
The 7th Annual
Ecological Integration Symposium
At Texas A&M
Biodiversity, Ecology and Climate Change
Mark Bush
Florida Institute of Technology
Lee Hannah
Conservation International
Eric Post
Pennsylvania State University
Daniel Schindler
University of Washington
Susan Kilham
Drexel University
Joel Scheraga
Environmental Protection Agency
Friday, March 31 2006, 8am - 5pm. Rudder Theater Auditorium
Texas A&M University, College Station, Texas.
Saturday, April 1 2006, 8am - 5pm.
Ecological Student Symposium. Memorial Student Center, Texas
A&M University, College Station Texas.
Free To All
http://wfsc.tamu.edu/symposium

Welcome the 7th Annual Ecological Integration Symposium: Biodiversity, Ecology and Climate Change

Texas A&M University's nationally recognized Ecological Integration Symposium is in its 7th year of attracting renowned, cutting-edge scientists to address trends and frontiers in ecological research and conservation.

Past Symposia

2000 Integration Across Ecological Scales
James H. Brown, Gustavo Fonseca, Michael Gilpin, Michael Huston, Reed Noss, James Reichman, Joan Roughgarden, and Jack Ward Thomas

2001 Biodiversity, Complexity and Ecosystem Function
Lenore Fahrig, J. P. Grime, Dan Janzen, James Kitchell, Ariel Lugo, Judy Meyer, Bruce Milne, and Dan Simberloff

2002 Evolutionary Perspectives in Ecological Integration
Peter Cranston, Paul Ewald, Stephen Hubbell, Jonathan Losos, Craig Moritz, and Elisabeth Vrba

2003 Natural History and Modern Conservation
Harry Greene, Hans Paerl, Thomas Sherry, Maureen Stanton, Thomas Swetnam

2004 Demonstrating Ecological Value: Promoting Conservation and Sustainability
Robert Costanza, Brian Czech, Claire Kremen, Peter Moyle, Richard Rice, Michael Rosenzweig

2005 Restoration Ecology: Bridging the gaps between theory, practice, and policy
David Allan, David Maehr, Dennis Martinez, Robert Twilley, Joy Zedler

Acknowledgements

In no particular order

- **Vickie Buckbee,** Business Assistant II, Wildlife and Fisheries Science
- **Dr. Robert Brown**, former department head of Wildlife and Fisheries Sciences currently with the Institute of Renewable Natural Resources
- **Lee and Gini Fitzgerald**, hosts of the EIS Social
- **Tariq Ayyub & Ross Anderson** computer personnel in Wildlife and Fisheries Sciences
- **Dr. Arnold Vedlitz**, Director Bush School of Government and Public Service
- **Julie Villareal**, Assistant Director Rudder Theater Complex
- **Rebecca L. White**, Director Student Research Week 2006
- **Chris Lang**, Academic Business Administrator II Wildlife and Fisheries Sciences
- **Shirley Konecny**, Senior Office Assistant Wildlife and Fisheries Sciences
- **The Department of Wildlife and Fisheries Sciences**

Ecological Integration Symposium 2006 Schedule

7:45 - 8:15 - Registration and Coffee

8:15 - 8:30 – Welcome

8:30 - 9:30 – Dr. Post

9:30 - 10:30 – Dr. Kilham

10:30 - 10:45 – Break

10:45 - 11:45 – Dr. Bush

11:45 - 1:00 – Lunch

1:00 - 2:00 – Dr. Schindler

2:00 - 3:00 – Dr. Hannah

3:00 - 3:15 – Break

3:15 - 4:15 – Dr. Scheraga

4:15 - 5:00 - Roundtable Discussion

7:00-?? Social at the Fitzgerald's home (direction in back of program)

2006 EIS Committee Members

Rebecca Flack, Dept. of Rangeland Ecology & Management
James Bradley Johnson, Dept. of Wildlife & Fisheries Sciences
Carrie Miller, Dept. of Wildlife & Fisheries Sciences
Nicole Smolensky, Dept. of Wildlife & Fisheries Sciences
Michael Sorice, Dept. of Wildlife & Fisheries Sciences

Biodiversity, Ecology and Climate Change

The consensus among scientists is that we are living through a period of drastic change in the earth's climate. The ramifications of this change for our own species as well as others inhabiting our planet are profound. How will changes in local climate regimes affect species distributions? How will natural selection be altered? What are the economic ramifications for our societies? What insight can we gain from investigating the historical occurrences of climate change? Such questions are innumerable. This year's EIS committee has brought together a number of top scientists who are engaging questions like those listed above in hopes of increasing our understanding of the ecological ramifications of climate change.

Dr. Mark Bush

Professor of Biological Sciences,
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Climate change: The view from a hotspot

There is nothing unusual about climate change. Indeed climatic stasis would be much more unusual, yet conservation policy has always taken climate for granted. Over the past 40 years there has evolved an appreciation of the influence of glacial-interglacial cycles on tropical biotas. Data-free hypotheses of aridity prompted speculation regarding the origins of Amazonian diversity, and the popular, but incorrect refugial hypothesis. As paleoecological and systematic data have accumulated the origins of Amazonian diversity are seen to lie beyond the period of the ice-ages. Substantial climatic changes ranging from rapid oscillations in CO2 concentration, cooling and precessionally-driven changes in precipitation have all been weathered by the biota of Amazonian and Andean hotspots.

Although plants and animals have survived these changes they have done so through migration and the resulting formation of novel species assemblages. The fastest warming that took place in the transition from ice-age to Holocene, generally regarded as the most comparable to coming changes, was an order of magnitude slower than the predicted rate. In fact, the fastest rate of Amazonian ecosystem change in the last 100,000 years may have occurred about 7,000 years ago, as a profound drought moved across the Amazon and Andes. The pace of coming change will result in individualistic species responses expressed in varying abilities to migrate. Strategies for conservation of populations must consider the likelihood and feasibility of migration, and that attempting to conserve recognizable communities is doomed to fail. Conservation corridors that span the greatest potential habitat range need to be established, even if modern habitat quality is low.

Dr. Lee Hannah

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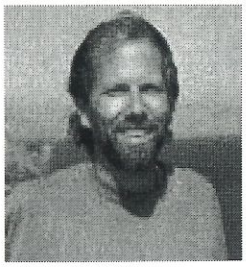

Climate Change and Biodiversity: Adapt, Move or Die

Biodiversity faces a new threat and lots of uncertainty in climate change. How many global extinctions might result from climate change? What can we do to improve consideration of climate change in conservation strategies? How far will improved conservation take us? What biological systems are most sensitive to climate change, and are they policy-relevant? Does climate change mean that biologists should be policy advocates?

Dr. Susan Kilham

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Linking resources, diatoms and climate change in the large lakes of the Greater Yellowstone Ecosystem

I worked in collaboration with Dr. Edward Theriot (Director, Texas Memorial Museum) and a doctoral student, Dr. Sebastian Interlandi. The major focus of this work was to link planktonic diatoms and climate change using resource-based theory in the large lakes of the Yellowstone Ecosystem. Resource-based physiology of the eight important diatom species in the large lakes of the Yellowstone region were used to explain the relative abundances and seasonal changes. The diatoms were ranked along resource gradients according to their relative abilities to grow under limitation by Si, N, P and light. Hypotheses based on resource physiology were integrated with *in situ* observations on seasonal changes in diatom abundances on fine temporal and spatial scales to explain the present distributions of diatoms and to test causal factors to explain diatom distributions over the Holocene (the last 13,000 years), using long sediment cores from the lakes with their preserved diatoms fossils (Theriot). The limnological characterisitcs of the lakes, such as time of ice-out, the mixing regime (affected by temperature and wind), and the nutrient loading (affected by hydrological loading) are all components of the climate that directly impact diatom abundances. There is a very strong ENSO signal in Yellowstone related to snow accumulation. Knowledge of the limnology of these lakes and process-oriented physiology provided the basis for a more detailed interpretation of the paleorecord and a firmer basis for landscape-level transfer functions for fine-scale climate reconstruction.

species assort according to resource ratios — phytoplankton in fw lakes

Dr. Eric Post

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Ecological Response to Climate Change across Spatial and Organizational Scales

A great challenge for ecologists studying climate change has been to integrate ecological responses to rapid warming across organizational, spatial, and temporal scales. Such integration can lead to insights into how very local, short-term responses to climate change among individuals at one trophic level might scale up to influence larger-scale population dynamical responses to climate change at other trophic levels. I will present a combination of experimental and observational data from Greenland illustrating responses to climate change across scales of space, time, and across trophic levels. These data suggest that life history responses of individual plants to climatic warming have implications for the reproductive success and population dynamics of large herbivores such as caribou.

Dr. Joel Scheraga

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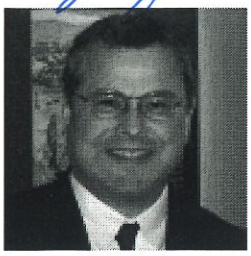

Preparing for a Changing Climate

Climate change is an ongoing process that has been occurring for millions of years. But for the first time, humans are having a discernible effect on climate at a global scale. This fact was acknowledged by the leaders of the Group of Eight (G8) countries in their declaration of July 8, 2005:

"Climate change is a serious and long-term challenge that has the potential to affect every part of the globe. We know that increased need and use of energy from fossil fuels, and other human activities, contribute in large part to increases in greenhouse gases associated with the warming of our Earth's surface. While uncertainties remain in our understanding of climate science, we know enough to act now to put ourselves on a path to slow and, as the science justifies, stop and then reverse the growth of greenhouse gases."

Scientific uncertainties remain, but the policy debate has shifted to questions of how much should be done and by when.

As the climate changes, it poses risks and opportunities to human health, ecosystems, social and cultural systems, and economic systems. And effects on ecosystems, human health, and human systems due to the changes in climate that have occurred since the beginning of the Industrial Revolution are already being seen. Glaciers are shrinking and contributing to sea level rise, permafrost that supports structures in Alaska is thawing, growing seasons are lengthening, and trees are flowering earlier in the year, in the same way that insects are emerging and birds are laying their eggs earlier. Given these observed changes and the changes that may occur as the climate continues to change, the imperative to focus on adaptation as one component of a policy portfolio has increased.

Investments in adaptation made in anticipation of climate change will protect climate-sensitive systems, including human health, air and water quality, ecosystems, and economic activity.

Decisions that affect climate-sensitive systems (including ecosystems) are regularly made by resource managers and other stakeholders. There is an urgent need for the research community to conduct scientifically-sound, "policy-focused" assessments that inform these decision makers about the potential effects of climate change on the resources they manage, and help them adapt to a changing climate. Relevant uncertainties need to be characterized and quantified, and the implications of the uncertainties explained. And new models and tools need to be developed to help resource managers account for climate change as they make decisions that affect ecosystems, human health, and society.

Portfolio of life history strategies
Contribution of habitats have changed

Dr. Daniel Schindler

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Pop. dyn & interactions are where the action is → understand changes in ecosystem dynamics

Big Effects from Subtle Causes: How Climate Change is Affecting Aquatic Ecosystems in the Pacific Northwest

Trophic uncoupling can occur / Biol resp are often driven by ecol processes

Evidence of ecological responses to recent climate change is accumulating to the point where some generalization is now possible. Current evidence shows that ecological systems often have substantial responses to subtle changes in environmental conditions. These responses often derive from the inherent feedback mechanisms in ecosystems. Simple physiological studies of climatic effects do not account for these amplifiers of climate change. For example, switch-points in complex life histories and variation in responses of the phenological dynamics of interacting species can cause abrupt changes in both populations and ecosystem processes. Although there is substantial variation among climate forecasts in the expected magnitude of change in environmental conditions, ecological responses to nearly all of these changes are likely be substantial. Conservation of networks of viable habitat that encompass the full complement of species and their range of local adaptations provides a framework for action now.

Mid 70's → critical time period for climate change in the N. Hemisphere

last 40 years

BIC – Bayesian Information Criteria

Ecol dynamics masked climate signal

Mantua, N.J. et al 1997 Am Meteorol Soc 78: 1069–1079

Many cons needs to focus on maintaining biocomplexity & networks of viable habitats

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- Department of Rangeland Ecology and Management, Texas A&M University
- College of Agriculture and Human Sciences Texas A&M University Kingsville
- Department of Wildlife and Fisheries Sciences, Texas A&M University
- Caesar Kleberg Wildlife Research Institute, Texas A&M University

EIS Social

Open to everyone!

Friday, March 31 2006

7:00pm – 11:00pm

Dr. Lee Fitzgerald and his wife Jenny have been gracious enough to provide a venue of the EIS social since its inception. Food and beverages will be provided.

Directions to the Fitzgerald's house

1. From Rudder Theater bear southeast on Thockmorton/Coke.
2. Left on George Bush Drive
3. Right on Texas
4. Left on Harvey Mitchell PKWY aka FM 2818
5. Pass under Hwy 6/Earl Rudder, Harvey Mitchell becomes Emerald PKWY
6. Right on Sandstone Dr and follow until you reach 8901 Sandstone.

Please park on the street but do not block traffic. Do not park in anyone's driveway or yard.