A scenic view of a lake at sunset. The sun is low on the horizon, casting a warm glow over the water. Several sailboats are visible on the lake, and a pier extends into the water. The sky is a mix of blue and orange.

A Strategic Water Quality Plan Colchester, Vermont:

Incorporating Wastewater, Stormwater, Land Use, and Recreational Use of Receiving Waters

NEIWPC 15th Annual Nonpoint Source Pollution
Conference

May 27, 2004

Carl Etnier, Stone Environmental, Inc.

Overview

- Background
- Strategic Water Quality Plan process
- Organization of plan
- Criteria used
- Recommendations of plan
- Audience choice: Details of resource vulnerability assessment process OR longer general Q&A



SAND BAR STATE PARK

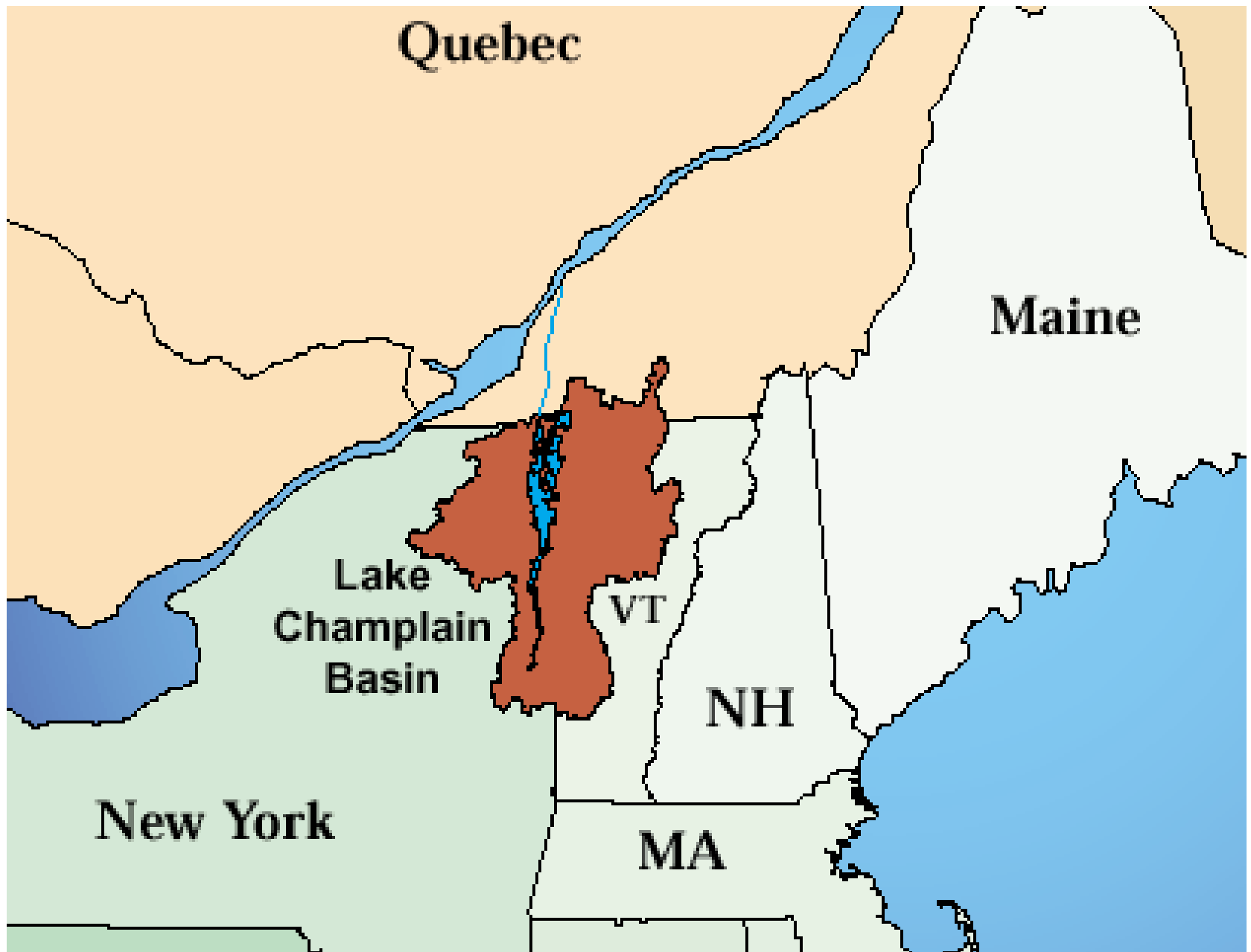
SAND BAR WATERFOWL MGMT AREA

MALLETTS BAY STATE PARK

MALLETTS BAY

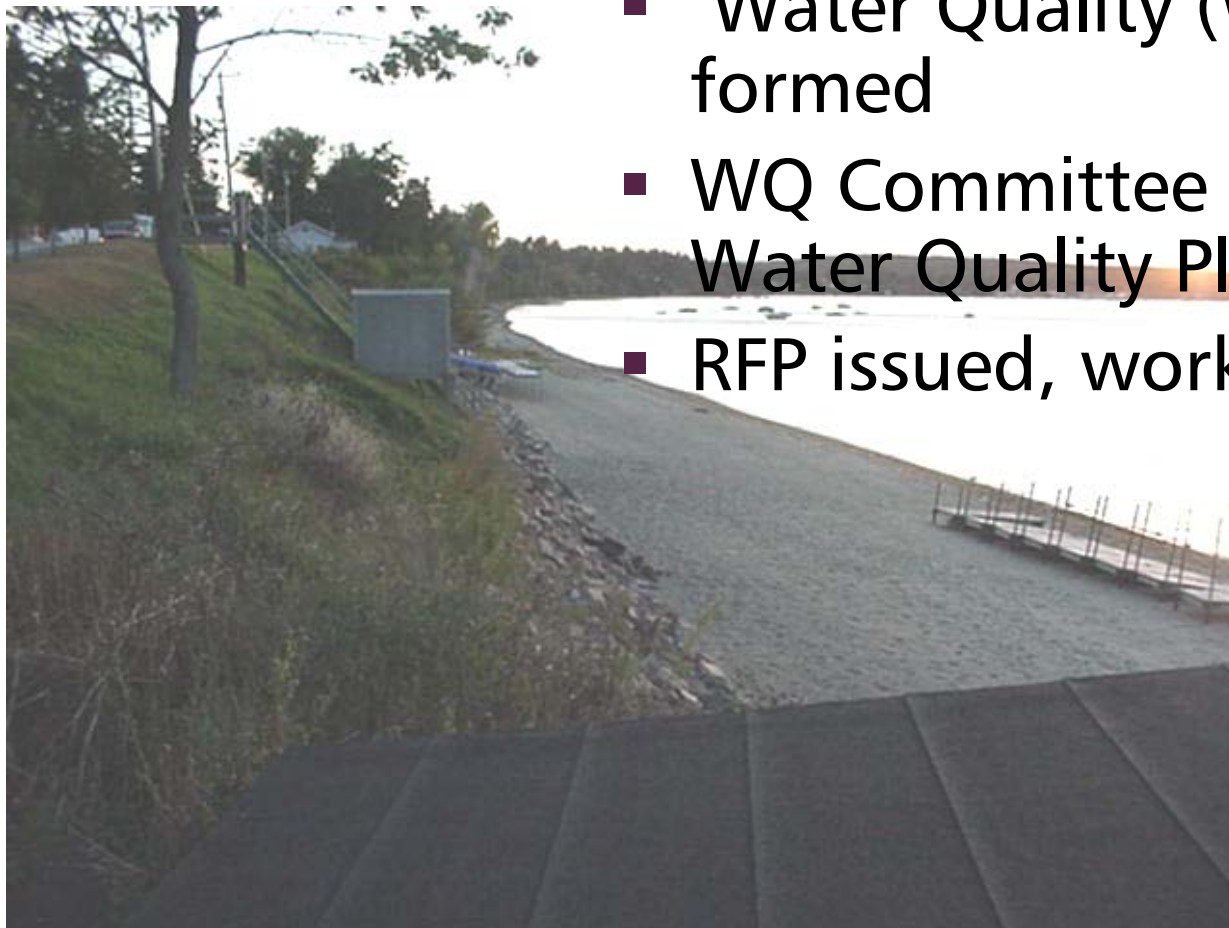
Burlington

CAMP JOHNSON NAT AREA



Origins of the SWQP

- Sewer Bond Vote 1999
- Water Quality (WQ) Committee formed
- WQ Committee proposed Strategic Water Quality Plan 2000
- RFP issued, work begun 2001



Team members

- Department of Public Works
- Water Quality Committee
- Consultant team
 - Stone Environmental
 - Forcier Aldrich & Associates
 - David Spitz
 - Green Mountain Institute



Process

- Meetings with WQ Committee, Town staff, Town boards
- Literature review
- Public input
- Development of alternatives
- Development of criteria
- Multicriteria assessment
- Resource vulnerability assessment
- Draft detailed outline, get feedback
- Draft final report, get feedback
- Final report



Organization of the Plan

- Abstract
- Executive Summary
- Introduction
- State of Water Quality in Colchester
- Overview of Planning Process
- Goals for the SWQP
- Actions Prioritized by Category
 - Wastewater
 - Stormwater
 - Land Use
 - Recreational Use of Receiving Water
- Roles and Responsibilities
- Time Frame
- Indicators
- SWQP as Living Document



State Colchester's water quality

- Outer Malletts Bay



SAND BAR STATE PARK

SAND BAR WATERFOWL MGMT AREA

Lamelle

Walnut Ledge

MALLETT'S BAY STATE PARK

Red Rock Point

Malletts Bay

Coates Island

MALLETT'S BAY

Malletts Bay

Burlington

CAMP JOHNSON

LAKE INDEPENDENCE BOUNDARY

Allen Point

Robinson Point

LAKE

L

Mills Point

Porter Point

Landing Field

Bamsey Point

Five Islands

Sunderland

Brook

River

CAMP JOHNSON NAT AREA

13

24

INDIAN BROOK

Cochester

Break

Pond

Colch Pond

West View

West Milton

Village

Corn Camp

Cobbles Hill

Colch Pond

Outer Malletts Bay water quality

- Nutrients
 - P levels lower than target (9.8 vs. 10 ppb)
 - P loads higher than target
 - Developed land increasing
- Toxins
 - Mercury: Fish consumption advisory
 - Sediment arsenic, manganese, nickel
 - PCBs in fish

Outer Malletts Bay water quality (cont)

- Invasive species
 - Sea lamprey
 - Zebra mussel
 - Eurasian milfoil



Outer Malletts Bay water quality (cont)

- Other: Esocid lymphosarcoma



Inner Malletts Bay water quality

- Similar to outer Malletts Bay
- Pathogens monitored, some hot spots
- DNA ribotyping tested

Sample site	1991	1992	1993	1994	1995	1998	1999	2000	Avg. %
The Moorings Stream	30	31	35	42	92	19	27	31	38
Smith Hollow Stream	11	23	75	88	71	69	96	68	69
60 Lakeshore Dr. Stream	na	25	15	5	32	25	23	21	21
28 Lakeshore Dr. Stream	11	46	25	10	39	50	23	55	32
Crooked Creek	60	23	65	64	52	38	100	90	61

Percentage of summer sample dates on which fecal coliform and/or E. coli densities exceeded Vermont state safety limits for recreational waters, for selected sampling spots in inner Malletts Bay. Source: (Gabos 2000)

Inner Malletts Bay water quality (cont)

- Bayside Beach of prime concern



Inland water quality

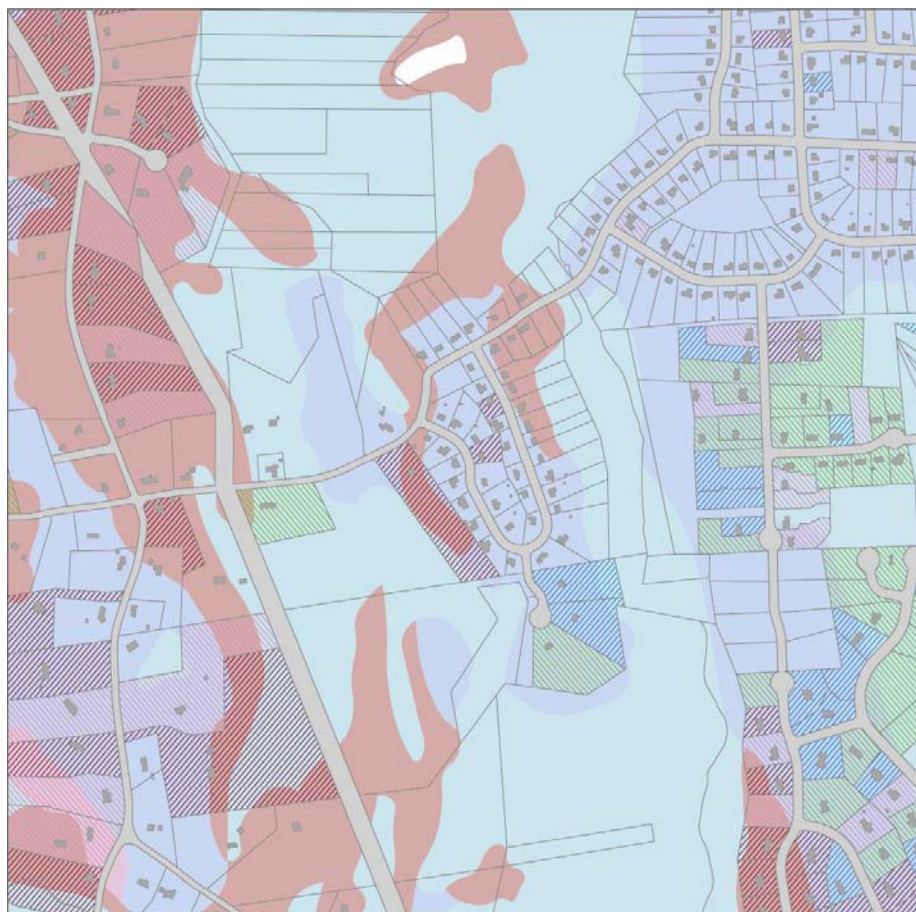
- Phosphorus carried largely by rivers
- A number of impaired streams
- Colchester Pond eutrophic, “threatened” by Eurasian milfoil

Criteria for ranking alternatives

- Cost
- Promotes economic vitality
- Fairness to property owners
- Fosters stewardship/participation
- Improves water quality
- Preserves water quality

Top recommendations

- Wastewater
 - Needs assessment for onsite wastewater treatment systems



Top recommendations (cont)

- Wastewater (cont)
 - Townwide onsite wastewater management program

City Of Malibu IWIMS

Systems

Components

Parcels

Structures

Home

Accounts

Search...

Add Data...

Reports

[System ID: 205695] [Parcel ID: 4452010027]

[MALIBU COLONY RD]

Install Date	<input type="text" value="00/00/1900"/>	City Approval Date	<input type="text" value="08/20/1985"/>
System Type	<input type="text" value="Residential/Conventional"/>	Discharge Type	<input type="text" value="Single Family Residential"/>
As-Built On File	<input type="text" value="Yes"/>	Source Of Design Flow	<input type="text"/>
Design Flow	<input type="text"/>	Design Bedrooms	<input type="text"/>
Percolation Rate	<input type="text" value="32.000"/>	Percolation Category	<input type="text"/>
Garbage Disposal	<input type="text" value="Yes"/>	Industrial Waste Receptor	<input type="text"/>
Separation to Ground Water (feet)	<input type="text"/>	Low Elev Pt of Discharge	<input type="text"/>
Comments	<input type="text"/>		

Update System

Settling/Conveyance

Select component category

Component Type

Parcel ID

Septic Tank

4452010027

Drainfield/Leachfield

4452010027

Drainfield/Leachfield

4452010027

Top recommendations (cont)

- Wastewater (cont)
 - Special wastewater management attention to Lakeshore Drive area



Top recommendations (cont)

- Wastewater (cont)
 - Special wastewater management attention to Lakeshore Drive area
 - Buildout analysis
 - How much can onsite & cluster systems handle?
 - Revisit and update sewer alternatives
 - Draft zoning rules to minimize induced growth from sewers
 - Decide between decentralized and sewer

Top recommendations (cont)

- Stormwater
 - Implement structural best management practices from Stormwater Management Plan, e.g.,
 - Catch basins with interceptors
 - Ditch maintenance
 - Detention chambers
 - Grass swales
 - Bioretention systems
 - Street and parking lot cleaning
 - Roof disconnect and swales

Top recommendations (cont)

- Stormwater (cont.)
 - Upgrade stormwater outfalls
 - Complete inventory of existing private stormwater systems, prioritizing impaired watersheds and those draining to Malletts Bay

Top recommendations (cont)

- Land use
 - Upgrade review standard for new development
 - Zoning standards: Uses, density, dimensional standards
 - Site plan/subdivision standards

Top recommendations (cont)

- Land use (cont)
 - Protect lands with high impact on water quality, esp. stream setbacks
 - Work with upstream communities

Top recommendations (cont)

- Recreational use of receiving water
 - Public education to prevent further spread of aquatic nuisance species

Summary

- Key goals
 - Clean beaches
 - Less phosphorus
 - Clean up Sunderland Brook
 - No increase in invasive species
 - Edible fish
 - Less sediment

Summary (cont)

- Key actions
 - Manage/maintain onsite septic systems town-wide
 - Fix stormwater systems
 - Maintain stormwater infrastructure
 - Match regulations to water quality goals
 - Create a program to keep aquatic nuisance species out

What next?

- Questions?
- More details on “resource vulnerability assessment”?

Process

- Meetings with WQ Committee, Town staff, Town boards
- Literature review
- Public input
- Development of alternatives
- Development of criteria
- Multicriteria assessment
- **Resource vulnerability assessment**
- Draft detailed outline, get feedback
- Draft final report, get feedback
- Final report



<http://www.town.colchester.vt.us/water>





Examples of alternatives

<i>Recommendation 1: Develop a knowledge base of the potential and actual failures of wastewater treatment systems</i>	
Number in report	Code
1.1) The Town performs a field-based, lot-by-lot wastewater treatment needs assessment.	W1.1
1.2) The Town performs a wastewater treatment needs assessment using planning-level data (e.g., Natural Resources Conservation Service soils data, assessor's data) with limited field verification.	W1.2
1.4) The Town performs an initial study of the older sewers to estimate the amount of sewer which needs inspection by TV camera and how many building inspections are necessary.	W1.4
1.5) The Town performs a full assessment of the state of the older sewers and designs measures to fix them where necessary.	W1.5

Origin in Hoover's "Risk Assessment"

Ranking of Environmental and Water Resource Areas

Vulnerability to pollution ↓	Drinking Water		Surface Water						
	Public Well Zone 1	Head Protection Areas Zone 2	Down-town district	Lagoon Pond Watershed	Lake Tashmoo Watershed	Inner Harbor	Mink Meadows	Cranberry Acres/Smith Brook	Outer Harbor
High (Control zone)	NDP*	ML1	ML3	ML5	ML5*	ML7	ML7	ML7	ML7
Moderate	NDP*	ML2	ML4	ML6	ML6*	ML8	ML8	ML8	ML8
Considerations Affecting Management Level	DEP requires no development	Citizens expressed need for long-term protection	Area to be served by large cluster system	Physical and modeled indications of nutrient impairment. Productive shellfishery.	Physical signs of impairment from human activities. Shellfishery. Recreational use.	Some indication of beach impairment. Older houses. Recreational use. Well flushed.	Area adjacent to beach with high GW. Marshes not used publicly. Little surrounding residential development.	No indications of impairment. Privately controlled.	Area adjacent to beach with high GW. Generally good soils. Well flushed harbor.

Notes: *NDP - No development permitted

ML - Management Level (see appropriate section of the Community Wastewater Management Plan)

If 50% of a parcel lies in a control zone, it will be subject to that level of management. This designation may change if the initial inspection reveals (or the owner proves) that the disposal area is in an adjoining lower vulnerability control zone.

* Tentative levels pending completion of nitrogen limit work by Martha's Vineyard Commission

GW = Groundwater

Why Hoover's method was difficult to use in Colchester

- Many types of threat to water quality
- Many types of action considered

Our method

- “Endpoints of interest” instead of “water resources”
- A different sort of table

How the table was used

- Consultants filled in individually
- Consultants met and achieved consensus
- “Votes” were compiled to recommendations
- Recommendations modified after input from Town
- Plan drafted which addressed any mutually exclusive recommendations

Comparison of Hoover's and our method

Hoover	Etnier-Jones-Romond
One threat type	Multiple threat types
Focus on water resources	Focus on endpoints of interest for water resources
One type of action	Many types of action
Area specific	Action specific

Conclusions

This method of resource vulnerability assessment in integrated water management:

- Systematizes prioritization of widely different alternatives
- Respects community values
- Promotes interdisciplinary discussion
- Relies on professional judgement
- Can be reported transparently
- Is a *basis* for discussion and decisions

<http://www.town.colchester.vt.us/water>

