Caddo Lake Watershed Group

Watershed Group Development and Watershed Restoration Planning in Caddo Lake and its Tributaries

Funding Opportunity: R23AS00362

Caddo Lake Institute, **SAM**.gov registration identifier - CADDO LAKE INSTITUTE INC / L5RYJFPAWXT5 / 4ULN4

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1. EXECUTIVE SUMMARY

The Caddo Lake Watershed Group will focus on protecting and restoring water quantity and water quality in Caddo Lake, located in Marion and Harrison County, Texas. Over the next year, this new watershed group will establish itself, the coordinator and consultants will provide all the relevant water quality and quantity data that exists to the stakeholders/members.

The members will come to consensus about goals for the Watershed Group. We currently believe some goals to be discussed are reducing invasive plants that threaten both quality and quantity of water by reducing the nutrients that feed the invasive plants. By reducing nutrients, overall water quality will also be improved.

Gaps in knowledge and new challenges (invasives) and new conditions (herbicide applications to invasives, aging septic systems, current land use conditions) will be addressed with new data.

The new data and its analysis by professionals and stakeholders will inform the ultimate Watershed Plan with a clear roadmap to restore and protect Caddo Lake. The public will be informed of the findings and plans. The landowners and local public will be made more aware of any non-point sources they can influence.

Action on these items will be pursued after completion of the plan and conclusion of the grant period.

Overall, the reason for wanting to fund this group and set up this plan would be because we have a shared interest in:

- protecting water quantity through reduced sedimentation from invasives,
- improving water quality through reduction of nutrients and invasives,
- restoring the watershed to a state of less invasive species, less herbicides, less sedimentation, and less nutrient loading.

The Lake is objectively special, USFWS Priority Habitat 1, Ramsar Wetland of International Importance, and has been challenged with excessive invasive aquatic plants that threaten both water quantity and quality.

Project Dates: February 1, 2025-January 31, 2026 *(all dates are based on the Instructions we downloaded with this award package stating "B3. Anticipated Award Funding and Dates. Anticipated Award Date December 31, 2024." If we misunderstood, we can alter all dates.*

Federal Facility: The Federal government owns 8,000 acres at the Wildlife Refuge on the southwest shores of Caddo Lake. (this is a small portion of the overall area of the Watershed Group which includes tens of thousands of acres of open lake, swamp, surrounding the community of Uncertain, Texas.

2. Eligibility -

Caddo Lake Institute is eligible as "12 – Nonprofits having a 501(c)(3) status with the IRS, other than institutions of higher education." Caddo Lake Institute, Inc. Texas received our IRS

determination October 24, 2006.

The Caddo Lake Watershed Group is applying as a New, Phase 1 Watershed Planning Group.

Caddo Lake Institute has a 30 year history of financial stability, grant execution and reporting, working with stakeholder groups. Each of the stakeholder groups are well suited for success with strong track records.

3. EVALUATION CRITERIA

3.A. Evaluation Criterion A – Watershed Group Diversity and Geographic Scope

3.A.1 Sub-criterion No. A1. Watershed Group Diversity

Affected Stakeholders

Affected stakeholders are those who own property around Caddo Lake, who do business on and around the lake, who recreate in and around the lake, who consume fish from the lake, who have a mission to protect their natural resources at Caddo Lake.

- Clean Rivers Project (CRP) Group Representative. – CRP is a program developed by the Texas Commission on Environmental Quality. In the Cypress Basin which includes Caddo Lake this program is administered by the Northeast Texas Municipal Water Distict which has a deep knowledge of existing datasets and Watershed Protection activities to the West of Caddo Lake, including the major reservoirs and tributaries feeding into Caddo Lake.

- Friends of the Caddo Lake National Wildlife Refuge: Local knowledge of land use and historical land use as well as dedication to outdoor educational opportunities and motivated volunteers who can help spread the word.

- Conservation Delivery Network (CDN); an existing collaborative group of conservation professionals from many different government agencies. The Northeast Texas (NETX) Conservation Delivery Network (CDN) was the first CDN established by the Lower Mississippi Valley Joint Venture in the West Gulf Coastal Plain region. The CDN focal area covers 24 Counties in East Texas including Harrison and Marion County (the entirety of the Caddo Lake and Cypress Basin geography). Being in the Pineywoods of East Texas, this CDN focuses on prescribed fire, terrestrial invasive plant removal, and other land practices that improve habitat for a wide range of species.

- SP8 EnviroServices (experts in invasive species detection) , Laura Speight, will be the Watershed Group Coordinator and will provide for field work and coordination with the laboratory for sample testing. Laura Speight will be the lead to plan and lead meetings, soliciting input from stakeholders and organizing activities of consultants (the consultants review existing data, acquire new data, interpret data for stakeholders.) The Coordinator will be responsible for using best practices around Watershed Planning for the meetings as well as staying on track to meet milestones.

- Caddo Biocontrol Alliance (CBA) – 501c3 formed to rear and provide biological controls

(Giant Salvinia Weevils) in an attempt to slow the growth of this invasive plant species

- Collins Academy, nonprofit environmental education group providing hands-on learning opportunities that focus on environmental conservation. Educational & Environmental -

Local Civic/Citizen Group: Greater Caddo Lake Association (GCLA). 50 year history of communicating with thousands of members who currently or formerly lived around Caddo Lake and activating to combat threats. We trust Greater Caddo Lake Association to help us identify appropriate landowners in the watershed.

Industries:
Agriculture: Representatives of the major industries related to our watershed,

- Cattle Ranching along Big Cypress Bayou, (probably Bob Sanders who has ranched locally since the 1980s.)
- Timber Interests along Big Cypress Bayou. (probably Jason Holland, forester for Holland forestry active in the area)
- Seeking Construction Industry representative (possibly Paul Fortune.)

Recreation:

- Boat Guide/Tour Guide (possibly Captain Danny Sullivan)
- Representative from the only marina providing boat gas on the lake who employs fishing guides and works regularly with locals and visitors (possibly Will Carter)
- Lodging and tourism representative (possibly Jay Webb)
- Uncertain Chamber of Commerce.

Government:
Federal, Caddo Lake National Wildlife Refuge,
State:

- Texas Ag Life Extension Agent; Works with landowners to provide educational activities relevant to programs such as beekeeping, water quality in ponds and tanks, herbicide/pesticide applications for crops and water.
- Texas Forest Service; TFS provides landowner assistance with prescribed fire information and wildfire prevention. Works to continually evaluate threats of invasive pests on the landscape.
- Texas Parks and Wildlife Department from the Caddo Lake State Park and the Caddo Lake Wildlife Management Area and Fisheries division. Biologists from all three divisions work regularly in the Caddo Lake watershed to ensure visitors, residents as well as native flora and fauna have the best experience possible

Municipal:

- City of Uncertain Texas (Mayor Judye Patterson); Small City along the Eastern Shore of Caddo Lake in Harrison County
- County of Harrison representative TBD Harrison County lies in the southern half of the Caddo Lake watershed with 2 of its 4 county commissioners having responsibilities in the watershed
- County of Marion representative TBD Marion County lies in the northern half of the Caddo watershed with 1 commissioner having responsibilities in the watershed.

- Cypress Valley Navigation District (CVND) is a political subdivision of the State of Texas. It is responsible for maintaining navigation on Big Cypress Bayou and Caddo Lake. Its boundaries are from the Dam on Lake O the Pines downstream to Caddo Lake and continuing through the lake to the Texas/Louisiana state line.

- OSSF office reps from Marion and Harrison are licensed by TCEQ to administer the OSSF program which permits, inspects and responds to complaints on residential and commercial septic systems within the entirety of these counties. These two cover all of the Caddo Lake watershed and workgroup area.

Water Provider:

- Northeast Texas Municipal Water District (NETMWD) who is the administrator of the Cypress Basin Clean Rivers Project (CRP). Supplies raw and treated water to communities and industries in 8 counties including Harrison and Marion. Has been the administrator of the CRP program for the entire basin since 1999.NETMWD has an extensive institutional knowledge of the hydrological and environmental needs of the basin.

These entities are supportive of the Watershed Group and will be part of this effort.
Each of these groups has a strong commitment to the region and a long-standing history in the local area giving them diverse knowledge of issues and of other groups or individuals who need to be better represented.

Diversity may need to be improved and will be addressed before the first meeting through phone and email. Diversity will also certainly be discussed again *at* the first meeting. Recruiting additional members will be an activity for all the members to share as best suited to recruit. Ultimately, the responsibility for reaching out and recruiting will be on the Watershed Group Coordinator.

Each stakeholder group will appoint their own representative and alternate.

Consensus will be built among the members while dissenting and differing views will be respected and explored.

Sub-criterion No. A2. Geographic Scope

Geographic Boundaries and Scope:

The USGS Hydrologic Unit Code for the Caddo Lake is **11140306**
The map below (Figure 1) shows the general area of Caddo Lake with the town of Uncertain, Texas, on it's shores. The water flows west to east with the major tributaries can off to the left. Smaller creeks and tributaries exist closer to the lake itself. (Figure 2 more specifically delineates the area of focus for this group.) Office and meeting space for a base of operations for this effort will be the Caddo Lake Institute's office and meeting room on Zeugner drive in Karnack, Texas. Other locations may be suggested by the group to best reach constituents.

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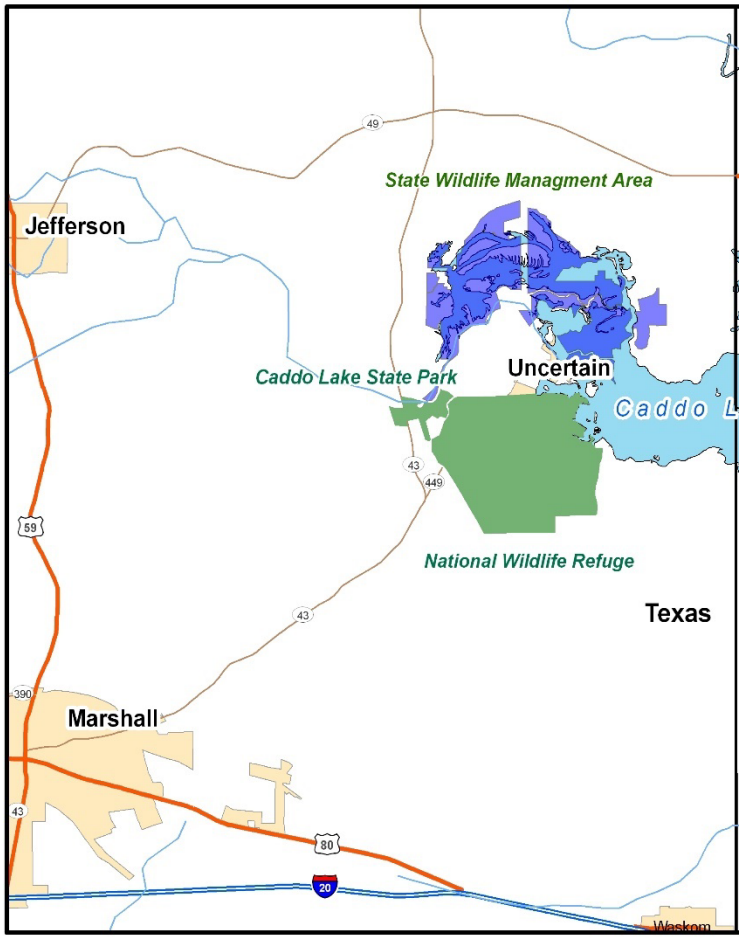
Figure 1 – Map Region



The Workgroup area falls within 2 different counties, Marion and Harrison in Texas.

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The Workgroup area will include the grey "Caddo Lake Watershed," "Segment 0401" as seen in

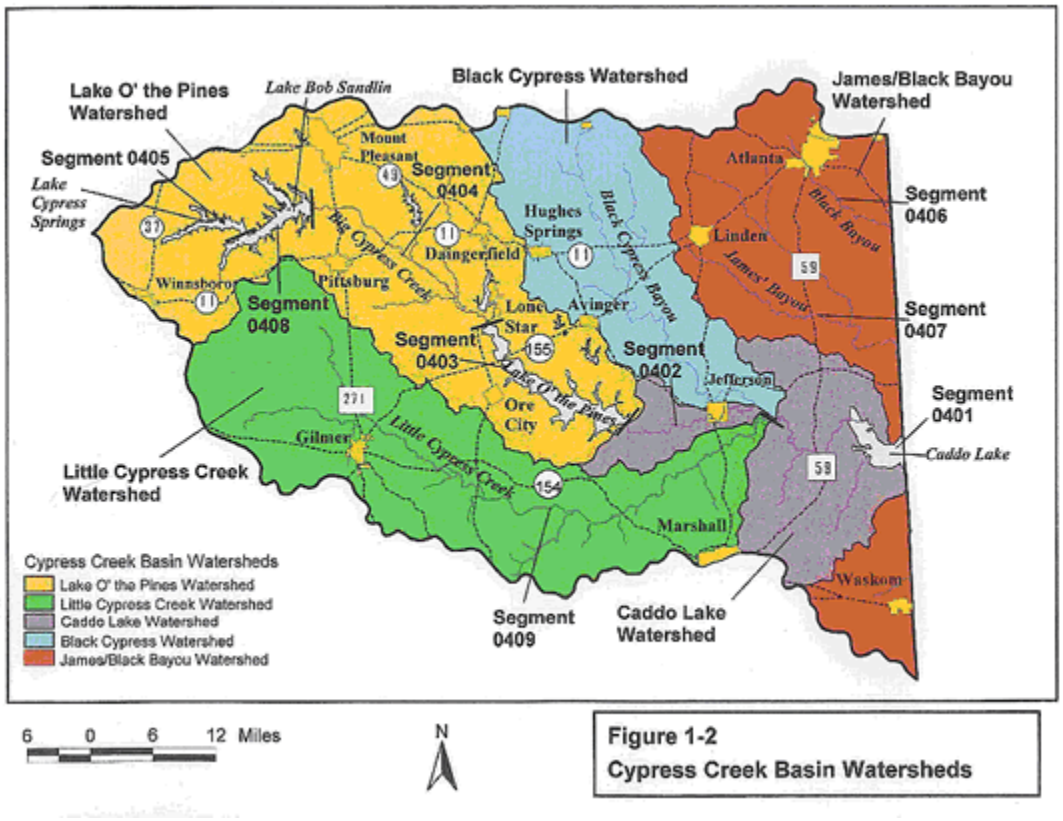

Figure 1-2
Cypress Creek Basin Watersheds

Uncertain, Tx, is really the center of the Caddo Community with the most amenities and resources in the area. This is a very rural and spread-out community, except for Uncertain and nearby Karnack, location of the Caddo Lake Institute office and meeting space.

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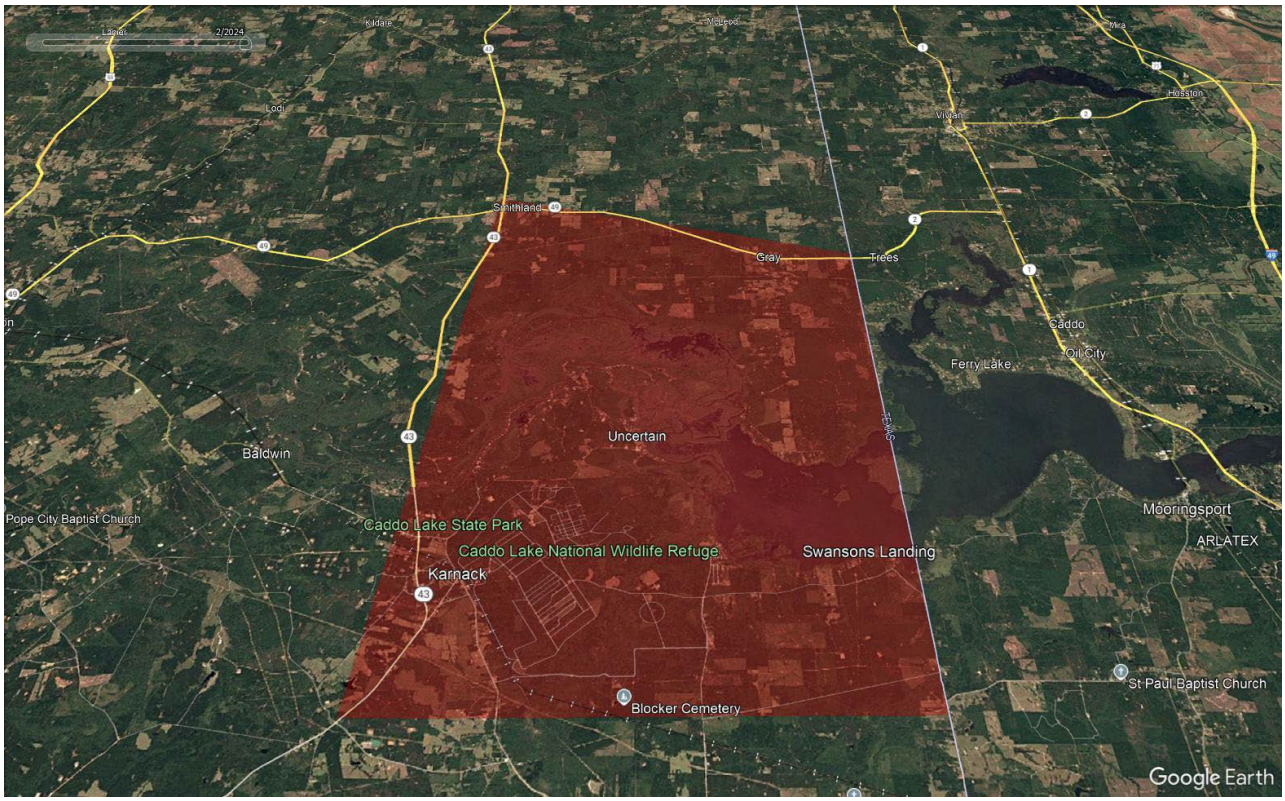
Figure 2: Specific areas for inquiry during this watershed planning group focus



The Watershed of Caddo, Segment 0401, HUCS **11140306** will be appropriately represented.

The larger *basin* has several reservoirs outside of our segment with resources and data that we will be building on. The NETMWD and Clean Rivers Program representative will assist greatly in relevant information. East of the major reservoirs, Caddo Lake data is incomplete. The extreme challenge of invasive species are unique to Caddo Lake and are not a critical issue in flowing creeks and managed reservoirs. We seek to learn more about nutrient loading into Caddo, exacerbating the invasive issues that are assumed to be reducing water quantity and quality.

3.B.Evaluation Criterion B – Addressing Critical Watershed Needs

3.B.1 Sub-criterion No. B1. Critical Watershed Needs or Issues

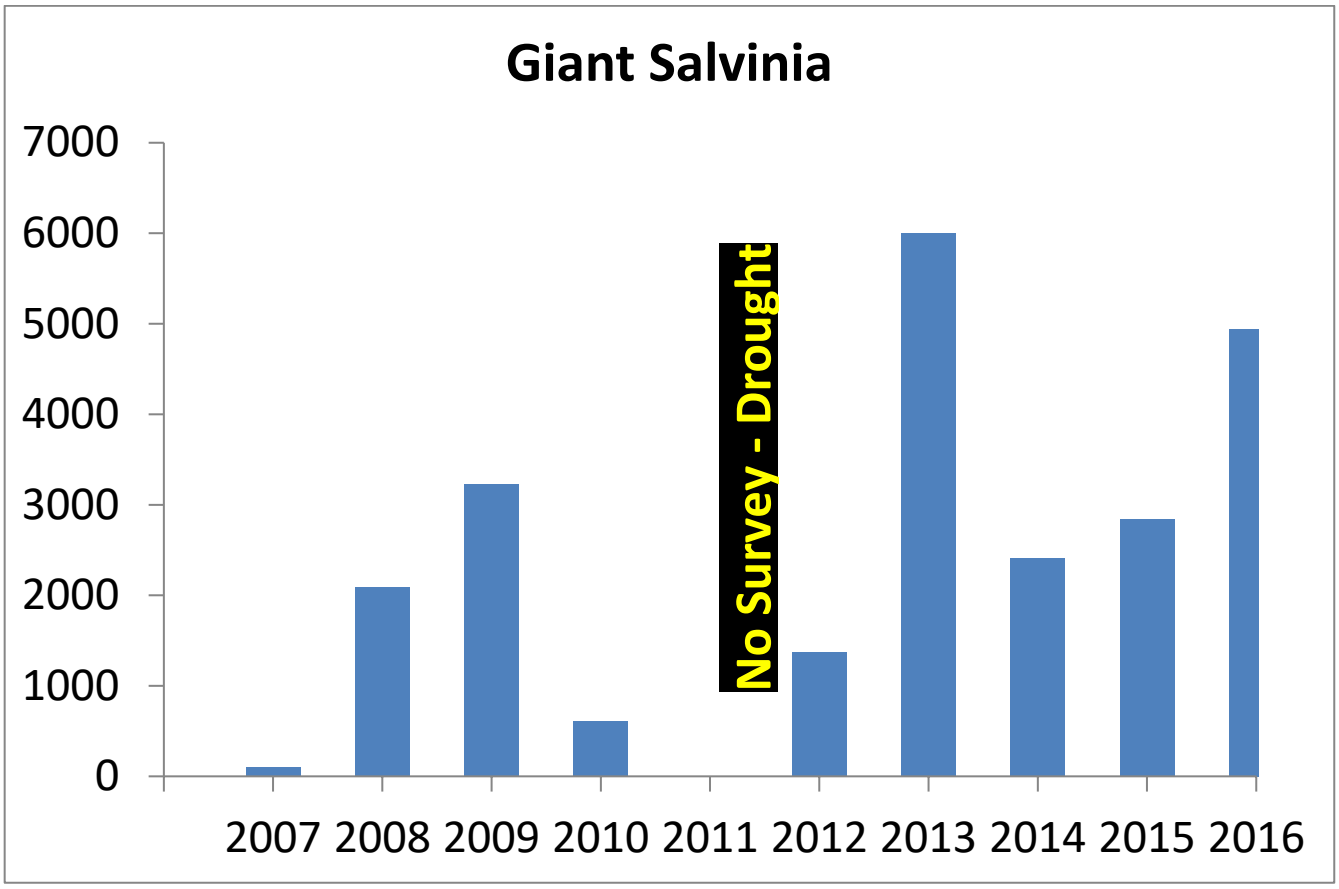
Critical Importance of Caddo Lake with local groups having unusual importance:

Caddo Lake is the only naturally-formed lake in the entire state of Texas; all other Texas lakes are impounded reservoirs. Caddo Lake is not managed by the Corps of Engineers nor is it part of a River Authority: the local community and non-profit groups must serve this purpose. 50 years ago, the Greater Caddo Lake Association was formed to fill this purpose from a civic organization standpoint. 30 years ago, The Caddo Lake Institute emerged to fill scientific gaps, to inform the community, and to organize state and federal resources to best improve, maintain, and protect Caddo in perpetuity.

The area was declared the US's 13th Wetland of International Importance by the Ramsar Convention, an intergovernmental treaty that recognizes exemplary wetland systems. The USFWS has assigned Caddo a Priority 1 [RC-1] ranking for acquisition and preservation based on the high-quality habitat and critical services provided to migratory and resident waterfowl including one of the highest populations of wood ducks in the Upper West Gulf Coastal Plain ecoregion. Area bottomland hardwoods serve as a critical staging area for a variety of neotropical songbirds. Because of the diverse habitat, small bayous, seasonally flooded swamps, open lake, there is a high diversity of species with 973 documented plant and animal species.

The critical needs and issues in our Watershed are: water quality impairment and aquatic ecosystem degradation.

Invasive Species: Texas Parks and Wildlife performs surveys of invasives at Caddo Lake. In 2013, salvinia covered 50% of the lake's surface; many boat roads and businesses were inaccessible. The Texas side of Caddo Lake is approximately 13,000 acres, and this chart shows coverage in acres by year:

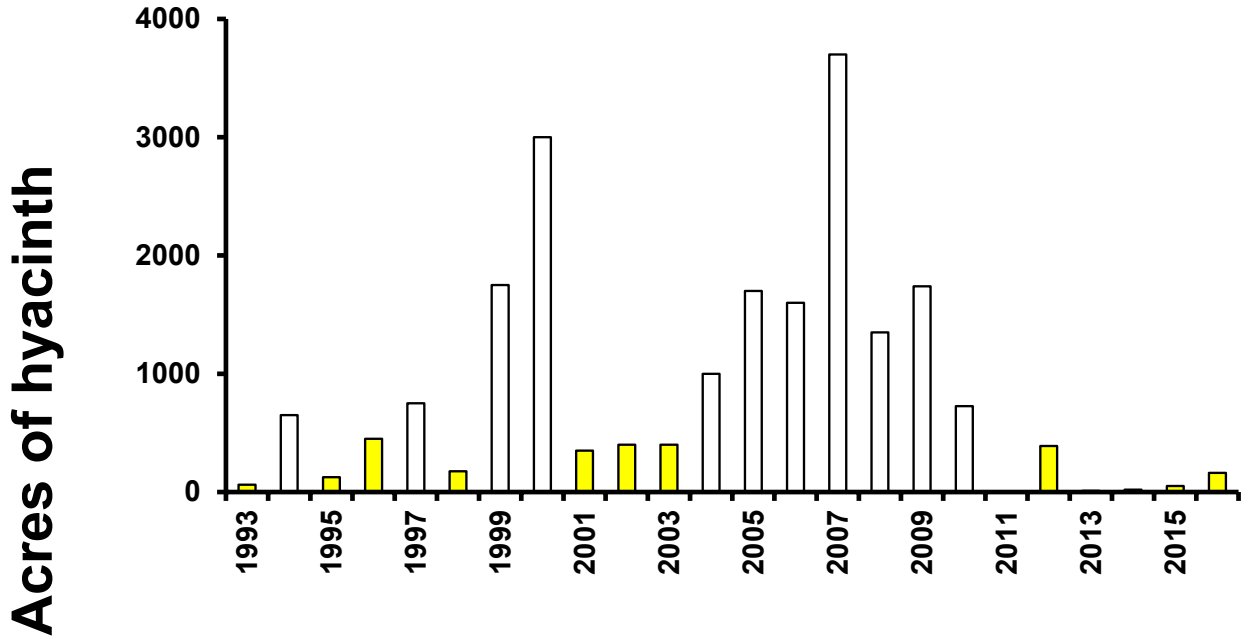


Salvinia coverage in acres each year.

Here are some images from 2015, (not the worst year, of Salvinia Coverage)

Pictures top and bottom show dying Salvinia, sprayed with Herbicide before it sinks to the bottom

Water Hyacinth is another invasive species. The next figure is the chart showing Hyacinth acreage by year –



Water Quality Issues: There are water quality monitoring stations on Caddo Lake, but none in the smaller tributaries of Kitchens Creek and Haggerty Creek. 9.8% of the drainaiges, (e.g., Kitchen Creek, Harrison Bayou and Haggerty Creek) are ungauged. No nutrient testing has been done in decades.)

From existing monitoring stations and all available data, we will analyze to determine any gaps. 303(d) list for water quality impairments include:
Harrison Bayou, feeding into Caddo Lake, has been added to the 303(d) list of impairments for *e coli.*
Caddo Lake is on the list for low dissolved oxygen.
The USGS/USACE 1991-92 survey indicates that extremely high levels of coliform bacteria (average values of 4,500-6,000 colonies/100ml) in the water column. The DO and pH occasionally fall below the minimum criteria.

None of the monitoring stations are capturing nutrient data. We do not have eDNA data to know the origin of the *e coli*. We do not have a Watershed Management Plan to address nutrients. We do not have a dedicated coordinator to pull together strategic planning around this issue. We do not have a coordinator to strategically build formal partnerships. We do not have funding streams for additional needed testing. We do not have funding currently for acquiring needed data, for synthesizing that with existing data, or for concerted outreach to the stakeholders and public about the water issues and plan.

The lake has been teetering on eutrophication for many years. The lake communities have been flooding for many years. The theory is that sedimentation, especially due to die off of the world's worst aquatic invasive species, Salvinia Molesta, has added to the nutrient loads/eutrophication and sedimentation in recent years.

Caddo has had issues for many decades with excessive amounts of aquatic invasive vegetation. Since the 2006 discovery of Giant Salvinia, considered the most prolific aquatic invasive plant, the lake has been experiencing sedimentation due to the exponential growth rate of this invasive plant. A single plant can grow to cover 40 acres in 3 months. Additionally problematic for water supply, as the plant dies whether through natural conditions or herbicide applications, the vast amount of the dead plant sinks to the bottom and starts to decompose. As current, wind, boat traffic disturbs this sediment some of it is resuspended into the water column causing water quality issues. This growth also exacerbates the depth of the shallow areas of the lake limiting the amount of water that can be stored for environmental and human needs.

Water Quantity: Caddo Lake is already naturally shallow. The average depth ranges from 4-6 feet deep. Therefore, sedimentation is even more of an issue for this unusually shallow lake.

And, the shallow upper end of Caddo Lake is densely populated with aquatic plants (macrophytes).

Normal pan evaporation is about 45 inches per year. The rate for evapotranspiration of with Giant Salvinia is 5-7 times that amount, leading to water supply security concerns as well as degraded quality.

Water quality problems associated with dense growth of aquatic macrophytes include low DO, nutrient release to the water during active growth and senescence, and loading of organic matter to

the environment. Additionally, the canopy of macrophytes becomes so thick in Caddo Lake during the growing season that access to some areas of the lake is restricted; this obviously harms the economy and quality of life for people, along with detrimental effects for animal species.

Due to the excessive growth, herbicide applications are required to maintain navigation and recreational use of the lake. These herbicides are deemed safe by the EPA but the community has asked for local water to be tested for residuals and how to fully understand how the combinations of surfactants and different herbicides react with the local water.

Before the herbicide applications began, when Giant Salvinia covered half the lake, there were times when water quality was showing the lake as eutrophic and dissolved oxygen was very low. Biological controls have been used with mixed results: the temperature is difficult on the weevils that consume Giant Salvinia; rearing weevils can be difficult. The Caddo Biocontrol Alliance raises weevils in small numbers and puts them in areas where herbicide is not advisable. While biological controls hold future promise, they are not yet at a scale to effectively manage the invasive plants.

Giant Salvinia is found in almost all lakes in Louisiana and a number of Texas lakes, the exponential growth seen at Caddo is rarely seen. One suspected cause of this extreme issue with invasive species at Caddo is excessive nutrient deposits trapped in the sediment as well as nutrient rich water flowing in from tributaries.

Need for Data and Collaborative Understanding: There are many questions that remain: many different tributaries run through different land use types – timber, ranching, agriculture, residential with septic, boathouses, and periodic floods. Where are the nutrients coming from?

With fecal coliform and *e. coli* testing high in many places, we are uncertain where the concentrations are highest. Without eDna testing and concerted input from area residents and local industry, we also do not know the source (human/septic/wastewater treatment plants, feral hogs, etc.) so a plan to reduce these stressors is unclear.

We have a need for resources: This is a small community and each of these stakeholder groups are operating near max capacity. Being able to employ a coordinator will give the structure and direction and bring the existing tools and data into an organized format to maximize valuable time and energy of each stakeholder group. The coordinator, data consultant, and testing consultant will be compensated. This will provide concerted focus that makes each meeting and engagement more productive. By reimbursing stakeholders for any travel, they will feel appreciated and supported; participating will not be an undue burden.

With this level of community support and coordination, could we – through existing partners and other stakeholder groups or social media and targeted mailers - encourage buffer zones and native plants to reduce nutrient loading? We recognize that implementation is not part of Phase I, but some progress may be made by sharing information. This planning would make future efforts most effective; knowing where those buffer zones and native plants would best be deployed.

3.B.2. Sub-criterion No. B2. Project Benefits

This project will synthesize all existing data into one current document, citing sources, elucidating

where gaps in knowledge are. Newly acquired data will fill in those gaps. The group will then be able to identify areas that are most effective and strategic for improvements. The stakeholders and the community will then have access to a comprehensive Watershed data set and a road map to move forward.

The Watershed, the community, the species who live here, and each of the participant groups will benefit from enhanced partnerships for coordination and cooperation to protect wetlands and expanded public support for the plan. Specifically:

- The City of Uncertain, the Counties of Marion and Harrison, will hopefully have a path forward to decreased flooding due to decreased sedimentation and therefore increased water / flood capacity. Initially it will help them know what efforts and expenditures are most effective, and eventually, it will safeguard a key asset in their region that supports the tax base and the population.

- The Texas Parks and Wildlife Department, who spends time and money on herbicide application, will have a strengthened understanding of the community in which they work. They will access to those who are regularly on the water, who can help us all know real time information. The TPWD has a Wildlife Management Area and Texas' second state park on the shores of Caddo, so their investments and activities will be better understood and eventually more resilient and healthy.

- The Caddo Valley Navigation District will have a clear path forward to a day when it is easier to maintain boat roads due to decreased sedimentation and obstruction by invasive species.

- The Greater Caddo Lake Association represents the civic interests. The citizens and those former citizens who still remain members due to their deep love of Caddo, will have a clearer understanding of the issues and where their philanthropy and future grants may be best directed. Eventually, they will have a more sustainable and resilient community with a stronger foundation for the economy, the way of life, recreation, and quality of life.

- The Caddo Lake Institute will be making progress on their mission to protect and improve Caddo Lake.

- NETMWD and The Clean Rivers Program will have access to more relevant data, just as the group is benefitting from their data. This data and plan will complement their efforts and expand upon them. This project also supports the *Texas Nonpoint Source Management Program Short-Term Goals* of data collection, assessment, and implementation by: 1) collecting data to help identify nonpoint sources of pollution; 2) conducting assessment activities to determine the effect of the nonpoint source pollution; 3) conducting outreach efforts that will help to educate and initiate action at the local level; and 4) identifying BMPs that can be put in phase 2 implementation under another potential grant with Environmental Water Resources Projects NOFO, and through sharing with another collaborative implementation group, the Conservation Delivery Network

- The Texas Forest Service and the Timber Industry will have a clear idea of how their

activities could harm or benefit the resource (water) that allows their forests to be so productive. The interplay between forests and water will be better understood with actionable ideas.

- The Ranching community will have a clear idea of how their activities could harm or benefit the resource (water) which allows their cattle to drink water from the watershed and whose hay can be irrigated from the resource.

- The OSSF departments in both counties will better see the importance of their septic permitting reviews and oversight to see the link between a healthy Caddo and their day-to-day operations.

- The Conservation Delivery Network will have more information about where conservation delivery could be of benefit when they are selecting projects and focusing efforts.

- The Friends of the Caddo Lake National Wildlife Refuge will have increased knowledge about threats and opportunities as they interact with the public through refuge activities, and as they spend their time and financial resources on projects at the refuge.

- The Collins Academy will have access to hands on science experiences for their young participants showing them real world examples of jobs in conservation, different ways they might serve in their adult lives in civic and community organizations, and by helping with social media post creation, see how their native talents can be used as a force for good.

- The community will then know that people do care about them and this resource and are sharing information with them in an organized way.

The goal of this group's formation is to protect the water supply in Caddo Lake by reducing invasive species. The sedimentation from decaying plants, the increased evaporation and water loss from rampant invasives, as well as the potential water quality issues from reduced dissolved oxygen and increased herbicides and surfactants will be improved by reduced invasives. Attacking invasives at their root cause, the excessive nutrients feeding these plants, will improve water quantity and quality.
By bringing together scientists, government agencies, and local groups, we can create a holistic plan. Volunteers, community groups, tour guides, fishermen, locals, are out on the lake every day. Using their on the ground, daily knowledge of where the invasives are, with surveys of the plant type and stage, can help the herbicide applicators be more effective and efficient with their chemicals.
Coordinated meetings with science based surveys and invasive identification will streamline efforts to combat invasives. Holistic water sampling will show the locations with the highest nutrients and help identify the source. By knowing what nutrients and where they are coming from, we can provide this information to those who can already develop strategies to reduce these inflows, through communication we can even encourage individuals and stakeholders to begin to implement changes themselves, and we are poised to develop strategies to reduce these inflow in a future phase or through other sources in the futures.

There is also great value in formalizing partnerships and working together across disciplines in

this underserved area.

- Formalizing this network or organizations will contribute to a more resilient and sustainable Caddo.
- The local community will be more informed about water issues and non-point sources.
- The active conservation stakeholder groups will be more informed about what diverse local viewpoints, especially industry, prioritize in the watershed and their indigenous knowledge.

We expect that when implemented, the benefits would be: increased water storage for flooding, environment and human needs, due to reduced sedimentation; improved water quality due to reduced nutrients and reduced invasives; reduced government (state) burden of herbicide application.

In addition, there will be benefits for Species of Greatest Conservation Need. At Caddo that list includes:
State Endangered: American Peregrine Falcon; Peregrine Falcon; Interior Least Tern; Red Wolf.
State Threatened: Black Bear; Louisiana Black Bear; Black Rail; Piping Plover; Wood Stork; Bachman's Sparrow; White-Faced Ibis; Paddlefish; Blackside Darter; Bluehead Shiner; Creek Chubsucker; Texas Fatmucket; Sand Pocketbook; Louisiana Pigtoe; Texas Heelsplitter; Rafinesque's big-eared bat; Alligator Snapping Turtle; Eastern Box Turtle; Louisiana Pine Snake; Northern Scarlett Snake; Timber Rattlesnake.
State Imperiled: Brown Pelican; Western Chicken Turtle
State Vulnerable: Bald Eagle; Swainson's Warbler, American White Pelican; Prothonotary Warbler; Least Tern; Southeastern Myotis Bat; Southern Crawfish Frog

As well as several species who are being considered for Federal ESA Listing:

- Alligator Snapping Turtle
- Western Chicken Turtle
- Kisatchie Painted Crayfish (endemic only to the Cypress Basin in Texas)

3.C.Evaluation Criterion C –

3.C.1. Sub-criterion No. C1. Readiness to proceed

The lead and the partners are well established, stable, and ready to proceed. The core group of partners is known to one another. The needed consultants are also known. The access to the data that is existing is on hand. We are poised for success because there is a history of coordination. Strong relationships already exist, but partners are not regularly meeting nor focused on Water Quantity and Quality.

NETMWD is upstream and has extensive data, there is solid baseline of data on some parameters at some locations in and around Caddo Lake, and there is another existing collaborative, the Conservation Delivery Network (CDN) who may be able to take the implications of this plan for implementation, regardless if we are successful in securing Phase II funding. If awarded this grant, the Caddo Lake Institute will be able to have a dedicated coordinator to regularly and effectively activate strong partnerships:

We are not starting from zero – we have a strong foundation – but we need funds for a coordinator to focus a group and to reimburse the group for travel to meetings as well as funds for outreach, and of course, the nutrient testing to target locations where nutrients are highest to create a plan that points resources where they are most effective. Because so many people already love Caddo and have worked together in the past and do not have to start from scratch, we have a high degree of confidence in our future success given the resources.

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ACTIVITY	DATES	MILESTONES	Responsible Party
1 Task A: Watershed Group Development			
Part-time coordinator formally engaged by Caddo Lake Institute	2/1/2025-2/4/2025	Consultant contract with SP8 signed. Utilize existing Watershed Planning Guides as a handbook for activities, recognizing many of the items already exist and have been accomplished.	CLI Coordinator
Stakeholder Engagement	2/4/2025-2/18/2025	• Reach out by phone to each Member to ask about further diversity and appropriate reps from other potential important groups • Illicit Feedback for new members	Coordinator
Workgroup meetings	2/18/2025-1/31/2026	• Hold monthly meetings, 6 in person and 6 via zoom	
Collaboartion/Information Sharing and gathering among stakeholders	Throughout the grant term as they occur	• 2 CDN meetings • 1 Region D meeting • 2 CVND meetings • 2 Uncertain City Council meetings	Coordinator
Outreach & education	3/1/2025 3/14/2025	• Article in the Caddo Lake Institute Quarterly Newsletter emailed to 900 explaining the process and purpose and how to have input • Social Media Posts by all partners involved (utilize students from Collins Academy to assist with designing and posting social media posts about the Workgroup)	Caddo Lake Institute Each partner organization

Stakeholder & Community Outreach/Education/Engagemetn	1/29/2026	Article written by the Watershed Group in the Greater Caddo Lake Association Newsletter mailed to 2,000 members with an email address for input	Coordinator with review by consultant and group
	1/29/2026	Sharing the Final Report via the Quarterly Caddo Lake Institute e-newsletter sent to 900 with an email address for input	Caddo Lake Institute
	1/29/2026	Social Media Posts Summarizing Results with a link to the full Final Report on each partners social media	Each Member Group
	After 1/15/2026 – some scheduled community activities where the final report can be shared will be after the grant period	Provide copies and have at least one representative of the Planning Group at established community events – 4th of July parade & fireworks, Annual Floatilla, GCLA fish fry, Christmas boat parade	Different members of the group
	1/15-1/31/2026	Meeting with OSSF/Septic Permitting in Harrison and in Marion to share Final Report	Coordinator
	Quarterly and then afer completion of grant	• Financial reports and accounting as well as reimbursement for Watershed Group travel to and from meetings. • State of the Lake Public Meeting to share results from the Watershed Group	Caddo Lake Institute

2 Task B: Needed Science

Water Data consultant formally engage by Caddo Lake Institute	2/1/2025-2/4/2025	Contract signed by both	Dr. Roy Darville & Clean Rivers Rep –
Literature/Data Review of Existing	2/4-2/18/2025	• Coordinator and consultant to provide literature review and existing data analysis at the first meeting. Perform water quality data and literature review to identify existing information and to focus future efforts on most important water quality issues	Darville & CRP rep
		• Take Clean Rivers Program Existing Data and where stations are over the past 10 years to see each station's water quality issues	Darville & CRP rep
		• This task will involve the evaluation of data (land use and water quality) collected by by other agencies and under other contracts and grants	Darville & CRP rep
		• Identify Gaps in Data	Group Led by Coordinator & Darville
Gaps identified, testing plan created	2/18-3/18	• Group looks at data review and maps to determine the tributaries where data is lacking as well as the population centers/buildings and industry activities, identifying on a map where the unknowns are. verification may be conducted through stakeholder input, comparison with existing aerial photography, limited field visits	Group Led by Coordinator & Darville & SP8 expert
	3/18-4/18	• Create a plan for where sediment testing needs to occur, where ecoli testing needs to occur, and where herbicide applications are most heavy to pinpoint strategic locations for gathering water	

New Data/Sampling	4/18/25-12/15/25	• New testing sights • Sediment sampling • residuals and combinations of surfactants and different herbicides with the local water. • Ecoli samples for eDna	SP8 EnviroServices
Cooperative Watershed Management Plan for Caddo Lake – Segement 0401	12/15/25-1/15/2026	• Ranking the potential source locations of pollutants (identified in the §303(d) list and Water Quality inventory, and through stakeholder concerns) and categorizing the potential fate and transport of those pollutants • Development of a prioritized list of sources of environmental contaminants in the Big Cypress Watershed • Drivers of nutrients and sedimentation identified. • Clear Plan of Actions identified to reduce nutrients, sedimentation, and pollutants	Caddo Watershed Planning Group
Science & Collaboration	1/15/2026	• Final report Final Plan for Watershed Protection. A clear and comprehensive plan, taking into account stakeholder input, existing data, and data acquired during this grant that fills in gaps in knowledge.	Coordinator with input from the Group and oversight from SP8 support from Graphic Designer

3.D. Evaluation Criterion D – Department of the Interior and Bureau of Reclamation Priorities

1. *Climate Change:*

Climate change in the form of the change in timing and amount of precipitation and air temperature increase is occurring, and continued greenhouse gas emissions at or above current rates will cause further warming (Intergovernmental Panel on Climate Change (IPCC) 2021, pp. 1-13-1-15). Warming in Texas is expected to be greatest in the summer (Maloney *et al.* 2014, p. 2236, figure 3), with the number of extremely hot days (high temperatures exceeding 35 °C (95 °F)) projected to double by around 2050 (Kinniburgh *et al.* 2015, p. 83). Changes in stream temperatures are expected to reflect changes in air temperature, at a rate of an approximately 0.6-0.8 °C (33 °F) increase in stream water temperature for every 1 °C (33 °F) increase in air temperature (Morrill *et al.* 2005, pp. 1-2, 15), with implications for temperature-dependent water quality parameters such as dissolved oxygen and ammonia toxicity.

Effects of climate change, such as changes to seasonal rainfall patterns, air temperature increases, and increases in drought frequency and intensity, have been shown to be occurring throughout East Texas (Andreadis and Lettenmaier 2006, p. 3; USGCRP 2017, p. 188); these effects are expected to exacerbate several of the stressors discussed above, such as water temperature and flow loss (Wuebbles *et al.* 2013, p. 16). A recent review of future climate projections for Texas concludes that both droughts and floods could become more common in east Texas, with droughts like 2011 (the driest on record) becoming commonplace by the year 2100 (Mullens and McPherson 2017, pp. 3, 6). This trend of more frequent droughts is driven by increases in hot temperatures (*e.g.,* daily maximum) and the number of days projected to be at or above 37.8 °C (100 °F), which is set to "increase in both consecutive events and the total number of days" (Mullens and McPherson 2017, pp. 14-15). Similarly, floods and extreme runoff are projected to become more common and severe in the 21st century as the frequency, magnitude, and intensity of heavy precipitation events increase (Mullens and McPherson 2017, p. 20; USGCRP 2017, p. 224).

Therefore, non point sources of pollution and reduced capacity to hold flood water in Caddo Lake due to sedimentation from dying invasives, need to be addressed now to make Caddo more resilient and better poised to handle these expected changes.

2. *Benefits to Disadvantaged and Underserved Communities and Tribal Communities*

    - The Council on Environmental Quality's Climate and Economic Justice Screening tool identifies Harrison County as: "This tract is considered disadvantaged because it meets more than 1 burden threshold **AND** the associated socioeconomic threshold." Census data tells us that Harrison County is 21% Black, 14% Hispanic, 17% in poverty, 14% with no high school diploma (and only 14% with a Bachelor degree.) The CDC/ATSDR Social Vulnerability Index is 68% more vulnerable than the rest of Texas Counties.

- The Council on Environmental Quality's Climate and Economic Justice Screening tool identifies Marion County as "This tract is considered disadvantaged because it meets more than 1 burden threshold **AND** the associated socioeconomic threshold." Marion County is 27% Black, 18% in poverty, 14% with no High school diploma (and only 13% with a Bachelor degree.) The CDC/ATSDR Social Vulnerability Index is 65% more vulnerable than the rest of Texas

Counties.

- Benefits to this community include:

    i. economic benefits as many are either directly or indirectly economically supported due to tourism and recreation activities at Caddo.

    ii. Water Quality impacts this community as many get much of their protein from fish caught in the waters of Caddo.

    iii. Quality of life is greatly influenced by the pride in and enjoyment of the natural beauty of Caddo lake and the outdoor lifestyle it supports.

    iv. Having a trusted roadmap for future strategies and solutions that reflect community priorities will better ensure their success and the overall integrity and resilience of this community

2.1 Tribal Benefits – There are no federally recognized tribes in the region. There are no ongoing Reclamation activities. Unfortunately, the Caddo Nation peoples for whom the lake is named, were relocated to a reservation in Oklahoma in the 1800s. In the past, there have been organized Caddo Nation / Caddo Lake stakeholder group interactions around archeology and culture. While the Caddo Lake Institute has established a relationship with the current chief of the Caddo Nation and he has visited, they have not lived in the area for many generations. The Caddo Nation primarily reside outside Binger, Oklahoma, which is more than a six (6) hour drive from Caddo Lake. Chief Bobby Gonzalez was appreciative of conservation efforts to keep Caddo as healthy as possible and to try to restore it to a more natural state.

Benefits to the tribe are that by protecting and restoring water quality and quantity, this allows for future potential for the Caddo Nation to enjoy their tribal homelands. Caddo Lake Institute and some of the local partners proposed special educational and experiential visits for Caddo youth and opportunities for current locals to learn from Caddo people. These ideas have not yet been put in motion, but the door is open to further collaboration.

4. BUDGET NARRATIVE (uploaded separately as Budget Narrative Webform)

5. ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

Water monitoring, taking samples of water from a boat, will not require permits or compliance. The consultant will be well versed in local permitting and water sampling and will not engage in any activity that would disturb cultural resources or sensitive species. Several members of stakeholder groups are Texas Historical Commission stewards with knowledge of best practices and sensitive areas. Therefore, we would be able to avoid this.

6. REQUIRED PERMITS OR APPROVALS

Caddo Lake Watershed Planning Group does not intend to do work under this grant that requires permits or formal approvals.

7. ATTACHMENTS: LETTERS OF SUPPORT

Letters of Support uploaded to the application in “Attachments” are from:

- Northeast Texas Municipal Water District (”NETMWD” also the Clean Rivers Program Lead)
- The Conservation Delivery Network (“CDN” Larger Region gov’t & ngo conservation implementation)
- City of Uncertain
- Greater Caddo Lake Association (GCLA)
- Friends of the National Wildlife Refuge

NORTHEAST TEXAS MUNICIPAL WATER DISTRICT

August 30, 2024

Bureau of Reclamation
Financial Assistance Support Section

RE: Water SMART Cooperative Watershed Management Program grant

Greetings Grant Staff

The Northeast Texas Municipal Water District (NETMWD) is pleased to provide this letter of support for the Caddo Lake Watershed Group's grant application.

Caddo Lake Institute continues to be a stalwart organization in protecting and conserving the environment in the Cypress Basin. For many years they have worked with our organization and others to understand the water for human needs as well. CLI has partnered with us for over 3 decades as we work together to address both water supply and environmental needs in the Cypress basin and in Caddo lake. This Caddo Lake Watershed Group is a continuing example of the proactive stance CLI takes to find answers to questions and concerns of the communities and entities that support and rely on the Cypress Basin and Caddo Lake.

NETMWD encourages your approval of the Caddo Lake Watershed Group's grant application. This group intends to utilize a portion of this grant funding to hire a coordinator to bring together varied entities and to guide them to find answers to their concerns with the balance of the funding used to further determine the relationship between excessive invasive aquatic plant growth in Caddo Lake and water loss through evapotranspiration as well as what effect this excessive growth is having on water quality and quantity in the study area.

This letter constitutes our support of the Caddo Lake Watershed Group's grant application and our continued support of their goals and objectives.

Sincerely,

Robert Speight,
Environmental Manager

NETMWD EXECUTIVE OFFICE
4180 FM 250 South
P.O. Box 955, Hughes Springs, Texas 75656
Office:(903) 639-7538 Fax: (903) 639-2208
E-mail: wowen@netmwd.org Website: www.netmwd.com

August 30, 2024

Ms. Robin Graber,
CWMP Program
Coordinator
Water Resources and
Planning Office
Bureau of Reclamation
P.O. Box 25007
Denver CO 80225
rgraber@usbr.gov

Dear Ms. Graber,

The City of Uncertain, population 86, is the only town directly on the banks of Caddo Lake. We appreciate the efforts of multiple civic and environmental groups who work tirelessly to protect this unique place. We respectfully request you seriously consider the application of the Caddo Lake Institute to create a Watershed Planning Group.

Our ecosystem is dynamic and challenges evolve. We know that the Caddo Lake Institute and the Greater Caddo Lake Association and other partners are capable of executing this grant. We welcome the opportunity to fund a coordinator and activities to address watershed protection and restoration.

We appreciate the hard work you and your team do to safeguard our natural resources,

Judye Patterson, Mayor, City of Uncertain
177 Cypress Drive, Uncertain, TX, 75661

30 August 2024

Bureau of Reclamation (BOR)
Financial Assistance Support Section

RE: Water SMART Cooperative Watershed Management Program Grant

I am writing to confirm the Northeast Texas Conservation Delivery Network's (NETX CDN) support for the Caddo Lake Institute's proposal to BOR's Water SMART Cooperative Watershed Management Program Grant. CLI has been a partner of NETX CDN since 2011, working with us to address needs in the NETX, and the broader region, well beyond the footprint of Caddo Lake. As a member of the 8-state Lower Mississippi Valley Joint Venture, our 56-county partnership believes that CLI is a key advocate for conservation with a reliable track record of success.

Our NETX CDN partners, including CLI, effectively collaborate and cooperate to address the very real challenges associated with conservation of water resources – ensuring better water quality and quantity for all needs that are important for those natural resources that are dependent upon fully functional watersheds. This grant, through support from BOR in this endeavor, will be a key factor to future success of our conservation. CLI has been, and continues to be, a stalwart organization in catalyzing, organizing, and communicating conservation in the Cypress Basin. CLI continuously seeks ways to maximize the protections needed, while working collaboratively to ensure water is available to meet the needs of people and our wildlife and fisheries resources.

NETX CDN encourages you to support CLI's grant application. CLI will utilize these funds to determine the extent of the relationship between excessive invasive aquatic plant growth in Caddo Lake and water loss through evapotranspiration, as well as how this excessive growth affects water quality in the study area. This letter constitutes our support of CLI's grant application, and our continued support of their goals and objectives.

Sincerely,
Bill Bartush
Partnership Coordinator
Lower Mississippi Valley Joint Venture
PO Box 6954
Tyler, TX 75711

The Lower Mississippi Valley Joint Venture and the Northeast Texas Conservation Delivery Network serves as the forum in which the private, state, federal conservation community develops a shared vision of bird conservation for the LMVJV region; cooperates in its implementation; and collaborates in its refinement.

September 1, 2024

Ms. Robin Graber,
CWMP Program
Coordinator
Water Resources and
Planning Office
Bureau of Reclamation
P.O. Box 25007
Denver CO 80225
rgraber@usbr.gov

Dear Ms. Graber,

The Greater Caddo Lake Association, a 501(c)3 civic organization, has a 50 year history of caring for this community. Caddo Lake is the lifeblood of our small town. It draws people from near and far to relocate here, to retire here, to vacation here. Our local economy depends upon a healthy Caddo Lake. Our membership is dedicated to addressing threats to the lake and maintaining and restoring it for current and future generations.

We support this application and hope that our rural, underserved area can acquire resources to coordinate together around a Watershed Management Plan. This grant will help our region focus on solutions to issues facing our water supply and quality.

We have done much with very little in addressing the severe threat of invasive species. We have made great strides. But the impacts of excessive aquatic vegetation have a multitude of effects. There are questions we still want to answer and strategies we would like to identify to be most effective in protection and restoration of our shared natural resource.

We hope the grant will be approved so we may take the steps necessary to come together and collaborate on a Watershed Protection and Restoration Plan for Caddo Lake. Caddo is a unique and irreplaceable treasure.

Thank you for your time and consideration,

Judye K Patterson

Judye Patterson, ~~President~~ member, Greater Caddo Lake Association
P.O. Box 339, Karnack, TX 75661
gclaoftx@gmail.com

Steve Woodson, President, GCLA

September 1, 2024

Ms. Robin Graber,
CWMP Program
Coordinator
Water Resources and
Planning Office
Bureau of Reclamation
P.O. Box 25007
Denver CO 80225
rgraber@usbr.gov

Dear Ms. Graber,

We share the vision of a protected and restored watershed for Caddo Lake. We support the Caddo Lake Institute's application for forming and funding a Watershed Management Group and Plan.

Friends of the Caddo Lake National Wildlife Refuge is a 501(c)3 with the mission of supporting the Caddo Lake National Wildlife Refuge. We provide volunteers and financing for projects that enhance the 8,000 acre Wildlife Refuge and to promote it to visitors.

The refuge and the lake are great assets for our piece of deep East Texas. Having a coordinator to bring us together in a consistent and organized way to strategically uncover threats to water quantity and quality at Caddo and to develop a plan to address the threats is welcomed and needed.

Sincerely,

John Fortune
President, Friends of the Caddo Lake National Wildlife Refuge