



# Bosque River Watershed Initiative August 2008





US Army Corps  
of Engineers

Fort Worth District

# *Agenda*



Comprehensive Plan – Stacy Gray

Conservation Planning – Steve Bednarz

Modeling– Dr. R. Srinivasan

Tonk Creek Demonstration Project – Dr. R. Srinivasan

Gilmore Creek Demonstration Project – Dr. Larry Hauck

Streamflow & Water Quality Monitoring – Dr. Larry Hauck

Funding Streams & Requirements – Stacy Gray

Q&A and Issue Resolution – facilitated by Stacy Gray



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# *Historical Perspective*



## Fort Worth District

- 1990: North Bosque identified as nutrient impaired (TCEQ & TSSWCB)
- 1992 – 2000: Texas A&M BREC and TIAER collaborative efforts in Bosque River watershed
- 1992 – Present: BRA, TCEQ, TSSWCB, USEPA & USDA-NRCS fund water quality studies & monitoring
- 2000 – 2006/07: TSSWCB & TCEQ compost assistance
- 2001 TMDL adopted; 2002 I-Plan approved; 2004 TMDL re-evaluation begins
- 2005 – Present: USACE funds for Infrastructure Plan
- 2007: Individual permit applications CAFOs (TCEQ)



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# *Comprehensive Plan*



- Directed by WRDA '07, Sec 5139
- Draft completed; will be finalized upon receipt of Implementation Guidance for the project
- Identifies participating agencies and their roles
- Outlines the concept of operations and key components of the operation
- Identifies two demonstration project areas
- Defines schedule and budget for the demonstration projects
- Outlines program and project governance and the communication plan



**BOSQUE RIVER WATERSHED** *Environmental Infrastructures*

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[Project Phases](#)

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The Bosque River watershed has a drainage area of more than 1,600 square miles, extending northwest from the city of Waco in McLennan County to parts of Bosque, Coryell, Hamilton, and Erath counties. The Bosque River serves as the primary drinking water supply for more than 200,000 people.

Water quality monitoring in the watershed has shown high levels of nutrients and bacteria that have contributed to excessive growth of algae and other aquatic plants in the river. Total Maximum Daily Load analyses for the river suggest that dairy waste application fields, municipal discharges and other lesser sources contribute to these high nutrient and bacteria loads.

In an effort to better manage potential sources of point and non-point source pollution, this series of projects was designed to evaluate the physical characteristics of the watershed, evaluate the effectiveness of recommended management practices and to develop an estimation of the anticipated benefits of implementing these practices. The project can be broken into four individual components or phases. Phase I consisted of establishing and convening a scientific advisory committee that provided guidance on the types of management practices that may be considered in the future and assisted in the development of a GIS representation of the watershed. Phase II built upon earlier work and used the SWAT model to evaluate the impacts of implementing recommended management practices in the watershed. This phase also included the development of a report that described the recommended management practices in detail and provided general information on site selection, installation, operation, maintenance and expected effectiveness of each of these practices. Phase III tasks will be an on-the-ground planning effort and practice verification using to estimate load reductions prior to implementation. Phase IV would begin the implementation process and will be focused on two initial sub-watersheds within the Bosque River watershed. More detailed information about each phase of the project can be found by clicking on that specific phase's link to the left.

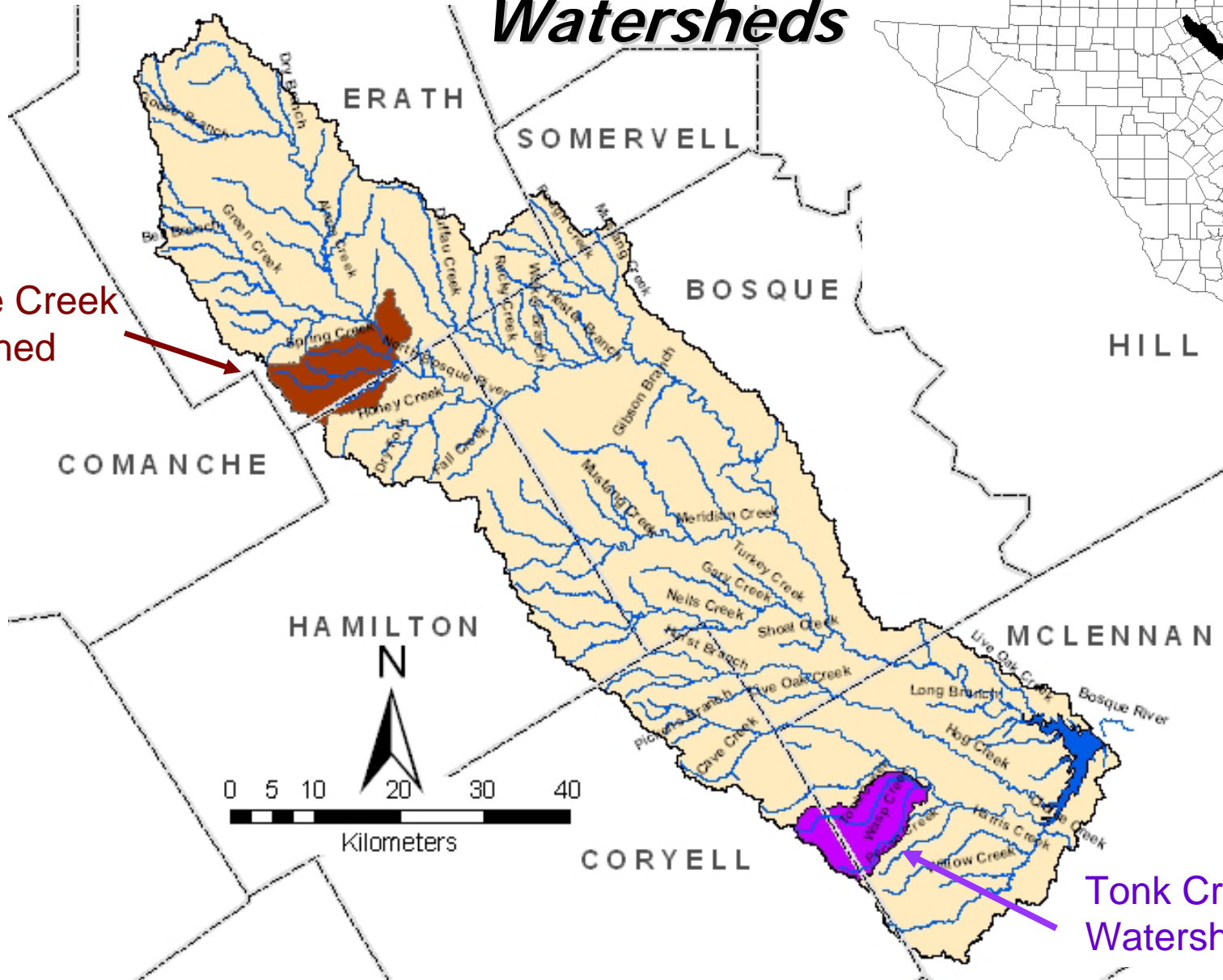
# *Conservation Planning*

- Watersheds selected for demonstration
  - Gilmore Creek (North Bosque River)
  - Tonk Creek (South Bosque River)
- Selection criteria
  - Historical monitoring
  - Current monitoring
  - Small area; 5-year period for planning and application
  - Land users willing to participate
  - Variation in land use (range, pasture, crop)

# *Gilmore Creek & Tonk Creek Watersheds*



Gilmore Creek Watershed



Tonk Creek Watershed



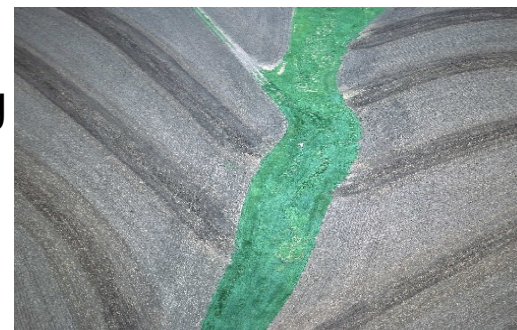
# *Conservation Planning*

- Resource Management System (RMS) plans
- Conservation practice alternatives
- Conservation practice installation
  - Cost-Share Contracts
- Goal is 75% coverage of each sub-watershed
- Sub-watersheds and data
  - Gilmore Creek – 155 plans on 23,000 acres
  - Tonk Creek – 145 plans on 19,000 acres
- Benefit to cost ratio = 1.64 to 1.0
  - Approximately \$14.6 million in benefits



# *Conservation practices*

- No-till
- Mulch-till
- Water wells
- Filter strips
- Terrace
- Field Border
- Fence
- Pipelines
- Firebreak
- Nutrient management
- Brush management
- Grade stabilization structure
- Pest management
- Conservation crop rotation
- Upland wildlife habitat management
- Wetland creation or enhancement
- Contour farming
- Critical area planting
- Prescribed grazing
- Prescribed burning
- Range planting
- Pasture planting
- Riparian forest buffer
- Grassed waterways
- Watering facility



# *Modeling*

- Model used: ***APEX*** - Agricultural Policy/Environmental eXtender
- The model is capable of detailed field scale modeling & routing function connecting farm/field sized subareas.
- Water quality benefits of conservation practices, in terms of % reduction in sediment and nutrient loads at the edge-of-field and the watershed outlet

# Tonk Creek Watershed

Digital Elevation Model: 10m

TONK CRK @ FM938

WASP CRK @ FM938

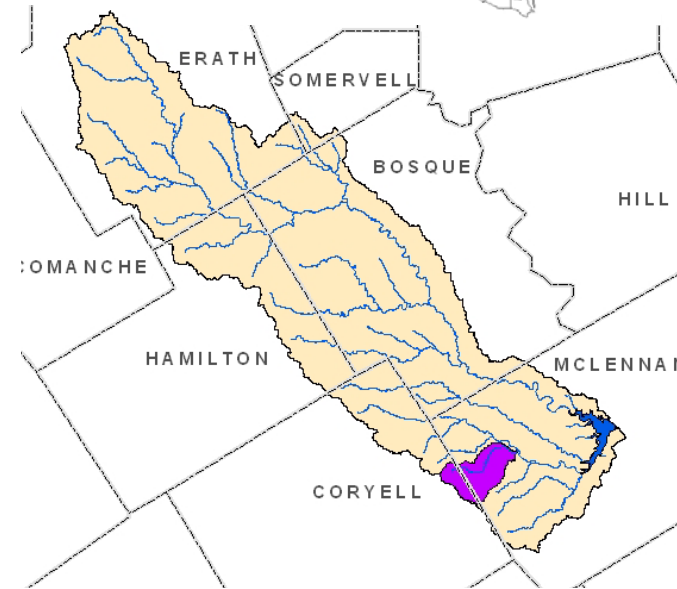
**Altitude, m**

High : 294

Low : 174

0 1 2 4 6 8

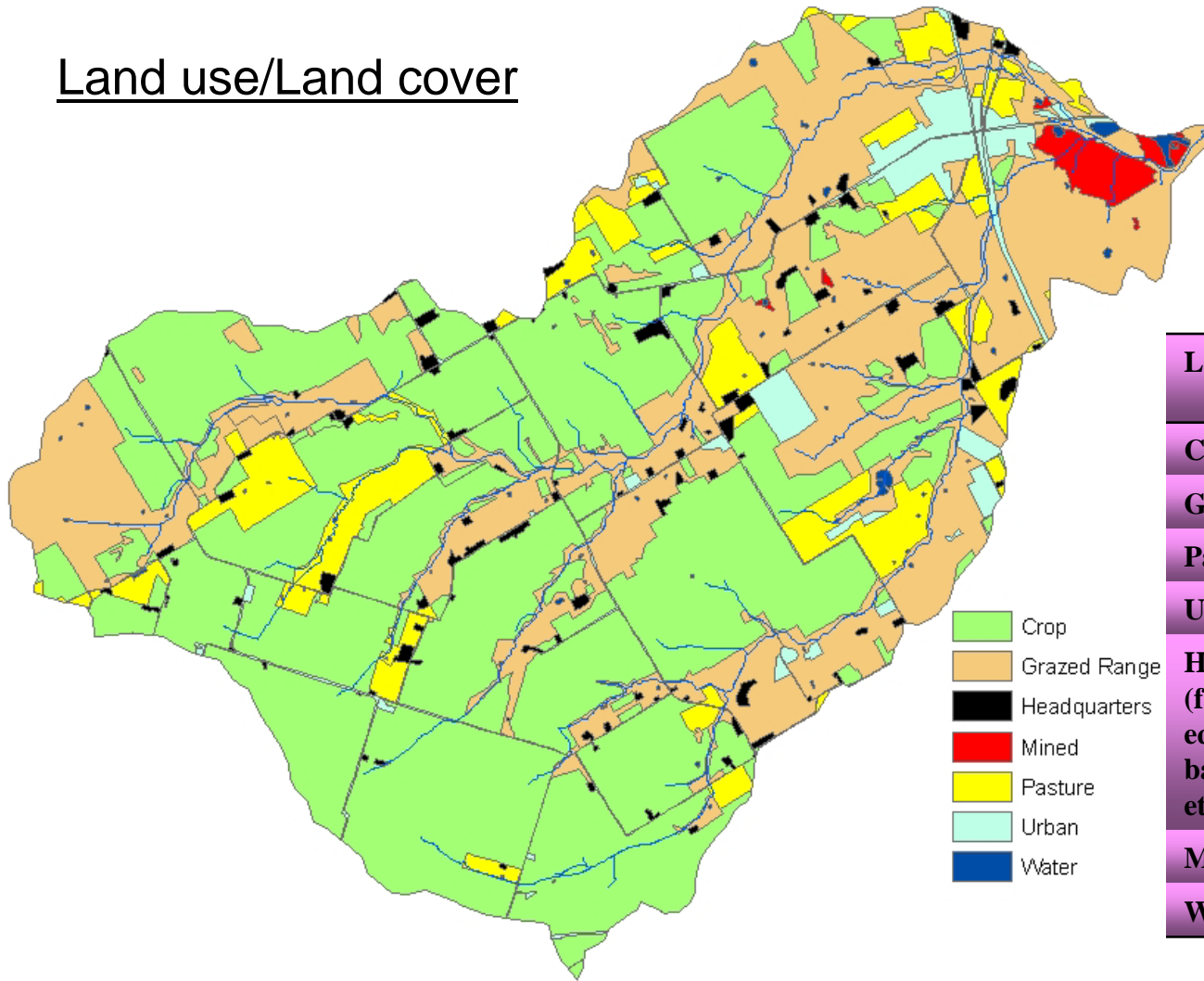
Kilometers



Source: NED from USGS

# Tonk Creek Watershed

## Land use/Land cover



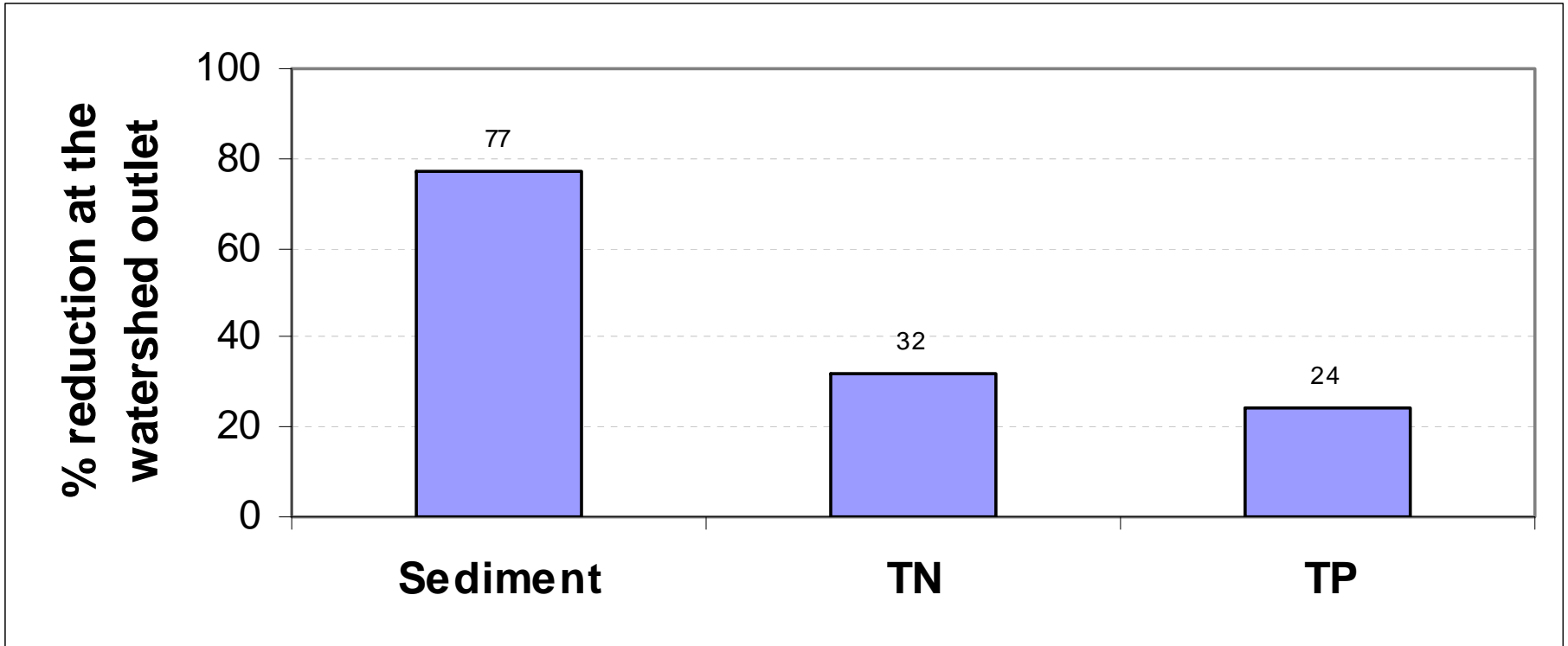
Watershed area:  
104 km<sup>2</sup> (25,700 ac.)

Simulation period:  
30 yrs (1977 – 2006)

Land use type	% watershed area (from NRCS GIS shape file)
Cropland	52.5
Grazed range	31.6
Pasture	8.3
Urban	4.3
Headquarters (farm & equip. house, barn yard, etc)	1.8
Mined	1.1
Water	0.4

Source: USDA - NRCS

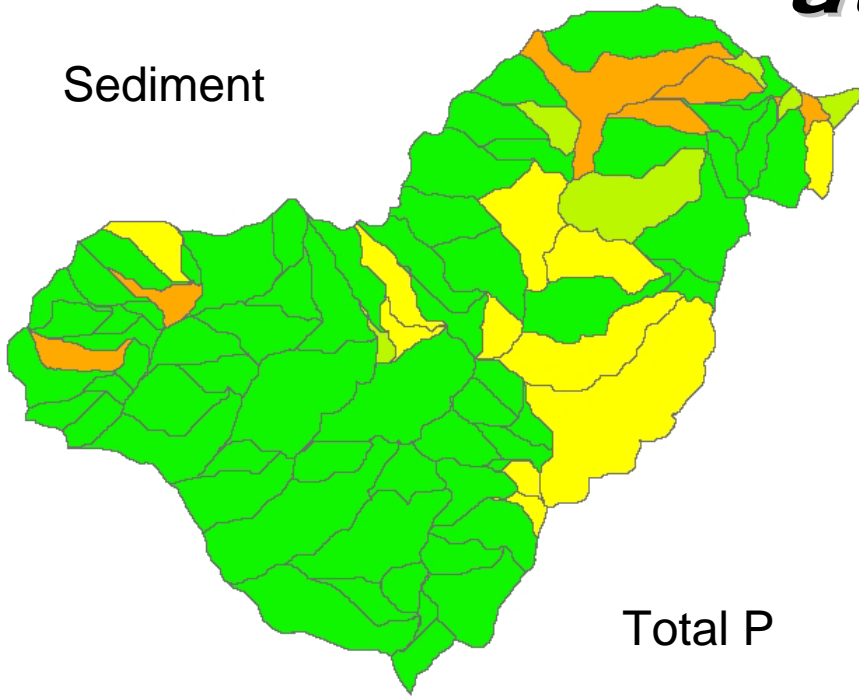
# Water Quality Benefits at Tonk Creek Watershed Outlet



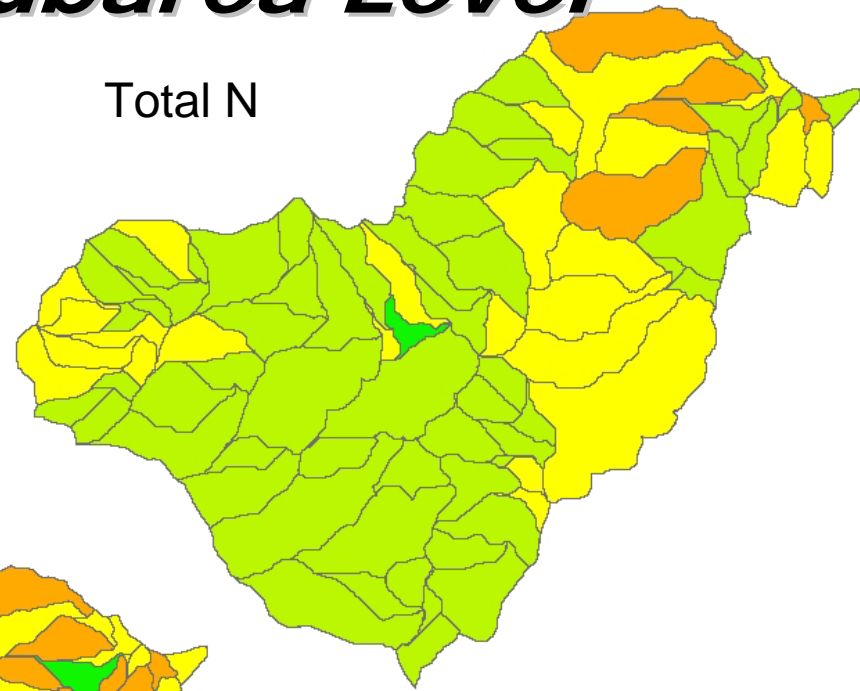
	Baseline	Scenario 1
Cropland	Conventional till	No-till with fertilizer incorporated
Rangeland	15 acres / AU	30 acres/ AU
Pastureland	3 acres / AU	5 acres / AU

# Water Quality Benefits at Subarea Level

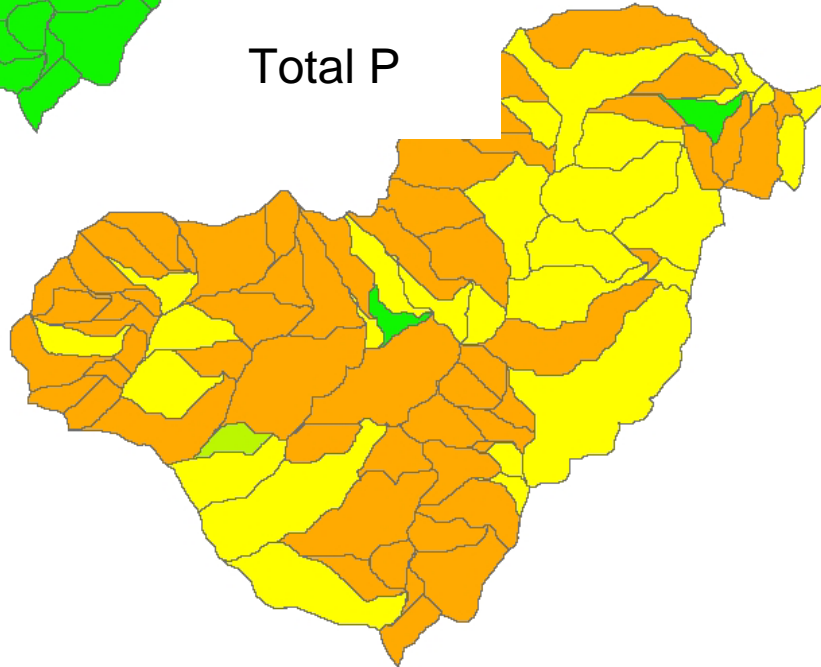
Sediment



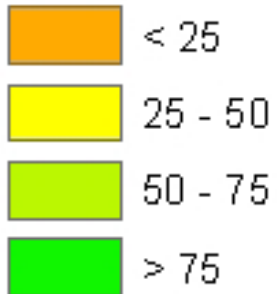
Total N



Total P

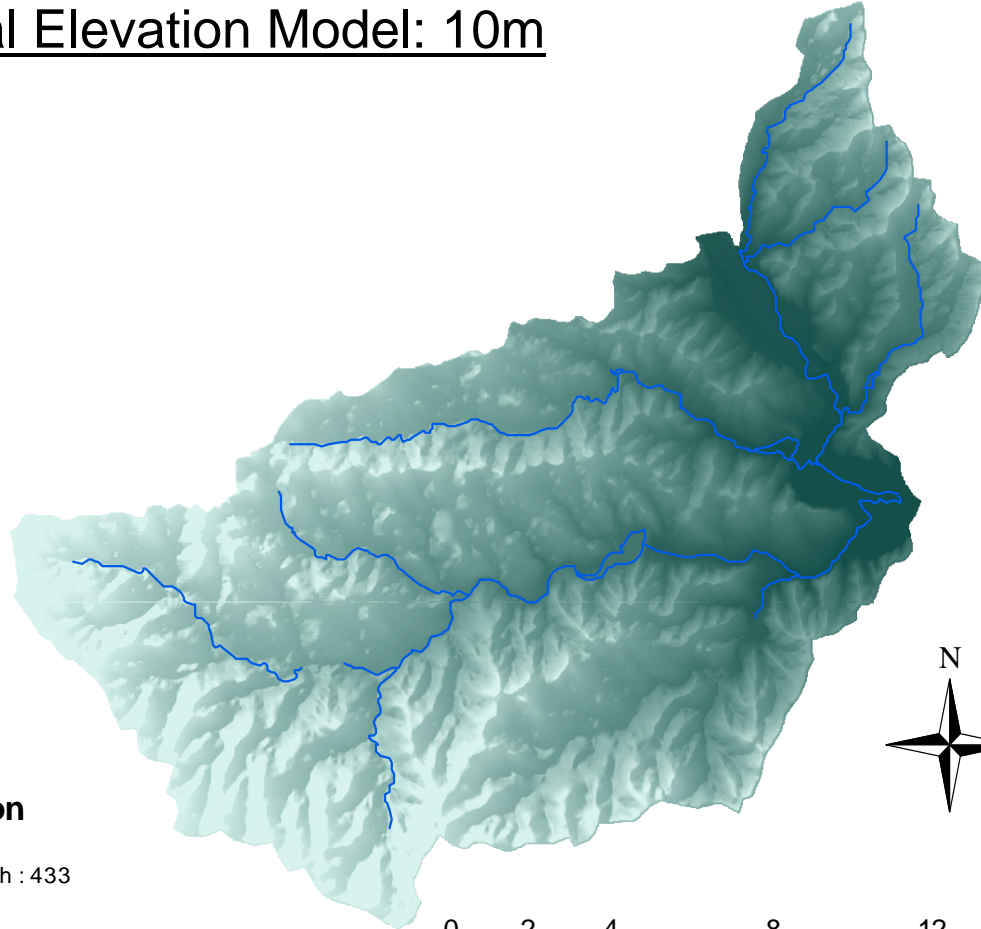


## % reduction

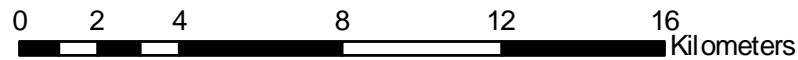
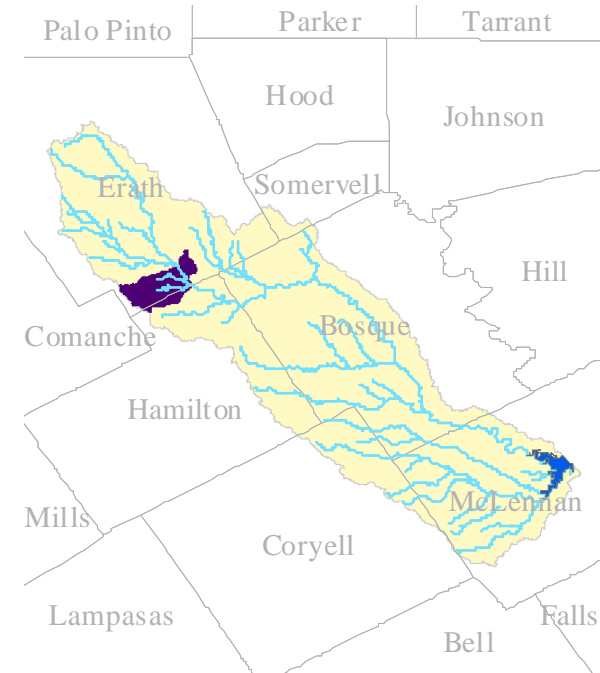
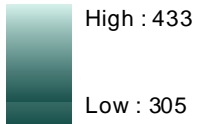


# *Gilmore Creek Watershed*

Digital Elevation Model: 10m



**Elevation**

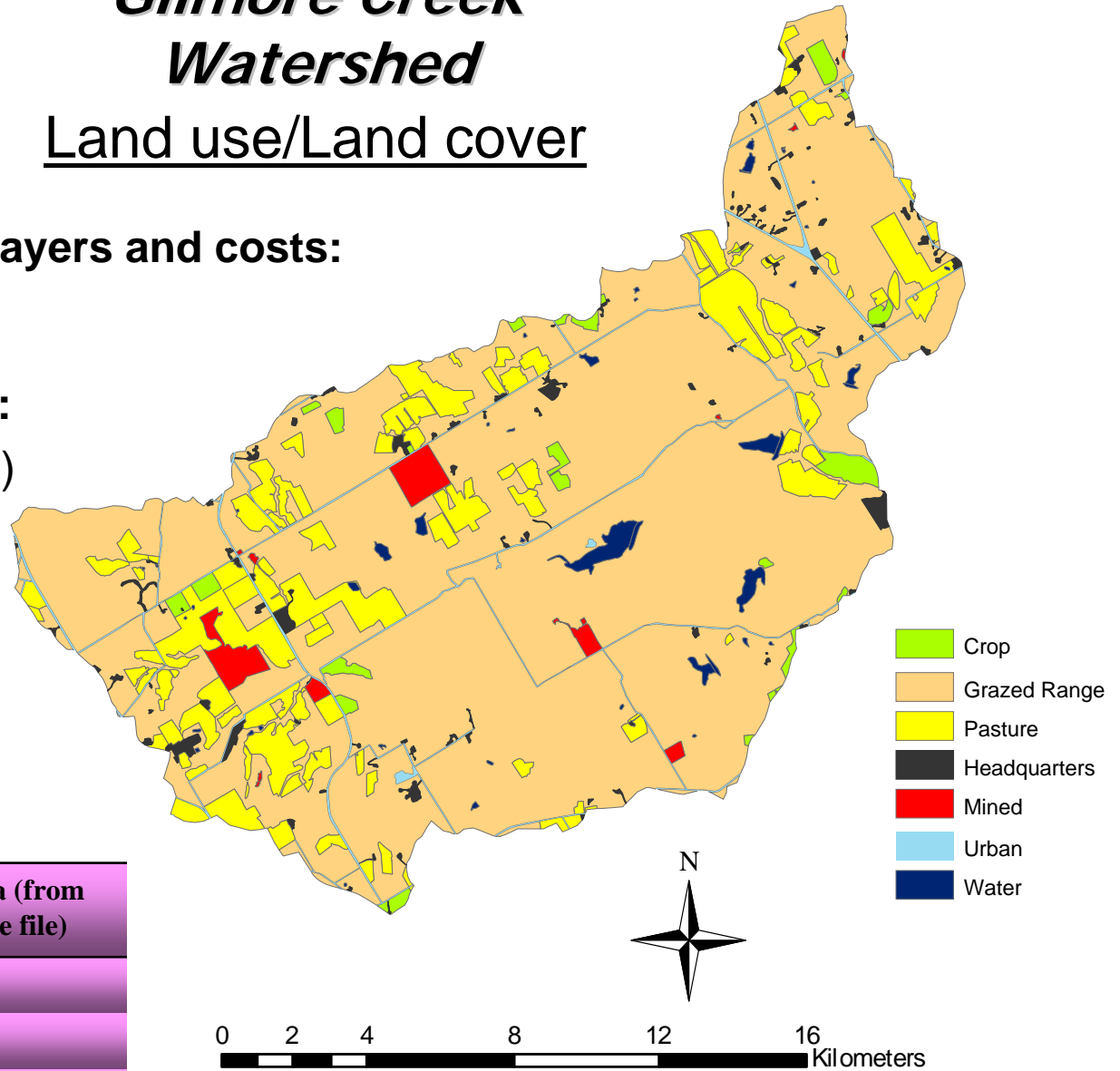


# Gilmore Creek Watershed

## Land use/Land cover

**Data Source for GIS layers and costs:**  
USDA-NRCS

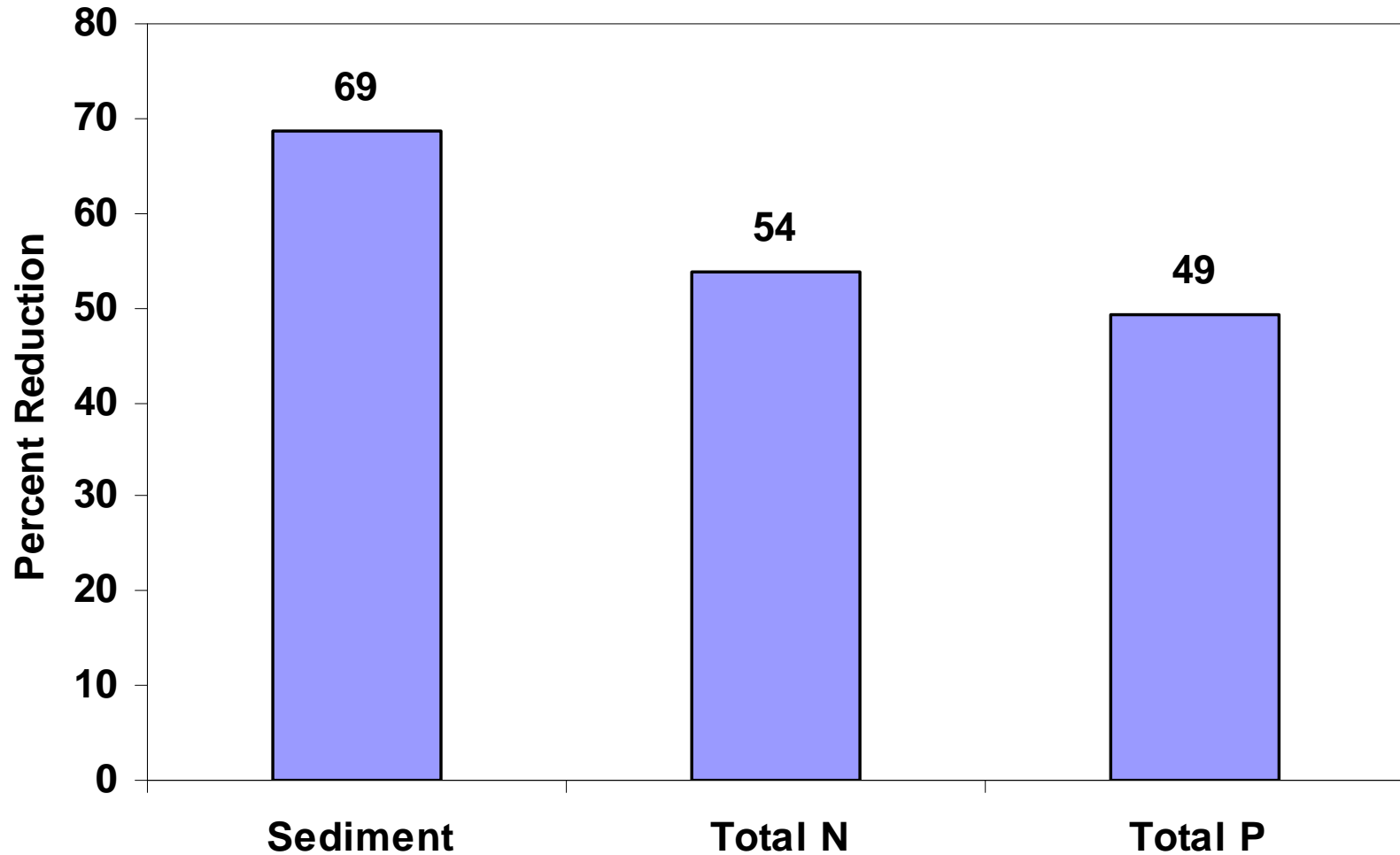
**Total watershed area:**  
31,000 acres (125 km<sup>2</sup>)



Land use type	% watershed area (from NRCS GIS shape file)
Cropland	1.8
Grazed range	79.6
Pasture	13.6
Urban	1.3
Others	5.7

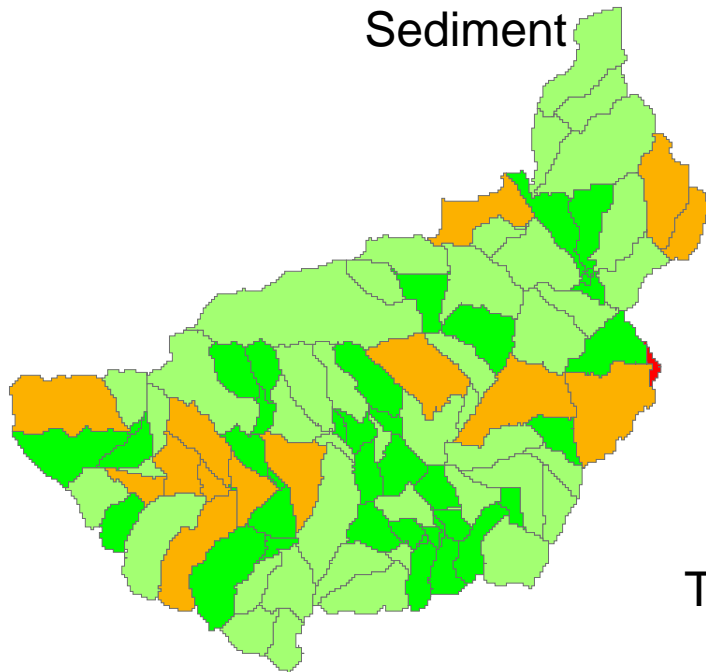


# *Water Quality Benefits at Gilmore Creek Watershed Outlet*

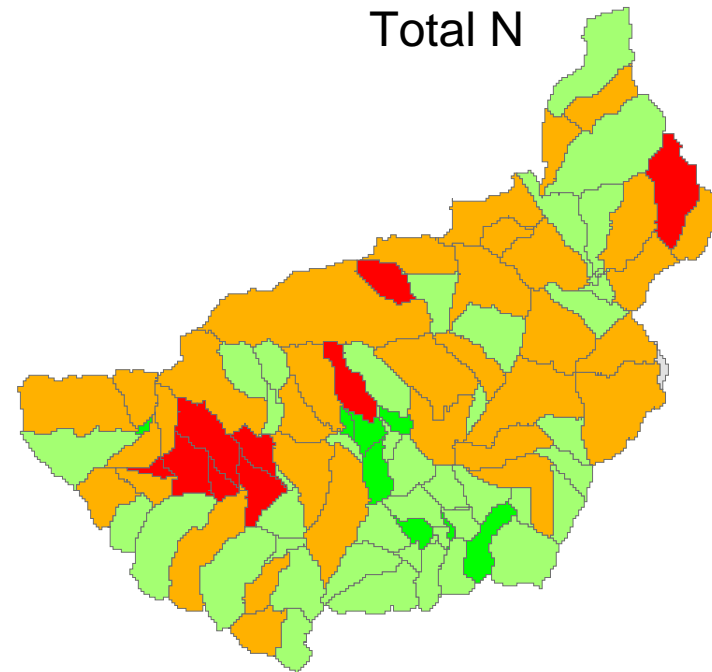


# *Water Quality Benefits at Subarea Level*

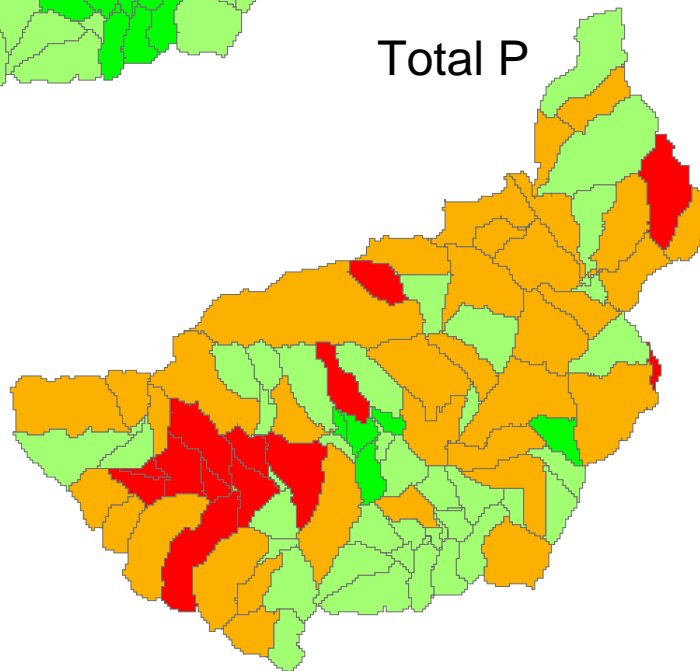
Sediment



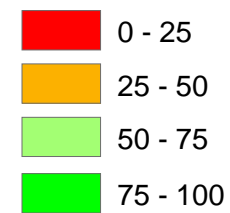
Total N

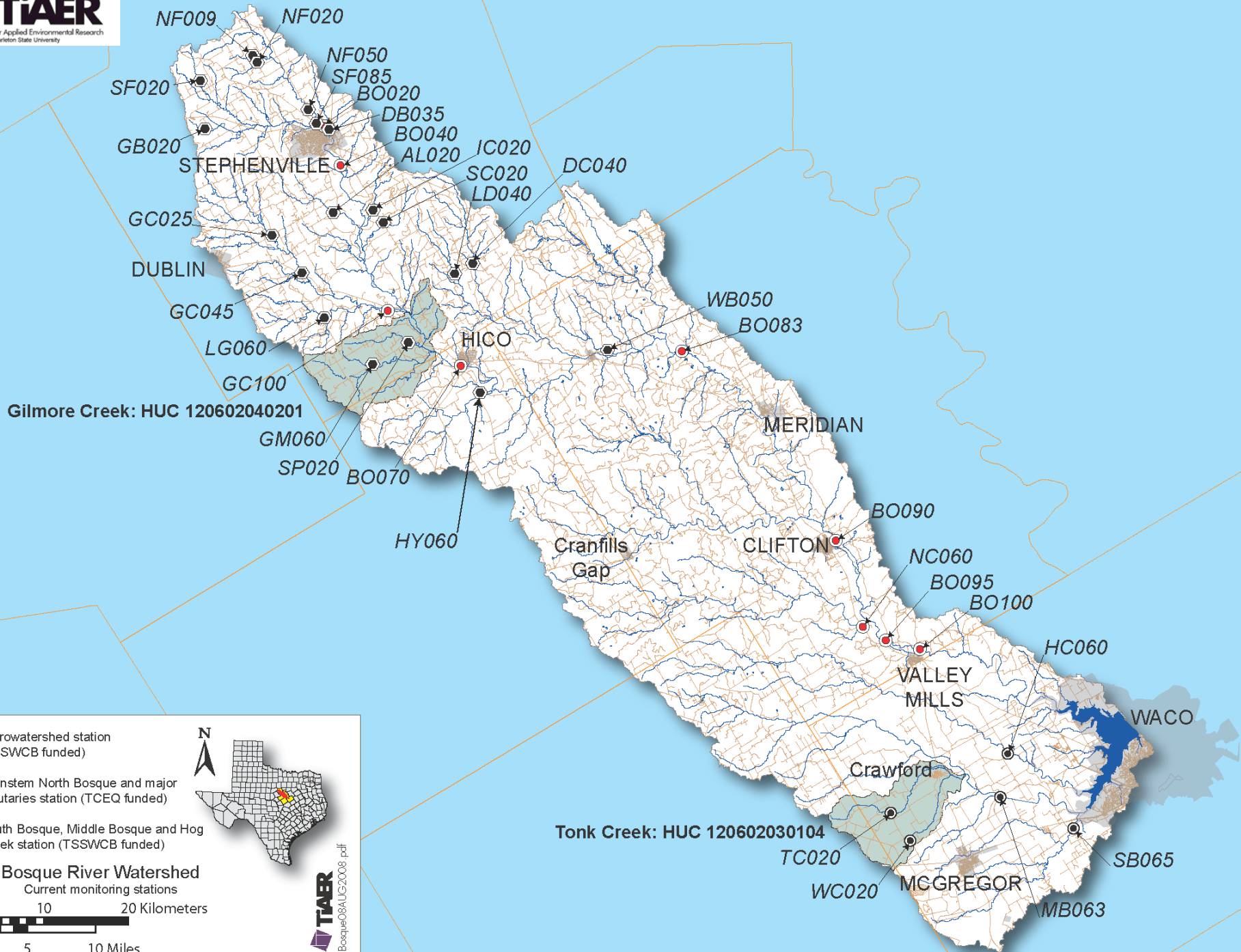


Total P

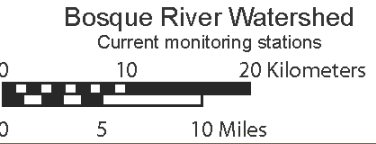
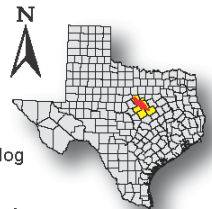


**Reduction (%)**





- Microwatershed station (TSSWCB funded)
- Mainstem North Bosque and major tributaries station (TCEQ funded)
- South Bosque, Middle Bosque and Hog Creek station (TSSWCB funded)





# *Water Quality Sample Analysis*

- Total suspended solids
  - Nutrients (nitrogen and phosphorus)
  - Chlorophyll (measure of suspended algae)
  - Bacteria (*E. coli*)
  - Dissolved oxygen
  - Temperature
- 
- Flow is also recorded



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# *Funding Streams*



- Memorandums of Agreement in place to move funds
- Universities; invoices based on a negotiated scope of work
- COE-NRCS; Military Interdepartmental Purchase Request (MIPR)
- Texas State Soil and Water Conservation Board; Work In Kind (WIK) credits



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# *Funding Requirements*



- Currently identified federal funding for execution of Demonstration Projects:
  - 2009 - \$1.5 million
  - 2010 - \$6.0 million
  - 2011 - \$1.5 million
  - 2012 - \$1.0 million
- If you send it, we will spend it.
  - Accelerate projects
  - Expand program

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*Texas State Soil & Water  
Conservation Board*



**Questions??**



**Brazos River  
Authority**

**Issues to be Resolved??**

**Action Items**

