Maximizing Water Storage Capacity Through Conservation Practices

2018 Oklahoma Governor’s Water Conference, Reed Center, Midwest City, OK
Water: We are most concerned when there is too much or not enough...
Water Cycle Out of Balance with Oklahoman’s Needs
And not a drop was fit to drink…
What Are Conservation Practices (CPs)?

• “Methods which reduce soil erosion and retain soil moisture.” defined by USDA National Agricultural Library

• Typically thought of as practices that reduce soil erosion, improve water quality, and to optimize the farming process for the long-term.

• Modes of action typically try to replace or reproduce “natural” processes in the landscape.

• Generally implemented on a voluntary basis
Impacts of Conservation Programs

- Primarily funded through USDA Natural Resources Conservation Service and Farm Services Agency

- Between 2005 – 2017, 14 conservation programs authorized in USDA Farm Bills

- Average $68 million in financial assistance per year in Oklahoma

- Total more than $886 million in financial assistance to landowners and partners between 2005 – 2017.

- There are an average of 23,000 contracts per year installing conservation on 3 – 13% of Oklahoma per year.
Conservation Practices Maximize Reservoir Storage Capacity

• OK ARS documented reservoir capacity loss rates in Little Washita River Watershed ranging from 0.84 – 2.20 percent per year.

• Daniel Wisleder (OSU graduate student) in 2004 estimated that flood control structures in the Upper Washita River Basin were 0.8 – 54.2 percent filled with sediment.

• Graf. et. al (2010) found reservoir storage across the U.S. lost an average of 0.04 – 2.00 percent annually (OK ranged typically from 0.81 – 1.20 percent).

• USDA (2012) found that conservation practices could reduce edge of field sediment losses by as much as 52 percent.
Conservation Practices Create Surface Water Storage

- Upstream Flood Control Structures- >50,000 surface acres of water storage

- Wetland Creation: Since 2005, have created at least 16,778 acres of wetlands

- Livestock ponds- since 2005, USDA programs have constructed almost 5,500 ponds on grazing lands
Oklahoma is the Land of 10,000 lakes
Conservation Practices Can Improve Irrigation Efficiency

• Approximately 430,000 acres (16% of total farmland) are irrigated farmland in Oklahoma (2013 FRIS).

• USDA NRCS has improved irrigation water management on over 100,000 acres since 2005

• Efficiencies have led to reductions of as much as 40% of water use in OK panhandle
Brush Management - Removal of Invasive Woody Species

• Invasive woody species such as salt cedar and eastern red cedar have spread to throughout the state
• Evergreen - use water all year
• Water use depends on size and area of the state, but can range from <1 to >40 gallons/day
• Removal replaces these woody species with vegetation that typically use less water throughout the year.
• Since 2005, approximately 17% of USDA grassland improvement practices have been brush management (approx. 375,000 acres)
Maximizing Water Storage Capacity Through Conservation
How Do We Increase Water Storage?

• Build or increase capacity in another reservoir!
Use Oklahoma’s Soil as a Water Reservoir

• Continuous cultivation has reduced Oklahoma soil organic matter levels from 4% to about 1% on cropland

• Loss of 75,000 gallons per acre storage

• 34 million acres farmland × 25,000 gallons = loss of **850 billion** gallons of water storage = 32% of Oklahoma major reservoir storage capacity.
Conservation Practices that Increase Water Holding Capacity of Soil

• No-till
  • Maintains channels created by plant roots
  • Reduces compaction
  • Increases organic matter
  • Increases biological activity
  • Shades and insulates the soil surface

• Cover Crops
  • Same as above, but wider variety of plants increases those effects

• Improved Pasture Management
  • Less compaction
  • More organic matter recycling, less runoff
Healthy Soils Weather the Storms

No-Till and Cover Crops

Conventional Tillage System
A Greener Landscape is A Cooler Landscape
How Much Water is Conservation Storing?
Questions?

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