2016-17 WCPSS District-Wide K-12 Forecast Third Draft

Third Draft Date: December 7, 2016

WCPSS Month-2 Average Daily Membership: 159,549

Draft 3 of the 2016-17 ten-year K-12 forecast is based on Average Daily Membership (ADM) as reported by WCPSS: 159,549. The 2016-17 membership represents a net gain of 2,369 (or about 1.51%) over the 2015-16 Month-2 Average Daily Membership of 157,180 as reported by NC DPI.

	2015-16 (actual)	2016-17 (forecast)	2016-17 (actual)	Gain (actual)	Error (actual – forecast)
К	11,860	12,221	11,855	-5	-366
1	12,372	12,123	12,173	-199	50
2	12,498	12,432	12,625	127	193
3	12,591	12,612	12,509	-82	-103
4	12,429	12,685	12,728	299	43
5	12,052	12,626	12,682	630	56
6	11,423	12,195	12,065	642	-130
7	12,212	11,685	11,611	-601	-74
8	12,102	12,415	12,246	144	-169
9	13,663	13,730	13,366	-297	-364
10	12,385	12,276	12,994	609	718
11	11,056	11,618	11,764	708	146
12	10,537	10,632	10,931	394	299
Total	157,180	159,248	159,549	2,369	301

Comparison with 2015-16 K-12 Forecast (final version, 20151204)

The 2015-16 K-12 forecast relative error is 301 or 0.19%.

Some Membership Statistics

Grade K

WCPSS continues to experience flat growth in kindergarten membership. From historic NC DPI Month-2 ADM data, K-membership has not grown significantly since before the 2010-11 school year, seeing a gain of only 247 kindergarteners through 2016-17. For that same time period, the overall K-12 net gain was 16,250 with an average growth rate of about 1.81% per year. Factors contributing to this lack of growth in grade K, including lower county resident live births and charter school impact, are described elsewhere in this report.

	2010	2011	2012	2013	2014	2015	2016
К	11,608	12,057	12,108	12,213	12,065	11,860	11,855
K-12	143,299	146,848	149,730	153,300	155,184	157,180	159,549

Cohort Survival Ratios (CSR)

School population forecasts often rely heavily on the CSR to advance grade membership year by year. A CSR is calculated by dividing the membership of a grade for a specific year by the membership of the preceding grade in the preceding year:

 $CSR = \frac{membership in grade k, year t}{membership in grade (k - 1), year (t - 1)}$

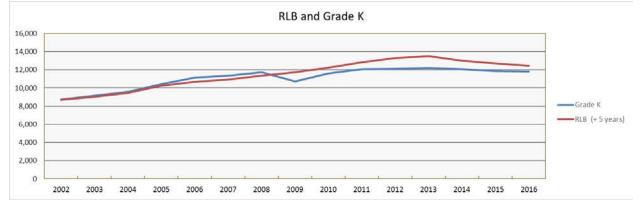
The historic set of CSR values for a school population provides a simple way to track how these populations change over time and may give insight to developing trends.

One important factor in school membership forecasts is the CSR for county resident live births (RLB) to grade K five years later. The most recent RLB data from 2015 shows the continued upward trend from a low of 12,309 RLB in 2012. This forecast assumes the positive RLB trend will continue.

	2010	2011	2012	2013	2014	2015	2016 (est.)
RLB	12,705	12,458	12,309	12,439	12,635	12,867	13,100

Source: NC State Center for Health Statistics http://www.schs.state.nc.us/data/vital.cfm#vitalbaby

A CSR tracks the numeric relation between RLB for a particular year and the number of grade K students 5 years later. CSR values higher than 1 suggest that in-migration has occurred in the five years between the year of birth and entry into kindergarten. This occurred in Wake County from 2004 through 2010.



The lack of growth in grade K since 2010 has resulted in historically low RLB-to-Grade-K CSR values. For 2010 through 2016, the mean CSR value is 0.9301 compared to an average of 1.0568 from 1988 to 2008. (Year 2009 is excluded due to the change in Kindergarten eligibility age.) **Since 2010, the membership in grade K averages about 957 fewer per year than the number of RLB five years before.**

It is also useful to note that the share of grade K (compared to the total K-12 population) has decreased from 8.10% in 2010 to 7.43% in 2016. As these smaller cohorts advance through the system year by year, they will decrease the relative share of subsequent grades as described in the next section.

Interestingly, CSR data is showing contrasting behavior in high school grades. The Grade-9-to-Grade-10 and Grade-11-to-Grade-12 CSRs are at historically high values of 0.9510 and 0.9887, respectively.

Grade Cohorts

The historic Month-2 ADM data table shown below highlights (**in red**) several negative growth cohorts present in WCPSS membership. Red values indicate a net loss for that grade over the previous year. (The blue cells indicate a lower cohort due to the change in age for kindergarten eligibility in 2009.) Typically, these negative growth cohorts are stable as they advance through the system unless a significant change in district in-migration causes a reversal.

Another point of interest is the cohort net growth from grade 8 to grade 9. For the period from 2010-11 through 2016-17, the mean net growth from grade 8 to grade 9 is about 1541 (or an average annual net increase of about 13%.) A high net increase from grade 8 to grade 9 is common for public school systems. There are several reasons for this increase, including the entry of students to WCPSS from charter, home, and private schools.

	2010	2011	2012	2013	2014	2015	2016
К	11,608	12,057	12,108	12,213	12,065	11,860	11,855
1	11,014	11,958	12,278	12,592	12,388	12,372	12,173
2	11,964	11,223	11,986	12,417	12,646	12,498	12,625
3	11,673	12,015	11,301	12,016	12,286	12,591	12,509
4	11,715	11,681	12,042	11,449	11,929	12,429	12,728
5	11,349	11,874	11,739	12,196	11,428	12,052	12,682
6	11,044	11,413	11,864	11,814	12,086	11,423	12,065
7	10,926	11,232	11,565	12,133	11,981	12,212	11,611
8	10,763	11,175	11,310	11,766	12,252	12,102	12,246
9	12,274	12,602	12,851	12,854	13,278	13,663	13,366
10	10,360	10,632	11,173	11,619	11,865	12,385	12,994
11	9,575	9,717	10,067	10,539	10,919	11,056	11,764
12	9,034	9,269	9,446	9,692	10,061	10,537	10,931
Total	143,299	146,848	149,730	153,300	155,184	157,180	159,549

Charter School Impact

One new charter school with potential impact to WCPSS opened in the fall of 2016: Central Wake Charter High School, serving grades 9-12. As of October 2016, there are three additional charter schools in Wake County slated to open in the fall of 2017.

As of October 2016, there are approximately 10,900 students residing in Wake attending charter schools. The WCPSS membership forecast quantifies the continuing impact of charter schools on WCPSS membership. Impacts from the following newly opened or newly expanded charter schools is calculated over the entire forecast window.

LEA	Charter Name (Open as of 2016-17)	Opened	Grades
92B	Exploris Middle School	30-JUN-97	K-8
92D	Magellan Charter	30-JUN-97	3-8
92E	Sterling Montessori Academy	28-JUN-97	K-8
92F	Franklin Academy	30-JUN-98	K-12
92G	East Wake Academy	30-JUN-98	K-12
92K	Raleigh Charter High School	30-JUN-99	9-12
92L	Torchlight Academy	30-JUN-99	K-6
92M	PreEminent Charter School	30-JUN-00	K-8
92N	Quest Academy	30-JUN-99	K-8
92P	Southern Wake Academy	28-JUN-00	6-12
92Q	Hope Charter Leadership Academy*	30-JUN-01	K-5
92R	Casa Esperanza Montessori	30-JUN-03	K-8
92S	Endeavor Charter	01-JUL-08	K-8
92T	Triangle Math and Science Academy	01-JUL-12	K-12
92U	Longleaf School of the Arts	01-JUL-13	9-12
92V	Wake Forest Charter Academy	01-JUL-14	K-6
92W	Cardinal Charter	01-JUL-14	K-8
92X	Dynamic Community Charter**	01-JUL-14	6-12
92Y	Envision Science Academy	01-JUL-14	K-8
93J	PAVE Southeast Raleigh Charter School	01-JUL-15	K-8
00A	NC Connections Academy	Fall 2015	K-12
00B	NC Virtual Academy	Fall 2015	K-12
93L	Central Wake Charter High School	01-JUL-16	9-12

*Risk of Closure

**State Closed

Virtual Charter Schools

In addition to brick-and-mortar charter schools, the increased presence of on-line charter schools such as NC Virtual Academy and NC Connections Academy, is impacting WCPSS membership. The virtual charter school option is new for North Carolina and long-range impacts on traditional schools is not known.

NC Virtual Academy opened for grades K-10 in 2015-16. As of October 2016, NC DPI reported a K-11 Month-1 ADM of 1719 including 194 students residing in Wake County. NC Virtual Academy will be K-12 school in 2017, with a maximum capacity of 4082 virtual seats serving North Carolina students.

NC Connections Academy opened to grades K-9 in the fall of 2015 and currently serves grades K-10 with a Month-1 membership of 1748 (NC DPI), of which 227 are Wake County residents. NC Connections will add one grade per year, serving K-12 students in 2018 with a maximum capacity of 2592.

The K-12 forecast team will continue to monitor charter school applications and approvals that may impact WCPSS membership.

Other School Systems

In addition to charter schools, both private and home schools have an impact on WCPSS membership. The market share of private schools has remained flat just below 9% since 2012. The market share of home schools has increased by 1.1 points since 2012 to a 2015-16 share of 5.8%. The current forecast includes a CSR adjustment to lower grades to account for this increasing share of home school.

Academic Year	Private Schools	Home Schools	Charter Schools	WCPSS 20th Day	K-12 Totals	Private Schools	Home Schools	Charter Schools	WCPSS	Total
2000-2001	12,006	3,131	2,334	97,691	115,162	10.4%	2.7%	2.0%	84.8%	100%
2001-2002	12,615	4,490	2,964	101,432	121,501	10.4%	3.7%	2.4%	83.5%	100%
2002-2003	13,267	5,042	3,471	104,461	126,241	10.5%	4.0%	2.7%	82.7%	100%
2003-2004	12,951	5,374	3,962	108,969	131,256	9.9%	4.1%	3.0%	83.0%	100%
2004-2005	13,375	5,801	4,531	114,068	137,775	9.7%	4.2%	3.3%	82.8%	100%
2005-2006	13,525	6,361	4,997	120,504	145,387	9.3%	4.4%	3.4%	82.9%	100%
2006-2007	14,021	6,516	4,985	128,072	153,594	9.1%	4.2%	3.2%	83.4%	100%
2007-2008	14,696	7,059	5,319	134,002	161,076	9.1%	4.4%	3.3%	83.2%	100%
2008-2009	15,123	7,571	4,990	137,706	165,390	9.1%	4.6%	3.0%	83.3%	100%
2009-2010	15,689	7,890	5,299	139,599	168,477	9.3%	4.7%	3.1%	82.9%	100%
2010-2011	16,084	8,033	5,398	143,289	172,804	9.3%	4.6%	3.1%	82.9%	100%
2011-2012	16,135	7,600	5,798	146,687	176,220	9.2%	4.3%	3.3%	83.2%	100%
2012-2013	16,048	8,507	6,229	149,508	180,292	8.9%	4.7%	3.5%	82.9%	100%
2013-2014*	16,249	9,559	6,733	153,300	185,841	8.7%	5.1%	3.6%	82.5%	100%
2014-2015*	16,932	10,407	8,755	155,184	191,278	8.9%	5.4%	4.6%	81.1%	100%
2015-2016*	17,240	11,356	9,577	157,180	195,353	8.8%	5.8%	4.9%	80.5%	100%
2016-2017*	Yet to be r	eleased	10,739				·			

Distribution of Wake County Student Population in Public and Non-Public Systems: Market Share
October 2016

*WCPSS PowerSchool 2nd Month ADM

Private and Home schools data compiled from the North Carolina Division of Non-Public Education website. Data released Spring of current school year. Home and Private Schools data collection may not reflect 20th day enrollment. Charter schools data from WCPSS September billing of charter school students. Analysis of the growth of non-WCPSS schools through 2015-16 shows a growth in enrollment in private schools of around 400 students per year since 2012 and a growth of around 950 students per year in home schools. What is not evident from the data is where these students originated. Evidence suggests that many students may return to WCPSS in later grades, but there is a lack of data to quantify with precision the movement between WCPSS and non-WCPSS systems.

	Private Schools		Home Schools			Charter Schools			WCPSS			
Academic			%			%			%			%
Year	Enrollment	Growth	Growth	Enrollment	Growth	Growth	Enrollment	Growth	Growth	Enrollment	Growth	Growth
2000-2001	12,006			3,131			2,334			97,691		
2001-2002	12,615	609	5.1%	4,490	1,359	43.4%	2,964	630	27.0%	101,432	3,741	3.8%
2002-2003	13,267	652	5.2%	5,042	552	12.3%	3,471	507	17.1%	104,461	3,029	3.0%
2003-2004	12,951	(316)	-2.4%	5,374	332	6.6%	3,962	491	14.1%	108,969	4,508	4.3%
2004-2005	13,375	424	3.3%	5,801	427	7.9%	4,531	569	14.4%	114,068	5,099	4.7%
2005-2006	13,525	150	1.1%	6,361	560	9.7%	4,997	466	10.3%	120,504	6,436	5.6%
2006-2007	14,021	496	3.7%	6,516	155	2.4%	4,985	(12)	-0.2%	128,072	7,568	6.3%
2007-2008	14,696	675	4.8%	7,059	543	8.3%	5,319	334	6.7%	134,002	5,930	4.6%
2008-2009	15,123	427	2.9%	7,571	512	7.3%	4,990	(329)	-6.2%	137,706	3,704	2.8%
2009-2010	15,689	566	3.7%	7,890	319	4.2%	5,299	309	6.2%	139,599	1,893	1.4%
2010-2011	16,084	395	2.5%	8,033	143	1.8%	5,398	99	1.9%	143,289	3,690	2.6%
2011-2012	16,135	51	0.3%	7,600	(433)	-5.4%	5,798	400	7.4%	146,687	3,398	2.4%
2012-2013	16,048	(87)	-0.5%	8,507	907	11.9%	6,229	431	7.4%	149,508	2,821	1.9%
2013-2014*	16,249	201	1.3%	9,559	1,052	12.4%	6,733	504	8.1%	153,300	3,792	2.5%
2014-2015*	16,932	683	4.2%	10,407	848	8.9%	8,755	2,022	30.0%	155,184	1,884	1.2%
2015-2016*	17,240	308	1.8%	11,356	949	9.1%	9,577	822	9.4%	157,180	1,996	1.3%
2016-17*	Yet to be released			Yet to be released			10,739	1,162	12.1%		(155,184)	-100.0%

Market Share Descriptive Statistics

October 2016

*WCPSS PowerSchool 2nd Month ADM

Private and Home schools data compiled from the North Carolina Division of Non-Public Education website. Data released Spring of current school year. Home and Private Schools data collection may not reflect 20th day enrollment. Charter schools data from WCPSS September billing of charter school students.

WCPSS District-Wide K-12 Forecast

The accompanying Third Draft of the 2016-17 WCPSS District-wide K-12 forecast (dated December 7, 2016) is based on the following:

Assumptions

- 13,100 Resident Live Births (RLB) in Wake County for 2016.
- The current RLB upward trend for Wake County will continue. The membership forecast uses a projected 3-year linear regression adjusted for additional growth. The average annual RLB growth rate for the 2016 to 2021 period is projected to be 2.07%.
- Projected CSR values calculated using the 2014-15 SDPM run (final version: 20150415) advanced two years.
- Charter school impact calculated over the ten-year forecast window.
- CSR values adjusted for annual projected gain and cohort dynamics.

Some Results

- The forecast for 2017-18 predicts a gain of 2,206 K-12 students for a total Month-2 ADM of 161,755. The corresponding annual growth rate is 1.38%.
- The predicted gain over the next ten years is 28,986 K-12 students with an average annual growth rate of 1.68%.

The complete ten-year forecast by grade accompanies this report.

2017-18 WCPSS Month-2 ADM – Draft 3, December 7, 2016:

	2016-17	2017-18
Grade	(actual)	(forecast)
К	11,855	11,895
1	12,173	12,196
2	12,625	12,207
3	12,509	12,751
4	12,728	12,638
5	12,682	12,917
6	12,065	12,816
7	11,611	12,376
8	12,246	11,940
9	13,366	13,717
10	12,994	12,550
11	11,764	12,204
12	10,931	11,550
Total	159,549	161,755

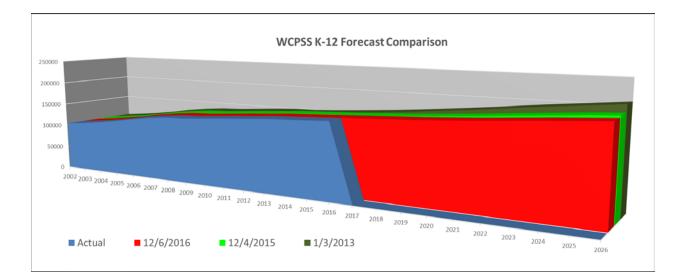
Supplemental Materials

A History of WCPSS K-12 Forecasting

Since 2005, the WCPSS K-12 forecast has been determined by a collaborative process involving WCPSS, Wake County government, and the Operations Research and Education Laboratory (OREd) at ITRE/NCSU. In 2016 the team also included the consultant Numerix LLC. Over the past ten years, the forecasting team has generated annual updates for WCPSS, with major updates occurring in 2008 and 2012 when new land use data was collected. Seeing signs of recovery in residential development after the recession, the land use data collection effort was ramped up to an annual cycle beginning with the 2015-16 update.

During each annual update, the forecast team reviews current membership data as well as demographic and economic data. Forecast parameters are adjusted to account for emerging trends in membership, general population dynamics and residential development activity. Reductions in long-range forecast numbers (as evident in the table and graph below) reflect the continuing analysis of this data each year and the resulting adjustment of the membership forecast.

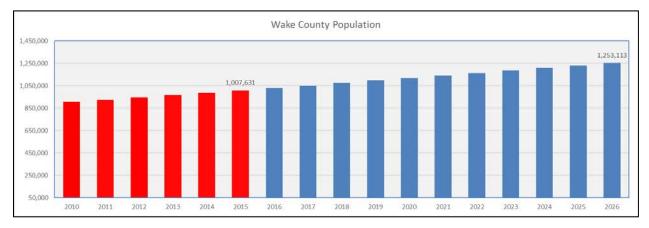
	Target Year						
Forecast Date	2016-17	2020-21	2025-26				
1/3/13	159,345	176,573	201,879				
12/4/15	159,248	170,513	189,398				
12/6/16	n/a	168,885	185,330				
Actual	159,549	n/a	n/a				



Wake County General Population

The State Demographics branch of the North Carolina Office of State Budget and Management (OSBM) publishes annual population estimates and projections by county. The most recent estimate for Wake County's general population is 1,007,631 on July 1, 2015. In 2015, WCPSS Month-2 Average Daily Membership of 157,180 represented 15.60% of the general population in the county. In 2010, WCPSS membership represented 15.80% of the county's general population. The decline in the share of the general population going to WCPSS is consistent with the analysis of impacting factors discussed in this report.

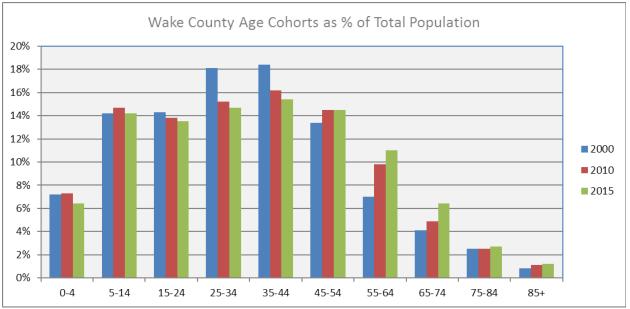
Current population projections suggest a gain of over 200,000 in Wake County over the next ten years. Projecting a 15.60% share of general population to 2026 yields a WCPSS membership of about 195,500 in 2026-27.



Source: NC Office of Budget and Management, Demographics Unit. http://www.osbm.nc.gov/demog/county-projections

Cohort Analysis of the General Population

U.S. Census data indicates the general population of Wake County is aging. Examining the change in distribution of select age cohorts shows an increase in share of total population for ages 45 and over measured between 2010 and 2015. For instance, the population between the ages of 55 and 64 accounted for about 7% of the population in 2010. By 2015, this age group accounted for about 11% of the total population. For comparison, the share of population for ages 5 through 14 has remained about the same at just over 14% over the same time period.



Source: US Census

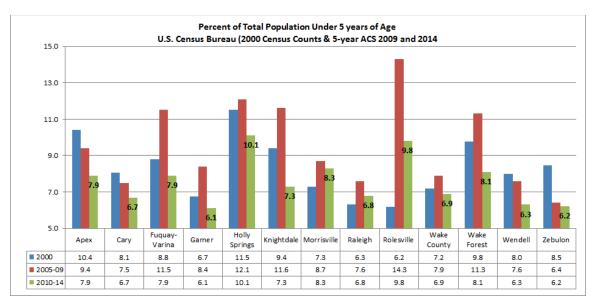
Population Share by Age Group/Municipality

Census data of select age groups may be further broken down by municipality. The following summary tables are generated from 2000 Census data and 5-year American Community Survey (ACS) data for the periods 2005-2009 and 2010-2014.

In all tables, the Wake County values are county-wide.

Population Share – Under 5 Years of Age

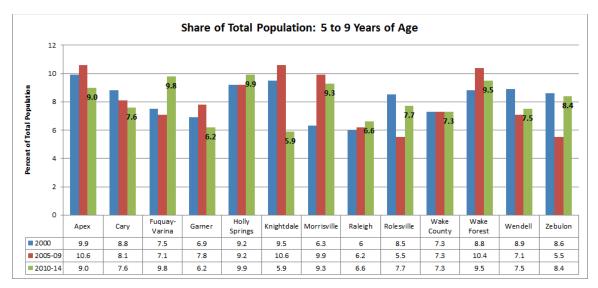
- The percentage of population for this age group decreases for <u>all</u> jurisdictions in the county over the 2010-2014 period.
- Holly Springs and Rolesville averaged the highest percentage of under 5 (10%) during 2010-2014.
- The most substantial declines for this age group occurred in Fuquay-Varina, Knightdale and Rolesville.



Source: US Census

Population Share – Ages 5-9

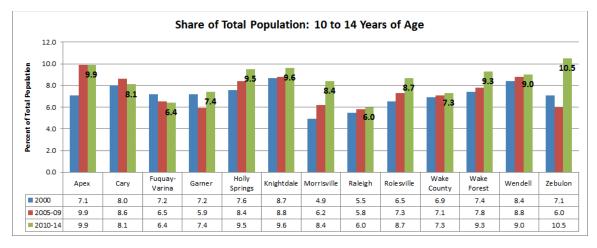
- Holly Springs, Fuquay-Varina and Wake Forest averaged the highest share of 5-9 Year Olds (10%) during 2010-2014. Wake Forest, Morrisville and Apex averaged to about 9%.
- Most substantial increases occurred in Fuquay-Varina, Rolesville and Zebulon.
- Knightdale experienced the most significant decline between 2005-2009 and 2010-2014.



Source: US Census

Population Share – Ages 10-14

• Zebulon, Apex, Knightdale and Holly Springs averaged the highest share of 10-14 Year olds (rounded to at least 10%) during 2010-2014. The county-wide share remained 7.3% in 2010-2014.

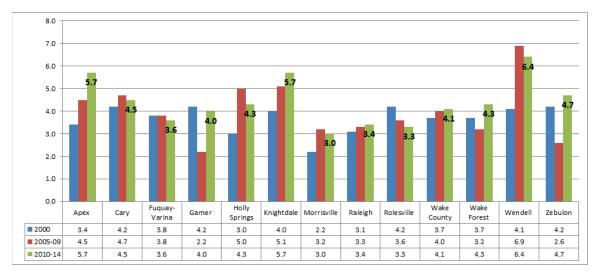


• Most substantial share increase - Zebulon (6% to 10.5%).

Source: US Census

Population Share – Ages 15-17

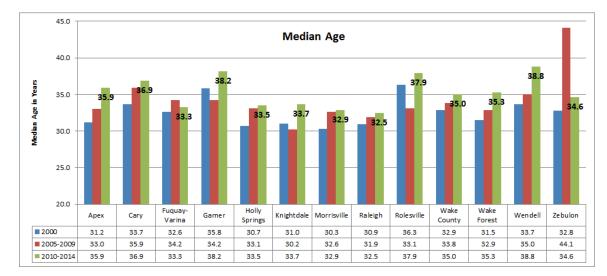
- Wendell, Apex, and Knightdale averaged the highest share of 15-17 Year olds (rounded to 6%) during 2010-2014. The county-wide share was 4.1% in 2010-2014.
- Most substantial share increase Zebulon (2.6% to 4.7%).



Source: US Census

Median Age

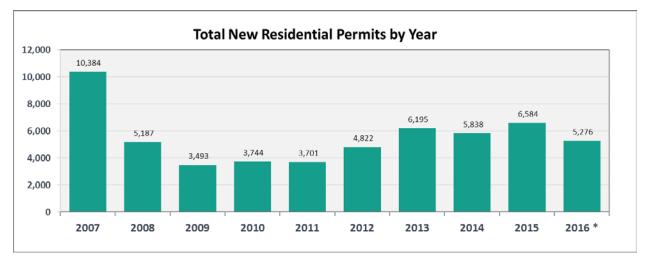
Median age for most jurisdictions (and Wake County as a whole) increased between the 2005-09 and 2010-2014 periods, with the exceptions of Fuquay-Varina and Zebulon. The current estimate for median age of Wake County residents is 35.0.



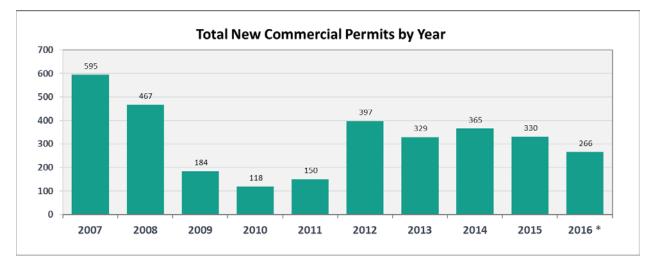
Source: US Census

Wake County Building Permits

According to Wake County Revenue Department data (through Sept. 2016), new residential permit activity continues its moderate positive overall trend since the low of 2009, showing some stability around the 6000+ permits per year mark.



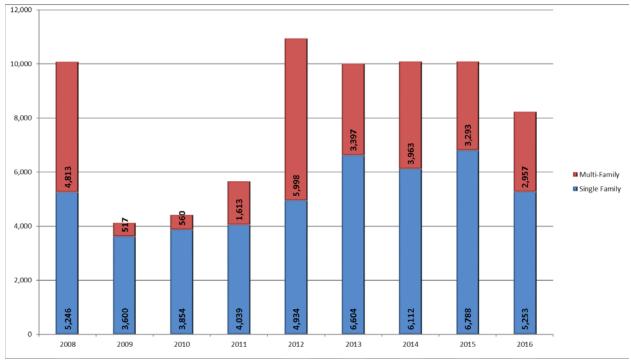
Source: Wake County Revenue Dept., Oct. 2016



Since 2012, new commercial permits show some stability around the 350 permits per year mark.

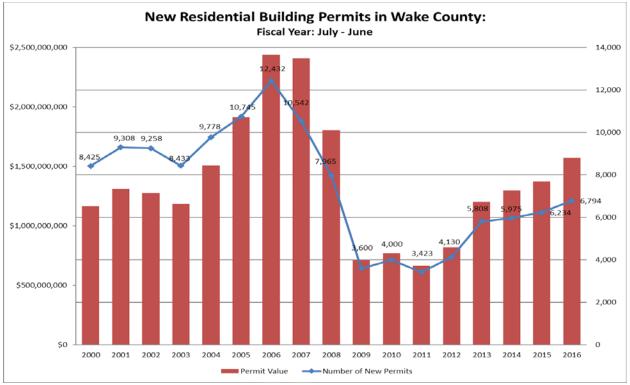
Source: Wake County Revenue Dept., Oct. 2016

The US Census Bureau's building permit survey breaks down residential permits by single family or multi-family dwelling unit. As with the residential and commercial permit activity, there are signs of stability in the data at around 10,000 total units per year since 2012.



Source: US Census Bureau, Building Permit Survey, Oct. 2016

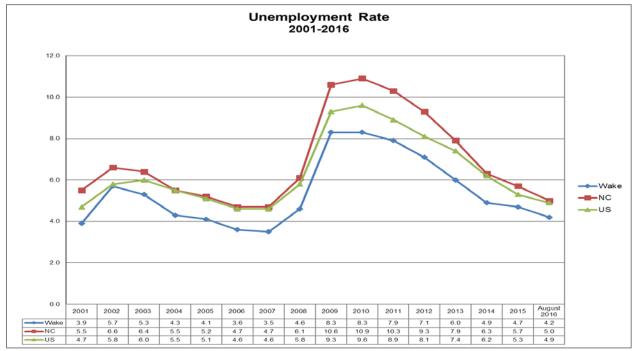
Additional data from Wake County Revenue shows an upward trend in residential permit value with the corresponding increase in new residential permits when measured by fiscal year.



Source: Wake County Revenue Dept., Oct 2016

Unemployment

According to US Department of Labor data, Wake County favors well to national and state unemployment rate through August 2016. Current estimates are at 4.2%, the lowest rate since 2007.



Source: US Dept. of Labor, Bureau of Labor Statistics