



# NONPOINT SOURCE SUCCESS STORY

## Oklahoma

### Turbidity Levels in Winter Camp Creek are Reduced Through Voluntary Agricultural Conservation Programs

#### Waterbody Improved

Elevated turbidity levels resulted in the impairment of Winter Camp Creek and placement on Oklahoma's Clean Water Act (CWA) section 303(d) list of impaired waters in 2006. Grazing and crop production contributed to these impairments, and implementation of conservation practice systems (CPs) to promote better-quality grazing lands and croplands decreased turbidity levels in the creek. As a result, Winter Camp Creek was removed from Oklahoma's 2010 CWA section 303(d) list for turbidity. Winter Camp Creek now partially supports its fish and wildlife protection (FWP) beneficial use.

#### Problem

Winter Camp Creek is a 24.23-mile stream that flows through Kingfisher and Canadian counties in Oklahoma before discharging to Kingfisher Creek near the town of Kingfisher (Figure 1). Land use in the 74,000-acre watershed is primarily cropland (59 percent of total) for dryland winter wheat production which is concentrated in the lower end of the watershed. About 35 percent of the watershed is grassland and pasture for grazing and hay production, and 1 percent is forested, primarily along stream channels. Portions of the stream have been channelized and impounded in a series of ponds and small reservoirs for livestock watering and more recently to provide water for oil and natural gas extraction. The channel is deeply incised and unstable in some areas.

Cropland and grazing management and hydromodification contributed to excess turbidity in Winter Camp Creek. It was listed as impaired for turbidity in 2006 when 11 percent of assessed baseflow turbidity samples violated Oklahoma water quality standards. An Oklahoma stream is considered to violate the turbidity standard when more than 10 percent of baseflow samples are higher than 50 nephelometric turbidity units (NTU). On the basis of these results, Oklahoma added Winter Camp Creek (OK620910050080\_00) to the 2006 CWA section 303(d) list for nonattainment of the FWP beneficial use.

#### Project Highlights

Landowners in the watershed worked with the Kingfisher County and Central North Canadian River conservation districts, the U.S. Department of

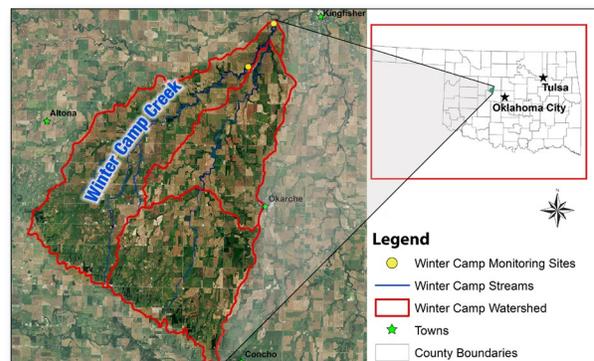


Figure 1. The Winter Camp Creek watershed is in central Oklahoma.

Agriculture (USDA) Natural Resources Conservation Service (NRCS), and the Oklahoma Conservation Commission (OCC) to implement conservation practices (CPs) through Oklahoma NRCS's Environmental Quality Incentives Program (EQIP), Conservation Stewardship Program (CStwP), Grazing Lands Conservation Initiative (GLCI) conservation technical assistance, and the general conservation technical assistance program, as well as through the OCC's Locally Led Cost-Share Program (LLCP).

From 2006 to 2010, landowners installed CPs to improve many acres of croplands and grazing lands, which reduced runoff of sediment and other pollutants by decreasing erosion. Landowners continued to implement CPs after 2010, which has helped maintain water quality improvements (Table 1).

Winter Camp Creek also benefits from the forested and grassed riparian buffers that most landowners have set aside in the lower watershed. Some areas

Table 1. Conservation practices installed in the Winter Camp Creek watershed during two time periods.

Practice type installed	Amount	
	2006–2010	2010–2017
Prescribed grazing (ac)	2,594	957
Nutrient management (ac)	762	439
Ponds	5	--
Cross fencing (feet)	3,872	6,195
Upland wildlife management	443	76
Well	--	1
Terrace (ft)	26,740	2,985
Grade stabilization structures	2	--
No-till (ac)	1,030	984
Integrated pest management (ac)	622	744
Rotation of supplement/feeding areas (ac)	--	588
Using controlled-release nitrogen fertilizer (ac)	--	1,367
Solar pumping plant for livestock watering	--	1
Forage and biomass planting (ac)	333	143
Brush management (ac)	268	42
Critical area planting (ac)	39	8
Contour farming (ac)	265	265
Conservation crop rotation (ac)	1,199	--
Diversion (feet)	669	1,774
Field border (feet)	2,760	--
Grassed waterways (ac)	60	15
Reduced tillage (ac)	1,776	--
Seasonal residue management (ac)	500	288
Using technology to reduce pesticide drift (ac)	--	1,370
Incorporating native plants and legumes into pasture plantings (ac)	--	64
Forage harvest management (ac)	155	--

Notes: ac = acres; ft = feet

are grazed, but many are not farmed—likely because the areas along the incised creek channel are difficult to access. Although the upper watershed does not have as much protected buffer, the lower end of the watershed has significant buffers of trees, shrubs, and grasses between tilled fields and the stream. These buffers continue to mature and protect the stream.

## Results

Through its statewide nonpoint source Rotating Basin Ambient Monitoring Program, the OCC documented improved water quality in Winter Camp Creek due to landowners implementing CPs. The installed practices worked to decrease erosion and reduce turbidity.

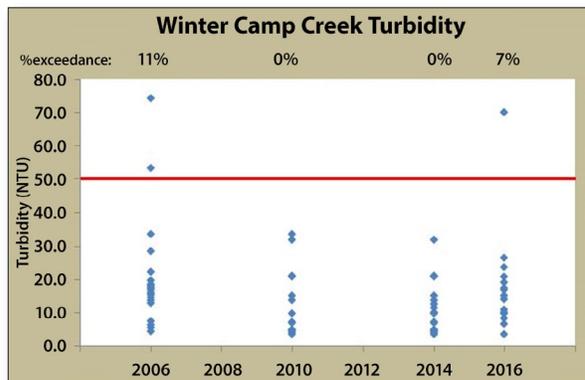


Figure 2. Turbidity decreased in Winter Camp Creek as agricultural producers implemented CPs.

Monitoring data compiled from the upstream site (see Figure 1) for the 2006 integrated report showed excessive turbidity in Winter Camp Creek when 11 percent of baseflow samples exceeded the state standard of 50 NTU. However, by 2010, turbidity values at the upstream site had decreased such that 0 percent of samples exceeded 50 NTU. In 2012 the monitoring site was moved further downstream to capture the influence of a major tributary, and the water quality improvement continues at this site through the 2016 assessment (Figure 2). On the basis of these data, Winter Camp Creek was removed from the Oklahoma CWA section 303(d) list for turbidity in 2010. This change resulted in partial support of its FWP beneficial use. Monitoring in Winter Camp Creek will continue in order to track progress towards full support of beneficial uses.

## Partners and Funding

The OCC monitoring program is supported by U.S. Environmental Protection Agency (EPA) CWA section 319 funds at an average annual statewide cost of \$1 million. Approximately \$500,000 in EPA 319 funds support statewide water quality educational efforts through Blue Thumb. Working in partnership with local conservation districts, NRCS supplied approximately \$90,000 for implementation of CPs in the watershed through NRCS EQIP. Additional dollars supported conservation practices installed and maintained through NRCS CStwP and the GLCI. The LLCPC provided \$14,361 matched by \$6,641 from landowners. Finally, many practices were funded by landowners based on recommendations through NRCS general technical assistance and conservation planning.



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