

ECOLOGICAL STUDIES OF WILLOW (*SALIX CAROLINIANA*):
MONTHLY STATUS REPORT #1



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Ecological Studies of Willow (*Salix caroliniana*): Monthly Status Report #1
Covering the time period from project initiation through January 31, 2009

This status report summarizes progress made on the Ecological Studies of Willow project through January 31, 2009, with reference to the tasks and timeline outlined in the Scope of Work and presented in Table 1 below.

Table 1. Timeline of tasks to be accomplished in Year 1 and later. Tasks initiated in this reporting month are highlighted in blue.

YEAR 1

Quarter	Months	Tasks accomplished
1 st	Oct – Dec, 2008	Initiate and complete Task 1 (<i>Finalize research plan</i>)
2 nd	Jan – Mar, 2009	Initiate Task 2.1 (<i>Germination & early survival and growth experiments</i>) Initiate Task 2.4 (<i>Life history</i>)
3 rd	Apr – Jun, 2009	Continue Task 2.1 (<i>Germination experiment</i>) Initiate Task 2.2 (<i>Willow transplantation</i>) Initiate Task 2.3 (<i>Fire response</i>) Continue Task 2.4 (<i>Life history</i>)
4 th	Jul – Sep, 2009	Continue Task 2.4 (<i>Life history</i>) Complete Tasks 2.1 & 2.2 (<i>Germination experiment & Willow transplantation</i>) Complete Task 3.1 (<i>Data analysis and final report, Year1</i>)

YEAR 2

Quarter	Months	Tasks accomplished
1 st	Oct – Dec, 2009	Continue Task 2.3 (<i>Fire response</i>) Continue Task 2.4 (<i>Life history</i>)
2 nd	Jan – Mar, 2010	Continue Task 2.3 (<i>Fire response</i>) Continue Task 2.4 (<i>Life history</i>) Initiate Task 2.5 (<i>Spatial analysis of willow distribution</i>)
3 rd	Apr – Jun, 2010	Initiate Task 2.2 (2nd iteration, <i>Willow transplantation</i>) Continue Task 2.3 (<i>Fire response</i>) Continue Task 2.4 (<i>Life history</i>) Continue Task 2.5 (<i>Spatial analysis of willow distribution</i>)
4 th	Jul – Sep, 2010	Complete Task 2.2 (2nd iteration, <i>Willow transplantation</i>) Continue Task 2.3 (<i>Fire response</i>) Continue Task 2.4 (<i>Life history</i>) Continue Task 2.5 (<i>Spatial analysis of willow distribution</i>) Complete Task 3.2 (<i>Data analysis and final report, Year2</i>)

Progress on Task 1 – Finalizing the research plan

The UCF team submitted a research plan for review by District personnel, and, after several meetings and field trips, is in the process of modifying the planned experiments. One important change was expanding the germination and early survival and growth experiments by 50%, to include additional soil types (Fig. 1).

Nutrient level

Soil	ambient	+N	+P	+N +P	+micro	+N + P + micro
S, H	Ambient water	Ambient water	Ambient water	Mild drought	Mild drought	Mild drought
50% S, H + 50% S, L	Ambient water	Ambient water	Ambient water	Mild drought	Mild drought	Mild drought
S, L	Ambient water	Ambient water	Ambient water	Mild drought	Mild drought	Mild drought
50% S, H + 50% R	Standing water	Standing water	Standing water	Episodic flooding	Episodic flooding	Episodic flooding
50% S, L + 50% R	Standing water	Standing water	Standing water	Episodic flooding	Episodic flooding	Episodic flooding
R	Standing water	Standing water	Standing water	Episodic flooding	Episodic flooding	Episodic flooding

Fig. 1. One-quarter of the expanded cross-over experiment. Each nutrient treatment is delivered to an individual pot in sequence; thus, the treatments “cross-over” and responses to every treatment are recorded for each individual pot. This can be visualized as a rotation of the watering treatments (colored text) in the diagram above. The new experimental design includes six soils: each soil alone or in a 50:50 mixture with another type. Soil types are coded as susceptible (S) or resistant (R) to willow invasion and having high (H) or low (L) soil nutrients. Specifically, the S, H soil was collected from the Drigger’s Property; the S, L soil from Blue Cypress Conservation Area; and the R soil from an upland site near the Drigger’s Property.

The research plan will be revised and finalized once the UCF team receives comments from District personnel. We have been very pleased with the amount of interest shown in this project and note that interactions between the UCF team and District personnel helped focus the experiments and maximize their relevance to both management concerns and the predictive, demographic model.

Progress on Task 2.1 – Germination and early survival and growth experiments

The UCF team prepared for two greenhouse experiments that will assess germination and early survival of Carolina willow under different soil textures and moisture regimes, as depicted in Figure 1. The UCF team collected invasion-susceptible (peaty) soil from the Drigger's Property and invasion-resistant (sandy) soil from a nearby upland area (Fig. 2). Soil samples were sent to UF-IFAS (University of Florida, Institute of Food and Agricultural Sciences) for analysis of a comprehensive suite of nutrients (Codes 1, 3-5: <http://soilslab.ifas.ufl.edu/pdf%20files/SS18600.pdf>).



Fig. 2. UCF students and faculty collecting soil for the greenhouse experiment. (TOP LEFT) Dr. Pedro Quintana-Ascencio and students from his restoration ecology class collecting peaty soil from the Drigger's Property. (TOP RIGHT) Graduate students collecting sandy soil from a nearby upland site. (BOTTOM) Unloading soil at the UCF Arboretum. The peaty Micco soil from the Drigger's Property is much darker than the sandy soil. The soils are now covered with tarps to impede oxidation. Note: The 3rd soil type, invasion-susceptible and low-nutrient soil, was collected from Blue Cypress Conservation Area on February 10, 2009).



Fig. 3. An arch greenhouse similar to the one ordered for this project. Photo from Jaderloon, <http://www.jaderloon.com/default.htm>.

The UCF team also ordered a 6.7 m x 13.7 m (22' x 45') portable greenhouse (Fig. 3), and pots for the experiments. We did not observe any Carolina willow fruits dehiscing in January and therefore did not collect seeds. A few isolated individuals in Blue Cypress Conservation Area were dehiscing on February 10, 2009, so we expect to begin seed collection within the next two weeks.

Progress on Task 2.2 – Willow Transplantation

The UCF team collected cuttings from multiple willows at ≥ 25 locations within District lands (Fig. 4). These several hundred cuttings are being maintained in water until multiple roots emerge and grow to approximately 1.5-2.0 cm long. We will begin potting rooted cuttings on February 17, 2009. This protocol is very effective; the plant shown on the cover doubled in size since this photograph was taken in January.

Progress on Task 2.5 – Spatial Analysis of Willow Distribution

In preparation for field trips with District personnel to the southern and central regions of the Upper Basin, the UCF team produced a spatial model that accurately predicted the distribution of willow based only on soils (Fig. 5). We are continuing to improve this model.

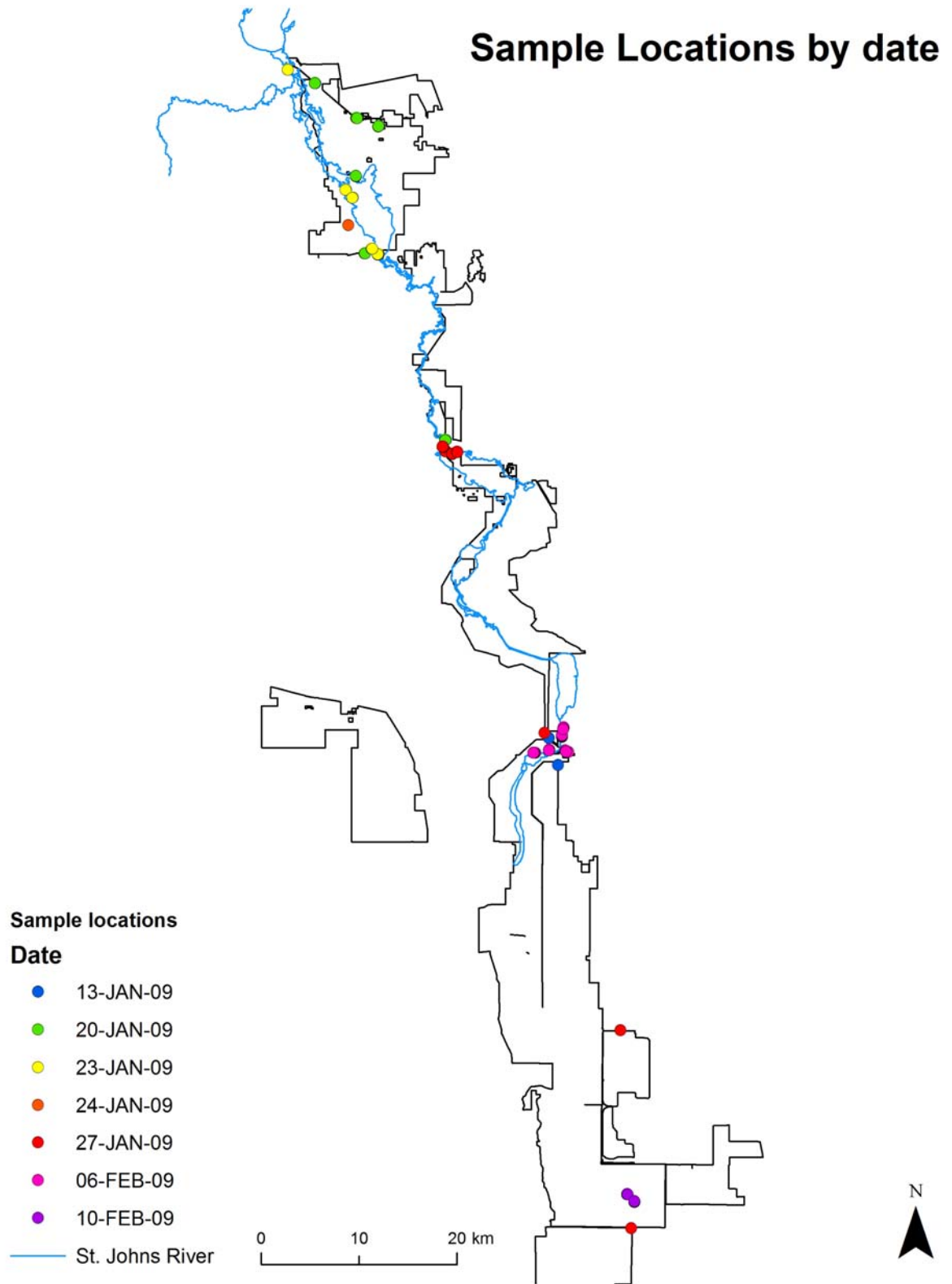


Fig. 4. Locations where willow cuttings were collected in January and February, 2009. At least seven collections were made in each zone: northern, southern and central.

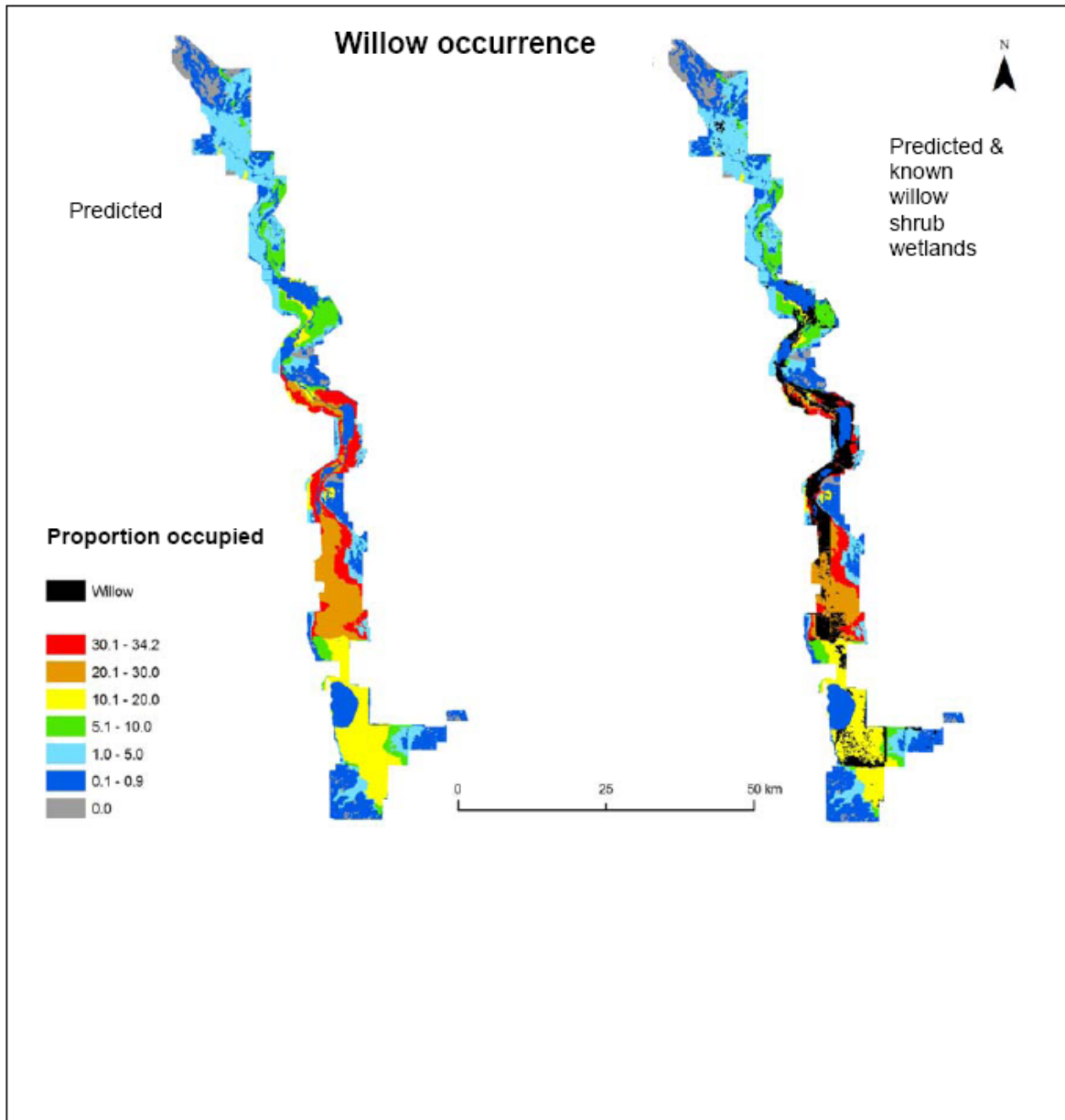


Fig. 5. (LEFT) Predicted distribution of willow shrub wetlands based on soil type. Red and orange shading indicates regions with a high probability of having willow shrub wetlands, blue and gray depict regions with low probability. (RIGHT) Actual distribution of willow shrub wetlands (black), as mapped by the District.

Summary of activity

During this reporting period, the UCF team logged more than 27 person-days meeting with District personnel, reconnoitering field sites and collecting willow cuttings and soil (Table 2). Early flowering of Carolina willows required us to accelerate the collection of cuttings. Willow seeds are only just beginning to mature and dehisce (Fig. 6).

Table 2. Dates of meetings, field trips and sampling collections during this reporting period.

Date	Work performed with	Purpose
10/30/08	SJRWMD staff	Meeting at SJRWMD in Palatka to gather general geographic and environmental information and discuss overall project.
12/05/08	SJRWMD staff	Field reconnaissance of the south region
12/12/08		Field reconnaissance of the north region
12/16/08	SJRWMD staff	Field reconnaissance of the central region
01/03/09	UCF graduate students	Collection of willow cuttings
01/06/09	SJRWMD staff	Meeting at SJRWMD in Palatka to gather general geographic and environmental information and discuss overall project.
01/10/09	UCF graduate students	Collection of willow cuttings and soil
01/13/09	UCF graduate students	Collection of soil
01/20/09	UCF graduate students	Collection of willow cuttings
01/24/09		Collection of willow cuttings
01/27/09	UCF graduate students	Collection of willow cuttings



Fig. 6. Seeds of *Salix caroliniana*. Image by L. Castro-Morales.

Acknowledgments

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