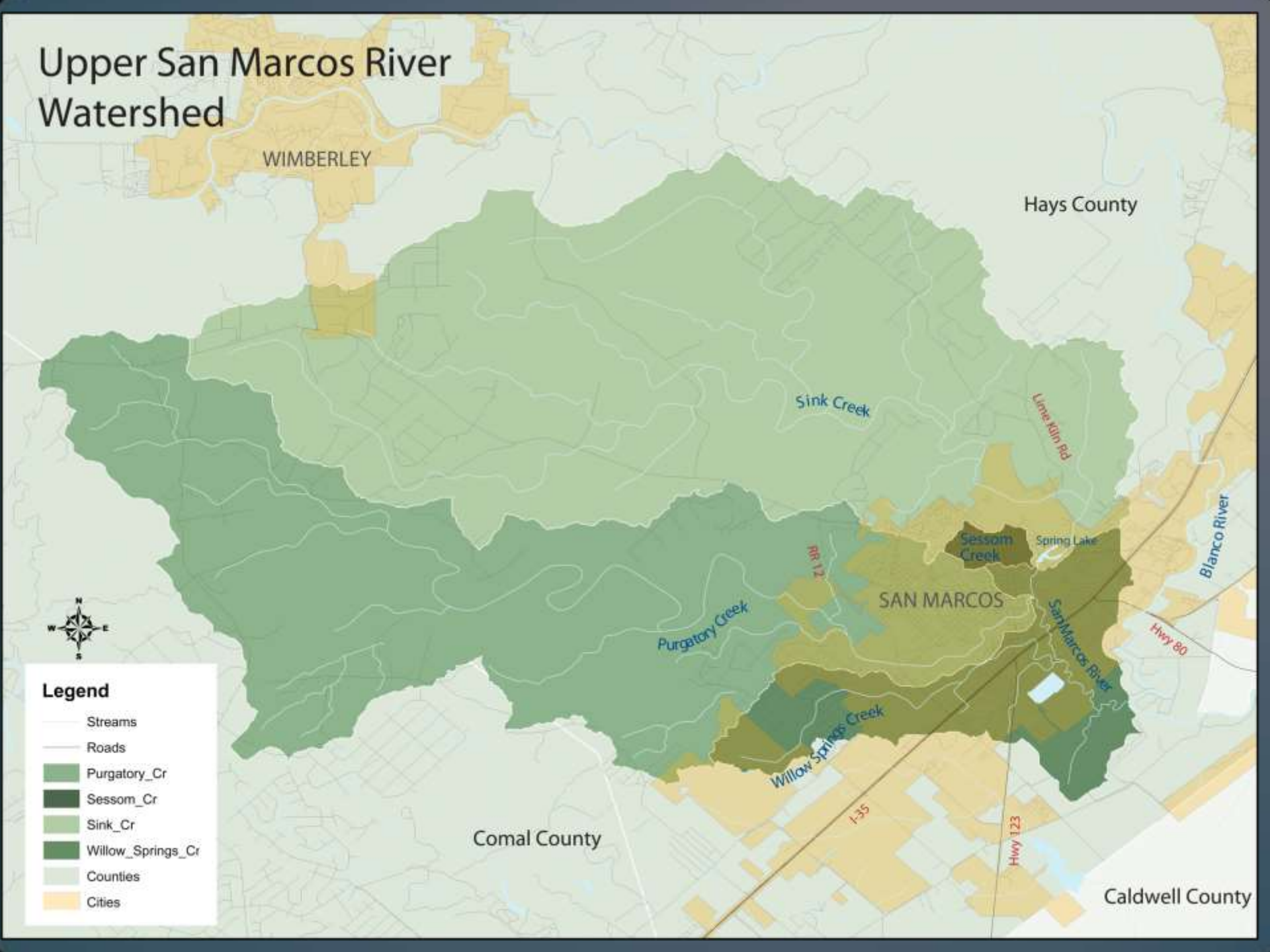
Upper San Marcos River Watershed Protection Planning

CRP Meeting

GBRA

March 26, 2015

SAN MARCOS
WATERSHED INITIATIVE


Upper San Marcos River Watershed
WIMBERLEY
Hays County
Sink Creek
Lime Kiln Rd
Sessom Creek
Spring Lake
RR 12
SAN MARCOS
Purgatory Creek
SanMarcos River
Blanco River
Hwy 80
Willow Springs Creek
I-35
Hwy 123
Comal County
Caldwell County
Legend
Streams
Roads
Purgatory_Cr
Sessom_Cr
Sink_Cr
Willow_Springs_Cr
Counties
Cities

The Upper San Marcos River

- Impaired for elevated Total Dissolved Solids
- Other pollution concerns include:
  - Total Suspended Solids
  - *E. coli*
  - Nutrients
- One of the fastest growing regions in the nation
- A unique ecosystem with constant spring flow and eight endangered and threatened species

Partners


TCEQ


THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT
TEXAS STATE UNIVERSITY


UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY


HAYS COUNTY
STATE OF TEXAS


STATE SOIL AND WATER CONSERVATION BOARD


San Marcos
River Foundation


THE CITY OF
SAN MARCOS


GBRA
GUADALUPE-BLANCO RIVER AUTHORITY


THE TEXAS
CLEAN
RIVERS
PROGRAM


SAN MARCOS
GREENBELT ALLIANCE
www.smgreenbelt.org


NATIONAL
PARK
SERVICE


HABITAT
CONSERVATION
PLAN
EDWARDS
AQUIFER

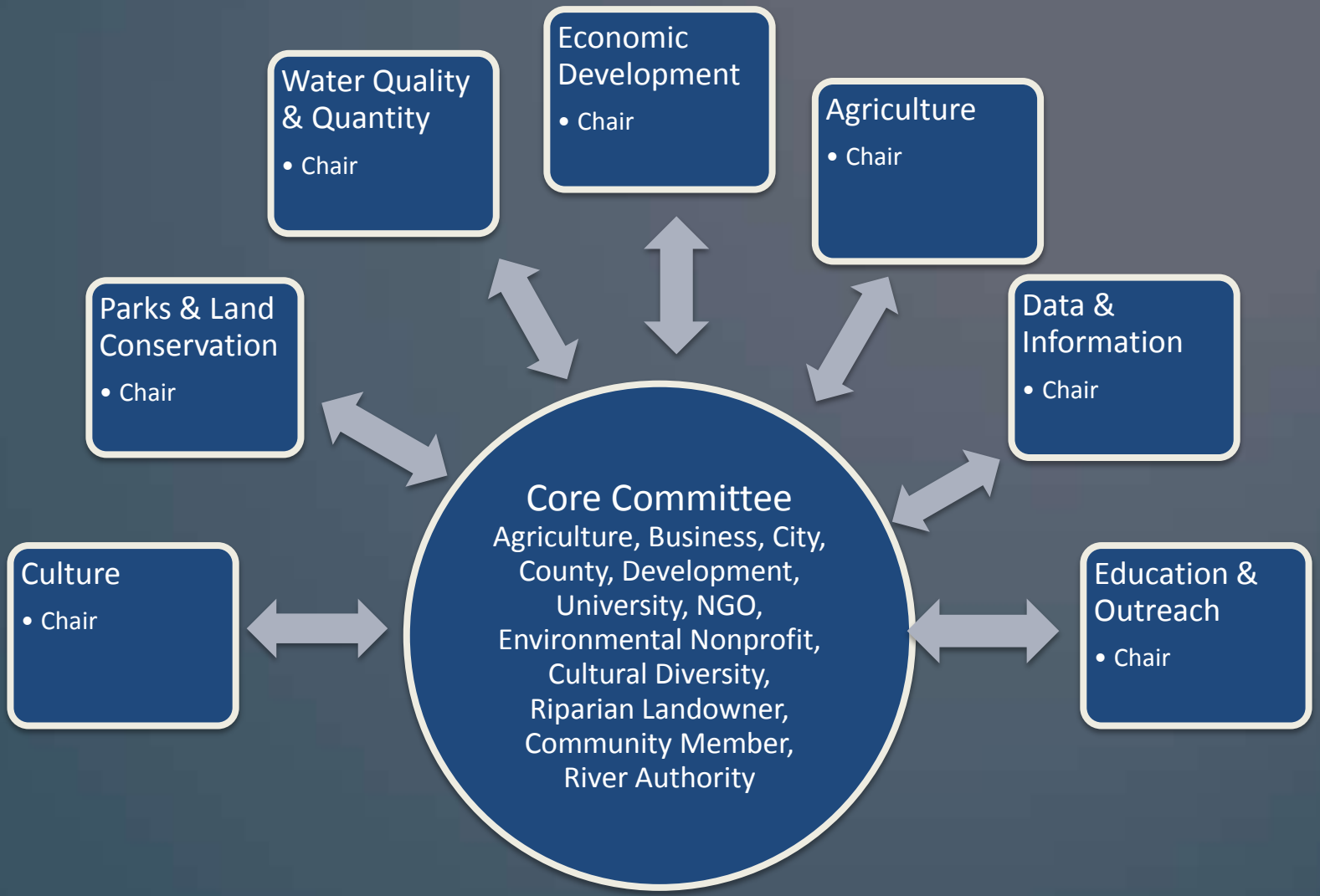

TEXAS STATE
UNIVERSITY
The rising STAR of Texas

Project	2010	2011	2012	2013	2014	2015	2016	2017	Notes
San Marcos Observing System									Meadows Center for Water and the Environment comprehensive study
Spring Lake Underwater Archaeology									Meadows Center for Water and the Environment Underwater Archaeology in Spring Lake
Spring Lake Watershed Characterization									Meadows Center for Water and the Environment analysis of sediment inputs and stakeholder process
San Marcos Watershed Initiative									Meadows Center for Water and the Environment managed Watershed Protection Plan
Water Quality Protection Plan									EAHCP: Protect surface water and groundwater, for habitat for endangered species
Comprehensive Plan									Revised San Marcos comprehensive master plan.
Stormwater Master Plan									Texas state University.
Drainage Master Plan									City plan to address flooding and erosion.
Sessom Creek Study									Sediment removal options to determine the best procedure to remove sand and gravel bar
Texas Pollution Elimination Discharge System									MS4 Regulatory program to control discharges of pollutants into surface waters
Revisions to Construction Standards									Texas State University
Revision to Land Development Code									City of San Marcos
Habitat Conservation Plan									Plan to protect threatened and endangered species associated with the Edwards Aquifer
Texas State Master Plan									Texas State University-San Marcos to review and update of the 2006-2015 Campus Master Plan

SMWI Vision Statement:

"The vision of the San Marcos Watershed Initiative is a healthy watershed that supports a clean, clear, and flowing San Marcos River for the future as it was in the past."

SMWI Stakeholder Committee Structure



Task	Timeframe		
	Year1	Year 2	Year 3
Education & Outreach			
Stakeholder Process			
Data Collection			
Watershed Characterization			
Modeling			
BMP Identification			
Watershed Protection Plan Finalization			
Engaging Stakeholders to Ensure Implementation			

9 Elements of a WPP

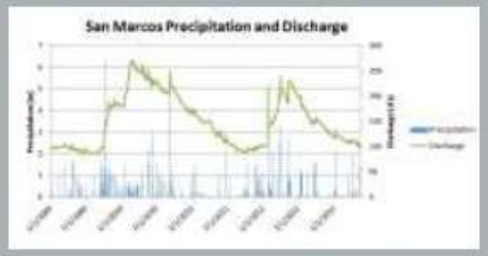
Element
A. Identification of causes & pollution sources
B. Estimated load reductions needed
C. BMPs to achieve load reductions
D. Technical and financial assistance, costs and partners
E. Education and outreach activities
F. Schedule
G. Measureable milestones
H. Criteria for water quality benchmarks
I. Monitoring component to evaluate effectiveness

What it means to implement a WPP

Once WPP is completed, we will submit a proposal for funds to implement highest priority WPP activities.

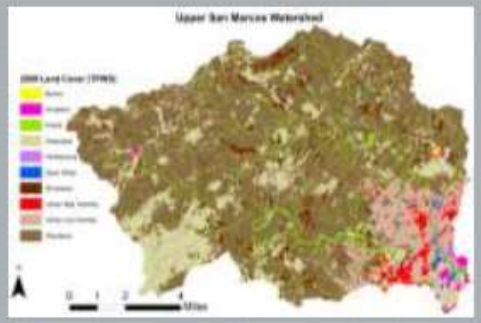
- Acceptance of WPP from EPA, TCEQ and Community
- Partnership between MCWE, TCEQ and Communities to execute tasks
- 60% funding & 40% financial/in-kind match for all activities
- One year lag time in funding (not before Sept, 2016)

Modeling – BASINS & HSPF



(Precipitation & Discharge)

+



(Land Use Land Cover)

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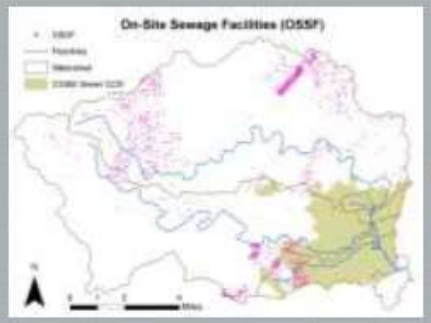

(Septic)

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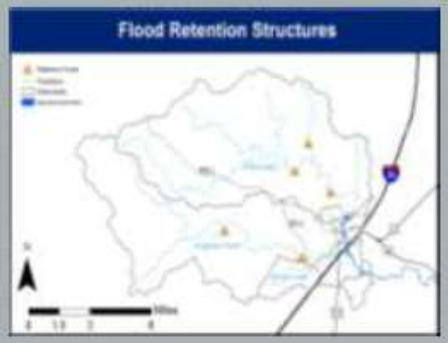

(Flood Structures)

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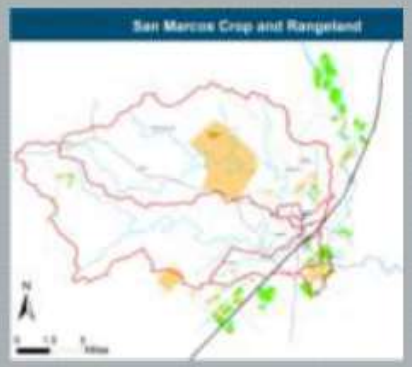


(Agriculture)

+

(WQ data)

+

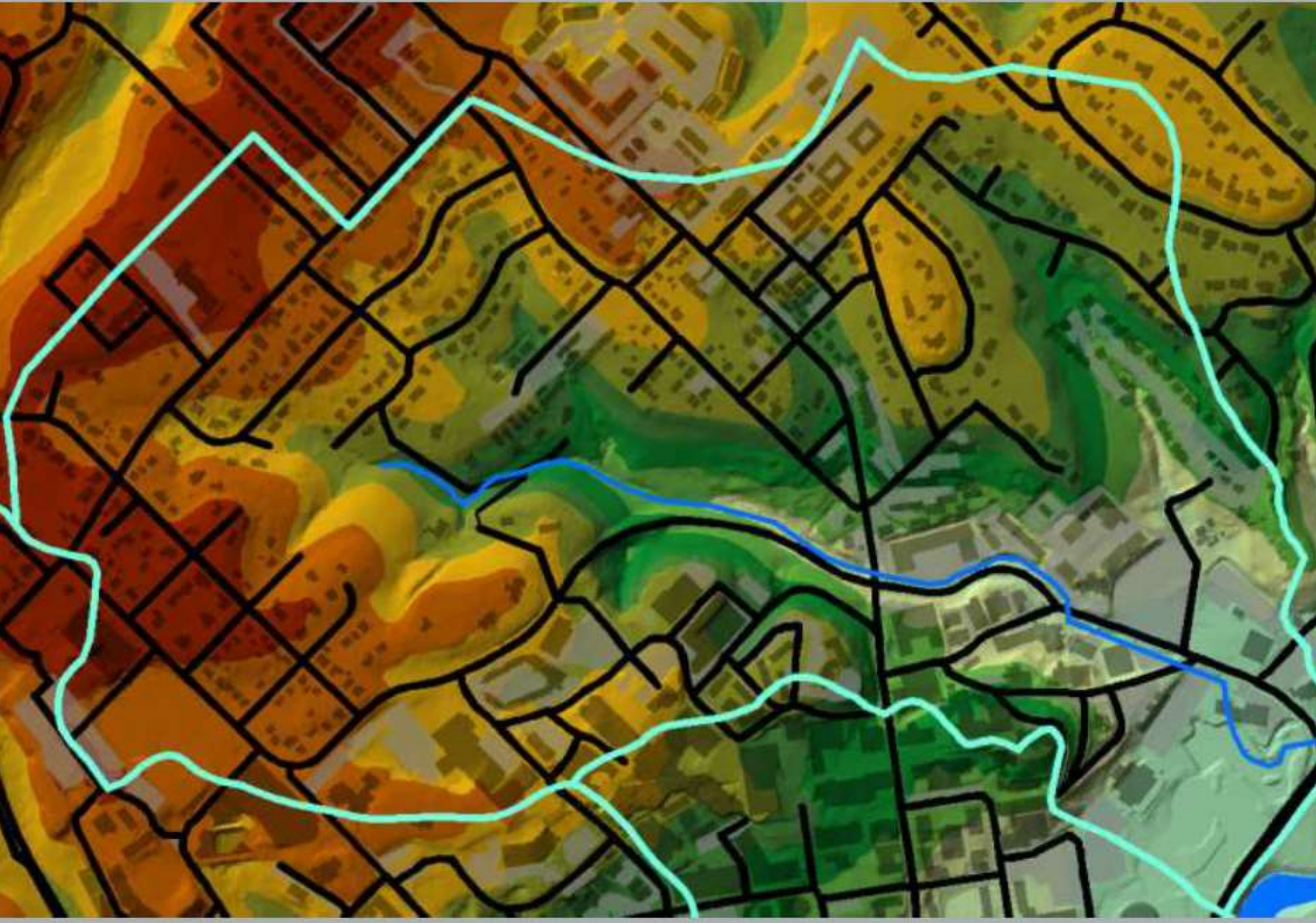
(Pets & Wildlife)

+ (Topography)

(Soils)

=

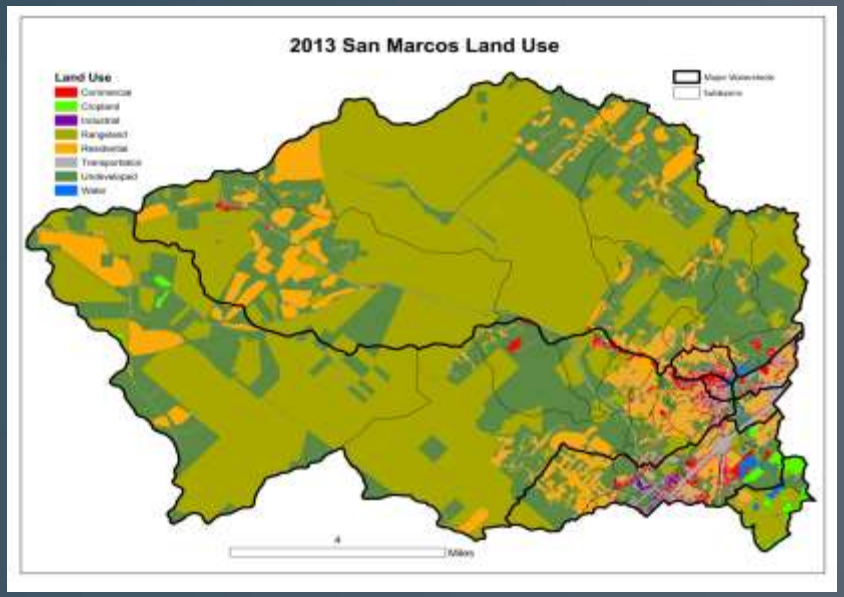
Receiving Water	Na	P	DO	BOD	Am	eColi	TSS
Sink Creek	?	?	?	?	?	?	?
Sessom	?	?	?	?	?	?	?
Sewell Park	?	?	?	?	?	?	?
Purgatory	?	?	?	?	?	?	?
Willow Creek	?	?	?	?	?	?	?



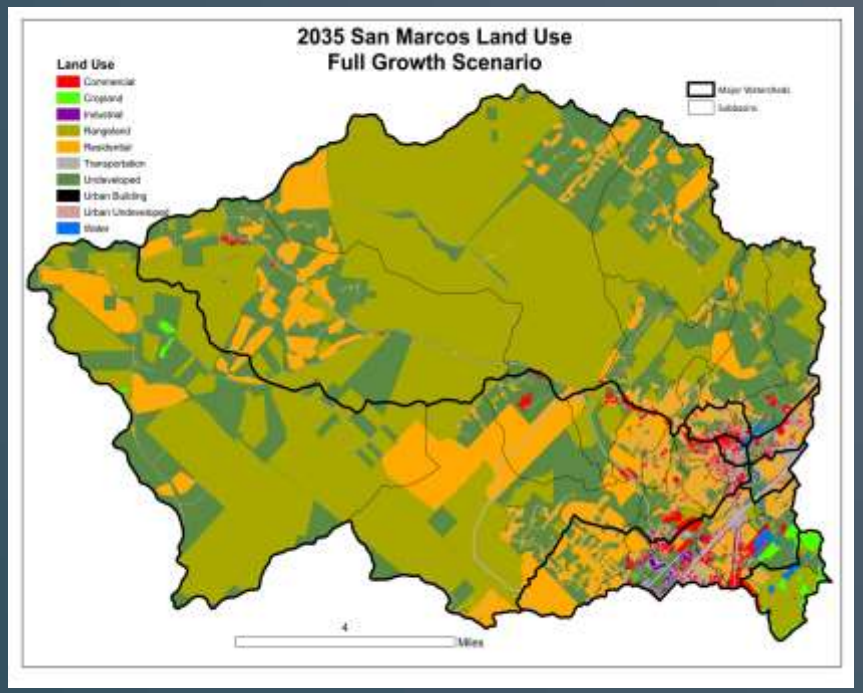
Example of Resolution- Sessoms Creek Watershed

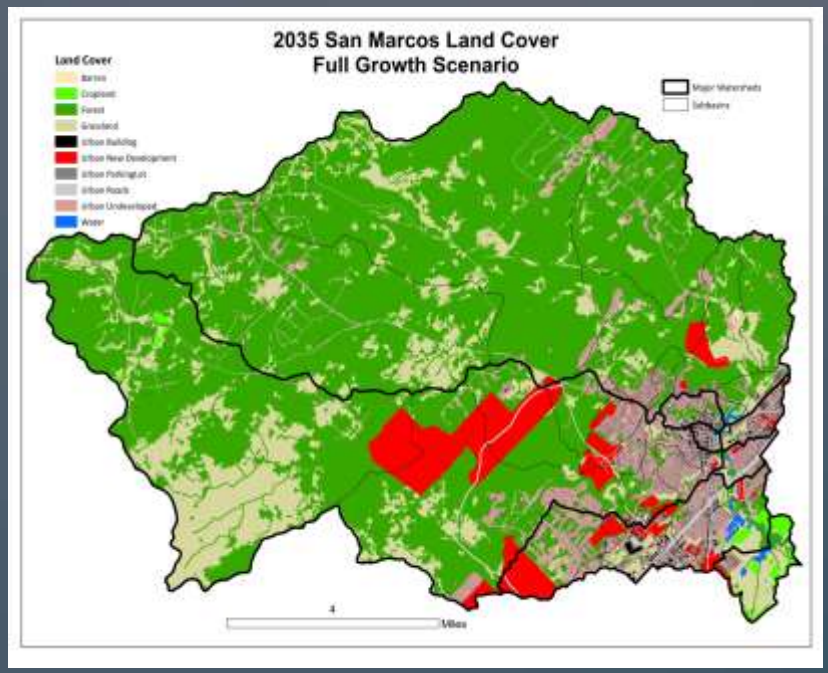
Table 5.1. EMC estimates for selected NPS constituents (*from Baird et al., 1996*).

Constituent	Land Use						
	Residential	Commercial	Industrial	Transportation	Cropland	Rangeland	Undev/Open
Total Nitrogen (mg/L)	1.82	1.34	1.26	1.86	4.40	0.70	1.50
Total Kjeldahl Nitrogen (mg/L)	1.50	1.10	0.99	1.50	1.7	0.20	0.96
Nitrate + Nitrite (mg/L as N)	0.23	0.26	0.30	0.56	1.6	0.40	0.54
Total Phosphorus(mg/L)	0.57	0.32	0.28	0.22	1.3	<0.01	0.12
Dissolved Phosphorus(mg/L)	0.48	0.11	0.22	0.10	--	--	0.03
Suspended Solids(mg/L)	41.0	55.5	60.5	73.5	107	1.0	70
Dissolved Solids(mg/L)	134	185	116	194	1225	245.0	--
Total Lead (µg/L)	9.0	13.0	15.0	11.0	1.5	5.0	1.52
Total Copper (µg/L)	15.0	14.5	15.0	11.0	1.5	<10	--
Total Zinc (µg/L)	80	180	245	60	16	6.0	--
Total Cadmium (µg/L)	0.75	0.96	2.0	< 1	1.0	<1.0	--
Total Chromium (µg/L)	2.1	10.0	7.0	3.0	<10.0	7.5	--
Total Nickel (µg/L)	< 10	11.8	8.3	4.0	--	--	--
BOD (mg/L)	25.5	23.0	14.0	6.4	4.0	0.5	--
COD (mg/L)	49.5	116	45.5	59	--	--	40
Oil and Grease (mg/L)	1.7	9.0	3.0	0.4	--	--	--
Fecal Coliform(colonies/100 ml)	20,000	6,900	9,700	53,000	--	37	--
Fecal Strep.(colonies/100 ml)	56,000	18,000	6,100	26,000	--	--	--


2013 San Marcos Land Use
Land Use
Commercial
Cropland
Industrial
Rangeland
Residential
Transportation
Undeveloped
Water
Major Watersheds
Subbasins
4
Miles

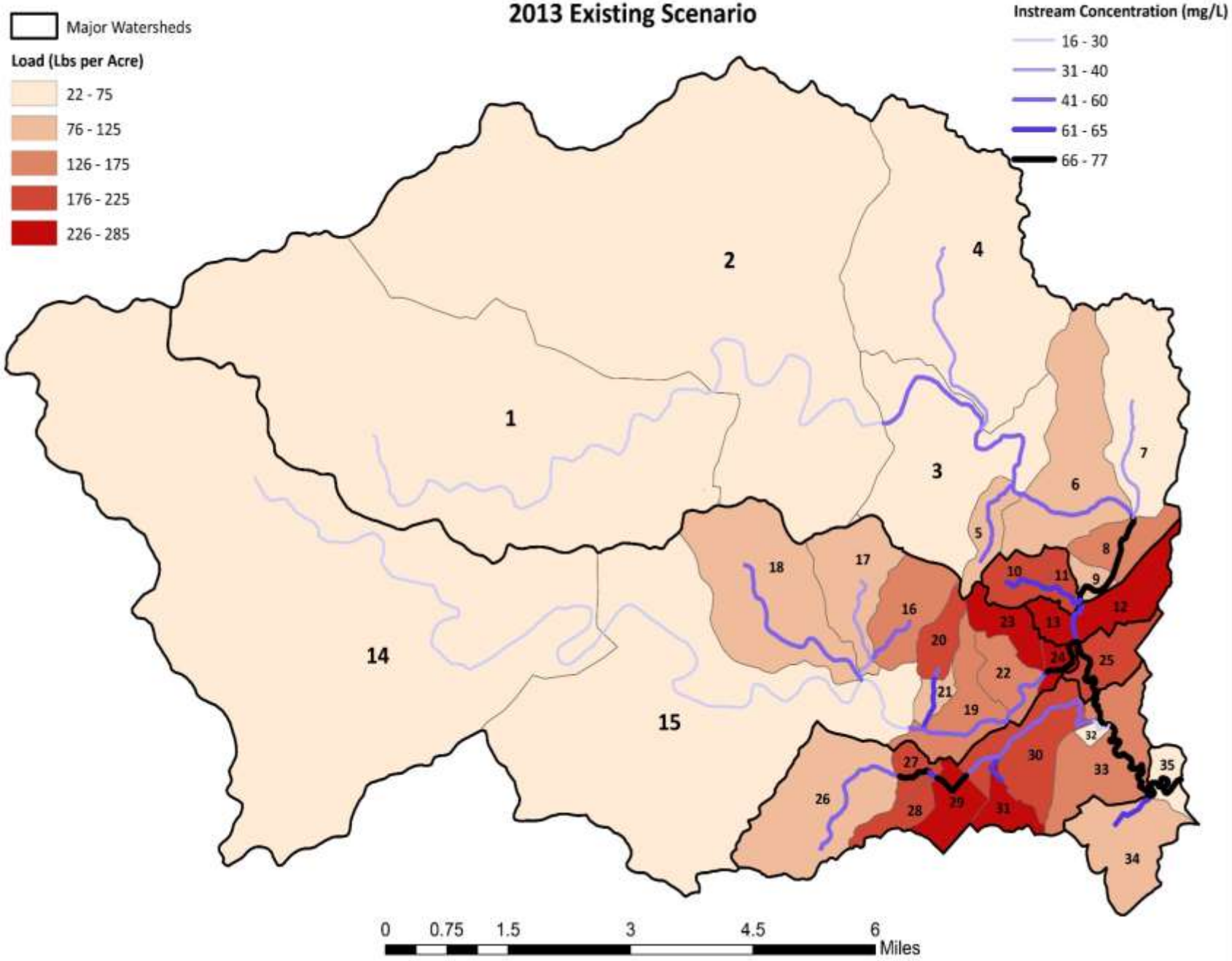

2013 San Marcos Land Cover
Land Cover
Barren
Cropland
Forest
Grassland
Urban Building
Urban Parkinglot
Urban Roads
Urban Undeveloped
Water
Major Watersheds
Subbasins
4
Miles


2035 San Marcos Land Use
Full Growth Scenario
Land Use
Commercial
Cropland
Industrial
Rangeland
Residential
Transportation
Undeveloped
Urban Building
Urban Undeveloped
Water
Major Watersheds
Subbasins
4
Miles


2035 San Marcos Land Cover
Full Growth Scenario
Land Cover
Barren
Cropland
Forest
Grassland
Urban Building
Urban New Development
Urban Parkinglot
Urban Roads
Urban Undeveloped
Water
Major Watersheds
Subbasins
4
Miles

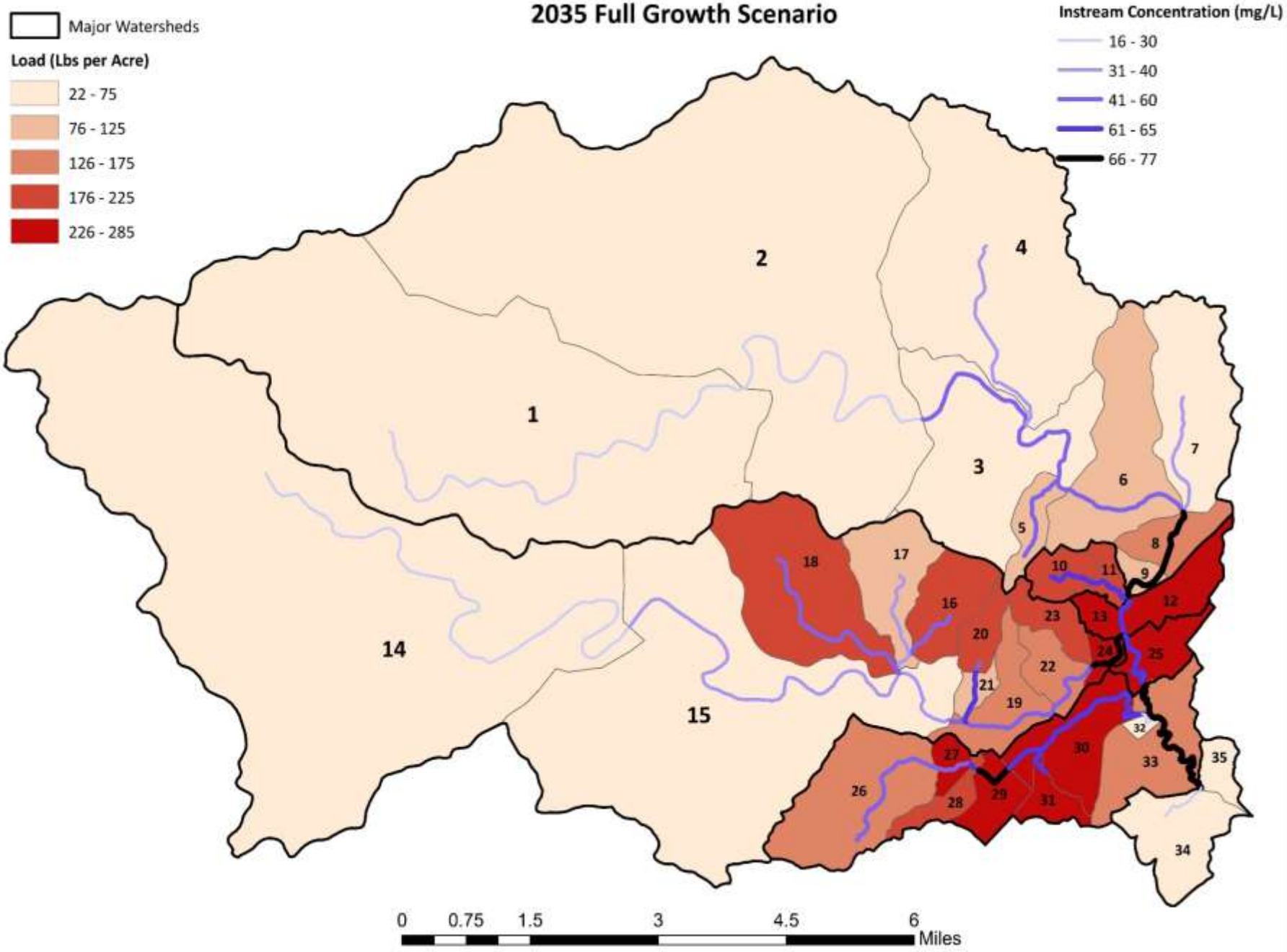
Potential Total Suspended Solids Loadings

2013 Existing Scenario



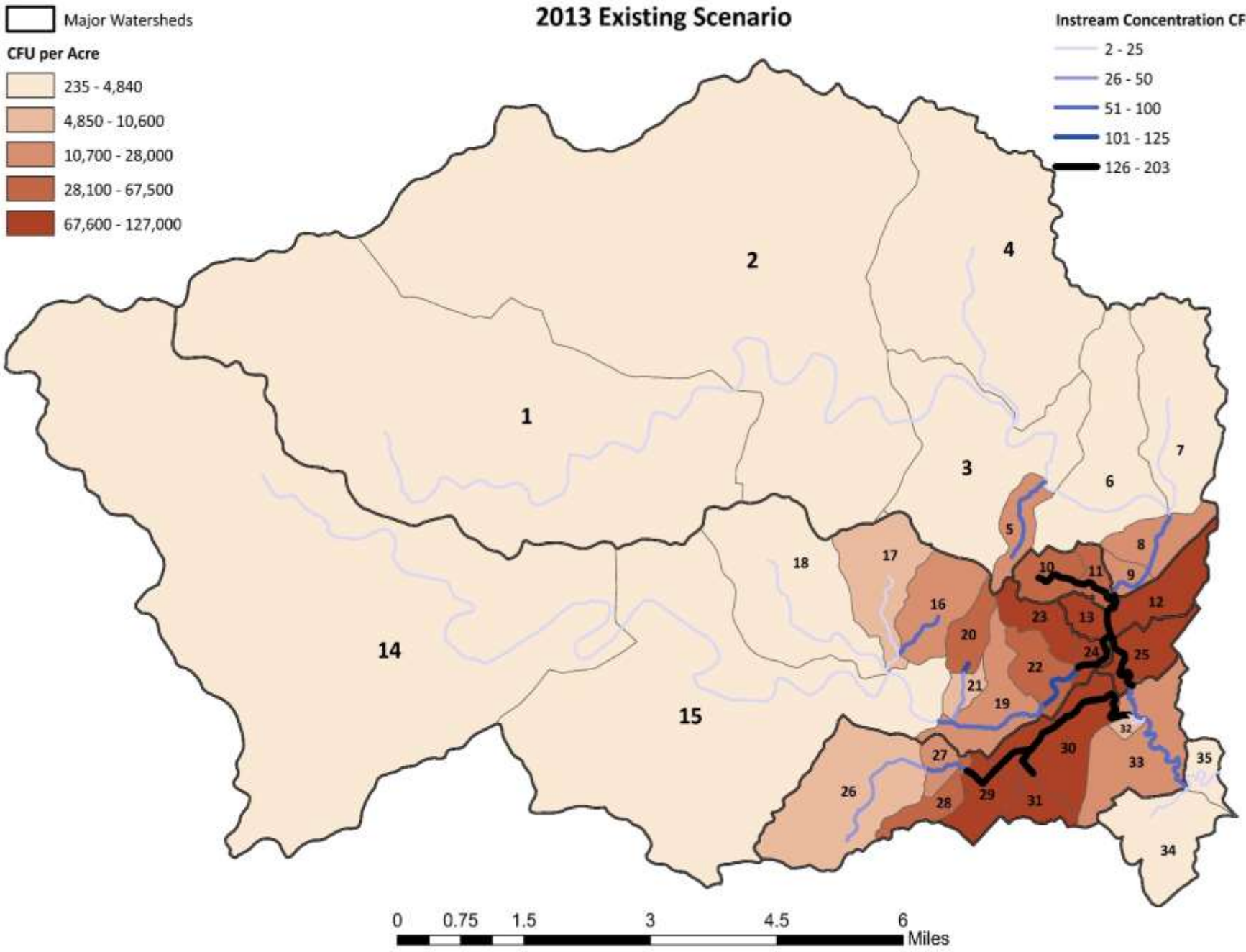
Potential Total Suspended Solids Loadings

2035 Full Growth Scenario



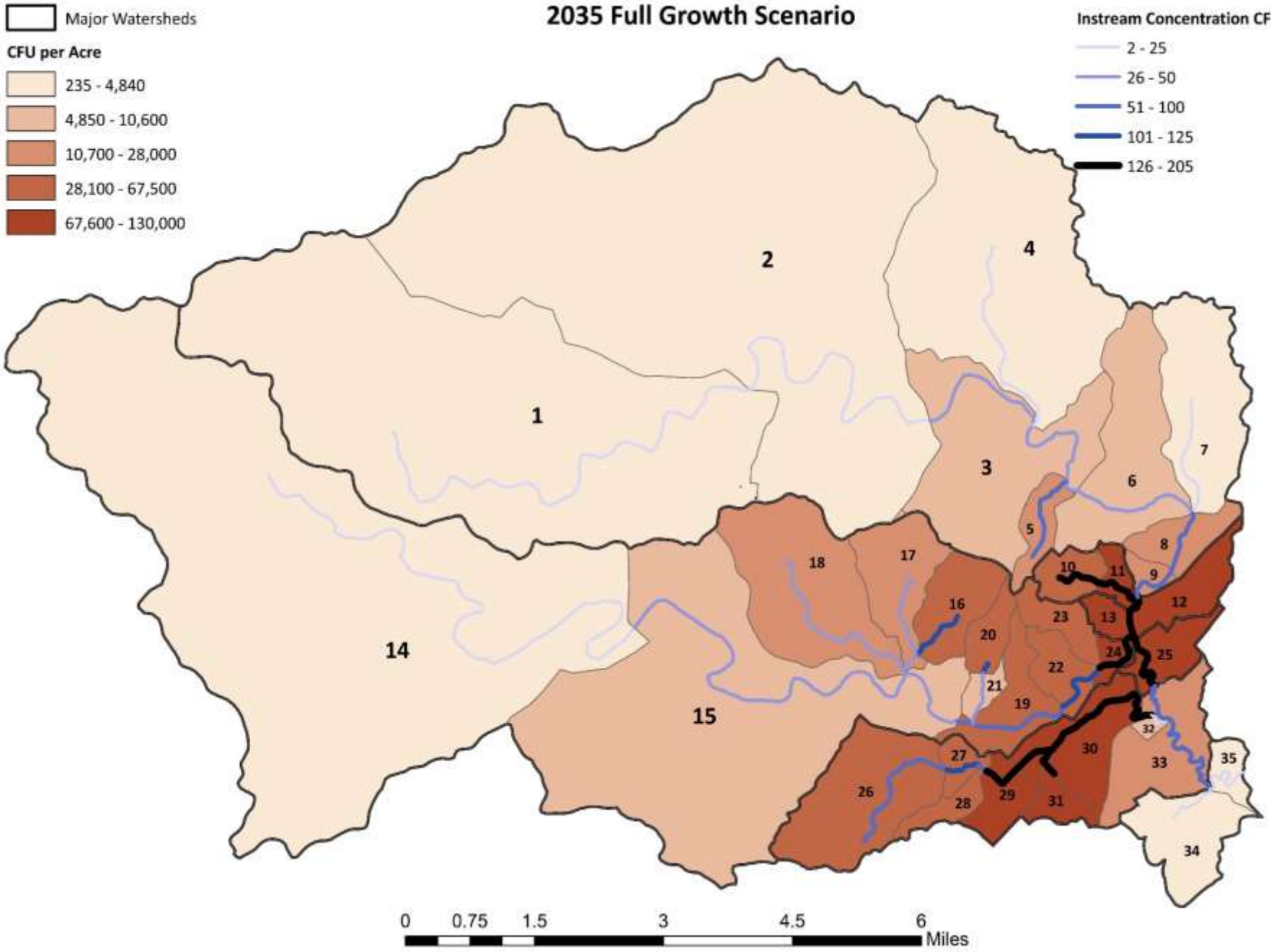
Potential Ecoli Bacteria Loadings

2013 Existing Scenario



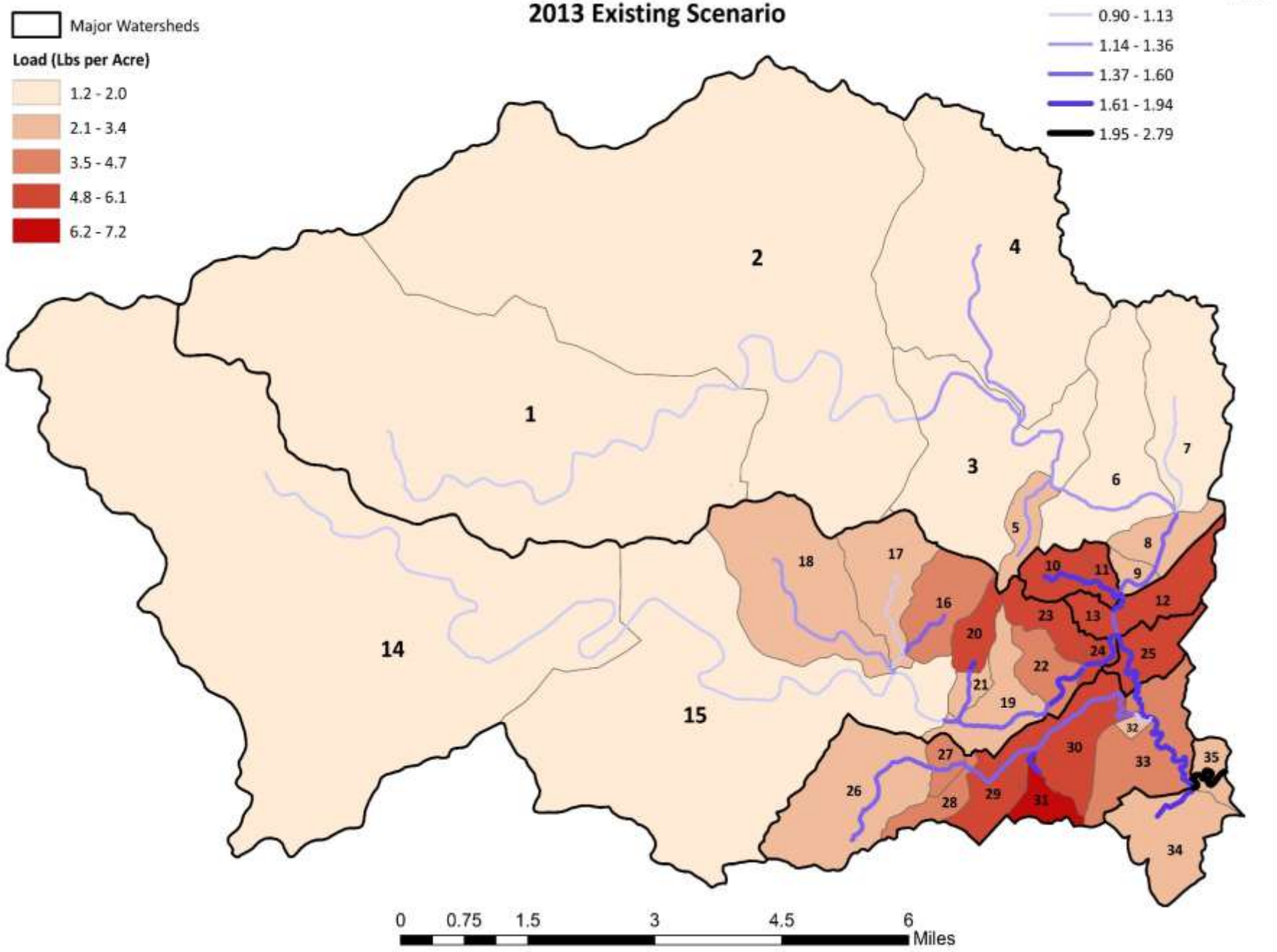
Potential Ecoli Bacteria Loadings

2035 Full Growth Scenario



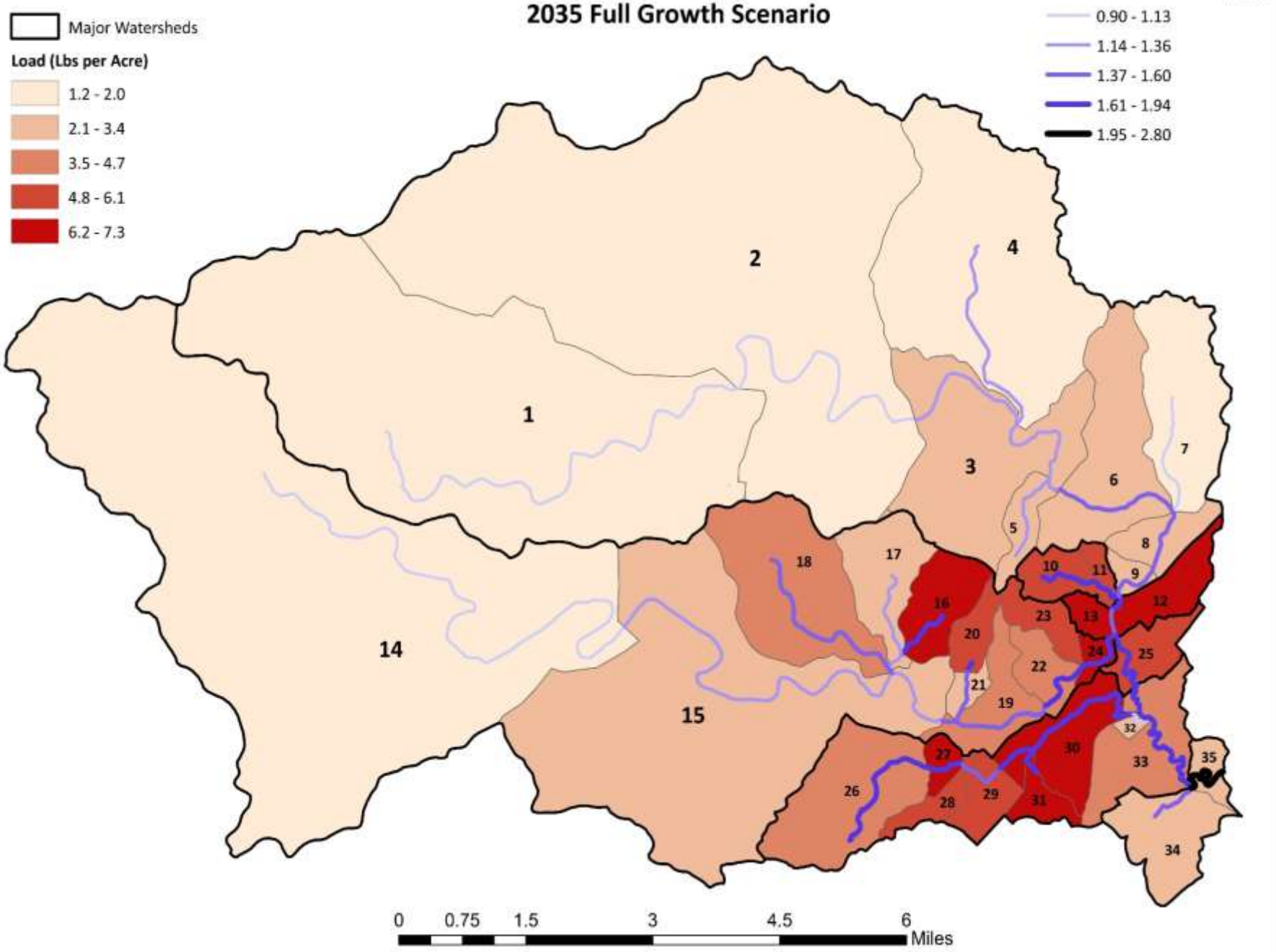
Potential Total Nitrogen Loadings

2013 Existing Scenario



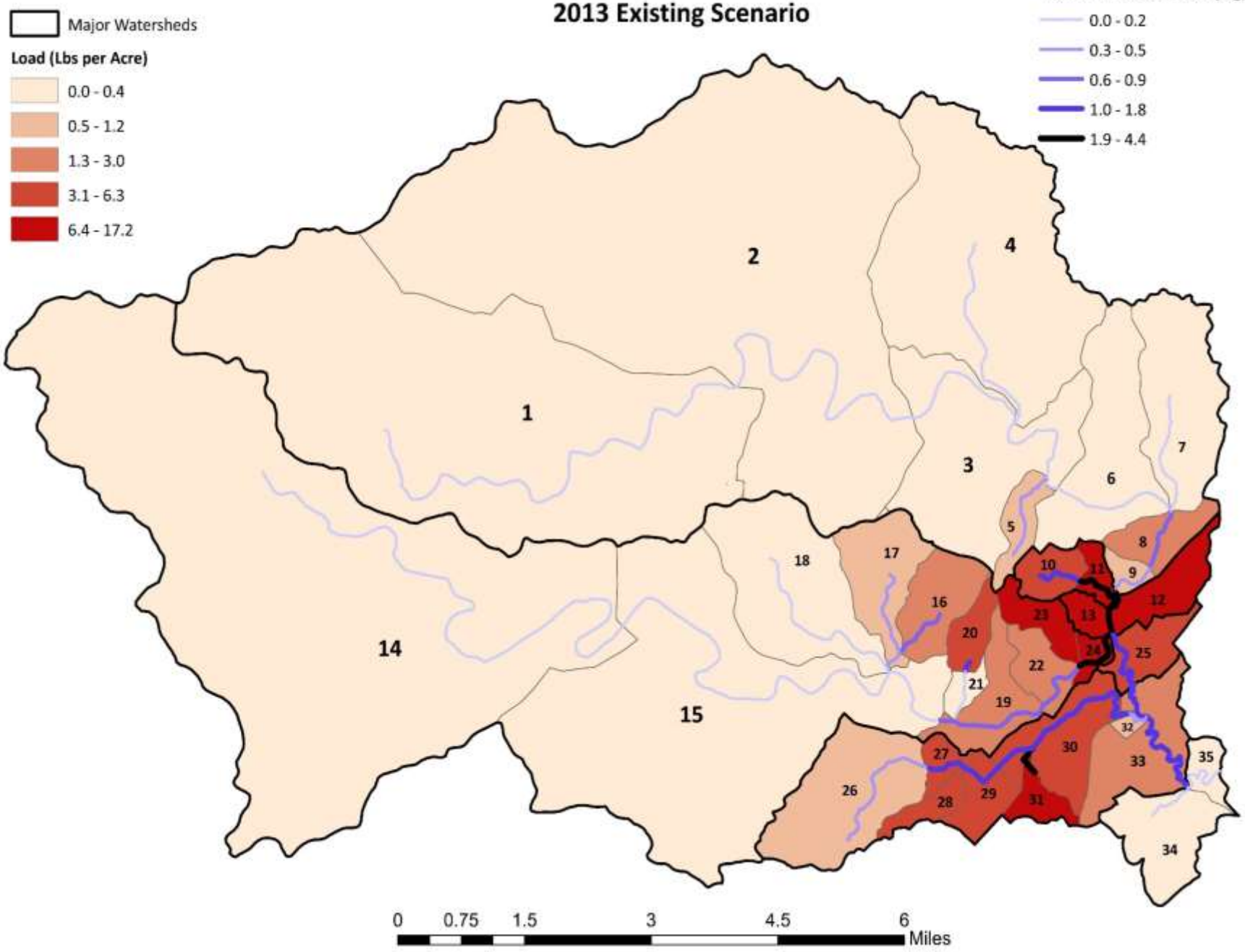
Potential Total Nitrogen Loadings

2035 Full Growth Scenario



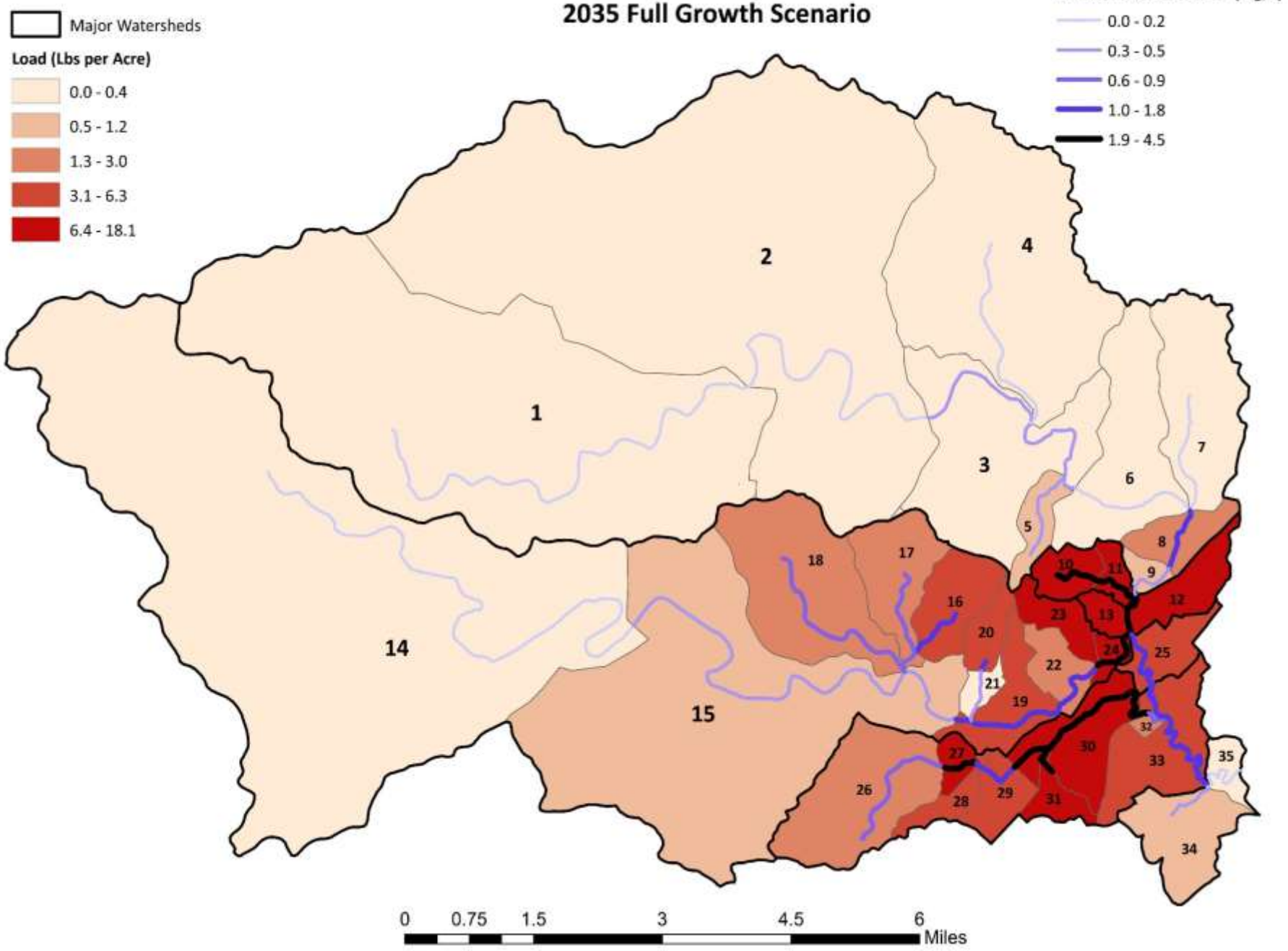
Potential Oil and Grease Loadings

2013 Existing Scenario



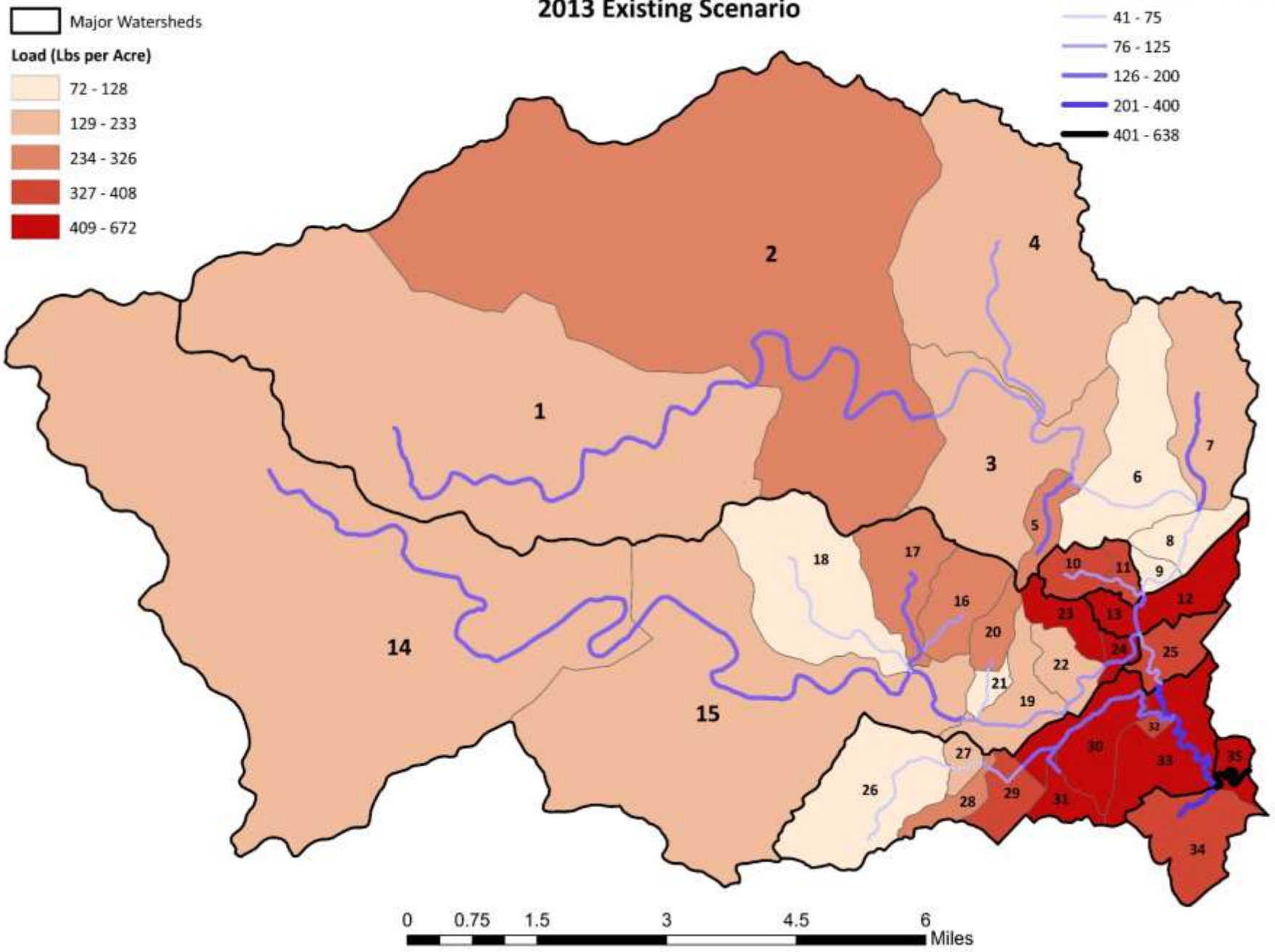
Potential Oil and Grease Loadings

2035 Full Growth Scenario



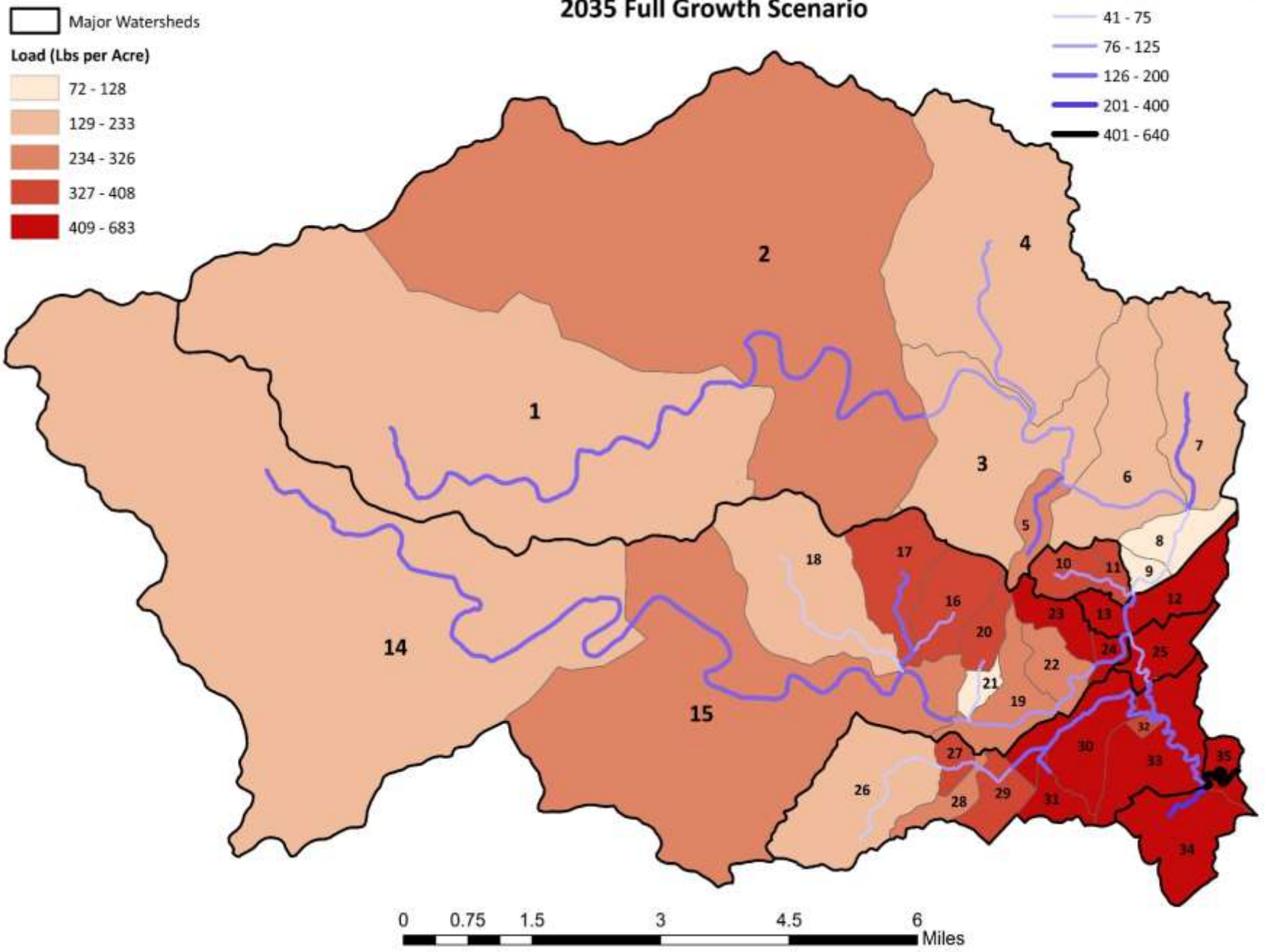
Potential Total Dissolved Solids Loadings

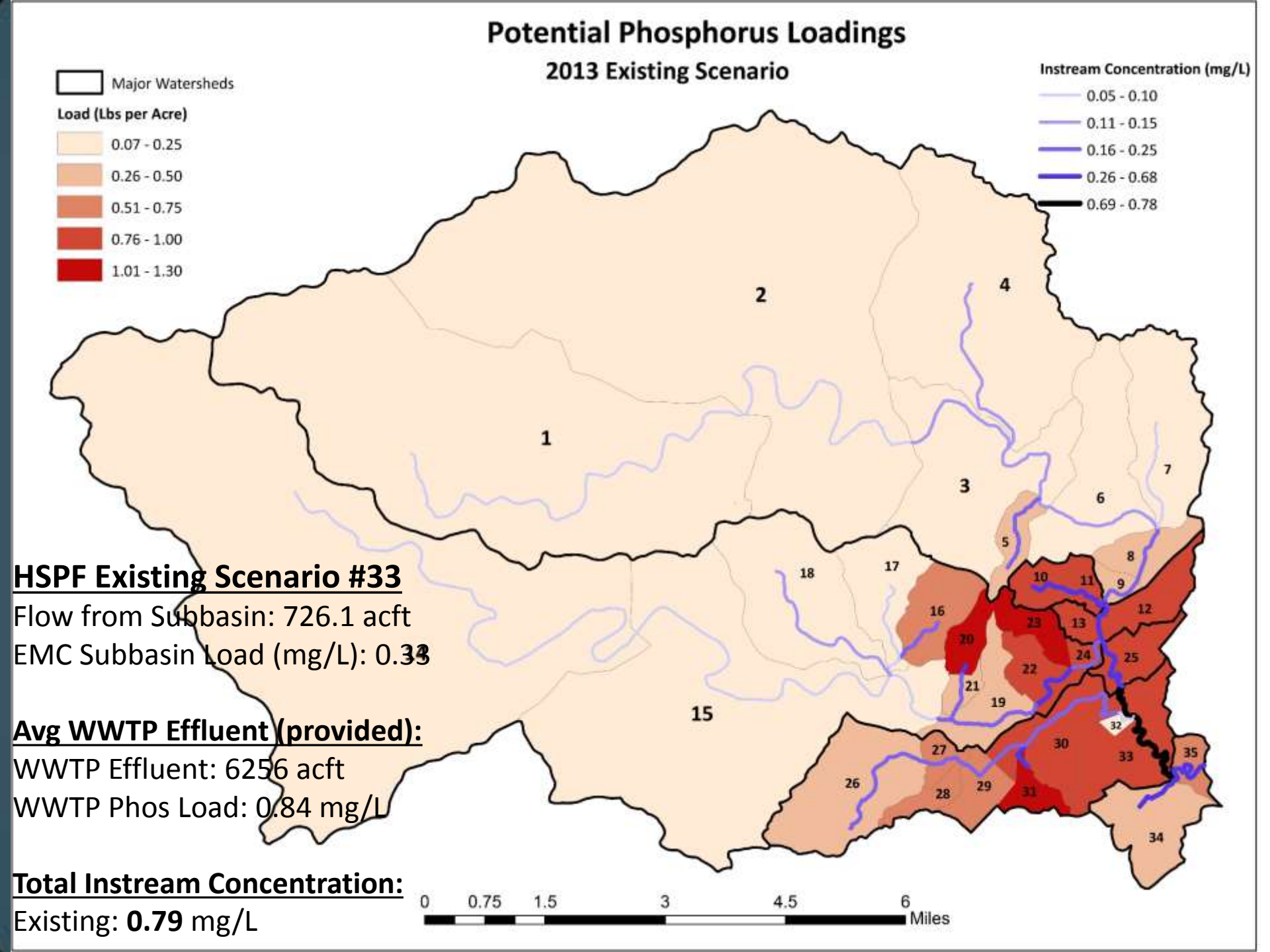
2013 Existing Scenario



Potential Total Dissolved Solids Loadings

2035 Full Growth Scenario





HSPF Existing Scenario #33

Flow from Subbasin: 726.1 acft

EMC Subbasin Load (mg/L): 0.33

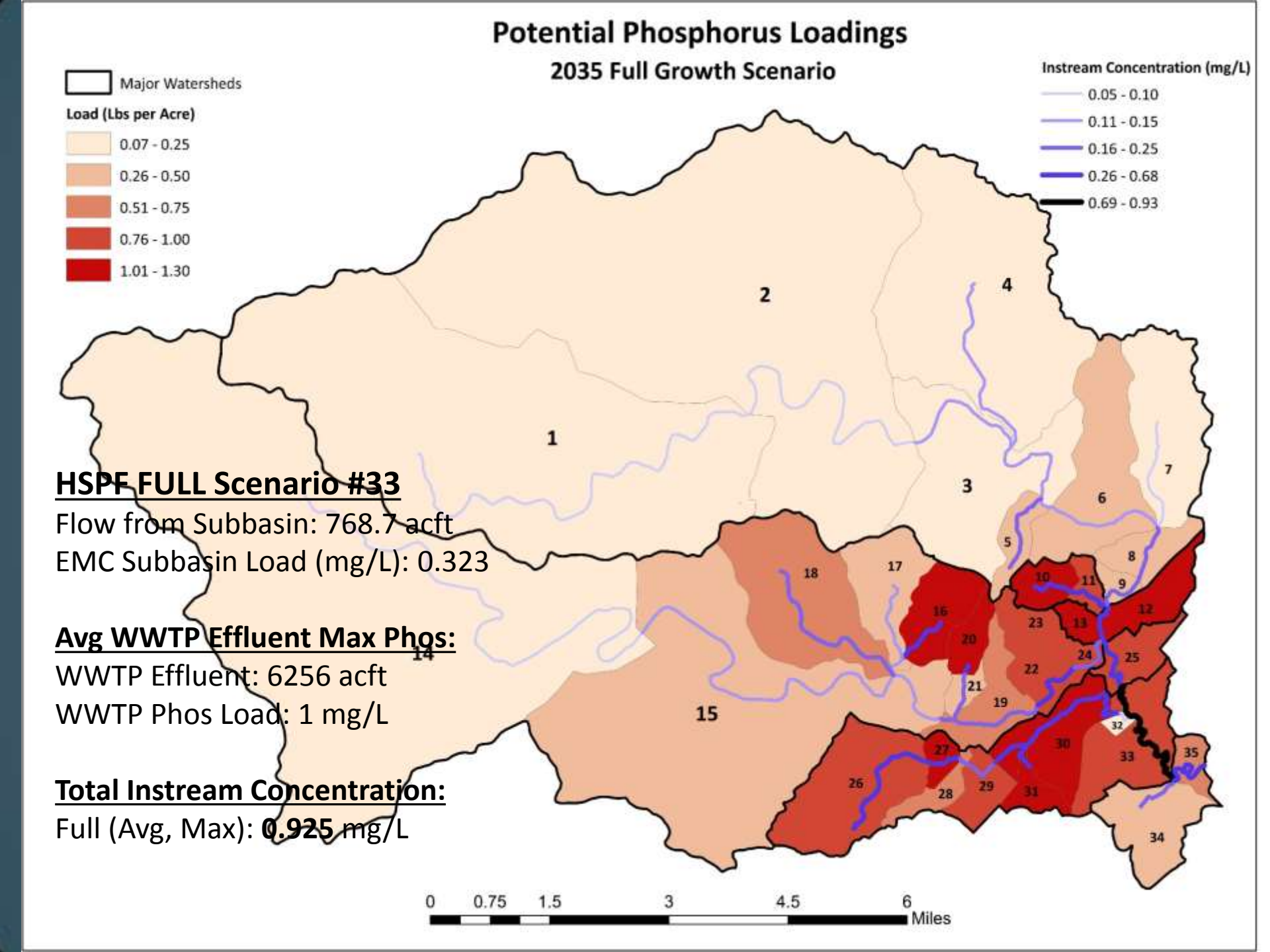
Avg WWTP Effluent (provided):

WWTP Effluent: 6256 acft

WWTP Phos Load: 0.84 mg/L

Total Instream Concentration:

Existing: **0.79** mg/L



HSPF FULL Scenario #33

Flow from Subbasin: 768.7 acft

EMC Subbasin Load (mg/L): 0.323

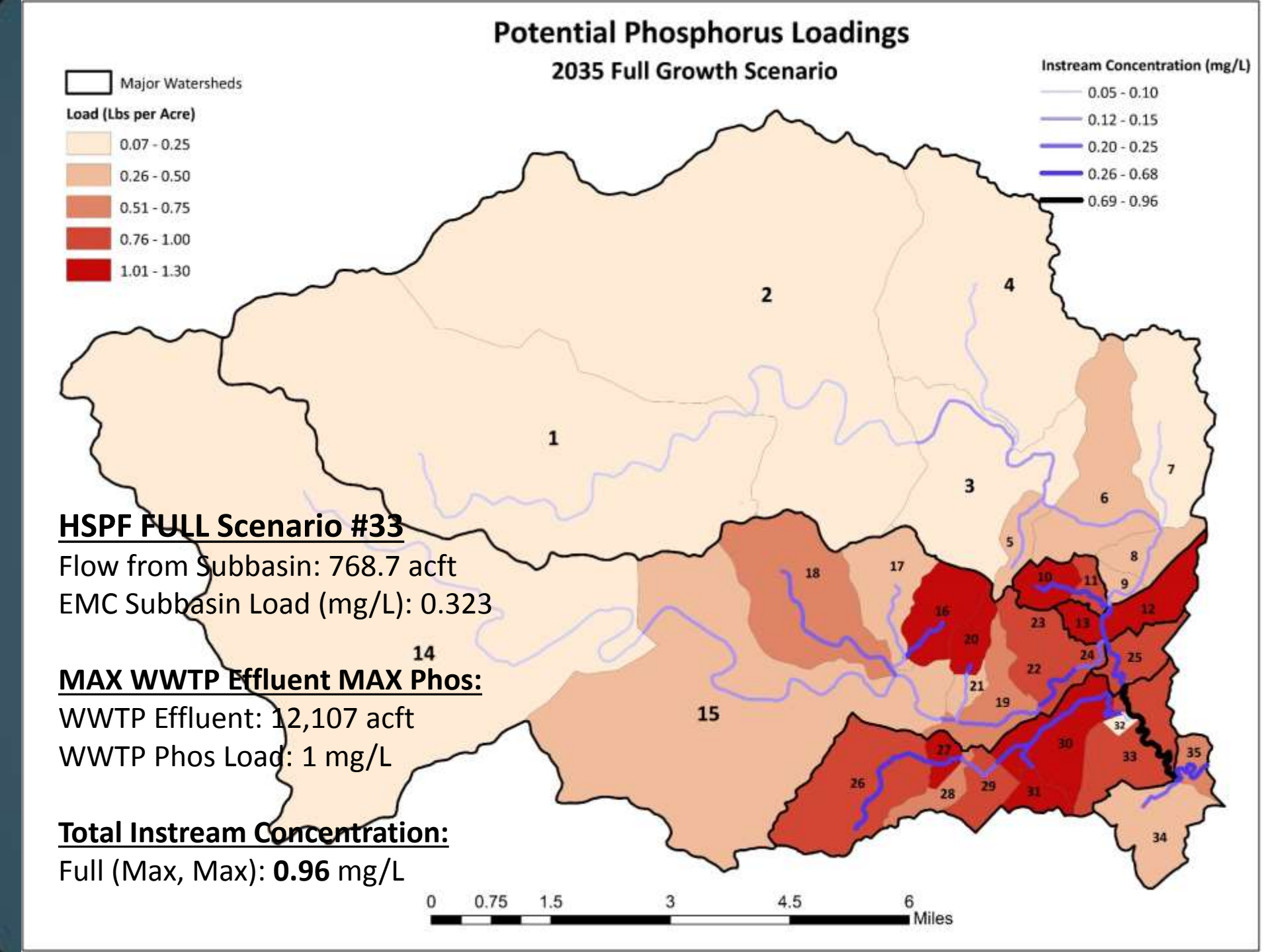
Avg WWTP Effluent Max Phos:

WWTP Effluent: 6256 acft

WWTP Phos Load: 1 mg/L

Total Instream Concentration:

Full (Avg, Max): **0.925** mg/L



HSPF FULL Scenario #33

Flow from Subbasin: 768.7 acft

EMC Subbasin Load (mg/L): 0.323

MAX WWTP Effluent MAX Phos:

WWTP Effluent: 12,107 acft

WWTP Phos Load: 1 mg/L

Total Instream Concentration:

Full (Max, Max): **0.96** mg/L

Standards, Screening Levels and Stakeholder Targets

	Mg/L								#/100ml
Parameter	Cl^{-1}	SO_4^{-2}	TDS	DO	TSS (for base flow and average storm events)	Nitrogen nitrate	Phosphorus	Oil and Grease	E. coli (Geomean)
State Standard/ Screening level	50	50	400	6.0	5.0	1.95	.69	N/A	126
Target A (% change Improvement from State Standard/Screening Level)	45 (10%)	45 (10%)	380 (5%)	6.6 (10%)	4.5 (10%)	1.775 (9%)	.621 (10%)	5.0*	113.4 (10%)
Target B (% change Improvement from State Standard/Screening Level)	40 (20%)	40 (20%)	360 (10%)	7.2 (20%)	4.0 (20%)	1.60 (18%)	.55 (20%)	5.0*	101 (20%)

Load Reductions Needed

Table 38. Future Load Reductions needed in Lb/yr and Billion CFUs

Subbasin Number	Parameter	Instream Concentration (mg/L or *CFU/100mL)	Land Based Load (lb/yr or *billion CFU/yr)	Difference in Concentration Required At Standard/Screening Level (mg/L and Geomean *CFU/100mL)	Load Reduction Required At Standard/Screening Level (lb/yr or *billion CFU/yr)	Difference in concentration Required For Target A Level (mg/L and Geomean *CFU/100mL)	Load Reduction Required For Target A Level (lb/yr or *billion CFU/yr)	Difference in concentration Required For Target B Level (mg/L and *CFU/100mL for *E. coli*)	Load Reduction Required For Target B Level (lb/yr or *billion CFU/yr)
10	*E. coli*	132.74*	79673.10*	6.74*	4045.61*	19.34*	11608.36*	31.74*	19051.07*
10	Nitrogen	1.64	1509.25	---	---	---	---	0.04	38.97
11	*E. coli*	140.73*	43597.86*	14.73*	4564.38*	27.33*	8467.73*	39.73*	12309.12*
11	Nitrogen	1.62	769.30	---	---	---	---	0.02	10.45
12	*E. coli*	179.76*	188386.30*	53.76*	56342.56*	66.36*	69546.93*	78.76*	82541.71*
12	Nitrogen	1.66	2664.28	---	---	---	---	0.06	97.20
13	*E. coli*	165.18*	61613.24*	39.18*	14614.63*	51.78*	19314.49*	64.18*	23939.75*
16	*E. coli*	104.36*	144929.62*	---	---	---	---	3.36*	4664.02*
16	Nitrogen	1.64	3492.94	---	---	---	---	0.04	91.03

Subwatershed to Use	Management Measure	BMP	Cost	TSS	Sediment	N	Bacteria	P	Oil & Grease	Water Quantity	Metals	Q	COD	Source
13, 23, 24, 33, 35	WQPP	Vegetated Buffers	$4,500	85 %	---	25 %	---	50 %	---	---	---	---	---	---
10, 16, 20, 24, 25, 27, 31, 34	WQPP	Vegetative Filter Strips	$7/lin ft seed, $22/lin ft sod, $13,000-30,000/acre-$0.30/ft2 seed, $0.70/ft2 sod ($3.20-7.41/m2), Maintenance-$350/ac/year Native Filter Strip by EQIP- $255/ac	---	76 %	41 %	---	---	---	---	78 %	---	---	https://www.casqa.org/sites/default/files/downloads/socallid-manual-final-040910.pdf
31	Planning and Management	Water-Intensive Turf Grass Regulation/Ban	Ordinance development + Cost to replace grass per household/ft2, Incentives = $20/100ft2 replaced with natives, Up to ½ staff person salary for project management/enforcement	---	---	---	---	---	---	---	---	---	---	---
10, 11, 12, 13, 16, 20, 22, 23, 24, 25, 26, 27, 29, 30, 31,	WQPP	Wet Pond	$1.90 per CF storage	83 %	89 %	22 %	2693/446.4	50 %	---	---	89 %	---	---	https://www.casqa.org/sites/default/files/downloads/socallid-

Thank you!

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