Hamilton Wenham Regional School District
High School Students by Town

December 2013

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Executive Summary

1. The fertility rates for the Hamilton-Wenham school district are below replacement levels during the entire life of the forecasts. (TFR=1.76 for the district vs. 2.1 for replacement level)

2. Most of the in-migrating households to the district contain population in the 0-to-9 and 30-to-44 age groups.

3. The locally raised 18-to-24 year old population (recent graduating high school seniors) continues to leave the district, going to college or moving to other urban areas.

4. The primary factors causing the district's enrollment to decline after 2013 is an increase in the number of out-migrants in the local 18-to-24 year old age group, the rise in the number of empty nest households and a slight decrease in the number of in-migrating of younger families.

5. Changes in year-to-year enrollment will largely be due to smaller grade cohorts in conjunction with larger grade cohorts leaving the system.

6. If there was zero migration in the district during the 2013-14 to 2016-17 time period, the elementary (K-5) enrollment would decline by 130 students. The elementary enrollment is forecasted to decline by 26 students the same period.

7. If the current home construction trends continue, the number of existing home sales and the occupancy rates of the rental housing units will continue to be the dominant factor affecting the amount of population and enrollment change.

8. Total enrollment is forecasted to decrease by 93 students, or -4.8 %, between 2013-14 and 2017-18. Total enrollment will decline by 70 students, or -3.8%, from 2017-18 to 2023-24.

INTRODUCTION

By demographic principle, distinctions are made between projections and forecasts. A projection extrapolates the past (and present) into the future with little or no attempt to take into account any factors that may impact the extrapolation (e.g., changes in fertility rates, housing patterns or migration patterns) while a forecast results when a projection is modified by reasoning to take into account the aforementioned factors.

To maximize the use of this study as a planning tool, the ultimate goal is not simply to project the past into the future, but rather to assess various factors' impact on the future. The future population and enrollment growth of each school district is influenced by a variety of factors. Not all factors will influence the entire school district at the same level. Some may affect different areas at dissimilar magnitudes and rates causing changes at varying points of time within the same district. Forecaster's judgment based on a thorough and intimate study of the district has been used to modify the demographic trends and factors to more accurately predict likely changes. Therefore, strictly speaking, this study is a forecast, not a projection; and the amount of modification of the demographic trends varies between different areas of the district as well as within the timeframe of the forecast.

To calculate population forecasts of any type, particularly for smaller populations such as a school district, realistic suppositions must be made as to what the future will bring in terms of age specific fertility rates and residents' demographic behavior at certain points of the life course. The demographic history of the school district and its interplay with the social and economic history of the area is the starting point and basis of most of these suppositions particularly on key factors such as the age structure and the household composition of the district. The unique nature of each district's demographic composition and rate of change over time must be assessed and understood to be factors throughout the life of the forecast series. Moreover, no two populations, particularly at the school district level, have exactly the same demographic, social or economic characteristics.

The manifest purpose of these forecasts is to ascertain the demographic factors that will ultimately influence the enrollment levels in the district's schools. There are of course, other non-demographic factors the affect enrollment levels over time. These factors include, but are not limited to transfer policies within the district; student transfers to and from neighboring districts; placement of "special programs" within the district (as opposed to in neighboring districts); state or federal mandates that dictate the movement of students from one facility to another (No Child Left Behind is an excellent example of this factor); the development of charter schools in the district; any voucher system that is in place, the prevalence of home schooling in the area; and the dynamics of local private schools.

Unless the district specifically requests the calculation of forecasts that reflect the effects of changes in these non-demographic factors, their influences are held constant for the life of the forecasts. Again, the main function of these forecasts is to determine what impact demographic changes will have on future enrollment. It is quite possible to calculate special "scenario" forecasts to measure the impact of school policy modifications as well as planned economic and financial changes. However in this case the results of these population and enrollment forecast are meant to represent the most likely scenario for changes over the next 10 years in the district.

The first part of the report will examine the assumptions made in calculating the population forecasts for the Hamilton-Wenham School District. Since the results of the population forecasts drive the subsequent enrollment forecasts, the assumptions listed in this section are paramount to understanding the area's demographic dynamics. The remainder of the report is an explanation and analysis of the district's population forecasts and how they will shape the district's grade level enrollment forecasts.

DATA

The data used for the forecasts come from a variety of sources. Enrollments by grade and attendance center were provided by the Hamilton-Wenham School District for school years 2008-2009 to 2013-14. Birth and death data were obtained from the Massachusetts Department of Public Health for the years 2000 through 2011. The net migration values were calculated using Internal Revenue Service migration reports for the years 2000 through 2010. The data used for the calculation of migration models came from the United States Bureau of the Census, 2000-2010, and the models were designed using demographic and economic factors. The base age-sex population counts used are from the results of the 2010 Census.

Recently the Census Bureau began releasing

annual estimates of demographic variables at the block group and tract level from the American Community Survey (ACS). There has been wide scale reporting of these results in the national, state and local media. However, due to the methodological problems the Census Bureau is experiencing with their estimates derived from ACS data, particularly in areas with a population of less than 60,000, the results of the ACS are not used in these forecasts. For example, given the sampling framework used by the Census Bureau, each year only 120 of the over 4,000 current households in the district would have been included. For comparison over 700 households in the district were included in the sample for the long form questionnaire in the 2000 Census. As a result of this small sample size, the ACS survey result from the last 5 years must be aggregated to produce the tract and block group estimates.

To develop the population forecast models, past migration patterns, current age specific fertility patterns, the magnitude and dynamics of the gross migration, the age specific mortality trends, the distribution of the population by age and sex, the rate and type of existing housing unit sales, and future housing unit construction are considered to be primary variables. In addition, the change in household size relative to the age structure of the forecast area was addressed. While there was a drop in the average household size in the Hamilton-Wenham School District area as well as most other areas of the state during the previous 20 years, the rate of this decline has been forecasted to slow over the next ten years.

ASSUMPTIONS

For these forecasts, the mortality probabilities are held constant at the levels calculated for the year 2010. While the number of deaths in an area are impacted by and will change given the proportion of the local population over age 65, in the absence of an extraordinary event such as a natural disaster or a breakthrough in the treatment of heart disease, death rates rarely move rapidly in any direction, particularly at the school district level. Thus, significant changes are not foreseen in district's mortality rates between now and the year 2023. Any increases forecasted in the number of deaths will be due primarily to the general aging of the district's population and specifically to the increase in the number of residents aged 65 and older.

Similarly, fertility rates are assumed to stay fairly constant for the life of the forecasts. Like mortality rates, age specific fertility rates rarely change quickly or dramatically, particularly in small areas. Even with the recently reported rise in the fertility rates of the United States, overall fertility rates have stayed within a 10% range for most of the last 40 years. In fact, the vast majority of year to year change in an area's number of births is due to changes in the number of women in child bearing ages (particularly ages 20-29) rather than any fluctuation in an area's fertility rate.

The total fertility rate (TFR), the average number of births a woman will have in her lifetime, is estimated to be 1.76 for the total district for the ten years of the population forecasts. A TFR of 2.1 births per woman is considered to be the theoretical "replacement level" of fertility necessary for a population to remain constant in the absence of in-migration. Therefore, over the course of the forecast period, fertility will not be sufficient, in the absence of sufficient in migration, to maintain the current level of population within the Hamilton-Wenham School District.

A close examination of data for the Hamilton-Wenham School District has shown the age specific pattern of net migration will be nearly constant throughout the life of the forecasts. While the number of in and out migrants has changed in past years for the Hamilton-Wenham School District (and will change again over the next 10 years), the basic age pattern of the migrants has stayed nearly the same over the last 30 years. Based on the analysis of data it is safe to assume this age specific migration trend will remain unchanged into the future. This pattern of migration shows most of the local out-migration occurring in the 18-to-24 year old age group as young adults leave the area to go to college or move to other urban areas. The second group of out-migrants is those householders aged 70 and older who are downsizing their residences. Most of the local in-migration occurs in the 0-to-9 and 30-44 age groups (bulk of which is from areas within 75 miles of Hamilton-Wenham School District) primarily consisting of younger adults and their children.

As the Hamilton-Wenham School District or Essex County are not currently contemplating any major expansions or contractions, the forecasts also assume the current economic, political, transportation and public works infrastructure (with a few notable exceptions), social, and environmental factors of the Hamilton-Wenham School District will remain the same through the year 2023.

Below is a list of assumptions and issues that are specific to the Hamilton-Wenham School District and the rest of the Boston Metropolitan area. These issues have been used to modify the population forecast

models to more accurately predict the impact of these factors on the area's population change and composition. Specifically, the forecasts for the Hamilton-Wenham School District assume that throughout the 10 years of the study period:

a. There will be no significant short term economic recovery in the next 18 months and the national, state or regional economy does not go into deep recession at anytime during the 10 years of the forecasts; (Deep recession is defined as four consecutive quarters where the GDP contracts greater than 1% per quarter)
b. Interest rates have reached an historic low and will not fluctuate more than one percentage point in the short term; the interest rate for a 30 year fixed home mortgage stays below 5.5%;
c. The rate of mortgage approval stays at 1999-2002 levels and lenders do not return to "sub-prime" mortgage practices;
d. There are no additional restrictions placed on home mortgage lenders or additional bankruptcies of major credit providers;
e. The rate of housing foreclosures does not exceed 125% of the 2005-2007 average of Essex County for any year in the forecasts;
f. All currently planned, platted, and approved housing developments are built out and completed by 2022. All housing units constructed are occupied by 2023;
g. The unemployment rates for Essex County will remain below 8.5% for the 10 years of the forecasts;
h. The rate of students transferring into and out of the Hamilton-Wenham School District will remain at the 2008-09 to 2013-14 average;
i. The inflation rate for gasoline will stay below 5% per year for the 10 years of the forecasts;
j. There will be no building moratorium within the district;
k. Businesses within the district and Essex County will remain viable;
l. The number of existing home sales in the district that are a result of "distress sales" (homes worth less than the current mortgage value) will not exceed 20% of total homes sales in the district for any given year;
m. Housing turnover rates (sale of existing homes in the district) will remain at their current levels. The majority of existing home sales are made by home owners over the age of 55;
n. Private school and home school attendance rates will remain constant;
o. The recent decline in new home construction has ended and building rates have stabilized;
p. The rate of foreclosures for commercial property remains at the 2004-2008 average for the Essex County area;

If a major employer in the district or in Essex County closes, reduces or expands its operations, the population forecasts would need to be adjusted to reflect the changes brought about by the change in economic and employment conditions. The same holds true for any type of natural disaster, major change in the local infrastructure (e.g., highway construction, water and sewer expansion, changes in zoning regulations, water usage restrictions, etc.), a further economic downturn, any additional weakness in the housing market or any instance or situation that causes rapid and dramatic population changes that could not be foreseen at the time the forecasts were calculated.

The high proportion of high school graduates from the Hamilton-Wenham School District that attend college or move to urban areas outside of the district for employment is a significant demographic factor. Their departure is a major reason for the high out-migration in the 18-to-24 age group and was taken into account when calculating these forecasts. The out-migration of graduating high school seniors is expected to continue over the period of the forecasts and the rate of out-migration has been forecasted to remain the same over the life of the forecast series.

Finally, all demographic trends (i.e., births, deaths, and migration) are assumed to be linear in nature and annualized over the forecast period. For example, if 1,000 births are forecasted for a 5-year period, an equal number, or proportion of the births are assumed to occur every year, 200 per year. Actual year-to-year variations do and will occur, but overall year to year trends are expected to be constant.

METHODOLOGY

The population forecasts presented in this report are the result of using the Cohort-Component Method of population forecasting (Siegel, and Swanson, 2004: 561-601) (Smith et. al. 2004). As stated in the **INTRODUCTION**, the difference between a projection and a forecast is in the use of explicit judgment based upon the unique features of the area under study. Strictly speaking, a cohort-component projection refers

to the future population that would result if a mathematical extrapolation of historical trends were applied to the components of change (i.e., births, deaths, and migration). Conversely, a cohort-component forecast refers to the future population that is expected because of a studied and purposeful selection of the components of change believed to be critical factors of influence in each specific area.

Five sets of data are required to generate population and enrollment forecasts. These five data sets are:

a. a base-year population (here, the 2010 Census population for the Hamilton-Wenham School District);

b. a set of age-specific fertility rates to be used over the forecast period;

c. a set of age-specific survival (mortality) rates;

d. a set of age-specific migration rates for each; and

e. the historical enrollment figures by grade.

The most significant and difficult aspect of producing enrollment forecasts is the generation of the population forecasts in which the school age population (and enrollment) is embedded. In turn, the most difficult aspect of generating the population forecasts is found in deriving the rates of change in fertility, mortality, and migration. From the standpoint of demographic analysis, the Hamilton-Wenham School District is classified as "small area" populations (as compared to the population of the state of Massachusetts or to that of the United States). Small area population forecasts are more difficult to calculate because local variations in fertility, mortality, and migration may be more irregular than those at the state or national scale. Especially challenging to project are migration rates for local areas, because changes in the area's socioeconomic characteristics can quickly change from past and current patterns (Peters and Larkin, 2002.)

The population forecasts for Hamilton-Wenham School District were calculated using a cohort-component method with the populations divided into male and female groups by five-year age cohorts that range from 0-to-4 years of age to 85 years of age and older (85+). Age- and sex-specific fertility, mortality, and migration models were constructed to specifically reflect the unique demographic characteristics of the Hamilton-Wenham School District.

The enrollment forecasts were calculated using a modified average survivorship method. Average survivor rates (i.e., the proportion of students who progress from one grade level to the next given the average amount of net migration for that grade level) over the previous five years of year-to-year enrollment data were calculated for grades two through eight. This procure is used to identify specific grades where there are large numbers of students changing facilities for non-demographic factors, such as private school transfers or enrollment in special programs.

The survivorship rates were modified or adjusted to reflect the average rate of forecasted in and out migration of 5-to-9 and 10-to-14 year olds cohorts in the Hamilton-Wenham School District for the period 2005 to 2010. These survivorship rates then were adjusted to reflect the forecasted changes in age-specific migration the district should experience over the next five years. These modified survivorship rates were used to project the enrollment of grades two through eight for the period 2010 to 2015. The survivorship rates were adjusted again for the period 2015 to 2020 to reflect the predicted changes in the amount of age-specific migration in the districts for the period.

The forecasted enrollments for kindergarten and first grade are derived from the 5-to-9 year old population of the age-sex population forecast at the elementary attendance center district level. This procedure allows the changes in the incoming grade sizes to be factors of forecasted population change and not an extrapolation of previous class sizes. Given the potentially large amount of variation in Kindergarten enrollment due to parental choice, changes in the state's minimum age requirement, and differing district policies on allowing children to start Kindergarten early, first grade enrollment is deemed to be a more accurate and reliable starting point for the forecasts. (McKibben, 1996) The level of the accuracy for both the population and enrollment forecasts at the school district level is estimated to be ±2.0% for the life of the forecasts.

RESULTS AND ANALYSIS OF THE POPULATION FORECASTS

From 2010 to 2020, the populations of the Hamilton-Wenham School District, Essex County; the state of Massachusetts, and the United States are forecasted to change as follows; the Hamilton-Wenham School District will decrease by -0.2%, Essex County will grow by 4.4% Massachusetts will increase by 3.7%; and the United States grow by 8.4% (see Table 1).

Table 1: Forecasted Population Change, 2010 to 2020

	2010	2015	2020	10-Year Change
U.S. (in millions)	308	322	334	8.4%
Massachusetts	6,483,800	6,603,100	6,695,700	3.3%
Essex County	47,536	48,200	48,900	2.9%
H-W R.S.D.	12,639	12,640	12,610	-0.2%

A number of general demographic factors will influence the growth rate of the Hamilton-Wenham School District during this period, and include the following:

a. The bulk of the in-migrating households from the 1990s and 2000s have moved through the prime childbearing ages and will increasingly become empty nest over the next 10 years;

b. The remaining population in childbearing ages (women ages 15-45) will have fewer children;

c. A large proportion of the locally raised 18-to-24 year old population, in prime childbearing ages, will continue to leave the area to go to college or to other urban areas, with the magnitude of this out-migration flow slowly increasing; and,

d. The district will experience an increase in housing stock, with an average of 10 units being built each year through 2020.

The Hamilton-Wenham School District will continue to experience in-migration (movement of new young families into the district) over the next 10 years. However, the size and age structure of the pool of potential in-migrants will change and the effects of the in-migration of families on population growth will be greatly offset by the continued steady growing out-migration of young adults as graduating seniors continue to leave the district.

From 2010 to 2015, the district's population is forecasted to increase by 1 or 0.0%, to 12,640. From 2015 to 2020, the population is forecasted to decrease by 30 persons or -0.2%. While all parts of the district will see some amount of gross in-migration, (primarily in the 0-to-9 and 30-to-44 age groups,) all areas also will continue to see gross out-migration. This out-migration primarily will be young adults, 18-to-24 years old, as graduating seniors continue to leave the district to go to college or seek employment in larger urban areas. Consequently, the district will experience a modest reduction in their average household size.

Table 2: Hamilton-Wenham School District Population: 2015 & 2020 Forecast

	2010	2015	2010-2015 Change	2020	2015-2020 Change	2010-2020 Change
District Total	**12,639**	**12,640**	*0.0%*	**12,610**	*-0.2%*	***-0.2%***

As stated in the **ASSUMPTIONS** and emphasized above, the impact of the high proportion of high school graduates that leave the district to continue on to college or to seek employment in large urban areas is significant to the size and structure of the future population of the district. Up to 70% of all births occur to women between the ages of 20 and 29. As the graduating seniors continue leave the district, the number of women at risk of childbirth during the next decade declines. Consequently, even though the district's fertility rate is just slightly below the replacement level, the small number of women in the district in prime child bearing ages will keep the number of births declining at a modest rate despite the district having a growing population (see the population pyramid in the appendix of this report for a graphic representation of the age/sex distribution of the district). This will require the district to become dependent on the in-migration of children just to maintain current grade cohort sizes.

As a general rule of thumb, for every two graduating high school seniors that leave the district, one new household must move into the district to replace the young adults that have left and to replace their lost potential fertility. Over the course of the forecast period, the average number of graduating seniors will be approximately 160 per year and at least 75% of them will move out of the district within three years of graduation. Using the general rule, approximately 60 new families will be required to move into the district every year or 600 new families for the ten-year study period to replace the graduating seniors and their lost fertility. It is forecasted that the impact of the steadily increasing out-migration of young adults will continue to be mostly offset by younger families (30-39 year old householders) in-migration and that the total number of births will decline only slightly throughout the forecast period.

Another factor that needs to be considered is the birth dynamics of the last twenty years. An examination of national birth trends shows there was a large "Baby Boomlet" born between 1980 and 2000. This Boomlet

was nearly as large as the Baby Boom of the 1950s and 1960s. However, unlike the Baby Boom, the Boomlet was a regional and not a national phenomenon (McKibben, et. al. 1999). Because Massachusetts did not experience a Baby Boomlet, most of the expected enrollment growth will have to result from in-migration and not from an increase in the grade cohort size.

Table 3: Hamilton-Wenham Regional School District Household Characteristics, 2010 Census

	HH w/ Pop Under 18	% HH w/ Pop Under 18	Total Households	Household Population	Persons Per Household
Hamilton	1125	41.8%	2692	7616	2.83
Wenham	508	37.4%	1358	3622	2.67
District Total	**1633**	**40.3%**	**4050**	**11238**	**2.77**

Clearly, the dominant factor that has affected the population growth rates of the Hamilton-Wenham School District over the last 20 years has been the number, pace and cost of existing home sales and some new homes construction. However, the dynamics of this in migration flow are more complex than many realize. There is a common misconception that any changes in the economy, housing market or transportation system will an immediate impact of the size of an area's population and the total impact of that change will be experiences immediately.

This "delayed demographic reaction" is a key issue when attempting to ascertain the impact and duration of a trend. While it is true that the households moving into these new housing units bring many school age (particularly elementary) children into the district, they also bring many preschool age children as well. Consequently, the full impact of the growth in new home construction is not seen immediately in elementary enrollment as it takes three to seven years for all of the children to age into the schools. This is the manifest issue in regards to future population and enrollment trends since the number of births in the Hamilton-Wenham School District is insufficient to maintain current enrollment levels. The number of women living in the district that are ages 20-29 (prime child bearing ages) is too small to produce birth cohorts that are the same size as those currently in the elementary grades.

Of additional concern are the issues of the district's aging population and the growing number of "empty nest" households. For example, after the last school age child leaves middle school, (for the household's impact on the Hamilton-Wenham School District) the household becomes an "empty nest" and most likely will not send any more children to the school system. In most cases, it takes 20 to 30 years before all original (or first time) occupants of a housing area move out and are replaced by new, young families with children. This principle also applies to children leaving elementary school and moving on the middle school. Households can still have school age children in the district's school, but also in effect be "empty nest" of elementary age children.

Table 4: Hamilton-Wenham Regional School Dist. Household Characteristics, 2010 Census

	Percentage of Householders aged 35-54	Percentage of Householders aged 65+	Percentage of Householders Who Own Homes
Hamilton	45.7%	21.8%	81.5%
Wenham	42.1%	32.5%	84.8%
District Total	**44.5%**	**25.4%**	**82.6%**

As a result of the "empty nest" syndrome, the Hamilton-Wenham School District will see a steady rise in the median age of their populations, even while the district as a whole continues to attract new young families. It should be noted that many of these "childless" households are single persons and/or elderly (See Table 5). Consequently, even if many of these housing units "turnover" and attract households of similar characteristics, they will add little to the number of school age children in the district. Furthermore, many of the empty nest households will "down size" to smaller households within the district. In these cases new housing units (elder housing) may be built in an area, yet there is no corresponding increase in school enrollment.

There are several additional factors that are responsible for the difference between growth in population and growth in housing stock. Included among these factors are: people building new "move up" homes in the same area or district, (an important point since the children in move up homes tend to be of middle or high school age); children moving out of their parents homes and establishing residence in the same area; the increase in single-individual households; and divorce, with both parents remaining in the same area.

Table 5: Hamilton-Wenham Regional School District - Single Person Households and Single Person Households over age 65, 2010 Census

	Percentage of Single Person Households	Percentage of Households single person and 65+
Hamilton	15.7%	7.3%
Wenham	23.2%	14.2%
District Total	**18.2%**	**9.6%**

RESULTS AND ANALYSIS OF ENROLLMENT FORECASTS

Elementary Enrollment

The total elementary enrollment (Grades PK through 5th) of the district is forecasted to decrease from 799 in 2013-14 to 787 in 2018-19, a drop of 12 students or -1.5%. From 2018-19 to 2023-24, elementary enrollment is expected to drop by 34 students to 753. This will represent a -4.3% decrease over the five-year period (see Table 6).

Table 6: Total Elementary Enrollment, 2013, 2018, 2023

	2013	2018	*2013-2018 Change*	2023	*2018-2023 Change*	*2013-2023 Change*
Hamilton-Wenham	**799**	**787**	*-1.5%*	**753**	*-4.3%*	*-5.8%*

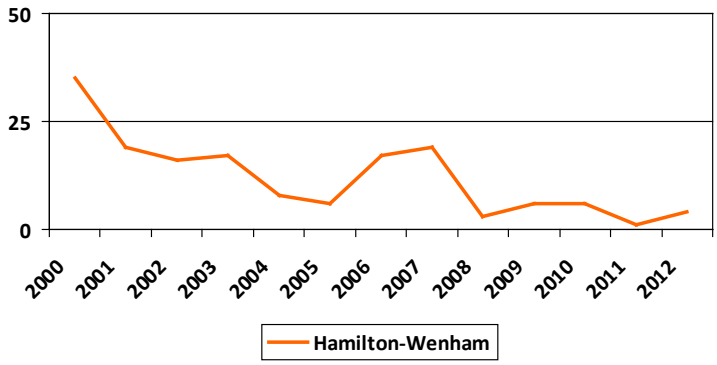
The reason for this overall decline in elementary enrollment over the next 10 years is the convergence of the effects of three factors, all having their full impact roughly by 2016. These factors are the reversal of cohort sizes in the elementary grades, the number of existing housing units turning over along with the low number of new homes constructed, and the existence of a "dearth" of population in the late pre-school ages. Each of these factors will contribute in part to the decline in elementary enrollment through 2016.

One of the reasons elementary enrollment will be decreasing over the next decade is due to the fact that the number of children entering Kindergarten and 1st grade is smaller than the number leaving elementary school after completing 5th grade. From 2012 to 2015, the number of students in 5th grade will average 137 each year while the entering Kindergarten and 1st grade cohort will average 121 students.

The second factor is the slowdown in the home sales/housing construction industry. While it is true that the Essex County housing market has performed somewhat better than the national trends the last three years, it is not immune the effects of a tightening of the mortgage market and in increasingly restrictive lending practices. The Hamilton-Wenham School District area, like most areas of the county, saw the number of primarily existing home sales increase in 2000 to 2008 as the expansion of sub-prime mortgage practices allowed many people to purchase new homes. Given the turmoil the collapse of the sub prime market has caused, it can be assumed that there will not be a return to these lending practices anytime in the near future.

Consequently, the Hamilton-Wenham School District (like most suburban/exurban areas in the country) have seem the number of new and existing homes sales drop back to the levels experienced before the sub prime boom. Further, these forecasts assume that there will not be a significant increase in the number of foreclosed housing units being put on the market in the immediate future. Yet despite this decline in home sales, the housing market in Hamilton-Wenham appears to have stabilized. There is a significant flow of young families into the district that are bringing elementary age and/or preschool age children to the district. On the short term, this in migration flow will be sufficiently large enough to provide some growth in the elementary grades.

Chart 1: Residential Permitted Units, Hamilton-Wenham - 2000 to 2012



The third factor is the size of the individual age cohorts that are in the preschool ages and their size relative to the exiting elementary grade cohorts. A clear comprehension of the size of these incoming cohorts is imperative to understanding the base size of the prospective elementary cohort over the next five years. This allows for the forecasts to add or subtract students

(via migration) to an accurate student base. If there are year to year changes in the size of the incoming Kindergarten cohort, they can be reflected in the forecast results.

The best example of this is the single year of age counts for the district from the 2010 Census (See Table 7). The population at age six is closely related to the combined 1th grade enrollment of the public and private students in the district (as it is for all elementary grades). However, note the slight decrease in the number of residents from age three to five. This trend is shows that for the last three years the district should have experienced a slight decrease in elementary enrollment even if in migration was at or near zero. Any net in or out migration of students would be seen elementary enrollment by grade that is in excess/reduction to these numbers. These numbers show that the district has a three year "dearth" in these grade cohorts that will be working in way through the elementary grades (and subsequently through the higher grades) over the next several years.

Table 7: Age <1 to Age Ten Population Counts, by Year of Age: 2010 Census

	Under 1 year	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years
Hamilton town	109	88	90	101	104	98	134	110	117	119	114
Wenham town	18	23	39	28	34	45	53	62	54	51	72
Total District	127	111	129	129	138	143	187	172	171	170	186

The demographic factors that will become the most influential in the district over the next ten years are the growth rate of empty nest household in the district, the number of sales of existing homes, the rate and magnitude of existing housing unit "turn over," the relative size of the elementary and pre-school age cohorts and the district's fertility rate. Each of these factors will vary in the scale of their influence and timing of impact on the enrollment trends of any particular elementary area.

As the district continues to be mostly dependent upon existing home sales to attract new families, the overall elementary enrollment trend of the district will be stable or show a slight decline. Thus, the best primary short- and long-term indicator for enrollment change in most of the district will be the year-to-year rate of existing housing turnover. If the Total Fertility Rates remain at their current low levels (and they are forecasted to do so) they will insure that enrollments will continue to see slowing growth (or outright declines) even if the level of net out-migration is greatly reduced.

Middle School Enrollment

The total middle school enrollment (Grades 6 through 8) for the district is forecasted to decline from 441 in 2013-14 to 387 in 2018-19, a 54 student or -12.2% decreases. Between 2018-19 and 2023-24 middle school enrollment is forecasted to grow to 419, an increase of 32 students or 8.3 %. The difference in the size of the individual grade cohorts and the aging of students through the school system are the primary reasons why the middle school enrollment trends deviate from those of the elementary grades.

There are currently smaller grade cohorts enrolled in the elementary school grades compared to those in the middle schools' grade cohorts. As these elementary school cohorts "age" into middle school and smaller middle school cohorts age into high school, they decrease the overall middle school enrollment level. Note how the size of the incoming 6th grade class is usually smaller than the previous year's 8th grade class, which has now moved on the high school. As long as this "deficit" in the enrollment pattern exists, there will be to some degree, a decrease in middle school enrollment at least until the 2019-2020 school years.

After the 2019-2020 school years, this cohort trend reverses. There will then be the grade cohorts entering the middle school grades will be larger compared to those leaving. The result is a slight increase of middle school enrollment until 2023. This trend will most likely continue beyond the end of the forecasts series ending sometime after 2025.

High School Enrollment

Enrollment at the high school level is forecasted to decline from 678 in 2013-14 to 651 in 2018-19, a decrease of 27 students or -4.0%. After 2018-19, the high school enrollment decline will accelerate. The net result for the five-year period 2018-19 to 2023-24 will be a decrease of 68 students to 583 or -10.4%.

The aforementioned effects of changes in cohort size on middle school enrollment are also affecting the growth patterns of the high school population. Until 2023, the smaller grade cohorts that will affect the middle school enrollment will enter high school. Until the current smaller grade cohorts of students (now in the elementary grades and middle school) passes through the high school grades, there will be continued decline at the district's high school. The main difference is that the decline in the high school enrollment will continue until at least 2023.

It is important to note that the vast majority of

this future high school enrollment change will be a result of students aging into those grades. Specifically, students who already live in the district (and not in-migration of students ages 14 to 18) will be the primary cause of the forecasted change in high school enrollment. Additionally, as was mentioned earlier, these forecasts represent the demographic changes that will affect high school enrollment. Any changes in the district's student transfer policy and/or changes in special high school level programs will need to be added or subtracted from the forecast result

High school enrollment is the most difficult of all the grade levels to project. The reason for this is the varying and constantly changing dropout rates, particularly in grades 10 and 11. For these forecasts the dropout rates at the high school were calculated for each grade over the last five years. These five-year averages were then held constant for the life of the forecast. The effects of any policy changes dealing with any school's dropout rates, program placement or reassignment of former students to new grade levels will need to be added or subtracted from the forecast results.

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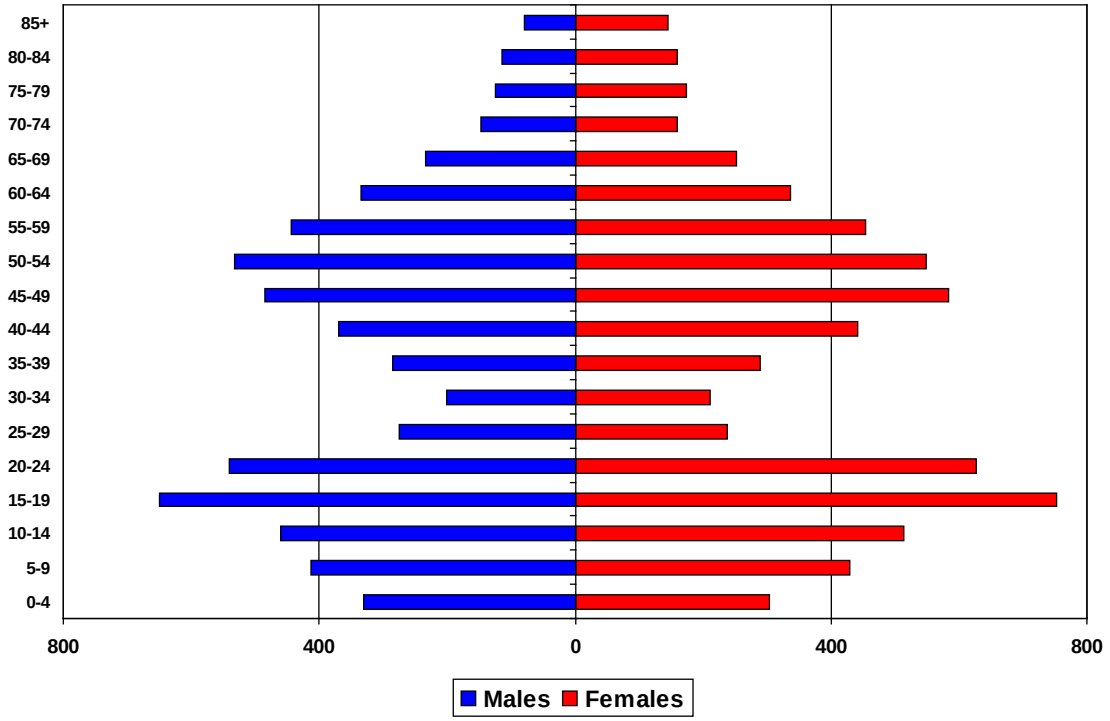
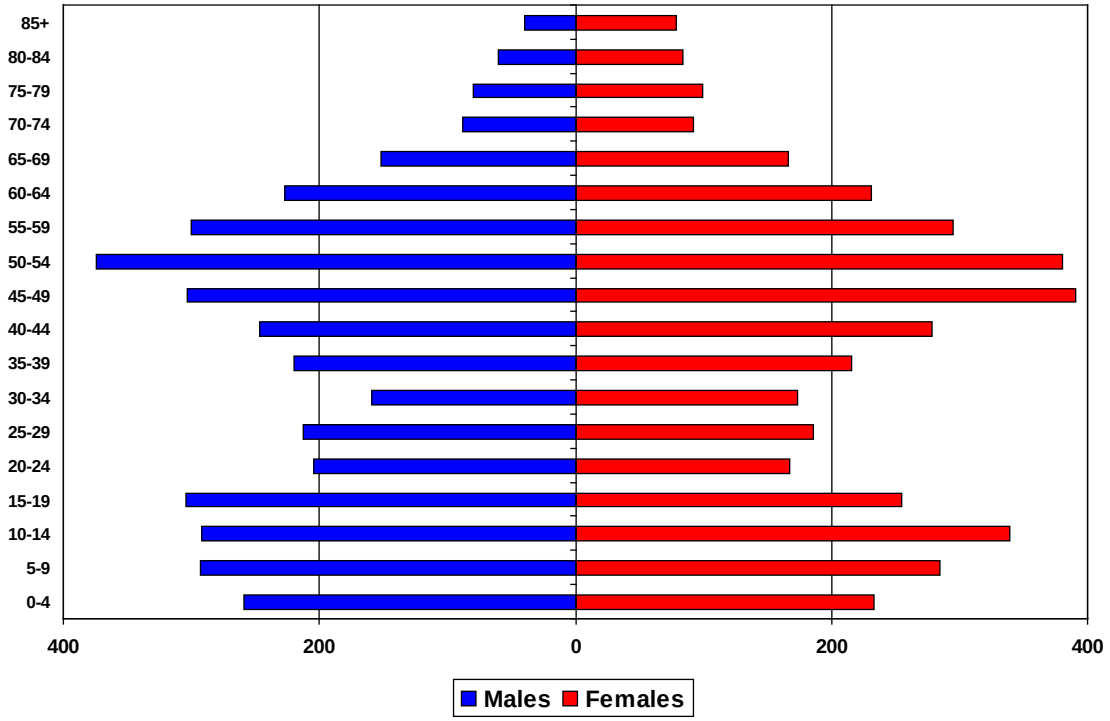
Appendix A: Population Pyramids (Age/Sex)

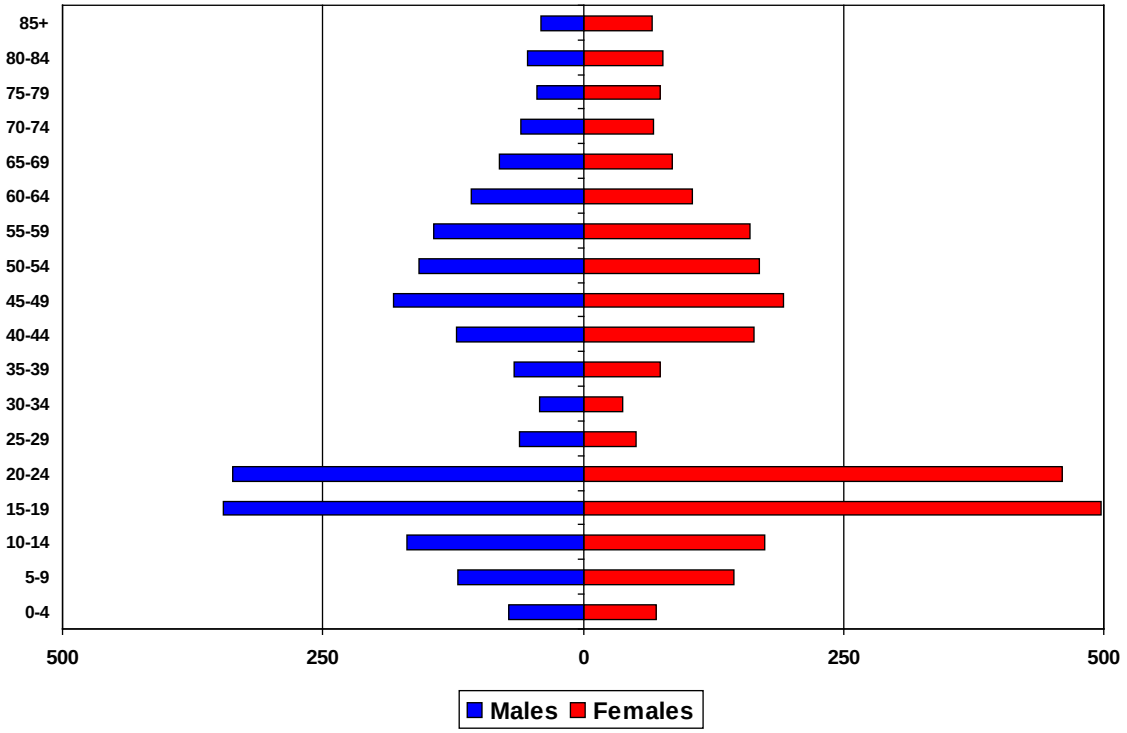
Hamilton Wenham District Total 2010 Census



Hamilton Town 2010 Census



Wenham Town 2010 Census



Appendix B: Enrollment Forecast Tables

Hamilton-Wenham Regional School District: Total District Enrollment

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
PK	20	11	20	29	25	25	25	25	25	25	25	25	25	25	25
K	130	133	101	120	120	118	125	122	121	119	118	115	112	109	112
1	138	127	132	106	121	119	120	128	125	124	121	120	117	114	111
2	135	137	129	140	119	126	125	126	134	131	132	129	128	124	120
3	151	144	142	136	134	120	127	126	127	135	132	133	130	129	125
4	135	155	149	142	137	137	123	127	128	129	138	135	135	132	131
5	148	137	148	145	143	135	134	119	123	124	127	135	132	132	129
Total: PK-5	857	844	821	818	799	780	779	773	783	787	793	792	779	765	753
Change		-13	-23	-3	-19	-19	-1	-6	10	4	6	-1	-13	-14	-12
%-Change		-1.5%	-2.7%	-0.4%	-2.3%	-2.4%	-0.1%	-0.8%	1.3%	0.5%	0.8%	-0.1%	-1.6%	-1.8%	-1.6%
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**
6	142	151	138	156	142	146	138	137	122	127	128	132	140	138	138
7	154	144	150	141	154	143	147	139	138	123	128	129	134	142	140
8	173	152	142	149	145	153	142	146	138	137	122	127	128	133	141
Total: 6-8	469	447	430	446	441	442	427	422	398	387	378	388	402	413	419
Change		-22	-17	16	-5	1	-15	-5	-24	-11	-9	10	14	11	6
%-Change		-4.7%	-3.8%	3.7%	-1.1%	0.2%	-3.4%	-1.2%	-5.7%	-2.8%	-2.3%	2.6%	3.6%	2.7%	1.5%
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**
9	166	173	175	169	165	165	175	163	168	159	158	141	148	149	155
10	187	166	181	175	163	163	163	173	161	166	157	156	140	147	148
11	173	178	171	184	170	161	161	161	170	159	164	155	154	138	145
12	175	166	177	166	180	167	158	158	158	167	156	161	152	151	135
Total: 9-12	701	683	704	694	678	656	657	655	657	651	635	613	594	585	583
Change		-18	21	-10	-16	-22	1	-2	2	-6	-16	-22	-19	-9	-2
%-Change		-2.6%	3.1%	-1.4%	-2.3%	-3.2%	0.2%	-0.3%	0.3%	-0.9%	-2.5%	-3.5%	-3.1%	-1.5%	-0.3%
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**	**2023-24**
Total: PK-12	2027	1974	1955	1958	1918	1878	1863	1850	1838	1825	1806	1793	1775	1763	1755
Change		-53	-19	3	-40	-40	-15	-13	-12	-13	-19	-13	-18	-12	-8
%-Change		-2.6%	-1.0%	0.2%	-2.0%	-2.1%	-0.8%	-0.7%	-0.6%	-0.7%	-1.0%	-0.7%	-1.0%	-0.7%	-0.5%

Buker Elementary

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
K	43	39	35	39	36	33	37	36	36	36	36	35	34	33	34
1	41	46	40	35	39	35	34	39	38	38	37	37	36	35	34
2	44	42	46	44	40	41	37	36	41	40	41	40	40	39	37
3	51	48	39	47	41	39	40	36	35	40	39	40	39	39	38
4	38	51	51	36	46	40	38	38	35	34	39	38	39	38	38
5	41	40	46	49	37	44	38	36	36	33	33	37	36	37	36
Total K-5	258	266	257	250	239	232	224	221	221	221	225	227	224	221	217
Change		8	-9	-7	-11	-7	-8	-3	0	0	4	2	-3	-3	-4
% Change		3.1%	-3.4%	-2.7%	-4.4%	-2.9%	-3.4%	-1.3%	0.0%	0.0%	1.8%	0.9%	-1.3%	-1.3%	-1.8%

Cutler Elementary

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
K	45	41	31	42	50	48	51	50	50	49	48	47	46	45	46
1	57	41	40	33	45	52	50	53	52	52	51	50	49	48	47
2	46	52	39	44	37	46	54	52	55	54	55	54	53	51	50
3	50	48	57	43	43	38	47	55	53	56	55	56	55	54	52
4	56	52	49	60	46	45	40	48	57	55	58	57	58	57	56
5	46	57	48	49	60	46	45	39	47	56	54	57	56	57	56
Total K-5	300	291	264	271	281	275	287	297	314	322	321	321	317	312	307
Change		-9	-27	7	10	-6	12	10	17	8	-1	0	-4	-5	-5
% Change		-3.0%	-9.3%	2.7%	3.7%	-2.1%	4.4%	3.5%	5.7%	2.5%	-0.3%	0.0%	-1.2%	-1.6%	-1.6%

Winthrop Elementary

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
PK	20	11	20	29	25	25	25	25	25	25	25	25	25	25	25
K	42	53	35	39	34	37	37	36	35	34	34	33	32	31	32
1	40	40	52	38	37	32	36	36	35	34	33	33	32	31	30
2	45	43	44	52	42	39	34	38	38	37	36	35	35	34	33
3	50	48	46	46	50	43	40	35	39	39	38	37	36	36	35
4	41	52	49	46	45	52	45	41	36	40	41	40	38	37	37
5	61	40	54	47	46	45	51	44	40	35	40	41	40	38	37
Total PK-5	279	276	280	268	254	248	243	230	223	219	222	219	213	207	204
Change		-3	4	-12	-14	-6	-5	-13	-7	-4	3	-3	-6	-6	-3
% Change		-1.1%	1.4%	-4.3%	-5.2%	-2.4%	-2.0%	-5.3%	-3.0%	-1.8%	1.4%	-1.4%	-2.7%	-2.8%	-1.4%

Miles River Middle School

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
6	142	151	138	156	142	146	138	137	122	127	128	132	140	138	138
7	154	144	150	141	154	143	147	139	138	123	128	129	134	142	140
8	173	152	142	149	145	153	142	146	138	137	122	127	128	133	141
Total: 6-8	469	447	430	446	441	442	427	422	398	387	378	388	402	413	419
Change		-22	-17	16	-5	1	-15	-5	-24	-11	-9	10	14	11	6
% Change		-4.7%	-3.8%	3.7%	-1.1%	0.2%	-3.4%	-1.2%	-5.7%	-2.8%	-2.3%	2.6%	3.6%	2.7%	1.5%

Hamilton-Wenham Regional High School

	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
9	166	173	175	169	165	165	175	163	168	159	158	141	148	149	155
10	187	166	181	175	163	163	163	173	161	166	157	156	140	147	148
11	173	178	171	184	170	161	161	161	170	159	164	155	154	138	145
12	175	166	177	166	180	167	158	158	158	167	156	161	152	151	135
Total: 9-12	701	683	704	694	678	656	657	655	657	651	635	613	594	585	583
Change		-18	21	-10	-16	-22	1	-2	2	-6	-16	-22	-19	-9	-2
% Change		-2.6%	3.1%	-1.4%	-2.3%	-3.2%	0.2%	-0.3%	0.3%	-0.9%	-2.5%	-3.5%	-3.1%	-1.5%	-0.3%

Appendix C: Population Forecast Tables

Hamilton-Wenham Regional School District - Population Forecasts

Males	2010	2015	2020
0-4	331	330	300
5-9	413	400	400
10-14	461	420	410
15-19	649	680	630
20-24	541	560	590
25-29	274	290	300
30-34	201	290	310
35-39	286	310	400
40-44	369	350	370
45-49	485	410	390
50-54	532	470	400
55-59	444	510	450
60-64	335	370	450
65-69	233	250	310
70-74	148	110	120
75-79	125	90	60
80-84	114	120	80
85+	80	90	90
Total	6,021	6,050	6,060

Females	2010	2015	2020
0-4	303	330	300
5-9	430	370	390
10-14	513	440	380
15-19	752	750	670
20-24	627	640	650
25-29	237	270	280
30-34	211	260	290
35-39	290	320	360
40-44	442	350	380
45-49	584	480	390
50-54	549	580	470
55-59	455	540	560
60-64	336	390	490
65-69	252	270	350
70-74	159	200	220
75-79	173	100	130
80-84	160	140	80
85+	145	160	160
Total	6,618	6,590	6,550

Total	2010	2015	2020
0-4	634	660	600
5-9	843	770	790
10-14	974	860	790
15-19	1,401	1,430	1,300
20-24	1,168	1,200	1,240
25-29	511	560	580
30-34	412	550	600
35-39	576	630	760
40-44	811	700	750
45-49	1,069	890	780
50-54	1,081	1,050	870
55-59	899	1,050	1,010
60-64	671	760	940
65-69	485	520	660
70-74	307	310	340
75-79	298	190	190
80-84	274	260	160
85+	225	250	250
Total	12,639	12,640	12,610
Median Age	38.3	37.3	37.7

	2010 to 2015	2015 to 2020
Births	490	480
Deaths	710	710
Natural Increase	-220	-230
Net Migration	220	210
Change	1	-30

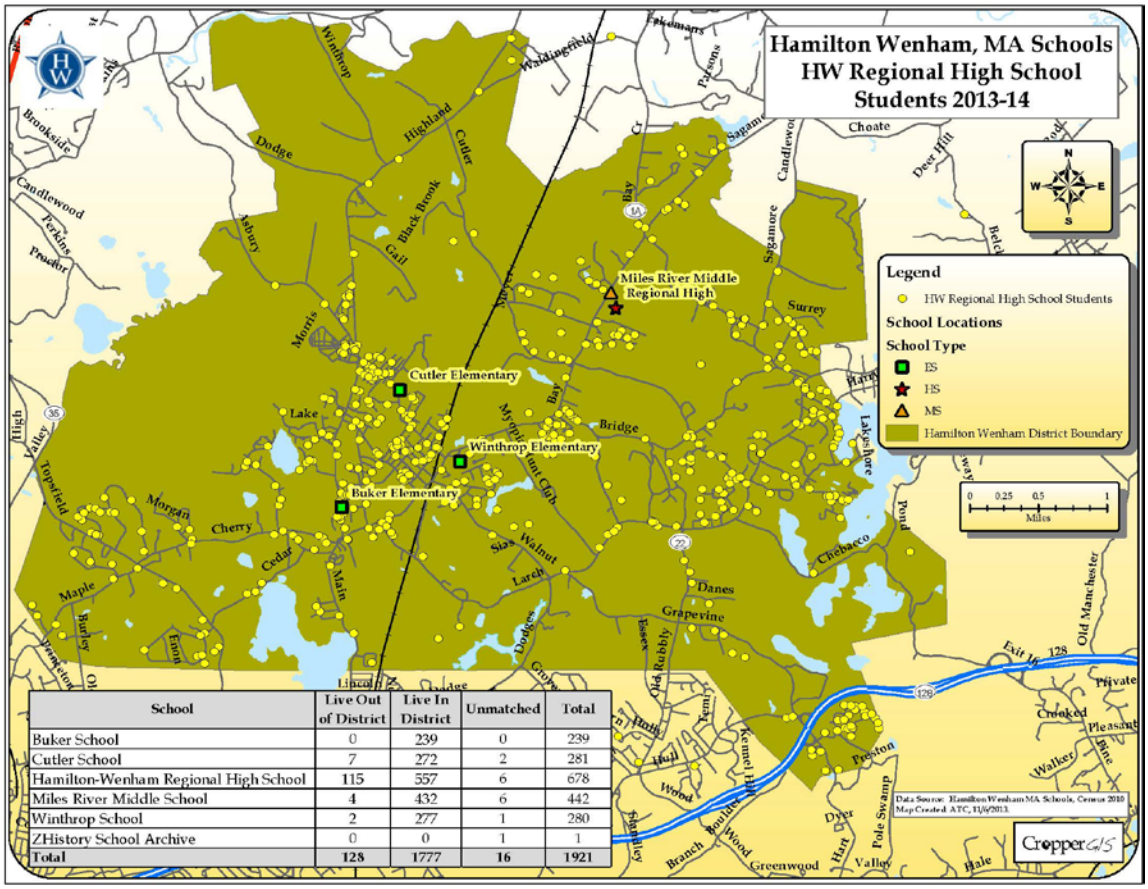
Differences between period Totals may not equal Change due to rounding.

Appendix D: Live Attend Report

LIVE ATTEND ANALYSIS

This map series focuses on illustrating the geographic distribution of Hamilton Wenham students in relation to the district boundary.

Here is an example of a map from this series.



School	Live Out of District	Live In District	Unmatched	Total
Buker School	0	239	0	239
Cutler School	7	272	2	281
Hamilton-Wenham Regional High School	115	557	6	678
Miles River Middle School	4	432	6	442
Winthrop School	2	277	1	280
ZHistory School Archive	0	0	1	1
Total	128	1777	16	1921

Basic Map Elements

The legend explains how different features are represented, either by a point (e.g. schools and students), or by an area/polygon (e.g. attendance boundaries). The scale bar references the distance ratio of the map in relation to the real world. So the length between 0 and 1 on the map image is equal to a real world distance of one mile.

Please note that each yellow dot represents a student's address, at which, multiple students could reside. Therefore, counting the number of dots shown on the map might not reflect the student population accurately.

Live-Attend Tables

Each map has a table listing various statistics about the student data in the district. Here is a guide for reading this table:

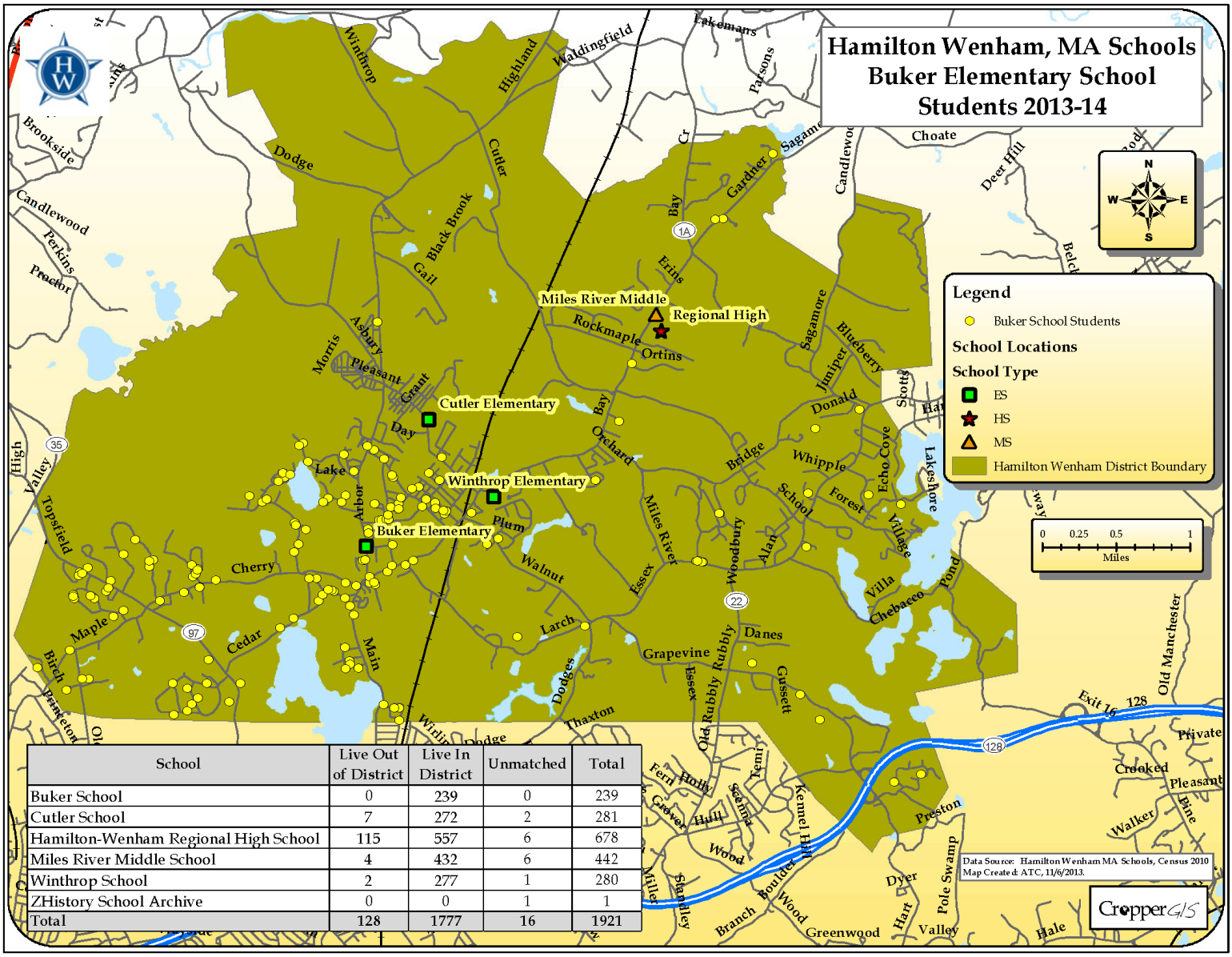
School	Live Out of District	Live In District	Unmatched	Total
Buker School	0	239	0	239
Cutler School	7	272	2	281
Hamilton-Wenham Regional High School	115	557	6	678
Miles River Middle School	4	432	6	442
Winthrop School	2	277	1	280
ZHistory School Archive	0	0	1	1
Total	**128**	**1777**	**16**	**1921**

Live Out of District – number of students who live outside of the Hamilton Wenham district yet attend that school

Live In District – number of students who live within the district boundary

Total – number of students attending each school

Unmatched - number of students whose addresses were not able to be located, and have not been placed on the map.



School	Live Out of District	Live In District	Unmatched	Total
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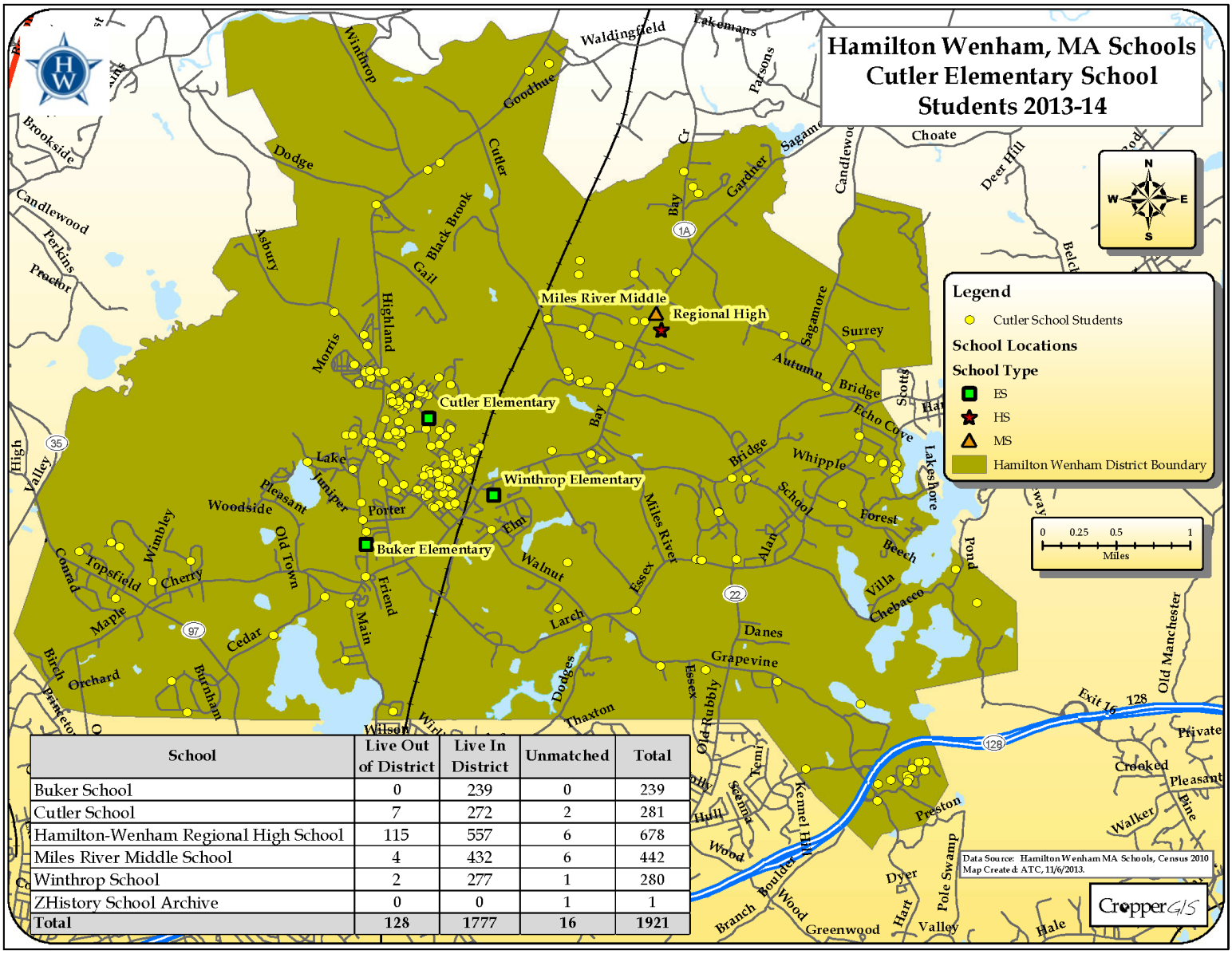
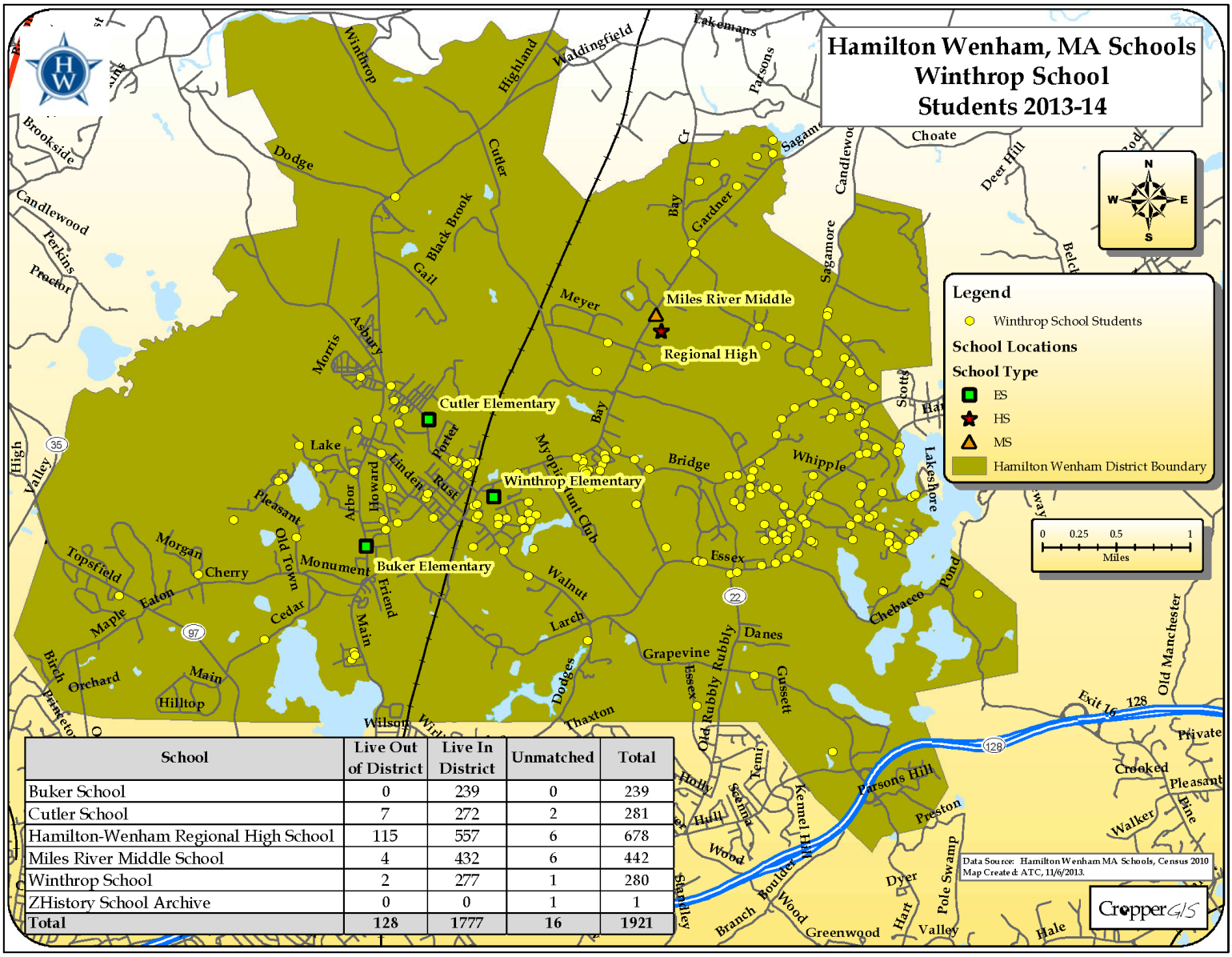
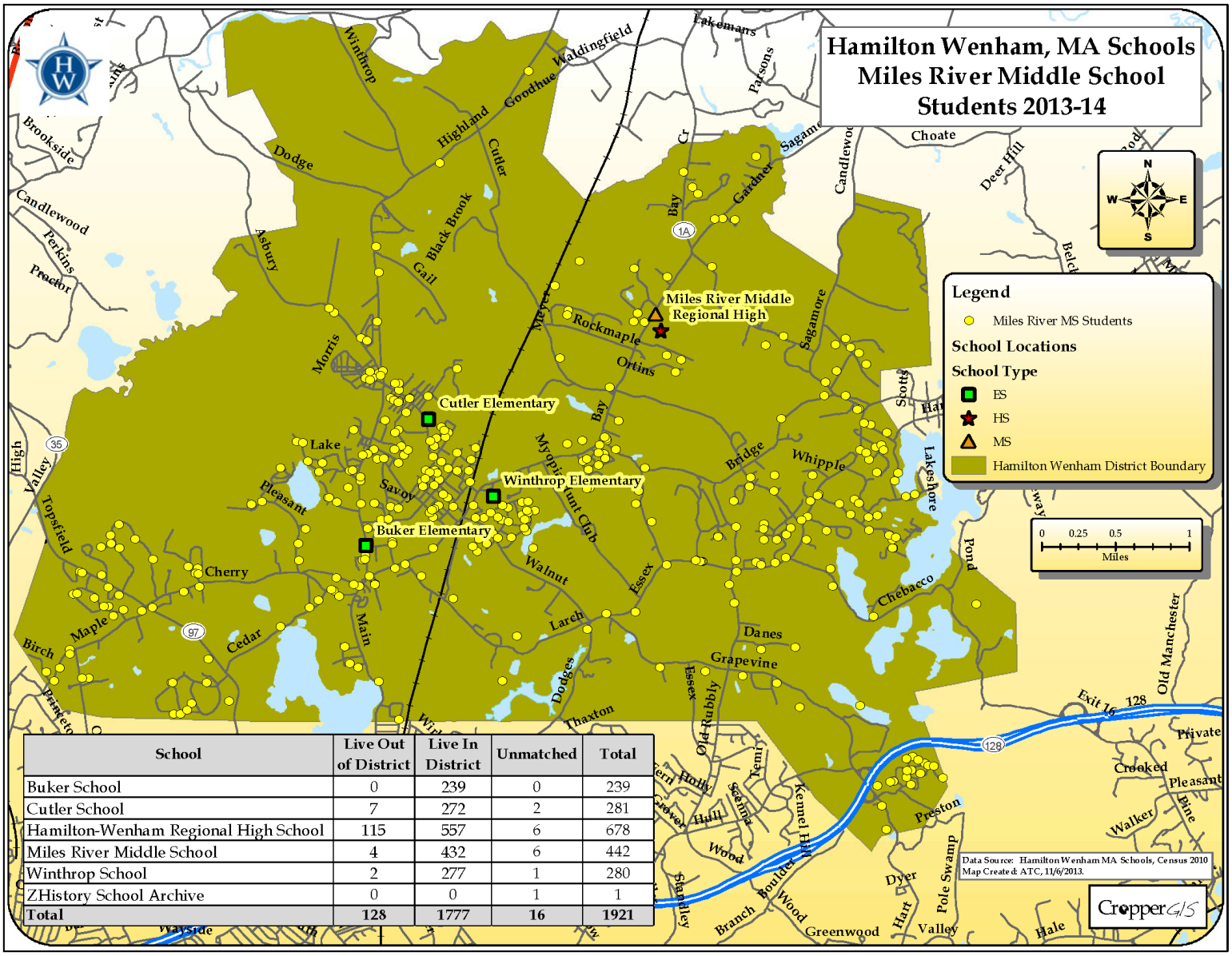
Cutler School	7	272	2	281
Hamilton-Wenham Regional High School	115	557	6	678
Miles River Middle School	4	432	6	442
Winthrop School	2	277	1	280
ZHistory School Archive	0	0	1	1
Total	128	1777	16	1921



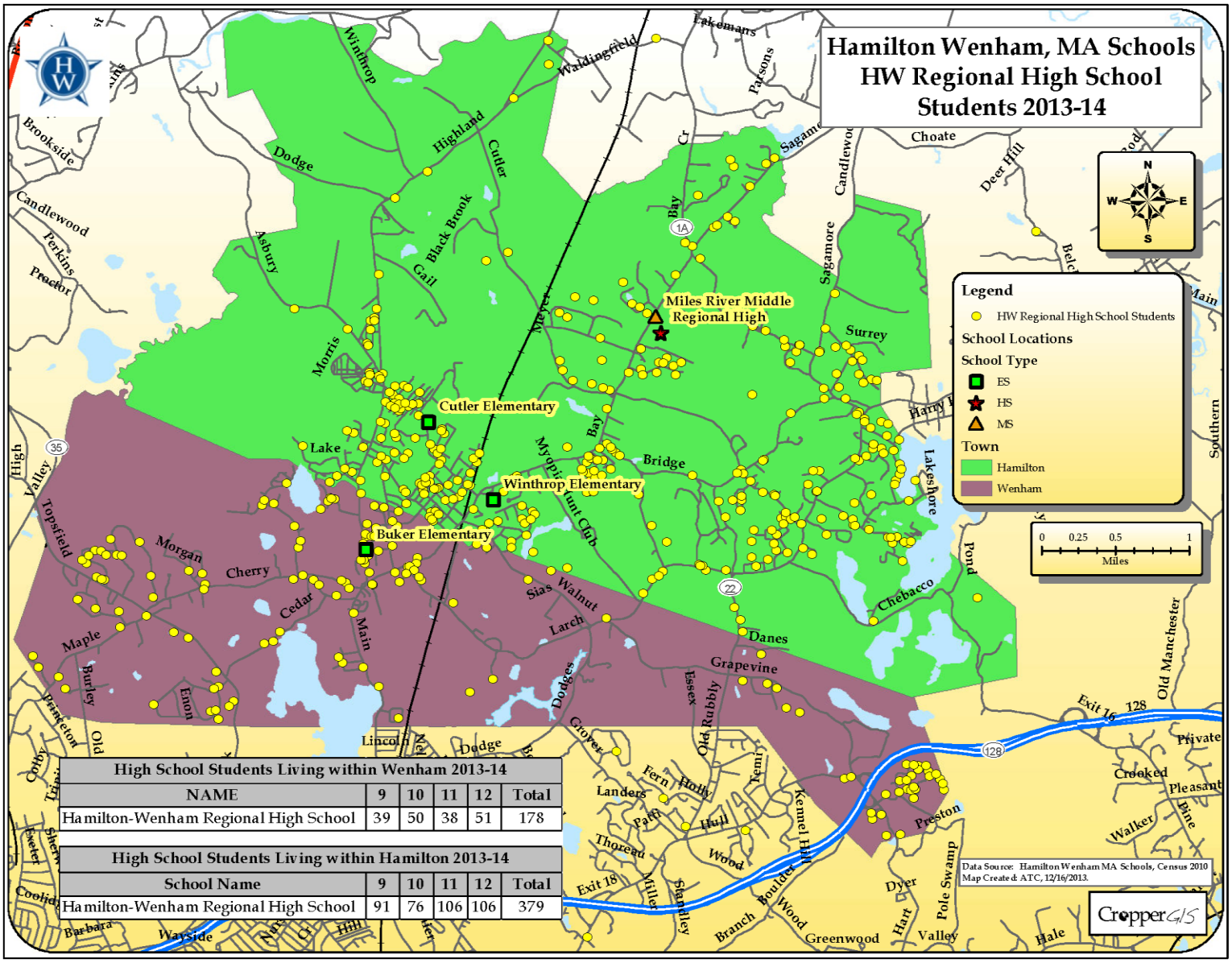
School	Live Out of District	Live In District	Unmatched	Total
Buker School	0	239	0	239
Cutler School	7	272	2	281
Hamilton-Wenham Regional High School	115	557	6	678
Miles River Middle School	4	432	6	442
Winthrop School	2	277	1	280
ZHistory School Archive	0	0	1	1
Total	**128**	**1777**	**16**	**1921**



School	Live Out of District	Live In District	Unmatched	Total
Buker School	0	239	0	239
Cutler School	7	272	2	281
Hamilton-Wenham Regional High School	115	557	6	678
Miles River Middle School	4	432	6	442
Winthrop School	2	277	1	280
ZHistory School Archive	0	0	1	1
Total	**128**	**1777**	**16**	**1921**

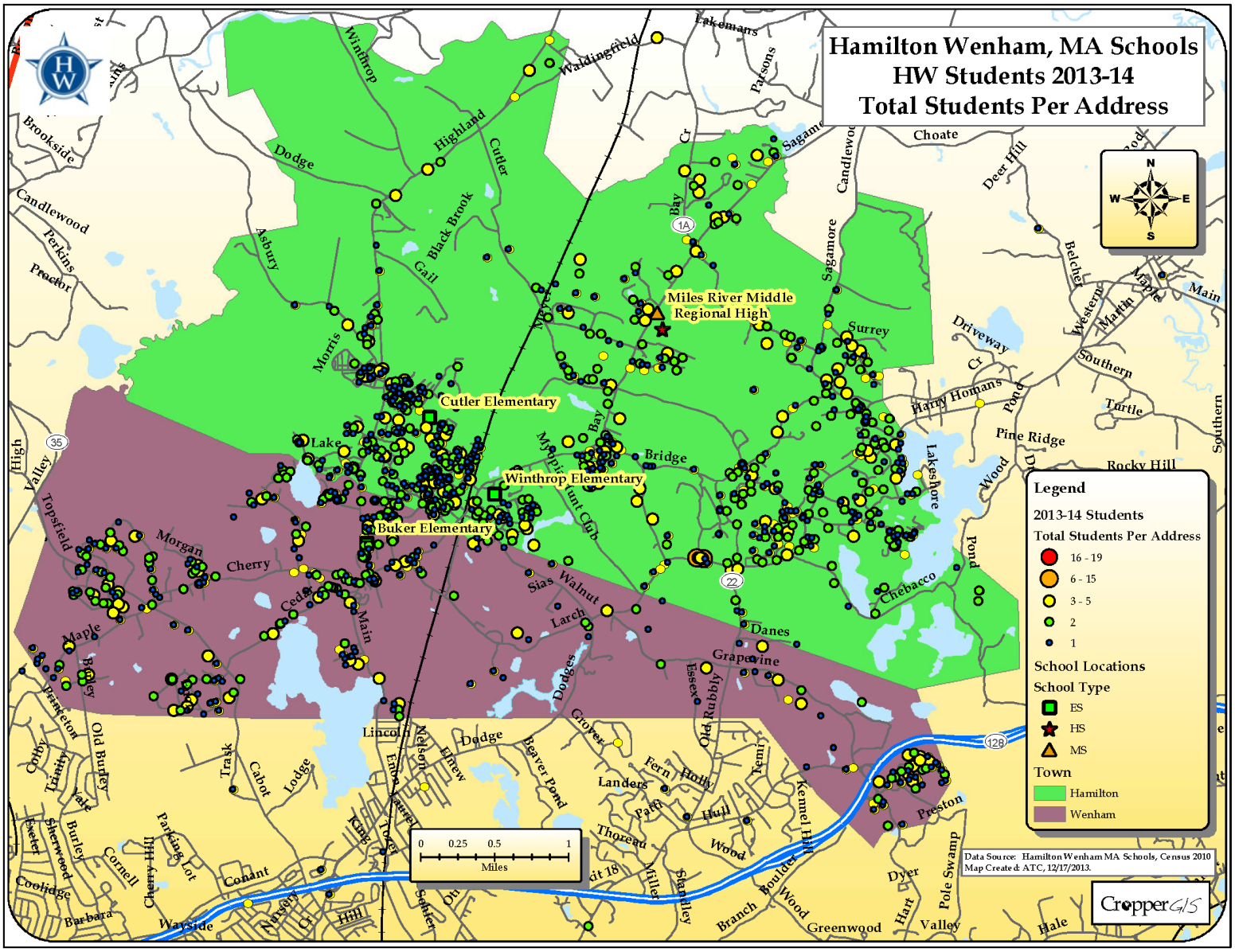


School	Live Out of District	Live In District	Unmatched	Total
Buker School	0	239	0	239
Cutler School	7	272	2	281
Hamilton-Wenham Regional High School	115	557	6	678
Miles River Middle School	4	432	6	442
Winthrop School	2	277	1	280
ZHistory School Archive	0	0	1	1
Total	**128**	**1777**	**16**	**1921**



High School Students Living within Wenham 2013-14					
NAME	9	10	11	12	Total
Hamilton-Wenham Regional High School	39	50	38	51	178

High School Students Living within Hamilton 2013-14					
School Name	9	10	11	12	Total
Hamilton-Wenham Regional High School	91	76	106	106	379


Hamilton Wenham, MA Schools
HW Students 2013-14
Total Students Per Address
Miles River Middle Regional High
Cutler Elementary
Winthrop Elementary
Buker Elementary
Legend
2013-14 Students
Total Students Per Address
16 - 19
6 - 15
3 - 5
2
1
School Locations
School Type
ES
HS
MS
Town
Hamilton
Wenham
0 0.25 0.5 1
Miles
Data Source: Hamilton Wenham MA Schools, Census 2010
Map Create d: ATC, 12/17/2013.
CropperGIS

Hamilton Wenham HS Students by Town

The table below describes which town the 2013-14 Hamilton Wenham HS students live. According to this table 379 Hamilton-Wenham Regional High School students live in Hamilton, 178 in Wenham, and 121 live out of the district or were unmatched in the GIS.

Where Hamilton Wenham HS Students Live 2013-14			
School Name	Hamilton	Wenham	Out of District or Unmatched
Hamilton-Wenham Regional High School	379	178	121

The following tables show the by grade breakdown of 2013-14 HS students that live in Hamilton, Wenham, or Out of District/Unmatched.

High School Students Living within Wenham 2013-14					
School Name	9	10	11	12	Total
Hamilton-Wenham Regional High School	39	50	38	51	178

High School Students Living within Hamilton 2013-14					
School Name	9	10	11	12	Total
Hamilton-Wenham Regional High School	91	76	106	106	379

High School Students Living Out of District 2013-14					
School Name	9	10	11	12	Total
Hamilton-Wenham Regional High School	33	34	26	22	115

High School Students Unmatched in GIS 2013-14					
School Name	9	10	11	12	Total
Hamilton-Wenham Regional High School	2	3	1		6