From: Malik, Christopher
Sent: Tuesday, May 31, 2016 10:45 AM
To: Malik, Christopher
Subject: FW: public comment opportunity for Preliminary Watershed Selections

Public Comment Opportunity:

Connecticut is taking a new approach to restoring water quality in our rivers, streams, lakes, local harbors, and Long Island Sound. This enhanced approach, called **Integrated Water Resource Management**, will help focus state resources through a comprehensive review of information and by building on local partnerships to protect and restore water quality.

Under the federal Clean Water Act, Connecticut creates pollution reduction plans called Total Maximum Daily Loads (TMDLs) to restore and protect water quality. A TMDL is a type of water quality action plan. Developing water quality action plans is not a new activity, however, the US Environmental Protection Agency (USEPA) and the CT DEEP are taking a new approach to improve effectiveness.

These new actions to include:

- **Reviewing information to choose waterbodies** with the most likely successful restoration potential
- **Focusing on certain water resource areas** while maintaining statewide water quality efforts
- **Identifying alternative action plans** that will lead to effective water quality improvement
- **Enhancing protection of high quality** water resources from pollution impacts
- **Building on existing partnerships**

Integrated Water Resource Management includes identifying an initial set of waterbodies (and their watersheds) for development of water quality action plans. After plans are developed in these areas, other waters will be selected for development of water quality action plans. The waters currently proposed under the Integrated Water Resource Management were identified by CT DEEP by focusing on landscape features and pollutants that influence water quality with additional focus placed on aquatic resources and features of important public value.

A selection of proposed waters for action plan development is open for public review and comment. Comments are welcome on these waters, other locations, or water resource information for consideration by CT DEEP. The Department is particularly interested in working with partners who have additional plans or data to help achieve water quality improvements.

Public Comment Opportunity

Public comments will be collected from **May 27, 2016, through June 30, 2016**. Two public meetings will be held on **June 20th.** The first session will be held at **CT DEEP HQ, 79 Elm ST, Hartford, CT in the Gina McCarthy Auditorium from 1:30 to 3:30 p.m**. A second session will be held at **Goodwin College, One Riverside Drive, East Hartford, CT 06118 in the Auditorium from 6:00 to 8:00 in the evening.** These events will feature a presentation on the Integrated Water Resource Management process and identification of potential waters for development of water quality action plans. Interested people are invited to attend and participate in the session. Written comments may be submitted through email or regular mail by **June 30, 2016**. Email comments should be submitted to: christopher.sullivan@ct.gov , written comments may also be submitted to CTDEEP 79 Elm Street Hartford CT 06106 Attn: Mr. Christopher Sullivan, Planning and Standards Division.

Learn More

A Story Map is available that provides an interactive format for interested people to further understand the how the waters were selected for action plan development. There are also mapping tools available at this location for further investigating the information available in each of the current preliminary list of waterbodies.

A fact sheet gives an overview of the new approach to developing action plans is available on the project website.

Information on Integrated Water Resource Management is available in a separate document: *Integrated Water Resource Management in Connecticut.*

Further details on the process for selecting waters for action plan development

can be found in a separate document: *Technical Support Document: Identifying Watershed for Restoration and Protection Plans with Connecticut Integrated Water Resource Management Efforts*.

In addition to the attached files, all reports, documents and a link to the Story Map are also available on the CT DEEP Integrated Water Resource Management website. (www.ct.gov/deep/iwrm)

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Integrated Water Resource Management

Taking Action to Restore and Protect Water Quality

An Integrated Approach

Connecticut is taking a new approach to restoring water quality in our rivers, streams, lakes, local harbors, and Long Island Sound. This enhanced approach, called **Integrated Water Resource Management**, will help focus state resources through a comprehensive review of information and by building on local partnerships to protect and restore water quality.

Figure 1. Healthy forest stream

Blueprint for Improved Waters

Under the federal Clean Water Act, Connecticut creates pollution reduction plans called Total Maximum Daily Loads (TMDLs) to restore and protect water quality. **A TMDL can be thought of as a water pollution budget or diet**. A TMDL is a type of water quality action plan. Waterbodies with poor water quality are over their budget and pollutants must be reduced to meet acceptable **water quality standards**. For waterbodies with good water quality, setting a budget maintains this good water quality. The long term goal for all waterbodies is to meet water quality standards for safe human use and a healthy aquatic environment.

Developing water quality action plans is not a new activity, however, the US

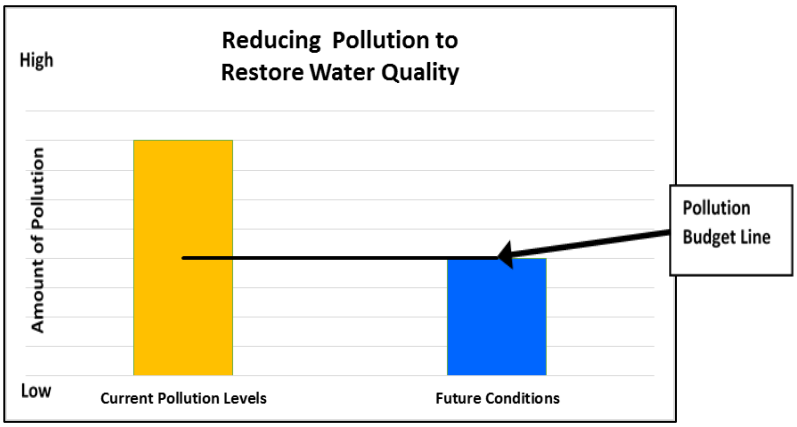


Figure 2. Poor water quality budget

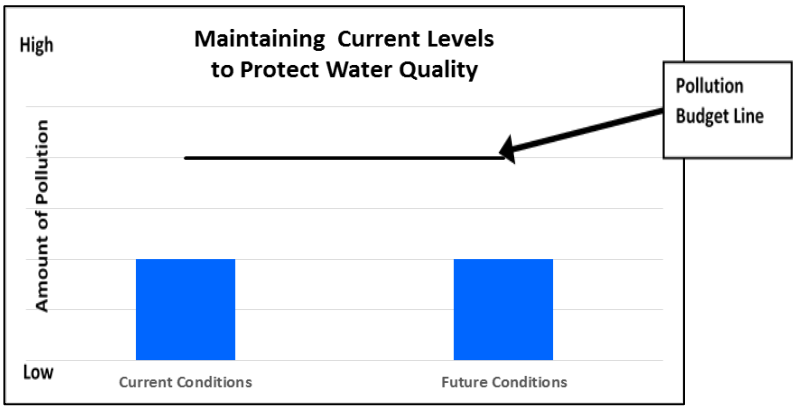


Figure 3. Good water quality budget

Environmental Protection Agency (USEPA) and the CT DEEP are taking a new approach to improve effectiveness.
These new actions to improve water quality include:

- **Reviewing information to choose waterbodies** with the most likely successful restoration potential
- **Focusing on certain water resource areas** while maintaining statewide water quality efforts
- **Identifying alternative action plans** that will lead to effective water quality improvement
- **Enhancing protection of high quality** water resources from pollution impacts
- **Building on existing partnerships**

Focus Waters

Integrated Water Resource Management includes identifying waterbodies (and their watersheds) for focused water quality efforts. CT DEEP is focusing on landscape features and pollutants that influence water quality. Additional focus is placed on aquatic resources and features of important value to the public (Figure 4).

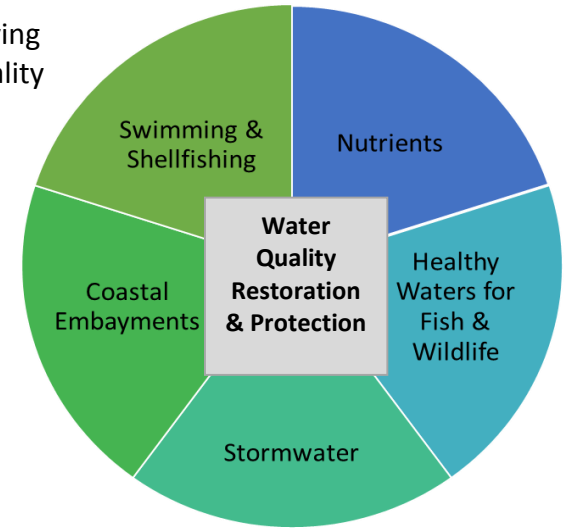


Figure 4. CT DEEP Water Quality Concerns

CT DEEP used a practical approach to select waterbodies using ecological, stressor and social data. This approach resulted in a list of waterbodies with a high likelihood of restoring water quality. For each selected waterbody, an action plan (which could be a TMDL) will be developed to improve water quality and enhance water resources.

During the selection process many groups within CT DEEP worked together to review ecological conditions, social values, and existing management efforts. Priority data used to select waterbodies for focused efforts included:

- Ecological information showing the health of fish and other aquatic life
- Social values such as fishing, swimming, other recreation, and drinking water sources
- Types and sources of potential pollution such as industrial discharges and sewage treatment plants
- Land use conditions, amount of hard surfaces, and stormwater runoff
- Existing planning efforts within the watershed
- Existing and potential partnerships

Figure 5. Children Fishing

Figure 6. Wastewater Treatment Facility

Further details on the process for selecting waters for action plan development can be found in a separate document: *Technical Support Document: Identifying Watershed for Restoration and Protection Plans with Connecticut Integrated Water Resource Management Efforts*.

Public Review, How to Get Involved

An initial map of proposed waters for action plan development is open for public review and comment (See Figure 8). Comments are welcome on these waters, other locations, or water resource information for consideration by CT DEEP. The Department is particularly interested in working with partners who have additional plans or data to help achieve water quality improvements.

Public comments will be collected from **May 27, 2016, through June 30, 2016.** Two public meetings will be held on **June 20th.** The first session will be held at **CT DEEP HQ, 79 Elm ST, Hartford, CT in the Gina McCarthy Auditorium from 1:30 to 3:30 p.m**. A second session will be held at **Goodwin College, One Riverside Drive, East Hartford, CT 06118 in the Auditorium from 6:00 to 8:00 in the evening.** These events will feature a presentation on the Integrated Water Resource Management process and identification of potential waters for development of water quality action plans. Interested people are invited to attend and participate in the session. Written comments may be submitted through email or regular mail by **June 30, 2016**. Email comments should be submitted to: christopher.sullivan@ct.gov , written comments may also be submitted to CTDEEP WPLR 79 Elm Street Hartford CT 06106 Attn: Mr. Christopher Sullivan, Planning and Standards Division.

Learn More

All reports and documents can be downloaded from the CT DEEP TMDL website. A Story Map is available that provides an interactive format for interested people to further understand the how the waters were selected for action plan development. There is also mapping tools available at this location for further investigating the information available in each of the current preliminary list of waterbodies.

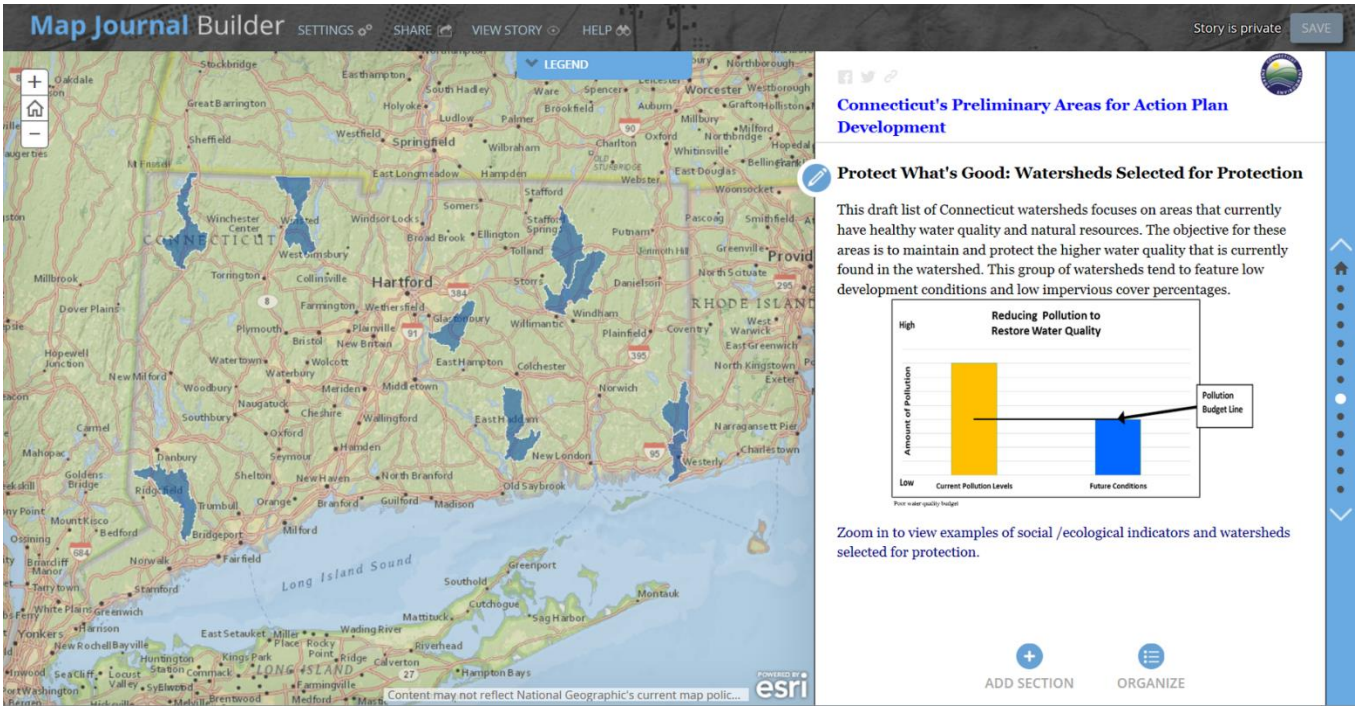


Figure 7. Story Map Screen of Protection Watersheds

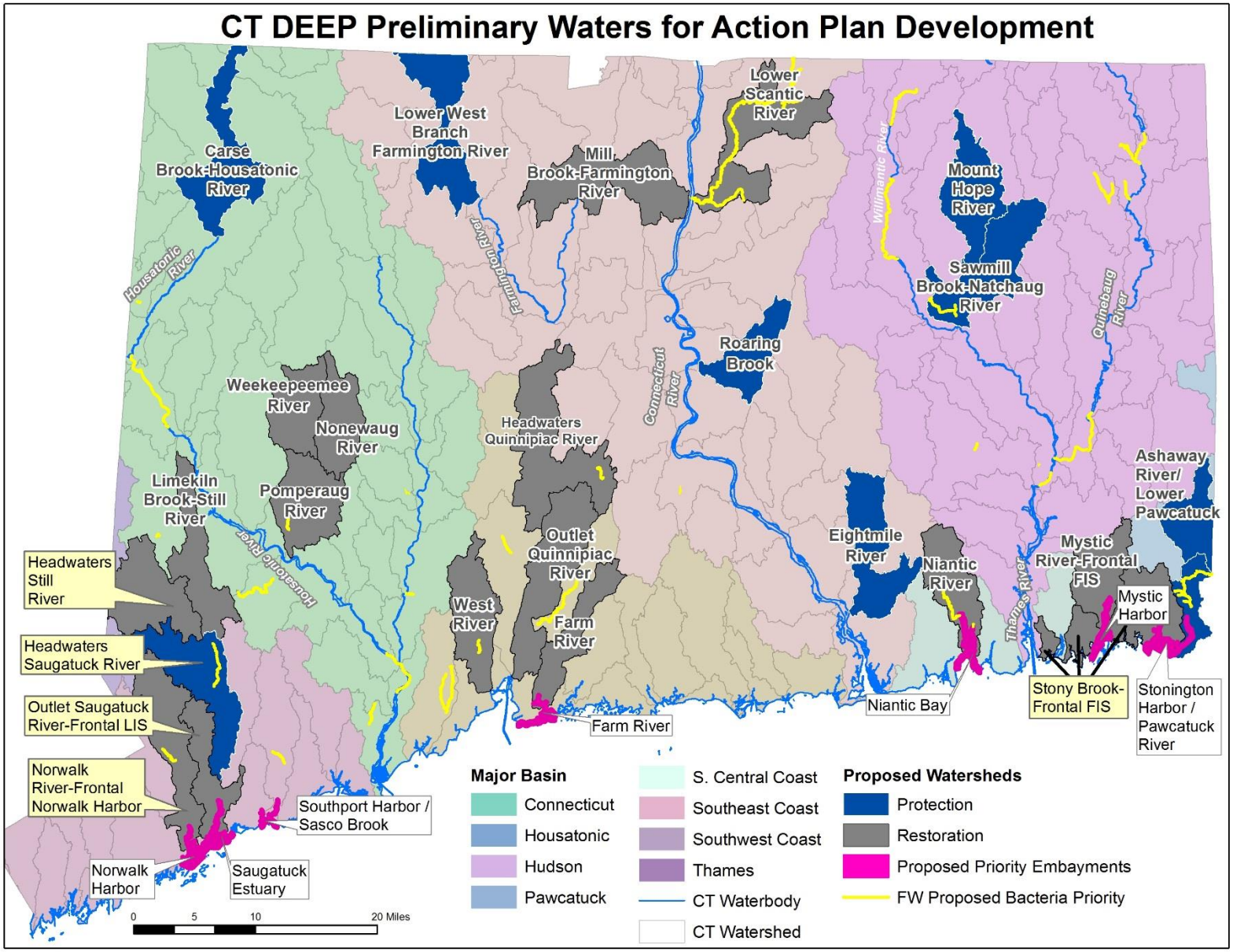


Figure 8. CT DEEP Preliminary Waters for Action Plan Development

Technical Support Document:

Identifying Watersheds for Restoration and Protection Action Plans with Connecticut Integrated Water Resource Management Efforts

CT DEEP

May 2016

Contents

Introduction

CT DEEP routinely selects watersheds and impairments to develop action plans for priority locations across Connecticut. Historically, this process has been more focused on the existence of data on a waterbody or in a watershed and the ability to produce TMDLs in a short time frame. More recently EPA has been allowing for an increasingly flexible approach to the States for developing these priorities, allowing for States to focus on important water quality issues for each state and providing for a longer time frame if needed to address complex issues. EPA has created a VISION process, to assist with the States approaches for evaluating water quality issues. This is a new approach that CT DEEP has called Integrated Water Resources Management.

As part of the Integrated Water Resource Management efforts, CT DEEP has undertaken a process to identify watersheds for focusing water quality planning efforts of the Department for the next 6 years (2016-2022). CT DEEP is focusing on a proactive methodology to select waterbodies that feature high probability for return on the State investments in terms of improved water quality and enhanced natural resource utilization.

Figure 1: Components of Integrated Water Resource Management

This report identifies a draft list of waters which will be provided for public review and outreach for further refinement. After responding to public comments, the list of waterbodies for CT DEEP to develop restoration and protection plans over the next 6 years will be incorporated into CT DEEP's Integrated Water Resource Management efforts and identified to EPA as initial program commitments. Based on efforts and success rates in these listed waterbodies the list of commitments to EPA will be revised to reflect new objectives and goals.

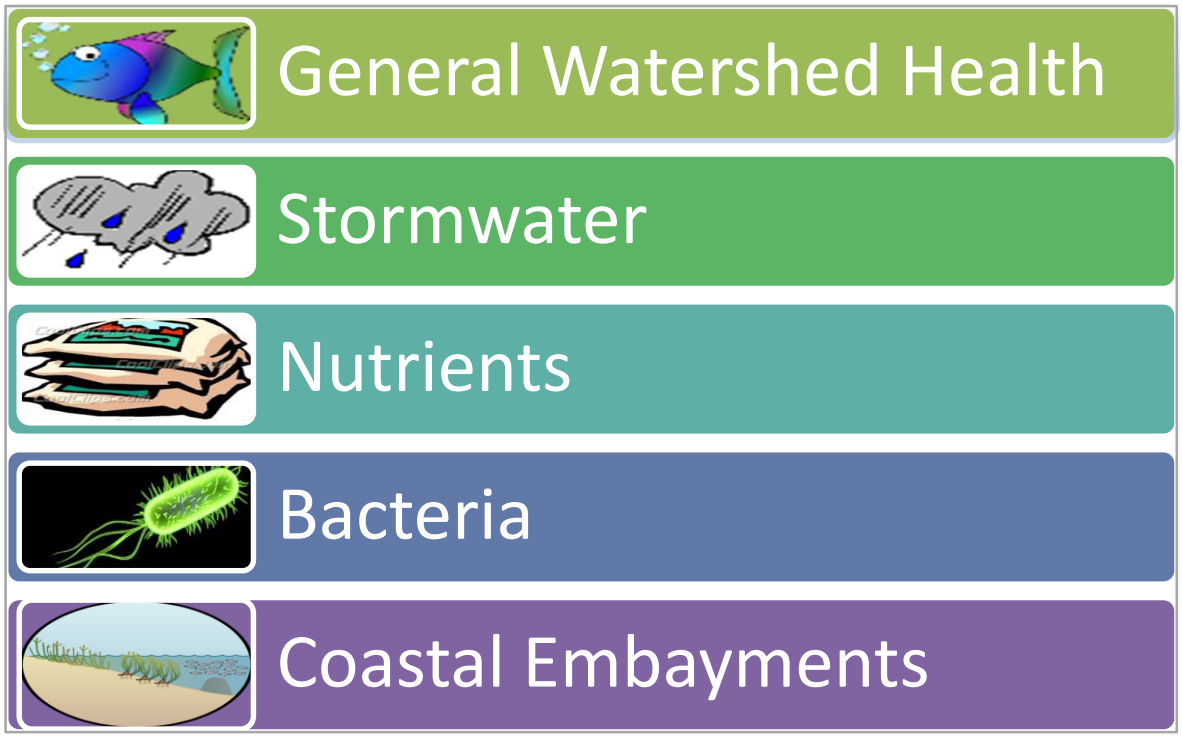
Objectives

The major goal of this project is to develop a preliminary listing of potential watersheds and waterbodies for public review and comment, enhance the DRAFT list with public input, and submit a list of waterbodies to EPA. The list identifies where CT DEEP may focus efforts and resources over the next 6 years to complete action plans that address identified water quality issues. The goal of this project is to complete these action plans in each prioritized watershed by 2022.

Water Quality Concerns for Connecticut

As part of the Integrated Water Resource Management process, CT DEEP initially identified several focus scenarios for water quality planning activities based on current programs and public comments on previously released action plans and water quality reports. These focus scenarios were used as the basis for evaluating potential watersheds for future plan development and included general watershed health, nutrients, stormwater, and bacteria as sources of impairments in both freshwater and estuaries locations. Each of these scenarios was evaluated within the context of watershed restoration or protection. Watersheds designated for restoration will be evaluated for impairments and planning efforts will focus on those that return waterbodies to meeting their water quality use goals. Watersheds that are designated for protection are areas that are currently meeting water quality goals and may be high quality waters or other areas of special concern. These watersheds will be targeted for efforts to preserve the water quality in the watershed and maintain current water quality. Within watersheds designated for restoration, there may be specific waterbodies or areas that are targeted for protection focus, and it is also possible that protection watersheds may have waterbodies where restoration is a focus. These details will be spelled out within the resultant action plans for each watershed.

Figure 2: Water Quality Considerations



Process for Translating Water Quality Concerns into Potential Watersheds for Plan Development

The EPA Recovery Potential Screening Tool (RPS) was used to help screen for watersheds that have high potential for restoration or protection of water quality goals when considering general watershed health, nutrients and stormwater.

Additional Department specific factors, including on-going CT DEEP water quality project work and partnership efforts already underway within a watershed were used to refine this list as well as to identify other waterbodies such as coastal embayments on Long Island Sound and waters affected by bacteria to consider for plan development

Recovery Potential Tool

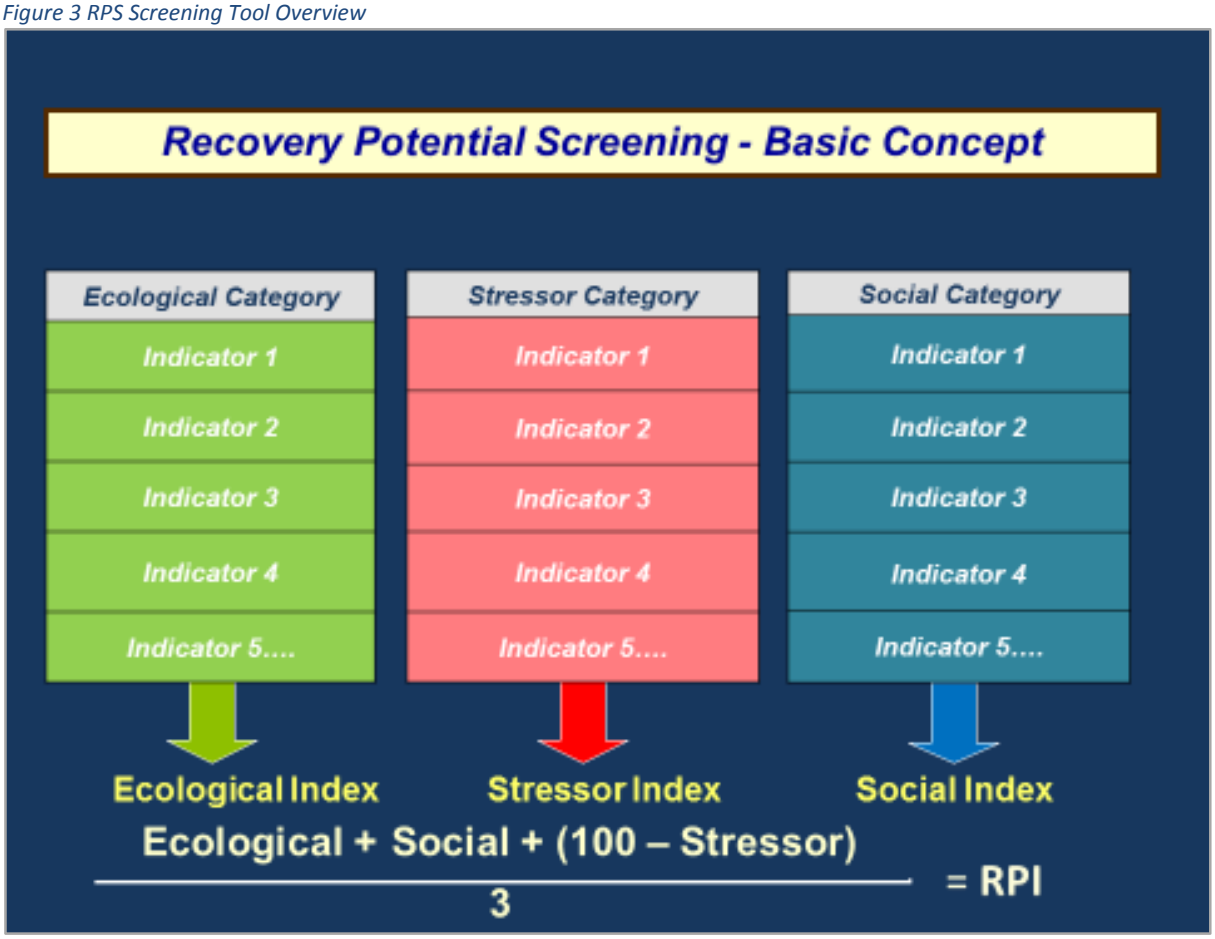
The RPS Tool was selected as a primary screening method for ranking watersheds in Connecticut. The RPS Tool is a screening tool based in an excel spreadsheet that evaluates hundreds of watersheds utilizing the same sets of indicators. For additional details about the origins of the tool and its use and functions, please see the EPA fact sheet included as Appendix A in this report. The RPS Tool utilizes a systematic and repeatable method that can be customized to use State specific information and Connecticut has generated over 80 state-specific indicators for consideration during the evaluation and comparison of watersheds.

The use of the RPS Tool allows for an objective ranking of watersheds based on a selection of many indicators and weights. Utilizing a selected set of indicators, the RPS Tool list of watersheds accounts for the relative restorability of evaluated indicators and waterbodies. The indicators in the RPS Tool are divided into three major groups, ecological, stressor, and social categories.

The ecological category includes indicators that are indicative of higher water quality or represent high quality natural resources. Higher scores for these indicators usually correlate with lower impacts from human development and more data indicating healthy aquatic populations and higher percentages of undeveloped natural resources. The higher these scores for the ecological category the more valuable the resources are considered to be in the evaluated watershed. The stressor category includes indicators that would create negative impacts or stresses to a waterbody. These impacts decrease the water quality in a watershed and impact the value of natural resources in the affected area. Higher scores for the stressor category usually correlate with increased percentages of impervious cover and developed conditions in a watershed. In addition, the number and concentrations of potential inputs of contaminants to a waterbody are higher in the watersheds with higher stressor scores. The final category, social scores, covers two types of indicators for evaluations using the RPS tool. The RPS Tool initially has social indicators that show existing levels of data collection and programmatic work in a watershed. Presence of TMDLs and monitoring stations are examples of this type of social indicator. The other set of indicators accounts for citizen use of aquatic resources.

Another feature of the RPS Tool is the use of HUC watersheds for screening evaluations. The Hydrologic Unit Code (HUC) watersheds are one set of watersheds that can be used in States across the United States. Connecticut has developed its own watershed mapping system for depiction of watershed sizes and locations. Many of the borders for these two sets of watersheds match with each other. However, some of the watershed borders do not exactly match and the names are often different, based on the waterbodies that are included within the boundaries. A HUC12 watershed is similar in scale to a CT subregional watershed with an average area of 32.28 square miles in Connecticut. For this evaluation, the RPS Tool uses HUC12 watersheds which is the geographic location that is referred to within this report for description of screening results.

Figure 3 RPS Screening Tool Overview



The RPS Tool was originally delivered to CT DEEP by EPA with 208 indicators based on national level data sets from: EPA, USGS and other entities. CT DEEP worked with EPA and a team of contractors to enhance the RPS Tool specifically to include Connecticut generated indicator data. The list of CT enhanced data sets was developed through internal meetings and conversations with the CT DEEP project workgroup formed to develop the RPS Tool. Members of this workgroup submitted data sets and information that was deemed valuable for protection and restoration of watersheds. Additional outreach was conducted within the Department divisions to capture a wide range of information.

Targeted items included data that would be useful for future analysis as well as the current project focusing on water quality and watershed value. An example of how CT DEEP worked to expand the indicator lists was to show the presence of natural resources that are used by the public, things such as boat ramps, beaches, and fish stocking locations were included as part of the social score evaluation. By adding these indicators, CT DEEP accounts for the natural resources that citizens are using in a watershed and results in higher scores for the social category where citizens will reap the benefits of improved water quality from action plan development. The complete list of Connecticut developed indicators for enhancing the RPS Tool is over 80 and the complete list is included as an appendix to this report.

The next step of the process was to select and develop preferred indicators to utilize for evaluating three main scenarios: General Watershed Health, Stormwater, and Nutrients. Each of these three scenarios included a selection of indicators for protection rankings and another for restoration rankings to generate six separate lists of watershed rankings for review and analysis by CT DEEP staff.

The following section of the report gives a brief summary of the six scenarios that were created for analysis of watersheds across Connecticut. General description of the goal for each scenario is followed by a table that details the indicators selected and the weights attached to each indicator. A set of selected key indicators was kept as a similar core across each of the three protection scenarios and an additional core set of key indicators was used across the restoration scenarios. The core indicators were used to standardize some of the important factors for water quality. In general, the ecological and social indicators were weighted heavier in the protection scenarios and the stressor indicators received heavier weights for restoration screening. The indicators from each scenario are described in tables for each scenario including the weighting decisions. In-State Only text (ISO) refers to an indicator that only covers the area of a watershed within the state of Connecticut. This coverage is only a factor for the watersheds that cross over a State border.

Watershed Health

Table 1 details the indicators and weights that were used to rank the watersheds for General Watershed Health Protection. This scenario evaluates the watersheds based on a range of categories that were considered to be valuable for protection in a watershed. In general the protection scenarios utilized heavier weights for the ecological and social indicator categories, while leaving the stressor indicators at a weight of 1.

Table 1. General Health Protection indicators with weights

Ecological	Wgt	Stressor	Wgt	Social	Wgt
% Natural Cover land use	3	% average impervious cover in watershed	1	Count of waterbodies with action plans for	1

Ecological	Wgt	Stressor	Wgt	Social	Wgt
				each impairment cause	
% Wetlands in Watershed	3	Average soil erosion potential in watershed	1	% Urban stormwater permit area (ISO)	1
% Streamlength Supporting Aquatic Life (ISO)	3	Phosphorus Yield in watershed	1	% Waterbody Area Supporting Recreation Use (ISO)	3
% Open Space Area (ISO)	3	Count of impaired segments + segments with action plans in watershed	1	Number of Recreation Areas (ISO)	3
Miles of free flowing streams (ISO)	3	Number of combined sewer overflow outfalls (ISO)	1	% Threatened Species Area (ISO)	3
% Waterbody Area Supporting Aquatic Life Uses (ISO)	3	Nitrogen Yield in watershed	1	Count of Watershed National discharge Permits in watershed	1
Monitoring stations with sensitive organisms (ISO)	2			Stream miles with Trout Stocking (ISO)	3
Miles with healthy benthic community (ISO)	3			% Streamlength Supporting recreation use (ISO)	3
Number of Dams with Fishways (ISO)	1			% Watershed Stream miles with action plans	3
				% Open Space Area (ISO)	3
				% wetlands with potential to recover in watershed	1

ISO = In State Only data. This information is not available for any watershed area that extends beyond CT borders

Table 2 details the indicators for the General Watershed Health restoration scenario. The weights in this screening were heavier for the stressor category, with mostly 3s as the weight for inputs. The objective of this scenario was to rank the watersheds where impairments and water quality issues already exist, and there are additional supportive background indicators in the social and ecological categories to help return the affected waterbodies to meeting water quality goals. In addition, indicators that covered potential extended benefits of improved water quality such as threatened species areas or environmental justice areas were included in the evaluation. Better water quality can enhance habitat for the threatened species and enhance the local value of aquatic resources in environmental justice areas.

Table 2. General Health Restoration indicators with weights.

Ecological	Wgt	Stressor	Wgt	Social	Wgt
% Natural Cover, in Watershed	1	% Agriculture land use in Watershed	1	% watersheds with potential to recover in watershed	1
Number of Dams with Fishways (ISO)	1	Count of impaired segments + segments with action plans in watershed	3	% Urban stormwater permit area (ISO)	1
% Threatened Species Area (ISO)	1	Number of Remediation Sites (ISO)	1	Percent Drinking Water Source Protection Area WS	1
% Open Space Area (ISO)	1	percentage of Watershed with ≥ 12% impervious cover	3	% Environmental Justice Area (ISO)	1
		% Human Use in Watershed	3	Number of Recreation Areas (ISO)	1
		Miles of impaired segments + segments with action plans in watershed	1	% watershed area Potential Aquifers (ISO)	1
		Streamlength Altered Flow (ISO)	3	Count of Watershed National discharge Permits in watershed	1
		Number of Discharge permits showing toxicity (ISO)	3	Number of Towns Inverse (ISO)	1
		Number of combined sewer overflow Outfalls (ISO)	2	Count of waterbodies with action plans for each impairment cause	1
		Average soil erosion potential in watershed	3	% Open Space Area (ISO)	1
		% Waterbody Area Not Supporting Aquatic Life Uses (ISO)	3	% Threatened Species Area (ISO)	1
		% Streamlength Not Supporting Aquatic Life Uses (ISO)	3	Stream miles with Trout Stocking (ISO)	1

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Stormwater

Table 3 details the stormwater protection scenario. Stormwater is created when precipitation events create surface flows in areas with no infiltration. These flows carry contaminants as suspended or dissolved chemicals and dump them into nearby waterways. The number of road crossings at streams within the watershed was added as a stressor indicator. In similar fashion as with other protection scenarios, the ecological and social categories were weighted heavier than the stressor category.

Table 3. Stormwater Protection Indicators with weights.

Ecological	Wgt	Stressor	Wgt	Social	Wgt
% Open Space Area (ISO)	3	% average impervious cover in watershed	1	Count of waterbodies with action plans for each impairment cause	1
% Streamlength Supporting Aquatic Life Uses (ISO)	3	Number of Combined sewer overflow Outfalls (ISO)	1	% Streamlength Supporting Recreational uses (ISO)	3
% Waterbody Area Supporting Aquatic Life Uses (ISO)	3	Count of impaired segments + segments with action plans in watershed	1	Waterbody Area Supporting Recreational uses (ISO)	3
% Natural Cover in Watershed	3	Average soil erosion potential in watershed	1	Stream miles with Trout Stocking (ISO)	3
% Wetlands in Watershed	3	Number Road Stream Crossings in Watershed	1	% Open Space Area (ISO)	3
% Threatened Species Area (ISO)	3	Number of Remediation Sites (ISO)	1	% Threatened Species Area (ISO)	3
Miles of free flowing streams (ISO)	3			Count of Watershed National discharge Permits in watershed	1
				% Urban stormwater permit area (ISO)	1
				% wetlands with potential to recover in watershed	1

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Table 4 details the Stormwater restoration scenario. Additional indicators included not supporting for Aquatic Life Use area and streamlengths, also added human use in the watershed due to the impact on surface flows reaching waterbodies. For the restoration screenings, the Impervious Cover layer was used ranking the % of impervious cover greater than 12% as opposed to the mean Impervious Cover% within the watershed for protection scenarios. The focus of the selections was to find watersheds that may have some significant issues stemming from Impervious Cover and stormwater runoff.

Table 4. Stormwater Restoration Indicators with weights.

Ecological	Wgt	Stressor	Wgt	Social	Wgt
% Natural Cover in Watershed	1	% Agriculture in Watershed	1	% wetlands with potential to recover in watershed	1
Number of Dams with Fishways (ISO)	1	Count of impaired segments + segments with action plans in watershed	3	% Urban stormwater permit area (ISO)	1
% Threatened Species Area (ISO)	1	Number of Road Stream Crossings in Watershed	1	Percent Drinking Water Source Protection Area in watershed	1
% Open Space Area (ISO)	1	percentage of Watershed with ≥ 12% impervious cover	3	% Environmental Justice Area (ISO)	1
		% Human Use in Watershed	3	Watershed Segments with TMDLs Count	1
		Average soil erosion potential in watershed	3	% Threatened Species Area (ISO)	1
		% Waterbody Area Not Supporting Aquatic Life Uses (ISO)	3	Count of Watershed National discharge Permits in watershed	1
		% Streamlength Not Supporting Aquatic Life Uses (ISO)	3	Number of Towns Inverse (ISO)	1
				Count of waterbodies with action plans for each impairment cause	1
				% Open Space Area (ISO)	1

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Nutrients

Table 5 details the selections for the Nutrient Protection Scenario. The focus is on indicators dealing with nutrient sources and inputs to our watersheds. Additional indicators were % low phosphorus enrichment factor as an ecological indicator and bringing back nitrogen and phosphorus yields as stressor. The weighting patterns were consistent with other protection scenarios, utilizing higher weights for ecological and social indicators and generally lower for the stressor weights.

Table 5. Nutrient Protection Indicators with weights.

Ecological	Wgt	Stressor	Wgt	Social	Wgt
% Open Space Area (ISO)	3	% average impervious cover in watershed	1	Count of waterbodies with action plans for each impairment cause	1
% Streamlength Supporting Aquatic Life Uses (ISO)	3	Number of CSO Outfalls (ISO)	1	% Streamlength Supporting Recreation Use (ISO)	3
Waterbody Area Supporting Aquatic Life Uses (ISO)	3	Phosphorus Yield	1	Waterbody Area Supporting Recreation Use (ISO)	3
% Natural Cover in Watershed	3	Average soil erosion potential in watershed	1	Stream miles with Trout Stocking (ISO)	3
% Wetlands in Watershed	3	Count of impaired segments + segments with action plans in watershed	1	% Open Space Area (ISO)	3
% Threatened Species Area (ISO)	3	Nitrogen Yield	1	% Threatened Species Area (ISO)	3
Stream miles Free Flowing (ISO)	3			Count of Watershed National discharge Permits in watershed	1
% Low Phosphorus Enrichment Factor Area (ISO)	1			% Urban stormwater permit area (ISO)	1

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Table 6 shows the results for nutrient restoration ranking efforts. This scenario has several new indicators for the stressor category with nitrogen deposition, fertilizer application, and human use contiguous to open water added to the group for calculations. More detailed agricultural inputs were included with counts of cattle and poultry included over the more generic %agriculture in the watershed. Similar to other restoration scenarios, the social and ecological categories are weighted with 1s while the stressor category indicators are predominantly weighted as a 3.

Table 6. Nutrient Restoration Indicators with weights.

Ecological	Wgt	Stressor	Wgt	Social	Wgt
% Threatened Species Area (ISO)	1	% Agriculture in Watershed	3	% wetlands with potential to recover in watershed	1
% Open Space Area (ISO)	1	Poultry Population in Confined Agriculture Feeding Operations (ISO)	1	% Open Space Area (ISO)	1
% Natural Cover in Watershed	1	Cattle Population in Confined Agriculture Feeding Operations (ISO)	3	Count of Watershed National discharge Permits in watershed	1
Number of Dams with Fishways (ISO)	1	Agricultural water use in watershed	1	% Farmland Preservation Area (ISO)	1
		% Human Use adjacent to waterbody in Watershed	1	% Urban stormwater permit area (ISO)	1
		% Human Use in Watershed	1	Percent Drinking Water Source Protection Area WS	1
		Phosphorus Yield	3	Count of waterbodies with action plans for each impairment cause	1
		Number of Combined Sewer Overflow Outfalls (ISO)	2	Stream Miles with Trout Stocking (ISO)	1
		Nitrogen Yield	3	% Environmental Justice Area (ISO)	1
		% High Phosphorus Enrichment Factor Area (ISO)	3	Number of Recreation Areas (ISO)	1
		percentage of Watershed with ≥ 12% impervious cover	3		
		Total nitrogen deposition in watershed	3		
		Synthetic N fertilizer application (kg N/ha/yr) in watershed	3		

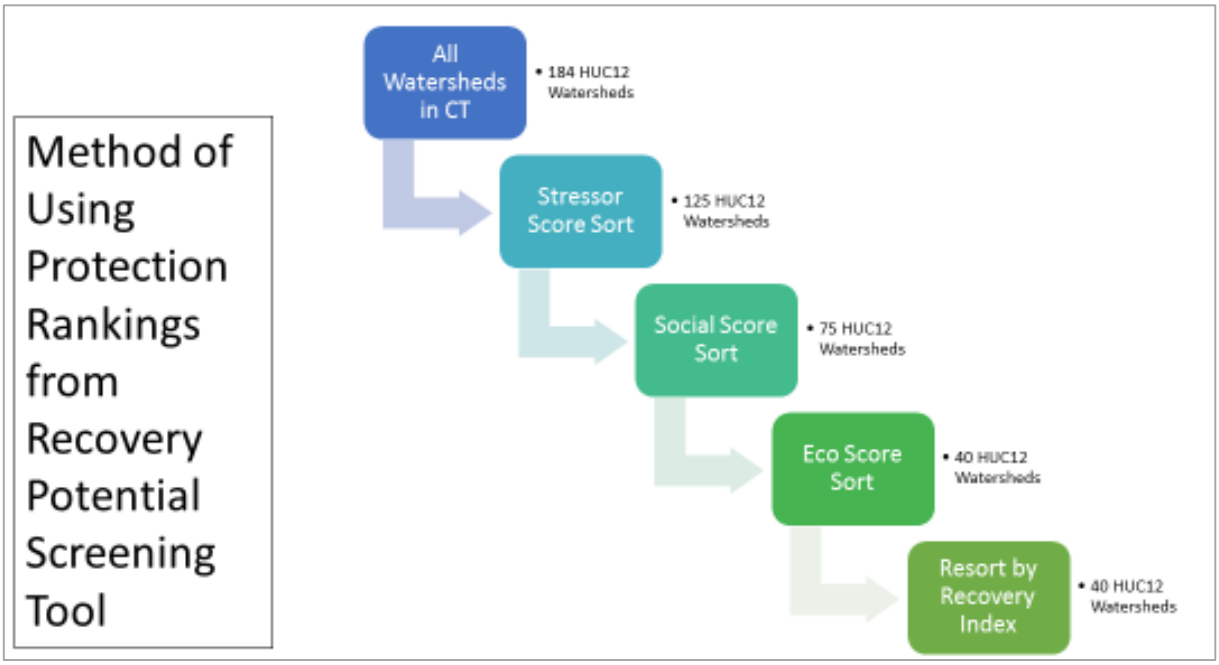
Ecological	Wgt	Stressor	Wgt	Social	Wgt
		% Watershed Waterbody Area impaired by Nutrients	3		
		% Watershed Streamlength impaired by Nutrients	3		

ISO = In State Only data. This information is not available for any watershed area that extends beyond CT borders

RPS Tool Results

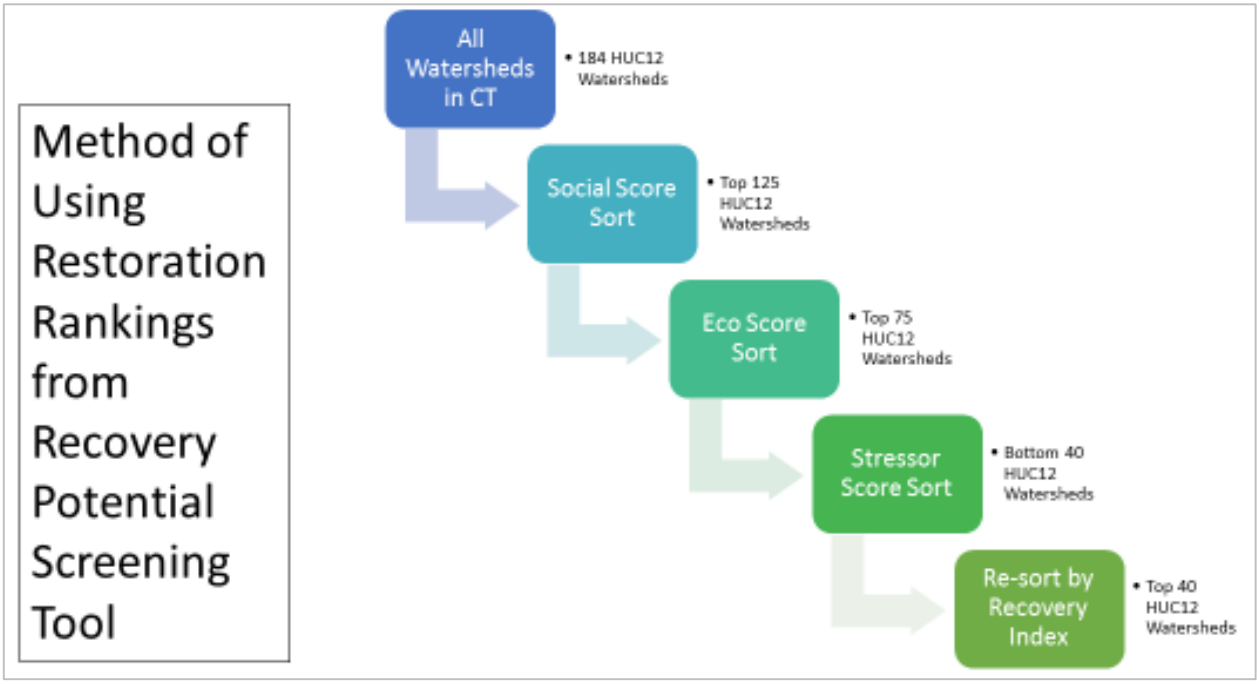
The resultant watershed rankings for each scenario were extracted from the RPS Tool and further evaluated in a new Excel workbook. The raw summary scores data from the RPS Tool were pasted into the first page of the new spreadsheet. New tabs were created in the spreadsheet for sorting and refining the watershed lists. For the protection rankings, the extracted watershed data was sorted by stressor ranks from smallest to largest to give the basins with the lowest stress and impairments the highest return. This list reduced the original 184 watersheds to 125 of the top scores for low stressor results. In a similar approach this 125 list was placed into a new tab in the Excel workbook and sorted by ranking the top 75 social indicator scores from small to large value. This resulted in a list of stressed basins with valuable resources and previous efforts and work within the watershed. The list of 75 watersheds was then sorted by ecological indicators smallest to largest. This new list was reduced to the top 40 scores of the remaining watersheds and placed into a new tab in the Excel workbook. The final top 40 watersheds would represent low stressed basins with high level of potential partners, watershed plans and groups in existence to build from and high ecological value in the watershed. The final top 40 was sorted by total RPI rank from the original analysis done by the RPS Tool. This process was followed for the three protection scenarios (general health, stormwater, nutrients) and resulted in three top 40 watershed lists for consideration as Protection Prioritized watersheds. The resulting tables from each sorting effort by scenario are included in the appendices of this report. The raw screening scores for all watersheds are also included and are ranked by the RPI values for each watershed. See the following graphic for a visual representation of the sorting and filtering "tiered decision matrix" process.

Figure 4.Graphic flow chart of watershed sorting for protection after RPS Tool Screening



A similar approach was utilized to develop the list of watersheds for prioritization for restoration efforts. There were some differences in the process for restoration rankings. The watersheds were sorted by stressor score from largest to smallest to promote the basins with the largest negative impacts to water quality. The order of sorts and subsets was also slightly different for the restoration process. A subset list of 125 of the best ecological basins was clipped from the 184 watershed list. The next step was to re-sort the list of the top remaining 75 watersheds by social scores. Finally the remaining 75 watersheds were re-sorted by stressor scores from largest to smallest to give the watersheds most in need of restoration efforts a higher rank. This list was trimmed to the top 40 remaining watersheds and re-sorted by Total RPI rank based on the original analysis done by the RPS Tool. All three of the restoration scenarios followed the ranking and sorting method described above to arrive at their respective final top 40 watersheds. Figure 5 depicts this process in a visual flow chart.

Figure 5.Graphic flow chart of watershed sorting for restoration after RPS Tool Screening



Once the top 40 lists for each scenario were generated, further analysis was conducted by CT DEEP staff. The protection listings were compared across the three scenarios to create a list of watersheds. Any watersheds that appeared within the top 20 watershed list of all three scenarios were extracted into a final table. This process of evaluating watersheds resulted in a group of 8 HUC12 watersheds for prioritization for protection.

The top 40 lists of restoration priorities were evaluated using a similar method as the protection priorities. The ranking lists for all three scenarios were compared and watersheds that appeared within the top 40 on all three lists were selected as priorities for restoration. The entire top 40 list was utilized to develop the restoration list placing greater emphasis on selecting watersheds targeted for restoration efforts.

Priorities Selected outside of RPS Tool

In a parallel effort, CT DEEP assessed additional waterbodies for prioritization outside of the RPS Tool results. These additional waterbodies were evaluated based on review of existing data and water quality efforts that are taking place, or scheduled to take place in the watershed. Some of the other targeted areas are coastal embayments with a focus on nutrient and stormwater impacts. Additional efforts focused on targeting all bacteria related impairments included on the Impaired Waters List contained in the 2012 Integrated Water Quality Report.

Any freshwater or saltwater segments that are impaired due to a bacteria source are included as a priority for CT DEEP starting from the impaired list as of 2013. As future sampling efforts discover new impairments, these segments may also be prioritized by CT DEEP efforts. Any newly impaired segments will be detailed in the Statewide Bacteria TMDL format as the data becomes available for staff to conduct calculations. If necessary, existing TMDL documents can be revised to include newly impaired segments in a watershed already covered by a TMDL.

A list of coastal embayments was also evaluated by DEEP staff. This initial list of embayments was selected through internal review by members of the project workgroup. The initial list of embayments focused on areas where data has been collected or other efforts have been conducted via the Long Island Sound Futures Fund grant program. Therefore these are embayments where there are interested citizen groups and researchers, and where limited water quality data are already available for plan development efforts.

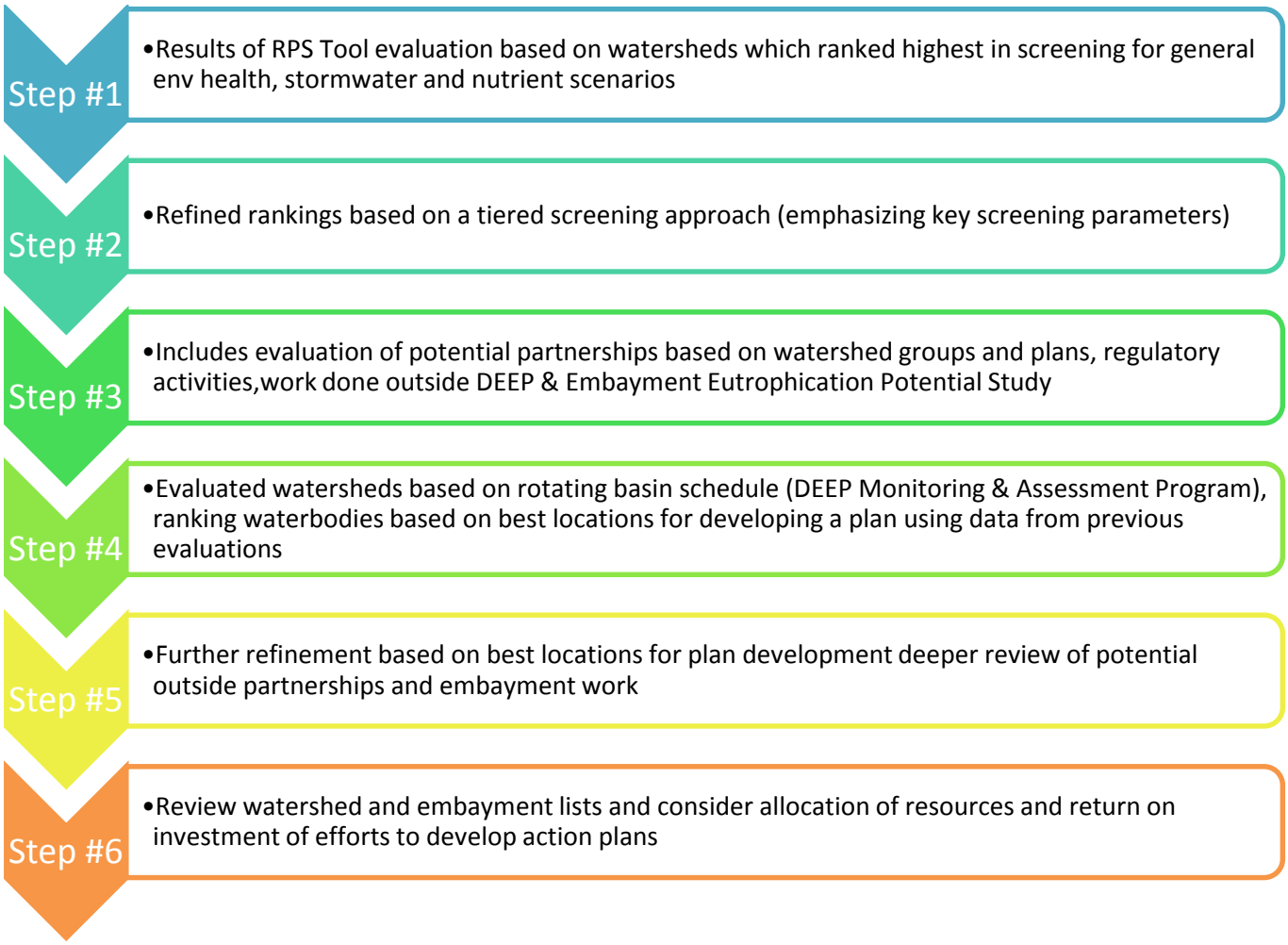
Further Analysis

The resulting list of watersheds from the RPS Tool created a starting point for the watershed analysis. Additional data was not able to be formatted into the Tool and other details on datasets came into CT DEEP staff after multiple screening runs in the RPS Tool were complete. These new data were placed into ARCGIS and maps were created with the watershed screening results and the following additional datasets were added to the State map. After maps were created, a comparison of watersheds for the presence of the indicators below, further refined the list of watersheds to result in an even more targeted list. A listing of data and further coordination efforts is included in the following bullets.

- Inland watersheds
    - Evaluation of existence of watershed based plans or other planning efforts recently complete or in progress in a watershed via coordination with watershed management group at CT DEEP
    - Review of active watershed groups and partners (municipal, non-profits, or other types) in a watershed via coordination with watershed management group at CT DEEP
    - Additional detailing of wild trout management areas in coordination with CT DEEP fisheries
    - Plotting existence of Least Disturbed Monitoring Sites from CT DEEP Monitoring and Assessment group
    - Refinement of CT DEEP Remediation Group site data to target the RCRA site subset of all industrial remediation sites
    - Evaluation of existing monitoring data sources with inclusion of USGS gage locations and CT DEEP sentinel and trend station locations.
    - Alignment with CT DEEP Monitoring Group Rotating Basin Ambient Sampling Plan and rank watersheds within each Major Watershed delineation
- Coastal embayments

- Consultation with Bureau of Aquaculture staff for shellfishing priority areas
- Review of upland areas using the CT DEEP Long Island Sound Programs Estuarine Land Conservation Plan, which ranks areas for land acquisition efforts
- Evaluation of eelgrass potential growth layer developed by UCONN and Cornell
- Review of embayments eutrophication potential in a 2015 draft report from UCONN to cross-reference with current CT DEEP listings. A significant percentage (25%) of the DRAFT embayments matched up with the draft top 20 embayment rankings
- Review hydrologic connections to prioritized upland watersheds

Figure 6 Flow chart of watershed ranking process



Next Steps

After completing the review and analysis of data from upland watersheds and the coastal embayments a draft list has been developed by CT DEEP staff to distribute to the public and gather feedback and input on the selections. The list includes 22 HUC12 upland watersheds and 8 coastal embayment areas. These locations are the preliminary list of waters for action plan development over the time period of 2016-2022. These action plan documents will lay the ground work for addressing water quality issues in restoration locations and to preserve the high quality resources in protection locations. However, there could be smaller sections of a watershed listed for protection that actually have restoration activities scheduled as a function to protect other resources within the watershed. See the map in Appendix B and the following table for the listing of prioritized waters.

Table 7. DRAFT Preliminary list of waters for Action Plan Development by 2022.

Watershed ID	Watershed Name	Coastal Embayment Area	Protect / Restore	Active Planning Efforts	Potential Planning Partners	Water Quality Concerns
011000050306	Carse Brook – Housatonic River	N/A	Protect		X	Nutrients, Aquatic Life
011000050903	Pomperaug	N/A	Restore		X	Bacteria, Nutrients, Aquatic Life
011000050801	Headwaters Still River	N/A	Restore	X	X	Nutrients. Aquatic Life
011000050802	Limekiln Brook-Still River	N/A	Restore	X	X	Nutrients
011000060103	Outlet Saugatuck River	N/A	Restore	X	X	Nutrients
011000060102	Headwaters Saugatuck River	N/A	Protect	X	X	Bacteria, Nutrients, Aquatic Life
011000060202	Norwalk River	N/A	Restore		X	Bacteria, Nutrients, Aquatic Life
011000040302	West River	N/A	Restore	X	X	Bacteria, Nutrients, Aquatic Life

Watershed ID	Watershed Name	Coastal Embayment Area	Protect / Restore	Active Planning Efforts	Potential Planning Partners	Water Quality Concerns
011000040103	Headwaters Quinnipiac	N/A	Restore		X	Nutrients, Aquatic Life
011000040105	Outlet Quinnipiac River	N/A	Restore		X	Nutrients, Aquatic Life
011000040206	Farm River	N/A	Restore		X	Nutrients, Aquatic Life
010802070204	Lower West Branch Farmington River	N/A	Protect	X	X	Nutrients
010802070602	Mill Brook-Farmington	N/A	Restore	X	X	Nutrients, Aquatic Life
010802050203	Lower Scantic River	N/A	Restore	X		Bacteria, Nutrients, Aquatic Life
010802050504	Roaring Brook	N/A	Protect			Nutrients
010802050903	Eightmile River	N/A	Protect		X	Nutrients
011000020205	Mount Hope River	N/A	Protect	X	X	Nutrients
011000020206	Sawmill Brook-Natchaug River	N/A	Protect	X	X	Nutrients
011000030304	Niantic River	N/A	Restore	X	X	Bacteria, Nutrients
011000030301	Mystic River	N/A	Restore			Nutrients
011000030303	Stony Brook-Frontal Fishers Island Sound	N/A	Restore			Nutrients, Aquatic Life
010900050303 / 010900050301	Pawcatuck River / Ashaway River	N/A	Restore / Protect	X	X	Nutrients
	N/A	Saugatuck Estuary	Restore		X	Nutrients
	N/A	Norwalk Harbor	Restore		X	Nutrients

Watershed ID	Watershed Name	Coastal Embayment Area	Protect / Restore	Active Planning Efforts	Potential Planning Partners	Water Quality Concerns
	N/A	Southport Harbor / Sasco Brook	Restore	X	X	Nutrients
	N/A	Farm River	Restore		X	Nutrients
	N/A	Niantic Bay	Restore	X	X	Nutrients
	N/A	Mystic Harbor	Restore		X	Nutrients
	N/A	Stonington Harbor / Pawcatuck River	Restore		X	Nutrients

Story Map Development

Along with the State map that is included as Appendix B to this report, Planning and Standards staff created a series of maps detailing key indicators and their counts and distribution within the prioritized HUC12 watersheds. Some examples that have been developed are maps that focus on each of the following: NPDES permits and their receiving waterbodies, remediation sites, dams, trout stocking areas or locations of recreation areas. These maps were used for internal discussions to help coordinate with targeted CT DEEP programs and will further aid development of action plans, implementation efforts, and other projects.

Interactive maps have been developed for use with a GIS online storyboard. These maps show the watersheds included in the CT DEEP list of waters for action plan development. The online interface allows interested participants to review many of the same data sets that were included in the evaluation of watersheds for the prioritization rankings and selections. This interaction gives the end user a visual of what issues exist throughout a watershed. The mapping interface is only part of the storyboard, as there is also text that details the process and decisions for the scenarios that were used to develop the DRAFT CT DEEP list of waters for action plan development. The storyboard also includes information about getting involved with watershed groups that are located in the end users neighborhood. Connecting interested citizens with these watershed organizations will potentially further the level of activity that can be accomplished in a prioritized watershed.

Opportunity for Public Review and Comment

Public comments will be collected from **May 27, 2016, through June 30, 2016**. Two public meetings will be held on **June 20th.** The first session will be held at **CT DEEP HQ, 79 Elm ST, Hartford, CT in the Gina McCarthy Auditorium from 1:30 to 3:30 p.m**. A second session will be held at **Goodwin College, One Riverside Drive, East Hartford, CT 06118 in the Auditorium from 6:00 to 8:00 in the evening.** These events will feature a presentation on the Integrated Water Resource Management process and identification of potential waters for development of water quality action plans. People are invited to attend and ask questions.

Any comments on the potential areas for plan development should be provided in writing either through the mail or email by **June 30, 2016**. Email comments should be submitted to: christopher.sullivan@ct.gov . Written comments may also be submitted to CTDEEP WPLR 79 Elm Street. Hartford CT 06106 Attn: Mr. Christopher Sullivan

Bibliography

Connecticut Integrated Water Quality Report. *CT DEEP* 2012. www.ct.gov/deep/iwqr

Appendices

Appendix A: EPA Fact Sheet on Recovery Potential Tool

USEPA Office of Water - TMDL Program Results Analysis Fact Sheet – Doc. No. EPA841-F-11-002, March 2011

Fact Sheet: Recovery Potential Project

Landscape Screening Tools and Resources for Comparing the Restorability of Impaired Waters

Project Goal: Develop methods and tools that help state TMDL and nonpoint source programs consider where best to use limited restoration resources among large numbers of impaired waters and watersheds.

- Compile information on factors relevant to recovery potential from the technical literature and practitioner experience;
- Apply these findings to develop recovery potential indicators measurable from commonly available geospatial and monitoring data;
- Develop a rapid, flexible recovery potential screening methodology and tools; and
- Help states compare impaired waters recovery potential during restoration planning by using watershed geospatial analysis techniques and aquatic monitoring data.

Recovery potential should be a primary consideration in restoration programs whose main aim is to bring about recovery

Recovery Potential is the likelihood of an impaired water to reattain Water Quality Standards or other desired condition, given its ecological capacity to regain function, its exposure to stressors, and the social context affecting efforts to improve its condition.

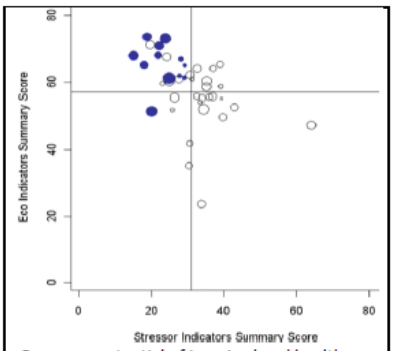
Funding for restoration is always limited, and difficult choices are inevitable. Poor decisions and strategies can result in little or no program success. Comparative methods to aid restoration planning can lead to better-informed investments that restore valued waters earlier, more consistently, more cost-effectively, and in more places. Recovery potential screening enables rapid, statewide comparison of large numbers of waters using ecological, stressor and social indicators of restorability selected for the place and purpose at hand. Recovery potential should be a primary consideration in restoration programs whose aim is to bring about recovery.

Practical Applications of Recovery Potential

- Aid state decisions in 303(d) impaired waters list scheduling for TMDL development, and in TMDL implementation;
- Assist in restoration-related decisions regarding Clean Water Act Section 319 nonpoint source control projects as well as state-level restoration initiatives;
- Help EPA regions and states develop strategies to meet performance tracking measures, such as identifying where increases in restored waters and improved watersheds can most likely be achieved;
- Assist watershed-level programs that need to focus on priority places due to limited resources; and
- Reveal underlying factors that influence restoration success and use these new insights to improve programs.

Recovery Potential Tools and Resources for Restoration Practitioners

- **Recovery Potential Screening Methodology:** A rapid, comparative assessment approach that uses commonly available datasets to screen user-selected indicators that influence restorability. Integrates three sub-indices (ecological, stressor, social) that relate to the three major drivers affecting recovery potential.
- **Recovery Potential Indicators** (see examples on back): Ecological capacity, stressor exposure, and social context traits measurable from common datasets. 200+ metrics demonstrated, 70+ with reference sheets on their scientific basis and measurement.
- **Restoration and Recovery Literature Database:** 1700+ published citations in a partially annotated MS Access database; open for each user's personal option to add entries and keywords on a local copy.
- **Tools for Scoring and Displaying Results:** A programmed data spreadsheet that weights and normalizes indicators and auto-calculates summary scores; a tool for visualizing screening results as 3D bubble plots (right); measurement methods and data sources for indicators; and more.
- **Recovery Potential User Support Website:** Central source of step-by-step screening directions, literature database, indicator reference sheets, auto-scoring spreadsheet, 3D bubble plotting tool, training materials, case studies, other resources. *[http://www.epa.gov/recoverypotential/]*



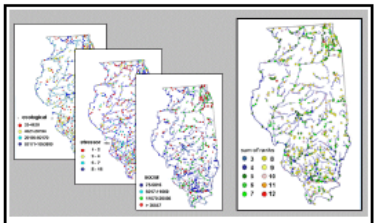
Recovery potential of impaired and healthy (blue) watersheds compared in a 3D bubble plot; dot size increases with social score.

Example Recovery Potential Indicators *(user selects 3 to 8 metrics in each class most relevant to the place and purpose of the screening)*		
Ecological Capacity Metrics	**Stressor Exposure Metrics**	**Social Context Metrics**
natural channel form	invasive species risk	watershed % protected land
recolonization access	channelization	applicable regulation
Strahler stream order	hydrologic alteration	funding eligibility
rare taxa presence	aquatic barriers	303(d) schedule priority
historical species occurrence	corridor road crossings	estimated restoration cost
species range factor	corridor road density	certainty of causal linkages
elevation	corridor % U-index	TMDL or other plan existence
corridor % forest	corridor % agriculture	university proximity
corridor % woody vegetation	corridor % urban	certainty of restoration practices
corridor slope	corridor % impervious surface	watershed organizational leadership
bank stability/soils	watershed % U index	watershed collaboration
bank stability/woody vegetation	watershed road density	large watershed management potential
watershed size	watershed % agriculture	government agency involvement
watershed % forest	watershed % tile-drained cropland	local socio-economic conditions
watershed % wetlands	watershed % urban	landownership complexity
proximity to green infrastructure hub	watershed % impervious surface	jurisdictional complexity
contiguity w/green infrastructure corridor	severity of 303(d) listed causes	valued ecological attribute
biotic community integrity	severity of loading	human health and safety
flow regime	past land use change trajectory	recreational resource

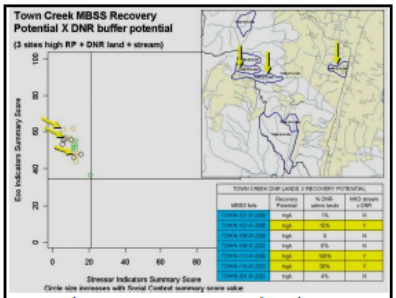
Example Watershed, State and Regional Scale Projects

Illinois Pilot Study

- screened the recovery potential of 723 impaired waters in a statewide comparison
- developed, measured and mapped 104 ecological, stressor and social indicators of recovery potential
- compared several priority-setting methods and alternatives



Example IL maps for ecological, stressor, and social metrics and sum of ranks.



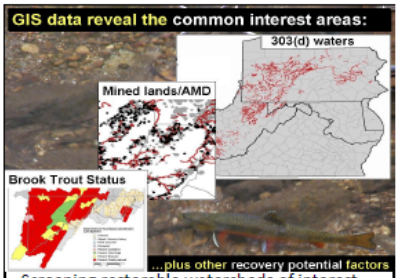
Example MD recovery potential application with map, tabular and bubble plot outputs.

Maryland Watershed Screening

- staged screening at two watershed scales
- informed TMDL impaired waters and nonpoint source program strategies on relative restorability among watersheds, ecoregionally and statewide
- screened finer-scale subwatersheds in 10 priority watersheds to help inform best management practice implementation options

Middle Atlantic Native Fisheries Recovery Screening

- screening in four states identified possible native fish habitat restorations of interest to three programs (303(d), abandoned minelands, fisheries)
- demonstrated very rapid statewide recovery screening to address a narrowly focused issue
- stimulated cross-program collaboration and restoration investments in PA

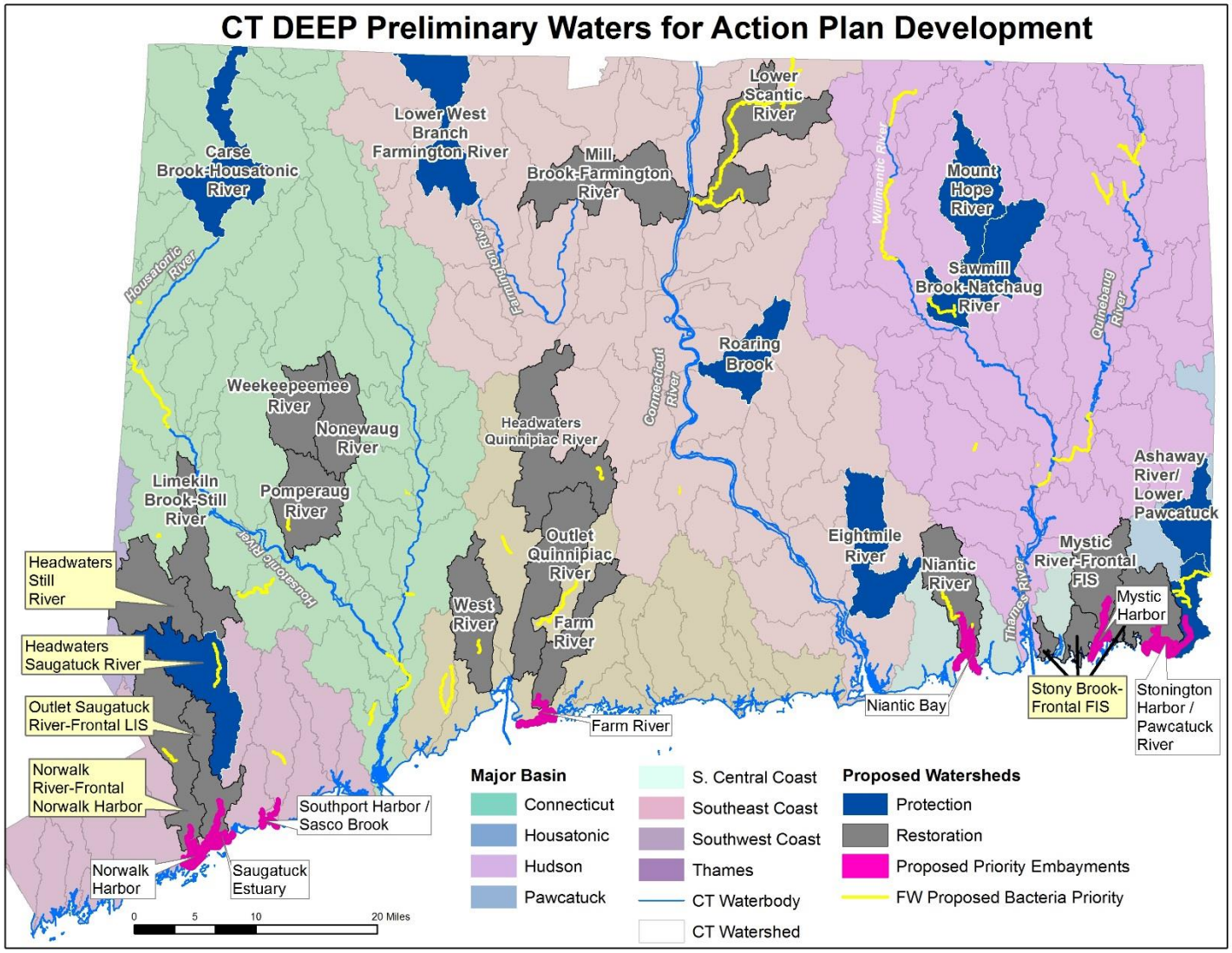


Screening restorable watersheds of interest to water, fisheries and mining programs in PA.

Contacts

- Doug Norton, EPA Office of Water, Project Co-Manager norton.douglas@epa.gov
- Jim Wickham, EPA Office of Research and Development, Project Co-Manager wickham.james@epa.gov

Appendix B. Map detailing the selected watersheds for prioritization



Appendix C. Complete CTDEEP Developed Indicator List for RPS Tool

INDICATOR NAME	TYPE	DESCRIPTION
NDDB Area (ISO)	ECOLOGICAL & SOCIAL	Acres in Connecticut DEEP Natural Diversity DataBase (NDDB). The NDDB includes locations of endangered, threatened and special concern species and significant natural communities in Connecticut. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% NDDB Area (ISO)	ECOLOGICAL & SOCIAL	% of HUC12 in Connecticut DEEP Natural Diversity DataBase (NDDB). The NDDB includes locations of endangered, threatened and special concern species and significant natural communities in Connecticut. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Streamlength Free Flowing (ISO)	ECOLOGICAL	Percent of stream miles classified as free flowing by Connecticut DEEP. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of Dams with Fishways (ISO)	ECOLOGICAL	Number of dams with fishways to allow fish migration. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Streamlength Supporting ALUS (ISO)	ECOLOGICAL	Stream miles supporting Connecticut aquatic life use goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Streamlength Supporting ALUS (ISO)	ECOLOGICAL	Percent of assessed stream miles supporting Connecticut aquatic life use goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Waterbody Area Supporting ALUS (ISO)	ECOLOGICAL	Lake acres supporting Connecticut aquatic life use goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Waterbody Area Supporting ALUS (ISO)	ECOLOGICAL	Percent of assessed lake acres supporting Connecticut aquatic life use goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
High MMI Streamlength (ISO)	ECOLOGICAL	Stream miles with predicted benthic invertebrate MMI score that is indicative of aquatic life use support (>48). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
MMI Stations Supporting ALUS (ISO)	ECOLOGICAL	Number of monitoring stations with average benthic invertebrate MMI score that is indicative of aquatic life use support (>48). ISO means this indicator is calculated for the In-State Only portion of border watersheds.

INDICATOR NAME	TYPE	DESCRIPTION
MMI Stations with ZeroT Organisms (ISO)	ECOLOGICAL	Number of benthic invertebrate monitoring sites with presence of zero tolerance organisms during 2006-2012 sampling. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Low Phosphorus EF Area (ISO)	ECOLOGICAL	Acres with low Phosphorus Enrichment Factor (<1.9). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Low Phosphorus EF Area (ISO)	ECOLOGICAL	Percent of HUC12 with low Phosphorus Enrichment Factor (<1.9). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% of Stream Length within 30 m 2011 IC ≥ 12% WS	STRESSOR	Percentage of watershed streamlength within 30 meters of cells in the NLCD 2011 impervious cover (IC) grid with IC > 12% in 2011.
% of Lake Shore Length within 30 m 2011 IC ≥ 12% WS	STRESSOR	Percentage of watershed shoreline length within 30 meters of cells in the NLCD 2011 impervious cover (IC) grid with IC > 12% in 2011.
% Water, 2011 IC ≥12%;Weighted Sum Stream & Lake WS	STRESSOR	Percentage of watershed streamlength and shoreline length within 30 meters of cells in the NLCD 2011 impervious cover (IC) grid with IC > 12% in 2011.
Impervious Cover (2011) IC ≥ 12%, PCT of Watershed	STRESSOR	Percentage of watershed with impervious cover (IC) > 12% in NLCD 2011 IC grid.
Domestic Water Use WS	STRESSOR	Estimated millions of gallons of water used daily for domestic purposes for each HUC-12. Estimates include all indoor and outdoor domestic water uses, such as drinking, bathing, cleaning, landscaping, and pools for primary residences.
Streamlength Minimally Altered Flow (ISO)	STRESSOR	Percent of stream miles classified as having minimally altered flow regime by Connecticut DEEP. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Streamlength Moderately Altered Flow (ISO)	STRESSOR	Percent of stream miles classified as having moderately altered flow regime by Connecticut DEEP. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Streamlength Altered Flow (ISO)	STRESSOR	Percent of stream miles classified as having minimally or moderately altered flow regime by Connecticut DEEP. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of Dams without Fishways (ISO)	STRESSOR	Number of dams with no fishways for fish migration. ISO means this indicator is calculated for the In-State Only portion of border watersheds.

INDICATOR NAME	TYPE	DESCRIPTION
Number of Toxic Dischargers (ISO)	STRESSOR	Number of permitted discharges with greater than 10% acute toxicity in at least 10% of effluent monitoring samples over the period 2009-2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of At-Risk Remediation Sites (ISO)	STRESSOR	Number of environmental remediation sites that exhibit potential risk for release of contaminated materials. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of Cattle CAFOs (ISO)	STRESSOR	Number of cattle CAFOs. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Cattle Population in CAFOs (ISO)	STRESSOR	Number of cattle in CAFOs. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of Poultry CAFOs (ISO)	STRESSOR	Number of poultry CAFOs. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Poultry Population in CAFOs (ISO)	STRESSOR	Number of poultry in CAFOs. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of CSO Outfalls (ISO)	STRESSOR	Number of CSO outfalls. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
High Phosphorus EF Area (ISO)	STRESSOR	Acres with high phosphorus Enrichment Factor (>6.2). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% High Phosphorus EF Area (ISO)	STRESSOR	Percent of HUC12 with high phosphorus Enrichment Factor (>6.2). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Nitrogen Yield	STRESSOR	Nitrogen yield from HUC12 predicted by USGS SPARROW model in units of kilograms per square kilometer per year.

INDICATOR NAME	TYPE	DESCRIPTION
Phosphorus Yield	STRESSOR	Phosphorus yield from HUC12 predicted by USGS SPARROW model in units of kilograms per square kilometer per year.
Nitrogen Yield Delivered to LIS	STRESSOR	Nitrogen yield from HUC12 delivered to Long Island Sound predicted by USGS SPARROW model in units of kilograms per square kilometer per year.
Phosphorus Yield Delivered to LIS	STRESSOR	Phosphorus yield from HUC12 delivered to Long Island Sound predicted by USGS SPARROW model in units of kilograms per square kilometer per year.
MMI Stations Not Supporting ALUS (ISO)	STRESSOR	Number of monitoring stations with average benthic invertebrate MMI score that is indicative of non-support of aquatic life use (<43). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Low MMI Streamlength (ISO)	STRESSOR	Stream miles with predicted benthic invertebrate MMI score that is indicative of non-support of aquatic life use (<43). ISO means this indicator is

INDICATOR NAME	TYPE	DESCRIPTION
		calculated for the In-State Only portion of border watersheds.
Streamlength Not Supporting ALUS (ISO)	STRESSOR	Stream miles not supporting Connecticut aquatic life use goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Streamlength Not Supporting ALUS (ISO)	STRESSOR	Percent of assessed stream miles not supporting Connecticut aquatic life use goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Waterbody Area Not Supporting ALUS (ISO)	STRESSOR	Lake acres not supporting Connecticut aquatic life use goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Waterbody Area Not Supporting ALUS (ISO)	STRESSOR	Percent of assessed lake acres not supporting Connecticut aquatic life use goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Assessed Streamlength (ISO)	SOCIAL	Stream miles assessed for recreation and aquatic life use water quality goals.
Assessed Waterbody Area (ISO)	SOCIAL	Acres of lakes and ponds assessed for recreation and aquatic life use water quality goals.
Streamlength Supporting REC (ISO)	SOCIAL	Stream miles supporting Connecticut recreational water quality goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Streamlength Supporting REC (ISO)	SOCIAL	Percent of assessed stream miles supporting Connecticut recreational water quality goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Waterbody Area Supporting REC (ISO)	SOCIAL	Lake acres supporting Connecticut recreational water quality goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Waterbody Area Supporting REC (ISO)	SOCIAL	Percent of assessed lake acres supporting Connecticut recreational water quality goals in 2014. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Streamlength Not Supporting REC Inverse (ISO)	SOCIAL	Stream miles not supporting Connecticut recreational water quality goals in 2014. Inverse of original values calculated by subtracting from the maximum so that HUC12s with a larger number of non-supporting stream miles receive a lower Social Index score. ISO means this indicator is calculated for the In-State Only portion of border watersheds.

INDICATOR NAME	TYPE	DESCRIPTION
% Streamlength Not Supporting REC Inverse (ISO)	SOCIAL	Percent of assessed stream miles not supporting Connecticut recreational water quality goals in 2014. Inverse of original values calculated by subtracting from the maximum so that HUC12s with a larger percentage of non-supporting stream miles receive a lower Social Index score. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Waterbody Area Not Supporting REC Inverse (ISO)	SOCIAL	Lake acres not supporting Connecticut recreational goals in 2014. Inverse of original values calculated by subtracting from the maximum so that HUC12s with a larger number of non-supporting lake acres receive a lower Social Index score. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Waterbody Area Not Supporting REC Inverse (ISO)	SOCIAL	Percent of assessed lake acres not supporting Connecticut recreational goals in 2014. Inverse of values calculated by subtracting from the maximum so that HUC12s with a larger percentage of non-supporting lake acres receive a lower Social Index score. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of Recreation Areas (ISO)	SOCIAL	Number of potential recreation areas (beaches, boat ramps, coastal access points, and other known areas of recreation). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of Fish Stocking Locations (ISO)	SOCIAL	Number of fish stocking locations. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of Trout Stocking Sites (ISO)	SOCIAL	Number of trout stocking sites. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Streamlength with Trout Stocking (ISO)	SOCIAL	Stream miles with trout stocking. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Farmland Preservation Area (ISO)	SOCIAL	Acres in Connecticut Department of Agriculture Farmland Preservation program. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Farmland Preservation Area (ISO)	SOCIAL	Percent of HUC12 in Connecticut Department of Agriculture Farmland Preservation program. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
NDDB Area (ISO)	ECOLOGICAL & SOCIAL	Acres in Connecticut DEEP Natural Diversity DataBase (NDDB). The NDDB includes locations of endangered, threatened and special concern species and significant natural communities in Connecticut. ISO means this indicator is

INDICATOR NAME	TYPE	DESCRIPTION
		calculated for the In-State Only portion of border watersheds.
% NDDB Area (ISO)	ECOLOGICAL & SOCIAL	% of HUC12 in Connecticut DEEP Natural Diversity DataBase (NDDB). The NDDB includes locations of endangered, threatened and special concern species and significant natural communities in Connecticut. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Open Space Area (ISO)	SOCIAL	Acres in Connecticut DEEP federal, private, municipal, state, and water company protected open space areas. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Open Space Area (ISO)	SOCIAL	Percent of HUC12 in Connecticut DEEP federal, private, municipal, state, and water company protected open space areas. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
MS4 Area (ISO)	SOCIAL	Acres in permitted MS4 service area. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% MS4 Area (ISO)	SOCIAL	Percent of HUC12 in permitted MS4 service area. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Sewer Service Area (ISO)	SOCIAL	Acres with municipal or private sanitary sewer service. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Sewer Service Area (ISO)	SOCIAL	Percent of HUC12 with municipal or private sanitary sewer service. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of Towns Inverse (ISO)	SOCIAL	Number of towns per HUC12. Inverse of original values calculated by subtracting from the maximum so that HUC12s with a larger number of towns receive a lower Social Index score. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
EJ Area (ISO)	SOCIAL	Acres in environmental justice area. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% EJ Area (ISO)	SOCIAL	Percent of HUC12 in environmental justice area. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Potential Aquifer Area (ISO)	SOCIAL	Acres of potential aquifers for public water supply in HUC12. ISO means this indicator is

INDICATOR NAME	TYPE	DESCRIPTION
		calculated for the In-State Only portion of border watersheds.
% Potential Aquifers (ISO)	SOCIAL	Percent of HUC12 with potential aquifers for public water supply. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Aquifer Protection Area (ISO)	SOCIAL	Acres of regulated aquifer protection areas in HUC12. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Aquifer Protection Area (ISO)	SOCIAL	Percent of HUC12 in regulated aquifer protection areas. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Groundwater PWS Area (ISO)	SOCIAL	Acres contributing to public water supply groundwater wells. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Groundwater PWS Area (ISO)	SOCIAL	Percent of HUC12 contributing to public water supply groundwater wells. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Number of PWS Wells (ISO)	SOCIAL	Number of public water supply groundwater wells. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Surface PWS Area (ISO)	SOCIAL	Acres in drainage area of surface water supplies for public. ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% Surface PWS Area (ISO)	SOCIAL	Percent of HUC12 in drainage area of surface water supplies for public. ISO means this indicator is calculated for the In-State Only portion of border watersheds.

Appendix D: list of "Top 40 Watersheds for Each Scenario"

This list of tables represents the results of the tiered decision screening used by CT DEEP staff to sort the raw rankings from the RPS Tool.

Table 1. General Watershed Health Protection Ranking (darker line at top 20 cutoff)

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
010802050903	Eightmile River	69.338	1	5.917	17	25.372	18	62.931	1
011000010601	Upper Pachaug River	65.713	5	5.45	6	26.752	11	62.338	2
011000020206	Sawmill Brook-Natchaug River	57.779	21	5.65	8	31.088	5	61.072	3
011000020205	Mount Hope River	58.196	19	5.983	20	27.676	7	59.963	4
010900050301	Ashaway River	62.821	7	6.267	31	22.776	29	59.777	5
010802070302	Valley Brook-East Branch Farmington	65.875	4	8.067	92	21.124	39	59.644	6
011000020203	Bigelow Brook	59.633	15	6.5	44	25.528	16	59.554	7
011000060102	Headwaters Saugatuck River	68.029	2	6.483	42	16.824	72	59.457	8
011000020106	Hop River	53.55	41	6.717	49	31.168	4	59.334	9
010802050901	Deep River-Connecticut River	61.05	10	7.217	64	23.988	23	59.274	10
011000050306	Carse Brook-Housatonic River	55.613	29	5.7	10	27.284	8	59.066	11
010802070501	West Branch Salmon Brook	55.657	28	5.767	12	26.3	14	58.73	12
011000050702	Bantam River	60.746	11	10.267	121	25.408	17	58.629	13
010802050802	Jeremy River	60.442	12	7.15	60	20.356	47	57.883	14
011000010301	Upper Fivemile River	59.354	17	5.667	9	19.64	53	57.776	15
010802070204	Lower West Branch Farmington River	55.696	27	10.267	121	27.256	9	57.562	17
010802050804	Moodus River	57.305	23	6.15	25	18.244	64	56.466	20
011000010302	Lower Fivemile River	54.129	37	6.333	36	20.924	42	56.24	22
011000020202	Still River	55.379	32	5.933	18	19.024	58	56.157	23

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000030304	Niantic River	55.871	26	7.983	91	20.028	49	55.972	24
010802050701	Higganum Creek	54.263	35	6.25	30	19.18	56	55.731	25
010802050905	Joshua Creek-Connecticut River	53.8	40	8.85	104	22.18	31	55.71	26
011000030201	Poquetanuck Brook	61.263	8	7.25	66	13.108	102	55.707	27
011000050203	Hubbard Brook	58.5	18	6.667	48	14.928	88	55.587	28
011000060101	Aspetuck River	56.329	25	5.767	12	15.982	82	55.515	30
011000020107	Tenmile River	55.492	31	7.167	61	17.644	66	55.323	32
011000051001	Pootatuck River	52.654	49	7.433	74	20.568	44	55.263	33
011000010503	Lower Moosup River	57.733	22	7.3	71	14.896	90	55.11	35
011000010703	Broad Brook	59.481	16	6.217	28	11.15	120	54.805	36
011000050305	Salmon Creek	57.808	20	7.883	87	14.184	94	54.703	37
011000050902	Weekeepeemee River	52.008	51	6.917	54	18.996	59	54.696	38
010802070401	Nepaug River	54.124	38	6.05	21	14.523	92	54.199	42
011000020201	Bungee Brook	51.267	53	6.733	50	17.78	65	54.105	43
010900050101	Upper Wood River	54.609	34	5.817	14	12.34	110	53.711	46
011000040202	Hammonasset River-Frontal Clinton Harbor	52.421	50	7.95	89	16.58	75	53.684	47
011000020302	Little River	53.038	44	6.3	33	13.896	96	53.545	49
011000010101	Mashapaug Pond	53.536	42	7.717	81	14.612	91	53.477	50
011000010602	Lower Pachaug River	53.536	42	5.533	7	11.112	121	53.038	52
011000010704	Cory Brook-Quinebaug River	51.479	52	4.867	2	11.696	115	52.769	54
011000030101	Deep River	52.996	45	6.45	41	10.692	125	52.413	62

Table 2. Nutrient Protection Ranking (darker line at top 20 cutoff)

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
010802070501	West Branch Salmon Brook	48.914	9	5.767	12	27.14	5	56.762	2
011000010601	Upper Pachaug River	53.513	5	5.45	6	21.344	23	56.469	3
011000020203	Bigelow Brook	55.013	4	6.5	44	18.967	34	55.827	4
011000060101	Aspetuck River	47.852	15	5.767	12	22.807	17	54.964	5
010802070401	Nepaug River	49.119	8	6.05	21	20.273	28	54.447	6
010900050301	Ashaway River	46.929	17	6.267	31	21.417	22	54.026	7
011000020104	Roaring Brook	39.176	50	7.533	77	28.073	3	53.239	9
010802050504	Roaring Brook	41.083	38	5.283	4	23.661	14	53.154	10
011000020106	Hop River	39.821	46	6.717	49	26.239	6	53.114	11
011000010105	Shunway Brook-Quinebaug River	39.663	49	6.233	29	25.75	7	53.06	13
011000020101	Edson Brook	44.817	22	5.9	15	20.217	29	53.045	14
011000010703	Broad Brook	55.595	2	6.217	28	9.573	114	52.984	15
011000050601	Candlewood Lake	40.696	41	7.533	77	24.472	9	52.545	16
011000010402	Mashamoquet River	46.01	19	6.933	55	18.387	37	52.488	17
011000020206	Sawmill Brook-Natchaug River	39.133	51	5.65	8	23.8	12	52.428	18
011000060102	Headwaters Saugatuck River	41.096	37	6.483	42	22.411	18	52.341	19
010802050804	Moodus River	50.338	7	6.15	25	10.744	100	51.644	20
011000020302	Little River	44.788	23	6.3	33	15.694	49	51.394	21
010802050801	Blackledge River	40.225	45	7.317	72	21.117	25	51.342	22
010802050903	Eightmile River	46.058	18	5.917	17	13.256	74	51.132	23
011000030302	Poquonock River-Frontal Fishers Island Sound	48.25	11	8.7	101	13.633	66	51.061	24
011000020205	Mount Hope River	43.929	28	5.983	20	14.317	61	50.754	25

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000040202	Hammonasset River-Frontal Clinton Harbor	40.371	44	7.95	89	18.933	35	50.451	26
010900050102	Lower Wood River	47.222	16	6.417	39	10.258	104	50.354	27
010802050902	East Branch Eightmile River	43.057	30	6.567	45	13.887	63	50.126	30
011000040201	Menunketesuck River	44.167	27	7.267	69	13.313	73	50.071	31
010802070302	Valley Brook-East Branch Farmington	44.513	25	8.067	92	13.572	67	50.006	33
011000040203	East River-Frontal Guilford Harbor	38.057	59	9.45	110	21.313	24	49.973	34
011000010301	Upper Fivemile River	43.758	29	5.667	9	10.9	97	49.664	37
010802070301	Hubbard River	45.157	21	8.067	92	11.247	96	49.446	40
011000050702	Bantam River	38.246	57	10.267	121	20.194	30	49.391	41
010802070502	Salmon Brook	44.438	26	6.117	24	9.593	113	49.305	42
011000050402	Furnace Brook-Housatonic River	40.576	42	6.067	22	12.013	88	48.841	43
011000020204	Fenton River	39.125	52	6.333	36	13.067	77	48.62	45
011000050305	Salmon Creek	39.733	48	7.883	87	13.433	71	48.428	48
011000030101	Deep River	37.133	64	6.45	41	13.567	68	48.083	50
010900050101	Upper Wood River	38.379	56	5.817	14	11.467	94	48.01	53
011000020102	Middle River	37.371	61	5.933	18	11.88	90	47.773	55
011000010702	Mill Brook	40.995	39	7.283	70	9.44	116	47.717	56
010802050802	Jeremy River	38.688	54	7.15	60	10.844	99	47.461	62

Table 3. Stormwater Protection Ranking (darker line at top 20 cutoff)

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000010601	Upper Pachaug River	67.519	1	6.1	3	20.626	23	60.682	1

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
010802070501	West Branch Salmon Brook	57.067	23	9	28	26.406	6	58.158	3
010900050301	Ashaway River	63.238	6	10.7	57	21.505	20	58.014	4
011000020203	Bigelow Brook	62.019	9	7.567	15	18.374	36	57.609	5
011000020206	Sawmill Brook-Natchaug River	56.652	24	9.533	38	23.358	10	56.826	6
011000020106	Hop River	53.919	39	10.6	56	25.668	8	56.329	7
010802070401	Nepaug River	55.683	29	7.8	17	19.969	27	55.951	8
010802070302	Valley Brook-East Branch Farmington	64.143	4	10	47	12.858	76	55.667	9
011000020101	Edson Brook	53.462	42	6.35	5	19.558	32	55.557	10
010802050903	Eightmile River	62.948	7	9.317	33	12.963	73	55.531	11
011000010703	Broad Brook	63.4	5	8.65	24	11.381	97	55.377	12
011000050304	Hollenbeck River	66.648	2	14.15	88	12.989	71	55.162	13
011000060101	Aspetuck River	54.711	32	12.2	70	21.863	17	54.791	14
011000020205	Mount Hope River	58.833	17	9.367	34	13.968	67	54.478	16
011000060102	Headwaters Saugatuck River	58.429	18	16.583	110	21.232	21	54.359	18
011000030101	Deep River	55.024	31	6.333	4	14.068	65	54.253	20
010802050804	Moodus River	57.71	22	7.117	11	10.989	101	53.861	25
011000030302	Poquonock River-Frontal Fishers Island Sound	58.286	19	10.483	54	12.916	75	53.573	26
011000050701	Headwaters Shepaug River	62.148	8	13.967	86	11.963	90	53.381	27
011000050702	Bantam River	54.462	34	14.75	96	20.347	25	53.353	28
011000010301	Upper Fivemile River	59.376	15	10.45	53	10.732	105	53.219	29
011000010402	Mashamoquet River	48.6	61	9.3	31	18.681	34	52.66	31
010802050802	Jeremy River	57.99	21	12.433	73	11.084	99	52.214	32
011000030102	Susquetonscut Brook	53.044	45	7.333	13	10.8	104	52.17	33
010802070204	Lower West Branch Farmington River	52.424	50	17.75	118	21.689	19	52.121	34

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000050305	Salmon Creek	56.371	25	14.967	97	13.942	68	51.782	39
011000050306	Carse Brook-Housatonic River	50.929	55	11.567	64	15.484	54	51.615	40
011000010503	Lower Moosup River	52.457	49	12.8	76	15.047	57	51.568	42
011000010302	Lower Fivemile River	53.943	38	11.9	67	12.1	89	51.381	44
010900050101	Upper Wood River	55.962	28	12.917	78	10.863	103	51.303	46
010802050902	East Branch Eightmile River	48.156	62	8.417	22	13.981	66	51.24	47
010802070301	Hubbard River	52.683	47	9.717	42	10.544	109	51.17	49
011000050303	Blackberry River	55.971	27	18.433	122	15.926	48	51.155	50
011000040201	Menunketesuck River	49.572	58	9.583	40	12.963	73	50.984	51
011000020302	Little River	51.7	51	14.45	92	15.679	49	50.976	52
011000010602	Lower Pachaug River	47.738	64	6.9	8	10.663	108	50.5	55
011000010204	Lower French River	51.071	53	17.7	116	16.589	43	49.987	59
011000040204	West River-Frontal Guilford Harbor	51.29	52	15.733	104	14.084	64	49.88	61
010802070502	Salmon Brook	47.639	65	10.433	52	11.4	95	49.535	65
010802050901	Deep River-Connecticut River	54.057	36	19	125	12.8	78	49.286	66

Table 4. General Watershed Health Restoration Ranking

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000030303	Stony Brook-Frontal Fishers Island Sound	64.6	1	27.864	147	34.592	2	57.109	1
011000020303	Beaver Brook-Shetucket River	48.6	2	16.835	114	19.692	60	50.486	5
011000040203	East River-Frontal Guilford Harbor	42.55	10	13.664	99	21.258	47	50.048	10

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000030302	Poquonock River-Frontal Fishers Island Sound	30.525	55	13.31	95	26.725	11	47.98	24
011000030306	Pattagansett River-Frontal Long Island Sound	39.025	15	15.087	108	18.617	76	47.518	28
011000040208	Indian River-Frontal Long Island Sound	42.475	12	27.2	145	27.05	9	47.442	29
011000051101	West Branch Naugatuck River	36.125	25	13.816	101	17.892	81	46.734	36
011000060201	Silvermine River	30.75	50	16.093	111	25.3	15	46.652	37
011000051003	Halfway River-Housatonic River	34.1	35	13.468	97	17.808	86	46.147	39
011000040204	West River-Frontal Guilford Harbor	33.7	36	15.539	109	19.983	58	46.048	44
011000040201	Menunketesuck River	33.1	39	13.104	91	16.942	97	45.646	46
011000020108	Nelson Brook-Willimantic River	24.75	102	14.368	104	25.65	13	45.344	51
011000050903	Pomperaug River	30.225	58	14.979	107	20.433	55	45.226	53
011000050303	Blackberry River	32.3	43	16.5	113	18.592	77	44.797	58
010802050203	Lower Scantic River	27.7	78	24.865	137	31.483	3	44.773	60
011000050702	Bantam River	28.9	69	13.348	96	18.725	74	44.759	62
011000040205	Branford River	38.75	16	26.681	143	21.125	50	44.398	67
011000060103	Outlet Saugatuck River-Frontal Long Island Sound	31.725	45	19.864	126	20.208	57	44.023	72
011000051207	Bladens River-Naugatuck River	35	30	24.752	136	21.367	42	43.872	73
010802070405	Roaring Brook-Farmington River	26.1	90	18.196	121	23.225	24	43.71	80
011000030301	Mystic River-Frontal Fishers Island Sound	26.9	85	13.152	92	16.8	100	43.516	85
011000060202	Norwalk River-Frontal Norwalk Harbor	29.125	67	26.268	140	27.667	8	43.508	87
010802050506	Reservoir Brook-Connecticut River	27.3	81	17.389	116	20.533	53	43.481	89
011000040302	West River	30.7	52	25.877	139	25.592	14	43.472	91

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000010702	Mill Brook	24.575	104	13.196	93	16.75	101	42.71	99
011000050604	Great Brook-Housatonic River	30.875	49	20.077	128	16.525	106	42.441	103
010802050602	Coginchaug River	30.35	57	26.377	142	23.317	23	42.43	104
011000040206	Farm River	33.05	40	30.357	151	22.758	30	41.817	111
011000040101	Eightmile River	25.6	97	19.725	125	19.167	67	41.681	113
010802070103	Still River	24.2	109	17.239	115	18.025	80	41.662	115
011000051104	Branch Brook	28.6	71	24.416	134	19.967	59	41.384	118
010802050702	Mill Creek-Connecticut River	24.925	100	17.548	117	15.967	117	41.115	122
011000010105	Shunway Brook-Quinebaug River	25.85	94	20.013	127	15.592	123	40.476	126
011000051105	Northfield Brook-Naugatuck River	26.1	90	25.474	138	20.417	56	40.348	128
011000010403	Fall Brook-Quinebaug River	29.3	65	28.087	148	17.525	91	39.579	134
011000040102	Tenmile River	23.5	114	28.09	149	23.125	26	39.512	135
010802070602	Mill Brook-Farmington River	28.425	72	37.239	165	23.058	28	38.081	144
010802050402	Lower Hockanum River	27.625	79	45.358	176	30.75	6	37.672	148
010802050601	Upper Mattabesset River	23.5	114	39.942	170	23.442	22	35.667	159
011000040304	Cove River-Frontal Long Island Sound	31.15	48	64.182	184	35.092	1	34.02	165

Table 5. Nutrient Restoration Ranking

Watershed ID	Watershed NAME	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000030303	Stony Brook-Frontal Fishers Island Sound	64.6	1	19.006	141	22.68	5	56.091	1
011000020303	Beaver Brook-Shetucket River	48.6	2	17.525	136	15.06	52	48.712	11
011000040205	Branford River	38.75	16	12.942	103	15.31	49	47.039	20
011000060201	Silvermine River	30.75	50	11.317	88	20.5	13	46.644	25
011000030306	Pattagansett River-Frontal Long Island Sound	39.025	15	11.417	91	11.91	81	46.506	26
011000010602	Lower Pachaug River	44.025	7	15.822	125	10.23	103	46.144	29

Watershed ID	Watershed NAME	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000040208	Indian River-Frontal Long Island Sound	42.475	12	25.428	164	18.1	24	45.049	41
011000051207	Bladens River-Naugatuck River	35	30	15.667	122	15.68	44	45.004	43
011000040204	West River-Frontal Guilford Harbor	33.7	36	13.103	106	13.77	64	44.789	45
010802050602	Coginchaug River	30.35	57	15.872	127	19.4	17	44.626	46
011000050903	Pomperaug River	30.225	58	11.456	93	13.92	62	44.23	52
010900050301	Ashaway River	31.85	44	11.417	91	12.09	80	44.174	53
011000050303	Blackberry River	32.3	43	13.067	104	12.58	76	43.938	55
011000051003	Halfway River-Housatonic River	34.1	35	14.403	117	11.58	86	43.759	58
011000050702	Bantam River	28.9	69	11.203	86	12.96	74	43.552	61
011000040302	West River	30.7	52	22.081	152	20.65	12	43.09	65
011000060202	Norwalk River-Frontal Norwalk Harbor	29.125	67	22.664	157	22.8	4	43.087	66
011000040102	Tenmile River	23.5	114	11.722	94	17.02	32	42.933	68
010802050203	Lower Scantic River	27.7	78	26.556	167	27.17	2	42.771	69
011000040206	Farm River	33.05	40	23.631	160	18.47	23	42.63	71
011000060103	Outlet Saugatuck River-Frontal Long Island Sound	31.725	45	18.531	140	14.47	58	42.555	72
011000051105	Northfield Brook-Naugatuck River	26.1	90	14.05	115	14.52	56	42.19	76
010802050506	Reservoir Brook-Connecticut River	27.3	81	13.756	113	13	73	42.181	78
010802070405	Roaring Brook-Farmington River	26.1	90	16.314	129	15.89	39	41.892	80
010802050601	Upper Mattabesset River	23.5	114	15.8	124	17.59	26	41.763	84
010802050802	Jeremy River	25.95	92	10.906	84	10.16	105	41.735	86
010802050402	Lower Hockanum River	27.625	79	23.514	158	20.8	11	41.637	87
011000030301	Mystic River-Frontal Fishers Island Sound	26.9	85	12.817	101	10.52	101	41.534	90
010802070602	Mill Brook-Farmington River	28.425	72	19.797	143	15.95	38	41.526	91
011000060402	Mianus River	25.775	96	11.397	90	10	109	41.459	92
010802070103	Still River	24.2	109	11.761	95	11.61	84	41.35	96
011000010704	Cory Brook-Quinebaug River	29.5	63	18.206	137	12.25	79	41.181	97

Watershed ID	Watershed NAME	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000010403	Fall Brook-Quinebaug River	29.3	65	17.05	132	10.84	96	41.03	99
011000050803	Outlet Still River	30	60	18.456	138	10.72	99	40.755	106
010802070502	Salmon Brook	23.325	116	13.317	108	10.12	106	40.043	119
011000010703	Broad Brook	25.9	93	17.389	134	10.95	94	39.82	123
011000010105	Shunway Brook-Quinebaug River	25.85	94	20.233	148	9.92	111	38.512	139
011000040304	Cove River-Frontal Long Island Sound	31.15	48	38.606	183	22.48	6	38.341	141
011000030102	Susquetonscut Brook	22.775	119	28.536	175	18.93	20	37.723	151
011000030203	Thames River-Frontal New London Harbor	22.75	120	29.992	177	12.52	77	35.093	170

Table 6. Stormwater Restoration Ranking

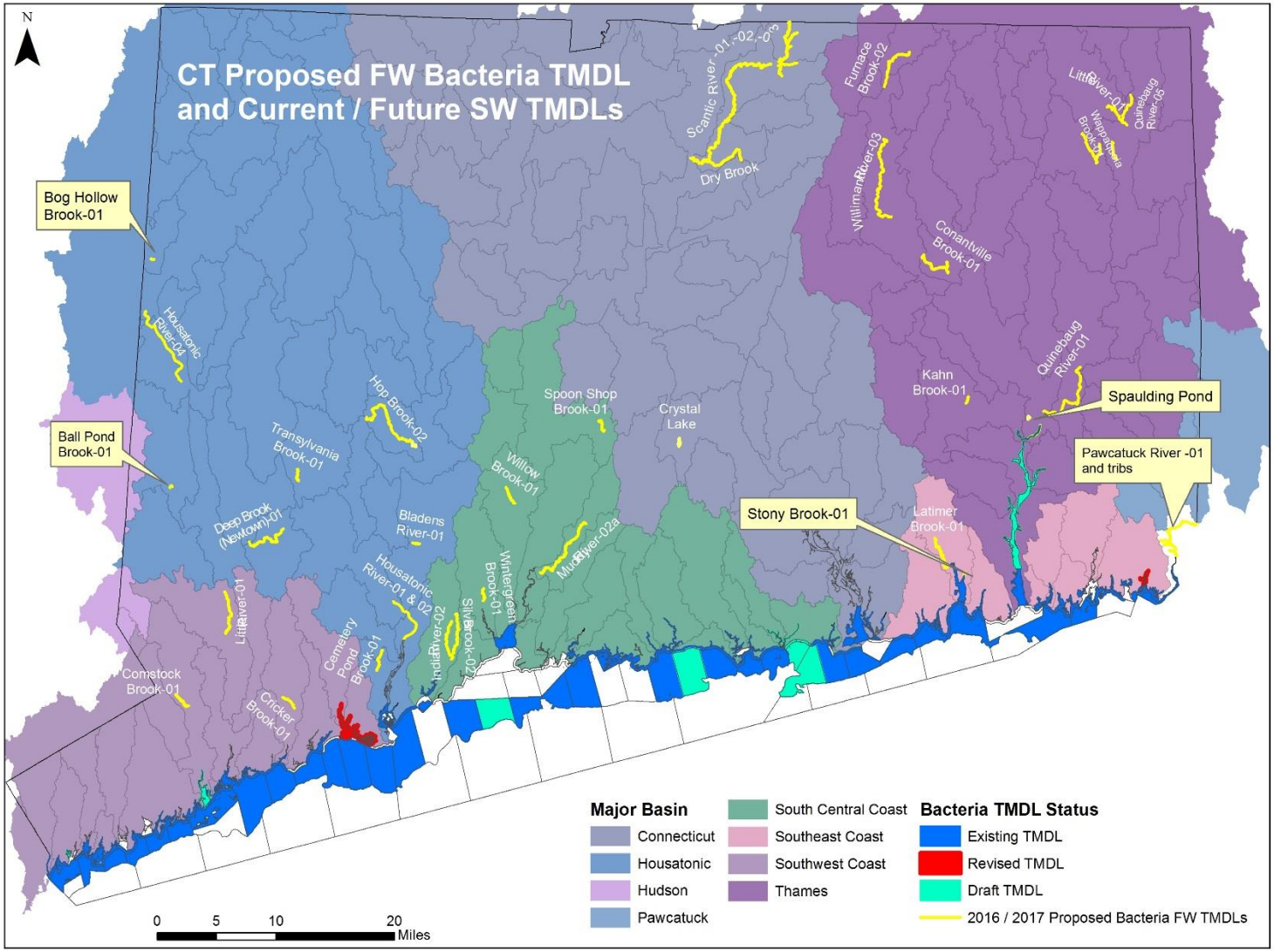
Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000030303	Stony Brook-Frontal Fishers Island Sound	64.6	1	26.365	141	37.89	2	58.708	1
011000020303	Beaver Brook-Shetucket River	48.6	2	15.105	86	17.12	108	50.205	5
011000040203	East River-Frontal Guilford Harbor	42.55	10	15.647	91	22.07	46	49.658	11
011000060201	Silvermine River	30.75	50	18.171	110	29.64	9	47.406	27
011000040208	Indian River-Frontal Long Island Sound	42.475	12	28.524	146	27.96	12	47.304	28
011000051003	Halfway River-Housatonic River	34.1	35	16.665	100	20.39	61	45.942	38
011000040302	West River	30.7	52	23.585	130	30.28	8	45.798	39
011000040204	West River-Frontal Guilford Harbor	33.7	36	17.59	104	21.11	54	45.74	41
011000051101	West Branch Naugatuck River	36.125	25	18.045	108	18.42	87	45.5	43
011000051207	Bladens River-Naugatuck River	35	30	23.56	129	23.12	39	44.853	47
011000050803	Outlet Still River	30	60	15.41	88	18.91	81	44.5	53
011000040207	Patchogue River-Frontal Westbrook Harbor	34.95	31	18.259	113	16.32	120	44.337	55
011000050701	Headwaters Shepaug River	31.625	46	14.93	85	16.26	122	44.318	56
011000040205	Branford River	38.75	16	29.285	148	23.34	37	44.268	58
011000050303	Blackberry River	32.3	43	17.58	103	17.75	94	44.157	60
011000050903	Pomperaug River	30.225	58	18.206	112	20.31	62	44.11	61
010802050506	Reservoir Brook-Connecticut River	27.3	81	15.665	93	20.61	58	44.082	62
011000060202	Norwalk River-Frontal Norwalk Harbor	29.125	67	25.54	138	27.4	13	43.662	71
011000060402	Mianus River	25.775	96	14.515	81	18.62	84	43.293	76
011000050702	Bantam River	28.9	69	16.52	99	17.25	107	43.21	78
010802070405	Roaring Brook-Farmington River	26.1	90	17.729	105	21.22	52	43.197	79
010802050203	Lower Scantic River	27.7	78	22.025	123	23.8	33	43.158	80

Watershed ID	Watershed Name	Ecological Index	Ecological Rank	Stressor Index	Stressor Rank	Social Index	Social Rank	RPI Score	RPI Rank
011000060103	Outlet Saugatuck River-Frontal Long Island Sound	31.725	45	23.959	133	21.08	55	42.949	85
011000040101	Eightmile River	25.6	97	18.182	111	20.8	56	42.739	88
011000051104	Branch Brook	28.6	71	24.265	135	23.14	38	42.492	92
010802050702	Mill Creek-Connecticut River	24.925	100	14.855	84	17.37	104	42.48	94
010802070101	Mad River	28.9	69	19.57	118	17.33	106	42.22	97
011000010702	Mill Brook	24.575	104	15.653	92	17.52	98	42.147	100
010802070502	Salmon Brook	23.325	116	14.812	83	17.39	102	41.968	104
011000040102	Tenmile River	23.5	114	23.815	132	25.99	19	41.892	107
011000040206	Farm River	33.05	40	30.271	153	22.89	41	41.89	108
011000050604	Great Brook-Housatonic River	30.875	49	23.635	131	16.72	111	41.32	115
011000010403	Fall Brook-Quinebaug River	29.3	65	23.26	127	17.45	100	41.163	116
011000051105	Northfield Brook-Naugatuck River	26.1	90	23.31	128	17.4	101	40.063	129
010802050602	Coginchaug River	30.35	57	34.69	166	21.83	48	39.163	136
010802070602	Mill Brook-Farmington River	28.425	72	36.48	169	23.8	33	38.582	138
010802050402	Lower Hockanum River	27.625	79	44.095	177	30.69	7	38.073	140
011000010105	Shunway Brook-Quinebaug River	25.85	94	27.785	143	16.11	125	38.058	141
011000040304	Cove River-Frontal Long Island Sound	31.15	48	57.576	183	39.65	1	37.741	143
010802050601	Upper Mattabesset River	23.5	114	42.89	174	26.72	16	35.777	166

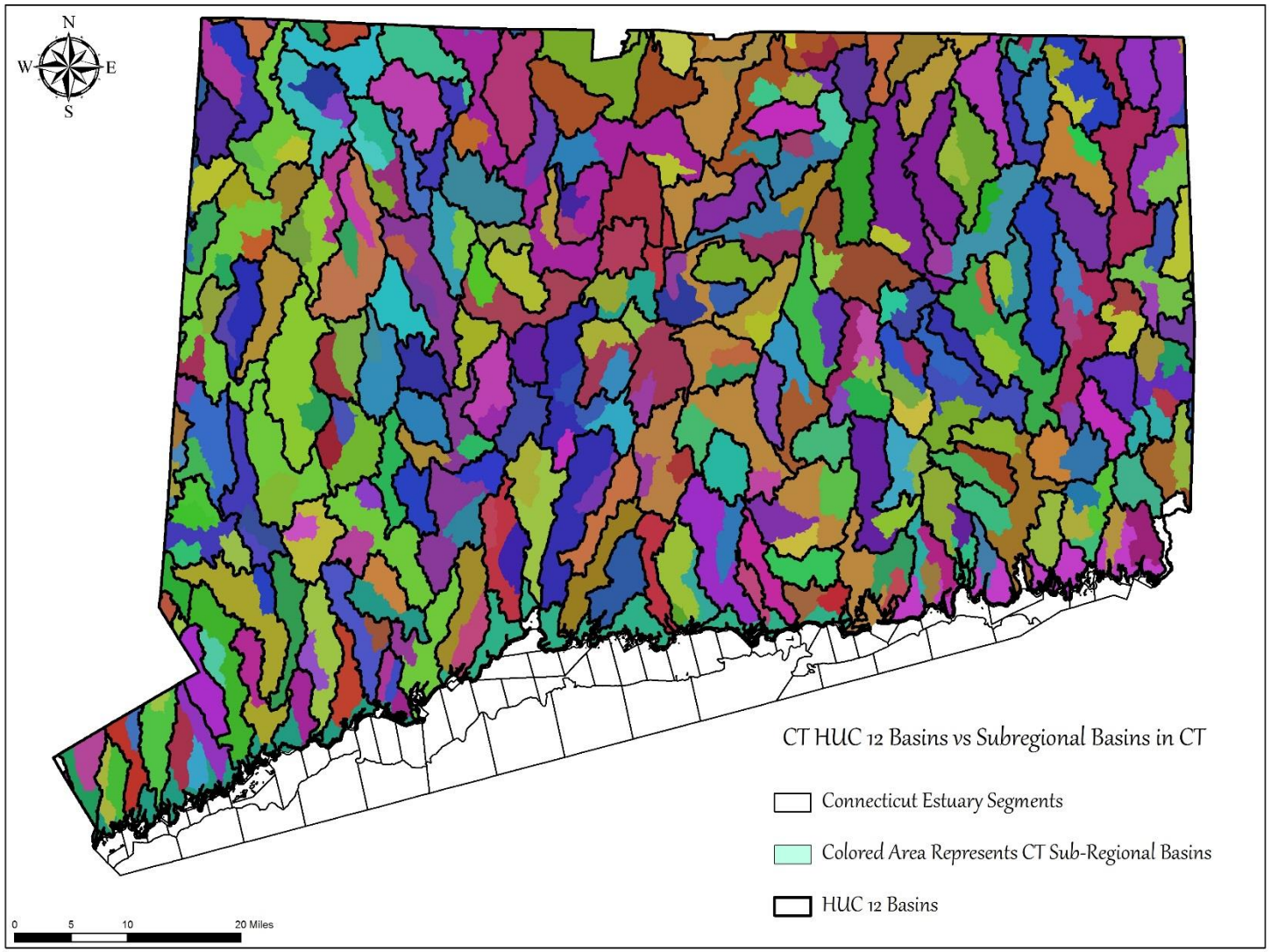
Appendix E: List of Watershed Raw Rankings Each Scenario

The list of all watershed rankings as produced from the RPS Tool is a separate file that is available for download in the same web location as this report. This separate file creation step was taken to keep the file size of both documents to be a manageable size (this data set doubles the number of pages in this report if included within the file).

Appendix F: Waterbodies for bacteria TMDL development



Appendix G: Map of HUC vs CT Watersheds



2016

Integrated Water Resource Management in Connecticut

Connecticut Department of Energy and Environmental Protection, Bureau of Water Protection and Land Reuse,
Planning & Standards Division

5/17/2016

Contents

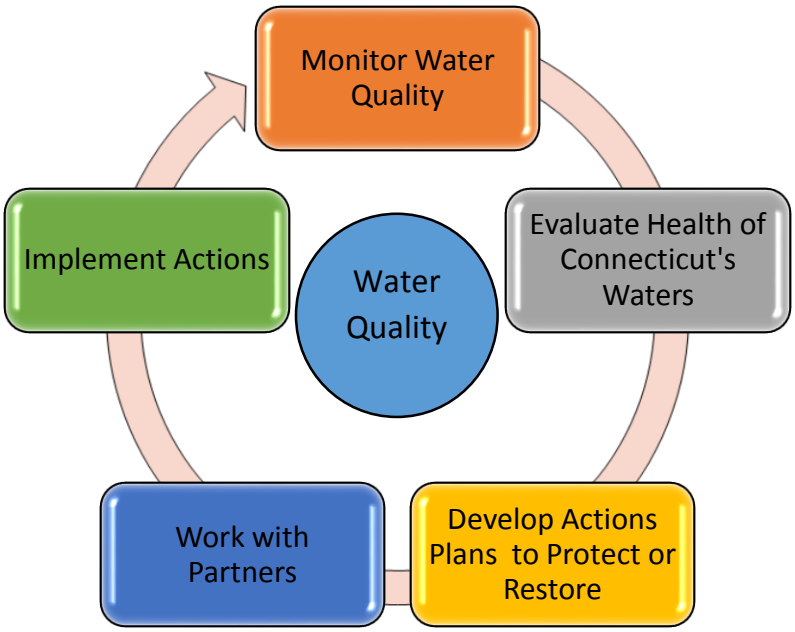
Introduction

Taking action to restore and protect water quality…..that's the goal for Connecticut Department of Energy and Environmental Protection's current efforts to improve our approach to restoring and protecting Connecticut's water resources. Surface waters, such as rivers, streams, lakes, embayments and Long Island Sound, are important resources for residents, businesses and for fish and wildlife. Through Integrated Water Resource Management, we are looking to focus state resources and strengthen partnerships in Connecticut to better protect and restore our water quality.

Protecting and Restoring Connecticut's Water Quality

In order to take care of our natural resources, the Connecticut Department of Energy and Environmental Protection (CT DEEP) monitors our waters. We focus on how our waters are used, such as for drinking water, fishing, swimming and for supporting healthy wildlife and fish, as well as the water quality needed to support these activities. We find some waters which are impaired and need some actions to bring back or restore good water quality. Other waters are healthy and have very good water quality, which needs to be maintained and protected. We establish plans and identify actions to achieve these restoration or protection goals and work with partners through voluntary and regulatory efforts to protect areas of good water quality and restore areas with impaired water quality.

Figure 1: Protecting & Restoring Water Quality

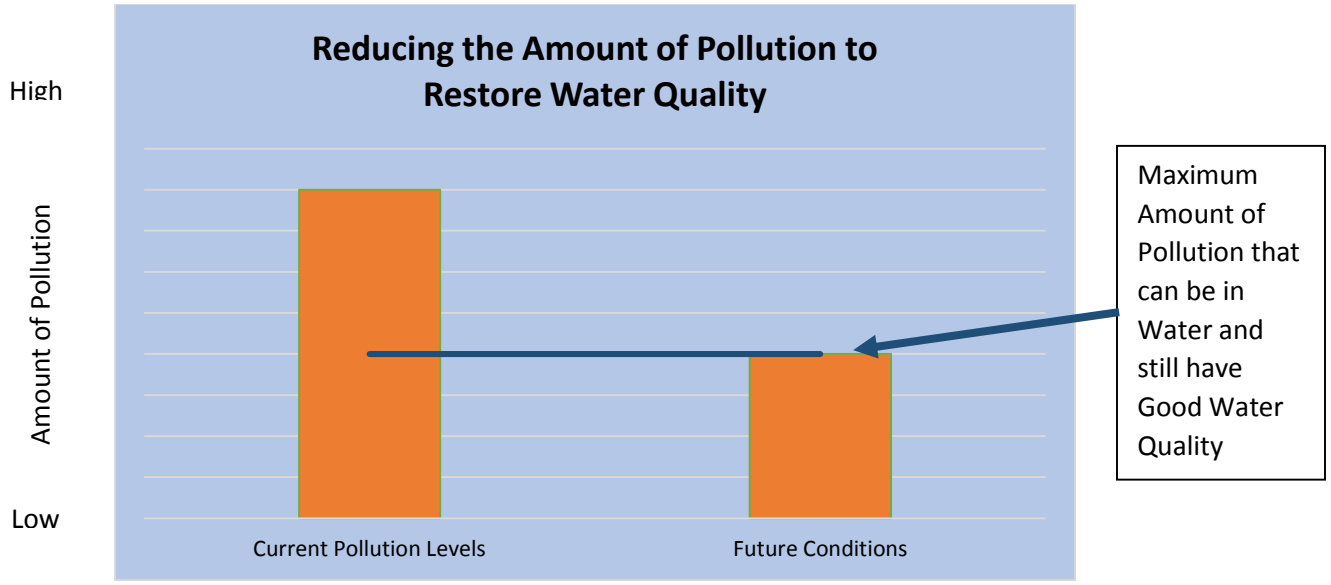


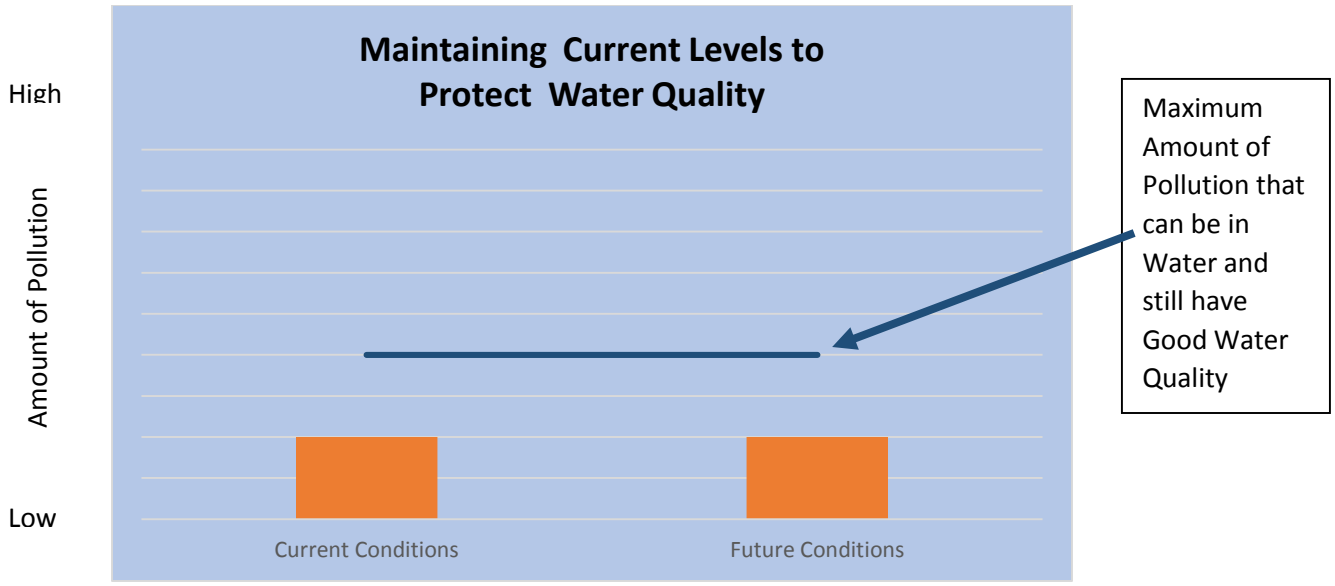
We are currently working to identify waters for development of action plans during the next 6 years (2016-2022). Over time, we may adjust the waters selected for plan development as new information and opportunities occur. With this report, we are identifying some potential places to start this effort, with input from the public.

Background:

Under the federal Clean Water Act, States develop plans called **Total Maximum Daily Loads** (TMDLs) to restore waters with impaired water quality and protect waters with good water quality. A TMDL can be thought of as a water pollution budget or diet. Any waterbody with poor water quality is over its daily budget for a pollutant. These waterbodies are considered to be impaired by CT DEEP. The pollutant must be reduced to a lower level for the waterbody to be within its budget and water quality to be restored. Similarly, for waters with good water quality, setting a budget helps keep the amount of each pollutant at levels which protect existing water quality. The goal for all waterbodies is to have concentrations within their planned budgets.

Figure 2: Water Pollution Budgets: Total Maximum Daily Load Analysis





Developing these pollution budgets is not a new activity, but the United States Environmental Protection Agency (EPA) and the States are trying to take a new approach to this effort. EPA and the States looked at the past practices used to develop these plans and found some changes which could be made to improve this effort. EPA calls this updated approach to developing these plans the "Long-Term Vision for Assessment, Restoration and Protection under the Clean Water Act Section 303(d) Program" or the 303d Vision in short.

Figure 3: EPA 303(d) Vision Goal Statement

> ***The Clean Water Act Section 303(d) Program provides effective integration for implementation of activities to restore and protect the nation's aquatic resources, where the nation's waters have been assessed, restoration and protection objectives have been systematically prioritized, and Total Maximum Daily Loads and alternative approaches are being adaptively implemented to achieve water quality goals with the collaboration of States, federal agencies, tribes, stakeholders, and the public***

Connecticut has taken this updated approach and used it as the basis to enhance our efforts in restoring and protecting Connecticut's waters through Integrated Water Resource Management. Through Integrated Water Resource Management we are trying to more effectively work towards restoring and protecting our waters by developing partnerships and looking for flexible and efficient approaches to linking our environmental data and goals with actions that support restoring or protecting our resources.

Figure 4: Integrated Water Resource Management

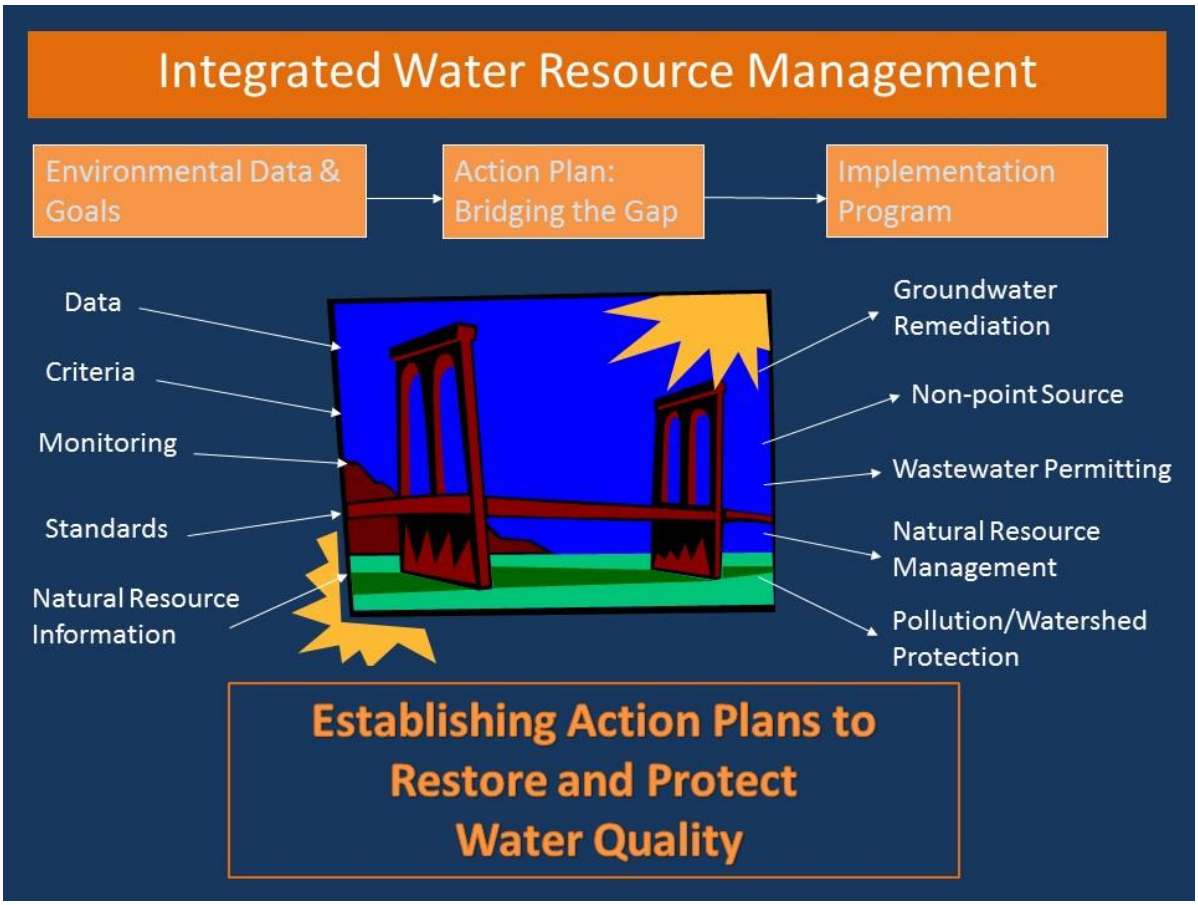


Figure 5: Key Elements of EPA Vision and Integrated Water Quality Management

The updated approach is based on six key elements which EPA identifies as: Prioritization, Assessment, Protection, Alternatives, Engagement and Integration. It allows states to identify areas for plan development based on state-specific concerns and provides sufficient time to develop plans using flexible approaches while creating no new regulatory requirements.

Prioritization

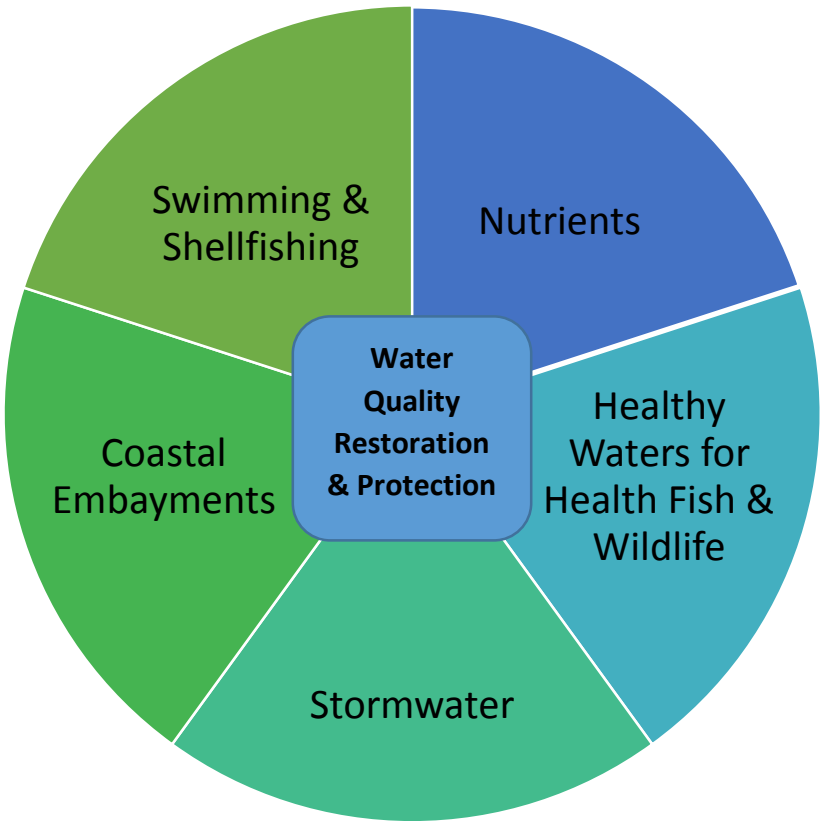
Figure 6: EPA Prioritization Goal

> ***"Prioritization"*** *For the 2016 integrated reporting cycle and beyond, States review, systematically prioritize, and report watersheds or waters for restoration and protection in their biennial integrated reports to facilitate State strategic planning for achieving water quality goals*

States have been identifying waters for plan development for many years. However, with Integrated Water Resource Management, CTDEEP is taking a more proactive approach to identifying waters for plan development. Previously, EPA placed value on developing plans as quickly as possible. This approach has some benefits, such as focusing attention on areas where issues are more easily understood or addressed. However, sometimes more time is needed to address complex water quality concerns or to focus on issues which need a plan to address important statewide issues that might not be able to be done quickly. With this new effort, Connecticut has developed a new approach to identifying areas for plan development, systematically evaluating waters based on available ecological, social and pollution information while considering partnerships and the ability to realize restoration and protection goals.

CTDEEP identified aquatic resources and watershed conditions that have been previously listed as concerns which include:

Figure 7: Considerations for Plan Development



Nutrients:

Nutrients such as nitrogen and phosphorus come from natural and manmade sources. Too much nutrients from manmade sources can lead to excessive growth of water plants and algae which then reduces the amount of oxygen available to living things in these waters. Sometimes algae blooms can contain toxic forms of algae which are harmful to people and animals that come into contact with it. Long Island Sound, coastal embayments and our rivers and streams are affected by nutrients and can impair recreation and aquatic life.

Healthy waters for healthy fish and wildlife:

Good water quality provides support for healthy communities of fish that live in our rivers and streams and the wildlife that use these resources. Healthy aquatic communities are important for a healthy environment in Connecticut and also provide us with the opportunity to fish and enjoy our rivers and streams. Restoring and protecting these communities are important for both the health of Connecticut's environment and recreational and commercial fishing.

Stormwater:

Hard surfaces across the landscape such as roads, sidewalks, parking lots and roofs force rain to flow across the land, carrying pollutants quickly and directly to rivers, lakes, and coastal waters instead of allowing the rain to soak into the ground and be filtered by the soil. This stormwater can carry pollutants to rivers and streams where they can affect fish and other aquatic life in the streams. The solids that stormwater carries can clog fish gills and smother fish eggs and suffocate the organisms that fish eat. Studies have shown that both the quality and flows of stormwater can harm rivers and streams.

Coastal Embayments:

Connecticut's shore line and Long Island Sound are important resources for our state. While much is being done to improve the health of Long Island Sound, more work is needed both for the Sound and for the local embayments directly along our coastline.

Swimming & Shellfishing:

High levels of bacteria in waters may cause illness to people coming in contact with it. For this reason, authorities may close beaches for swimming or may close shellfishing areas if high levels of bacteria are found. While many of our waters are affected by bacteria, we have developed action plans for most of these waters and will continue to do more.

CTDEEP under took a systematic evaluation to identify potential areas to develop plans for water quality restoration and protection. A detailed description of this approach is provided in a separate document, Technical Support Document: Identifying Watersheds for Restoration and Protection Plans with Connecticut Integrated Water Resource Management Efforts. Through this effort, CTDEEP has identified the areas for consideration of plan development. A list of these waters is provided in Appendix B. CTDEEP is asking the public to review and provide input on the areas for plan development. Additional information on this public comment opportunity is provided at the end of this report.

Assessment

Figure 2: EPA Assessment Goal

> ***"Assessment"*** *By 2020, States identify the extent of impaired and healthy waters in each State's priority areas through site-specific assessments, which may be supplemented by on-going state-wide statistical surveys that have been initiated by 2014*

CTDEEP monitors and evaluates our waters to find out if our waters are clean or not and meeting Connecticut's water quality goals. Water quality goals are identified in the Connecticut Water Quality Standards and are developed to protect common uses for waters such as fishing, swimming, drinking and providing healthy waters for fish and wildlife. CTDEEP routinely monitors waters across our state and our monitoring activities are important to support this Integrated Water Resource Management effort, providing some of the data needed to develop plans for restoration and protection.

Initial Evaluation of Water Quality

Through on-going routine efforts, CTDEEP evaluates waters across Connecticut looking at the physical, chemical and biological quality of the water to see if the goals for the water are being met. Every two years, CTDEEP reports to EPA and the public on the health of Connecticut's waters in a report called the Integrated Water Quality Report. Information from this regular evaluation shows which areas have healthy or impaired water quality and was used to help identify potential waters for plan development. A summary of the findings from the 2014 Integrated Water Quality Report are presented in Appendix A and the entire report is available on the CTDEEP website.

Data to Support Plan Development

Often additional information is needed in order to put together water quality plans. Once a water is selected for development of a plan, a review will be done to see if more information is needed in order to develop the plan. Efforts will be made to get the necessary information either through CTDEEP efforts or by working with partners. Having enough of the right kind of information is important for development of a plan and actions to improve or protect our water resources. The ability and resources to get the needed information will be one of the key considerations when CTDEEP identifies waters for plan development.

Checking on Success

After a plan has been developed and implementation actions begin, information will be needed from time to time to track actions and progress to restore or protect water quality.

Protection

Figure 3: EPA Protection Goal

> ***"Protection"*** *For the 2016 reporting cycle and beyond, in addition to the traditional TMDL development priorities and schedules for waters in need of restoration, States identify protection planning priorities and schedules for healthy waters, in a manner consistent with each State's systematic prioritization*

Restoration looks at what is needed to improve waters where water quality is impaired, where our environment is not healthy or where we cannot enjoy our waters as we would like. Protection looks at finding ways to keep healthy environments and good water quality. Both restoration and protection actions are important for Connecticut's waters and can be reflected in the plans we develop.

Alternatives

Figure 4: EPA Alternatives Goal

> ***"Alternatives"*** *By 2018, States use alternative approaches, in addition to TMDLs, that incorporate adaptive management and are tailored to specific circumstances where such approaches are better suited to implement priority watershed or water actions that achieve the water quality goals of each state, including identifying and reducing nonpoint sources of pollution*

Use the right tool for the right job. Sometimes a large and complex plan is needed to address the water quality concerns, other times, solutions to issues can be very straight forward and not need a great deal of study in order to know what needs to be done. States, with support from EPA, are encouraged to consider the best type of plans to make in order to protect or restore waters. States can develop traditional TMDL plans or use other innovative approaches. As traditional or innovative approaches to plan development are selected, there will be a need to check on progress from time to time to make sure that we are being effective.

CTDEEP has typically developed traditional TMDL plans to address impaired water quality for specific waters. Some TMDLs were developed to address issues which affect wide spread areas within our state. These TMDLs include the Long Island TMDL to address the impacts of nutrients on the oxygen levels within Long Island Sound, the Regional Mercury TMDL which was done in conjunction with other New England states and New York to address elevated levels of mercury in fish tissue, and the Connecticut Statewide Bacteria TMDL to address the impacts of elevated levels of bacteria on recreational and shellfishing activities within Connecticut.

There are times, though, when Connecticut has used alternative approaches to protecting and restoring water quality. Examples of alternative approaches which have been or may be used in Connecticut include:

- Water Quality Based Permitting: TMDL staff work with permitting staff to develop permit limits and requirements which are protective of water quality, even if a TMDL has not been developed for the water. This provides an initial level of protection for water quality and consistency with Connecticut's Water Quality Standards.

- Watershed Response Plan for Impervious Cover: This document addresses the impacts of stormwater on the health of rivers and streams in Connecticut. The relationship between hard surfaces within the landscape (called impervious cover) and water quality is discussed and recommended approaches to minimizing water quality impacts from stormwater are provided. The document provides general information which is applicable statewide as well as detailed analyses of 20 urban watersheds which are affected by stormwater. Also as part of this effort, CTDEEP made a web page to discuss Stormwater and Water Quality. This web page provides general information on the potential for stormwater to impact water quality and provides links to the Watershed Response Plans for Impervious Cover as well as fact sheets for each town which discusses water quality concerns and stormwater quality for each town to help towns and other permittees reduce the impacts from stormwater.

- Remediation Activities: TMDL staff work with CTDEEP Remediation Division staff to develop remediation goals and requirements so that when a clean-up is completed, Connecticut water quality goals would be expected to be met. One example of this is the cleanup of the Mill River in Fairfield. The sediments in the river were contaminated by lead from a former industrial facility. Instead of developing a TMDL for this river, TMDL staff worked with staff in the Remediation Division to have contaminated sediments removed and the river habitat restored based on water quality goals.

  Another example is a cleanup of contaminated sediments on the Quinnipiac River. CT Department of Public Health established a fish consumption advisory for the Quinnipiac River south of the Gorge to Hanover Pond. However there is no longer need to issue a consumption advisory for fish caught in the Quinnipiac River north of the

Gorge in Meriden, because new sampling data from the river indicates Polychlorinated Biphenyl (PCB) levels in fish have decreased greatly over the past decade. The fish advisory was needed because in 1996 buried drums containing PCBs were found along the Quinnipiac River in Southington. Emergency response teams from both the Connecticut Department of Energy and Environmental Protection (DEEP) and the United States Environmental Protection Agency responded to the discovery and identified that high levels of contamination were also present in river sediments and in some fish. DEEP conducted an extensive cleanup of the river, removing the drums and the contaminated sediments. The lower PCB levels in fish are the result of these cleanup efforts.

- Watershed Based Plan: Watershed based plans focus on addressing pollution from nonpoint sources, such as runoff from the land from landuse activities which aren't covered under regulatory programs. Watershed Based Plans are developed to identify and understand sources of nonpoint pollution which can affect waters and then determine what actions are needed to restore or protect water quality. Watershed Based Plans can be a good alternative to traditional plans (TMDLs). For example, in 2004, North Running Brook in Northeastern Connecticut was identified as having impaired water quality. A Watershed Based Plan, The Muddy Brook and Little River Water Quality Improvement Plan, was done in 2009 which identified the need to control runoff from a nearby farm to restore water quality in North Running Brook. Using the Watershed Based Plan, a team of partners came together to fix the issues causing the impaired water quality. In 2012 the stream met its water quality goals as a result of that work. A summary of this project is included in Appendix C of this document.

As we develop new plans to restore and protect water quality through the Integrated Water Resource Management effort, CTDEEP expects to use traditional approaches (TMDLs) and alternative approaches.

Engagement

Figure 5: EPA Engagement Goal

> *"Engagement" By 2014, EPA and the States actively engage the public and other stakeholders to improve and protect water quality, as demonstrated by documented, inclusive, transparent, and consistent communication; requesting and sharing feedback on proposed approaches; and enhanced understanding of program objectives*

Protecting and restoring water in Connecticut depends on building partnerships….and successful partnerships depend on communicating with and involving people and organizations interested in or affected by what is happening within our waters and watersheds. Through the Integrated Water Resource Management Process CTDEEP seeks to improve communication and outreach to strengthen existing partnerships and work with new partners.

CTDEEP will use multiple means to communicate with people, including:

CT DEEP Web Site: Information on Integrated Water Resource Management will be provided on the CTDEEP web site.

Email Notification: CTDEEP offers a Water Quality Planning Listserv for people to sign up to receive email notification of activities related to water quality programs at CTDEEP. This email notification service will be used to send notices about Integrated Water Resource Management activities to those who sign up for this service.

Meetings: Meeting will be scheduled as part of the Integrated Water Resource Management activities. Some of these meetings may be public meetings. Staff will also look for opportunities to present information on Integrated Water Resource Management at conferences or meetings scheduled by other groups. Additionally, staff will be available to participate in meetings at the request of other organizations or agencies.

Public Comment Opportunities: Opportunities for public comment will be provided throughout the Integrated Water Resource Management process. Typically, public comment will be solicited when CTDEEP is identifying waters for which to develop plans for restoration or protection. Additionally, once a plan is drafted there will be an opportunity to comment on the plan before it is finalized.

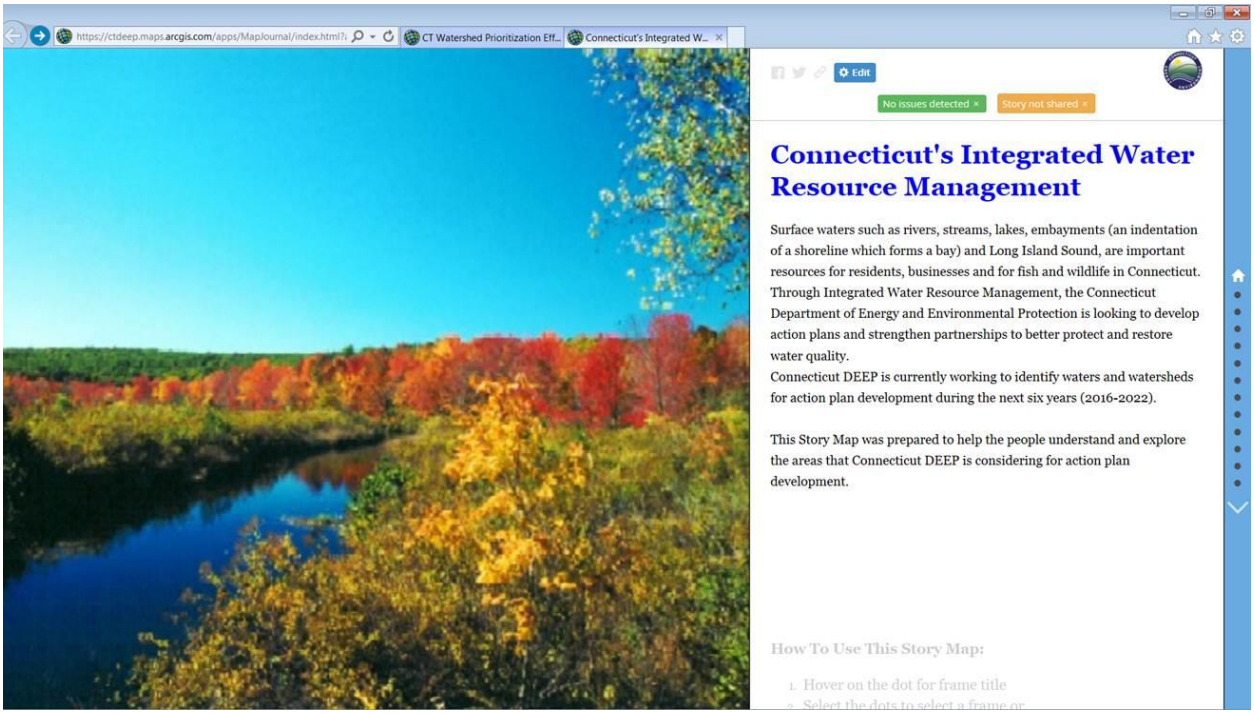
Innovative Approaches: CTDEEP will look for new and innovative approaches to improve communication. Currently we are beginning to use interactive online mapping tools to design new ways to share information with the public. For Integrated Water Resource Management we have developed an interactive online map to help people review and explore the areas currently recommended for plan development as part of the public comment opportunity detailed below. Another example of interactive maps developed to address water quality issues is the online map for Stormwater Pollution Management in Connecticut.

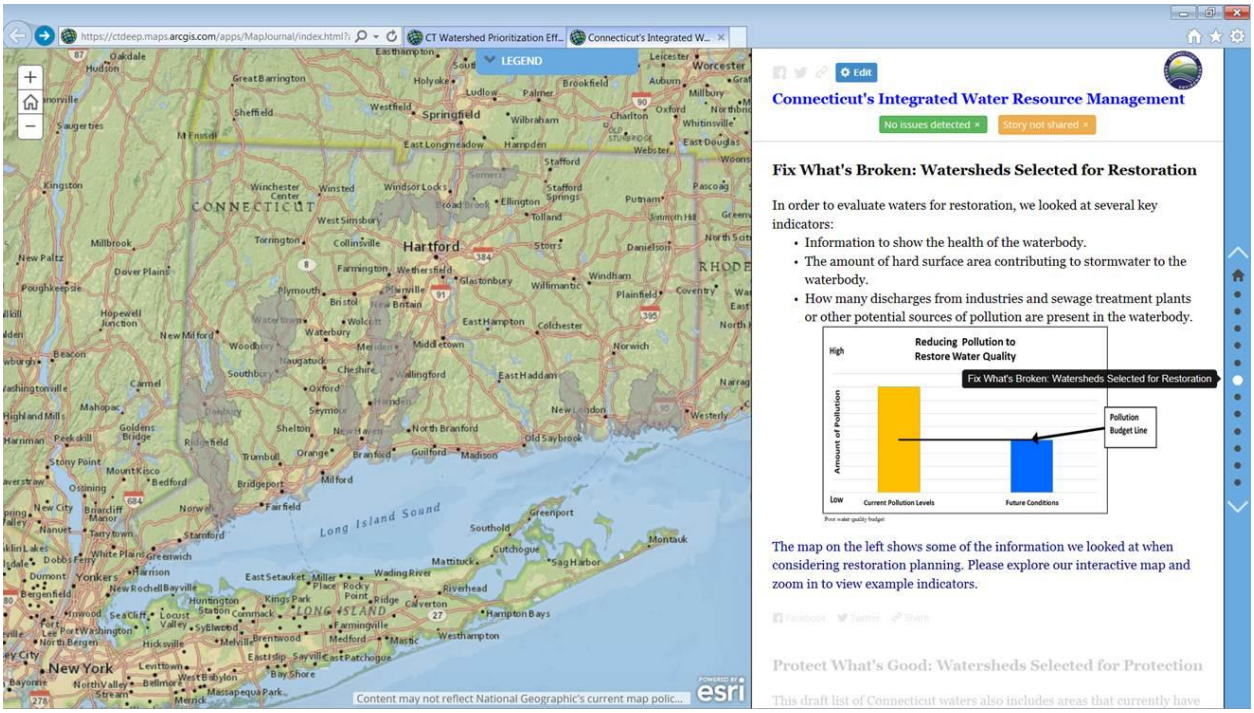
Public Comment Period

This initial listing of potential waters for plan development is being offered for public review and comment. We would like to hear from you. We are particularly interested in working with partners to achieve restoration and protection goals for Connecticut's water resources.

CTDEEP has developed an online interactive Story Map to help you understand which waters are being considered for plan development and why. This Story Map gives you the opportunity to explore these areas and others so you can provide us with your opinions.

Figure 12: Story Map





Public comments will be collected from **May 27, 2016, through June 30, 2016.** Two public meetings will be held on **June 20th.** The first session will be held at **CT DEEP HQ, 79 Elm ST, Hartford, CT in the Gina McCarthy Auditorium from 1:30 to 3:30 p.m**. A second session will be held at **Goodwin College, One Riverside Drive, East Hartford, CT 06118 in the Auditorium from 6:00 to 8:00 in the evening.** These events will feature a presentation on the Integrated Water Resource Management process and identification of potential waters for development of water quality action plans. People are invited to attend and ask questions.

Any comments on the potential areas for plan development should be provided in writing either through the mail or email on by **June 30, 2016**. Email comments should be submitted to: christopher.sullivan@ct.gov . Written comments may also be submitted to CTDEEP WPLR 79 Elm Street. Hartford CT 06106 Attn: Mr. Christopher Sullivan

A website has been set up to provide information and documents for the public to review. The Story Map can also be found as a link on this web page.

Integration

Figure 13: EPA Integration Goal

> *"Integration" By 2016, EPA and the States identify and coordinate implementation of key point source and nonpoint source control actions that foster effective integration across CWA programs, other statutory programs (e.g., CERCLA, RCRA, SDWA, CAA), and the water quality efforts of other Federal departments and agencies (e.g., Agriculture, Interior, Commerce) to achieve the water quality goals of each state*

As part of Integrated Water Resource Management, CTDEEP has been working to improve coordination within and outside of our Agency. We have held meetings, inviting members from the different regulatory and environmental resource programs in CTDEEP to learn about and participate in Integrated Water Resource Management. As part of initial efforts to identify potential areas for plan development, we sought data and participation from these various programs to help in identifying an initial group of focus areas for plan development. This included with the CTDEEP Watershed Managers who work on nonpoint source pollution, members of regulatory programs such as site clean-up programs and permitting programs, staff involved in resource protection such as fisheries managers as well as staff from our state parks programs. We have begun the integration with other agencies in Connecticut and will continue to work to broaden the integration throughout Connecticut, seeking partners involved in resource protection and implementation activities.

Become Involved!

CTDEEP would like the public to weigh in on the waters which we have identified as candidates for developing plans for protection or restoration of water quality. This was done through a detailed process relying on environmental data and input from regulatory and conservation programs across the agency and areas of interest for environmental quality in Connecticut.

In order to evaluate waters for plan development, we looked at various information and many factors affecting water quality and use, including:

- Health of the waterbody, such as: Do we have information to show the waters are healthy or not?

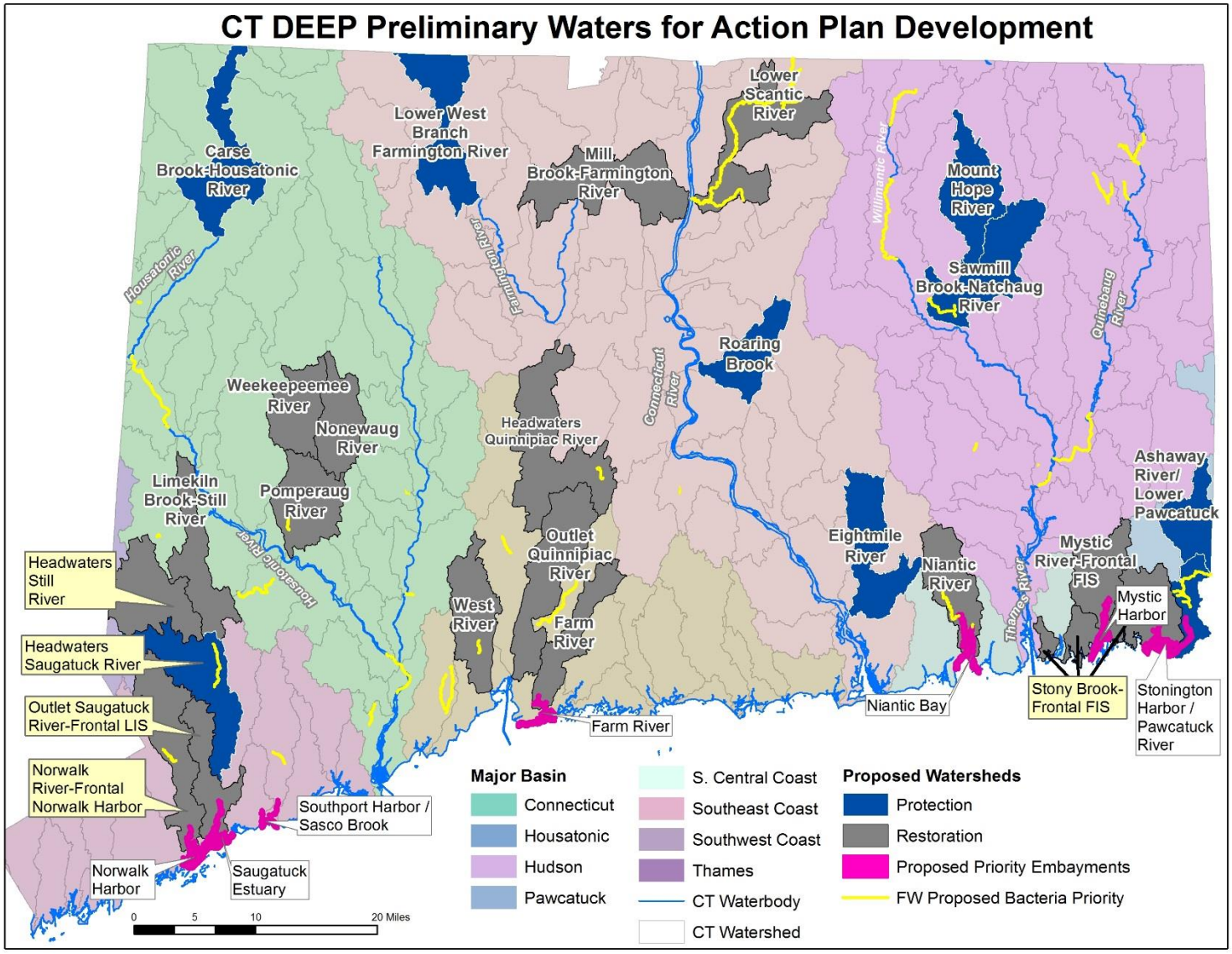
- Potential for pollution to affect the water, including: How much hard surfaces contribute stormwater? How many discharges from industries and sewage treatment plants or other potential sources of environmental contamination could be present?
- Potential partnerships to help restore water quality.

A detailed discussion of the process which we used to identify potential waters for plan development is presented in a separate document called Technical Support Document: Identifying Watershed for Restoration and Protection Plans with Connecticut Integrated Water Resource Management Efforts.

The initial set of waters which CTDEEP is considering for plan development are identified in Figure 14 below. A detailed listing of these waters is also included in Appendix B. While many waters could benefit from developing a plan, this initial list of waters represent areas where we may develop action plans over the next few years. This list of waters may be refined based on comments received from the public and on CTDEEP resources available to develop these plans. Over time, additional waters will be identified for development of water quality restoration and protection plans.

In addition to the waters identified in Figure 13, the impact of stormwater on water quality is also a concern for water quality. The potential for stormwater to impact water quality was taken into consideration in selecting waters for action plan development. Additionally, CTDEEP intends to address the impacts from stormwater by working collaboratively with between water quality and permitting programs to make sure that stormwater permits and regulatory requirements are responsive to the water quality concerns in Connecticut. As such, development of a separate plan to address stormwater is not being proposed at this time. It is possible that stormwater will be included in the plans developed for the selected watersheds, but inclusion of stormwater will be on a case by case basis.

Figure 6: Potential Areas for Plan Development



Appendix A: Summary Information from the 2014 Integrated Water Quality Report

CONNECTICUT DEPARTMENT OF ENERGY AND

ENVIRONMENTAL PROTECTION

79 Elm Street, Hartford, CT 06106-5127

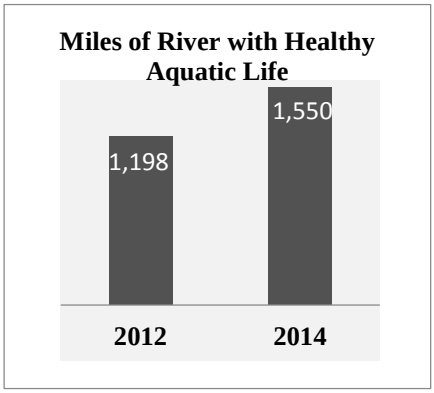
http://www.ct.gov/deep/iwqr

2014 INTEGRATED WATER QUALITY REPORT

The Connecticut Integrated Water Quality Report (IWQR) was prepared by the Department of Energy and Environmental Protection (CT DEEP) pursuant to Sections 305(b) and 303(d) of the federal Clean Water Act (CWA). Section 305(b) requires each State to monitor, assess and report on the quality of its waters every two years. Water quality is assessed in terms of designated uses established by the Connecticut Water Quality Standards (WQS) that include aquatic life support, fish consumption, recreation, and shellfish harvesting. Monitoring and assessment data indicate the attainment of designated uses when consistent with appropriate WQS. If data are not consistent, the waterbody is identified as impaired for a particular designated use. Section 303(d) requires each State to compile an Impaired Waters List identifying those waters not meeting WQS and to assign a priority for each impaired waterbody for development of Total Maximum Daily Load (TMDL) analysis or other management action. The Impaired Waters List includes any waterbodies that are not supporting one or more designated uses. The IWQR is submitted to the United States Environmental Protection Agency (EPA) for review and approval of the Impaired Waters List.

Water Quality Monitoring

There are 5,830 river miles and 64,973 acres of lakes in the State, of which 2,838.12 river miles (990 assessment segments) and 30,437.46 acres of lakes (182 assessed segments) have been tracked for designated uses. Along the coast, there are 611.89 square miles of estuarine waters (210 assessed segments) in the State which have been tracked for designated uses. The number of estuarine and lake assessed segments remains unchanged in this report cycle while 118 assessed segments of rivers (298.98 miles) were added.



In the 2012 IWQR, 1,198 miles of assessed river met chemical and biological criteria to fully support aquatic life use. In this 2014 IWQR 1,550 miles of assessed river meet chemical and biological criteria to fully support aquatic life use, showing an increase of 352 miles of healthy waters assessed in Connecticut.

Designated Uses

The *Aquatic Life Use* (i.e. Habitat for Fish and Aquatic Life) assessment is supported when habitat and water quality are suitable for maintaining a native, naturally diverse community of aquatic plants and animals.

Aquatic Life Use	Fully Supporting	Not Supporting	Not Assessed	Insufficient Information
Rivers (Miles)	1549.54	435.94	552.91	299.73
Lakes (Acres)	26523.93	1158.90	2754.63	0
Estuaries (SQ. Miles)	237.22	314.46	59.13	1.08

The *Fish Consumption Use* assessment is determined by consumption advisories issued by the Connecticut Department of Public Health (CT DPH) and published in the CT DEEP Angler's Guide. Unless a site-specific advisory has been issued, the designated use is considered supported. Advisories may be issued for a site-specific concern or to address large areas of impact. There are statewide fish advisories for all freshwaters due to mercury contamination and for all estuarine waters due to Polychlorinated Biphenyl (PCB) contamination.

Fish Consumption Use*	Fully Supporting	Not Supporting	Not Assessed
Rivers (Miles)	2705.97	130.21	1.94
Lakes (Acres)	26797.08	3639.01	1.37
Estuaries (SQ. Miles)	603.26	8.63	0

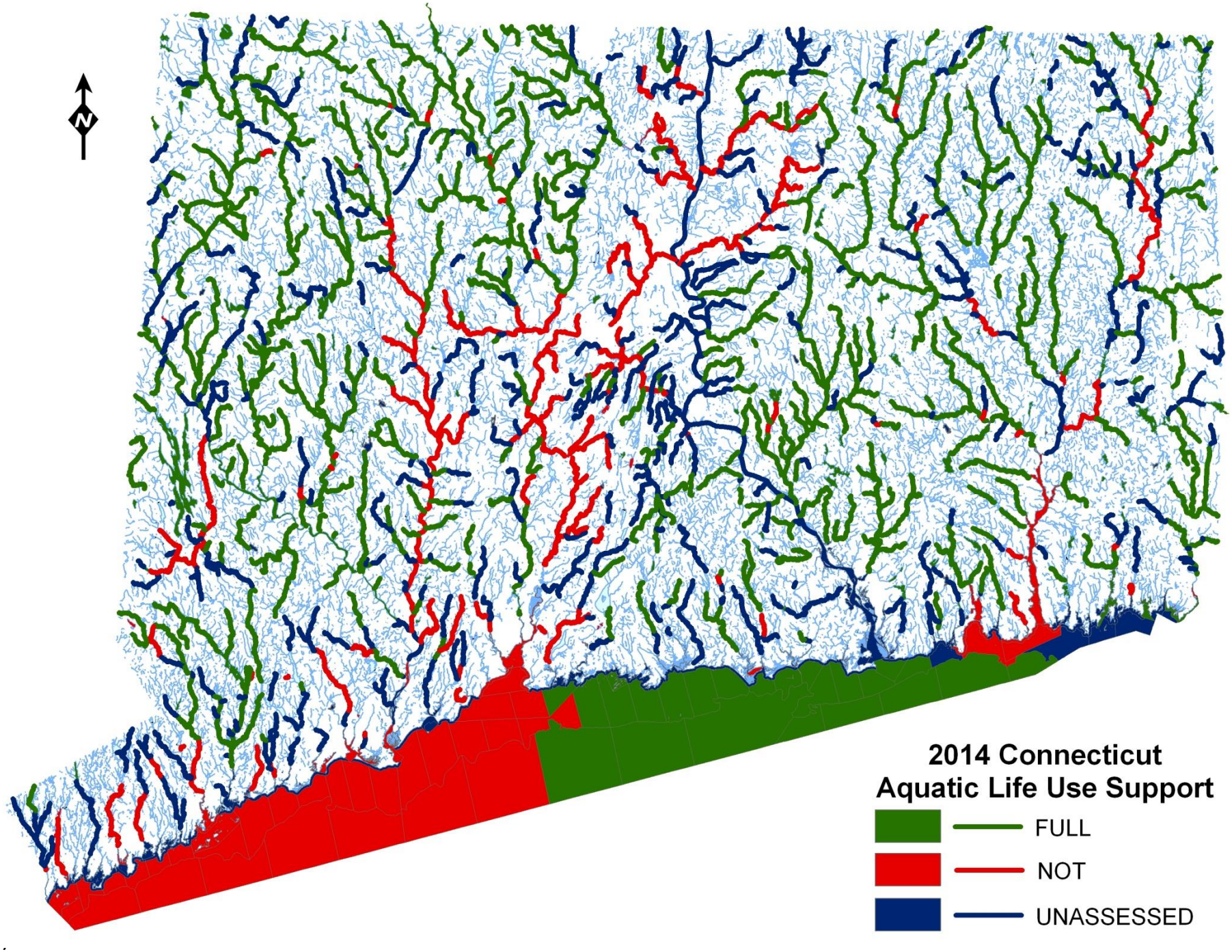
*Refer to CT DEEP Angler's Guide for more information about fish consumption advisories, online at www.ct.gov/deep

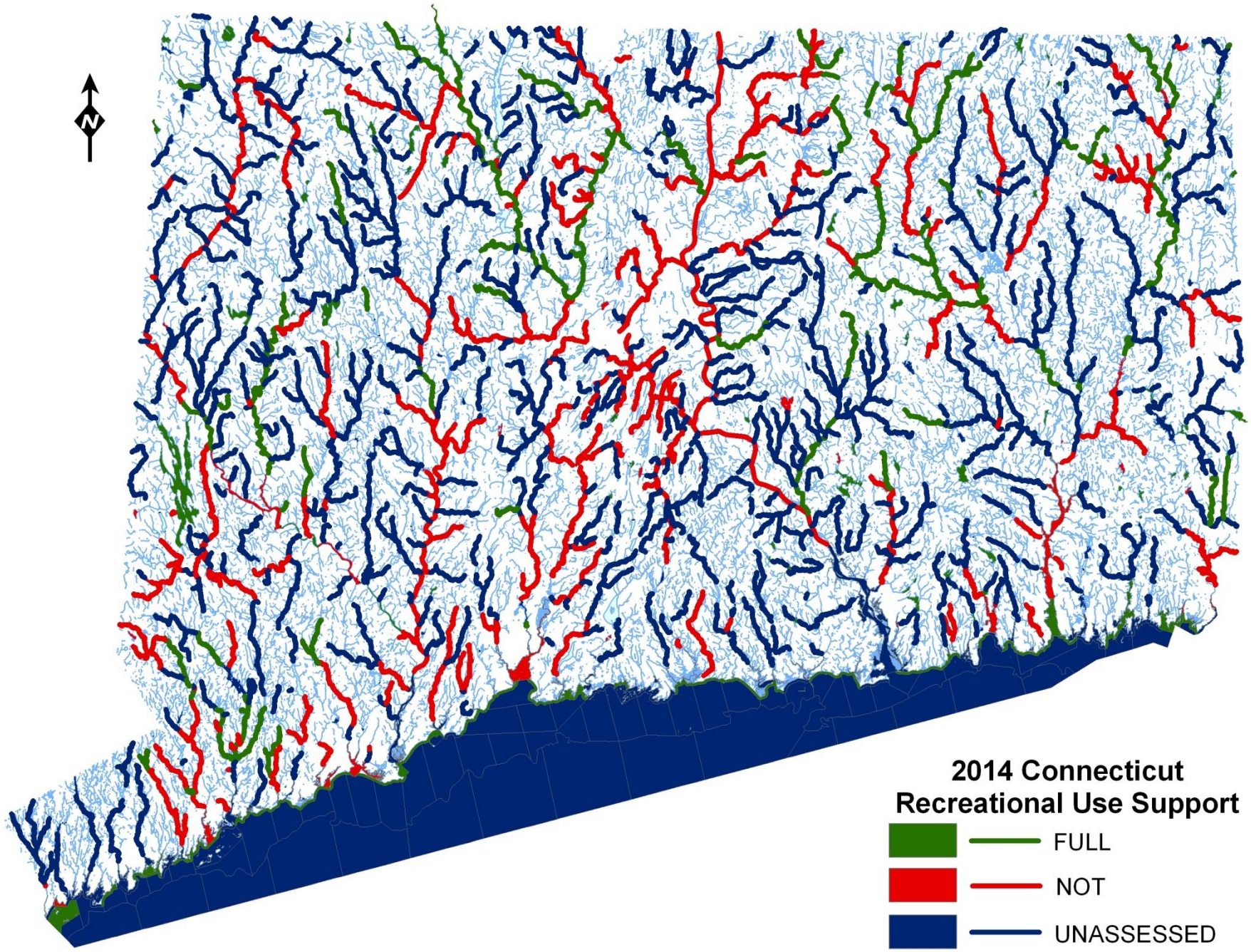
The *Recreation Use* is supported when indicator bacteria concentrations are below the thresholds in the CALM for any water-related activity during which there is contact with the water and/or there exists a risk of water ingestion.

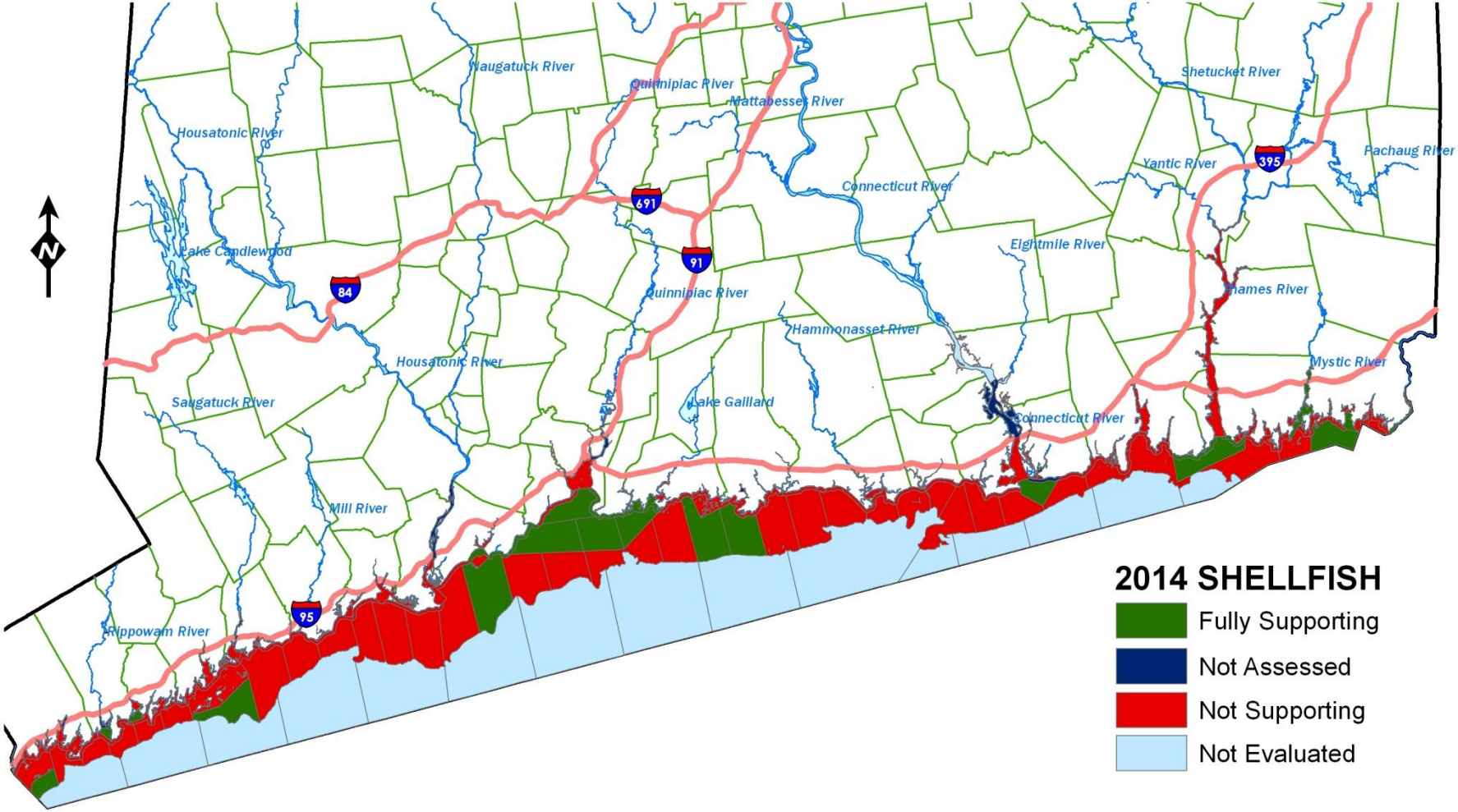
Recreation Use	Fully Supporting	Not Supporting	Not Assessed	Insufficient Information
Rivers (Miles)	357.47	826.75	1570.07	83.83
Lakes (Acres)	18897.39	4442.11	7097.96	0
Estuaries (SQ. Miles)	28.89	13.11	569.89	0

Shellfish Harvesting Use	Fully Supporting	Not Supporting	Not Assessed
Class SA Estuaries (Miles)	39.19	206.62	0.58
Class SB Estuaries (Miles)	38.69	20.43	5.99

The *Shellfish Harvesting Use* is supported when shellfish harvested from Approved Shellfish Areas (Class SA) are safe for consumption without depuration and shellfish harvested from approved Restricted Shellfish Areas (Class SB) are safe for consumption with depuration. The Department of Agriculture Bureau of Aquaculture classifies and evaluates shellfishing areas in the State.


N
2014 Connecticut
Aquatic Life Use Support
FULL
NOT
UNASSESSED


N
2014 Connecticut
Recreational Use Support
FULL
NOT
UNASSESSED


Naugatuck River
Quinnipiac River
Mattabesset River
Shetucket River
Housatonic River
Yantic River
Pachaug River
Connecticut River
Lake Candlewood
Eightmile River
Quinnipiac River
Thames River
Hammonasset River
Housatonic River
Mystic River
Saugatuck River
Lake Gaillard
Connecticut River
Mill River
Pippowam River
2014 SHELLFISH
Fully Supporting
Not Assessed
Not Supporting
Not Evaluated

Impaired Waters

Based on the designated use assessments, a total of 546 assessed segments do not support one or more designated uses. These assessed segments appear on both the Connecticut's Impaired Waters List (EPA Category 5) and those included within EPA Category 4 where a pollution control or management measure has been developed for the impairment.

Impaired EPA Category	4a = TMDL Established	4b = Other pollution control requirements to be implemented	4c = Reduce nonpollutant impacts through management measures	5 = TMDL is Needed
Assessed Segments within each Category	253	13	66	285

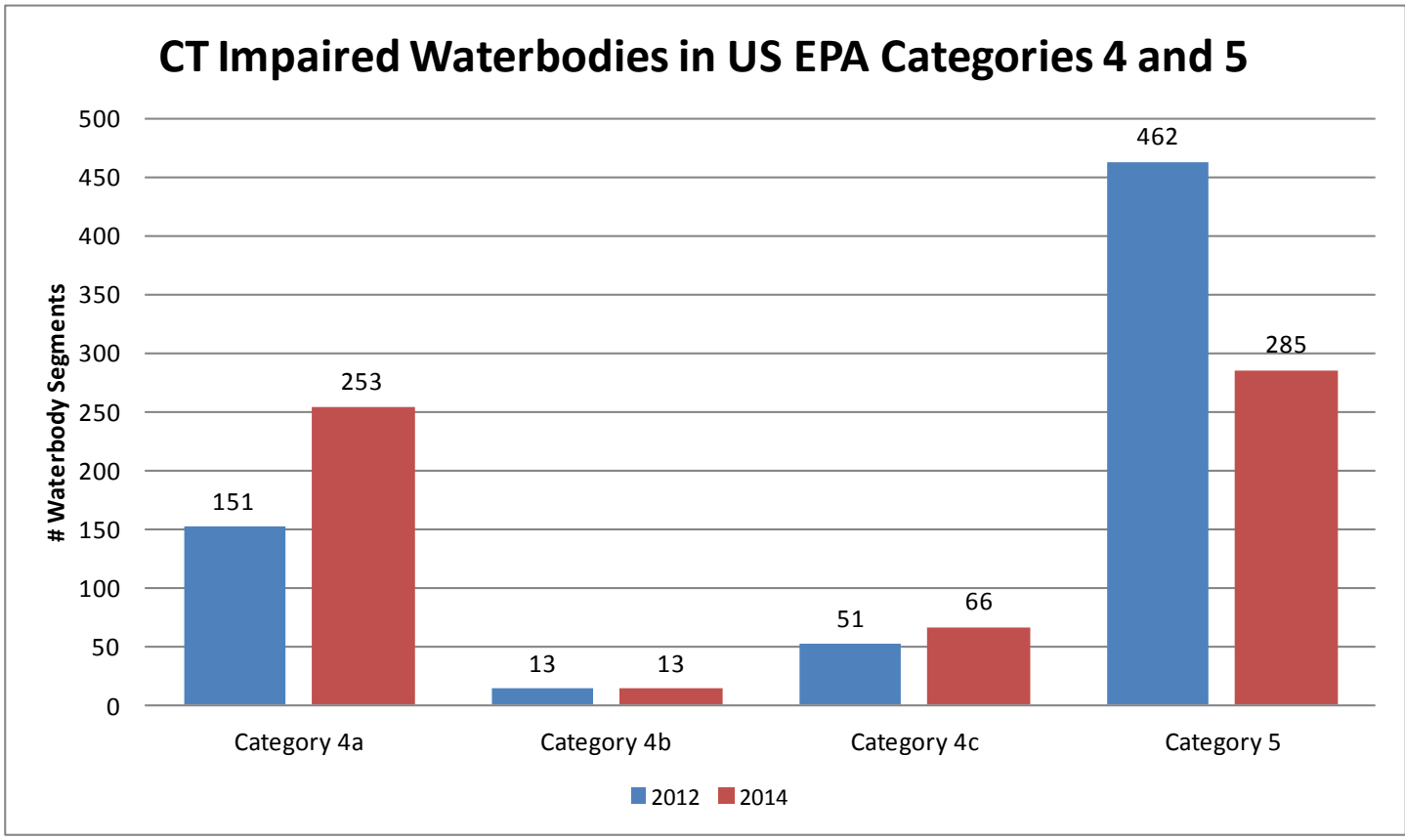
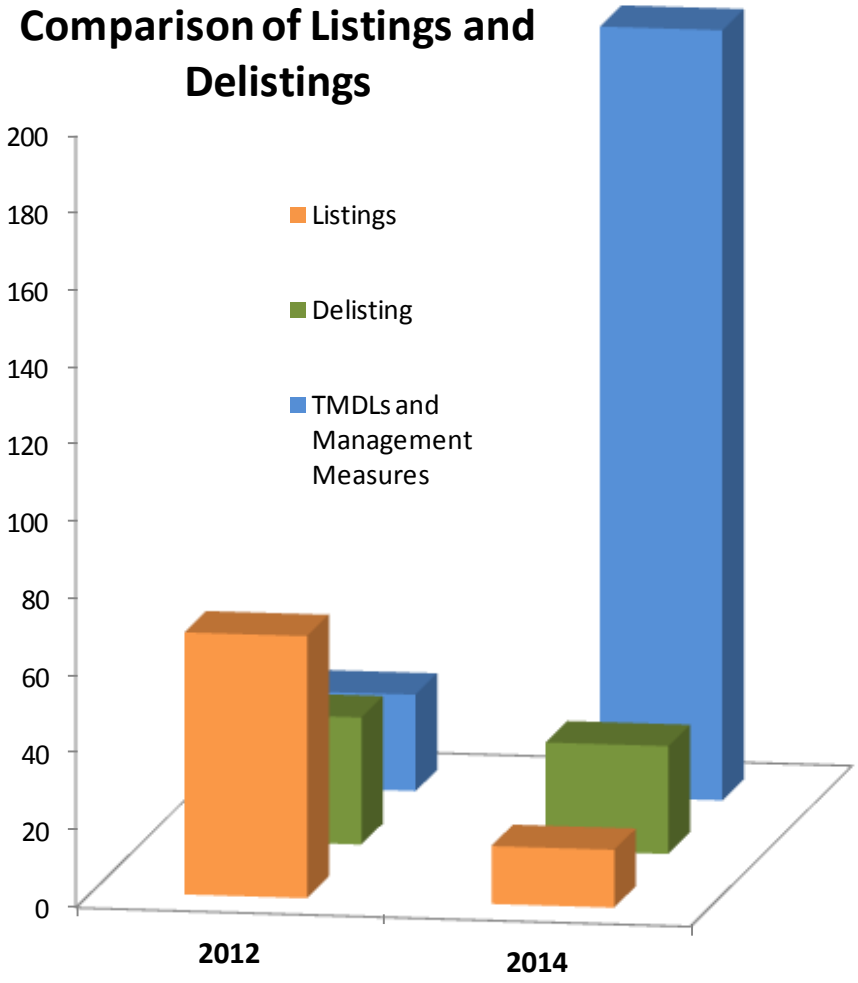


Figure: Summary of 2012 and 2014 Impaired Waterbody Segments in US EPA Category 4 and 5



For this report cycle, 15 assessed segments were added to the Impaired Waters List primarily due to recreation impairments. Removing impaired waters from the List often begins with a Total Maximum Daily Load (TMDL) analysis which is a management plan to identify necessary water quality improvements. A total of 217 assessed segments were delisted due to completion of EPA approved TMDLs. An additional 28 assessed segments were delisted because the assessments of new data indicated that the designated uses were fully supporting.

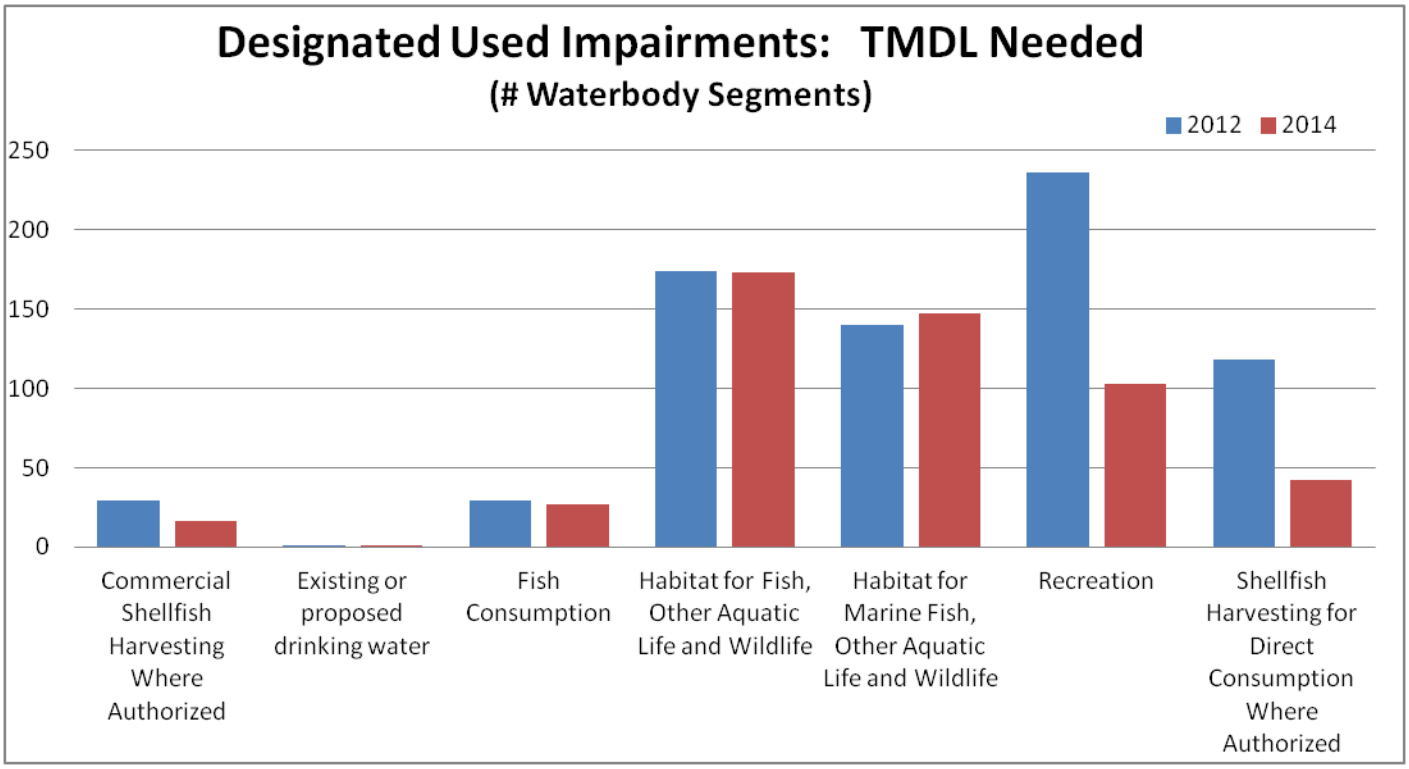


Figure: Summary of 2012 and 2014 Impaired Segments by designated use for Category 5 Waterbodies.

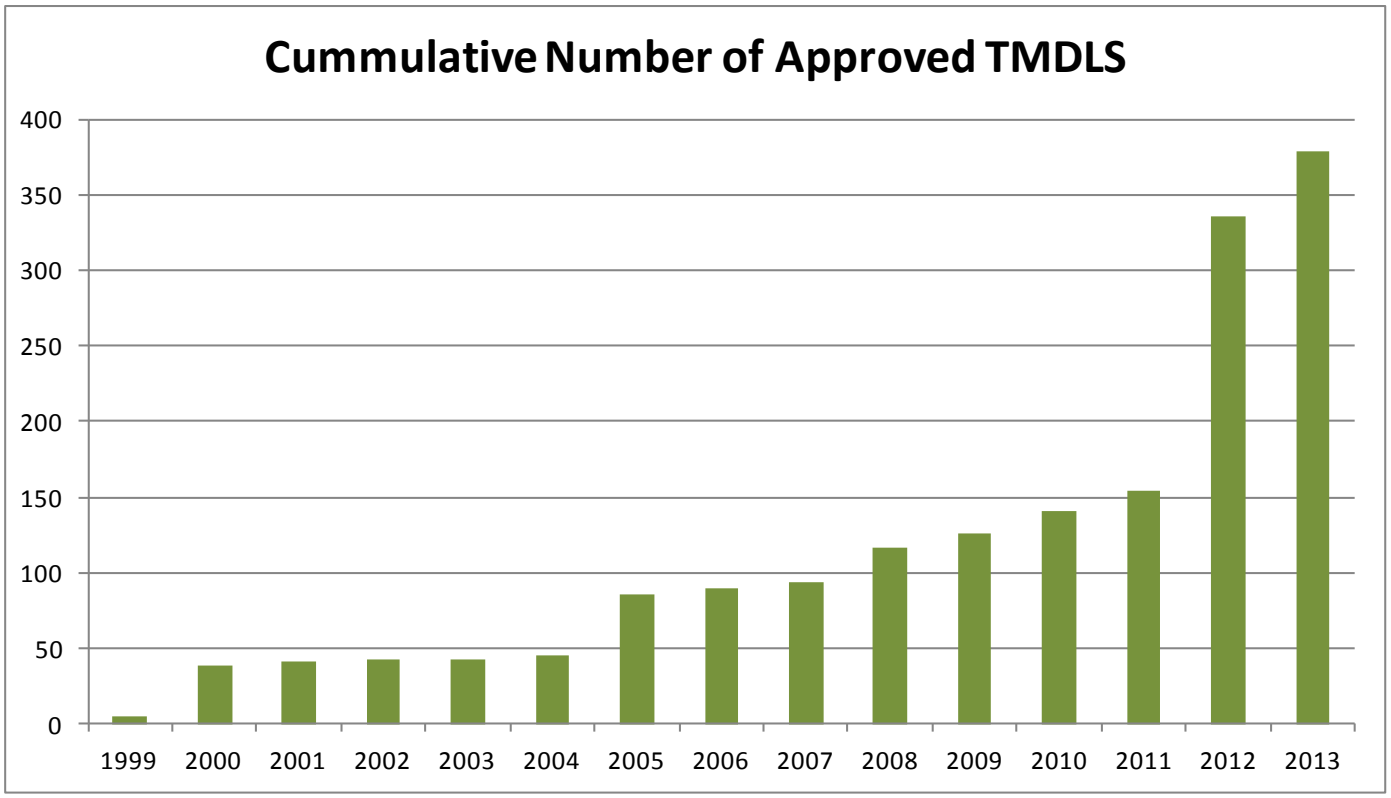


Figure: The total number of TMDLs in CT that have been developed by DEEP and approved by EPA.

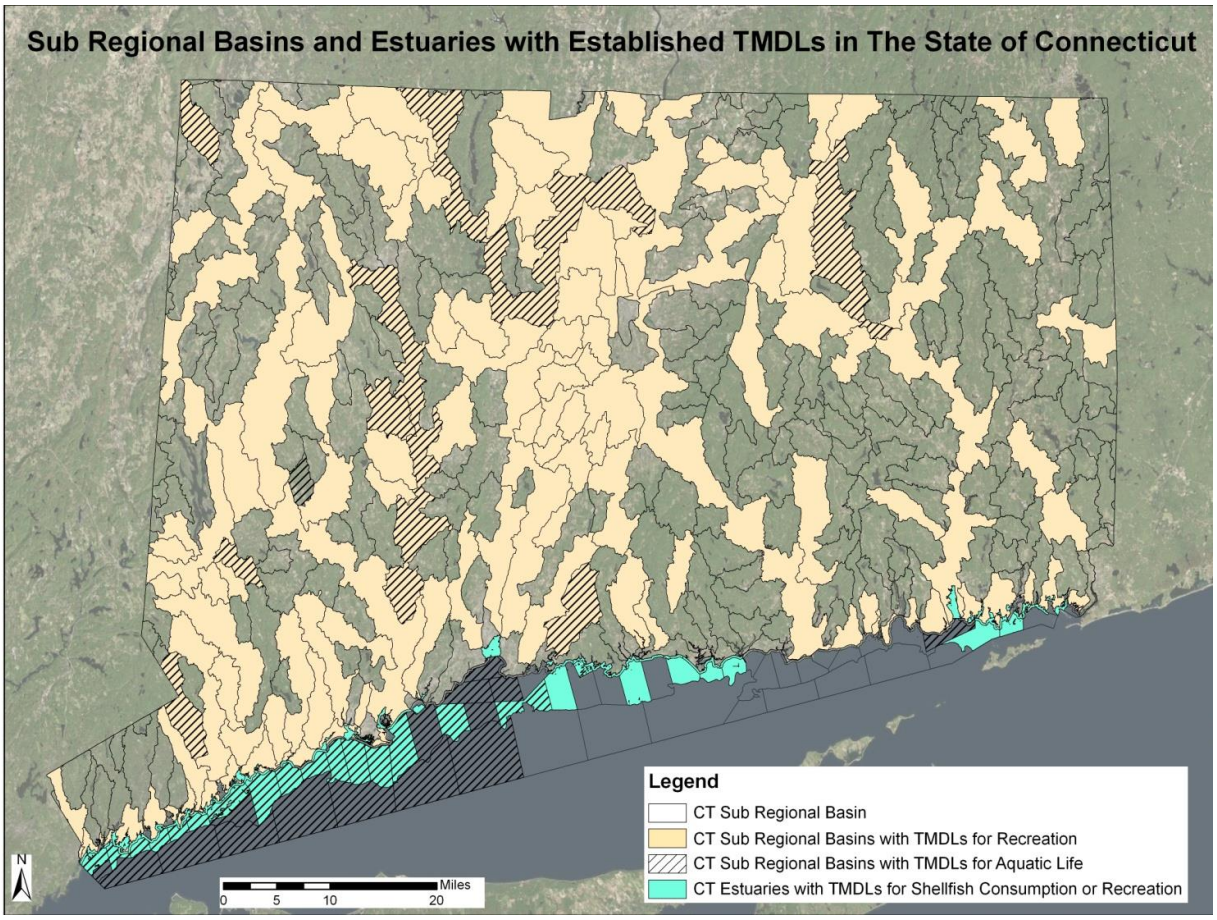
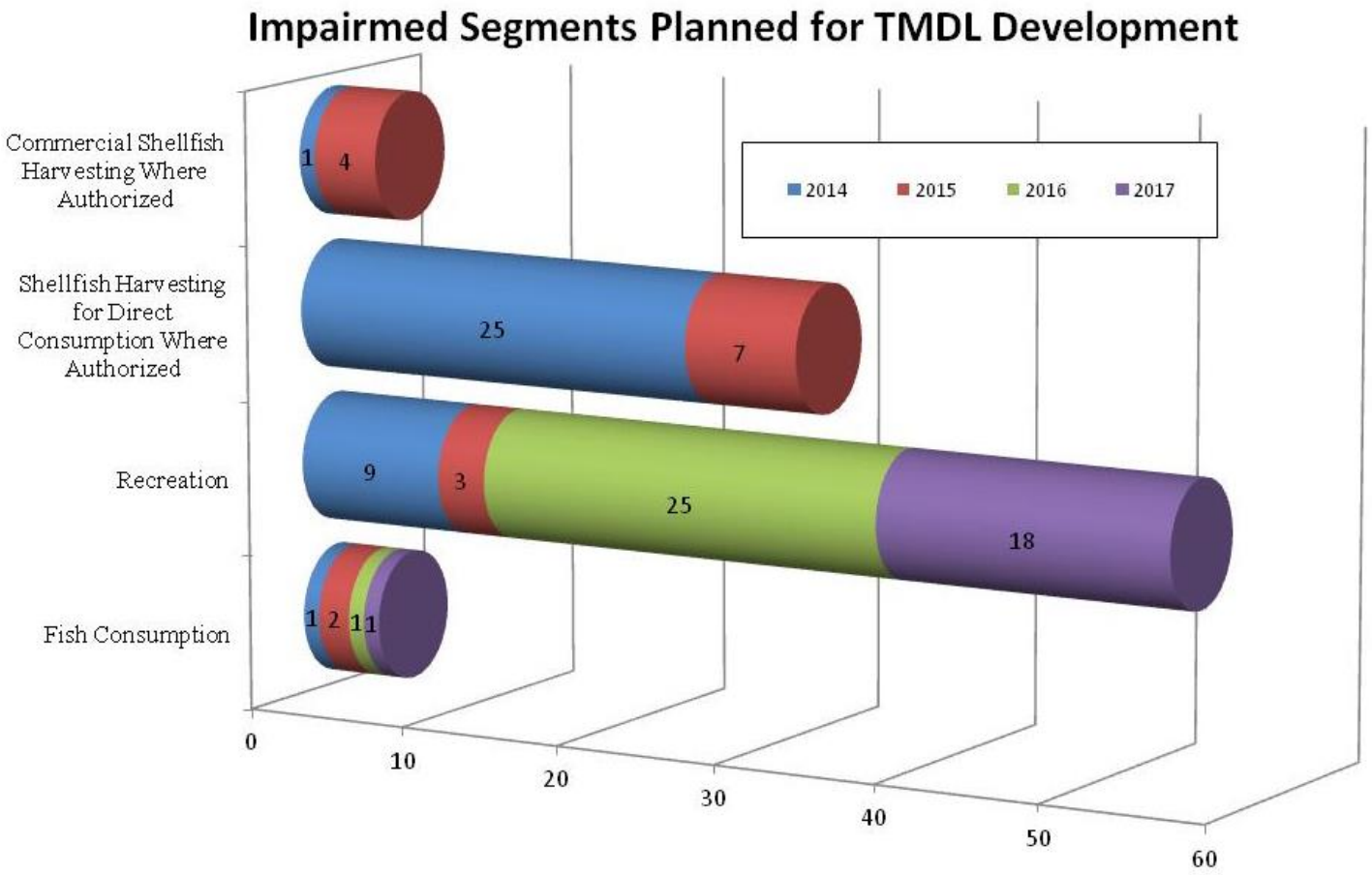


Figure 3-5 Subregional Basins and Estuaries with Established TMDLs in Connecticut



For additional information, please see the full IWQR on the CT DEEP website at http://www.ct.gov/dep/iwqr.

Appendix B: List of Potential Waters for Plan Development

Table 1. DRAFT Preliminary list of waterbodies for Action Plan Development by 2022.

Watershed ID	Watershed Name	Coastal Embayment Area	Protect / Restore	Active Planning Efforts	Potential Planning Partners	Water Quality Concerns
011000050306	Carse Brook – Housatonic River	N/A	Protect		X	Nutrients, Aquatic Life
011000050903	Pomperaug	N/A	Restore		X	Bacteria, Nutrients, Aquatic Life
011000050801	Headwaters Still River	N/A	Restore	X	X	Nutrients. Aquatic Life
011000050802	Limekiln Brook-Still River	N/A	Restore	X	X	Nutrients
011000060103	Outlet Saugatuck River	N/A	Restore	X	X	Nutrients
011000060102	Headwaters Saugatuck River	N/A	Protect	X	X	Bacteria, Nutrients, Aquatic Life
011000060202	Norwalk River	N/A	Restore		X	Bacteria, Nutrients, Aquatic Life
011000040302	West River	N/A	Restore	X	X	Bacteria, Nutrients, Aquatic Life
011000040103	Headwaters Quinnipiac	N/A	Restore		X	Nutrients, Aquatic Life
011000040105	Outlet Quinnipiac River	N/A	Restore		X	Nutrients, Aquatic Life
011000040206	Farm River	N/A	Restore		X	Nutrients, Aquatic Life

Watershed ID	Watershed Name	Coastal Embayment Area	Protect / Restore	Active Planning Efforts	Potential Planning Partners	Water Quality Concerns
010802070204	Lower West Branch Farmington River	N/A	Protect	X	X	Nutrients
010802070602	Mill Brook-Farmington	N/A	Restore	X	X	Nutrients, Aquatic Life
010802050203	Lower Scantic River	N/A	Restore	X		Bacteria, Nutrients, Aquatic Life
010802050504	Roaring Brook	N/A	Protect			Nutrients
010802050903	Eightmile River	N/A	Protect		X	Nutrients
011000020205	Mount Hope River	N/A	Protect	X	X	Nutrients
011000020206	Sawmill Brook-Natchaug River	N/A	Protect	X	X	Nutrients
011000030304	Niantic River	N/A	Restore	X	X	Bacteria, Nutrients
011000030301	Mystic River	N/A	Restore			Nutrients
011000030303	Stony Brook-Frontal Fishers Island Sound	N/A	Restore			Nutrients, Aquatic Life
010900050303 / 010900050301	Pawcatuck River / Ashaway River	N/A	Restore / Protect	X	X	Nutrients
	N/A	Saugatuck Estuary	Restore		X	Nutrients
	N/A	Norwalk Harbor	Restore		X	Nutrients
	N/A	Southport Harbor / Sasco Brook	Restore	X	X	Nutrients
	N/A	Farm River	Restore		X	Nutrients
	N/A	Niantic Bay	Restore	X	X	Nutrients
	N/A	Mystic Harbor	Restore		X	Nutrients

Watershed ID	Watershed Name	Coastal Embayment Area	Protect / Restore	Active Planning Efforts	Potential Planning Partners	Water Quality Concerns
	N/A	Stonington Harbor / Pawcatuck River	Restore		X	Nutrients

Appendix C: Fact Sheet: Improving Agricultural Practices Improves North Running Brook

Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Connecticut

Improving Agricultural Practices Restores North Running Brook

Waterbody Improved

Excessive nutrients from dairy farm runoff had impaired Connecticut's North Running Brook. As a result, the Connecticut Department of Energy and Environmental Protection (DEEP) added the brook to the state's 2004 Clean Water Act (CWA) section 303(d) list of impaired waters for not supporting its aquatic life use. Local, state and federal partners collaborated with local farm producers to implement targeted agricultural best management practices (BMPs). The BMPs include improved manure management and silage leachate collection, as well as agronomic practices such as no-till/minimum tillage and continuous cover crops. Improved water quality prompted DEEP to remove the 0.19-mile impaired segment of North Running Brook from the state's impaired waters list in 2012.

Problem

North Running Brook is a 2.5-mile-long tributary nested within the 39-square-mile Muddy Brook and Little River watersheds in northeastern Connecticut. North Running Brook drains a largely rural, upland watershed with a locally high percentage of active agricultural land (21 percent) in eight large dairy farms and an additional 57 percent in forested landscape. The watershed is experiencing a trend of greater commuter-based rural residential development and its commensurate activities and impacts; as a result, some urban development pockets are present.

Twenty years of DEEP and U.S. Geological Survey water quality monitoring program data from the Muddy Brook and Little River watersheds indicated excessively high nutrient levels in several streams and river impoundments. An assessment of data collected in 2003 from the lower stretch of North Running Brook showed that macroinvertebrate populations were dominated by pollution-tolerant species and lacked diversity; therefore, they did not meet the state's water quality criteria for benthic macroinvertebrate communities. DEEP's in-stream field work identified an extremely thick fungal mat across the stream substrate at the confluence with a nearby farm field ditch, which indicated silage leachate discharges coming from upstream corn/hay silage storage (Figure 1). The silage leachate contained high concentrations of sugars and nutrients, which even in small amounts can deplete oxygen, killing fish and other aquatic organisms. Sampling immediately upstream of the ditch and its silage leachate input revealed stream conditions typical of a high-quality, small headwater stream.

Figure 1. A farm ditch contributed silage leachate and farm runoff to North Running Brook.

As a result of data assessment and the threat of future leachate discharges occurring, DEEP placed a segment of the brook (segment CT3708-10-02) on its 2004 CWA section 303(d) list of impaired waters for failing to support the aquatic life designated use.

Project Highlights

The Eastern Connecticut Conservation District (ECCD) used a 2005 CWA section 319 grant to complete an in-depth evaluation of land uses and farm practices in the impaired Muddy Brook and Little River watershed sections to identify ways to reduce nonpoint source pollution. The resulting information was used to develop the *2009 Muddy Brook and Little River Watershed-Based Plan*. Soon afterwards, DEEP and ECCD, in cooperation with the Connecticut

Figure 2. The completed silage bunker and leachate collection system helps to manage manure at Valleyside Farm in Woodstock, Connecticut.

office of the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), met with stakeholders to prioritize the opportunities identified in the watershed plan. As part of the process, the owners of a 250-head dairy farm with a history of responsible manure management expressed interest in fixing a continuing problem they had with silage leachate release. Following stakeholder agreement, ECCD received a CWA section 319 grant in 2010 to plan, design and add a portion of a silage leachate collection and transfer system to the farmers' nearby long-term manure storage facility (Figure 2).

The grant funds were used to develop plans, relocate and construct several silage bunkers, and redirect the flow of bunker-based silage leachate away from North Running Brook and into an underground pipe drainage system that leads to a secure manure storage facility. NRCS leveraged that work as part of the design and installation of a larger integrated collection, pumping and transport system. Overall construction was completed in mid-2011. Since project completion, NRCS staff have continued to provide additional technical agronomic assistance to the farm producers.

Over the past five years, NRCS has used Environmental Quality Incentive Program funds to partner with farmers throughout the larger Little River watershed to install waste storage facilities, improve nutrient management, and implement other practices to reduce nitrogen and phosphorus loadings. In 2012 the Little River watershed was selected as a National Water Quality Initiative (NWQI) priority watershed.

Results

Implementing agricultural BMPs and improving agronomic practices reduced nutrients contained in barnyard and farm field runoff and allowed water quality to improve in North Running Brook. Benthic data collected in 2009 and 2010 show that North Running Brook scored 67 on a macroinvertebrate multimetric index (MMI), surpassing the minimum MMI score of 43 needed to indicate aquatic life support. Physical and chemical data collected during the same period also showed no exceedances of water quality criteria. On the basis of these data, DEEP determined that the lower North Running Brook segment meets the Connecticut Water Quality Standards for aquatic life use and removed a 0.19-mile segment from the state's 2012 CWA section 303(d) list.

Partners and Funding

In 2010 ECCD received a $111,000 CWA section 319 grant to implement agricultural BMPs on private farmland, along with a contributing match of $104,000 and significant contributions from NRCS and the farm producers. ECCD and NRCS developed an operation and maintenance plan for the farm producers. The farm producers own, operate and maintain the silage leachate system, which has an estimated design life of 25 years.

A technical transfer workshop for area farmers was then held, and NRCS national Chief Dave White and state and federal agency and legislative representatives visited the site in the summer of 2012. An additional large dairy farm producer who attended the site tour has since collaborated with the listed partners to install a silage leachate collection system to further protect an adjacent tributary feeding Muddy Brook.

DEEP and ECCD continue to partner with the Town of Woodstock, the Woodstock History Society and Roseland Lake Association, all of which have also demonstrated support and assistance by installing demonstration bioretention and riparian buffer plantings, using $63,000 in CWA section 319 funds and contributing $45,000 in matching funds. DEEP and ECCD used another $152,000 in CWA section 319 funds to help additional animal agricultural producers implement BMPs in the watershed. The Last Green Valley, Inc., a nonprofit group, helped ECCD to conduct water quality monitoring to assess improvements.

U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-13-001R
April 2013

For additional information contact:

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Scott Gravatt, Eastern Connecticut Conservation District, Inc.
860-887-4163 x400 • scott.gravatt@comcast.net