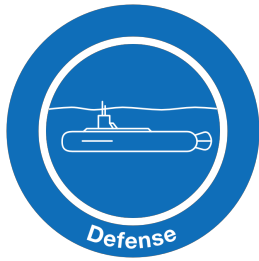


NARRAGANSETT BAY WATERSHED ECONOMY

The ebb and flow of natural capital



Defense Overview

The defense sector is one of the key economic drivers of the Narragansett Bay watershed (NBW), especially in Newport and Quonset, Rhode Island (RI). This sector is the center of basic and applied research and development projects in marine-related technology, including submarines, underwater sound equipment, systems, and technical engineering services. The sector provides some of the highest paying jobs in RI, employing tens of thousands of highly skilled individuals in the labor force.

The Naval Station Newport hosts the Naval Undersea Warfare Center Division Newport (NUWC Division Newport) along with approximately 50 Navy, Marine Corps, Coast Guard, and U.S. Army Reserve tenant commands and activities.¹ At the core of the sector is the NUWC Division Newport, which is the U.S. Navy's principal research, development, test, and evaluation center for undersea weapons systems and other systems related to undersea battlespace (Figure 1). This federal military defense infrastructure is integrated with the private defense industry through contracts from the Department of Defense (DoD), ranging from ship building and repair, search detection, navigation, aeronautical and nautical system, instrument manufacturing to scientific research in general.

In 2013, the defense sector directly supported nearly 17,500 military and civilian workers and added \$1.1 billion in earnings to the economy. The direct contribution to RI's Gross Domestic Product was estimated at \$2.3 billion (in 2016 dollars).² While both public and private industries have contributed to the watershed economy through significant employment and wages, recent growth is attributable to the private defense industry.

History

Newport has been the center of the U.S. Navy's undersea technology since the U.S. Naval Torpedo Station was founded on Goat Island in 1871.³ Situated in a geographically important location for times of warfare, it has military ties dating back to 1703, when it was used as a military fort.⁴ As a result of the American Civil War, submarine and other technologies were introduced as a new radical concept in conducting naval warfare. During the first three decades of existence, the torpedo station found itself in a race to build new physical facilities fast enough to keep up with the expanding torpedo

program requirements. A factory was built in 1907 to build steam torpedoes for the U.S. Navy, which became (and remains) a major employer in Newport.



Figure 1: Naval undersea Warfare Center Division (NUWC), Newport, RI

Source: NUWC, Division Newport

This factory designed, researched, tested, and produced underwater weaponry through World War I and II (WWI and WWII), creating additional facilities on several islands. The Navy's presence expanded throughout WWI and WWII; in the 1940s, the U.S. Naval Operating Base had headquarters in Newport, including extensive naval facilities on both sides of Narragansett Bay. The Naval Torpedo Station was the first major contributor to the development and production of new high-energy explosives for the U.S. Navy. Since its establishment, it also became a training center for both officers and enlisted individuals who were instructed in a wide range of technical subjects including torpedoes, diving, mines, gun-control systems, torpedo boat and submarine operations, and countermining. By WWII, the Goat Island facility complex became an industrial activity primarily dedicated to the production of artillery, where personnel worked around the clock to manufacture torpedoes during the war.

Shortly after the U.S. entered WWII, the U.S. military expanded its base in Quonset and Davisville, RI.⁵ In 1941, the U.S. Navy built the Quonset Point Naval Air Station, which served as the major northeastern naval base during the war and subsequent years. During WWII, Quonset was involved in the development of a naval night fighter aircraft. The Navy also established the Construction Battalion Center in Davisville on a site that was previously home to the thriving 370-acre Romano Farm and Vineyards. Davisville became the birthplace of the "Seabees," a portion of service people in the U.S. Navy tasked with building bases, creating roadways and airstrips, and numerous other construction projects during conflicts. During its heyday, Quonset's workforce, combined with that of the adjacent Davisville Construction Battalion Center, was the largest in the State of RI.

After WWII, Quonset Point saw a depletion in ships on the base. It became a Naval Air Rework Facility, where it specialized in reciprocating engines, and repaired and manufactured naval aircrafts. Like other WWII-era military installations across the country, Quonset Point fell victim to military budget cuts during the Nixon years and the Quonset base was decommissioned in 1974. The land and

buildings were offered to the State of RI and North Kingstown for civilian use. By the 1980s, Davisville's facilities were also stripped back to a skeleton crew—many of its buildings were sealed and the facilities faced operational closure in 1994. Following their closures, the land at Quonset and Davisville was managed and developed by various state entities until the Quonset Development Corporation (QDC) was created by the RI General Assembly in 2005. The QDC created Quonset Business Park, which is now home to almost 200 companies and employs more than 10,000 people in full- and part-time jobs across a variety of industries (for more information, refer to the section on “Ports and Transportation”).

In contrast to Quonset, the defense sector reorganized and revived in Newport. A series of reorganizations of the naval undersea research and technology centers within the U.S. Navy led to the establishment of the NUWC Division Newport in 1992. Two NAVSEA Warfare Centers—the Naval Surface Warfare Center and the NUWC—were officially established as part of an overall Department of the Navy consolidation of research, development, test and evaluation, engineering, and fleet support activities. The station had once declined due to lack of demand for undersea weaponry after the Cold War, but it has regained its scale after the 9/11 attack in 2001. Since 2001, the sector has been growing and has become a key engine in naval technology in the US. In 2003, the Naval Surface Warfare Center and the NUWC began operating as an integrated entity, shifting from a site-centric model to a national business model. Today, Newport remains an integral site of naval training, research, and development. In addition to NUWC, the prestigious Naval War College, the Naval Education and Training Center, and other navy command schools makes this sector a leading employer in the watershed economy.

Data Sources

Almost all activities in the defense sector in the watershed lie solely in the RI portion of the NBW. We therefore report data only on RI's federal military defense infrastructure and the private defense industry (private contractors through the DoD).

Publicly available data for employment and outputs in the defense sector is limited. Therefore, this chapter relies heavily on a recent economic impact study of the RI's defense sector by Tebaldi (2014) and data provided by NUWC. NUWC employs two-thirds of all employees in the military defense infrastructure in RI.

Telbadi (2014) uses data partially available publicly and others available through exclusive contracts from the U.S. Office of Personnel Management, U.S. Coast Guard, RI National Guard, Defense Manpower Data Center, Federal Procurement Data System, RI Department of Labor and Training, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, and NUWC Division Newport. Salve Regina University (2017) includes a few updated statistics. These data do not include U.S. Army National Guard's military base in Bridgewater, MA. Finally, Wyld (1997) describes the history of the Navy in Newport, RI from the 1800s to the present.

Current Trends

Overview of the defense sector in the watershed

The defense sector is one of the key economic drivers of the NBW, with almost all activities located in the RI portion of the watershed around Newport and Quonset, RI. The sector's core is the "military defense infrastructure," which is integrated with the "private defense sector" through contracts from the DoD. Combined, it undertakes basic and applied research and projects in marine-related technology, including submarines, underwater sound equipment, systems, and technical engineering services.

The defense sector contributes significantly to the watershed economy (Table 1). In 2013, the defense sector supported 17,497 jobs (or 15,760 full-time equivalents), of which 40% is in the private defense industry and 60% in military defense infrastructure.⁶ This is nearly 3% of total employment in RI. The total direct earnings were \$1.1 billion dollars. The direct contribution to the state's GDP was estimated at \$2.3 billion (2016 dollars).

Table 1: The Direct Impact of the Defense Sector (2016 dollars)

	Employment	Earnings (\$1000)	Output (\$1000)
Military defense infrastructure	11,106	\$680,964	\$1,325,864
Private defense industry	6,391	\$476,455	\$976,288
Total defense sector	17,497	\$1,157,419	\$2,302,152

Source: Telbadi, 2014

The defense sector also supports nearly 4% of the RI's GDP. In 2013, the sector added \$1.3 billion to the state's GDP. Roughly 42% was from the private defense industry and 58% from military defense infrastructure, roughly the same ratio as employment.

It is important to note that this federal military defense infrastructure is integrated with the private defense industry through contracts from the DoD, including ship building and repair, search detection, navigation, aeronautical and nautical system, and instrument manufacturing as well as scientific research. In 2013, the DoD engaged in 4,768 transactions with more than 200 private defense contractors in RI, awarding a total of \$736 million in contracts (2016 dollars). The largest contracts included underwater sound equipment, aircraft accessories and components, systems and other professional engineering services. Since 2013, the proportion of employment has shifted slightly from federal military defense to the private defense industry.⁷

The defense sector is the highest paying sector in RI, with a large portion of the civilians classified in science, technology, engineering, and math (STEM) disciplines. In 2013, the average wage for civilian employees working for NUWC Division Newport was \$114,256; the average for all civilian

employees for DoD was \$97,381; and the average wage for all RI private defense workers was \$74,550 (2016 dollars). These average wages are considerably higher than other sectors, for instance, manufacturing (\$52,788) and leisure and hospitality (\$19,050) (2016 dollars).⁸

Military defense infrastructure

The military defense infrastructure includes NUWC Division Newport along with 50 Navy, Marine Corps, Coast Guard, and U.S. Army Reserve tenant commands and activities at Naval Station Newport. Among these, the NUWC Division Newport employs two-thirds of the defense civilians in the military defense infrastructure; it is the U.S. Navy's principal research, development, test and evaluation center for undersea weapons systems and other systems associated with undersea battlespace. Its major focus is in applied research and system development for submarines, autonomous underwater systems, undersea offensive and defensive weapon systems, and countermeasures associated with undersea warfare. It provides research, development, test and evaluation, engineering and fleet support.

Over time, employment at NUWC Newport Division has increased steadily in RI (Figure 3). The workforce in this sector tends to be highly educated with the majority in STEM fields. In 2016, roughly one-third of those employees had advanced degrees and more than two-thirds were classified as engineers or scientists. The Naval Station Newport also hosts more than 30 Naval Educational Programs (e.g., the Naval War College), which train and develop Navy's midshipman candidates, senior enlisted personnel, officer candidates, and senior officers. The number of Navy students is estimated to be 9,600 to 15,000 annually (Telbadi, 2014).

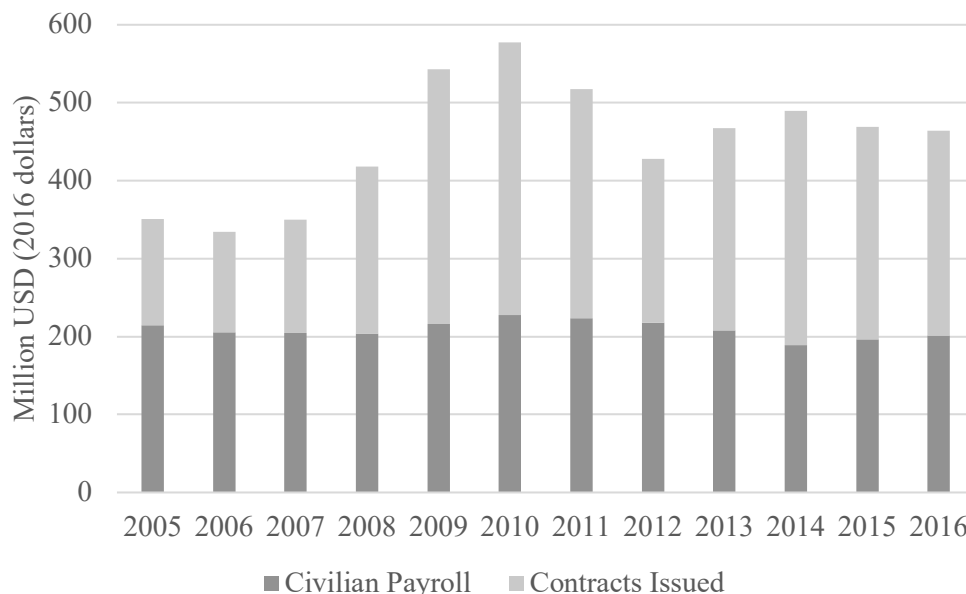


Figure 2: Civilian Payroll and Contracts in RI Issued at the Naval Undersea Warfare Center (Division Newport, RI) from 2005 to 2016 (2016 dollars, million)

Source: NUWC Economic Impact on Southern New England, 2005-2016

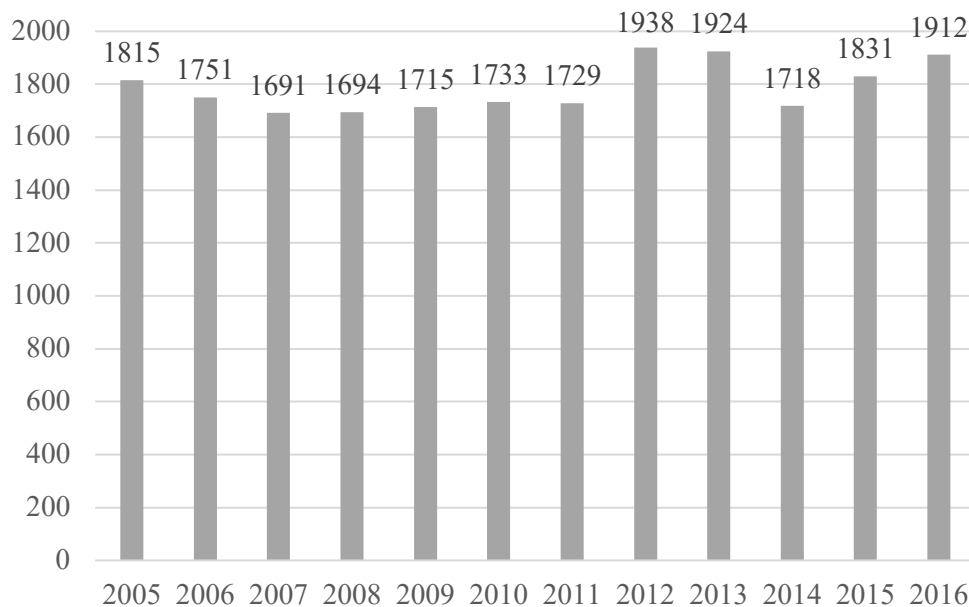


Figure 3: Civilian Employees Based in RI Employed by the Naval Undersea Warfare Center (Division Newport, RI) from 2005 to 2016

Source: NUWC Economic Impact on Southern New England, 2005-2016

Private defense industry

The military defense industry is complemented by research and development performed by the private defense industry, which is based on contracts awarded by the DoD. Funded programs, especially private contracts, have been increasing in the past decade (Figure 2). Between 2005 and 2016, private contracts in RI have increased by nearly twofold from \$136 million to \$262 million, peaking in 2010 at \$350 million (in 2016 dollars). In 2013, the DoD awarded a total of \$713 million in contracts, of which nearly 85% was through the Department of the Navy. The remaining 15% was awarded by the Defense Logistics Agency, Department of the Army, Department of the Air Force, and directly by the DoD. In 2013, more than 200 private defense contractors in RI were awarded contracts from the DoD.

DoD contracts support the development of new defense technologies and products. These include underwater sound equipment, systems engineering services, and aircraft accessories and components. Major private contractors in 2013 included Systems Engineering Associates Corporation, L-3 Communications Holdings, McLaughlin Research Group, and SAIC Inc.⁹ RI also receives contracts from defense companies outside RI, such as General Dynamics Electric Boat. In 2013, General Dynamics employed 2,522 workers at its Quonset Point facility in RI, which fabricates Virginia Class submarines.

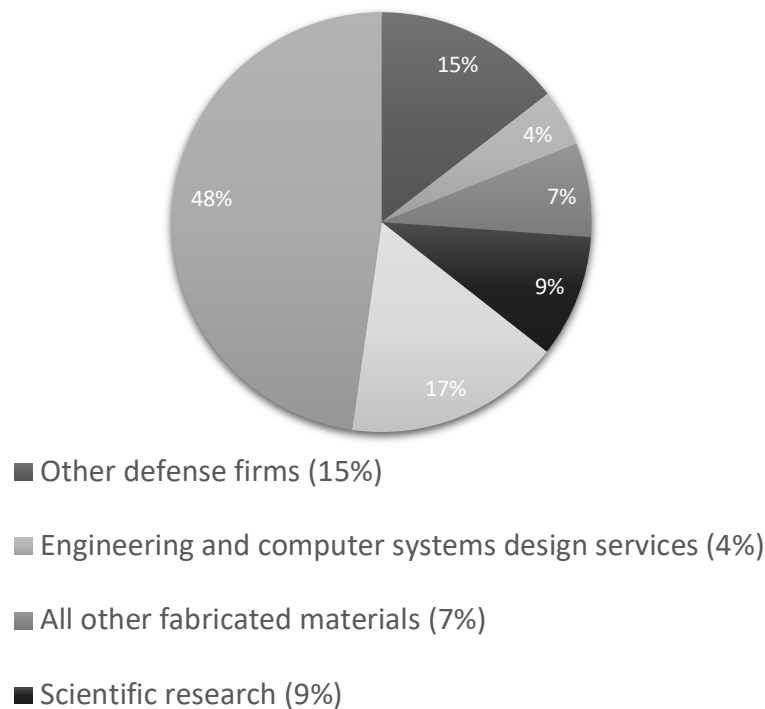


Figure 4: Employment in Private Defense Industry in RI, 2013

Source: Adapted from Telbadi, 2014

These DoD contracts support a significant labor force across several sectors in the watershed's economy (Figure 4). In 2013, the private defense industry in RI employed 6,391 workers. Ship building and repair, the largest private defense sector, employed 3,051 workers, accounting for nearly 50% of private defense employment in the state.¹⁰ The second largest defense industry is search detection, navigation, guidance, aeronautical and nautical system, and instrument manufacturing, with over 1,000 workers. Other sectors include scientific research, engineering and computer systems design services, and fabricated metal.

Future Threats and Opportunities

Sea level rise

The main threat to the defense sector in the NBW is sea level rise that will occur in coming years due to climate change. NOAA predicts that sea level rise along the Northeast Atlantic will be higher than the global average and will rise by an estimated 9.8 feet by 2100 (intermediate-high scenario).¹¹ A study of 18 coastal Naval installations in the U.S. found that flooding will likely increase tenfold in these bases by 2050, and by 2070 nine of the 18 bases could experience up to 520 floods per year. The study also found that eight of the 18 bases may lose up to 50% of their land due to these floods by the year 2100.¹² Much like the bases in this study, given that the U.S. Naval War College in Newport as well as numerous defense industry buildings are along the coast, they are extremely vulnerable to a rise in sea-level. As seen from the STORMTOOLS projection, even just a one-foot

rise in sea level would impact the area surrounding the Naval War College (Figure 5) and would also impact the Coast Guard station on Block Island (Figure 6). As with other industries, such as Ports and Marine Transportation, adjustments will need to be made to accommodate these changes. While sea level rise may negatively impact current infrastructure in the defense sector, it also provides the opportunity to build new infrastructure along the future coastline that will arise due to climate change.

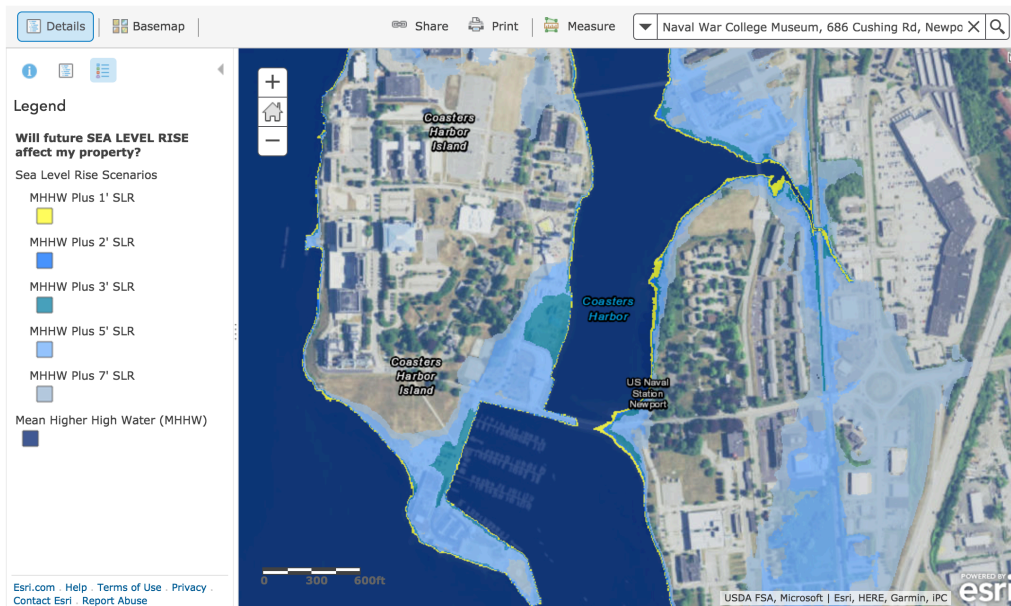


Figure 5: Sea Level Rise and Its Impact on the Naval War College, Newport, RI

Note: The rise in sea level is based on an increase in sea level rise (SLR) from the mean higher high-water point (MHHW)

Source: STORMTOOLS

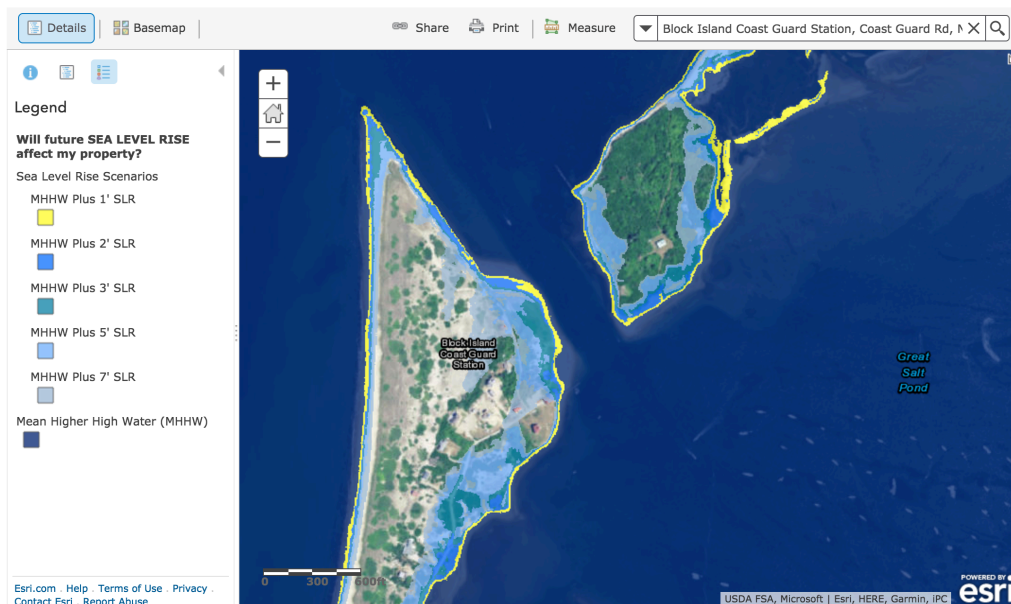


Figure 6: Sea Level Rise and its Impact on the Coast Guard Station on Block Island

Note: The rise in sea level is based on an increase in sea level rise (SLR) from the mean higher high-water point (MHHW)

Source: STORMTOOLS

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¹ Source: CNIC, n.d.

² Source: Tebaldi, 2014.

³ Source: U.S. Navy, n.d.

⁴ Source: Wyld, 1997.

⁵ Source: QDC, 2014.

⁶ Source: Tebaldi, 2014. The Military Defense Infrastructure includes civilian employees operating under the umbrella of the DoD, Coast Guard Personnel, RI National Guard personnel, and the

active-duty military in the Army, Navy, Marine Corps, and Air Force. The Private Defense Industry is comprised of defense contractors in NAICS sectors defined in Tebaldi, 2014, p.3.

⁷ Source: Personal communication, Tebaldi, 2017.

⁸ Source: Tebaldi, 2014.

⁹ Source: Tebaldi, 2014.

¹⁰ Source: RI Department of Labor and Training, reported in Tebaldi, 2014.

¹¹ Source: NBEP “Sea Level,” 2017.

¹² Source: Spanger-Siegfried *et al.*, 2016.

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