

Carancahua Bay Bacteria Loads and Needed Reductions

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Today

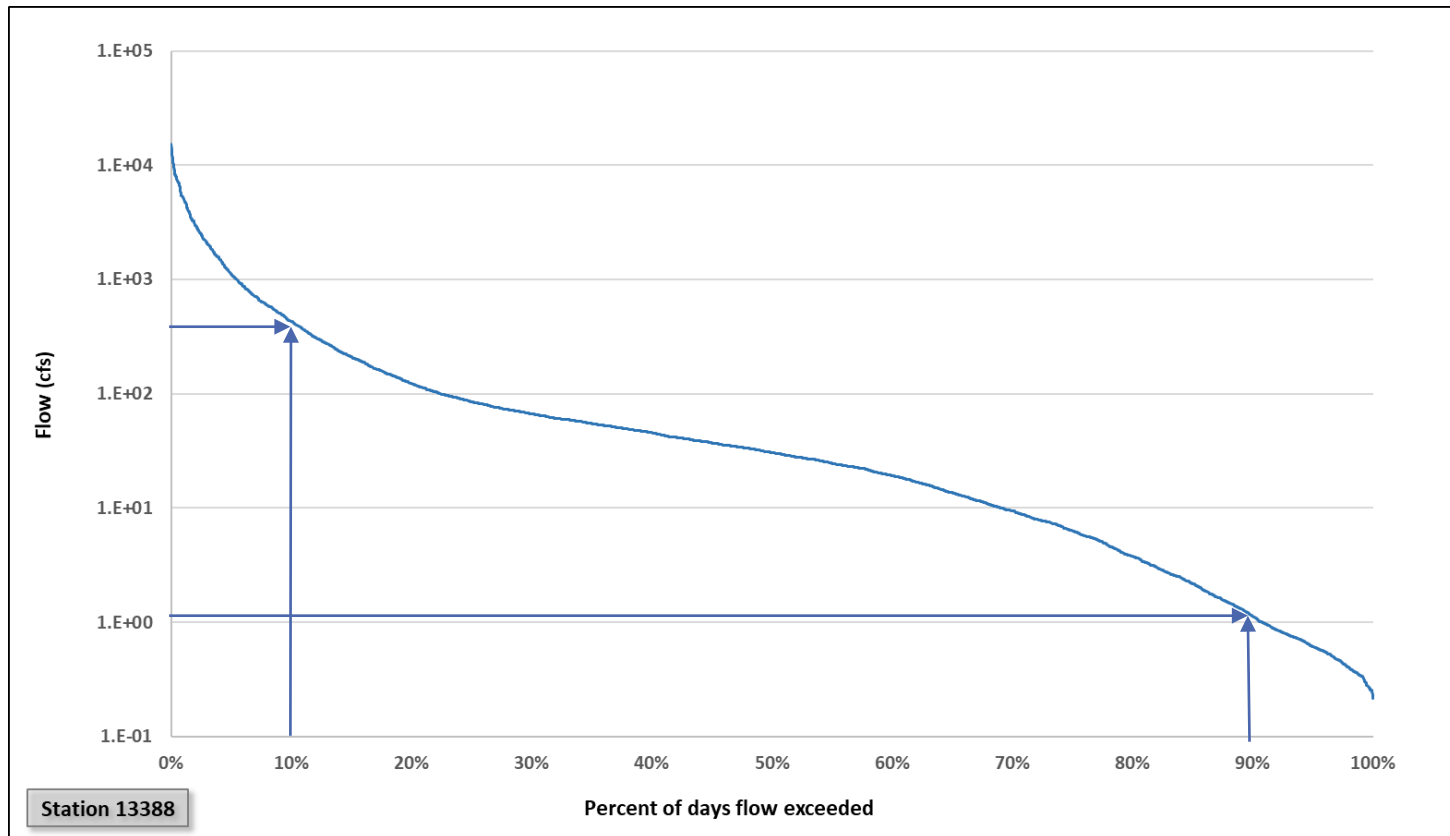
- ⦿ Reductions needed to meet water quality standards (Load Duration Curves)
- ~~⦿ Identify areas with highest potential to impact water quality~~
- ⦿ Potential sources of bacteria

Load Duration Curve

- ⦿ Visualizes streamflows and pollutant loads
- ⦿ Helps assess under what conditions pollutant loads exceed water quality standards
- ⦿ Can use to estimate the pollutant capacity of a stream and the reductions needed

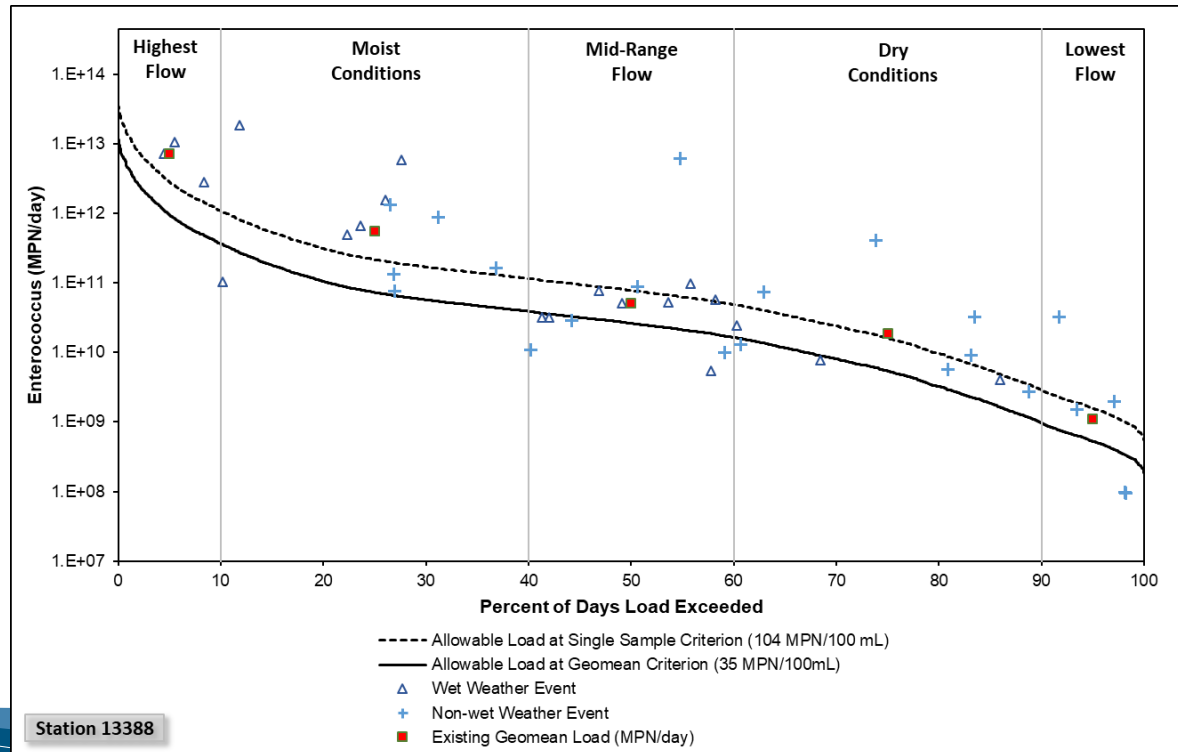
Needed Load Reduction

Example:



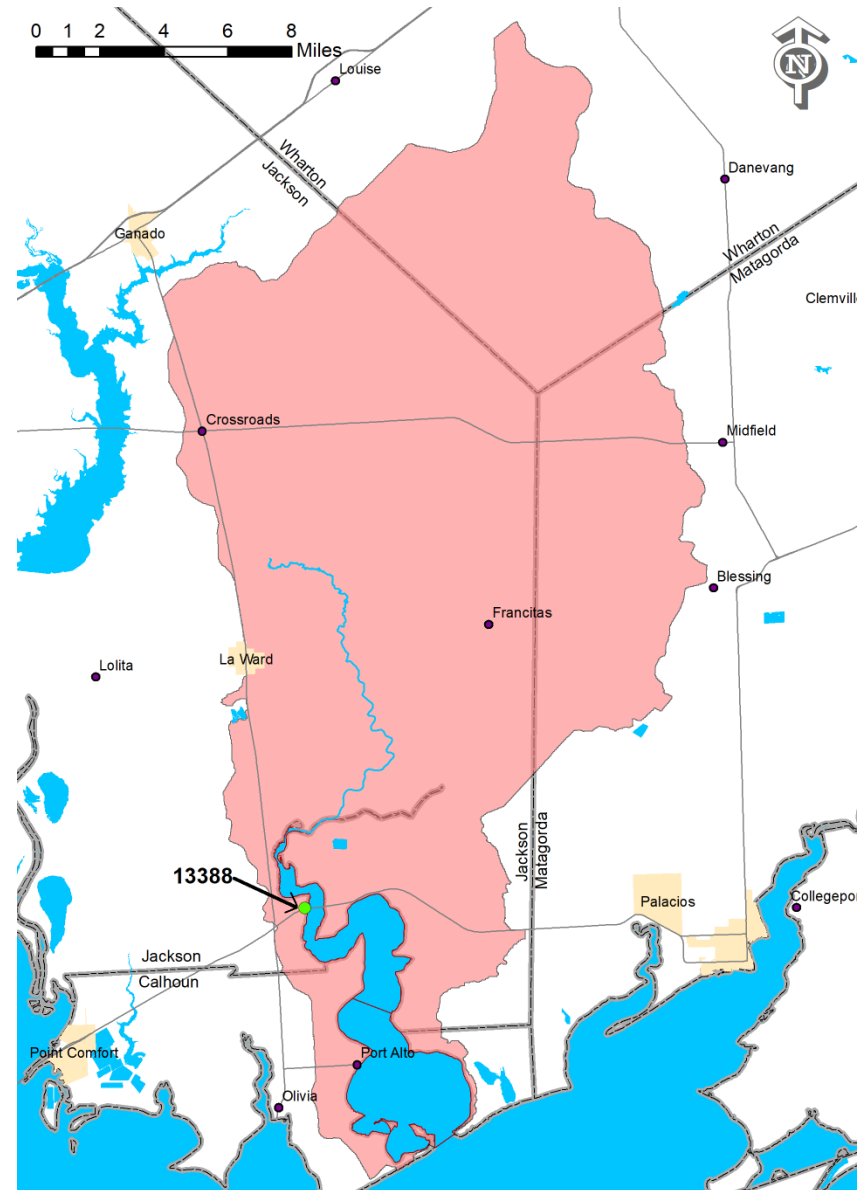
Needed Load Reduction

- ⊙ Multiply allowable bacteria concentration (minus 10% margin of safety)
- ⊙ Plot measured pollutant loads



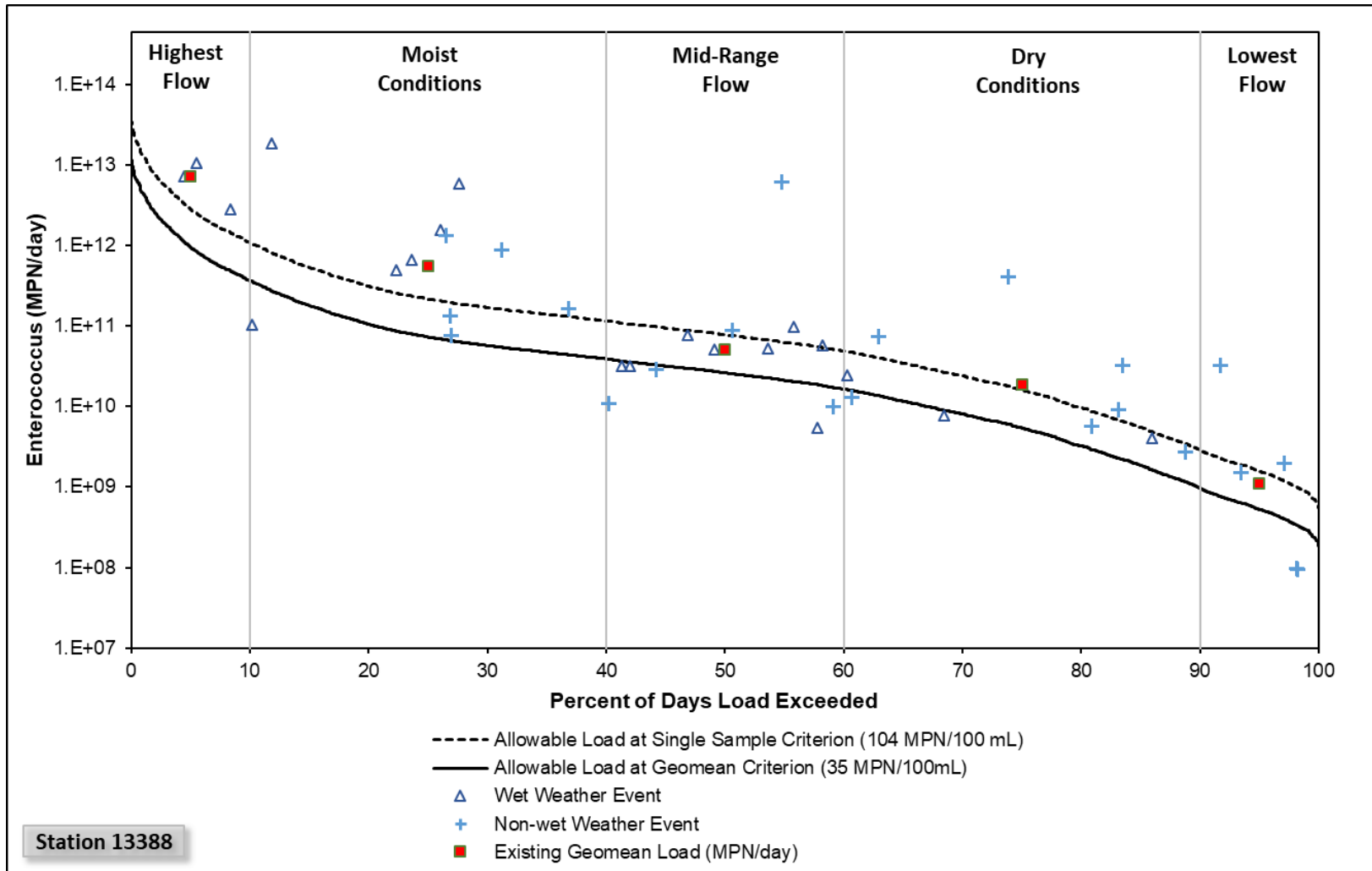
TCEQ SWQM Station

- Only 1 active station in the watershed recording Enterococcus data for AU 2456_01.



Bacteria Loads

Load duration curve for Carancahua Bay Station 13388, January 1, 2002 – December 31, 2016



Bacteria Loads

	High Flow Conditions	Moist Flow Conditions	Mid-Range Flow Conditions	Dry Flow Conditions	Low Flow Conditions
Days per year	36.5	109.5	73	109.5	36.5
Median Flow (cubic feet per second)	1,106.373	85.056	30.417	6.33	0.612
Existing Geomean Concentration (MPN/100 mL)	268	269	68	122	73
Allowable Daily Load (Billion MPN)	947.387	72.83	26.05	5.42	0.52
Allowable Annual Load (Billion MPN)	34,579.626	7,975.26	1,901.36	593.53	19.13
Existing Daily Load (Billion MPN)	7,254.279	559.78	50.60	18.89	1.09
Existing Annual Load (Billion MPN)	264,452.684	61,295.60	3,694.07	2,068.88	39.90
Annual Load Reduction Needed	229,873.058	53,320.33	1,792.71	1,475.35	20.77
Percent Reduction Needed	86.94%	86.99%	48.53%	71.31%	52.05%

Needed Load Reduction

	High Flow Conditions	Moist Flow Conditions	Mid-Range Flow Conditions	Dry Flow Conditions	Low Flow Conditions
Possible Sources	Overland flow, Sanitary Sewer Overflows, Resuspension				
	Failing or non-existent OSSFs				
			Direct deposition from wildlife, feral hogs, livestock, pets. Illegal dumping		
Total Annual Load (Billion MPN)	331,879.6				
Total Annual Load Reduction	286,810.7				
Total Percent Reduction (Billion MPN)	86.4%				

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Carancahua Bay Watershed Potential Source Estimates

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Review of Potential Bacteria Sources

- Nonpoint Sources
 - Livestock
 - Wildlife/Feral Hogs
 - Septic Systems/OSSFs
 - Pets

Focus for today

- Point Sources
 - Wastewater plants
 - Sanitary Sewer Overflows

Estimated Livestock in Carancahua Bay watershed

Estimated Numbers of livestock in the Carancahua Bay Watershed

	Calhoun	Jackson	Matagorda	Wharton	Total	AU Conversion	AUs
Horses	7	233	54	86	380	1.25	475
Goats	16	162	41	37	256	0.17	44
Sheep	8	9	14	20	51	0.2	10
Poultry	35	187	57	10	289	0.01	3

Numbers developed from NASS
2012

Cattle Estimates

Land Type	Method	Acres	Stocking Rate (cattle/acre)	Cattle Estimate	AU Conversion	AU
Unimproved	Stocking rate	34,626	1/15	2,308	1	2,308
Improved	Stocking rate	63,100	1/3	21,033	1	21,033
Total	Stocking rate	97,726	N/A	23,341	1	23,341
Overall	NASS	97,726	N/A	15,701	1	15,701

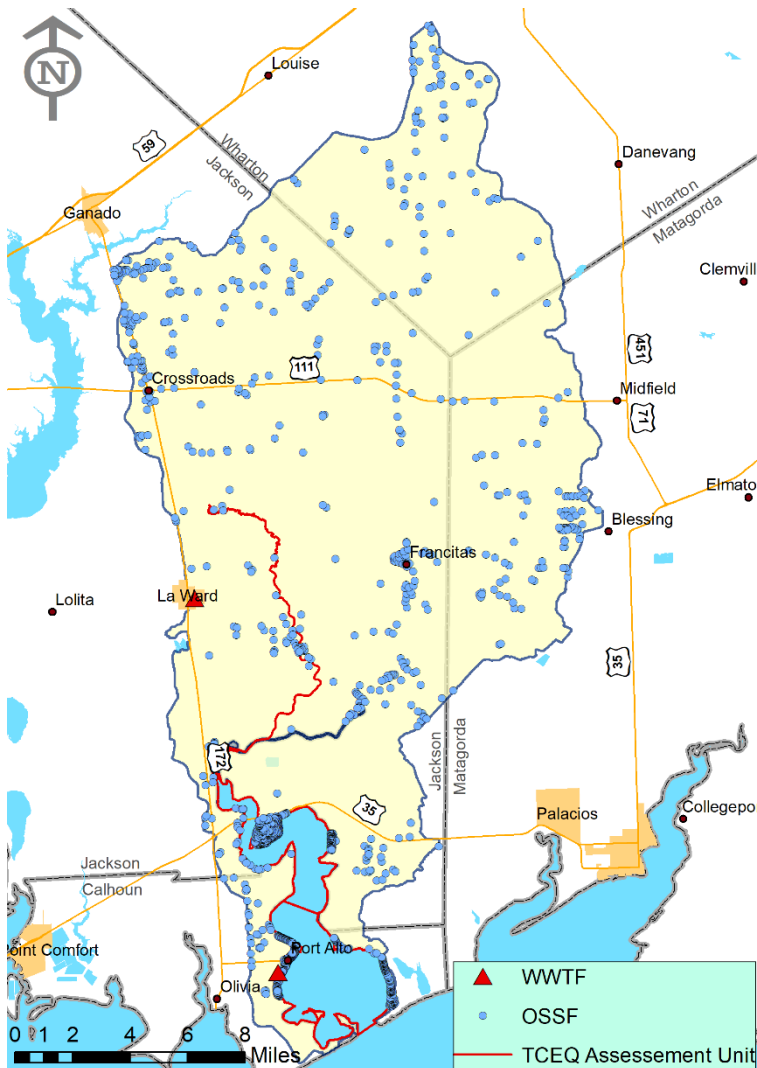
Unimproved Land: Forest, Shrub/Scrub, Herbaceous

Improved Land: Pasture/Hay

Cattle Estimates

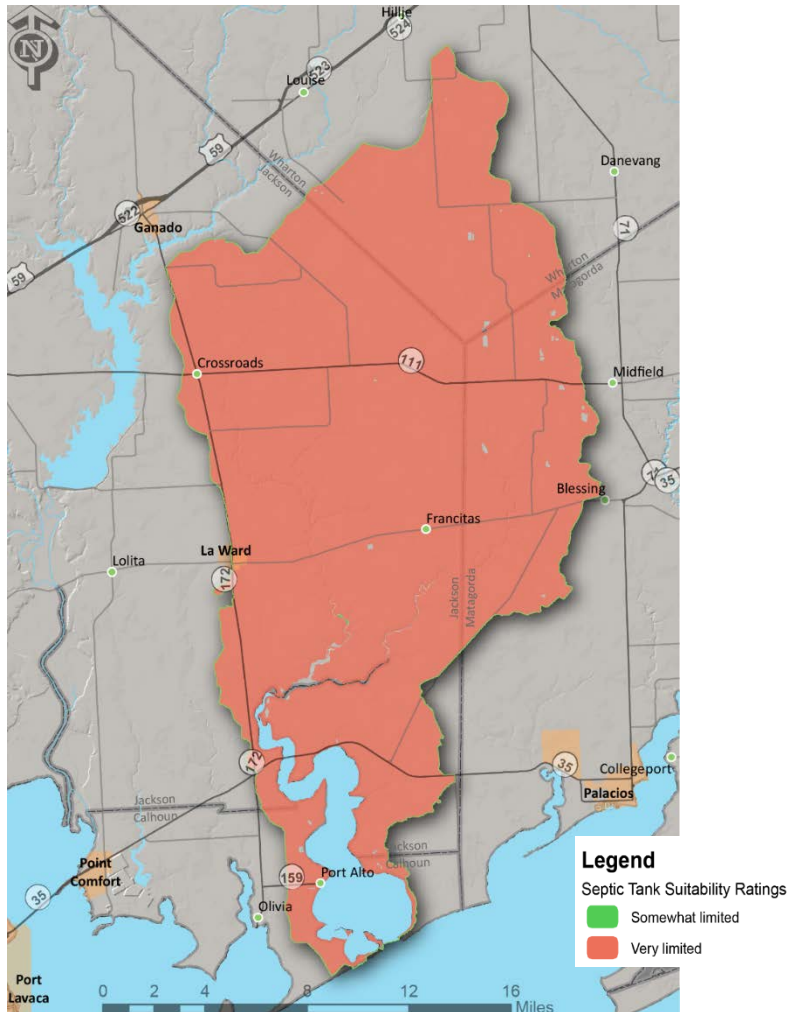
- ⦿ Substantial difference between NASS and stocking rate estimation methods
- ⦿ NASS might be reflective of decreased stocking rates utilized in drought/dry years
- ⦿ Do we want to use the NASS estimate or stocking rate estimate?
- ⦿ If we use stocking rate estimate, is the 1 head/15 acres appropriate for unimproved range?
- ⦿ What about 1 head/3 acres for pastures?
- ⦿ Are these realistic stocking rates locally?

OSSF Estimates



Watershed	Segment	Estimated OSSFs
Carancahua Bay	2456	1389

OSSF Suitability Ratings



Soil Type	Failure Rate	Number of OSSFs	Percent of OSSFs
not limited	5%	0	0%
somewhat limited	10%	0	0%
very limited	15%	1389	100%
Total	N/A	1389	100%

Estimated Household Pets

Watershed	Segment	Estimated Number of Households	AVMA Estimated Dogs per Household	AVMA Estimated Cats per Household	Estimated Dog Population	Estimated Cat Population
Carancahua Bay	2456	888	0.584	0.638	519	567

Estimated Wildlife

Estimated Number of wildlife in the Carancahua Bay Watershed

	Calhoun	Jackson	Matagorda	Wharton	Total	AU Conversion	AUs
Feral Hogs	205	3,746	976	1,009	5,936	0.125	742
Deer	273	5,000	1,303	1,348	7,924	0.112	887

Numbers developed for Deer from a density of 38.4 deer/1,000 acres provided by Texas Parks and Wildlife.

Numbers developed for Feral Hogs from a density of 33.3 acres per hog (Wagner and Moench, 2009).

Questions/Discussion

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Possible Management Measures to Address Impairments

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- ⦿ Identify management measures used elsewhere
- ⦿ Evaluate which ones would work here
- ⦿ Next Meeting – Identify how many will be needed to accomplish water quality goals

Some Management Measures Used In Other Watersheds

- ◎ Source: Septic Systems/OSSFs
 - ◎ Repair/replace failing systems
 - ◎ Decommission and connect to centralized system
 - ◎ Develop voluntary inspection program
 - ◎ Education and outreach
- ◎ Source: Agriculture
 - ◎ Develop and implement WQMPs & Conservation Plans
 - ◎ Soil testing campaigns
 - ◎ Education and outreach

Some Management Measures Used In Other Watersheds

- ⦿ Source: Wildlife
 - ⦿ Voluntary hog removal
 - ⦿ Fencing deer feeders
 - ⦿ Bounty programs
 - ⦿ Education and outreach
- ⦿ Source: Pets
 - ⦿ Install and maintain pet waste stations
 - ⦿ Education and outreach

What Management Measures To Include

- ⦿ Is it effective?
- ⦿ Is it locally acceptable?
- ⦿ Is it feasible?

Source: On-Site Sewage Facilities

1. Management Measure

- Repair and replace failing OSSF systems

2. Responsible Parties:

- Extension, county staff/DR, homeowners, contractors

3. Effectiveness:

- Results in direct load reductions - high

4. Feasibility:

- Needed financial resources (~\$8,000-\$10,000 per system)
- Technical resources (County staff time, Extension, service providers)
- Inventory of coastal zone OSSF is being developed

Source: On-Site Sewage Facilities

1. Management Measure

- Decommission and connect to centralized system

2. Responsible Parties:

- Extension, county staff/DR, homeowners, cities/communities

3. Effectiveness:

- Results in direct load reductions - high

4. Feasibility:

- Needed financial resources (\$\$\$)
- Technical resources (county staff time, Extension, service providers, TCEQ)

Source: On-Site Sewage Facilities

1. Management Measure

- ◎ Develop voluntary inspection program

2. Responsible Parties:

- ◎ Extension, county staff/DR, homeowners, cities/communities

3. Effectiveness:

- ◎ Indirect load reductions, depends on participation - moderate

4. Feasibility:

- ◎ Needed financial resources (relatively inexpensive)
- ◎ Technical resources (Extension, service providers)
- ◎ Might include incentives to promote proper maintenance

Source: Agriculture

1. Management Measure:

- Develop and implement WQMPs & Conservation Plans

2. Responsible Parties:

- TSSWCB, SWCDs, NRCS, Landowners, Lessees

3. Effectiveness:

- Results in direct load reductions, depends on participation - high

4. Feasibility:

- Needed Financial Resources (funding for technician, availability of cost-share programs to implement)
- Technical Resources (Local availability?)

Source: Agriculture

1. Management Measure:

- Soil testing campaigns

2. (Potential) Responsible Parties:

- Extension, TSSWCB, SWCDs, NRCS, landowners, lessees

3. Effectiveness:

- Depends on participation – uncertain

4. Feasibility:

- Needed financial resources (uncertain who would fund this)
- Technical resources (local availability?)

Source: Wildlife

1. Management Measure:

- Voluntary hog “removal”

2. Responsible Parties:

- Extension, TSSWCB, SWCDs, USDA-APHIS, landowners, lessees

3. Effectiveness:

- Results in direct load reductions, difficult to track - moderate to high

4. Feasibility:

- Needed financial resources (minimal at the individual property level)
- Technical resources (generally available from agencies)

Source: Wildlife

1. Management Measure:

- Fencing deer feeders

2. (Potential) Responsible Parties:

- Extension, TSSWCB, SWCDs, NRCS, landowners, lessees

3. Effectiveness:

- Reduces free food for hogs – low to moderate across the watershed, possibly high at the property level

4. Feasibility:

- Needed financial resources (~ \$200 per feeder)
- Technical resources (Generally available)

Source: Wildlife

1. Management Measure:

- Feral hog bounties

2. (Potential) Responsible Parties:

- Counties, Extension, TDA

3. Effectiveness:

- Direct reductions, depends on participation – moderate to high

4. Feasibility:

- Needed financial resources (sources uncertain)
- Technical resources

Source: Pets

1. Management Measure:

- Install and maintain pet waste stations

2. (Potential) Responsible Parties:

- Extension, local communities/HOAs

3. Effectiveness:

- Depends on individual participation - uncertain

4. Feasibility:

- Needed financial resources (~ \$500-700 per station)
- Technical resources
- Feasible locations?

Feedback

- ⦿ Please check the Management Measures you would prefer to include in the plan.
- ⦿ Consider if you think the measure would be effective at reducing pollutant loads and how feasible they are to implement in the watershed.
- ⦿ Then rank how important you think each checked management measure is (relative to the management measures you would like to see in the plan).

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