UNIVERSITY OF SOUTH CAROLINA
COLUMBIA, S. C. 29208

BELLE W. BARUCH INSTITUTE FOR
MARINE BIOLOGY AND COASTAL RESEARCH

(803) 777-5288

March 21, 1989

Dr. Jerry F. Franklin
College of Forest Resources
AR-10
University of Washington
Seattle, WA 98195

Dear Jerry:

Enclosed is a revised proposal and budget for our component of the LTER collaborative research grant for 1989-1990, "Modeling Forest-Stream Interactions". As you suggested, we have secured approval for an 11% indirect administrative cost for the project to avoid the expense of a double overhead (see the enclosed letter from our Office of Sponsored Programs and Research). We have revised the budget accordingly to fit within the $27,000 limit for our project as described on page 33 of the overall proposal.

I am looking forward to this collaborative effort and expect some exciting new products from this research. Please contact me if we can provide you with further information on our proposed work.

Sincerely,

H. N. McKellar, PhD
Associate Professor

APPROVED:

Dr. F. J. Vernberg, Director
Baruch Institute

Ardis Savory
System Vice President for Research

COLLABORATIVE RESEARCH IN THE LTER NETWORK:

Modeling Forest-Stream Interactions

H. N. McKellar
Baruch Institute
University of South Carolina
Columbia, S.C.

The coupling of terrestrial and aquatic ecosystems has been long recognized as a major factor controlling water quality and population dynamics in stream ecosystems. Likens and Bormann (1974) outlined several major land-water linkages which are important in understanding sediment transport, nutrient yields, and toxic substance transport in aquatic ecosystems. The "river continuum concept" as set forth by Vannote et al. (1980) describes spatial transitions in streams and rivers relating patterns of material loading from adjacent terrestrial landscapes to organic matter processing and downstream changes in physical geometry. More detailed simulation models have been developed which describe the seasonal dynamics of organic matter processing in stream ecosystems in relation to energy input (light, litterfall, and lateral allochthonous inflow), controlled by vegetation dynamics in the watershed and riparian zone (McIntire and Colby 1978).

From the forest perspective, stream ecosystems represent a downhill receptor of exported water, organic matter and nutrients. In lowland forests, stream flooding represents a feedback of these commodities as well as a hydrologic control on some dominant processes in forest functioning (productivity and seedling survival). Several forest dynamics models have been developed which address these important interactions. Golkin and Ewel (1984) developed a model to simulate production dynamics and nutrient cycling in the forest canopy and soils in relation to hydrologic inputs and outflows. The hydrologic outflows of water and nutrients from such a model could be used as inputs to a stream ecosystem model. In our recent work in South Carolina, we modified the forest succession models of Botkin et al.(1972) and Shugart and West (1977) to simulate spatial and temporal patterns of forest productivity and species distribution in relation to flooding (Pearlstine et al. 1985). These models provide the basis for further process simulations of hydrodynamic effects on litter production, decomposition, and detrital export from the forest ecosystem to the receiving stream.

We propose an LTER collaboration to develop a forest-stream interaction model which will couple the essential components of these forest and stream models. The resultant model will focus on simulating the major patterns of productivity and organic matter processing with emphasis on the controlling interactions at this dynamic interface. Such a model will help summarize and synthesize data from ongoing research and will provide a working basis to examine theoretical aspects of boundary dynamics where forest-stream interactions represent important interfaces of the landscape.

We propose a two-year effort (beginning in June 1989) including an initial workshop (fall 1989) to establish directions of the work. We suggest collaboration among scientists from at least three LTER sites (North Inlet, Coweeta, and Andrews Experimental Forest) where ongoing research has considerable focus on aspects of forest-stream interactions. Our earlier work on modeling subsystem interactions (Summers et al. 1980 , Summers and McKellar 1981) and existing models of stream ecosystem dynamics (McIntire and Colby, 1978) will provide initial directions for coupling forest and stream interactions.

After one year, the basic forest-stream models should be working on a unit area basis. Subsequently, the more complex issues of boundary dynamics, landscape-level processes, and watershed export can be further developed. The second year would involve new synthesis of information from aerial photographs providing critical data on area and boundary dimensions. The project will also include a final workshop (fall 1990) to summarize results and recommend future directions.

Participants at the North Inlet site will include Hank McKellar, Fred Sklar and Liz Blood with most of the modeling work being done by McKellar. We have been in contact with Dr. Jack Waide at Coweeta who has also expressed considerable interest in this collaboration although there are some time constraints on a major commitment from him at this time.

BUDGET
(University of South Carolina)

	YEAR 1	YEAR 2	Total
PI Salary (1.5 mo./yr)	$6,150	$6,460	$12,610
Fringe (.1561 x SW)	$ 960	$ 1010	$ 1,970
Travel (Three people X 1 trip/yr)	$2,500	$2,500	$ 5,000
Computer (Hardware)	$3,000	0	$ 3,000
Supplies (Maps, software)	$1,000	$1,000	$ 2,000
Total Direct Costs	$13,610	$10,970	$24,580
MTDC.(TDC-Computer)	$10,610	$10,970	$21,580
Indirect Costs (11% MTDC)	$ 1,170	$1,210	$ 2,380
TOTAL (TDC+Indirect)	$14,780	$12,180	$26,960

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OFFICE OF SPONSORED PROGRAMS
AND RESEARCH

(803) 777-7093

April 21 1988

Dr. Jerry Franklin
c/o Ms Judy Brenneman
Department of Forest Services
Oregon State University
Corvallis, Oregon 97331-5704

Dear Dr. Franklin:

It is the policy of the University of South Carolina to recover full indirect cost when permitted by the granting agency. Exceptions to this policy are occasionally granted when there are mitigating circmustances. One of the situations that arises is the one that you find yourself in, that is a limited amount of resources are available to accomplish a specific project. According to our discussion, the other institutions involved in this project have indicated a willingness to give up a portion of their indirect costs in order to accomplish this research within the funding limitations.

In light of these circumstances and, because USC as a LTER grantee feels that this is a very valuable project, we are willing to share in the costs by accepting an indirect cost rate of 11% for Dr. Henry McKellar's NSF sponsored project entitled, "Modeling Forest-Stream Interactions".

If you require any further assistance or information, please contact me. We look forward to working with you on this project.

Sincerely,

Thomas A. Coggins
Associate Director

Ardis M. Savory, System
Vice President for Research