Lavaca River Watershed Protection Plan
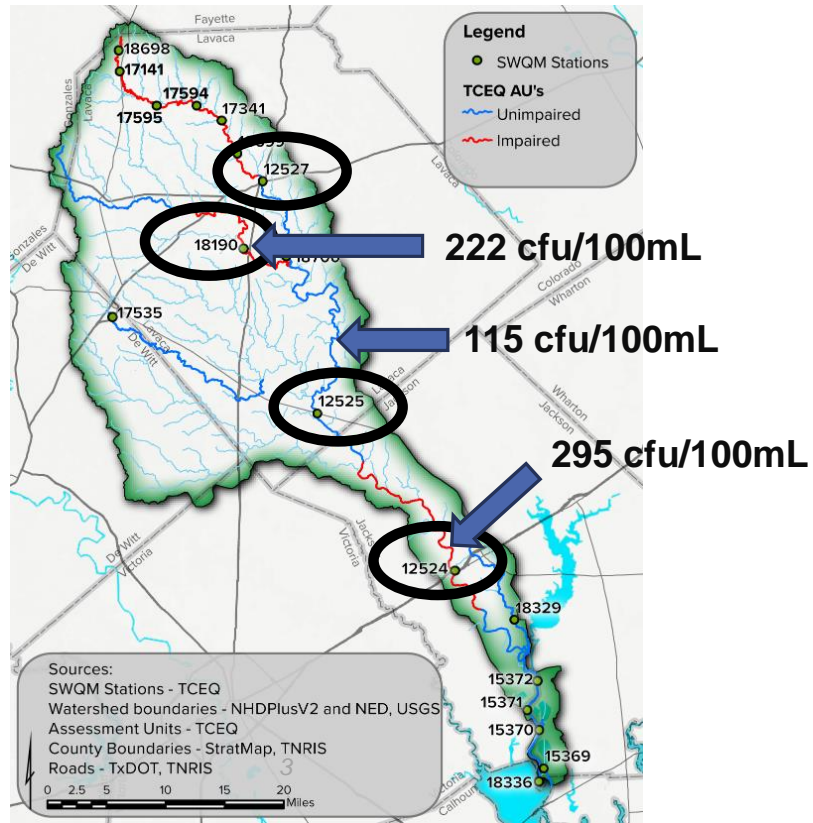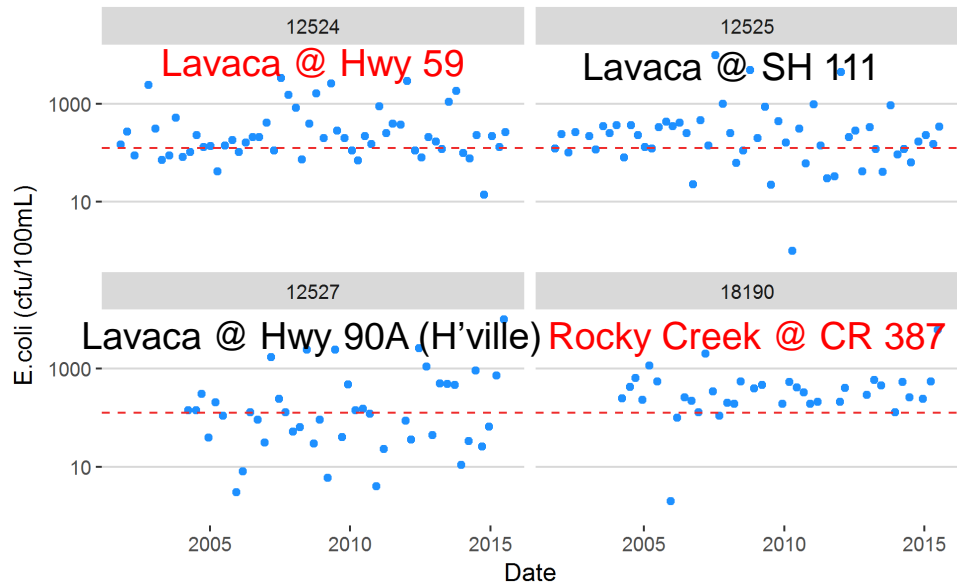
Michael Schramm, M.E.E.P.
Allen Berthold Ph.D.
Texas Water Resources Institute

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TEXAS A&M
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Today

- Reductions needed to meet water quality standards
- Identify areas with highest potential to impact water quality
- Discuss potential management measures

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TEXAS A&M
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RESEARCH | EXTENSION

Background

Lavaca @ Hwy 59 (Station 12524)
Lavaca @ SH 111 (Station 12525)
Lavaca @ Hwy 90A (H'ville) (Station 12527)
Rocky Creek @ CR 387 (Station 18190)

E.coli (cfu/100mL) vs Date

222 cfu/100mL
115 cfu/100mL
295 cfu/100mL

Legend
SWQM Stations
TCEQ AU's
Unimpaired
Impaired

Sources:
SWQM Stations - TCEQ
Watershed boundaries - NHDPlusV2 and NED, USGS
Assessment Units - TCEQ
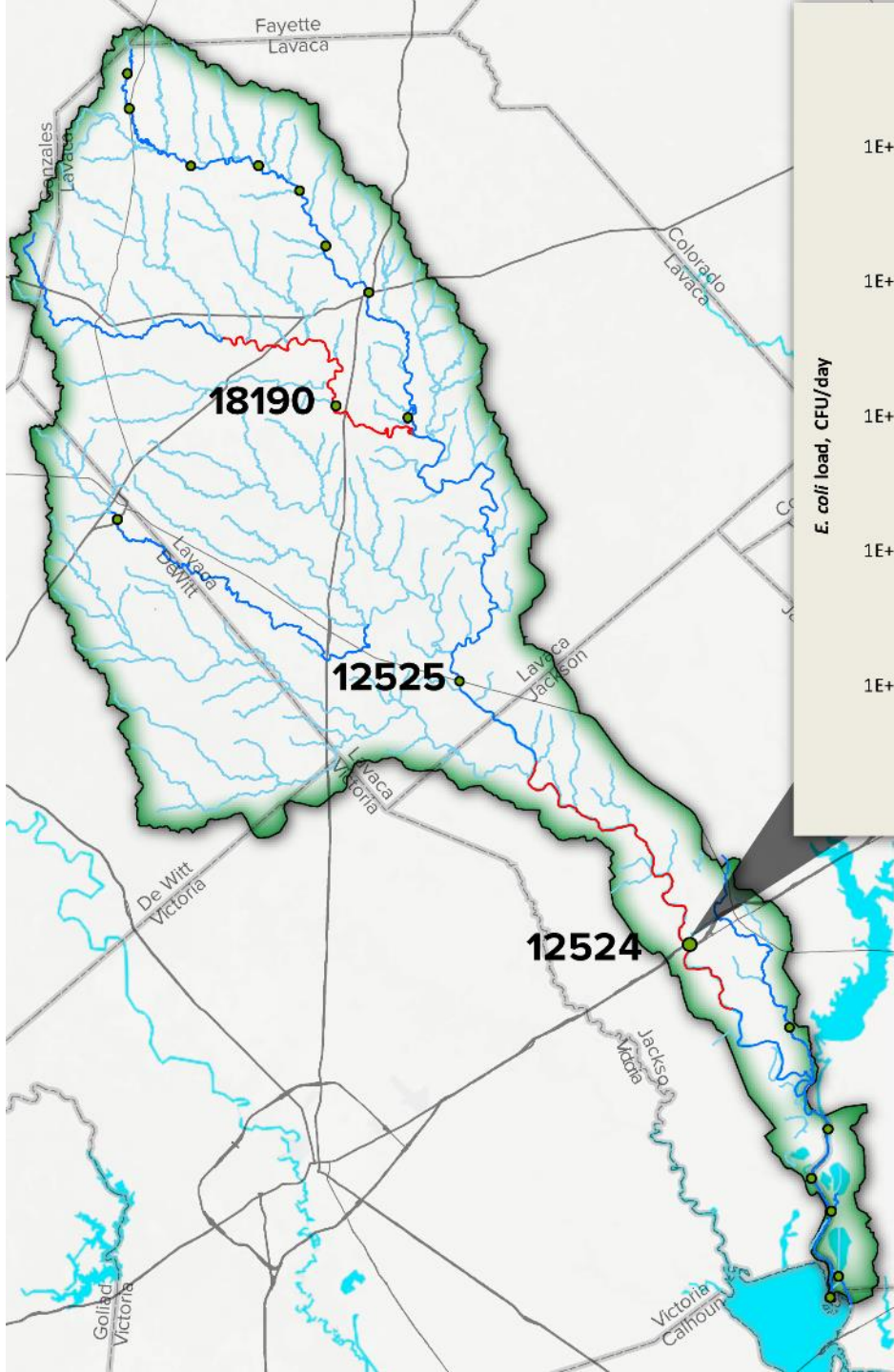County Boundaries - StratMap, TNRIS
Roads - TxDOT, TNRIS

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

Load Duration Curve Lavaca River Station 12524 (2003-2015)
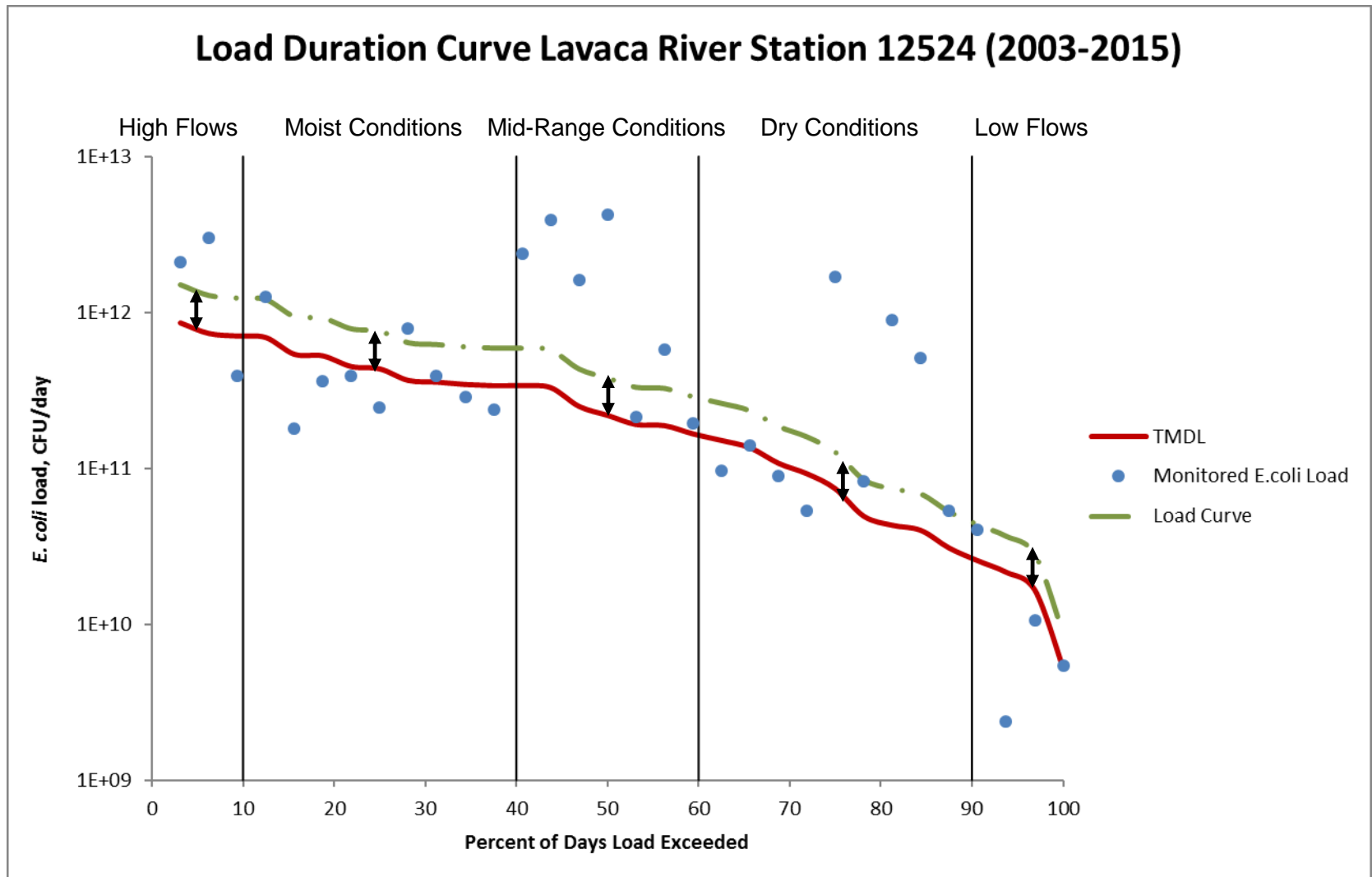
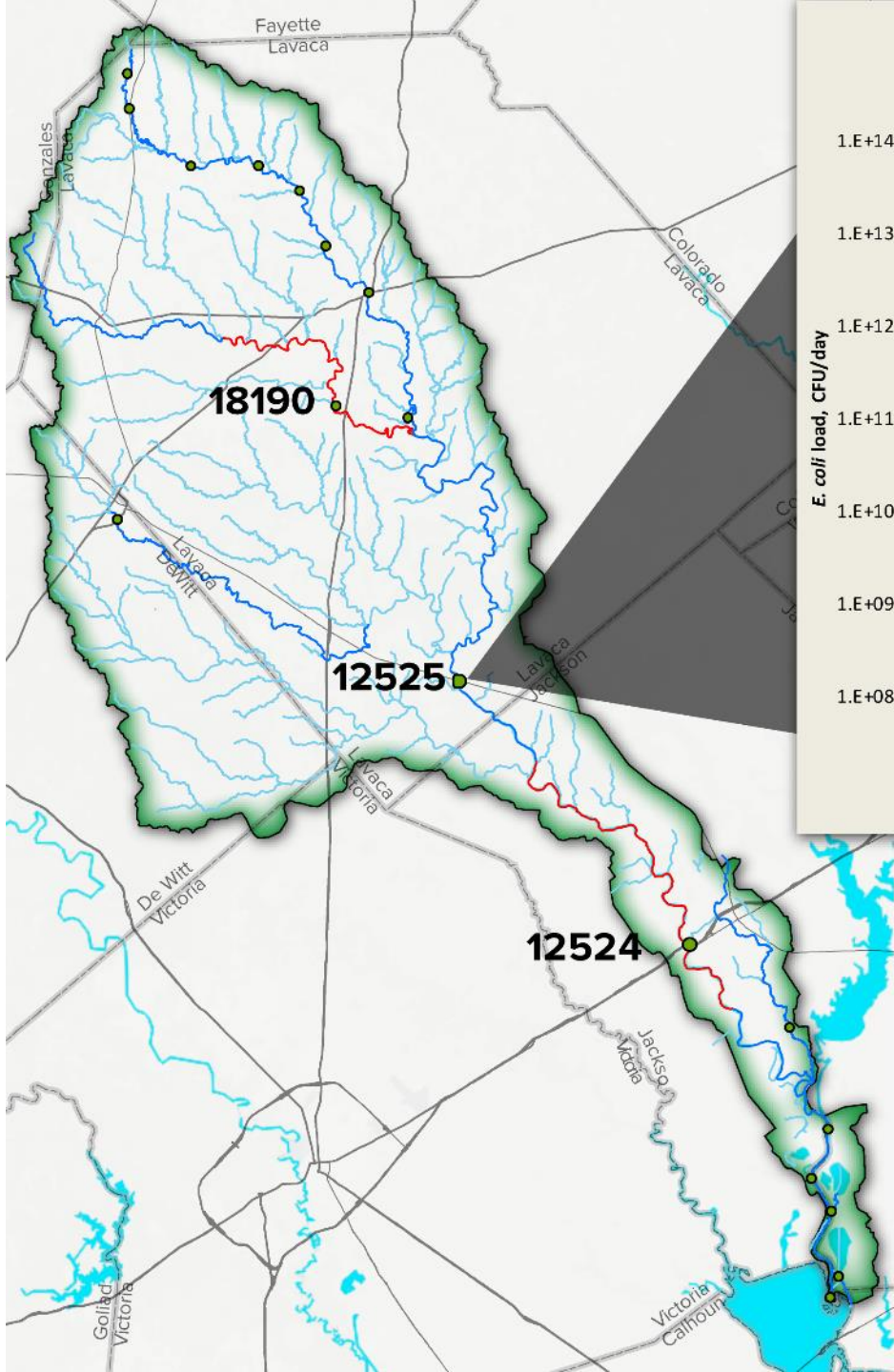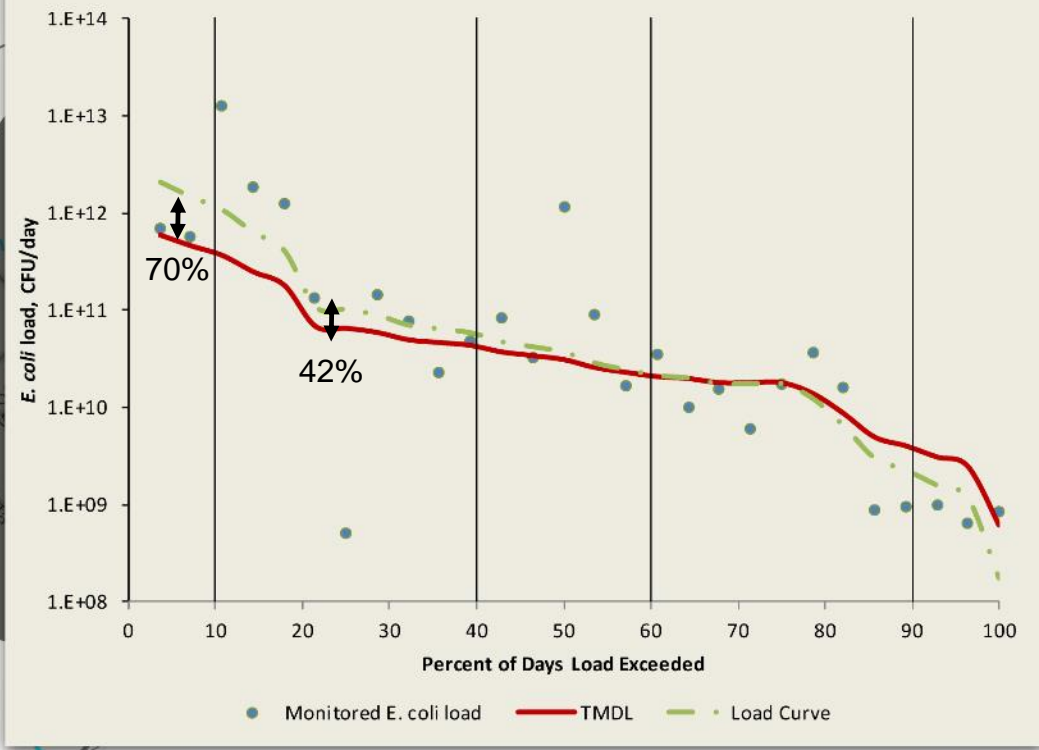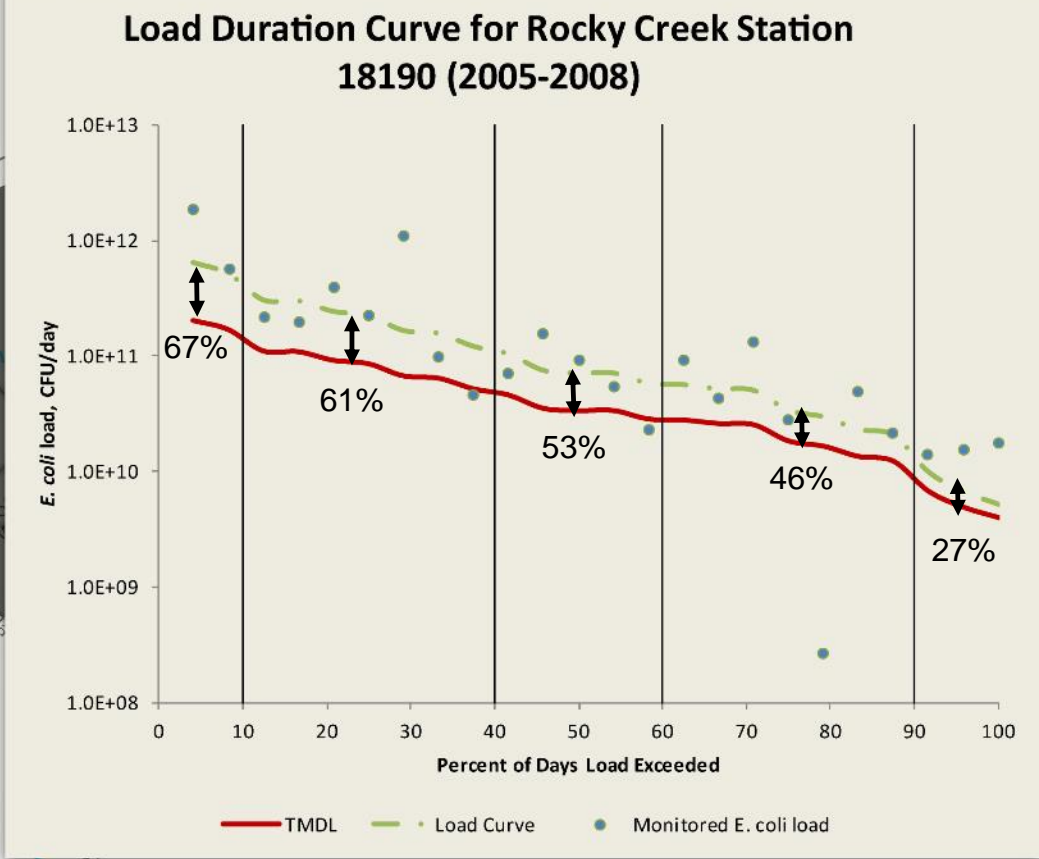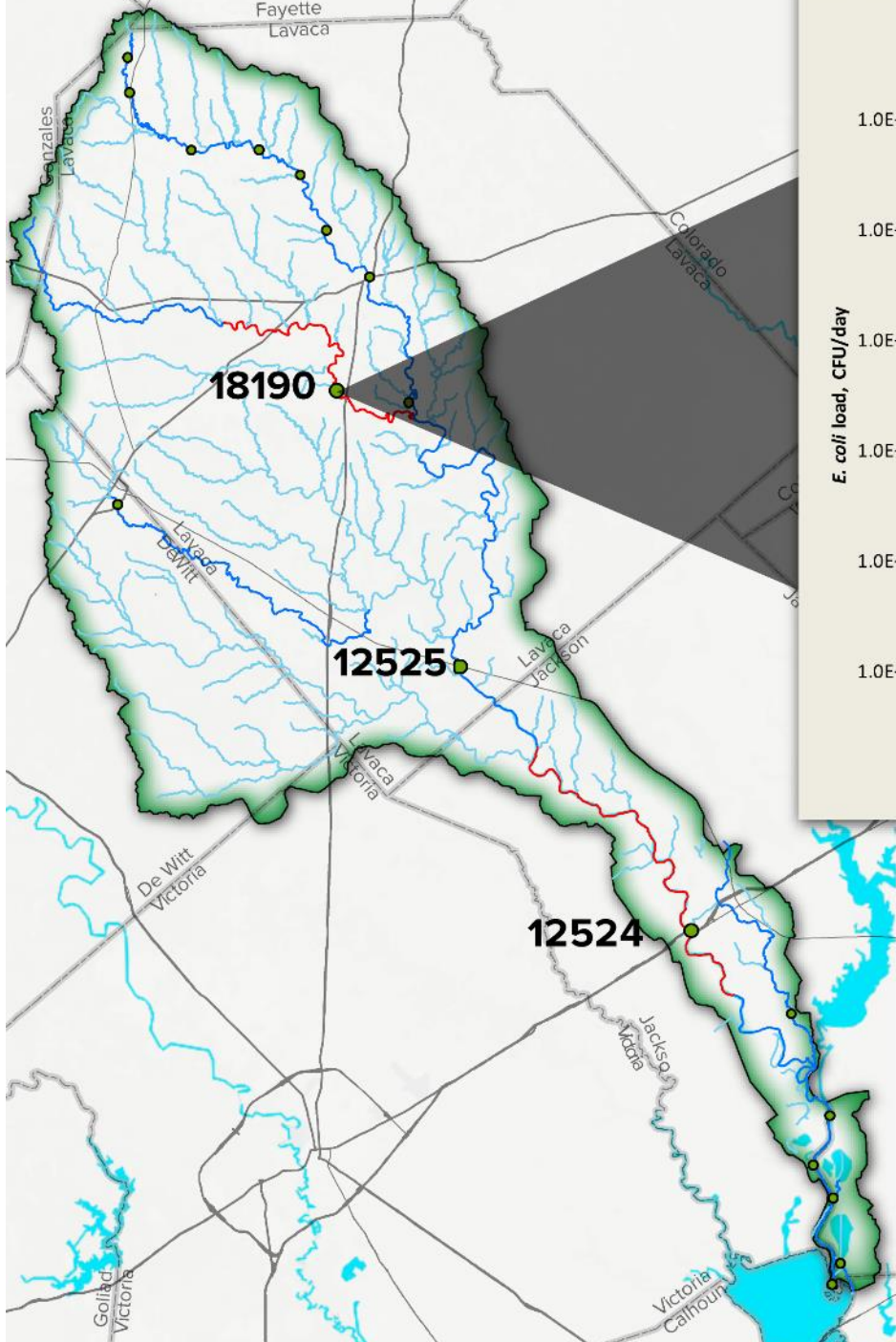Load Duration Curve Lavaca River Station 12524 (2003-2015)
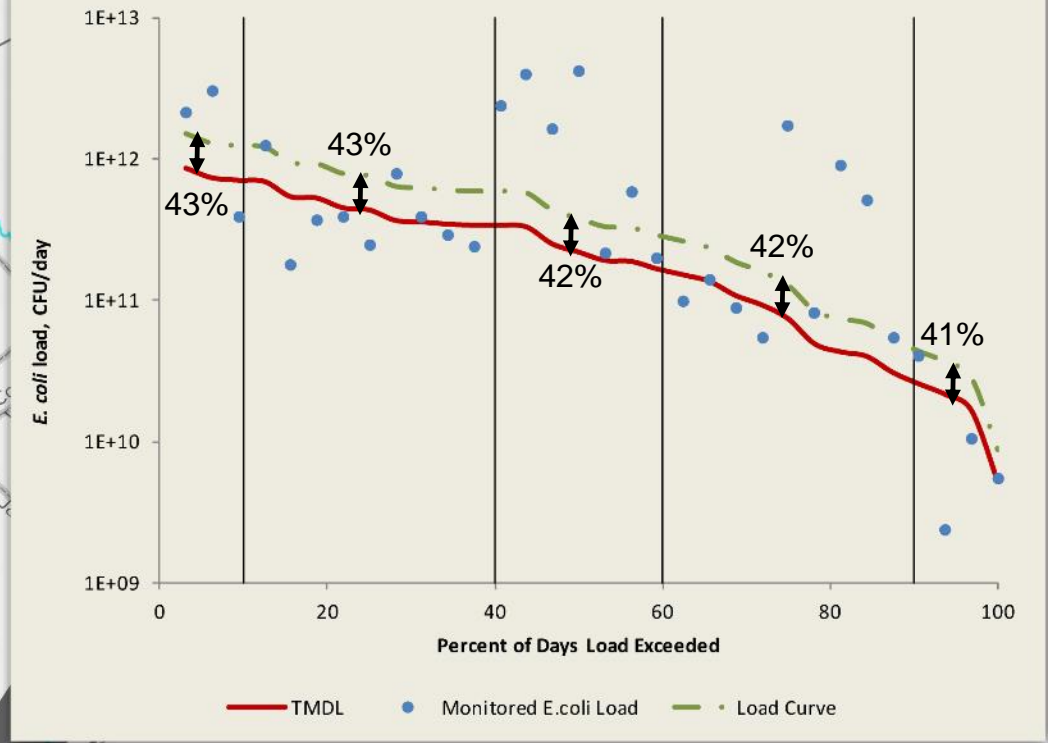
Total reduction of 7.51 x 10^{13} cfu/yr

Load Duration Curve Lavaca River Station 12525 (2008-2015)

No reduction needed to meet current standards

Load Duration Curve for Rocky Creek Station 18190 (2005-2008)

Total reduction of 3.31 x 10^{13} cfu/yr
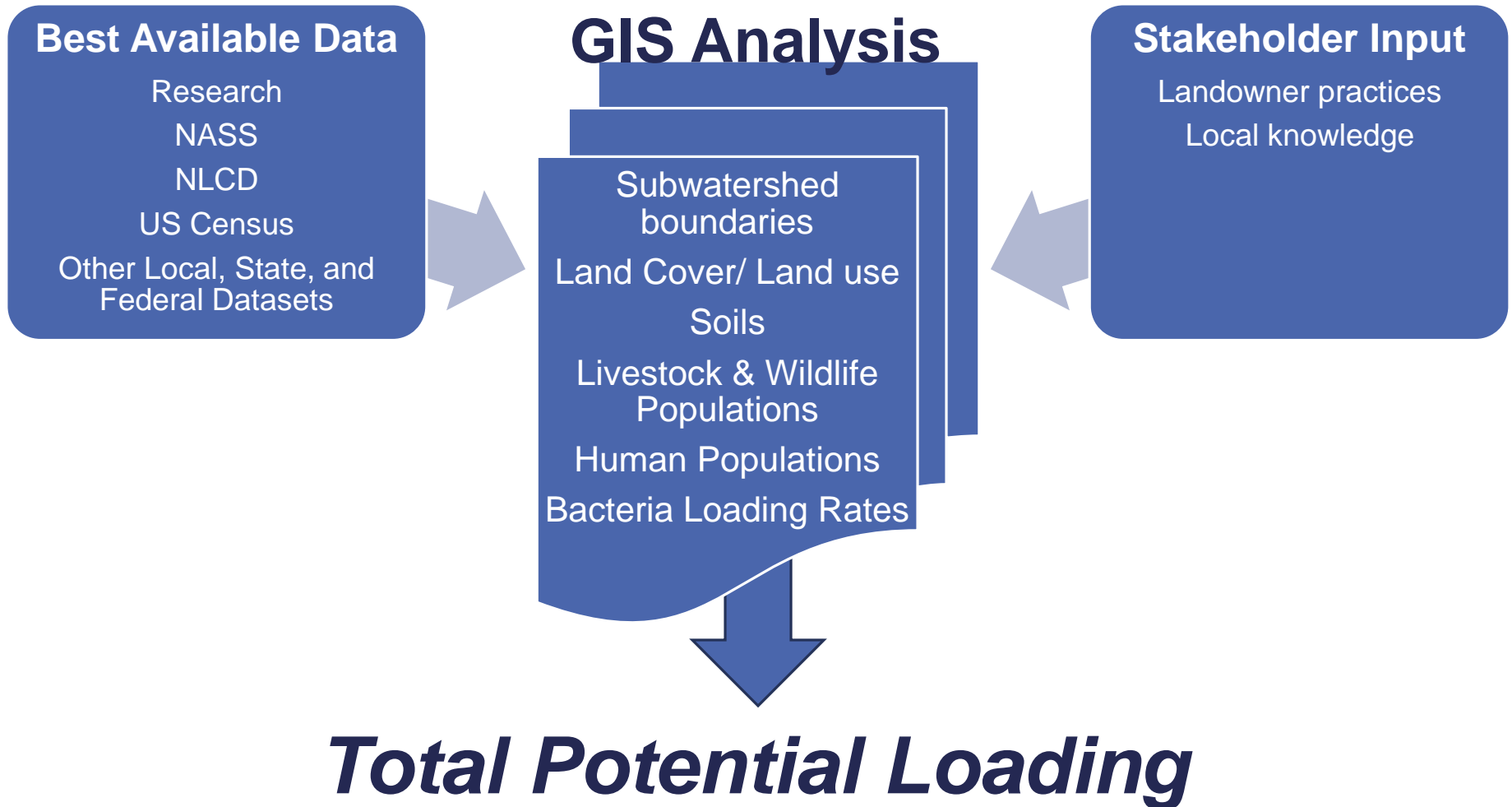
Summary

- Lavaca River Above Tidal
  - Reduction of 7.51×10^{13} cfu *E. coli*/yr to meet primary contact recreation water quality standard

- Rocky Creek
  - Reduction of 3.31×10^{13} cfu *E. coli*/yr to meet primary contact recreation water quality standard

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GIS Analysis (SELECT)

Best Available Data

Research

NASS

NLCD

US Census

Other Local, State, and Federal Datasets

GIS Analysis

Subwatershed boundaries

Land Cover/ Land use

Soils

Livestock & Wildlife Populations

Human Populations

Bacteria Loading Rates

Stakeholder Input

Landowner practices

Local knowledge

Total Potential Loading

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RESEARCH | EXTENSION

GIS Analysis
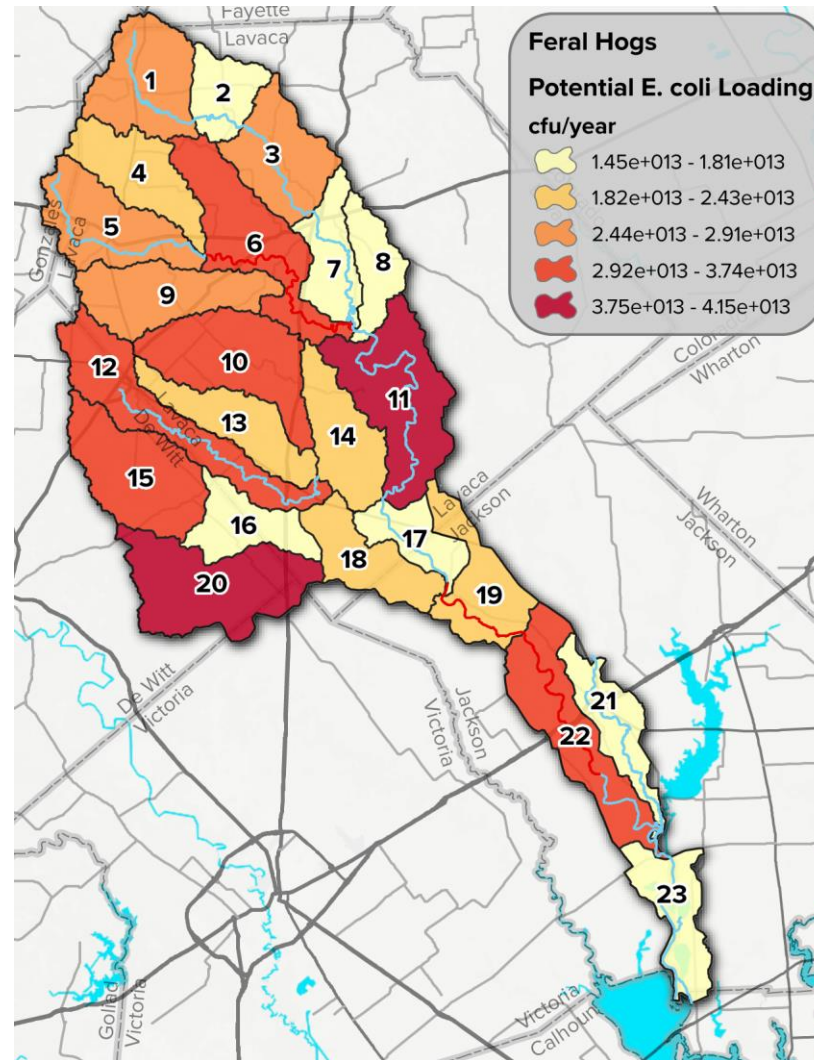## Cattle

Total Potential Load
~ 1.45×10^{17} cfu *E.coli* per year

Assumptions:
~73,948 animal units

GIS Analysis
Feral Hogs

Total Potential Load
~ 6.03×10^{14} cfu E.coli per year

Assumptions:
~16,259 feral hogs

GIS Analysis
Pets (Dogs)
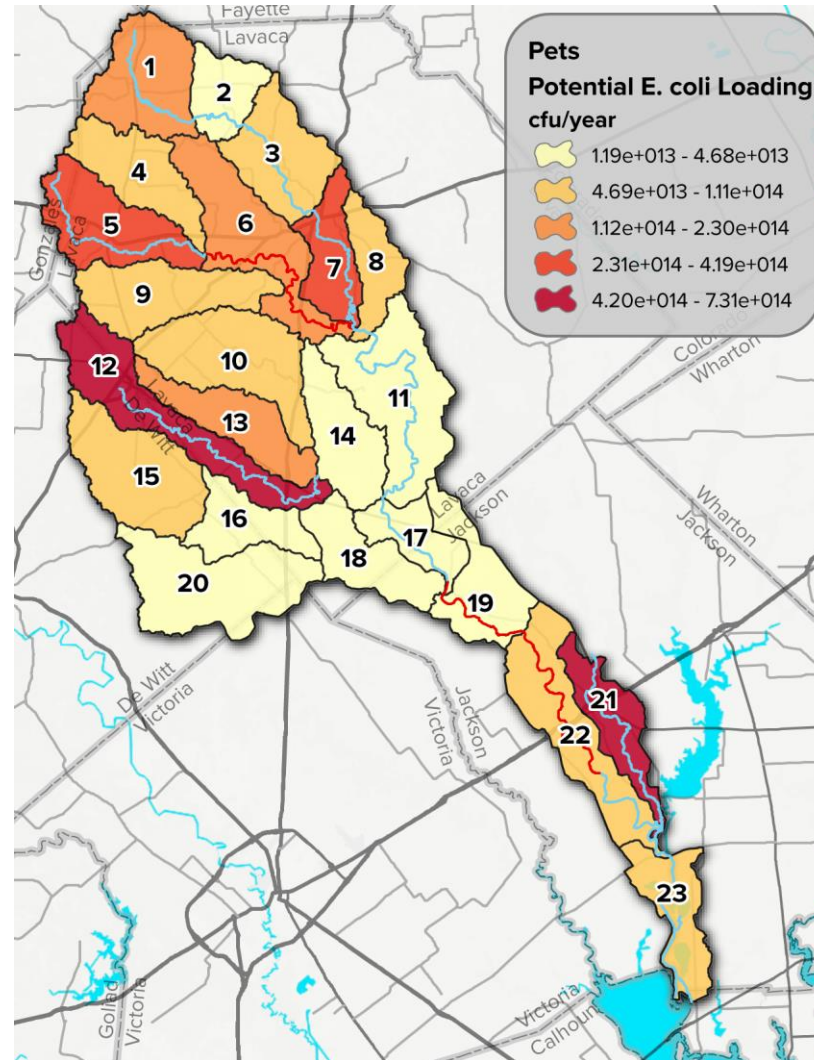
Assuming ~8,069 dogs and 40% of the dog waste may reach the stream

Total Potential Load
~ 3.71 x 10^{15} cfu

GIS Analysis
OSSFs
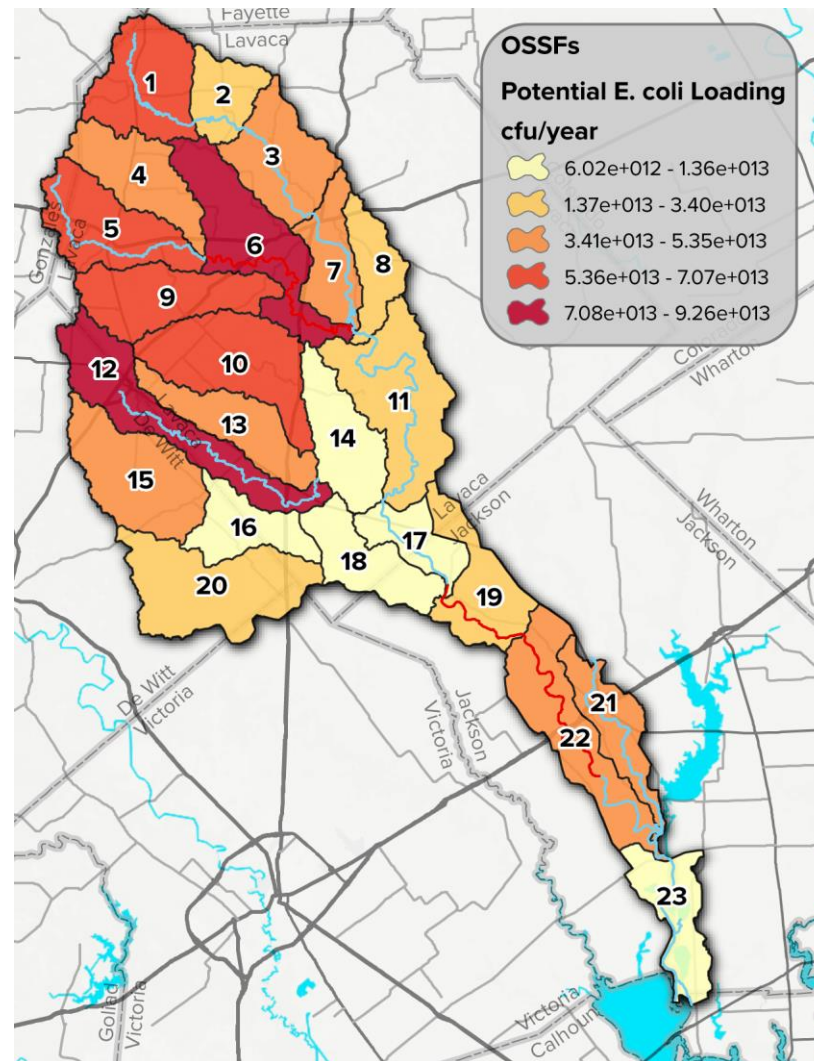
Assuming ~5,246 OSSFs and 15% failure rate

Total Potential Load
~ 9.29 x 10^{14} cfu

GIS Analysis
Urban Areas and Impervious Surfaces
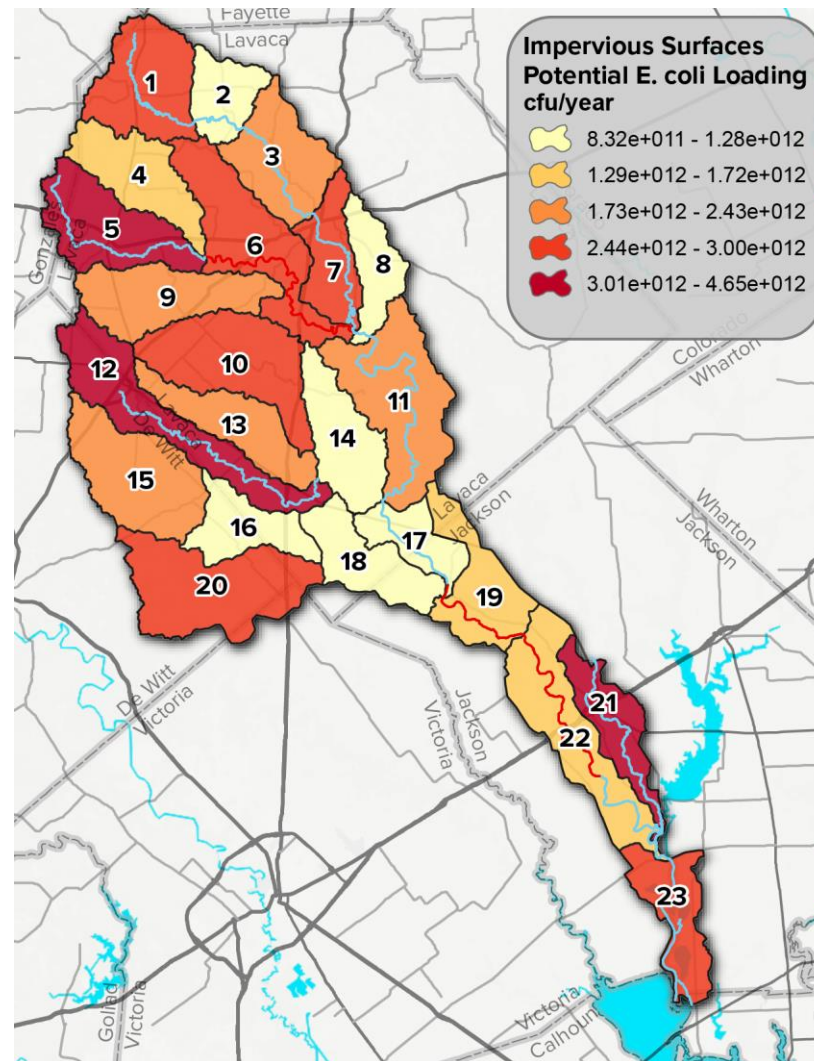
Assuming ~35,607 acres of urban/impervious surface

Total Potential Load
~ 5.10 x 10^{13} cfu

GIS Analysis
Wastewater Treatment Plants
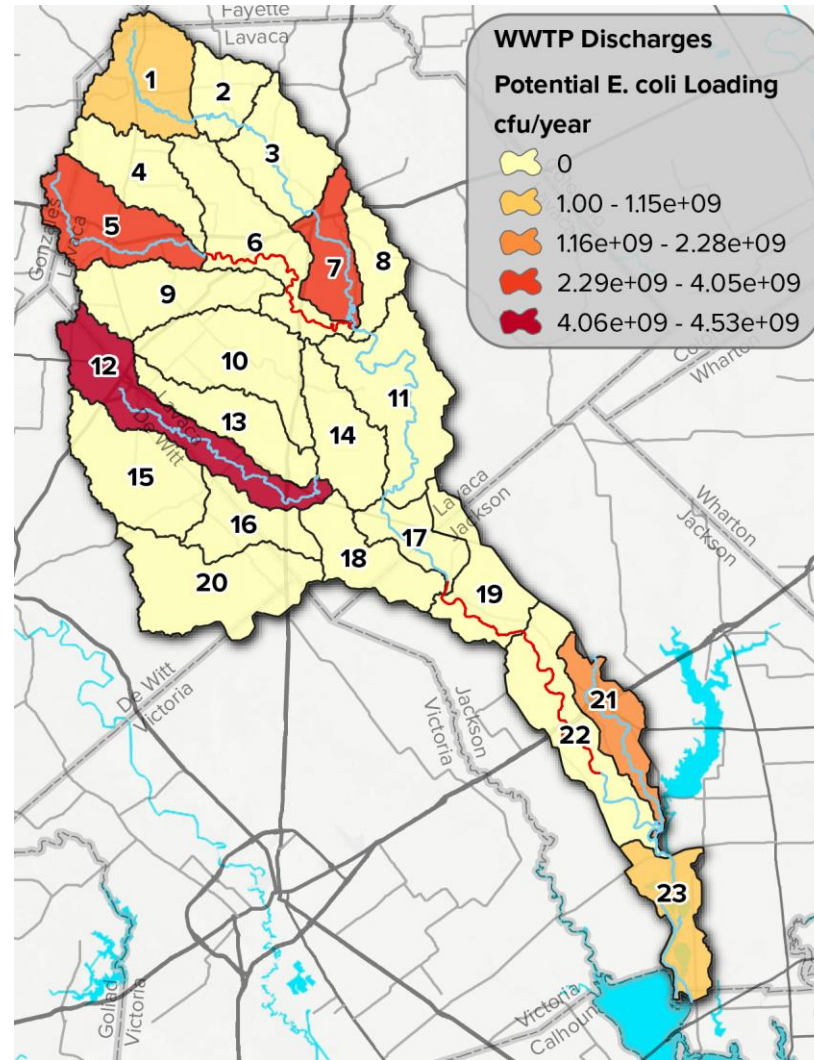
Assumes each maximum permitted discharge at 126cfu/100mL

Total Potential Load
~ 1.62×10^{10} cfu

GIS Analysis Summary

Best Available Data

Research

NASS

NLCD

US Census

Other Local, State, and Federal Datasets

Subwatershed boundaries

Land Cover/ Land use

Soils

Livestock & Wildlife Populations

Human Populations

Bacteria Loading Rates

Stakeholder Input

Landowner practices

Local knowledge
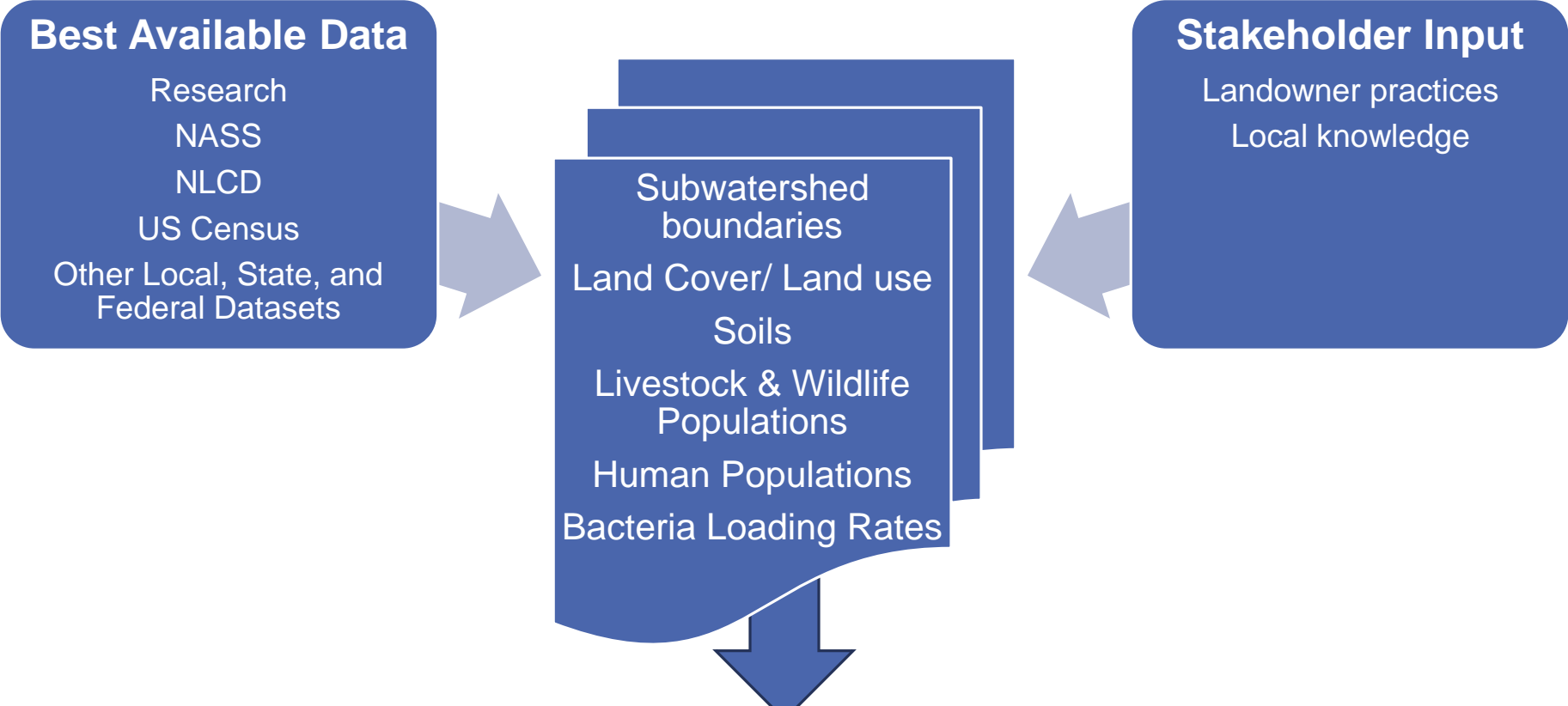
Total Potential Loading

Livestock/Cattle ~ 1.45 x 10^{17} cfu *E.coli* per year

Pets/Dogs ~ 3.71 x 10^{15} cfu *E.coli* per year

OSSFs ~ 9.29 x 10^{14} cfu *E.coli* per year

Wildlife/Feral Hogs ~ 6.03 x 10^{14} cfu *E.coli* per year

Urbanized/Impervious Runoff ~ 5.10 x 10^{13} cfu *E.coli* per year

WWTP ~ 1.62 x 10^{10} cfu *E.coli* per year

Management Recommendations

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Livestock/Cattle

1. **Goal:**
   - Minimize runoff and time livestock spend in streams
2. **Objectives:**
   - Work with ranchers to develop and implement WQMPs or Conservation Plans
3. **Strategies:**
   - Implement TSSWCB Water Quality Management Plans
   - Implement NRCS Conservation Plans
   - Deliver Education Programs and Workshop
4. **Participants:**
   - TSSWCB, SWCDs, NRCS, Landowners, Lessees, AgriLife Extension, TWRI

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Feral Hogs/Wildlife

1. **Goal:**

   ◉ Manage/reduce the feral hog population

2. **Objectives:**

   ◉ Reduce bacteria loading from feral hogs

   ◉ Reduce food supply available to feral hogs

3. **Strategies:**

   ◉ Promote technical and direct operational assistance to landowners for feral hog control

   ◉ Implement TPWD wildlife habitat management plans

   ◉ Deliver Feral Hog control workshops

4. **Participants:**

   ◉ AgriLife Extension, TPWD, Texas Wildlife Services, Landowners/managers/lessees, TWRI

On-Site Sewage Facilities

1. **Goal:**
   - Reduce number of failing OSSFs

2. **Objectives:**
   - Work with homeowners and communities to repair or replace failing OSSFs

3. **Strategies:**
   - Identify and secure resources to repair and replace OSSF systems in targeted areas
   - Deliver OSSF workshops

4. **Participants:**
   - AgriLife Extension, County Governments/Staff, Authorized Agents, Homeowners, TWRI

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Urbanized Areas

1. **Goal:**
   - Reduce runoff and loading from urbanized areas/impervious surfaces
2. **Objectives:**
   - Reduce potential bacterial loadings from pet waste
   - Reduce stormwater runoff from impervious cover
3. **Strategies:**
   - Install pet waste stations
   - Develop and deliver educational materials to pet owners
   - Identify potential locations, costs, resources, and types of BMPs to reduce stormwater runoff
4. **Participants:**
   - TWRI, Municipal Utilities and Public Works

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Wastewater Treatment Plants/Sanitary Sewer Overflows

1. **Goal:**
   - Improve WWTP performance and reduce SSOs

2. **Objectives:**
   - Reduce potential bacterial loading WWTPs where possible
   - Reduce occurrences of SSOs

3. **Strategies:**
   - Develop and deliver educational materials to residents on proper disposal of Fats/Oils/Greases and solids
   - Identify infrastructure upgrades and replacement as funding allows

4. **Participants:**
   - Municipal Utilities, TWRI

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Other Potential Measures

- ⊙ Source – Wildlife/White tailed deer
  - ◉ Implement wildlife management plans
- ⊙ Source – Illicit Dumping/Animal Carcasses
  - ◉ Develop and deliver education programs
- ⊙ Source – Wastewater
  - ◉ Identify opportunities/funding to implement wastewater reuse
- ⊙ Source – Urban Stormwater
  - ◉ Develop municipal stormwater management plan

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