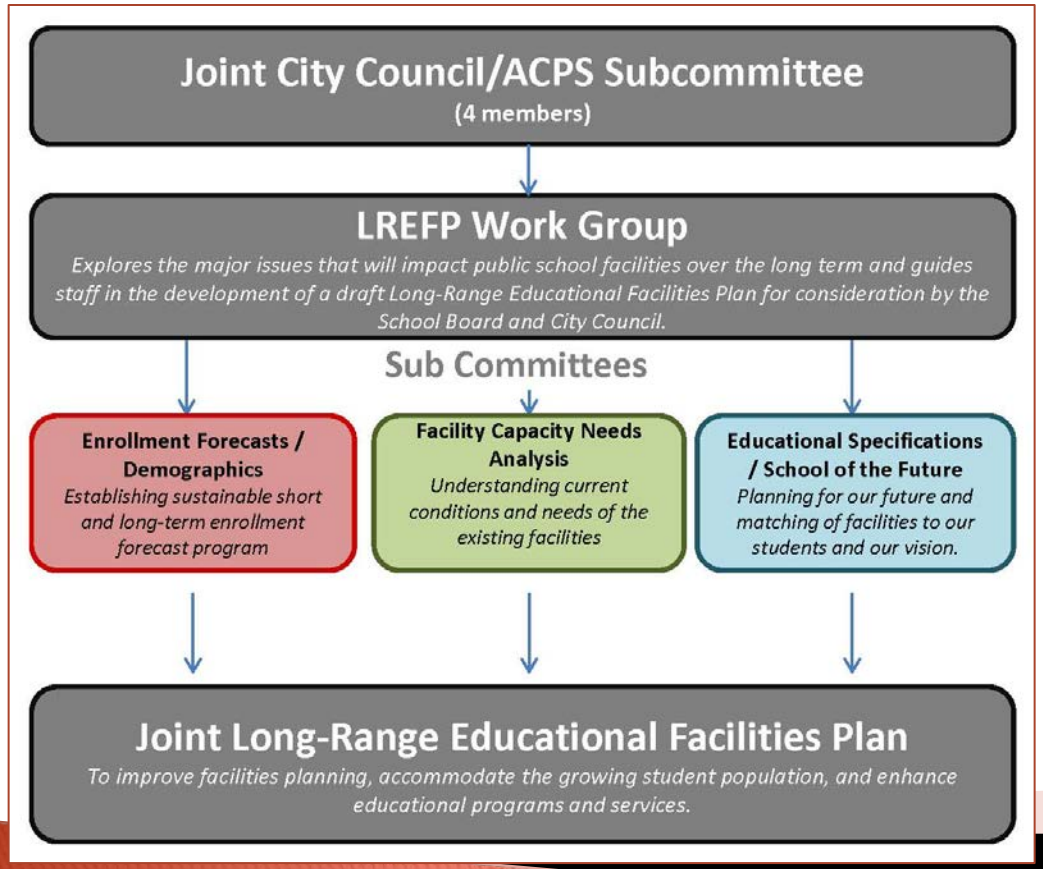
Enrollment Forecasting/Demographics Subcommittee



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Presentation Overview

I. Subcommittee Overview
II. Overview of 2013-2014 Student Enrollment
III. Short-Term Projections- Proposed Methodology
IV. Long-Term Forecast Update

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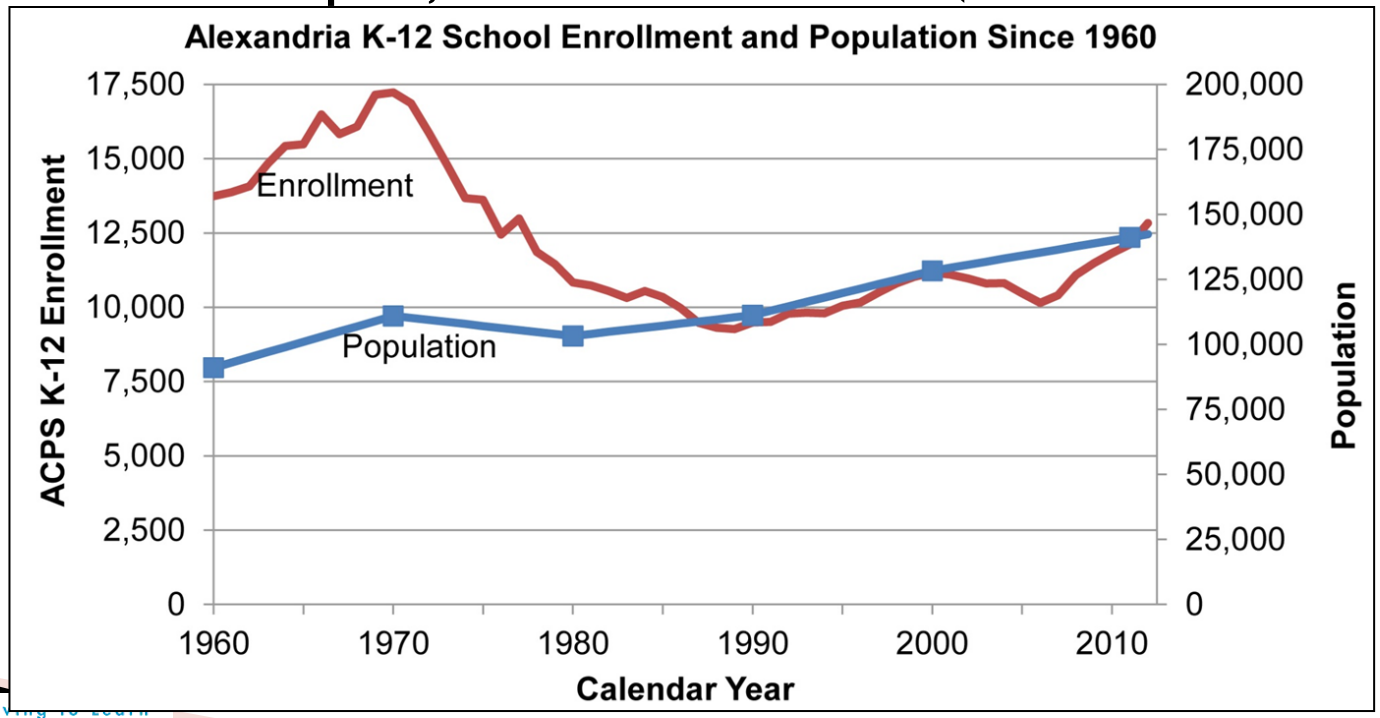
Enrollment Subcommittee Overview

LREFP Purpose

- Improve facilities planning, accommodate the growing student population, and enhance educational program and services.
- Enrollment up 3,100 since 2007 (29.5% increase)



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Enrollment Subcommittee Overview

Subcommittee Role

- Review the details of the forecasting research topics
- Collaborate on the development of a short term and long term enrollment forecast
- Report results to the LREFP workgroup

Enrollment Subcommittee Overview

Timeline

- **June**
  - Reviewed role of the subcommittee
  - Reviewed overall work program and research elements: births, cohort survival, capture rates, student generation
- **July**
  - Reviewed research elements: housing affordability programs, aggregate cohort survival, birth rates
- **September**
  - Reviewed research elements: market affordability, cohort survival by individual student
- **October**
  - Reviewed current year enrollment numbers
  - Consolidated research elements to create short & long term assumptions
  - Reviewed multiple forecast scenarios
- **November/December**
  - Produce preliminary long-term forecast
  - Produce recommended short-term and long-term forecasts
  - Develop process for regular updates

Enrollment Subcommittee Overview

- ## Subcommittee Research Topics

Predictors: Effect on enrollment can be quantified and forecast	Future Kindergarten Capture Rate	Future Cohort Survival Rate	Student Generation Rates
Housing stock - affordability	X	X	X
Job growth		X	X
Birth rates	X		
Housing stock - age of unit	X		X
Net migration - who is moving	X	X	
Student participation rate	X	X	
Household profiles: income, race/ethnicity, country of origin	X	X	X
Historic cohort survival rate		X	
Housing stock - size of unit	X		X
Influencers: can boost or depress enrollment but difficult to quantify or forecast	**Future Kindergarten Capture Rate**	**Future Cohort Survival Rate**	**Student Generation Rates**
New school buildings/facilities	X	X	X
Reputation	X	X	X
Programmatic initiatives	X	X	X
Availability to alternatives for Alexandria public schools	X	X	X

Key

Research Complete

Research TBD

Research Ongoing

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Enrollment Subcommittee Overview

Multiple Enrollment Forecasts

- **Short Term (1-6 years)**
  - Most specific forecast. Is done for every school by every grade. Informs near-term capacity and operating needs.
- **Mid Term (6-10 years)**
  - Is a citywide forecast. Informs the 10 year Capital Improvement Plan (CIP).
- **Long Term (30 years)**
  - Is citywide forecast. Informs long term public facility needs.

Presentation Overview

I. Subcommittee Overview

II. Overview of 2013-2014 Student Enrollment

- **Overall**
- **By Grade**
- **Elementary Growth by Region**
- **Actual versus Projected**

III. Short-Term Projections- Proposed Methodology

IV. Long-Term Forecast Update

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Overview of 2013-2014 Student Enrollment

October 1 Student Enrollment

FY2014

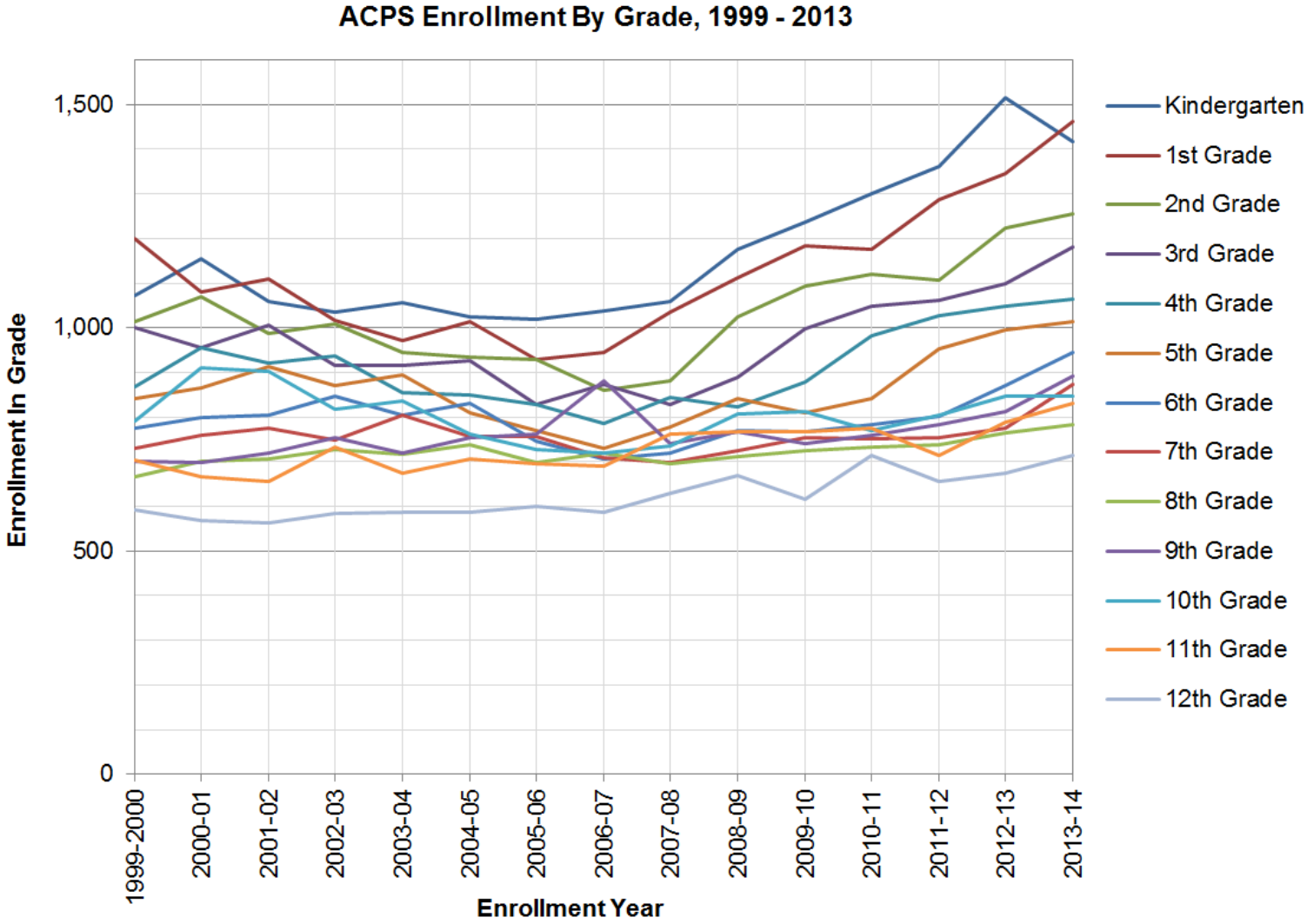
- Total Enrollment: 13,622
  - 3.9% increase from FY13
  - K-12 Enrollment: 13,277
  - Prek Enrollment: 285
- Growth
  - Elementary 2.3%
  - Middle School 7.9%
  - High School 5.2%

FY2013

- Total Enrollment: 13,114
  - 5.6% increase from FY12
  - K-12 Enrollment: 12,759
  - Prek Enrollment: 276
- Growth
  - Elementary 5.9%
  - Middle School 4.3%
  - High School 5.7%

Overview of 2013–2014 Student Enrollment

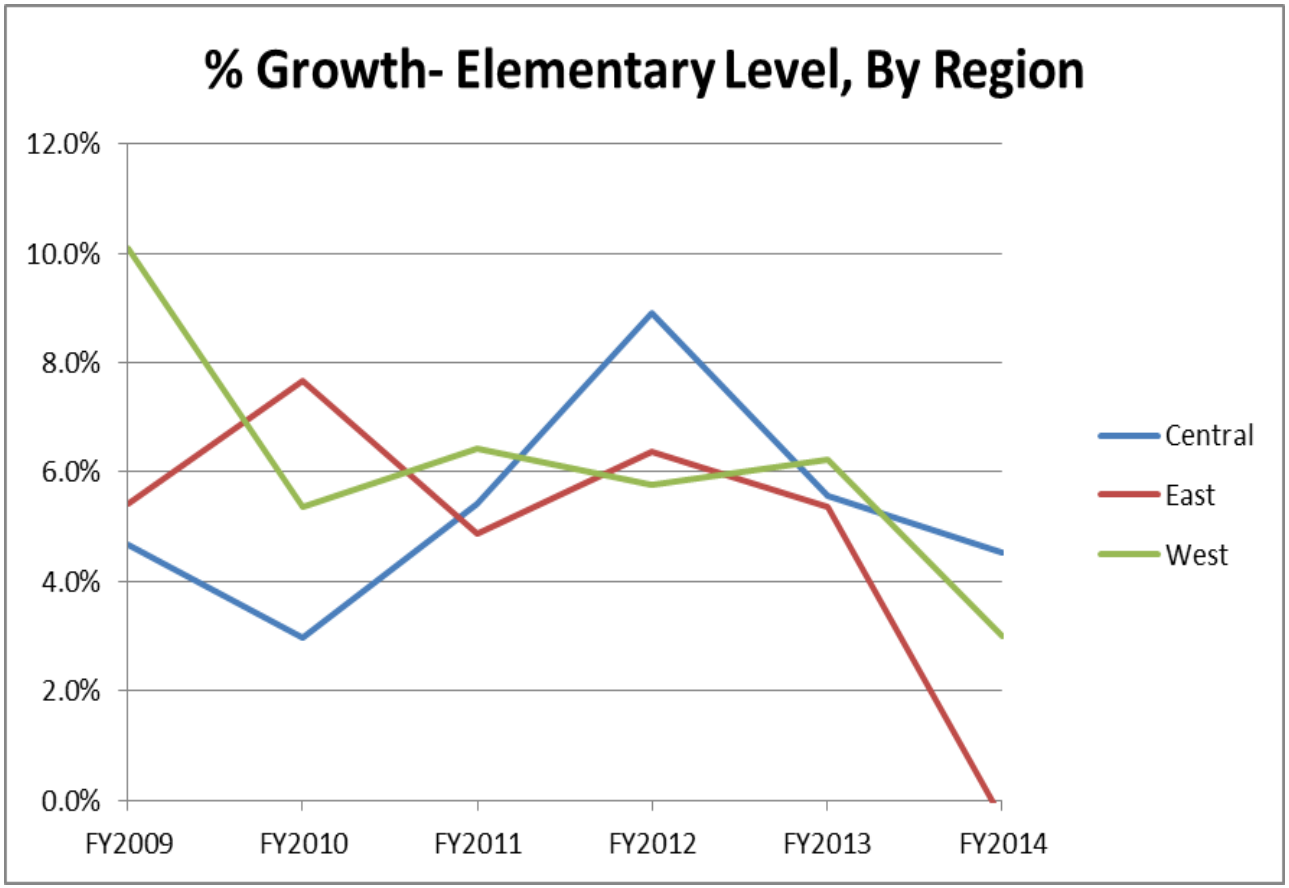
Actual Enrollment Trends



Overview of 2013-2014 Student Enrollment

October 1 Student Enrollment

- Central: C. Barrett, D. MacArthur, G. Mason
  East: C. Kelly, J.-Houston, L.-Crouch, M. Maury, Mt. Vernon
  West: J.K. Polk, J. Adams, P. Henry, S. Tucker, W. Ramsay



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Overview of 2013-2014 Student Enrollment

Actual vs. Projected- FY2014

School Name	FY2014 Final Projected	FY2014 10/1/2013	Projection Error
Charles Barrett Total	442	446	+.9%
Cora Kelly Total	367	373	+1.6%
Douglas MacArthur Total	715	704	-1.5%
George Mason	525	512	-2.5%
James K. Polk	708	690	-2.5%
Jefferson Houston	385	356	-7.5%
John Adams	883	874	-1.%
Lyles-Crouch	457	437	-4.4%
Matthew Maury	461	418	-9.3%
Mount Vernon	836	768	-8.1%
Patrick Henry	621	586	-5.6%
Samuel Tucker	729	740	+1.5%
William Ramsay	870	831	-4.5%
ES Total	**7,999**	**7,735**	**-3.3%**
Francis Hammond MS			
Francis Hammond MS 1	445	462	+3.8%
Francis Hammond MS 2	449	459	+2.2%
Francis Hammond MS 3	447	465	+4.%
George Washington MS			
George Washington MS 1	540	580	+7.4%
George Washington MS 2	540	578	+7.%
MS Total	**2,421**	**2,544**	**+5.1%**
Minnie Howard Center	695	714	+2.7%
TC Williams HS	2,498	2,569	+2.8%
HS Total	**3,193**	**3,283**	**+2.8%**
Grand Total	**13,613**	**13,562**	**-.37%**

Grade	FY2014 Final Projected	FY2014 10/1/2013	Projection Error
PK	295	285	-3.4%
K	1,578	1,418	-10.1%
1	1,484	1,462	-1.5%
2	1,270	1,255	-1.2%
3	1,212	1,181	-2.6%
4	1,085	1,063	-2.%
5	1,013	1,013	+.%
6	897	946	+5.5%
7	828	872	+5.3%
8	758	784	+3.4%
9	807	892	+10.5%
10	861	845	-1.9%
11	809	832	+2.8%
12	716	714	-.3%
Grand Total	**13,613**	**13,562**	**-.37%**

Presentation Overview

I. Subcommittee Overview
II. Overview of 2013-2014 Student Enrollment
III. **Short-Term Projections- Proposed Methodology**
   - **Foundations**
   - **Kindergarten Trends and Capture Rates**
   - **Cohort Survival**
   - **Enrollment: Historical and Projected**
IV. Long-Term Forecast Update

Short-Term Projections: Proposed Methodology

- Foundation of the Short- and Mid-Term Enrollment Forecasts

  - Changes in births
  - Changes in the kindergarten capture rate
  - Changes in cohort survival
  - Changes to student generation rate

Short-Term Projections: Proposed Methodology

Kindergarten Trends

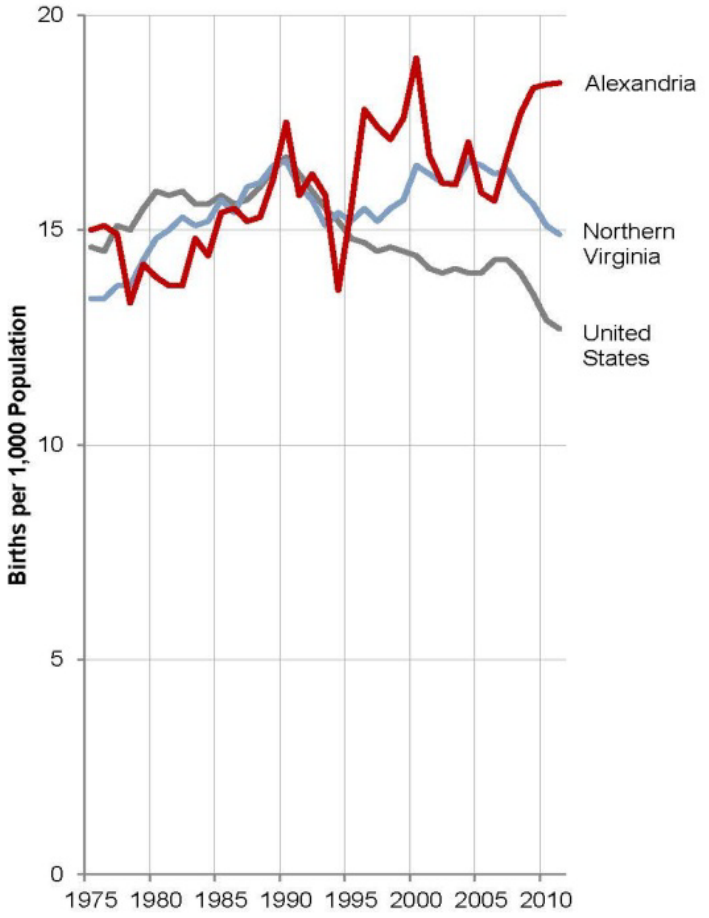
- Key Assumptions
  - Births/Birth Rate
    - Increasing
  - Kindergarten Capture Rate
    - FY2014 rate of .581 or 58.1% (projected 64%)
    - FY2013 rate of .66 or 66%
    - Recommend using 5-year average of 60.9% for projections

Short-Term Projections: Proposed Methodology

Kindergarten Trends

Alexandria's Birth Rates are higher than those of Northern Virginia and the nation as a whole.

Trends in Crude Birth Rates
Comparison with National and Regional Trends



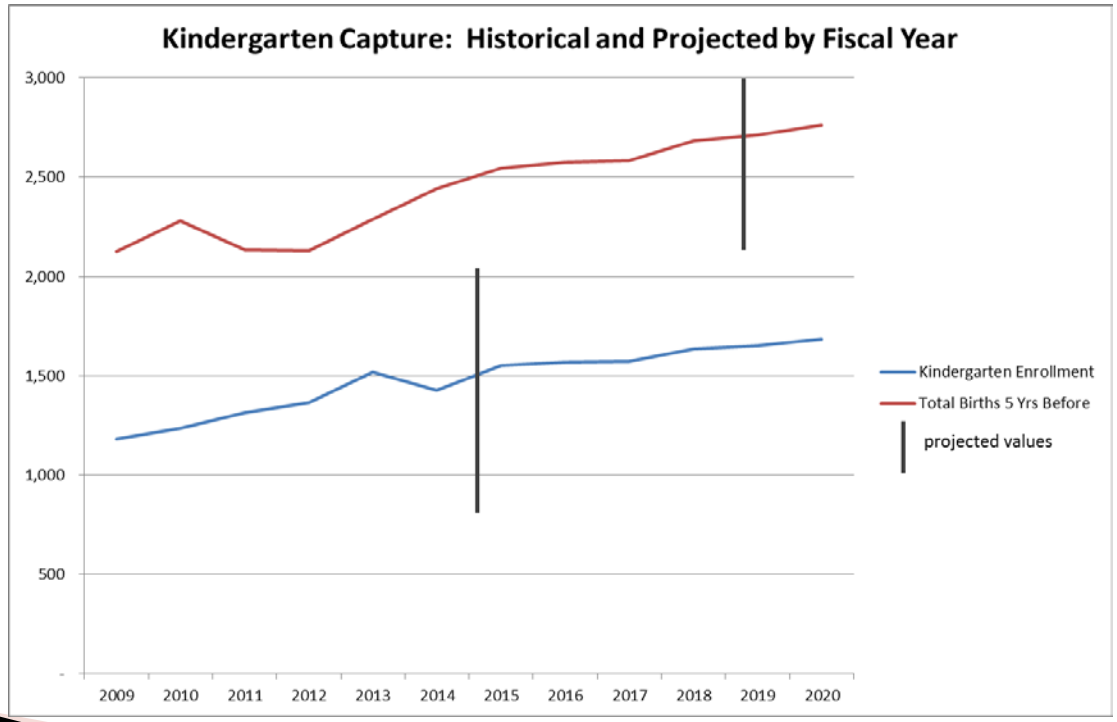
Births per 1000 Population

Year	Alexandria	Northern Virginia	United States
1975	15.0	13.4	14.6
1976	15.1	13.4	14.5
1977	14.9	13.7	15.1
1978	13.3	13.7	15.0
1979	14.2	14.3	15.5
1980	13.9	14.8	15.9
1981	13.7	15.0	15.8
1982	13.7	15.3	15.9
1983	14.8	15.1	15.6
1984	14.4	15.2	15.6
1985	15.4	15.7	15.8
1986	15.5	15.4	15.6
1987	15.2	16.0	15.7
1988	15.3	16.1	16.0
1989	16.2	16.5	16.4
1990	17.5	16.6	16.7
1991	15.8	16.0	16.3
1992	16.3	15.7	15.9
1993	15.8	15.1	15.5
1994	13.6	15.4	15.2
1995	15.5	15.2	14.8
1996	17.8	15.5	14.7
1997	17.4	15.2	14.5
1998	17.1	15.5	14.6
1999	17.6	15.7	14.5
2000	19.0	16.5	14.4
2001	16.7	16.3	14.1
2002	16.1	16.1	14.0
2003	16.0	16.1	14.1
2004	17.0	16.6	14.0
2005	15.9	16.5	14.0
2006	15.7	16.3	14.3
2007	16.7	16.4	14.3
2008	17.7	15.9	14.0
2009	18.3	15.6	13.5
2010	18.4	15.1	12.9
2011	18.4	14.9	12.7

Short-Term Projections: Proposed Methodology

Kindergarten Capture Rate

- Birth Data- Virginia Department of Health
  - Births to Alexandria mothers
  - Revised to ensure valid Alexandria addresses and adjust to months of kindergarten eligibility (October – September)



FY	Total Births 5 Yrs Before	Kindergarten Enrollment	K Capture
2009	2,126	1,179	55.5%
2010	2,277	1,236	54.3%
2011	2,133	1,313	61.6%
2012	2,129	1,364	64.1%
2013	2,289	1,516	66.2%
2014	2,442	1,418	58.1%
2015	2,546	1,550	60.9%
2016	2,576	1,569	60.9%
2017	2,584	1,573	60.9%
2018	2,683	1,634	60.9%
2019	2,711	1,651	60.9%
2020	2,762	1,682	60.9%

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Short-Term Projections: Proposed Methodology

Cohort Survival: "Grade Cohort Succession"

- Compares the number of students in a grade to the number of students in the previous grade the previous school year.
- Annual ratios are averaged and then used to project future enrollment.
- Using a 3-year average for projections.

3-Year Average FY12-14

- Lower Elementary (K-3) 96.4
- Upper Elementary (3-5) 97.5
- Middle School (6-8) 97.3
- Lower High (8-10) 108.6
- Upper High (10-12) 93.1

3-Year Average FY11-13

- Lower Elementary (K-3) 96.3
- Upper Elementary (3-5) 97.5
- Middle School (6-8) 96.8
- Lower High (8-10) 106.5
- Upper High (10-12) 93.1

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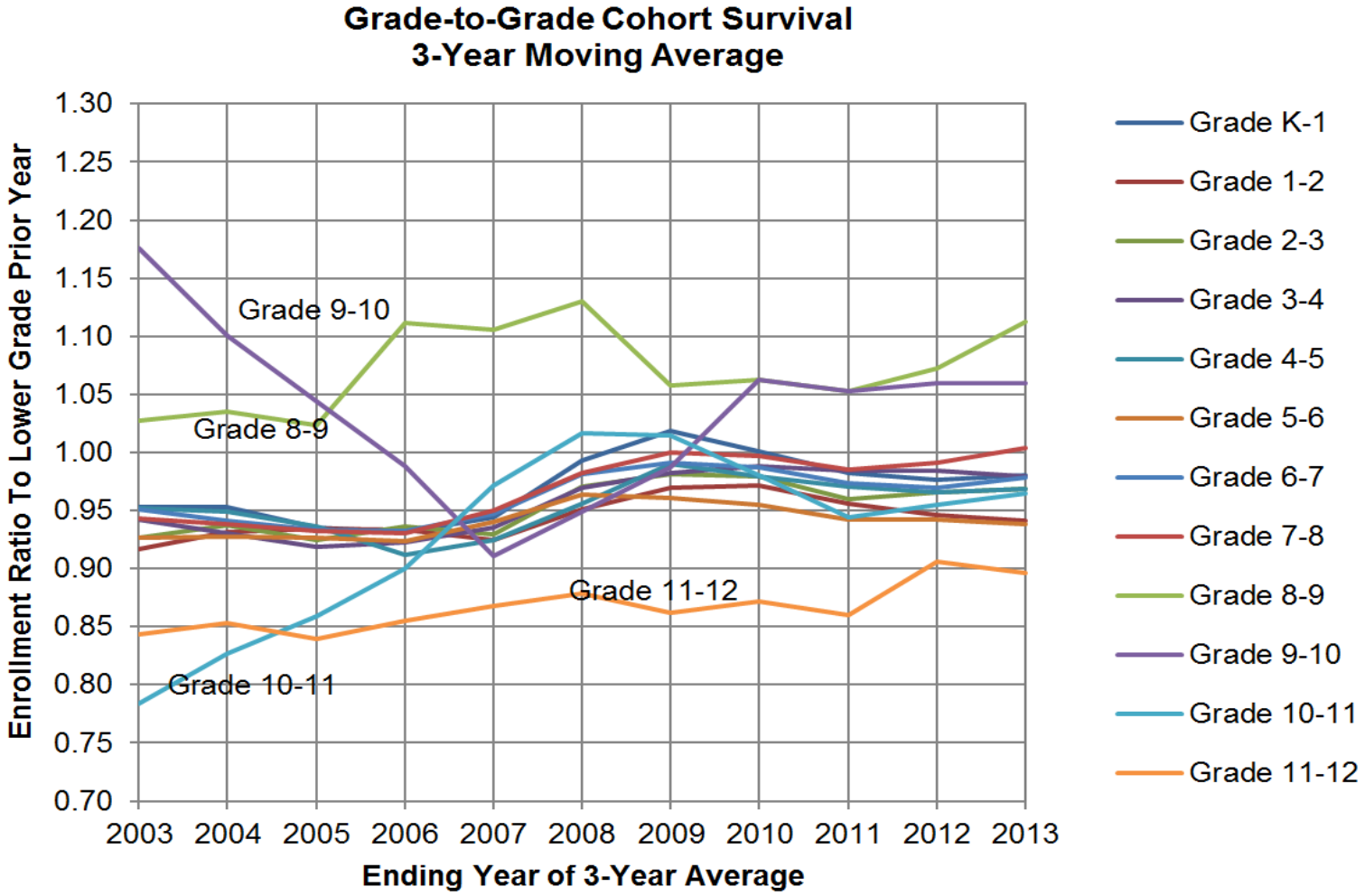
Short-Term Projections: Proposed Methodology

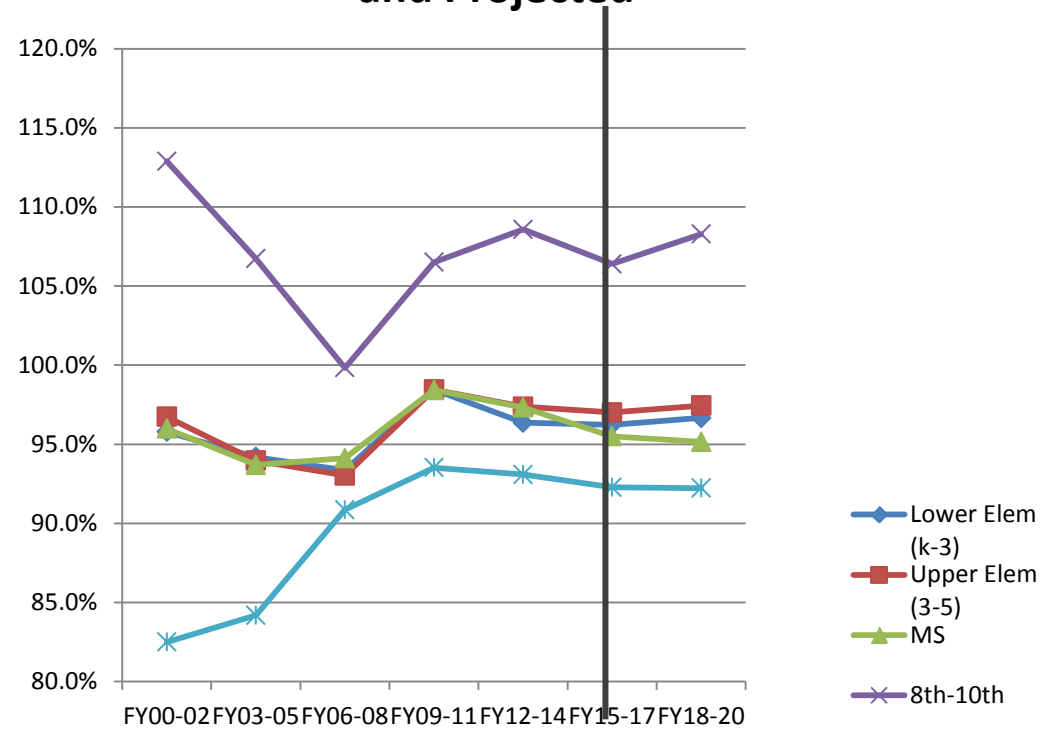
Cohort Survival Trends



Short-Term Projections: Proposed Methodology

Cohort Survival: Historical and Projected

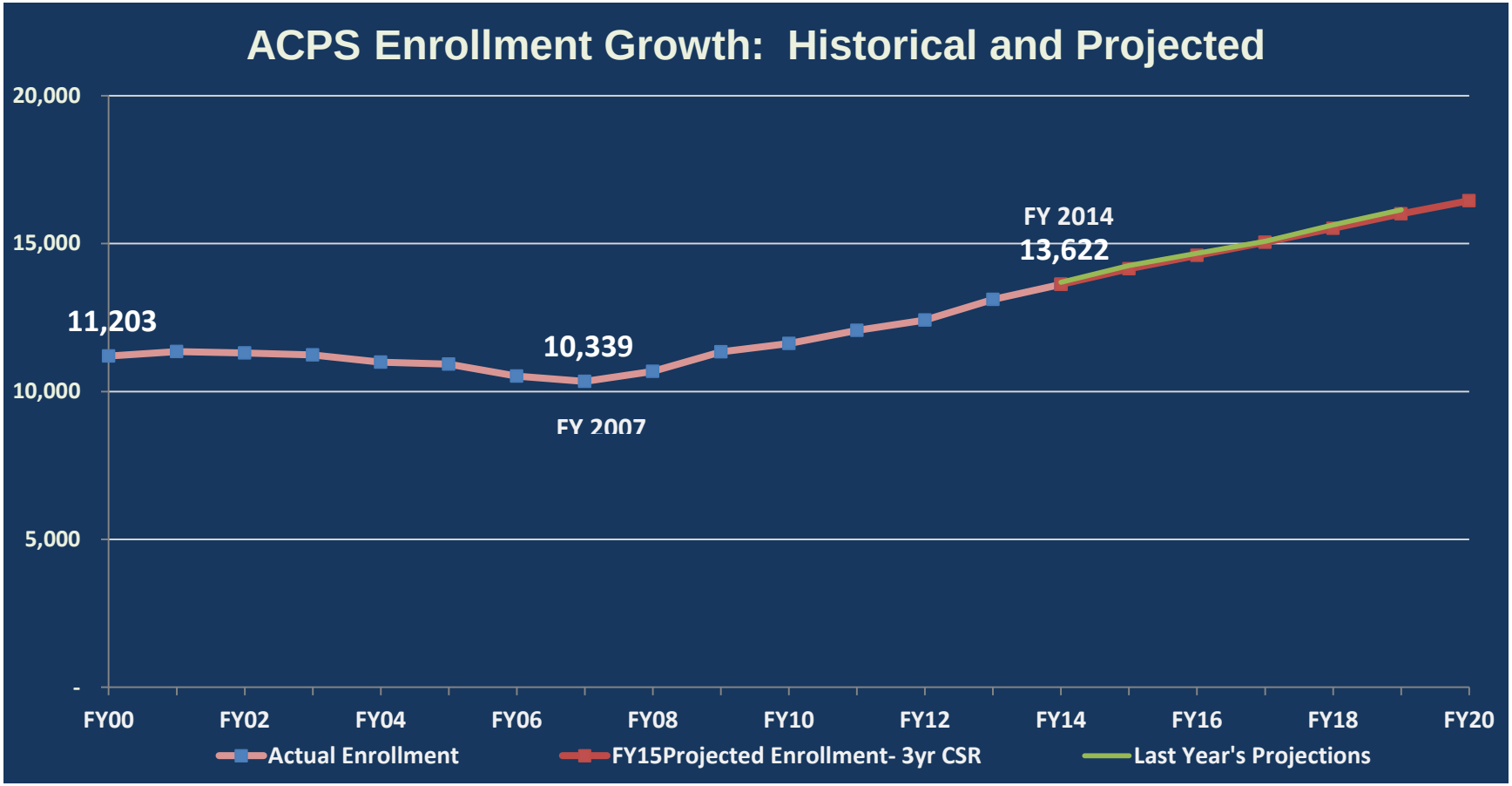
3 Year Average Cohort Survival: Historical and Projected



	Lower Elem (k-3)	Upper Elem (3-5)	MS	8th-10th	10th-12th
FY00-02	95.8%	96.7%	96.0%	112.9%	82.5%
FY03-05	94.2%	94.0%	93.7%	106.7%	84.2%
FY06-08	93.3%	93.0%	94.1%	99.8%	90.9%
FY09-11	98.5%	98.5%	98.4%	106.5%	93.5%
FY12-14	96.4%	97.4%	97.3%	108.6%	93.1%
FY15-17	96.2%	97.0%	95.5%	106.4%	92.3%
FY18-20	96.7%	97.4%	95.2%	108.3%	92.2%

Short-Term Projections: Proposed Methodology

ACPS Enrollment: Historical and Projected



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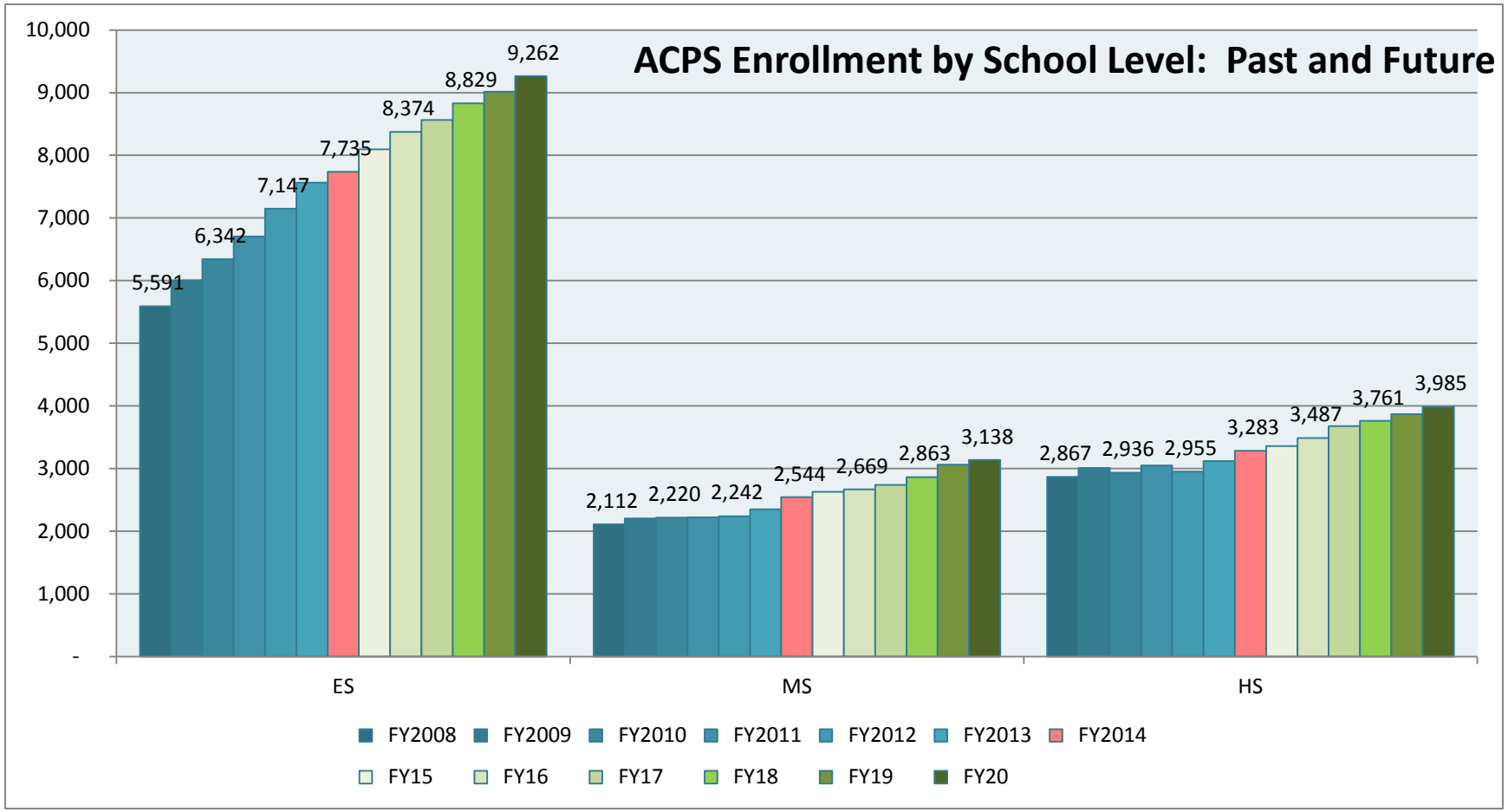
Short-Term Projections: Proposed Methodology

ACPS Enrollment: Historical and Projected



Short-Term Projections: Proposed Methodology

Next Steps- Short-Term Projections

- Calculate student generation rates for SY2013-2014
- Calculate detailed by school, by grade projections
- Capacity Analysis to determine how the projections affect capacity

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Long-Term Forecasting

Short-Term Forecast	Long-Term Forecast
Known **births** for recent years	How will births and birth rates change?
Kindergarten capture – recent years average from known births	How could kindergarten capture change and why?
Cohort survival by grade – recent years average	How could cohort survival change?
Students from **new development** – approved projects	Approved projects and **potential future projects**
Student generation per housing unit for existing development and new projects – recent years average	How could student generation to change over time?

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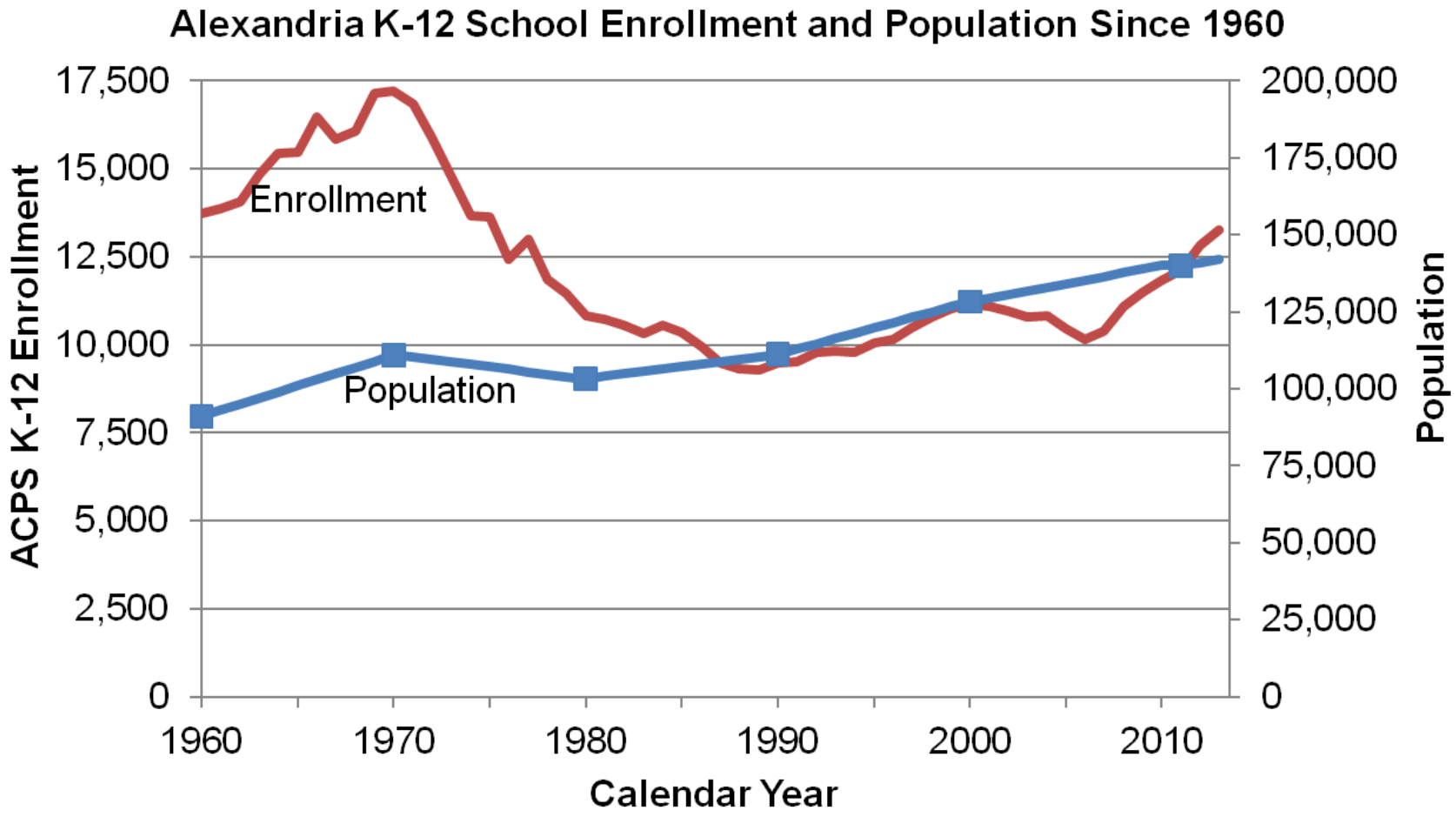
Enrollment History Since 1960



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Trends vs Disruptions

- Early 2000s boom brought a big young cohort to the region for jobs. This group is now having families.
- The housing boom and subsequent financial crisis disrupted a pattern of moves up and outward in the region as families grow.
- Racial and ethnic trends may also have been disrupted by the recent boom and bust.
- The 2000s show a substantial disruption in the long-term enrollment trend.

Potential Changes in Direction

- Reduced birth rates per 1000 population as population ages, and among immigrant populations in particular.
- Families choosing more urban lifestyles but limited by housing types available.
- Nearly all new development is in building types less preferred by families.
- Continued pressure on prices and rents as region grows outward may threaten affordability and economic diversity.

Short-Term vs. Long-Term Trends

Short-Term Trend	Long-Term Trend
Births and birth rate increasing	Birth rates expected to decline with changing demographics
Kindergarten capture – sharp decline from recent peak	Slow decline to somewhat higher than pre-boom and crisis rates
Cohort survival at high	Expected slight decline with normalization of markets, but steady with return to the city
New development: New housing units about 1% per year	Continued new housing units about 1% per year
Student generation dropped in housing bubble, then rose rapidly since 2007	Student generation expected to rise somewhat as current cohorts reach graduation, then gradually decline.

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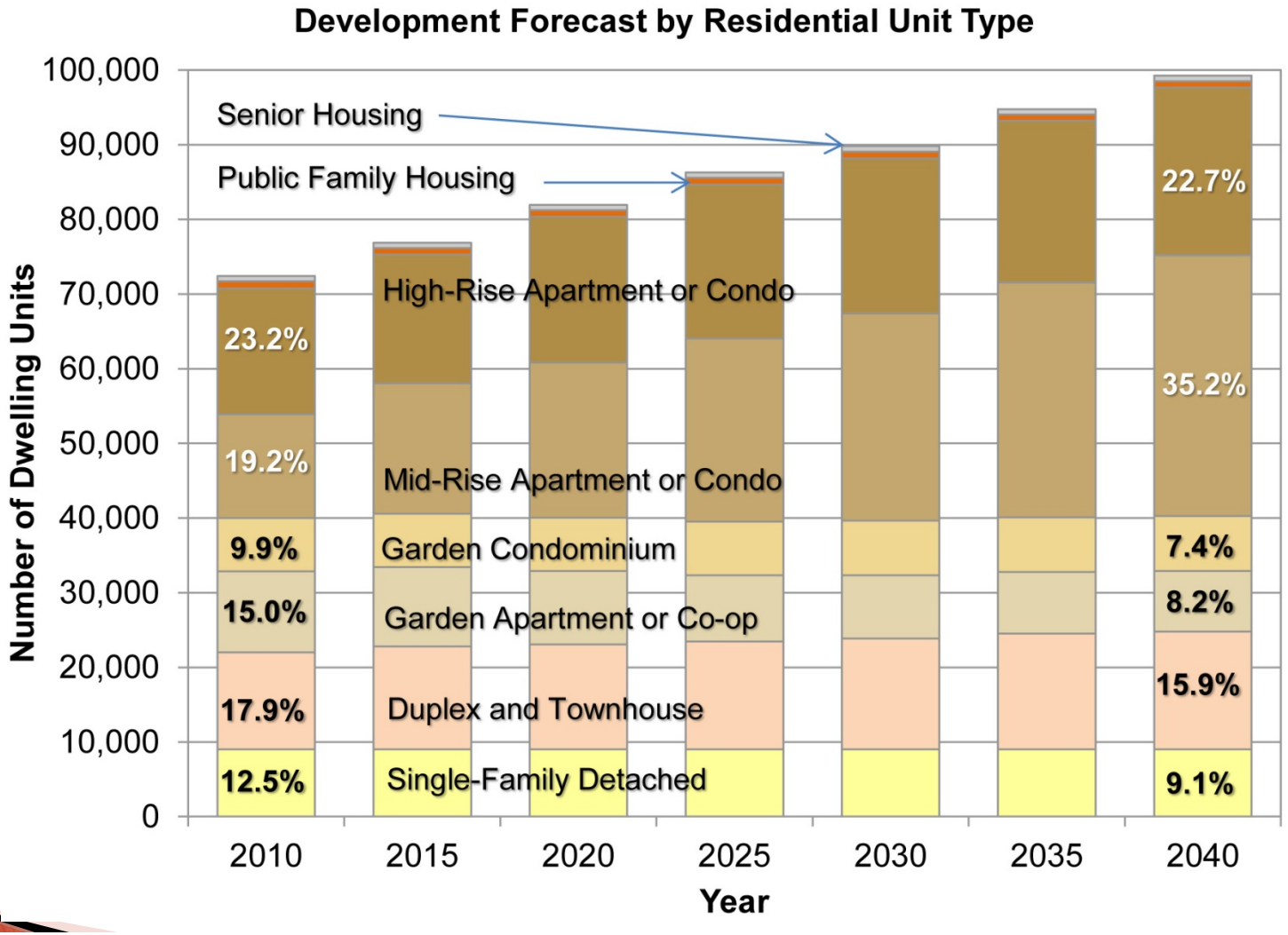
Predictors Trends

Predictor	Current Trend	Expected Future Trend
Housing affordability	Decreasing	Neutral or decreasing
Job growth	Sustained	Sustained
Age of housing	Average increasing	Average increasing
Net out-migration of pre-school and school-age children	High during housing bubble, then much lower in crisis	Stabilize at a somewhat higher level than during housing crisis
Student participation rate	Similar to other area jurisdictions	Remains similar to other area jurisdictions
Race and ethnicity, income, origins	Hispanic share increasing	Hispanic share increasing
Historic cohort survival	Stable at lower than recent high	Slight decline
Size of housing units	Most new units small	Most new units small

Long-Term Forecasting Methods

Method	Process
Development Forecast	Estimate future development based on approved projects, plans, and likely development areas. (Use current forecast with alternate scenarios)
Enrollment Trends Forecast	Births, kindergarten capture and grade cohort survival
Generation Rates Forecast	Estimate future generation rates based on trends, building types, structure age and limitations of current inventory
Demographic Forecast	Age distribution, race and ethnicity, birth rates, cohort survival and immigration

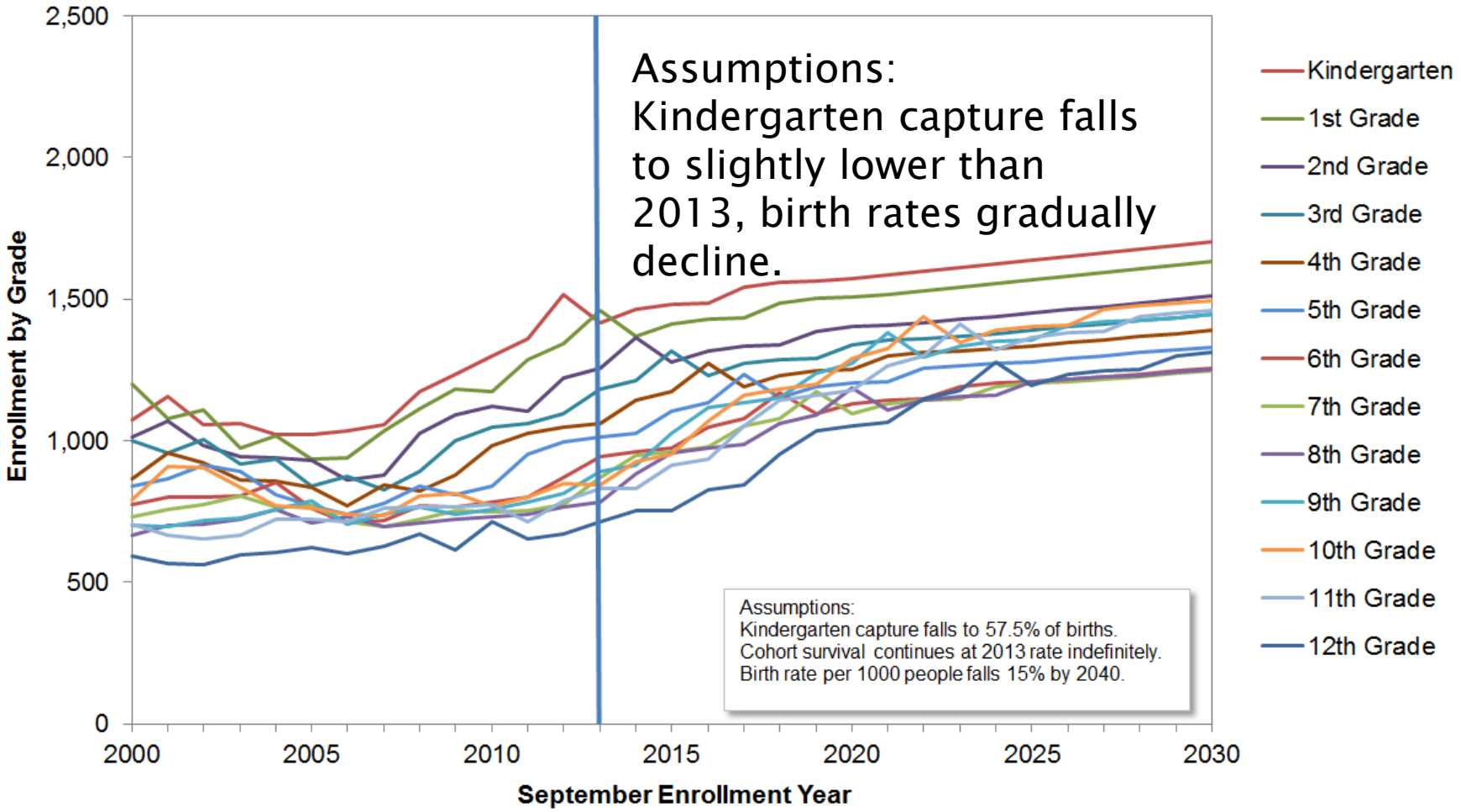
Development Forecast – Growth



Enrollment Trends Model

- Model similar to short-term model.
- Assume changes over time in:
  - Birth rates
  - Kindergarten capture
  - Cohort survival
- Assumptions based on:
  - Development forecast
  - Student generation potential by housing type
  - Demographic changes in age, race and ethnicity

Current Year Trends Modified Extended



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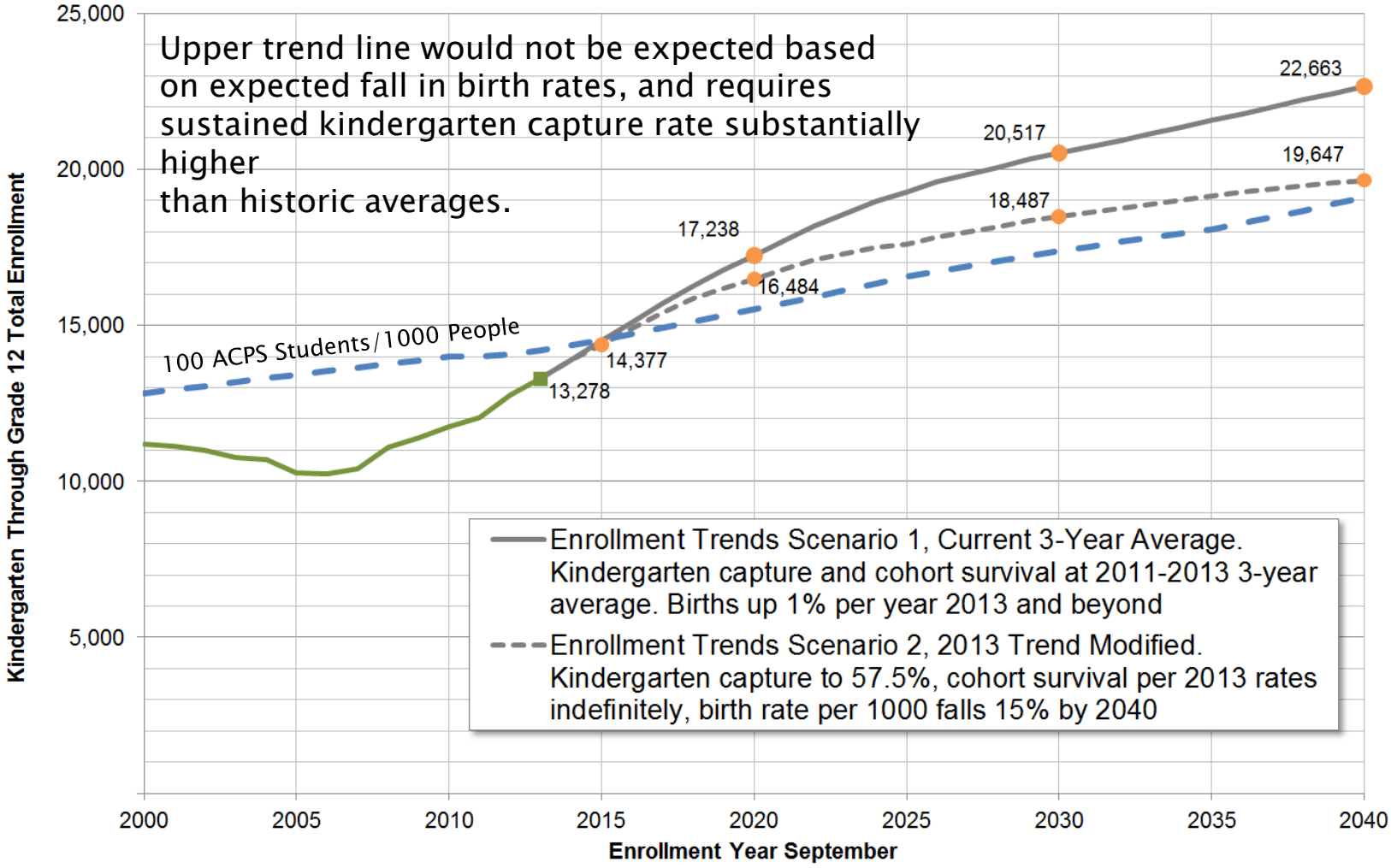
Conceptual Enrollment Trends Scenarios



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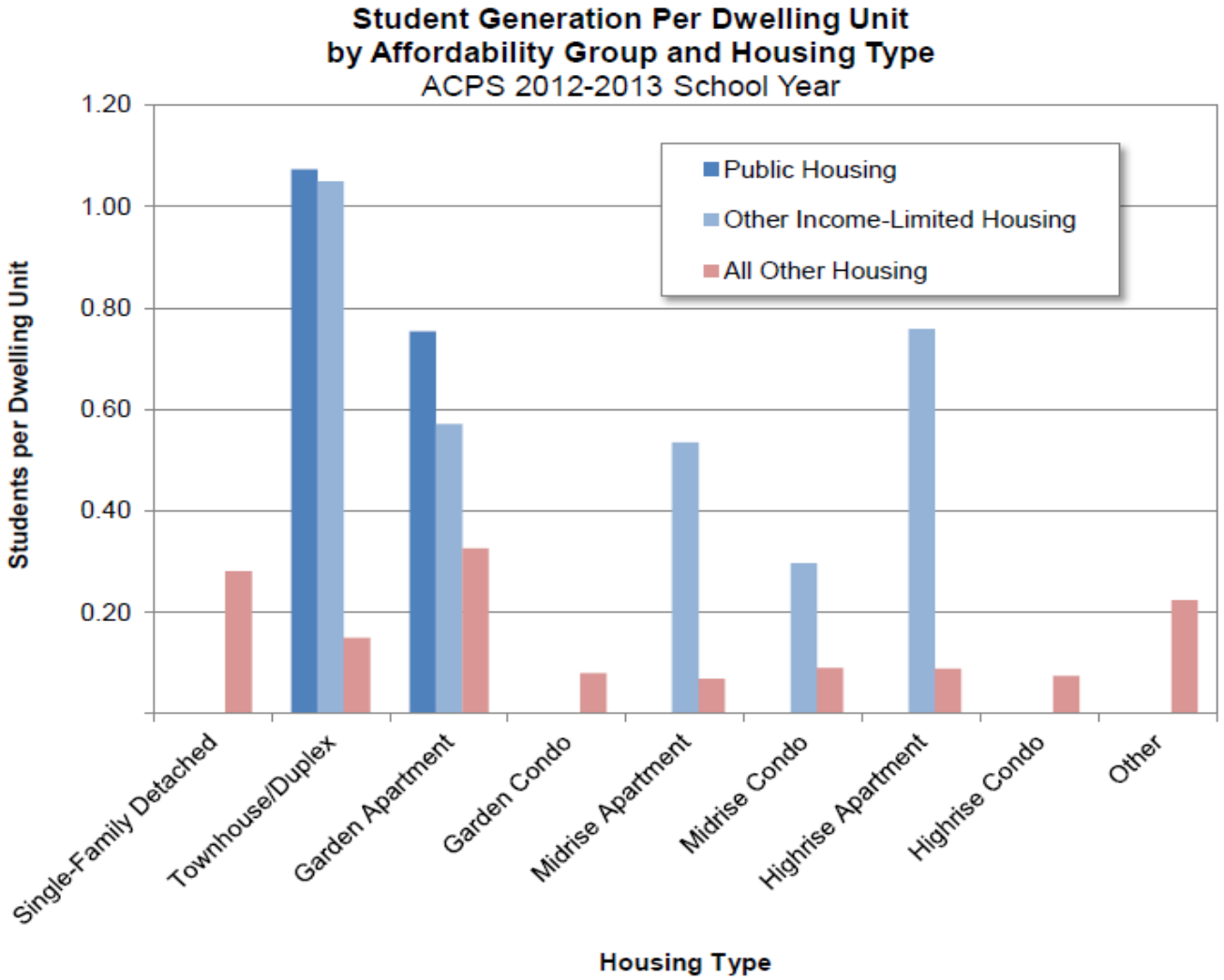
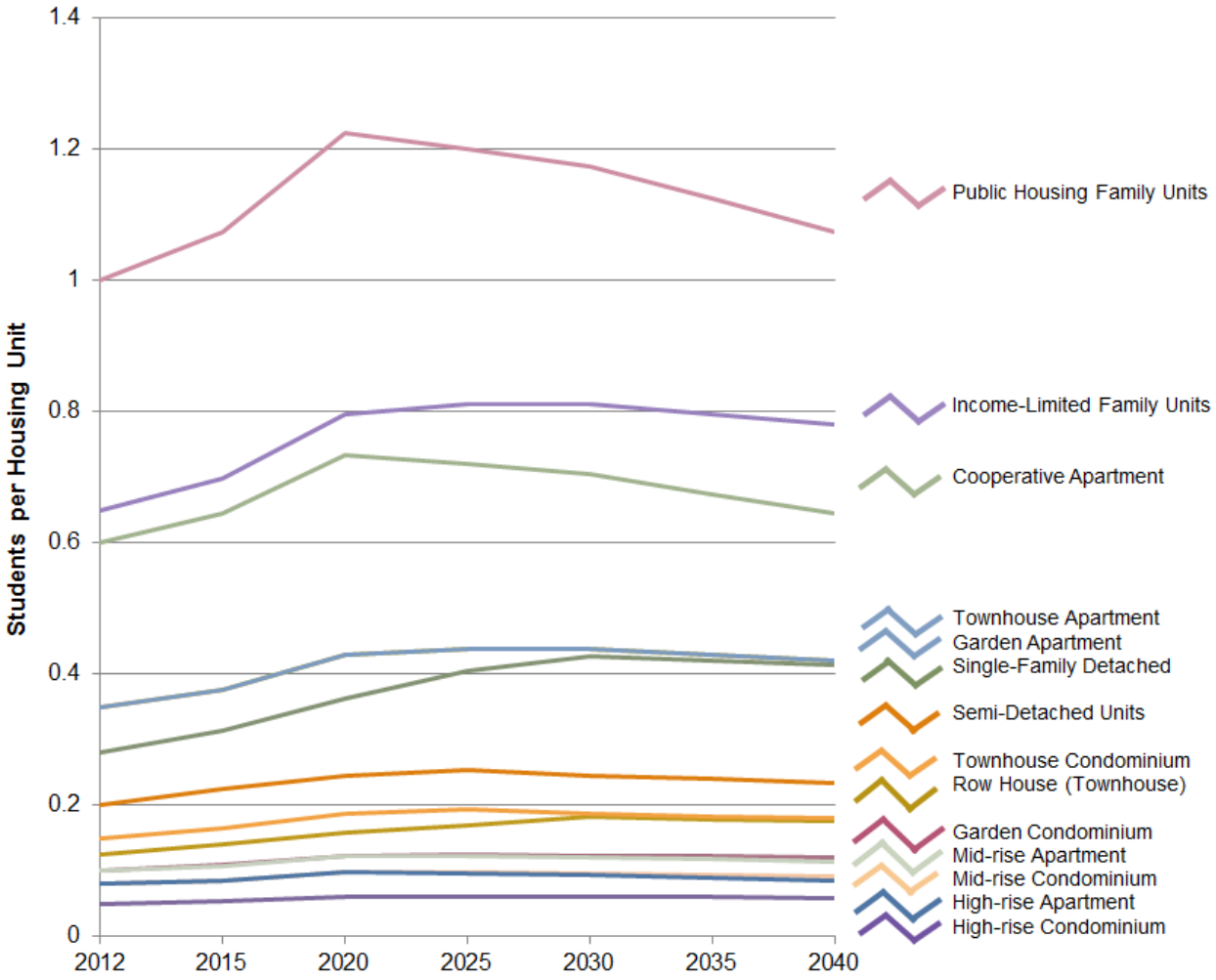
Generation Rate Forecast Model

- Reasonable assumptions for student generation rates by housing type, size and affordability
- Reasonable rates of change in generation rates with changes in occupancy, births and aging of children to school age, more seniors over time
- Generation rates increase somewhat as units age and some become more affordable
- No explicit assumptions about birth rates, kindergarten capture or cohort survival

Current Generation Rates



Generation Rate Scenario



Assumptions:

Rates rise until recent cohort starts to graduate.

Rates gradually fall but to higher than recent rates, particularly for single-family, townhouse and affordable units, with return of families to the city.

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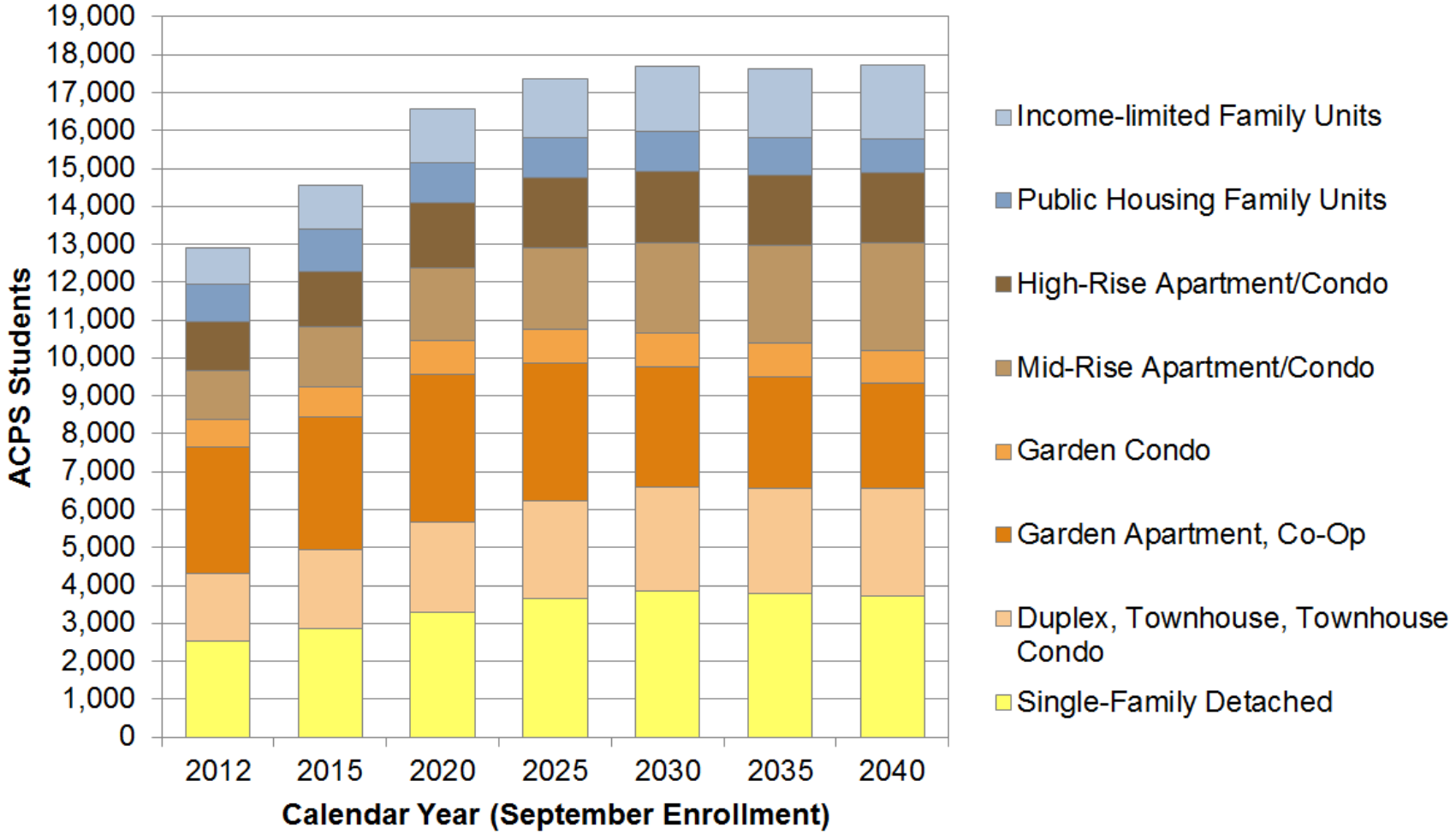
Students Generated by Housing Type



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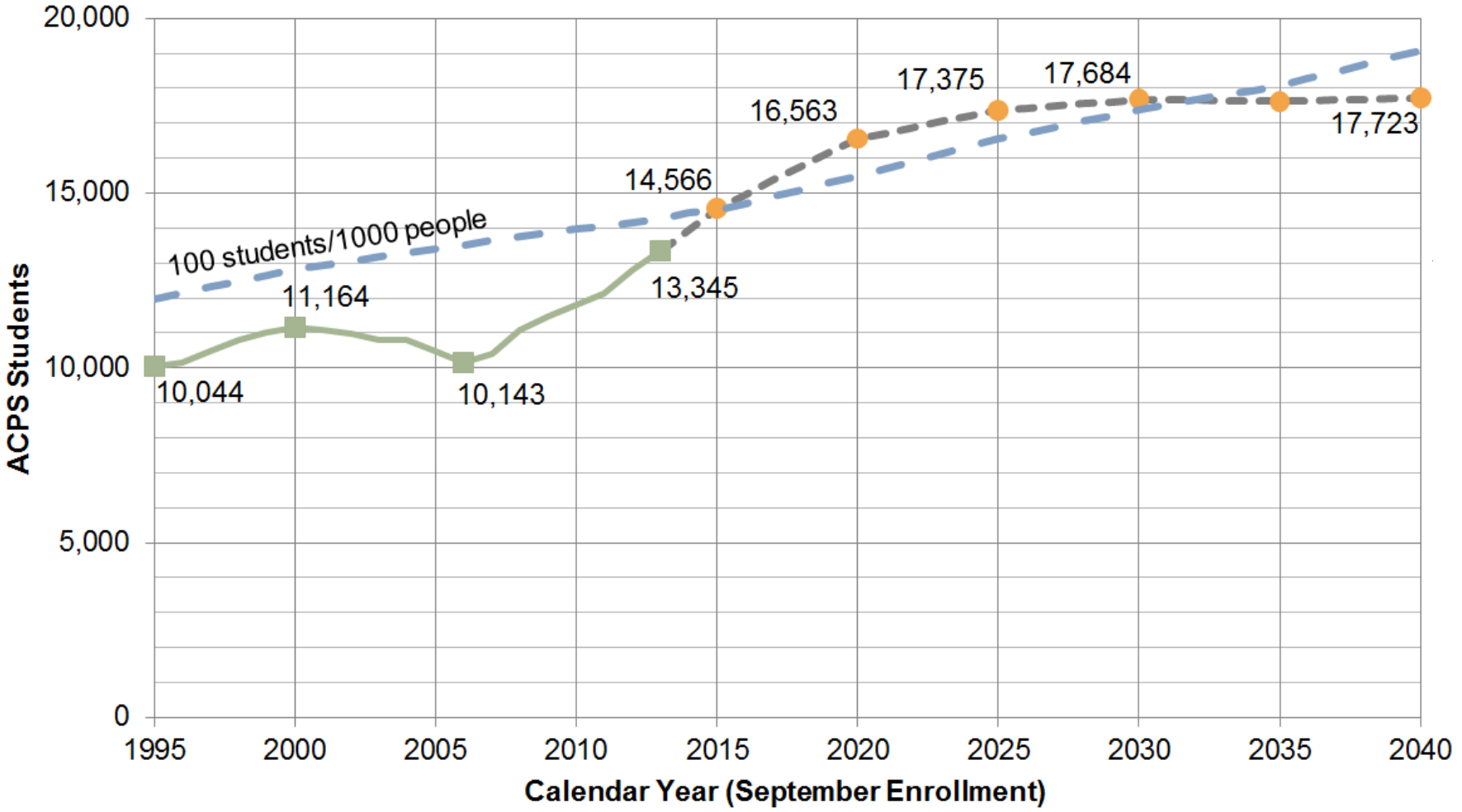
Conceptual Student Generation Scenario



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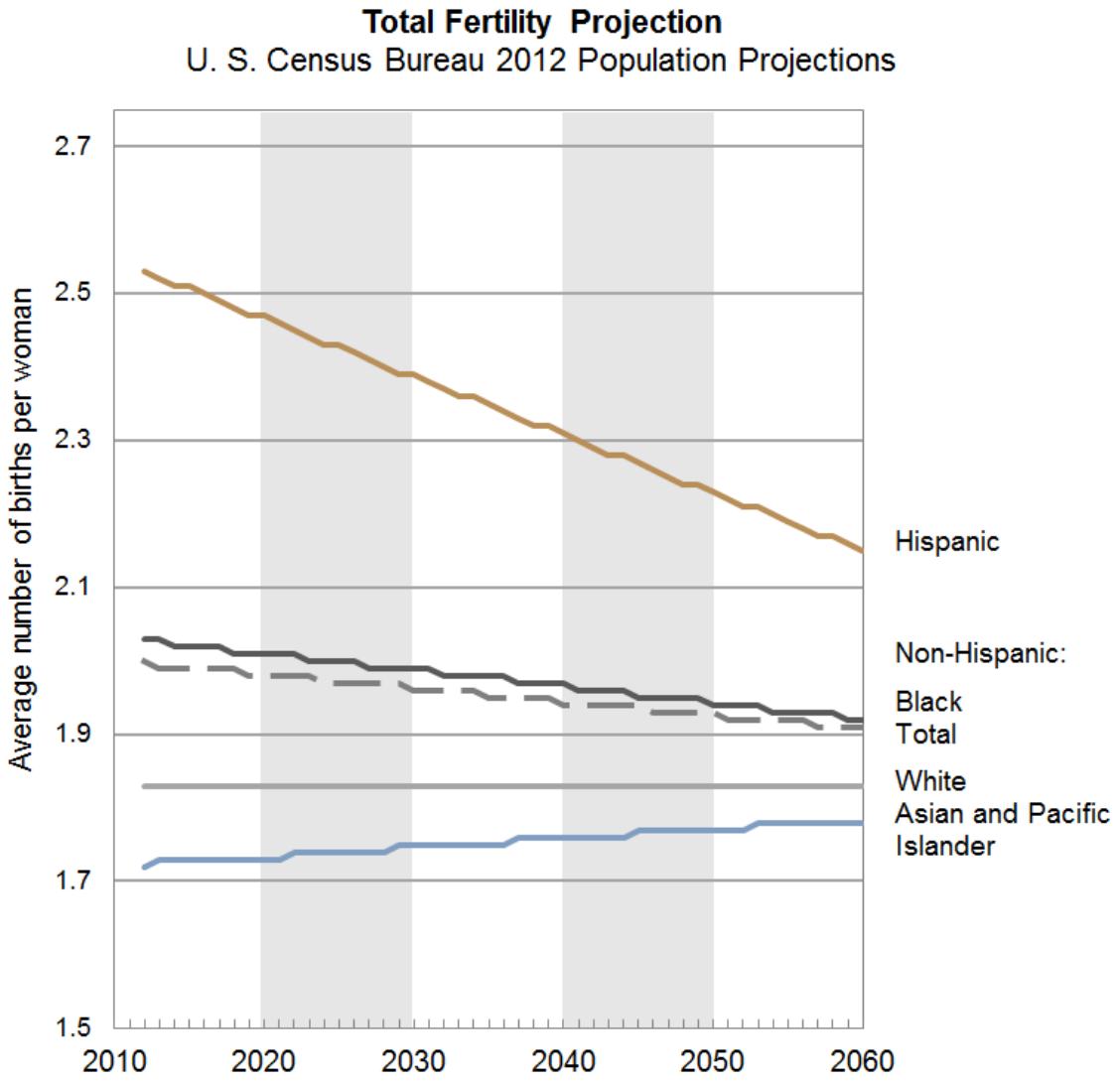
Demographics: Declining Fertility Rates



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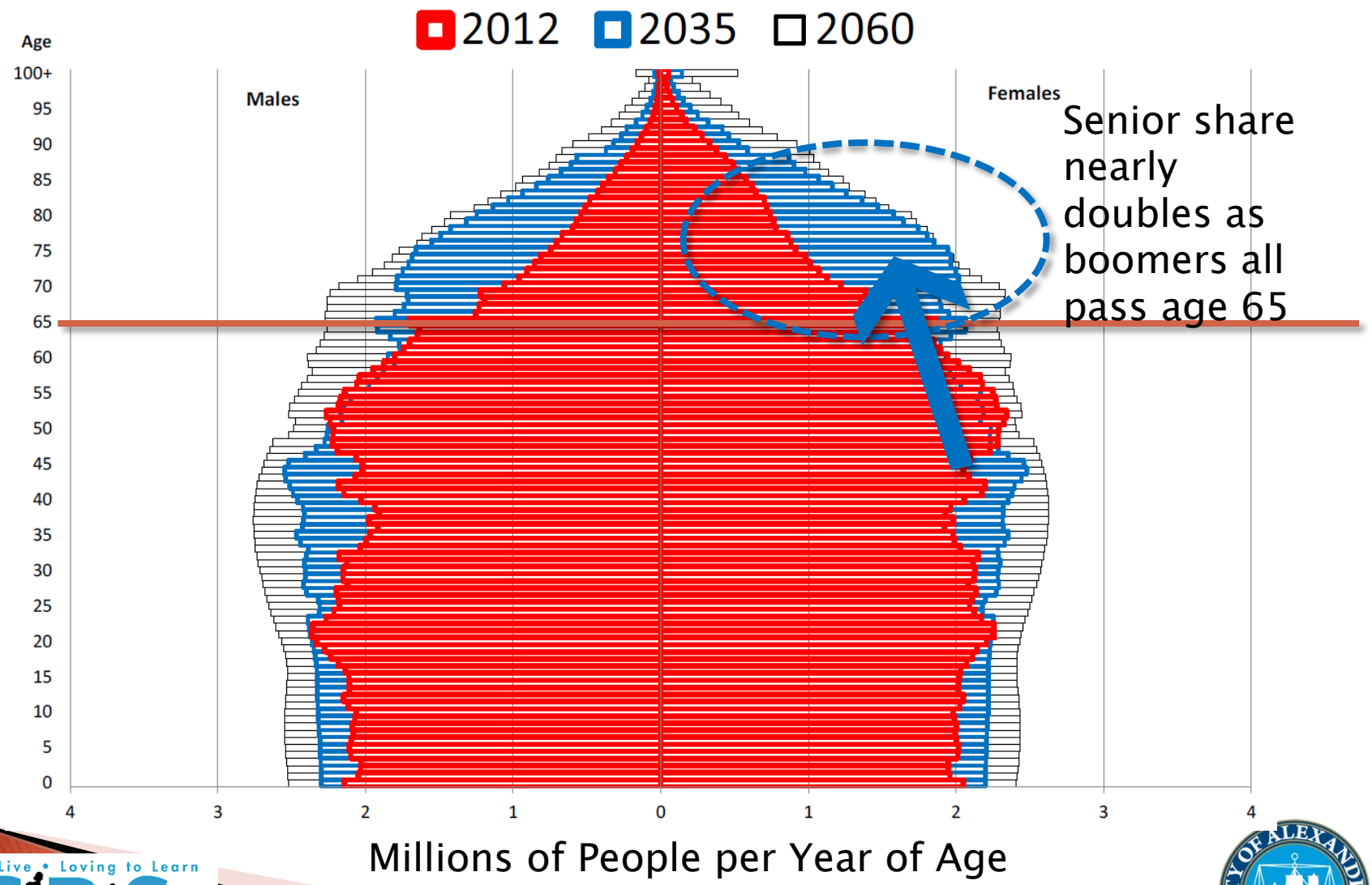
Demographics: Aging Population



Next Steps for Long-Term Forecast

- Develop assumptions for long-term birth rate trends based on demographic scenarios.
- Evaluate long-term generation rate trends:
  - Review 2013 student generation data
  - Consider potential change in affordability of existing units over time.
- Prepare candidate scenarios with sensitivity analysis.
- Review with enrollment and forecasting committee at next meeting.