Implementation of the Lower Nueces River Watershed Protection Plan

FINAL REPORT

TSSWCB PROJECT #15-09

Photo courtesy of Jana Lloyd, TSSWCB

DEVELOPED BY NUECES RIVER AUTHORITY

FUNDING PROVIDED THROUGH A FEDERAL CLEAN WATER ACT §319(h) NONPOINT SOURCE GRANT ADMINISTERED BY THE TEXAS STATE SOIL AND WATER CONSERVATION BOARD FROM THE US ENVIRONMENTAL PROTECTION AGENCY

Introduction

The Lower Nueces River is the conduit of water from Lake Corpus Christi to the City of Corpus Christi, which supplies drinking water to approximately 500,000 people and to industries in the Coastal Bend. In November 2009, the City of Corpus Christi experienced a sudden, unexpected increase in turbidity levels at the O. N. Stevens Water Treatment Plant (WTP) that resulted in a drinking water violation. The City of Corpus Christi hired the Nueces River Authority (NRA) to develop a source water protection plan to help prevent future turbidity issues and to identify and prevent other possible threats to the water supply. The NRA based the source water protection plan on the US Environmental Protection Agency's (EPA) *Nine Elements of Successful Watershed Plans* with the goal of developing a full watershed protection plan (WPP) for the Lower Nueces River (Figure 1).

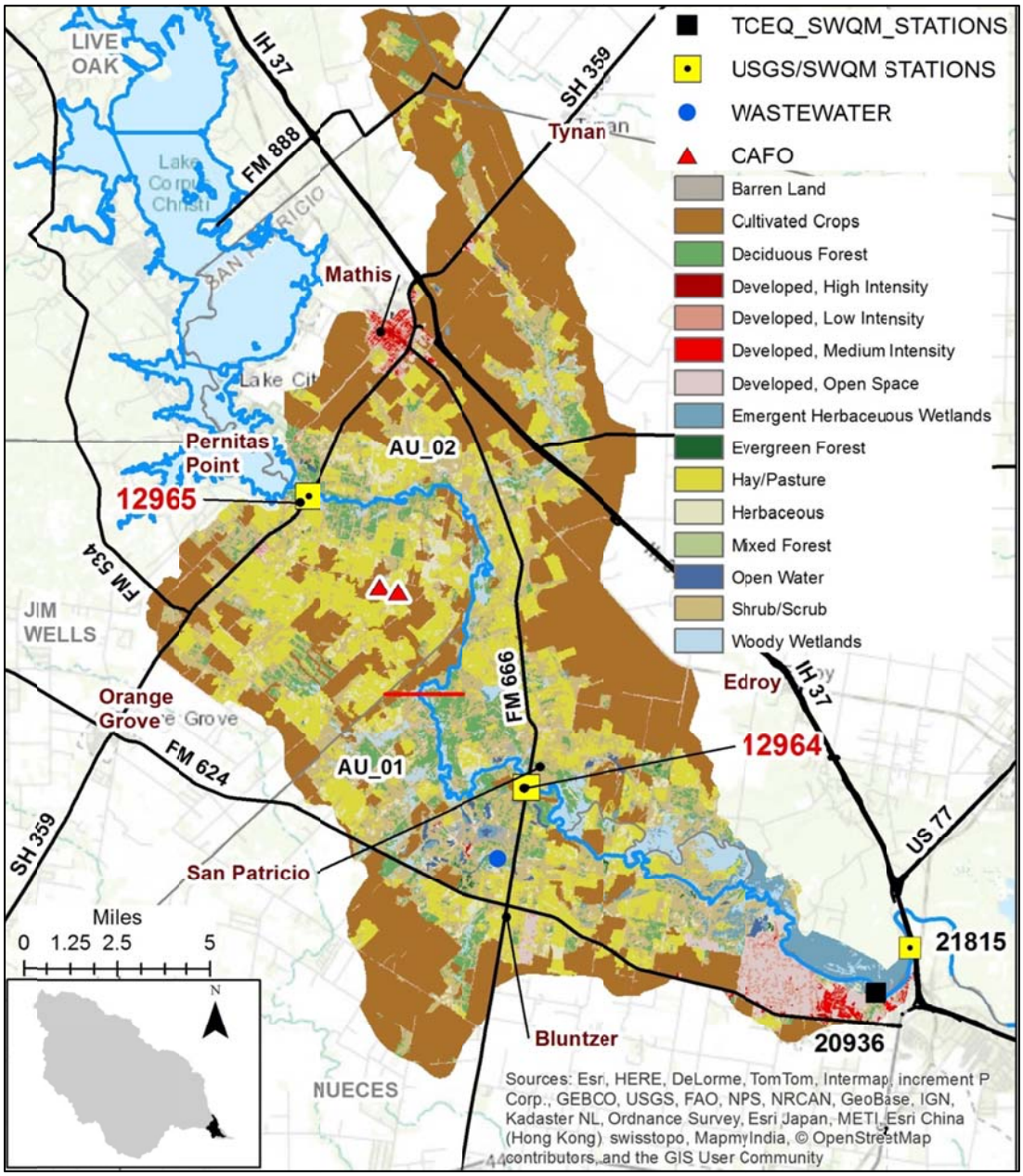

Figure 1. Map of the Lower Nueces River Watershed

Although at the time the Lower Nueces River was not listed on the Texas 303(d) List of impaired waters, the Texas State Soil and Water Conservation Board (TSSWCB) acknowledged the stakeholders' interest and efforts in protecting the river and selected it for development of the Lower Nueces River WPP – a voluntary, non-regulatory alternative to addressing water quality issues. The segment has been assessed as having a concern for chlorophyll-*a* since the 2008 Texas 303 (d) list. It was listed as being impaired for total dissolved solids (TDS) in the 2012 Integrated Report. An increasing trend in bacteria concentrations was initially identified in the Clean River Program (CRP) 2008 Basin Summary Report (BSR). This trend continued to be documented in the 2013 BSR and Draft 2018 BSR.

The Lower Nueces Watershed WPP was developed through TSSWCB project 12-05 – *Development of the Lower Nueces River Watershed Protection Plan*, and the WPP was accepted by the EPA in April 2016. The development of the WPP was a stakeholder driven process facilitated by the NRA. The Nueces River Watershed Partnership (NRWP) Steering Committee includes local officials, land and business owners, and citizens. Most of the citizens were also members of the Nueces River Preservation Association (NRPA), a group of home owners that live on the river, and are dedicated to helping keep the river clean.

Project Overview

The contract for this project was initiated in November 2015 and completed in June 2018. The contract goals were to:

- Foster coordinated assistance activities for the NRWP
- Conduct regular stakeholder meetings to encourage citizen participation, provide partners with updates on progress, and seek stakeholder input and recommendations on needed activities
- Support and facilitate the NRWP in identifying management measures to improve water quality, developing proposals to acquire funding for implementation of management measures, managing and tracking implementation projects, as well as encourage adoption of best management practices
- Evaluate progress toward achieving milestones established in the WPP
- Coordinate and conduct water resources and related environmental outreach/education efforts across the watershed

The project consisted of five tasks:

- Task 1 – Project Administration – to effectively administer, coordinate, and monitor all work
- Task 2 – Quality Assurance – to develop data quality objectives and quality assurances / quality control activities to ensure data of known and acceptable quality are generated
- Task 3 – Support and Facilitation of WPP Implementation – to facilitate continued stakeholder involvement in the NRWP to ensure successful implementation of the Lower Nueces River WPP and track implementation
- Task 4 – Outreach, Education, and Community Support – to promote involvement, provide information transfer, and encourage participation in the NRWP
- Task 5 – Hyacinth Management Plan Revision – to determine the upper extent and possible source of water hyacinth in order to effectively treat the infestation

Project Highlights

NRA and TSSWCB held quarterly coordination meetings / conference calls. Financial Status Reports and Requests for Reimbursement were submitted monthly to TSSWCB. Quarterly progress reports were submitted to TSSWCB and posted on the NRWP website, http://www.nuecesriverpartnership.org.

A Quality Assurance Project Plan was developed for the Task 5 aerial reconnaissance of the upper end of Lake Corpus Christi and the Nueces River above the lake.

As the Watershed Coordinator, NRA facilitated public participation and stakeholder involvement through stakeholder meetings, website updates, newsletters, emails, and participation in educational opportunities

throughout the watershed; worked with other entities to identify funding opportunities to implement the management measures identified in the WPP; and promoted and communicated the implementation of the WPP and related activities in the watershed at other public meetings.

Stakeholder Involvement

NRA facilitated eight stakeholder / steering committee meetings during the project period. The meeting announcements and agendas were posted on the website for each meeting. All meeting summaries, along with any presentations, are being maintained on the NRWP website. Meeting summaries were also emailed to the steering committee for the benefit of those that were unable to attend. NRA developed five newsletters, posted them to the website, and emailed /mailed copies to the watershed stakeholder database and distribution lists.

The project website also posted announcements for other watershed related meetings and workshops, graphs of the quarterly water quality data, and implementation progress.

During the contract period, the website was accessed a total of 15,841 times. The monthly hits ranged from 110 to 1,057, with an average of 495 hits per month. The total number of webpages accessed was 24,096 pages – ranging from 132 to 1,828 per month, with an average of 753 pages per month. The total number of hits including links to documents such as the WPP, newsletters, and meeting summaries, was 51,474: – ranging from 312 to 2,725 per month, with an average of 1,609 total hits per month. The number of unique visitors per month ranged from 91 to 947 with an average of 424. Appendix A includes the complete monthly statistics.

Water Quality Analysis

NRA, through its CRP contract with the Texas Commission on Environmental Quality (TCEQ), conducts quarterly water quality sampling at four sites along the river (Figure 1). The Draft 2018 BSR analyzed trends in water quality data from January 1, 2000 through November 30, 2016 and conducted statistical analysis on data from December 1, 2009 through November 2016. The analysis was conducted for the two assessment units (AU) designated by the TCEQ. AU_01 is the from the downstream end of the segment at the Saltwater Barrier Dam to the confluence with Javelin Creek just downstream of the Jim Wells/Nueces county line. AU_02 is from the upstream end of AU_01 to Wesley E. Seale Dam at Lake Corpus Christi.

TDS: trend analysis indicates increasing trends in both AUs; statistical analysis calculated an average of 562 mg/l in AU_01, which exceeds the water quality standard of 500 mg/l; statistical analysis calculated an average of 491 mg/l in AU_02, just barely meeting the standard. Impairments for TDS are calculated on the average concentration over the entire segment. Therefore, both AUs are listed as being impaired for TDS.

Chlorophyll-a: trend analysis indicates an increasing trend in AU_02. Statistical analysis shows that only 2 of the 28 samples exceeded the screening criteria of 14.1 µg/l in AU_01, but that >20% of the samples exceeded the screening level in AU_02. Therefore, AU_02 is assessed as having a concern for chlorophyll-*a*.

Bacteria (E. coli): trend analysis indicates an increasing trend in AU_01; statistical analysis calculated a geometric mean of 124 cfu/100ml in AU_01, just barely meeting the standard of 126 cfu/100 ml; statistical analysis calculated a geometric mean of 32 cfu/100ml in AU_02, well below the standard.

The analysis did not identify any additional potential impairments or concerns in this segment of the river.

Implementation

The management measures identified in the Lower Nueces River WPP were organized into six categories: agricultural nonpoint source, riparian habitat conservation, wastewater and urban, wildlife, feral hog, and cleanup. Measures that have been completed or initiated during the project period are discussed below.

Riparian Habitat Conservation Measures Implementation

- *Purchase of Properties:* There are a number of properties along the river in Nueces County that have been auctioned off due to back taxes being owed on them. The City of Corpus Christi has purchased some of these properties with the intent to prevent further development in these flood prone areas. San Patricio County has also purchased properties after major flood events through Federal Emergency Management Agency grant opportunities. Some of these properties have been converted to parks and have been placed into conservation easements in perpetuity.

- *Acquisition of Conservation Easements:* Acquiring conservation easements through the purchase or donation of development rights is one avenue for protecting riparian zones from development. Easements allow land owners to retain ownership of their land while agreeing to leave it in its natural state for perpetuity. Conservation easements do not imply nor provide for public access to these lands. A local foundation has recently acquired property in San Patricio County for the purpose of placing it into conservation easements.

Wastewater and Urban Measures Implementation

- *Trash Can Lids at Hazel Bazemore Park:* The Coastal Bend Bays and Estuaries Program (CBBEP) provided funds for materials for 29 trash cans to be placed along the Nueces River in Hazel Bazemore Park in 2013. Nueces County provided the labor to install the cans. Loose trash was still an issue at the park due to nightly raids by raccoons. In 2018, Nueces County designed and installed lids on the trash cans (Figure 2).

Figure 2. Trash can with lid at Hazel Bazemore Park

- *On-Site Sewage Facility (OSSF) Repair and Replacement:* NRA received a federal Clean Water Act §319(h) Nonpoint Source Grant administered by the TCEQ from the EPA to fund an OSSF inspection, repair, and replacement program. As of June 30, 2018, 43 systems have been inspected: 14 were found to be in good working order; 10 were in need of repair, 9 of which have been completed; and 19 needed to be completely replaced, 14 of which have been completed (Figure 3). NRA intends to submit a proposal for TCEQ's FY 2019 Request for Grant Applications to continue the program.

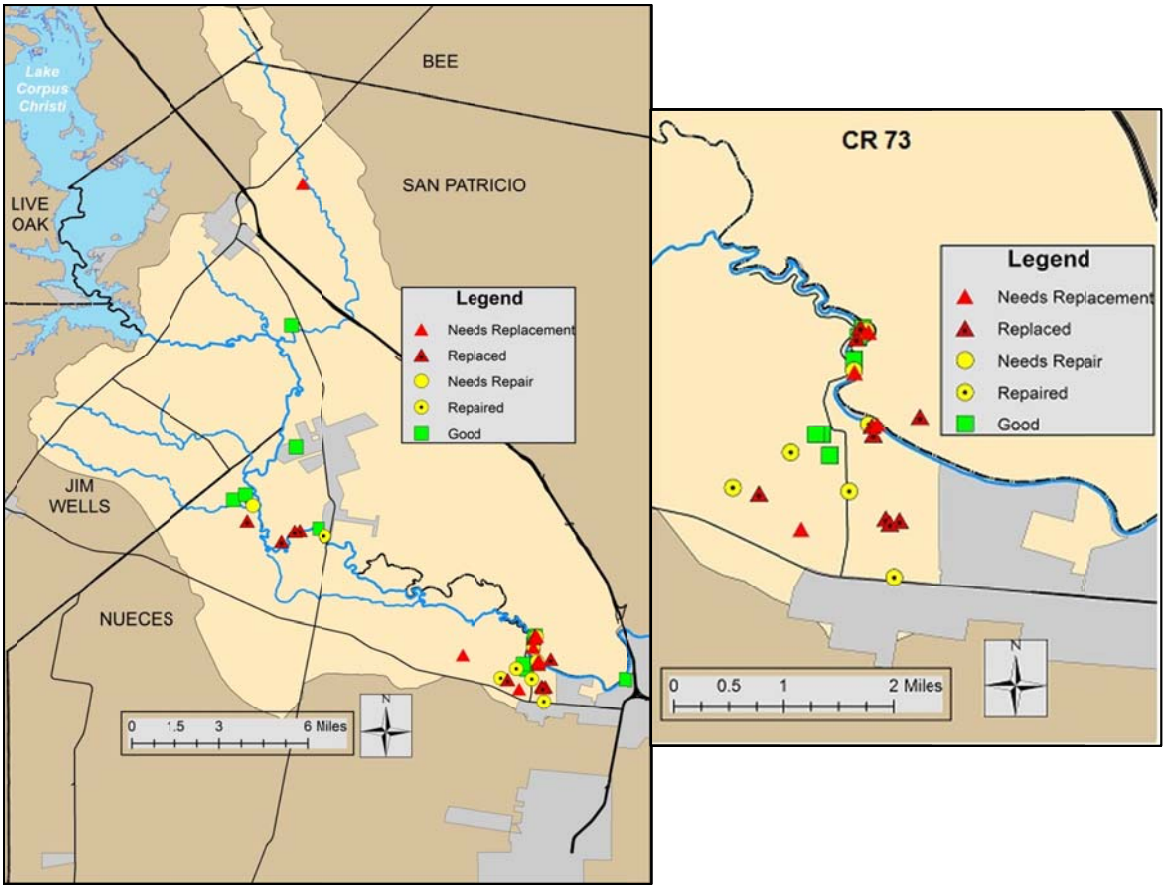

Figure 3. OSSF Inspections, Repairs, and Inspections

- *Connections to the City Corpus Christi's Wastewater System:* There is portion of a neighborhood in the Calallen area, adjacent to the river and within the City of Corpus Christi city limits, that relies on OSSFs. These homes are also situated just upstream of the City's water intake at the O. N. Stevens WTP. Many of the homes are a short distance, but downhill, from existing wastewater infrastructure. The goal of this management measure is to connect these homes to the existing infrastructure and remove the OSSFs.

  Implementation of this measure is a multi-phased approach. The first phase was initiated in December 2017 with NRA contracting with the City of Corpus Christi to develop a detailed plan and cost estimate for actual implementation. This work is being funded through a federal Clean Water Act §319(h) Nonpoint Source Grant administered by the TCEQ from the EPA. The next phases will include identifying funding sources for construction, incorporating the work into the City's work schedule, and actual construction.

- *Pet Waste Collection Stations and Leash Bag Holders:* In 2017 the CBBEP funded the purchase of nine pet waste stations, 12 boxes of additional bags (2,000 bags/box), and 500 leash bag holders. Nueces County installed four of the stations at Hazel Bazemore Park and received 10 boxes of extra bags. San Patricio County installed two of the stations at La Fruta Park. Wilderness Lakes RV Park in Mathis installed two of the stations and received two boxes of extra bags. Tackle Box Bait and RV Park in Mathis installed one of the stations and received two boxes of extra bags (Figure 4). Unfortunately, some of the stations at Hazel Bazemore Park have been vandalized.

Figure 4. Pet Waste Station at Hazel Bazemore Park

- *Municipal and Public Utility Districts / Wastewater Treatment Facilities:* NRA conducted research on the feasibility of creating Municipal Utility Districts (MUD) or Public Utility Districts (PUD) to serve as wastewater treatment facilities for the communities relying solely on OSSFs.

  MUDs are initiated by the homeowners. They require a petition requesting creation be filed with the TCEQ by a majority of the land title owners, or at least 50 land title owners if there are more than 50 land title owners. They must also have written consent from a city if they are within that city's extraterritorial jurisdiction. The legal expense of requesting the MUD creation, developing the supporting documentation, finding funding for construction, and the operation and maintenance, is borne by the citizens. A MUD does have taxation authority. The communities that would benefit from a MUD most likely do not have the resources to implement this measure.

  PUDs are created by a local government body, such as a city, county, or metropolitan service area (two or more communities joining together for public utility purposes), and they are non-profit. PUDs are often governed by a commission, which may be appointed or elected. None of the local governments have expressed an interest in implementing this measure.

  Water Control and Improvement Districts (WCID) can also operate sanitary wastewater systems. The closest WCID is Nueces County WCID #3, but its jurisdictional boundary does not include any of these communities in the area.

Feral Hog Management Measures Implementation

- *Workshops:* Feral hogs are a problem throughout the state. They cause millions of dollars of damage to crops every year and can be a major contributor to bacteria loading. Feral hogs cannot sweat, so they need access to water to cool themselves, making riparian areas a prime habitat. NRA has hosted several workshops which have included presentations on feral hog management: Texas AgriLife Extension's Spring Ranch Field Day (May 2017), Texas Riparian & Stream Ecosystem Workshop (October 2017), and Lone Star Healthy Streams Workshop (April 2018).

Cleanup Management Measures Implementation

- *Hyacinth Control:* There have been reports over the years of parts of the Lower Nueces River being completely covered by water hyacinth. Weather conditions, such as hard freezes and floods, periodically reduce the infestations. Water hyacinth is problematic in that it increases the time required for water released from Wesley E. Seale Dam at Lake Corpus Christi to make its way to the fresh water intakes at the lower end of the river segment, its evapotranspiration can increase evaporative water loss, and it can be an impediment to recreation.

  Through TSSWCB project 12-05 an aerial survey of water hyacinth on the Lower Nueces River was funded. One hundred twenty-five (125) colonies of water hyacinth were documented by photograph and their global positioning system locations recorded. Follow-up visits to several of these colonies revealed an average colony size of 1,120 sq. ft. Based on these observations it is estimated that approximately 3.21 acres of water hyacinth were present in the project area at this time.

  The key to managing the hyacinth is to remove the source. Another aerial survey was conducted of the upper end of Lake Corpus Christi and the Nueces River up to US 59 near George West. The upper extent of the hyacinth was identified near the confluence of an unnamed tributary, near Live Oak County Road 151, with the river (Figure 5).

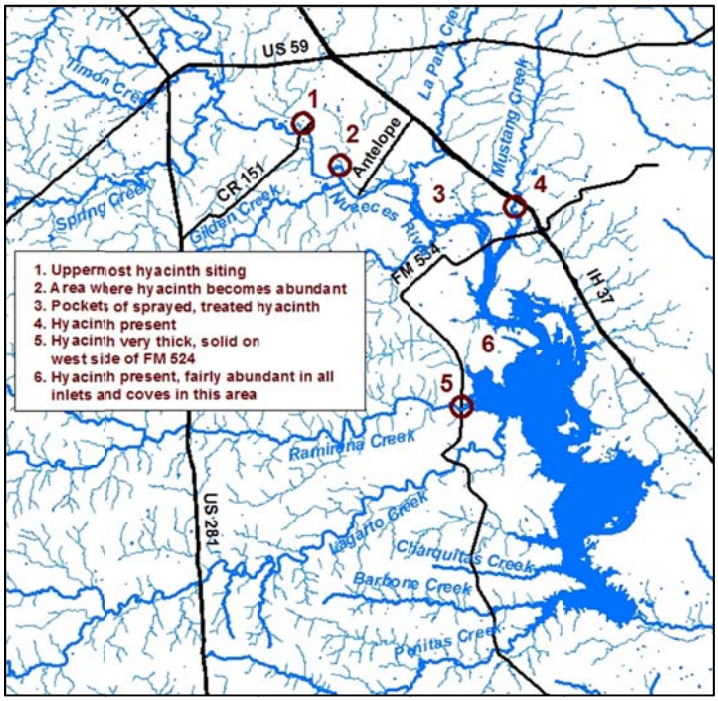

Figure 5. Hyacinth Survey Results

The City of Corpus Christi has authority to treat the hyacinth as far up the river as they can travel. The City works with the Texas Parks and Wildlife Department to periodically treat the hyacinth. However, they are prohibited from spraying within ½ mile of the City of Beeville's water intake structure just downstream of FM 534 (Figure 6).

Figure 6. Hyacinth Surrounding the City of Beeville's Intake Structure (left) and Buffer Zone (right)

NRA will continue to seek funding opportunities to develop a program that would work with landowners along the river above Lake Corpus Christi to treat the hyacinth in a coordinated effort.

- *Volunteer Cleanups:* The NRPA has organized at least five cleanups of the river since 2012. The volunteers pick up trash and debris from boats and kayaks. Between 40 and 60 volunteers at each of the events donated their time to the cleanups. Two to three roll-off dumpsters were located along the river for the volunteers to unload their boats. The City of Corpus Christi and Nueces County have provided in-kind services for disposal of the trash and debris. The NRPA lead person, Tim McWha, is an AEP Texas employee. In 2017, AEP Texas filmed a number of commercials recognizing employees that have gone above and beyond to give back to their community. Tim was one of these featured employees. The commercial can be seen at https://www.youtube.com/watch?v=DfTjEftp0so.

- *Large Debris Removal:* The identification of a leaking tar bucket during an investigation of an oil sheen on the Nueces River in 2003 resulted in an interest to further investigate what else was in the river. During development of the Lower Nueces River WPP, the NRA partnered with Texas A&M AgriLife Research Center at Blackland to conduct a side-scan sonar survey of the river in April 2014.

  The NRA worked with stakeholders and members of the NRPA to review the results of the survey and develop a list of objects to be removed from the river. The list consisted of 10 partially submerged boats and one collapsed pier. Other objects that were identified during the side-scan sonar survey were not considered to be recreation or navigation hazards nor detrimental to water quality, and were better left undisturbed (Figure 7).

The success of the large debris removal was made possible by the collaboration of a number of entities. In addition to the TSSWCB and EPA funding of the side-scan sonar survey, the NRA utilized funding from a CBBEP grant to contract with J. M. Davidson Inc. to remove the boats and pier in May of 2016. The NRPA spent their time and resources investigating and tagging, for the contractor's benefit, items to be removed; the City of Corpus Christi Solid Waste Department provided a dumpster for the debris and its disposal; and the mobilization and demobilization expenses of the removal equipment were covered by Nueces County.

Figure 7. Boat Removal during Large Debris Cleanup

Education and Outreach (E&O)

The NRA has an extensive E&O program and participates in E&O opportunities throughout the Nueces River Basin and the adjoining coastal basins. NRA is also asked to give presentations about the work we do to various organizations. Nonpoint source pollution and water quality protection are two topics that are addressed at nearly every event and presentation. Below is a list of all stakeholder meetings, workshops facilitated, E&O events attended, and presentations given during the contract period that included the Lower Nueces River Watershed.

2016

January 19	Presentation to the Corpus Christi Propeller Club
March 10	Watershed Model Demonstration at Mireles Elementary in Corpus Christi
March 23	Presentation to the Water Environmental Association of Texas & Texas American Water Works Association – Coastal Bend Division
March 30	CRP FY 2017 Coordinated Monitoring Meeting
April 9	Watershed Model Demonstration at Earth Day / Bay Day in Corpus Christi
April 18-19	Watershed Model Demonstration at Jim Wells County Ag Fair
May 15	Texas Agricultural Land Trust Going, Going, Gone Landowner Workshop
May 18	TCEQ's Total Maximum Daily Load Stakeholder Engagement Conference
May 31	NRWP Stakeholder meeting
July 13	Texas Watershed Coordinator Roundtable
July 29	OSSF Workshop
August 1	Attended Nueces Soil and Water Conservation District (SWCD) meeting to discuss implementation and status reviews of WQMPs

August 10	Attended Jim Wells SWCD meeting to discuss implementation and status reviews of WQMPs
August 26	WPP presented and discussed at NRA Board of Directors Meeting
August 30	Presentation to Corpus Christi City Council regarding water rights and flow on the Lower Nueces River
August 31	NRWP Stakeholder meeting
September 9	Presentation to United Corpus Christi Chamber of Commerce Infrastructure Committee regarding water rights and flow on the Lower Nueces River
September 18	Discussed the Lower Nueces River Watershed at the Gulf Coast Association of Geological Sciences Field Trip
September 20	Attended San Patricio SWCD meeting to discuss implementation and status reviews of WQMPs
October 29	OSSF Workshop
November 9	NRWP Stakeholder meeting

Also in 2016, the project supported Texas A&M AgriLife Extension's Soil Testing Campaign. Between October 1 and November 18, landowners in Aransas, Bee, Jim Wells, Kenedy, Kleberg, Live Oak, Nueces, Refugio, and San Patricio counties were offered discounted prices for agricultural soil sample analysis. NRA sent out 96 letters to landowners within the Lower Nueces Watershed with properties of 150 acres or more offering to pay the $7 fee for routine analysis (pH, nitrate as nitrogen, conductivity, phosphorus, potassium, calcium, magnesium, sodium and sulfur). Ten landowners took NRA up on the offer.

2017

February 1	Texas Watershed Coordinator Roundtable
February 9	Plum Creek Watershed Partnership Meeting
February 13	Presentation to the Coastal Bend Bays Foundation Coastal Issues Forum concerning the pass through requirements of the Agreed Order and fresh water inflows to Nueces Bay via the Lower Nueces River
February 15	NRWP Stakeholder meeting
February 27	Presentation to Nueces County Commissioner Pusley concerning the pass through requirements of the Agreed Order and fresh water inflows to Nueces Bay via the Lower Nueces River
April 7	New Board of Directors Presentation at Board Meeting
April 8	Watershed Model Demonstration at Earth Day / Bay Day in Corpus Christi
May 10	NRWP Stakeholder meeting
May 12	Attend San Patricio County Commissioners Court Meeting
May 15	Presentation to Port Industries Technical Committee on water quality and NRA activities
May 17-19	Watershed Model Demonstration at Jim Wells County Ag Fair
May 18	Texas AgriLife Extension's Spring Ranch Field Day
May 20	Watershed Model Demonstration at City Hall in the Mall in Corpus Christi
June 15	Presentation to Port Industries of Corpus Christi Technical Committee
June 26	CRP FY 2018 Coordinated Monitoring Meeting
July 26	Texas Watershed Coordinator Roundtable
August 9	Presentation to Nueces County Commissioners Court on Arundo donax prevention
August 14	Presentation to San Patricio County Commissioners Court on Arundo donax prevention
August 16	NRWP Stakeholder meeting
October 3	Texas AgriLife Extension's Texas Riparian & Stream Ecosystem Workshop
October 31	Presentation to Sunset Review Committee
November 10	Presentation to Kingsville Environmental Engineering Seminar Class

2018

January 23	Texas Watershed Coordinator Roundtable
January 31	NRWP Stakeholder meeting
March 3	Discussed the Lower Nueces River Watershed at the Gulf Coast Association of Geological Sciences Field Trip
March 21	CRP FY 2019 Coordinated Monitoring Meeting
April 18	Presentation to the Coastal Bend Group of the Sierra Club
April 7	Watershed Model Demonstration at Earth Day / Bay Day in Corpus Christi
April 10	Texas AgriLife Extension's Lone Star Healthy Streams Workshop
April 24	Presentation to Nueces County Drainage District on Arundo donax prevention
April 24-26	Watershed Model Demonstration at Jim Wells County Ag Fair
April 25	NRWP Stakeholder meeting
May 7	Presentation to Nueces SWCD on Arundo donax prevention
May 9	Presentation to Jim Wells SWCD on Arundo donax prevention
May 15	Presentation to San Patricio SWCD on Arundo donax prevention
May 15	Presentation to San Patricio County Drainage District on Arundo donax prevention

Conclusion

TSSWCB Project 15-09 – *Coordinating Implementation of the Lower Nueces River Watershed Protection Plan*, has been completed and was essential to the continued implementation of the WPP. NRA will continue implementation of projects and activities that support the goals of the WPP with a TSSWCB 18-53 – *Coordinating Implementation of the Lower Nueces River Watershed Protection Plan* grant beginning July 2018. NRA will also continue to seek funds for additional implementation opportunities as new water quality data is obtained and assessed by the CRP and as conditions in the watershed change over time.

List of Acronyms

AEP	American Electric Power
AU	Assessment Unit
BSR	Basin Summary Report
CBBEP	Coastal Bend Bays and Estuaries Program
cfu/100 ml	Colony forming units per 100 milliliters
CRP	Clean Rivers Program
E&O	Education and Outreach
EPA	United States Environmental Protection Agency
mg/l	milligram per liter
MUD	Municipal Utility District
NRA	Nueces River Authority
NRPA	Nueces River Preservation Association
NRWP	Nueces River Watershed Partnership
OSSF	On-site Sewage Facility
PUD	Public Utility District
RRC	Railroad Commission of Texas
SWCD	Soil and Water Conservation District
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TSSWCB	Texas State Soil and Water Conservation Board
µg/l	microliter per liter
WCID	Water Control and Improvement District
WPP	Watershed Protection Plan
WTP	Water Treatment Plant

Appendix A – Monthly Website Statistics

Month	Unique Visitors	Number of Visits	Number of Pages	Number of Hits
Nov-15	132	155	330	1,188
Dec-15	140	169	333	1,025
Jan-16	146	178	329	973
Feb-16	91	112	223	717
Mar-16	144	191	407	1,276
Apr-16	180	286	726	1,906
May-16	193	253	466	2,205
Jun-16	196	253	457	1,767
Jul-16	195	240	417	1,507
Aug-16	318	371	568	1,881
Sep-16	263	343	548	1,862
Oct-16	274	413	775	1,978
Nov-16	347	544	1,101	2,244
Dec-16	389	572	1,105	2,027
Jan-17	164	169	229	421
Feb-17	103	110	131	383
Mar-17	637	694	858	1,801
Apr-17	723	782	1,014	2,144
May-17	671	728	970	1,892
Jun-17	717	772	931	1,850
Jul-17	719	779	978	1,736
Aug-17	697	746	864	1,642
Sep-17	947	1,034	1,653	2,725
Oct-17	834	968	1,258	2,156
Nov-17	884	1,057	1,405	2,203
Dec-17	721	793	921	1,377
Jan-18	793	948	1,828	2,636
Feb-18	155	175	232	312
Mar-18	519	559	697	1,154
Apr-18	422	477	980	1,830
May-18	427	487	778	1,578
Jun-18	428	483	584	1,078
Total		15,841	24,096	51,474
Minimum	91	110	131	312
Maximum	947	1,057	1,828	2,725
Average	424	495	753	1,609