

**National Science Foundation  
4201 Wilson Boulevard  
Arlington, Virginia 22230**

**Title: Quantitative Environmental and Integrative Biology (QEIB)**

Dear Colleague,

The Directorates for Biological Sciences (BIO) and Mathematics & Physical Sciences (MPS) at the National Science Foundation have a long history of supporting basic research relevant to environmental and integrative biology. This letter is to inform the community of U.S. scientists that BIO and MPS continue to encourage submission of proposals that are at the interface of environmental and integrative biology and mathematics.

Environmental and integrative biologists are entering a new era in which they possess the data necessary for building or testing models, but lack the quantitative solutions to large-scale and complex problems. BIO and MPS recognize that the time is especially ripe for accelerating progress in understanding and predicting important phenomena in environmental and integrative biology by using existing mathematical tools *and* by developing new mathematical and statistical approaches. The burgeoning base of theoretical and empirical work, made possible by new methods and technologies, is providing the impetus to develop robust answers to the major integrative biological and environmental challenges faced by our society. Meeting those challenges will require new efforts to train environmental and integrative biologists in mathematical sciences - including analytical and numerical modeling, statistics and time series analysis, and dynamical and nonlinear systems analysis. We need a new generation of empiricists with stronger quantitative skills and theoreticians with a detailed understanding of the empirical structure of biological processes. The challenge also requires new efforts to train mathematicians in the environmental sciences - including ecological and evolutionary theory and empiricism and in integrative organismal biology.

Our goals are: 1) to encourage major mathematical advances of relevance to ecological and evolutionary forecasting; 2) to encourage mathematical and statistical advances in analyses of complex sets of phenotype traits, the values of which are functions of age and environmental conditions; 3) to foster collaboration among environmental and integrative biologists and mathematicians; and 4) to enhance quantitative skills of students and investigators through training activities.

Examples of areas in which mathematical advances are desired include, but are not limited to:

- the integration of stochastic and nonlinear effects;
- the development of new statistical and mathematical methods; and
- the development of new methods for characterizing variability and uncertainty across scales of space and time.

It is our hope that both the biological *and* mathematical sciences will benefit from additional collaboration and cross training. Collaboration between biologists with mathematicians can produce truly emergent insights into biology and create interesting mathematical challenges, the combination of which will exceed the sum of their individual domains.

Titles of proposals emphasizing Quantitative Environmental and Integrative Biology (QEIB) should be prefaced with "QEIB:". This is not a special competition or new program. The purpose of this letter is to encourage submissions of relevant proposals to existing core programs at the programs' regular target dates. Target dates for applicable programs may be found at <http://www.nsf.gov/dir/index.jsp?org=bio> or [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5690&org=DMS](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5690&org=DMS). NSF FastLane requirements apply to all proposals submitted. Proposals must conform to all format requirements in the Grant Proposal Guide ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg)). Investigators are strongly encouraged to contact one of the following program officers to determine if their proposed ideas fall within the QEIB goals.

**Division of Environmental Biology, BIO**

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