



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

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March 11, 2014

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Dear Messrs. Odefey, Kilian, and Devine:

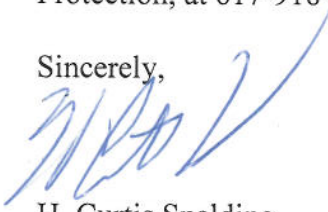
This letter is in response to your July 10, 2013 petition for a determination that stormwater discharges from commercial, industrial, and institution ("CII") sites contribute to water quality standards violations in numerous waters throughout EPA Region 1 and require permits pursuant to Section 402 of the Clean Water Act. Due to the scope and complexity of your request, it has taken the Region significant time to review and analyze the information you submitted. The Region has also consulted with Regions 3 and 9 and with the Office of Water in Washington, D.C. during our review.

The petition requests that EPA use its residual designation authority ("RDA") under 40 C.F.R. §122.26(a)(9)(i)(D) to require National Pollutant Discharge Elimination System ("NPDES") permits for currently unregulated non-*de minimus* stormwater discharges from CII sites because they are contributing to violations of water quality standards. For reasons discussed in the enclosed document, entitled "Region 1- Response to Petition for Designation," the Region is neither granting the petition as it is currently framed, nor is it denying the petition. Rather, the Region intends to evaluate individual watersheds, focusing on the nature of the impairment and the extent to which stormwater discharges from CII sites are contributing to such impairment, to determine whether and the extent to which exercise of RDA is appropriate. Any potential designations will be in localized areas where the Region has site specific information to support a designation. The Region will begin this evaluation process in watersheds where EPA or the state agency has already determined that stormwater is a significant contributor of pollutants

causing a water quality standard (or standards) to be exceeded. Further discussion of our decision is found in the enclosed document.

The Region appreciates the Petitioners' advocacy for the protection of our nation's waters. If you have any questions, please contact Ken Moraff, Director of the Office of Ecosystem Protection, at 617-918-1502.

Sincerely,



H. Curtis Spalding  
Regional Administrator – Region 1

Enclosure

cc w/enclosure:

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## **Region 1 - Response to Petition for Designation**

### **I. Regional Overview**

Region 1 is comprised of the six New-England states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont and ten Tribal Nations. Region 1 is the permitting authority for Massachusetts, New Hampshire, Indian lands in Connecticut, Massachusetts, and Rhode Island, and federal facilities in Vermont. Connecticut, Rhode Island, Maine, and Vermont have been authorized to administer the National Pollutant Discharge Elimination System (NPDES) permit programs those states.

### **II. Statutory and Regulatory Background**

In 1987, Congress amended Section 402 of the Clean Water Act (CWA) and established a phased approach to regulating discharges "composed entirely of stormwater," requiring some, but not all, point source discharges of stormwater to be regulated. Water Quality Act § 405, codified as CWA § 402(p). In the first phase, Congress required NPDES permits for discharges from municipal separate storm sewer systems (MS4s) serving a population greater than 100,000, and stormwater discharges associated with industrial activity. CWA § 402(p)(1), (2), 33 U.S.C. § 1342(p)(1), (2). Additionally, the Act provides for NPDES permits for any stormwater discharge determined by EPA or an authorized state to contribute to a violation of water quality standards (WQS) or to be a significant contributor of pollutants to waters of the United States. CWA § 402(p)(2)(E), 33 U.S.C. § 1342(p)(2)(E).<sup>1</sup> In 1990, EPA promulgated permit application regulations for these discharges pursuant to § 402(p)(4), 33 U.S.C. § 1342(p)(4). 55 Fed. Reg. 47990 (Nov. 16, 1990) ("Phase I rule"). The Phase I rule included a provision allowing any person to petition EPA to require an NPDES permit for a discharge composed entirely of stormwater that contributes to a water quality standard violation or is a significant contributor of pollutants to waters of the United States. 40 C.F.R. § 122.26(f)(2).

In the second phase, Congress required EPA, after conducting studies and reporting on the results to Congress, to issue regulations designating additional stormwater discharges to be regulated "to protect water quality." CWA § 402(p)(5), (6), 33 U.S.C. § 1342(p)(5), (6). Stormwater discharges designated for regulation under § 402(p)(6) were not necessarily required to be regulated through NPDES permits. Rather, Congress required that EPA "establish a comprehensive program to regulate such designated sources." *Id.* In 1995, EPA completed studies and submitted a report to Congress describing additional stormwater discharges under consideration for regulation. Based on this report, EPA promulgated regulations in 1999 ("Phase II rule") designating two additional categories of stormwater discharges for regulation: certain small MS4s<sup>2</sup> and small construction sites (1-5 acres); and requiring NPDES permit coverage for these discharges. 64 Fed. Reg. 68722 (Dec. 8, 1999).

<sup>1</sup> This case-by-case authority to designate stormwater discharges for NPDES permits was codified at 40 C.F.R. § 122.26(a)(1)(v) in 1989. 54 Fed. Reg. 255 (Jan. 4, 1989). *See also* 55 Fed. Reg. 47990, 47993 (Nov. 16, 1990).

<sup>2</sup> Regulated small MS4s are primarily separate storm sewer systems serving municipal populations within "urbanized areas" as defined by the Census Bureau based on the latest census. 40 C.F.R. § 122.32(a). This term also includes other publicly owned separate storm sewer systems similar to MS4s (e.g., military bases, large hospital or prison complexes, highways) and small MS4s outside urbanized areas based on criteria developed by the State; at



The Phase II rule also added to the regulations for designating additional stormwater discharges for NPDES permit coverage (“residual designation authority” or “RDA”) to allow designation of a category of discharges within a geographic area if determined to contribute to a violation of a water quality standard or to significantly contribute pollutants to waters of the United States. 64 Fed. Reg. at 68781; 40 C.F.R. § 122.26(a)(9)(i)(D).<sup>3</sup> These residual designation provisions are based on the authority of both §§ 402(p)(2)(E) and 402(p)(6), recognizing the permitting authority’s potential need to regulate individual unregulated stormwater discharges on a case-by-case basis, as well as the potential need to regulate stormwater discharges on a localized or regionalized categorical basis to address local concerns or to make progress in complying with water quality standards. See 64 Fed. Reg. at 68781. The Preamble does not expand on the term “localized,” but in prior uses of this authority, Region 1 has proposed designation on a watershed basis (Long Creek in Maine and Charles River in Massachusetts). Any discharge or category of discharges designated under the RDA regulation is subject to NPDES permitting. 40 C.F.R. § 122.26(a)(9)(ii), (iii).

### III. Summary of Petition

In July 2013, Conservation Law Foundation (CLF), National Resources Defense Council (NRDC) and American Rivers (AR), (hereinafter, collectively the Petitioners), petitioned the Regional Administrator of EPA Region 1 to make a determination, pursuant to 40 CFR §122.26(a)(9)(i)(D), that all non-*de minimus* currently non-NPDES permitted stormwater discharges from commercial, industrial and institutional (CII) sites are contributing to violations of water quality standards in certain impaired waters throughout Region 1, and therefore require NPDES permits pursuant to section 402(p) of the Act. The petition cites nutrients (phosphorus and nitrogen), zinc, copper, lead, Biochemical Oxygen Demand (BOD)/ Chemical Oxygen Demand (COD), and total suspended solids (TSS) as the pollutants of concern contributing to impaired waters within the Region. The Petitioners provided a listing of impaired waters in Region 1. Petitioners summarize 1711 segments for which one or more of the listed pollutants is identified as the cause of the impairment. Petition at 11. These 1711 segments are a subset of the total impaired waters in the Region.

Petitioners claim that “[n]on-de minimis discharges from impervious surfaces associated with industrial, institutional, and commercial sites (including rooftops and parking lots) are contributing to violations of water quality standards throughout Region 1.” While the petition defines these site categories as part of the designation request<sup>4</sup>, it does not identify specific

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minimum, municipal entities outside urbanized areas with a population greater than 10,000 must be considered for permitting. 40 C.F.R. §§ 122.26(b)(16); 40 C.F.R. § 123.35(b).

<sup>3</sup> The Phase II rule also allows for designating stormwater discharges for NPDES permit coverage if stormwater controls are needed for such discharges based on wasteload allocations in a TMDL. 40 C.F.R. § 122.26(a)(9)(i)(C). This basis for designating stormwater discharges was not raised in the petition.

<sup>4</sup> Under the petition “commercial sites” means any site where the primary land use is commercial activity (the sale of goods and services), as opposed to residential or industrial use. Commercial sites may include malls, shopping centers, strip commercial areas, neighborhood stores, office buildings, hotels, gas stations, restaurants, parking lots and garages, and other businesses, including their associated yards and parking areas. Mixed use developments that include commercial uses are considered commercial sites for this purpose. “Industrial sites” means any site where



subgroups of these categories or specific facilities within these categories. EPA estimates that the Regional universe of the facilities identified in the petition is tens of thousands<sup>5</sup>.

The petition requests designation of stormwater discharges from CII sites that contain non- *de minimus* levels of pollutants. The term *de minimus* appears in a September 16, 2003 letter from Tracey Mehan, III, Assistant Administrator, to Elizabeth McLean, Secretary, Vermont Agency of Natural Resources ("Mehan letter"). The term is used to describe the level of pollutant contribution to an impairment above which it would be reasonable to designate the source and require an NPDES permit. The term should be evaluated within the scope of EPA's regulations which state that designations should be for discharges that are "a significant contributor of pollutants" or "contribute to a violation of a water quality standard." (40 CFR 122.26(a)(9)(i)(D)) A discharge may contain more than a "*de minimus*" amount of a pollutant but that fact is only one determining factor for designation. Designations are made on a case-by-case basis where supporting information provides evidence that the discharge is a significant contributor or contributes to a water quality violation.

#### IV. Petition Review Criteria

EPA has identified a number of factors to consider in exercising its case-by-case and categorical designation authority. For a case-by-case determination under section 402(p)(2)(E), EPA described as relevant factors the available water quality and sampling data as well as "the location of the discharge with respect to waters of the United States; the size of the discharge, the quantity and nature of the pollutants reaching waters of the United States; and any other relevant factors." 55 Fed. Reg. at 47993. State reports generated under CWA section 305(b) are critical sources of information for making designation determinations<sup>6</sup>, as noted in early EPA guidance, as well as other available information that characterizes stormwater discharges.

In the development of the Phase II rule, EPA considered designation of additional categories of stormwater sources for regulation under the NPDES permit program, based on three factors. 64 Fed. Reg. 68722, 68780 (December 8, 1999). EPA considered 1) the likelihood for exposure of pollutant to precipitation at sources included in that category, 2) whether sufficient data are available on which to make a determination of potential adverse water quality impacts for the category of sources, and 3) whether such sources were adequately addressed by other environmental programs. *Id.* The likelihood of exposure of a pollutant to precipitation at industrial sources was also a factor in defining the scope of "stormwater discharges associated with industrial activity" in the Phase I rule. See 55 Fed. Reg. at 48008.<sup>7</sup> These basic factors are also relevant in evaluating the petition.<sup>8</sup>

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the primary land use is light or heavy industry, including buildings, equipment, and parking areas. "Institutional sites" means any site where an institution is located, including schools, colleges, hospitals, museums, prisons, town halls or court houses, police and fire stations, including parking lots, dormitories, and university housing. (Petition at p. 10, fn 62)

<sup>5</sup> Estimate based on the number of entities potentially regulated by the Draft Charles River RDA in the towns of Franklin, Bellingham, and Milford multiplied by the number of municipalities in the region.

<sup>6</sup> *Designation of Stormwater Discharges for Immediate Permitting*, August 8, 1990, available at <http://www.epa.gov/npdes/pubs/owm0220.pdf> at 12.

<sup>7</sup> The Phase I rule provision excluding from the definition certain industrial stormwater discharges based on the assumption that there is little or no exposure of materials or activities to precipitation was remanded. *NRDC v. EPA*,



In the Mehan letter, EPA elaborated on these factors. EPA noted that “[n]either the CWA nor implementing regulations impose a non-discretionary duty to designate sources” and that a decision to “exercise its discretion to designate (or not) sources should be based on available information and relevant considerations.” (Mehan letter at 1). Noting that sufficient information to determine causes of impairment or to identify stormwater sources of the impairment may not be available in some circumstances, EPA further stated that while it has not defined a threshold level of pollutant contribution that would trigger a finding that a source is contributing to a violation of a WQS or is a significant contributor of pollutants to waters of the U.S., “it would be reasonable to require permits for discharges that contribute more than *de-minimus* amounts of pollutants identified as the cause of impairment to a water body.” (Mehan letter at 2). However, EPA also noted that “other water quality protections that are already in place” are relevant to consider with respect to whether to designate a source or when to make such designation or permit application requirement effective. “Vigorously implemented controls that otherwise might be ‘voluntary’ may provide a reasonable basis to defer designation of a particular source.” (Mehan letter at 3).

The Region has evaluated the petition in light of the factors discussed above and has consulted with authorized states in the region since in a majority of circumstances, a state and not EPA would be responsible for issuing and overseeing permits for any designated stormwater discharges.

In sum, the factors considered by the Region in evaluating the petition are:

1. Likelihood of exposure of pollutants to precipitation at sources in the categories identified in the petition;
2. Sufficiency of available data to evaluate the contribution of stormwater discharges to water quality impairment from the targeted categories of sources
  - a. Data with respect to receiving water quality causes of impairment
  - b. Data available from establishment of Total Maximum Daily Loads;
3. Whether other federal, state, or local programs adequately address the known stormwater discharge contribution to a water quality standard violation; and

## V. Regional Response

Residual designations have been used several times in New England, both by EPA and states, and the Region intends to continue to use this tool where appropriate. The Region is neither granting the petition as it is currently framed, nor is it denying the petition. The Region will evaluate individual watersheds where site-specific information may support a designation. The

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966 F.2d 1292, 1305 (9th Cir. 1992). However, the underlying rationale that exposure of industrial pollutants to precipitation is a relevant factor was not questioned. Rather, EPA’s exclusion was remanded for lack of record support. To cure this defect, in the Phase II rule EPA promulgated a conditional exclusion for owners/operators of industrial activities to certify that the facility meets the “no exposure” requirements of the rule. 64 Fed. Reg. at 68782-87; 40 C.F.R. § 122.26(g).

<sup>8</sup> EPA’s use of these factors in deciding not to designate additional stormwater sources in the Phase II rule was upheld. See *Environmental Defense Center v. EPA*, 344 F.3d 832, 861 (9th Cir., 2003).



evaluations will focus on the nature of the impairment and the extent to which stormwater discharges from CII sites are contributing to such impairment, to determine whether and the extent to which exercise of RDA is appropriate. This process will require consideration of Region-specific data that were not provided or cited in the petition, and EPA will work with the New England states as it proceeds with these evaluations. Any potential designation of individual, or categories of, commercial, industrial and/or institutional stormwater discharges would be in localized areas where the Region has site specific information to support a designation.

Given the vast number of sites that could potentially be designated based on the scope of the petition, it will be necessary to phase these evaluations. The Region will begin with the evaluation of unregulated CII sites in watersheds where EPA or a state agency has already determined that stormwater is a significant contributor of pollutants or is contributing to a water quality standard (or standards) being exceeded. Following this evaluative process, EPA will determine whether it is appropriate to designate sources. Thereafter, as time, resources, site specific information, and knowledge of stormwater controls allow, additional phased designations may follow the initial ones.

As described in Section V.3 below, the Region has already begun considering several water segments with approved TMDL(s) that clearly identify unregulated stormwater sources to be contributing to the impairment, as identified in the petition. These watersheds are examples of where efforts may be focused.

## **VI. Evaluations/Analysis**

### *1. Likelihood of Exposure of pollutants to Precipitation at Sources in Categories Identified in the Petition:*

The petition identifies the following pollutants: lead, copper, zinc, sediment, COD/BOD, phosphorus and/or nitrogen.

There are many different sources that are associated with these pollutants. Some CII sites or activities will have greater potential to contribute these pollutants than others. In addition to evaluating the potential for pollutant exposure, the Region also evaluated the connection between specific pollutants, various land uses and impervious cover.

Sources of metals include roads and traffic as well as some industrial sources. Metals may also be the result of acid rain. Due to the connection between the sources of metals and roads or other paved surfaces, it is reasonable to predict that areas with large parking lots and other paved surfaces such as roads, sidewalks and driveways could be a source of metals. CII sites in general may contribute to metals impairments. Many, but not necessarily all, CII sites could be a source of metals impairments however, without more specific information the Region cannot determine that all CII sites within the region are a source of metals impairments.

There are several sources associated with nutrients, including atmospheric deposition, vehicle exhaust, fossil fuel combustions (power plants), fertilizer, septic systems, agriculture, and pet



and wildlife wastes. The term “nutrients” refers to phosphorus and nitrogen. Nutrients could come from municipal sources such as urban runoff as well as runoff from CII sites that may either discharge directly to surface waters or be a component of MS4 urban runoff. Similar to metals, nutrients accumulate on impervious surfaces and can be deposited into water bodies during precipitation events. To the extent the CII sites have impervious surfaces that are connected to a water body or use products that contain nutrients (fertilizers), these pollutants could be exposed to precipitation and result in stormwater discharges.

BOD is the measure of the quantity of oxygen used by microorganisms in oxidation of organic matter. In other terms, it is the measure of the rate at which oxygen is taken up. COD is a measure of the amount of organic compounds in water. It is the capacity of the water to consume oxygen during the decomposition of organic matter. Both of these parameters are a measure of oxygen consumption within the water column. The water quality parameter that is connected with these measurements is dissolved oxygen. Waters with high BOD or COD levels contain high levels of oxygen consuming organic materials and have low levels of dissolved oxygen. Excessive levels of nutrients can often result in low levels of dissolved oxygen. BOD and COD as mentioned previously are measurements which indicate the condition of the water and impairments for these parameters are typically listed as dissolved oxygen. Low dissolved oxygen is often associated with nutrient impairments. BOD and COD are indicators of impairments such as dissolved oxygen which could also be an indicator of nutrient impairment.

TSS is a measure of the amount of suspended sediment particles in the water column. It also provides an estimate of the sediment load transported to a water body. Sediment loads may also be characterized by turbidity, which measures the presence of suspended solids and organic material<sup>9</sup>. Waters that are high in turbidity are often cloudy in appearance. Sediment is often associated with land clearing and site construction, but also comes from the wash off of particles and materials from impervious surfaces such as rooftops, streets, and parking lots. Sediment provides a medium for transport of other materials such as metals and nutrients since they adhere to the sediment particle. Sediment is often used as a surrogate for other pollutants. In Region 1, where roads and parking lots are often treated with sand during the winter months, the likelihood exists for this pollutant to be present at CII sites.

The extent of impervious surfaces is important because it increases the volume of rainfall that becomes runoff and amplifies the pollutant loads flowing into surface waters. As noted in the Preamble to the Phase II stormwater rule “...the level of imperviousness in an area strongly correlates with the quality of the nearby receiving water.” 64 FR 68722, 68725 (December 8, 1999). The National Research Council (NRC) report notes “flow and related parameters like impervious cover should be considered for use as proxies for stormwater pollutant loadings.”<sup>10</sup> Impervious cover is often an appropriate surrogate/proxy for pollutant loads for several reasons. Due to the variability of stormwater, addressing its impacts on water quality on a pollutant by pollutant basis may not be the most effective approach for stormwater management. There is a relationship between land use and pollutant loadings. There is also a relationship between land use and impervious cover. The extent of impervious cover differs by land use. For example, commercial and industrial land uses typically have impervious cover in the range of 60 to 90

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<sup>9</sup> 2012 Construction General Permit definitions – Appendix A

<sup>10</sup> NRC Report Summary (page 3)



percent. Agriculture and open space typically have impervious cover in the range of zero to five percent.<sup>11</sup>

The table below presents generalizations about the relative pollutant levels of various land uses based on various studies.

Table1 – Relative Source of Parameters for Different Land Uses<sup>12</sup>

	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Freeway</b>	<b>Construction</b>
Sediment	Low	Moderate	Low	Low	Very High
Metals/Toxics	Low	Moderate	High	High	Moderate
Nutrients	Moderate	Moderate	Low	Low	Moderate
Organics	High	Low	Low	Low	Moderate

EPA recognizes that as a general matter, the extent of impervious cover at commercial and industrial properties is relevant due to the connection between water quality impairments and impervious surfaces. While studies have shown a wide range of biotic responses from increasing impervious cover, several studies has demonstrated that even small amounts of impervious cover in a watershed can negatively impact aquatic life. Depending on the watershed, impairments can be observed with as little as 10 percent impervious cover<sup>13</sup>.

In sum, with respect to exposure of sediment/TSS, metals, nutrients and BOD/COD to precipitation, the Region finds that there is a likelihood of pollutant exposure, and therefore presence in stormwater discharges from CII sites generally. The degree of exposure may be most clearly related to the presence of large amounts of impervious surfaces at such sites.

## *2. Sufficiency of Available Data on which to Make A Determination that CII Sites Contribute to Water Quality Standards Exceedances:*

The petition presents summary data collected from National Urban Runoff Program (NURP) study, the National Stormwater Quality Database (NSQD), National Research Council (NRC) Report, and several other sources. Data presented in the petition provided median values for various pollutants from various land uses. The Region focused on the data from the NSQD and the impaired waters listing. The Region also created a series of maps in an effort to assess connections between impaired waters and impervious cover. The NURP data is mainly focused on urban runoff (which is a combination of many sources) and was not geared towards the evaluation of CII discharges, and therefore it was not a focus for Regional review.

### National Stormwater Quality Database

NSQD contains data for all EPA Rainfall Zones<sup>14</sup>. There is a robust data set from Rainfall Zone 2 (mid-Atlantic), 2000 events or 53.12% of the events sampled. There are limited data from Rainfall Zone 1 (northeast), 69 events or 1.83% of the events sampled. Despite the extreme

<sup>11</sup> Charles River RDA – page 5

<sup>12</sup> Table 3-3- NRC Report (page 153)

<sup>13</sup> Article – *The Importance of Imperviousness* – Feature article from Watershed Protection Techniques 1(3): 100 - 111 - Schueler (2000)

<sup>14</sup> 40 CFR Part 122 Appendix E



differences in the number of data points, the rainfall patterns of the two zones are sufficiently similar and the data from Rainfall Zone 2 can be considered representative for Region 1. This is supported with data collected from the Reagan National Airport in Washington, DC and Logan airport in Boston, Mass. The rainfall patterns in the two zones are similar: 89.44 percent of the storms at National Airport are less than 0.3 inches and 88.07 percent of the storms at Logan Airport are less than 0.3 inches. Both locations have several small frequent storms over the course of a year. This information is presented in Attachment A. Although Boston has a higher annual precipitation, there are sufficient similarities in storm event frequency and storm type (several small events with comparable intermittent dry periods) which makes the data relevant for use in the Region. This similarity is also relevant in the calculation of event mean concentration (EMC). The EMC is the concentration of a pollutant divided by the volume of stormwater. EMC values were used in the development of pollutant loading export rates (PLER) for phosphorus included in the Region's draft small MS4 general permits. In an effort to support the use of the NSQD EMC values, the Region compared data collected within the Region<sup>15</sup> with data collected from the NSQD for total phosphorus (presented in Table 2).

**Table 2. Summary of Residential and Commercial Stormwater Total Phosphorus EMC Data – New England and NSQD, 2008**

Data Set - Source	Total Phosphorus Stormwater EMC, mg/L					
	Count	Arithmetic Mean	Median	Geometric Mean	25th%	75th%
NE Region - Residential	90	0.45	0.30	0.24	0.10	0.50
NSQD, 2008 Residential	733	0.41	0.29	0.29	0.18	0.47
NE Region - Commercial	18	0.22	0.23	0.11	0.12	0.30
NSQD, 2008 – Commercial & Industrial	557	0.30	0.20	0.19	0.11	0.34

Based on the similarities regarding data and storm events, the Region considers the data from the NSQD for Rainfall Zone 2 to be appropriate for describing stormwater in this Region. However, though representative, the data are not sufficient for the Region to make a determination that all CII sites contribute to water quality standards violations.

#### Impaired waters listings

Attachment A of the petition provides a listing of impaired waters based on the current approved 303(d) lists of each state. The lists are required by Section 303(d) of the Clean Water Act and are included in the Integrated Water Report required by Section 305(b) of the Act. These lists are updated every two years. The most recent approvals for the state 303(d) lists by the Region are as follows: Connecticut – January 30, 2013; Maine – September 20, 2011; Massachusetts – May 2, 2013; New Hampshire – September 7, 2011; Rhode Island – September 27, 2012 and Vermont- June 13, 2012.

States are required to develop their 303(d) lists using all existing and readily available water quality related data and information about the following categories of waters: (1) waters identified as partially meeting or not meeting designated uses, or as threatened in the most recent Section 305(b) report; (2) waters for which dilution calculations or predictive models indicate

<sup>15</sup> Data source: USGS, and Universities of New Hampshire and Vermont



nonattainment; (3) waters for which water quality problems have been reported by other government agencies, members of the public or academic institutions; and (4) waters identified as impaired or threatened in any Section 319 non-point source assessment. States must also consider other data that are existing and readily available. States may submit to EPA documentation supporting their decisions to rely or not rely on particular data and information. States have different methodologies, within the scope of EPA regulations, for listing their waters. Due to the various methodologies available to states, the 303(d) lists often do not provide information regarding the potential source of the impairment, the data used to make the determination; or the date when the water segment was listed as impaired. While the lists show that some of the Region's waters are impaired for the pollutants identified in the petition, and for specific segments may indicate that urban runoff in general needs to be controlled, they do not alone provide the connection between the impairments and any CII stormwater sources.

### Maps

In an effort to gain a sense of any connection between impaired waters, impervious cover, and MS4 jurisdictional boundaries, Region 1's GIS staff developed two maps for each state within the Region. (Attachments B through I). One map depicted MS4 areas subject to NPDES permits, impaired waters and impervious surfaces greater than 10 percent, and the second map depicted only impaired waters and impervious surfaces greater than 10 percent. Although biological impacts have been observed in watersheds with less than 10 percent impervious cover, a 10 percent impervious cover threshold was chosen as a reasonable indicator that stormwater discharges would likely be contributing to water quality standards exceedances. The maps were created at a broad scale with no watershed, town or parcel specific information included. With limited exceptions, impaired waters are found near impervious surfaces and mainly within MS4 areas. The maps served as reinforcement of the connection between impaired waters and impervious surfaces.

### Summary of Data Findings:

The data submitted by the Petitioners and reviewed by the Region are generalized. The petition does provide information which indicates that CII sites could contribute more than a non *de-minimus* amount of pollutants of concern identified in the petition, but it does not provide the Region with specific information about specific sources within the Region. The crux of the Petitioner's argument draws the following line of reasoning: water quality problems are caused by pollutants; there are pollutants in CII stormwater discharges; therefore all such CII discharges are problematic and require designation and permitting. In the Region's view the Petitioners' approach is too simplistic.<sup>16</sup> While the presented data do indicate that urban stormwater contains pollutants and that commercial sources can contribute a portion of these pollutants, the data are too generic to allow identification of specific CII sources, or to categorically link stormwater discharges from CII sites in a particular area to water quality impairments.

### *3. Data from approved TMDLs*

In addition to the data submitted with the petition, the Region evaluated available data contained in the four approved TMDLs identified in the petition.

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<sup>16</sup> As noted in the NURP Executive Summary (page 2): "An important finding of the work conducted during NURP was to learn to avoid the following simplistic logic train (a) water quality problems are caused by pollutants; (b) there are pollutants in urban runoff, therefore (c) urban runoff causes 'problems.'"



Mashapaug Pond, RI – This TMDL was completed in 2007. This pond is located in the City of Providence in the Pawtuxet River Basin. The pond is impaired for phosphorus, low dissolved oxygen, excess algal growth/chlorophyll a, pathogens and PCBs. The land uses surrounding the pond are high density residential, commercial and industrial. The designated use impairments are fish propagation and other animal life in the pond, and swimming. The goal of the TMDL is to restore the pond and protect it from future degradation. Load reduction simulations using a calibrated model “indicate that 65% reduction in nutrient loads from manageable sources (i.e. storm drains, direct overland runoff, and base flow from Spectacle Pond)”<sup>17</sup> is necessary.

The largest source of phosphorus is via tributary flow from Spectacle Pond. The second largest source is from storm drains that are owned by Rhode Island Department of Transportation (RIDOT) and the City of Providence; both are subject to the RI small MS4 general permit. Other sources include currently unregulated sources that contribute to the MS4 systems as well as sources discharging directly to the pond. Sources that are not addressed in the TMDL include atmospheric deposition and groundwater underflow.

The TMDL proposes a phased implementation. It calls for a combination of BMPs to be applied within the watershed. As the BMPs are applied and implemented, the response of the phosphorus concentrations within the pond will be measured and BMP adjustments made. Contributions from Spectacle Pond are not addressed by the Mashapaug Pond TMDL implementation plan. Spectacle Pond’s impairments are addressed as part of the “Total Maximum Daily Loads for Phosphorus to Address 9 Eutrophic Ponds in Rhode Island.” Stormwater outfalls to Spectacle Pond are from the City of Cranston, which is permitted under the RI small MS4 general permit.

The general permit for regulated small MS4s requires permittees to enhance existing minimum controls to address the pollutant reductions specified in the implementation plans of the TMDLs. Permittees are required to update their existing Stormwater Management Program Plans (SWMPP) to incorporate the required amendments to Phase II stormwater Management Program Plans (Part 6.3 of the TMDL). These plans are submitted to Rhode Island Department of Environmental Management (RIDEM) for review.

The TMDL identifies the need for volume reduction in stormwater flows to Mashapaug Pond. The TMDL indicates that this is the responsibility of the City of Providence, RIDOT, and private property owners in general. Private property owners are included as has having some responsibility for management of direct runoff to the pond. Specific private property owners have not been individually identified in the TMDL. The currently unregulated discharges from specific private property owners could be potential sources for designation. Region 1 will continue to consult with the state of Rhode Island about whether residual designation would be an appropriate tool in this watershed.

Indian Run Brook, RI– This TMDL for dissolved metals was completed in 2008. This brook is located in the town of South Kingstown. The brook is impaired for dissolved copper, lead and zinc. The land surrounding the brook is subdivided into three Sub-watersheds. Sub-Watershed

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<sup>17</sup> Mashapaug Pond TMDL



A, Upper Indian Run East, is 1.2 square miles and the surrounding land use is wetlands, deciduous forest, and roads. Sub-Watershed B, Upper Indian Run West, is 0.7 square miles and the surrounding land use is wetlands, deciduous forest and institutional. Sub-Watershed C, Lower Indian Run- Peacedale/Wakefield Center, is 0.47 square miles and the surrounding land use is commercial, medium-high density residential and medium density residential. The TMDL indicates that the following reductions in dissolved metals are needed copper 76%; lead 79% and zinc 39%.

Neither Sub-Watershed A nor Sub-Watershed B has any recommended actions as part of the TMDL. This is because there were no exceedances of water quality standards during the sampling events for the TMDL development. Also, for Sub-Watershed B, no sources were identified. Sub-watershed C consists of 104 acres of land, 73 of which are impervious. These acres drain to a single 7' x 3' outfall. The only sources identified were stormwater. Sources of stormwater include the town of South Kingstown and RI DOT. According to the TMDL, existing CII sites discharge stormwater to existing MS4 infrastructure.

The town of South Kingstown is covered under the RI small MS4 general permit. The permit requires the Town to update its existing SWMPP to address the TMDL. The TMDL implementation plan identifies required amendments to Phase II Stormwater Management Program Plans (see Part 6.4.2 of the TMDL). The updates are submitted to RIDEM for review. In addition to metals reductions, the TMDL identifies the need for stormwater volume reductions. A report completed in 2006 is intended to assist the Town of South Kingstown in the development of a "strategy that included capturing and infiltrating up to 1" of runoff from impervious areas."<sup>18</sup> The report provides design concepts for each parcel within the catchment area to restore groundwater recharge levels to those that existed prior to development. When these plans are implemented, regulation of currently unregulated CII stormwater discharges may not be necessary. Additional information is needed to make this assessment, and EPA will continue to consult with the state of Rhode Island about whether residual designation is an appropriate tool in this watershed.

Barberry Creek, ME – This TMDL for impervious cover was completed in 2006. Barberry Creek is located in South Portland, Maine. The entire watershed is located within an urbanized area. This TMDL addresses aquatic life impairments and uses impervious cover as a surrogate for pollutant specific concentration levels. At the time of the TMDL development, the estimated impervious area of the watershed was 23 percent. The TMDL sets a target of 12 percent impervious cover for the watershed and a goal to have the macro invertebrate community attain class C standards<sup>19</sup>.

The creek is 1.3 miles long and has a 786 acre watershed. The TMDL identifies 5 discharges to the creek which all appear to be addressed by an existing state permit. There are 3 MS4 outfalls from the City of South Portland, one CSO outfall, and one commercial stormwater discharge from Hannaford Brothers Company. The discharges from the MS4 outfalls are addressed by Maine's small MS4 general permit, which requires permittees to update existing SWMPs for

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<sup>18</sup> Indian Run Brook TMDL

<sup>19</sup> Water quality criteria for Class C streams 38 MRSA §465

consistency with approved TMDLs<sup>20</sup>. The plans are submitted to ME Department of Environmental Protection for review<sup>21</sup>. The CSO outfall is addressed by the permit issued to the City's wastewater treatment plant. The CSO is scheduled for removal. Hannaford Brothers has a small stormwater treatment and detention pond that was permitted under Maine's Site Location of Development Law<sup>22</sup>. The property drains approximately 8 acres or 1 percent of the total watershed. The TMDL identifies the Hannaford discharge as "a minor source".<sup>23</sup>

Charles River, MA – There are two TMDLs for the Charles River, one for the "lower Charles River" (completed in June 2007) and one for the "upper/middle Charles River" (completed May 2011). Both TMDLs are for phosphorus and both focus on adaptive management for addressing the phosphorus impairment. The Charles River is approximately 80 miles in length and flows through 23 towns and cities and five counties. The Charles River drains an area of approximately 308 square miles. The Lower Charles River is highly urbanized.

The Lower Charles TMDL includes WLAs for CSOs, wastewater treatment facilities (WWTFs) and stormwater. Both non-point sources and unregulated stormwater discharges are combined with regulated stormwater sources and are identified as WLAs. This was done because at the time of TMDL development there was not sufficient information to distinguish the non-point source and unregulated sources from the regulated sources so all were included in the WLA. The CSOs are addressed with Long Term Control Plans required by applicable NPDES permits. WWTFs have NPDES permits with seasonal phosphorus limits. The TMDL identifies phosphorous reductions based on land use:

- Commercial/Industrial – 65 %
- High Density Residential/ Medium density residential – 65%
- Low density residential – 45 %
- Agriculture/ Open land – 35%
- Forest 0%

The Upper/Middle Charles River TMDL identifies two main sources of phosphorus, wastewater treatment facilities (WWTF) and stormwater. There are three major WWTFs along the river. The WWTFs have winter phosphorus limits of 0.3 mg/l and summer phosphorus limits of 0.1 mg/l, based on the WLAs in the TMDL. Stormwater phosphorus reductions are based on land use. The phosphorus reductions identified are:

- Commercial/industrial/transportation - 65%
- High Density/medium density/multifamily – 65%
- Low density residential – 45%
- Open space/agriculture – 35 %
- Forest/forested wetlands – 0%
- Open water/wetlands – 0%

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<sup>20</sup> ME General Permit MER041000 – Part IV(K)

<sup>21</sup> ME General Permit MER041000 – Part IV(K)

<sup>22</sup> 38 MRSA §§481-490

<sup>23</sup> Barberry Creek TMDL page 26



Most of the communities within the Charles River watershed are subject to the small MS4 general permit. The one exception is the City of Boston which is subject to an individual permit for its MS4. Both the current draft small MS4 general permit under development and the planned individual permit reissuance will contain requirements for the municipalities to achieve the reductions indicated in the approved Lower and Upper/Middle Charles River TMDLs. While municipal sources will be addressed by existing permits, the TMDLs note that "Some stormwater point sources may not be the responsibility of the municipal government and may have to be addressed through other regulatory vehicles available to EPA and MassDEP, including, but not limited to EPA's exercise of its residual designation authority to require NPDES permits, depending upon the severity of the source."<sup>24</sup>

In November 2008, Region 1 made a preliminary determination to designate storm water discharges from two or more acres of impervious surfaces located on a single lot or two or more contiguous lots in three communities in the Lower Charles River watershed. EPA released a draft general permit for these sources, but the designation will not be finalized until the issuance of a final general permit. The Region anticipates revisiting the existing designation with the potential for expansion of its scope.

#### *4. Review of existing environmental programs:*

##### Federal Stormwater Permit Programs

##### Multi-Sector General Permit (MSGP)<sup>25</sup>

This permit regulates stormwater discharges associated with industrial activity as defined in 40 CFR 122.26(b)(14). The regulatory definition specifically excludes the areas identified in the petition (parking lots and rooftops not associated with industrial activity)<sup>26</sup> as such, the MSGP does not address the areas specifically excluded by the regulations. The scope of the petition is aimed at addressing stormwater discharges that may occur at an industrial facility, but are not regulated by the MSGP, such as parking lots and other impervious surfaces.

For the most part, industrial stormwater permits in the authorized NPDES states mirror the federal permit and its limitations. Any exceptions are identified below.

##### MS4 Permits

There are individual permits issued to Phase I MS4s and general permits for Phase II MS4s. There are only three Phase I municipalities within the Region. The permits apply only within the jurisdictional boundaries of the municipality and do not extend to neighboring MS4s or the county. The Phase I MS4 program requires municipalities to have structural and source control measures to reduce pollutants from runoff from commercial and residential areas. The regulatory language for the Phase I MS4s does not specifically require municipalities to address either industrial or institutional areas as part of their stormwater management program (SWMP).

<sup>24</sup> Upper/Middle Charles River TMDL (page 85); Lower Charles River TMDL (page 113)

<sup>25</sup> The 2008 MSGP expired on September 29, 2013 and was administratively extended for covered entities. EPA proposed a new MSGP on September 27, 2013 (78 Fed. Reg. 59672) and the comment period on the proposed permit closed December 26, 2013.

<sup>26</sup> 40 CFR 122.26(b)(14): "...This term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas..."



While the current Phase I MS4 permits require the permittees to have a program to “identify, monitor and control pollutants” discharging to the MS4, the effectiveness of the program has not been fully evaluated. Furthermore, the Region has not issued “second generation” permits for the Phase I MS4s which potentially could include more prescriptive requirements for addressing commercial and industrial sources that discharge directly into the MS4. The existing Region 1 Phase I MS4 permits only regulate discharges from the MS4 and therefore they do not address discharges from CII sites directly to waters of the U.S.

The Phase II MS4 program requires operators of MS4s to “...develop, implement and enforce a storm water management program designed to reduce the discharge of pollutants...to the maximum extent practicable (MEP), to protect water quality, and to satisfy the appropriate requirements of the Clean Water Act.” (40 CFR 122.34(a)). There are over 500 regulated Phase II municipalities within the Region. Most all regulated small MS4s within the Region are covered by a general permit. The Region, RI and CT are working on their “second generation” general permits. Vermont and Maine have issued “second generation” permits. Vermont’s small MS4 general permit contains some specific requirements for addressing existing development. Details are included in the state programs section below. The small MS4 permits issued in 2003 (CT, MA, NH, and RI) do not contain requirements to address existing development nor do they include specific requirements regarding management of existing CII discharges to the MS4.

#### State Programs

States have either an industrial stormwater general permit or a MSGP and a small MS4 general permit. These permits for the most part address the same stormwater sources as the EPA permits. Each state also has regulations to address new development and redevelopment. Implementation of redevelopment standards will address a limited number of CII sites when redevelopment activities trigger state standards. The states have many different tools and programs to address stormwater. For purposes of this review, the Region focused on mechanics that address existing development or sources similar to those described in the petition. These findings are described below.

**Connecticut** - Connecticut has a General Permit for the Discharge of Stormwater Associated with Commercial Activity. The state defines commercial activity as those properties with Standard Industrial Classification of (50– 59)<sup>27</sup> and (70 -79)<sup>28</sup> with five acres or more of contiguous impervious surface. The permit requires the development of a stormwater management plan which includes BMPs such as sweeping, proper storage of materials, and annual inspections/evaluations. There are a few hundred facilities covered by this general permit. This permit does address many types of commercial properties, but generally does not address institutional or industrial facilities.

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<sup>27</sup> Major Group 50 is wholesale trade-durable goods; 51 is wholesale trade-nondurable goods; 52 is building materials, hardware, garden supply and mobile home dealers; 53 is general merchandise stores; 54 is food stores; 55 is automotive dealers and gasoline service stations; 56 is apparel and accessory stores; 57 is home furniture, furnishings and equipment stores; 58 is eating and drinking places; and 59 is miscellaneous retail.

<sup>28</sup> Major group 70 is hotels, rooming houses, camps and other lodging places; 72 is personal services (laundry, beauty shops); 73 is business services; 75 is automotive repair, service, and parking; 76 is miscellaneous repair services; 78 is motion pictures; and 79 is amusement and recreation services.



**Maine** - Stormwater in Maine is address through the Stormwater Management Law and the Site Location of Development Law (Site Law). These rules apply to developments of 20,000 square feet or more of impervious area or 5 acres or more of developed area in watersheds identified associated with urban impaired streams<sup>29</sup>. They also apply to development of one acre or more of impervious area or 5 acres or more of developed area in any other watershed. Properties which meet either of these criteria must meet standards associated with on-site retention and volume control, channel protection, and flood control<sup>30</sup>. The Site Law requires review of developments that may have a substantial effect on the environment these include developments of 20 or more acres, oil and gas exploration, structures (buildings, parking lots, roads, paved areas that occupy in excess of 3 acres), subdivisions, oil terminals and off-shore wind projects. The applicability of these programs to areas such as parking lots and developments with threshold amount of impervious cover indicate that these existing laws can apply to CII sites.

**Vermont** – Vermont has a statewide program that regulates new development, expansion of existing impervious surfaces, and redevelopment equal to or greater than one acre<sup>31</sup>. The state may regulate discharges of regulated stormwater runoff from an impervious surface of any size to stormwater-impaired waters if the Secretary determines that treatment is necessary to reduce the adverse impact of such stormwater discharges due to the size of the impervious surface, drainage patterns, hydraulic connectivity, existing stormwater treatment, or other factors identified by the Secretary<sup>32</sup>. The state has several permits addressing stormwater discharges. General Permit 3-9010 applies to “regulated stormwater runoff to waters of the State of Vermont that are not principally impaired by stormwater runoff”<sup>33</sup>. General Permit 3-9030 applies to discharges in five specific watersheds<sup>34</sup>. This permit was issued pursuant to Vermont’s RDA authority in 2009 and applies to “...a stormwater discharge from any impervious surface...if such discharge is not covered under a NPDES municipal separate storm sewer system (MS4) permit or another NPDES permit or is not authorized by a state stormwater discharge permit with an associated offset or on-site controls that result in no net contribution to the receiving water.”<sup>35</sup> Vermont’s small MS4 general permit, General Permit 3-9014(2012), requires municipalities that discharge to a stormwater-impaired water with an EPA approved stormwater TMDL to develop a Flow Restoration Plan (FRP)<sup>36</sup>. The goal of the plan is to restore the water to the flow restoration target of the approved TMDL. Municipalities must address not only their stormwater discharges, but must also identify stormwater sources that discharge directly to the MS4 as well as discharges to waters which are not conveyed to the MS4 whose regulation is necessary for the municipality to effectively implement their FRP.

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<sup>29</sup> Urban impaired stream means a stream that fails to meet water quality standards because of the effects of stormwater runoff from developed land. Urban impaired streams are those streams identified and listed in Chapter 502, Appendix B of the Department of Environmental Protection Rules as amended from time to time. (Maine Small MS4 – definitions page 6)

<sup>30</sup> See Department of Environmental Protection Rules, Chapter 500(4)

<sup>31</sup> 10 V.S.A. §1264(d)(1)(D)

<sup>32</sup> 10 V.S.A. §1264(d)(1)(E)

<sup>33</sup> VT General Permit 3-9010-introduction

<sup>34</sup> Bartlett, Centennial, Englesby, Morehouse and Potash Brook Watersheds

<sup>35</sup> VT General Permit 3-9030

<sup>36</sup> VT General Permit 3-9014(2012)



## **VII. Views of Others Entities (States, Tribes, and Trade Organizations)**

The Region shared the petition with each state and the Tribes. All states expressed concern about the scope to the petition, and the potential impact any designations would have on resources, and they were generally unsupportive. The Maine Department of Environmental Protection submitted a letter dated October 2, 2013 to Region 1 Administrator, Curt Spalding expressing its opposition to the petition. The letter states that the issues presented in the petition "...are addressed effectively at the watershed level and years of collaborative efforts by DEP, the municipalities, and stakeholders in the watersheds." The letter further explains activities being undertaken within the state, including the development of stormwater utilities, proactively address stormwater. Maine expressed concern that granting of the petition as presented would harm the "progressive efforts of individuals, municipalities, businesses, groups and DEP throughout the state of Maine." Opposition letters from other entities have expressed concern that the granting of this petition will hinder efforts to establish stormwater utilities and create an additional layer of regulations.

One Tribal Nation expressed support for the petition, believing it will help improve water quality in the reservation waters and throughout the state.<sup>37</sup> The National Association of Clean Water Agencies (NACWA) expressed support for any regulatory approach that would place more responsibility for the management of stormwater on properties owners and ease the burden to MS4 operators. NACWA expressed both the possible benefits and drawbacks of the use of RDA, but stated that "...with thoughtful and targeted execution, exercising the Agency's RDA could improve our members' ability to achieve water quality by controlling stormwater discharges outside of their regulatory purview."<sup>38</sup>

In addition to the letters mentioned above, EPA received letters from several municipalities and other trade organizations expressing their opinions on the petition. The Region reviewed all letters that were submitted however they were not a significant factor in reaching its decision.

## **VIII. Conclusions and Next Steps**

The petition included references to several studies, EPA guidance and various reports to support the request. The evidence provided indicates that urban runoff contributes to water quality impairments. While CII sites are located in urban areas and thus contribute, the evidence in the petition does not provide information that directly connects a CII site or category to a specific impairment.

Region 1 will consider the use of RDA to address impaired waters in a targeted manner where there is adequate evidence and documentation of storm water discharges from one or more CII sites causing or contributing to water quality impairments. If a determination to designate is made, EPA will work with states and other stakeholders in development of a proposed designation that will include taking public comment and engaging with stakeholders. This is the process that was used in the Long Creek designation which has been in place since 2009 and has led to improvements in the watershed.

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<sup>37</sup> Email correspondence from Dan Kusnierz Penobscot Nation to Thelma Murphy, EPA Region 1, January 17, 2014

<sup>38</sup> Letter from NACWA to Nancy Stoner, EPA, February 14, 2014



EPA's proposed designation in the Charles River affected stormwater sources in only three municipalities. Since that designation has not been finalized, the Region plans to revisit its proposal and consider whether it would be appropriate to expand the designation to include sources in additional towns or throughout the entire watershed. EPA will conduct this effort in the context of the petition previously filed by CLF specifically related to the Charles River watershed.

Region 1 – Petition Response – Attachment A

Table 1-Rainfall data Reagan Airport<sup>1</sup>

REAGAN NATIONAL AIRPORT (1998-2002)			
Precipitation depth, inches	count	Cumulative count	Percentage
0-0.3	1634	1634	89.44%
0.3-0.5	59	1693	3.23%
0.5-1	97	1790	5.31%
1-1.5	24	1814	1.31%
1.5-2	10	1824	0.55%
2-2.5	2	1826	0.11%
2.5-3	0	1826	0.00%
3-3.5	0	1826	0.00%
>=3.5	1	1827	0.05%

Table 2 – Rainfall Data Logan Airport

LOGAN AIRPORT - BOSTON, MA (1998-2002)			
Precipitation depth, inches	count	Cumulative count	Percentage
0-0.3	1609	1609	88.07%
0.3-0.5	78	1687	4.27%
0.5-1	93	1780	5.09%
1-1.5	22	1802	1.20%
1.5-2	11	1813	0.60%
2-2.5	8	1821	0.44%
2.5-3	1	1822	0.05%
3-3.5	3	1825	0.16%
>=3.5	2	1827	0.11%

Table 3 – Comparison Annual Average Rainfall Boston and Washington, DC

Average annual rainfall, inches		
	Logan	Reagan
1998	52.9	33.3
1999	39.6	40.0
2000	50.1	39.3
2001	34.7	29.9
2002	45.4	33.4
Average	44.5	35.2

<sup>1</sup> National Climate Center



Table 4 – Comparison Average Intermittent Dry Periods – Boston and Washington, DC

Average intermittent dry period, days		
	Logan	Reagan
1998	4.0	5.1
1999	4.0	4.2
2000	3.3	4.0
2001	3.9	4.5
2002	3.3	4.6
Average	3.7	4.5

## Region 1 Petition Response - Attachments B – I

### Maps:

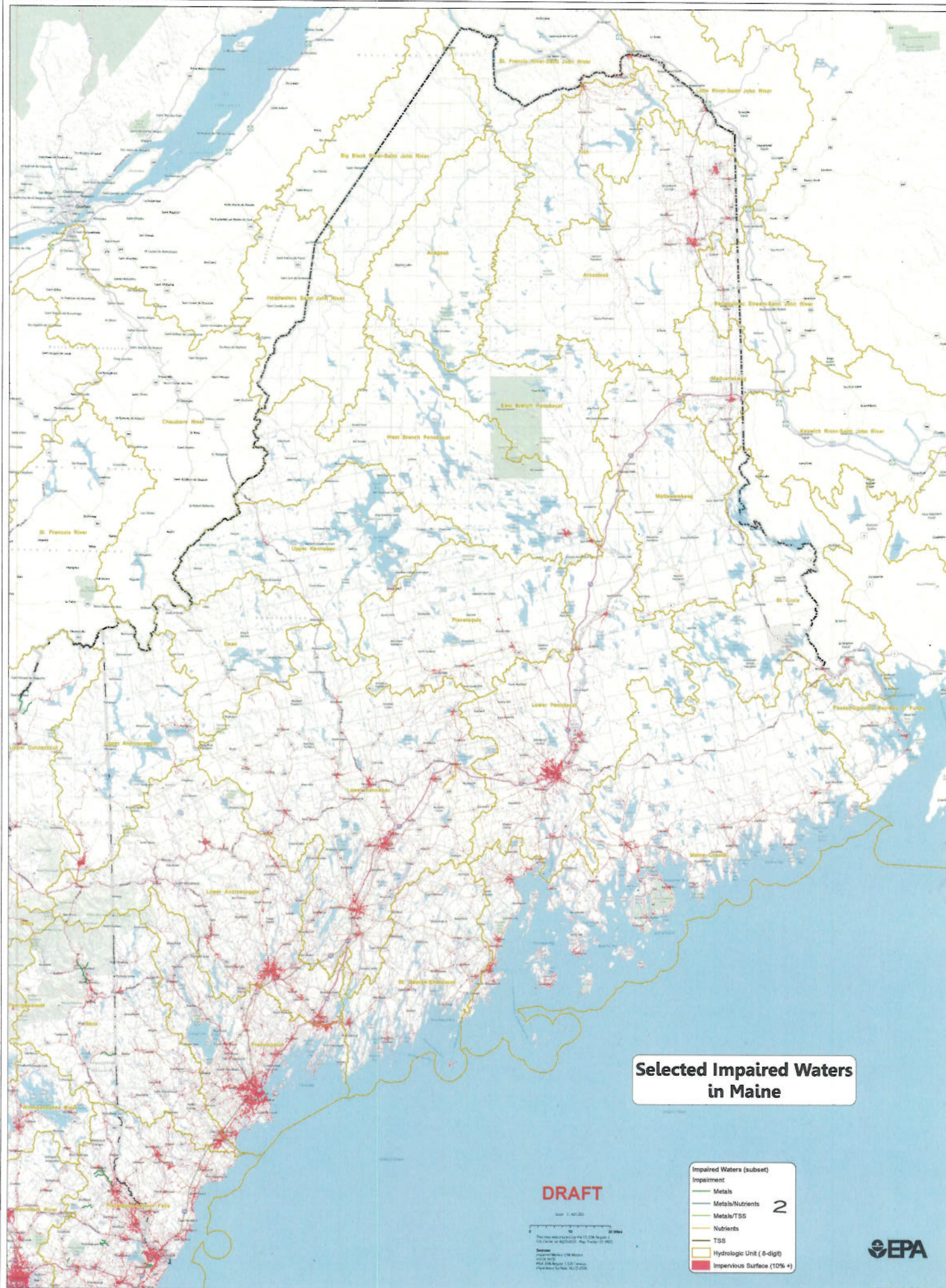
- B – Maine with MS4 boundaries
- C – Maine without MS4 boundaries
- D – Massachusetts with MS4 boundaries
- E – Massachusetts without MS4 boundaries
- F – New Hampshire/Vermont with MS4 boundaries
- G- New Hampshire/Vermont without MS4 boundaries
- H – Connecticut/Rhode Island with MS4 boundaries
- I- Connecticut/Rhode Island without MS4 boundaries





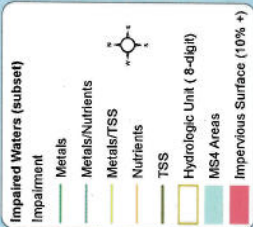


C





# Selected Impaired Waters in Massachusetts



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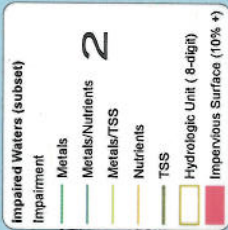


This map was created by the US EPA Region 1  
US Center for Environmental & Estuarine Science (US EES)

Sources:  
USGS National Water Research Institute  
USGS National Water Research Institute  
USGS National Water Research Institute  
USGS National Water Research Institute  
USGS National Water Research Institute



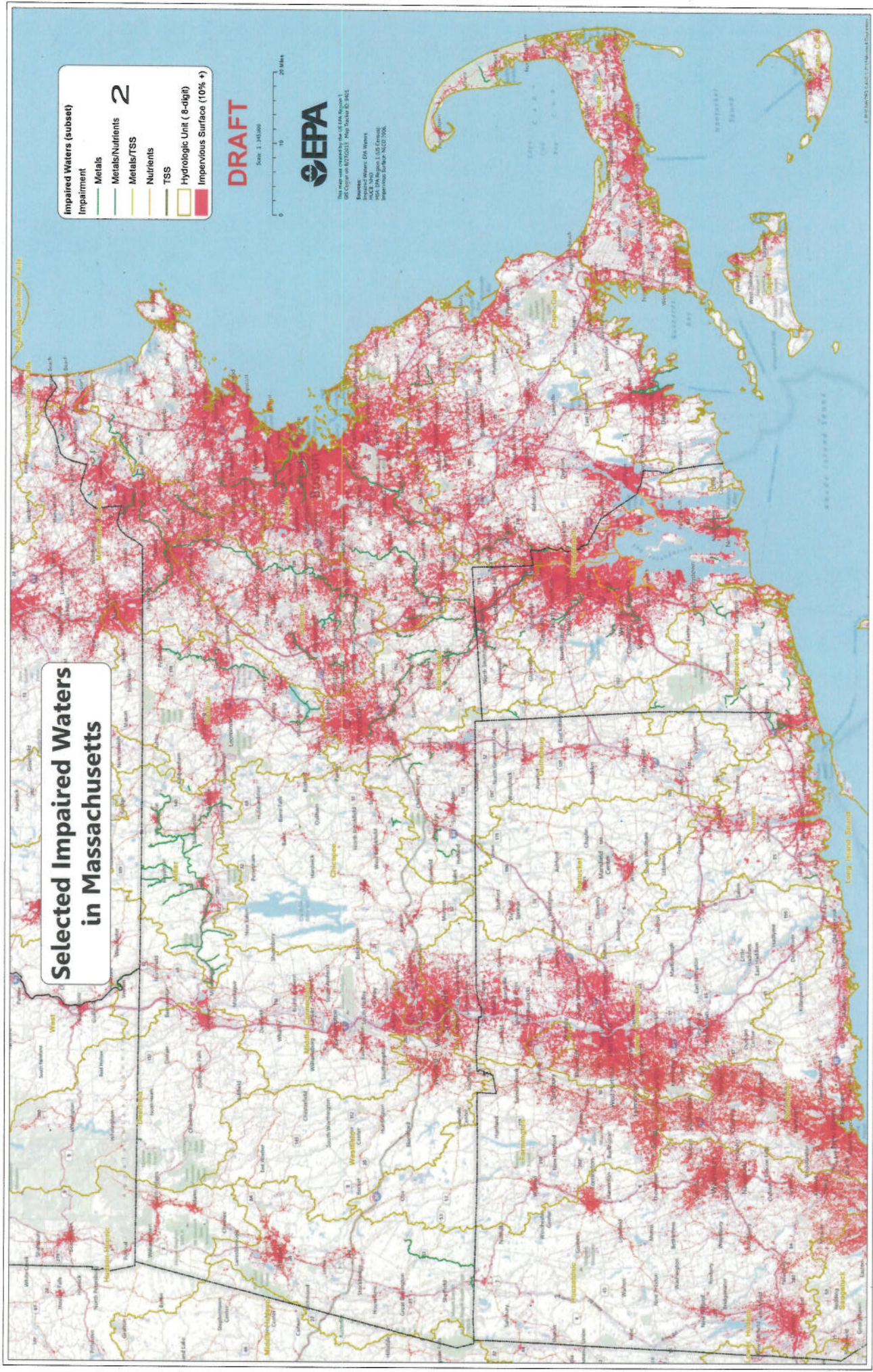
# Selected Impaired Waters in Massachusetts



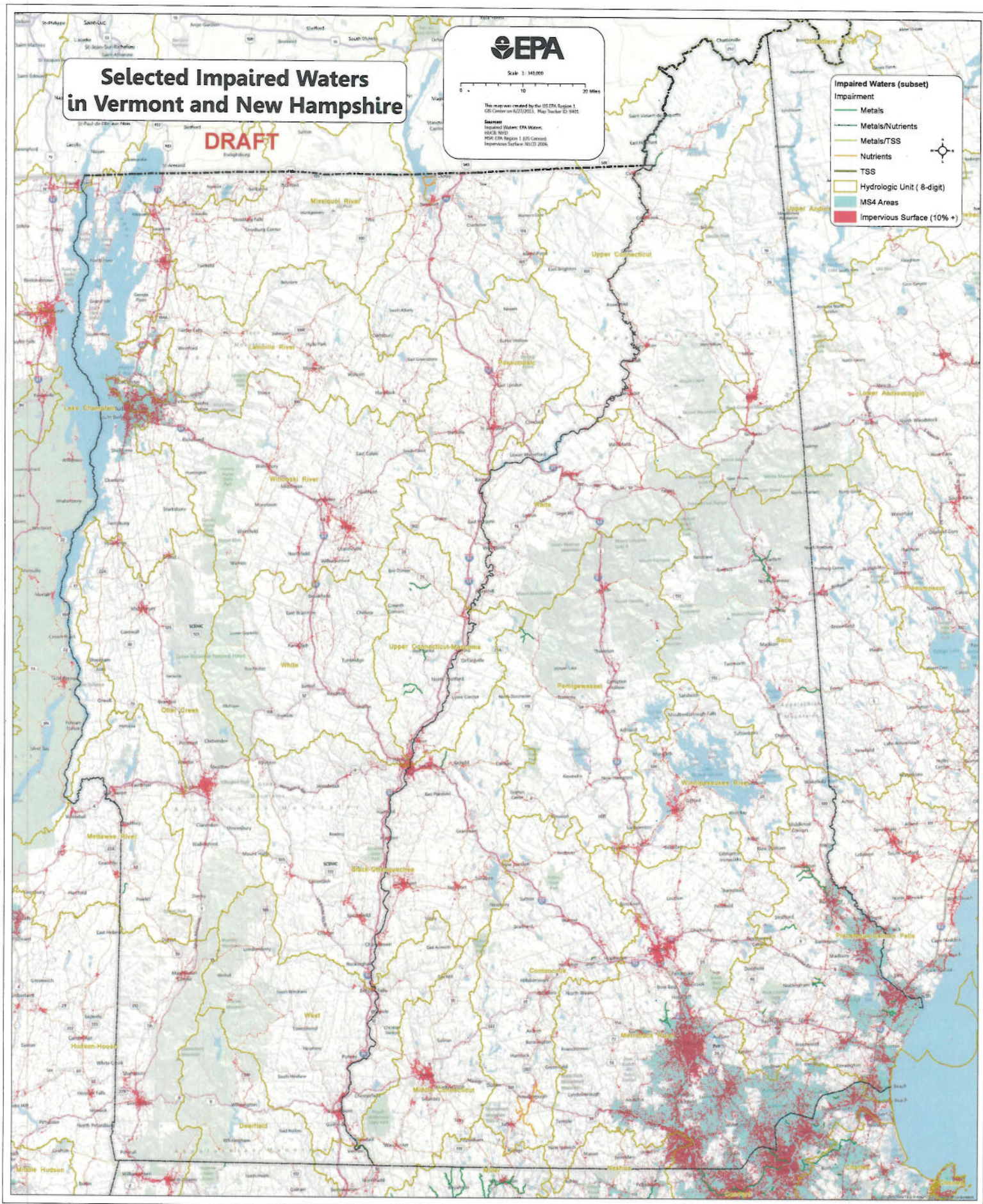
**DRAFT**



This map was created by the US EPA Region 1  
GIS Center on 8/27/2013. Map Scale: 1:100,000  
Source: National Wetlands Inventory (NWI)  
USGS National Hydrography Dataset (NHD)  
USGS National Impervious Surface Inventory (NISI)  
USGS National Hydrography Dataset (NHD)  
USGS National Wetlands Inventory (NWI)









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This map was created by the US EPA Region 1 GIS Center on 8/27/2013. Map Tracker ID: 5408

**Sources:**  
Impaired Waters: EPA Waters,  
HUCK NHD  
NSR: EPA Region 1 EIS Census  
Impervious Surface: NLCD 20

Impaired Waters (subset)  
Impairment

Metals

Metals 0

Metals/Nutrients

Metals/

— Nutrient

— TSS

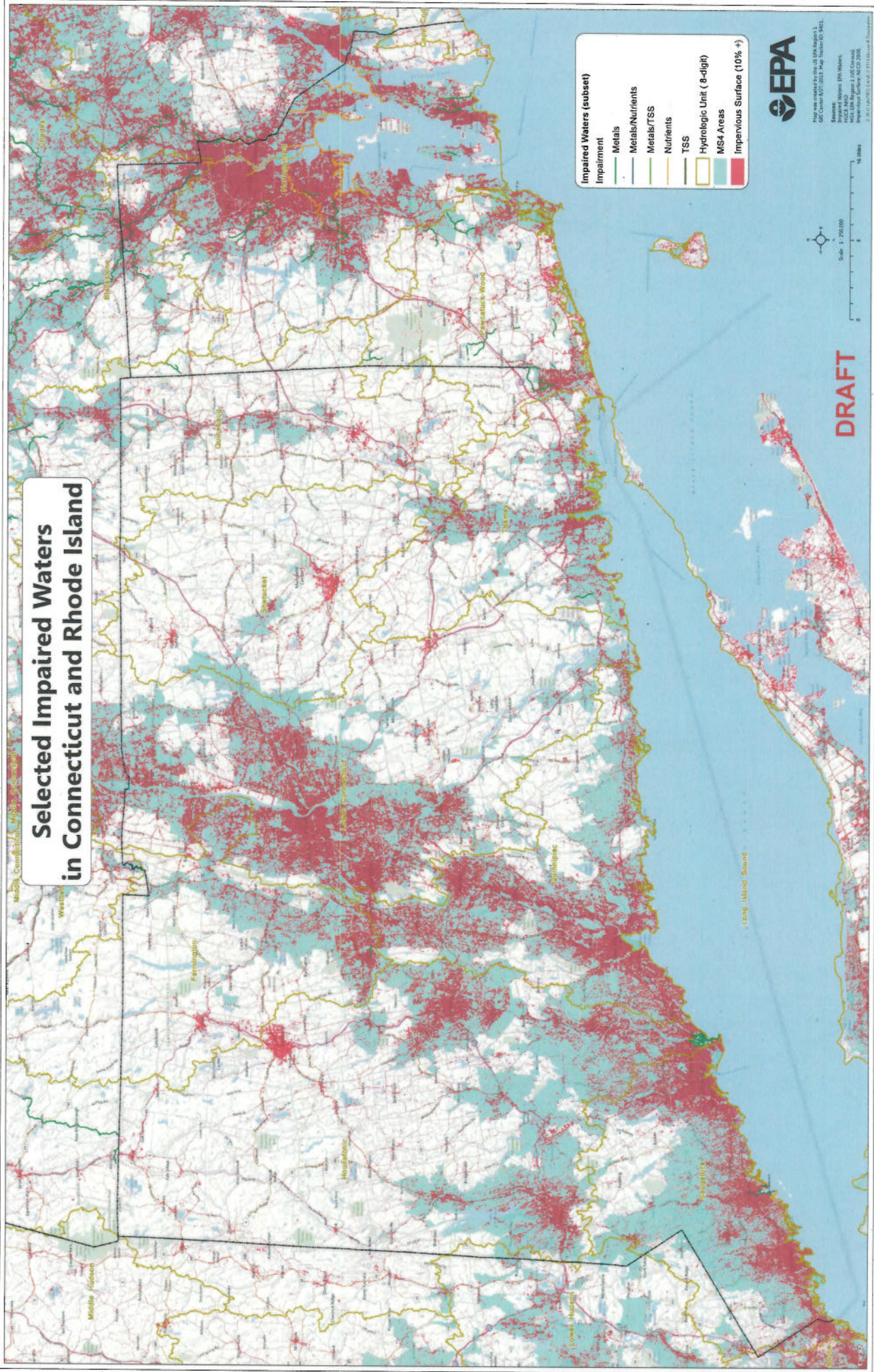
Hydrologic Unit ( 8-digit)

Impervious Surface (10% +)

2



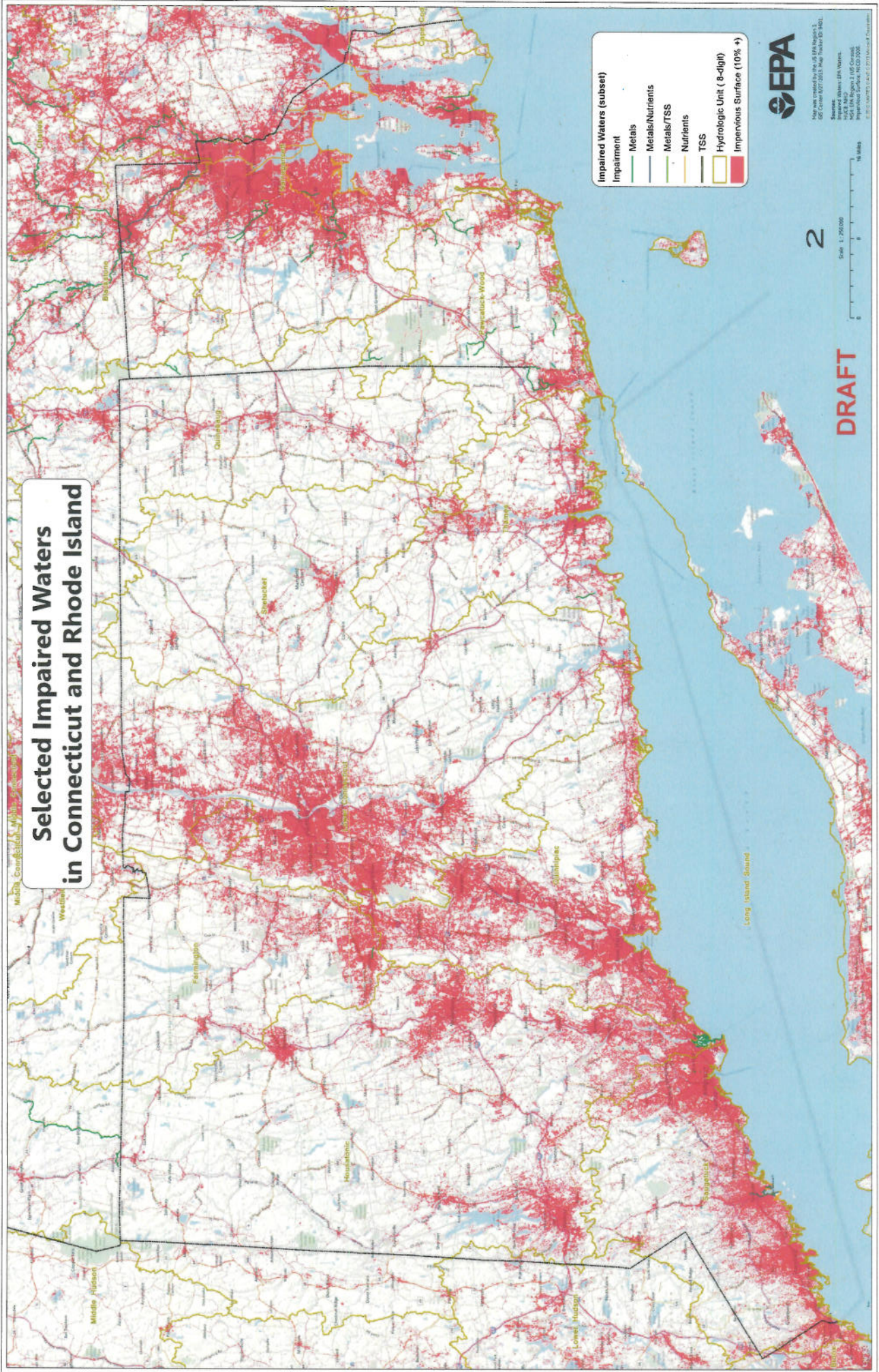
# Selected Impaired Waters in Connecticut and Rhode Island



7



# Selected Impaired Waters in Connecticut and Rhode Island



Map was created by the U.S. EPA Region 1  
Map Date: 07/15/2010  
Map Title: Selected Impaired Waters (EPA Waters)  
Map Scale: 1:250,000  
Map Projection: NAD 83  
Map Data Source: USGS, EPA, and other sources

2

Scale 1:250,000  
0 5 10 Miles

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