Characteristics of the Ranch Creek Watershed

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Acronyms

BMP – Best Management Practice
CPP – Continuing Planning Process
FEMA – Federal Emergency Management Agency
GIS – Geographic Information System
INCOG – Indian Nations Council of Governments
MAWPR – Middle Arkansas Watershed Planning Region
OCWP – Oklahoma Comprehensive Water Plan
ODEQ – Oklahoma Department of Environmental Quality
OWRB – Oklahoma Water Resources Board
PBCR – Primary Body Contact Recreation
TMDL – Total Maximum Daily Load
WBID – Waterbody Identification Number
WQS – Water Quality Standard
WWAC – Warm Water Aquatic Community

Introduction

This report provides information obtained through numerous sources regarding the physical characteristics of the Ranch Creek watershed. Maps, data tables and photos are used along with text to help watershed managers gain more insight into watershed activities that can have an impact on water quality. Ranch Creek is an impaired waterbody and not meeting water quality criteria established by the State of Oklahoma for all assigned beneficial uses. By better understanding the population and activities along with the features within a watershed it becomes easier to select and place best management practices (BMPs) designed to reduce the pollutant load causing the impairment.

The Ranch Creek watershed along with the Haikey Creek, Polecat Creek and Coal Creek watersheds made up the study area for this report. Each watershed is listed separately, but combined; they make up the whole study.

Physical Description and Location

Ranch Creek (WBID OK121300010060_00) is 6.9 miles long and flows south along the west side of the City of Owasso in Tulsa County before joining Bird Creek. The east side of the upper portion of the watershed is primarily within the city limits of Owasso and more heavily developed. The west side of the upper watershed and the lower portion of the watershed are primarily outside of the Owasso city limits and lightly developed. The entire Ranch Creek watershed is within Tulsa County.

Map 1: Ranch Creek Watershed and City Limits
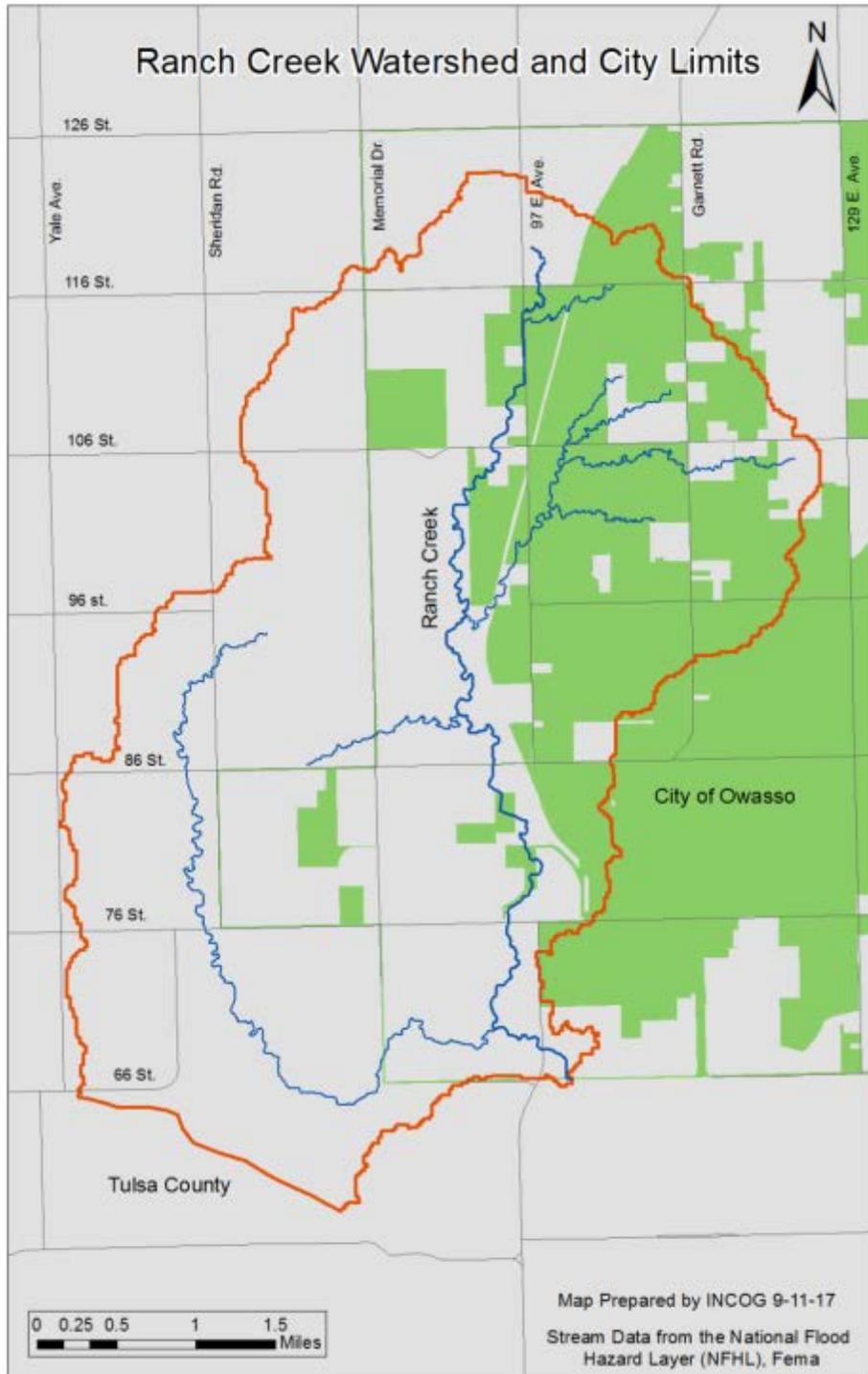
The Ranch Creek watershed is comprised of two sub-watersheds. The upper watershed covers 10.0 square miles and the lower covers 8.1 square miles for a total of 18.1 square miles. There are a total of 22.8 miles of streams and creeks within this watershed.

Map 2: Ranch Creek Watershed and Sub-Basins
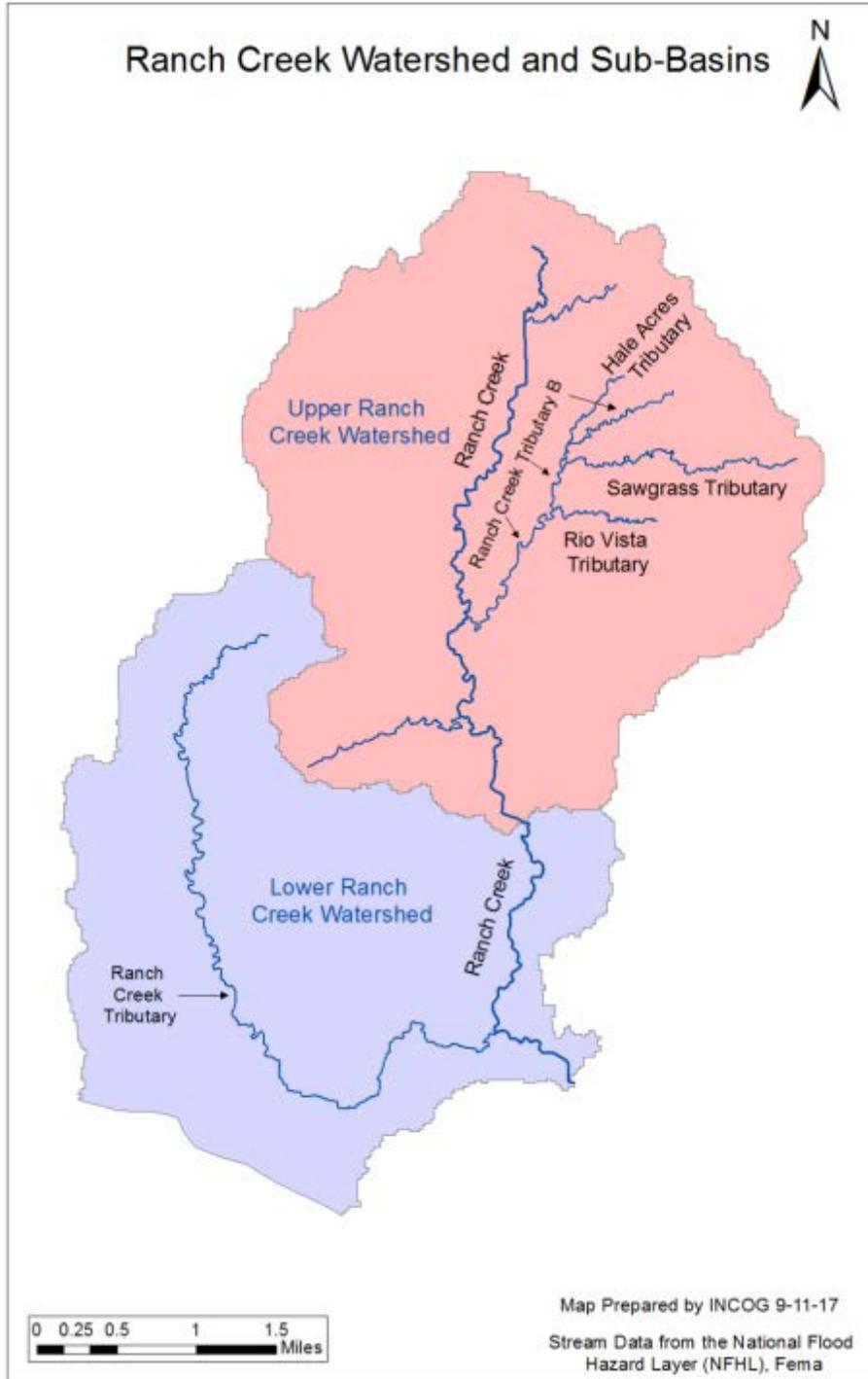
Streams within this watershed are listed in Table 1 below and shown on Map 2 above. According to the 2014 Integrated Report, Ranch Creek is the only stream that has been assigned a waterbody identification number (WBID) and the only stream that has been assigned a name

by the Oklahoma Water Resources Board (OWRB) or Oklahoma Department of Environmental Quality (ODEQ). (Water Quality In Oklahoma, 2014 Integrated Report)

The Federal Emergency Management Agency (FEMA) lists names for three more streams in this watershed on their "National Flood Hazard Layer (Official)". To avoid duplicate names for the same stream, INCOG recommends the adoption of the names FEMA uses for the steams OWRB/DEQ has not published names or issued WBIDs for. FEMA's names are already in use and on their maps and these names will be used in this report. The unnamed streams are referred to as unnamed streams or unnamed tributaries.

Table 1: Ranch Creek Watershed Streams and WBIDs			
DEQ/OWRB Waterbody Identification (WBID)	DEQ/OWRB Waterbody Name	Length (Miles)	Federal Emergency Management Agency Waterbody Name
OK121300010060_00	Ranch Creek	6.9	Ranch Creek
-----	-----	1.0	Rio Vista Tributary
-----	-----	2.1	Sawgrass Tributary
-----	-----	0.7	Hale Acres Tributary
-----	-----	6.6	Ranch Creek Tributary
-----	-----	3.0	Ranch Creek Tributary B
-----	-----	2.5	Unnamed Tributaries

The advent of stormwater collection systems has changed the shape of some watersheds in developed areas. Runoff does not always flow to the closest receiving stream. It may get intercepted by a stormwater collection system inlet and piped somewhere else. Therefore caution should be exercised when determining watershed boundaries in developed areas with just topo maps.

Ranch Creek at 76th St. N., 4-24-08

Watershed Demographics

To manage a watershed you have to manage the people within the watershed. Any changes that occur within the watershed will be made through the actions of the people living there so it is advisable to understand the population demographics. The following tables show the current demographics and how they have changed from 2000 to 2017 with projections out to 2022. The 2017 values are estimates. Data from the United States Census Bureau were used for these demographics.

Some comments are offered following some of the tables to help get individuals thinking about how demographic information can be used to help develop watershed plans and what actions could be implemented to improve watershed conditions. Detailed studies of the data will reveal opportunities that are sometimes overlooked.

Lower Ranch Creek Sub-Basin

Table 2: Lower Population Demographics									
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	**Percent Change**
									2000 to 2010	2017 to 2022
Total Population	1,140		1,469		1,681		1,770		28.8%	5.3%
Population Density (Pop/Sq Mi)	140.46		215.32		207.05		218.04		53.3%	5.3%
Total Households	412		509		578		616		23.5%	6.5%
Population by Gender:									
Male	567	49.7%	733	49.9%	843	50.1%	890	50.3%	29.3%	5.7%
Female	574	50.3%	736	50.1%	838	49.9%	880	49.7%	28.3%	5.0%

The total population within this sub-basin increased 28.8% from 2000 to 2010 and is expected to increase another 5.3% from 2017 to 2022. The population density increased by 53.3% from 2000 to 2010, and is expected to increase by 5.3% from 2017 to 2022. Overall the population is growing within this sub-basin with a significant shift from rural to urban areas.

Table 3: Lower Population by Race									
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
White	991	86.9%	1,100	74.9%	1,223	72.8%	1,255	70.9%	11.0%	2.6%
Black	23	2.0%	49	3.3%	61	3.6%	66	3.7%	116.2%	8.7%
American Indian or Alaska Native	93	8.2%	111	7.6%	131	7.8%	139	7.9%	19.4%	6.4%
Asian/Native Hawaiian/Other Pacific Islander	1	0.1%	38	2.6%	54	3.2%	61	3.5%	3,643.3%	13.6%
Some Other Race	1	0.1%	94	6.4%	123	7.3%	143	8.1%	9,302.2%	15.9%
Two or More Races	31	2.8%	77	5.2%	89	5.3%	105	6.0%	145.6%	18.2%

Table 4: Lower Population by Ethnicity									
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
Hispanic	24	2.1%	149	10.1%	189	11.2%	219	12.4%	523.7%	15.8%
Not Hispanic or Latino	1,116	97.9%	1,321	89.9%	1,492	88.8%	1,551	87.6%	18.3%	4.0%

Educational outreach efforts should take into consideration the race and ethnicity of the target audience. Cultures and languages vary and priorities may be different so these factors need to be evaluated when coordinating educational outreaches, forming watershed alliances and trying to gain support for changes that could improve watershed conditions.

Table 5: Lower Population by Age									
	2000 Census	**%**	**2010 Census**	**%**	**2017A Estimates**	**%**	**2022 Projections**	**%**	**Percent Change**	
									2000 to 2010	**2017 to 2022**
0 to 4	74	6.5%	106	7.2%	117	7.0%	124	7.0%	43.6%	5.7%
5 to 14	174	15.2%	229	15.6%	252	15.0%	243	13.7%	31.7%	-3.5%
15 to 19	121	10.6%	94	6.4%	112	6.6%	124	7.0%	-22.4%	11.2%
20 to 24	61	5.4%	85	5.8%	87	5.2%	92	5.2%	39.1%	5.8%
25 to 34	159	13.9%	195	13.3%	220	13.1%	221	12.5%	22.9%	0.6%
35 to 44	185	16.2%	203	13.8%	227	13.5%	237	13.4%	9.7%	4.6%
45 to 54	147	12.9%	223	15.2%	227	13.5%	213	12.0%	52.1%	-6.2%
55 to 64	106	9.3%	144	9.8%	195	11.6%	210	11.8%	35.5%	7.3%
65 to 74	83	7.3%	105	7.2%	145	8.6%	180	10.2%	26.4%	24.6%
75 to 84	24	2.1%	68	4.7%	79	4.7%	102	5.8%	183.6%	30.1%
85+	6	0.5%	16	1.1%	20	1.2%	23	1.3%	162.4%	13.3%
Median Age:										
Total Population	34.0		36.3		37.3		38.4			

The median age within this sub-watershed is steadily increasing. From 2000 to 2010 the most notable change is the big jump in the 75 to 85+ year age brackets. The 65 to 84 year age brackets are expected increase the most from 2017 to 2022.

Table 6: Lower Households by Income										
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
$0 - $15,000	66	15.9%	63	12.3%	55	9.5%	45	7.3%	-4.3%	-19.0%
$15,000 - $24,999	45	10.8%	50	9.8%	52	8.9%	46	7.5%	12.3%	-10.3%
$25,000 - $34,999	63	15.2%	40	7.9%	42	7.2%	37	6.1%	-35.4%	-10.4%
$35,000 - $49,999	69	16.7%	77	15.0%	81	14.0%	75	12.1%	11.1%	-7.8%
$50,000 - $74,999	104	25.3%	128	25.1%	142	24.5%	140	22.8%	22.4%	-0.9%
$75,000 - $99,999	22	5.4%	59	11.6%	75	12.9%	93	15.1%	164.0%	24.3%
$100,000 - $149,999	18	4.4%	70	13.7%	95	16.4%	123	20.0%	283.8%	30.2%
$150,000 +	12	3.0%	23	4.5%	38	6.6%	57	9.2%	81.8%	49.2%
Average Hhld Income	$47,702		$66,572		$73,414		$84,401		39.6%	15.0%
Median Hhld Income	$40,494		$55,485		$60,757		$69,333		37.0%	14.1%
Per Capita Income	$17,256		$23,079		$25,247		$29,352		33.7%	16.3%

Hhld = Household

Average household income, median household income and per capita income have steadily increased throughout the watershed.

Table 7: Lower Employment										
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
Total Population 16+	877		1,113		1,288		1,374		26.9%	23.5%
Total Labor Force	600	68.4%	761	68.4%	844	65.5%	910	66.2%	26.9%	7.9%
Civilian, Employed	568	94.8%	707	92.9%	807	95.7%	879	96.6%	24.3%	8.9%
Civilian, Unemployed	31	5.2%	54	7.1%	36	4.3%	30	3.4%	73.2%	-16.3%
In Armed Forces	0	0.0%	0	0.0%	0	0.0%	0	0.0%	N/A%	0.0%
Not In Labor Force	277	31.6%	352	31.6%	444	34.5%	464	33.8%	26.9%	4.6%
% Blue Collar	262	46.1%	263	37.2%	307	38.0%	334	41.4%	0.3%	8.8%
% White Collar	307	53.9%	444	62.8%	500	62.0%	545	67.6%	44.8%	9.0%

Table 8: Lower Housing Units										
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
Total Housing Units	440		544		610		650		23.5%	6.5%
Total Occupied Housing Units	n/a	n/a	509	93.6%	578	94.7%	616	94.8%	n/a	6.5%
Owner Occupied: Owned with a mortgage or loan	n/a	n/a	259	50.9%	272	47.1%	288	46.8%	n/a	5.9%
Owner Occupied: Owned free and clear	n/a	n/a	110	21.6%	142	24.5%	155	25.1%	n/a	8.9%
Renter Occupied	n/a	n/a	140	27.4%	164	28.4%	173	28.1%	n/a	5.4%
Vacant	28	6.3%	35	6.4%	32	5.3%	34	5.2%	24.4%	5.8%

Total housing units increased 23.5% from 2000 to 2010 and are expected to increase another 6.5% through 2022 so residential development and residential construction related runoff pollutants are likely to increase as well if best management practices are not put in place to minimize the effects of the additional impervious area.

Table 9: Lower Vehicles Available										
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
0 Vehicles Available	18	4.5%	16	3.1%	22	3.8%	24	3.9%	-13.8%	9.0%
1 Vehicle Available	107	26.0%	151	29.6%	158	27.3%	165	26.7%	40.7%	4.4%
2+ Vehicles Available	287	69.5%	343	67.3%	399	69.0%	427	69.4%	19.4%	7.2%
Average Vehicles Per Household	1.90		2.11		2.17		2.19		12.6%	0.5%

The average number of vehicles per household increased by 12.6% from 2000 to 2010, then leveled off and is expected to remain constant through 2022. Vehicles can contribute a variety of pollutants, but unless traffic from outside the watershed increases or the average age of the local vehicles increases, transportation related pollutants might remain constant.

Table 10: Lower Marital Status										
									Percent Change	
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	2000 to 2010	2017 to 2022
Married, Spouse Present	513	57.4%	619	54.5%	705	53.8%	753	53.7%	20.7%	6.7%
Married, Spouse Absent	16	1.8%	15	1.4%	40	3.1%	45	3.2%	-4.2%	11.0%
Divorced	83	9.3%	187	16.4%	161	12.3%	173	12.4%	124.8%	7.7%
Widowed	65	7.3%	83	7.3%	67	5.1%	70	5.0%	27.6%	4.9%
Never Married	213	23.8%	231	20.4%	338	25.8%	362	25.8%	8.8%	7.1%
Age 15+ Population	893		1,135		1,312		1,403		27.1%	7.0%

Table 11: Lower Educational Attainment										
									Percent Change	
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	2000 to 2010	2017 to 2022
Grade K - 8	50	7.0%	36	3.8%	39	3.5%	41	3.4%	-27.0%	5.1%
Grade 9 - 11	76	10.8%	73	7.6%	86	7.7%	91	7.7%	-4.0%	5.7%
High School Graduate	252	35.5%	305	31.9%	348	31.3%	370	31.2%	21.2%	6.5%
Some College, No Degree	175	24.7%	213	22.3%	238	21.4%	253	21.3%	21.4%	6.2%
Associates Degree	49	6.9%	107	11.2%	115	10.4%	121	10.2%	117.1%	5.1%
Bachelor's Degree	81	11.5%	130	13.6%	174	15.6%	188	15.9%	59.9%	8.2%
Graduate Degree	21	3.0%	80	8.4%	98	8.8%	107	9.0%	272.4%	9.0%
No Schooling Completed	4	0.5%	12	1.3%	14	1.3%	15	1.3%	222.1%	5.0%
Age 25+ Population	708		955		1,113		1,187		34.9%	6.6%

Upper Ranch Creek Sub-Basin

The following tables show the current demographics for the Upper Ranch Creek sub-basin and how they have changed from 2000 to 2017 with projections out to 2022. The 2017 values are estimates.

Table 12: Upper Population Demographics										
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
Total Population	4,773		10,000		13,097		15,154		109.5%	15.7%
Population Density (Pop/Sq Mi)	475.22		720.25		1,303.94		1,508.76		51.6%	15.7%
Total Households	1,735		3,616		4,715		5,554		108.4%	17.8%
Population by Gender:										
Male	2,385	50.0%	4,864	48.6%	6,398	48.9%	7,432	49.0%	103.9%	16.2%
Female	2,388	50.0%	5,136	51.4%	6,699	51.2%	7,722	51.0%	115.1%	15.3%

The total population within this sub-basin increased 109.5% from 2000 to 2010 and is expected to increase another 15.7% from 2017 to 2022. The population density increased by 51.6% from 2000 to 2010, and is expected to increase by 15.7% from 2017 to 2022. Overall the population is growing within this sub-basin with a significant shift from rural to urban areas.

Table 13: Upper Population by Race								Percent Change	
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	2000 to 2010	2017 to 2022
White	4,173	87.4%	8,123	81.2%	10,384	79.3%	11,767	77.7%	94.6%	13.3%
Black	53	1.1%	295	2.9%	409	3.1%	491	3.2%	459.1%	19.9%
American Indian or Alaska Native	250	5.2%	646	6.5%	846	6.5%	990	6.5%	158.1%	17.1%
Asian/Native Hawaiian/Other Pacific Islander	72	1.5%	254	2.5%	430	3.3%	544	3.6%	254.6%	26.5%
Some Other Race	9	0.2%	152	1.5%	227	1.7%	292	1.9%	1,565.9%	28.7%
Two or More Races	216	4.5%	532	5.3%	800	6.1%	1,069	7.1%	145.7%	33.6%

Table 14: Upper Population by Ethnicity								Percent Change	
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	2000 to 2010	2017 to 2022
Hispanic	31	0.7%	477	4.8%	700	5.3%	905	6.0%	1,433.0%	29.3%
Not Hispanic or Latino	4,742	99.4%	9,523	95.2%	12,397	94.7%	14,249	94.0%	100.8%	14.9%

Educational outreach efforts should take into consideration the race and ethnicity of the target audience. Cultures and languages vary and priorities may be different so these factors need to be evaluated when coordinating educational outreaches, forming watershed alliances and trying to gain support for changes that could improve watershed conditions.

Table 15: Upper Population by Age										
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
0 to 4	356	7.5%	752	7.5%	995	7.6%	1,079	7.1%	111.1%	8.4%
5 to 14	770	16.1%	1,753	17.5%	2,339	17.9%	2,516	16.6%	127.8%	7.6%
15 to 19	378	7.9%	691	6.9%	966	7.4%	1,168	7.7%	83.1%	20.9%
20 to 24	196	4.1%	449	4.5%	709	5.4%	896	5.9%	129.2%	26.4%
25 to 34	694	14.5%	1,403	14.0%	1,592	12.2%	1,799	11.9%	102.1%	13.0%
35 to 44	820	17.2%	1,623	16.2%	1,977	15.1%	2,267	15.0%	98.0%	14.7%
45 to 54	684	14.3%	1,389	13.9%	1,668	12.7%	1,829	12.1%	103.0%	9.6%
55 to 64	473	9.9%	986	9.9%	1,371	10.5%	1,568	10.3%	108.6%	14.4%
65 to 74	276	5.8%	593	5.9%	966	7.4%	1,311	8.6%	114.9%	35.6%
75 to 84	116	2.4%	291	2.9%	399	3.0%	585	3.9%	150.9%	46.7%
85+	11	0.2%	69	0.7%	115	0.9%	137	0.9%	553.5%	18.7%
Median Age:										
Total Population	34.9		34.7		34.7		35.6			

The median age within this sub-watershed has remained steady. From 2000 to 2010 the most notable change is the big jump in the 75 to 85+ year age brackets. The 75 to 84 year age bracket is expected increase the most from 2017 to 2022.

Ranch Creek between 106
St. N. and 116 St. N., 3-23-18

Table 16: Upper Households by Income									
								Percent Change	
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	2000 to 2010	2017 to 2022
$0 - $15,000	130	7.5%	267	7.4%	302	6.4%	261	4.7%	105.7%	-13.8%
$15,000 - $24,999	160	9.2%	195	5.4%	197	4.2%	192	3.5%	22.3%	-2.3%
$25,000 - $34,999	256	14.8%	341	9.4%	334	7.1%	307	5.5%	33.2%	-8.1%
$35,000 - $49,999	280	16.1%	461	12.8%	561	11.9%	541	9.7%	65.0%	-3.7%
$50,000 - $74,999	466	26.9%	799	22.1%	1,015	21.5%	1,084	19.5%	71.2%	6.8%
$75,000 - $99,999	279	16.1%	717	19.8%	1,009	21.4%	1,237	22.3%	156.9%	22.6%
$100,000 - $149,999	113	6.5%	650	18.0%	923	19.6%	1,360	24.5%	473.3%	47.3%
$150,000 +	40	2.3%	185	5.1%	373	7.9%	572	10.3%	359.5%	53.4%
Average Hhld Income	$57,377		$77,755		$83,780		$93,874		35.5%	12.0%
Median Hhld Income	$51,996		$67,043		$73,771		$82,632		28.9%	12.0%
Per Capita Income	$20,861		$28,113		$30,161		$34,405		34.8%	14.1%

Average household income, median household income and per capita income have steadily increased throughout this sub-basin.

Table 17: Upper Employment									
								Percent Change	
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	2000 to 2010	2017 to 2022
Total Population 16+	3,553		7,346		9,552		11,287		106.7%	53.7%
Total Labor Force	2,523	71.0%	5,057	68.8%	6,330	66.3%	7,570	67.1%	100.4%	19.6%
Civilian, Employed	2,448	97.0%	4,853	96.0%	6,175	97.6%	7,423	98.1%	98.3%	20.2%
Civilian, Unemployed	62	2.5%	194	3.8%	142	2.3%	133	1.8%	212.0%	-6.9%
In Armed Forces	13	0.5%	9	0.2%	13	0.2%	15	0.2%	-27.7%	16.6%
Not In Labor Force	1,030	29.0%	2,289	31.2%	3,222	33.7%	3,717	32.9%	122.2%	15.4%
% Blue Collar	843	34.5%	1,672	34.4%	2,118	34.3%	2,530	41.0%	98.3%	19.4%
% White Collar	1,604	65.6%	3,182	65.6%	4,057	65.7%	4,892	79.2%	98.3%	20.6%

Table 18: Upper Housing Units									Percent Change	
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	2000 to 2010	2017 to 2022
Total Housing Units	1,803		3,786		4,894		5,759		110.0%	17.7%
Total Occupied Housing Units	n/a	n/a	3,616	95.5%	4,715	96.4%	5,554	96.4%	n/a	17.8%
Owner Occupied: Owned with a mortgage or loan	n/a	n/a	2,352	65.0%	2,877	61.0%	3,374	60.8%	n/a	17.3%
Owner Occupied: Owned free and clear	n/a	n/a	553	15.3%	806	17.1%	951	17.1%	n/a	17.9%
Renter Occupied	n/a	n/a	711	19.7%	1,032	21.9%	1,229	22.1%	n/a	19.1%
Vacant	68	3.8%	171	4.5%	179	3.7%	205	3.6%	152.6%	14.7%

Total housing units increased 110.0% from 2000 to 2010 and are expected to increase another 17.7% through 2022 so residential development and residential construction related runoff pollutants are likely to increase as well if best management practices are not put in place to minimize the effects of the additional impervious area.

Table 19: Upper Vehicles Available									Percent Change	
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	2000 to 2010	2017 to 2022
0 Vehicles Available	31	1.8%	62	1.7%	81	1.7%	93	1.7%	98.7%	14.5%
1 Vehicle Available	348	20.0%	859	23.8%	1,121	23.8%	1,318	23.7%	147.1%	17.5%
2+ Vehicles Available	1,357	78.2%	2,695	74.5%	3,512	74.5%	4,143	74.6%	98.6%	18.0%
Average Vehicles Per Household	2.00		2.08		2.09		2.09		4.1%	0.0%

The average number of vehicles per household increased by only 4.1% from 2000 to 2010, then leveled off and is expected to remain constant through 2022. Vehicles can contribute a variety of pollutants, but unless traffic from outside the watershed increases or the average age of the local vehicles increases, transportation related pollutants might remain constant.

Table 20: Upper Marital Status										
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
Married, Spouse Present	2,497	68.5%	4,527	60.4%	5,979	61.3%	6,948	60.1%	81.3%	16.2%
Married, Spouse Absent	42	1.2%	147	2.0%	228	2.3%	282	2.4%	246.8%	23.4%
Divorced	258	7.1%	936	12.5%	1,120	11.5%	1,378	11.9%	262.8%	23.0%
Widowed	179	4.9%	231	3.1%	249	2.6%	286	2.5%	29.0%	15.0%
Never Married	671	18.4%	1,655	22.1%	2,186	22.4%	2,665	23.1%	146.5%	21.9%
Age 15+ Population	3,647		7,495		9,762		11,559		105.5%	18.4%

Table 21: Upper Educational Attainment										
	2000 Census	%	2010 Census	%	2017A Estimates	%	2022 Projections	%	Percent Change	
									2000 to 2010	2017 to 2022
Grade K - 8	67	2.2%	112	1.8%	114	1.4%	130	1.4%	67.0%	13.7%
Grade 9 - 11	233	7.6%	296	4.7%	335	4.1%	382	4.0%	27.3%	13.9%
High School Graduate	948	30.9%	1,720	27.1%	2,108	26.1%	2,449	25.8%	81.4%	16.2%
Some College, No Degree	815	26.5%	1,634	25.7%	1,968	24.3%	2,292	24.1%	100.5%	16.5%
Associates Degree	283	9.2%	683	10.8%	908	11.2%	1,075	11.3%	141.2%	18.3%
Bachelor's Degree	511	16.6%	1,286	20.2%	1,836	22.7%	2,196	23.1%	151.6%	19.6%
Graduate Degree	188	6.1%	573	9.0%	764	9.4%	911	9.6%	205.6%	19.3%
No Schooling Completed	27	0.9%	51	0.8%	53	0.7%	59	0.6%	89.4%	11.7%
Age 25+ Population	3,071		6,354		8,087		9,495		106.9%	17.4%

Impaired Waters

Every two years the State of Oklahoma evaluates its waterbodies to determine which ones are not meeting minimum water quality standards and beneficial use criteria. The currently approved report is "Water Quality In Oklahoma, 2014 Integrated Report". The 2016 Integrated Report is still in draft form, and at this time, the impairment listing is the same as it is in the 2014 report. In the 2014 Integrated Report, Ranch Creek is the only waterbody listed as impaired in this watershed and it is, and has been, impaired for *Escherichia coli*. for a number of years. (See Map 3)

Map 3: Ranch Creek Watershed Impaired Streams
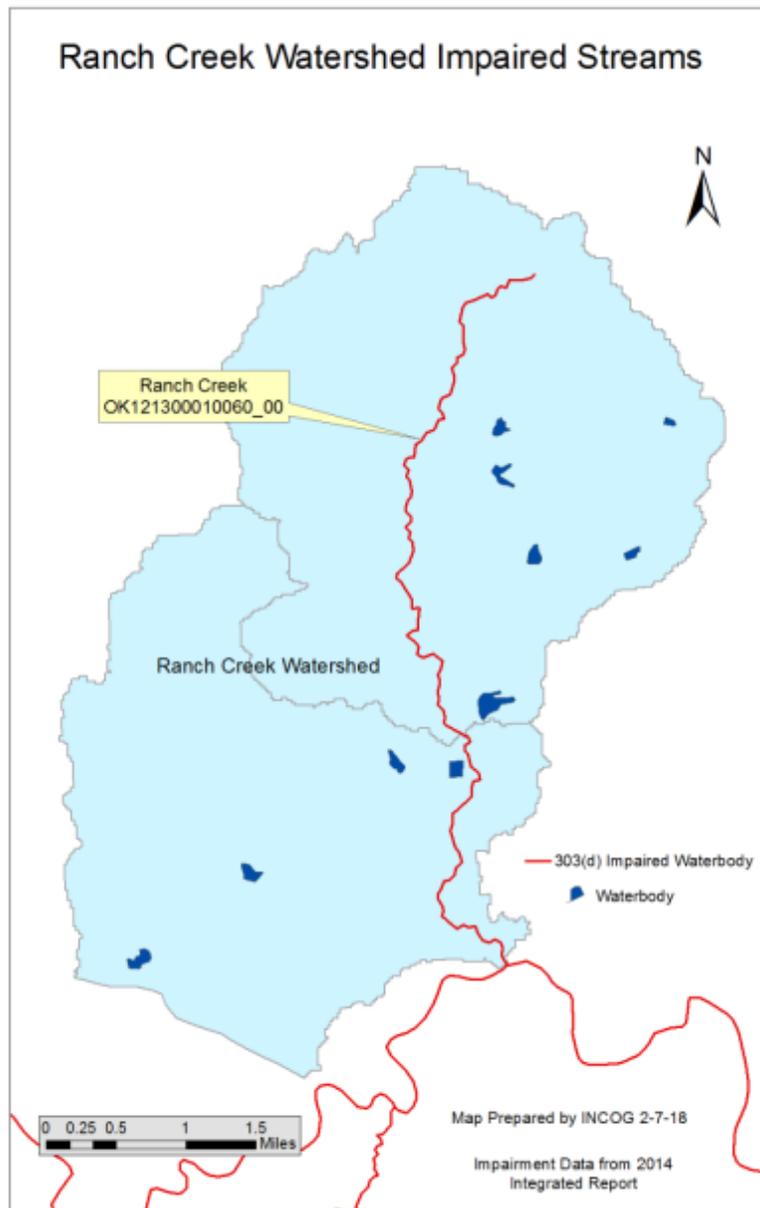
Impairment listings for 2010 through 2014 are shown in Table 22.

Table 22: 2010 Through 2014 Oklahoma Integrated Reports					
Waterbody	Category	Aesthetic	Warm Water Aquatic Community (WWAC)	Fish Consumption	Primary Body Contact Recreation (PBCR)
Ranch Creek (2010 Integrated Report)	5a	I	I	X	N
Ranch Creek (2012 Report)	4a	I	F	X	N
Ranch Creek (2014 Report)	4a	I	I	X	N

F=Fully Supporting   I=Insufficient Information   N=Not Supporting   X=Not Assessed

The 2010 Integrated Report placed Ranch Creek in Category 5a, meaning a TMDL was underway or will be scheduled. In 2012 it was listed as 4a meaning a TMDL was completed. *Escherichia coli* was delisted in the 2012 report because a TMDL (#40972) was completed. This TMDL was prepared by INCOG, dated July 2011, and is titled <u>Bacteria Total Maximum Daily Loads For The Lower Bird Creek Watershed Area (OK121300010010_00</u>.

Ranch Creek E. of Mingo, S. of 116 St. N., 3-23-18

Table 23 lists the causes of impairment and the unconfirmed potential sources for the 2010 listing.

Table 23: 2010 Through 2014 Oklahoma Integrated Reports Cause of Impairment			
Waterbody	Cause of Impairment	Impaired Use	Unconfirmed Potential Sources or TMDL Number
Ranch Creek (2010)	*Escherichia coli*	Primary Body Contact Recreation	46, 92, 108, 111, 133, 136, 140
Ranch Creek (2012 Report)	*Escherichia coli*	Primary Body Contact Recreation	TMDL # 40972
Ranch Creek (2014 Report)	*Escherichia coli*	Primary Body Contact Recreation	TMDL # 40972

Table 24 is the legend for the potential sources.

Table 24: 2010 Oklahoma Integrated Report (Legend of Potential Sources)	
Source ID	Source Description
46	Grazing in Riparian or Shoreline Zones
92	On-site Treatment systems (Septic Systems and Similar Decentralized Systems)
108	Rangeland Grazing
111	Residential Districts
133	Wastes from Pets
136	Wildlife Other than Waterfowl
140	Source Unknown

Once an impairment is determined, the waterbody is placed in one of five categories:

Category 1 - Attaining the water quality standard and no use is threatened. Waterbodies listed in this category are characterized by data and information that meet the requirements of the Continuing Planning Process (CPP) to support a determination that the water quality standard is attained and no use is threatened. Consideration will be given to scheduling these waterbodies for future monitoring to determine if the water quality standard continues to be attained.

Category 2 - Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened. Waterbodies listed in this category are characterized by data and information which meet the requirements of the CPP to support a determination that some, but not all, uses are attained and none are threatened. Attainment status of the remaining uses is unknown because there is insufficient or no data or information. Monitoring shall be scheduled for these waterbodies to determine if the uses previously found to be in attainment remain in attainment, and to determine the attainment status of those uses for which data and information was previously insufficient to make a determination.

Category 3 - Insufficient or no data and information to determine if any designated use is attained. Waterbodies are listed in this category when the data or information to support an

attainment determination for any use is not available or consistent with the requirements of the CPP. To assess the attainment status of these waterbodies, supplementary data and information shall be obtained, or monitoring shall be scheduled as needed.

   Category 4 - <u>Impaired or threatened for one or more designated uses but does not require the development of a TMDL</u>.

   4A - <u>TMDL has been completed</u>. Waterbodies are listed in this subcategory once all TMDL(s) have been developed and approved by EPA that, when implemented, are expected to result in full attainment of the standard. Where more than one pollutant is associated with the impairment of a waterbody, the waterbody will remain in Category 5 until all TMDLs for each pollutant have been completed and approved by EPA. Monitoring shall be scheduled for these waterbodies to verify that the water quality standard is met when the water quality management actions needed to achieve all TMDLs are implemented.

   4B - <u>Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future</u>. Consistent with the regulation under 130.7(b)(i),(ii), and (iii), waterbodies are listed in this subcategory when other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters. These requirements must be specifically applicable to the particular water quality problem. Monitoring shall be scheduled for these waterbodies to verify that the water quality standard is attained as expected.

   4C - <u>Impairment is not caused by a pollutant</u>. Waterbodies are listed in this subcategory if the impairment is not caused by a pollutant. Scheduling of these waterbodies for monitoring to confirm that there continues to be no pollutant-caused impairment and to support water quality management actions necessary to address the cause(s) of the impairment, shall be considered.

   Category 5 - <u>The water quality standard is not attained. The waterbody is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL</u>. This category constitutes the Section 303(d) list of waters impaired or threatened by a pollutant(s) for which one or more TMDL(s) are needed. A waterbody is listed in this category if it is determined, in accordance with the CPP, that a pollutant has caused, is suspected of causing, or is projected to cause an impairment. Where more than one pollutant is associated with the impairment of a single waterbody, the waterbody will remain in Category 5 until TMDLs for all pollutants have been completed and approved by EPA. For waterbodies listed in this category, monitoring schedules shall be provided that describe when data and information will be collected to support TMDL establishment and to determine if the standard is attained. While the waterbody is being monitored for a specific pollutant to develop a TMDL, the watershed shall also be monitored to assess the attainment status of other uses. A schedule for the establishment of TMDLs for all waters in Category 5 shall be submitted. This schedule shall reflect the priority ranking of the listed waters. Category 5 waterbodies are further divided into the following subcategories:

   5A – TMDL is underway or will be scheduled.

5B – A review of the Water Quality Standards will be conducted before a TMDL is scheduled.

5C – Additional data and information will be collected before a TMDL or review of the Water Quality Standards is scheduled.

Aquifers

According to the Oklahoma Water Resources Board, there are no major or minor aquifers beneath this watershed. Major basins are distinct underground bodies of water overlain by contiguous land and having substantially the same geological and hydrological characteristics and from which groundwater wells yield at least fifty (50) gallons per minute on the average basinwide if from a bedrock aquifer and at least one hundred fifty (150) gallons per minute on the average basinwide if from an alluvium and terrace aquifer, or as otherwise designated by the Oklahoma Water Resources Board. (OWRB website, groundwater, 8-1-17)

Wells

According to the Oklahoma Corporation Commission 2013 records data base, there are no underground injection control wells (UIC) within the Ranch Creek watershed. The closest one is 1.5 miles to the west of the watershed operated by Daycon Exploration. There is one disposal well used to dispose of wastes from an oil gas operation and operated by Bird Creek Resources, Inc. in the south portion of the watershed. There are numerous other oil and gas disposal wells located west of this watershed. The closest one is less than a half mile away.

Groundwater Wells

There are 29 groundwater wells within the watershed according to the Multi-Purpose Well Completion Reports filed by licensed well drillers with the Oklahoma Water Resources Board. These reports are required for each new well constructed. The uses vary and are shown in Table 25 with some of the information available. Improperly maintained wells, improperly plugged wells and abandoned wells are potential sources of groundwater pollution. Therefore, it is always advisable to consider the number, type and condition of wells in an area when looking for potential pollutant sources.

The Wellhead Protection program is part of a federal program geared to improving drinking water quality by protecting the area around a well. The goal of Oklahoma's Wellhead Protection program is to minimize the risk of pollution by limiting activities on the land around public water supply wells. DEQ rules state that public drinking water wells are not to be located within 300 feet horizontally from any existing or potential source of pollution.

| Table 25: Groundwater Wells in Ranch Creek Watershed			
Number of Wells	Type of Well	Use Class	Depth Range
11	Groundwater Well	Domestic	45 to 200 ft.
3	Geothermal or Heat Pump Well	Heat Exchange	280 to 310 ft.
4	Geotechnical Boring	Soil Evaluation	10 to 60 ft.
5	Monitoring Well	Water Quality	14 to 19 ft.
6	Monitoring Well	Site Assessment	0 to 14 ft.

Map 4: Ranch Creek Groundwater Wells
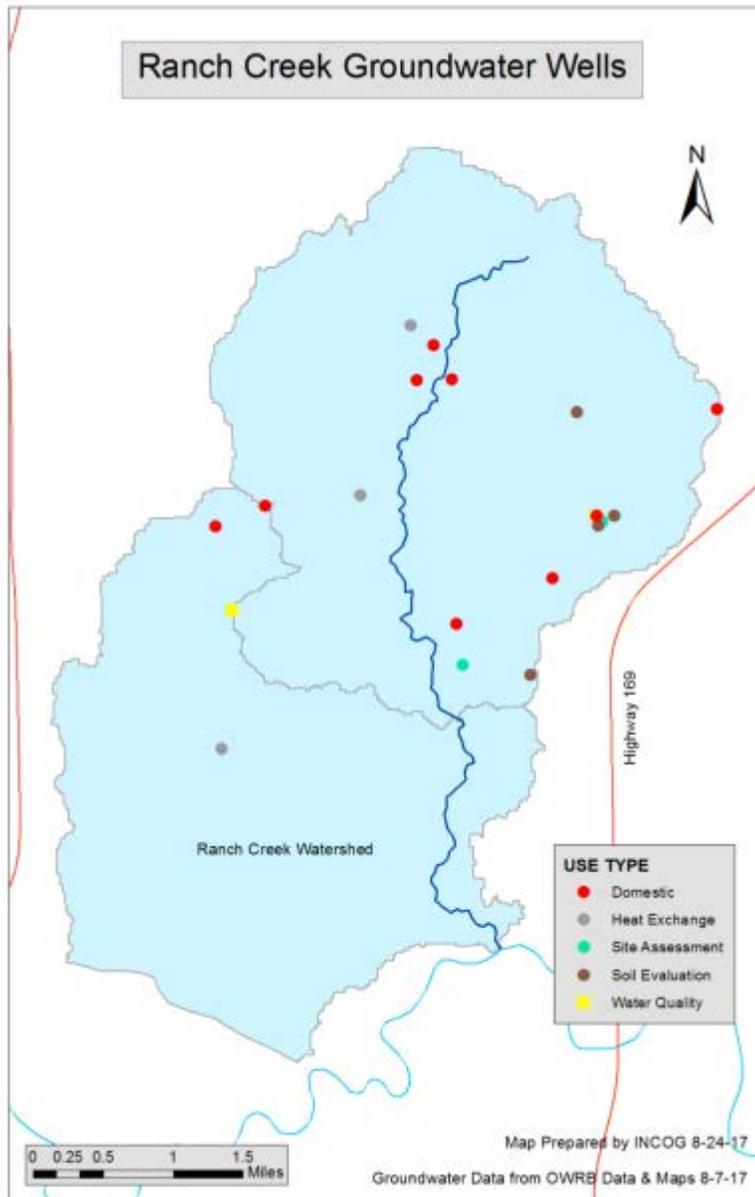
Watershed Aerial

An aerial photo of the Ranch Creek watershed during the summer months shows vegetation and development.   There is a mix of residential, commercial and some industrial with a significant percentage of the watershed still undeveloped.

Map 5: Ranch Creek Watershed Aerial
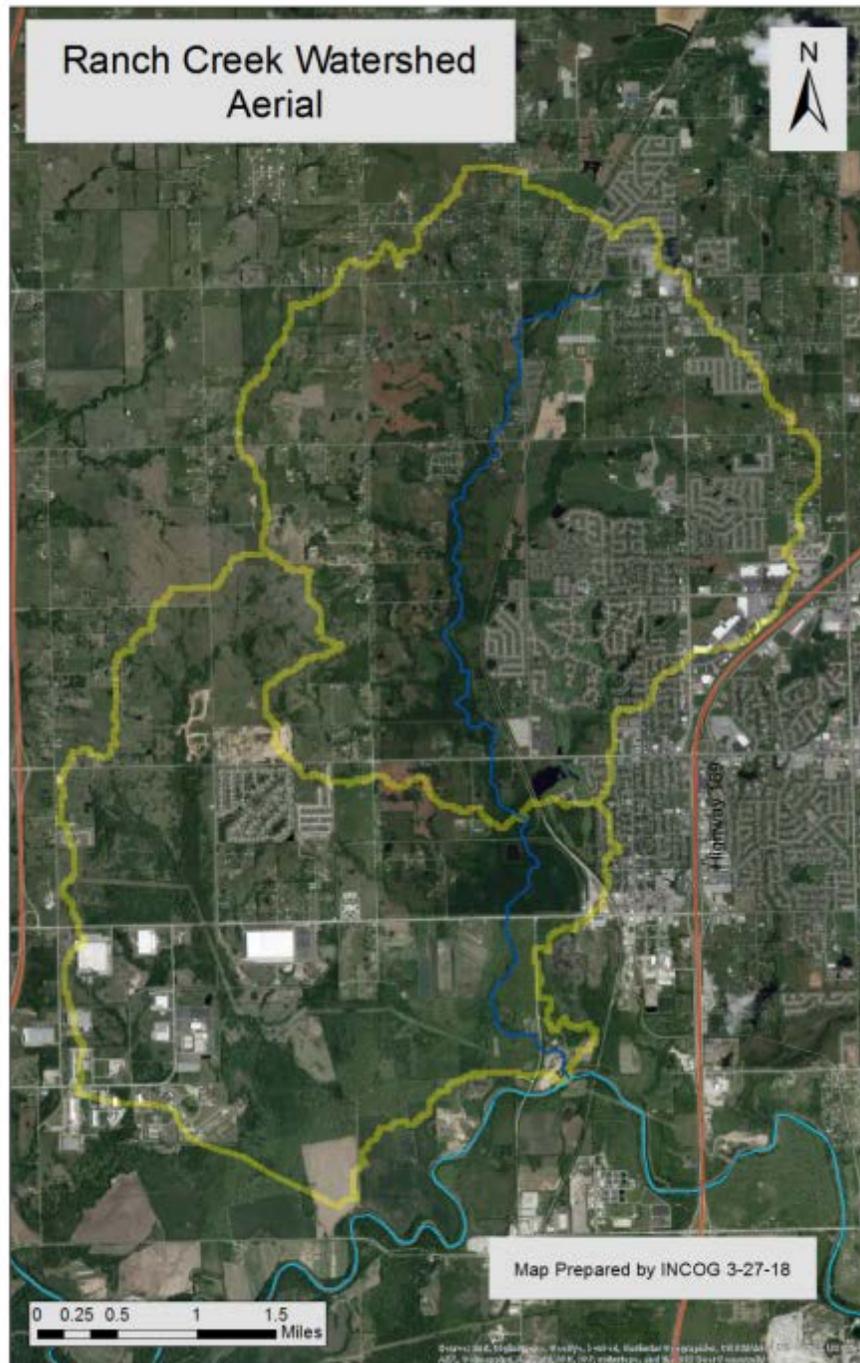
Zoning

The lower Ranch Creek watershed is primarily zoned for agriculture, moderate industry and residential. The upper watershed has agricultural zoning with considerably more residential and some commercial and office zoning.

Map 6: Ranch Creek Watershed Zoning
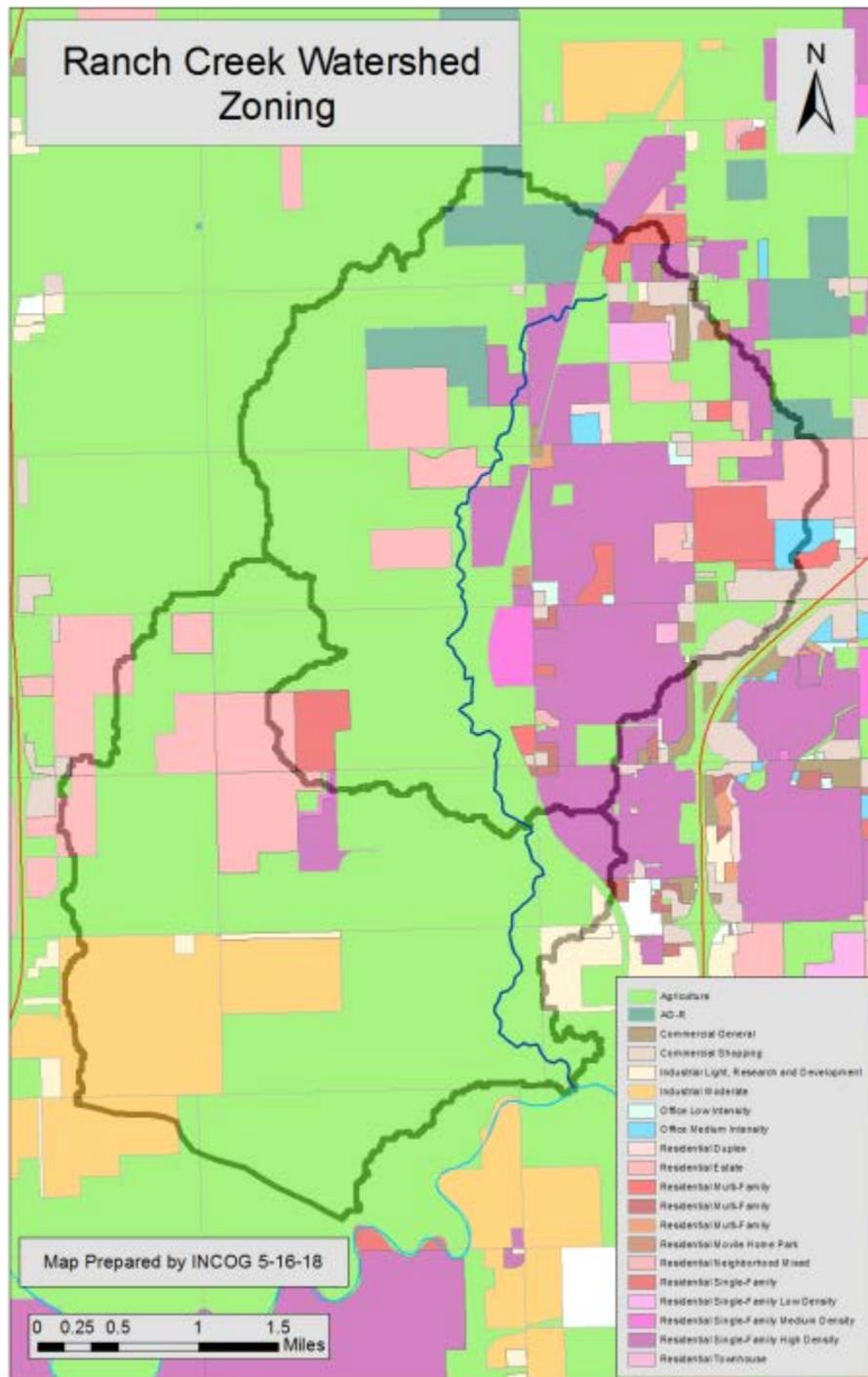
Impervious Cover

The National Land Cover Database products are created through a cooperative project conducted by the Multi-Resolution Land Characteristics (MRLC) and used to show how much and where impervious cover exists.

This type of information is helpful in determining where development may concentrate stormwater runoff. In the following maps, the darker the red the more impervious the surface. The purple areas indicate the densest portions and the black areas indicate the least impervious or less developed areas. In 2006, the most impervious areas are in the southeast and northeast portions of the upper watershed and the southwest portion of the lower watershed.

Map 7: Ranch Creek Watershed Impervious Cover 2006
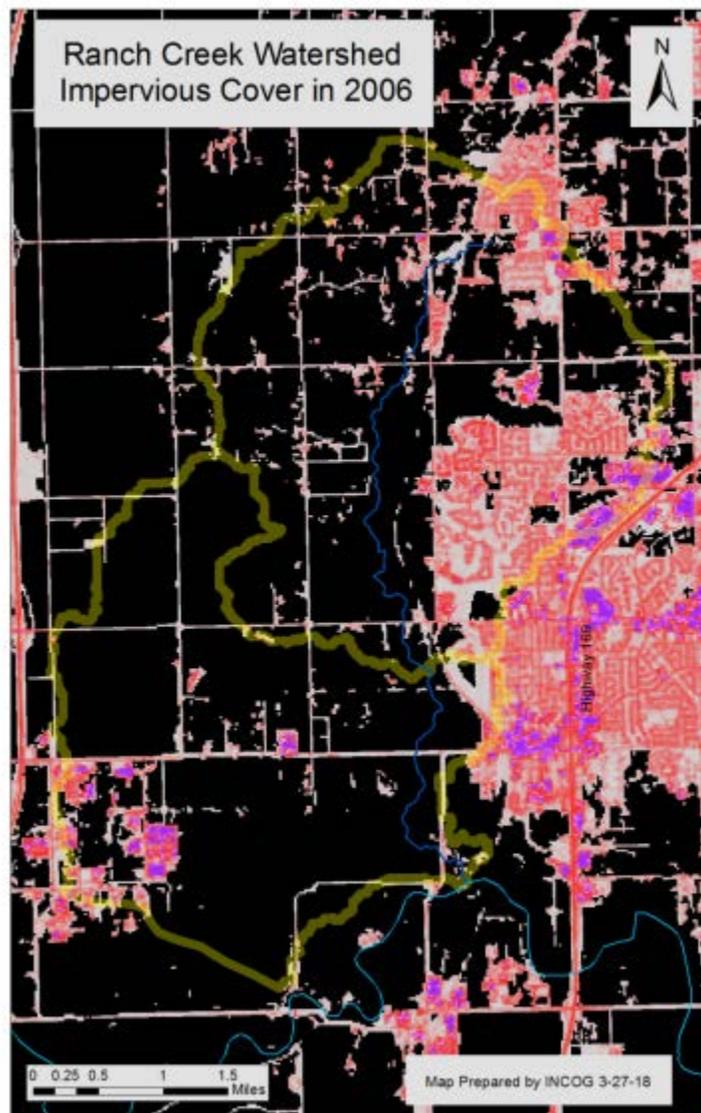
By comparing the 2006 and 2011 impervious cover maps it becomes more obvious where growth and development are occurring and where educational efforts might be the most beneficial.
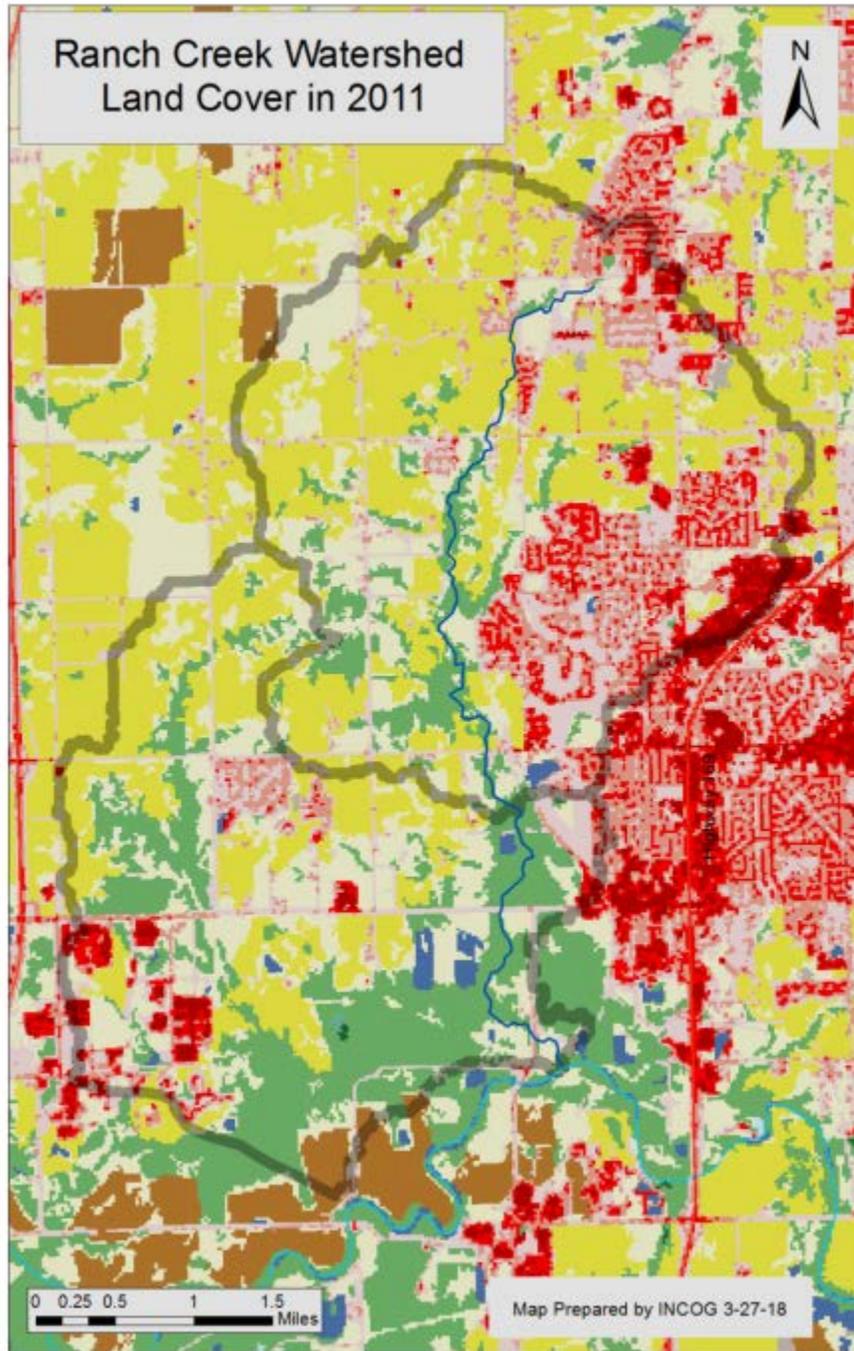
Map 8: Ranch Creek Watershed Impervious Cover 2011
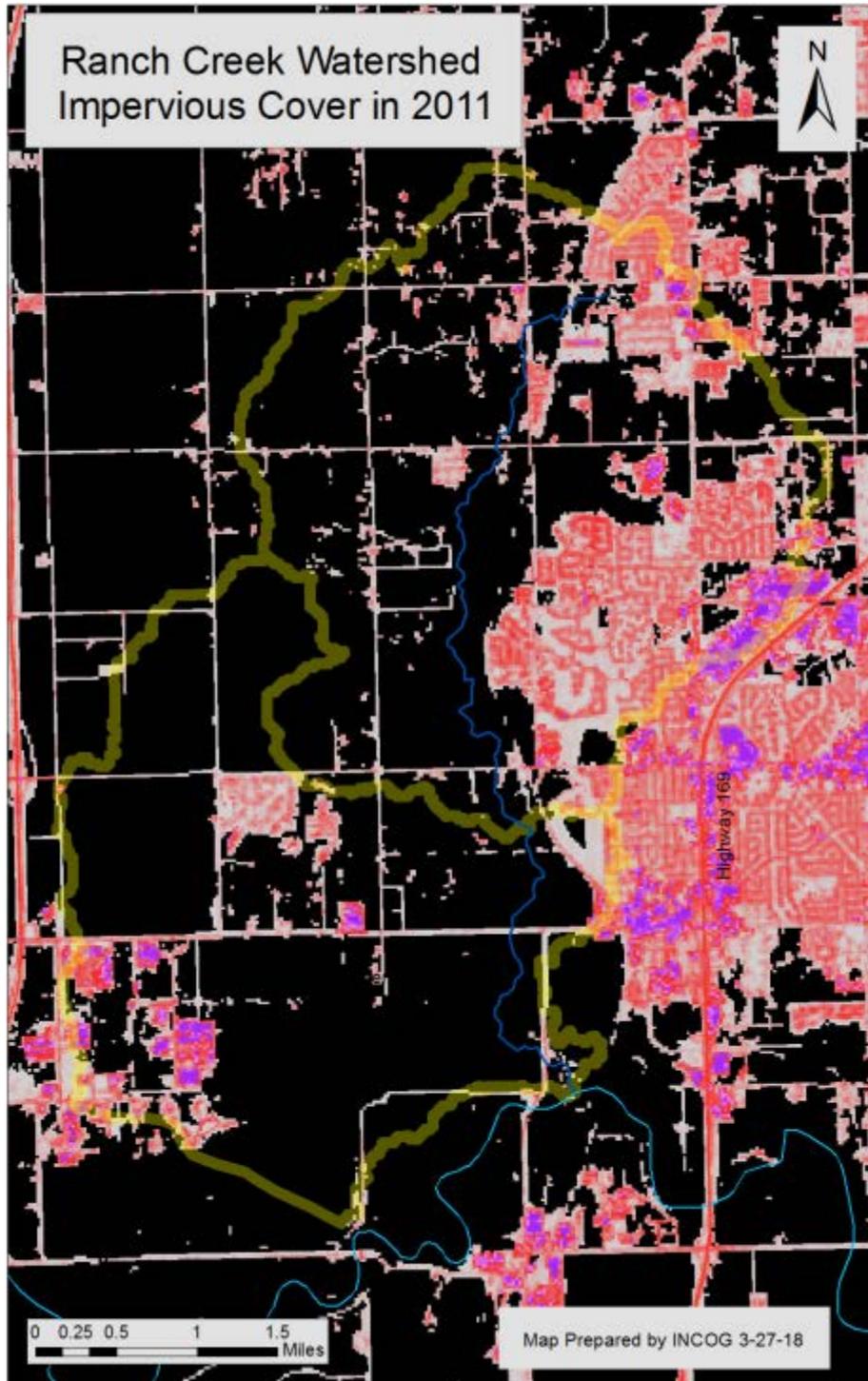
Land Cover

The National Land Cover Database products are created through a cooperative project conducted by the Multi-Resolution Land Characteristics (MRLC) Consortium. This data is used to depict how the land is being used.

Map 9: Ranch Creek Watershed Land Cover 2011

Much of the undeveloped portions of the watershed are used agriculturally for pasture and haying with most of the remainder in deciduous forest. The developed areas are shown as "Low Intensity Residential", "High Intensity Residential" and "Commercial/Industrial/Transportation". See the legend for land cover below.

Legend

The classification system used by NLCD1992 is modified from the Anderson Land Cover Classification System*. Download the NLCD1992 land cover classification legend.

| Class\ Value	Classification Description
Water	*areas of open water or permanent ice/snow cover.*
11	**Open Water** - areas of open water, generally with less than 25% cover of vegetation/land cover.
12	**Perennial Ice/Snow** - areas characterized by year-long surface cover of ice and/or snow.
Developed	*areas characterized by a high percentage (30 % or greater) of constructed materials (e.g. asphalt, concrete, buildings, etc.).*
21	**Low Intensity Residential** - areas with a mixture of constructed materials and vegetation. Constructed materials account for 30% to 80% of the cover. Vegetation may account for 20% to 70 % of the cover. These areas most commonly include single-family housing units. Population densities will be lower than in high intensity residential areas.
22	**High Intensity Residential** - areas highly developed where people reside in high numbers. Examples include apartment complexes and row houses. Vegetation accounts for less than 20% of the cover. Constructed materials account for 80% to100% of the cover.
23	**Commercial/Industrial/Transportation** - areas of infrastructure (e.g. roads, railroads, etc.) and all highly developed areas not classified as High Intensity Residential
Barren	*areas characterized by bare rock, gravel, sand, silt, clay, or other earthen material, with little or no "green" vegetation present regardless of its inherent ability to support life. Vegetation, if present, is more widely spaced and scrubby than that in the green vegetated categories; lichen cover may be extensive.*
31	**Bare Rock/Sand/Clay** - perennially barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, beaches, and other accumulations of earthen material.
32	**Quarries/Strip Mines/Gravel Pits** - areas of extractive mining activities with significant surface expression.
33	**Transitional** - areas of sparse vegetative cover (less than 25% of cover) that are dynamically changing from one land cover to another, often because of land use activities. Examples include forest clear cuts, a transition phase between forest and agricultural land, the temporary clearing of vegetation, and changes due to natural causes (e.g. fire, flood, etc.).
Forest	*areas characterized by tree cover (natural or semi-natural woody vegetation, generally greater than 6 meters tall); tree canopy accounts for 25% to 100% of the cover.*
41	**Deciduous Forest** - areas dominated by trees where 75% or more of the tree species shed foliage simultaneously in response to seasonal change.
42	**Evergreen Forest** - areas dominated by trees where 75% or more of the tree species maintain their leaves all year. Canopy is never without green

	foliage.
43	**Mixed Forest** - areas dominated by trees where neither deciduous nor evergreen species represent more than 75% of the cover present.
Shrubland	*areas characterized by natural or semi-natural woody vegetation with aerial stems, generally less than 6 meters tall, with individuals or clumps not touching to interlocking. Both evergreen and deciduous species of true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions are included.*
51	**Shrubland** - areas dominated by shrubs; shrub canopy accounts for 25 to 100% of the cover. Shrub cover is generally greater than 25% when tree cover is less than 25%. Shrub cover may be less than 25% in cases when the cover of other life forms (e.g. herbaceous or tree) is less than 25% and shrubs cover exceeds the cover of the other life forms.
Non-natural woody	*areas dominated by non-natural woody vegetation; non-natural woody vegetative canopy accounts for 25% to 100% of the cover. The non-natural woody classification is subject to the availability of sufficient ancillary data to differentiate non-natural woody vegetation from natural woody vegetation.*
61	**Orchards/Vineyards/Other** - orchards, vineyards, and other areas planted or maintained for the production of fruits, nuts, berries, or ornamentals.
Herbaceous Upland	*upland areas characterized by natural or semi-natural herbaceous vegetation; herbaceous vegetation accounts for 75% to 100% of the cover.*
71	**Grasslands/Herbaceous** - areas dominated by upland grasses and forbs. In rare cases, herbaceous cover is less than 25%, but exceeds the combined cover of the woody species present. These areas are not subject to intensive management, but they are often utilized for grazing.
Planted/Cultivated	*areas characterized by herbaceous vegetation that has been planted or is intensively managed for the production of food, feed, or fiber; or is maintained in developed settings for specific purposes. Herbaceous vegetation accounts for 75% to 100% of the cover.*
81	**Pasture/Hay** - areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops.
82	**Row Crops** - areas used for the production of crops, such as corn, soybeans, vegetables, tobacco, and cotton.
83	**Small Grains** - areas used for the production of graminoid crops such as wheat, barley, oats, and rice.
84	**Fallow** - areas used for the production of crops that do not exhibit visible vegetation as a result of being tilled in a management practice that incorporates prescribed alternation between cropping and tillage.
85	**Urban/Recreational Grasses** - vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Examples include parks, lawns, golf courses, airport grasses, and industrial site grasses.
Wetlands	*areas where the soil or substrate is periodically saturated with or covered with water as defined by Cowardin et al., (1979).*
91	**Woody Wetlands** - areas where forest or shrubland vegetation accounts for 25% to 100 % of the cover and the soil or substrate is periodically saturated with or covered with water.
92	**Emergent Herbaceous Wetlands** - areas where perennial herbaceous vegetation accounts for 75% to 100% of the cover and the soil or substrate is periodically saturated with or covered with water.

Ranch Creek Canopy

The National Land Cover Database 2011 (NLCD2011) USFS percent tree canopy product was produced through a cooperative project conducted by the Multi-Resolution Land Characteristics (MRLC) Consortium. The darker the green, the denser the tree canopy. A black background indicates zero percent tree canopy. The lower reaches of Ranch Creek show a good, dense riparian zone that thins out as you move up into the watershed.

Map10: Ranch Creek Watershed Canopy 2011
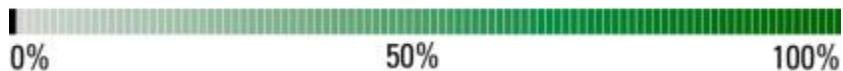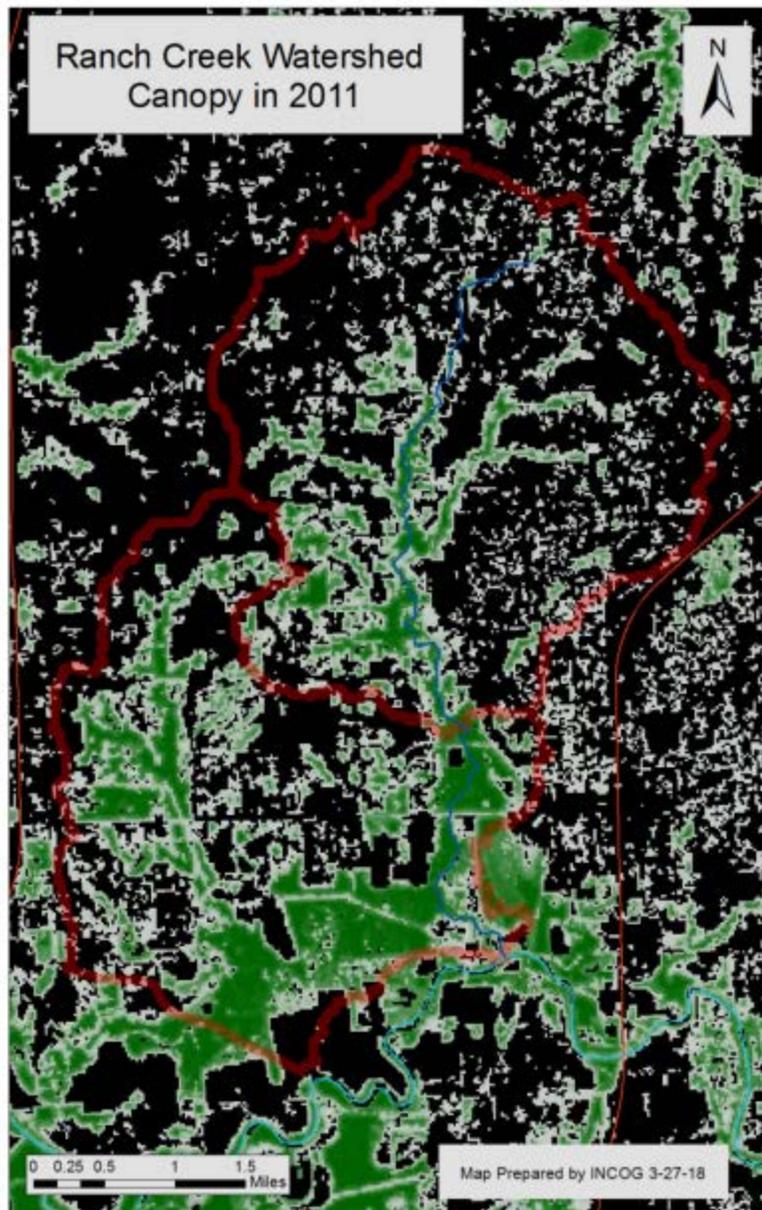
Floodplain

The southeast portion of the watershed that is still largely undeveloped is within the 100 year (Zone AE) floodplain which extends up the Ranch Creek channel and the Ranch Creek tributary in the lower portion of the watershed. The 100 year floodplain has a 1% chance of flooding each year. The rest of the watershed is in Zone X which is the 500 year floodplain or has a 0.2% chance of flooding each year.

Map 11: Ranch Creek Watershed Floodplain
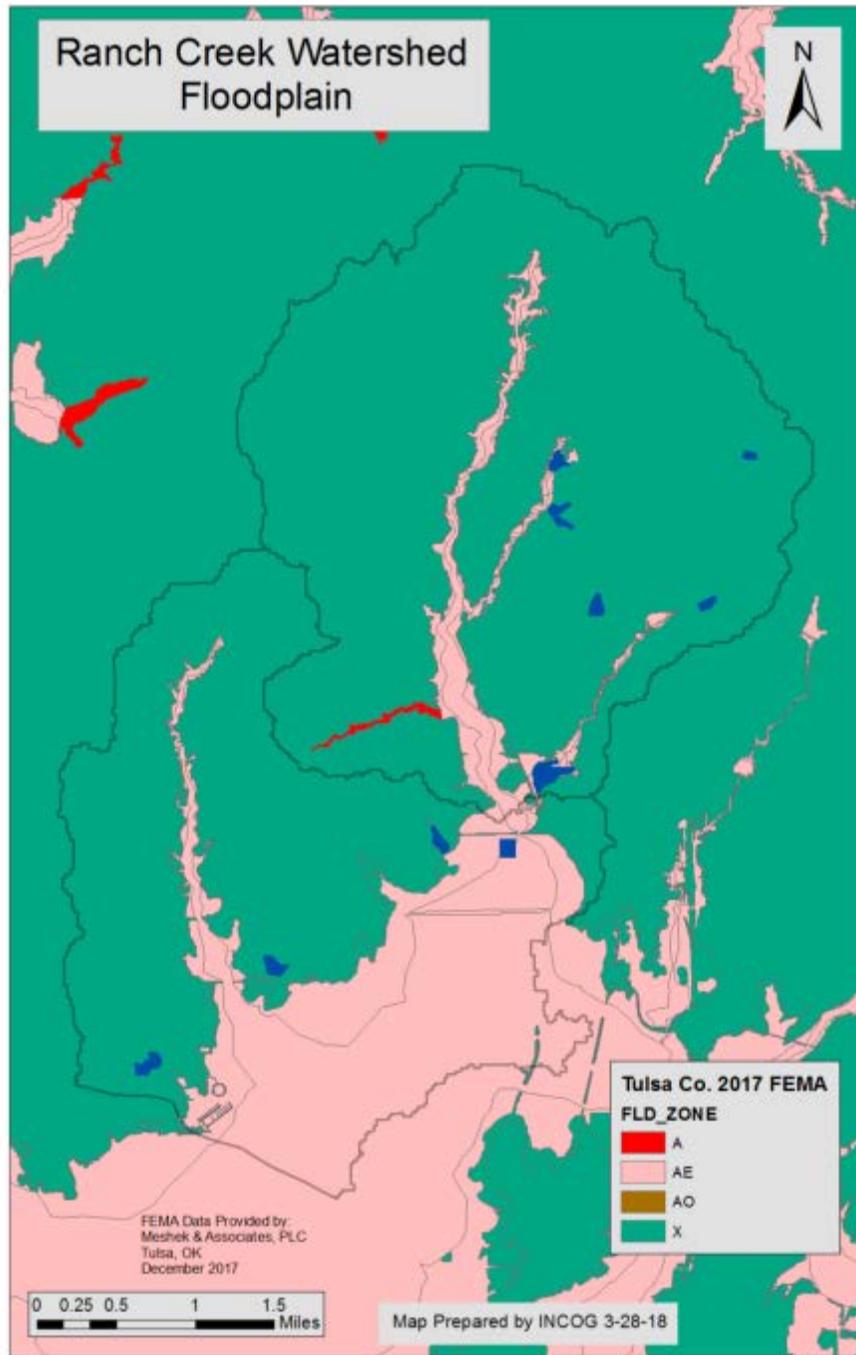
Zone A is the area with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas: no depths or base flood elevations are shown within these zones.

Zone AE is the base floodplain where base flood elevations are provided.

Zone AO is a river or stream flood hazard area and an area with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage.

Zone X is the 500 year floodplain with a 0.2% annual chance of flooding.

Ranch Creek at 86 St. N., 3-23-18
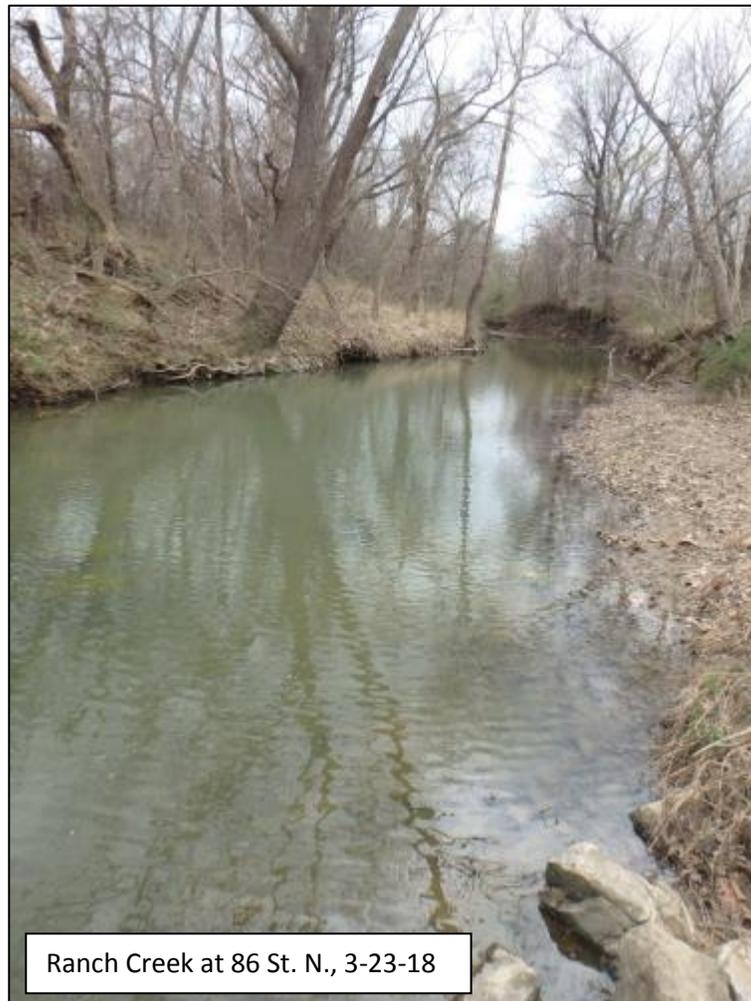
Wetlands

Map 12 shows wetlands and deep water habitats as reported by the National Wetlands Inventory (version 2) from the US Fish & Wildlife Service GIS Wetlands Data. There are numerous small wetlands scattered throughout the watershed with larger wetlands located along major water courses, mainly in the lower watershed. These wetlands correlate well with areas prone to flooding shown on the floodplain map.

Map 12: Ranch Creek Watershed Wetlands

Abandoned Coal Mine Features

Areas within this watershed that are listed in the Oklahoma Conservation Commission's Abandoned Mine Land Reclamation Program (AML) and potential problem areas are shown on Map 13. These are areas that contain abandoned coal mine features which may consist of dry or water-filled strip pits and underground mine related objects such as air shafts, portals, structures or areas of subsidence. Unknown AML features may exist outside of the areas shown. In addition to physical public health and safety concerns, acid mine drainage can have very low pH values and mobilize heavy metals negatively impacting receiving waters.

Map 13: Ranch Creek Watershed Abandoned Coal Mine Areas
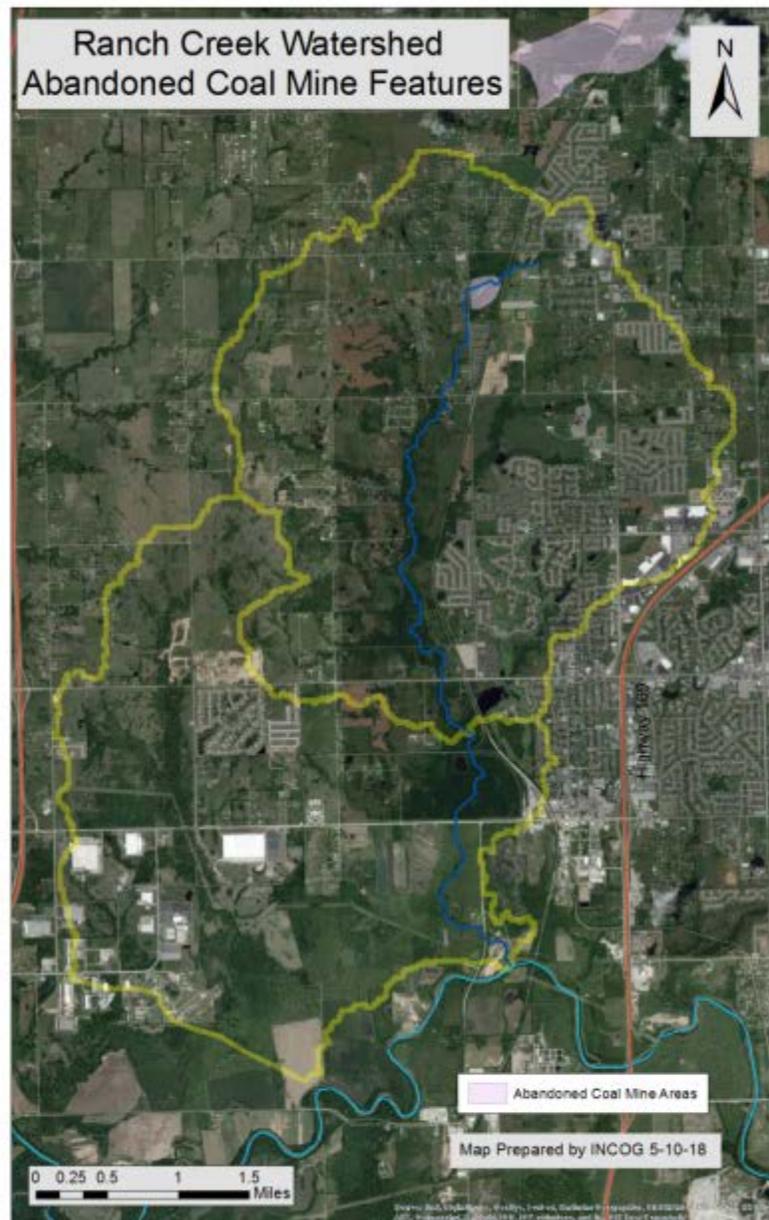
There is one area south of E 116th St. N. and east of N 97th East Ave. This area is still heavily vegetated and undeveloped with open bodies of water. The headwaters of Ranch Creek flow right through or from this site.

Map 14: Ranch Creek Watershed Abandoned Coal Mine Areas Close Up

Remediation Sites

DEQ lists all properties associated with Brownfields, voluntary cleanup, Site Cleanup Assistance Program (SCAP), and Superfund sites that have had institutional controls placed on the property and all sites that have been awarded a Brownfield Certificate through the DEQ's Brownfields Program. This is handled by the Land Protection Division. This watershed has no properties listed by DEQ as remediation sites with institutional controls.

Hazardous Waste Facilities

DEQ permits hazardous waste landfill disposal sites, facilities that store hazardous wastes, hazardous waste transfer facilities, and certain types of recycling or treatment facilities, and Commercial Hazardous Waste Receiving Facilities. Permits allow these facilities to receive, store and transfer hazardous materials above threshold amounts. There are no permitted hazardous waste facilities within this watershed.

Ranch Creek at 106 St. N., 3-23-18

Water Supply

The 1995 Oklahoma Comprehensive Water Plan (OCWP) was last updated (portions) in 2012. The purpose of this study was to determine the availability of water in Oklahoma and establish a reliable supply of water for state users for at least the next 50 years. It provides information useful to water providers, policy makers and water users enabling informed decisions concerning the use and management of Oklahoma's water resources.

The state was divided into 82 surface water basins within 13 Watershed Planning Regions. The Middle Arkansas Watershed Planning Region (MAWPR) includes eight basins numbered 49 and 73-79. Most water users in MAWPR rely on surface water supplies and to a lesser extent on alluvial and bedrock groundwater and will continue to do so in the future.

Map 15: Middle Arkansas Watershed Planning Region

Reservoirs in Oklahoma may serve multiple purposes, such as water supply, irrigation, recreation, hydropower generation, and flood control. Reservoirs designed for multiple purposes typically possess a specific volume of water storage assigned for each purpose.

(OCWP) Oklahoma Comprehensive Water Plan, Version 1.1, 2012 Update.

Currently surface water is used to meet about 95% of this regions demand. Conservation measures could reduce or eliminate some of these shortages and surface water alternatives, such as bedrock groundwater supplies from major aquifers and/or developing new reservoirs could mitigate surface water gaps without major impacts to groundwater storage. No basins within this region have been identified as water availability "hot spots," or areas where severe deficits or gaps in supply are anticipated.

The Ranch Creek watershed is in Basin 73. In this basin, water users are expected to continue to rely primarily on surface water supplies and major reservoirs. By 2050 there is a low probability of surface water gaps from increased demands on existing supplies during low flow periods. There are currently no groundwater rights in Basin 73. However, it is assumed that non-delineated minor alluvial groundwater sources will supply a small amount of domestic (self-supplied residential) water use, which does not require a permit. The use of groundwater to meet in-basin demand is not expected to be limited by the availability of permits through 2060. There are no significant groundwater quality issues in the basin.

Land Application

DEQ lists only one land application site within this watershed and it is in the southern end. See Map 16.

Map 16: Ranch Creek Land Application Sites
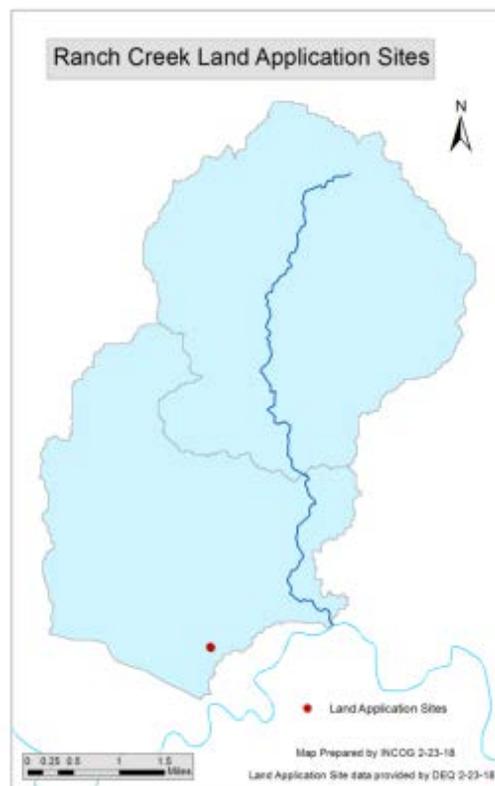
Permitted Discharge Sites

DEQ does not list any permitted discharge sites within the Ranch Creek watershed.

Ranch Creek at 106 St. N., 3-23-18

Ranch Creek at 76th St. N. . 8-5-09

Ranch Creek E. of Mingo, S. of 116 St. N., 3-23-18

Ranch Creek at 76 St.. N. 3-23-18