

Integrated & Interdisciplinary Modeling for Water-Related Issues

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Session Objectives:

- Justification / Motivation
- One Approach: The Course
 - NRES 730
Interdisciplinary Modeling: Water Resources and Changing Climate
 - Univ. Nevada Reno, Summer 2010
- **Open Discussion**



Motivation & Justification



The screenshot shows the official website of the Office of Science and Technology Policy (OSTP) within the White House. At the top, there is a navigation bar with links for "BLOG", "PHOTOS & VIDEO", "BRIEFING ROOM", "ISSUES", "ADMINISTRATION", "WHITE HOUSE", and "GOVERNMENT". A search bar is located on the right side of the page. The main heading reads "Office of Science and Technology Policy". Below this, there is a secondary navigation bar with links for "About OSTP", "OSTP Blog", "Pressroom", "Divisions", "R&D Budgets", "Resource Library", "NSTC", "PCAST", and "Contact Us". The central content area features the text "SCIENCE, TECHNOLOGY and INNOVATION" in a serif font. Below this, a quote from President Barack Obama states: "Whether it's improving our health or harnessing clean energy, protecting our security or succeeding in the global economy, our future depends on reaffirming America's role as the world's engine of scientific discovery and technological innovation." To the right of the text is a photograph of President Barack Obama and Vice President Joe Biden in conversation with other officials in a formal setting.

From OSTP Memo

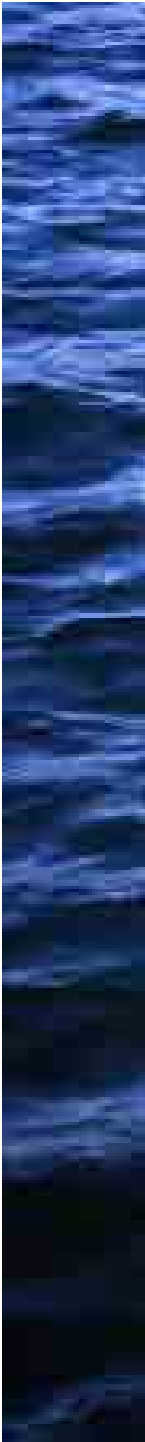
July 21, 2010

- 6 Priority Areas:
 - Economic Growth & Job Creation
 - Health & Disease
 - Clean Energy
 - **Climate Change** 
 - **Competing Resources Demands** 
 - Security & Defense



On Competing Resource Demands...

Support research on integrated ecosystem management approaches that bring together biological, physical, chemical, and human uses data into forecast models, assessments and decision support tools.



e.g.: NSF Water Sustainability and Climate RPF

Proposals that do not broadly integrate across the biological sciences, engineering, geosciences, and social sciences may be returned without review.

Integrated Modeling

Information

Decision

Academic Training
Understanding of
Requirements
Experience



Idea Model #1
(Hydrology)



**Hydro
Model**

Academic Training
Understanding of
Requirements
Experience



Idea Model #1
(Land Use)



**Land-Use
Model**



Academic Training
Understanding of
Requirements
Experience



Idea Model #1
(Ecology)



**Eco
Model**

**Integrated
Model**

**Political
Process**



Decision

From: J. Westervelt,
Simulation Modeling for Watershed Management

Training Approach: The Course



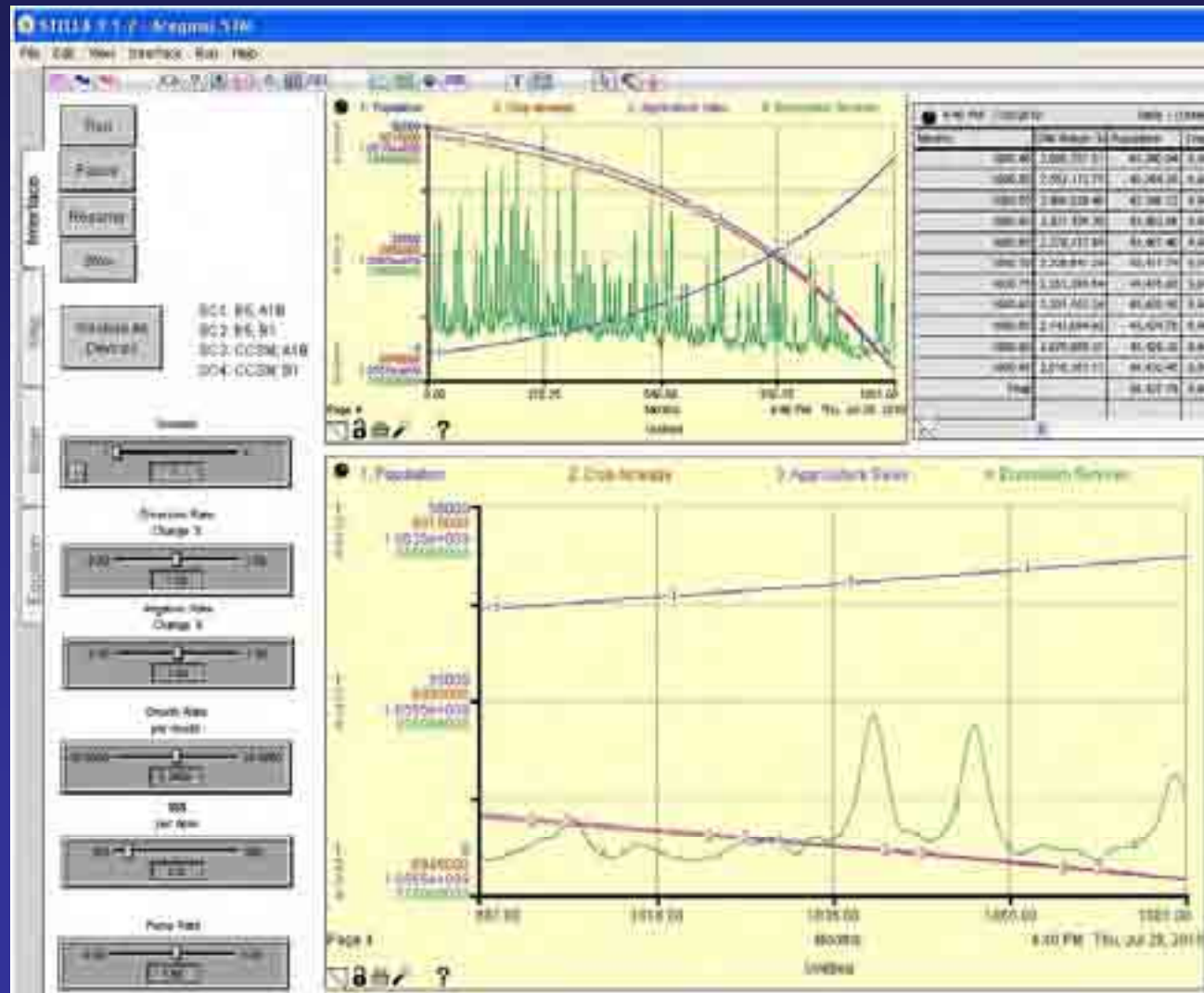
**Interdisciplinary Modeling: Water-Related Issues
and Changing Climate
NRES 730 (Summer 2010)**

2010 Course Highlights

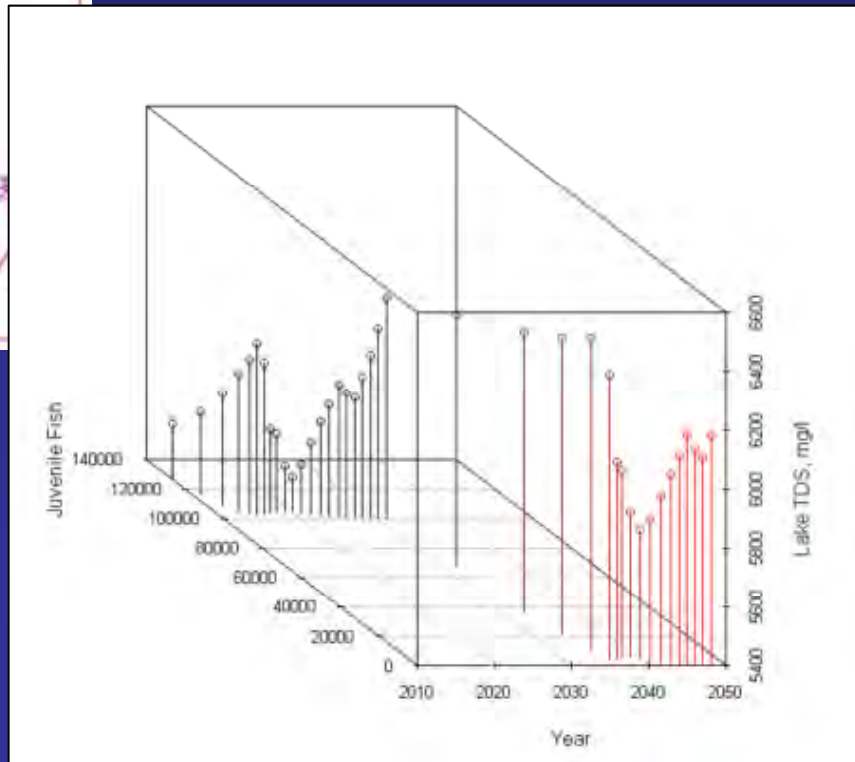
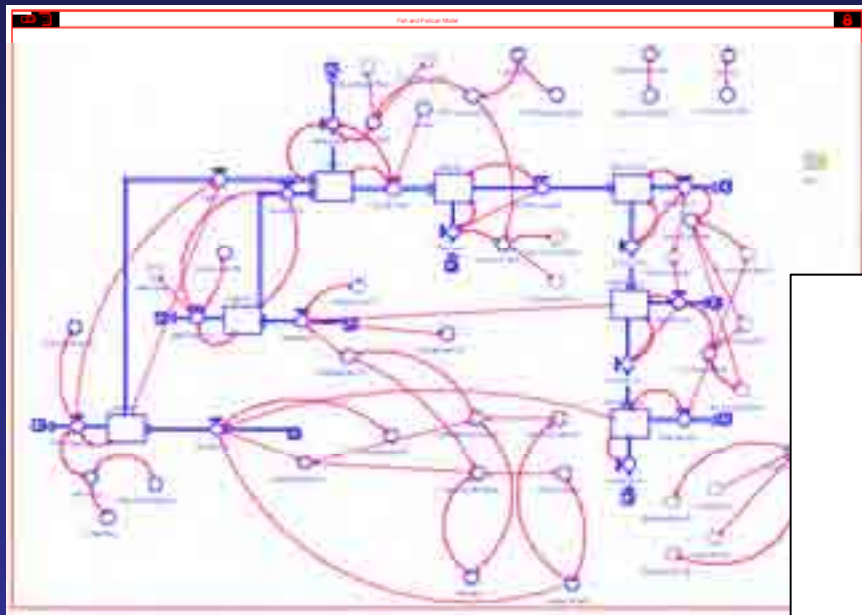
- Interdisciplinary Modeling:
 - July 12-30, 2010
 - Tri-State EPSCoR supported:
 - 23 students from ID, NM, NV
 - 26 faculty from ID, NM, NV
 - Modeling projects regarding impacts of climate change on:
 - Fish sustainability at Pyramid Lake
 - Invasion of cheatgrass/red brome
 - Trout survivability downstream of Palisades Dam, ID
 - Acequia communities in NM



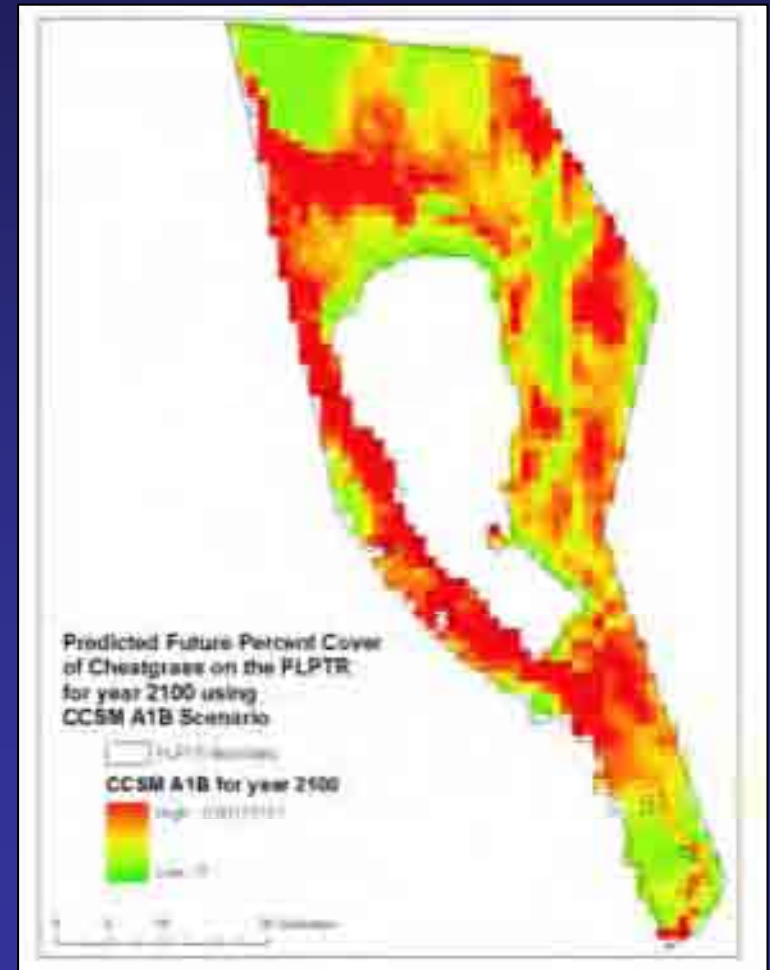
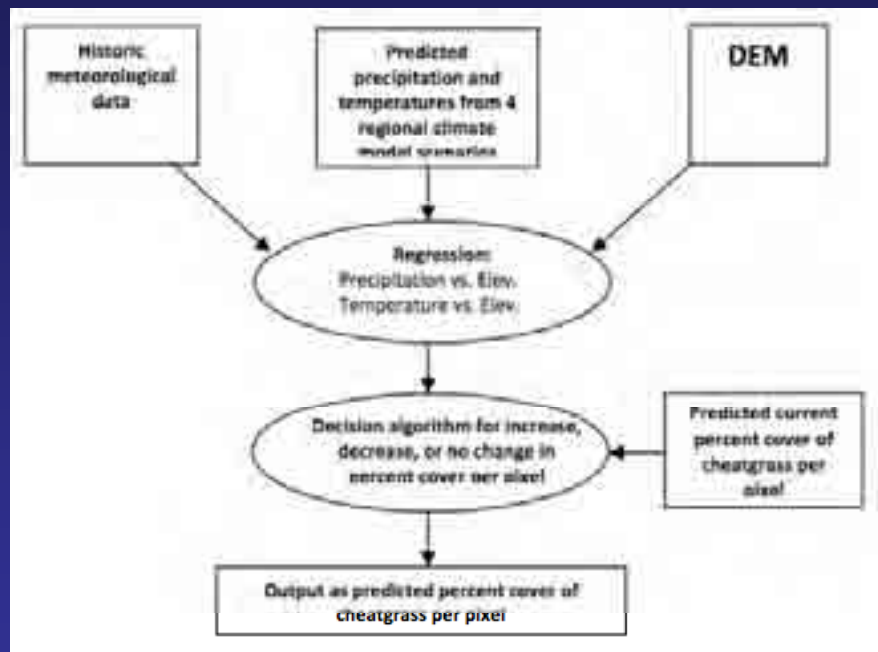
Climate change impacts on the New Mexico acequias project



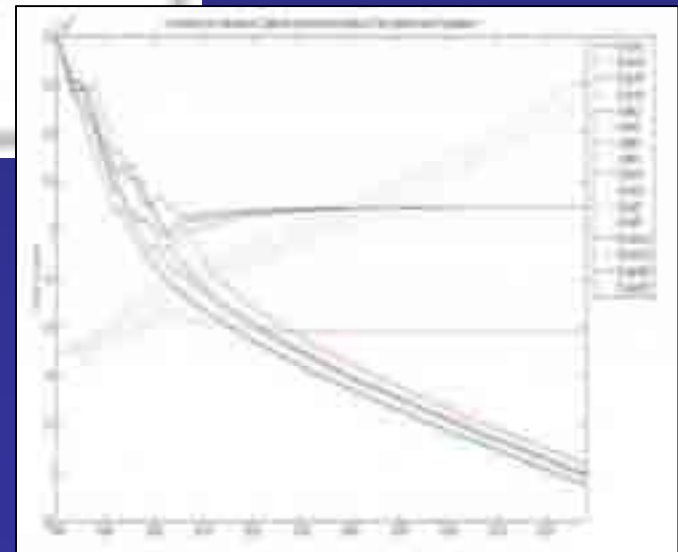
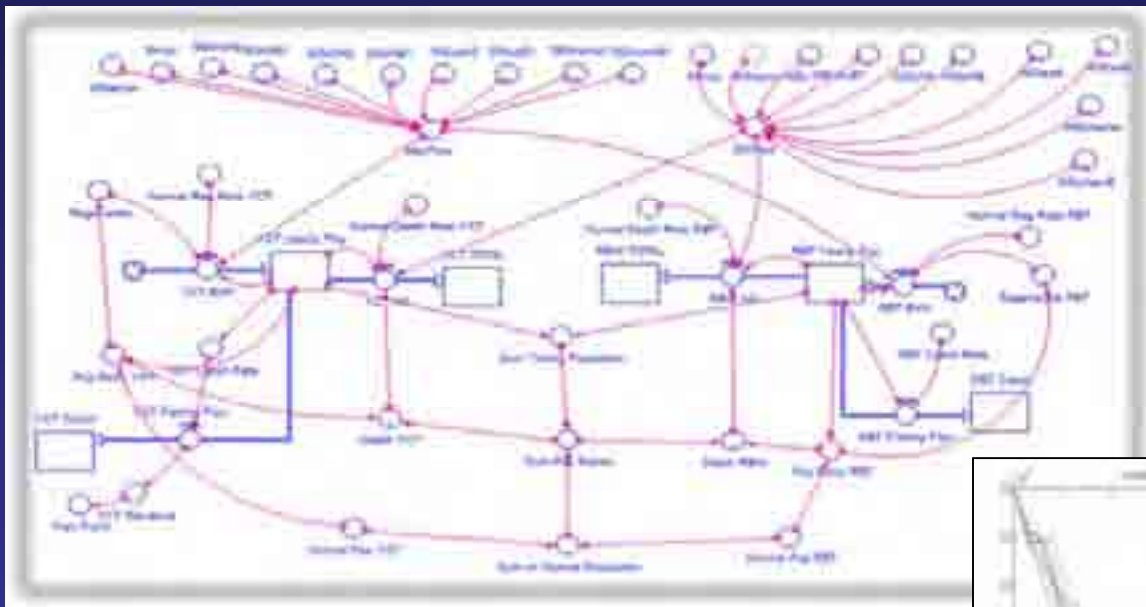
Impact of climate change on pelican predation and fish population sustainability in Pyramid Lake



Impact of climate change on cheatgrass and red brome invasion on the Pyramid Lake Paiute Tribe Reservation



Climate change and water resources on the South Fork of the Snake River: An interdisciplinary modeling approach to Yellowstone cutthroat trout sustainability



Plans for 2012...

- NMSU, Las Cruces
- June 4 -15, 2012
- 2-week course
- Mid-week faculty workshop
- Focus: NSF CNH Acequias
 - All teams focus on same project
- **Currently recruiting instructors !!!**





Discussion Points

To advance water resources in a changing climate:

- Do we need to integrate models ?
- How do we extend disciplinary models to complex issues?
- How do we integrate disciplinary models ?
 - Soft (one-way) coupling
 - Hard (two-way) coupling
- Physically vs. empirically-based ?
- Disciplinary modeling needs ?
- How do we advance disciplinary research in an interdisciplinary framework ?
- Education and training needs ?
- Propagation of uncertainty