Chapter 3: Pollutant Loads and Sources

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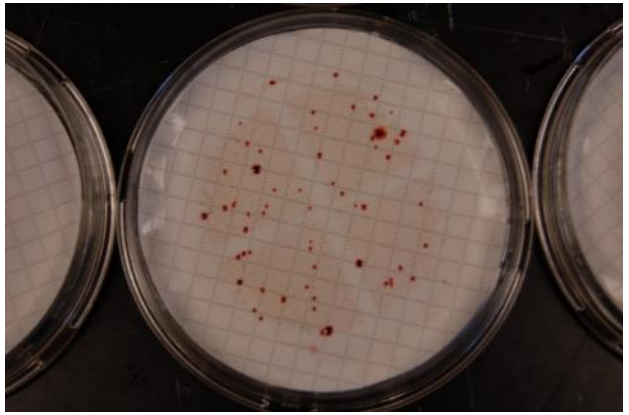
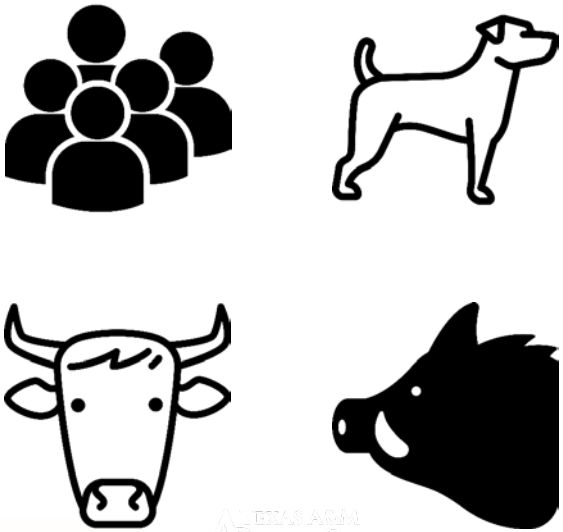
Texas Water Resources Institute
make every drop count

Texas A&M AgriLife Research | Extension

Overview

1. Determine reductions needed to meet water quality standards



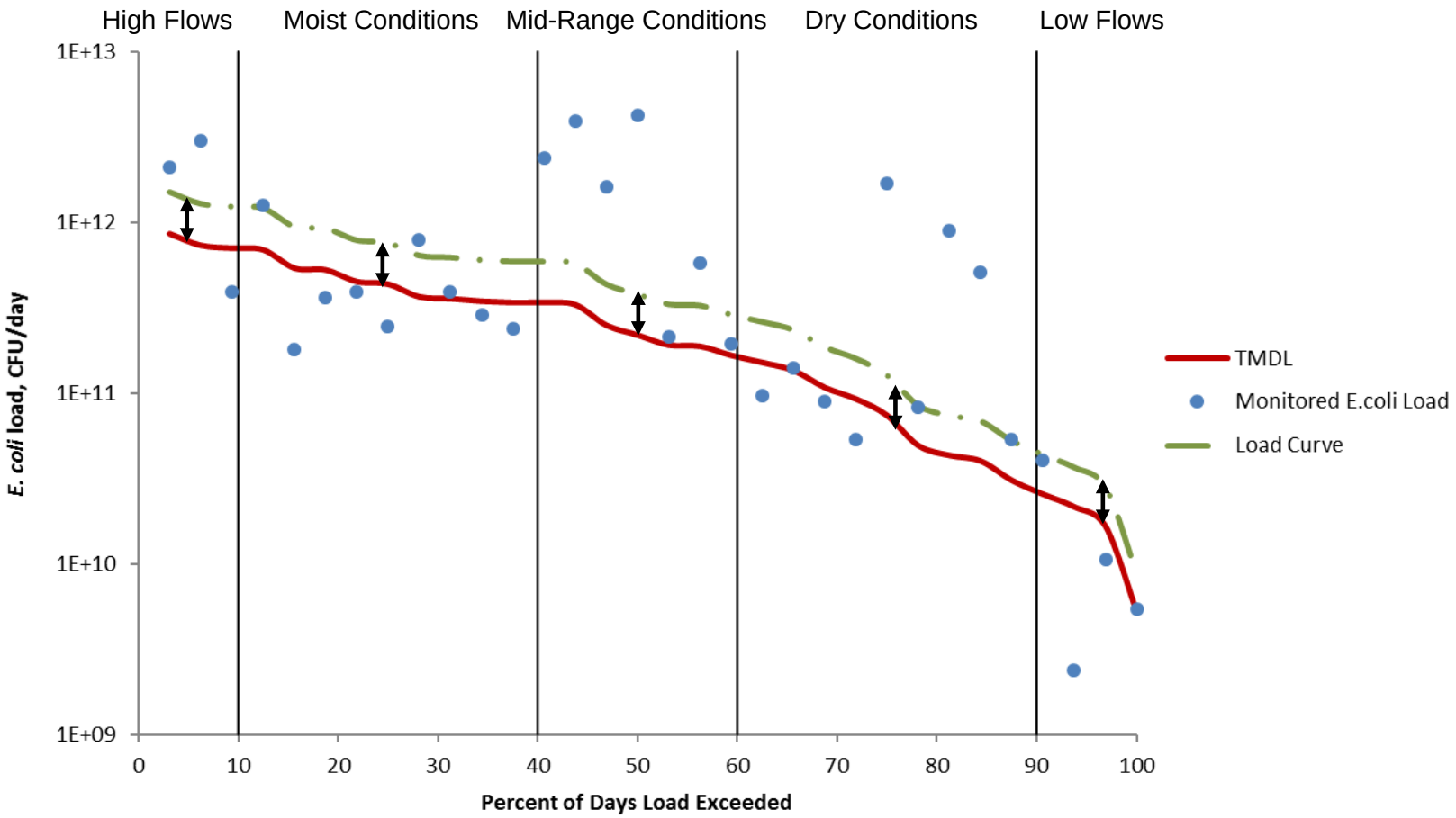


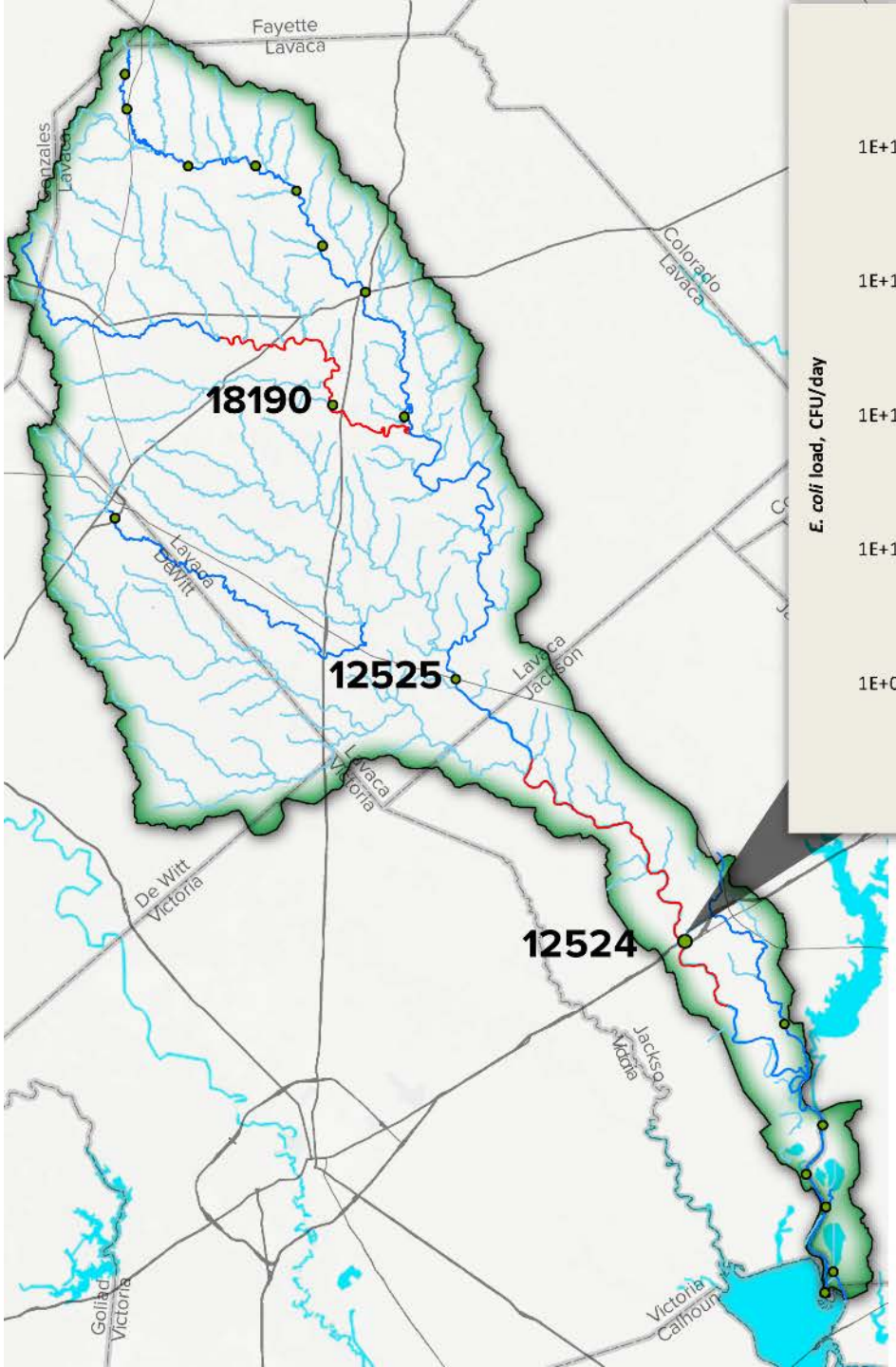
2. Determine likely sources of bacteria (What and Where)

Load Duration Curve

- Load Duration Curves - Visualize streamflow, pollutant capacity, and water quality data
- Tells us under what flow conditions that pollutant loadings exceed the stream's capacity to handle discharges/runoff and still meet water quality standards
- Can also inform us how much that capacity has historically been exceeded under different flow conditions

Load Duration Curve Lavaca River Station 12524 (2003-2015)




Fayette
Lavaca
Gonzales
Lavaca
Colorado
Lavaca
18190
Lavaca
DeWitt
12525
Lavaca
Jackson
Lavaca
Victoria
De Witt
Victoria
12524
Jackson
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Goliad
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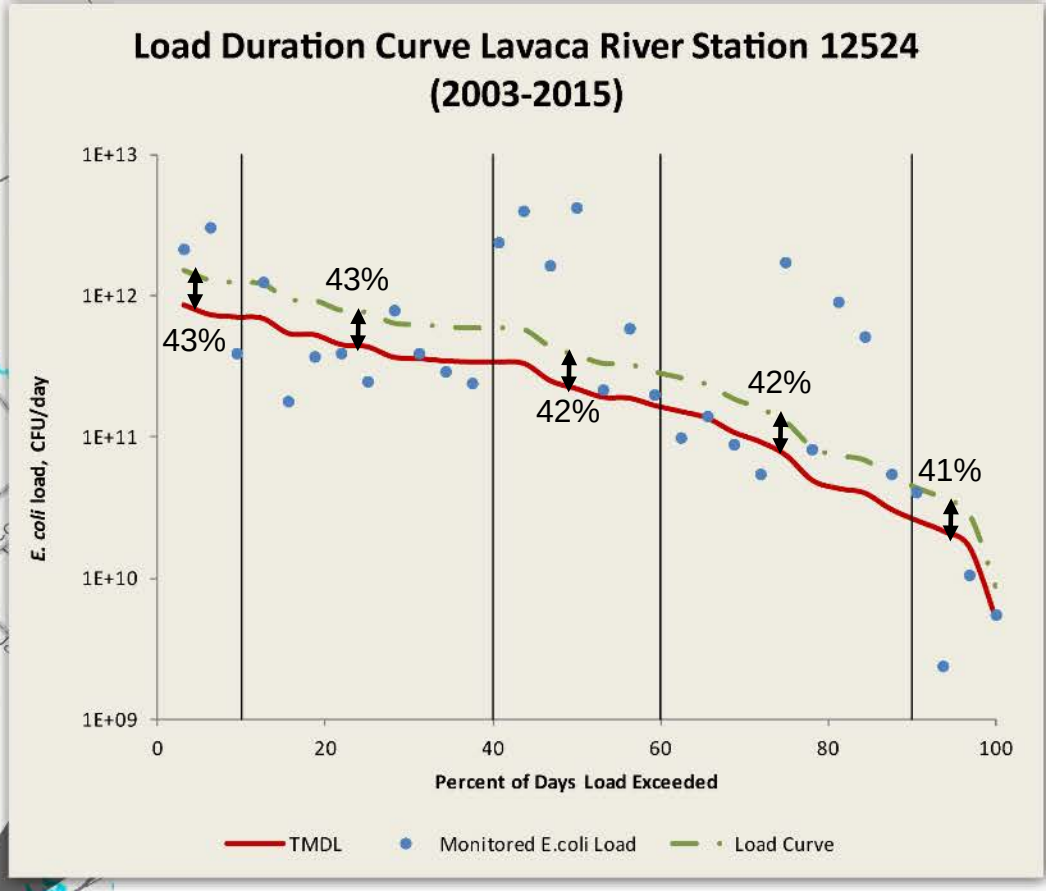
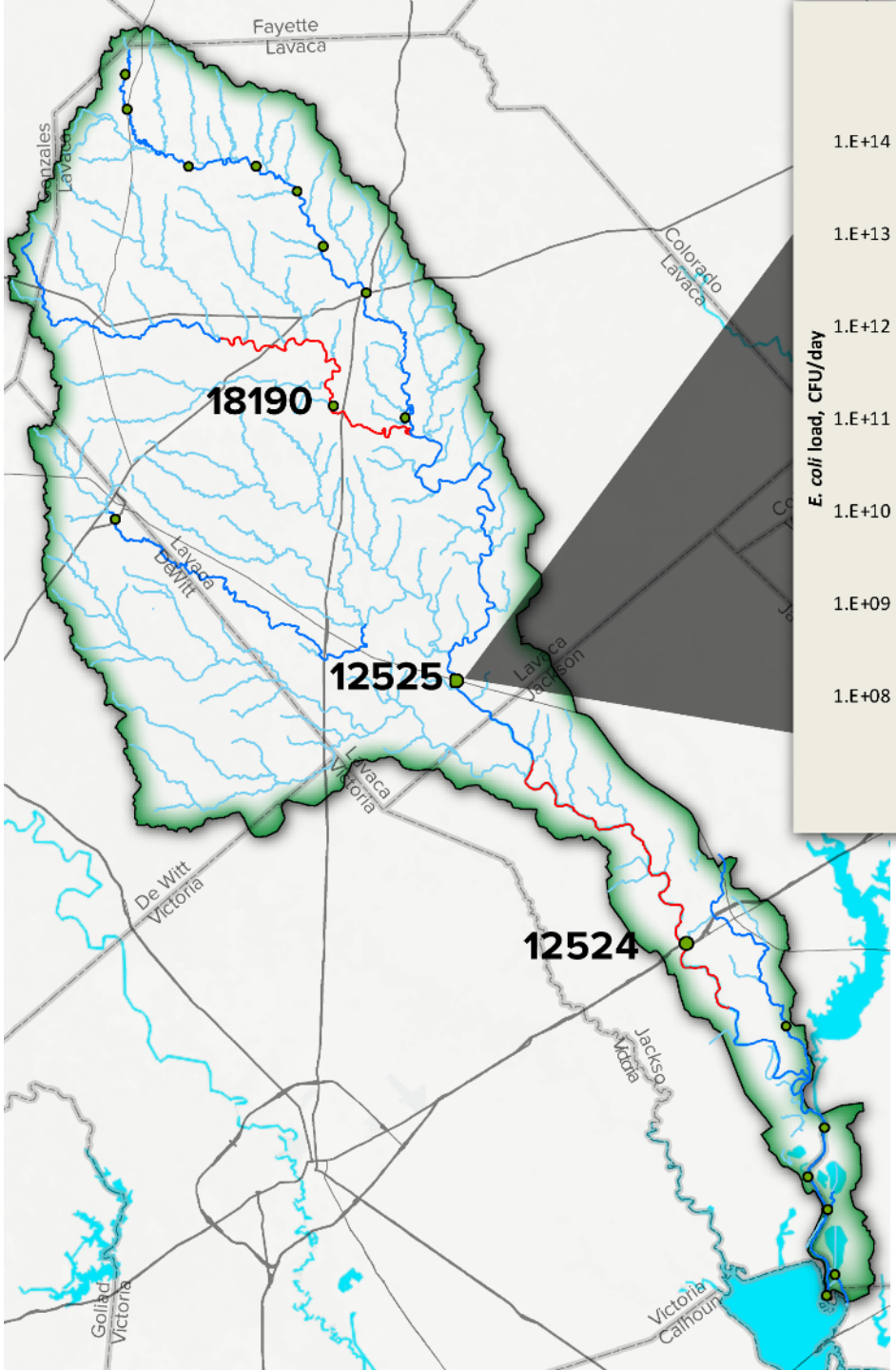
Victoria
Calhoun


Load Duration Curve Lavaca River Station 12524
(2003-2015)
E. coli load, CFU/day
1E+13
1E+12
1E+11
1E+10
1E+09
0
20
40
60
80
100
Percent of Days Load Exceeded
43%
43%
42%
42%
41%
TMDL
Monitored E.coli Load
Load Curve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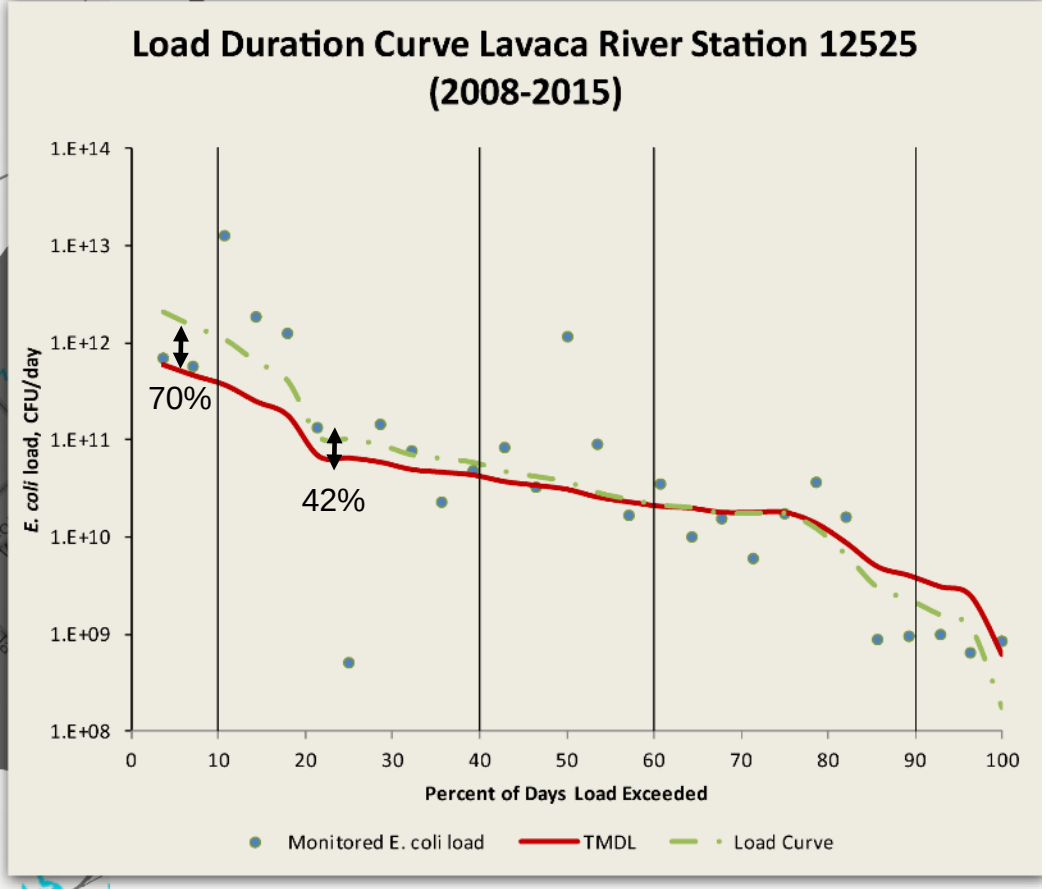
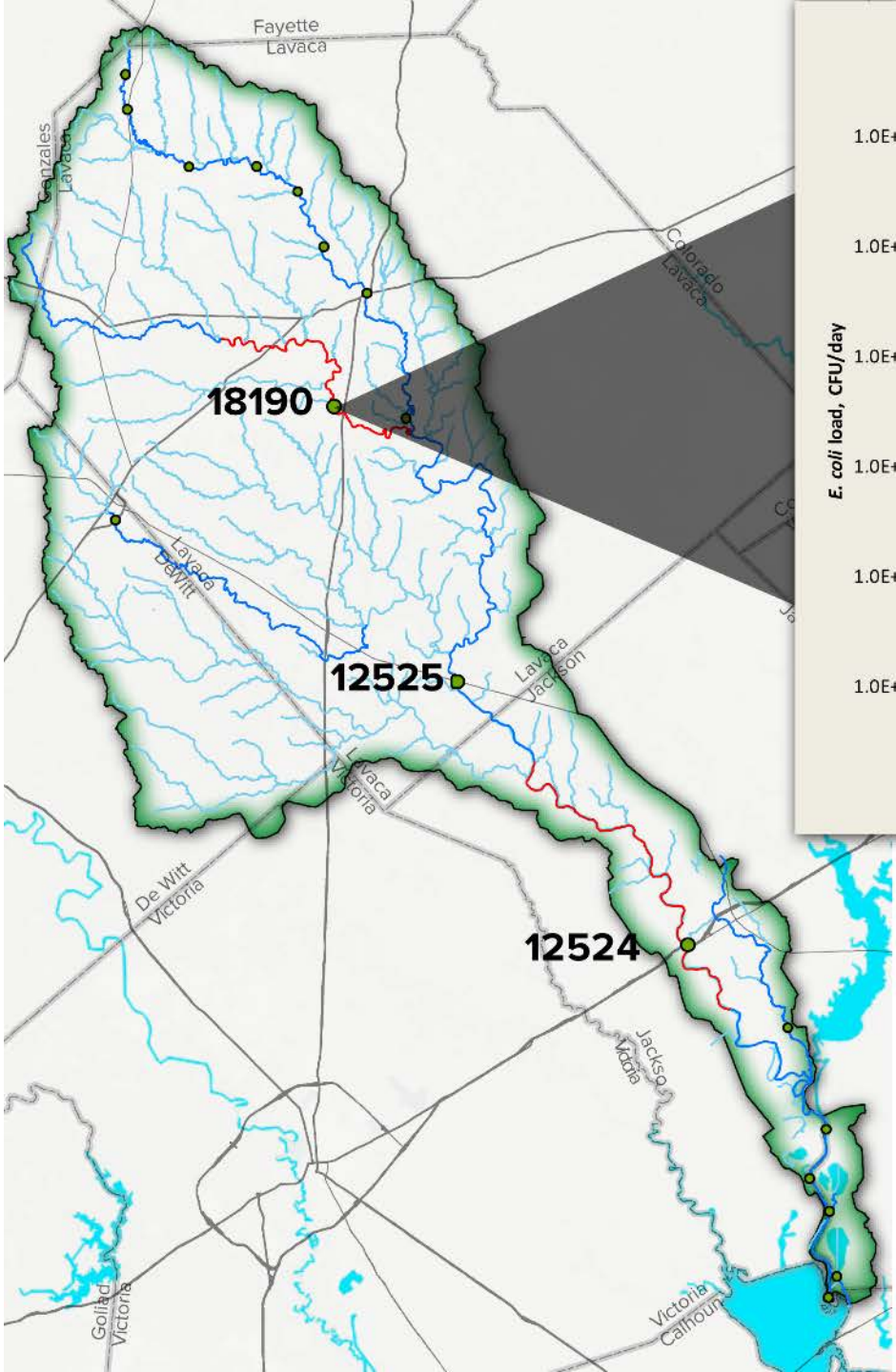

Load Duration Curve Lavaca River Station 12525
(2008-2015)
1.E+14
1.E+13
1.E+12
1.E+11
1.E+10
1.E+09
1.E+08
E. coli load, CFU/day
70%
42%
0
10
20
30
40
50
60
70
80
90
100
Percent of Days Load Exceeded
Monitored E. coli load
TMDL
Load Curve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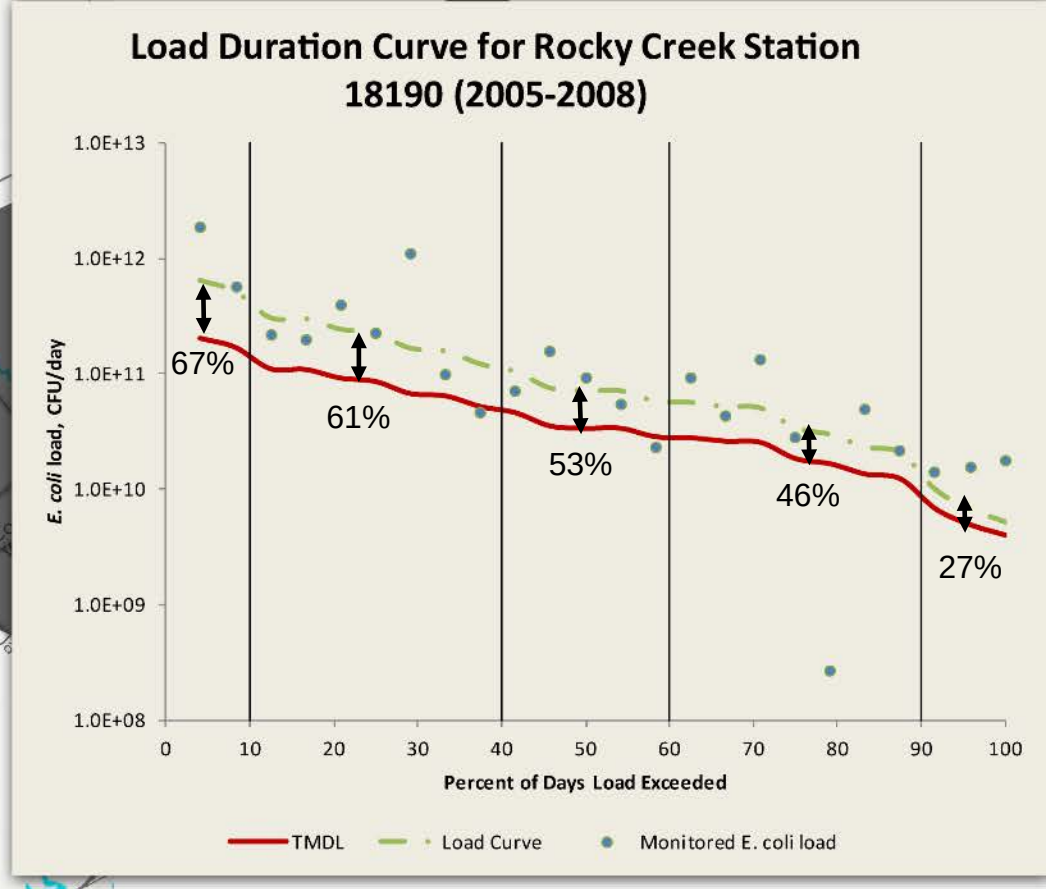
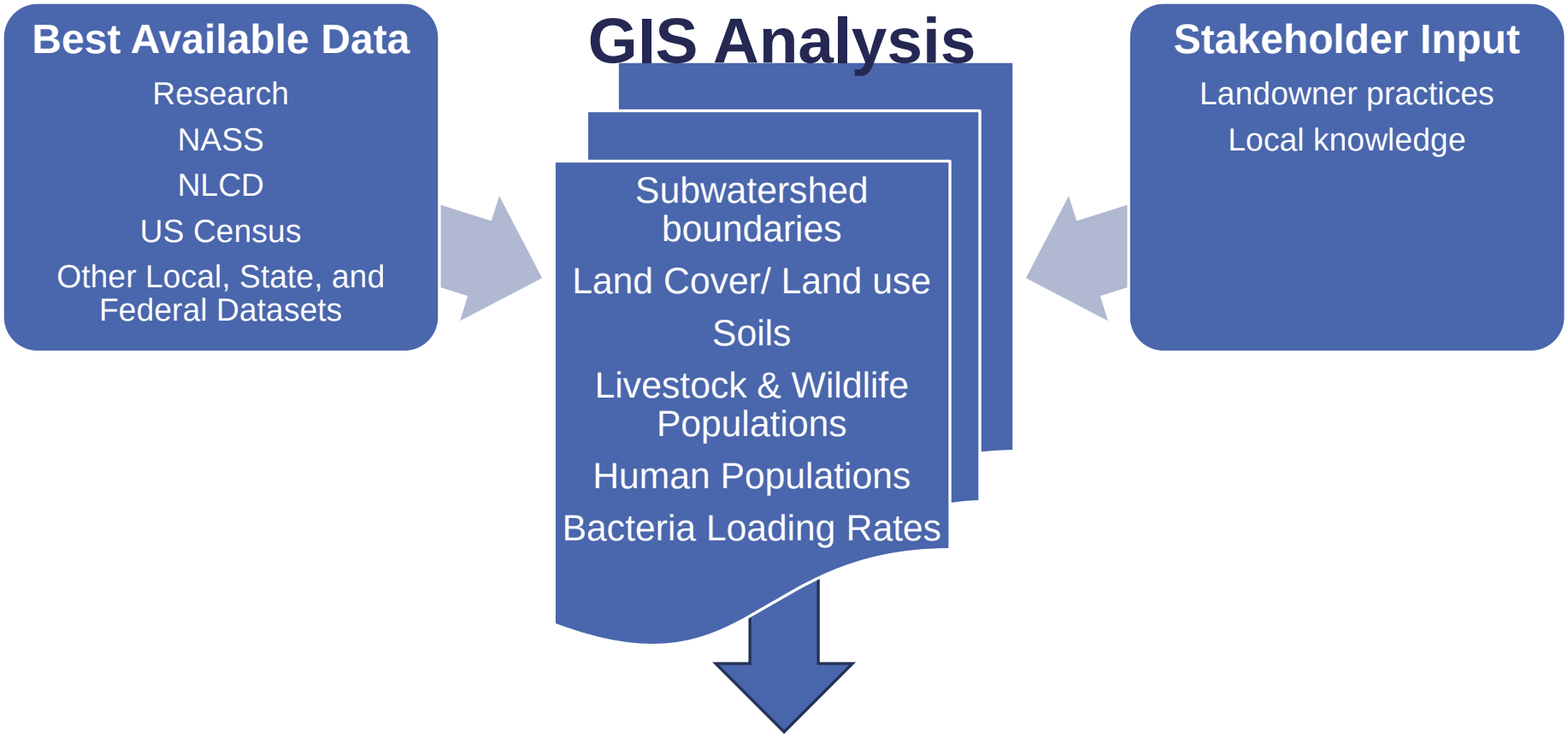
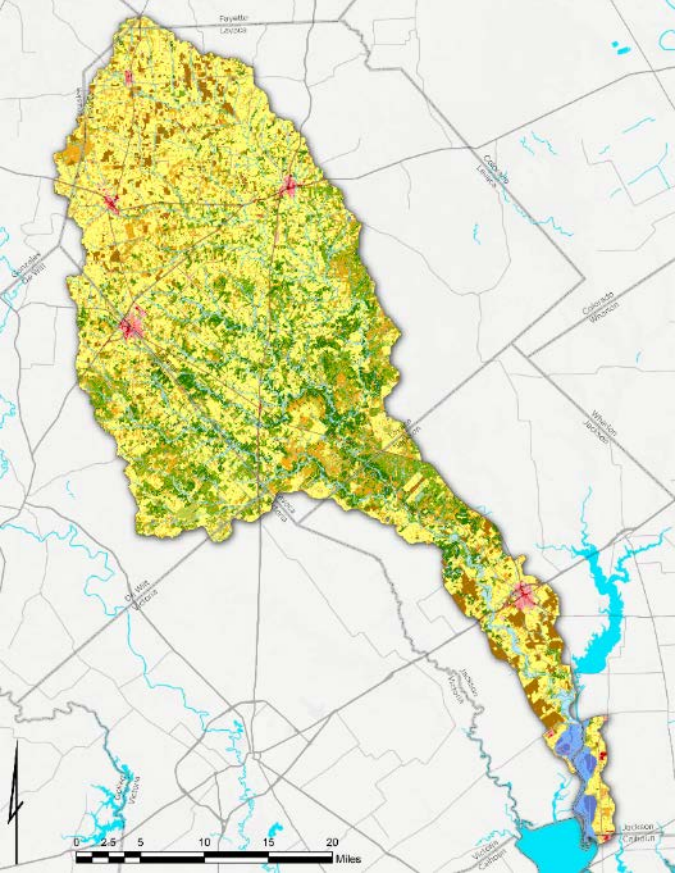
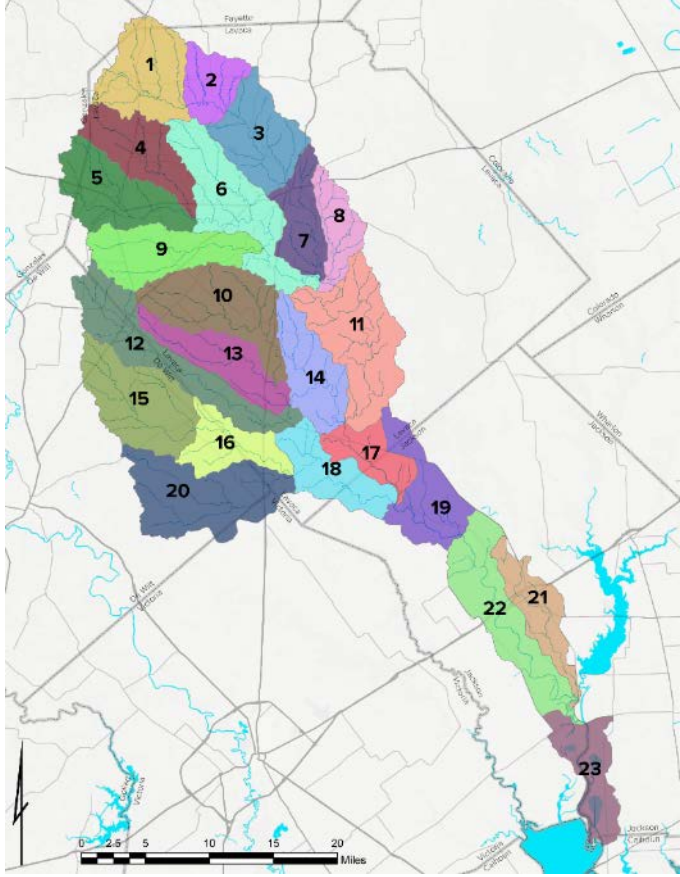

Load Duration Curve for Rocky Creek Station
18190 (2005-2008)
1.0E+13
1.0E+12
1.0E+11
1.0E+10
1.0E+09
1.0E+08
E. coli load, CFU/day
0
10
20
30
40
50
60
70
80
90
100
Percent of Days Load Exceeded
67%
61%
53%
46%
27%
TMDL
Load Curve
Monitored E. coli load

GIS Analysis (SELECT)



Total Potential Loading



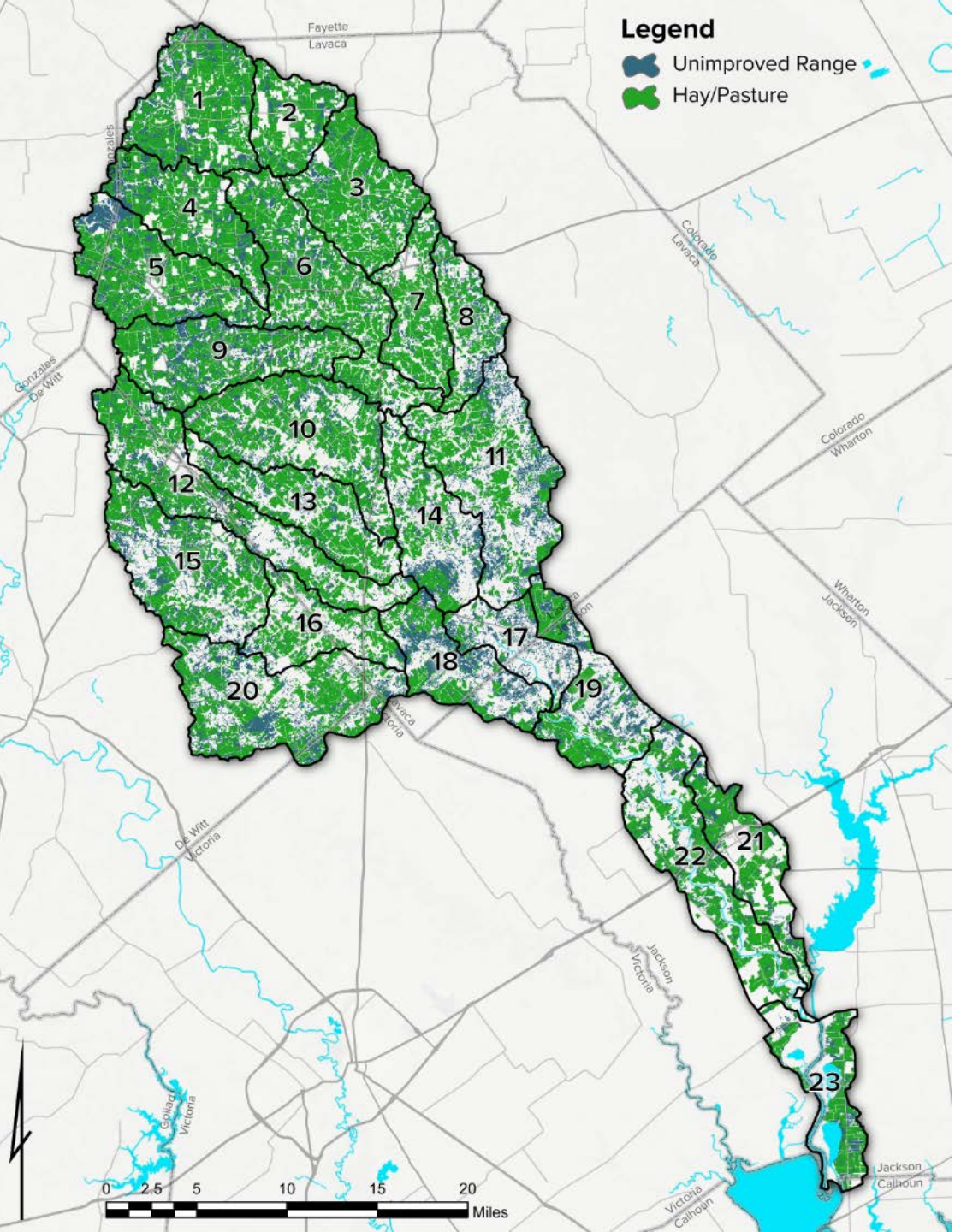


GIS Analysis (SELECT)

Cattle Example

Step 1 – Identify landuses in subwatersheds

23 subwatersheds delineated within the project area based on NHDPlusV2 and NED datasets from USGS



GIS Analysis (SELECT)

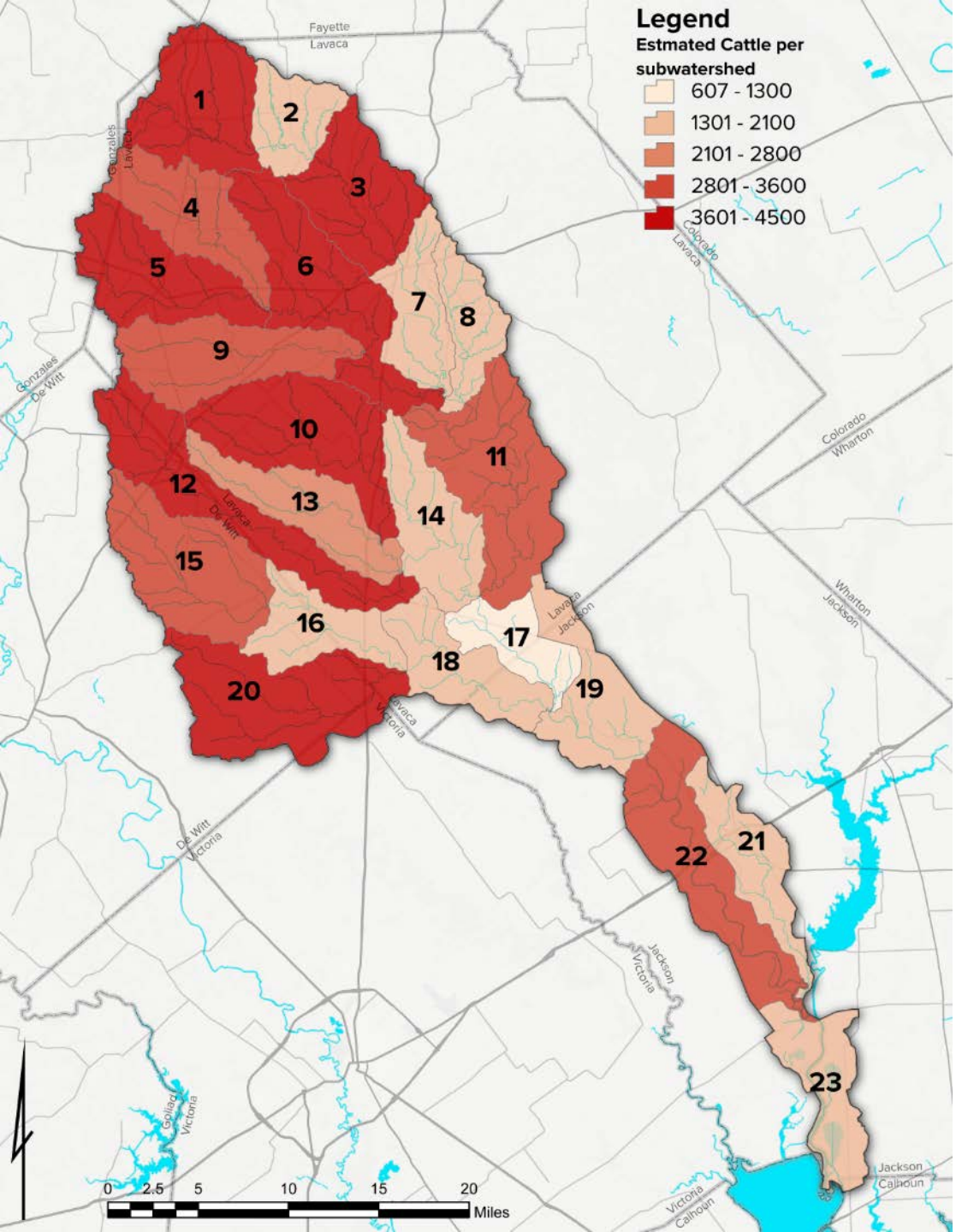
Cattle Example

Step 2 – Estimate grazeable acreage

Green = Hay, Pasture (404 sq miles)

Blue = Grassland, Shrub/Scrub, Herbaceous (159 sq miles)

Based on 2011 NLCD



GIS Analysis (SELECT)

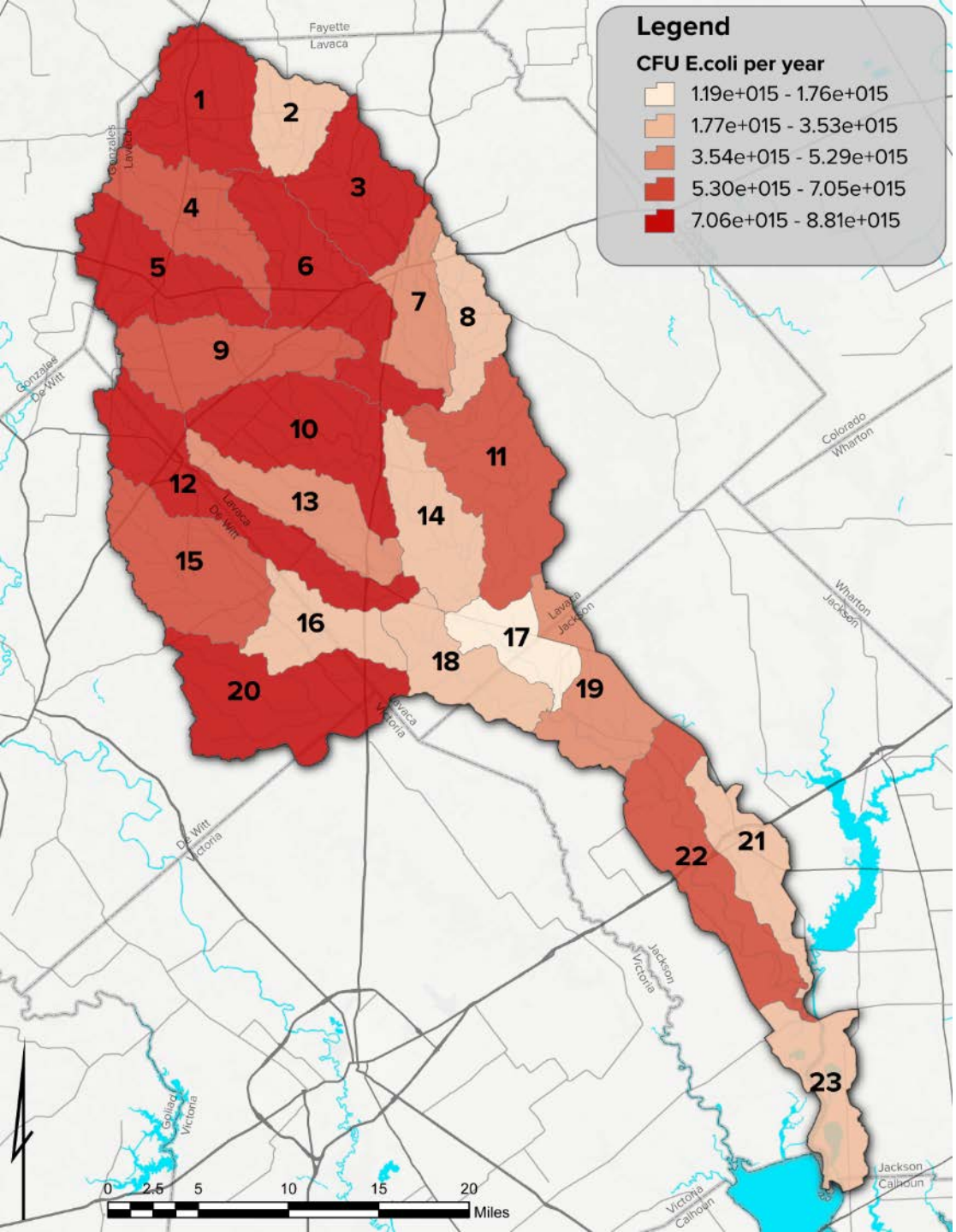
Cattle Example

Step 4 – Estimate potential cattle populations based on typical stocking rates

1 AU/5 acres on Hay/Pasture
1 AU/12 acres on Grassland/Herbaceous, Shrub/Scrub
AU = Animal Unit

~ 60,236 AU's across the watershed

USDA NASS Estimate:
~72,182 head of cattle and calves



GIS Analysis (SELECT)

Cattle Example

Step 5 – Estimate potential loading based on literature values

(*E. coli* produced per AU per day)

~ 5.39 x 10^9 cfu E.coli per AU per day

Total: 1.18 x 10^{17} cfu/yr

Range: 1.19 x 10^{15} – 8.81 x 10^{15}

GIS Analysis (SELECT)

- Identify potential bacteria sources to model in GIS:
  - Domestic Livestock – Cattle
  - Wildlife - Deer, feral hogs
  - Human – OSSFs
  - Urbanized Areas – Stormwater runoff
  - Other potential non-point sources?

Your Input!

- Cattle stocking rates – currently 1AU per 5 acres and 1AU per 12 acres
- 258,560 acres of hay/pasture
- 101,760 acres of rangeland
- **~ 60,236 AU's**

Your Input!

- Feral Hog densities – estimated at 1 hog per 33 acres of habitat (pasture, wetlands, forest, rangeland)
- **16,414 feral hogs** in 541,650 acres of habitat

Your Input!

- Whitetail deer densities – estimated at 1 deer per 19 acres across the watershed
- 30,645 deer across the watershed

Your Input!

- OSSF failure rates – estimated around 15% across the watershed
- ~5,246 OSSFs across the watershed (based on 911 address data)
- **~786 failing OSSFs**

Contact Us!

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