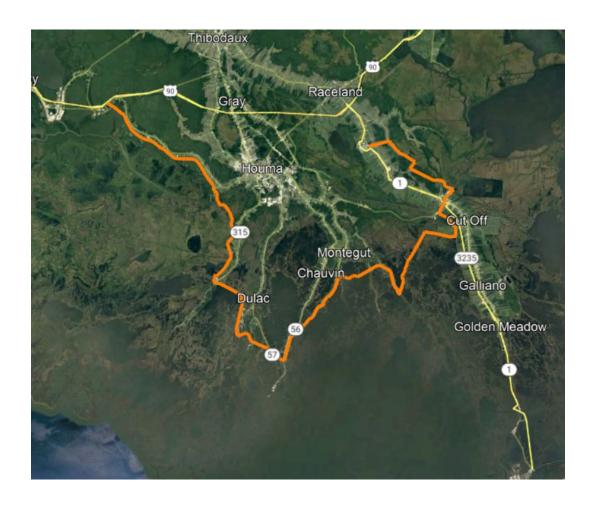
# MORGANZA TO THE GULF SURVEYS AND BORINGS ANALYSIS TERREBONNE AND LAFOURCHE PARISHES, LOUSIANA



APPENDIX D: WETLAND VALUE ASSESSMENT

**Model Name** 

Wetland Value Assessment - Swamp Community Model

**Model Version** 

2

**Original Model** 

Version December 6, 2018

Date of Last Update March 10, 2010

**Objective of Model** 

The swamp model was developed to determine the suitability of swamp habitat in providing resting, foraging, and nesting habitat for a diverse assemblage of wildlife species. The model is generally applied to areas supporting or capable of supporting a canopy of woody vegetation which covers at least 33 percent of the area's surface, and with at least 60 percent of that canopy consisting of any combination of baldcypress, tupelogum, red maple, buttonbush, and/or planertree. If greater than 40 percent of the woody vegetation canopy consists of species such as oaks, hickories, American elm, green ash, sweetgum, sugarberry, boxelder, persimmon, honeylocust, red mulberry, eastern cottonwood, American sycamore, etc., then a bottomland hardwood model should be applied.

Enter data in green cells. All green cells must contain values (including 0's) in order for the HSI calculation to compute for that year.

Always error check data following entry.

Instructions

Click on variable name in column B for a brief description of the variable.

Intermediate Calculations are "over flow" calculations that were too long or complex to fit within one cell within the table.

Refer to WVA documents for model structure and background.

**Notes** 

- 1) Enter data in units noted.
- 2) All percentages should be entered as whole numbers between 0 and 100.
- 3) It is recommended that Microsoft Office Excel Version 2007 or higher be used. Earlier versions may result in compatability issues or loss of some functions.

Color Coding Key:

Color Coding Rey.	
Input	
Calculation	
Output	
No Input	
No Input	

# WETLAND VALUE ASSESSMENT COMMUNITY MO Swamp 2.0

Project: Reach A PACRalign_SurveyOnly_ A8andA9-swamp	Project Area:	0
--	---------------	---

Condition: Future Without Project

	] [	TY	0	TY	1	TY	16
Variable		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	
		Overstory		Overstory		Overstory	
		54		54		51	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		8		8		4	
		Herbaceous		Herbaceous		Herbaceous	
		100		100		100	
		Class		Class		Class	
		4	0.60	4	0.60	4	0.60
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		9.2		9.3		9.6	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		130		131		162.5	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		7.6		6.1		7	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		143	0.44	2	0.28	2	0.39
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Permanent	0.30	Permanent	0.30	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.3	1.00	0.3	1.00	0.3	1.00
		Class		Class		Class	
V5	Forest Size	2	0.40	2	0.40	2	0.40
V6	Surrounding Land Use	Values %		Values %		Values %	
Vo	Use						
	Forest / marsh	45	0.64	45	0.64	45	0.64
	Abandoned Ag	0		0		0	
	Pasture / Hay	48		48		48	
	Active Ag	0 7		0 7		0 7	
	Development Disturbance	1		/		/	
V7	510(4) 541100	Class		Class		Class	
	Туре	4	1.00	4	1.00	4	1.00
	Distance	Class		Class		Class	
	Distance	1	0.73	1	0.45	1	0.71
		HSI =	0.52	HSI =	0.47	HSI =	0.51

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL Swamp 2.0

Project: Reach A PACRalign\_SurveyOnly\_ A8andA9-swamp Project Area: 0

Condition: Future With Project

		TY	0	TY	1	TY	16
Variable		Class/Value	SI	Class/Value	SI	Class/Value	SI
V1	Stand Structure	% Cover		% Cover		% Cover	

		Overstory		Overstory		Overstory	
		54		54		51	
		Scrub-shrub		Scrub-shrub		Scrub-shrub	
		8		8		0	
		Herbaceous		Herbaceous		Herbaceous	
		100		100		0	
		Class		Class		Class	
		4	0.6	4	0.60	3	0.40
V2	Stand Maturity	Cypress dbh		Cypress dbh		Cypress dbh	
		9.2		9.3		10.4	
		Cypress Basal Area		Cypress Basal Area		Cypress Basal Area	
		130		131		150	
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh	
		7.6		6.1		6.98	
		Tupelo et al. Basal Area		Tupelo et al. Basal Area		Tupelo et al. Basal Area	
		143	0.44	2	0.28	2	0.41
V3	Water Regime	Flow/Exchange		Flow/Exchange		Flow/Exchange	
		Low		Low		Low	
		Flooding Duration		Flooding Duration		Flooding Duration	
		Permanent	0.3	Permanent	0.30	Permanent	0.30
V4	Salinity	Salinity		Salinity		Salinity	
		0.26	1	0.3	1.00	0.3	1.00
		Class		Class		Class	
V5	Forest Size	2	0.4	2	0.40	2	0.40
V6	Surrounding Land Use	Values %		Values %		Values %	
	Forest / marsh	45	0.6427	45	0.64	45	0.64
	Abandoned Ag	0	0.0127	0	0.01	0	0.01
	Pasture / Hay	48		48		48	
	Active Ag	0		0		0	
	Development	7		7		7	
V7	Disturbance	Class		Class		Class	
''	Туре	4	1	4	1.00	4	1.00
		Class		Class		Class	
	Distance	1		1		1	
		HSI =	0.52	HSI =	0.47	HSI =	0.46

# **AAHU CALCULATION**

Project: Reach A PACRalign\_SurveyOnly\_ A8andA9-swamp

Future Witho	out Project		Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0	0.52	0.04	
1	0	0.47	0.04	0.04
16	0	0.51	0.04	0.60
32	0	0.50	0.04	0.65
62	0	0.52	0.04	1.24

Max TY=	62	Total	
		CHUs =	2.53
		AAHUs =	0.04

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0	0.52	0.04	
1	0	0.47	0.00	0.02
16	0	0.46	0.00	0.00
32	0	0.48	0.00	0.00
62	0	0.46	0.00	0.00

# Original CWPPRA Model Version

1.0 - March 10, 2010

# **CWPPRA Model Revisions**

Version 1.1 - 1/6/2012

- 1) Minor formatting changes to font type, font size, font color, etc.
- 2) Spreadsheet formatted to populate FWP TY0 with FWOP TY0 values.

Version 1.2 - 4/26/2012

1) The previous version contained incorrrect line formulas for Variable 4-Salinity. The line formulas have been corrected and are consistent with the Word document.

Version 1.3 - 11/18/2015

- 1) The previous version contained incorrrect formulas in cells D199, D200, and D201. Those cells were not referencing the correct target years. The formulas were revised to reference the correct cells.
- 2) Cells corrected to allow entry of decimal values for tupelo basal area.

# USACE Civil Works Model Revisions

Version 2.0 - 12/06/2018

- 1) Increased TYs to 15
- 2) Changed Target Year cell calculations to give ERROR message if cell to the left is less than current cell or equal to previous.
- 3) Updated color coding key in Notes tab for white and gray cells.
- 4) Added landscape variables (V5, V6, and V7).
- 5) Updated V1 to include all possible field measurement combinations.

Model Name Wetland Value Assessment - Brackish Marsh Community Model

Model Version USACE Civil Works Model 2.0

Date of Last Update Sep-17

Original Model Version 1.0 - March 10, 2010

Objective of Model The coastal marsh models were developed to determine the suitability

of marsh and open water habitats in the Louisiana coastal zone. These models were designed to function at a community level and therefore attempt to define an optimal combination of habitat conditions for all fish and wildlife species utilizing coastal marsh

#### Instructions

Enter data in green cells. All green cells must contain values (including

0's) in order for the HSI calculation to compute for that year.

Always error check data following entry.

Be sure to enter only the needed target years. Unintended values in target year cells will result in erroneous AAHU ouputs!! If more than 12 target years and or more than ten access openings, contact the WVA Manager.

Missing target year inputs will also result in incorrect AAHU output!!

Intermediate Calculations are "over flow" calculations that were too long or complex to fit within one cell within the table.

Refer to WVA documents for model structure and background

#### Notes

- 1) Enter data in units noted.
- 2) All percentages should be entered as whole numbers between 0 and 100.

### Color Coding Key:

Input
Calculation
Output
No Input
No Input

#### To avoid calculation errors for Interspersion Classes (Variable 3):

- 1) The total of Interspersion Classes 1 to 5 must equal 100%.
- 2) Only whole numerical values between 0 through 100% can be entered in cells for all of the five Interspersion Classes for each target year.
- 3) No cells may be left blank

#### To avoid calculation errors for Salinity (Variable 5):

When the salinity for the community marsh model exceeds the following levels, consider the next marsh habitat with higher optimal salinity. Refer to WVA documents for further details.

- For Fresh Marsh: Between 0\* to 5 ppt.
- For Intermediate Marsh: Between 0\* to 7 ppt.
- For Brackish Marsh: Between 0\* to 16 ppt
- For Saline Marsh: Between 0\* to 35 ppt

#### V6 calculator application (Variable 6):

- 1) Under the "V6 Calculator" spreadsheet, use pull-down menu to obtain Structure Rating (R calc) from V6 Table.
- 2) % Wetland accessible by all access points (P) may be determined by examination of aerial photography, knowledge of field conditions, or other appropriate methods.

See "Procedure for Calculating Access Value" Section in WVA Marsh Models Manual for example V6 calculations and further details.

Structure Rating (R calc) and % wetland (P) must be entered for each opening. "Error" results from missing entry.

<sup>\*</sup> A value of 0 ppt for all models "makes allowances for lower salinities to account for occasions when there is a trend of decreasing salinities through time toward a more intermediate condition." (See WVA documents for details.)

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL Fresh/Intermediate Marsh

Project: Reach A Surveys-South of Marmande Ridge AAHUs = -0.01

Project Area (ac)	0	0	0	0	0				
% Fresh	100	100	100	100	100				
% Intermediate	0	0	0	0	0				
Target Year (TY)	0	1	32	58	62				
V1: % Emergent	100	100	97	90	89				
V2: % Aquatic	0	0	0	0	0				
V3: Interspersion Class 1	0	0	100	100	85				
V3: Interspersion Class 2	0	0	0	0	15				
V3: Interspersion Class 3	100	100	0	0	0				
V3: Interspersion Class 4	0	0	0	0	0				
V3: Interspersion Class 5	0	0	0	0	0				
V4: %OW <= 1.5ft	0	0	0	0	0				
V5: Salinity (ppt) - Fresh	0.24	0.24	0.38	0.50	0.51				
V5: Salinity (ppt) - INT									
V6: Access Value - Fresh	1.00	1.00	1.00	1.00	1.00				
V6: Access Value - INT									

# **FWP**

Project Area (ac)	0	0	0	0	0				
% Fresh	100	100	100	100	100				
% Intermediate	0	0	0	0	0				
Target Year (TY)	0	1	32	58	62				
V1: % Emergent	100	0	0	0	0				
V2: % Aquatic	0	0	0	0	0				
V3: Interspersion Class 1	0	0	0	0	0				
V3: Interspersion Class 2	0	0	0	0	0				
V3: Interspersion Class 3	100	0	0	0	0				
V3: Interspersion Class 4	0	0	0	0	0				
V3: Interspersion Class 5	0	100	100	100	100				
V4: %OW <= 1.5ft	0	0	0	0	0				
V5: Salinity (ppt) - Fresh	0	0.24	0.38	0.50	0.51				
V5: Salinity (ppt) - INT									
V6: Access Value - Fresh	1.00	1.00	1.00	1.00	1.00				
V6: Access Value - INT									

# Computed SIs - do not enter data here !

FWOP SIs									
Target Year (TY)	0	1	32	58	62				
% Emergent	0.63	0.63	0.69	0.82	0.83				
% Aquatic	0.10	0.10	0.10	0.10	0.10				
Interspersion									
Class 1	0.50	0.50	0.75	0.75	0.79				
Class 2									

	Intersper	sion Calcu	ılations									
TY	0	1	32	58	62							
	0	0	0.75	0.75	0.75	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0	0
	0.5	0.5	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	0	0	0	0	0
	Salinity C	alculation	s									
TY	0	1	32	58	62							
	1.00	1.00	1.00	1.00	1.00							
	Access V	alue Calc	ulations									
TY	0	1	32	58	62							
	1.00	1.00	1.00	1.00	1.00							
	Ī					·						

	Intersper	sion Calcu	lations									
ΓY	0	1	32	58	62							
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0.5	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	0.1	0.1	0.1	0	0	0	0	0	0	0
	Salinity C	alculation	s									
ГΥ	0	1	32	58	62							
	1.00	1.00	1.00	1.00	1.00							
	Access V	alue Calc	ulations									
ГΥ	0	1	32	58	62							
	1.00	1.00	1.00	1.00	1.00							

Revised V5 7/24/06 Class 2 112/6/2023

Class 3										
Class 4										
Class 5										
%OW <= 1.5ft	0.10	0.10	0.10	0.10	0.10					
Salinity (ppt)										
fresh	1.00	1.00	1.00	1.00	1.00					
intermediate										
Access Value										
fresh	1.00	1.00	1.00	1.00	1.00					
intermediate										
Emergent Marsh HSI =	0.70	0.70	0.76	0.85	0.87					
Open Water HSI =	0.26	0.26	0.28	0.28	0.28					
	<u> </u>				·		<u> </u>	·		
FWP SIs										
Target Year (TY)	0	1	32	58	62					
% Emergent	0.63	0.10	0.10	0.10	0.10					
% Emergent % Aquatic	0.63	0.10	0.10	0.10	0.10					
· ·										
% Aquatic										
% Aquatic Interspersion	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2 Class 3	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2 Class 3 Class 4	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2 Class 3 Class 4 Class 5 %OW <= 1.5ft	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2 Class 3 Class 4 Class 5 %OW <= 1.5ft Salinity (ppt)	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2 Class 3 Class 4 Class 5 %OW <= 1.5ft Salinity (ppt) fresh	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2 Class 3 Class 4 Class 5 %OW <= 1.5ft Salinity (ppt) fresh intermediate	0.10	0.10	0.10	0.10	0.10					
% Aquatic Interspersion Class 1 Class 2 Class 3 Class 4 Class 5 %OW <= 1.5ft Salinity (ppt) fresh intermediate Access Value	0.10 0.50 0.10 1.00	0.10 0.10 0.10 1.00	0.10 0.10 0.10 1.00	0.10 0.10 0.10	0.10 0.10 0.10 1.00					
% Aquatic Interspersion Class 1 Class 2 Class 3 Class 4 Class 5 %OW <= 1.5ft Salinity (ppt) fresh intermediate Access Value fresh	0.10 0.50 0.10 1.00	0.10 0.10 0.10 1.00	0.10 0.10 0.10 1.00	0.10 0.10 0.10	0.10 0.10 0.10 1.00					

## **AAHU CALCULATION - EMERGENT MARSH**

Project: Reach A Surveys-South of Marmande Ridge

FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
0.013243384	0	0.013243	0.70	0.01	
0.013243384	1	0.013243	0.70	0.01	0.01
0.013243384	32	0.012846	0.76	0.01	0.29
0.013243384	58	0.011919	0.85	0.01	0.26
0.013243384	62	0.011787	0.87	0.01	0.04
		_		·	

12/6/2023

Max=	62	AAHUs =	0.01

FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
0.013243384	0	0.013243	0.70	0.01	
0.013243384	1	0	0.24	0.00	0.00
0.013243384	32	0	0.24	0.00	0.00
0.013243384	58	0	0.24	0.00	0.00
0.013243384	62	0	0.24	0.00	0.00
	Max=	62	_	AAHUs	0.00

A. Future With Project Emergent Marsh AAHUs =	0.00
B. Future Without Project Emergent Marsh AAHUs =	0.01
Net Change (FWP - FWOP) =	-0.01

## **AAHU CALCULATION - OPEN WATER**

Project: Reach A Surveys-South of Marmande Ridge

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
0.013243384	0	0	0.26	0.00	
0.013243384	1	0	0.26	0.00	0.00
0.013243384	32	0.000397	0.28	0.00	0.00
0.013243384	58	0.001324	0.28	0.00	0.01
0.013243384	62	0.001457	0.28	0.00	0.00
	Max=	62		AAHUs =	0.00

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
0.013243384	0	0	0.26	0.00	
0.013243384	1	0.013243	0.23	0.00	0.00
0.013243384	32	0.013243	0.23	0.00	0.09
0.013243384	58	0.013243	0.23	0.00	0.08
0.013243384	62	0.013243	0.23	0.00	0.01

Revised V5 7/24/06 12/6/2023

Max=	62	AAHUs	0.00

A. Future With Project Open Water AAHUs =	0.00
B. Future Without Project Open Water AAHUs =	0.00
Net Change (FWP - FWOP) =	0.00

### TOTAL BENEFITS IN AAHUS DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-0.01
B. Open Water Habitat Net AAHUs =	0.00
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-0.01

## TOTAL BENEFITS IN AAHUS DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-0.01
B. Open Water Habitat Net AAHUs =	0.00
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-0.01

Revised V5 7/24/06

	V6 Table									
	Structure Type	Structure Rating R								
а	Open system	1								
b	Rock weir set at 1ft below marsh level (BML), w/ boat bay	0.8								
С	Rock weir with boat bay	0.6								
d	Rock weir set at ≥ 1 ft BML	0.6								
е	Slotted weir with boat bay	0.6								
f	Open culverts	0.5								
g	Weir with boat bay	0.5								
h	Weir set at > 1 ft BML	0.5								
i	Slotted weir	0.4								
j	Flap-gated culvert with slotted weir	0.35								
k	Variable crest weir	0.3								
	Flap-gated variable crest weir	0.25								
m	Flap-gated culvert	0.2								
n	Rock weir	0.15								
0	Fixed crest weir	0.1								
р	Solid plug	0.0001								

N O T E Where multiple openings <u>equally</u> affect a common "accessible unit", the Structure Rating (R) of the structure proposed for the "major" access point for the unit will be used to calculate the Access Value. The designation of "major" will be made by the HET.

1) In the case of a "hybrid" structure or a unique application of one of the above-listed types (including unique or "non-standard" operational schemes), the WVA analyst(s) may assign an appropriate Structure Rating between 0.0001 and 1.0 that most closely approximates the relative degree to which the structure in question would allow ingress/egress of estuarine organisms. In those cases, the rationale used in developing the new Structure Rating shall be documented. 2) Use drop down list to enter value for Structure Rating (R calc) when structure is in V6 Table above; if structure is not included in V6 Table, then Structure Rating (R calc) may be entered manually (0 to 1).

Notes are from the Procedural Manual. See "Procedure for Calculating Access Value" Section in WVA Marsh Models Manual (pages 38-41) for example V6 calculations and further details.

	FWOP V6 Calculator	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	Notes: Please provide a brief description of assumptions and structure type
	Total Access Value V <sub>6</sub>	0	1	32	58	62								
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)	а	а	а	а	а								
eni	% Wetland accessible by all access points (P calc)	100	100	100	100	100								
Ö	V <sub>6</sub> : Access Value	1	1	1	1	1								
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
l g	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ő	V <sub>6</sub> : Access Value													

		 			 			·
4	Structure Rating (R calc)							
ıë, 🗀	(see V6 Table above and user manual for letter descriptions)							
e	% Wetland accessible by all access points (P calc)							
Opening	V <sub>6</sub> : Access Value							
2	Structure Rating (R calc)							
Вu	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
g	V <sub>6</sub> : Access Value							
9	Structure Rating (R calc)							
ugu	(see V6 Table above and user manual for letter descriptions)							
Opening (	% Wetland accessible by all access points (P calc)							
g	V <sub>6</sub> : Access Value							
7	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
g	V <sub>6</sub> : Access Value							
8	Structure Rating (R calc)							
ugu	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
g	V <sub>6</sub> : Access Value							
6	Structure Rating (R calc)							
Б	(see V6 Table above and user manual for letter descriptions)							
eni	% Wetland accessible by all access points (P calc)							
Opening	V <sub>6</sub> : Access Value							
10	Structure Rating (R calc)							
	(see V6 Table above and user manual for letter descriptions)							
Opening	' '							
ē	% Wetland accessible by all access points (P calc)							
	70 Welland decessible by an decess points (1 date)							
g	V <sub>6</sub> : Access Value							

	FWP V6 Calculator	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	Notes: Please provide a brief description of assumptions and structure type
	Total Access Value V <sub>6</sub>	0	1	32	58	62								
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)	а	а	а	а	а								
eni	% Wetland accessible by all access points (P calc)	100	100	100	100	100								
ဝီ	V <sub>6</sub> : Access Value	1	1	1	1	1								
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ő	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ဝီ	V <sub>6</sub> : Access Value													
ng 4	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													

I = [	0/ Matter de conscibile buselle consciute (Decla)									
Openi	% Wetland accessible by all access points (P calc)									
0	V <sub>6</sub> : Access Value									
2	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
ဝီ	V <sub>6</sub> : Access Value									
9	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
o	V <sub>6</sub> : Access Value									
7	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
ဝီ	V <sub>6</sub> : Access Value									
8	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
ő	V <sub>6</sub> : Access Value									
6	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
o	V <sub>6</sub> : Access Value									
10	Structure Rating (R calc)									
ğ 1	(see V6 Table above and user manual for letter descriptions)									
ening	% Wetland accessible by all access points (P calc)									
ŏ	V <sub>6</sub> : Access Value									
$\vdash$	Ÿ	4.00	4.00	4.00	4.00	4.00				
	Total FWP Access Value V <sub>6</sub>	1.00	1.00	1.00	1.00	1.00				

	V6 Table									
	Structure Type	Structure Rating R								
а	Open system	1								
b	Rock weir set at 1ft below marsh level (BML), w/ boat bay	0.8								
С	Rock weir with boat bay	0.6								
d	Rock weir set at ≥ 1 ft BML	0.6								
е	Slotted weir with boat bay	0.6								
f	Open culverts	0.5								
g	Weir with boat bay	0.5								
h	Weir set at > 1 ft BML	0.5								
i	Slotted weir	0.4								
j	Flap-gated culvert with slotted weir	0.35								
k	Variable crest weir	0.3								
I	Flap-gated variable crest weir	0.25								
m	Flap-gated culvert	0.2								
n	Rock weir	0.15								
0	Fixed crest weir	0.1								
р	Solid plug	0.0001								

N O T E Where multiple openings <u>equally</u> affect a common "accessible unit", the Structure Rating (R) of the structure proposed for the "major" access point for the unit will be used to calculate the Access Value. The designation of "major" will be made by the HET.

1) In the case of a "hybrid" structure or a unique application of one of the above-listed types (including unique or "non-standard" operational schemes), the WVA analyst(s) may assign an appropriate Structure Rating between 0.0001 and 1.0 that most closely approximates the relative degree to which the structure in question would allow ingress/egress of estuarine organisms. In those cases, the rationale used in developing the new Structure Rating shall be documented. 2) Use drop down list to enter value for Structure Rating (R calc) when structure is in V6 Table above; if structure is not included in V6 Table, then Structure Rating (R calc) may be entered manually (0 to 1).

Notes are from the Procedural Manual. See "Procedure for Calculating Access Value" Section in WVA Marsh Models Manual (pages 38-41) for example V6 calculations and further details.

	FWOP V6 Calculator	TY	Notes: Please provide a brief description of assumptions and structure type											
	Total Access Value V <sub>6</sub>	0	1	32	58	62								
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
l g	V <sub>6</sub> : Access Value													
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
8	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)									_				
8	V <sub>6</sub> : Access Value													

_				 					
4 6	Structure Rating (R calc)								
<u>=</u>	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
ō	V <sub>6</sub> : Access Value								
5	Structure Rating (R calc)								
ũ	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
o	V <sub>6</sub> : Access Value								
9	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
g	V <sub>6</sub> : Access Value								
7	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
g	V <sub>6</sub> : Access Value								
8	Structure Rating (R calc)								
l gu	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
ő	V <sub>6</sub> : Access Value								
6	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
g	V <sub>6</sub> : Access Value								
10	Structure Rating (R calc)								
	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
l g	,		_				_		
	V <sub>6</sub> : Access Value								
	Total FWOP Access Value V <sub>6</sub>								

	FWP V6 Calculator	TY	Notes: Please provide a brief description of assumptions and structure type											
	Total Access Value V <sub>6</sub>	0	1	32	58	62								
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
ēni	% Wetland accessible by all access points (P calc)													
Ö	V <sub>6</sub> : Access Value													
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ဝီ	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ြင္ပို	V <sub>6</sub> : Access Value													
ng 4	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													

Openi	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
2	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
9	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
7	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
8	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
6	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
10	Structure Rating (R calc)							
	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
ဝီ	V <sub>6</sub> : Access Value							
	Total FWP Access Value V <sub>6</sub>							

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL Fresh/Intermediate Marsh

Project:	Reach A borings-South of GIWW	AAHUs =	-0.28
FWOP		•	

1 4401								
Project Area (ac)	1	1	1					
% Fresh	100	100	100					
% Intermediate	0	0	0					
Target Year (TY)	0	1	62					
V1: % Emergent	94	94	92					
V2: % Aquatic	50	50	40					
V3: Interspersion Class 1	100	100	100					
V3: Interspersion Class 2	0	0	0					
V3: Interspersion Class 3	0	0	0					
V3: Interspersion Class 4	0	0	0					
V3: Interspersion Class 5	0	0	0					
V4: %OW <= 1.5ft	0	0	0					
V5: Salinity (ppt) - Fresh	0.24	0.24	0.51					
V5: Salinity (ppt) - INT								
V6: Access Value - Fresh	1.00	1.00	1.00					
V6: Access Value - INT								

F١	W	D
Г	vv	

Project Area (ac)	1	1	1					
% Fresh	100	100	100					
% Intermediate	0	0	0					
Target Year (TY)	0	1	62					
V1: % Emergent	94	0	0					
V2: % Aquatic	50	0	0					
V3: Interspersion Class 1	100	0	0					
V3: Interspersion Class 2	0	0	0					
V3: Interspersion Class 3	0	0	0					
V3: Interspersion Class 4	0	0	0					
V3: Interspersion Class 5	0	100	100					
V4: %OW <= 1.5ft	0	0	0					
V5: Salinity (ppt) - Fresh	0	0.24	0.51					
V5: Salinity (ppt) - INT								
V6: Access Value - Fresh	1.00	1.00	1.00					
V6: Access Value - INT								

# Computed SIs - do not enter data here !

FWOP SIs								
Target Year (TY)	0	1	62					
% Emergent	0.74	0.74	0.78					
% Aquatic	0.90	0.90	0.74					
Interspersion								
Class 1	0.75	0.75	0.75					
Class 2								

Ī	Interspers	sion Calcu	lations									
TY	0	1	62									
	0.75	0.75	0.75	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	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
	Salinity C	alculation	s									
TY	0	1	62									
	1.00	1.00	1.00									
	Access V	alue Calcı	ulations									
TY	0	1	62									
	1.00	1.00	1.00									

	Interspers	sion Calcu	lations									
TY	0	1	62									
	0.75	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	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.1	0.1	0	0	0	0	0	0	0	0	0
	Salinity C	alculation	s									
ΤY	0	1	62									
	1.00	1.00	1.00									
	Access V	alue Calcı	ulations									
TY	0	1	62									
	1.00	1.00	1.00									

Class 3								
Class 4								
Class 5								
%OW <= 1.5ft	0.10	0.10	0.10					
Salinity (ppt)								
fresh	1.00	1.00	1.00					
intermediate								
Access Value								
fresh	1.00	1.00	1.00					
intermediate								
Emergent Marsh HSI =	0.80	0.80	0.83					
Open Water HSI =	0.86	0.86	0.76					
FIAID CI-								
FWP SIs								
Target Year (TY)	0	1	62					
% Emergent	0.74	0.10	0.10					
% Aquatic	0.90	0.10	0.10					
Interspersion								
Class 1	0.75	0.10	0.10					
Class 2								
Class 3								
Class 4								
Class 5								
%OW <= 1.5ft	0.10	0.10	0.10					
Salinity (ppt)								
Salinity (ppt) fresh	1.00	1.00	1.00					
	1.00	1.00	1.00					
fresh	1.00	1.00	1.00					
fresh intermediate	1.00	1.00	1.00					
fresh intermediate Access Value								
fresh intermediate Access Value fresh								

## **AAHU CALCULATION - EMERGENT MARSH**

Project: Reach A borings-South of GIWW

TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
0	0.571025	0.80	0.46	
1	0.571025	0.80	0.46	0.46
62	0.558875	0.83	0.46	28.01
	0	TY Acres 0 0.571025 1 0.571025	TY         Acres         x HSI           0         0.571025         0.80           1         0.571025         0.80	TY Acres x HSI HUs 0 0.571025 0.80 0.46 1 0.571025 0.80 0.46

12/6/2023

Max=	62	AAHUs =	0.46

FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
0.607473099	0	0.571025	0.80	0.46	
0.607473099	1	0	0.24	0.00	0.17
0.607473099	62	0	0.24	0.00	0.00
	Max=	62		AAHUs	0.00

A. Future With Project Emergent Marsh AAHUs =	0.00
B. Future Without Project Emergent Marsh AAHUs =	0.46
Net Change (FWP - FWOP) =	-0.46

## **AAHU CALCULATION - OPEN WATER**

Project: Reach A borings-South of GIWW

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
0.607473099	0	0.036448	0.86	0.03	
0.607473099	1	0.036448	0.86	0.03	0.03
0.607473099	62	0.048598	0.76	0.04	2.09
u-	Max=	62		AAHUs =	0.03

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
0.607473099	0	0.036448	0.86	0.03	
0.607473099	1	0.607473	0.23	0.14	0.14
0.607473099	62	0.607473	0.23	0.14	8.42
	·			·	·

Revised V5 7/24/06 12/6/2023

Max=	62	AAHUs	0.14

A. Future With Project Open Water AAHUs =	0.14
B. Future Without Project Open Water AAHUs =	0.03
Net Change (FWP - FWOP) =	0.10

### TOTAL BENEFITS IN AAHUS DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-0.46
B. Open Water Habitat Net AAHUs =	0.10
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-0.28

### TOTAL BENEFITS IN AAHUS DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-7.07
B. Open Water Habitat Net AAHUs =	1.61
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-4.27

Revised V5 7/24/06

	V6 Table								
	Structure Type	Structure Rating R							
а	Open system	1							
b	Rock weir set at 1ft below marsh level (BML), w/ boat bay	0.8							
С	Rock weir with boat bay	0.6							
d	Rock weir set at ≥ 1 ft BML	0.6							
е	Slotted weir with boat bay	0.6							
f	Open culverts	0.5							
g	Weir with boat bay	0.5							
h	Weir set at > 1 ft BML	0.5							
i	Slotted weir	0.4							
j	Flap-gated culvert with slotted weir	0.35							
k	Variable crest weir	0.3							
	Flap-gated variable crest weir	0.25							
m	Flap-gated culvert	0.2							
n	Rock weir	0.15							
0	Fixed crest weir	0.1							
р	Solid plug	0.0001							

N O T E Where multiple openings <u>equally</u> affect a common "accessible unit", the Structure Rating (R) of the structure proposed for the "major" access point for the unit will be used to calculate the Access Value. The designation of "major" will be made by the HET.

1) In the case of a "hybrid" structure or a unique application of one of the above-listed types (including unique or "non-standard" operational schemes), the WVA analyst(s) may assign an appropriate Structure Rating between 0.0001 and 1.0 that most closely approximates the relative degree to which the structure in question would allow ingress/egress of estuarine organisms. In those cases, the rationale used in developing the new Structure Rating shall be documented. 2) Use drop down list to enter value for Structure Rating (R calc) when structure is in V6 Table above; if structure is not included in V6 Table, then Structure Rating (R calc) may be entered manually (0 to 1).

Notes are from the Procedural Manual. See "Procedure for Calculating Access Value" Section in WVA Marsh Models Manual (pages 38-41) for example V6 calculations and further details.

	FWOP V6 Calculator	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	Notes: Please provide a brief description of assumptions and structure type
	Total Access Value V <sub>6</sub>	0	1	62										
ing 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)	а	а	а										
eni	% Wetland accessible by all access points (P calc)	100	100	100										
g	V <sub>6</sub> : Access Value	1	1	1										
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
g	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
g	V <sub>6</sub> : Access Value													

4	Structure Rating (R calc)								
I .≝′ L	(see V6 Table above and user manual for letter descriptions)								
e	% Wetland accessible by all access points (P calc)								
Opening	V <sub>6</sub> : Access Value								
2	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
ő	V <sub>6</sub> : Access Value								
9	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening (	% Wetland accessible by all access points (P calc)								
ő	V <sub>6</sub> : Access Value								
7	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
o	V <sub>6</sub> : Access Value								
8	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
ď	V <sub>6</sub> : Access Value								
6	Structure Rating (R calc)								
Вu	(see V6 Table above and user manual for letter descriptions)								
eni	% Wetland accessible by all access points (P calc)								
Opening	V <sub>6</sub> : Access Value								
10	Structure Rating (R calc)								
	(see V6 Table above and user manual for letter descriptions)								
ا قِ	,								
Opening	% Wetland accessible by all access points (P calc)								
ō	V <sub>6</sub> : Access Value								
	Total FWOP Access Value V <sub>6</sub>	1.00	1.00	1.00					

	FWP V6 Calculator	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	Notes: Please provide a brief description of assumptions and structure type
	Total Access Value V <sub>6</sub>	0	1	62										
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)	а	а	а										
eni	% Wetland accessible by all access points (P calc)	100	100	100										
ő	V <sub>6</sub> : Access Value	1	1	1										
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ြီ	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
၂ ၀ီ	V <sub>6</sub> : Access Value													
ng 4	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													

1 = [	0/ Watlandibla bu all nainta (D asla)								
Openi	% Wetland accessible by all access points (P calc)								
0	V <sub>6</sub> : Access Value								
5	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
g	V <sub>6</sub> : Access Value								
9	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
g	V <sub>6</sub> : Access Value								
7	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
g	V <sub>6</sub> : Access Value								
8	Structure Rating (R calc)								
ng	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
o	V <sub>6</sub> : Access Value								
6	Structure Rating (R calc)								
l ig	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
do	V <sub>6</sub> : Access Value								
10	Structure Rating (R calc)								
, gr	(see V6 Table above and user manual for letter descriptions)								
Opening	% Wetland accessible by all access points (P calc)								
ဝီ	V <sub>6</sub> : Access Value								
	Total FWP Access Value V <sub>6</sub>	1.00	1.00	1.00					

	V6 Table	
	Structure Type	Structure Rating R
а	Open system	1
b	Rock weir set at 1ft below marsh level (BML), w/ boat bay	0.8
С	Rock weir with boat bay	0.6
d	Rock weir set at ≥ 1 ft BML	0.6
е	Slotted weir with boat bay	0.6
f	Open culverts	0.5
g	Weir with boat bay	0.5
h	Weir set at > 1 ft BML	0.5
i	Slotted weir	0.4
j	Flap-gated culvert with slotted weir	0.35
k	Variable crest weir	0.3
I	Flap-gated variable crest weir	0.25
m	Flap-gated culvert	0.2
n	Rock weir	0.15
0	Fixed crest weir	0.1
р	Solid plug	0.0001

N O T E Where multiple openings <u>equally</u> affect a common "accessible unit", the Structure Rating (R) of the structure proposed for the "major" access point for the unit will be used to calculate the Access Value. The designation of "major" will be made by the HET.

1) In the case of a "hybrid" structure or a unique application of one of the above-listed types (including unique or "non-standard" operational schemes), the WVA analyst(s) may assign an appropriate Structure Rating between 0.0001 and 1.0 that most closely approximates the relative degree to which the structure in question would allow ingress/egress of estuarine organisms. In those cases, the rationale used in developing the new Structure Rating shall be documented. 2) Use drop down list to enter value for Structure Rating (R calc) when structure is in V6 Table above; if structure is not included in V6 Table, then Structure Rating (R calc) may be entered manually (0 to 1).

Notes are from the Procedural Manual. See "Procedure for Calculating Access Value" Section in WVA Marsh Models Manual (pages 38-41) for example V6 calculations and further details.

	FWOP V6 Calculator	TY	Notes: Please provide a brief description of assumptions and structure type											
	Total Access Value V <sub>6</sub>	0	1	62										
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
g	V <sub>6</sub> : Access Value													
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ဝီ	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)											·		
g	V <sub>6</sub> : Access Value													

4	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
ဝီ	V <sub>6</sub> : Access Value							
2	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
9	Structure Rating (R calc)							
l g	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
ő	V <sub>6</sub> : Access Value							
7	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
ြီ	V <sub>6</sub> : Access Value							
8	Structure Rating (R calc)							
ug	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
ဝီ	V <sub>6</sub> : Access Value							
6	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
10	Structure Rating (R calc)							
J gr	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
ဝီ	V <sub>6</sub> : Access Value							
	Total FWOP Access Value V <sub>6</sub>							

	FWP V6 Calculator	TY	Notes: Please provide a brief description of assumptions and structure type											
	Total Access Value V <sub>6</sub>	0	1	62										
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
õ	V <sub>6</sub> : Access Value													
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
õ	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ဝီ	V <sub>6</sub> : Access Value													
ng 4	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													

Openi	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
2	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
9	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
7	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
8	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
6	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
10	Structure Rating (R calc)							
	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
ဝီ	V <sub>6</sub> : Access Value							
	Total FWP Access Value V <sub>6</sub>							

# WETLAND VALUE ASSESSMENT COMMUNITY MODEL

## Fresh/Intermediate Marsh

Project:	RchA_NorthSurveyOnlyPACR (poly 635)	AAHUs =	-0.29
<b>FWOP</b>		•	

Project Area (ac)	1	1	1	1	1				
% Fresh	100	100	100	100	100				
% Intermediate	0	0	0	0	0				
Target Year (TY)	0	1	9	41	61				
V1: % Emergent	100	100	100	100	100				
V2: % Aquatic	0	0	0	0	0				
V3: Interspersion Class 1	100	100	0	100	100				
V3: Interspersion Class 2	0	0	0	0	0				
V3: Interspersion Class 3	0	0	100	0	0				
V3: Interspersion Class 4	0	0	0	0	0				
V3: Interspersion Class 5	0	0	0	0	0				
V4: %OW <= 1.5ft	0	0	0	0	0				
V5: Salinity (ppt) - Fresh	0.24	0.24	0.28	0.42	0.51				
V5: Salinity (ppt) - INT									
V6: Access Value - Fresh	1.00	1.00	1.00	1.00	1.00				
V6: Access Value - INT								_	

# **FWP**

Project Area (ac)	1	0	0	0	0				
% Fresh	100	100	100	100	100				
% Intermediate	0	0	0	0	0				
Target Year (TY)	0	1	9	41	61				
V1: % Emergent	100	0	0	0	0				
V2: % Aquatic	0	0	0	0	0				
V3: Interspersion Class 1	100	0	0	0	0				
V3: Interspersion Class 2	0	0	0	0	0				
V3: Interspersion Class 3	0	0	0	0	0				
V3: Interspersion Class 4	0	0	0	0	0				
V3: Interspersion Class 5	0	100	100	100	100				
V4: %OW <= 1.5ft	0	0	0	0	0				
V5: Salinity (ppt) - Fresh	0.24	0	0	0	0				
V5: Salinity (ppt) - INT									
V6: Access Value - Fresh	1.00	0.01	0.01	0.01	0.01				
V6: Access Value - INT									
		FRROR	EDDOD	EDDOD	EDDOD				

ERROR ERROR ERROR

# Computed SIs - do not enter data here !

	• • • • • •	<del></del>			• • • • • • • • • • • • • • • • • • • •	 	-		
FWOP SIs									
Target Year (TY)	0	1	9	41	61				
% Emergent	0.63	0.63	0.63	0.63	0.63				
% Aquatic	0.10	0.10	0.10	0.10	0.10				
Interspersion									
Class 1	0.75	0.75	0.50	0.75	0.75				
Class 2									

I	Interspers	sion Calcu	lations									
TY	0	1	9	41	61							
	0.75	0.75	0	0.75	0.75	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0.5	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	0	0	0	0
	Salinity Calculations											
TY	0	1	9	41	61							
	1.00	1.00	1.00	1.00	1.00							
	Access V	alue Calc	ulations									
TY	0	1	9	41	61							
	1.00	1.00	1.00	1.00	1.00							

	Interspersion Calculations											
ΤY	0	1	9	41	61							
	0.75	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	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0
	Salinity Calculations											
ΤY	0	1	9	41	61							
	1.00											
	Access V	alue Calcı	ulations									
TY	0	1	9	41	61							
	1.00	0.31	0.31	0.31	0.31							

Revised V5 7/24/06 Class 2 1 12/6/2023

Class 3									
Class 4									
Class 5									
%OW <= 1.5ft	0.10	0.10	0.10	0.10	0.10				
Salinity (ppt)									
fresh	1.00	1.00	1.00	1.00	1.00				
intermediate									
Access Value									
fresh	1.00	1.00	1.00	1.00	1.00				
intermediate									
Emergent Marsh HSI =	0.72	0.72	0.70	0.72	0.72				
Open Water HSI =	0.28	0.28	0.26	0.28	0.28				
FWP SIs									
				- 44	1 04		1		
Target Year (TY)	0	1	9	41	61				
% Emergent	0.63	0.10	0.10	0.10	0.10				
% Aquatic	0.10	0.10	0.10	0.10	0.10				
Interspersion									
Class 1	0.75	0.10	0.10	0.10	0.10				
Class 2									
Class 3									
Class 4									
Class 5									
%OW <= 1.5ft	0.10	0.10	0.10	0.10	0.10				
Salinity (ppt)									
fresh	1.00	0.00	0.00	0.00	0.00				
intermediate									
Access Value									
	1.00	0.31	0.31	0.31	0.31				
fresh									
intermediate									
	0.72	0.10	0.10	0.10	0.10				

## **AAHU CALCULATION - EMERGENT MARSH**

Project: RchA\_NorthSurveyOnlyPACR (poly 635)

FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
0.6012	0	0.6012	0.72	0.44	
0.6012	1	0.6012	0.72	0.44	0.44
0.6012	9	0.6012	0.70	0.42	3.41
0.6012	41	0.6012	0.72	0.44	13.66
0.6012	61	0.6012	0.72	0.43	8.70

12/6/2023

Max=	61	AAHUs =	0.43

FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
0.6012	0	0.6012	0.72	0.44	
0	1	0	0.10	0.00	0.16
0	9	0	0.10	0.00	0.00
0	41	0	0.10	0.00	0.00
0	61	0	0.10	0.00	0.00
	Max=	61		AAHUs	0.00

A. Future With Project Emergent Marsh AAHUs =	0.00
B. Future Without Project Emergent Marsh AAHUs =	0.43
Net Change (FWP - FWOP) =	-0.43

## **AAHU CALCULATION - OPEN WATER**

Project: RchA\_NorthSurveyOnlyPACR (poly 635)

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
0.6012	0	0	0.28	0.00	
0.6012	1	0	0.28	0.00	0.00
0.6012	9	0	0.26	0.00	0.00
0.6012	41	0	0.28	0.00	0.00
0.6012	61	0	0.28	0.00	0.00
	Max=	61		AAHUs =	0.00

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
0.6012	0	0	0.28	0.00	
0	1	0	0.12	0.00	0.00
0	9	0	0.12	0.00	0.00
0	41	0	0.12	0.00	0.00
0	61	0	0.12	0.00	0.00

Revised V5 7/24/06 12/6/2023

Max=	61	AAHUs	0.00

A. Future With Project Open Water AAHUs =	0.00
B. Future Without Project Open Water AAHUs =	0.00
Net Change (FWP - FWOP) =	0.00

### TOTAL BENEFITS IN AAHUS DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-0.43
B. Open Water Habitat Net AAHUs =	0.00
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-0.29

Revised V5 7/24/06

	V6 Table										
	Structure Type	Structure Rating R									
а	Open system	1									
b	Rock weir set at 1ft below marsh level (BML), w/ boat bay	0.8									
С	Rock weir with boat bay	0.6									
d	Rock weir set at ≥ 1 ft BML	0.6									
е	Slotted weir with boat bay	0.6									
f	Open culverts	0.5									
g	Weir with boat bay	0.5									
h	Weir set at > 1 ft BML	0.5									
i	Slotted weir	0.4									
j	Flap-gated culvert with slotted weir	0.35									
k	Variable crest weir	0.3									
	Flap-gated variable crest weir	0.25									
m	Flap-gated culvert	0.2									
n	Rock weir	0.15									
0	Fixed crest weir	0.1									
р	Solid plug	0.0001									

N O T E Where multiple openings <u>equally</u> affect a common "accessible unit", the Structure Rating (R) of the structure proposed for the "major" access point for the unit will be used to calculate the Access Value. The designation of "major" will be made by the HET.

1) In the case of a "hybrid" structure or a unique application of one of the above-listed types (including unique or "non-standard" operational schemes), the WVA analyst(s) may assign an appropriate Structure Rating between 0.0001 and 1.0 that most closely approximates the relative degree to which the structure in question would allow ingress/egress of estuarine organisms. In those cases, the rationale used in developing the new Structure Rating shall be documented. 2) Use drop down list to enter value for Structure Rating (R calc) when structure is in V6 Table above; if structure is not included in V6 Table, then Structure Rating (R calc) may be entered manually (0 to 1).

Notes are from the Procedural Manual. See "Procedure for Calculating Access Value" Section in WVA Marsh Models Manual (pages 38-41) for example V6 calculations and further details.

	FWOP V6 Calculator	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	Notes: Please provide a brief description of assumptions and structure type
	Total Access Value V <sub>6</sub>	0	1	9	41	61								, , , , , , , , , , , , , , , , , , , ,
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)	а	а	а	а	а								
eni	% Wetland accessible by all access points (P calc)	100	100	100	100	100								
8	V <sub>6</sub> : Access Value	1	1	1	1	1								
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
8	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ြီ	V <sub>6</sub> : Access Value													

			 		 	 		 ·
4	Structure Rating (R calc)							
ıë, 🗀	(see V6 Table above and user manual for letter descriptions)							
e	% Wetland accessible by all access points (P calc)							
Opening	V <sub>6</sub> : Access Value							
2	Structure Rating (R calc)							
Вu	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
g	V <sub>6</sub> : Access Value							
9	Structure Rating (R calc)							
ugu	(see V6 Table above and user manual for letter descriptions)							
Opening (	% Wetland accessible by all access points (P calc)							
g	V <sub>6</sub> : Access Value							
7	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
g	V <sub>6</sub> : Access Value							
8	Structure Rating (R calc)							
ugu	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
g	V <sub>6</sub> : Access Value							
6	Structure Rating (R calc)							
Б	(see V6 Table above and user manual for letter descriptions)							
eni	% Wetland accessible by all access points (P calc)							
Opening	V <sub>6</sub> : Access Value							
10	Structure Rating (R calc)							
	(see V6 Table above and user manual for letter descriptions)							
Opening	' '							
ē	% Wetland accessible by all access points (P calc)							
	70 Welland decessible by an decess points (1 date)	$\overline{}$						
g	V <sub>6</sub> : Access Value							

	FWP V6 Calculator	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	TY	Notes: Please provide a brief description of assumptions and structure type
	Total Access Value V <sub>6</sub>	0	1	9	41	61								
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)	а	а	а	а	а								
eni	% Wetland accessible by all access points (P calc)	100	1	1	1	1								
ő	V <sub>6</sub> : Access Value	1	1	1	1	1								
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ő	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ဝီ	V <sub>6</sub> : Access Value													
ng 4	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													

1 = [	0/ 14/ 11   11   11   11   12   13   13   13									
Openi	% Wetland accessible by all access points (P calc)									
ō	V <sub>6</sub> : Access Value									
2	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
l g	V <sub>6</sub> : Access Value									
9	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
o	V <sub>6</sub> : Access Value									
7	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
ဝီ	V <sub>6</sub> : Access Value									
8	Structure Rating (R calc)									
ng	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
g	V <sub>6</sub> : Access Value									
6	Structure Rating (R calc)									
ugu	(see V6 Table above and user manual for letter descriptions)									
Opening	% Wetland accessible by all access points (P calc)									
å	V <sub>6</sub> : Access Value									
9	Structure Rating (R calc)									
Bu	(see V6 Table above and user manual for letter descriptions)									
ening	% Wetland accessible by all access points (P calc)									
ď	V <sub>6</sub> : Access Value									
	Total FWP Access Value V <sub>6</sub>	1.00	0.01	0.01	0.01	0.01				

	V6 Table										
	Structure Type	Structure Rating R									
а	Open system	1									
b	Rock weir set at 1ft below marsh level (BML), w/ boat bay	0.8									
С	Rock weir with boat bay	0.6									
d	Rock weir set at <u>&gt;</u> 1 ft BML	0.6									
е	Slotted weir with boat bay	0.6									
f	Open culverts	0.5									
g	Weir with boat bay	0.5									
h	Weir set at > 1 ft BML	0.5									
i	Slotted weir	0.4									
j	Flap-gated culvert with slotted weir	0.35									
k	Variable crest weir	0.3									
	Flap-gated variable crest weir	0.25									
m	Flap-gated culvert	0.2									
n	Rock weir	0.15									
0	Fixed crest weir	0.1									
р	Solid plug	0.0001									

N O T E Where multiple openings <u>equally</u> affect a common "accessible unit", the Structure Rating (R) of the structure proposed for the "major" access point for the unit will be used to calculate the Access Value. The designation of "major" will be made by the HET.

1) In the case of a "hybrid" structure or a unique application of one of the above-listed types (including unique or "non-standard" operational schemes), the WVA analyst(s) may assign an appropriate Structure Rating between 0.0001 and 1.0 that most closely approximates the relative degree to which the structure in question would allow ingress/egress of estuarine organisms. In those cases, the rationale used in developing the new Structure Rating shall be documented. 2) Use drop down list to enter value for Structure Rating (R calc) when structure is in V6 Table above; if structure is not included in V6 Table, then Structure Rating (R calc) may be entered manually (0 to 1).

Notes are from the Procedural Manual. See "Procedure for Calculating Access Value" Section in WVA Marsh Models Manual (pages 38-41) for example V6 calculations and further details.

	FWOP V6 Calculator	TY	Notes: Please provide a brief description of assumptions and structure type											
	Total Access Value V <sub>6</sub>	0	1	9	41	61								
ing 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
en	% Wetland accessible by all access points (P calc)													
ő	V <sub>6</sub> : Access Value													
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ြင္ပို	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ő	V <sub>6</sub> : Access Value													

	·						
4	Structure Rating (R calc)						
ng	(see V6 Table above and user manual for letter descriptions)						
Opening	% Wetland accessible by all access points (P calc)						
g	V <sub>6</sub> : Access Value						
2	Structure Rating (R calc)						
ng	(see V6 Table above and user manual for letter descriptions)						
Opening	% Wetland accessible by all access points (P calc)						
g	V <sub>6</sub> : Access Value						
9	Structure Rating (R calc)						
ng	(see V6 Table above and user manual for letter descriptions)						
Opening	% Wetland accessible by all access points (P calc)						
g	V <sub>6</sub> : Access Value						
7	Structure Rating (R calc)						
ng	(see V6 Table above and user manual for letter descriptions)						
Opening	% Wetland accessible by all access points (P calc)						
g	V <sub>6</sub> : Access Value						
8	Structure Rating (R calc)						
<u>g</u>	(see V6 Table above and user manual for letter descriptions)						
Opening	% Wetland accessible by all access points (P calc)						
Ö	V <sub>6</sub> : Access Value						
6	Structure Rating (R calc)						
ug	(see V6 Table above and user manual for letter descriptions)						
Opening	% Wetland accessible by all access points (P calc)						
o	V <sub>6</sub> : Access Value						
10	Structure Rating (R calc)						
	(see V6 Table above and user manual for letter descriptions)						
Opening	, ,						
be	% Wetland accessible by all access points (P calc)						
0	V <sub>6</sub> : Access Value						
	Total FWOP Access Value V <sub>6</sub>						

	FWP V6 Calculator	TY	Notes: Please provide a brief description of assumptions and structure type											
	Total Access Value V <sub>6</sub>	0	1	9	41	61								
ng 1	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
õ	V <sub>6</sub> : Access Value													
ng 2	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
õ	V <sub>6</sub> : Access Value													
ng 3	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													
eni	% Wetland accessible by all access points (P calc)													
ဝီ	V <sub>6</sub> : Access Value													
ng 4	Structure Rating (R calc) (see V6 Table above and user manual for letter descriptions)													

Openi	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
2	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
9	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
7	Structure Rating (R calc)							
ng	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
8	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
Q	V <sub>6</sub> : Access Value							
6	Structure Rating (R calc)							
ing	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
o	V <sub>6</sub> : Access Value							
10	Structure Rating (R calc)							
	(see V6 Table above and user manual for letter descriptions)							
Opening	% Wetland accessible by all access points (P calc)							
ဝီ	V <sub>6</sub> : Access Value							
	Total FWP Access Value V <sub>6</sub>							

Original Model Version 1.0 - March 10, 2010

#### **Model Revisions**

Version 1.1 - 11/15/2011

- 1) Spreadsheet formatted to populate FWP TY0 with FWOP TY0 values.
- 2) Spreadsheet formatted to allow entry of any value in Marsh and Water acreage cells in AAHU calculation section.
- 3) Minor formatting changes to font type, font size, font color, etc.

### **User Friendly Revisions** Version 2.2

7/28/2015

- 1) Added input cells for input of unique project area acres for each TY in both FWOP and FWP.
- 2) Added column in acreage calc region to display project area acreages.
- 3) Edited formulas to automatically calculate marsh and water acreages.
- 4) Edited formulas for HSIs and HUs to not display numbers/ref error messages in rows below the last TY.

Model checked against V1.1 model - same AAHU outputs !!

8/20/2015

- 1) Added 3 more target years.
- 2) Re-arranged input page to facilitate pasting in rows of input by eliminating blanks cells and rows.
- 3) Locked portions of the model page password = FWS
- 4) Inserted AAHU output at top of page to avoid having to scroll down to see results.
- 5) Added ERROR warnings below green input field to warn of computation errors.

### Model Version Update: Civil Works ver. 2.0

8/4/2017 Model updated per Battelle (2010) Comment #10 as part of USACE PMIP See Revised WVA Procedure Manual 8/2/2017

8/4/2017 1) V5 formatted to give error message for negative and non-numerical values.

- 2) Added error alert to only allow values greater than 0 for project area.
- 3) Updated cell format; all cells where user enters data are green.
- 4) Changed Target Year cell calculations to give ERROR message if cell to the left is less than current cell.
- 9/25/2017 1) Included V6 Calculator sheet for Fresh and Intermediate Marsh to provide P & R calculations for each TY (See "Notes" tab).
  - 2) Linked V6 Calculator to populate V6 in Fresh-Intermediate Marsh spreadsheet.

**Model Name** 

Wetland Value Assessment - Bottomland Hardwoods Community Model

**Model Version** 

1.2

**Original Model** 

Version

March 10, 2010

Date of Last Update December 6, 2018

### **Objective of Model**

The bottomland hardwood model was developed to determine the suitability of the habitat in providing resting, foraging, and nesting habitat for a diverse assemblage of wildlife species. Bottomland hardwoods are defined as an area supporting or capable of supporting a canopy of woody vegetation of which greater than 40 percent consists of tree species such as oaks, hickories, American elm, cedar elm, green ash, sweetgum, sugarberry, boxelder, common persimmon, honeylocust, red mulberry, eastern cottonwood, black willow, American sycamore, etc.

If 60 percent of the woody canopy consists of any combination of baldcypress, tupelogum, red maple, buttonbush, and/or planertree, the fresh swamp model should be applied.

#### Instructions

Enter data in green cells. All green cells must contain values (including 0's) in order for the HSI calculation to compute for that year.

Always error check data following entry.

Click on variable name in column B for a brief description of the variable.

Intermediate Calculations are "over flow" calculations that were too long or complex to fit within one cell within the table.

Refer to WVA documents for model structure and background.

#### Notes

- 1) Enter data in units noted.
- 2) All percentages should be entered as whole numbers between 0 and 100.
- 3) It is recommended that Microsoft Office Excel Version 2007 or higher be used. Earlier versions may result in compatability issues or loss of some functions.

Input
Calculation
Output
No Input
No Input

## To avoid calculation errors for Surrounding Land Use (Variable 6):

- 1) The total of land use categories must equal 100%.
- 2) Only whole numerical values between 0 through 100% can be entered in cells for all of the five land use categories for each target year.
- 3) No cells may be left blank.

## Original CWPPRA Model Version

1.0 - March 10, 2010

# CWPPRA Model Revisions

Version 1.1 - 1/6/2012

1) Minor formatting changes to font type, font size, font color, etc.

2) Spreadsheet formatted to populate FWP TY0 with FWOP TY0 values.

Version 1.2 - 7/16/2014

1) Corrected hydrology, variable 4, flow/exchange = low and flooding duration = seasonal calculated an SI of 0.35 but should have been 0.65 according to manual.

2) Revised formulas for V6, surrounding land use; used formulas from first column that will require all rows to have a digit entered (formula uses OR instead of AND) per Notes tab.

Version 1.3 - 1/13/2015

1) Placed version name in cell a2 and "acres" in cell g4

2) Linked data cell between TY0 FWOP & TY0 FWP columns for all variables except V4 to get Habitat Suitablity Index to display for TY0 FWP; replaced IF statements.

# USACE Civil Works Model Revisions

Version 1.2 - 12/6/2018

- 1) Increased TYs to 15
- 2) Changed Target Year cell calculations to give ERROR message if cell to the left is less than current cell or equal to previous.
- 3) Updated color coding key in Notes tab for white and gray cells.
- 4) Revised V6 formula updated weighting for non-habitat

Version 1.2a - 3/8/2023

Revised to a user-friendly format. All formulas remain unchanged and same results produced as version 1.2

Project: A7 Surveys Acres: 0.016695

	FWOP	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	5	5	5	5	1	1
V2	Maturity	Age (yrs)						
		Dbh	9.2	9.32	9.8	10.4	0	0
V3		Understory (%)	50	50	50	30	60	100
		Midstory (%)	70	70	65	45	0	0
V4	Hydrology	Flow/Exchange	Low	Low	Low	Low	Low	Low
		Flooding Duration	emi-Permanei	emi-Permane	emi-Permanei	emi-Permaner	Permanent	Permanent
V5	Forest Size	Class	4	4	4	4	1	1
V6	Surrounding	Forest / marsh	47	47	47	47	47	47
	Land	Abandoned Ag	0	0	0	0	0	0
	Use	Pasture / Hay	45	45	45	45	45	45
		Active Ag	0	0	0	0	0	0
		Development	8	8	8	8	8	8
V7	Disturbance	Disturbance Type	4	4	4	4	4	4
		Distance	3	3	3	3	3	3

	FWP	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	5	5	5	5	1	1
V2	Maturity	Age (yrs)						
		Dbh	9.2	9.32	9.8	10.4	0	0
V3		Understory (%)	50	0	0	0	0	0
		Midstory (%)	70	0	0	0	0	0
V4	Hydrology	Flow/Exchange	Low	Low	Low	Low	Low	Low
		Flooding Duration	emi-Permanei	emi-Permanei	emi-Permanei	emi-Permaner	Permanent	Permanent
V5	Forest Size	Class	4	4	4	4	1	1
V6	Surrounding	Forest / marsh	47	47	47	47	47	47
	Land	Abandoned Ag	0	0	0	0	0	0
	Use	Pasture / Hay	45	45	45	45	45	45
		Active Ag	0	0	0	0	0	0
		Development	8	8	8	8	8	8
V7	Disturbance	Disturbance Type	4	4	4	4	4	4
		Distance	3	3	3	3	3	3

LAAA	OP SI Calculations	TY =	0	1	16	32	47	61
Variat	ole - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	1.00	1.00	1.00	1.00	UNUSED	UNUSED
V2	Maturity	Age (yrs)						
		Dbh	0.18	0.19	0.22	0.26		
V3		Understory (%) Midstory (%)	0.90	0.90	0.93	1.00	UNUSED	UNUSED
V4	Hydrology	Flow/Exchange Flooding Duration	0.45	0.45	0.45	0.45	0.30	0.30
V5	Forest Size	Class	0.80	0.80	0.80	0.80	UNUSED	UNUSED
V6	Surrounding Land Use	Forest / marsh Abandoned Ag Pasture / Hay Active Ag Development	0.65	0.65	0.65	0.65	0.65	0.65
V7	Disturbance	Disturbance Type Distance	1.00	1.00	1.00	1.00	1.00	1.00
		HSI =	0.54	0.54	0.57	0.60		

ΓVV	P SI Calculations	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	1.00	1.00	1.00	1.00	UNUSED	UNUSED
V2	Maturity	Age (yrs)						
		Dbh	0.18	0.19	0.22	0.26		
V3		Understory (%)						
		Midstory (%)	0.90	0.10	0.10	0.10	UNUSED	UNUSED
V4	Hydrology	Flow/Exchange						
		Flooding Duration	0.45	0.45	0.45	0.45	0.30	0.30
V5	Forest Size	Class	0.80	0.80	0.80	0.80	UNUSED	UNUSED
V6	Surrounding	Forest / marsh						
	Land	Abandoned Ag						

	Use	Pasture / Hay	0.65	0.65	0.65	0.65	0.65	0.65
		Active Ag						
		Development						
V7	Disturbance	Disturbance Type	1.00	1.00	1.00	1.00	1.00	1.00
		Distance						
		HSI =	0.54	0.41	0.42	0.44		

Project: A7 Surveys

F۷	VOP		Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.016695384	0.54	0.01	
1	0.016695384	0.54	0.01	0.01
16	0.016695384	0.57	0.01	0.14
32	0.016695384	0.60	0.01	0.16
47	0.016695384		0.00	0.08
61	0.016695384		0.00	0.00
61	= Max TY		Total	
			AAHUs =	0.38
			AAHUs =	0.01

F	WP		Total	Cummulativ
TY	Acres	x HSI	HUs	HUs
0	0.016695384	0.54	0.01	
1	0.016695384	0.41	0.01	0.01
16	0.016695384	0.42	0.01	0.10
32	0.016695384	0.44	0.01	0.12
47	0.016695384		0.00	0.06
61	0.016695384		0.00	0.00
61	= Max TY		Total	

Project: H8 Surveys Acres: 0.087988

	FWOP	TY =	0	1	16	32	47	57
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	5	5	5	5	5	1
V2	Maturity	Age (yrs)						
		Dbh	13.4	13.6	13.6	13.6	14.4	0
V3		Understory (%)	50	50	50	50	45	100
		Midstory (%)	50	50	50	50	40	0
V4	Hydrology	Flow/Exchange	Low	Low	Low	Low	Low	Low
		Flooding Duration	Temporary	Temporary	Temporary	Temporary	Temporary	emi-Permaner
V5	Forest Size	Class	4	4	4	4	4	4
V6	Surrounding	Forest / marsh	36	36	36	36	36	36
	Land	Abandoned Ag	0	0	0	0	0	0
	Use	Pasture / Hay	40	40	40	40	40	40
		Active Ag	19	19	19	19	19	19
		Development	5	5	5	5	5	5
V7	Disturbance	Disturbance Type Distance						

	FWP	TY =	0	1	16	32	47	57
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	5	5	5	5	5	1
V2	Maturity	Age (yrs)						
		Dbh	13.4	13.6	13.6	13.6	14.4	0
V3		Understory (%)	50	0	0	0	0	0
		Midstory (%)	50	0	0	0	0	0
V4	Hydrology	Flow/Exchange	Low	Low	Low	Low	Low	Low
		Flooding Duration	Temporary	Temporary	Temporary	Temporary	Temporary	emi-Permaner
V5	Forest Size	Class	4	4	4	4	4	4
V6	Surrounding	Forest / marsh	36	36	36	36	36	36
	Land	Abandoned Ag	0	0	0	0	0	0
	Use	Pasture / Hay	40	40	40	40	40	40
		Active Ag	19	19	19	19	19	19
		Development	5	5	5	5	5	5
V7	Disturbance	Disturbance Type	4					
		Distance	1					

FW(	OP SI Calculations	TY =	0	1	16	32	47	57
Variah	le - Description	• • • • • • • • • • • • • • • • • • • •	Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	1.00	1.00	1.00	1.00	1.00	UNUSED
V2	Maturity	Age (yrs)						
		Dbh	0.54	0.56	0.56	0.56	0.63	
V3		Understory (%)						
		Midstory (%)	1.00	1.00	1.00	1.00	1.00	UNUSED
V4	Hydrology	Flow/Exchange						
		Flooding Duration	0.70	0.70	0.70	0.70	0.70	0.45
V5	Forest Size	Class	0.80	0.80	0.80	0.80	0.80	UNUSED
V6	Surrounding	Forest / marsh						
	Land	Abandoned Ag						
	Use	Pasture / Hay	0.56	0.56	0.56	0.56	0.56	0.56
		Active Ag						
		Development						
V7	Disturbance	Disturbance Type	0.98	0.98	0.98	0.98	0.98	0.98
		Distance						
		HSI =	0.77	0.77	0.77	0.77	0.80	

1 44	P SI Calculations	TY =	0	1	16	32	47	57
Variab	le - Description		Value	Value	Value	Value Value	Value	Value
V1	Tree Species Composition	Class	1.00	1.00	1.00	1.00	1.00	UNUSED
V2	Maturity	Age (yrs)						
		Dbh	0.54	0.56	0.56	0.56	0.63	
V3		Understory (%)						
		Midstory (%)	1.00	0.10	0.10	0.10	0.10	UNUSED
V4	Hydrology	Flow/Exchange						
		Flooding Duration	0.70	0.70	0.70	0.70	0.70	0.45
V5	Forest Size	Class	0.80	0.80	0.80	0.80	0.80	UNUSED
V6	Surrounding	Forest / marsh						
	Land	Abandoned Ag						

	Use	Pasture / Hay	0.56	0.56	0.56	0.56	0.56	0.56
		Active Ag						
		Development						
V7	Disturbance	Disturbance Type	0.98	0.98	0.98	0.98	0.98	0.98
		Distance						
		HSI =	0.77	0.57	0.57	0.57	0.59	

Project: H8 Surveys

F۷	VOP		Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.087988	0.77	0.07	
1	0.087988	0.77	0.07	0.07
16	0.087988	0.77	0.07	1.02
32	0.087988	0.77	0.07	1.09
47	0.087988	0.80	0.07	1.04
57	0.087988		0.00	0.35
61	0.087988		0.00	0.00
61	= Max TY		Total	
			AAHUs =	3.56
			AAHUs =	0.06

F	WP		Total	Cummulativ
TY	Acres	x HSI	HUs	HUs
0	0.087988	0.77	0.07	
1	0.087988	0.57	0.05	0.06
16	0.087988	0.57	0.05	0.75
32	0.087988	0.57	0.05	0.80
47	0.087988	0.59	0.05	0.76
57	0.087988		0.00	0.26
61	0.087988		0.00	0.00
61	= Max TY		Total	

Project: H9 Surveys Acres: 0.02457

	FWOP	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	5	5	5	5	1	1
V2	Maturity	Age (yrs)						
		Dbh	13.1	13.3	12.8	13.9	0	0
V3		Understory (%)	25	25	22	20	30	100
		Midstory (%)	50	50	45	65	50	0
V4	Hydrology	Flow/Exchange	Low	Low	Low	Low	Low	Low
		Flooding Duration	Seasonal	Seasonal	Seasonal	Seasonal	emi-Permaner	emi-Permaner
V5	Forest Size	Class	1	1	1	1	1	1
V6	Surrounding	Forest / marsh	34	34	34	34	34	34
	Land	Abandoned Ag	0	0	0	0	0	0
	Use	Pasture / Hay	45	45	45	45	45	45
		Active Ag	15	15	15	15	15	15
		Development	7	7	7	7	7	7
V7	Disturbance	Disturbance Type						
		Distance						

	FWP	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	5	5	5	5	1	1
V2	Maturity	Age (yrs)						
		Dbh	13.1	13.3	12.8	13.9	0	0
V3		Understory (%)	25	0	0	0	0	0
		Midstory (%)	50	0	0	0	0	0
V4	Hydrology	Flow/Exchange	Low	Low	Low	Low	Low	Low
		Flooding Duration	Seasonal	Seasonal	Seasonal	Seasonal	Permanent	Permanent
V5	Forest Size	Class	1	1	1	1	1	1
V6	Surrounding	Forest / marsh	34	34	34	34	34	34
	Land	Abandoned Ag	0	0	0	0	0	0
	Use	Pasture / Hay	45	45	45	45	45	45
		Active Ag	15	15	15	15	15	15
		Development	7	7	7	7	7	7
V7	Disturbance	Disturbance Type Distance						

FW(	OP SI Calculations	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	1.00	1.00	1.00	1.00	UNUSED	UNUSED
V2	Maturity	Age (yrs)						
	_	Dbh	0.51	0.53	0.48	0.59		
V3		Understory (%)						
		Midstory (%)	0.93	0.93	0.88	0.78	UNUSED	UNUSED
V4	Hydrology	Flow/Exchange						
		Flooding Duration	0.65	0.65	0.65	0.65	0.45	0.45
V5	Forest Size	Class	0.20	0.20	0.20	0.20	UNUSED	UNUSED
V6	Surrounding	Forest / marsh						
	Land	Abandoned Ag						
	Use	Pasture / Hay	0.54	0.54	0.54	0.54	0.54	0.54
		Active Ag						
		Development						
V7	Disturbance	Disturbance Type	0.80	0.80	0.80	0.80	0.80	0.80
		Distance						
		HSI =	0.66	0.67	0.65	0.67		

FVV	P SI Calculations	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	1.00	1.00	1.00	1.00	UNUSED	UNUSED
V2	Maturity	Age (yrs)						
		Dbh	0.51	0.53	0.48	0.59		
V3		Understory (%)						
		Midstory (%)	0.93	0.10	0.10	0.10	UNUSED	UNUSED
V4	Hydrology	Flow/Exchange						
		Flooding Duration	0.65	0.65	0.65	0.65	0.30	0.30
V5	Forest Size	Class	0.20	0.20	0.20	0.20	UNUSED	UNUSED
V6	Surrounding	Forest / marsh						
	Land	Abandoned Ag						

	Use	Pasture / Hay	0.54	0.54	0.54	0.54	0.54	0.54
		Active Ag						
		Development						
V7	Disturbance	Disturbance Type	0.80	0.80	0.80	0.80	0.80	0.80
		Distance						
		HSI =	0.66	0.50	0.49	0.51		

Project: H9 Surveys

F۱	WOP		Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.02457	0.66	0.02	
1	0.02457	0.67	0.02	0.02
16	0.02457	0.65	0.02	0.24
32	0.02457	0.67	0.02	0.26
47	0.02457		0.00	0.12
61	0.02457		0.00	0.00
61	= Max TY	_	Total	0.04
			AAHUs =	0.64
			AAHUS =	0.01

F	WP		Total	Cummulativ
ΤY	Acres	x HSI	HUs	HUs
0	0.02457	0.66	0.02	
1	0.02457	0.50	0.01	0.01
16	0.02457	0.49	0.01	0.18
32	0.02457	0.51	0.01	0.20
47	0.02457		0.00	0.09
61	0.02457		0.00	0.00
61	= Max TY		Total	

Project: H10 Surveys Acres: 0.020273

	FWOP	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	5	5	5	5	5	1
V2	Maturity	Age (yrs)						
		Dbh	11.5	11.7	13.1	14.8	16.7	0
V3		Understory (%)	20	20	20	20	15	100
		Midstory (%)	80	80	65	55	40	0
V4	Hydrology	Flow/Exchange	Low	Low	Low	Low	Low	Low
		Flooding Duration	Seasonal	Seasonal	emi-Permaner	emi-Permane	emi-Permaner	Permanent
V5	Forest Size	Class	2	2	2	2	2	1
V6	Surrounding	Forest / marsh	34	34	34	34	34	34
	Land	Abandoned Ag	0	0	0	0	0	0
	Use	Pasture / Hay	40	40	40	40	40	40
		Active Ag	20	20	20	20	20	20
		Development	7	7	7	7	7	7
V7	Disturbance	Disturbance Type Distance						

	FWP	TY =	0	1	16	32	47	61
Variab	le - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	5	5	5	5	5	1
V2	Maturity	Age (yrs)						
		Dbh	11.5	11.7	13.1	14.8	16.7	0
V3		Understory (%)	20	0	0	0	0	0
		Midstory (%)	80	0	0	0	0	0
V4	Hydrology	Flow/Exchange	Low	Low	Low	Low	Low	Low
		Flooding Duration	Seasonal	Seasonal	emi-Permaner	emi-Permane	emi-Permaner	Permanent
V5	Forest Size	Class	2	2	2	2	2	1
V6	Surrounding	Forest / marsh	34	34	34	34	34	34
	Land	Abandoned Ag	0	0	0	0	0	0
	Use	Pasture / Hay	40	40	40	40	40	40
		Active Ag	20	20	20	20	20	20
		Development	7	7	7	7	7	7
V7	Disturbance	Disturbance Type						
		Distance						

LAAA	OP SI Calculations	TY =	0	1	16	32	47	61
Variat	ole - Description		Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	1.00	1.00	1.00	1.00	1.00	UNUSED
V2	Maturity	Age (yrs)						
	-	Dbh	0.35	0.37	0.51	0.65	0.78	
V3		Understory (%)						
		Midstory (%)	0.70	0.70	0.78	0.83	0.78	UNUSED
V4	Hydrology	Flow/Exchange						
		Flooding Duration	0.65	0.65	0.45	0.45	0.45	0.30
V5	Forest Size	Class	0.40	0.40	0.40	0.40	0.40	UNUSED
V6	Surrounding Land Use	Forest / marsh Abandoned Ag Pasture / Hay	0.53	0.53	0.53	0.53	0.53	0.53
		Active Ag Development						
V7	Disturbance	Disturbance Type Distance	0.78	0.78	0.78	0.78	0.78	0.78
		HSI =	0.60	0.61	0.64	0.69	0.72	

ΓVV	P SI Calculations	TY =	0	1	16	32	47	61
Variable - Description			Value	Value	Value	Value	Value	Value
V1	Tree Species Composition	Class	1.00	1.00	1.00	1.00	1.00	UNUSED
V2	Maturity	Age (yrs)						
		Dbh	0.35	0.37	0.51	0.65	0.78	
V3		Understory (%)						
		Midstory (%)	0.70	0.10	0.10	0.10	0.10	UNUSED
V4	Hydrology	Flow/Exchange						
		Flooding Duration	0.65	0.65	0.45	0.45	0.45	0.30
V5	Forest Size	Class	0.40	0.40	0.40	0.40	0.40	UNUSED
V6	Surrounding	Forest / marsh						
	Land	Abandoned Ag						

	Use	Pasture / Hay	0.53	0.53	0.53	0.53	0.53	0.53
		Active Ag						
		Development						
V7	Disturbance	Disturbance Type	0.78	0.78	0.78	0.78	0.78	0.78
		Distance						
		HSI =	0.60	0.47	0.49	0.52	0.55	

Project: H10 Surveys

FWOP			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.020273	0.60	0.01	
1	0.020273	0.61	0.01	0.01
16	0.020273	0.64	0.01	0.19
32	0.020273	0.69	0.01	0.22
47	0.020273	0.72	0.01	0.22
61	0.020273		0.00	0.10
61	= Max TY		Total	
			AAHUs =	0.74
			AAHUs =	0.01

FWP			Total	Cummulativ
TY	Acres	x HSI	HUs	HUs
0	0.020273	0.60	0.01	
1	0.020273	0.47	0.01	0.01
16	0.020273	0.49	0.01	0.15
32	0.020273	0.52	0.01	0.16
47	0.020273	0.55	0.01	0.16
61	0.020273		0.00	0.08
61	= Max TY		Total	