

Project 2

AGENCY: Oklahoma's Office of the Secretary of Environment
In Cooperation with:
Oklahoma Conservation Commission
Oklahoma Water Resources Board
Lincoln County Conservation District
Rogers County Conservation District
Oklahoma State University
US Fish & Wildlife Service

TITLE: Wetlands Monitoring Program Development

BACKGROUND:

The Oklahoma Conservation Commission (OCC) is charged by state statute with development and implementation of Oklahoma's Wetlands Strategy. A pervading objective of this strategy is to monitor wetland resources to determine compliance with "no net loss" goals. Although a national imperative, "no net loss" determinations have proven difficult to achieve and a standardized national methodology is not available. To this end, the OCC in conjunction with the Oklahoma Water Resources Board (OWRB) and Lincoln County Conservation District (LCCD) propose to implement a probabilistic approach to compare current and historic wetland coverage of the Deep Fork watershed to determine net gain/loss of total wetland resources. This watershed is recognized by state and federal agencies and LCCD for its high quality, important wetland functions, and its excellent fish and wildlife values. The results of the project outlined below will constitute a large step toward the development of a wetlands monitoring program along with conservation and management of one of Oklahoma's unique resource areas.

The Oklahoma Surface Water Monitoring Strategy has recognized probabilistic monitoring as a high priority item. As part of the statewide strategy, the wetlands monitoring strategy incorporates probabilistic design and is three-fold: (1) track wetlands gains and losses, (2) track status and trends for wetlands quality, and (3) determine beneficial use attainability. This proposal will address the first objective of the strategy.

The first step in fulfilling the wetlands monitoring strategy is the creation of a monitoring design. This project would enable Oklahoma to develop a probabilistic monitoring design, which would facilitate the establishment of wetlands gain/loss estimates. By being able to determine wetland area within a given percent accuracy using digitized National Wetlands Inventory (NWI) maps, digital orthophotographs, digitized Natural Resources Conservation Service wetlands inventory maps, and other available digital data, the State will be able to make scientifically defensible estimates of wetlands gains/losses. Consequently, conservation efforts could be rendered more efficient and effective by focusing effort on areas of greatest loss, including sprawling metropolitan and suburban areas. In addition, the creation of a monitoring design is a critical component in the development of a comprehensive wetlands program in Oklahoma.

The second step in the monitoring strategy will be to use wetlands monitoring techniques, which are being developed in part by a current wetland development grant, with the probabilistic design. This will then allow for estimates of status and trends to be made not only for wetland acreage but also for wetlands quality in the state. Ultimately, the third step in the monitoring strategy, determination of beneficial use attainability, will be implemented. However, this cannot occur until wetland water quality standards and beneficial uses are developed for Oklahoma.

Currently a use attainability analysis specific to wetlands is underway to aid in the determination of which beneficial uses are appropriate for a particular wetland type.

The Deep Fork watershed was chosen for this project because digital wetlands data is currently available. This data is the digital version of the NWI maps that were created by USFWS in the early eighties from aerial photographs. According to USFWS these maps were ground-truthed and incorporated all lands, including agricultural areas. Since the watershed's total wetland resources were mapped approximately 20 years ago, Oklahoma has a viable and exceptional opportunity to determine net gain/loss of wetland resources for a large and unique watershed over a significant period of time. To this end, the OCC proposes to implement a probabilistic based visual assessment of current orthophotography to render a statistically sound estimate of total wetlands. This estimate would then be compared to the Deep Fork census results of the NWI, resulting in calculation of the net loss/gain in total wetlands. The results of this project would be three-fold: (1) provide a foundation for fulfilling the national "no net loss" mandate in a exceptional resource area and (2) provide a potential pilot methodology for future net loss/gain determinations in Oklahoma and perhaps other areas (3) provide a foundation for further development of a statewide wetland monitoring program.

GOAL:

To further development of Oklahoma's wetlands monitoring program through the creation of a probabilistic monitoring design and interactive wetland mapping system, which will provide the ability to estimate wetlands gains/losses and eventually wetland quality statewide, with increased analytical opportunities for the public as well as the private sectors.

MEASURES OF SUCCESS:

1. Development of a wetlands probabilistic monitoring design to be incorporated into the state wetlands monitoring program.
2. Generation of 750 digital wetland maps meeting USFWS standards to use as a tool for future estimates of wetlands gains and losses statewide.
3. Calculate a scientifically defensible estimate of wetland area with gains and losses in the Deep Fork watershed so that the methodology can be used statewide.
4. Continued development of an interactive web page mapping system, and showing groups, such as professionals and students (at least 1 teacher each of upper elementary, middle, and high school) how to:
 - a) view the location of wetlands in Oklahoma (250 students/school year)
 - b) discover relationships between wetlands and the environment by creating maps using the digitized Oklahoma wetland maps coverage overlaid on Oklahoma specific coverages such as digital orthophotos, stream systems, geology, watershed maps, water quality data, etc. (50% increase in skills and abilities measured by pre and post tests)

WORKPLAN:

Task 1: Probabilistic Design

Consult with Tony Olson (EPA Corvallis) and obtain a probabilistic design to be used for estimation of total wetland resources in the Deep Fork watershed from current digital orthophotography. This probabilistic design will serve as a model for other areas of the state as the digital information becomes available.

Milestone Date: September 2007

Deliverable: QAPP with incorporated probabilistic design

Costs: \$7,753 (\$5,815 federal)

Task 2: Implementation of Probabilistic Design

Implement the probabilistic design to obtain estimate of total wetland resources in the Deep Fork. This task will involve determination of aerial extent of total wetlands on the current coverage for comparison to that from the historic NWI map. The areas derived from the probabilistic design will require some field verification using GPS technology. During the site visit, boundaries can be mapped and compared/contrasted to the digital NWI data to estimate wetland acreage with a degree of confidence.

Milestone Date: September 2008

Deliverable: Derived estimate of wetland resources in the Deep Fork Watershed.

Costs: \$40,000 (\$30,000 federal)

Task 3: Determination of Net Loss/Gain in Wetland Resources

Determine net loss/gain in total wetland resources of the Deep Fork Watershed for the coverage period from the early 1980's to the present (app. 20 years). This will be done by using the digital NWI data as a baseline and comparing to current digital information, including field GPS observations. The difference, accounting for map error, would be attributed to wetlands gain or loss. This determination technique could be used statewide and improved as the necessary digital information becomes available. The successful probabilistic design and determination of wetlands gains/losses will be presented to the Oklahoma Wetlands Working Group to disseminate this information. The ability to calculate wetlands gains/losses will be important for prioritizing future wetlands restoration sites across the state.

Milestone Date: March 2009

Deliverable: Derived estimate of wetland gains/losses in the Deep Fork Watershed.

Costs: \$20,000 (\$15,000 federal)

Task 4: Digitization of NWI Maps and Development of Interactive Web Page Mapping System for Urbanizing Areas

The Oklahoma Conservation Commission will enter into agreement with the USFWS for assistance in digitizing the NWI maps. The USFWS will supply the necessary materials (overlays and blueprints) for the 250 NWI maps and the OCC will digitize the maps with the help of the Oklahoma State University or other entities. The digitization will meet all specifications as required by the USFWS. Currently, 117 maps have been digitized and approved, and 340 maps are in the digitization/approval process. Selection of the 250 maps would be based on areas with expanding urbanization and development.

The additional 250 digitized wetlands maps will be merged into the existing wetlands shapefiles and the new/revised layers published on OWRB's ArcIMS map server. The system will provide users with the ability to display and query wetlands coverages along with existing Oklahoma GIS coverages. With the additional maps, the ability to create maps of the wetlands overlaid on other Oklahoma coverages such as digital orthophotos and watershed boundaries will be expanded. Custom features will be added to the ArcIMS wetlands mapping system to increase application functionality. Users will be able to interactively select cities, counties, legal descriptions, and schools to easily locate nearby wetland areas. This will provide increased opportunities for students, researchers and the public to study and learn about wetlands. The system will be a valuable tool for communities conducting watershed planning and government agencies in developing a comprehensive wetlands monitoring program.

Previous projects have only provided wetlands maps covering about one-third of the state. Few digitized wetland maps are available for the other two-thirds of the state. Those are limited to a

handful of sites on state and federal land. Field trips to visit these could take several hours for some. The existing multi-page wetland education section encourages users to locate and visit a wetland. The section will be updated to reference the new maps. With the addition of maps in rapidly developing areas, all of the larger urban areas of the state could be queried by the public to locate wetlands in their own backyard. This facilitates teachers, school children, environmental groups and others in locating nearby wetlands they can visit and learn more about. This local involvement will help promote community environmental stewardship of wetlands resources. In addition, OWRB will continue to support and maintain the existing data/ArcIMS wetlands mapping system.

Milestone Date: December 2007

Deliverable: MOA with USFWS
Letter stating that the USFWS has accepted the digitized products as complete and accurate. Letter report describing the features of the updated web page relating to urbanizing areas and a link to the web page for EPA review.

Costs: \$103,550 (\$77,662 federal)

Task 5: Digitization of NWI Maps and Development of Interactive Web Page Mapping System for Remainder of State

OCC will enter into agreement with the USFWS for assistance in digitizing the NWI maps. The USFWS will supply the necessary materials (overlays and bluelines) for the remaining 500 undigitized NWI maps for the State and the OCC will digitize the maps with the help of the Oklahoma State University or other entities. The digitization will meet all specifications as stated above. As a result of this project, all of the NWI maps would be digitized for Oklahoma.

The additional 500 digitized wetlands maps will be incorporated into the existing system as stated above. This task will allow all of the state to be queried by the public to locate wetlands in their area. In addition, the State will be able to use the digitized maps as a tool with the developed probabilistic design to estimate wetland gains/losses statewide.

Milestone Date: December 2008

Deliverable: MOA with USFWS
Letter report stating that the USFWS has accepted the digitized products as complete and accurate. Letter report describing the features of the updated statewide web page and a link to the web page for EPA review.

Costs: \$159,700 (\$119,775 federal)

Task 6: Outreach and Education

Field test usability of the interactive web page mapping system and the educator/student section of the website for upper elementary, middle school and high school students in an area where digital wetlands maps are available. The three key elements for identifying wetlands; wetland hydrology, hydric soils and hydrophytic plant communities will be central to the lessons along with the biological, physical and chemical parameters that create wetlands and the functions they provide. Students will perform various field tests at wetland sites, including collection of water quality data using chemical methodologies and digital meters. However, the physical biological components (hydrology, hydrophytic plants and hydric soils) and ecology of wetlands as unique aquatic systems that under go cycles of wet and dry periods will be principal elements demonstrating the differences from other surface water types found in the state. These activities will occur during the 2006-07 school year, and will educate students on the use of the on-line interactive mapper. In addition, the students will become aware of wetlands in

their local community and the role those wetlands play in their quality of life, including wetland functions such as, fish and wildlife habitat, flood and erosion control, water quality improvement and recreation. These activities will meet over 75 state standards for education in math, science, and social studies, and career opportunities related to natural resource management will be explored. The field activities will be funded and conducted by elementary, middle, and high school classes that currently use the Rogers State University Conservation Education Reserve; so additional field trip funding will not be necessary. The facilitators will include OCC Education Coordinator, Rogers County educators, and trained volunteer wetlands monitors that will train teachers who will then train their students on the use of wetland maps and monitoring techniques. In addition, the feasibility of incorporating these activities into a school's existing curriculum and the state wetlands monitoring program will be investigated.

In addition, a brochure will be developed describing the interactive web page mapping system, and it will be distributed to a targeted audience, who have concerns regarding wetlands. This audience would include colleges, universities, conservation districts, and professional organizations (Wetlands Working Group, Stream Team, Geographic Information Systems Council, American Society of Civil Engineers, etc.).

Milestone Date: June 2008
Deliverable: Letter report describing the outreach activities demonstrating the importance of wetland monitoring and tracking status and trends. Pre/post testing data will be included to demonstrate the change in attitude and knowledge and increased skills and abilities. Brochure describing the interactive web page mapping system.
Costs: \$20,188 (\$15,141 federal)

Task 7: Quarterly and Final Reports

Milestone Date: December 2005 through June 2009
Deliverable: Quarterly reports will be written to provide an update on the status of the project. A final report will be submitted to EPA, which summarizes all the activities associated with this project as well as a section that documents the utility of this effort.
Costs: \$3,733 (\$2,800 federal)

TIME-LINE: Project Milestones October 2005— June 2009

MILESTONES	RESPONSIBLE PARTY	MILESTONE DATE
Task 1 – Obtain Prob. Design	OCC	September 2007
Task 2 – Derive Estimate	OCC	September 2008
Task 3 – Determine net loss/gain	OCC	March 2009
Task 4 – Dig. Urban Areas	OCC/OWRB	December 2007
Task 5 – Dig. Rest of State	OCC/OWRB	December 2008
Task 6 – Outreach and Education	OCC	June 2008
Task 7 – Final report	OCC/OWRB	June 2009

BUDGET:

	<i>Federal</i>	<i>State</i>	<i>Total</i>
Personnel	\$57,356	\$19,119	\$76,475
Fringe Benefits	\$20,971	\$6,991	\$27,962
Equipment	\$0	\$0	\$0
Travel	\$3,000	\$1,000	\$4,000
Supplies	\$8,800	\$2,933	\$11,733
Contracting*	\$150,000	\$50,000	\$200,000
Total Direct Charges	\$240,127	\$80,043	\$320,170
Indirect Charges @ 20%	\$26,065	\$8,689	\$34,754
<i>Total</i>	<i>\$266,192</i>	<i>\$88,732</i>	<i>\$354,924</i>

*Contracting will pay for digitizing and training by Oklahoma State University

“OTHER” PERSONNEL:

<i>Personnel</i>	<i>Years</i>	<i>Cost</i>
OCC		
Executive Director	0.05	\$3,100
Assistant Director	0.05	\$3,000
Administrative Officer	0.06	\$2,640
Administrative Assistant	0.06	\$1,741
Wetlands Program Coordinator	1.00	\$32,100
Education Coordinator	0.08	\$3,000
GIS Specialist	0.05	\$1,639
OWRB		
GIS Developer	0.29	\$16,068
Web Developer	0.05	\$2,803
System Administrator	0.15	\$8,300
IT Manager	0.03	\$2,084
<i>Total</i>		<i>\$76,475</i>

“OTHER” SUPPLIES:

<i>Supplies</i>	<i>Cost</i>
Office Supplies (paper, pen, printer ink, etc.)	\$733
Resource Materials	\$1,500
GPS Unit and Software	\$4,000
Sampling equipment for data collection and acquisition	\$4,850
Field guides	\$650
<i>Total</i>	<i>\$11,733</i>