Executive Summary of Major Wastewater Pollutant Reduction Efforts in RI Since Meeting Secondary Treatment Standards

RIDEM Office of Water Resources

Prepared October 5, 2016, updated September 12, 2017 and November 2, 2017

- Chlorine Reductions – For more than 15 years, the harmful effects of total residual chlorine have been eliminated from every wastewater treatment facility (WWTF) in Rhode Island as a result of discharge limits established to protect aquatic life. **By 2001, an 85% reduction in the total amount of TRC released from all RI WWTFs from 1997 levels was achieved (200 versus 1,340 lbs/day).** By 2003 the reduction was 95 % and has remained between 96% and 98% since. **In 2016 only 20.2 lbs/day was discharged, less than 1/10 of the permitted levels (i.e. the levels that will not cause adverse impacts to aquatic organisms)**. **Between January 2005 and December 2016, the monthly average TRC limit compliance rate for all RI WWTFs was 99.9%.**
    - Completion of Phase I of the CSO tunnel (in November 2007) and Phase II (in December 2014) have substantially reduced chlorinated discharges from the Fields Point wet weather facility (only once in 2015, twice in 2016 and 8 times in 2017). In Newport, discharges from the Wellington Avenue CSO Facility were nearly eliminated in June 30, 2017 and the Washington Street CSO facility completed installation of dechlorination at the end of June 2016.

- Nitrogen Reductions – Since the early 1980s it has been documented that the health of Narragansett Bay north of Prudence Island and Greenwich Bay is impacted by excessive nitrogen which stimulates excessive phytoplankton and seaweed growth, loss of seagrass habitat, poor benthic habitat and low dissolved oxygen levels. To address impacts to aquatic life from excessive nitrogen loadings to these waters a goal of reducing RI WWTF loadings by 50% was adopted in the spring of 2004 by the Governor's Narragansett Bay and Watershed Planning Commission and signed into law during the 2004 legislative session. Estimates of dissolved oxygen and chlorophyll improvements were based on studies conducted at the University of Rhode Island's Marine Ecosystems Research Laboratory (MERL).

- In December 2004 DEM evaluated implementation costs, the performance of available technologies, and estimates of water quality improvement. As a result, 11 Rhode Island and 6 Massachusetts WWTFs were identified for seasonal nitrogen reductions to make progress toward increasing dissolved oxygen to **protect against acute impacts and 95% larval survivability. The criteria are based on the four most sensitive species studied, which included lobster.**

- Between 2013 and 2016, the summer season (May – October) nitrogen loads from the eleven RI and six MA WWTFs have been reduced 62-73% when compared to the (pre-nitrogen reduction) early 2000s time period, These reductions coupled with changes to

other loads to rivers result in an estimated 51% reduction in the total annual loading to the Upper Narragansett Bay and Greenwich Bay.

- Reductions to Upper Bay and the Taunton River (including WWTFs) have resulted in a 49% reduction in total annual loading to Narragansett Bay (NBEP 2017). It is estimated that WWTFs constitute 55% of the remaining load to the entire Bay (NBEP 2017)

- Toxic Chemicals Reductions- Since 1985 DEM has monitored WWTF discharges for the 126 EPA Priority Pollutants and established discharge limits when necessary to meet standards that protect aquatic life. Industries that discharge to WWTFs have been required to significantly reduce the amount of chemicals they discharge to the WWTFs. The most prevalent priority pollutant of concern has been metals.

    - Toxic Metals Reductions - Since the early 1990s DEM has established discharge limits for toxic metals. Compliance was primarily achieved by the WWTFs requiring pretreatment by industries. Historically, the NBC's Fields Point and Bucklin Point WWTFs were the largest sources of metals. Since 1993, toxic metals discharges from these WWTFs have decreased by 89.4% and 74.0%, respectively.

- Effluent Toxicity Testing – Since 1990 RI WWTFs have been required to expose aquatic organisms to samples of their discharge to determine if there are any acute or chronic effects. This technique is referred to as a bioassay test, a standard method to check whether chemicals not measured in the discharge (e.g. personal care products or pharmaceuticals) or combinations of chemicals are more toxic than the aquatic life criteria suggest. **Prior to 2003 samples collected from chlorinated effluent would need to be diluted 100 times to eliminate acute effects while dechlorinated samples show no acute effects or chronic effects**. **These impacts were eliminated more than 15 years ago. For example, from October 2014 - June 2017, RI WWTFs achieved 93% compliance with the requirement for no chronic (i.e. sub-lethal) effects beyond the mixing zone. Of the 9 violations, 6 are from one WWTF and have been traced to an industrial wastewater discharge to the WWTF**

- CSO Reductions – In certain older US cities, sewer systems collect a combination of stormwater and sewage that is discharged untreated to nearby waters when the system's capacity is exceeded (known as combined sewage overflows, CSOs). The only wastewater systems in RI with CSOs are Newport, and the Narragansett Bay Commission (NBC) Fields Point and Bucklin Point WWTFs. CSOs are the largest contributor of bacteria to metro Providence Rivers and to the Upper Bay impacting shellfishing, swimming and other recreational activities. Pollutants in domestic and industrial wastewater are discharged with CSOs. As of September 12, 2017 implementation of Phases I and II of the NBC's CSO control plan has resulted in the capture and treatment of 8.3 billion

gallons of combined sewage at the Fields Point WWTF. This allowed DEM to increase the rainfall depth that causes shellfish closures from 0.5" to 1.2" in Area A and to eliminate conditional area B, which previously closed at 1.0" and is now operated as an approved area with no rainfall closures. Both of the NBC WWTFs and the Newport WWTF continue to work towards further CSO reductions under agreements with the DEM.

- Phosphorus Reductions – Excessive levels of phosphorus promote the growth of nuisance algae and rooted aquatic plants in freshwaters which results in reduced water clarity, poor aesthetic quality and low dissolved oxygen levels that impact aquatic life. There are 6 municipal WWTFs that discharge to freshwater rivers in RI. By the mid-2000s all 6 reduced their discharge below 1 mg/l (one was required to meet this limit when constructed in 1980). All facilities were required to complete construction to lower phosphorus to 0.1 mg/l, between 2014 and 2017. RI and MA WWTFs along the Blackstone, Pawtuxet, Taunton, Ten Mile, and Woonasquatucket have been required to reduce phosphorus loads**. These reductions contributed to a 37% reduction in Bay-wide phosphorus loads between the early 2000s and 2013-15 (NBEP 2017).**

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Background

In 1984, Rhode Island was delegated authority by the Environmental Protection Agency to implement the National Pollutant Discharge Elimination System (NPDES) (known as RIPDES in RI). The RIPDES program responsibilities includes developing, tracking compliance and enforcing permit limitations that apply to municipal and industrial wastewaters, storm water and combined sewer overflows discharged directly into the waters of the State as well to industrial wastewaters discharged into publicly-owned treatment facilities (Pretreatment Program).

This document describes some of the more significant water pollution reductions that have been achieved by municipal WWTFs after the initial focus in the 1970s and 1980s on meeting federal secondary treatment standards. Additional information regarding WWTF construction is available in the DEM document, History of Rhode Island Wastewater Treatment Facility Construction & Upgrades (RIDEM 2016).
http://www.dem.ri.gov/programs/benviron/water/permits/wtf/pdfs/conuphis.pdf

Total Residual Chlorine (TRC)

Chlorine is toxic to aquatic life and combines with organic matter to form toxic compounds. DEM has adopted the Environmental Protection Agency's TRC criteria developed based on toxicity testing. Beginning more than 20 years ago, WWTFs in RI were required to achieve discharge limits that protect aquatic life from the toxic effects of chlorine. For WWTFs that discharge to tidal waters, the discharge limits are based on meeting the water quality criteria at the edge of acute and chronic mixing zones near the point of the discharge (determined from dye studies or computer modeling). For discharges to freshwater rivers, the criteria must be met at the lowest seven consecutive day river flow expected to happen once every ten years (7Q10 flow). By September 1999 many municipal wastewater treatment facilities (WWTFs) in RI (12 of 19) achieved a significant reduction in the amount of chlorine used and total residual chlorine (TRC)

The total amount of chlorine released from the RI WWTFs in 2015 was 23 lbs/day (including CSOs captured in the NBC tunnel that receive full treatment at the WWTF), a 94% reduction from what was released in 2000. This represents less than 1/10 of the permitted levels (i.e. the levels that will not cause adverse impacts to aquatic organisms).

Reduction at most WWTFs was achieved by improving the chlorine addition methods to minimize the amount of chlorine used, adding sodium bi-sulfite to neutralize the toxic effects and reduce TRC (i.e. de-chlorination), or by switching to ultraviolet light (UV) disinfection. Three RI WWTFs eliminated the use of chlorine by switching to the use of UV light to disinfect their

wastewaters (one of these, the NBC Bucklin Point WWTF continues to use chlorination/dechlorination at their combined sewer overflow (CSO) wet weather treatment facility).

Each WWTF completed a Facilities Plan which evaluated the cost and effectiveness of alternatives for compliance with discharge limits and selected a preferred alternative. DEM approves the selected alternative provided the Facilities Plan followed proper engineering procedures. For example, in 2014 Newport decided to upgrade their existing chlorination/dechlorination system after determining that doing so would involve construction costs of $1,500,000 with annual O&M cost of $120,000 versus UV construction cost of $6,300,000 with annual O&M cost of $340,000.

Dechlorination

Chlorination of wastewater results in the formation of hypochlorous acid, hypochlorite ion, chloramines. These combined forms of chlorine plus any free chlorine are collectively known as Total Residual Chlorine. When discharged into salt water, similar bromide compounds are formed, collectively referred to as Chlorine Produced Oxidants.

The 16 RI WWTFs that dechlorinate use sodium bi-sulfite to neutralize the chlorine and reduce and prevent the formation of chlorinated compounds (Fam and Stenstom, 1988; USEPA, 2000). This reaction results in the formation of small amounts of sulfate and acidity (that is neutralized by the WWTF). If sodium bi-sulfite is added in excess, it can reduce dissolved oxygen. **The concentration of sulfate naturally occurring in seawater is 1000 times higher than in wastewater dechlorinated after dosing with a TRC concentration of 2 mg/l.**

A concern has been voiced regarding the discharge of sulfate from the dechlorinating process. Based on a literature review the only potential concerns are the formation of small amounts of acidity that are neutralized by the wastewater and reduced dissolved oxygen if sodium bisulfite is added in excess. As documented in Attachment 2 **the concentration of sulfate naturally present in seawater is 1,000 times higher than it is in dechlorinated wastewater.**

WWTF Effluent Toxicity Testing

In addition to pollutant specific monitoring and limits, WWTFs are required to perform whole effluent toxicity testing (WET) or bioassay tests where aquatic organisms are exposed to samples of the discharge to determine if there are any lethal (acute) or reproductive/sub lethal (chronic) effects.

All testing required by a RIPDES permit, including WET, must be conducted using EPA approved methods found in 40CFR Part 136. Per EPA's Report to Congress on the Availability, Adequacy, and Comparability of Testing Procedures (USEPA, 1988), prior to adoption EPA validates the: accuracy, precision, dynamic range, detection limits, interferences, ruggedness (applicability), reporting, and representativeness/method comparability. The organisms that EPA approved

for acute and chronic toxicity testing were selected since they are easily cultured in the laboratory, are sensitive to a variety of pollutants and are generally available throughout the year from commercial sources (EPA 1993).

The approved estuarine and marine whole effluent toxicity test methodologies were developed by the EPA Environmental Research Laboratory in Narragansett, RI (EPA 2002). All the approved organisms are native to RI marine and estuarine waters, including the chronic toxicity test for Sea urchin, *Arbacia punctulata*, fertilization test. This test determines whether the test substance (i.e. WWTF effluent) causes a reduction in fertilization.

Tests performed on RI WWTFs document that chlorinated effluent was highly toxic but after implementation of dechlorination (i.e. by 2003) little to no toxic effects have been observed. In the early 90s WET testing was conducted on wastewater prior to and after chlorination on both an invertebrate and a fish. Samples tested after chlorination were consistently more toxic than prior to chlorination.

Once WWTFs achieved compliance with their TRC limit i.e. after dechlorination at 16 facilities, acute and chronic bioassay testing has been done on samples collected from the final discharge. This testing conducted since 2003 has confirmed earlier results that samples collected after dechlorination are far less toxic that chlorinated samples. For example, of the 122 data points collected between October 2014 and June 2017, 113, or 93% of the samples, showed no in-stream toxicity beyond the mixing zone (i.e., the chronic test results complied with the chronic toxicity permit limits). Additionally, 93 data points, or 76% of the samples, showed no toxicity in the effluent itself (i.e., the chronic test result was 100%, indicating that there was no adverse effects in 100% effluent). Of the 9, violations 6 are from one WWTF and have been traced to an industrial wastewater discharge to the WWTF. This data indicates that dechlorinated effluent does not cause adverse toxic impacts.

Further Details Regarding Chlorine, Dechlorination and Bioassay Testing are presented in in the RIDEM document RI Municipal WWTF Total Residual Chlorine Limits History and Status (RIDEM 2017)

Nitrogen Reductions

Since at least the early 1980s, several researchers documented that the health of the Upper Bay (north of Prudence Island) and Greenwich Bay are impacted by excessive nitrogen. Excessive nitrogen stimulates excessive phytoplankton and algae growth that causes loss of seagrass habitat, poor benthic habitat, and low dissolved oxygen levels. Negative effects can begin when excessive nitrogen stimulates the growth of phytoplankton or seaweed to a point where the algae prevent sunlight from penetrating through the water column. Once deprived of sunlight, underwater seagrasses cannot survive and are lost. Animals that depend on seagrasses for food or shelter leave the area or die. As the algae decay, they rob the water of oxygen. Fish and shellfish are in turn deprived of oxygen. The, 1992 Narragansett Bay Comprehensive

Conservation and Management Plan for Narragansett Bay summarized the prior research and identified several management actions to reduce nitrogen (EPA 1992).

Low oxygen levels can kill aquatic life, impact their ability to successfully reproduce, and cause them to avoid areas. Since the early 1980s, it has been documented that dissolved oxygen levels in the Upper Bay (north of Prudence Island including Greenwich Bay) are unacceptable in the summer due to excessive phytoplankton growth fueled by excess nitrogen.

In 2006, DEM adopted oxygen criteria developed at the EPA Narragansett Lab based on studies that include adequate larval survivability. DEM Office of Water Resources worked with DEM Division of Marine Fisheries and EPA to ensure criteria were appropriate for Narragansett Bay. **The criteria protect for acute impacts and 95% larval survivability based on the four most sensitive species studied which included lobster**. The EPA 2000 report, entitled Ambient Aquatic Life Water Quality Criteria for Dissolved Oxygen (Saltwater): Cape Cod to Cape Hatteras specifically notes that States without lobster habitat should use caution removing them as they may be representative of other sensitive species in those areas.

50% Reduction in Total Nitrogen from WWTFs

Multiple studies agree that the majority of nitrogen discharged to the dissolved oxygen impaired areas of the Bay is released from MA and RI WWTFs. To address impacts to aquatic life from excessive nitrogen loadings in waters north of Prudence Island and Greenwich Bay, a goal of reducing summer (May through October) RI WWTF nitrogen loadings by 50% was established. This goal, first recommended by DEM, was subsequently adopted in the spring of 2004 by the Governor's Narragansett Bay and Watershed Planning Commission (Pryor 2004), and then signed into law during the 2004 legislative session (RIGL § 46-12-2(f)).

As required by RIGL§ 46-12-3(25), DEM evaluated implementation costs, analyses of the performance of available technology, and estimates of water quality improvement to develop a phased plan for implementation of WWTF improvements that maximizes nutrient reductions relative to implementation cost (RIDEM 2004 and RIDEM 2005). Consistent with RIGL § 46-12-2(f) DEM issued RIPDES permit limits consistent with the plan and RIGL§ 46-12-3(25). A total of eleven RI WWTFs[1] within the Upper Narragansett Bay and Greenwich Bay watersheds were identified for nitrogen control. RIDEM estimated that the implementation of the planned nitrogen removal would initially reduce the summer season nitrogen load discharged from these eleven Rhode Island WWTFs to the Upper Bay by 65%, dropping to 48% as WWTF flows increase to their approved design flows. (See **Plan for Managing Nutrient Loadings to Rhode Island Waters** http://www.dem.ri.gov/pubs/nutrient.pdf) EPA implements the NPDES program

[1] Rhode Island WWTFs – Burrillville, Cranston, East Greenwich, East Providence, NBC Bucklin Point, NBC Fields Point, Smithfield, Warren, Warwick, West Warwick, Woonsocket.

for Massachusetts WWTFs and required similar reductions from six MA WWTFs[2] within the Upper Narragansett Bay watershed.

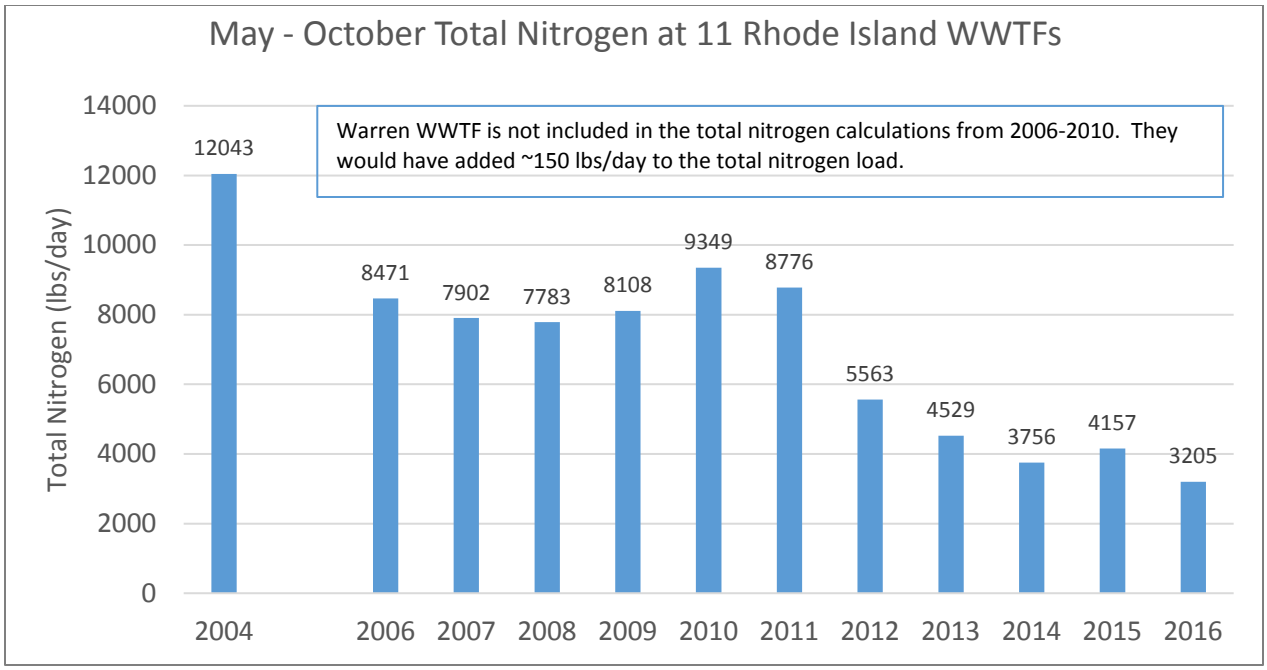
Estimates of water quality improvements were based on studies conducted at the University of Rhode Island's Marine Ecosystems Research Laboratory (MERL). The MERL experiments measured the impact of various nitrogen loading levels on dissolved oxygen and chlorophyll a. This analysis indicated that the 50% goal will result in substantial progress toward mitigation of low dissolved oxygen events but also that further reductions were likely needed to comply with dissolved oxygen criteria and fully protect aquatic life (RIDEM 2004).

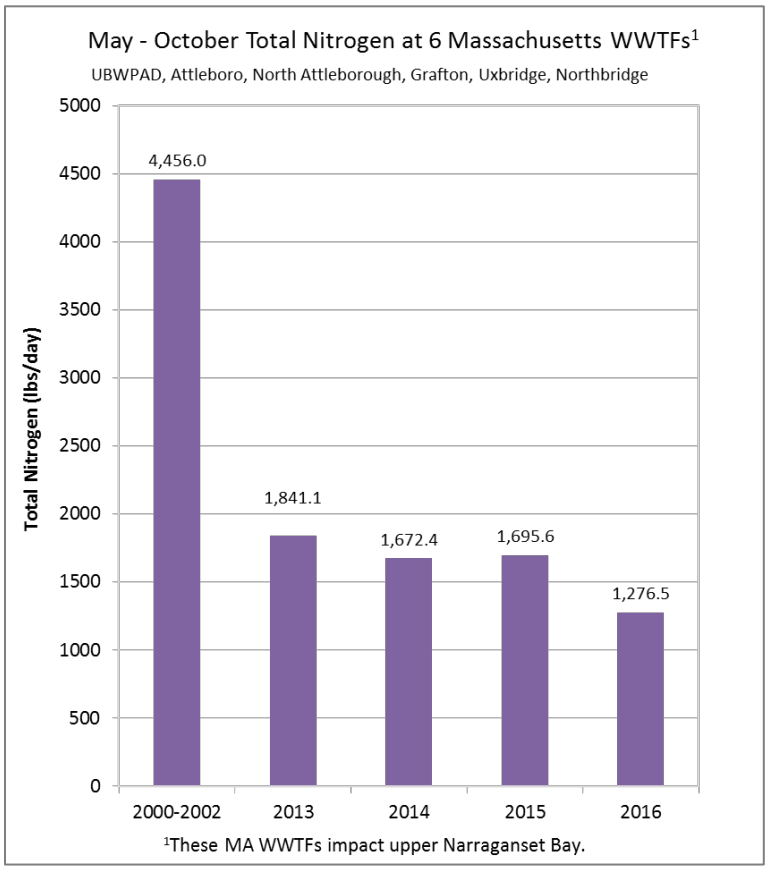
The Rhode Island WWTFs first achieved the 50% summer reduction goal during the 2012 summer season. Between 2013 and 2016, the percent reduction of the nitrogen loads from the eleven RI and six MA WWTFs ranged from 62-73% when compared to the (pre-nitrogen reduction) early 2000s time period. Loads from plants vary from year to year based on removal efficiencies, changes in flow, etc. All RI WWTFs have completed upgrades except for Warren which is scheduled for completion in August 2019. Since winter nitrogen loads are not expected to contribute to summer season water quality problems, WTTFs do not have November through April limits, though they must operate their facilities to reduce nitrogen to the maximum extent practicable. Winter reductions vary greatly between plants.

Narragansett Bay exhibits a strong north to south gradient of decreasing nutrients and improving water quality conditions. RIDEM adapted Bay-wide nitrogen loading estimates by Nixon et. al to reflect the loads impacting Upper Narragansett Bay and Greenwich Bay and evaluate changes in response to WWTF improvements. The most recent analysis (RIDEM, 2016) uses river loads, atmospheric deposition and WWTFs from Nixon et al 2008. RIDEM 2016 also uses 2014 data from the WWTFs required to reduce nitrogen (i.e. assuming no changes to other nitrogen sources) to estimate that annual load to the upper Narragansett Bay and Greenwich Bay area had decreased 51% (RIDEM, 2016). Although not yet documented, RIDEM has revised its analysis to reflect 2013-2015 river and WWTF data compiled by Narragansett Bay Estuary Program (NBEP 2017) and calculated an Upper Narragansett Bay and Greenwich Bay annual load reduction is 51%, consistent with RIDEM 2016.

Reductions to Upper Bay and the Taunton River (including WWTFs) have resulted in an estimated 49% reduction in total annual loading to Narragansett Bay (NBEP 2017). It is estimated that WWTFs constitute 55% of the remaining load to the entire Bay (NBEP 2017).

[2] Massachusetts WWTFs – Attleboro, Grafton, North Attleborough, Northbridge, UBWPAD (Worcester), Uxbridge.


May - October Total Nitrogen at 11 Rhode Island WWTFs
Warren WWTF is not included in the total nitrogen calculations from 2006-2010. They would have added ~150 lbs/day to the total nitrogen load.
Total Nitrogen (lbs/day)
14000
12000
10000
8000
6000
4000
2000
0
12043
8471
7902
7783
8108
9349
8776
5563
4529
3756
4157
3205
2004
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

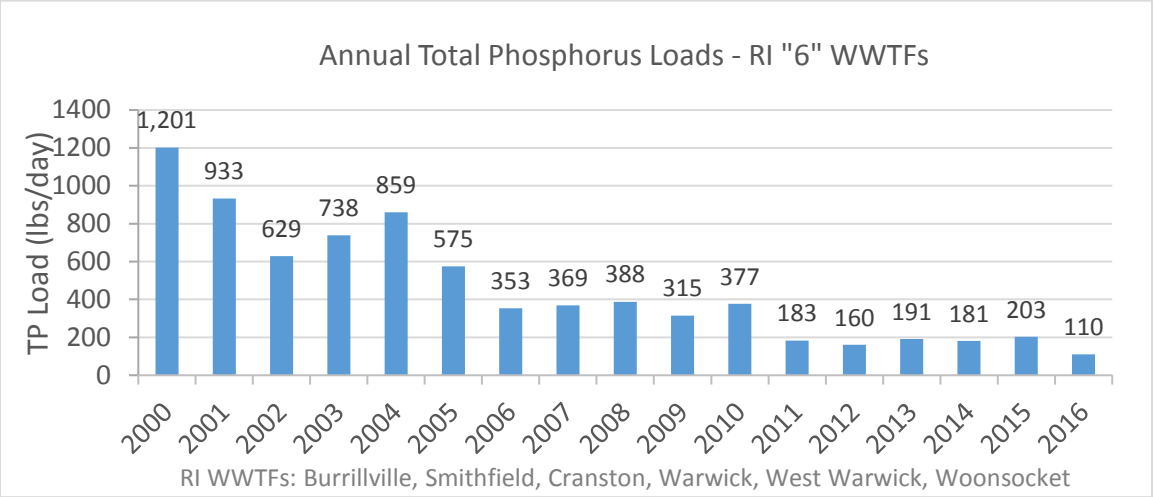

May - October Total Nitrogen at 6 Massachusetts WWTFs[1]
UBWPAD, Attleboro, North Attleborough, Grafton, Uxbridge, Northbridge
Total Nitrogen (lbs/day)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
4,456.0
1,841.1
1,672.4
1,695.6
1,276.5
2000-2002
2013
2014
2015
2016
[1]These MA WWTFs impact upper Narraganset Bay.

Phosphorus Reductions

Excessive levels of phosphorus promote the growth of nuisance algae and rooted aquatic plants in freshwaters which results in reduced water clarity, poor aesthetic quality and low dissolved oxygen levels that impact aquatic life. There are 6 RI municipal WWTFs that discharge to freshwater rivers. By the mid-2000s all 6 reduced their discharge below 1 mg/l. One was required to meet a phosphorus limit of 1.0 mg/l when constructed in 1980. These facilities were required to complete construction to lower phosphorus to 0.1 mg/l, 2014-2017.

		Phosphorus Construction Deadline Limit 1.0 mg/l	**Phosphorus Construction Deadline Limit 0.1 mg/l except as noted**
1	Burrillville	April 1981	July 2017
2	Cranston	January 2006	April 2017
3	Smithfield	July 2006	May 2014 (0.2 mg/l)
4	Warwick	November 2004	May 2016
5	West Warwick	July 2005	July 2016
6	Woonsocket	September 2001	December 2016

RI and MA WWTFs along the Blackstone, Pawtuxet, Taunton, Ten Mile, and Woonasquatucket have been required to reduce phosphorus loads. These reductions contributed to a 37% reduction in Bay-wide phosphorus loads between the early 2000s and 2013-15 (NBEP 2017).



Toxic Chemicals

Since 1985 DEM has monitored WWTF discharges for the 126 EPA Priority Pollutants and established discharge limits when necessary to meet standards that protect aquatic life. Industries that discharge to WWTFs have been required to significantly reduce the amount of chemicals they discharge to the WWTFs. The most prevalent priority pollutant of concern has been metals.

Toxic Metals

Since the early 90s DEM has established discharge limits for WWTFs that have the potential to cause the receiving waters to violate levels EPA established to prevent acute and chronic toxicity impacts to aquatic life. Compliance was primarily achieved by the WWTFs requiring pretreatment by industries that discharge to their sewer system. Substantial reductions in metals discharged form WWTFs have been achieved.

Historically, the NBC Fields Point and Bucklin Point WWTFs were the largest sources of metals from RI WWTFs. The Fields Point facility handles approximately twice the flow volume of Bucklin Point. Overall since 1993, effluent metals (Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Silver and Zinc) from Bucklin Point have decreased by 74.0% and from Field's Point by 89.4% (NBC 2017).

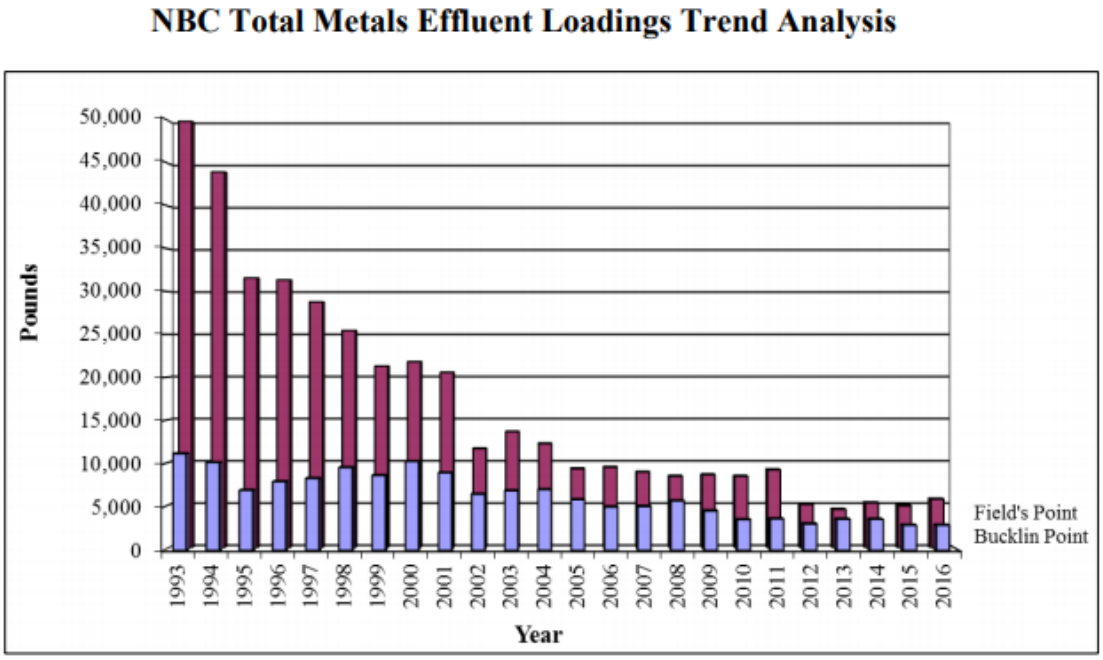


Figure from NBC 2017.

Combined Sewer Overflows

In older US cities sewage and stormwater flow into one set of pipes (i.e. combined sewers). During dry weather, the combined sewage flows to a treatment facility. During storms, the system's capacity is exceeded and the combined sewage is discharged untreated to waterbodies. The only combined sewer systems in RI are: in Central Falls and portions of Pawtucket connected to the NBC Bucklin Point WWTF, portions of Providence connected to the NBC Fields Point WWTF and portions of Newport.

Description of NBC CSOs

- CSOs are by far the largest contributor of bacteria to metro Providence Rivers and to the Upper Bay. Bacteria from CSOs impact shellfishing, swimming and other recreational activities leading to significant economic loss to shellfishermen and the tourism industry and from lost recreational opportunities.

- Fields Point Service Area – 45 CSO discharge points primarily located along the Woonasquatucket, Providence and lower Seekonk. (primarily addressed by Phases I & II)

- Bucklin Point Service Area – 25 CSO discharge points located along Blackstone, Seekonk and Moshassuck Rivers. (to be addressed by Phase III)

NBC CSO Abatement Plan History

1998 - DEM approved NBC's three phase CSO plan and entered a consent agreement with schedules to complete each phase. Plan is designed to reduce the number of overflows to no more than 4 per year on average and significantly increase shellfishing in conditional areas of the Upper Bay and swimming in Providence and Seekonk River.

October 2008 - Phase I completed (Tunnel to capture CSO for treatment at Fields Point WWTF - targeted CSOs to Providence River)

December 2014- Phase II completed (sewer interceptor to connect additional CSO to the tunnel - targeted CSOs to Woonasquatucket and lower Seekonk River)

As of 9/12/17 implementation of Phases I and II has resulted in the capture and treatment of 8.337 billion gallons of combined sewage at the Fields Point WWTF. Previously this combination of industrial and sanitary wastewater and stormwater would have discharged untreated with a small portion receiving primary treatment. After implementation of Phase I and II DEM was able to increase the rainfall depth that causes shellfish closures from 0.5" to 1.2" in Area A and to eliminate conditional Area B which previously closed at 1.0" changing it to an approved status with no rainfall closures.

Despite the water quality improvements that resulted from Phases I and II, untreated CSOs currently contribute 83% of the bacterial load to Upper Bay, and continue to be the primary pollution source impacting recreational use in the Seekonk River and upper Providence River.

In 2015 Narragansett Bay commission completed its re-evaluation of the previously approved conceptual plan for Phase III. NBC is currently addressing comments by DEM.

Newport CSO Abatement Plan History

There are two CSOs from the City of Newport sewer system both receive primary treatment and chlorination prior to discharge. Since the 1970s the City has undertaken numerous projects to reduce the impacts of CSOs by separating storm water and improving treatment. In 2015 the

City entered a Consent Decree with DEM, EPA and a citizens group that includes a schedule for completing their System Master Plan in a phased manner by June 2033.

The major components of the plan are separation of storm water, modifying the sewer system and expanding the WWTF to send combined sewage flows to the WWTF for treatment and upgrading the Washington Street CSO treatment facility to provide for dechlorination. The plan will be implement in three phases, the first phase will have the greatest reduction in CSO and must be implement by June 2019. Components of Phase I are:

- Washington Street CSO - dechlorination was added in the end of June 2016.
- Wellington Ave CSO - system modifications have significantly reduced the number of discharges and further changes were expected to virtually eliminate discharges by June 30, 2017
- WWTF system upgrades by June 28, 2019

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