

Carancahua Bay Watershed Protection Plan and TMDL I-Plan

Michael Schramm



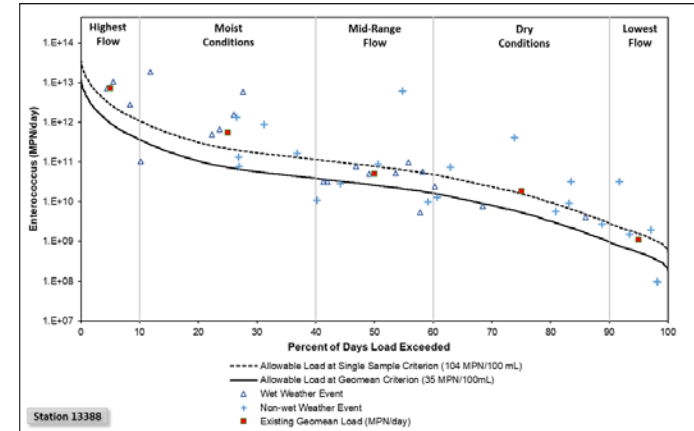
Overview

- ⦿ Brief Recap
- ⦿ SELECT
- ⦿ Management Measures
- ⦿ Measuring Success

Recap

- Load Reduction Curves to assess pollutant loads and identify needed reductions

- Identified 86% reduction in bacteria loads required to meet water quality standards



Recap

- Discussed and estimated possible sources



Recap

- ⦿ Ranked out possible management measures



SELECT

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Estimating Potential Enterococcus Loads

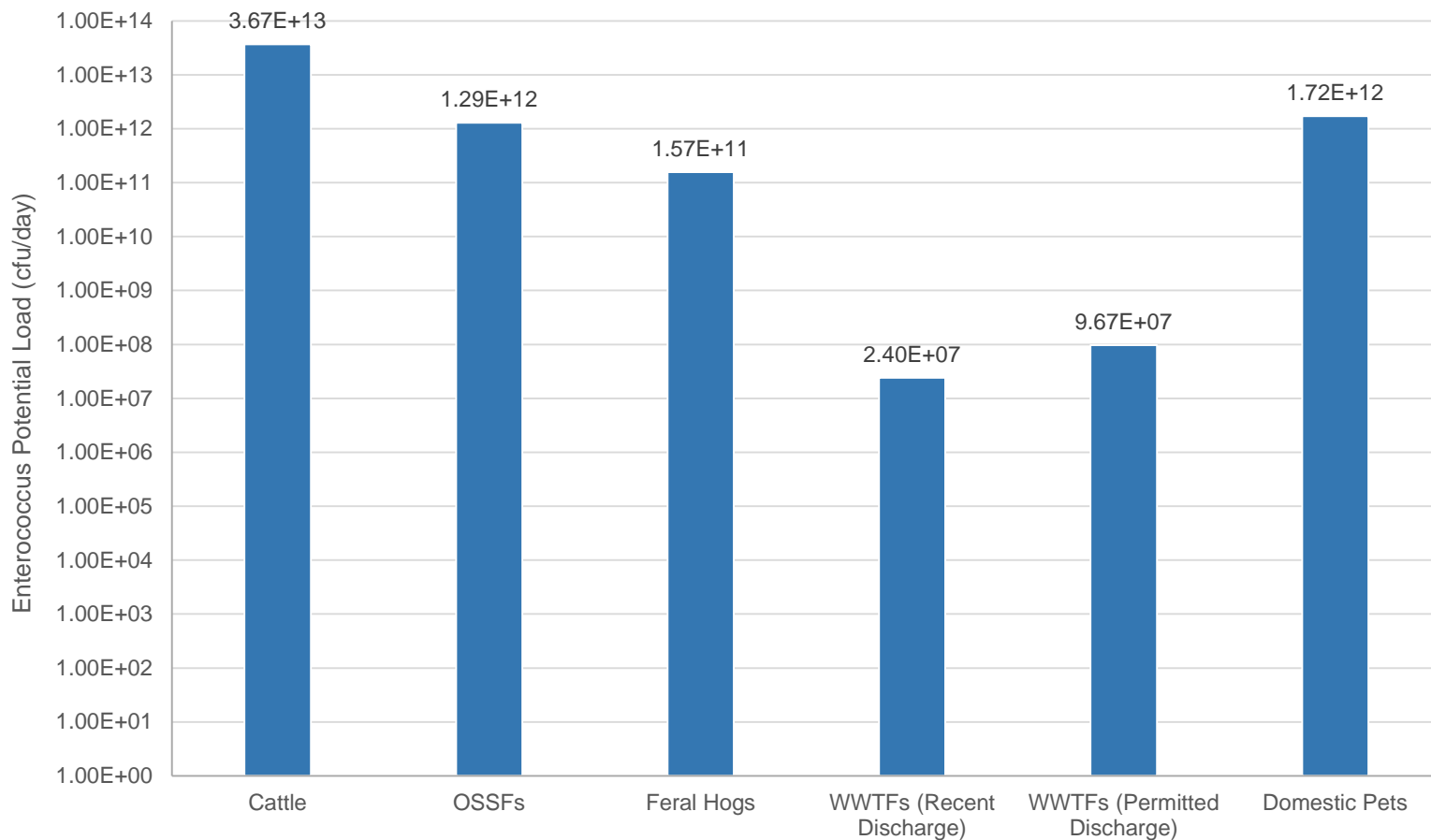
- ⊙ Spatially Explicit Load Enrichment Calculation Tool (SELECT)
- ⊙ Characterize bacteria sources based on spatial (how things are distributed across the landscape) factors
- ⊙ Relies on:
 - ⊙ Land use
 - ⊙ Soil
 - ⊙ Population density estimates

SELECT

Identify the areas and sources with highest *potential* to impact water quality



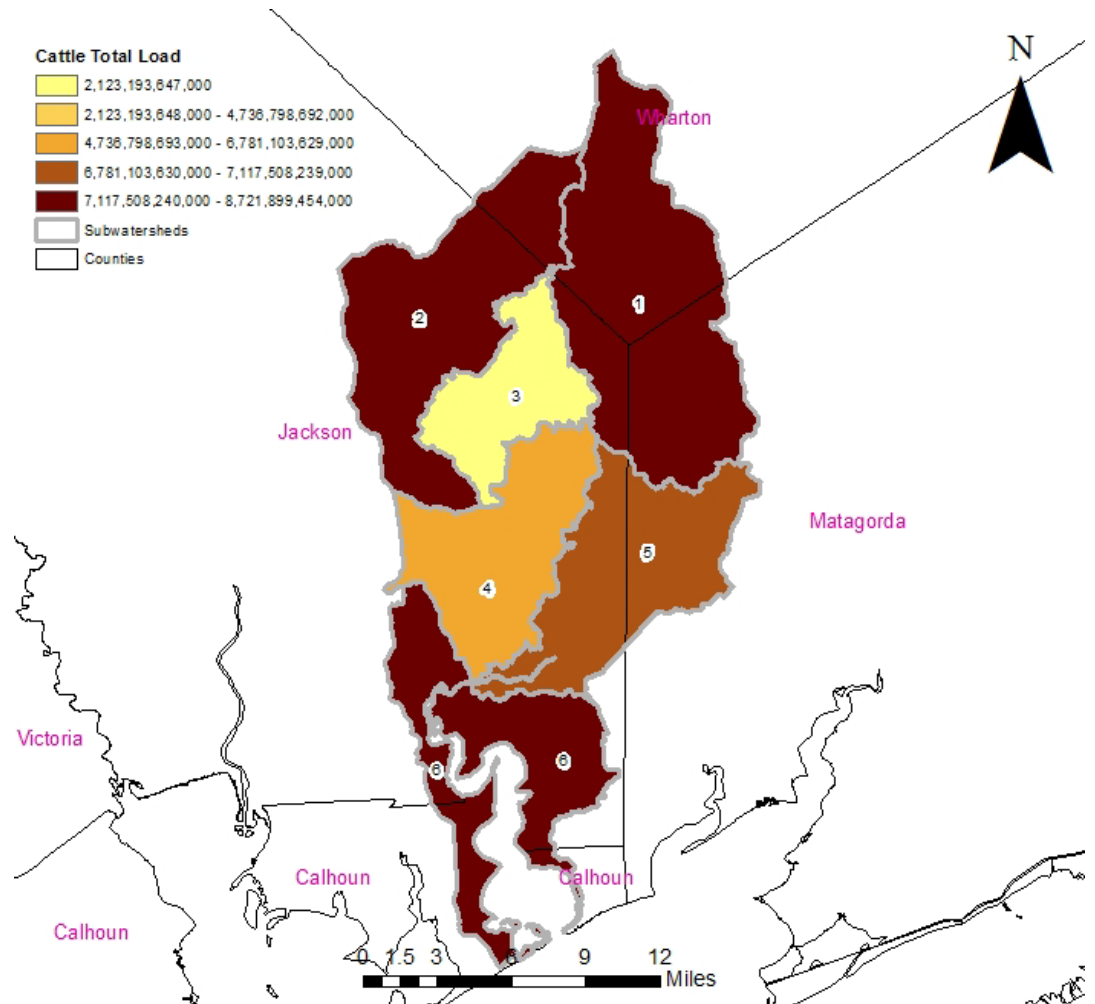
Enterococcus Potential Load Summary



GIS Analysis: Cattle

Potential Loading from Cattle:

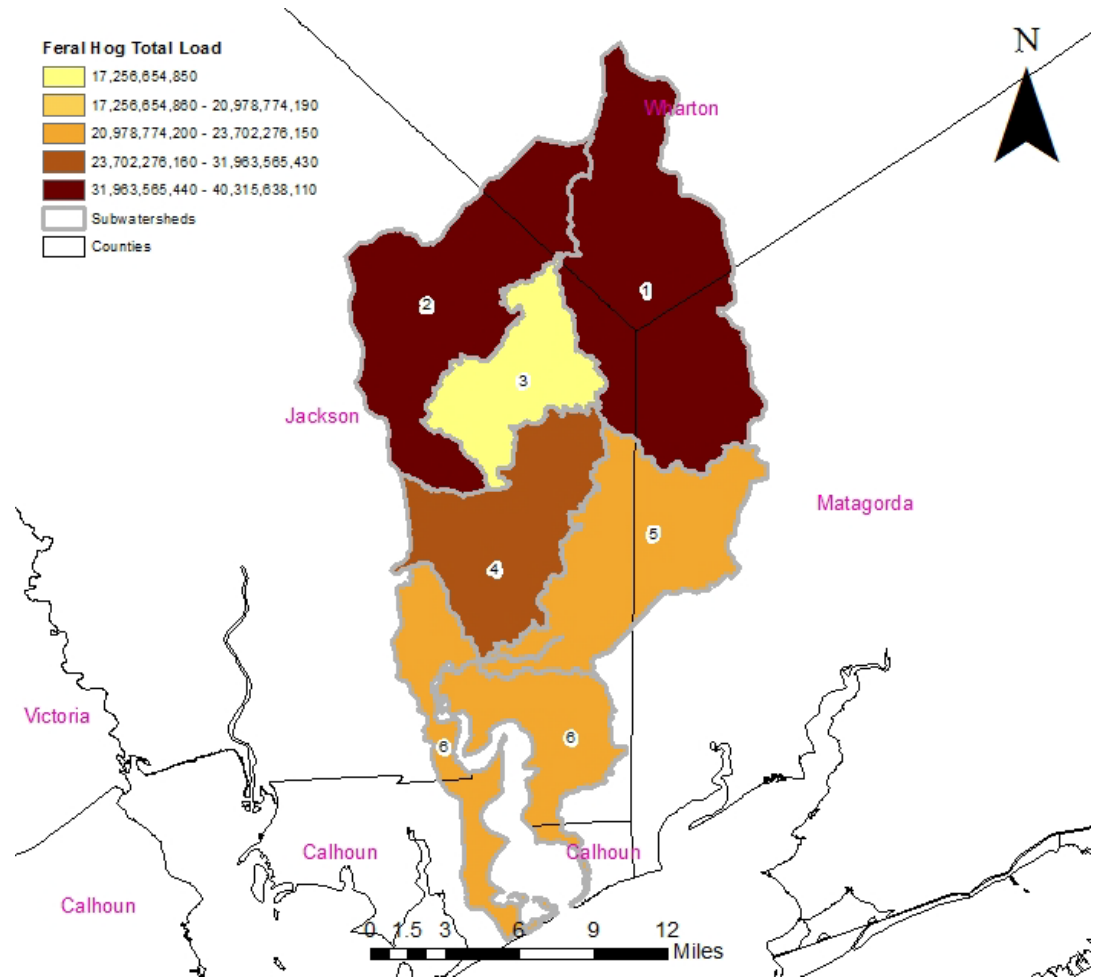
- Estimated 24,496 head
- Annual Load 3.67×10^{13} cfu/yr
- Subwatersheds 1, 2, 6



GIS Analysis: Feral Hogs

Potential Loading from Feral Hogs:

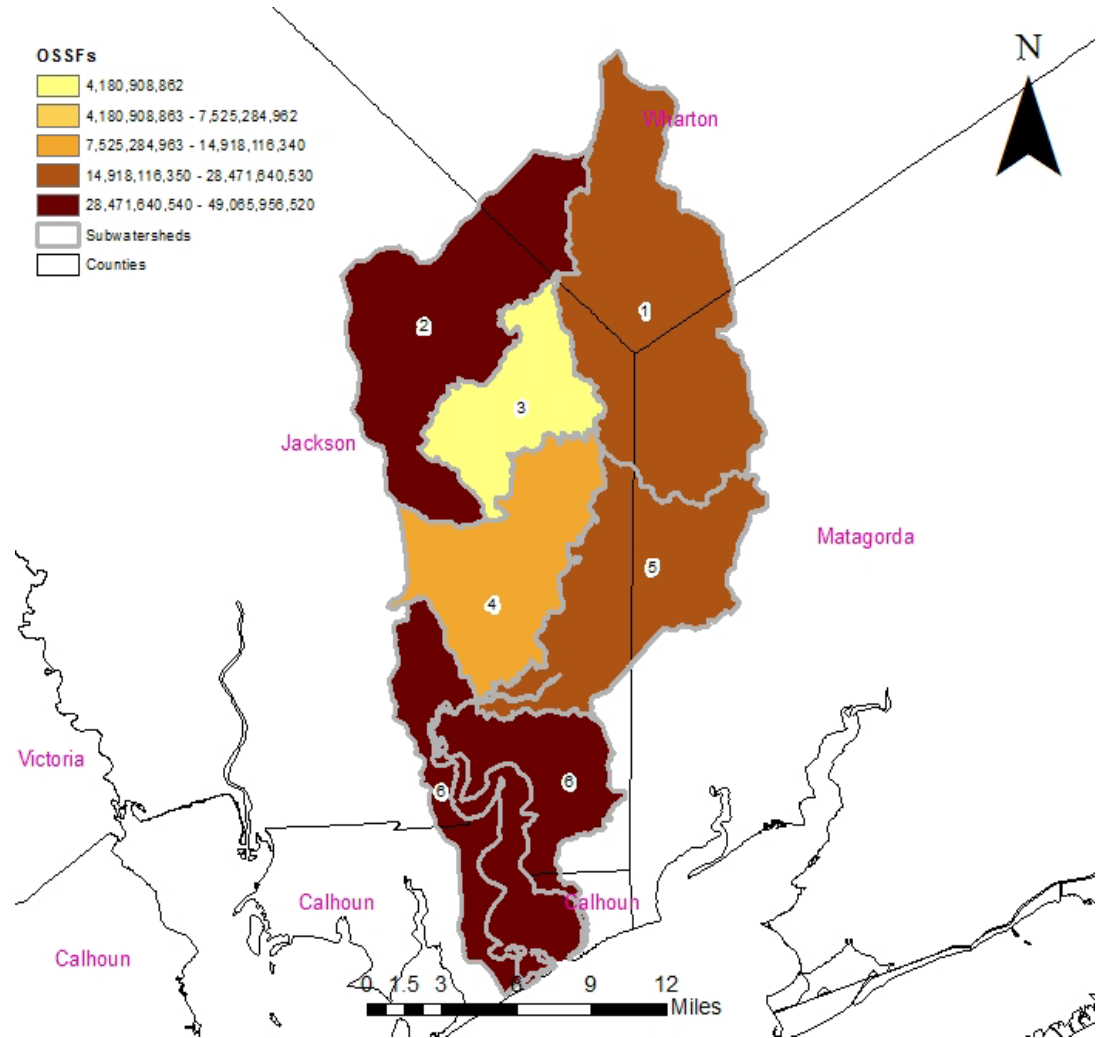
- Estimated 5,936 feral hogs
- Annual Load 1.57×10^{11} cfu/yr
- Subwatersheds 1, 2



GIS Analysis: OSSFs

Potential Loading from OSSFs:

- Estimated 1,389 OSSFs
- Annual Load 4.70×10^{13} cfu/yr
- Subwatersheds 2, 6



GIS Analysis: Pets (Dogs & Cats)

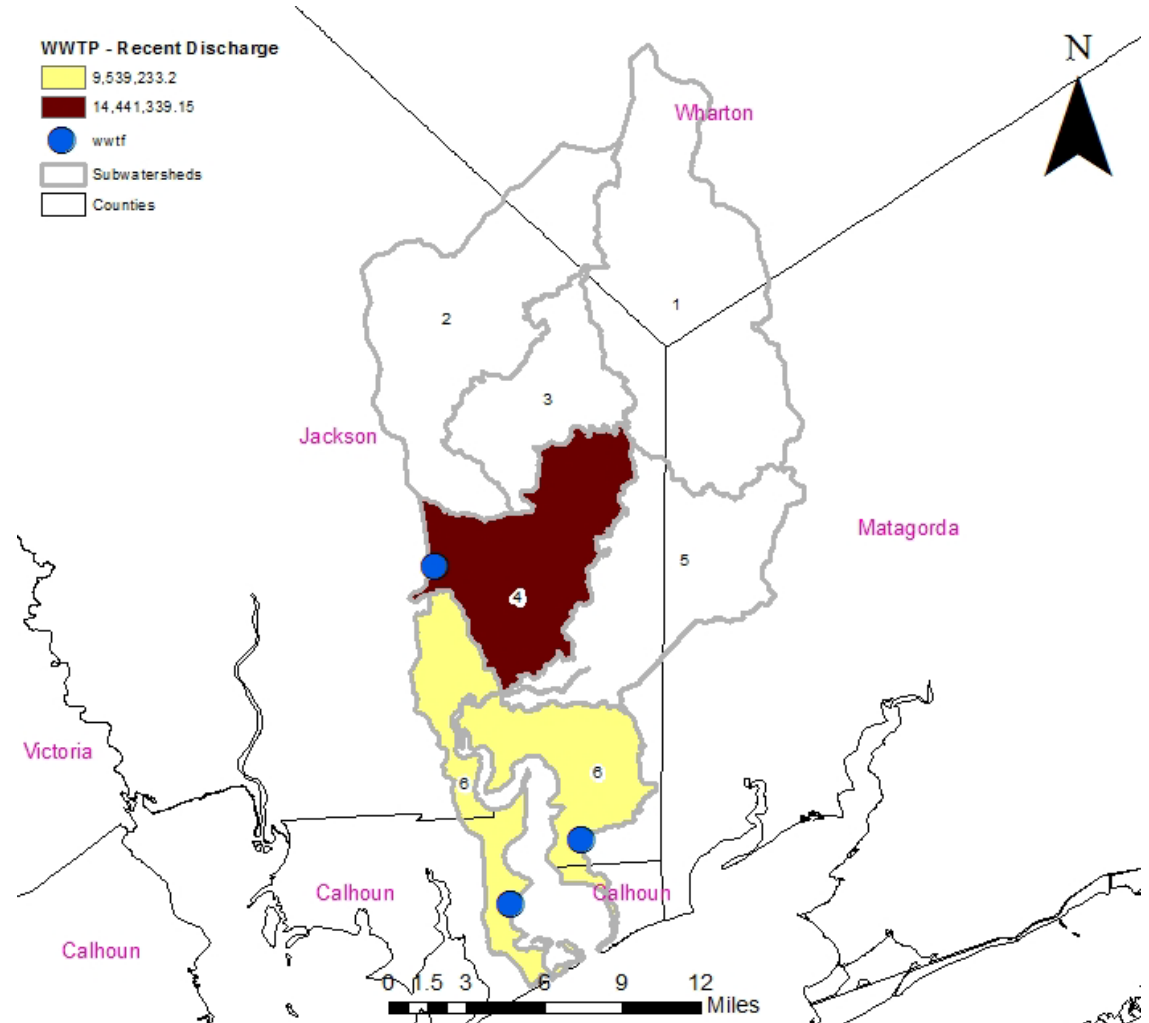
Potential Loading from Dogs:

- ⊙ Estimated 937 dogs & 1,024 cats
- ⊙ Annual Load 1.72×10^{12} cfu/yr (DRAFT)
- ⊙ SELECT map is not completed yet

GIS Analysis: WWTPs Recent Discharge

Potential Loading
from WWTPs:

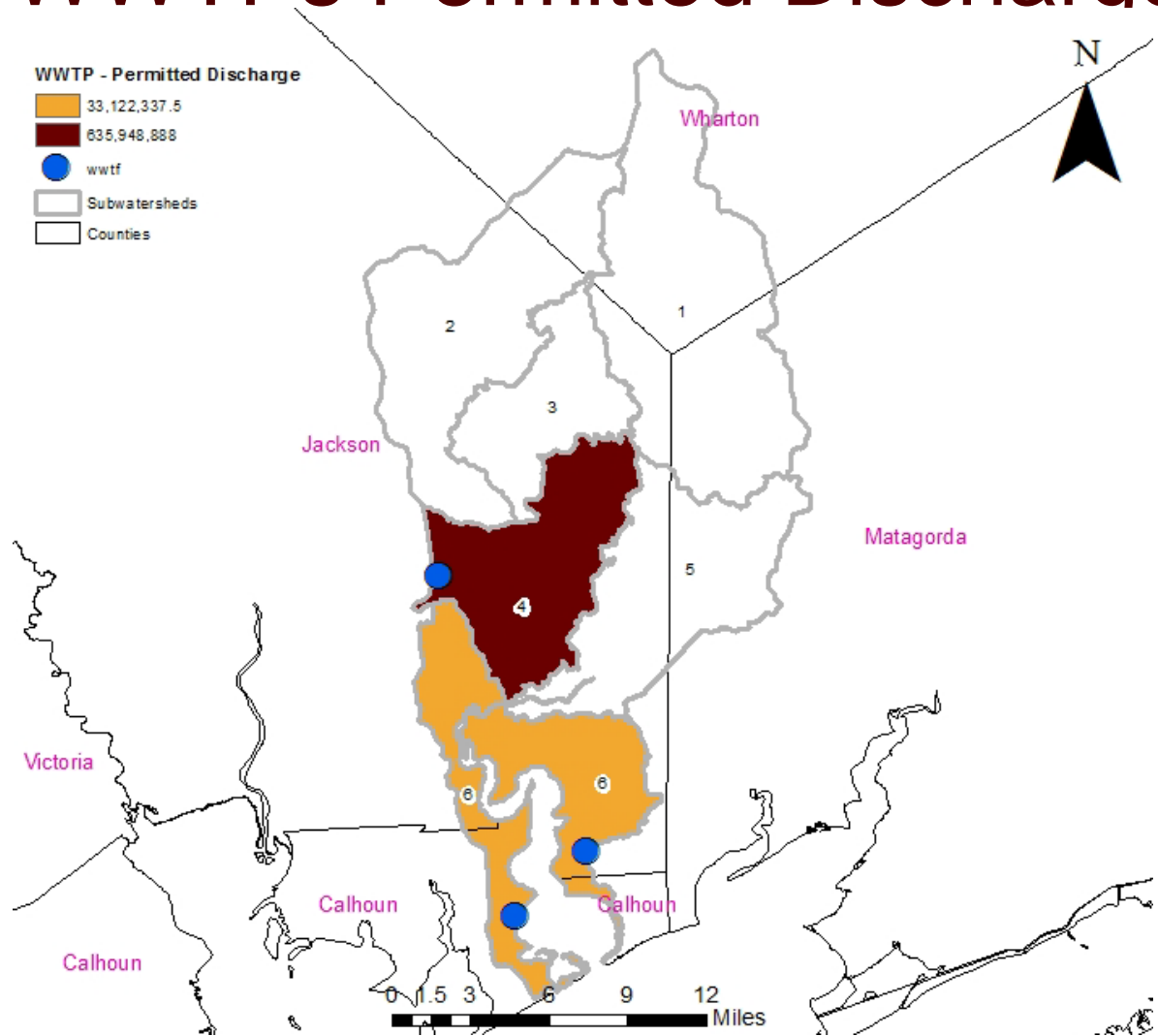
- ⊙ 3 WWTPs
- ⊙ Annual Load
 8.75×10^9 cfu/yr
- ⊙ Subwatershed 4



GIS Analysis: WWTPs Permitted Discharge

Potential Loading
from WWTPs:

- ⊙ 3 WWTPs
- ⊙ Annual Load
 3.53×10^{10} cfu/yr
- ⊙ Subwatershed 4



SELECT Summary

Source	Potential Daily Load ^a	Priority Subwatersheds
Cattle	3.67×10^{13}	1, 2, 6
Feral Hogs	1.57×10^{11}	1, 2
OSSFs	1.29×10^{12}	2, 6
Dogs & Cats	1.72×10^{12} (Pending final SELECT run)	(Pending final SELECT run)
Wastewater plants (Recent Discharge)	2.40×10^7	4
Wastewater plants (Permitted Discharge)	9.67×10^7	4

^a in units of MPN/day

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Management Measures

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Management Measures

1. Develop and implement Water Quality Management Plans or conservation plans
2. Increase soil testing on agricultural lands
3. Repair and replace failing OSSFs
4. Develop voluntary OSSF inspection program
5. Promote feral hog control and removal
6. Promote effective pet waste management

Develop and implement Water Quality Management Plans or conservation plans

- ⦿ Fund and hire a field technician (\$75,000 per year)
- ⦿ Develop and implement 70 plans (\$15,000 per plan)
- ⦿ Provide outreach and promotional material to increase participation

- ⦿ Estimated load reductions
 - ⦿ 3.75×10^{14} MPN/year Enterococcus
 - ⦿ 7.76×10^4 pounds of nitrogen per year
 - ⦿ 2.75×10^4 pounds of phosphorous per year

Currently 24 WQMPs covering 5,277 acres in the watershed

Increase soil testing on agricultural lands

- ⦿ Soil testing by producers/property owners (\$10 per test ~20 acres)
- ⦿ Develop and implement soil testing campaign (\$78,252 covers 156,505 acres of pastures and cropland)

- ⦿ Estimated load reductions
 - ⦿ Unknown, nutrient reductions will be property and producer specific

Repair and replace failing OSSFs

- ⦿ Develop and administer OSSF repair/replacement program
- ⦿ Repair and replace 42 septic tanks (\$5 - \$10k per system)
- ⦿ Estimated load reductions
 - ⦿ 9.67×10^{12} MPN/year Enterococcus
 - ⦿ 4.87×10^2 pounds of nitrogen per year
 - ⦿ 1.22×10^2 pounds of phosphorous per year

Develop Voluntary OSSF Inspection Program

- ⦿ Develop and administer a voluntary OSSF inspection program
- ⦿ Estimated load reductions
 - Unknown

Promote Feral Hog Removal and Control

- ⦿ Construct fencing around deer feeders (\$200 per feeder)
- ⦿ Trap, hunt, remove hogs on site
- ⦿ Deliver feral hog management workshops
- ⦿ Reduce population by 15% below current population estimate

- ⦿ Estimated load reductions
 - ⦿ 8.58×10^{12} MPN/year Enterococcus
 - ⦿ 5.68×10^3 pounds of nitrogen per year
 - ⦿ 2.03×10^3 pounds of phosphorous per year

Promote Effective Pet Waste Management

- ⦿ Develop and deliver education and outreach materials to at least 1,000 households
- ⦿ Estimated load reductions
 - ⦿ 2.69×10^{13} MPN/year Enterococcus
 - ⦿ 88.2 pounds of nitrogen per year
 - ⦿ 20.4 pounds of phosphorous per year

Additional Needs

- ⦿ Part or full-time watershed coordinator
- ⦿ Continued and additional water quality monitoring
 - ⦿ Assess progress (next presentation)
 - ⦿ Limited dissolved oxygen data available
- ⦿ Education and outreach
 - ⦿ General water quality education (Texas Watershed Stewards, Texas Well Owners Network, Lone Star Healthy Streams, Riparian Ecosystem, and others)
 - ⦿ Texas Stream Team volunteer monitoring
 - ⦿ Newsletters, websites, meetings, and other methods to increase awareness

Total Potential Load Reduction

- ⊙ Needed bacteria load reduction to meet existing water quality standards: 2.86×10^{14} MPN/year
- ⊙ Potential bacteria load reduction with management measures after 10 years: 4.20×10^{14} MPN/year

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Measuring Success

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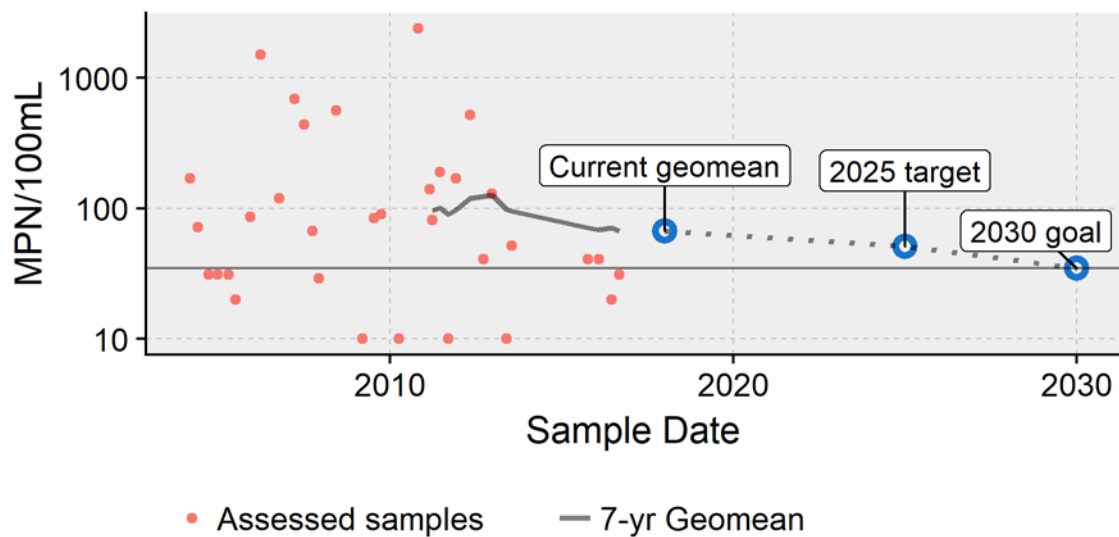
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Measuring Success

- ⦿ Positive impacts on water quality might take a long time
- ⦿ Tracking water quality status and implementation progress is critical to stay focused on the big picture
- ⦿ Adaptive management is a process to adjust the plan if things take a wrong turn

Water quality goals and targets

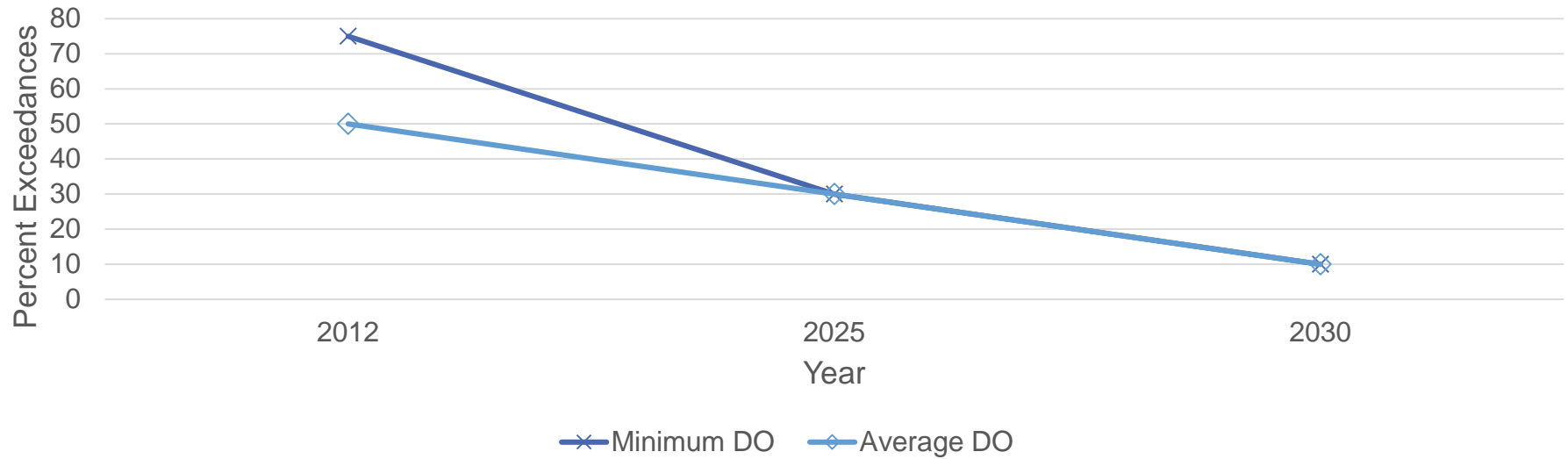


	2014 Integrated Report	Dec 2008 – Nov 2016*	2025 Target	2030 Goal
7-yr Geometric Mean	124 MPN/100mL	67.3 MPN/100mL	57 MPN/100mL	35 MPN/100mL

* This is not the official data assessment for Carancahua Bay.

Water quality goals and targets

Dissolved Oxygen Exceedances



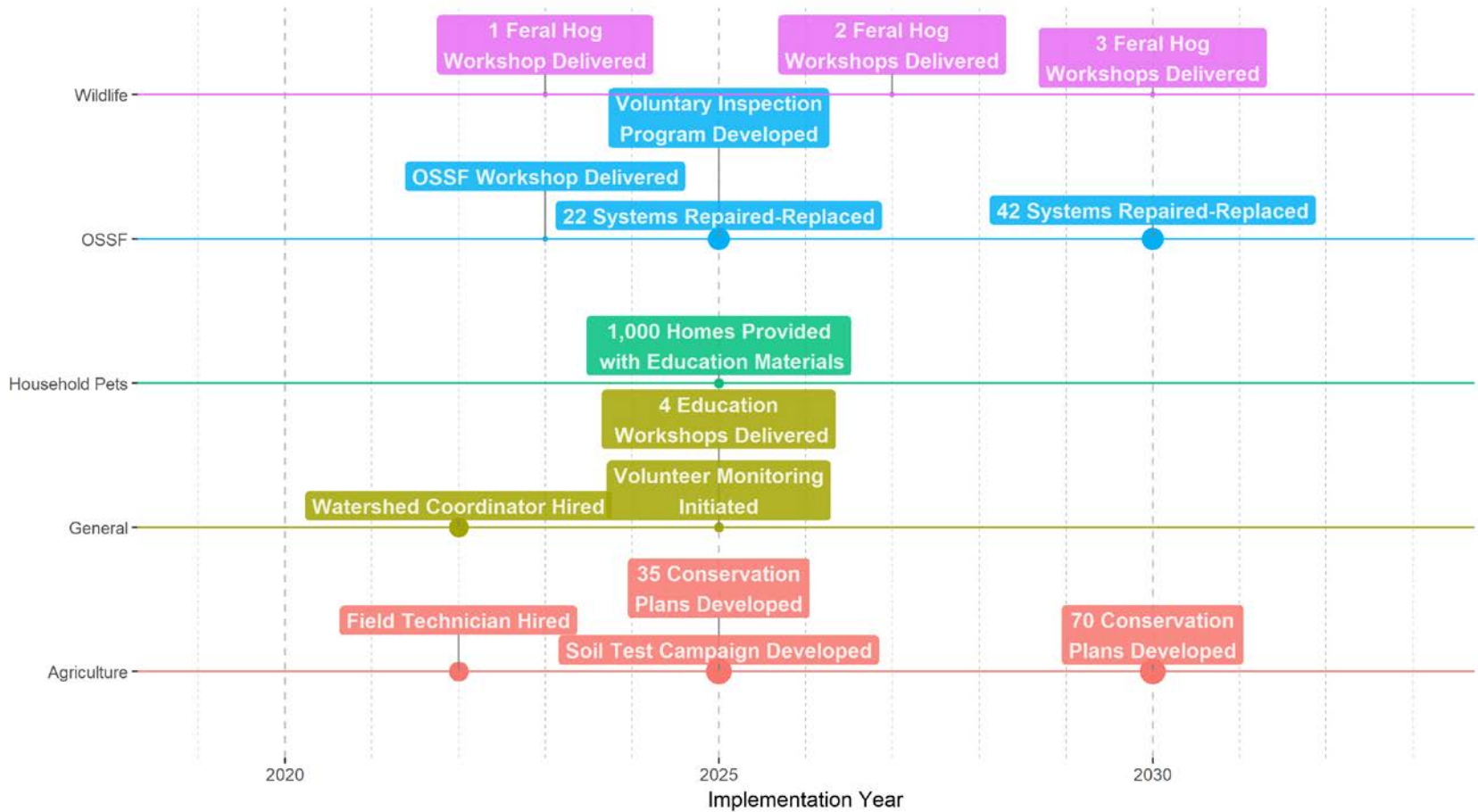
Data Reviews

- ⦿ TCEQ Integrated Report on Surface Water Quality
- ⦿ Provide up to date 7-yr Geometric Mean for Enterococcus and Binomial Test for Dissolved Oxygen and Nutrients
- ⦿ Statistical trend analysis of water quality concentrations and instream loads

Project Milestones

- ⦿ Milestones are established to evaluate implementation progress
- ⦿ Interim milestones helps break up seemingly large milestones into more achievable actions

Project Milestones



Adaptive Management

- ⦿ The watershed plan is a living document
- ⦿ Review and revise as necessary
- ⦿ When do we need to revise the plan? – Adaptive management

Adaptive Management

- ⦿ Formal review after 5 years
- ⦿ Three assessments for positive progress:
 - ⦿ Water quality – increase in pollutant concentrations and/or loads, increase in % exceedances
 - ⦿ Implementation progress – Substantial delays or lower than expected achievements
 - ⦿ External factors – Significant increases in population, changes in land use, economic factors, or other data that point to increases in pollutant sources or changes in hydrologic condition
- ⦿ Two or more events should trigger changes in the plan

Adaptive Management

- ⦿ Are additional assessments/criteria warranted for adaptive management?

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