Niantic River Watershed Plan

... a treasure worth protecting

Niantic River Watershed Protection Plan

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Guided Summary

March 2009

The Guided Summary of the Niantic River Watershed Protection Plan was prepared by the Eastern Connecticut Conservation District and funded in part by the CT DEP through the US EPA Nonpoint Source grant under section 319 of the Clean Water Act.

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Niantic River scallops were abundant during the days of the Nehantic Indians, for the shoreline property soil is well-sprinkled with their shells. Again in the 1930's the scallops flourished. This was the time of "The Great Depression" and many of the jobless earned a scant living scalloping. Great trucks from Boston, Providence and New York backed up to the several town landings especially at the foot of Grand St. – to buy directly from the individual scallopers. Those of us who enjoyed the bounty of the scallops still remember the tender sweetness of those tiny morsels. We remember as well the chapped hands and the hands encased in band-aids from the horrendous task of opening those razor-sharp shells. We all learned at an early age that pleasure usually comes with a price! ***-Olive Chenaldi, (Town Historian)***

Excerpt from "Stories of East Lyme"
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Did You Know?
Niantic River ~ Quick Facts

Did you know?

- **The Niantic River does not currently meet state water quality standards because of observed degradation of aquatic life and shellfish harvesting.**
- **Nitrogen and bacteria are the two greatest water quality concerns for the Niantic River.**
- **Rain carries bacteria into the river where it is filtered by shellfish rendering them unsafe for consumption. The shellfish beds in the River are closed after every rainfall event of at least one inch.**
- **Excess nitrogen entering the river enriches the brackish Niantic River water, like fertilizer on a lawn, increasing algal and plant growth**
- **Polluted runoff accounts for approximately half (50%) of the nitrogen inputs into the Niantic River.**
- **Beginning in the 1980s, there was a sharp decline in eelgrass and in subsequent years eelgrass populations have shown annual variation. Scallops and winter flounder, which rely on eelgrass as nursery habitat, are practically missing from the Niantic River.**
- **New species like green crabs and grubby, which are more tolerant of polluted waters, appear to be on the rise in the river.**
- **The Niantic River Watershed covers 31.3 square miles, or approximately 20,000 acres, and includes areas from the four towns of Salem, East Lyme, Waterford, and Montville. Watershed management boils down to *land use management* and will depend on participation of all four communities.**
- **There is a direct relationship between increased impervious surfaces in a watershed and degradation of water quality.**
- **Oswegatchie Hills is one of the last large stretches of undeveloped waterfront land in Connecticut.**

Table of Contents

Acknowledgements

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***Chief Executive Officers**: We* would like to express our appreciation to Paul Formica, East Lyme First Selectman, Joseph Jaskiewicz, Mayor of Montville, Bob Ross, Salem First Selectman, and Dan Steward, Waterford First Selectman for their time and contributions.

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> ***Consulting Team:*** Kleinschmidt Associates
> ***The Original Project Steering Committee:*** Marcia Balint, CTDEP OLISP, Colleen Bezanson, Town of Montville, Allison Branco, UCONN Avery Point, Marine Sciences Mary Ann Chinatti, Town of Salem, Maureen Fitzgerald, Town of Waterford John Gaucher, CTDEP OLISP, Fred Grimsey, Save the River, Save the Hills Mary-Beth Hart, CTDEP OLISP, Kristal Kallenberg, CTDEP OLISP, Dr. Jim Kremer, UCONN Avery Point, Marine Sciences, Don Landers, East Lyme Harbor Management/Shellfish Commission, John Mullaney, USGS, Meg Parulis, Town of East Lyme, Sally Snyder, Town of Salem, Paul Stacey, CTDEP Nonpoint Source Program Eric Thomas, CTDEP Watershed Management Program, Jamie Vaudrey, UCONN Avery Point, Marine Sciences and Tom Wagner, Town of Waterford

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Introduction:

The Guided Summary of the Niantic River Watershed Protection Plan was produced for the purpose of providing town officials, commission members, business owners, homeowners and the general public a shortened account of the highlights of the full plan. It has been organized in a format that describes the watershed management concerns then outlines the goals, objectives and recommendations. Throughout the text, references to sections in the full plan are included, so that the reader may conduct further research into an area of interest. To a great extent most of the wording, tables and maps are taken directly from the original plan, with editing, updates or clarifications included, as warranted.

Niantic River Watershed Protection Plan
Guided Summary

The Niantic River Watershed Protection Plan was produced for the communities and advised by a Steering Committee with the vision to improve water quality throughout the watershed, eliminate shellfish bed closures, support fish and wildlife habitat and provide safe and healthy recreational areas.

Executive Summary

This plan takes a *watershed approach* to addressing the problems of nonpoint source pollution associated with the Niantic River, rather than a site specific approach. It considers the hydrologic, or watershed, boundaries of the Niantic River to characterize pollution sources and to develop strategies to address them. Through this scope, the characteristics and land uses of the watershed were examined to better understand the current and potential risk of nonpoint source pollution. Based on these risk assessments, it can then be determined what measures should be taken to decrease nonpoint source pollution to protect the Niantic River and its tributaries.

Full Watershed Management Plan

The full version of the watershed management plan, entitled *Niantic River Watershed Protection Plan*, was completed in 2006. This plan was completed under a consulting team, headed by Kleinschmidt Associates. It offers detailed information on environmental issues specific to the Niantic River, a Vulnerability Analysis of key parcels within the watershed and strategies aimed at addressing identified water quality impairments. Copies of the full plan were forwarded to each watershed town's Public Library and Planning Department. The plan may also be viewed on-line at the following link:

http://www.ct.gov/dep/cwp/view.asp?a=2719&q=379296&depNav_GID=1654

Purpose of the "Guided Summary"

The Guided Summary of the *Niantic River Watershed Management Plan* was produced for the purpose of offering commission members and the general public a concise description of the water quality impairments affecting the watershed and to provide a focused directory of recommendations aimed at reducing those impairments. With this condensed version as a tool, it is anticipated that stakeholders will have a better understanding of the relevant issues, be able to determine their role in the decision-making process and take appropriate actions.

Description of the Niantic River Watershed

A watershed consists of all the land that drains to a waterbody, in this case, the Niantic River. Local water features such as Fairy Lake, Horse Pond, Barnes Reservoir, Bogue Brook Reservoir, Lake Konomac, Darrow Pond, Latimer Brook, Oil Mill Brook, Stony Brook as well as the Niantic River itself, are all part of what is called the Niantic River Watershed, (Fig. I). The watershed covers 31.3 square miles, or approximately 20,000 acres and includes areas from the four towns of East Lyme, Waterford, Salem and Montville.

The Niantic River is an estuary. Fresh water drains from a small coastal watershed to a tidal embayment where fresh water mixes with the salt water of Long Island Sound. Many people relate to the Niantic River as a body of saltwater that provides access to the Sound and to a rich variety of marine resources. Others make connections to local freshwater streams and ponds through recreational activities such as fishing and swimming. For citizens of Waterford, including Quaker Hill, and New London, the freshwater resources in the watershed provide drinking water to 13,000 homes and businesses.

According to Min Huang, CT DEP Migratory Game Bird Program Leader, the Niantic River harbors relatively large concentrations of resident mallards, Canada geese, and feral mute swans throughout the year. The largest concentrations of resident waterfowl are typically found in the upper reaches of the river. These birds will stay in the upper reaches of the river until ice forces them further downstream. In the fall, winter, and early spring the lower river holds large numbers of wintering diving ducks such as hooded mergansers, bufflehead, and red-breasted mergansers. The bay, south of RT 156, attracts large flocks of Atlantic brant and, to a lesser extent, common goldeneye during the winter months.

The shallow marine estuary of the Niantic River was formed when sea level was at an elevation high enough to flood the low lying coastal valley. The river has historically supported healthy populations of shellfish, crustaceans, and finfishes and also provides excellent bird habitat as ospreys, herons, kingfishers, and cormorants may be observed at various times throughout the year. A fish ladder installed in Latimer Brook just north of I-95, allows the passage of species such as alewives and sea-run trout to spawning areas upstream.

In East Lyme, the area known as Oswegatchie Hills consists of over 700 acres of valuable land that offers great recreational potential because of its interesting terrain, and diverse wildlife. It is also one of the last large stretches of undeveloped waterfront land in Connecticut. The Waterford shoreline along this reach consists mainly of sandy beaches and gradual wooded slopes with moderate density residential development.

For additional information on Niantic River resources please refer to Section 3 of the full Niantic River Watershed Protection Plan.

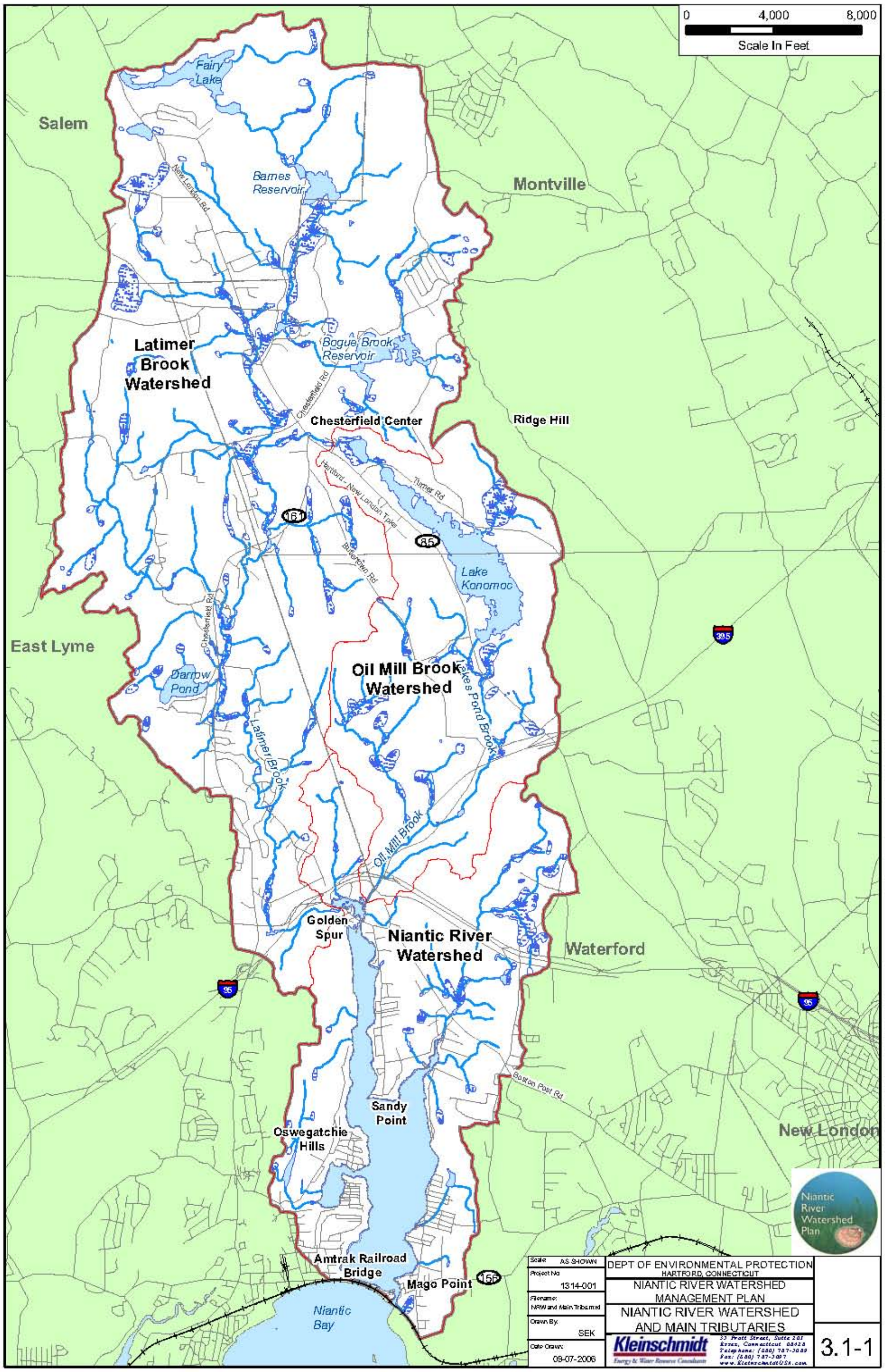


Figure I - Niantic River Watershed

Water Quality Issues in the Watershed

The Niantic River does not currently meet state water quality standards because of observed degradation of aquatic life. A map of the water quality classifications for the watershed based on 2006 data is shown on the following map (Fig. II). Table I describes the surface water quality classifications.

The Niantic River does not currently meet state water quality standards because of observed degradation of aquatic life

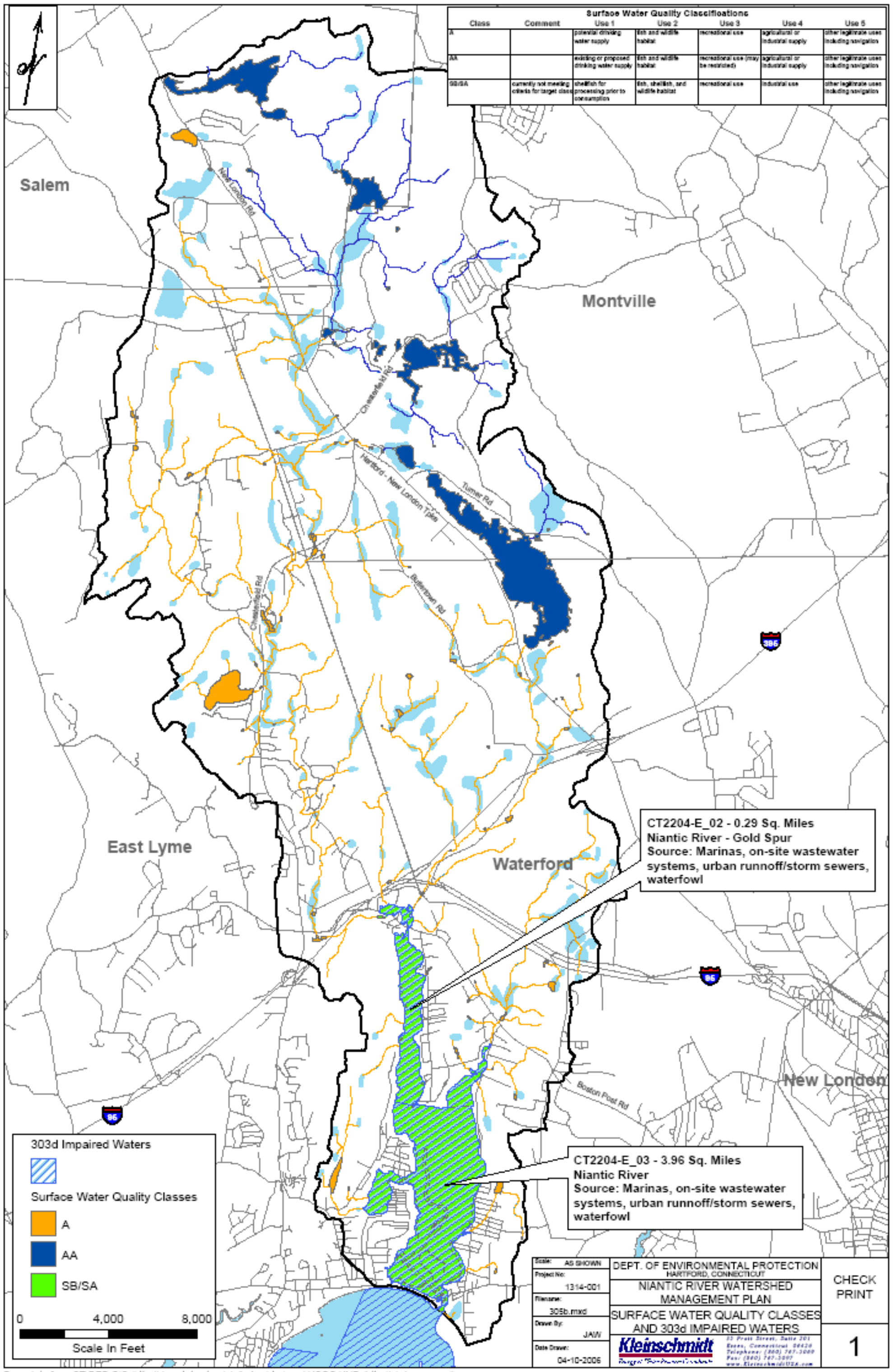
There are two active shellfish beds in the Niantic River. The upper bed remains open year round, while the lower bed is closed during boating season. Following one inch of rainfall, the State of Connecticut, Department of Aquaculture, is required to close both of the shellfish beds, regardless of the time of year. Rain carries bacteria into the river where it is filtered by shellfish rendering them unsafe for consumption. Normally it would take 14 to 28 days for shellfish to cleanse themselves (depurate) so that potentially harmful bacteria are no longer a concern (until the next 1"rainstorm).

The *§303(d) List of Impaired Waters* states that the water quality of the Niantic River is not supporting the aquatic life known to inhabit the estuary. Symptoms of this condition include, algal blooms, seasonal variations in eelgrass populations, loss of scallop populations and changes to the fish communities.

Table I Surface Water Quality Classifications for the Niantic River and its Tributaries

Class	Comment	Use 1	Use 2	Use 3	Use 4	Use 5
A	Known, or presumed, to meet criteria which support designated uses	Potential drinking water supply	Fish and wildlife habitat	Recreational use	Agricultural or industrial supply	Other legitimate uses including navigation
AA	Known, or presumed, to meet criteria which support designated uses	Existing or proposed drinking water supply	Fish and wildlife habitat	Recreational use (may be restricted)	Agricultural or industrial supply	Other legitimate uses including navigation
SA	Uniformly excellent	Direct consumption of shellfish	Designated swimming	All other recreational uses		
SB/SA	Currently not meeting criteria for SA target	Shellfish for processing prior to consumption	Fish, shellfish, and wildlife habitat	Recreational use	Industrial	Other legitimate uses including navigation

Populations of marine plants and animals commonly found in the Niantic River have decreased over the past 4 decades (Millstone Environmental Laboratory (MEL), 2005). Beginning in the 1980s, a sharp decline in eelgrass (*Zostera marina*) was documented (Marshall, 1994) and in more recent years, eelgrass in the Niantic has shown annual



Base data from CT DEP GIS (http://dep.state.ct.us/gis/index.htm) and USGS NHD (http://nhd.usgs.gov/).
303d and Surface Water Quality Classes data from CT DEP, 2004 and 2003.

Figure II – Surface Water Quality Classification

variation (MEL, 2005). Continued threats to eelgrass populations in the Niantic River include nutrient input from domestic septic systems, disease, increased turbidity, competitive interactions with macroalgae, and herbivory. Scallops and winter flounder rely on eelgrass as nursery habitat and are practically missing from the Niantic River (Heck, *et al.*, 1995; MEL, 2005). Meanwhile, new species like green crabs and grubby, appear to be on the rise in the River (MEL, 2005).

The cause of this impairment to aquatic life is not completely understood; however, there is a building body of scientific evidence that states that the river is overloaded with nutrients, primarily nitrogen. Nitrogen enriches the brackish Niantic River water, like fertilizer on a lawn, increasing algal and plant growth. Like bacteria, nutrients flow to the river with stormwater and are considered a problem of nonpoint source pollution.

This widespread, nonpoint source pollution is the greatest threat to the water quality and ecological health of the Niantic River.

Bacteria and nitrogen enter the Niantic River from several sources. Historically, marine vessels, inadequately functioning septic systems and stormwater runoff have been cited as the primary sources of these and other pollutants to the Niantic River. Table II lists nonpoint sources of pollutants their characteristics and impacts. Polluted runoff, illegal marine discharges and sewer line accidents are the most probable sources of bacteria to the Niantic (CT DA/BA, 2005).

Nitrogen associated with polluted runoff, atmospheric deposition and groundwater inputs are critical water quality concerns for the Niantic River (Marshall, 1994; Mullaney, 2006; Stacey and Mullaney, 2004). For instance, we know that polluted runoff accounts for approximately half (50%) of the nitrogen inputs into the Niantic River. Atmospheric deposition of nitrogen accounts for approximately 10% of the nitrogen making its way to the river (Marine Biological Laboratory, 2006). The remaining nitrogen is most likely coming from sources such as septic systems and fertilizer, through groundwater discharge (Mullaney, 2006).

As East Lyme and Waterford continue to extend domestic wastewater sewers to homes along the river, Salem and Montville enforce their surface water protection areas and marine vessels are prohibited from dumping sanitary wastewater into the river, stormwater runoff has become the primary target for protecting the Niantic River. Stormwater runoff transports pollutants of the land into the many drainage systems and tributaries feeding the Niantic River. This widespread, *nonpoint source pollution* is the greatest threat to the water quality and ecological health of the Niantic River.

Without the continued maintenance of existing water quality conditions, or attempts to reduce nonpoint source inputs, the health of the Niantic River ecosystem will deteriorate further.

In recent times, changes in river ecology believed to be associated with nitrogen loading include the loss of commercially important shellfish species, in addition to eelgrass stands and indicate a need for further water quality protection. Measures to protect water quality include land use and development controls to help reduce the influx of nonpoint source pollution. Additionally, the designation of the river and near-shore waters of Long Island Sound as a No Discharge Area may help eliminate potential sewage discharges from vessels, and eliminate another source of nutrient enrichment (CTDEP, 2005). Without the continued maintenance of existing water quality conditions, or attempts to reduce nonpoint source inputs, the health of the Niantic River ecosystem will deteriorate further.

Table II - Nonpoint Source Pollutants, Characteristics and Impacts

Nonpoint Source Pollutants	Pollution Characteristics	Impacts
Sediments	• Produced by natural and anthropogenic erosion of streams. • Generated by particulates settled on impervious surfaces. • Constitutes the largest mass of pollutant loadings to surface waters. • Provide transport for other pollutants like nutrients and bacteria.	*Short term*: increased turbidity, reduced light penetration, decreased submerged aquatic vegetation (SAV), respiration impacts to fish and wildlife, reduced fecundity in fish. *Long term*: Smothered benthic habitat, siltation, channel shoaling, aesthetic impacts.
Nutrients	• Introduced to the watershed by the burning of fossil fuels, use of fertilizers and detergents and the deposit/disposal of human and animal wastes. • Phosphorus and nitrogen are the primary nutrients of concern.	• Eutrophication and low dissolved oxygen in marine ecosystems.
Oxygen-Demanding Substances	• Organic matter enters fresh and coastal waters and then is decomposed, depleting dissolved oxygen. • Organic matter is washed off impervious surfaces with runoff.	• Depletes dissolved oxygen. • Exacerbates the negative impacts of eutrophication.
Pathogens	• Associated with the feces of warm-blooded animals. • Elevated levels typically found in urban runoff. • Leading cause of water quality impairments in the United States.	• Beach and shellfish bed closures. • Contaminated drinking water sources.
Road Salts	• Primarily in northern climates. • Major pollutant in urban areas. • Produces high salt/chlorine concentrations in surface and ground water.	• Contaminated surface waters and ground water. • Toxic to benthic organisms. • Ecological effects pronounced in freshwater systems.
Petroleum hydrocarbons	• Derived from oil and other petroleum products. • Introduced into the watershed from vehicles. • Accumulates on impervious surfaces. • Bind to sediments and often collect in the benthic region.	• Toxic to aquatic life at high and low levels depending on compound. • Accumulate and persist in the benthic environment.
Heavy Metals	• Common in urban runoff: cadmium, chromium, copper, lead, and zinc. • Copper, lead, and zinc are the most prevalent in nonpoint source pollution from urban areas. • Deposit from vehicles and the atmosphere (particulate matter).	• Produce toxic effects on aquatic life. • Bioaccumulate in fish and marine mammals.
Toxics	• Various toxic compounds (USEPA "priority pollutants") can be found in urban runoff.	• Acute and chronic impacts to aquatic life.

For additional information on Water Quality concerns please refer to section 4.0 of the full Niantic River Watershed Plan – Bacteria (4.2.1), Nitrogen Loading (4.2.2), Niantic River Ecosystem (4.3), and Fish Community and Macroinvertebrates (4.4)

Land-Use and Water Quality

The Niantic River Watershed exhibits a settlement pattern similar to other coastal watersheds in the Northeast United States. Older, denser development occurred along the coast in association with shipping and commercial centers while forestry and agriculture were the predominant land uses inland (Marshall, 1994 and Civco, *et. al*., 2002). This land use pattern continues, by and large, with the exception that the upper portions of the watershed have converted back to forest land now that agricultural uses have diminished or are being developed for residential or commercial uses as a result of sprawl from the coastal areas. In the lower portions of the watershed – East Lyme and Waterford – new development is restricted to infill areas with the exception of Oswegatchie Hills in East Lyme. In the upper reaches of the watershed - Montville and Salem – there remain sizeable areas of land that could be developed.

It is the cumulative impacts of years of development with which we are concerned.

Figures III and IV on the following pages, illustrate the land cover changes in the Niantic River Watershed between 1985 and 2006. Table III below gives the acreages per land use cover for 1985 to 2006. This characteristic of land use change is probable cause for nonpoint source pollution and related water quality problems. Note that there has been significant increase in developed land and a substantial decrease in forest land acres.

Table III - Area in Acres of Land Cover Type

Description	Change in Acres	1985	2006
Developed	+653.3	1969.1	2622.4
Turf and Grass*	+274	607.0	881.0
Other Grasses	+104.6	264.5	369.1
Agricultural Fields	-109.5	758.0	648.5
Deciduous Forest	-984.3	12245.8	11261.5
Coniferous Forest	-38.5	905.8	867.3
Water	-77.6	1536.9	1459.3
Non-forested Wetland	+1.1	63.3	64.4
Forested Wetland	-63.6	938.4	874.9
Tidal Wetland	0	0.3	0.3
Barren	+248.2	338.5	586.7
Utility Corridors	-7.6	129.5	121.9
Totals		19757.3	19757.3

(*includes golf course greens)
Satellite Derived Land Cover data version 2.02, J. Stocker, UCONN, 10/03/08

Generally, no one development will cause, in and of itself, the degradation of a stream. It is the cumulative impacts of *years* of development with which we are concerned. Development in the Niantic River Watershed has occurred and will occur incrementally over time. From year to year, changes in the landscape, as a result of development, are negligible with the possible exception of relatively large developments (*e.g.* “big box” retail outlets, large residential, or road projects) on large parcels of land. But, after many years, landscape changes are obvious. The same holds true for nonpoint source pollution; the gradual development of the watershed will cause water quality concerns over time unless protective actions are taken.

Civco and others (2002) have described land use as, “the common denominator underlying many of the issues that our communities face from nonpoint source water pollution and open space preservation to sustainable economic development and community character”. Changes in land use are the result of community decision-making with regard to all of these community objectives. Development converts vegetated land to mostly impervious surfaces. When the pattern of development emanates from urban areas to suburban and rural areas, we call this pattern ‘urban sprawl’. Therefore, as settlement expands into rural areas, building and road density increases in these areas increasing the area of impervious surfaces.

***Impervious surfaces not only increase the total volume of runoff, but also transmit pollutants readily and can even contribute to thermal pollution*.**

The area of impervious surfaces in a watershed is essential to understanding nonpoint source pollution potential and consequent management requirements (Schueler, 1994; Sleavin *et al.*, 2000). Impervious surfaces include any surface that water cannot infiltrate, such as parking lots, paved roads, sidewalks, buildings, rooftops, and highly compacted earth. Impervious surfaces not only increase the total volume of runoff, but also transmit pollutants readily and can even contribute to thermal pollution. Therefore, much of the impervious surface we recognize in our community is associated with transportation or buildings. Schueler (1994) noted that the transportation system typically contributes the most to total impervious area in a watershed.

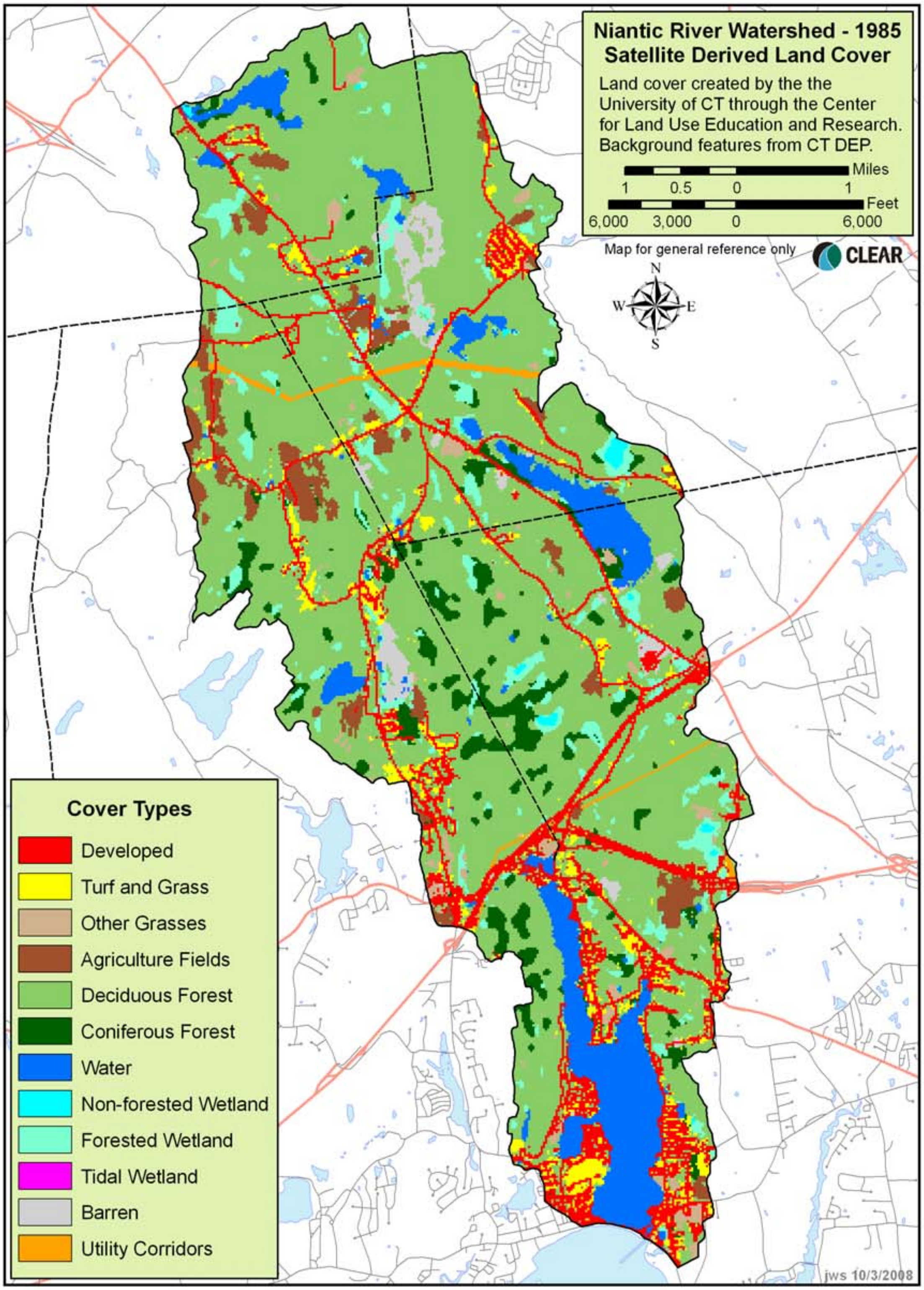


Figure III – Land Use Cover - 1985

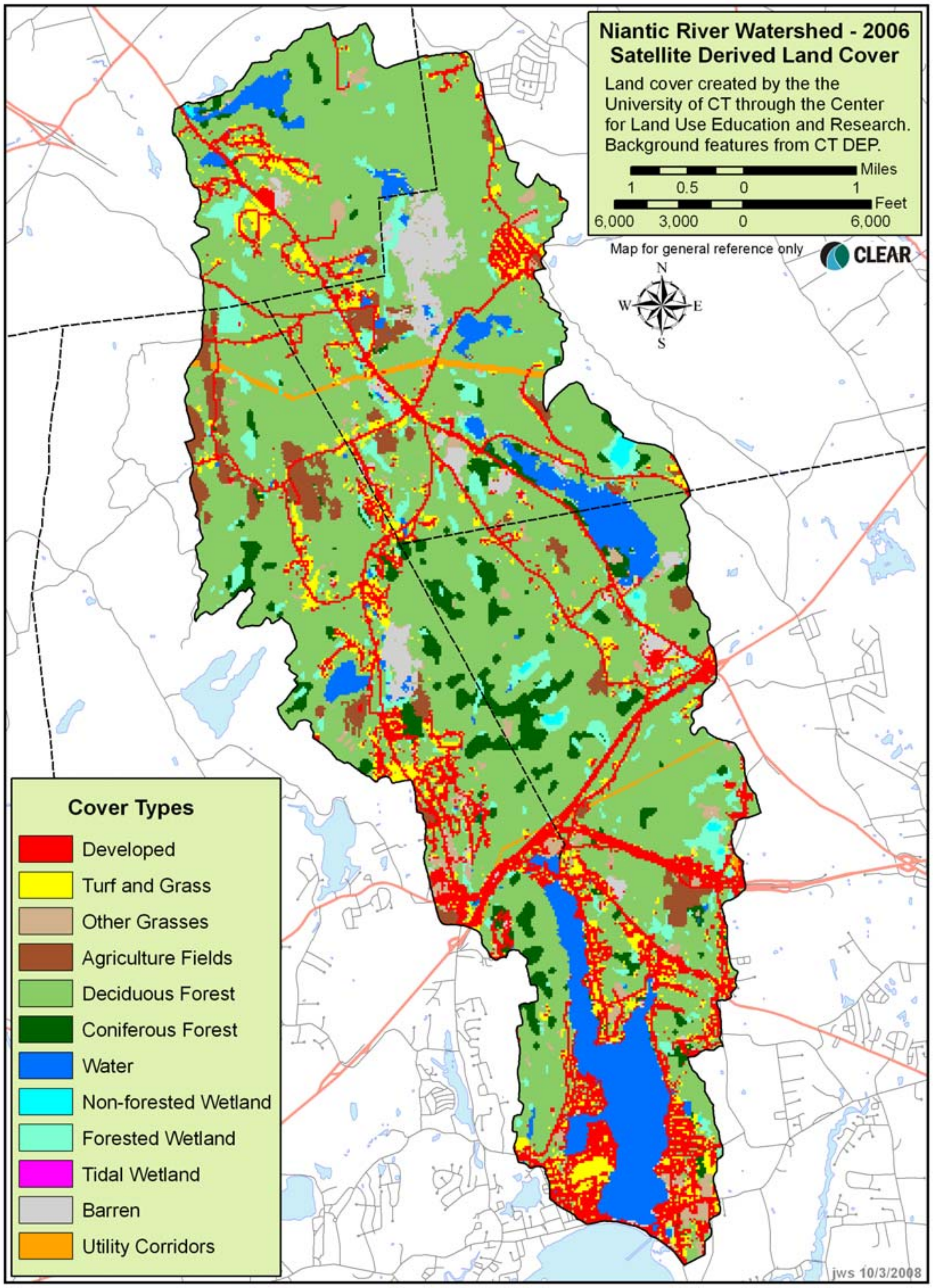


Figure IV - Land-Use Cover-2006

Impervious surfaces lead to four major impacts to a watershed. In no particular order, these are *altering the natural flow of water*, *aquatic habitat loss*, *decreasing water quality*, and *loss of biological diversity*. As a watershed's imperviousness increases, the quality of its streams decreases**.** Early and recent work by the Center for Watershed Protection (CWP) in the Chesapeake Bay Watershed established a close relationship between a watershed's imperviousness and the state of water and habitat quality degradation in streams (CWP, 2003). Figure V illustrates this relationship and reflects the degree of stream degradation as *degraded, impacted,* and *protected.*

As a watershed's imperviousness increases, the quality of its streams decreases.

(adapted from UCONN NEMO, 2006 and Schueler, 2002)

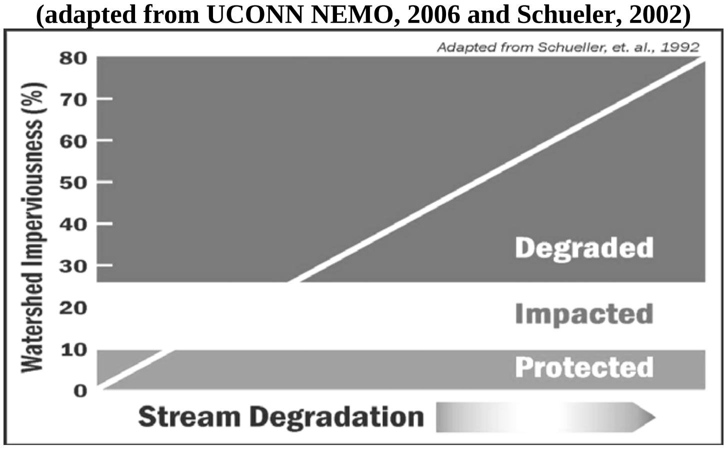


Figure V – Relationship between Watershed Imperviousness and Stream Degradation

Full build-out scenarios were developed for each of the sub-basins in the watershed to predict the amount of impervious surface coverage based on current zoning. Impervious surface percents were calculated for current conditions and were estimated under full-buildout conditions. Basins at less than 10% impervious are shaded green, between 10 and 25% impervious are shaded yellow and above 25% impervious are shaded red. Maps of estimated current and future percent impervious surface area for basins are shown on Figures VI and VII.

Based on existing conditions approximately 90% of the sub-basins in the Niantic River Watershed have less than 10% impervious surface coverage. The remaining 10% falls between the 10-25% range. Under the projected build-out analysis approximately 69% of the of sub-basins will have less than 10% impervious coverage, 29% would then be in the 10-25% range and 2% of the sub-basins would have impervious surface coverage over 25%. Referring to the graph above, this would mean that based on current land development practices over 30% of the sub-basins will fall into the impacted or degraded category.

For additional information on Land-Use in the Niantic River resources please refer to sections 4.5 of the full Niantic River Watershed Plan.

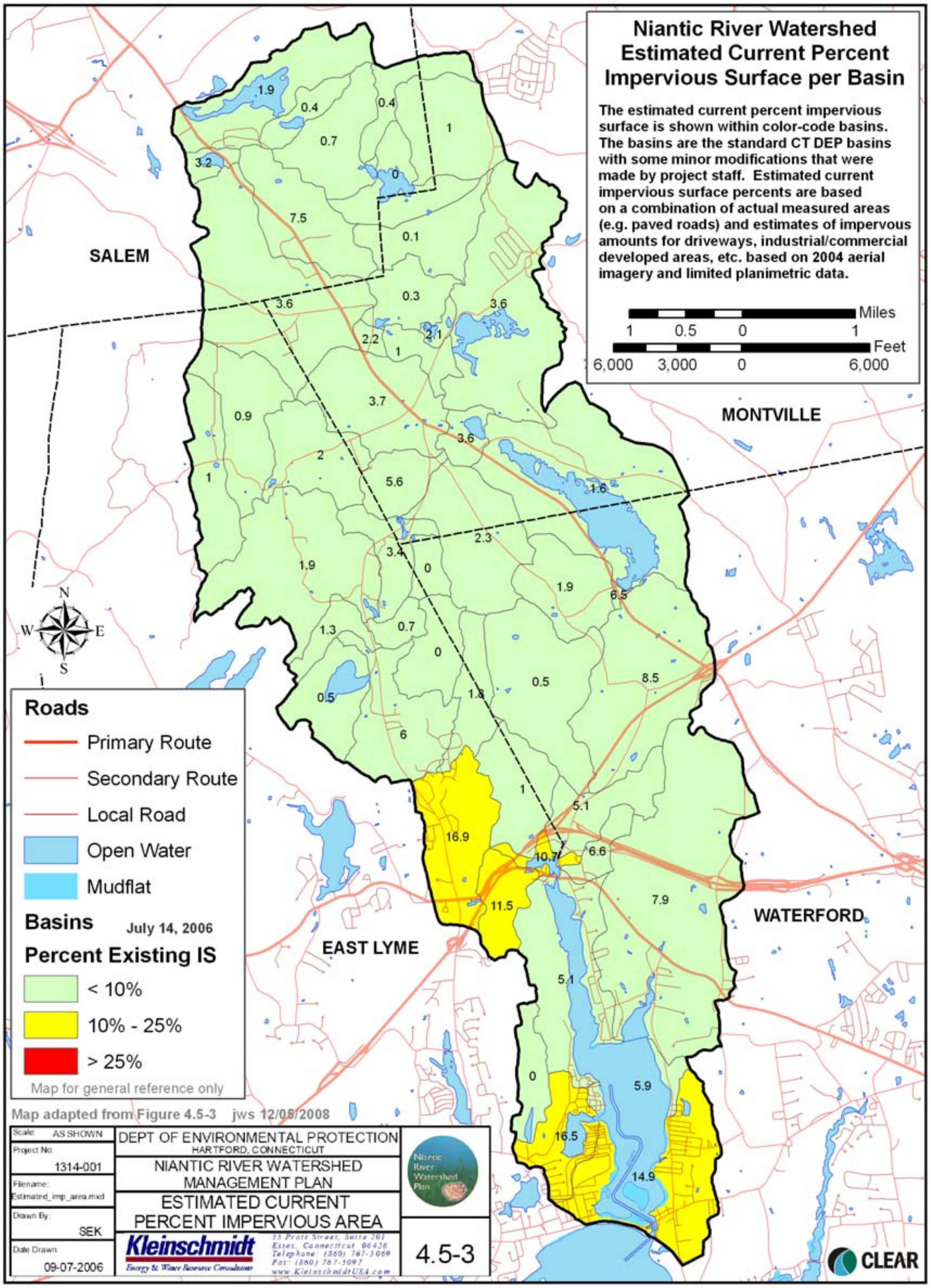


Figure VI – Estimated Current Impervious Area per Basin

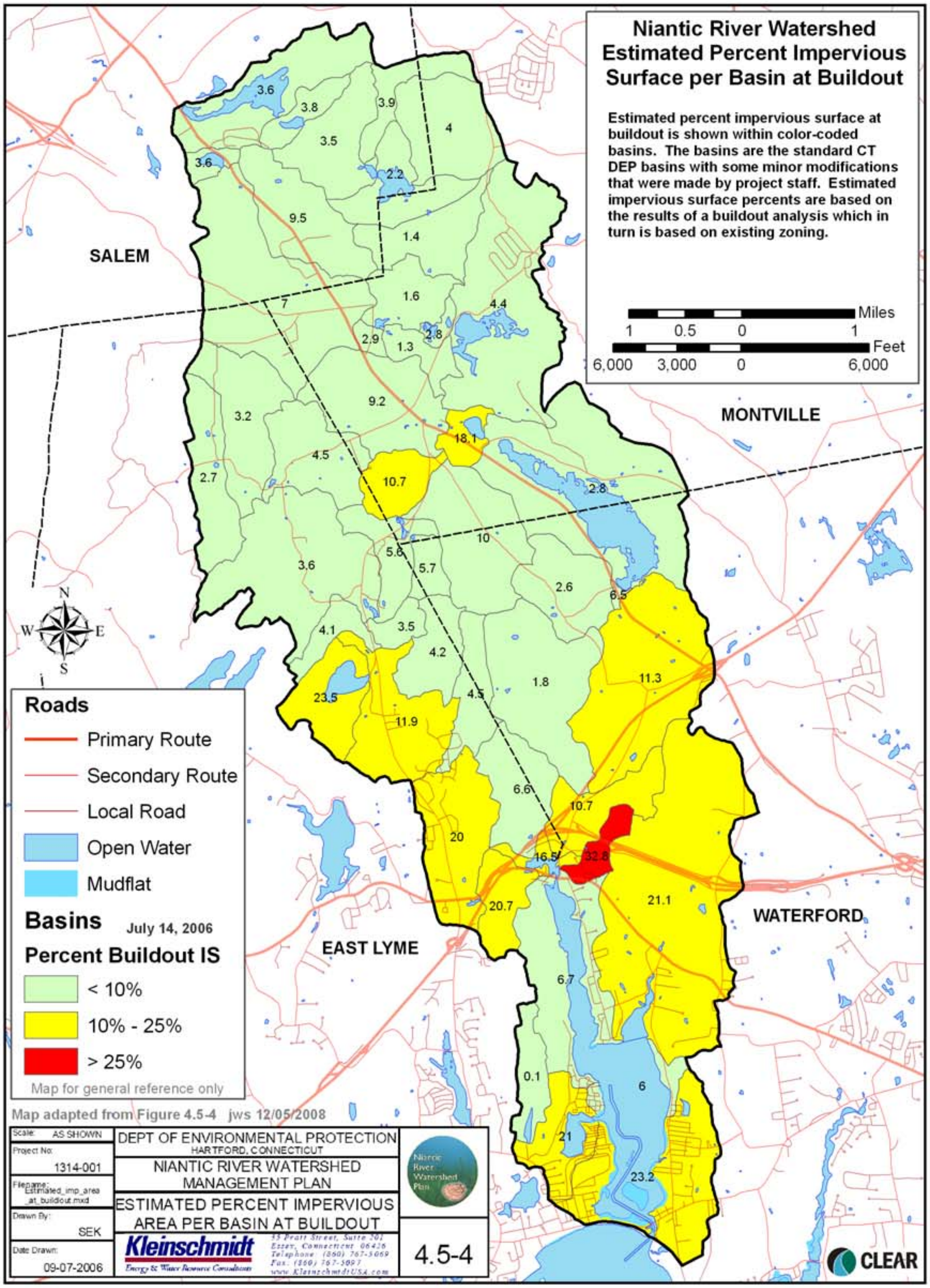


Figure VII – Estimated Current Impervious Area per Basin at Buildout

What Needs to be Done?

Significant investments have been made to control pollution to the Niantic River. East Lyme and Waterford have sewered many of the neighborhoods along the shores of the river to eliminate the risk of bacterial and nutrient pollution from septic systems. The Niantic boating community is being encouraged to observe the No Discharge Zone on the river to control sewage from marine vessels. These efforts, combined with advances in stormwater management, offer hope that impacts from historic activities can be turned around. However, the impacts and management of nonpoint source pollution (*i.e.* polluted runoff and stormwater) remain.

The nature of nonpoint source pollution makes it extremely challenging to manage.

The nature of nonpoint source pollution makes it extremely challenging to manage. It is decentralized (sources vary and are scattered), cumulative (pollution results not from one, voluminous event; rather, it occurs over time in regular, periodic rain/runoff events), and systematic (an entire hydrologic unit [watershed] is both the scope and scale of the problem). In the case of the Niantic River, pollution is transported to the main stem via several smaller streams, each carrying pollutant loads emanating from sources somewhere else in the watershed. Hence, effectively managing nonpoint source pollution issues relies on an approach that is comprehensive and watershed-based, *i.e.* scaled according to the natural system to be managed.

…watershed boundaries are not political boundaries

Although watershed-based management plans have been recognized as the approach to dealing with nonpoint source pollution, they are not without their own set of challenges. For instance, watershed boundaries are not political boundaries; therefore several jurisdictions often have a stake in watershed management. The Niantic River Watershed includes portions of four towns – East Lyme, Montville, Salem, and Waterford. Therefore, watershed management relies on participation and execution from all four communities.

Watershed management boils down to land use management.

Watershed management boils down to *land use* management. By and large, land use planning and regulation, including the management of runoff (*i.e.* stormwater), lies with the municipalities. Current nonpoint source pollution problems are linked to historic development and stormwater management in these four communities. Like all coastal watershed communities in Connecticut, population and development pressure will continue to yield more full-time residents, housing and other developments, thereby increasing the potential for nonpoint source pollution problems. (NOAA, Spatial Trends in Coastal Socioeconomics (STICS), 2006).

…there is real hope and possibility to prevent further degradation of the Niantic River and to restore it to an improved condition

As the last remaining parcels of developable land are converted to commercial, industrial, and residential uses, the quantity and quality of stormwater runoff can be expected to change. Therefore, it is central to this plan that polluted runoff be considered the greatest water quality management challenge for the Niantic River, primarily because it is considered the most *manageable* of all potential sources of pollution to the river. That is to say there is real hope and possibility to prevent further degradation of the Niantic River and to restore it to an improved condition. This plan is needed to establish a coherent and practical approach to dealing with nonpoint source pollution in the Niantic River Watershed.

Key Watershed Findings

In completion of the full Niantic River Watershed Plan, several key project findings emerged which spearheaded the recommendations for future management efforts in the watershed. Table IV on the following page summarizes those findings.

Watershed Stakeholders—Where Do You Fit In?

There are four categories of watershed plan stakeholders. The categories are defined by the role the stakeholders play in moving the plan forward. In Table V the stakeholder roles are defined by the questions listed in the left column and the stakeholders in the right column. Many of these stakeholders were involved in the planning process and all play a role in plan implementation.

Table IV – Key Watershed Findings

Data Assembly & Results	• Fifteen or more storm sewer outfalls discharge untreated runoff directly into the Niantic River. These outfalls collect runoff from several drainage areas of various sizes along the Niantic River shoreline. • As a watershed's imperviousness increases, the quality of its streams decreases – a relationship well-established in scientific literature. Five drainages of the Niantic River are currently covered by over 10% impervious surfaces such as roads, parking lots, sidewalks and roofs. At fully developed conditions (maximum development allowed by current planning and zoning regulations), ten drainages in the watershed will be covered by 10% or more imperviousness and one drainage will be over 30% impervious surface cover. • Stormwater modeling showed increased loading to the Niantic River from existing development, but drainages adjacent to the lower river are fairly developed with respect to the remainder of the watershed. Any areas that may be considered developable pose a risk for direct discharge to the lower river by increasing the pollutant loading through its tributaries. • Undeveloped areas further upstream in the watershed pose a great risk to increasing loads to town water supply reservoirs. Preservation of lands abutting receiving waterbodies is as much a key component to water quality protection as is stabilizing and treating existing development. • Tracked development of the watershed has steadily increased since monitoring using aerial images was implemented in 1985. Since that time, over a thousand acres of forest has been converted into either developed, barren or grassed lands.
Zoning	• Each of the towns is making great efforts to do their part in protecting the waters of their communities. A more effective approach may be to match wetland protection requirements for a consistent watershed wide approach to protecting water quality. For example, the towns of East Lyme and Waterford each have a 100-foot upland review for wetlands and watercourses, where the towns of Montville and Salem have different buffer areas.
Environmental	• Eelgrass populations plummeted in 1999, but experienced a rebound in 2003 and 2004. The future of the grass is still questionable and requires regular protection and monitoring. It is believed that continued growth of the eelgrass populations will also aid in restoring shellfish populations, although the increased predation by an overall increase in fish species may limit growth opportunities.
• *Monitoring*	• Measurement of water quality throughout the watershed is not currently a standard practice. Improvements may be made through BMP and planning changes, but without practical measurement techniques, it becomes difficult to measure, monitor and adjust. • Monitoring and inspection programs, which are making great progress, are underway in the Towns of Waterford and East Lyme, but the potential for future development is the greatest in the upper reaches of the watershed.

Table V – Stakeholder Roles

<table>
<tr><td>Who is responsible for implementing the plan?</td><td colspan="2">Property Owners and Managers (e.g. Home & Business)
Developers, contractors and realtors
Local government:
Local boards and commissions
Directors of Department of Public Works – East Lyme, Montville, Salem, Waterford
Directors of Planning – East Lyme, Montville, Salem, Waterford
Environmental Planner/Wetland Officer – East Lyme, Montville, Salem, Waterford
Zoning Officers
East Lyme-Waterford Shellfish Commission
Niantic River Gateway Commission
Ledge Light Health District
State agencies:
CTDEP Bureau of Water Protection and Land Reuse – OLISP, Nonpoint Source Pollution Program, Coastal Management
CTDEP Bureau of Natural Resources – Fisheries, Wildlife
Connecticut Department of Transportation (ConnDOT)
Connecticut Department of Health
Local environmental groups
Save the River, Save the Hills & Friends of Oswegatchie Hills</td></tr>
<tr><td>Who is affected by the implementation of the plan?</td><td>Property owners, Water supply customers, Local businesses, Visitors</td><td>Recreational users, Boaters, Marinas, Anglers</td></tr>
<tr><td>Who can provide information on the issues and concerns in the watershed?</td><td colspan="2">Property owners
Anglers
Boaters
Local government:
Boards of Selectman, planning, zoning, wetland commissions in East Lyme, Montville, Salem, Waterford. East Lyme-Waterford Shellfish Commission
State agencies:
CT Department of Agriculture/Bureau of Aquaculture, CTDEP Bureaus of Natural Resources & Outdoor Recreation, Office of the Commissioner
Non-profit organizations</td></tr>
<tr><td>Who can provide technical and financial assistance in developing and implementing the plan?</td><td colspan="2">State agencies and institutions:
CTDEP Bureau of Water Protection and Land Reuse – OLISP, Nonpoint Source Pollution Program, Coastal Management
CTDEP Bureau of Natural Resources – Fisheries, Wildlife •ConnDOT
CT Department of Agriculture/Bureau of Aquaculture, (DA/BA)
University of Connecticut Cooperative Extension System
Federal agencies:
NOAA, USEPA, USGS, USDA NRCS, USFWS</td></tr>
</table>

Goals and Objectives

Overarching Goal

To restore and preserve the Niantic River and its tributaries so that they fully support all uses, including shellfishing, fishing, swimming and habitat for aquatic-life.

Main Goals and Objectives

Support Designated Uses for Shellfishing and Primary Contact Recreation

- Reduce bacterial loads from stormwater outfalls, runoff and direct discharges

Support Designated Uses for Aquatic Life

- Reduce nutrient loading from stormwater outfalls and runoff

Protect and Restore Natural Stream Channels

- Minimize flooding impacts by improving peak and volume controls from impervious surfaces
- Preserve and restore critical wetland and watercourse vegetative buffers

Raise Stakeholder Awareness and Involvement by Implementing a Watershed Management Information and Education Campaign

- Educate stakeholders about the Niantic River and its tributaries and watershed management.

Establish a Sustainable Coalition of Partners to Manage the Niantic River Watershed

- Create a coalition of watershed stakeholders to take a leadership role for the implementation of this plan

Improve Water Quality and Biological Monitoring for the Niantic River and its Tributaries

- Establish a comprehensive long-term water quality monitoring program for the Niantic River Watershed

Key Recommendations

The following recommendations were adopted from the full version of the *Niantic River Watershed Protection Plan.* They have been organized to present an edited version of the original recommendations to facilitate implementation.

Establish a Watershed Coalition

- **Support establishment of a sustainable watershed board**
    1. The coalition, which may be formed by modifying an existing board, would include appointed representatives from each of the four towns. This may include town officials, town board members, local environmental and non-profit organizations, business owners and landowners. Liaison representation from; environmental organizations with an interest in the watershed, local, state, and federal government, utilities, educational institutions and local businesses should be encouraged.
    2. Responsibilities would include putting into action the recommendations of the watershed management plan, with periodic plan reviews and updates.

Continued Support for a Watershed Coordinator Position

- **Support a Watershed Coordinator Position**
    1. This position would be dedicated to assisting the watershed board in implementing the Watershed Management Plan including conducting the inter-jurisdictional coordination activities, grant-writing and evaluation of plan achievements.

Develop and Implement Education and Outreach Programs

- **Increase stakeholder awareness about the link between shellfish closures and sources of bacterial pollution in the Niantic River.**
- **Increase stakeholders' level of knowledge about nutrient loading and the health of the Niantic River Estuary.**
- **Educate land use decision makers about the value of vegetated riparian buffers in the protection of water quality.**
- **Establish an outreach and tracking program for landowners about on-site septic system maintenance.**
- **Partner with other local groups to develop and implement a comprehensive education and outreach program addressing water quality and watershed management issues**
    1. Identify existing programs and target audiences
    2. Develop targeted outreach activities and materials- See Table VI on following page.*(and Chapter 7 of the full plan)*
    3. Annual evaluations on program(s) effectiveness
    4. Include public updates on municipal participation, local business efforts, development changes, monitoring results, changing technology and open space preservation.

Table VI – Outreach Activities

Targeted Group	Outreach Activities
Marinas and boat owners	✓ Support incentive and recognition programs for marinas to become Certified Connecticut Clean Marinas ✓ Support and assist in boat owner education programs ✓ Support pump out program conducted by Save the River-Save the Hills and improve awareness of availability land based pumpout facilities at Niantic Dockominiums, Three Belles, and Port Niantic in addition to the dump station at Niantic Bay Marina.
Homeowners and business owners	✓ Periodically complete a public outreach campaign for shoreline neighborhoods about potential sources of bacterial pollutants ✓ Conduct ongoing outreach on topics such as lawn care practices, pet waste management, and impervious surface run-off. Support MS4 requirements wherever feasible. ✓ Encourage and participate in programs such as storm drain stenciling, river and beach clean-ups and household hazardous waste disposal ✓ Promote the protection of riparian buffers for the benefit of water quality and habitat protection. Encourage public participation in habitat restoration and riparian revegetation projects ✓ Promote good “housekeeping” practices
Contractors and developers	✓ Sponsor on-going workshops to promote topics such as management of nitrogen loading during the development process, best management practices during construction
Municipal staff and appointed and elected officials	✓ Partner with organizations such as CT-NEMO, NRCS and CT Sea Grant to provide ongoing education on topics including; LID practices, riparian buffers, land conservation, stormwater regulations, housekeeping BMPs and management of nitrogen loading during the development process
Local Schools and youth organizations	✓ Work with local schools, education facilities and youth groups to promote outreach opportunities on water quality programs

Develop Design Standards for Local Implementation

- **Mitigate the impacts of increased/increasing impervious surfaces from development through Low Impact Development (*LID*) design and Best Management Practice (*BMP*) implementation. Apply to new and redeveloped sites, both public and private.**
    1. Incorporate low-impact site preparation and development techniques.
    2. Wherever feasible, eliminate curb requirements and mandatory sidewalks, reduce road widths and require pervious surfaces.
    3. Adopt new or modify existing cluster and/or conservation subdivision ordinances that promote density allowances with minimum footprints and limit rezoning that will result in more impervious surface and/or less wetlands in critical sub-drainage basins.
    4. Encourage and enforce non-structural, non-piped stormwater handling techniques wherever possible, avoid short-circuiting of stormwater discharges and incorporate effective vegetative buffers in site design.
    5. Carefully consider any rezoning that would allows an increase or high percentage of impervious surface on a lot.

> ***What does it mean?***
> ***LID****- design strategy using small scale controls integrated throughout a site to manage stormwater run-off and replicate pre-development hydrology*
> ***BMP****-a measure used to mitigate changes to the quality and quantity of runoff due to development*
> ***Cluster Subdivisions****-subdivisions that promote the preservation of natural resources while allowing similar densities as a conventional subdivision.*

- **Encourage and support municipal approaches to land-use planning, development reviews and site inspections that protect watershed resources. For uniformity within the watershed, the following management tools should be considered in land-use regulations and review of development proposals.**
    1. Conduct assessments of tributaries to establish stream preservation and restoration priority locations and needs. Assess value and functions of resources, (i.e. wetland and watercourses) as part of preliminary planning and design.
    2. Use an Upland Review Area from inland wetlands and watercourses boundaries in Inland Wetland and Watercourse Regulations. The DEP and *Niantic River Watershed Protection Plan* recommended guideline is 100 feet.
    3. Regulate activities in any other non-wetland or non-watercourse area that will likely impact inland wetland or watercourses.
    4. A minimum 50 foot wide vegetated buffer beyond wetland and watercourse boundaries, within which no alteration or vegetative removal is permitted, to the extent feasible.

Encourage vegetative buffer restoration where needed.

5. A riparian buffer overlay zoning district based on delineation of perennial and associated wetlands with associated widths of 100 feet for larger streams and 50 feet for smaller, headwater streams.
6. Protect existing wetlands, vernal pools and watercourses to maximum extent practicable (i.e. no alteration of areas with good existing functions and values). Mitigate for any and all wetland/riparian impacts, with emphasis on re-establishing vegetated buffers (water quality filtration zones) in appropriately placed locations (even if uplands locations are the only option*)*
7. Focus on stormwater treatment at beginning of site design. Design stormwater management treatment and controls that can and will be maintained, are suited to the site, maximize pollutant removal and minimize flooding impacts. Consider soils, hydrology, peak flows, stormwater volume, wetland and watercourse values and function, receiving waters, topography and vegetation. Develop checklists for stormwater design and, construction inspection and long-term maintenance. Table VII below lists management objectives and targets for bacteria, nitrogen and peak stormwater volume controls.
8. Use resources including *2004 Connecticut Stormwater Quality Manual*, *2002 Guidelines for Sediment and Erosion Contro*l, and full version of the *Niantic River Watershed Protection Plan* for plan and site reviews.
9. Apply development restrictions on steep slopes or adopt a steep slope overlay zone.
10. Develop incentive based programs where appropriate to promote resource protection.

<u>What does it mean?</u>

2004 CT Stormwater Manual-Standards adopted by the State of CT to address stormwater control design and maintenance

2002 Guidelines for Sediment & Erosion Control-Standards adopted by the State of CT to address soil erosion and site stabilization

Table VII - Watershed Management Objectives and Targets

Management Objective	Target
Reduce bacterial loads from stormwater outfalls, runoff, and direct discharges.	Fecal coliform: Geometric Mean less than 14/100ml; 90% of Samples less than 43/100ml (CTDEP, 2002).
	Enterococci: Geometric Mean less than 35/100ml; Single Sample Maximum 500/100ml
Reduce nutrients loading from stormwater outfalls and runoff.	Nutrient criteria for eelgrass is currently being developed by CT-DEP. Suggested Dissolved Inorganic Nitrogen (DIN) for LIS is <0.03mg/L (Vaudrey, 2008)
Minimize flooding impacts by improving peak and volume [stormwater] controls from impervious surfaces.	Peak flow volume and velocity: Minimized peak velocity for 1-yr, 24-hr storm events (CTDEP, 2004).

(Adapted from Table 6.1 of the Niantic River Watershed Protection Plan, updated to reflect input from DEP on nutrient loading)

Further reference on these management tools may be found in Section 6 of the Niantic River Watershed Protection Plan.

Develop a Comprehensive Watershed Monitoring Plan

- **Support the establishment of a Total maximum Daily Load** (TMDL) **for the Niantic River and its tributaries to establish water quality goals.**
- **Establish a repository system for monitoring data for the Niantic River and its tributaries to promote periodic water quality assessments**
- **Integrate existing watershed monitoring programs to address water quality restoration, tracking of indicator bacteria and nitrogen, status of riparian zones and impervious surfaces, to measure management performance.**
  1. Develop a water quality and biological integrity baseline for the tributaries including, Latimer, Oil Mill and Stony Brooks
  2. Evaluate monitoring data against performance measures (*e.g.* indicators, targets) to evaluate the effectiveness of the watershed protection plan.
  3. Monitor impervious surface cover/land use and net loss of wetlands and riparian corridors on a watershed and local basin basis.

What does it mean?
TMDL-establishes the maximum amount of a pollutant that a waterbody can take in without adverse impact

- **Support monitoring efforts conducted by town, state, federal and private organizations.**
    1. Support continued monitoring efforts by organizations including, Town Public Works Departments, Local and Regional Departments of Health, Shellfish Boards, CT-DEP, CT-Dept. of Agriculture, University of Connecticut, USGS, Dominion, City of New London Water Dept. and Save the River-Save the Hills, Inc.
- **Support training sessions for municipal officials and volunteers on water quality monitoring parameters specific to the watershed.**
    1. Support citizen–based water quality monitoring programs**.**
- **Produce annual/biennial "*State of the Watershed--Progress Report Card*", including the Niantic River and its tributaries as well as the watershed as a whole.**
    1. Track the implementation of the management strategies and monitoring parameters to determine status and effectiveness and identify trends. Levels of indicator bacteria and nitrogen should be tracked to measure management performance.
    2. Determine changes needed in monitoring protocol
    3. Report progress and recommendations to inform planning and management decision-makers.

What does it mean?
Vulnerability Analysis- An assessment completed as part of the full Watershed Mgt. Plan to identify areas of the watershed that demand the most priority for management.

Define, Adapt and Implement Open Space Initiatives

- **Key Resource Protection Recommendations:**
    1. Set watershed land preservation goals and targets based on available (undeveloped) land and priority watershed areas
    2. Protect acres of priority watershed areas every year as identified in the Vulnerability Analysis
    3. Maintain no-disturb buffers around wetlands and waterbodies and provide demarcation in key areas
    4. Preserve continuous wildlife corridors
- **Funding:** Work with legislative and funding organizations to obtain monies to purchase lands for preservation.

Develop and Support a Stormwater Utility Partnership

- **Support development of a municipal stormwater partnership for purpose of facilitating effective stormwater management, meeting Municipal Separate Storm Sewer System (MS4) requirements and implementing Stormwater Management Program Plans (SWMPPs)**
    1. Identify and prioritize maintenance schedules including, street sweeping, and stormwater structure inspection, maintenance

and repair
2. Identify and prioritize stormwater retrofits
3. Coordinate stormwater monitoring
4. Identify and coordinate cooperative agreements for cost-sharing of equipment and services
5. Identify and apply for funding sources
6. Provide outreach and education for staff, regulated community and general public

> ***<u>What does it mean?</u>***
> ***MS4-*** system of pipes, ditches, or gullies, that is owned or operated by a governmental entity and used for collecting and conveying storm water
> ***SWMPPs***-plans prepared by a municipality to address stormwater issues
> ***Stormwater retrofits***-a series of structural stormwater practices designed to mitigate erosive flows, reduce pollutants in stormwater run-off, and promote conditions for improved aquatic habitat

Form Working Relationships with Public and Utility Organizations Impacting the Watershed

- **Identify organizations and contacts for all groups that impact the watershed.**
- **Establish a communication system with organizations to promote opportunities for coordinating and commenting on construction proposals and state and federal permits**

Seek Grant Funding Opportunities

- **Identify and apply for grants that address the Watershed Management Plan goals and recommendations.**
- **Partner with other organizations for coordinated grant efforts**

Where are we Now?

Periodically an assessment or progress report should be conducted to determine what has been accomplished and to direct future focus area activities. It will document what has been implemented on a town by town basis and will be used to make town-specific recommendations as part of watershed management implementation.

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