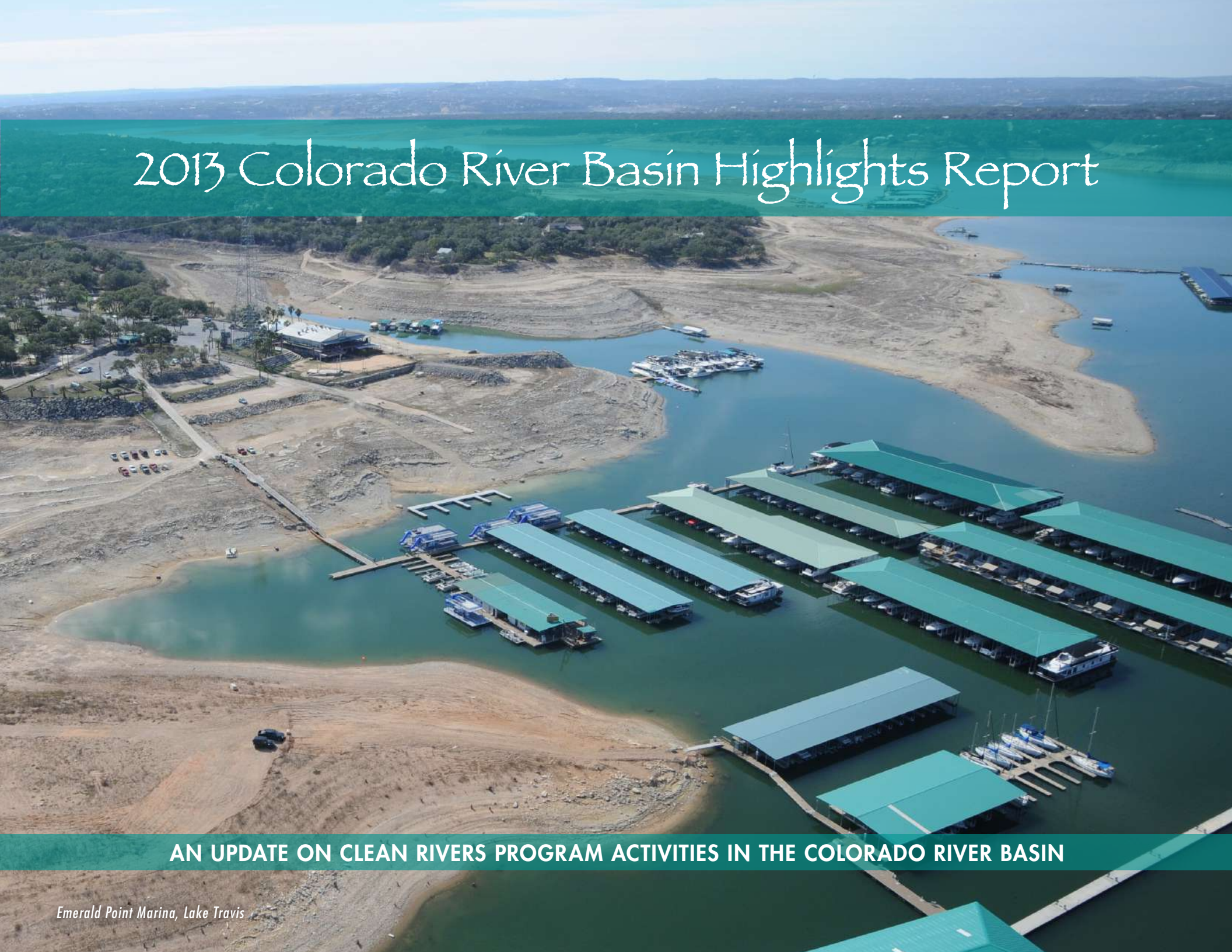
2013 Colorado River Basin Highlights Report



AN UPDATE ON CLEAN RIVERS PROGRAM ACTIVITIES IN THE COLORADO RIVER BASIN

Emerald Point Marina, Lake Travis

Introduction

The Clean Rivers Program (CRP) is a statewide water quality program that emphasizes monitoring, assessment and public outreach to protect Texas' surface water. The Texas Commission on Environmental Quality (TCEQ) administers the program along with 15 regional partners in their respective river basins. CRP partners across the state collect and assess water quality data that TCEQ uses to establish water quality standards, set wastewater discharge permit limits and evaluate aquatic systems. In the Colorado River basin, the Lower Colorado River Authority (LCRA) and the Upper Colorado River Authority (UCRA) implement the program. The City of Austin and Hays County also contribute water quality data to help assess water quality in their regions.

Clean Rivers Program Partners in the Colorado River Basin

This report is an update on CRP activities in the Colorado River basin during 2012 and early 2013. For detailed water quality information, see the 2012 Colorado River Basin Summary Report at www.lcra.org.

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Program Update

In 1991, Texas lawmakers passed legislation to establish the Texas Clean Rivers Program. Senate Bill 818 authorized funding for the program from annual fees paid by water rights holders and by municipal and industrial facilities that discharge wastewater. While the original legislation dedicated $5 million per year to accomplish CRP objectives, legislation passed in 2004 combined the CRP funds with other TCEQ water program dollars.

CRP long-term objectives:

- Provide quality-assured data to TCEQ for use in water quality decision making;
- Identify and evaluate water quality issues;
- Promote cooperative watershed planning;
- Inform and engage stakeholders;
- Maintain efficient use of public funds; and
- Adapt the program to emerging water quality issues.

The CRP budget remained constant until 2012 when a 10 percent budget cut was implemented. TCEQ CRP staff was able to minimize the impact to the program in 2012 by using other grants for special studies. In the absence of additional grants, monitoring activities will likely decrease in the future. This is a trend seen throughout the state as shrinking state budgets have caused several entities to cut back on water quality monitoring. In the Colorado River basin, for example, there are 33 fewer monitoring sites (17 percent) in 2012 than there were in 2009 (Fig. 1). Monitoring frequency dropped by 27 percent during the same period.

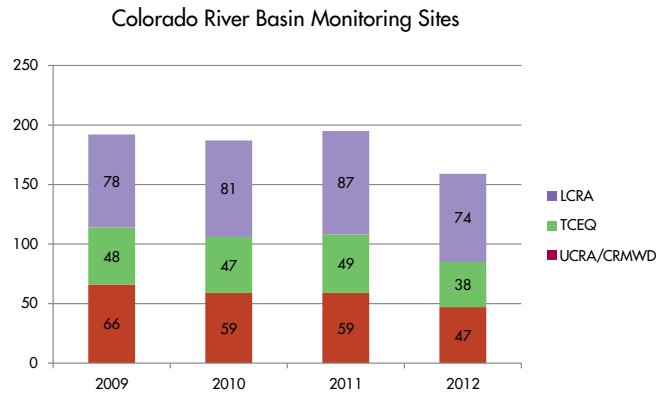


Fig. 1. Number of monitoring sites sampled in the Colorado River basin

Even with budget cuts, the program continues to be cost-effective with the majority of the funds used for water monitoring, assessment and reporting (Fig. 2). In 2012, LCRA received $416,000 for the Colorado River basin. UCRA received $125,000 (30 percent) of that amount to carry out CRP activities in the upper basin.

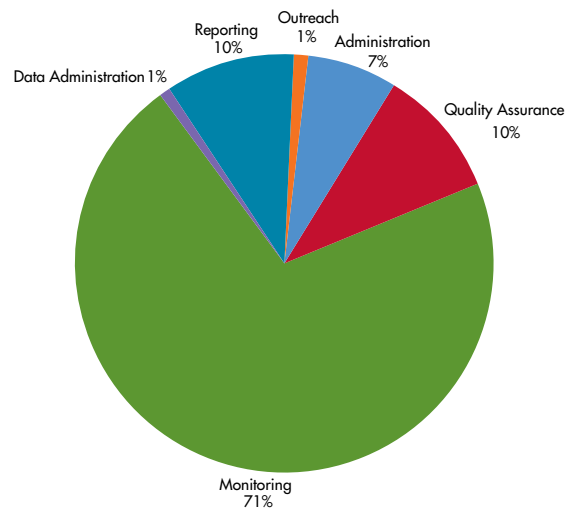


Fig. 2. CRP funding distribution in the Colorado River basin in 2012

Water Quality Overview

The upper Colorado River basin extends far into West Texas, a region that typically gets less than 20 inches of rain per year. Flows are intermittent in this region, with contributions from groundwater seeps. The seeps often contain high levels of dissolved solids, which come from the dissolution of minerals in geologic formations. Oil field activities that took place prior to environmental regulations are also a source of dissolved solids in the upper basin.

In the Concho River basin, dissolved solids are not as much of an issue due to dilution. Increased flows from higher annual rainfall and major freshwater springs on the South Concho River dilute solids in much of the watershed. Downstream of San Angelo, nitrate levels in the Concho River and some of its tributaries are elevated. Sources of nitrates include the Lipan Aquifer, which is a natural source, and agricultural runoff from fertilizer and animal feeding operations.

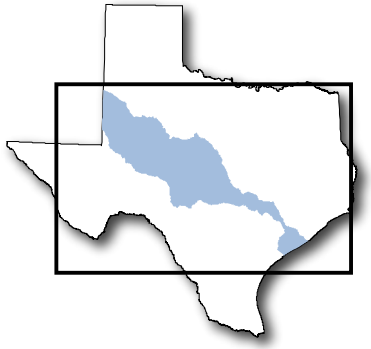
The middle portion of the basin includes the Texas Hill Country, where limestone and granite bedrock in the Edwards Plateau give rise to clear, spring-fed perennial streams. The largest tributaries – the San Saba, Llano and Pedernales rivers – dilute dissolved solids and suspended sediment. This region includes the Highland Lakes of Buchanan, Inks, LBJ, Marble Falls, Travis and Austin, as well as Lady Bird Lake in Austin. Several streams around Austin contain excessive amounts of *E. coli*, the bacteria used to determine waters' suitability for contact recreation. These bacteria levels are attributed to aging wastewater lines, stormwater runoff and pet waste from the highly urbanized areas.

In the lower basin, a radical transition in topography, soils and geology occurs. The steep canyons of the Hill Country give way to the deep clay soils on flat land. Downstream of Austin, the water is less clear because of suspended solids from clay soils.

Flows below Austin are variable. From March through October, water has historically been released from the Highland Lakes to provide water for downstream crops. These water releases help maintain flow in the river and attenuate nutrient loads from wastewater discharges in Austin. In 2012, severe drought conditions prompted LCRA to decrease downstream water releases. The combination of drought and decreased flow resulted in increased aquatic plant and algal growth in the river downstream of Austin.

Algae and aquatic plants in the Colorado River near Columbus in Nov. 2012

Colorado River Basin Water Quality Monitoring Locations 2012



- Lower Colorado River Authority
- Upper Colorado River Authority
- Texas Commission on Environmental Quality
- U.S. Geological Survey
- City of Austin

Colorado River
North Concho River
Middle Concho River
S Concho River
Concho River
Pecan Bayou
San Saba River
Llano River
Pedernales River
Tres Palacios R
Ballinger
Brownwood
San Angelo
Mason
Llano
Junction
Fredericksburg
Johnson City
Austin
Bastrop
La Grange
Columbus
Bay City

N
W
E
S

0 30 60 90 120 Miles

Drought

State Climatologist John Nielson-Gammon has reported that the current drought began in the early 2000s. But in 2011, it hit with such force that it became the second worst drought on record, surpassing the drought from 1916 to 1919. In the upper basin, the decade-long drought has left many streams dry and reservoirs at fractions of their capacities. In the middle basin, flows have historically been higher because of springs and more frequent rains. However, 2011 was the lowest year on record (10% of average) for inflows into the Highland Lakes and 2012 was the fifth lowest year on record (32% of average), due to the drought. These persistent drought conditions can impact water quality directly. Reduced flows can increase water temperatures and dissolved solids and decrease dissolved oxygen levels, which can negatively impact aquatic life.

In January 2013, reservoir levels in the upper basin were a small fraction of their capacities due to the ongoing drought. The levels of the Highland Lakes were comparatively better, but still extremely low (Table 1).

Table 1. Reservoir levels on Jan. 14, 2013

Reservoir Name	Percent Full	Watershed
Lake J.B. Thomas	0.6	Upper Colorado River
E.V. Spence Reservoir	5.5	Upper Colorado River
O.C. Fisher Lake	0.8	Concho River
Twin Buttes Reservoir	2.5	Concho River
Lake Nasworthy (Feb. 14, 2013)	78	Concho River
O.H. Ivie Reservoir	23	Upper Colorado
Lake Brownwood	56	Pecan Bayou
Lake Buchanan	42	Lower Colorado River
Lake Travis	39	Lower Colorado River

Source: Texas Water Development Board and City of San Angelo

Exposed shoreline along Hudson Bend at Lake Travis, April 2012

Water intake rendered useless by drought on E.V. Spence Reservoir in the upper basin, Feb. 2012

Ongoing Water Quality Projects

Upper Llano River Watershed Protection Plan

The upper Llano River watershed, composed of the North and South Llano Rivers and the springs that feed them, supports several unique plant and animal communities and provides critical flows to the Llano and Colorado Rivers and the Highland Lakes. However, aquifer withdrawals, invasive species encroachment, land fragmentation and the loss of riparian habitat threaten the health of the watershed. In an effort to protect and maintain the ecological integrity of the Upper Llano River, the Texas Tech University Llano River Field Station and Texas Water Resources Institute are working with the South Llano Watershed Alliance and others to develop and implement a Watershed Protection Plan (WPP). The effort is supported by a federal Clean Water Act grant from the Texas State Soil and Water Conservation Board and the U.S. Environmental Protection Agency.

The groups are assessing the watershed's condition by looking at the condition of the land, the health of the aquatic ecosystem and water quality. Quarterly samples are taken at 14 main stem sites and six spring sites and biological monitoring is conducted semi-annually at 14 river sites to assess the cumulative impact of pollutant loading on stream health and biological communities. The WPP will identify land use and cover, future needs, water yields from implementing best management practices (BMP) and efforts to control invasive aquatic plants and their impacts. The WPP will also include watershed education components (including programs for K-12 and adult education), wildlife concerns, the economics of BMPs, landowner interest and cooperation, types of treatment measures needed and an implementation schedule.

The WPP process is voluntary and stakeholder-driven. Three public meetings were held in 2012 and a stakeholder Coordination Committee was formed to guide the planning and implementation process. Information collected during the development of the WPP will be presented to stakeholders to help define and prioritize the most effective BMPs. The plan is scheduled to be complete in 2014.

For more information on the Llano River WPP, visit www.southllano.org or contact Tom Arsuffi, Watershed Coordinator or Emily Seldomridge, Researcher at 325-446-2301.

Springs flow into the South Llano River near Junction

Colorado River Environmental Models

The Highland Lakes provide water storage, recreational opportunities and a livelihood for many Central Texans. Recognizing their importance to the region, TCEQ adopted the Watershed Protection Rules (described in Chapter 311 of the Texas Administrative Code, subchapters A, B, E and F) in 1986 to protect water quality. The rules, known as the discharge ban, prohibit new wastewater discharges into each of the Highland Lakes.

In an effort to assess and predict changes to water quality in the lakes, LCRA began developing the Colorado River Environmental Models project (CREMS) in 2006. CREMS uses the best available science to evaluate water quality issues, discern trends and predict the impacts of various decisions, actions and future scenarios on the Highland Lakes. The first model was completed on Lake Travis in May 2009, followed by the remaining Highland Lakes. In 2013, the Lake Buchanan model was completed.

CREMS have been used to demonstrate the impact of different discharge scenarios and help establish wastewater permit limits in the Highland Lakes watersheds. LCRA worked with the cities of Burnet and Fredericksburg during their TCEQ wastewater permit amendment to develop protective measures based on CREMS output. LCRA will continue to use the CREMS models as lake conditions change and work with Highland Lakes communities to develop reasonable treatment options that protect water quality.

For more information on CREMS models, visit www.lcra.org/water/quality/models.html or contact Bryan Cook, LCRA Water Quality Supervisor at 512-578-3258.

Brady Creek Watershed Protection Plan

The Brady Creek watershed in McCulloch County is approximately 784 square miles. It is primarily rural, but includes the towns of Brady, Melvin and Eden. Water quality monitoring performed by UCRA in the early 2000s indicated persistently low levels of dissolved oxygen, which can impact aquatic life.

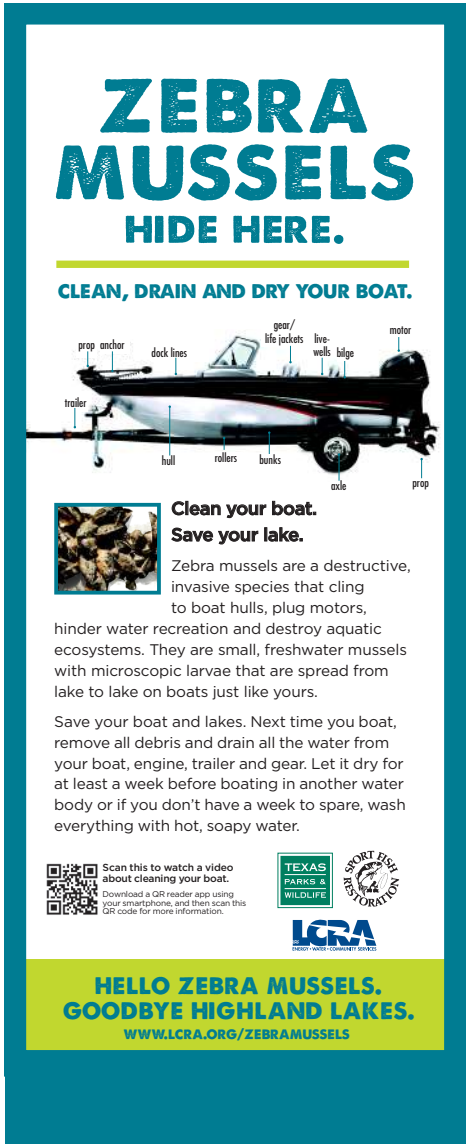
In 2004, funded by an EPA 319(h) grant administered by TCEQ, UCRA created the Brady Creek Master Plan. The plan was an urban runoff abatement project that identified stormwater runoff and low flows as causes of the impairment and implemented stormwater controls to lessen the impact of runoff into the creek. In March 2009, UCRA received another Clean Water Act 319(h) grant from TCEQ to develop the Brady Creek WPP. Unlike the Brady Creek Master Plan, which included only the area within Brady's city limits, the WPP encompassed the entire watershed. In 2010, stakeholders were identified and a monitoring plan was developed. Three stakeholder meetings were held in 2011 and 2012 to update the group on the project's progress and gather input. Ambient and stormwater monitoring from nine sites throughout the watershed was completed in 2012. In 2013, computer models will be used to simulate land use, potential mitigation projects and wastewater discharge scenarios that help determine which water quality improvement projects will be most effective. A draft watershed plan will be presented to stakeholders in the summer of 2013, with a final report expected in August 2013. For more information on the Brady Creek WPP, visit www.ucratx.org or contact Chuck Brown, UCRA Director of Operations at 325-655-0565.

Zebra mussels Outreach Project

Zebra mussels (*Dreissena polymorpha*) have drastically changed ecosystems and caused hundreds of millions of dollars in damage to utilities in the Northeast United States. Once established in a water body, they have the potential to impact natural ecosystems by excessively filtering water and transferring nutrients from the water column to the lake bottom. They also impact the recreation and utility industries because they attach to hard surfaces such as docks, buoys, pumps and pipes. Their arrival in the Red River and Trinity River basins brings zebra mussels closer to the Colorado River and presents a risk to the Colorado River ecosystem and water intake structures, as well as the Highland Lakes' recreation industry.

Originally from Russia, zebra mussels arrived in the U.S. in 1988 in Lake St. Clair, Michigan, as hitchhikers in the ballast water of ships. They quickly spread though the Great Lakes and migrated down the Mississippi River. According to the U.S. Geological Survey, zebra mussels are now in 30 states. They were discovered in Texas in Lake Texoma in the Red River basin in April 2009, and in Sister Grove Creek in the Trinity River basin later that year. They have since been discovered in Lake Ray Roberts north of Dallas.

Zebra mussels spread to lakes via incidental transport in boats. Once attached to a boat hull or trailer, the mussels can be transported to other water bodies by unsuspecting water recreationalists. Adult zebra mussels can live out of water for several days.



Zebra mussel larvae are microscopic and free-float with currents. As such, they can pass through dams, pipelines, pumps and other infrastructure to migrate across river basins. Transport via boat live-wells is also well documented.

In November 2012, Texas Parks and Wildlife Department (TPWD), the agency responsible for managing invasive species in Texas, amended state regulations to require boaters to drain their boats (including live wells and bilges) before leaving lakes Ray Roberts, Lewisville, Texoma and sections of the Trinity River. These regulations, specific to the affected North Texas reservoirs, were adopted to complement existing state rules prohibiting the transport of harmful exotic species.

TPWD has also developed an outreach campaign to educate the public and reduce incidental transport. Most of the outreach has taken place in North Texas, where the mussels have been documented. In 2012, LCRA partnered with TPWD to develop and distribute outreach materials specific to the Highland Lakes. LCRA staff have contacted marina owners and other lakeside businesses to educate them about the dangers of zebra mussels entering Texas lakes. Brochures, posters and banners have been placed in parks and businesses throughout the lower Colorado River basin to get the word out. Additionally, LCRA launched an invasive species website at www.lcra.org/zebramussels and participated in a series of Highland Lakes-area zebra mussel symposiums hosted by TPWD. Education efforts will continue in 2013 in hopes of preventing an infested boat from launching in the Colorado River basin.

2012 TCEQ Integrated Report Assessment of Water Quality Data

Every two years, TCEQ compares all available quality assured-data to the Texas Surface Water Quality Standards (or to screening levels when no standards have been established) and publishes the results in the Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d). The Integrated Report defines the status of each water body as one of the following:

1. Meets or Supports – Sufficient data were available to assess and the water body meets Texas Surface Water Quality Standards or supports the water body's designated use(s).
2. Concern – a) Sufficient data to perform a full assessment were not collected, but the limited data indicate standards are not met, or b) standards have not yet been established, as is the case with nutrients. If standards have not been established, the data are compared to screening levels.
3. Impaired – Sufficient amount of data are available, and the water body does not meet state standards. TCEQ publishes impaired water bodies in the 303(d) List, part of the Integrated Report.

Water bodies either meet the standards that indicate they support their designated uses or they do not. If monitoring data indicate that a water body fully supports its uses, then the water body meets the state standards and water quality is considered good. If water quality data indicate a concern, resources are allocated to collect more data and verify the concern. If monitoring data indicate that the water body does not support one or more of its designated uses, then it is said to be impaired and placed on the TCEQ 303(d) List, which refers to the section of the Clean Water Act that requires states to identify impaired water bodies.

The Draft 2012 Integrated Report includes an evaluation of 95 water bodies in the Colorado River basin. Twenty received an impaired status, including Lake J. B. Thomas which was added this year (Table 2). Seven were proposed for delisting based on new data that showed they met the standards (Table 3). TCEQ Commissioners approved the Draft 2012 Integrated Report on Feb. 13, 2013. It is currently pending final approval from EPA.

Table 2. Water bodies proposed for impaired status in the Draft 2012 Integrated Report

Segment	Water Body	Cause of Impairment
1304	Caney Creek (Tidal)	Bacteria
1304 A	Linnville Bayou	Bacteria
1305	Caney Creek	Dissolved oxygen
1305	Caney Creek	Bacteria
1401	Colorado River	Bacteria
1402 C	Buckners Creek	Dissolved oxygen
1402 H	Skull Creek	Dissolved oxygen
1403	Bull Creek	Dissolved oxygen
1403 J	Spicewood Trib to Shoal Creek	Bacteria
1407 A	Clear Creek	Aluminum in water
1407 A	Clear Creek	pH
1407 A	Clear Creek	Total dissolved solids
1407 A	Clear Creek	Sulfate
1412	Colorado River	Bacteria
1412 B	Beals Creek	Selenium in water
1412 B	Beals Creek	Bacteria
1413	Lake J.B. Thomas	Total dissolved solids
1413	Lake J.B. Thomas	Chloride
1413	Lake J.B. Thomas	Sulfate
1416	San Saba River	Bacteria
1416 A	Brady Creek	Dissolved oxygen
1421	Concho River	Dissolved oxygen
1421	Concho River	Bacteria
1427 A	Slaughter Creek	Biology
1428 B	Walnut Creek	Bacteria
1429 C	Waller Creek	Biology
1429 C	Waller Creek	Bacteria
1431	Pecan Bayou	Bacteria
1501	Tres Palacios River (Tidal)	Dissolved oxygen
1501	Tres Palacios River (Tidal)	Bacteria

Table 3. Water bodies proposed for delisting in the Draft 2012 Integrated Report		
Segment	Water Body	Cause of Impairment
1305	Caney Creek	Dissolved oxygen
1402 H	Skull Creek	Bacteria
1403 K	Taylor Slough	Bacteria
1403 R	Westlake-Dav trib to Lake Austin	Bacteria
1421	Concho River	Biology
1428	Colorado River below Lady Bird Lake	Bacteria
1429 B	Eanes Creek	Bacteria

Clear Creek, a tributary to Inks Lake

Stakeholder Participation

CRP activities are driven by local input from steering committee members. The steering committee is an advisory committee that identifies and prioritizes local water quality concerns. It is made up of a diverse group of stakeholders, including landowners, farmers, the general public, non-governmental organizations and state and federal agencies. Two steering committee meetings were held in 2012, one in San Angelo and one in Brady.

Steering committee meetings are open to the public and held at different locations in the basin annually. Visit the public outreach section of the LCRA Web site at www.lcra.org/water/quality/crp/ to learn how you can be involved in water quality efforts in the Colorado River basin.

THE TEXAS CLEAN RIVERS PROGRAM

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"Keeping and Eye on West Texas Waters"

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