

**Final Massachusetts Statewide
Total Maximum Daily Load for
Pathogen-Impaired Waterbodies**

Appendix AB: Islands Coastal Drainage Area

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Rebecca L. Tepper, Secretary
Massachusetts Department of Environmental Protection
Bonnie Heiple, Commissioner
Bureau of Water Resources
Kathleen M. Baskin, Assistant Commissioner

December 2024

CN 515.1.28



Final Massachusetts Statewide Total Maximum Daily Load for Pathogen-Impaired Waterbodies

Appendix AB: Islands Coastal Drainage Area

Prepared by:
TMDL Section, Watershed Planning Program
Division of Watershed Management, Bureau of Water Resources
Massachusetts Department of Environmental Protection

December 2024

CN 515.1.28



Suggested Citation

MassDEP. 2024. Final Massachusetts Statewide Total Maximum Daily Load for Pathogen-Impaired Waterbodies. CN 515.1, Massachusetts Department of Environmental Protection, Bureau of Water Resources, Division of Watershed Management, Watershed Planning Program. Worcester, MA.

Available Online

<https://www.mass.gov/lists/total-maximum-daily-loads-by-watershed>

Massachusetts Department of Environmental Protection

The mission of the Massachusetts Department of Environmental Protection (MassDEP) is to protect and enhance the Commonwealth's natural resources – air, water, and land – to provide for the health, safety, and welfare of all people, and to ensure a clean and safe environment for future generations. In carrying out this mission MassDEP commits to address and advance environmental justice and equity for all people of the Commonwealth; provide meaningful, inclusive opportunities for people to participate in agency decisions that affect their lives; and ensure a diverse workforce that reflects the communities we serve.

Watershed Planning Program

The mission of the Watershed Planning Program (WPP) in the Massachusetts Department of Environmental Protection is to protect, enhance, and restore the quality and value of the waters of the Commonwealth. Guided by the federal Clean Water Act, WPP implements this mission statewide through five Sections that each have a different technical focus: (1) Surface Water Quality Standards; (2) Surface Water Quality Monitoring; (3) Data Management and Water Quality Assessment; (4) Total Maximum Daily Load; and (5) Nonpoint Source Management. Together with other MassDEP programs and state environmental agencies, WPP shares in the duty and responsibility to secure the environmental, recreational, and public health benefits of clean water for all people of the Commonwealth.

Acknowledgements

FB Environmental Associates, under contractual agreements with MassDEP, previously prepared two separate documents for the Watershed Planning Program: (1) *Massachusetts TMDL for Pathogen-Impaired Inland Fresh Water Rivers* and (2) *Massachusetts Statewide TMDL for Pathogen-Impaired Coastal Waterbodies*. MassDEP combined these two documents into a single statewide approach encompassing both inland fresh water and coastal impairments to prepare the *Final Massachusetts Statewide Total Maximum Daily Load for Pathogen-Impaired Waterbodies*.

Disclaimer

References to trade names, commercial products, manufacturers, or distributors in this report constituted neither endorsement nor recommendations by the Massachusetts Department of Environmental Protection.

Contact Information

Watershed Planning Program
Division of Watershed Management, Bureau of Water Resources
Massachusetts Department of Environmental Protection
8 New Bond Street, Worcester, MA 01606
Website: <https://www.mass.gov/guides/watershed-planning-program>
Email address: dep.wpp@mass.gov

TABLE OF CONTENTS

1.	INTRODUCTION	5
2.	ISLANDS COASTAL DRAINAGE AREA OVERVIEW	7
3.	MA97-16 KATAMA BAY	10
3.1.	Waterbody Overview.....	10
3.2.	Waterbody Impairment Characterization	13
3.3.	Potential Pathogen Sources	13
3.4.	Existing Local Management.....	14
4.	MA97-29 LONG POND.....	16
4.1.	Waterbody Overview.....	16
4.2.	Waterbody Impairment Characterization	19
4.3.	Potential Pathogen Sources	19
4.4.	Existing Local Management.....	20
5.	REFERENCES	21

1. Introduction

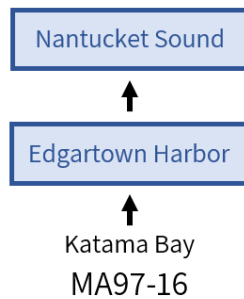
This appendix to the Massachusetts Statewide Total Maximum Daily Load (TMDL) for Pathogen-Impaired Waterbodies provides additional information to support the determination of the TMDL for the two pathogen-impaired segments in the Islands Coastal Drainage Area (Figure 1-1). The core document and appendix together complete the TMDL for each of these pathogen-impaired segments.

This appendix includes a description of the watershed and maps to identify the segments of focus for the TMDLs; the impaired uses, and the water classification and qualifiers as designated by the Massachusetts Surface Water Quality Standards (SWQS, 314 CMR 4.00); the water quality standards applicable to the impaired uses; the data supporting the pathogen impairment determination; and a description of the sources of pathogen loading with supporting maps.

This appendix also includes a summary of the allocation of the current indicator bacteria load into two categories: point sources (waste load allocation, WLA) and nonpoint sources (load allocation, LA), based on an analysis of watershed percent impervious cover. This appendix identifies the percent reduction in indicator bacteria pollutant load from current conditions required to meet the TMDL, based on the highest levels of indicator bacteria recorded in the monitoring data, if applicable. The TMDLs for the two Islands River segments were calculated with the buffer-based equation. Refer to Tables 1-1 and 1-2.

Finally, for each impaired segment, this appendix presents existing local management efforts to reduce pathogen pollutant loading. General recommended next steps for implementation of this TMDL are provided in the Overview section.

Martha's Vineyard



Nantucket

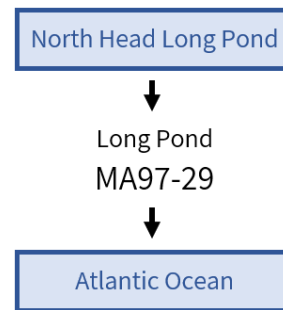


Figure 1-1. Conceptual diagram of water flow through the Islands Coastal Drainage Area for the two pathogen-impaired segments. Connections between waterbodies are shown with black arrows. Not to scale. Impaired segments are shown with the assessment unit.

Table 1-1. Enterococci Total Maximum Daily Loads, the percent reductions needed to meet the TMDL target (35 CFU/100ml) based on the Massachusetts Surface Water Quality Standards (SWQS), and the TMDL allocations for pathogen-impaired **marine** assessment units in the Islands Coastal Drainage Area

Waterbody & Assessment Unit	Class (Qualifier)	TMDL Type	SWQS-Based TMDL target (CFU/100ml)	Maximum Geomean (CFU/100ml)	Geomean Percent Reduction	TMDL Allocation	Watershed Area (acres)	Impervious Area in Watershed (acres)	TMDL (CFU/day*10 ⁹)
Katama Bay MA97-16	SA (SF)	P	35	NA	-	WLA (100%) LA (0%)	4,773	374	0.07 -
Long Pond MA97-29	SA (SF)	R*	35	NA	-	WLA (100%) LA (0%)	1,573	78	0.02 -

Table 1-2. Fecal Coliform Total Maximum Daily Loads, the percent reductions needed to meet the TMDL target (14 CFU/100ml for Class SA) based on the Massachusetts Surface Water Quality Standards (SWQS), and the TMDL allocations for pathogen-impaired **marine** assessment units in the Islands Coastal Drainage Area

Waterbody & Assessment Unit	Class (Qualifier)	TMDL Type	SWQS-Based TMDL target (CFU/100ml)	Maximum Geomean (CFU/100ml)	Geomean Percent Reduction	TMDL Allocation	Watershed Area (acres)	Impervious Area in Watershed (acres)	TMDL (CFU/day*10 ⁹)
Katama Bay MA97-16	SA (SF)	R	14	NA	-	WLA (100%) LA (0%)	4,773	374	0.03 -
Long Pond MA97-29	SA (SF)	R*	14	NA	-	WLA (100%) LA (0%)	1,573	78	0.01 -

Class defined in the Massachusetts Surface Water Quality Standards (SWQS) at 314 CMR 4.02.

Qualifiers that identify segments with special characteristics are defined at 314 CMR 4.06(1)(d).

SF = Shellfishing; waters subject to more stringent regulation by Massachusetts Division of Marine Fisheries (DMF) pursuant to M.G.L. c. 130, § 75

Pathogen bacteria units are presented in colony-forming units or CFU per 100 milliliter or ml.

TMDL Type identifies the restorative or protective action approach:

R = Restorative TMDL addressing a pathogen impairment identified in the 2018/2020 Integrated List of Waters

R* = Restorative TMDL addressing a historic impairment of former indicator bacteria for which no current applicable criteria are available. See Section 2.3 of the core document for summary of water quality criteria and designated uses.

P = Protective TMDL addressing all applicable uses, regardless of impairment status, for the associated pathogen (refer to the Massachusetts SWQS:314 CMR 4.00)

Target TMDL or Total Maximum Daily Load is presented as both SWQS-Based and Flow-Based.

SWQS-Based TMDL Target is the target concentration applicable to the TMDL pollutant indicator bacteria based on the Surface Water Quality Standards (to 314 CMR 4.00).

Flow-Based Target TMDL is the target concentration (CFU/100mL) multiplied by the standard flow volume (cubic feet per second or cfs). See Section 4.2.2 in core document for full equation and conversion factors.

Maximum Geomean is the highest calculated 30- or 90- day rolling geometric mean for TMDL pollutant indicator bacteria associated with the segment.

Geomean Percent Reduction is the percent reduction from the highest calculated 30- or 90- day rolling geomean needed to achieve the target concentration. Percent reductions are for planning purposes only.

2. Islands Coastal Drainage Area Overview

The Islands Coastal Drainage Area covers an area of approximately 159 square miles (mi²) in southeastern Massachusetts (Figure 2-1). It is comprised of three regions: the Elizabeth Islands (13.6 mi² in area), Martha's Vineyard (96 mi²), and Nantucket (49 mi²; Connors, 2003). Ponds are the dominant form of surface freshwater resources on Martha's Vineyard and Nantucket; however, groundwater sources provide all of the drinking water. Today, the Martha's Vineyard and Nantucket aquifers are designated as sole source aquifers by the U.S. Environmental Protection Agency (USEPA), awarding them additional protections under law that are designed to safeguard public health.

The Elizabeth Islands are a chain of 15 islands extending southwest from Cape Cod that serve as the barrier between Buzzards Bay and Vineyard Sound. These islands are primarily grassy with some low woods and shrubs, and a single family owns and manages all of the islands except two. All surface waters within and adjacent to these islands that are subject to the tides and 1,000 feet seaward are designated Class SA Outstanding Resource Waters (ORWs) (314 CMR 4.06(6)(b): *Table 14, Islands Coastal Drainage Area*). Martha's Vineyard is an island south of western Cape Cod that consists of six towns: Aquinnah, Chilmark, Edgartown, Oak Bluffs, Tisbury, and West Tisbury. Nantucket is an island south of eastern Cape Cod composed primarily of moraines and outwash plains surrounded by the Atlantic Ocean. Today, the Martha's Vineyard and Nantucket economies are mostly based on tourism as they are popular vacation destinations (Connors, 2003). All waters subject to the tides and within the off-shore boundaries of the towns within Nantucket and Dukes County are designated Class SA with a shellfishing qualifier.

The Islands Coastal Drainage Area completely encompasses eight municipalities in Massachusetts. These municipalities include Gosnold (the Elizabeth Islands), Nantucket which encompasses Nantucket Island, and the six towns located on Martha's Vineyard. None of these municipalities operate and maintain municipal separate storm sewer systems (MS4s) in urban areas. See Figure 2-1 for a map showing impaired segments and watershed municipalities.

The geographic ranges of two Regional Planning Agencies (RPAs) lie entirely within the Islands Coastal Drainage Area. RPAs are public organizations advising municipalities, private business groups, and state and federal governments on a range of matters. Their research, coordination and technical assistance are especially valuable in addressing watershed-level issues such as pathogen pollutants and stormwater that cross town boundaries. These RPAs include:

- Martha's Vineyard Commission (MVC, 2022)
- Nantucket Planning & Economic Development Commission (NPEDC, 2022)

The following RPA initiatives and tools utilized are especially noteworthy:

- NPEDC is responsible for developing the Master Plan and the Open Space and Recreation Plan for Nantucket (NPEDC, 2022)
- MVC assists in efforts to improve water quality in the region by collecting water samples, planting eelgrass sprouts, protecting shellfish beds, removing invasive species, and implementing systems to remove pollutant inputs to waterbodies (MVC, 2022).
- MVC has an Aquifer Monitoring Program that measures the water table elevation in a network of 14 wells across Martha's Vineyard (MVC, 2022).

Beyond these activities, the Massachusetts Statewide Municipal Stormwater Coalition (MSMSC), composed of about 10 stormwater groups around the state, further coordinates with and assists municipalities on pathogen pollutant concerns through their "Think Blue" campaign (Think Blue Massachusetts, 2019).

Additional watershed-scale initiatives are carried out by several organizations, including:

- **EPA Southeast New England Program (SNEP)** whose mission is to "foster collaboration among regional partners across southeast New England's coastal watersheds to protect and restore water quality, ecological health, and diverse habitats by sharing knowledge and resources, promoting

innovative approaches, and leveraging economic and environmental investments to meet the needs of current and future generations” (USEPA, 2022).

- **Nantucket Conservation Foundation (NCF)** whose mission is to “assist in the preservation of Nantucket’s character by permanently conserving, maintaining, and managing natural areas and habitats and to encourage an appreciation of and interest in the Island’s natural resources (NCF, 2022).
- **Nantucket Land Council, Inc. (NLC)** is a 501 (c)(3) non-profit that is “dedicated to protecting Nantucket’s natural world and rural character by holding and enforcing conservation restrictions, commissioning scientific research, monitoring development proposals, engaging in legal proceedings to protect natural resources, and educating the public on local environmental issues” (NLC, 2022).
- **Nantucket Shellfish Association** whose mission is to “preserve and protect Nantucket’s harbors, water quality, and shellfish resources” (Nantucket Shellfish Association, 2022).
- **Massachusetts Office of Coastal Zone Management (CZM)** has a Cape Cod and Islands Regional office that “serves the coastal communities from Bourne to Provincetown, along with Martha’s Vineyard, Nantucket, and the Elizabeth Islands.” (CZM, 2022a).
- **Trout Unlimited (TU)** operates a chapter in the geographic area of the Islands Coastal Drainage Area in Massachusetts, the Cape Cod. Their mission is to conserve, protect and restore our country’s coldwater fisheries and their watersheds; some of their activities include river cleanups, scientific assessments (e.g., trout habitat, culvert connectivity) and restoration projects (TU, 2022). However, the Cape Cod Chapter website did not show any activities on the Islands (CCTU, 2022), and there are no Coldwater Fish Resources identified on Nantucket (MDFW, 2022).

The following actions by identified stakeholders will help reduce pathogen loads to the impaired segments. The list represents a starting point and is not intended to be comprehensive. For a more detailed discussion of pollutant reduction actions, see Section 5, “Implementation” of the Pathogen TMDL core document.

- **Municipalities:** Although the MS4 permit does not currently apply to Martha’s Vineyard or Nantucket, the municipalities may consider voluntarily implementing the permit requirements, which includes specific requirements for waterbodies with an approved Bacteria/Pathogen TMDL, such as prioritization and reporting, enhanced BMPs, IDDE, and education (USEPA, 2020).
- **Regional Planning Agencies (RPAs) and municipalities:** Collaborate on MS4 and stormwater issues. Cooperatively develop tools and share knowledge to reduce costs, increase innovation, and generate consistent and effective stream restoration efforts at the watershed scale.
 - Two tools developed by MAPC are potentially valuable in all MS4 communities across the state; municipalities and other RPAs (with permission from MAPC) should consider adapting and/or expanding these tools in their area:
 - Stormwater Utility/Funding Starting Kit (MAPC, 2014); and
 - a GIS toolkit to calculate MS4 outfall catchments, which is a requirement under the MS4 General Permit, created by MAPC and the Neponset River Watershed Association (MAPC, 2018).
- **USDA NRCS and landowners:** Develop comprehensive nutrient management plans for agriculture, reaching farmers through local connections.
- **Parks departments, schools, private landowners, and others** who maintain large, mowed fields with direct connections to surface water should consider maintaining a vegetated buffer along the shoreline. Buffers slow and filter stormwater runoff, provide a visual screen that can discourage large aggregations of waterfowl, and offer many other water quality benefits at low cost.

Sanitary wastes associated with boating activities are a potential source of pathogens to surface waters. Since 2014, all Massachusetts waters are designated as a No-Discharge Zone (NDZ) in which the discharge of boat sewage is prohibited. Many free boat pump-out services are available at various sites along the coast, funded by the Clean Vessel Act (CZM, 2022b). The Massachusetts CZM webpage maintains online maps of these boat pump-out facilities, and the Clean Vessel Act Program offers a *Boaters Pocket Guide to Pumpout Facilities*. Any sewage discharges from boats or boating infrastructure in the waters covered by this TMDL are therefore illicit discharges.

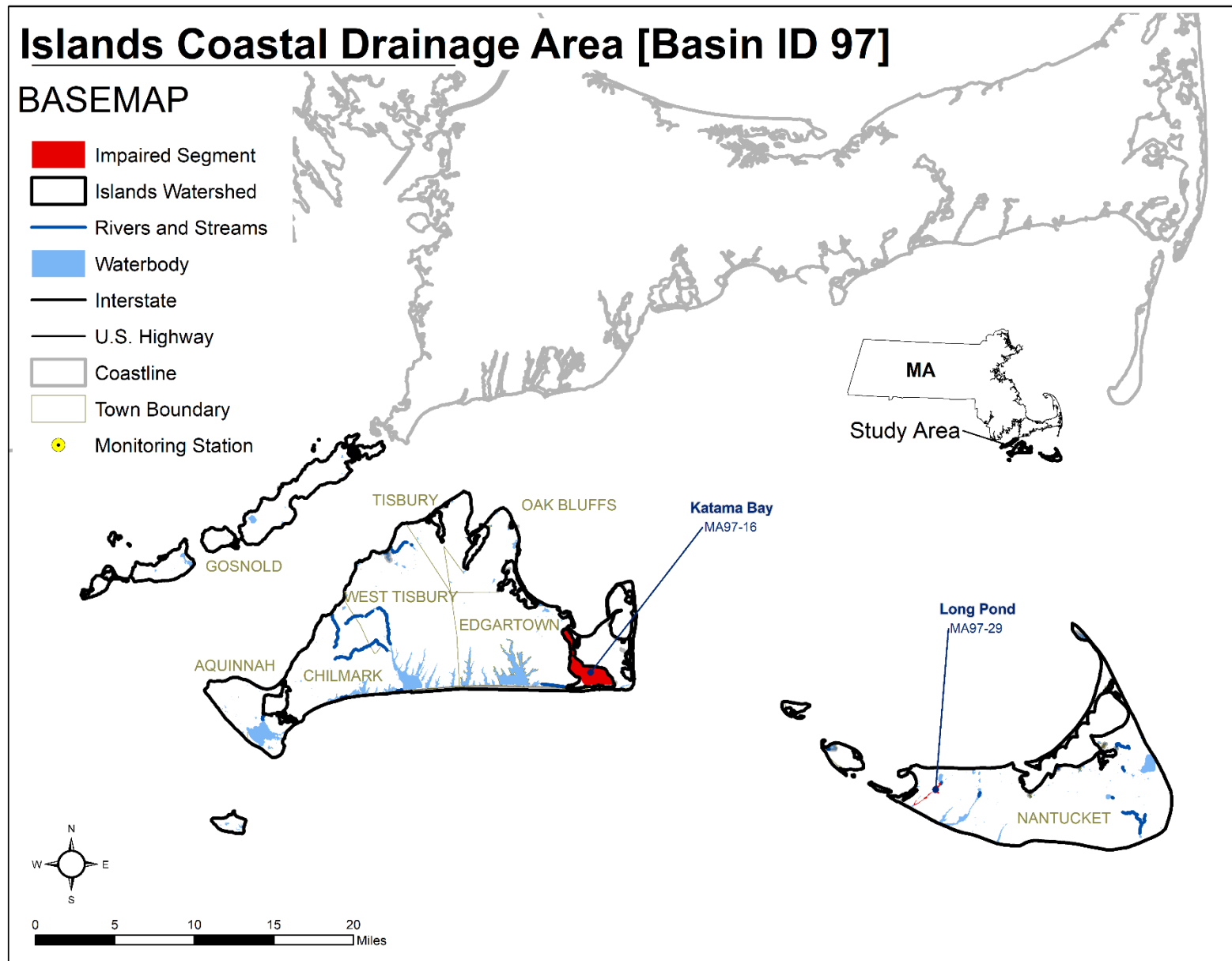


Figure 2-1: Map of all pathogen-impaired segments, water quality monitoring stations, municipal borders, waterbodies, and major roads in the Islands Coastal Drainage Area.

3. MA97-16 Katama Bay

3.1. Waterbody Overview

Katama Bay segment MA97-16 is 2.05 square miles (mi²) in area and begins at the southern shore of Martha's Vineyard in Edgartown, MA. The segment is tidally influenced and, at the northern end, extends to the imaginary line from Chappaquiddick Point to Dock Street in Edgartown, MA. At times, the southern barrier beach separating Katama Bay from the Atlantic has been breached; currently, Norton Point Beach is connected to Wasque Point, with no flow leaving or entering the bay from the south (Brown, 2015).

Tributaries to the Katama Bay segment MA97-16 include Caleb Pond, Mattakeset Herring Creek and a few unnamed streams. Lakes and ponds in the watershed include a few small unnamed waterbodies. The segment is encompassed by wetland, developed, and natural areas.

Key landmarks in the watershed include the town center of Edgartown; Katama Airpark; Katama and Waller farms; The Farm Institute; Katama, South, and Norton Point beaches; South Beach State Park; Wasque; and Packard Preserve. The segment is not crossed by any roads, pedestrian bridges, or other crossings.

Katama Bay (MA97-16) drains a total area of 7.5 mi², of which 0.58 mi² (8%) are impervious area. A 200-foot buffer around the segment covers an area of 0.36 mi², of which 0.03 mi² (7%) are impervious area. The watershed is served by a public sewer system in Edgartown¹. None of the land area is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit (USEPA, 2020). There are no NPDES permits on file governing point source discharges of pollutants to surface waters, MassDEP discharge-to-groundwater permits for on-site wastewater discharge, or combined sewer overflows (CSOs) within the watershed. There are no landfills or unpermitted land disposal dumping grounds within the segment watershed. See Figure 3-1.

The Katama Bay segment MA97-16 watershed is located in a moderately-developed part of Massachusetts. Almost three quarters of the watershed consists of forest and natural lands

Reduction from Highest Calculated Geomean: NA

Watershed Area (Acres): 4,773

Segment Area (mi²): 2.05

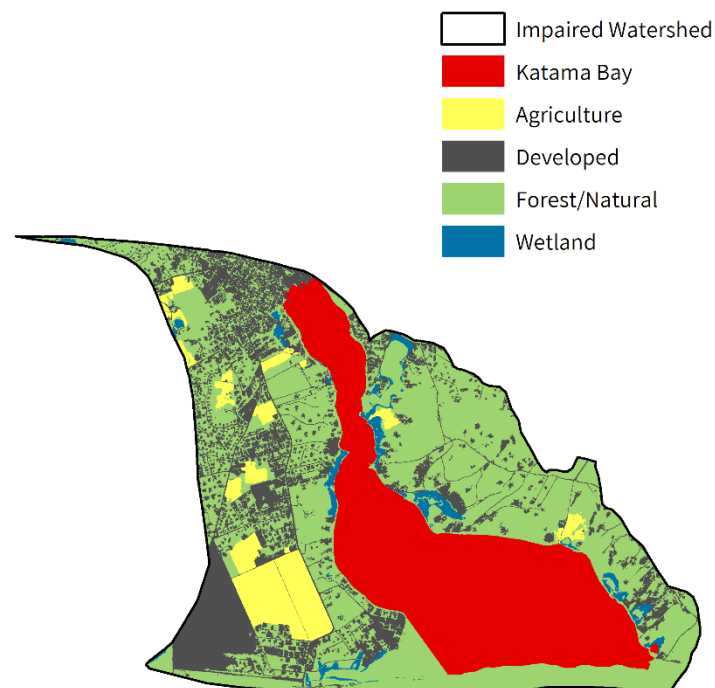
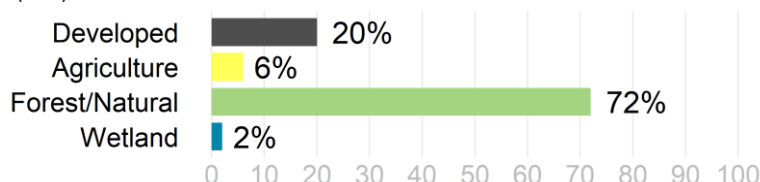
200-foot Buffer Area (Acres): 233

Impairment(s): Fecal Coliform (Shellfish)

Class (Qualifier): SA (Shellfishing)

Impervious Area (Acres, %): 374 (8%)

Impervious Area Within 200-foot Buffer (Acres, %): 16 (7%)



0 0.5 1 2 Miles



¹ Estimated percentage of developed areas with wastewater infrastructure in the watershed was based on available information: MWRA service areas, MassDEP's Water Utility Infrastructure Mapping Project (MassDEP, 2021b), MS4 reports, and local knowledge.

(72%) or wetland areas (2%). There is a moderate amount of agriculture in the watershed (6%), all of which consists of pasture/hay and cultivated fields. The remainder of the watershed is covered by development (20%). This development consists mostly of residential areas with some commercial development primarily located in the northern portion of the watershed near the town center of Edgartown.

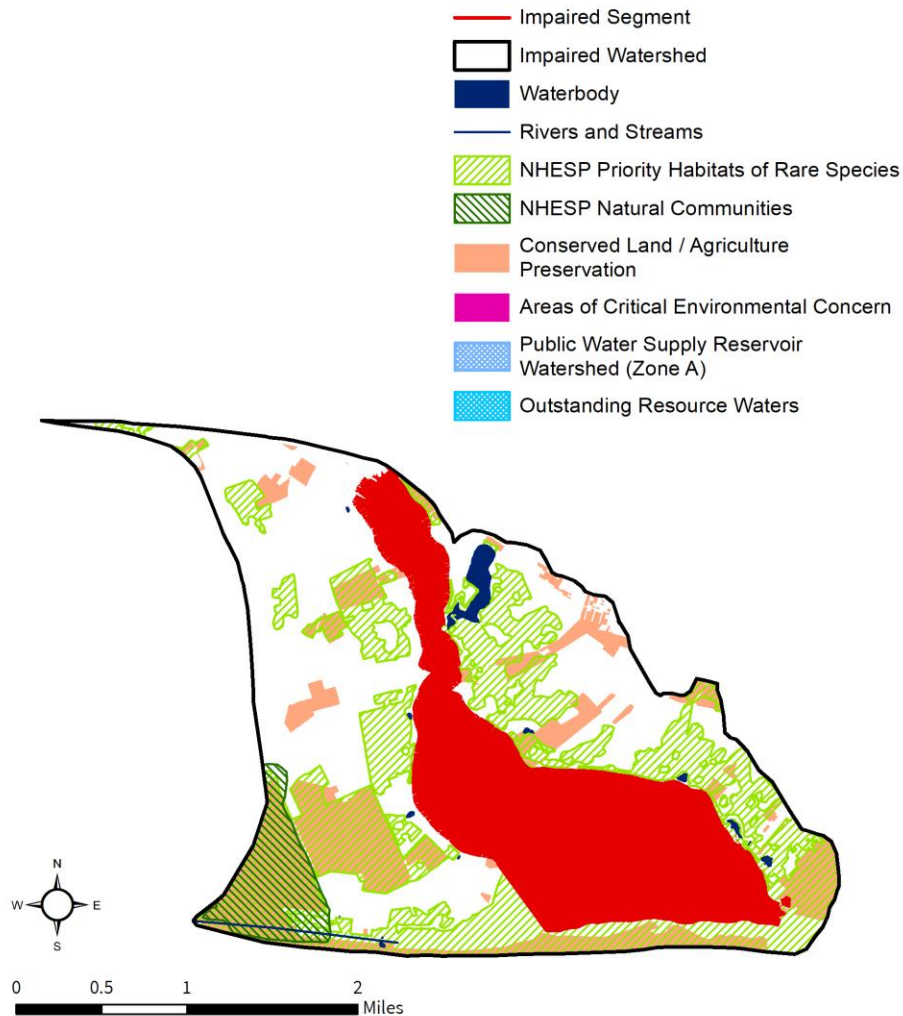
In the Katama Bay (MA97-16) watershed, under the Natural Heritage and Endangered Species Program, there are 2,769 acres (58%) of Priority Habitats of Rare Species and 232 acres (5%) of Priority Natural Vegetation Communities. There are no acres under Public Water Supply protection, within designated Areas of Critical Environmental Concern, or Outstanding Resource Waters. Overall, there are 838 acres (18%) of land protected in perpetuity², part of 887 acres (19%) of Protected and Recreational Open Space³. See Figure 3-1.

² Land protected in perpetuity includes conservation restrictions, agricultural preservation, private deed restrictions, wetland restrictions, aquifer protection, historic preservation, etc. Refer to Mass GIS metadata for the Protected and Recreational Open Space data layer.

³ All Protected and Recreational Open Space land is shown on the natural resources map.

Katama Bay [MA97-16]

NATURAL RESOURCES



Katama Bay [MA97-16]

POLLUTANT SOURCES

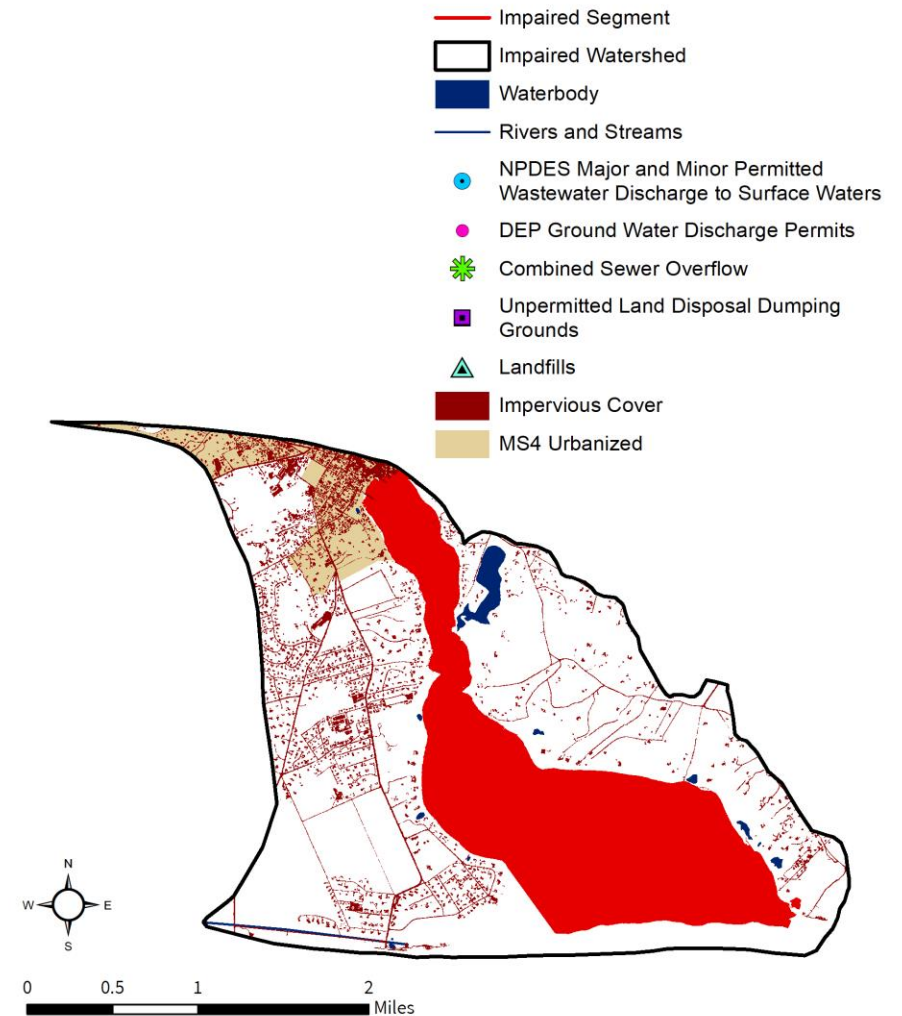


Figure 3-1. Natural resources and potential pollution sources draining to the Katama Bay segment MA97-16. The map on the left shows critical habitat, water features, and conserved land. The map on the right indicates potential and known pollutant sources, including impervious cover, MS4 areas, permitted facilities, etc.

3.2. Waterbody Impairment Characterization

Katama Bay (MA97-16) is a Class SA tidal estuary, with a Shellfishing qualifier (MassDEP, 2021a).

The Shellfish Harvesting use was assessed for attainment of SWQS using fecal coliform indicator bacteria at three shellfish growing areas that cover 2.01 mi² (100% of the segment area; refer to Figure 3-2). MassDEP assessed the Shellfish Harvesting use as not supporting since the growing area normalized to the segment area is less than 100% approved for shellfishing by the Massachusetts Division of Marine Fisheries (Table 3-1).

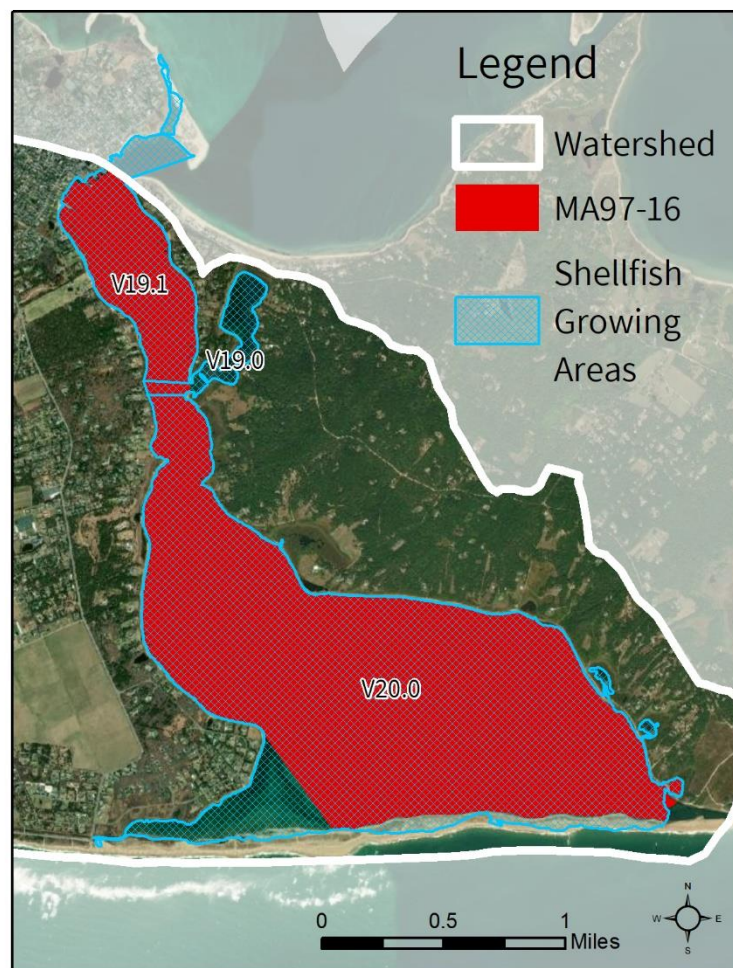


Figure 3-2. Location of Shellfish Growing Areas in the impaired segment.

Table 3-1. Summary of MA DFG-Division of Marine Fisheries classification data from January 2014 for three shellfish growing areas in the Katama Bay segment MA97-16. Percentage indicates the relative area within the segment covered by each shellfish growing area. Shellfish Harvesting is classified as not supporting if the growing area normalized to the segment area is less than 100% approved for shellfishing by the Massachusetts Division of Marine Fisheries.

Name	Area Description	Class	Area (mi ²)	Percentage
V19.0	Caleb Pond	Conditionally Approved	0.010	1%
V19.1	Edgartown Inner Harbor	Conditionally Approved	0.245	12%
V20.0	Katama Bay	Approved	1.758	87%

3.3. Potential Pathogen Sources

Each potential pathogen source is described in further detail below.

Urban Stormwater: The watershed is moderately developed, with the 20% of the watershed considered developed consisting mostly of moderate-density residential areas and a few commercial buildings. Within the watershed, none of the land area is subject to MS4 permit conditions, 8% is classified as impervious area, and 7% of the land area within a 200-foot buffer of the segment is classified as impervious area. Stormwater runoff from urban areas is a likely source of pathogens.

Illicit Sewage Discharges: Public sewer service is available in the watershed within Edgartown. Sewer-related risks to water quality include leaking infrastructure (pipes, pump stations, etc.) and sanitary sewer overflows (SSOs), which may be caused by undersized infrastructure, blockages, or excessive infiltration of groundwater or rainwater into pipes, exceeding system capacity. Illicit connections of wastewater to stormwater conveyances are also a potential source.

On-Site Wastewater Disposal Systems: Some development in the watershed likely utilizes on-site septic systems for wastewater treatment. It is likely that some septic systems are not properly maintained and are discharging untreated waste to groundwater.

Illicit Boat Discharges: The segment is navigable by marine vessels. Vessels with onboard toilets are required to have a marine sanitation device (MSD) to treat or store wastewater. MSDs that treat wastewater may be improperly maintained or malfunctioning and therefore could discharge untreated sewage to coastal waterbodies. For MSDs that store wastewater, this sewage can either be pumped out at shore-based pump-out facilities (CZM, 2022b) or discharged directly into the water when the vessel is more than three miles offshore beyond the designated No Discharge Zone (NDZ). Negligent boaters who ignore these laws and discharge untreated sewage to coastal waterbodies may be a source of pathogen pollution.

Vessel Pump-Out Facilities: There is one vessel sewage pump-out facility directly adjacent to the Katama Bay segment MA97-16: Edgartown Pump-out (Edgartown; CZM, 2022b). Although pump-out facilities provide boaters with a means of disposing onboard sewage without discharging it into coastal waters, these facilities are generally associated with high boating activity. Pump-out facilities which malfunction or leak also represent a potential pathogen source. As a result, waterbodies adjacent to pump-out facilities are likely at high risk of illicit boat (and facility) discharges.

Agriculture: Agricultural activities in the watershed account for a moderate portion (6%) of the total land use. This agricultural land is comprised of pasture/hay and cultivated fields. Manure storage and spreading activities, if not properly conducted, are possible sources of pathogens to waterbodies.

Pet Waste: There are a few residential neighborhoods and public beaches near Katama Bay segment MA97-16. Conservation lands, parks, and ballfields popular for dog-walking, especially where paths or residential neighborhoods are adjacent to rivers, ponds, or wetlands, represent possible sources of pathogens.

Wildlife Waste: A few open beaches are located directly adjacent to the impaired segment. Large mowed areas, fields, or wetlands with a clear sightline to a waterbody may attract large congregations of waterfowl, resulting in elevated indicator bacteria counts in the water.

Boating: All Massachusetts waters, including this impaired segment, are designated by the State of Massachusetts with EPA approval as a “no discharge zone” (NDZ). Discharge of boat sewage is prohibited within the NDZ. Nonetheless, boats who fail to comply with the NDZ may be a source of pathogens to the segment. There is a free recreational boat pump-out facility on Katama Bay in Edgartown center (at the end of Cooke Road), as well as a Pumpout boat (CZM, 2022b). And docks and marinas populate the entire bay shoreline.

3.4. Existing Local Management

This section identifies the major municipalities immediately surrounding the impaired segment and its contributing watershed. For a complete view of upstream municipalities and waterbodies, see the map in Figure 2-1.

Town of Edgartown

Edgartown is not within an MS4 area.

Edgartown has the following ordinances and bylaws, mostly accessible online via the town website <https://www.edgartown-ma.us/https://www.rehobothma.gov/https://www.cityofattleboro.us/> (Town of Edgartown, 2021):

- Wetland protection bylaw
- Surface water district and floodplain zoning but no explicit stormwater bylaw
- Stormwater Utility: None found

- Pet Waste: None found

Edgartown completed a Master Plan in 1990, though an update was in progress in 2021. The 1990 Master Plan mentions the value of the environment to the community and includes an inventory of the environmental features of the town at the time, including water resources (pg. 23); there is no mention of stormwater. Edgartown's public wastewater system consisted of 13,800 feet of gravity sewers (pg. 26) when the plan was written. No Open Space and Recreation Plan was found online (Town of Edgartown, 2021).

4. MA97-29 Long Pond

4.1. Waterbody Overview

Long Pond segment MA97-29 is 0.12 square miles (mi²) in area and includes tidally-restricted brackish water, completely within Nantucket, MA. The segment begins south of Madaket Road and extends southwest to include White Goose Cove. The flow in Long Pond is North Head Long Pond to the southwest, and from White Goose Cove to the northeast; both discharge to the Madaket Ditch on the west side of Long Pond, near Second Bridge on Madaket Road (USGS, 2022).

Tributaries to the Long Pond segment MA97-29 include North Head Long Pond. Lakes and ponds in the watershed include North Head Long Pond and a few small unnamed waterbodies. Much of the segment flows through wetland areas.

Key landmarks in the watershed include the Nantucket Public Works office and Round O Swamp. Segment MA97-29 is crossed by South Cambridge Street in Nantucket.

Long Pond (MA97-29) drains a total area of 2.5 mi², of which 0.12 mi² (5%) are impervious area. A 200-foot buffer around the segment covers an area of 0.20 mi², of which 0.01 mi² (3%) are impervious area. The watershed is not served by a public sewer system⁴; and none of the land area is subject to stormwater regulations under the NPDES General MS4 Stormwater Permit (USEPA, 2020). There are no NPDES permits on file governing point source discharges of pollutants to surface waters, MassDEP discharge-to-groundwater permits for on-site wastewater discharges, or combined sewer overflows (CSOs) within the watershed. There is one landfill and no unpermitted land disposal dumping grounds within the segment watershed. See Figure 4-1.

The Long Pond segment MA97-29 watershed is located in a lightly-developed part of Massachusetts. Most of the watershed consists of forest and natural lands (72%) or wetland areas (18%). There is no agriculture in the watershed. The remainder of the watershed is covered by development (10%), which consists exclusively of

Reduction from Highest Calculated Geomean: NA

Watershed Area (Acres): 1,573

Segment Area (mi²): 0.12

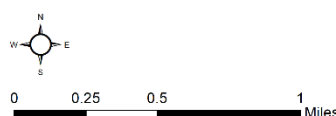
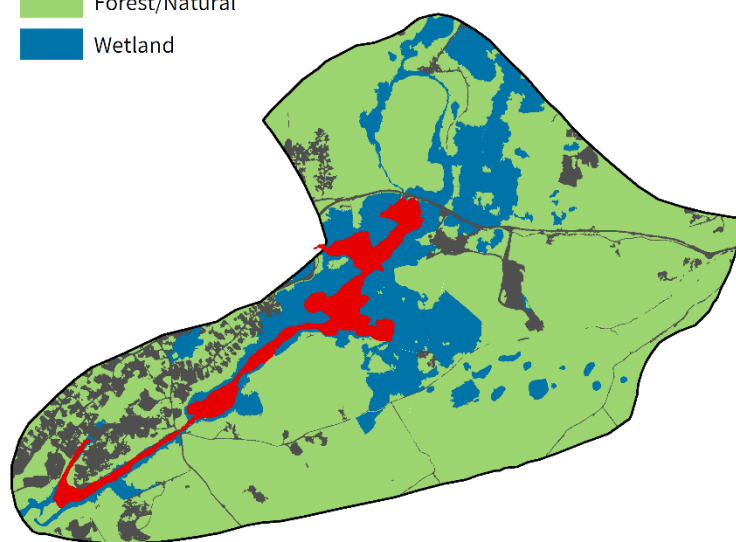
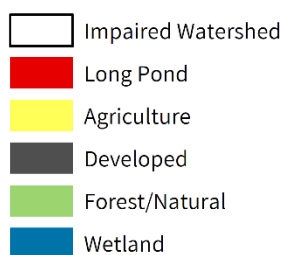
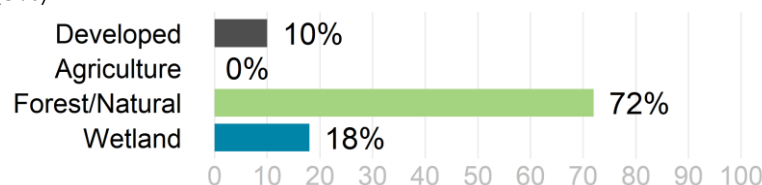
200-foot Buffer Area (Acres): 125

Impairment(s): *E. coli* (Primary Contact Recreation)

Class (Qualifier): SA (Shellfishing)

Impervious Area (Acres, %): 78 (5%)

Impervious Area Within 200-foot Buffer (Acres, %): 4 (3%)



⁴ Estimated percentage of developed areas with wastewater infrastructure in the watershed was based on available information: MWRA service areas, MassDEP's Water Utility Infrastructure Mapping Project (MassDEP, 2021b), MS4 reports, and local knowledge.

residential areas, except for the landfill located northeast of Jeremy Cove.

In the Long Pond (MA97-29) watershed, under the Natural Heritage and Endangered Species Program, there are 1,063 acres (68%) of Priority Habitats of Rare Species and 916 acres (58%) of Priority Natural Vegetation Communities. There are also no acres under Public Water Supply protection, within designated Areas of Critical Environmental Concern, or Outstanding Resource Waters. Overall, there are 596 acres (38%) of land protected in perpetuity⁵, part of 633 acres (40%) of Protected and Recreational Open Space⁶. See Figure 4-1.

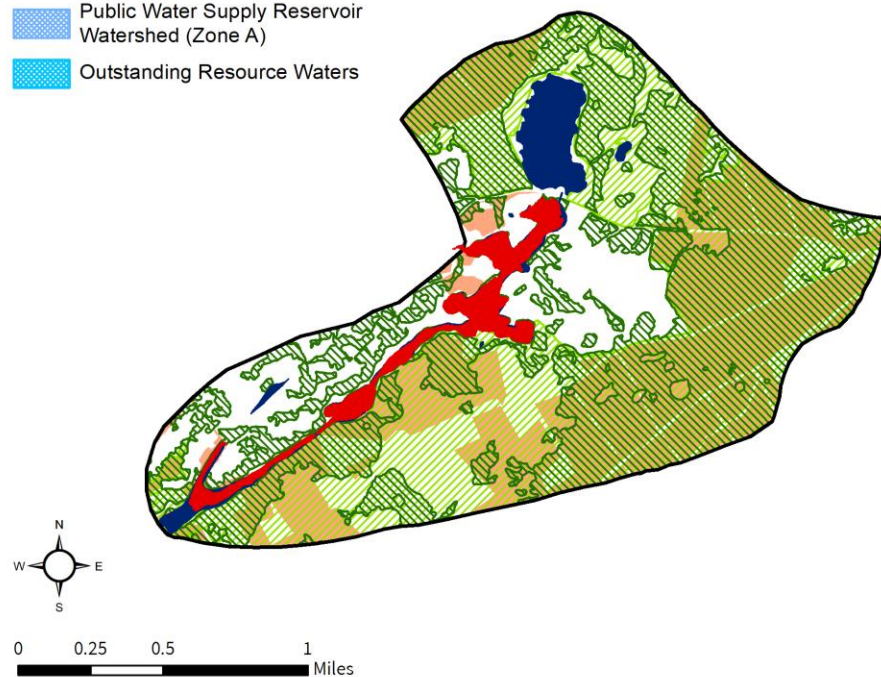
⁵ Land protected in perpetuity includes conservation restrictions, agricultural preservation, private deed restrictions, wetland restrictions, aquifer protection, historic preservation, etc. Refer to Mass GIS metadata for the Protected and Recreational Open Space data layer.

⁶ All Protected and Recreational Open Space land is shown on the natural resources map.

Long Pond [MA97-29]

NATURAL RESOURCES

- Impaired Segment
- Impaired Watershed
- Waterbody
- Rivers and Streams
- NHESP Priority Habitats of Rare Species
- NHESP Natural Communities
- Conserved Land / Agriculture Preservation
- Areas of Critical Environmental Concern
- Public Water Supply Reservoir Watershed (Zone A)
- Outstanding Resource Waters



Long Pond [MA97-29]

POLLUTANT SOURCES

- Impaired Segment
- Impaired Watershed
- Waterbody
- Rivers and Streams
- NPDES Major and Minor Permitted Wastewater Discharge to Surface Waters
- DEP Ground Water Discharge Permits
- ✱ Combined Sewer Overflow
- Unpermitted Land Disposal Dumping Grounds
- ▲ Landfills
- Impervious Cover
- MS4 Urbanized Areas

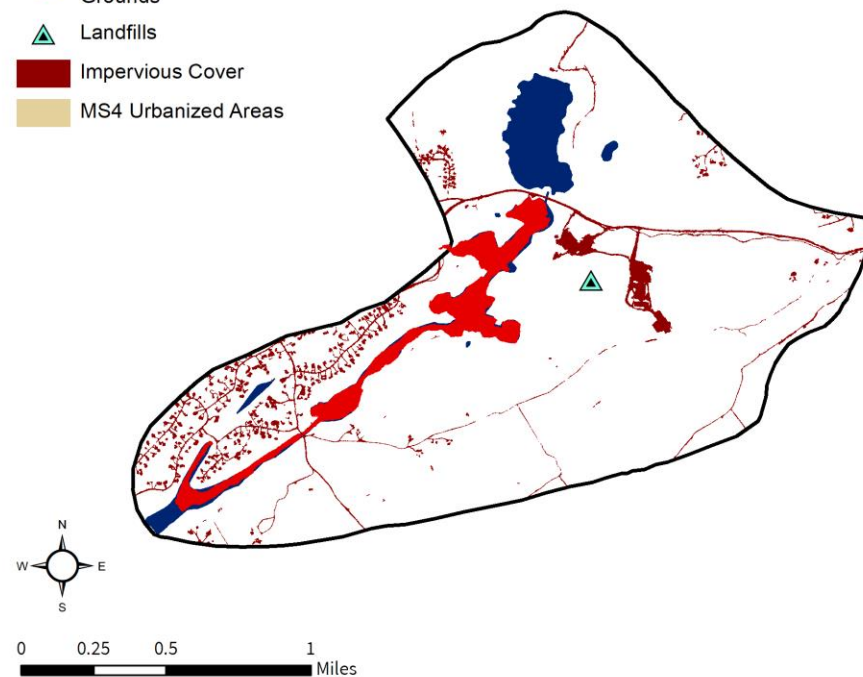


Figure 4-1. Natural resources and potential pollution sources draining to the Long Pond segment MA97-29. The map on the left shows critical habitat, water features, and conserved land. The map on the right indicates potential and known pollutant sources, including impervious cover, MS4 areas, permitted facilities, etc.

4.2. Waterbody Impairment Characterization

Long Pond (MA97-29) is a Class SA tidal estuary with a Shellfishing qualifier (MassDEP, 2021a) that has been identified as impaired for Primary Contact Recreation (MassDEP and USEPA, 2020). While impaired for Primary Contact Recreation Use due to fecal coliform, the Shellfish criteria are more appropriate and conservative and form the basis of the TMDL.

The impairment decision was carried forward from the *2000 Water Quality Assessment Report* (Connors, 2003). Northeast Aquatic Research (NEAR) collected fecal coliform samples and Secchi disk measurements at three stations in Long Pond and one station at the inlet to Long Pond once per month from May to October in 2001. The geometric mean of fecal coliform at the three Long Pond stations was 111 colonies/100 mL, with two out of 18 samples exceeding 400 colonies/100 mL (Connors, 2003). The geometric mean of fecal coliform at the inlet to Long Pond was 122 colonies/100 mL, with two out of six samples exceeding 400 colonies/100 mL (Connors, 2003). Across all four sites, Secchi disk depth ranged from 2.0 – 2.7 feet except in June where it ranged from 3.0 – 4.8 feet and in July where it ranged from 1.0 – 1.5 feet (Connors, 2003). Three additional wet-weather samples were collected at a station in White Goose Cove on Long Pond in August, September, and October of 2001. The geometric mean of fecal coliform at this station was 420 colonies/100 mL (Connors, 2003). As a result of high fecal coliform counts and low Secchi disk depths, the Primary Contact Recreation use was assessed as impaired.

4.3. Potential Pathogen Sources

Each potential pathogen source is described in further detail below.

Urban Stormwater: There is a small amount of development in the watershed (10%), which consists almost exclusively of residential areas. Within the watershed, none of the land area is subject to MS4 permit conditions, 5% is classified as impervious area, and 3% of the land area within a 200-foot buffer of the segment is classified as impervious area. Stormwater runoff from urban areas is likely a minor source of pathogens.

Illicit Sewage Discharges: Public sewer service is not currently available in the watershed, though there are plans to expand sewer service to the western portion of the watershed. Sewer-related risks to water quality include leaking infrastructure (pipes, pump stations, etc.) and sanitary sewer overflows (SSOs), which may be caused by undersized infrastructure, blockages, or excessive infiltration of groundwater or rainwater into pipes, exceeding system capacity. Illicit connections of wastewater to stormwater conveyances are also a potential source.

On-Site Wastewater Disposal Systems: Most of the development in the watershed utilizes on-site systems for wastewater treatment. It is likely that some septic systems are not properly maintained and are discharging untreated waste to groundwater.

Illicit Boat Discharges: The segment is navigable by marine vessels. Vessels with onboard toilets are required to have a marine sanitation device (MSD) to treat or store wastewater. MSDs that treat wastewater may be improperly maintained or malfunctioning and therefore could discharge untreated sewage to coastal waterbodies. For MSDs that store wastewater, this sewage can either be pumped out at shore-based pump-out facilities (CZM, 2022b) or discharged directly into the water when the vessel is more than three miles offshore beyond the designated No Discharge Zone (NDZ). Negligent boaters who ignore these laws and discharge untreated sewage to coastal waterbodies may be a source of pathogen pollution.

Vessel Pump-Out Facilities: There are no vessel sewage pump-out facilities directly adjacent to the Long Pond segment MA97-29 (CZM, 2022b). Although pump-out facilities provide boaters with a means of disposing onboard sewage without discharging it into coastal waters, these facilities are generally associated with high boating activity. Pump-out facilities which malfunction or leak also represent a potential pathogen source. As a result, waterbodies adjacent to pump-out facilities are likely at high risk of illicit boat (and facility) discharges.

Agriculture: Land use maps indicate no agricultural activity in the watershed. As a result, stormwater runoff from agricultural land is not a likely source of pathogens to the impaired segment.

Pet Waste: There are a few residential neighborhoods near the Long Pond segment MA97-29. Conservation lands, parks, and ballfields popular for dog-walking, especially where paths or residential neighborhoods are adjacent to rivers, ponds, or wetlands, represent possible sources of pathogens.

Wildlife Waste: There are a few open wetland areas directly adjacent to the impaired segment. Large mowed areas, fields, or wetlands with a clear sightline to a waterbody may attract large congregations of waterfowl, resulting in elevated indicator bacteria counts in the water.

Boating: All Massachusetts waters, including this impaired segment, are designated by the State of Massachusetts with EPA approval as a “no discharge zone” (NDZ). Discharge of boat sewage is prohibited within the NDZ. Nonetheless, boats who fail to comply with the NDZ may be a source of pathogens to the segment. There are no recreational boat pumpout facilities within the watershed (CZM, 2022b), nor docks or marinas, though there are three in Nantucket Harbor.

4.4. Existing Local Management

This section identifies the major municipalities immediately surrounding the impaired segment and its contributing watershed. For a complete view of upstream municipalities and waterbodies, see the map in Figure 2-1.

Town of Nantucket

Nantucket is not within an MS4 area.

Nantucket has the following ordinances and bylaws, mostly accessible online via the town website <https://www.nantucket-ma.gov>/<https://www.rehobothma.gov>/<https://www.cityofattleboro.us/> (Town of Nantucket, 2021):

- Wetland protection bylaw
- Pet Waste: None found
- Stormwater Regulations and Utility: None found

Nantucket has a 2009 Master Plan which emphasizes environmental protection. In the natural resources section, the importance of ponds and water resources are highlighted, specifically regarding protection and preservation of the town’s resources and culture (pg. 59). The water resources section implements the plan to prioritize conservation and acquisition of land within the 100-year coastal floodplain and wetland resource areas (pg. 64). Additionally, Nantucket has a Parks and Recreation Master Plan from 2020. Nantucket intends to expand public sewer service to the western portion of the watershed, defined as the “Madaket and Warren’s Landing Needs Area,” in its 2014 Sewer District Master Plan (Town of Nantucket, 2021).

5. References

- Brown, S. (2015). *Land Meets Land; Norton Point Breach Closes*. Vineyard Gazette. April 2, 2015. Available at: <https://vineyardgazette.com/news/2015/04/02/land-meets-land-norton-point-breach-closes>
- CCTU. (2022). Cape Cod Trout Unlimited. Retrieved from Chapter home page: <https://nj.tu.org/blog-posts/upcoming-events-for-cape-cod-trout-unlimited>
- Connors, S. G. (2003). *Islands Watershed: 2000 Water Quality Assessment Report*. CN 084.0. Massachusetts Department of Environmental Protection. Division of Watershed Management. Worcester, MA. September 2003. Available at: <https://www.mass.gov/doc/islands-watershed-2000-water-quality-assessment-report/download>
- CZM. (2022a). Massachusetts Office of Coastal Zone Management. Retrieved from Cape Cod and Islands Region page: <https://www.mass.gov/locations/czm-cape-cod-and-islands-region>
- CZM. (2022b). Boat Pumpout Facilities. Retrieved from: <https://www.mass.gov/service-details/boat-pumpout-facilities>
- MAPC. (2014). Metropolitan Area Planning Council. Retrieved from Stormwater Financing/Utility Starter Kit: <https://www.mapc.org/resource-library/stormwater-financing-utility-starter-kit/>
- MAPC. (2018). Metropolitan Area Planning Council. Retrieved from MS4 Outfall Catchment Calculator: <https://www.mapc.org/resource-library/ms4-outfall-catchment-calculator/>
- MassDEP. (2021a). *314 CMR 4.00: Massachusetts Surface Water Quality Standards*. Massachusetts Department of Environmental Protection, Boston, MA. Available at: <https://www.mass.gov/regulations/314-CMR-4-the-massachusetts-surface-water-quality-standards#current-regulations>
- MassDEP. (2021b). Water Utility Resilience Program. Retrieved from home page: <https://www.mass.gov/guides/water-utility-resilience-program>
- MassDEP. (2022). *Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle*. CN 505.1. Massachusetts Department of Environmental Protection, Bureau of Water Resources, Division of Watershed Management, Watershed Planning Program. Worcester, MA. Available at <https://www.mass.gov/doc/final-massachusetts-integrated-list-of-waters-for-the-clean-water-act-20182020-reporting-cycle/download>
- MassDEP and USEPA. (2020). *Final Pathogen TMDL for the Islands Watershed*. April 2020. Massachusetts Department of Environmental Protection. Division of Watershed Management. Worcester, MA. And EPA New England Region 1. Boston, MA. Available at: <https://www.epa.gov/sites/default/files/2020-06/documents/islands-tmdl-report.pdf>
- MDFW. (2022). *Coldwater Fish Resources*. Massachusetts Department of Fish and Game. Division of Fisheries and Wildlife. Retrieved from Coldwater Fish Resources page: <https://www.mass.gov/info-details/coldwater-fish-resources>
- MVC. (2022). Martha's Vineyard Commission. Retrieved from home page: <https://www.mvcommission.org/>
- NCF. (2022). Nantucket Conservation Foundation. Retrieved from home page: <https://www.nantucketconservation.org/>
- NLC. (2022). Nantucket Land Council, Inc. Retrieved from home page: <https://www.nantucketlandcouncil.org/>
- Nantucket Shellfish Association. (2022). Retrieved from home page: <https://www.nantucketshellfish.org/>
- NPEDC. (2022). Nantucket Planning & Economic Development Commission. Retrieved from home page: <https://www.nantucket-ma.gov/306/Planning-Economic-Development-Commission>
- Think Blue Massachusetts. (2019). Retrieved from About Think Blue Massachusetts: <https://www.thinkbluemassachusetts.org/about-us>

- Town of Edgartown. (2021). Retrieved from Town of Edgartown home page: <https://www.edgartown-ma.us/>
- Town of Nantucket. (2021). Retrieved from Town of Nantucket home page: <https://www.nantucket-ma.gov/>
- TU. (2022). Trout Unlimited. Retrieved from Trout Unlimited Chapter Location page: <https://www.tu.org/find-your-chapter/>
- USEPA. (2020). General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts, United States Environmental Protection Agency. Region 1. National Pollutant Discharge Elimination System (NPDES). Issued April 4, 2016. Modified December 7, 2020. Available at: <https://www3.epa.gov/region1/npdes/stormwater/ma/2016fpd/final-2016-ma-sms4-gp-mod.pdf>
- USEPA. (2022). Southeast New England Program. Retrieved from home page: <https://www.epa.gov/snep>
- USGS. (2022). StreamStats. Developed from home page at: <https://streamstats.usgs.gov/ss/>