

ECOLOGICAL STUDIES OF WILLOW (*SALIX CAROLINIANA*):
MONTHLY STATUS REPORT #14



A willow island almost completely submerged on March 18, 2010.

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Ecological Studies of Willow (*Salix caroliniana*):
Monthly Status Report #14

Covering the time period from March 1-31, 2010

This status report summarizes progress made on the Ecological Studies of Willow project through March 31, 2010, 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 2. Tasks initiated and underway in this reporting month are highlighted in blue, completed tasks in red.

YEAR 2

Quarter	Months	Tasks accomplished
1st	Oct – Dec, 2009	Initiate 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>)
2nd	Jan – Mar, 2010	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>)
3rd	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>)
4th	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, Year 2</i>)

Progress on Task 2.1 – Germination and Early Survival and Growth Experiments

On March 1, we potted approximately 700 additional cuttings for the fire, competition, flooding, and other experiments. We also collected seed and established ~500 pots with seedlings.

In addition, we began a growth chamber experiment to determine how long willow seeds remain viable. The experiment is being performed at two temperature regimes representative of the Upper St. Johns River Basin: one similar to that of the northern region (State Route 50) and the other of the southern region (State Route 60). Seeds collected from each region are held for different time periods, then germinated at each temperature regime. The entire design is being repeated three times, with seeds collected early, middle or late in the flowering season within each region. Initial results show that most willow seeds remain viable for only ~ 2 weeks and there are clear differences between temperatures in germination rates. This experiment will be completed in April and preliminary results will be in the next monthly report.

Progress on Task 2.2 – Willow Transplantation

A. Competition Experiment – On March 18, 2010, we terminated the willow competition experiment. Some of the surviving cuttings had flowered but not yet set seed. We will combine results of this experiment with those of the hydrology experiment (next section) in a peer-reviewed publication, which we intend to write this summer.

B. Hydrology Experiment – We analyzed results of this experiment and present those for willow seedlings below. Preliminary results for willow cuttings will be in the next report.

Only 15% of willow seedlings planted onto the experimental islands survived to the end of the experiment. Survivors were clustered in 16 of the 64 locations on the islands. We used nominal logistic regression to evaluate the effects of island, elevation above marsh level, and orientation (north, east, west and south face), plus all their two-way interactions, on seedling survival. The model fit well ($X^2 = 60.89$, 36 df, $P < 0.006$, $R^2 = 0.85$) but parameter estimates were unstable. We therefore used individual likelihood-ratio tests to evaluate the main effects. Variation due to island and orientation were not statistically significant (both $X^2 < 4.55$, 3 df, $P > 0.22$) but survival differed significantly among elevations ($X^2 = 18.12$, $P < 0.0004$, $R^2 = 0.25$). Survival was highest at the intermediate elevation of 0.35 m above initial marsh height (Fig. 1). No seedlings survived at the lowest elevation, very few at 0.175 m above initial marsh depth and just 22% at the highest elevation (Fig. 1).

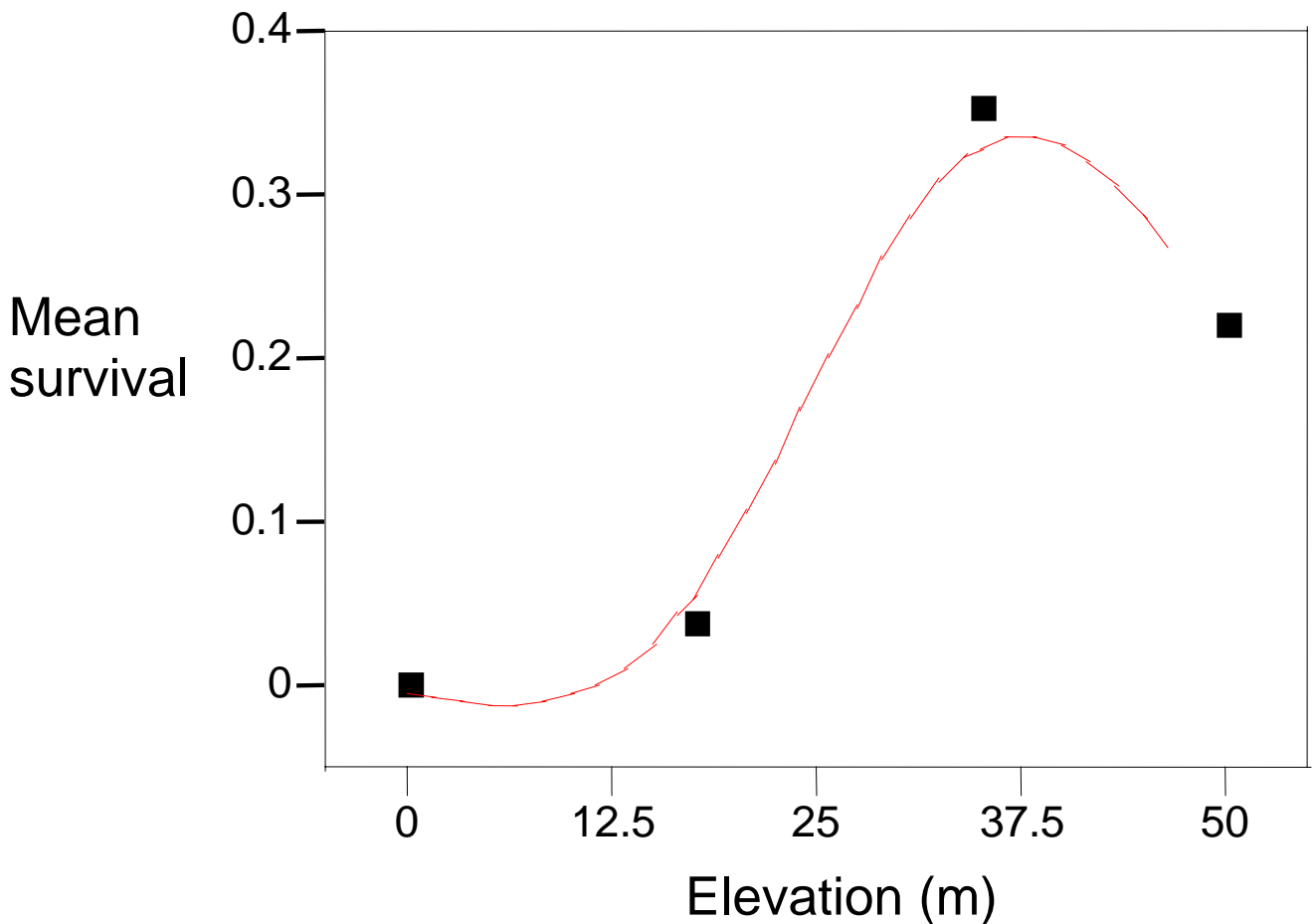


Fig. 1. Mean survival of willow seedlings as a function of elevation above initial marsh height. The curve is a spline fit with $\lambda = 100$.

However, mean height of willow seedlings tended to decrease with increasing elevation above the initial marsh level (Fig. 2).

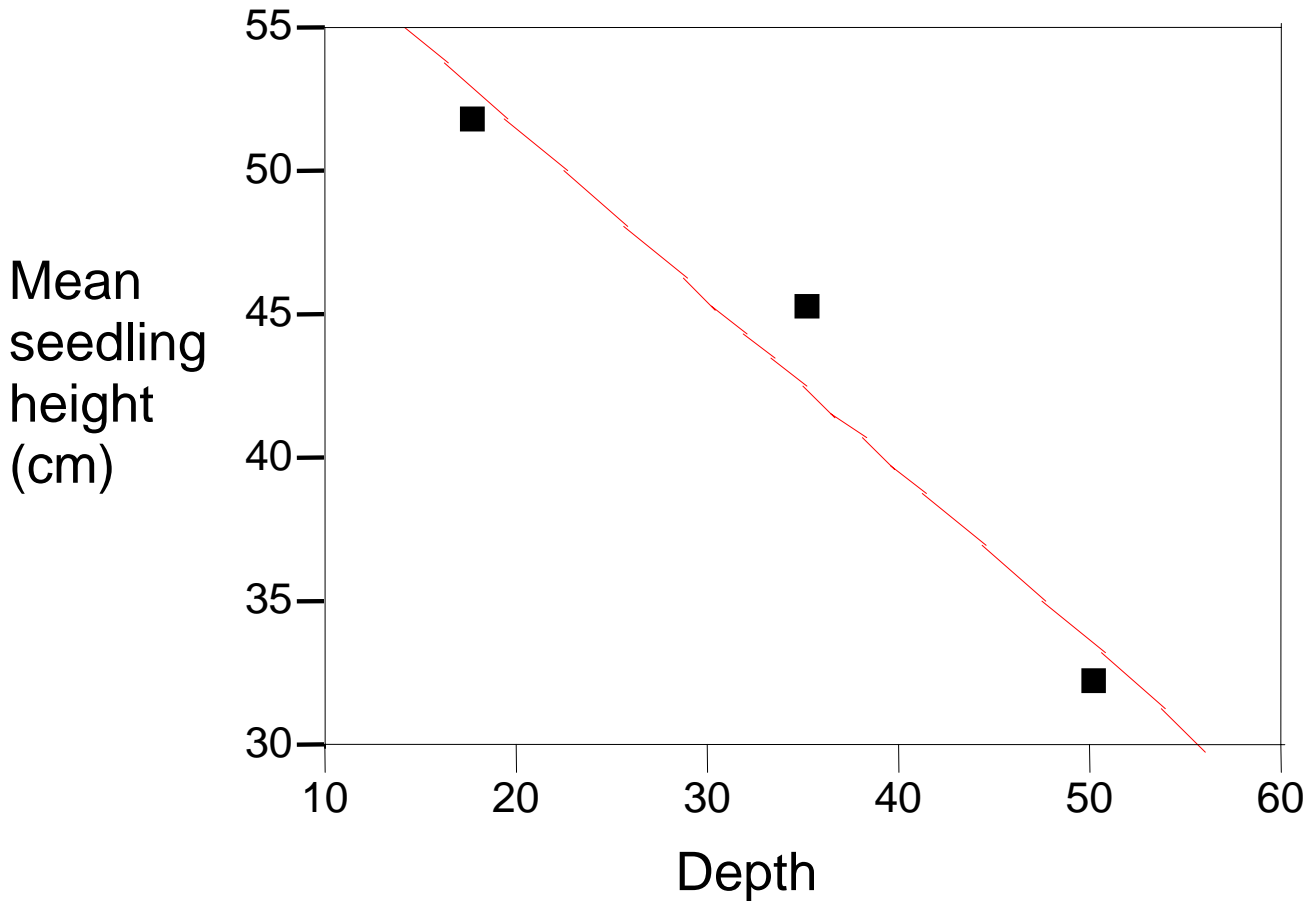


Fig. 2. Mean height of willow seedlings as a function of elevation above the initial marsh level. The regression line explains substantial variation ($R^2 = 0.95$, $F_{1,1} = 17.49$) but is not statistically significant at $\alpha = 0.05$.

Initiate Task 2.3 - Fire response

Unusually high water levels prevented conducting the prescribed burns for this experiment.

Progress on Task 2.4 - Life History

We did not gather additional life history information during this period.

Progress on Task 2.5 – Spatial Analysis of Willow Distribution.

We did not modify our existing spatial model during this period.

Summary of Activity

During this reporting period, the UCF team potted seedlings and maintained cuttings for use in field and laboratory experiments; disassembled the competition experiment; and initiated a seed viability experiment.