Water Quality Nolan Creek/South Nolan Creek (Segment 1218)

Project Update
September 25, 2014
Segment 1218
303(d) List

Impaired due to elevated bacteria in two Assessment Units (AUs)

- 1218_02 – South Nolan from Liberty Ditch to confluence with North Nolan/Nolan Creek
- 1218C_01 – Little Nolan Creek
Project Goal

Identify potential sources

• Monitoring program
• Source Survey
• Geographic inventory & modeling
Monitoring Program

Monthly Routine
• 11 Stations

Quarterly Storm
• 4 Stations

Presenting Preliminary Data -
May 2013 through August 2014
Routine (16 events) & Storm (5 events)
Stream Team Monitoring

http://txstreamteam.meadowscenter.txstate.edu/data/data-viewer.html
Routine & Storm Monitoring Stations
Preliminary Routine Data
(6 vs 16 Monthly Events)

- Geomean Routine (May-Oct2013)
- Geomean Routine (May2013-Aug2014)
- Primary Contact Recreation Criterion

E. coli (MPN/100 mL)
Station 11913
(Roy Reynolds Rd)

10 July 2013

PCR indicates criterion for
Primary Contact Recreation

E. coli (MPN/100 mL)
0

- E. coli (routine)
- E. coli (storm)
- PCR Criterion
Station 11910
(US 90 in Nolanville)

E. coli (MPN/100 mL)


E. coli (routine)  E. coli (storm)  PCR Criterion

Legend:
How can we decrease bacteria?

First need to Identify Sources

• Monitoring program
• Source Survey
• Geographic inventory & modeling
Source Survey

Visual Assessment

• Streambank erosion
• Pipe outfalls
• Livestock (near or with stream access)
• Wildlife (e.g., swallows on bridges or large populations of waterfowl)
Swallows under Bridges

Ducks & Geese on the water
Sources

Municipal Storm Water
Sanitary Sewer Overflows (SSOs)

Reported by municipalities to TCEQ
Sources ?? Local Knowledge Needed to Identify

Feral hogs? Illegal discharges?

Clean Water? Or Poop Soup!
Pet Waste Pollutes Our Waterways! Scoop The Poop, Don’t Pollute!

Pet waste?
Sources

On-Site Sewage Facilities (Septic Systems) Failure Rate ??
Land Use/Land Cover

2011 NLCD
- Barren Land
- Cultivated Crops
- Developed
- Forest
- Grassland/Herbaceous
- Open Water
- Pasture/Hay
- Shrub/Scrub
- Wetlands

NLCD – National Land Cover Database
Modeling to Identify Potential Bacteria Sources

**SELECT (Spatially Explicit Load Enrichment Calculation Tool)**

Developed by Dept. of Biological and Agricultural Engineering and Spatial Sciences Laboratory at Texas A&M University by Dr. R. Karthikeyan, Dr. R. Srinivasan and others
• Identifies **POTENTIAL** bacteria loadings by subwatershed
• Based on spatial data, such as:
  – Land use
  – Soils
  – Stream network
  – Animal density
  – Human population information
SELECT Subwatersheds
SELECT Example

Leona Watershed in southwest Texas
Deer distributed on Near-Riparian Forest, Shrubland & Woodland

Deer #s in Leona 16.8/1,000 acres

Input Fecal Production Rate
Deer 3.5E8 cfu/animal/day

Leona River - SELECT Potential Loads from Deer

E. coli (cfu/day)
- 7.19e+06 - 5.71e+07
- 5.72e+07 - 1.03e+08
- 1.04e+08 - 1.51e+08
- 1.52e+08 - 2.18e+08
- 2.19e+08 - 3.71e+08
Input Fecal Production Rate

Cattle 10E10 cfu/animal/day

Cattle distributed on Grassland Herbaceous and Pasture/Hay

Leona River - SELECT Potential Loads from Cattle

Cattle #s in Leona
Uvalde  5,516
Zavala  10,566
Frio     6,418

E. coli (cfu/day)
- 0.00e+000 - 8.45e+012
- 8.46e+012 - 2.14e+013
- 2.15e+013 - 3.93e+013
- 3.94e+013 - 6.47e+013
- 6.48e+013 - 1.27e+014

Input Fecal Production Rate
Cattle 10E10 cfu/animal/day
SELECT

- Indicates potential loadings based on a “worst case” scenario
- Highlights “hot spots” to consider for control efforts
- Stakeholder feedback needed to scrutinize inputs and results
Input Data for SELECT

- Population & Household Densities - 2010 Census data, used in determining
  - Domestic Animal Density

American Veterinary Medical Association estimates 0.6 dogs/household

Does this make sense for the Nolan Creek watershed?
Input Data for SELECT

• Population & Household Densities - used in determining
  – Areas on septic systems indicated as outside CCNs

Certificate of Convenience and Necessity (CCN) is issued by TCEQ and authorizes a utility to provide water and/or sewer service to a specific area.

Is this an appropriate representation?
Input Data for SELECT

• Permitted Discharges (TCEQ & EPA records)
  – Wastewater treatment facilities
  – Industrial
  – Concentrated Animal Feeding Operations (CAFOs)
Input Data for SELECT

• Livestock Densities
  – Agricultural Statistics (USDA) County level data
  – Stakeholder input

• Wildlife (native & exotic)
  – Resource Experts (Texas Parks & Wildlife)
  – Stakeholder input
Input Data for SELECT

• Feral Hogs
  – Resource Experts (Texas Parks & Wildlife, AgriLife Extension)
  – Stakeholder input

How large is the feral hog problem in the Nolan Creek watershed?
SELECT does not yet handle

- Exotics
- Small wildlife (birds, raccoons, possums, etc.)
How can we decrease bacteria?

✔ Identify potential sources
  • Monitoring program
  • Source Survey
  • Geographic inventory & modeling
Next Steps

✓ Determine load reductions needed to meet standards

✓ Inventory existing programs and practices and their effectiveness
Next Steps

✓ Identify new management opportunities targeting critical areas

✓ Develop educational outreach program to encourage voluntary implementation
Contact Information

Leah Taylor
Email: ltaylor@tiaer.tarleton.edu
Office Phone: 254.968.0513

Anne McFarland
Email: mcfarla@tiaer.tarleton.edu
Office Phone: 254.968.9581

http://www.killeentexas.gov/nolancreekwatershed
Station 11913
South Nolan Creek at Roy Reynolds Road