

Carancahua Bay Watershed Protection Plan and TMDL I-Plan

Michael Schramm



Overview

- ⦿ Brief Recap
- ⦿ SELECT Update
- ⦿ Management Measure Update
- ⦿ Resources for implementation

Recap

- ⦿ Presented first results from the Spatially Explicit Load Enrichment Calculation Tool (SELECT)

Recap

- Summarized potential loads and priority subwatersheds



Recap

- ⦿ Presented management measures, amount required, and resulting load reductions.



Recap

- ⊙ Established water quality goals and targets
- ⊙ Established data review procedures
- ⊙ Identified project milestones
- ⊙ Discussed adaptive management

SELECT

Michael Schramm – Texas Water Resources Institute

*Uvashree Mohandass – Texas A&M Water
Management and Hydrological Science*

April 24, 2018

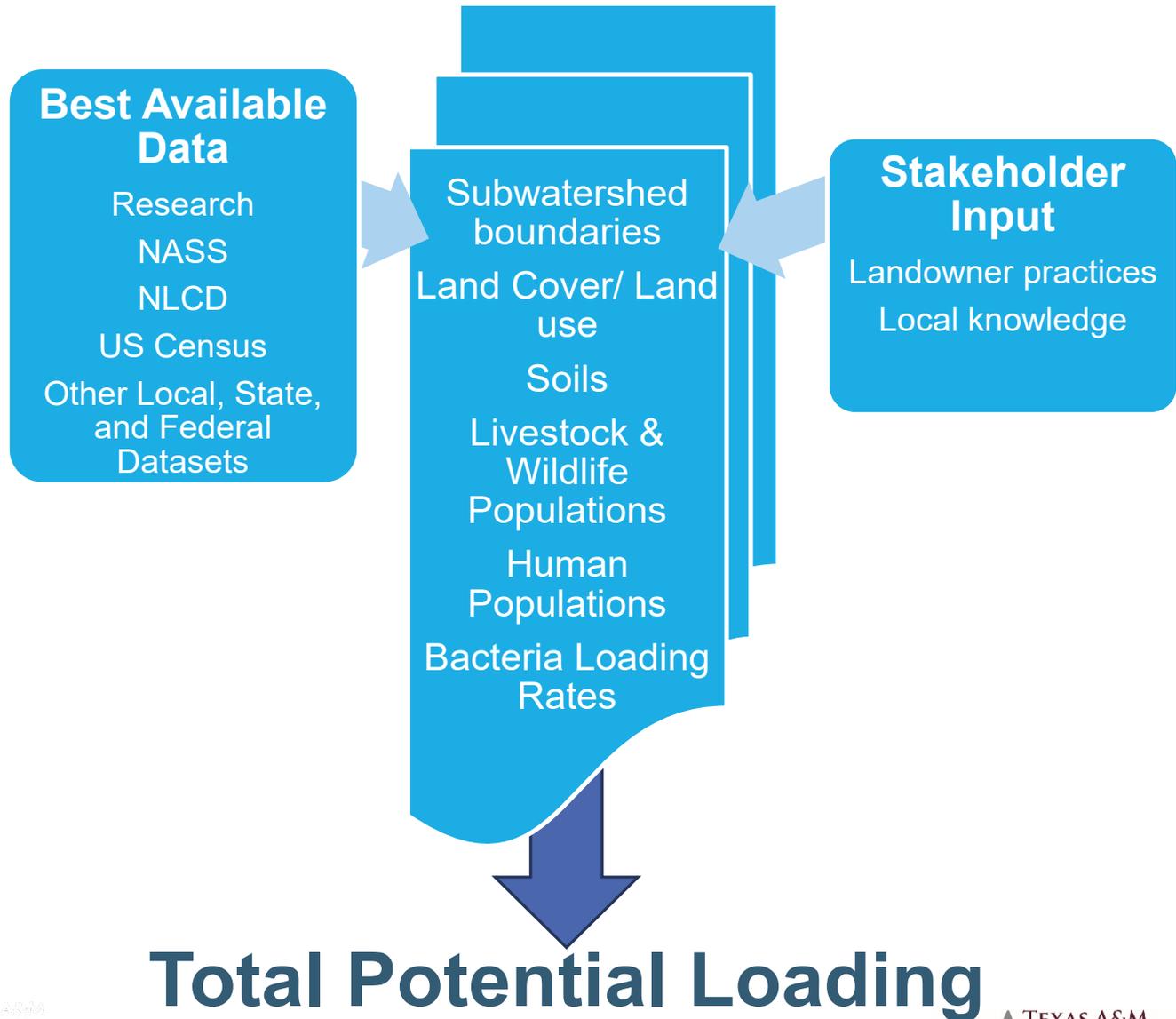


Estimating Potential Enterococcus Loads

- ⊙ 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

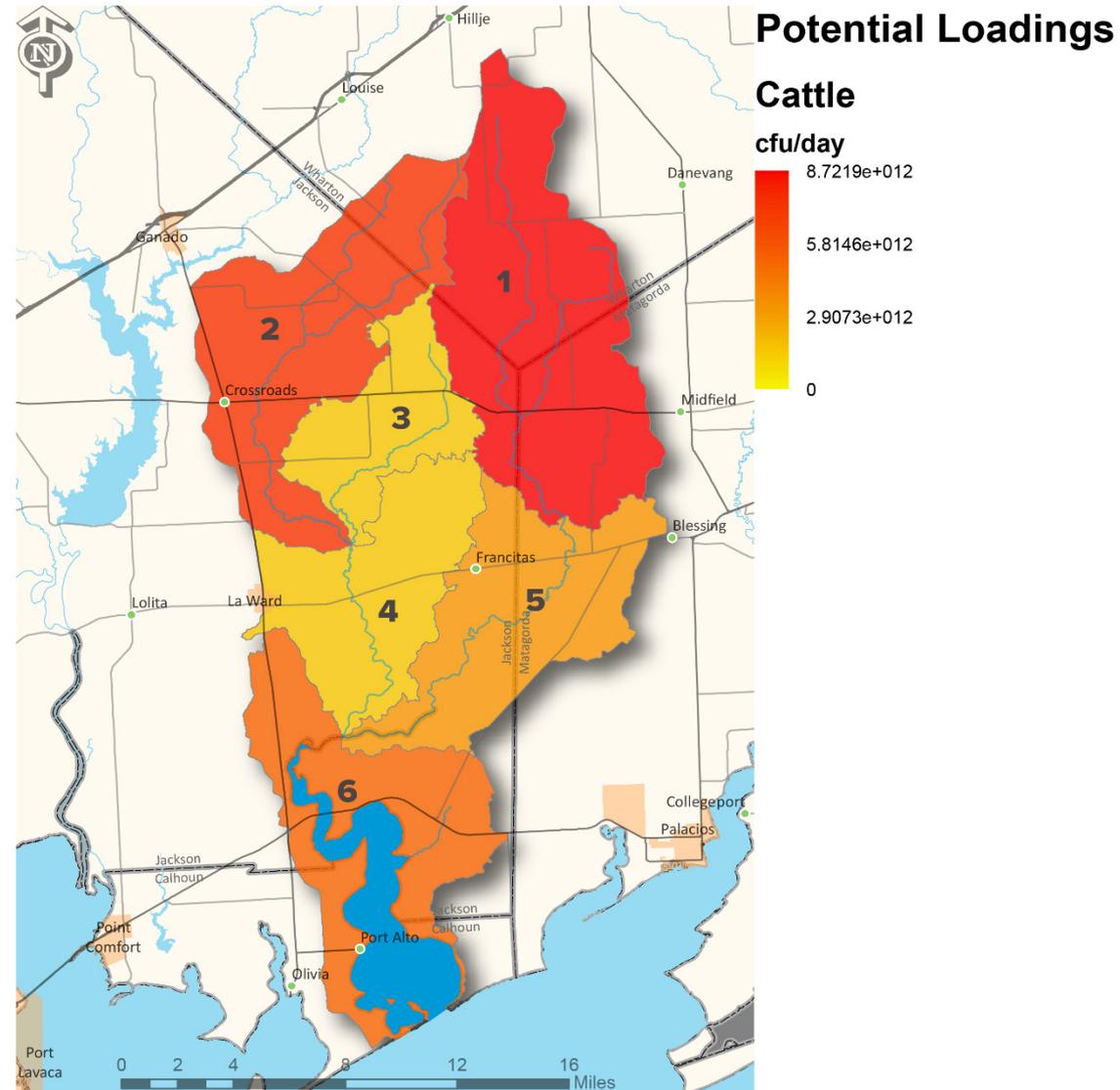
Identify the areas and sources with highest *potential* to impact water quality



GIS Analysis: Cattle

Potential Loading from Cattle:

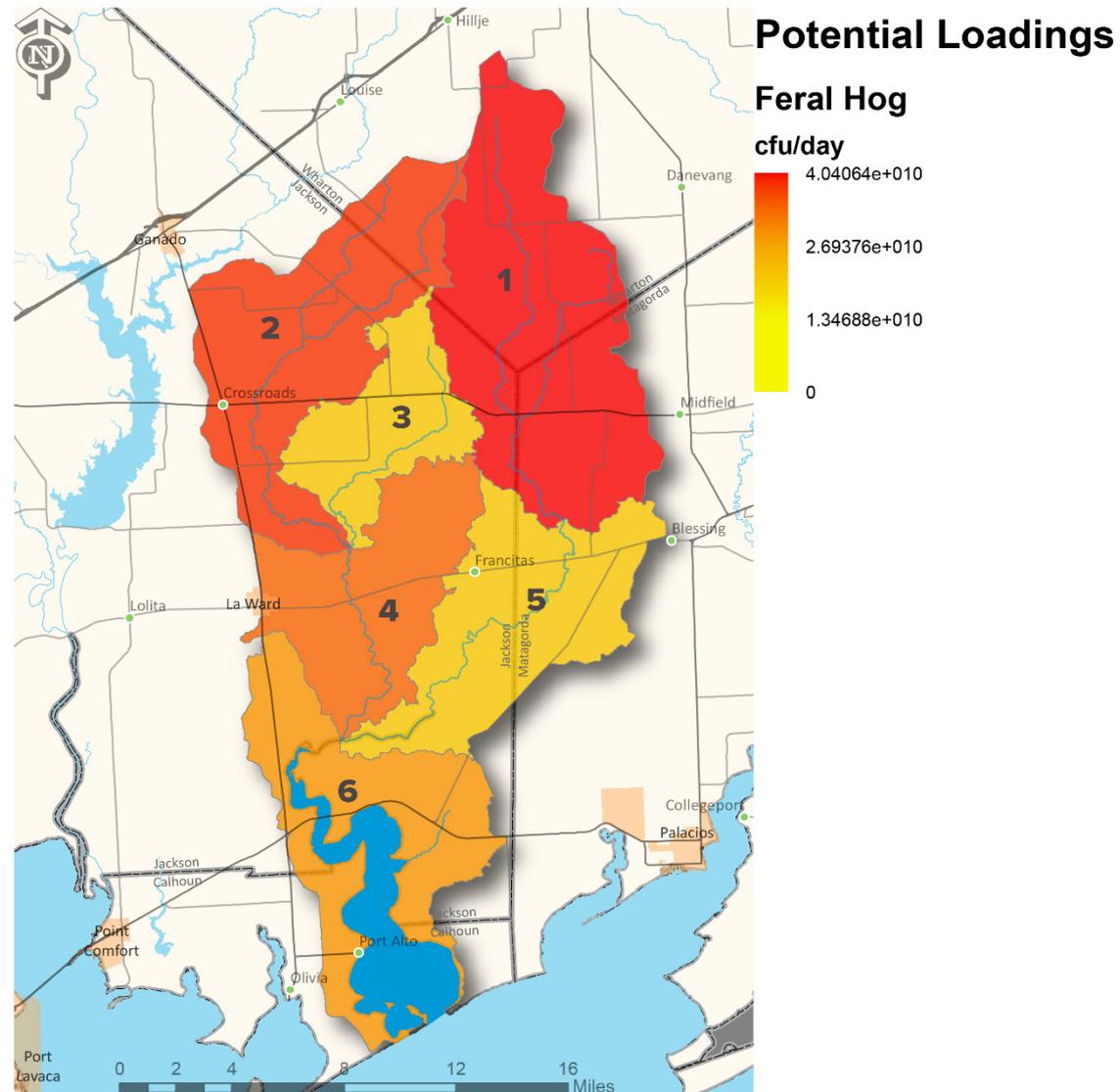
- Estimated 24,496 head
- Annual Load 3.67×10^{13} cfu/yr
- Subwatersheds 1, 2, 6



GIS Analysis: Feral Hogs

Potential Loading from Feral Hogs:

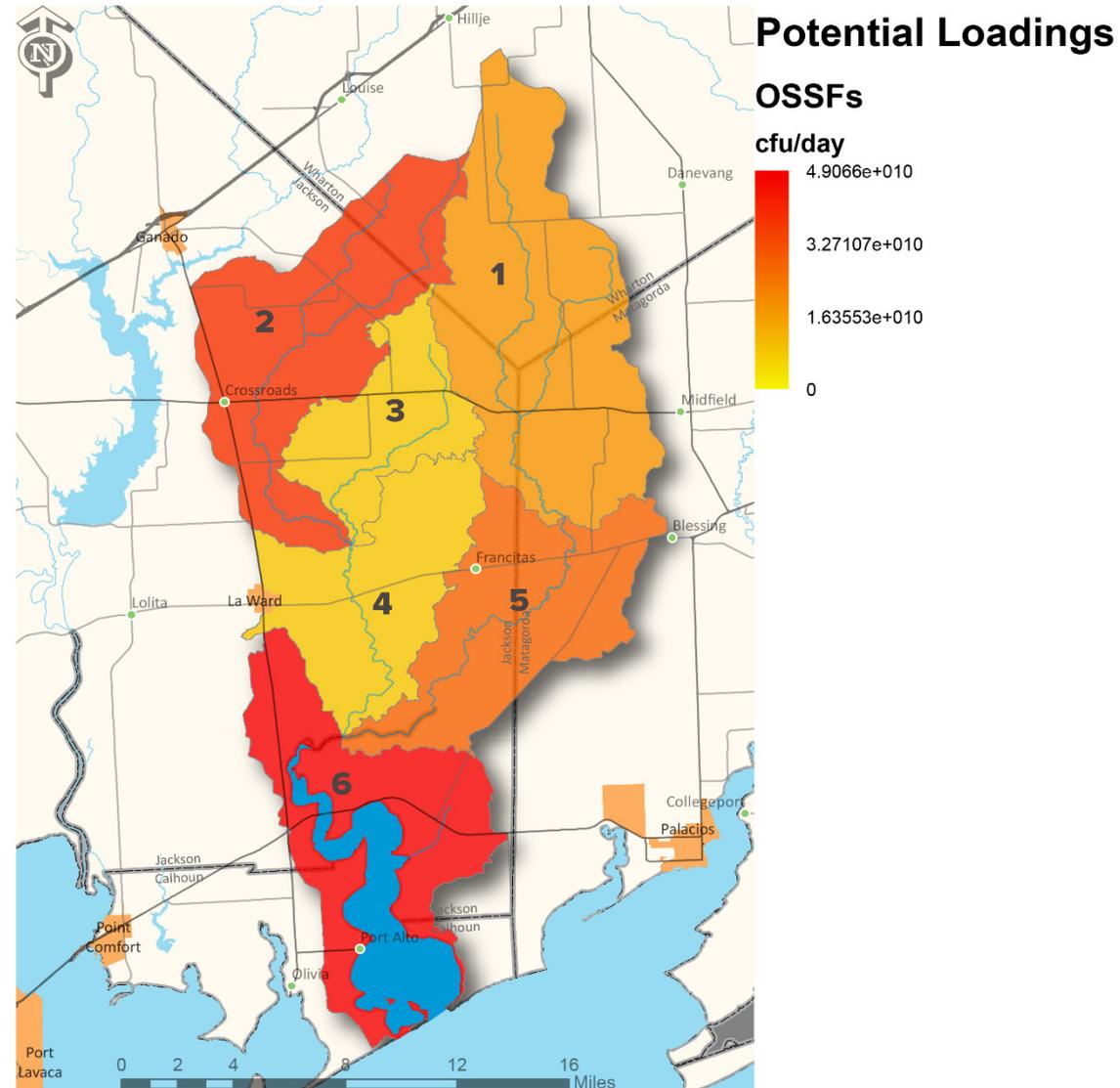
- Estimated 5,936 feral hogs
- Annual Load 1.57×10^{11} cfu/yr
- Subwatersheds 1, 2



GIS Analysis: OSSFs

Potential Loading from OSSFs:

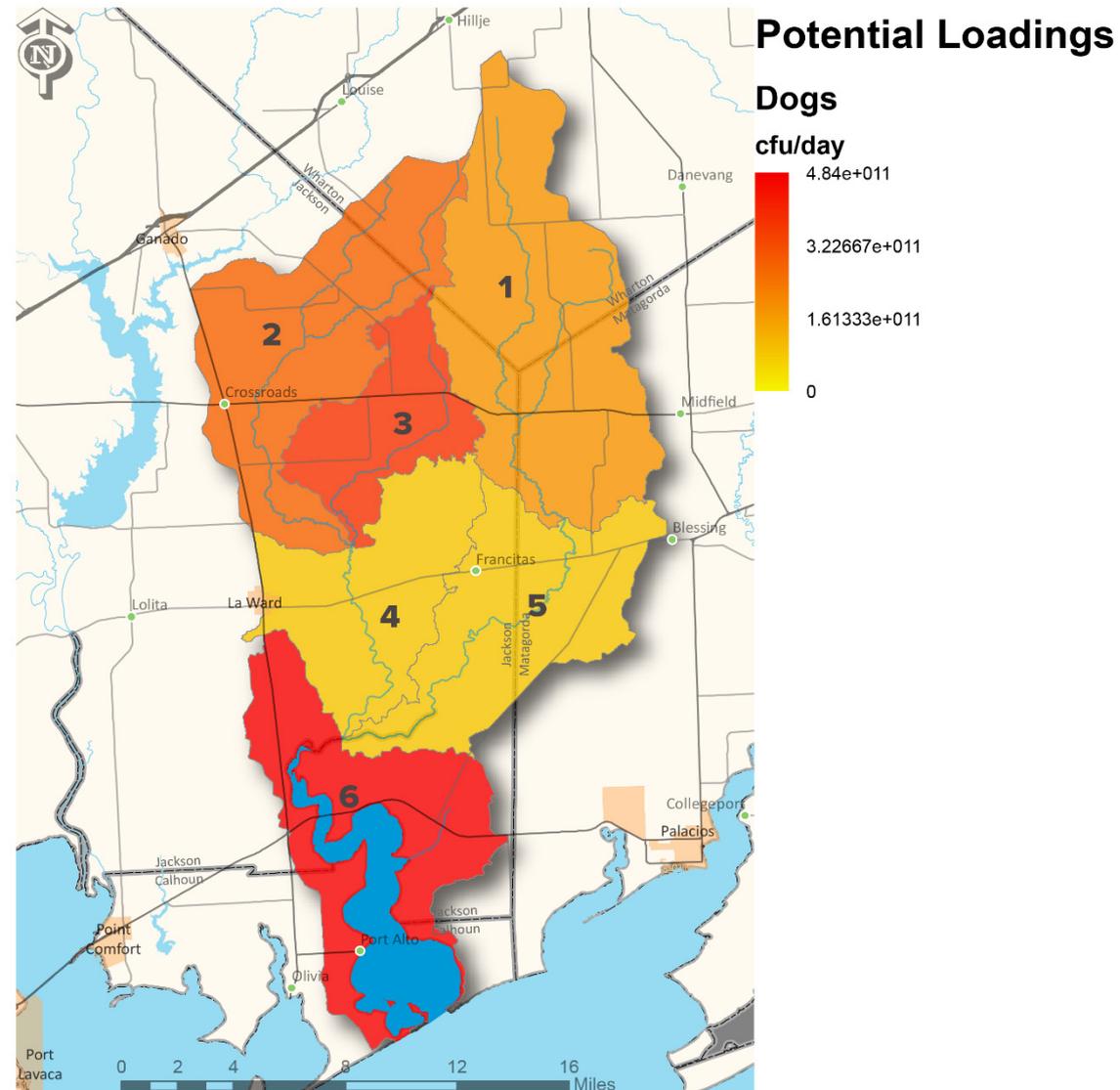
- Estimated 1,389 OSSFs
- Annual Load 4.70×10^{13} cfu/yr
- Subwatersheds 2, 6



GIS Analysis: Pets (Dogs & Cats)

Potential Loading from Dogs:

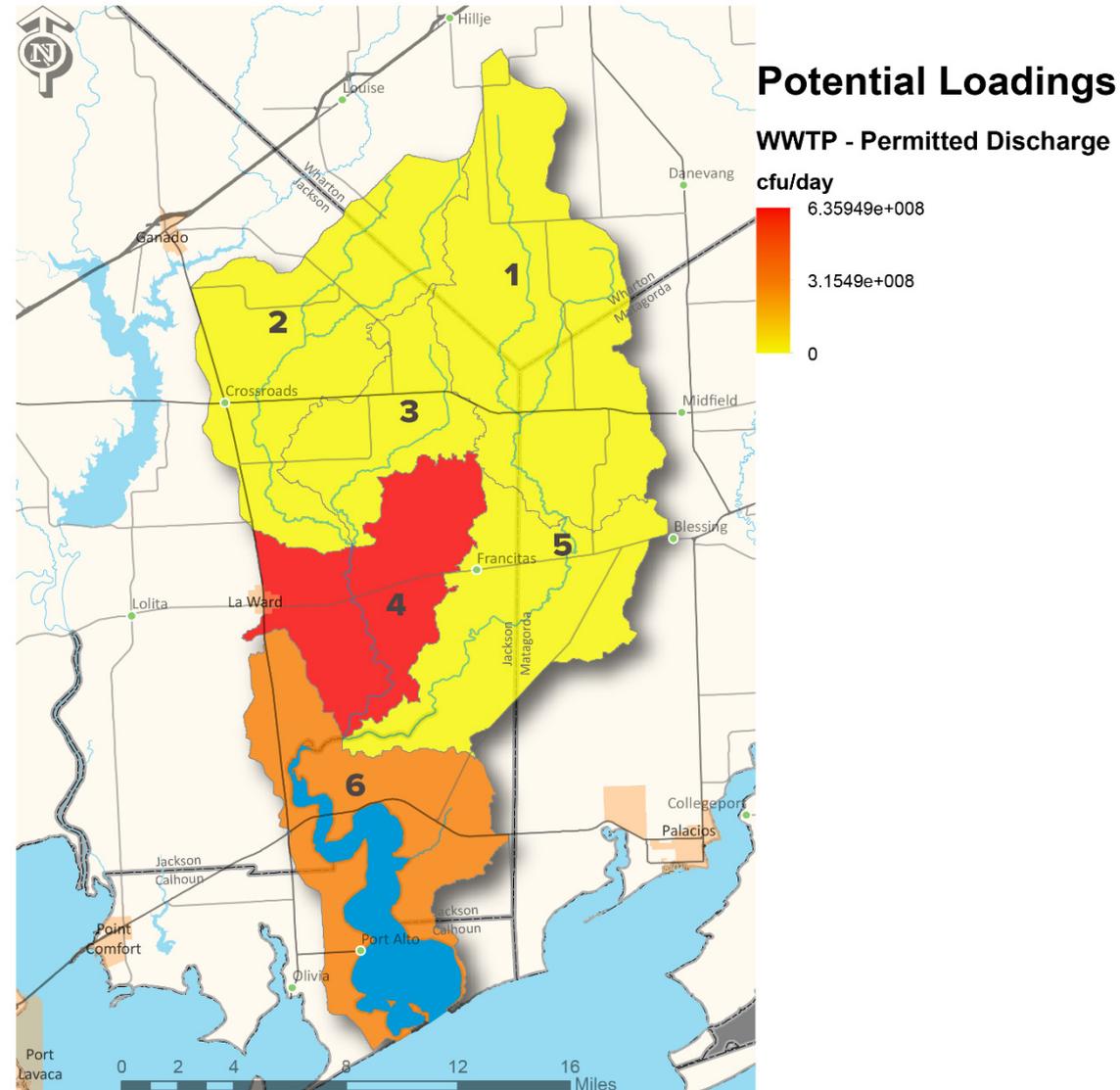
- Estimated 937 dogs & 1,024 cats
- Annual Load 1.72×10^{12} cfu/yr



GIS Analysis: WWTPs Permitted Discharge

Potential Loading
from WWTPs:

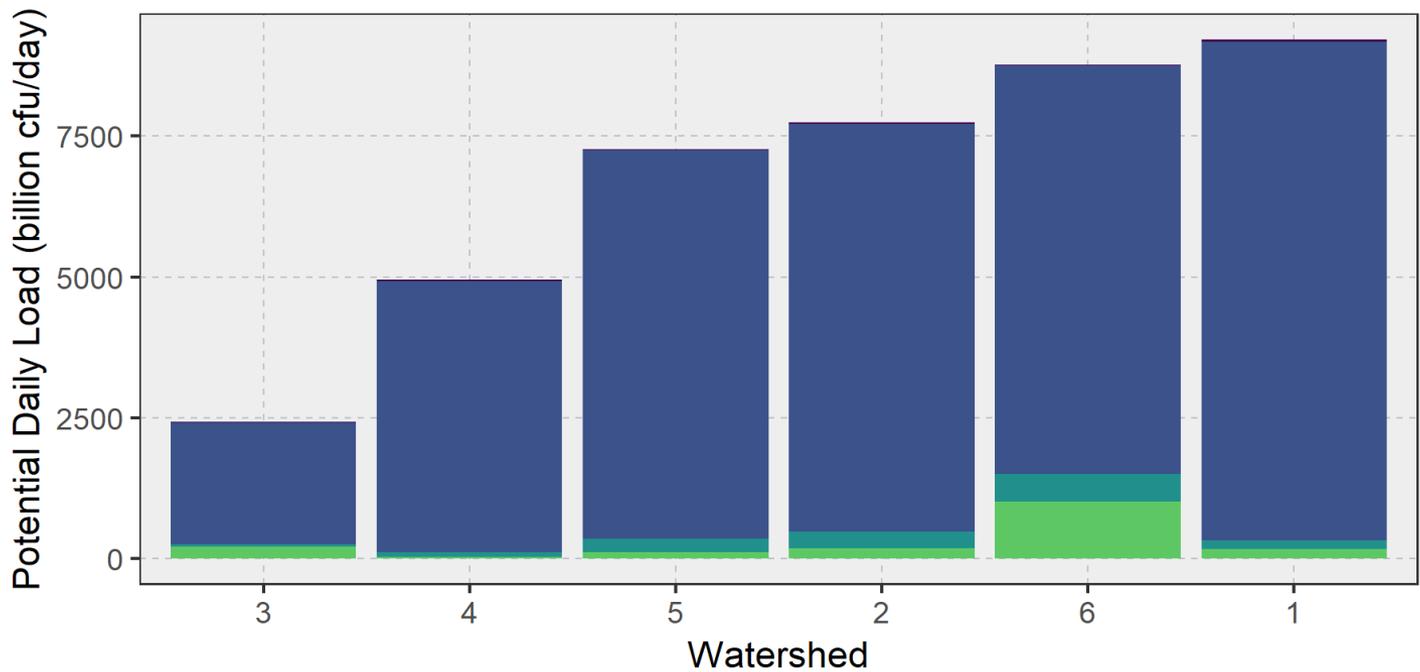
- ⊙ 3 WWTPs
- ⊙ Annual Load
 3.53×10^{10} cfu/yr
- ⊙ Subwatershed 4



SELECT Summary

Source	Potential Daily Load ^a	Priority Subwatersheds
Cattle	3.67×10^{13}	1, 2, 6
Feral Hogs	1.56×10^{11}	1, 2
OSSFs	1.29×10^{12}	2, 6
Dogs & Cats	1.72×10^{12}	3, 6
Wastewater plants (Permitted Discharge)	9.67×10^7	4

^a in units of colonies/day



Management Measures

*Michael Schramm
Allen Berthold Ph.D.
Stephanie Ruff
Texas Water Resources Institute*

April 24, 2018



Management Measures (Section 5.1)

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
7. **Proposed – Restore oyster habitat**

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

Develop and implement Water Quality Management Plans or conservation plans

Responsibilities:

- ⦿ Fund and hire a field technician (\$75,000 per year)
 - ⦿ NRCS, SWCD, TSSWCB
- ⦿ Develop and implement 70 plans (\$15,000 per plan)
 - ⦿ Landowners, NRCS, SWCD, TSSWCB
- ⦿ Provide outreach and promotional material to increase participation
 - ⦿ Watershed coordinator, AgriLife Extension

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

Increase soil testing on agricultural lands

Responsibilities:

- ◎ Soil testing by producers/property owners (\$10 per test ~20 acres)
 - ◎ Landowners, operators, lessees
- ◎ Develop and implement soil testing campaign (\$78,252 covers 156,505 acres of pastures and cropland)
 - ◎ Extension, NRCS, SWCD, TSSWCB,

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

Repair and replace failing OSSFs

Responsibilities:

- Develop and administer OSSF repair/replacement program
 - AgriLife Extension, Jackson County Permit Office, Matagorda County Dept. of Health
- Repair and replace 42 septic tanks (\$5 - \$10k per system)
 - Homeowners

Develop Voluntary OSSF Inspection Program

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

Develop Voluntary OSSF Inspection Program

Responsibilities:

- ⦿ Develop and administer a voluntary OSSF inspection program
 - ⦿ AgriLife Extension, Jackson County Permit Office, Matagorda County Dept. of Health, Watershed coordinator

Promote Feral Hog Removal and Control

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

- ⦿ 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 Feral Hog Removal and Control

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

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

Promote Effective Pet Waste Management

- ⦿ Develop and deliver education and outreach materials to at least 1,000 households
 - ⦿ Watershed coordinator

Restore oyster habitat

- ⦿ Work with property owners to create community oyster gardens
- ⦿ Support living shoreline and oyster reef restoration efforts
- ⦿ Estimated load reductions
 - ⦿ NA
 - ⦿ NA
 - ⦿ NA

Restore oyster habitat

- ⦿ Work with property owners to create community oyster gardens
 - ⦿ Watershed coordinator, Sea Grant, Matagorda Bay Foundation, property owners
- ⦿ Support living shoreline and oyster reef restoration efforts
 - ⦿ Watershed coordinator, Sea Grant, Matagorda Bay Foundation, property owners

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

Management Measure Recap

- ⦿ No changes to existing management measures
 - ⦿ Did we cover the appropriate responsible parties?

- ⦿ Should we include oyster habitat management measure?

Technical and Financial Resources

*Michael Schramm
Allen Berthold Ph.D.
Stephanie Ruff
Texas Water Resources Institute*

April 24, 2018



Financial Resources (Section 7.2)

- ◉ Promote and implement Water Quality Management Plans or conservation plans
- ◉ Clean Water Act § 319(h) Nonpoint Source Grant Program,
- ◉ NRCS Conservation Innovation Grants (CIG),
- ◉ NRCS Conservation Stewardship Program (CSP)
- ◉ NRCS Environmental Quality Incentives Program (EQIP),
- ◉ NRCS Regional Conservation Partnership Program (RCPP),
- ◉ TSSWCB WQMP Program

Financial Resources

- Increase soil testing on agricultural lands
- Clean Water Act § 319(h) Nonpoint Source Grant Program,
- NRCS Conservation Innovation Grants (CIG),
- NRCS Conservation Stewardship Program (CSP)
- NRCS Environmental Quality Incentives Program (EQIP),
- NRCS Regional Conservation Partnership Program (RCPP),
- TSSWCB WQMP Program

Financial Resources

- ◉ Repair and replace failing OSSFs
- ◉ Clean Water Act § 319(h) Nonpoint Source Grant Program,
- ◉ TCEQ Supplemental Environmental Projects

Financial Resources

- ◉ Develop voluntary OSSF inspection program
- ◉ Clean Water Act § 319(h) Nonpoint Source Grant Program,
- ◉ TCEQ Supplemental Environmental Projects

Financial Resources

- ⦿ Promote feral hog removal
- ⦿ Clean Water Act § 319(h) Nonpoint Source Grant Program (education only)

Financial Resources

- ◉ Promote effective pet waste management
- ◉ Clean Water Act § 319(h) Nonpoint Source Grant Program (education only)
- ◉ EPA Urban Waters Small Grants Program

Financial Resources

- ⦿ Restore oyster habitat
- ⦿ Coastal Management Program (CMP)
- ⦿ National Fish and Wildlife Foundation (NFWF) Gulf Environmental Benefit Fund
- ⦿ Texas Trustee Implementation Group (TIG) Natural Resource Damage Assessment (NRDA)

Technical Resources (Section 7.1)

- ⦿ Promote and implement WQMPs and conservation plans
- ⦿ AgriLife Extension
- ⦿ Local SWCDs
- ⦿ NRCS
- ⦿ TSSWCB

Technical Resources

- ⦿ Increase soil testing
- ⦿ AgriLife Extension
- ⦿ Local SWCDs
- ⦿ NRCS
- ⦿ TSSWCB

Technical Resources

- ⦿ Repair and replace OSSFs
- ⦿ AgriLife Extension
- ⦿ Jackson County Office of Permitting
- ⦿ OSSF service providers
- ⦿ Wharton County Health Department

Technical Resources

- ⦿ Develop voluntary OSSF inspection program
- ⦿ AgriLife Extension
- ⦿ Jackson County Office of Permitting
- ⦿ Wharton County Health Department

Technical Resources

- ⦿ Promote feral hog removal
- ⦿ AgriLife Extension
- ⦿ TPWD
- ⦿ USDA Animal and Plant Health Inspection Service

Technical Resources

- ⦿ Promote effective pet waste management
- ⦿ EPA
- ⦿ TCEQ
- ⦿ TWRI

Technical Resources

- ⦿ Restore oyster habitat
- ⦿ Texas Sea Grant

Resources

- ⦿ Please review available resources and let us know if we missed any.

Watershed Plan Review

- Chapter 1 – Intro to Watershed Management
- Chapter 2 – Watershed Characterization
 - Potential Sources (Nonpoint and point sources)
- Chapter 3 - Existing Water Quality
 - Review bacteria, dissolved oxygen, and nutrients
- Chapter 4 – Pollution Source Assessment
 - Load Duration Curve, SELECT

Watershed Plan Review

- ⦿ Chapter 5 – Management Measures
 - ⦿ Voluntary measures, load reductions, needed resources, etc.
- ⦿ Chapter 6 – Plan Implementation
 - ⦿ Schedule, monitoring, education and outreach
- ⦿ Chapter 7 – Resources
 - ⦿ Technical and financial
- ⦿ Chapter 8 – Measuring Success
 - ⦿ Water quality targets and goals, methods, project milestones, adaptive management

Watershed Plan Review

- ⦿ Appendix A - Nine Elements Review
- ⦿ Appendix B – Load Duration Curve Methodology
- ⦿ Appendix C – Needed Reduction Calculations
- ⦿ Appendix D – SELECT and Bacteria Loading Calculations
- ⦿ Appendix E – Bacteria Load Reduction Calculations
- ⦿ Appendix F – Nutrient Load Reduction Calculations
- ⦿ Appendix G – Nine Elements Checklist

Contact Us

Allen Berthold
Texas Water Resources Institute
979-845-2028
taberthold@ag.tamu.edu

Michael Schramm
Texas Water Resources Institute
979-458-9191
michael.schramm@ag.tamu.edu