

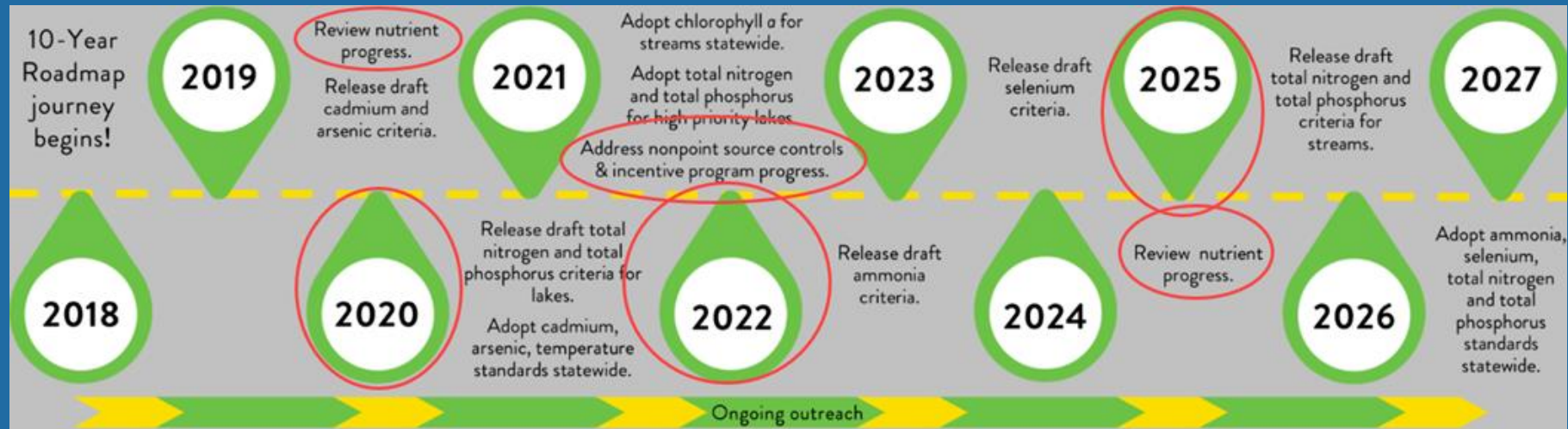
Demonstrating Ag Progress on Water Quality: Modeling the Effectiveness of EQIP-funded conservation practices.



Regulation 85 (5 CCR 1002-85):

- Promulgated in 2012.
- Nutrient control regulation (N & P) governing point and NPS pollution in surface waters.
- Provides for voluntary management of Nonpoint Sources of pollution by encouraging the use of BMPs.
- Carrot and Stick: After 10 years (2022), the WQCC may consider adoption of additional prohibitions or precautionary measures if voluntary controls on nonpoint sources are not effective in reducing nutrient loads and protecting classified uses.
- **2020: WQCC reviews progress on nutrient controls in protecting water quality.**
- **2022: WQCC reviews “NPS controls and incentive program progress.”**

CDPHE's Road Map for Regulation 85 compliance:



What's been done so far?

Outreach and Awareness activities focusing on Regulation 85 and it's relevance to the Agricultural Industry.

- Presentations to agricultural producers and organizations
- Website, videos and factsheets (CSU) (<https://coagnutrients.colostate.edu/>)
- Edge-of-field monitoring studies (CSU – ongoing).

Not much progress on actually quantifying large scale water quality improvement and protection in agriculture.

Project Goal:

“Measure” the Effects of EQIP Conservation Practices using CSU’s model.

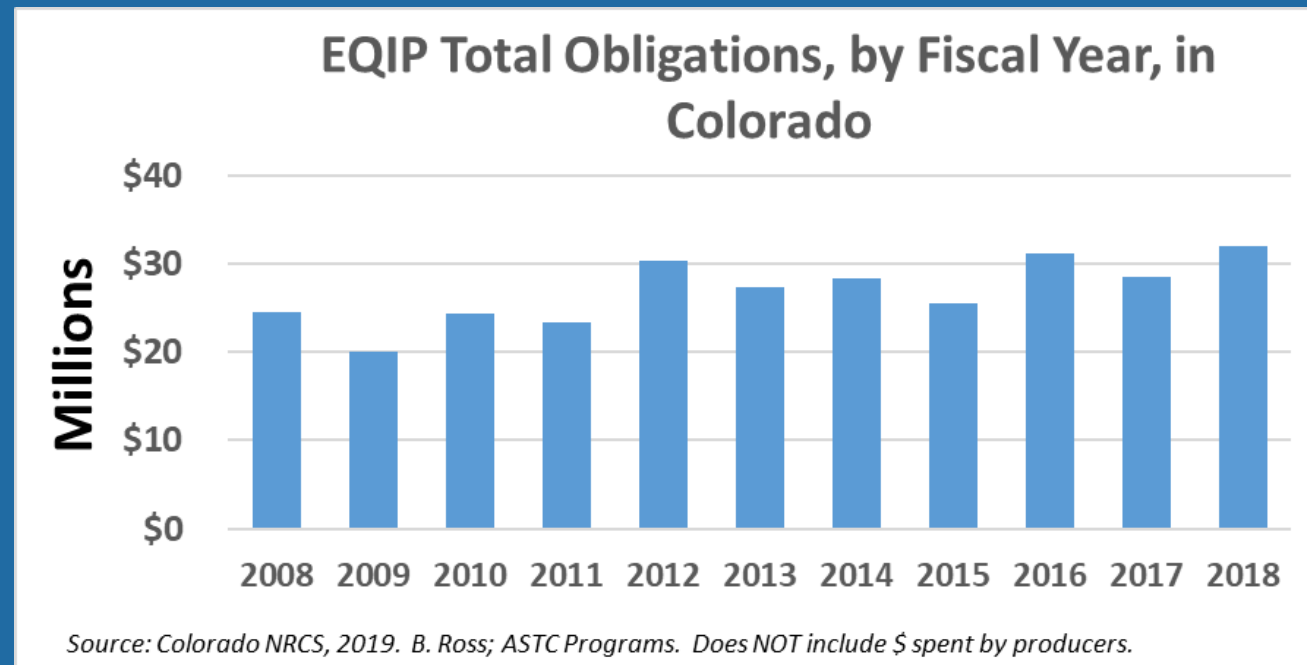
The project uses:

- 1) Existing NRCS – EQIP conservation practice data
- 2) CSU CLEAN Center Edge-of-Field Conservation modeling tool.

Background on EQIP

USDA – NRCS Environmental Quality Incentive Program (EQIP)

- Colorado agricultural producers have used the NRCS Environmental Quality Incentive Program (EQIP) for decades to help implement conservation practices that protect and/or improve water quality and soil health.
- Conservation practices are standardized. Each practice has a standard and SOW.
- NRCS tracks EQIP-funded project details by practice(s) installed, acres, cost, year).
- Valuable Data, but never used to quantify progress on water quality.



Project Purpose:

1. **Quantify** progress made in reducing pollutant losses from fields through the use of conservation practices.
2. Report conclusions to the WQCC and public.

Funding:

- Colorado Corn Administrative Committee
- Colorado Livestock Association
- Colorado Pork Producers Council
- State of Colorado

Project Roles:

Brink, Inc. (Phil): Overall Project Coordinator

CSU Clean Center (Tyler): Modeling & Analytical Lead / Co-coordinator



Connecting world class research with real-world water challenges

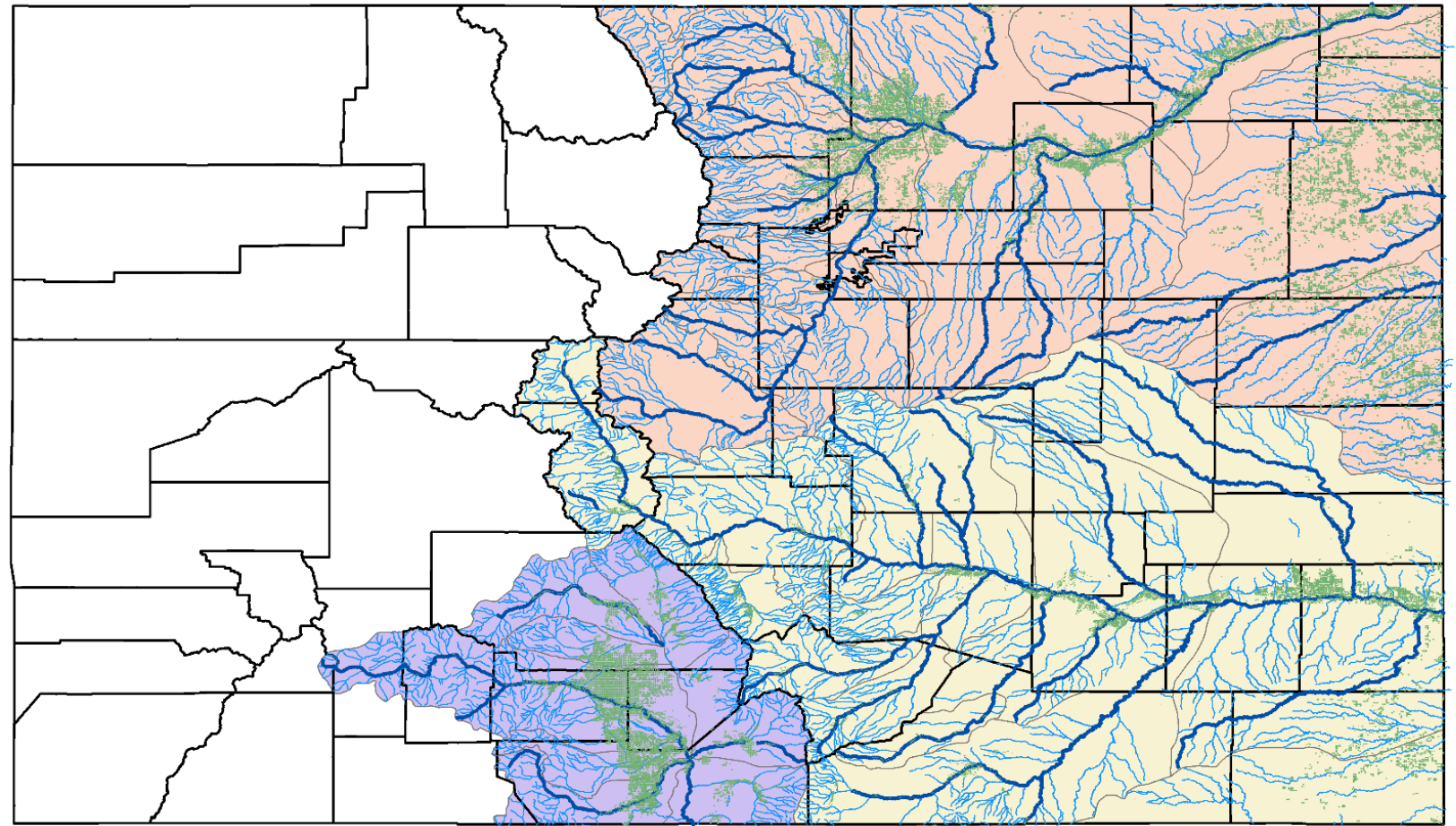
Colorado State University

The background of the slide features a city skyline at sunset, with buildings illuminated by warm orange and yellow light. In the foreground, there is a lush green field. A semi-transparent grey rectangular box is centered over the image, containing the text "Colorado Agriculture".

Colorado Agriculture

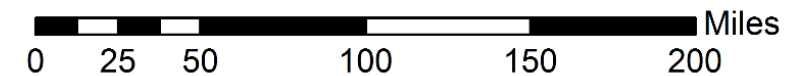
HYDROLOGY

- Map of important hydrologic characteristics for the Colorado counties considered in this analysis



Legend

-  Counties
-  Irrigated Fields
-  Division 1 (S. Platte and Republican)
-  Division 2 (Arkansas)
-  Division 3 (Rio Grande)
-  Major Rivers
-  Tributaries



IRRIGATED AGRICULTURE (2015)

Combined

- ~2,140,000 Acres
 - ~48,000 fields

South Platte and Republican River Basin

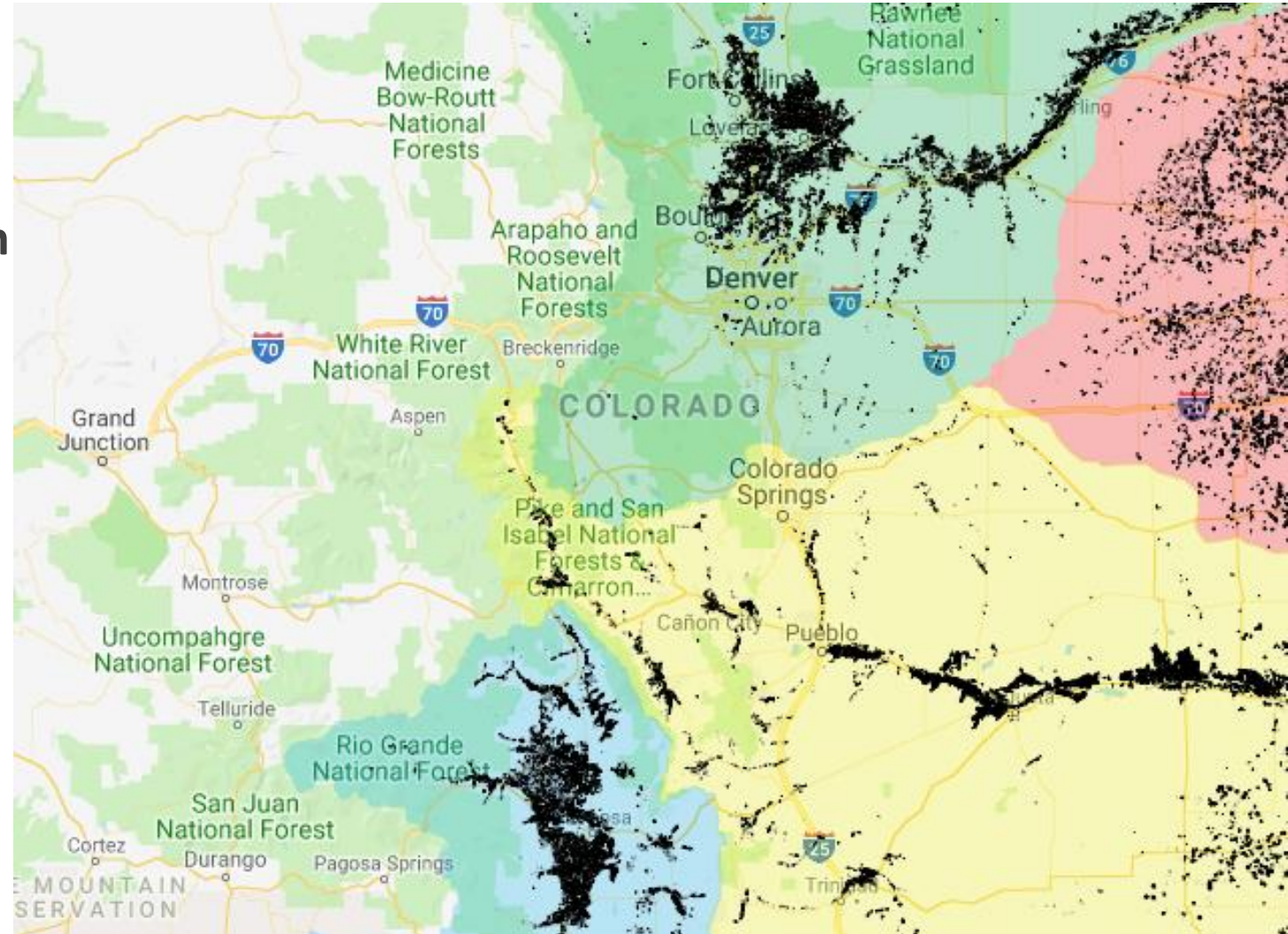
- ~1,200,000 Acres
 - ~22,000 fields

Lower Arkansas River Valley Irrigated Agriculture

- ~430,000 Acres
 - ~17,000 fields

San Luis Valley Irrigated Agriculture

- ~510,000 Acres
 - ~8,900 fields



COLORADO AGRICULTURAL SURVEY*

Overview

- Statewide survey
 - Targeted towards irrigated farms with at least 100 acres
 - Sent in 2011 (for the 2010 crop year)
- Focus on BMP adoption rates and costs
- Response rate of 37%, but still useable

Results

- Tillage
 - 60% Conventional
 - 30% Reduced
 - 10% Strip
- Fertilizer
 - 70% Split-Apply

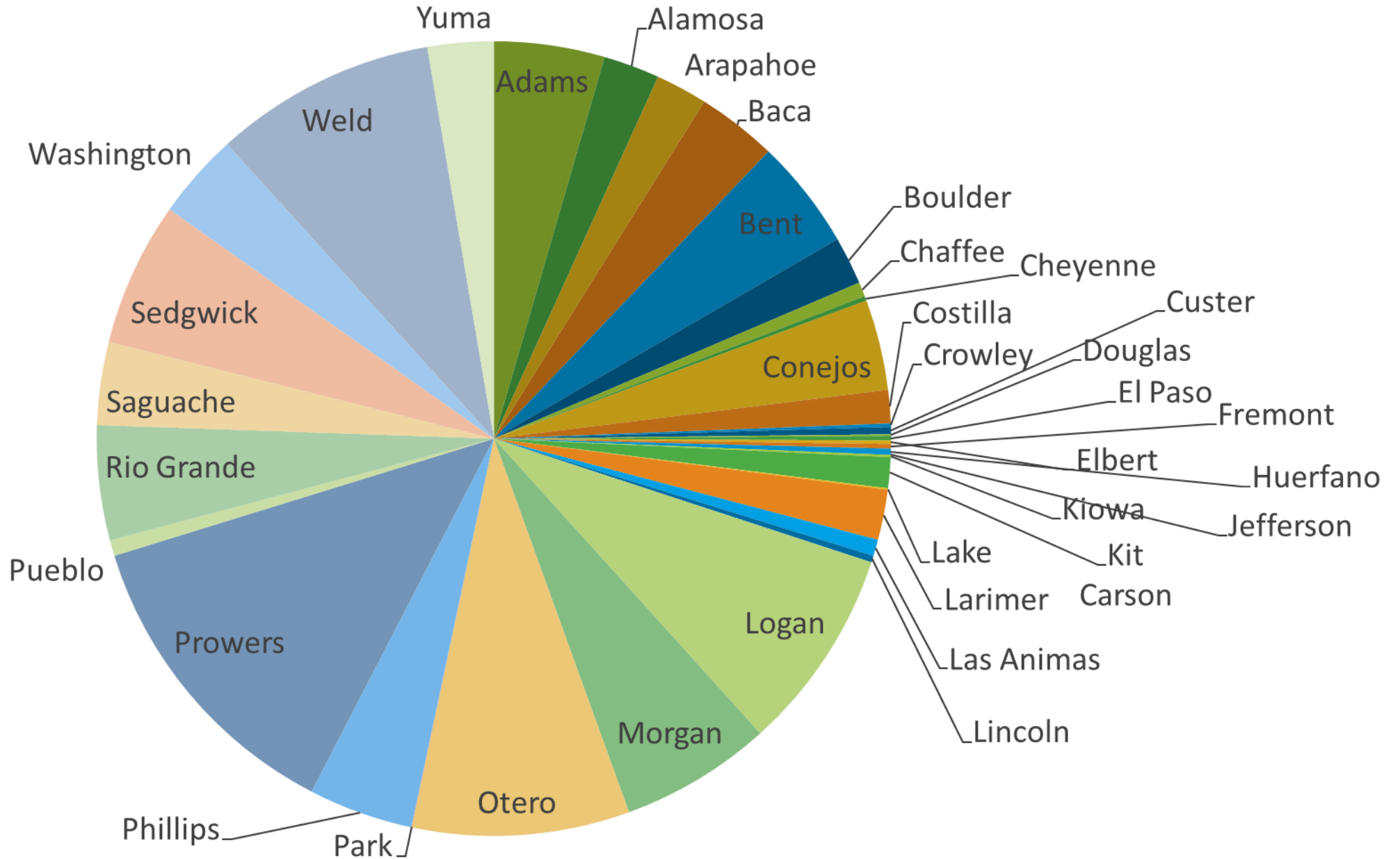


EQIP OVERVIEW

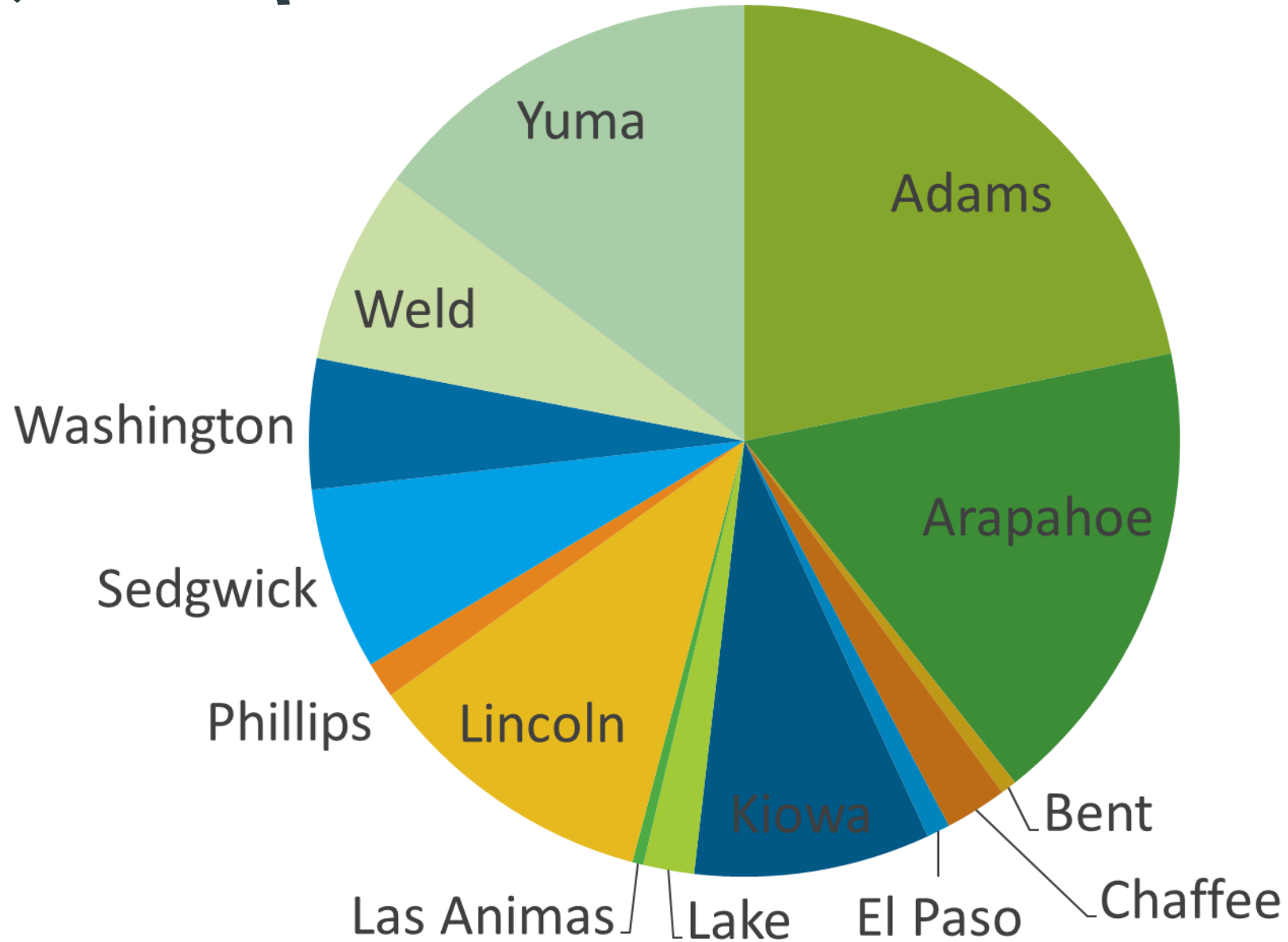
- USDA Cost-Share Projects
- Implemented between 2008 and 2018
- Examples Include
 - Irrigation
 - Tillage
 - Cover Crops
 - Prescribed Grazing
- CLEAN Center Modeling
 - Irrigation
 - Tillage
 - Filter Strips



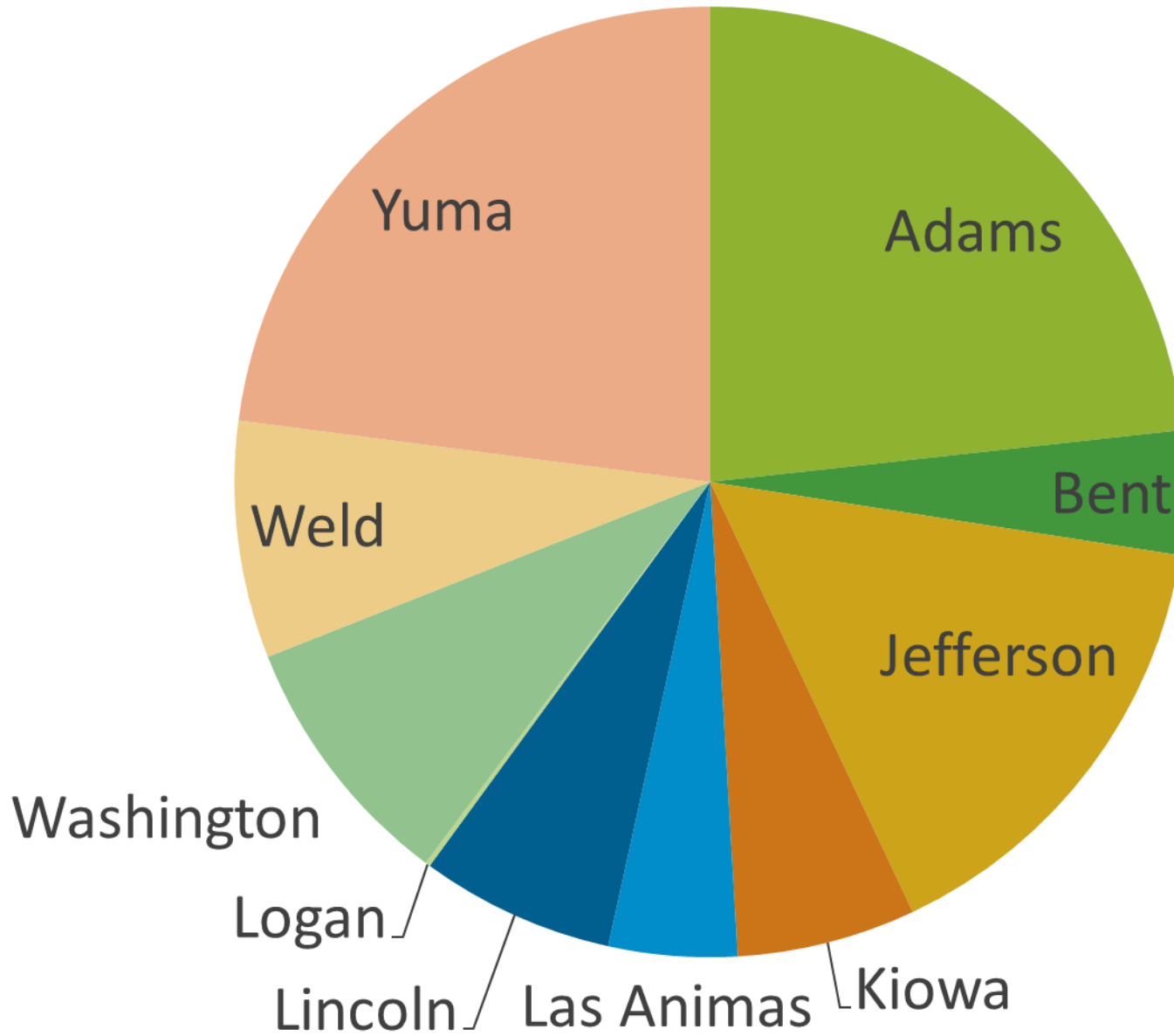
195,000 EQIP ACRES OF SPRINKLER/DRIP IRRIGATION ADDED



201,000 EQIP ACRES OF STRIP TILLAGE ADDED



15,600 EQIP ACRES OF NO TILLAGE ADDED





Connecting world class research with real-world water challenges

Colorado State University

A wide background image showing a city skyline. The left side shows the city at sunset with a dark, orange sky, while the right side shows the city at sunrise with a bright blue sky. In the foreground, there is a lush green field. A semi-transparent dark grey rectangle is overlaid in the center, containing the text. Two white horizontal lines with circular endpoints extend from the left and right sides of the text area.

EQIP Funded Projects

Results

SINGLE FIELD RESULTS

- Tillage Reductions

	Nitrate	Total Nitrogen	Total Phosphorus
Conventional	-	-	-
Reduced	21%	19%	4%
Strip	23%	21%	3%

- Irrigation Reductions

	Nitrate	Total Nitrogen	Total Phosphorus
Flood	-	-	-
Sprinkler	24%	13%	59%

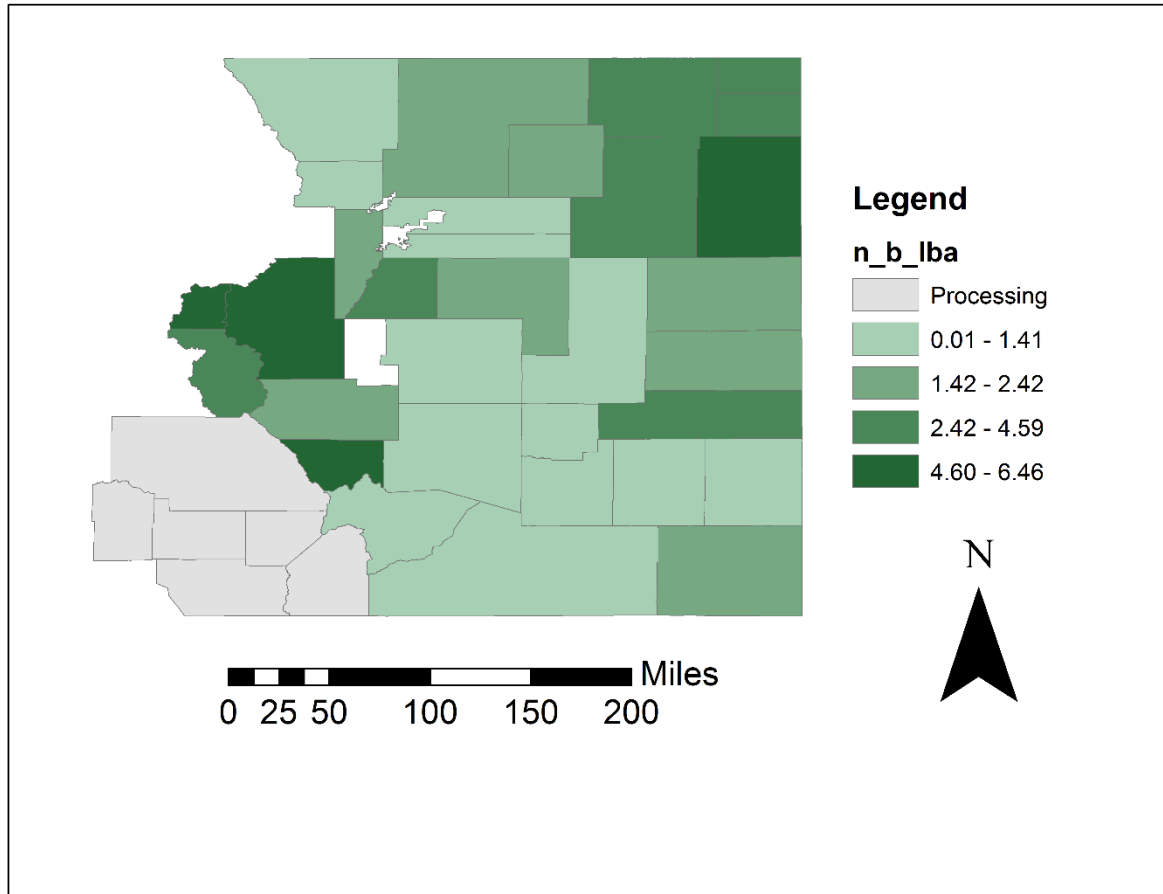
- Split Application Reductions

	Nitrate	Total Nitrogen	Total Phosphorus
Single Application	-	-	-
Split Apply	9.9%	8.62%	9.7%

BASELINE

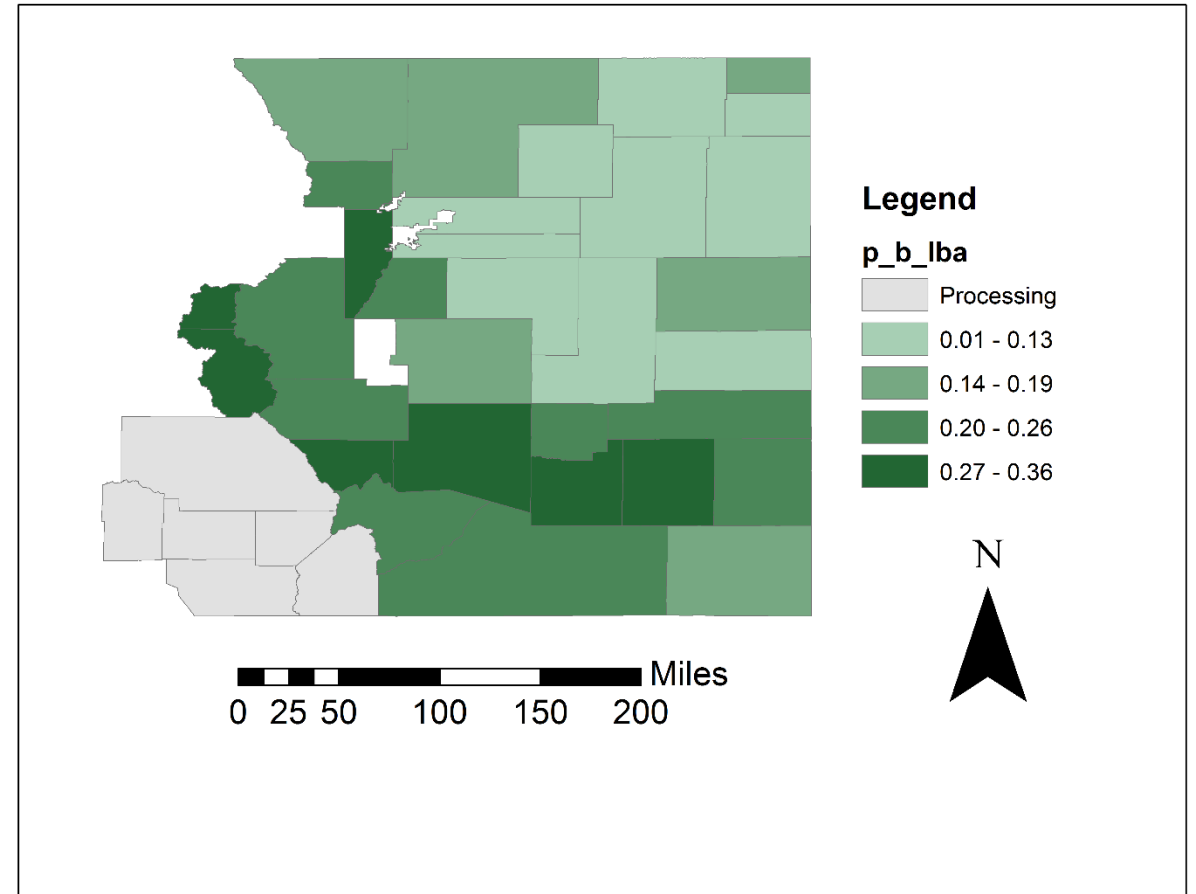
Total Nitrogen

- 5.453* lbs/acre/year



Total Phosphorus

- 0.328* lbs/acre/year

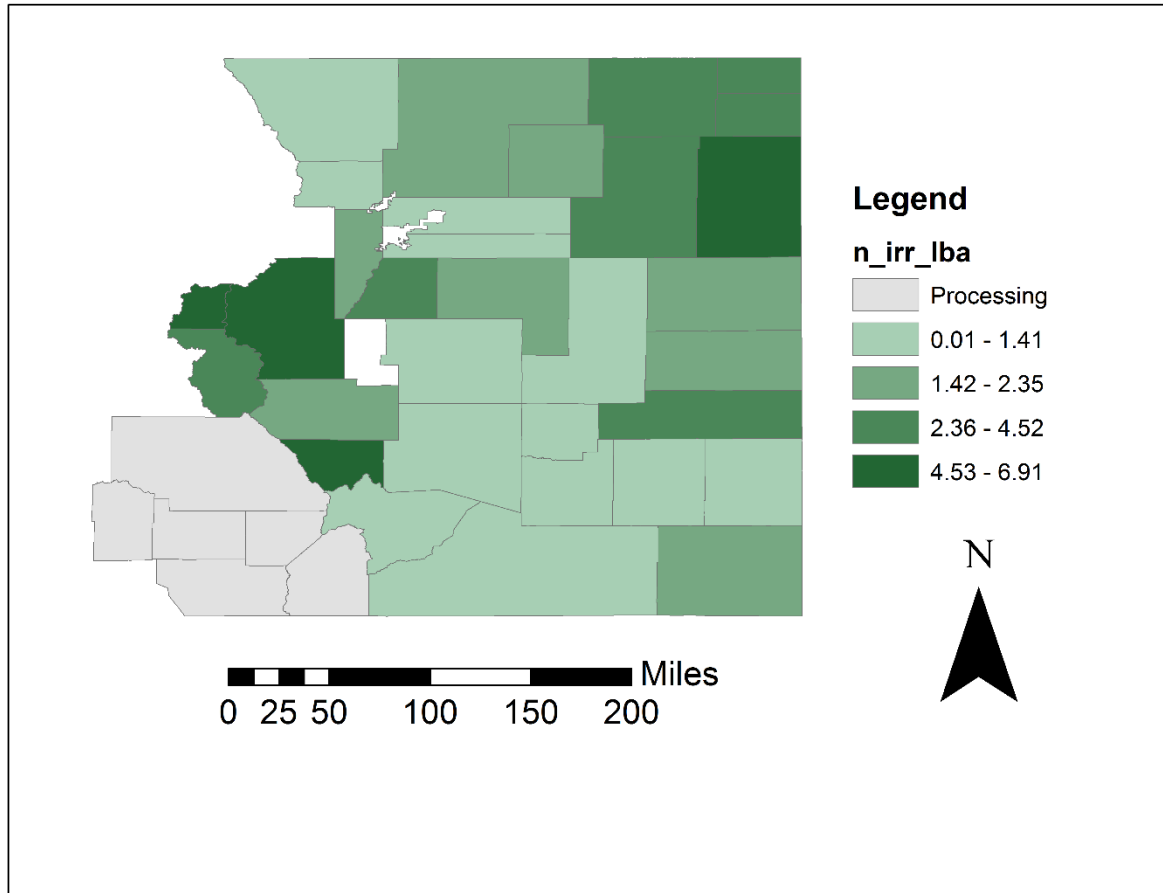


* Values are annual average edge-of-field surface and subsurface runoff of nutrients from 2008-2018

REDUCTION BY EQIP IRRIGATION

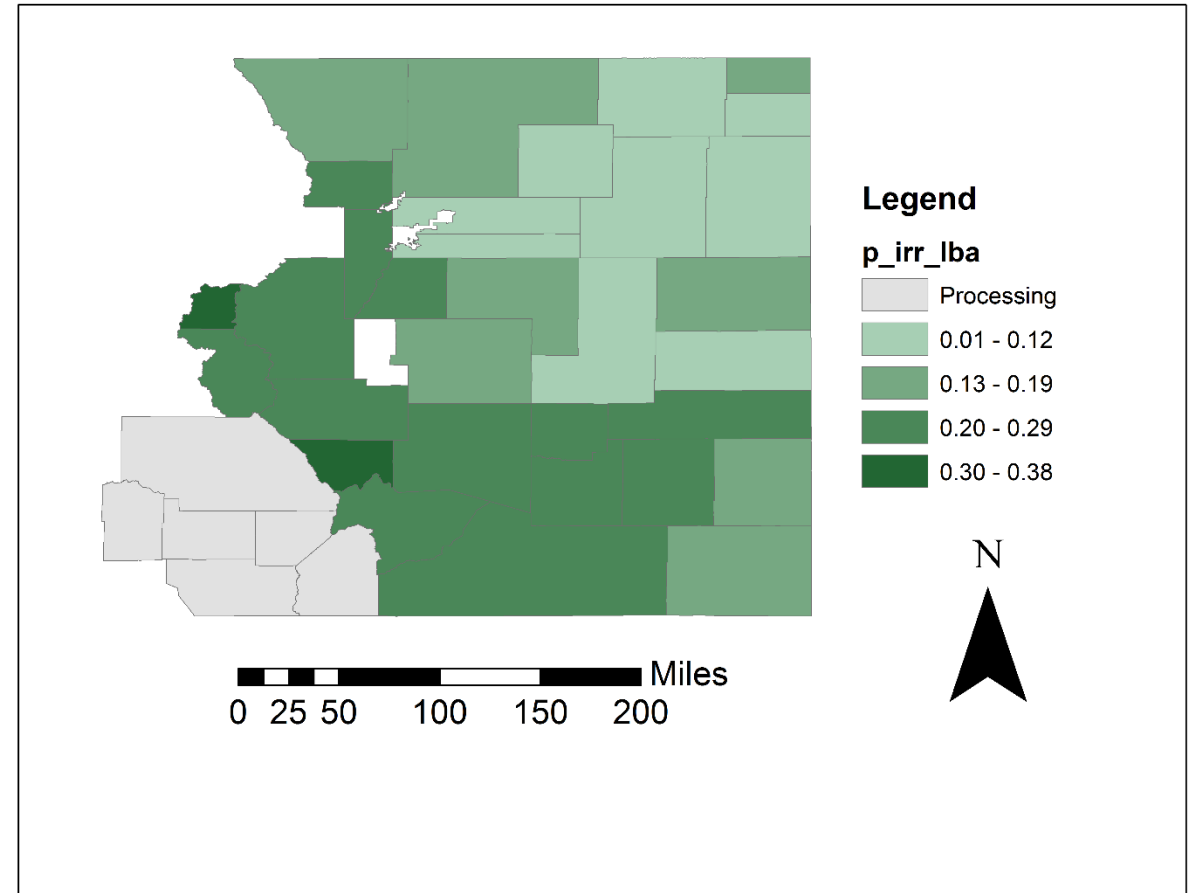
Total Nitrogen

- 5.408* lbs/acre/year (1% reduction TN)



Total Phosphorus

- 0.308* lbs/acre/year (6% reduction TP)

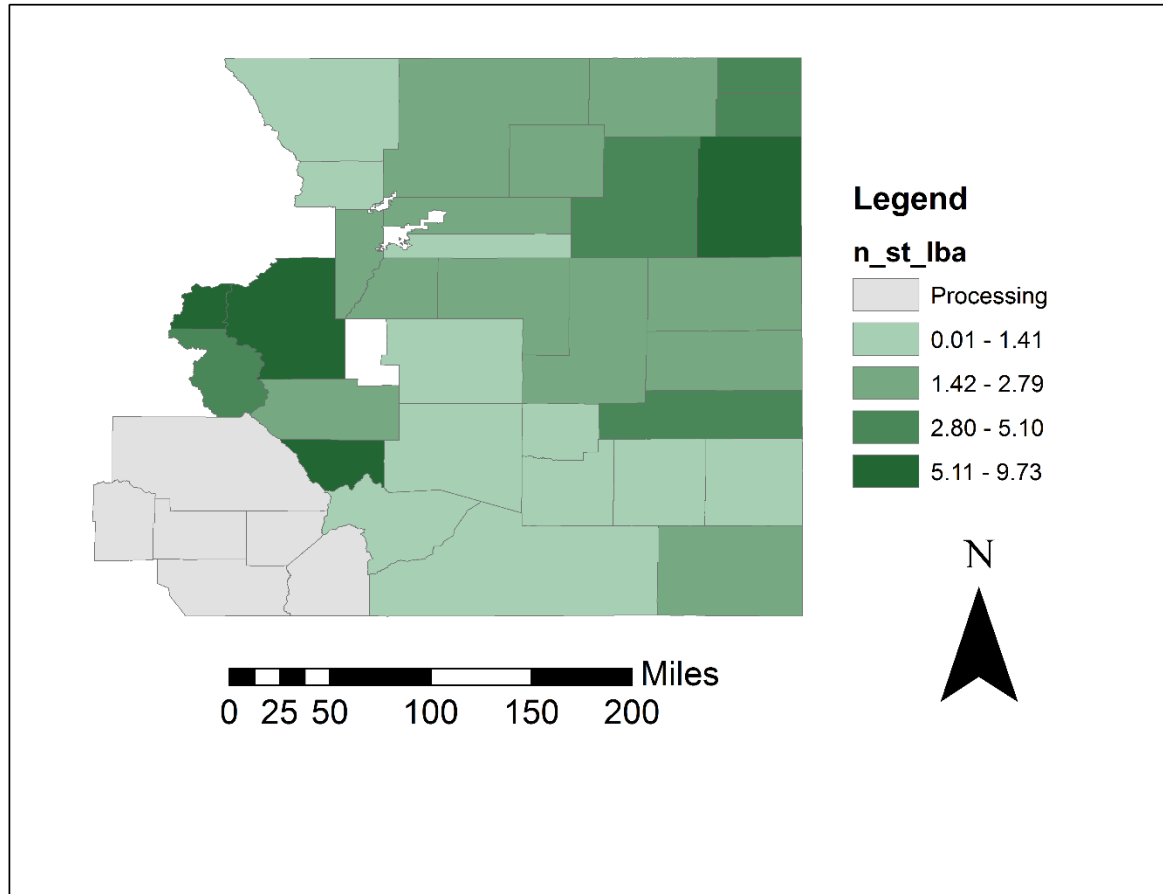


* Values are annual average edge-of-field surface and subsurface runoff of nutrients from 2008-2018

REDUCTION BY EQIP STRIP TILLAGE

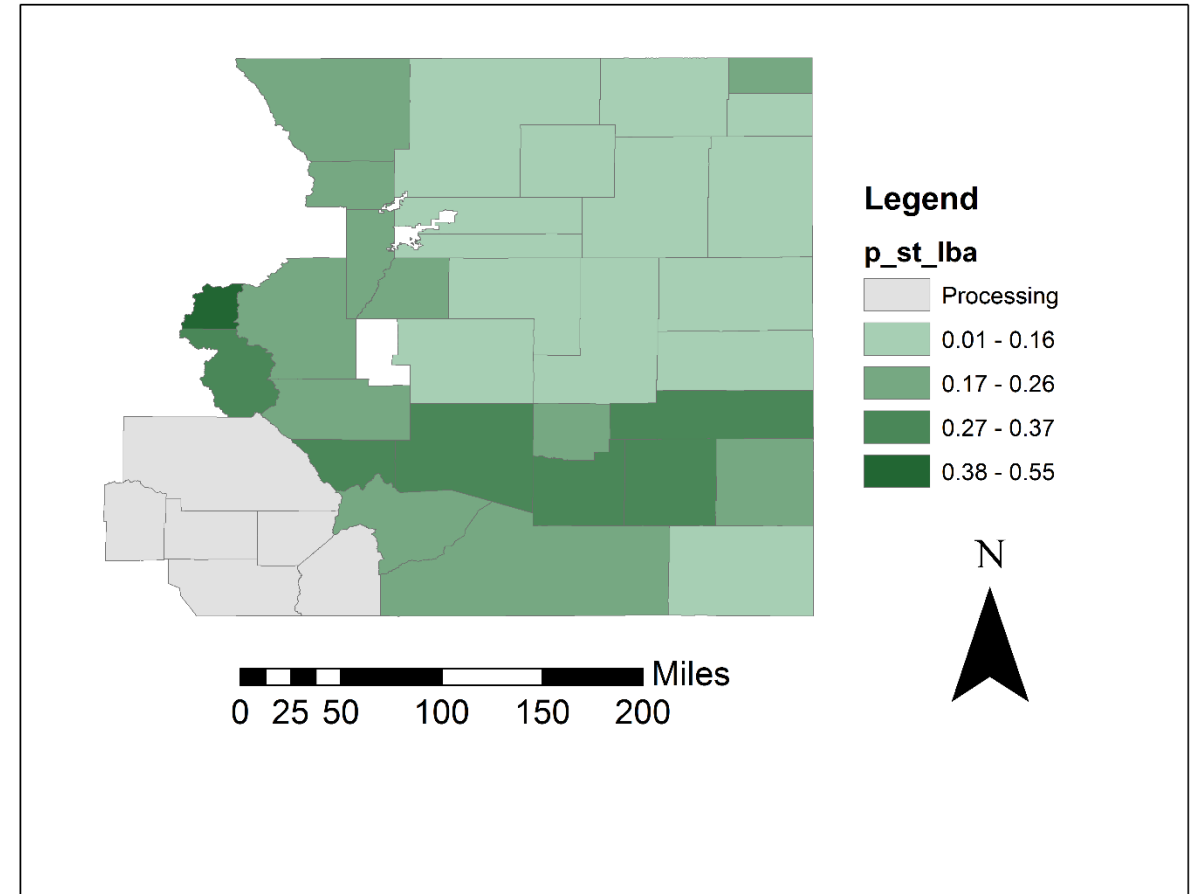
Total Nitrogen

- 5.453* lbs/acre/year



Total Phosphorus

- 0.328* lbs/acre/year

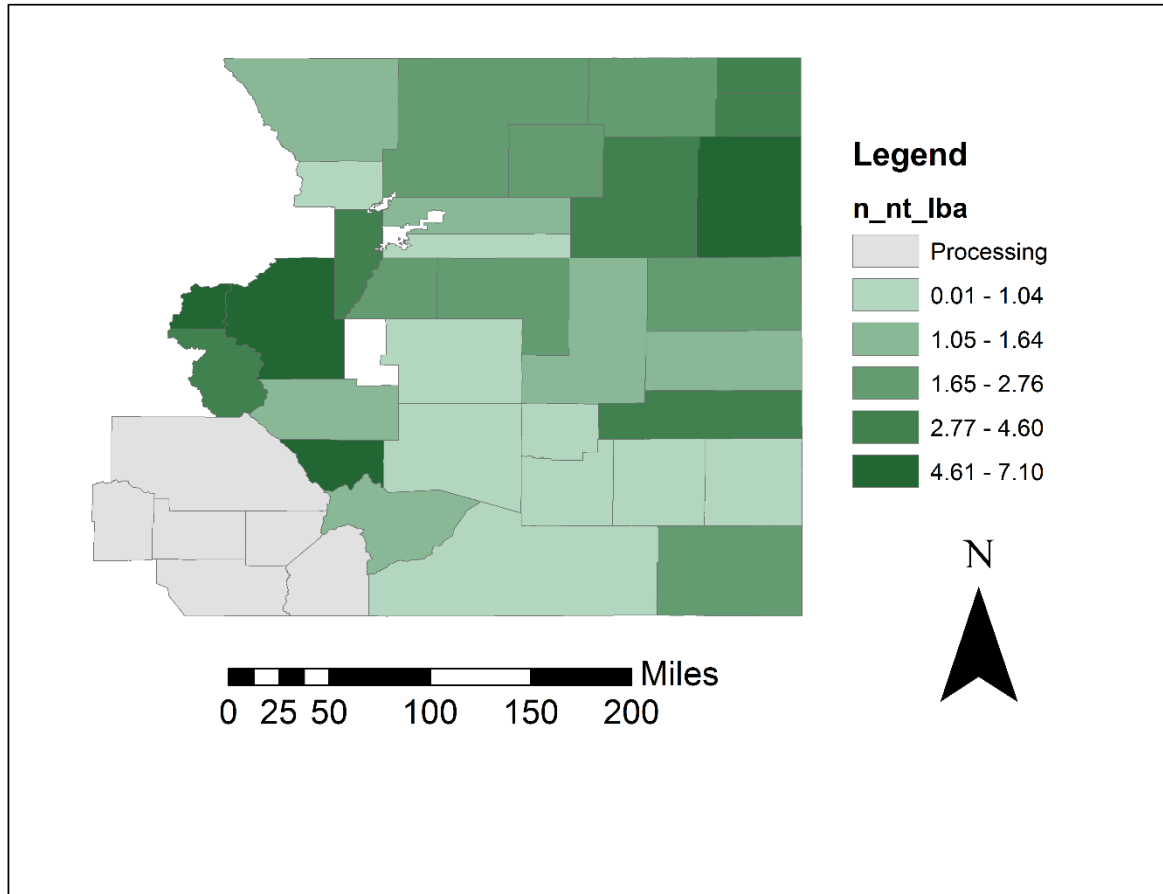


* Values are annual average edge-of-field surface and subsurface runoff of nutrients from 2008-2018

REDUCTION BY EQIP NO TILLAGE

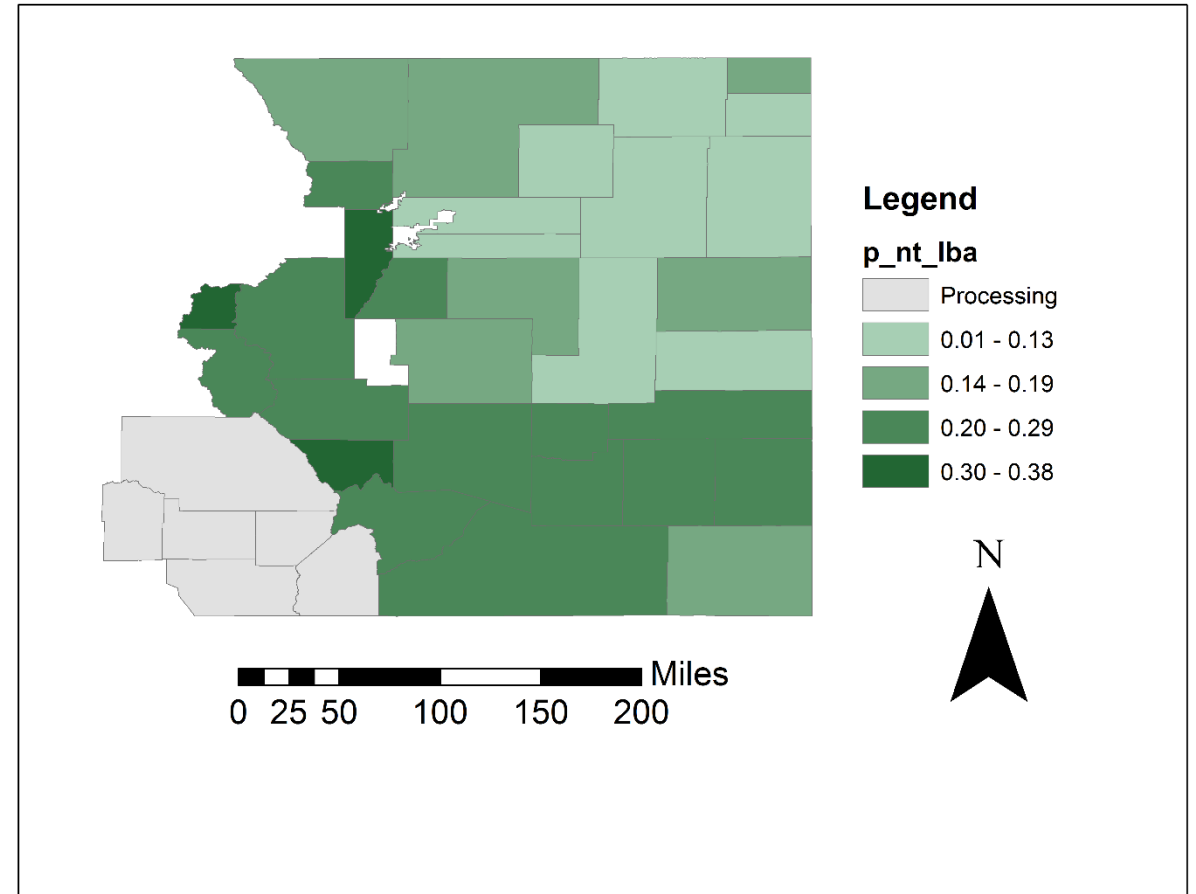
Total Nitrogen

- 5.453* lbs/acre/year



Total Phosphorus

- 0.328* lbs/acre/year

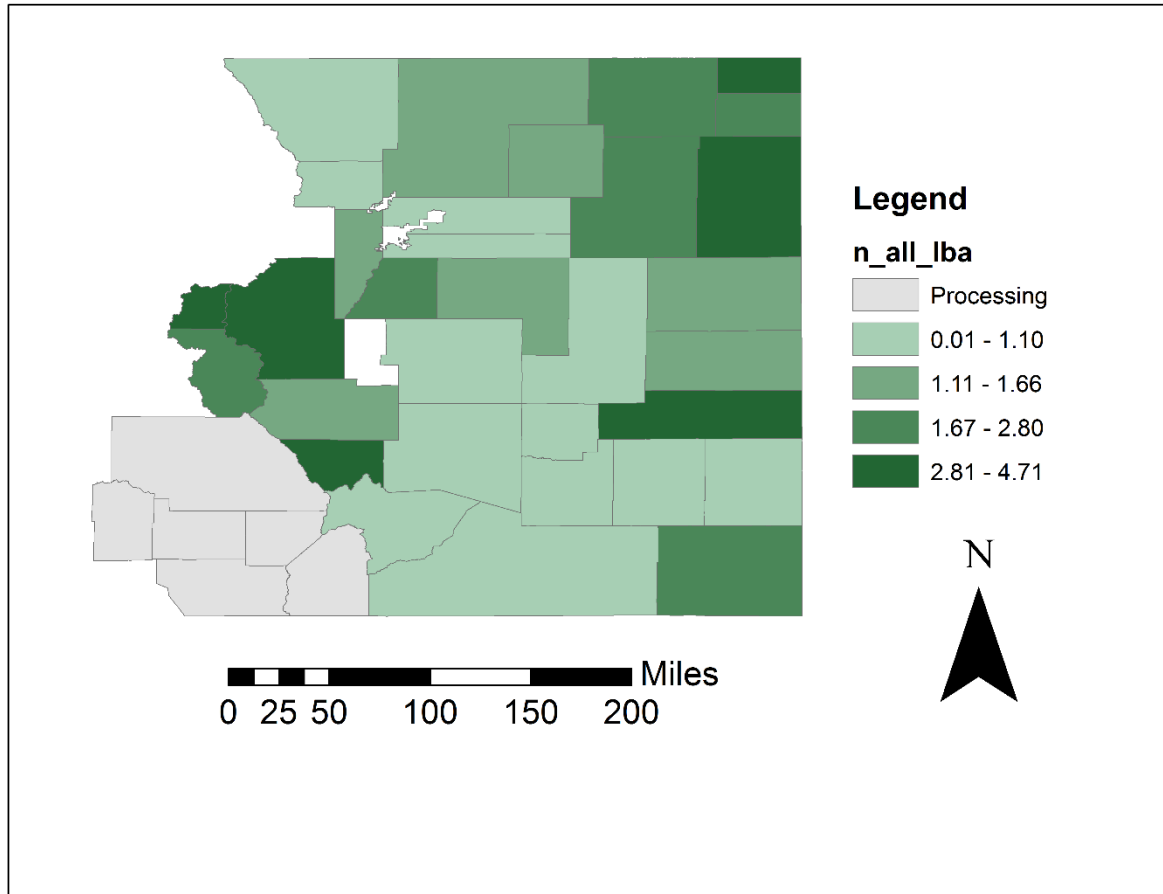


* Values are annual average edge-of-field surface and subsurface runoff of nutrients from 2008-2018

REDUCTION BY *FULL* ADOPTION

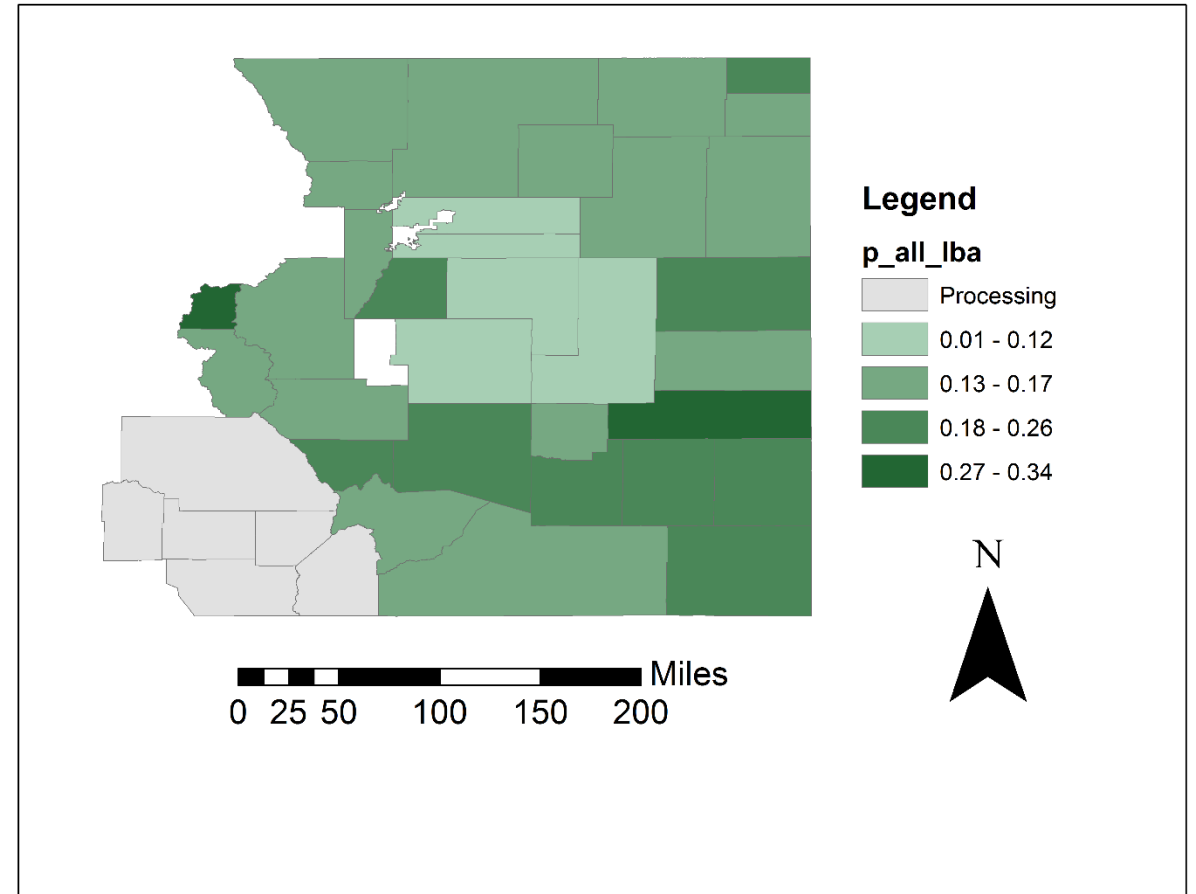
Total Nitrogen

- 3.940* lbs/acre/year (30% reduction TN)



Total Phosphorus

- 0.317* lbs/acre/year (3% reduction TP)



* Values are annual average edge-of-field surface and subsurface runoff of nutrients from 2008-2018

Discussion

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Connecting world class research with real-world water challenges

Colorado State University

A wide banner image showing a city skyline at sunset or sunrise, with a green field in the foreground. A dark grey semi-transparent rectangle is overlaid in the center, containing the text "CLEAN Center". Two white horizontal lines with circular endpoints extend from the left and right sides of the rectangle.

CLEAN Center

CLEAN DASHBOARD

Purpose

Geospatial User Interface for watershed selection and comparison of management scenarios to summarize average annual nutrient loads by source.

eRAMS Analyses

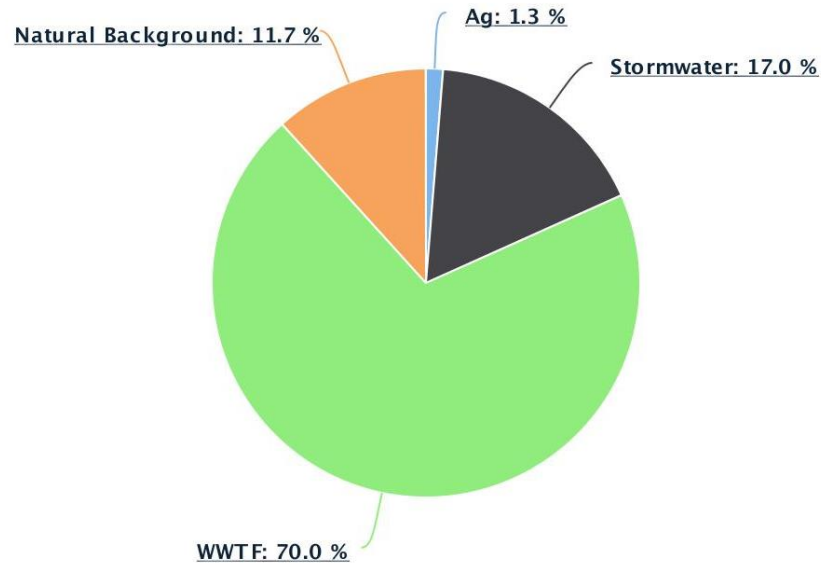
- Wastewater Treatment Plants Annual Load (EPA STORET/WQX)
- Urban Stormwater Runoff
- Edge of Field Irrigated Agriculture Runoff
- Groundwater Seepage/Discharge (South Platte MODFLOW model)
- Forest and Rangeland runoff (USGS SPARROW)

CSIP Services

- csip-clean
- csip-clean-stormwater
- csip-wrap
- csip-cfa

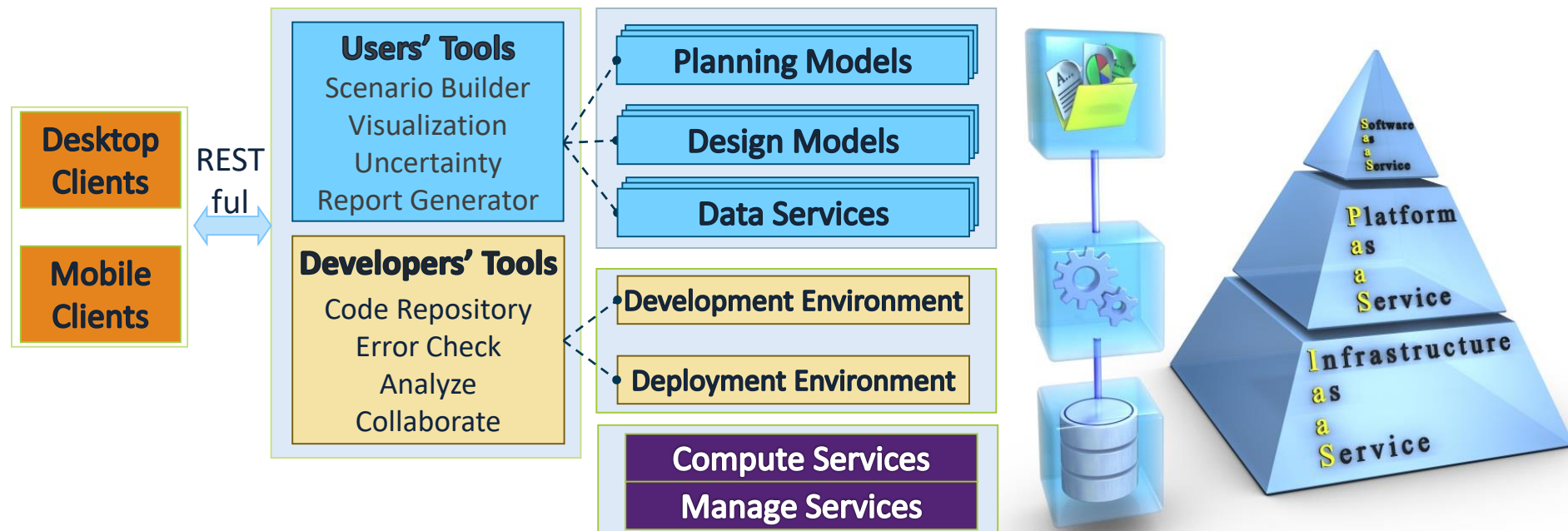
Total Nitrogen

678,934 lbs/yr



Environmental Resource Assessment & Management System (eRAMS)

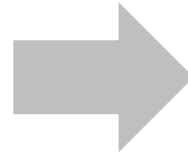
A platform for development and deployment of web-based water analytics:
Computationally scalable and accessible data and analysis tools



ERAMS

Data Sources

- CDPHE
- CO Water Resources
- CDSN
- USEPA – STORET
- USGS
- Land Use
- Climate
- User Supplied



Analysis Modules

WRAP

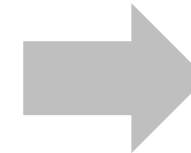
CLEAN

Flow Analysis

Healthy Watersheds

Integrated Urban Water Model

Soil & Water Assessment Tool



Custom Outputs

- ✓ Individual Watershed Reports
- ✓ Watershed Comparison Reports
- ✓ Nutrient Loading Analysis
- ✓ Water Conservation Effectiveness
- ✓ Many more!

Technology Platform

