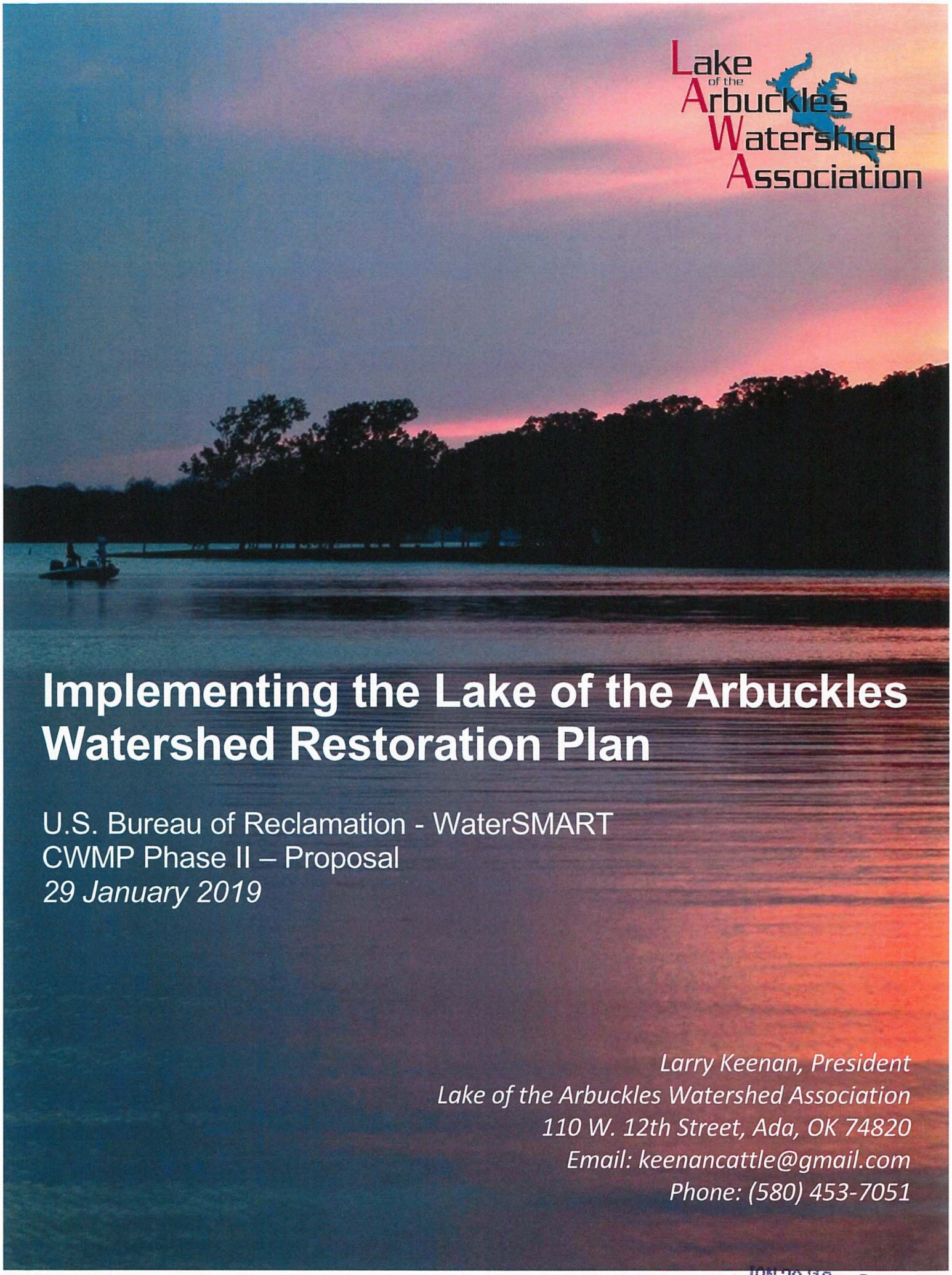

Implementing the Lake of the Arbuckles Watershed Restoration Plan

U.S. Bureau of Reclamation - WaterSMART
CWMP Phase II – Proposal
29 January 2019

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1. FEDERAL FORMS

The following required forms are included with this proposal:

1. SF-424 Application for Federal Assistance
2. SF-424C Budget Information for Construction Programs
3. SF-424D Assurances Construction Programs

Note: Form SF-424C does not contain any cost information, because the proposed project does not include construction activities.

2. TECHNICAL PROPOSAL AND EVALUATION CRITERIA

2.1 Executive Summary

The Lake of the Arbuckles and its watershed, located in southern Oklahoma, are affected by several water quality and quantity problems, including impairment due to low levels of dissolved oxygen and high levels of chlorophyll-a in the lake. The Lake of the Arbuckles Watershed Association (LAWA), through this grant opportunity, will encourage development and implementation of best management practices, including brush control, within the watershed in order to produce positive impacts on water quality and quantity. Cedar tree removal is expected to be a major focus of the project, as the watershed, like much of the south-central United States, has seen a proliferation of invasive brush species (particularly cedar) in recent years. Research suggests that an increase in the concentration of brush species exacerbates drought conditions and also affects water quality, as well as other environmental factors. Removal of brush and improvement of soil health in the watershed will have positive economic impacts for farmers and ranchers in the watershed too. The activities proposed under this grant application include (i) identifying target areas for BMP implementation, (ii) landowner outreach and training, (iii) developing conservation plans and science-based, locally appropriate BMPs, and (iv) implementation of these conservation plans and BMPs. These activities are recommended in the LAWA Watershed Restoration Plan, and will contribute to the goals of the WaterSMART Program and Cooperative Watershed Management Program by improving soil health and water quality, as well as potentially enhancing streamflow and aquifer recharge. Project success will be measured based on conservation plan implementation and cedar tree removal, with an initial goal of clearing at least ten percent of the watershed area outside of the Chickasaw National Recreation Area (CNRA). The ultimate aim of this scope of work is to produce positive impacts to landowners, the lake, and its tributaries. We expect that implementation of BMPs more broadly will result in removal of the Lake of the Arbuckles from the EPA's Section 303(d) list.

The application information specified in the Department's Funding Opportunity Announcement is provided below.

Date:	29 January 2019
Applicant Name:	Lake of the Arbuckles Watershed Association
City, County, and State:	Sulphur, Murray County, Oklahoma

The proposed scope of work is projected to take 24 months to complete. The proposed scope of work will not take place on a Federal facility or Federal land. The CNRA is supportive of this proposal, but project activities will take place on privately owned properties.

2.2 Background Data

2.2.1 Lake of the Arbuckles Watershed Association

LAWA is composed of a diverse set of stakeholders in the region who are collaborating to identify, evaluate and resolve water quantity and quality issues within the Lake of the Arbuckles watershed. In 2016, the Chickasaw Nation and Oka' Institute at East Central University identified and organized the stakeholder representatives and mediated development of a cohesive vision and mission. LAWA is registered as a 501(c)(3) organization in Oklahoma, and is administered by an elected Board of Directors, with officers. The Chickasaw Nation and Oka' Institute provide administrative support and continue to coordinate regular meetings of the Association.

Active LAWA stakeholders and meeting attendees currently include landowners, municipalities, business interests, state and federal agencies, recreational interests, educational and conservation organizations and others, as indicated below:

Arbuckle Master Conservancy District
Bureau of Reclamation
Chickasaw Nation
Chickasaw National Recreation Area
City of Sulphur
Oka' Institute, East Central University
Oklahoma Conservation Commission
Oklahoma Department of Environmental Quality
Noble Research Institute
Murray County Extension Office
Oklahoma Department of Agriculture
Natural Resources Conservation Service
Oklahoma Water Resources Board

2.2.2 Watershed Restoration Plan

In 2016, the Chickasaw Nation received a grant from the U.S. Bureau of Reclamation (Reclamation)—through its Cooperative Watershed Management Program (CWMP)—to develop the Lake of the Arbuckles Watershed Restoration Plan with the express goal of proactively addressing current and future water quality issues impacting the lake. The watershed restoration plan is attached to this proposal as Attachment 6.

Development of the LAWA Watershed Restoration Plan included an initial water quality assessment of the lake and watershed; review of state water quality standards, available monitoring data and impairments; preliminary identification of the sources of sediments, nutrients (especially phosphorus and nitrogen), mercury and other primary contaminants (to be verified and tracked through current and recommended future monitoring programs); and potential restoration opportunities that would likely result in removal of the lake from the EPA's

303(d) list of impaired waters. Data and information collected through this exercise are essential to the development of appropriate, justifiable and effective BMPs targeting native grasslands, such as brush management (mechanical removal), prescribed burning, grassland restoration (seed mixtures) and prescribed grazing.

2.2.3 Relationship with U.S. Bureau of Reclamation

The U.S. Bureau of Reclamation built Arbuckle dam, and continues to manage the operations of the lake through the Arbuckle Master Conservancy District. Reclamation also provided funding for the development of the Arbuckle Simpson Aquifer Drought Contingency Plan. Related to the proposed project, Reclamation is a member of the LAWA stakeholder group, and provided funding for the establishment of the group. Reclamation also provided funding under its Cooperative Watershed Management Program (2016-2018) for the group to identify watershed management concepts and develop its watershed restoration plan.

2.2.4 Watershed Description

The Lake of the Arbuckles watershed covers 88,580 acres and is located in the State of Oklahoma within Murray, Garvin and Pontotoc Counties (as shown in Figure 1). The City of Sulphur is located within the watershed and the cities of Dougherty, Hickory, and Davis are within five miles of watershed boundaries, all within Murray County The watershed lies within the boundaries of the Gulf Coast Prairie Landscape Conservation Cooperative (LCC) and Cross Timbers eco-region, as defined by the U.S. Environmental Protection Agency (EPA).

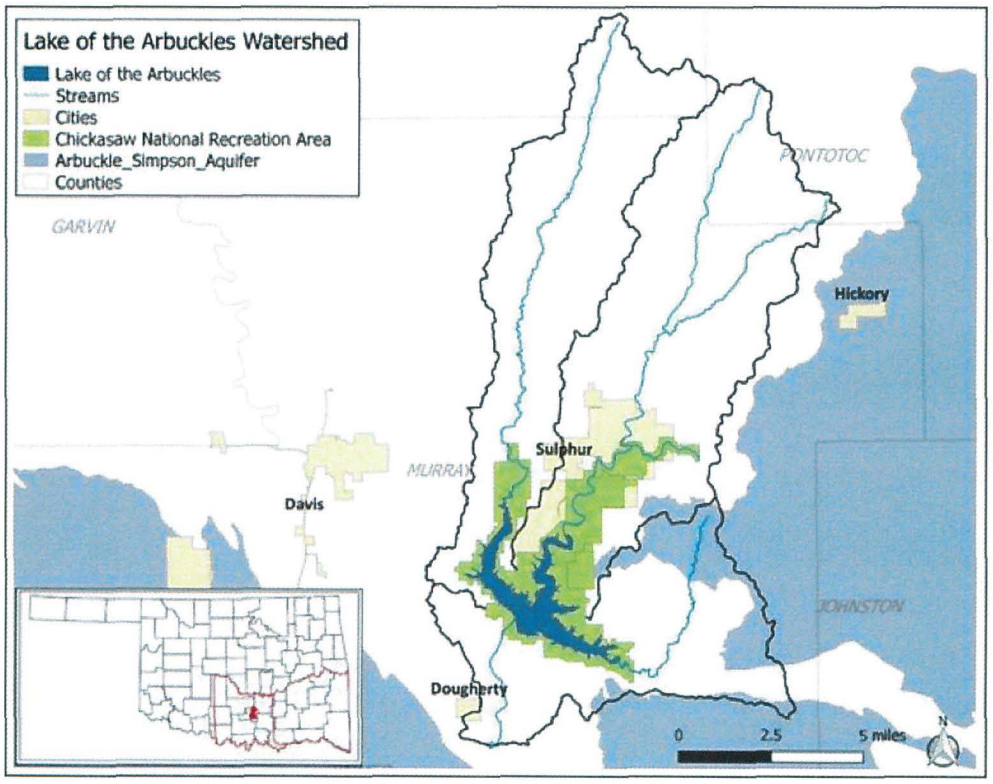

Figure 1: Location of the Lake of the Arbuckles Watershed

The Chickasaw National Recreation Area (CNRA), covering an area of 9,899 acres and managed by the National Park Service, surrounds the Lake of the Arbuckles and includes a number of springs that attract tourists to the park, Sulphur and Murray County. In 2012, the CNRA received almost 1.5 million visitors. However, the drought experienced by the entire state from 2011 to 2015 ultimately impacted lake levels and streamflow, decreasing tourism. The springs, streams, and lakes in the Chickasaw NRA are significant resources for tourism and recreation, aquatic and terrestrial ecosystems, and public water supply.

The Lake of the Arbuckles has a surface area of 2,350 acres and water storage capacity of 72,400 acre-feet (AF) at conservation pool elevation. The lake was created by Reclamation after construction of the Arbuckle Dam in 1966. Its watershed is delineated by the Hydrologic Unit Code (HUC) Boundary Dataset, inside the HUC-10 watershed (1113030306) that covers an area of 88,590 acres. The Lake of the Arbuckles has 36,440 AF of capacity assigned to flood control. In addition to the considerable revenue the lake brings from tourists, the lake provides substantial flood control benefits to the surrounding region.

2.2.5 Water Supply

The Lake of the Arbuckles serves as a vital source of water supply for some 51,000 citizens in several municipalities. The Arbuckle Master Conservancy District operates and maintains the Arbuckle Lake Dam and water supply infrastructure. The Lake also receives groundwater in the form of springflow from the Arbuckle-Simpson aquifer, which is an important supply source for the region.

2.2.6 Water Rights

Current water uses for all rights include irrigation, public supply and recreation/fish/wildlife. The 24,000 acre-feet/year (AFY) yield of the Lake of the Arbuckles is allocated to the Arbuckle Master Conservancy District, which supplies water to the cities of Ardmore, Davis, Wynnewood and Southern Oklahoma Water Corporation. The City of Sulphur has also contracted for a portion of the lake's supply but does not currently utilize its share nor possess the infrastructure to bring that water to the community.

2.2.7 Watershed Issues

Numerous water quality and quantity issues affect the Lake of the Arbuckles and its watershed.

(i) Aquifer Recharge

Insufficient and inconsistent water supply is a growing concern in light of an Oklahoma Water Resources Board (OWRB) Arbuckle-Simpson aquifer hydrology study that identified water limitations of the aquifer.[1] The multiyear study was performed to determine the annual yield of the aquifer, and the equal proportionate share was reduced from two ac-ft/ac to 0.2 ac-ft/ac as a result. This diminishing groundwater resource will put additional stress on the lake's surface supply, which could be compounded by diminished spring flows from the aquifer.

[1] https://www.owrb.ok.gov/studies/groundwater/arbuckle_simpson/arbuckle_study.php

(ii) Water Quality

Both potable water and ecological health are affected by impaired water quality. The EPA has designated specific beneficial use groups for the Lake of the Arbuckles. These include aesthetic value, agricultural, fish and wildlife propagation, recreation and public water supply. Oklahoma Department of Environmental Quality (ODEQ) assessments indicate that the Lake of the Arbuckles does not meet state water quality standards. In particular, the reservoir does not meet the dissolved oxygen (DO) portion of Warm Water Aquatic Community standards. In addition, the watershed is considered a Special Provision Watershed with a Sensitive Public and Private Water Supply. A TMDL has not yet been conducted for this watershed because of insufficient funds, but the lake is included on the ODEQ priority list for 2019 to conduct a Total Maximum Daily Load (TMDL) evaluation for the DO-related impairment. In addition, the lake is mesotrophic and phosphorus–limited, and it has periodically not supported the beneficial use of fish and wildlife propagation due to low dissolved oxygen concentrations. Blue-green algae (Cyanobacteria) blooms have occurred in the lake over the last couple of years and have raised concerns about nutrient loading and the lake's trophic status.

(iii) Invasive Species

Cedar tree (i.e. *Juniperus virginiana* and *Juniperus ashei*) invasion and spread in the south-central United States has long been identified as a problem, with negative effects on water quality and potential aquifer recharge, as well as on forage production, air quality, and fragile ecosystems.[2] The spread of invasive cedar has been particularly rapid in southern Oklahoma in recent years. A study published in 2002 estimated cedar growth at over 700 acres per day across the state, and in the same year the State Technical Committee for the NRCS cost-share programs identified cedar encroachment as the number one conservation concern in Oklahoma.[3] Another more recent study estimates that the total cedar cover in Murray County,
in which the Lake of the Arbuckles is located, makes up greater than six percent of the total county area.[4] The rapid growth of individual trees is well documented, with some species able to grow at the rate of one foot in height and one foot in width per year.[5] Figure 2 provides an example of visible cedar growth over a period of just six years in the Lake of the Arbuckles watershed.

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[2] http://factsheets.okstate.edu/wp-content/uploads/2017/05/E-947.pdf

[3] http://www.forestry.ok.gov/Websites/forestry/Images/rcstf.pdf

[4] J. Wang et al. Remote Sensing of Environment 205 (2018) 166-179

[5] https://www.ok.gov/conservation/documents/Eastern%20Redcedar%20Invading%20the%20Landscape%20publication.pdf

2.2.8 Watershed Priorities

Within its Watershed Restoration Plan, LAWA identified three priority areas, as shown in Table 1. This project, however, will focus on coordination, technical, and financial support, which is the priority most closely aligned with the goals of the CWMP. The primary means of implementation of the watershed restoration plan is to work cooperatively with landowners to develop land conservation plans that sustain or improve production while preserving or enhancing the land, in an effort to affect water quality and quantity within the watershed. Targeted outreach to landowners, while addressing their individual needs and concerns, will be imperative to the implementation of conservation plans and related management measures in the watershed. Key to this engagement is recognizing the consistency between land use practices commonly utilized to preserve and restore the integrity of waterways and those that improve soil health and productivity of the land.

Figure 2: Increase in cedar cover between 2012 and 2018 (source: Google Earth Imagery)

Priorities	LAWA Actions	Expected Outcomes
Education and Outreach	NFWF grant application (declined for funding)	Outreach materials, training sessions and land owner contacts
Coordination, Technical and Financial Support	Support USGS SCS springs connection study (including tracer testing)	Ensure water quality of springs
	Continue to follow and update Arbuckle-Simpson Aquifer Drought Contingency Plan	Ensure responsible water management and maintenance of spring flows
	Coordinate with Noble Research Institute to work with land owners on Conservation Plans	**Promote watershed health, sediment management and downstream water quality**
	Coordinate with Oaks and Prairies JV to improve native grass habitat	**Promote recreation and endangered bird species**
Monitoring and Data Analysis	NFWF grant application (declined for funding)	Monthly and storm-event data in streams and lakes
	Investigate mercury fish consumption advisory and monitor associated studies to confirm mercury sources	Understand current status and needed actions
	Continue monitoring status of Mahard Egg Farm consent actions	Promote water quality of Guy Sandy Creek and lake
	Continue monitoring status of improvements at Cedar Blue WWTP	Promote lake water quality
	Monitor state 305b water quality assessment list (stream nutrients)	Understand current status of contributing streams
	Monitor state 305b water quality assessment list (lakes DO and chlorophyll-a)	Verify current status of lake

Table 1: Identified LAWA Projects, Studies and Activities according to LAWA's Watershed Restoration Plan. Activities included in this proposal are in bold.

Consistent with LAWA objectives and priorities, LAWA has identified specific projects to enhance effectiveness of the Watershed Restoration Plan. Data indicates that management of sediments and nutrients, particularly phosphorus, in sub-watersheds is essential. Specific surface water goals seek to maintain or decrease chlorophyll-a concentrations in the lake and decrease phosphorus and nitrogen concentrations in contributing streams. In this regard, LAWA will promote land management practices in the watershed that reduce sediment and nutrient runoff. LAWA, through the development of its watershed restoration plan, identified soil health and native grassland management as two required areas of focus in order to restore and preserve the watershed, as noted below.

(i) Soil Health

The Noble Research Institute and other relevant partner agencies and organizations will provide technical on-the-ground assistance to individual landowners in the watershed through development and implementation of science-based best management practices. LAWA will serve as the intermediary between soil health experts and landowners, promoting the benefit and importance of voluntary BMPs in relation to general watershed health while ensuring the accomplishment of specific landowner goals.

LAWA and partners will promote and advance the recognition of soil health principals in the Lake of the Arbuckles watershed, including land assessments of soil health, the utilization of soil quality indicators and a general understanding of the linkage between overall soil health and related economic benefits to landowners in the watershed. LAWA and partners will utilize land management demonstration projects, workshops and field days to provide educational outreach to landowners and other stakeholders.

(ii) Native Grassland Management

LAWA recognizes the elemental importance of native grasses to the Lake of the Arbuckles watershed. However, these native grassland ecosystems are currently threatened by conversion to urban and pasture land, fragmentation and decreasing land parcel size. Their restoration is essential to the future sustainability of the watershed. Increasing water infiltration and yield, reducing erosion and lake sedimentation, augmenting water supply, and expected improvements in water quality due to the decreased use of fertilizers, pesticides and herbicides are all expected outcomes of the implementation of the watershed plan. Aside from watershed protection, native grasslands also provide many direct economic benefits to landowners and producers, such as increased livestock forage and improved wildlife habitat.

LAWA will facilitate the involvement of partner agencies and organizations in providing technical assistance to landowners through development of science-based BMPs specifically targeting native grasslands, including brush management (mechanical removal), prescribed burning, grassland restoration (seed mixtures) and prescribed grazing. LAWA will leverage ongoing grassland management initiatives, such as the Oaks and Prairies Joint Venture Partnership that includes Murray County in its Grassland Bird Restoration Focus Area.

While the priorities described in the watershed restoration plan address a broad range of water quality and quantity issues, a specific concern repeatedly discussed during LAWA meetings has been the proliferation of invasive brush species, particularly cedars, within the watershed. Cedar control and removal[6] is a common grassland management and restoration measure, with many potential benefits.[7] Therefore, to mitigate the negative effects of invasive cedar species on water quality and quantity, and as a first step in implementing its watershed restoration plan, LAWA has decided to prioritize brush control and related best management practices within the watershed. There is considerable interest from landowners in adopting this strategy, with expected benefits for both the local ranchers on whose land these activities will take place, but also for the local environment and other water users in the Lake of Arbuckles watershed.[8] Prescribed burning will be pursued as a strategy to this end, as it has already proven to be successful within the watershed.[9]

2.3 Project Location

The proposed project activities will take place throughout the Lake of the Arbuckles watershed, in Murray, Garvin, and Pontotoc counties, as shown in Figure 1. The proposed scope of work includes a methodology to identify and prioritize specific areas of focus for landowners.

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[6] There are two main methods of cedar control and removal: prescribed burning and mechanical treatment. Prescribed burning is ideal for smaller trees and has been shown to be very effective in controlling cedar. Mechanical treatment can be carried out using a wide range of methods. https://www.ok.gov/conservation/documents/Eastern%20Redcedar%20Invading%20the%20Landscape%20publication.pdf

[7] Vegetation classification Project: interpretive Booklet, Oklahoma Department of Wildlife Conservation

[8] http://www.twdb.texas.gov/conservation/BMPs/Ag/doc/4.1.pdf

[9] Prescribed burning is currently already carried out on CNRA land, under the National Park Service's prescribed fire program. For more information see: https://www.nps.gov/chic/learn/news/prescribed-fires-2018.htm

2.4 Technical Project Description

Proposed activities include identification and prioritization of areas for brush control and other BMP implementation, landowner outreach and education, development of locally appropriate BMPs, and BMP implementation. These steps are proposed to be carried out in a stepwise fashion, as shown below in Figure 3. In this way, priority areas of land and cooperative landowners will be prioritized, which will help to make most efficient use of funds. Ultimately, the project will contribute towards the CWMP priority of removing invasive species and restoring native vegetation within the watershed.

Figure 3: Proposed workflow under project

Activity 1: Identify areas for brush removal and other conservation measures

As a necessary first step in the high priority measure of cedar/brush removal, this activity will utilize current and historical imagery data to quantify the location and extent of cedar within the watershed, as well as assess changes in cedar distribution over time. This work will build on previous analysis by researchers from the University of Oklahoma, led by Dr. Xiangming Xiao at the Center for Spatial Analysis, which made use of satellite imagery analysis to identify and quantify cedar species across Oklahoma.[10] Datasets showing cedar extent will be obtained from the research group and used to prioritize land that may benefit the most from BMP implementation. These data were derived from Landsat data using an image classification algorithm designed specifically for this purpose (see Figure 4 for an example of Eastern redcedar distribution change over time). Once maps have been produced using these datasets, corresponding aerial imagery (NAIP) will be used to confirm the imagery classification and mapping.

[10] J. Wang et al. Remote Sensing of Environment 205 (2018) 166-179

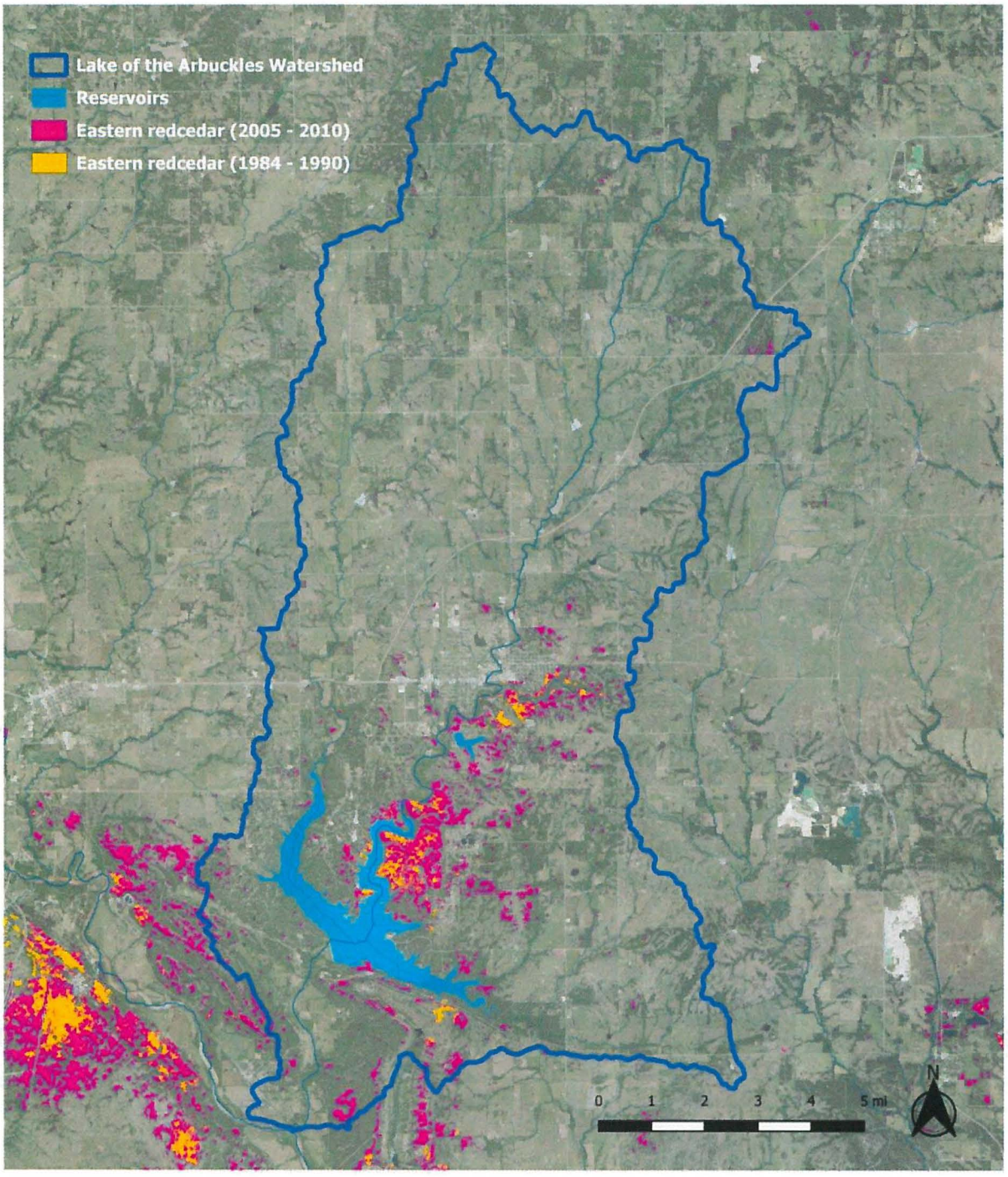

Figure 4: Eastern redcedar distribution (1984 – 1990 and 2005 - 2010) as reported by research group at the Center for Spatial Analysis

Based on the results of the remote-sensing identification activity, areas of high cedar growth will be prioritized and mapped. The following factors will be taken into account under a simple prioritization process of land parcels:

- Extent of cedar
- Distance to stream or river (i.e. riparian corridors identified)
- Soil type
- Slope

These areas can then be linked to landowners in order to aid in targeting outreach and education efforts, as outlined in Activity 2.

Expected outcomes

The expected outcomes from this activity include:

1. A series of maps showing change in cedar tree distribution in the watershed over time. A map showing areas of priority for cedar removal, based on study results and the subsequent stakeholder meeting. This map will also set a baseline for monitoring future cedar growth and assessing effectiveness of control activities.

Activity 2: Landowner Outreach and Education

Landowner education and training, especially related to the implementation of effective land use practices, is an integral component of the Watershed Restoration Plan as it both builds the case for land management and generates interest among area landowners. Existing initiatives, along with other available programs, will be extensively leveraged to facilitate the dissemination of cedar eradication information, recommended procedures and resources available to landowners. To this end, LAWA will provide educational outreach to watershed landowners promoting the value of Noble Research Institute BMPs and management plans. The Noble Research Institute provides farmers, ranchers and land managers with no-cost consultation services that engage them in both science-based BMPs for achieving specific goals and creating sustainable outcomes for agriculture and overall watershed health. In addition, the Oka' Institute, at East Central University, is developing a website which will help to disseminate LAWA educational materials.

In particular, LAWA has envisioned a series of education events—both workshops and field days—as part of its Watershed Restoration Plan implementation. A scheduled workshop in January 2019 will include discussions on the beneficial management of pasture and habitat (featuring landowners and producers responsible for past/current successful projects in the watershed), prescribed burning and the development of land use plans. Presenting will be various LAWA partners, including officials from the Oklahoma Associations of Conservation Districts, Noble Research Institute, Oaks and Prairies Joint Venture, Arbuckle Restoration Association and Oklahoma Department of Wildlife Conservation.

Similar educational opportunities will be designed specifically to promote on-farm BMPs, to be performed in cooperation with the Noble Research Institute. A proposed organization chart is shown in Figure 5.

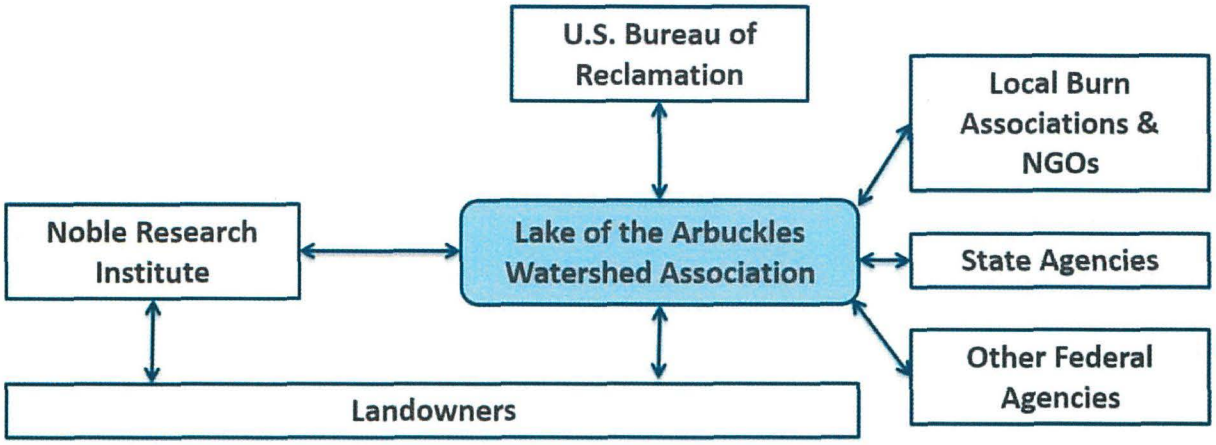

Figure 5: Organization Chart

Expected outcomes

The expected outcomes from this activity include:

1. 2-3 farmer/landowner workshops providing specific BMP information and training.
2. Other educational events conducted in cooperation with the Noble Research Institute.
3. A land management demonstration workshop convened by LAWA and its partners.

Activity 3: Develop Conservation Plans, including local, science-based BMPs

After priority areas and interested landowners have been identified, through educational outreach or otherwise, conservation plans will be developed on an individual landowner basis. These conservation plans will be developed in cooperation with the Noble Research Institute, the Oaks and Prairies Joint Venture (OPJV), as well as other third-party contributers. The Noble Research Institute is a valuable institutional partner, as staff have extensive experience and offer complementary technical assistance related to the development and funding of cedar eradication projects, as well as other beneficial land management strategies. The Oaks and Prairies Joint Venture, a public/private partnership supporting voluntary bird conservation with an ongoing project in the watershed, could help facilitate LAWA efforts focused on native grassland management.

Conservation plans will be developed using five proven soil health principles, developed by the Noble Research Institute. These principles, along with a suite of corresponding BMPs, are presented in Table 2. Conservation plans, including a tailored set of BMPs, will be tailored for individual landowners based upon landowner preference, landscape condition and characteristics, and available funding.

Principle	Best Management Practice
Minimize Soil disturbance	No-till / Conservation tilling
Armor the soil	Prescribed grazing
Living roots in the ground all year	Prescribed grazing
Integrate livestock grazing	Prescribed grazing
Plant diversity	Prescribed burning
	Mechanical brush removal

Table 2: Soil Health Principles and corresponding BMPs, with average costs.[11]

Expected outcomes

The expected outcomes from this activity include:

1. Two-page document describing example BMPs for distribution to individual farmers/ranchers/land managers
2. Document describing process for assessing land and recommending BMPs
3. List of potential funding sources for BMP implementation for distribution to farmers and landowners

Activity 4: BMP Implementation

BMP implementation activities make up the bulk of this scope of work, in terms of both time and resources. After interested landowners have been identified and BMPs have been individually tailored to local conditions, funds will be provided to implement ranch-level plans. An emphasis will be placed on supporting landowners to perform prescribed burns, to the extent possible. This is an efficient way to remove invasive cedar, and it can also help to restore native grassland areas.

Expected outcomes

The expected outcomes from this activity include:

1. Implementing a variety of BMPs on at least 4,275 acres of the watershed area outside of the CNRA. Prescribed burning and mechanical removal methods for cedar clearance will be prioritized.

[11] Costs derived from NRCS EQIP Payment Schedule (2019). See: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/?cid=nrcseprd1328258

2.5 Evaluation Criteria

2.5.1 Evaluation Criterion A— Project Benefits (30 points)

- Describe the expected benefits of the proposed project. Address all of the following sub-bullets that apply to the project (the described benefits are not listed in order of priority). In your responses, describe the geographic extent and the magnitude of the benefits associated with the project. Project benefits that are supported and quantified will receive more points.

o Will the project make more water available to meet water needs, or make water available at a more advantageous time or location? If so, how and to what extent?

The project will not only improve water quality, but also augment the quantity of water that flows into the lake. Land management BMPs, including riparian improvement and the removal of invasive trees, will help to relieve stress on the Arbuckle-Simpson Aquifer. In particular, cedar trees intake a great deal of water that would normally infiltrate into the subsurface to provide aquifer recharge and base flow to streams.[12]

o Will the project result in long-term improvements to water quality? For example, will the project decrease sediment or nutrient pollution, improve water temperature, or mitigate impacts from floods or drought? If so, how and to what extent?

The project will decrease sediment and nutrient pollution through BMP implementation on private land throughout the watershed. Invasive cedar removal will be central to this benefit, as cedar trees prohibit the growth of native grasses that would normally filter out nutrients and sediments from runoff that flows into streams, increasing the amount of bare soil between individual trees. Removing cedars will allow native grasses to flourish among other benefits, as noted in Figure 7.

The project is also expected to mitigate flood and erosion impacts due to riparian buffer improvement and other land management BMPs, such as implementing no-till agriculture practices. The project will complement the goals of the Arbuckle-Simpson Aquifer Drought Contingency Plan Task Force, as outlined in the Reclamation-funded drought contingency plan published in 2017.[13]

[12] Study cited in this article: https://www.hpj.com/ag_news/waging-war-on-cedar-trees/article_7b8c7ae8-204d-56db-8d39-24bfd9a5fcf4.html

[13] https://okainstitute.org/page_images/1514914209.pdf

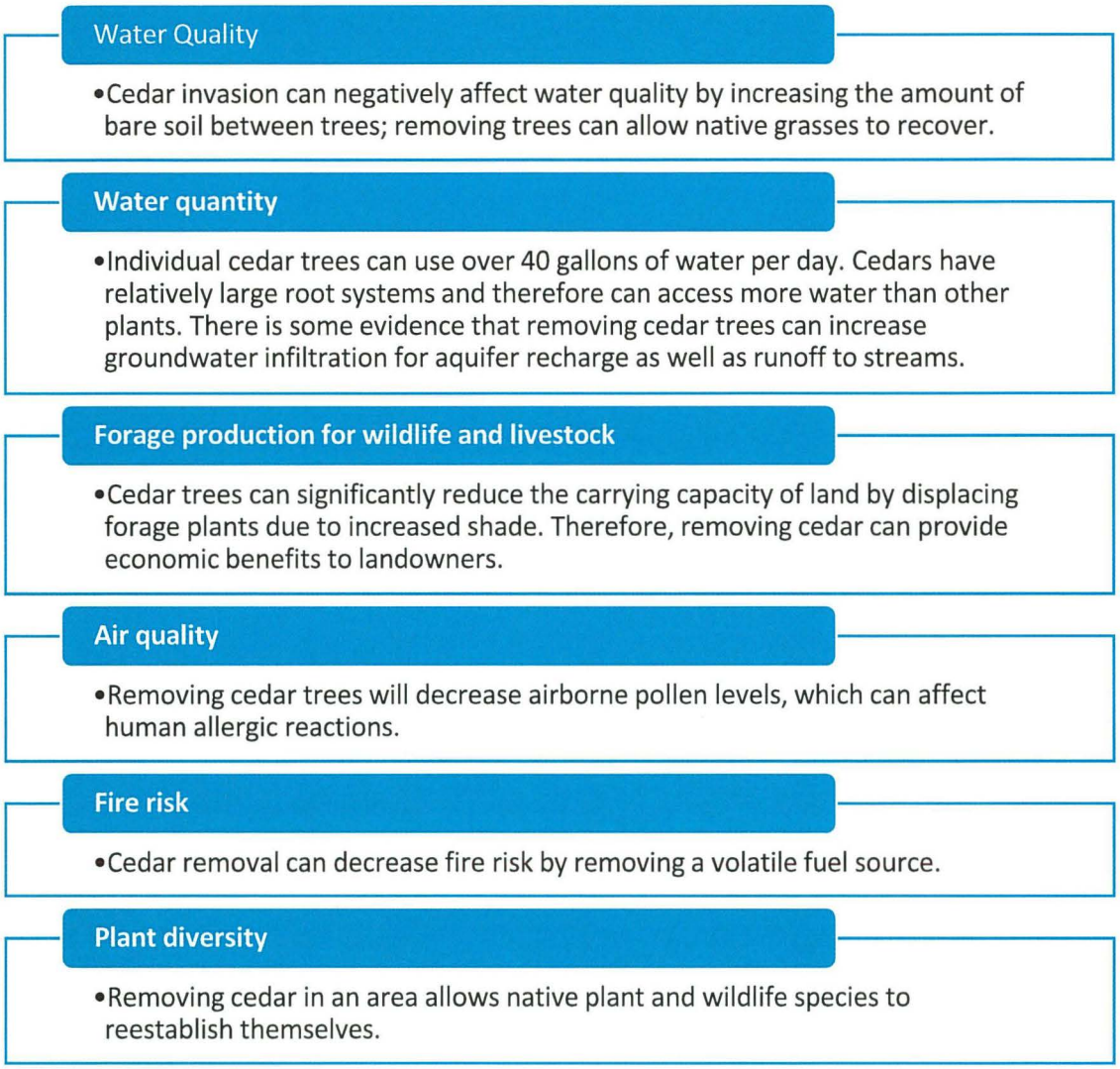

Figure 7: The Negative Effects of Cedar Encroachment in a Watershed

o Will the project benefit aquatic or riparian ecosystems within the watershed? For example, will the project reduce flood risk, reduce bank erosion, increase biodiversity, or preserve native species? If so, how and to what extent?

Replacing cedars with native grass will help to stabilize the soil, reduce runoff, and therefore potentially reduce flooding. The reestablishment of native grasses and trees will also enlarge and improve habitat for birds and other native species.

o Will the project benefit specific species and habitats? If so, describe the species and/or type of habitat that will benefit. How and to what extent will the project benefit the species or habitat? Please explain the status of species and habitat that will benefit (e.g., native species, game

species, federally threatened or endangered, state listed, and whether critical habitat has been designated).

Birds that nest in native grasses would benefit from the removal of cedar trees. Wildlife that consume grass will also benefit by increasing the amount of forage material.

Endangered species identified in Murray County by the U.S. Fish & Wildlife Service include the threatened piping plover (*Charadrius melodus*), endangered whooping crane (*Grus americana*), endangered least tern (*Sterna antillarum*), and the candidate species Sprague's pipit (*Anthus spragueii*). These species will benefit from improved water quality.

o Will the project benefit multiple water uses within the watershed (e.g., agricultural, municipal, tribal, environmental, recreation uses)? If so, how and to what extent?

The ranching and recreation sectors rely heavily on water use in the watershed, and both sectors will benefit from the project. Ranching will benefit from improvements in soil health, increases in forage material, and likely increases in water availability. Recreation will benefit from improved water quality within the lake and its contributing streams. In particular, the Chickasaw National Recreation Area has a number of swimming areas within the park that are used by tourists in the summer, and the lake is also a popular destination for boating, fishing, and recreational activities. Table 3 summarizes benefits across multiple users in the watershed.

Water Users	Benefits
Municipalities	Improved water quality for water supply; Economic benefits from increased tourism; Decreased wildfire risk
Recreational users	Improved water quality
Wildlife	Improved water quality (aquatic species); Increased quantity and quality of forage material
Ranchers/landowners	Increased quantity and quality of forage material; Flood mitigation; Economic benefits
Local public	Decreased wildfire risk; Improved air quality (decreased cedar pollen); Flood mitigation

Table 3: Summary of Water Users and Potential Benefits in the Watershed

o Will the project benefit watershed stakeholders in ways not addressed in the preceding questions? If so, how? Will the project reduce water conflicts within the watershed? Will the project increase resiliency to drought? Will the project provide benefits to other water uses not mentioned above? If so, how and to what extent?

Multiple water suppliers, including municipalities and rural water districts, rely on the lake for at least a portion of their water supply. These stakeholders will benefit from an increase in available water supply and improved water quality. The project will also complement the goals of the

Arbuckle-Simpson Aquifer Drought Contingency Plan, as outlined in the Reclamation-funded report published in 2017.[14] In addition to industrial, agricultural, and recreational users of water, the development of the Arbuckle-Simpson Aquifer Drought Contingency Plan brought together eight municipal water providers, who worked together to identify appropriate mitigation activities and response actions, to protect the aquifer and be better prepared for the next drought. Similarly with this project, healthier and more productive rangeland are also expected to be able to better respond to future periods of drought.

- Will the project address multiple issues of concern within the watershed (e.g., both water supply and fish habitat issues)?

Cedar removal and implementation of other BMPs designed to improve soil health will contribute to an improved water supply for those users that depend on the lake, and improving the water quality of the lake and contributing streams will be beneficial to aquatic species as well as their habitat. Arbuckle Lake is a popular destination for anglers, but the lake is currently on the EPA's 303(d) list for low dissolved oxygen (DO). Decreasing the amount of sediment and nutrients that flow into the lake is expected to increase DO, which will benefit fish and the general aquatic habitat.

- Will the project benefit multiple water uses within the watershed (e.g., agricultural, municipal, tribal, environmental, recreation uses)? If so, how and to what extent?

Ranching is a major activity within the watershed and removing cedar and implementation of other BMPs will be beneficial to ranchers, for reasons noted above. Increasing both supply and water quality will be beneficial to water suppliers and soil health. The Chickasaw Nation is very interested in improving the water quality and quantity in this watershed, which is of key economic, environmental, and cultural importance. The Chickasaw National Recreation Area and Arbuckle Lake are extremely popular tourist destinations, which produce approximately $100 million for the local economy annually.

2.5.2 Evaluation Criterion B— Watershed Restoration Planning (30 points)

- Describe your watershed restoration plan.

o When was the restoration plan prepared and for what purpose?

The restoration plan was prepared in April 2018. The mission of the Lake of the Arbuckles Watershed Association (LAWA) is to improve water quality and water supply, thus promoting economic prosperity in the region. The plan promotes the development of collaborative best management practices as well as landowner outreach and training within the Lake of the Arbuckles watershed.

[14] https://okainstitute.org/page_images/1514914209.pdf

o What types of watershed management issues are addressed in the plan? For example, does the restoration plan address water quantity issues, water quality issues, and/or issues related to ecosystem health or the health of species and habitat within the watershed?

The watershed restoration plan addresses several water quality and quantity issues, as outlined in Table 4.

Watershed Issue	Description
Aquifer recharge	Insufficient and inconsistent water supply is a growing concern in light of an OWRB Arbuckle-Simpson aquifer hydrology study that identified water limitations of the aquifer. [15] The multiyear study was performed to determine the annual yield of the aquifer, and the equal proportionate share was reduced from two ac-ft/ac to 0.2 ac-ft/ac as a result. This diminishing groundwater resource will put additional stress on the lake's surface supply, which could be compounded by diminished spring flows from the aquifer.
Dissolved oxygen impairment	The lake does not meet the dissolved oxygen (DO) portion of Warm Water Aquatic Community standards. In addition, the lake is mesotrophic and phosphorus–limited, and it has periodically not supported the beneficial use of fish and wildlife propagation due to low dissolved oxygen concentrations.
Nutrient/sediment loading	Blue-green algae (Cyanobacteria) blooms have occurred in the lake over the last couple of years and have raised concerns about nutrient loading and the lake's trophic status.
Invasive Species	LAWA has decided to prioritize brush control and related best management practices within the watershed. Prescribed burning will be pursued as a strategy to this end, as it has already proven to be successful within the watershed.[16]

Table 4: Watershed Issues in the Lake of the Arbuckles Watershed

o Who was involved in preparing the plan? Was the plan prepared with input from stakeholders with diverse interests (e.g., water, land or forest management interests, or agricultural, municipal, tribal, environmental, recreation uses)? What was the process used for interested stakeholders to provide input during the planning process?

Local landowners form the LAWA Board, which consists primarily of ranchers and representatives of local business. Two members of the Board are also employees of the Noble Research Institute. Additional stakeholders include the Nature Conservancy, Oklahoma Conservation Commission, Oklahoma Department of Agriculture, Food and Forestry, Oklahoma Water Resources Board, Oklahoma Department of Environmental Quality, Arbuckle Master Conservancy District, Chickasaw Nation, Bureau of Reclamation, Oka' Institute, Chickasaw National Recreation Area, Murray County Cooperative Extension Office, and City of Sulphur. This group represents a diverse

[15] https://www.owrb.ok.gov/studies/groundwater/arbuckle_simpson/arbuckle_study.php

[16] Prescribed burning is currently already carried out on CNRA land, under the National Park Service's prescribed fire program. For more information see: https://www.nps.gov/chic/learn/news/prescribed-fires-2018.htm

range of interests from within the watershed. Stakeholders had the opportunity to provide input to the Watershed Restoration Plan at several points during the planning process.

o If the restoration plan was prepared by an entity other than the applicant, explain why the watershed group applying did not prepare its own plan. In cases where the applicant did not prepare the restoration plan, the applicant must provide documented support for the proposed project by the entity that authored the plan.

The restoration plan was prepared by LAWA with assistance from the Chickasaw Nation.

- Describe how the existing restoration plan provides support for your proposed watershed management project.

The restoration plan provides a framework for addressing water quality and quantity concerns by education/outreach, and also implementing best management practices within the watershed. The plan also identifies agencies that can help educate and develop restoration plans for individuals in the watershed that are willing to cooperate. Furthermore, the plan identifies funding sources that can be used to help alleviate costs to individual landowners. The proposed project is very much in sync with the restoration plan, as it identifies priority restoration areas, cooperative landowners, and spaces for educational activities, as well as implementing soil health and land management BMPs.

o Does the proposed project implement a goal or need identified in the restoration plan?

The particular goals stated in the plan are to reduce nutrient loading into the streams that feed the lake, reduce concentrations of chlorophyll-a, and increase DO in the lake. The ultimate goal is to remove the lake from the 303(d) list. The proposed activities will address these impairments at their source.

o Describe how the proposed project is prioritized in the referenced restoration plan.

Soil health and native grassland management in the watershed are the two priority initiatives stated in the Plan. In addition, LAWA's stated goals and objectives in the Plan specifically address the desire to reduce cedar and other invasive species in the watershed. LAWA will facilitate the involvement of partner agencies and organizations in providing technical assistance to landowners through development of science-based BMPs specifically targeting native grasslands, including brush management (mechanical removal), prescribed burning, grassland restoration (seed mixtures) and prescribed grazing. LAWA will leverage ongoing grassland management initiatives, such as the Oaks and Prairies Joint Venture Partnership that includes Murray County in its Grassland Bird Restoration Focus Area.

2.5.3 Evaluation Criterion C— Stakeholder Support (15 points)

- Please describe the level of stakeholder support for the proposed project. Are letters of support from stakeholders provided (see Section D.2.2.8. Letters of Support)? Are any

stakeholders providing support for the project through cost-share contributions, or through other types of contributions to the project?

The Chickasaw Nation, Noble Research Institute and Oaks & Prairies Joint Venture have all expressed an interest in supporting this project. Furthermore, we have the support of many landowners in the basin, as demonstrated in a recent workshop. Participation from landowners is critical to the success of the project, and we have succeeded in bringing many of them on board. Letters of support from stakeholders are provided in Attachment 4.

- Please explain whether the project is supported by a diverse set of stakeholders (appropriate given the types of interested stakeholders within the watershed and the scale, type and complexity of the proposed project). For example, is the project supported by entities representing agricultural, municipal, tribal, environmental, or recreation uses?

Numerous stakeholders were involved in developing the Watershed Restoration Plan, including water suppliers (Arbuckle Master Conservancy District), water users (City of Sulphur), agricultural producers, the Chickasaw Nation, and recreational interests (the Chickasaw National Recreation Area). Other stakeholders include federal, state and local agencies that can assist in the technical aspects of the restoration plan. All of these stakeholders remain active participants in implementing the restoration plan.

- Is the project supported by entities responsible for the management of land, water, recreation, or forestry within the watershed? Is the project consistent with the policies of those agencies?

The project is supported by the City of Sulphur (land), the Chickasaw National Recreation Area (land, water, recreation), and the Arbuckle Master Conservancy District (land, recreation, forestry) as well as individual landowners (land) in the watershed and the Noble Research Institute. More specifically, the Chickasaw National Recreation Area periodically does prescribed burns on parklands, and therefore the proposed BMP implementation is consistent with current policies within the watershed.

- Will the proposed project complement other, ongoing watershed management activities by state, Federal, or local government entities, nonprofits or individual landowners within the watershed? Please describe other relevant efforts, including who is undertaking these efforts and whether they support the proposed project. Explain how the proposed project will avoid duplication or complication of other ongoing efforts.

This project will focus on individual landowners, some of whom are currently LAWA members and model stewards of watershed lands. A primary goal of LAWA is to coordinate and promote the activities, including cedar eradication, of relevant landowners to restore watershed benefits. The Noble Research Institute, an active participant in this project, has a similar goal.

- Is the project completely or partially located on Federal land or a Federal facility? If so, explain why the Federal agency is not completing the project, whether the agency supports the project, and whether the agency will contribute toward the project?

The Chickasaw National Recreation Area (CNRA) is located within the watershed, but this project will focus primarily on properties privately owned by individuals. The CNRA is supportive of the project.

- Is there opposition to the proposed project? If so, describe the opposition and explain how it will be addressed. Opposition will not necessarily result in fewer points.

There is no known opposition to the project. Individual landowners will participate on a voluntary basis.

2.5.4 Evaluation Criterion D— Readiness to Proceed (10 points)

- Describe the implementation plan for the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.

Section 3.4, Project Timeline provides a timeline for the activities proposed under this project, including estimated completion dates.

- The project budget outlining costs for specific tasks (required in Section D.2.2.5. Project Budget) should identify costs associated with the tasks in your project schedule, and all contractor costs should be broken out to identify the specific tasks included in those costs.

A proposed budget is provided in Section 2, Project Budget.

- Describe any permits and agency approvals that will be required, along with the process and timeframe for obtaining such permits or approvals.

Ground disturbance and other activities that would require environmental compliance will be avoided where possible. Native grass restoration activities will utilize no-till drilling techniques, and mechanical removal of invasive cedars will be carried out using tree shears or mulching techniques to avoid bulldozing, wherever possible. However, some earth disturbance may be required during brush clearance activities or in order to create firebreaks before prescribed burning can begin. All required environmental permits will be obtained before work begins. The Chickasaw Nation have staff available to assist with environmental and cultural resources compliance, if necessary, including a staff member able to conduct surveys and trap American Burying Beetles for relocation.

Furthermore, all required permits for prescribed burns will be obtained before burning begins, and burns will be carried out using dormant season firing techniques, mowed firebreaks, and a back burning technique, wherever possible.

- Identify and describe any engineering or design work performed specifically in support of the proposed project, or that will be performed as part of the project. Priority will be given to projects that are further along in the design process and ready for implementation.

There is no engineering design work required as part of this project.

- Does the applicant have access to the land or water source where the project is located? Has the applicant obtained any easements that are required for the project? If so, please provide documentation. If the applicant does not yet have permission to access the project location, please describe the process and timeframe for obtaining such permission.

The work will be done on individual landowner properties. Workshops will be held initially to educate the landowners and then the landowners will volunteer to have biologists from the Noble Research Institute, ODWC, and OPJV prepare a plan to implement locally appropriate BMPs. Therefore, no easements or additional permission will be required.

- Describe the type of environmental and cultural resource you anticipate will be necessary for this project and how the estimated cost of environmental compliance was developed. Provide support for both the type of compliance you anticipate and your estimate. Have the compliance costs been discussed with the local Reclamation office? Environmental compliance must be completed prior to any ground disturbing activity. These costs are considered project costs that must be included in the project budget and will be cost shared accordingly. These costs vary based on project type, location, and potential impacts to the environment and cultural resources. Please consider the questions posed under Section H.1. Environmental and Cultural Resources Compliance Considerations when answering this criterion.

Ground disturbance and other activities that would require environmental compliance will be avoided where possible. Native grass restoration activities will utilize no-till drilling techniques, and mechanical removal of invasive cedars will be carried out using tree shears or mulching techniques to avoid bulldozing, wherever possible. However, some earth disturbance may be required during brush clearance activities or in order to create firebreaks before prescribed burning can begin. All required environmental permits will be obtained before work begins. The Chickasaw Nation have staff available to assist with environmental and cultural resources compliance, if necessary, including a staff member able to conduct surveys and trap American Burying Beetles for relocation.

Furthermore, all required permits for prescribed burns will be obtained before burning begins, and burns will be carried out using dormant season firing techniques, mowed firebreaks, and a back burning technique, wherever possible.

Based on consultation with other stakeholders in the watershed, environmental and other regulatory compliance costs were estimated for the proposed budget based on a unit price of $4,000 per square mile of BMP implementation.

2.5.5 Evaluation Criterion E— Performance Measures (5 points)

- Please describe the performance measures that will be used to quantify actual project benefits upon completion of the project. Include support for why the specific performance measures were chosen.

LAWA will use the following performance measures to quantify project benefits:

1. Decrease in presence of cedar within watershed, as measured by updated satellite imagery classification
2. Landowner soils test results
3. Native grass habitat acres improved

In addition, each LAWA meeting will include an update on water quality metrics (TP, TN, chlorophyll-a and DO), according to the most recent data.

The following are long-term goals and milestones from the Lake of the Arbuckles watershed restoration plan:

1. Within 2 years, LAWA and its partners will ensure development of landowner conservation plans and conduct associated outreach activities that will result in no net increases in nutrient and sediment loading in targeted creeks.
2. Within 5 years, LAWA restoration strategies will result in maintenance (i.e., no increase) of chlorophyll-a in the lake and reduction in nutrient and sediment concentrations in contributing streams, thereby reducing loading to the lake.
3. Within 10 years, LAWA restoration strategies will result in a noticeable change or reduction in chlorophyll-a in the lake.

2.5.6 Evaluation Criterion F— Department of the Interior Priorities (10 points)

1. Creating a conservation stewardship legacy second only to Teddy Roosevelt

   a. Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment;

Science-based decision-making will be used throughout the project. Remote sensing data will be utilized to identify where invasive species are the most abundant in the watershed and to guide BMP implementation. Tailored BMP plans for landowners will be built around research-based principles identified by the Noble Research Institute. Monitoring and evaluation of project activities (both short- and long-term) will make use of all available water quality data.

b. Examine land use planning processes and land use designations that govern public use and access;

Proposed project activities will take place on private land.

c. Revise and streamline the environmental and regulatory review process while maintaining environmental standards.

No changes are proposed for the environmental and regulatory review process.

d. Review DOI water storage, transportation, and distribution systems to identify opportunities to resolve conflicts and expand capacity;

The Chickasaw Nation has already met with municipalities and rural water districts that rely on Arbuckle Lake. The Nation has identified ways for each water provider to increase their available supply, including reuse, and incorporate alternative water supplies. This is an active area of study in the region, supported by both the Chickasaw Nation and Reclamation.

e. Foster relationships with conservation organizations advocating for balanced stewardship and use of public lands;

The Oklahoma Conservation Commission, Nature Conservancy, ODWC, OPJV, CNRA, Arbuckle Restoration Association, and Noble Research Institute are all stakeholders in the watershed.

f. Identify and implement initiatives to expand access to DOI lands for hunting and fishing;

Improving watershed conditions and water quality in the Lake of the Arbuckles and its contributing streams will benefit recreational users within the Chickasaw National Recreation Area (managed by the National Park Service).

g. Shift the balance towards providing greater public access to public lands over restrictions to access.

Proposed project activities will take place on private land.

2. Utilizing our natural resources

a. Ensure American Energy is available to meet our security and economic needs;

This project does not address nor impede energy availability.

b. Ensure access to mineral resources, especially the critical and rare earth minerals needed for scientific, technological, or military applications;

This project does not address nor impede access to mineral resources.

c. Refocus timber programs to embrace the entire 'healthy forests' lifecycle;

The goals of this project are consistent with the 'healthy forests' lifecycle.

d. Manage competition for grazing resources.

Increasing the amount of grazing acreage by reducing invasive species will benefit both cattle producers and wildlife.

3. Restoring trust with local communities

a. Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands;

The watershed consists of a mixture of land uses, including ranches, poultry farms, a major municipality and public lands. LAWA and its watershed plan are integral tools in getting all of the land users to work together for the benefit of the watershed.

b. Expand the lines of communication with Governors, state natural resource offices, Fish and Wildlife offices, water authorities, county commissioners, Tribes, and local communities.

The National Park Service, City of Sulphur, Chickasaw Nation, ODWC, Arbuckle Master Conservancy, City of Davis, Murray County Conservation District, and local landowners are all stakeholders in the watershed.

4. Striking a regulatory balance

a. Reduce the administrative and regulatory burden imposed on U.S. industry and the public;

Removing the lake from the 303(d) list will help reduce regulatory burden.

b. Ensure that Endangered Species Act decisions are based on strong science and thorough analysis.

Project activities are not expected to affect endangered species, though monitoring will occur.

5. Modernizing our infrastructure

a. Support the White House Public/Private Partnership Initiative to modernize U.S. infrastructure;

The proposed project does not include construction or infrastructure-related activities.

b. Remove impediments to infrastructure development and facilitate private sector efforts to construct infrastructure projects serving American needs;

The proposed project does not include construction or infrastructure-related activities.

c. Prioritize DOI infrastructure needs to highlight:

1. Construction of infrastructure;
2. Cyclical maintenance;
3. Deferred maintenance.

The proposed project does not include construction or infrastructure-related activities.

2.6 Performance Measures

2.6.1 Timeline and Measurable Milestones

The following metrics will be used to track the progress of project activities:

1. Number of hosted or sponsored educational activities
2. Number of landowners contacted
3. Number of landowners who participated in educational activities
4. Number of conservation plans created
5. Number of acres under conservation plans (fully implemented)
6. Number of acres of invasive cedar cleared
7. Number of acres with implemented BMPs (prescribed burns, fencing, alternative water sources, etc.)

The following are long-term goals and milestones for watershed restoration, as noted in the watershed restoration plan:

1. Within 2 years, LAWA and its partners will ensure development of landowner conservation plans and conduct associated outreach activities that will result in no net increases in nutrient and sediment loading in targeted creeks.
2. Within 5 years, LAWA restoration strategies will result in maintenance (i.e., no increase) of chlorophyll-a in the lake and reduction in nutrient and sediment concentrations in contributing streams, thereby reducing loading to the lake.
3. Within 10 years, LAWA restoration strategies will result in a noticeable change or reduction in chlorophyll-a in the lake.

2.6.2 Monitoring

To assist in measuring the success of Restoration Plan implementation, LAWA will track the following metrics:

1. Decrease in presence of cedar within watershed, as measured by updated satellite imagery classification
2. Landowner soils test results
3. Native grass habitat acres improved

In addition, each LAWA meeting will include an update on water quality metrics (TP, TN, chlorophyll-a and DO), according to the most recent data.

3. PROJECT BUDGET

3.1 Funding Plan and Letters of Commitment

Estimated project funding sources are provided in Table 5. Corresponding Letters of Commitment are attached to this proposal in Attachment 1, from the following organizations:

1. Chickasaw Nation
2. Oka' Institute

Other written commitments are provided in the Official Resolution provided by the LAWA board of directors and included in this proposal as Attachment 5. Other letters of support are provided in Attachment 4.

Funding Source	In-kind labor
Applicant	
LAWA Board of Directors (in-kind)	$ 1,500
Third party contributions	
Landowner contributions	$ 60,000
Chickasaw Nation (in-kind)	$ 10,000
Chickasaw Nation (cash)	$ 15,000
Oka' Institute (in-kind)	$ 2,500
Subtotal Third party in-kind contributions	**$ 87,500**
Non-federal subtotal	**$ 89,000**
Federal	
Requested from Reclamation	$ 88,841
Total Project Cost	**$ 177,841**

Table 5: Total Project Cost

3.2 Budget Proposal

A budget proposal is included in Table 6.

Budget Item Description	Computation		Quantity Type	Federal Share	Match Share	Total Cost
	$/Unit	Quantity				
Salaries and Wages						
LAWA Foundation Board of Directors (volunteer labor; project management)	See budget narrative			$ -	$ 1,500	$ 1,500
TOTAL						**$ 1,500**
Travel						
Accommodation for meetings (3 speakers)	$ 400	$ 4	meeting	$ 600	$ 1,000	$ 1,600
TOTAL						**$ 1,600**
Materials and Supplies						
Printed educational materials	$ 150	$ 4	meeting	$ 600	$ -	$ 600
Meeting supplies (catering)	$ 1,000	$ 4	meeting	$ -	$ 4,000	$ 4,000
TOTAL						**$ 4,600**
Contractual Expenses						
Aqua Strategies Inc (mapping/support)	$ 110	$ 32	Hours	$ 3,520	$ -	$ 3,520
BMP implementation	See budget narrative			$ 73,121	$ -	$ 73,121
TOTAL						**$ 76,641**
Third-party in-kind contributions						
BMP Implementation (Oka' Institute in-kind)	See budget narrative			$ -	$ 2,500	$ 2,500
Conservation plan development (landowner)	$ 3,000	$ 20	plans	$ -	$ 60,000	$ 60,000
TOTAL						**$ 62,500**
Environmental and Regulatory Compliance Costs						
Environmental and Regulatory Compliance (cash)	See budget narrative			$ 10,000	$ 8,000	$ 18,000
Environmental and Regulatory Compliance (in-kind)	See budget narrative			$ -	$ 10,000	$ 10,000
TOTAL						**$ 28,000**
Other Expenses						
Advertising	$ 150	$ 4	meeting	$ 600	$ -	$ 600
Meeting venue rental and setup	$ 600	$ 4	meeting	$ 400	$ 2,000	$ 2,400
TOTAL						**$ 3,000**
GRAND TOTAL				**$ 88,841**	**$ 89,000**	**$ 177,841**

Table 6: Budget Proposal

3.3 Budget Narrative

Salaries and Wages

This budget item only includes in-kind contributions from LAWA, in the form of labor provided for project management by the board of directors.

Travel

This budget item includes accommodation costs for invited speakers to four planned outreach and education events. This item will be split between federal and matching funds provided by the Chickasaw Nation.

Materials and Supplies

This budget item includes catering for four planned outreach and education events (covered by matching funds from the Chickasaw Nation) as well as printing of educational materials (a planned federal cost).

Contractual Expenses

This budget item includes mapping and GIS analysis support to be provided by Aqua Strategies, in order to make best use of data from the University of Oklahoma. Aqua Strategies will provide maps and analysis and other project support. This is a planned federal cost.

The budget category also includes the costs of implementing BMPs within the watershed, which is the focus and final aim of this project. An estimated breakdown of planned acreages and BMP implementation is included below in Table 7.

Description	Unit Cost	Quantity	Total Cost	Unit
Prescribed burning	$ 17.80	$ 2,750	$ 48,950	ac
Residue and tillage management	$ 21.62	$ 525	$ 11,351	ac
Prescribed grazing	$ 12.82	$ 1,000	$ 12,820	ac
TOTAL			**$ 73,121**	

Table 7: BMP Implementation Costs

Third-party in-kind contributions

This budget item includes BMP implementation through in-kind support from the Oka' Institute (matching funding) as well as contributions from landowners in the form of in-kind labor. It is estimated that at least 20 landowners will cooperate with a third-party organization (such as OPJV or Noble Research Institute) to create individually-applicable conservation plans. Each plan is estimated to have an in-kind value of $3,000, to give a combined in-kind contribution of $60,000 (local match).

Environmental and Regulatory Compliance Costs

This budget item includes the estimated costs of environmental and other regulatory compliance measures. This cost was estimated based on a unit price of $4,000 per section, and the number

of planned sections to be placed under a conservation plan. This item is proposed to be covered by $10,000 of federal funding, with a further $18,000 provided by the Chickasaw nation (with $8,000 as cash and $10,000 as in-kind labor).

Other Expenses

This budget item includes advertising and venue rental/setup fees for four planned outreach and education events. These costs will be split between Chickasaw nation and federal funding.

3.4 Project Timeline

Table 8 provides a timeline for the activities proposed under this project.

<table>
<tr><th>Activities</th><th colspan="2">Q1</th><th>Q2</th><th>Q3</th><th>Q4</th><th>Q5</th><th>Q6</th><th>Q7</th><th>Q8</th></tr>
<tr><td>Project Management</td><td>Kickoff meetings</td><td></td><td colspan="2">Reporting</td><td>Project review meeting; reporting</td><td colspan="2">Reporting</td><td></td><td>Final meeting and reports</td></tr>
<tr><td>(1) Identify areas for brush removal and other conservation measures</td><td colspan="2">Complete satellite imagery analysis/mapping for cedar</td><td colspan="7"></td></tr>
<tr><td>(2) Landowner Outreach and Education</td><td colspan="2">1. Planning for outreach/education events
2. First outreach / education event</td><td colspan="2">1. Hold second and third outreach/education events
2. Hold final outreach/education event</td><td colspan="2">Continue landowner outreach as required</td><td colspan="2"></td></tr>
<tr><td>(3) Develop Conservation Plans</td><td colspan="2">Develop agreements with third-party conservation planning contributors</td><td colspan="5">Develop individual conservation plans in cooperation with landowners</td><td></td></tr>
<tr><td>(4) BMP Implementation</td><td colspan="2">Engage with landowners in areas of high cedar density</td><td colspan="7">BMP implementation, as conservation plans are developed</td></tr>
<tr><td>Environmental Compliance</td><td colspan="9">Conduct environmental and other reviews as required before BMP implementation</td></tr>
</table>

Table 8: Project Timeline

4. ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

Will the proposed project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

Ground disturbance and other activities that would require environmental compliance will be avoided where possible. Native grass restoration activities will utilize no-till drilling techniques, and mechanical removal of invasive cedars will be carried out using tree shears or mulching techniques to avoid bulldozing, wherever possible. However, some earth disturbance may be required during brush clearance activities or in order to create firebreaks before prescribed burning can begin. All required environmental permits will be obtained before work begins. The Chickasaw Nation have staff available to assist with environmental and cultural resources compliance, if necessary, including a staff member able to conduct surveys and trap American Burying Beetles for relocation.

Furthermore, all required permits for prescribed burns will be obtained before burning begins, and burns will be carried out using dormant season firing techniques, mowed firebreaks, and a back burning technique, wherever possible.

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

Endangered species identified in the project area by the U.S. Fish & Wildlife Service include the threated piping plover (*Charadrius melodus*), endangered whooping crane (*Grus americana*), endangered least tern (*Sterna antillarum*), and the candidate species Sprague's pipit (*Anthus spragueii*). In the long-term, these species are likely to be positively affected by the proposed activities (including prescribed burns and mechanical brush clearing), as the project specifically aims to restore habitat that has been altered by invasive species.[17]

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.

No proposed activities will take place in any wetlands or other surface waters during the project.

When was the water delivery system constructed?

No water delivery system will be constructed or improved during the proposed project.

[17] http://wildlife.org/wp-content/uploads/2014/05/TechManual16-01FINAL.pdf

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

No modifications to irrigation systems will be made during the proposed project.

Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

There are no buildings, structures, or features in the proposed project area listed or eligible for listing on the National Register of Historic Places. Furthermore, proposed activities will not disturb any buildings, structures, or features.

Are there any known archeological sites in the proposed project area?

The proposed project will take place entirely on private land, and no known archaeological sites will be affected by any project activity. If any sites are discovered during project implementation, all required regulations will be followed.

Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?

The proposed project activities will take place on private land in rural areas of the watershed, in cooperation with landowners. This project will both directly and indirectly benefit farmers and ranchers in the watershed, regardless of income.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

The proposed project activities are not expected to limit access to any Indian sacred sites or have any negative impacts on tribal lands.

Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

No noxious weeds or non-native species will be introduced or spread. A major thrust of the project activities is the removal of invasive cedar species from the watershed.

5. DOCUMENTATION IN SUPPORT OF APPLICANT ELIGIBILITY

Self-certification that group meets the definition of a "Watershed Group"

LAWA is a 501(c)(3) non-profit organization, made up of stakeholders in southeastern Oklahoma who are collaborating to identify, evaluate and resolve water quantity and quality issues within the Lake of the Arbuckles watershed. The association was officially founded in 2017 by the Chickasaw Nation and Oka' Institute at East Central University, who identified and organized the stakeholder representatives and mediated development of a cohesive vision and mission. LAWA is administered by an elected Board of Directors, with officers.

Active LAWA stakeholders and meeting attendees currently include landowners, municipalities, business interests, state and federal agencies, recreational interests, educational and conservation organizations and others, as indicated below:

Arbuckle Master Conservancy District
Bureau of Reclamation
Chickasaw Nation
Chickasaw National Recreation Area
City of Sulphur
Oka' Institute, East Central University
Oklahoma Conservation Commission
Oklahoma Department of Environmental Quality
Noble Research Institute
Murray County Extension Office
Oklahoma Department of Agriculture
Natural Resources Conservation Service
Oklahoma Water Resources Board

LAWA and its partners promote the implementation of sensible and feasible land management practices within the watershed that will improve soil health and reduce sediment and nutrient runoff. Ultimately, such measures are intended to result in removal of the Lake of the Arbuckles from its current impaired status, thus ensuring long-term sustainability of the lake and preservation of its vital water supply, recreational and related benefits to the local economy.

Articles of Incorporation

Articles of Incorporation are attached to this proposal in Attachment 2.

Bylaws

Bylaws are attached to this proposal in Attachment 3.

Mission Statement

LAWA's mission is to improve water quality and water supply thus promoting economic prosperity in the region through education and development of collaborative best management practices within the Lake of the Arbuckles watershed.

Meetings

The Chickasaw Nation and Oka' Institute provide administrative support to LAWA and continue to coordinate regular meetings of the Association. LAWA's Board of Directors meets quarterly, as required by the organization's bylaws.

Watershed Restoration Plan

In 2016, the Chickasaw Nation received a grant from the U.S. Bureau of Reclamation—through its Cooperative Watershed Management Program (CWMP) Phase I —to develop the Lake of the Arbuckles Watershed Restoration Plan with the express goal of proactively addressing current and future water quality issues impacting the lake. The plan summarizes existing water quality and quantity in the watershed, issues of concern, ongoing remedial activities and potential best management practices (BMPs) and related actions. Data and recommendations presented in the plan will help to guide development and implementation of appropriate and effective BMPs targeting soil health and native grassland restoration, with the ultimate goal of improved water quality. The watershed restoration plan is attached to this proposal as Attachment 6.

6. LETTERS OF PROJECT SUPPORT

Letters of support are provided in Attachment 4, from the following organizations:

1. Noble Research Institute
2. Oaks and Prairies Joint Venture
3. Arbuckle Master Conservancy District
4. The University of Oklahoma

7. OFFICIAL RESOLUTION

An official, signed resolution is provided in Attachment 5.

Attachment 1: Letters of Commitment

OFFICE OF THE GOVERNOR
The Chickasaw Nation
Post Office Box 1548 • Ada, Oklahoma 74821
(580) 436-2603 • Fax (580) 436-4287
http://www.chickasaw.net

BILL ANOATUBBY
GOVERNOR

January 7, 2019

Mr. Darren Olson
Bureau of Reclamation
Financial Assistance Services
Post Office Box 25007, MS 84-27814
Denver, CO 80225

Dear Mr. Connolly:

The Chickasaw Nation supports the work planned by the Arbuckle Lake Watershed Association for Phase II of the watershed restoration plan. The Chickasaw Nation will provide $15,000 cash and $10,000 of in-kind labor to the project by helping in developing restoration workshops, identifying potential sites for restoration activities and working with individual landowners to improve their operations economically as well as environmentally.

The Chickasaw Nation appreciates the opportunity to support the Arbuckle Lake Watershed Association, the Noble Foundation, the Oka' Institute and the U.S. Bureau of Reclamation on this project to implement best management practices to improve the water quality and quantity of water flowing into Lake of the Arbuckles. If you have any questions, please contact Mr. Wayne Kellogg at wayne.kellogg@chickasaw.net or at (580) 272-5076.

Sincerely,

Bill Anoatubby

Bill Anoatubby, Governor
The Chickasaw Nation

THE OKA' INSTITUTE
EAST CENTRAL UNIVERSITY

1100 East 14th Street, PMB J-4 | Ada, OK 74820 | 580.559.5151

January 17, 2019

Mr. Darren Olson
Bureau of Reclamation
Financial Assistance Services
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Bureau of Reclamation
Water Smart: Cooperative Watershed Management Program, Phase II

Dear Mr. Olson:

The Oka' Institute supports the work planned by the Lake of the Arbuckles Watershed Association for Phase II of the watershed restoration plan. The Oka' Institute has had the distinct privilege of helping with the creation of the board that will provide oversight and implementation of the plan. They are a very talented and dedicated group of citizens who will move this plan forward with passion and commitment. The Oka' Institute will be honored to continue working with this dynamic board by assisting in the development of restoration workshops, identifying potential sites for restoration activities and working with individual landowners to improve their operations economically as well as environmentally. We are committed to providing $2,500 of in-kind services towards these activities.

The Oka' Institute appreciates the opportunity to support the Lake of the Arbuckles Watershed Association, The Chickasaw Nation, the Noble Research Institute, and the U.S. Bureau of Reclamation on this project to implement best management practices to improve the water quality and quantity of water flowing into the Lake of the Arbuckles. This project not only increases the overall value of the Arbuckle Lake, but it also enhances the quality of life for all citizens in the area. If you have questions or need further information, please do not hesitate to contact me.

Sincerely,

Susan Paddack

Susan Paddack, Executive Director
Oka' Institute
580.559.5152
spaddack@ecok.edu

Attachment 2: Articles of Incorporation

OFFICE OF THE SECRETARY OF STATE

STATE OF OKLAHOMA

NOT FOR PROFIT
CERTIFICATE OF INCORPORATION

WHEREAS, the Not For Profit Certificate of Incorporation of

LAKE OF THE ARBUCKLES WATERSHED GROUP, INC.

has been filed in the office of the Secretary of State as provided by the laws of the State of Oklahoma.

NOW THEREFORE, I, the undersigned, Secretary of State of the State of Oklahoma, by virtue of the powers vested in me by law, do hereby issue this certificate evidencing such filing.

IN TESTIMONY WHEREOF, I hereunto set my hand and cause to be affixed the Great Seal of the State of Oklahoma.

GREAT SEAL OF THE STATE OF OKLAHOMA 1907

Filed in the city of Oklahoma City this 11th day of September, 2017.

Secretary of State

09/11/2017 12:15 PM
OKLAHOMA SECRETARY OF STATE

SOS

34670680002

CERTIFICATE OF INCORPORATION

(Oklahoma Not for Profit Corporation)

Filing Fee $25.00

SECRETARY OF STATE
421 N.W. 13th, Suite 210
Oklahoma City, Oklahoma 73103
(405) 522-2520

I hereby execute the following articles for the purpose of forming an Oklahoma not for profit corporation pursuant to the provisions of Title 18, Section 1006:

1. Name of the corporation: (**Note:** The name of the corporation **shall** contain one of the words **association, company, corporation, club, foundation, fund, incorporated, institute, society, union, syndicate, limited** or any abbreviations thereof, with or without punctuation, which shall be such as to distinguish it upon the records in the Office of the Secretary of State.)

Lake of the Arbuckles Watershed Group, Inc.

2. **NAME** and the street address of the registered agent for service of process in the State of Oklahoma:
   - The registered agent **shall** be the corporation itself, an individual resident of Oklahoma, **or** a domestic or qualified foreign corporation, limited liability company, or limited partnership.

Name	Street Address (P.O. BOXES ARE NOT ACCEPTABLE)	City	State	Zip Code	County
Krystina Phillips	110 W. 12th St.	Ada	Oklahoma	74820	Pontotoc

3. In the event the corporation is a **CHURCH**, the street address of its location in Oklahoma:

Street Address (P.O. BOXES ARE NOT ACCEPTABLE)	City	State	Zip Code
		Oklahoma	

4. Duration of the corporation is perpetual, unless otherwise stated: _____

5. Nature of the business or purposes for which the corporation is being formed:
   - It shall be sufficient to state, either alone or with other businesses or purposes, that the purpose of the corporation is to **engage in any lawful act or activity for which corporations may be organized under the general corporation law of Oklahoma.**

The purpose is to engage in any lawful act or activity for which corportations may be organized under the law of Oklahoma.

RECEIVED
SEP 11 2017
OKLAHOMA SECRETARY OF STATE

(SOS FORM 0009-07/12)

6. This corporation does not have authority to issue capital stock.

7. This corporation is not for profit, and as such the corporation does not afford pecuniary gain, incidentally or otherwise, to its members.

8. Number of trustees or directors to be elected at the first meeting: 1

   ❖ There must be at least **one (1)** trustee or director elected.

9. Names and mailing addresses of each person who will serve as a trustee or director:

   ❖ There must be at least **one (1)** trustee or director.

Name	Mailing Address	City	State	Zip Code
Marilyn Bearden	995 Lowrance Rd	Sulphur	OK	73086

10. Names and mailing addresses of the **undersigned incorporators**:

    ❖ There must be at least **three (3)** incorporators.

Name	Mailing Address	City	State	Zip Code
Kent Cornell	1804 W Broadway	Sulphur	OK	73086
Ronald Trett	P.O. Box 333	Sulphur	OK	73086
mb ~~mjbearden~~ @ Marilyn Bearden	995 Lowrance Rd.,	Sulphur,	OK	7

11. **E-MAIL** address of the primary contact for the registered business:
kystina@jaelaw.com

The certificate of incorporation must be signed by all incorporators stated within article #10.

- Signature of Incorporator: Kent Cornell Dated: 8-11-17
- Signature of Incorporator: Ronald Trett Dated: 8-11-17
- Signature of Incorporator: Marilyn Bearden Dated: 8-11-17

OKLAHOMA SECRETARY OF STATE

Dave Lopez
Secretary of State

421 N.W. 13th, Suite 210
Oklahoma City, OK 73103

Mary Fallin
Governor

November 3, 2017 **RECEIPT**

INDIAN AND ENVIRONMENTAL LAW GROUP.
110 W. 12TH STREET
ADA OK 74820

Client ID: 194221564

Session ID:N/A

Process Date: 11/03/2017 **Receive Date:** 11/03/2017

Document Number	Document Detail	Filing Number	Entity Name	Page Count	Fee
35156740002	Amended Certificate of Incorporation	2112635947	LAKE OF THE ARBUCKLES WATERSHED ASSOCIATION, INC.		$25.00

Total Document Fees **$25.00**

Payment Type	Payment Reference	Amount
Check	6599	$25.00

Total Payments Received **$25.00**

Note: Any overpayment will be refunded within 15 days of receipt of written request, or an automatic refund will be issued in 60 days
Evidence of Filed Document(s) or Orders(s) requested is enclosed.
Please include Client ID number on all correspondence.

OFFICE OF THE SECRETARY OF STATE

STATE OF OKLAHOMA

AMENDED NOT FOR PROFIT CERTIFICATE OF INCORPORATION

WHEREAS, the Amended Not For Profit Certificate of Incorporation of

LAKE OF THE ARBUCKLES WATERSHED ASSOCIATION, INC.

has been filed in the office of the Secretary of State as provided by the laws of the State of Oklahoma.

***NOW THEREFORE, I,** the undersigned, Secretary of State of the State of Oklahoma, by virtue of the powers vested in me by law, do hereby issue this certificate evidencing such filing.*

***IN TESTIMONY WHEREOF, I** hereunto set my hand and cause to be affixed the Great Seal of the State of Oklahoma.*

GREAT SEAL OF THE STATE OF OKLAHOMA 1907

Filed in the city of Oklahoma City this
3rd day of November, 2017.

Secretary of State

FILED - Oklahoma Secretary of State #2112635947 11/03/2017

11/03/2017 11:41 AM
OKLAHOMA SECRETARY OF STATE

SOS

35156740002

AMENDED
CERTIFICATE OF INCORPORATION
(Oklahoma Not for Profit Corporation)

Filing Fee: $25.00

--- -- STATE
421 N.W. 13th, Suite 210
Oklahoma City, Oklahoma 73103
(405) 522-2520

I hereby execute the following articles for the purpose of amending an Oklahoma corporation's certificate of incorporation pursuant to the provisions of Title 18, Section 1077:

1. A) Name of the corporation:

Lake of the Arbuckles Watershed Group, Inc.

B) **AS AMENDED:** Name of the corporation:

Lake of the Arbuckles Watershed Association, Inc.

(Note: The new name of the corporation **shall** contain one of the words **association, company, corporation, club, foundation, fund, incorporated, institute, society, union, syndicate, limited** or any abbreviations thereof, with or without punctuation, which shall be such as to distinguish it upon the records in the Office of the Secretary of State.)

2. If the corporation is a **CHURCH,** the street address of its location:

Street Address (P.O. BOXES ARE NOT ACCEPTABLE)	City	State	Zip Code

3. **AS AMENDED: NAME** and street address of the registered agent for service of process in the state of Oklahoma:

- The registered agent **shall** be the corporation itself, an individual resident of Oklahoma, **or** a domestic or qualified foreign corporation, limited liability company, or limited partnership.

Name	Street Address (P.O. BOXES ARE NOT ACCEPTABLE)	City	State	Zip Code	County
Krystina Phillips	110 W. 12th Street	Ada	Oklahoma	74820	Pontotoc

4. Duration of the corporation is **perpetual,** unless otherwise stated: _____

5. **AS AMENDED:** Nature of the business or **purposes** to be conducted or promoted by the corporation:

- It shall be sufficient to state, either alone or with other businesses or purposes, that the purpose of the corporation is to **engage in any lawful act or activity for which corporations may be organized under the general corporation law of Oklahoma.**

The purpose is to engage in any lawful act or activity for which corporations may be organized under the general corporation law of Oklahoma.

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NOV 03 2017
SECRETARY

(SOS FORM 0015-07/12)

6. Set forth clearly any and all amendments to the certificate of incorporation:

Change of name.

7. **E-MAIL** address of the primary contact for the registered business:

krystina@laelaw.com

CHECK ONE OF THE FOLLOWING STATEMENTS, WHICHEVER IS APPLICABLE:

☐ The governing body of the corporation adopted a resolution setting forth the amendment proposed and declaring its advisability.

At a subsequent meeting held upon notice stating the purpose thereof and given in accordance with the provision of Title 18, Section 1067, a majority of all the members of the governing body voted in favor of the amendment.

OR

☒ At a meeting of the governing body of said corporation, a resolution was duly adopted setting forth the foregoing proposed amendment(s) to the certificate of incorporation of said corporation, declaring said amendment(s) to be advisable and calling a meeting of the members for consideration thereof.

Pursuant to such call and to due written notice given to each member, a meeting was held, at which meeting the necessary number of members as required by the certificate of incorporation of said corporation voted in favor of the amendment(s).

The amended certificate of incorporation must be signed by the president or vice president of said corporation and attested to by its secretary or assistant secretary.

- **Signed this** 27th **day of** October, 2017 **by:**

Signature of **President or Vice President**

Larry Keenan
Printed Name

Attested to by:

Marilyn Bearden
Signature of **Secretary or Assistant Secretary**

MARILYN BEARDEN
Printed Name

(SOS FORM 0015-07/12)

RESOLUTION NO. 2017-01

LAKE OF THE ARBUCKLES WATERSHED GROUP, INC.

WHEREAS, the Lake of the Arbuckles Watershed Group, Inc. was incorporated as a not for profit corporation by the State of Oklahoma on September 11, 2017.

WHEREAS, the Board for the Lake of the Arbuckles Watershed Group, Inc. desires to change the name of the organization to Lake of the Arbuckles Watershed Association, Inc.

LET IT THEREFORE BE RESOLVED, that the name of the organization shall be changed to Lake of the Arbuckles Watershed Association, Inc.

LET IT BE FURTHER RESOLVED, that the Secretary and President of the organization shall be authorized to execute the documents necessary to amend the organization's articles of incorporation with the State of Oklahoma.

Adopted this 27th day of October, 2017.

President

ATTEST:

Secretary

Attachment 3: Bylaws

BYLAWS OF THE
Lake of the Arbuckles Watershed Association, Inc.
(an Oklahoma nonprofit corporation)

Article I. NAME

Section 1.01 **Name.** The name of this Corporation shall be the Lake of the Arbuckles Watershed Association, Inc. (hereinafter referred to as the "Corporation").

Article II. OFFICES AND FISCAL YEAR

Section 2.01 **Registered Office.** The registered office of the Corporation shall be located at the Indian and Environmental Law Group, PLLC, 110 W. 12th Street, Ada, Oklahoma 74820. The Corporation may also have such other offices at such other places within or without the State of Oklahoma as the Board of Directors may from time to time determine.

Section 2.02 **Fiscal Year.** The fiscal year of the Corporation shall be the calendar year unless otherwise fixed by resolution of the Board of Directors.

Article III. PURPOSES AND LIMITATIONS OF THE CORPORATION

Section 3.01 **Purposes.** The purposes for which the Corporation are formed are charitable, to-wit: to promote the sustainable use of water resources in the Lake of the Arbuckles watershed through education, collaboration with local stakeholders, and scientific application.

Section 3.02 **Limitations.** The Corporation shall not endorse, support, or oppose political candidates or political parties or otherwise engage or participate in, in a partisan manner, any political campaign. Notwithstanding any other provision of these Bylaws, the Corporation shall not engage in any act or activities prohibited (a) to a corporation exempt from federal income taxation under Section 501(c)(3) of the Internal Revenue Code or any corresponding provision or provisions of subsequent federal tax laws and any applicable regulations, as they now exist or as the same may hereafter be amended (collectively the "Code"); or (b) by any other provision of these Bylaws notwithstanding.

Article IV. BOARD OF DIRECTORS

Section 4.01 **Powers.** The Board of Directors shall have full power to oversee the management of the business and affairs of the Corporation and all powers of the Corporation.

Section 4.02 Number and Term of Office. The Board of Directors of the Corporation shall consist of such number of Directors, not less than five (5) nor more than fifteen (15), as may be determined from time to time by resolution of the Board of Directors.

Section 4.03 Term. The initial term of office of the Directors shall be approximately one-third one (1) year Directors, one-third two (2) year Directors, and one-third three (3) year Directors. Replacement Directors term of office shall be three (3) years. Each Director shall serve until the end of his or her term and until his or her successor shall have been elected and qualified, except in the event of his or her death, resignation, or removal. All Directors of the Corporation shall be natural persons of full age and either live or own property in Oklahoma. At the Board's discretion, a Director may be elected to successive terms.

Section 4.04 Resignations. Any Director of the Corporation may resign at any time by giving written notice to the President or Secretary of the Corporation. Resignations shall be deemed effective upon receipt. The acceptance of such resignation shall not be necessary to make it effective.

Section 4.05 Removal of Directors. Any Director or the entire Board of Directors may be removed from office, with or without cause, at any time, by a majority vote of the Directors of the Corporation.

Section 4.06 Vacancies. Vacancies caused by resignation, removal, or death shall be filled by a majority vote of the remaining Directors, though less than a quorum, at any duly called meeting of the Directors. The newly-appointed Directors shall serve for the remaining term of the replaced Director.

Section 4.07 Place of Meeting. The Board of Directors may hold its meetings, both regular and special, at such place or places within or without the State of Oklahoma as the Board of Directors may from time to time appoint, or as may be designated in the notice calling the meeting.

Section 4.08 Meetings. The Board shall have quarterly meetings, one of which shall be designated the annual meeting.

Section 4.09 Special Meeting. Special meetings of the Board of Directors shall be held whenever called by the President or by two or more Directors.

Section 4.10 Notice. Notice of each meeting, both regular and special, shall be given to each Director by telephone, in writing, electronically, or in person at least one (1) day, if notice is given by a method other than mail, and three (3) days, if given by mail, before the time at which the meeting is to be held. Each such notice shall state the time, place, date, and purpose of the meeting to be so held.

Section 4.11 **Records of Meetings.** The Board of Directors shall keep a complete record of all its acts and the proceedings of its meeting, and it shall present, in abbreviated form, a report of the condition and business of the Corporation at the Annual Meeting.

Section 4.12 **Quorum.** At all meetings of the Board of Directors, five members of the Board of Directors present in person shall be sufficient to constitute a quorum for the transaction of business. In the absence of the President and Vice-President, the quorum present may choose a Chairman for the meeting.

Section 4.13 **Voting.** At all meetings of the Board of Directors, a majority vote of the quorum present is required for approval, except as provided in these Bylaws.

Section 4.14 **Presumption.** A Director of the Corporation who is present at a meeting of the Board of Directors at which action on any corporate matter is taken shall be presumed to have assented to the action unless: his or her dissent shall be entered in the minutes of the meeting; or he or she files written dissent to such action with the person acting as the Secretary of the meeting, prior to adjournment; or he or she shall forward such dissent by certified mail to the Secretary of the Corporation as soon as practicable after adjournment. Such right to dissent shall not apply to any Director who voted in favor of the action.

Section 4.15 **Unanimous Consent.** Unless otherwise required by the Certificate of Incorporation or these Bylaws, any action required or permitted to be taken at a meeting of the Board of Directors may be taken without a meeting if all the members of the Board of Directors consent thereto in writing, including electronic communications, and the writing or writings are filed with the minutes of proceedings of the Board.

Section 4.16 **Telephonic Participation.** A Director may participate in any Board meeting through the use of any means of conference telephones or similar communications equipment as long as all Directors participating can hear one another. A Director so participating is deemed to be present in person at the meeting.

Section 4.17 **Duties of Board of Directors.** The Board of Directors shall keep a complete record of all its acts and the proceedings of its meeting and it shall present a full statement at the annual meeting of the Corporation, showing in detail the conditions and affairs of the Corporation. The Board of Directors shall audit all accounts of the Corporation at least once per calendar year. An outside auditor may be hired to conduct the audit if the Board feels it necessary. A report of the audit shall be presented to the members at the annual meeting. The Board shall promulgate and enforce such regulations that are necessary and proper for the fulfillment of the Corporation's purpose.

Section 4.18 **Committees.** The Board of Directors, as outlined in these Bylaws or by future resolution adopted by a majority of the Directors, may designate one or more committees, each of which shall consist of one or more Directors and may include non-Directors as voting members. Committee members shall be appointed by the President, who shall also designate the Committee's president, with the advice and consent of the Board. Committees, to the extent provided in these Bylaws or said adopted resolution, shall have and exercise the authority of the Board of Directors in the management of the Corporation, except that no such committee shall have the authority of the Board of Directors in reference to amending, altering or repealing Bylaws; electing, appointing or removing any member of any such committee or any such Director or officer of the Corporation; amending or restating the Articles of Incorporation; adopting a plan of merger or adopting a plan of consolidation with another Corporation; authorizing the sale, lease, exchange, or mortgage of all or substantially all the real property and assets of the Corporation; authorizing the voluntary dissolution of the Corporation; or amending, altering, or repealing any resolution of the Board, which by its terms provides that it shall not be amended, altered, or repealed by the committee. The designation and appointment of any such committee and the delegation thereto of authority shall not operate to relieve the Board, or any individual Director, of any responsibility imposed upon the Board of Directors by law.

Article V. OFFICERS

Section 5.01 **Number, Qualifications and Designations.** The officers of the Corporation shall be chosen by the Board of Directors and shall be a President, a Vice-President, a Secretary, a Treasurer, and such other officers as may from time to time be elected by the Board of Directors. One person may hold more than one office, except the offices of President and Secretary may not be held by the same person.

Section 5.02 **Election and Term of Office.** The officers of the Corporation shall be elected annually by the Board of Directors and shall hold office until their successors shall have been elected and qualified or until their resignation or removal. Any officer may resign at any time upon written notice to the Corporation or may be removed, with or without cause, by the Board of Directors.

Section 5.03 **President.** The President shall be the chief executive officer of the Corporation. It shall be the duty of the President to preside at all meetings of the Board of Directors and to have general and active management of the business of the Corporation.

Section 5.04 **Vice-President.** The Vice-President or Vice-Presidents shall be vested with all the powers required to perform all the duties of the President in the President's absence or disability, and the Vice-President(s) shall perform such other duties as may be prescribed by the Board of Directors. The Vice-President shall assume the office of the President for its unexpired term if a vacancy occurs.

Section 5.05 Secretary. The Secretary shall attend all meetings of the Corporation and the Board of Directors. The Secretary shall record all of the proceedings of such meetings in a book kept for that purpose, give proper notice of the meetings of the Board of Directors, and perform such other duties as shall be assigned the Secretary by the President or the Board of Directors.

Section 5.06 Treasurer. The Treasurer shall: (a) have charge and custody of and be responsible for all fund, notes, and other valuable assets of the Corporation; (b) deposit all funds in the name of the Corporation in such banks, trust companies, or depositories as shall be selected in accordance with the provisions of these Bylaws; (c) keep complete and accurate records of accounts, showing accurately at all times the financial condition of the Corporation; (d) render a statement of the condition of the finances of the Corporation at all annual meetings of the Board of Directors; and (e) perform all duties and exercise all powers incident to the office of Treasurer and such other duties and powers as the Board of Directors, President or the Vice-President(s) may from time to time designate.

Section 5.07 Delegation The Board of Directors may delegate, temporarily, the powers and duties of any officer of the Corporation in the case of the officer's absence, or for any other reason, to any other officer. The Board of Directors may also authorize the delegation by any officer of the Corporation of any of the officer's powers and duties to any agent or employee, subject to the general supervision of such officer.

Article VI. CONFLICTS OF INTEREST

Section 6.01 Conflicts of Interest. The Board is committed to demonstrating the highest standards of conduct. Board Members' duty to the Corporation, as well as their personal commitment to the mission of the Corporation, requires they act not in their personal interests but solely in the best interests of the Corporation.

Section 6.02 Financial Conflict of Interest. A person has a potential financial conflict of interest if the person has, directly or indirectly, through business, investment, or family: (a) an ownership or investment interest greater than 5% of an entity with which the Corporation has a transaction or arrangement; (b) a compensation arrangement with Corporation or with any entity or individual with which the Corporation has a transaction or arrangement; or (c) a potential ownership or investment interest in, or compensation arrangement with, any entity or individual with which the Corporation is negotiating a transaction or arrangement. "Compensation" includes direct and indirect remuneration as well as gifts or favors that are not insubstantial.

Section 6.03 Positional Conflict of Interest. A person has a potential positional conflict of interest if the person has allegiance to an organization, such as an employer, major business client, or another organization on whose board the person serves, which might affect, or might reasonably appear to affect, such person's independence, judgment, or conduct in matters affecting the Corporation. Disclosure of a positional conflict does not prohibit the Board Member from either discussing or voting on the issue raising the conflict.

Section 6.04 Duty to Disclose. It is the duty of each Board Member to disclose any potential financial or positional conflict of interest to the Board upon election. Each Board Member has a continuing duty to disclose potential conflicts as they arise throughout his or period of service.

Section 6.05 Process for Board Review of a Financial Conflict of Interest. The Board shall review the potential financial conflict of interest, excercising due diligence to determine if the Board can obtain with reasonable efforts a more advantageous transaction from a person or entity that would not give rise to a conflict of interest. The Board shall then determine by a majority vote (of which the Board Member with the potential conflict shall not participate) whether the transaction is in the Corporation's best interest and fair and reasonable and whether to approve or disapprove the transaction. The minutes shall reflect the discussion and decision regarding the potential financial conflict of interest and the fact that the disclosing Board Member did not participate.

Article VII. MISCELLANEOUS

Section 7.01 Contracts. The Board of Directors may authorize any officer or officers, agent or agents, of the Corporation to enter into any contract or execute and deliver any instrument in the name of and on behalf of the Corporation. Unless so authorized by the Board of Directors or by these Bylaws, no officer, agent, or employee shall have any power or authority to bind the Corporation by any contract or engagement, or to pledge its credit or to render it liable for any purpose or for any amount.

Section 7.02 Checks, Drafts, etc. All checks, drafts, or other orders for the payment of money, notes, or other evidence of indebtedness issued in the name of the Corporation shall be signed by such officer or employees of the Corporation as shall from time to time be authorized by resolution of the Board of Directors or any of these Bylaws.

Section 7.03 Depositories. All funds of the Corporation shall be deposited to the credit of the Corporation in such banks, trust companies, or other depositories as the Board of Directors may from time to time designate upon such terms and conditions as shall be fixed by the Board of Directors. The Board of Directors may authorize the opening, with any such depository as it may designate, of general and special bank accounts and may make such special rules and regulations with respect thereto, not inconsistent with the provisions of these Bylaws, as it may deem expedient.

Section 7.04 Acceptance of Gifts. The Board of Directors, by or through its duly appointed agents, may accept on behalf of the Corporation any unencumbered contribution, gift, or bequest for the general purpose or for any special purpose of the Corporation.

Section 7.05 **Prohibition Against Sharing in Earnings or Profits.** No Director, officer, employee, or any person connected with the Corporation, or any other private individual, shall receive, at any time, any of the net earnings or profits from the operation of the Corporation. This provision notwithstanding, these Bylaws or the Certificate of Incorporation shall not prevent the payment to any person of such reasonable compensation for services rendered to or for the Corporation as shall be fixed by the Board of Directors.

Section 7.06 **Dissolution.** The Board of Directors by a majority vote may elect to dissolve the Corporation at any duly held meeting of the Board. Actual dissolution and termination of the Corporation shall be carried out according to the provisions of the Oklahoma General Corporation. Upon dissolution, any remaining assets of the Corporation shall be used exclusively for charitable exempt purposes.

Section 7.07 **Amendments.** These Bylaws may be altered, amended, or repealed, or new Bylaws may be adopted, by a majority vote of the Board of Directors present at any duly held Board meeting.

Section 7.08 **Conflicts.** In the event of any conflicts between these Bylaws and the Certificate of Incorporation of the Corporation, the Certificate of Incorporation shall control.

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SECRETARY'S CERTIFICATE

I hereby certify that the foregoing is a true and correct copy of the Bylaws of the Lake of the Arbuckles Watershed Group, Inc., as adopted by its Board of Directors effective as of September 29, 2017, and that the foregoing remains in full force and effect as to the date hereof.

Date: Dec 29, 2017

Ronald Trott
Secretary

Attachment 4: Letters of Support

NOBLE RESEARCH INSTITUTE

January 29, 2019

Mr. Darren Olson
Bureau of Reclamation
Financial Assistance Services
P.O. Box 25007, MS 84-27814
Denver, CO 80225

RE: Support for Lake of the Arbuckles Watershed Association WaterSMART Cooperative Watershed Management Program (Phase II) Project and Funding

Dear Mr. Olson:

The Noble Research Institute officially supports the Lake of the Arbuckles Watershed Association's application for Phase II funding to implement its Watershed Restoration Plan in the Lake of the Arbuckles watershed. As an agricultural research institute practicing in the watershed, we acknowledge that proper resource stewardship within the Lake of the Arbuckles watershed, through proven land management strategies, is vital to the health of the Lake of the Arbuckles and to the environmental health and economy of southern Oklahoma.

A major effort of the Noble Research Institute is to provide farmers and ranchers in the Southern Great Plains with agriculture consultation services. We do this free of charge to those that request our service through an integrated, multi-disciplinary effort. We provide customized recommendations on best management practices to individual producers in the areas of livestock, forage, wildlife, soils and crops, horticulture, and agriculture economics. We also recognize the importance of and therefore encourage producers to work collaboratively with one another on shared resources such as the Lake of the Arbuckles watershed. Therefore, the efforts of the Lake of the Arbuckles Watershed Association and the Noble Research Institute fit together nicely.

The Noble Research Institute welcomes the opportunity to support the Lake of the Arbuckles Watershed Association, Bureau of Reclamation and others involved in implementing best management practices to improve soil health and the quality and quantity of water within the watershed. Please contact Russell Stevens at 580-224-6435 or rlstevens@noble.org should you require any additional information concerning our support of this proposed plan or the Institute itself.

Sincerely,

A. Jill Wallace

A. Jill Wallace
Vice President and Chief Financial Officer
Noble Research Institute, LLC

Oaks and Prairies Joint Venture
6438 Gene Autry Road
Ardmore, OK 73401
January 3, 2019

Mr. Darren Olson
Bureau of Reclamation
Financial Assistance Services
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Bureau of Reclamation
Water Smart: Cooperative Watershed Management Program, Phase II

Dear Mr. Olson:

As Conservation Delivery Specialist of the Oaks and Prairies Joint Venture (OPJV) partnership, I extend my support to the Arbuckle Lake Watershed Association in their proposal to conduct Phase II of the watershed restoration plan. The Oaks and Prairies Joint Venture (OPJV) is a self-directed public-private partnership of state and Federal agencies, non-governmental organizations, corporations, universities, and individuals to address large scale bird conservation in central Texas and central Oklahoma. To date, the OPJV's primary focus has been on grassland bird conservation.

Phase II of the watershed restoration plan addresses the development and implementation of best management practices to improve the water quality and quantity of water flowing into Lake of the Arbuckles. Many of these best management practices overlap nicely with the work we are doing in central Oklahoma to positively impact native grassland habitat and grassland birds.

Over the last six months, we have met several times with representatives of the Arbuckle Lake Watershed Association to share ideas and expertise. We look forward to continued discussions and involvement as this project moves forward.

If you have questions, please contact Mr. Kenneth Gee at kgee@abcbirds.org or (580) 319-8440.

Sincerely,

Kenneth Gee
Conservation Delivery Specialist
Oaks and Prairies Joint Venture
American Bird Conservancy

Arbuckle Master Conservancy District

STEVEN R. JOLLY
District Manager

P.O. Box 753
Davis, Oklahoma 73030
580/369-3121
580/369-3202 Fax

Mr. Darren Olson
Bureau of Reclamation
Financial Assistance Services
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Bureau of Reclamation
Water Smart: Cooperative Watershed Management Program, Phase II

Dear Mr. Olson:

The Arbuckle Master Conservancy District supports the work planned by the Arbuckle Lake Watershed Association for Phase II of the watershed restoration plan. The Arbuckle Master Conservancy District is very interested in improving the water quality of the streams feeding the lake in order to remove the lake from the 303d list of impaired waters.

The Arbuckle Master Conservancy District appreciates the opportunity to support the Arbuckle Lake Watershed Association, The Chickasaw Nation, the Noble Foundation, and the U.S. Bureau of Reclamation on this project to implement best management practices to improve the water quality and quantity of water flowing into Lake of the Arbuckles. If you have questions, please contact me at sjolly@sbcglobal.net or (580) 369-3121.

Sincerely,

Steven R. Jolly, District Manager
Arbuckle Master Conservancy District

The University of Oklahoma
CENTER FOR SPATIAL ANALYSIS

January 25, 2019

Mr. Darren Olson
Bureau of Reclamation
Financial Assistance Services
P.O. Box 25007, MS 84-27814
Denver, CO 80225

Re: Support for the Lake of the Arbuckles Watershed Association WaterSMART Cooperative Watershed Management Program, Phase II Grant Proposal

Dear Mr. Olson:

I am pleased to write this letter of support for the proposal to be submitted by the Lake of the Arbuckles Watershed Association under USBR's CWMP Phase II grant program. I am excited that this watershed group is planning to use satellite data produced at the Center for Spatial Analysis to inform and plan their conservation measures. I will be able to provide related technical advice during the project, if needed.

Yours sincerely,

Xiangming Xiao (萧向明), Ph.D.
George Lynn Cross Research Professor
Professor, Department of Microbiology and Plant Biology, College of Arts and Sciences
Associate Director, Center for Spatial Analysis, College of Atmospheric & Geographic Sciences
Director, Earth Observation and Modeling Facility
Email: xiangming.xiao@ou.edu; Website: http://www.eomf.ou.edu; Telephone: (405)-3258941

Attachment 5: Official Resolution

Lake of the Arbuckles Watershed Association

January 25, 2019

Mr. Darren Olson
Bureau of Reclamation
Financial Assistance Support Section
P.O. Box 25007, MS 84-27814
Denver, CO 80225

RE: Official Resolution
Bureau of Reclamation – Water Smart: Cooperative Watershed Management Program Phase II

Dear Mr. Olson,

The Lake of the Arbuckles Watershed Association (LAWA) is pleased to submit this proposal for Phase II of the Arbuckle Lake Watershed Restoration Plan. LAWA will work with the Chickasaw Nation, the Noble Research Institute, the Oka' Institute and the Bureau of Reclamation by assisting in developing restoration workshops, identifying potential sites for restoration activities and work with individual landowners to improve their operations economically as well as environmentally.

LAWA will meet their financial obligations as follows:
The Chickasaw Nation will provide $15,000 in cash and $10,000 in in-kind labor.
The Oka' Institute will provide $2,500 in-kind labor.
LAWA Board of Directors will provide $1,500 in-kind labor.
Watershed Landowners will develop 20 land management plans at an average cost of $3,000/written plan providing $60,000 in-kind labor (see attached).
Total non-federal funding provided towards this project is $89,000.

LAWA appreciates the opportunity to work with the Chickasaw Nation, the Noble Research Institute, the Oka' Institute and the U.S. Bureau of Reclamation on this project to implement best management practices to improve the water quality and quantity of water flowing into Lake of the Arbuckles. The Chickasaw Nation, Oka' Institute, watershed landowners and LAWA will provide in-kind services for the project. LAWA will work with all parties to meet established deadlines. If you have questions, please contact me at keenancattle@gmail.com or (580) 622-2242.

Sincerely,

Larry Keenan, President
Arbuckle Lake Watershed Association

Lake of the Arbuckles Watershed Association

Landowner Written Grazing Management Plan*

Grazing Management Plan - Written Grazing Management Plan Less Than or Equal to 100 acres $1,936.50
Grazing Management Plan - Written Grazing Management Plan 101 to 500 acres $2,581.99
Grazing Management Plan - Written Grazing Management Plan 501 to 1500 acres $3,227.49
Grazing Management Plan - Written Grazing Management Plan 1501 to 5000 acres $3,872.98

Grazing Management Plan - Written Grazing Management Plan Greater Than 5000 acres $4,518.48

Landowner Written Prescribed Burning Plan*

Prescribed Burning Plan - Written Prescribed Burning Plan Less Than or Equal to 20 Acres $312.16
Prescribed Burning Plan - Written Prescribed Burning Plan 21-100 Acres $499.45
Prescribed Burning Plan - Written Prescribed Burning Plan 101-250 Acres $749.17
Prescribed Burning Plan - Written Prescribed Burning Plan 251-500 Acres $998.89
Prescribed Burning Plan - Written Prescribed Burning Plan 501-1000 Acres $1,248.62
Prescribed Burning Plan - Written Prescribed Burning Plan Greater Than 1000 Acres $1,498.34

Landowner Written Wildlife Habitat Plan*

Wildlife Habitat Plan – Written Wildlife Habitat Management (1 Land Use) $2,643.19
Wildlife Habitat Plan - Written Wildlife Habitat Management (2 Land Uses) $2,934.19
Wildlife Habitat Plan - Written Wildlife Habitat Management (3 Land Uses) $3,467.68
Pollinator Habitat Plan - Written Pollinator Habitat Enhancement Plan $2,800.81

Landowner Stream Habitat / Riparian Buffer Zone Written Management Plan*

Stream Habitat / Riparian Buffer Zone Written Plan $5,295.28

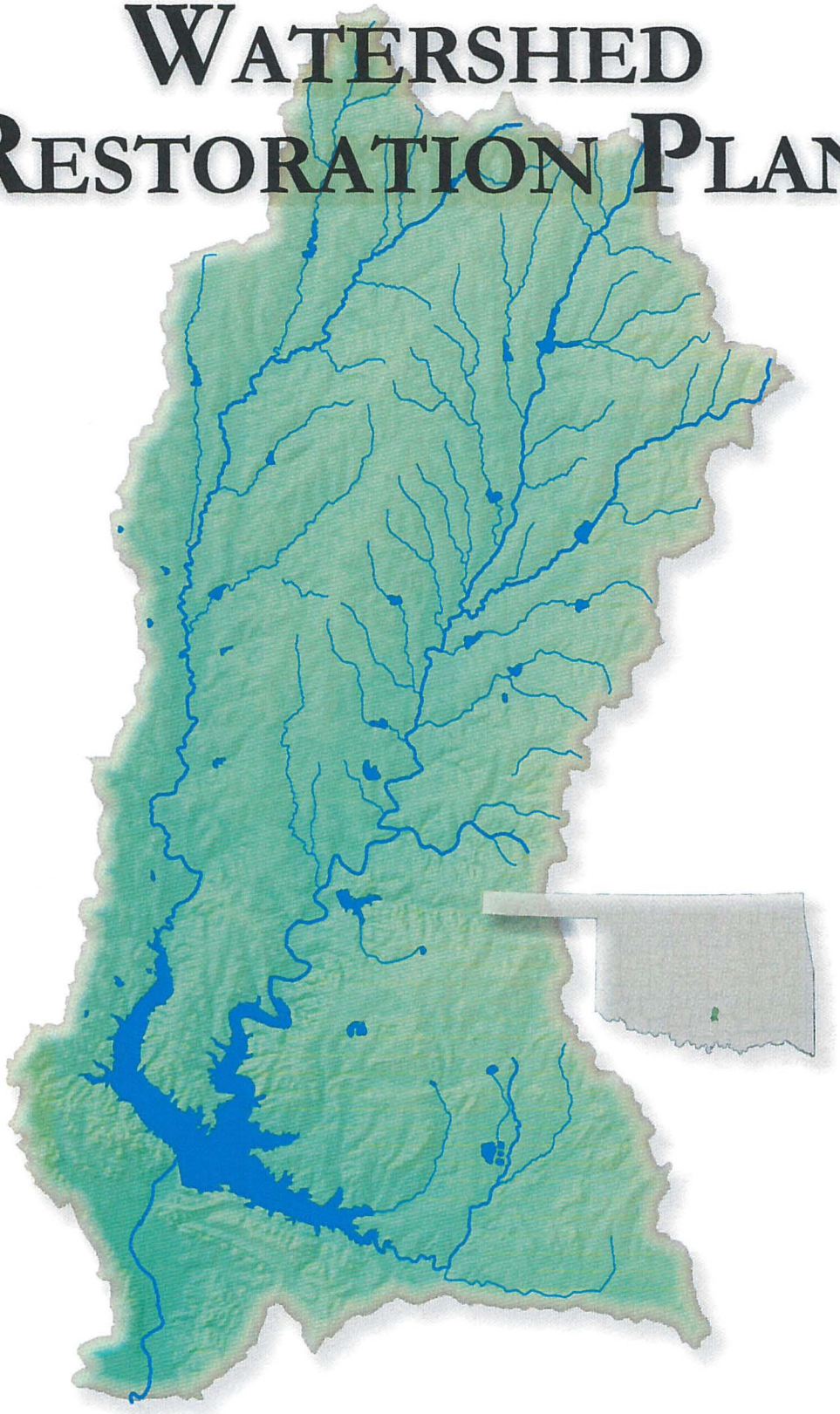
***LAWA requires written plans to be developed with technical assistance from one of the following agencies:**

1) Noble Research Institute
2) Oklahoma Department of Wildlife Conservation
3) Oaks and Prairies Joint Venture

Attachment 6: Watershed Restoration Plan

Lake of the Arbuckles

Watershed Restoration Plan



Lake of the Arbuckles Watershed Association

April 2018

Lake of the Arbuckles Watershed Management Study
USBR WaterSMART Cooperative Management Program, FY-2016

Prepared by the Chickasaw Nation and Oka' Institute of East Central University
in collaboration with Duane Smith & Associates and AquaStrategies, Inc.

Table of Contents

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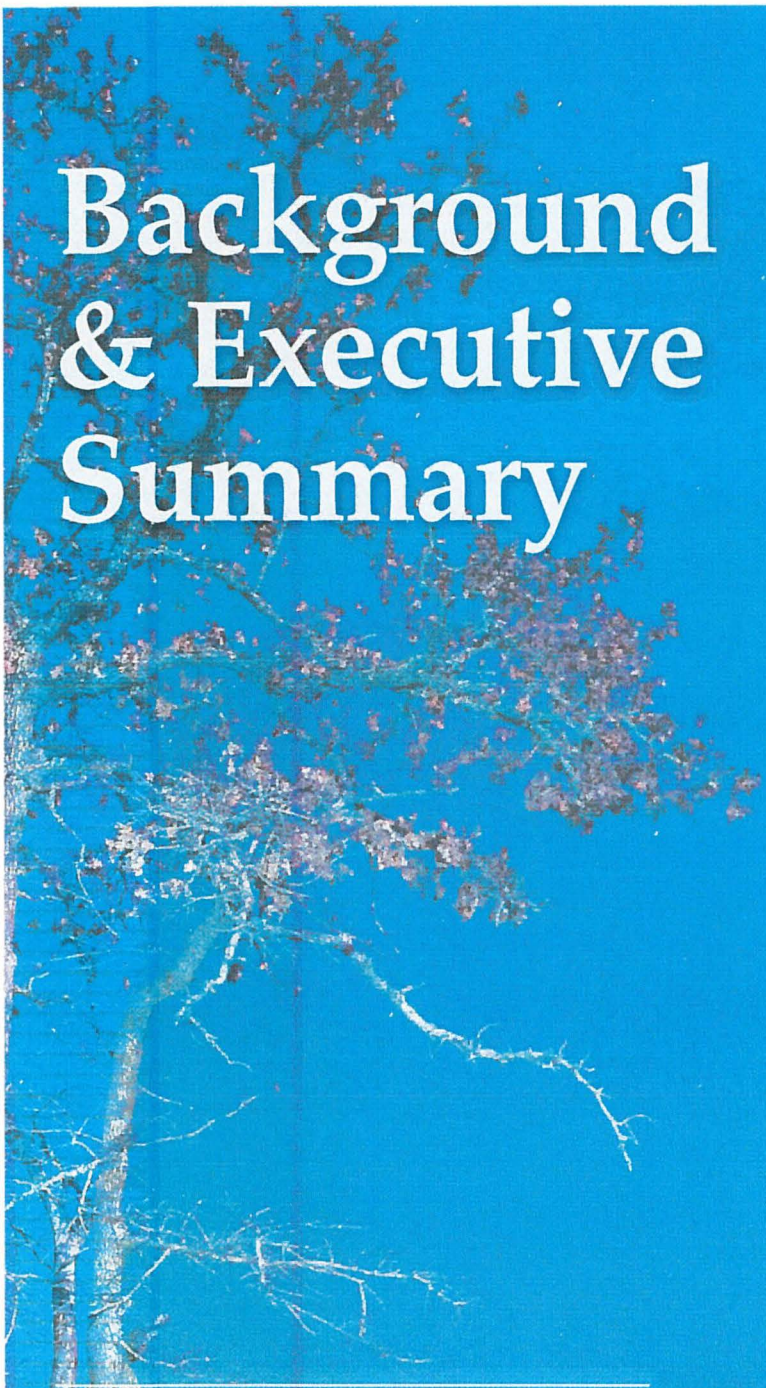
Background & Executive Summary



The Chickasaw Nation, through the Bureau of Reclamation's Cooperative Watershed Management Program, facilitated establishment of the Lake of the Arbuckles Watershed Association in 2016 to foster grassroots solutions to local water challenges. Successful implementation of the Association's Watershed Restoration Plan—the product of this collaborative federal/tribal/local partnership—will result in improved water quality and elimination of water impairments, thus ensuring the long-term integrity of the lake and its watershed.

Located some six miles south of the town of Sulphur at the confluence of Buckhorn, Guy Sandy and Rock Creeks, the Lake of the Arbuckles provides uniquely important economic and recreational value to south central Oklahoma. Constructed by the Bureau of Reclamation in the heart of the Chickasaw Nation, the 51-year-old lake consists of 2,350 acres of open water and 36 miles of shoreline. A vital water supply source to the region, the lake impounds 72,400 acre-feet of water reaching depths up to 85 feet.

The scenic Lake of the Arbuckles is widely known for its crystal clear water and looming rock cliffs along its shores, making it one of Oklahoma's most popular destinations for fishing, waterskiing, swimming and scuba-diving. Public amenities include six campgrounds and more than 400 camping sites. Turkey, deer and small game birds are found on nearby hunting grounds.

The lake also occupies the western portion of the Chickasaw National Recreation Area (CNRA), a recreational, historical and cultural attraction in its own right. Established in 1902 as one of Amercia's first national parks, CNRA alone hosts more than 1.5 million people each year.

This frequency of visitors to the lake and surrounding area has made recreation a mainstay of the south central Oklahoma economy. According to the report, "The Economic Impact of Travel on Oklahoma Counties, 2011-2012," travel expenditures in the 22-county Choctaw/Chickasaw Planning Region, which includes the Lake of the Arbuckles, exceeded $730 million in 2012. This created 5,400 jobs, generating more than $94 million in payroll and $57.5 million in state and local tax receipts. Associated revenue is generated through equipment sales, licenses, land ownership and leasing, jobs, salaries, taxes, rents and other trip-related spending. Domestic travel, including tourism, is the third largest industry in Oklahoma; it may be the largest industry in south central Oklahoma.

Aside from being a beautiful amenity and essential source of revenue for the region, the Lake of the Arbuckles is the primary water source for numerous residents and businesses. Through the Arbuckle Master Conservancy District, which controls the operation and maintenance of Arbuckle dam and aqueduct, reliable water supply is provided to the cities of Ardmore, Davis and Wynnewood (and its oil refinery) as well as the Southern Oklahoma Water Corporation.

As is common with many waterbodies, Lake of the Arbuckles has begun to exhibit water quality and quantity issues of concern. The Oklahoma Department of Environmental Quality (ODEQ) had determined that the lake is impaired for failing to meet dissolved oxygen (DO) standards. Municipal, agricultural and other land use practices in the watershed may be a contributing factor, but additional monitoring is required to pinpoint sources. The many springs and streams in the Lake of the Arbuckles watershed are partially sustained by flow from the Arbuckle-Simpson aquifer, so existing quality and quantity impacts to the aquifer are also manifested in the lake.

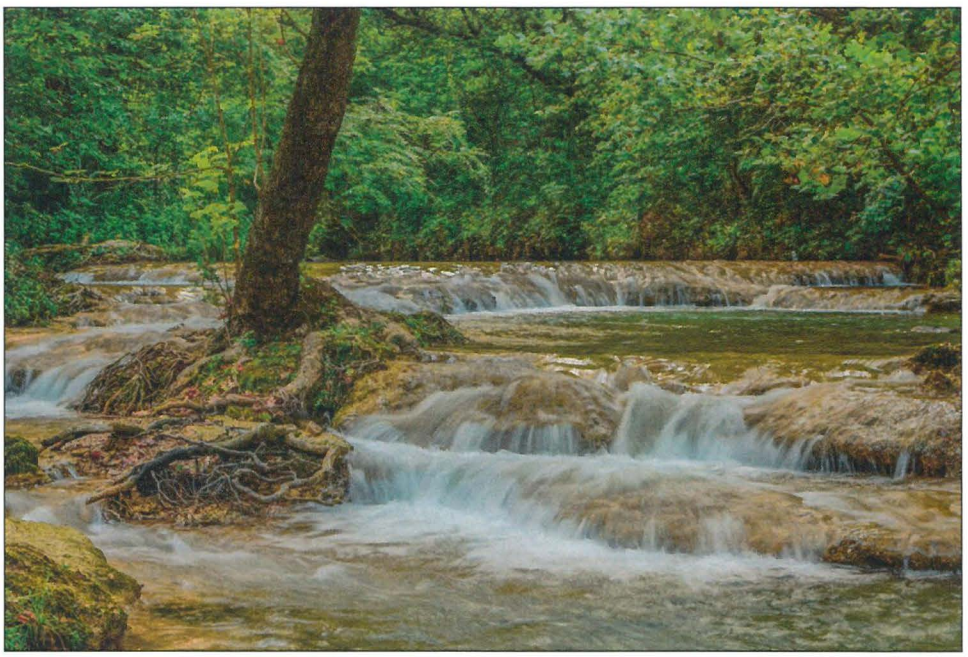


Figure 1. Spring-fed Travertine Creek, Chickasaw Nation Recreation Area

In 2016, the Chickasaw Nation received a grant from the Bureau of Reclamation—through its Cooperative Watershed Management Program (CWMP)—to develop the Lake of the Arbuckles Watershed Restoration Plan with the express goal of proactively addressing current and future water quality issues impacting the lake. Rather than being a top-down initiative, this program facilitates the development of stakeholder-driven grassroots watershed initiatives to improve water quality and quantity and reduce water conflicts at the local level. Working with the Oka' Institute at East Central University, the Chickasaw Nation and its consultants helped galvanize community leaders and local stakeholders through formation of the Lake of the Arbuckles Watershed Association (LAWA), a 501(c)3 organization. An associated Board of Directors was subsequently appointed, including officers to fill key roles. The Chickasaw Nation and Oka' Institute provide administrative support.

Through this Plan, LAWA and its partners promote the implementation of sensible and feasible land management practices within the watershed that will improve soil health and reduce sediment and nutrient runoff. Ultimately, such measures are intended to result in removal of the Lake of the Arbuckles from its current impaired status, thus ensuring long-term sustainability of the lake and preservation of its vital water supply, recreational and related benefits to the local economy.

Specifically, this Plan summarizes existing water quality and quantity in the watershed, issues of concern, ongoing remedial activities and potential best management practices (BMPs) and related actions. It does not identify individual sources of pollution nor target specific actions on defined tracts of land.

This Plan also outlines a process for working with stakeholders to implement BMPs and other watershed improvement strategies, including available technical and financial resources to facilitate the implementation of future projects. And it establishes metrics—quantified through a planned program to expand and enhance monitoring of water quantity and quality in the watershed—to determine the anticipated success of these actions.

A final, yet most important, component of the Plan is education and outreach, especially to area landowners, in implementing strategies beneficial to both the watershed and its economy.

Introduction

Background

The Lake of the Arbuckles watershed is located in the State of Oklahoma within Murray, Garvin and Pontotoc Counties (Figure 2). The City of Sulphur is located within the watershed and the cities of Dougherty, Hickory, and Davis are within five miles of watershed boundaries, all within Murray County. The watershed lies within the boundaries of the Gulf Coast Prairie Landscape Conservation Cooperative (LCC) and Cross Timbers eco-region, as defined by the U.S. Environmental Protection Agency (EPA).

The Lake of the Arbuckles has a surface area of 2,350 acres and water storage capacity of 72,400 acre-feet (AF). The Lake was created by the U.S. Bureau of Reclamation (USBR) by construction of the Arbuckle Dam in 1966. Its watershed is delineated by the Hydrologic Unit Code (HUC) Boundary Dataset, inside the HUC-10 watershed (1113030306) that covers an area of 88,590 acres. The Lake of the Arbuckles has 36,440 AF of capacity assigned to flood control. In addition to the considerable revenue the lake brings from tourists, the lake provides substantial flood control benefits—amounting to as much as $5 million or more since its construction—to the surrounding region.

The Lake of the Arbuckles serves as a vital source of water supply for some 51,000 citizens in several municipalities. The Arbuckle Master Conservancy District operates and maintains the Arbuckle Lake Dam and water supply infrastructure. The Lake also receives groundwater in the form of springflow from the Arbuckle-Simpson aquifer, which serves as an important supply source for the region.

The Arbuckle-Simpson aquifer, which underlies more than 500 square miles in south central Oklahoma, is the principal water source for the City of Sulphur and is the source of a number of important springs in the region, including those in the Chickasaw National Recreation Area (CNRA), which is operated by the National Park Service (NPS). Stakeholders are concerned that increased withdrawals from the aquifer will result in declining flows in streams and springs.

The Chickasaw Nation's aboriginal homeland in south central Oklahoma is an area rich in water resources, thus water has long been a fundamental element of the Chickasaw identity. Sustainability and protection of water resources—along with stewardship of the land and environment—has become a central focus of Nation policies and practices in its 13-county territory.

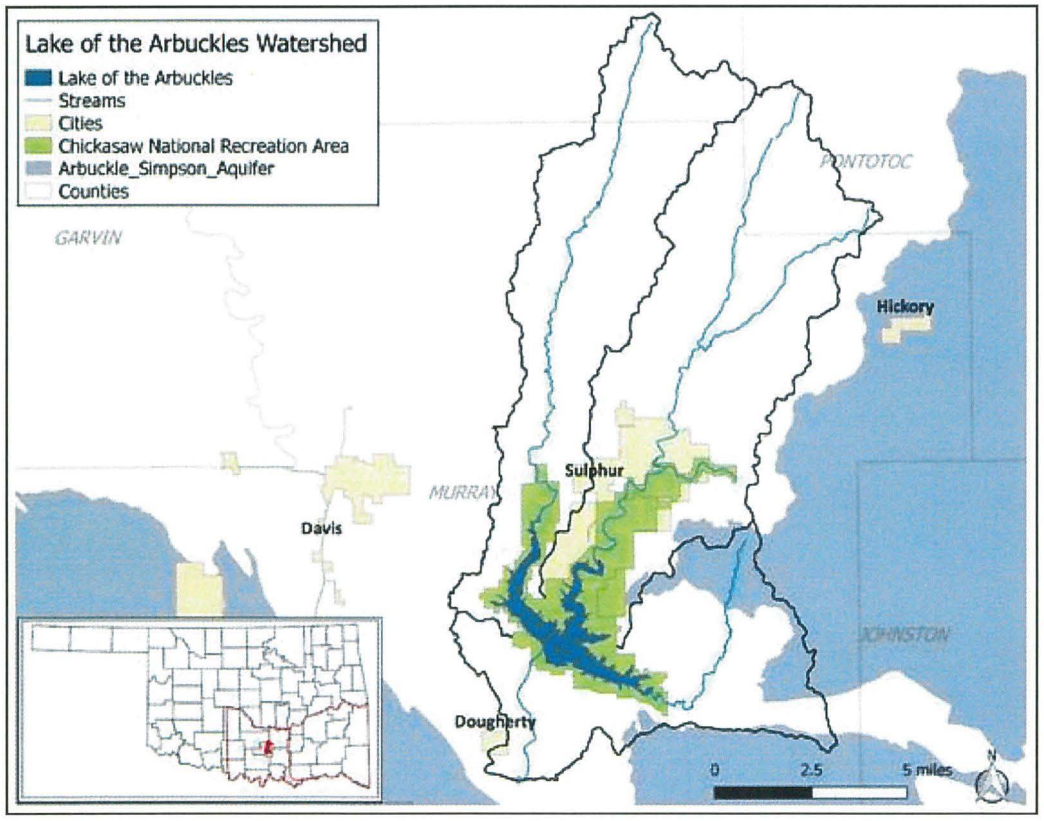


Figure 2. Geographic location of the Lake of the Arbuckles Watershed

Purpose and Framework

South central Oklahoma faces an increasing number of water resource challenges. Aging infrastructure, expanding population, depletion of groundwater resources, impaired water quality associated with particular land uses and land covers, growing water

requirements for human and environmental needs, drought and climate variability all contribute to water availability concerns. Water shortages and water-use conflicts have become more commonplace in many areas of the country, even in normal water years. As competition for water increases—crop irrigation, municipal requirements, energy production and the environment—the need for accurate data and tools to aid water resource managers also grows.

The U.S. Bureau of Reclamation's WaterSMART (Sustain and Manage America's Resources for Tomorrow) Program establishes a framework to pursue multiple watershed goals: provide Federal leadership and assistance on the efficient use of water; integrate water and energy policies to support the sustainable use of all natural resources; form strong diverse partnerships with States, tribes and local entities; and coordinate with other Department bureaus and offices on water conservation activities. The CWMP contributes to the WaterSMART strategy by providing funding to watershed groups to encourage stakeholders to form local solutions to address their collective water management needs.

Lake of the Arbuckles Watershed Association (Stakeholder Group)

LAWA is composed of a diverse set of stakeholders in the region who are collaborating to identify, evaluate and resolve water quantity and quality issues within the Lake of the Arbuckles watershed. The Chickasaw Nation and Oka' Institute at East Central University originally identified and organized the stakeholder representatives, mediated development of a cohesive vision and mission, and continue to coordinate regular meetings of the Association.

Members

LAWA stakeholders include landowners, municipalities, business interests, state and federal agencies, recreational interests, educational and conservation organizations and others, as indicated below:

- Arbuckle Master Conservancy District
- Bureau of Reclamation
- Chickasaw Nation
- Chickasaw National Recreation Area
- City of Sulphur
- Murray County Extension Office
- Oka' Institute, East Central University
- Oklahoma Conservation Commission
- Oklahoma Department of Agriculture
- Oklahoma Department of Environmental Quality
- Oklahoma Water Resources Board
- Natural Resources Conservation Service
- Noble Research Institute

LAWA is administered by an elected Board of Directors, with officers, and supported by the Oka' Institute and Chickasaw Nation, including experienced water and planning consultants from Duane Smith and Associates and Aqua Strategies.

Additional stakeholders identified to support and strengthen the planning process include:

- Agricultural Irrigators
- Arbuckle Conservation District
- Buckhorn Rural Water District
- Citizens for the Protection of the Arbuckle-Simpson Aquifer
- Continental Resources
- Mahard Egg Farm
- Murray Co. Conservation District
- Murray Co. RWD #1
- Oaks and Prairies Joint Venture
- OGE Energy Corp.
- Oklahoma Biological Survey
- Oklahoma Department of Wildlife Conservation
- Oklahoma Geological Survey
- Oklahoma Historical Society (Research Center)
- Oklahoma Intertribal Agricultural Council
- Oklahoma Mesonet
- Oklahoma Rural Water Association
- Oklahoma State University
- Oklahoma Tourism & Recreation Dept.

Board of Directors

Lake of the Arbuckles Watershed Association

Larry Keenan, President

Marilyn Bearden, Vice Pr

- OU South Central Climate Science Center
- Pontotoc Co. RWD #8
- Rural Development (Ada Office)
- Sierra Club
- South Central Climate Science Center
- The Nature Conservancy
- U.S. Dept. of Agriculture, El Reno Office
- U.S. Fish & Wildlife Ecological Service
- U.S. Geological Survey
- USDA Climate Hub, El Reno
- Wingard Water Corporation

Many of these stakeholders have already indicated an interest in partnering to implement on-the-ground strategies to achieve the Association's goals.

Mission & Goals and Objectives

As the first order of business, the Board developed priorities, Goals and Objectives and established the following Mission Statement to guide the organization as it seeks to implement this Plan:

> *"...to improve water quality and water supply thus promoting economic prosperity in the region through education and development of collaborative best management practices within the Lake of the Arbuckles watershed."*

The mission statement goes hand-in-hand with Goals and Objectives of LAWA, developed and adopted by the Board:

1) Ensure Sustainable Management of Surface Water Resources:
   - Identify strategies to remove Arbuckle Lake from the State 303(d) impaired waterbody list for low Dissolved Oxygen levels.
   - Identify strategies to improve the condition of Guy Sandy, Rock and Buckhorn Creeks, which are listed as areas exceeding State thresholds for nutrient parameters.
   - Support municipal water supplies by encouraging existing and future water right holders to adopt sustainable water management practices that minimize impacts to streamflow, springs and lake levels.
2) Support Sustainable Stream Water Quality & Quantity Efforts:
   - Focus on reducing instream chemicals, pollutants and bacteria by developing Best Management Practices for the watershed.
   - Coordinate ongoing water monitoring efforts to ensure data availability.
   - Support Blue Thumb and other educational outreach projects that will expand water monitoring in the watershed.
3) Enhance Economic Prosperity from Water Resources and Outdoor Recreation:
   - Support efforts to provide a unified water tourism voice within Murray County.
   - Showcase water quality and land use practice benefits resulting from initiated Best Management Practices.
4) Promote Educational Opportunities and Activities that lead to a Healthy Watershed:
   - Promote Land Management Practices resulting in healthy soil, allowing for greater production, cleaner water and an improved environment.
   - Facilitate workshops, field days and other educational programs promoting Best Management Practices.
   - Improve and enhance riparian habitat through development of Best Management Practices.
5) Development of an Advisory Committee to the Board:
   - Receive focused strategic advice from area stakeholders on watershed management.
   - Coordinate efforts combating invasive aquatic and land-based species, such as Eastern Red Cedar, Hydrilla and Zebra Mussels.

Meetings

Initial meetings of the LAWA Board, officially formed in September 2017, focused on inventorying financial and technical resources, and discussion of both watershed issues of concern and general strategies to accomplish watershed restoration and protection. Including early unofficial meetings and regular monthly meetings of the Board, LAWA members have accomplished the following important tasks:

- Developed Mission Statement and clarified project/organization Goals and Objectives.
- Filed with state as a 501(c)3 organization.
- Ensured all relevant interests are adequately represented.
- Provided input on watershed concerns.

- Educated members on watershed issues and prospective strategies.
- Provided input on preferred management strategies.
- Helped develop evaluation criteria for analyzing success of restoration/protection strategies.
- Provided review and comments on draft watershed restoration plan.
- Assisted in conducting community education and outreach.
- Discussed and approved Mission Statement.

Table 1: LAWA Meeting Schedule and Summary

Meeting Date	Highlights
2016	
October 10 (Organizational Meeting)	· Met with OWRB, ODEQ, OCC, and USDA staff at Governor's Water Conference to discuss the grant and receive input.
December 15	· Met with key stakeholders. · Discussed proposed draft Bylaws. · Discussed plan outreach activities and identified other stakeholders.
2017	
January 18	· Identified and discussed intersection of stakeholder interests. · Discussed and approved Mission Statement.
March 28	· CNRA discussed watershed management and cedar control in the park. · Department of Agriculture talked about CAFOs and related activities in the watershed. · Aqua Strategies discussed funding opportunities.
May 22	· Developed Watershed Management Concepts. · Identified watershed concerns. · Identified sources and potential solutions for water resource concerns.
June 30	· Chickasaw Nation discussed the status and goals of the project. · Noble Research Institute discussed their work with ranchers. · BOR summarized the grant and planning process.
July 27	· Elected Board members.
August 11	· Met with the Board to discuss the Mission Statement and Bylaws. · Prioritized water resource concerns. · Finalized watershed project concepts for top-ranked water resource concerns.
September 29 (First Official LAWA Board Meeting)	· Elected officers. · OWRB discussed ideas on how to improve water quality.
October 27 (LAWA Board)	· BOR staff discussed Phase I and Phase II of the watershed grant. · The Board discussed the Articles of Incorporation.
December 1 (LAWA Board)	· Arbuckle Master Conservancy District discussed the history of the lake. · Chickasaw Nation discussed their monitoring activities in the watershed. · Developed outline of watershed restoration plan based on watershed project concepts. · Implemented process and evaluation needed to develop watershed restoration plan.
December 29 (LAWA Board)	· Bylaws approved. · Chickasaw Nation discussed the Five Star & Urban Waters grant that is being proposed to accomplish some of the water quality monitoring in the watershed.
2018	
January 26 (LAWA Board)	· Chickasaw Nation discussed the Five Star grant application. · Discussed draft LAWA Watershed Restoration Plan brochure. · Chickasaw Nation summarized the meeting staff had with the Noble Research Institute.
February 23 (LAWA Board)	· Discussed Technical Advisory Group membership. · Barney Austin presented an overview of the draft Watershed Restoration Plan, including timeline for review/submittal to BOR.

Association meeting dates and brief individual meeting summaries are presented in Table 1.

Technical Advisory Group

Consistent with LAWA Goals and Objectives, the organization will also utilize a Technical Advisory Group to further inform decisions related to prescribed land use practices, monitoring and other important issues associated with implementation of the Watershed Restoration Plan. Members include representatives of:

- Arbuckle Master Conservancy District
- Buckhorn Rural Water District
- Bureau of Reclamation
- Chickasaw Nation
- Chickasaw National Recreation Area
- City of Davis
- City of Sulphur
- Murray County OSU Cooperative Extension
- Murray County Rural Water District #1
- Natural Resource Conservation Service
- Noble Research Institute
- Oaks and Prairies Joint Venture
- Oka' Institute
- Oklahoma Conservation Commission
- Oklahoma Department of Wildlife Conservation
- Oklahoma Dept. of Agriculture, Food & Forestry
- Oklahoma Dept. of Environmental Quality
- Oklahoma Water Resources Board

Current Conditions

Watershed Overview and Sources of Water Supply

Lake of the Arbuckles is fed by five principal creeks: Rock Creek, Guy Sandy Creek, Wilson Creek, Buckhorn Creek and Travertine Creek (Figure 3). All of these creeks are fed by springs in dry weather, with Rock and Travertine Creeks receiving additional flow contributions from artesian springs of the Arbuckle-Simpson aquifer.

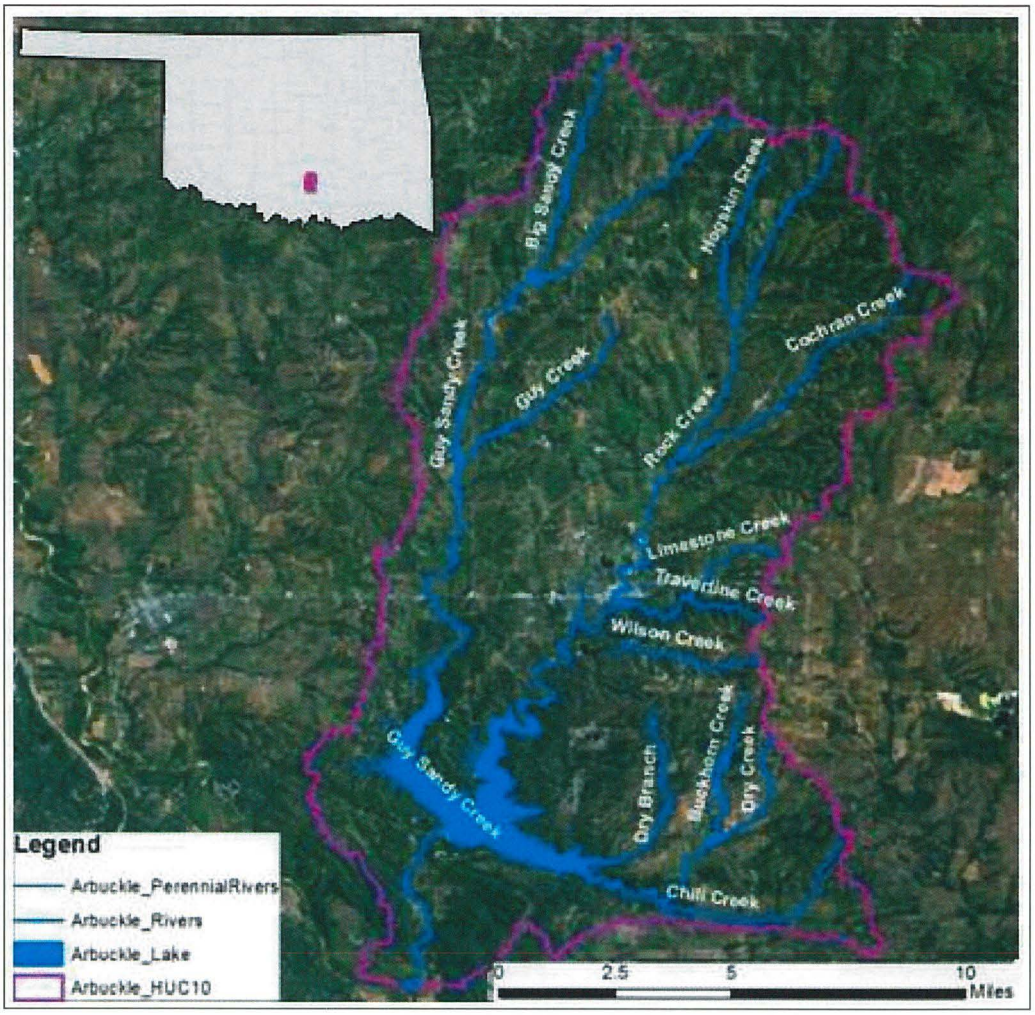


Figure 3. Contributing Creeks to the Lake of the Arbuckles.

Water Rights and Uses

Table 2 summarizes existing water rights within the Lake of the Arbuckles watershed. Six of the eight rights are vested, having been in existence since 1969. Current water uses for all rights include irrigation, public supply and recreation/fish/wildlife. The 24,000 acre-feet/year (AFY) of storage within the Lake of the Arbuckles is allotted to the Arbuckle Master Conservancy District, which supplies water to the cities of Ardmore, Davis, Wynnewood and Southern Oklahoma Water Corporation. The City of Sulphur has also contracted for a portion of the lake's supply but doesn't currently utilize its share nor possess the infrastructure to bring that water to the community.

Table 2. Water Rights and Uses in the Lake of the Arbuckles Watershed

Permit Number	Owner Name	Date Issued	Total Permitted (AFY)	Primary Purpose
19490043	Buckhorn Sportsman Club LLC	8/11/1969	500	Recreation, Fish & Wildlife
19030003	Oscar Lowrance, Jr.	8/12/1969	342	Irrigation
19540270	Denny Binderman	8/12/1969	1	Irrigation
19560823	Chickasaw National Recreation Area	8/12/1969	100	Public Supply
19610061	Willis H Milton	8/12/1969	63	Recreation, Fish & Wildlife
19570516	Arbuckle Master Conservancy District	8/12/1969	3,127	Public Supply
19820009	Arbuckle Master Conservancy District	5/11/1982	20,873	Public Supply
19980014	Jim Leanard	10/13/1998	160	Irrigation

Wastewater Treatment Facilities and Discharges

In the past, treated wastewater effluent was discharged into Rock Creek from the City of Sulphur's wastewater treatment plant (WWTP). Occasionally, Sulphur's sewage treatment holding pond would overflow into Rock Creek (Graham, 2015). Degradation to

water quality within the boundaries of the CNRA, which is adjacent to the City of Sulphur, occurred in the summer and autumn of 1994 as a result of a sewage spill, resulting in high fecal coliform levels in Travertine Creek and Rock Creek and large algal blooms in the Lake of the Arbuckles. On at least four separate occasions, a city sewer line backed up and flowed into a storm drain that later emptied into Travertine Creek, which flows into Rock Creek and the lake (Wikle et al., 1998).

Improvements were made to the system in 2007 and 2011, including treatment upgrades, storage lagoon improvements and transmission line replacements. As a result of those improvements, the Sulphur wastewater treatment plant currently discharges about 0.9 million gallons per day (MGD) of treated effluent into Dry Sandy Creek, which is outside of the Arbuckle Lake watershed. Although these upgrades significantly reduced leaks and overflows, CNRA National Park Service staff continue to work closely with the City of Sulphur to monitor and address potential sewer-line blockages and manhole overflows that may impact the water quality of the park's sensitive springs and streams.

Wastewater treatment retention facilities (lagoons) in the watershed exist at the Five Lakes Property Owners Association, Goddard Youth Camp WWTP, and Cedar Blue WWTP. The Cedar Blue WWTP experienced a number of compliance problems that are currently being remedied under an ODEQ consent order. In 2016, significant improvements were made to the system's irrigation field equipment, force mains, pumps and wet wells; a new generator was also installed.

There are currently no conventional treated wastewater dischargers in the watershed.

Recreation

The Chickasaw National Recreation Area (CNRA), covering an area of 9,899 acres, surrounds the Lake of the Arbuckles and includes a number of springs that attract tourists to the park, Sulphur and Murray County. The National Park Service manages the CNRA along with an additional 2,409 acres in the open water area. In 2012, the CNRA received almost 1.5 million visitors. However, the drought experienced by the entire state from 2011 to 2015 ultimately impacted lake levels and streamflow, decreasing tourism. The low flows and lake levels have yet to return to previous highs.

The springs, streams, and lakes in the Chickasaw NRA are significant resources for tourism and recreation, aquatic and terrestrial ecosystems, and public water supply. These water features draw visitors to the park to enjoy water-based recreational activities, such as boating, waterskiing, fishing and swimming, and to enjoy the scenic beauty of the Lake. The Lake of the Arbuckles is considered one of the best fishing lakes in Oklahoma for catfish, perch, bass, and crappie, and is a major tourist attraction in south central Oklahoma.

Water Quality Summary

The following section describes current water quality in the Lake of the Arbuckles watershed as well as potential opportunities for water quality improvements.

Lake

Oklahoma Department of Environmental Quality (ODEQ) assessments indicate that the Lake of the Arbuckles does not meet state water quality standards. In particular, the reservoir does not meet the dissolved oxygen (DO) portion of Warm Water Aquatic Community standards.[1] The 2015 Oklahoma Beneficial Use Monitoring Program (BUMP) Lakes Report determined that the lake is a phosphorus limited, eutrophic system, so identifying impacts of existing and future phosphorus sources in the watershed should be a priority. [BUMP includes several sites within the lake that are periodically monitored. Additional lake/stream monitoring in the watershed is conducted by the Chickasaw Nation, National Park Service and through Blue Thumb, a voluntary monitoring effort administered by the Oklahoma Conservation Commission.]

In addition, the watershed is considered a Special Provision Watershed with a Sensitive Public and Private Water Supply. The lake is included on the ODEQ priority list for 2019 to conduct a Total Maximum Daily Load (TMDL) evaluation for the DO-related impairment. A bathymetric survey of

[1]*The Fish and Wildlife Propagation beneficial use is considered not attained with respect to dissolved oxygen if at least one of two criteria is met - Surface Criteria: More than 10% of the samples from the epilimnion during periods of thermal stratification, or the entire water column when no stratification is present, are less than 4.0 mg/L from June 16 through October 15 (5.0 mg/L during the remainder of the year). Water Column Criteria: 50% or more of the water volume has a DO concentration of less than 2.0 mg/L. Or if no volumetric data is available, more than 70% of the water column at any given sample site has a DO concentration of less than 2 mg/L.*

the lake was conducted in 2016 and will help determine if the lake's DO impairment is still applicable (OWRB, 2016).

On a related note, in early 2018 the ODEQ issued an advisory for the lake concerning elevated levels of mercury found in sampled fish tissue. For at least the time-being, "sensitive" individuals (defined as women of child-bearing age, pregnant or nursing mothers, and children up to the age of 15) are advised to limit consumption of flathead catfish and white bass species of certain sizes. There are no restrictions on those fish for the general population. Black crappie, channel catfish, largemouth bass, smallmouth bass and spotted bass were also sampled and found to be safe for general population consumption. The most likely source of this mercury is thought to be atmospheric disposition from coal-fired power plants in nearby states. This issue is not associated with current activities in the Lake of the Arbuckles watershed and is thus outside the scope of this Plan.

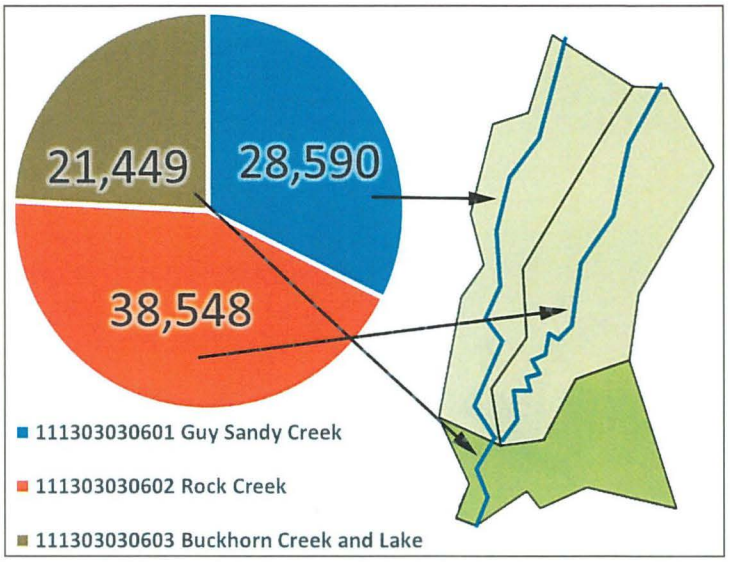


Figure 4. HUC12 sub-basins with watershed size (acres) from EPA HAWQS

The NPS is currently conducting a broad study of mercury occurring in national parks, including the CNRA, which includes sampling of mercury levels in dragonfly larvae. Dragonfly larvae, a popular food source for fish, accumulate higher levels of mercury than other types of aquatic insects. Final data will shed light on ecosystem health by characterizing the risk and potential transfer of mercury around food webs.

Sub-Watersheds

Available resources were used to delineate and compare the lake's sub-watersheds (HUC12, see Figures 4 and 5). Specifically, the Soil Survey Geographic Database (SSURGO), EPA Hydrologic and Water Quality System (HAWQS) and recent water quality data were investigated to see if significant differences exist between the Guy Sandy and Rock Creek watersheds.

An uncalibrated Soil and Water Assessment Tool (SWAT) model was executed using the EPA HAWQS

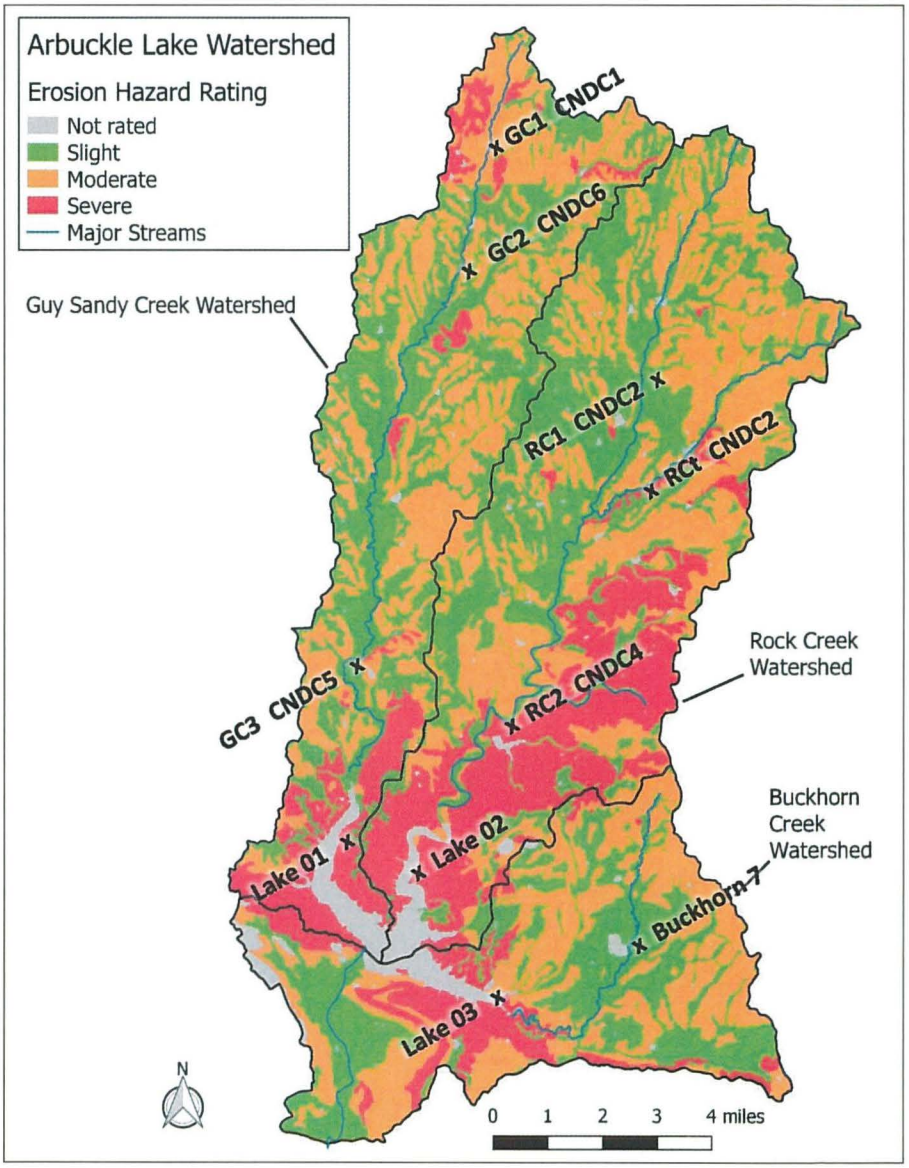


Figure 5. Lake of the Arbuckles SSURGO Erosion Hazard Rating map with Chickasaw Nation water quality sampling sites

system for an eight-year simulation period from January 2003 through December 2010. The preliminary model scenario run utilized available site-specific geospatial soil, slope, land use and precipitation datasets combined with literature values for watershed processes. Because of the relatively large HUC12 watershed area, total flow exiting the Rock Creek watershed is higher than in Guy Sandy Creek (Figures 6 and 7); however, on a per-acre basis, runoff in the Rock Creek watershed is lower than in the Guy Sandy Creek watershed (Figure 8).

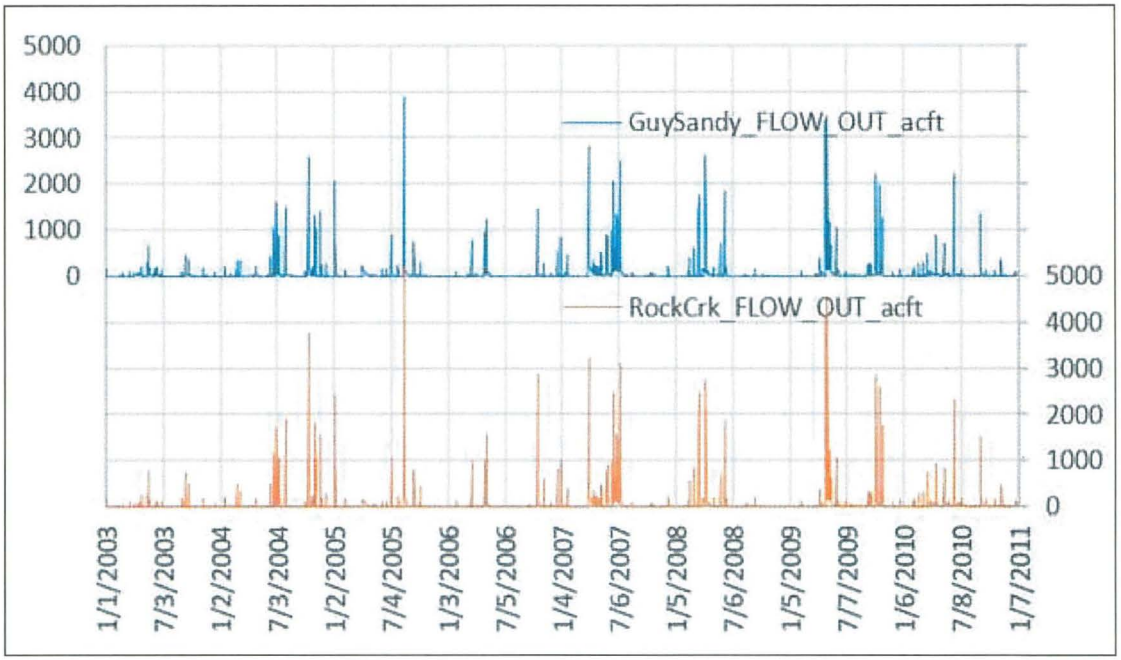


Figure 6. Uncalibrated EPA HAWQS model result for surface water flow exiting watersheds in acre-feet per day

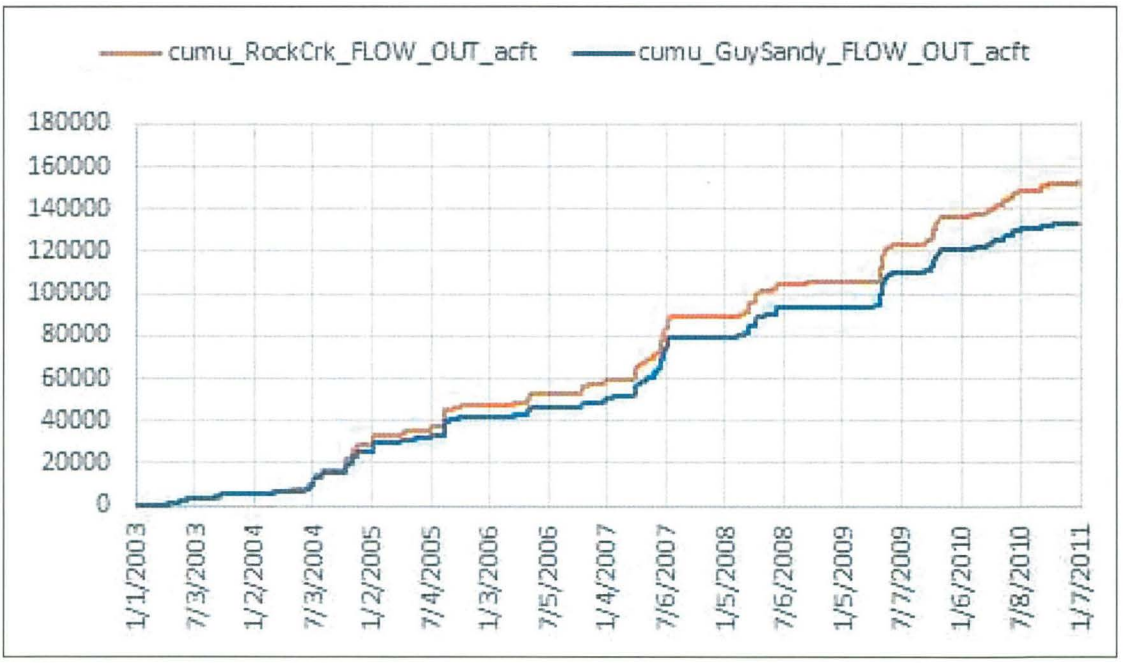


Figure 7. Uncalibrated EPA HAWQS model result for cumulative surface water flow exiting watersheds in acre-feet

Sediment loading per acre (Figure 9) from Rock Creek is higher than in Guy Sandy Creek. This is consistent with the erosion hazard rating map that exhibits higher potential erosion in the Rock Creek sub-watershed than in Guy Sandy or Buckhorn Creek (Figure 4).

Despite sediment loading from the Rock Creek watershed being higher, nutrient loading per acre from Rock Creek is lower than from Guy Sandy Creek for both nitrogen and phosphorus (Figures 10 and 11). Therefore, the Guy Sandy Creek watershed should have increased priority for nutrient (particularly phosphorus) management. Additionally, the model results should be further investigated, calibrated and validated after incorporating additional site-specific information.

Chickasaw Nation staff collected additional water samples at nine sites during the study period. In addition to field parameters, nutrient concentrations were analyzed (Table 3). Nitrogen concentrations in the stream samples rarely exceeded the Oklahoma screening level of 3 mg/L (Figure 12). Total phosphorus (TP), however, exceeds the EPA screening level and Oklahoma Scenic River standard

of 0.037 mg/L and Oklahoma screening level for streams entering lakes of 0.016 mg/L in nearly all samples across all locations (Figure 13). Therefore, the focus for nutrient control should be on phosphorus in this watershed. Phosphorus, as well as nitrogen, is commonly contributed to streams and lakes through agricultural and municipal runoff. Because phosphorus is transported with sediments, sediment control is also a recommended focus.

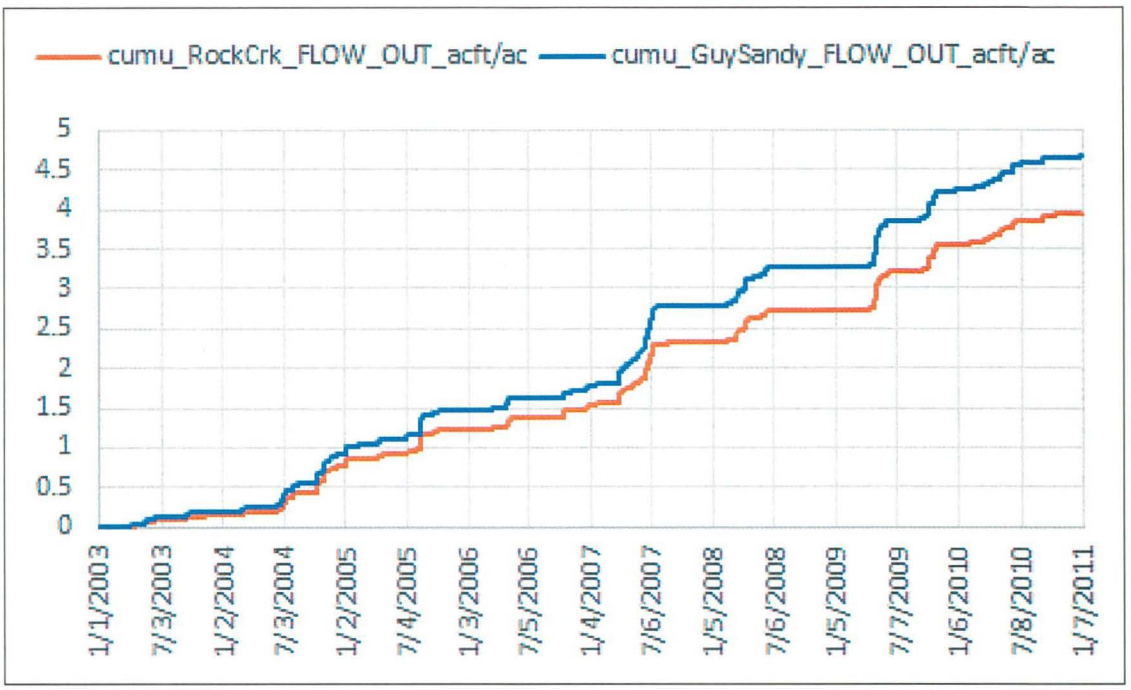


Figure 8. Uncalibrated EPA HAWQS model result for cumulative surface water flow per acre exiting watersheds in acre-feet

Stream flow measurements were conducted during two stream and lake water quality sampling events in October 2017. The coincident flow and concentration measurements allow calculating mass loading of nutrients. Based upon loading calculations and molar ratios of total nitrogen (TN) and total phosphorus, Guy Sandy Creek appears to have higher relative phosphorus loading than Rock Creek (Table 4); this is consistent with SWAT model results and confirms the recommendation that BMP focus on phosphorus and sediment should be within the Guy Sandy Creek watershed.

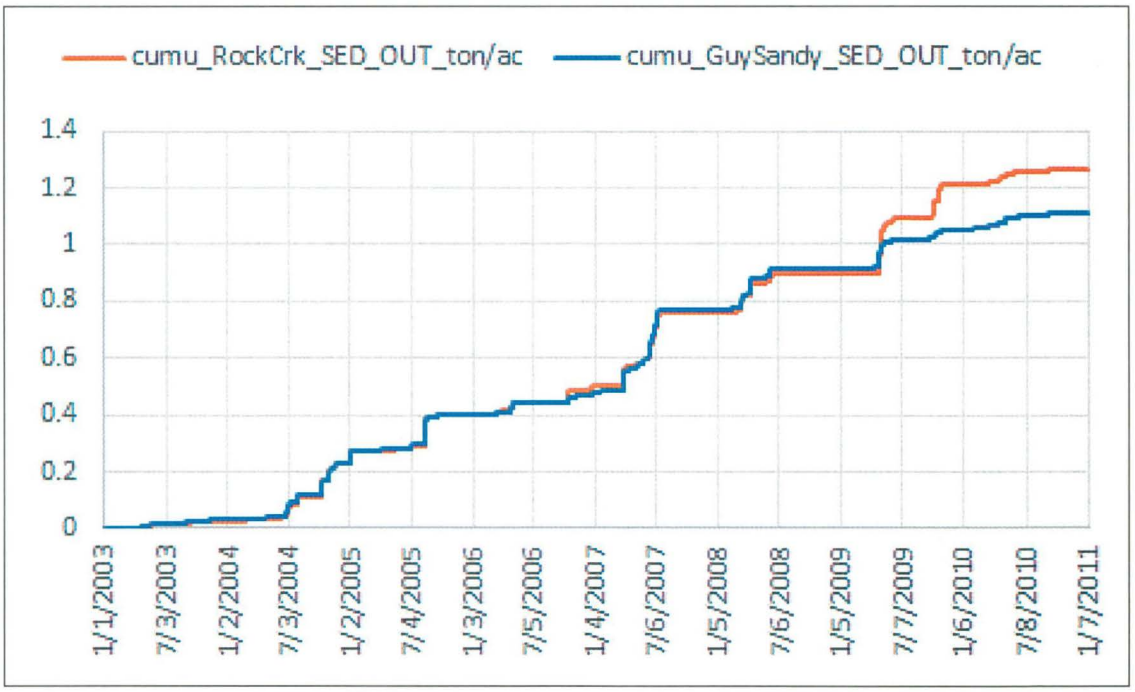


Figure 9. Uncalibrated preliminary EPA HAWQS (SWAT) model result for cumulative Sediment Loading per acre from Guy Sandy and Rock Creek watersheds

As with the stream samples, measurements of lake water quality indicate high phosphorus concentrations (Table 5).

Due to loading characteristics, implementation of management measures, such as conservation plans, in the Guy Sandy watershed are anticipated to have increased beneficial impact on Lake of the Arbuckles. Therefore, Guy Sandy Creek should receive priority

over Rock Creek for remediation and in ultimate removal of the lake from its current impaired status.

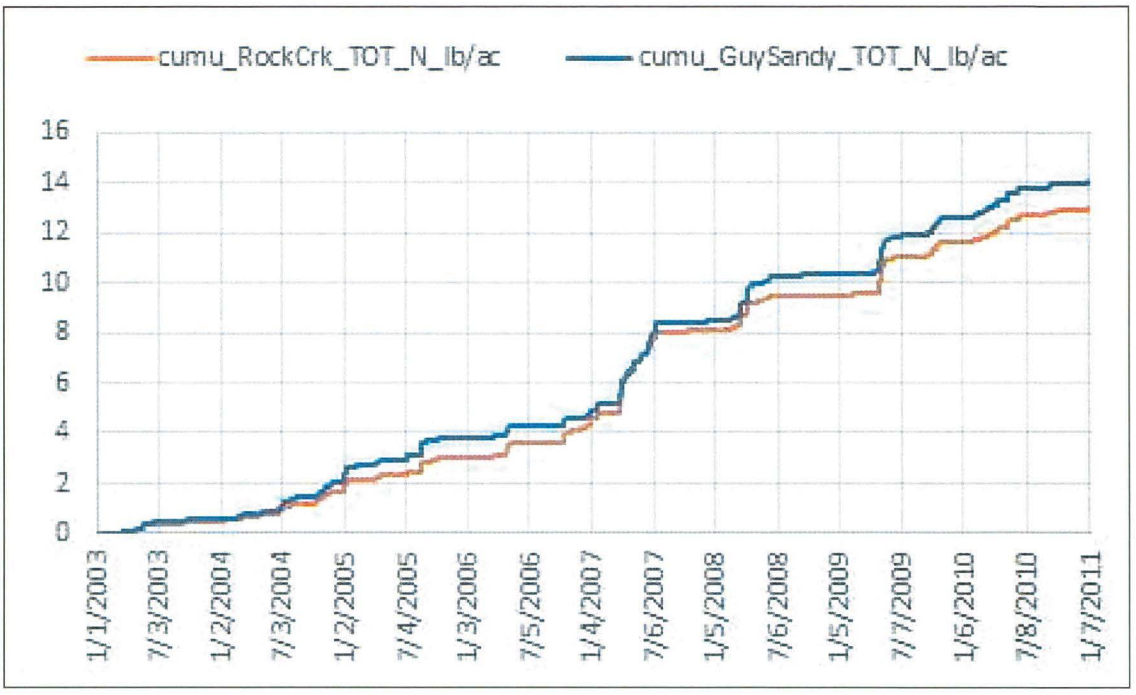


Figure 10. Uncalibrated preliminary EPA HAWQS (SWAT) model result for cumulative Nitrogen Loading per acre from Guy Sandy and Rock Creek watersheds

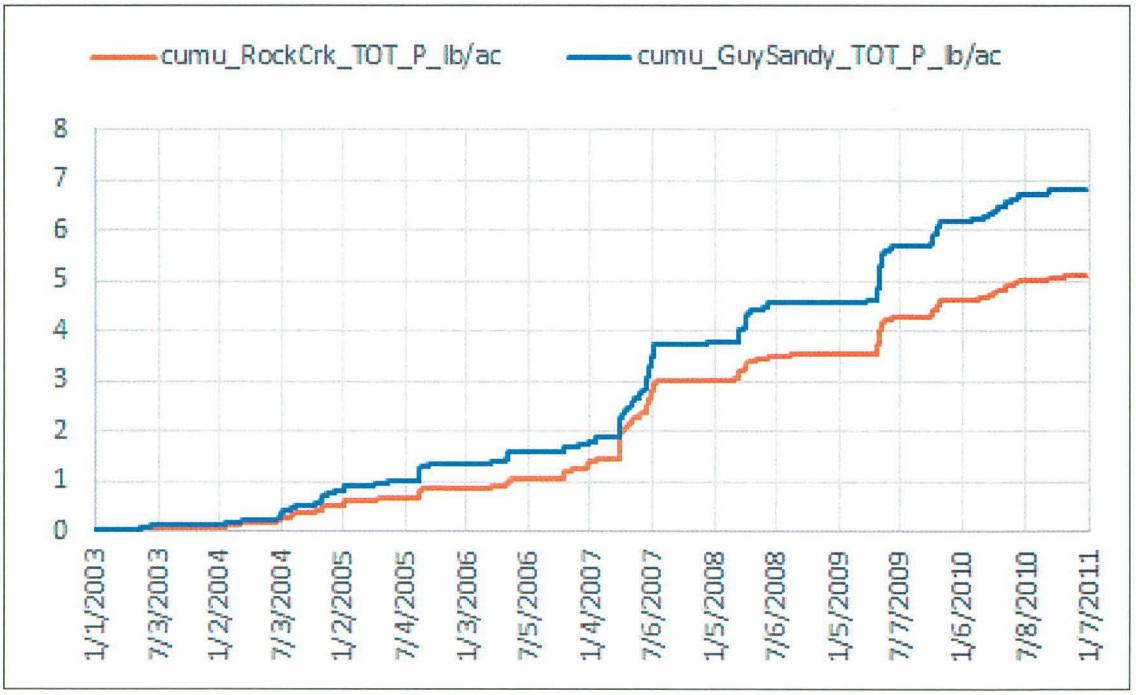


Figure 11. Uncalibrated preliminary EPA HAWQS (SWAT) model result for cumulative Phosphorus Loading per acre from Guy Sandy and Rock Creek watersheds

Table 3. Water quality concentration data in streams measured by Chickasaw Nation

	6/23/2016	7/29/2016	9/27/2016	2/23/2017	3/29/2017	5/12/2017	7/26/2017	10/4/2017	10/24/2017
Total Nitrogen as N (mg/L)									
GS1_Big Guy Sandy 1	NA	Dry	Dry	2.39	1.52	0.45	Dry	0.71	Dry
GS2_South Mayhard 6	NA	NA	NA	NA	1.21	0.29	1.51	0.50	1.94
GS3_Cox Coll 5	NA	1.23	0.77	4.90	0.47	0.84	1.18	0.47	1.19
RC1_Baker 2	NA	0.81	1.01	3.85	1.27	0.30	1.32	0.87	1.98
RCt_Keller 3	NA	1.45	Dry	2.59	4.32	2.36	1.78	0.53	1.57
RC2_Park 4	NA	0.63	0.80	2.10	0.91	0.69	1.44	0.52	1.60
Buckhorn 7	NA	NA	NA	NA	NA	NA	NA	0.80	1.91
Total Phosphorous as P (mg/L)									
GS1_Big Guy Sandy 1	BDL	Dry	Dry	0.139	0.281	0.153	Dry	0.183	Dry
GS2_South Mayhard 6	n/a	n/a	n/a	n/a	0.152	0.105	0.125	0.253	0.900
GS3_Cox Coll 5	0.086	0.051	0.093	0.321	0.330	0.193	0.185	0.210	0.156
RC1_Baker 2	0.040	0.017	0.130	0.273	0.198	0.117	0.126	0.347	BDL
RCt_Keller 3	0.019	0.108	Dry	0.216	1.550	0.782	0.103	0.112	0.032
RC2_Park 4	0.007	BDL	0.034	0.303	0.221	0.098	BDL	0.051	0.036
Buckhorn 7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.075	0.009
	Calculated: Phosphate x 0.326 = TP as P								

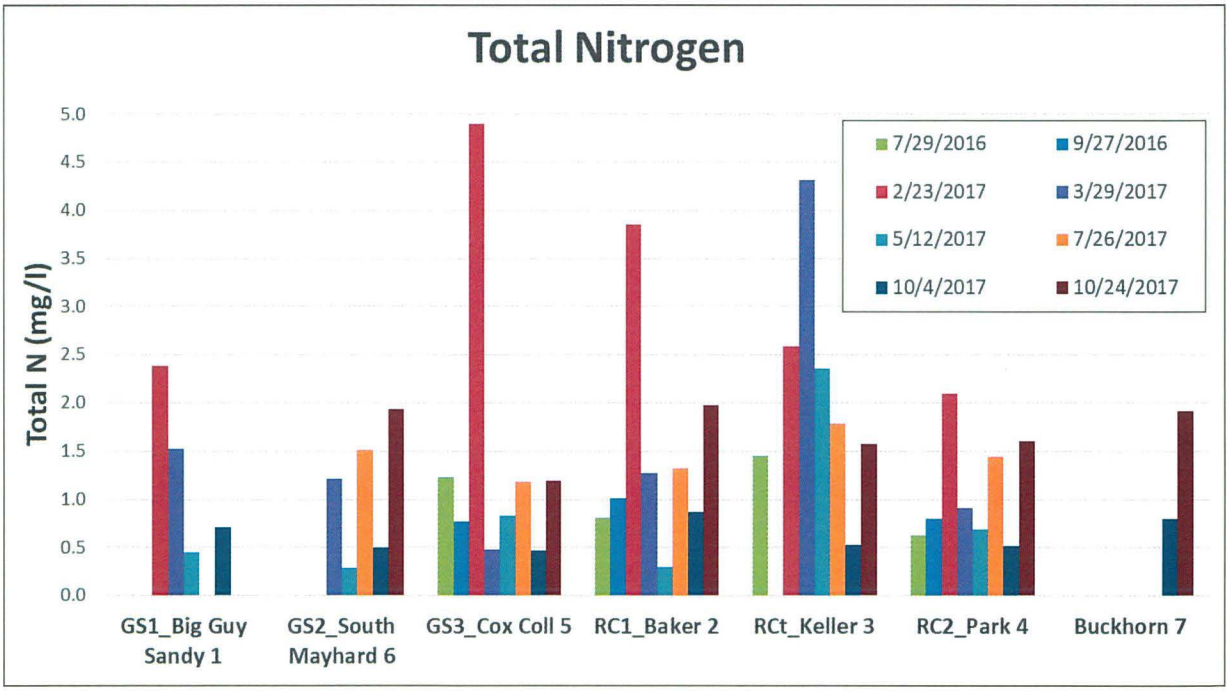


Figure 12. Total Nitrogen (TN) concentration field measurements at seven sites measured by Chickasaw Nation

Table 4. Flow measurements and calculated nutrient loading in streams measured by Chickasaw Nation

Flow (cfs)	10/4/2017	10/24/2017
GS3_Guy Sdy (Cox 5)	1.27	1.05
RC2_Rock Creek (Park 4)	17.04	9.50
Buckhorn 7	4.83	1.99
TN Load (kg/day)		
GS3_Guy Sdy (Cox 5)	1.45	3.06
RC2_Rock Creek (Park 4)	21.47	37.19
Buckhorn 7	9.44	9.30
TP Load (kg/day)		
GS3_Guy Sdy (Cox 5)	0.653	0.401
RC2_Rock Creek (Park 4)	2.126	0.837
Buckhorn 7	0.886	0.044
TN:TP (molar ratio)		
GS3_Guy Sdy (Cox 5)	N:P 4.9	N:P 16.9
RC2_Rock Creek (Park 4)	N:P 22.3	N:P 98.3
Buckhorn 7	N:P 23.4	N:P 469

Table 5. Water quality concentration data in Lake of the Arbuckles measured by Chickasaw Nation

Total Nitrogen (mg/L)	10/4/2017	10/24/2017
Lake 01	1.22	1.96
Lake 02	1.61	1.74
Lake 03	1.73	1.56
Total Phosphorous (mg/L)		
Lake 01	0.101	0.029
Lake 02	0.124	0.039
Lake 03	0.135	0.026
TN:TP (molar ratio)		
Lake 01	N:P 26.7	N:P 149
Lake 02	N:P 28.7	N:P 98.7
Lake 03	N:P 28.3	N:P 133
Visibility (secchi depth, ft)		
Lake 01	4.2	4.0
Lake 02	3.8	3.8
Lake 03	4	3.6

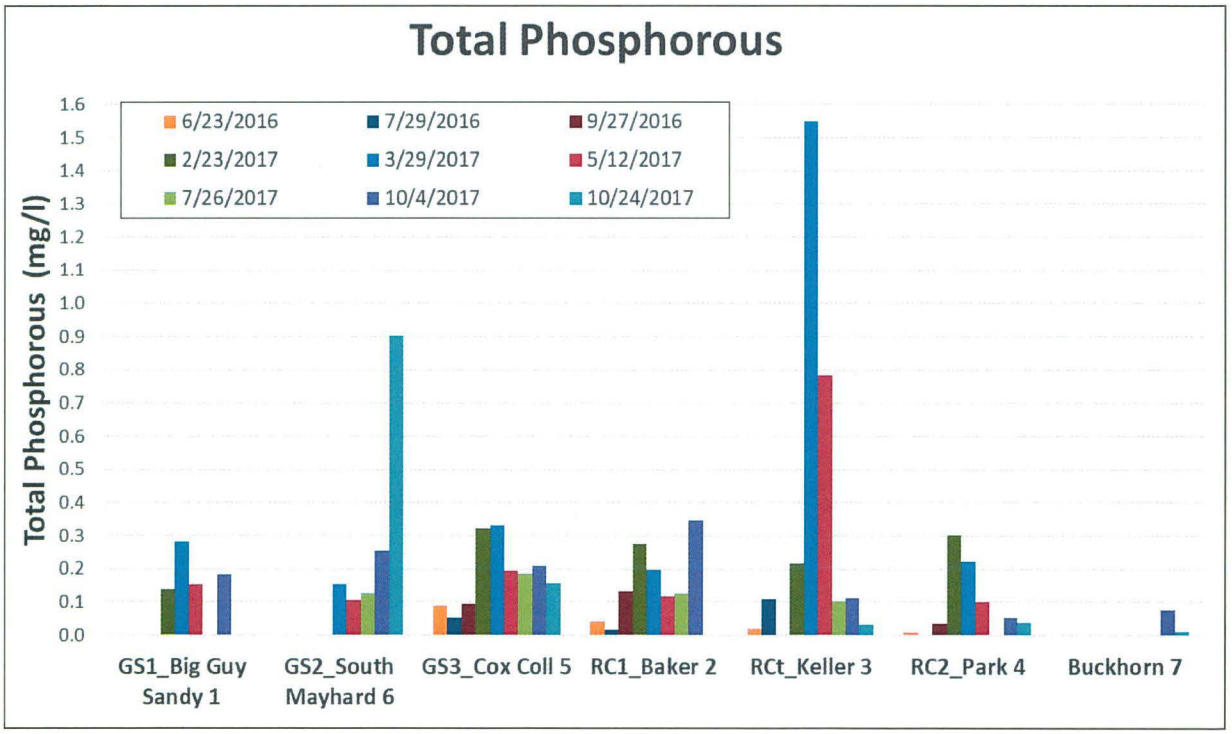


Figure 13. Total Phosphorus (TP) concentration field measurements at seven sites measured by Chickasaw Nation

Issues of Concern or Impairment

Water Issues

As with many lakes, the Lake of the Arbuckles and its watershed is impacted by numerous water quality/quantity issues. Insufficient and inconsistent water supply is a growing concern in light of the recent Arbuckle-Simpson aquifer hydrology study that identified water limitations of the aquifer. This diminishing groundwater resource will put additional stress on the lake's surface supply, which could be compounded by diminished spring flows from the aquifer.

Both potable water and ecological health are impacted by impaired water quality. The EPA has designated specific beneficial use groups for the Lake of the Arbuckles. These include aesthetic value, agricultural, fish and wildlife propagation, recreation and public water supply. As mentioned, the lake is on the EPA's 303(d) list of impaired waters due to dissolved oxygen. A TMDL has not yet been conducted for this watershed because of insufficient funds. Still, removal of the Lake of the Arbuckles from the impaired waters list remains a central focus of this Plan.

Mahard Egg Farm, an egg production facility located in the upper portion of the watershed, was recently under an EPA consent order to remediate discharge violations. Remedial measures and monitoring are underway to gain compliance.

In addition, Cedar Blue RV Park, just east of the lake, was recently required by the Oklahoma Department of Environmental Quality to upgrade its wastewater treatment system, including repair of lift stations and a sewer main. The project is nearing completion.

Environmental Issues

The springs, streams and lakes in the Lake of the Arbuckles watershed are partly sustained by groundwater-flow from the Arbuckle-Simpson aquifer. However, the quantity and quality of these water resources are threatened by groundwater withdrawals, mining, agriculture runoff, drought and climate variability.

The Lake of the Arbuckles is mesotrophic and phosphorus–limited, and it has periodically not supported the beneficial use of fish and wildlife propagation due to low dissolved oxygen concentrations. Blue-green algae (Cyanobacteria) blooms have occurred in the lake over the last couple of years and have raised concerns about nutrient loading and the lake's trophic status.

Endangered species identified in Murray County by the U.S. Fish & Wildlife Service include the threated piping plover (Charadrius melodus), endangered whooping crane (Grus americana), endangered least tern (Sterna antillarum), and the candidate species Sprague's pipit (Anthus spragueii).

Finally, as mentioned previously, elevated levels of mercury have been found in certain fish species. While it appears that this issue cannot be addressed by recommended land use strategies because its cause is atmospheric dispostion, LAWA will continue to monitor the situation.

Narrative and Numerical Goals for the Watershed

In improving and preserving the quality and quantity of water in the Lake of the Arbuckles and its watershed, LAWA's focus is to provide leadership and a process for watershed actions, and to ensure the accumulation and comprehensive documentation of relevant data (i.e., a data clearinghouse) to guide those actions. Associated goals are to preserve the purity and prevent contamination of associated groundwater and spring water resources. To achieve groundwater goals, the Watershed Association will promote projects that monitor the quality of groundwater and spring flow as well as minimize contamination.

Specific surface water goals seek to maintain or decrease chlorophyll-a concentrations in the lake and decrease phosphorus and nitrogen concentrations in contributing streams. In this regard, LAWA will promote land management practices in the watershed that reduce sediment and nutrient runoff. A major focus area is to increase the number of watershed acres under conservation plans.

Monitoring goals include identification of priority areas to focus watershed efforts, identification of current-day baseline conditions and establishment of long-term monitoring to assess improvements in waterbody conditions.

Implementation of a robust water quality and watershed monitoring program will be required to determine the specific sources and magnitudes of pertinent constituents as well as the effectiveness of future watershed actions. Data would also benefit any work related to a TMDL, if necessary, to address the DO impairment. Furthermore, defined indicator values—based upon concentrations of particular constituents associated with relevant state water quality standards common in natural water bodies (Table 6)—will provide essential metrics to quantify the success of future restoration measures.

Table 6. Relevant Water Quality Standards and Indicator Goals

Lake			Contributing Streams		
Parameter	**Value**		**Parameter**	**Value**	
Dissolved Oxygen	5.0 mg/L	Oklahoma standard	Total Nitrogen	4.95 mg/L	Oklahoma standard; goal of 3 mg/L screening level
Chlorphyll-a	0.01 mg/L	Long-term average concentration at depth of 0.5 meters	Total Phosphorus	0.037 mg/L	Oklahoma standard for state Scenic Rivers; goal of 0.016 mg/L screening level for streams entering lakes

Restoration Strategies & Project Prioritization

Effectuating water quality improvements within the Lake of the Arbuckles watershed will require the full engagement of area landowners. Key to this engagement is recognizing the consistency between land use practices commonly utilized to preserve and restore the integrity of waterways and those that increase productivity of the land.

As a result, the primary focus of this plan's implementation is working cooperatively with landowners to develop land conservation plans that sustain or improve production while preserving or enhancing the land. Targeted outreach to landowners while addressing their individual needs and concerns will be imperative to the implementation of conservation plans and related management measures in the watershed.

Consistent with LAWA objectives and priorities summarized earlier, including education, LAWA has also identified specific projects to enhance effectiveness of the Watershed Restoration Plan. Data indicates that management of sediments and nutrients, particularly phosphorus, in sub-watersheds—and especially in Guy Sandy Creek—is essential. Projects identified to date are summarized in Table 7 and organized by priorities, actions and outcomes.

Ongoing Projects and Activities

LAWA and its partners have identified a number of ongoing projects, studies and activities—in addition to enhanced monitoring—that will impact watershed goals pertaining to water quality and quantity. Brief descriptions follow.

Oaks and Prairies Joint Venture Partnership

The Oaks and Prairies Joint Venture Partnership has conducted three years of bird survey work in Murray County. Oaks and Prairies targets Native Grassland Management or Healthy Grassland Habitats under limited BMPs: Brush Management (mechanical removal), Prescribed Burning, Grassland Restoration (seed mixtures) and Prescribed Grazing. Oaks and Prairies can pay out up to 75 percent of the cost of implemention.

Native Grassland Project

The Oaks and Prairies Joint Venture, National Bobwhite Conservation Initiative, Oklahoma Department of Wildlife Conservation and National Park Service are cooperating on a major grassland restoration project at CNRA that not only influences habitat for grassland bird species, but provides for a healthier watershed. LAWA hopes to encourage other landowners who are interested in returning bobwhite

Table 7. Identified LAWA Projects, Studies and Activities According to Priorities with Expected Outcomes

Priorities	LAWA Actions	Expected Outcomes
Education and Outreach	NFWF grant application (submitted)	Outreach materials, training sessions and land owner contacts
Coordination, Technical and Financial Support	Support USGS SCS springs connection study	Ensure water quality of springs
	Continue to follow and update Arbuckle-Simpson Aquifer Drought Contingency Plan	Ensure responsible water management and maintenance of spring flows
	Coordinate with Noble Research Institute to work with land owners on Conservation Plans	Promote watershed health, sediment management and downstream water quality
	Coordinate with Oaks and Prairies JV to improve bird habitat	Promote recreation and endangered bird species
Monitoring and Data Analysis	NFWF grant application (submitted)	Monthly and storm-event data in streams and lake
	Investigate mercury fish consumption advisory and monitor associated studies to confirm mercury sources	Understand current status and needed actions
	Continue monitoring status of Mahard Egg Farm consent actions	Promote water quality of Guy Sandy Creek and lake
	Continue monitoring status of improvements at Cedar Blue WWTP	Promote lake water quality
	Monitor state 305b water quality assessment list (Stream nutrients)	Understand current status of contributing streams
	Monitor state 305b water quality assessment list (lakes DO and chlorophyll-a)	Verify current status of lake

quail and productive native grasslands to their properties to become involved in OPJV BMPs.

USGS Tracer SCS/Spring Connection Study

The USGS is attempting to secure funding to determine if a hydrologic connection exists between a sewage line and Big Tom Springs in the CNRA. The USGS plans to perform a tracer test to trace the movement of sewage effluent, then analyze water quality samples to identify bacteria counts and the presence of wastewater compounds in water discharging from the spring, which flows into Rock Creek. If a hydrologic connection is confirmed, the line will need to be repaired or replaced.

Mahard Egg Farm Consent Order

In response to an EPA consent order, Mahard Egg Farm has cleaned out barns, closed inactive lagoons, and spread the manure at agronomic rates both within and outside the watershed. Subsequent groundwater monitoring has been conducted in the vicinity to verify that nitrate-N and ammonium-N levels have dropped below 10 mg/L.

Wastewater Treatment at Cedar Blue RV Park

Cedar Blue was required to repair and modify their lift stations, add an irrigation field and relocate a forced sewer main by June 2017. When Chickasaw Nation staff last visited the Park, all that remained to be done was to hang signage and have ODEQ conduct a final inspection.

Arbuckle Rangeland Restoration Association

The Arbuckle Rangeland Restoration Association, one of 21 Local Prescribed Burn Associations in Oklahoma, oversees such activities in Murray County and adjoining counties in the watershed region. The Association is a partnership between landowners and other local citizens to conduct prescribed burning, a key land management practice used to restore and maintain native plant communities to their former diversity and productivity for livestock production and wildlife habitat, along with reducing fuels and damage from wildfires.

Oklahoma Department of Wildlife Conservation Fishery and Wildlife Management

The ODWC maintains the Lake of the Arbuckles Fishery Management Plan, developed to maintain and improve aquatic resources in the lake, as well as a working Memorandum of Understanding with the NPS concerning the management and regulation of wildlife resources within the CNRA.

Monitoring

To help facilitate accomplishment of its monitoring goal, LAWA has submitted a grant application to the National Fish and Wildlife Foundation (NFWF) through its Five Star & Urban Waters Restoration Program. If funded, three additional monitoring sites will be established and monitoring at four existing sites expanded (frequency and parameters) to obtain crucial watershed/water quality data. Current and proposed sites are detailed in Table 8. Grant funds will also be used for education/outreach.

Once sufficient monitoring data is available, additional steps similar to those conducted as part of an EPA watershed-based plan can be conducted in the Lake of the Arbuckles watershed. Typical components of an EPA 319 project include source identification, pollutant loading analysis, load reduction goals, and recommendations of management measures that achieve load reduction goals.

Until additional data is available to make those steps possible, LAWA will promote sustainable watershed practices, including landowner implementation of conservation plans with BMPs, that reduce sediment and nutrients from entering waterways. While these activities lack specific quantitative end targets, they contribute to net reductions in loading and subsequent improvements in water quality.

Table 8. Proposed Monitoring Program

Current/Expanded Sites	Oversight	Proposed New Sites	Oversight
40-Foot Hole on Rock Creek	National Park Service & Chickasaw Nation	Guy Sandy Creek at Oaklawn	Chickasaw Nation
Buckhorn Creek at the Hatchery		Rock Creek at the Turnpike	
Guy Sandy Creek		Travertine Creek at USGS stream gage	
Lake near Dam/ Intake			

Landowner Education and Partnerships

An integral source of LAWA engagement with landowners will be through training and education workshops hosted in concert with local community groups (such as Rotary Clubs), elected bodies and local conservation organizations. LAWA will also take advantage of existing opportunities and programs to disseminate information related to effective land use practices.

Specifically concerning education of youth and the general public, numerous opportunities already exist in the Lake of the Arbuckles watershed region through which to disseminate information about ongoing LAWA watershed efforts and the value of watershed sustainability and protection. Potential youth education opportunities are listed in Table 9. As mentioned, a grant application has been submitted to the National Fish and Wildlife Foundation (NFWF) to fund a portion of Restoration Plan education as well as monitoring. The Oka' Institute will establish a website to support LAWA, which will also provide an opportunity to share educational materials, such as the "Restoring the Lake of the Arbuckles Watershed" brochure that is currently in development (see Appendix).

Table 9. Youth Education Opportunities

Activity/Event	Target Audience	Potential Funding Source
Water Festival	4th Grade Students	OSU County Extension
EARTH Workshop	K–12th Grade Students	NFWF Grant
Stream Workshop	7th–8th Grade Students	Friends of Chickasaw NRA
Day on the Farm Workshop	3rd Grade Students	Farm Bureau
Water-based Art & Essay Contest	K–12th Grade Students	Chickasaw Nation
Arbuckle Water Eco-Camp	K–12th Grade Students	OSU County Extension

Watershed Restoration Principles

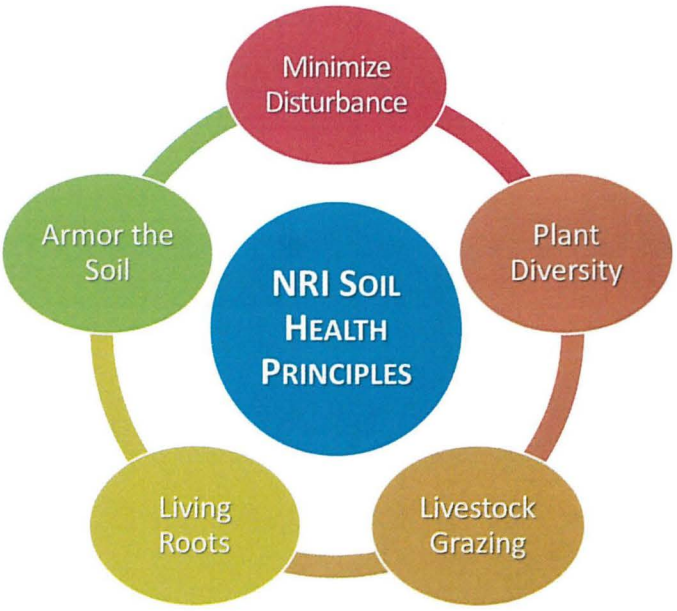
Soil Health

LAWA proposes to address soil health deficiencies within the watershed through promoting landowner utilization of an Oklahoma Conservation Commission initiative that facilitates local non-regulatory, voluntary partnerships to target and resolve issues. The USDA Natural Resources Conservation Service states that understanding soil health means assessing and managing soil so that it functions optimally and is not degraded. By monitoring changes in soil health, a land manager can determine if a set of practices is sustainable. LAWA will engage landowners through local community workshops, civic organizations and conservation groups to provide soil health training and education to landowners. A key strategic partner in this conservation delivery strategy will be the Noble Research Institute, which builds upon existing soil health initiatives through five proven principles:

1) ***Armor the Soil:***
Bare ground is enemy number one. Insufficient cover can increase soil temperatures, decreasing or killing biological activity. Soil bacteria die at temperatures reaching 140 degrees Fahrenheit. Bare ground must be minimized or avoided through forage, crop residue or related cover methods.

2) ***Minimize Soil Disturbance:***
Physical soil disturbance such as plowing and overgrazing can result in bare ground and compacted soils that disrupt soil microbial activity. Incorporating reduced tillage methods in cropping systems and proper grazing management in pastures will keep soil covered.

3) ***Increase Plant Diversity:***
Increasing plant diversity above ground allows for a more diverse underground community. Specific soil microbes require specific plant types. The more diverse the microbial population in the soil, the better the forage will respond, due to increased biological activity.



4) ***Keep Living Roots in the Ground All Year:*** *Soils are most productive when soil microbes have access to living plant material. A living root provides a food source for beneficial bacteria and promotes the symbiotic relationship between plant roots and mycorrhizal fungi. This is aided by increased plant diversity, which can be achieved by incorporating cover crops into your pasture and crop systems.*

5) ***Integrate Livestock Grazing:*** *Grasses evolved under grazing pressure. Soil and plant health is improved by grazing, which recycles nutrients through improved manure distribution, reduces plant selectivity and increases plant diversity. The most important factor in grazing systems is to allow adequate rest for the plant to recover before being grazed again.*

A primary goal of a rancher should be to improve soil health. As more grass is grown, more organic matter is available to recycle into the soil for feeding microbes. This captures and holds more water and nutrients, growing more and larger plants that can gather more sunlight to power the process.

The Noble Research Institute provides farmers, ranchers and land managers with no-cost consultation services that engage them in both science-based BMPs for achieving specific goals and creating sustainable outcomes for agriculture and overall watershed health. LAWA will provide educational outreach to watershed landowners promoting the value of Noble Research Institute BMPs and management plans.

Native Grassland Management

LAWA recognizes the elemental importance of native grasses to the Lake of the Arbuckles watershed. However, these native grassland ecosystems are currently threatened by conversion to urban and pasture land, fragmentation and decreasing land parcel size. Their restoration is essential to the future sustainability of the watershed, resulting in increased water infiltration and yield, reduced erosion and lake sedimentation, augmented water supply, and expected improvements in water quality due to the decreased use of fertilizers, pesticides and herbicides. Aside from watershed protection, native grasslands also provide many direct economic benefits to landowners and producers, such as increased livestock forage and wildlife habitat.

The success of grassland management and restoration in the watershed is in the hands of private landowners, who own 94.6 percent of the land in Oklahoma. Therefore, LAWA will work closely with landowners and other relevant stakeholders to maintain both the productivity of the land and value of natural habitats—including that required for fish and wildlife populations—while preserving the economic bottom-line of producers.

As mentioned, the Oaks and Prairies Joint Venture, a public/private partnership supporting voluntary bird conservation with an ongoing project in the watershed, could help facilitate LAWA efforts focused on native grassland management. Already, OPJV has completed three years of bird survey work in Murray County, establishing a baseline for bird species richness within the area. OPJV also administers the Grassland Restoration Incentive Program (GRIP), which pays landowners (up to 75 percent of the cost) to implement approved grassland bird habitat improvement practices on their property.

Restoration Plan Initiatives

Presented on the following page are overarching priority initiatives identified by the LAWA Board that should result in the most effective implementation of this Watershed Restoration Plan and, in particular, removal of the Lake of the Arbuckles from the EPA's 303(d) list of impaired waters. The subsequent section outlines implementation of these and related strategies.

Priority Initiatives

Lake of the Arbuckles Watershed Association

- The Lake of the Arbuckles Watershed Association will continue as a permanent, voluntary organization which will:
  - Implement and regularly update the Lake of the Arbuckles Watershed Restoration Plan;
  - Seek out and secure technical and financial assistance that will contribute to watershed restoration and preservation;
  - Oversee surface water, spring and groundwater monitoring activities in the watershed and serve as a clearinghouse for both existing and future data; and
  - Promote landowner education—especially that associated with the benefits of soil health and prescribed land use practices—and conduct public education and outreach in local schools and communities to advance knowledge of watershed sustainability concepts.

Restoration Strategies

- The Lake of the Arbuckles Watershed Association has determined that implementation of the following strategies is imperative to restoration and long-term preservation of the lake's watershed, including removal of the lake from the EPA's 303(d) list of impaired waters:

Soil Health

- The Noble Research Institute and other relevant partner agencies and organizations will provide technical on-the-ground assistance to individual landowners in the watershed through development and implementation of science-based best management practices. LAWA will serve as the intermediary between soil health experts and landowners, promoting the benefit and importance of voluntary BMPs in relation to general watershed health while ensuring the accomplishment of specific landowner goals.
- LAWA and partners will promote and advance the recognition of soil health principals in the Lake of the Arbuckles watershed, including land assessments of soil health, the utilization of soil quality indicators and a general understanding of the linkage between overall soil health and related economic benefits to landowners in the watershed. LAWA and partners/experts will utilize land management demonstration projects, workshops and field days to provide educational outreach to landowners and other stakeholders.

Native Grassland Management

- LAWA will facilitate the involvement of partner agencies and organizations in providing technical assistance to landowners through development of science-based BMPs specifically targeting native grasslands, including brush management (mechanical removal), prescribed burning, grassland restoration (seed mixtures) and prescribed grazing. LAWA will leverage ongoing grassland management initiatives, such as the Oaks and Prairies Joint Venture Partnership that includes Murray County in its Grassland Bird Restoration Focus Area.

Implementation

Timeline and Measurable Milestones

The following are goals and milestones for watershed restoration:

- Within 2 years, LAWA and its partners will ensure development of landowner conservation plans and conduct associated outreach activities that will result in no net increases in nutrient and sediment loading in targeted creeks.
- Within 5 years, LAWA restoration strategies will result in maintenance (i.e., no increase) of chlorophyll-a in the lake and reduction in nutrient and sediment concentrations in contributing streams, thereby reducing loading to the lake.
- Within 10 years, LAWA restoration strategies will result in a noticeable change or reduction in chlorophyll-a in the lake.

Monitoring

To assist in measuring the success of Restoration Plan implementation, at least once per year, LAWA will provide updates on the following metrics:

- Number of hosted or sponsored educational activities;
- Number of landowners contacted and participating in educational activities;
- Number of landowner soils tests;
- Number of acres under conservation plans;
- Number of acres with implemented BMPs (prescribed burns, fencing, alternative water sources, etc.);
- Birding habitat acres improved or managed; and
- Watershed and lake monitoring indicators (TP, TN, chlorophyll-a and DO).

In addition, each LAWA meeting will include an update on water quality metrics (TP, TN, chlorophyll-a and DO), according to the most recent data.

Potential Funding Sources

The Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) is widely used by landowners in Murray County. Additional funding mechanisms are available to conservation partners, including Tribal governments and higher education institutes, to provide financial assistance directly to landowners. The following section summarizes federal, state and private assistance programs that promote land stewardship, water conservation, wildlife habitat improvement and related efforts in Oklahoma. Programs that seek to improve water quality, quantity and on-farm economics are also included for potential utility in the Lake of the Arbuckles watershed.

Funding sources change annually, so the best way for landowners to take advantage of funding is to develop site-specific conservation plans as well as a beneficial working relationship with NRCS agents, OCC staff and local conservation groups. These experts in the field continually monitor funding opportunities and changes, including sources available from intermediary non-profit conservation partners.

U.S. Department of Agriculture/Natural Resources Conservation Service

Conservation Innovation Grants (CIG)/ Environmental Quality Incentives Program (EQIP): Conservation Innovation Grants (CIG) are competitive grants funded by the Environmental Quality Incentives Program (EQIP). They are focused on providing a bridge between research and widespread application of innovative approaches and technologies for conservation on agricultural lands. CIG is used to scale proven, emerging conservation strategies in order to increase adoption including pilot projects, field demonstrations and on-farm conservation research. Resource concerns addressed by CIG grants include water quality, wildlife, soil, grazing, and water quantity.

Focus areas for FY 2017 funding include precision conservation; water management technologies and approaches; and benefitting historically underserved and military farmers, ranchers and private forest landowners. Each year, up to 10 percent of national CIG funds may be set aside for applicants who are beginning or limited resource farmers and ranchers, American Indian Tribes, or community-based organizations that include or represent these producers and private forest landowners. Competitive grant funding with an award ceiling of $2,000,000. 50 percent non-federal matching funds must be provided by the grantee.

Regional Conservation Partnership Program (RCPP): RCPP projects address resource concerns, including excess/insufficient water/drought, water quality

degradation, soil quality degradation, inadequate habitat for fish and wildlife (and invertebrates), air quality impacts, degraded plant condition, energy and climate uncertainty.

Conservation partners will work together to promote healthy habitat, the sustainable use of water resources and a productive agricultural sector. Individual landowners are not eligible for this funding directly, rather project partners apply for funding that is then distributed to landowners.

Recent example projects selected under RCPP in Oklahoma include the Elk City Lake Watershed RCPP Project and Middle and Lower Neosho River Basin RCPP Project both addressing water quality issues. Both projects will work with landowners in the watershed to install conservation measures that reduce delivery of pollutants (nutrients, sediment, bacteria) contributing to problems in the lake.

Oklahoma is in the Prairie Grasslands Region, which is identified as a Critical Conservation Area (CCA), and is eligible to receive 35% of funding ($10,000,000 maximum).

Agricultural Conservation Easement Program (ACEP)/Wetlands Reserve Easements:
NRCS provides financial assistance to eligible partners for purchasing Agricultural Land Easements that protect the agricultural use and conservation values of eligible land. In the case of working farms, the program helps farmers and ranchers keep their land in agriculture. The program also protects grazing uses and related conservation values by conserving grassland, including rangeland, pastureland and shrub land. Eligible partners include American Indian tribes, state and local governments and non-governmental organizations that have farmland, rangeland or grassland protection programs. Under the Agricultural Land component, NRCS may contribute up to 50 percent of the fair market value of the agricultural land easement. Where NRCS determines that grasslands of special environmental significance will be protected, NRCS may contribute up to 75 percent of the fair market value of the agricultural land easement.

The Agricultural Conservation Easement Program (ACEP) provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the Agricultural Land Easements component, NRCS helps Indian tribes, state and local governments and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. Under the Wetlands Reserve Easements component, NRCS helps to restore, protect and enhance enrolled wetlands.

Conservation Stewardship Program (CSP):
The Conservation Stewardship Program (CSP) helps agricultural producers maintain and improve their existing conservation systems and adopt additional conservation activities to address priority resources concerns. Participants earn CSP payments for conservation performance—the higher the performance, the higher the payment.

Enhancements are management activities that go above and beyond the minimum practice requirements helping the producer achieve a higher level of conservation. Bundles are suites of conservation enhancements designed to address multiple resource concerns. Bundle options are offered at a higher payment rate.

Grassland Restoration Incentive Program (GRIP):
GRIP provides financial assistance to landowners for grassland restoration practices such as range planting, prescribed burning and invasive plant control. GRIP is administered by the Oaks and Prairies Joint Venture, a regional partnership of government and non-government organizations in Oklahoma and Texas including the National Wild Turkey Federation, Oklahoma Department of Wildlife Conservation and Texas Parks and Wildlife Department.

Working Lands for Wildlife (WLFW):
Through WLFW NRCS works with partners and private landowners to focus voluntary conservation on working landscapes. NRCS provides technical and financial assistance to agricultural producers, helping them plan and implement conservation practices that benefit target species and priority landscapes. The monarch butterfly is a new national priority species of WLFW.

Improving Working Lands for Monarch Butterflies:
NRCS offers technical and financial assistance to help landowners manage monarch habitat on farms, ranches and forests. Producers and conservation partners can plant milkweed and nectar-rich plants along field borders, in buffers along waterways or around wetlands, in pastures and other suitable locations. Conservation practices that benefit monarch butterflies and other insects also help reduce erosion, increase soil health, control invasive species, provide quality forage for livestock and

make agricultural operations more resilient and productive. Financial assistance is provided to implement these practices, helping producers improve working lands.

Wildlife Habitat Incentive Program (WHIP):
WHIP was repealed in 2014, but LAWA will monitor potential future reenactment of the Program.

USDA/Farm Service Agency (FSA)

Conservation Reserve Program (CRP):
The Conservation Reserve Program (CRP) offers financial incentives to private landowners to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat by planting trees, grass, and other long-term cover. The CRP is the largest private-lands conservation program in the United States. Land must be agricultural commodity cropland or marginal pastureland that is suitable for one of 42 conservation practices defined by the program such as riparian buffers or filter strips.

Special CRP initiatives with additional funding include:

Clean Lakes, Estuaries and Rivers (CLEAR):
CLEAR will assist landowners with the cost of building bioreactors and saturated buffers that filter nitrates and other nutrients from tile-drained cropland. Early estimates indicate that CLEAR could help to reduce nitrate runoff by as much as 40 percent over traditional conservation methods. CLEAR may cover up to 90 percent of the cost to install these new practices through incentives and cost-share. These new methods are especially important in areas where traditional buffers have not been enough to prevent nutrients from reaching bodies of water.

State Acres for Wildlife Enhancement (SAFE) Initiative:
Through SAFE, landowners re-establish wetlands, grasses, and trees on their land. These practices are designed to enhance important wildlife populations by creating critical habitat and food sources. They also protect soil and water health by working as a barrier to sediment and nutrient run-off before they reach waterways.

U.S. Environmental Protection Agency (EPA)

Section 319 Nonpoint Source Management Program Grants:
The 1987 amendments to the Clean Water Act (CWA) established Section 319 Nonpoint Source Management Program funding to address the need for greater federal leadership to help focus state and local nonpoint source efforts. Under Section 319, states, territories and tribes receive grant money that supports a wide variety of activities, including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source implementation projects.

Environmental Education Grants:
In 2018 EPA is making available up to $3 million in funding for locally-focused environmental education grants to support environmental conservation and stewardship. Requests for Proposals are issued in each of EPA's ten Regions in anticipation of awarding three to four grants in each Region of between $50,000 and $100,000 each. The program requires a 25% match.

Healthy Watersheds Consortium Grants (HWCG):
The goal of the Healthy Watersheds Consortium Grant Program is to protect healthy, freshwater ecosystems and their watersheds. This program, a partnership between the U.S. Endowment and NRCS, focuses on larger-scale watershed protection and land management, which ultimately benefits water quality. Up to $3 million in funding is available for 2018 with awards ranging from $50,000 to $300,000. There is a 25% minimum match requirement.

Pollution Prevention (P2) Grant Program:
This program funds grants/cooperative agreements that implement pollution prevention technical assistance services and/or training for businesses and support projects that utilize pollution prevention techniques to reduce and/or eliminate pollution from air, water and/or land. EPA awarded approximately $7.94 million in P2 grants in FY2016 and FY2017. There is a match requirement of 50 percent match; for tribal governments that place P2 grant activities into a performance partnership grant (PPG) the match for the federally-recognized tribe gets reduced to 5 percent. Proposed range in FY 2016 is $40,000 to $360,000 for a two-year funding period. On average, 40 grants are issued annually.

Source Reduction Assistance Grant Program (SRA):
SRA awards support pollution prevention through source reduction and resource conservation work. Proposed projects must carry out one or more of the following activities: surveys, studies, research, investigation, experimentation, education, training and/or demonstrations. In FY2016, the 20 grant awards ranged from $20,000 to $260,000 for a two-

year funding period. There is a 5 percent match requirement.

Urban Waters Small Grants:
The Urban Waters Small Grants are competed and awarded every two years. Grant funds are awarded to projects that address local water quality issues related to urban runoff pollution, foster partnerships, and provide community benefits. Since its inception in 2012, the program has awarded approximately $6.6 million in Urban Waters Small Grants to 114 organizations across the country and Puerto Rico, with individual award amounts of up to $60,000.

U.S. Fish and Wildlife Service (USFWS)

Tribal Wildlife Grants:
The purpose of the funding is to provide technical and financial assistance for the development and implementation of programs that benefit fish and wildlife resources and their habitat, including species that are not hunted or fished. Funding is available for projects that initiate, develop or implement activities or programs that benefit wildlife and their habitat, including species of Native American cultural or traditional importance and species that are not hunted or fished. Grants have been awarded for wildlife management activities, conservation easements and habitat restoration and preservation. There is a maximum of $200,000 grant funding per project with 20 to 30 awards anticipated for 2017. Matching funds are not required.

Partners for Fish and Wildlife Program:
Partners for Wildlife is designed to form alliances between private landowners and government agencies through technical assistance and cost sharing projects that significantly improve fish and wildlife resources, while promoting compatibility between agriculture and other land uses. The objectives of the program are to promote and implement habitat improvement projects on private lands that benefit Federal trust species including migratory birds, threatened and endangered species. There are 30 such species in the Lake of the Arbuckles watershed.

Regional priorities identified by the Southwest Region Management Team include Native American affairs and strategic habitat conservation/ implementation including short and tall grass prairies, and rare, imperiled and listed species in Oklahoma. Four projects have been funded in Murray County of the 948 project sites implemented under this program in Oklahoma. This program is a cost-share cooperative agreement or contract for a minimum of 10 years in duration. Funding is limited to $25,000 per project.

U.S. Bureau of Reclamation

WaterSMART Cooperative Watershed Management Program Grants:
The Cooperative Watershed Management Program (CWMP) contributes to the WaterSMART strategy by providing funding to watershed groups to encourage diverse stakeholders to form local solutions to address their water management needs. Through CWMP grants, Reclamation promotes the sustainable use of water resources and improves the ecological resilience of rivers and streams using collaborative conservation efforts. Funding is provided on a competitive basis for 1) development of watershed groups (such as LAWA); and 2) implementation of watershed management projects. LAWA's early work has placed the organization in an advantageous position to receive Phase 2 implementation cost-share funding, when available, or additional Phase 1 funding to identify, study and/or design specific watershed restoration projects, or conduct analysis required to comply with the National Environmental Policy Act (NEPA) .

National Fish & Wildlife Foundation

Five-Star and Urban Waters Restoration Grant Program:
This is a nationwide grant program to support on-the-ground, community-based conservation, outreach and education/training with approximately $2,000,000 available nationwide for projects meeting program priorities. Most individual grants are about $30,000 with a minimum 1:1 non-federal requirement match of cash or in-kind goods and services.

National Environmental Education Foundation

Common/Competitive Grants:
NEEF offers a variety of grants and awards to support work being done across the nation at the local level supporting the environment through education and service. In 2017, NEEF provided nearly $600,000 in grants and awards to educational (both formal and informal) and public land partners across the country. The grant application process is initiated by submitting a grant application using the Common Grant Application. Grants are awarded twice a year.

Oklahoma Conservation Commission (OCC)

Conservation Cost-Share Program:
The OCC Cost-Share Program provides funds to county conservation districts to help landowners install conservation practices on the land to reduce soil erosion and improve water quality. Conservation districts administer the program to meet their local needs.

The districts select practices from a state list to offer to landowners, establish cost-share rates, set signup periods, establish application ranking procedures, take applications, and assist landowners complete paperwork for payment. The USDA Natural Resources Conservation Service (NRCS) provides free technical assistance for the conservation practices to landowners. Landowner payments are received through the local conservation district after approval by the Oklahoma Conservation Commission.

Approved Conservation Practices include Brush Management, Livestock Water (new pond or water well), Herbaceous Weed Control, Pasture Planting, Pipeline, Watering Facility and Heavy Use Area Protection. All conservation practices must meet NRCS standards and specifications.

Funding was provided by the Murray County Conservation District in 2016 for conservation practices including brush management, ponds, water wells, pipelines, and pasture planting. $18,750 was allocated to Murray County for Program Year 16, which was completed in June 2016; $8,861 was paid to participants with $9,889 carried over to Program Year 17.

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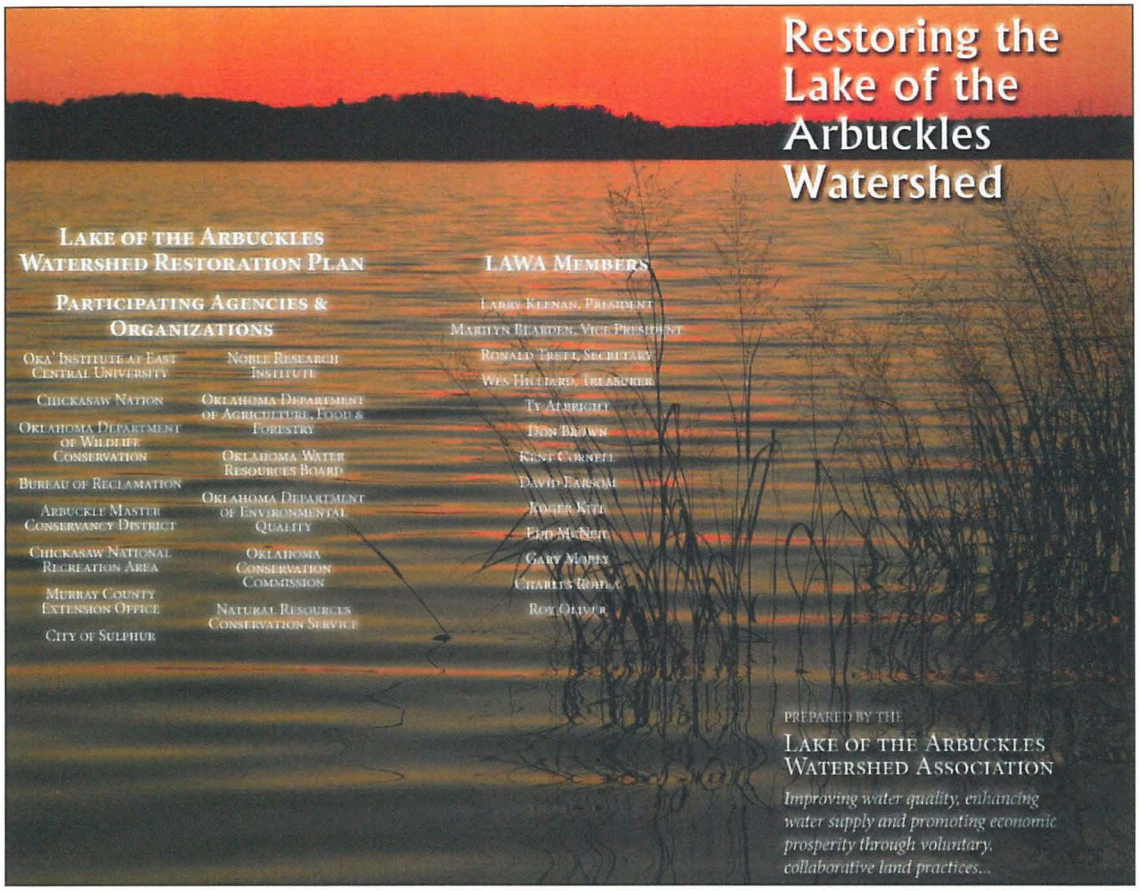
Appendix

Lake of the Arbuckles Brochure (Draft)

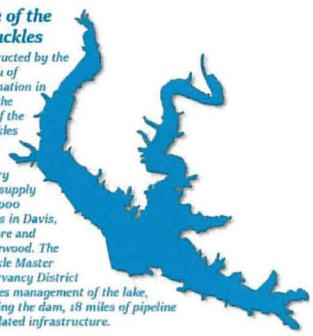


Background

The Lake of the Arbuckles—as well as the adjacent Chickasaw National Recreation Area (CNRA)—provides enormous economic benefits to south central Oklahoma. In addition to serving as a vital water supply for area citizens, associated recreational opportunities and more than 1.5 million annual visitors contribute some $12.7 million to area economies.

However, Arbuckle Lake is profoundly impacted by activities in its 132 square-mile watershed. The elements that fuel growth and make this area a desirable place to live—the City of Sulphur, industries, farms and ranches, and CNRA—also present complex challenges to the lake's continued sustainability. Growing water demands and increased activity in the watershed have begun to impair the quantity and quality of lake waters. And recent drought, such as the devastating 2011-15 event, have revealed additional vulnerabilities of the lake and park.

While water quality problems are not always visually apparent, data indicate that the Lake of the Arbuckles is "impaired" due to low dissolved oxygen levels. This condition precludes the lake from achieving a level of quality necessary for dependent fish and wildlife species. Three known tributary streams currently exceed state thresholds for nutrients. However, while nutrients and sediments contributed during precipitation/runoff events are common factors leading to depleted saturated oxygen in waterbodies, more data—especially from the surrounding watershed and streams and springs that empty into the lake—is required to identify specific pollution sources and potential long-term remedies.



Lake of the Arbuckles

Constructed by the Bureau of Reclamation in 1967, the Lake of the Arbuckles serves as the primary water supply for 51,000 citizens in Davis, Ardmore and Wynnewood. The Arbuckle Master Conservancy District oversees management of the lake, including the dam, 18 miles of pipeline and related infrastructure.

Lake of the Arbuckles Watershed Association

In 2017, the Lake of the Arbuckles Watershed Association (LAWA) was created to help the lake meet and maintain its potential. LAWA is a voluntary, non-regulatory and nonprofit organization of area stakeholders—concerned landowners, business leaders and agricultural experts—that are currently working to develop and implement a watershed restoration plan for Arbuckle Lake.

LAWA is supported by the Chickasaw Nation, Oka' Institute (at East Central University) and a variety of state and federal agencies, organizations and additional stakeholders—including the Noble Research Institute and others possessing expertise in watershed protection and unique insight into relevant local issues—that comprise a broad Advisory Council.

Watershed Restoration Plan

The Lake of the Arbuckles Watershed Restoration Plan, scheduled for completion in 2018, will include detailed evaluation of data to determine pollution sources as well as the most effective voluntary remedial actions—such as both structural and non-structural Best Management Practices (BMPs)—for the lake and its watershed. BMPs and related land practices foster soil health and stability, resulting in increased agricultural production, reduced sediment, cleaner water and an improved environment for fish, wildlife and humans.

Funding for Plan development has been provided by the Bureau of Reclamation's Cooperative Watershed Management Program, which was procured by the Chickasaw Nation in support of the Tribe's ongoing sustainable water initiative. Additional Reclamation funding will be pursued to implement long-term strategies identified in the Restoration Plan. LAWA has also applied for funds from the National Fish and Wildlife Foundation, which will be matched by the Chickasaw Nation, to expand and enhance water monitoring and landowner/citizen education in the watershed.