Project Title: Bull Run Mountains Chestnut Survival Study

FINAL Grant Report
to The American Chestnut Foundation
June 11, 2012

From: Virginia Chapter of The American Chestnut Foundation
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Objectives

The purpose of this Chestnut Survival Study was to test in influence of light and deer herbivory on American chestnut (*Castanea dentata*) seedling growth and survival in an area where chestnut was once a dominant tree.

Methods and Monitoring, Evaluation

Seeds were planted in142 paired canopy gap and closed forest sites within the Bull Run Mountains Natural Area Preserve (BRMNAP) and eight sites in the adjacent forested tract of Roland Farm, totaling 150 sites in all. Within each site eight seeds were randomly assigned to one of 12 possible locations distributed at three-meter intervals along the four cardinal direction axes. Each seed was assigned to one of three treatments (control, individual fenced or slash pile to protect them from deer herbivory) in an approximate 4:3:1 ratio. In canopy gap planting sites, underbrush, saplings, and branches, particularly of red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*) and invasive species, were removed to provide more light to the forest floor. In control sites, no thinning of the understory occurred. Seeds were planted in the above described array around a steel pole marked with orange flagging. The seeds were planted with a small amount of potting soil mix and each location was marked with a short wooden dowel labeled with the site and location numbers. Fences were fashioned from wire, bent across the top to discourage predators, and secured with sod pins. Slash was gathered at the site and dropped over the planting location. Although the duff layer at Bull Run Mountains is deep, the vermiculite in the soil mix helped to identify the planting locations. Three reconnaissance cameras were placed among the sites to capture nocturnal activity. A database was established to capture the number of seedlings to germinate, their growth rate, and evidence of browse, structural, or insect damage.

Actual Results

Volunteer training was conducted on January 14, 2012. Approximately 20 people attended and many signed up to participate in the study in one or more respects.

Planting sites were identified and prepared the second half of January. Attachment 1 is the location of the planting sites.

Seeds were planted during the weeks of March 5 and 12, 2012. Attachment 2 is the specific layout of each site. Within days, it was apparent that small mammals (most likely gray squirrel

[*Sciurus carolinensis*]) were eating many seeds: fences and slash piles did not deter them. Planting sites that had their seeds predated were replanted during the first month of the study until seed supplies were exhausted. Approximately 60% of all sites were replanted at least once. During a project conference call of May 8, the status of 1,001 (83.4%) of the 1,200 planting sites was evaluated from data received from volunteer monitors and staff (*see* Attachment 3). Of the 1,001 planting sites, 269 (27%) of them were still active (*i.e.*, the seed had not been dug up and was still present but no seedling had emerged aboveground). The percentage of active sites in each treatment did not differ greatly (38% for controls, 43% for fence-protected, and 32% for slash-protected). A total of 77 seeds had sprouted and emerged aboveground, yielding an initial survival to seedling stage rate of 8%. Approximately 6% of control seeds, 5% of fenced seeds, and 2% of slash seeds sprouted and survived as of May 8. However, there was considerable variation in the amount of seed predation, with the percent of active planting sites ranging from 0-78% and the percent of seeds surviving to sprout and emerge ranging from 0-36% across locations. Although overall survival to the seedling stage was very low, those plants that had emerged were growing and ranged in size from 0.5 – 20 cm in height.

Cameras were installed in late March. The original plan was to rotate them on a random basis (*see* Attachment 4), but there are so few sites with germinated nuts that the plan will need to be revised.

Site monitoring began March 19th and continues to date on a twice monthly basis. Attachment 5 presents the first compilation of germination results. Only about 20% of the nuts survived after six weeks, including those that had been replanted, with the northern unit of BRMNAP suffering particularly high seed predation rates, where only a single seedling emerged. Hence, sites in the northern unit of BRMNAP were replanted with 110 seedlings on April 18, which, after three weeks, are all surviving; and plans are being made to plant several hundred more seedlings this winter in sites that are completely depleted.

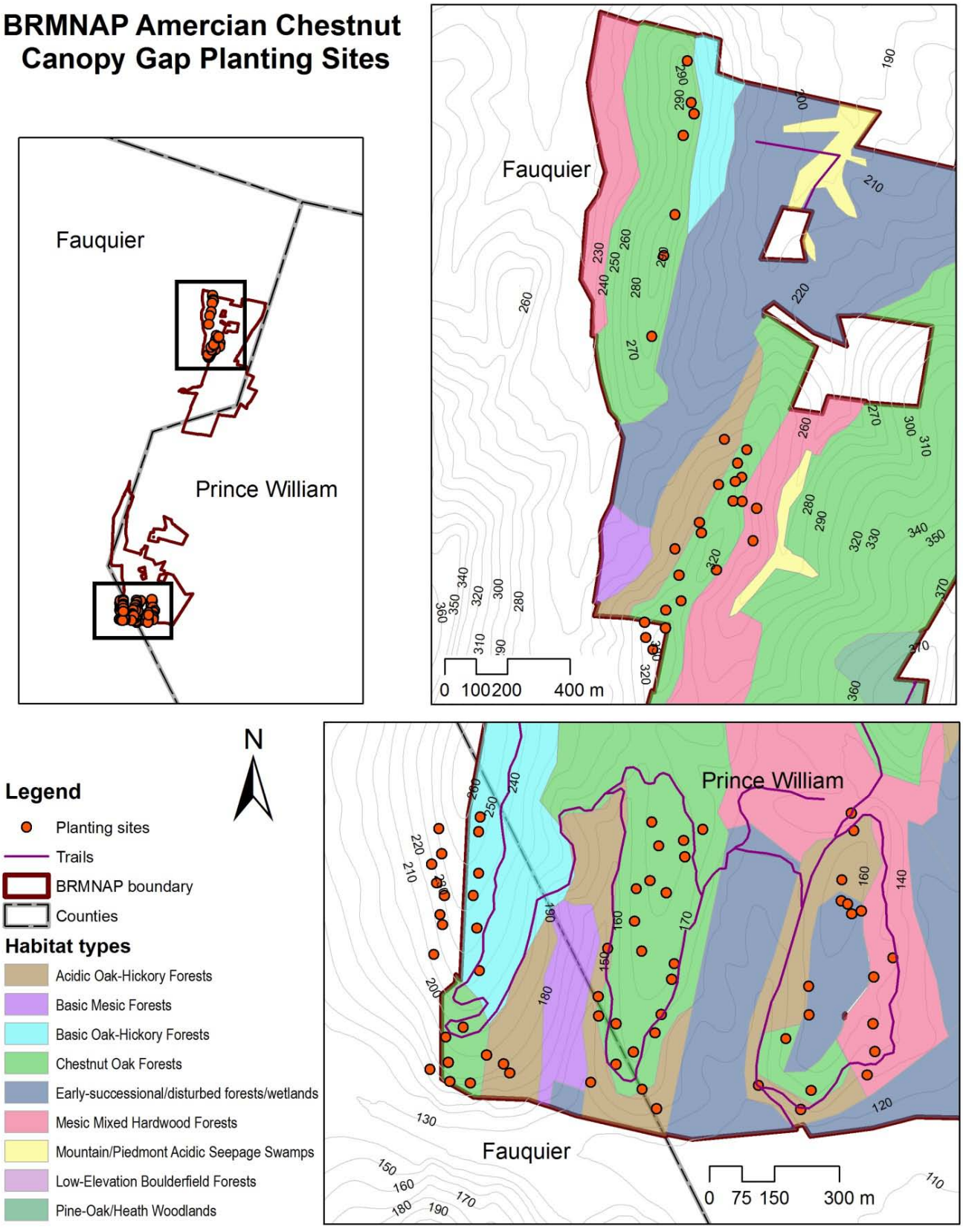
Published works and presentations
Attachment 6 is a copy of a story published in *The Bur* (Volume 5, Number 2, Spring 2012), the newsletter of the Virginia Chapter of The American Chestnut Foundation.

Press coverage
None.

Budget and Breakdown
A total grant of $4,850 was awarded through the TACF External Grants Program on November 2, 2011, for the purchase of the reconnaissance cameras to capture nocturnal activity at the test sites. The actual cost of cameras and peripherals was only $1,864.88, which was disbursed by TACF to the vendor RECONYX, Inc., on January 27, 2012. The Chapter subsequently purchased locks for the cameras, for a cost of $69.96. No further expense with respect to the cameras is currently anticipated.

Attachment 7 presents a complete budget and expense report for the project.

Attachment 1 – Location of Planting Sites



Attachment 2 – Site Layouts

Attachment 3 – Monitors' Log Sheet

Attachment 4 – Initial Germination Results

Attachment 5 – Camera Rotation Plan

Attachment 6 – *Bur* article

Attachment 7 – Budget and Expenses

Phase I. From award date through Dec. 2011		
Item	Budget	Actual
Pollination and office supplies, copying, etc.	$ 150	69.96
Biological technician (part time)	1,000	1,000.00

Phase II. Jan. 2012 through April 2012		
Item	Budget	Actual
Field materials (fencing, tapes, soil tests, *etc.*)	$ 800	800.00
Reconnaissance cameras & peripherals	4,850	1,934.84
Training materials, office supplies, copying, *etc.*	150	0
Travel Front Royal to Broad Run (gasoline 20 trips)	250	250.00
Biological technician (part time)	1,000	1,000.00
Volunteer coordinator (part time)	2,000	2,000.00

Phase III. May 2012 through Sep. 2013		
Item	Budget	Actual
Office supplies, copying, *etc*.	$1,330	1,300.00
Travel Front Royal to Broad Run (gasoline 26 trips)	320	320.00
Biological technician (13 months part time)	6,500	6,500.00
Volunteer coordinator (13 months part time)	6,000	6,000.00

Total Project Budgeted Cost:	$24,350.00
Allocation of costs:	
SI Portion	$9,870.00
BRMC Portion	$8,000.00
Released to TACF	$2,915.16
VATACF portion (includes items removed from inventory)	$3,564.84

Receipts:

Sacharuna	3/13/2012	$8,000.00
Sacharuna	05/23/11	3,500.00
Sacharuna	11/28/11	3,400.00
TACF (paid to RECONYX)	1/27/2012	1,864.88
Total received to date		$16,764.88

Payments:

SCBI (Phase I)	12/9/2011	$ 3,200.00
SCBI (Phase II)	1/19/2012	3,250.00
RECONYX (pd by TACF)	1/27/2012	1,864.88
RECONYX, Inc.		69.96
G. Carver (shipping chestnuts)	3/21/2012	141.19
BRMC	3/14/12	8,000.00
Total disbursed to date		$16,526.03

Table 1. Summary of survival and growth of 1,001 American chestnuts planted from seed in one of three treatment categories [Control (C), Fenced (F), and Slash (S)] in the Bull Run Mountains Natural Area Preserve, VA. Cells missing values are locations whose full monitoring reports had not yet been received to be included in the summary.

Location	Subunit	Last Monitoring Data	#C	#F	#S	Total	#C Active	#F Active	#S Active	Active_Total	#C Sprout(cm)	#F Sprout(cm)	#S Sprout(cm)	#Sprout_Total
Main East	south	.	.	.	.	.	.	.	.	.	.	.	.	.
Main East	north	.	.	.	.	.	.	.	.	.	.	.	.	.
Main East	mid	5/6/2012	40	22	18	80	5	5	3	13	0	2 (14, 16)	1 (12)	3
Main Central	south	4/14/2012	44	27	17	88	19	14	6	39	0	0	0	1
Main Central	mid_west	4/1/2012	48	29	19	96	2	2	1	5	0	0	1 (12)	1
Main Central	mid_east&toe	3/29/2012	31	18	15	64	15	11	6	32	0	0	0	0
Main Central	north	4/28/2012	48	33	15	96	29	19	9	57	16 (0.5-13)	8 (1-16)	1 (4)	25
Main West	south	5/2/2012	46	34	16	96	13	11	1	12	5 (7.5-20)?	2 (7.5-15)?	?	7
Main West	boulder	3/28/2012	44	29	15	88	35	23	11	69	.	.	.	32
North Unit	Shooters	4/9/2012	29	19	9	57	20	17	5	42	.	.	.	3
North Unit	east	5/3/2012	.	.	.	272	0	0	0	0	.	.	.	1
Roland		5/3/2012	32	24	8	64	0	0	0	0	.	.	.	4
Subtotals			362	235	132	1001	138	102	42	269	21	12	3	77
%Active/%Survival							38%	43%	32%	27%	6%	5%	2%	8%