



Grant Scope

*Sam Houston State University
Office of Research and Special Programs*

A Member of The Texas State University System



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THE STIMULUS PACKAGE & RESEARCH OPPORTUNITIES

The American Recovery and Reinvestment Act of 2009, aka The Stimulus Package, is aimed at creating Jobs, supporting the States while investing in the future of the Country. This Stimulus Package is



meant to create and save jobs; help state and local governments with their budget deficits to prevent deep cuts in basic services such as health, education, and law enforcement; cut taxes for working/middle class families.

Some of the highlights of The American Recovery and Reinvestment Act provides \$311 billion in appropriations, including the following critical investments:

- Investments in Infrastructure and Science - \$120 billion
- Investments in Health - \$14.2 billion
- Investments in Education and Training - \$105.9 billion
- Investments in Energy (over \$30 billion in infrastructure) - \$37.5 billion
- Law Enforcement, Oversight, Other Programs - \$7.8 billion

Investments in Infrastructure and Science include infrastructure improvements totaling:

- \$7.2 billion for Broadband to increase broadband access and usage in unserved and underserved areas of the Nation.
- \$4.2 billion for Facilities Sustainment, Restoration and Modernization to be used to invest in energy efficiency projects and to improve the repair and modernization of Department of Defense facilities to include Defense

Health facilities.

- \$1 billion for the Community Development Block Grant program for community and economic development projects including housing and services for those hit hard by tough economic times.
- \$1 billion for the Bureau of Reclamation to provide clean, reliable drinking water to rural areas and to ensure adequate water supply to western localities impacted by drought.
- \$250 million is included for energy retrofitting and green investments in HUD-assisted housing projects.
- \$6 billion is directed towards environmental cleanup of former weapon production and energy research sites.
- \$6 billion for local clean and drinking water infrastructure improvements.
- \$1.2 billion for EPA's nationwide environmental cleanup programs, including Superfund.
- \$1.38 billion to support \$3.8 billion in loans and grants for needed water and waste disposal facilities in rural areas.
- \$3 billion total for National Science Foundation (NSF). The NSF is directed to submit to the House and Senate Committees on Appropriations a spending plan, signed by the Director, detailing its intended allocation" of funds provided in this Act within 60 days of enactment of this Act.

Continues on page 4

In this issue...

Stimulus Package	1
CBFS	2
Upcoming Events	4
Staff Contacts	4

Aquatic Fitness: Exploring the Realm of Ecological Success

The Center for Biological Field Studies (CBFS) is a “multi-use field station” for students of Sam Houston State University. Established in 1999 and “a member of the Organization of Biological Field Studies since 2004,” the CBFS provides the ideal environment for research and education. (http://www.shsu.edu/~bio_cbfs/SiteHistory.html)

Among the various ongoing projects at the CBFS, the research established by Dr. Chad Hargrave and Dr. Raelynn Deaton occurs at the newly developed Aquatic Research Complex. As evidentiary of the importance of this research to SHSU, Dr. Jaimie Hebert, Dean of the College of Arts and Sciences (COAS) has pledged his full support for aquatics research by allocating \$45,000 for this project. As Dr. Hebert reports, “The funding was to support the construction of tanks, shade houses and a water well to provide permanent structures for the research.” He also confirmed that, “In addition to the \$45,000, I gave Dr. Hargrave \$20,000 upon his employment for “start-up” expenditures to get his research program underway. In addition to that, Dr. Deaton has received “start-up” funds - she is using \$25,000 to construct shade structures, cattle tanks, and a water cooling system for the research facility.” Therefore, the total amount of funding the COAS designated for aquatics research is \$90,000.

Both Drs. Hargrave and Deaton came to SHSU in 2006, and since then they have excelled in the area of ecological research. With the backing of the COAS, they conduct the bulk of their research primarily at the aquatics research facility out at the field station (CBFS). To be completed in



Harmon Creek, part of the Center for Biological Field Studies

the Spring of 2009, the Aquatic Research Complex consists of a greenhouse, some artificial stream arrays, and creek water storage and conditioning capabilities.

There are essentially two parts to Dr. Hargrave’s research—the importance of (1) fish conservation for (2) overall ecosystem health. These two general questions involve research at the following four levels:

1. What role do fishes play in the ecosystem?
2. How do they maintain ecosystem health (i.e. water quality, energy movement)?
3. So then, if fish communities change because of extinction or invasion, how will that affect ecosystem health?
4. How do these fish roles that affect ecosystems change as the climate changes?

In a recent interview, Dr. Hargrave said he addresses these four levels using controlled experiments in Harmon Creek and in artificial streams. In Harmon Creek, he builds cages and puts fishes in them for observation. He also has artificial streams in which he puts different fishes in, and he can alter the environmental conditions of those streams.”

The second part of his research involves the conservation of fishes throughout Texas. While he monitors the fishes in communities and ecosystems throughout Texas, he primarily focuses his research in the Big Thicket.

The following is a list of Dr. Hargrave’s current research activities that address the aforementioned questions



Dr. Chad Hargrave, Dr. Raelynn Deaton, and their students at the Aquatics Research Complex



regarding stream health and fish communities:

1. Investigating the effects of elevated CO₂ on stream health (i.e. if you increased CO₂ in the atmosphere, how does that affect stream health?).
2. Assessing how fishes from different groups (i.e. different species groups) affect stream health.
3. Monitoring fishes in Harmon creek (since 2006) and the Big Thicket (just initiated) and modeling potential effects that climate change might have on these ecosystems by associated affects to the fishes.

In regards to the study of the effects of elevated CO₂ on stream health, Dr. Hargrave reported that “this study, which recently was accepted for publication in *Global Change Biology*, was actually funded by the Office of Research and Special Programs (ORSP) through a Faculty Research Grant (FRG).” Also, it is worth mentioning that two of his graduate students collaborated with him on this article: Kaitlen Gary and Samir Rosado. Dr. Hargrave has submitted a large NSF grant based on the findings from this work and other studies conducted at the CBFS.

Dr. Deaton’s “research lies at the interface of behavior and life history evolution, which fits under the umbrella of Evolutionary Ecology.” Her two main focuses are as follows:

1. Factors that influence the overall fitness of individuals. Individual fitness is typically measured by looking at their reproductive success (e.g. number of offspring, offspring size, and how often individuals reproduce).
2. Understanding the evolution of different mating systems.

Dr. Deaton is primarily interested in a system called coercive mating, where the males force the females to mate. Her model system is live-bearing fishes, which belong to the Family *Poeciliidae* (e.g. guppies, mollies, and mosquito-fishes). This is an ideal model system because unlike most fish, the females give birth to live young and they have internal fertilization. This allows Dr. Deaton to actually do behavioral observations of the mating process. The males have a modified fin called the gonopodium that they use to transfer sperm. Because this modified fin has little hooks and barbs on the end of it, she is hypothesizing that this may be causing direct damage to the females (to their genital area), thereby reducing female reproductive success. The aforementioned system of coercive mating leads to a general research question concerning sexual conflict, which essentially means that the evolutionary interests of the males and females are not the same. Thus, most of Dr. Deaton’s current experiments are involved in trying to understand the role of sexual conflict in this system.



Dr. Hargrave’s Artificial Stream Arrays at the CBFS

In terms of experimental evidence, all of the research is executed out at the field station (CBFS). The following techniques are used to aid Dr. Deaton in her research:

1. Scanning Electron Microscopy (SEM): if a particular fin is causing damage to the female, this technique is used to measure that damage.
2. Dissections and other Microscopy Work: this research is performed in one of the lab areas at ORSP and in the collaborate Deaton-Hargrave lab on campus.
3. Genetic techniques: This reveals which male is siring the offspring.
4. Immunology/Microbiology techniques: these test for tissue inflammation from the damage to the females.

Dr. Deaton has several papers that have been accepted for publication and has made several presentations at various professional meetings/conferences which highlight her two main research focuses. She has one paper in review for the work at the CBFS. This is a collaborate study with two of her graduate students and Dr. Hargrave. Dr. Deaton also has an FRG submitted, and if funded, the majority of the experimental work proposed will take place in the greenhouse laboratory at the CBFS.

The Aquatic Research Complex at the CBFS is a tremendous asset to the field of research at SHSU for faculty and students alike. Because of the diverse habitats, this makes the CBFS an exceptional outdoor laboratory.

Visit us online for more funding opportunities

http://www.shsu.edu/~rgs_www/



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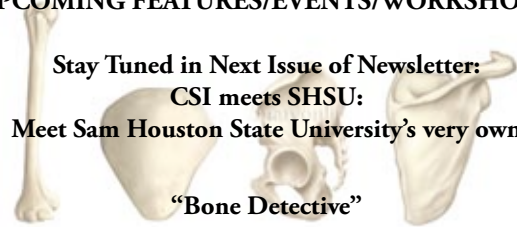
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UPCOMING FEATURES/EVENTS/WORKSHOPS:



Continued from page 1

Research And Related Activities

For research and related activities, the conference agreement provides a total of \$2.5 million to remain available until September 30, 2010. Within this amount, \$300 million shall be available solely for the major research instrumentation program and \$200 million shall be available for activities authorized by title II of Public Law 100-570 for academic facilities modernization.

In allocating the resources provided under this heading, the conferees direct that NSF support all research divisions and support advancements in supercomputing technology.

Education And Human Resources

The conference agreement includes: \$100 million for education and human resources, to remain available until September 30, 2010. These funds shall be allocated as follows:

- Robert Noyce Scholarship Program: \$60 million
- Math and Science Partnerships: \$25 million
- Professional Science Master's Programs: \$15 million

Major Research Equipment And Facilities Construction

The conference agreement includes \$400 million for major research equipment and facilities construction, to remain available until September 30, 2010.

Investments in Education and Training include:

- \$53.6 billion for the State Fiscal Stabilization Fund, including \$5 billion to states as bonus grants for meeting key performance measures in education; and \$8.8 billion to states for high priority needs such as public safety and other critical services, which may include education and for modernization, renovation and repairs of public school facilities

and institutions of higher education facilities.

- \$13 billion for Title 1 to help close the achievement gap and enable disadvantaged students to reach their potential.
- \$12.2 billion for Special Education/IDEA to improve educational outcomes for disabled children. This level of funding will increase the Federal share of special education services to its highest level ever.
- \$15.6 billion to increase the maximum Pell Grant by \$500. This aid will help 7 million students pursue postsecondary education.
- \$3.4 billion for Fossil Energy research and development.
- \$11 billion for smart-grid related activities, including work to modernize the electric grid.
- State and Local Law Enforcement: \$4 billion total to support law enforcement efforts.