APPENDIX D REVIEW COMMENTS AND CEMVN RESPONSES

CED - PHASE II COMMENT AND CEMVN RESPONSES

Source of Comment	Date received	Concur/Non-concur/ Noted	Theme	Mode of Comment	Comment (may be paraphrased or summarized)	Response
Public	5/25/2021	Noted	General	Electronic	Request copy of CED	The hyperlink to the electronic copy was provided.
Agency (DEQ)	6/7/2021	Concur	Air Quality	Electronic/ phone call	Difficult to navigate the document and find what they were looking for. Request a link in the table of contents that takes the reader to the section would be beneficial	A hyperlink will be added to the TOC to assist the reader with navigation
Agency (DEQ)	6/7/2021	Concur	Air Quality	Electronic/ phone call	Request emissions by parish and not by project. Request a table that reported total emissions for all projects in each parish.	A table will be developed listing project emissions by parish
Agency (DEQ)	6/7/2021	Concur	Air Quality	Electronic/ phone call	We have some of the nonattainment/maintenance areas improperly listed.	Corrections will be made to properly list non-attainment/maintenance areas
General (Thompson)	7/5/2021	Non-concur	Hydrology	Letter	The CED failed to meet its stated objectives to analyze the cumulative human and environmental impacts resulting from the HSDRRS projects in combination with other proposed and foreseeable future projects in southeast Louisiana.	CED meets stated objective in assessing cumulative impacts of the HSDRRS construction along with cumulative impacts of other past, present and reasonably foreseeable future work. As regarding hydrologic cumulative impacts, the USACE estimated impacts of the West Shore Lake Pontchartrain project on surge levels outside the system. Impacts to Eden Isles are roughly 0.1ft for 500YR high sea-level-rise, and much less than 0.1ft for higher frequency events such as the 100YR or 50YR. The Corps tends estimate impacts on a project by project basis but in this case the projects are far enough apart where very little increase in water levels at Eden Isle can be attributed to WSLP. The following graphic shows the displacement of water levels for a 500YR event due to the WSLP project.

						
General (Thompson)	7/5/2021	Non-concur	Hydrology	Letter	The Corps used imaginary levees, embankments and floodgates that did not exist in 1965 to create their 1965 baseline model, instead of using existing Corps' maps and documents with the correct data. Then the Corps compared their incorrect 1965 models with incorrect HSDRRS models that left out major components of the system.	The Corps developed the 1965 ADCIRC mesh to represent conditions prior to federal involvement in the New Orleans hurricane levee system. The 1965 and 2005 ADCIRC meshes include no floodgate at Seabrook and assume no levee along the northern portion of New Orleans East Polder. The setup of the 1965 ADCIRC mesh allows significant overtopping to pour into the New Orleans East polder for Katrina and other synthetic storm simulations, which, when compared to with-HSDRRS 2012 simulations, maximizes the estimated impacts to water levels in exterior areas such as Eden Isle. The assumption to completely remove the northern portion of the New Orleans East polder in the 1965 mesh is conservative, because a railroad embankment was there prior to 1965 which would have blocked some flow from entering the polder. Figure 6 in Appendix D shows the maximum water surface elevation from the 1965 simulation of Hurricane Katrina and clearly shows the New Orleans East and St Bernard polders completely inundated with water surface elevations of 10 to 14ft NAVD88 (keep in mind ground level is well below 0ft NAVD88 in New Orleans East so this is a tremendous volume entering the levee system). Figure 7 shows the same simulation on the 2012 ADCIRC mesh. With the 2012 HSDRRS in place, no flooding occurs in the New Orleans East and St. Bernard Polders. The comparison of the peak water

						level between the 1965 and 2012 simulation (Figure 8) shows the impact of raising the system which is estimated to be a 0.4ft rise. The modeling estimates the maximum displacement of water since the polder goes from completely inundated in the 1965 simulation, to completely dry in the 2012 simulation. The 2012 simulation includes any “outflow funnel surge” that would be created by raising the northern side of the New Orleans East polder, since that levee does not overtop in the 2012 simulation.
General (Thompson)	7/5/2021	Concur	Hydrology	Letter	The CED Executive Summary, states that the HSDRRS increases surge to Eden Isles by only 0.2 ft. This is a false statement from the original impact study the Corps refused to release until a Freedom of Information Act forced its release. A corrected Appendix D to the original study was released in February 2020, increasing HSDRRS impact to Eden Isles from 0.2 ft to 0.4 ft. The revised impact is contained in Appendix D, Public Comments Section of the CED Phase II.	Correct the revised impact is stated in Appendix T. The ES will be updated to reflect the correct number
General (Thompson)	7/5/2021	Non-concur	Hydrology	Letter	The 1965 model incorrectly showed the Seabrook Industrial Canal closed. The Seabrook Industrial Canal was a major Lake Pontchartrain outflow opening until HSDRRS construction in 2012, closed the canal and redirected outflow surge into southeast St. Tammany Parish. A corrected pre/post HSDRRS comparison would show an increased HSDRRS outflow surge impact to St. Tammany Parish.	This is a false statement. Both the 2005 and 1965 grids do not include Seabrook floodgate.
General (Thompson)	7/5/2021	Non-concur	Hydrology	Letter	The new HSDRRS components reshaped the lake’s landscape and hydrology. When flood plains are removed and pumping stations are built, the cumulative outflow surge requires inclusion into the CED’s comprehensive impact evaluation.	Pumping has a localized and minor effect on exterior water levels.

General (Thompson)	7/5/2021	Non-concur	Hydrology	Letter	The HSDRRS' human environmental impacts to southeast St. Tammany Parish are significant, and will: Increase flooding to thousands of homes; Increase surge damage from surge velocity; Increase FEMA flood elevation requirements resulting in unaffordable insurance cost; Make rebuilding at new elevation building code requirements financially impossible	The CED environmental assessment includes analysis of storm surge impacts outside the levee system. The comparison of peak water levels for with and without project show relatively minor impacts to Eden Isles. The simulation of Hurricane Katrina demonstrates that a rise of approximately 0.4ft can be attributed to the construction of the HSDRRS. A 0.4ft rise from 15.4 to 15.8 ft NAVD88 is a 2.6% increase in peak water level. In other storms, a slight reduction in peak water level can be attributed to construction of HSDRRS.
General (Thompson)	7/5/2021	Non-concur	Hydrology	Letter	The study did not include the pumping stations that add to the surge outflow volume, along with other new proposed, built, elevated and modified system components	Pumping has a localized and minor effect on exterior water levels.
General (Thompson)	7/5/2021	Non-concur	Hydrology	Letter	The study did not evaluate the increased outflow surge "velocity" caused by the HSDRRS restricting Lake Pontchartrain's outflow opening from 12 miles to 6 miles	The 1965 mesh does not include a levee along the north side of New Orleans East polder. When we evaluate with and without HSDRRS, the effects of narrowing the outlet from 12 to 6 miles is captured in the modeling. The modeling shows approximately 0.4ft increase near Slidell for the Hurricane Katrina simulation, which is above a 100YR surge event for that area.
General (Thompson)	7/2/2021	Non-Concur	Hydrology	Letter	The human environmental impacts justify expanding the HSDRRS scope to correct damage caused by the HSDRRS. In 2012, Col. Fleming, stated Corps' policy requires corrective action to mitigate additional flooding problems their projects cause.	Induced flooding damages have not been identified.
General (Thompson)	7/5/2021	Non-concur			The CED's impact study requires an "independent" reevaluation of the data and methodology used to determine the before and after impact of the entire HSDRRS and its negative human environmental impacts to St. Tammany Parish and the community of Eden Isles. Because the Corps refused to release their modeling data for 5 years; Because the modeling process is so subjective and easily manipulated; Because the modeling errors	An agency technical review was conducted on the CED hydraulic modeling. Additional modeling could be performed by another group, although they would likely use the same ADCIRC software and methodology to assess impacts.

					found are so obvious they appear deliberate; Because the study ignored damage from increased outflow surge velocity; Because the errors do not show the full HSDRRS impacts to St. Tammany Parish.	
Agency (DNR)	7/13/21	Concur	WVA's impacts and Mitigation	Electronic	It was difficult to reconcile the AAHUs in Section 5 , with the values presented in the Nov 2020 WBV and LPV General Re-Evaluation Reports. It would be helpful to have a single document comparing the earlier and later data, with discussion of the reasons for any changes. If impacts have increased beyond those previously reviewed by this office, the mitigation must also increase, and Wetland Value Assessments provided to OCM in order to assess the total AAHUs and consistency with the Louisiana Coastal Resources Program	The HSDRRS Impacts and mitigation AAHU are complex and difficult to follow. The CED captured the impacts and mitigation AAHU's as reported in previously approved Programmatic IER's, IER's, SIERs, and applicable EA's for work that has already been constructed. The general reevaluation EIS's are capturing potential impacts and mitigation for construction of future levee lifts if approved and funded. If at the time of construction, it appears that impacts may increase beyond what was disclosed in the NEPA documents, those additional impacts and necessary mitigation will be coordinated with applicable agencies.
Agency (DNR)	7/13/21	Concur	Coastal Zone Consistency	Electronic	Table 7-3, Coastal Zone Management Act of 1972, Coastal Zone Consistency (CZC) has an error. The entry for PIER #37 Tiered IER 1 NPS Joint EA cites an incorrect Consistency Number. A consistency concurrence letter dated August 21, 2015 was issued to the Corps of Engineers for C20140014 Mod 01, Programmatic IER 37, Tier 1: wetland restoration at five sites in Jean Lafitte NHPP.	Table 7-3 will be amended to include the correct consistency number

Source – general public, agency, public official, etc.

Theme – EJ, Cultural, T&E, Land Use, etc.

Mode – phone call, verbal @ meeting, letter, email, etc.

CED – PHASE I COMMENT AND RESPONSES

Public Comments and CEMVN Responses

Question #1
Do the model simulations show surge elevations for the full path/duration of these scenarios passing over Lake Pontchartrain? Will the study be revised to show the southeast Lake Pontchartrain surge tilt as the surge leaves the Lake Basin?
The only reference to surge flow is on Page 14 paragraph 1, of the Corps' evaluation states: the comparison between the SL15-2012, grid and the SL15-1965, grid was modeled to show only surge flows "into" Lake Pontchartrain. In addition all simulation Figures only show wind and surge elevations as the Lake Pontchartrain is tilted to the northwest. The highest surge levels within the Lake Pontchartrain Basin are created when storm winds rotate to the southeast funneling the surge out of the lake (outflow surge). Therefore, official confirmation is needed to confirm that the study model simulations show the full cycle of Lake Pontchartrain Basin's wind and surge tilt, both to the northwest and the southeast.

Question #1 Response
The modeling includes storms that cause the "outflow funnel surge" described above. Noted in the original question, the "outflow funnel surge" destroyed the I-10 bridge in 2005 during Katrina. This outflow is included in the ADCIRC simulation of Katrina, and other storms. ADCIRC simulates the entire duration of each storm and captures the complete surge development and subsequent draining of the floodplain.

The ADCIRC modeling of these storms includes the full time-series of surge development and subsequent draining. The model includes inflow and outflow of Lake Pontchartrain. A surge animation of Katrina or Storm 023 would show winds and surge approaching Eden Isle from the west after the storm crossed the lake. However, the corps approach is not to evaluate such a specific storm when evaluating overall impacts to surge patterns. Storm specific impacts can vary considerably depending of track, size, forward speed, intensity etc. The purpose of the Corps modeling is to determine overall impacts of a wide range of storm parameters.

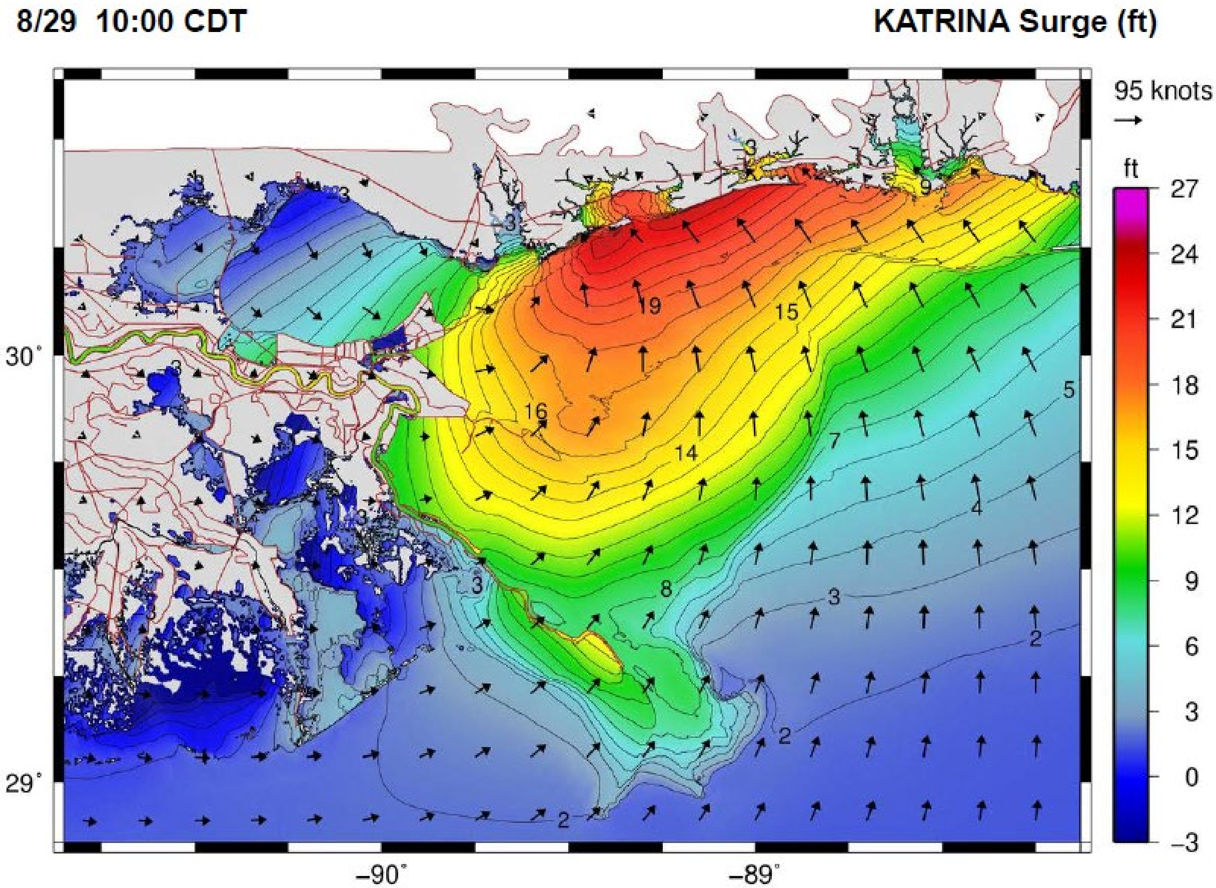

Figure 1 Snapshot of simulated ADCIRC water levels of Hurricane Katrina showing outflow surge from Lake Pontchartrain. Simulation time is 8/29 10:00 CDT.

Question #2 –Why is there a discrepancy between the Corps' study surge elevations and other independent studies? Will the Corps address these discrepancies?
Table 3, page 37, of the Corps' study shows a peak elevation of 12.4 feet at Eden Isles. However, The Lake Pontchartrain Basin Foundation Study Dynamics of Storm Surge in the Pontchartrain and Maurepas Region, has the Hurricane Katrina Slidell surge elevation at 16feet (Table 3, page 26 of the study).

Table 3: Record water levels in feet at various locations around Lake Pontchartrain, based on a SURGEDAT| dataset covering 1900 - 2013. The highest water levels in the lake are expected in Slidell (northeast shoreline) and Frenier (southwest shoreline.)

Location	Storm	Year	Water Level (ft)	Calculated Recurrance Interval (yr)	Datum
Slidell	Katrina	2005	15.7	114	NAVD88
Frenier	Betsy	1965	13.1	115	Unknown
New Orleans Lakefront	Katrina	2005	11.9	98	NAVD88
Mandeville	Katrina	2005	10	78	NAVD88

Question #2 response
High water marks surveyed after the storm by FEMA show coastal flooding elevations of 10.5 to 13.5 feet NAVD88 were recorded in the Slidell vicinity. These values tend to agree with the Corps' Katrina simulation. Typically, ADCIRC matches HWM data to within 1.5ft, but higher discrepancies between observed and modeled high water marks can occur.

https://www.fema.gov/pdf/hazard/flood/recoverydata/katrina/katrina_la_hwm_public.pdf

From page x:
Northern Shore: St. Tammany and Tangipahoa Parishes
The increased volume of water was forced into Lake Pontchartrain by hurricane winds. This caused water to pile up on the north shore of the lake and resulted in storm surge extending northas far as US Highway 190 in Slidell and to Interstate 12 north of Mandeville. HWMs recorded flooding elevations ranging from 7 to 16 feet, with the general trend of the highest values on the east end of the north shore working westward to lower surge values. Coastal flooding elevations of 10.5 to 13.5 feet were recorded in the Slidell vicinity.

HWM data recorded by FEMA

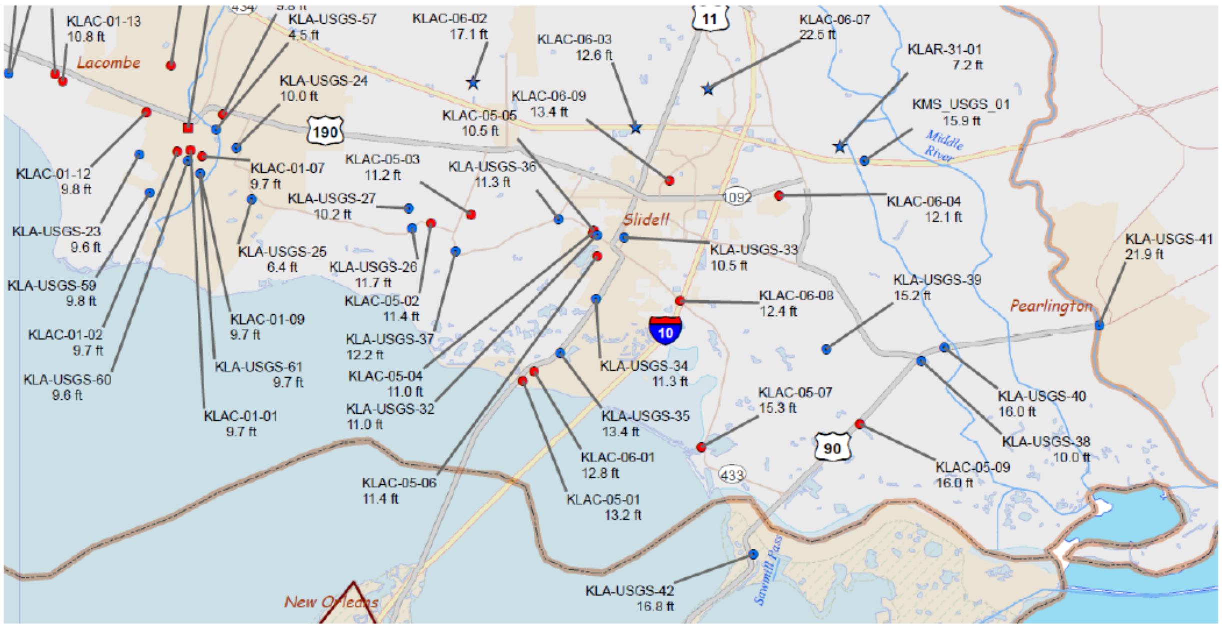

Figure 2 Hurricane Katrina High Water Mark Records from FEMA

Question # 3 –Will the Corps address questions raised about how the 1965 vs. current HSDRRS impacts were determined?

See attached comments by Bob Jacobsen:

The Report Section 2.4, says that the Figure 10 1965 (pre-Betsy) linear feature elevations are taken from information showing “existing conditions” on the original(mid-60s, post-Betsy) Hurricane Protection System Design Memos. For example, see the Report Figure 5 copy of 1967 Design Memo. This Figure 5 shows that there is a substantial “existing” levee at the time of the 1967 design. The Report states that the elevation of this “existing” levee is what is used as the 1965 “pre-Betsy” elevation in Figure 10. HOWEVER, an initial perusal of historical topography (http://historicalmaps.arcgis.com/usgs/) indicates that this substantial “existing” levee shown in Figure 5 may not have been present in 1965 for Betsy. It is important to consider that there likely was significant post-Betsy emergency levee work” done in the immediate aftermath of Betsy in 1965-66 (maybe with federal funds).HOWEVER, if the Report is meant to evaluate the impact of full post-Betsy improvements, then perhaps the real 1965 topography should be used. In this latter case, there may be many reaches of 1965 linear feature elevations that need to be substantially reduced.

Question #3 Response:

The Corps is aware that the historical U.S. Geological Survey topographic maps produced at the time of Hurricane Betsy do not indicate levees around New Orleans East. However, our experience is that these maps do not always provide the best source of information regarding levee alignments and elevations. With this understanding, we sought and consulted additional resources to gain better insight into what levees existed during this time period. We identified the U.S. Army Corps of Engineers’ “Interim Survey Report-Lake Pontchartrain and Vicinity, 21 NOV 1962” during our research for the project. In addition to the attached map, the below is an excerpt from this report that describes the levee system as it existed in 1962:

"Citrus and New Orleans East. The New Orleans Airport is fronted by a vertical seawall with an average elevation of 11.5 feet and a length of 2.3 miles. The embankment of the Southern Railway extends along the remainder of the south shore for approximately 11.5 miles with an average elevation of about 9.3 feet. The area is protected on the west by a levee along the Inner Harbor Navigation Canal having a grade of 9.6 feet, on the east by a levee that extends from South Point to the Gulf Intracoastal Waterway with an elevation of 11.6 feet, and on south by a levee along the Gulf Intracoastal Waterway with elevation 9.6 to 14."

We attempted to develop each scenario based on the best information accessible when preparing to undertake this modeling effort. Based on our research, the 1962 survey report provides the most accurate information regarding the existing levee details when establishing the 1965 baseline.

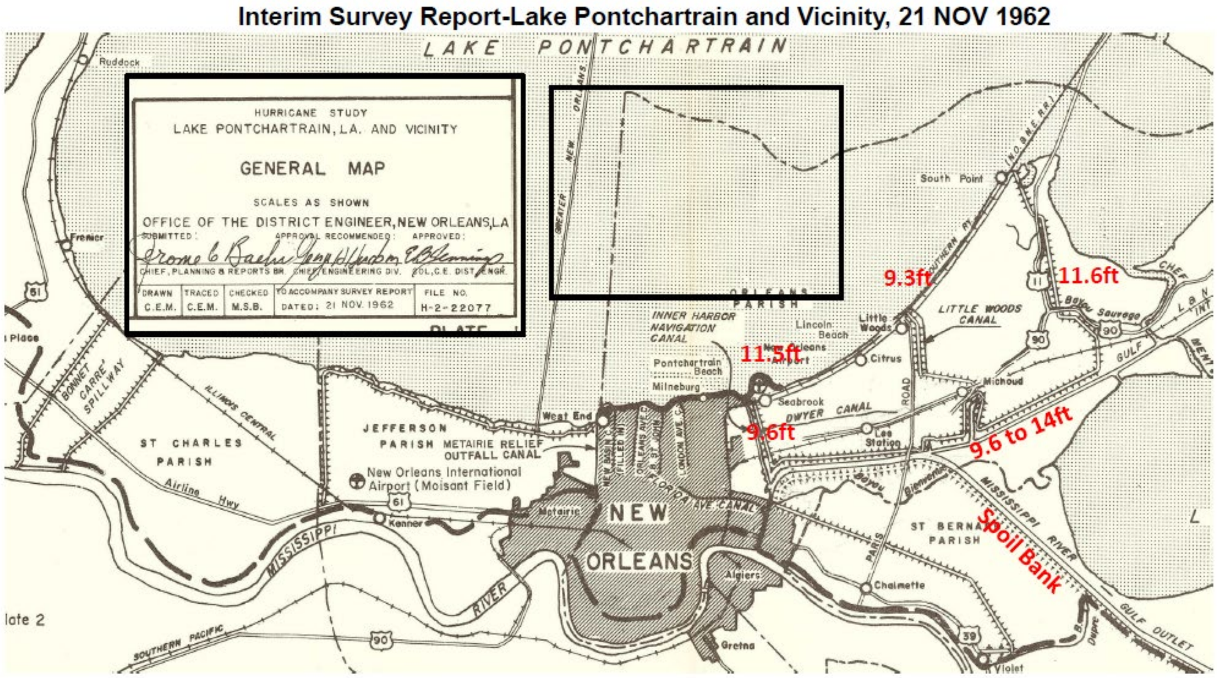

Figure 3   Elevations from "Interim Survey Report-Lake Pontchartrain and Vicinity, 21 NOV 1962"

Subsequent review revealed a discrepancy between the levee heights described in "Interim Survey Report-Lake Pontchartrain and Vicinity, 21 NOV 1962" and the elevations assigned in the SL15-1965 ADCIRC grid. Specifically, the elevation assigned in the SL15-1965 grid for the Southern Railway was approximately 14 ft NAVD88 based on a report from the 1980s. This elevation conflicts with the 1962 report which states the elevation is approximately 9.3ft NGVD. A lower levee elevation assigned in the SL15-1965 ADCIRC grid will result in more inundation within the polder for certain storms. This effect has potential to increase the estimates of induced flooding, since a greater volume of water will be displaced to the polder exterior for "with-project" conditions.

To remedy this error in the assumed levee elevations, a series of ADCIRC simulations were conducted with most up-to-date understanding of the levee system as it existed in 1965. An ADCIRC grid developed by CPRA in 2017 was utilized for this re-analysis. Figure 4 displays the updated elevations assumed in the 1965 ADCIRC grid. In the latest simulations, the elevations along the Southern Railway were set to natural ground elevations (< 2 ft NAVD88), which is less than the 9.3 ft NGVD elevation described in the 1962 report. Since the railway enbankment was composed on substandard material, it could not be included in the analysis because it was assumed it would have failed completely during a storm surge event. Figure 5 displays the elevations assumed in the 2017 "With Project" ADCIRC grid. From 1965 to 2017, there has been a significant increase in the perimeter levee and floodwall elevations, and also creation of new barriers, such as the Inner Harbor Navigation Channel Surge Barrier. These changes to HSDRRS have potential to displace volume during surge events and increase water levels on the exterior. The ADCIRC simulations comparing 1965 to 2017 give a general idea of the magnitude of increase due to levee and floodwall construction.

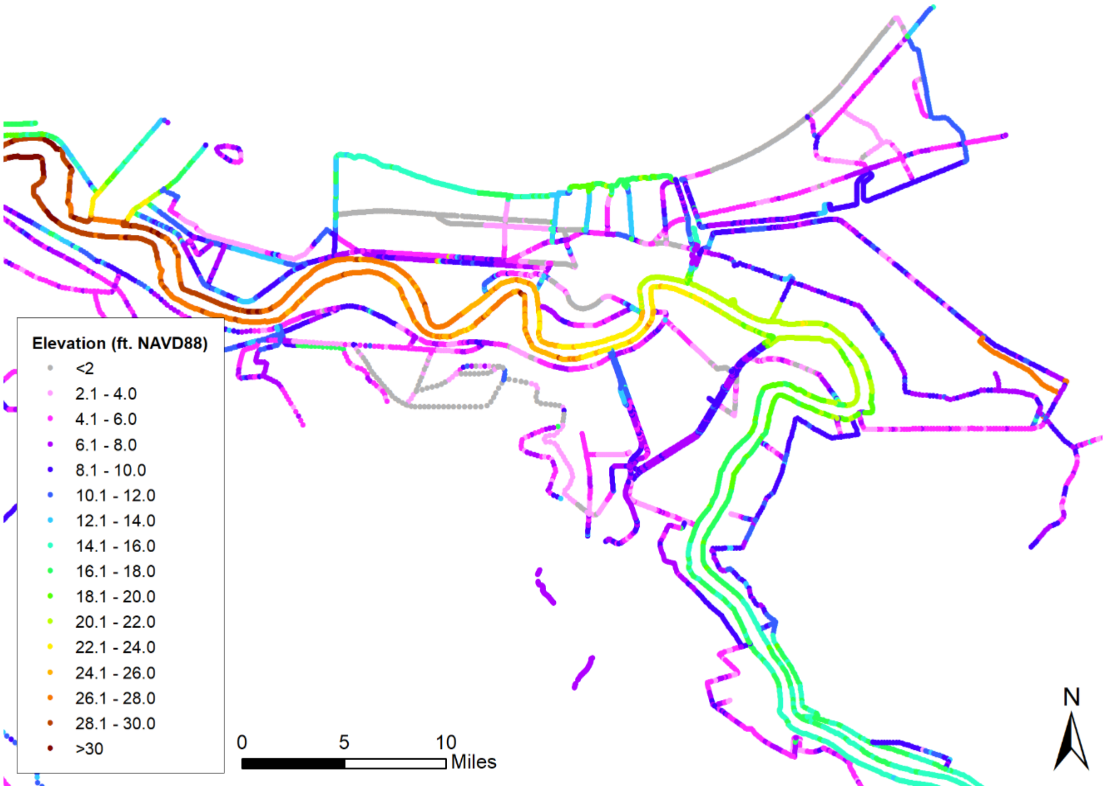

Figure 4 Elevations assumed in the updated CPRA-1965 ADCIRC grid

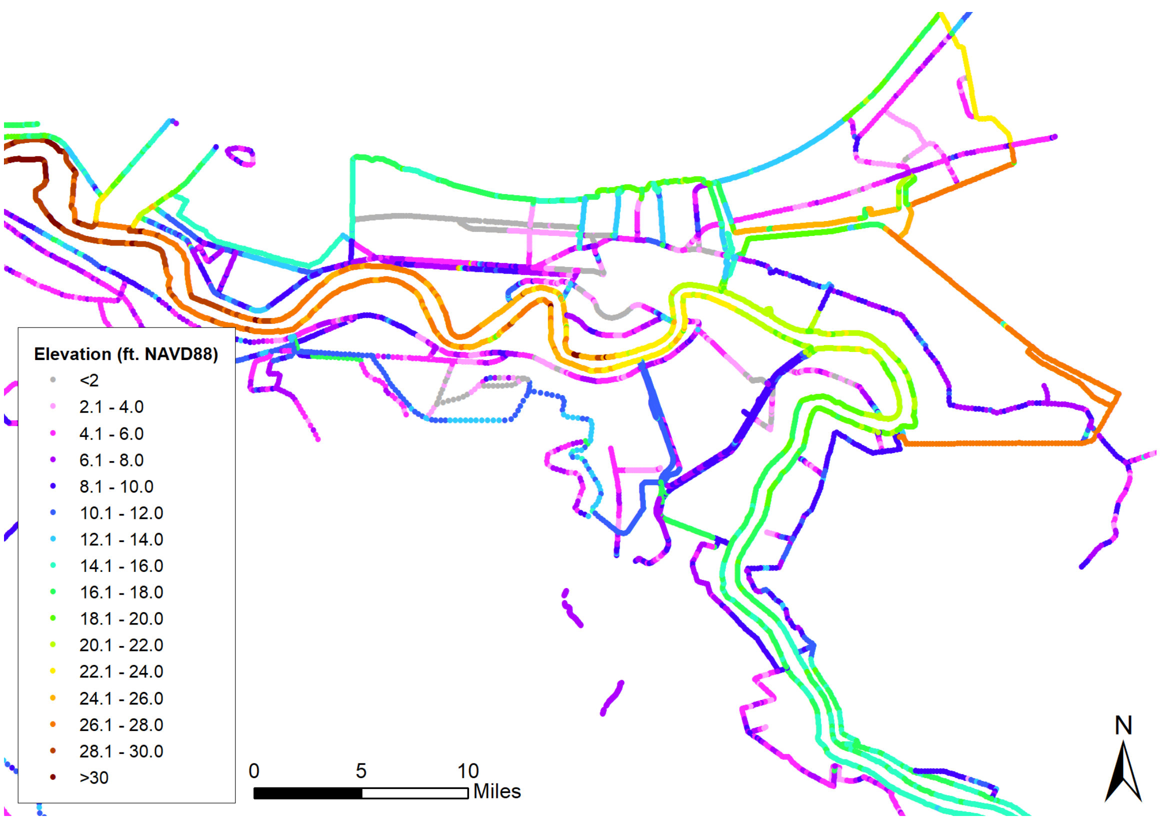

Figure 5 Elevations assumed in the updated CPRA-2017 ADCIRC grid

Figure 6 displays the maximum water surface elevations produced during the ADCIRC simulation of Hurricane Katrina assuming the 1965 levee elevations. The lower elevations assigned in the grid result in a tremendous amount of volume entering the Saint Bernard, New Orleans East, and New Orleans Metro Polders. In the 1965 simulation, the levee elevations of the Saint Bernard and New Orleans East polders are completely overwhelmed, resulting in complete inundation within the polder. Figure 7 displays the maximum water surface elevation produced by Katrina assuming the 2017 levee elevations. The simulation shows very little overtopping into the HSDRRS polders. Figure 8 displays the difference in maximum water surface elevation between the 2017 and 1965 simulations of hurricane Katrina. The difference plot shows the increase in water surface elevation that can be attributed to the raising of levees from 1965 to present day. At Eden Isles, the maximum surge produced by Katrina on the 1965 grid was 15.4 ft NAVD88 while the maximum surge produced by the 2017 grid was 15.8 ft NAVD88. This means an increase of approximately 5" (or roughly 3%) can be attributed to construction of the HSDRRS at Eden Isle. When looking at a broader area, the maximum increase in water surface elevation along the Northshore communities of Slidell and Pearlington is shown to be roughly 8 to 10". The earlier simulations showed a maximum surge at Eden Isles of 12.1 ft NAVD88 for the SL15-1965 grid and a maximum surge of 12.4 ft NAVD88 for the SL15-2012 grid. This results in a 4" increase in peak surge level with is a roughly 2% increase in peak surge elevation. The percentage increase in surge elevation is slightly higher (3% vs 2%) using the most up-to-date assumptions.

An additional suite of ADCIRC simulations was conducted to compare results on from the updated 1965 ADCIRC grid to the 2017 ADCIRC grid. Synthetic storms S008, S012, S014, S015, S023, S026, S069, S077, S085, S094, S126, S146 were simulated. These are the same synthetic storms as simulated in the earlier analysis. Table 1 contains the peak surge results for each of the synthetic storm for 1965 and 2017 conditions as well as the difference and percentage difference. Figure 9 displays a map of the selected output locations. The estimates of induced flooding varies by storm and location. Comparison to the earlier estimates of induced flooding show roughly the same order of magnitude of the percent increase. For example, the previous results for all storms show increase in peak surge elevation at Eden Isle to Pearlington on the order of 3 to 6%. The latest simulations show an increase on the order of 3 to 7%. The overall conclusions derived from the latest simulations show that a slightly higher estimate of induced flooding, when compared to previous estimates, can be attributed to the construction of HSDRRS levees from 1965 to present day.

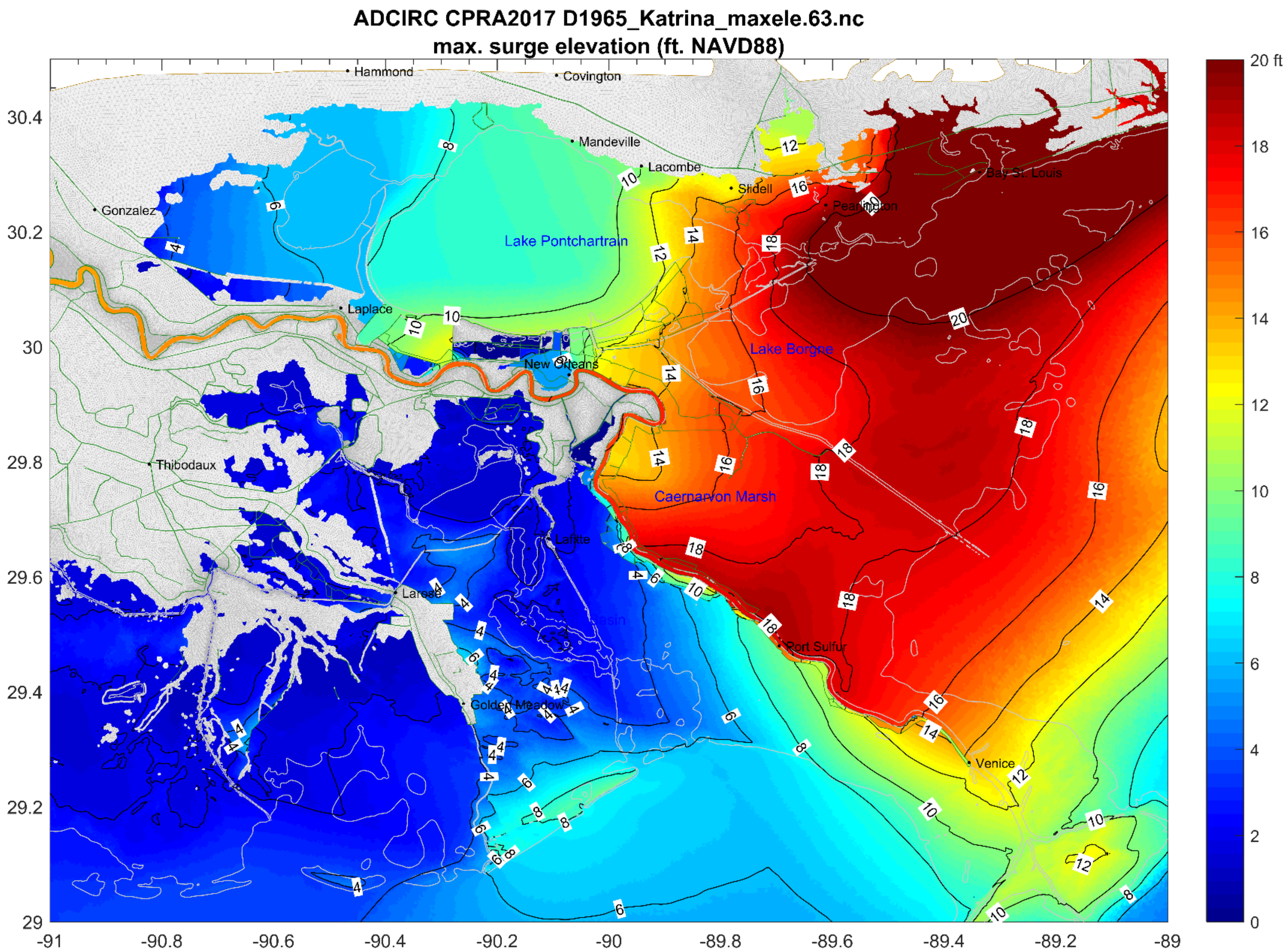

Figure 6   Maximum Water Surface Elevation from Hurricane Katrina Simulation for 1965 Conditions

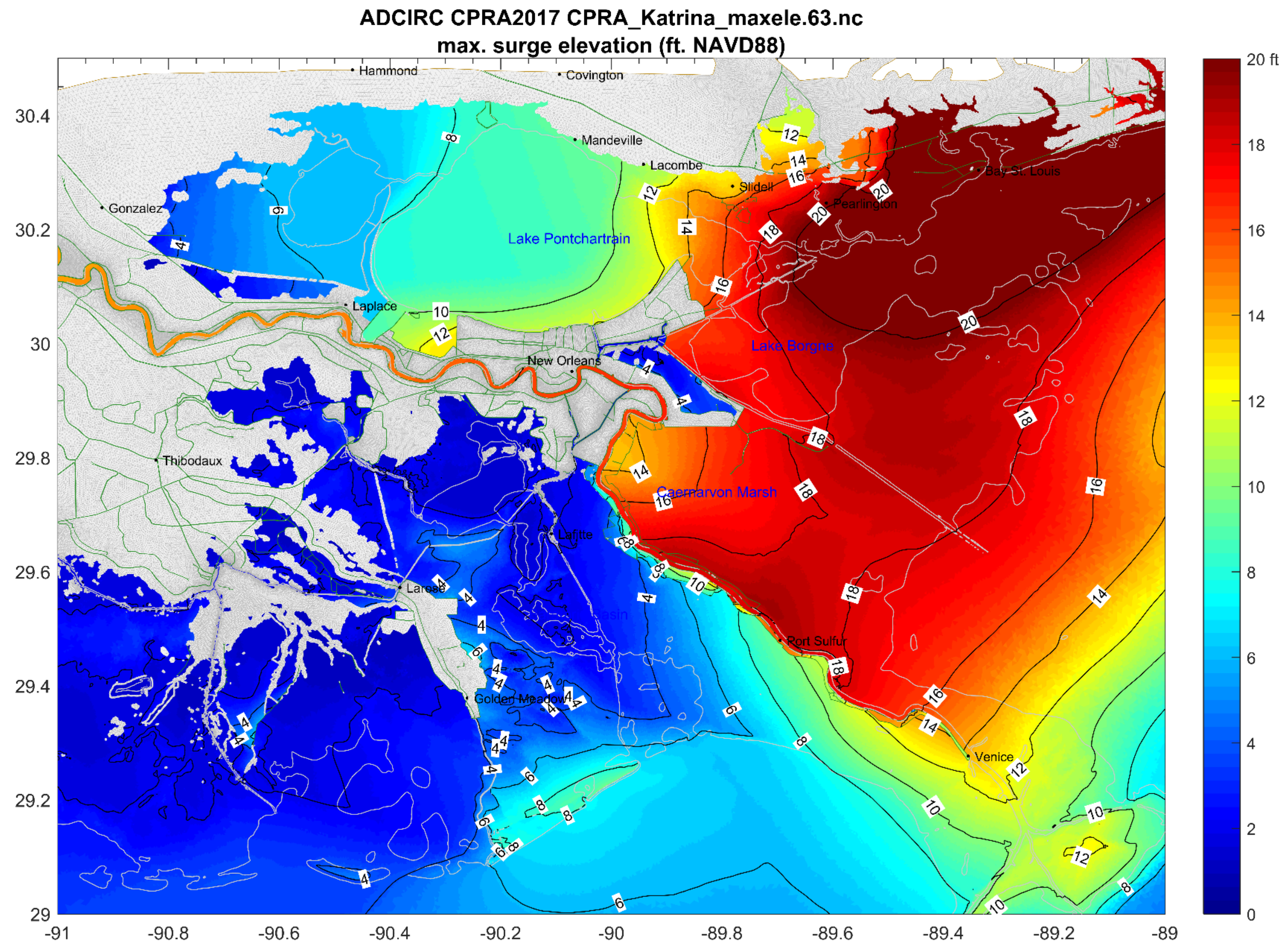

Figure 7   Maximum Water Surface Elevation from Hurricane Katrina Simulation for 1965 Conditions

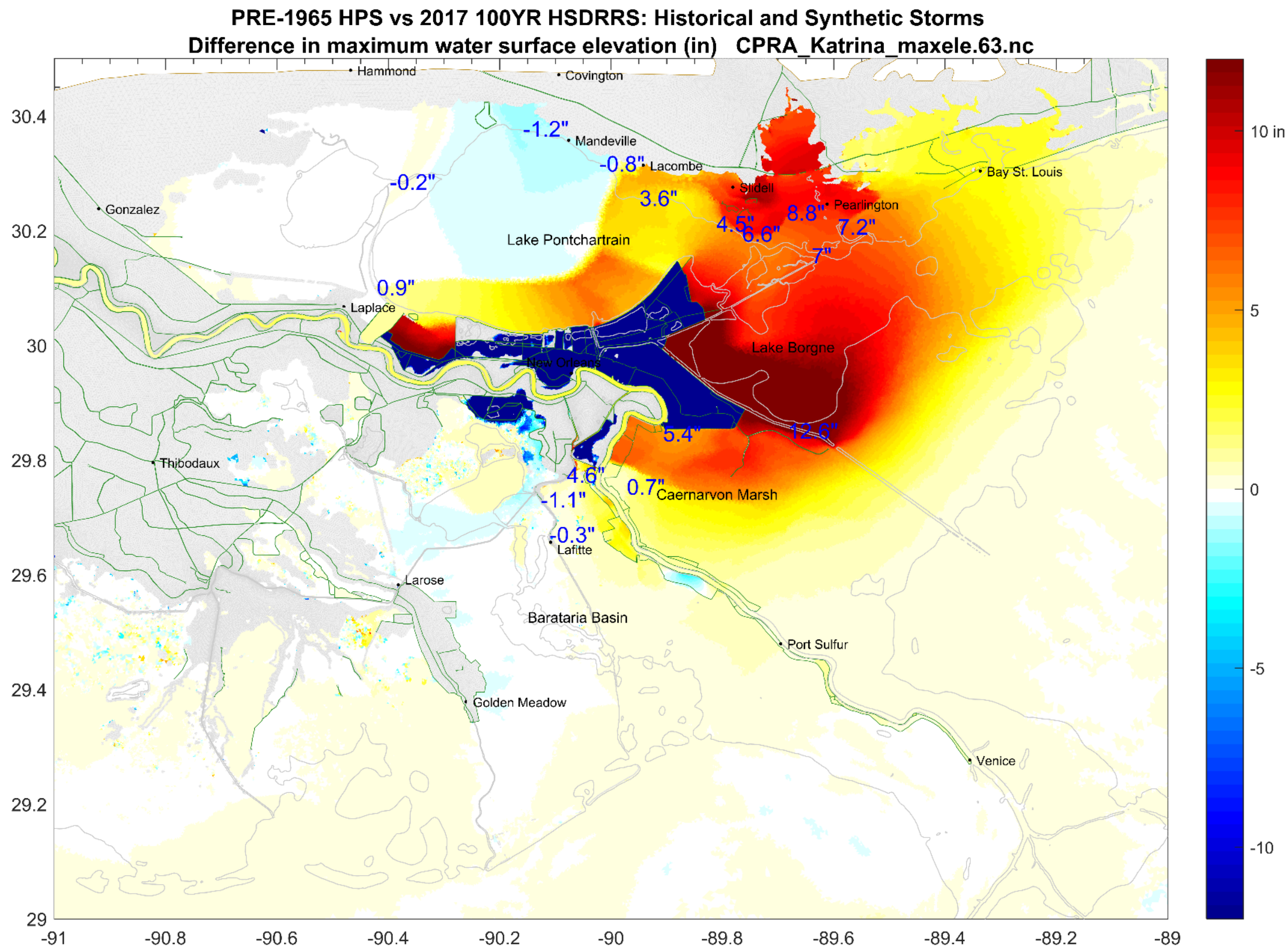

Figure 8 Difference in Maximum Water Surface Elevation between 1965 and 2017 ADCIRC simulations of Hurricane Katrina.

Table 1 Comparison of Peak Surge at Selected Output Locations for the updated 1965 and 2017 ADCIRC Grids

Metairie	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	10.7	7.2	7.0	7.4	8.5	8.7	9.8	3.2	8.1	11.0	9.4	8.3	8.9
2012 Peak Surge (ft. NAVD88)	11.0	7.2	7.1	7.4	8.4	8.7	9.9	3.0	8.1	10.6	9.0	8.0	8.1
Difference 1965 to 2012 (ft.)	0.28 2.6%	0.01 0.2%	0.06 0.9%	0.00 0.0%	-0.18 -2.1%	0.03 0.4%	0.12 1.2%	-0.18 -5.7%	0.02 0.2%	-0.40 -3.6%	-0.34 -3.6%	-0.32 -3.8%	-0.76 -8.6%

Kenner	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	10.0	7.3	7.0	7.3	8.5	9.8	9.9	5.3	8.9	11.0	10.8	8.4	9.3
2012 Peak Surge (ft. NAVD88)	10.2	7.3	7.0	7.3	8.4	9.9	10.1	5.1	8.9	10.6	10.8	8.1	9.4
Difference 1965 to 2012 (ft.)	0.19 1.9%	0.02 0.2%	0.07 1.0%	0.00 -0.1%	-0.17 -2.0%	0.04 0.4%	0.15 1.5%	-0.14 -2.7%	0.02 0.3%	-0.43 -3.9%	-0.01 -0.1%	-0.32 -3.9%	0.08 0.8%

Caernarvon	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	14.1	13.5	13.3	14.8	17.4	12.8	16.4	8.1	5.2	20.5	19.7	17.0	19.3
2012 Peak Surge (ft. NAVD88)	14.6	14.2	14.0	15.7	18.4	13.6	17.5	8.3	4.9	21.4	20.5	17.8	20.1
Difference 1965 to 2012 (ft.)	0.45 3.2%	0.73 5.4%	0.71 5.3%	0.85 5.7%	0.97 5.5%	0.80 6.3%	1.13 6.9%	0.21 2.6%	-0.38 -7.3%	0.90 4.4%	0.75 3.8%	0.84 5.0%	0.74 3.9%

IHNC Surge Barrier	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	14.3	10.0	10.0	10.6	12.4	12.3	14.9	8.2	10.4	15.5	17.0	12.8	14.6
2012 Peak Surge (ft. NAVD88)	16.3	11.7	11.5	13.1	14.9	16.4	21.0	9.7	13.1	18.2	20.1	15.1	17.4
Difference 1965 to 2012 (ft.)	2.07 14.5%	1.72 17.2%	1.55 15.6%	2.49 23.4%	2.53 20.4%	4.10 33.4%	6.18 41.5%	1.48 18.1%	2.62 25.1%	2.67 17.2%	3.09 18.1%	2.27 17.7%	2.73 18.6%

Shell Beach	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	16.3	8.4	8.3	8.6	10.4	10.8	13.3	4.6	10.1	13.0	14.9	11.4	13.0
2012 Peak Surge (ft. NAVD88)	17.6	9.2	9.1	9.5	11.6	12.3	15.3	4.9	11.3	14.4	16.4	12.5	14.3
Difference 1965 to 2012 (ft.)	1.23 7.5%	0.75 8.9%	0.74 8.9%	0.94 11.0%	1.15 11.1%	1.54 14.3%	2.05 15.5%	0.36 7.9%	1.14 11.2%	1.36 10.4%	1.48 9.9%	1.14 10.0%	1.29 9.9%

Venetian Isles	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	15.6	9.0	9.0	9.6	11.4	10.9	14.2	5.8	7.7	13.7	14.8	11.5	12.8
2012 Peak Surge (ft. NAVD88)	16.5	9.9	9.8	10.8	12.5	12.8	16.8	6.3	9.2	15.0	16.6	12.7	14.0
Difference 1965 to 2012 (ft.)	0.88 5.7%	0.85 9.4%	0.79 8.7%	1.12 11.7%	1.17 10.3%	1.90 17.3%	2.59 18.2%	0.43 7.3%	1.47 19.0%	1.28 9.4%	1.85 12.6%	1.18 10.2%	1.23 9.6%

Eden Isle	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	15.4	7.4	8.1	8.4	9.9	11.9	15.0	2.3	2.3	11.6	10.6	8.7	9.4
2012 Peak Surge (ft. NAVD88)	15.8	7.6	8.2	8.6	10.1	12.2	15.4	2.3	2.3	11.2	11.1	9.0	9.7
Difference 1965 to 2012 (ft.)	0.40 2.6%	0.15 2.0%	0.12 1.5%	0.26 3.0%	0.15 1.5%	0.25 2.1%	0.40 2.6%	-0.01 -0.3%	0.00 -0.1%	-0.41 -3.6%	0.57 5.4%	0.33 3.8%	0.29 3.1%

Pearlington, MS	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	19.3	10.2	10.3	11.4	12.9	15.3	19.8	4.8	3.3	13.7	13.6	11.8	12.1
2012 Peak Surge (ft. NAVD88)	20.0	10.7	10.6	11.9	13.5	15.9	20.6	4.9	3.3	14.5	14.6	12.5	12.8
Difference 1965 to 2012 (ft.)	0.65 3.4%	0.48 4.7%	0.37 3.6%	0.55 4.8%	0.64 5.0%	0.62 4.1%	0.82 4.1%	0.11 2.2%	0.05 1.4%	0.82 6.0%	1.01 7.4%	0.76 6.5%	0.74 6.1%

Manchac Pass	Katrina	S008	S012	S014	S015	S023	S026	S069	S077	S085	S094	S126	S146
1965 Peak Surge (ft. NAVD88)	6.3	8.2	7.3	8.5	9.1	6.4	7.4	4.9	3.4	13.1	10.9	9.2	10.8
2012 Peak Surge (ft. NAVD88)	6.3	8.1	7.3	8.4	8.8	6.4	7.5	4.9	3.3	12.4	10.3	8.8	10.2
Difference 1965 to 2012 (ft.)	-0.01 -0.2%	-0.07 -0.8%	0.01 0.2%	-0.08 -0.9%	-0.22 -2.5%	0.06 1.0%	0.10 1.3%	-0.07 -1.5%	-0.07 -2.1%	-0.65 -4.9%	-0.63 -5.8%	-0.37 -4.0%	-0.62 -5.8%

Mandeville	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	9.3		8.2		8.6		8.9		10.6		8.8		10.7		3.1		2.9		13.6		11.8		9.1		10.6	
2012 Peak Surge (ft. NAVD88)	9.2		8.2		8.6		8.8		10.2		8.9		10.8		3.0		2.9		13.0		11.0		8.7		9.8	
Difference 1965 to 2012 (ft.)	-0.08	-0.8%	-0.01	-0.1%	0.01	0.1%	-0.12	-1.4%	-0.37	-3.5%	0.14	1.6%	0.09	0.8%	-0.05	-1.5%	-0.03	-1.0%	-0.65	-4.8%	-0.80	-6.8%	-0.41	-4.5%	-0.84	-7.9%

LaPlace	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	8.2		9.5		8.6		11.3		11.6		11.6		11.6		9.9		11.2		14.3		13.5		11.0		11.8	
2012 Peak Surge (ft. NAVD88)	8.3		9.4		8.6		11.3		11.5		11.7		11.6		9.9		11.2		14.0		13.5		11.0		11.9	
Difference 1965 to 2012 (ft.)	0.08	1.0%	-0.08	-0.8%	-0.01	-0.1%	-0.08	-0.7%	-0.03	-0.3%	0.02	0.2%	0.01	0.0%	0.00	0.0%	-0.05	-0.4%	-0.25	-1.8%	-0.02	-0.2%	-0.03	-0.3%	0.08	0.7%

MSY Airport	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	11.8		7.1		6.9		8.7		9.6		12.6		12.7		5.7		11.8		11.6		12.4		8.8		11.3	
2012 Peak Surge (ft. NAVD88)	12.7		7.2		7.0		9.1		10.0		13.2		13.5		5.6		12.3		12.2		13.2		8.9		11.8	
Difference 1965 to 2012 (ft.)	0.94	8.0%	0.05	0.6%	0.08	1.2%	0.36	4.1%	0.35	3.6%	0.54	4.3%	0.78	6.1%	-0.14	-2.4%	0.51	4.3%	0.58	5.0%	0.72	5.8%	0.13	1.5%	0.50	4.4%

Braithwaite	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	13.2		13.8		13.2		14.9		17.7		12.1		15.5		9.8		9.3		21.5		20.3		17.6		20.4	
2012 Peak Surge (ft. NAVD88)	13.8		14.4		13.9		15.6		18.6		12.8		16.5		9.8		9.3		22.2		20.9		18.3		21.0	
Difference 1965 to 2012 (ft.)	0.55	4.2%	0.65	4.7%	0.68	5.2%	0.78	5.3%	0.88	4.9%	0.66	5.4%	1.02	6.6%	0.08	0.8%	-0.03	-0.3%	0.67	3.1%	0.57	2.8%	0.77	4.4%	0.59	2.9%

Jean Lafitte	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	2.3		6.3		4.7		6.6		6.8		2.4		3.1		2.6		2.2		11.5		3.3		6.0		6.6	
2012 Peak Surge (ft. NAVD88)	2.2		6.5		4.9		6.7		6.9		2.5		3.0		2.6		2.2		12.1		3.8		6.1		7.0	
Difference 1965 to 2012 (ft.)	-0.09	-4.2%	0.18	2.9%	0.12	2.6%	0.11	1.7%	0.11	1.7%	0.06	2.3%	-0.07	-2.4%	0.01	0.5%	0.05	2.5%	0.51	4.5%	0.57	17.5%	0.08	1.3%	0.41	6.2%

Lafitte	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	1.9		7.2		5.7		7.9		8.2		2.8		3.4		4.3		2.8		13.1		4.6		7.6		7.9	
2012 Peak Surge (ft. NAVD88)	1.9		7.2		5.7		7.9		8.2		2.8		3.3		4.3		2.8		13.5		4.9		7.6		8.1	
Difference 1965 to 2012 (ft.)	-0.03	-1.4%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	-0.01	-0.3%	-0.02	-0.7%	0.01	0.1%	0.02	0.7%	0.35	2.7%	0.23	4.9%	0.00	0.0%	0.13	1.7%

Crown Point	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	1.5		6.1		4.9		6.6		6.9		2.6		3.1		2.6		2.3		12.0		4.8		5.8		7.2	
2012 Peak Surge (ft. NAVD88)	1.8		6.9		5.6		7.7		8.0		2.9		3.5		2.9		2.5		13.3		6.4		6.6		8.8	
Difference 1965 to 2012 (ft.)	0.36	24.9%	0.87	14.4%	0.78	16.0%	1.10	16.8%	1.12	16.2%	0.23	8.7%	0.39	12.6%	0.33	12.6%	0.18	7.6%	1.32	11.1%	1.58	33.0%	0.82	14.1%	1.66	23.1%

Waveland	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	25.6		10.1		9.6		11.3		12.5		17.0		21.5		8.4		11.5		12.7		13.0		11.9		11.2	
2012 Peak Surge (ft. NAVD88)	25.8		10.3		9.7		11.5		12.8		17.3		22.0		8.4		11.6		13.0		13.4		12.0		11.5	
Difference 1965 to 2012 (ft.)	0.25	1.0%	0.12	1.2%	0.13	1.3%	0.16	1.4%	0.25	2.0%	0.35	2.0%	0.46	2.2%	0.02	0.2%	0.02	0.2%	0.38	3.0%	0.34	2.6%	0.19	1.6%	0.31	2.7%

Boutte	Katrina		S008		S012		S014		S015		S023		S026		S069		S077		S085		S094		S126		S146	
1965 Peak Surge (ft. NAVD88)	NaN		5.9		2.9		5.0		4.7		NaN		NaN		2.4		2.3		8.9		NaN		5.1		NaN	
2012 Peak Surge (ft. NAVD88)	NaN		6.2		3.2		5.4		5.2		NaN		NaN		2.5		2.3		9.7		NaN		5.4		NaN	
Difference 1965 to 2012 (ft.)	NaN	NaN	0.33	5.5%	0.26	8.7%	0.36	7.1%	0.46	9.7%	NaN	NaN	NaN	NaN	0.09	3.8%	0.05	2.2%	0.87	9.8%	NaN	NaN	0.27	5.2%	NaN	NaN

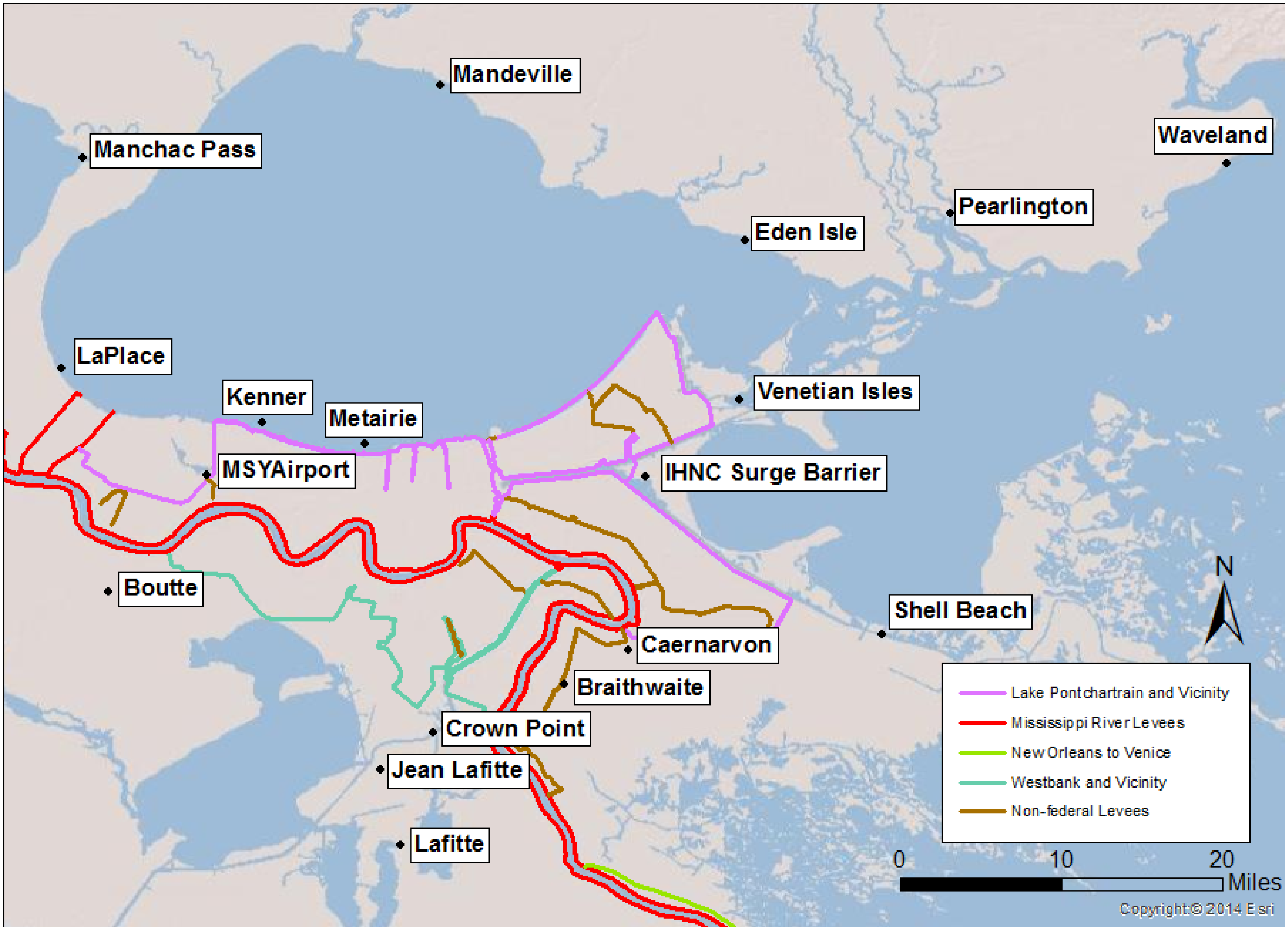

Figure 9 Selected Output Locations