Comprehensive Recommendations
Supporting the Use of the Multiple Lines of Defense Strategy to Sustain Coastal Louisiana

Planning Unit 3a

Lake Pontchartrain Basin Foundation
Coalition to Restore Coastal Louisiana

Workshop Presentation
November 9, 2007
Multiple Lines of Defense (MLOD) are definable geographic areas in which certain natural or manmade features or activities are promoted or implemented, resulting in the reduction of impacts by tropical weather systems to the Louisiana coast.

The order of LOD’s derived from the physical location of the LOD’s moving from the Gulf of Mexico inland. The order is not intended to indicate a relative significance, just relative physical position.
<table>
<thead>
<tr>
<th>Save Points</th>
<th>Surge (ft)</th>
<th>Wave Height (ft)</th>
<th>Wave Period (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 10</td>
<td>33</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>11 – 26</td>
<td>36</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>27 – 33</td>
<td>33</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>34 – 44</td>
<td>30</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>45 – 51</td>
<td>33</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>52 – 53</td>
<td>36</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>54 – 104</td>
<td>40</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>105 - 126</td>
<td>36</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>127 – 134</td>
<td>33</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>135 – 142</td>
<td>30</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>200 - 214</td>
<td>13 - 20</td>
<td>9 - 12</td>
<td>8</td>
</tr>
</tbody>
</table>
I - 12
I - 10
HWY 90
Rita Surge
Source: FEMA Inundation Maps (2006), map adjusted in Orleans and Jefferson Parishes to show approximate inundation.
Draft Non-Structural Measures

Levee Protected >> Non-Structural Measures for Indirect Storm Surge

Non-levee Protected >> Non-Structural Measures for Direct Storm Surge

- Levee Restoration
- Elevated road foundation
- Diversion
- Spillway
- Hydrologic Control
- Ridge Restoration
The wetland habitat goals are the desired future habitat distribution proposed in this plan. This habitat distribution was selected because they compliment other restoration proposals, and they represent potentially sustainable conditions for the coast. The wetland habitat distribution, in general, also corresponds to the historic distribution of habitats around 1900 before significant alteration by humans. One exception is in the area of Atchafalaya & Vermillion Bays where the habitat goals are fresher than historic 1900 conditions. The post-1900 freshening here is due to the increase in discharge through the Atchafalaya River. Since it is desirable to continue the land building of the active deltas which also contribute to the western shore’s mud stream, it is not considered desirable to re-establish the more saline conditions of 1900 in this area of the coast.
<table>
<thead>
<tr>
<th>Levee Alignment</th>
<th>Levee Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lafourche Parish (M to G only)</td>
<td>66 miles</td>
</tr>
<tr>
<td>USACE 2002 (M to G only)</td>
<td>72 miles</td>
</tr>
<tr>
<td>MLODS AT (100 &amp; 500 Y)</td>
<td>60 miles</td>
</tr>
<tr>
<td>State Master Plan (100 (16)&amp; 500 y (44))</td>
<td>86 miles</td>
</tr>
</tbody>
</table>
Morganza to the Gulf of Mexico Project

map of project features
USACE 2002
Morganza to the Gulf alignment

USACE alignment

Lafourche Psh alignment

Funnel Geometry which may amplify surge

Terrebonne Bay

Basemap source: USGS/NWRC
10 miles
Currently Projected Levee Alignment for Planning Units 2 and 3a
Concerns with Morganza to the Gulf (Parish or USACE alignments)

- Levee is too close to the Gulf
- Levee does not have an adequate wetland buffer
- Levee encourages development that is inherently at high risk
- 100 year levee is not designed to be overtopped
- Levee design does not include armoring
- Levee will put more wetlands at risk of loss
- Evacuation is not included in levee planning
- Non-structural measures are not enhanced appropriately
- Levee has “funnel geometries” that would amplify surge
- Levee heights may not be adequate for 100 year protection
- Intended protection includes low density development

**Bottomline:**
If M-to-G is built, it is very likely the levee will be overtopped and breached leading to complete inundation of the protected side with catastrophic consequences.
View South Along Hwy 665 at J1 Levee Reach
Hwy 57 Proposed Location of Ring levee near Dulac
Hwy 56 – south of Chauvin Proposed Non-structural - elevating
Four Freshwater Introductions

- Houma
- Larose
- Bayou Lafourche
- East Atchafalaya Rest Spillway
- HNC
- Montegut
- Dulac
- Cocodrie
- Terrebonne Bay

GIWW Management 100% of Bayou Lafourche discharge

USACE

Existing levee

Approximate location of proposed spillway #13

Spillway discharge from high pulse events
Marsh Creation - 20,000 acres
500 y levees  44 miles
100 y ring Levees  16 miles
Navigation / water control lock
Marsh creation near levees  20,000 Acres
Barrier Island restoration
Oyster reef restoration around bays

Bayou Lafourche spillway
Non-structural programs (elevation)
4 freshwater reintroductions
Improved evacuation
Breakwater at Cat Island Pass
Houma
Larose
Larose
GIWW
GIWW
Montegut
Bayou
LaFourche
Dulac
Surge Fall-Off
USACE
Cocodrie
Detached Peak Surge > 100 year
Terrebonne Bay
Barrier Island Management

500 Year Protection
HNC
Existing levee
Approximate location of proposed spillway #13
Bayou LaFourche
500 Year Protection

Surge Fall-Off

Detached Peak Surge > 100 year

Barrier Island Management
Barrier Island Management

Surge Amplification?

Detached Peak Surge?