

Project 2

Agency: Oklahoma Water Resources Board

In cooperation with

Oklahoma City Water & Wastewater Utilities Department [OCWWUD]

Oklahoma City Parks and Recreation Department [OCPRD]

Oklahoma Department of Wildlife Conservation [ODWC]

Corps of Engineers at Lewisville (LAERF)

Title: Initiating a Vegetated Wetland throughout the Littoral Zone of Atoka Lake

Hydrologic Unit Code (HUC) 11140103

Lake Atoka Watershed

Total Project Cost: \$205,000

Federal Dollars: \$112,553

State Dollars: \$92,447

ABSTRACT

Atoka Lake is not meeting its Fish and Wildlife Propagation (FWP) Beneficial Use due to turbidity and only partially supporting due to high true color values. A 1981 Phase 1 Clean Lakes study recommended planting vegetation in its large shallow mud flats especially at the upper end of lake to reduce the resuspension of solids exacerbated by wave action produced from the 6+ mile fetch. While the pollution of the lake is deemed natural based on the soil composition of the area, the addition of a lacustrine wetland should have a significant impact on the lake as a whole. The city of Oklahoma City (OKC) has taken the initiative with the OWRB and other agencies to look for holistic treatments to their lake properties including watershed BMPs and forest management options. OKC has proven to be an excellent partner in its Wetland Program Development Grant (WPDG) wetlands creation in Lake Stanley Draper and is an eager participant to carry this work on to Atoka Lake. Atoka Lake's relatively weak population of rough fish should be extremely helpful in getting wetland plants established there.

PROJECT DESCRIPTION

a. PROJECT NEED:

Atoka Lake is owned by the City of Oklahoma City. It lies 150 miles away in southeast Oklahoma. Water from this 5,700 acre lake is pumped to Oklahoma City to one of the city's municipal lakes, Stanley Draper. Built in 1964 on the Muddy Boggy Creek, the impoundment is used primarily as a public water supply source. During times of extremely high use or low rainfall the lake receives water pumped from nearby McGee Creek Reservoir.

Atoka Lake is listed on the Clean Water Act 303(d) list for turbidity. It is not meeting Fish and Wildlife Propagation (FWP) beneficial use due to the turbidity. It is only partially supporting FWP due to high true color values. The 2005 annual report of the Beneficial Use Monitoring Program (BUMP) gave an average lake-wide turbidity of 94 NTU with samples varying from 47–302 NTU. All samples exceeded the Oklahoma Water Quality Standards (OWQS) of 25 NTU. Evidence suggests that the high turbidity readings are natural due to local soil conditions. The predominantly colloidal clay soils do not easily settle out in the water column. The average secchi disk depth was 21 cm and average lake-wide color was calculated at 156 units which far exceeded Aesthetics OWQS for color of 70 units. Extremely high turbidity and color issues were a problem soon after impoundment of the reservoir. Interest in this problem prompted a 1981 Clean Lakes study by the Oklahoma Water Resources Board (OWRB) which recommended, among other things, to plant the extensive mudflats which are primarily located on the upper (north) end of the lake. The lake is very conducive to high waves and wave energy with straight long fetches running primarily north to south. To further intensify the problem, it is a shallow lake with an average depth of only 18 feet and a maximum depth of 60 feet. Creating a lacustrine wetland both in the upper flats and along the 59 mile perimeter can greatly reduce resuspension of solids in the lake and improve the lake's fishery.

The Oklahoma City Water & Wastewater Utilities Department (OCWWUD) has requested that OWRB staff begin looking for holistic management options for the Atoka Lake property (of which this proposal is one piece) and is committed toward its ecological improvement. OCWWUD is aware that littoral aquatic plants are a vital part of any natural lake that bring with them improved habitat and water quality and circumvent shoreline erosion.

b. PROJECT GOALS AND OBJECTIVES:

i. STATED OBJECTIVE/LINK TO EPA STRATEGIC PLAN

The long-term goal of this project is directly in line with EPA's Strategic Plan, Goal 4, Sub-objective 4.3 by working with partners to increase net wetlands acreage in the watershed by at least 181 acres (59 mile shoreline x 25 width). These 181 acres will also enhance the quality and habitat of the entire 5,477 acres of the lake for both turbidity and aesthetic color.

By planting founder colonies of wetland species in key protected areas around the lake, natural spread will result in development of wetland habitat around much of the lake. This habitat will result in a healthier lake and more diverse ecosystem. Only just beginning to be used in Oklahoma by the OWRB and ODWC, native aquatic plant establishment methods are being detailed for Oklahoma applications. All parties involved will have a chance to cooperate, some for the first time, to learn new techniques and build partnerships.

ii. OUTPUTS:

- At the end of 3-years, the project will have established founder colonies of key lacustrine fringe herbaceous plant species at multiple sites around the lake and viable tree plots of diverse bottomland hardwood species (Figure 1). Tree plantings will be wildlife plots with species notable for cover, browse and nesting.
- Transfer of this technology specific for Atoka Lake will be made via teamwork in the field between the OWRB and OCWWUD personnel, as well as other agencies should they choose to participate. All relevant project reports and data will be transferred as well.
- A monitoring data set for the three project years will be submitted to EPA. Coverage areas will be mapped and calculated using GPS/GIS technology.
- A baseline survey of the current status of the lake's aquatic plant population. The survey will name the aquatic plant species or genera found at the lake and their estimated relative abundance during the initial planting phase in 2008.
- Educational signage at high traffic sites will be put in place.
- A final report describing our measure of success, conclusions on what was learned, and future recommendations for Atoka Lake.

iii. OUTCOMES:

- Plants will be distributed over at least 5 sites across the lake, providing immediate (3 year) wetland habitat in what is currently a poorly vegetated environment.
- An understanding of appropriate plant species for Atoka and the best planting elevations for success of each species.
- Following founder colony establishment these protected plants will create a seed bank and give off fragments that will over time populate the coves where sites are built and spread to other parts of the lake as well.

- Turbidity will be reduced as the colloidal clays fall out in the plant protected waters. Shoreline erosion will be curtailed by reduction of wave action and compaction of shoreline sediments by root systems. Emergent species such as bulrush (*Schoenoplectus spp.*), spike rush (*Eleocharis spp.*) and duck potato (*Sagittaria spp.*) will buffer the lake from upland erosion. Submersed species such as American pondweed (*Potamogeton nodosus*) and coontail (*Ceratophyllum demersum*) will populate the deeper portions of the littoral zone.
- Fish nursery habitat will be enhanced as the plants provide cover, macroinvertebrate habitat, and improved water quality.
- OKC personnel will have the tools necessary to carry and maintain the project.
- Potential niches for invasive or exotic species will have been closed. Every wetland area is vulnerable to invasion from nuisance species. Oklahoma has had several recent infestations of hydrilla (*Hydrilla verticillata*), alligator weed (*Alternanthera philoxeroides*), Eurasian watermilfoil (*Myriophyllum spicatum*), common reed (*Phragmites australis*), and others. Every wetland area that can be claimed first by a diverse native community guards it from future infestation.

MEASURE OF SUCCESS:

OWRB expects to see healthy viable founder colonies established with an average of at least 25% coverage of each cage and pen in the planted sites. Development of new colonies outside the founder colony sites should begin by year 3 of monitoring, fall 2010. At a minimum, we expect that founder colonies will be fully established at their sites and capable of naturally populating the remainder of their respective coves via seed dispersion and vegetative reproduction. Tree plots are expected to have at least 50% survival of caged trees.

Two progress metrics will be calculated. First will be a measure of the percent survival of plants within the cages. If an average coverage of 50% per cage and pen is calculated the Founder Colonies will be 100% successful. The second metric will be the percent area of plants growing outside of protected cages and pens compared to that within the cages. An area of growth equal to the amount growing inside the cages at the end of year three will be 100% successful (100% is *not* expected).

Oklahoma City will take up the project and continue to plant new sites as well as maintain the old sites.

iv. BASELINE FOR MEASUREMENT:

Each site's cove will be inventoried for existing aquatic plants before any planting is done.

c. & d. PROJECT TASKS AND SCHEDULE

Task	Fed	State	Total	Deliverable	Milestone Date(s)
1 QAPP	\$ 3,850	\$ 3,150	\$ 7,000	QAPP	Mar, 2008
2 Materials	\$ 16,385	\$ 13,406	\$ 29,790	Annual Report	Jan 2009 & 2010
3 Labor	\$ 83,727	\$ 68,862	\$152,590	Annual Report	Jan 2009 & 2010
4 Monitoring	\$ 4,400	\$ 3,600	\$ 8,000	Annual Report	Jan 2009 & 2010
5 Wetland Conf	\$ 1,991	\$ 1,629	\$ 3,620	In Quarterly Reports	One per year
6 Reporting	\$ 2,200	\$ 1,800	\$ 4,000	Qtr Reports, Final Rpt	Dec '07 to Sep '10
Totals	\$ 112,553	\$ 92,447	\$205,000		

Task 1: OWRB: Develop and write QAPP. Consult with the Corps of Engineers' Lewisville Aquatic Ecosystem Research Facility (LAERF) to identify and prioritize needs and appropriate treatments for each site, develop methodologies for monitoring and installation of project sites.

Deliverable: QAPP

Milestone Date: 3/08

Cost: \$7,000 (\$3,850 Federal, \$3,150 State Match).

Task 2: OWRB: Procure Materials – Potted plants, tree seedlings caging, tools, equipment and signage materials.

Deliverables: Annual letter report to include purchases.

Milestone Dates: 1/09, 1/10.

Cost: \$29,790 (\$16,385 Federal, \$13,406 State Match)

Task 3: All Cooperators: Labor – summer activities - installation of herbaceous plantings and caging materials; May also include collection of transplants and sprigs from local wetlands. Winter activities – Tree seedling plantings.

Deliverable: Annual letter report to describe planting activities

Milestone Dates 1/09, 1/10

Cost including travel, equipment maintenance: \$152,590 (\$83,727 Federal, \$68,862 State Match).

Task 4: OWRB: Plant Monitoring – Monitoring using GPS technology will be targeted to occur before each planting session (early June) and at the end of each growing season (late September). Monitoring will provide data on site characteristics in the littoral zone before and after project installation, including at a minimum: species, percent coverage, substrate, and photo logging.

Deliverable: Monitoring data set included in the final report

Milestone Dates for plan monitoring: 8/08, 8/09, 8/10

Cost: \$8,000 (\$4,400 Federal, 3,600 State Match).

Task 5: OWRB: Required Annual Wetland Conference for 3 years.

Cost: \$3,620 (\$1,991 Federal, \$1,629 State Match).

Task 6: OWRB: Reporting – Quarterly reports will be written to update the status of the project. A final report will be submitted on all activities and documents our measure of success, conclusions and recommendations.

Deliverable: Quarterly Reports and Final Report

Milestone Dates: 12/2007 (if awarded by then) to 9/2010

Cost: \$4,000 (\$2,200 Federal, \$1,800 State Match).

e. THE PROJECT WILL ADDRESS:

i. This demonstration will initiate a wetlands program at Atoka Lake. The project has several facets of Regional Priority #1 “Wetland and Stream Restoration.”

- Transfer of technology to Oklahoma City and any other partners by demonstrating new methods being used on several lakes in Oklahoma and Texas for instigating a lacustrine wetland.
- Promotes partnerships between multiple local and state entities.
- Promotes the use of wetland creation as a means of pollution reduction and holistic treatment of a watershed.
- Initiates a wetland program.

ii. State and Local participation will be instigated as OWRB and OKC work together to begin this wetlands program.

iii. OKC will use either its own resources or from state appropriation or both to continue the program if the demonstration proves valid for Atoka Lake.

iv. QA/QC issues for monitoring have been largely worked out on previous projects, namely the current Lake Stanley Draper FY-05 - 104(b)(3) WPDG.

v. Spread of invasive species through this project will be controlled at the nursery level. All nursery vendor sources have persons on staff that diligently work to find and discard any propagules that show signs of unwanted species and will not be transported to the lake.

f. & g. STAFFING DESCRIPTION, ORGANIZATION AND FUNDING:

Staff is fully funded through state appropriations and other ongoing grants. The OWRB has two boats and several trucks able to do the work required for this project. Staff qualifications are as follows:

Owen Mills – Project Manager: Owen has been managing lacustrine wetland and bio-engineered erosion control projects for four years for the Grand River Dam Authority, Oklahoma City, Oklahoma State University, and the Poteau Valley Improvement Authority. This includes an FY-05 104(b)(3) WPDG at Lake Stanley Draper for which this proposal is modeled.

Paul Koenig – Program Manager – Paul is manager of the Lakes & Special Studies section in the Water Quality Division of the OWRB. This section includes lake restoration projects, diagnostic studies, bathymetric mapping and other special lakes projects. He has been managing lacustrine wetlands projects since 1996 in several lakes around the state.

The Lakes and Special Studies section has three other full time environmental specialists and a Carl Albert Executive Fellow position that will be assisting in fieldwork and coordination capacity on an as needed basis. Summer labor will also be hired to assist in the fieldwork at Atoka.

Oklahoma City has local staff at the lake that will assist in planting operations as well as other staff and equipment that will be brought from Oklahoma City on an as needed basis

h. TRANSFER OF RESULTS AND METHODS TO OTHER S/T/LGs AND PUBLIC

The OWRB lakes restoration keeps close ties with other agencies working on similar projects, in particular ODWC, which is also attempting to populate local lakes with aquatic plants. The results and Final Report will be made available to those employees known to take interest in the subject.

LAERF will work as a consultant on this project and will publish this work as part of their resume

OWRB will present the results of this project at the Oklahoma Clean Lakes and Watersheds Association (OCLWA) annual meeting and publish them on the OWRB website. OWRB will also prepare a press release to local papers, especially in Atoka and Oklahoma City areas. OWRB will continue to actively promote the success of our wetland plantings and seek other agencies, municipalities and organizations willing to learn these methods to enhance their lakes with wetland plants.

OCWWUD will publish the general information as part of its newsletter to its customers.

PROPOSED BUDGET

PROJECT BUDGET			
	Personnel	Person Yrs.	Expenditure
##	Environmental Programs Manager	0.00	\$ -
1	Environmental Programs Specialist IV	0.67	\$ 32,253
1	Environmental Programs Specialist II	0.26	\$ 8,715
	Carl Albert Executive Fellow	0.00	\$ -
3	Temporary Employee	0.74	\$ 14,682
	Information Systems Services Coordinator	0.00	\$ -
Total Person Years =		1.67	Total = \$ 55,650
Benefits			
	62.77% of Salary for Fringe Benefits		\$ 34,931
	83.03% of Salary for Indirect Costs		\$ 46,207
			Total = \$ 81,138
Contractual			
	Ok. State Forestry Regeneration Cntr.		\$ 500.00
	Plant Nursery Supplier		\$ 9,500
	COE Consulting		\$ 5,000
Total Contractual =			\$ 15,000
Other* (Partner In-Kind Funds towards project)			
	OCWWUD Planting Labor		\$ 15,000
Travel/PerDiem			
	Wetlands Conference (Mandatory)		\$ 3,620
	Hotel & Per Diem		\$ 14,802
Supplies			
	Plant Enclosure Materials		\$ 15,000
	Boat/Vehicle Maintenance and Repair		\$ 1,500
	Other Supplies		\$ 3,290
Total Supplies =			\$ 19,790
TOTAL PROJECT COSTS = \$ 205,000			

Figure 1. Atoka Lake with potential areas for planting in green.

