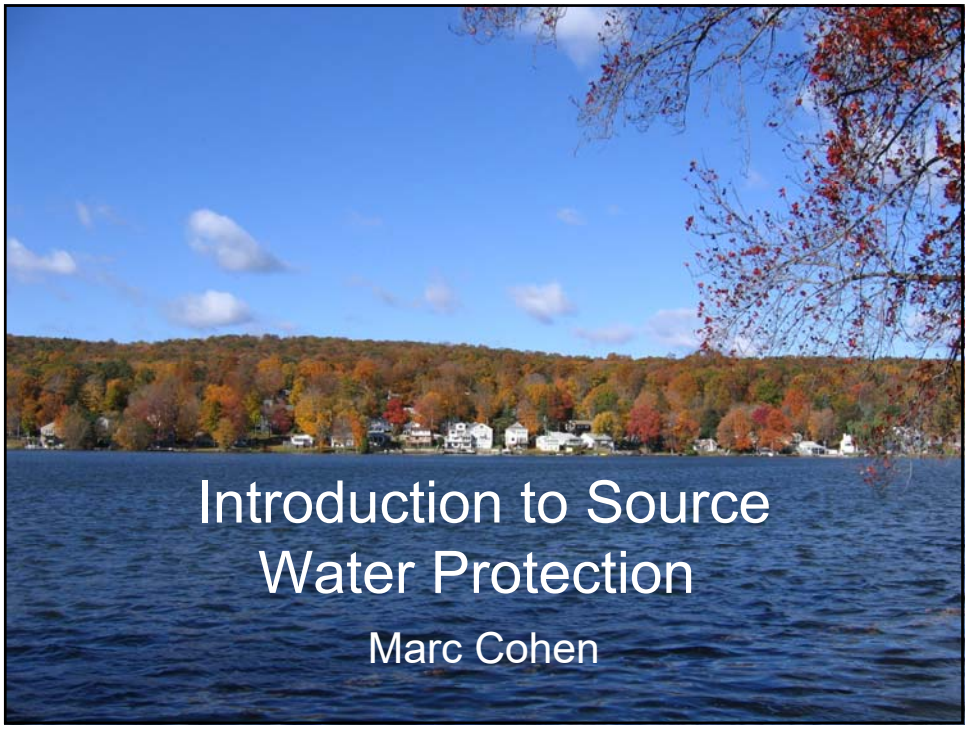


Introduction to Source Water Protection

Marc Cohen

Outline

- Political Overview
- Connecticut Geologic History
- Surface and Groundwater Hydrology
- Protecting Surface Water Sources
- Protecting Groundwater Sources
- Protecting Future Sources
- Case Studies
- Discussion

Why Source Water Protection

- Protects public health
- Reduces treatment costs
- Protects natural resources
- Positive economic impact

Why Source Water Protection

- Safe Drinking Water Act, SWP focus with 1996 Reauthorization
- Source Water Assessments
- Total Coliform Rule
- Watershed inspection

Why Source Water Protection

- Zoning must protect existing and future drinking water supplies.
- IW&W: Direct connection between gravel aquifers and many inland wetlands and watercourses.
- Conservation Commission: Tasked with mapping resources and recommending protection measures to other town commissions.

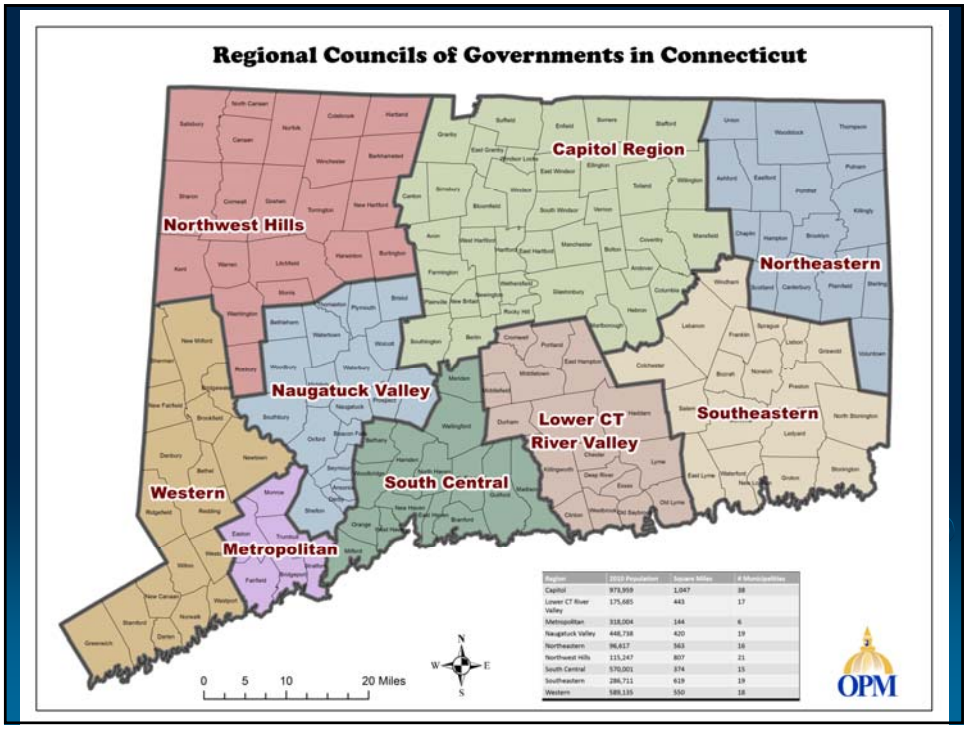
Challenges to Source Water Protection in Connecticut

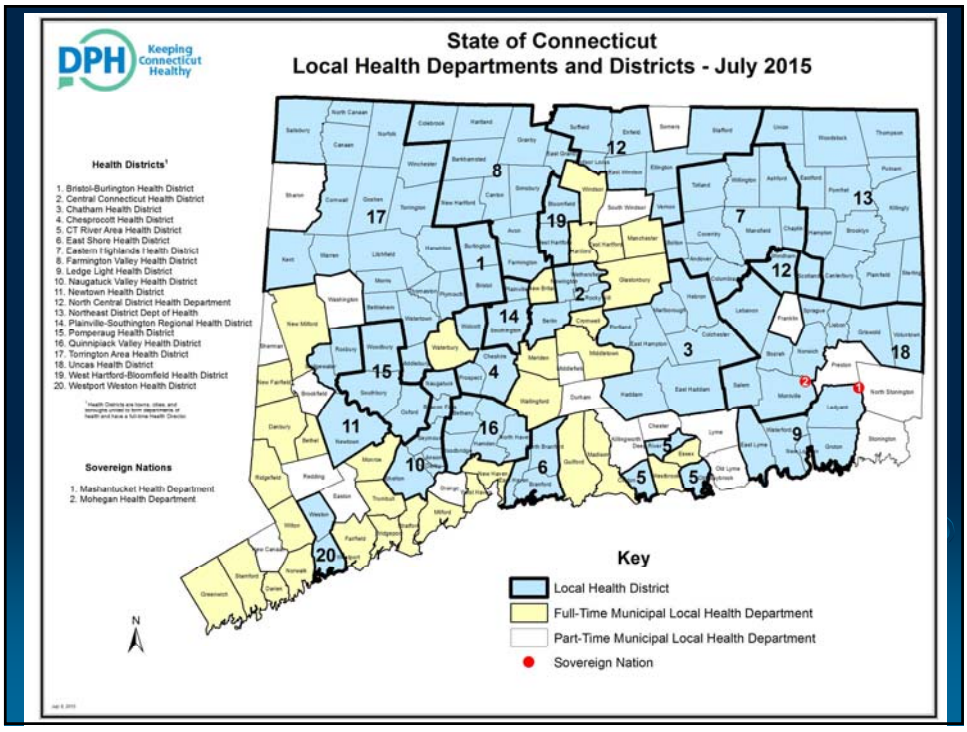
How political, geological and hydrological factors make a state with 45 inches of rainfall a year thirsty for more!

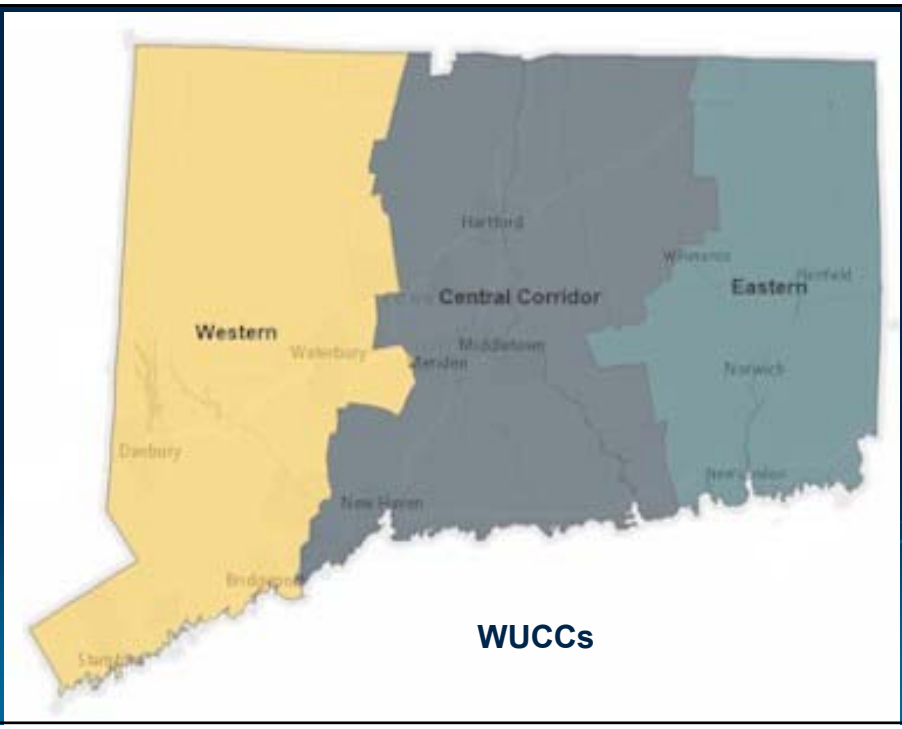
Political: The Nutmeg State

- 169 Towns with "Home Rule"
- No county government. Hodgepodge of:
  - Municipal and regional planning agencies,
  - Municipal and area health districts, and
  - Water Utility Coordinating Committees.
- DPH vs DEP vs 2,627 systems

- Department of Public Health
  - •SDWA Primacy
  - •Focus on Enforcement
- Department of Environmental Protection
  - •CWA Primacy
  - •Aquifer Protection Program (Pop >1000)
  - •SW & GW withdrawals > 50,000 GPD
- Public Water Systems


Regional Councils of Governments in Connecticut
Capitol Region
Northwest Hills
Northeastern
Naugatuck Valley
Lower CT River Valley
Southeastern
Western
South Central
Metropolitan
0 5 10 20 Miles
N
W
E
S
OPM

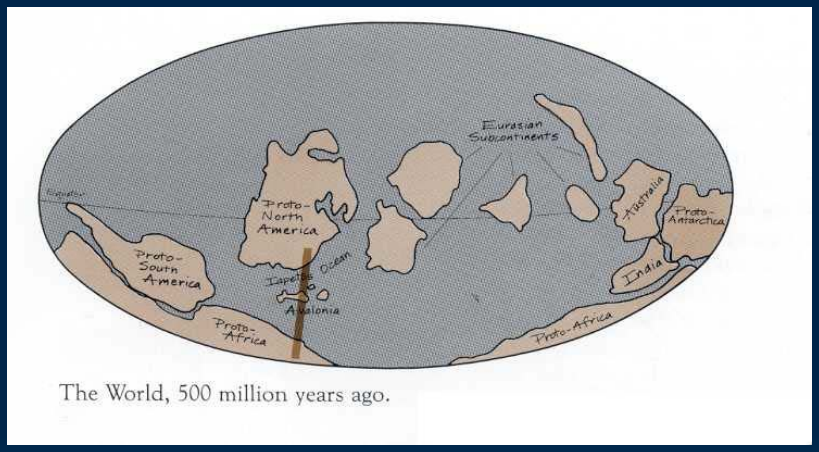

DPH Keeping Connecticut Healthy
State of Connecticut
Local Health Departments and Districts - July 2015
Health Districts¹
1. Bristol-Burlington Health District
2. Central Connecticut Health District
3. Chatham Health District
4. Chesprocott Health District
5. CT River Area Health District
6. East Shore Health District
7. Eastern Highlands Health District
8. Farmington Valley Health District
9. Ledge Light Health District
10. Naugatuck Valley Health District
11. Newtown Health District
12. North Central District Health Department
13. Northeast District Dept of Health
14. Plainville-Southington Regional Health District
15. Pomperaug Health District
16. Quinnipiack Valley Health District
17. Torrington Area Health District
18. Uncas Health District
19. West Hartford-Bloomfield Health District
20. Westport Weston Health District
¹ Health Districts are towns, cities, and boroughs united to form departments of health and have a full-time Health Director.
Sovereign Nations
1. Mashantucket Health Department
2. Mohegan Health Department
Key
Local Health District
Full-Time Municipal Local Health Department
Part-Time Municipal Local Health Department
Sovereign Nation
N

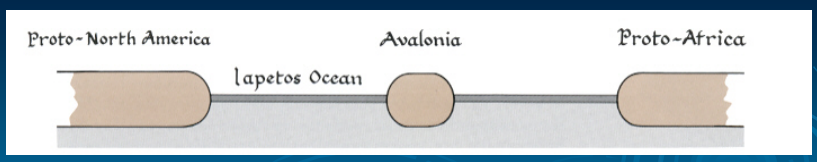


WUCCs

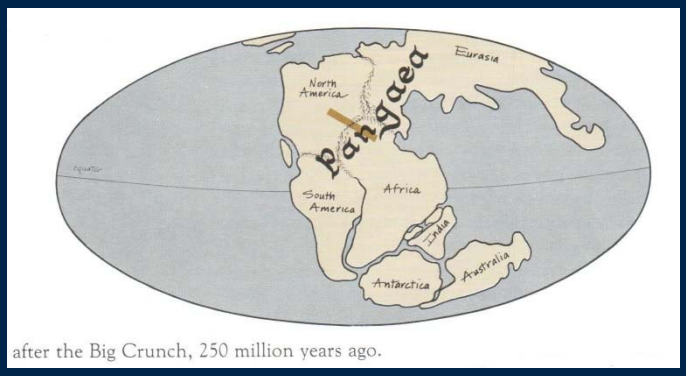
Geological: Ain't that gneiss?

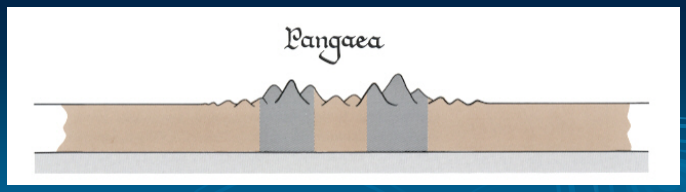
- Bedrock
- Glaciation
- Depth to Bedrock
- Lots of glacial till
- Little stratified drift





From "The Face of Connecticut" by Michael Bell © 1985





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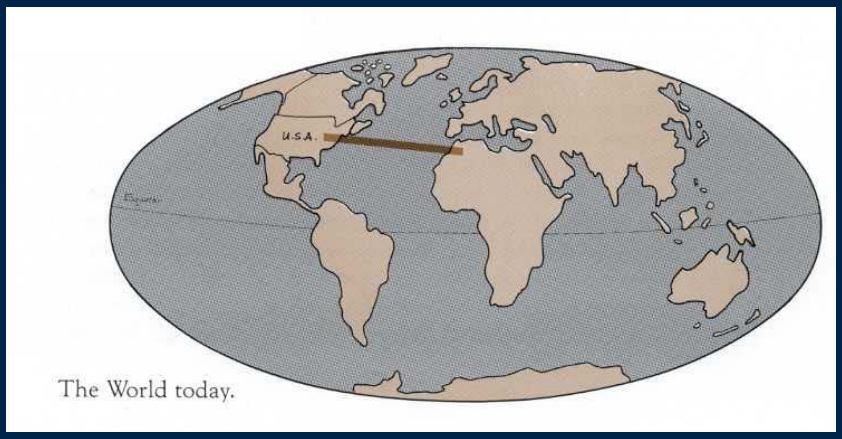

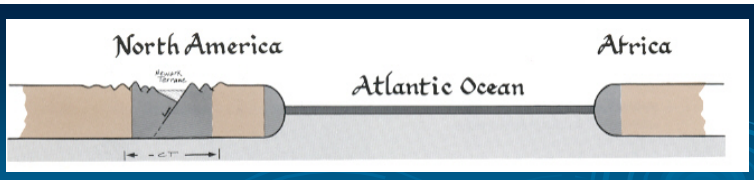

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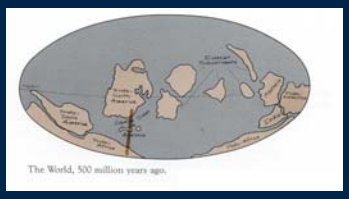

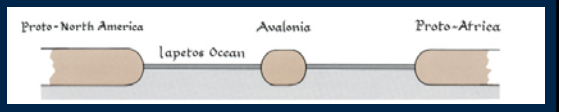

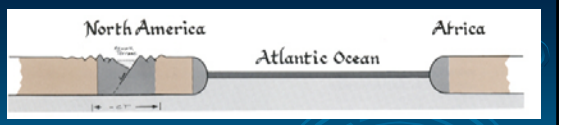

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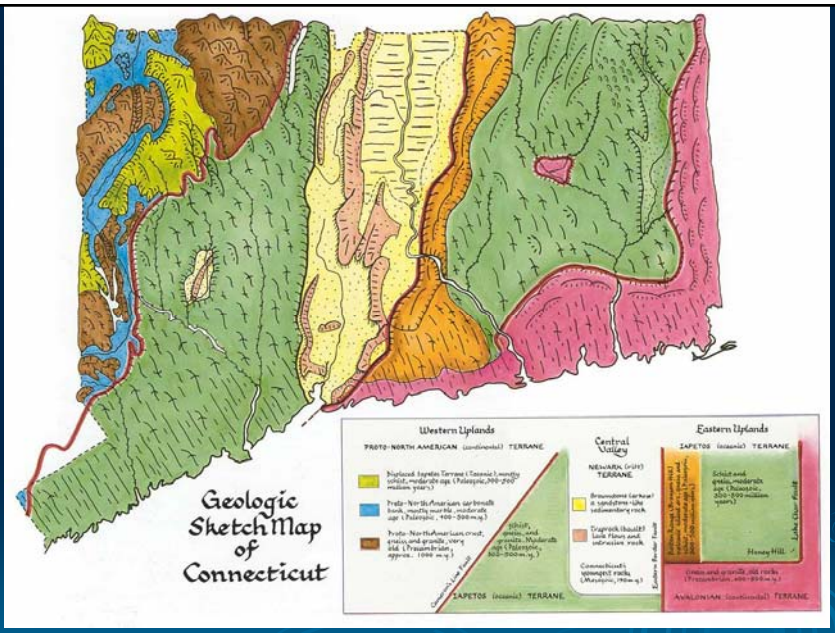
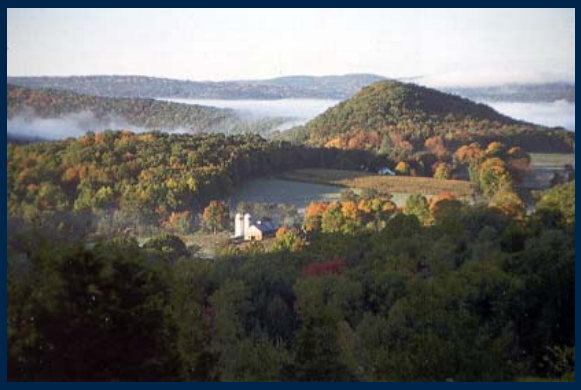
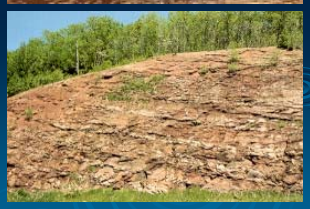


From “The Face of Connecticut” by Michael Bell © 1985



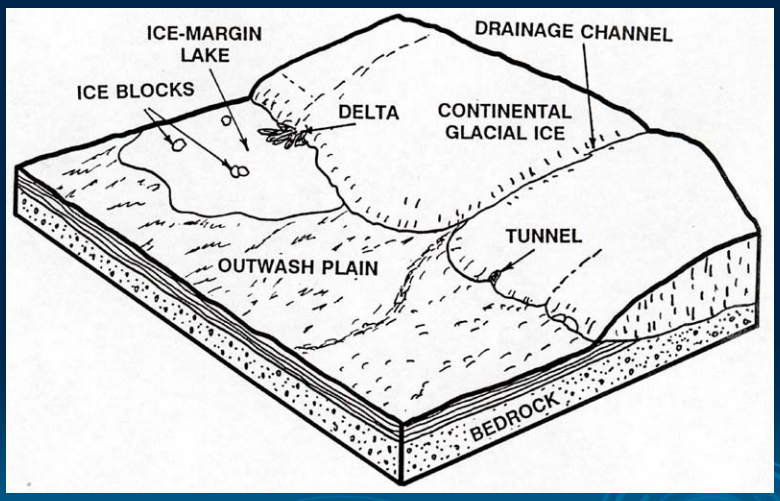
East and West Uplands

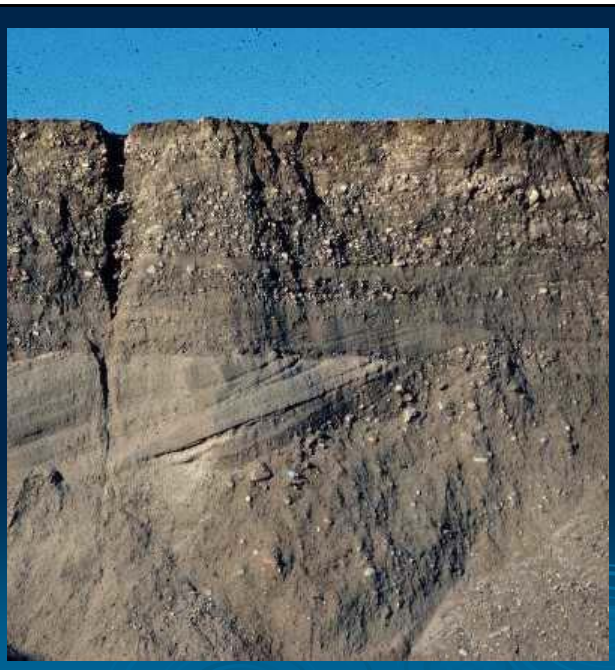
From “The Face of Connecticut” by Michael Bell © 1985

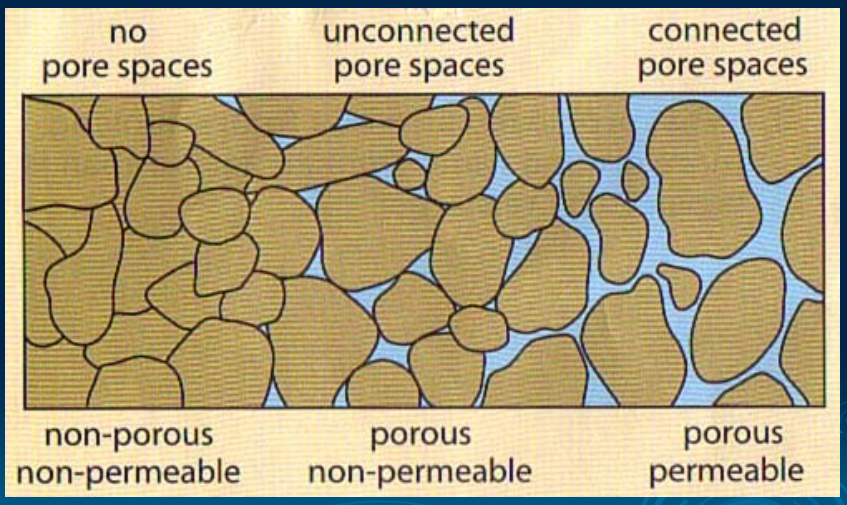


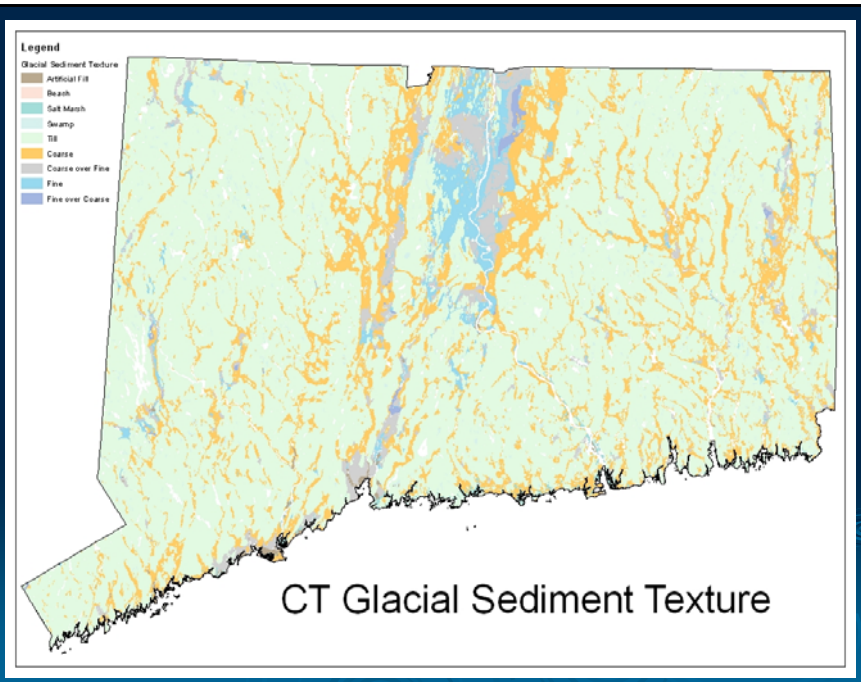
Central Valley

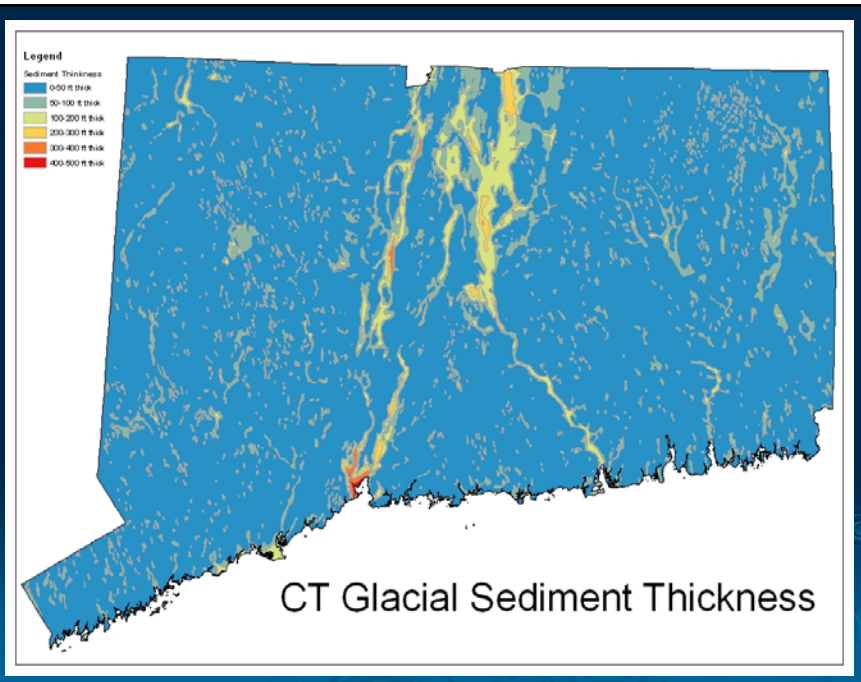
From “The Face of Connecticut” by Michael Bell © 1985

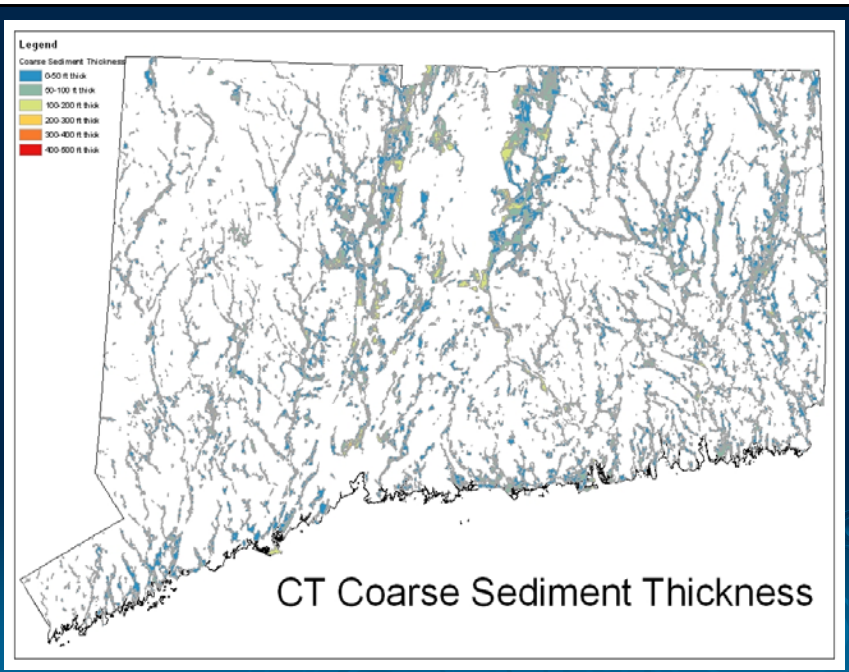

ICE-MARGIN LAKE
ICE BLOCKS
DELTA
DRAINAGE CHANNEL
CONTINENTAL GLACIAL ICE
TUNNEL
OUTWASH PLAIN
BEDROCK




no
pore spaces
unconnected
pore spaces
connected
pore spaces
non-porous
non-permeable
porous
non-permeable
porous
permeable


Legend
Glacial Sediment Texture
Artificial Fill
Beach
Salt Marsh
Swamp
Till
Coarse
Coarse over Fine
Fine
Fine over Coarse
CT Glacial Sediment Texture

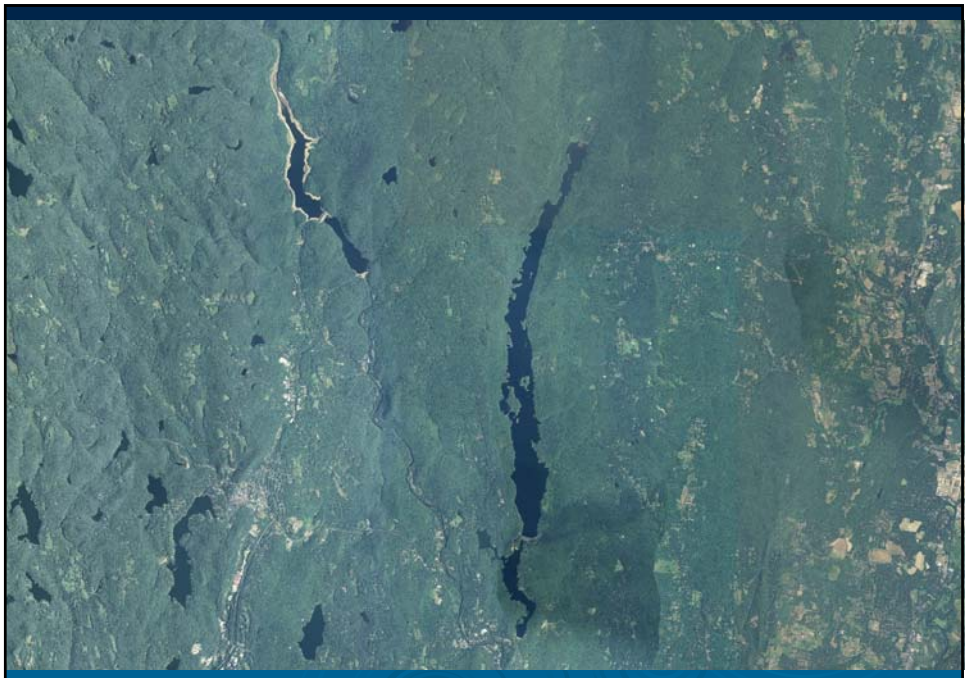

Legend
Sediment Thickness
0-50 ft thick
50-100 ft thick
100-200 ft thick
200-300 ft thick
300-400 ft thick
400-500 ft thick
CT Glacial Sediment Thickness

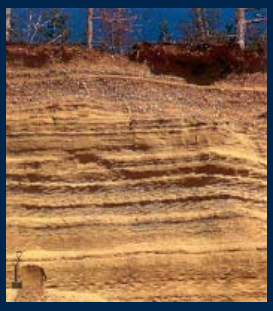


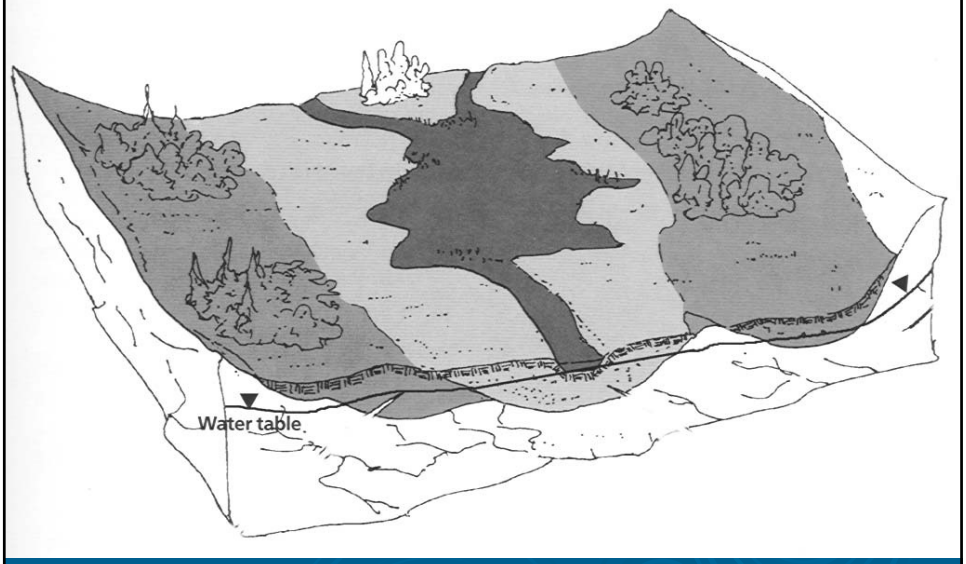
Hydrologic:

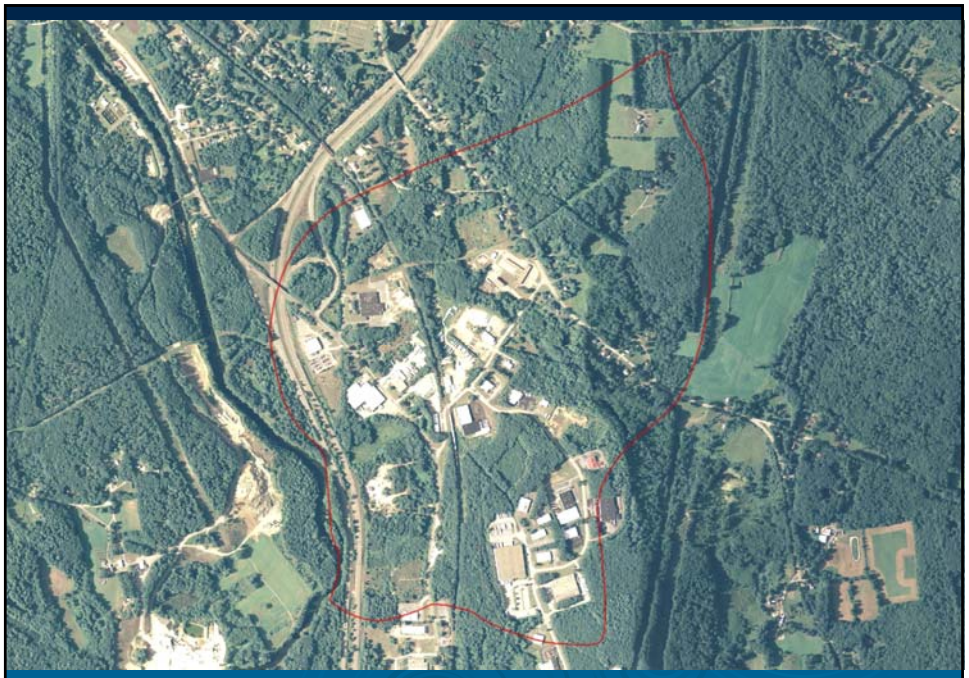
Water, water everywhere, Nor any drop to drink.

- Larger surface water systems
- Many small groundwater systems
- Bedrock well yields: uplands vs. central
- Stratified drift scarcity
- Threats: brownfields, development, etc.

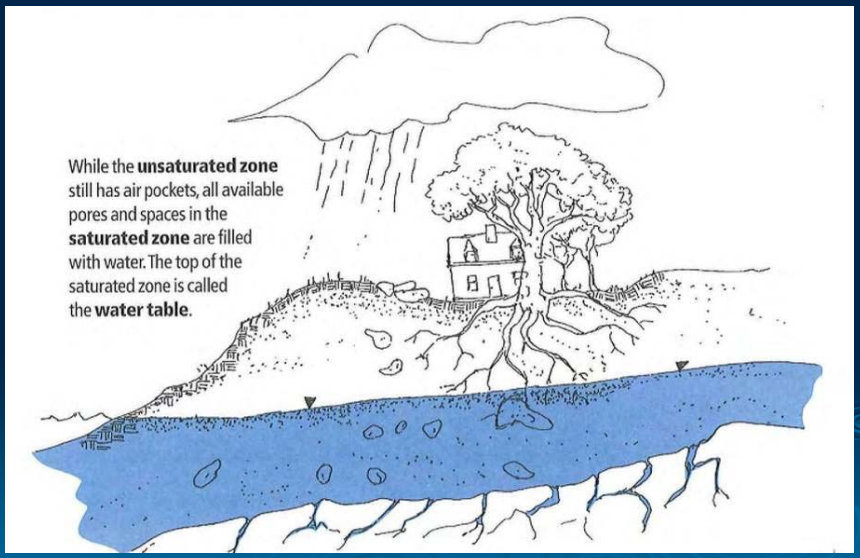





Water table

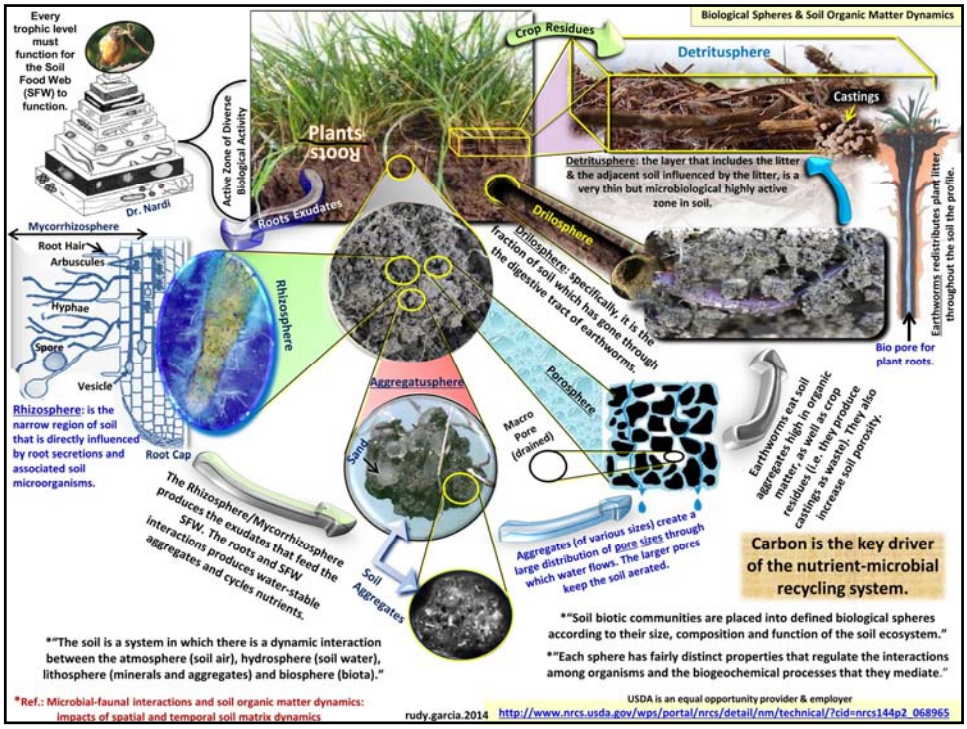


Infiltration



Permeability Measurements of Sampled Layers within 20 " of Soil Surface		
Site	Bulk Density (g/cm3)	Permeability (in/hr)
Woods	1.42	15
Pasture	1.47	9.9
Subdivision Lawn (1)	1.79	0.14
Garage Lawn	1.82	0.13
Cleared Woods	1.83	0.13
Subdivision Lawn (2)	2.03	0.03
Athletic field	1.95	0.01
Concrete	2.4	0.00

Soil Health



Protecting Surface Water Sources

- Watershed based
- Land Use
- Forest Management
- Agricultural BMPs
- Stormwater (MS4)
- Disinfectant By-products
- Cyanobacteria

Protecting Groundwater Sources

- Aquifer Protection Area Program
- Wellhead protection is often more about good siting, sanitary conditions near well.
- Well construction
- Runoff, ponding
- Storage of petroleum and other chemicals

Source Water Plan Process

- Every plan is different and the goal is have a plan that the water system or community will work to implement.
  - Source Water Protection Workshop
  - Assemble local team
  - Evaluate threats
  - Develop protection strategies
  - Prepare plan

The Local SWP Team

- Diverse group of stakeholders from town administrators and boards, water systems, businesses, industry and agriculture

Barkhamsted, Connecticut Source Water Protection Plan

The Goal

- Source Water Protection Plan that met the needs of Barkhamsted
  - PC&D tasked Conservation Commission with developing Potential Aquifer Protection Zone
  - ConComm wanted technical help and help with outreach

The Process

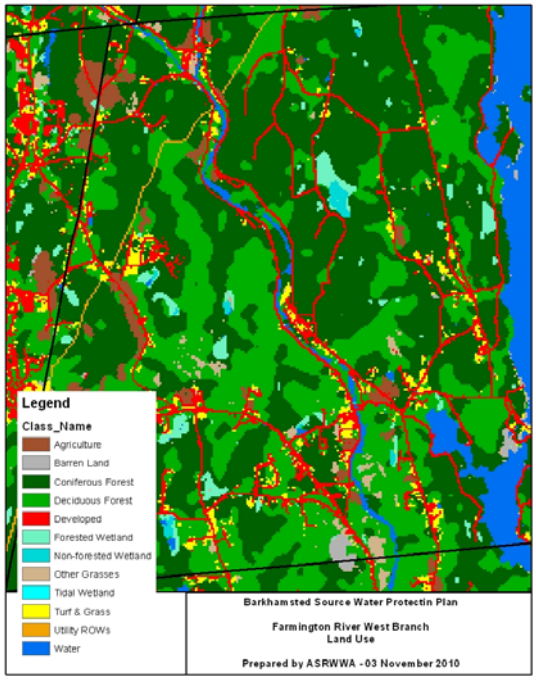
- Met with ConComm at several monthly meetings
- Discussed best approaches with DEP
- Reviewed existing town ordinances
- Helped merge Barkhamsted requirements into a model we knew would work.
- Will continue to assist process through adoption

Barkhamsted

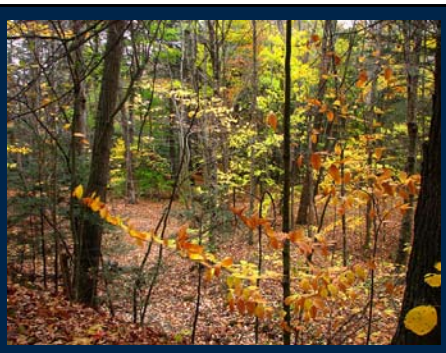
- Total area: 38.8 sq. mi.
  36.2 sq. mi. of land
- Low population density (2000 data)
  (3,494 people / 36.2 sq mi = 96.5)
- 7.3% developed, 79.5% forested
  (2006 data)

Barkhamsted

- Mix of rural and village
- Roughly half of land area protected as State Forest or MDC land
- 26 small public water supplies
- Motivated town administrators and boards




PEOPLES FOREST
MATTHIES GROVE
RECREATION
AREA
ENTRANCE

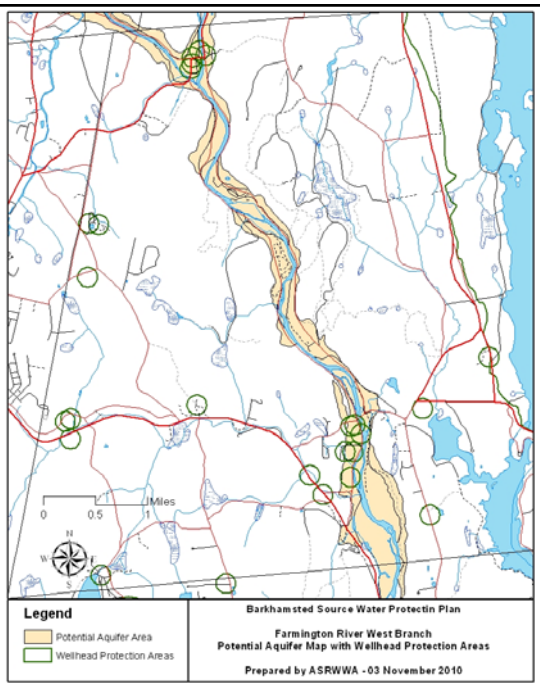


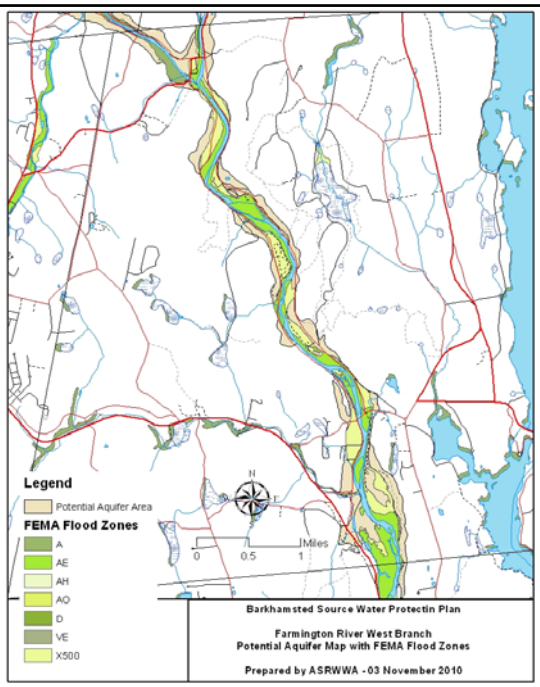

Farmington River
Wild & Scenic
Please Carry Out
What You Carry In
Trash Containers
Not Provided

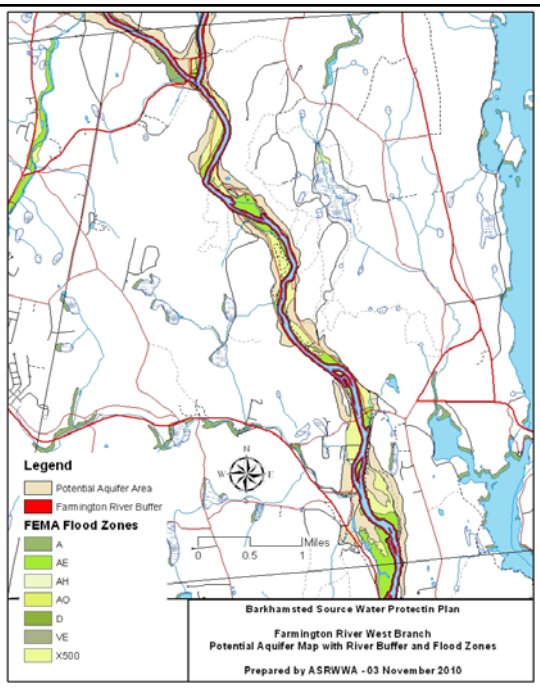

Riverton

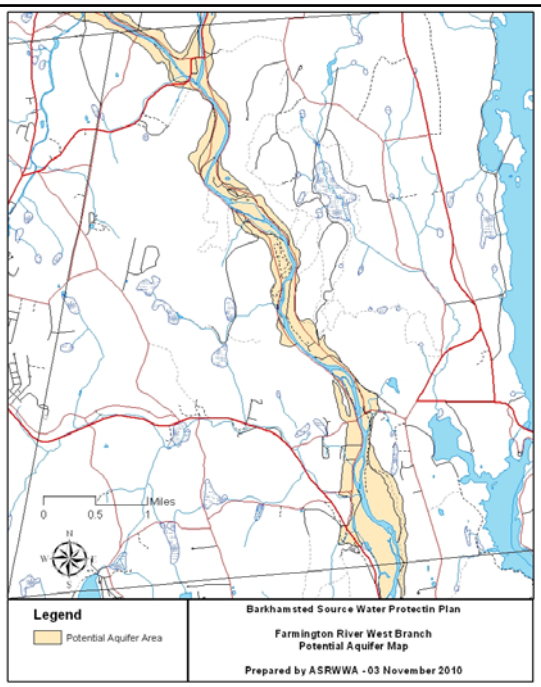
Barkhamsted Public Water Systems

PWSID	SYSTEM NAME	POP SERVED	SERVICE CONNS
	Community Water Systems		
CT0051011	FOXRIDGE APARTMENTS-WELL 1	25	10
CT0055071	FOXRIDGE APARTMENTS-WELL 2	25	10
CT0050011	ROCKTREE APARTMENTS	60	22
CT0051031	WALLENS HILL APARTMENTS	50	20
	Non Transient Non Community Systems		
CT0055043	BARKHAMSTED ELEMENTARY SCHOOL	360	1
CT0050082	LOMBARD FORD	35	1
CT0050122	MDC - SUPPLY DIVISION HEADQUARTERS	30	2
CT0050062	STERLING ENGINEERING CORP.	110	2
	Transient Non Community Systems		
CT0050014	AMERICAN LEGION SF / AUSTIN F. HAWES	42	7
CT0050024	BRASS HORSE CAFE	25	1
CT0050044	LOG HOUSE RESTAURANT INC.	25	1
CT0055013	MALLORY BROOK PLAZA - WELL #1	36	4
CT0055083	MALLORY BROOK PLAZA - WELL #2	33	8
CT0050234	MDC - LAKE MCDONOUGH - EAST BEACH	25	2
CT0050244	MDC - LAKE MCDONOUGH-PATROL HEADQUARTERS	25	1
CT0050064	OLD RIVERTON INN	25	1
CT0050104	PEOPLES S.F./MAIN PICNIC AREA	26	4
CT0050114	PLEASANT VALLEY DRIVE-IN	25	1
CT0050124	PLEASANT VALLEY GENERAL STORE	25	1
CT0050134	PLEASANT VALLEY UNITED METHODIST CHURCH	25	1
CT0050144	RIVERTON GENERAL STORE	25	1
CT0050184	SWEET PEAS RESTAURANT	25	1
CT0050164	THE CATNIP MOUSE TEAROOM	25	1
CT0050074	VILLAGE OF BOULDER RIDGE- WELL #1	25	5
CT0050254	VILLAGE OF BOULDER RIDGE- WELL #2	25	2
CT0050224	WHITE PINES CAMPSITES-WELL #1 & WELL #2	100	1




Legend
Potential Aquifer Area
FEMA Flood Zones
A
AE
AH
AO
D
VE
X500
N
W
E
0
0.5
1
Miles
Barkhamsted Source Water Protectin Plan
Farmington River West Branch
Potential Aquifer Map with FEMA Flood Zones
Prepared by ASRWWA - 03 November 2010


Legend
Potential Aquifer Area
Farmington River Buffer
FEMA Flood Zones
A
AE
AH
AO
D
VE
X500
N
W
E
0
0.5
1
Miles
Barkhamsted Source Water Protectin Plan
Farmington River West Branch
Potential Aquifer Map with River Buffer and Flood Zones
Prepared by ASRWWA - 03 November 2010



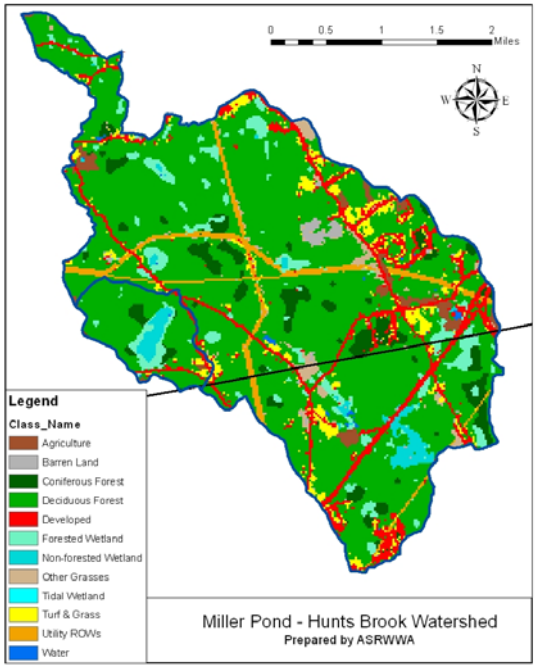
Miller Pond
Source Water Protection Plan

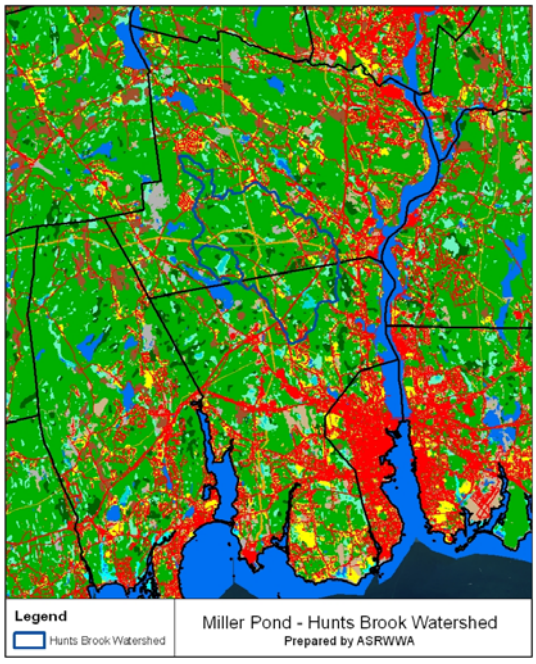
The Goal

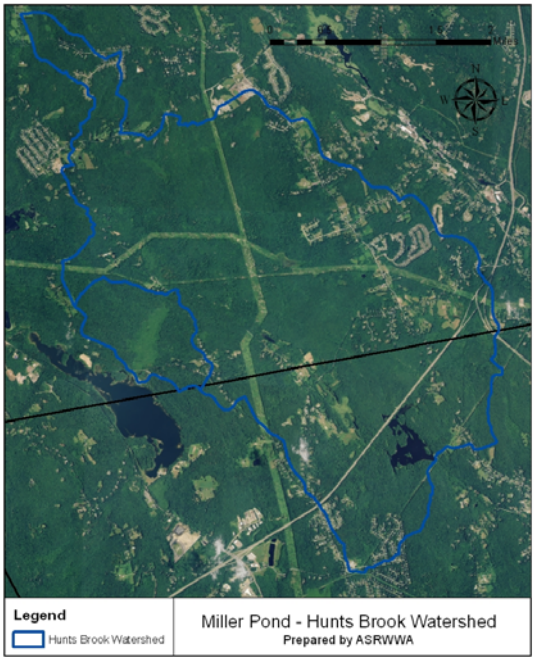
- Source Water Protection Plan that protects the watershed and is compatible with Montville and Waterford planning goals.
  - Source Water Protection Workshop
  - Assemble local team
  - Evaluate threats
  - Develop protection strategies
  - Prepare plan

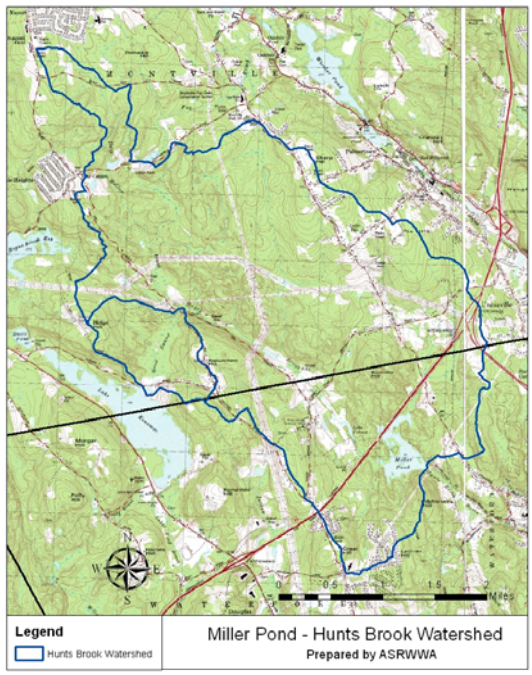
Hunts Brook Watershed

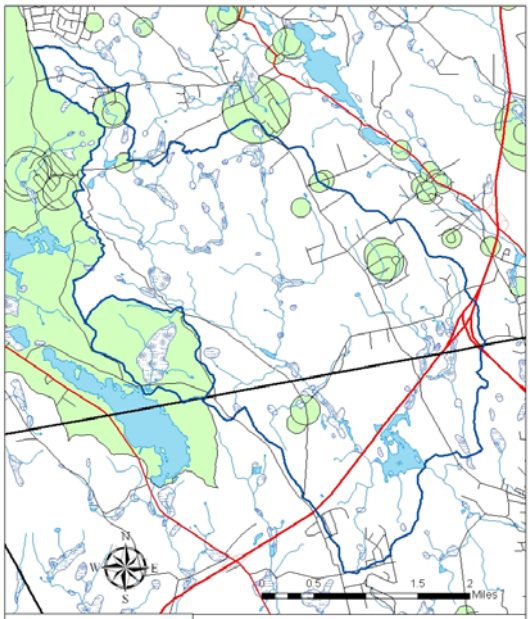
- 10.35 square miles (6,625 acres) above Miller Pond outlet.
- Very rural
- 9% developed, 77% forested
  Entire watershed: 11% developed
  Montville: 15%, Waterford: 21%
- Adjacent to Konomoc watershed
- Some small public water supplies


0 0.5 1 1.5 2
Miles
N
W
E
S
Legend
Class_Name
Agriculture
Barren Land
Coniferous Forest
Deciduous Forest
Developed
Forested Wetland
Non-forested Wetland
Other Grasses
Tidal Wetland
Turf & Grass
Utility ROWs
Water
Miller Pond - Hunts Brook Watershed
Prepared by ASRWWA


Legend
Hunts Brook Watershed
Miller Pond - Hunts Brook Watershed
Prepared by ASRWWA


Legend
Hunts Brook Watershed
Miller Pond - Hunts Brook Watershed
Prepared by ASRWWA


Legend
Hunts Brook Watershed
Miller Pond - Hunts Brook Watershed
Prepared by ASRWWA


N
W
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0
0.5
1
1.5
2
Miles
Legend
Source Water Protection Areas
Miller Pond - Hunts Brook Watershed
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WATERSHED
FISHING.
NO DUMPING.
SPEED LIMIT
25

Threats

- Storm water runoff
  - salt, sand, oil, gas from roadway
- Potential spills from trucking on I-395
- Current and future development
- Septic systems and household activities
  - phosphates, nitrates

Protection Strategies

- Treatment of runoff from I-395
- Spill Response Plan
- Septic system maintenance program
- Zoning overlays
- Preservation of undeveloped land
- Education and Outreach

How to Succeed

- Have the support of town government
- Tie to existing efforts
- Implement at the grass roots level
- Raise public awareness
- The work is ongoing

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