NARRAGANSETT BAY WATERSHED ECONOMY

The ebb and flow of natural capital

Beach Use Overview

The Narragansett Bay watershed (NBW) is gifted with a magnificent shoreline over 560 miles long with more than 100 marine and freshwater beaches (for a map of the NBW, please see the "Geography" section of this report).[1] Access to high quality beaches is an essential part of the heritage of Ocean and Bay State residents. In fact, visiting beaches and swimming in salt and freshwater have immense social value and are among the most popular water-based activities for residents in the area.[2] Out-of-state tourists are also drawn to these beaches, contributing significant economic value to the area. Visitors travel to locations such as Cedar Cove, Narragansett Town Beach, and Goddard Memorial State Park, partaking in recreational activities that include sunbathing, swimming, walking, yoga, kayaking, fishing, and surfing.

Recreational beach use in the NBW brings significant economic value to the region. While comprehensive data of beach use and revenue do not exist, data for seven beaches in eastern and southern Rhode Island (RI) show that over three million individuals visited these beaches during the summer of 2015. An additional three beaches in western RI brought in over $2 million (in 2016 dollars) in beach revenue. It is important to note that the economic value of visiting and swimming at marine and freshwater beaches in the NBW depends on water quality. Clean coastal waters are vital for human and ecosystem health; aesthetically pleasing waters that are safe for swimming are catalysts for a healthy watershed economy through beach user expenditures and job creation in fishing, tourism, and hospitality industries.[3] In the past, beach closures due to unsafe levels of bacteria have been an issue for monitored marine beaches in the watershed. However, in recent years, in part due to the completion of the combined sewer overflow abatement project, overall water quality has been improving at NBW beaches.

History

For centuries, the beaches of the NBW have attracted people to the region both to live and to visit. Beginning in the latter half of the 19th century, there was a rise of interest in leisure activities and areas within the NBW became destination hotspots for vacationers. For those with a taste for luxury shore resorts and beaches, Newport drew their interest, with activities ranging from sailing races to yacht clubs (Figure 1). Those with more adventurous tastes could visit northern Narragansett Bay

beaches to swim at Crescent Park in East Providence, the "Coney Island of the East Coast," or Rocky Point Park in Warwick.[4]

Figure 1: Dunes Club Beach (Narragansett, RI)
Credit: Sean McMahon

As populations and economies grew in the NBW, so did indoor plumbing and downstream pollution. This led to marine beach water quality issues, including waterborne epidemics in the mid-1800s and the closure of Crescent Park in 1979. Acceptable water quality remains a struggle today for NBW beaches, especially those located in the upper bay. Oakland Beach and Conimicut Point Beach in Warwick have the highest rate of marine beach closures in the NBW, and swimming is no longer allowed in Rocky Point due to poor water quality.[5]

Due to the passage of the Beaches Act in 2000, state health departments have monitored bacteria levels, closing beaches when levels exceed those that are safe for swimming (Figure 2). Since 2000, the number of saltwater beach closure days in the NBW peaked at 429 in 2003. To combat closures, RI and Massachusetts (MA) communities have taken steps to reduce bacteria flow into waters, including the construction of the combined sewer overflow tunnel in 2009 in RI. Largely due to these efforts and investments, the number of beach closure days has declined. The five-year average after building the sewer overflow tunnel (2010-2014) is 46% lower compared to the prior five-year period (2005-2009).[6]

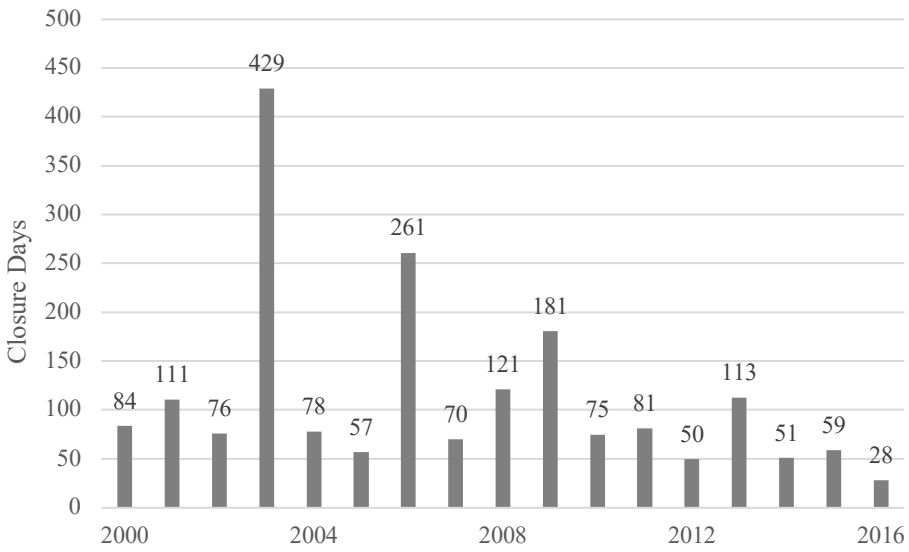

Figure 2: Number of Beach Closure Days at Marine Beaches in the NBW, 2000-2016
Sources: MADPH, 2001-2016; RIDOH, 2017

Data Sources and Limitations

The economic impact of recreational beach use within the NBW is measured using estimated attendance rates and beach revenues. These data are derived from Watershed Counts, the Narragansett Bay Estuary Program (NBEP), the Environmental Protection Agency (EPA), RI Department of Environmental Management (RIDEM), RI Department of Health (RIDOH), MA Department of Public Health (MADPH), and personal communication with managers of various beaches throughout the RI portion of the watershed. Data for RI beaches are also obtained from a 2017 report by Tom Sproul, *The Economic Impact of Rhode Island State Parks.*

Data are limited for recreational beach use participation and expenditures in the NBW for various reasons. First, few public beaches within the NBW charge fees to step on to the beach. Many charge parking fees, but do not tally individuals in each vehicle and not all beachgoers park where fees are required. Secondly, many NBW beaches are privately owned with no attendance figures. Thirdly, information is not available for beach use that takes place at public access points throughout the NBW that are not formally designated beaches. For example, the town of Narragansett alone has 36 entrances that provide access to NBW beaches.[7] In addition, while stringent water quality monitoring programs exist for marine beaches within the NBW, there is no mandated attendance reporting system. Finally, due to a lack of federal funding, information is not available for the significant recreational beach use that takes place at the approximately 75 monitored public and private freshwater beaches throughout the NBW, leaving communities and organizations to fund their own bacteria monitoring programs. For this reason, data is much more limited for freshwater beaches than

saltwater beaches.[i 8] These various circumstances make participation and expenditures for recreational beach use difficult to measure. Therefore, it should be noted that estimates provided in this section only capture a small portion of the economic impact of beach use within the NBW.

It is also important to note that the data for RI and MA come from their respective state agencies and that these sources may use different data collection or methodology. As a result, there is some margin of error when comparing data from the two states. For more comprehensive information on methodology used throughout this report, please reference the "Methodology" section.

Current Status & Trends

Today, beach use and its associated leisure activities comprise key recreational activities in the NBW (Figure 3). Monitored marine beaches are the most popular attraction, with all 37 of the marine beaches— public and private—located on the shores of the Narragansett Bay. In 2015 at three marine beaches in the NBW there were nearly 2.5 million beach attendees, an increase of 56% compared to 2010. Visiting beaches and swimming in both salt and freshwater are the three most popular water-based activities in the area; according to a survey conducted by the State of RI in 2002, participants spent an average of 32 days visiting beaches, 26 days freshwater swimming, and 21 days saltwater swimming per year.[9] In RI alone, this amounts to more than 20 million beach visits and over 15 million salt water swimming days per year.[10]

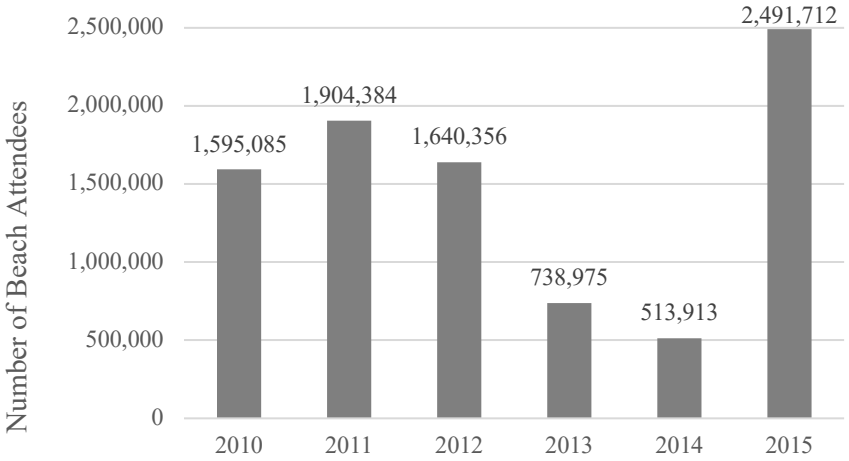

Figure 3: Recreational Beach Use at Three Marine Beaches in the NBW (2010-2015)[ii]
Source: Tom Rosa, Personal Communication, RIDEM

[i] Note: Sources that provide data on beaches in the NBW from which this number is derived includes the U.S. EPA, RI Parks and Recreation, RIDOH, RIGIS, and Mass GIS portals.

[ii] Attendance rate data were available for three marine beaches in the NBW: Scarborough, Fort Adams, and Goddard State Park. From 2013-2014, data was unable to be collected at Goddard Park, which could explain for the sudden drop in attendance.

Employment, Wages and Revenues

Recreational beach use is an activity that brings significant economic value to the NBW. Data for visitation, revenue, and employment at public, state, and town-operated marine beaches in the RI portion of the watershed suggest that beaches attract many visitors and generate considerable revenue (Table 1). While comprehensive data of beach use and revenue do not exist, data for seven beaches in eastern and southern RI show that over three million individuals visited these beaches during the summer of 2015. An additional three beaches in western RI brought in over $2 million (in 2016 dollars) in beach revenue.

Table 1: Attendance Rates, Revenue, and Employment for Seven RI Marine Beaches in the NBW over a 100-Day Season (2015) ($2016)

	Attendance (1000s)	Revenue ($1000s)*	Employment
Bristol	n/a	$253	45
City Park/Oakland	35	n/a	16
Conimicut	20	n/a	16
Eastons	n/a	$847	60
Fort Adams/Goddard/Scarborough	2,492	n/a	n/a
Narragansett	742	n/a	140
Sachuest/Third	n/a	$1,419	95
Total	3,289	$2,519	372

* Revenue for the 2015 fiscal year; includes parking and seasonal pass sales

Sources: Personal Communications[11]

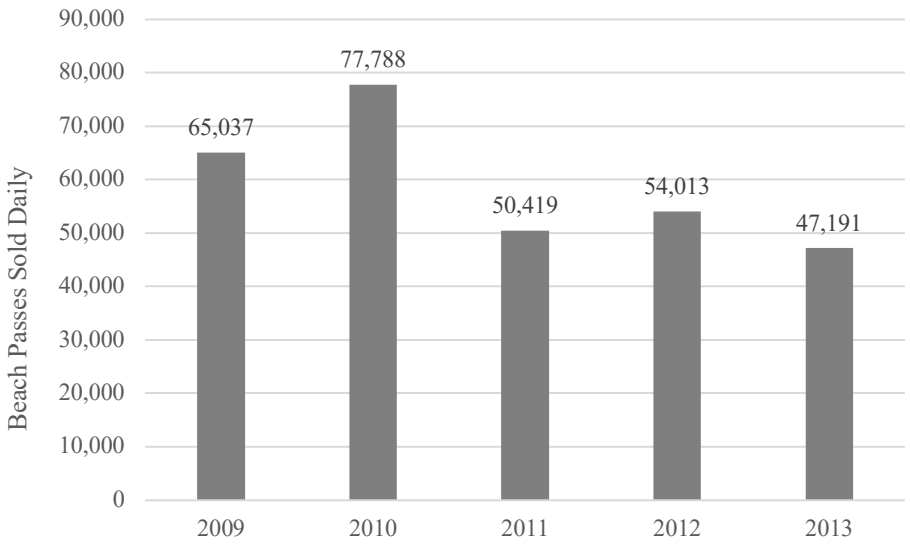

Figure 4: Beach Passes Sold Daily at Scarborough North and South Beaches in NBW (2009-2013)

Source: WPRI, 2014

Daily passes at Scarborough North and Scarborough South beaches in Narragansett, RI also illustrate the popularity of NBW beaches (Figure 4).[12] The number of daily beach passes sold is impressive, but unfortunately sales have decreased since 2010. The downward trend could possibly be due to an increase in RI beach fees for daily and seasonal passes in 2011. However, during the 2016 season, RI beach fees were reduced by close to 50%, marking the first reduction in recent history. This price reduction will hopefully increase beach attendance, bringing in more revenue to the area.

Furthermore, a 2017 study, *The Economic Impact of Rhode Island State Parks*, includes visitation and revenue data for several Rhode Island beaches. Four of the seven beaches in the study fall within NBW boundaries – in 2016, these four beaches had nearly 600,000 visitors (approximately 245,000 at Roger Wheeler, 53,000 at Salty Brine, 192,500 at Scarborough North, and 107,500 at Scarborough South) and $51.3 million in spending (approximately $18.7 million at Roger Wheeler, $3.6 million at Salty Brine, $19.3 million at Scarborough North, an $9.6 million at Scarborough South). Additionally, of the beaches in the study (including those outside of NBW boundaries), in-state visitors spent an average of $40 per beach visit, while out-of-state visitors spent considerably more at almost $200, with out-of-state visitors making up nearly 47% of all visitors.[13] These figures, although provided for only four beaches within the watershed, highlight their vast economic contribution to the watershed and their importance for drawing in tourists to the region.

Water quality and beach closures in the NBW

Monitoring water quality in the NBW is important for the safety of beach use. Beaches with high water quality attract people to the region to both reside and to visit, bringing in significant economic value to RI and MA. The marine beaches in the watershed are regularly monitored for water quality through funding provided by the U.S. EPA (Table 2). If bacteria levels exceed safety thresholds, beaches are closed by the health department until waters are safe for swimming.

Table 2: Monitored Marine Beaches in the NBW

RI	RI	RI	MA
Atlantic Beach Club	Fort Adams State Park	Peabody's Beach	Cedar Cove
Barrington Town Beach	Goddard Memorial Park	Plum Beach Club	Coles River Club
Bonnet Shores Beach Club	Gooseberry Beach	Sachuest Beach	Leeside
Bristol Town Beach	Grinells Beach	Sandy Point Beach	Pierce Beach
Camp Grosvenor	Hazards Beach	Saunderstown Yacht	Sandy Beach
Camp St. Dorothy	King Park Swim Area	Scarborough North	Swansea Town Beach
City Park Beach	Mackerel Cove Beach	Scarborough South	
Conimicut Point Beach	Narragansett Town Beach	Spouting Rock Assoc.	
Dunes Club	North Kingstown Town Beach	Third Beach	
Easton's Beach	Oakland Beach	Warren Town Beach	
Fogland Beach			

Source: NBEP, 2017

To combat closures, RI and MA communities have taken steps to reduce bacteria flow into waters, including the construction of the combined sewer overflow tunnel in 2009 in RI. Largely due to these

efforts and investments, the number of saltwater beach closure days has declined (Figure 5). The five-year average after building the sewer overflow tunnel (2010-2014) is 46% lower compared to the prior five-year period (2005-2009). [14]

Despite significant improvements to beach and water quality in the watershed, some monitored marine beaches are still a concern, particularly those in the upper region of the Bay; of the NBW beach closure days, 63% occurred in Warwick beaches.[15] Continued efforts to reduce water contaminants and beach closures will be critical for the economy and health of beach users.[16]

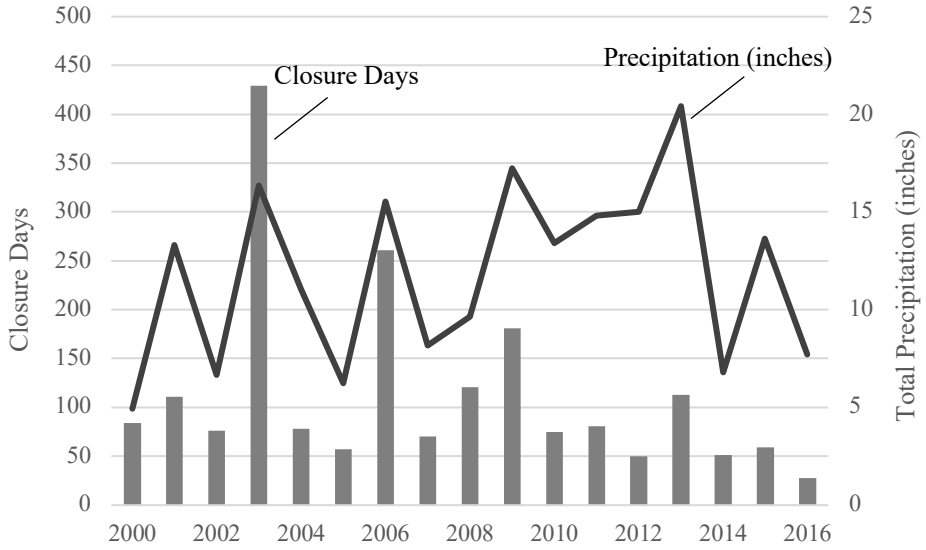

Figure 5: Saltwater Beach Closure Days and Precipitation in the NBW, 2000-2016
Sources: MADPH, 2001-2016; RIDOH, 2017

Future Threats and Opportunities

Land use | Sea level | Marine beaches | Water quality for recreation

As discussed above, water quality and its relation to human safety has long been a concern for beaches in the NBW. Currently, the most pressing threat to beaches is still beach closure due to poor water quality. Fecal bacteria measurements serve as a common indicator for water quality at beaches, and beaches with excessive fecal bacteria levels are closed due to the fact that they can cause serious illness in humans. Currently, out of the 37 beaches in the NBW, 14 are considered "high concern" (averaging more than 1.5 closures per year), while the other 23 are "low concern" (averaging less than 1.5 closures per year).[17] Fecal bacteria is carried into the water by rainfall, and originates from poor septic systems, overflow of sewers, poorly functioning cesspools, animal waste, and numerous other sources.[18] Due to increased urbanization (more impervious cover, cesspools, and septic systems, etc.) and increased rainfall from climate change, the level of fecal bacteria and prevalence of beach closures may increase in the future. This effect may be exacerbated by the warmer water temperatures from climate change, which promote bacterial growth, all of which may lead to increased beach closures unless the issue is properly managed. Furthermore, another pressing issue threatening the

future of marine beaches in the NBW is sea level resulting from climate change. With an expected sea level rise of 9.8 feet by 2100, the submersion of many of these beaches seems to be a looming issue for the future.[19]

Overall, the quality of water at marine beaches faces threats from increased urbanization and the impacts of climate change, which may lead to increased beach closures in coming years. Additionally, aside from the quality of the water, the beaches themselves are threatened by submersion from sea level rise. Efforts to control water quality moving forward are essential to the health of NBW and the important economic contribution that they have in the area.

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[1] Sources: Marine Beaches Source: NBEP "State of the Bay," 2017; Freshwater Beaches Source: U.S. EPA, 2010.
[2] Source: RIDEM, 2002.
[3] Source: Watershed Counts, 2014.
[4] Source: Rodericks, 2013.
[5] Sources: RIDOH, 2017; RIparks.com

[6] Sources: MA DPH, 2001-2016; RI DOH, 2017.
[7] Source: Allard, 2004.
[8] Source: Watershed Counts, 2014.
[9] Source: RIDEM, 2002.
[10] Source: Mazzotta et al., 2012.
[11] Sources: Personal Communications with Rosa, T.; Burke, W.; Cronin, W.; Reis, E.; Rooney, M.; and Wright, S.
[12] Source: WPRI, 2014.
[13] Source: Sproul, 2017.
[14] Sources: MA DPH, 2001-2016; RI DOH, 2017.
[15] Sources: RIDOH, 2017; Parris & McCormick, 2016; MA DPH, 2016.
[16] Source: Watershed Counts, 2014.
[17] Source: NBEP "Marine Beaches," 2017.
[18] Source: NBEP "Water Quality for Recreation," 2017.
[19] Source: NBEP "Sea Level," 2017

Appendix

Table A1: Beaches in the RI and MA portion of the NBW

Beach	State	Town	Beach	State	Town
Atlantic Beach Club	RI	Middletown	Holiday Acres Campground	RI	Glocester
Barrington Town Beach	RI	Barrington	Hope Pond Beach	RI	Scituate
Beachmont/Hayes Field	RI	Cranston	Irons Homestead	RI	North Scituate
Blue Beach	RI	N. Kingstown	Jamestown Shores Beach	RI	Jamestown
Bonnet Shores	RI	Narragansett	Jamestown Town Beach	RI	Jamestown
Branton	MA	Somerset	Kent County YMCA	RI	Warwick
Briar Point Beach Area	RI	Coventry	Kings Beach	RI	Newport
Bristol Town	RI	Bristol	Lincoln Woods State Park	RI	Lincoln
Camp Aldergate	RI	N. Scituate	Little Pond Beach	RI	Warwick
Camp Cookie	RI	Chepachet	Mackerel Cove Beach	RI	Jamestown
Camp Massasoit	RI	Johnston	Marion Irons Beach	RI	Glocester
Camp Meehan	RI	N. Providence	Mother of Hope Day Camp	RI	Chepachet
Camp Shepard	RI	Smithfield	Narragansett Town Beach	RI	Narragansett
Camp St. Dorothy	RI	Bristol	Ninigret Park	RI	Charlestown
Camp Watmough	RI	Glocester	North Kingstown Town Beach	RI	N. Kingstown
Cedar Cove	MA	Swansea	Oakland Beach Park	RI	Warwick
City Park Beach	RI	Warwick	Peabody's Beach	RI	Middletown
Colt State Park	RI	Bristol	Pierce	MA	Somerset
Colwells Campground	RI	Coventry	Roger Wheeler State Beach	RI	Narragansett
Conimicut Pt. Beach	RI	Warwick	Rose Nulman Memorial Park	RI	Narragansett
DiFonzo Recreation Area	RI	Glocester	Sachuest	RI	Newport
Dunes Club	RI	Narragansett	Salty Brine Beach	RI	Narragansett
Echo Lake Campground	RI	Burrillville	Sandy Beach	MA	Swansea
Easton's Beach	RI	Newport	Sandy Point Beach	RI	Portsmouth
Elm Street Pier	RI	Newport	Saunderstown Yacht Club	RI	Saunderstown
Episcopal Conference Center	RI	Pascoag	Scarborough State Beach	RI	Narragansett
Fogland Beach	RI	Tiverton	Slack Pond	RI	Smithfield
Fort Adams	RI	Newport	Spring Grove Beach	RI	Glocester
Georgiaville Beach	RI	Smithfield	Spring Lake Beach	RI	Burrillville
Glocester Country Club	RI	Glocester	Teddy's Beach	RI	Portsmouth
Goddard Memorial State Park	RI	Warwick	Third Beach	RI	Middletown
Gooseberry	RI	Newport	Town Beach	MA	Swansea
Gorton's Pond Beach	RI	Warwick	Town Walkway	MA	Somerset
Governor Notte Park	RI	N. Providence	Vanzandt Pier Beach	RI	Newport
Greenlake Beach	RI	Smithfield	Warren Town Beach	RI	Warren
Grinnells Beach	RI	Tiverton	Westwood YMCA	RI	Coventry
Harmony Hill School	RI	Glocester	World War II Memorial Park	RI	Woonsocket
Hazards	RI	Newport			

Source: MassGIS, RIGIS, USEPA, RIDOH

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