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Simulated Hydrologic Effects of Canals in Barataria Basin: A Preliminary Study of Cumulative Impacts

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Final Report to
Louisiana State Planning Office
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ABSTRACT

Computer simulations of the hydrography of Barataria Basin indicate significant hydrologic changes due to navigation and transportation canals. The simulations compared hydrologic parameters in the Basin before and after the construction of the Barataria and Intracoastal waterways, and the canals associated with eight oil and gas fields. The waterways accounted for about 90 percent of the simulated changes; the remaining 10 percent was due to the canals of the eight oil and gas fields. The effects of oil and gas canals are individually small, but they are cumulative and, overall, probably are just as significant as those due to waterways, since there are approximately 90 fields in the Basin.

The following hydrologic parameters were measured: area flooded versus nonflooded, water heights over a tidal cycle, and total water flow at several locations over a tidal cycle. Canals increased the area of wetland, especially in the northern half of the Basin; for example, flooded areas increased between 11 and 13 percent. Water heights increased on the average by about 2 inches, or more than 9 percent above normal conditions; this effect was evident only north of Little Lake. Total water flow over a 25-hour tidal cycle increased between 7 and 16 percent in the intermediate marshes. Water flow at individual exchange points in the freshwater marshes was reduced between 20 and 70 percent of normal. Water flow through tidal passes was not changed.

Systematic studies of these effects, how to mitigate them, and how they are related to biological production are badly needed. Large-scale development projects, which require waterways or canals, should be carefully evaluated and monitored to determine their full environmental effects. Although the hydrologic effects of individual canals of oil and

gas fields are probably small (especially when evaluated at the basin level) their effects are cumulative, and so we recommend that additional canals be added only if absolutely necessary; and, when they are no longer useful, they should be refilled and refurbished. We also recommend that a series of workshops be hold with public agencies and private interests to discuss these results and their management implications.

CONCLUSIONS

1) Computer simulations can be used to assess the hydrologic effects of canals, especially for the evaluation of their cumulative effects on a hydrologic basin.
2) Computer simulations indicate that canals, such as those used for large ship traffic and those used for access to oil and gas fields, have created significant and cumulative hydrologic changes within Barataria Basin.
3) Navigational canals, namely the Barataria and Intracoastal Waterways, accounted for approximately 90 percent of the hydrologic changes, and canals of eight oil and gas fields (out of a total of 90 in Barataria Basin) accounted for about 10 percent of the changes.

RECOMMENDATIONS

1) We recommend that a systematic study on the cumulative hydrologic effects of canals be undertaken via computer simulation studies. This effort should also be related to the other studies on cumulative impacts (namely, land loss and eutrophication), and if possible, correlated with a field study so that some

empirical relationship can be derived for the effects on biological production and species habitat requirements.

2) We suggest that guidelines developed for canaling include such hydrologic parameters as: flooding; water heights; water flow over a complete tidal cycle, namely ebb and flood conditions.

3) The hydrologic effects of large-scale development projects should be evaluated by means of this computer stimulation technique. On completion of each project, the environment should be refurbished to its prior or original condition.

4) The effects of small projects, such as access canals to oil and gas fields, should also be evaluated by means of the computer simulation technique but at two levels; one being the macro-scale level, as done in this study, for evaluation of their cumulative effects and the other being the micro-scale level for evaluation of immediate hydrologic effects.

5) We recommend that a series of technical workshops be held with public agencies (such as the Louisiana Department of Wildlife and Fisheries and the U.S. Army Engineers) and with private companies (such as oil companies) in order to present our data and discuss possible management implications and mitigative procedures.

6) We also recommend that research efforts on computer simulation models be vigorously supported. A hydrography model should be developed for each coastal basin, along with a series of models that are sensitive to various geographic

scales so that impacts and mitigations may be more accurately determined.

INTRODUCTION

Canal and dredging activities have a long history--from at least the 1920s--in coastal Louisiana. Detailing the environmental effects of these activities is of recent origin--namely, the 1970s (e.g., see Gagliano 1973; Day and Craig 1977; and Stone et al. 1977). The primary purpose of these environmental studies has been to place the impacts of these activities on an objective basis and to provide some data for the design of possible mitigative procedures.

The extent of canals in Barataria Basin is given in Adams et al. 1976. They estimate that there are about 60 square miles (about 2 percent of the total Basin) of various type canals in the basin. Some 34 percent of this total consists of rig access canals, pipeline canals, and oil field navigation canals. These oil and gas pipeline canals are widely distributed throughout the basin among 90 fields (Stanfeld 1973). Canaling and dredging is not a problem of the past. For example, during 1974 more than 100 dredging permits were issued in the Basin. The remainder of the canals in Barataria Basin is made up of navigation canals, agricultural, and urban drainage canals, and impoundments.

It is very apparent that canals and their associated activities are significant in their extent in Barataria Basin, and a complete environmental evaluation of their effects is badly needed.

OBJECTIVES

The objectives of this study were:

1) To investigate the feasibility of using hydrologic modeling to assess cumulative effects of channelization in the lower Barataria Basin.

2) To suggest hydrologic parameters which are important for canaling guidelines.

MATERIALS AND METHODS

Solution Technique of the Circulation Model

The three-dimensional hydrodynamic equations of motion were averaged from bottom to top of the water column and solved by the Alternating Directions Implicit-Explicit technique of numerical analysis (McHugh 1976). The driving force of the model is tidal elevation. No wind was considered in this study and freshwater inputs were neglected. Outputs of the model and water elevations and currents.

Geographical Configuration of the Circulation Model

The circulation model encloses a region of coastal Louisiana bounded on the west by the levee of Bayou Lafourche and on the east by the levee of the Mississippi River (Fig. 1); this constitutes a hydrological unit that can be treated, for modeling purposes, in isolation from the surrounding territory, except where man-made canals conduct water into the unit from either of these two rivers. The northern boundary of the unit is strictly the Mississippi River at its junction with Bayou Lafourche, but it was convenient to take as the northern boundary of the estuarine model an artificial obstruction to water flow, namely, Highway 90. This boundary can be considered closed except through Bayou des Allemands. The latter conducts fresh water into the Basin from Lac des Allemands.

Certain canals breach the western model boundary, and, for the strictest analysis, their flow contributions into the estuary must be considered. There are only two canals that breach the eastern boundary; these are the Harvey Canal No. 1, and the Algiers Alternate Route. However, these latter features are controlled by locks at their junction with the Mississippi, and they are considered as contained solely within the model area; hence the eastern boundary is entirely closed. The most important canals in the western are the Harvey Canal No. 2 (Intracoastal Waterway), and Company Canal, and the South West Louisiana Canal. All these features were modeled, with the option of being open or closed. A similar option was extended to Bayou des Allemands.

The southern boundary of the model area is defined by three physically distinct sectors: In the west, from La. Highway 1 to the bridge across Caminada Pass; in the center, the barrier islands of Barataria Bay; and in the east, the Freeport Sulphur Company Canal, considered here as a hydrologically constraining feature.

The southern boundary has four breaks that allow gulf water to flow into the model area; they are Caminada Pass, Barataria Pass, Pass Abel, and Quatre Bayoux Pass. Computation with the model shows that Barataria Pass accounts for some two thirds of the volume flow into and out of the bay; Pass Abel is the least significant.

Grid Selection and Topography

The basic mesh size of the grid is 5,741 feet; it was chosen because it corresponded with 1 cm on the National Ocean Survey chart, and because it was the approximate width of Barataria Pass. This square mesh grid was oriented so that the southern boundary coincided approximately with the barrier islands and the four tidal passes. The rest of the boundary followed the levees and obstructions mentioned above. In particular, much of the western boundary of the model was chosen to follow the 5-foot elevation above mean sea level.

Next, additional lines were drawn on the regular grid in such a manner that the greatest number of water bodies and contours of importance could be represented with the fewest number of additional lines (see Appendix Fig. A1). The total number of north-south lines (in the frame of the model) was restricted to 58, and the total number of east-west lines to 75. This created 4,218 interior points at which topographical elevations had to be specified--one per grid "square."

From the dependence of numerical stability on grid mesh size and integrating time step, it was found desirable to place grid lines not closer than 574.1 feet apart, corresponding to 1 mm on the chart. This enabled a time step as large as 40 seconds to be employed. Canals with represented widths of less than this figure had to be expanded in width to approximately 574 ft. The depths of such expanded canals, or natural channels, were reduced in such a way as to maintain the model flow cross-section equal to the actual cross section.

Topographical elevations and depths were defined relative to mean sea level (MSL), which in turn was assumed to be 0.5 feet above the mean low water datum of the chart used. Marsh areas were set at 0.5 ft above MSL; areas enclosed by dashed lines on the chart were set either 1-5 ft above MSL (if they occurred in the western half of the model area), or 2.5 ft above MSL. Land 5 ft and more above MSL was assumed to be outside the model area.

Variable Wet-Dry Boundary Feature

The internal boundary between water and "dry" land is a function of time in tidal wetlands. In the model, this boundary was allowed to adjust itself automatically, following a technique described in McHugh (1977).

Tidal Input to the Model. Hourly tidal elevations measured at the Bayou Rigaud station (Grand Isle) on 9 and 10 January 1971 were used to construct tidal histories at each of the three passes, Caminada, Barataria, and Quatre Bayou. On these days the wind was insignificant. The tide at Pass Abel was assumed to be the mean of those at Barataria Pass and Quatre Bayoux Pass. On the assumption that tidal relationships in the Gulf of Mexico have not changed significantly since 1971, the tidal corrections for the times and heights of high and low water, based on Pensacola, Fla., were taken from the publication, Tide Tables (1977). With these corrections, and assuming sinusoidal variation of water level between adjacent turning points of the tidal curve, the necessary input tidal functions were estimated. It is important to note that the tidal curve off the Louisiana coast is noticeably asymmetric, with very commonly a drift in mean tide level from one cycle to the next. Consequently, a pure sinusoid is unrealistic to assume for accurate work.

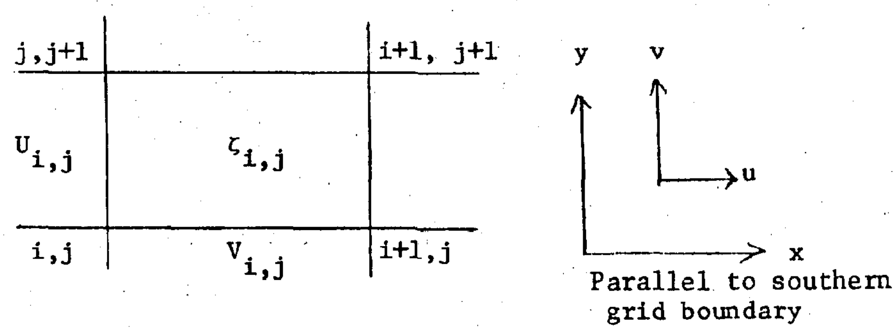
The constructed tides at the passes showed clearly a periodicity of approximately 25 hours in the fundamental harmonic, starting at 0 hours on 9 January. In order that the model might achieve cyclic steady state, it was necessary to assume strict periodicity of 25 hours for all cycles, and therefore that the tidal level at time 25 hours after time zero, equalled the value at time zero. The adjustment to the value at 25 hours was less than 8 percent in each case.

Since the model requires water levels in the passes at every time step, these levels were computed by interpolation between the constructed hourly values.

Output of the Circulation Model

The fundamental output consists of three variables for each grid square: water elevation (relative to MSL), and two perpendicular components of velocity.

These quantities are shown in the diagram for square i, j:



Locations of Water Level ζ and Components of Velocity U, v for a Grid Square.

In addition, certain integrated volume flows were also computed pertinent to the aims of the present study. These are described herewith.

The model area was divided up into four vegetation zones and eight "exchange points" or short segments of the grid between zones. Around each zone boundary the instantaneous volume flow in cu ft/sec was computed every 12 minutes in the tidal cycle. Thus for zone z at time t, the net volume flow out of the zone is

$$F_z(t) = \int_{\substack{\text{Zone}\\ \text{Boundary}}} \underline{V}\cdot\underline{n} H dl$$

where $\underline{V}$ is the velocity vector, dl is an element of the zone boundary with outward unit normal $\underline{n}$, and H is the depth along dl. The integral is of course obtained numerically from the grid discretization.

A similar integration was performed every 12 minutes for the exchange segments.

At the completion of a tidal cycle, the time summation of the instantaneous flows was computed using the trapezoidal method to yield the net flow per zone (exchange segment) per tidal cycle. Thus for zone z, if T is the tidal period, the algebraic net flow is given by

$$Q_z = \int_0^T F_z(t)dt$$

Also of interest are the summed positive flows and the summed negative flows, which may be denoted for zone z: Q_z^+ and Q_z^-.

$$Q_z = Q_z^+ - Q_z^-$$

Ideally, the sum of Q_z over all the zones, or equivalently, the net algebraic flow through all tidal passes per tidal cycle (since the model boundary is assumed closed elsewhere) should equal zero. But computational errors prevent this.

The total volume of water crossing a zone or zone segment per tidal cycle, regardless of direction is calculated as

$$Q = |Q^+| + |Q^-|$$

Difficulties Encountered in Obtaining Solutions

Following the "zero start" of the model, when artificial (zero) values of the field variables were specified; and thereafter following any shock to the system consequent on making changes in topography, the model had to be allowed to achieve cyclic equilibrium in the field variables, or to approach fairly near to such a state. This means that running the model for an additional cycle will not then significantly change the results.

Unfortunately, considerations of time necessitated that the iterative process be terminated in every case before cyclic equilibrium could be achieved. Only 11 cycles were run for each case: (1) no canals; (2) canals added. The great time needed to execute one tidal cycle (about 3 1/2 hours), conditions of the service, and an approaching deadline, made such an arbitrary cut-off necessary. In order to check the closeness of solution convergence, water levels were output at five selected points in the grid (Manilla, Airplane Lake, Little Lake, Lafitte, Barataria) at every hour. The changes in values between the 10th and 11th cycles at corresponding times were generally less than 2 percent; but there were still some larger fluctuations (up to 8 percent) at Airplane Lake. The larger fluctuations probably arise from the disturbing effect of the variable wet-dry boundary feature of the model.

It appears, however, from graphical display, that the small increase in water level registered at Little Lake, Lafitte, and Barataria, consequent on adding the Intracoastal and Barataria Waterways, is significant.

The net flows out of the various vegetative zones also provide a check on solution convergence. Ideally, these should be zero per tidal cycle. Actually, residuals were present in the four zones, being smallest in the south and increasing northward. The trend is well illustrated by figures for case (1). Looking at the 11th cycle, the most southerly zone flow per cycle has a residual error of 0.2 percent (expressed relative to $|Q^+| + |Q^-|$), the next has an error of 4 percent, the next of 11 percent, and the last, or freshwater zone, of 100 percent. In this region the currents were simply too far from the cyclic steady state to give meaningful results.

Still considering the 11th cycle, the percentage errors for the flow through all passes per cycle, were, for cases (1) and (2), 2.6 percent and 4.9 percent, respectively. These errors remained nearly constant from cycle to cycle, and hence must again be attributed to the noise-generating effect of the variable wet-dry boundary.

Test Conditions

Sections of the Barataria and Intracoastal Waterways were deleted from the model in order to obtain "pristine" or baseline conditions; this run was considered #1. Data on the canals of eight oil and gas fields (Figure 1) were extracted from standard quad maps; these data are given in table A14 in the appendix.

RESULTS

Three computer simulations were made. The first simulated the "pristine" condition of Barataria Basin without the Barataria and Intracoastal Waterways and without the canals of the eight oil and gas fields; this run (#1) is considered as our baseline condition against which the other runs (#2 and #3) are compared. The second run simulated the hydrologic system after the Barataria and Intracoastal waterways were constructed. For the third run the canals of eight oil and gas fields and the two waterways were inserted. Data were computed on three hydrologic parameters; they are flooded versus nonflooded area, water height over a 25-hour tidal cycle, and total water flow over a 25-hour tidal cycle; the latter parameter was estimated at several locations in Barataria Basin. The raw data on each of these parameters are given in the Appendix, along with a figure that shows the exact grid system of the computer model.

The addition of Barataria and Intracoastal waterways to baseline conditions resulted in the flooding of dry areas in the northern part of the Barataria Basin, namely, mostly north of Lake Salvador (Fig. 1). Flooding is defined as water heights greater than or equal to 0.2 ft in each grid (see Appendix, tables A1 through A3). The exact area of the flooding cannot be calculated because of the variable grid system used. However, this represents an 11 percent increase over baseline conditions (Namely, run #1, table 1).

The addition of the canals of eight oil and gas fields resulted in the flooding of additional dry areas, particularly in the northern part of the Barataria Basin, namely, mostly north of Lake Salvador (Fig. 1). This represents a 3 percent increase in flooding over and above the effects of the two waterways (table 1).

Water heights were increased as a result of canals. The increase over baseline conditions was significant from Little Lake north (Table 2). The median increase of water height at Little Lake, as a result of Barataria and Intracoastal waterways, was 0.09 ft; at Lafitte it was 0.16 ft; and at Barataria it was 0.22 ft. The addition of the canals of the eight oil and gas fields increased these values to 0.10, 0.18, and 0.24 ft, respectively.

Total water flow over a 25-hour tidal cycle was significantly changed in the northern part of Barataria Basin as a result of the canals (Tables 3, 4, and 5). Total water flow per tidal cycle in intermediate marshes was increased by about 7 percent above normal as a result of the two waterways (Barataria and Intracoastal) and by about 9 percent above normal as a result of the addition of the canals of the eight oil and gas fields. Total water flow per tidal cycle in the fresh marshes was reduced by about 22 percent as a result of the two waterways and by an additional 2 percent as a result of the addition of the canals of the eight oil and gas fields (Table 3).

Total water flow per tidal cycle at some of the eight exchange points (Fig. 1) was also significantly altered as a result of the canals (Table 4). For example, total water flow per tidal cycle at exchange point 2 (Fig. 1) was reduced by about 67 percent of normal as a result of the addition of the two waterways, while the addition of the oil and gas canals did not alter flow volume at this point. Water flow at exchange point 3 showed the same pattern, namely, a reduction of about 62 percent of normal as a result of the two waterways, and oil and gas canals had no effect. At exchange point 4 the total water flow per tidal cycle was reduced by about 22 percent of normal or baseline conditions; the canals of the eight oil and gas fields decreased water flow by 2.5 percent of normal.

It should be emphasized that exchange points 2, 3, and 4 are located in the north part of Barataria Basin (Fig. 1).

Total water flow per 25-hour tidal cycle at the four tidal passes of Barataria Basin--namely, Caminada Pass, Barataria Pass, Pass Abel, and Quatre Bayou Pass--did not show any change by the addition of any canals. The total water flow for each tidal pass was in all cases almost exactly equivalent to normal or baseline conditions.

DISCUSSION

The basic question of these studies is: Do the results describe reasonablv well what exists in nature? There are two ways to resolve this question. One, compare the output of the model with empirical or known hydrographic data from Barataria Basin. This has been done in a preliminary way and the results are comparable; additional data on hydrography of the basin are now being collected so that this verification will be done more completely and the model adjusted appropriately. Second, compare the output of the model with hydrography data gathered before and after a large-scale project. This will be done in association with the pipeline being developed for the Louisiana Offshore Oil Port, Inc. (LOOP).

The next most important questions about our results are: Are the results significant? Do they indicate cumulative effects?

Significance usually connotes a statistical definition; such as, the results are significant and real if their probability is less than or equal to a 5 percent of being due to chance. We have no way at present of establishing such a rigorous definition to our data; however, we have considered all results significant if they differ by 5 percent or more from baseline conditions. Thus we believe that the flooding, the water heights, and water movement at the northern locations are significantly different from baseline conditions and that these are the result of the canals.

Cumulative effects can be defined as environmental impacts that are small individually but are additive in nature. Our preliminary data suggest that the hydrologic effects of canals of oil and gas fields are small--at least when analyzed at the basin level--and that they are cumulative. The basis for this conclusion is first that the effects of the canals of eight oil and gas fields were small in comparison to effects of major waterways, and, secondly, that in almost all cases these canals caused an increase (or added to) the effects of the waterways.

Computer simulation models have limitations and assumptions that the user should be fully aware of. The basin-level model (used in this study) is presently limited because of the following: (1) it does not as yet include the effects of wind; (2) the grid size is approximately 1-mile, which is quite large; (3) the canal data must be averaged into one canal per number of grids covered by the particular oil and gas field--this is an extreme simplification; (4) the calculations assume a variety of simplying features--as described in the materials and methods section; (5) certain geographic features are not yet realistic, for example the intracoastal waterway has no levee that blocks waterflow on either side; and (6) the computer model needs to be run through several (at least 12) tidal cycles so that the final results stabilize. For example, Run #3 was calculated through only 4 cycles because of the time limitations of the contract. Therefore, the hydrologic values derived for the freshwater marsh are to be viewed only as an indication of the effect; they are not absolute values.

This preliminary study indicates where there is a lack of data or information. For example, we do not know how yet to correlate these results with a change in biological production or with a change in species habitats. In addition, we do not know how to couple these data with the results of other cumulative impact studies such as eutrophication, land loss, and salinity intrusion.

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Efforts toward implementation of coastal zone management in Louisiana have enlisted the interest and participation of many public agencies and institutions. As a cornerstone for this program, scientific information from every available source is being compiled and digested in a series of Coastal Zone Management reports. The collection is ultimately intended as an authoritative central reference source for persons involved in administration of an operational CZM program.

The information presented in this report has been synthesized from research studies administered by the National Oceanic and Atmospheric Administration, U.S. Dept. Commerce, through the Office of Coastal Zone Management and the Office of Sea Grant.

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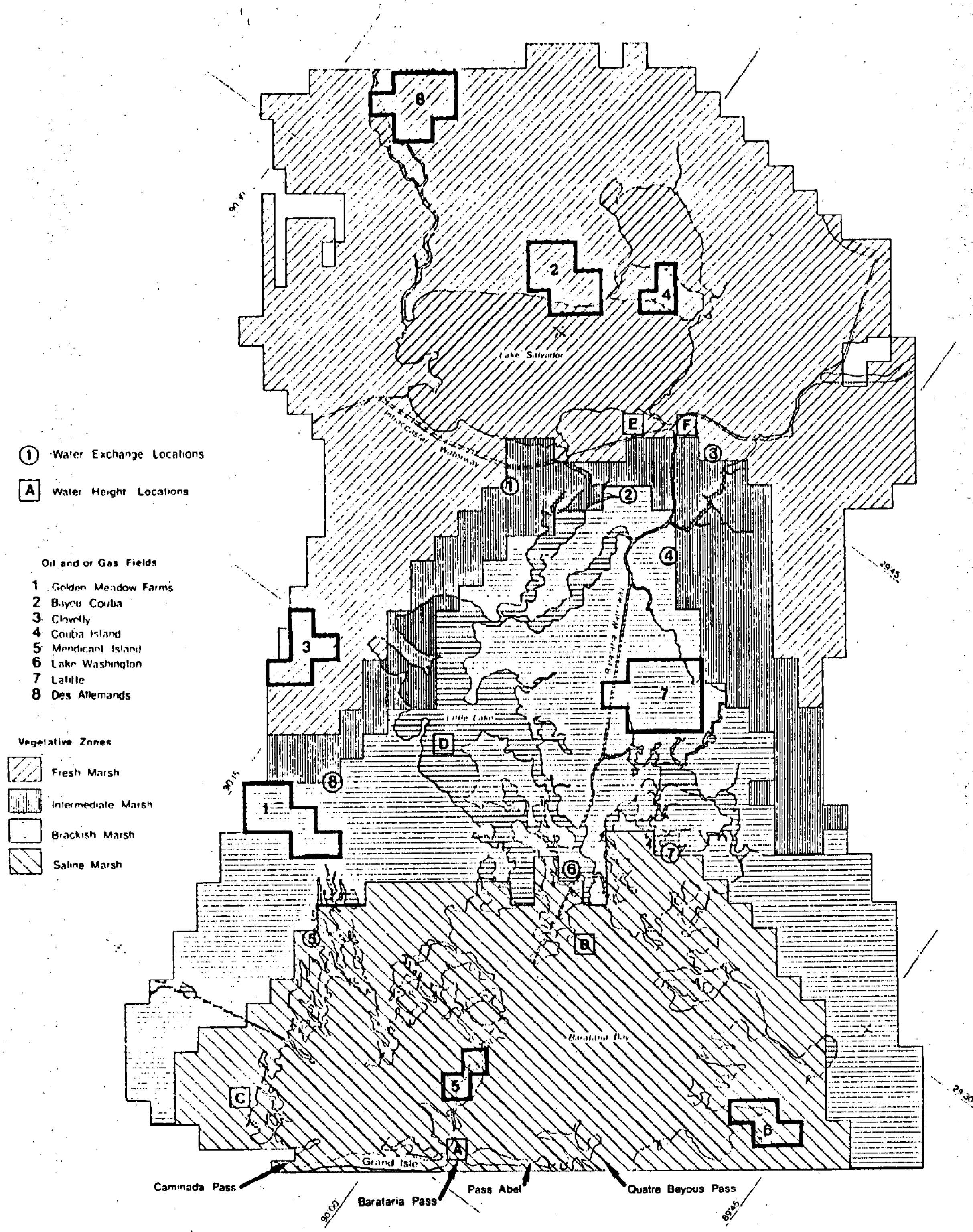

Fig. 1. Location Map.

Table 1. Simulation estimates of the flooded area in Barataria Basin created as a result of Barataria and Intracoastal Waterways (Run #2) and the canals of eight oil and gas fields (Run #3). Both runs were compared to Run #1. Extracted from Tables A1 through A3 in Appendix.

	Computer Simulation	
Area	Run #2	Run #3
Percent Change	10.8+	13.4+

Table 2. Median increases of water heights due to canals at selected locations in Barataria Basin, La. Values are in feet. Computer simulation Run #2 was done with Barataria and Intracoastal Waterways and simulation Run #3 was done with the waterways and canals of oil and gas fields. Both runs were compared to Run #1 which was done without any canals or waterways.

location	legend on Fig. 1	Computer Simulation Run #2	Computer Simulation Run #3
Barataria Pass	a	0.00	0.00
Manilla	b	0.02	0.01
Airplane Lake	c	0.01	0.01
Little Lake	d	0.09	0.10
LaFitte	e	0.16	0.18
Barataria	f	0.22	0.24

Table 3. Total water flow per 25 hr tidal cycle in each of four marsh types in Barataria Basin, La., in cubic feet and in percent change (common log base used; see table in appendix). Computer simulation Run #1 was done with no canals; simulation Run #2 was done with the Barataria and Intracoastal Waterways; and simulation Run #3 was done with both waterways and canals of eight oil and gas fields.

	# cubic feet X 10^x			Percent change	
Marsh Type	Run #1	Run #2	Run #3	#2/#1 X 100%	#3/#1 X 100%
Saline	1.5424	1.5511	1.5618	100.6	101.2
Brackish	0.3615	0.3658	0.3685	101.2	101.9
Intermediate	0.4105	0.4390	0.4764	106.9	116.0
Fresh	0.7151	0.4844	0.5001	67.7	69.9

Table 4. Total water flow per 25 hr tidal cycle at selected exchange points in Barataria Basin, La., in cubic feet and percent change (common log base used; see Appendix, tables A8-A10). Computer simulation Run #1 was done with no canals; Simulation Run #2 was done with the Barataria and Intracoastal Waterways; Simulation Run #3 was done with both waterways and the canals of eight oil and gas fields.

	Computer Simulation (cubic feet X 10^x)			Percent change	
Exchange Point	Run #1	Run #2	Run #3	#2/#1 X 100%	#3/#1 X 100%
1	0.0	0.5195	0.3238	—	—
2	0.1949	0.0639	0.0613	32.8	31.4
3	0.9302	0.3571	0.3581	38.4	38.5
4	0.6327	0.4901	0.4998	77.5	79.0
5	0.2880	0.2877	0.2848	99.9	98.9
6	2.3375	2.3590	2.3480	100.9	100.4
7	0.9077	0.8789	0.8719	96.8	96.0
8	0.0	0.0	0.0	—	—

Table 5. Total water flow in cubic feet and percent change per 25 hr tidal cycle through tidal passes of Barataria Basin, La. (common log base used; see table ___ in appendix). Computer simulation Run #1 was done with no canals; Simulation Run #2 was done with the Barataria and Intracoastal waterways; Simulation Run #3 was done with both waterways and the canals of eight oil and gas fields.

	Computer Simulation (cubic feet X 10^x)			Percent change	
Pass	Run #1	Run #2	Run #3	#2/#1 X 100%	#3/#1 X 100%
Caminada	1.5088	1.5180	1.5299	100.6	101.4
Barataria	0.9210	0.9221	0.9256	100.1	100.5
Abel	0.8725	0.8674	0.8768	99.4	100.5
Quatre Bayou	2.8560	2.8448	2.8927	99.6	101.3
All	1.3597	1.3597	1.3708	100.0	100.8

DATA APPENDIX

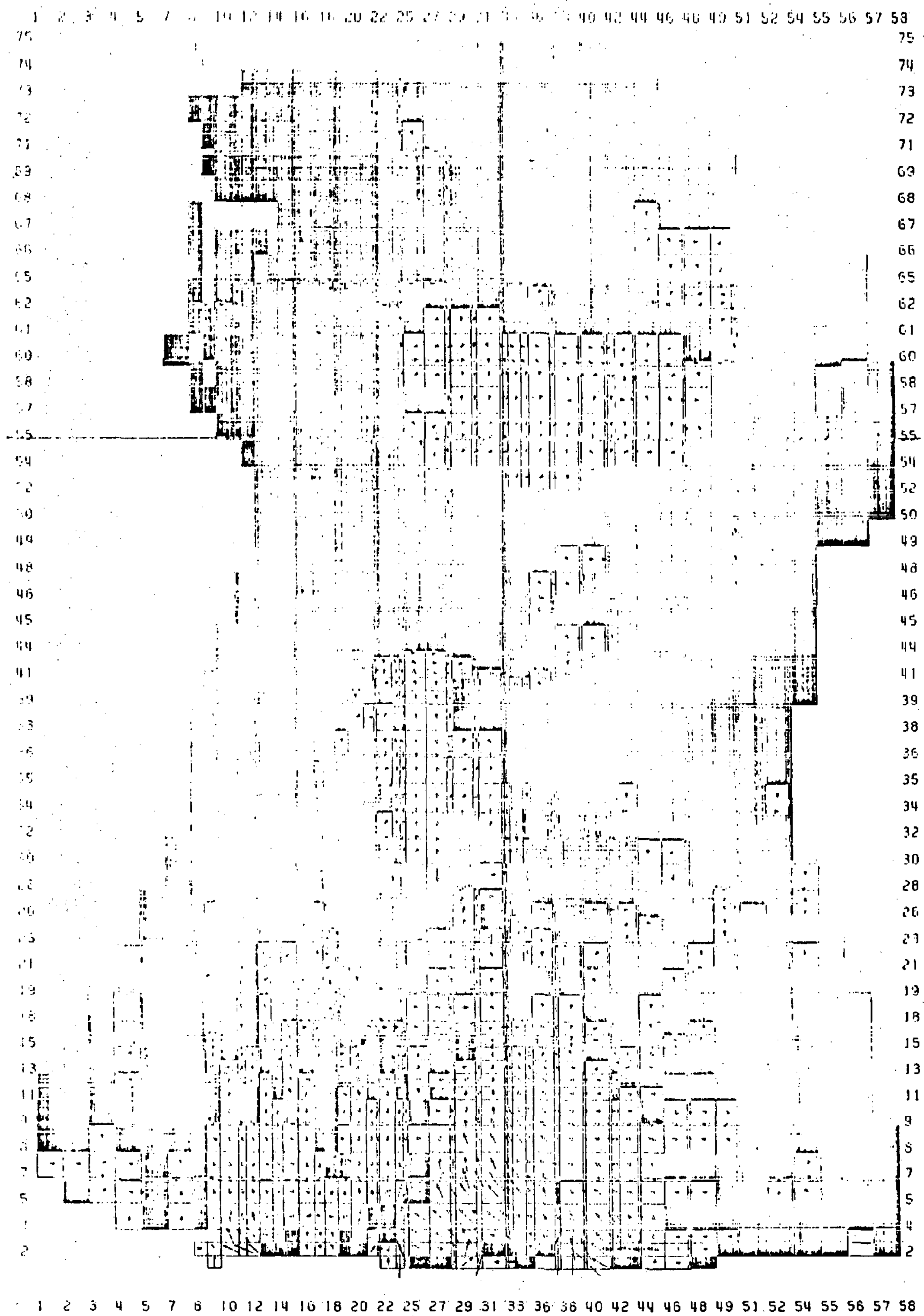

Fig. A1. Grid numbering system and water areas used by the hydrographic model of lower Barataria Basin.

Table A1. Flooded areas indicated by 1 and nonflooded areas indicated by 0 for Run #1. Grid corresponds to Fig. A1 (for 10 cycles).

SYMBOLIC DEPTH MATRIX

Row	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
64	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1
62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1
29	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1
28	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1
27	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
26	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1
25	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1
24	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1
23	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
22	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
21	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	0	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1

Row	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
68	1	0	0	1	0	1	0	1	0	1	0	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0
66	1	0	0	0	0	0	0	1	0	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0
64	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0
62	0	0	1	1	0	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0
60	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0
58	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0
56	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	0	0
54	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	0
52	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
50	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	0	0
48	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	0
46	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
44	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
42	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0
40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
38	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
36	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	0
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0

Table A2. Flooded areas indicated by 1 and nonflooded areas indicated by 0 for Run #2. Grid corresponds to Fig. A1 (for 10 cycles).

SYMBOLIC DEPTH MATRIX

Table A3. Flooded areas indicated by 1 and nonflooded areas indicated by 0 for Run #3. Grid corresponds to Fig. A1 (for 10 cycles).

SYMBOLIC DEPTH MATRIX

Table A4. Water heights over a tidal cycle at selected locations in Barataria Basin in feet for Run #1 (11 cycles), #2 (11 cycles), and #3 (4 cycles).

Run #1

HOUR	B.PASS (24,1)	MANILLA (36,14)	A.LAKE (7,7)	L.LAKE (27,35)	LAFITTE (45,46)	BARATAR (47,51)
0	0.99	1.41	1.05	0.99	0.77	0.71
2	0.45	1.12	1.00	1.05	0.79	0.71
4	0.03	0.86	0.91	1.05	0.91	0.72
6	-0.14	0.58	0.82	0.98	0.82	0.73
8	-0.06	0.38	0.73	0.90	0.82	0.72
10	0.18	0.28	0.59	0.84	0.81	0.72
12	0.53	0.34	0.55	0.79	0.78	0.74
14	0.93	0.64	0.55	0.75	0.76	0.72
16	1.30	0.91	0.51	0.74	0.73	0.69
18	1.57	1.12	0.72	0.78	0.72	0.70
20	1.70	1.33	0.89	0.83	0.74	0.58
22	1.62	1.48	0.97	0.90	0.75	0.69
24	1.29	1.49	1.04	0.96	0.77	0.69
25	0.99	1.41	1.05	1.00	0.78	0.70

Run #2

HOUR	B.PASS (24,1)	MANILLA (36,14)	A.LAKE (7,7)	L.LAKE (27,35)	LAFITTE (46,46)	BARATAR (47,51)
0	0.99	1.42	1.05	1.08	0.94	0.92
2	0.45	1.13	1.00	1.13	0.95	0.93
4	0.03	0.98	0.90	1.11	0.97	0.93
6	-0.14	0.61	0.82	1.03	0.98	0.94
8	-0.06	0.42	0.73	0.97	0.98	0.95
10	0.18	0.30	0.56	0.92	0.96	0.95
12	0.53	0.35	0.57	0.88	0.94	0.94
14	0.93	0.63	0.55	0.84	0.92	0.93
16	1.30	0.93	0.54	0.83	0.91	0.93
18	1.57	1.14	0.71	0.87	0.90	0.92
20	1.70	1.35	0.90	0.94	0.90	0.92
22	1.62	1.50	0.97	1.00	0.92	0.92
24	1.29	1.50	1.03	1.06	0.94	0.92
25	0.99	1.42	1.05	1.09	0.95	0.93

Run #3

HOUR	B.PASS (24,1)	MANILLA (36,14)	A.LAKE (7,7)	L.LAKE (27,35)	LAFITTE (46,46)	BARATAR (47,51)
0	0.99	1.42	1.05	1.09	0.96	0.94
2	0.45	1.14	1.01	1.13	0.97	0.95
4	0.03	0.98	0.91	1.11	0.99	0.95
6	-0.14	0.63	0.83	1.04	1.00	0.96
8	-0.06	0.40	0.74	0.97	0.99	0.97
10	0.18	0.31	0.59	0.92	0.97	0.97
12	0.53	0.35	0.58	0.89	0.95	0.96
14	0.93	0.65	0.55	0.85	0.94	0.95
16	1.30	0.93	0.53	0.84	0.93	0.95
18	1.57	1.14	0.70	0.88	0.92	0.94
20	1.70	1.34	0.90	0.94	0.92	0.93
22	1.62	1.49	0.98	1.00	0.94	0.94
24	1.29	1.50	1.03	1.06	0.96	0.94
25	0.99	1.42	1.05	1.09	0.96	0.95

Table A5. Water flow per vegetative zone over a tidal cycle. A6 is saline, A5 is brackish, A4 is intermediate, and A3 is fresh. See Figure 1. Values were calculated through 11 cycles for Run #1.

HOUR	A6	A5	A4	A3
0	0.1980E 06	-0.6004E 05	-0.7469E 04	-0.7425E 04
1	0.2791E 06	-0.4545E 05	-0.6755E 04	-0.9954E 04
2	0.2936E 06	-0.1920E 05	-0.7491E 04	-0.8555E 04
3	0.2673E 06	0.8251E 04	-0.7081E 04	-0.7319E 04
4	0.2413E 06	0.3087E 05	-0.2465E 04	-0.1059E 05
5	0.2135E 06	0.4235E 05	-0.1575E 04	-0.1031E 05
6	0.1939E 06	0.4919E 05	-0.7299E 03	-0.9305E 04
7	0.1572E 06	0.5012E 05	0.2528E 04	-0.1091E 05
8	0.1257E 06	0.5052E 05	0.3051E 04	-0.9945E 04
9	0.8902E 05	0.4849E 05	0.4133E 04	-0.1013E 05
10	0.4344E 05	0.4880E 05	0.5619E 04	-0.1034E 05
11	-0.1817E 05	0.4300E 05	0.5004E 04	-0.1025E 05
12	-0.1041E 06	0.3861E 05	0.4172E 04	-0.5499E 04
13	-0.1528E 06	0.3486E 05	0.5158E 04	-0.5967E 04
14	-0.1869E 06	0.2762E 05	0.6751E 04	-0.7226E 04
15	-0.2284E 06	0.2451E 05	0.5117E 04	-0.5733E 04
16	-0.2313E 06	-0.4878E 04	0.7594E 04	-0.5453E 04
17	-0.2282E 06	-0.3008E 05	0.5828E 04	-0.5454E 04
18	-0.2362E 06	-0.3330E 05	0.2487E 04	-0.4550E 04
19	-0.2289E 06	-0.3890E 05	-0.2745E 02	-0.5174E 04
20	-0.2086E 06	-0.4954E 05	0.3951E 03	-0.5709E 04
21	-0.1731E 06	-0.5748E 05	-0.1205E 04	-0.5115E 04
22	-0.1191E 06	-0.6175E 05	-0.2894E 04	-0.5725E 04
23	-0.4020E 05	-0.6322E 05	-0.5750E 04	-0.5739E 04
24	0.6218E 05	-0.6367E 05	-0.3988E 04	-0.9285E 04
25	0.2004E 06	-0.6265E 05	-0.6795E 04	-0.7562E 04
ALGEBRAIC SUM	0.3608E 08	-0.1427E 09	0.4413E 08	-0.7151E 09
SUM OF + FLOWS	0.7730E 10	0.1736E 10	0.2273E 09	0.0
SUM OF - FLOWS	-0.7694E 10	-0.1879E 10	-0.1832E 09	-0.7151E 09

Table A6. Water flow per vegetative zone over a tidal cycle. A6 is saline, A5 is brackish, A4 is intermediate, and A3 is fresh. See Figure 1. Values were calculated through 11 cycles for Run #2.

HOUR	A6	A5	A4	A3
0	0.1984E 06	-0.5592E 05	-0.8139E 04	-0.6004E 04
1	0.2798E 06	-0.4246E 05	-0.8439E 04	-0.6880E 04
2	0.2953E 06	-0.1461E 05	-0.8180E 04	-0.7659E 04
3	0.2634E 06	0.1458E 05	-0.6517E 04	-0.8388E 04
4	0.2358E 06	0.3577E 05	-0.3812E 04	-0.9036E 04
5	0.2122E 06	0.4561E 05	-0.1097E 04	-0.9379E 04
6	0.1927E 06	0.5188E 05	0.6513E 03	-0.9401E 04
7	0.1567E 06	0.5364E 05	0.2671E 04	-0.8841E 04
8	0.1257E 06	0.4986E 05	0.4228E 04	-0.7804E 04
9	0.8731E 05	0.4877E 05	0.5137E 04	-0.6517E 04
10	0.4421E 05	0.4662E 05	0.5641E 04	-0.4847E 04
11	-0.1692E 05	0.4184E 05	0.6163E 04	-0.2627E 04
12	-0.1066E 06	0.3854E 05	0.6261E 04	0.5884E 02
13	-0.1545E 06	0.2977E 05	0.6088E 04	0.2091E 04
14	-0.1955E 06	0.2039E 05	0.5825E 04	0.3287E 04
15	-0.2243E 06	0.1177E 05	0.5342E 04	0.4151E 04
16	-0.2330E 06	-0.5354E 04	0.4927E 04	0.4795E 04
17	-0.2399E 06	-0.2347E 05	0.3694E 04	0.5288E 04
18	-0.2378E 06	-0.3528E 05	0.8708E 03	0.5564E 04
19	-0.2284E 06	-0.4580E 05	-0.4967E 03	0.5598E 04
20	-0.2069E 06	-0.5540E 05	-0.2272E 04	0.4983E 04
21	-0.1725E 06	-0.5986E 05	-0.4604E 04	0.3436E 04
22	-0.1194E 06	-0.6197E 05	-0.6292E 04	0.8322E 03
23	-0.3673E 05	-0.6450E 05	-0.7109E 04	-0.2414E 04
24	0.6539E 05	-0.6207E 05	-0.7759E 04	-0.4505E 04
25	0.1986E 06	-0.5598E 05	-0.8182E 04	-0.5889E 04
ALGEBRAIC SUM	-0.4114E 08	-0.1273E 09	-0.2606E 08	-0.1949E 09
SUM OF + FLOWS	0.7735E 10	0.1765E 10	0.2065E 09	0.1448E 09
SUM OF - FLOWS	-0.7776E 10	-0.1893E 10	-0.2325E 09	-0.3396E 09

Table A7. Water flow per vegetative zone over a tidal cycle. A6 is saline, A5 is brackish, A4 is intermediate, and A3 is fresh. See Figure 1. Values were calculated through 4 cycles for Run #3.

HOUR	A6	A5	A4	A3
0	0.1986E 06	-0.5686E 05	-0.8581E 04	-0.5801E 04
1	0.2780E 06	-0.3878E 05	-0.8808E 04	-0.6910E 04
2	0.2933E 06	-0.1321E 05	-0.8494E 04	-0.7857E 04
3	0.2637E 06	0.1600E 05	-0.6858E 04	-0.8685E 04
4	0.2359E 06	0.3711E 05	-0.4080E 04	-0.9372E 04
5	0.2214E 06	0.4685E 05	-0.1153E 04	-0.9792E 04
6	0.1943E 06	0.5295E 05	0.9634E 03	-0.9825E 04
7	0.1606E 06	0.5401E 05	0.3479E 04	-0.9271E 04
8	0.1270E 06	0.5248E 05	0.5021E 04	-0.8165E 04
9	0.9457E 05	0.4676E 05	0.5935E 04	-0.6654E 04
10	0.5256E 05	0.4347E 05	0.6507E 04	-0.4548E 04
11	-0.9707E 04	0.4115E 05	0.6773E 04	-0.1783E 04
12	-0.1015E 06	0.3661E 05	0.6596E 04	0.9557E 03
13	-0.1556E 06	0.2692E 05	0.6414E 04	0.2574E 04
14	-0.1994E 06	0.2821E 05	0.6050E 04	0.3668E 04
15	-0.2193E 06	0.1236E 05	0.5657E 04	0.4471E 04
16	-0.2376E 06	-0.3273E 04	0.5132E 04	0.5149E 04
17	-0.2430E 06	-0.2284E 05	0.4013E 04	0.5659E 04
18	-0.2399E 06	-0.3725E 05	0.1010E 04	0.5922E 04
19	-0.2311E 06	-0.4511E 05	-0.9516E 03	0.5891E 04
20	-0.2090E 06	-0.5519E 05	-0.2959E 04	0.5344E 04
21	-0.1747E 06	-0.6082E 05	-0.4939E 04	0.4110E 04
22	-0.1200E 06	-0.6434E 05	-0.6537E 04	0.2109E 04
23	-0.3900E 05	-0.6607E 05	-0.7620E 04	-0.1084E 04
24	0.6316E 05	-0.6285E 05	-0.8237E 04	-0.3854E 04
25	0.1972E 06	-0.5555E 05	-0.8680E 04	-0.5564E 04
ALGEBRAIC SUM	-0.1398E 08	-0.1170E 09	-0.2041E 08	-0.1714E 09
SUM OF + FLOWS	0.7802E 10	0.1784E 10	0.2280E 09	0.1643E 09
SUM OF - FLOWS	-0.7816E 10	-0.1901E 10	-0.2484E 09	-0.3358E 09

Table A8. Water flow per exchange point over a tidal cycle (see Fig. 1). Values were calculated through 11 cycles for Run #1.

HOUR	1	2	3	4	5	6	7	8
0	0.0	0.1946E 04	0.9555E 03	0.8355E 03	0.5468E 04	0.4033E 05	-0.1764E 03	0.0
1	0.0	0.2022E 04	0.9775E 03	0.8901E 03	0.4524E 04	0.3207E 05	0.2594E 03	0.0
2	0.0	0.2268E 04	0.1059E 04	0.9277E 03	0.2431E 04	0.1891E 05	0.8500E 03	0.0
3	0.0	0.2245E 04	0.1095E 04	0.9547E 03	-0.6513E 03	0.1393E 04	0.1569E 04	0.0
4	0.0	0.2323E 04	0.1081E 04	0.1023E 04	-0.2376E 04	-0.1316E 05	0.1855E 04	0.0
5	0.0	0.2682E 04	0.1080E 04	0.1029E 04	-0.2994E 04	-0.2120E 05	0.1850E 04	0.0
6	0.0	0.2657E 04	0.1130E 04	0.1042E 04	-0.3371E 04	-0.2651E 05	0.1639E 04	0.0
7	0.0	0.2639E 04	0.1075E 04	0.1025E 04	-0.3537E 04	-0.2829E 05	0.1513E 04	0.0
8	0.0	0.2665E 04	0.1219E 04	0.9793E 03	-0.3783E 04	-0.2660E 05	0.1384E 04	0.0
9	0.0	0.2543E 04	0.1075E 04	0.9194E 03	-0.3257E 04	-0.2634E 05	0.1342E 04	0.0
10	0.0	0.2322E 04	0.1156E 04	0.8450E 03	-0.2883E 04	-0.2664E 05	0.1356E 04	0.0
11	0.0	0.2343E 04	0.1097E 04	0.7148E 03	-0.2533E 04	-0.2636E 05	0.1235E 04	0.0
12	0.0	0.1933E 04	0.1058E 04	0.5232E 03	-0.2501E 04	-0.2609E 05	0.1168E 04	0.0
13	0.0	0.1718E 04	0.1055E 04	0.5450E 03	-0.2489E 04	-0.2245E 05	0.1107E 04	0.0
14	0.0	0.1402E 04	0.9680E 03	0.3827E 03	-0.3317E 04	-0.1622E 05	0.1019E 04	0.0
15	0.0	0.1349E 04	0.1035E 04	0.3074E 03	-0.3002E 04	-0.9885E 04	0.8674E 03	0.0
16	0.0	0.9958E 03	0.8568E 03	0.1939E 03	-0.2821E 04	0.6254E 04	0.3754E 03	0.0
17	0.0	0.1418E 04	0.9189E 03	0.1542E 03	-0.1994E 04	0.1851E 05	-0.6051E 03	0.0
18	0.0	0.1851E 04	0.7290E 03	0.2145E 03	0.1824E 03	0.2625E 05	-0.5169E 03	0.0
19	0.0	0.1949E 04	0.7208E 03	0.3553E 03	0.2415E 04	0.3152E 05	-0.7879E 03	0.0
20	0.0	0.2096E 04	0.8507E 03	0.5145E 03	0.3295E 04	0.3601E 05	-0.8273E 03	0.0
21	0.0	0.2078E 04	0.9443E 03	0.6550E 03	0.4179E 04	0.3975E 05	-0.8353E 03	0.0
22	0.0	0.2611E 04	0.9178E 03	0.7534E 03	0.4969E 04	0.4263E 05	-0.7958E 03	0.0
23	0.0	0.1911E 04	0.9484E 03	0.7952E 03	0.5540E 04	0.4422E 05	-0.6810E 03	0.0
24	0.0	0.1715E 04	0.1084E 04	0.8454E 03	0.5735E 04	0.4383E 05	-0.4832E 03	0.0
25	0.0	0.1874E 04	0.1085E 04	0.8534E 03	0.5459E 04	0.4023E 05	-0.1834E 03	0.0
ALGEBRAIC SUM	0.0	0.1949E 09	0.9302E 08	0.5327E 08	-0.8751E 07	0.4164E 09	0.4885E 08	0.0
SUM OF + FLOWS	0.0	0.1949E 09	0.9302E 08	0.5327E 08	0.1395E 09	0.1377E 10	0.6961E 08	0.0
SUM OF - FLOWS	0.0	0.0	0.0	0.0	-0.1484E 09	-0.9605E 09	-0.2076E 08	0.0

Table A9. Water flow per exchange point over a tidal cycle (see Fig. 1). Values were calculated through 11 cycles for Run #2.

HOUR	1	2	3	4	5	6	7	8
0	0.3266E 02	0.6037E 03	0.3370E 03	0.5261E 03	0.5442E 04	0.3774E 05	-0.1625E 03	0.0
1	0.2993E 02	0.8275E 03	0.4501E 03	0.6330E 03	0.4471E 04	0.2891E 05	0.2900E 03	0.0
2	0.2946E 02	0.1040E 04	0.5298E 03	0.7122E 03	0.2344E 04	0.1473E 05	0.9562E 03	0.0
3	0.2928E 02	0.1224E 04	0.5889E 03	0.7773E 03	-0.7550E 03	-0.4060E 04	0.1598E 04	0.0
4	0.3075E 02	0.1369E 04	0.6365E 03	0.8287E 03	-0.2424E 04	-0.1716E 05	0.1724E 04	0.0
5	0.3400E 02	0.1467E 04	0.6754E 03	0.8612E 03	-0.3039E 04	-0.2456E 05	0.1582E 04	0.0
6	0.3801E 02	0.1505E 04	0.7034E 03	0.8602E 03	-0.3421E 04	-0.2880E 05	0.1329E 04	0.0
7	0.4270E 02	0.1462E 04	0.7108E 03	0.8084E 03	-0.3682E 04	-0.3066E 05	0.1244E 04	0.0
8	0.4906E 02	0.1352E 04	0.6920E 03	0.7104E 03	-0.3843E 04	-0.2928E 05	0.1259E 04	0.0
9	0.5707E 02	0.1187E 04	0.6462E 03	0.5677E 03	-0.3321E 04	-0.2948E 05	0.1110E 04	0.0
10	0.6712E 02	0.9689E 03	0.5702E 03	0.3808E 03	-0.3004E 04	-0.2916E 05	0.1115E 04	0.0
11	0.7881E 02	0.7068E 03	0.4684E 03	0.1721E 03	-0.2656E 04	-0.2892E 05	0.1103E 04	0.0
12	0.8964E 02	0.4420E 03	0.3505E 03	-0.7394E 02	-0.2628E 04	-0.2895E 05	0.1055E 04	0.0
13	0.9383E 02	0.2373E 03	0.2119E 03	-0.2951E 03	-0.2556E 04	-0.2627E 05	0.9921E 03	0.0
14	0.9337E 02	0.5936E 02	0.7704E 02	-0.4304E 03	-0.2684E 04	-0.2061E 05	0.8517E 03	0.0
15	0.9185E 02	-0.1109E 03	-0.4838E 02	-0.5286E 03	-0.3221E 04	-0.1644E 05	0.6631E 03	0.0
16	0.8830E 02	-0.2686E 03	-0.1683E 03	-0.6101E 03	-0.2306E 04	-0.2603E 04	0.9431E 02	0.0
17	0.8416E 02	-0.4021E 03	-0.2638E 03	-0.6703E 03	-0.1339E 04	0.1197E 05	-0.1128E 04	0.0
18	0.7889E 02	-0.5001E 03	-0.3286E 03	-0.7063E 03	0.4693E 03	0.2178E 05	-0.1130E 04	0.0
19	0.7247E 02	-0.5528E 03	-0.3673E 03	-0.7112E 03	0.2342E 04	0.2871E 05	-0.1080E 04	0.0
20	0.6580E 02	-0.5209E 03	-0.3732E 03	-0.6452E 03	0.3286E 04	0.3352E 05	-0.9748E 03	0.0
21	0.5828E 02	-0.3953E 03	-0.3278E 03	-0.4834E 03	0.4142E 04	0.3735E 05	-0.9580E 03	0.0
22	0.4759E 02	-0.1681E 03	-0.2260E 03	-0.2536E 03	0.4966E 04	0.4030E 05	-0.8936E 03	0.0
23	0.3607E 02	0.9399E 02	-0.6791E 02	0.4493E 02	0.5537E 04	0.4194E 05	-0.7286E 03	0.0
24	0.2827E 02	0.3326E 03	0.1395E 03	0.3274E 03	0.5727E 04	0.4147E 05	-0.4904E 03	0.0
25	0.2313E 02	0.5644E 03	0.3047E 03	0.5100E 03	0.5439E 04	0.3757E 05	-0.1614E 03	0.0
ALGEBRAIC SUM	0.5195E 07	0.4298E 08	0.2016E 08	0.1006E 08	-0.9825E 07	0.7934E 08	0.3357E 08	0.0
SUM OF + FLOWS	0.5195E 07	0.5343E 08	0.2793E 08	0.2953E 08	0.1389E 09	0.1219E 10	0.6073E 08	0.0
SUM OF - FLOWS	0.0	-0.1045E 08	-0.7779E 07	-0.1948E 08	-0.1488E 09	-0.1140E 10	-0.2716E 08	0.0

Table A10. Water flow per exchange point over a tidal cycle (see Fig. 1). Values were calculated through 4 cycles for Run #3.

HOUR	1	2	3	4	5	6	7	8
0	0.3439E 01	0.4415E 03	0.1941E 03	0.4540E 03	0.5435E 04	0.3756E 05	-0.1456E 03	0.0
1	0.1523E 00	0.6750E 03	0.3484E 03	0.5938E 03	0.4476E 04	0.2891E 05	0.3027E 03	0.0
2	-0.3983E-01	0.9087E 03	0.4665E 03	0.6921E 03	0.2366E 04	0.1501E 05	0.8683E 03	0.0
3	0.3562E 00	0.1121E 04	0.5500E 03	0.7677E 03	-0.6973E 03	-0.3358E 04	0.1627E 04	0.0
4	0.2141E 01	0.1291E 04	0.6128E 03	0.8243E 03	-0.2369E 04	-0.1664E 05	0.1768E 04	0.0
5	0.5326E 01	0.1408E 04	0.6618E 03	0.8576E 03	-0.2957E 04	-0.2418E 05	0.1598E 04	0.0
6	0.98d6E 01	0.1454E 04	0.6953E 03	0.8519E 03	-0.3317E 04	-0.2850E 05	0.1321E 04	0.0
7	0.1598E 02	0.1408E 04	0.7025E 03	0.7854E 03	-0.3590E 04	-0.3067E 05	0.1206E 04	0.0
8	0.2405E 02	0.1283E 04	0.6756E 03	0.6632E 03	-0.3764E 04	-0.2994E 05	0.1245E 04	0.0
9	0.3395E 02	0.1096E 04	0.6146E 03	0.4891E 03	-0.3367E 04	-0.2985E 05	0.1117E 04	0.0
10	0.4642E 02	0.8497E 03	0.5215E 03	0.2872E 03	-0.2966E 04	-0.2889E 05	0.1087E 04	0.0
11	0.6174E 02	0.5659E 03	0.4088E 03	0.6070E 02	-0.2601E 04	-0.2919E 05	0.1066E 04	0.0
12	0.7248E 02	0.3253E 03	0.2779E 03	-0.1944E 03	-0.2572E 04	-0.2846E 05	0.1051E 04	0.0
13	0.7705E 02	0.1336E 03	0.1316E 03	-0.3732E 03	-0.2499E 04	-0.2716E 05	0.1007E 04	0.0
14	0.7671E 02	-0.4454E 02	-0.3421E 01	-0.4886E 03	-0.2725E 04	-0.2111E 05	0.8168E 03	0.0
15	0.7455E 02	-0.2140E 03	-0.1383E 03	-0.5854E 03	-0.2936E 04	-0.1755E 05	0.6287E 03	0.0
16	0.7195E 02	-0.3699E 03	-0.2576E 03	-0.6707E 03	-0.3424E 04	-0.4981E 04	0.1273E 03	0.0
17	0.6799E 02	-0.4992E 03	-0.3477E 03	-0.7339E 03	-0.1192E 04	0.1018E 05	-0.1158E 04	0.0
18	0.6315E 02	-0.5934E 03	-0.4090E 03	-0.7736E 03	0.5354E 03	0.2095E 05	-0.1168E 04	0.0
19	0.5732E 02	-0.6459E 03	-0.4480E 03	-0.7847E 03	0.2187E 04	0.2805E 05	-0.1092E 04	0.0
20	0.5072E 02	-0.6248E 03	-0.4602E 03	-0.7271E 03	0.3136E 04	0.3302E 05	-0.9464E 03	0.0
21	0.4194E 02	-0.5206E 03	-0.4260E 03	-0.5794E 03	0.4148E 04	0.3692E 05	-0.9270E 03	0.0
22	0.2864E 02	-0.3363E 03	-0.3437E 03	-0.3651E 03	0.4959E 04	0.3989E 05	-0.8521E 03	0.0
23	0.1252E 02	-0.6749E 02	-0.2144E 03	-0.8775E 02	0.5537E 04	0.4157E 05	-0.7046E 03	0.0
24	0.2412E 01	0.1757E 03	-0.3448E 02	0.2208E 03	0.5729E 04	0.4121E 05	-0.4732E 03	0.0
25	-0.9071E 00	0.4084E 03	0.1576E 03	0.4380E 03	0.5438E 04	0.3746E 05	-0.1489E 03	0.0
ALGEBRAIC SUM	0.3237E 07	0.3313E 08	0.1353E 08	0.4237E 07	-0.7029E 07	0.5180E 08	0.3411E 08	0.0
SUM OF + FLOWS	0.3237E 07	0.4720E 08	0.2467E 08	0.2711E 08	0.1389E 09	0.1200E 10	0.6065E 08	0.0
SUM OF - FLOWS	-0.6796E 03	-0.1407E 08	-0.1114E 08	-0.2287E 08	-0.1459E 09	-0.1148E 10	-0.2654E 08	0.0

Table All. Water flow at tidal passes of Barataria Basin per 25-hour cycle (see Fig. 1). Values were calculated through 11 cycles for Run #1.

HOUR	CAMINADA	BARATARIA	ABEL	O.BAYOU	ALL PASSES
0	-0.2678E 05	-0.1337E 06	0.2814E 04	0.1519E 05	-0.1425E 06
1	-0.2970E 05	-0.1554E 06	-0.6217E 04	-0.1437E 05	-0.2057E 06
2	-0.3141E 05	-0.1523E 06	-0.9354E 04	-0.3215E 05	-0.2252E 06
3	-0.3180E 05	-0.1521E 06	-0.1002E 05	-0.3082E 05	-0.2247E 06
4	-0.3076E 05	-0.1458E 06	-0.1063E 05	-0.3271E 05	-0.2199E 06
5	-0.3008E 05	-0.1349E 06	-0.1072E 05	-0.3171E 05	-0.2074E 06
6	-0.2849E 05	-0.1232E 06	-0.1014E 05	-0.2973E 05	-0.1916E 06
7	-0.2595E 05	-0.1058E 06	-0.8708E 04	-0.2543E 05	-0.1559E 06
8	-0.2343E 05	-0.8818E 05	-0.7332E 04	-0.2113E 05	-0.1401E 06
9	-0.2065E 05	-0.6635E 05	-0.5476E 04	-0.1509E 05	-0.1086E 06
10	-0.1827E 05	-0.4113E 05	-0.3334E 04	-0.9783E 04	-0.7252E 05
11	-0.1495E 05	-0.5675E 04	0.3941E 03	0.1341E 04	-0.1839E 05
12	-0.1224E 05	0.4494E 05	0.5569E 04	0.1430E 05	0.5256E 05
13	-0.9406E 04	0.8280E 05	0.7509E 04	0.1897E 05	0.9987E 05
14	-0.6302E 04	0.1021E 06	0.8947E 04	0.2754E 05	0.1324E 06
15	-0.2302E 03	0.1269E 06	0.1110E 05	0.3565E 05	0.1735E 06
16	0.5834E 04	0.1319E 06	0.1227E 05	0.4070E 05	0.1907E 06
17	0.8311E 04	0.1383E 06	0.1401E 05	0.4721E 05	0.2079E 06
18	0.9259E 04	0.1396E 06	0.1512E 05	0.5155E 05	0.2157E 06
19	0.8030E 04	0.1344E 06	0.1569E 05	0.5451E 05	0.2127E 06
20	0.6768E 04	0.1224E 06	0.1578E 05	0.5584E 05	0.2008E 06
21	0.2135E 04	0.1021E 06	0.1539E 05	0.5523E 05	0.1749E 06
22	-0.5754E 04	0.6747E 05	0.1451E 05	0.5314E 05	0.1294E 06
23	-0.1423E 05	0.1417E 05	0.1298E 05	0.4720E 05	0.6011E 05
24	-0.2080E 05	-0.5780E 05	0.1047E 05	0.3577E 05	-0.3137E 05
25	-0.2682E 05	-0.1337E 06	0.2800E 04	0.1515E 05	-0.1426E 06
ALGEBRAIC SUM	-0.1227E 10	-0.5361E 09	0.2928E 09	0.1115E 10	-0.3551E 09
SUM OF + FLOWS	0.1408E 09	0.4337E 10	0.5826E 09	0.1985E 10	0.6621E 10
SUM OF - FLOWS	-0.1368E 10	-0.4873E 10	-0.2899E 09	-0.8710E 09	-0.6975E 10

Table A12. Water flow at tidal passes of Barataria Basin per 25-hour cycle (see Fig. 1). Values were calculated through 11 cycles for Run #2.

HOUR	CAMINADA	BARATARIA	ABEL	Q.BAYOU	ALL PASSES
0	-0.2693E 05	-0.1358E 06	0.2307E 04	0.1417E 05	-0.1463E 06
1	-0.2981E 05	-0.1562E 06	-0.6530E 04	-0.1562E 05	-0.2082E 06
2	-0.3150E 05	-0.1570E 06	-0.9539E 04	-0.3296E 05	-0.2310E 06
3	-0.3190E 05	-0.1535E 06	-0.1014E 05	-0.3123E 05	-0.2268E 06
4	-0.3099E 05	-0.1437E 06	-0.1080E 05	-0.3323E 05	-0.2187E 06
5	-0.3020E 05	-0.1360E 06	-0.1072E 05	-0.3220E 05	-0.2091E 06
6	-0.2856E 05	-0.1259E 06	-0.1026E 05	-0.3013E 05	-0.1948E 06
7	-0.2617E 05	-0.1079E 06	-0.8923E 04	-0.2598E 05	-0.1689E 06
8	-0.2343E 05	-0.8982E 05	-0.7585E 04	-0.2187E 05	-0.1427E 06
9	-0.2072E 05	-0.6817E 05	-0.5724E 04	-0.1686E 05	-0.1115E 06
10	-0.1810E 05	-0.4316E 05	-0.3624E 04	-0.1072E 05	-0.7560E 05
11	-0.1541E 05	-0.8968E 04	-0.1496E 03	0.1383E 03	-0.2439E 05
12	-0.1217E 05	0.4140E 05	0.5238E 04	0.1365E 05	0.4811E 05
13	-0.9645E 04	0.7905E 05	0.7717E 04	0.1906E 05	0.9618E 05
14	-0.5670E 04	0.9870E 05	0.9820E 04	0.2923E 05	0.1321E 06
15	-0.8568E 03	0.1257E 06	0.1052E 05	0.3508E 05	0.1705E 06
16	0.5825E 04	0.1306E 06	0.1216E 05	0.4002E 05	0.1886E 06
17	0.7493E 04	0.1372E 06	0.1381E 05	0.4643E 05	0.2049E 06
18	0.8309E 04	0.1377E 06	0.1487E 05	0.5081E 05	0.2117E 06
19	0.7977E 04	0.1325E 06	0.1544E 05	0.5381E 05	0.2097E 06
20	0.6687E 04	0.1204E 06	0.1555E 05	0.5509E 05	0.1977E 06
21	0.1646E 04	0.1000E 06	0.1519E 05	0.5459E 05	0.1714E 06
22	-0.6249E 04	0.6498E 05	0.1432E 05	0.5250E 05	0.1255E 06
23	-0.1456E 05	0.1081E 05	0.1279E 05	0.4660E 05	0.5564E 05
24	-0.2102E 05	-0.6170E 05	0.1022E 05	0.3614E 05	-0.3635E 05
25	-0.2694E 05	-0.1359E 06	0.2282E 04	0.1413E 05	-0.1464E 06
ALGEBRAIC SUM	-0.1244E 10	-0.7388E 09	0.2728E 09	0.1045E 10	-0.6649E 09
SUM OF + FLOWS	0.1370E 09	0.4241E 10	0.5701E 09	0.1945E 10	0.6466E 10
SUM OF - FLOWS	-0.1381E 10	-0.4980E 10	-0.2973E 09	-0.8998E 09	-0.7131E 10

Table A13. Water flow at tidal passes of Barataria Basin per 25-hour cycle (see Fig. 1). Values were calculated through 4 cycles for Run #3.

HOUR	CAMINADA	BARATARIA	ABEL	Q.BAYOU	ALL PASSES
0	-0.2690E 05	-0.1353E 06	0.2375E 04	0.1452E 05	-0.1454E 06
1	-0.2982E 05	-0.1564E 06	-0.6561E 04	-0.1631E 05	-0.2090E 06
2	-0.3155E 05	-0.1596E 06	-0.9599E 04	-0.3357E 05	-0.2343E 06
3	-0.3197E 05	-0.1526E 06	-0.1038E 05	-0.3168E 05	-0.2266E 06
4	-0.3110E 05	-0.1438E 06	-0.1083E 05	-0.3352E 05	-0.2193E 06
5	-0.3030E 05	-0.1424E 06	-0.1092E 05	-0.3273E 05	-0.2164E 06
6	-0.2857E 05	-0.1285E 06	-0.1041E 05	-0.3092E 05	-0.1984E 06
7	-0.2636E 05	-0.1090E 06	-0.9157E 04	-0.2688E 05	-0.1714E 06
8	-0.2363E 05	-0.9145E 05	-0.7803E 04	-0.2282E 05	-0.1457E 06
9	-0.2105E 05	-0.7060E 05	-0.5985E 04	-0.1804E 05	-0.1157E 06
10	-0.1874E 05	-0.4596E 05	-0.3898E 04	-0.1192E 05	-0.8053E 05
11	-0.1543E 05	-0.1238E 05	-0.6547E 03	-0.1873E 04	-0.3034E 05
12	-0.1264E 05	0.3862E 05	0.4962E 04	0.1325E 05	0.4419E 05
13	-0.9986E 04	0.8099E 05	0.7556E 04	0.1943E 05	0.9799E 05
14	-0.6572E 04	0.1026E 06	0.8858E 04	0.2902E 05	0.1339E 06
15	-0.9465E 03	0.1209E 06	0.1080E 05	0.3484E 05	0.1656E 06
16	0.6815E 04	0.1313E 06	0.1219E 05	0.4044E 05	0.1908E 06
17	0.7680E 04	0.1383E 06	0.1391E 05	0.4662E 05	0.2065E 06
18	0.9977E 04	0.1384E 06	0.1494E 05	0.5128E 05	0.2146E 06
19	0.8321E 04	0.1331E 06	0.1553E 05	0.5434E 05	0.2113E 06
20	0.6879E 04	0.1212E 06	0.1565E 05	0.5566E 05	0.1993E 06
21	0.2046E 04	0.1010E 06	0.1530E 05	0.5519E 05	0.1735E 06
22	-0.5974E 04	0.6624E 05	0.1443E 05	0.5311E 05	0.1278E 06
23	-0.1449E 05	0.1253E 05	0.1289E 05	0.4718E 05	0.5811E 05
24	-0.2098E 05	-0.5999E 05	0.1032E 05	0.3668E 05	-0.3397E 05
25	-0.2692E 05	-0.1354E 06	0.2368E 04	0.1451E 05	-0.1454E 06
ALGEBRAIC SUM	-0.1244E 10	-0.7635E 09	0.2668E 09	0.1037E 10	-0.7038E 09
SUM OF + FLOWS	0.1429E 09	0.4246E 10	0.5718E 09	0.1965E 10	0.6502E 10
SUM OF - FLOWS	-0.1387E 10	-0.5010E 10	-0.3050E 09	-0.9277E 09	-0.7206E 10

Table A14. Canal data per oil and gas field used for computer simulations.*

Field	Golden Meadow 1	Bayou Couba 2	Clovelly 3	Couba Island 4
Volume (cu ft)	0.1557E+09	0.1147E+09	0.7370E+08	0.1230E+08
Area (sq ft)	0.2241E+09	0.2274E+09	0.1648E+09	0.6592E+08
Mean Depth (ft)	0.69	0.50	0.45	0.19
Field	Mendicant Island	Lake Washington	Lafitte	Des Allemands
Field	5	6	7	8
Volume (cu ft)	0.1640E+08	0.2008E+09	0.2294E+09	0.6550E+08
Area (sq ft)	0.6921E+08	0.1252E+09	0.3296E+09	0.2472E+09
Mean Depth (ft)	0.24	1.60	0.70	0.26

*See Figure 1 for locations.
NOTE: Depths of Fields to be taken relative to MSL. Depth = Volume/Area.

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