Open Space

"Buy land. They ain't making any more of the stuff."
(Will Rogers)

NARRAGANSETT BAY WATERSHED COUNTS
ECONOMY • ENVIRONMENT • EQUITY
www.watershedcounts.org

The Narragansett Bay watershed is 1754 sq. mi. (730 in RI, 1024 in MA)

The Pawcatuck River watershed is 304 sq. mi. (246 in RI; 58 in CT)

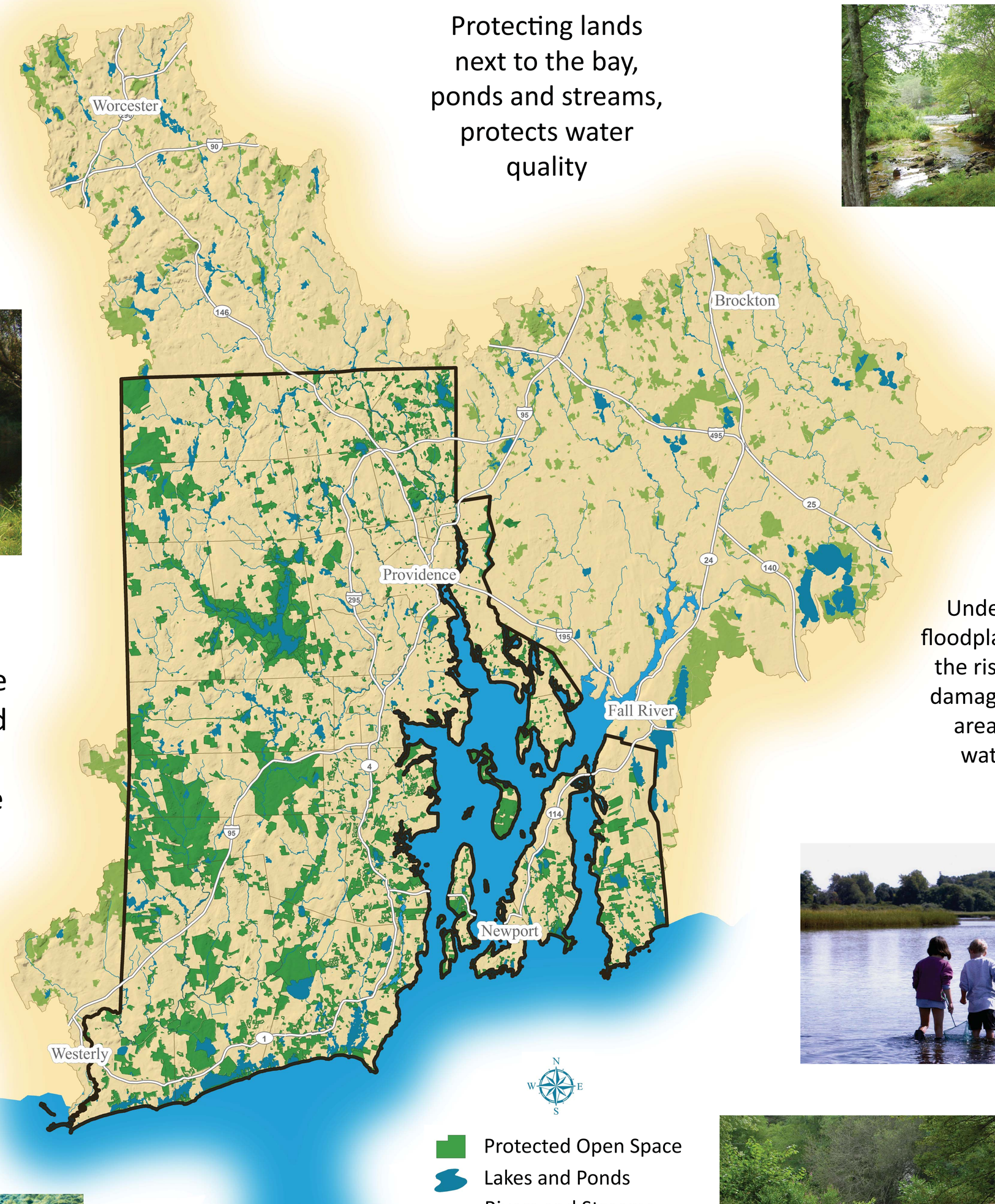
In Rhode Island

234 sq. mi. (22%) are protected/conserved

534 sq.mi. (50%) are undeveloped *and* unprotected

Open spaces not only protect water quality, but also provide places to roam and explore.

Protecting lands next to the bay, ponds and streams, protects water quality



Map produced by Kevin Ruddock

Undeveloped floodplains reduce the risk of flood damage to other areas of the watershed

Data Sources:
RIGIS, 2011. State Conservation Lands
RIGIS, 2011. Municipal & Non-Governmental Organization Conservation Lands
The Nature Conservancy, 2010. Secured Lands 2009 Northeast States, Public Version

Open Space Conservation: Many Faces, Many Benefits

Strategic investment in preserving RI's natural assets and resources
Protecting RI's economically and environmentally most valuable waters and lands
Providing urban, suburban and rural recreational, cultural and historical areas that improve Rhode Islanders' health and quality of life
Preserving working farms for the benefit of individuals and communities statewide
Understanding how all aspects of conservation are linked together to ensure a better Rhode Island for today and future generations

Watershed Counts Logos: BrianJonesDesign.com

Photos: RI Dept. of Environmental Management

Marine Water Quality

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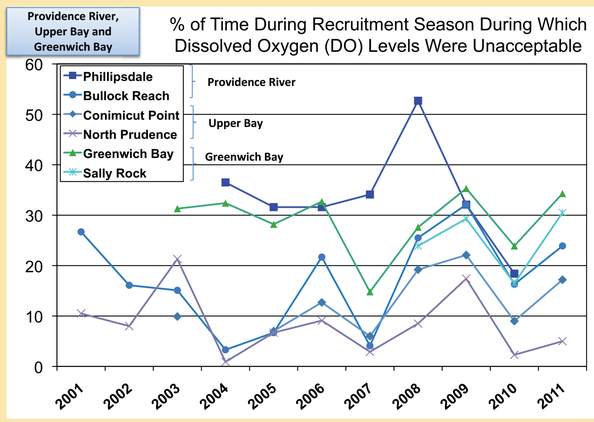
Water Quality Status of Narragansett Bay for Dissolved Oxygen (DO)

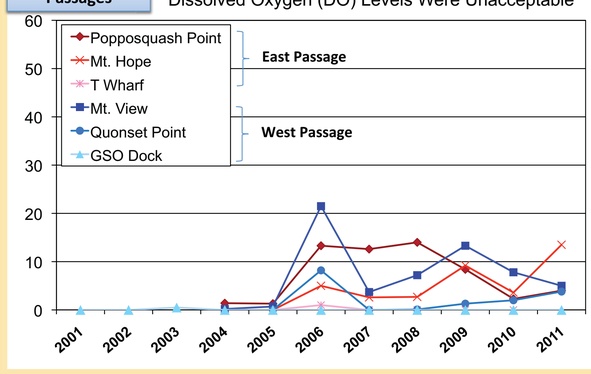
Providence River, Upper Bay and Greenwich Bay

% of Time During Recruitment Season During Which Dissolved Oxygen (DO) Levels Were Unacceptable



East and West Passages

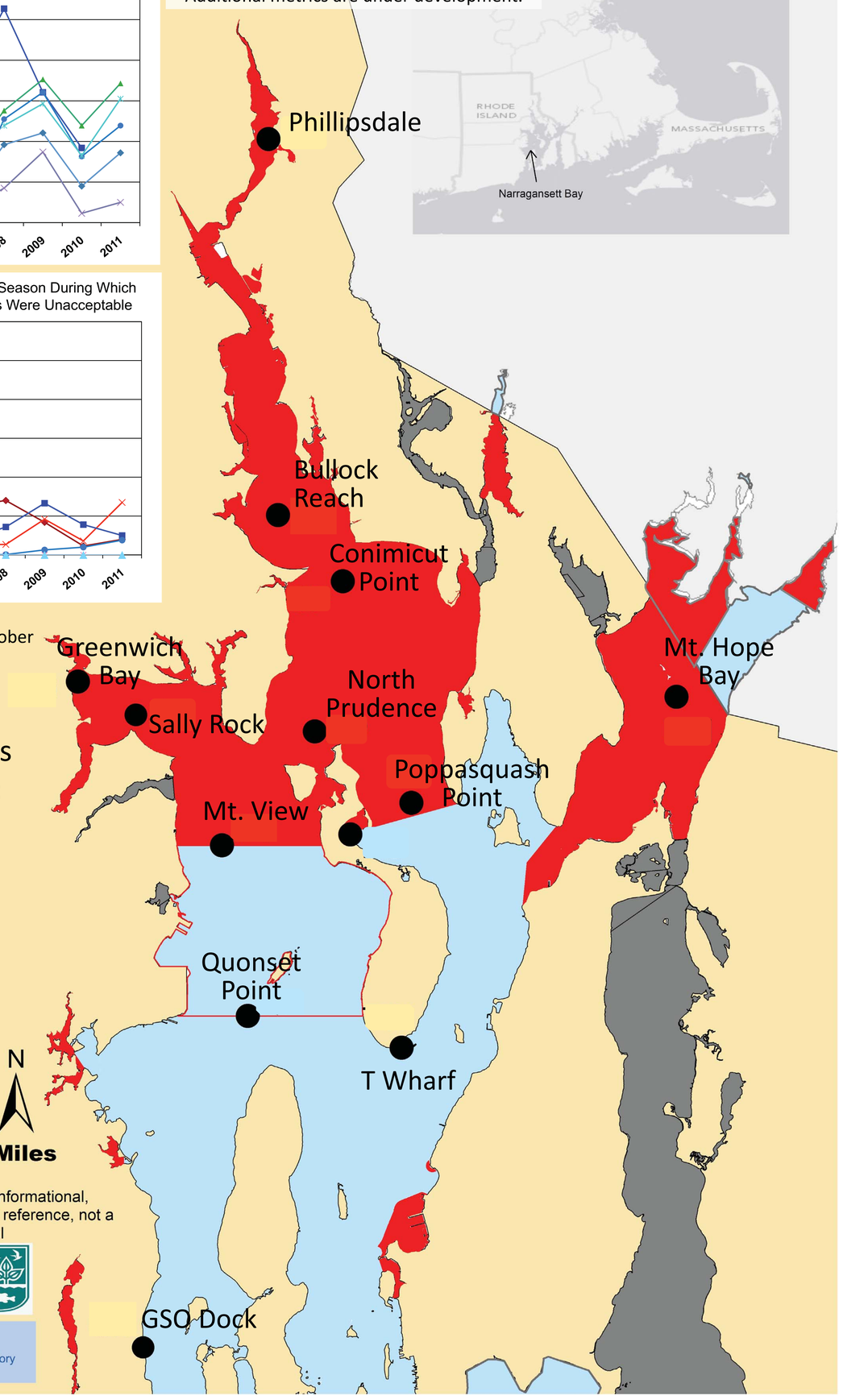
% of Time During Recruitment Season During Which Dissolved Oxygen (DO) Levels Were Unacceptable



Recruitment Season = May through October

Low dissolved oxygen is localized and episodic

Dissolved oxygen is just one of many valuable metrics of marine water quality. Additional metrics are under development.



Note:
This map was created by MERL for RIDEM for informational, planning, and guidance use only. It is a general reference, not a legally authoritative source for location of natural or manmade features.

RIGIS

University of Rhode Island
Graduate School of Oceanography
Marine Ecosystems Research Laboratory

Narragansett Bay is 148.6 square miles
(140 square miles in RI)

Impaired Waters for DO
42.1 square miles in RI
6.2 square miles in MA
23.6 square miles unassessed

Based on the 2010 RI DEM and MA DEP assessments

Hypoxia = low dissolved oxygen (daily average < 2.9 mg O_2/L)
Anoxia = no dissolved oxygen

The State of RI has DO criteria for Narragansett Bay designed to protect aquatic life.

Many factors affect the concentration of dissolved oxygen (DO) in the bay:

- Weather (rainfall, temperature, wind)
- Circulation patterns (tides and currents)
- River flows into the bay from the watershed
- Discharges that result in nutrient over-enrichment.

  Includes point discharges such as wastewater treatment facilities and non-point discharges such as stormwater runoff from across the watershed.

We can control these

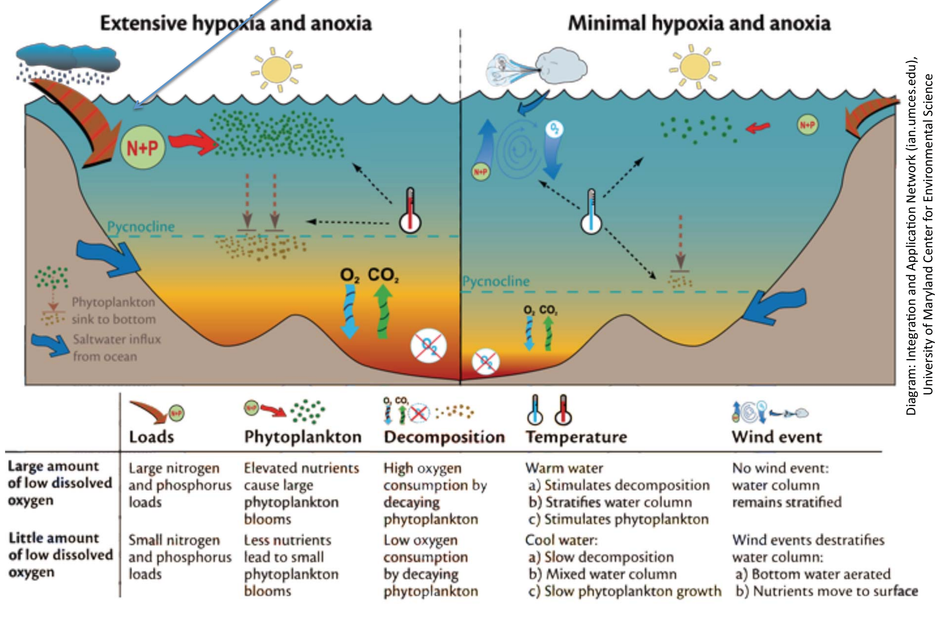
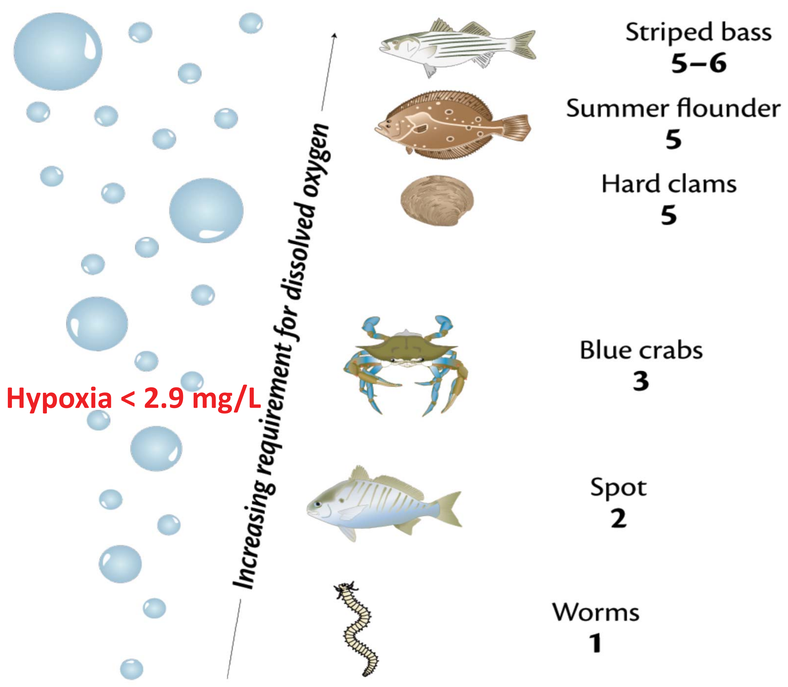


Diagram: Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science

Dissolved oxygen needs

Minimum amount of dissolved oxygen needed to survive (milligrams of dissolved oxygen per liter of water [mg L^{-1}])



Different organisms require different levels of dissolved oxygen in the water to survive. Dissolved oxygen is a useful indicator of water quality.
Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: Dennison, W.C., J.E. Thomas, C.J. Cain, T.J.B. Carruthers, M.R. Hall, R.V. Jesian, C.E. Wazniak, and D.E. Wilson. 2009. *Shifting Sands: Environmental and cultural change in Maryland's Coastal Bays*. IAN Press, University of Maryland Center for Enviromental Science.

Improved stormwater management and the adoption of low-impact development approaches throughout the watershed will protect rivers and lakes, as well as contribute to improved water quality in the bay.

Wastewater discharges are the largest source of nutrients to the upper Bay region. We are making progress toward the RI goal of reducing by 50% the pollutant loadings of nitrogen to the upper Bay.

11 RI wastewater treatment facilities (WWTFs) have committed to nutrient reductions, and 6 MA facilities are also working on reductions, reflecting the need for bi-state collaboration to address water quality issues in Narragansett Bay. Nutrient loadings are decreasing as WWTFs continue to upgrade to remove nutrients.

It's important to continue monitoring to track changes in the bay.

Watershed Counts Logos: BrianJonesDesign.com

Freshwater Quality

Rivers and Streams

NARRAGANSETT BAY WATERSHED COUNTS

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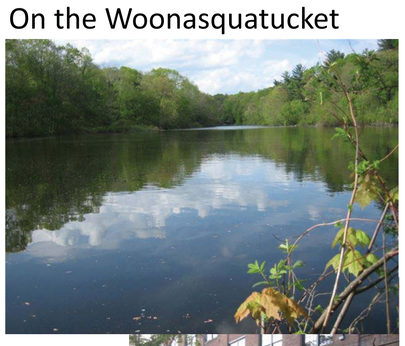
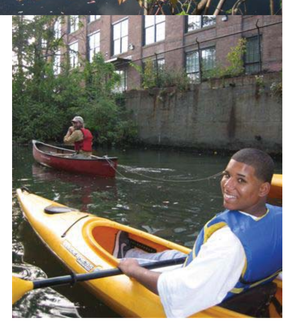
Watershed Counts focused on water quality in rivers and streams in four watersheds for 2012 In the future, Watershed Counts will include the full Narragansett Bay watershed, as well as lakes and ponds.

On the Blackstone

Photos: The Blackstone River Coalition

On the Woonasquatucket

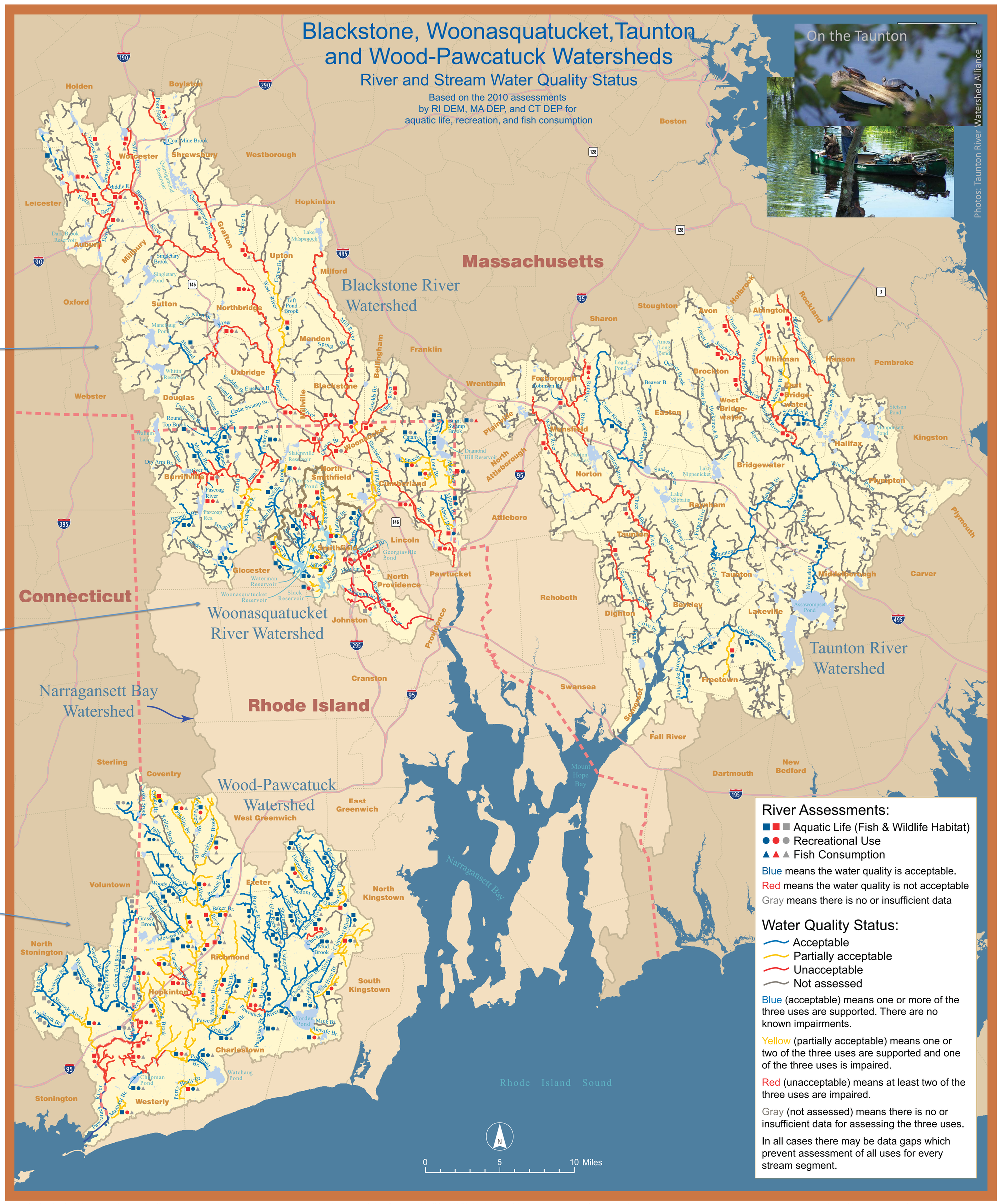




Photos: Woonasquatucket River Watershed Council

On the Wood-Pawcatuck

Photos: Wood-Pawcatuck Watershed Association

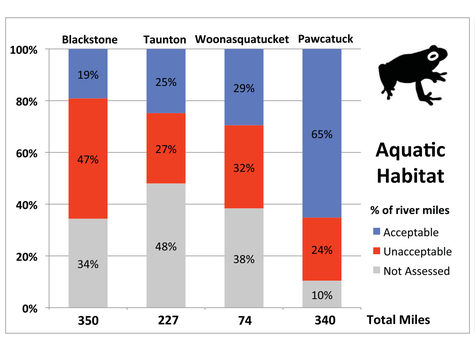


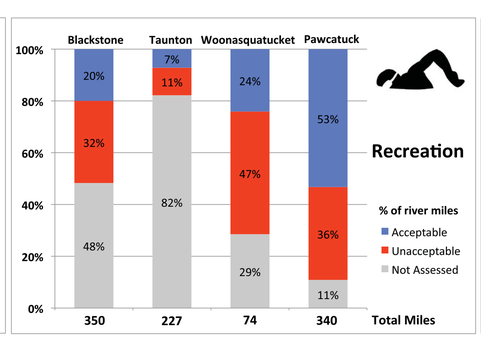
Data: Rhode Island 2010 Integrated Water Quality Monitoring and Assessment Report, MassDEP 2010 Integrated List of Waters (305(b)/303(d)), 2010 State of Connecticut Integrated Water Quality Report .

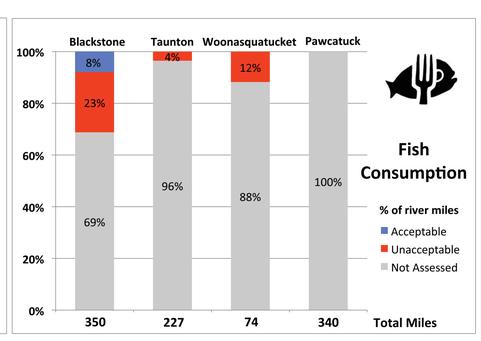
Map produced by Bruce Hooke and Terry Meyer

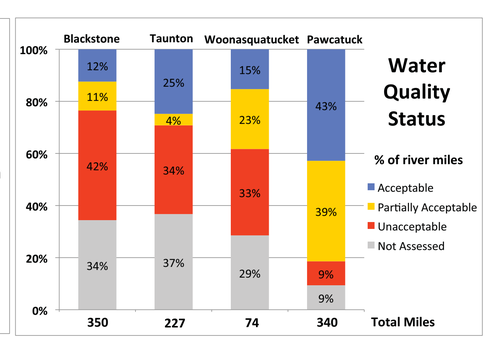
In general, water quality is best in upper, headwater regions of the watersheds. The health of major rivers is strongly affected by the health of streams that feed into them. Development pressures can be high in the very areas where high quality tributary streams flow.

In addition to controlling wastewater and other direct dischargers, protection of headwater streams requires maintaining undeveloped buffer land adjacent to streams and wetlands to filter runoff from roads and lawns, placing road crossings and culverts so stream flow and movement of fish and other river animals is not restricted, and managing stormwater to minimize impacts.









Watershed Counts Logos: BrianJonesDesign.com

Freshwater Invasive Species

Managing to live together

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Does not occur, but could:
zebra mussel
Chinese mitten crab
hydrilla
European frog-bit

Limited distribution:
Asiatic clam
water hyacinth
parrot feather
Eurasion water nymph
rusty crayfish
American water lotus

Somewhat widely distributed:
water chestnut
European carp

Widely distributed:
fanwort
purple loosestrife
variable milfoil
phragmites

Of the 133 lakes inspected in RI to date, 80 were infested with one or more aquatic invasive plants.

Efforts must be made to prevent the spread of aquatic invsives to unaffected lakes and rivers.

Rapid response saves money.

Without early detection, invasives can become firmly established.

Photo: RI Dept. of Env. Management
Water chestnut in Chapman Pond

Photo: RI Dept. of Env. Management
Fanwort in Hundred Acre Pond

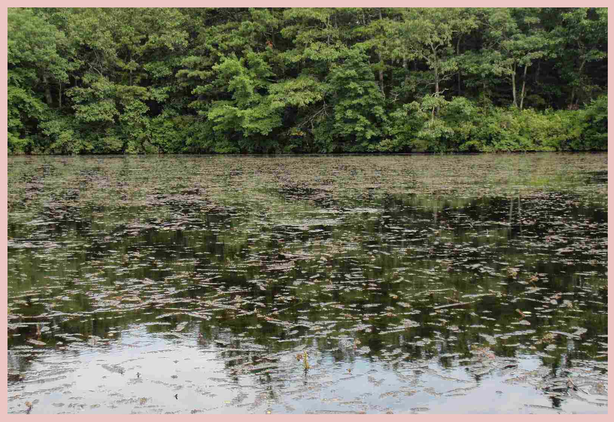


Photo: RI Dept. of Env. Management
Variable milfoil in Wyoming Pond

Management

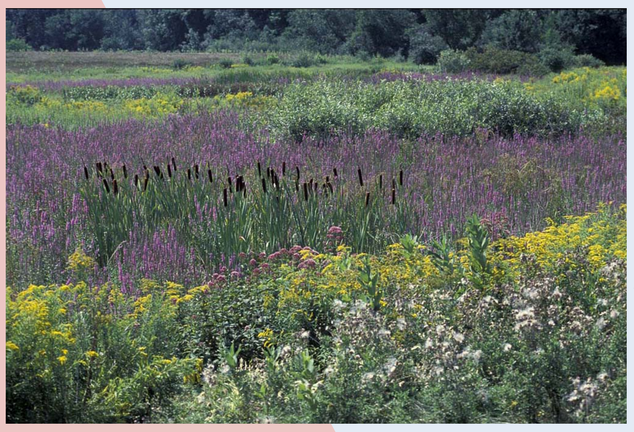
Volunteers pull water chestnut out of Chapman Pond, Westerly

Photo: RI Natural History Survey

Why are aquatic invasive plants a problem?

They degrade habitat, create dense mats that interfere with boating and swimming, and can cause property values to decline.

Photo: ME Volunteer Lake Monitoring Program
Dog swimming in parrot feather


Dan L. Perlman/EcoLibrary.org
Purple Loosestrife, Massachusetts

Impact

Management takes many forms, depending on the location and species.

Invasives are here. Management will help us live with them.

Once invasives become firmly established, management is often expensive.

Data from: RI DEM, 2012, Rhode Island Freshwater Lakes and Ponds: Aquatic Invasive Plants and Water Quality Concerns
http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/pdfs/lakes012.pdf

Sustained monitoring = Proactive management

Watershed Counts Logos: BrianJonesDesign.com

Natural Resource Economics

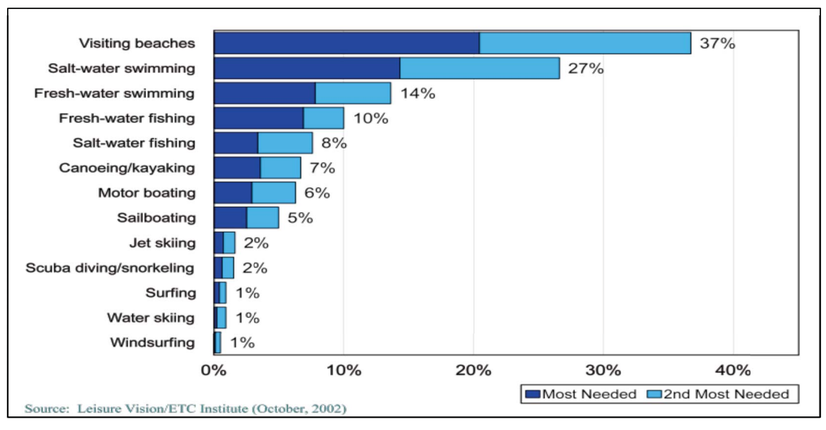
www.watershedcounts.org

Beach closed? Money washed away…

Scarborough Beach, RI

Photo: RI Dept. of Environmental Management

- There are over 20 million "beach visits" in Rhode Island per year.[1]
- The total social value of these beach days is estimated at over $155 million per year. This is the how much the beach is worth to people beyond what they actually pay. [2]
- 37% of individuals surveyed rated visiting beaches as the 1st or 2nd most needed water-based activity in RI.[3]

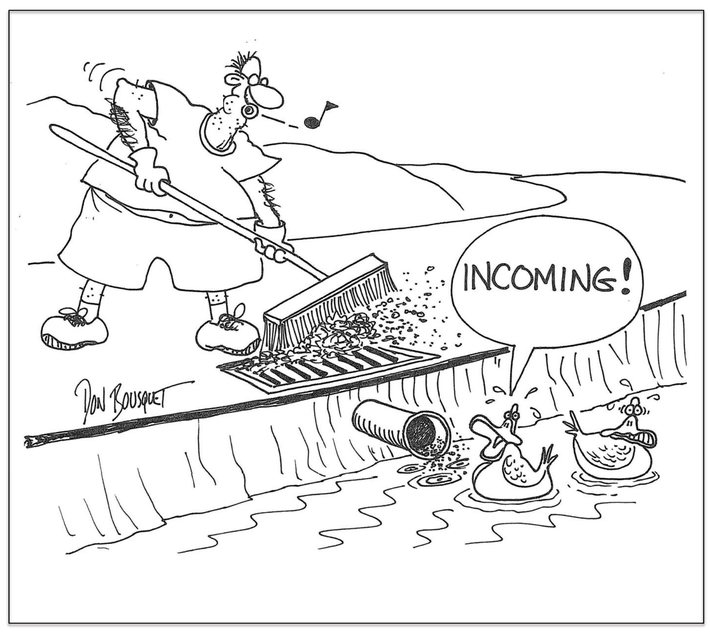


Water-based activities that are needed most in Rhode Island. By percentage of individuals in households who will have the next birthday (two choices could be made).

Healthy Watershed = Healthy Bay = Healthy Economy

Photo: Town of North Kingstown, RI

Photo: Save The Bay



Rhode Island Stormwater Solutions

Investments in stormwater infrastructure and public education help to protect and improve beach water quality

Conimicut Point Beach, RI

Photo: RIPhoto.com

Oakland Beach and Conimicut Point Beach are among those beaches that have frequent closures. Around 14,000 people use these beaches each summer, far below maximum capacity (5-25%), and therefore many more people, particularly in the urban area, might enjoy these beaches if water quality improves.

Narragansett Beach, RI

Photo: South County Office of Tourism

Data sources:

[1] Average estimate from RIDEM Outdoor Recreation Demand Citizen Survey, Conducted by Leisure Vision, Aug-Oct., 2002 and National Survey of Recreation and Environment 2000 (From: http://coastalsocioeconomics.noaa.gov/core/nsre/nsre2000.html#marine, preliminary estimates from versions 1-6: coastal recreation participation, and 2001 participation in marine rec nsre_2).

[2] This refers to the "consumer surplus" or net "willingness to pay" value for a beach day – what a person would be willing to give up beyond what they actually pay for that day at the beach. Sources: Peconic Estuary recreation survey, conducted summer of 1995, at Peconic Estuary LI beaches, using travel cost (revealed preference) method and Kline and Swallow, 1998, based on CV survey (stated preference method) conducted in summer 1995 at Gooseberry Island, near Horseneck Beach, MA (beach with no facilities or services).

[3]Source: RIDEM Outdoor Recreation Demand Citizen Survey, Conducted by Leisure Vision, Aug-Oct., 2002.

Watershed Counts Logos: BrianJonesDesign.com