INTEGRATION OF COASTAL/INLAND SURFACE WATER AND GROUNDWATER

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2017 COASTAL MASTER PLAN

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Conceptual Water Budget

Upland Zone

Surface Water

Ground Water

Coastal Zone

Surface Water
Integrated Compartment Model (ICM)
ICM Model Hydraulic Link Network

Contains 946 ICM compartments
Estuary and Open Water Processes

- Hydrodynamics
- Water quality
- Sedimentation
- Bed resuspension
- Sediment distribution
Wetland Processes and Vegetation

- Wetland elevation change
- Wetland area change
- Marsh collapse
- Marsh edge erosion
- Storm effects
- Coastal vegetation
Fish and Shellfish

• 19 fish, shellfish, and wildlife Habitat Suitability Indexes (HSIs)
  – Statistical analysis
  – Revised equations from 2012
  – Added several new HSIs
  – Coded into the ICM

• EwE (Ecopath with Ecosim)
  – Community fish and shellfish model
  – Dynamically coupled to the ICM
Model Calibration and Validation
Data used to calibrate water level, salinity, & vegetation.
Stage Calibration – 201 sites

**Stage - 2010-2013 - ICM_ID: 92 - PB - Brant Island (Breton)**

- **Observed data:** CRBM3448-H01_STG
- **Daily R-squared:** 0.95
- **Monthly R-squared:** 0.76
- **Monthly RMSE:** 0.09 m
- **Bias:** -0.08 m

**Stage - 2010-2013 - ICM_ID: 280 - PB - N Barataria Bay**

- **Observed data:** 07380251_STG
- **Daily R-squared:** 0.58
- **Monthly R-squared:** 0.74
- **Monthly RMSE:** 0.07 m
- **Bias:** -0.03 m

**Stage - 2010-2013 - ICM_ID: 545: AA - Atchafalaya River @ Morgan City**

- **Observed data:** 07390441_STG
- **Daily R-squared:** 0.97
- **Monthly R-squared:** 0.98
- **Monthly RMSE:** 0.11 m
- **Bias:** 0.07 m

**Stage - 2010-2013 - ICM_ID: 796 - CP - Mud Lake (CP)**

- **Observed data:** CRBM3098-H01_STG
- **Daily R-squared:** 0.54
- **Monthly R-squared:** 0.55
- **Monthly RMSE:** 0.12 m
- **Bias:** -0.02 m
Salinity Calibration Example

**Salinity - 2010-2013 - ICM_ID: 247 - PB - Wilkinson Bayou (E Barataria)**

- **Observed data:** CR1830517-H01_SAL
- **Daily R-squared:** 0.67
  - **Monthly R-squared:** 0.70
  - **Daily RMSE:** 2.40 ppt
  - **Monthly RMSE:** 2.22 ppt
  - **Bias:** 0.02 ppt

**Model (entire period):**
- Mean: 7.90
- Median: 7.03
- SD: 3.87
- Min: 1.60
- Max: 27.17

**Model (days with observations):**
- Mean: 7.93
- Median: 7.67
- SD: 3.86
- Min: 1.60
- Max: 27.17

**Observed:**
- Observations: 1448
- Mean: 7.43
- SD: 4.65
- Min: 0.34
- Max: 21.32

**Salinity - 2010-2013 - ICM_ID: 373 - AA -**

- **Observed data:** CR1830538-H01_SAL
- **Daily R-squared:** 0.66
  - **Monthly R-squared:** 0.76
  - **Daily RMSE:** 2.35 ppt
  - **Monthly RMSE:** 1.81 ppt
  - **Bias:** 0.19 ppt

**Model (entire period):**
- Mean: 18.05
- Median: 18.15
- SD: 3.92
- Min: 9.04
- Max: 26.61

**Model (days with observations):**
- Mean: 18.08
- Median: 18.21
- SD: 3.53
- Min: 9.04
- Max: 26.61

**Observed:**
- Observations: 1429
- Mean: 17.99
- SD: 3.95
- Min: 5.43
- Max: 26.10

**Salinity - 2010-2013 - ICM_ID: 486 - AA -**

- **Observed data:** CR1830587-H01_SAL
- **Daily R-squared:** 0.00
  - **Monthly R-squared:** 0.00
  - **Daily RMSE:** 0.12 ppt
  - **Monthly RMSE:** 0.13 ppt
  - **Bias:** -0.04 ppt

**Model (entire period):**
- Mean: 0.17
- Median: 0.18
- SD: 0.04
- Min: 0.10
- Max: 0.50

**Model (days with observations):**
- Mean: 0.17
- Median: 0.18
- SD: 0.04
- Min: 0.10
- Max: 0.50

**Observed:**
- Observations: 1455
- Mean: 0.21
- SD: 0.11
- Min: 0.10
- Max: 2.04

**Salinity - 2010-2013 - ICM_ID: 863 - CP -**

- **Observed data:** CR1830085-H01_SAL
- **Daily R-squared:** 0.55
  - **Monthly R-squared:** 0.61
  - **Daily RMSE:** 4.45 ppt
  - **Monthly RMSE:** 4.13 ppt
  - **Bias:** -0.60 ppt

**Model (entire period):**
- Mean: 16.68
- Median: 16.68
- SD: 5.20
- Min: 5.38
- Max: 26.78

**Model (days with observations):**
- Mean: 16.63
- Median: 16.68
- SD: 5.46
- Min: 5.38
- Max: 26.78

**Observed:**
- Observations: 1294
- Mean: 17.24
- Median: 17.32
- SD: 6.45
- Min: 3.29
- Max: 34.38
Integrated Water Management System

Upland Zone

Surface Water
Integrated Water Management System
Integrated Water Management System

Some updates and improvements needed

Ground Water
Integrated Water Management System

Upland Zone

Coastal Zone

Surface Water

Ground Water
Integrated Water Management System
Summary

• Considerable funds and effort already devoted to develop these individual components
• Integrating the components provides a comprehensive water management tool
• Integrated tool can be used to:
  – Manage current and projected resources
  – Support decision making process
  – Support development of policies
Questions