

# WQMP IMPLEMENTATION ASSISTANCE IN THE ARROYO COLORADO WATERSHED

FINAL REPORT  
TSSWCB PROJECT 05-12



## **SOUTHMOST AND HIDALGO SOIL AND WATER CONSERVATION DISTRICTS**

FUNDING PROVIDED THROUGH A CLEAN WATER ACT §319(h) NONPOINT SOURCE  
GRANT FROM THE TEXAS STATE SOIL AND WATER CONSERVATION BOARD AND THE  
U.S. ENVIRONMENTAL PROTECTION AGENCY

## **TABLE OF CONTENTS**

- **EXECUTIVE SUMMARY**
- **INTRODUCTION**
- **PROGRAM DEVELOPMENT**
- **CONCLUSIONS**
- **APPENCICES**
  - **ANNOUNCEMENT IN THE FARM SERVICE AGENCY'S NEWSLETTER**
  - **MAP OF WQMP LOCATIONS**
  - **INVENTORY OF WQMP BMPS**

## **EXECUTIVE SUMMARY**

The Southmost and Hidalgo Soil and Water Conservation Districts (SWCDs), working cooperatively with the Texas State Soil and Water Conservation Board (TSSWCB) Harlingen Regional Office and the United States Department of Agriculture- Natural Resources Conservation Service (NRCS), provided technical and financial assistance to agricultural producers in the Arroyo Colorado watershed.

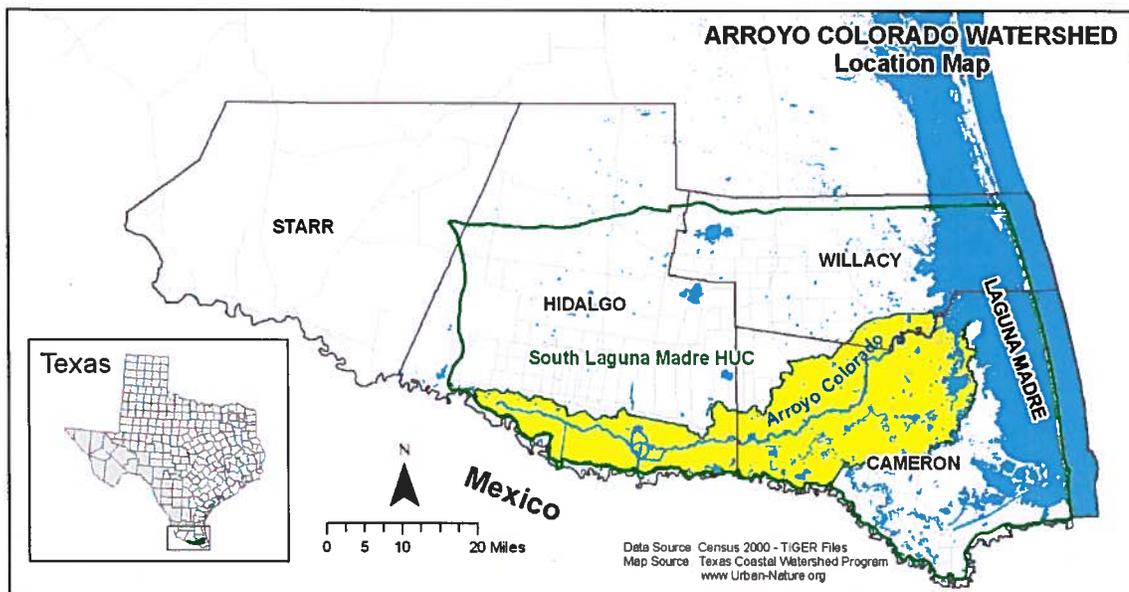
The development, installation, and maintenance of water quality management plans (WQMPs) in the Arroyo Colorado watershed was and continues to be a success. A full-time District Technician was hired with the Southmost SWCD and a part-time District Technician was hired with the Hidalgo SWCD. Both worked cooperatively with the TSSWCB Harlingen Regional Office and NRCS to provide agricultural producers with the opportunity to voluntarily implement best management practices (BMPs) that would have a positive impact on the Arroyo Colorado.

Through this project, a total of 138 WQMPs were developed and implemented on approximately 7,870 acres. A majority of the practices installed were related to the installation and management of irrigation. In addition, nutrient, residue, and pest management was applied to almost all 7,870 acres. Soil testing was provided to producers in the Arroyo Colorado who operated under a WQMP. The District Technicians and TSSWCB Harlingen Regional Office worked with the SWCDs and local producers to educate them on their operation, the WQMP Program, proper soil test, and their impacts on water quality. They also presented at field events, field days, and were active in the development and implementation of the Arroyo Colorado Watershed Protection Plan (WPP).

Implementation of WQMPs has and will continue to be a key component in the overall effort reduce nutrients and sedimentation and improve water quality in the Arroyo Colorado watershed.

# INTRODUCTION

The Arroyo Colorado, an ancient distributary channel of the Rio Grande, extends 90 miles from Mission, Texas to the Laguna Madre in the Rio Grande Valley. The watershed of the Arroyo Colorado is approximately 1,828 square kilometers (706 square miles) bounded on the west and south by the drainage divide to the Rio Grande, on the north by the drainage divide to the North Floodway and on the east side by the Lower Laguna Madre. Flow in the Arroyo Colorado is sustained by waste water discharges, agricultural irrigation return flows, urban runoff, and base flows from shallow groundwater. The Arroyo is the major source of fresh water to the lower Laguna Madre, an economically and ecologically important resource to the region. The Laguna Atascosa National Wildlife Refuge and several county and city parks are located within the Arroyo Colorado watershed. One third of the stream is used for shipping from the Gulf Intracoastal Waterway to the Port of Harlingen.



**Figure 1.** Arroyo Colorado Watershed

Agriculture is the dominate land use within the Arroyo Colorado, with approximately 330,000 acres under cultivation. The fertile farmland, long growing season, and access to water from the Rio Grande for irrigation make this region one of the most productive agricultural areas in the U.S. Cotton and grain sorghum are the most prominent crops in the three-county region with corn, sugarcane, citrus, and vegetables representing other important crops in the area.

Surface waters serve almost exclusively as the source of irrigation water for the vast agriculture enterprise of the area. The surface water derives primarily from stream flow diverted from the Rio Grande through leveed floodways and stored in constructed reservoirs in the Arroyo Colorado watershed. Although it is typically of poorer quality than the surface, a limited amount of groundwater, from the shallow Gulf Coast aquifer, is used in the western part of the watershed. No major or minor aquifers underlie the eastern half of Arroyo Colorado watershed, although shallow, variably saline groundwater is found in the area. In years of insufficient flow in the Rio Grande, however, up to 25 percent of the total water demand has been supplied by groundwater (USACE, 1990).

The Arroyo Colorado is one of the more complex watercourses in the state from its headwaters to its mouth; it has been extensively modified by human activity, which affects both its hydrology and water quality. The low-relief, arid watershed is artificially plumbed by canals, aqueducts, siphons and pumping stations to provide irrigation water for the vast agriculture enterprise of the region. Similarly, the drainage of the urban area consist of rectified leveed intersecting channels with gates for controlling and directing flow to alleviate chronic flooding problems common to the area.

Water quality analyses have shown water quality in the Arroyo Colorado is poor. The 1996 Texas Water Quality Inventory and 303(d) List indicated the Arroyo Colorado Tidal, Segment 2201, was not supporting aquatic life use because of low dissolved oxygen (DO) levels. The Arroyo Colorado above Tidal, Segment 2202, was also not meeting its designated use of contact recreation because of elevated bacteria levels. Nutrient concentrations (nitrogen and phosphorus compounds) are high in both segments.

In 1998, the Texas Commission on Environmental Quality (TCEQ) initiated an effort to develop a Total Maximum Daily Load (TMDL) for pollutants causing low DO. Results of a TMDL analysis indicated that the dissolved oxygen problem in the tidal segment is related as much to the physical setting and geomorphology of the Arroyo Colorado as it is to the loading of nutrients and oxygen-demanding substances from the non-tidal segment. However, there was still lingering uncertainty surrounding cause-and-effect relationships associated with the observed DO impairment, the TMDL analysis was unable to support a quantitative, water quality target-based allocation of loadings of constituents associated with DO dynamics in the tidal segment of the Arroyo Colorado.

In response, the TCEQ initiated a comprehensive strategy to address low DO through the development of an Arroyo Colorado WPP. A WPP is a holistic, locally driven plan that combines scientific and regulatory water quality factors with social and economic considerations to coordinate activities and resources to manage water quality. The Arroyo Colorado Watershed Partnership, made up of private individuals, local organizations, county and municipal governments, and state and federal agencies, worked together to address issues identified in the TMDL and develop recommendations for improving water quality. "*A Watershed Protection Plan for the Arroyo Colorado: Phase I*" was approved by stakeholders in January 2007.

The Arroyo Colorado Watershed Protection Plan outlines near- and long-term goals for agricultural issues in the watershed. The near-term goal (2005-2010) is to encourage the voluntary implementation of conservation plans on 33% of the irrigated cropland in the watershed by providing educational programs, technical assistance, and cost-share assistance. This additional 50,000 acres will bring the total number of acres under conservation plans up to roughly 100,000 acres. The long-term goal is to encourage the voluntary implementation and maintenance of conservation plans on at least 50% of the irrigated cropland in the watershed (approximately 150,000 acres) by providing educational programs, technical assistance, and cost-share assistance.

Through the use of state cost-share funds and TSSWCB project 99-03 "*WQMP Implementation Assistance in the Arroyo Colorado River Basin*", the TSSWCB and the Southmost, Hidalgo, and Willacy SWCDs addressed loadings attributed to the approximately 290,000 acres of irrigated cropland in the watershed through the implementation of WQMPs. The Southmost, Hidalgo, and Willacy SWCDs continued to develop and implement WQMPs in the Arroyo Colorado watershed through the

TSSWCB CWA §319(h) nonpoint source grant projects 02-12A and 02-16 “*Soil and Water Conservation District Water Quality Management Plan Development, Implementation, and/or Maintenance Assistance: Implementation Support Project in the Arroyo Colorado Watershed.*” Through the FY02 projects, 85 WQMPs were developed on 5,100 acres.

A WQMP is a site-specific plan developed through and approved by SWCDs for agricultural or silvicultural lands. The plan includes appropriate land treatment practices, production practices, management measures, technologies or combinations thereof. The purpose of WQMPs is to achieve a level of pollution prevention or abatement determined by the TSSWCB, in consultation with local SWCDs, to be consistent with state water quality standards.

## PROGRAM DEVELOPMENT

This project consisted of the TSSWCB working with the Southmost SWCD #319 and Hidalgo SWCD #350 to provide technical and financial assistance to landowners for the development, implementation, and/or maintenance of WQMPs.

Through this project, a full-time District Technician was hired by the Southmost SWCD and a part-time District Technician was hired by the Hidalgo SWCD to coordinate technical and financial assistance activities between the TSSWCB, cooperating SWCDs, NRCS and all other interested parties in the Arroyo Colorado watershed. The District Technicians promoted the availability of assistance through the local SWCDs and an announcement in the Farm Service Agency's newsletter (Appendix A).

After compiling the list of producers who were interested in assistance, they were ranked based on priority. Priority was placed on encouraging voluntary implementation of practices in close proximity to the impaired segment first and progress outward. Highest priority was given to practices that reduce runoff from fields and reduce runoff of nutrients. A three-tier system was established based on land units that are in the greatest need of WQMP implementation in targeted subwatersheds. They also targeted the three dominant land activities in the watershed. The three-tier system included the following:

- 1st priority: Irrigated Cropland/Citrus with tile drains
- 2nd priority: Irrigated Cropland/Citrus without tile drains
- 3rd priority: Areas of cropland conversion to grassland

The District Technicians, working in cooperation with the NRCS, developed WQMPs based on the criteria outlined in the Field Office Technical Guide (FOTG), a publication of the NRCS. The FOTG represents the best available technology and is already tailored to meet the needs of SWCDs all over the nation. A WQMP includes the following:

- Conservation plan map showing boundaries, fields, land use, acres and facilities
- Soils map
- Soils description
- Topography map
- Conservation Plan of Operation
- Soil test (required when nutrients are applied)

Once the WQMP was developed and approved by NRCS and the local district, it was then sent to the TSSWCB Harlingen Regional Office for technical review and certification. Upon certification of the WQMP, the plan could be implemented.

The District Technicians worked with landowners to implement BMPs laid out in the WQMP. The major BMPs installed included:

### Irrigation Land Leveling (464)

- This practice is for the reshaping of land to be irrigated to planned grade. Land to be leveled shall be suitable for irrigation and for the proposed methods of water application. Water supplies and irrigation deliveries to the area to be leveled shall be sufficient to make irrigation practical for the crops to be grown and the irrigation water application method to be used.
- 3,763 acres were leveled for irrigation.



### Irrigation Pipeline (430)

- Irrigation pipelines are installed to replace open ditches, increase irrigation efficiency and protect water quality.
- 61,217 feet of irrigation pipeline were installed through this project.



### Nutrient Management (590)

- Managing the amount, source, placement, form, and timing of the application of plant nutrients and soil amendments.
- 7,259.8 acres were placed under nutrient management.
- Soil sampling occurred on an annual basis on WQMPs that included nutrient management.

### Residue Management (seasonal) (344)

- Manage amount, orientation and distribution of organic residue to maximize soil protection until immediately prior to planting the following crop.
- Tillage will be limited to those operations that meet the standard for SCI (see RUSLE2). Leaving residues on or near the surface to within 6 weeks of the recommended planting date of the next crop will aid in preventing wind and water erosion. This practice was applied annually.
- 4,910.5 acres were placed under residue management.



Other BMPs installed were surface roughening (609), conservation crop rotation (328), pest management (595), irrigation water management (449), and irrigation system, surface and subsurface (443).



Soil tests can be used to estimate the kinds and amounts of soil nutrients available to plants. Properly conducted soil testing can also be cost-effective indicators of the type and amount of fertilizer and lime needed to improve crop yields. Soil tests were available to all WQMP holders in the watershed. The District Technicians assisted landowners with the collection and shipment of soil samples. Soil tests were also geo-referenced with a global positioning system.

The District Technician helped landowners acquire any cost-share assistance available. Through the WQMP Program, landowners were eligible for 60% cost-share assistance not to exceed \$10,000. This one-time cost-share was only available to producers that were located within the Arroyo Colorado watershed. Once the practice was implemented and certified, the cost-share was paid on. Status Reviews were conducted annually on all WQMPs developed and certified through this project to ensure the BMPs were installed and maintained properly.

In addition to the development, installation, and maintenance of WQMPs, the District Technicians and TSSWCB Harlingen Regional Office worked with the SWCDs and local producers to educate them on their operation, the WQMP Program, proper soil sampling, and water quality. The District Technician and TSSWCB Harlingen Regional Office attended field days and educational events in the Arroyo Colorado watershed disseminating information on this project and other agricultural related issues. They were also active in the development and implementation of the Arroyo Colorado WPP by serving on the Agricultural Issues Workgroup and Steering Committee.

## CONCLUSIONS

The development, installation, and maintenance of WQMPs in the Arroyo Colorado watershed was and continues to be a success. The District Technicians, working cooperatively with the TSSWCB Harlingen Regional Office and NRCS, provided agricultural producers with the opportunity to voluntarily implement BMPs that would have a positive impact on the Arroyo Colorado.

Through this project, a total of 138 WQMPs were developed and implemented on approximately 7,870 acres. A majority of the practices installed were related to the installation and management of irrigation. In addition, nutrient, residue, and pest management was applied to almost all 5,100 acres.

There is still a need to address agricultural NPS issues in the Arroyo Colorado watershed. In 2009, the TSSWCB funded *“Implementing the Arroyo Colorado Watershed Protection Plan by Providing Technical and Financial Assistance to Reduce Agricultural Nonpoint source Pollution”* (project 09-09) to continue efforts in providing local landowners with technical assistance and financial incentives to develop and implement WQMPs in the Arroyo Colorado watershed. Through these efforts, there will be a continued reduction in nutrient and sediment loads and help improve water quality. This project will help the Arroyo Colorado Watershed Partnership and agricultural landowners move closer to achieving the Plan’s short- and long-term goals as described in the Arroyo Colorado WPP.

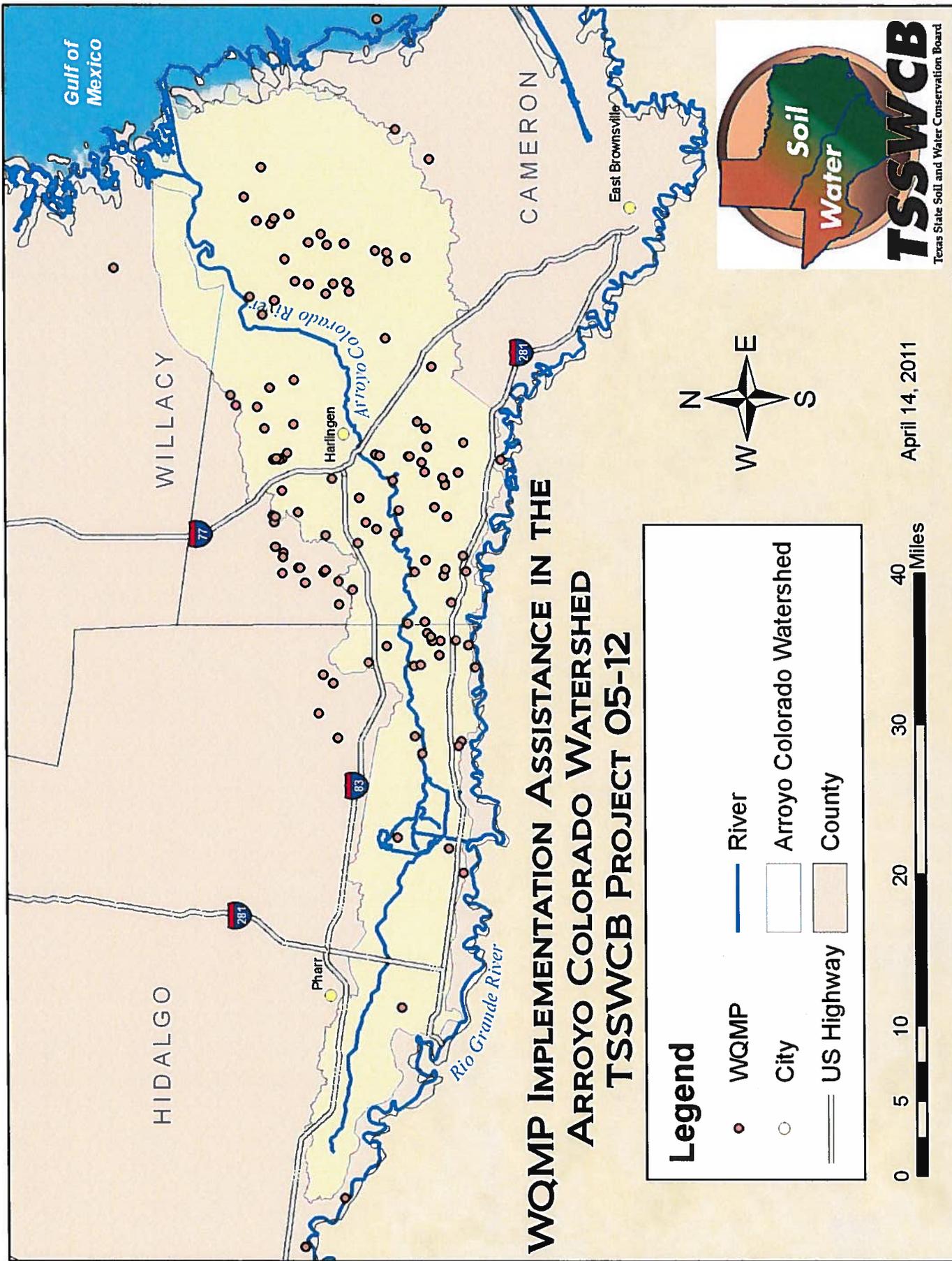
**APPENDIX A: ANNOUNCEMENT IN THE FARM SERVICE  
AGENCY NEWSLETTER**

# **ATTENTION FARMERS**

**The Southmost Soil and Water Conservation District is currently is administering programs that offer cost – share assistance for implementation of conservation practice such as irrigation pipeline, irrigation land leveling, tile drain, ect.**

**For more information contact USDA –  
NRCS in San Benito, TX  
at (956) 399 – 2522 ext 3**

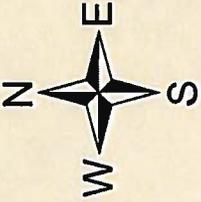
**APPENDIX B: MAP OF WQMP LOCATIONS**



# WQMP IMPLEMENTATION ASSISTANCE IN THE ARROYO COLORADO WATERSHED TSSWCB PROJECT 05-12

**Legend**

- WQMP
- City
- US Highway
- River
- Arroyo Colorado Watershed
- County



April 14, 2011



## **APPENDIX C: INVENTORY OF WQMP BMPS**



Plan Number	County	Acres	PRACTICES																					
			Ac.	Ac.	Ac.	Ac.	No.	Ft.	Ac.	Ft.	Ac.	Ft.	No.	Ac.	No									
24	Cameron	33.6		33.6	33.6	33.6																		
25	Cameron	32.6	14.4	17.9	32.6	32.6		675.0																
26	Cameron	93.2		93.2	93.2	93.2																		
27	Cameron	35.3		35.3	35.3	35.3		850.0																
28	Cameron	29.0		29.0	29.0	29.0																		
29	Cameron	28.5		28.5	28.5	28.5		1272.3																
30	Cameron	4.4		4.4	4.4	4.4																		
31	Cameron	9.0		9.0	9.0	9.0		350.0																
32	Cameron	26.4		26.4	26.4	26.4																		
33	Cameron	42.7		42.7	42.7	42.7																		
34	Cameron	17.0		17.0	17.0	17.0																		
35	Cameron	67.2		67.2	67.2	67.2																		
36	Cameron	9.0		9.0	9.0	9.0																		
37	Cameron	19.4		19.4	19.4	19.4																		
38	Cameron	10.0		10.0	10.0	10.0		625.0																
39	Cameron	17.0		17.0	17.0	17.0		500.0																
40	Cameron	59.6		59.6	59.6	59.6																		
41	Cameron	25.3		25.3	25.3	25.3																		
42	Cameron	61.7		61.7	61.7	61.7																		
43	Cameron	22.5		22.5	22.5	22.5		70.0																
44	Cameron	10.2		10.2	10.2	10.2		154.0																
45	Cameron	137.7		137.7	137.7	137.7																		
46	Cameron	13.0		13.0	13.0	13.0		700.0																

Plan Number	County	Acres	PRACTICES																		
			512 - Pasture/Hayland Planting	609 - Surface Roughening	443 - Irrigation System, Surface & Subsurfa	449 - Irrigation Water Management	410 - Grade Stabilization Structure	430 - Irrigation Pipeline	462 - Precision Land Leveling	464 - Irrigated Land Levellung	511 - Forage Harvest Management	328 - Conservation Crop Rotation	528A - Prescribed Grazing	590 - Nutrient Management	595 - Pest Management	516 - Livestock Pipeline	344 - Residue Management-Seasonal	382 - Fencing	614 - Trough/Water Storage Facility	314 - Brush Management	441 - Micro-Irrigation
			Ac.	Ac.	Ac.	Ac.	No.	Ft.	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.	Ft.	Ac.	Ft.	No.	Ac.	No
47	Cameron	241.6	241.6								241.6				241.6						
48	Cameron	22.1	22.1					1025.0							22.1						
49	Cameron	22.9		22.9	22.9									22.9	22.9						
50	Cameron	21.5			21.5	21.5								21.5	21.5						
51	Cameron	31.4	31.4		31.4	31.4		251.8						31.4	31.4						
52	Cameron	17.9	17.9											17.9	17.9						
53	Cameron	7.9												7.9	7.9						
54	Cameron	13.7	13.7					13.7						13.7	13.7	400.0		1000.0	2.0		
55	Cameron	14.1	14.1					1688.6						14.1	14.1			1053.0	1.0		
56	Cameron	5.5	5.5											5.5	5.5						
57	Cameron	14.5												14.5	14.5						
58	Cameron	115.4	115.4											115.4	115.4				115.4		
59	Cameron	24.2		24.2	24.2			300.0						24.2	24.2						
60	Cameron	16.4	16.4					698.4						16.4	16.4						
61	Cameron	44.6			44.6	44.6								44.6	44.6					44.6	
62	Cameron	19.9	19.9											19.9	19.9					19.9	
63	Cameron	3.0	3.0											3.0	3.0	3.0					
64	Cameron	45.7	45.7				1	250.0						45.7	45.7						
65	Cameron	62.5	62.5											62.5	62.5						62.5
66	Cameron	140.0		140.0	140.0									140.0	140.0						
67	Cameron	11.9	11.9											11.9	11.9						
68	Cameron	16.3	16.3					800.0						16.3	16.3						
69	Cameron	16.1	16.1											16.1	16.1						



Plan Number	County	Acres	PRACTICES																				
			Ac.	Ac.	Ac.	Ac.	No.	Ft.	Ac.	Ft.	Ac.	Ft.	No.	Ac.	No.								
94	Cameron	67.7	67.7	67.7	67.7	67.7	600.0		67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7	67.7		67.7		
95	Cameron	9.3	9.3	9.3	9.3	525.0		9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3				
96	Cameron	18.4	18.4	18.4	18.4	750.0		18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4				
97	Cameron	1.5	1.5	1.5	1.5	750.0		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5				
98	Cameron	120.5	120.5	120.5	120.5			120.5	120.5	120.5	120.5	120.5	120.5	120.5	120.5	120.5	120.5	120.5	120.5				
99	Cameron	2.5	2.5	2.5	2.5			2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5				
100	Cameron	10.6	10.6	10.6	10.6			10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6				
101	Cameron	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
102	Cameron	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
103	Cameron	17.8	16.0	16.0	16.0	1000.0		16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0		16.0		
104	Cameron	4.4	4.4	4.4	4.4	210.0		4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4		4.4		
105	Cameron	478.8	478.8	478.8	478.8			478.8	478.8	478.8	478.8	478.8	478.8	478.8	478.8	478.8	478.8	478.8	478.8		478.8		
106	Hidalgo	15.7	15.7	15.7	15.7			15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7		15.7		
107	Hidalgo	70.0	70.0	70.0	70.0	3391.0		70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0		70.0		
108	Hidalgo	162.0				1720.0																	
109	Hidalgo	18.9	18.9	18.9	18.9			18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9	18.9		18.9		
110	Hidalgo	18.4	18.4	18.4	18.4			18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4	18.4				
111	Hidalgo	62.0	62.0	62.0	62.0			62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0		62.0		
112	Hidalgo	116.0	116.0	116.0	116.0			116.0	116.0	116.0	116.0	116.0	116.0	116.0	116.0	116.0	116.0	116.0	116.0		116.0		
113	Hidalgo	37.8	37.8	37.8	37.8			37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8	37.8		37.8		
114	Hidalgo	29.5	29.5	29.5	29.5	700.0		29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5		29.5		
115	Hidalgo	14.3	14.3	14.3	14.3			14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3		14.3		



