WVA Monte Carlo (MC) Model

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Background

- Wetland Value Assessment (WVA) Model
  - Suite of Models developed for evaluation of Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) projects in Louisiana
    - http://lacoast.gov/new/About/Default.aspx
    - Used to identify optimal combination of habitat conditions for all fish and wildlife species in coastal Louisiana
  - Main focus is to quantify the wetland benefits for project alternative comparison
    - Characterize habitat quality relative to fish and wildlife
    - Value of future variables determined with project and without project

Background

- Wetland Value Assessment (WVA) Model
  - Calculations use Suitability Indices (SI) to determine an overall Habitat Suitability Index (HSI)
  - HSI is used to calculate total Habitat Units (HU)
  - The Annual Average Habitat Unit (AAHU) is used to compare alternatives and projects

Background

- WVA Model Certification
  - Battelle evaluated WVA and determined areas of concern
  - ERDC-EL addressed several comments with assistance from New Orleans District and ECO-PCX
    - Equation errors
    - Usability of spreadsheets
    - Suitability Index concerns
    - Incorporation of uncertainty
    - Sensitivity analyses performed

Background

WVA Methodology

- Includes seven community habitat assessment models
  - ► Marsh Models
    - Saline
    - Brackish
    - Fresh/Intermediate
  - ► Coastal Chenier/Ridge
  - ► Swamp
  - ► Barrier Island
  - ► Barrier Headland

Marsh Model Description

- Variable Description
  - V1 – Percent Emergent Marsh
  - V2 – Percent Open Water Covered by Submerged Aquatic Vegetation
  - V3 – Marsh Edge Interspersion
  - V4 – Percent Open Water (Greater than 1.5 feet)
  - V5 – Salinity
  - V6 – Aquatic Organism Access

Swamp Model Description

- Variable Description
  - V1 – Stand Structure
  - V2 – Stand Maturity
  - V3 – Water Regime
  - V4 – Mean High Salinity During Growing Season

Barrier Headland Model Description

- Variable Description
  - V1 – Percent of Project Area Classified as Dune
  - V2 – Percent of Project Area Classified as Supratidal Habitat
  - V3 – Percent Vegetative Cover of Dune and Supratidal Habitat
  - V4 – Percent Vegetative Cover by Woody Species
  - V5 – Beach/Surf Zone Features

Barrier Island Model Description

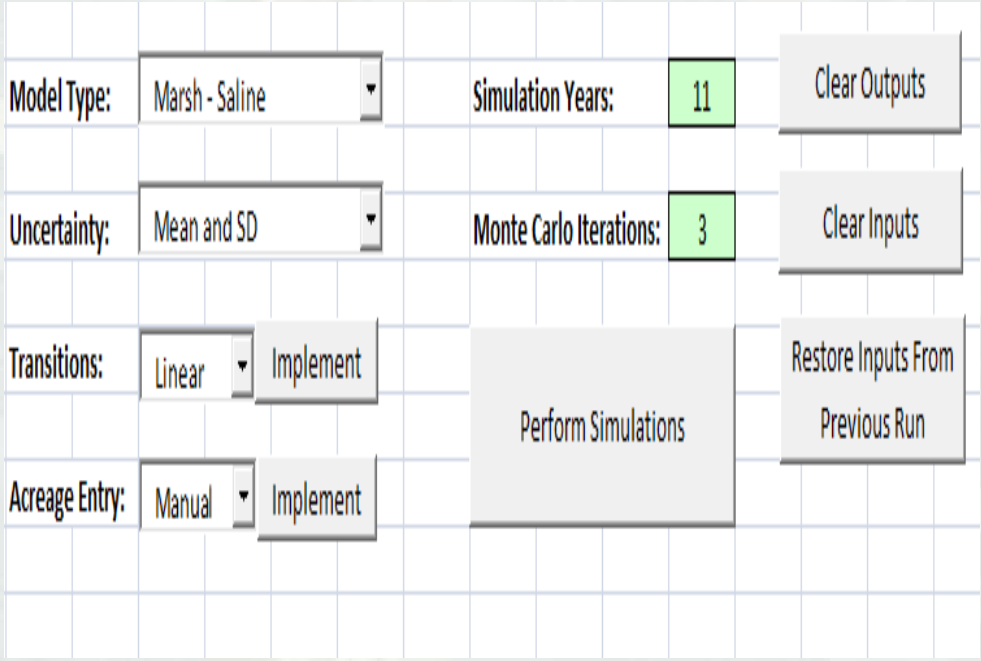
- Variable Description
  - V1 – Percent of Project Area Classified as Dune
  - V2 – Percent of Project Area Classified as Supratidal Habitat
  - V3 – Percent of Project Area Classified as Intertidal Habitat
  - V4 – Percent Vegetative Cover of Dune and Supratidal Habitat
  - V5 – Percent Vegetative Cover by Woody Species

Coastal Chenier/Ridge Model Description

- Variable Description
  - V1 – Percent Tree Canopy Cover
  - V2 – Percent Shrub/Midstory Cover
  - V3 – Native Woody Species Diversity

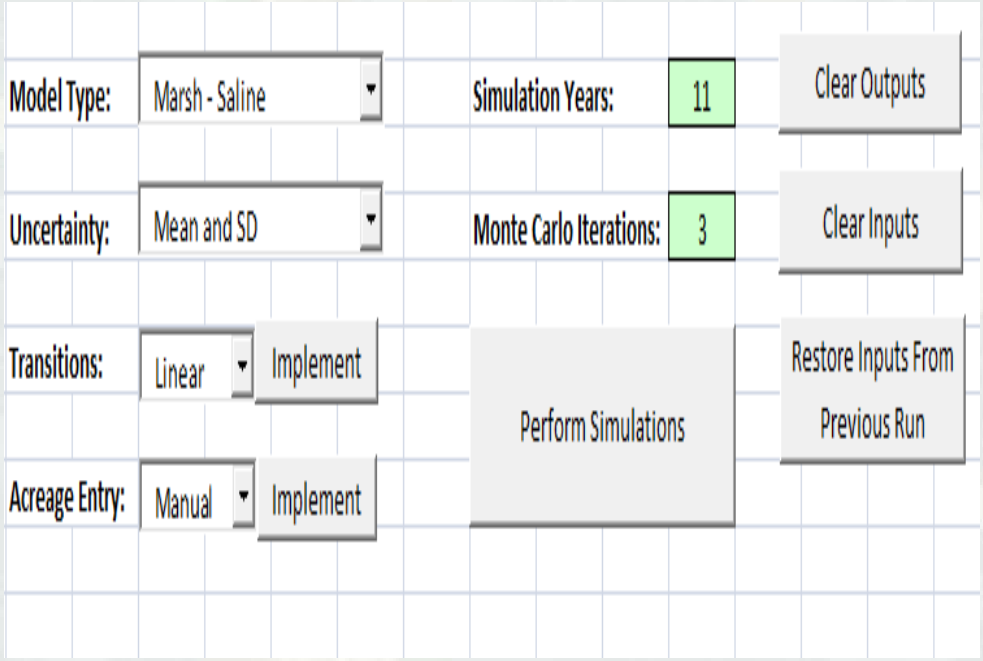
Updates to Model

- All models included in a single spreadsheet
- Monte-Carlo Simulation
  - Two ways to account for uncertainty
    - High/Low
    - Standard Deviation
- Any empty cell is treated as zero



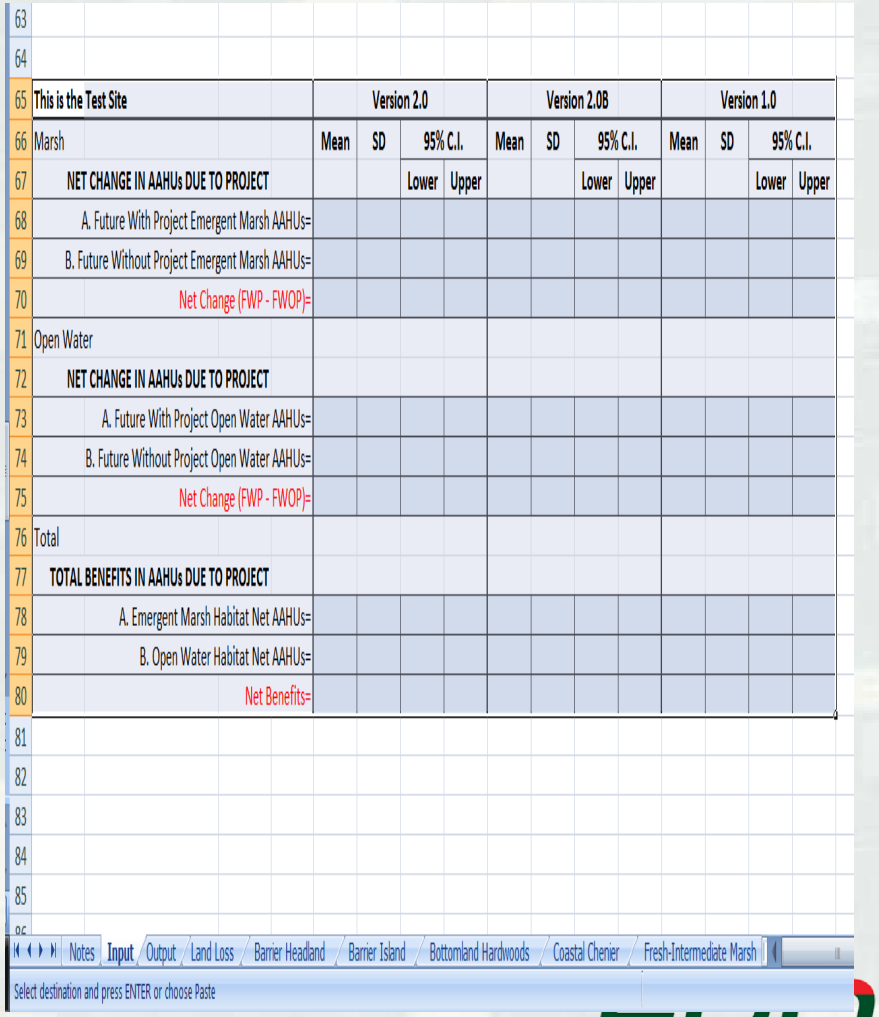
Updates to Model

- Two methods to handle data between Target Years
  - ► Linear
    - Assumes straight line relationship for data
  - ► Step
    - Assumes data remains constant until user specifies



Updates to Model

- Built in statistics
  - Mean
  - Standard Deviation
  - 95% Confidence Interval



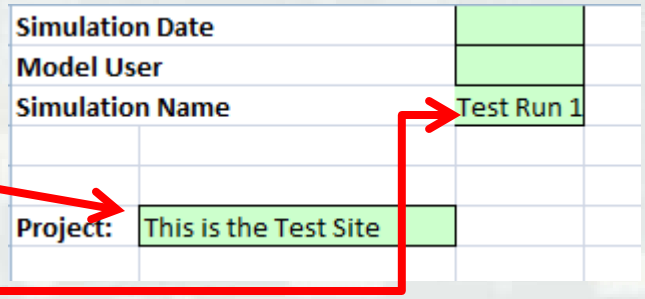
This is the Test Site	Version 2.0				Version 2.0B				Version 1.0			
Marsh	Mean	SD	95% C.I.		Mean	SD	95% C.I.		Mean	SD	95% C.I.	
NET CHANGE IN AAHUs DUE TO PROJECT			Lower	Upper			Lower	Upper			Lower	Upper
A. Future With Project Emergent Marsh AAHUs=												
B. Future Without Project Emergent Marsh AAHUs=												
Net Change (FWP - FWOP)=												
Open Water												
NET CHANGE IN AAHUs DUE TO PROJECT												
A. Future With Project Open Water AAHUs=												
B. Future Without Project Open Water AAHUs=												
Net Change (FWP - FWOP)=												
Total												
TOTAL BENEFITS IN AAHUs DUE TO PROJECT												
A. Emergent Marsh Habitat Net AAHUs=												
B. Open Water Habitat Net AAHUs=												
Net Benefits=												

Notes | Input | Output | Land Loss | Barrier Headland | Barrier Island | Bottomland Hardwoods | Coastal Chenier | Fresh-Intermediate Marsh

Select destination and press ENTER or choose Paste

Updates to Model

- Ability to run model and have results exported to new excel file for multiple scenarios
  - Set-up of export file
    - Filename: Project
      - This is the Test Site
    - Tab: Simulation Name
      - Test Run 1



Updates to Model

- Incorporation of Land Loss
  - Not dependent on spreadsheet version
    - Acreage values must be in columns
  - Ability to import values from any land loss spreadsheet

Excel Spreadsheet Name:	C:\Projects\WVA Spreadsheet Model\Land Loss Spreadsheets 7-26-10.xls			
Excel Worksheet Name:	Standard			
	Starting Cells in Worksheet (assumes all values in columns)			
	FWOP		FWP	
	Emergent Marsh	Open Water	Emergent Marsh	Open Water
	C8	E8	H8	J8

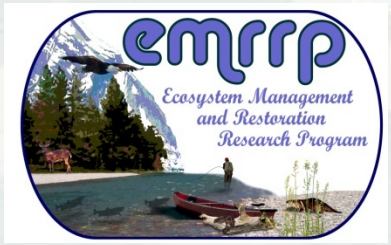
	Values			
Year	FWOP		FWP	
	Emergent Marsh	Open Water	Emergent Marsh	Open Water
0	368379.00	542884.00	368379.00	542884.00
1	367055.78	544207.22	368048.20	543214.80
2	365737.32	545525.68	367717.69	543545.31
3	364423.59	546839.41	367387.48	543875.52
4	363114.58	548148.42	367057.56	544205.44
5	361810.27	549452.73	366727.95	544535.05
6	360510.65	550752.35	366398.62	544864.38
7	359215.70	552047.30	366069.60	545193.40
8	357925.39	553337.61	365740.87	545522.13
9	356639.73	554623.27	365412.43	545850.57
10	355358.68	555904.32	365084.29	546178.71
11	354082.23	557180.77	364756.45	546506.55

Current Spreadsheet Limitations

- When changing file name input values will automatically clear
- If rows or columns are frozen to ensure parameters are placed in correct location the model will not run
- All output is displayed on Output tab and can be cumbersome depending on number of Monte Carlo Iterations

Acknowledgements

- Ecosystem Management and Restoration Program (EMRRP)
- Dredging Operations and Environment Research Program (DOER)
- Engineering With Nature (EWN)



References

- Battelle Memorial Institute. 2010. Final Model Review Report for the Wetland Value Assessment Models. Prepared for Department of the Army Ecosystem Planning Center of Expertise, Mississippi Valley Division.
- Roy, K. 2010. Coastal Wetlands Planning, Protection and Restoration Act, Wetland Value Assessment Methodology, Procedural Manual. Environmental Work Group http://lacoast.gov/reports/wva/WVA%20Procedural%20Manual.pdf
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- http://lacoast.gov/new/Projects/WVA.aspx