

Town of Dennis Wastewater Development Study

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UMASS DONAHUE INSTITUTE
Economic & Public
Policy Research

Town of Dennis Wastewater Development Study

Prepared by the UMass Donahue Institute's
Economic & Public Policy Research Group

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Executive Summary

Due to environmental concerns, and associated lawsuits, related to elevated nitrogen levels in the waters of Cape Cod, there is an imperative for Dennis and other towns on Cape Cod to review their wastewater planning processes and the ramifications of building (or not building) wastewater infrastructure.

The purpose of this study is to: (1) examine the role of wastewater infrastructure as a driver of economic growth; and (2) demonstrate the types and extent of growth that may be unlocked in the Town of Dennis with the introduction of a municipal wastewater treatment system.

The underlying **Economic and Demographic Backdrop** of Dennis demonstrates concerns, both as a place to live and to conduct business.

- While Massachusetts showed relatively strong population growth between 2010 and 2016, Dennis and Barnstable County lost residents.
- Dennis has seen little change in the number of business establishments since 2010.
- Job numbers have recovered since the Great Recession in Dennis but growth lags the state's.
- Revenues from room occupancy taxes are relatively low in Dennis compared to Cape Cod towns with more developed wastewater infrastructure.
- Dennis's tax base is dependent on residential properties, demonstrating a potential opportunity to diversify further through the expansion of retail and commercial enterprises.

There are a range of **Economic Advantages** for introducing municipal wastewater services.

- Generally, businesses do not want to be in the wastewater treatment business and wastewater infrastructure provides the capacity for larger-scale businesses to operate.
- Wastewater infrastructure allows for more compact, higher density development and thus enables the building of more affordable housing options, notably for the types of workers Cape Cod finds in short supply.
- With municipal sewerage, homeowners can more easily expand or add bedrooms.

There are **Negative Potential Consequences** for not addressing the wastewater infrastructure situation in Dennis.

- Poor water quality resulting in beach closures and an onerous traffic situation can turn visitors off from future visits to Dennis. People can also choose to travel to competitor destinations – Maine, New Hampshire, and New Jersey.
- Restaurants, hotels, and conference facilities in Dennis are constrained from reaching their market potential due to the lack of municipal wastewater treatment.
- With uncertainty over wastewater, existing lodging owners may be unwilling to invest in their properties and allow them to deteriorate. Antiquated and obsolete lodging facilities join traffic congestion and water pollution as threats to Dennis's and the mid-Cape's image as a destination. In next-door Yarmouth, a major hotel investment is on hold due to concern that other commercial property owners are not similarly investing in their properties.
- Cost burdens for updating septic systems discourages home owners from investing in their properties and can lead some to move if they need additional space for a child or parents.
- Non-compliance with wastewater standards may force the closure of some of Dennis's cottage communities and their accompanied local purchases which help support the economy.

Wastewater infrastructure may introduce numerous **Benefits** to Dennis.

- The high price of housing on Cape Cod has led to a worker shortage, notably in occupations to an aging population. Water infrastructure could lead to more affordable, higher-density housing which would help retain or attract labor and defray Cape Cod's high costs.
- Tastes have changed - people increasingly are showing a preference for denser, more walkable areas that provide better access to a variety of amenities and activities. These types of areas need wastewater infrastructure.
- Hyannis, today, is able to build much higher density development than Dennis due to wastewater infrastructure. Bourne also is seeing the possibility of substantial investment, as well as higher property tax revenues, being unlocked by municipal wastewater treatment.
- With wastewater treatment, numerous investments may be unlocked in Dennis to support the tourism economy, including additional amenities at the Cape Playhouse and an expansion at the Lighthouse Inn. The availability of municipal wastewater treatment is an indicator to property owners and developers that it is safe to invest.
- Municipal wastewater treatment would encourage a large capital infusion (commercial, hotel, motel, and residential) in Dennis and this would help with cost recovery for the improved infrastructure. Today, commercial growth tends to be headed to Hyannis and business owners also indicate that they are concentrating more of their investments off-Cape to realize growth opportunities.

Introduction

In 2010, the Conservation Law Foundation filed a lawsuit suing the U.S. Environmental Protection Agency (EPA) for failing to address the issue of elevated nitrogen levels in the waters of Cape Cod. As a result of this, and other lawsuits, the Cape Cod Commission updated its Area-wide Water Quality Management Plan and developed a Regional Wastewater Management Plan. Even before this, individual towns on Cape Cod started their own wastewater planning processes, including the Town of Dennis. As Dennis has moved forward with its Comprehensive Wastewater Management Planning process, there was a desire to investigate the potential economic benefits of implementing a municipal wastewater treatment system. The University of Massachusetts Donahue Institute's Economic and Public Policy Research group was retained to provide an initial understanding of:

- 1) the types of benefits that other municipalities have experienced from implementing municipal wastewater treatment;
- 2) what benefits Dennis might experience; and
- 3) what might happen if Dennis chooses to do nothing on this front.

This study reviews the underlying demographic and economic trends that provide a socioeconomic context for introducing water and wastewater treatment in Dennis. It then reviews, generally, the types of benefits that accrue economically and for the environment that are linked to wastewater treatments. Finally, through interviews conducted by the research staff in Dennis, the study goes into more specifics about how water and wastewater treatment could introduce greater economic opportunities for the Town of Dennis. The findings also translate for much of the mid-Cape region.

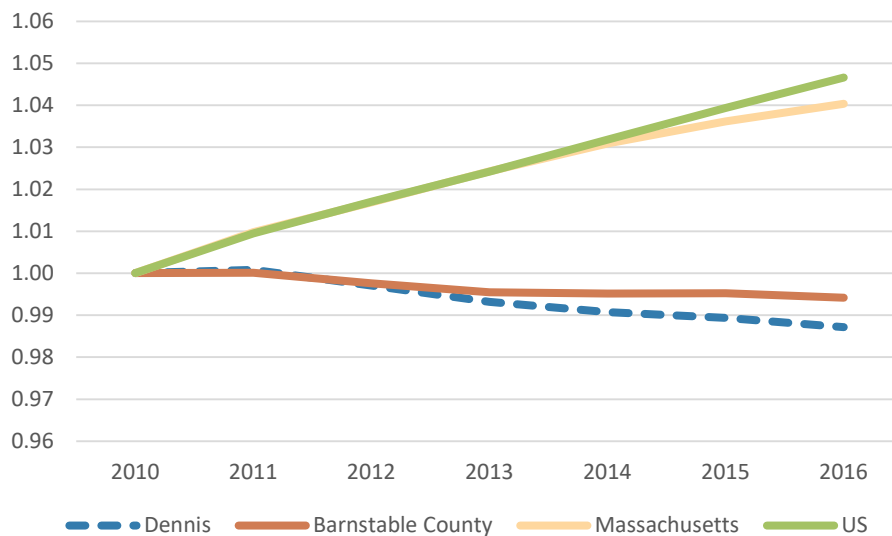
Socioeconomic Context for Introducing Wastewater Treatment to Dennis

Local Population and Economic Trends

While not a direct indicator of economic conditions, trends in population change can be indicative of the underlying fundamentals that make a place an attractive place to live. This is particularly true in seasonal tourist locations such as Cape Cod, where summertime population may be booming while witnessing an actual decrease in the number of full-time residents. In some instances this may be the result of the conversion of residences from full-time residents to seasonal second homes. In others, it can be indicative of an economy that is not strong enough to support a year-round population as large as previously was the case.

When comparing Dennis and Barnstable County to the state and nation, the change in population between 2010 and 2016 tells a tale of two diverging trends (**Figure 1**). While both Massachusetts and the U.S. grew in population by between four and five percent between 2010 and 2016, both Dennis and Barnstable County have seen population declines of between 1.3 percent and 0.6 percent, respectively. The lack of population growth in Dennis and Cape Cod is worrisome because it translates to a declining labor supply and that, in turn, can make the region less appealing for business expansions and investments. As will be shown later in this study, a lack of wastewater treatment can negatively affect population growth by making housing more expensive and by not providing necessary infrastructure for larger-scale business establishments.

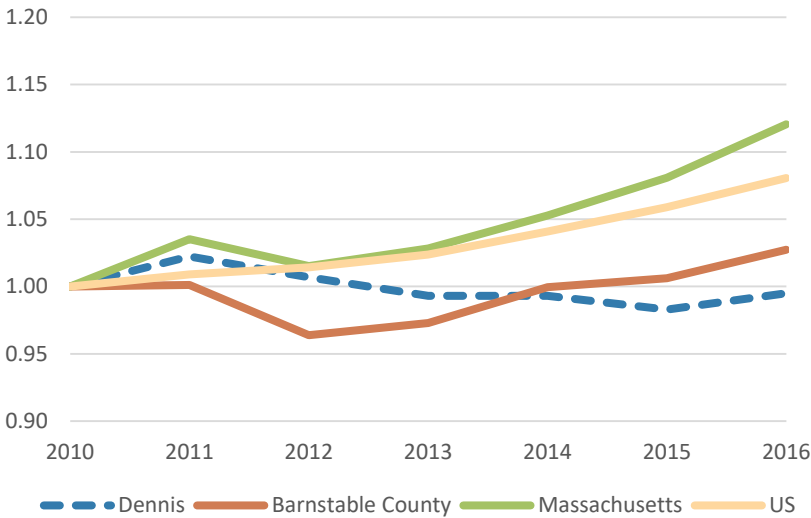
Figure 1: Population Change, Indexed to 2010



Source: U.S. Census Bureau, Population Division

Similar to the population trends, Dennis and Barnstable County have also diverged from the state and the nation in terms of business establishment growth (**Figure 2**). While Massachusetts and the United States have experience strong growth in the numbers of businesses since 2010, Cape Cod has seen relatively flat growth, overall, and the Town of Dennis has actually witnessed a decline in the number of business establishments. Again, as with population, the sluggish performance with business establishments points to a lack of dynamism, with water infrastructure likely being one of several possible contributing factors.

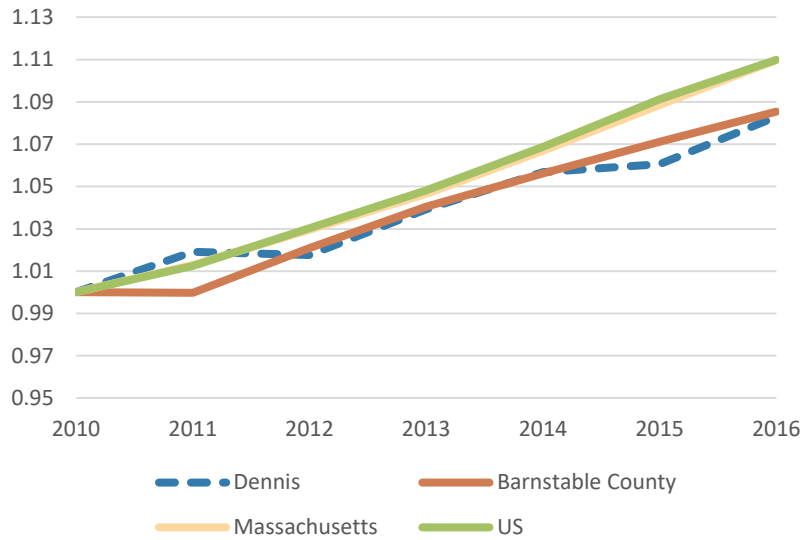
Figure 2: Change in Establishments, Indexed to 2010



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

In terms of employment, all four geographies are showing growth, much of it cyclical due to an economic rebound following the Great Recession (**Figure 3**). Nevertheless, neither Dennis nor Barnstable County are seeing their job numbers increase as quickly as Massachusetts or the United States.

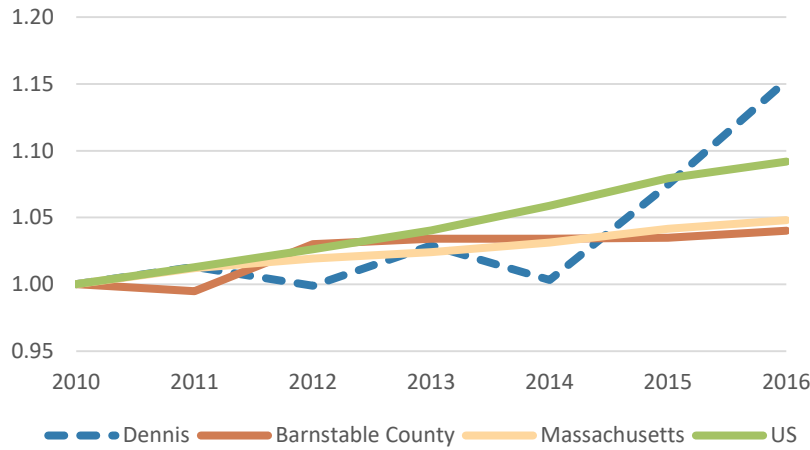
Figure 3: Change in Employment, Indexed to 2010



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

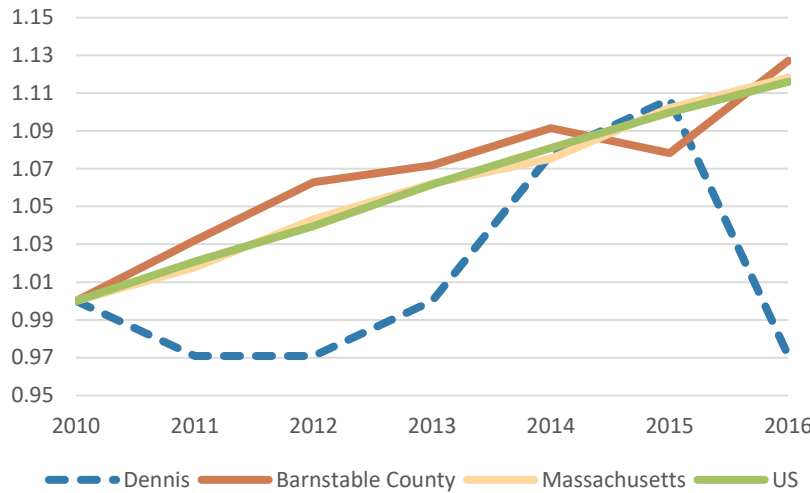
Drilling down into some of the industry sectors most relevant to Cape Cod’s economy, we can see some diverging trends. For example, employment in the retail sector shows employment has grown faster in Dennis than in Barnstable County, the state, and the nation (**Figure 4**). Meanwhile, employment in the accommodation and lodging sector (**Figure 5**) has fallen precipitously in Dennis since 2010, while the other three geographies have shown steady rises in employment in this sector. Dennis’s fall in accommodations employment is consistent with messages that came from interviews concerning antiquated and obsolete hotel and motel properties that are in need of major upgrades or replacement to bring them up to the standards expected by contemporary guests.

Figure 4: Change in Retail Sector Employment, Indexed to 2010



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Figure 5: Change in Employment in the Accommodation and Lodging Sector, Indexed to 2010

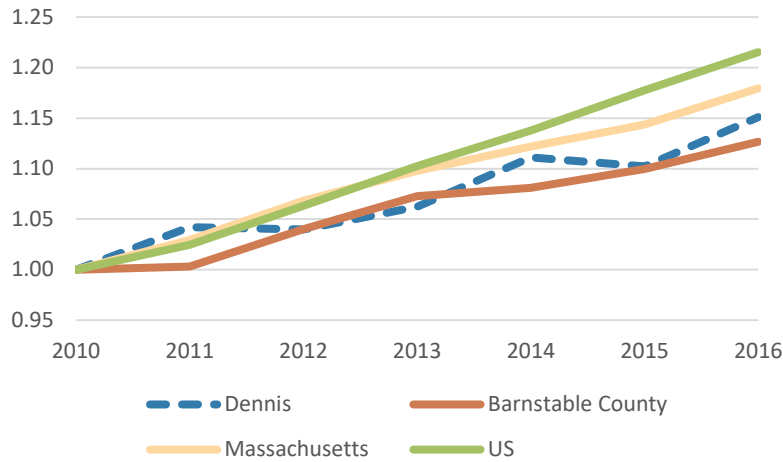


Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Lastly, employment in eating and drinking places has trended higher for all four geographies (**Figure 6**) since 2010. Again, however, both Dennis and Barnstable County are not seeing their jobs growth keep up with either Massachusetts or the United States. This is particularly important as food and drinking jobs are particularly vital in an economy that is led by tourism, like Dennis' and Cape Cod's. Through interviews, it was evident that some food establishments (or places that serve food as part of their business) could not grow to scale or could not even clean dishes (forcing the use of paper and plastic

disposables) due to the lack of municipal wastewater treatment services. There are many other factors that may be contributing to the slower growth but the lack of infrastructure is a clear hindrance.

Figure 6: Change in Employment in the Food Services and Drinking Places Sector, Indexed to 2010



Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.

Appendix 1, at the back of this study includes six tables comparing Dennis to Barnstable, Chatham, Falmouth, and Provincetown for each of these concepts. The comparison towns were selected because each offers the municipal wastewater treatment services that Dennis does not. Despite this disadvantage compared to the other towns, Dennis generally demonstrated similar performance. That said, there is a pervasive sense in Dennis that growth is stagnant and has been for the last five years (and this is during a period of Massachusetts and national economic expansion). Investments are going elsewhere and infrastructure is really needed to help turn this trend around.

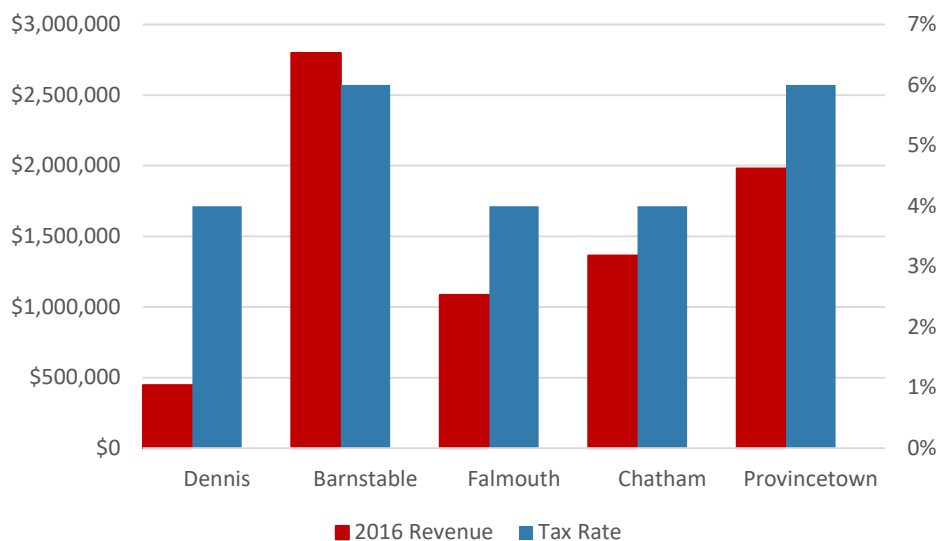
In terms of sectoral performance, a stand-out for Dennis was the notably subpar performance of the town’s accommodations and lodging industry. The industry showed growth in the other towns but declined in Dennis between 2010 and 2016. Additionally, Dennis has much lower employment levels in this crucial tourism-related industry than its competitor towns. The precipitous drop in Dennis between 2015 and 2016, in particular, should be monitored to see if it continues or is a one-year aberration. Regardless, and as noted previously, the condition of Dennis’s motel and hotel offerings has become a concern which may be contributing to the jobs decline. Needed updates and investments in these properties may not be forthcoming without the availability of municipal wastewater treatment infrastructure.

Tax Revenues

A measure of Dennis’s overall competitiveness on Cape Cod and a reflection of progress in diversifying revenue sources, is its ability to generate tax revenues and reduce its dependence on residential property taxes to support municipal services. This section analyzes three types of tax revenues, meal, hotel room, and property, and compares Dennis, in each, with Barnstable, Chatham, Falmouth, and Provincetown. Beyond property taxes, towns and cities in Massachusetts, can levy meal and room occupancy taxes to help generate revenues to support city and town services.

The Massachusetts Department of Revenue allows municipalities to levy room occupancy taxes of up to six percent. In Dennis, the town has had a 4 percent room occupancy tax in place since 1987. Falmouth and Chatham also use a four percent rate while Barnstable and Provincetown both impose a six percent room occupancy tax. As **Figure 7** shows, Dennis generates significantly less revenue from the room occupancy tax than competitor destinations on Cape Cod. At less than \$500,000 in 2016, hotel room tax revenues are only a fraction of Barnstable’s (\$2.75 million) and much lower than Chatham’s, Falmouth’s, or Provincetown’s. Significantly, Falmouth and Chatham both raise more revenue with the same four percent room occupancy tax rate. The relatively low room occupancy tax revenues in Dennis point to an opportunity to expand the number of rooms in the town and/or to increase average room rates. However, as shown in a later section of this report, expansions, the building of larger hotels and motels, and the types of property investments that would bring in larger-scale room rates are currently constrained by the lack of wastewater treatment infrastructure.

Figure 7: Room Occupancy Tax Rate and Revenue

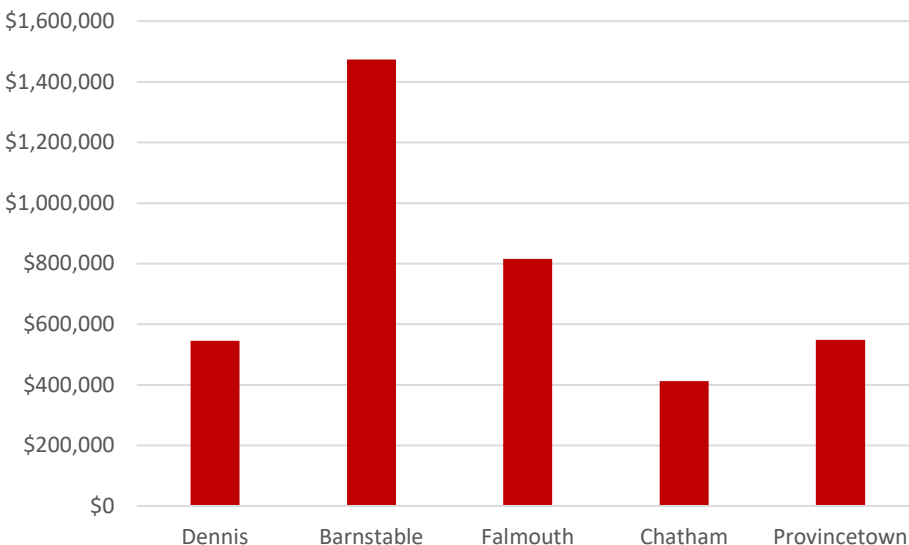


Source: Town Budget Documents.

There are two different meals tax rates in Massachusetts. One is the 6.25 percent that goes to the Commonwealth's coffers. The other is 7 percent, with the additional .75 percent going to the community in which the restaurant resides. Massachusetts law provides cities and towns with the "local option" to increase the meals tax in their communities to 7 percent as a way of bringing in additional revenue. With the exception of Eastham, all towns on Cape Cod have a meals tax. Dennis instituted a local sales tax on meals in 2010. In 2016, Dennis reaped nearly \$550,000 from the meals tax, a significant increase over the \$315,000 collected in 2011. In terms of meals tax revenue, Dennis is fairly similar to other Cape Cod towns, with the exception of much larger Barnstable as shown on **Figure 8**. Dennis benefits from the Exit 9 cloverleaf which provides excellent access for local and longer-distance travelers on Cape Cod. The exit area includes the operations of several major franchises like Burger King and Dunkin Donuts that tend to have high turn-over, generating significant revenues. As such, Dennis may benefit as a location due to the more restrictive bylaws put into place by other Cape Cod communities, like Wellfleet, that prevents or limits the development of chain stores and restaurants in those communities.

Meals taxes, like hotel room taxes, are an important source of revenue in Dennis and other Cape Cod communities. However, just as hotels are restrained in their growth and investment opportunities in Dennis by the lack of wastewater treatment, restaurants are also encumbered by the absence of sewerage services that limit their capacity to serve or force practices that create other problems (e.g., increased trash volumes from using disposable utensils in lieu of metal flatware to reduce water consumption from dishwashing). By opening options and providing the impetus for eating places to invest and expand, wastewater treatment in Dennis would be a means for increasing revenues via the local sales tax on meals.

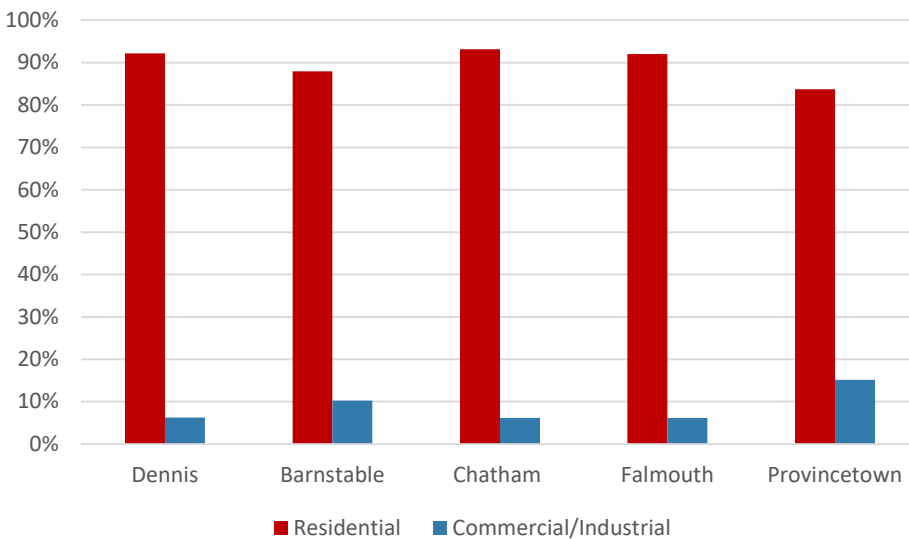
Figure 8: Meal Tax Revenue



Source: Town Budget Documents.

Like other towns on Cape Cod and reflective of visitor-oriented economy dependent on second homes and tourism, Dennis is dependent on residential property taxes as a primary source of tax revenues. In terms of assessed value, residential property types accounted for 92 percent of Dennis’s total property valuation in 2016, with commercial/industrial property contributing only six percent (see **Figure 9**). By comparison, Barnstable’s and Provincetown’s commercial/industrial properties account for 10 percent and 15 percent, respectively, of total assessed property values. Cities with diversified economies with extremely strong business and office presence, like Waltham, can see commercial/industrial properties comprise upwards of 30 percent of total assessed property values. While few towns or cities have as diversified a property tax base as Waltham, an expansion of retail businesses, office buildings and other commercial entities in Dennis (and elsewhere on Cape Cod) would help shift the tax burden from homeowners to other sources and better allow the Town of Dennis to embark upon capital projects and expansions or improvements in services. However, as will be discussed in a later section of this report, the relative lack of wastewater treatment in Dennis can stymie interest from investors in expanding (or updating existing properties) and prevent the needed scale and densities to make projects economically justifiable. The suppression of these types of investments represents a missed opportunity in Dennis and will limit the possibilities for diversifying the town’s tax base in the future.

Figure 9: Share of Total Assessed Property Value, by Property Type



Source: Town Budget Documents.

Cape Cod Wastewater Treatment – What Is Happening in Other Towns

Dennis, like all towns on Cape Cod, must reduce the amount of nitrogen flowing primarily from septic systems into estuaries, embayments, and ocean waters and degrading the marine environment. Too much nitrogen can result in algae blooms that choke out eelgrass and other pond organisms and can lead to fish kills. Eel grass is crucial to the Cape Cod ecosystem by providing a habitat for oysters and a wide range of other organisms. Cape Cod communities, per the Regional Wastewater Management Plan, need to address this issue which requires alternative technology nitrogen removal systems to be installed in areas declared nitrogen sensitive. With these clean water challenges, Dennis and many other towns are considering building or expanding existing municipal wastewater treatment systems. While it is relatively straightforward process to clean up water discharged by a water treatment plant, it is far harder to remove nitrogen when the source of the pollution is individual septic systems spread across a town.

Examples of wastewater treatment initiatives taking place in other communities on Cape Cod include the following:

- **Chatham.** Chatham has been moving towards expanding its municipal wastewater treatment system since the town approved its final comprehensive wastewater management plan in 2009. Chatham first installed its sewer system more than 40 years ago to serve the downtown area, but has recently undertaken construction to build an expanded treatment plant and to expand sewer service, with a goal of covering two-thirds of the town by 2030.
- **Orleans.** The town is moving forward with adding a sewer system and a water treatment facility that would initially cover its downtown area as well as a large residential district. Initial pipe-laying is planned for the spring of 2018.
- **Harwich.** In May 2017, Harwich voters approved \$11 million to fund the next phase in the town's comprehensive wastewater management plan, which involves installing sewer mains to connect East Harwich to Chatham's wastewater treatment plant. A month later, both towns reached a 25-year intergovernmental agreement under which Harwich paid a portion of the costs for Chatham's newly expanded wastewater treatment facility in exchange for having wastewater treated at the plant.
- **Mid-Cape.** Barnstable, Dennis, Harwich, and Yarmouth were awarded a state grant in early 2018 to further study a regional solution to the towns' collective wastewater treatment needs.
- **Bourne.** In October 2017, Bourne voters approved funding the construction of a new wastewater treatment facility to provide the capacity needed to allow for a number of new developments to take place on Main Street.
- **Provincetown.** After declaring a state of limited sewer capacity in 2015, Provincetown is exploring options for expanding the town's tightly constrained sewer system. Restaurant and

marina owners are pleased to see the town looking into a wastewater treatment expansion as it will help accommodate future economic growth.

- **Falmouth.** The town has a wastewater treatment facility with more treatment capacity than it is allowed to discharge. The imbalance is due to the amounts of nitrogen the facility is permitted to discharge locally. To accommodate future growth, Falmouth is looking into either finding a remote discharge location (e.g., at Joint Base Cape Cod in Bourne) or introducing new nitrogen filtration technologies (e.g., a membrane treatment system) at the plant.

The imperative for the improvement and preservation of water resources on Cape Cod has pushed the region's towns into a very active period of planning to address water treatment issues. Towns reliant of septic systems are looking into introducing sewerage systems while other towns with existing wastewater infrastructure are exploring ways to expand capacity. By addressing wastewater issues, particularly with regards to nitrogen discharges, Cape Cod's towns, including Dennis, can help to ensure a more pristine environment as well as increase economic development opportunities in coming years. The economic and environmental arguments for introducing municipal wastewater treatment are reviewed in the next section of this report.

The Case for Municipal Wastewater Treatment

The lack of a municipal wastewater treatment and sewerage system in Dennis has two main effects; the first is economic and the second is on the environment. While these effects are focused on Dennis, they can also affect the larger mid-Cape region as well.

The Economic Case

The economic effects of wastewater treatment are wide-ranging, but can generally be summarized as:

1. Septic systems put wastewater treatment responsibility and compliance on the owner.
2. Septic systems are expensive to upgrade/repair/replace
3. Generally, businesses don't want to be in the "wastewater treatment business," but a lack of sewerage forces them to operate septic systems or more expensive package treatment plants. Commercial property owners can spend hundreds of thousands of dollars to install one of these systems, and pay annual operating costs of tens of thousands of dollars to operate and maintain such systems and provide testing to ensure compliance with environmental regulations.
4. Enables reuse of vacant/underutilized properties and more compact, dense downtown areas
5. Enables homeowners to expand/add bedrooms to their homes, allowing more families to stay invested in their local communities
6. Provide viable wastewater treatment options for residential properties on lots too small for modern system
7. Prevent the need for expensive and unsightly raised septic systems
8. Attract property and business owners who want to live/operate a business in the area but don't want to be in the wastewater treatment business.

More generally, the construction and operation of municipal wastewater treatment systems has its own direct and indirect economic benefits.

In a 2002 study,¹ the author studied the economic impact of 87 sewer and water projects financed by the Economic Development Association (EDA). The projects were completed in 1989 and 1990 and spread across 30 states, with 33 projects located in rural areas and 54 in urban areas. These projects were built for specific firms or businesses, with the express goal of promoting economic development in

¹ Bagi, Faqir. Economic Impact of Water-Sewer Facilities on Rural and Urban Communities. Rural America. 2002

the host communities. Clearly these firms and businesses were direct beneficiaries of the water project, but the study found a host of other businesses benefitted indirectly from the same project; from companies that supplied or serviced the direct beneficiary of the project, to new businesses that moved into the area to hook up to the new water system, to existing businesses that used the increased water or sewerage capacity to expand their own business. Together, these direct and indirect benefits results in more investment, jobs, and wages in the local economy. Specifically, the study found that every dollar (1990\$) spent on construction of a sewer/water project:

- Resulted in nearly \$15 of private investment
- Generated \$2 in public investment
- Increased the property tax base by \$14
- Every \$10,000 in construction costs saved or created 5.75 jobs

In Massachusetts, Mansfield, Foxboro, and Norton are seeing clear economic development benefits from an ongoing project to introduce sewerage into new areas and expand its regional wastewater treatment plant. The expansion project, designed to accommodate growing commercial and residential neighborhoods in the three towns, likely has already had a major impact on encouraging development according to Lee Azinheira, the executive director of the MFN Regional Wastewater District.² Local officials indicate the wastewater treatment expansion is now resulting in:

- Growth at many businesses in Norton;
- Construction of residential and commercial buildings in downtown Mansfield;
- Retail, residential, and commercial/industrial activity as well as growth prospects are seen as improving in Foxboro. The expansion of wastewater treatment is also expected to jumpstart the town's downtown area.

The Environmental Case

On Cape Cod, perhaps the biggest problem stemming from a lack of municipal wastewater treatment is the presence of elevated levels of nitrogen in lakes, ponds, rivers, and streams. Excess nitrogen levels in surface water can lead to excessive growth of aquatic plants and algae and reduced oxygen levels. Because even properly maintained and functioning septic systems emit significant amounts of nitrogen, a municipal wastewater treatment and sewer system would prevent much of this nitrogen from entering the ecosystem in the first place, thus preventing these negative environmental effects.

² "Expansion of wastewater treatment plant serving Mansfield, Norton and Foxboro progressing," The Sun Chronicle, July 17, 2017.

Other environmental benefits to municipal wastewater treatment include³:

1. Fewer beach closures due to poor water quality, high bacteria levels, algal blooms, or other similar events. The economic impact of beach closures, which often coincide with the peak tourist season, can range into the millions of dollars. A study in Washington State estimated that the local economy lost \$6.4 million in spending impact when four beaches were shut down for a period of two to five days. A study from Florida has estimated that almost \$10.6 million was lost, per month, in the lodging and restaurant industries along a 10-mile stretch of beach during closures from red tide events (2017\$)⁴. Further, the economic impacts to tourism can linger even after the beach closures are over, as tourists may be turned off or negatively associate the beach closures with the Cape as a destination overall and decide to vacation elsewhere in subsequent years.
2. Fewer closures of commercial fishing grounds and shellfish beds. In 2005, a red tide event shut down shellfish beds in Massachusetts (as well as New Hampshire and Maine). It is estimated that this closure alone cost the Massachusetts shellfish industry \$22.4 million. Numerous other studies have been conducted that confirm the economic impact algal blooms on the commercial fishing industry.
3. Lower drinking water treatment costs. Because almost all drinking water on Cape is supplied from one single aquifer, any contaminants, including excess nitrogen, can end up in the water supply. Additional equipment, supplies, and processes are required to remove these excess nutrients, which in turn increases the cost of providing clean, safe, drinking water.
4. Reduced impacts on health. Whether through contact in surface water or consumed through drinking water or contaminated shellfish, algal blooms and elevated nitrogen levels can cause a number of negative health impacts for both humans and animals. Infants are particularly susceptible to nitrates in drinking water, which can oxygen levels in the blood. Horses, dogs, and other animals that consume surface water can be at risk as well.
5. Lower environmental impact from pollution from leaking/failing septic systems, cesspools, or other outdated or ineffective wastewater treatment systems.
6. During a flooding event, MWWT would reduce the risk floodwater being contaminated by untreated sewage leaking from raised septic systems or backed-up underground septic systems.

³ All dollar values updated to 2017\$ using CPI-U.

⁴ U.S. EPA. A Compilation of Cost Data Associated with the Impacts and Control of Nutrient Pollution. 2015.

The Case for Introducing Wastewater Treatment in Dennis

The study team spent a day touring Dennis and meeting with town officials, members of the wastewater implementation committee, property owners, developers, and other stakeholders to hear first-hand about the challenges and opportunities presented by wastewater treatment.

The Cost of Doing Nothing

There is a sense that Cape Cod, and Dennis in particular, needs quality redevelopment and reinvestment in order to both maintain and strengthen its status as a first class vacation destination. Cape Cod already has an onerous traffic situation and people can choose to vacation in numerous other destinations, with locations in Maine, New Hampshire, and the New Jersey Shore being the primary competitors for tourism.

Without a municipal wastewater treatment system, owners of large commercial properties are forced to provide their own on-site treatment systems. In many cases a septic system cannot handle the volume of wastewater generated, and so owners must install a package treatment plant, which is essentially a miniature wastewater treatment plant. Depending on the size and design of such systems, installation of a new system can cost anywhere from \$500,000 to \$750,000 and beyond. Furthermore, operating and maintaining these systems is costly, with annual costs of up to \$100,000. Much of these costs would be avoided with MWWT and replaced instead with a monthly sewer bill.

Limitations in septic system capacity also constrain small businesses in Dennis. Conference and meeting venues that could otherwise accommodate larger groups are prevented from reaching their maximum capacity due to septic systems and inadequate wastewater treatment capacity. In some instances, the lack of wastewater treatment creates the unintended consequence of increased trash volumes. Some restaurants and bars in Dennis must serve food on paper plates and with disposable utensils because they do not have adequate septic system capacity to handle the dirty water coming from dishwashing.

Businesses are not alone in feeling the side effects of not having municipal wastewater treatment. Because of the high cost of bringing older septic systems up to code, many homeowners have found that they cannot substantially renovate or expand their homes without incurring prohibitive costs. The cost burdens for updating residential septic systems discourages property owners from investing in their properties. Without the ability to add an extra bedroom or an in-law suite, many families find it hard to stay on Cape when they have another child or need to move their parents into the same home. Additionally, the lack of investment can also take a visual toll on Dennis as older properties are allowed to deteriorate. Dennis, like other Cape Cod communities, needs to maintain its appeal for both residents and visitors, and any property degradation can erode the town's ability to draw the people it needs to sustain its economy and provide opportunities for growth.

One recurring concern was about the cottage communities in Dennis and how these seasonal cottages were often built without even consideration of wastewater treatment. The result being that it would be very expensive to retrofit septic systems in these communities, if it were even technically feasible, which

may not be the case due to space limitations. Without a connection to a sewer system, it is possible that some of Dennis's cottage communities could ultimately face being closed over Title 5 non-compliance. The cottage communities form an important part of Dennis's historic legacy and closure would also translate into economic losses. A single cottage rental can generate \$1,000 per week in local food and entertainment purchases. If this is multiplied by hundreds, representing the types of activity currently taking place during the summer months at Dennis's cottage communities, it is clear that the economic impacts resulting from any closures would be significant.

Furthermore, without municipal wastewater treatment, the environmental effects will continue to compound, leading to deteriorating conditions in the waterways that are so important in making Dennis an attractive place to live and visit. Already, a beachfront inn reports having to remove five to ten pickup-truck-loads of seaweed and algae growth daily during the summer season. In fact, at least one group decided against booking a three-day conference there because the smell from the seaweed was so intense. Clearly, a problem like this cannot continue indefinitely or be allowed to worsen if Dennis is to maintain its quality of life attributes that are integral to its vitality.

How Dennis Can Benefit from Wastewater Treatment

An investment in municipal wastewater treatment has the potential to generate outside returns when it comes to land use and development patterns in Dennis. Perhaps one of the greatest challenges facing the Cape right now is the need for more workforce housing. Per a 2017 Cape Cod Commission study on the issue, Cape Cod is short 22,000 housing units that would be affordable to those households earning under \$90,000 a year. Furthermore, as portions of the Cape's economy become more dependent on services and occupations like landscaping, housekeeping, and healthcare that cater to an aging population, this workforce housing crisis, if not addressed, could lead to a worker shortage in these critical services because there is not an adequate supply of affordable housing options. A worker shortage also leads to higher wages to attract labor which further perpetuates already high costs on Cape Cod. The only way to provide a very large number of affordable housing units is to enable higher density development to occur in areas that have the infrastructure to handle it, and currently wastewater treatment is often the missing piece in most areas that is needed to make such developments feasible.

As an example, Cape Built is currently working on a project in Hyannis called Sea Captain's Row. With the municipal sewer in place there, they are able to build 60 units on 2.5 acres with a mix of workforce and market rate housing. In contrast, at another Cape Built development in Dennis, Heritage Sands, was built at a density of 63 units on eight acres. The Sea Captain's Row development in Hyannis accommodates the same number of units on one-third the amount of land as the Dennis project. This housing density would not be feasible without the municipal wastewater infrastructure that is available in Hyannis.

There has also been a profound shift in the types of places people want to live and visit, with people increasingly showing a preference for denser, more walkable neighborhoods that provide better access to a variety of amenities and activities. This type of development, often called "New Urbanism", requires levels of density that can only be accommodated through infrastructure, including sewerage

systems. The lack of wastewater treatment, as in Dennis, is a limiting factor that prevents the building of developments that better meet changing tastes in living styles.

A New Urbanism, higher density development initiative is now in its early stages in Bourne. Three owners of vacant or underutilized properties on Main Street in downtown Buzzards Bay want to develop their properties, but need the town to provide wastewater treatment capacity to accommodate the higher density style of development. The potential value of the proposed development exceeds \$100 million and is expected to provide several hundred jobs. The proposed treatment plant would include sufficient capacity to treat wastewater from these developments as well as other potential projects downtown. If these developments were assessed at 75 percent of their development costs, they would generate almost \$800,000 in property taxes for the town of Bourne. Similar developments located in Dennis, with its lower property tax rates, would generate \$475,000 in property tax revenue.

By using wastewater treatment to facilitate denser developments in downtown locations, another, perhaps counterintuitive benefit, can be realized. By concentrating development in a few, smaller areas, a larger share of remaining parts of Dennis can be preserved in its current state, which is a goal many residents and stakeholders would like to see realized.

Additionally, a number of specific developments were cited (and mentioned, below) that would become feasible and move forward through the planning stages if municipal wastewater treatment were to be built in Dennis as well as in neighboring Yarmouth.

The Cape Playhouse has in the past considered adding additional amenities on-site, including dormitories for staff housing as well as a small outdoor performance space. Similarly, the Lighthouse Inn would like to expand with an additional new building with 70 new rooms and some conference and meeting space to improve economies of scale and help extend its operating season further into the shoulder seasons. In both these cases, the lack of municipal wastewater treatment means that the costs of providing on-site wastewater treatment are significant enough to discourage this type of investment in new and/or expanded facilities. With much of the peak tourism activity in Dennis and on Cape Cod concentrated into a very short season and now becoming shorter due to earlier start times for schools, strategies to expand visitor activity beyond the summer months has become increasingly important. Again, the lack of wastewater treatment services is an obstacle for developing options to address this problem.

Red Jacket Resorts in Yarmouth (which is facing similar water treatment problems as Dennis) has reached a 20-year development agreement with the Cape Cod Commission to demolish and replace four resorts between the Parkers River and Bass River with two, new hotel resort properties. This development, representing \$75 million or more in investment, is on hold as there is concern about making such a large investment while other commercial property owners are not investing similarly in their properties. The lack of reinvestment and redevelopment of existing properties in Dennis and the mid-Cape region is a clear problem and cannot improve without municipal wastewater treatment given the concerns for estuary, bay, river, and aquifer quality. Reinvestment is a key pillar for economic vitality in Dennis wastewater puts the town and the mid-Cape in a “chicken and egg” situation. Wastewater treatment is needed for reinvestment and reinvestment is needed to fund wastewater

treatment infrastructure. Wastewater treatment is an indicator to property owners and developers that it is safe to invest. This lack of investment sends a signal that the market in and around Dennis is not vibrant enough to generate the economic activity needed to make such a substantial investment pay off.

Municipal wastewater treatment would encourage a large capital infusion (commercial, hotel, motel, and residential) in Dennis and this would help with cost recovery for the improved infrastructure. Today, commercial growth tends to be headed to Hyannis and business owners also indicate that they are concentrating more of their investments off-Cape to realize growth opportunities.

Conclusion

In conclusion, this study helps to inform the Town of Dennis as it pursues the building of a municipal wastewater treatment system. Through the information and data collected over the course of the study, evidence shows that water infrastructure has the potential to unlock development and increase investment in the community, both commercially and residentially.

Towns on Cape Cod that have already built municipal wastewater systems, namely Barnstable, Provincetown, Falmouth, and Chatham, are showing larger relative levels of room occupancy tax revenues. Barnstable and Provincetown, overall, are also less dependent on residential property for their tax bases. In Bourne, the passage of funding for a wastewater facility is expected to stimulate significant investment on that town's Main Street. Numerous other Cape Cod communities are also pursuing initiatives to introduce municipal wastewater infrastructure. Outside of Boston, a shared wastewater treatment expansion in Foxboro, Mansfield, and Norton is now seen as underpinning retail, residential, and commercial activity and new downtown construction, notably in Mansfield.

In Dennis, the provision of a municipal wastewater treatment system, as shown in this study, could result in a number of enhancements that would better situate the town for future residential and commercial investments. Homeowners could more easily expand their properties for children and aging parents, restaurants and venue operators could accommodate larger numbers of people, and motel/hotel-owners would see a greater impetus to upgrade their facilities. In terms of preserving the Town of Dennis's character, wastewater treatment would allow cottage communities to comply with environmental standards and help secure their future. The combination of these types of improvements would be further complemented by higher density development that would be made possible in Dennis with wastewater infrastructure. Higher densities are crucial for stimulating the building of more affordable housing in Dennis and attracting the workers needed to make the economy run.

Without municipal wastewater treatment, Dennis will have more limited policy levers to help guide its own future and it will be less able to capitalize on economic opportunities as they arise. Needed residential and commercial investments would continue to be intermittent and the worker-housing mismatch would contribute to an erosion of business competitiveness in both Dennis and Cape Cod. Additionally, further deterioration of estuary, bay, river, and aquifer quality due to poorly maintained septic systems would undermine the natural attributes that make Dennis attractive to visitors and residents alike. Left "as is", this combination of factors would damage both the tourism economy in Dennis and also negate possibilities for developing a more diversified economy.

Appendix 1: Population and Economic Indicators

	Population			Total Employment		
	2010	2016	Change	2010	2016	Change
Chatham	6,125	6,146	0.3%	2,822	3,550	25.8%
Dennis	14,207	14,024	-1.3%	4,609	4,991	8.3%
Falmouth	31,531	31,547	0.1%	14,158	14,597	3.1%
Provincetown	2,942	2,979	1.3%	2,459	2,809	14.2%
Barnstable	45,193	44,362	-1.8%	26,103	27,870	6.8%
Barnstable County	215,888	214,621	-0.6%	88,699	96,271	8.5%
Massachusetts	6,547,629	6,811,779	4.0%	3,149,169	3,494,553	11.0%
US	308,745,538	323,127,513	4.7%	127,820,442	141,870,066	11.0%
	Establishments			Employment in Retail Trade		
	2010	2016	Change	2010	2016	Change
Chatham	402	406	1.0%	383	460	20.1%
Dennis	585	582	-0.5%	925	1,066	15.2%
Falmouth	1,183	1,168	-1.3%	1,920	1,805	-6.0%
Provincetown	446	436	-2.2%	604	619	2.5%
Barnstable	2,257	2,326	3.1%	5,112	5,103	-0.2%
Barnstable County	9,196	9,446	2.7%	14,921	15,520	4.0%
Massachusetts	220,134	246,651	12.0%	339,425	355,771	4.8%
US	8,993,109	9,716,618	8.0%	14,549,251	15,886,000	9.2%
	Employment in Accommodation and Lodging			Employment in Food and Drinking Places		
	2010	2016	Change	2010	2016	Change
Chatham	353	490 [1]	38.8%	403	438	8.7%
Dennis	103	100	-2.9%	901	1,037	15.1%
Falmouth	325	411	26.5%	1,566	1,736	10.9%
Provincetown	324	353	9.0%	647	826	27.7%
Barnstable	643	650	1.1%	2,631	2,764	5.1%
Barnstable County	3,245	3,658	12.7%	11,154	12,567	12.7%
Massachusetts	31,932	35,706	11.8%	226,566	267,279	18.0%
US	1,809,341	2,019,459	11.6%	9,373,409	11,391,578	21.5%

Notes: [1] 2016 value has been imputed to account for missing data.

Source: Mass. Executive Office of Labor and Workforce Development ES-202, Bureau of Labor Statistics Quarterly Census of Employment and Wages.