Special Technology Development Program
Progress Report

Complete a copy of this form for: 1) each multi-year project active in the current fiscal year and not requesting funds, and 2) each multi-year project active in the current fiscal year and requesting funds. Add lines within the form as necessary.

PROJECT NUMBER (from original application form)**: R2-2000-01**

PROJECT TITLE (from original form)**: Epidemiology of Armillaria Root Disease in Campgrounds**

PROJECT STATUS: Continuing (funds are being requested for the next fiscal year to continue the project)

EXPECTED PROJECT DURATION (total years for project)**: 2 years**

EXPECTED COMPLETION DATE OF THE PROJECT (fiscal year): **2001**

SUBJECT (from original form)**: Disease Management, Hazard Tree Management, *Armillaria ostoyae***

STATUS OF SUBJECT SPECIES (select one by deleting inapplicable option)**: native**

PROJECT OBJECTIVES (from original application form)**:**

1) Infer the epidemiology and mode of spread of Armillaria root disease in campgrounds of the central Rocky Mountains by careful excavation and observation and by identifying genets (clones) by molecular means. The resulting understanding of epidemiology will facilitate prediction of future spread and thus formulation of management recommendations. 2) Develop and demonstrate the application of a technology to rapidly and accurately identify samples of Armillaria to species.

BRIEF DESCRIPTION OF THE PROJECT:

Last year (the first year, FY00) three campgrounds in the central Rocky Mountains were surveyed intensively for Armillaria root disease. All trees in the sampled areas were recorded, mapped, and inspected for Armillaria. Stumps with the pathogen were also recorded and mapped. Plot sampling was conducted outside the campgrounds to determine if the frequencies of infection differ between the campgrounds and the surrounding forests. When the pathogen was found, samples were taken for isolation. We now have over 500 samples and are continuing to isolate from them and transfer and store the isolates. Isolates will be identified by examination of restriction digests of amplified IGS sequences. Clonal identity (genets) will be determined by both somatic incompatibility and DNA fingerprinting using microsatellite probes to identify genets. Based on the pattern of genet structure observed in campgrounds and other information, recreation resource managers will be informed regarding mode of spread and factors that may influence infection and the expected development of the disease. Management recommendations in campgrounds of southern Colorado will be adjusted accordingly.

Results to date:

In all, 191 stumps with the pathogen and 3261 trees have been recorded and mapped.

532 samples were taken for isolation.

Approximately 100 isolates have been purified and stored; remaining isolations are in progress.

The frequency of infection differed between campgrounds and surrounding forests:

	# trees recorded	% of trees with Armillaria	# stumps with Armillaria
Wolf Creek CG	**1522**	**12 %**	**75**
surrounding forest	68	38 %	0
Williams Creek CG	**777**	**9 %**	**45**
surrounding forest	108	25 %	5
Jumbo CG	**654**	**10 %**	**65**
surrounding forest	132	18 %	1

Although the percentage of trees infected in the campgrounds is high (averaging 11%), infection is even more frequent outside the campgrounds (averaging 25%). This is the opposite of our expectation. It had been supposed that the campground environment and management was somehow responsible for the high levels of infection in the campgrounds. Now it appears that vegetation management in the campgrounds has been successful in reducing the amount of root disease in standing trees, although much of that inoculum is still present in the stumps.

The coming year will be focused on working with the cultures and conducting the somatic incompatibility and genetic analyses to identify genets of the fungus. Then we will revisit the field sites to assess the distribution of genets in conjunction with forest conditions.

CHANGES TO ORIGINAL PROJECT SCOPE OR OBJECTIVES: It was originally intended to excavate infected trees to identify, where possible, the location and nature of the infection court and the inoculum (rhizomorph or root contact). This proved impractical. Aside from the great deal of time excavation takes, trees had to have reasonably advanced infections for it to be detected and the tree identified as a candidate for excavation. By that point it is difficult to determine where and how the initial infection took place. An addition to the project is additional molecular analyses that we plan to use to confirm and extend understanding of clonal structure in the campgrounds (Wingfield, Harrington & Steimel 1996, A simple method for detection of mitochondrial DNA polymorphisms. Fungal Genetics Newsletter 43:56-60).

ADDITIONS TO ORIGINAL PROJECT SCOPE OR OBJECTIVES: none

FHP LEAD CONTACT (FHP person submitting proposal)**:**

Name	Affiliation (Office or Dept.)	Phone, E-mail, Fax
Jim Worrall	R2 Forest Health Management	(970) 641-0471, jworrall@fs.fed.us, (970) 641-1928

PRINCIPAL INVESTIGATOR(S) (add lines as necessary)**:**

Name	Affiliation (Office or Dept.)	Phone, E-mail, Fax
Jim Worrall	R2 Forest Health Management	(970) 641-0471, jworrall@fs.fed.us, (970) 641-1928
Tom Harrington	Iowa State Univ.	(515) 294-0582, tcharrin@iastate.edu, (515) 294-9420

COOPERATORS (contributing to, but not leading, the project) (add lines as necessary)**:**

Name	Affiliation (Office or Dept.)	Phone, E-mail, Fax
Jo Bridges	Pagosa District Ranger	(970) 264-2268, jbridges, (970) 264-1538
Ron Decker	Recreation Forester, Pagosa RD	(970) 264-2268, rdecker01, (970) 264-1538
Connie Clementsen	Grand Valley District Ranger	(970) 242-8211, cclementson, (970) 242-8211
Lynn Kolund	Recreation Forester, Grand Valley RD	(970) 242-8211, lkolund, (970) 242-8211
Allen Stork	Dept. Chair, Western State College	(970) 943-2015, astork@western.edu

COOPERATOR INVOLVEMENT (add lines as necessary)**:**

Name	Role	Time Commitment
Jo Bridges	providing field housing, permission	minimal
Ron Decker	field contact and support	15 hr
Connie Clementsen	providing field housing, permission	minimal
Lynn Kolund	field contact and support	10 hr
Allen Stork	providing laboratory facility	10 hr

PRODUCTS AND DUE DATES (from original application form)**:**

The immediate products of this project will be a document presenting management alternatives for the subject campgrounds (produced by the end of the project period), and a technical publication of the results and conclusions in a scientific journal (submitted within six months of the end of the project period). The technical publication will present the application of a new tool for use in locally identifying and mapping Armillaria genets, information which will be useful in management. Ultimately, it is hoped that the results will be incorporated into a broader, comprehensive Forest Service publication, targeted to recreation managers, that addresses management of root diseases in recreation areas.

STATUS OF PRODUCTS/PRESENTATIONS: (If products or presentations are not completed by the due date, explain why and indicate when the products will be completed. Indicate whether the Region/Area considers current progress on the project to be acceptable; if not, what corrective measures are planned?)

ACCOMPLISHMENTS TO DATE:

Products: scheduled for next year

Publications: "

Technology Transfer: "

FIRST FISCAL YEAR FUNDED: 2000

FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH CURRENT FISCAL YEAR (extend table as needed)(Ignore this section if not requesting funds)**:**

	Item	Requested Funding	Expended Funding	Unused Funding
FIRST YEAR (FY 2000)				
Administration	Salary	20,123	17,182	2,941
	Overhead	0	0	0
	Travel	12,496	5,799	6,697
Procurements	Contracting	1,000	0	1,000
	Equipment	0	0	0
	Supplies	2,100	4,423	-2,323
Year Totals		35,719	27,404	8,315
CURRENT YEAR (FY 2001)		**Requested FHP STDP Funding**	**Other Source Funding**	**Source**
Administration	Salary	2,682		
	Overhead	0		
	Travel	1200		
Procurements	Agreement*	9,000	5000*	Iowa State
	Equipment	0		
	Supplies	2000		
Year Totals		14,882		
PROJECT TOTALS				

*** Challenge Cost-Share Agreement with Iowa State University. The University will contribute Dr. Tom Harrington's salary for his time on the project ($5,000).**

FUNDS NOT USED FROM PREVIOUS FISCAL YEAR (If there are unused funds, what is the reason for not using them? How will the project continue without these funds?)

Fiscal Year	STDP Funding Allocated	Funds Obligated	Funds Unused
2000	**35,719**	**27,404**	**8,315**

Explanation for FY2000 unused funds: Savings were experienced in salary because seasonals were hired at the GS-4 instead of GS-5 level and because the work force was occasionally supplemented with other FHM staff. Travel savings were possible because employees were housed at the expense of districts and received field per diem instead of full per diem. Contracting savings occurred because Dr. Harrington did not visit the field sites during FY 2000. On the other hand, supply expenses were higher than anticipated because of the unexpectedly large number of samples and the lack of existing laboratory infrastructure here (lab facilities at Western State College in Gunnison are being used).

EXPECTED BUDGET FOR NEXT FISCAL YEAR (FY2001)**:**

	Item	Requested FHP STDP Funding	Other-Source Funding	Source
Administration	Salary	2,682		
	Overhead	0		
	Travel	1200		
Procurements	Contracting	12,000		
	Equipment	0		
	Supplies	1000		
Totals		16,882*		

***This figure does not take into account carryover of unused FY00 funds. If carryover is taken into account, the amount of additional funds needed to complete the project is 16,882 – 8,315 = $8,567.**

DIFFERENCE BETWEEN ORIGINAL AND AMENDED REQUESTS AND JUSTIFICATION (the difference between originally requested funds and funds needed based on changes in the budget or scope of the project)**:** (This applies to FY2001) The budget for FY2001 is higher than anticipated last year. This is largely due to the greater number of infected trees than anticipated, which translates into more culture work and more laboratory work in the contract. The salary category is for a part-time student (10 hr/wk) to help with culturing, making media, etc. The travel is for revisiting field sites with our technician. Supplies are for additional laboratory supplies that will be needed as culture work, progresses. The contracting is to Iowa State University, where Tom Harrington's lab will do somatic incompatibility and molecular identification and fingerprinting. In addition to the microsatellite probe/fingerprinting originally proposed, we are also proposing to conduct mitochondrial DNA fingerprinting to extend and confirm the clonal analysis. The Iowa State portion is broken down as follows:

Labor	6,500	
Supplies	3,500	
Travel	2,000	(to field sites, for Harrington and graduate student)
Contributed salary	(8,000)	

STDP FUNDING NEEDED:

Total estimated additional future funding needed beyond the current fiscal year:

Estimated STDP funding needed in remaining year(s) of the project by fiscal year. Show separately the funding to be requested/provided from other sources (extend the table as necessary).

No further funding should be required beyond FY 2001.