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COUNTY OF HAWAI'I

GENERAL PLAN COMPREHENSIVE REVIEW TRENDS AND FORECASTS FINAL REPORT – SEPTEMBER 2016

Final Forecasts and Analysis

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INTRODUCTION TO THE SUMMARY REPORT

This report provides forecasts and discussions of a set of variables relevant to the County of Hawai'i's General Plan Update for 2016. The data contained in this report and in the accompanying Excel workbook provide both trend and forecast data for several key variables relevant to the County's planning. The data have been deemed necessary for the geodesign-based scenario modeling which the County will use as part of its planning process.

This report is designed to accompany the trend and forecast data by providing definitions of key variables, identification of forecast sources, explanations of forecast methods, and discussion of important issues that the County and its other consultants may wish to take into consideration when using and updating the data in ongoing planning. Accompanying the discussion of each variable is a graph of county-level data. In the case of graphs that include forecasts, the primary forecast line begins with historical data going back to the year 1990 and ends in the year 2040. High and low forecast lines are also included as a margin around the primary forecast.

In addition to the county-level data, historical and forecast data were provided for each of the variables at the Census Tract and Forecast Analysis Zone (FAZ) levels. The FAZs were groupings of census tracts based on the geographic location and characteristics of population centers in Hawai'i County (see the FAZ definitions at the end of this report). For the most part, Tract and FAZ data are not presented in this report but are provided in the forecast database Excel file.

For most of the forecast variables, historical data were allocated to the FAZs using a constant share approach, independently applied for each variable. This was consistent with the *ceteris paribus* (business as usual) approach to the county level forecasts. For example, if the census tracts in a given FAZ accounted for 12 percent of the county's total in 2015, it was assumed that the FAZ would account for the same percentage (constant share) of the total in the future.

There were two fundamental exceptions to this approach. The first exception was forecast for total housing units. These were allocated to FAZs using an average of three approaches. One approach was the typical constant share method applied to Census housing unit data. The second and third approaches used a rate-of-change method in lieu of a constant share method to account for the significant differences in rates of growth among FAZs. Forecasts were scaled back so that County totals remained consistent. The second and third approaches differed in their source of data. The second approach used housing unit data from the County of Hawai'i Real Property Tax (RPT) records for the years 2004 to 2014 (the period over which reliable data were available). The third approach used population growth data; growth rates from 2000 to 2014 were used to correspond closely with the timeframe covered by the RPT data.

This first exception had ripple effects through other FAZ forecasts. Population, number of households, housing units, and affordable housing units were allocated in tandem, as parts of a set. Allocating each one independently would yield inconsistent results with increasing divergence over the forecast period. Therefore, after the FAZ forecasts for housing units was completed, the FAZ forecasts for the other three related metrics were recalibrated.

The second exception to the constant share approach was for non-residential square footage. As with housing units, these FAZ forecasts were an average of two approaches, each with

different methods and data sources. One approach used the typical constant share approach applied to DBEDT job growth projection data, with jobs converted to non-residential square feet. The second was the 2000-2015 rate of change in non-residential development from RPT records. As with housing units, rate-of-change forecasts were scaled back so that County totals remained consistent.

The forecast database Excel file and a procedures manual covering methods by which data can be updated were provided separately.

Demographic Forecasts

In 2013, there were 194,190 residents living in the County of Hawai'i. The *de facto* population or all persons (residents and visitors) present in the County at a given point in time, was approximately 221,200. The median age for all residents was 41.3 years. Nearly one-quarter of the County's population (24.2%) was age 65 or older. As this subset of the population continues to age, it will present a variety of challenges with regard to housing and healthcare.

During the last two decades, there has been an average of 2,218 births and 1,269 deaths per year in the County, resulting in a net increase of almost 950 people annually. Also contributing to population growth are the approximately 2,300 individuals, on average, who choose to move to Hawai'i County each year.

Hawai'i County's current resident population lives in approximately 70,000 households, with an average household size of 2.75 persons. The number of households has increased by more than 17 percent over the past decade.

The County of Hawai'i includes 87 square miles of urban land with an average of 1,300 people living in every square mile. It also has an average of 18 persons per square mile across its 3,942 square miles of rural land¹.

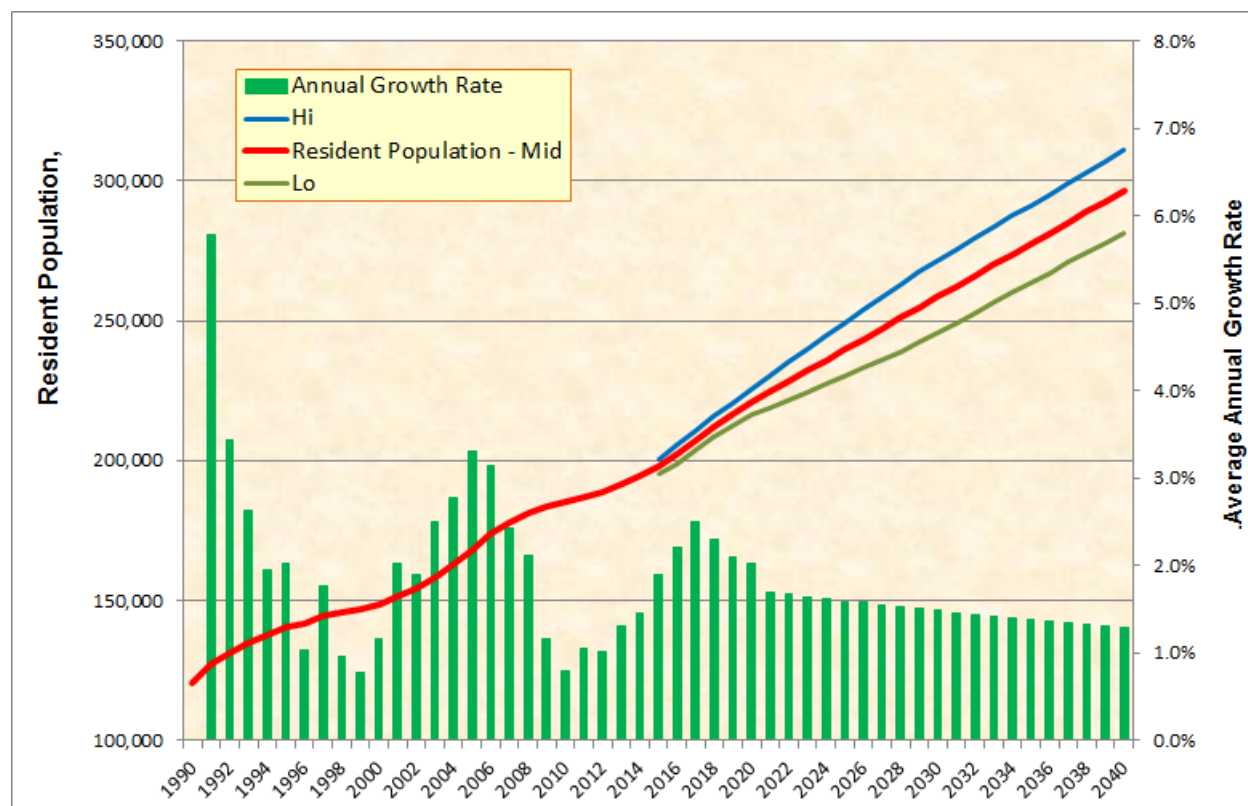
In the following sections, those demographic variables most relevant to the County of Hawai'i's long-range planning efforts are discussed in detail.

RESIDENT POPULATION

Definition: Resident population is the number of persons residing in the County of Hawai'i in a given year. Persons were said to be residents if they live in the County for a minimum of five months of the year. The term includes part-time residents, but excludes visitors (tourists), students, and military personnel stationed in Hawai'i who maintain a home of record outside the State of Hawai'i. The number of residents of the County may differ from time to time during the year and is usually presented as an average population for the year centered on July 1.

¹ *Urban and Rural Areas in the State of Hawai'i, by County: 2010*. Hawai'i State Data Center. Sept. 2013. http://files.hawaii.gov/dbedt/census/Census_2010/Other/2010urban_rural_report.pdf

FIGURE 1: RESIDENT POPULATION, COUNTY OF HAWAII, 1990 THROUGH 2040



Trend: Data for the years 1990, 2000, and 2010 taken from the U.S. Decennial Census. Non-census years 2005 through 2013 were taken from the American Community Survey. Estimates for the years 2005 through 2013 were five-year combined files. Estimates for the years 2002 through 2004 were one or three-year combined files as available. Estimates for some intercensal years between 1991 and 2002 were developed from data in the Hawai'i Housing Planning Study, 2011, Housing Model.

Forecast: The forecast estimates were based on the Hawai'i Department of Business, Economic Development and Tourism, Research and Economic Analysis Division, Population and Economic Projections for the State of Hawai'i to 2040 (2040 Forecast). By 2013, the empirical data on the population of the County of Hawai'i had already shown that the 2040 Forecasts were too high. The temporary solution was to use the trend data for 1990 through 2013, and the forecast data from 2020 through 2040. The interim years were estimated by fitting a third order polynomial curve to the data. While the resulting forecast is open to change and to interpretation, the forecast represents a reasonable estimate of future population change assuming that there are no serious changes in demographic, social, or economic factors underlying any population model. The low and high estimates are based on plus and minus about 5 percent in the years through 2040.

Discussion: The data can be interpreted as a three-cycle system with peaks in 1990, 2005, and 2016. The last of those peaks is actually an artifact of the smoothing process applied to join the empirical trend with the DBEDT forecast. The cycles happen to run a close parallel to economic growth trend for the County of Hawai'i as well. This was not built into the population model used here. Note the average annual growth rate bars show we are accepting a population growth rate that is declining from about 1.7 percent per annum to about 1.4 percent per annum over about 20 years. That would be continuing a long-range logarithmic decline in growth rates through the last 25 years. The basic population forecast is shown here as roughly linear, but we can reasonably expect that the economic sine wave around the linear trend will continue into the future.

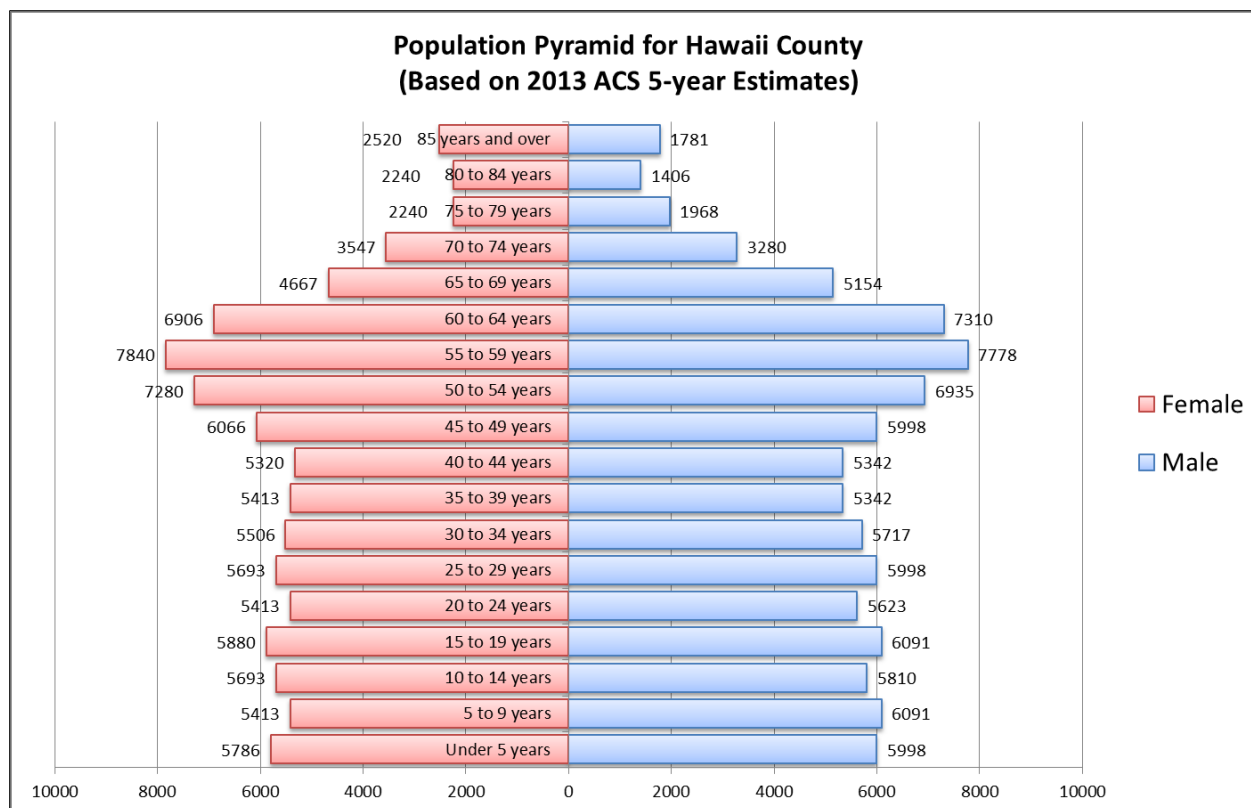
Considerations: This seems a rational place to start the planning process. It answers the question, what would the population be in each of the next 25 years if existing trends continue unabated? It incorporates all of the general agreements about forecasts across the state, including the idea that population growth will be slower than in previous decades, and statewide population growth will be higher on the outer islands than on O'ahu.

POPULATION PYRAMIDS

Definition: A population pyramid is a graphic illustration showing the distribution of age groups in a population. It takes the shape of a pyramid when the population is growing. Departures from the pyramid shape represent meaningful characteristics of the local population. A population pyramid typically consists of two back-to-back bar graphs, with the population size plotted on the X-axis and age on the Y-axis. One side of the pyramid presents the number of males and the other side represents females in the population. Ages are presented in five-year age groups called cohorts. Population pyramids are often viewed as the optimal way to graphically depict the age and gender distribution of a population.

Trend: Rather than being in the shape of a pyramid, the population of the County of Hawai'i shown in Figure 2 displays similar numbers of residents for the cohorts from birth to 44 years of age. There is a bulge depicting the larger number of residents between the ages of 45 and 64. The graph then tapers for residents age 65 and older, with a slight increase among the oldest residents (85 years and over).

FIGURE 2: RESIDENT POPULATION, COUNTY OF HAWAI'I, 2013



Discussion: The population pyramid for 2025, shown below, shows bulges indicating larger numbers of residents between the ages of 25 to 34 and between 65 and 74 years of age.

FIGURE 3: RESIDENT POPULATION, COUNTY OF HAWAII, 2025

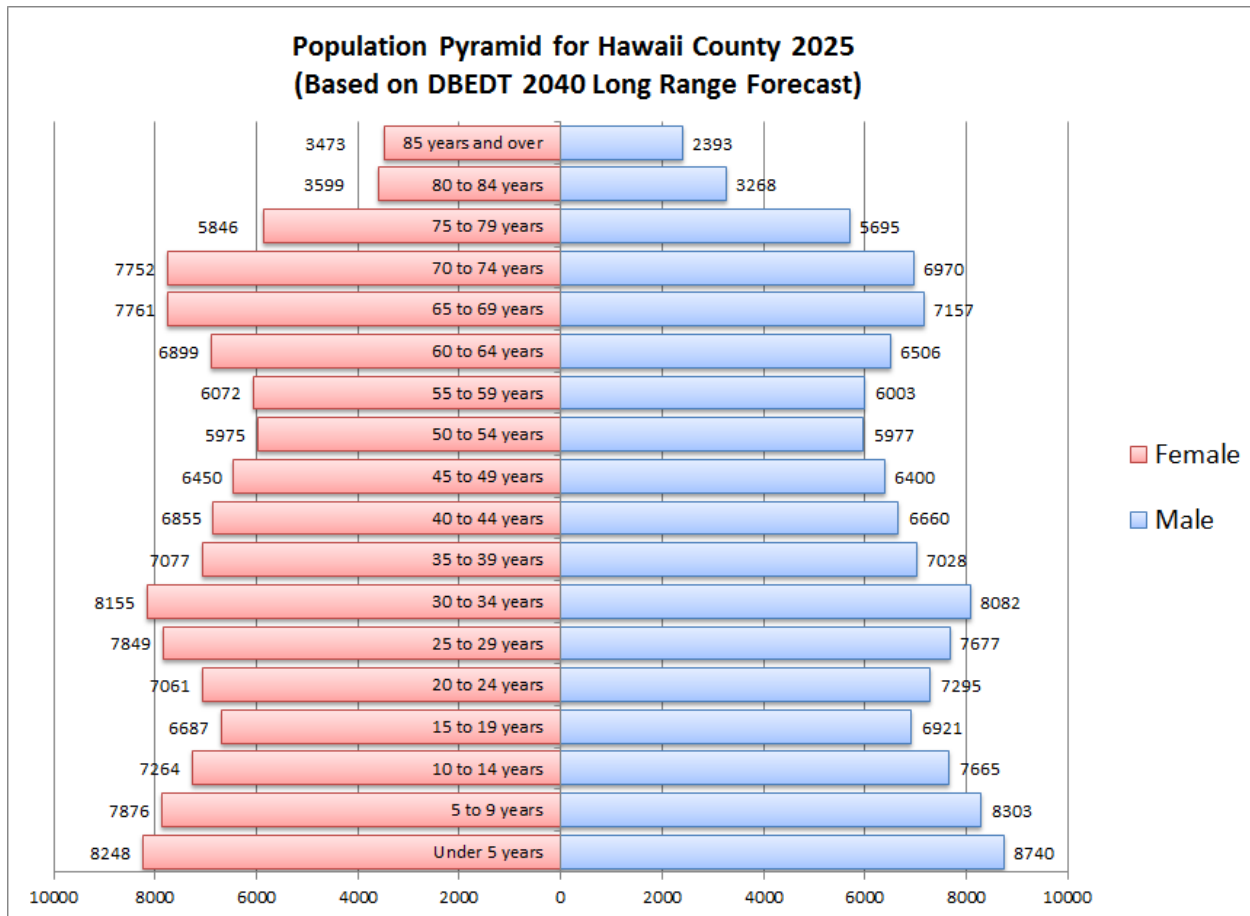
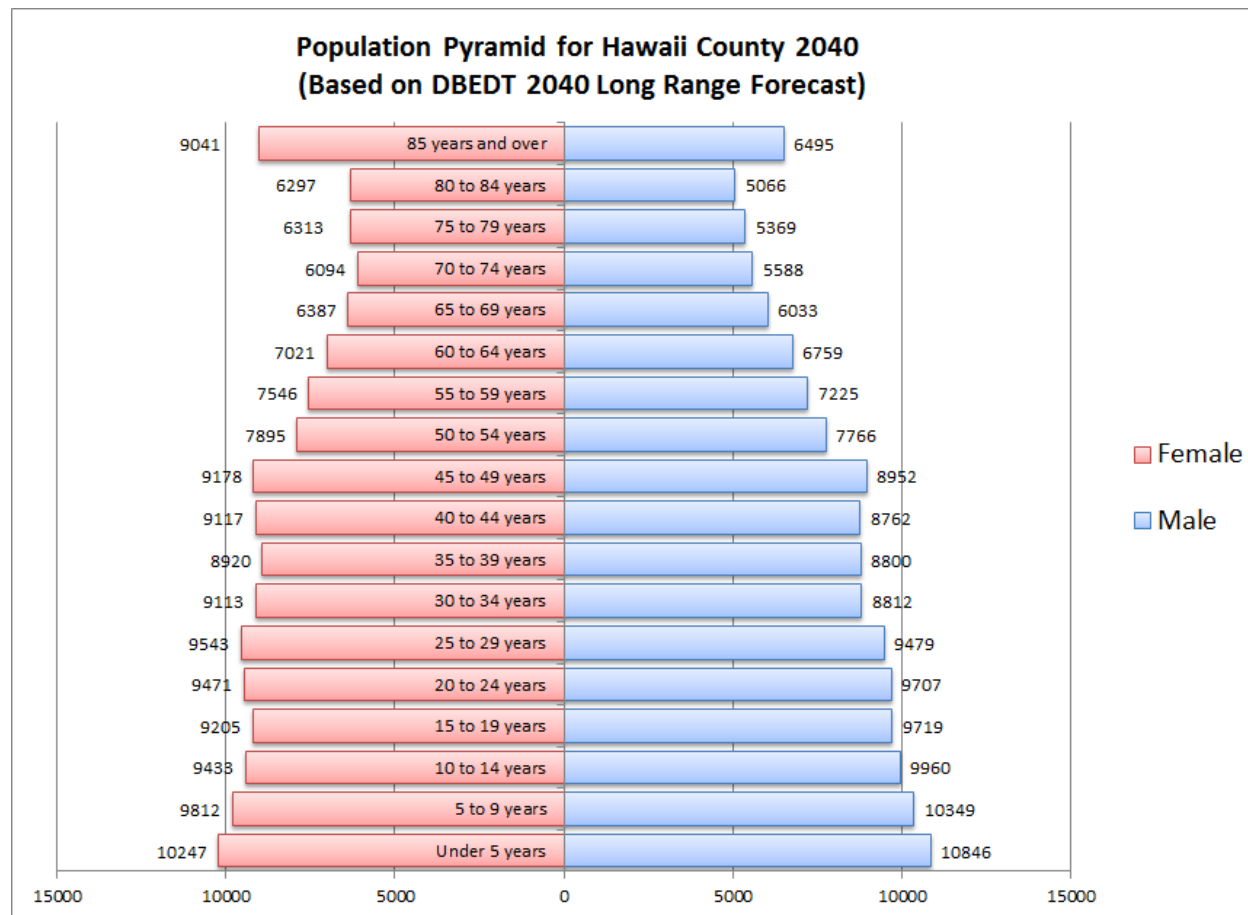


Figure 4 displays the population pyramid for 2040. The graph is nearly rectangular, indicating similar numbers of residents from birth through age 49. Between the ages of 50 and 84, the population tapers to increasingly smaller numbers of Hawai'i County residents, before a notable bulge in the uppermost age category of 85 years and older.

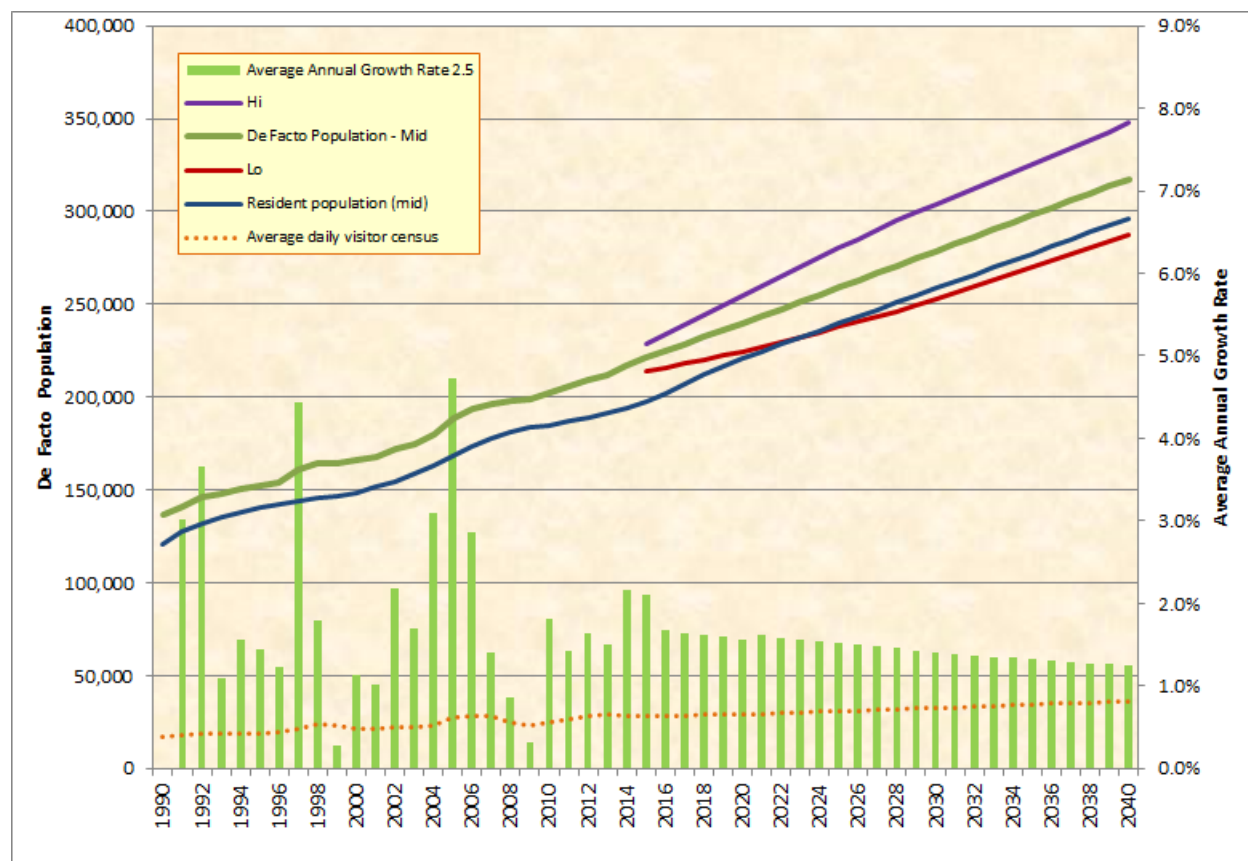
FIGURE 4: RESIDENT POPULATION, COUNTY OF HAWAII, 2040



DE FACTO POPULATION

Definition: The *de facto* population is a count of all persons present in the County at a given point in time. It was estimated as the resident population, plus non-residents who are present in the County, minus residents who are temporarily absent. In practice in Hawai'i, the *de facto* population is usually considered to be the sum of the resident population and the average daily visitor census.

FIGURE 5: DE FACTO POPULATION, COUNTY OF HAWAII, 1990 THROUGH 2040



Trend: The *de facto* population data for the years 1990 through 2013 were taken from the U.S. Census, 1990, 2000, and 2010, as they appear in the DBEDT Hawai'i Data Book Time Series, and also from the Hawai'i County Data Book, 2010, Table 1.18. Forecast data were taken from DBEDT's 2040 Forecast. Periods of population growth in the late nineties and between 2002 and 2007, occurred during periods of economic growth. They are a bit more obvious in the *de facto* population trend because growth resulted from an increase in visitors, net in-migration, and increased natural growth.

Forecast: The forecasting method for *de facto* population was more straightforward than for other series. The estimate was the sum of the forecasts for resident population and the average daily visitor census for each year. The average annual growth rate was calculated directly from the data.

URBAN POPULATION

Definition: The Census Bureau defines urban areas as densely developed territories that may include residential, commercial, and other non-residential urban land uses. Urban areas generally have a densely settled core of census tracts and/or blocks that meet minimum population density requirements. They must also encompass adjacent territory with non-residential urban land uses and territories with low population density that link outlying, densely settled territory with a densely settled core. In other words, an urban area consists of a dense urban (commercial and residential) core surrounded by less dense residential areas that are dependent on the commercial, industrial, and administrative activity in the core.

To qualify as an urban area, the territory must encompass at least 2,500 people, at least 1,500 of which reside outside institutional group quarters.²

The Census Bureau identifies two types of urban areas:

- Urbanized Areas (UAs) of 50,000 or more people;
- Urban Clusters (UCs) of at least 2,500 and less than 50,000 people.

Table 1 includes a list of the urban clusters in the County of Hawai'i.

TABLE 1: URBAN CLUSTERS, COUNTY OF HAWAII'I, 1990-2015

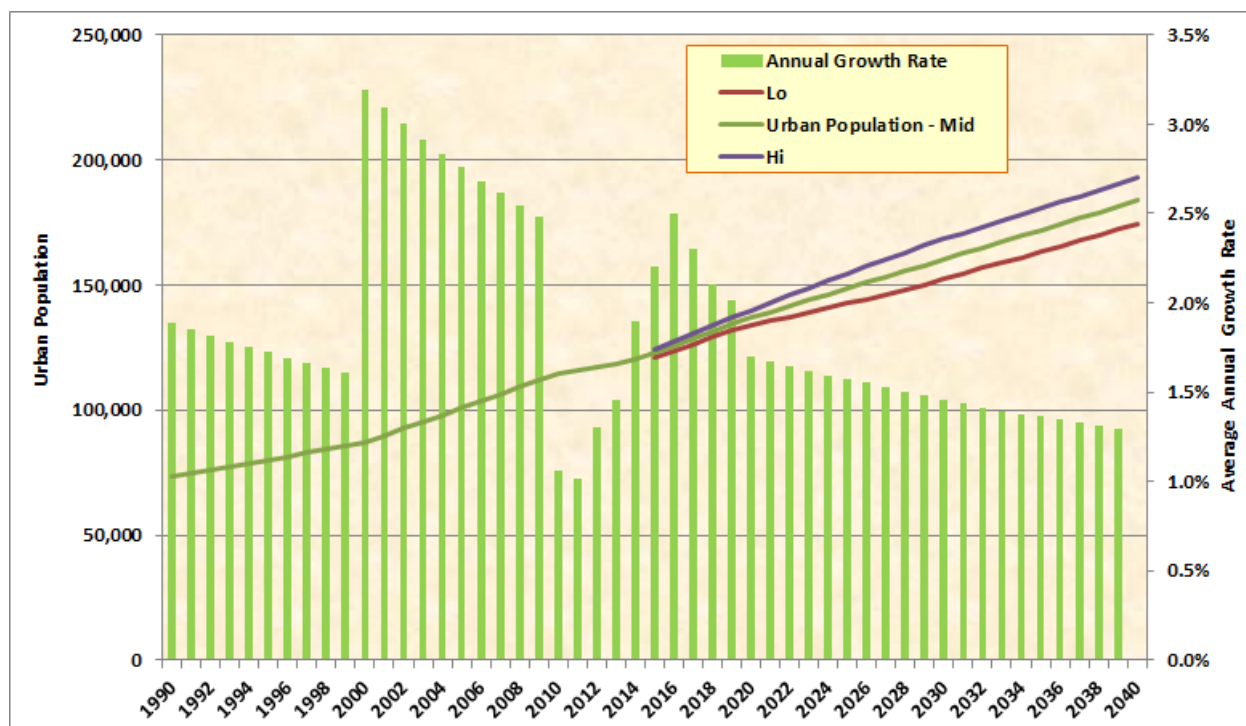
	Population	Housing Units	Land Area (sq km)	Land Area (sq mi)	Population Density
Hawaii County	114,766	47,680	224.7	86.8	1,323.10
Captain Cook	4,175	1,640	10.8	4.2	998.6
Hawaiian Paradise Park	20,503	8,062	83.6	32.3	635.1
Hilo	43,925	17,091	63.5	24.5	1,791.00
Honokaa	2,667	972	4.1	1.6	1,698.70
Holualoa	28,850	14,269	37.1	14.3	2,012.50
Kapaau	3,597	1,263	10.5	4.1	887.9
Waikoloa Village	4,089	1,838	2.8	1.1	3,799.00
Waimea	6,960	2,545	12.2	4.7	1,475.30

Figure 6 shows the resident civilian and urban populations of the County of Hawai'i, including both urban areas and urban clusters, for the five decades covered by the forecasts.

"Rural Areas" were defined as all areas of the County that were not classified as urban areas. Both urban and rural areas described the land, population, and housing units within the area.

² <https://www.census.gov/geo/reference/ua/uafaq.html>

FIGURE 6: URBAN POPULATION, COUNTY OF HAWAI'I, 1990 THROUGH 2040



Trend: The 1990, 2000, and 2010 trend data was taken from the Decennial Census Table P2 for each census year. The American Community Survey does not report the percentage of the resident population classified as urban or rural so the intercensal years were calculated as a function of the anchor points for each decade.

By the Census definition, the majority (60 percent) of the County's population has been classified as urban throughout the last 25 years. The years 1990 through 2015 were years of substantial population growth for the County of Hawai'i. They also witnessed changes in the distribution of non-agricultural workers to new areas in Kona, Waikoloa, etc. Yet the Census data shows us that relatively little change occurred in the percent of the population classified as urban.

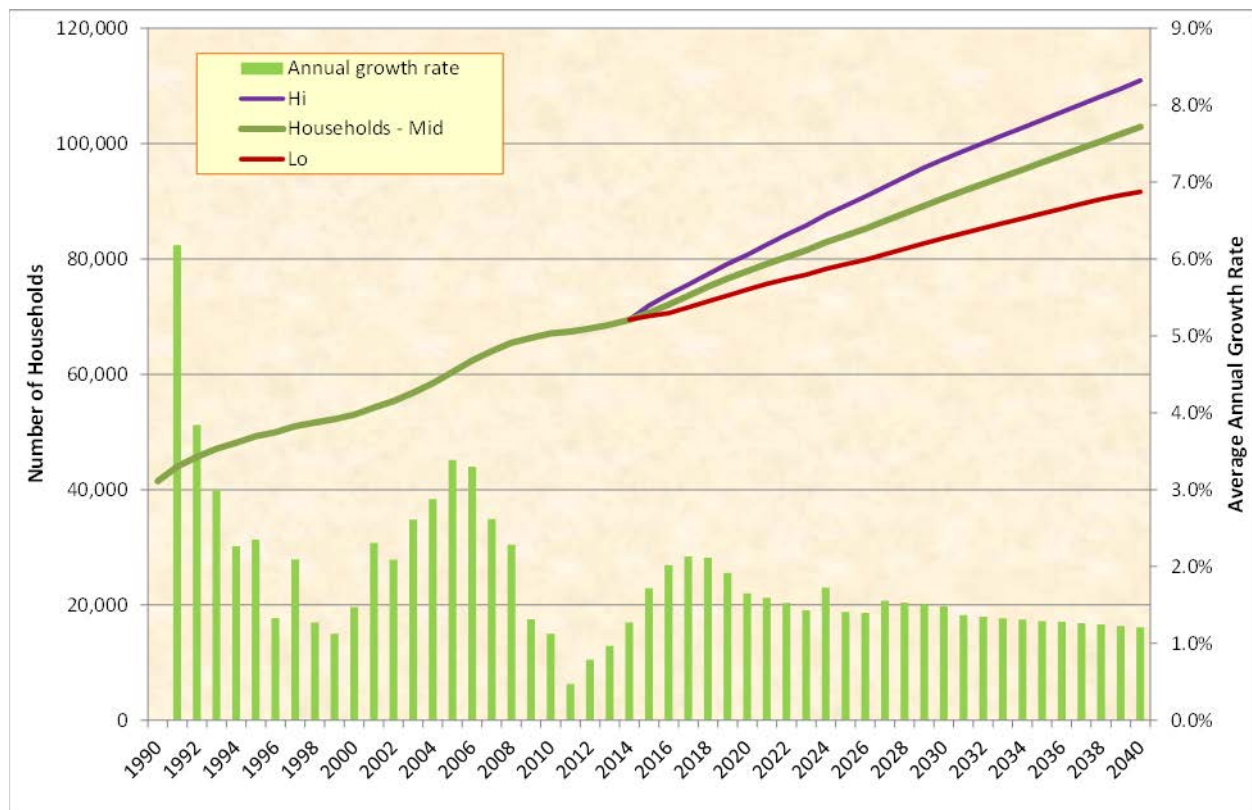
Forecast: The forecast for the percent of the population classified as urban was determined as a percentage of the total population forecast. The high and low estimates were developed in proportion to the high and low estimates of the total population. The forecast carries through the general trend of the last thirty years, which predicts growth in the urban and rural populations, but no change at all in the percent of the population classified as urban according to census definitions. We show the low and high estimates as relatively close to the mid-level forecast. If we accept the basic zero change theory of forecasting, there is little reason to believe that the level of error in predicting the 2040 urban population of the county will vary much from the base forecast.

Discussion: Forecasts of the relative sizes of the urban and rural populations of the County of Hawai'i are useful in planning for the maintenance of rural character and economic viability, and for providing opportunity for economic growth in urban areas. There are several definitions of urban and rural in use by various agencies of the federal government and other agencies that support the interest of urban and rural areas. The census definition used here seems particularly appropriate for Hawai'i County. The forecast is for no change. That, too, is appropriate considering past trends.

NUMBER OF HOUSEHOLDS

Definition: A household consists of all people who occupy a housing unit regardless of relationship to each other. A household may consist of a person living alone or multiple unrelated individuals or families living together. The number of people in a household includes all persons residing there, related or unrelated.

FIGURE 7: NUMBER OF HOUSEHOLDS, COUNTY OF HAWAII, 1990 THROUGH 2040



Trend: The data for the years 1990 through 2013 were taken from the U.S. Census, 1990, 2000, and 2010, as they appear in the DBEDT Hawai'i Data Book Time Series, the ACS data for the years 2005 through 2013, and from the Hawai'i County Data Book, 2010. No household forecast data were located.

The number of households can be calculated as the total persons in households divided by persons per household³. Also by definition, the number of households in any Census geographic location is equal to the number of occupied housing units in the same geographic area.

Forecast: The household forecast reflects the 2040 Forecast only in that it has resident population as its base. As noted above, the household population forecast was developed in tandem with the forecasts for persons in households and the ratio of persons to households. All three variables use trend data from the same sources.

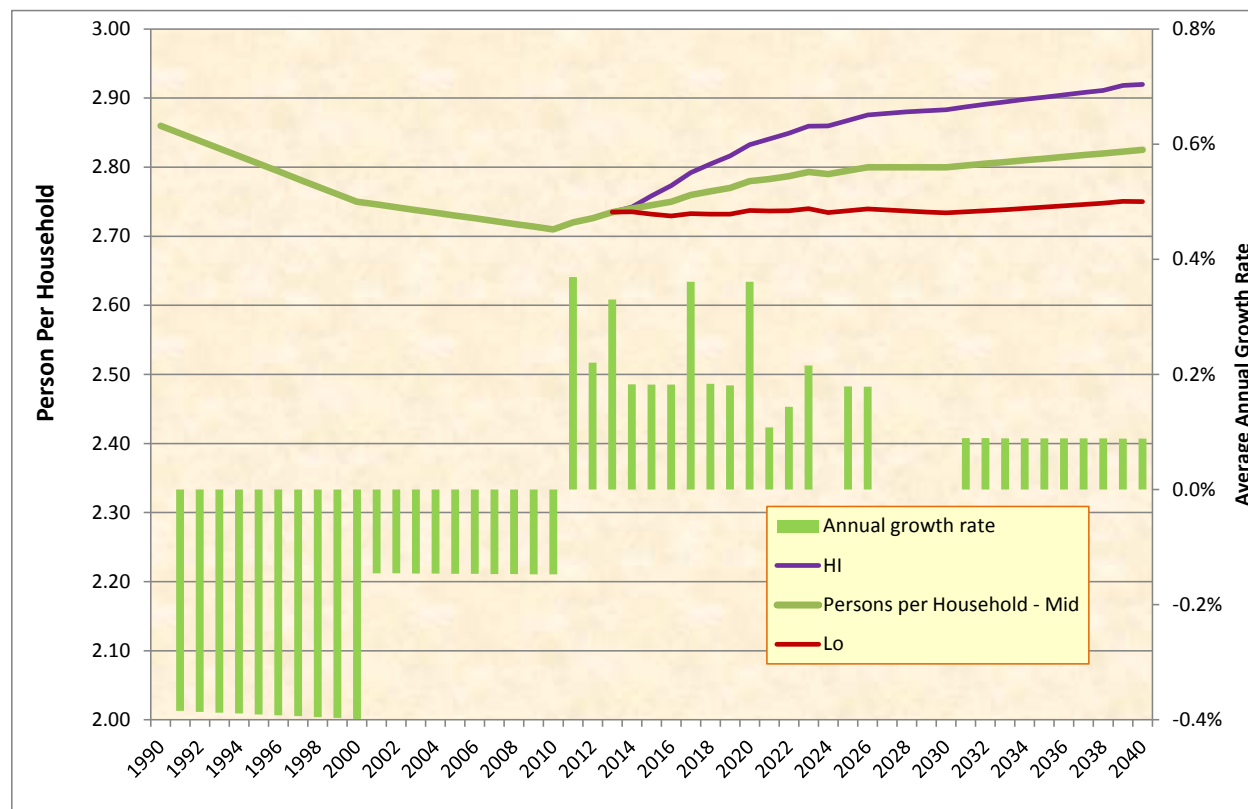
Discussion: The series "number of households" follows the same trajectory as the resident population forecast. They show a steady increase for fifty years, with significant variation around the trend line. That variation has the same relationship to the average trend line over time, and deviations from that line that are consistent with economic trends. In the case of the household trend, there is a relationship to housing supply as well, because the definition of a household requires a housing unit.

³ Estimating Households by Household Size Using the Poisson Distribution.
<http://paa2013.princeton.edu/papers/130204>

PERSONS PER HOUSEHOLD

Definition: Persons per household was defined here as the number of persons in households divided by the total number of households. This differs arithmetically from the average household size, although the concept is the same. Persons per household was the most appropriate variable to use here because it will be used to develop our forecast estimates for persons per household and thereafter the number of households.

FIGURE 8: PERSONS PER HOUSEHOLD, COUNTY OF HAWAII‘I, 2000-2040



Trend: Prior to 2009, the number of persons per household was reported only in the decennial census years. With the advent of ACS, we began to get annual estimates of this ratio and other important population and household variables. The trend showed that persons per household dropped from 2.86 in 1990 to 2.75 in 2000. It fell again to 2.71 in 2010. The ACS data show that persons per household began to climb again in the present decade, reaching 2.75 in 2015.

Forecast: To assure the comparability of the current data, forecasts for persons per household, persons in households, and number of households were carried out in a tandem process. The ratio, persons per household, therefore defines the relationship between population (households) and housing units for the forecasts..

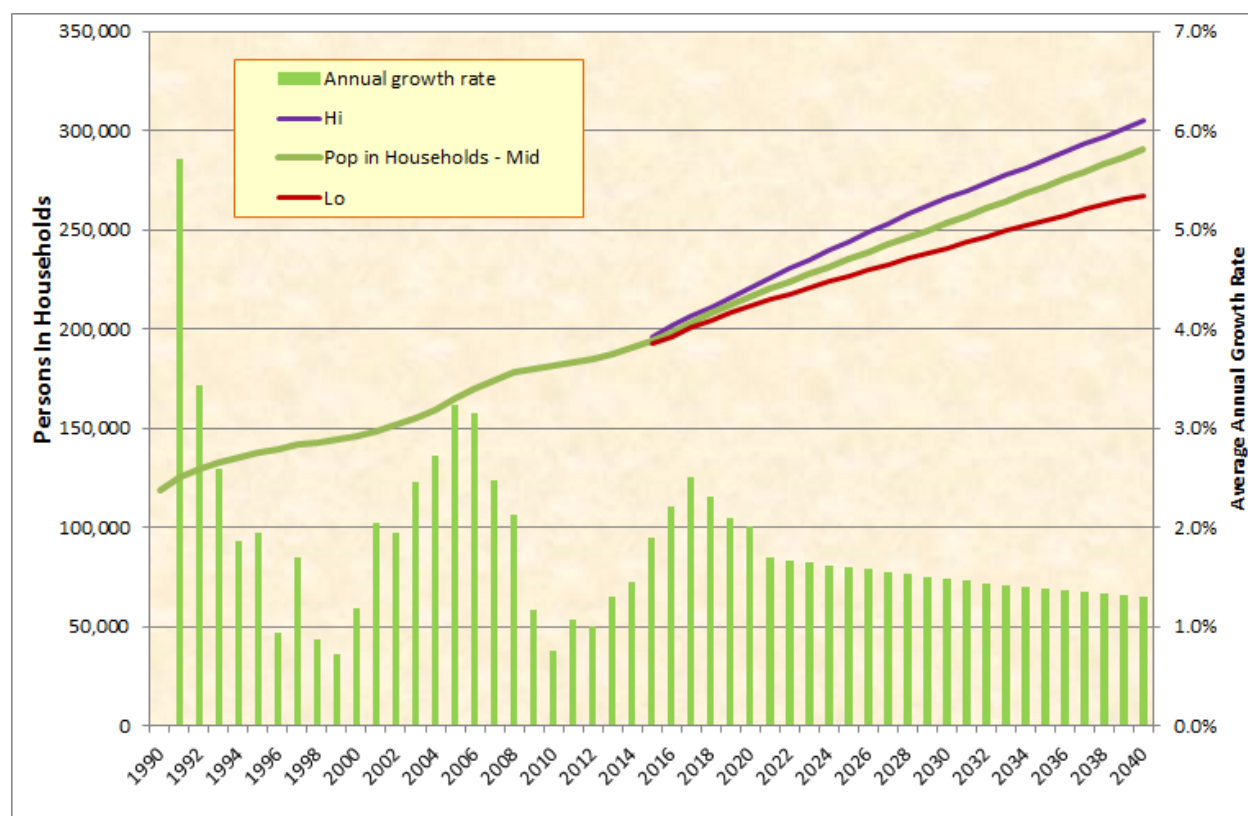
The forecast for persons per household shows a steady upward climb through 2025 (to 2.79 persons per household) and then continued increase but at a slower rate through 2040 (to 2.85). The rationale was based on the trend and expectations for population growth and housing unit supply. The trend line showed a rebound in persons per household that could be

an anomaly in the data for the last Census. A decrease of that magnitude had not been witnessed in Hawai'i County before, and was not reflected in the average family size. The return to 2.75 will be shown to be on target to about 2.80 or more in 2014. The figure will continue to rise through 2020 or 2025 because we expect population growth to run ahead of growth in housing stock. Thereafter, the ratio will continue to climb but at a slower rate. Population growth will proceed at a slower pace, and additions to the housing stock will remain at about the current pace.

PERSONS IN HOUSEHOLDS

Definition: "Persons in households" is the number of individuals in the resident population who reside in households, that is, the number of persons who live in housing units. Residents who do not live in housing units were said to live in group quarters (see Figure 10).

FIGURE 9: PERSONS IN HOUSEHOLDS, COUNTY OF HAWAI'I, 2000-2040



Trend: The data for the years 1990 through 2013 were taken from the U.S. Census, 1990, 2000, and 2010, as they appear in the DBEDT Hawai'i Data Book Time Series, and also from the Hawai'i County Data Book, 2010, Table 1.18. Forecast data were taken from DBEDT's 2040 Forecasts. The number of persons in households has a profile curve that is very similar to that shown for the resident population.

Forecast: As with the resident population forecast, the forecasting method for persons in households was based on the 2040 Forecast. Once again, census data showed that empirical data were running below the 2040 Forecast estimate by 2015 and it was necessary to merge the two series using data from the ACS from 2005 through 2013. The number of persons in households was expected to rise as a function of population change. The rate of growth reflected that set by DBEDT in the 2040 forecasts.

Discussion: The series "persons in households" followed the same trajectory as the resident population forecast. They showed a steady increase for fifty years, with some variation around the trend line. That variation again appeared to be similar to the rise and fall of local economic conditions over time. It can also be interpreted as the impact of the economy on household formation rates. In a slow economy, the number of persons per household may rise as higher prices and lower supply work to increase crowding and decrease new household formation. In a rising economy, housing opportunities increase, crowded households empty out, and average household size decreases.

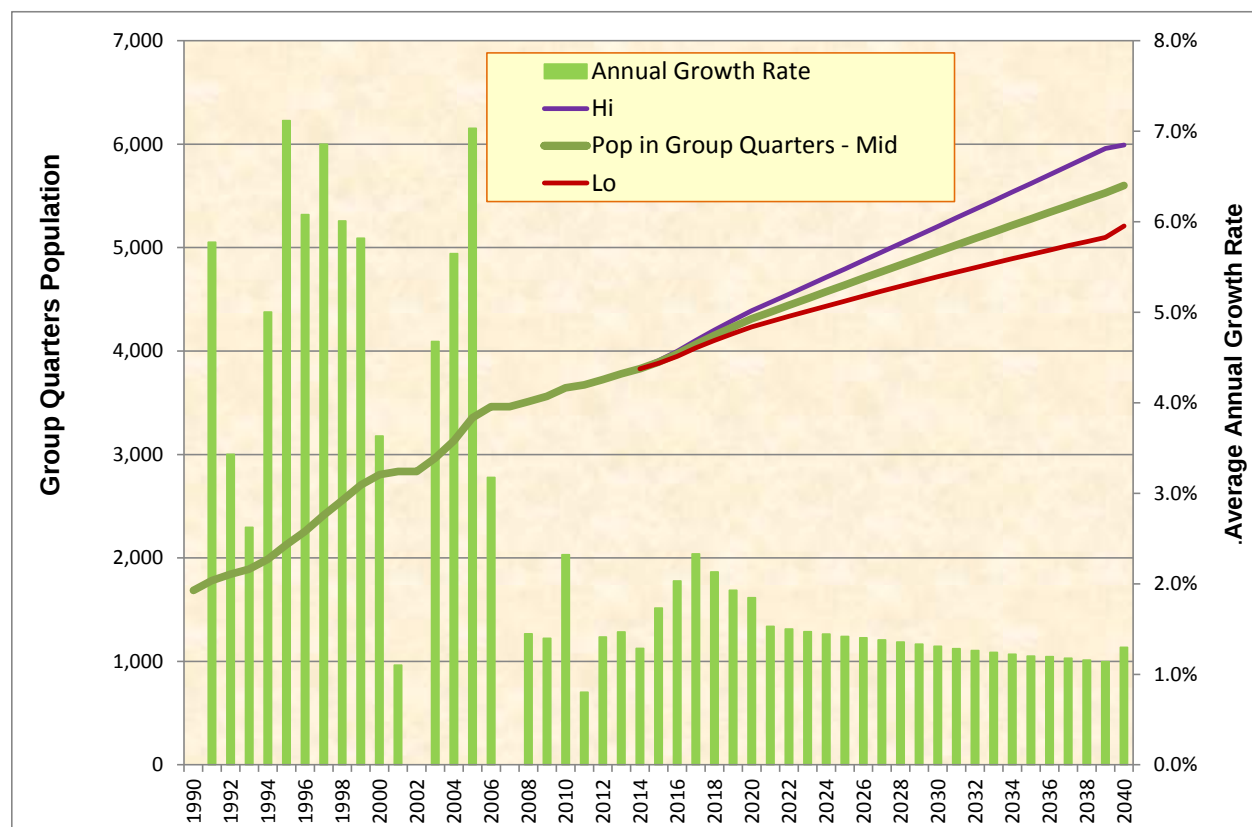
Considerations: The focus should probably be on the ratio of persons to households. Using the current definition, the rate has varied from about 2.7 to 2.86 with an average of 2.76 over the last 30 years. Planning decisions that involved ratios outside that range might require some explanation.

PERSONS LIVING IN GROUP QUARTERS

Definition: Group Quarters (GQ) are defined by the Census as places where people live or stay, in a group living arrangement, which is owned or managed by an organization that provides housing and/or services for the residents. These services may include custodial or medical care, or other types of assistance, and residency is commonly restricted to those receiving services. People living in group quarters are usually not related to each other. Group quarters include such places as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, and workers' dormitories.

Group quarters are classified as one of two types - institutional and non-institutional - by the American Community Survey (ACS)⁴. Institutional Group Quarters are facilities for people who have been placed under formally authorized, supervised care or custody. Group quarters include correctional facilities, nursing facilities/skilled nursing facilities, in-patient hospice facilities, mental (psychiatric) hospitals, group homes for juveniles, and residential treatment centers for juveniles. Non-institutional Group Quarters include facilities not classified as institutional group quarters, such as college/university housing, group homes intended for adults, residential treatment facilities for adults, workers' group living quarters, Job Corps centers, and religious group quarters.

FIGURE 10: PERSONS LIVING IN GROUP QUARTERS, COUNTY OF HAWAII, 2000-2040



⁴ ACS began including group quarters population in the sample in 2006. Prior to that time, only the population living in households was included.

Trend: The historical data were taken from the Hawai'i State Data Book 2013 Table 1.53 and DBEDT Census 1990 Selected Profile for the State by Counties. Figure 10 shows only the group quarters population. There are two peaks and two troughs in the data between 1995 and 2010. The peaks correspond roughly to the last two housing run-ups in Hawai'i and the troughs to the adjustment or recessionary periods thereafter. In general, the trend line for institutional group quarters residents (about 40 to 50 percent of the group quarters population) is a nearly straight line between 1990 and 2013. The variation is primarily due to changes in the number of non-institutionalized persons in group quarters. These people include unrelated individuals living in residential units. Because none are related by blood, marriage, or adoption, they cannot be classified as persons in households.

Forecast: Persons in group quarters is equal to resident population minus persons in households. Therefore the basis for forecasting persons in group quarters depends on the DBEDT 2040 forecast for resident population and persons in households. ACS data trends for persons in group quarters were extremely volatile between 2005 and 2014⁵, so the trend line was merged to the forecast line by fitting a third order polynomial curve through 2014. The mid-level estimate then assumed very slow growth in the percent of the County's total population housed in group quarters through 2040. The low and high estimates for the group quarters population were fairly narrow. The rationale for that was that there had been very little variation in the institutionalized population which remains the larger segment of the group quarters population. We might expect considerable variation in the non-institutionalized segment. That variation is expected to be driven by future volatility in housing prices, and thus will be expressed as variation around the non-institutionalized group quarters forecast line.

Discussion: The group quarters population is sometimes thought of as a residual segment of the population – people not in housing units are in group quarters. In fact, the Census Bureau calculates these data and they are built up from actual counts. The institutionalized group quarters population is, in part, dependent on the number of institutionalized housing units in the County. Its growth may be hindered by barriers to supply and its growth rate may underestimate the number of people who need institutionalized housing. In fact, the Hawai'i Housing Planning Survey 2011 included a special study on housing of persons with special needs, which suggests that may be true for all Counties.

Considerations: There are many ways to interpret changes in the number of persons in non-institutionalized group quarters. Even without speculating on the issues now, we can be certain that there will be increased interest in information on the group quarters population. Their number, rate of change, characteristics, behavior, and relationship to planning issues like housing, employment, and social services, will increase demand for data and analysis. The easy availability and growing reliability of ACS data on groups quarters people will boost supply of information to match that demand.

⁵ Most likely due to early imprecision and low sample sizes, rather than actual variation in the number of persons in group quarters in the County of Hawai'i.

Economic Forecasts

The County of Hawai'i's current labor force was comprised of just over 90,000 persons age 16 or older. The labor force had grown at an average annual rate of 1.7 percent over the previous decade.

An estimated 90.4 percent of the labor was employed (81,575 workers). The unemployment rate for Hawai'i County followed the overall economic trend. The unemployment rate was 3.5 percent in 1990, then climbed to over 9 percent by the middle of the decade and dropped back down to 4.7 percent by 2000. The rate continued to decline until it reached an all-time low of 3.4 percent in 2007, just prior to the beginning of the Great Recession. After reaching close to 10 percent during the Recession, the County's economic recovery is evidenced by the current unemployment rate of just 5.6 percent.

Among employed persons who worked outside their homes, roughly 40 percent lived and worked in the same place⁶. The average travel time to work for employees increased from 24.5 minutes in 2000 to 27.1 minutes in 2013 (+10.6%).

There were an estimated 103,000 jobs in Hawai'i County. The average annual growth rate for jobs ranged from 1.6 to 1.9 percent since 1990, and was expected to remain at that level for the next several decades. Workers were most often employed in one of five key industries: educational service, healthcare, and social assistance; arts, entertainment, recreation, accommodation, and food services; retail trade; professional, scientific, management, administrative, and waste management; and construction.

The estimated 2015 median household income for Hawai'i County workers was \$51,795. This represented a 1.9 percent decrease over the last ten years. The median household income peaked in 2008 at \$58,500, then dropped 4.9 percent in 2009 as a result of the Recession. Median household income is expected to increase steadily over the next several years and reach its pre-recession level by 2020.

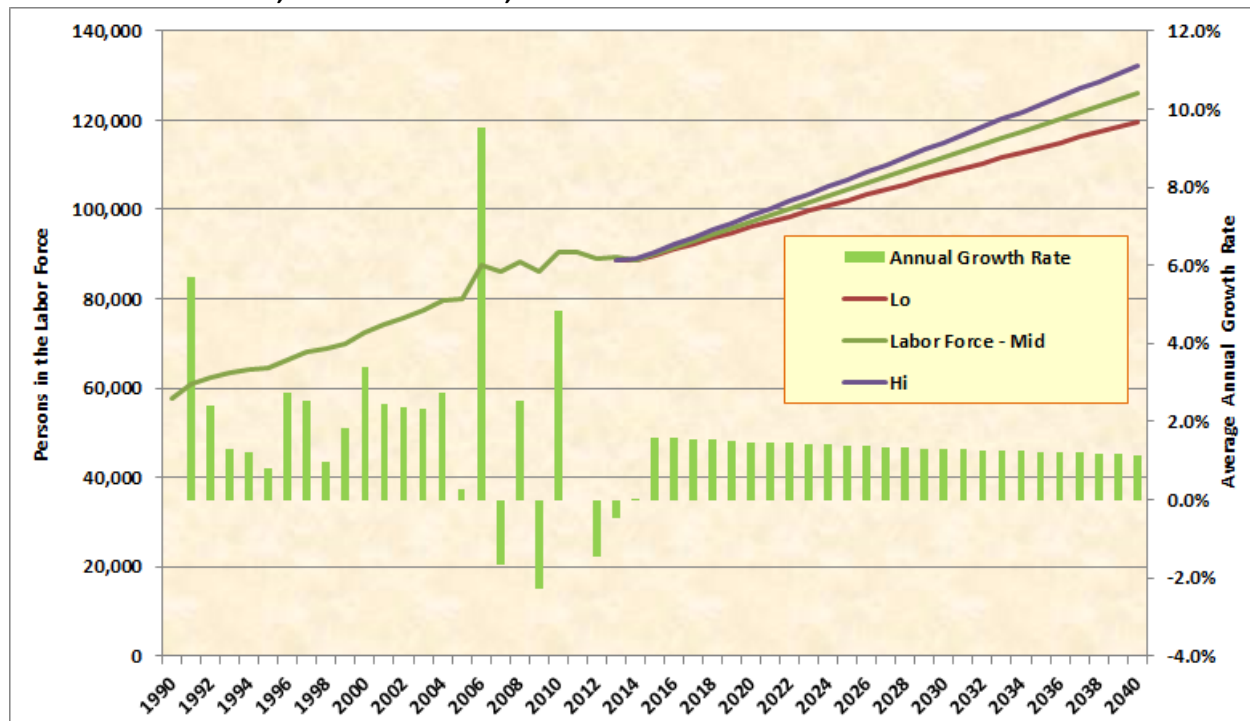
In keeping with the other economic measures, the poverty status of individuals and families in the County increased over the past five to seven years. The percentage of persons in poverty was 15.7 percent in 2000 and was on a downward trend, falling to a low of 13.1 percent in 2007. Since that time, the percentage in poverty has increased to a record high of 18.3 percent for individuals and 13.5 percent among families.

⁶ As defined by the U.S. Census Bureau; American Community Survey 2013 5-year Summary File: Technical Documentation, the same place refers to the same census block or, if the place of employment could not be geocoded to the block, in the same city, town or census designated place.

LABOR FORCE IN THE COUNTY OF HAWAII

Definition: The number of persons in the labor force in the County of Hawai'i was defined by the U.S. Census as the number of county residents 16 years of age or older who were either employed (full-time or part-time) or unemployed and actively looking for work. Persons who were not employed and not actively looking for work were excluded from the definition. Those persons may include retired persons, students, homemakers, and others who were not seeking employment at the time the measurement was taken. The number of persons in the labor force was the denominator used in calculating percent employed and the unemployment rate.

FIGURE 11: LABOR FORCE, COUNTY OF HAWAII, 1990 THROUGH 2040



Trend: Trend data for the period 1990 to 2013 were taken from the U.S. Census and from the American Community Survey, 2005 through 2013. To some extent, the shape of the trend data curve is an artifact of available data. Census data for intercensal years between 1990 and 2010 have been interpolated based on the ratio of labor force members to total persons 16 years of age or older. Within-decade changes in the size of the labor force were unknown. After 2004, year-on-year changes in the size of the labor force may have been exaggerated by small sample sizes and evolving data collection protocols for the ACS. Evidence of the latter proposition can be seen in the fluctuation of the annual growth rate between 2005 and 2011.

Forecast: We are aware of no official forecast for the size of the labor force in Hawai'i County. The forecast shown here depends on the DBEDT 2040 forecast for number of persons employed and an assumption that the percent of the labor force who were employed was relatively constant over time. The low and high estimates were based on plus and minus about 5 percent in the years before 2040.

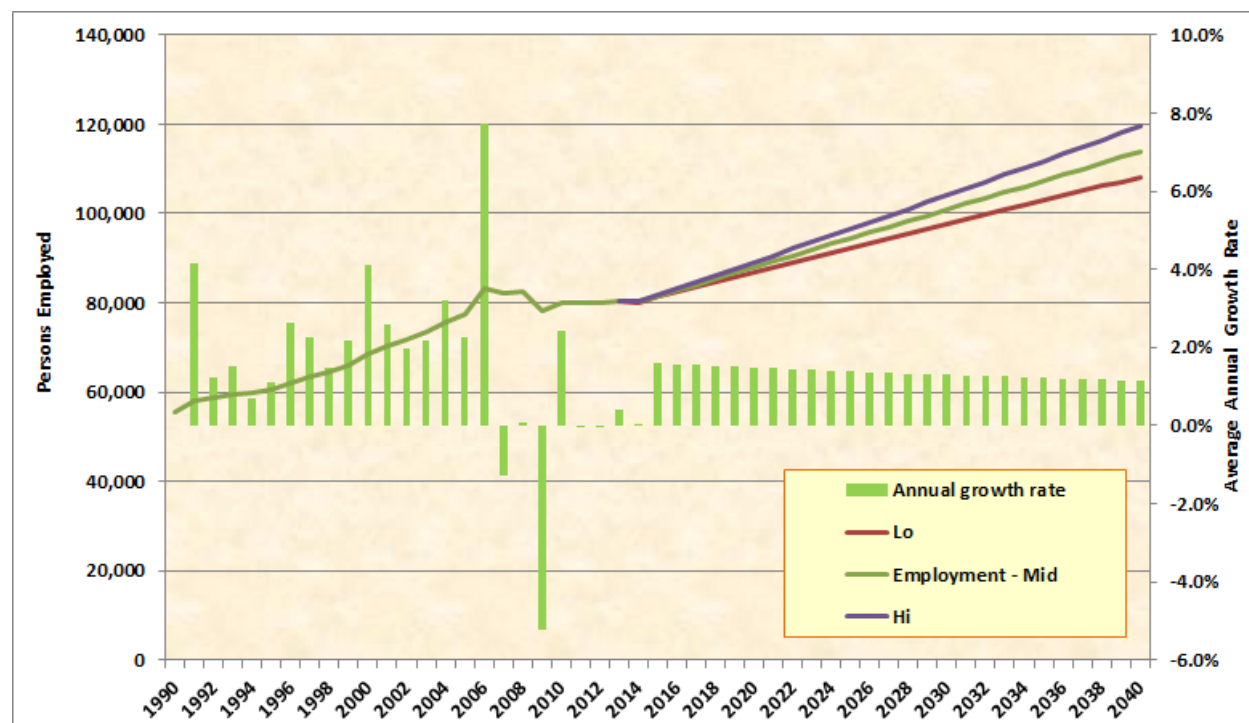
Discussion: This analysis suggested that the labor force growth rate between 2005 and 2013 was higher than it was between 1990 and 2004. After 2013, the forecast growth rate returned to its pre-2005 level. The nature of the available data causes us to have less confidence in the 2005-2013 data, but the return to the long-range growth rate for the county seems reasonable for the future. The confidence levels that produced our low and high estimate were based on the forecast itself and did not include any consideration of the point at which the two trends met.

Considerations: The forecast is the most reliable that is available at this time and we believe it will serve the planning needs of the County for the short-run. This forecast will benefit greatly from new data available when the next editions of the DBEDT Forecast, the Intra-County I-O Model, the Housing Planning Study 2015, and the next editions of ACS data become available.

EMPLOYMENT BY SECTOR, INDUSTRY, OCCUPATION

Definition: Employment -- the number of persons employed -- was defined here as the average number of Hawai'i County residents 16 years of age or older who were employed either full-time or part-time during a calendar year. The average number of employed persons was calculated over the course of the 12 months. A person was considered to be employed regardless of the number of jobs he or she may have had in a given month.

FIGURE 12: EMPLOYMENT, COUNTY OF HAWAI'I, 1990 THROUGH 2040



Trend: Data for the years 1990 through 2013 were taken from the U.S. Census, 1990, 2000, and 2010, and for the non-census years 2005 through 2013 from the American Community Survey. Estimates for the years 2005 through 2013 were taken from five-year combined files. Estimates for the years 2002 through 2004 were one- or three-year combined files as available. Data were also matched with information from the Hawai'i County Data Book.

The empirical data on employment (1990 through 2013) reflect well known trends in the economy and jobs during that period. Employment was relatively high in 1990 and 1991 and then slowed dramatically during the remainder of the decade. Growth took a jump in 2000, one of the best years in Hawai'i's economic history. It fell off in 2001 after the disaster of September 11, 2001 and then grew at an increasing rate for six years. The Great Recession caused major unemployment in 2008 and 2009 and the subsequent recovery period produced irregular gains.

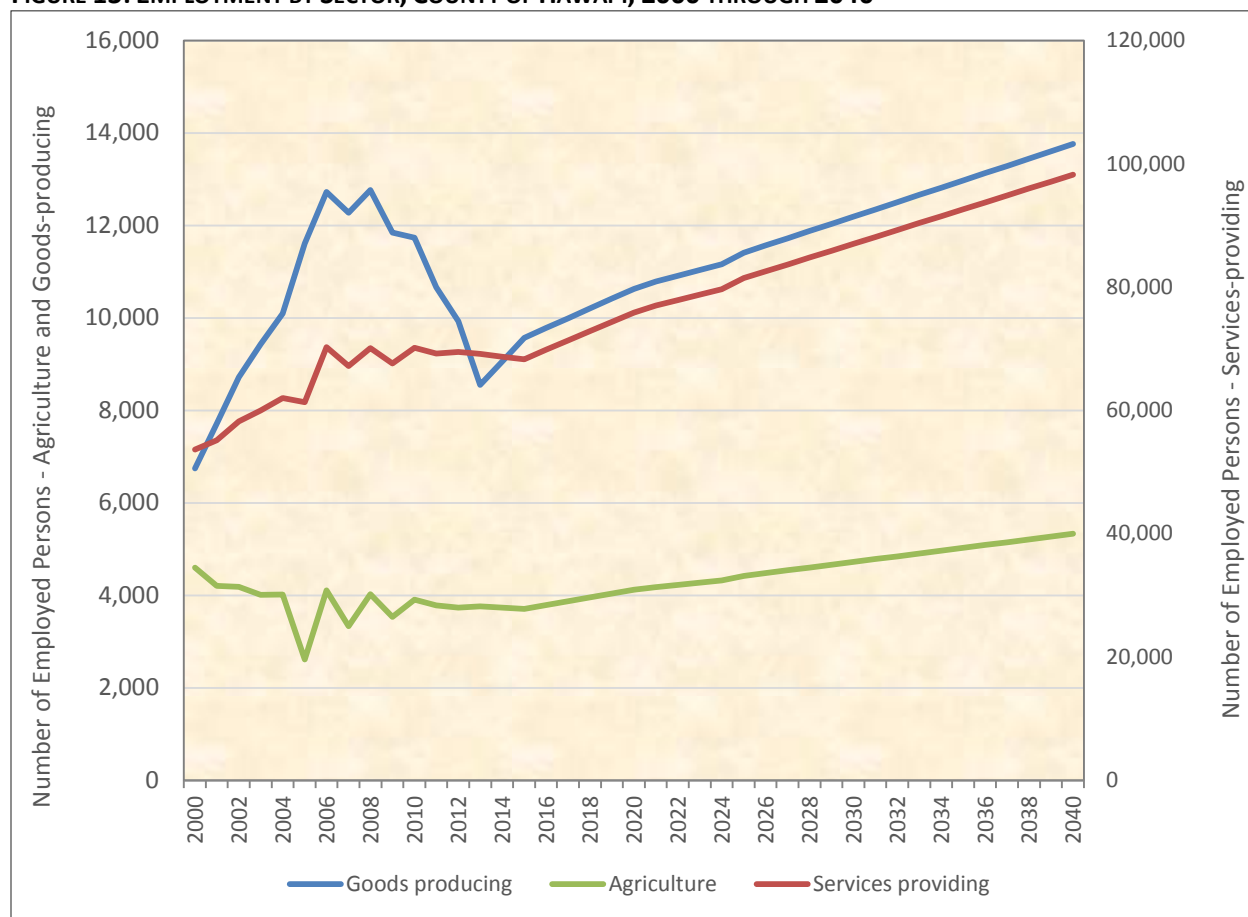
Forecast: Forecast estimates were based on the DBEDT 2040 forecasts once again. The empirical data on employment fit reasonably well with the DBEDT 2040 forecast in 2014-15 and no extensive curve fitting was required to merge the two data series. The straight-line forecast seemed consistent with empirical data in terms of the long-range growth rates and of course we expect that future growth rates will vary around the forecast trend. The high and low estimates are reasonably close to the most probable forecasts, suggesting that we find no data or other evidence that the DBEDT 2040 forecast might be inaccurate to this point.

Discussion: Employment trend and forecast data are a reliable and accurate estimate for the County between 1990 and 2040. There were no problems in forecasting and the employment data are consistent with other related variables gathered for this project.

Employment by Sector

The three primary sectors of the Hawai'i Island economy are the goods producing sector, the services producing sector, and agriculture. The next figure shows the trend and forecast data for employment in those three sectors. The data sources and definitions are the same as noted for the employment data shown above. Note that the service producing sector, the largest part of the Hawai'i County economy, is shown on a separate scale to the right.

FIGURE 13: EMPLOYMENT BY SECTOR, COUNTY OF HAWAII, 2000 THROUGH 2040



Employment in the County's goods producing sector (construction and manufacturing) grew rapidly during the early part of the last decade and then fell back a bit. DBEDT's forecast suggests that the future will bring a slow but steady increase in sector employment.

The forecast for employment in agriculture (agriculture, forestry, fishing, hunting, and mining) is for slower growth and may reflect a less certain future for the sector. The trend line does not follow general economic growth trend as do the other two sectors. Employment in agriculture dropped slightly during the 2000-2007 booms, the great recession, and recovery. The forecast, however, suggests slow and steady growth through 2040. The rate is lower than for the other sectors and seems a reasonable foundation for planning at this time.

The services-producing sector (all industries except those classified as goods-producing or agriculture) showed a growth pattern very similar to the good-producing sector over the last 15 years, albeit with less volatility.

The DBEDT forecast for all three sectors predicted the same steady growth through 2040. It followed the assumption that future growth will continue as it has been in the past. Of course, the forecast was a straight-line prediction and future changes in employment will vary around the forecast line.

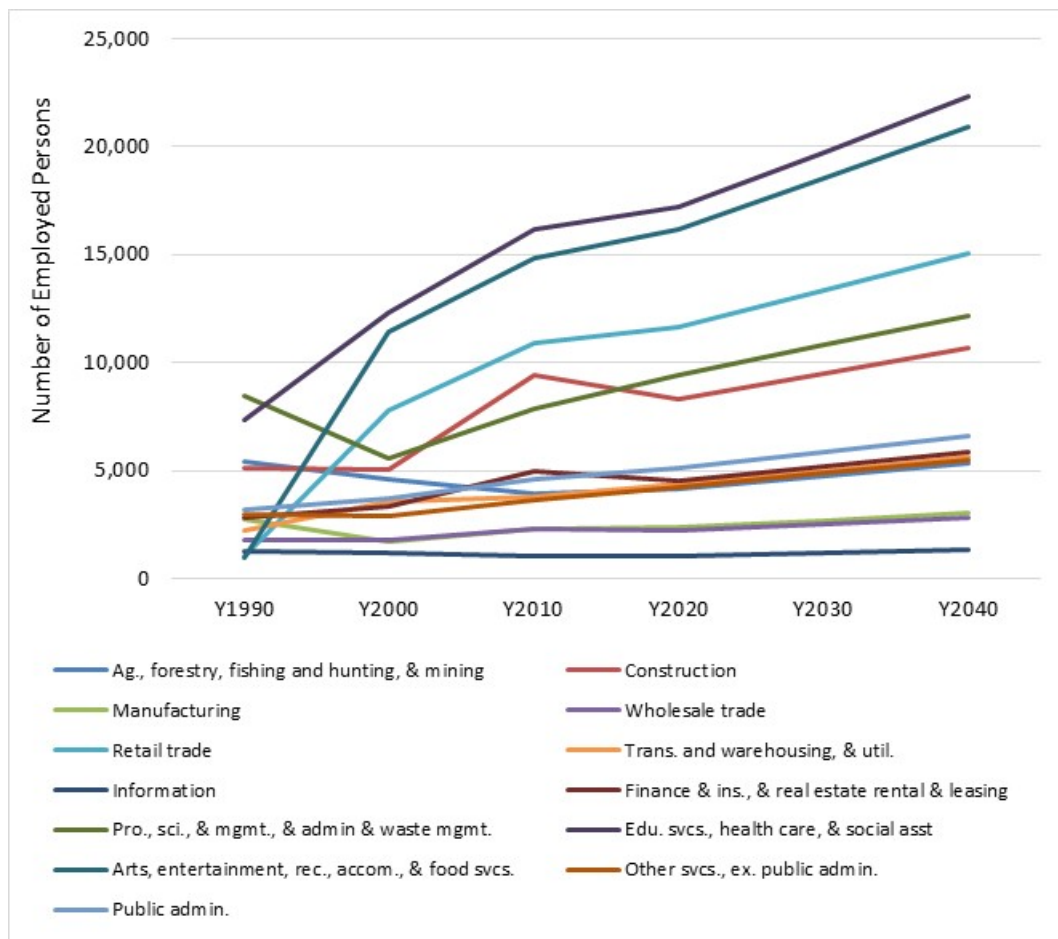
Table 2 presents some further disaggregation of the forecast data shown in Figure 13. Data for all industry classifications in the years between 1990 and 2040 are included in the data matrix submitted along with this report. Table 2 shows that the largest sectors in the County of Hawaii have been construction, retail, education, health, and government services. Those same industries are forecast to be the County's primary employment areas in 2040.

TABLE 2: EMPLOYMENT BY INDUSTRY, COUNTY OF HAWAII, 1990-2015

Industry	1990	2000	2010	2020	2030	2040
Agriculture, forestry, fishing and hunting, and mining	5,437	4,600	3,910	4,120	4,724	5,332
Construction	5,153	5,057	9,450	8,282	9,496	10,719
Manufacturing	2,721	1,685	2,282	2,348	2,693	3,040
Wholesale trade	1,754	1,786	2,289	2,204	2,527	2,853
Retail trade	1,055	7,826	10,922	11,629	13,333	15,051
Transportation and warehousing, and utilities	2,208	3,546	3,789	4,364	5,004	5,648
Information	1,251	1,159	1,071	1,018	1,167	1,318
Finance and insurance, and real estate and rental and leasing	2,810	3,346	5,002	4,545	5,211	5,883
Professional, scientific, and management, and admin and waste management	8,461	5,596	7,858	9,426	10,808	12,201
Educational services, and health care, and social assistance	7,338	12,287	16,162	17,223	19,748	22,292
Arts, entertainment, recreation, accommodation, and food services	1,004	11,462	14,809	16,148	18,516	20,901
Other services, except public administration	2,992	2,911	3,639	4,244	4,866	5,493
Public administration	3,164	3,718	4,597	5,084	5,829	6,580

Source: ACS 5-year Table DP03

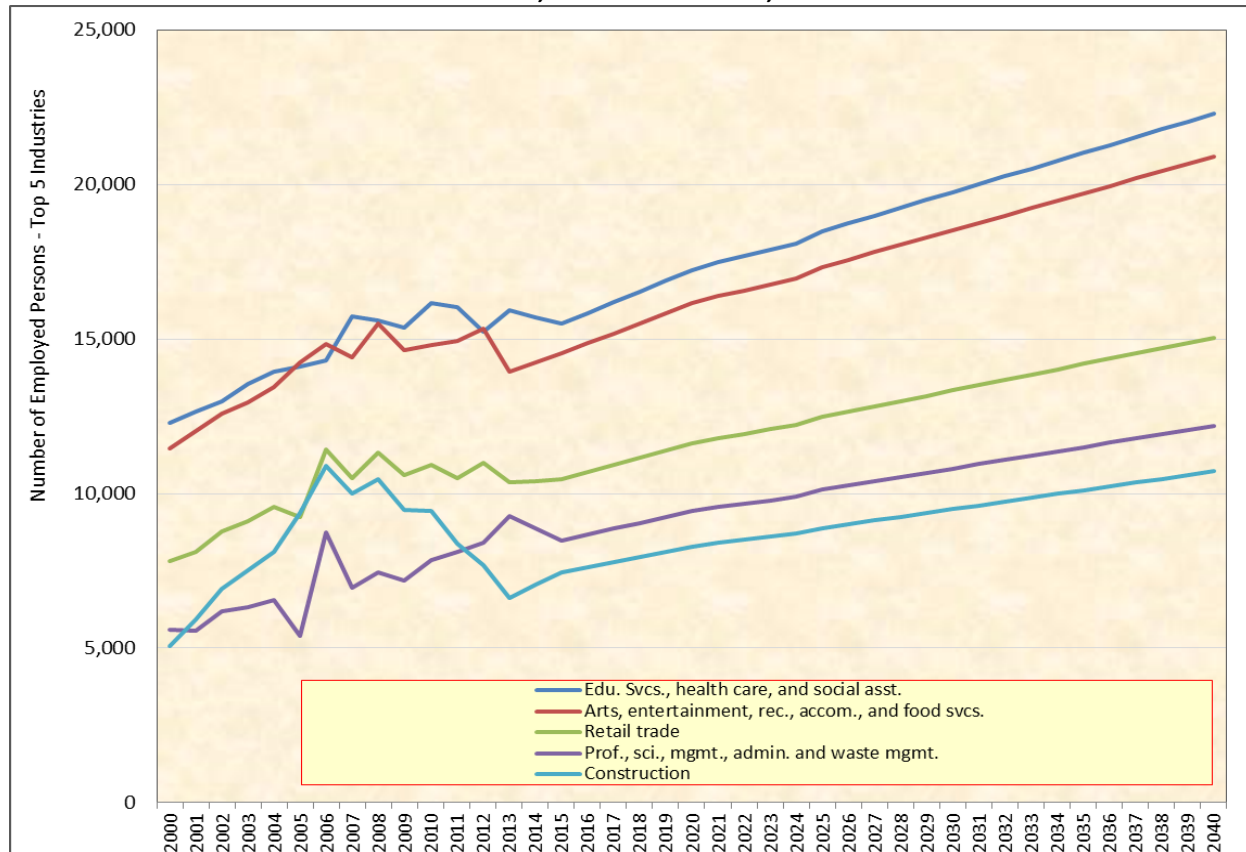
FIGURE 13A: EMPLOYMENT BY INDUSTRY, COUNTY OF HAWAI'I, 1990-2040



Employment by Industry

Employment in the County's 13 major industries is shown here in two figures. Figure 14 presents trend and forecast data for the top five industries by volume and growth rate. Figure 15 offers up the data on the remaining 8 industries. Data sources and definitions are the same as noted for the rest of the employment data.

FIGURE 14: EMPLOYMENT BY TOP FIVE INDUSTRIES, COUNTY OF HAWAII, 2000 THROUGH 2040



Nearly 70 percent of the employed persons in Hawai'i County work in one of these industries:

- Educational service, healthcare, and social assistance
- Arts, entertainment, recreation, accommodation, and food services
- Retail trade
- Professional, scientific, management, administrative, and waste management
- Construction

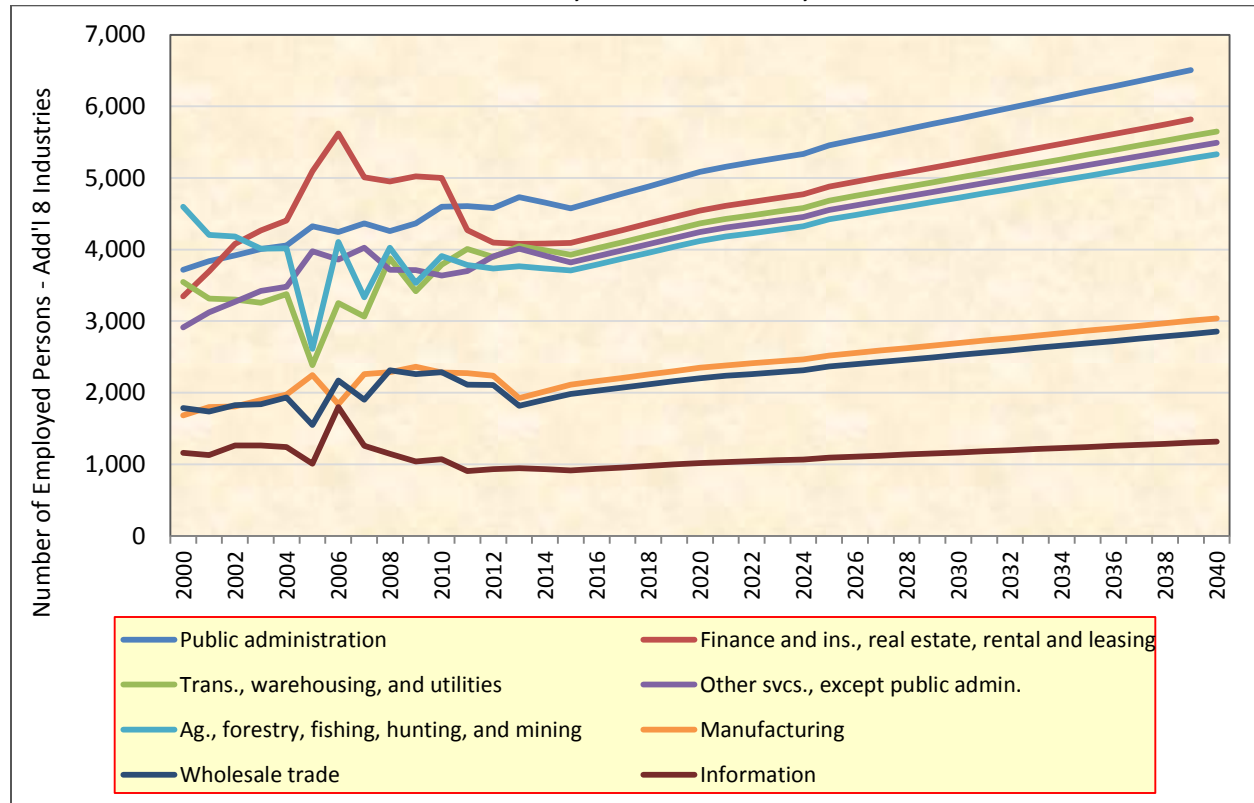
The two largest components of the employment picture were the health and education, and the tourist industries⁷. The employment trend in both industries rose through 2008 and then leveled

⁷ Health and education includes health care, social assistance, and education. The tourist industry includes arts, entertainment, recreation, accommodations, and food services.

off during the recession. Employment figures have drifted downward very slightly since about 2010. The forecast for both industries is strong through 2040 and it is likely that increases in employment will be led by job opportunities in health and tourism.

Employment in the retail trade and construction industries has also been high in the County economy. Employment in both industries rose during the period from 2000 to 2008. Retail trade drifted down very slightly between 2008 and 2014, and construction employment dropped significantly during the same period. Both industries are expected to grow steadily through 2040, providing the second largest number of employees in the island economy.

FIGURE 15: EMPLOYMENT BY ADDITIONAL INDUSTRIES, COUNTY OF HAWAII, 2000 THROUGH 2040



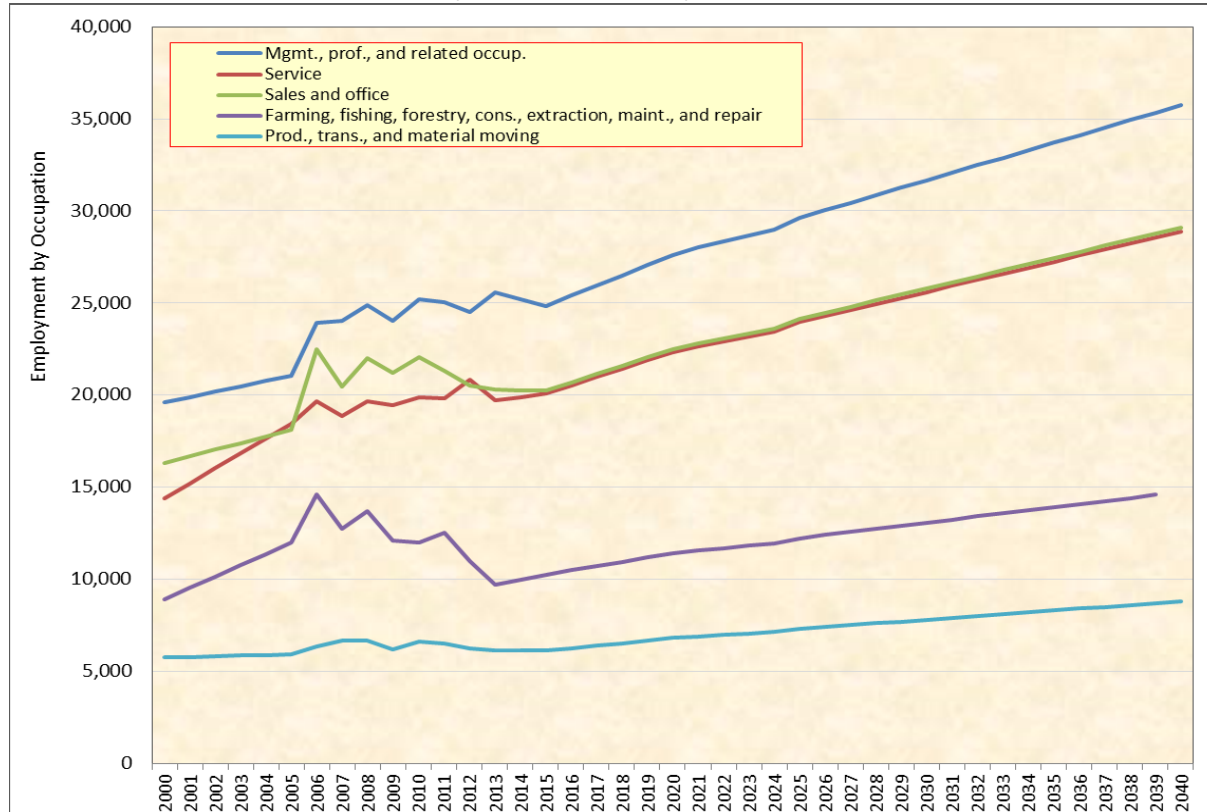
Employment in the professions, scientific, management, administrative, and waste management increased steadily through the last 15 years. The forecast predicts a similar steady growth through the next 25 years.

The remaining 30 percent of employed persons work in one of the eight industries shown in Figure 15. As was true with the construction industry, employment in the Finance, insurance, real estate, rental and leasing industry tends to rise and fall with the housing market. Similarly, employment trends in the Agriculture, forestry, fishing, hunting and mining industry are matched by the Transportation, warehousing and utilities industry.

Employment by Occupation

The number of persons employed in each of five major occupations in Hawai'i County was also taken from Census data and the foundation data for forecasts were taken from DBEDT. Again, we present the average number of persons employed at each five occupations in each year between 2000 and 2040.

FIGURE 16: EMPLOYMENT BY OCCUPATION, COUNTY OF HAWAI'I, 2000 THROUGH 2040



Management, professional and related occupations account for the largest percentage of employed persons in the County of Hawai'i (30.5 percent). Sales and office occupations account for approximately one-quarter of all employed persons (25.4 percent), followed closely by service occupations (24.6 percent).

Location Quotients

Definition: One of the more useful statistics that planners use in their work is the “location quotient”. A location quotient (LQ) is used to quantify how concentrated a particular characteristic or activity is within a geographic area at some specific time. As an example, we are concerned here with the relative concentration of employment by industry in Hawai'i County relative to its concentration in the State as a whole (Table 2).

Trend: Note that location quotients are available on the Bureau of Labor Statistics website⁸ for Hawai'i County relative to the State for 2001 through 2014. Because the BLS sectors and those available in DBEDT's 2040 forecast for employment by county are not exactly aligned, LQs were calculated for the County relative to the State and for the FAZs relative to the County of Hawai'i for each year between 2010 and 2040. These data are reported in the forecast data worksheets.

Discussion: The LQs for Hawai'i County employment by industry explain how the distribution of jobs in the County of Hawai'i compare to their distribution across the State. For instance, the number of persons employed in agriculture and forestry was more than three times higher in Hawai'i County than in the state. That suggests a much higher concentration of agricultural jobs in the County than in the state as a whole. Hawai'i County also employed about 1.5 times as many people in utilities and in hotel professions as the rest of the State. This is expected to continue throughout the forecast period for utilities jobs, and only decrease slightly from 1.53 to 1.44 for hotel jobs.

Professional services is the employment classification for which jobs in Hawai'i County are underrepresented as compared to the rest of the state. In 2010, the location quotient for professional services employees was 0.54, meaning that the concentration of persons employed in professional services in the county was just over half of that across the state. Employment in the finance and insurance industry has also been relatively low in Hawai'i County compared to the state. In 2010, the concentration of finance and insurance jobs in the County was approximately two-thirds of the State's concentration. This is expected to continue to decline throughout the forecast period, reaching 0.60 by 2040.

Table 3 presents the distribution of wage and salary jobs for each of the County's 13 FAZ in 2013 and 2040. The LQ for 2040 is also presented there. Then distribution of jobs across FAZs is similar at the beginning and end of the forecast period, reflecting a forecast strategy of maintaining the “business as usual” approach.

The location quotients reflect the existing concentration of jobs across the FAZ's given our forecasts for population and job growth. Recall that jobs were distributed according to industry location (where the jobs are) and employment was distributed according to population growth (where the people live).

⁸ http://data.bls.gov/location_quotient/ControllerServlet

TABLE 3: SUMMARY OF IMPACT: LOCATION QUOTIENTS FOR ALL FAZ RELATIVE TO COUNTY DISTRIBUTION OF JOBS, 2013 TO 2014.

CIVILIAN WAGE & SALARY JOBS BY SECTOR		Forecast Analysis Zones, County of Hawai'i												
		Hilo	North Hilo	Hāmākua Coast Villages	Honoka'a-Pa'auilo	Waimea	North Kohala	Kawaihae-Puakō-Waikoloa-Waikoloa Resorts	North Kona	South Kona Villages	Ka'ū	Kea'au-Kurtistown	Upper Puna	HPP-Orchidland
FAZ Number		1	2	3	4	5	6	7	8	9	10	11	12	13
All Jobs	2013	19749	2808	2513	3142	1988	3461	15977	3781	2085	1463	3588	4349	2343
	2040	23229	3,734	3,904	5,052	3,098	4,554	23288	5,829	3,145	2,176	4,650	6,744	3,688
Agriculture, mining, and construction	2013	843	199	316	517	165	283	1394	554	352	158	303	540	387
	2040	1,036	309	467	529	198	250	1,644	722	450	223	347	551	319
	LQ	0.61	1.14	1.64	1.44	0.88	0.75	0.97	1.70	1.96	1.41	1.02	1.12	1.19
Food processing and other manufacturing	2013	323	33	60	133	16	48	217	56	85	22	65	107	58
	2040	401	25	36	163	28	44	244	58	120	15	84	97	125
	LQ	1.29	0.49	0.69	2.41	0.68	0.72	0.78	0.74	2.84	0.50	1.34	1.07	2.53
Transportation and utilities	2013	938	115	50	124	25	193	741	77	91	61	75	122	181
	2040	1,207	140	36	163	28	147	895	123	126	69	53	179	157
	LQ	1.41	1.02	0.25	0.88	0.25	0.88	1.05	0.58	1.09	0.86	0.31	0.72	1.16
Information	2013	293	19	27	18	58	34	163	46	21	3	7	62	31
	2040	280	33	32	12	22	12	168	71	43	16	17	146	48
	LQ	1.08	0.78	0.74	0.22	0.63	0.24	0.64	1.09	1.21	0.67	0.33	1.94	1.17
Wholesale trade	2013	530	47	32	64	25	20	242	52	0	58	112	152	292
	2040	551	141	39	21	76	31	331	38	4	53	207	122	297
	LQ	1.13	1.81	0.48	0.19	1.16	0.32	0.68	0.31	0.07	1.16	2.13	0.87	3.84
Retail trade	2013	2383	364	201	332	220	432	2718	542	292	151	520	617	275
	2040	2,882	336	418	367	328	500	3,105	657	282	181	464	581	480
	LQ	1.16	0.84	1.00	0.68	0.99	1.03	1.25	1.05	0.84	0.78	0.93	0.81	1.22

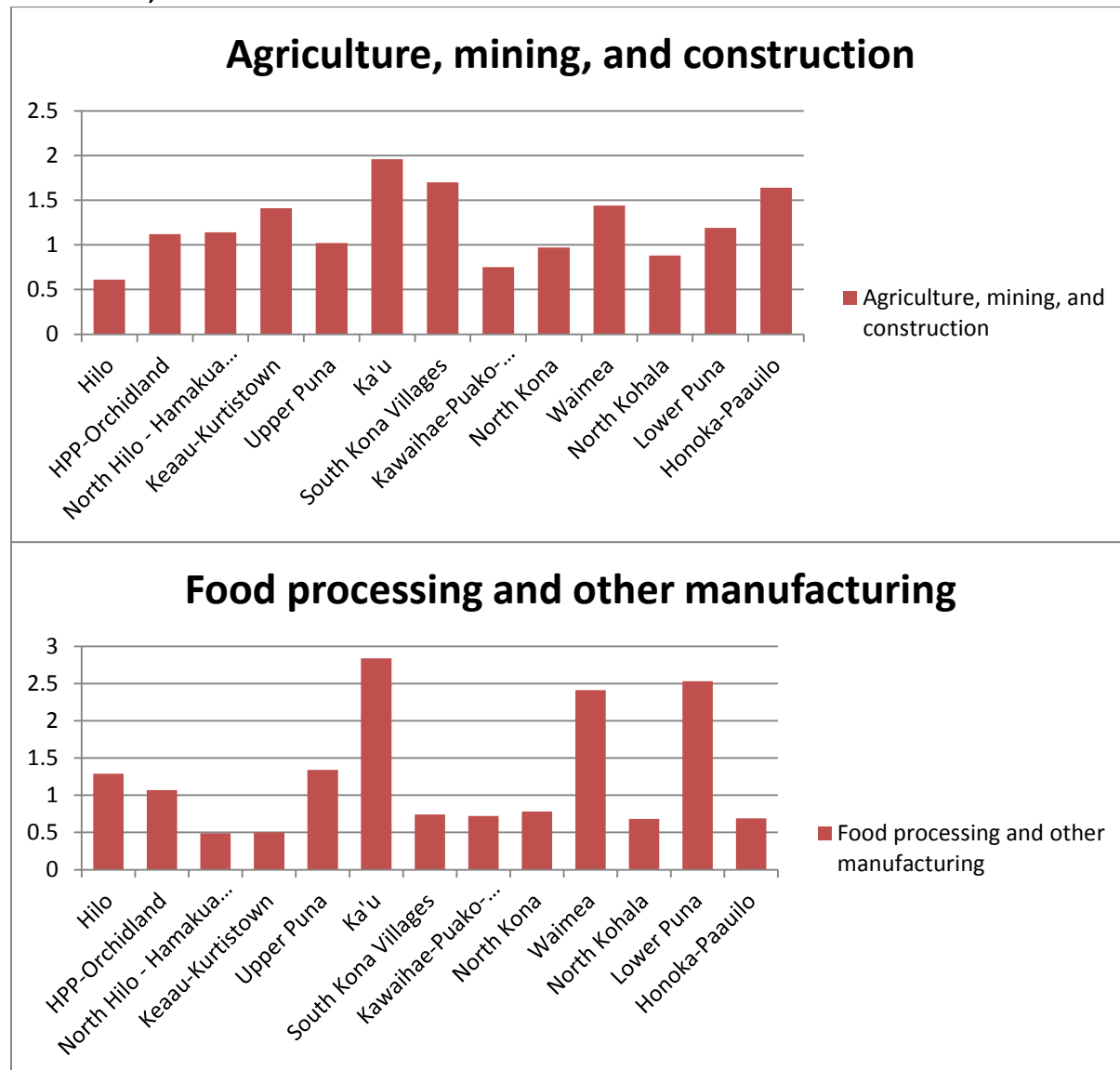
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TABLE 3 (CONTINUED): SUMMARY OF IMPACT: LOCATION QUOTIENTS FOR ALL FAZ RELATIVE TO COUNTY DISTRIBUTION OF JOBS, 2013 TO 2014.

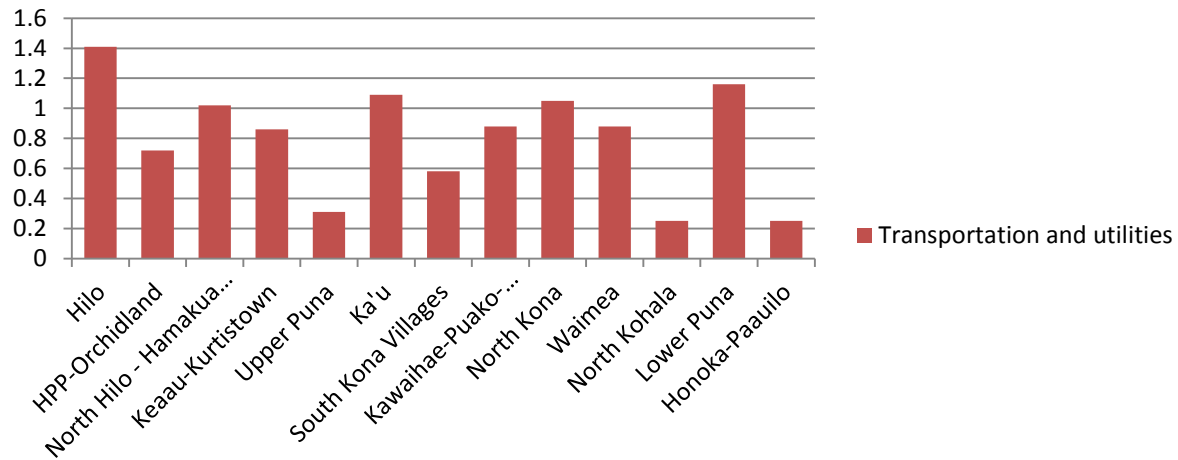
CIVILIAN WAGE & SALARY JOBS BY SECTOR		Forecast Analysis Zones, County of Hawai'i												
		Hilo	North Hilo	Hāmākua Coast Villages	Honoka'a-Pa'auilo	Waimea	North Kohala	Kawaihae-Puakō-Waikoloa-Waikoloa Resorts	North Kona	South Kona Villages	Ka'ū	Kea'au-Kurtistown	Upper Puna	HPP-Orchidland
FAZ Number		1	2	3	4	5	6	7	8	9	10	11	12	13
Finance and insurance, Real estate and rentals	2013	743	73	70	75	111	222	931	210	40	25	82	152	119
	2040	878	57	86	138	94	175	1,126	250	43	36	109	211	98
	LQ	1.24	0.50	0.72	0.89	0.99	1.26	1.58	1.41	0.45	0.54	0.77	1.02	0.87
Professional services and Business services	2013	982	136	154	323	162	170	1780	350	128	90	171	314	164
	2040	1,219	154	208	636	220	247	1,921	343	172	130	235	296	239
	LQ	0.53	0.42	0.54	1.27	0.72	0.55	0.83	0.59	0.55	0.60	0.51	0.44	0.66
Educational services and Health services	2013	3181	398	354	360	176	181	1346	483	271	217	486	656	364
	2040	3,648	535	546	608	183	244	1,430	547	361	300	485	1,091	505
	LQ	0.82	0.74	0.73	0.63	0.31	0.28	0.32	0.49	0.60	0.72	0.54	0.84	0.71
Arts/entertainment, hotels, eating, drinking	2013	2028	520	805	895	769	1276	4087	609	265	253	524	586	180
	2040	2,114	469	927	868	1,028	1,410	4,862	938	415	272	817	622	320
	LQ	0.50	0.70	1.32	0.95	1.84	1.72	1.16	0.89	0.73	0.69	0.97	0.51	0.48
Other services	2013	742	113	113	122	49	107	655	127	121	27	82	84	55
	2040	782	79	130	133	40	64	796	235	85	39	172	112	158
	LQ	1.20	0.76	1.19	0.93	0.46	0.50	1.22	1.43	0.96	0.64	1.31	0.59	1.52
Government	2013	6763	789	332	177	211	494	1703	674	419	398	1162	957	236
	2040	8,230	772	246	468	273	577	2,405	754	455	434	789	1,474	251
	LQ	1.71	1.00	0.30	0.45	0.43	0.61	0.50	0.62	0.70	0.96	0.82	1.05	0.33

The following figure displays location quotients for each FAZ by job type. Recall that the location quotient is a ratio of ratios, here describing the relative concentration of job types across the County. For a particular job type, a FAZ LQ of 1.0 means that FAZ has about the same percentage of that job type as does the county as a whole. If the LQ is higher than 1.0, then there are more of those jobs in the FAZ than in the County as a whole. If the LQ is lower, then the FAZ has fewer of those jobs than the average for the county.

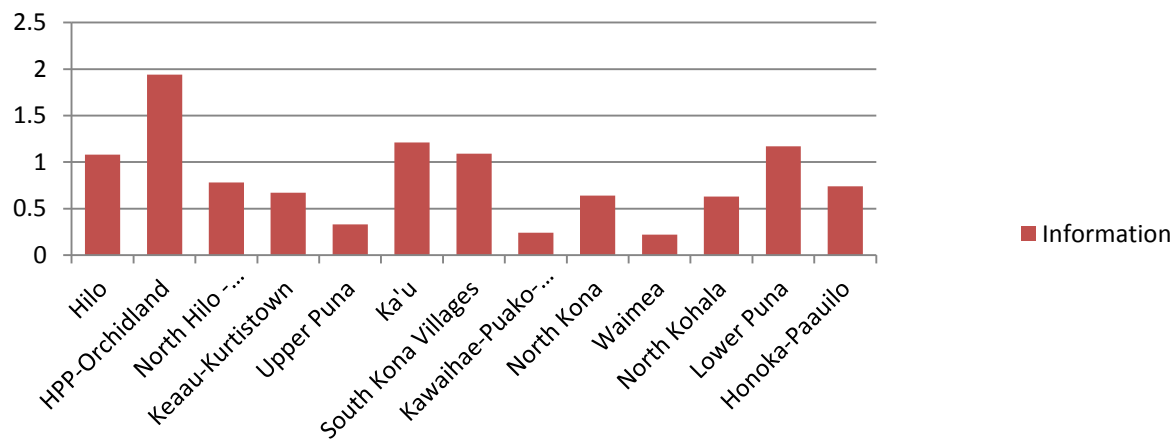
FIGURE 16A: LOCATION QUOTIENTS FOR CIVILIAN WAGE AND SALARY JOBS BY JOB TYPE AND FAZ, COUNTY OF HAWAII, 2000-2040



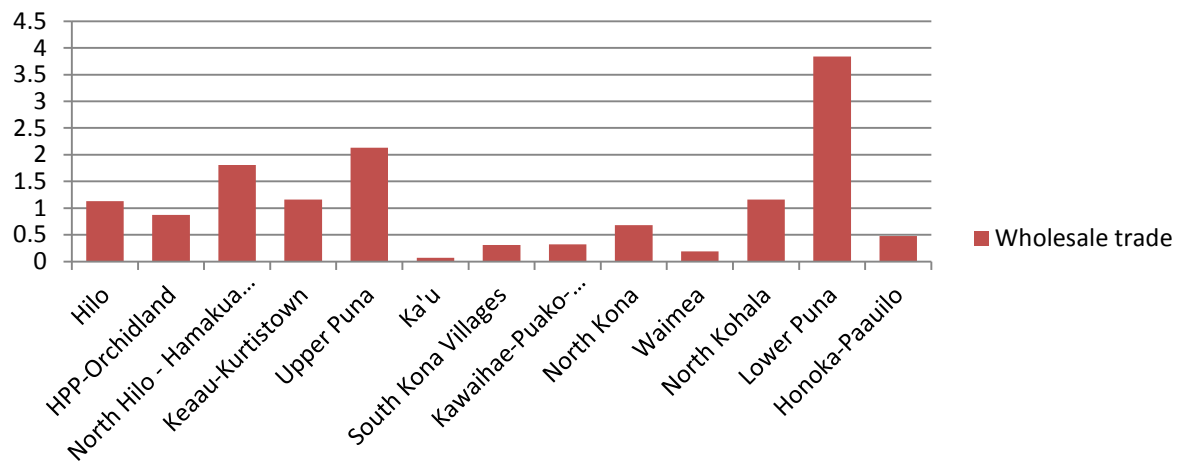
Transportation and Utilities

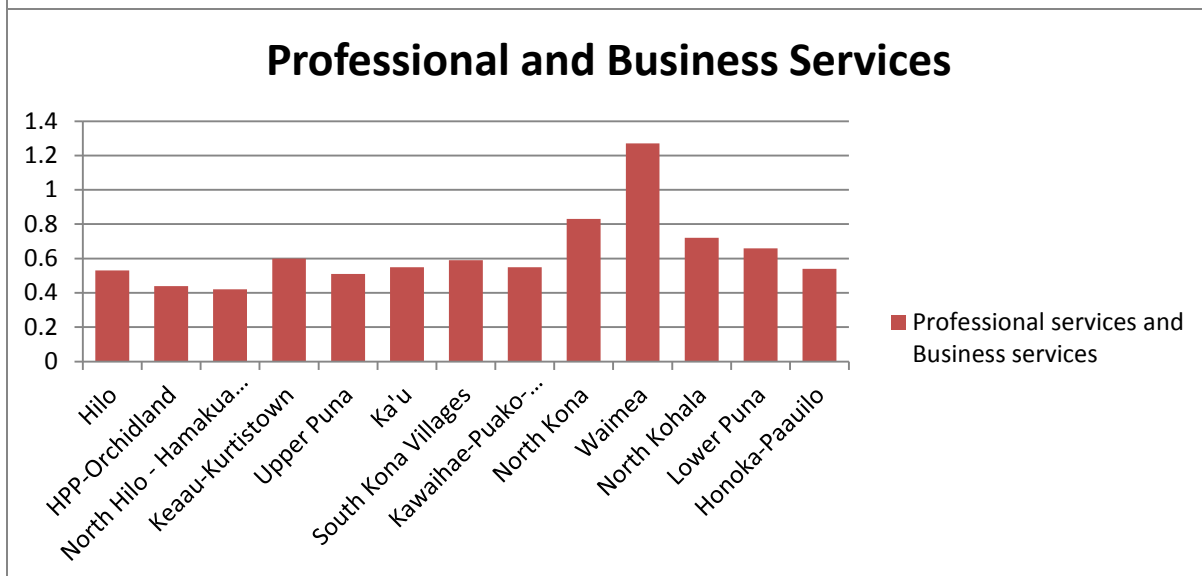
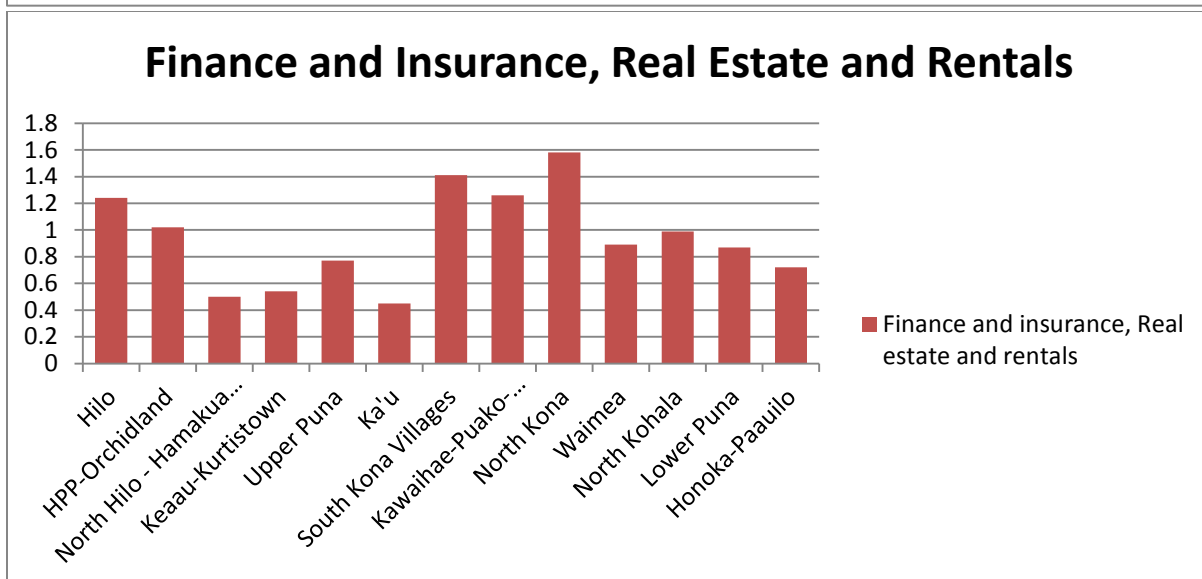


Information

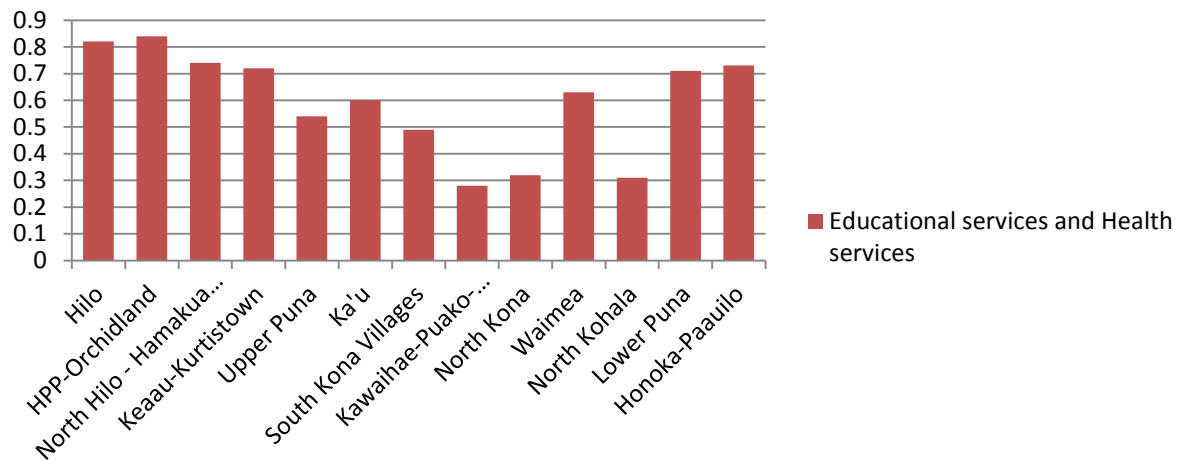


Wholesale Trade

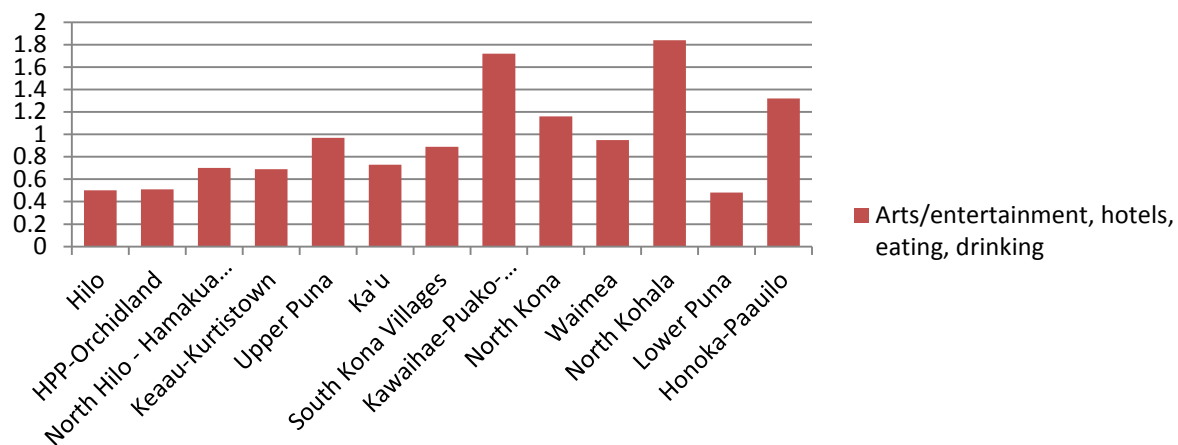




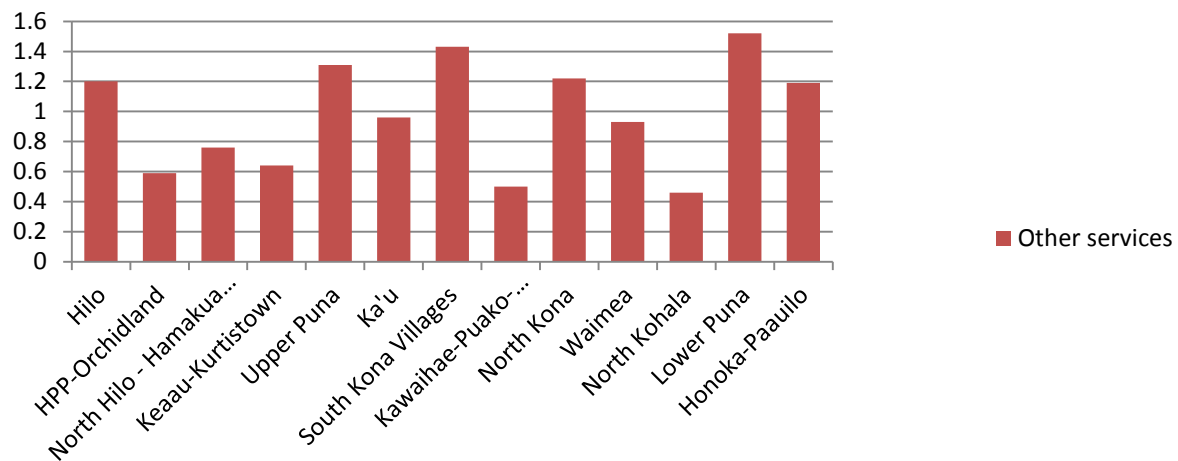
Educational and Health Services

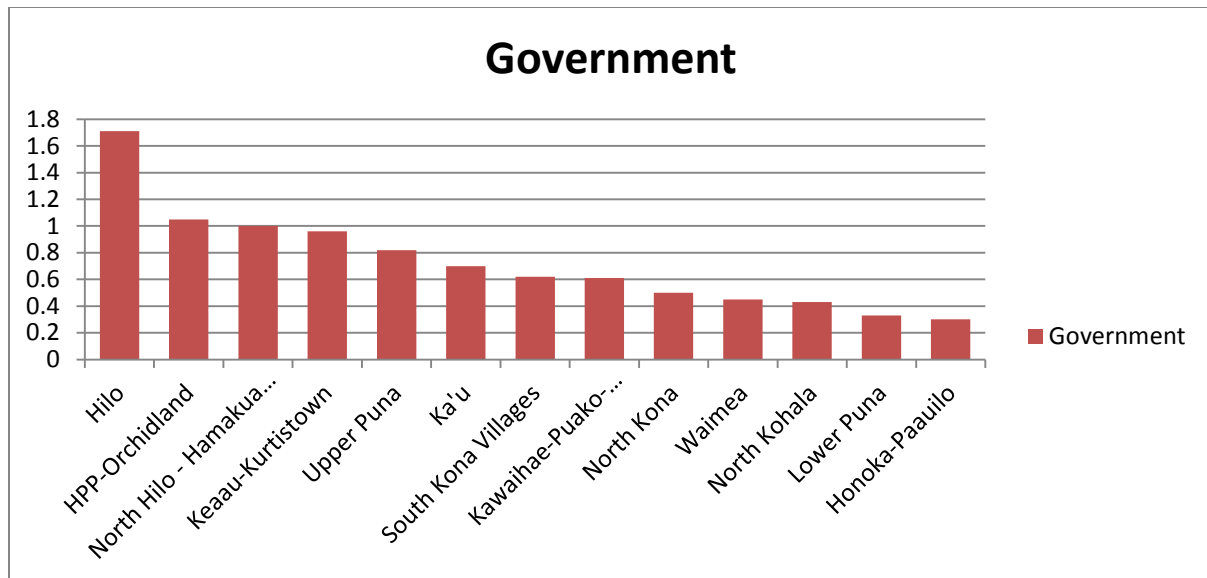


Arts and Entertainment



Other Services





Note also that location quotients were not forecasted nor allocated to tracts and FAZS. They were calculated from empirical or forecast data for each job and FAZ of interest.

Table 4 presents the location quotients for the County of Hawaii viz-a-viz the State of Hawai'i. Here the LQs measured the difference between the relative concentration of jobs at the County and State levels. It was not surprising then to find much higher concentration of agricultural jobs in Hawaii County than in the State. Neither was it surprising to find that Hawaii Island had fewer jobs than the State as a whole in the information industry, finance and insurance, or the manufacturing sector.

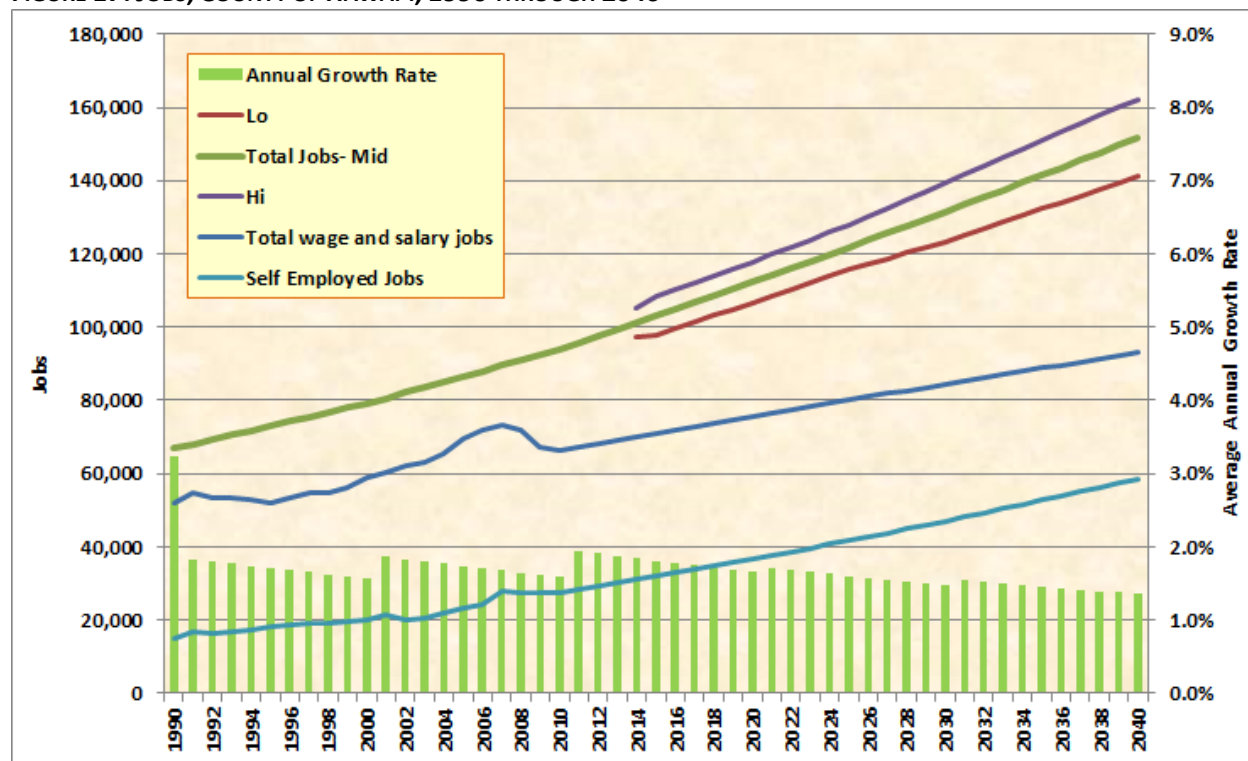
TABLE 4: LOCATION QUOTIENTS: EMPLOYMENT FOR 20 NAICS CLASSES, COUNTY OF HAWAI'I VS. STATE OF HAWAI'I, 2001-2014

	2010	2015	2020	2025	2030	2035	2040
Agriculture	3.39	3.32	3.25	3.19	3.14	3.10	3.06
Utilities	1.52	1.55	1.55	1.55	1.55	1.53	1.52
Hotels	1.53	1.52	1.51	1.49	1.47	1.46	1.44
Arts and entertainment	1.46	1.45	1.43	1.40	1.37	1.34	1.31
Real estate and rentals	1.35	1.32	1.30	1.27	1.25	1.24	1.22
Retail trade	1.26	1.24	1.22	1.20	1.18	1.16	1.13
Food processing	1.14	1.12	1.09	1.07	1.06	1.03	1.02
Health services	1.03	1.08	1.13	1.17	1.21	1.25	1.28
Mining and construction	1.05	1.02	1.00	1.00	0.99	0.98	0.97
Government	0.95	0.94	0.94	0.94	0.94	0.94	0.94
Eating and drinking	0.89	0.91	0.91	0.92	0.92	0.92	0.92
Transportation	0.90	0.89	0.88	0.87	0.86	0.85	0.84
Educational services	0.83	0.86	0.89	0.93	0.95	0.97	0.99
Wholesale trade	0.85	0.85	0.83	0.83	0.82	0.81	0.80
Information	0.74	0.72	0.74	0.73	0.74	0.74	0.73
Other services	0.71	0.70	0.70	0.68	0.67	0.66	0.64
Business services	0.66	0.69	0.72	0.75	0.77	0.80	0.82
Other manufacturing	0.69	0.69	0.67	0.67	0.66	0.65	0.64
Finance and insurance	0.67	0.66	0.65	0.64	0.63	0.61	0.60
Professional services	0.54	0.55	0.56	0.56	0.56	0.56	0.56

JOBS IN THE COUNTY OF HAWAII

Definition: “Jobs” is usually used to refer to paid positions of regular employment. The number of jobs is one of the most common measures used by economists to measure economic well-being and economic growth. The number of jobs (that is, available positions in which a person could be employed) is a measure of demand for labor. The measure of jobs is different from the measure of employment for two reasons. First, not all jobs are filled positions. Second, jobs may be filled by more than one person. Figure 17 presents the historical and forecast data for total jobs in the County of Hawai‘i between 1990 and 2040.

FIGURE 17: JOBS, COUNTY OF HAWAII, 1990 THROUGH 2040



Trend: Because the number of jobs is one of the few topics not covered by the U.S. Census Bureau, jobs data were taken from the Hawai‘i State Department of Labor and Industrial Relations (DLIR). DLIR’s historical data series of job counts by North American Industry Classification System (NAICS) classification (not seasonally adjusted)⁹ was reported by DBEDT. Total jobs data as prepared by DBEDT also provide detailed descriptions of individual job types included in each industry classification. These definitions are included in Appendix A. Finally, DBEDT 2040 also provided a comprehensive data set for total jobs, wage and salary jobs, and self-employment for the period between 1990 and 2040. These data were used as the basis for trends and forecasts reported here.

⁹ <http://www.hiwi.org/gsipub/index.asp?docid=421>

Job growth was somewhat chaotic during the nineties, but resulted overall in slow growth pattern until 2000. The year 2000 was a high growth year, and 2002 fell dramatically after the events of September 11, 2001. Jobs grew quickly from 2003 through 2007, and then fell off during the Great Recession. By 2011, slow and steady job growth began at about the level that DBEDT 2040 had predicted in the earlier forecast.

The number of persons who are self-employed has grown at a relatively steady pace throughout the last three decades. Wage and salary jobs, on the other hand, reflect economic conditions. Their numbers grow faster during periods of economic growth and slow down during economic downturns.

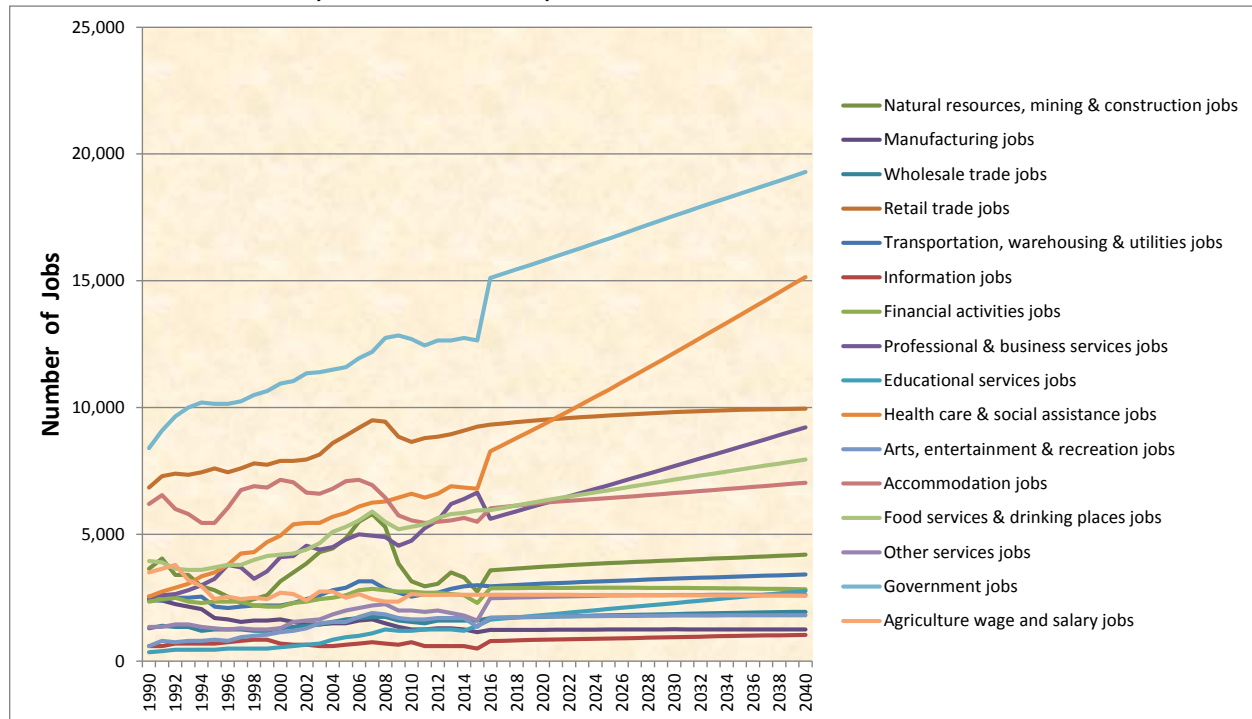
Forecast: The job forecast estimates were taken directly from the 2040 Forecast Tables A-43 and A-48. The historical data, as we have noted, matched the 2040 forecasts very well, and no adjustment was required. The number of jobs is expected to increase at a decreasing rate through the next 25 years from about 100,000 in 2014 to about 150,000 in 2040. The high estimate is about ten percent more than the forecast in 2040. The low estimate is down about five percent.

Discussion: The total job count forecast seems to be a reasonable estimate and we found no alternative forecasts that suggested significant changes should be considered.

Jobs by Sector

Definition: Sector data for jobs were available only for wage and salary jobs. Job sectors were a set of 15 categories of jobs developed by DBEDT and shared by most State and County governmental agencies. Definitions of the various industry sectors are shown in Appendix A and appear in figures presented in this section. Figure 18 shows the number of wage and salary jobs by sector between 1990 and 2040.

FIGURE 18: NUMBER OF JOBS, COUNTY OF HAWAI‘I, 1990 THROUGH 2040



Graphing 15 job categories over 50 years produces results that are difficult to read. The chart provides a rough overview of the historical and predicted growth patterns for wage and salary jobs in Hawai'i County. Table 5 presents the number of jobs recorded and forecast for the years 1990 through 2015. Figures for all years between 1990 and 2040 have been included in the data matrix submitted along with this report.

TABLE 5: PERCENTAGE OF TOTAL NON-AGRICULTURAL WAGE AND SALARY JOBS BY SECTOR, COUNTY OF HAWAII, 1990-2015

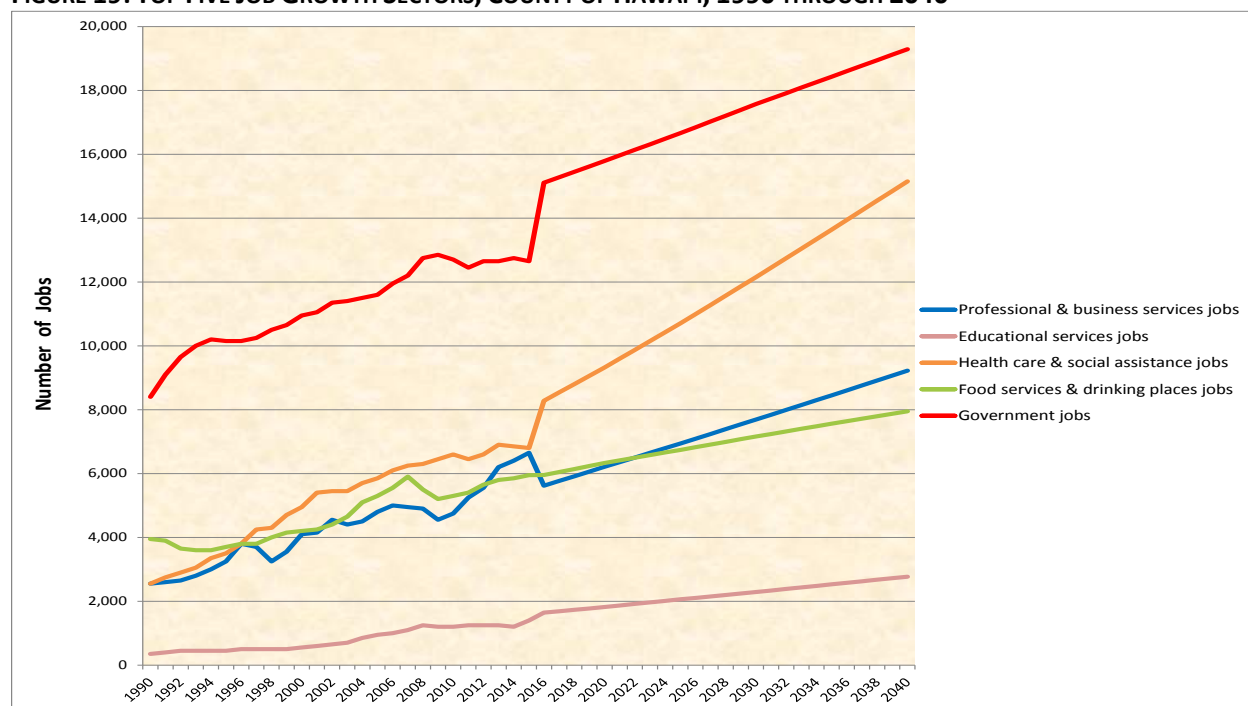
	1990	1995	2000	2005	2010	2015
Total wage and salary jobs	49,000	49,550	56,000	64,700	62,950	
Total non agriculture wage & salary jobs	45,500	47,100	53,300	62,200	60,300	62,500*
Natural resources, mining & construction	8.0%	5.9%	5.9%	7.8%	5.2%	4.4%
Manufacturing	5.4%	3.6%	3.1%	2.4%	2.1%	1.8%
Wholesale trade	2.9%	2.7%	2.4%	2.7%	2.6%	2.6%
Retail trade	15.1%	16.1%	14.8%	14.3%	14.3%	14.8%
Transportation, warehousing & utilities	5.3%	4.6%	4.1%	4.7%	4.2%	4.8%
Information	1.3%	1.5%	1.3%	1.0%	1.2%	0.8%
Financial activities	5.2%	5.0%	4.0%	4.2%	4.6%	3.7%
Professional & business services	5.6%	6.9%	7.7%	7.7%	7.9%	10.6%
Educational services	0.8%	1.0%	1.0%	1.5%	2.0%	2.2%
Health care & social assistance	5.6%	7.4%	9.3%	9.4%	10.9%	10.9%
Arts, entertainment & recreation	1.3%	1.8%	2.2%	2.5%	2.7%	2.2%
Accommodation	13.6%	11.6%	13.4%	11.4%	9.2%	8.8%
Food services & drinking places	8.7%	7.9%	7.9%	8.5%	8.8%	9.5%
Other services	3.0%	2.8%	2.4%	3.2%	3.3%	2.6%
Government	18.5%	21.5%	20.5%	18.6%	21.1%	20.2%
Agriculture wage and salary	7.7%	5.2%	5.1%	4.0%	4.4%	0.0%

* 2015 data are first and second quarters only

The top five growth sectors in the DBEDT 2040 forecast are government jobs, food services and drinking place jobs, health care and social services jobs, education services jobs, and professional and business services jobs. Historical growth has been significant in all five sectors. All but the business sector have made up large portions of the County's total job count. The five sectors comprise the services jobs component of the county economy and it will surprise no one that the forecast describes an economy increasingly based on service jobs.

Figures 19 and 20 show details from Figure 18. In Figure 19, we separate out the trends and forecasts for the five sectors with the highest growth rates in DBEDT 2040. Figure 20 presents similar data for the next five highest growth sectors.

FIGURE 19: TOP FIVE JOB GROWTH SECTORS, COUNTY OF HAWAII, 1990 THROUGH 2040



Three sector forecasts do not match the historical data well and we expect that the next set of forecasts, due next year, will remedy that fact. Government jobs have not performed at the forecast level and, in fact, have shown very little growth since 2004. The forecasted growth rate for government jobs, however, seems consistent with the historical behavior of this data series. The same situation exists with the forecast for health care and social services jobs. Performance has been about 1,500 jobs below what the forecast predicted. More importantly, the forecast rate of growth is higher than the rate of growth between 2000 and 2013. Finally, the forecast for professional and business services is somewhat lower than its historical performance.

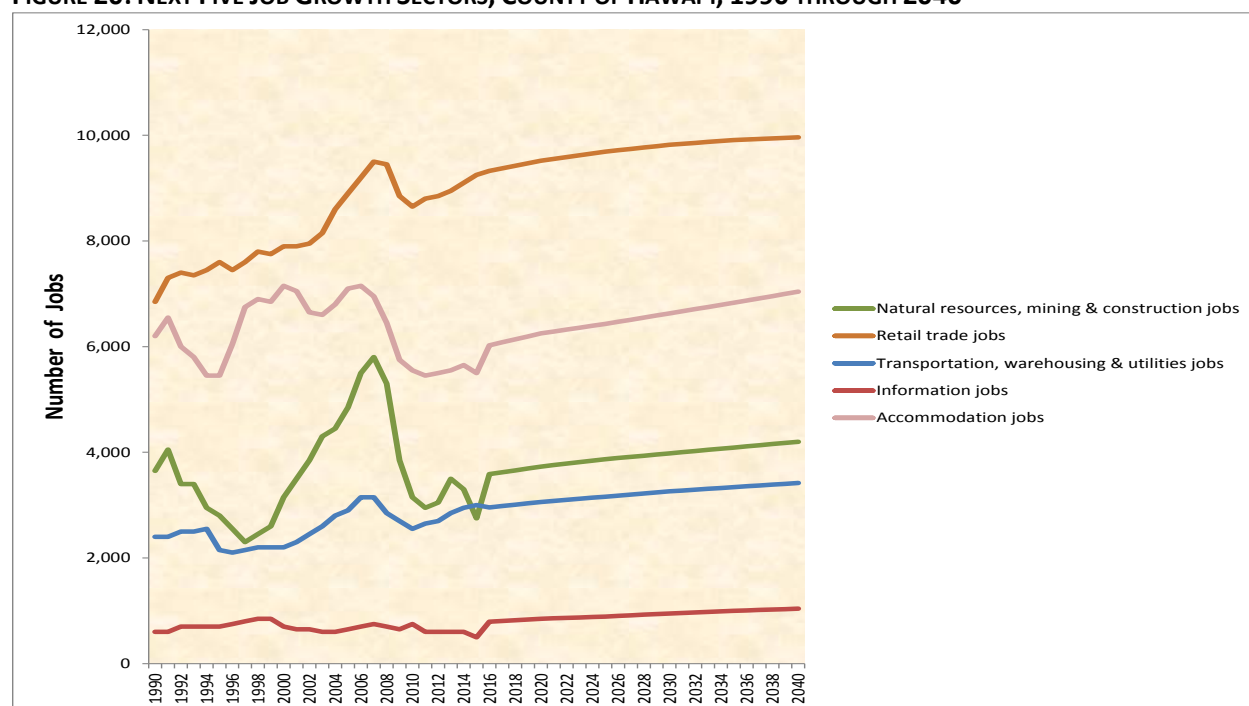
For the next five most important job sectors (Figure 15) the trend data have been volatile, making forecasting more risky. In general, we do not anticipate serious problems with these forecasts, however.

For information sector jobs, high growth accompanied the housing bubble economy until 2007 and then fell again during the Great Recession. The forecast rate, however, may be lower than the pre-2013 performance would support.

Jobs in the accommodations sector and the construction sector varied widely since 1990. The intersection of the historical data and the DBEDT 2040 forecast were slightly lower than predicted and their forecasted rates of growth are moderate. All three of these sectors may perform better in the next 25 years than is indicated in the forecast shown here.

Forecasts for transportation, warehousing and utilities jobs, and for retail trade jobs, seem reasonable when compared with their historical data series.

FIGURE 20: NEXT FIVE JOB GROWTH SECTORS, COUNTY OF HAWAII, 1990 THROUGH 2040



Discussion: The jobs by sector trends and forecasts provided by DLIR and DBEDT should suffice for most planning decisions in the short-run. The next edition of the forecasts is underway and should be available in late 2016. Before that time, planning decisions that depend heavily on sectors discussed above should be approached carefully. Jobs in government, health and social services, and the information sector jobs should be considered in the category. The disconnect between trends (sector performance in the recent past) and forecasts (future growth rates) may affect the reliability of those forecasts.

Longitudinal Employer-Household Dynamics

Definition: Longitudinal Employer-Household Dynamics (LEHD) provides several data products that may be used to research and characterize workforce dynamics for specific groups. These data products include the Quarterly Workforce Indicators (QWI) and LEHD Origin-Destination Employment Statistics (LODES) data sets.

LEHD Origin-Destination Employment Statistics (LODES) data are state-based and organized into three types: Origin-Destination (OD), Residence Area Characteristics (RAC), and Workplace Area Characteristics (WAC). This information is available at the census block geographic level. For the present study, WAC data were utilized.

Trend: From the LEHD LODES data, tract level data regarding the total number of jobs were assembled for 2002 through 2013¹⁰ and is displayed in Figure 16 below. The average annual growth rate ranged from – 9.4 percent in 2009 to 5.7 percent in 2005.

The job counts provided by LEHD LODES and that provided by DLIR are somewhat different. This is because the LODES data come from Unemployment Insurance (UI) records. Review of their fundamental data definitions describes them as monthly data for all persons employed by employers who are registered in the UI system¹¹. Companies with no employees, or sole proprietorships, are not counted in the LODES data but are included in ACS data. There were approximately 16,500 sole proprietorships in Hawai'i County in 2013. Also excluded from the LODES job counts are the military and other security-related federal agencies, postal workers, some employees at nonprofits and religious institutions, informal workers, and the self-employed.

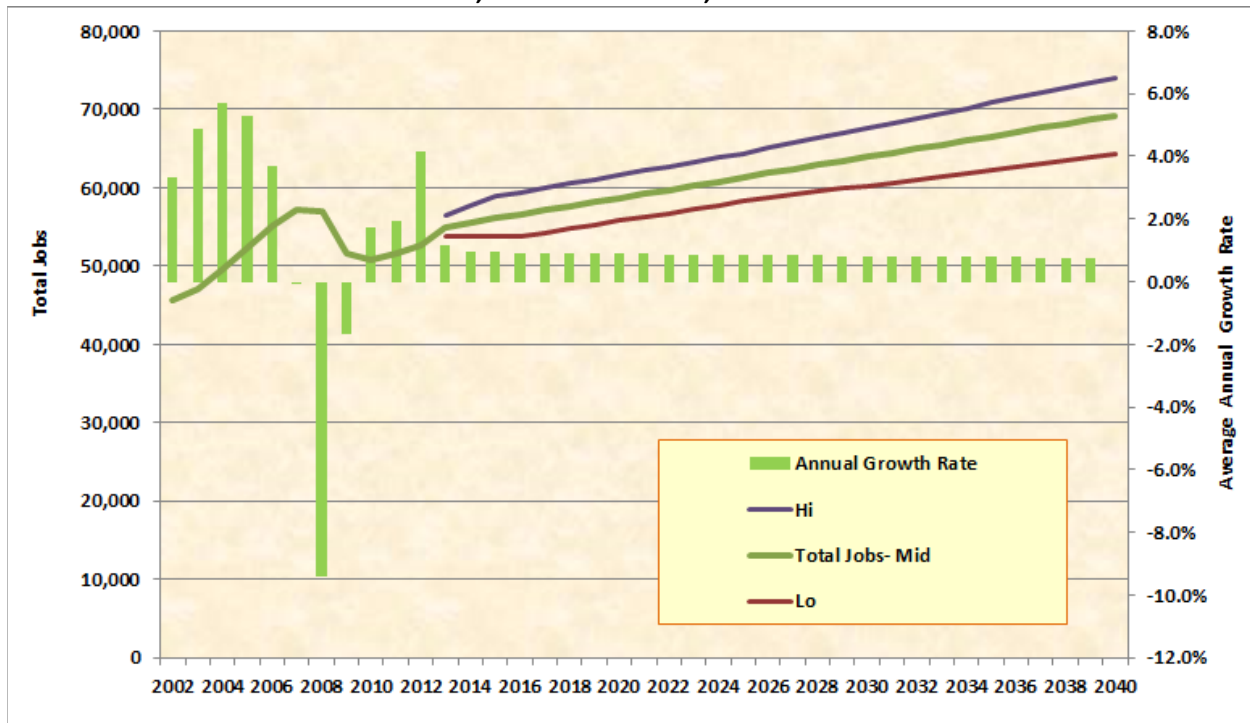
It is possible that the LEHD LODES data does not include certain employment types because it was primarily developed for transportation modeling. Transportation modeling must link where people live and where they go to work on regular basis. The self-employed, informal sectors, postal workers, etc. all tend to have unusual or nonconforming transportation patterns, making them outliers for transportation modeling. The LEHD is intended to detail where people are working, not just whether they have a job (which is the primary focus of the DLIR data).

Forecast: To generate the forecast for 2014 through 2040, a standard linear regression equation was applied. The resulting projection bears a striking resemblance to the jobs forecast based on DLIR and DBEDT data (Figure 12). The high forecast estimate begins with the mid-level estimate in 2014 and applies a standard five percent increase through 2040. Similarly, the low estimate begins with the mid-level estimate in 2014 and applies a standard five percent decrease to 2040. The average annual growth rate for the period 2014 through 2040 was 0.8 percent.

¹⁰ <http://lehd.ces.census.gov/data/>

¹¹ All employers with one or more employees must register with UI and report data monthly

FIGURE 21: TOTAL JOBS FROM LEHD LODES, COUNTY OF HAWAI'I, 2002-2040



Discussion: In addition to providing insight into the nature of jobs across the County, these data will serve as the foundation for analyses of the total commercial and industrial square footage occupied and available in the County of Hawai'i.

HOUSEHOLD INCOME DISTRIBUTION

Definition: Household income is the income of the householder and all other household members 15 years of age or older, whether they are related to the householder or not, during a 12-month period. Household income excludes the income of any members who earned money during the year, but are not currently residing in the home.

Income includes money received on a regular basis (exclusive of capital gains) before payments for personal income taxes, social security, union dues, Medicare deductions, etc. Therefore, money income does not reflect income in the form of noncash benefits, such as food stamps, and other transfer payments. The Census measure of income is generally considered more accurate than more comprehensive measures of income because it is easier for respondents to remember wage and salary income.

TABLE 6: HOUSEHOLD INCOME DISTRIBUTION, COUNTY OF HAWAII, 2000-2013

	2000	2005	2010	2011	2012	2013
Total households	52,945	59,470	64,382	64,270	64,556	64,909
Annual Household Income						
Less than \$10,000	6,135	4,356	5,184	5,211	5,473	6,187
\$10,000 to \$14,999	3,489	3,770	3,862	3,712	3,717	3,532
\$15,000 to \$24,999	6,730	5,205	6,638	6,645	7,211	7,541
\$25,000 to \$34,999	7,043	6,587	5,613	6,264	6,318	6,427
\$35,000 to \$49,999	8,727	10,739	8,138	8,509	8,402	7,990
\$50,000 to \$74,999	9,764	12,790	12,641	12,002	11,771	12,217
\$75,000 to \$99,999	5,493	7,464	9,023	9,114	8,759	8,703
\$100,000 to \$149,999	3,715	5,834	8,623	8,170	8,357	7,803
\$150,000 to \$199,999	910	1,374	2,457	2,721	2,684	2,672
\$200,000 or more	939	1,351	2,203	1,922	1,864	1,837

Trend: Household income data were taken from the U.S. Decennial Census for 1990 and 2000, and from the American Community Surveys 2005-2013.¹² Estimates were calculated for the intercensal years from 2001 to 2004. The average annual growth rate was calculated directly from the data. The decennial census data do not provide much detail for the first twenty years of the series, but the introduction of the ACS data resulted in household incomes rising from about 2005 through 2008. The data are based on relatively small samples and are less reliable than we might wish. It is consistent with the fact that average household income in Hawai'i County rose during the 2003-2007 economic boom and fell between 2008 and 2010.

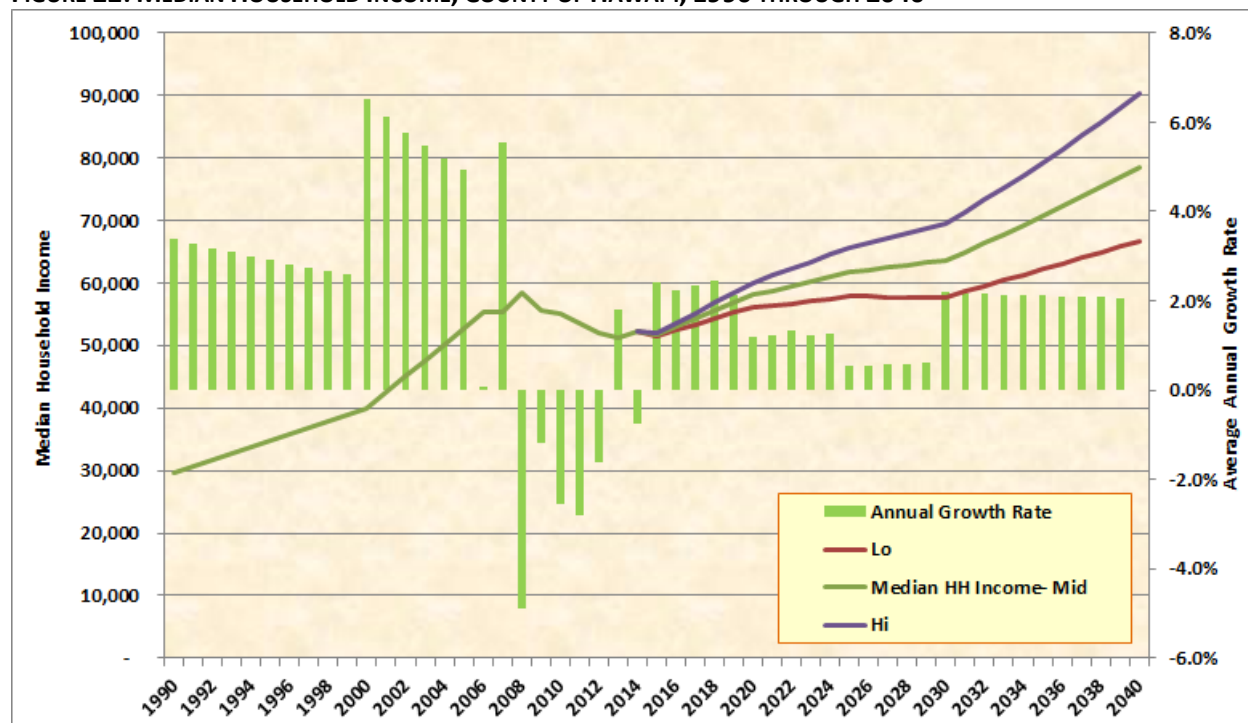
The Area Median Income (AMI) for Hawai'i County in 2015 is \$62,400. Between 2000 and 2010, the percentage of households earning \$100,000 or more nearly doubled (10.5% in 2000 to 20.6% in 2010). During that same decade, the percentage of households earning less than \$25,000 dropped from 30.9 percent to 24.4 percent.

¹² 2005-2006: single-year estimates; 2007-2008: three-year estimates; 2009-2013: five-year estimates

MEDIAN HOUSEHOLD INCOME

Definition: Median household income divides the income distribution into two equal parts, with one-half of the cases falling below the median income and one-half above the median. For households, the median income is based on the distribution of the total number of households (including those with no income).

FIGURE 22: MEDIAN HOUSEHOLD INCOME, COUNTY OF HAWAI‘I, 1990 THROUGH 2040



Trend: Household income data were taken from the U.S. Decennial Census for 1990 and 2000, and from the American Community Surveys 2005-2013.¹³ Estimates were calculated for the intercensal years from 2001 to 2004. The average annual growth rate was calculated directly from the data. The decennial census data do not provide much detail for the first twenty years of the series, but the introduction of the ACS data resulted in household incomes rising from about 2005 through 2008. The data are based on relatively small samples and are less reliable than we might wish. It is consistent with the fact that average household income in Hawai‘i County rose during the 2003-2007 economic boom and fell between 2008 and 2010.

Forecast: The mid-level median household income forecast was computed as a function of total personal income (for which forecast data are available from DBEDT Data Book 2014 Table 13.12). The rationale is that total income divided by persons produces per capita income. In the same sense, total income divided by the number of household yields an estimate of average household income in the County. The Data Book also provided data on the total number of households, the ratio of median income to personal income, and current and constant dollar household income figures for the State. After 2030, the forecast takes its shape from the total income growth pattern. Between 2014 and 2030 the data were fit to a set of curves to approximate household incomes based on total income.

¹³ 2005-2006: single-year estimates; 2007-2008: three-year estimates; 2009-2013: five-year estimates

Discussion: Forecasting household income is an imprecise undertaking. It is rarely attempted. The determinants of household income form a complex array including household formation and household characteristics, number of employed persons per household, the changing distribution of incomes over time, and the array of income sources throughout the household. Even when the median household income exhibits a clear and unchanging pattern over time, the component and independent variables may be changing.

In all, the pattern of change in household income since 1990 is of interest and helps to explain the demographic, economic, and housing issues over those years. The forecast, on the other hand, is an acceptable indication of what might happen to household incomes between 2016 and 2040.

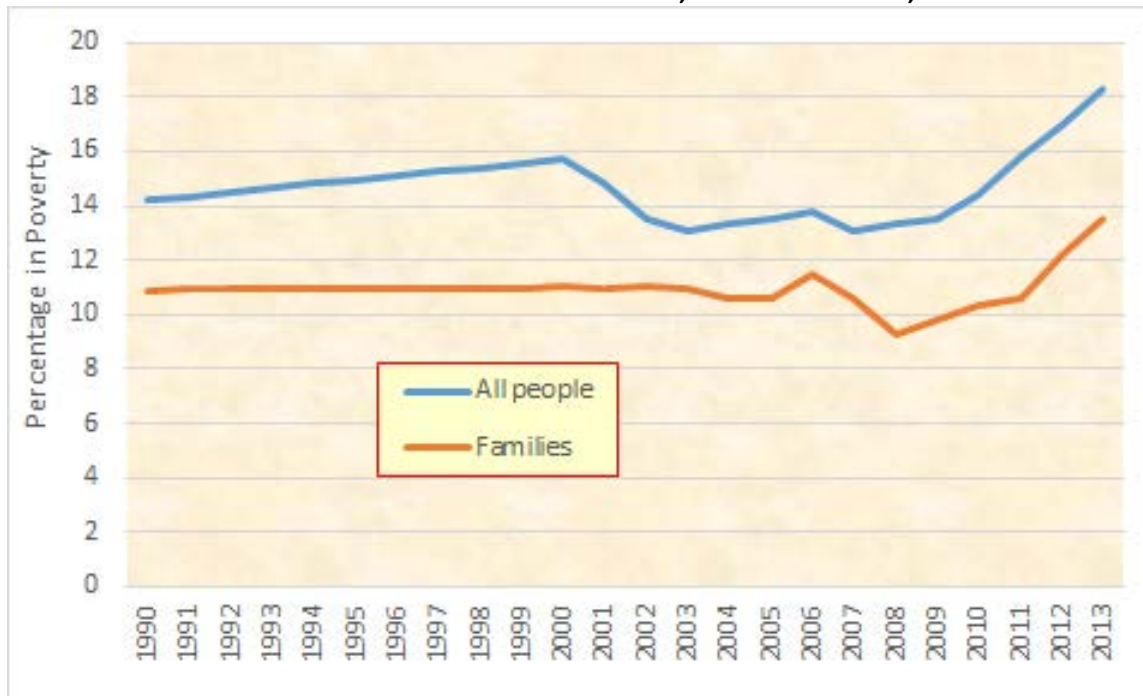
Poverty Status

Trend data regarding the percentage of Hawai'i County residents and families in poverty were taken from the U.S. Decennial Census for 1990 and 2000, and from the American Community Surveys 2005-2013.¹⁴ In 1990, 14.2 percent of persons and 10.9 percent of families were reportedly living below the poverty threshold. While the percentage of impoverished persons increased slightly over the next decade to 15.7 percent, the percentage of families in poverty remained relatively unchanged (11.0%).

Between 2000 and 2010, the percentage of persons in poverty fell to as low as 13.1 percent (2007) and was back to just over the 1990 level by 2010 (14.4%). Since 2010, this percentage has jumped nearly 4 percentage points to an all-time high of 18.3 percent in 2013. For families, the percentage in poverty ranged from a low of 9.3 percent in 2008 to a peak of 11.5 percent in 2006. Since 2010, the percentage of families in poverty has increased by 3.2 percentage points to 13.5 percent in 2013.

¹⁴ 2005-2006: single-year estimates; 2007-2008: three-year estimates; 2009-2013: five-year estimates

FIGURE 23: PERCENTAGE OF PERSONS AND FAMILIES IN POVERTY, COUNTY OF HAWAII, 1990 TO 2013



An additional indicator of the financial well-being of residents is the self-sufficiency measure. Unfortunately, the self-sufficiency data currently available addresses a very specific subset of the population. Because this narrow focus is not especially useful for planning purposes, it was not included in the present report.

Real Estate Market and Housing

The number of housing units in the County of Hawai'i in 2013 was estimated to be 87,310. Among those, approximately 80 percent were single-family dwellings and the remainder were multi-family units. Roughly 80 percent of the County's housing stock was occupied and among the occupied housing units, 64 percent were owner-occupied

HOUSING VALUES

Definition: The median value of the housing units on Hawaii Island increased by more than 150 percent between 2000 and 2010. Between 2010 and 2013, however, the value of owner-occupied homes has slightly but steadily declined (-3.4%) to a median value of \$373,833.

TABLE 7: VALUE OF OWNER-OCCUPIED HOUSING UNITS, COUNTY OF HAWAII, 2000-2013

	2000	2005	2010	2011	2012	2013
Total Specified Owner-Occupied Housing Units	29,914	39,949	42,591	42,334	42,042	42,661
Total Value						
Less than \$50,000	1,444	748	897	963	1,134	1,144
\$50,000 to \$99,999	5,793	1,892	1,550	1,729	1,651	1,828
\$100,000 to \$149,999	1,792	4,037	1,790	2,141	2,490	2,925
\$150,000 to \$199,999	6,588	3,212	3,414	3,689	3,947	4,515
\$200,000 to \$299,999	5,264	7,791	8,649	9,043	9,425	10,094
\$300,000 to \$499,999		11,977	13,227	13,441	13,456	13,326
\$500,000 to \$999,999	9,033	8,579	10,202	8,892	7,864	7,074
\$1,000,000 or more		1,713	2,862	2,436	2,075	1,755
Median (dollars)	\$153,700	\$329,900	\$387,154	\$381,065	\$376,534	\$373,833

Source: Decennial Census 2000, American Community Survey 2005-2013, Hawaii County Data Book

Trend: The data were taken from the standard sources as shown above, and there is no existing forecast of housing value for the County. Notice that the values are given only for owned units with a mortgage and only for cases in which the ACS has complete data on housing characteristics and estimated housing value (self-reported). The general pattern of these data is very similar to the trend for home prices across the state in the last 13 years. Prices or values rose rapidly during the price run-up of the last decade. Unlike other states, however, housing unit values did not drop precipitously during the Great Recession. Rather, prices held steady until 2013. The drop during the last year shown here is relatively small and is not expected to lead to major devaluation of real estate during this decade. In fact, local forecasters, including TZ Economics, UHERO, and DBEDT, have all predicted significant growth in housing prices through 2020.

SHELTER BURDEN

Definition: HUD housing guidelines suggest that households should devote no more than 30 percent of their income to pay monthly housing expenses. By 2005, the ACS was gathering data on this definition of shelter burdened household for both owned and rented housing units. Table 8 presents a review of those data for the County of Hawaii from 2000 through 2013.

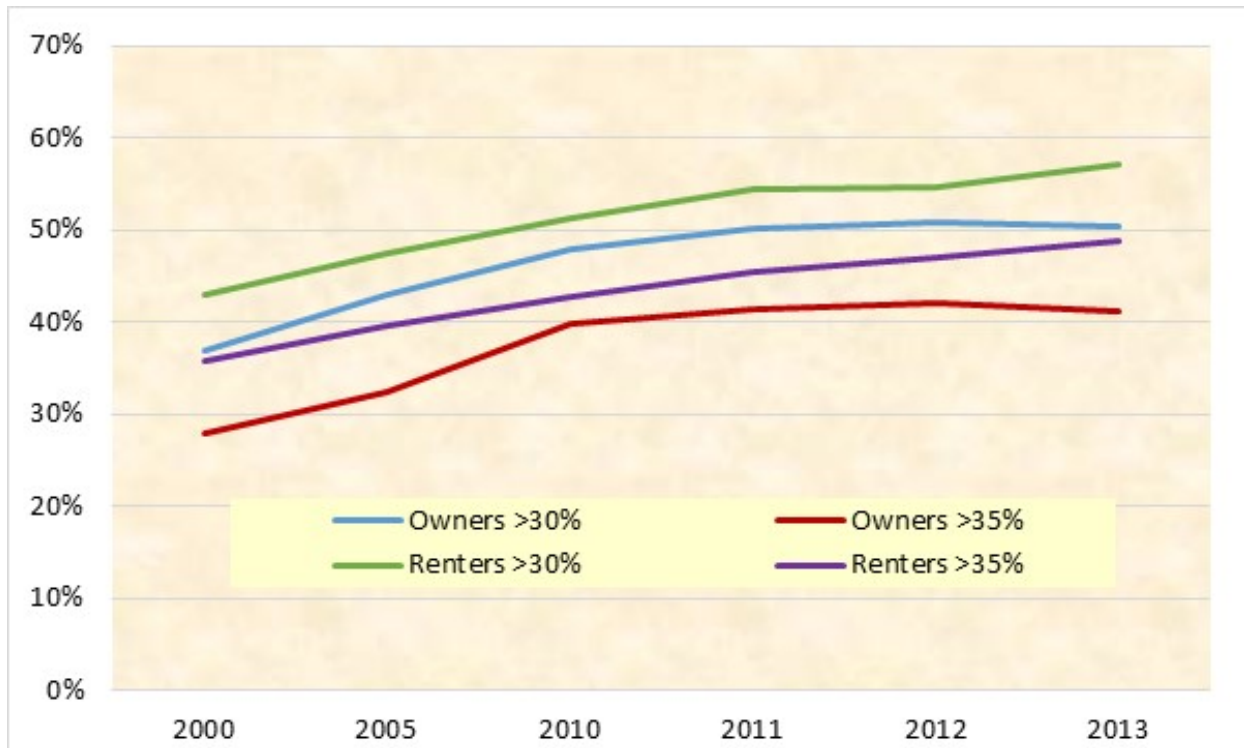
TABLE 8: PERCENT OF HOUSEHOLD INCOME PAID FOR HOUSING, COUNTY OF HAWAII, 2000-2013

	2000	2005	2010	2011	2012	2013
Selected housing units with a mortgage:	19,167	25,055	26,773	26,586	26,221	26,538
Less than 15 percent	19.8%	15.8%	15.2%	13.8%	12.9%	13.0%
15.0 to 19.9 percent	15.2%	16.6%	13.9%	12.5%	12.2%	11.9%
20.0 to 24.9 percent	15.7%	14.5%	13.3%	12.0%	12.6%	13.4%
25.0 to 29.9 percent	11.6%	10.1%	9.0%	10.8%	10.4%	10.7%
30.0 to 34.9 percent	9.1%	10.6%	8.3%	8.7%	8.9%	9.1%
35 percent or more	27.8%	32.4%	39.7%	41.4%	42.0%	41.2%
Not computed	0.8%	0.0%	0.6%	0.8%	1.0%	0.8%
Selected rental housing units:*	18,382	20,087	21,791	21,936	22,514	22,248
Less than 15 percent	16.8%	13.7%	11.1%	9.2%	9.6%	9.2%
15.0 to 19.9 percent	11.6%	11.5%	11.4%	10.3%	9.5%	8.4%
20.0 to 24.9 percent	11.4%	11.0%	10.6%	9.9%	10.4%	10.9%
25.0 to 29.9 percent	9.1%	9.1%	9.1%	9.1%	8.5%	6.8%
30.0 to 34.9 percent	6.2%	6.8%	7.3%	7.5%	6.4%	6.9%
35 percent or more	30.7%	34.1%	36.9%	38.4%	39.3%	40.3%
Not computed	14.2%	13.9%	13.6%	15.5%	16.4%	17.5%

The monthly shelter payments were extracted separately for owners and renters and compared with HUD household income guidelines for the County of Hawaii. HUD guidelines are standardized for household size and household income and are thus comparable for the entire housing stock. Thus we see that, in 2013, 49 percent of all owner households in the County were paying less than 30 percent of their monthly income for shelter. Among renter households, that percentage was notably lower at only 35.3 percent.

Adjusting those data for incomplete data, we arrived at the summary of shelter burdened households shown in Figure 24. We offer two observations there, one for the standard 30 percent above AMI, and the other for households with shelter payments above 35 percent of the County AMI.

FIGURE 24: SHELTER BURDEN ESTIMATES IN POVERTY, COUNTY OF HAWAI'I, 1990 TO 2013



Source: ACS Data as shown in Figure 24. Notice the change in scale on the year axis.

In 2000, only 36.9 percent of owner households with a mortgage were paying more than 30 percent of their income for housing. By 2010, this had increased to 48 percent, and by 2013 it had risen to over half of owner households (50.1%). Historically, renter households tend to dedicate a larger percentage of their income to housing payments. In 2000, 43 percent of all renter households were rent burdened. A decade later, 51.2 percent of renter households were spending over 30 percent of their income on housing. This percentage had increased to 57.2 percent by 2013.

CROWDING

Definition: We adopted the standard U.S. Census definition for household overcrowding. It states that a household is overcrowded when the ratio of household member to rooms in the housing unit exceed 1.0. A household is classified as extremely overcrowded then that ratio exceeds 1.50.

Trend: Crowding may be the result of an increase in house prices or rents, or to a decrease in household income. It may also be a response to decrease in jobs or employment, or to a sudden increase in population, due either to natural increase or net in-migration. Regardless crowding is considered to be a negative indicator if the health of a local housing market. It is associated with pent-up demand, a sign that the market is unable to supply the number and types of housing units needed by newly forming households and newly arriving residents. Table 9 presents the Census and ACS data for overcrowding in the County of Hawaii between 2000 and 2013.

TABLE 9: OVERCROWDING, COUNTY OF HAWAI'I, 2000-2013

	2000	2005	2020	2011	2012	2013
Total Occupied Housing Units	52,985	59,470	64,382	64,270	64,556	64,909
Owner occupied	34,166	39,949	42,591	42,334	42,042	42,661
0.50 if fewer persons per room	19,199	24,011	28,142	27,701	28,224	28,394
0.51 to 1.00 persons per room	11,607	13,426	12,106	12,192	11,486	11,874
1.01 to 1.50 persons per room	1,972	1,684	1,619	1,767	1,606	1,633
1.51 to 2.00 persons per room	969	567	584	554	557	596
2.01 or more persons per room	419	261	140	120	169	164
percent overcrowded	9.8%	6.3%	5.5%	5.8%	5.5%	5.6%
percent extremely overcrowded	2.8%	1.4%	1.4%	1.3%	1.3%	1.4%
Renter occupied	18,819	19,521	21,791	21,936	22,514	22,248
0.50 if fewer persons per room	7,860	8,529	10,626	11,068	11,039	11,246
0.51 to 1.00 persons per room	7,531	8,431	8,474	7,949	8,325	8,191
1.01 to 1.50 persons per room	1,817	1,712	1,691	1,678	1,834	1,613
1.51 to 2.00 persons per room	1,208	795	776	1,109	1,163	1,050
2.01 or more persons per room	403	54	224	132	153	148
percent overcrowded	18.2%	13.1%	12.3%	13.3%	14.0%	12.6%
percent extremely overcrowded	6.4%	4.1%	3.6%	5.1%	5.2%	4.7%

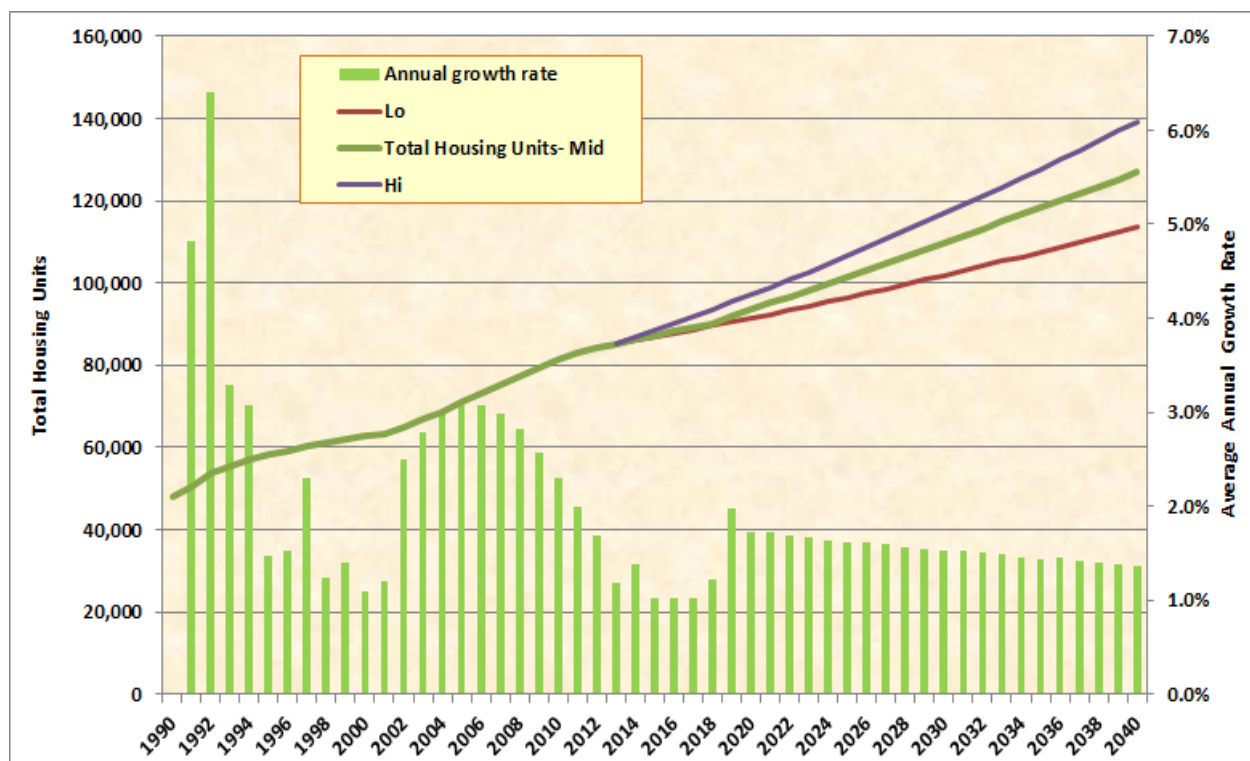
At 5.6 percent of owner-occupied units, the level of overcrowding in Hawai'i County's owner-occupied units is the highest among all of Hawai'i's counties. The percentage of overcrowded renter-occupied units, however, is notably higher at 12.6 percent of rented units.

TOTAL HOUSING UNITS

Definition: Total housing units is the count of all structures intended for housing residents in the year indicated. The count included all such units present and enumerated including occupied and vacant units, owned and rented units, and regardless of physical condition. The count included abandoned units if the unit was structurally sound (had functional roof, walls, doors, and windows). Commercial residential units, those used to house transient short-term temporary residents for cash payment (hotels, apartment hotels, condominium hotels, hostels, and others) were excluded from total housing units. Timeshare units were included in the count as seasonal units. Second homes (those used for housing residents only at certain times during the year) were also included.

Trend: The data for 1990 and 2010 were taken from the U.S. Decennial Census for those years, with interpolation for intercensal years. Data for the years 2005 through 2013 were taken from ACS data. The forecast data came from DBEDT 2040.

FIGURE 25: TOTAL HOUSING UNITS, COUNTY OF HAWAII, 1990 THROUGH 2040



There has been little long-range change in this series. The beginning of the series showed relatively high growth as the late-eighties housing boom slowed down. The mid-nineties were marked by very slow growth in housing starts and growth picked up to between two and three percent during the most recent housing boom. That boom ended in 2007, but residual permits and federal economic incentive programs held housing production above economic growth until 2010. A steep drop in production between 2013 and 2015 suggests that housing production, and therefore growth in total housing units, has returned to the norm.

Forecast: ACS empirical data for 1990 through 2013 were a reasonable match for the DBEDT 2040 data, suggesting that the empirical change in housing units was similar to what had been predicted by DBEDT. The two series were joined using long-range fourth order polynomial curve fitting and the DBEDT 2040 forecast was maintained from 2015 onward. The low and high estimates were again formed using rough error estimates around the forecast line. The high and low estimates are not exactly equal suggesting that there is less likelihood of lower growth rates than higher growth rates between now and the year 2040. Overall, the growth rate will decline over the next 25 years from about 1.8 percent to 1.2 percent per year.

Discussion: The forecast is fairly straightforward and matched both the empirical and the existing forecast data. The high-growth aberration for the middle of the last decade is consistent with construction activity during the last housing boom. So is the steep drop through 2013. The pattern is carried through to produce a slight increase in housing stock by the end of the present decade. Thereafter the forecast will continue to increase at a decreasing rate through the year 2040. The housing unit forecast line is a straight trend line. We can safely assume that Hawai'i's volatile housing market will continue to produce significant growth rate variation around that line.

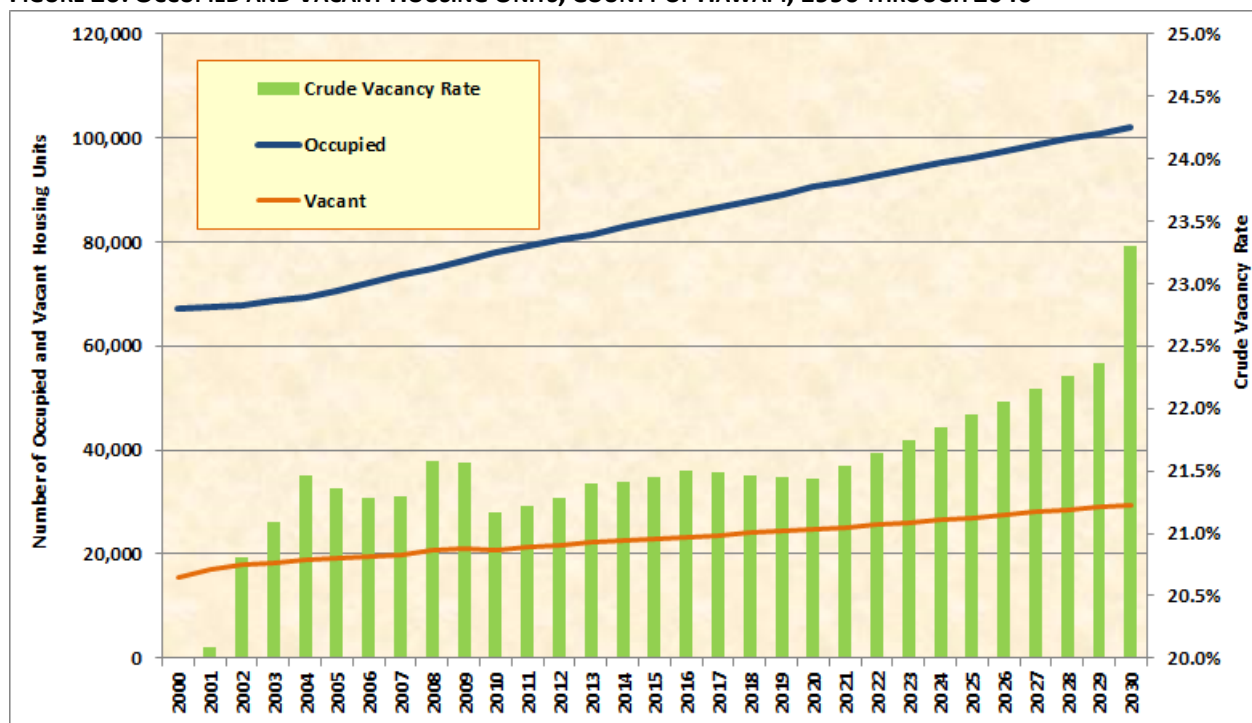
Considerations: We believe that the general forecast for housing units in the County of Hawai'i is reasonable and reliable. Variation in the content and configuration of the housing stock may be less regular over the next 25 years.

TOTAL HOUSING UNITS: OCCUPIED AND VACANT

Definition: Hawai'i County housing units were classified as either occupied or vacant. Occupied housing units were housing units currently occupied by a household and by definition, their number is equal to the number of households in the County.

Vacant units were categorized as either vacant-and-available or vacant-and-unavailable. The first category includes units that were vacant for rent, rented but not yet occupied, vacant for sale, and sold but not yet occupied. Available vacant units were the slack in the housing market, units that are vacant between occupants. Vacant unavailable units included units held for occasional or seasonal use, units for migrant workers, and "other vacant" a catch-all category that includes a variety of unit types. Seasonal units are especially important in Hawai'i because the category includes second homes and timeshare units, along with the traditional summer homes and hunting lodges. Migrant worker units are rare. "Other vacant units" is the fastest growing class in the nation for reasons not yet fully understood. The category includes units that are off the market because they are part of a trust, they are in foreclosure, the owner has passed away without a will or the will is contested, units being refurbished, and other similar financial and construction issues. It may be that unregistered vacation rentals fall into this category as well. Regardless of the type, vacant units reduce the number of housing units being used by local residents.

FIGURE 26: OCCUPIED AND VACANT HOUSING UNITS, COUNTY OF HAWAII, 1990 THROUGH 2040



Trend: The historical data on occupied and vacant units were gathered from the Decennial Census for 1990 and 2000; ACS 1-year, 3-year, and 5-year estimates for the years 2005 through 2013 (Table B25024); and from the Hawai'i County Data Book. The crude vacancy rate shown above was simply the percent of total housing stock classified as vacant each year. The rate started off very low as the late eighties housing boom ended, and rose during the recession years in the mid-nineties. Vacancy rates decreased again during the run-up between 2003 and 2008. Recently, the crude vacancy rate reached a record high level.

Forecast: The forecast data were taken again from DBEDT 2040 for occupied housing units. Vacant unit estimates were calculated by subtracting occupied units from the total housing stock forecasted. The results suggested that, for the years between now and 2040, the number vacant units will increase at an increasing rate each year. Individual forecasts for each of the components of the vacant unit group are not available. It is clear, however, that the chief components of growth in the recent trend data are growth in seasonal and "other" vacant unit types. It is not unreasonable to assume that these two types of vacant units will drive the increased growth rate of vacant units between now and 2040.

Discussion: The mix of occupied and vacant units in an area's housing stock has always been of interest to planners and developers. Vacancy rates have always been used as a measure of the health of the area housing market. The forecast present here will be useful and reliable for planners at the County of Hawai'i.

OCCUPIED HOUSING UNITS: SINGLE-FAMILY AND MULTI-FAMILY

Definition: Occupied housing units are further classified according to several different characteristics. One that is nearly always of interest is the number of units in a structure. This variable is often reduced to a dwelling unit's status as single-family or multi-family.

The Census divides the total housing inventory into ten categories according to the number of units in each housing structure. Here we consider only single-family and multi-family housing units. Single-family units (attached or detached) are those residences intended for occupancy by only one household. Multi-family housing units refer to individual dwelling units located in structures with more than one housing unit (duplexes, multiplexes, apartments, townhomes, etc.).

FIGURE 27: SINGLE FAMILY DWELLINGS, COUNTY OF HAWAI'I, 1990 THROUGH 2040

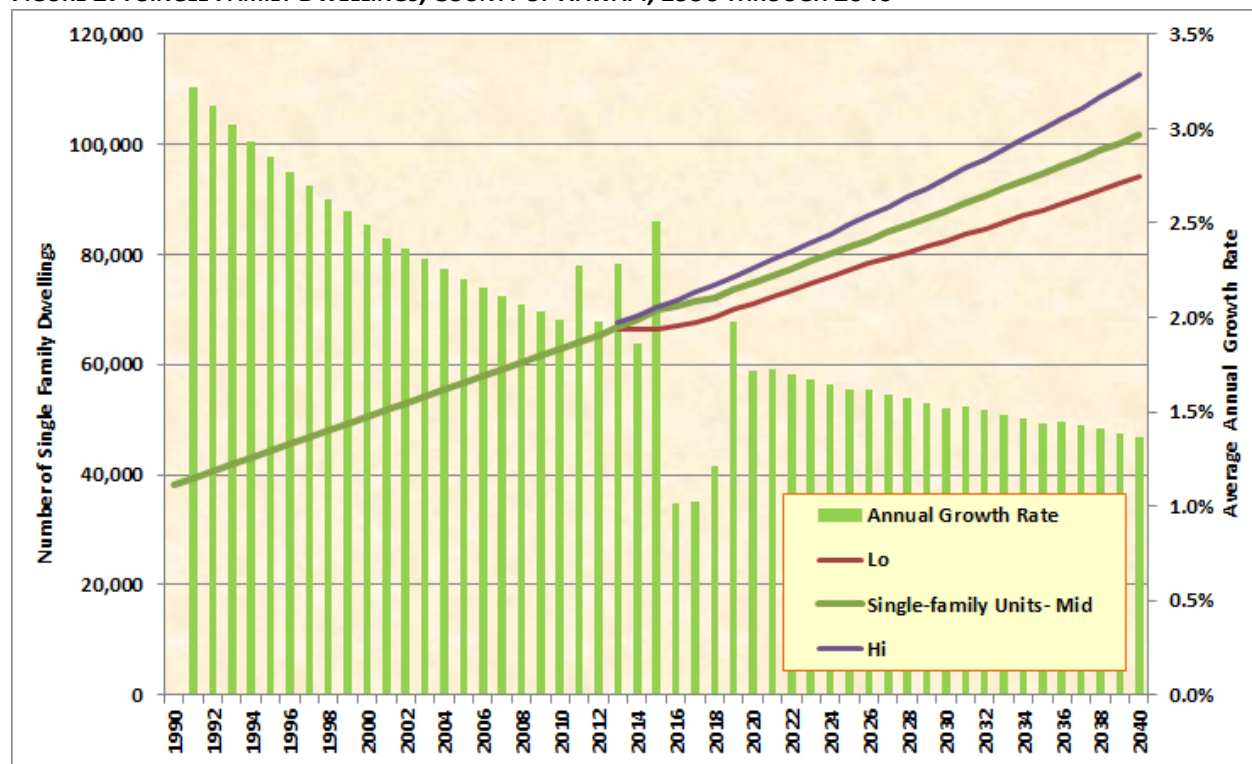
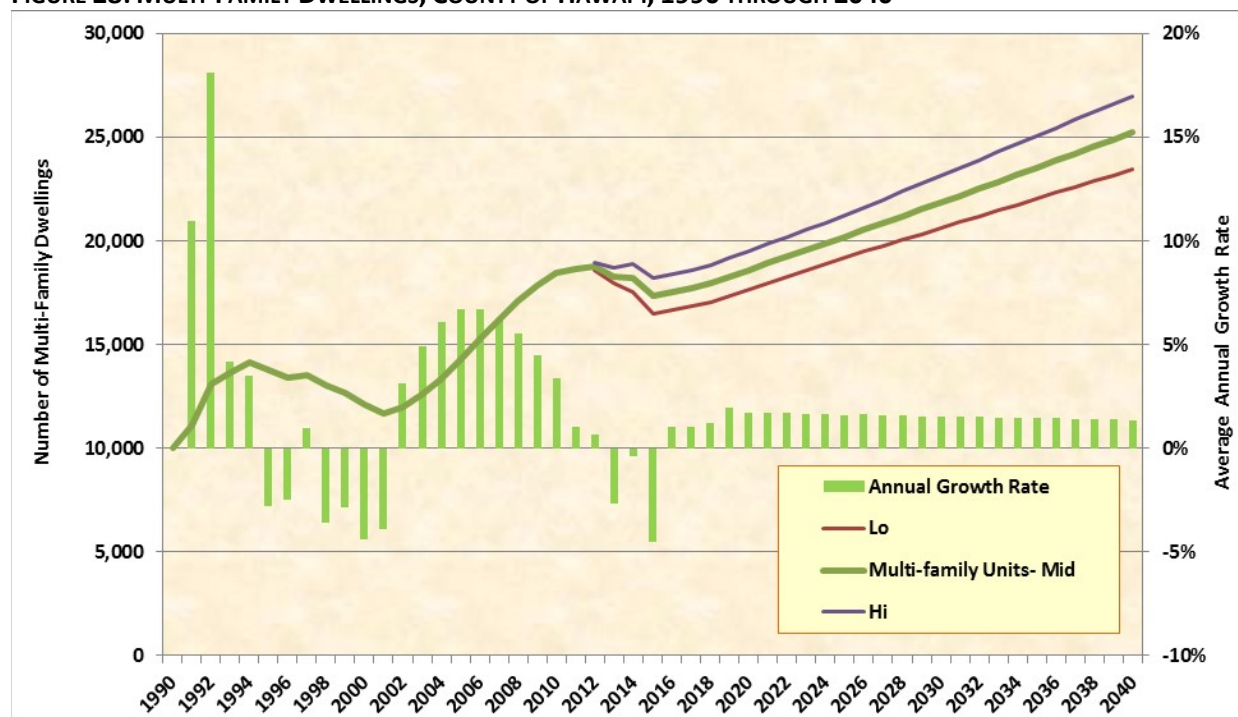


FIGURE 28: MULTI-FAMILY DWELLINGS, COUNTY OF HAWAII, 1990 THROUGH 2040



Trend: Historical data on the number of units in housing structures was taken from the Decennial Census for 1990 and 2000; from ACS 1-year, 3-year, and 5-year estimates for 2005 through 2013 (Table B25024); and from the Hawai'i County Data Book (Table 16.18). Trend data show that the relative numbers of single-family and multi-family occupied housing units tend to change very little over time. Within the growth rate for total occupied units, the homeownership rate changes very little. There was a slight increase in the percent multi-family units in the last decade. That change may be, at least in part, an artifact of the introduction of ACS data. The increase never exceeded one percentage point and the rate returned to normal by the end of the decade. Overall, about 20 percent of Hawai'i County's occupied housing units are and have been located in multi-family structures. In Hawai'i's other three counties, multi-family dwellings account for a significantly larger percentage of the total housing stock (26%-44%).

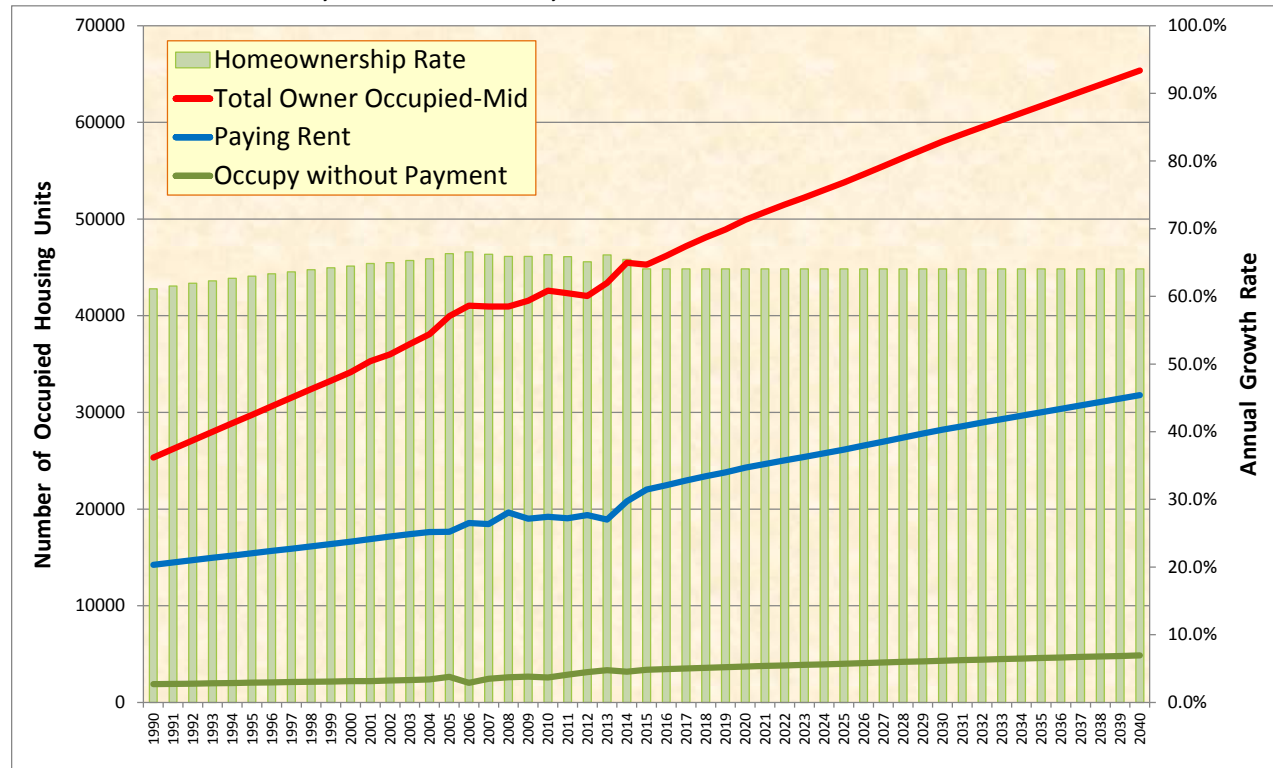
Forecast: The mid-level projections for single-family and multi-family dwellings were based on the DBEDT 2014 Population Series and County Social, Business, and Economic Trends in Hawai'i 1990-2013 (Table A-5). The high estimate applies the present proportion of single-family dwelling units in the total housing stock to the high estimate for total housing units.

Discussion: The forecast predicts that there will be no change in the percent of occupied units that will be in multi-family structures. The forecast is a reasonable prediction based on past trends. Recall that we are developing *ceteris paribus* forecasts, predicting what will happen if conditions and policies do not change. The very steady ratio of multi-family units to total occupied units is ample indication that the ratio will not change significantly in the next 25 years.

OCCUPIED HOUSING UNITS: OWNED AND RENTED

Definition: Occupied housing units were also classified according to tenure. Housing unit tenure was defined as the means by which households occupy housing units. All occupied housing units were classified first as either owned or rented. A housing unit was owned if the name of one or more of the resident household is on the deed or mortgage for the unit. Otherwise, the unit is classified as rented. Rented units are further classified as either paying rent or occupied without payment of cash rent.

FIGURE 29: HOUSING TENURE, COUNTY OF HAWAII, 1990 THROUGH 2040



Trend: Historical data on the number of units that are owned, rented, or occupied without payment of cash rent were taken from the Decennial Census for 1990 and 2000; from ACS 1-year, 3-year, and 5-year estimates for 2005 through 2013 (Table B25024); and from the Hawai'i County Data Book. Trend data show that patterns for these three types of tenure have different patterns of growth and different growth rates. The homeownership rate, however, changes at a slow pace.

Forecast: The long-range growth of homeownership from 1990 through 2006 was steady, reaching a high of over 66 percent in 2006. The years between 2006 and 2013 showed a slow but steady decline in homeownership, dropping back to 65 percent. The forecast shows a further decline to about 64 percent in 2040. These changes are small and do little to alter the long-range homeownership rate in the County of Hawai'i. The county has long been a place where about two-thirds of all occupied housing units are owned. It is likely to continue in that mode. While the homeownership rate has declined slightly, it remains three to ten percent higher than for the other counties in the state.

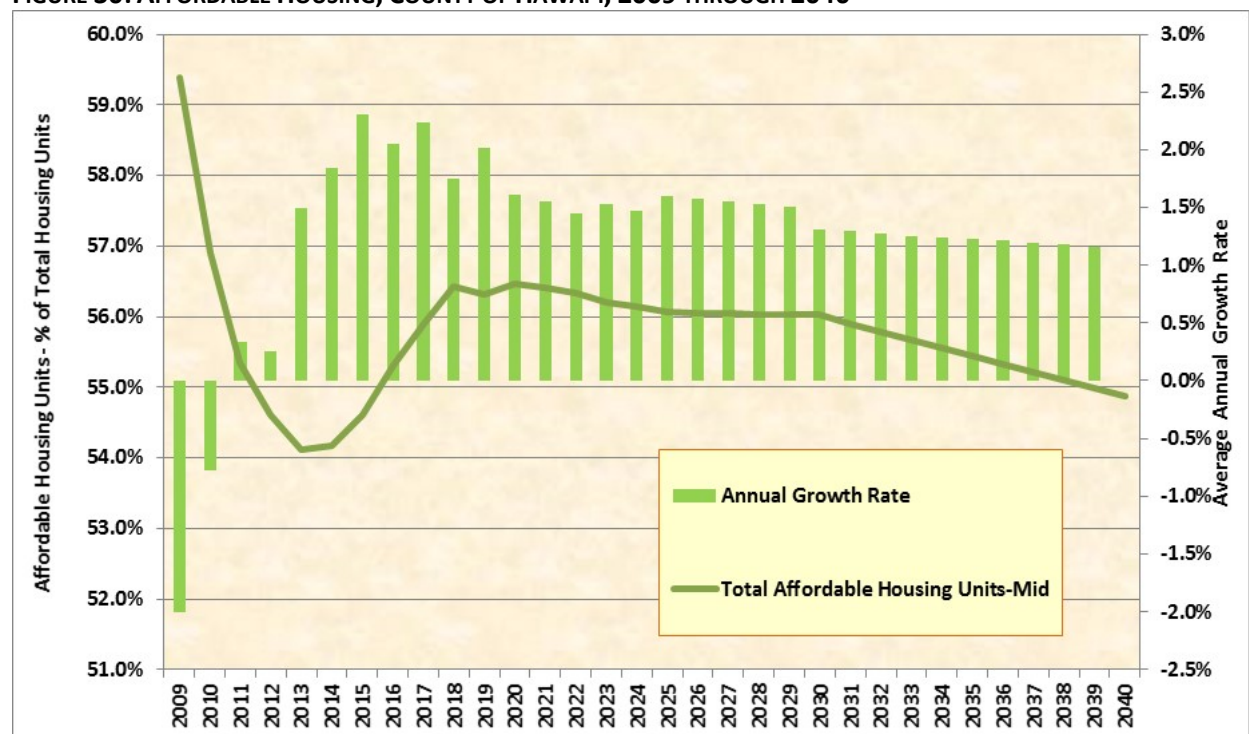
TOTAL HOUSING UNITS: AFFORDABLE

Definition: We defined affordable housing units as units that are affordable to households with annual household incomes less than 80 percent of the HUD Area Median Income (AMI). ACS Public Use Microdata Sample (PUMS) data provide monthly rent, monthly mortgage payment, and annual household income for all occupied housing units. PUMS data also provide asking rents and asking sales prices for units that are vacant for rent or for sale. These data were used to calculate the number of units with prices (contract rents or monthly mortgage payments) that were less than 80 percent of the household income¹⁵ guidelines established by HUD each year. All other housing units were classified as being affordable to households with annual household incomes greater than 80 percent of AMI.

The analyses were conducted separately for occupied and vacant units, and owned and rented units, for the years 2009 through 2013. Results were then accumulated to produce the best estimate of the number of housing units within Hawai'i County's available housing stock¹⁶ that were affordable to low and moderate-income households each year between 2009 and 2013.

The forecast for affordable occupied housing units from 2014 through 2040 was a compilation of separate forecasts for occupied, vacant for rent, and vacant for sale housing units. For each, we used a third order polynomial regression based on components of the affordable housing estimate and available unit forecasts. Results are shown in Figure 30 and discussed below.

FIGURE 30: AFFORDABLE HOUSING, COUNTY OF HAWAI'I, 2009 THROUGH 2040



¹⁵ The 80 percent of AMI guideline is used by HUD to define households that are extremely low income (less than 30% AMI), low income (30 to 50% AMI) and moderate income (50 to 80% AMI).

¹⁶ Available units include occupied housing units and vacant units that are available for rent or sale, and those that are rented but not yet occupied and sold but not yet occupied.

Note that PUMS data and numbers of affordable units were also available for each County of Hawai'i census tract. PUMS data for occupied and vacant housing units were evaluated, using the same method detailed above, to determine the number of level of affordable housing units per tract. Those figures were aggregated to the FAZs used in this study and reported in the data matrix.

Note also that, while the forecasting and FAZ allocation were calculated using housing units numbers, Table 30 reports data as a percent of affordable units in the County.

Trend: Between 2009 and 2013, roughly 56 percent of all housing units available to residents of Hawai'i County were classified as affordable by our definition. That period covers that last 18 months of the Great Recession and the first three years of the recovery. As expected, the estimate of affordable units in the local housing stock changed during that period. The percent of housing units that were affordable fell from over 59 percent to about 54 percent in four years. Affordability was being altered by the number of units in the stock (growing slowly), the shelter price (stable, then rising) and both the average household income (falling) and the household incomes of low- and moderate-income households (falling). Within this complex system of variables, the percent of affordable housing units stayed relatively stable in 2012 and 2013.

The measure of affordability we have selected for this project is difficult to compare over time and space. We can, however, gain some perspective by considering another, frequently used measure of housing affordability, the shelter-to-income ratio (STI). The STI ratio is calculated as the current monthly shelter cost expressed as a percentage of current monthly household income¹⁷. To further simplify the measure we report the percentage of households with STI greater than 30 percent. Some version of the STI ratio is the basis of most affordability measures in use today¹⁸.

In 2014, about 39.1 percent of Hawai'i County households paid more than 30 percent of their income for shelter payments. Nationally, 35.3 percent of households paid more than 30 percent. For the State of Hawai'i, the comparable figure is 42.8 percent, third highest among the 50 States, Washington D.C., and Puerto Rico. The two higher states were California (45.6%) and New Jersey (43.6%). The lowest score in the nation was North Dakota's at 21.8 percent. Within Hawai'i, Hawai'i County's STI ratio was lowest in the state, behind Kauai County (41.9%), Maui County (43.5%), and the City and County of Honolulu (43.6%). As noted earlier (Table 8), the County's rating on this measure of affordability has been steadily increasing since 2000.

Forecast: The forecast method for affordable occupied housing units based on both the growth in total housing units and the annual change in housing prices. The forecast suggests the annual rate of change in the percent of affordable housing units will reach almost 2.5 percent in 2014 and then fall to about 1.0 percent per year by 2040.

Comparing this measure of affordable housing to other times or places is somewhat problematic. The data needed to make the estimates has only been available since 2009 and

¹⁷ The ratio is calculated separately for owner and renter occupied units, and is based on all households with non-zero shelter payments and non-zero household incomes.

¹⁸ STI-based measures have been criticized for their exclusion of relatively large numbers of households for lack of data. Economists also disagree with the rather arbitrary cutoff at 30 percent of household income. They argue that households with STI above 0.30 may have freely chosen a lifestyle in which they spend greater amounts of their income on housing than on some other household expenditure.

the analysis is time consuming. More important, the five-year trend data series is less than we would like as a base for a 2040 forecast. The solution was to rely on the percent of the housing stock that is affordable, as described above. The forecast is valid under the assumption that the relationship between housing supply and price remains stable over the next 25 years.

The forecast suggests that a relatively steady percentage of the County's housing stock (56%) will be affordable in the near future. That stable prediction seems reasonable because it is similar to other data we have reported here. The shelter burden or shelter-to-income ratio data have remained stable over the last five years, as have the data on crowding. In the future, the affordable housing stock will hover around 56 percent through 2030 and then decrease to 55% by 2040.

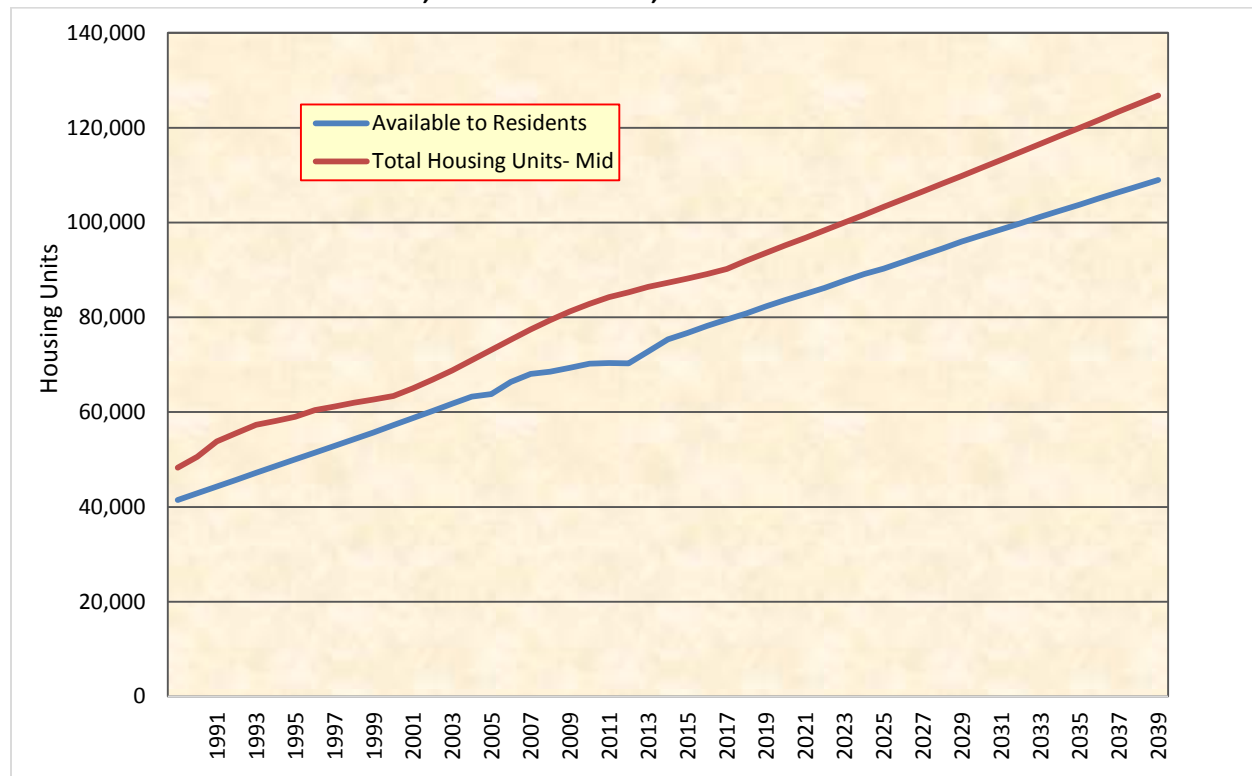
The future performance of the measure depends on many factors. To properly model the effects of local (and external) supply and demand on local housing prices would require a level of effort that is currently outside the scope of this project. Further steps will be taken in the Hawai'i Housing Planning Study, 2016.

For now, this new measure of affordability is clearly superior to anything we have had in the past. Previous measures (monthly payments, shelter burden, rent-to-income ratios, crowding and doubling up, etc.) were all measures based on the residents' condition. The method applied here, being based on the price of housing units, seems better suited to planning and policy-making.

AVAILABLE HOUSING UNITS

Definition: Available Housing Units (AHU) were defined as those housing units available to be used by county residents. Available units, also referred to as the housing stock, are equal to occupied housing units plus vacant-and-available units. All currently occupied units are “available” to the local market by definition. Vacant units classified as vacant for rent; vacant, rented but not occupied; vacant for sale; or vacant, sold but not occupied are also “available”. They are available for use by the residents or intended residents of the County. Unavailable housing units are units intended for and suitable for use by county residents, but currently not available to county residents. These include vacant and held for seasonal or occasional use, vacant units held for migrant workers, and other vacant units.

FIGURE 31: AVAILABLE HOUSING UNITS, COUNTY OF HAWAII, 2009 THROUGH 2040



Trend: The trend data on occupied units and vacant and available units were taken from the Decennial Census for 1990 and 2000; from ACS 1-year, 3-year, and 5-year estimates for 2005 through 2013 (Table B25024). Available units are shown here with total units to emphasize the pattern of change in available units. In particular, we note the decrease in the rate of change between 2007 and 2012. The difference is largely the result of an increase in the number of “other vacant” units, units held off the market due to indecision on the best course of action in a housing market characterized by high prices, very low inventory, and little or no new supply.

Forecast: The forecast is based on the assumption that the ratio of available to total units will return to its pre-recession trend. That is, we expect that the rising price of housing (market prices and rents), and pressure on regulating agencies will generate new housing development and push the resale market to bring “other vacant” units back onto the market. We expect the return to pre-recession availability rates will occur slowly over the next two or three years.

NEEDED UNITS

There are many definitions of this term. In fact, “needed units” is not formally a part of the lexicon of housing research. But, after all the analysis and forecasting are finished, there is a practical question about the number of units that might be needed to plan appropriately for the citizenry. In the present planning context, we considered the question, “How many housing units will be needed to accommodate the County population forecast?” But we might just as well have addressed other questions, including “How many units must be produced using government resources?” “How many units will be needed to fill demand for housing for very low-income families or for workforce families?” “How many units are needed to address homelessness?”

Historically, that would involve gathering data on the number of new households and the number of new housing units added to the County of Hawai‘i housing stock each year since 1990. The forecast method is straightforward, being a function of new household formation and new units provided in the past.

Definition: In this study, Needed Housing Units (NHU) equals the total number of persons added to the resident population each year (new resident population) minus the estimated number of persons in group quarters, divided by the average household size (persons in households divided by number of households). The resulting number of households is then multiplied by one plus the ratio of vacant-and-available housing units to total available housing units to satisfy the demand for vacant-and-available units.

NHU is the number of housing units that must be added to the County’s housing stock each year. Current estimates are shown in Table 10.

TABLE 10: NEEDED HOUSING UNITS, COUNTY OF HAWAI‘I, 2015-2040

	2015	2020	2025	2030	2035	2040
Total Needed Units	1,406	1,647	1,401	1,407	1,388	1,383
Needed Single-family Units	1,126	1,319	1,122	1,127	1,112	1,108
Needed Multi-family Units	280	328	279	280	276	275

Forecast: The figures shown in this table represent the number of housing units needed to accommodate the new households formed in each of the years shown. They are not cumulative estimates for five-year periods. Estimates for individual years have been delivered in the master data file prepared for this project. The table also presents estimates for single-family housing units and multi-family housing units. Those are based on the relative percentages of each type of unit produced in the past. By this definition, the County of Hawai‘i will need to produce about 1,400 housing units per year between 2016 and 2040.

NHU is the number of housing units to be added to the available housing stock each year, under the following assumptions:

1. the average household size is similar to and rationally related to recent trends;
2. no unusual growth or decline in the percent of the population living in group quarters;
3. no significant change in the housing demand and supply trends;
4. no change in the ratio of vacant to occupied housing units in Hawai'i County;
5. no change in pent-up demand, doubling up, or homelessness.

Discussion: These assumptions represent a rigid approach to forecasting housing need that could produce very conservative estimates of needed units. Examining each in turn may be useful here.

1. **Average Household Size:** Our own approach to the forecasting problem postulates a slightly increasing household size. Unless the limitations on supply that have characterized housing production in Hawai'i for the last 20 years are lifted, average household size must rise. If the average household size were to decrease from the current 2.75 persons per household in Hawai'i, even more new units would be needed.
2. **Group Quarters:** Then number of persons in group quarters has been rising for the last several decades. If that number were to fall, more new units would be needed. Efforts to increase housing in group quarters (more dormitories, rooming houses, etc.) would reduce the number of new units needed.
3. **Supply and Demand:** In a sense, all of the forecasts produced here are based on supply and demand in the recent past. Both the data series collected and the forecasts incorporated have an underlying dependence on the number of housing units purchased and the number of units supplied in the past. But the relationship between supply and demand and the number of housing units needed has not been specifically applied in a rigorously designed housing market model. We are not aware of any such model in Hawai'i. If housing supply were to increase in the next 25 years, the number of needed units would diminish each year. If demand, especially external demand were to increase, the number of units needed to house the County's population would increase.
4. **Vacant Units:** There has been relatively little change in rental vacancy rates (11% to 12%) or for sale vacancy rates (3%) since 2000. The composition of the vacant unit classification, however, has changed dramatically. In 1990, 50 percent of all vacant units were either for sale or for rent. By 2010, that figure had dropped to 28 percent. The percentage of seasonal-held-for-occasional-use units rose from 44 percent to 55 percent between 1990 and 2000, and then dropped to 51 percent in 2010. The percentage of "other vacant" units rose from 4 percent in 1990 to 21 percent in 2010. The forecasting assumption was that all of these fluctuating trends would remain relatively stable between 2016 and 2040. Obviously, changes in the number and types of vacant housing units will affect the housing stock (available units) and the number of units needed to house the residents of the County.

5. **Market Inefficiencies:** A perfectly efficient housing market will provide sufficient and appropriate housing units for all interested and qualified households with occasional interruptions to accommodate equilibrium adjustments. That is, it will balance supply and demand. Inefficient housing markets with inelastic supply will produce pent-up demand, crowding, doubling-up, and homelessness. The forecasting assumption was that there would be no change in these effects, suggesting that any inefficiency in the past two or three decades will be preserved in forecast estimates. Thus, the number of needed units is the number required to preserve the *status quo* in the County's housing situation.

These assumptions are, in their turn, related to the types of questions in the first paragraph of this section. The needed unit forecasts, like others presented in this report, are *ceteris paribus* forecasts. They predict what will happen if there were no major changes in population, policy, or procedures between 2014 and 2040. Planning is precisely about producing changes. These forecasts are the baseline from which planners work.

Two other sets of housing forecasts deserve mention here. The first is the number of needed units presented in each of the last four iterations of the Hawai'i Housing Planning Study¹⁹. HHPS estimates address the question, "How many units are needed to provide housing for County residents in addition to those produced by the housing market?" In other words, it addresses assumption 5, above, and focuses attention on ameliorating the effects of the County's limitations on supply. As such, it will be notably lower than the forecast produced here.

The second forecast was produced this year by DBEDT and addresses a slightly different question about total housing demand between 2015 and 2025²⁰. It produces a demand estimate of about 1,900 units per year for the County of Hawai'i, about 500 units higher than our forecast. The difference between the questions addressed is reflected in slightly different forecasting methods and assumptions. Our forecast used a slightly higher and rising estimate of household size. We focused on available units rather than total housing units. We used empirical and slightly rising vacancy rates rather than fixed estimates. Finally, the forecast here is for "needed units" and the DBEDT appropriately labels theirs a "demand estimate".

¹⁹ HHPS published needed units estimates in 1997, 2003, 2006, and 2011.

²⁰ Measuring Housing Demand in Hawaii, 2015-2025. DBEDT. April, 2015.

Visitor Arrivals and Accommodations

Hawai'i County had a peak number of visitors in 2007 (1.62 million) just prior to the beginning of the Great Recession. As was the case for all of the Counties, Hawai'i County experienced a sharp decline in visitor arrivals between 2008 and 2010. The recovery that began with a substantial 8.7 percent increase in visitor arrivals from 2010 to 2011 has continued over the past several years.

Arrivals by air to Hawai'i Island rose one percent from 2013 to 1,449,070 visitors in 2014. The average daily census increased 2.6 percent during the same period to 30,008 visitors present on the island on any given day. A longer length of stay resulted in a 2.6 percent growth in visitor days, which contributed to an increase in visitor expenditures to \$1.9 billion (+2.3% over 2013). Nearly half (46.2%) of the visitors who visited Hawai'i Island spent their entire trip there as opposed to dividing their vacation between Hawai'i's islands.

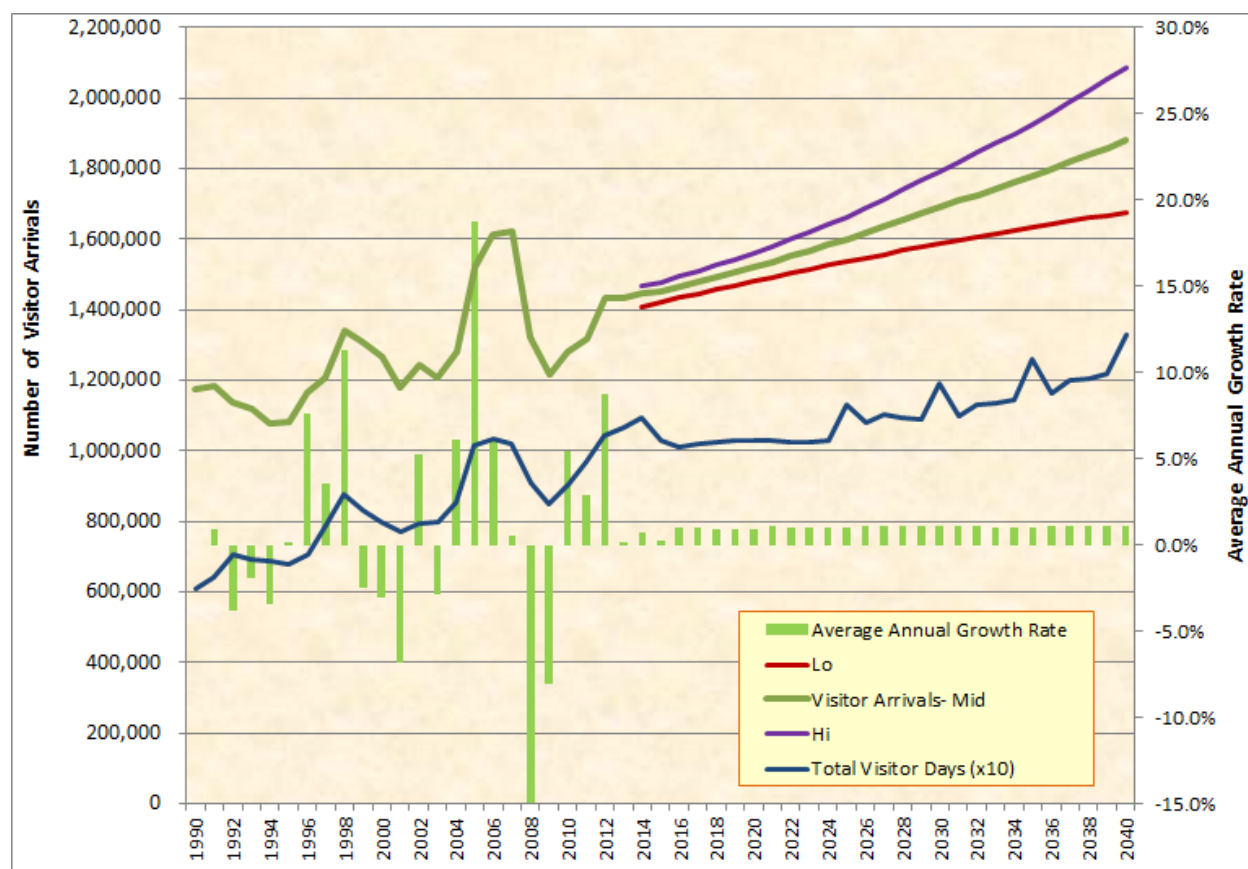
With the increasing number of visitors traveling to Hawai'i County comes the challenge of planning for their impact on the local economy, especially with regard to accommodations. Hotel rooms account for the majority of the visitor accommodation units in the County of Hawai'i (59.5%). A distant second and third were timeshare properties and Visitor Rental Units (VRUs), with 13 and 12 percent of the total visitor units, respectively. With the upward trend in visitor arrivals expected to increase through 2040, increasing demand for visitor units is likely.

One of the significant difficulties in keeping track of visitor accommodations units on Hawai'i Island is that the number of housing units being let to visitors as short term rentals is unknown. Residential units used for this purpose were referred to as Transient Vacation Rentals (TVRs). Their number is known because their owners pay General Excise Tax (GET) and Transient Accommodation Tax (TAT) and their number is recorded in the Hawai'i Tourism Authority's annual *Visitor Plant Inventory*. However, it is strongly suspected that significant numbers of homeowners rent all or parts of their units to visitors as short term rentals without registering their rental activity and without paying the required taxes. There is no estimate for the number for those properties. If their number is substantial, then the estimate for visitor accommodations units in the County would be low, and the estimate of residential rental units would be high.

VISITOR ARRIVALS

Definition: The foundation statistic for monitoring the number of visitors in Hawai'i is the number of visitors arriving in the State during a given year. The visitor arrival count is the fundamental measurement in the system for visitor data, the basis for many planning decisions, and the basis for most forecasting. Data collection for the visitor industry is currently the responsibility of the Hawai'i Tourism Authority (HTA). They carry out that responsibility using a complex system of surveys and maintain the data as part of the Basic Data Series. The particular statistic used here is total visitor arrivals by air. A small number of visitors arriving by sea have been excluded from our analysis. Visitors arriving by sea were treated as a constant in the 2040 Forecasts and we have taken the same approach here.

FIGURE 32: VISITOR ARRIVALS, COUNTY OF HAWAI'I, 1990 THROUGH 2040



Trend: Data for the years 1990 through 2013 were taken from HTA Annual Research Reports. Other relevant data were taken from DBEDT 2040 Forecasts, Table A-64, Table A-69 and from DBEDT's Annual Visitor Report 2012-2013 Table 60, and finally from DBEDT Data Warehouse for 2014 data.

Forecast: The official forecast was taken from the DBEDT 2040 Forecasts. The empirical data from HTA were running a little higher than the forecast expected. Hawai'i has enjoyed three consecutive record years in tourism arrival growth. We used a logarithmic curve to fit a merged line between the visitor arrivals data series and the 2040 Forecast data. The result is shown in Figure 32.

The forecast for visitor arrivals was carried out in tandem with visitor accommodations units, visitor days, and average daily visitor census. Note also that the forecast is a smooth line representing the trend for visitor arrivals over the next 25 years. The visitor industry has been quite volatile in the past and the annual counts can be expected to vary widely around the forecast trend line.

Discussion: The forecast for visitor arrivals reflects the DBEDT 2040 forecast in which the number of arrivals increases steadily at an increasing rate, from about 1.4 million in 2013 to about 1.9 million in 2040. It reflects both the known trends for visitor arrivals from all ten of Hawai'i's Major Market Areas (MMAs). It also reflects the expected impact of Hawai'i's visitor industry development strategy, which includes shifting visitor arrivals from O`ahu to other islands.

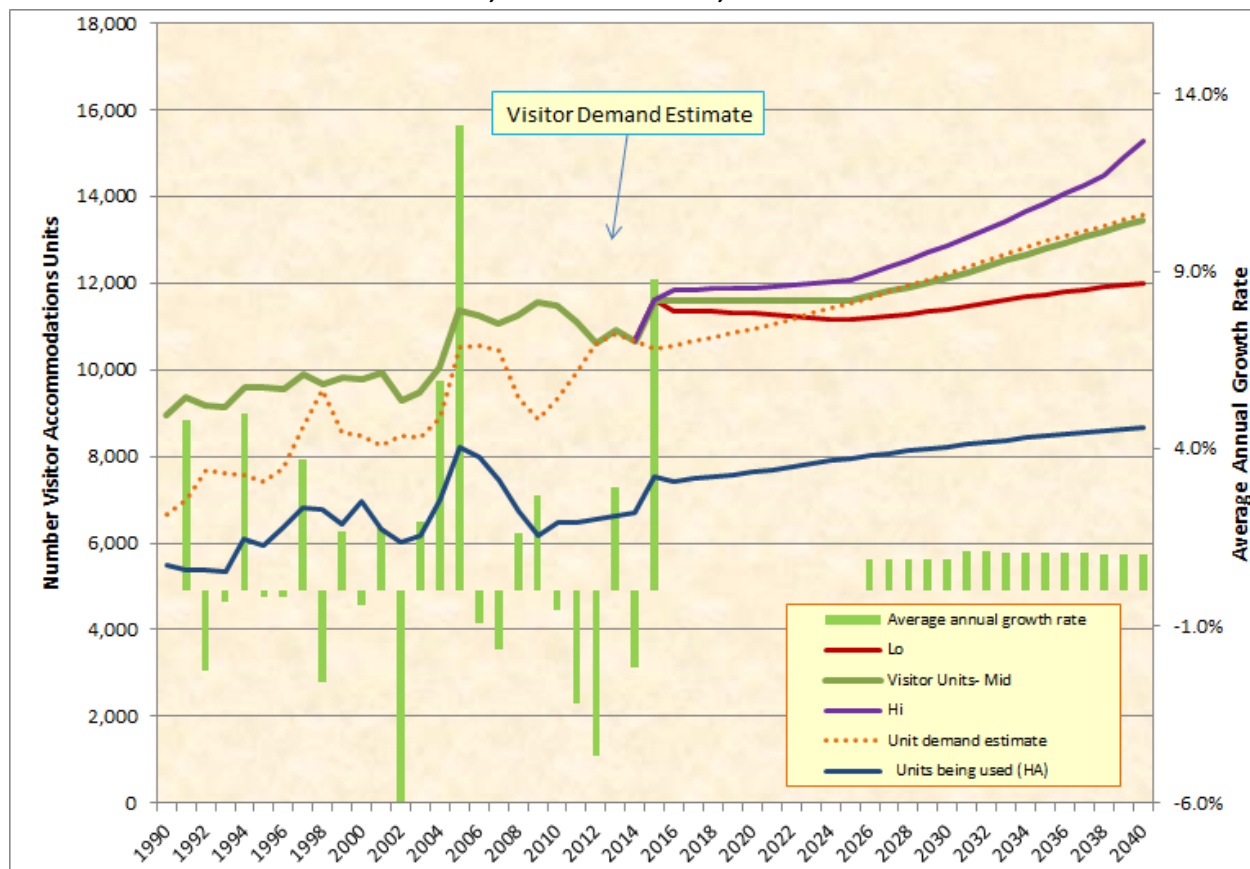
Considerations: If the General Plan update process were to adopt strategies aimed at either increasing or decreasing the expected number of visitor arrivals from the path suggested by the 2040 Forecasts, the visitor arrivals forecast must be changed. Since it is the foundation for all other visitor-related statistics covered in this project, the changes will have far-reaching effects.

VISITOR ACCOMMODATION UNITS

Definition: The number of visitor accommodations units is the housing stock reserved for the visitor industry. It includes individual commercial housing units classified as hotel rooms, condominium hotel rooms, apartment hotel rooms, bed & breakfast units, timeshare units, vacation rental units, hostel units (beds), and other commercial housing units intended for the use of short-term visitors to the State.

Note also the additional lines presented for the unit demand estimate, and units being used. The unit demand estimate is an estimate of the number of accommodations units that would be needed to house the total number of visitors in the County of Hawai'i on an average day in a given year. The value is calculated by dividing the average daily visitor census by the party size (to get the average daily party census) and then multiplying by the percent of all visitor parties requiring commercial units²¹. The measure of units being used was calculated by multiplying the total number of visitor accommodations by the average occupancy rate for a given year.

FIGURE 33: VISITOR ACCOMMODATION UNITS, COUNTY OF HAWAI'I, 1990 THROUGH 2040



²¹ Not all visitor parties are housed in commercial housing units. Some are housed in the homes of friends and relatives, in their own second homes, at campgrounds or camping vehicles, or other, non-commercial housing arrangements.

Trend: Data for the years 1990 through 2014 were taken from HTA's annual Visitor Plant Inventory (VPI).

Forecast: The official forecast was taken from the DBEDT 2040 Forecasts. The empirical data from HTA were running considerably lower than the forecast for 2014. A substantial part of the difference may have been the result of measurement issues documented in the VPI. No adjustment has been made for the difference in number of visitor accommodations units in 2015.

The forecast for visitor accommodations units was developed in tandem with visitor arrivals, visitor days, and average daily visitor census. Two tracking estimates, the unit demand estimate and units being used, were also used in analyzing the trend and forecast data.

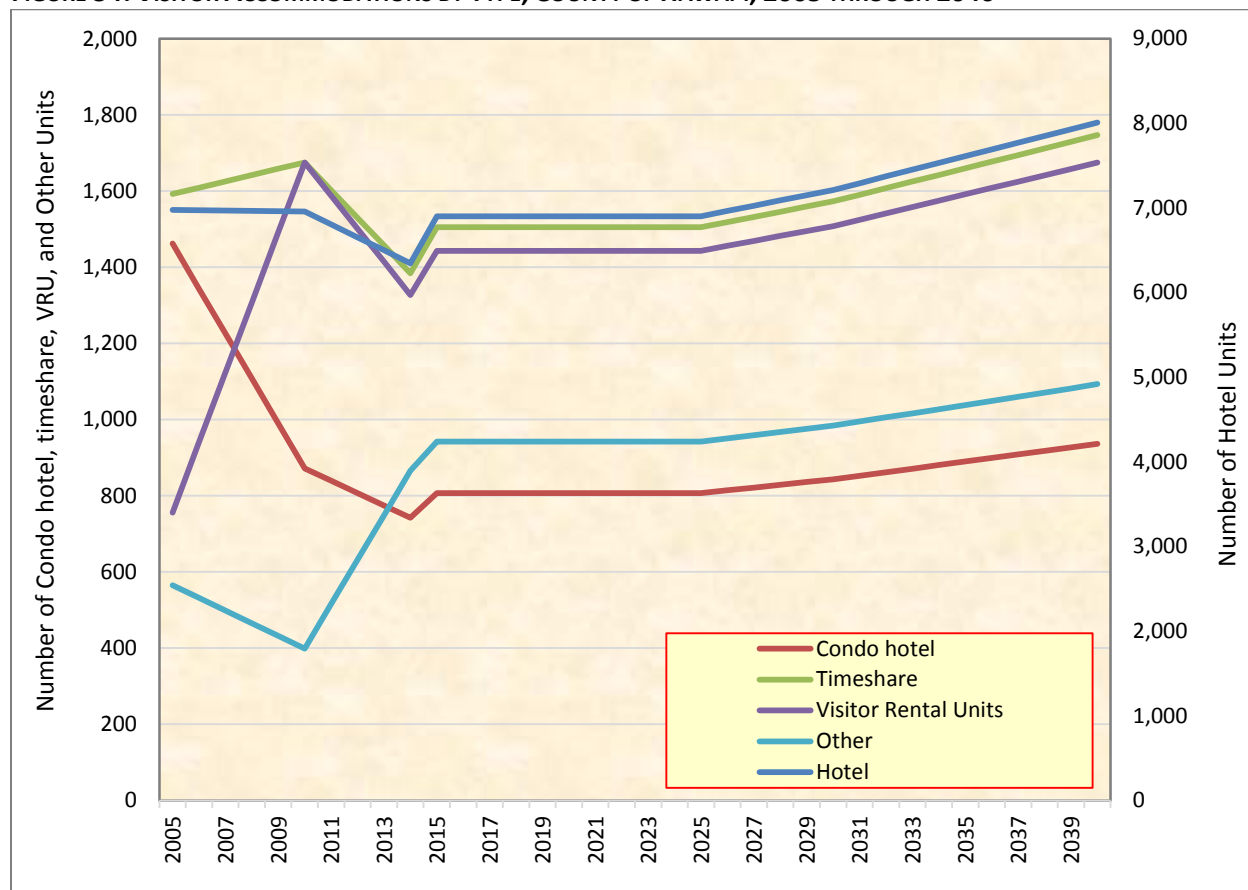
The forecast appears as a smooth line representing the trend for visitor accommodations units over the next 25 years. We expect that actual performance will vary significantly around the trend line.

Discussion: The years between 2010 and 2014 were marked by a rapid growth of vacation rental units in Hawai'i. A substantial part of that growth was the result of transforming other unit types (mostly condominium hotel units, but also hotel and timeshare units) to vacation rental status. The VPI update method (surveys of known properties) was not able to account for the increased number of vacation rentals. A separate study commissioned by HTA in 2014 (*Individually Advertised Units in Hawai'i, 2014*) reported that there were 9,986 vacation rental units in the County of Hawai'i. That would bring the total of visitor accommodations units up from 10,666 to 13,969. The DBEDT 2040 forecast for the County of Hawai'i was 11,600 units.

VISITOR ACCOMMODATIONS UNITS BY TYPE

Definition: In the Visitor Plant Inventory, visitor accommodation units are assigned to one of five categories according to the nature of the unit: hotel, condo-hotel, timeshare, visitor rental unit (individual vacation unit, visitor rental-condo, visitor rental-house), and other units.

FIGURE 34: VISITOR ACCOMMODATIONS BY TYPE, COUNTY OF HAWAII, 2005 THROUGH 2040



Note. Visitor Rental Units includes IVU, VR-condo, and VR-house

Trend: The historical data were compiled from the Hawai'i Tourism Authority's Visitor Plant Inventory annual reports.

Forecast: The forecast referenced the mid-level projections for total visitor units. The current relative contribution of each of the various unit types to the total visitor unit inventory was maintained through 2040.

Discussion: Hotel rooms account for the majority of the visitor accommodation units in the County of Hawai'i (59.5 percent). Timeshare properties and Visitor Rental Units (VRUs) are a distant second and third, with 13 and 12 percent of the total visitor units, respectively

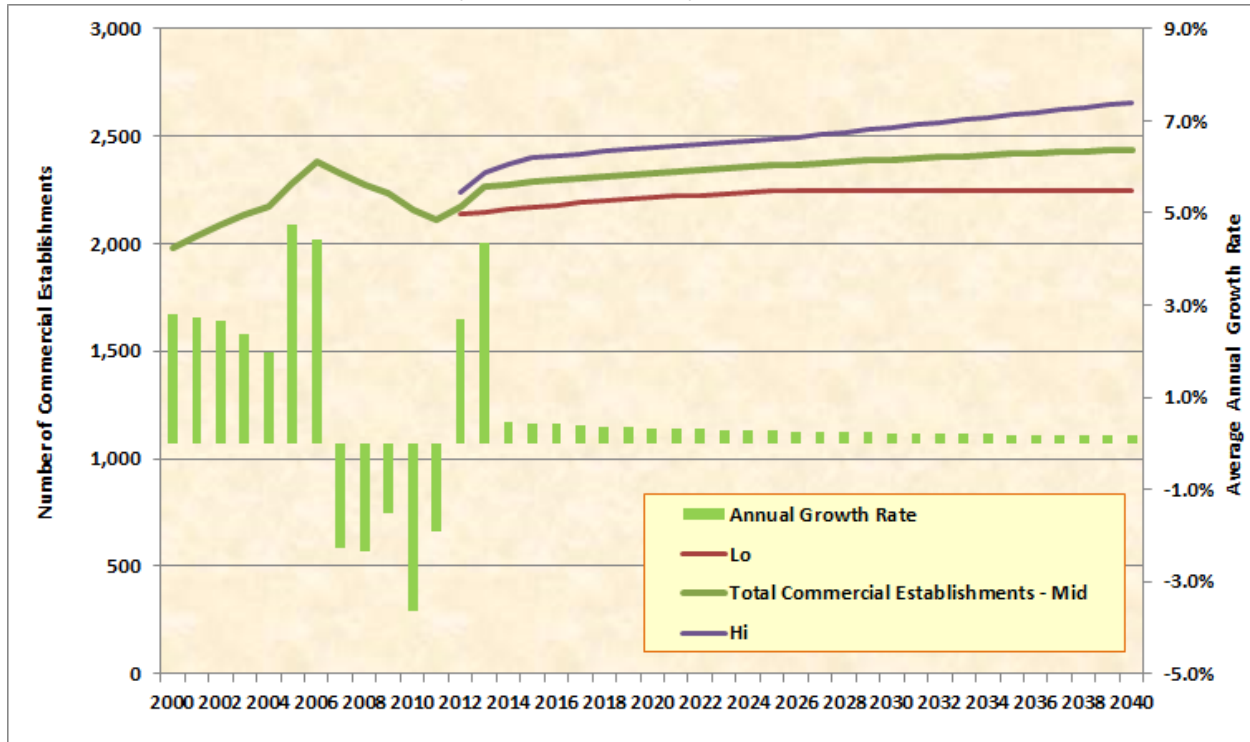
Considerations: There are numerous challenges with regard to the VPI data and identifying visitor accommodation units.

Commercial and Industrial Space

COMMERCIAL SPACE BY TYPE

Definition: Commercial real estate is defined as buildings or land intended to generate profit. Commercial real estate classifications include retail or wholesale trade, hotels, restaurant, offices, clinics, warehouses, light manufacturing, and other uses. Residential buildings are not classified as commercial real estate.

FIGURE 35: COMMERCIAL ESTABLISHMENTS, COUNTY OF HAWAI‘I, 1997 THROUGH 2040

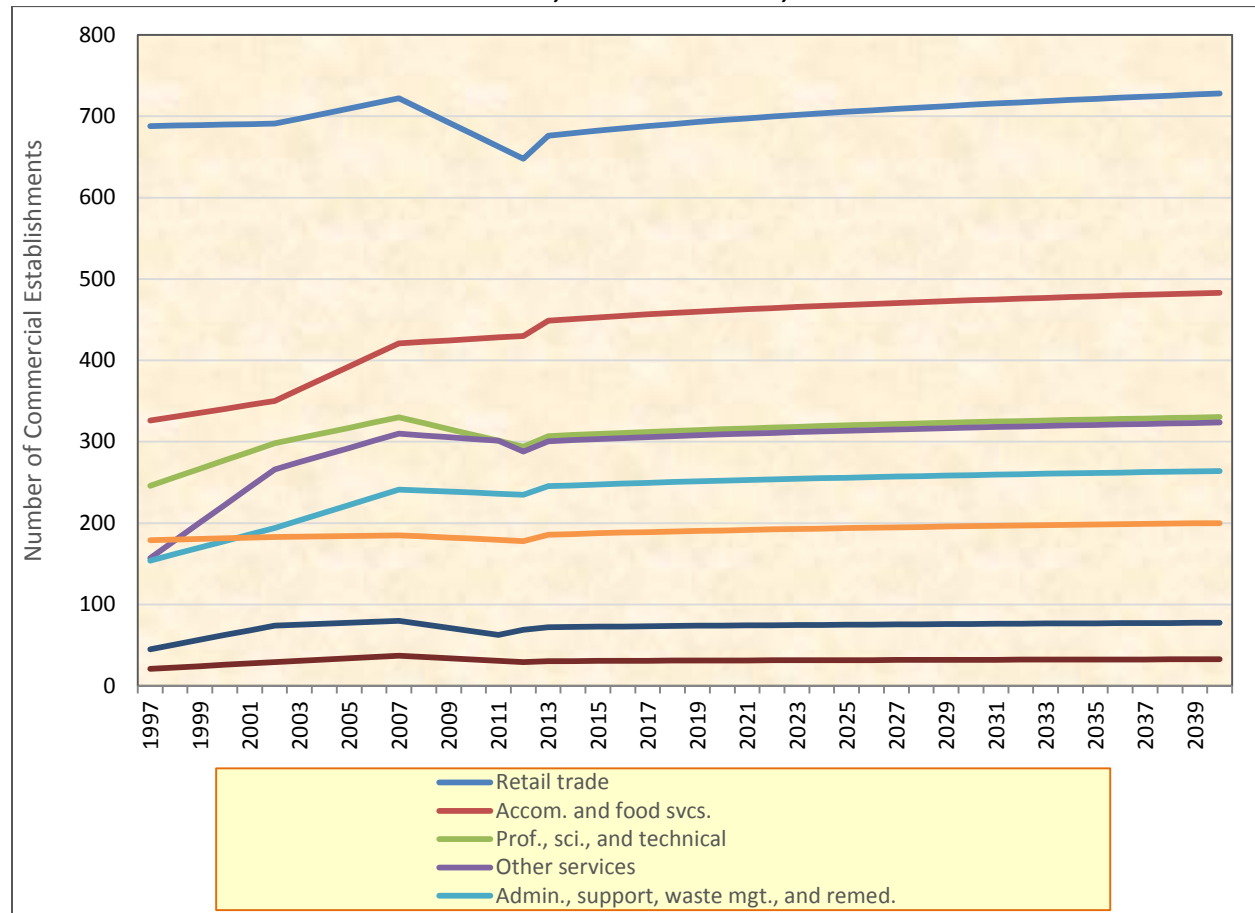


Trend: The historical data for the period from 1997 through 2012 were taken from the DBEDT Data Book 2014 Table 15.16. Those data were supplemented using North American Industry Classification Systems (NAICS) data.

Forecast: The forecast is a logarithmic function using the trend data from 1997 through 2002 as the basis.

Discussion: Based on data obtained from the County of Hawai'i Planning Department, the total square footage for commercial establishments is 6.26 million, with a median of 3,432 per establishment. The current median value of commercial buildings is \$126,700. This represents a 1.04 percent increase over the 2014 median value. The median value of commercial land has increased 3.04 percent over the past year, from \$170,800 in 2014 to \$176,000 in 2015. Considering the large number of tourists that visit the County of Hawai'i each year, it is not surprising that thirty percent of all commercial establishments in the County are retail trade locations. Tourism also supports the additional twenty percent of all commercial establishments that provide accommodations and food services.

FIGURE 36: COMMERCIAL ESTABLISHMENTS BY TYPE, COUNTY OF HAWAI'I, 1997 THROUGH 2040



INDUSTRIAL SPACE BY TYPE

Definition: Industrial real estate is considered a sub-category of commercial real estate. An industrial property is defined as a property used for the actual manufacturing of something, and can be considered either a factory or plant. This is usually zoned for light, medium or heavy industry. This includes things such as warehouses, garages, and distribution centers.

Trend: The data for industrial spaces were obtained from the County of Hawai'i's Planning Department for 2015 only.

Discussion: In 2015, the total square footage of industrial space in the County of Hawai'i is 5.77 million. This translates into a median square footage of 7,200 per industrial establishment. The median value among industrial buildings in the County is \$360,500. This represents a 1.01 percent increase over 2014 (\$356,900). The value of industrial land also increased from 2014 to 2015. The median land value for industrial spaces was \$304,900 in 2014 and \$333,800 in 2015, a 9.48 percent increase.

Considerations: The lack of available data for industrial space in the County of Hawai'i, as well as the intended use of the information for planning purposes, require this information to be used with considerable caution.

REVISED FORECAST ANALYSIS ZONES

In the Phase I Interim Report, SMS recommended a set of forecast analysis zones (FAZ) that would create the geographic boundaries for all lower-than-county level forecasts.

SMS developed FAZs in order to establish a geographic level of forecasting that accounts for both:

1. Hawai'i County Population centers – geographic boundaries of towns, residential areas, etc. that are colloquially used by residents to differentiate segments of the county
2. Census tracts – the lowest level of geography for which data are consistently available across the range of variables included in this forecast.

Following the delivery of recommendations for FAZs in the Phase I Interim Report, SMS met with Hawai'i County and Placeways to review the FAZs for accuracy from the County's standpoint and usability from Placeways' standpoint. Subsequently, Hawai'i County made recommendations for the modifications of the FAZs that would reassign some census tracts and census-designated places (CDPs) in a manner that was more reflective of the way that Hawai'i County's residents see the island as being divided.

The final revised list of FAZs is included in Table 1 below. Each FAZ is named according to the recommendation of Hawai'i County. The table includes the population centers, census statistical geography (which include both tracts and CDPs), and the census tracts associated with each FAZ.

TABLE 11: REVISED LIST OF FORECAST ANALYSIS ZONES

Forecast Analysis Zone	Hawai'i County Population Centers	Census Statistical Geography	Census Tracts
Hilo	Hilo	Hilo CDP (multiple tracts), micro statistical area, & urban cluster Keaukaha & Pana'ewa Hawaiian Homelands	202.02 207.01 203 207.02 204 208.01 205 208.02
	Wainaku	Wainaku CDP	206 209
North Hilo-Hāmākua Coast Villages	Hāmākua Coast Villages	Pauka'a CDP Pāpa'ikou CDP Pepe'ekeo CDP Honomū CDP Hawaiian Homelands mauka of Honomū	201 221.02
	Pa'auilo-Laupāhoehoe	Laupāhoehoe CDP & Tract 221.02	
Honoka'a-Pa'auilo	Honoka'a	Pa'auilo CDP & Tract 220 Honoka'a CDP & urban cluster Kukuihaele CDP Waipi'o Hawaiian Homelands Tract 219.02	219.02 220
Waimea	Waimea	Waimea CDP & urban cluster Hawaiian Homelands	217.02
North Kohala	Hāwī	Hāwī CDP	218
	Kapa'au	Kapa'au CDP & urban cluster Hala'ula CDP	
	Rural North Kohala	Tract 218	
Kawaihae-Puakō-Waikoloa-Waikoloa Resorts	Kawaihae	Portion of Tract 217.04 Hawaiian Homelands	217.04
	Puakō	Portion of Tract 217.04	
	Waikoloa	Waikoloa Village CDP & urban cluster	
	Waikoloa Resort	Puakō CDP	
North Kona	Kailua-Kona-Kūki'o	Kalaoa CDP Kailua CDP Hōlualoa CDP Kailua/Hōlualoa urban cluster Kahalu'u-Keahou CDP Honalo CDP Portion of Tract 215.07	215.02 215.04 215.07 215.09 216.01 216.04
South Kona Villages	South Kona Villages	Kealakekua CDP Captain Cook CDP & urban cluster Hōnaunau-Nāpō'opo'o CDP Portions of Tract 213 Miloli'i (portion of Tract 213)	213 214.02
Ka'ū	Ocean View	Hawaiian Ocean View CDP	212.02
	South Point	Portion of Tract 212.02 Hawaiian Homeland	
	Discovery Harbour	Discovery Harbour CDP	
	Wai'ohinu	Wai'ohinu CDP	
	Nā'ālehu	Nā'ālehu CDP	
	Pāhala	Pāhala CDP	
Kea'au-Kurtistown	Highway 19 Puna Subdivisions & Villages – North	Kurtistown CDP	210.13
	Kea'au	Kea'au CDP	

TABLE 11 (CONTINUED): REVISED LIST OF FORECAST ANALYSIS ZONES

Forecast Analysis Zone	Hawai'i County Population Centers	Census Statistical Geography	Census Tracts
Upper Puna	Volcano	Volcano CDP	210.10 210.11
	Highway 19 Puna Subdivisions & Villages – North	Mountain View CDP	
	Highway 19 Puna Subdivisions & Villages – South	Hawaiian Acres CDP Fern Acres CDP Eden Roc CDP Fern Forest CDP	
HPP-Orchidland	Highway 130 Puna Subdivisions – Mauka	Orchidland Estates CDP Ainaloa CDP	210.03 210.05
	Highway 130 Puna Subdivisions – Makai	Hawaiian Paradise Park CDP & urban cluster	
Lower Puna	Pāhoa	Pāhoa CDP	211.01 211.06
	Highway 130 Puna Subdivisions – Makai	Hawaiian Beaches CDP Maku'u Hawaiian Homeland	
	Lower Puna Subdivisions	Nānāwale Estates CDP	
	Lower Puna Subdivisions	Leilani Estates CDP Tract 211.01	

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APPENDIX A: DEFINITIONS OF JOBS BY INDUSTRY

Accommodation Jobs

This industry provides lodging or short-term accommodations for travelers, vacationers, and others. Some provide lodging only; while others provide meals, laundry, and recreational facilities, as well as lodging. There are three industry groups: (1) traveler accommodation includes establishments that primarily provide traditional types of lodging services. This group includes hotels, motels, and bed and breakfast inns. (2) recreational accommodation includes establishments that operate lodging facilities primarily designed to accommodate outdoor enthusiasts. Included are travel trailer campsites, recreation vehicle parks, and outdoor adventure retreats; and (3) rooming and boarding houses includes establishments providing temporary or longer-term accommodations that for the period of occupancy may serve as a principal residence. Board (i.e., meals) may be provided but is not essential.

Agriculture Wage and Salary Jobs

Full- and part-time jobs for which payment was made by the employer in the survey week containing the 12th of the month. Includes farm jobs and machinery operators. Closely related management and services jobs are included for sugar and pineapple but are excluded for other types of agriculture.

Arts, Entertainment & Recreation Jobs

This industry includes a wide range of establishments that operate facilities or provide services to meet varied cultural, entertainment, and recreational interests of their patrons. This sector comprises (1) establishments that are involved in producing, promoting, or participating in live performances, events, or exhibits intended for public viewing; (2) establishments that preserve and exhibit objects and sites of historical, cultural, or educational interest; and (3) establishments that operate facilities or provide services that enable patrons to participate in recreational activities or pursue amusement, hobby, and leisure-time interests. Excluded from this sector are: (1) establishments that provide both accommodations and recreational facilities, such as hunting and fishing camps and resort and casino hotels; (2) restaurants and night clubs that provide live entertainment in addition to the sale of food and beverages, (3) motion picture theaters, libraries and archives, and publishers of newspapers, magazines, books, periodicals, and computer software; and (4) establishments using transportation equipment to provide recreational and entertainment services, such as those operating sightseeing buses, dinner cruises, or helicopter rides.

Civilian Labor Force

Total of employed and unemployed persons, excluding those in the armed forces and 16 years of age or under. U.S. Census Bureau does surveys for the U.S. Bureau of Labor Statistics.

Educational Services Jobs

This industry comprises establishments that provide instruction and training by specialized establishments, such as schools, colleges, universities, and training centers. These establishments may be privately owned and operated for profit or not for profit, or they may be publicly owned and operated. They may also offer food and accommodation services to their students. Educational services are usually delivered by teachers or instructors that explain, tell, demonstrate, supervise, and direct learning, in diverse settings, such as educational institutions, the workplace, or the home through correspondence, television, or other means.

Federal Government Jobs

Includes those in the civilian agencies, i.e. Department of Defense, Agriculture, United States Postal Service and the various armed services exchange systems.

Financial Activities Jobs

Establishments primarily engaged in financial transactions, i.e. those transactions involving the creation, liquidation, or change in ownership of financial assets, and/or in facilitating financial transactions. Three principal types of activities are identified: (1) raising funds by taking deposits and/or issuing securities and, in the process, incurring liabilities; (2) pooling of risk by underwriting insurance and annuities, (3) providing specialized services facilitating or supporting financial intermediation, insurance, and employee benefit programs. In addition, monetary authorities charged with monetary control are included in this sector. This also includes real estate and the rental and leasing sector which is comprised of establishments primarily engaged in renting, leasing, or otherwise allowing the use of tangible or intangible assets, and establishments providing related services. The major portion of this sector comprises establishments that rent, lease, or otherwise allow the use of their own assets by others. The assets may be tangible, as is the case of real estate and equipment, or intangible, as is the case with patents and trademarks. Excluded from this sector are real estate investment trusts (REITS) and establishments primarily engaged in renting or leasing equipment with operators. In many cases, such as the rental of heavy construction equipment, the operator is essential to operate the equipment.

Food Services & Drinking Places Jobs

These industries prepare meals, snacks, and beverages to customer order for immediate on-premises and off-premises consumption. Some provide food and drink only; while others provide various combinations of seating space, waiter/waitress services and incidental amenities, such as limited entertainment. The industries are grouped based on the type and level of services provided, i.e. full-service restaurants; limited-service eating places; and special food services including caterers and mobile food services. Food services and drinking activities at hotels and motels; amusement parks, theaters, casinos, country clubs, and similar recreational facilities; and civic and social organizations are included here only if these services are provided by a separate establishment primarily engaged in providing food and beverage services. Excluded are establishments operating dinner cruises which are classified as scenic and sightseeing transportation because those establishments utilize transportation equipment to provide scenic recreational entertainment.

Health Care & Social Assistance Jobs

This industry includes establishments that provide both health care and social assistance for individuals. Both are included as it is sometimes difficult to distinguish between the boundaries of these two activities starting with those establishments providing medical care exclusively, continuing with those providing health care and social assistance, and finally finishing with those providing only social assistance. These services are delivered by trained professionals and the industries are defined based on the educational degree held by its practitioners. Excluded are aerobic classes and nonmedical diet and weight reducing centers. Although these can be viewed as health services, these services are not typically delivered by health practitioners.

Information Jobs

Are in establishments engaged in the following processes: (a) producing and distributing information and cultural products, (b) providing the means to transmit or distribute these products as well as data or communications, and (c) processing data. Included are publishing industries, including software publishing, and both traditional publishing and publishing exclusively on the Internet; the motion picture and sound recording industries; the broadcasting industries, including traditional broadcasting and those broadcasting exclusively over the Internet; the telecommunications industries; the industries known as Internet service providers and web search portals, data processing industries, and the information services industries. For the purpose of developing NAICS, it is the transformation of information into a commodity that is produced and distributed by a number of growing industries that is at issue. The Information sector groups three types of establishments: (1) those engaged in producing and distributing information and cultural products; (2) those that provide the means to transmit or distribute these products as well as data or communications; and (3) those that process data. Many of the industries in the NAICS Information sector are engaged in producing products protected by copyright law, or in distributing them (other than distribution by traditional wholesale and retail methods). Examples are traditional publishing industries, software and directory and mailing list publishing industries, and film and sound industries. Broadcasting and telecommunications industries and information providers and processors are also

included in the Information sector, because their technologies are so closely linked to other industries in the Information sector.

Local Government Jobs

Includes those in the county governments.

Manufacturing Jobs

Are in establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The assembling of component parts of manufactured products is considered manufacturing, except in cases where the activity is appropriately classified as construction. Included in manufacturing are plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. However, establishments that transform materials or substances into new products by hand or in the worker's home and those engaged in selling to the general public products made on the same premises from which they are sold, such as bakeries, candy stores, and custom tailors, may also be included in this sector. Manufacturing establishments may process materials or may contract with other establishments to process their materials for them. Both types of establishments are included in manufacturing. The following activities are considered manufacturing in NAICS: milk or water bottling and pasteurizing; fresh fish packaging; printing and related activities; ready-mixed concrete production; ship repair and renovation; machine shops; and tire retreading. Conversely, there are activities that NAICS classifies as non-manufacturing, i.e. agriculture, forestry, fishing and hunting; the construction of structures and fabricating operations performed at the site of construction by contractors, establishments engaged in breaking of bulk and redistribution in smaller lots, including packaging, repackaging, or bottling products, customized assembly of computers, etc.

Natural Resources, Mining & Construction Jobs

In Hawai'i, 99 percent of the jobs in this category are in Construction and the remaining 1 percent in Mining. Included are those establishments that extract naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas. There are two activities: mine operation and mining support activities. The construction sector comprises establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems), additions, alterations, or maintenance and repairs. Establishments primarily engaged in the preparation of sites for new construction and establishments primarily engaged in subdividing land for sale as building sites also are included in this sector.

Non-Agriculture Wage and Salary Jobs

Derived monthly from a sample survey of employers reporting the number of persons who received pay for any part of the pay period containing the 12th of the month. Includes all full- and part-time non-agricultural workers, permanent and temporary workers, and workers on paid sick leave and paid vacation.

Other Services (except public administration) Jobs

Are in establishments engaged in providing services not specifically provided for elsewhere in the classification system, such as equipment and machinery repairing, promoting or administering religious activities, grant making, advocacy, and providing dry cleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services. Private households that engage in employing workers on or about the premises in activities primarily concerned with the operation of the household are included in this sector. Excluded from this sector are establishments primarily engaged in retailing new equipment and also performing repairs and general maintenance on equipment.

Professional & Business Services Jobs

Are in establishments that specialize in performing professional, scientific, and technical activities for others and require a high degree of expertise and training. These activities include: legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer services; consulting services; research services; advertising services; photographic services; translation and interpretation services; veterinary services; and other professional, scientific, and technical services to business and sometimes to households, but excludes establishments primarily engaged in providing a range of day-to-day office administrative services, such as financial planning, billing and recordkeeping, personnel, and physical distribution and logistics. The management sector comprises establishments that hold the securities of companies and enterprises for the purpose of owning a controlling interest or influencing management decisions or establishments that administer, oversee, and manage establishments of the company or enterprise and that normally undertake the strategic or organizational planning and decision making role of the company or enterprise. Establishments in this sector perform essential activities that are often undertaken, in-house, by establishments in many sectors of the economy but by consolidating the performance of these activities, economies of scale are achieved. Also included are establishments that perform routine support activities, such as office administration, hiring and placing of personnel, document preparation and similar clerical services, solicitation, collection, security and surveillance services, cleaning, and waste disposal services on a contract or fee basis.

Retail Trade Jobs

Are in establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The retailing process is the final step in the distribution of merchandise; retailers are, therefore, organized to sell merchandise in small quantities to the general public. This sector comprises two main types of retailers: store and non-store retailers. Store retailers operate fixed point-of-sale locations, located and designed to attract a high volume of walk-in customers where they have extensive displays of merchandise and use mass-media advertising to attract customers from the general public for personal or household consumption, but some also serve business and institutional clients. These include establishments such as office supply stores, computer and software stores, building materials dealers, plumbing supply stores, and electrical supply stores. Catalog showrooms, gasoline services stations, automotive dealers, and mobile home dealers are treated as store retailers. Generally, establishments engaged in retailing merchandise and providing after-sales services are classified in this sector. Non-store retailers are also organized to serve the general public, but they reach customers and market merchandise with methods, such as the broadcasting of "infomercials," the broadcasting and publishing of direct-response advertising, the publishing of paper and electronic catalogs, door-to-door solicitation, in-home demonstration, selling from portable stalls (street vendors, except food), and distribution through vending machines.

State Government Jobs

Education includes all employees under the Department of Education (DOE) and the University of Hawai'i System. This includes public library personnel, substitute teachers who received pay during the pay period including the 12th of the month, and support personnel such as cafeteria workers, classroom cleaners, and school security attendants. Also included are part-time employees in special programs such as the A+ After School.

Non-Education – Includes all other executive branch departments (i.e. Agriculture, Transportation, etc.), the legislative and judicial branches, and the Research Corporation of the University of Hawai'i (RCUH).

Total Wage and Salary Jobs

Includes nonagricultural wage and salary workers and agriculture wage and salary workers. Persons on the payroll of more than one establishment during the pay period are counted in each establishment that reports them.

Transportation, Warehousing, & Utilities Jobs

Are in industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation, and support activities related to modes of transportation – air, rail, water, road, and pipeline. The sector distinguishes subsectors for each mode of transportation, a subsector for warehousing and storage, and a subsector for establishments providing support activities for transportation. In addition, there are subsectors for establishments that provide passenger transportation for scenic and sightseeing purposes, postal services, and courier services. Warehousing establishments in this sector are distinguished from merchant wholesaling in that the warehouse establishments do not sell the goods. Excluded are establishments primarily engaged in providing travel agent services that support transportation and other establishments, such as hotels, businesses, and government agencies. The Utilities sector comprises establishments engaged in the provision of the following utility services: electric power, natural gas, steam supply, water supply, and sewage removal. Within this sector, the specific activities associated with the utility services provided vary by utility: electric power includes generation, transmission, and distribution; natural gas includes distribution; steam supply includes provision and/or distribution; water supply includes treatment and distribution; and sewage removal includes collection, treatment, and disposal of waste through sewer systems and sewage treatment facilities. Excluded from this sector are establishments primarily engaged in waste management services that do not use sewer systems or sewage treatment facilities.

Wholesale Trade Jobs

Are in establishments engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise and includes the outputs of agriculture, mining, manufacturing, and certain information industries, such as publishing. It is an intermediate step in the distribution of merchandise. Wholesalers are organized to sell or arrange the purchase or sale of goods for resale, capital or durable non-consumer goods, and raw and intermediate materials and supplies used in production. Wholesalers sell merchandise to other businesses and normally operate from a warehouse or office that have little or no display of merchandise and do not solicit walk-in traffic. Transactions are often conducted between wholesalers and clients that have long-standing business relationships. There are two main types: merchant wholesalers that sell goods on their own account and business to business electronic markets, agents, and brokers that arrange sales and purchases for others generally for a commission or fee.

APPENDIX B: EMPLOYMENT SECTORS, INDUSTRIES, AND OCCUPATIONS

SECTOR Goods producing
 Services providing
 Agriculture

INDUSTRY

Agriculture, forestry, fishing and hunting, and mining
Construction
Manufacturing
Wholesale trade
Retail trade
Transportation and warehousing, and utilities
Information
Finance and insurance, and real estate and rental and leasing
Professional, scientific, and management, and admin and waste mgmt.
Educational services, and health care, and social assistance
Arts, entertainment, and recreation, and accommodation, and food services
Other services, except public administration
Public administration

OCCUPATION

Management, professional, and related occupations
Service occupations
Sales and office occupations
Farming, fishing, and forestry occupations
Construction, extraction, maintenance and repair occupations
Production, transportation, and material moving occupations