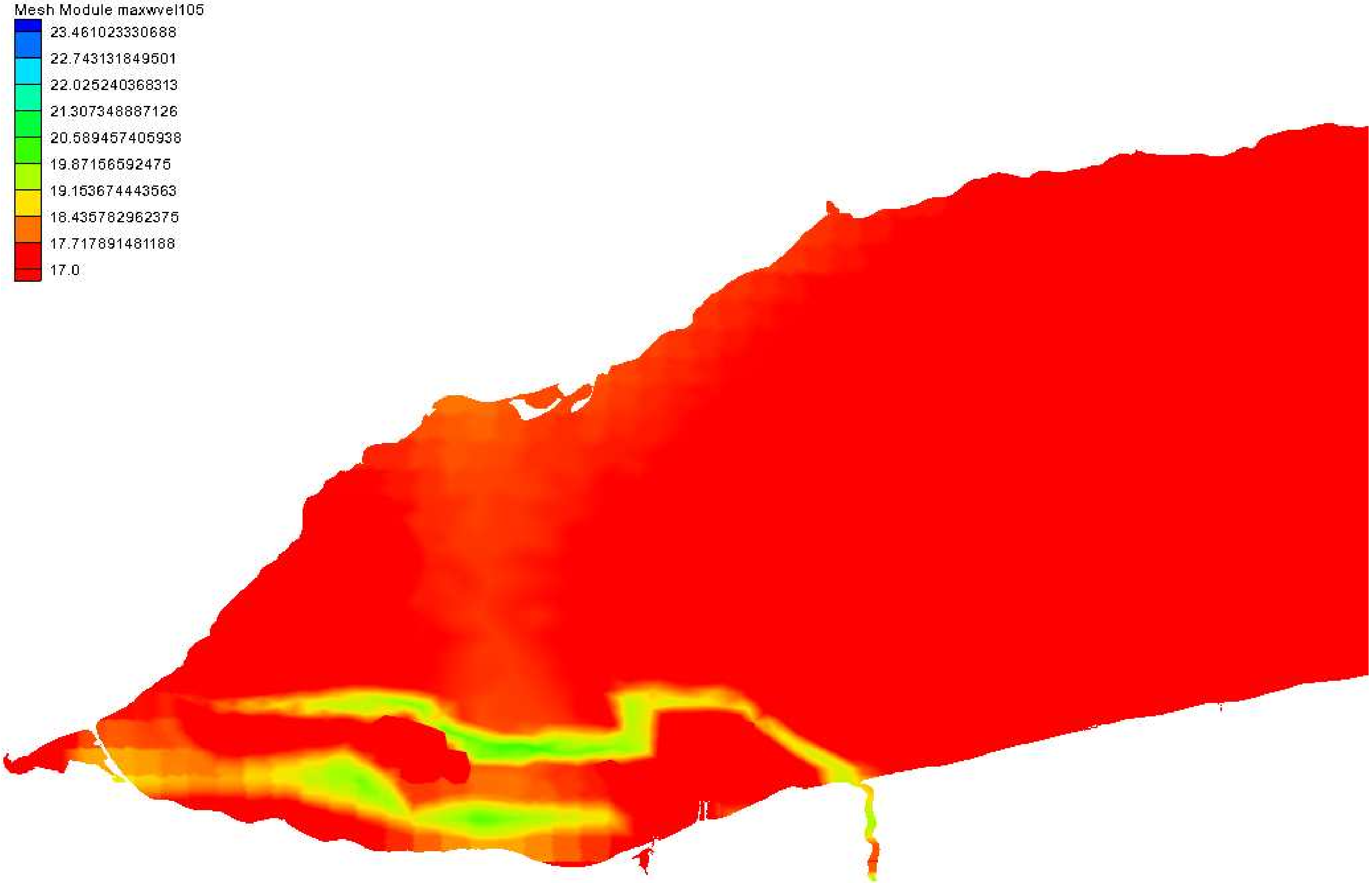
Issues

File	Comment	Resolution	Verification
maxwvel	Abnormal gradient in west.	The gradient is caused by the ice implementation and the course nature of the ice data during this time period. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C. Davis
Date:	6/25/2012



RUN NAME: Storm105_1971021000

ADCIRC REVIEW	
Storm:	Storm106_1971022500
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/22/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

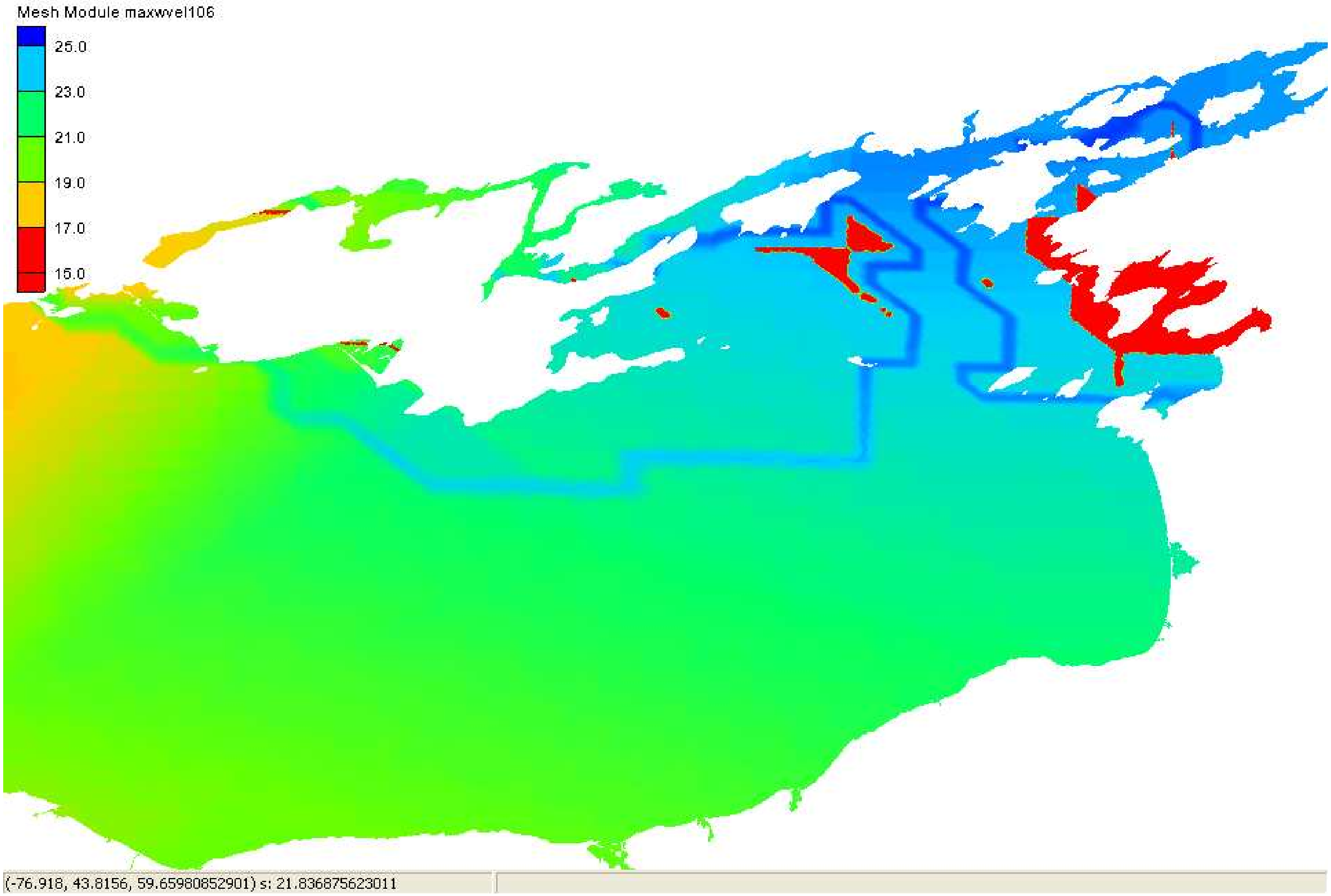
Issues

File	Comment	Resolution	Verification
maxwvel	Abnormal gradient in East	The gradients in the east are due to the implementation of ice. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with about 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	6/26/2012


Mesh Module maxwvel106
25.0
23.0
21.0
19.0
17.0
15.0
(-76.918, 43.8156, 59.65980852901) s: 21.836875623011

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm107_1971030100
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/18/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

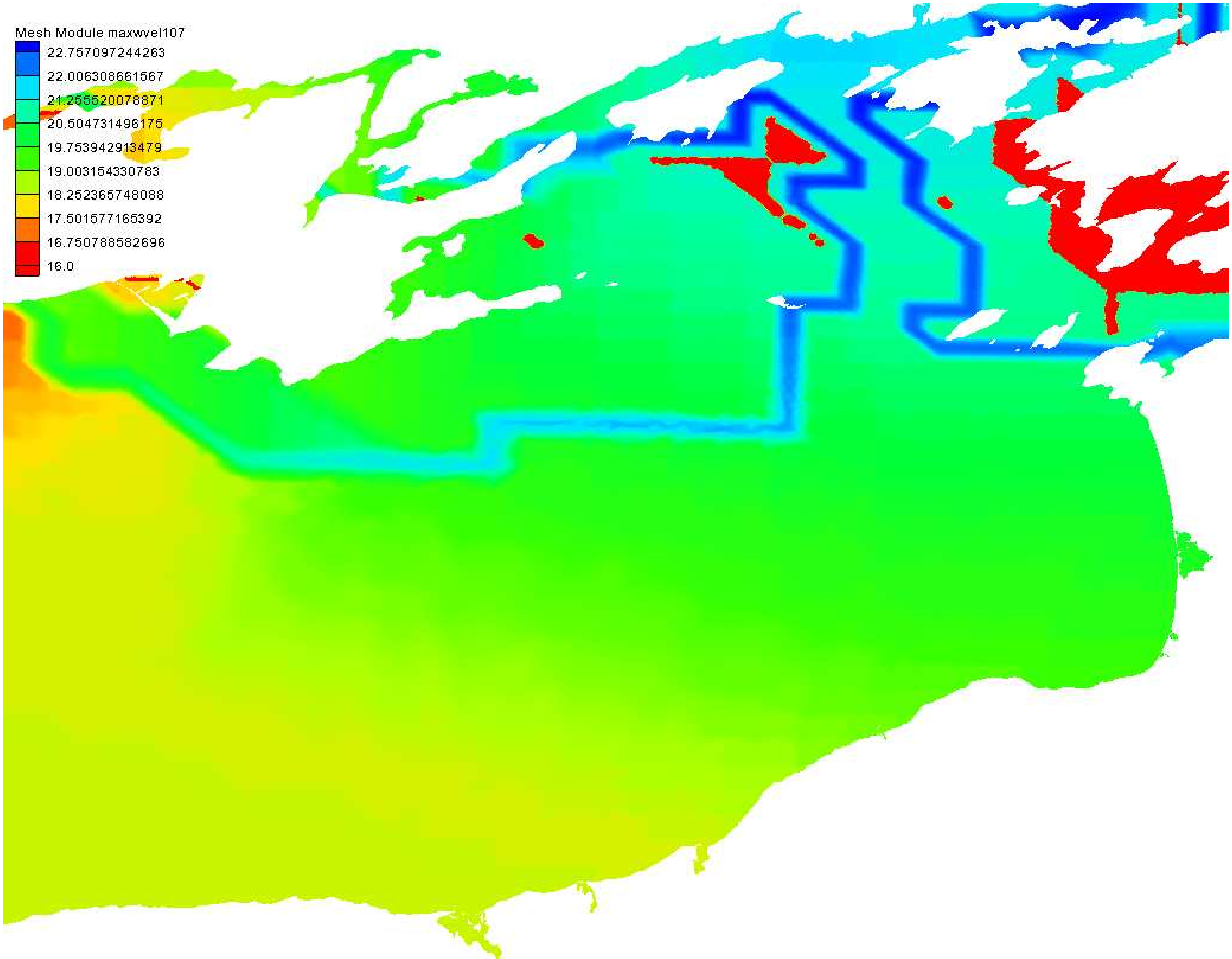
Issues

File	Comment	Resolution	Verification
maxwvel	Abnormal gradient in east.	The pattern is due to the coarse nature of the ice data during this time period. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012



RUN NAME: Storm107_1971030100

ADCIRC REVIEW	
Storm:	Storm108_1971120800
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/18/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

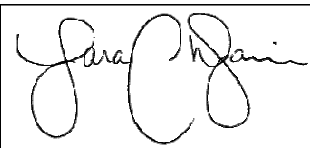
Issues

File	Comment	Resolution	Verification
	none		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	06/18/2012

ADCIRC REVIEW			
Storm:	Storm109_1971122700		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	06/18/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
	none		
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:			
Date:	06/18/2012		

ADCIRC REVIEW			
Storm:	Storm110_1972012200		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	06/13/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele	Abnormal pattern in east and west.	The pattern in the west is caused by the difference in pressure data at St. Catherine's and Niagara This storm is prior to 1979 when CFSR pressure data is not available and natural neighbor pressure fields have been generated using available data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). In addition, gaps in the data at St. Catherine's were interpolated to avoid unrealistic oscillations in the water surface elevation. However, for this particular storm the interpolated St. Catherine's data was slightly lower than that measured at Niagara causing a small difference (<10 cm) in the water surface elevation in the eastern end on Lake Ontario. This issue is small, contained within Canada where the results will not be used for mapping and is a limitation of the data available for the natural neighbor interpolation technique. The spatially and time varying elevation file (fort.63) was checked and no abnormal patterns were observed in the east.	SCD
maxvel	Noisy at shoreline.	The variations along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm111_1972020100
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

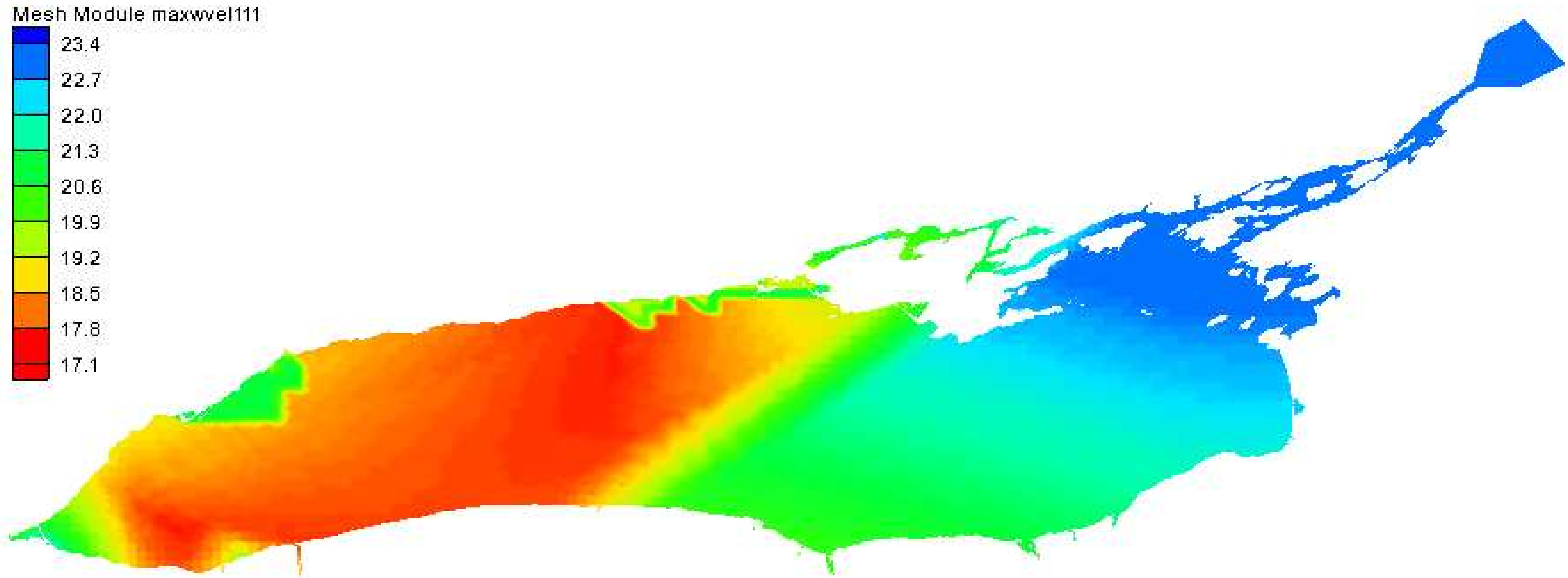
Issues

File	Comment	Resolution	Verification
maxwvel	Abnormal pattern across lake.	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology. This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, areas of high winds are representative of measured data around the Lake.	SCD
maxele	Abnormal pattern in the west and east.	The pattern in the west is caused by the difference in pressure data at St. Catherine’s and Niagara This storm is prior to 1979 when CFSR pressure data is not available and natural neighbor pressure fields have been generated using available data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). In addition, gaps in the data at St. Catherine’s were interpolated to avoid unrealistic oscillations in the water surface elevation. However, for this particular storm the interpolated St. Catherine’s data was slightly lower than that measured at Niagara causing a small difference (<10 cm) in the water surface elevation in the eastern end on Lake Ontario. This issue is small, contained within Canada where the results will not be used for mapping and is a limitation of the data available for the natural neighbor interpolation technique. The spatially and time varying elevation file (fort.63) was checked and no abnormal patterns were observed in the east.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C. Davis
Date:	6/26/2012


Mesh Module maxwvel111
23.4
22.7
22.0
21.3
20.6
19.9
19.2
18.5
17.8
17.1

ADCIRC REVIEW	
Storm:	Storm112_1972111200
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

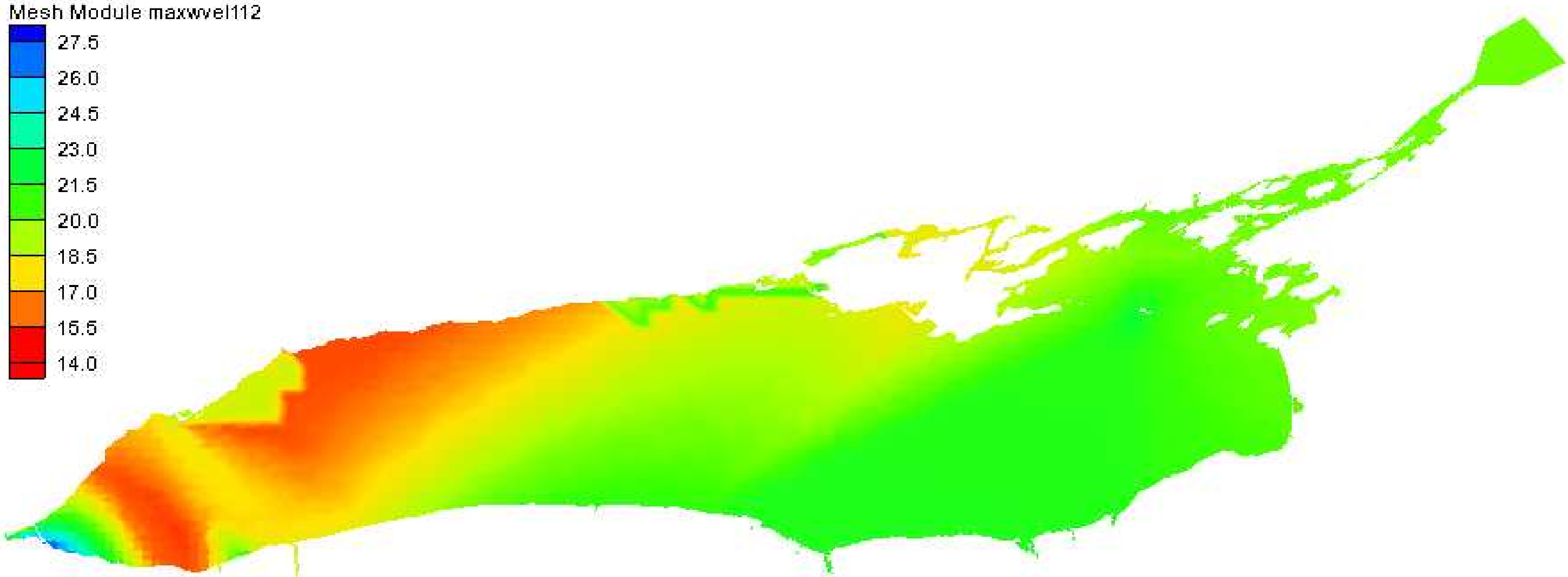
Issues

File	Comment	Resolution	Verification
maxwvel	Abnormal pattern across lake.	The pattern observed on the North side of the Lake is due to ice implementation. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology. This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, winds are representative of measured data around the Lake. The spatially and time varying wind file (fort.22) was checked and no abnormal patterns were observed across the Lake. However, this particular storm does change direction and is therefore the cause of the pattern seen across the Lake in the maximum wind speed file.	SCD

Additional Comments on Detailed Check

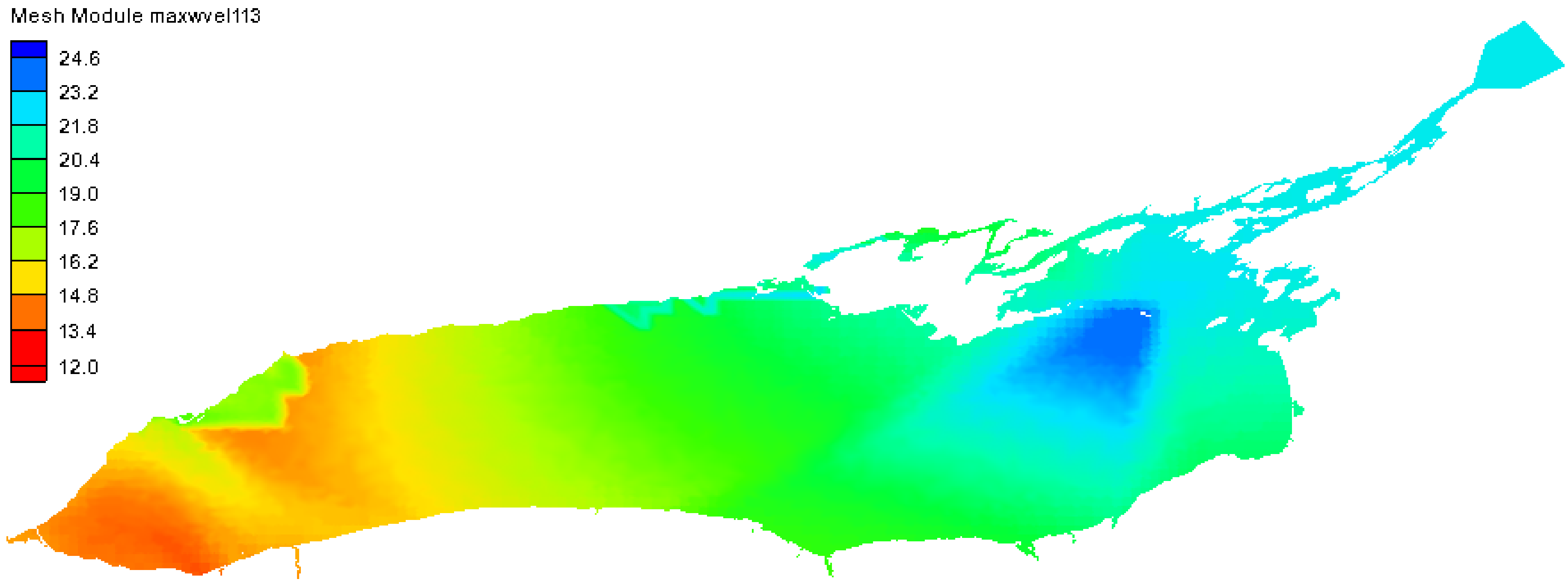
Comment	Resolution	Verification

Reviewer Signature:	Sara C Davis
Date:	6/25/2012

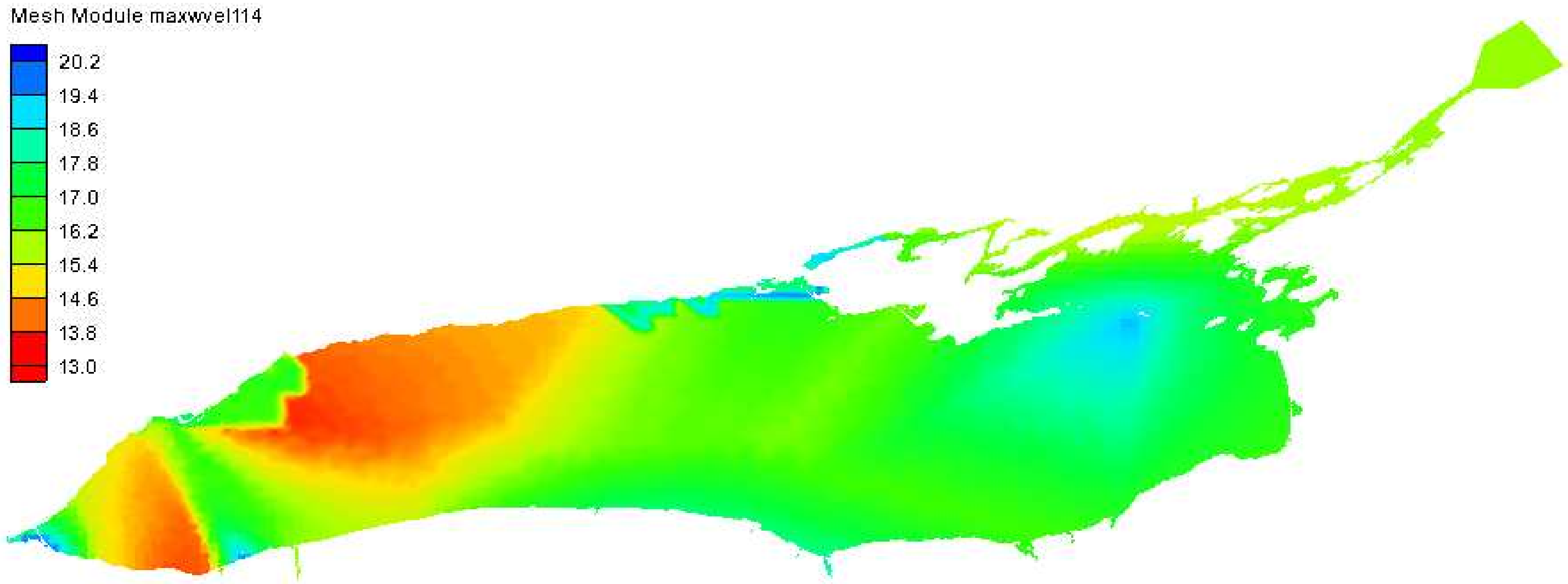

Mesh Module maxwvel112
27.5
26.0
24.5
23.0
21.5
20.0
18.5
17.0
15.5
14.0

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW			
Storm:	Storm113_1972112400		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	06/13/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxwvel	Abnormal pattern across lake.	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology. This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, areas of high winds are representative of measured data around the Lake.	SCD
maxele	Abnormal pattern in the west and east.	The pattern in the west is caused by the difference in pressure data at St. Catherine's and Niagara This storm is prior to 1979 when CFSR pressure data is not available and natural neighbor pressure fields have been generated using available data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). In addition, gaps in the data at St. Catherine's were interpolated to avoid unrealistic oscillations in the water surface elevation. However, for this particular storm the interpolated St. Catherine's data was slightly lower than that measured at Niagara causing a small difference (<10 cm) in the water surface elevation in the eastern end on Lake Ontario. This issue is small, contained within Canada where the results will not be used for mapping and is a limitation of the data available for the natural neighbor interpolation technique. The spatially and time varying elevation file (fort.63) was checked and no abnormal patterns were observed in the east.	SCD
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:	Sara C Davis		
Date:	6/26/2012		


Mesh Module maxwvel113
24.6
23.2
21.8
20.4
19.0
17.6
16.2
14.8
13.4
12.0

ADCIRC REVIEW			
Storm:	Storm114_1972120200		
Reviewer:	Sara C. Davis		
Organization:	RAMPP		
Date Checked:	06/13/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxwvel	Abnormal pattern across lake.	The pattern observed on the North side of the Lake is due to ice implementation. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology. This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, winds are representative of measured data around the Lake. The spatially and time varying wind file (fort.22) was checked and no abnormal patterns were observed across the Lake. However, this particular storm does change direction and is therefore the cause of the pattern seen across the Lake in the maximum wind speed file.	SCD
<u>Additional Comments on Detailed Check</u>			
Comment		Resolution	Verification
Reviewer Signature:	Sara C. Davis		
Date:	6/25/2012		


Mesh Module maxwvel114
20.2
19.4
18.6
17.8
17.0
16.2
15.4
14.6
13.8
13.0

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm115_1973031500
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Abnormal pattern in west.	The pattern in the west is caused by the difference in pressure data at St. Catherine's and Niagara This storm is prior to 1979 when CFSR pressure data is not available and natural neighbor pressure fields have been generated using available data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). In addition, gaps in the data at St. Catherine's were interpolated to avoid unrealistic oscillations in the water surface elevation. However, for this particular storm the interpolated St. Catherine's data was slightly lower than that measured at Niagara causing a small difference (<10 cm) in the water surface elevation in the eastern end on Lake Ontario. This issue is small, contained within Canada where the results will not be used for mapping and is a limitation of the data available for the natural neighbor interpolation technique.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

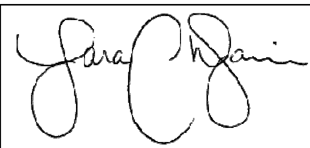
ADCIRC REVIEW	
Storm:	Storm116_1973040800
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
	none		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	06/13/2012

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm117_1973103000
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Abnormal pattern in west and east.	The pattern in the west is caused by the difference in pressure data at St. Catherine's and Niagara This storm is prior to 1979 when CFSR pressure data is not available and natural neighbor pressure fields have been generated using available data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). In addition, gaps in the data at St. Catherine's were interpolated to avoid unrealistic oscillations in the water surface elevation. However, for this particular storm the interpolated St. Catherine's data was slightly lower than that measured at Niagara causing a small difference (<10 cm) in the water surface elevation in the eastern end on Lake Ontario. This issue is small, contained within Canada where the results will not be used for mapping and is a limitation of the data available for the natural neighbor interpolation technique. The spatially and time varying elevation file (fort.63) was checked and no abnormal patterns were observed in the east.	SCD

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Sara C. Davis
Date:	6/26/2012

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm118_1973110300
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012

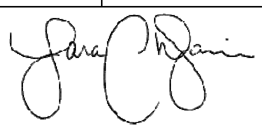
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Abnormal pattern in west and east.	The pattern in the west is caused by the difference in pressure data at St. Catherine's and Niagara This storm is prior to 1979 when CFSR pressure data is not available and natural neighbor pressure fields have been generated using available data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). In addition, gaps in the data at St. Catherine's were interpolated to avoid unrealistic oscillations in the water surface elevation. However, for this particular storm the interpolated St. Catherine's data was slightly lower than that measured at Niagara causing a small difference (<10 cm) in the water surface elevation in the eastern end on Lake Ontario. This issue is small, contained within Canada where the results will not be used for mapping and is a limitation of the data available for the natural neighbor interpolation technique. The spatially and time varying elevation file (fort.63) was checked and no abnormal patterns were observed in the east.	SCD

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm119_1973122600
Reviewer:	Sara C. Davis
Organization:	RAMPP
Date Checked:	06/13/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele	Abnormal pattern in west.	The pattern in the west is caused by the difference in pressure data at St. Catherines and Niagara This storm is prior to 1979 when CFSR pressure data is not available and natural neighbor pressure fields have been generated using available data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). In addition, gaps in the data at St. Catherines were interpolated to avoid unrealistic oscillations in the water surface elevation. However, for this particular storm, the interpolated St. Catherines data was slightly lower than that measured at Niagara (10.5 m compared to 10.562 m for example) by about 6 hPa. A difference of 1 hPa can cause a difference in height of 1 cm, therefore this difference in pressure causes a small difference (~6 cm) in the water surface elevation in the eastern end on Lake Ontario. This issue is small, contained within Canada where the results will not be used for mapping and is a limitation of the data available for the natural neighbor interpolation technique.	SCD

Additional Comments on Detailed Check

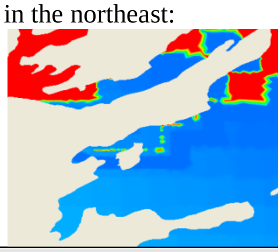
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

ADCIRC REVIEW			
Storm:	Storm120_1974010800		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/7/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 2.4 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH
maxwvel.63	band of anomalous data surrounding much of the lake	This band occurs due to shore fast ice around the perimeter of the lake. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:	Betsy Hicks		
Date:	6/26/2012		

ADCIRC REVIEW	
Storm:	Storm121_1974012800
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012
Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.4 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent and underpredicts the other three locations	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH
maxwvel.63	small area of zero wind (indicating ice) not attached to the shoreline in the northeast: 	This is caused by the pre-processor that is used to adjust the wind field to account for ice. At times, when there is limited ice data there are small pockets of non-zero winds between areas of zero wind. Considering surge is generated by the winds over the entire lake, areas with zero winds along the shore have little effect on surge. In addition, for this particular storm, these small pockets in the ice data are on the Canadian side of Lake Ontario where the surge results will not be used for mapping.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm122_1974022000
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxele.63	slightly noisy values in the surge near the shoreline in the east	The variations along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.1 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	The peak of the storm at Cape Vincent agrees well to the measured data. Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

Lake Erie Lake Ontario Production Run QA/QC Form

ADCIRC REVIEW	
Storm:	Storm123_1974030200
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 2.0 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
maxwvel.63	band of anomalous wind data adjacent to the ice area in the northeast	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm124_1974031400
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.5 m/s difference observed in the northeastern part of Lake Ontario	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. This area in the northeastern end of the lake has 60% ice coverage and therefore the wind speeds are increased according to the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW			
Storm:	Storm125_1974041100		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/7/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:	Betsy Hicks		
Date:	6/26/2012		

ADCIRC REVIEW	
Storm:	Storm126_1974051500
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 0.8 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm127_1974111200
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	The peak of the storm at Cape Vincent agrees well with the measured data. However, discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/25/2012

ADCIRC REVIEW	
Storm:	Storm128_1974112900
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.5 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	The starting water surface elevation in the model is set to the average of all four gauges. In this storm it appears that the water level at Cape Vincent at the start of the storm was lower than the other gauges causing an overprediction. Note that, Cape Vincent is located in the St. Lawrence River where water levels can be influenced by downstream conditions that are not included in the model. Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

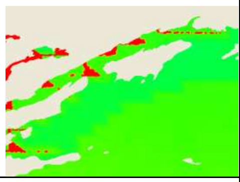
Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm129_1975012300
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	a few small areas of zero wind (indicating ice) not attached to the shoreline in the northeast: 	This is caused by the pre-processor that is used to adjust the wind field to account for ice. At times, when there is limited ice data there are small pockets of non-zero winds between areas of zero wind. Considering surge is generated by the winds over the entire lake, areas with zero winds along the shore have little effect on surge. In addition, for this particular storm, these small pockets in the ice data are on the Canadian side of Lake Ontario where the surge results will not be used for mapping.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	The starting water surface elevation in the model is set to the average of all four gauges. In this storm it appears that the water level at Cape Vincent at the start of the storm was lower than the other gauges causing an overprediction. Note that, Cape Vincent is located in the St. Lawrence River where water levels can be influenced by downstream conditions that are not included in the model. Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW			
Storm:	Storm130_1975022300		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/7/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.5 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent and underpredicts the other three locations	The starting water surface elevation in the model is set to the average of all four gauges. In this storm it appears that the water level at Cape Vincent at the start of the storm was lower than the other gauges causing an overprediction. Note that, Cape Vincent is located in the St. Lawrence River where water levels can be influenced by downstream conditions that are not included in the model. Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td colspan="2">Storm:</td><td colspan="2">Storm131_1975033100</td></tr>
<tr><td colspan="2">Reviewer:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Organization:</td><td colspan="2">RAMPP</td></tr>
<tr><td colspan="2">Date Checked:</td><td colspan="2">6/7/2012</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><td>File</td><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td>maxele.63</td><td>high values in the Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>maxele.63</td><td>higher surge than normally observed in the eastern side of the Irondequoit Bay, could be explained by high winds in the area</td><td>Large wind speeds (~29 m/s) occurred in this area causing high surge in the eastern end of the Bay.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>large differences in the wind velocity between adjacent nodes, as high as 0.6 m/s difference observed in the southwestern part of Lake Ontario</td><td>This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.</td><td>BSH</td></tr>
<tr><td>measure vs. model</td><td>overpredicts the surge at Cape Vincent and underpredicts the other three locations</td><td>The starting water surface elevation in the model is set to the average of all four gauges. In this storm it appears that the water level at Cape Vincent at the start of the storm was lower than the other gauges causing an overprediction. Note that, Cape Vincent is located in the St. Lawrence River where water levels can be influenced by downstream conditions that are not included in the model. Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.</td><td>BSH</td></tr>
<tr><td colspan="4"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td colspan="2">Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
<tr><td colspan="2">Reviewer Signature:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Date:</td><td colspan="2">6/26/2012</td></tr>
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ADCIRC REVIEW	
Storm:	Storm132_1975110700
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm133_1975112800
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 0.8 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW			
Storm:	Storm134_1975121800		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/7/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 0.9 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:	Betsy Hicks		
Date:	6/26/2012		

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td>Storm:</td><td colspan="3">Storm135_1976013000</td></tr>
<tr><td>Reviewer:</td><td colspan="3">Betsy Hicks</td></tr>
<tr><td>Organization:</td><td colspan="3">RAMPP</td></tr>
<tr><td>Date Checked:</td><td colspan="3">6/7/2012</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><td>File</td><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td>maxele.63</td><td>high values in the Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>maxele.63</td><td>slightly noisy values in the surge near the shoreline in the east</td><td>The variations along the shore are the result of changes in the velocity head that are due to variations in the bathymetry under strong shore parallel wind conditions.</td><td>BSH</td></tr>
<tr><td>maxele.63</td><td>higher surge than normally observed in the eastern side of the Irondequoit Bay, please confirm that this is supported by the wind direction</td><td>High winds from the west, therefore supporting high surge values in the eastern side of Irondequoit Bay.</td><td>BSH</td></tr>
<tr><td colspan="4"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td colspan="2">Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td colspan="2"></td><td></td><td></td></tr>
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<tr><td>Reviewer Signature:</td><td colspan="3">Betsy Hicks</td></tr>
<tr><td>Date:</td><td colspan="3">6/26/2012</td></tr>
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ADCIRC REVIEW	
Storm:	Storm136_1976030200
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.0 m/s difference observed in the northwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
maxwvel.63	band of anomalous wind data adjacent to the ice area	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
measure vs. model	underpredicts the surge at Olcott	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Olcott showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW			
Storm:	Storm137_1976040800		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/7/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 0.7 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area of higher winds is representative of measured winds speeds in this area. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW			
Storm:	Storm138_1976042400		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/7/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 0.7 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area of higher winds is representative of measured winds speeds in this area. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm139_1976051600
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/7/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.0 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent, underpredicts at Rochester and Olcott	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm140_1976112700
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/10/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 0.7 m/s difference observed in the northwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm141_1977010700
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/10/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

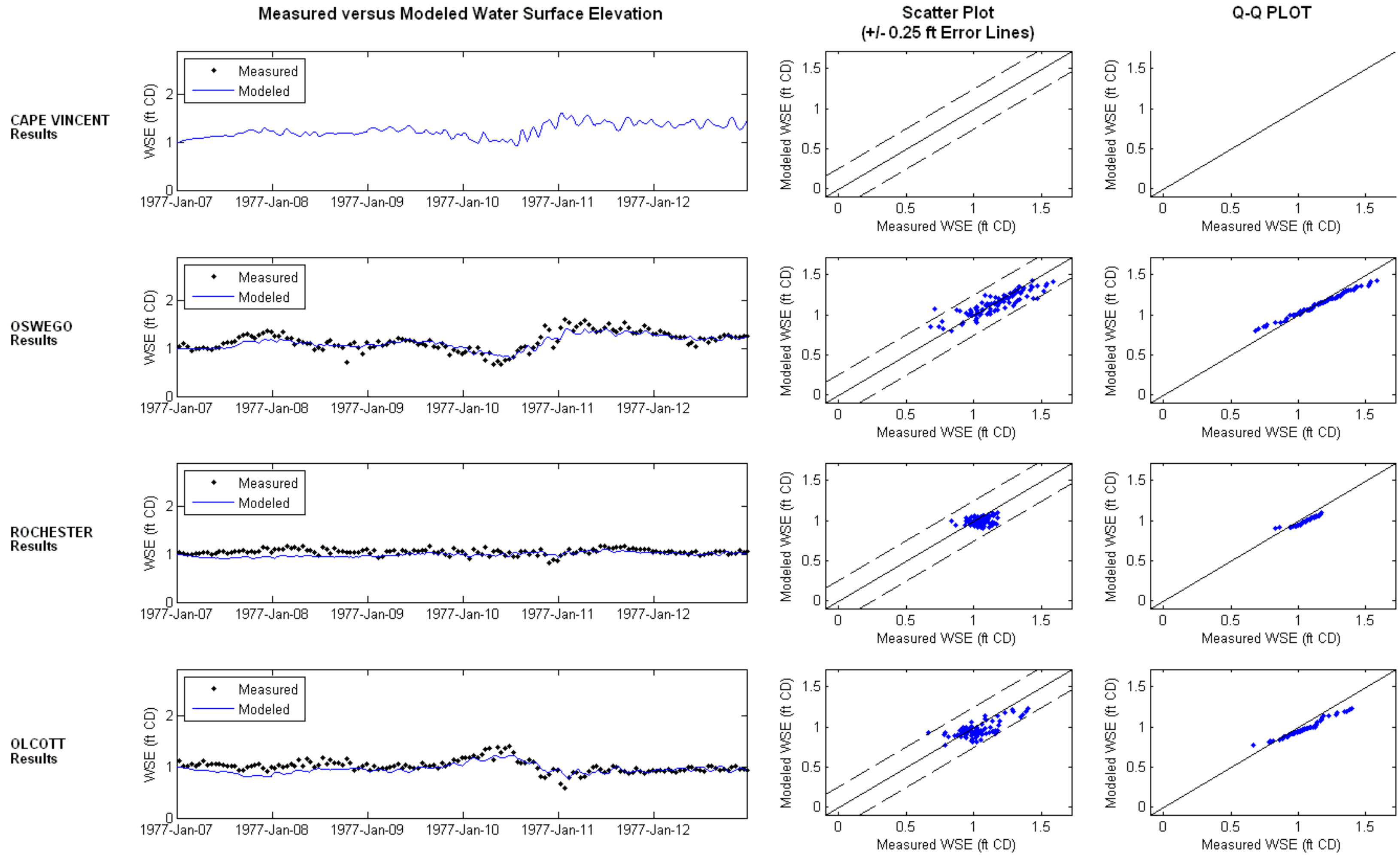
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 2.4 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
maxwvel.63	small area of zero wind (indicating ice) not attached to the shoreline in the southwest: 	This is caused by the pre-processor that is used to adjust the wind field to account for ice. At times, when there is limited ice data there are small pockets of non-zero winds between areas of zero wind. Considering surge is generated by the winds over the entire lake, areas with zero winds along the shore have little effect on surge. This is shown in measured vs modeled plots; the modeled data agrees well with the measured data at gauges along the shoreline near this area (Olcott and Rochester).	BSH
maxwvel.63	band of anomalous wind data adjacent to the ice area	This band in the wind data is caused by the transition in ice coverage from 100% to 10%. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent	BSH

		coverage; in some cases, this results in regions of ice with about 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	
measure vs. model	overpredicts the surge at all four locations	Disagree. Modeled results agree well to measure. See image below.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012


Measured versus Modeled Water Surface Elevation
Scatter Plot
(+/- 0.25 ft Error Lines)
Q-Q PLOT
CAPE VINCENT
Results
OSWEGO
Results
ROCHESTER
Results
OLCOTT
Results
Measured
Modeled
WSE (ft CD)
1977-Jan-07
1977-Jan-08
1977-Jan-09
1977-Jan-10
1977-Jan-11
1977-Jan-12
Modeled WSE (ft CD)
Measured WSE (ft CD)

ADCIRC REVIEW			
Storm:	Storm142_1977012600		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/10/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxele.63	higher surge than normally observed in the eastern side of the Irondequoit Bay, please confirm that wind direction supports the result	Wind direction is from the southwest, therefore supporting high surge values in the eastern side of Irondequoit Bay.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.0 m/s difference observed in the western part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
maxwvel.63	band of anomalous wind data throughout lake perimeter	This band in the wind data is caused by the transition in ice coverage from 90% to 10%. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm143_1977031500
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/10/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.6 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts the surge at Cape Vincent and underpredicts at Rochester and Olcott	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm144_1977033000
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/10/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 4.1 m/s difference observed in the southwestern part of Lake Ontario (Martindale Pond)	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
maxwvel.63	band of anomalous wind data in the east	This band in the wind data is caused by the transition in ice coverage from 80% to 10%. The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with about 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
measure vs. model	underpredicts surge at Rochester and Olcott	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm145_1977110900
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/10/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.2 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW			
Storm:	Storm146_1977120300		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/10/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.6 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
measure vs. model	overpredicts surge at Cape Vincent	Discrepancy between modeled and measured data is to be expected when comparing against numerous storm events. When analyzed statistically as a population of storms, the Q-Q plots at Cape Vincent showed good agreement between measured and modeled surface elevations. See Figure 6.6 of Baird Lake Ontario report.	BSH

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW			
Storm:	Storm147_1977120600		
Reviewer:	Betsy Hicks		
Organization:	RAMPP		
Date Checked:	6/10/2012		
Was the max water surface elevation file checked for anomalies?			Yes
Was the max current velocity file checked for anomalies?			Yes
Was the max wind velocity file checked for anomalies?			Yes
Was the minimum pressure file checked for anomalies?			Yes
Was the model time series output compared to the measured gage data?			Yes
Issues			
File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.0 m/s difference observed in the southwestern part of Lake Ontario	This storm is prior to 1979 when CFSR wind data is not available and natural neighbor wind fields have been generated using available wind data around the Lake (refer to Section 2.2.2.1 of the Baird Lake Ontario Report). Therefore, this area is representative of measured winds speeds. The spatially varying time-series data was checked to verify this.	BSH
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:	Betsy Hicks		
Date:	6/26/2012		

<table>
<tr><th colspan="4">ADCIRC REVIEW</th></tr>
<tr><td colspan="2">Storm:</td><td colspan="2">Storm148_1978011100</td></tr>
<tr><td colspan="2">Reviewer:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td colspan="2">Organization:</td><td colspan="2">RAMPP</td></tr>
<tr><td colspan="2">Date Checked:</td><td colspan="2">6/10/2012</td></tr>
<tr><td colspan="3">Was the max water surface elevation file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max current velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the max wind velocity file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the minimum pressure file checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="3">Was the model time series output compared to the measured gage data?</td><td>Yes</td></tr>
<tr><th colspan="4">Issues</th></tr>
<tr><td>File</td><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td>maxele.63</td><td>high values in the Niagara River</td><td>This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>large differences in the wind velocity between adjacent nodes, as high as 3.5 m/s difference observed in the northwestern part of Lake Ontario</td><td rowspan="2">The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.</td><td>BSH</td></tr>
<tr><td>maxwvel.63</td><td>bands of anomalous wind data throughout lake</td><td>BSH</td></tr>
</table>

<table>
<tr><td colspan="3"><u>Additional Comments on Detailed Check</u></td></tr>
<tr><td>Comment</td><td>Resolution</td><td>Verification</td></tr>
<tr><td></td><td></td><td></td></tr>
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<tr><td></td><td></td><td></td></tr>
<tr><td>Reviewer Signature:</td><td colspan="2">Betsy Hicks</td></tr>
<tr><td>Date:</td><td colspan="2">6/26/2012</td></tr>
</table>

ADCIRC REVIEW	
Storm:	Storm149_1978011700
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/10/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 1.0 m/s difference observed in the northwestern part of Lake Ontario	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
maxwvel.63	bands of anomalous wind data throughout lake		BSH

Additional Comments on Detailed Check

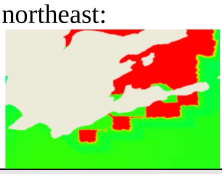
Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

ADCIRC REVIEW	
Storm:	Storm150_1978012300
Reviewer:	Betsy Hicks
Organization:	RAMPP
Date Checked:	6/10/2012

Was the max water surface elevation file checked for anomalies?	Yes
Was the max current velocity file checked for anomalies?	Yes
Was the max wind velocity file checked for anomalies?	Yes
Was the minimum pressure file checked for anomalies?	Yes
Was the model time series output compared to the measured gage data?	Yes

Issues

File	Comment	Resolution	Verification
maxele.63	high values in the Niagara River	This is due to model boundary effects and poorly resolved bathymetry. This effect does not impact surge levels in the lake. Note that predicted surge levels in the Niagara River are not to be used to support flood mapping in the river as it falls outside the scope of work and the model is not setup to resolve the river in detail.	BSH
maxwvel.63	large differences in the wind velocity between adjacent nodes, as high as 3.0 m/s difference observed in the southwestern part of Lake Ontario	The Modified Garratt Formulation (MGF) was used to define wind speeds over ice fields. Using this parabolic function, the largest wind drag occurs at 50% ice coverage. Given the coarse resolution of the ice data relative to the model grid, the winds were interpolated between neighboring ice fields of different percent coverage; in some cases, this results in regions of ice with 50% coverage, which generates the strongest winds drag coefficient under the MGF. Refer to Section 6.1.3 in Baird Lake Ontario report, which describes ice implementation methodology.	BSH
maxwvel.63	small area of zero wind (indicating ice) not attached to the shoreline in the northeast: 	This is caused by the pre-processor that is used to adjust the wind field to account for ice. At times, when there is limited ice data there are small pockets of non-zero winds between areas of zero wind. Considering surge is generated by the winds over the entire lake, areas with zero winds along the shore have little effect on surge. In addition, for this particular storm, these small pockets in the ice data are on the Canadian side of Lake Ontario where the surge results will not be used for mapping.	BSH

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	Betsy Hicks
Date:	6/26/2012

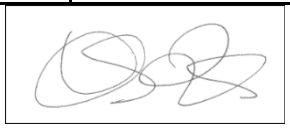
SWAN REVIEW	
Storm:	Storm001_1979040300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/12/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slides 3 & 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW		
Storm:	Storm002_1980010900	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/13/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues			
File	Comment	Resolution	Verification
swan_HS_max.63	Wave data where ice concentration > 0.9 (see slide 3)	Ice Data was not complete, storm will be re-run with proper ice representation and re-sent for QC.	Storm was rerun, and SWAN output is appropriate for ice coverage. The output looks fine.

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

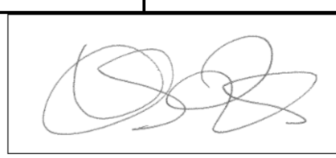
SWAN REVIEW	
Storm:	Storm003_1980060600
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Area of unusual high period (Node: 23196; See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

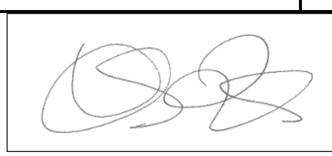
SWAN REVIEW	
Storm:	Storm004_1982010800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	Wave data where ice has concentration > 0.9 (See slide 3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm005_1982012900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012; re-reviewed 6/6/2012

Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	Linear feature in wave field connecting two areas of high ice concentration (Slide 4).	The storm was re-run	The issue has been corrected.
Swan_TP_atMaxHS.63	Linear feature in period field associated with the linear feature in wave field. (see slide 6)	The storm was re-run	The issue has been corrected.
Swan_DIR_atMaxHS.63	Linear feature in direction field that corresponds with linear feature in wave field and period field. Secondary linear feature that doesn't correspond to wave field. (See slide 8)	The storm was re-run	The issue has been corrected for the primary linear feature, the secondary is still there, but perhaps due to timestep issues in wave extraction.

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/6/2012

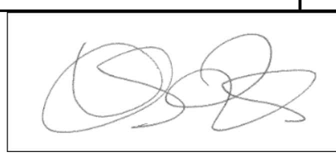
SWAN REVIEW	
Storm:	Storm006_1984022500
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification
Ice field does not match ice data. Ice strip on southwestern part of lake has concentration of 50% based on Ice Atlas while it was considered 90% (see slide 6)	The ice input data matches the original source data. See section 2.2.3 of FEMALakeOntario_Draft_2012-02-14 Chpt1-2-5-6-8. Therefore no change required.	CAL

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm007_1984042700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012; re-checked 6/6/2012

Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	Wave field has anomalies, in locations where no data should exist due to ice concentration > 0.7. (See slide 3)	Storm was re-run	There are no anomalies anymore, however the data is significantly different from previous run.
swan_TP_atMaxHS.63	Anomalies associated with ice concentration, where no data should exist. (See slide 5)	Storm was re-run	There are no anomalies anymore, however the data is significantly different from previous run.
swan_DIR_atMaxHS.63	Anomalies in the western portion of the lake, and eastern (associated with ice concentration). (See slide 6).	Storm was re-run	There are no anomalies anymore, however the data is significantly different from previous run.

Additional Comments on Detailed Check

Comment	Resolution	Verification
Based on ice atlas lake was ice-free at the time of storm (Slide 7)	Ice data removed, storm re-run	There are no signs of wave data anymore.

Reviewer Signature:	
Date:	6/6/2012

SWAN REVIEW	
Storm:	Storm008_1985011800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

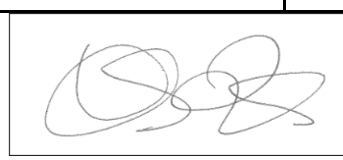
SWAN REVIEW	
Storm:	Storm009_19851125500
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_DIR_atMaxHS.63	Anomaly on eastern part of lake (see slide 5)	Storm starts with a strong NW wind that causes the Max Hs in the Eastern part of lake. The winds then switch to a predominately Eastern direction which drives the Max Hs in the rest of the lake.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm010_1985112900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

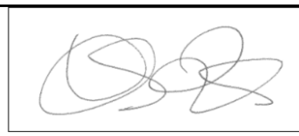
SWAN REVIEW	
Storm:	Storm011_1985112900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

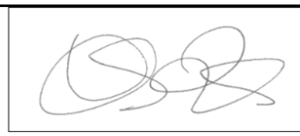
SWAN REVIEW	
Storm:	Storm012_1985112900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

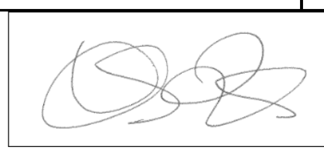
SWAN REVIEW	
Storm:	Storm013_199111300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm014_1991121100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012

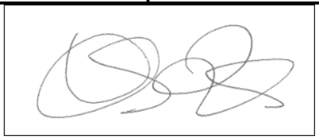
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm015_1992042900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/13/2012

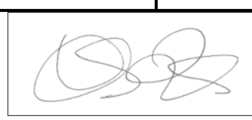
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196; see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

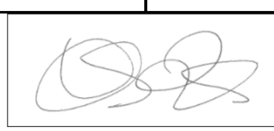
SWAN REVIEW	
Storm:	Storm016_1992080800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23491, 23388, 23290, 23196; see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
swan_DIR_atMaxHS.63	Wind direction file may require review (see slide 5)	Reviewed: Max Hs in eastern region of lake range from 1 - 1.2 metres. The end of the simulation has winds from the NE that are stronger than the winds from the West which in turn cause the division in wave direction at Max Hs.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm017_1992111000
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196; see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm018_1992120800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012

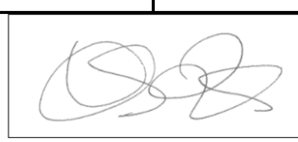
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196; see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

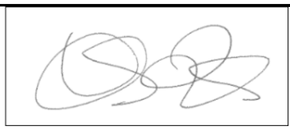
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm019_1993030100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm020_1993031100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012

Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

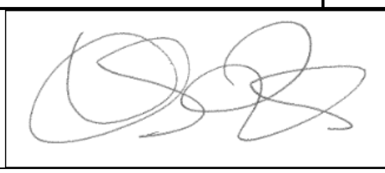
Issues

File	Comment	Resolution	Verification
swan_HS_max.63	No wave data on the western portion of the lake where ice concentration is < 0.7 (See slide 3). This also carries over in wave period and direction.	There was a malfunction in the post processing script, storm will be post processed again and re-sent for QC.	Wave data now appropriate for ice coverage.

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:



Date: 6/22/2012

SWAN REVIEW	
Storm:	Storm021_1993101500
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012

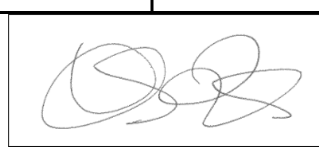
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, 23195, 23289; see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm022_1996051800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012

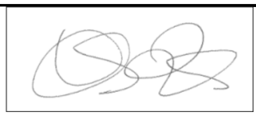
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Measured_vs_SWAN.bmp	There is a large difference between modeled and measured data, with low correlation for buoy C45135	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, 23288; see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

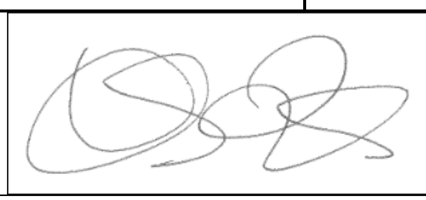
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm023_1997021900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012; re-checked 6/6/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues			
File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where the ice concentration > 0.7. This issue is also occurring in the wave period and direction data. (See slide 3).	The storm was re-run	There is no longer data where ice concentrations are > 0.7.
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196; see slide 5)	Ice data covers this node now	This issue no longer exists.

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/6/2012

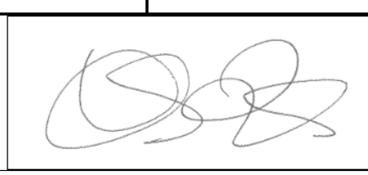
SWAN REVIEW	
Storm:	Storm024_1999011100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 39081, 39082, 39093, 39541, 40005, 39543, 40007, 49544, 40490, 40491, 40009, 4008, 39544; see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification
Wave height at C45135 shows 200% error	) Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	CAL
Ice file does not match the actual ice data (Slide 7).	The ice input data matches the original source data. See section 2.2.3 of FEMALakeOntario_Draft_2012-02-14 Chpt1-2-5-6-8. Therefore no change required.	CAL

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm025_1999030300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012

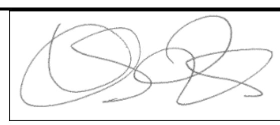
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where ice concentrations are greater than 0.7 in the northern part of the Lake. (see slides: 3)	Ice Data was not complete, storm will be re-run with proper ice representation and re-sent for QC.	Wave data is appropriate for ice coverage now.
swan_TP_atMaxHS.63	Area of anomaly in wave period in the northern part of the lake (see slide 5)	Will address after re-run is QC	Wave data is appropriate for ice coverage now.
Measured_vs_Swan	The modeled results for Buoy C45135 is not consistent with measured results and have a poor correlation.		

Additional Comments on Detailed Check

Comment	Resolution	Verification
There is an area of high period on the Canadian side that will not interfere with US mapping.		

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW		
Storm:	Storm026_1999110100	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/16/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

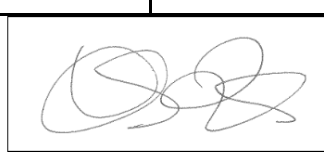
Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period in the northern part of the lake (see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:



Date: 6/18/2012

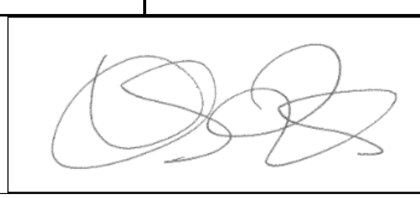
SWAN REVIEW		
Storm:	Storm027_2000121500	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/16/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where ice concentrations are greater than 0.7 (see slide 3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period in the northern part of the lake (see slide 6)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

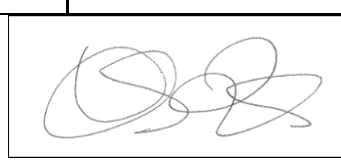
SWAN REVIEW	
Storm:	Storm028_2001061700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Measured_vs_SWAN_selected.bmp	There is a large difference between modeled and measured wave data for buoy C45135 (see slide 1)	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, 23289, see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

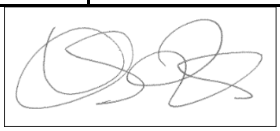
SWAN REVIEW	
Storm:	Storm029_2002012900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Measured_vs_SWAN_selected.bmp	There is a large difference between modeled and measured wave data for buoy C45135 (see slide 1)	The wrong Measured_vs_SWAN_selected.bmp is being looked at(Slide 1 is from storm 28). Will provide file if original was misplaced or deleted.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

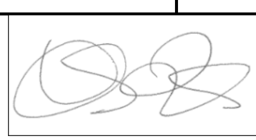
SWAN REVIEW	
Storm:	Storm030_2002030700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where the ice concentration is greater than 0.9 (See slide 2)	Ice Data was not complete, storm will be re-run with proper ice representation and re-sent for QC.	Wave data is appropriate for ice coverage.
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 5)	High spikes in wave height and period are a known issues in the SWAN models where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh. See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The location of these spikes is either located on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012

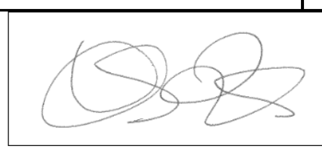
SWAN REVIEW	
Storm:	Storm031_2003020200
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

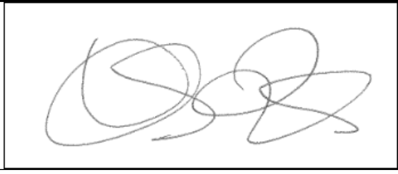
SWAN REVIEW	
Storm:	Storm032_2003111000
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period in the northern portion of the lake. (see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/12/2012

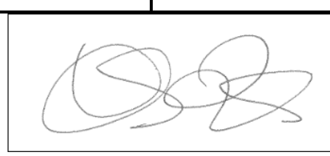
SWAN REVIEW	
Storm:	Storm033_2004122000
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where ice concentrations are greater than 0.7 (see slide 3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm034_2006021400
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/16/2012

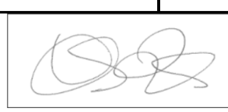
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where ice concentrations are greater than 0.7 (see slide 3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm035_2008012700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/17/2012

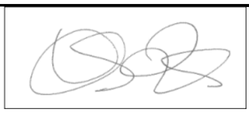
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm036_2008020300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/17/2012; re-checked 6/6/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where ice concentrations are greater than 0.7. This issue is also apparent for the period and directional data (See slide 4)	The storm was re-run	This issue has been resolved.
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 6)	The storm was re-run	This issue has been resolved since it is covered by ice in the new storm run.

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/6/2012

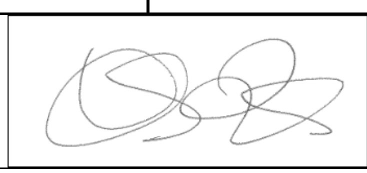
SWAN REVIEW		
Storm:	Storm037_2009120800	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/17/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 39082, see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm038_1979080400
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/17/2012

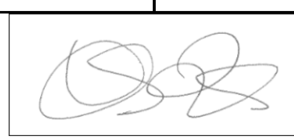
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

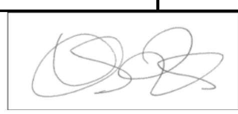
Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, 23289, see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW			
Storm:	Storm039_1979120500		
Reviewer:	Christina Lindemer		
Organization:	RAMPP		
Date Checked:	4/17/2012		
Was the max significant wave height map checked for anomalies?			Yes
Was the wave period at max significant wave height checked for anomalies?			Yes
Was the wave direction at max significant wave height checked for anomalies?			Yes
Issues			
File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196 see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
Additional Comments on Detailed Check			
Comment	Resolution		Verification
Reviewer Signature:			
Date:	6/18/2012		

SWAN REVIEW	
Storm:	Storm040_1974032100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/17/2012

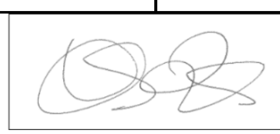
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196 see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

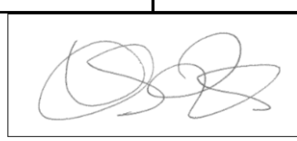
SWAN REVIEW		
Storm:	Storm041_1980102300	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/17/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23195, 23196 see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

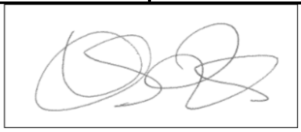
SWAN REVIEW		
Storm:	Storm042_1980121100	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/17/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23289, 23196 see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

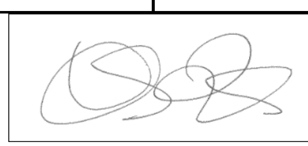
SWAN REVIEW		
Storm:	Storm043_1981112500	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/17/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23289, 23196 see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

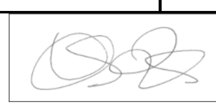
SWAN REVIEW		
Storm:	Storm044_1982010200	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/17/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, 23196 see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

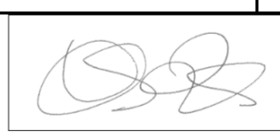
SWAN REVIEW	
Storm:	Storm045_1982012000
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/17/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	Wave data where there isn't an ice concentration defined (slide 2) but may have an ice concentration greater than 0.9 based on the surrounding region (See slide5)	The ice input data matches the original source data. See section 2.2.3 of FEMALakeOntario_Draft_2012-02-14 Chpt1-2-5-6-8. Therefore no change required	CAL
swan_TP_atMaxHS.63	Wave period data where there isn't an ice concentration defined (slide 2) but may have an ice concentration greater than 0.7 based on the surrounding region (See slide 7)	The ice input data matches the original source data. See section 2.2.3 of FEMALakeOntario_Draft_2012-02-14 Chpt1-2-5-6-8. Therefore no change required	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification
Ice file does is not consistent with measured ice (Slide 9). The northern part lake has ice concentration of less than 70% while the ice file that was inputted to SWAN appeared to have 100% ice concentration.	The ice input data matches the original source data. See section 2.2.3 of FEMALakeOntario_Draft_2012-02-14 Chpt1-2-5-6-8. Therefore no change required	CAL

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm046_1982040300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/17/2012; re-checked 6/6/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where ice concentration is greater than 0.7 (see slide 2)	The storm was rerun	This issue no long exists
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196, 23196 see slide 4)	The storm was rerun	This issue no longer exists because it is covered by wave data.

Additional Comments on Detailed Check

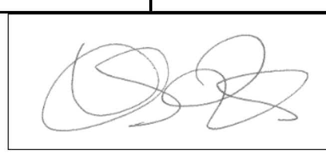
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/6/2012

SWAN REVIEW			
Storm:	Storm047_1982110300		
Reviewer:	Christina Lindemer		
Organization:	RAMPP		
Date Checked:	4/17/2012		
Was the max significant wave height map checked for anomalies?			Yes
Was the wave period at max significant wave height checked for anomalies?			Yes
Was the wave direction at max significant wave height checked for anomalies?			Yes

Issues			
File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196 see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm048_1982122600
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/18/2012

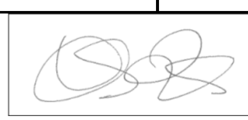
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196 see slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

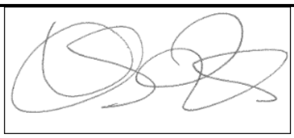
SWAN REVIEW	
Storm:	Storm049_1985030100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	4/18/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	There is wave period data where there should not be any data due to ice concentrations. (See slide 5)	There was a malfunction in the post processing script, storm will be post processed again and re-sent for QC.	Wave data is appropriate for ice coverage
swan_TP_atMaxHS.63	There are some wave period anomalies along the south-west shore of the lake (See slide 6)	Will address after re-run has been QC	Wave data is appropriate for ice coverage
swan_Dir_atMaxHS.63	There is directional data where there should not be any due to ice concentrations. (See slide 8).	There was a malfunction in the post processing script, storm will be post processed again and re-sent for QC.	Wave data is appropriate for ice coverage.

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

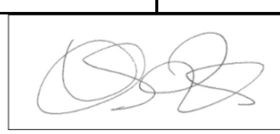
SWAN REVIEW		
Storm:	Storm050_1986010600	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	4/17/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
swan_HS_max.63	There is wave data where ice concentrations are > 0.7. This issue extends into the wave period and direction files. (See slide 3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL
swan_TP_atMaxHS.63	Area of anomaly in wave period (Node: 23196; see slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/18/2012

SWAN REVIEW	
Storm:	Storm051_1986091200
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/25/2012

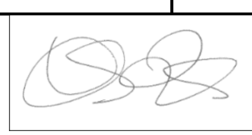
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slides 3 & 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
Measured vs SWAN_selected.bmp	File for wave heights comparison not provided.	There is no Buoy Data prior to 1989	CAL

Additional Comments on Detailed Check

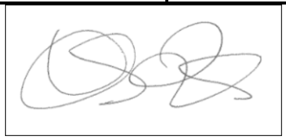
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW		
Storm:	Storm052_1986100100	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	5/25/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues			
File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slides 3 & 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

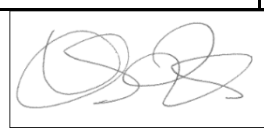
Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm053_1988011000
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

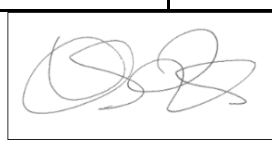
SWAN REVIEW		
Storm:	Storm054_1988061900	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	5/29/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm055_1988071400
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/29/2012

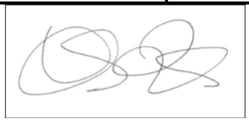
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm056_1988110700
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/29/2012

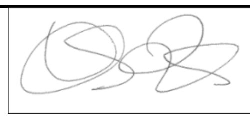
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

SWAN REVIEW			
Storm:	Storm057_1988111700		
Reviewer:	Siva Sangameswaran		
Organization:	RAMPP		
Date Checked:	5/29/2012		
Was the max significant wave height map checked for anomalies?			Yes
Was the wave period at max significant wave height checked for anomalies?			Yes
Was the wave direction at max significant wave height checked for anomalies?			Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

SWAN REVIEW	
Storm:	Storm058_1989020500
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/29/2012

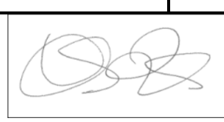
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm059_1989031500
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/29/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
None			

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

SWAN REVIEW	
Storm:	Storm060_1989101100
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/29/2012

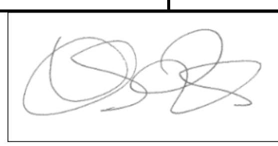
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm061_1990110300
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/29/2012

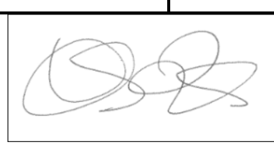
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm062_1991032500
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/30/2012

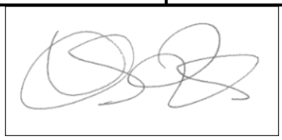
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the meshSee: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
Swan_MaxHS	Waves where ice>70% (slides 2&3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL

Additional Comments on Detailed Check

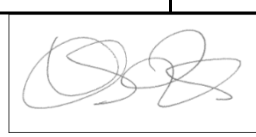
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW		
Storm:	Storm063_1992122300	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	5/30/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues			
File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm064_1993020900
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012

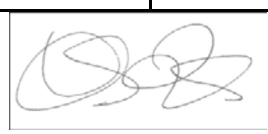
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	High spikes in wave height and period are a known issues in the SWAN models where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh. See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The location of these spikes is either located on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm065_1994022000
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/30/2012

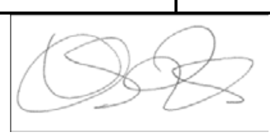
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

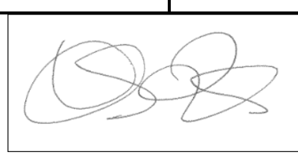
SWAN REVIEW		
Storm:	Storm066_1994110300	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	5/30/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm067_1994111900
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012

Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

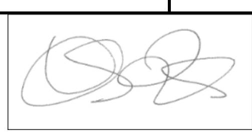
Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slides 4 and 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:



Date: 6/19/2012

SWAN REVIEW	
Storm:	Storm068_1994122100
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012

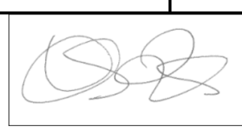
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slides 4 and 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

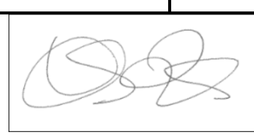
SWAN REVIEW	
Storm:	Storm069_1995010300
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

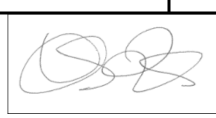
SWAN REVIEW		
Storm:	Storm070_1995110800	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	5/31/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm071_1996012500
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slides 5 and 6)	The larger waves are propagating through the channel interacting with bay generated chop producing the difference seen in Tp	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

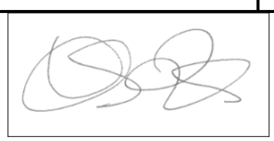
SWAN REVIEW	
Storm:	Storm072_1996030100
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slides 5 and 6)	The larger waves are propagating through the channel interacting with bay generated chop producing the difference seen in Tp	CAL
Ice file	Ice polygon does not match the actual ice data (slide 2)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

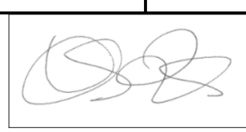
SWAN REVIEW		
Storm:	Storm073_1996110500	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	5/31/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAl

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

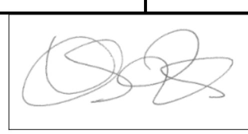
SWAN REVIEW	
Storm:	Storm074_1997120800
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm075_1998011200
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012

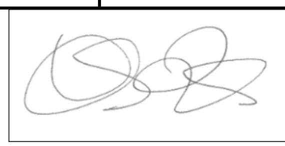
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Measured_vs_SWAN_selected.bmp	C45135 and C45139: Explain discrepancies in modeled vs measured wave heights and wave periods	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	CAL
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
Swan_MaxHS.63	Waves where ice>70% (slides 2,3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm076_1998031800
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012

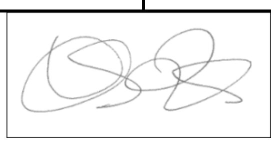
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW			
Storm:	Storm077_1998090400		
Reviewer:	Siva Sangameswaran		
Organization:	RAMPP		
Date Checked:	5/31/2012		
Was the max significant wave height map checked for anomalies?			Yes
Was the wave period at max significant wave height checked for anomalies?			Yes
Was the wave direction at max significant wave height checked for anomalies?			Yes
Issues			
File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
Additional Comments on Detailed Check			
Comment	Resolution		Verification
Reviewer Signature:			
Date:	6/19/2012		

SWAN REVIEW	
Storm:	Storm078_1999010100
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012

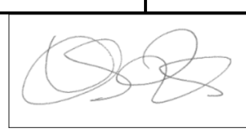
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

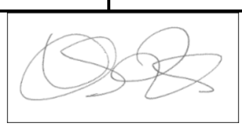
SWAN REVIEW	
Storm:	Storm079_2000051000
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Measured_vs_SWAN_selected.bmp	C45135 and C45139: Discrepancies in modeled vs measured wave heights and wave periods	Discrepancies between modeled and measured data are expected, particularly when comparing against numerous storm events. These discrepancies are most likely a limitation of the modeled wind fields. Recognizing this, one of the goals of the comparative analysis is to ensure a balance is observed between the measured and modeled results; that is the model under-predicts some storms and over-predicts others. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 6.6 of Baird Lake Ontario report.	CAL
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/12/2012

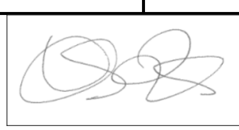
SWAN REVIEW	
Storm:	Storm080_2000120300
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	5/31/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
Swan_MaxHS	Waves where ice > 70% (slides (2,3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL

Additional Comments on Detailed Check

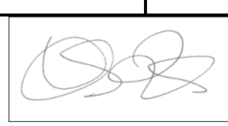
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW		
Storm:	Storm081_2001020700	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	6/1/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues			
File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5).	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping..	CAL
Swan_TP_atMaxHS.63	Abrupt increase in wave period observed in the area shown on Slide 6.	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

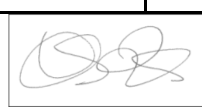
SWAN REVIEW	
Storm:	Storm082_2001040400
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5 and 6)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

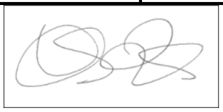
SWAN REVIEW	
Storm:	Storm083_2002123000
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL
Swan_MaxHS	Waves where ice>70% (slides 2,3)	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

RUN NAME:

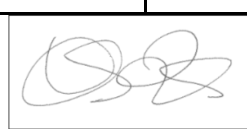
SWAN REVIEW	
Storm:	Storm084_2003040100
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 7)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

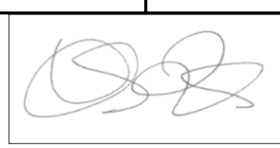
SWAN REVIEW		
Storm:	Storm085_2003040400	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	6/1/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

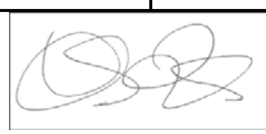
SWAN REVIEW	
Storm:	Storm086_2003041400
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	High spikes in wave height and period are a known issues in the SWAN models where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh. See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The location of these spikes is either located on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm087_2003112500
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm088_2005033000
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012

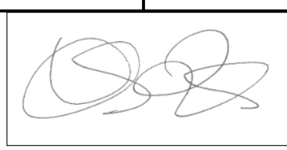
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

SWAN REVIEW	
Storm:	Storm089_2005092600
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012

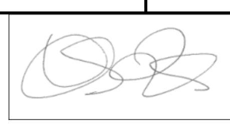
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

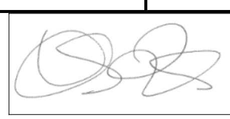
SWAN REVIEW	
Storm:	Storm090_2006020300
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	High spikes in wave height and period are a known issues in the SWAN models where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh. See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The location of these spikes is either located on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

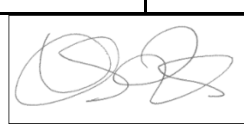
SWAN REVIEW	
Storm:	Storm091_2006031200
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slides 5 and 6)	High spikes in wave height and period are a known issues in the SWAN models where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh. See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The location of these spikes is either located on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping. The larger waves are propagating through the channel interacting with bay generated chop producing the difference seen in Tp	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

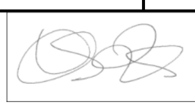
SWAN REVIEW		
Storm:	Storm092_2006102600	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	6/1/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

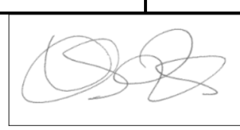
SWAN REVIEW	
Storm:	Storm093_2006112900
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

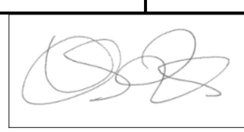
SWAN REVIEW		
Storm:	Storm094_2007010600	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	6/1/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

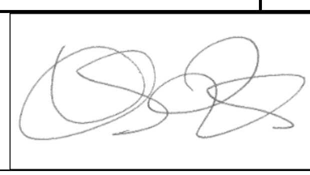
SWAN REVIEW	
Storm:	Storm095_2007031500
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
NO DATA PROVIDED for HSMax, TPatHSMax, DIRatHSMax		Data provided 06\22\2012	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012

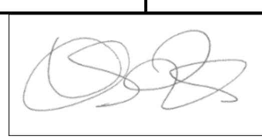
SWAN REVIEW	
Storm:	Storm096_2007112400
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/1/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 4)	Localized spikes in wave height and period are a known issue in the SWAN model where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The observed spike(s) are limited to one or two elements and are located either on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/19/2012

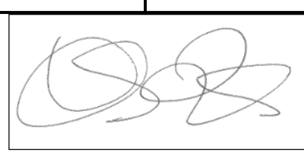
SWAN REVIEW	
Storm:	Storm097_2008010600
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_TP_atMaxHS.63	Areas of unusual high period (See slide 5)	High spikes in wave height and period are a known issues in the SWAN models where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh. See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The location of these spikes is either located on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

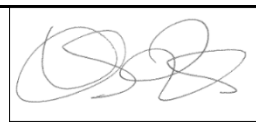
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW		
Storm:	Storm098_2008030500	
Reviewer:	Siva Sangameswaran	
Organization:	RAMPP	
Date Checked:	6/14/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm099_2008091200
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012

Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Measured_vs_SWAN.bmp	Discrepancies in wave heights between measured and model results are observed In C45139. See slide 1.	Discrepancy between modeled and measured data is expected for some storm events. It is most likely a limitation of the modeled wind fields. When analyzed statistically as a population of storms, the Q-Q plots showed good agreement between measured and modeled wave heights. See Figure 7.8 of Baird Lake Ontario report.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

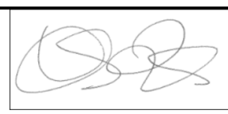
SWAN REVIEW	
Storm:	Storm100_2008122500
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice_data.csv	Wave data observed in the northern most portions of the Lake, where ice concentrations > 0.7.	Area of concern is not located in the United States and thus will not influence the model results along the US shoreline that will be used for floodplain mapping.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

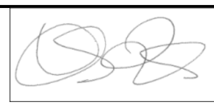
SWAN REVIEW	
Storm:	Storm101_1970112000
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

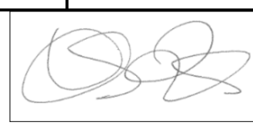
SWAN REVIEW	
Storm:	Storm102_1971012400
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
No Data Provided.		Data provided 06\22\2012	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012

SWAN REVIEW	
Storm:	Storm103_1971012700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/18/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

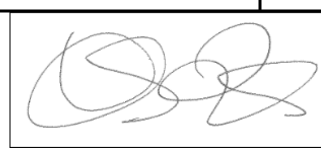
SWAN REVIEW	
Storm:	Storm104_1971020300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/18/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice_data.csv	Incomplete ice data provided. Wave results suggest ice concentrations > 0.7.	Ice data was incomplete(older datasets 1960 - 1972, tend to be incomplete) Polygon was added for the Bay of Quinte	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

SWAN REVIEW	
Storm:	Storm105_1971021000
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/18/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice_data.csv	Incomplete ice data provided. Wave results suggest ice concentrations > 0.7.	Ice data was incomplete(older datasets 1960 - 1972, tend to be incomplete) Polygon was added where ice concentration was >70% .	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

SWAN REVIEW	
Storm:	Storm106_1971022500
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/18/2012

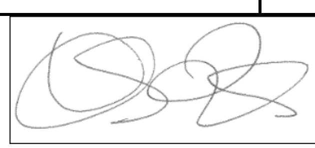
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice_data.csv	Incomplete ice data provided. Wave results suggest ice concentrations > 0.7.	Ice data was incomplete(older datasets 1960 - 1972, tend to be incomplete) Polygon was added where ice concentration was >70% . Polygon inputted into simulation encroached into Bay of Quinte where there was no ice data but will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL
swan_HS_max.63	Linear features where wave heights are lower than surrounding, suggest ice issue (see slide 3)	There was a malfunction in the post processing script, the storm will be post processed again and re-sent for QC.	CAL
swan_TP_atMaxHS.63	Linear features where wave periods are lower than surrounding, suggest ice issue (see slide 4)	There was a malfunction in the post processing script, the storm will be post processed again and re-sent for QC.	CAL
swan_DIR_atMaxHS.63	Linear features where wave directions are different than surrounding, suggest ice issue (see slide 5)	There was a malfunction in the post processing script, the storm will be post processed again and re-sent for QC.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

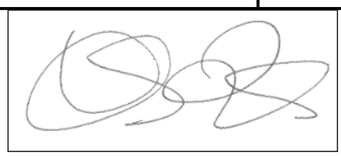
SWAN REVIEW	
Storm:	Storm107_1971030100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/19/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice_data.csv	Incomplete ice data provided. Wave results suggest ice concentrations > 0.7.	Ice data was incomplete(older datasets 1960 - 1972, tend to be incomplete) Polygon was added where ice concentration was >70% . Polygon inputted into simulation encroached into Bay of Quinte where there was no ice data but will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

SWAN REVIEW	
Storm:	Storm108_1971120800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/19/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

SWAN REVIEW	
Storm:	Storm109_1971122700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/19/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

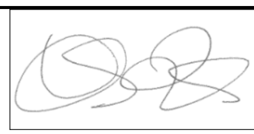
SWAN REVIEW	
Storm:	Storm110_1972012200
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice_data.csv	Wave data observed in the northern most portions of the Lake, where ice concentrations > 0.7.	Ice_data.csv is incorrect for storm time period. Ice data were incomplete and therefore not considered for this SWAN simulation. (see attached ice images)	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/25/2012

SWAN REVIEW	
Storm:	Storm111_1972020100
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice data.csv	Data does not cover the entire Lake (refer slide 2). Based on the data that is present, there is wave data where concentrations are greater than 0.7.	Ice data closest to storm peak was incomplete; it was decided to exclude ice from model simulation.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm112_1972111200
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/15/2012

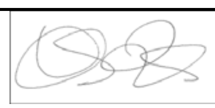
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice data.csv	Data does not cover the entire Lake (refer slide 2) Based on the partial ice map, there is wave data where ice concentrations are > 0.7. The ice data does appear identical to storm 111.	There were no ice data within 2 weeks of storm peak; ice was excluded from model simulation. An in house script was developed to call the nearest ice data (ice_data.csv) to the storm peak after which a decision was made to include\exclude ice in model simulation based how near data fell to peak of storm. (ice_data.csv should have been deleted prior to sending files)	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm113_1972112400
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

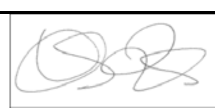
Issues

File	Comment	Resolution	Verification
Ice data.csv	Data does not cover the entire Lake (refer slide 2) Based on the ice coverage that is provided, there is wave data where ice concentrations are >0.7. Ice data appears identical to storms 111, 112.	There were no ice data within 2 weeks of storm peak; ice was excluded from model simulation. An in house script was developed to call the nearest ice data (ice_data.csv) to the storm peak after which a decision was made to include\exclude ice in model simulation based how near data fell to peak of storm. (ice_data.csv should have been deleted prior to sending files)	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW			
Storm:	Storm114_1972120200		
Reviewer:	Siva Sangameswaran		
Organization:	RAMPP		
Date Checked:	6/15/2012		
Was the max significant wave height map checked for anomalies?			Yes
Was the wave period at max significant wave height checked for anomalies?			Yes
Was the wave direction at max significant wave height checked for anomalies?			Yes
Issues			
File	Comment	Resolution	Verification
Ice data.csv	Data does not cover the entire Lake (refer slide 2). Based on provided ice map, there is wave data where ice concentrations are > 0.7. Ice data is identical to storms 111, 112, 113.	There were no ice data within 2 weeks of storm peak; ice was excluded from model simulation. An in house script was developed to call the nearest ice data (ice_data.csv) to the storm peak after which a decision was made to include\exclude ice in model simulation based how near data fell to peak of storm. (ice_data.csv should have been deleted prior to sending files)	CAL
Additional Comments on Detailed Check			
Comment		Resolution	Verification
Reviewer Signature:			
Date:	6/22/2012		

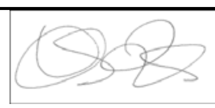
SWAN REVIEW	
Storm:	Storm115_1973031500
Reviewer:	Siva Sangameswaran
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Ice_data.csv	Wave data observed in the northern most portions of the Lake, where ice concentrations > 0.7.	The area of concern is limited to a localized region near the Canadian shoreline. This area will not influence the wave model results that will be used to support floodplain mapping along the US shoreline.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW			
Storm:	Storm116_1973040800		
Reviewer:	Siva Sangameswaran		
Organization:	RAMPP		
Date Checked:	6/15/2012		
Was the max significant wave height map checked for anomalies?			Yes
Was the wave period at max significant wave height checked for anomalies?			Yes
Was the wave direction at max significant wave height checked for anomalies?			Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	GLProdRunQCForm_Storm117_1973103000
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm118_1973110300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW		
Storm:	Storm119_1973122600	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	6/15/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm120_1974010800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
No Data provided	Data provided		

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm121_1974012800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012

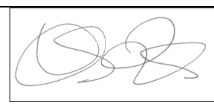
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

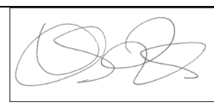
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW		
Storm:	Storm122_1974022000	
Reviewer:	Christina Lindemer	
Organization:	RAMPP	
Date Checked:	6/15/2012	
Was the max significant wave height map checked for anomalies?		Yes
Was the wave period at max significant wave height checked for anomalies?		Yes
Was the wave direction at max significant wave height checked for anomalies?		Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm123_1974030200
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012

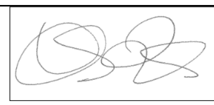
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

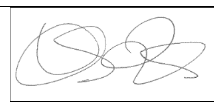
SWAN REVIEW	
Storm:	Storm124_1974031400
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

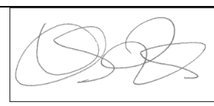
SWAN REVIEW	
Storm:	Storm125_1974041400
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

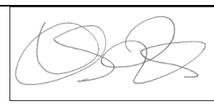
SWAN REVIEW	
Storm:	Storm126_1974051500
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

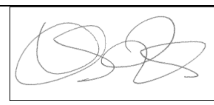
SWAN REVIEW	
Storm:	Storm127_1974111200
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm128_1974112900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/19/2012

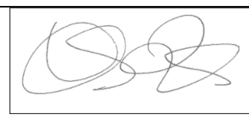
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/26/2012

SWAN REVIEW	
Storm:	Storm129_1975012300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012

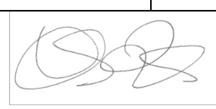
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_TP_atMaxHS.63	Area of high wave period, node 39082. See slide 5.	High spikes in wave height and period are a known issues in the SWAN models where a sharp transition in elevation is not smoothly resolved due to the coarseness of the mesh. See: http://www.caseydietrich.com/2011/05/27/wave-refraction-on-coarse-meshes-part-2/. The location of these spikes is either located on the Canadian side of the lake or in the St. Lawrence River, where output will not be used for floodplain mapping.	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

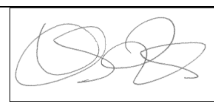
SWAN REVIEW	
Storm:	Storm130_1975022300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

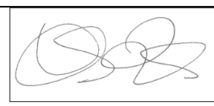
SWAN REVIEW	
Storm:	Storm131_1975033100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

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<tr><td colspan="2">Reviewer:</td><td colspan="3">Christina Lindemer</td></tr>
<tr><td colspan="2">Organization:</td><td colspan="3">RAMPP</td></tr>
<tr><td colspan="2">Date Checked:</td><td colspan="3">6/15/2012</td></tr>
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<tr><td colspan="4">Was the wave period at max significant wave height checked for anomalies?</td><td>Yes</td></tr>
<tr><td colspan="4">Was the wave direction at max significant wave height checked for anomalies?</td><td>Yes</td></tr>
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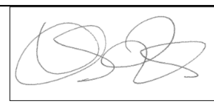
<tr><td colspan="2">Reviewer Signature:</td><td colspan="3"></td></tr>
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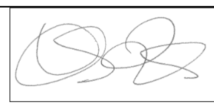
SWAN REVIEW	
Storm:	Storm133_1975112800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm134_1975121800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm135_1976013000
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/15/2012

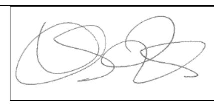
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

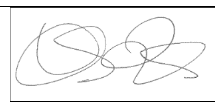
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm136_1976030200
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm137_1976040800
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012

Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm138_1976042400
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012

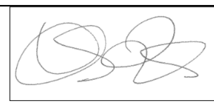
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

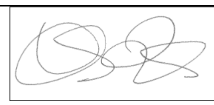
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm139_1976051600
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm140_1976112700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012

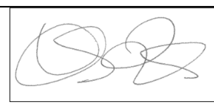
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

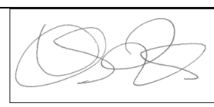
SWAN REVIEW	
Storm:	Storm141_1977010700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
swan_DIR_atMaxHS.63	Spots of high wave direction along ice border that are not coherent with surrounding nodes on southern shore of lake.	Wave directions are variable as they are taken at max Hs and therefore can have abrupt changes. Wind file was reviewed and wave directions are consistent with wind directions.	CAL

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

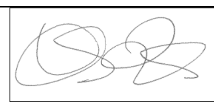
SWAN REVIEW	
Storm:	Storm142_1977012600
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

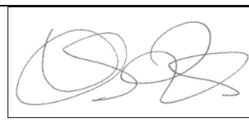
SWAN REVIEW	
Storm:	Storm143_1977031500
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_Hs_atMaxHS.63, Swan_Tp_atMaxHS.63, Swan_Dir_atMaxHS.63	No wave, period or directional data on western portion of lake where ice data indicates ice concentrations < 0.7. See slide 2 for ice coverage. Real ice data coverage for this date indicate no ice in this region.	There was a malfunction in the post processing script, the storm will be post processed again and re-sent for QC	This area on the western side of the lake has been fixed.

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/27/2012

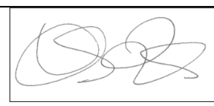
SWAN REVIEW	
Storm:	Storm144_1977033000
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm145_1977110900
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012

Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

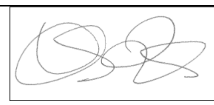
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm146_1977120300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues			
File	Comment	Resolution	Verification

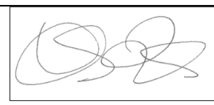
Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm147_1977120600
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues			
File	Comment	Resolution	Verification

Additional Comments on Detailed Check		
Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

SWAN REVIEW	
Storm:	Storm148_1978011100
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification

Additional Comments on Detailed Check

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

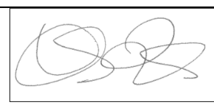
SWAN REVIEW	
Storm:	Storm149_1978011700
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_Hs_atMaxHS.63, Swan_Tp_atMaxHS.63, Swan_Dir_atMaxHS.63	Wave, period or directional data on western portion of lake where ice data indicates ice concentrations > 0.7. See slide 2 for ice coverage.	Ice in western portion of lake is classified as 20% coverage and therefore not included	CAL
Ice_data.csv	Ice data is significantly different than data for Storm 148, which was 6 days prior.	Ice data matches ice map of Jan. 18, 1978	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/22/2012

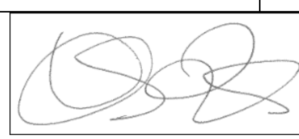
SWAN REVIEW	
Storm:	Storm_150_1978012300
Reviewer:	Christina Lindemer
Organization:	RAMPP
Date Checked:	6/14/2012
Was the max significant wave height map checked for anomalies?	Yes
Was the wave period at max significant wave height checked for anomalies?	Yes
Was the wave direction at max significant wave height checked for anomalies?	Yes

Issues

File	Comment	Resolution	Verification
Swan_Hs_atMaxHS.63, Swan_Tp_atMaxHS.63, Swan_Dir_atMaxHS.63	No wave, period or directional data on western portion of lake where ice data indicates ice concentrations < 0.7. See slide 2 for ice coverage.	There was a malfunction in the post processing script, the storm will be post processed again and re-sent for QC	Western portion of lake now looks appropriate.
Ice_data.csv	Ice data is significantly different than data for Storm 149, which was 6 days prior.	Ice data matches ice map of Jan. 25, 1978	CAL

<u>Additional Comments on Detailed Check</u>

Comment	Resolution	Verification

Reviewer Signature:	
Date:	6/27/2012