2017 Coastal Master Plan

Appendix C – Modeling

Attachment C3-5

Vegetation

Report: Version I

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Prepared By: **Jenneke M. Visser** (University of Louisiana at Lafayette), Scott M. Duke-Sylvester (University of Louisiana at Lafayette), Gary P. Shaffer (Southeaster Louisiana University), Mark W. Hester (University of Louisiana at Lafayette), Brady Couvillion (U.S. Geological Survey), Whitney P. Broussard III (University of Louisiana at Lafayette), Jonathan M. Willis (University of Louisiana at Lafayette), and Holly Beck (U.S. Geological Survey)

Coastal Protection and Restoration Authority

This document was prepared in support of the 2017 Coastal Master Plan being prepared by the Coastal Protection and Restoration Authority (CPRA). The CPRA was established by the Louisiana Legislature in response to Hurricanes Katrina and Rita through Act 8 of the First Extraordinary Session of 2005. Act 8 of the First Extraordinary Session of 2005 expanded the membership, duties and responsibilities of the CPRA and charged the new Authority to develop and implement a comprehensive coastal protection plan, consisting of a Master Plan (revised every 5 years) and annual plans. The CPRA's mandate is to develop, implement and enforce a comprehensive coastal protection and restoration Master Plan.

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- The Water Institute of the Gulf - Ehab Meselhe, Alaina Grace, and Denise Reed
- Coastal Protection and Restoration Authority (CPRA) of Louisiana - Mandy Green, Angelina Freeman, and David Lindquist

The following people assisted with access and summaries of data used in this report:

- Coastal Protection and Restoration Authority (CPRA) of Louisiana: Bernard Wood and Leigh Anne Sharpe
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Executive Summary

The update for the 2017 Coastal Master Plan vegetation modeling builds on the strategy pursued in the 2012 modeling effort. The vegetation subroutine of the Integrated Compartment Model (ICM), referred to herein as LAVegMod 2.0 or 'vegetation model' interacts with the hydrology and morphology subroutines to predict change in vegetation cover across coastal Louisiana for 50 years. The change in vegetation at a site is driven first by mortality of existing vegetation due to the previous year's environmental condition. The reduction in plant cover caused by mortality creates space for the establishment of new species the following year. Unoccupied land also can occur as a result of soil morphodynamics and the creation of new land. Establishment of new species on unoccupied area is driven by the environmental conditions of the year in which the new species establishes. LAVegMod 2.0 adds additional species, and abandons the species mixtures used in LAVegMod.

In the update to the model design, there are additional conditions that need to be fulfilled for a species to be able to establish. The first new condition is that a colonizing species should be present in a grid cell or within the surrounding grid cells. This incorporates the effects that dispersal of plant propagules have on limiting the spread of plants.

The second new condition that applies to plant establishment is the potential for seed germination. In general, wetland plant seeds only germinate on moist soil and require periods without inundation. This requirement was added to those species that only establish from seeds. All of the marsh species in the model can establish through vegetative reproduction (growth from adjacent plants, as well as vegetative propagules), which reduces the need for seed germination in establishment. For floating marshes, the potential colonizers are limited to those species that can maintain a floating mat. The second part of the update is that an establishment probability matrix has been developed for each species. Both the mortality and establishment matrices were updated based upon six full years of CRMS data (2007-2012).

Finally, the revised model also includes plant species that characterize the barrier islands and bottomland hardwood forests of coastal Louisiana. These species are governed by elevation above mean sea level, a feature that was not part of LAVegMod. As a result, the model expansion includes new rules and parameters to govern the establishment and persistence of plants on barrier islands and bottomland hardwood forests. The barrier island part of the model requires higher resolution to capture the relatively steep elevation gradients in these systems.

Initial testing of LAVegMod 2.0 in the central coastal region using hydrology output from the 2012 Coastal Master Plan eco-hydrology model for the future without action under a moderate future scenario shows that the results from the new model are comparable to the results from the previous version of the model.

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List of Abbreviations

BHF	Bottomland Hardwood Forest
CRMS	Coastwide Reference Monitoring System
CPRA	Coastal Protection and Restoration Authority
FTI	Flood Tolerance Index
ICM	Integrated Compartment Model
LAVegMod	Louisiana Vegetation Model
PPT	Parts Per Thousand
SAV	Submerged Aquatic Vegetation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WLV	Water Level Variability

1.0 Introduction

The coastal wetlands of Louisiana are a unique ecosystem that supports a diversity of wildlife as well as a diversity of commercial interests of local and national importance. The state of Louisiana has established a five-year cycle of scientific investigation to provide up-to-date information to guide future legislation and regulation aimed at preserving this critical ecosystem. After the first Master Plan in 2007, a suite of individual modeling tools was developed for use in the 2012 Coastal Master Plan. During this effort, hundreds of projects were modeled for 50 years into the future in an effort to cull low-performing project options. The Coastal Protection and Restoration Authority (CPRA) is again utilizing modeling tools to evaluate project effects in support of the 2017 Coastal Master Plan, building upon existing technical efforts where possible. The modeling tools for this effort are designed to efficiently run 50-year time sequences with the ability to predict project effects at the basin-scale. Updated hydrology, morphology, and vegetation subroutines are combined into an Integrated Compartment Model (ICM) that allows for feedbacks among the different components. This document describes the updates made to the 2012 vegetation model for use in the 2017 Coastal Master Plan modeling effort.

Plant communities play a central role in shaping wetland ecosystems. Both the species and plant growth forms define habitat conditions for a diverse collection of arthropods, birds, reptiles, fish, mammals, and a host of other organisms. The plant species that comprise a wetland also shape hydrology and edaphic conditions through processes such as evapotranspiration and frictional resistance to water flow, thus affecting sedimentation and erosion rates. For these reasons, vegetation models are an integral part of ecosystem modeling projects (DeAngelis, 1998; Davis and Ogden, 1994). The Louisiana Vegetation Model (LAVegMod) was an integral part of a suite of models developed for the 2012 Coastal Master Plan (Visser et al., 2013). The purpose of LAVegMod is twofold. First, it is designed to provide a landscape-scale assessment of potential changes in the response of Louisiana coastal plant communities to natural and anthropogenic perturbations that may occur in coming decades. Second, it is a tool to assess the potential for management and restoration projects aimed to preserve and enhance wetlands both for their ecological values as well as a natural resource for sustainable commercial use.

The revised version of LAVegMod is referred to as LAVegMod 2.0. LAVegMod 2.0 is spatially explicit and simulates changes in plant community composition over time in response to changes in abiotic environmental conditions. The spatial domain for the model includes all of the coastal wetlands of Louisiana, defined as all wetland vegetation that occurs seaward of the 3 m land elevation contour (Figure 1.1). This 48,722 km^2 area is divided into a regular grid of 500 x 500 m cells (total 194,889 cells). Some areas (comprising 2,012 cells) are completely occupied by agricultural, urban, or river and are not modeled. In the remaining 192,877 cells the model tracks the fraction of the area occupied by different types of plants. Changes in the composition of each cell are computed at a yearly time interval and are the result of plant mortality and establishment that result from dynamic changes in the abiotic environment. Establishment is based on the eight adjacent cells for most, except for cells along the margins of the model domain, which can have as little as one adjacent cell.

Figure 1.1. The spatial domain for LAVegMod 2.0. The spatial domain of the LAVegMod 2.0 is outlined in red with the outline of Louisiana shown in green. Within the model domain, areas where the LAVegMod does not update the local plant community dynamics are shown in black. These areas represent either places that are dominated by the presence of agriculture, urbanization or other land uses that are strongly influenced by human actives or are places such as the Mississippi River, where emergent macrophytes are not present. The remaining area, shown in white, represents areas dominated by natural plant communities and are places where the LAVegMod simulates plant community dynamics.

Each plant species likely responds to changes in environmental conditions individualistically (Gleason, 1926), and the goal in designing LAVegMod was to include as much of this reality as is supported by available data and the existing literature. The emergent wetlands of coastal

Louisiana traditionally have been classified into five habitat types (Chabreck, 1972): swamp, fresh marsh, intermediate marsh, brackish marsh, and saline marsh. In this approach, the habitats represent either an aggregation of multiple plant species (e.g. swamp) or are largely descriptive of a particular environmental condition (e.g., saline marsh). One difficulty with this approach is that the classes become little more than a simple categorization of environmental conditions into specific ranges. Another drawback is that the plant species assigned to a habitat type do not all respond at the same rate and may not necessarily remain in association with each other under future environmental conditions. This can be problematic if a particular plant placed in a broad category plays an important role in creating habitat for species in higher trophic levels. For example, black mangroves (*Avicennia germinans*) are an important breeding habitat for Brown Pelican (*Pelecanus occidentalis*) and support different estuarine fishes than oyster grass (*Spartina alterniflora*) yet both are classified as salt marsh habitats. Such a broad category will not reflect a change in the distribution of a component species that might be of concern for the sustainability of a species at higher trophic levels. In LAVegMod 2.0, only SAV is modeled as a group while every other species is based on the environmental conditions used by each species.

Within the model, two distinct approaches are taken to represent species niches and plant species dynamics for each cell. The submerged aquatic vegetation (SAV) code treats the SAV as an annual crop and it predicts the establishment of SAV based on water depth, salinity, and temperature during the summer months. The SAV code has remained unchanged from LAVegMod and for completeness the establishment algorithm is provided in Appendix 2. For all other species, dynamics emerge within a cell as environmental conditions in the cell move out of the niche of one species, indicating a loss in cover within the cell (mortality), and into the niche of another species resulting in the establishment and/or expansion of the other species (establishment).

LAVegMod 2.0 builds on the strategy utilized for this model in the 2012 Coastal Master Plan effort (Visser et al., 2013). The basic logic for this model is described below (Figure 1.2). Simulations begin with an initial allocation of species, open water, and upland to each cell. This initialization map, or base map, is generated based on current vegetation distribution in the Louisiana coast. The development of the base map is described in Attachment C3-27 – Landscape Data and is similar to the map developed for LAVegMod (Visser et al., 2012). The change in vegetation at a site is driven first by the mortality of the existing species due to the previous year's environmental conditions. The reduction in plant cover caused by mortality creates space for the establishment of new species the following year and can be adjusted based on available land area within the cell as derived by other subroutines within the ICM. Establishment of new species on unoccupied area is driven by the available species pool in the cell as well as the adjacent cells and the environmental conditions of the year in which the new species establishes. The model does not include any plant species interactions such as facilitation and competition that could affect mortality and establishment (Feagin et al., 2005). However, the mortality and establishment conditions are based on the realized niche (i.e. in the presence of competition with other species). The rationale for mortality and establishment algorithms for specific species is provided in Sections 2, 3, 4, 5, and 6 (Table 1.1).

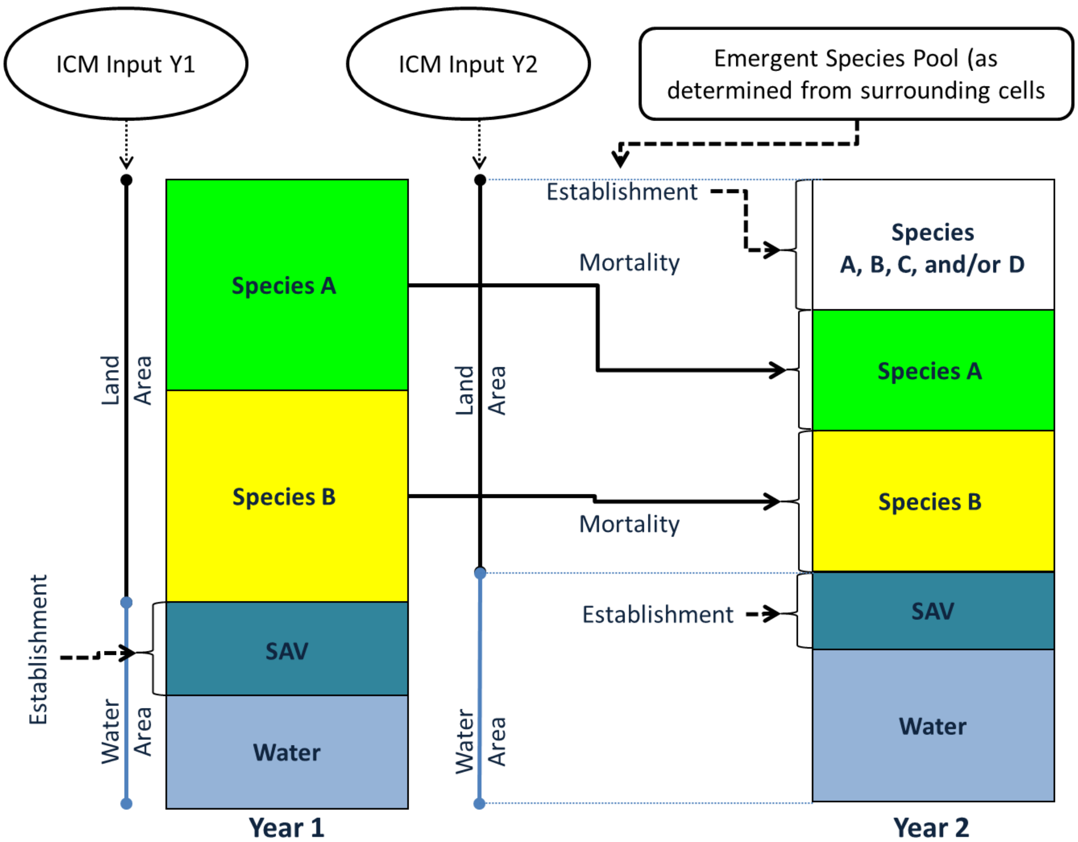


Figure 1.2. The conceptual model for LAVegMod 2.0. Note that SAV is treated as an annual, which is responding to the environment in a particular year. This is unchanged from LAVegMod. For this generalization no upland is shown, but if upland is present in a cell it is assumed to remain constant and depicted in the model as a category called NOTMOD.

Table 1.1. Species included in LAVegMod 2.0 are organized by habitat and the report section describing their algorithm development. Newly added species and habitats are in bold.

Habitat	Species	Species Code	Section
Bottomland Hardwood Forest	***Quercus lyrata* Walter**	*QULE*	4
	***Quercus texana* Buckley**	*QUTE*	
	***Quercus laurifolia* Michx.**	*QULA3*	
	***Ulmus americana* L.**	*ULAM*	
	***Quercus nigra* L.**	*QUNI*	
	***Quercus virginiana* Mill.**	*QUVI*	
Swamp Forest	***Salix nigra* Marshall**	*SANI*	3
	***Taxodium distichum* (L.) Rich.**	*TADI2*	
	***Nyssa aquatica* L.**	*NYAQ2*	
Fresh Floating Marsh	***Panicum hemitomon* Schult.**	*PAHE2*	6
	***Eleocharis baldwinii* (Torr.) Chapm.**	*ELBA2*	
	***Hydrocotyle umbellata* L.**	*HYUM*	
Fresh Attached Marsh	*Morella cerifera* (L.) Small	*MOCE2*	2
	Panicum hemitomon Schult.	*PAHE2*	
	***Sagittaria latifolia* Willd.**	*SALA2*	
	Zizaniopsis miliacea (Michx.) Döll & Asch.	*ZIMI*	
	Cladium mariscus (L.) Pohl	*CLMA10*	
	Typha domingensis Pers.	*TYDO*	
	Sagittaria lancifolia L.	*SALA*	
Intermediate Marsh			2
	Phragmites australis (Cav.) Trin. ex Steud.	*PHAU7*	
	Schoenoplectus californicus (C.A. Mey.) Palla	*SCCA11*	
	***Iva frutescens* L.**	*IVFR*	
	***Baccharis halimifolia* L.**	*BAHA*	
Brackish Marsh	*Spartina patens* (Aiton) Muhl.	*SPPA*	2
	Paspalum vaginatum Sw.	*PAVA*	
Saline Marsh	*Juncus roemerianus* Scheele	*JURO*	2
	Distichlis spicata (L.) Greene	*DISP*	
	Spartina alterniflora Loisel.	*SPAL*	
	Avicennia germinans (L.) L.	*AVGE*	
Dune	***Uniola paniculata* L.**	*UNPA*	5
	***Panicum amarum* Elliott**	*PAAM2*	
	***Sporobolus virginicus* (L.) Kunth**.	*SPVI3*	
Swale	***Spartina patens* (Aiton) Muhl.**	*SPPABI*	5
	***Distichlis spicata* (L.) Greene**	*DISPBI*	
	***Solidago sempervirens* L.**	*SOSE*	
	***Strophostyles helvola* (L.) Elliott**	*STHE9*	
	***Baccharis halimifolia* L.**	*BAHABI*	

In LAVegMod, predictions were based on vegetation types, some of which were dominated by single species, whereas others were mixtures of several species without a clear dominant. Because each species has its own environmental requirements, LAVegMod 2.0 instead forecasts changes in individual species cover. Specific replacements from LAVegMod are as follows:

1. Thin-mat has been replaced by *Eleocharis baldwinii* and *Hydrocotyle umbellata*
2. Splay has been replaced by *Sagittaria latifolia*
3. Swamp has been replaced by *Taxodium distichum, Nyssa aquatia*, and *Salix nigra*
4. Shrub has been replaced by *Iva frutescens* and *Baccharis halimifolia*

2.0 Updates to Marsh Species

This section describes the algorithm development for *Panicum hemitomon* Schult. (maidencane), *Eleocharis baldwinii* (Torr.) Chapm. (Baldwin's spikerush), *Hydrocotyle umbellata* L. (marsh pennywort), *Morella cerifera* (L.) Small (waxmyrtle), *Sagittaria latifolia* Willd. (duck potato), *Zizaniopsis miliacea* (Michx.) Döll & Asch. (rice cutgrass), *Cladium mariscus* (L.) Pohl (saw grass), *Typha domingensis* Pers. (southern cattail), *Sagittaria lancifolia* L. (bull tongue), *Phragmites australis* (Cav.) Trin. ex Steud. (roseau cane), *Schoenoplectus californicus* (C.A. Mey.) Palla (California bulrush), *Iva frutescens* L. (marsh elder), *Baccharis halimifolia* L. (groundselbush), *Spartina patens* (Aiton) Muhl. (wiregrass), *Paspalum vaginatum* Sw. (seashore paspalum), *Juncus roemerianus* Scheele (black needlerush), *Distichlis spicata* (L.) Greene (salt grass), *Spartina alterniflora* Loisel. (oystergrass), and *Avicennia germinans* (L.) (black mangrove).

2.1. Background

All of the species included in this section are species that were included in LAVegMod or are characteristic species for areas without clear dominants as described in LAVegMod (Visser et al., 2012). New mortality and establishment matrices for all of these species were created using the additional full three years (2010, 2011, and 2012) of Coastwide Reference Monitoring System (CRMS) data that have become available since LAVegMod. A map of the distribution of the CRMS stations is provided in Figure 2.1.

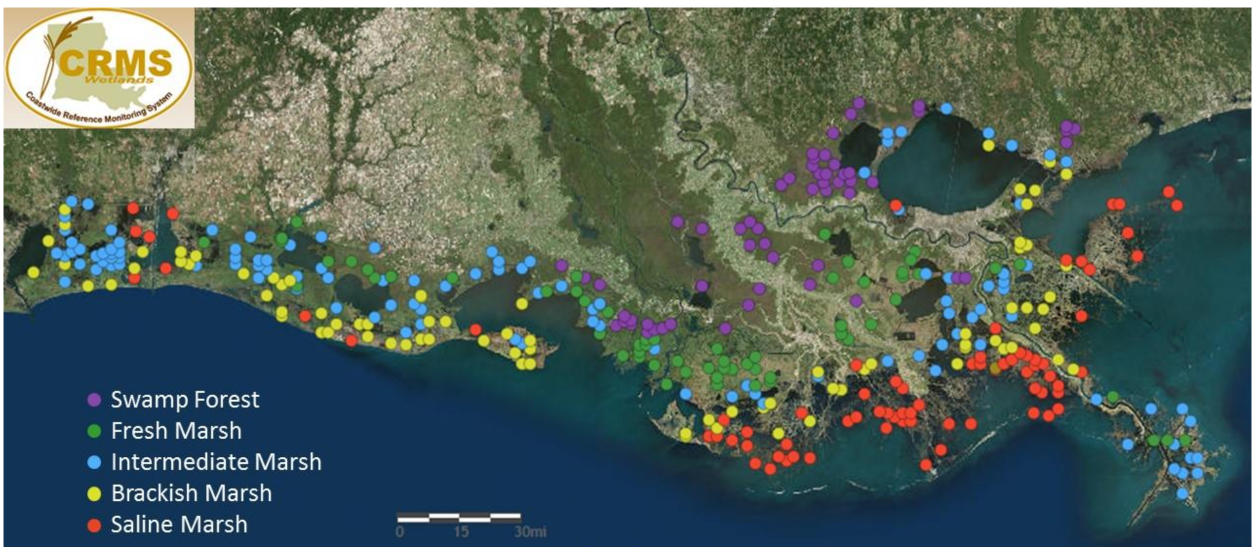


Figure 2.1. Distribution of the CRMS stations in coastal Louisiana. Habitat classification of CRMS stations is based on 2013 data.

In addition, we added a step in the algorithm that takes into account that propagules (seeds or plant fragments) have to be able to reach a cell for establishment to occur (Figure 2.2). The literature on seed dispersal for Louisiana coastal plants is relatively scarce to non-existent. Seed banks have been described for intermediate marshes and water bottoms (Baldwin et al. 1996, LaPeyre et al., 2005). However, no studies reporting the composition of the seed bank are available for other Louisiana coastal wetlands. Neither of the two available studies estimated the distance to the parent plants needed for a dispersal estimation. In general, the seed bank is dominated by annual species that are not the dominants that are included in LAVegMod 2.0. However, LaPeyre et al. (2005) found a large number of *Cladium mariscus* seeds in a *Spartina patens* dominated site. It is generally assumed that many of the dominant plants in coastal Louisiana rarely establish from seed and that most expansion is due to vegetative spread and vegetative propagation from dislodged rhizomes, or stem fragments. Therefore, LAVegMod 2.0 assumes that the establishment species pool for a cell consists of the plant species that were present in the cell the previous year and the species that were present in the surrounding cells the previous year (Figure 2.3). Model code has been written so that the dispersal distance can be adjusted for each species if more information becomes available.

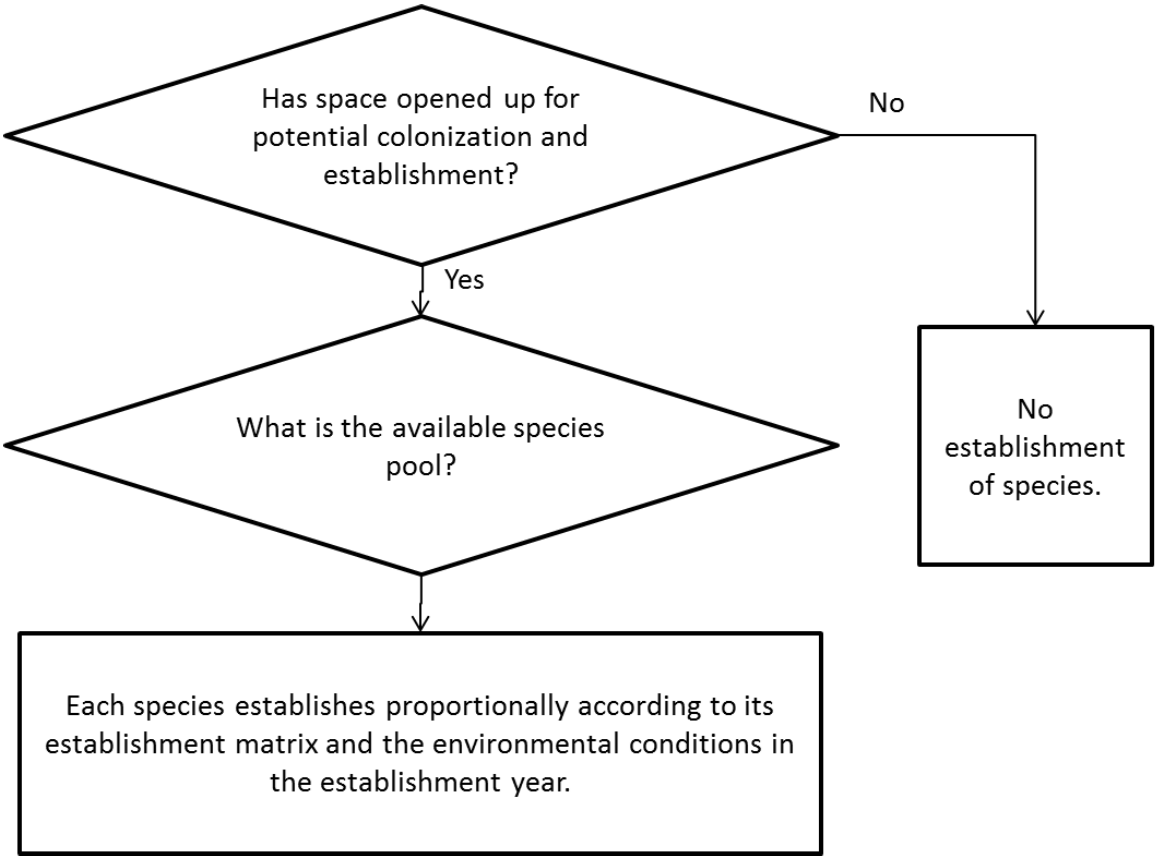


Figure 2.2. New model step for establishment of species in a cell. If the species pool is empty, bare ground is created, if only one species is available and the establishment value is greater than 0 all of the available area is occupied by that species.

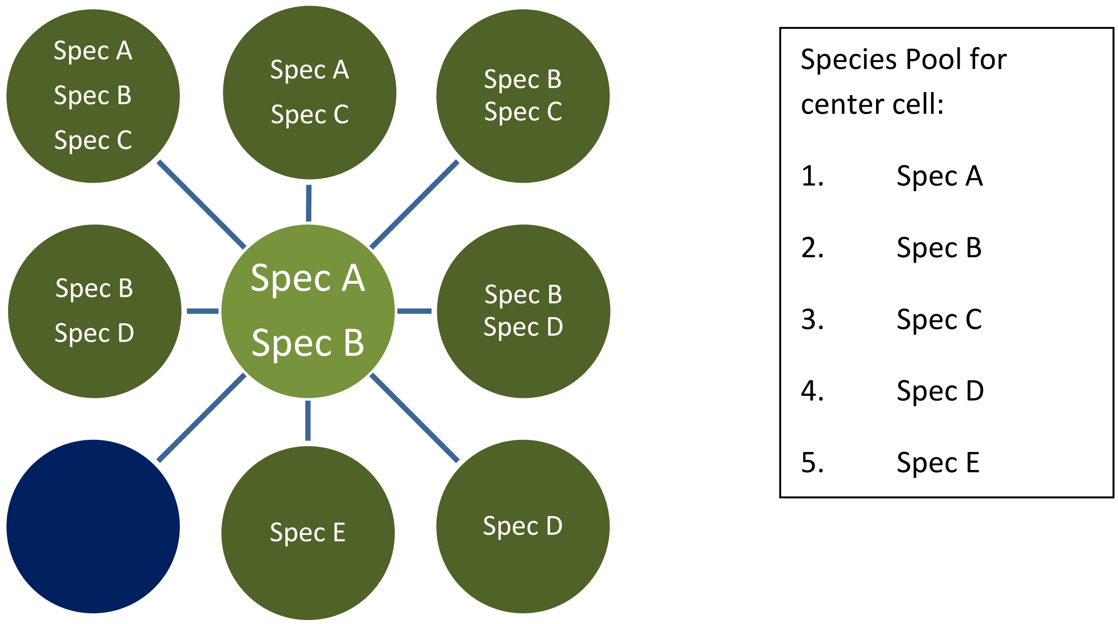


Figure 2.3. Example of determining the species pool for establishment using the surrounding cells. A hypothetical species distribution in year 1 is provided, including a surrounding cell without species (blue), which could be an open water, upland, or outside the model domain cell. The species pool for the center cell in the following year is provided in the rectangle.

2.2. Methods

The CRMS database manager (Mark Comeaux, U.S. Geological Survey [USGS]) provided a statistical analysis of all the CRMS hydrologic data to date in both annual and monthly summaries (Table 2.1). Data were culled to those with complete years of data (2007, 2008, 2009, 2010, 2011, and 2012). Most CRMS sites were established during 2006, and the 2013 dataset was incomplete at the time of this analysis.

Annual vegetation survey data of herbaceous plots for every available CRMS station were downloaded from the CRMS database for vegetation sampling years 2007, 2008, 2009, 2010, 2011, and 2012. These survey records included the annual estimates of percent cover for each species present at a station (the percentage of total area occupied by a species' canopy). Percent cover here is an ocular estimate of vegetation cover by species conducted in 10 or less (9 in swamps) 2m x 2m or 4m^2 plots per site. For a detailed description of CRMS vegetation sampling techniques, see Folse et al. (2008). Vegetation surveys are regularly conducted between July and October for a given year.

Table 2.1. CRMS monthly and annual summary of hydrologic data provided by USGS.

Hydrology Variable	Derived Parameter
Stage (m)	1. Standard Deviation, as an estimate of water exchange
Inundation (stage relative to soil elevation in m)	2. Percentage of positive observations, as estimate of duration of flooding 3. 90th percentile, as an estimate of the average height of flooding events 4. 10th percentile as an estimate of moist soil availability
Salinity (parts per thousand [ppt])	5. Median as an estimate of the most common salinity 6. 95th percentile as estimate of the maximum salinity 7. 70th percentile as estimate of duration of extreme salinity
Temperature	8. 5th percentile as an estimate of winter severity

The plot level percent cover data for each species were then averaged by site. In the CRMS dataset, however, only observed species and cover values were recorded. Less than 10 plots per site may have the species of interest present, and the total area of all sampled plots must be taken into account when averaging the data by site. So, the estimated percent cover value for each species present at a site was computed as follows:

$$PercentCover_{ab} = \frac{\sum_{i=1}^{z} PercentCover_i}{z}$$

where: *a* = individual species

b = individual station

i = plot number

Z = number of plots per site

A subset of the data table was then produced that included only the species in LAVegMod 2.0 (Table 2.2). CRMS stations with no vegetation cover for the LAVegMod 2.0 species were discarded. The final dataset of vegetation included the percent cover values for the LAVegMod 2.0 species at each available CRMS station in the survey years 2007, 2008, 2009, 2010, 2011, and 2012. Additions to the vegetation dataset used in LAVegMod include data for survey years 2010, 2011, and 2012, as well as vegetation data for new species introduced in LAVegMod 2.0, which are listed in Table 1.1.

Finally, the hydrologic and vegetation records were merged by station and year. Only those records with complete data were retained. The resulting matrix includes the following annualized parameters for each available CRMS station in the years 2007, 2008, 2009, 2010, 2011, and 2012: median salinity, Water Level Variability (WLV), and percent cover for each species in LAVegMod 2.0. WLV is the standard deviation of the stage and is an estimate of the degree of water exchange between the water and the marsh. Percentage of time flooded although an important variable did not vary substantially among plant species. Time constraints precluded evaluating if WLV and annual median salinity were the best out of all of the parameters mentioned in Table 2.1.

Summary statistics generated for use in the model development include the mean, median, P5, P25, P75, and P95 values calculated from the annual median salinity values and annual WLV at those CRMS sites where the vegetation was present for each species. Additionally, the calculated statistics were weighted by the percent cover values at each station of record. Weighted means are calculated by repeating each observation as many times as indicated by the weighing variable. If a species has a cover of 100 percent then the observation of those environmental parameters are repeated 100 times. If a species has a cover of 1 percent only one observation of that environmental condition is used. If these are the only two observations used in the calculation, the weighted mean of the environmental parameter would be very similar to the parameter for the site with 100 percent cover. Therefore, this procedure ensures that the salinity and water level records at a given station will have more influence on the final statistic if the percent cover for the species is high. The resulting average salinity and WLV with standard errors for each vegetation type are provided in Figure 2.4, as well as Tables 2.2 and 2.3.

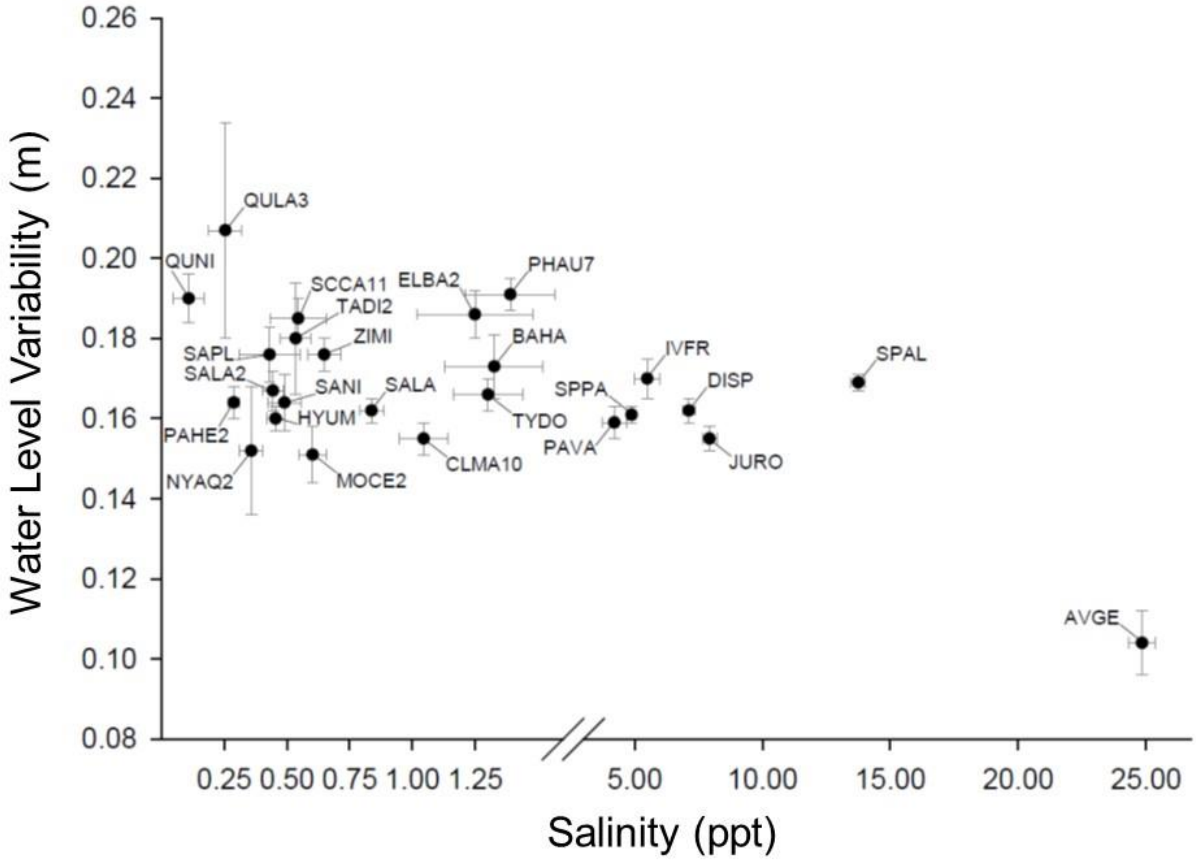


Figure 2.4. The distribution for all species included in LAVegMod 2.0 relative to salinity and water level variability as determined from six years of CRMS data. Species abbreviations follow the U.S. Department of Agriculture (USDA) plants database and species names are provided in Table 2.2.

Table 2.2. Weighted annual statistics for salinity (ppt) for each marsh species[1].

Code	Scientific Name	N	M	SE	P5	P25	P75	P95
AVGE	*Avicennia germinans* (L.) L.	25	24.8	0.5	19.5	23.5	26.3	26.9
BAHA	*Baccharis halimifolia* L.	80	1.3	0.2	0.1	0.4	1.4	6.4
CLMA10	*Cladium mariscus* (L.) Pohl	69	1.0	0.1	0.2	0.4	1.3	2.7
DISP	*Distichlis spicata* (L.) Greene	347	7.1	0.2	1.6	4.0	9.3	15.2
ELBA2	*Eleocharis baldwinii* (Torr.) Chapm.	37	1.2	0.2	0.2	0.2	2.0	3.3
HYUM	*Hydrocotyle umbellata* L.	201	0.5	0.0	0.2	0.2	0.5	1.5
IVFR	*Iva frutescens* L.	102	5.5	0.5	1.0	1.9	6.6	19.2
JURO	*Juncus roemerianus* Scheele	237	7.9	0.3	2.0	4.5	10.5	16.4
MOCE2	*Morella cerifera* (L.) Small	72	0.6	0.1	0.1	0.2	0.8	1.7
NYAQ2	*Nyssa aquatica* L.	20	0.4	0.0	0.1	0.2	0.6	0.6
PAHE2	*Panicum hemitomon* Schult.	133	0.3	0.0	0.1	0.2	0.3	0.7
PAVA	*Paspalum vaginatum* Sw.	51	4.2	0.5	0.4	2.2	4.7	10.0
PHAU7	*Phragmites australis* (Cav.) Trin. ex Steud.	85	1.4	0.2	0.2	0.2	2.4	4.4
SALA	*Sagittaria lancifolia* L.	308	0.8	0.0	0.2	0.2	1.2	2.8
SALA2	*Sagittaria latifolia* Willd.	86	0.4	0.0	0.2	0.2	0.6	1.5
SAPL	*Sagittaria platyphylla* (Engelm.) J.G. Sm.	25	0.4	0.1	0.2	0.2	0.3	2.1
SANI	*Salix nigra* Marsh.	35	0.5	0.1	0.1	0.2	0.8	1.1
SCCA11	*Schoenoplectus californicus* (C.A. Mey.) Palla	59	0.5	0.1	0.2	0.2	0.3	2.8
SPAL	*Spartina alterniflora* Loisel.	405	13.7	0.3	3.6	9.8	18.2	21.7
SPPA	*Spartina patens* (Aiton) Muhl.	493	4.9	0.1	0.9	2.6	6.4	10.7
TADI2	*Taxodium distichum* (L.) Rich.	38	0.5	0.1	0.1	0.1	0.8	1.1
TYDO	*Typha domingensis Pers.*	53	1.3	0.1	0.3	0.5	1.9	3.8
ZIMI	*Zizaniopsis miliacea (Michx.) Döll & Asch.*	88	0.6	0.1	0.2	0.2	0.8	1.9

1 Code: USDA code for the species

N: Number of observations; M Median; SE: Standard Error; P5: 5th Percentile; P25: 25th Percentile; P75: 75th Percentile; P95: 95th Percentile

Table 2.3. Weighted annual statistics for water level variability (m) for each species2.

Code	Scientific Name	N	Mean	SE	P5	P25	P75	P95
AVGE	*Avicennia germinans* (L.) L.	25	0.104	0.008	0.060	0.081	0.118	0.176
BAHA	*Baccharis halimifolia* L.	80	0.173	0.008	0.069	0.132	0.199	0.329
CLMA10	*Cladium mariscus* (L.) Pohl	69	0.155	0.004	0.094	0.139	0.175	0.194
DISP	*Distichlis spicata* (L.) Greene	347	0.162	0.003	0.068	0.135	0.194	0.231
ELBA2	*Eleocharis baldwinii* (Torr.) Chapm.	37	0.186	0.006	0.120	0.162	0.214	0.246
HYUM	*Hydrocotyle umbellata* L.	201	0.160	0.003	0.095	0.119	0.194	0.230
IVFR	*Iva frutescens* L.	102	0.170	0.005	0.093	0.142	0.199	0.285
JURO	*Juncus roemerianus* Scheele	237	0.155	0.003	0.069	0.121	0.183	0.233
MOCE2	*Morella cerifera* (L.) Small	72	0.151	0.007	0.031	0.113	0.201	0.230
NYAQ2	*Nyssa aquatica* L.	20	0.152	0.016	0.072	0.088	0.229	0.275
PAHE2	*Panicum hemitomon* Schult.	133	0.164	0.004	0.095	0.145	0.193	0.217
PAVA	*Paspalum vaginatum* Sw.	51	0.159	0.004	0.107	0.147	0.186	0.188
PHAU7	*Phragmites australis* (Cav.) Trin. ex Steud.	85	0.191	0.004	0.113	0.172	0.214	0.252
SALA	*Sagittaria lancifolia* L.	8	0.207	0.027	0.083	0.113	0.227	0.301
SALA2	*Sagittaria latifolia* Willd.	3	0.190	0.006	0.175	0.194	0.194	0.194
SAPL	*Sagittaria platyphylla* (Engelm.) J.G. Sm.	308	0.162	0.003	0.090	0.134	0.186	0.237
SANI	*Salix nigra* Marsh.	86	0.167	0.005	0.085	0.134	0.211	0.246
SCCA11	*Schoenoplectus californicus* (C.A. Mey.) Palla	25	0.176	0.007	0.102	0.149	0.191	0.225
SPAL	*Spartina alterniflora* Loisel.	35	0.164	0.007	0.102	0.127	0.192	0.243
SPPA	*Spartina patens* (Aiton) Muhl.	59	0.185	0.005	0.119	0.170	0.206	0.230
TADI2	*Taxodium distichum* (L.) Rich.	405	0.169	0.002	0.097	0.142	0.192	0.248
TYDO	*Typha domingensis Pers.*	493	0.161	0.002	0.078	0.137	0.190	0.231
ZIMI	*Zizaniopsis miliacea (Michx.) Döll & Asch.*	38	0.180	0.014	0.088	0.127	0.194	0.275

2 Abbreviation: USDA code for the species

N: Number of observations; SE: Standard Error; P5: 5th Percentile; P25: 25th Percentile; P75: 75th Percentile; P95: 95th Percentile

2.3. Algorithms

The standard algorithm (Figure 1.2) for emergent marsh species is unchanged for the mortality step. In the mortality step, cover of each species is reduced based on the proportional mortality of the species under the environmental conditions in a given year using the mortality matrix. Mortality matrices were updated using the data analysis described above. Mortality of marsh species was assumed to be 0 (total survival) in the 25th to 75th percentile (Figure 2.5). For salinity, everything outside the 5th to 95th percentile range was assumed to be 1 (total mortality), except for 0 ppt in the fresh marsh species (see Table 1.1), since absolute zero salinity is seldom measured and therefore is below the 5th percentile. For WLV, the mortality was slightly increased below the 5th percentile and rapidly decreased after the 95th percentile for those species known to occur under stagnant conditions (i.e. *Paspalum vaginatum*, *Eleocharis baldwinii*, and *Hydrocotyle umbellata*). For the other species the opposite occurred, with high increases in mortality below the 5th percentile and slower increases in mortality above the 95th percentile (For an example see Figure 2.5). Mortality matrices for all species are provided in Appendix 1.

In the establishment step, surrounding cells were queried to define the species pool for potential establishment (Figure 2.3). Next the probability of establishment was read from the establishment matrix for the species. For establishment, we assumed that species are more sensitive to the environmental conditions at this life stage than mature plants. Therefore, we assumed that we had higher survival of propagules at the lower stress condition for the species. We used the mortality matrices described above and subtracted the mortality proportion from 1, to get a survival proportion. To move the survival to a less stressful salinity condition, we moved the values up 1 row in the matrix towards a lower salinity. For fresh marsh species this was a 0.1 ppt decrease, while for all other species this constitutes a 1 ppt decrease. For WLV, 1 species known to occur under more stagnant conditions (i.e. *Paspalum vaginatum*, *Eleocharis baldwinii*, and *Hydrocotyle umbellata*) were moved one column toward the lower WLV (0.04 m decrease in WLV); all other species were moved one cell higher. Establishment matrices for all species are provided in Appendix 2.

The final step in the algorithm was to proportionally assign cover to those species that are able to establish. For example, if there were two species that could establish and species 1 had an establishment probability of 0.5 and species 2 had an establishment probability of 0.1 then the available space would be occupied by 83% species 1 and 17% species 2.

Note: the maximum value for WLV in the model code is 10. This is to avoid vegetation model crashes that could result from instabilities from the hydrodynamic subroutine.

Water Level Variability (m)

Average Annual Salinity (ppt)

SALA2	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1	1.00	0.85	0.60	0.35	0.10	0.10	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
1.2	1.00	0.95	0.70	0.45	0.20	0.20	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.4	1.00	1.00	0.80	0.55	0.30	0.30	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00
1.6	1.00	1.00	0.90	0.65	0.40	0.40	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
1.8	1.00	1.00	1.00	0.75	0.50	0.50	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	0.75	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure 2.5. Mortality matrix for Sagittaria latifolia*. Green shows the location of the mean, yellow shows the 25th to 75th percentile range, and red indicates the 5th to 95th percentile range. Values represent the proportion of the cover that senesces. Mortality matrices for all species are provided in Appendix 1.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SALA2	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.2	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.4	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.6	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.8	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1	0.00	0.00	0.15	0.40	0.65	0.90	0.90	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15
1.2	0.00	0.00	0.05	0.30	0.55	0.80	0.80	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05
1.4	0.00	0.00	0.00	0.20	0.45	0.70	0.70	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
1.6	0.00	0.00	0.00	0.10	0.35	0.60	0.60	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.25	0.50	0.50	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 2.6. Establishment matrix for Sagittaria latifolia. *Green shows the location of the mean, yellow shows the 25th to 75th percentile range, and red indicates the 5th to 95th percentile range. Values represent the proportion of the cover that establishes. Establishment matrices for all species are provided in Appendix 2.*

2.4. Discussion

Increased submergence and salinity levels are stressors that limit plant productivity (DeLaune et al., 1987; McKee and Mendelssohn, 1989; Howard and Mendelssohn, 1999; Hester et al., 2001), partly because increased salinity and flooding stress decrease the uptake of nitrate and ammonium (McKee and Mendelssohn, 1989; Webb and Mendelsohn, 1996). Not all species respond in the same way and therefore these factors are also considered the drivers for changes in species composition along the Louisiana coast (Visser et al., 1998, 2000, 2002). Although emergent vegetation distribution in coastal systems can also be driven by pH, soil organic matter, nutrients, fire, competition, and herbivory (Day et al., 1988; Doren et al., 1997; Urban et al., 1993; Pennings and Callaway, 1992; Taylor et al., 1997; Evers et al., 1998) these drivers are not affected by most restoration and protection project features.

Analysis of the CRMS data showed the realized niches of the species in the model. These realized niches take into account all of the drivers combined with the two drivers of interest (WLV and salinity). Table 2.4 summarizes the comparison of the CRMS based realized salinity niches with the realized niches documented in the literature. Most of the literature is based on distributions of the species along the salinity gradient throughout North and Central America. This comparison shows that most species occur at lower salinity than observed elsewhere, which is due to the lower salinity in Louisiana's coastal waters due to the large amount of freshwater coming from the Mississippi river. Salinity at which growth is negatively affected is also documented in Table 2.4; this is primarily based on greenhouse studies. In general, species are found at salinities where growth is not affected.

Flooding is generally considered the second driver affecting coastal plants (DeLaune et al., 1987; McKee and Mendelssohn, 1989; Naidoo et al., 1992; Spalding and Hester, 2007). However, when trying to delineate among coastal vegetation types along the Louisiana coast tidal amplitude was a better parameter to delineate species distribution (Snedden and Steyer, 2013). This is primarily because simple flooding statistics like the percentage of time that the marsh is flooded are very similar across the Louisiana coast (Snedden and Steyer, 2013). Tidal amplitude or WLV can be an estimate of the amount of exchange that will affect nutrient and sediment input as well as the duration of flooding. WLV tends to be higher near the coast where daily flooding cycles occur driven by lunar tides, while WLV is low in interior marshes and the Chenier Plain, where flooding cycles have longer duration and are driven by wind and precipitation.

Using both WLV and average annual salinity LAVegMod yielded reasonable results with respect to vegetation change (Visser et al., 2013). The updates described in this section and the species added to LAVegMod 2.0 will be calibrated and validated. The results will be provided in a separate report.

Table 2.4. Comparison of annual salinity tolerance from CRMS analysis (M=Median, P5 = 5th percentile, P95 = 95th percentile) with data from the literature.

Scientific Name	M	P5	P95	Literature Values	References
Avicennia germinans (L.) L.	24.8	19.5	26.9	35-85 Growth reduced >10	Soto 1988, Suarez and Medina 2005
Baccharis halimifolia L.	1.3	0.1	6.4	0-20	Eleuterius and McDaniel 1978, Young et al. 1994
Cladium mariscus (L.) Pohl	1.0	0.2	2.7	0-5	Macek and Rejmankova 2007
Distichlis spicata (L.) Greene	7.1	1.6	15.2	5-43	Hester et al. 2005, Lonard et al. 2010
Eleocharis baldwinii (Torr.) Chapm.	1.2	0.2	3.3		
Hydrocotyle umbellata L.	0.5	0.2	1.5		
Iva frutescens L.	5.5	1.0	19.2	1-20 Growth reduced >10	Hester et al. 2005, Tolliver et al. 1997
Juncus roemerianus Scheele	7.9	2.0	16.4	3-90	Eleuterius 1989
Morella cerifera (L.) Small	0.6	0.1	1.7	<0.5	Eleuterius and McDaniel 1978, Hester et al. 2005
Panicum hemitomon Schult.	0.3	0.1	0.7	<0.5 Growth reduced > 0	Willis and Hester 2004, Hester et al. 2005
Paspalum vaginatum Sw.	4.2	0.4	10.0	0-50 Growth reduced > 13	Lonard et al. 2014, Lee et al. 2005
Phragmites australis (Cav.) Trin. ex Steud.	1.4	0.2	4.4	0-5	Burdick et al. 2001, Chambers et al. 2003
Sagittaria lancifolia L.	0.8	0.2	2.8	0-9 Growth reduced > 4	Eleuterius and McDaniel 1978, Hester et al. 2005, Greiner La Peyre et al. 2001, McKee and Mendelsson 1989
Sagittaria latifolia Willd.	0.4	0.2	1.5	<0.5 Growth reduced > 0	Holm and Sasser 2001, Martin and Shaffer 2005
Schoenoplectus californicus (C.A. Mey.) Palla	0.5	0.2	2.8	0-23 Growth reduced > 5	Hester et al. 2005, Madrid et al. 2012, Howard and Rafferty 2006
Spartina alterniflora Loisel.	13.7	3.6	21.7	3-50 Growth reduced > 18	Eleuterius and McDaniel 1978, Stalter 1973, Konisky and Burdick 2004, Linthurst and Blum

Scientific Name	M	P5	P95	Literature Values	References
					1981, Linthurst and Seneca 1981
Spartina patens (Aiton) Muhl.	4.9	0.9	10.7	1-27 Growth reduced > 18	Eleuterius and McDaniel 1978, Hester et al. 1996, Lonard et al. 2010, Broome et al. 1995, Hester et al. 2001
Typha domingensis Pers.	1.3	0.3	3.8	0-8 Growth reduced > 4	Baeza et al. 2013, Beare and Zedler 1987, Glenn et al. 1995
Zizaniopsis miliacea (Michx.) Döll & Asch.	0.6	0.2	1.9	<0.50-8 Growth reduced > 2	Eleuterius and McDaniel 1978, Hester et al. 2005, Neubauer 2013

3.0 Swamp Forest Species

This section describes the algorithm development for *Salix nigra* Marshall (black willow), *Taxodium distichum* (L.) Rich. (baldcypress), and *Nyssa aquatica* L. (water tupelo).

3.1. Background

The optimal hydrology for *T. distichum – N. aquatica* swamps involves pulsing of nutrient-rich fresh water (Montz and Cherubini, 1973; Conner and Day, 1976; Mitsch et al., 1991; Day et al., 1995, 2004, 2009; Odum et al., 1995; Visser and Sasser, 1995; Hoeppner et al., 2008; Shaffer et al., 2009a), resulting in a relatively high water level variability. A pulsing hydrology with several periods of flooding and drawdown also promotes regeneration events, as *T. distichum* and *N. aquatica* seeds must have a bare, moist soil to germinate and will not germinate under water (Mattoon, 1915; DuBarry, 1963). In contrast, impounded, stagnant water reduces forest primary production (Schlesinger, 1978; Conner et al., 1981; Taylor, 1985; Dicke and Toliver, 1990; Mitsch et al., 1991; King, 1995; Keeland et al., 1997; Megonigal et al., 1997; Shaffer et al., 2009a), which translates to other trophic levels (Batzer et al., 1999; Chambers et al., 2005).

Many studies have demonstrated that salinity is an important variable with general negative impacts to swamp health (Penfound and Hathaway, 1938; Pezeshki et al., 1989; Conner, 1994; Allen et al., 1994; Krauss et al., 1998; Thomson et al., 2002; Conner and Inabinette, 2003; Mitsch and Gosselink, 2007; van Heerden et al., 2007; FitzGerald et al., 2008; Shaffer et al., 2009a, b). Conner et al. (1997) and Pezeshki et al. (1989) reported that *N. aquatica*, *Fraxinus* spp (ash), and *Acer rubrum* (swamp red maple) show signs of stress and reduced growth in salinities as low as 2-3 ppt. *Nyssa biflora* (Blackgum) seedlings experienced 100% mortality at salinities as low as 2 ppt (McCarron et al. 1998). Furthermore, an average salinity of 1.5 ppt (Wiseman et al., 1990; Thomson et al., 2002) in the Manchac/Maurepas area over the past half-century was sufficient to cause massive degradation and lethality to *N. aquatica*, *Fraxinus spp*, and *A. rubrum*, but not *T. distichum* (Shaffer et al., 2009a). *Taxodium distichum* has been shown to be more salt tolerant than other swamp species (Dickson and Broyer, 1972; Pezeshki et al., 1989; Souther-Effler, 2004; Chambers et al., 2005; Shaffer et al., 2009a,b). The drought of 1998-2000, however, caused salinity extremes of 4-8 ppt (Thomson et al., 2002), sufficient to kill century-old *T. distichum* (Shaffer et al., 2009a). In a 20-week study on *T. distichum* seedling germination and establishment (Souther, 2000), *T. distichum* suffered 100% mortality at 8.7 ppt ($\pm$ 0.4 s.e.) interstitial soil salinity, 84.4 % mortality at 4.5 ppt ($\pm$ 0.4), and only 36.8% mortality below 3.2 ppt ($\pm$ 0.2). Other studies (Conner and Askew, 1993; Conner, 1994; Pezeshki et al., 1995; Allen et al., 1996; Shaffer et al., 2009b) have demonstrated that *T. distichum* may tolerate salinities as high as 7 ppt, but productivity and survivorship decline with salinities > 3 ppt. With increased rate of sea level rise (Conner and Day, 1988; FitzGerald et al., 2008), saltwater intrusion into coastal swamps is expected to increase, which will reduce net primary production and increase mortality (Allen, 1996; Krauss et al., 2000; Pezeshki et al., 1995; Souther-Effler, 2004; Shaffer et al., 2009a).

Considerably less is known about the growth requirements of *S. nigra*. This species occurs at the higher elevations of active delta splays (Johnson et al., 1985; White 1993). *Salix nigra* is a pioneer species that establishes rapidly and is expected to increase in area as the splay matures (Rejmanek et al., 1987). Geological sequences as well as splay formation in the Atchafalaya basin indicate that eventually *T. distichum* establishes in the *S. nigra* forest and that these areas eventually become swamps (Gosselink et al., 1998).

3.2. Methods

To estimate the realized niche of the swamp forest species six years of CRMS hydrology data were analyzed in the same way as described above for the herbaceous marsh species. As in the marsh models, the controlling variables were salinity (ppt) and water level variability (i.e., standard deviation of stage). Mortality matrices were further adjusted based on the literature review above, as well as our own professional experience of working in these systems. For example, the CRMS data do not reflect that a small proportion of *T. distichum* can tolerate salinities from 6-8 ppt (Chambers et al., 2005; Shaffer et al., 2009a,b). Therefore, w niche width was increased for this species in the mortality and establishment matrices to reflect the larger known salinity tolerance than that observed within the CRMS database. Because the swamp forest species only establish from seed, additional rules were developed for establishment that take into consideration the germination and seedling survival conditions for these species (Figure 3.1).

3.3. Algorithms

The algorithms for swamp forest species mortality are the same as that described for the herbaceous marsh species, i.e. the mortality matrix is consulted for the conditions in a specific year and the proportion mortality is subtracted from the cover to estimate the remaining cover for the subsequent year. Establishment of new swamp species is determined by a set of hierarchical rules (Figure 3.1). Mortality matrices are provided in Appendix 1. Establishment matrices are provided in Appendix 2.

3.4. Discussion

Probability fields for mortality and establishment of three key swamp forest species (*T. distichum, N. aquatic,* and *S. nigra*) were built using data from the 50 CRMS swamp stations (see appendices). Because forests are surveyed less frequently (2007, 2010, and 2012) the data did not contain extreme weather events such as severe drought (like the 1999-2000 drought), the realized niches for these species were expanded to reflect what is known about them. The original probability fields caused swamp forest to disappear quickly in places where they are known to currently occupy. Because there are many more marsh stations than swamp stations in the CRMS data set, the observed niche for the marsh species did not have this problem.

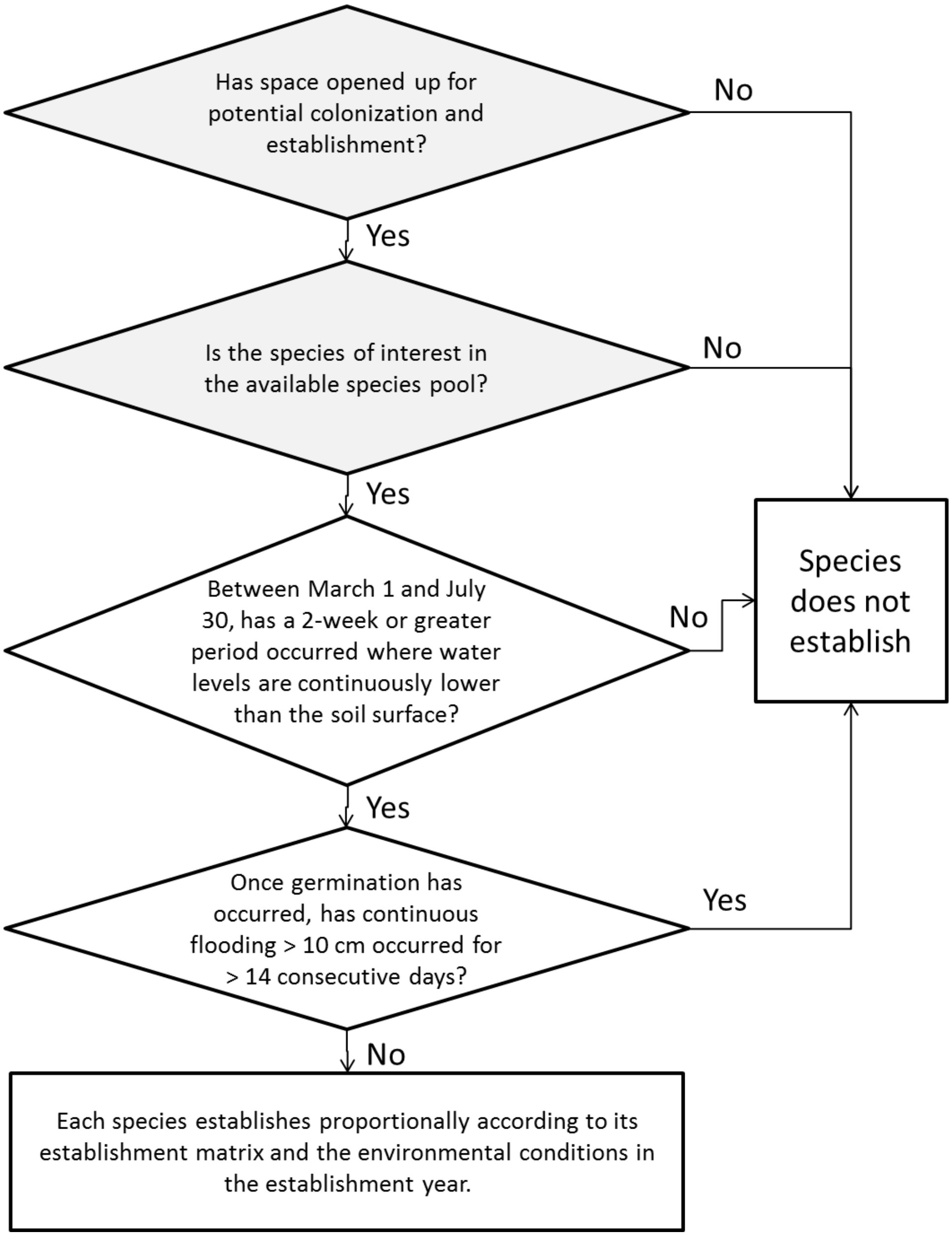


Figure 3.1. Establishment rules for swamp forest species. The first two steps (grey boxes) are part of the general establishment algorithm (see section 2). The second two steps (white boxes) are the conditions under which species can germinate and survive as seedlings.

4.0 Bottomland Hardwood Species

This section describes the algorithm development for *Quercus lyrata* Walter (overcup oak), *Q. laurifolia* Michx. (laurel oak), *Q. texana* Buckley (Nuttal oak), *Ulmus americana* L. (American elm), *Quercus nigra* L. (water oak), and *Q. virginiana* Mill. (live oak).

4.1. Background

The primary assumption concerning bottomland hardwood forests (BHF) of coastal Louisiana is that freshwater flooding will decrease establishment and cause mortality and potential conversion to swamp, prior to substantial saltwater intrusion events. Even the no-action, less optimistic scenario in the 2012 Coastal Master Plan maintained fresh marsh in the inland parts of the coast during the next 50 years, illustrating that the areas of BHF will remain fresh under very severe conditions (Visser et al., 2013). However, sea level rise and local subsidence are expected to raise water levels in these areas, as may some restoration and protection actions. Like most wetland systems, it has been well documented that BHF have strong separation of species along elevational/flooding gradients (Bedinger, 1971; McKnight et al., 1980; Hook, 1984; Reed, 1989; Gosselink et al., 1998; Theriot, 1993; King and Fredrickson, 1998; Wall and Darwin, 1999; Denslow and Battaglia, 2002; Burkett et al., 2005; Chamberlain and Leopold, 2005; Mitsch and Gosselink, 2007; McCurry et al., 2010). Following the literature, BHF is grouped into three zones (Table 4.1) characterized by key species: Low BHF (zone 1) containing *Q. lyrata*, *Q. laurifolia*, and *Q. texana,* mixed with *T. distichum*; Intermediate BHF (zone 2) containing no *T. distichum*, with a mix of the previous three oak species, *U. americana*, and *Q. nigra*; and High BHF (Zone 3) containing *Q. nigra*, *U. americana* and *Q. virginiana*. As LAVegMod 2.0 predicts the distribution of these species in a cell, the cell can be classified into different BHF zones based on their species composition.

Table 4.1. Growing season flooding by bottomland hardwood zone.

	Zone 1	Zone 2	Zone 3
[1]Flooding (months/year)	3-8	1-3	0-1
[2]Average Flooding (days/year)	37 ± 18	18 ± 6	6 ± 3

[1]King and Fredrickson 1999; [2]Teriot 1993

4.2. Methods

Elevation data were obtained from forested CRMS stations, Bayou Sauvage (Wall and Darwin, 1999), Jean Lafitte National Park (Denslow and Battaglia, 2002), and Spanish Lake (Natural Resource Professionals, LLC, 2011). At Spanish Lake water levels were held 1.22 m above normal for 58 years, rendering a clear sorting of species by elevation (Natural Resource Professionals, LLC, 2011). Once the species sorted out at the artificially high elevations, they were back to natural elevations using the data from Jean Lafitte (Denslow and Battaglia, 2002). To ensure that these species – elevation relationships mapped onto flood duration, the detailed study of Theriot (1993) who analyzed 55 BHF stands, from 17 sites across the southeast, with 20-year stage gage records, was to ensure that key species were indicators of hydrologic conditions. Theriot developed a robust Flood Tolerance Index (FTI) that ranged from 2 (permanently flooded) to 6.5 (rarely flooded) based on the hydrologic records. Our key species produced the following FTI indices: *N. aquatica* = 2.62, *S. nigra* = 2.83, *T. distichum* = 2.97, *Q. lyrata* = 3.73, *Q. laurifolia* = 3.89, *U. americana* = 4.46, *Q. texana* = 4.50, *Q. nigra* = 5.73, and *Q. virginica* = 6.50. The only species that didn't score as expected was *Q. texana*, which is commonly found in close association with *Q. lyrata* and *Q. laurifolia* in Louisiana bottomlands. *Q. texana* is considered more flood-tolerant than *Q. laurifolia* (Hook, 1984; Reed, 1989).

Burkett et al. (2005) and Chamberlain and Leopold (2005) found that short and periodic flooding increased survival of BHF seedlings by decreasing rodent herbivory and vegetative competition. However, too much flooding decreased seedling survival and stressed mature trees. The threshold from a positive to negative inundation effect may be as low as 30 days (McCurry et al., 2010). However, Conner et al. (1998) found significantly reduced growth of several oaks to occur at 17 weeks of continuous growing season flooding.

4.3. Algorithms

As explained above, the algorithm for the BHF species is the same as that described for the swamp forest species, except the mortality and establishment matrices for these species are based on elevation relative to mean water level rather than WLV and salinity. Note that this is a relative elevation and not an absolute elevation. This elevation should be highly correlated with the flooding frequency of the area. Mortality matrices are provided in Appendix 1. Establishment matrices are provided in Appendix 2. The dispersal function is the same as for the marsh species (species from the eight surrounding cells contribute to the establishment species pool). This does not take into consideration the potential for seeds from these species to be distributed by water flow.

4.4. Discussion

The CRMS database does not contain bottomland hardwood forests; therefore exploration of realized niche space across two-dimensional probability fields as for marsh and swamp was not possible. The three zones of bottomland hardwood distinctions match those of Bedinger (1971), Gosselink et al. (1998), Denslow and Battaglia (2002), Mitsch and Gosselink (2007), and the zones established at Spanish Lake after 58 years of abnormally high water levels, which caused all tree species to shift upwards by roughly 1.22 m (Natural Resource Professionals, LLC, 2011). In the latter case the *T. distichum – N. aquatica* swamp, along with the three zones of bottomland, all occupied a roughly 30 cm slice of vertical zonation prior to grading to the next higher or lower zone of tree species.

The bottomland hardwood forest probability fields were purposely designed independent of the elevation map of coastal Louisiana broken into 0.25 km^2 cells of known elevation. In the future testing model output against vegetation actually found at these elevations through ground truthing areas characterized by the four wetland forest zones (3 BHF and 1 Swamp) could be done. A stratified random sample of cells from each elevation zone could be surveyed to determine if the predicted species are actually present. If necessary, probability fields would then be modified to better reflect what is on the ground. To date, model runs appear to be tracking topography well, judging from riparian zones with known ridge and swale areas.

Several studies have demonstrated that the wetland forest zones are strongly associated with hydrologic conditions. Bedinger (1971) found a definite relationship between the distribution of BHF species and frequency and duration of flooding in the White River Valley, Arkansas. Using flood frequency and duration, not elevation, he defined four similar species associations, each with a distinctly different tolerance to inundation. Growing season flood duration can be summarized (Table 4.1.) from King and Fredrickson (1999) and Theriot (1993). McCurry et al. (2010) classify low BHF as that which floods > 12 times per year, intermediate BHF flooding between 8 – 12 times per year, and high BHF flooding < 8 times per year.

5.0 Barrier Island Vegetation

This section describes the algorithm development for *Uniola paniculata* L. (seaoats), *Panicum amarum* Elliott (bitter panicum), *Spartina patens* (Aiton) Muhl. (wiregrass), *Distichlis spicata* (L.) Greene (salt grass), *Sporobolus virginicus* (L.) Kunth (seashore dropseed), *Strophostyles helvola* (L.) Elliott (amberique bean), *Solidago sempervirens* L. (goldenrod), and *Baccharis halimifolia* L. (groundselbush).

5.1. Background

Elevation above mean sea level and distance from the ocean/beach interface have long been recognized as the key factors directing zonation of coastal dune and swale species, primarily by imposing environmental gradients that modulate the establishment and expansion of coastal vegetation (Doing, 1985; Enhrenfeld, 1990; Stallins & Parker, 2003; Hester et al., 2005). These environmental gradients include exposure to salt spray and sand abrasion, susceptibility to sand burial and overwash events, nutrient availability, and soil organic matter content, among others (Oostings & Billings, 1942; van der Valk, 1974). The constancy of the above factors makes dune and swale habitats amenable to efforts to model the succession of plant communities (Major, 1951; Johnson, 1997). However, for greatest accuracy, such predictive efforts need to be performed at the appropriate geographic scale, which is dictated by those geomorphic characteristics that broadly influence vegetation response (Johnson, 1997). For example, the barrier shorelines of the Mississippi River Deltaic Plain in Louisiana vary greatly from the adjacent shorelines to their east and west due to their greater silt content, lower elevation, and deficiency of sand resources (Mendelssohn et al., 1987; Ritchie & Penland, 1988). Further, the sand-deficient nature of this geomorphic setting has greatly reduced the width of dune and swale habitats, enabling the use of elevation above mean sea level as a more effectual predictor of plant establishment and expansion than distance from shore, as only a single dune complex generally exists rather than a series of dune structures (Mendelssohn et al., 1987).

Uniola paniculata and *P. amarum* are well known as the primary dune grasses in the northern Gulf of Mexico (Hester et al., 2005; Lonard & Judd, 2011; Lonard et al., 2011) and both are frequently employed in barrier shoreline restoration efforts to build and maintain dune systems (Dahl & Woodard, 1977; Mendelssohn & Hester, 1988; Nabukalu & Knott, 2013). Within Louisiana, *Spartina patens* also occurs as a key dune species in areas subject to frequent overwash as well as throughout swale habitats (Ritchie & Penland, 1988; Hester et al., 2005; Lonard et al., 2010) and is employed in many barrier island restoration projects (Mendelssohn & Hester, 1988). Although susceptible to injury from burial (Mendelssohn & Hester, 1988; Balestri & Lardicci, 2013), *Sporobolus virginicus* commonly occurs in Louisiana rear dune and swale habitats (Hester et al., 2005; Lonard et al., 2013a) and is occasionally employed for restoration efforts in these habitats. Both *Solidago sempervirens* and *Strophostyles helvola* are regularly interspersed throughout foredune, rear dune, and swale habitats, but are not currently included in barrier island restoration plans. *Distichlis spicata* is a minor component of dune and swale habitats that has recently been incorporated into restoration efforts because of its tolerance to elevated soil salinities (Lonard et al., 2013b). *Baccharis halimifolia* is an important shrub species in swale habitats (Mendelssohn et al., 1987) and its use in barrier shoreline restoration has recently been investigated (Hester et al., 2012).

5.2. Methods

Elevation matrices (based on meters above mean sea level) for the establishment and mortality of selected barrier island dune and swale species were generated by evaluating transect elevation-species presence graphs from Louisiana barrier islands and headlands (Grand Terre, Caminada Moreau Beach East, Caminada Moreau Beach West, Timbalier Island, and the Isle Dernieres), which are summarized in Mendelssohn et al. (1987). Specifically, elevations were extracted from summary graphs for sampling points where characteristic plant species for dune (*U. paniculata*, *P. amarum*, *S. patens*) and swale (*S. virginicus*, *D. spicata*, *S. sempervirens*, *S. helvola*, *B. halimifolia*) habitats occurred. After elevation values were extracted from summary graphs, the 0%, 10%, 15%, 25%, 50%, 75%, 85%, 90%, and 100% quantiles of elevation for each species were determined. An establishment probability of 1.0 was assigned to elevation values between the 25% and 50% quantiles of each species. A linear relationship was then developed for each species with 0%, 15%, and 25% quantiles assigned establishment probability values of 0, 0.5, and 1.0, respectively. Similarly, a linear relationship was developed for each species in which the 100%, 85%, and 75% quantiles were assigned establishment values of 0, 0.5, and 1.0, respectively. Note that linear relationships were selected for these initial analyses as the small number of data points available precluded the development of survivorship curves (Figure 5.1). An establishment matrix was constructed in which each species was assigned an establishment probability for elevation above mean sea level of 1.0 for elevations falling within the 25% to 75% quantiles for that species and then grading the establishment probability to 0% as elevation approached either the 0% and 100% elevation quantile based on the above described linear relationship. The production of the mortality matrix was similar, except that mortality of a species was assigned 0 for elevations within the 25% to 75% quantiles, and linear relationships of elevation and mortality were based on mortality probability assignments of 0, 0.5, and 1.0 for quantiles of 25%, 10%, and 0% for lower elevations and 75%, 90%, and 100% for higher elevations. Importantly, *U. paniculata* and *P. amarum* were assigned mortality probabilities of 0 for all elevations above the 75% quantile as these species are highly unlikely to experience mortality at higher elevations (Hester & Mendelssohn, 1989).

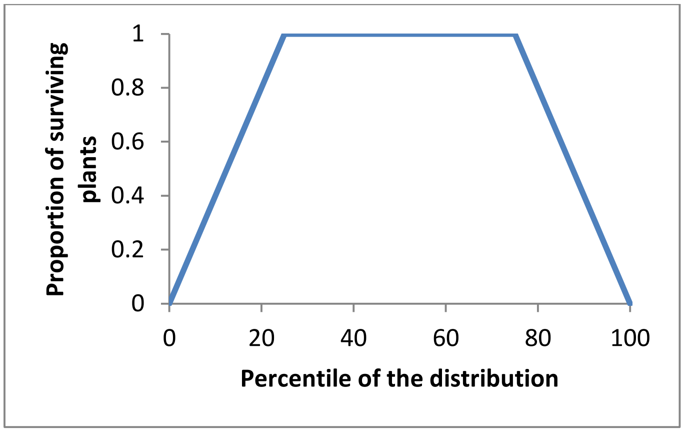


Figure 5.1. Survivorship as a function of the statistical distribution of a given parameter for a species.

Annual expansion rates for *U. paniculata* and *P. amarum* were estimated by analyzing the change in coverage values for these species from the monitoring of a restoration project on Whiskey Island (Hester et al., 2012) over the time period of May 2010 to May 2011. This time period was selected as it did not include substantial perturbation due to tropical storm activity. Plots were separated into fertilized and unfertilized treatments that were planted at the commonly used planting density (1.22 meter centers) and were not subject to any other experimental manipulations. Annual vegetation cover expansion rates for *U. paniculata* were estimated to be 15.6% (percentage cover increase per year) under a standard fertilization regime (Broome et al., 1982) and 8.8% (percentage cover increase per year) under natural conditions. Annual vegetation cover expansion rates for *P. amarum* were estimated to be 17.8% (percentage cover increase per year) under a standard fertilization regime (Broome et al., 1982), but 5.2% (percentage cover increase per year) under natural conditions. Additionally, annual vegetation cover expansion rates were estimated for *S. patens* and *S. virginicus* by evaluating the change in cover values for these species in Mendelssohn and Hester (1988) from May 1985 to May 1986. Data selected for analysis were averages for plots planted at 1 meter centers or adjacent, naturally-occurring populations. Annual expansion rates were determined to be 5.5% (percentage cover increase per year) for *S. patens* and 0.6% (percentage cover increase per year) for *S. virginicus*. An additional investigation into the annual vegetation expansion rates for *S. patens* and *S. virginicus* was performed by evaluating data from Hester and Mendelssohn (1992). The average annual expansion of *S. patens* and *S. virginicus* cover was calculated for both a standard fertilization treatment (Broome et al., 1982) and natural conditions over a 3-year period. Annual increase in *S. patens* cover was determined to be 9.2% under fertilized conditions and 1.6% under natural conditions, whereas the annual increase in *S. virginicus* cover was 0.8% under fertilized conditions and 0.4% under natural conditions.

5.3. Algorithms

The barrier island region of LAVegMod 2.0 uses a 30 x 30 m grid cell. Occurrence of selected dune and swale species for Louisiana barrier shorelines is guided in LAVegMod 2.0 by the elevations that serve as the criteria for the establishment and mortality of these species. Within the ICM, these elevations are derived using the approaches described in the Barrier Island Model Development Attachment (C3-4). The species occupying each 30x30 meter cell, and the transitions between cells is determined by the elevation of the cell above the annual mean sea level. This elevation is computed from the stage height simulated by the hydrology model and the elevations simulated by the barrier island morphology model. Each species is characterized by probabilities of establishment (Appendix 1) and mortality (Appendix 2) that change with elevation. The model first determines which species are extirpated from a cell based on their probability of mortality as determined from the mortality matrix (Appendix 2) and the height of a cell above the annual mean water stage height. Next, the model determines which species occupy the newly available area based on the establishment probabilities (Appendix 1) and the cell height above the annual mean water stage. In the event that the total establishment probability, summed across all species, is greater than one, the probabilities are first renormalized before the area gained by each species is determined. The vegetation model is provided with information regarding the aspect of each location. That is, each cell is identified as either being on the landward side of the island (typically northward facing for the Dernier Islands and westward facing for the Chandeleur Islands), or on the Gulf side of islands. The dune and swale species other than *U. paniculata* and *P. amarum* are confined to the landward side of the islands, while *U. paniculata* and *P. amarum* can occur on the Gulf side of islands.

5.4. Discussion

Predicted elevation ranges for the dune and swale plant species selected for inclusion into the barrier shoreline component of LAVegMod are generally consistent with the results of field observations and experimental assessments of these species in the peer-reviewed literature, which are reviewed below. The three plant species frequently associated with Louisiana dune habitats, *U. paniculata*, *P. amarum* and *S. patens*, were predicted to exhibit optimal establishment at elevations typical of these systems, but as expected, exhibited interspecific variation in their exact elevation ranges. Interestingly, those plant species selected to represent swale habitats occur over a broader range of estimated elevations for optimal establishment, which likely results in part from the highly dynamic barrier shorelines of Louisiana. The relatively low topographic relief of barrier shorelines in Louisiana in combination with frequent overwash due to tropical storm events leads to the occurrence of overwash fans in swale habitats, which generate microhabitats of highly variable elevation. The analysis presented herein effectively captures this variability such that realistic estimates of elevation for optimal establishment are produced.

Uniola paniculata is well known to be positively associated with elevation throughout its geographic range (Miller et al., 2010; Lonard et al., 2011). This positive correlation of *U. paniculata* and elevation is thought to be a consequence of waterlogging stress, which is highly relevant to Louisiana dune habitats as elevations typically do not exceed 2 m in these barrier shorelines (Hester & Mendelssohn, 1989). Further, experimental trials have determined that an elevation of 0.3 m above the water table decreases *U. paniculata* biomass, whereas elevations of 0.9 to 2.7 m do not result in decreased *U. paniculata* biomass (Hester & Mendelssohn, 1989). Interestingly, the median elevation above sea level derived for *U. paniculata* in this study was 0.96, which is very similar to the 0.9 m above the water table presented by Hester and Mendelssohn (1989) as relieving waterlogging stress in this species. Further, the 25% quantile of elevation estimated in this study, which is used as the lower bound for optimal establishment in the model, is 0.59 m, well above the 0.3 m reported to decrease biomass in this species (Hester & Mendelssohn 1989). Hester and Mendelssohn (1989) determined that the average depth to the water table for three populations of *U. paniculata* in coastal Louisiana was 1.3 m, which is between the 25% and 75% elevation quantiles estimated in this study and therefore in agreement with the predicted 0% mortality elevation range. Because *U. paniculata* frequently occurs at much greater elevations in other barrier shorelines where dune height is not limited by sand resources (Wagner, 1964), no upper bound for optimal establishment was stipulated for this species.

Although *U. paniculata* is typically the dominant foredune grass throughout the Gulf of Mexico (Wagner, 1964; Lonard et al., 2011) it is largely replaced by *P. amarum* in the dune habitat of Louisiana (Hester & Mendelssohn, 1989). This shift in species dominance is not completely understood, but has been hypothesized to be a result of the slower establishment rate of this species, in combination with frequent overwash of Louisiana barrier shorelines, and potentially substrate characteristics (Hester & Mendelssohn, 1989; Lonard et al., 2011). The lower bound estimated for optimal *P. amarum* establishment was actually higher than that estimated for *U. paniculata*; however, both values represent likely limits for foredune plant species in Louisiana. As with *U. paniculata*, *P. amarum* for modeling purposes is assumed to not have an upper bound for optimal establishment in Louisiana, which is reinforced by the relatively high 75% quantile of elevation (1.51 m) estimated in this study. A strong, positive correlation has been demonstrated between *P. amarum* biomass and proximity of the water table in a Virginia barrier island where the depth to the water table ranged from approximately 0.6 to 1.85 meters (Day et al., 2001). These results further support the optimal elevation ranges predicted for *P. amarum* since similar elevations above the water table support the occurrence of this species, despite substantial differences in environmental setting.

Within Louisiana barrier shorelines, *S. patens* is a dominant plant species in the rear dune and frequently occurs in swale habitats as well (Mendelssohn et al., 1987). Correspondingly, *S. patens* has a lower predicted upper bound (0.90 m above sea level) for optimal establishment than the foredune species included in this work. *Spartina patens* is believed to be limited to dune heights of approximately 1 m in Louisiana (Mendelssohn et al., 1987), suggesting this upper bound for optimal establishment is realistic. However, the mechanism for this height restriction has not been documented. *Spartina patens* has an extraordinary ecological amplitude in regard to elevation, and has been reported to occur across all habitats of some barrier islands within its geographic range (Ehrenfeld, 1990; Lonard et al., 2010). In the mid-Atlantic coast, *S. patens* is reported to occur from mean high tide to 1.1 m above mean high tide (Lonard et al., 2010), which is generally consistent with our predicted upper optimal establishment threshold, even though these are substantially different ecosystems. The lower bound of optimal elevation estimated for the establishment of *S. patens* (0.44 m) is consistent with the majority of swale species included in this study, and seems realistic given the elevations of swale habitats in Louisiana.

Considerably less information is available in the peer-reviewed literature regarding elevation thresholds for the swale species included in this study, although they are typically found in association with *S. patens*. Several of these species, including *S. virginicus* and *D. spicata* are, like *S. patens,* also constituents of high marsh habitats (Lonard et al., 2013a; Lonard et al., 2013b). Therefore, the lower elevation bounds for the optimal establishment of these species, 0.43 and 0.42 meters above sea level respectively, are reasonable given the elevations of swale habitats in Louisiana. Shumway and Banks (2001) found that *S. sempervirens* survived transplantation into swale habitats with depth to average water level of approximately 0.25 meters over three months and noted the occurrence of *S. sempervirens* in dune habitats with depth to average water level of almost 1 meter. The findings of Shumway and Banks (2001) are supportive of the upper bound for optimal establishment of *S. sempervirens* that is predicted for this modeling effort. Although the average depth to the water table present by Shumway and Banks (2001) is lower than we estimated in our modeling effort for *S. sempervirens*, this may reflect the substantial difference in environmental setting between coastal Louisiana and coastal Massachusetts.

6.0 Floating Marsh Vegetation

This section describes the algorithm development for *Panicum hemitomon* Schult. (maidencane), *Eleocharis baldwinii* (Torr.) Chapm. (spikerush), and *Hydrocotyle umbellata* L (pennywort).

6.1. Background

In the 2012 Coastal Master Plan, floating marshes were not modeled as a distinct vegetation type. Floating marshes were defined by Sasser et al. (1995) as "wetlands of emergent vegetation with a mat of live roots and associated and decomposing organic material and mineral sediments that move vertically as ambient water levels rise and fall." These vegetation types are distinguished from free-floating aquatic vegetation species such as *Eichhornia crassipes* (water hyacinth) by the formation of a mat. Floating marshes portray differing tolerances to stressors, such as water level changes (no inundation), and the consequences of vegetation loss differ from those of attached marshes (Sasser et al., 1995) and as such, should be modeled as a distinct group.

LAVegMod forecasted conversions from one vegetation type to another when the conditions became less suitable for one species and more suitable for another. However, floating marshes cannot simply convert to another vegetation type. If the conditions change and the floating marshes die, establishment of non-floating marsh species will be unlikely because their root systems do not provide the same buoyancy as floating marsh species. The root structure of non-floating marsh species does not provide the buoyancy provided by floating marsh species. These areas will therefore convert to open water.

This effort has developed an approach for forecasting the mortality of floating marshes in the model. This approach is first contingent upon the development of spatial datasets identifying floating marshes, and linking those datasets to LAVegMod 2.0. The spatial datasets enable algorithms to apply specifically to floating marshes. Formation of new floating marshes can occur through several pathways. The first is separation of the vegetated mat from the underlying substrate as it subsides (O'Neill, 1949); the second is peat dislodging from a pond bottom and forming a floating substrate that is colonized by plants (Hogg and Wein, 1989); and the third is the in growth of floating mats from the edges of a pond (Russell, 1942). Formation of new floating marshes on a large scale has not occurred in Louisiana in the last 80 years, since all new land is either deltaic or associated with dredged material (Couvillion et al., 2011). Therefore, formation of new floating marshes is not included in the ICM, and the algorithms developed for this effort focus on mortality of floating marsh species.

6.2. Methods

A spatial mask detailing areas where flotant marsh is known to occur is needed to identify the areas where species occur in a flotant state vs. attached. After a review of Figure 6.1 (Evers et al., 1996) by the vegetation model development team, it was determined that this dataset overestimated the extent of flotant to be utilized in this modeling effort. In particular, the areas identified as "Spartina patens flotant" may have been incorrectly identified as flotant. In the Sasser et al. (1996) description of these types there is no floating *Spartina patens* marsh, and types other than *P. hemitomon* and *E. baldwinii*-dominated are described as damped floating which is more an expansion and contraction of the peat depending on the amount of water absorption.

Additionally, the coastal landscape is constantly changing, and a more current dataset that could also be used to initialize model runs for the 2017 Coastal Master Plan was explored. Focusing on the 2007-2014 time period, potential datasets included those from Landsat 5 and Landsat 8 imagery, field data collected as components of the 2007 and 2013 helicopter vegetation surveys, as well as CRMS data.

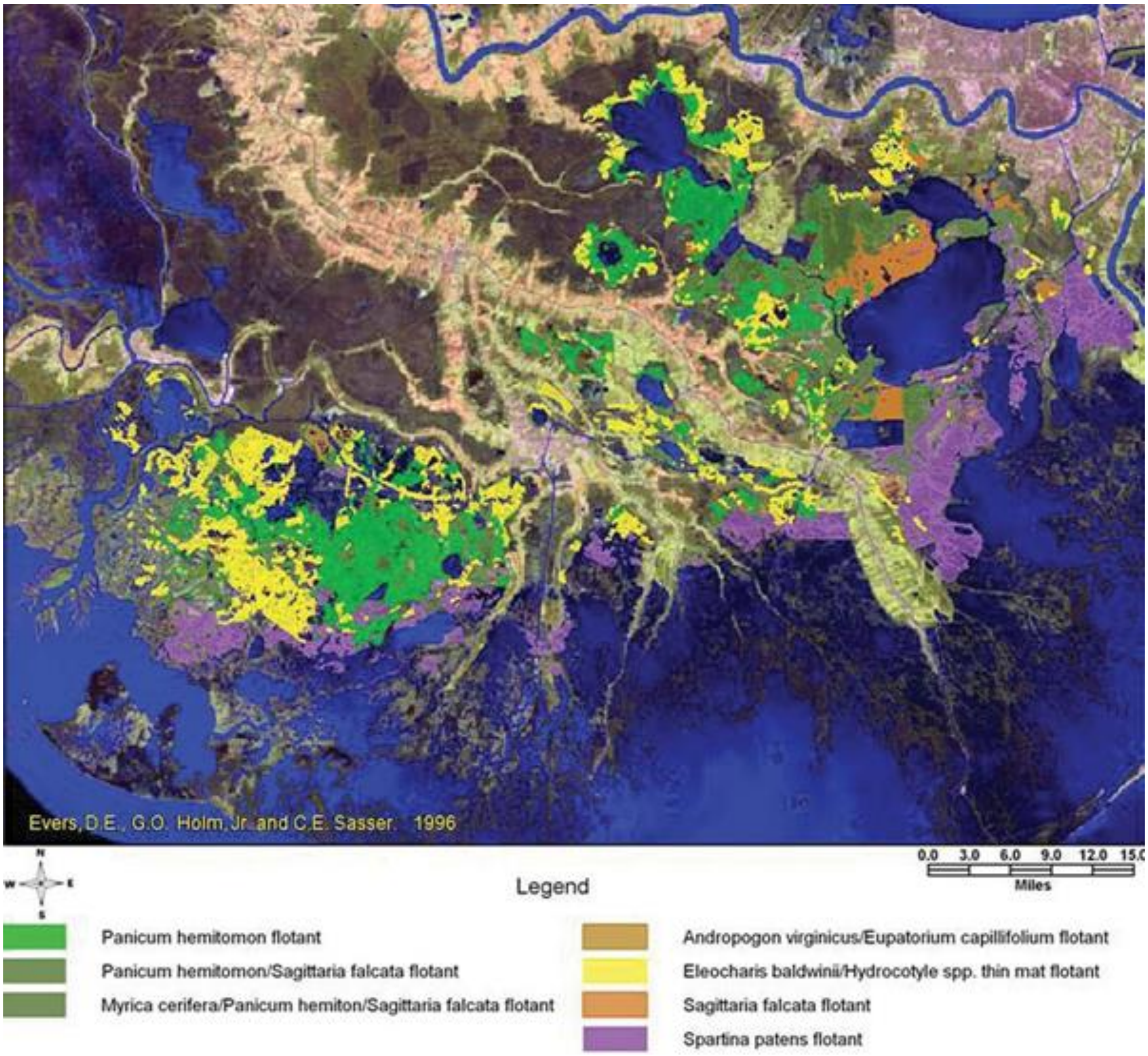


Figure 6.1. Identification of flotant areas from Evers et al. 1996.

There are numerous algorithms and methodologies for classifying remotely-sensed imagery. Decision tree classifiers are "non-parametric", can accommodate both continuous and nominal data, generate interpretable classification rules, and are fast to train and often as accurate as, or even slightly more accurate than, many other classifiers (Homer et al., 2004).

See5© software from RuleQuest Research has been utilized to perform remotely-sensed classifications. This software focuses initial efforts on recognizing patterns in each class as delineated by the training data among all spectral and ancillary datasets and employs an information gain ratio method in tree development and pruning (Quinlan, 1993). This software has advanced features including boosting and cross-validation.

The methodology utilized an artificial neural network to recognize patterns that differentiate one class from another in the training data, and then exploited those patterns to build rule-sets for classifying the remainder of the image. Following construction of the decision-tree, the classification proceeds by subjecting each independent variable (imagery and ancillary data sources) to the rule-sets developed for categorizing each pixel into categories.

To identify training points for the GIS TWINSPAN analysis of the coast-wide vegetation-survey data for 2007 (Sasser et al., 2008) and 2013 (Sasser et al., 2014) were used. The method described in Visser et al. (2002) was used to assign all marsh stations surveyed a salinity score. This method assigns a salinity score to each species found at a station based on the marsh type where the species is known to occur and then calculates a weighted mean based on the abundance of each species at the station. This score was then used to select only those stations that received a salinity score below 2, which should include primarily the fresh marsh stations as free-floating marshes are found only under fresh conditions (Sasser et al., 1996). There were 2269 stations in the dataset (1100 in 2007, and 1169 in 2013). The TWINSPAN division tree is provided in Figure 6.2 and a table of characteristic species is provided in Table 6.2. Please note that common names are used to identify different vegetation types (not plant species) based on their dominant species. Only those stations classified as maidencane flotant or thin-mat are considered floating marshes in the sense that they have a free layer of water under the rooted soil mat (Sasser et al. 1996). Other vegetation types classified as floating by Sasser et al. (1995) move due to soil expansion and contraction and lack a free water layer below the mat even at high water stages.

The stations classified as either attached or floating were fed into the classifier, using 80% of the stations for training and 20% for validation. Example results of the classification are shown in Figure 6.3. Results are presented for both training data and test data (points of known vegetation type not used for training but rather held in reserve for accuracy assessment). Trials represent an iterative process of decision tree formulation and improvement. The overall error as assessed from the test datasets is represented by the final iteration (23.4%). While 23.4% error is considered acceptable in many remotely-sensed classifications, in this case, it was concerning due to the relatively simple, two-class categorization. In an effort to decrease the error and improve the resulting spatial dataset, CRMS data were also investigated as a source of field data.

Of the 391 CRMS sites, 47 were identified as floating marsh vegetation types (Figure 6.4) by CPRA and USGS personnel at the time of station establishment. These CRMS stations were outfitted with a mat gauge in addition to a water level gauge.

The results of this classification (Figure 6.5) were more precise (6.3% error for Terrebonne and 8.6% error for Barataria), and were therefore chosen for creation of the final spatial dataset which details areas in which floating marsh are known to occur. This dataset is seen in Figure 6.6.

Once it was shown that a floating marsh base map could be created, the next step in the process was the development of the algorithm.

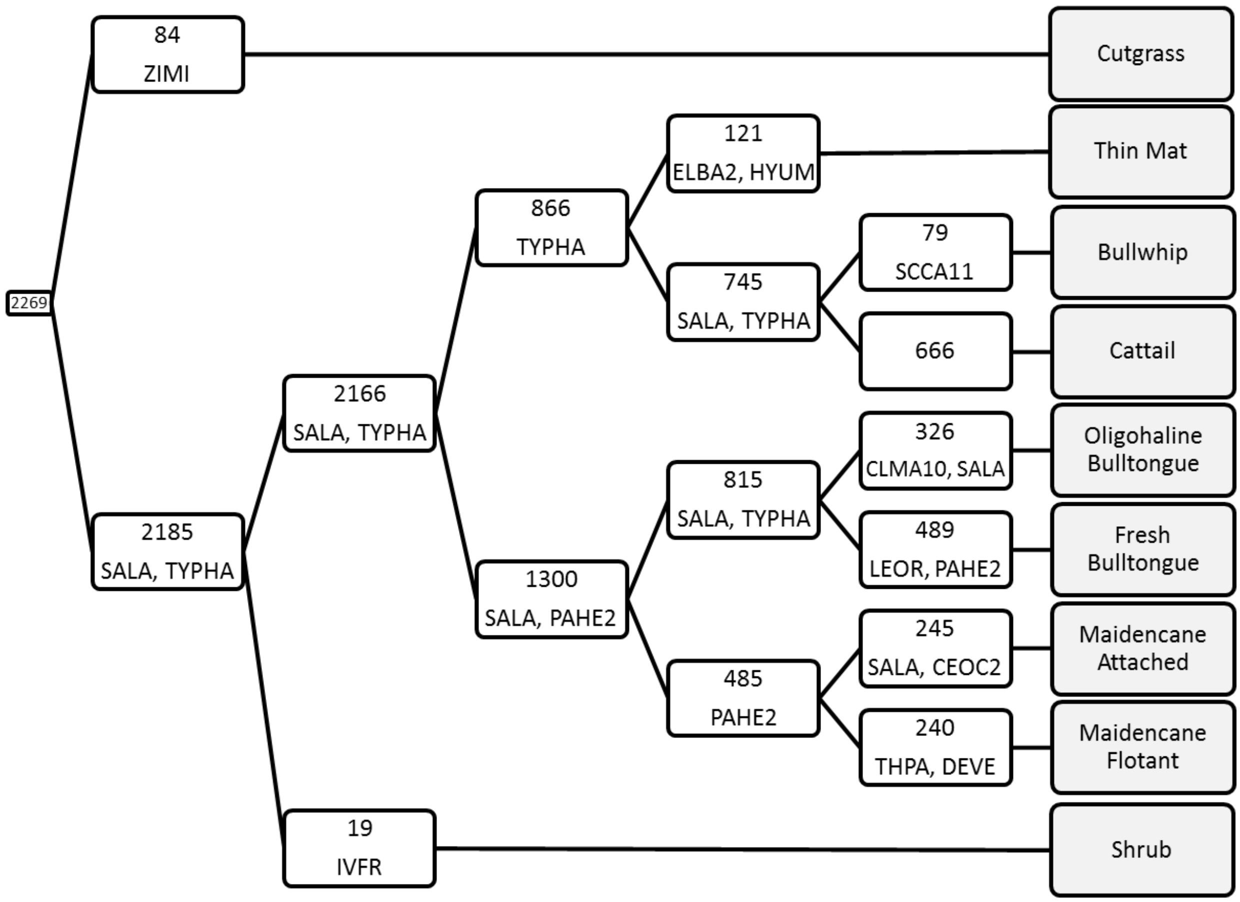


Figure 6.2. Summary of the TWINSPAN analysis of fresh marsh stations in the 2007 and 2013 coast-wide surveys. Numbers are the number of stations in each division step. Abbreviations are some of the indicator species used. Abbreviations follow http://plants.usda.gov and species names are provided in Table 1.1.

Table 6.1. Vegetation types identified from fresh marsh stations in the 2007 and 2013 coast-wide surveys using TWINSPAN. Values represent the average cover (Braun-Blanquet scale) of the characteristic species (i.e., species with an average abundance ≥ 0.9 in one of the vegetation types indicated in bold). Species abbreviations are those used by the USDA (http://plants.usda.gov) and species names are provided in Table 1.1.

	Shrub	Maidencane Flotant	Maidencane Attached	Fresh Bulltongue	Oligohaline Bulltongue	Cattail	Bullwhip	Thin-Mat Flotant	Cutgrass
Stations									
2007	11	122	135	158	114	381	39	94	46
2013	8	118	110	331	212	285	40	27	38
Species									
PAHE2		**3.7**	**4.2**	**1.1**	0.4	0.2	0.2	0.1	
SALA	0.1	0.6	**1.7**	**2.0**	**3.0**	**1.1**	0.5	0.2	
TYPHA	0.1	0.4	0.4	**1.2**	**1.1**	**2.2**	**0.9**	0.4	
SCCA11					0.1		**3.7**		
ELEOC		0.4	0.1	**1.8**	**1.0**	0.2	0.1	0.2	
IVFR	**2.9**				0.1	0.1			
MOCE2	0.4	**1.5**	0.2	0.5	0.3				
HYUM	0.1	0.1		0.7	0.1	0.1		**1.7**	
ELBA2				0.5				**2.0**	
ZIMI	0.1	0.1	0.1	0.1		0.1	0.1		**1.7**
THPA		**1.1**	0.1	0.7	0.1				
CLMA10	0.3		0.1		**0.9**	0.4			
BILA				0.3		0.1		**1.0**	0.1

```
Evaluation on training data (79531 cases):

Trial        Decision Tree
-----      -----------------
           Size      Errors

   0        689 16734(21.0%)
   1        175 20874(26.2%)
   2        278 21921(27.6%)
   3        322 22428(28.2%)
   4        209 22297(28.0%)
   5        182 27238(34.2%)
   6        140 26122(32.8%)
   7        342 20478(25.7%)
   8        403 19123(24.0%)
   9        525 17364(21.8%)
boost           14932(18.8%)   <<

            (a)   (b)    <-classified as
           ----  ----
          11626 11524    (a): class 1
           3408 52973    (b): class 2

        Attribute usage:

            100%  band03
            100%  band07
            100%  band04
             99%  band02
             98%  band05
             97%  band06
             97%  band08
             94%  band01
             94%  band09
```

```
Evaluation on test data (19883 cases):

Trial        Decision Tree
-----      -----------------
           Size      Errors

   0        689 4959(24.9%)
   1        175 5564(28.0%)
   2        278 6036(30.4%)
   3        322 6061(30.5%)
   4        209 5968(30.0%)
   5        182 7169(36.1%)
   6        140 6713(33.8%)
   7        342 5614(28.2%)
   8        403 5440(27.4%)
   9        525 5055(25.4%)
boost           4654(23.4%)   <<

            (a)   (b)    <-classified as
           ----  ----
           2395  3392    (a): class 1
           1262 12834    (b): class 2
```

Figure 6.3. Results for initial classification of flotant marsh (a) vs. non-flotant marsh (b) vegetation types in satellite image WRS-2 path 22 (representing Barataria basin) using the 2007 Helicopter Survey points.

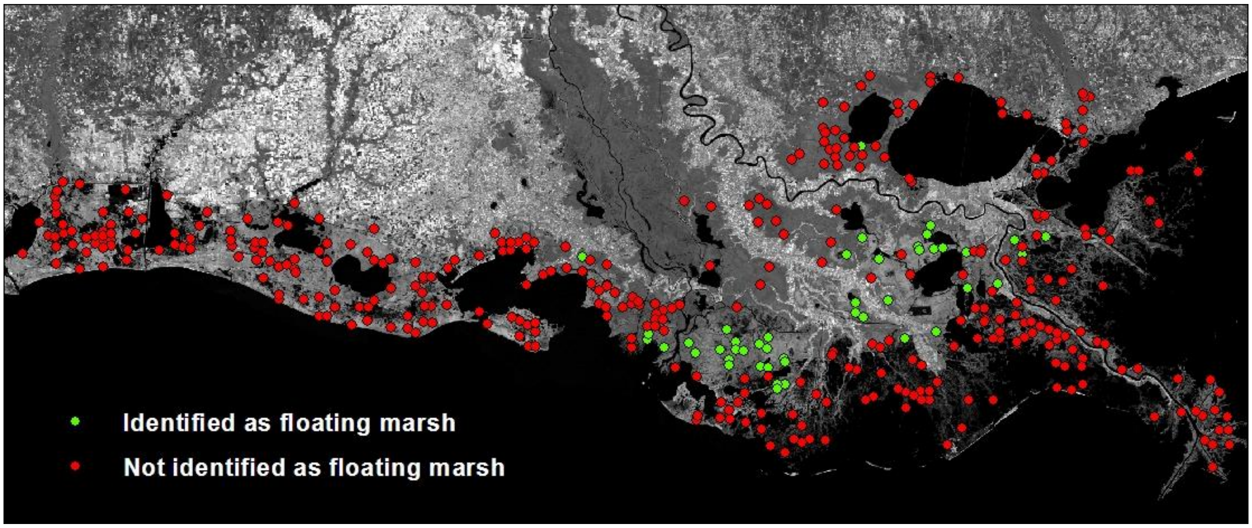


Figure 6.4. CRMS sites identified as flotant vs. attached marsh types.

```
Evaluation on training data (192566 cases):

Trial        Decision Tree
-----      -----------------
           Size      Errors

   0        181 11683( 6.1%)
   1         71 21615(11.2%)
   2         90 17446( 9.1%)
   3        124 19555(10.2%)
   4        134 19251(10.0%)
   5        147 17396( 9.0%)
   6        140 16425( 8.5%)
   7        131 13931( 7.2%)
   8        129 13108( 6.8%)
   9        114 12476( 6.5%)
boost           11523( 6.0%)   <<


           (a)    (b)     <-classified as
          -----  -----
          6204   9110     (a): class 1
          2413 174839     (b): class 2


        Attribute usage:

            100%  band01
            100%  band02
            100%  band03


Evaluation on test data (19257 cases):

Trial        Decision Tree
-----      -----------------
           Size      Errors

   0        181 1210( 6.3%)
   1         71 2185(11.3%)
   2         90 1826( 9.5%)
   3        124 2000(10.4%)
   4        134 2007(10.4%)
   5        147 1825( 9.5%)
   6        140 1687( 8.8%)
   7        131 1415( 7.3%)
   8        129 1297( 6.7%)
   9        114 1291( 6.7%)
boost           1217( 6.3%)   <<


          (a)   (b)     <-classified as
          ----  ----
          602   935     (a): class 1
          282 17438     (b): class 2
```

```
Evaluation on training data (414276 cases):

Trial        Decision Tree
-----      -----------------
           Size      Errors

   0        685 32648( 7.9%)
   1        247 59120(14.3%)
   2        329 46595(11.2%)
   3        395 49831(12.0%)
   4        391 51675(12.5%)
   5        431 50293(12.1%)
   6        423 45428(11.0%)
   7        448 41382(10.0%)
   8        471 37211( 9.0%)
   9        418 35754( 8.6%)
boost           32062( 7.7%)   <<


           (a)    (b)     <-classified as
          -----  -----
          40569  18778    (a): class 1
          13284 341645    (b): class 2


        Attribute usage:

            100%  band01
            100%  band03
             99%  band02


Evaluation on test data (41428 cases):

Trial        Decision Tree
-----      -----------------
           Size      Errors

   0        685 3548( 8.6%)
   1        247 5886(14.2%)
   2        329 4831(11.7%)
   3        395 5169(12.5%)
   4        391 5438(13.1%)
   5        431 5307(12.8%)
   6        423 4712(11.4%)
   7        448 4445(10.7%)
   8        471 3938( 9.5%)
   9        418 3845( 9.3%)
boost           3579( 8.6%)   <<


          (a)   (b)     <-classified as
          ----  ----
          3785  2048    (a): class 1
          1531 34064    (b): class 2
```

Figure 6.5. Results for initial classification of flotant marsh (a) vs. non-flotant marsh (b) vegetation types in satellite images WRS-2 path 23 in Terrebonne (left) and WRS-2 path 22 in Barataria (right) using CRMS data for training and validation. Results are presented for both training data and test data (points of known vegetation type not used for training but rather held in reserve for accuracy assessment). Trials represent an iterative process of decision tree formulation and improvement. The overall error as assessed from the test datasets is represented by the final iteration (6.3% for path 23 and 8.6% for path 22). Red numbers in this figure represent points that were misclassified.

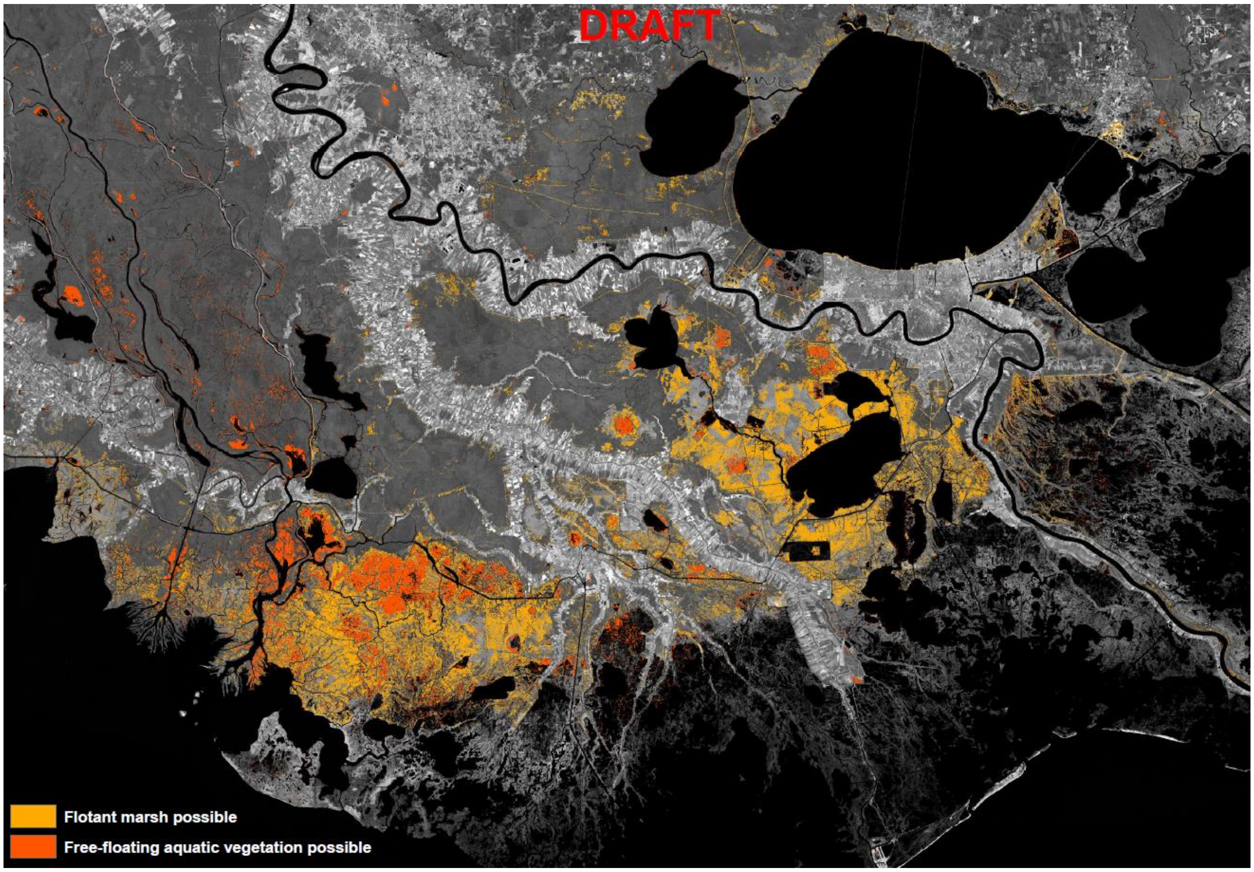


Figure 6.6. Map of the dataset created by this effort to serve as a flag of floating marsh and free-floating aquatic vegetation types.

6.3. Algorithms

The algorithm for areas identified as floating marsh mats are similar to the standard format, with the exception that only those species that are known to occur on floating mats can establish if part of the existing vegetation dies (Figure 6.7). If no new vegetation can establish on the bare floating mat, that area is converted to open water within the ICM. Since several hypotheses exist for the formation of new floating marshes (see above), floating marsh formation is not currently included in LAVegMod 2.0.

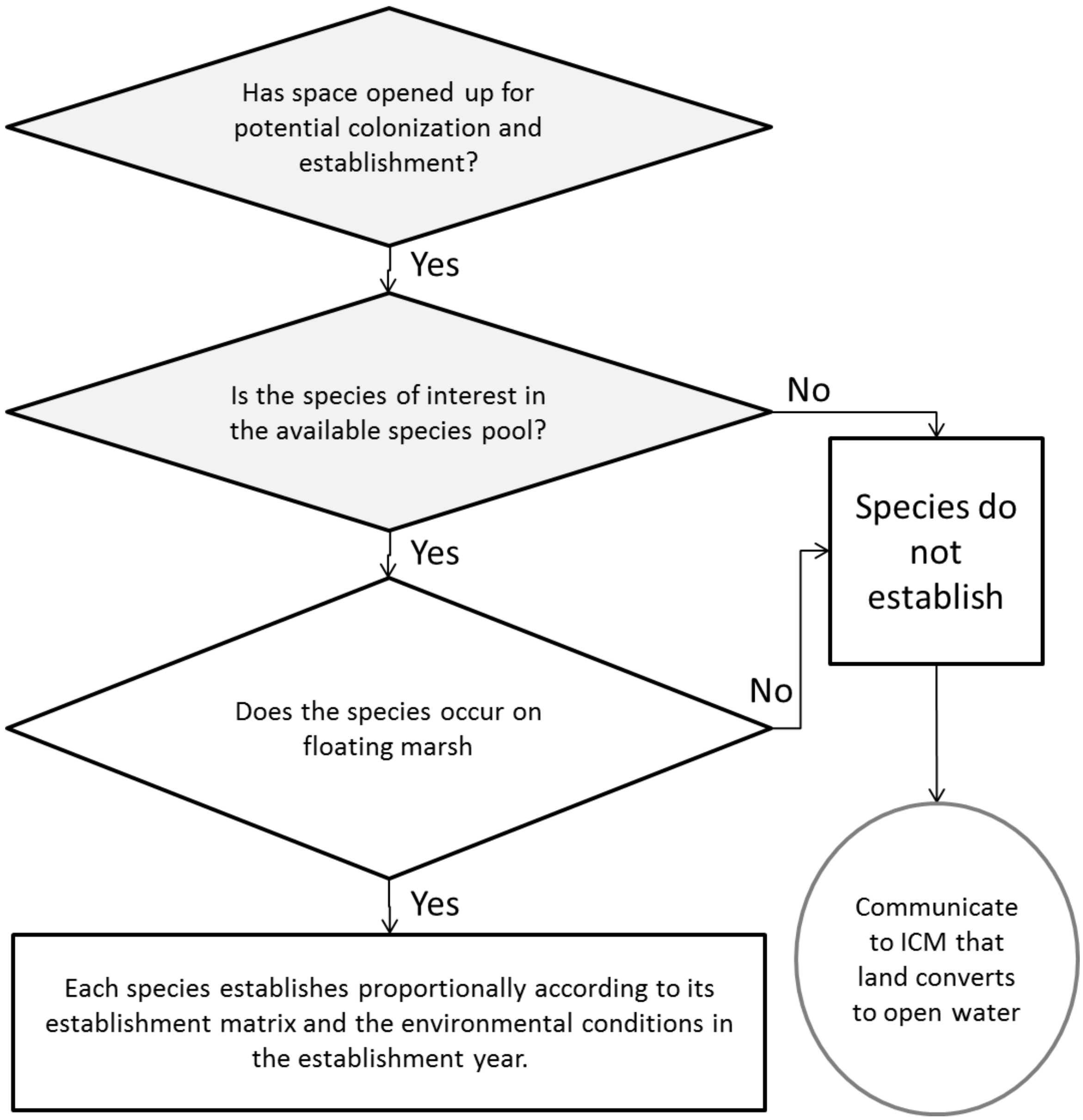


Figure 6.7. Establishment rules for floating marsh areas. The first two steps (grey boxes) are part of the general establishment algorithm (see section 2). The third step (white box) allows only those species that are adapted to the floating mats to establish.

7.0 Results

The performance of the updated and extended vegetation algorithms in LAVegMod 2.0 were tested and compared to LAVegMod. For this comparison, existing eco-hydrology model output from the 2012 Coastal Master Plan (central coast region) (Figure 7.1) for the moderate future scenario (Table 7.1) was used.

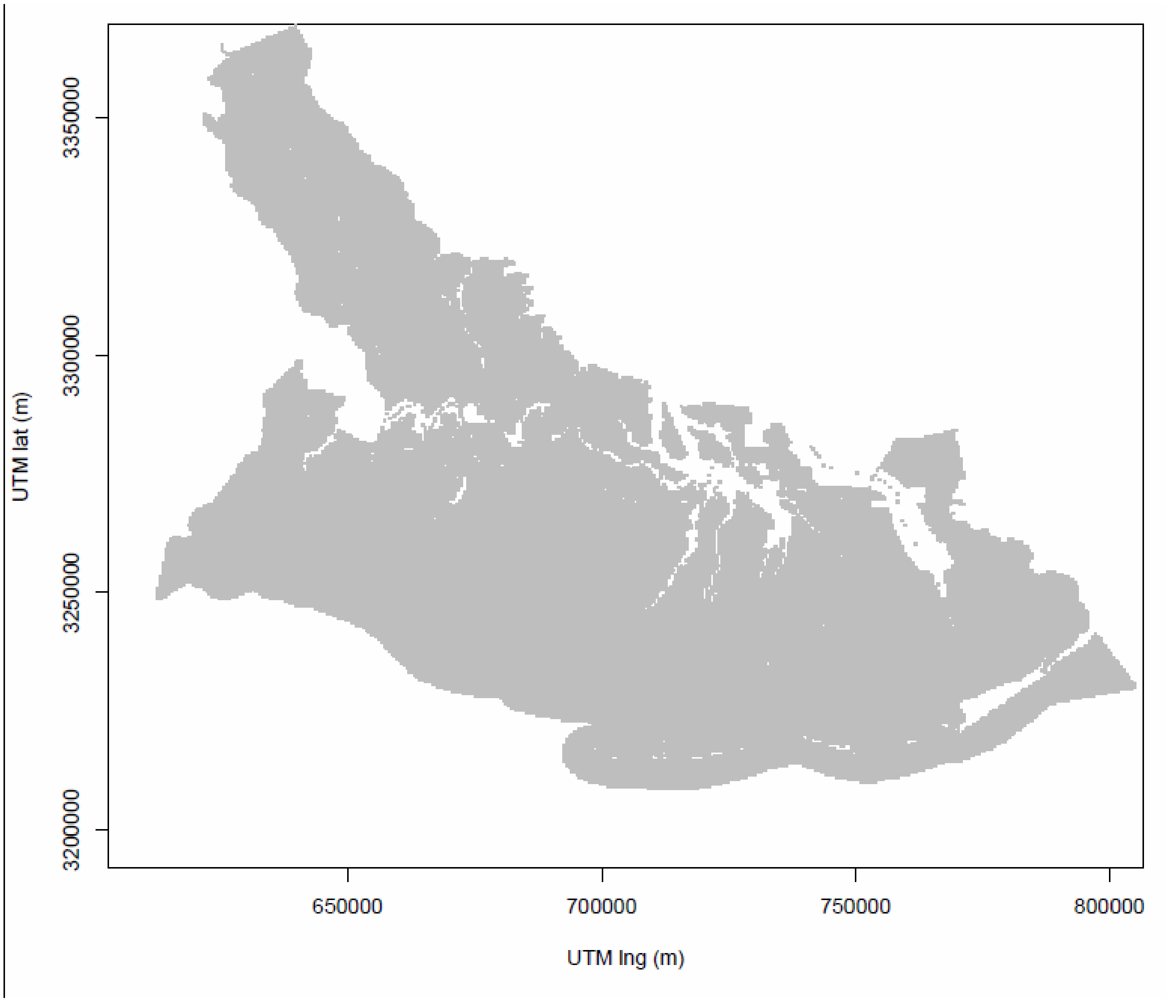


Figure 7.1. The 2012 Coastal Master Plan central coast model domain used for code testing of LAVegMod 2.0. The grey area represents the 2012 wetland morphology model domain. This area includes but is not limited to the Atchafalaya and Terrebonne basins.

Table 7.1. Description of the moderate scenario used to test the LAVegMod 2.0 code.

Factors	Plausible Range over 50 years	Moderate Value CPRA derived	Source of range values
Sea Level Rise	0.12 m to 0.65 m of sea level rise over 50 years	0.27 m of sea level rise over 50 years	Literature, USACE guidance
Storm Intensity	0% to +30%	+ 10% of current storm intensities	Literature, global model predictions
Storm Frequency	-20% to +10%	Current storm frequency (One Category 3 or greater storm every 19 years)	Literature, global model predictions
River Discharge / Sediment Load	-7% to + 14% (annual mean discharge, adjusted for seasonality)	534,000 cubic feet per second (annual mean)	Literature
Rainfall (varies spatially)	Historical monthly range	Variable percentage of historical monthly mean	Eco-hydrology Modeling Team
Evapotranspiration (varies spatially)	+/-1 standard deviation of historical monthly range	Mean monthly values of the historical record	Eco-hydrology Modeling Team

7.1. Wetland Vegetation

Because the wetland vegetation modeled in LAVegMod 2.0 is the same as that modeled for the 2012 Coastal Master Plan with LAVegMod the two model versions in this section were compared. In general, the changes to the model provide the same trends in major habitats (Figure 7.2). However, there are significant differences in the trend for fresh marsh. This is primarily due, to the unrealistic expansion of maidencane in LAVegMod (Figure 7.3). This unrealistic expansion of maidencane came at the expense of several other fresh and intermediate marsh species. All other fresh marsh species show similar trends among the two model versions.

In the intermediate marsh, both model versions show similar changes of species over time (Figure 7.4). In the brackish marsh, LAVegMod had a vegetation type, identified as BRACK, that reflected a mixture of *Spartina alterniflora*, *Distichlis spicata*, and *Spartina patens* without a clear dominant. In LAVegMod 2.0 these species were modeled as individual species. To ease the comparison, 1/3 of the BRACK area was added to the individual species in LAVegMod for a direct comparison with LAVegMod 2.0. Overall, the brackish marsh species show similar trends among the model versions (Figure 7.2). However, LAVegMod 2.0 shows a steep decline in *Spartina patens* in the first year, but remains relatively stable for the remaining 49 years (Figure 7.5). In contrast, *Paspalum vaginatum* and *Baccharis halimifolia* show a steady increase over the similuation in LAVegMod 2.0. The same species (PASP and SCRUB) remain at low presence in LAVegMod.

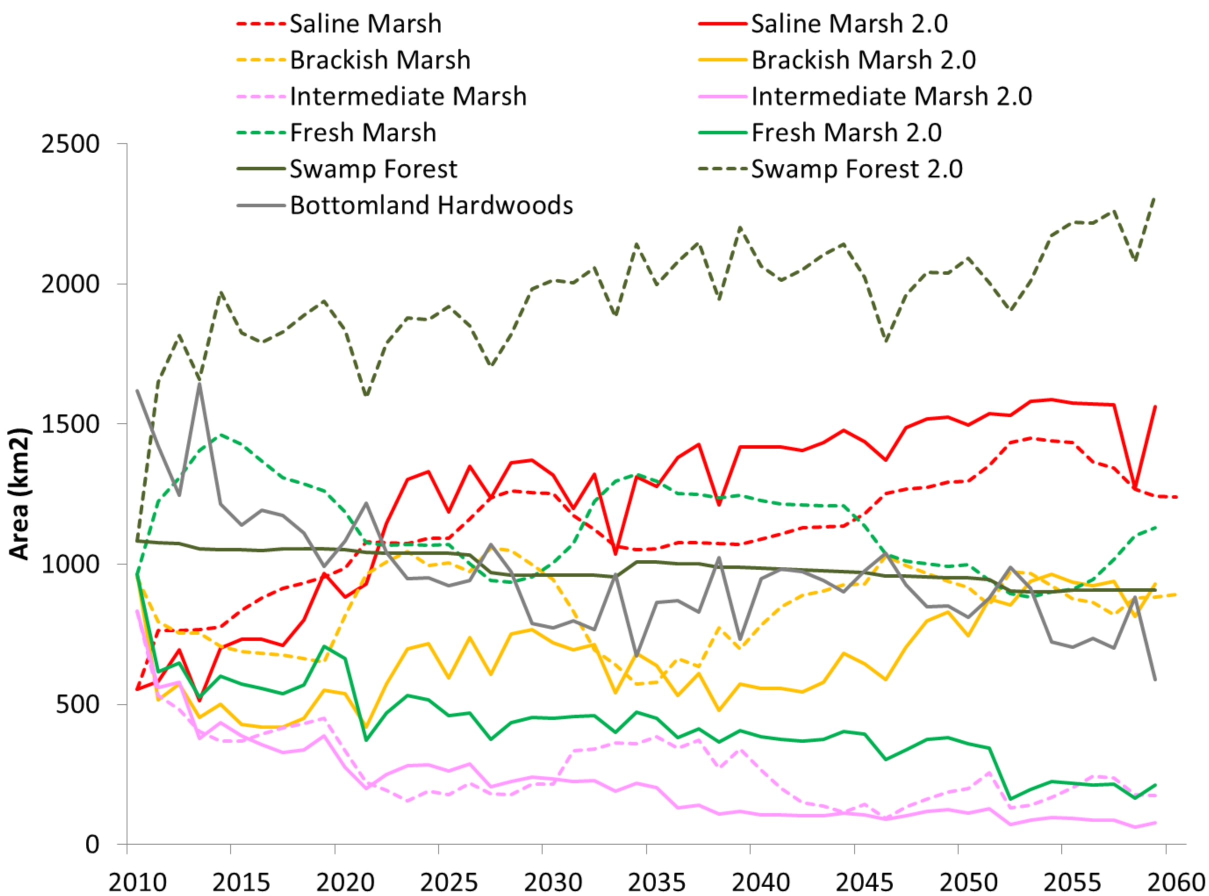


Figure 7.2. Comparison of prediction of change in major habitat groups. Dashed lines reflect output from LAVegMod. Solid lines reflect output from LAVegMod 2.0.

Table 7.2. Comparison of species abbreviations used for the two versions of the model for marsh species.

Species	**V1**	**V2**
Morella cerifera (L.) Small	WAXM	MOCE2
Eleocharis baldwinii (Torr.) Chapm.	THIN	ELBA2
Hydrocotyle umbellata L.	THIN	HYUM
Panicum hemitomon Schult.	MAID	PAHE2
Sagittaria latifolia Willd.	SPLAY	SALA2
Zizaniopsis miliacea (Michx.) Döll & Asch.	CUTGR	ZIMI
Cladium mariscus (L.) Pohl	SAWG	CLMA10
Typha domingensis Pers.	CAT	TYDO
Sagittaria lancifolia L.	BULL	SALA
Schoenoplectus californicus (C.A. Mey.) Palla	WHIP	SCCA11
Phragmites australis (Cav.) Trin. ex Steud.	ROSEAU	PHAU7
Iva frutescens L.	SCRUB	IVFR
Baccharis halimifolia L.	SCRUB	BAHA
Paspalum vaginatum Sw.	PASP	PAVA
Spartina patens (Aiton) Muhl.	WIRE + BRACK	SPPA
Distichlis spicata (L.) Greene	SALT + BRACK	DISP
Spartina alterniflora Loisel.	OYST + BRACK	SPAL
Juncus roemerianus Scheele	NEEDLE	JURO
Avicennia germinans (L.) L.	MANGR	AVGE

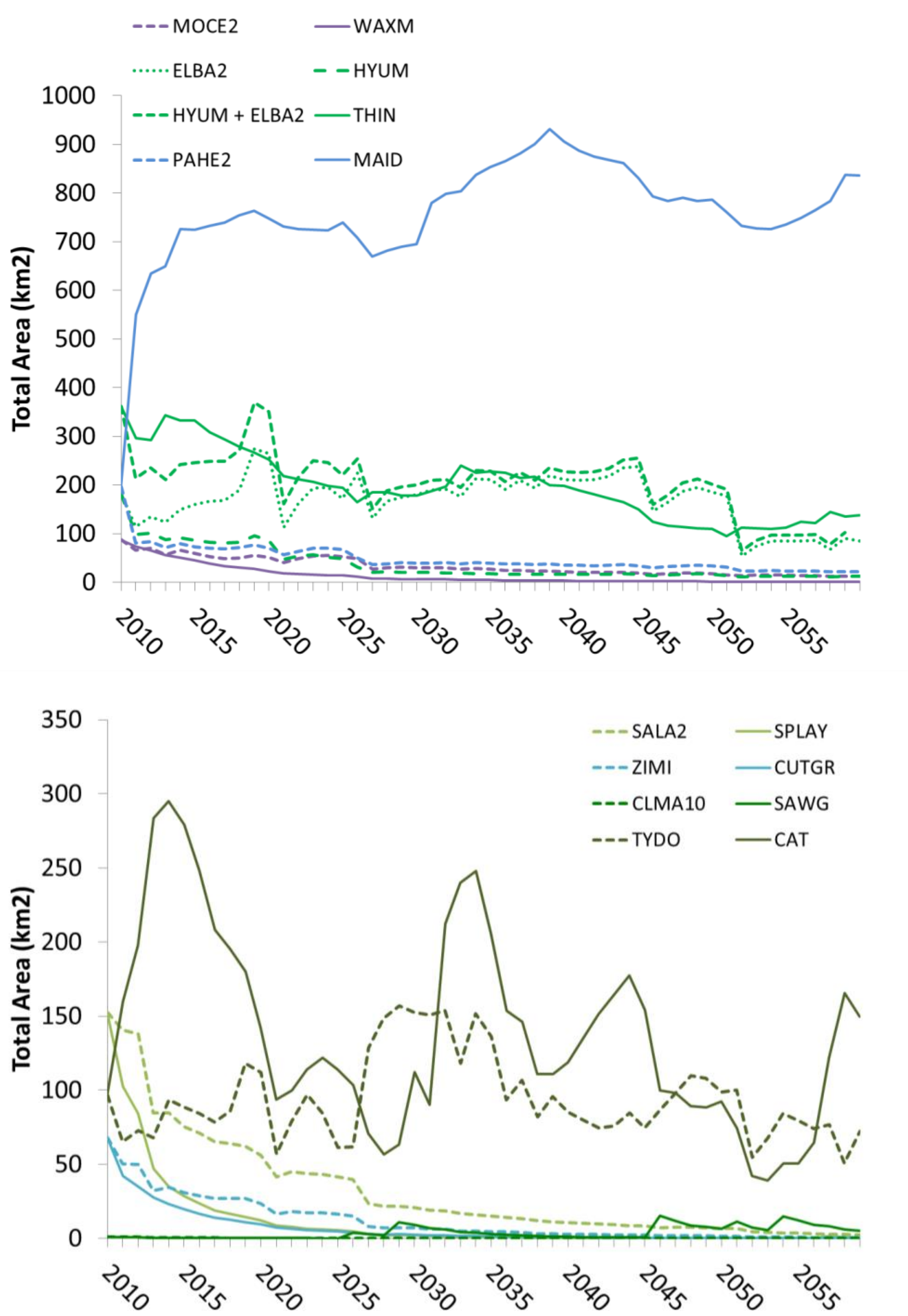


Figure 7.3. Comparison of prediction of change in freshwater species. Solid lines reflect output from LAVegMod. Dashed lines reflect output from LAVegMod 2.0. Colors identify the same species or species groups. Abbreviations are provided in Table 7.2.

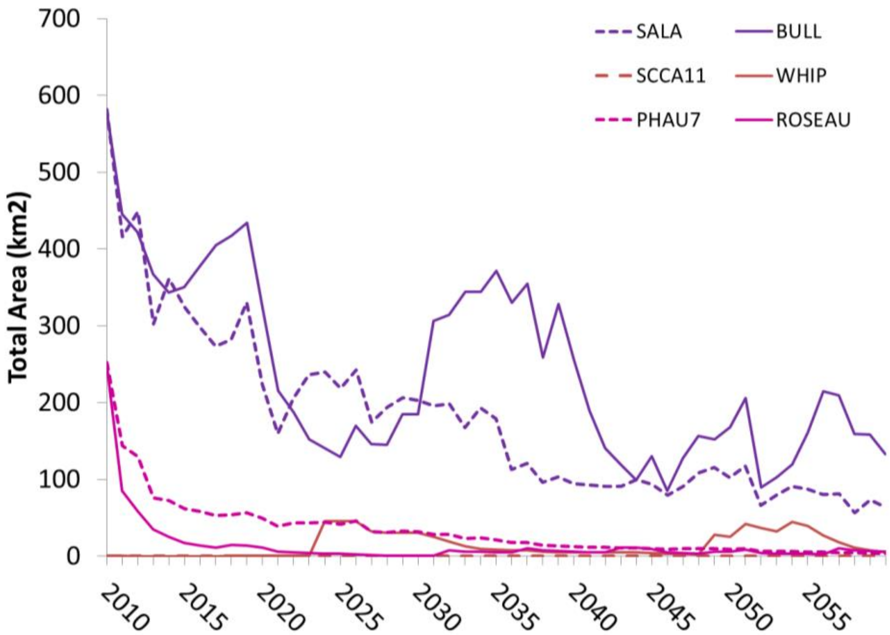


Figure 7.4. Comparison of prediction of change in intermediate marsh species. Solid lines reflect output from LAVegMod. Dashed lines reflect output from LAVegMod 2.0. Colors identify the same species. Abreviations: SALA and BULL are Sagittaria lancifolia*, SCCA11 and WHIP are* Schoenoplectus californicus*, PHAU7 and ROSEAU are* Phragmites australis*.*

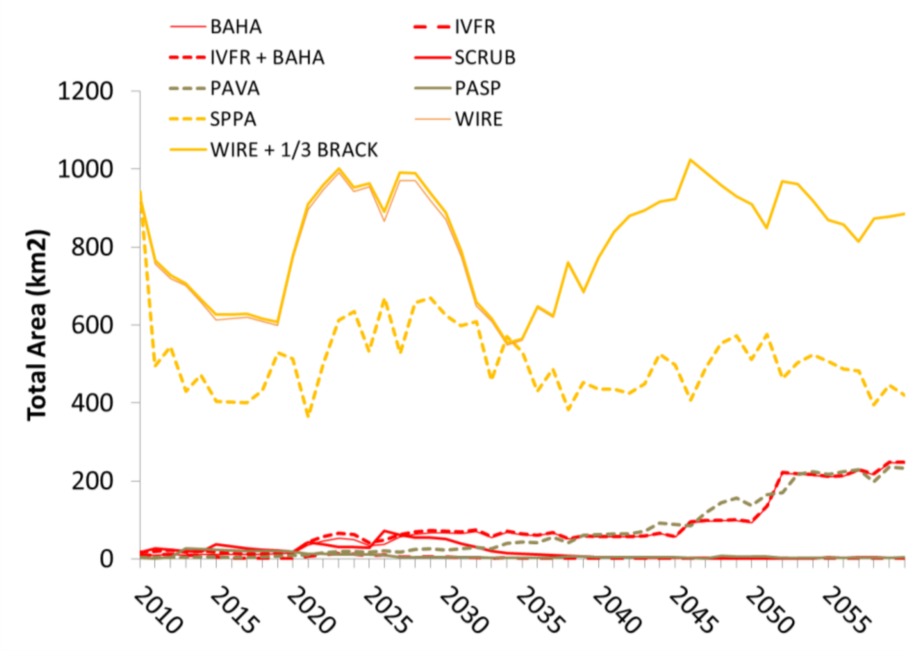


Figure 7.5. Comparison of prediction of change in brackish marsh species. Solid lines reflect output from LAVegMod. Dashed lines reflect output from LAVegMod 2.0. Colors identify the same species or species groups. BAHA is Baccharis halimifolia, *IVFR is* Iva frutescens, *whereas both were lumped into SCRUB for LAVegMod. PAVA and PASP are* Paspalum vaginatum, *SPPA and WIRE are* Spartina patens.

In general both versions of the model give similar output for saline marsh (Figure 7.2) and the saline marsh species (Figure 7.6). For *Avicennia germinans*, LAVegMod 2.0 gives slightly higher cover than LAVegMod. In general, LAVegMod 2.0 is more sensitive (i.e., has more interannual variation) than LAVegMod. Additional testing will be done during the calibration phase.

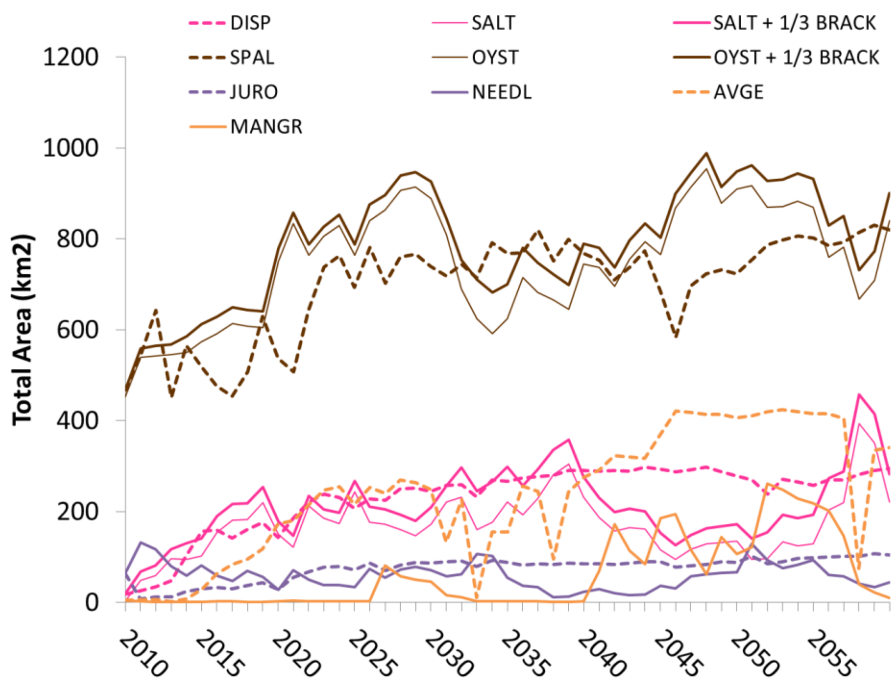


Figure 7.6. Comparison of prediction of change in saline marsh species. Solid lines reflect output from LAVegMod. Dashed lines reflect output from LAVegMod 2.0. Colors identify the same species. DISP and SALT are Distichlis spicata*, SPAL and OYST are* Spartina alterniflora*, JURO and NEEDL are* Juncus roemerianus*, AVGE and MANGR are* Avicennia germinans*.*

7.2. Forested Wetlands

7.2.1. Swamp Forest

Swamp forest was included as one vegetation type in LAVegMod and separated into *Taxodium distichum*, *Nyssa aquatica*, and *Salix nigra* in LAVegMod 2.0. Due to the unavailability of a base map the swamp species were equally distributed over the swamp forested areas in the 2010 base map for the initial condition of LAVegMod 2.0. Therefore, the first 10 years of the model run are considered an initialization stage, where species are eliminated from the areas that are unsuitable. With the addition of BHF (see below) some areas suitable for *Taxodium distichum* and *Nyssa aquatica* became available for expansion. In LAVegMod swamp forest steadily declines (Figure 7.7) and is replaced by marsh species. In LAVegMod 2.0 swamp forest expands (Figure 7.7), but this is primarily due to a migration upslope as *Taxodium distichum* and *Nyssa aquatica* replace the BHF species (Figure 7.8). For *Salix nigra*, the total area remains relatively constant (Figure 7.9), but by 2060 this species occupies the areas influenced by the Atchafalaya River as well as some isolated wetlands along the eastern edge of the model domain (Figure 7.8). In general, LAVegMod 2.0 displays more interannual variation due to environmental changes than LAVegMod (Figure 7.7). Additional sensitivity testing will be done during the calibration phase.

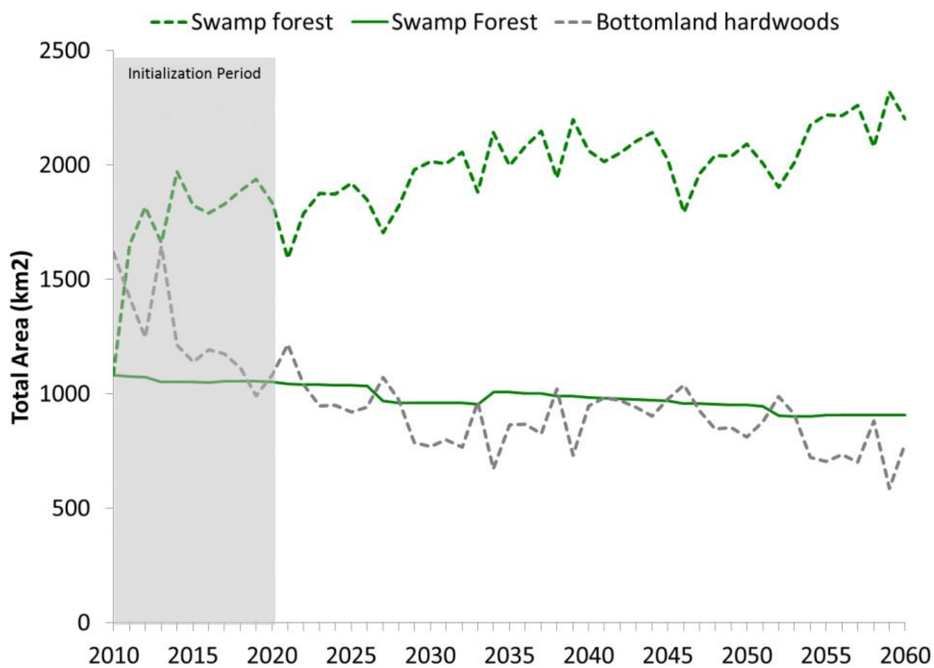


Figure 7.7. Comparison of prediction of change in forested wetland habitats. Solid line reflects output from LAVegMod. Dashed lines reflect output from LAVegMod 2.0. Colors identify the same habitats.

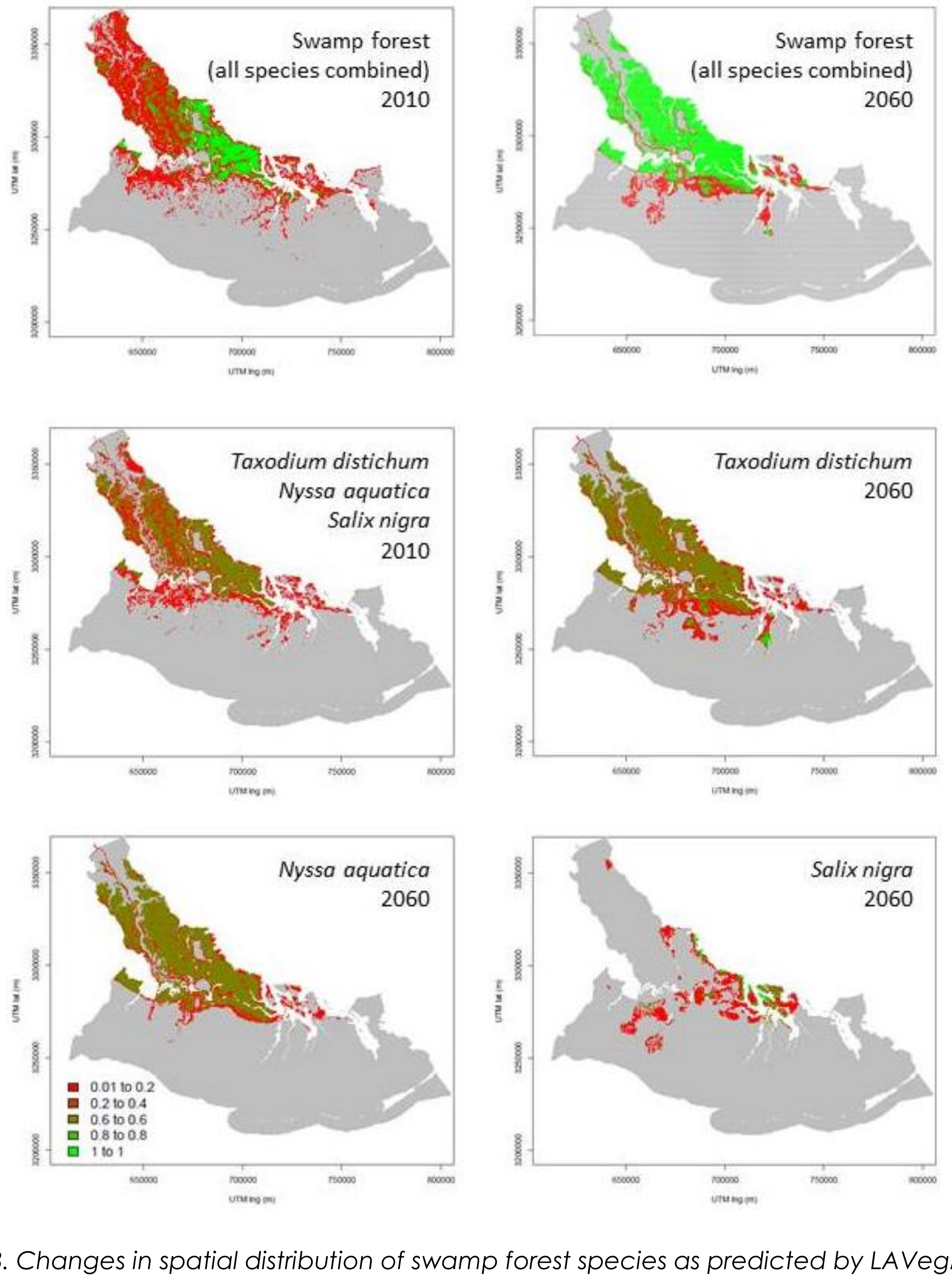


Figure 7.8. Changes in spatial distribution of swamp forest species as predicted by LAVegMod 2.0. Areas are shaded from red to green with red areas indicating low cover by a species at a location and green areas indicating high cover. Cover is indicated by the fraction of each 500x500 m cell occupied by a species. Please note that, because of the unavailability of a base map, the swamp forest habitat was equally distributed over the three swamp species for the initial conditions in 2010.

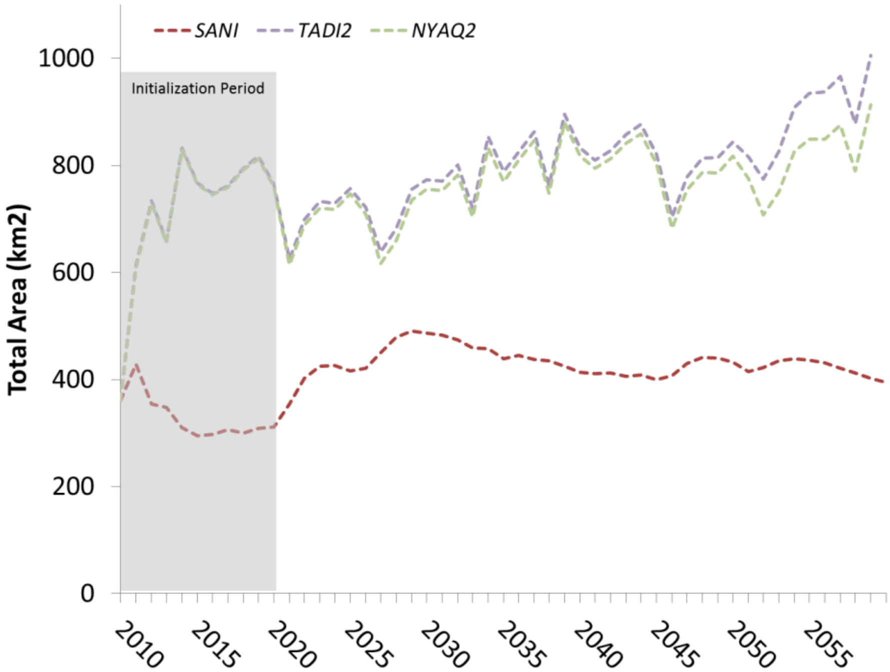


Figure 7.9. Changes in total area of swamp forest species as predicted by LAVegMod 2.0. SANI is Salix nigra*, TADI2 is* Taxodium distichum*, and NYAQ2 is* Nyssa aquatica.

7.2.2. Bottomland Hardwood Forest

Because bottomland hardwood forest (BHF) was not included in LAVegMod, only results from LAVegMod 2.0 are discussed in this section. Due to the unavailability of a base map the BHF species were equally distributed over the non-swamp forested areas in the 2010 base map (Figure 7.10) for the initial condition. This led to a low initial cover since a maximum 17% of a cell is occupied by each species. Therefore, the first 10 years of the model run are considered an initialization stage, where species are eliminated from the areas that are unsuitable. As species are eliminated, other species can expand and rapid changes occur that would not normally occur in a BHF.

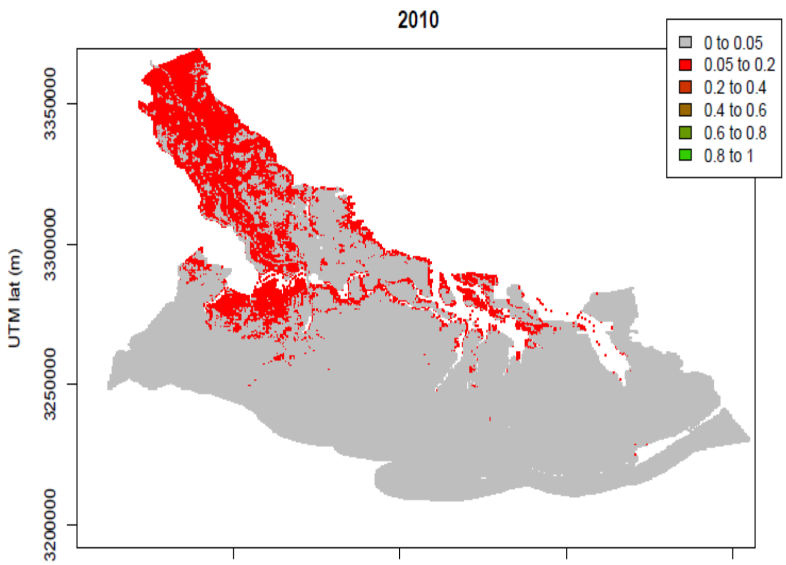


Figure 7.10. Distribution used as initial condition for all BHF species. Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2), bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 500x500 m cell occupied by a species. Note: the initial BHF habitat was equally distributed over six species, so the initial cover is all low (red).

Quercus virginica occupies the highest BHF zone and dominates the ridges in the model domain, particularly the high natural level of the Atchafalaya River (Figure 7.11). This species slightly decreased in area over the model run, from 2020 to 2060 (Figure 7.12),

Quercus lyrata occupies the lowest BHF zone, and occupies most of the BHF area in the Atchafalaya Basin (Figure 7.13).

According to the model results, very limited habitat is available for the other BHF species (Figure 7.12). The model results show a rapid gradient from the upland to lower BHF zone in the Atchafalaya basin (Figures 7.14 to 7.17).

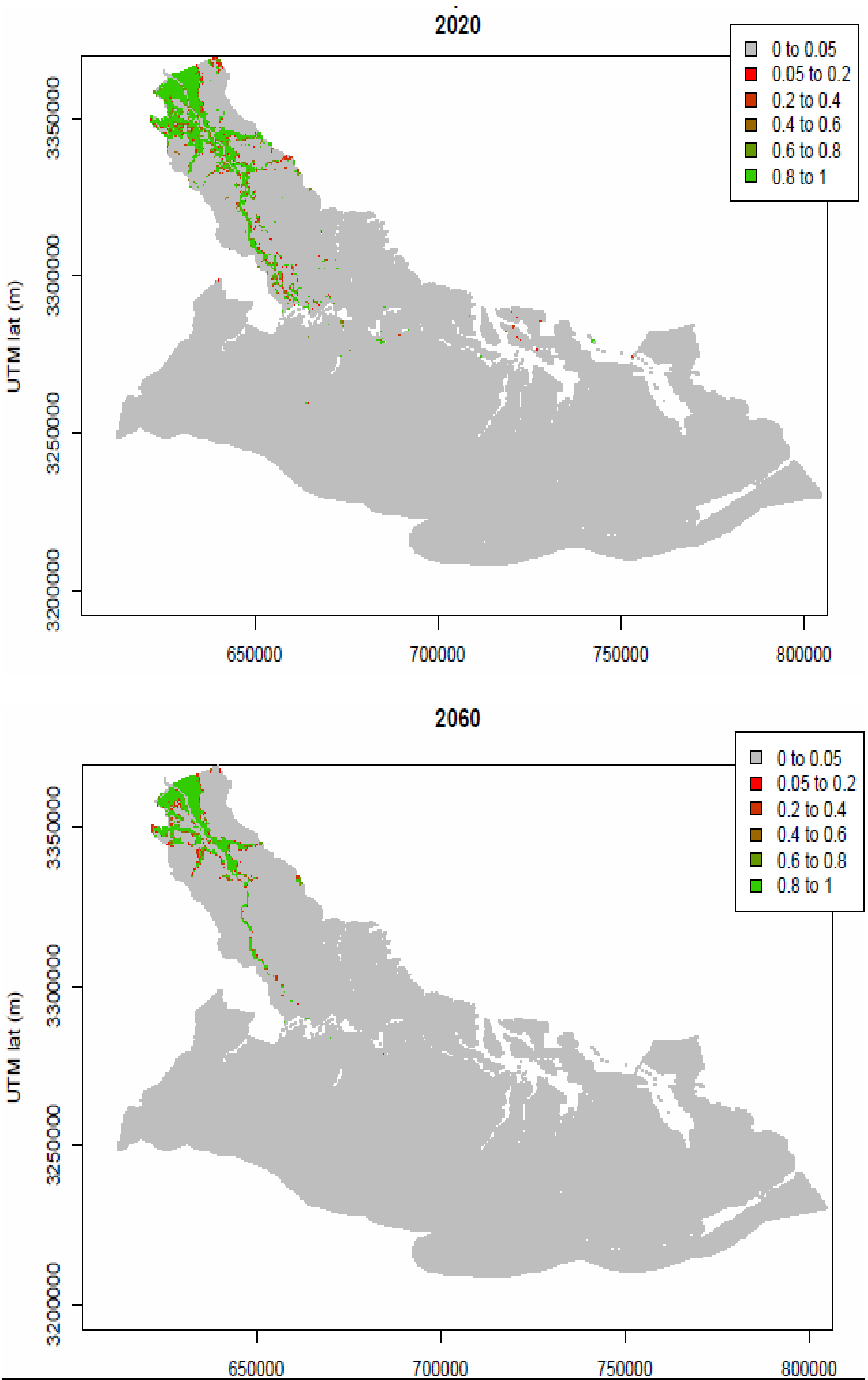


Figure 7.11. Distribution of Quercus virginica *in years 2020 (top) and 2060 (bottom). Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2), bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 500x500 m cell occupied by a species.*

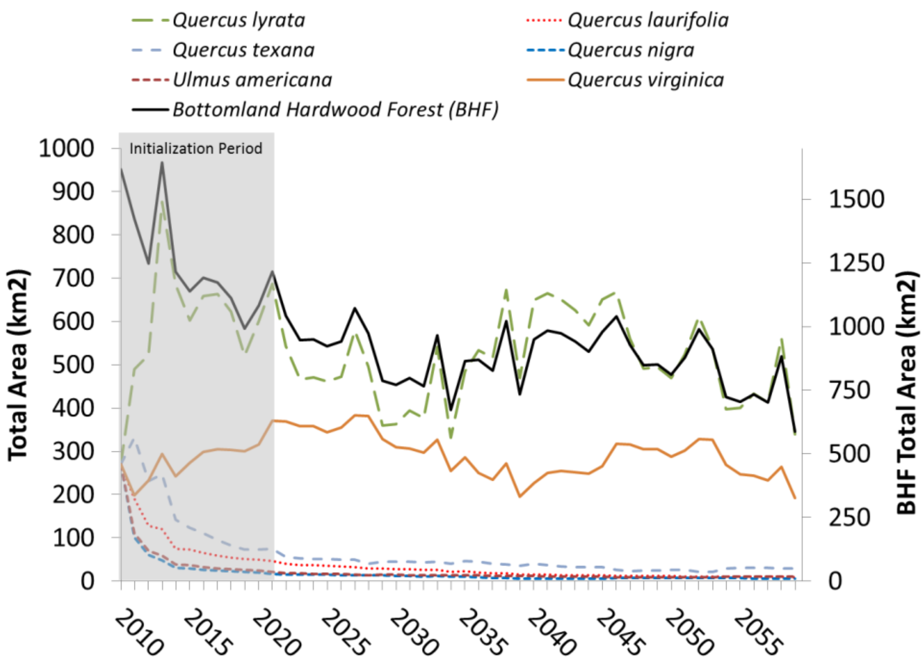
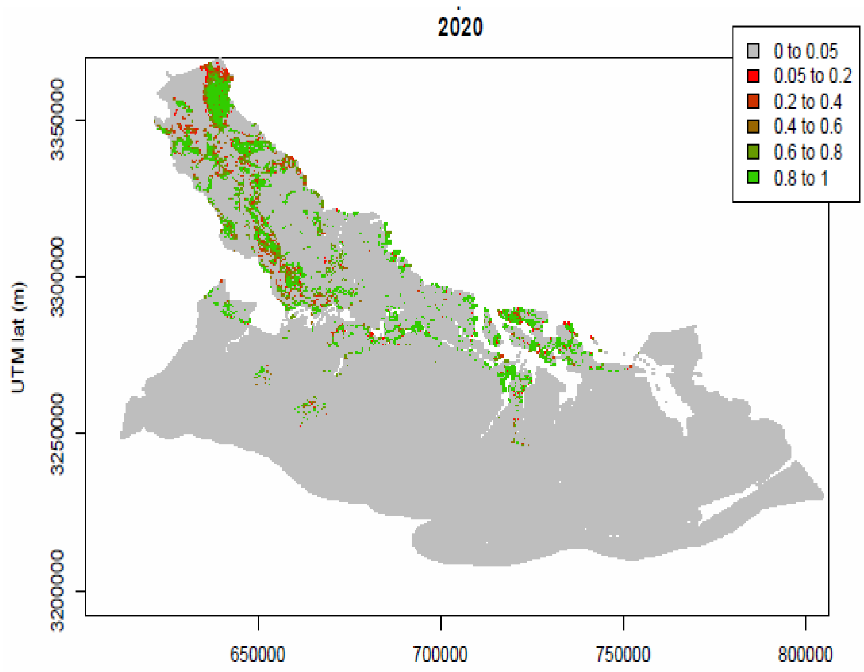


Figure 7.12. Changes in total area occupied by different BHF tree species over the model run.

Even the lowest elevation BHF species (*Q. lyrata, Q. texana*, and *Q. laurifolia*) were eliminated from the lowest elevation sites that on the base map were classified as forested but not swamp forest during the calibration stage (Figures 7.10 and 7.13). However, as time progressed, cover of these species declined as well as the total cover of BHF (Figure 7.12). By 2060, these species were restricted to the intermediate elevations of the ridges in the model domain. Much of the area, identified as BHF in 2010 converted to swamp by 2060.



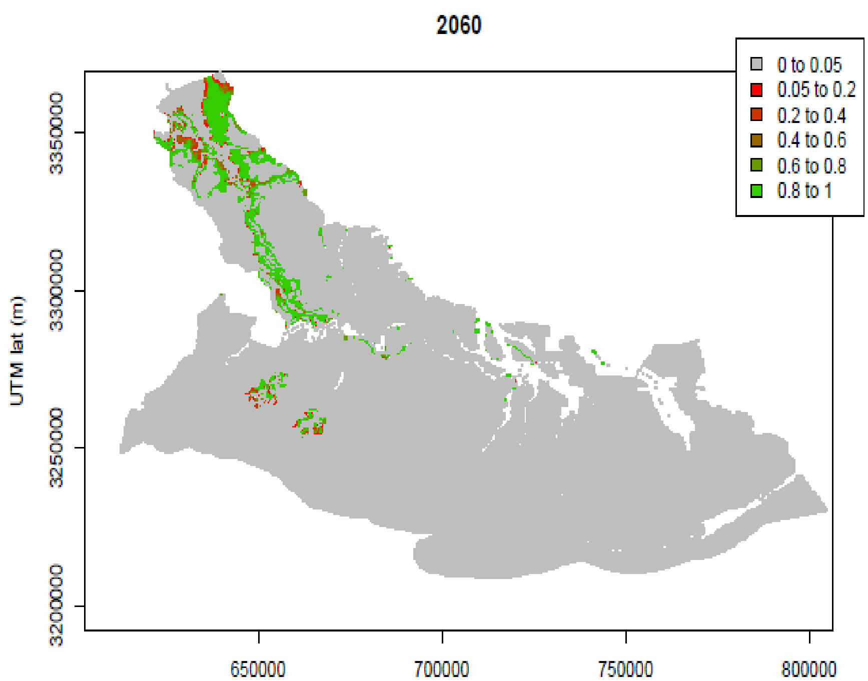


Figure 7.13. Distribution of Quercus lyrata *in years 2020 (top) and 2060 (bottom). Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2), bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 500x500 m cell occupied by a species.*

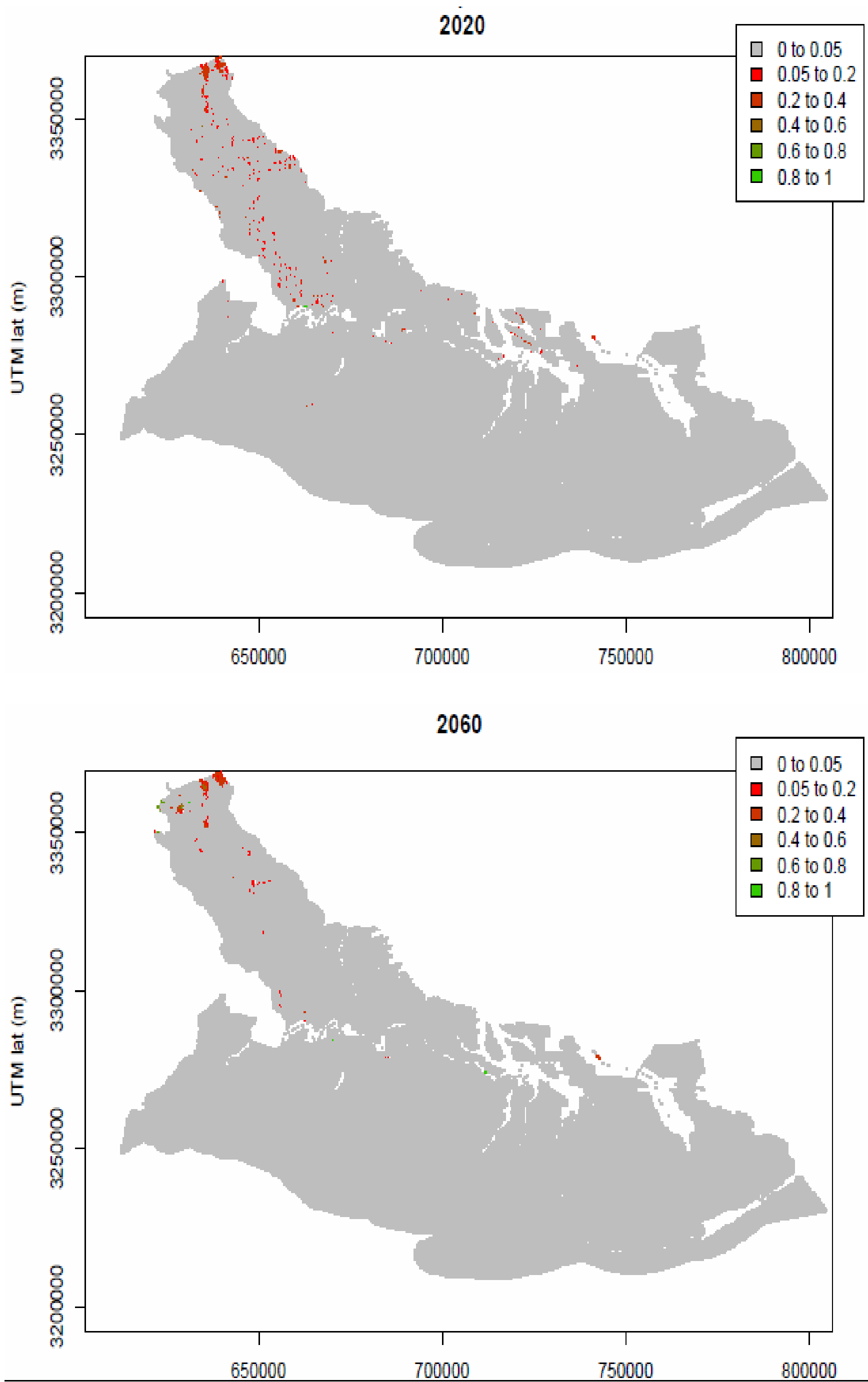


Figure 7.14. Distribution of Ulmus americana *in years 2020 (top) and 2060 (bottom). Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2), bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 500x500 m cell occupied by a species.*

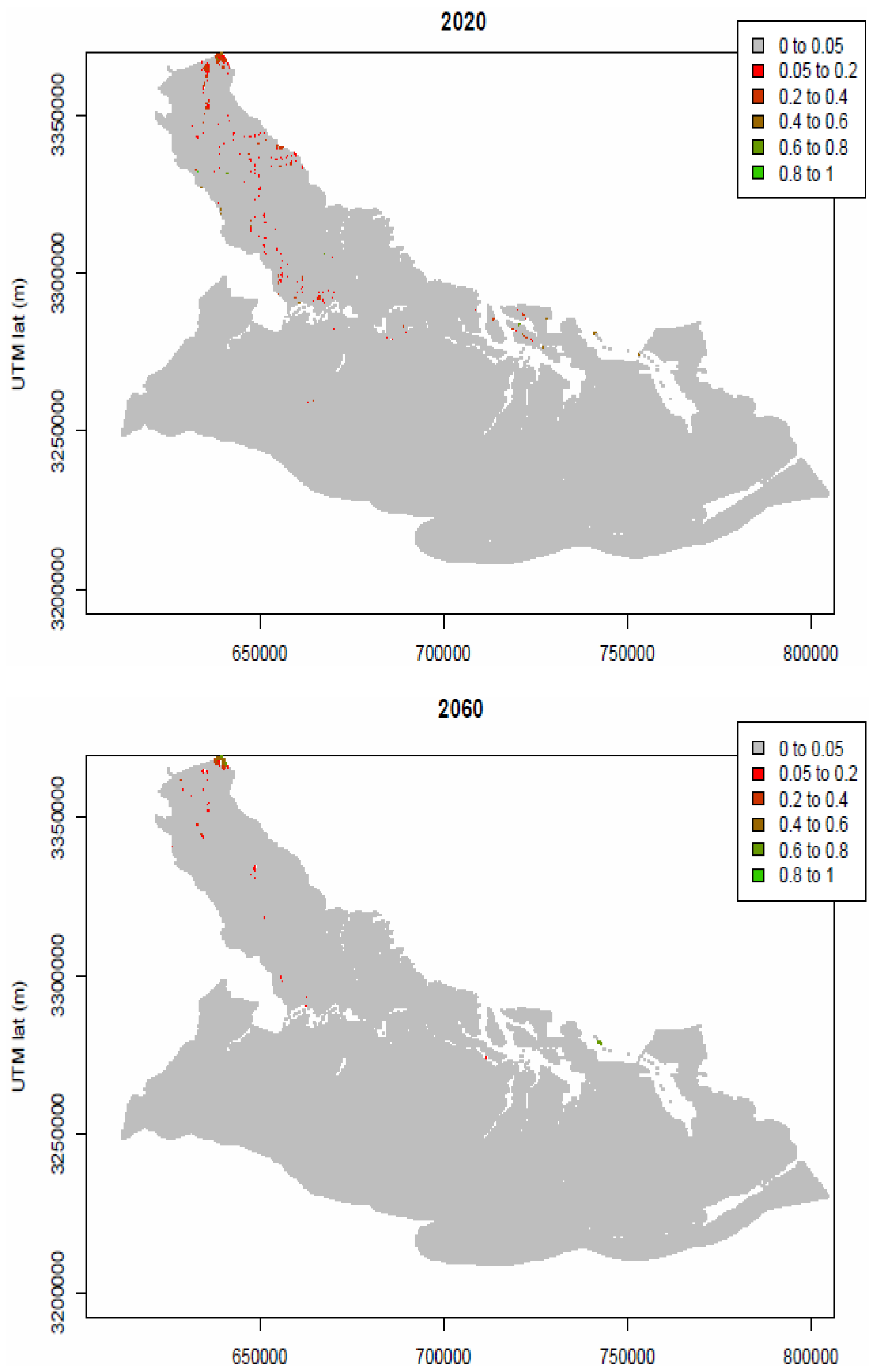


Figure 7.15. Distribution of Quercus nigra in years 2020 (top) and 2060 (bottom). Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2), bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 500x500 m cell occupied by a species.

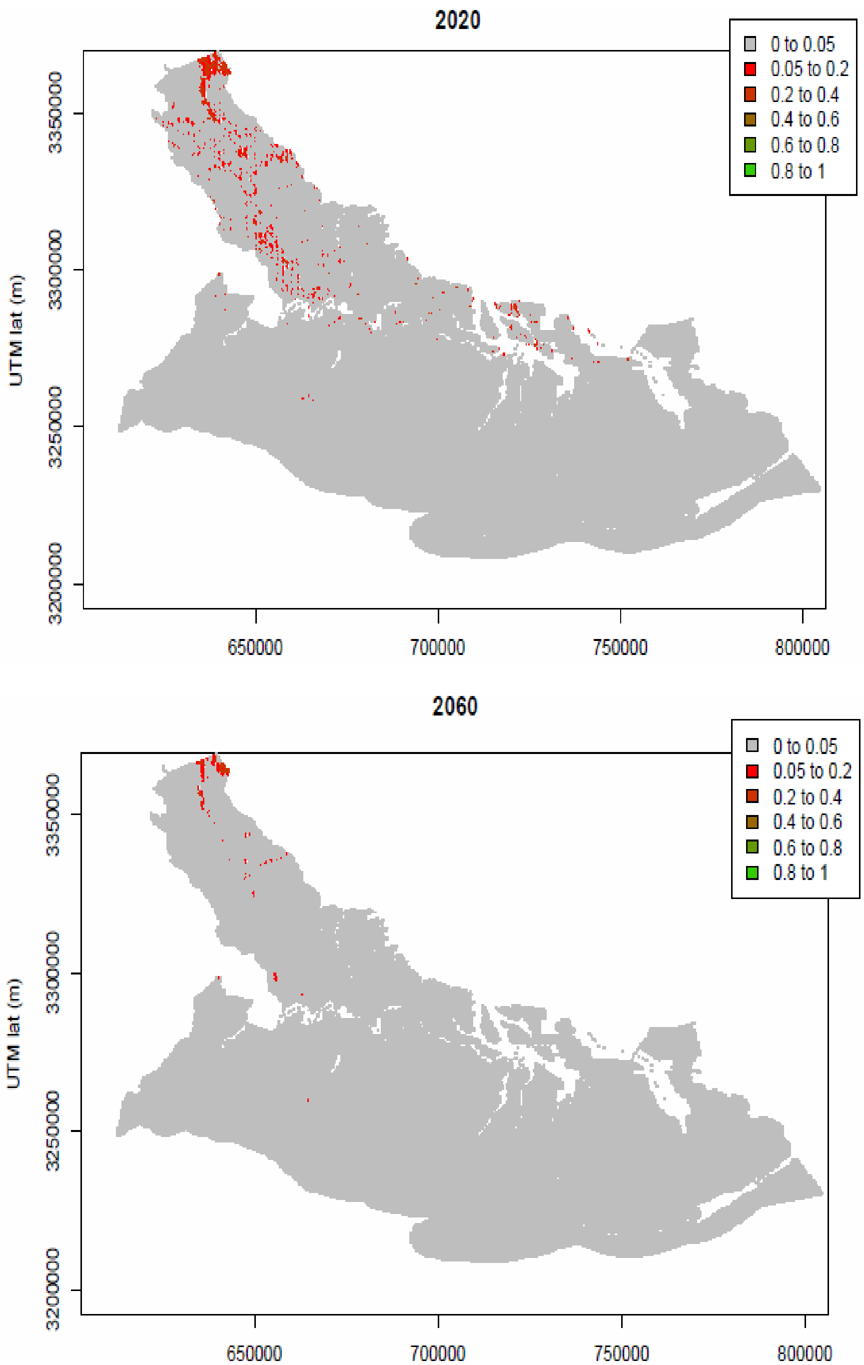


Figure 7.16. Distribution of Quercus laurifolia *in years 2020 (top) and 2060 (bottom). Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2), bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 500x500 m cell occupied by a species.*

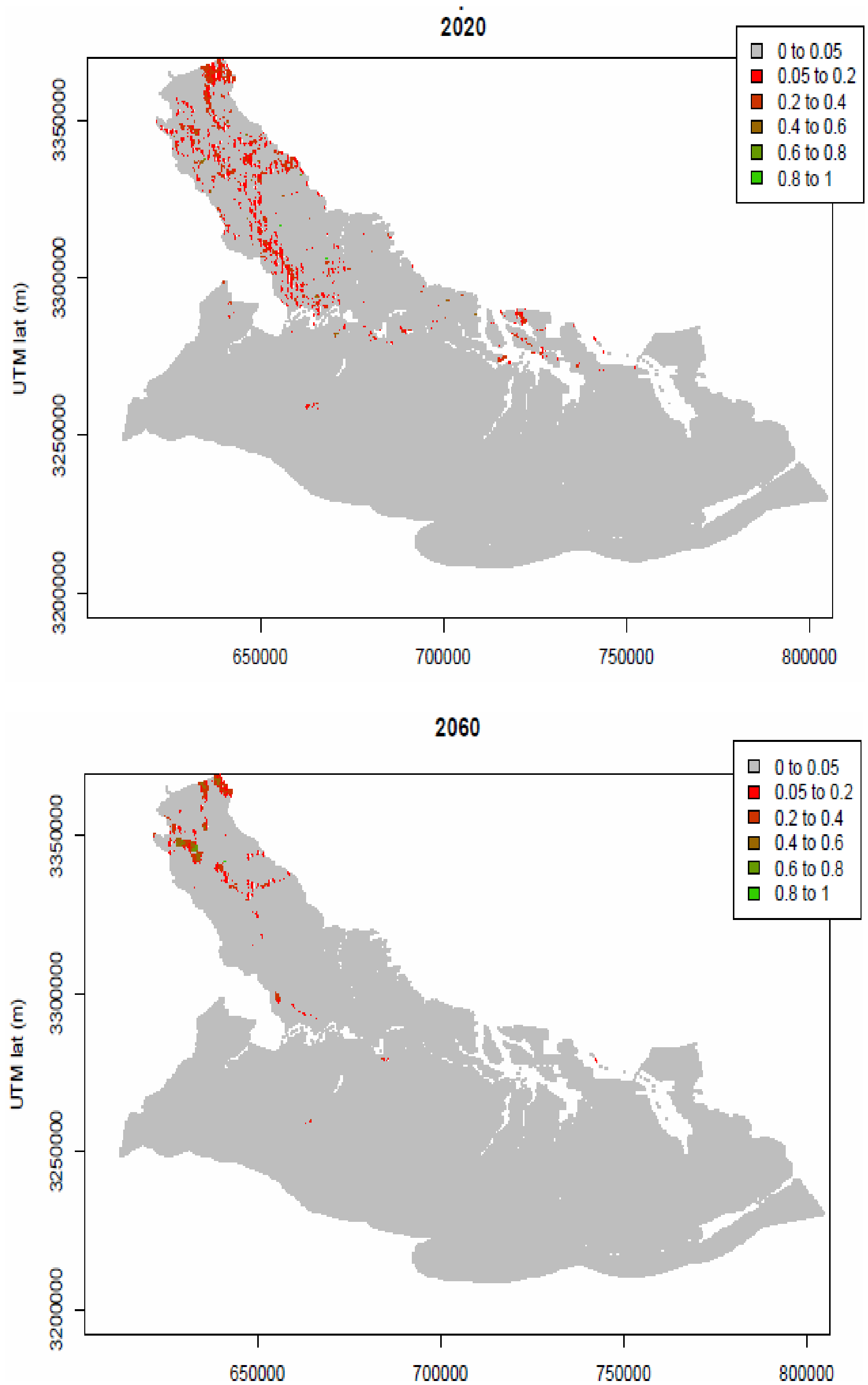


Figure 7.17. Distribution of Quercus texana *in years 2020 (top) and 2060 (bottom). Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2), bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 500x500 m cell occupied by a species.*

7.3. Barrier Island Vegetation

Central Isle Dernieres was used as a test case when testing the barrier island vegetation module (Figure 7.18). The model was run at a 30 x 30 m resolution for the area enclosed in the grey box shown in Figure 7.18. The plot resolution is based on the resolution of the elevation data used by the model. The same hydrology inputs were used as previously described for the other model tests.

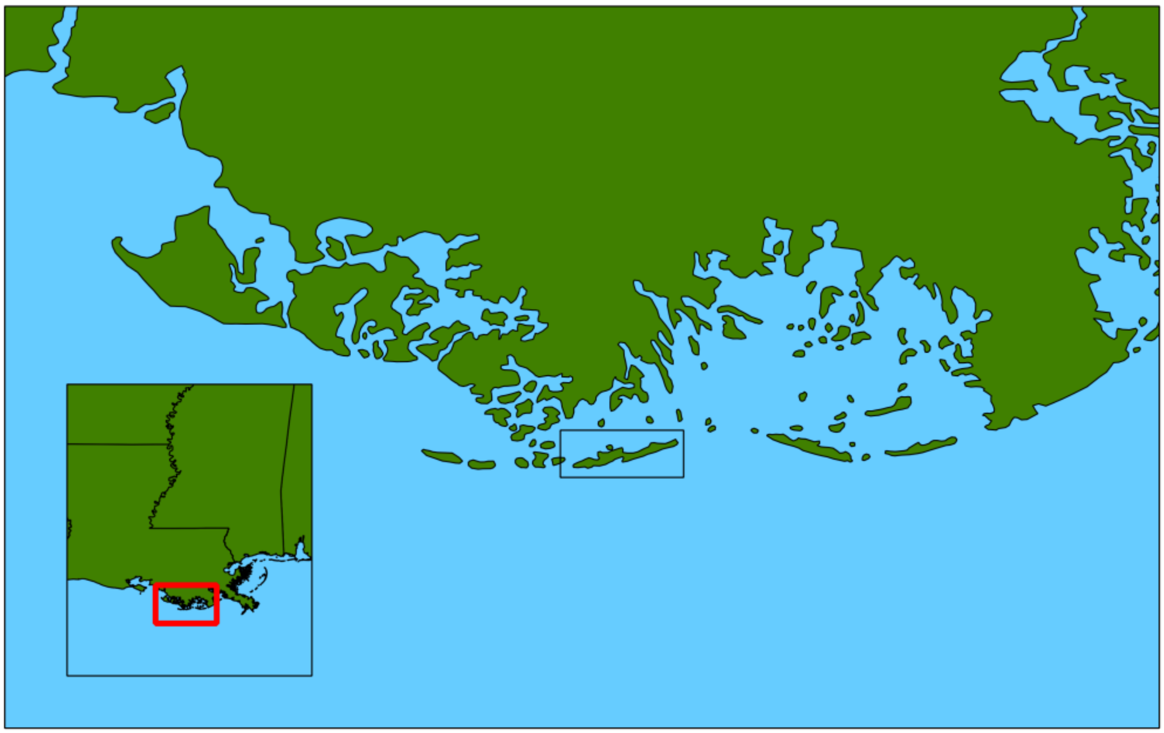


Figure 7.18. Map showing the island used for simulation results. The extent of the larger map is show as the red box in the inset map. The Isle Derniers Island simulated is enclosed in a grey box in the larger map. Green areas represent land while blue areas are the Gulf of Mexico.

Because a base map of barrier island vegetation was unavailable at the time of this test, the model domain was initialized with a uniform distribution for all species. It is also important to note that this island received significant restoration and thus has a higher elevation and wider dune than a more natural barrier island in this region.

Because *Strophostylis helvola* has the widest elevation tolerance it occupies the most space in the model output (Figure 7.19). It dominates the back side of the dune as well as the front side of the dune (Figure 7.20) and is found with small cover on the dune. The three dune species share space on the dune, with *Panicum amarum* restricted to the highest elevation and *Uniola paniculata* and *Sporobolus virginicus* having fairly similar distributions (Figure 7.21). The other swale species (*Spartina patens, Distichlis spicata, Solidago sempervirens* and *Bacharis halimifolia)* are distributed throughout the island, but are absent from the dune (Figure 7.22).

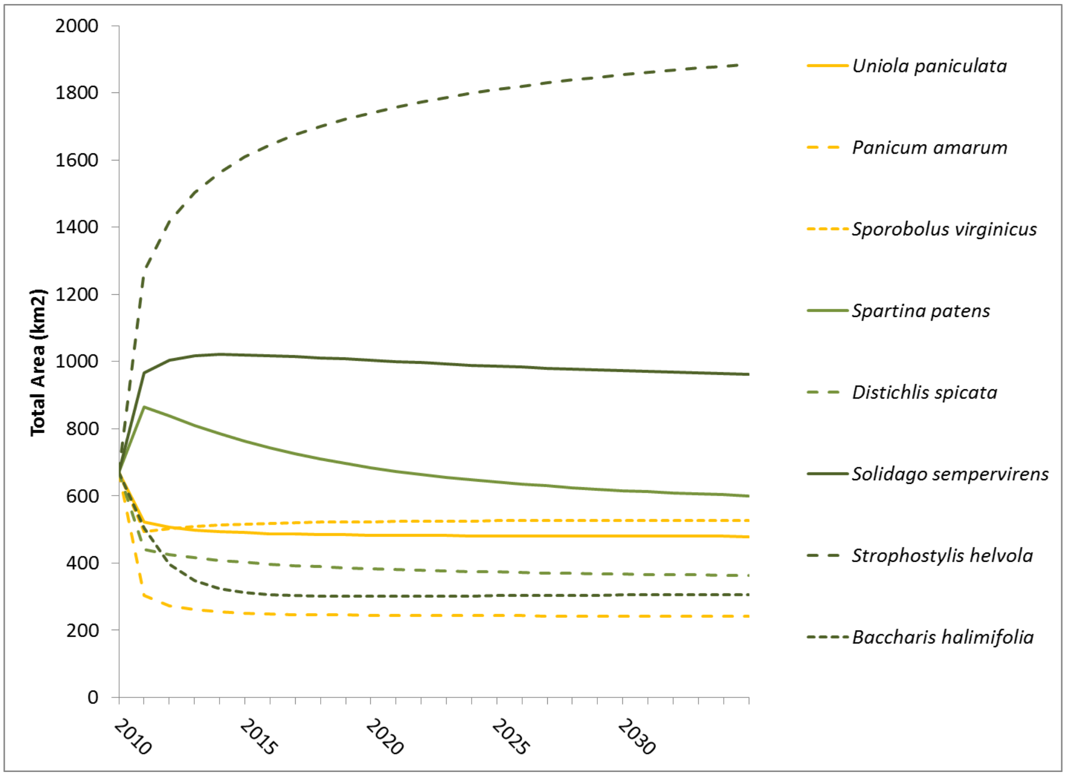


Figure 7.19. Change in area over time for the barrier island vegetation species.

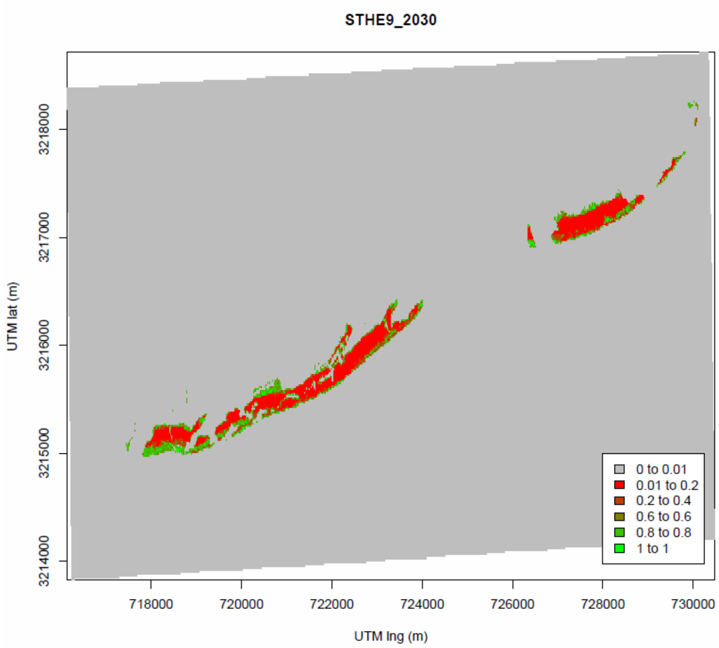
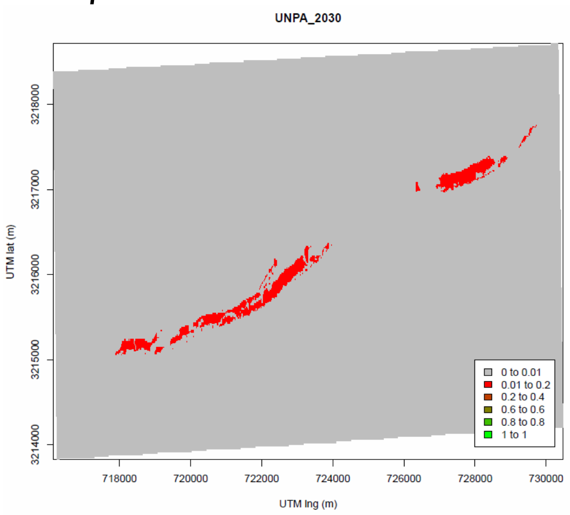
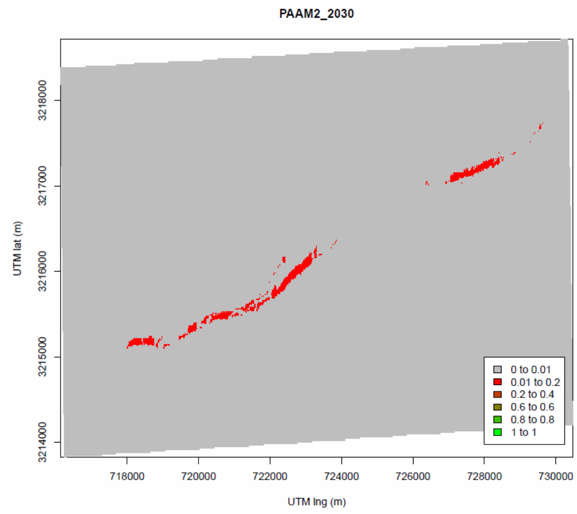


Figure 7.20. Distribution of Strophostylis helvola *after a 20 year model run with unchanged elevation, but increasing sea-level. Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2); bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 30x30 m cell occupied by a species.*

Uniola paniculata



Panicum amarum



Sporobolus virginicus

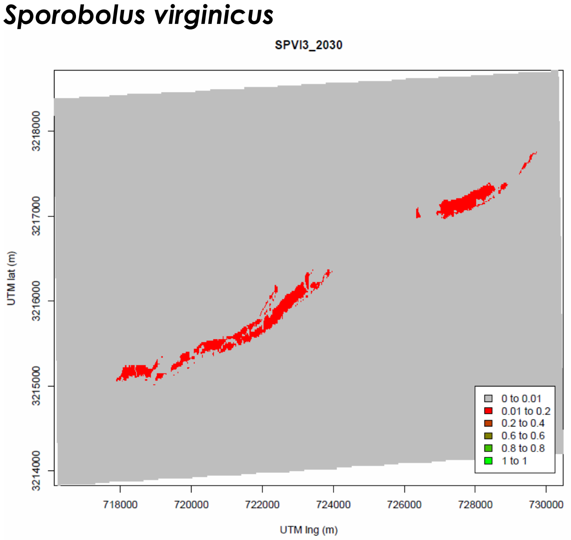
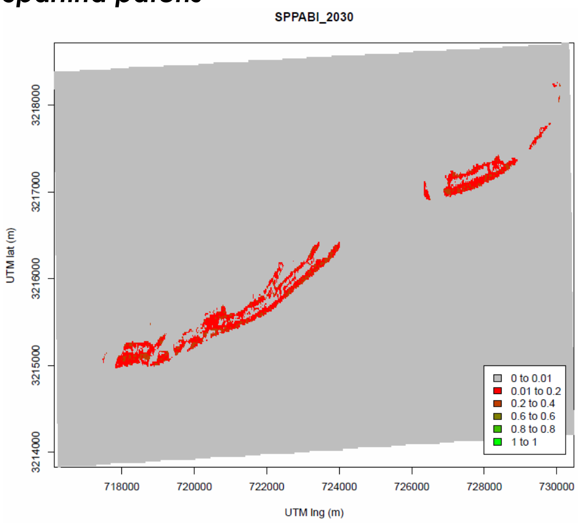
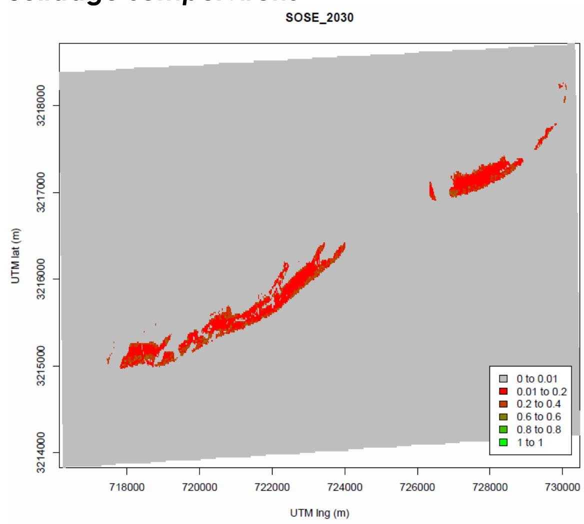


Figure 7.21. Distribution of the three dune species after a 20 year model run with unchanged elevation, but increasing sea level. Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2); bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 30x30 m cell occupied by a species.

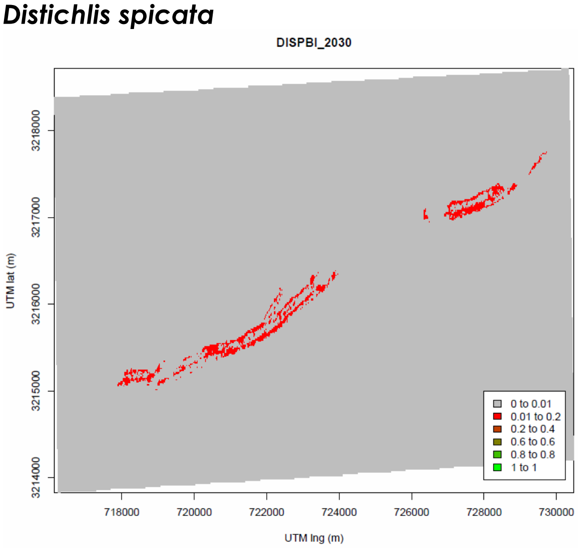
Spartina patens



Solidago sempervirens



Distichlis spicata



Baccharis halimifolia

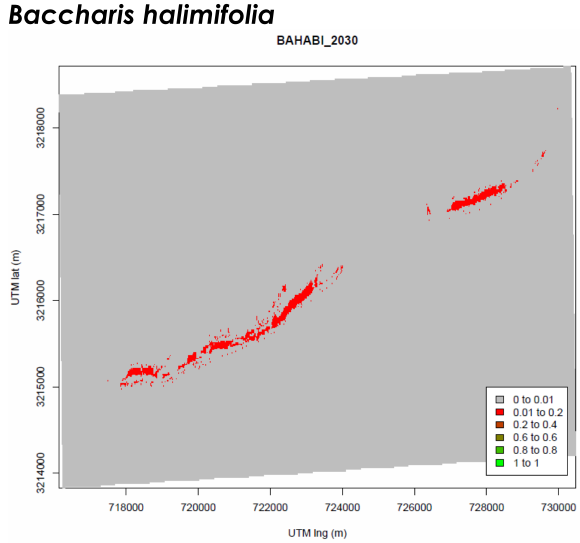


Figure 7.22. Distribution of the four swale species after a 20 year model run with unchanged elevation, but increasing sea-level. Areas are colored from red to green based on the fraction of a cell covered. Red indicates low cover (0.05 to 0.2); bright green indicates high cover (0.8 and 1.0). Cover is indicated by the fraction of each 30x30 m cell occupied by a species.

7.4. Floating Marsh Vegetation

Although an approach for incorporating floating marsh in the ICM has been developed, full test results are not available at this time. Results will be included in a future update of this report.

8.0 Discussion

LAVegMod 2.0 is a planning level vegetation model that can assist in the evaluation of ecological outcomes from coastal restoration and protection projects. Therefore, vegetation changes due to inundation and salinity are emphasized. There are many other factors that can affect actual vegetation changes in the Louisiana coastal zone that are generally unaffected by master plan restoration actions such as fire, air temperature, plant diseases, herbicide applications, invasive species removal, timber harvest, and insect outbreaks. Therefore these factors are not included in this model.

In general, the results from LAVegMod 2.0 are very similar to the output from LAVegMod. The improved model allows swamp forest tree species (*T. distichum* and *N. aquatica*) to expand upslope into the bottomland hardwood areas, where these species are known to occur. Although the new dispersal and establishment parts of the model code reduce the establishment of species, no formation of bare ground resulted. This indicates that changes in the hydrology of the system over the 50 years are sufficiently slow to allow species to migrate.

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10.0 Appendices

Appendix 1: Mortality Matrices

This appendix contains the Mortality matrices used by LAVegMod 2.0 to determine what the probability for Mortality is in response to the forcing factors (elevation or salinity and water level variability). Actual Mortality is a function of available space, availability of propagules, and competition with other species.

For those species for which CRMS data was available, the median of the distribution is green, the remaining area between the 25th and 75th quantile is yellow, and the remaining area from the 5th to the 95th percentile is red.

Abbreviation	Species
QULE	*Quercus lyrata* Walter
QUTE	*Quercus texana* Buckley
QULA3	*Quercus.laurifolia* Michx.
ULAM	*Ulmus americana* L.
QUNI	*Quercus nigra* L.
QUVI	*Quercus virginiana* Mill.

Elevation (m)	QULE	QUTE	QULA3	ULAM	QUNI	QUVI
-3	0	0	0	0	0	0
-0.1525	0	0	0	0	0	0
0	0	0	0	0	0	0
0.1525	0.2	0.1	0	0	0	0
0.305	0.3	0.2	0.1	0	0	0
0.475	0.4	0.3	0.2	0.1	0	0
0.61	0.6	0.5	0.4	0.3	0.2	0
0.7625	0.8	0.7	0.6	0.5	0.4	0
0.915	0.9	0.8	0.7	0.6	0.5	0
1.0675	1	0.9	0.8	0.7	0.6	0.1
1.22	0.9	1	0.9	0.8	0.7	0.3
1.3725	0.8	0.9	1	0.9	0.8	0.5
1.525	0.6	0.7	0.8	1	0.9	0.7
1.6775	0.4	0.5	0.6	0.7	1	0.9
1.83	0.2	0.3	0.4	0.5	0.6	1
1.9825	0	0.1	0.2	0.3	0.4	1
2.135	0	0	0	0.1	0.2	1
30	0	0	0	0	0	0

Figure A1- 1. Bottomland Hardwood Forest Mortality Matrix.

Water Level Variability (m)

Average Annual Salinity (ppt)

SANI	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.10	0.05	0.03	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
0.2	0.10	0.05	0.03	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
0.4	0.10	0.05	0.03	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
0.6	0.10	0.05	0.03	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
0.8	0.20	0.15	0.13	0.10	0.10	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85
1	0.30	0.25	0.23	0.20	0.20	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
1.2	0.40	0.35	0.33	0.30	0.30	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
1.4	0.50	0.45	0.43	0.40	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
1.6	0.70	0.65	0.63	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	0.90	0.85	0.83	0.80	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
400	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 2. Salix nigra *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

TADI	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	10
0.0	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
3	0.20	0.10	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
4	0.40	0.30	0.20	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
5	0.50	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
6	0.60	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
7	0.70	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
8	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
400	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 3. Taxodium distichum *Mortality Matrix.*

		Water Level Variability (m)																			
Average Annual Salinity (ppt)	NYAQ	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	10
	0.0	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.2	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.4	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.6	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.8	0.10	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	0.10	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	1.2	0.20	0.10	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	1.4	0.40	0.30	0.20	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	1.6	0.50	0.40	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	1.8	0.60	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	2	0.70	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	3	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	400	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 4. Nyssa aquatica *Mortality Matrix*

Water Level Variability (m)

Average Annual Salinity (ppt)

PAHE2	0	0.04	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4	0.44	0.48	0.52	0.56	0.6	0.64	0.68	0.72	0.76	10
0	0.20	0.15	0.1	0	0	0	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	0.20	0.15	0.1	0	0	0	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	0.20	0.15	0.1	0	0	0	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	0.20	0.15	0.1	0.1	0.1	0.1	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	0.30	0.25	0.2	0.2	0.2	0.2	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	1.00
1	0.40	0.35	0.30	0.30	0.30	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
1.2	0.50	0.45	0.40	0.40	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
1.4	0.60	0.55	0.50	0.50	0.50	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00
1.6	0.70	0.65	0.60	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	0.80	0.75	0.70	0.70	0.70	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.90	0.85	0.80	0.80	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 5. Panicum hemitomon *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

ELBA2	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
0.2	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
0.4	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
0.6	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
0.8	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
1	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
1.2	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
1.4	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
1.6	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
1.8	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
2	0.10	0.10	0.10	0.05	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
3	0.65	0.65	0.65	0.55	0.50	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 6. Eleocharis baldwinii *Mortality Matrix.*

Average Annual Salinity (ppt) \ Water Level Variability (m)																					
HYUM	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.10	0.10	0.10	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
0.2	0.10	0.10	0.10	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
0.4	0.10	0.10	0.10	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
0.6	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
0.8	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	0.20	0.20	0.20	0.30	0.30	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.2	0.40	0.40	0.40	0.40	0.40	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.4	0.50	0.50	0.50	0.50	0.50	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.6	0.60	0.60	0.60	0.60	0.60	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	0.70	0.70	0.70	0.70	0.70	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.80	0.80	0.80	0.80	0.80	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	0.90	0.90	0.90	0.90	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 7. Hydrocotyle umbellata *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

MOCE	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.20	0.15	0.10	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	0.20	0.15	0.10	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	0.20	0.15	0.10	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	0.20	0.15	0.10	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	0.20	0.15	0.10	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1	0.35	0.30	0.25	0.15	0.15	0.15	0.25	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.2	0.50	0.45	0.40	0.30	0.30	0.30	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00
1.4	0.60	0.55	0.50	0.45	0.45	0.45	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00
1.6	0.80	0.75	0.70	0.60	0.60	0.60	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	1.00	0.95	0.90	0.80	0.80	0.80	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 8. Morella cerifera *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SALA2	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1	1.00	0.85	0.60	0.35	0.10	0.10	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
1.2	1.00	0.95	0.70	0.45	0.20	0.20	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.4	1.00	1.00	0.80	0.55	0.30	0.30	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00
1.6	1.00	1.00	0.90	0.65	0.40	0.40	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
1.8	1.00	1.00	1.00	0.75	0.50	0.50	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	0.75	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

*Figure A1- 9.*Sagittaria latifolia *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

ZIMI	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	1.00	0.75	0.50	0.25	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1	1.00	0.85	0.60	0.35	0.10	0.10	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
1.2	1.00	0.95	0.70	0.45	0.20	0.20	0.30	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	1.00
1.4	1.00	1.00	0.80	0.55	0.30	0.30	0.40	0.45	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.6	1.00	1.00	0.90	0.65	0.40	0.40	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
1.8	1.00	1.00	1.00	0.75	0.50	0.50	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	0.75	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 10. Zizaniopsis miliacea *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

CLMA10	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.80	0.60	0.35	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	0.80	0.60	0.35	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	0.80	0.60	0.35	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	0.80	0.60	0.35	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	0.80	0.60	0.35	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1	0.80	0.60	0.35	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.2	0.80	0.60	0.35	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.4	0.90	0.70	0.45	0.10	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
1.6	1.00	0.85	0.60	0.25	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
1.8	1.00	1.00	0.50	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	0.55	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	0.85	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 11. Cladium mariscus *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

TYDO	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.2	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.4	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.6	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.8	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
2	0.45	0.40	0.35	0.30	0.25	0.25	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
3	0.70	0.65	0.60	0.55	0.50	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00
4	0.95	0.90	0.85	0.80	0.75	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 12. Typha domingensis *Mortality Matrix.*

										Water Level Variability (m)											
Average Annual Salinity (ppt) SALA	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.45	0.30	0.15	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	0.45	0.30	0.15	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	0.45	0.30	0.15	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	0.45	0.30	0.15	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	0.45	0.30	0.15	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1	0.45	0.30	0.15	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.2	0.45	0.30	0.15	0.00	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.4	0.55	0.40	0.25	0.10	0.10	0.10	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
1.6	0.65	0.50	0.35	0.20	0.20	0.20	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.8	0.75	0.60	0.45	0.30	0.30	0.30	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00
2	0.85	0.70	0.55	0.40	0.40	0.40	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	0.95	0.80	0.80	0.80	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 13. Sagittaria lancifolia *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

PHAU7	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.6	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.8	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.2	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.4	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.6	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
1.8	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
2	1.00	0.75	0.50	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
3	1.00	1.00	0.80	0.40	0.30	0.30	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00
4	1.00	1.00	1.00	0.80	0.70	0.70	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 14. Phragmites australis *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SCCA11	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.2	0.25	0.20	0.15	0.10	0.00	0.00	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
0.4	0.30	0.25	0.20	0.15	0.05	0.05	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	1.00
0.6	0.35	0.30	0.25	0.20	0.10	0.10	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
0.8	0.40	0.35	0.30	0.25	0.15	0.15	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	1.00
1	0.45	0.40	0.35	0.30	0.20	0.20	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.2	0.50	0.45	0.40	0.35	0.25	0.25	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
1.4	0.55	0.50	0.45	0.40	0.30	0.30	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00
1.6	0.60	0.55	0.50	0.45	0.35	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
1.8	0.85	0.60	0.55	0.50	0.40	0.40	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
2	0.90	0.85	0.60	0.55	0.45	0.45	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00
3	0.95	0.90	0.85	0.80	0.75	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 15. Schoenoplectus californicus *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

IVFR	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	0.95	0.85	0.70	0.50	0.50	0.55	0.55	0.55	0.55	0.60	0.65	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.2	1.00	0.90	0.80	0.65	0.45	0.45	0.50	0.50	0.50	0.50	0.55	0.60	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00
0.4	0.95	0.85	0.75	0.60	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
0.6	0.90	0.80	0.70	0.55	0.35	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00
0.8	0.85	0.75	0.65	0.45	0.30	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
1	0.80	0.70	0.60	0.35	0.25	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.2	0.75	0.65	0.55	0.30	0.20	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	1.00
1.4	0.70	0.60	0.50	0.20	0.15	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
1.6	0.65	0.55	0.45	0.35	0.10	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	1.00
1.8	0.60	0.50	0.40	0.30	0.05	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
2	0.55	0.45	0.35	0.25	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
3	0.55	0.45	0.35	0.25	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
4	0.55	0.45	0.35	0.25	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
5	0.55	0.45	0.35	0.25	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
6	0.55	0.45	0.35	0.25	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
7	0.55	0.45	0.35	0.25	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
8	0.50	0.40	0.30	0.20	0.20	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	1.00
9	0.70	0.60	0.50	0.40	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
10	0.90	0.80	0.70	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	0.90	0.80	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 16. Iva frutescens *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

BAHA	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.50	0.25	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	1.00
0.2	0.50	0.25	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	1.00
0.4	0.50	0.25	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	1.00
0.6	0.50	0.25	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	1.00
0.8	0.50	0.25	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	1.00
1	0.50	0.25	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	1.00
1.2	0.50	0.25	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	1.00
1.4	0.50	0.25	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	1.00
1.6	0.60	0.35	0.20	0.10	0.10	0.10	0.15	0.20	0.25	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
1.8	0.70	0.45	0.30	0.20	0.20	0.20	0.25	0.30	0.35	0.45	0.50	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00
2	0.80	0.55	0.40	0.30	0.30	0.30	0.35	0.40	0.45	0.50	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
3	0.90	0.65	0.55	0.45	0.45	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
4	1.00	0.95	0.70	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	0.85	0.75	0.75	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	0.95	0.90	0.90	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 17. Baccharis halimifolia *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SPPA	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.4	1.00	1.00	0.95	0.90	0.90	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.6	1.00	0.90	0.85	0.80	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.8	0.90	0.80	0.75	0.70	0.70	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	0.80	0.70	0.65	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.2	0.70	0.60	0.55	0.50	0.50	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.4	0.60	0.50	0.45	0.40	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
1.6	0.50	0.40	0.35	0.30	0.30	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00
1.8	0.40	0.30	0.25	0.20	0.20	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00
2	0.30	0.20	0.15	0.10	0.10	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	1.00
3	0.20	0.10	0.05	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
4	0.20	0.10	0.05	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
5	0.20	0.10	0.05	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
6	0.20	0.10	0.05	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	1.00
7	0.40	0.30	0.25	0.20	0.20	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00
8	0.60	0.50	0.45	0.40	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
9	0.80	0.70	0.65	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	0.90	0.85	0.80	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 18. Spartina patens *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

PAVA	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.2	1.00	1.00	0.95	0.90	0.90	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.4	0.95	0.90	0.85	0.80	0.80	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.6	0.85	0.80	0.75	0.70	0.70	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.8	0.75	0.70	0.65	0.60	0.60	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	0.65	0.60	0.55	0.50	0.50	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.2	0.55	0.50	0.45	0.40	0.40	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.4	0.45	0.40	0.35	0.30	0.30	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.6	0.35	0.30	0.25	0.20	0.20	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	0.25	0.20	0.15	0.10	0.10	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.15	0.10	0.05	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
3	0.15	0.10	0.05	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
4	0.15	0.10	0.05	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
5	0.15	0.10	0.05	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
6	0.15	0.10	0.05	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
7	0.15	0.10	0.05	0.00	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00
8	0.40	0.35	0.30	0.25	0.25	0.25	0.35	0.45	0.55	0.65	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	0.65	0.60	0.55	0.50	0.50	0.50	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	0.90	0.85	0.80	0.75	0.75	0.75	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 19. Paspalum vaginatum *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

JURO	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	1.00	1.00	0.90	0.80	0.80	0.80	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.90	0.80	0.70	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	0.70	0.60	0.50	0.40	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
4	0.50	0.40	0.30	0.20	0.20	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.55	0.70	0.75	0.80	0.85	0.95	1.00
5	0.30	0.20	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
6	0.30	0.20	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
7	0.30	0.20	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
8	0.30	0.20	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
9	0.30	0.20	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
10	0.30	0.20	0.10	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
12	0.55	0.45	0.35	0.25	0.25	0.25	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00
14	0.80	0.70	0.60	0.50	0.50	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	0.95	0.85	0.75	0.75	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 20. Juncus roemerianus *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

DISP	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.6	1.00	0.90	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	0.80	0.70	0.60	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.60	0.50	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	0.40	0.30	0.20	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00
4	0.20	0.10	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	1.00
5	0.20	0.10	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	1.00
6	0.20	0.10	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	1.00
7	0.20	0.10	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	1.00
8	0.20	0.10	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	1.00
9	0.20	0.10	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	1.00
10	0.40	0.30	0.20	0.20	0.25	0.30	0.35	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00
12	0.60	0.50	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.80	0.70	0.60	0.60	0.65	0.70	0.75	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	0.90	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 21. Distichlis spicata *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SPAL	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4.0	1.00	1.00	1.00	0.90	0.90	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5.0	1.00	1.00	1.00	0.75	0.75	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6.0	1.00	1.00	0.90	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7.0	1.00	1.00	0.75	0.45	0.45	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
8.0	1.00	1.00	0.60	0.30	0.30	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
9.0	1.00	0.85	0.45	0.15	0.15	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
10.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
12.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
14.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
16.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
18.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
20.0	1.00	0.90	0.50	0.15	0.15	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	1.00
22.0	1.00	1.00	0.70	0.30	0.30	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.95	1.00	1.00	1.00
24.0	1.00	1.00	1.00	0.45	0.45	0.45	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26.0	1.00	1.00	1.00	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28.0	1.00	1.00	1.00	0.75	0.75	0.75	0.80	0.85	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 22. Spartina alterniflora *Mortality Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

AVGE	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20	1.00	1.00	0.95	0.90	0.70	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
22	1.00	1.00	0.80	0.50	0.30	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
24	1.00	1.00	0.50	0.20	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
26	1.00	1.00	0.50	0.20	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	1.00
28	1.00	1.00	0.70	0.40	0.20	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	1.00
30	1.00	1.00	0.90	0.60	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
35	1.00	1.00	1.00	0.80	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
40	1.00	1.00	1.00	1.00	0.80	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
45	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figure A1- 23. Avicennia germinans *Mortality Matrix.*

Abbreviation	***Species***
STHE9	*Strophostyles helvola* (L.) Elliott
SOSE	*Solidago sempervirens* L.
DISPBI	*Distichlis spicata* (L.) Greene
SPPABI	*Spartina patens* (Aiton) Muhl.
SPVI3	*Sporobolus virginicus* (L.) Kunth.
PAAM2	*Panicum amarum* Elliott
UNPA	*Uniola paniculata* L.
BAHABI	*Baccharis halimifolia* L.

Elevation (m above msl)	**STHE9**	**SOSE**	**DISPBI**	**SPPABI**	**SPVI3**	**PAAM2**	**UNPA**	**BAHABI**
-100	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.00	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.05	0.7	0.8	1.0	0.9	1.0	1.0	1.0	0.8
0.10	0.6	0.7	1.0	0.8	1.0	1.0	1.0	0.8
0.15	0.4	0.6	1.0	0.7	1.0	1.0	1.0	0.8
0.20	0.2	0.4	1.0	0.6	1.0	1.0	1.0	0.8
0.25	0.1	0.3	1.0	0.5	1.0	1.0	1.0	0.7
0.30	0.0	0.2	1.0	0.3	1.0	1.0	1.0	0.7
0.35	0.0	0.1	1.0	0.2	1.0	1.0	0.9	0.7
0.40	0.0	0.0	1.0	0.1	1.0	1.0	0.7	0.6
0.45	0.0	0.0	0.6	0.0	0.6	1.0	0.5	0.6
0.50	0.0	0.0	0.1	0.0	0.1	1.0	0.3	0.6
0.55	0.0	0.0	0.0	0.0	0.0	0.9	0.1	0.6
0.60	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.5
0.65	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.5
0.70	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.5
0.75	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.4
0.80	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4
0.85	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
0.90	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
0.95	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
1.00	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
1.05	0.0	0.0	0.5	0.2	0.0	0.0	0.0	0.0
1.10	0.0	0.1	1.0	0.2	0.0	0.0	0.0	0.0
1.15	0.0	0.2	1.0	0.3	0.0	0.0	0.0	0.0
1.20	0.0	0.2	1.0	0.3	0.0	0.0	0.0	0.0
1.25	0.0	0.3	1.0	0.3	0.0	0.0	0.0	0.0
1.30	0.0	0.4	1.0	0.4	0.0	0.0	0.0	0.0
1.35	0.0	0.5	1.0	0.4	0.0	0.0	0.0	0.0

1.40	0.0	0.5	1.0	0.5	0.0	0.0	0.0	0.0
1.45	0.0	0.6	1.0	0.5	0.1	0.0	0.0	0.0
1.50	0.1	0.7	1.0	0.6	0.4	0.0	0.0	0.0
1.55	0.4	0.8	1.0	0.6	0.6	0.0	0.0	0.0
1.60	0.7	0.8	1.0	0.7	0.8	0.0	0.0	0.0
1.65	1.0	0.9	1.0	0.7	1.0	0.0	0.0	0.0
1.70	1.0	1.0	1.0	0.7	1.0	0.0	0.0	0.0
1.75	1.0	1.0	1.0	0.8	1.0	0.0	0.0	0.0
1.80	1.0	1.0	1.0	0.8	1.0	0.0	0.0	0.0
1.85	1.0	1.0	1.0	0.9	1.0	0.0	0.0	0.0
1.90	1.0	1.0	1.0	0.9	1.0	0.0	0.0	0.0
1.95	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
2.00	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0
100.00	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0

Figure A1- 24. Dune and Swale Mortality Matrix.

Appendix 2: Establishment Matrices

This appendix contains the establishment matrices used by LAVegMod.2.0 to determine what the probability for establishment is in response to the forcing factors (elevation or salinity and water level variability). Actual establishment is a function of available space, availability of propagules, and competition with other species.

For those species for which CRMS data was available, the median of the distribution is green, the remaining area between the 25th and 75th quantile is yellow, and the remaining area from the 5th to the 95th percentile is red.

Abbreviation	Species
QULE	*Quercus lyrata* Walter
QUTE	*Quercus texana* Buckley
QULA3	*Quercus.laurifolia* Michx.
ULAM	*Ulmus americana* L.
QUNI	*Quercus nigra* L.
QUVI	*Quercus virginiana* Mill.

Elevation (m)	QULE	QUTE	QULA3	ULAM	QUNI	QUVI
-3	0	0	0	0	0	0
-0.1525	0	0	0	0	0	0
0	0	0	0	0	0	0
0.1525	0.2	0.1	0	0	0	0
0.305	0.3	0.2	0.1	0	0	0
0.475	0.4	0.3	0.2	0.1	0	0
0.61	0.6	0.5	0.4	0.3	0.2	0
0.7625	0.8	0.7	0.6	0.5	0.4	0
0.915	0.9	0.8	0.7	0.6	0.5	0
1.0675	1	0.9	0.8	0.7	0.6	0.1
1.22	0.9	1	0.9	0.8	0.7	0.3
1.3725	0.8	0.9	1	0.9	0.8	0.5
1.525	0.6	0.7	0.8	1	0.9	0.7
1.6775	0.4	0.5	0.6	0.7	1	0.9
1.83	0.2	0.3	0.4	0.5	0.6	1
1.9825	0	0.1	0.2	0.3	0.4	1
2.135	0	0	0	0.1	0.2	1
30	0	0	0	0	0	0

Figure A2- 1. Bottomland Hardwood Forest Establishment Matrix.

Water Level Variability (m)

Average Annual Salinity (ppt)

SANI	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.85	0.90	0.95	0.98	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
0.2	0.85	0.90	0.95	0.98	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
0.4	0.85	0.90	0.95	0.98	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
0.6	0.75	0.80	0.85	0.88	0.90	0.90	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
0.8	0.65	0.70	0.75	0.78	0.80	0.80	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10
1	0.55	0.60	0.65	0.68	0.70	0.70	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00
1.2	0.45	0.50	0.55	0.58	0.60	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00
1.4	0.25	0.30	0.35	0.38	0.40	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.50	0.10	0.15	0.18	0.20	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 2. Salix nigra *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

TADI2	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	10
0.0	0.20	0.40	0.60	0.70	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
0.2	0.20	0.40	0.60	0.70	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
0.4	0.20	0.40	0.60	0.70	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
0.6	0.20	0.40	0.60	0.70	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
0.8	0.20	0.40	0.60	0.70	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
1	0.20	0.40	0.60	0.70	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
1.2	0.20	0.40	0.60	0.70	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
1.4	0.20	0.40	0.60	0.70	0.85	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
1.6	0.20	0.40	0.60	0.70	0.85	0.90	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.70	0.60	0.50	0.40	0.30
1.8	0.15	0.35	0.55	0.65	0.80	0.85	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.70	0.60	0.50	0.40	0.30
2	0.10	0.30	0.50	0.60	0.75	0.80	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.80	0.70	0.60	0.50	0.40	0.30
3	0.00	0.00	0.15	0.25	0.40	0.45	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.40	0.30	0.20	0.10	0.00	0.00
4	0.00	0.00	0.00	0.00	0.15	0.20	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.10	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.05	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 3. Taxodium distichum *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

NYAQ2	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	10
0.0	0.20	0.40	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
0.2	0.20	0.40	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
0.4	0.20	0.40	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
0.6	0.20	0.40	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
0.8	0.20	0.40	0.60	0.70	0.80	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40
1	0.10	0.30	0.50	0.60	0.70	0.80	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.80	0.70	0.60	0.50	0.40	0.30
1.2	0.00	0.20	0.40	0.50	0.60	0.70	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.70	0.60	0.50	0.40	0.30	0.20
1.4	0.00	0.10	0.30	0.40	0.50	0.60	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.60	0.50	0.40	0.30	0.20	0.10
1.6	0.00	0.00	0.10	0.20	0.30	0.40	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.40	0.30	0.20	0.10	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.05	0.15	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.10	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 4. Nyssa aquatica *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

PAHE2	0	0.04	0.08	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4	0.44	0.48	0.52	0.56	0.6	0.64	0.68	0.72	0.76	10
0	0.55	0.70	0.85	0.9	1	1	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.2	0.55	0.70	0.85	0.9	1	1	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.4	0.25	0.40	0.55	0.7	0.8	0.8	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10
0.6	0.05	0.20	0.35	0.5	0.6	0.6	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00
0.8	0.00	0.00	0.15	0.3	0.4	0.4	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.10	0.20	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 5. Panicum hemitomon *Establishment Matrix*.

Water Level Variability (m)

Average Annual Salinity (ppt)

ELBA2	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.85	0.90	0.95	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.35	0.40	0.45	0.50	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 6. Eleocharis baldwinii *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

HYUM	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.90	0.95	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.90	0.95	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.75	0.80	0.85	0.85	0.85	0.75	0.65	0.55	0.45	0.35	0.25	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.60	0.65	0.70	0.70	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.45	0.50	0.55	0.55	0.55	0.45	0.35	0.25	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.30	0.35	0.40	0.40	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.15	0.20	0.25	0.25	0.25	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.00	0.05	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 7. Hydrocotyle umbellata *Establishment Matrix*.

Water Level Variability (m)

Average Annual Salinity (ppt)

MOCE	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.75	0.80	0.85	0.90	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.2	0.75	0.80	0.85	0.90	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.4	0.75	0.80	0.85	0.90	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.6	0.75	0.80	0.85	0.90	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.8	0.60	0.65	0.70	0.75	0.85	0.85	0.85	0.75	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05
1	0.45	0.50	0.55	0.60	0.70	0.70	0.70	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
1.2	0.35	0.40	0.45	0.50	0.55	0.55	0.55	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00
1.4	0.15	0.20	0.25	0.30	0.40	0.40	0.40	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.00	0.00	0.05	0.10	0.20	0.20	0.20	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 8. Morella cerifera *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SALA2	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.2	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.4	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.6	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.8	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1	0.00	0.00	0.15	0.40	0.65	0.90	0.90	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15
1.2	0.00	0.00	0.05	0.30	0.55	0.80	0.80	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05
1.4	0.00	0.00	0.00	0.20	0.45	0.70	0.70	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
1.6	0.00	0.00	0.00	0.10	0.35	0.60	0.60	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.25	0.50	0.50	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 9. Sagittaria latifolia *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

ZIMI	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.2	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.4	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.6	0.00	0.00	0.25	0.50	0.75	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.8	0.00	0.00	0.15	0.40	0.65	0.90	0.90	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15
1	0.00	0.00	0.05	0.30	0.55	0.80	0.80	0.70	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
1.2	0.00	0.00	0.00	0.20	0.45	0.70	0.70	0.60	0.55	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05
1.4	0.00	0.00	0.00	0.10	0.35	0.60	0.60	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
1.6	0.00	0.00	0.00	0.00	0.25	0.50	0.50	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 10. Zizaniopsis miliacea *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

CLMA10	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.20	0.40	0.65	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.2	0.00	0.20	0.40	0.65	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.4	0.00	0.20	0.40	0.65	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.6	0.00	0.20	0.40	0.65	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.8	0.00	0.20	0.40	0.65	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1	0.00	0.20	0.40	0.65	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1.2	0.00	0.10	0.30	0.55	0.90	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15
1.4	0.00	0.00	0.15	0.40	0.75	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00
1.6	0.00	0.00	0.00	0.50	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.45	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.15	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 11. Cladium mariscus *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

TYDO	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
0.2	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
0.4	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
0.6	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
0.8	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
1	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
1.2	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
1.4	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
1.6	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
1.8	0.55	0.60	0.65	0.70	0.75	0.75	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
2	0.30	0.35	0.40	0.45	0.50	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
3	0.05	0.10	0.15	0.20	0.25	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 12. Typha domingensis *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SALA	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.40	0.55	0.70	0.85	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.2	0.40	0.55	0.70	0.85	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.4	0.40	0.55	0.70	0.85	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.6	0.40	0.55	0.70	0.85	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.8	0.40	0.55	0.70	0.85	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1	0.40	0.55	0.70	0.85	1.00	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1.2	0.30	0.45	0.60	0.75	0.90	0.90	0.90	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15
1.4	0.20	0.35	0.50	0.65	0.80	0.80	0.80	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05
1.6	0.10	0.25	0.40	0.55	0.70	0.70	0.70	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
1.8	0.00	0.15	0.30	0.45	0.60	0.60	0.60	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.05	0.20	0.20	0.20	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 13. Sagittaria lancifolia *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

PHAU7	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.2	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.4	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.6	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
0.8	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1.2	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1.4	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1.6	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
1.8	0.00	0.00	0.25	0.50	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25
2	0.00	0.00	0.00	0.20	0.60	0.70	0.70	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
3	0.00	0.00	0.00	0.00	0.20	0.30	0.30	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 14. Phragmites australis *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SCCA11	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0	0.75	0.80	0.85	0.90	1.00	1.00	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20
0.2	0.70	0.75	0.80	0.85	0.95	0.95	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15
0.4	0.65	0.70	0.75	0.80	0.90	0.90	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10
0.6	0.60	0.65	0.70	0.75	0.85	0.85	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05
0.8	0.55	0.60	0.65	0.70	0.80	0.80	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00
1	0.50	0.55	0.60	0.65	0.75	0.75	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
1.2	0.45	0.50	0.55	0.60	0.70	0.70	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00
1.4	0.40	0.45	0.50	0.55	0.65	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
1.6	0.15	0.40	0.45	0.50	0.60	0.60	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00
1.8	0.10	0.15	0.40	0.45	0.55	0.55	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
2	0.05	0.10	0.15	0.20	0.25	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 15. Schoenoplectus californicus *Establishment Matrix.*

Water Level Variability (m)

IVFR	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.10	0.20	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.00	0.10	0.20	0.30	0.40	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.20	0.30	0.40	0.50	0.60	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00
1.6	0.30	0.40	0.50	0.60	0.70	0.80	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10
1.8	0.35	0.45	0.55	0.65	0.75	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
2	0.35	0.45	0.55	0.65	0.75	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
3	0.35	0.45	0.55	0.65	0.75	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
4	0.35	0.45	0.55	0.65	0.75	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
5	0.35	0.45	0.55	0.65	0.75	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
6	0.35	0.45	0.55	0.65	0.75	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
7	0.30	0.40	0.50	0.60	0.70	0.80	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10
8	0.20	0.30	0.40	0.50	0.60	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00
9	0.00	0.10	0.20	0.30	0.40	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.10	0.20	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Annual Salinity (ppt)

Figure A2- 16. Iva frutescens *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

BAHA	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.15	0.40	0.65	0.80	0.90	0.90	0.90	0.85	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
0.2	0.25	0.50	0.75	0.90	1.00	1.00	1.00	0.95	0.75	0.70	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.15	0.10	0.05	0.00
0.4	0.25	0.50	0.75	0.90	1.00	1.00	1.00	0.95	0.75	0.70	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.15	0.10	0.05	0.00
0.6	0.25	0.50	0.75	0.90	1.00	1.00	1.00	0.95	0.75	0.70	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.15	0.10	0.05	0.00
0.8	0.25	0.50	0.75	0.90	1.00	1.00	1.00	0.95	0.75	0.70	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.15	0.10	0.05	0.00
1	0.25	0.50	0.75	0.90	1.00	1.00	1.00	0.95	0.75	0.70	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.15	0.10	0.05	0.00
1.2	0.25	0.50	0.75	0.90	1.00	1.00	1.00	0.95	0.75	0.70	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.15	0.10	0.05	0.00
1.4	0.25	0.50	0.75	0.90	1.00	1.00	1.00	0.95	0.75	0.70	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.15	0.10	0.05	0.00
1.6	0.15	0.40	0.65	0.80	0.90	0.90	0.90	0.85	0.65	0.60	0.55	0.50	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00
1.8	0.05	0.30	0.55	0.70	0.80	0.80	0.80	0.75	0.55	0.50	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
2	0.00	0.20	0.45	0.60	0.70	0.70	0.70	0.65	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
3	0.00	0.10	0.35	0.45	0.55	0.55	0.55	0.50	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.05	0.30	0.40	0.40	0.40	0.35	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.15	0.20	0.20	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 17. Baccharis halimifolia *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SPPA	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.00	0.00	0.00	0.05	0.10	0.10	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.00	0.00	0.10	0.15	0.20	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.00	0.10	0.20	0.25	0.30	0.30	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.10	0.20	0.30	0.35	0.40	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.20	0.30	0.40	0.45	0.50	0.50	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.30	0.40	0.50	0.55	0.60	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00
1.4	0.40	0.50	0.60	0.65	0.70	0.70	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00
1.6	0.50	0.60	0.70	0.75	0.80	0.80	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05
1.8	0.60	0.70	0.80	0.85	0.90	0.90	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10
2	0.70	0.80	0.90	0.95	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25
3	0.70	0.80	0.90	0.95	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25
4	0.70	0.80	0.90	0.95	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25
5	0.70	0.80	0.90	0.95	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25
6	0.50	0.60	0.70	0.75	0.80	0.80	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05
7	0.30	0.40	0.50	0.55	0.60	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00
8	0.10	0.20	0.30	0.35	0.40	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.10	0.15	0.20	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 18. Spartina patens *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

PAVA	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.05	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.10	0.15	0.20	0.20	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.20	0.25	0.30	0.30	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.30	0.35	0.40	0.40	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.40	0.45	0.50	0.50	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.50	0.55	0.60	0.60	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.60	0.65	0.70	0.70	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.70	0.75	0.80	0.80	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.80	0.85	0.90	0.90	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.90	0.95	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.90	0.95	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.90	0.95	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.90	0.95	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.90	0.95	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.90	0.95	1.00	1.00	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.65	0.70	0.75	0.75	0.75	0.65	0.55	0.45	0.35	0.25	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.40	0.45	0.50	0.50	0.50	0.40	0.30	0.20	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.05	0.10	0.15	0.15	0.15	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 19. Paspalum vaginatum *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

JURO	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.05	0.15	0.25	0.25	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.10	0.20	0.30	0.40	0.50	0.50	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
3	0.35	0.45	0.55	0.65	0.75	0.75	0.75	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00
4	0.60	0.70	0.80	0.90	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
5	0.60	0.70	0.80	0.90	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
6	0.60	0.70	0.80	0.90	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
7	0.60	0.70	0.80	0.90	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
8	0.60	0.70	0.80	0.90	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
9	0.60	0.70	0.80	0.90	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
10	0.35	0.45	0.55	0.65	0.75	0.75	0.75	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00
12	0.10	0.20	0.30	0.40	0.50	0.50	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.05	0.15	0.25	0.25	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 20. Juncus roemerianus *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

DISP	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.00	0.10	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.20	0.30	0.40	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.40	0.50	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.60	0.70	0.80	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00
3	0.80	0.90	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05
4	0.80	0.90	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05
5	0.80	0.90	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05
6	0.80	0.90	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05
7	0.80	0.90	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05
8	0.80	0.90	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05
9	0.60	0.70	0.80	0.80	0.75	0.70	0.65	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00
10	0.40	0.50	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.20	0.30	0.40	0.40	0.35	0.30	0.25	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.10	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 21. Distichlis spicata *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

SPAL	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.25	0.25	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.10	0.40	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.05	0.25	0.55	0.55	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00
7	0.00	0.05	0.10	0.40	0.70	0.70	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00
8	0.00	0.05	0.15	0.55	0.85	0.85	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15
9	0.00	0.15	0.30	0.70	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
10	0.00	0.15	0.30	0.70	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
12	0.00	0.15	0.30	0.70	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
14	0.00	0.15	0.30	0.70	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
16	0.00	0.15	0.30	0.70	1.00	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
18	0.00	0.05	0.10	0.50	0.80	0.80	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10
20	0.00	0.05	0.25	0.30	0.60	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00
22	0.00	0.05	0.10	0.25	0.40	0.40	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.05	0.15	0.20	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.05	0.10	0.10	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 22. Spartina alterniflora *Establishment Matrix.*

Water Level Variability (m)

Average Annual Salinity (ppt)

AVGE	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.05	0.10	0.30	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.20	0.50	0.70	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00
22	0.00	0.00	0.00	0.50	0.80	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
24	0.00	0.00	0.00	0.50	0.80	1.00	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30
26	0.00	0.00	0.00	0.30	0.60	0.80	0.80	0.75	0.70	0.65	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10
28	0.00	0.00	0.00	0.10	0.40	0.60	0.60	0.55	0.50	0.45	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.20	0.40	0.40	0.35	0.30	0.25	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.15	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure A2- 23. Avicennia germinans *Establishment Matrix.*

Abbreviation	*Species*
STHE9	*Strophostyles helvola* (L.) Elliott
SOSE	*Solidago sempervirens* L.
DISPBI	*Distichlis spicata* (L.) Greene
SPPABI	*Spartina patens* (Aiton) Muhl.
SPVI3	*Sporobolus virginicus* (L.) Kunth.
PAAM2	*Panicum amarum* Elliott
UNPA	*Uniola paniculata* L.
BAHABI	*Baccharis halimifolia* L.

Elevation (m above msl)	**STHE9**	**SOSE**	**DISPBI**	**SPPABI**	**SPVI3**	**PAAM2**	**UNPA**	**BAHABI**
-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.05	0.3	0.1	0.0	0.1	0.0	0.0	0.0	0.0
0.10	0.4	0.2	0.0	0.2	0.0	0.0	0.0	0.0
0.15	0.6	0.3	0.0	0.2	0.0	0.0	0.0	0.0
0.20	0.8	0.4	0.0	0.3	0.0	0.0	0.0	0.1
0.25	0.9	0.5	0.0	0.4	0.0	0.0	0.0	0.1
0.30	1.0	0.6	0.0	0.5	0.0	0.0	0.0	0.2
0.35	1.0	0.7	0.0	0.6	0.0	0.0	0.1	0.3
0.40	1.0	1.0	0.0	0.7	0.0	0.0	0.3	0.3
0.45	1.0	1.0	0.9	1.0	0.2	0.0	0.5	0.4
0.50	1.0	1.0	1.0	1.0	0.8	0.0	0.7	0.5
0.55	1.0	1.0	1.0	1.0	1.0	0.0	0.9	0.5
0.60	1.0	1.0	1.0	1.0	1.0	0.0	1.0	0.6
0.65	1.0	1.0	1.0	1.0	1.0	0.1	1.0	0.6
0.70	1.0	1.0	1.0	1.0	1.0	0.2	1.0	0.7
0.75	1.0	1.0	1.0	1.0	1.0	0.4	1.0	0.8
0.80	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.8
0.85	1.0	1.0	1.0	1.0	1.0	0.7	1.0	1.0
0.90	1.0	1.0	1.0	1.0	1.0	0.8	1.0	1.0
0.95	1.0	1.0	1.0	0.8	1.0	1.0	1.0	1.0
1.00	1.0	1.0	1.0	0.8	1.0	1.0	1.0	1.0
1.05	1.0	1.0	0.5	0.8	1.0	1.0	1.0	1.0
1.10	1.0	0.7	0.0	0.7	1.0	1.0	1.0	1.0
1.15	1.0	0.7	0.0	0.7	1.0	1.0	1.0	1.0
1.20	1.0	0.6	0.0	0.6	1.0	1.0	1.0	1.0
1.25	1.0	0.5	0.0	0.6	1.0	1.0	1.0	1.0
1.30	1.0	0.4	0.0	0.6	1.0	1.0	1.0	1.0
1.35	1.0	0.4	0.0	0.5	1.0	1.0	1.0	1.0
1.40	1.0	0.3	0.0	0.5	1.0	1.0	1.0	1.0
1.45	1.0	0.2	0.0	0.4	0.8	1.0	1.0	1.0
1.50	0.9	0.1	0.0	0.4	0.6	1.0	1.0	1.0
1.55	0.6	0.1	0.0	0.4	0.3	1.0	1.0	1.0
1.60	0.2	0.0	0.0	0.3	0.1	1.0	1.0	0.8

1.65	0.0	0.0	0.0	0.3	0.0	1.0	1.0	0.5
1.70	0.0	0.0	0.0	0.2	0.0	1.0	1.0	0.3
1.75	0.0	0.0	0.0	0.2	0.0	1.0	1.0	0.0
1.80	0.0	0.0	0.0	0.1	0.0	1.0	1.0	0.0
1.85	0.0	0.0	0.0	0.1	0.0	1.0	1.0	0.0
1.90	0.0	0.0	0.0	0.1	0.0	1.0	1.0	0.0
1.95	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0
2.00	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0
100.00	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0

Figure A2- 24. Dune and Swale Establishment Matrix.

For completeness the parameters used to predict the presence of SAV are provided here. This formula is unchanged from LAVegMod. SAV presence is a function of Temperature (Temp), Salinity (Sal) and Depth.

Parameter	Value
Name	SAV
Abr	SAV
Index	32
Intercept	1.83
Temp	-0.0373100
Sal	-0.0776600
Depth	-0.0002588

Figure A2- 25. Submerged Aquatic Vegetation Establishment Matrix.