

Project 1

Agency: Oklahoma Water Resources Board (OWRB)

Title: Creation of a Vegetated Wetland Throughout The Littoral Zone of Lake Stanley Draper

Project Location: Lake Stanley Draper, WBID OK520810000130_00, HUC 11090203

Cooperators: 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)

Problem Statement:

Lake Stanley Draper (Draper) is the largest municipal lake (2,900 ac) owned by Oklahoma City. It supplies much of the city's potable water. Built in 1962 on Elm Creek, the impoundment is used primarily as terminal storage from water pumped from Atoka and McGee Creek Reservoirs in southeast Oklahoma. The lake is listed on the Clean Water Act 303(d) list for turbidity [Avg. NTU = 40 1997-2002]. Since the addition of the highly turbid Lake Atoka water, the lake has been devoid of even lacustrine fringe wetlands. However, historically the lake was clear and supported *Potamogeton* and other aquatic plants.

Draper Lake's ecological value has been long ignored and is an underutilized recreation resource. The city has made the decision to clean up the lake for recreational purposes as well as reducing treatment plant costs. It invested in a 1998 turbidity study for both Stanley Draper and Atoka lakes that has resulted in, among other things, a series of Best Management Practices (BMP's) in both watersheds. These include paving or disking and seeding some of the dirt roads that surround the lake, closing or moving a series of problem ATV trails further from the lake, restricting access points to the lake and contouring and re-vegetating buffer strips near the shoreline. These measures attest that the Oklahoma City Water & Wastewater Utilities Department (OCWWUD) is committed to maintaining the shoreline and protecting the lake from visitor abuse. Unfortunately, little work is planned at or below the waterline, where essentially all of the problems are realized.

Wetland habitat for wildlife, fishing and aesthetics all suffer due to the turbid waters and sterile shoreline of Draper Lake. Given the stable water levels, fluctuating less than 3 ft. most years, and low numbers of certain herbivores at Draper, chances are good that a wetland community could be established around much of the shoreline. This would promote healing (reduce nutrient loading, shoreline erosion, resuspension of sediments due to wave action, etc.) of the lake as well as put in place a vibrant healthy ecosystem.

Project Objectives:

Restoration of the shoreline to lacustrine wetlands: 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 wetland will result in a healthier lake and more diverse ecosystem. "Founder Colony" plants will be distributed over 40 acres, providing

immediate (3 year) wetland habitat in a poorly vegetated environment and is projected to spread over subsequent years to vegetate much of the habitable littoral zone in the lake.

In the long term, 10+ years, 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, spikerush and duck potato will buffer the lake from upland erosion. Fish nursery habitat will be enhanced as the plants provide cover, macroinvertebrate habitat, and improved water quality. Moreover, we are likely to see an increase in lake visitation as fishing and aesthetics improve, bringing in substantial revenue to the city and making it a better place to live.

Enhancement of Watershed Planning: Plantings will enhance the effectiveness of OCWWUD implemented BMP's by creating another buffer from upland runoff and reducing wave induced erosion and resuspension of sediments. Initial sites will be directed near those sites where wetlands would be of benefit to the lake and watershed.

Outreach: Through the use of workshops and conferences local interested parties will be given the opportunity to see and work with wetland species. The creation of wetlands around Oklahoma lakes is an unused alternative shoreline treatment. OWRB recognizes all the benefits of colonization of the littoral zone with diverse native plants. OWRB aims to promote the future success of this project to lake managers statewide with the intention of replicating it in lakes across Oklahoma.

OWRB will kick off the project by inviting all project cooperators, universities and organizations around Draper Lake to educate them about this project and recruit planting volunteers. This will have a dual role of enhancing project congruity among participants and establishing multiple caretakers of the project.

OWRB will make on-site presentations after the third planting season to entities actively managing shorelines such as lake managers, master conservancy districts, municipalities and state parks to teach the multiple advantages of creating wetlands on their lakeshores.

Project Outline

July 2005 to May 2006 - Develop QAPP - Determine site placement, species, planting schemes, Consult with LAERF on design.

April to May 2006 - Baseline Ecological Surveys begin of existing aquatic plants, water quality, and fish populations. Water quality sampling will continue quarterly through 2006 and again in 2008.

May 2006 – Kick Off Workshop with all cooperators in the project and interested groups. This will teach the value of aquatic plants in lakes, ensure that all parties understand the plan and concepts of the project and provide uniformity of techniques.

Summer 2006 – Install protective cages, and plants within the lake's littoral zone .

Fall 2006 – GPS Monitoring of Plant survival and growth

Spring 2007 – Recruitment of volunteer groups like Boy Scouts, Fishing clubs or Environmental clubs to assist for summer plantings

May 2007 – GPS monitoring of plant survival and growth.

Summer 2007 - Install breakwaters, protective cages, and plants around the lake. Repair damaged cages and replant empty cages from previous year.

Fall 2007 - GPS Monitoring of plant survival and growth

Spring 2008 – Recruitment of volunteer groups like Boy Scouts, Fishing clubs or Environmental clubs to assist for summer plantings

May 2008 – GPS Monitoring of Plant survival and growth

Summer 2008 - Install breakwaters, protective cages, and plants within the lake's littoral zone. Repair and replant damaged cages from previous year. Fish surveys will be repeated.

September 2008 – Conference/Workshop for Lake Managers and other interested parties to showcase the work, teach the value of these plants, teach the techniques, build and plant some site cages.

Fall 2008 – GPS Monitoring of Plant survival and growth

April 2009 – Final Report due to EPA

Project Tasks:

Task 1: OWRB: Develop and write QAPP. Consult with OCWWUD and LAERF to identify and prioritize needs and appropriate treatments for each site, develop methodologies for monitoring and implementation of project sites. The Plan will address how plantings will fall into place with the overall watershed objectives.

Deliverable: QAPP

Milestone Date: 01/06

Cost: \$7,000 (\$5,250 Federal)

Task 2: OWRB: Procure Materials – Potted plants, caging and breakwater materials.

Potted plants will be 2" & 4" pots including various bulrush (*Schoenoplectus* spp.), waterwillow (*Justicia americana*), pondweeds (*Potamogeton* spp.), buttonbush (*Cephalanthus occidentalis*), duck potato (*Sagittaria latifolia*), pickerelweed (*Pontederia cordata*), tall burhead (*Echinodorus berteroi*), spatterdock (*Nuphar luteum*) and others.

Caging materials to protect plants from herbivory will be welded wire generally in 3' diameter ring cages varying from 3'-5' tall depending on depth in the water and rebar to stake them to the sediment; roughly 50'x50' pen cages will also be built, using T-posts to stake them to.

Breakwater materials will generally be T-posts and wire necessary to anchor and tie the trees in place.

Deliverables: Line-Item reports of material purchases

Milestone Dates: 6/06, 6/07, 6/08

Cost: \$19,843 \$ (\$15,632 Federal)

Task 3: OWRB: Plant Monitoring – Monitoring of planted species using GPS technology will occur before each planting session (early June) and at the end of each growing season (late September). Between October and May the plants are dormant. For most species it will not be possible during that period to distinguish between dormant and dead plants.

Monitoring will provide data on site characteristics in the littoral zone before and after project implementation, including at a minimum: species present, percent coverage, rate of spread, substrate type, and photo logging.

Expansion or decline of two existing beneficial aquatic plant species will be tracked via GPS in at least one cove.

Expansion or decline of at least one existing exotic/nuisance plant species will be tracked via GPS in at least one cove

An interim visit to the sites in July or August will be made to investigate general survival and herbivory. Breached cages will be repaired and dead or missing plants will be replaced.

Goals – Each planted cove will have a documented number of plants planted. Cages will be logged with GPS. Each group of plantings in the monitoring sites will be photo logged at the same point to reference and estimate of percent coverage.

Deliverable: Monitoring data set

Milestone Dates: 8/06, 6/07, 6/08

Cost: \$10,000 (\$ 8,000 Federal)

Task 4: OWRB: Outreach – Workshops and Conferences with tours of the project.

Kick-off workshop for all cooperators and volunteers.

Goals – educate those that will be working with the project as to the project plan and methods as well as familiarize them with the plants and their uses in the lake. Participants, many of which will have little or no knowledge of aquatic plants will be able to identify the different plants to be used. They will be able to list their benefits to the ecosystem. They will understand the littoral zone and the interrelationships within that ecosystem and how populating that ecosystem with aquatic plants will improve it. They will also learn about the project plan, breakwaters, caging materials, see the plant nursery and all aspects about the project. A short test will be taken before and after the workshop to quantify what was learned. A 30% or better overall improvement of participants' scores will be measured as successful.

Conference with tours of Lake Stanley Draper, project plant nursery and other area lakes with plantings such as Lake Thunderbird and Lake Carl Blackwell. Invited attendees will be lake managers, state parks and lakes associations.

Goals – Change attitudes about lakeshore treatments. These individuals are very familiar with lakes but have become use to very standardized treatments of their shores such as riprap. This conference will show participants the benefits and low cost to their lake by choosing wetlands as an alternative. Tests about treatments they have used on their lakes will be sent around before the conference. Feedback sheets will be filled out after the conference with their opinions as to the usefulness of these treatments and if they will implement them in their lakes. A 75% majority of the participants rating this conference as useful and 25% saying they will implement some or all of these strategies will be measured as successful.

Deliverables: Program Agendas with abstracts, Pre/Post Test results of attendants

Milestone Date: 10/08

Cost: \$3,000 (\$2,250 Federal)

Task 5: OWRB / OCWWUD: Installation of Breakwaters –

A limited number of small [P1]breakwaters may be built as needed at strategic points that will protect long spans of shoreline. Construction of these breakwaters would consist of stacking delimbed trees, between posts to build a short 3' tall barrier out into the water and perpendicular to the shore. When constructed on a minor point, they can protect several hundred feet of shoreline from some of the most significant waves that occur there.

Goal – Construct one or more breakwaters at points around the lake that will maximize protected shoreline. Wave action will be subdued sufficiently behind these breakwaters to allow additional plantings to survive and grow.

Deliverables: Letter report with photo documentation on installation

Milestone Dates: 8/06, 8/07, 8/08

Cost: \$ 2,000 (\$0 Federal)

Task 6: All Cooperators and volunteers: Labor – Planting Implementation - Plantings and caging materials; Collection of transplants and sprigs from local wetlands.

Ring cages will be set in groups of founder colonies of differing species around selected coves. Potted plants will be used for cages.

Uncaged patches of waterwillow and bulrush will be planted in the coves in between cages. Waterwillow is very resistant to herbivory. It creates an excellent seedbed for succession of other plants and may act to mask those plants from aquatic herbivores. Cuttings and transplants from local sources will be used.

Goals – Installation of 40 acres of aquatic plant colonies dispersed around the lake. The colonies will be viable healthy aquatic plants capable of populating much of the remaining habitable cove shoreline.

Deliverable: Letter report describing summer planting activities, numbers of plants and plant cages established. Full data will be incorporated into the project final report.

Milestone Dates: 9/06, 9/07, 9/08

Cost: \$ 89,000 (\$ 79,000 Federal).

Task 7: ODWC: Aquatic plant nursery. Collect and pot at least 500 new propagules at ODWC Fisheries Lab in Norman, Oklahoma. These potted plants should yield approximately 1500 quality plants over the 3-year life of the project. Since potted aquatic plants cost between \$1.50 and \$5.00 each, the nursery will save the project money. (Since the writing of this workplan ODWC has determined they don't need any more ponds but could use help in getting the existing ones filled with new propagules.)

Goal – Collect and pot at least 500 new propagules per year at ODWC Fisheries Lab.

Deliverables: Letter reports describing nursery activities

Milestone Dates: 4/06, 4/07, 4/08

Cost: \$2,000 (\$0 Federal)

Task 8: OWRB/OCPRD/ODWC: Baseline Monitoring –sampling for water quality and primary productivity, bird and fish studies for the lake.

Water sampling (OWRB) –

Monitoring of Draper lake as part of the OWRB Beneficial Use Monitoring Program (BUMP) will be done by [G2]OWRB staff during the year before planting (2005-2006) and the year following the final planting (2008-2009). BUMP sampling tests for: ammonia, nitrate-nitrite, Total Nitrogen, Ortho Phosphorus, Total Phosphorus, True Color, Alkalinity, Chloride, Sulfate, Chlor-a, Turbidity and Secchi Depth.

Fish studies (OCPRD, ODWC) – Three year in lake study. Three years is not long enough to show measurable changes in fish populations given the lack of precision of current methods. The intention will be to document current pre-project populations for comparison to any future fish sampling that may be taken

Deliverables: Data sets and analyses attached to Final Report

Milestone Dates: 4/09

Cost: \$ 9,000 (\$0 Federal).

Task 9: OWRB: Reporting – Quarterly progress 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, monitoring data of plants, birds, fish, water quality and productivity, conclusions and recommendations.

Deliverable: Semi-Annual Reports and Final Report

Milestone Dates: 12/05 to 4/09

Cost: \$4,000 (\$3,000 Federal)

Task 10: OCWWUD / OWRB – Invasive Species Management – Draper Lake has an infestation of invasive plants along its shoreline that are aggressively expanding. They threaten to fill the habitable littoral zone with dense monocultures of poor quality wetland habitat greatly reducing the lake's potential for a diverse wetland and moreover reduce it's ability to support a broad range of wildlife. Furthermore these invasive plants include exotics that do not belong in Oklahoma and may spread to other wetlands and waterbodies and should be eliminated. These

invasives will out-compete and fill the niche of project plants effectively destroying project objectives. Invasive species identified include *Phragmites australis*, *Arundo donax*, & *Tamarix* spp. Currently, *Phragmites* poses the greatest threat to this aquatic system.

OCWWUD will treat infested areas by purchasing and applying the BASF herbicide "Habitat" with the assistance of BASF professional applicators. Application will be by spot spraying and occur over two to three seasons. The resulting patches of dead plant material will work toward project goals by providing an excellent substrate for target species colonization and protective seedbed for their expansion. Costs and labor will be at the expense of OCWWUD. No federal dollars will be used on this portion of the project.

Deliverable: Included in Semi-Annual Reports and Final Report

Milestone Dates: 9/08

Cost: \$5,000 (\$0 Federal)

MEASURES OF SUCCESS:

Key Measure: OWRB will plant in 40 acres of littoral zone in Lake Stanley Draper by September 2008. Establishment of aquatic vascular plants will initiate a shift from algae dominated productivity to aquatic plant dominated productivity.

Survival and growth of placed founder colonies will quantify this success.

Baseline ecological monitoring of water quality parameters, phytoplankton, and fish studies will serve as supporting measures of successful shifts in reservoir ecology. The short-term nature of the project does not predict supporting measures outside of the implementation area. Significant shifts far from those areas planted or within the greater lake will not be evident for several years.

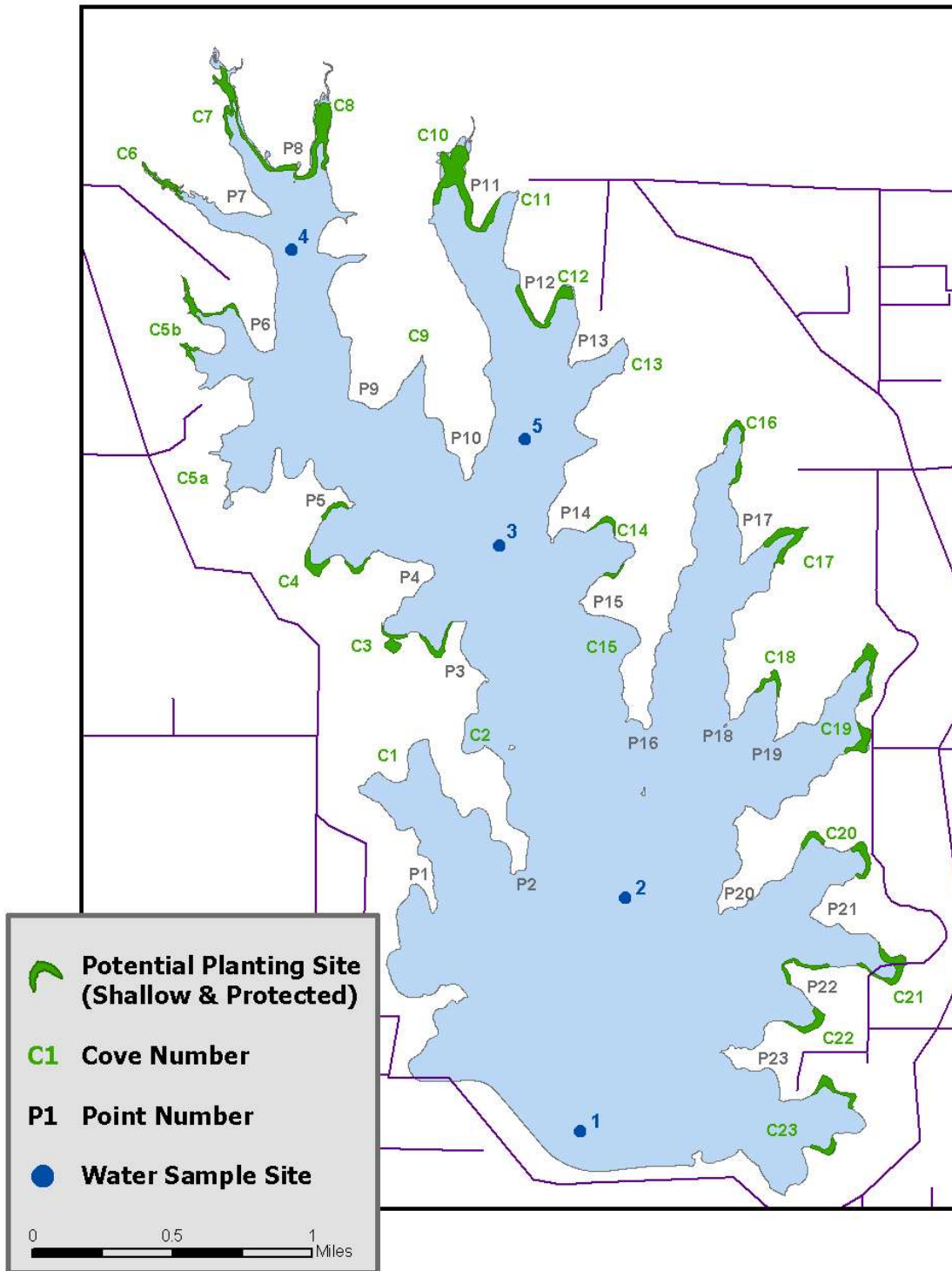
BUDGET ITEMIZED BY CATEGORY:

Proposed Budget for Lake Stanley Draper 104B3		
Personnel Costs for 3 years	Person Yrs.	Cost
1 Environmental Programs Manager	0.10	\$5,100
1 Environmental Programs Specialist III	0.71	\$27,335
1 Carl Albert Intern	0.22	\$5,280
Total Person Years =	1.03	Total Salary = \$37,715
Benefits		
74.83% of Salaries for Indirect Costs		\$28,222
44.86% Fringe Benefits		\$16,919
Contractual		
	Person Yrs.	
1 ODWC Planting Labor	0.15	\$7,520
1 ODWC 1 Year Fish Study - Labor	0.03	\$1,128
1 OCPRD Planting Labor	0.10	\$3,774
1 OCPRD 2 Year Fish Study - Labor, Equipment and Analysis		\$5,100
OCWWUD (<u>labor</u> & heavy equipment)		\$12,000
ODWC Aquatic Plant Nursery - Expansion and maintenance		\$2,000
Environmental Monitoring Laboratory Expenses (3 yrs)		\$0
Design Consultation with COE @ Lewisville		\$4,000
Travel		
Annual Wetland Conference/ Training 1 person for 3 yrs)		\$4,500
Equipment & Supplies		
Outreach Meetings and materials		\$3,000
Plant purchases		\$7,000
Plant enclosure materials - wire, rebar, posts		\$16,000
Boat/Truck Maintenance and Repairs		\$2,000
TOTAL PROPOSED COST FOR LAKE STANLEY DRAPER=		\$150,878
	Federal Share (75%)	\$113,159
	State Share (25%)	\$37,720

* 3 Years of Implementation, 3 Years of Monitoring

Figure 1: Anticipated Planting Sites

Potential Planting Sites for Stanley Draper





The City of
OKLAHOMA CITY
Department of Water & Wastewater Utilities

Mr. Tyrone Hoskins,
State/Tribal Programs Section
EPA Region 6
1445 Ross Avenue Suite 1200
Dallas, TX 75202

Date: January 28, 2005

RE: Wetland Program Development Grant "Creation of a Vegetated Wetland
Throughout the Littoral Zone of Lake Stanley Draper"

Dear Mr. Hoskins,

I want to express my support for the referenced project. The development of a vegetated wetland will further our goal of improving water quality at Lake Stanley Draper. The Oklahoma City Water and Wastewater Utilities Department serves as the primary caretaker of Lake Stanley Draper. We have expended significant time and money (well over the requested grant amount) to implement Best Management Practices (BMP) in the drainage basin of Lake Stanley Draper. Most of these BMPs removed or minimized the impact of off-road vehicles and associated dirt trails from the lake.

The Oklahoma City Water and Wastewater Utilities Department has agreed to participate in the project should it be funded. Our commitment will be in the form of contributing manpower, equipment, laboratory analysis, etc. I would encourage you to fund this project and help us make the most of this valuable water resource.

Sincerely,

A handwritten signature in cursive script, appearing to read "Marsha Slaughter".

Marsha Slaughter, Director
Oklahoma City Water and Wastewater Utilities Department

Administration Division, 420 West Main, Suite 500
Oklahoma City, OK 73102 • 405/297-2422 • FAX 405/297-3813

TO: Trustees, Oklahoma City Water Utilities Trust

FROM: Marsha Slaughter, General Manager

Oklahoma Water Resources Board Vegetation Proposal (Ward 4)

Location Lake Stanley Draper

Background The City of Oklahoma City (Oklahoma City) owns and operates and the Oklahoma City Water Utilities Trust (OCWUT) leases and finances the water utility system which includes the Lake Stanley Draper reservoir and reservation. The Oklahoma Water Resources Board (OWRB) has requested authority to plant vegetation on the Lake Stanley Draper reservoir and reservation, more particularly described on the attached map. The OWRB proposes to create a fringe along the lake shore of Stanley Draper Lake through the establishment of "founder colonies" of native plants.

The proposal will target a 0'-1' depth zone in the back of coves with water willow and bulrush being the target species. Breakwaters will be built to help protect the plantings from wave action. The plan is to distribute the plants over approximately 40 acres and let natural spread fill in the gaps. The expected benefit is improved water quality and habitat for fish. A reduction in the turbidity (cloudiness) of water in Lake Draper may carry with it some risk of increasing the growth of algae in the lake. The impact of such algae growth on treatment costs and taste and odor will need to be studied and evaluated as the project proceeds. Lake Draper has such a high turbidity, however, that it does not seem likely these efforts will accomplish as much turbidity removal as would be needed for algae to become a problem.

The OWRB has requested that Oklahoma City furnish heavy equipment and manpower to help establish breakwaters in the lake prior to the commencement of the project. Existing Oklahoma City Water and Wastewater Utilities Reservoirs and Canals Division staff should be able to construct such breakwaters as a part of their regular maintenance. Staff has met with the OWRB to review this project and believes the proposal provides a great deal of flexibility where plantings will be distributed and the type of plants distributed.

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The OWRB will determine in the summer of 2005 whether it will proceed with the project and should the OWRB proceed with the project, work on the project would begin in the summer of 2006.

Review Water and Wastewater Utilities Department, Office of Management and Budget, Finance Department and Municipal Counselor's Office.

Recommendation: Adopt the Resolution.

JOINT RESOLUTION BETWEEN THE CITY OF OKLAHOMA CITY AND THE OKLAHOMA CITY WATER UTILITIES TRUST AUTHORIZING THE OKLAHOMA WATER RESOURCES BOARD TO PLANT AND CULTIVATE VEGETATION AS PART OF AN EROSION CONTROL PROJECT AT LAKE STANLEY DRAPER AND AGREEING TO CONSTRUCT A BREAK WATER.

WHEREAS, The City of Oklahoma City (Oklahoma City) owns and operates and the Oklahoma City Water Utilities Trust (OCWUT) leases and finances and water utility system which includes the Lake Stanley Draper reservoir and reservation; and

WHEREAS, the Oklahoma Water Resources Board (OWRB) has requested authority to plant vegetation on the Lake Stanley Draper reservoir and reservation, more particularly described on the attached map; and

WHEREAS, the OWRB proposes to create a fringe along the lake shore of Stanley Draper Lake through the establishment of “founder colonies” of native plants; and

WHEREAS, the proposal will target a 0’-1’ depth zone in the back of coves with water willow and bulrush being the target species; and

WHEREAS, breakwaters will be built to help protect the plantings from wave action; and

WHEREAS, the plan is to distribute the plants over approximately 40 acres and let natural spread fill in the gaps; and

WHEREAS, the expected benefit is improved water quality and habitat for fish; and

WHEREAS, a reduction in the turbidity (cloudiness) of water in Lake Draper may carry with it some risk of increasing the growth of algae in the lake; and

WHEREAS, the impact of such algae growth on treatment costs and taste and odor will need to be studied and evaluated as the project proceeds; and

WHEREAS, Lake Draper has such a high turbidity, however, that it does not seem likely these efforts will accomplish as much turbidity removal as would be needed for algae to become a problem; and

WHEREAS, the OWRB has requested that Oklahoma City furnish heavy equipment and manpower to help establish breakwaters in the lake prior to the commencement of the project; and

WHEREAS, existing Oklahoma City Water and Wastewater Utilities Reservoirs and Canals Division staff should be able to construct such break waters as a part of the their regular maintenance; and

WHEREAS, staff has met with the OWRB to review this project and believes the proposal provides a great deal of flexibility in where the plantings will be distributed and the type of plants distributed; and

WHEREAS, the OWRB will determine in the summer of 2005 whether it will proceed with the project and should the OWRB proceed with the project, work on the project would begin in the summer of 2006.

NOW THEREFORE BE IT RESOLVED by the Trustees of the Oklahoma City Water Utilities Trust and Council of The City of Oklahoma City that the OWRB is authorized to plant and cultivate vegetation on the Lake Stanley Draper reservoir and reservation and to study its impact of turbidity as part of an Erosion Control Project.

BE IT FURTHER RESOLVED by the Trustees of the Oklahoma City Water Utilities Trust and Council of The City of Oklahoma City that should the Oklahoma Water Resources Board determine to proceed with the project and so notify The City of Oklahoma City and the Oklahoma City Water Utilities Trust by December 31, 2005, the Reservoirs and Canals staff of the Oklahoma City Water and Wastewater Utilities, Water Quality Division shall construct a break water as a part of the their regular maintenance.

ADOPTED by the Trustees and signed by the Chairman of the Oklahoma City Water Utilities Trust this _____ day of _____, 2005.

ATTEST:

Secretary

Chairman

ADOPTED by the Council and signed by the Mayor of The City of Oklahoma City this _____ day of _____, 2005.

ATTEST:

City Clerk

Mayor

Reviewed for form this _____ day of _____, 2005.

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