January 27,2000

Dear Dr. Collins:

Enclosed are the rationale and budget ($15,000) in request for supplemental funding under the Research Assisitant for Minority High School students (RAMHSS) program. As you are aware, I have been a member of the Shortgrass Steppe LTER team for sometime and have been operating my lab and research at The University of Northern Colorado (UNC). If funded, the monies would be subcontracted to UNC through Colorado State University. I have added Dr. Jrene Rham to the request as a Co-PI. Dr. Rahm is a faculty member in the Department of Educational Psychology at UNC with expertise in assessing the effectiveness of outreach programs on K-12 education. Her involvement will assist us in strengthening this and future outreach efforts.

Before going into the specifics of the research and how the students would be involved, I'd like to discuss why I feel we are in a unique position with regards to the RAMHSS program. I have been involved with minority high school student education since 1985 through Upward Bound. Upward Bound is a program funded by the Department of Education designed to increase the enrollments of first-generation and low-income students in four year colleges. In Colorado, the majority of these students are students of color. I am currently the Director of a Math and Science Upward Bound Program here at UNC that serves 40 high school students from schools in the North Denver to Greeley area. In 1997, our program started a student mentor program for students entering their senior year. Since 1998, this program has been supported largely by the RAMHSS supplement to the SGS-LTER. As is past years, we will select students from our Upward Bound program, and team them up with SGS-LTER scientists, UNC graduate student(s) and a teacher from the school district. We feel that this maximizes the outreach potential of RAMHSS.

The area we currently serve with Upward Bound includes 14 high schools from the Greeley and Denver areas. These students are housed on-campus during the summer for the Upward Bound Program. Hence, by selecting students from the Upward Bound program, the RAMHSS program would include students from areas that we could not normally serve due to distance and logistics. Furthermore, the Upward Bound Students are highly motivated. They have already expressed an interest in math and science careers. The RAMHSS funds would help solidify this interest. Third, if the students are selected from the Upward Bound pool we can arrange for the students to receive college credit. I do not see this as a duplication of the Upward Bound effort or the recently funded LTER Schoolyard Supplement. As for Upward Bound, we are very limited in terms of the research opportunities that we can provide the students and the stipends that we can pay them with the Upward Bound Program. The research opportunities offered by RAMHSS are far superior for the students. As for the Schoolyard LTER effort, the first year's funding was designated for planning ad site preparation. The 2000 RAMHSS effort would address important questions about how to measure microbial biomass and diversity at the LTER site.

Research

The students will prepare methodologies to estimate microbial biomass and patterns of substrate utilization. The studies involve comparing methodologies that are currently in place at the SGS LTER and Arctic LTER sites. Students will use soils that they collect from the SGS LTER and the UNC Schoolyard LTER sites, and soils that were collected from the Arctic-LTER site in August 1999. The focal point of the study will be the Schoolyard LTER plots. I have provided copies of the posters that last year's RAMHSS recipients prepared for their final presentation to their parents, faculty, and students. The posters were displayed at the UNC Michner Library during August and September of 1999.

Microbial Biomass and Diversity of the Schoolyard LTER Demonstration Plots: We established a cluster of 18 25-m2 demonstrations plots on the UNC campus. The plots are meant to serve as educational tools for K-16 students. To this end, participants in the 1998 RAMHSS program helped prepare the plots and collected preliminary pre-treatment data on soil organisms. During the fall of 1998, students from our Ecology, mycology, and Microbiology classes collected additional samples and implemented the treatments. Data collection continued with the 1999 RAMHSS funding. The experiment mimics an ongoing study at the SGS-LTER site in Colorado and the Arctic-LTER site at Toolik Lake. Our aim is to study the effects of nitrogen availability on the succession of a disturbed grassland. We established a nitrogen gradient on denuded plots by addiding (sucrose). Plots were seeded with native seed from native vegetation. This summer will be the third growing season following the treatments.

Assessing Techniques to Estimate Microbial Biomass and Diversity: Several SGS-LTER projects are estimating microbial biomass (Uch *et al*. 1999). To date, we have used different conversion formulae to standardize our methods. I would like to standardize our procedures. Students will compare three main means of estimating microbial biomass – plate counts, direct counts using fluorescent stains (DTAF and Calcofluor), and chloroform fumigation. The objectives of their work will be to assess the different techniques for efficacy, reliability, cost, and feasibility in different settings (schools verses research labs).

Assessing Microbial Diversity and Patterns of Substrate Ulitlization via Ecolog ®: We have used the Ecolog® plates provided by the Biology Corporation to assess patterns of substrate utilization. The sampling, plate preparation and incubation procedures have been worked through (see Van Lew et al. 1999). We would like to work to make the interpretation more user-friendly for high school students. Hence, our objective is to tie this procedure to state and national standards in an age-appropriate manner.

Selection Criteria

Students from under-represented minority groups and/or women will be selected from our pool of Math and Science Upward Bound students. These students are from high

schools in the Denver and Greeley areas. In addition to being from under-represented minority groups, these students are either first generation (no one in their immediate family has earned a 4-year degree) or low income (family incomes below 150% of the poverty level, as determined by the Federal Government). To be eligible for the program, all students were required to undergo a formal application process. To remain in the program, students had to maintain satisfactory academic progress based on an individualized plan and behave in a mature manner (no problems with behavior, drugs, etc.).

Students will be evaluated based on their academic performance at their high schools, their previous year's participation in our summer program, and their math and science ACT scores. I have provided a list of potential participants for this summer. All have formally requested that they be considered for participation in some form of summer research. These students were asked to respond to the following in addition to the regular application questions:

1) Why do you think you should be selected for the mentored program?
2) What would you most like to gain from this more independent experience?
3) What qualities will help you succeed as a mentored student?

I have included what information I can about the students, but have excluded their grades, ACT scores and other information that will be used for evaluation for privacy reasons. Other staff and I will evaluate their credentials and select four students for RAMHSS support.

Student	Gender	Ethnicity	High School
*	F	Caucasian	Windsor
*	M	Hispanic	Ft. Lupton
*	F	Hispanic	Valley
*	F	Hispanic	Valley
*	F	Asian Pacific	Denver West
*	M	Asian Pacific	John F. Kennedy
*	M	Asian Pacific	John F. Kennedy
*	F	Caucasian	Denver North
*	F	Caucasian	Adams City
*	F	Hispanic	Adams City

All the students listed above have at least a 3.3 from their respective high schools and 3.8 grade point average from our summer program.

Budget

I have requested $15,000 to support 5 students ($3000 for each student as per NSF guidelines). Of these funds, stipends of $500 will be made available to the students who complete the summer program and an additional $500 will be available for those students

that choose to follow through with their research during the academic year. I have also requested $5000 in funding to be split between a GRA and high school teacher to help supervise and mentor the students in the field during the summer. Students will receive 2 college credits for their work in the summer. Hence, I am requesting $1500 to cover the tuition and fees ($300 per student). The remaining funds will be used to house the students on campus, purchase supplies, for travel to and from the site (a van will be rented from the UNC motor pool for daily travel to and from the site), and travel to a regional meeting.

Concluding Remarks

I see this as an excellent opportunity to assist some highly motivated young people. I have worked with each of the students listed above over the past two-three years, and all are worthy of support (If there is a way to fund them all, we have the staff in place to work with them). I would also add that I have over 15 years experience working with high school students and summer programs for high school students. All students are subjected to an orientation that outlines program objectives and expectations. We have a well-tested discipline policy in place, that emphasizes a personal code of conduct, respect for others, and zero-tolerance for drugs and alcohol.

I thank you for consideration of this request and look forward to hearing from you.

Sincerely

John C. Moore
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