

NARRAGANSETT BAY WATERSHED ECONOMY

The ebb and flow of natural capital

Why do this study?

For hundreds of years, the Narragansett Bay Watershed (NBW) has been the center of a robust economy in New England, relying heavily on natural resources for economic growth and expansion. A high proportion of sectors in the economy of the watershed still depend on its natural capital. Coastal tourism, the defense sector, commercial and recreational fishing, aquaculture, agriculture, and marine transportation, among other industries, are examples of key sectors in NBW that depend on clean water and beaches, sustainable fish stocks, soil, and other coastal and marine resources—i.e., the “natural capital” from the watershed. These sectors contribute to the watershed’s economy by providing jobs and income to millions of people in Rhode Island and Massachusetts.

The future of the natural capital provided by NBW is at its crossroad. On one hand, state agencies, nonprofit organizations, and individuals have increased efforts to restore the health of the watershed. For instance, upgrading wastewater treatment facilities in the watershed has clearly improved the water quality of the Narragansett Bay and some of its tributaries. On the other hand, these natural resources are being threatened by a multitude of forces. Rapid urbanization and suburbanization in the past few decades have replaced a substantial amount of agricultural and forest land as well as wetlands with impervious areas, increasing the risk of water quality problems. Nearly a dozen locations in the NBW have been recently closed to shellfish harvesting due to harmful algal blooms caused by high levels of nutrient runoff from human settlements. Sea level rise, storm surges, flooding, and other effects of climate change may also have dramatic impacts on shoreline infrastructure, communities, and resources. These threats and decisions regarding how they are addressed will shape the future of the watershed and impact the health of its resources for years to come.

Many decisions made in the watershed—from creation of industrial infrastructure, land use and management, agriculture and conservation practices, to water regulations—involve tradeoffs between development and protecting the environment, which may result in impacts beyond coastal areas and across future generations. There is a clear need to understand those tradeoffs and the scale of benefits from the NBW so that decision makers and the public can make more informed choices in the future. However, no notable effort has been made to date to synthesize data and gather information, like has been done in this report, so that decision makers and the public in RI and MA can get a sense of the scope of the economy of the NBW. Understanding the economy of the NBW would have been useful for policy decisions, for instance, when there was a question about bringing in a liquefied natural gas

production facility to Providence, or the movement to retire the Brayton Point power plant in Somerset.

The overall goal of this report is to provide valuable information to decision makers, regulators, planners, and the concerned public to make effective decisions while recognizing tradeoffs and synergies that accompany these decisions. As the first step in a larger project, this report identifies and quantifies the major economic activities that depend on the natural capital of the NBW and the importance of a healthy watershed for sustained economic development. Future phases of this project will quantify non-market benefits of the NBW, including value of changes in water quality in the watershed under alternative future scenarios. Combined, the overall project is intended to provide a better answer to the question of the NBW's value. The project also intends to demonstrate how the NBW requires continual strategic investment to ensure the natural capital that we depend upon remains healthy and productive.

Objectives

The purpose of this report is to provide an economic assessment of the sectors that utilize the natural capital of the NBW. To meet this goal, this report provides an economic assessment of major watershed related uses, economic sectors, and economic impacts of these sectors on the NBW. This report has identified 13 sectors that make major and measurable contributions to the watershed's economy: agriculture; aquaculture; beach use; commercial fishing; the defense industry; forestry; hunting; ports, transportation, and maritime trade; recreational boating; recreational fishing; research and education; tourism; and wildlife viewing (Figure 1). With these sectors in mind, the goal of this report is to:

- Provide an economic history of the watershed and the key sectors.
- Assess and characterize the economic importance of activities in terms of number of establishments, employment, wages, and total revenue.
- Identify potential environmental threats and opportunities for each sector.

Ecosystem Goods & Services of Narragansett Bay

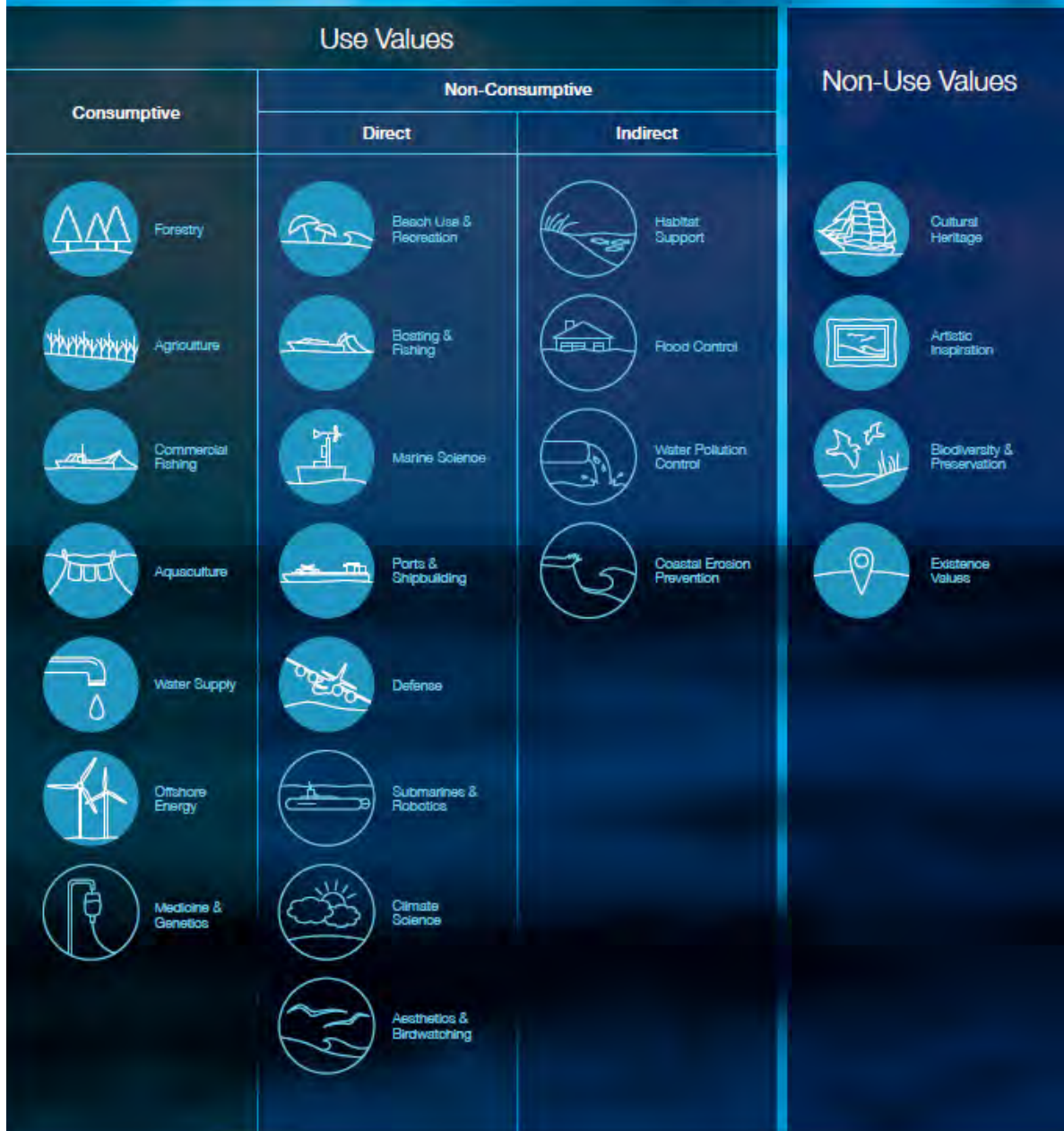


Figure 1: Ecosystem Goods and Services of Narragansett Bay

Overall findings

There are several key takeaways that have emerged from this report:

The NBW is an economic powerhouse for New England – From fueling colonial trade at its ports to powering mills during the Industrial Revolution, the NBW has supported a wide variety of economic sectors throughout MA, RI, and all of New England for centuries. Today, the economic scope of the watershed has expanded, and numerous sectors rely on the healthy natural capital that the watershed provides. No longer is it just maritime trade and commercial fishing that are reliant on the watershed, but industries such as recreational fishing, recreational boating, aquaculture, beach use, tourism, and wildlife viewing have emerged as powerful contributors to the economy, all of which rely on the resources of the watershed. Industries in the NBW have diversified watershed use through these sectors and, in turn, these sectors stimulate the economy by providing jobs, revenue streams, and a source of continuous innovation. For example, the tourism sector generate approximately 37,500 jobs in the NBW, aquaculture generated \$2.8 million in sales in 2016, and the defense sector employed over 17,500 individuals in 2013. These figures are just highlights of the significant economic impact of the NBW, which are elaborated on in various sections in this report.

Revival and growth of economic sectors in the NBW – Activities within the NBW contribute significantly to the economies of both RI and MA, and this contribution is growing for many sectors. Industries such as the tourism, defense, and aquaculture have a history of boom and bust, but have cultivated new market and development opportunities in recent years. For instance, the aquaculture sector has experienced substantial growth in recent decades—the market value of aquaculture sales in the NBW increased from \$67,000 in 1995 to \$2.8 million in 2016 (2016 dollars), a 4,000% increase. This growth is expected to continue in upcoming years as aquaculture is expected to supply 60% of fish consumed by the year 2030. This growth is paralleled by industries such as the defense sector where private defense contracts nearly doubled between 2006 and 2015, from \$136 million to \$262 million (in 2016 dollars). Other industries, such as ports, transportation, and marine trade, have additional sources of growth—the sector is expected to expand due to an increase in demand for submarine building, which is a specialty of Electric Boat in Quonset, RI, and millions in recently approved government support for expansion and modernization. These statistics represent just a sliver of the opportunities for growth experienced by economic sectors in the NBW.

“Only in the NBW” – The NBW provides a unique experience for those who partake in its wide offering of unique recreational, leisure, and research activities, including locals and out-of-state residents alike. Visitors can take a trip to the Newport Mansions, partake in a regatta on the bay, and spend the afternoon on Scarborough beach—experiences that, collectively, are not available outside of the NBW. The beautiful and unmatched scenery of the NBW draws in visitors for activities such as recreational fishing, which generated \$147 million in angler spending in 2016, or beach use, which attracted more than three million visitors in 2015. Aside from recreational and leisure activities, the NBW also attracts significant research opportunities due to its unique location and environment. These projects have been funded by institutions such as the U.S. Environmental Protection Agency

(EPA) and the National Science Foundation (NSF). It also offers unique learning experiences, whether it is through non-profit organizations such as Save The Bay teaching students about marine life with hands-on activities along the shore or Watershed Watch educating the public about water quality monitoring and the importance of healthy watersheds.

Potential environmental threats and opportunities – Sea level rise and changing landscapes from urbanization and suburbanization are major stressors to the key sectors in the NBW. Potential environmental threats and opportunities for each sector covered in this report were evaluated using the most recent assessment of the NBW, “State of the Narragansett Bay and Its Watershed” published by the Narragansett Bay Estuary Program (NBEP). For each section, the potential future threats and opportunities are outlined as they relate to climate change, including factors such as changing land use patterns, precipitation, temperature changes, and sea level rise. For instance, beaches within the NBW are highly susceptible to sea level rise, and the beaches of today may disappear in the next century; shellfishing may be affected by increased prevalence of disease and harmful outbreaks (RI has experienced two outbreaks of a toxic algae in less than a year—this type of algal bloom had previously never been found in RI waters). Despite these negative impacts, there may be some sectors that are more affected than others, or some that may potentially experience positive shifts from the warmer temperatures. For instance, the NBW’s agricultural sector may reap benefits from warmer temperatures and increased precipitation, allowing for potentially longer and more favorable growing seasons. The impact of climate change and its effects on these industries is highly uncertain, however, generalizations can be made regarding their effect on the sectors outline in this report.

Data gaps and limitations

There are a number of data gaps in assessing the economic sectors in NBW. First, data for the number of establishments and employment in many sectors are incomplete and understated. Complete information is not available because a substantial portion of firms and employment are independent contractors for whom payments received need not be reported to government agencies for the purpose of public use. We anticipate that this problem is substantial particularly for sectors such as commercial fishing, agriculture, and tourism. Second, data that do exist for each sector are often not reported at the watershed level and, instead, are reported either at the state, county, or census district levels. Currently available information does not allow for a precise determination of the proportions of economic activity in the NBW that are watershed-dependent. Statistics for the watershed in this report have been predicted proportionally to population or land area. Further data gaps include a lack of information on some consumptive and non-consumptive use of the watershed. For example, beach use statistics like visitation numbers and revenue are not required reporting for beaches in the watershed. As a result, in instances such as this, generalizations may be made using available data.

The estimates presented for each sector are as comprehensive as possible; however, some values are not included due to a lack of data through inaccessibility or non-existence for several economic sectors and, for this reason, estimates presented are not precise measurements. Notes are made in each

section if this is the case as well as a description of what steps were taken to ensure the most comprehensive data were provided for the related industry.

How to use this report

The rest of this report has five major sections:

- **Methodology:** describes the approach used for calculating statistics for employment, size of industry, and wages as well as the rationale behind this method, including definitions of the watershed and its boundaries, land mass, and population.
- **History:** provides a comprehensive narrative about the history of the watershed, including its land use, settlement patterns, populations, and industrial evolution.
- **Economic Overview:** provides a summary of the history of the watershed's economy, the forces that helped shape it, and how the economy got to be where it is today.
- **Geography and Demographics:** characterizes land use in the watershed as well as current socioeconomic and demographic characteristics of the watershed's population and how they have shifted over time.
- **Industry sections:** for each of the thirteen industries, there is a section containing: an overview, a brief history, data sources, current status and trends, and future opportunities and threats as they relate to the industry.

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