

Arroyo Colorado Bacteria Indicator Study

Nueces River Authority
Texas Commission on Environmental Quality

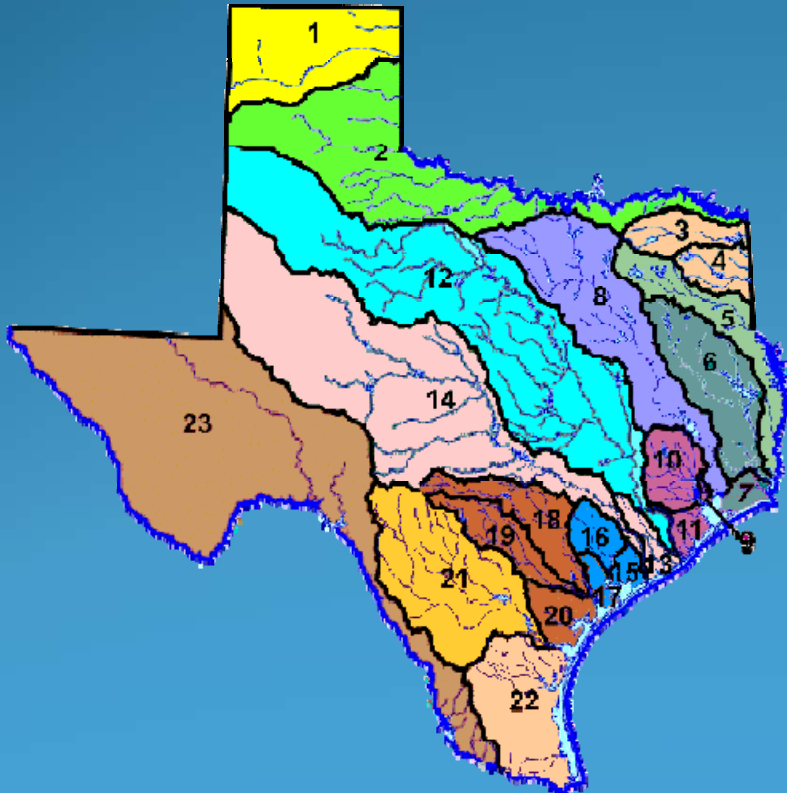
Texas Watershed Coordinator Roundtable – July 27, 2011

Location

Arroyo Colorado Above Tidal (Segment 2202)

63 Miles from FM 2062 in Hidalgo County to 100 yards downstream of Cemetery Rd. south of the Port of Harlingen

4 Assessment Units



Background

1996 – Bacteria Impairment for Arroyo Colorado Above Tidal

1998 – Arroyo Colorado Watershed Partnership formed

1999 – Indicator bacteria: Fecal Coliform → *E. coli*

2006 Assessment –

Fecal Coliform geomean > 200 cfu / 100 ml

E. coli geomean < 126 cfu /100 ml (AU_01 & AU_02)

Remained listed based on older Fecal Coliform data

Questions:

Are the lower bacteria numbers due to the Partnership's efforts?

Are the *E. coli* counts affected by specific conductance levels?

Would Enterococcus be a better indicator bacteria?

Study

Water quality samples collected monthly at 6 sites

January 2009 – December 2009

Analyzed for Fecal Coliform, *E. Coli*, and Enterococcus

13086 – FM 336 (McAllen)

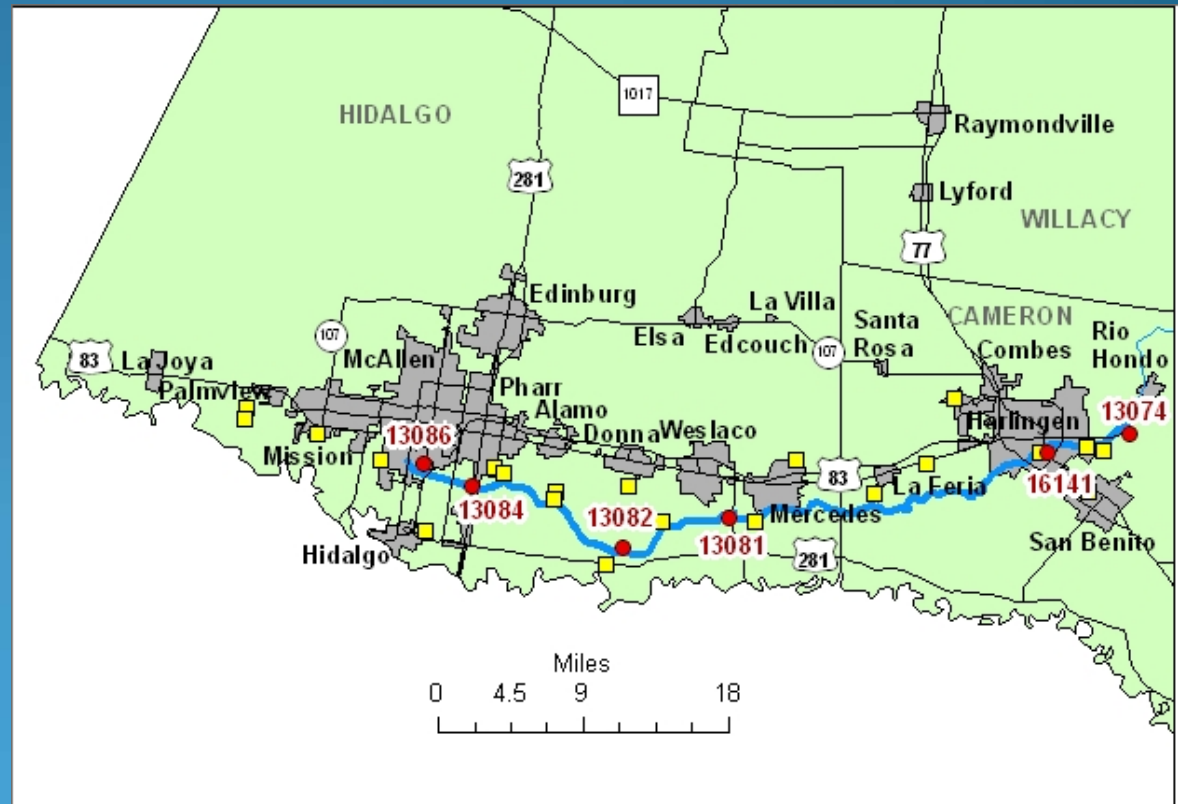
13084 – US 281 (Pharr)

13082 – FM 493 (Donna)

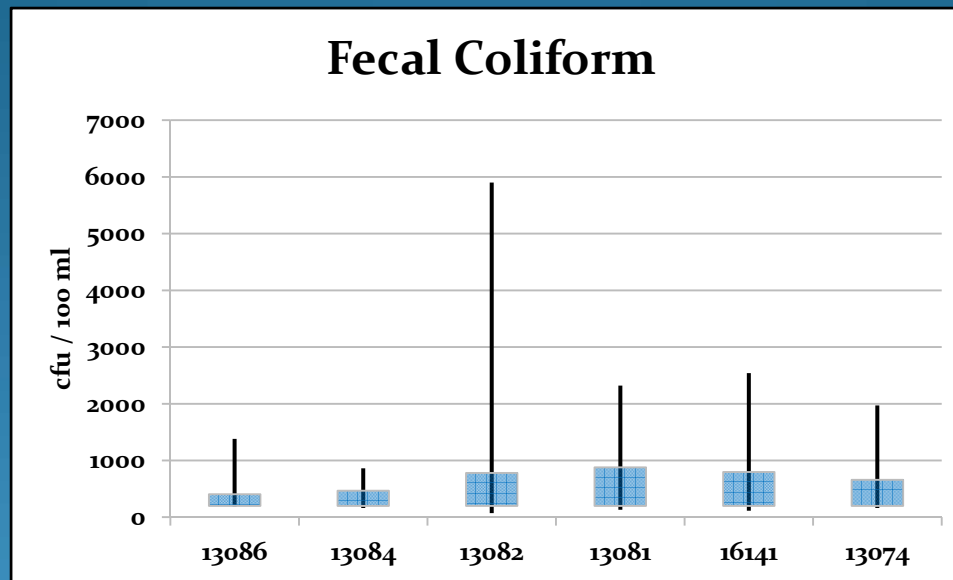
13081 – FM 1015 (Weslaco)

16141 – Commerce St.
(Harlingen)

13074 – Cemetery Rd. Bridge
(Port of Harlingen)



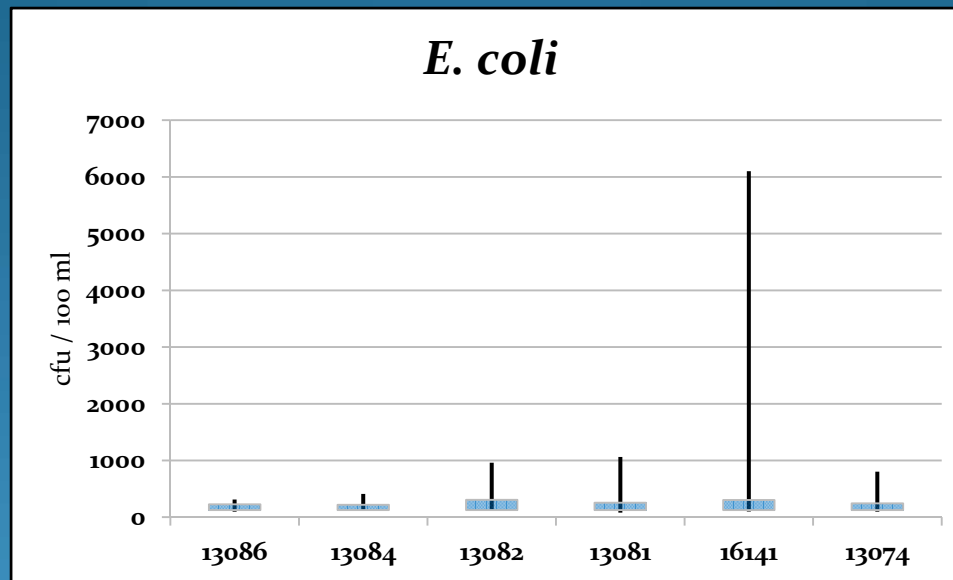
Results – Fecal Coliform



Fecal Criteria: Grab = 400, GM = 200

	1/13/09	2/11/09	3/17/09	4/8/09	5/13/09	6/16/09	7/14/09	8/12/09	9/15/09	10/14/09	11/18/09	12/15/09	GM
13086	380	450	500	213	1380	240	1010	188	250	1030	250	270	406
13084	500	430	580	230	480	640	820	160	590	860	450	410	467
13082	780	560	2240	70	5900	198	1680	260	2570	1490	820	460	780
13081	630	350	2040	1940	720	2070	130	520	610	1900	880	2320	877
16141	1170	2540	2150	1430	113	720	1220	380	160	630	1210	1560	797
13074	420	730	1240	1430	160	510	580	1090	220	970	580	1970	660

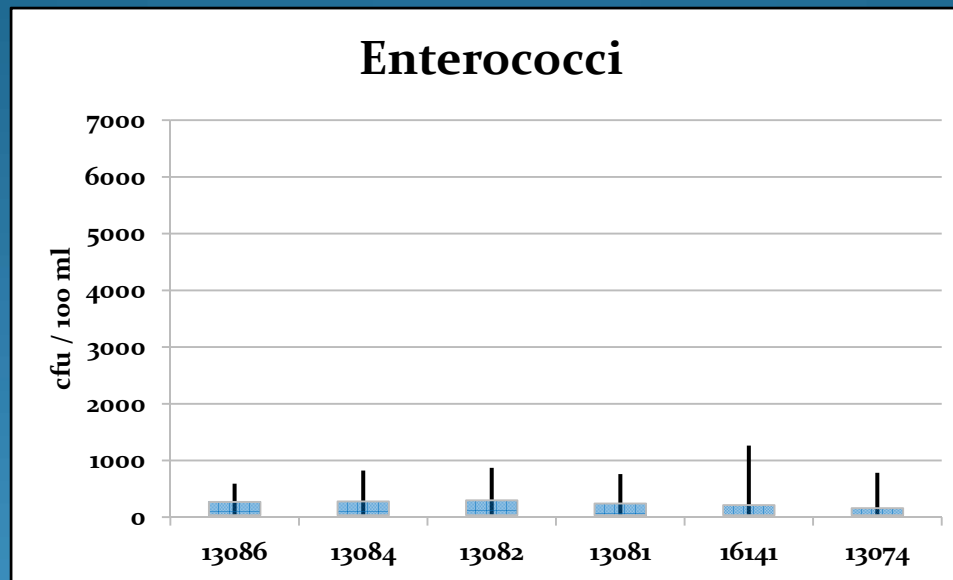
Results – *E. Coli*



***E. coli* Criteria: Grab = 394, GM = 126**

	1/13/09	2/11/09	3/17/09	4/8/09	5/13/09	6/16/09	7/14/09	8/12/09	9/15/09	10/14/09	11/18/09	12/15/09	GM
13086	310	230	240	168	200	263	260	253	95	250	265	290	226
13084	207	203	210	143	410	220	230	130	233	263	260	233	220
13082	218	213	600	168	280	208	200	370	960	720	218	230	307
13081	720	193	78	193	130	1060	230	315	102	350	210	480	255
16141	203	120	100	220	230	198	120	163	510	730	570	6100	304
13074	150	157	293	270	220	97	313	290	270	223	260	800	244

Results – Enterococcus



Enterococcus Criteria: Grab = 89, GM = 35

	1/13/09	2/11/09	3/17/09	4/8/09	5/13/09	6/16/09	7/14/09	8/12/09	9/15/09	10/14/09	11/18/09	12/15/09	GM
13086	540	590	480	188	380	193	180	155	33	530	400	350	269
13084	200	670	213	248	420	150	820	46	300	400	190	560	278
13082	390	163	300	410	215	330	178	230	870	198	290	440	298
13081	620	215	70	110	250	760	200	66	280	198	580	440	240
16141	113	123	83	175	250	120	157	62	480	290	890	1260	214
13074	100	157	36	147	145	52	93	140	540	178	410	780	158

Observations

Are the bacteria numbers declining due to the Partnership's effort?

Fecal Coliform Geomean

2006 Assessment: 557 – 2069 cfu / 100 ml

2008 Assessment: 573 – 2069 cfu / 100 ml

2009 Study: 406 – 877 cfu / 100 ml

2010 Assessment: 473 – 1516 cfu / 100 ml

E. Coli Geomean

2006 Assessment: 95-236 cfu / 100 ml

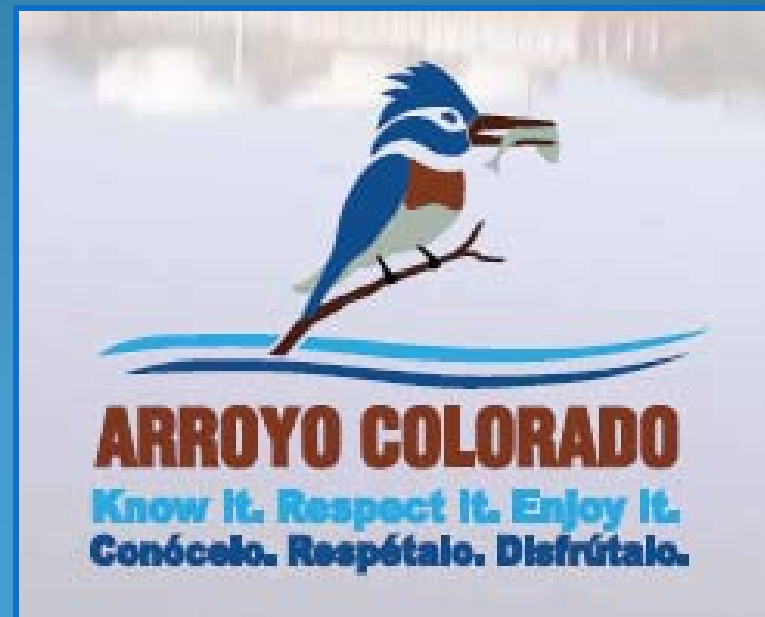
2008 Assessment: 95-191 cfu / 100 ml

2009 Study: 220 – 307 cfu / 100 ml

2010 Assessment: 133 – 180 cfu / 100 ml

Enterococcus Geomean

2009 Study: 158 – 298 cfu / 100 ml



Observations

Are *E. coli* counts affected by specific conductance levels?

13086: 3380 – 4610 $\mu\text{S}/\text{cm}$

13084: 3580 – 4760 $\mu\text{S}/\text{cm}$

13082: 3620 – 4690 $\mu\text{S}/\text{cm}$

13081: 3640 – 4840 $\mu\text{S}/\text{cm}$

16141: 3020 – 4420 $\mu\text{S}/\text{cm}$

13074: 2970 – 5030 $\mu\text{S}/\text{cm}$

Fresh water: 0 – 1,300 $\mu\text{S}/\text{cm}$

Brackish water: 1,301 – 28,800 $\mu\text{S}/\text{cm}$

Salty water: > 28,000 $\mu\text{S}/\text{cm}$

Source:

<http://sofia.usgs.gov/publications/wri/93-4057/specificc.html>

Observations

Would Enterococcus be a better indicator bacteria?

Fecal Criteria: Grab = 400, GM = 200

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Questions

Rocky Freund
Nueces River Authority

rfreund@nueces-ra.org

361-653-2110