Recd 2-17-99

Daniel R. Spivey
Box 95A RR1
Golconda, Il. 62938
618-683-9031

Scott Ballard
IDNR
9053 Route 148, Suite B
Marion, Il 62959

Dear Scott:

This is a progress report of the work that has been done on my project with the Quercus prinus during the summer and fall of 1998.

During the summer and fall, I collected data at 8 Quercus prinus sites within the Shawnee National Forest. I established 44 permanent plots. At each site, plots were determined by requiring a minimum of 40% basal area of Quercus prinus even to be considered. If an area looked as if it would meet the requirements, a starting point was chosen and random numbers were used to determine plot center. At each round .04 ha plot I collected data on the numbers and type of species in the overstory and understory. Within each .04 ha plot were two microplots located on each major axis making a total of eight microplots. These microplots were .001ha for seedlings and .0025ha for saplings. Data was collected on the number of seedlings and sapling species within each microplot.

Trees at each plot were cored, cores were glued to strips of wood (to be sanded in preparation for counting the individual growth rings) to determine age, needed for calculating site index. Tree height and dbh information were also collected and used in determining site index.

Soil pits were also dug at each plot on each site. Soil samples were taken at the different horizons. Samples were taken to a lab at the university and soil texture analysis test were done for each sample taken (approx. 132 samples). Soil samples will also be sent to a lab in Memphsis Tenn., to determine the organic matter and nutrient content.

Data was also collected on the site characteristics of each plot such as slope,shape, location of plot on slope,and plot aspect.

Plot centers still need to be located with a global positioning system. I hope that this can be done this spring.

At the present, I am summarizing my data in preparation for doing my data analysis. I am hoping to finish my work by the end of this spring semester.

Sincerely
Daniel R. Spivey
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Daniel R. Spivey
Box 95A RR1
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1-618-683-9031

6/24/99

Scott Ballard
IDNR
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Marion, Il. 62959
1-618-993-7023

Dear Scott:

This is a second progress report on the research with the *Quercus prinus* stands that has been requested from me.

During the summer and fall of 1998, data was collected at the different known stands of *Quercus prinus* located within the Shawnee National Forest. As mentioned before, data was collected on the overstory, understory, seedling density, sapling density, forest soils, aspect, topography, and site index.

Field data collection is finished at this time. The previous progress report explains in more detail about the procedures involved with the data collection.

Since the fall of 1998, work has been done on the summarization of the field data. Data for each plot was converted to represent per hectare. This data was then compiled into 40 tables. The data was separated into two different regions, the Shawnee Hills Region and the Ozark Hills Region. The data was then separated into different aspects according to the plots location on slope with regard to direction for each stand location. This allowed the data to be catagorized as either being located on a ridge top, on a north slope or on a south slope. This was how the first 30 tables were organized using the basal area, overstory tree density, seedling density, sapling density, and understory density. The last 10 tables are a compilation of the first 30 tables using average basal area, standard deviation, and average relative basal area for the north , south, and ridge top locations in each of the two different regions according to basal area, overstory tree density, seedling density, sapling density, and understory density. These tables are basically finished at this point. These last 10 tables will probably be used in the body of the research paper, and the first 30 tables will be added into the appendix.

At this point, data has been summarized (dependent and independent variables) to be used in a stepwise regression statistical analysis program. Seedling and sapling density are the dependent variables to be used to determine if there are any relationships between the dependent variables and any of the independent variables, (overstory basal area, *Quercus prinus* basal area, % slope, % sand, % silt, % clay, aspect, site index, and available water content).

I would like to thank you Scott, along with the Wildlife Preservation Fund, for your help on my research project. I hope when the project is finalized that there is some useful information to be had. I would also like to add that at your request upon completion of the data analysis and thesis, 2 copies of the thesis will be sent , one to you and another to the Springfield office staff. Dr. Zaczek and I will also send any reprints of any anticipated journal publications when they become available.

I am also enclosing a copy of the table of data summarized for running the stepwise regression analysis.

Sincerely

Dan Spivey

plot #	DnQPSe/ha	DnQPSa/ha	BAoverst	BAQp	%slope	%sand	%silt	%clay	avail H2O	site index	A'
1.1	50000	1600	31.867	29.863	31	30	53	17	7.334	36.5	1.29
2.1	16000	0	27.844	17.459	36	28	53	19	7.471	56	1.57
3.1	158000	2800	31.116	17.334	21	11	59	30	19.17	50	1.54
4.1	186000	6800	25.36	23.547	24	13	58	29	11.79	43	1.42
5.1	104000	3600	26.571	15.22	28	34	49	18	16.22	48	1.33
6.1	13000	0	25.04	13.631	22	18	60	22	16.22	58	1.26
7.1	38000	0	21.269	21.269	27	37	43	20	6.019	25	0.46
8.1	129000	400	22.214	22.214	19	36	47	17	13.3	33	0.41
9.1	136000	1200	31.488	22.997	16	7	60	33	16.49	41	1.09
10.1	60000	0	36.234	31.154	15	8	57	35	16.96	47	1.78
11.1	49600	400	19.501	16.329	14	7	63	30	21.1	53	1.14
12.1	0	800	24.398	16.537	10	14	55	31	16.55	45	1.42
13.1	70000	800	20.036	10.976	3	15	53	32	12.03	62	1.98
14.1	18000	0	40.513	25.28	35	16	43	41	3.168	66	1.98
15.1	96000	1600	28.666	24.248	21	7	65	28	19.55	49	1.09
16.1	43000	1200	35.746	35.746	41	36	49	15	11.56	58	0.55
17.1	44000	1600	16.273	11.673	23	40	39	21	18.44	40	0.37
18.1	4000	0	26.348	24.038	30	53	32	15	4.261	0	1.14
19.1	107000	4000	26.911	15.66	21	27	54	19	14.7	0	0.43
20.1	44000	3600	16.55	9.71	38	61	28	11	3.61	34	0.91
21.1	93000	1200	17.322	14.274	11.5	50	37	13	4.98	30	1.64
22.1	66000	800	27.147	19.26	50	35	50	15	5.89	57	0.55
23.1	20000	1200	26.239	9.333	36	17	65	18	12.1	37	0.88
24.1	93000	2400	16.668	9.347	26	11	59	30	16.6	44	1.36
25.1	88000	400	27.363	21.772	7	13	60	27	9.924	45	0.05
26.1	51000	2000	30.932	26.198	41	14	71	15	8	31	0.40
27.1	70000	800	21.594	20.712	22	16	69	15	6.738	20	0.21
28.1	39000	4800	22.795	12.558	29	24	61	15	3.335	37	0.18
29.1	76000	1600	15.324	15.324	59	30	52	18	3.561	55	0.09
30.1	23000	400	17.013	11.729	37	17	61	22	18.569	53	0.05
31.1	5000	400	28.539	9.376	25	18	65	17	15.184	58	1.37
32.1	34000	1200	33.252	19.971	37	13	65	22	17.153	60	0.12
33.1	34000	400	33.051	27.582	72	11	66	23	14.672	51	1.05
34.1	105800	1200	27.808	9.729	21	9	69	22	18.008	51	0.16
35.1	72000	0	42.458	31.654	40	7	66	27	17.822	61	1.88
36.1	49000	1600	18.68	15.281	39	11	62	27	18.253	45	1.33
37.1	54000	400	32.65	23.889	40	19	65	16	4.514	46	1.03
38.1	50000	800	37.24	36.175	37	20	65	15	4.309	51	0.04
39.1	80000	2800	29.787	24.625	36	29	58	13	2.356	42	0.25
40.1	42000	2400	42.19	32.597	20	15	59	26	14.787	53	0.67
41.1	139000	800	26.921	26.921	40	17	68	15	8.085	45	0.40
42.1	55000	0	43.012	39.565	65	42	47	11	4.714	0	1.19
43.1	56000	800	43.432	38.865	41	19	65	16	6.751	47	1.29
44.1	31000	0	40.646	38.867	45	47	28	25	4.316	61	0.74

99-016

Determining the Distribution, Site Relationships, and Successional Trends of Chestnut Oak in Illinois

Proposed by: James J. Zaczek and Daniel R. Spivey, Assistant Professor of Forest Ecology and Graduate Student, respectively, Department of Forestry, Southern Illinois University, Carbondale, IL 62901-4411

Estimated Cost: $1,000

Justification: Chestnut oak (*Quercus prinus* L.) is an important tree species native to southern Illinois and distributed across east-central North America. The species is an integral component of many mature mixed-oak forests especially on dry, nutrient-poor uplands (McQuilkin 1990). Although its' wood is valuable and sold as white oak, on these severe xeric sites the primary value of chestnut oak is largely nonconsumptive. It provides vegetative cover for watershed protection and it is considered to be highly important for food, cover, and habitat for many species of wildlife. Additionally, because it tends to occur on upland slopes and ridges, the species provides important aesthetic and recreational value as a component of the scenic panorama (Smith 1995). Past periodic disturbances such as fire, drought, and cutting have aided in the persistence of the species (Abrams 1992, Parker and Merritt 1995). However, changes in disturbance regimes over recent decades, especially fire suppression, are resulting in successional replacement of many oak forests by shade tolerant species. This is of particular concern in Illinois where chestnut oak is currently state-listed as a threatened species.

There is a need to document the current distribution, site relationships, and apparent successional trends of chestnut oak in Illinois to help manage the species. This proposed research will identify, monument, and document several natural chestnut oak stands in southern Illinois in order to determine the current successional status and provide baseline information to help assess future trends in the occurrence and persistence of the species.

Objectives: The objectives of this study are to: a) identify, locate, and document stands of chestnut oak in southern Illinois b) determine stand structure, composition, relative importance of overstory and understory tree species of several of the larger chestnut oak stands c) make management recommendations for the species. This proposal will serve to better understand the chestnut oak resource and provide important baseline information for future monitoring and management of the species.

Methods:

1) Locate, describe, and establish permanent research plots at Atwood Ridge Research Natural Area, Dennison Hollow, Cave Hill, High Knob, Reids Chapel, Provo Cemetery, Big Brushy, and Finneyville Cemetery sites in Alexander, Gallatin, Hardin, Saline, and Union Counties within the Shawnee National Forest.
2) Describe, analyze, and classify the overstory composition and understory regeneration for several of the larger populations of chestnut oak communities.
3) Relate vegetation to environmental factors such as slope position and angle, aspect, elevation, soil factors, and any apparent past disturbances.

Duration: 1 July 1998 to 30 June 1999.

Literature Cited:

Abrams, M. D. 1992. Fire and the development of oak forests. Bioscience 42:346-353.

McQuilkin, R. A. 1990. *Quercus prinus* L. chestnut oak. *In*, Silvics of North America. *Edited by* R. M. Burns and B. H. Honkala. USDA Agric. Handbook 654. pp. 721-726.

Parker, G. R., and C. Merritt. The central region. *In,* Regional Silviculture of the United States. *Edited by* J. W. Barrett. John Wiley and Sons. New York. pp. 129-172.

Smith D. W. 1995. The southern Appalachian Hardwood Region. *In,* Regional Silviculture of the United States. *Edited by* J. W. Barrett. John Wiley and Sons. New York. pp. 173-226.

Budget and Funds Provided: See attached.

Professional Vitae: See attached.

Curriculum Vitae

JAMES J. ZACZEK

March 24, 1998

Office:	Department of Forestry, Mailcode 4411	Phone:	(618) 453-7465
	Southern Illinois University	Fax:	(618) 453-7475
	Carbondale, IL 62901-4411	E-mail:	zaczek@siu.edu

Education

1991-94 **Ph.D. Forest Resources**, Pennsylvania State University, University Park, PA. Genetic, Ontogenetic, and Environmental Influences on Cloning Performance of *Quercus rubra* L.

1980-82 **M.S. Forest Genetics**, Southern Illinois University, Carbondale, IL. Evaluating Southern Appalachian Eastern White Pine *Pinus strobus* L. Provenances in Southern Illinois.

1976-80 **B.S. Forest Resource Management**, Southern Illinois University, Carbondale, IL.

1975-76 Forest Biology, Colorado State University, Fort Collins, CO.

Experience

1997 to present	Assistant Professor of Forest Ecology, Department of Forestry, Southern Illinois University, Carbondale, IL.
1996 - 1997	Senior Research Assistant of Forest Biology, Faculty, School of Forest Resources, Pennsylvania State University, University Park, PA.
1993 - 1997	Affiliated Faculty, Biotechnology Institute, Pennsylvania State University, University Park, PA.
1983 - 1996	Research Assistant of Forest Biology, Faculty, School of Forest Resources, Pennsylvania State University, University Park, PA.

Academic Interests

Biology, ecology, and genetics of trees with emphasis on oaks; silviculture; natural and artificial regeneration of forested ecosystems; agroforestry, age-related changes and growth determination in woody plants; propagation of trees; Christmas tree breeding and culture.

Refereed Publications

Zaczek, J. J., and K. C. Steiner. 1997. Grafting-mediated meristem selection influences rooting performance of *Quercus rubra* L. Can. J. For. Res. 27:86-90.

Zaczek, J. J., K. C. Steiner, and T. W. Bowersox. 1997. Northern red oak planting stock: 6-year results. New Forests 13:177-191.

Zaczek, J. J., J. Harding, and J. Welfley. 1997. Impact of soil scarification on the composition of regeneration and species diversity in an oak shelterwood. *In* Proceedings 11th Central Hardwood Forest Conference March 23-26, 1997, Columbia, MO. *Edited by* S. G. Pallardy, R. A. Cecich, H.G. Garrett, and P. S. Johnson. USDA Forest Serv. Gen. Tech. Rep. NC-188, pp. 341-348.

Zaczek, J. J., C. W. Heuser, Jr., and K. C. Steiner. 1997. Effect of shade levels and IBA during the rooting of eight tree taxa. J. Envir. Hortic. 15(1):56-60.

Zaczek, J. J., K. C. Steiner, and R. D. Shipman. 1994. Performance of Japanese and hybrid larch progenies in Pennsylvania. Northern J. Appl. Forestry 11(2):53-57.

Zaczek, J. J., K. C. Steiner, and T. W. Bowersox. 1993. Performance of northern red oak planting stock. Northern J. Appl. Forestry 10(3):105-111.

Zaczek, J. J., K. C. Steiner, and C. W. Heuser, Jr. 1993. Vegetative propagation of mature and juvenile northern red oak. *In* Proceedings 9th Central Hardwood Forest Conference 8-10 March 1993, West Lafayette, IN. *Edited by* Andrew R. Gillespie, George R. Parker, and Phillip E. Pope. USDA Forest Serv. Gen. Tech. Rep. NC-161, pp. 210-221.

Grants and Contracts

1994 to 1998	Genetics and Regeneration of Northern Red Oak and Other Pennsylvania Hardwoods. Pennsylvania Agricultural Experiment Station. K. C. Steiner and J. J. Zaczek (Investigators).
1997	Determining Optimal Duration of Exposure to Low Light Levels During Rooting of Difficult-to-Root Woody Plants. Horticultural Research Institute. J. J. Zaczek, C. W. Heuser, Jr., and K. C. Steiner (Investigators).
1995	Evaluating the Effectiveness of Low Light During Rooting of Difficult-to-Root Woody Plants. Horticultural Research Institute and the J. Frank Schmidt Charitable Trust. J. J. Zaczek, C. W. Heuser, Jr., K. C. Steiner, and F. W. Witham (Investigators).
1991 to 1997	Genetic Improvement of Christmas Trees. Pennsylvania Tree Improvement Program (Penn-TIP). J. J. Zaczek and H. D. Gerhold (Investigators).

ear 1

A. Professional Staff	Salary	# Mos.	% time	P/M	Agency	# Mos.	% time	P/M	SIU
1. James Zaczek	4778.00	0.00	0.00	0.00	0.00	9.00	0.05	0.45	2150.00
Subtotal:				0.00	0.00			0.45	2150.00
B. Other Personnel									
1. Daniel Spivey	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal:				0.00	0.00			0.00	0.00
C. Subtotal Personnel					0.00				2150.00
D. Fringe Benefits for Professional Staff									
1. Retirement @ 10.46%					0.00				225.00
2. Medical/Dental/Life @ $640/per.mo.					0.00				288.00
Subtotal:					0.00				513.00
E. Equipment									
Subtotal:					0.00				0.00
F. Travel									
1. Travel to collection sites (8)					700.00				
Subtotal:					700.00				0.00
G. Commodities									
1. Fence posts					125.00				
2. Flagging & permanent tags					40.00				
3. Soil collection bags					30.00				
4. Slide film					75.00				
Subtotal:					270.00				0.00
H. Contractual									
1. Film processing					30.00				
Subtotal:					30.00				0.00
I. Direct Costs					1000.00				2663.00
J. Indirect Costs (0%)					0.00				1092.00
Unrecovered Indirect Costs @ 41%									410.00
K. Total Project Costs					1000.00				4165.00