

**Creation of an Integrated Freshwater Fisheries Management Program**  
**College of Sciences, Angelo State University**  
**January 5, 2007**

The College of Sciences at Angelo State University (ASU) proposes to create an endowed chair in Natural Resource Management (NRM) with an emphasis on Freshwater Fisheries Management. This person hired for this position will be responsible for teaching classes in fisheries management with an emphasis on Geographic Information Systems (GIS) technology for statewide application.

Angelo State University is uniquely qualified to initiate an emphasis in freshwater fisheries. ASU's Department of Agriculture hosts an innovative undergraduate degree in Natural Resource Management (NRM) and the Department of Biology has a long-standing commitment to education in riparian environments. The *Inland Fisheries Office* of the Texas Parks and Wildlife Department (TP&W) is located in San Angelo where Craig Bonds operates a four-person office. Their charge is to perform fisheries management for a 20-county area centered on San Angelo. Routine tasks for them include sport fisheries management, harvesting forecasts, and restocking recommendations. This office will provide a ready resource for placement of fisheries management interns. San Angelo is also the headquarters of Bobby Farquhar, Regional Program Director for the West Texas Regional Fisheries District of TP&W, an area that includes the entire Rio Grande watershed in Texas. Together with our system partners at Sul Ross State University, ASU is in a prime geographical location to serve as the hub for a statewide fisheries management education program.

The existing undergraduate degree in Natural Resource Management at ASU is strongly interdisciplinary (see Appendix A). ASU proposes to expand the existing emphasis on basic ecology, animal nutrition, statistics, writing and public speaking with new commitments to mathematical modeling, geographic information systems, and sports fisheries management. Currently there is a paucity of qualified applicants for TP&W fisheries management positions. Most new hires come from out-of-state; primarily Auburn, Tennessee Tech, and Kansas State. Although there are several extant fisheries programs in Texas (e.g. A&M-College Station, Texas Tech, and Texas State-San Marcos), the primary emphasis of these programs is perceived to be environmental; not sport or recreation. In addition, overall management of sport fisheries in the wild is poorly constrained. An integrated freshwater environmental status and forecasting capability does not exist.

We believe that the Natural Resource Management (NRM) degree at ASU is ideally suited for candidates with a passion for conservation, strong communications skills, and a background in GIS. These are precisely the sort of graduates we need to be preparing for the management of our increasingly urbanized wild fisheries in the 21<sup>st</sup> century.

The potential for expanding ASU's Natural Resource Management (NRM) degree goes beyond an ad hoc emphasis on fisheries. Andy Sansom, Executive Director of the *River Systems Institute* at Texas State University-San Marcos, has been an enthusiastic

promoter for the [Texas Environmental Observatory](#) (TEO). This project, loosely analogous to the wildly successful [Texas Coastal Ocean Observation Network](#) (TCOON) has the goal of providing continuous real-time monitoring of the terrestrial and riparian ecosystems of Texas. For the uninitiated, TCOON operations are usually a surprise. The program operates out of A&M-Corpus Christi and is primarily funded by the Texas General Land Office and NOAA. They operate several dozen automated data acquisition stations along the Texas coast measuring a suite of physical variables (e.g. water temperature, salinity, wave height, etc.) which are automatically fed into an interactive web-based snapshot of Texas coastal conditions. TCOON is *big medicine* because of the automated data assimilation and modeling technologies they have developed. There is no reason these technologies cannot be exported to the freshwater resources of inland Texas. But doing so requires a new breed of scientists with training in GIS, computer science, math modeling, natural resource management, statistics, and even a little engineering.

Integrating the TCOON model into the Texas Environmental Observatory (TEO) would mean that typical meteorological measurements (e.g. air temperature, humidity, insolation, soil moisture, etc.) would be supplemented with freshwater flow rates, turbidity, nutrient loading, oxygen demand, and downstream releases data. ASU proposes to build the new NRM degree to work in concert with input data from TP&W restocking efforts and help build an input to the TEO network with meaningful forecasts of sport fisheries productivity *from Dumas to the delta*. By working with our colleagues at other Texas institutions, the ASU program can change the way university and state agency researchers interact; particularly in the area of providing meaningful outreach to our fellow Texans.

To reach towards these goals, ASU proposes to recruit a fisheries management biologist with a strong background in GIS and begin laying the groundwork for collaborative grant writing to support our statewide efforts. Simultaneously, ASU proposes to establish and equip a GIS laboratory with appropriate high performance computing equipment (see budget section below).

The curriculum for the NRM degree was approved by the regional TP&W directors for their *Wildlife Biologist* positions. The endowed chair in NRM, working in a fully functional GIS laboratory will be well-positioned to form a nucleus for collaboration with system colleagues (primarily SHSU, TSU-SM, and SRSU) on defining the dynamic state of the riparian environment and adjacent rangelands of Texas - the *land version* of TCOON. Grant funding would be sought from the Texas General Land Office (the same folks who primarily fund TCOON), the EPA, USDA, NASA, and NSF.

The endowed chair in Natural Resources Management would be employed in a full-time tenure-track position with 50% of their time dedicated to teaching and the remainder dedicated to procuring extramural funding to support the statewide freshwater fisheries GIS.

**BUDGET:**

Senior-level fisheries manager faculty w/GIS emphasis	70,000
Fringe benefits @ 25%	17,500
Graduate assistant (1/2 time)	18,000
Fringe benefits @ 20%	3,600
GIS laboratory capital equipment	45,000
GPS and surveying equipment	5,000
Remote data assimilation transponders	30,000
TOTAL	\$ 189,100

**VARIATIONS:**

There are several avenues for approaching this opportunity. The base budget above consists of \$109,100 in recurring annual expenses for salary and fringe benefits plus \$80,000 in one-time capital expenses.

At one extreme, using a very conservative 5% income rate, the recurring annual expenses could be endowed with a corpus of about \$2.18M plus \$80,000 for the startup lab equipment or \$2,262,000.

At the other end of the spectrum, one could chose to fund only the capital equipment and a portion of a solo endowed chair in Natural Resource Management. At one-quarter time with a 10% income rate, a corpus of \$875K would be indicated plus the \$80K in startup lab equipment or \$955K. With the limited time dedicated to the project, this later option would necessarily slow down implementation of the overall plan.

## **Appendix A:**

### **Background information on the Department of Agriculture at Angelo State University**

The Department of Agriculture at Angelo State University offers Bachelor degrees in Animal Science, Animal Business, and Natural Resource Management. In addition, the department offers minors in Food Science, Agronomy, and Range and Wildlife Management. The Bachelor program in Natural Resource Management is the latest addition to the department. The program began in 2004 with the purpose of meeting the academic interests and needs of students that are pursuing a Bachelor's degree focused on Range Management, Wildlife Management, and Management of Natural Resources. The curriculum allows for flexibility in that students can choose from a list of upper-level courses based on their specific academic interest. Students are also exposed to a multitude of disciplines that result in graduates possessing a wide range of knowledge necessary for successful range and wildlife managers including knowledge of plant physiology, habitat management and improvement, nutrition, animal physiology, plant identification and classification, ecology, and soil science.

Of the minors available to students, the Range and Wildlife minor is the most popular minor in the department. In the fall of 2006, approximately 70 students were enrolled as Range and Wildlife minors. In addition, 15 students listed Natural Resource Management as a major. Both programs are expected to continue growing over the next few years.

The Department of Agriculture maintains a 6,000-acre research and teaching facility on the north shore of O.C. Fisher Reservoir. The facility provides research and outdoor classroom opportunities for Animal Science, Range, Wildlife, and Agronomy courses. Most of the courses taught in the department consist of two hours of lecture per week and two hours of laboratory per week. Laboratory time is typically spent outdoors providing students with hands-on learning experiences. For example, a habitat management/range improvement course is taught each spring. During lab time, students are introduced to habitat evaluation, common habitat problems, and improvement techniques. Students are then expected to develop a range improvement plan that is economically and environmentally feasible. The plan is presented in both written and oral form for credit. These experiences are somewhat unique to Angelo State University and provide the training necessary for graduates to deal with management issues faced in the field of range and wildlife management.

When the research and teaching facility was established in 1969 by the 61<sup>st</sup> Legislature, its primary goal was to address agricultural and range issues for area livestock producers and land managers. Since 1969, that directive has remained the same. Some basic research is conducted at the facility; however most research efforts are directed toward current issues and problems facing management of our natural resources. This management-oriented focus is also portrayed in classroom settings, where both graduate and undergraduate students are expected to successfully address management-related problems.

In addition to the 6,000-acre research and laboratory facility, faculty in the department routinely interact with local land-owners and regional managers. In addition, faculty in the department collaborate with other research facilities. For example, several on-going research projects involve collaboration with the Texas Agricultural Experiment Station.

Unfortunately, the Natural Resource Management degree and the Range and Wildlife minors are not without their weaknesses, primarily because of a limited number of faculty. For instance, both state and federal agencies rely heavily of Geographic Information Systems (GIS) technology to assist with land management and wildlife management decisions. Currently, there is not a faculty member on campus with expertise in the field of GIS. Potential employees for state and federal agencies such as the Natural Resource Conservation Service (NRCS) and Texas Parks and Wildlife are expected to have a working knowledge of GIS.

Currently, no one on campus is teaching Fisheries Science/Management. This is particularly alarming given the number of reservoirs and rivers in the surrounding area that provide fresh-water fishing and other recreational opportunities. Most academic programs in Wildlife Management are divided into two distinct disciplines Terrestrial Wildlife Management and Fisheries Management. Currently, Fisheries Science/Management is not taught at ASU. In addition, Wildlife Management is the primary focus of only one course (RWM 4333). The department would like to increase its breadth of courses, particularly in the fields of GIS, Fisheries Management, and Wildlife Management.

### **Course Descriptions**

Agronomy 1361 (Principles of Crop Production)  
Agronomy 2322 (Soil Science)  
Agronomy 3325 (Plant Physiology)  
Agronomy 3361 (Advanced Crop Production)  
Agronomy 4315 (Soil Fertility)  
ASCI 1341 (Principles of Animal Science)  
ASCI 3349 (Animal Anatomy and Physiology)  
ASCI 3441 (Principles of Nutrition)  
ASCI 3443 (Genetics)  
ASCI 4181 (Seminar)  
ASCI 4345 (Animal Behavior and Welfare)  
RWM 3331 (Principles of Range Management)  
RWM 3332 (Range Improvements)  
RWM 3335 (Range Plants)  
RWM 4333 (Range Wildlife Management)  
RWM 4435 (Plant Taxonomy)  
Biology 1480 (Principles of Biology)  
Biology 2401 (General Botany)  
Biology 2402 (General Zoology)

Biology 3333 (Natural History of the Concho Valley)

Biology 3461 (Entomology)

Biology 4451 (Ecology)

Biology 4401 (Ornithology)

Biology 4402 (Mammalogy)

Biology 4404 (Herpetology)