Estuary 12: Stonington

Watershed Summary

WATERSHED DESCRIPTION AND MAPS

The Stonington Estuary (Estuary 12) covers an area of approximately 1621.76 acres in southern Connecticut. These impaired segments are located in the central portion of Long Island Sound (LIS). All of the impaired segments in this summary are located in the municipality of Stonington, CT.

The Stonington Estuary includes seven segments impaired for direct shellfish harvesting due to elevated bacteria levels. These segments were assessed by Connecticut Department of Energy and Environmental Protection (CT DEEP) and included in the CT 2012 303(d) list of impaired waterbodies. Some segments in the estuary are currently unassessed as of the writing of this document. This does not mean there are no potential issues on these segments, but indicates a lack of current data to evaluate the segments as part of the assessment process. An excerpt of the Integrated Water Quality Report is included in Table 1 (CT DEEP, 2012).

Impaired Segments

Segment 1: LIS EB Inner – Inner Wequetoequock Cove (CT-E1_003) is located in the Eastern portion of LIS. The segment is from Inner Wequetequock Cove from the railroad crossing upstream to saltwater limit, in two inlets adjacent to Route 1.

Segment 2: LIS EB Inner – Inner Stonington Harbor (CT-E1_005) extends from SB/SA water quality boundary at railroad crossing, upstream to saltwater limit near Route 1 crossing

Segment 3: LIS EB Inner – Inner Quiambaug Cove (CT-E1_006) extends from Inner Quiambaug Cove from the railroad crossing, upstream to the saltwater limit above Route 1 crossing, adjacent to Cove Road.

Segment 4: LIS EB Shore – Stonington Point (CT-E2_002) extends from Stonington Point to the railroad crossing on the west side of Wequetequock Cove out over approximately 1000 feet offshore.

Impaired Segment Facts

Impaired Segments, Classifications, and Areas (square miles):

Segment 1: LIS EB Inner – Inner Wequetequock Cove (CT-E1_003), SA; 0.094

Segment 2: LIS EB Inner – Inner Stonington Harbor (CT-E1_005), SA; 0.226

Segment 3: LIS EB Inner- Inner Quiambaug Cove (CT- E1_006), SA; 0.114

Segment 4: LIS EB Shore - Stonington Point (CT-E2_002), SA; 0.668

Segment 5: LIS EB Shore- Outer Quiambaug Cove (CT-E2-003), SA; 0.388

Segment 6: LIS EB Shore – Wilcox Cove (Mason Island) (CT-E2_004), SA; 0.694

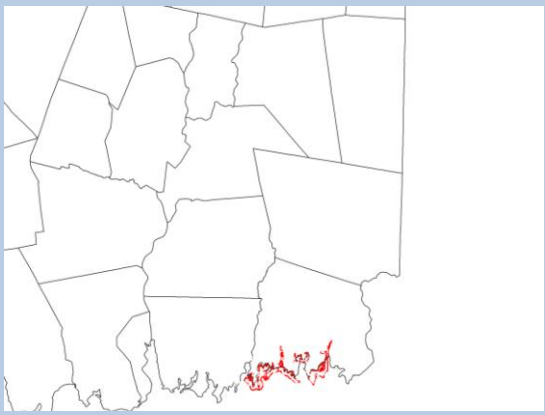
Segment 7: LIS EB Shore – Mouth Mystic River (CT-E2_005), SA; 0.350

Municipalities: Stonington

Designated Use Impairments: Shellfishing

MS4 Applicable? Yes

Applicable Season: Recreation Season (May 1 to September 30),Year Round for Shellfish Uses



Segment 5: LIS EB Shore - Outer Quiambaug Cove (CT-E2_003) extends from mouth of inner Quiambaug Cove at railroad crossing to SB/SA water quality boundary at mouth of Stonington Harbor, out approximately 1000 feet offshore.

Segment 6: LIS EB Shore – Wilcox Cove (Mason Island) (CT-E2_004) extends from the tip of Mason Island to the mouth of Inner Quiambaug Cove, out approximately 1000 feet offshore.

Segment 7: LIS EB Shore – Mouth Mystic River (CT-E2_005) extends from western most tip of Mason Island along SB/SA water quality boundary to eastern most tip of Mason Island, out approximately 100 feet offshore.

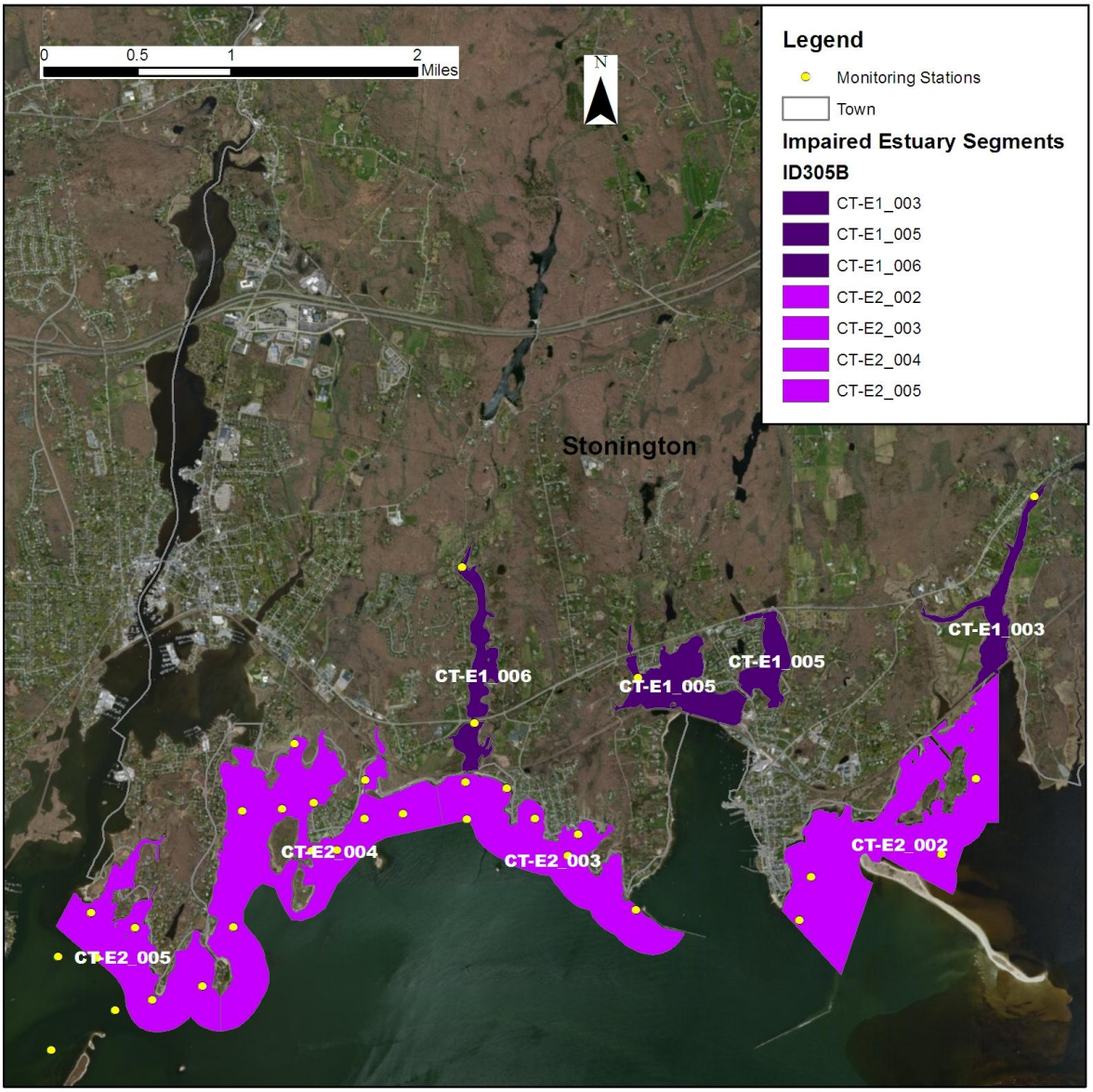
These impaired segments of the Stonington estuary all have a water quality classification of SA. Designated uses include shellfish harvesting for direct human consumption, recreation, habitat for marine fish and other aquatic life and wildlife, industrial water supply, and navigation. These segments of the estuary are impaired due to elevated bacteria concentrations, affecting the designated use of shellfishing for direct human consumption.

Table 1: Impaired segments in the Stonington Estuary from the Connecticut 2012 Integrated Water Quality Report

Waterbody ID	Waterbody Name	Location	Square Miles	Marine Aquatic Life	Recreation	Shellfish	Shellfish Class
CT-E1_003	LIS EB Inner - Inner Wequetequock Cove, Stonington	Eastern portion of LIS, Inner Estuary, Inner Wequetequock Cove from railroad crossing US to Saltwater limit, in two inlets adjacent to Route 1, Stonington.	0.094	Insufficient Information	Insufficient Information	Not Supporting	Direct Consumption
CT-E1_005	LIS EB Inner - Inner Stonington Harbor, Stonington	Eastern portion of LIS, Inner Estuary, Inner Stonington Harbor from SB/ SA water quality boundary at RAILROAD crossing, US to Saltwater limit near Route 1 crossing, Stonington.	0.226	Fully Supporting	Fully Supporting	Not Supporting	Direct Consumption
CT-E1_006	LIS EB Inner - Inner Quiambaug Cove, Stonington	Eastern portion of LIS, Inner Estuary, Inner Quiambaug Cove from RAILROAD crossing, US to Saltwater limit, above Route 1 crossing, adjacent to Cove Road, Stonington.	0.114	Not Assessed	Not Assessed	Not Supporting	Direct Consumption

Waterbody ID	Waterbody Name	Location	Square Miles	Marine Aquatic Life	Recreation	Shellfish	Shellfish Class
CT-E2_002	LIS EB Shore - Stonington Point, Stonington	Eastern portion of LIS from Stonington Point to RAILROAD crossing on west side of Wequetequock Cove, out approximately 1000 ft offshore.	0.668	Insufficient Information	Insufficient Information	Not Supporting	Direct Consumption
CT-E2_003	LIS EB Shore - Outer Quiambaug Cove, Stonington	Eastern portion of LIS from Mouth of inner Quiambaug Cove at RAILROAD crossing to SB/ SA water quality boundary at mouth of Stonington Harbor, out approximately 1000 ft offshore.	0.388	Not Assessed	Not Assessed	Not Supporting	Direct Consumption
CT-E2_004	LIS EB Shore - Wilcox Cove (Mason Is.), Stonington	Eastern portion of LIS from tip of Mason Island to Mouth of inner Quiambaug Cove, out approximately 1000 ft offshore.	0.694	Not Assessed	Not Assessed	Not Supporting	Direct Consumption
CT-E2_005	LIS EB Shore - Mouth Mystic River, Stonington	Eastern portion of LIS from western most tip of Mason Island along SB/ SA water quality boundary to eastern most tip of Mason Island, out approximately 1000 ft offshore.	0.35	Fully Supporting	Fully Supporting	Not Supporting	Direct Consumption

Figure 1: GIS map featuring general information for impaired segments in the Stonington Estuary



Stonington Impaired Estuaries MAP DATA DEEP Created March 2013

Shellfish Bed Classifications, Closures, and Lease Locations

The Connecticut Department of Agriculture/Bureau of Aquaculture (CT DA/BA) is responsible for regulating shellfish harvesting (http://www.ct.gov/doag/cwp/view.asp?a=1369&Q=259170). A shellfish growing area is defined by CT DA/BA as any area that supports or could support the growth and/or propagation of molluscan shellstock. Shellfish are defined by CT DA/BA as oysters, clams, mussels, and scallops, either shucked or in the shell, fresh or frozen, whole or in part. All shellfish growing areas are classified by CT DA/BA in accordance with the Interstate Shellfish Sanitation Conference (ISSC) National Shellfish Sanitation Program Model Ordinance (NSSP-MO) and CT General Statutes Chapter 491, §26-192e. These classifications, summarized below, are established to minimize health risks and may restrict the take and use of shellfish from some areas. The classifications are based on fecal coliform bacteria standards as provided in the NSSP-MO (Interstate Shellfish Sanitation Conference, 2007). Any

shellfish area, regardless of classification, may be temporarily closed to all activities when a potential public health emergency exists as a result of a storm event, flooding, sewage, chemical or petroleum discharges, or a hazardous algal bloom.

Shellfish harvesting has been divided into two designated uses as specified in the Connecticut WQS: shellfish harvesting suitable for direct human consumption (Class SA waters), and shellfish harvesting suitable for commercial operations requiring depuration or relay (Class SB waters).

Shellfish Bed Classifications and Closures in the Stonington Estuary

Shellfish classification areas in the Stonington Estuary are shown in Figure 2. The following classifications for shellfish growing areas are defined by CT DA/BA:

APPROVED AREA: Is a classification used to identify a growing area that is safe for the direct marketing or consumption of shellfish. An area may be classified as Approved when a sanitary survey finds that there is no contamination from pathogenic organisms, poisonous or deleterious substances, marine biotoxins, or bacteria concentrations exceeding the bacteriological standards for a growing area in this classification as set forth in the NSSP MO. The water quality in the growing area shall also meet the bacteriological standards for an Approved classification.

CONDITIONALLY APPROVED AREA: Is a classification used to identify a growing area that is safe for the direct, marketing or consumption of shellfish when the area is in the open status. The area must meet the criteria for Approved classification when the area is in the open status, and meets the criteria for the restricted classification in the closed status. An area may be classified as Conditionally Approved when a sanitary survey finds that the area can remain in the open status for a reasonable period of time, the factors impacting the area are known and predictable and do not preclude a reasonable management approach, and the water quality correlates with the environmental conditions or other factors affecting the distribution of pollutants into the growing area. Each Conditionally Approved growing area must have a written management plan that is adhered to by all responsible parties.

RESTRICTED RELAY/DEPURATION: Is a classification used to identify a growing area where harvested shellstock is relayed to Approved or Conditionally Approved waters for natural cleansing or depuration*. An area may be classified as Restricted Relay when a sanitary survey finds a limited degree of pollution and levels of fecal pollution, human pathogens, or poisonous or deleterious substances so that shellstock can be made safe for human consumption by either relaying, depuration or low acid-canned food processing. Shellfish may only be harvested from Restricted areas by special license, and may not be directly harvested for market or consumption.

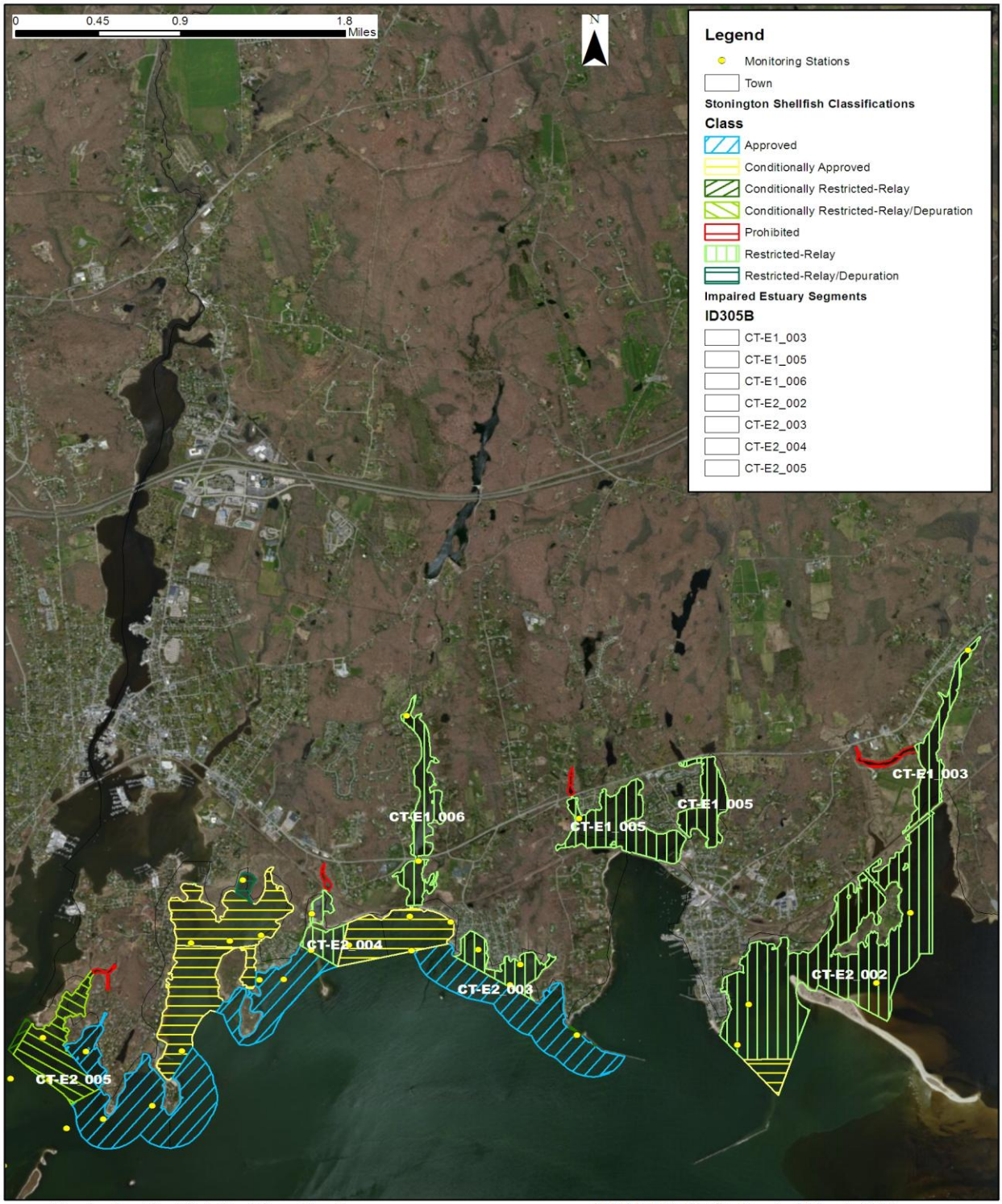
*Depuration means the process of reducing the pathogenic organisms that may be present in shellstock by using a controlled aquatic environment as the treatment process.

CONDITIONALLY RESTRICTED: Is a classification used to identify a growing area where a sanitary survey has found that the area meets the criteria for Restricted classification when the area is in the open status and meets the criteria for Prohibited classification when the area is in the closed status. Each Conditionally Restricted growing area must have a written management plan that designates whether harvested shellfish are relayed or depurated. Shellfish may only be harvested from Conditionally Restricted areas by special license, and may not be directly harvested for market or consumption.

PROHIBITED: Is a classification used to identify a growing area where there has been no current sanitary survey or where a sanitary survey has found that the area is adjacent to a sewage treatment plant or other point source outfall with public health significance; pollution sources may unpredictably contaminate the growing area; the growing area is contaminated with fecal waste so that the shellfish may be vectors for disease microorganisms; and/or that the concentration of biotoxin is sufficient to cause a public health risk. Shellfish may not be harvested from Prohibited areas except for seed oystering or depletion of the areas.

As discussed above and shown in Table 1, Segments 1 – 7 did not meet their designated use for shellfish harvesting for direct consumption due to bacteria. Segment 1 (CT-E1_003) is Prohibited from shellfish harvesting in one section and restricted relay for the remainder of the segment. Segment 2 (CT-E1_005) also has a small Prohibited area in the Northwest corner of the segment, while the remainder is classified as Restricted Relay. Segment 3 (CT-E1_006) is entirely a Restricted Relay classification. Segment 4 (CT-E2_002) has shoreline areas covering mostly Restricted Relay classification with a small section of Conditionally Approved classification further away from the shoreline. Segment 5 (CT-E2_003) is a mixture of classifications with Some Restricted Relay and Conditionally Approved areas close to shore and Approved portion further away from the shoreline. Segments 6 (CT-E2_004) and 7 (CT-E2_005) are divided amongst several classifications with Approved, Conditionally Approved, Restricted-Relay, Prohibited and a small portions of Conditionally Restricted-Relay.

Figure 2: GIS map featuring Shellfish Bed Classifications and Closures for the impaired segments in the Stonington Estuary



Stonington Shellfish Bed Classifications MAP DATA DEEP Created March 2013

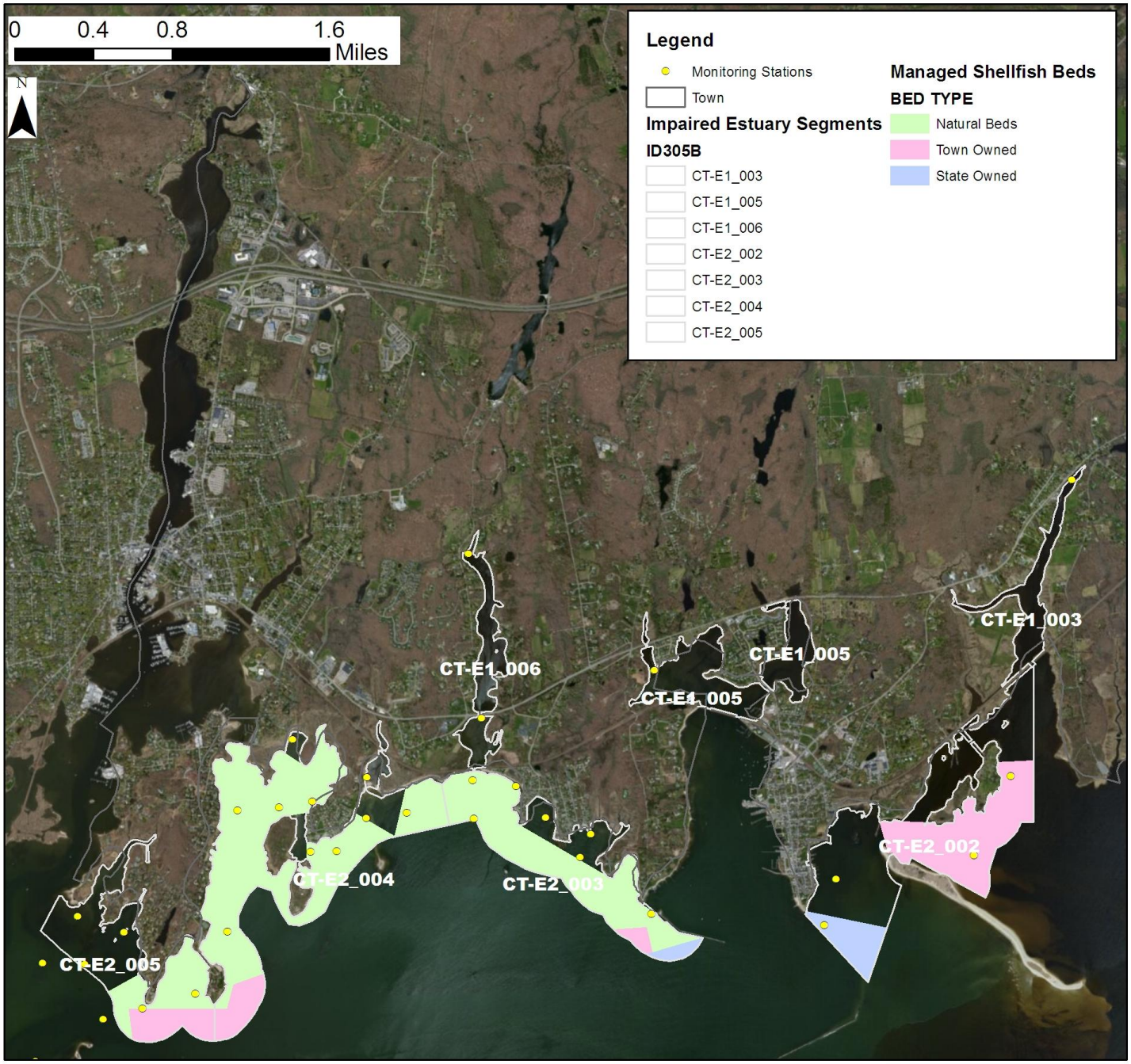
Shellfish Bed Lease Locations

Shellfish beds in the Stonington Estuary are also classified by their management (Figure 3). CT DA/BA defines these areas as follows:

> **State and Town Beds**: In 1881, a line, referred to as the Commissioner's Line, was established to divide the waters of the State into northern and southern sections. All beds south of this line are State beds and most beds north of this line are town beds. Town beds are leased, owned or managed through the local shellfish commission. However, CT DA/BA still controls all the licensing and regulations for both state and town beds. For example, DA/BA issues licenses and determines when an area will be closed to shellfishing due to a change in water quality. Towns may require additional permits to work in waters under local jurisdiction. Beds north of the line in Westport, Milford, West Haven, and New Haven are exceptions to this as they are fully under State control.
>
> **State and Town Natural Beds**: Natural beds get their name from the fact that shellfish, especially oyster, naturally inhabited the area. These areas tend to be closer to shore, usually at the mouth of a river. Natural beds have specific regulations concerning their use, including licensing and harvesting methods. They are predominately seed beds that cannot be mechanically harvested. Use of natural beds requires a Relay/Transplant License I or II and/or Seed Oyster Harvesting License from CT DA/BA. Any person assisting in the harvesting of seed oysters must have a Helper's License. These beds cannot be leased or subdivided; they are to remain open to any properly licensed harvester. State natural beds are natural beds south of the Commissioner's Line. Descriptions of these beds can be found in §3295 of the Connecticut General Statutes (CGS), revision of 1918. Not all beds listed in §3295 were mapped, and many natural beds in State waters off Greenwich are managed through leases. Town natural beds were defined by law under §2326 of the CGS of 1888. Each town had the opportunity to map areas to be considered natural beds. The documents, written descriptions, and maps were submitted to the Superior Court with jurisdiction for that town. Several towns did not avail themselves to this opportunity, and some, such as Westport, have changed the delineation of their natural beds in recent court decisions. There are also areas that may have been declared natural beds, but are now leased.

The shellfishing use is either recreational or non-existent due to freshwater flows in segment 1 (CT-E1_003), segment 2 (CT-E1_005), and segment 3 (CT-E1_006). Segment 4 (CT-E2_002) has portions of Town owned and State owned shellfish beds. Segment 7 (CT-E2_005) and segment 6 (CT_E2_004) have portions of natural beds and town owned beds, while segment 5 (CT-E2_003) has a combination of all three types of shellfish bed leases (Figure 3).

Figure 3: GIS map featuring Shellfish Bed Lease Locations for the impaired segments in the Stonington Estuary



Stonington Shellfish Bed Lease Locations **MAP DATA DEEP Created March 2013**

WHY IS A TMDL NEEDED?

For saltwater segments, the indicator bacteria, fecal coliform, is used in the CT Water Quality Standards (WQS) to assess shellfish uses for Class SA and SB waters (CTDEEP, 2011). Enterococcus is the indicator bacteria used to assess recreational uses for Class SA and SB waters. All data are from CT DEEP, USGS, Bureau of Aquaculture, or volunteer monitoring efforts at stations located on the impaired segments.

Segments 1 - 7 are Class SA saltwater waterbodies. Their applicable designated uses include shellfish harvesting for direct human consumption, recreation, habitat for marine fish and other aquatic life and wildlife, industrial water supply, and navigation. Water quality analyses were conducted using data from eight sampling locations on Segments 2 (CT-E1_005), 3 (CT-E1_006) and 5 (CT-E2_003), seven sampling locations on Segment 4 (CT-E2_001) and three sampling locations on Segments 6 (CT-E2_004) and 7 (CT-E2_005). The water quality criteria for fecal coliform, along with bacteria sampling results from 2000 – 2011, are presented in Tables 14 – 19. These segments of the estuary are impaired due to elevated bacteria concentrations, affecting the designated use of direct shellfishing.

Segment 1 (CT-E1_003): Water quality analyses were conducted using data from one sampling location on Segment 1 (Table 2). The water quality criteria for fecal coliform, along with bacteria sampling results from 2000 – 2011, are presented in Table 13. These segments of the estuary are impaired due to elevated bacteria concentrations, affecting the designated use of commercial shellfishing. To aid in identifying possible bacteria sources, the geometric mean was also calculated for wet-weather and dry-weather sampling days for all stations in Segment 1, where possible (Table 13).

As shown in Table 11, 90% less than values exceeded the WQS for fecal coliform regularly at station 137-17.8 in Segment 1(CT-E1_003) within the analyzed dataset. Geometric mean values also exceeded the WQS for fecal coliform regularly within the analyzed dataset. Only 2006 did not exhibit any exceedances, but there was only one data point collected that year. Geometric means for data collected during the entire sampling period were also calculated for each station using wet and dry-weather conditions, resulting in an exceedance of geometric mean WQS for fecal coliform during wet and dry weather conditions at Station 137-17.8.

Segment 2 (CT-E1_005): As shown in Table 12, geometric mean values exceeded the WQS for fecal coliform twice at Station 137-16.6. 90% less than values exceeded the WQS for fecal coliform once in Segment 2 during the sampling period, however many years only had one data point. Geometric means for data collected during the sampling period were also calculated for each station using wet and dry-weather conditions, with wet-weather fecal coliform results narrowly exceeding WQS.

Segment 3 (CT-E1_006): As shown in Table 13, 90% less than values exceeded the WQS for fecal coliform several times at station 137-14.3 and only twice at 137-14.1 during the sampling period. Geometric mean values exceeded the WQS for fecal coliform at both stations, multiple times during the sampling period. Geometric means for data collected during the sampling period were calculated for each station using wet and dry-weather conditions, resulting in geomeans that exceeded the WQS for fecal coliform at station 137-14.3 for all weather conditions and station 137-14.1 only for wet weather.

Segment 4 (CT-E2_002): As shown in Table 14, 90% less than values exceeded the WQS for fecal coliform at least once at three of the four stations during the sampling period. Station 137-14.1 was the only exception, with no exceedances. Geometric mean values also exceeded the WQS for fecal coliform for the same three stations during the sampling period. Geometric means for data collected during the sampling period were also calculated for each station using wet and dry-weather conditions, resulting in minor dry weather exceedances of the WQS for fecal coliform at station 137-17.5 and 137-17.6.

Segment 5 (CT-E2_003): As shown in Table 15, 90% less than values exceeded the WQS for fecal coliform at least once during the sampling period at stations 137-13.8, 137-13.1, and 137-13.0. Geometric mean values did not exceed the WQS for fecal coliform for any station and sampling year during the sampling period. Geometric means for data collected during the sampling period were also calculated for each station using wet and dry-weather conditions, no results exceeded the WQS.

Segment 6 (CT-E2_004): As shown in Table 16, 90% less than values exceeded the WQS for fecal coliform at station 137-9.0, 137-11.0, 137-11.2, 137-12.1, and 137-12.4 during the sampling period. Geometric mean values exceeded WQS at 137-12.1, 137-11.2, and 137-11.0. Geometric means for data collected during the sampling period were also calculated for each station using wet and dry-weather conditions, there were no results that exceeded WQS for fecal coliform.

Segment 7 (CT-E2_005): As shown in Table 17, 90% less than values exceeded the WQS for fecal coliform at station 137-3.0 once during the sampling period. Geometric mean values did not exceed the WQS for fecal coliform at any station during the sampling period. Geometric means for data collected during the sampling period were also calculated for each station using wet and dry-weather conditions, there were no exceedances discovered in this analysis.

Due to the elevated bacteria measurements presented in Tables 11-17, these seven impaired segments did not meet CT's bacteria WQS, were identified as impaired, and were placed on the CT List of Waterbodies Not Meeting Water Quality Standards, also known as the CT 303(d) Impaired Waters List. The Clean Water Act requires that all 303(d) listed waters undergo a TMDL assessment that describes the impairments and identifies the measures needed to restore water quality. The goal is for all waterbodies to comply with State WQS.

Table 2: Sampling station location description for the impaired segments in the Stonington Estuary

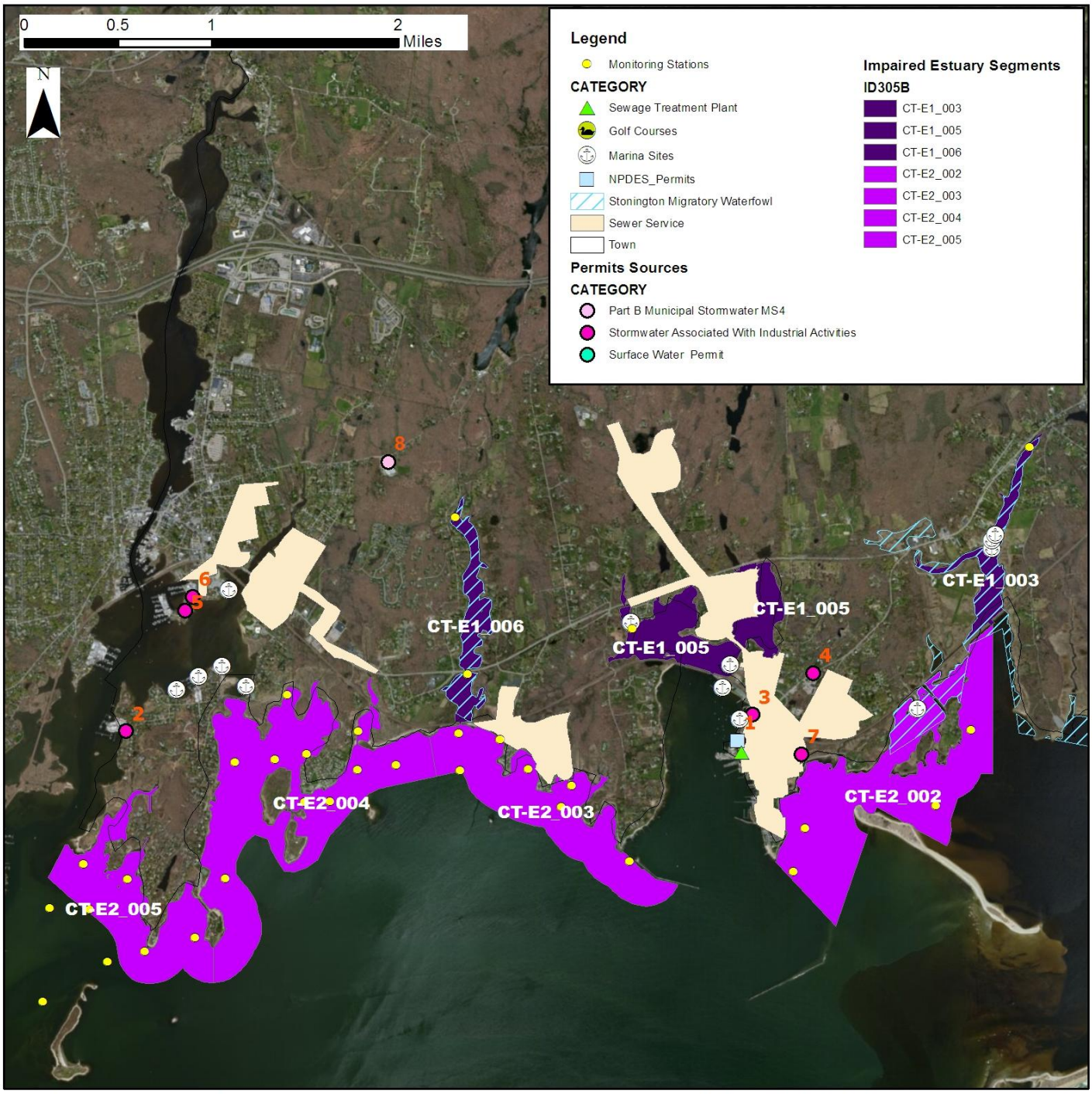
Waterbody ID	Station	Station Description	Municipality	Latitude	Longitude
Segment 1: CT-E1-003	137-17.8	Wequetequock Cove at route 1	Stonington	41.35906667	-71.87873333
Segment 2: CT-E1-005	137-16.6	Lambert Cove at Cardinal Cove Marina	Stonington	41.34530000	-71.91978333
Segment 3: CT-E1_006	137-14.1	Quiambog Cove at Rt 1 bridge	Stonington	41.34186667	-71.93671667
	137-14.3	Quiambog Cove near Copps Brook	Stonington	41.35403333	-71.93783333
Segment 4: CT-E2_002	137-17.1	Stonington Point at R"2"	Stonington	41.32631667	-71.90341667
	137-17.2	East of Stonington Point at RN "4"	Stonington	41.32968333	-71.90218333
	137-17.5	Little Narragansett Bay at C "5"	Stonington	41.33136667	-71.88870000
	137-17.6	East of Elihu Island	Stonington	41.33720000	-71.88505000
Segment 5: CT-E2_003	137-13.0	Outer Quiambog Cove at outlet	Stonington	41.33728333	-71.93768333
	137-13.1	Outer Quiambog Cove outside Lords Point	Stonington	41.33680000	-71.93341667
	137-13.2	Lords Point	Stonington	41.33445000	-71.93056667
	137-13.8	South of Quiambog Cove outlet	Stonington	41.33443333	-71.93756667
	137-14.0	Off Lords Point	Stonington	41.33150000	-71.92721667
	137-15.0	Outside W breakwater	Stonington	41.32723333	-71.92028333
Segment 6: CT-E2_004	137-8.0	CA "B" Off Mason Island Yacht Club dock	Stonington	41.32621667	-71.96178333
	137-9.0	CA"B"	Stonington	41.33521667	-71.96071667
	137-11.0		Stonington	41.33538333	-71.95663333
	137-11.1	CA "B"	Stonington	41.33208333	-71.95358333
	137-11.2	Cove East of Dodge Farm	Stonington	41.34043333	-71.95525000

Waterbody ID	Station	Station Description	Municipality	Latitude	Longitude
	137-11.3	CA "A"	Stonington	41.33580000	-71.95336667
	137-12.0	Latimer Point	Stonington	41.33538333	-71.95663333
	137-12.1	Wilcox Cove outlet	Stonington	41.33208333	-71.95358333
	137-12.4	East of Latimer Point	Stonington	41.33453333	-71.94811667
	137-12.6	Outer Quiambog Cove	Stonington	41.33491667	-71.94415000
Segment 7: CT-E2_005	137-02.1	Mystic Harbor	Stonington	41.32393333	-71.97576667
	137-03.0	Mystic Harbor	Stonington	41.32745000	-71.97638333
	137-5.0	Mystic Harbor	Stonington	41.32625000	-71.97188333
	137-6.1	Enders Island	Stonington	41.32166667	-71.96496667
	137-6.2	Mason Point	Stonington	41.32061667	-71.97015000

POTENTIAL BACTERIA SOURCES

Potential sources of indicator bacteria in a watershed include point and non-point sources, such as stormwater runoff, agriculture, sanitary sewer overflows (collection system failures), illicit discharges, and inappropriate discharges to the waterbody. Potential sources that have been tentatively identified in the Stonington Estuary are presented in Table 3 and Figure 4. However, the list of potential sources is general in nature and should not be considered comprehensive. There may be other sources not listed here that contribute to the observed water quality impairment in the study segments. Further monitoring and investigation will confirm listed sources and discover additional ones. Some segments in this watershed are currently listed as unassessed by CT DEEP procedures. This does not mean that there are no data or impairments in existence in the segment. There are data from permitted sources for some segments, and CT DEEP recommends that any elevated concentrations found from those permitted sources be addressed through voluntary reduction measures. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement these TMDLs.

Figure 4: Potential bacteria sources to the impaired segments in the Stonington Estuary



Stonington Potential Bacteria Sources **MAP DATA DEEP Created March 2013**

The potential sources map for the impaired basin was developed after thorough analysis of available data sets. If information is not displayed in the map, then no sources were discovered during the analysis. The following is the list of potential sources that were evaluated: problems with migratory waterfowl, golf course locations, reservoirs, proposed and existing sewer service, cattle farms, poultry farms, permitted sources of bacteria loading (surface water discharge, MS4 permit, industrial stormwater, commercial stormwater, groundwater permits, and construction related stormwater), and leachate and discharge sources (agricultural waste, CSOs, failing septic systems, landfills, large septic tank leach fields, septage lagoons, sewage treatment plants, and water treatment or filter backwash).

Table 3: Potential bacteria sources to the impaired segments in the Stonington Estuary

Segment #	Impaired Segment	Permit Source	Illicit Discharge	CSO/SSO Issue	Failing Septic System	Marinas	Stormwater Runoff	Nuisance Wildlife/Pets	Other
1	CT-E1_003 LIS EB Inner - Inner Wequetequock Cove, Stonington		x		x	x	x	x	
2	CT-E1_005 LIS EB Inner - Inner Stonington Harbor, Stonington	x	x		x	x	x	x	
3	CT-E1_006 LIS EB Inner - Inner Quiambog Cove, Stonington		x		x		x	x	
4	CT-E2_002 LIS EB Shore - Stonington Point, Stonington	x	x		x	x	x	x	x
5	CT-E2_003 LIS EB Shore - Outer Quiambog Cove, Stonington		x		x		x	x	x
6	CT-E2_004 LIS EB Shore - Wilcox Cove (Mason Is.), Stonington		x		x		x	x	x
7	CT-E2_005 LIS EB Shore - Mouth Mystic River, Stonington	x	x		x	x	x	x	

Point Sources

Permitted sources within the watershed that could potentially contribute to the bacteria loading are identified in Table 4. This table includes permit types that may or may not be present in the impaired watershed. A list of active permits in municipalities that drain to the Stonington estuary is included in Table 5. Additional investigation and monitoring could reveal the presence of other discharges in the estuary.

Table 4: General categories list of permitted discharges

Permit Code	Permit Description Type	Number in Estuary
CT	Surface Water Discharges	1
GPL	Discharge of Swimming Pool Wastewater	0
GSC	Stormwater Discharge Associated with Commercial Activity	0
GSI	Stormwater Associated with Industrial Activity	6
GSM	Part B Municipal Stormwater MS4	1
GSN	Stormwater Registration – Construction	0
LF	Groundwater Permit (Landfill)	0
UI	Underground Injection	0

Permitted Sources

As shown in Table 5, there are multiple permitted discharges in Stonington that could be contributing bacteria to the impaired LIS segments. These facilities include the Town of Stonington Water Pollution Control Facility (WPCF) and highway garage, and multiple marinas throughout the coastline. According to the 2011 Stonington Annual Assessment of Shellfish Waters, there are many marinas and mooring fields located in Stonington waters. In addition, there are seven pump-out facilities and three pump-out boats available in Stonington. As shown in Table 6, there are water quality data available for some of these permitted discharges. Although this data cannot be compared to the WQS as there is no single sample shellfish standard for fecal coliform, several samples were high, with a 50,000 cols/100mls and a 1,700 cols/100mls at the Stonington Landfill and Town Garage respectively.

Since the MS4 permits are not targeted to a specific location, but the geographic area of the regulated municipality, there is no one accurate location on the map to display the location of these permits. One dot will be displayed at the geographic center of the municipality as a reference point. Sometimes this location falls outside of the targeted watershed and therefore the MS4 permit will not be displayed in the Potential Sources Map. Using the municipal border as a guideline will show which areas of an affected watershed are covered by an MS4 permit.

Table 5: Permitted facilities in or near Stonington, CT that may be affecting the Stonington Estuary

Town	Client	Permit ID	Permit Type	Site Name	Address	Map #
Stonington	Town of Stonington	CT0101281	Surface Water	Stonington Borough WPCF	2 High Street	1
Stonington	Mystic River Marina	GSI000348	Stormwater Associated with Industrial Activities	Mystic River Marina	36 Quarry Road	2
Stonington	Dodson Boat Yard LLC	GSI001651	Stormwater Associated with Industrial Activities	Dodson Boat Yard Inc	194 Water St	3
Stonington	Town of Stonington	GSI000755	Stormwater Associated with Industrial Activities	Stonington Highway Garage	85 Alpha Ave	4
Stonington	Mystic River Properties	GSI000909	Stormwater Associated with Industrial Activities	Brewer Yacht Yard at Mystic	56 Roseleah Dr	5

Town	Client	Permit ID	Permit Type	Site Name	Address	Map #
Stonington	Gwenmor Marina Inc	GSI002313	Stormwater Associated with Industrial Activities	Gwenmor Marina	12 Roseleah Dr	6
Stonington	Town of Stonington	GSI000947	Stormwater Associated with Industrial Activities	Stonington Landfill	Green Haven Road	7
Stonington	Town of Stonington	200901918	Part B Municipal MS4	Town of Stonington	N/A	8

Table 6: Industrial permits affecting the Stonington Estuary and available fecal coliform data (colonies/100mL). These results alone cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform.

Town	Location	Permit Number	Receiving Water	Sample Location	Sample Date	Result
Stonington	Mystic River Marina	GSI000348	Mystic River	001	4/22/02	100
Stonington	Mystic River Marina	GSI000348	Mystic River	002	4/22/02	100
Stonington	Mystic River Marina	GSI000348	Mystic River	001	5/31/03	100
Stonington	Mystic River Marina	GSI000348	Mystic River	002	5/31/03	100
Stonington	Town of Stonington	GSI000755	Stonington Harbor	Outfall #1	08/20/02	210
Stonington	Town of Stonington	GSI000755	Stonington Harbor	Outfall #1	12/14/01	1700
Stonington	Town of Stonington	GSI000947	Wequetequock River	Outfall #1	9/26/02	50,000
Stonington	Town of Stonington	GSI000947	Wequetequock River	Outfall #1	12/14/01	100
Stonington	Brewer Yacht Yard @ Mystic	GSI000909	Mystic River	C-Dock	10/17/02	4
Stonington	Brewer Yacht Yard @ Mystic	GSI000909	Mystic River	C-Dock	12/18/01	200

Municipal Stormwater Permitted Sources

Per the EPA Phase II Stormwater rule all municipal storm sewer systems (MS4s) operators located within US Census Bureau Urbanized Areas (UAs) must be covered under MS4 permits regulated by the appropriate State agency. There is an EPA waiver process that municipalities can apply for to not participate in the MS4 program. In Connecticut, EPA has granted such waivers to 19 municipalities. All participating municipalities within UAs in Connecticut are currently regulated under MS4 permits by CT DEEP staff in the MS4 program.

The US Census Bureau defines a UA as a densely settled area that has a census population of at least 50,000. A UA generally consists of a geographic core of block groups or blocks that exceeds the 50,000 people threshold and has a population density of at least 1,000 people per square mile. The UA will also include adjacent block groups and blocks with at least 500 people per square mile. A UA consists of all or part of one or more incorporated places and/or census designated places, and may include additional territory outside of any place. (67 FR 11663)

For the 2000 Census a new geographic entity was created to supplement the UA blocks of land. This created a block known as an Urban Cluster (UC) and is slightly different than the UA. The definition of a UC is a densely settled area that has a census population of 2,500 to 49,999. A UC generally consists of a geographic core of block groups or blocks that have a population density of at least 1,000 people per square mile, and adjacent block groups and blocks with at least 500 people per square mile. A UC consists of all or part of one or more incorporated places and/or census designated places; such a place(s) together with adjacent territory; or territory outside of any place. The major difference is the total population cap of 49,999 people for a UC compared to >50,000 people for a UA. (67 FR 11663)

While it is possible that CT DEEP will be expanding the reach of the MS4 program to include UC municipalities in the near future they are not currently under the permit. However, the GIS layers used to create the MS4 maps in this Statewide TMDL did include both UA and UC blocks. This factor creates some municipalities that appear to be within an MS4 program that are not currently regulated through an MS4 permit. This oversight can explain a municipality that is at least partially shaded grey in the maps and there are no active MS4 reporting materials or information included in the appropriate appendix. While these areas are not technically in the MS4 permit program, they are still considered urban by the cluster definition above and are likely to contribute similar stormwater discharges to affected waterbodies covered in this TMDL.

As previously noted, EPA can grant a waiver to a municipality to preclude their inclusion in the MS4 permit program. One reason a waiver could be granted is a municipality with a total population less than 1000 people living in the UA portion of the municipality. There are 19 municipalities in Connecticut that have received waivers: Andover, Bozrah, Canterbury, Coventry, East Hampton, Franklin, Haddam, Killingworth, Litchfield, Lyme, New Hartford, Plainfield, Preston, Salem, Sherman, Sprague, Stafford, Washington, and Woodstock. There will be no MS4 reporting documents from these towns even if they are displayed in an MS4 area in the maps of this document.

The list of US Census UCs is defined by geographic regions and is named for those regions, not necessarily by following municipal borders. In Connecticut the list of UCs includes blocks in the following Census Bureau regions: Colchester, Danielson, Lake Pocotopaug, Plainfield, Stafford, Storrs, Torrington, Willimantic, Winsted, and the border area with Westerly, RI (67 FR 11663). Any MS4 maps showing these municipalities may show grey areas that are not currently regulated by the CT DEEP MS4 permit program.

The impaired segments of the Stonington Estuary are located within the Town of Stonington, CT. This municipality has designated urban areas, as defined by the U.S. Census Bureau and is required to comply with the General Permit for the Discharge of Stormwater from Small Municipal Storm Sewer Systems (MS4 permit) issued by CT DEEP (Figure 5). This general permit is only applicable to municipalities that are identified in Appendix A of the MS4 permit that contain designated urban areas and discharge stormwater via a separate storm sewer system to surface waters of the State. The permit requires municipalities to develop a Stormwater Management Plan (SMP) to reduce the discharge of pollutants as well as protect water quality. The MS4 permit is discussed further in the "TMDL Implementation

Guidance" section of the core TMDL document. Additional information regarding stormwater management and the MS4 permit can be obtained on CTDEEP's website (http://www.ct.gov/deep/stormwater).

There are ten MS4 outfalls that have been sampled for *E. coli* bacteria and reported in Stonington. These outfalls are discharging directly to the shoreline of LIS or indirectly through the Mystic River (Table 7). Although the results cannot be compared to the water quality standard as there is no single sample shellfish standard for *E. coli*, high counts were detected at seven of the ten analyzed outfalls in Stonington.

Figure 5: MS4 areas near the Stonington Estuary

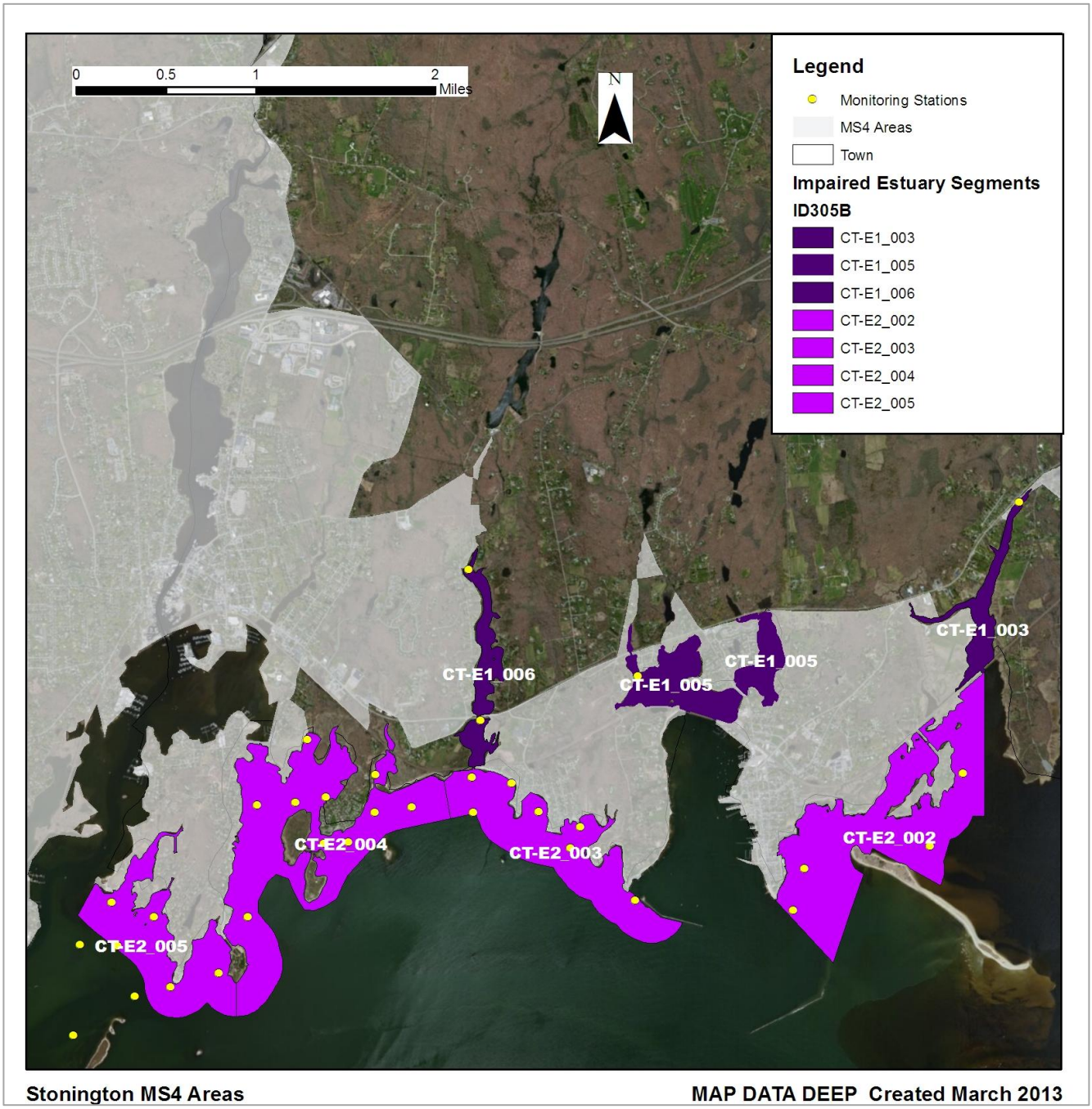


Table 7: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the Stonington Estuary. The results cannot be compared to the water quality standard as there is no single sample shellfish standard for *E. coli*.

Town	Location	MS4 Type	Receiving Waters	Sample Date	Result
Stonington	R-3-CB on E side of Rd across from 9 Cove Rd in Stonington	Residential	Quiambog Cove	12/07/04	300
Stonington	R-3-CB on E side of Rd across from 9 Cove Rd in Stonington	Residential	Quiambog Cove	9/26/2008	4350
Stonington	R-3-CB on E side of Rd across from 9 Cove Rd in Stonington	Residential	Quiambog Cove	09/15/05	<10
Stonington	R4-CB @ SE corner of Quanaduck Rd in Stonington	Residential	Quanaduck Cove	10/10/07	90
Stonington	R4-CB @ SE corner of Quanaduck Rd in Stonington (FKA C3)	Residential	Quanaduck Cove	9/26/2008	1070
Stonington	R4-CB @ SE corner of Quanaduck Rd in Stonington (FKA C3)	Residential	Quanaduck Cove	09/15/05	>1000
Stonington Borough	OF-2 CB SW of WPCF	Industrial	Stonington Harbor	10/17/06	40
Stonington Borough	OF-1 CB on E side of Water ST across from Dodsons Boatyard	Commercial	Stonington Harbor	10/17/06	280
Stonington	I2- CB N side across from 5 Edgemont ST in Mystic	Industrial	Mystic Harbor	09/15/05	70
Stonington	I2- CB N side across from 5 Edgemont ST in Mystic	Industrial	Mystic Harbor	12/07/04	250
Stonington	I2- CB N side across from 5 Edgemont ST in Mystic	Industrial	Mystic Harbor	9/26/2008	6490
Stonington	I2- CB N side across from 5 Edgemont ST in Mystic	Industrial	Mystic Harbor	10/10/07	>1000
Stonington	R-2 CB NE side of Rd btwn 19 & 21 Church ST in Mystic	Residential	Mystic River	12/07/04	400
Stonington	R-2 CB NE side of Rd btwn 19 & 21 Church ST in Mystic	Residential	Mystic River	10/10/07	400
Stonington	C-2 outfall through retention wall of river across from Old Mystic General Store @ 47 Main St in Mystic	Commercial	Mystic River	9/26/2008	670
Stonington	C-2 outfall through retention wall of river across from Old Mystic General Store @ 47 Main St in Mystic	Commercial	Mystic River	12/07/04	1,300
Stonington	C-2 outfall through retention wall of river across from Old Mystic General Store @ 47 Main St in Mystic	Commercial	Mystic River	10/10/07	1,300
Stonington	R-2 CB NE side of Rd btwn 19 & 21 Church ST in Mystic	Residential	Mystic River	9/26/2008	4880
Stonington	R-2 CB NE side of Rd btwn 19 & 21 Church ST in Mystic	Residential	Mystic River	09/15/05	<10
Stonington	C-2 outfall through retention wall of river across from Old Mystic General Store @ 47 Main St in Mystic	Commercial	Mystic River	09/15/05	>1000
Stonington	C3-outfall behind new house @ SE corner of Quanaduck Rd in Stonington	Commercial	Quanaduck Cove	12/07/04	500

Publicly Owned Treatment Works

There are three Publicly Owned Treatment Works, (POTW) located in Stonington, only one of them discharges into an affected segment in this study. The Stonington Borough WPCF discharges into Stonington Harbor. There were no water quality violations by this plant in 2011, or in either of the previous two monitoring years. According to the 2011 Annual Assessment of Shellfish Areas for Stonington, the only DEEP permitted industrial discharge is the Sea Research Foundation at Mystic Aquarium. This facility discharges to the Mystic River outside of any impaired segments and approximately 9200 feet upstream of Long Island Sound.

Table 8: Wastewater treatment plant fecal coliform (colonies/100 mL) data discharging to the Stonington Estuary

Town	Permitee	Permit Number	Receiving Water	Date	30-Day Geometric Mean	7-Day Geometric Mean
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	01/31/2010	2	8
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	02/28/2010	13	160
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	03/31/2010	8	62
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	04/30/2010	4	14
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	05/31/2010	9	16
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	06/30/2010	18	32
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	07/31/2010	34	70
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	08/31/2010	16	42
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	09/30/2010	34	96
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	10/31/2010	29	52
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	11/30/2010	51	180
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	12/31/2010	6	18
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	01/31/2011	5	24

Town	Permitee	Permit Number	Receiving Water	Date	30-Day Geometric Mean	7-Day Geometric Mean
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	02/28/2011	1	4
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	03/31/2011	2	6
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	04/30/2011	2	14
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	05/31/2011	1	2
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	06/30/2011	6	12
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	07/31/2011	23	32
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	08/31/2011	5	36
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	09/30/2011	12	64
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	11/30/2011	2	18
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	01/31/2012	5	34
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	02/29/2012	1	4
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	04/30/2012	2	4
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	05/31/2012	1	2
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	06/30/2012	2	8
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	07/31/2012	11	48
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	08/31/2012	8	28
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	09/30/2012	3	56

Town	Permitee	Permit Number	Receiving Water	Date	30-Day Geometric Mean	7-Day Geometric Mean
Stonington	STONINGTON BOROUGH WPCF	CT0101281	Stonington Harbor	10/31/2012	2	36

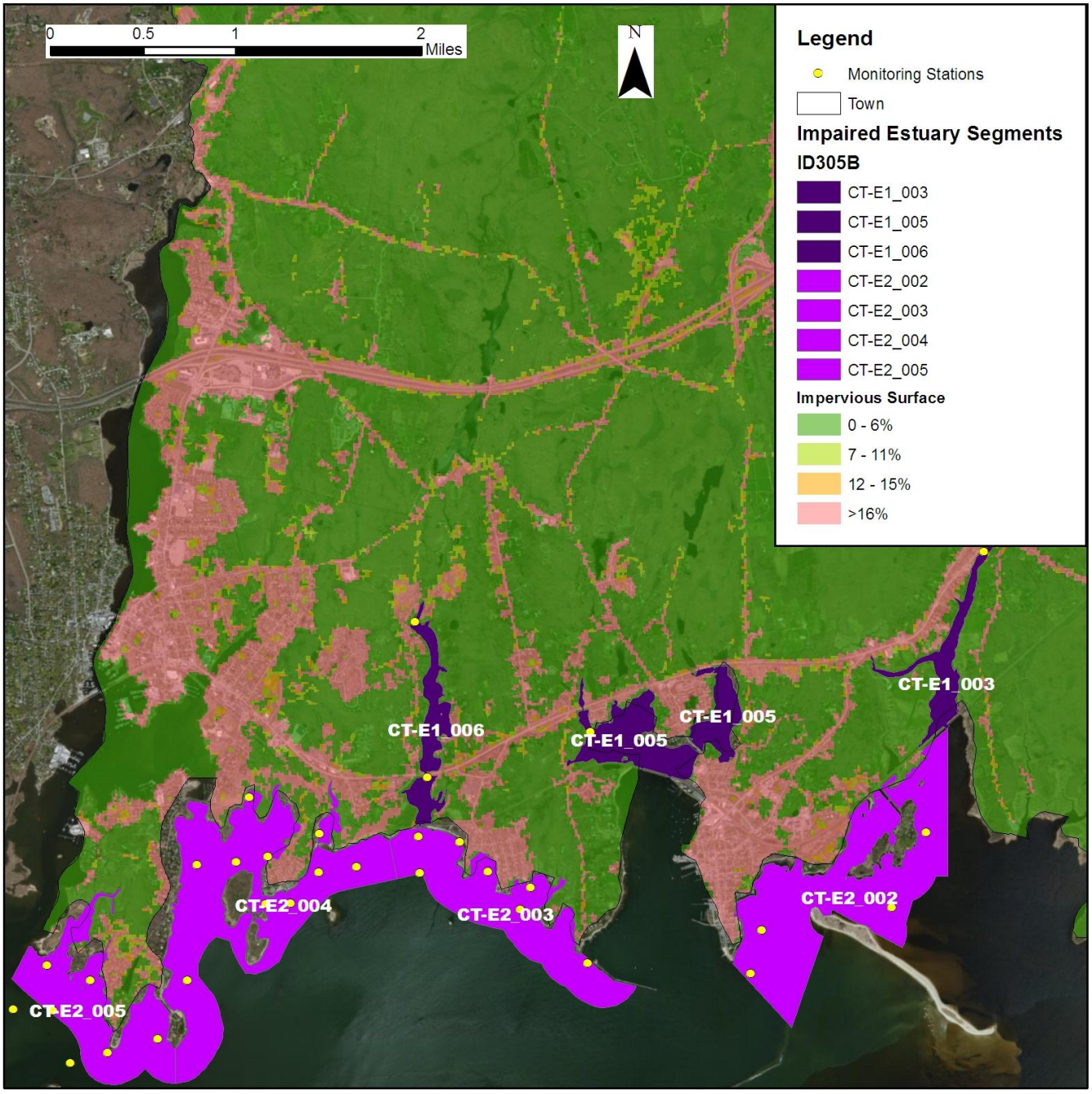
Non-point Sources

Non-point source (NPS) pollution comes from many diffuse sources and is more difficult to identify and control. NPS pollution is often associated with certain land-use practices. Examples of NPS that can contribute bacteria to surface waters include stormwater runoff, illicit discharges, insufficient septic systems, pet and wildlife waste, agriculture, and contact recreation (swimming or wading). With the waters of the Stonington Estuary being tidally influenced, many bacterial sources that appear to be downstream of the impaired segment may be affecting the water quality in upstream segments. Potential sources of NPS to the impaired segments in the Stonington Estuary are described below.

Stormwater Runoff from Developed Areas

The Town of Stonington is primarily residential and undeveloped land. The coastline of Stonington is developed with residential structures mixed with some small areas of salt marsh and protected open space. There are several roads and a secondary highway (route 1) that traverse the coastline in Stonington. Impervious surfaces, or surface areas such as roofs and roads that force water to run off land surfaces rather than infiltrate soil, often characterize developed areas. Studies have shown a link between the amount of impervious area in a watershed and water quality conditions (CWP, 2003). In one study, researchers correlated the amount of fecal coliform to the percentage of land with impervious cover in a watershed (Mallin *et al.*, 2000). Coastal land bordering the Stonington Estuary has sections of development that are in the >16% impervious surface range, which is the highest range depicted in the impervious cover map. These higher percentage IC areas primarily track development along major roads (Figure 6). Also, several stations exceeded the WQS for fecal coliform during wet-weather, which indicates that stormwater runoff is likely contributing bacteria to the estuary and the impairments.

Figure 6: Impervious cover (%) for Stonington, CT



Stonington Impervious Surfaces MAP DATA DEEP Created March 2013

Illicit Discharges and Insufficient Septic Systems

As shown in Figure 4, some portions of Stonington rely on a municipal sanitary sewer system. However most of the Town relies on septic systems for sanitation. Properly managed septic systems and leach fields have the ability to effectively remove bacteria from waste. If systems are not maintained, waste will not be adequately treated and may result in bacteria reaching nearby surface and ground water.

Wildlife and Domestic Animal Waste

Wildlife, including waterfowl, and domestic animals within the municipality of Stonington, including those present in the estuary, represent another potential source of bacteria to the impaired waterbodies. Elevated bacteria levels due solely to a natural population of wildlife are not subject to the WQS. However, any exacerbation of wildlife population sizes or residency times influenced by human activities is subject to the CT WQS and TMDL provisions. Multiple locations of concentrated migratory waterfowl have been identified throughout the Stonington Estuary, including the entirety of Segment CT-E1_006 and CT-E1_003, and along the shoreline near Segment CT-E2_002 (Figure 4). With the construction of roads and drainage systems, wastes from these waterfowl may no longer be retained on the landscape, but instead may be conveyed via stormwater to the nearest surface waterbody. As such, physical land alterations can exacerbate the impact of these natural sources on water quality (USEPA, 2001).

As indicated previously, portions of Stonington near the estuary are heavily developed with residential properties. As such, waste from domestic animals, such as dogs, may also be contributing to bacteria concentrations in these impaired segments in the Stonington Estuary.

Marinas

As noted previously, multiple marinas are located within the Stonington Estuary, particularly near segments CT-E1_005 and CT-E1_003 (Figure 4 and Table 5). Marinas are located at the water's edge, and if no measures are taken to reduce pollutants, including buffering, pollutants can be transported via runoff from parking lots and hull maintenance areas directly into the marina basin. Common pollutants from marinas include bacteria and nutrients from stormwater runoff, solid and liquid materials used in boat maintenance and cleaning, fuel and oil, sewage from public restrooms and boat pump-outs, fish waste, and turbidity from boating activities. The CT DEEP has information on regional pump-out boats and facilities at its website, http://www.ct.gov/dep/cwp/view.asp?a=2705&q=323708&depNav_GID=1711. There are several pump-out facilities in the Stonington area. Most services are free and eliminate the possibility of vessels dumping raw wastes into Long Island Sound, which is prohibited by CT WQS Number 24, “the discharge of sewage from any vessel to any water is prohibited.”

Recreation

People coming in direct contact with surface water presents another potential source of bacterial contamination. Microbial Source Tracking (MST) surveys conducted in New Hampshire have shown humans to be a source of bacterial contamination at beaches (Jones, 2008). Since there are several swimming areas along the shoreline it is probable that some bacterial contamination can be attributed to human activities in the Stonington Estuary.

Additional Sources

The 2011 Stonington Estuary Report noted that there are no active sanitary landfills or septage disposal lagoons in Stonington that would impact shellfish growing waters. There is the Town Transfer Station on Greenhaven Road in Pawcatuck, but the DABA report concludes that the facility has no impact on shellfish growing waters.

There may be other sources not listed here or identified in Figure 4 that contribute to the observed water quality impairments in the Stonington Estuary. Further monitoring and investigation will confirm the listed sources and discover additional ones. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement this TMDL.

CURRENT MANAGEMENT ACTIVITIES

The Town of Stonington has developed and implemented programs to protect water quality from bacterial contamination. In addition, the National Shellfish Sanitation Program (NSSP) has multiple requirements for the protection and evaluation of shellfish growing areas. More information about this program is provided below and available online: http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FederalStatePrograms/NationalShellfishSanitationProgram/ucm053724.htm.

The NSSP requires the completion of a sanitary survey to determine acceptable and unacceptable growing areas, and to accurately classify a growing area as Approved, Conditionally Approved, Restricted-Relay Conditionally Restricted, or Prohibited. A sanitary survey is an in-depth evaluation of all environmental factors impacting water quality in a shellfish growing area. Environmental factors include both actual and potential pollutant sources, (natural or man-made), along with meteorological and hydrographic characteristics of the growing area. The principal components of a sanitary survey are: (1) identification and evaluation of pollutant sources, (2) evaluation of meteorological factors, (3) evaluation of hydrographic factors affecting the distribution of pollutants, and (4) assessment of water quality.

The sanitary survey includes data and results from the following:

1. Shoreline survey;
2. Survey of the bacteriological quality of the water;
3. Evaluation of meteorological, hydrodynamic, and geographic characteristics of the growing area;
4. Analysis of shoreline survey, bacteriological water quality, and meteorological, hydrodynamic, and geographic characteristics; and
5. Determination of the appropriate growing area classification

Maintaining updated sanitary survey records consists primarily of routinely evaluating major pollutant sources, collecting water quality data from sampling stations under the selected NSSP water quality monitoring strategy, and analyzing the data to ensure that the classification continues to represent current sanitary conditions in the growing area. The entire sanitary survey process must be repeated every 12 years. In the interim, the sanitary quality of each growing area must be reviewed as often as necessary to ensure appropriate classification. Certain sanitary survey components are required by the Model Ordinance to be updated annually and triennially.

The growing area classification and supporting data from the sanitary survey shall be reviewed at least every three years. As required by the NSSP, this triennial re-evaluation shall include:

1. A review of water quality sampling results;
2. Documentation of any new pollutant sources and evaluation of their impact on the growing area;
3. Re-evaluation of all pollutant sources, including sources previously identified in the sanitary survey, as necessary to fully evaluate any changes in the sanitary conditions of the growing area. Re-evaluation may or may not include a site visit;
4. A comprehensive report analyzing the sanitary survey data and determining whether the existing growing area classification is accurate or requires revision; and
5. Reclassification of the growing area if re-evaluation determines that conditions for classification have changed based on data collected during the triennial review

NSSP also requires that the sanitary survey be updated annually to reflect changes in conditions in the growing area. The annual re-evaluation shall include:

1. Field observation of pollutant sources during drive-through surveys, sample collections, or other information sources;
2. Addition and review of current year's water quality sampling results to a database collected in accordance with the bacteriological standards and sample collection required;
3. Review of available inspection reports and effluent samples collected from pollutant sources;
4. Review of available performance standards for various types of discharges impacting the growing area; and
5. A brief report documenting annual re-evaluation findings.

The most recent triennial re-evaluation for the Shellfish Growing Waters in the Town of Stonington was published in 2011 (DABA 2011). Based upon the findings of this report, all stations in Approved shellfishing status areas met Approved criteria. All Conditionally Approved stations in the Stonington estuary met the approved criteria and are properly classified. According to the Report the Restricted Relay stations are properly classified and do not warrant upgrading. All stations in the Conditionally Restricted Relay/Depuration status in Mystic Harbor met Approved Criteria. According to the report, these stations can be upgraded to seasonal Conditional opening.

Other efforts have been taken by Stonington to reduce bacteria loading to its surface waters. As indicated previously, Stonington is regulated under the MS4 program. The MS4 General Permit is required for any municipality with urbanized areas that initiates, creates, originates or maintains any discharge of stormwater from a storm sewer system to waters of the State. The MS4 permit requires towns to design a Stormwater Management Plan (SMP) that reduces the discharge of stormwater pollutants to improve water quality. The plan must address the following six minimum measures:

1. Public Education and Outreach.
2. Public Involvement/Participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control.
5. Post-construction stormwater management in the new development and redevelopment.
6. Pollution prevention/good housekeeping for municipal operations.

Each municipality is also required to submit an annual update outlining steps taken to meet the six minimum measures. The most recent updates that address bacterial contamination in the watershed are summarized in Table 9.

Table 9: Summary of MS4 requirement updates related to the reduction of bacterial contamination from Stonington, CT (Permit # GSM000056)

Minimum Measure	Stonington Annual Report (2011)
Public Outreach and Education	1) Continued use of Enviroscape model for teaching school students about stormwater pollution. 2) Continued to provide information on the Town's website about Phase II subject. 3) Collaboration with a local organization to provide information on the internet and conduct education on stormwater.
Public Involvement and Participation	1) Conducting meetings with a Strategic Task Force with next gathering in spring of 2012. Some issues were met with scheduling due to existing project loads. 2) Planning for completion of storm drain markers for the remaining 200 catch basins in Town by summer of 2012.

Minimum Measure	Stonington Annual Report (2011)
Illicit Discharge Detection and Elimination	1) Outfall and drainage mapping project is complete. 35 outlets are targeted for screening in dry weather sampling program for 2012. 2) Ordinance to prohibit non-storm water discharges to the MS4 system legally effective on April 9, 2011. 3) Continued wet sampling at same locations since 2004. Sampling last completed on 10/13/2011.
Construction Site Stormwater Runoff Control	1) Continued inspection of all projects >5 acres and selected smaller projects for compliance with stormwater pollution prevention plan(SWPPP). 2) Continue to ensure that development applications >5 acres submit appropriate permit applications to CT DEEP. 3) Establish a Technical Standards Ordinance to establish clear development guidelines for all construction activities in Town. Ordinance legally effective on 10/11/2011.
Post Construction Stormwater Management	1) All projects held to conformance with the 2002 CT E&S Guidelines and 2004 CT Stormwater Quality Manual. 2) Developers that propose new drainage installation that will be town-owned upon completion must post a cash bond for future maintenance and sampling as required in MS4 permit. 3) Establish an illicit discharge and illegal connection ordinance to prohibit non-storm water discharges to the MS4 system. Ordinance was legally effective on 4/9/2011.
Pollution Prevention and Good Housekeeping	1) Continued adherence to the SWPPP for the Town Highway Garage and Town Dock facilities. 2) Street sweeping completed on all 107 miles of road throughout the Town by summer 2011. 3) Hired a contractor for vacuum removal of 954 of the ~1500 catch basins in Town. The remainder are scheduled for cleaning in 2012. Town will continue to budget funds for this type of work on an Annual basis. 4) The Town worked with Dodson Boatyard and CUSH, to install two hydrodynamic separators into the stormwater drainage system to drainages that directly enter Stonington Harbor. 5) The Town worked with CUSH to install a marine sewage disposal facility on Town Property adjacent to Stonington Harbor in spring of 2011. This facility allows greater access and abilities for the sewage pump-out boat patrols in the harbor.

RECOMMENDED NEXT STEPS

Stonington has developed and implemented programs to protect water quality from bacterial contamination. Future mitigation activities are necessary to ensure the long-term protection of segments 1 – 7 in the Stonington Estuary and have been prioritized below.

1) Continue monitoring of permitted sources.

There are at least 8 permitted sources in the Stonington Estuary, some of which have shown historically high bacteria concentrations. Further monitoring will provide information essential to better locate, understand, and reduce pollution sources. If any current monitoring is not done with appropriate bacterial indicator based on the receiving water, then a recommended change during the next permit reissuance is to use the appropriate indicator species for monitoring efforts. If facility monitoring indicates elevated bacteria, then implementation of permit is required, and any voluntary measures to identify and reduce sources of bacterial contamination at the facility are also recommended. Regular monitoring should be established for all permitted sources to ensure compliance with permit requirements and to determine if current requirements are adequate or if additional measures are necessary for water quality protection.

Section 6(k) of the MS4 General Permit requires a municipality to modify their Stormwater Management Plan to implement the TMDL within four months of TMDL approval by EPA if stormwater within the municipality contributes pollutant(s) in excess of the allocation established by the TMDL. For discharges to impaired waterbodies, the municipality must assess and modify the six minimum measures of its plan, if necessary, to meet TMDL standards. Particular focus should be placed on the following plan components: public education, illicit discharge detection and elimination, stormwater structures cleaning, and the repair, upgrade, or retrofit of storm sewer structures. The goal of these modifications is to establish a program that improves water quality consistent with TMDL requirements. Modifications to the Stormwater Management Plan in response to TMDL development should be submitted to the Stormwater Program of DEEP for review and approval.

Table 10 details the appropriate bacteria criteria for use as waste load allocations established by this TMDL for use as water quality targets by permittees as permits are renewed and updated, within the Stonington Estuary.

For any municipality subject to an MS4 permit and affected by a TMDL, the permit requires a modification of the SMP to include BMPs that address the included impairment. In the case of bacteria related impairments municipal BMPs could include: implementation or improvement to existing nuisance wildlife programs, septic system monitoring programs, any additional measures that can be added to the required illicit discharge detection and elimination (IDDE) programs, and increased street sweeping above basic permit requirements. Any non-MS4 municipalities can implement these same types of initiatives in effort to reduce bacteria source loading to impaired waterways.

Any facilities that discharge non-MS4 regulated stormwater should update their Pollution Prevention Plan to reflect BMPs that can reduce bacteria loading to the receiving waterway. These BMPs could include nuisance wildlife control programs and any installations that increase surface infiltration to reduce overall stormwater volumes. Facilities that are regulated under the Commercial Activities Stormwater Permit should report any updates to their SMP in their summary documentation submitted to DEEP.

Table 10: Bacteria (Fecal Coliform) TMDLs, WLAs, and LAs for Shellfish Harvesting Areas.

		Geometric Mean Fecal coliform (#/100mL)[4]		90% less than Fecal Coliform (#/100mL)[4]	
Class	**Bacteria Source[1]**	**WLA[5]**	**LA[5]**	**WLA[5]**	**LA[5]**
SA Direct Consumption	CSOs	14		31	
	SSOs	0		0	
	OBDs[3]	0		0	
	Illicit sewer connection	0		0	
	Leaking sewer lines	0		0	
	Stormwater (MS4s)	14[6]		31[6]	
	Stormwater (non-MS4)		14[6]		31[6]
	Wildlife direct discharge		14[6]		31[6]
	Human or domestic animal direct discharge[2]		14		31

(1) Criteria are based on utilizing the mTec method as specified in the U.S. Food and Drug Administration National Shellfish Sanitation Program-Model Ordinance (NSSP-MO) document *Guide for the Control of Molluscan Shellfish 2007.*

(2) Human direct discharge = swimmers

(3) All coastal and inland waters in Connecticut are designated as No Discharge Areas for Overboard Discharges (OBDs) from marine vessels with Marine Sanitation Devices.

(4) Adverse Condition Allocations apply to areas affected by Point Sources. Adverse Condition or Random Sampling Allocations apply to areas affected by Nonpoint Sources. Adverse condition is defined as "... a State or situation caused by meteorological, hydrological or seasonal events or point source discharges that has historically resulted in elevated [bacteria] levels in the particular growing area." USFDA 2005

(5) Unless otherwise required by statute or regulation, compliance with this TMDL will be based on ambient concentrations and not end-of-pipe bacteria concentrations

(6) Replace numeric value with "natural levels" if only source is naturally occurring wildlife. Natural is defined as the biological, chemical and physical conditions and communities that occur within the environment which are unaffected or minimally affected by human influences (CT DEEP 2011a). Sections 2.2.2 and 6.2.7 of this Core Document deal with BMPs and delineating type of wildlife inputs.

2) Identify areas in Stonington to implement Best Management Practices (BMPs) to control stormwater runoff.

The concentrations of Impervious Cover (IC) are the highest along the shoreline and major waterbodies in Stonington. There is a direct connection of roads and IC % density increases. Many of these sections of the Town are considered urban areas regulated under the MS4 program. As such, stormwater runoff is likely contributing bacteria to the Stonington Estuary. To identify areas that are contributing bacteria to the impaired segments, municipalities should conduct wet-weather sampling at stormwater outfalls that discharge directly to the impaired segments in Stonington Estuary. To treat stormwater runoff, the towns should identify areas along the developed sections of the impaired segments to install BMPs designed to encourage stormwater to infiltrate the ground before entering the waterbodies. These BMPs would disconnect impervious areas and reduce pollutant loads to the estuary. More detailed information and BMP recommendations can be found in the core TMDL document established in September 2012 and available at http://www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/ct_bacteria_coredoc_tmdl.pdf.

3) Implement a program to evaluate the sanitary sewer system and inspect conditions of lines.

Portions of Stonington near the estuary rely on a municipal sewer system (Figure 4). It is important for Stonington to develop a program to evaluate its sanitary sewer system and reduce leaks and overflows.

This program should include periodic inspections of the sewer line. Use of remote cameras could assist with completion of this suggested task.

4) Develop a system to monitor septic systems.

A number of residents near the Stonington Estuary rely on septic systems. If not already in place, Stonington should establish a program to ensure that existing septic systems are properly operated and maintained. For instance, communities can create an inventory of existing septic systems through mandatory inspections. Inspections encourage proper maintenance and identify failed and sub-standard systems. Policies that govern the eventual replacement of the sub-standard systems within a reasonable timeframe could be adopted. Municipalities can also develop programs to assist citizens with the replacement and repair of older and failing systems.

5) Evaluate municipal education and outreach programs regarding specifically with animal waste.

Any education and outreach program should highlight the importance of not feeding waterfowl and wildlife and managing waste from horses, dogs, and other pets. Municipalities and residents can take measures to minimize waterfowl-related impacts by allowing tall, coarse vegetation to grow in riparian areas of impaired segments frequented by waterfowl. Waterfowl, especially grazers like geese, prefer easy access to water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese and encourage migration. In addition, any educational program should emphasize that feeding waterfowl, such as ducks, geese, and swans, may contribute to water quality impairments in the Stonington Estuary and can harm human health and the environment. Animal wastes should be managed and disposed of away from any waterbody or storm drain system. BMPs effective at reducing the impact of animal waste on water quality include installing signage, providing pet waste receptacles in high-use areas, enacting ordinances requiring the clean-up of pet waste, and targeting educational and outreach programs in problem areas.

6) Improve education and outreach programs regarding boats and marinas.

Marinas must comply with permit requirements that limit bacteria contribution to the Stonington Estuary. Other programs, such as Connecticut's Clean Marina Program, may also be adopted by all marinas in the estuary to reduce bacteria contribution from non-point source pollution (http://www.ct.gov/dep/cwp/view.asp?a=2705&q=323530&depNav_GID=1635). The Clean Marina Program is a voluntary program that encourages inland and coastal marina operators to minimize pollution, and recognizes Connecticut marinas, boatyards, and yacht clubs that go above and beyond regulatory compliance as "Certified Clean Marinas." All certified marinas receive a weatherproof Clean Marina Flag to fly at their facility and authorization to use the Clean Marina Program logo on company publications. CT DEEP recognizes certified Clean Marinas through press releases, on its web page, and at public events. As a companion to the Clean Marina Program, the Clean Boater Program encourages boaters to use clean boating techniques when operating and maintaining their boats.

BACTERIA DATA AND PERCENT REDUCTIONS TO MEET THE TMDL

TABLE 11:
Waterbody ID: CT-E1_003
Characteristics: Saltwater, Class SA
Impairment: Shellfishing
Water Quality Criteria for Fecal coliform:
Geometric Mean: 14 colonies/100 ml
90% of Samples Less Than: 31 colonies/100 ml
Percent reduction to meet:
Geometric Mean: 85.7
90% of Samples Less Than: 90%

Data : 2003 – 2011 from CT DEEP target sampling efforts, 2012 TMDL cycle
Single sample fecal coliform data (colonies/100mL) for all monitoring stations on segment : LIS EB Inner – Wequetequock Cove, Stonington (CT-E1_003) with annual geometric means and reduction goals for samples.
(red cells exhibit values that exceed water quality criteria)

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-17.8	Wequetequock Cove at route 1	4/1/2003	29	Wet	96.5	40
137-17.8	Wequetequock Cove at route 1	9/2/2003	321	Wet		
137-17.8	Wequetequock Cove at route 1	3/8/2004	11	Dry	38.8	40
137-17.8	Wequetequock Cove at route 1	4/28/2004	137	Wet		
137-17.8	Wequetequock Cove at route 1	1/4/2005	22	Wet	22	n/a
137-17.8	Wequetequock Cove at route 1	4/11/2006	9	Dry	9	n/a
137-17.8	Wequetequock Cove at route 1	1/2/2007	171	Wet	51	90
137-17.8	Wequetequock Cove at route 1	5/13/2008	170	Dry	86	90
137-17.8	Wequetequock Cove at route 1	4/7/2009	171	Wet	97.9	90
137-17.8	Wequetequock Cove at route 1	10/21/2009	56	Dry		

Wet and dry weather geometric mean values for all monitoring stations on segment : LIS EB Inner – Wequetequock Cove, Stonington (CT-E1_003)

Station #	Station Name	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
137-17.8	Wequetequock Cove at route 1	2003-2009	6	4	61.49	96.75	31.16

TABLE 12:
Waterbody ID: CT-E1_005
Characteristics: Saltwater, Class SA
Impairment: Shellfishing
Water Quality Criteria for Fecal coliform:
Geometric Mean: 14 colonies/100 ml
90% of Samples Less Than: 31 colonies/100 ml
Percent reduction to meet:
Geometric Mean: 73.3
90% of Samples Less Than: 40%

Data : 2003 – 2011 from CT DEEP target sampling efforts, 2012 TMDL cycle
Single sample fecal coliform data (colonies/100mL) for all monitoring stations on segment : LIS EB Inner – Inner Stonington Harbor, Stonington (CT-E1_005) with annual geometric means and reduction goals for samples.
(red cells exhibit values that exceed water quality criteria)

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-16.6	Lambert Cove at Cardinal Cove Marina	2/10/2003	8.6	Dry	52.5	40
137-16.6	Lambert Cove at Cardinal Cove Marina	9/2/2003	321	Wet		
137-16.6	Lambert Cove at Cardinal Cove Marina	3/8/2004	10	Dry	10	n/a
137-16.6	Lambert Cove at Cardinal Cove Marina	1/4/2005	8	Wet	8	n/a
137-16.6	Lambert Cove at Cardinal Cove Marina	4/11/2006	2	Dry	1.4	n/a
137-16.6	Lambert Cove at Cardinal Cove Marina	10/16/2006	1	Dry		
137-16.6	Lambert Cove at Cardinal Cove Marina	1/2/2007	24	Wet	24	n/a
137-16.6	Lambert Cove at Cardinal Cove Marina	5/13/2008	8	Dry	8	n/a
137-16.6	Lambert Cove at Cardinal Cove Marina	4/7/2009	1	Wet	1.4	n/a
137-16.6	Lambert Cove at Cardinal Cove Marina	10/21/2009	1	Dry		
137-16.6	Lambert Cove at Cardinal Cove Marina	12/7/2009	4	Dry		
137-16.6	Lambert Cove at Cardinal Cove Marina	12/21/2009	1	Dry		

Wet and dry weather geometric mean values for all monitoring stations on segment : LIS EB Inner – Inner Stonington Harbor, Stonington (CT-E1_005)

Station #	Station Name	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
137-16.6	Lambert Cove at Cardinal Cove Marina	2003-2009	8	4	5.13	15.76	2.93

TABLE 13:
Waterbody ID: CT-E1_006
Characteristics: Saltwater, Class SA
Impairment: Shellfishing
Water Quality Criteria for Fecal coliform:

Geometric Mean: 14 colonies/100 ml
90% of Samples Less Than: 31 colonies/100 ml

Percent reduction to meet:

Geometric Mean: 87%
90% of Samples Less Than: 40%

Data : 2003 – 2011 from CT DEEP target sampling efforts, 2012 TMDL cycle
Single sample fecal coliform data (colonies/100mL) for all monitoring stations on segment : LIS EB Inner – Inner Quiambaug Cove, Stonington (CT-E1_006) with annual geometric means and reduction goals for samples.

(red cells exhibit values that exceed water quality criteria)

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-14.3	Quiambog Cove near Copps Brook	2/10/2003	8.6	Dry	8.6	n/a
137-14.3	Quiambog Cove near Copps Brook	3/8/2004	10	Dry	10.5	n/a
137-14.3	Quiambog Cove near Copps Brook	4/28/2004	11	Wet		
137-14.3	Quiambog Cove near Copps Brook	1/4/2005	36	Wet	20.8	40
137-14.3	Quiambog Cove near Copps Brook	2/7/2005	12	Dry		
137-14.3	Quiambog Cove near Copps Brook	4/11/2006	11	Dry	23.9	40
137-14.3	Quiambog Cove near Copps Brook	10/16/2006	52	Dry		
137-14.3	Quiambog Cove near Copps Brook	1/2/2007	108	Wet	108	90
137-14.3	Quiambog Cove near Copps Brook	5/13/2008	42	Dry	42	90
137-14.3	Quiambog Cove near Copps Brook	4/7/2009	28	Wet	29.1	23
137-14.3	Quiambog Cove near Copps Brook	10/21/2009	26	Dry		
137-14.3	Quiambog Cove near Copps Brook	12/7/2009	34	Dry		
137-14.1	Quiambog Cove at Rt 1 bridge	2/10/2003	1.6	Dry	1.6	n/a
137-14.1	Quiambog Cove at Rt 1 bridge	3/8/2004	11	Dry	11	n/a
137-14.1	Quiambog Cove at Rt 1 bridge	4/28/2004	11	Wet		
137-14.1	Quiambog Cove at Rt 1 bridge	1/4/2005	2	Wet	1.3	n/a
137-14.1	Quiambog Cove at Rt 1 bridge	2/7/2005	0.9	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-14.1	Quiambog Cove at Rt 1 bridge	4/11/2006	1	Dry	1	n/a
137-14.1	Quiambog Cove at Rt 1 bridge	1/2/2007	60	Wet	60	90
137-14.1	Quiambog Cove at Rt 1 bridge	5/13/2008	4	Dry	4	n/a
137-14.1	Quiambog Cove at Rt 1 bridge	4/7/2009	28	Wet	15.3	23
137-14.1	Quiambog Cove at Rt 1 bridge	10/21/2009	2	Dry		
137-14.1	Quiambog Cove at Rt 1 bridge	12/7/2009	64	Dry		

Wet and dry weather geometric mean values for all monitoring stations on segment : LIS EB Inner – Inner Quiambaug Cove, Stonington (CT-E1_006)

Station #	Station Name	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
137-14.3	Quiambog Cove near Copps Brook	2003-2009	8	4	23.35	33.08	19.62
137-14.1	Quiambog Cove at Rt 1 bridge	2003-2009	7	4	5.90	13.87	3.62

TABLE 14:
Waterbody ID: CT-E2_002
Characteristics: Saltwater, Class SA
Impairment: Shellfishing
Water Quality Criteria for Fecal coliform:

Geometric Mean: 14 colonies/100 ml
90% of Samples Less Than: 31 colonies/100 ml

Percent reduction to meet:

Geometric Mean: 77.4%
90% of Samples Less Than: 57%

Data : 2003 – 2011 from CT DEEP target sampling efforts, 2012 TMDL cycle
Single sample fecal coliform data (colonies/100mL) for all monitoring stations on segment : LIS EB Shore – Stonington Point, Stonington (CT-E2_002) with annual geometric means and reduction goals for samples.

(red cells exhibit values that exceed water quality criteria)

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-17.1	Stonington Point at R"2"	4/30/2003	1.7	Dry	1.7	n/a
137-17.1	Stonington Point at R"2"	5/5/2004	1.6	Dry	2.9	n/a
137-17.1	Stonington Point at R"2"	6/2/2004	18	Wet		
137-17.1	Stonington Point at R"2"	8/24/2004	1.6	Dry		
137-17.1	Stonington Point at R"2"	11/15/2004	1.6	Dry		
137-17.1	Stonington Point at R"2"	6/5/2006	1	Dry	1.4	n/a
137-17.1	Stonington Point at R"2"	6/12/2006	3	Dry		
137-17.1	Stonington Point at R"2"	6/21/2006	1	Dry		
137-17.1	Stonington Point at R"2"	6/11/2007	2	Dry	1.4	n/a
137-17.1	Stonington Point at R"2"	6/13/2007	1	Dry		
137-17.1	Stonington Point at R"2"	5/14/2008	1	Dry	1	n/a
137-17.1	Stonington Point at R"2"	6/18/2008	1	Wet		
137-17.1	Stonington Point at R"2"	5/6/2009	2	Wet	1.7	n/a
137-17.1	Stonington Point at R"2"	5/19/2009	2	Dry		
137-17.1	Stonington Point at R"2"	6/16/2009	1	Dry		
137-17.1	Stonington Point at R"2"	10/27/2009	2	Dry		
137-17.1	Stonington Point at R"2"	4/12/2010	4	Dry	4	n/a
137-17.1	Stonington Point at R"2"	5/25/2011	18	Dry	18	n/a
137-17.2	East of Stonington Point at RN "4"	4/30/2003	51	Dry	14.8	23

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-17.2	East of Stonington Point at RN "4"	6/10/2003	11	Dry		
137-17.2	East of Stonington Point at RN "4"	6/17/2003	5.8	Dry		
137-17.2	East of Stonington Point at RN "4"	5/5/2004	22	Dry	5.8	n/a
137-17.2	East of Stonington Point at RN "4"	6/2/2004	18	Wet		
137-17.2	East of Stonington Point at RN "4"	8/24/2004	1.7	Dry		
137-17.2	East of Stonington Point at RN "4"	11/15/2004	1.7	Dry		
137-17.2	East of Stonington Point at RN "4"	6/5/2006	81	Dry	20.6	23
137-17.2	East of Stonington Point at RN "4"	6/12/2006	27	Dry		
137-17.2	East of Stonington Point at RN "4"	6/21/2006	4	Dry		
137-17.2	East of Stonington Point at RN "4"	6/11/2007	14	Dry	13	n/a
137-17.2	East of Stonington Point at RN "4"	6/13/2007	12	Dry		
137-17.2	East of Stonington Point at RN "4"	5/14/2008	1	Dry	1	n/a
137-17.2	East of Stonington Point at RN "4"	6/18/2008	1	Wet		
137-17.2	East of Stonington Point at RN "4"	5/6/2009	8	Wet	12	15
137-17.2	East of Stonington Point at RN "4"	5/19/2009	12	Dry		
137-17.2	East of Stonington Point at RN "4"	6/16/2009	4	Dry		
137-17.2	East of Stonington Point at RN "4"	10/27/2009	54	Dry		
137-17.2	East of Stonington Point at RN "4"	4/12/2010	2	Dry	2	n/a
137-17.2	East of Stonington Point at RN "4"	5/25/2011	22	Dry	22	n/a
137-17.5	Little Narragansett Bay at C "5"	4/30/2003	51	Dry	18.3	23
137-17.5	Little Narragansett Bay at C "5"	6/10/2003	11	Dry		
137-17.5	Little Narragansett Bay at C "5"	6/17/2003	11	Dry		
137-17.5	Little Narragansett Bay at C "5"	5/5/2004	51	Dry	12.5	15
137-17.5	Little Narragansett Bay at C "5"	6/2/2004	28	Wet		
137-17.5	Little Narragansett Bay at C "5"	8/24/2004	10	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-17.5	Little Narragansett Bay at C "5"	11/15/2004	1.7	Dry		
137-17.5	Little Narragansett Bay at C "5"	6/5/2006	81	Dry	34.9	23
137-17.5	Little Narragansett Bay at C "5"	6/12/2006	25	Dry		
137-17.5	Little Narragansett Bay at C "5"	6/21/2006	21	Dry		
137-17.5	Little Narragansett Bay at C "5"	6/11/2007	26	Dry	16.1	n/a
137-17.5	Little Narragansett Bay at C "5"	6/13/2007	10	Dry		
137-17.5	Little Narragansett Bay at C "5"	5/14/2008	1	Dry	1	n/a
137-17.5	Little Narragansett Bay at C "5"	6/18/2008	1	Wet		
137-17.5	Little Narragansett Bay at C "5"	5/6/2009	14	Wet	9.9	15
137-17.5	Little Narragansett Bay at C "5"	5/19/2009	2	Dry		
137-17.5	Little Narragansett Bay at C "5"	6/16/2009	2	Dry		
137-17.5	Little Narragansett Bay at C "5"	10/27/2009	171	Dry		
137-17.5	Little Narragansett Bay at C "5"	4/12/2010	16	Dry	16	n/a
137-17.5	Little Narragansett Bay at C "5"	5/25/2011	62	Dry	62	90
137-17.6	East of Elihu Island	4/30/2003	8.1	Dry	12.2	n/a
137-17.6	East of Elihu Island	6/10/2003	28	Dry		
137-17.6	East of Elihu Island	6/17/2003	8.1	Dry		
137-17.6	East of Elihu Island	5/5/2004	50	Dry	21.1	40
137-17.6	East of Elihu Island	6/2/2004	36	Wet		
137-17.6	East of Elihu Island	8/24/2004	11	Dry		
137-17.6	East of Elihu Island	11/15/2004	10	Dry		
137-17.6	East of Elihu Island	6/5/2006	81	Dry	41.5	57
137-17.6	East of Elihu Island	6/12/2006	20	Dry		
137-17.6	East of Elihu Island	6/21/2006	44	Dry		
137-17.6	East of Elihu Island	6/11/2007	34	Dry	25.4	40
137-17.6	East of Elihu Island	6/13/2007	19	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-17.6	East of Elihu Island	5/14/2008	2	Dry	2.8	n/a
137-17.6	East of Elihu Island	6/18/2008	4	Wet		
137-17.6	East of Elihu Island	5/6/2009	4	Wet	7.4	15
137-17.6	East of Elihu Island	5/19/2009	2	Dry		
137-17.6	East of Elihu Island	6/16/2009	6	Dry		
137-17.6	East of Elihu Island	10/27/2009	64	Dry		
137-17.6	East of Elihu Island	4/12/2010	6	Dry	6	n/a
137-17.6	East of Elihu Island	5/25/2011	44	Dry	44	90

Wet and dry weather geometric mean values for all monitoring stations on segment : LIS EB Shore – Stonington Point, Stonington (CT-E2_002)

Station #	Station Name	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
137-17.1	Stonington Point at R"2"	2003-2011	3	15	2.06	3.30	1.87
137-17.2	East of Stonington Point at RN "4"	2003-2011	3	17	8.61	5.24	9.40
137-17.5	Little Narragansett Bay at C "5"	2003-2011	3	17	12.88	7.32	14.23
137-17.6	East of Elihu Island	2003-2011	3	17	14.18	8.32	15.58

TABLE 15:
Waterbody ID: CT-E2_003
Characteristics: Saltwater, Class SA
Impairment: Shellfishing
Water Quality Criteria for Fecal coliform:

Geometric Mean: 14 colonies/100 ml
90% of Samples Less Than: 31 colonies/100 ml

Percent reduction to meet:

Geometric Mean: NA
90% of Samples Less Than: 57%

Data : 2003 – 2011 from CT DEEP target sampling efforts, 2012 TMDL cycle
Single sample fecal coliform data (colonies/100mL) for all monitoring stations on segment : LIS EB Shore – Outer Quiambaug Cove, Stonington (CT-E2_003) with annual geometric means and reduction goals for samples.

(red cells exhibit values that exceed water quality criteria)

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-13.0	Outer Quiambog Cove at outlet	6/17/2003	1.6	Dry	4.2	n/a
137-13.0	Outer Quiambog Cove at outlet	8/21/2003	11	Dry		
137-13.0	Outer Quiambog Cove at outlet	5/5/2004	1.6	Dry	2.7	n/a
137-13.0	Outer Quiambog Cove at outlet	6/2/2004	18	Wet		
137-13.0	Outer Quiambog Cove at outlet	8/24/2004	3.6	Dry		
137-13.0	Outer Quiambog Cove at outlet	11/15/2004	1.6	Dry		
137-13.0	Outer Quiambog Cove at outlet	11/16/2004	1.6	Dry		
137-13.0	Outer Quiambog Cove at outlet	12/27/2004	1.6	Wet		
137-13.0	Outer Quiambog Cove at outlet	2/7/2005	0.9	Dry	4.4	n/a
137-13.0	Outer Quiambog Cove at outlet	9/28/2005	3	Dry		
137-13.0	Outer Quiambog Cove at outlet	10/19/2005	8	Dry		
137-13.0	Outer Quiambog Cove at outlet	10/27/2005	18	Dry		
137-13.0	Outer Quiambog Cove at outlet	4/11/2006	1	Dry	12.1	57
137-13.0	Outer Quiambog Cove at outlet	6/21/2006	57	Dry		
137-13.0	Outer Quiambog Cove at outlet	6/29/2006	31	Wet		
137-13.0	Outer Quiambog Cove at outlet	6/13/2007	14	Dry	2.4	n/a
137-13.0	Outer Quiambog Cove at outlet	9/19/2007	1	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-13.0	Outer Quiambog Cove at outlet	12/11/2007	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	2/27/2008	8	Wet	3.3	n/a
137-13.0	Outer Quiambog Cove at outlet	5/14/2008	3	Dry		
137-13.0	Outer Quiambog Cove at outlet	6/18/2008	2	Wet		
137-13.0	Outer Quiambog Cove at outlet	9/10/2008	8	Wet		
137-13.0	Outer Quiambog Cove at outlet	12/3/2008	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	2/25/2009	1	Dry	2.1	n/a
137-13.0	Outer Quiambog Cove at outlet	3/10/2009	1	Wet		
137-13.0	Outer Quiambog Cove at outlet	4/13/2009	1	Wet		
137-13.0	Outer Quiambog Cove at outlet	4/26/2009	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	5/6/2009	19	Wet		
137-13.0	Outer Quiambog Cove at outlet	5/19/2009	3	Dry		
137-13.0	Outer Quiambog Cove at outlet	6/16/2009	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	7/9/2009	4	Dry		
137-13.0	Outer Quiambog Cove at outlet	7/28/2009	5	Dry		
137-13.0	Outer Quiambog Cove at outlet	9/2/2009	5	Dry		
137-13.0	Outer Quiambog Cove at outlet	10/7/2009	6	Wet		
137-13.0	Outer Quiambog Cove at outlet	10/27/2009	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	10/28/2009	1	Wet		
137-13.0	Outer Quiambog Cove at outlet	11/17/2009	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	1/26/2010	1	Wet	1.9	n/a
137-13.0	Outer Quiambog Cove at outlet	3/2/2010	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	3/17/2010	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	4/12/2010	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	8/25/2010	13	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-13.0	Outer Quiambog Cove at outlet	9/7/2010	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	9/20/2010	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	12/16/2010	15	Dry		
137-13.0	Outer Quiambog Cove at outlet	1/31/2011	1	Dry	2.2	n/a
137-13.0	Outer Quiambog Cove at outlet	4/20/2011	3	Dry		
137-13.0	Outer Quiambog Cove at outlet	4/26/2011	1	Dry		
137-13.0	Outer Quiambog Cove at outlet	5/25/2011	4	Dry		
137-13.0	Outer Quiambog Cove at outlet	6/15/2011	11	Dry		
137-13.0	Outer Quiambog Cove at outlet	6/21/2011	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	6/17/2003	1.7	Dry	3.7	n/a
137-13.1	Outer Quiambog Cove outside Lords Point	8/21/2003	8.1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	5/5/2004	1.6	Dry	2.2	n/a
137-13.1	Outer Quiambog Cove outside Lords Point	6/2/2004	1.7	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	8/24/2004	1.6	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	11/15/2004	1.6	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	11/16/2004	1.6	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	12/27/2004	11	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	2/7/2005	0.9	Dry	2.1	n/a
137-13.1	Outer Quiambog Cove outside Lords Point	9/28/2005	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	10/19/2005	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	10/27/2005	23	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	4/11/2006	1	Dry	10.9	23
137-13.1	Outer Quiambog Cove outside Lords Point	6/21/2006	81	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	6/29/2006	16	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	6/13/2007	2	Dry	1.3	n/a

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-13.1	Outer Quiambog Cove outside Lords Point	9/19/2007	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	12/11/2007	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	2/27/2008	2	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	5/14/2008	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	6/18/2008	1	Wet	1.3	n/a
137-13.1	Outer Quiambog Cove outside Lords Point	9/10/2008	2	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	12/3/2008	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	2/25/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	3/10/2009	1	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	4/13/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	4/26/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	5/6/2009	5	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	5/19/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	6/16/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	7/9/2009	14	Dry	1.8	n/a
137-13.1	Outer Quiambog Cove outside Lords Point	7/28/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	9/2/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	10/7/2009	47	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	10/27/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	10/28/2009	1	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	11/17/2009	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	1/26/2010	2	Wet		
137-13.1	Outer Quiambog Cove outside Lords Point	3/2/2010	1	Dry	2.8	n/a
137-13.1	Outer Quiambog Cove outside Lords Point	3/17/2010	3	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	4/12/2010	2	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-13.1	Outer Quiambog Cove outside Lords Point	8/25/2010	4	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	9/7/2010	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	9/20/2010	3	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	12/16/2010	28	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	1/31/2011	1	Dry	1.9	n/a
137-13.1	Outer Quiambog Cove outside Lords Point	4/20/2011	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	4/26/2011	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	5/25/2011	18	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	6/15/2011	1	Dry		
137-13.1	Outer Quiambog Cove outside Lords Point	6/21/2011	3	Dry		
137-13.2	Lords Point	2/10/2003	3.6	Dry	3.6	n/a
137-13.2	Lords Point	3/8/2004	10	Dry	10	n/a
137-13.2	Lords Point	1/4/2005	30	Wet	5.2	n/a
137-13.2	Lords Point	2/7/2005	0.9	Dry		
137-13.2	Lords Point	4/11/2006	1	Dry	1	n/a
137-13.2	Lords Point	1/2/2007	1	Wet	1	n/a
137-13.2	Lords Point	5/13/2008	1	Dry	1	n/a
137-13.2	Lords Point	4/7/2009	1	Wet	1.6	n/a
137-13.2	Lords Point	10/21/2009	2	Dry		
137-13.2	Lords Point	12/7/2009	2	Dry		
137-13.8	South of Quiambog Cove outlet	4/30/2003	1.6	Dry	3.8	n/a
137-13.8	South of Quiambog Cove outlet	6/10/2003	22	Dry		
137-13.8	South of Quiambog Cove outlet	6/17/2003	1.6	Dry		
137-13.8	South of Quiambog Cove outlet	5/5/2004	1.6	Dry	1.9	n/a
137-13.8	South of Quiambog Cove outlet	6/2/2004	1.7	Wet		
137-13.8	South of Quiambog Cove outlet	8/18/2004	1.6	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-13.8	South of Quiambog Cove outlet	8/24/2004	3.6	Dry		
137-13.8	South of Quiambog Cove outlet	11/15/2004	1.6	Dry		
137-13.8	South of Quiambog Cove outlet	11/16/2004	1.6	Dry		
137-13.8	South of Quiambog Cove outlet	10/19/2005	8	Dry	8	n/a
137-13.8	South of Quiambog Cove outlet	10/27/2005	8	Dry		
137-13.8	South of Quiambog Cove outlet	6/5/2006	81	Dry		
137-13.8	South of Quiambog Cove outlet	6/12/2006	1	DRy	4.9	15
137-13.8	South of Quiambog Cove outlet	6/21/2006	7	DRy		
137-13.8	South of Quiambog Cove outlet	11/28/2006	1	Dry		
137-13.8	South of Quiambog Cove outlet	3/7/2007	1	Dry	4.1	n/a
137-13.8	South of Quiambog Cove outlet	6/11/2007	17	Dry		
137-13.8	South of Quiambog Cove outlet	6/13/2007	4	Dry		
137-13.8	South of Quiambog Cove outlet	5/14/2008	2	Dry	1.7	n/a
137-13.8	South of Quiambog Cove outlet	6/18/2008	1	Wet		
137-13.8	South of Quiambog Cove outlet	9/10/2008	4	Wet		
137-13.8	South of Quiambog Cove outlet	12/3/2008	1	Dry		
137-13.8	South of Quiambog Cove outlet	5/6/2009	4	Wet	2.9	1
137-13.8	South of Quiambog Cove outlet	5/19/2009	1	Dry		
137-13.8	South of Quiambog Cove outlet	6/16/2009	1	Dry		
137-13.8	South of Quiambog Cove outlet	7/7/2009	8	Wet		
137-13.8	South of Quiambog Cove outlet	7/9/2009	48	Dry		
137-13.8	South of Quiambog Cove outlet	7/28/2009	1	Dry		
137-13.8	South of Quiambog Cove outlet	10/27/2009	1	Dry		
137-13.8	South of Quiambog Cove outlet	11/17/2009	1	Dry		
137-13.8	South of Quiambog Cove outlet	12/15/2009	10	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-13.8	South of Quiambog Cove outlet	3/2/2010	1	Dry	1	n/a
137-13.8	South of Quiambog Cove outlet	4/12/2010	1	Dry		
137-13.8	South of Quiambog Cove outlet	5/25/2011	7	Dry	7	n/a
137-14.0	Off Lords Point	4/30/2003	1.6	Dry	2.7	n/a
137-14.0	Off Lords Point	6/10/2003	8.1	Dry		
137-14.0	Off Lords Point	6/17/2003	1.6	Dry		
137-14.0	Off Lords Point	5/5/2004	1.7	Dry	1.6	n/a
137-14.0	Off Lords Point	6/2/2004	1.6	Wet		
137-14.0	Off Lords Point	8/18/2004	1.7	Dry		
137-14.0	Off Lords Point	8/24/2004	1.6	Dry		
137-14.0	Off Lords Point	11/15/2004	1.6	Dry		
137-14.0	Off Lords Point	11/16/2004	1.6	Dry		
137-14.0	Off Lords Point	10/19/2005	2	Dry	4.2	n/a
137-14.0	Off Lords Point	10/27/2005	9	Dry		
137-14.0	Off Lords Point	6/5/2006	2	Dry	1.9	n/a
137-14.0	Off Lords Point	6/12/2006	1	DRy		
137-14.0	Off Lords Point	6/21/2006	6	DRy		
137-14.0	Off Lords Point	11/28/2006	1	Dry		
137-14.0	Off Lords Point	3/7/2007	1	Dry	1.4	n/a
137-14.0	Off Lords Point	6/11/2007	1	Dry		
137-14.0	Off Lords Point	6/13/2007	3	Dry		
137-14.0	Off Lords Point	5/14/2008	1	Dry	1.8	n/a
137-14.0	Off Lords Point	6/18/2008	1	Wet		
137-14.0	Off Lords Point	9/10/2008	6	Wet		
137-14.0	Off Lords Point	5/6/2009	3	Wet	2.5	n/a
137-14.0	Off Lords Point	5/19/2009	1	Dry		
137-14.0	Off Lords Point	6/16/2009	2	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-14.0	Off Lords Point	7/7/2009	6	Wet		
137-14.0	Off Lords Point	7/9/2009	4	Dry		
137-14.0	Off Lords Point	7/28/2009	3	Dry		
137-14.0	Off Lords Point	10/27/2009	2	Dry		
137-14.0	Off Lords Point	11/17/2009	1	Dry		
137-14.0	Off Lords Point	12/15/2009	4	Dry		
137-14.0	Off Lords Point	3/2/2010	1	Dry	1	n/a
137-14.0	Off Lords Point	4/12/2010	1	Dry		
137-14.0	Off Lords Point	5/25/2011	3	Dry	3	n/a
137-15.0	Outside W breakwater	4/30/2003	1.6	Dry	2.1	n/a
137-15.0	Outside W breakwater	6/10/2003	3.6	Dry		
137-15.0	Outside W breakwater	6/17/2003	1.6	Dry		
137-15.0	Outside W breakwater	5/5/2004	1.7	Dry	1.6	n/a
137-15.0	Outside W breakwater	6/2/2004	1.6	Wet		
137-15.0	Outside W breakwater	8/18/2004	1.7	Dry		
137-15.0	Outside W breakwater	11/15/2004	1.6	Dry		
137-15.0	Outside W breakwater	11/16/2004	1.6	Dry		
137-15.0	Outside W breakwater	10/19/2005	6	Dry	6.9	n/a
137-15.0	Outside W breakwater	10/27/2005	8	Dry		
137-15.0	Outside W breakwater	6/5/2006	5	Dry	3.4	n/a
137-15.0	Outside W breakwater	6/12/2006	1	DRy		
137-15.0	Outside W breakwater	6/21/2006	9	DRy		
137-15.0	Outside W breakwater	11/28/2006	3	Dry		
137-15.0	Outside W breakwater	3/7/2007	1	Dry	1.4	n/a
137-15.0	Outside W breakwater	6/11/2007	3	Dry		
137-15.0	Outside W breakwater	6/13/2007	1	Dry		
137-15.0	Outside W breakwater	5/14/2008	1	Dry	1.8	n/a
137-15.0	Outside W breakwater	6/18/2008	1	Wet		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-15.0	Outside W breakwater	9/10/2008	6	Wet		
137-15.0	Outside W breakwater	5/6/2009	2	Wet	2.5	n/a
137-15.0	Outside W breakwater	5/19/2009	1	Dry		
137-15.0	Outside W breakwater	6/16/2009	2	Dry		
137-15.0	Outside W breakwater	7/7/2009	3	Wet		
137-15.0	Outside W breakwater	7/9/2009	20	Dry		
137-15.0	Outside W breakwater	7/28/2009	7	Dry		
137-15.0	Outside W breakwater	10/27/2009	1	Dry		
137-15.0	Outside W breakwater	11/17/2009	1	Dry		
137-15.0	Outside W breakwater	12/15/2009	2	Dry		
137-15.0	Outside W breakwater	3/2/2010	1	Dry	1	n/a
137-15.0	Outside W breakwater	4/12/2010	1	Dry		
137-15.0	Outside W breakwater	5/25/2011	4	Dry	4	n/a

Wet and dry weather geometric mean values for all monitoring stations on segment : LIS EB Outer Quiambaug Cove, Stonington (CT-E2_003)

Station #	Station Name	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
137-13.0	Outer Quiambog Cove at outlet	2003-2011	12	39	2.75	3.92	2.46
137-13.1	Outer Quiambog Cove outside Lords Point	2003-2011	12	39	2.20	4.35	1.78
137-13.2	Lords Point	2003-2011	3	7	2.21	3.10	1.94
137-13.8	South of Quiambog Cove outlet	2003-2011	5	29	2.89	2.93	2.88
137-14.0	Off Lords Point	2003-2011	5	28	2.03	2.80	1.92
137-15.0	Outside W breakwater	2003-2011	5	27	2.24	2.25	2.24

TABLE 16:
Waterbody ID: CT-E2_004
Characteristics: Saltwater, Class SA
Impairment: Shellfishing
Water Quality Criteria for Fecal coliform:

Geometric Mean: 14 colonies/100 ml
90% of Samples Less Than: 31 colonies/100 ml

Percent reduction to meet:

Geometric Mean: 59.5%
90% of Samples Less Than: 40%

Data : 2003 – 2011 from CT DEEP target sampling efforts, 2012 TMDL cycle
Single sample fecal coliform data (colonies/100mL) for all monitoring stations on segment : LIS EB Shore – Wilcox Cove (Mason Island), Stonington (CT-E2_004) with annual geometric means and reduction goals for samples.

(red cells exhibit values that exceed water quality criteria)

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-08.0	CA "B" Off Mason Island Yacht Club dock	6/17/2003	1.6	Dry	1.6	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	11/15/2004	1.6	Dry	1.6	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	11/16/2004	1.6	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	2/7/2005	0.9	Dry	2.2	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	9/28/2005	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	10/19/2005	6	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	10/27/2005	4	Wet		
137-08.0	CA "B" Off Mason Island Yacht Club dock	4/11/2006	1	Dry	1	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	6/21/2006	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	12/11/2007	1	Dry	1	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	2/27/2008	1	Wet	1	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	5/14/2008	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	6/18/2008	1	Wet		
137-08.0	CA "B" Off Mason Island Yacht Club dock	12/3/2008	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	2/25/2009	1	Dry	1.5	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	3/10/2009	1	Wet		
137-08.0	CA "B" Off Mason Island Yacht Club dock	4/13/2009	1	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-08.0	CA "B" Off Mason Island Yacht Club dock	4/26/2009	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	10/27/2009	2	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	10/28/2009	9	Wet		
137-08.0	CA "B" Off Mason Island Yacht Club dock	11/17/2009	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	1/26/2010	1	Wet		
137-08.0	CA "B" Off Mason Island Yacht Club dock	3/2/2010	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	3/17/2010	1	Dry	1.4	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	4/12/2010	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	12/16/2010	5	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	1/31/2011	1	Dry		
137-08.0	CA "B" Off Mason Island Yacht Club dock	4/20/2011	3	Dry	1.4	n/a
137-08.0	CA "B" Off Mason Island Yacht Club dock	4/26/2011	1	Dry		
137-09.0	CA"B"	6/17/2003	1.6	Dry	1.6	n/a
137-09.0	CA"B"	8/24/2004	1.7	Dry		
137-09.0	CA"B"	11/15/2004	1.6	Dry	1.6	n/a
137-09.0	CA"B"	11/16/2004	1.6	Dry		
137-09.0	CA"B"	2/7/2005	1	Dry		
137-09.0	CA"B"	9/28/2005	1	Dry	2.9	15
137-09.0	CA"B"	10/19/2005	2	Dry		
137-09.0	CA"B"	10/27/2005	33	Wet		
137-09.0	CA"B"	4/11/2006	1	Dry	1.7	n/a
137-09.0	CA"B"	6/21/2006	3	Dry		
137-09.0	CA"B"	12/11/2007	1	Dry	1	n/a
137-09.0	CA"B"	2/27/2008	1	Wet		
137-09.0	CA"B"	5/14/2008	1	Dry	1.3	n/a
137-09.0	CA"B"	6/18/2008	1	Wet		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-09.0	CA"B"	12/3/2008	3	Dry		
137-09.0	CA"B"	2/25/2009	1	Dry	1.9	n/a
137-09.0	CA"B"	3/10/2009	1	Wet		
137-09.0	CA"B"	4/13/2009	1	Dry		
137-09.0	CA"B"	4/26/2009	1	Dry		
137-09.0	CA"B"	7/9/2009	16	Dry		
137-09.0	CA"B"	10/27/2009	1	Dry		
137-09.0	CA"B"	10/28/2009	10	Wet		
137-09.0	CA"B"	11/17/2009	1	Dry		
137-09.0	CA"B"	1/26/2010	1	Wet	1.4	n/a
137-09.0	CA"B"	3/2/2010	1	Dry		
137-09.0	CA"B"	3/17/2010	1	Dry		
137-09.0	CA"B"	4/12/2010	1	Dry		
137-09.0	CA"B"	12/16/2010	5	Dry		
137-09.0	CA"B"	1/31/2011	1	Dry	1	n/a
137-09.0	CA"B"	4/20/2011	1	Dry		
137-09.0	CA"B"	4/26/2011	1	Dry		
137-11.0	LIS EB Shore - Wilcox Cove (Mason Is.), Stonington	10/19/2005	10	Dry	18.2	40
137-11.0	LIS EB Shore - Wilcox Cove (Mason Is.), Stonington	10/27/2005	33	Wet		
137-11.0	LIS EB Shore - Wilcox Cove (Mason Is.), Stonington	5/14/2008	1	Dry	1	n/a
137-11.0	LIS EB Shore - Wilcox Cove (Mason Is.), Stonington	6/18/2008	1	Wet		
137-11.1	CA "B"	6/17/2003	1.6	Dry	1.6	n/a
137-11.1	CA "B"	11/15/2004	1.6	Dry	1.6	n/a
137-11.1	CA "B"	11/16/2004	1.6	Dry		
137-11.1	CA "B"	2/7/2005	0.9	Dry	2.6	n/a
137-11.1	CA "B"	9/28/2005	1	Dry		
137-11.1	CA "B"	10/19/2005	4	Dry		
137-11.1	CA "B"	10/27/2005	13	Wet		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-11.1	CA "B"	4/11/2006	1	Dry	2	n/a
137-11.1	CA "B"	6/21/2006	4	Dry		
137-11.1	CA "B"	12/11/2007	1	Dry	1	n/a
137-11.1	CA "B"	2/27/2008	2	Wet	1.6	n/a
137-11.1	CA "B"	5/14/2008	1	Dry		
137-11.1	CA "B"	6/18/2008	3	Wet		
137-11.1	CA "B"	9/10/2008	2	Wet		
137-11.1	CA "B"	12/3/2008	1	Dry		
137-11.1	CA "B"	2/25/2009	1	Dry	1.4	n/a
137-11.1	CA "B"	3/10/2009	1	Wet		
137-11.1	CA "B"	4/13/2009	1	Dry		
137-11.1	CA "B"	4/26/2009	1	Dry		
137-11.1	CA "B"	5/6/2009	2	Dry		
137-11.1	CA "B"	10/27/2009	6	Dry		
137-11.1	CA "B"	10/28/2009	1	Wet		
137-11.1	CA "B"	11/17/2009	1	Dry		
137-11.1	CA "B"	1/26/2010	1	Wet	1	n/a
137-11.1	CA "B"	3/2/2010	1	Dry		
137-11.1	CA "B"	3/17/2010	1	Dry		
137-11.1	CA "B"	4/12/2010	1	Dry		
137-11.1	CA "B"	12/16/2010	1	Dry		
137-11.1	CA "B"	1/31/2011	1	Dry	1.8	n/a
137-11.1	CA "B"	4/20/2011	3	Dry		
137-11.1	CA "B"	4/26/2011	2	Dry		
137-11.2	Cove E of Dodge Farm	2/10/2003	8.6	Dry	20.9	40
137-11.2	Cove E of Dodge Farm	8/21/2003	51	Dry		
137-11.2	Cove E of Dodge Farm	3/8/2004	10	Dry	10	n/a
137-11.2	Cove E of Dodge Farm	1/4/2005	1	Wet	1	n/a

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-11.2	Cove E of Dodge Farm	9/28/2005	1	Dry		
137-11.2	Cove E of Dodge Farm	4/11/2006	1	Dry	1	n/a
137-11.2	Cove E of Dodge Farm	9/19/2007	3	Dry	1.7	n/a
137-11.2	Cove E of Dodge Farm	12/11/2007	1	Dry		
137-11.2	Cove E of Dodge Farm	2/27/2008	1	Wet	1	n/a
137-11.2	Cove E of Dodge Farm	2/25/2009	1	Dry	1.4	n/a
137-11.2	Cove E of Dodge Farm	3/10/2009	1	Wet		
137-11.2	Cove E of Dodge Farm	10/28/2009	3	Wet		
137-11.2	Cove E of Dodge Farm	1/26/2010	1	Wet	1	n/a
137-11.2	Cove E of Dodge Farm	4/26/2011	1	Dry	1.4	n/a
137-11.2	Cove E of Dodge Farm	6/21/2011	2	Dry		
137-11.3	CA "A"	6/17/2003	11	Dry	4.2	n/a
137-11.3	CA "A"	8/21/2003	1.6	Dry		
137-11.3	CA "A"	5/5/2004	1.6	Dry	2.4	n/a
137-11.3	CA "A"	6/2/2004	11	Wet		
137-11.3	CA "A"	8/24/2004	1.7	Dry		
137-11.3	CA "A"	11/15/2004	1.7	Dry		
137-11.3	CA "A"	11/16/2004	1.6	Dry		
137-11.3	CA "A"	2/7/2005	0.9	Dry	3.2	n/a
137-11.3	CA "A"	9/28/2005	1	Dry		
137-11.3	CA "A"	10/19/2005	6	Dry		
137-11.3	CA "A"	10/27/2005	20	Wet		
137-11.3	CA "A"	4/11/2006	1	Dry	2.6	n/a
137-11.3	CA "A"	6/21/2006	7	Dry		
137-11.3	CA "A"	6/13/2007	7	Dry	1.9	n/a
137-11.3	CA "A"	9/19/2007	1	Dry		
137-11.3	CA "A"	12/11/2007	1	Dry		
137-11.3	CA "A"	2/27/2008	1	Wet	1.4	n/a

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-11.3	CA "A"	5/20/2008	1	Wet		
137-11.3	CA "A"	6/18/2008	6	Wet		
137-11.3	CA "A"	9/10/2008	1	Wet		
137-11.3	CA "A"	12/3/2008	1	Dry		
137-11.3	CA "A"	2/25/2009	2	Dry		
137-11.3	CA "A"	3/10/2009	1	Wet		
137-11.3	CA "A"	4/13/2009	1	Dry		
137-11.3	CA "A"	4/26/2009	1	Dry		
137-11.3	CA "A"	5/6/2009	1	Wet		
137-11.3	CA "A"	6/16/2009	4	Dry	2.4	n/a
137-11.3	CA "A"	7/28/2009	1	Dry		
137-11.3	CA "A"	9/2/2009	1	Dry		
137-11.3	CA "A"	10/7/2009	25	Wet		
137-11.3	CA "A"	10/28/2009	24	Wet		
137-11.3	CA "A"	11/17/2009	3	Dry		
137-11.3	CA "A"	1/26/2010	1	Wet		
137-11.3	CA "A"	3/2/2010	1	Dry		
137-11.3	CA "A"	3/17/2010	1	Dry		
137-11.3	CA "A"	8/25/2010	2	Dry	1.6	n/a
137-11.3	CA "A"	9/7/2010	1	Dry		
137-11.3	CA "A"	9/20/2010	2	Dry		
137-11.3	CA "A"	12/16/2010	7	Dry		
137-11.3	CA "A"	1/31/2011	1	Dry		
137-11.3	CA "A"	4/20/2011	1	Dry		
137-11.3	CA "A"	4/26/2011	1	Dry		
137-11.3	CA "A"	5/25/2011	2	Dry	1.6	n/a
137-11.3	CA "A"	6/15/2011	10	Dry		
137-11.3	CA "A"	6/21/2011	1	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-12.0	Latimer Point	4/30/2003	1.6	Dry	2.7	n/a
137-12.0	Latimer Point	6/10/2003	8.1	Dry		
137-12.0	Latimer Point	6/17/2003	1.6	Dry		
137-12.0	Latimer Point	5/5/2004	5.8	Dry	2.9	n/a
137-12.0	Latimer Point	6/2/2004	5.8	Wet		
137-12.0	Latimer Point	8/18/2004	3.6	dry		
137-12.0	Latimer Point	8/24/2004	1.7	Dry		
137-12.0	Latimer Point	11/15/2004	1.7	Dry		
137-12.0	Latimer Point	11/16/2004	1.6	Dry		
137-12.0	Latimer Point	10/19/2005	1	Dry	2.4	n/a
137-12.0	Latimer Point	10/27/2005	6	Wet		
137-12.0	Latimer Point	6/5/2006	6	Dry	4.1	n/a
137-12.0	Latimer Point	6/12/2006	3	Dry		
137-12.0	Latimer Point	6/21/2006	3	Dry		
137-12.0	Latimer Point	11/28/2006	5	Dry		
137-12.0	Latimer Point	3/7/2007	1	Dry	4.4	n/a
137-12.0	Latimer Point	6/11/2007	11	Dry		
137-12.0	Latimer Point	6/13/2007	8	Dry		
137-12.0	Latimer Point	5/14/2008	1	Dry	1.2	n/a
137-12.0	Latimer Point	6/18/2008	2	Wet		
137-12.0	Latimer Point	9/10/2008	1	Wet		
137-12.0	Latimer Point	12/3/2008	1	Dry		
137-12.0	Latimer Point	5/6/2009	2	Wet	3.2	n/a
137-12.0	Latimer Point	5/19/2009	1	Dry		
137-12.0	Latimer Point	6/16/2009	6	Dry		
137-12.0	Latimer Point	7/7/2009	6	Wet		
137-12.0	Latimer Point	7/9/2009	16	Dry		
137-12.0	Latimer Point	7/28/2009	2	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-12.0	Latimer Point	10/27/2009	7	Dry		
137-12.0	Latimer Point	11/17/2009	1	Dry		
137-12.0	Latimer Point	12/15/2009	2	Dry		
137-12.0	Latimer Point	4/12/2010	1	Dry	1	n/a
137-12.0	Latimer Point	5/25/2011	1	Dry	1	n/a
137-12.1	Wilcox Cove outlet	8/21/2003	1.7	Dry	1.7	n/a
137-12.1	Wilcox Cove outlet	3/8/2004	11	Dry	34.6	40
137-12.1	Wilcox Cove outlet	4/28/2004	109	Wet		
137-12.1	Wilcox Cove outlet	1/4/2005	2	Wet	1.3	n/a
137-12.1	Wilcox Cove outlet	2/7/2005	0.9	Dry		
137-12.1	Wilcox Cove outlet	4/11/2006	1	Dry	2.4	n/a
137-12.1	Wilcox Cove outlet	10/16/2006	6	Dry		
137-12.1	Wilcox Cove outlet	1/2/2007	30	Wet	30	n/a
137-12.1	Wilcox Cove outlet	5/13/2008	18	Dry	18	n/a
137-12.1	Wilcox Cove outlet	4/7/2009	1	Wet	1.3	n/a
137-12.1	Wilcox Cove outlet	10/21/2009	2	Dry		
137-12.1	Wilcox Cove outlet	12/7/2009	1	Dry		
137-12.4	East of Latimer Point	4/30/2003	1.6	Dry	2.5	n/a
137-12.4	East of Latimer Point	6/10/2003	5.8	Dry		
137-12.4	East of Latimer Point	6/17/2003	1.7	Dry		
137-12.4	East of Latimer Point	5/5/2004	1.6	Dry	2	n/a
137-12.4	East of Latimer Point	6/2/2004	5.8	Wet		
137-12.4	East of Latimer Point	8/18/2004	1.7	Dry		
137-12.4	East of Latimer Point	8/24/2004	1.6	Dry		
137-12.4	East of Latimer Point	11/15/2004	1.6	Dry		
137-12.4	East of Latimer Point	11/16/2004	1.6	Dry		
137-12.4	East of Latimer Point	10/19/2005	4	Dry	5.3	n/a
137-12.4	East of Latimer Point	10/27/2005	7	Wet		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-12.4	East of Latimer Point	6/5/2006	5	Dry	1.8	n/a
137-12.4	East of Latimer Point	6/12/2006	1	Dry		
137-12.4	East of Latimer Point	6/21/2006	1	Dry		
137-12.4	East of Latimer Point	11/28/2006	2	Dry		
137-12.4	East of Latimer Point	6/11/2007	3	Dry	1.7	n/a
137-12.4	East of Latimer Point	6/13/2007	1	Dry		
137-12.4	East of Latimer Point	5/14/2008	1	Dry	2.5	n/a
137-12.4	East of Latimer Point	6/18/2008	4	Wet		
137-12.4	East of Latimer Point	9/10/2008	4	Wet		
137-12.4	East of Latimer Point	5/6/2009	7	Dry	4.3	1
137-12.4	East of Latimer Point	5/19/2009	1	Dry		
137-12.4	East of Latimer Point	6/16/2009	14	Dry		
137-12.4	East of Latimer Point	7/7/2009	4	Wet		
137-12.4	East of Latimer Point	7/9/2009	54	Dry		
137-12.4	East of Latimer Point	7/28/2009	13	Dry		
137-12.4	East of Latimer Point	10/27/2009	1	Dry		
137-12.4	East of Latimer Point	11/17/2009	1	Dry		
137-12.4	East of Latimer Point	12/15/2009	2	Dry		
137-12.4	East of Latimer Point	4/12/2010	1	Dry	1	n/a
137-12.4	East of Latimer Point	5/25/2011	2	Dry	2	n/a
137-12.6	Outer Quiambog Cove	6/17/2003	1.7	Dry	4.3	n/a
137-12.6	Outer Quiambog Cove	8/21/2003	11	Dry		
137-12.6	Outer Quiambog Cove	5/5/2004	1.6	Dry	1.9	n/a
137-12.6	Outer Quiambog Cove	6/2/2004	3.6	Wet		
137-12.6	Outer Quiambog Cove	8/24/2004	1.7	Dry		
137-12.6	Outer Quiambog Cove	11/15/2004	1.7	Dry		
137-12.6	Outer Quiambog Cove	11/16/2004	1.6	Dry		
137-12.6	Outer Quiambog Cove	2/7/2005	0.9	Dry	1.7	n/a

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-12.6	Outer Quiambog Cove	9/28/2005	1	Dry		
137-12.6	Outer Quiambog Cove	10/19/2005	2	Dry		
137-12.6	Outer Quiambog Cove	10/27/2005	5	Wet		
137-12.6	Outer Quiambog Cove	6/21/2006	1	Dry	1	n/a
137-12.6	Outer Quiambog Cove	6/13/2007	8	Dry		
137-12.6	Outer Quiambog Cove	9/19/2007	1	Dry	2	n/a
137-12.6	Outer Quiambog Cove	12/11/2007	1	Dry		
137-12.6	Outer Quiambog Cove	2/27/2008	1	Wet		
137-12.6	Outer Quiambog Cove	5/14/2008	1	Dry		
137-12.6	Outer Quiambog Cove	6/18/2008	1	Wet	1	n/a
137-12.6	Outer Quiambog Cove	9/10/2008	1	Wet		
137-12.6	Outer Quiambog Cove	12/3/2008	1	Dry		
137-12.6	Outer Quiambog Cove	2/25/2009	25	Dry		
137-12.6	Outer Quiambog Cove	3/10/2009	1	Wet		
137-12.6	Outer Quiambog Cove	4/13/2009	1	dry		
137-12.6	Outer Quiambog Cove	4/26/2009	1	Dry		
137-12.6	Outer Quiambog Cove	5/6/2009	9	Wet		
137-12.6	Outer Quiambog Cove	5/19/2009	1	Dry		
137-12.6	Outer Quiambog Cove	7/9/2009	18	Dry	2.7	n/a
137-12.6	Outer Quiambog Cove	7/28/2009	7	Dry		
137-12.6	Outer Quiambog Cove	9/2/2009	1	Dry		
137-12.6	Outer Quiambog Cove	10/7/2009	9	Wet		
137-12.6	Outer Quiambog Cove	10/27/2009	2	Dry		
137-12.6	Outer Quiambog Cove	10/28/2009	1	Wet		
137-12.6	Outer Quiambog Cove	11/17/2009	1	Dry		
137-12.6	Outer Quiambog Cove	1/26/2010	1	Wet		
137-12.6	Outer Quiambog Cove	3/2/2010	1	Dry	1.7	n/a
137-12.6	Outer Quiambog Cove	3/17/2010	1	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-12.6	Outer Quiambog Cove	4/12/2010	1	Dry		
137-12.6	Outer Quiambog Cove	8/25/2010	1	Dry		
137-12.6	Outer Quiambog Cove	9/7/2010	1	Dry		
137-12.6	Outer Quiambog Cove	9/20/2010	3	Dry		
137-12.6	Outer Quiambog Cove	12/16/2010	27	Dry		
137-12.6	Outer Quiambog Cove	1/31/2011	1	Dry	1.1	n/a
137-12.6	Outer Quiambog Cove	4/20/2011	1	Dry		
137-12.6	Outer Quiambog Cove	4/26/2011	1	Dry		
137-12.6	Outer Quiambog Cove	5/25/2011	2	Dry		
137-12.6	Outer Quiambog Cove	6/15/2011	1	Dry		
137-12.6	Outer Quiambog Cove	6/21/2011	1	Dry		

Wet and dry weather geometric mean values for all monitoring stations on segment : LIS EB Shore – Wilcox Cove (Mason Island), Stonington (CT-E2_004)

Station #	Station Name	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
137-08.0	CA "B" Off Mason Island Yacht Club dock	2003-2011	6	23	1.41	1.81	1.32
137-09.0	CA"B"	2003-2011	6	25	1.62	2.63	1.45
137-11.0		2005-2008	2	2	4.26	5.74	3.16
137-11.1	CA "B"	2003-2011	7	24	1.54	2.06	1.42
137-11.2	Cove E of Dodge Farm	2003-2011	5	10	2.12	1.25	2.77
137-11.3	CA "A"	2003-2011	11	34	2.11	3.44	1.80
137-12.0	Latimer Point	2003-2011	6	27	2.66	3.06	2.58
137-12.1	Wilcox Cove outlet	2003-2011	4	8	4.11	8.99	2.79
137-12.4	East of Latimer Point	2003-2011	5	26	2.66	3.52	2.37
137-12.6	Outer Quiambog Cove	2003-2011	10	37	1.84	2.07	1.78

TABLE 17:
Waterbody ID: CT-E2_005
Characteristics: Saltwater, Class SA
Impairment: Shellfishing
Water Quality Criteria for Fecal coliform:
Geometric Mean: 14 colonies/100 ml
90% of Samples Less Than: 31 colonies/100 ml
Percent reduction to meet:
Geometric Mean: NA
90% of Samples Less Than: 7%

Data : 2003 – 2011 from CT DEEP target sampling efforts, 2012 TMDL cycle
Single sample fecal coliform data (colonies/100mL) for all monitoring stations on segment : LIS EB Shore – Mouth Mystic River, Stonington (CT-E2_005) with annual geometric means and reduction goals for samples.
(red cells exhibit values that exceed water quality criteria)

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-02.1	Mystic Harbor	4/30/2003	1.6	Dry	3	n/a
137-02.1	Mystic Harbor	6/10/2003	1.7	Dry		
137-02.1	Mystic Harbor	6/17/2003	10	Dry		
137-02.1	Mystic Harbor	5/5/2004	1.6	Dry	3.9	n/a
137-02.1	Mystic Harbor	6/2/2004	8.1	Wet		
137-02.1	Mystic Harbor	8/18/2004	10	Dry		
137-02.1	Mystic Harbor	8/24/2004	10	Dry		
137-02.1	Mystic Harbor	11/15/2004	1.6	Dry		
137-02.1	Mystic Harbor	11/16/2004	1.6	Dry		
137-02.1	Mystic Harbor	6/5/2006	29	Dry	8.9	n/a
137-02.1	Mystic Harbor	6/12/2006	6	Dry		
137-02.1	Mystic Harbor	6/21/2006	4	Dry		
137-02.1	Mystic Harbor	6/11/2007	1	Dry	1.7	n/a
137-02.1	Mystic Harbor	6/13/2007	5	Dry		
137-02.1	Mystic Harbor	12/11/2007	1	Dry		
137-02.1	Mystic Harbor	5/14/2008	1	Dry	1	n/a
137-02.1	Mystic Harbor	6/18/2008	1	Wet		
137-02.1	Mystic Harbor	9/10/2008	1	Wet		
137-02.1	Mystic Harbor	5/6/2009	5	Wet	2	n/a

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-02.1	Mystic Harbor	5/19/2009	2	Dry		
137-02.1	Mystic Harbor	6/16/2009	1	Dry		
137-02.1	Mystic Harbor	10/27/2009	2	Dry		
137-02.1	Mystic Harbor	11/17/2009	1	Dry		
137-02.1	Mystic Harbor	12/15/2009	3	Dry		
137-02.1	Mystic Harbor	3/2/2010	1	Dry	3.1	n/a
137-02.1	Mystic Harbor	3/17/2010	1	Dry		
137-02.1	Mystic Harbor	3/25/2010	24	Dry		
137-02.1	Mystic Harbor	4/12/2010	1	Dry		
137-02.1	Mystic Harbor	11/21/2010	9	Dry		
137-02.1	Mystic Harbor	12/15/2010	4	Dry		
137-02.1	Mystic Harbor	3/15/2011	1	Dry	1	n/a
137-02.1	Mystic Harbor	4/20/2011	1	Dry		
137-02.1	Mystic Harbor	5/25/2011	1	Dry		
137-03.0	Mystic Harbor	4/30/2003	1.7	Dry	5.2	n/a
137-03.0	Mystic Harbor	6/10/2003	8.1	Dry		
137-03.0	Mystic Harbor	6/17/2003	10	Dry		
137-03.0	Mystic Harbor	5/5/2004	1.7	Dry	3.9	n/a
137-03.0	Mystic Harbor	6/2/2004	8.1	Wet		
137-03.0	Mystic Harbor	8/18/2004	10	Dry		
137-03.0	Mystic Harbor	8/24/2004	10	Dry		
137-03.0	Mystic Harbor	11/15/2004	1.6	Dry		
137-03.0	Mystic Harbor	11/16/2004	1.7	Dry		
137-03.0	Mystic Harbor	6/5/2006	26	Dry	7.8	n/a
137-03.0	Mystic Harbor	6/12/2006	3	Dry		
137-03.0	Mystic Harbor	6/21/2006	6	Dry		
137-03.0	Mystic Harbor	6/11/2007	1	Dry	1.3	n/a
137-03.0	Mystic Harbor	6/13/2007	2	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-03.0	Mystic Harbor	12/11/2007	1	Dry		
137-03.0	Mystic Harbor	5/14/2008	1	Dry	1	n/a
137-03.0	Mystic Harbor	6/18/2008	1	Wet		
137-03.0	Mystic Harbor	9/10/2008	1	Wet		
137-03.0	Mystic Harbor	5/6/2009	2	Wet	1.3	n/a
137-03.0	Mystic Harbor	5/19/2009	1	Dry		
137-03.0	Mystic Harbor	6/16/2009	1	Dry		
137-03.0	Mystic Harbor	10/27/2009	1	Dry		
137-03.0	Mystic Harbor	11/17/2009	1	Dry		
137-03.0	Mystic Harbor	12/15/2009	3	Dry		
137-03.0	Mystic Harbor	3/2/2010	1	Dry	3.6	7
137-03.0	Mystic Harbor	3/17/2010	1	Dry		
137-03.0	Mystic Harbor	3/25/2010	36	Dry		
137-03.0	Mystic Harbor	4/12/2010	1	Dry		
137-03.0	Mystic Harbor	11/21/2010	9	Dry		
137-03.0	Mystic Harbor	12/15/2010	7	Dry		
137-03.0	Mystic Harbor	3/15/2011	1	Dry	2.2	n/a
137-03.0	Mystic Harbor	4/20/2011	2	Dry		
137-03.0	Mystic Harbor	5/25/2011	5	Dry		
137-05.0	Mystic Harbor	4/30/2003	1.6	Dry	2.2	n/a
137-05.0	Mystic Harbor	6/10/2003	5.8	Dry		
137-05.0	Mystic Harbor	6/17/2003	1.6	Dry		
137-05.0	Mystic Harbor	7/28/2003	1.7	Dry		
137-05.0	Mystic Harbor	5/5/2004	1.6	Dry	2	n/a
137-05.0	Mystic Harbor	6/2/2004	5.8	Wet		
137-05.0	Mystic Harbor	8/18/2004	1.7	Dry		
137-05.0	Mystic Harbor	8/24/2004	1.6	Dry		
137-05.0	Mystic Harbor	11/15/2004	1.6	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-05.0	Mystic Harbor	11/16/2004	1.6	Dry		
137-05.0	Mystic Harbor	6/5/2006	10	Dry	2.2	n/a
137-05.0	Mystic Harbor	6/12/2006	1	Dry		
137-05.0	Mystic Harbor	6/21/2006	1	Dry		
137-05.0	Mystic Harbor	6/11/2007	2	Dry	2.6	n/a
137-05.0	Mystic Harbor	6/13/2007	9	Dry		
137-05.0	Mystic Harbor	12/11/2007	1	Dry		
137-05.0	Mystic Harbor	5/14/2008	1	Dry	2	n/a
137-05.0	Mystic Harbor	6/18/2008	2	Wet		
137-05.0	Mystic Harbor	9/10/2008	4	Wet		
137-05.0	Mystic Harbor	5/6/2009	1	Wet	1	n/a
137-05.0	Mystic Harbor	5/19/2009	1	Dry		
137-05.0	Mystic Harbor	6/16/2009	1	Dry		
137-05.0	Mystic Harbor	7/7/2009	1	Wet		
137-05.0	Mystic Harbor	10/27/2009	1	Dry		
137-05.0	Mystic Harbor	11/17/2009	1	Dry		
137-05.0	Mystic Harbor	12/15/2009	1	Dry		
137-05.0	Mystic Harbor	4/12/2010	1	Dry	1	n/a
137-05.0	Mystic Harbor	5/25/2011	1	Dry	1	n/a
137-06.1	Enders Island	4/30/2003	1.7	Dry	1.7	n/a
137-06.1	Enders Island	6/10/2003	1.6	Dry		
137-06.1	Enders Island	6/17/2003	1.7	Dry		
137-06.1	Enders Island	7/28/2003	1.7	Dry		
137-06.1	Enders Island	5/5/2004	1.6	Dry	1.6	n/a
137-06.1	Enders Island	6/2/2004	1.7	Wet		
137-06.1	Enders Island	8/18/2004	1.7	Dry		
137-06.1	Enders Island	8/24/2004	1.6	Dry		
137-06.1	Enders Island	11/15/2004	1.6	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-06.1	Enders Island	11/16/2004	1.6	Dry		
137-06.1	Enders Island	10/19/2005	2	Dry	4.9	n/a
137-06.1	Enders Island	10/27/2005	12	Wet		
137-06.1	Enders Island	6/5/2006	5	Dry	2	n/a
137-06.1	Enders Island	6/12/2006	1	Dry		
137-06.1	Enders Island	6/21/2006	3	wet		
137-06.1	Enders Island	11/28/2006	1	Dry		
137-06.1	Enders Island	3/7/2007	1	Dry	1.6	n/a
137-06.1	Enders Island	6/11/2007	4	Dry		
137-06.1	Enders Island	6/13/2007	1	Dry		
137-06.1	Enders Island	5/14/2008	1	Dry	1	n/a
137-06.1	Enders Island	6/18/2008	1	Wet		
137-06.1	Enders Island	9/10/2008	1	Wet		
137-06.1	Enders Island	5/6/2009	1	Wet	1.4	n/a
137-06.1	Enders Island	6/16/2009	1	Dry		
137-06.1	Enders Island	7/7/2009	1	Wet		
137-06.1	Enders Island	7/9/2009	2	Dry		
137-06.1	Enders Island	7/28/2009	1	Dry		
137-06.1	Enders Island	10/27/2009	2	Dry		
137-06.1	Enders Island	11/17/2009	1	Dry		
137-06.1	Enders Island	12/15/2009	3	Dry		
137-06.1	Enders Island	3/2/2010	1	Dry	1	n/a
137-06.1	Enders Island	4/12/2010	1	Dry		
137-06.1	Enders Island	5/25/2011	2	Dry	2	n/a
137-06.2	Mason Point	4/30/2003	1.6	Dry	2.4	n/a
137-06.2	Mason Point	6/10/2003	8.1	Dry		
137-06.2	Mason Point	6/17/2003	1.6	Dry		
137-06.2	Mason Point	7/28/2003	1.6	Dry		

Station #	Station Name	Date	Results	Wet/Dry	Geomean	90% Reduction
137-06.2	Mason Point	5/5/2004	1.7	Dry	2.1	n/a
137-06.2	Mason Point	6/2/2004	8.1	Wet		
137-06.2	Mason Point	8/18/2004	1.6	Dry		
137-06.2	Mason Point	8/24/2004	1.6	Dry		
137-06.2	Mason Point	11/15/2004	1.6	Dry		
137-06.2	Mason Point	11/16/2004	1.6	Dry		
137-06.2	Mason Point	10/19/2005	2	Dry	4.2	n/a
137-06.2	Mason Point	10/27/2005	9	Wet		
137-06.2	Mason Point	6/5/2006	19	Dry	4.6	n/a
137-06.2	Mason Point	6/12/2006	2	Dry		
137-06.2	Mason Point	6/21/2006	6	Dry		
137-06.2	Mason Point	11/28/2006	2	Dry		
137-06.2	Mason Point	6/11/2007	10	Dry	7.1	n/a
137-06.2	Mason Point	6/13/2007	5	Dry		
137-06.2	Mason Point	5/14/2008	1	Dry	1.4	n/a
137-06.2	Mason Point	6/18/2008	3	Wet		
137-06.2	Mason Point	9/10/2008	1	Wet		
137-06.2	Mason Point	5/6/2009	1	Wet	1.5	n/a
137-06.2	Mason Point	5/19/2009	1	Dry		
137-06.2	Mason Point	6/16/2009	1	Dry		
137-06.2	Mason Point	7/7/2009	1	Wet		
137-06.2	Mason Point	7/9/2009	20	Dry		
137-06.2	Mason Point	10/27/2009	1	Dry		
137-06.2	Mason Point	11/17/2009	1	Dry		
137-06.2	Mason Point	12/15/2009	1	Dry		
137-06.2	Mason Point	3/2/2010	1	Dry	1	n/a
137-06.2	Mason Point	4/12/2010	1	Dry		
137-06.2	Mason Point	5/25/2011	3	Dry	3	n/a

Wet and dry weather geometric mean values for all monitoring stations on segment : LIS EB Shore – Mouth Mystic River, Southington (CT-E2_005)

Station #	Station Name	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
137-02.1	Mystic Harbor	2003-2011	4	29	2.51	2.52	2.51
137-03.0	Mystic Harbor	2003-2011	4	29	2.62	2.00	2.72
137-05.0	Mystic Harbor	2003-2011	5	23	1.69	2.15	1.60
137-06.1	Enders Island	2003-2011	7	26	1.59	1.80	1.55
137-06.2	Mason Point	2003-2011	6	26	2.26	2.45	2.22

REFERENCES

Stonington Annual Assessment of the Shellfish Growing Waters in the Town of Stonington, CT (2011). Department of Agriculture/Bureau of Aquaculture, Milford, CT.

Costa, Joe (2011). Calculating Geometric Means. Buzzards Bay National Estuary Program. **Online**: http://www.buzzardsbay.org/geomean.htm

CTDEEP (2012). State of Connecticut Integrated Water Quality Report. **Online:**http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2012_iwqr_final.pdf

CTDEEP (2011). State of Connecticut Water Quality Standards. **Online:** http://www.ct.gov/dep/lib/dep/water/water_quality_standards/wqs_final_adopted_2_25_11.pdf

CWP (2003). Impacts of Impervious Cover on Aquatic Systems. Center for Watershed Protection. **Online**: http://clear.uconn.edu/projects/tmdl/library/papers/Schueler_2003.pdf

Federal Register 67 (March 15, 2002) 11663-11670. Urban Area Criteria for Census 2000.

Mallin, M.A., K.E. Williams, E.C. Escham, R.P. Lowe (2000). Effect of Human Development on Bacteriological Water Quality in Coastal Wetlands. Ecological Applications 10: 1047-1056.

USEPA (2001). Managing Pet and Wildlife Waste to Prevent Contamination of Drinking Water. **Online**: http://www.epa.gov/safewater/sourcewater/pubs/fs_swpp_petwaste.pdf.

USEPA (2011a). Managing Nonpoint Source Pollution from Agriculture. **Online:** http://water.epa.gov/polwaste/nps/outreach/point6.cfm

USEPA (2011b). Riparian Zone and Stream Restoration. **Online:** http://epa.gov/ada/eco/riparian.html

USEPA (2011c). Land Use Impacts on Water. Online: http://epa.gov/greenkit/toolwq.htm