Plymouth Reservoir
Open Space

Plymouth, Connecticut

King's Mark
Environmental Review Team Report

King's Mark Resource Conservation & Development Area, Inc.

Plymouth Reservoir Property
Plymouth, Connecticut

Environmental Review Team Report

Prepared by the King's Mark Environmental Review Team

Of the
King's Mark
Resource Conservation & Development Area, Inc.

For the
Mayor
Plymouth, Connecticut

February 2014

Report #361

Acknowledgments

This report is an outgrowth of a request from the Plymouth Mayor to the Northwest Conservation District (NWCD) and the Environmental Review Team Subcommittee of the King's Mark RC&D Area and Eastern CT RC&D Area Councils for their consideration and approval. The request was approved and the measure reviewed by the King's Mark Environmental Review Team (ERT).

The King's Mark Environmental Review Team Coordinator, Elaine Sych, would like to thank and gratefully acknowledge the following Team members whose professionalism and expertise were invaluable to the completion of this report.

The field reviews took place on Thursday, June 6, 2013 and July 11, 2013.

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Jason Zheng	Assistant Transportation Planner Central CT Regional Planning Agency (860)

*The CTDEEP Inland Fisheries Division were contacted separate from the ERT and conducted their sampling on 5/8/13. Their report is included in the body of this ERT report.

I would also like to thank Theodore Scheidel, administrative assistant to the mayor, Anthony Lorenzetti, director of public works, John Wunsch and Marie MacDremid, reservoir ad-hoc committee, David Dudley, Town of Plymouth, Carleen Limmer, resident, and Francis Pickering and Amanda Ryan from the Central CT Regional Planning Agency, for their cooperation and assistance during this environmental review.

Prior to the review day, each Team member received a summary of the proposed project with location and aerial photos. During the field review Team members received additional information. Some team members made additional site visits. Reports from each Team member were submitted to the ERT coordinator for compilation and editing into this final report.

This report represents the Team's findings. It is not meant to compete with private consultants by providing site plans or detailed solutions to development problems. The Team does not recommend what final action should be taken on a proposed project - all final decisions rest with the Town. This report identifies the existing resource base and evaluates its significance to the proposed use, and also suggests considerations that should be of concern to the town. The results of this Team action are oriented toward the development of better environmental quality and the long term economics of land use.

The Kings Mark RC&D Executive Council hopes you will find this report of value and assistance in developing trails and use guidelines for the management and preservation of the property.

If you require additional information please contact:

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Introduction

Introduction

The Town of Plymouth mayor has requested Environmental Review Team (ERT) assistance in providing an environmental review of the recently acquired Plymouth Reservoir Property.

The Town of Plymouth recently acquired the Plymouth Reservoir and surrounding property from the Connecticut Water Company. The site is located directly east of north Street in the northwestern portion of town, close to the Plymouth Center Elementary School and a mile from Plymouth High School. The entire property is 178 acres including the 39 acre reservoir. The reservoir has not been used as a public drinking water supply since 1986 and is a Class AA* waterbody, the highest classification. The town is interested in establishing trails on the parcel that would connect to the 800 acre U.S. Corps of Engineers Thomaston dam property to the northeast which offers a multitude of recreational opportunities and the Naugatuck River Greenway. The Plymouth Reservoir trails would be used for passive recreation only including hiking, mountain biking, skiing and horseback riding and the reservoir for non-motorized boating, fishing and possibly swimming. A Resource Management Plan by Jerry Milne and the North Street Reservoir Ad Hoc Committee report are included in the appendix.

**Designated uses: existing or proposed drinking water supply, fish and wildlife habitat, recreational use (may be restricted), agricultural and industrial supply. Discharges restricted to: discharges from public or private drinking water treatment systems, dredges and dewatering, emergency and clean water discharges.*

Objectives of the ERT Study

The town is requesting assistance in taking an inventory of the natural resources of this property which was purchased for open space preservation. The town is seeking information on routing and design suitability for trails with a goal of protecting water quality. Besides linking to existing and future trail systems the town plans on developing parking and scenic/picnic areas. Their first steps in determining what types of recreation, education and passive uses are appropriate is to have a better understanding of the basic components of this site. Guidelines for its preservation and management will aid the town in being good stewards of the property and it is hoped that development of outdoor recreation opportunities for area residents as well visitors, will assist in sustainable economic development.

The ERT Process

Through the efforts of the Plymouth Mayor and the North Street Reservoir Ad Hoc Committee this environmental review and report was prepared for the Town of Plymouth.

This report provides an information base and a series of recommendations and guidelines which cover some of the issues of concern to the town. Team members were able to review maps, plans and supporting documentation provided by the town.

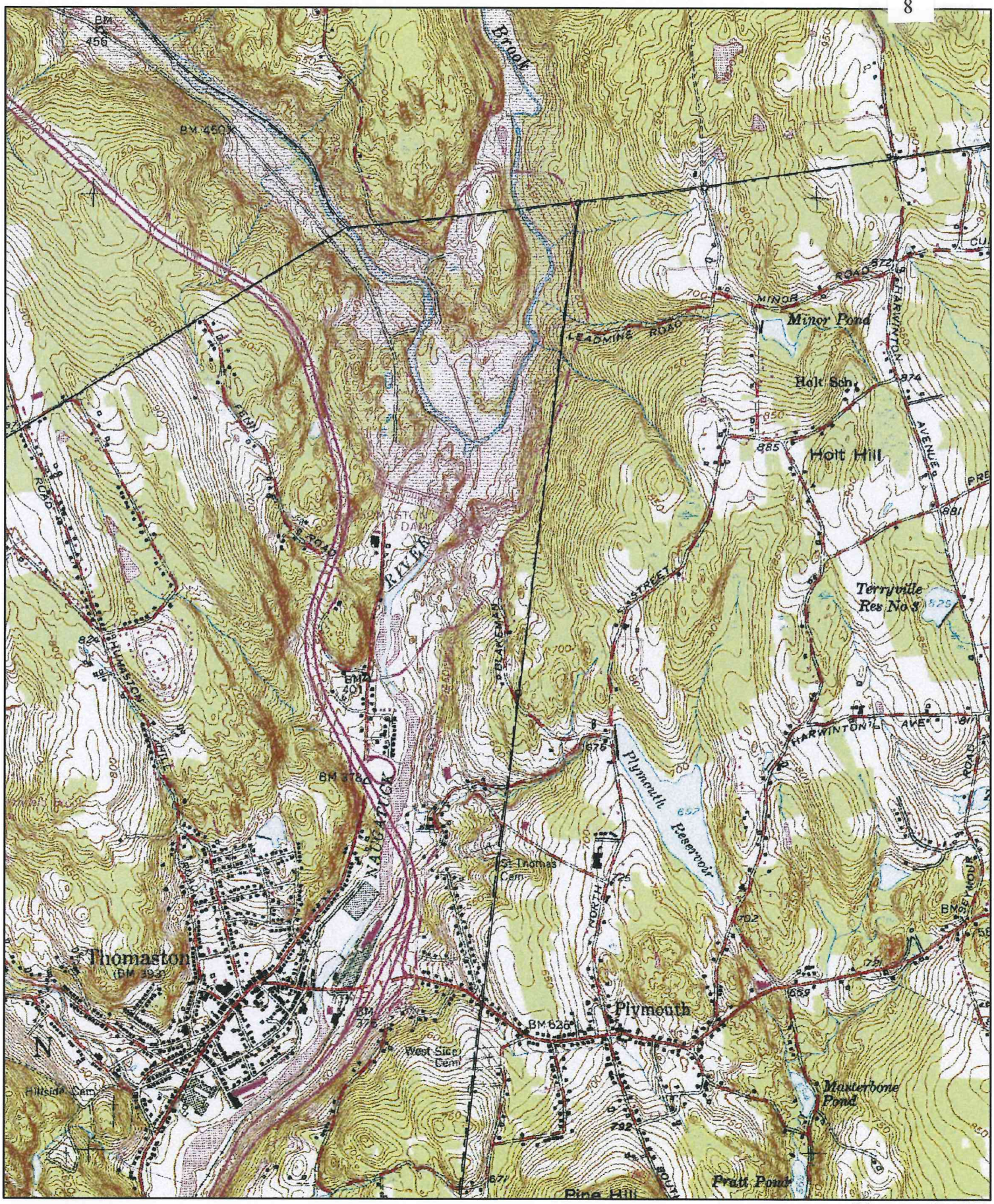
The review process consisted of four phases:

1. Inventory of the site's natural resources;
2. Assessment of these resources;
3. Identification of resource areas and review of plans; and
4. Presentation of education, management and land use guidelines.

The data collection phase involved both literature and field research. The field review was conducted June 6, 2013 and July 11, 2013. Several team members made additional field visits. The emphasis of the field review was on the exchange of ideas, concerns and recommendations. Being on site allowed Team members to verify information and to identify other resources.

Once Team members had assimilated an adequate data base, they were able to analyze and interpret their findings. Individual Team members then prepared and submitted their reports to the ERT coordinator for compilation into this final ERT report.

Plymouth Recreational Trail



The Connecticut Environmental Review Team

This map was prepared by Amanda Fargo-Johnson for the Connecticut Environmental Review Team.
This map is for educational use only.
It contains no authoritative data.
May 2013.

Plymouth, CT

0 650 1,300 2,600 3,900 Feet

Plymouth Recreational Trail

The Connecticut Environmental Review Team

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May 2013.

Plymouth, CT

0 475 950 1,900 2,850 Feet

Plymouth Recreational Trail

The Connecticut Environmental Review Team

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May 2013.

Plymouth, CT

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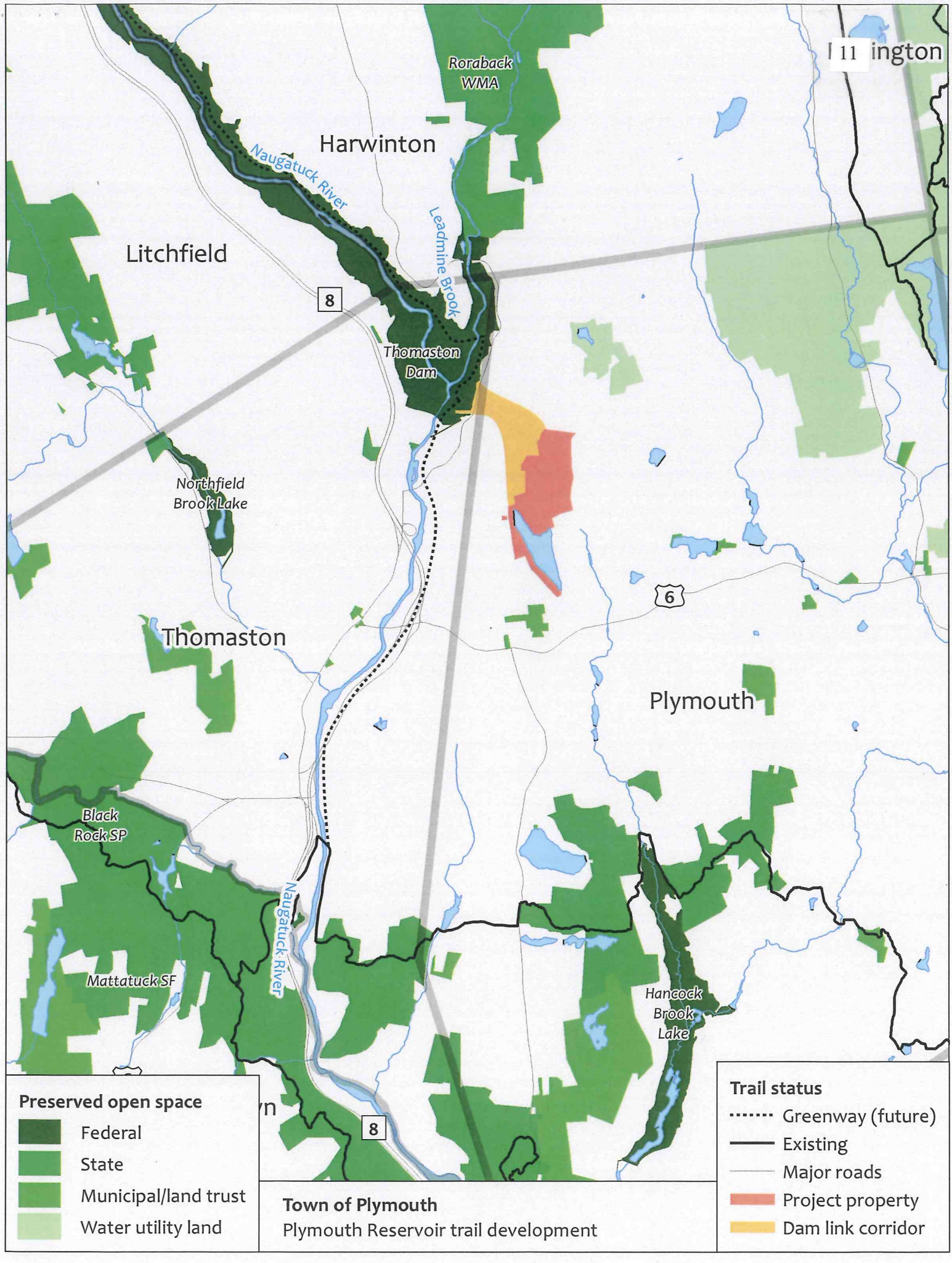
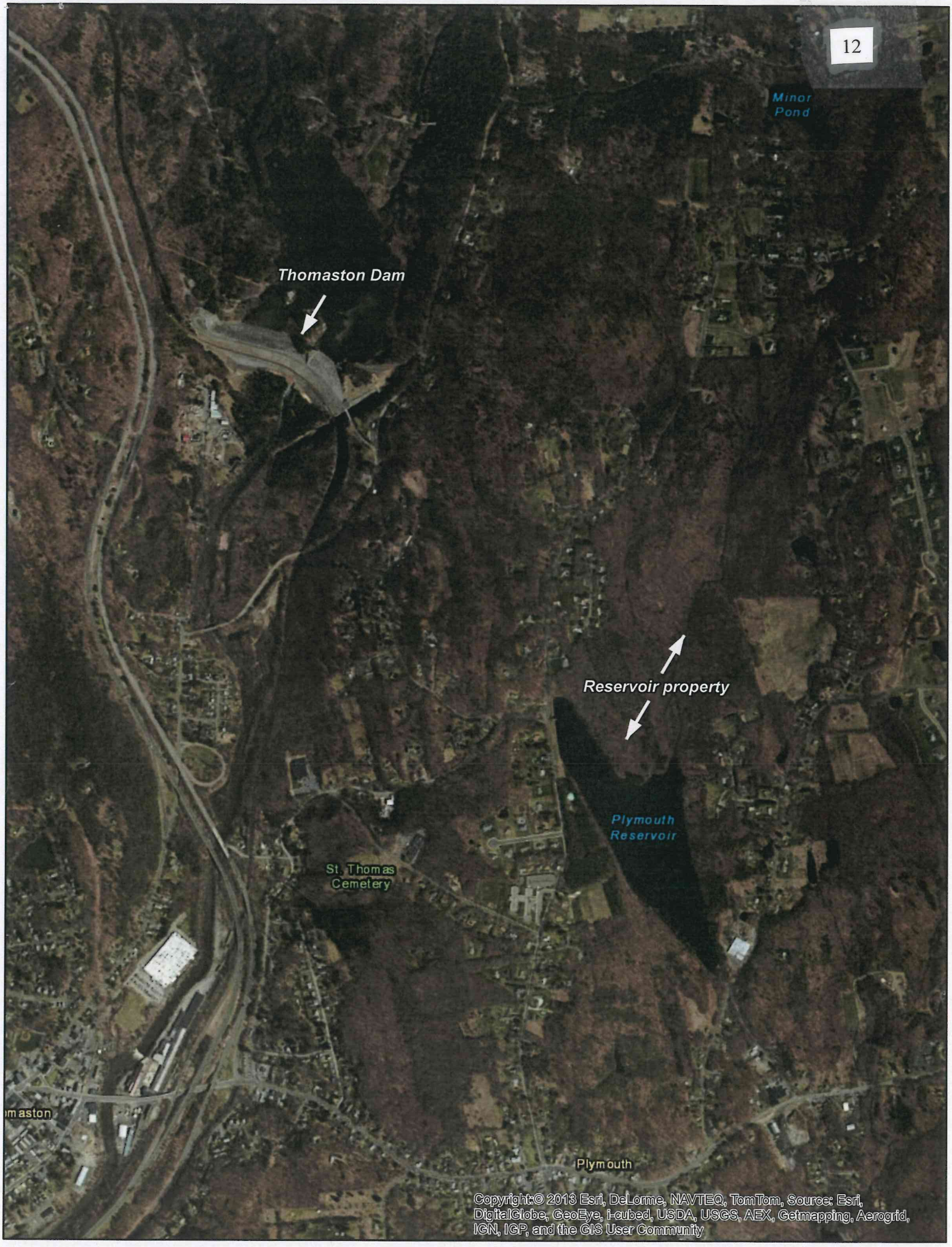

Roraback WMA
Harwinton
Naugatuck River
Leadmine Brook
Litchfield
8
Thomaston Dam
Northfield Brook Lake
6
Thomaston
Plymouth
Black Rock SP
Naugatuck River
Mattatuck SF
Hancock Brook Lake
8
Preserved open space
Federal
State
Municipal/land trust
Water utility land
Town of Plymouth
Plymouth Reservoir trail development
Trail status
Greenway (future)
Existing
Major roads
Project property
Dam link corridor


Minor Pond
Thomaston Dam
Reservoir property
Plymouth Reservoir
St. Thomas Cemetery
Plymouth
Copyright:© 2013 Esri, DeLorme, NAVTEQ, TomTom, Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

Geology

Bedrock Geology

The geologic unit shown in Figure 1 as shaded yellow has been identified as The Straits Schist (DSt) described as slivery to gray, coarse-grained schist. This schist is part of the Iapatos (Oceanic) Terrane / Connecticut Valley Synclinorium (a series of synclines - Figure 2) and estimated to be aged between about 360 million and 435 million years ago.

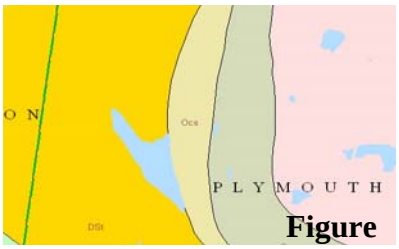


Figure 1

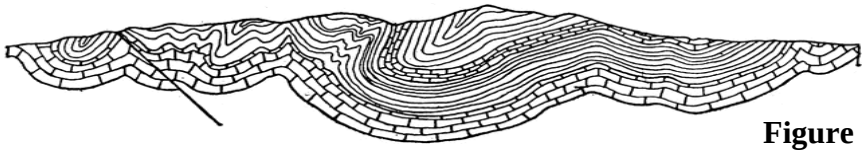


Figure 2

Quaternary and Surficial Geology

The Quaternary period in geologic time began about 1.8 million years ago and continues today. During the last million years the northern hemisphere has experienced numerous ice ages of varying intensity. At least two have been intense and spread ice as far south as Long Island. The last ice age ended about 15,000 years ago; during its height, ice more than a mile thick covered Plymouth.

Glacial till covers most of the property's surface. Flowing glacial ice is a powerful agent of erosion. The ice freezes soil and rocks into its base and uses those particles like sand paper to scrape and abrade the underlying bedrock. The result is to round off the hill tops and in the process, create a huge amount of sand, mud and gravel; essentially ground up bedrock. This ground-up debris is referred to as glacial till (or till).

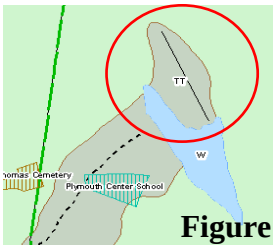


Figure 3

The area of the site upon which the trail network is desired (Figure 3- red outlined) is a geologic feature called a drumlin. A drumlin can be defined as, an elongated hill in the shape of an inverted spoon formed by glacial ice acting on underlying unconsolidated till or ground moraine. Drumlins are formed when glaciers melt and consequently become a record of the final direction of ice movement which is typically parallel with the long axis of the drumlin.

The Surficial Materials map for Connecticut compliments the Quaternary process information reviewed above. The map indicates that subject property area is covered by thick till, composed of gravel, sand and clay.

Comments

Some of the material shared here might be interesting on an educational kiosk.

References

Rodgers, John, 1985, *Bedrock Geological Map of Connecticut*. State Geological and Natural History Survey of Connecticut, Nat'l. Resource Atlas Series, 1:125,000, 2 sheets.

Stone, J.R., Schafer, J.P., London, E.H., DiGiacomo-Cohen, M.L., Lewis, R.S., and Thompson, W.B., 2005, Quaternary Geologic Map of Connecticut and Long Island Sound Basin (1:125,000). U.S. Geol. Surv. Sci. Invest. Map # 2784.

Soil Resources

This soil resources report applies to 139 Acres of the 178 acre parcel known as the Plymouth Reservoir Property; the remaining 39 acres are classified as open water. The soil information and soil map contained in the Plymouth Reservoir Resources Management Plan drafted by Jerry Milne dated May 18, 2013 (a copy may be found in the Appendix) are based on the USDA's National Cooperative Soil Survey. The soil data was compiled to create the soil map; the soil types, soil characteristics and the acreage of each soil type (see Soil Table after Conclusion Section). Given the proposed passive recreational use of the property, the town should consider the following soil capability and limitation assessment as well as the following comments and recommendations. A more detailed technical description of all the soil types found on the property is included in the Soil Series Description Appendix.

Wetland Soil and Open Water Resources

Wetland soils occupy approximately one fifth of the 139 forested acres on the property (26 acres), and the open water wetland is 39 acres.

The wetland soil types on the properties include:
(Soil Symbol #3 – 22.6 acres) Ridgebury, Leicester, and Whitman Poorly Drained Extremely Stony Soils
(Soil Symbol #13 – 3.4 acres) Timakwa and Natchaug soils
(Soil Symbol "W" – 39 acres) Open Water

The surface water quality standard/rating for all open water features on and down gradient of this property is "AA". This classification is given to only the cleanest of Connecticut streams and surface water features by the Connecticut Department of Energy and Environmental Protection. The water quality standard "AA" means that the CT DEEP is potentially considering (or proposing) the watercourse to serve as a drinking water supply and/or, that it is a drinking water supply as outlined in the Long Range Plan for the Management of Water Resources pursuant to Section 25-5b of the CT Statutes. No land use activities may take place in the watershed of "AA" rated streams and ponds that would potentially lower this water quality rating. The surface water runoff that passes through the 26 acres of forested wetlands on the property drains directly to the reservoir. These wetlands are responsible for preserving the high water quality ratings both in the surface water and any down gradient drinking water wells. Therefore, all wetland areas on the property should be protected. If a trail network is constructed, raised walkways should be used where trails cross wetland soil areas.

If a timber harvest operation is proposed, the operation should follow best management practices. The CT Department of Energy and Environmental Protection has published a valuable

guidance document titled Best Management Practices for Water Quality While Harvesting Timber Products, 2007
http://www.ct.gov/deep/lib/deep/forestry/best_management_practices/best_practicesmanual.pdf .

If timber harvesting is considered, the major management concepts described in the document should be applied to all timber harvesting activities on site. Best management practices should also be implemented if a timber harvest is proposed on Highly Erodible Soils (see Highly Erodible Soil Section Below).

Highly Erodible Soils

The U.S. Department of Agriculture defines a number of soil units on the property as highly erodible. There are approximately 76 acres classified by the USDA as being "Highly Erodible Lands" (HEL) which is over half of the Reservoir Property. Once vegetation is removed from these HEL soils, it is extremely difficult to control soil movement. HEL soils are excessively susceptible to sheet, rill and gully erosion and have the potential (if exposed and unprotected) to deposit large amount of sediments into surrounding wetland and water resources. If any land use activities are proposed on HEL soil types (trails, parking areas, picnic landings, swimming facility), rigorous soil erosion and sediment control practices should be implemented (see the Connecticut 2002 Guidelines for Soil Erosion and Sediment Control Published by the CT DEEP). http://www.ct.gov/deep/lib/deep/water_inland/sesc/sesc_intro_toc.pdf

(Soil Symbol #61C, #62C and #62D - 24.6 acres) Canton and Charlton extremely stony soils, 8 to 35 percent slopes,
(Soil Symbol #73C, #73E – 38.4 acres) Charlton – Chatfield very rocky 3 to 45 percent slopes
(Soil Symbol #84C, #85C, #86C and #86D – 12.8 acres) Paxton and Montauk fine sandy loams, 15 to 35 percent slopes

Prime Farmland Soil

The US Department of Agriculture classifies a select few soil series as "Prime Farmland Soil" and "Statewide Important Farmland Soil". These prime agricultural soils have the best combination of physical and chemical properties for producing food and livestock feed. In general, they have an adequate and dependable moisture supply, favorable temperature and growing season, acceptable acidity and alkalinity and few rocks. Prime agricultural soils are also not saturated with water for long periods of time. These favorable soil characteristics, combined with local climatic conditions, make Connecticut's prime farmland soils ideal for agriculture, with some of the highest non-irrigated soil productivity rates in the world.

Because prime agricultural soils have such a high conservation value, the Northwest Conservation District has been actively working with farmland preservation organizations to conserve this valuable, dwindling, and non-renewable natural resource. Prime farmland soil areas have been attracting attention in Northwestern Connecticut because of negative trends in both national and global food production industries. More and more, we are looking to our "back yards" for food production because of uncontrolled and unresolved food contamination issues both in the US and from food imported from other countries. In addition, escalating

energy and transportation costs make it more attractive to produce food locally. As fresh water resources in the western United States keep declining, farmers and food producers are looking back to the prime farmland soil areas of the Northeast because our adequate natural rainfall supports farming that has very high un-irrigated crop production yields (Connecticut receives 40 to 50 inches of rain per year).

The combined coverage of "Prime Farmland Soil" and "Statewide Important Farmland Soil" types in Litchfield County is approximately 12% of the land area. The Plymouth Reservoir Property contains 16.9 acres which is the same as Litchfield County's 12% prime agricultural soil coverage. Once prime agricultural soils have been disturbed and converted to an alternative use (ex. parking areas or ball fields), they will never again have the qualities that define them as USDA prime farmland. Once lost, the unique characteristics that define these soils for agricultural uses can never be recreated. Permanently protecting the prime agricultural soils will certainly benefit Plymouth and the surrounding communities.

The Prime Farmland Soil and Statewide Important Farmland Soil on the properties include:
(Soil Symbol #84B and #84C – 15.6 acres) Paxton and Montauk fine sandy loams, 3 to 15 percent slopes
(Soil Symbol #45B – 1.3 acres) Woodbridge fine sandy loam – 3 to 8 percent slopes

Conclusion

The conservation value of the 178 acre parcel described above is extremely high. After spending a day walking the property and reviewing all the publicly available natural resource information, it is clear that the permanent protection of the property will have enormous local and regional conservation value. This parcel has the potential to piece together surrounding permanently protected open space and greenways, which would create an uninterrupted block of land with huge natural resource value located at the ever creeping fringe of development created by the Route 8 Corridor. If there is anything the Northwest Conservation District can to do assist the Town of Plymouth with their goal of developing the property for passive recreation please do not hesitate to contact them. In addition, if any improvements are planned to facilitate public access, the Northwest Conservation District would welcome the opportunity to perform an environmental review of the proposal.

Soils Map

Soil Table and Soil Descriptions

(*refer to soils map in the* *Plymouth Reservoir Resources Management Plan – Jerry Milne - May 18, 2013 in the Appendix* ***)***

Soil Symbol	Acres	Soil Name	Description
3	22.6	Ridgebury, Leicester, and Whitman soils, extremely stony	Wetlands soils, poorly drained.
17	3.3	Timakwa and Natchaug soils	Wetlands soils, very poorly drained, mucky.
45B	1.3	Woodbridge fine sandy loam, 3-8% slopes	Moderately well-drained soil with a hardpan; perched water table from fall through spring (18-30" below the surface).
52C	2.3	Sutton fine sandy loam, 2-15% slopes	Moderately well-drained soil with a hardpan; perched water table (18-30" below the surface).
61C	1.7	Canton and Charlton soils, 8-15% slopes, very stony	Well-drained soil, fertile. Quick to dry out in spring.
62C & D	22.9	Canton and Charlton soils, 3-35% slopes, extremely stony	Well-drained soil, fertile. Quick to dry out in spring.
73C & E	38.4	Charlton-Chatfield complex, 3-45% slopes, very rocky	Well-drained soil. Quick to dry out in spring.
75C & E	3.2	Hollis-Chatfield Rock outcrop complex, 3-15% slopes.	Rock ledge, shallow to bedrock.
84B & C 85B & C 86C & D	41.7	Paxton and Montauk soils, 3-15% slopes, very stony.	Moderately well-drained soil with a hardpan; perched water table from fall through spring (18-30" below the surface).
309	1.6	Udorthents, flood control	Manmade dam.

Soil Series Description Appendix

CANTON SERIES

The Canton series consists of very deep, well drained soils formed in a loamy mantle underlain by sandy till derived from parent materials that are very low in iron sulfides. They are on nearly level through very steep glaciated plains, hills, and ridges. Slope ranges from 0 through 35 percent. Saturated hydraulic conductivity is high in the solum and high or very high in the substratum. The mean annual temperature is about 46 degrees F. (10 degrees C.) and the annual precipitation is about 44 inches (1194 millimeters).

TYPICAL PEDON: Canton fine sandy loam, 3 to 8 percent slopes, extremely bouldery in a forested area at an elevation of about 87 meters. (Colors are for moist soil.)

RANGE IN CHARACTERISTICS: Solum thickness commonly ranges from 18 through 36 inches (46 to 91 centimeters), but the range includes through 14 inches (36 centimeters). It

corresponds closely to the depth to the sandy till. Rock fragment content consists of 0 through 20 percent gravel and 0 through 5 percent cobbles in the solum. Gravel content is 10 through 30 percent, cobbles 5 through 10 percent, and stones 0 through 10 percent in the substratum. Stones and boulders are 0 through 15 percent of the surface and subsoil. Rock fragments are dominantly granite, gneiss, and quartzite. The soil ranges from extremely acid through moderately acid.
GEOGRAPHIC SETTING: Canton soils are on glaciated upland plains, hills, and ridges. Slope ranges from 0 through 35 percent. The soils developed in a fine sandy loam mantle over acid sandy till of Wisconsin age derived from parent materials that are very low in sulfur, mainly from granite and gneiss and some fine-grained sandstone. The climate is humid temperate. The mean annual air temperature is 45 to 51 degrees F. (7 through 11 degrees C.), and the mean annual precipitation ranges from 42 through 26 inches (1016 through 1295 millimeters).
DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Runoff is negligible to medium. Internal drainage is medium. Saturated hydraulic conductivity is high in the solum and high or very high in the substratum.
USE AND VEGETATION: Mostly forested. Some areas have been cleared of surface stones and are used for crops and pasture. Native vegetation is forest composed of eastern white pine, northern red, white, and black oaks, hickory, red maple, sugar maple, gray birch, yellow birch, beech, eastern hemlock, and white ash.

CHARLTON SERIES
The Charlton series consists of very deep, well drained loamy soils formed in till derived from parent materials that are very low in iron sulfides. They are nearly level to very steep soils on till plains and hills. Slope ranges from 0 to 50 percent. Saturated hydraulic conductivity is moderately high or high. Mean annual temperature is about 10 degrees C and mean annual precipitation is about 1194 mm.
TYPICAL PEDON: Charlton fine sandy loam - forested, very stony, at an elevation of about 170 meters. (Colors are for moist soil.)
RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 50 to 97 centimeters. Depth to bedrock is commonly more than 180 centimeters. Rock fragments range from 5 to 35 percent by volume to a depth of 100 centimeters and up to 50 percent below 100 centimeters. Except where the surface layer is stony, the fragments are mostly subrounded gravel and typically make up 60 percent or more of the total rock fragments. Unless limed, reaction ranges from very strongly acid to moderately acid. The ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron is high, greater than 0.15.
GEOGRAPHIC SETTING: Charlton soils are nearly level to very steep soils on till plains and hills. Slope ranges from 0 to 50 percent. The soils formed in acid till derived from parent materials that are very low in sulfur, mainly from schist, gneiss, or granite. Mean annual temperature ranges from 7 to 11 degrees C and mean annual precipitation commonly ranges from 940 to 1245 centimeters, but the range includes as low as 660 centimeters in some places east of Adirondack Mountains in the Champlain Valley of New York. The growing season ranges from 115 to 185 days.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Runoff is negligible to medium. Saturated hydraulic conductivity is moderately high or high in the mineral soil.
USE AND VEGETATION: Areas cleared of stones are used for cultivated crops, specialty

crops, hay, and pasture. Many scattered areas are used for community development. Stony areas are mostly wooded. Common trees are northern red, white, and black oak, hickory, sugar maple, red maple, black and gray birch, white ash, beech, white pine, and hemlock.

CHATFIELD SERIES

The Chatfield series consists of well drained and somewhat excessively drained soils formed in till derived from parent materials that are very low in iron sulfides. They are moderately deep to bedrock. They are nearly level through very steep soils on glaciated plains, hills, and ridges. Slope ranges from 0 through 70 percent. Crystalline bedrock is at depths of 20 to 40 inches (50 through 100 centimeters).

RANGE IN CHARACTERISTICS: Solum thickness ranges from 16 through 36 inches (40 through 91 centimeters). Depth to bedrock ranges from 20 through 40 inches (50 through 100 centimeters). Rock fragments range from 5 through 50 percent by volume in the A horizon and from 5 through 35 percent in the B and C horizons. Rock fragments are typically gravel or channers, but include cobbles, stones, boulders and flagstones, particularly just above the bedrock. The weighted average dithionite-citrate extractable iron (pedogenic iron) is less than 1 percent throughout the mineral pedon. The weighted average dithionite-citrate extractable aluminum content is commonly 0.67 times less than that found in competing series. The ratio of ammonium oxalate extractable iron to dithionite-citrate extractable iron is high, greater than 0.15.

GEOGRAPHIC SETTING: Chatfield soils are nearly level through very steep, and are on convex bedrock controlled glaciated upland landscapes. The soils formed in a moderately thick mantle of till derived from parent materials that are very low in sulfur overlying granite, gneiss, or schist bedrock. Slope ranges from 0 through 70 percent. Rock outcrops are rare or common and are limited to the more resistant bedrock.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well to somewhat excessively drained. Potential for surface runoff ranges from low to high. Saturated hydraulic conductivity is moderately high or high in the mineral soil.

USE AND VEGETATION: Most areas of Chatfield soils are in woodland. Major tree species include white and northern red oaks, sugar maple, beech, eastern hemlock, eastern white pine, eastern red cedar, and shagbark hickory. Some small cleared areas are used for pasture, are idle, or are sites for residential and recreational development.

HOLLIS SERIES

The Hollis series consists of well drained and somewhat excessively drained soils formed in a thin mantle of till derived mainly from parent materials that are very low in iron sulfides such as gneiss, schist, and granite. They are shallow to bedrock. They are nearly level through very steep upland soils on bedrock-controlled hills and ridges. Slope ranges from 0 through 60 percent. Saturated hydraulic conductivity is moderately high or high. Depth to hard bedrock ranges from 25 to 50 cm. Mean annual temperature is about 9 degrees C, and mean annual precipitation is about 1270 mm.

TYPICAL PEDON: Hollis gravelly fine sandy loam, 3 to 15 percent slopes, forested.

RANGE IN CHARACTERISTICS: Thickness of the solum and depth to bedrock range from 25 to 50 cm. Rock fragments commonly range from 5 through 35 percent by volume, but some pedons have less than 5 percent rock fragments. The fragments are mostly subrounded gravel, except where the surface is stony. The soil has 20 percent or more silt in the particle-size control

section. Unless limed, reaction ranges from extremely acid through moderately acid in the organic horizons and very strongly acid through moderately acid in the mineral horizons.
GEOGRAPHIC SETTING: Hollis soils are nearly level through very steep soils on bedrock controlled hills, modified by glacial processes. Slope ranges from 0 to 60 percent. The soils formed in a thin mantle of till derived from local bedrock of schist, granite, and gneiss that is very low in sulfur. Mean annual temperature ranges from 7 to 12 degrees C and mean annual precipitation ranges from 940 to 1295 mm, but the range includes as low as 660 mm in some places east of Adirondack Mountains in the Champlain Valley of New York. The growing season ranges from 115 through 185 days.
DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained and somewhat excessively drained. Surface runoff is negligible to very high. Saturated hydraulic conductivity is moderately high or high.
USE AND VEGETATION: Mostly forested. Small areas with few rock outcrops are cleared of stones and used for cultivated crops, but most cleared areas are in hay or pasture. Scattered areas are used for community development. Common trees are northern red, white, black, and chestnut oak, hickory, eastern white pine, eastern hemlock, and gray and black birch.

PAXTON SERIES
The Paxton series consists of well drained loamy soils formed in lodgement till. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to steep soils on till plains, hills, and drumlins. Slope ranges from 0 to 45 percent. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil and low to moderately high in the substratum. Mean annual temperature is about 10 degrees C., and mean annual precipitation is about 1194 millimeters.
TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Oxyaquic Dystrudepts
TYPICAL PEDON: Paxton fine sandy loam - in a brushy field at an elevation of about 850 feet. (Colors are for moist soil unless otherwise noted.)
RANGE IN CHARACTERISTICS: Thickness of the mineral solum commonly ranges from 50 to 100 centimeters. The depth to the densic contact and material is commonly 50 to 100 centimeters, but the range includes 46 to 100 centimeters. Depth to bedrock is commonly more than 1.5 meters. Rock fragments range from 5 through 35 percent by volume in the mineral soil. Except where the surface is stony, the fragments are mostly subrounded gravel and typically make up 60 percent or more of the total rock fragments. Unless limed, reaction ranges from very strongly acid through moderately acid in the mineral soil.
GEOGRAPHIC SETTING: Paxton soils are nearly level to steep and are on till plains, hills, and drumlins. Slope commonly is 0 through 35 percent, but range from 0 through 45 percent in some pedons. The soils formed in acid lodgement till derived mostly from schist, gneiss, and granite. Mean annual temperature ranges from 7 to 11 degrees C., mean annual precipitation ranges from 940 to 1245 millimeters, and the growing season ranges from 115 through 180 days.
DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Surface runoff is negligible to high. Saturated hydraulic conductivity is moderately high or high in the mineral solum and low through moderately high in the substratum.
2USE AND VEGETATION: Many areas are cleared and used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Some areas are wooded. Common trees are red, white, and black oak, hickory, sugar maple, red maple, gray and black birch, eastern white pine, and eastern hemlock.

MONTAUK SERIES

The Montauk series consists of well drained soils formed in lodgement or flow till derived primarily from granitic materials. The soils are very deep to bedrock and moderately deep to a densic contact. These soils are on upland till plains and moraines. Slope ranges from 0 through 35 percent. Saturated hydraulic conductivity is moderately high or high in the mineral solum and low through moderately high in the substratum. Mean annual temperature is about 9 degrees C, and mean annual precipitation is about 1143 mm.

TAXONOMIC CLASS: Coarse-loamy, mixed, subactive, mesic Oxyaquic Dystrudepts

TYPICAL PEDON: Montauk sandy loam on a 5 percent slope in a forested area. (Colors are for moist soil unless otherwise noted.)

RANGE IN CHARACTERISTICS: Thickness of the solum and depth to the dense substratum typically ranges from 50 to 97 cm, but the range currently includes 45 to 97 cm. Rock fragments range from 3 to 35 percent in the solum and 5 to 50 percent in the C horizon. The soil ranges from extremely acid to moderately acid.

GEOGRAPHIC SETTING: Montauk soils are on glaciated uplands and moraines. Slopes range from 0 to 35 percent. The landscape in some areas has many closed depressions, some of which are filled by perennial ponds or wet spots. The soils formed in thick moderately coarse or medium textured till mantles underlain by firm sandy till. Some areas have very stony or extremely stony surfaces. The climate is humid and cool temperate. Mean annual precipitation ranges from 889 to 1422 mm, mean annual temperature ranges from 8 to 11 degrees C, and the mean annual frost-free period ranges from 120 to 200 days. Elevation ranges from 3 to 122 meters above sea level.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Runoff is low to high. Saturated hydraulic conductivity is moderately high or high in the solum and low through moderately high in the substratum.

USE AND VEGETATION: Many of the nearly level and gently sloping areas are cleared and used for production of potatoes and vegetable crops, hay, silage corn and pasture. Steeper and uneven areas are largely forested. Woodland contains northern red oak, white oak, and occasionally yellow poplar, eastern white pine, red pine, sugar maple, beech, and birch.

SUTTON SERIES

The Sutton series consists of very deep, moderately well drained loamy soils formed in till. They are nearly level to strongly sloping soils on plains, low ridges, and hills, typically on lower slopes and in slight depressions. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity is moderately high or high throughout. Mean annual temperature is about 10 degrees Celsius and mean annual precipitation is about 1194 millimeters.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Aquic Dystrudepts

TYPICAL PEDON: Sutton fine sandy loam, extremely stony - forested, with a one inch layer of undecomposed litter on surface at an elevation of about 250 meters. (Colors are for moist soil.)

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 50 to 100 centimeters. Depth to bedrock is commonly more than 2 meters. Rock fragments range from 5 to 35 percent by volume to a depth of 100 centimeters and up to 50 percent below 100 centimeters. Except where the surface is stony, the fragments are mostly subrounded gravel and typically make up 60 percent or more of the total rock fragments. Unless limed, reaction ranges from very strongly acid to moderately acid.

GEOGRAPHIC SETTING: Sutton soils are nearly level to strongly sloping soils typically on lower slopes or in slightly depressed areas on glaciated hills. Slope ranges from 0 to 15 percent. The soils formed in acid till derived mainly from schist, gneiss, and granite. Mean annual temperature ranges from7 to 11 degrees Celsius mean annual precipitation ranges from 940 to 1250 millimeters. The growing season ranges from 115 to 185 days.
DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. Surface runoff is slow to medium. Saturated hydraulic conductivity ranges from moderately high or high throughout.
USE AND VEGETATION: Cleared areas are used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Some areas are wooded. Common trees are red oak, white oak, black oak, hickory, ash, red maple, gray birch, hemlock, and white pine.

TIMAKWA SERIES
The Timakwa series consists of very deep, very poorly drained soils formed in woody and herbaceous organic materials over sandy deposits in depressions on lake plains, outwash plains, till plains, moraines, and flood plains. Saturated hydraulic conductivity is moderately low to high in the organic layers and high or very high in the sandy material. Slope ranges from 0 to 2 percent. Mean annual temperature is about 13 degrees C and the mean annual precipitation is about 1258 mm.
TAXONOMIC CLASS: Sandy or sandy-skeletal, mixed, euic, mesic Terric Haplosaprists
TYPICAL PEDON: Timakwa muck - 0 percent slope in a swamp at an elevation of about 148 meters. (Colors are for moist soil.)
RANGE IN CHARACTERISTICS: The organic material extends to a depth of 40 to 130 cm. The reaction of the organic material commonly is ultra acid to moderately acid in 0.01 M calcium chloride but the range includes slightly acid or neutral in some places. The pH value is 4.5 or more (in 0.01 M calcium chloride) in one or more layers of organic soil materials within the control section. The reaction ranges from strongly acid to neutral in the substratum. Woody fragments occur in some part of the organic soil materials in most pedons consisting of twigs, branches, logs or stumps and average from 2 to 10 percent by volume in the control section. Fragments range in size from 2 to 30 cm in diameter.
GEOGRAPHIC SETTING: Timakwa soils are in depressions in lake plains, outwash plains, moraines, till plains and flood plains. These soils formed primarily in woody organic materials with some herbaceous materials. Slope ranges from 0 to 2 percent. Mean annual temperature is 8 to 10 degrees C and the mean annual precipitation is 109 to 127 cm. The frost-free period is 120 to 180 days.
DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Very poorly drained. Depth to the seasonal high water table ranges from 30 centimeters above the surface to 30 cm below the surface from October to June. Surface runoff is negligible or very low. Saturated hydraulic conductivity is moderately low to high in the organic layers and high or very high in the sandy material. Some areas are subject to rare, very brief flooding from November to May.
USE AND VEGETATION: Most areas are used for wildlife, or are in woodland or clear-cut woodland. Some of these soils are used for pasture. Common vegetation is red maple, skunk cabbage, and sphagnum moss.

RIDGEBURY SERIES

The Ridgebury series consists of very deep, somewhat poorly and poorly drained soils formed in till derived mainly from granite, gneiss and schist. They are commonly shallow to a densic contact. They are nearly level to gently sloping soils in low areas in uplands. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity ranges from moderately low to high in the solum and very low to moderately low in the substratum. Mean annual temperature is about 49 degrees F. and the mean annual precipitation is about 45 inches.

TAXONOMIC CLASS: Loamy, mixed, active, acid, mesic, shallow Aeric Endoaquepts

TYPICAL PEDON: Ridgebury sandy loam - on a 3 to 8 percent slope in an extremely stony wooded area at an elevation of about 1095 feet. (Colors are for moist soil.)

RANGE IN CHARACTERISTICS: Depth to the dense till commonly is 14 to 19 inches. The A horizon has 5 to 25 percent gravel, 0 to 10 percent cobbles, and 0 to 25 percent stones by volume. The B and C horizons have 5 to 25 percent gravel, 0 to 5 percent cobbles and 0 to 5 percent stones. Rock fragments within the soil range from 5 to 35 percent by volume and are subangular fragments. The unlimed soil ranges from very strongly acid through moderately acid but some horizon within a depth of 40 inches is moderately acid.

GEOGRAPHIC SETTING: The nearly level to gently sloping Ridgebury soils are in slightly concave areas and shallow drainageways of till uplands. Slope ranges from 0 to 15 percent. The soils formed in loamy till derived mainly from granite, gneiss and schist. Mean annual air temperature ranges from 45 to 52 degrees F. and mean annual precipitation ranges from 40 to 50 inches. Mean growing season ranges from l00 to l95 days.

DRAINAGE AND PERMEABILITY: Commonly poorly drained but the range includes the wetter part of somewhat poorly drained. Runoff is negligible to medium. Saturated hydraulic conductivity ranges from moderately low to high in the solum and very low to moderately low in the substratum. A perched, fluctuating water table above the dense till saturates the solum to or near the surface for 7 to 9 months of the year.

USE AND VEGETATION: Largely forested to gray birch, yellow birch, red maple, hemlock, elm, spruce and balsam fir. Cleared areas are used mainly for hay and pasture.

WOODBRIDGE SERIES

The Woodbridge series consists of moderately well drained loamy soils formed in lodgement till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level through moderately steep soils on till plains, hills, and drumlins. Slope ranges from 0 through 25 percent. Saturated hydraulic conductivity ranges from moderately low to high in the surface layer and subsoil and low or moderately low in the dense substratum.

TYPICAL PEDON: Woodbridge fine sandy loam - grass field, at an elevation of about 177 meters. (Colors are for moist soil unless otherwise noted.)

TYPE LOCATION: Tolland County, Connecticut; town of Mansfield, 0.75 mile south of the intersection of Connecticut Routes 275 and 195, and 0.25 mile east on the University of Connecticut Agronomy Farm, 800 feet north of the greenhouses near the corner of a brushy field. USGS Spring Hill, CT topographic quadrangle, Latitude 41 degrees, 47 minutes, 53 seconds N., Longitude 72 degrees, 13 minutes, 48 seconds W., NAD 1927.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 46 through 100 cm. Depth to densic materials commonly is 50 through 100 cm but the range currently includes 46

through 100 cm. Depth to bedrock is commonly more than 2 meters. Rock fragments commonly range from 0 to 35 percent.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. The potential for surface runoff is moderate to very high. Saturated hydraulic conductivity ranges from moderately low or moderately high in the surface layer and subsoil and low or moderately low in the dense substratum.

USE AND VEGETATION: Many areas are cleared and used for cultivated crops, hay, or pasture. Scattered areas are used for community development. Some areas are wooded. Common trees are red, white, and black oak, hickory, white ash, sugar maple, red maple, eastern hemlock, and eastern white pine.

Wildlife Resource Considerations

Current Conditions, Field Observations and Notes

The 137 acres of forest, 2 acres of mowed grass and 40 acres of reservoir provides habitat for a variety of wildlife species including the following species this reviewer observed on June 5, 2013: red-tailed hawk(*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), downy woodpecker (*Picoides pubescens*), great-crested flycatcher(*Myaircus crinitus*), ovenbird (*Seiurus aurcapillus*), veery (*Catharus fuscescens*), eastern wood pewee (*Contopus virens*) , scarlet tanager(*Piranga olivacea*) , wood thrush (*Hylocichla mustelina*) , red-eyed vireo (*Vireo olivaceus*) , American redstart (*Setophaga ruticilla)* , eastern kingbird (*Tyrannus tyrannus*), Baltimore oriole (*Icterus galbula)*, red-winged blackbird (*Agelaius phoeniceus*), green frog tadpoles (*Lithobates clamitans*, and red eft (*Notophthalmus viridescens*)(Illustration 1). Evidence or sign (droppings) of white-tailed deer (*Odocoileus virginianus*), and eastern coyote (*Canis latrans)* was also found.

The forested portion of this property (137 acres) comprises 1.4 percent of the forested acres (9,586 acres) of the town of Plymouth (University of Connecticut: CLEAR, 2006), (see Table 1). It is comprised of mostly older, saw timber-sized hardwoods. Interior forest birds such as ovenbird, eastern wood pewee, wood thrush and red-eyed vireo are indicative of typical inhabitants of saw timber-sized eastern deciduous forests with patch sizes larger than 30 acres.

Illustration 1. Red eft (*Notophthalmus viridescens)* in forest leaf litter at Plymouth Reservoir Forest, Plymouth,CT.

Planning for Wildlife

Hiking trails can bring people through a variety of habitats and give the hiker opportunity to hear and see a variety of wildlife. With Connecticut being the fourth most densely populated State, hiking trails that are properly placed and maintained can help educate the public about wildlife and its habitat. The challenge for trail planners and trail construction is to balance the need for hikers to see every aspect of a property and wildlife need for cover and limited disturbance from hikers especially during nesting periods. Hikers may affect wildlife through direct disturbance, trampling of habitat, and indirectly through discarded food and other items (Boyle and Samson 1985). There are some unexpected negative wildlife impacts such as having unleashed dogs repetitively disturbing songbird ground nests or swimming in vernal pools or streams.

Considering Potential Wildlife Impacts

Any trail that bisects habitat has some impact on wildlife. The key is determining what are the trade-offs of placing a trail through parts of the Plymouth Reservoir open space property.

A local example of an unanticipated wildlife impact
[The author manages State wildlife management areas in the western district of Connecticut].

> *An unanticipated wildlife impact from trail use occurred at Sessions Woods Wildlife Management Area in Burlington, CT. A vernal pool was highlighted along the walking trail and improvements to the site included a boardwalk and a stone dust trail to allow handicap access. The location along the trail provided educational opportunities for hikers to observe a vernal pool and its inhabitants such as wood frogs, salamanders, fairy shrimp, and tad poles. What was unanticipated was the use of the vernal pool by unleashed dogs to jump into and splash about. The ephemeral nature of the fishless vernal pool makes them vital for the seasonal visitation of area amphibians to breed and lay their eggs.Unleashed dogs have trampled the vernal pool, dislodged amphibian egg masses and have caused erosion to its edges.*

Dog Walking
It is a challenge for open space property managers to manage growing numbers of dog walkers and subsequent unleashed dogs on their trails (Picone, personal observation).

Recommendations:
Maintain strict trail rules including keeping dogs leashed at all times Consider creating a town-managed dog park on a separate property and ban dogs from this open space property.
Leave a portion of the property with no trails. Limiting the location of trails can help reduce negative impacts to wildlife while still allowing some access.

Illustration 2. Man-made farm pond in forest interior at Plymouth Reservoir property that may function as a vernal pool. Further investigation is needed to determine seasonal use by amphibians (green frog tad poles present on June 5, 2013 , Picone Personal observation) .

Bisecting Trails and Spur Trails
There is a natural tendency for trail users to want to access new areas on the property and create unauthorized trails. Spur trails are sometimes added to shorten distances or bisect or loop back

on a trail for the convenience or selfishness of a particular user/ hiker. There are impacts to habitat and wildlife as unauthorized trails are added on. Trail managers need to be aware of this and use strategies to block off unauthorized trails before they become well-established.

Recommendation:
Create one main hiking trail that loops back to a designated point of origin. Do not allow unauthorized trails. Have trail managers regularly walk authorized trails and respond promptly to diversions and unauthorized activities.

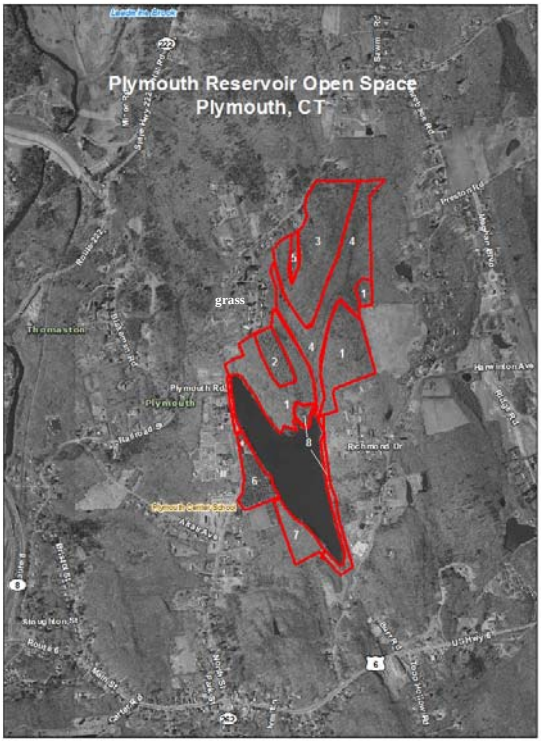
Vegetation Impact
Maintaining wildlife habitat requires active management in order to improve or increase a desired habitat or to reduce undesirable conditions. Both the quantity and quality of habitat are important to consider when making decisions about wildlife habitat management. Trail users can impact vegetation by trampling, digging, pulling, cutting and carving bark as they walk trails. Properly placing a trail and utilizing the assistance of experienced trail managers can help make prudent decisions as to what to cut and what to leave to enhance trail conditions for the user.

Standing dead or dying wood within falling reach of the hiking trail should be considered for removal for trail user safety and removed in a proactive manner. However, standing dead or dying wood outside of the falling reach(tree fall zone) of the trail should be spared in order to maintain the quality of habitat for cavity-dependent wildlife species.

In creating a trail, trail managers should consider removing invasive non-natives opportunistically. Invasive non-natives are the second largest threat to wildlife and wildlife habitat diversity. Several invasive non-native plants were noted growing in the understory, including oriental bittersweet (*Celastrus orbiculatus*), Japanese barberry (*Berberis thunbergii*), European privet (*Ligustrum vulgare*), winged euonymus (*Euonymus alatus*), autumn olive (*Eleagnus umbellata*) and dames rocket (*Hesperis matronalis*). Without intervention or active management, these invasive non-natives will continue to exert negative pressures on the natural plant communities of the property by displacing more valuable native plants. Choosing which invasive non-natives are to be managed requires thoughtful planning. A priority list of existing invasive non-natives should be made taking into account their relative abundance, funds, and labor available to manage them. Further technical assistance on invasive species management is available upon request from the Team Wildlife Biologist.

Recommendation:
Develop a forest stewardship for this property that has goals and objectives to ensure that the forest resources are managed in a ecologically sensitive manner. Hire a certified

forester to create a forest stewardship plan with the input from a town committee of conservation-minded individuals (open space committee?).
A forest stand map (Illustration 3) for the property that was developed in 2003 by Connwood Foresters is a good reference to use for the forest stewardship plan. (A larger version follows.)



Legend
Stand 1 – 45 acre mixed hardwoods
Stand 2 – 7 acre White pine/European larch
Stand 3 – 30 acre mixed hardwoods
Stand 4 – 24 acre forested wetland
Stand 5 - 8 acre mixed hardwood saplings (previous fire)
Stand 6 - 6 acre mixed softwood
Stand 7 – 8 acre mixed hardwood
Stand 8 – 6 acre mixed conifers

Illustration 3. Forest stand map adapted from Connwood Forester's Inc.'s 2003 forest management plan for this property (owned by Connecticut Water Company).

A forest management plan is important tool that to be used in planning the management of the property's natural resources so that it can occur in concert with the multiple uses that are being considered. It serves as a guide usually for at least ten years.

The property's 8 major forest stands (Illustration 3) have potential to be managed to improve conditions for wildlife and for forest health.

The forested wetland area comprised of Stand 4 is notable and provides diverse wildlife habitat. Any walking trails that are placed through it should be carefully located to minimize impacts.

Rules of Thumb (these are suggestions taken from the publication: *Planning Trails With Wildlife In Mind : A Handbook for Trail Planners* , Trails and Wildlife Task Force, Colorado State Parks-Hellmund Associates, 1998)

A- **Always some impact**. Any trail will have at least some negative impacts on wildlife. Such impacts must be weighed with the benefits of the trail.

B- **The broader view.** In considering wildlife, don't focus solely on the narrow width of the trail's treadway; also consider the wider area it may influence.

C- **Sensitive versus Non-sensitive.** Trail corridors may encourage some species of wildlife such as jays, raccoons, and other edge-loving generalists, but these species are already increasing across the landscape and may not need encouraging.

D- **Negative effects.** Trails may negatively affect species that need conditions (such as specific vegetation or light) that are altered in trail construction.

E- **Degraded areas.** Seek out degraded areas that have the potential to be restored when aligning a trail, rather than creating another disturbed area.

F- **Edges.** Align a trail along or near an existing human-created ecological edge, rather than bisecting undisturbed areas. When this is possible, the trail will not create a totally new ecological edge.

G- **Avoid sensitive wildlife.** Keep a trail and its zone of influence away from specific areas of known sensitive species, populations, or communities. Where appropriate , use glimpses of this areas a opportunities for educating trail users.

H- **Think thin.** In constructing or upgrading a trail, disturb as narrow an area as possible to help minimize the zone of influence.

I- **Screening.** Locate trails and supporting facilities in areas where they can be screened and separated from sensitive wildlife by vegetation or topography. This approach is less disturbing to wildlife and reduces the amount of energy wildlife must use in reacting to recreationists.

J- **Rewarding trails.** Provide trail experiences that are diverse and interesting enough that recreationists are less inclined to create their own trails and thereby expand the zone of influence.

The above rules of thumb can be used in consideration of minimizing the wildlife impacts to this property.

Wildlife Habitat Enhancement

Several habitat enhancement projects can be employed at this open space property. Songbird nest boxes (primarily for Eastern bluebird (*Sialis sialis*), Tree Swallow (*Tachycineta bicolor*), Chickadee, and House wren) can be placed in appropriated habitats. The open mowed area along the dike and spillway would be a good area to place at least 3 nest boxes on poles with predator guards (Illustration 4).

Illustration 4. Eastern bluebird on a songbird nest box on pole with sheet metal cone predator guard.

Songbird nest boxes may be placed in the forest, especially in forest gaps or forest openings. These areas may attract nesters including black-capped chickadee, tufted titmouse or house wren. For more information please contact the Team Wildlife Biologist.

Wood duck nest boxes may be placed in the wetland/water areas. Wood ducks and hooded mergansers utilize artificial nesting boxes placed in the water on posts or on land with a predator guard (Illustration 5)

Illustration 5. Duck nesting box placed on land near water using sign post and sheetmetal predator guard. This nest box contained a wood duck nest with 10 eggs spring of 2103.

Management of Invasive Non-native Plants

Managing invasive non-native plants requires some thoughtful planning and use a variety of techniques include biological, mechanical and chemical control methods. Any of the management techniques has trade-offs and challenges. Tailoring a management strategy for the invasives on this property will require some thoughtful assessment of which invasives can be managed effectively given the resources available.

Utilization of volunteers from local schools/ conservation organizations /committees to provide assistance in invasive non-native plant pulling/cutting could be planned. Cutting of the invasive oriental bittersweet vines could help save trees from being weighed down and wind thrown from the weight of the invasive vines. Invasive shrubs can also be cut/pulled or herbicided. Getting advice from professionals that are currently managing invasives in forested landscapes (DEEP Wildlife Division Biologists/The Nature Conservancy) or doing research on invasive plant management (Connecticut Agricultural Experiment Station: Jeff Ward, Scot Williams, Todd Mervosh) is recommended. Please consult the Team Wildlife biologist for more information.

Wildlife-based Recreational Opportunities

Forested Areas

The property lends itself well to passive recreational opportunities such as bird watching as long as trail users understand the need to limit their disturbance to wildlife especially during the nesting seasons that begin in the early spring and continue through the summer months.
Active recreation such as bowhunting for white-tailed deer and wild turkey can be considered at Plymouth Reservoir property given the 139 acre of forest land. A daily permit system can be used to issue permission during the hunting season. A minimum of 4 bowhunters per day could be allowed. Examples of daily bowhunting systems can be investigated in Southington (Crescent Lake Town-owned property) and in Burlington (Sessions Woods Wildlife Management Area State-owned property). Hunters reserve daily access permits and follow strict rules created by the property managers. DEEP Deer program biologist Howard Kilpatrick is available to provide information on the regional deer population goals and the value of harvesting deer through a regulated bowhunting season. (Should property managers like to pursue allowing daily permitted bowhunting , please contact the Team wildlife biologist).

Lake

An observation blind (Illustration 6) could be placed along a secluded portion of the lake to allow for visitors to observe birds and aquatic organisms.

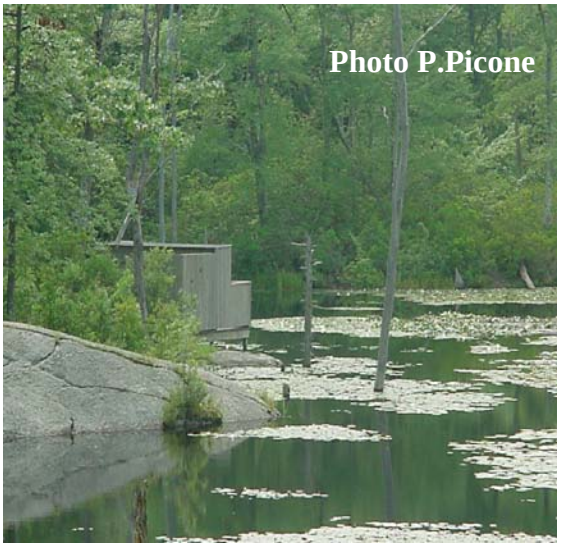


Illustration 6. Wildlife observation blind at Session Woods Wildlife Management Area in Burlington, CT .

Conclusions

The Plymouth Reservoir property can provide area residents opportunities to enjoy nature. The challenge for property managers is to balance the creation of trails to allow access and maintain adequate protection of the property's natural resources and ecological integrity. Properly placed trails, well-regulated access and strict trail rules can help reduce impacts to wildlife. Wildlife-based recreational opportunities can range from bird-watching to bow hunting.
A forest stewardship plan could be developed to address the vegetation management needs of the property, the wildlife resource challenges and state the desired future conditions of the land as it passes on to the next generation. Property managers should address invasive non-native species and at least have a plan to refer to that prioritizes which ones are to be managed or should be managed.

Nest boxes can be added to enhance conditions for cavity-nesting birds in appropriate habitats. Habitat management and trail building is a fun and great way to get folks out to enjoy this open space property. The Team biologist is available for further consultation.

	1985		1990		1995		2002		2006		Change	
	acres	% of town	acres	% of town	acres	% of town	acres	% of town	acres	% of town	acres	% change
Developed	2020	%14.1	2184	15.3%	2238	15.7%	2317	16.2%	2344	16.4%	323.3	16%
Turf & Grass	830	5.8%	882	6.2%	943	6.6%	986	6.9%	1119	7.8%	288.5	34.7%
Other Grasses	92	0.6%	91	0.6%	94	0.7%	99	0.7%	116	0.8%	24.1	26.3%
Agricultural Field	760	5.3%	712	5%	693	4.9%	628	4.4%	567	4%	-192.8	-25.4%
Deciduous Forest	8975	62.8%	8806	61.6%	8711	61%	8655	60.6%	8514	59.6%	-460.5	-5.1%
Coniferous Forest	834	5.8%	832	5.8%	831	5.8%	827	5.8%	822	5.8%	-12.1	-1.5%
Water	418	2.9%	416	2.9%	409	2.9%	398	2.8%	394	2.8%	-23.5	-5.6%
Non-forested Wetland	11	0.1%	14	0.1%	12	0.1%	14	0.1%	17	0.1%	6.2	58.7%
Forested Wetland	209	1.5%	200	1.4%	193	1.3%	194	1.4%	191	1.3%	-18.4	-8.8%
Tidal Wetland	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Barren	76	0.5%	89	0.6%	100	0.7%	108	0.8%	143	1%	66.1	86.5%
Utility (Forest)	60	0.4%	60	0.4%	60	0.4%	59	0.4%	59	0.4%	-0.9	-1.5%

Table 1. Town of Plymouth Land Cover and Land Cover Change. Go to:
http://clear.uconn.edu/projects/landscape/your/town.asp?townname=111&Go=Go

Literature Cited

Boyle, S.A. and F.B. Samson. 1985. *Effects of nonconsumptive recreation on wildlife: a review*. Wildlife Society Bulletin 13:110-116.

Colorado State Parks-Hellmund Associates. 1998 . *Planning Trails With Wildlife In Mind: A Handbook for Trail Planners*, Trails and Wildlife Task Force.

Center for Land Use Education and Research CLEAR. 2006. College of Agriculture and Natural Resources, University of Connecticut. Go to:
http://clear.uconn.edu/projects/landscape/your/town.asp?townname=111&Go=Go

Forest Stand Map

The Natural Diversity Data Base

A review of the Natural Diversity Data Base (NDDB) records for State Listed Species for the reservoir site indicates the following extant populations of species on or within the vicinity of the project site.

Wood Turtle (*Glyptemys insculpta*) **Protection Status:** Species of Special Concern

Wood turtles require riparian habitats bordered by floodplain, woodland or meadows. They hibernate in the banks of river in submerged tree roots. Their summer habitat includes pastures, old fields, woodlands, powerline cuts and railroad beds bordering or adjacent to streams and rivers. This species has been regularly impacted by the loss of suitable habitat.

the

Recommendation: If work is to be conducted during the summer or fall, the following guidelines should be met:

- Silt fencing should be installed around any work area prior to activity;
- After silt fencing is installed and prior to work being conducted, a sweep of he work are should be conducted to look for turtles;
- Workers should be apprised of the possible presence of turtles, and provided a description of the species http://www.ct.gov/deep/cwp/view.asp?a=2723&q=475304
  Also found in the Appendix.
- Any turtles that are discovered should be moved, unharmed, to an area immediately outside of the fenced area, and position in the same direction that it was walking;
- Work conducted during early morning and evening hours should occur with special care not to harm basking or foraging individuals; and
- All silt fencing should be removed after work is completed and soils are stable so that reptile amphibian movement between uplands and wetlands is not restricted.

Eastern Hognose Snake (*Heterodan platirhinos*) **Protection Status:** Species of Special Concern

Eastern hognose snakes are a species that has been declining due to loss of suitable habitat. They favor sandy areas with well drained gravelly soils. The active period for these snakes is April through November. Therefore, they will be more visible at this time and, in most cases, move out of harm's way.
http://www.ct.gov/deep/cwp/view.asp?a=2723&q=325832
Also found in the Appendix.

Alder Flycatcher (*Empidonax alnorum*) **Protection Status:** Species of Special Concern

Alder flycatchers have been documented in the past in the vicinity of the project area. Alder flycatchers utilize thickets of tall shrubby vegetation in close proximity to streams or open water. The breeding season for this bird is approximately May through August and it is during this period that they are most susceptible to disturbances in their feeding and nesting habitat. Minimizing impacts to shrubby habitat adjacent to streams and wetlands during this time period will likewise minimize impacts to this species.

The Natural Diversity Data Base includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the CT Department of Energy and Environmental Protection, Bureau of Natural Resources and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site specific filed investigations. Consultations with the Data Base should not be substituted for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. If the proposed work has not been initiated within 12 months of this review, contact the NDDB for an updated review.

Please be advised a more detailed review may be conducted as part of any subsequent environmental permit applications submitted to the Department of Energy and Environmental Protection for the proposed site. Should state involvement occur in some other manner, specific restrictions or conditions relating to the species discussed may apply.

Fisheries Resources

Project Title: Warmwater Monitoring Project
Job Title: Monitor Warmwater Fish Populations in Lakes and Large Rivers
Contact Personnel: Ed Machowski, Biologist, DEEP Western District, Harwinton, CT, (860) 485-0226
Eileen O'Donnell, Senior Biologist, DEEP Eastern District, Marlborough, CT, (860) 295-9523
Sample Location and Date: Plymouth Reservoir (5/8/13)

Reason for Sample:

Representatives from the town of Plymouth contacted the DEEP Inland Fisheries Division (IFD) requesting a fisheries inventory of Plymouth Reservoir. A town committee was set up and designated with developing a management plan for the newly acquired reservoir and surrounding property. To aid the town and the designated committee in gathering information on the fish population in Plymouth Reservoir, the IFD sampled the reservoir's fish population using standard boat electrofishing methods on 5/8/2013. In addition to the inventory, scales were extracted from each fish species over a range of sizes to determine growth patterns. The following is a summary of our findings.

Catch Effort and Length Frequency Data:

Catch per unit of effort is the number of fish of each species captured over the length of sample time (standardized as fish per hour). Electrofishing catch effort of a given fish species can then be used as an index of fish abundance. This index can be further broken down by size of fish captured (stock size and quality size). Stock size refers to the minimum fish length that anglers would likely catch, and quality size refers to the fish length that most anglers would consider desirable to catch. For example the stock and quality size for largemouth bass (a commonly sought after warmwater game fish) are 8 and 12 inches, respectively.

Table 1 shows the catch effort of the various fish species sampled in Plymouth Reservoir for both stock and quality size. State average catch effort is also presented in the table for comparison.

For example the catch effort of largemouth bass in Plymouth Res. was 180 stock size and 58 quality size bass compared to the state average of 62 stock size and 32 quality size bass. Therefore largemouth bass are more common in Plymouth Res. than in most Connecticut lakes (Table 1).

Length frequency is the breakdown of the number of fish captured for each species by length. Figure 1 graphically shows length frequency data for five of the six fish species captured in Plymouth reservoir. A small number (7) of hybrid sunfish (bluegill x pumpkinseed) were also captured, but not shown in figure 1. Note: all lengths are listed in centimeters and not inches.

Growth Data:

While it is important to know species composition and number of fish in a lake, it is also crucial to know how well the fish are growing. To do this, a few scales from a subsample of fish captured are taken to calculate the fish's age. This process is similar to counting growth rings in

a tree. Using the relationship of a fish's body length to their scale length we can calculate how big a fish was at a particular age (back-calculated length).

Table 2 lists all the back-calculated growth information for each fish species captured in the reservoir along with state average back-calculated growth for comparison (red font). In addition, Table 2 shows age at quality size for each species – this is the number of years it took (on average) for that species of fish in Plymouth Res. to reach quality size (again quality sizes are shown in Table 1).

Summary/Discussion:

The fish species assemblage in Plymouth Reservoir is not as diverse as that found in other lakes around the state. We did not sample any species of forage fish (e.g., white suckers, golden or common shiners, or other minnow species) nor did we find chain pickerel, or brown bullhead (species typically found in most lakes). While our sample is only a snapshot of the overall fish population, it is possible that we did not capture other fish species because their abundance in the reservoir is very low. However, the reservoir is fairly small and we were able to electrofish the entire shoreline. Therefore, our sample should be considered a good overall representation of the reservoir's fish population.

Of the fish species captured, the breakdown of size and number of fish falls very much in line with the state average. The same is true for growth of fish captured. While overall growth based on our scale aging data falls in line with other state lakes, we did notice that growth of largemouth bass was similar to the state average until age 4, but slower than average thereafter. This may indicate a lack of suitable forage in the reservoir, and consequently the bass cannot maintain growth at larger sizes.

Opening Plymouth Reservoir to angling would potentially provide an excellent opportunity to local fishermen, but this should be approached judiciously. Figure 2 shows data collected from two reservoir systems in CT (Maltby Res. #2 & #3, W. Haven; Lake Chamberlain, Bethany). Data is presented for three fish species from each reservoir before and after the reservoirs were opened to shore based angling under the statewide 12 inch minimum length limit. In all cases, both largemouth bass and sunfish populations declined dramatically. These waterbodies were designated as "bass management lakes" in 2002 with a 12 – 16 inch slot length limit and a 6 bass/day creel limit (only one of which can be 16 inches or greater). The bass and sunfish populations have recovered somewhat, but not to the pre-angling conditions. There is increasing scientific evidence that fish in unexploited waters are not only naïve, making them very vulnerable to angling, but they are also genetically more aggressive and need more protection from angler harvest.

Unlike the decline in bass and sunfish, the yellow perch in the Maltby's actually increased after the lakes opened to fishing. Yellow perch tend to spend more time in open water areas which may make them less vulnerable to angling so a shore based fishery may not have impacted the perch as much as bass or sunfish.

Management Options and Recommendations:

- It is recommended that fishing regulations be enacted prior to opening the area for fishing. The reservoir is fairly small in size and fishing pressure could quickly impact quality of the fish population as witnessed in other areas in CT. Since the reservoir has been closed to fishing for years, fish will be naïve and easily caught by anglers. Therefore, conservative fishing regulations would be recommended.

- Several regulation options exist for management of Plymouth Reservoir:
    - Creel limits (the number of fish an angler can keep per day) can be used to restrict the number of a specific fish an angler can keep.
    - Length limits (the size of fish legal to keep) are commonly used for different management scenarios. A minimum length limit is used to protect fish under a specific size while allowing harvest of fish above the specified size. This might be used in order to protect largemouth bass allowing them to spawn for a number of years prior to being harvested. This is also a preferred regulation in areas where the abundance of smaller/younger bass is low.
    - Slot length limits (as used in both the Maltby's and Lake Chamberlain) are typically used if abundance of smaller/younger fish is high, but recruitment (size at which the fish becomes catchable by anglers or the size at which a fish becomes sexually mature) is low. The regulation is designed to cull the smaller fish while protecting larger fish allowing them to spawn or at least get larger before being harvested by anglers.
    - A combination of creel and length limits are used commonly to both protect certain sizes of fish while allowing for limited harvest.
    - Catch and Release is the most protective of all regulations. Catch and release can be set specifically to protect one species of fish, or can be used to cover the entire resource (i.e., all fish would be protected). Presently in CT, there are no impoundments under catch and release regulation.
- Based on our sampling, the bass population in Plymouth Reservoir is fairly robust. But, due to the lakes small size and potential vulnerability of the fish to angling, it is recommended that the bass be protected under either a high minimum length limit (e.g., > 18"), along with a reduced creel limit (e.g, one bass/day) or by catch and release regulations. One added benefit to catch and release for Plymouth reservoir is that all fish species would be protected.
    - Note that only one bass over 18" (46cm) was sampled in Plymouth reservoir, so a high length limit of 18" would essentially act similar to catch and release regulations.
- Any regulation decided upon would require approval by the DEEP IFD and the state legislative review prior to implementation. Typically, this process takes 1 – 2 years.

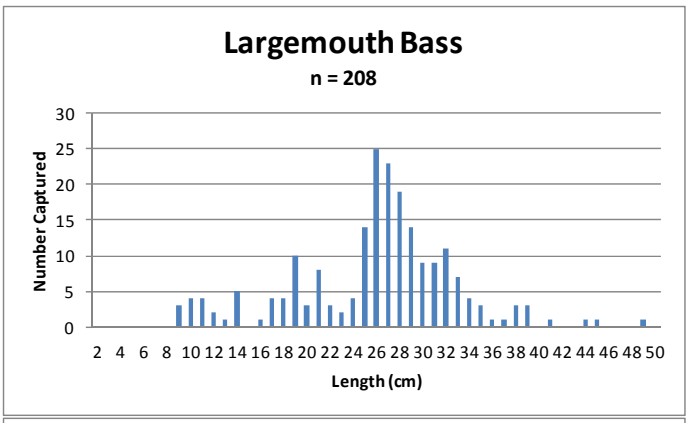
-

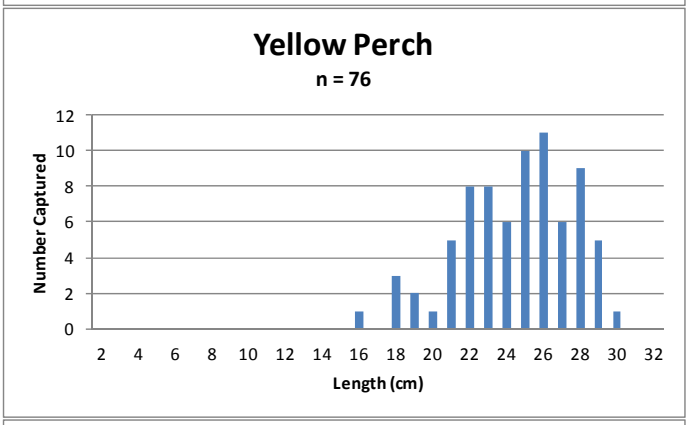
Table 1. Electrofishing catch per effort (fish /hour) for two size classes of game and panfish from Plymouth Reservoir on May 8, 2013. Stock size (grey background) is the size at which a fish will likely be caught by anglers and Quality size is the size above which most anglers would consider the fish desirable to catch. State average electrofishing catch rates (fish/hr) of stock and quality size fish shown in columns on right. Numbers in red font indicate catch per effort values in Plymouth Res. above the state average.

Year			**5/08/2013**		**State Average**	
Effort (hrs)[2]			**0.94**		**2005-2011**	
SPECIES	**Stock**	**Quality**	**Stock**	**Quality**	**Stock**	**Quality**
	Size					
GAMEFISH						
Largemouth bass	8"	12”	180	58	62	32
LARGER PANFISH						
White perch	5"	8”	6	6	123	23
Yellow perch	5"	8”	80	74	114	55
SUNFISH						
Bluegill	3"	6”	244	177	305	137
Pumpkinseed	3"	6”	34	29	57	25
Hybrid	3"	6”	7	6	4	

Table 2. Back-calculated mean length-at-age (inches) and age to quality size for selected fish species from Plymouth Reservoir. State average length-at-age listed for each species in red font. Age to quality size compared to state average in ( ).

SPECIES	Age @ Quality Size (Years)	AGE I	II	III	IV	V	VI	VII	VIII
Largemouth bass	**3.8**	**4.1**	**7.9**	**10.7**	**12.4**	**13.5**	**14.7**	**16.6**	**18.3**
N		59	48	35	28	24	16	7	4
State Avg.	(Avg)	3.9	7.3	10.8	12.9	14.5	15.8	16.9	17.7
Yellow perch	**3.8**	**3.1**	**5.3**	**7.0**	**8.2**	**9.3**	**10.0**	**10.5**	**11.0**
N		23	23	21	16	13	10	7	4
State Avg.	(Avg)	3.5	5.5	7.1	8.2	9.1	9.7	10.3	10.7
White perch	**2.1**	**3.8**	**7.7**	**9.8**	**10.8**	**11.5**	**12.0**		
N		6	6	6	6	5	3		
State Avg.	(Fast)	3.9	6.6	8.5	9.7	10.4	10.9		
Bluegill	**4.5**	**1.8**	**2.9**	**4.4**	**5.6**	**6.3**	**7.3**	**7.8**	**8.2**
N		31	28	24	16	11	9	8	7
State Avg.	(<Avg)	1.8	3.6	5.2	6.4	7.1	7.6	7.9	8.1
Pumpkinseed	**3.9**	**1.9**	**3.5**	**4.8**	**6.1**	**7.4**	**8.0**		
N		13	13	10	8	7	6		
State Avg.	(Avg)	2.0	3.6	4.9	5.9	6.5	6.9		


Largemouth Bass
n = 208
Number Captured
Length (cm)


Yellow Perch
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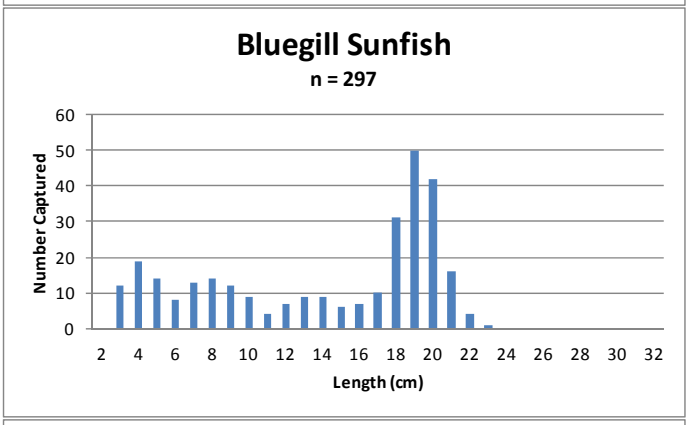
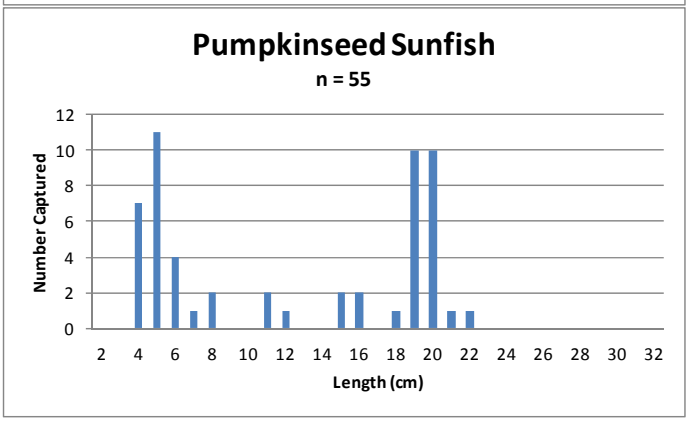
Number Captured
Length (cm)


Bluegill Sunfish
n = 297
Number Captured
Length (cm)


Pumpkinseed Sunfish
n = 55
Number Captured
Length (cm)

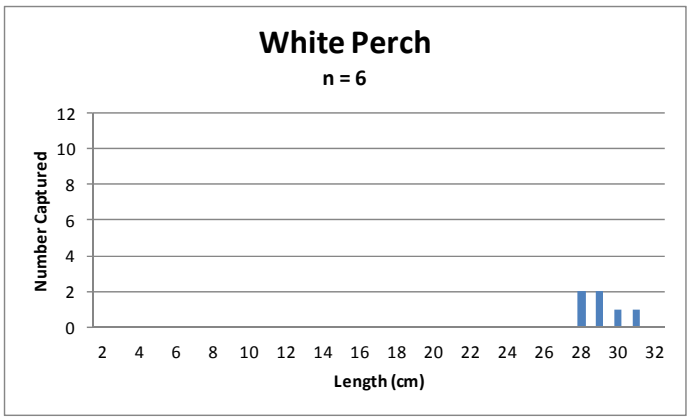


Figure 1. Number captured vs. length(cm)of five different fish species sampled in Plymouth reservoir by boat electrofishing (May 8, 2013). Total number (n) of each fish species sampled is also presented.

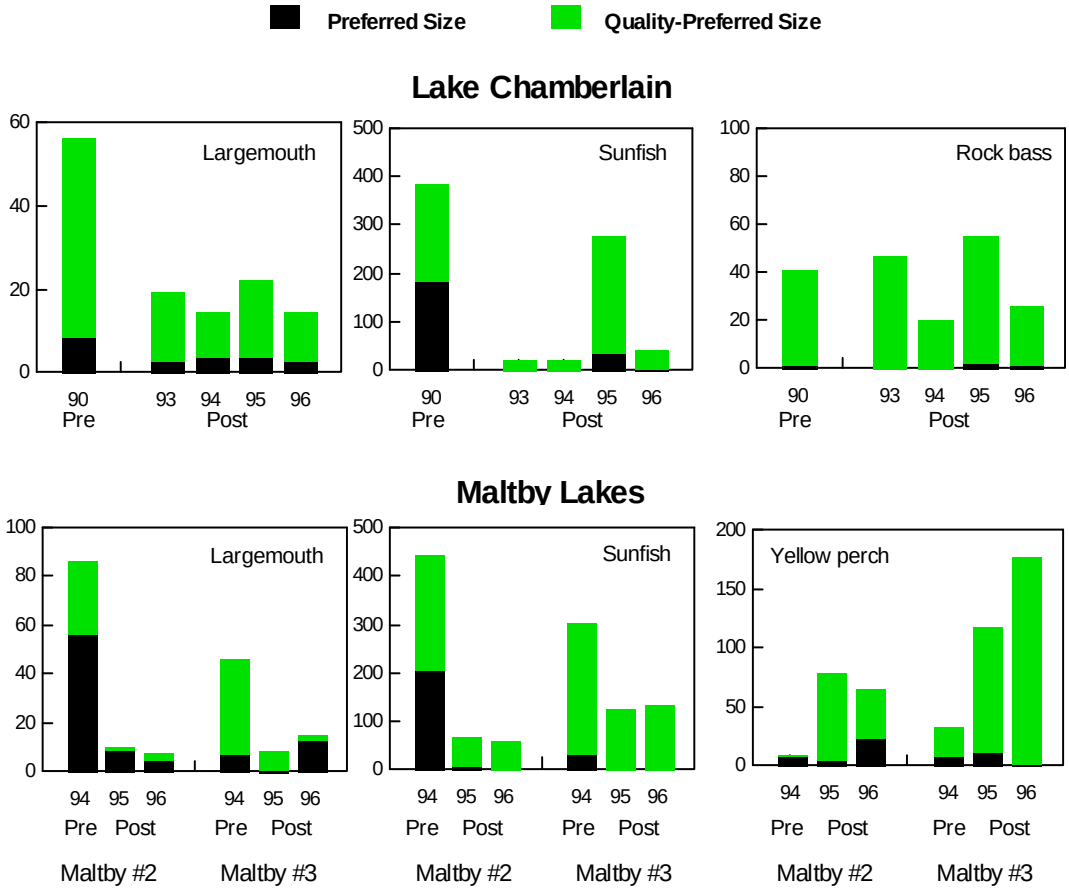


Figure 1. Electrofishing catch/effort (fish/hr) of quality and preferred size fish species before (Pre) and after (Post) opening three previously unexploited Connecticut water supply reservoirs to angling. Quality and preferred sizes used are largemouth 30cm and 38cm, sunfish 15cm and 20cm, rock bass 18cm and 23cm and yellow perch 20cm and 25cm.

Recreational Trail and Greenway Development

This section will discuss the opportunity to consider recreational trail and greenway development and potential links for the Plymouth Reservoir parcel to other state trails and greenways.

Site Visit and Observations

The Town has expressed an interest in utilizing an area of the property for passive recreation and educational opportunities. The Town has established The North St Reservoir Ad Hoc Committee (NSRAHC) which studied the property and, in June of 2013, submitted a report on recommended trail uses and potential next steps. Neighbors are current users and potential stewards. The Town would like to establish a trail link from the property to the U.S. Corps of Engineers Thomaston Dam property (800 acres) in Thomaston, the Naugatuck River Greenway and other trails systems.

Figure 1

All trails established will be unpaved and as low-impact as possible. The Town utilized funds acquired through The DEEP Open Space Grants Program which resulted in The State of Connecticut holding a Conservation and Public Recreation easement on the property "to be retained forever predominantly in its natural, scenic, forested, and/or open space condition, and to provide opportunities for public recreation, while preventing any use that will significantly impair or interfere with the conservation values of the property". DEEP staff has reported to the NSRAHC that no clearing of land would be allowed except for minor brush cutting with DEEP consultation.

The Town is also exploring ways to make the reservoir and dam, located on North Street, more accessible. During the site visit it was noted that there seems to be a good opportunity on North Street, adjacent to and just south of the dam to create a natural-surface parking area- trail head.

Comments

The town requires more detailed site specific information on the suitability of the property for trails so that trails can be built in the lowest-impact and most sustainable manner possible. The town is also seeking information on optimal routing and design considerations.

The Town submitted a grant application to the Recreational Trails Grants Program for the 2013-14 grant round which is currently still active. As the manager of this program this reviewer is familiar with the proposal and would like to note that the Town has done a good job in their submission of envisioning a path to establishment of trails for this property.

Understanding that the trail system will not be paved, this reviewer encourages the Town to research the literature on alternative surfacing options found at American trials website: http://www.americantrails.org/resources/trailbuilding/index.html .

The development of a trail plan is encouraged that might consider the needs of intended users as well as some of the vistas and interesting flora, fauna and geology on site. The development of a trail plan would also allow for well thought out connections to neighboring properties and avoidance of inherent potential conflicts. American Trails also has good trail planning resources and model trail plans. Visit: http://www.americantrails.org/nttp/skills/planning.html CT recreational user clubs such as CT Chapter of the New England Mountain Biking Association and The CT Forest & Park Association can provide, sometimes free of charge, good sources of trail design and installation.

The Recreational Trails & Greenways Program also encourages the Town of Plymouth to:

- Improve any existing trails which might include:
  - Improvements to trail surfaces and drainage;
  - Addition of amenities such as signage (might include allowed uses, safety, directional, interpretive) benches, rest areas, etc.
  - Remove/manage invasive plants that can encroach on trail corridors.
- Develop a property website that would include information on parking availability and allowed uses such as hiking, mountain bikes and equestrian, etc.
- Establish a trail maintenance plan and associated program that could include volunteers (can provide both maintenance and safety patrols) from all user groups and neighbors. I recall that one of the NSRAHC members is a neighbor who grew up using the trails on this property. This type of person would make a great on-site steward.

The Recreational Trails & Greenways Program is available upon request to further assist The Town.

Archaeological and Historic Sensitivity Review

The Office of State Archaeology (OSA) had the opportunity to review the Plymouth Reservoir site for its archaeological and historic sensitivity. A review of the Office of State Archaeology's Site Files and Maps shows no known pre-Contact Native American archaeological sites within the boundaries of the project area. However, the OSA files do show an historic site within one mile proximity of the project area. In addition, the nearness of significant wetlands like the Naugatuck and Pequabuck Rivers suggest a high sensitivity for Native American archaeological resources.

A review of historic town maps indicates that in 1836 there are some houses in the heart of the project area, some of which were inundated with the creation of the reservoir. There could definitely be remnants of these historic resources outside the water boundaries. Also, there are a series of stone walls associated with the property.

Proposed trail development should have minimal impact on any of these historic and archaeological resources, however, the Office of State Archaeology strongly recommends that any land use proposals for the Open Space area be reviewed by OSA for potential archaeological sites. The high sensitivity for cultural resources suggests that any earth moving activities may impact below-ground historic resources. In terms of educational opportunities and interpretive signage, there would need to be an archaeological survey of the property to be specific about the below-ground cultural resources which may exist there. Lacking subsurface testing, general wording about the use of Plymouth Reservoir and surrounding properties by Native Americans could add to the park's interpretation. The OSA would be happy to assist in the wording and possible graphics.

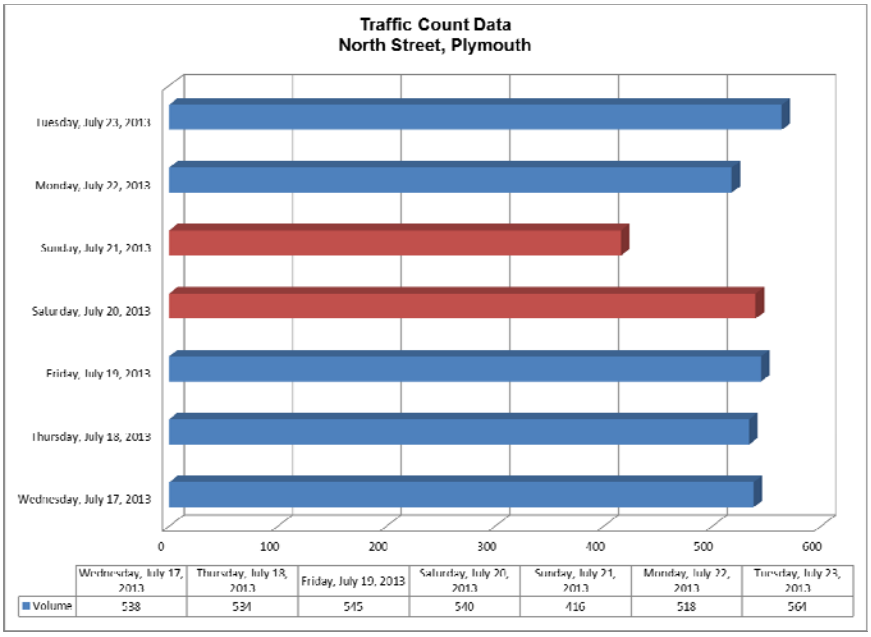
In this regard, the OSA would be more than willing to assist the Town of Plymouth to promote an educational awareness of their cultural resources, and they are prepared to review any proposed land use projects in the project area.

Traffic Review

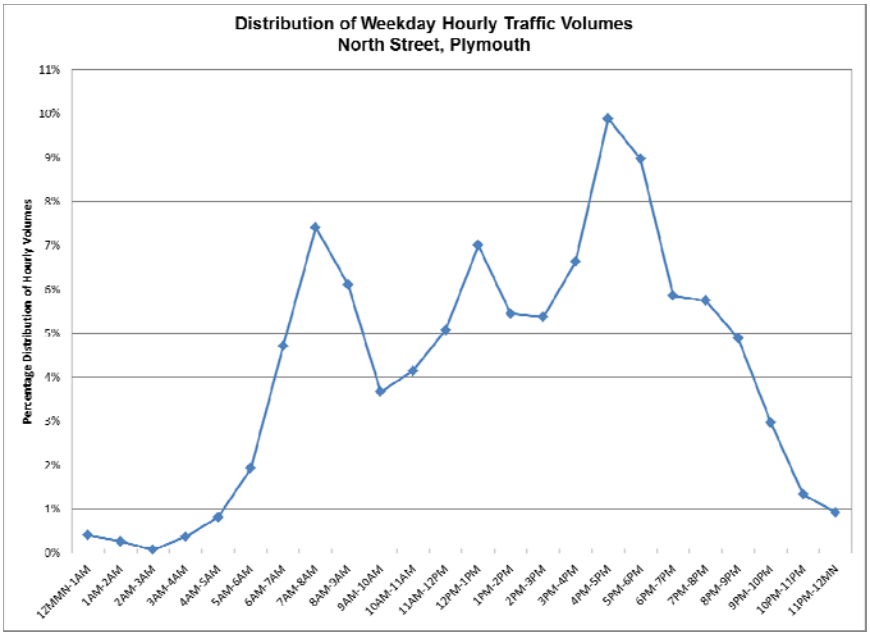
Automatic traffic recorders (ART) were placed along North Street in vicinity of the possible location of a small parking area for visitors to the Plymouth Reservoir. The intent of the traffic count survey was to determine if providing a small parking area along North Street would create a safety hazard for both vehicles travelling along North Street and those using the parking area. The ATRs were set up to collect both volume and speed data and were left at the site for a full seven-day period. This allows a comparison of weekday and weekend traffic flows.The survey was completed in July, 2013, between Wednesday, July 17th and Tuesday, July 23rd.

North Street is functionally classified as an urban local road. It extends from US Route 6 (Main Street) at its south end to North Harwinton Avenue. As a local street, it primarily serves residents living along the road. Through traffic would account for a lower proportion of the traffic volume. By contrast, US Route 6 is classified as a principle arterial and is the primary travel artery through Plymouth and adjacent communities. At the north end of North Street, North Harwinton Avenue is classified as a collector street and serves to collect traffic from the local street network.

Over the course of the count period, daily traffic volumes ranged from 416 vehicles recorded on Sunday, July 21st to a high of 564 vehicles on Tuesday, July 23rd. The average volume on a weekday was about 540 vehicles. The volume on Saturday was the same as the average weekday, while the flow on Sunday was substantially lower. These data indicate a low volume road and confirms the road's function as a local street, serving those who live along North Street.



It should be noted that typically volumes are higher during summer months. However, given the low traffic flows, there would not be significant differences between monthly and seasonal data and the data recorded during the survey are likely representative of average daily volumes throughout the year.



Typically, traffic patterns over the course of a weekday illustrate two peak travel periods; one in the morning time frame and one in the evening. These correspond to typical commuting periods. The data collected during the survey show a morning and evening peak periods, with the morning peak hour occurring between 7:00 am and 8:00 am with about 7.4% of daily volume and the evening peak hour, from 4:00 pm to 5:00 pm, accommodating about 9.9% of the daily traffic. A mid-day peak is also evident. About 7.0% of the daily traffic was recorded between 1:00 pm and 2:00 pm.

The ATRs were also set up to estimate traffic speed. Based on the results, the average traffic speed was estimated at 36 miles per hour. For traffic assessment purposes, the more critical speed measure is the 85th percentile speed. This refers to the speed at which 85% of the traffic is traveling. For this survey, the 85th percentile speed was calculated at 42 mph.

The results of the traffic collection effort indicate that North Street is low volume road with traffic speeds consistent with its geometry and layout. Volumes in the range of 500-to-600 vehicles per day are low and few conflicts are likely. This means that motorists would not encounter problems trying to turn into or from adjacent driveways. And, the speed of most vehicles is not excessive. Based on these data, construction of a small parking area would cause a safety problem and adversely impede the flow of traffic on North Street. It is likely that, given the constraints associated with the property, the parking area would be built along North Street with uncontrolled access. Vehicles would pull into and out of the parking area directly from North Street. A separate access driveway would not be provided. While this configuration and layout may cause traffic concerns on a higher volume road, the low traffic flow on North Street would provide sufficient gaps to allow vehicles parked in the area to safely maneuver onto the road. To ensure adequate operations, the parking area needs to be located along a tangent section of North Street that provides acceptable sight lines and stopping distances for traffic traveling at 42 mph. Any vegetation, including tree branches and shrubs, needs to be removed and controlled to maintain sight lines.

Appendix

CTDEEP Wood Turtle Fact Sheet

CTDEEP Eastern Hognose Snake Fact Sheet

Plymouth Reservoir Resource Management Plan by Jerry Milne (Revised 5/18/13)

North Street Reservoir Ad Hoc Committee Submission 6/9/2013

Connecticut Department of Energy & Environmental Protection

WOOD TURTLE

Glyptemys insculpta

State Species of Special Concern

Background

Wood turtles may be found throughout Connecticut, but they have become increasingly rare due to their complex habitat needs. Wood turtles also have become more scarce in Fairfield County due to the fragmentation of suitable habitat by urban development.

Range

Wood turtles can be found across the northeastern United States into parts of Canada. They range from Nova Scotia through New England, south into northern Virginia, and west through the Great Lakes region into Minnesota.

Description

The scientific name of the wood turtle, *Glyptemys insculpta*, refers to the deeply sculptured or chiseled pattern found on the carapace (top shell). This part of the shell is dark brown or black and may have an array of faint yellow lines radiating from the center of each chiseled, pyramid-like segment due to tannins and minerals accumulating between ridges. These segments of the carapace, as well as those of the plastron (bottom shell), are called scutes. The carapace also is keeled, with a noticeable ridge running from front to back. The plastron is yellow with large dark blotches in the outer corners of each scute. The black or dark brown head and upper limbs are contrasted by brighter pigments ranging from red and orange to a pale yellow on the throat and limb undersides. Orange hues are most typical for New England's wood turtles. The hind feet are only slightly webbed, and the tail is long and thick at the base. Adults weigh approximately 1.5 to 2.5 pounds and reach a length of 5 to 9 inches.

Habitat and Diet

Wood turtles use aquatic and terrestrial habitats at different times of the year. Their habitats include rivers and large streams, riparian forests (adjacent to rivers), wetlands, hayfields, and other early successional habitats. Terrestrial habitat that is usually within 1,000 feet of a suitable stream or river is most likely used. Preferred stream conditions include moderate flow, sandy or gravelly bottoms, and muddy banks.

Wood turtles are omnivorous and opportunistic. They are not picky eaters and will readily consume slugs, worms, tadpoles, insects, algae, wild fruits, leaves, grass, moss, and carrion.

Life History
From late spring to early fall, wood turtles can be found roaming their aquatic or terrestrial habitats. However, once temperatures drop in autumn, the turtles retreat to rivers and large streams for hibernation. The winter is spent underwater, often tucked away below undercut riverbanks within exposed tree roots. Dissolved oxygen is extracted from the water, allowing the turtle to remain submerged entirely until the arrival of spring. Once warmer weather sets in, the turtles will become increasingly more active, eventually leaving the water to begin foraging for food and searching for mates. Travel up or down stream is most likely, as turtles seldom stray very far from their riparian habitats.

Females nest in spring to early summer, depositing anywhere from 4 to 12 eggs into a nest dug out of soft soil, typically in sandy deposits along stream banks or other areas of loose soil. The eggs hatch in late summer or fall and the young turtles may either emerge or remain in the nest for winter hibernation. As soon as the young turtles hatch, they are on their own and receive no care from the adults.

Turtle eggs and hatchlings are heavily preyed upon by a wide variety of predators, ranging from raccoons to birds and snakes. High rates of nest predation and hatchling mortality, paired with the lengthy amount of time it takes for wood turtles to reach sexual maturity, present a challenge to maintaining sustainable populations. Wood turtles live upwards of 40 to 60 years, possibly more.

Conservation Concerns
Loss and fragmentation of habitat are the greatest threats to wood turtles. Many remaining populations in Connecticut are low in numbers and isolated from one another by human-dominated landscapes. Turtles forced to venture farther and farther from appropriate habitat to find mates and nesting sites are more likely to be run over by cars, attacked by predators, or collected by people as pets.

Other sources of mortality include entanglements in litter and debris left behind by people, as well as strikes from mowing equipment used to maintain hayfields and other early successional habitats.

The wood turtle is imperiled throughout a large portion of its range and was placed under international trade regulatory protection through the Convention on International Trade in Endangered Species (CITES) in 1992. Wood turtles also have been included on the International Union for Conservation of Nature's (IUCN) Red List as a vulnerable species since 1996. They are listed as a species of special concern in Connecticut and protected by the Connecticut Endangered Species Act.

How You Can Help

- Conserve riparian habitat. Maintaining a buffer strip of natural vegetation (minimum of 100 feet) along the banks of streams and rivers will protect wood turtle habitat and also help improve the water quality of the stream system. Stream banks that are manicured (cleared of natural shrubby and herbaceous vegetation) or armored by rip rap or stone walls will not be used by wood turtles or most other wildlife species.
- Do not litter. Wood turtles and other wildlife may accidentally ingest or become entangled in garbage and die.
- Leave turtles in the wild. They should never be kept as pets. Whether collected singly or for the pet trade, turtles that are removed from the wild are no longer able to be a reproducing member of a population. Every turtle removed reduces the ability of the population to maintain itself.
- Never release a captive turtle into the wild. It probably would not survive, may not be native to the area, and could introduce diseases to wild populations.
- As you drive, watch out for turtles crossing the road. Turtles found crossing roads in June

and July are often pregnant females. They should not be collected but can be helped on their way. Without creating a traffic hazard or compromising safety, drivers are encouraged to avoid running over turtles that are crossing roads. Also, still keeping safety precautions in mind, you may elect to pick up turtles from the road and move them onto the side in the direction they are headed. Never relocate a turtle to another area that is far from where you found it.

- Learn more about turtles and their conservation concerns, and educate others.
- If you see a wood turtle, leave it in the wild, take a photograph, record the location where it was seen, and contact the Connecticut Department of Environmental Protection Wildlife Division at dep.wildlife@ct.gov, or call 860-424-3011 to report your observation.

The production of this Endangered and Threatened Species Fact Sheet Series is made possible by donations to the Endangered Species-Wildlife Income Tax Checkoff Fund.
(4/11)

Connecticut Department of Energy & Environmental Protection

Eastern Hognose Snake

(Heterodon platirhinos)

IDENTIFICATION: A medium-size stoutly built snake with a distinctive upturned rostral scale, given the appearance of an upturned "nose." The dorsum is highly variable in pattern, some animals are uniformly brown or olive green, others have vivid banding of black alternating with brick red or yellow. The dorsal scales are keeled, the venter yellow with black pigment, the tail quite short. Adult total length 530-820 mm.

The hognose snake's center of distribution in Connecticut is the extensive glacial sand and gravel deposits that span the central portions of the eastern and western hills. It has been found up to 1,200 feet. In the Central Connecticut Lowland and coastal zone, there are far more historical records than recent sightings, indicating that this species has declined in this more intensely developed part of the state. Hognose snakes appear to occur at very low population levels when compared with other snakes. Declines of hognose snakes have been reported along the entire northern limit of their range, from New England westward to Michigan. The hognose is a "Special Concern" species in Connecticut, and under the Connecticut Code (Sec. 26-55-3-E) possession is limited to a single specimen.

Snakes | Amphibians and Reptiles in Connecticut

11) Natural Resources:

PLYMOUTH RESERVOIR

Plymouth, CT

Resource Management Plan

By Jerry Milne

Revised May 18, 2013

Background Information

The Town of Plymouth acquired the Plymouth Reservoir property from the Connecticut Water Company (CWC) on May 15, 2012. Grants from the State of Connecticut Open Space and Watershed Protection Program ($650,000) and the Federal Highway Administration's Public Lands Highways Discretionary Program ($800,000) paid for the acquisition. The purpose of the Federal grant was to enable an eventual connection to the Army Corps of Engineers (federal property) Thomaston Dam and the planned Naugatuck Valley Greenway.

The property consists of 178.28 acres: 138.79 acres of land and the 39.49 acre reservoir, based on a survey entitled "Perimeter Survey of 210 North Street, Plymouth, CT, prepared for Connecticut Water", dated March 11, 2010.

The State of Connecticut holds a Conservation and Public Recreation easement on the property "to be retained forever predominantly in its natural, scenic, forested, and/or open space condition, and to provide opportunities for public recreation, while preventing any use that will significantly impair or interfere with the conservation values of the property".

CWC retained a 2-acre parcel around its water storage tank on North Street. This tank is used by CWC for distributing water from its wells in Terryville and Thomaston. CWC has a permanent drainage easement to discharge water from its tank into the reservoir.

History of the Reservoir

According to "Annals of an Old New England Church" by Marshall Leach, in 1766, there was a sawmill below the dam of the present day reservoir. The 1895 Centennial History of Plymouth indicated that this same mill site, at what was then called Mattoon's Pond, was used for a metal stamping factory that supplied parts for the Ives Toy Factory in Plymouth Center.

In the 1880s, the reservoir was created to provide drinking water for Thomaston.

Figure 1. 1934 aerial photo from UCONN CLEAR website. Much of the watershed was agricultural land.

Location

The primary access to the property is from the east side of North Street, between Whitney Court and Blakeman Road. There is a grassy area just south of the dam that provides a view of the reservoir. The property also has small amounts of frontage at its northernmost end on North Street, and its southernmost end on West Harwinton Avenue.

Landscape Context

The property is bordered primarily by wooded and lightly developed residential land. To the east are nearby agricultural lands including a blueberry farm and a Christmas tree plantation. The nearest permanent open space is owned by the Plymouth Land Trust, which has 30 acres on North Street. The closest point is about 500 feet from the southern boundary of the reservoir property.

Reservoir Information

The reservoir was a source of drinking water until 1985. The most recent water quality sampling was conducted by CWC in October, 2010. The water quality is classified as AA, suitable for swimming.

According to Cindy Gaudino of CWC (*personal communication*), the deepest part of the reservoir is near the dam, where it is about 6 feet. Most of the rest of the reservoir is about 4 feet deep.

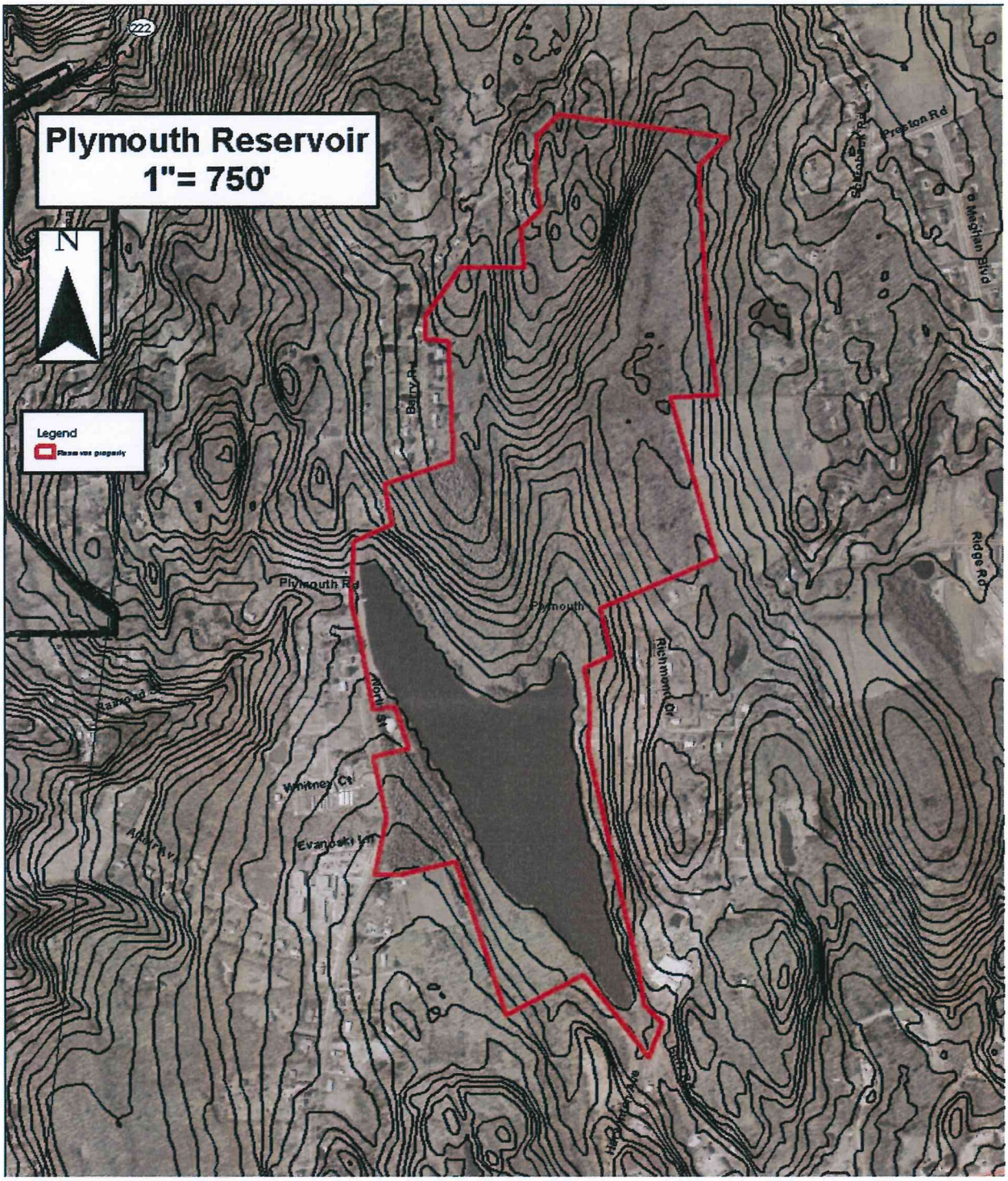


Figure 2. 2004 aerial photo with property lines and topographic contours

In the fall of 1986, CWC drained the reservoir to work on the dam.

Figure 3. Reservoir at draw down for dam maintenance, Oct. 1986.
Photo credit: Bill Pratt

The primary tributary is an unnamed brook that drains southward from the northeastern portion of the land, between North Street and Shroback Road. Most of the watershed of the reservoir is included in the property, which should protect water quality.

The outlet stream from the reservoir flows westerly into the Naugatuck River, which eventually drains into the Housatonic River.

Topography

The property is linear, running roughly north-south in line with the primary tributary. The lowest point on the parcel is at the dam (692 feet in elevation). The highest point is in the northern portion, the "Northern Uplands", near North Street, at 900 feet. Near here is a steep slope characterized by rock shelters that, according to local lore, may have been used by "the Leatherman" in the late 1800s.

The section from north of the reservoir to North Street is bisected by wetlands that border the unnamed tributary.

Boundary Lines

An A-2 survey was provided to the Town before the land acquisition.

There are approximately 18,000 feet of property lines. They were all marked by CWC with yellow paint, hatchet blazes, and yellow "No Trespassing Signs".

Encroachments

Along the southwestern portion of the property there has been some fairly recent ATV activity and some felling and removal of trees, apparently for firewood. There are significant encroachments behind the houses on Barry Road, where neighbors have dumped yard waste and pet droppings, and have expanded their backyards by mowing what is now Town property.

At 222 North Street, the neighbor has installed an invisible dog fence on Town property and also appears to have cleared Town land for his use.

All of these adjacent landowners must be notified by the Town to stop encroaching.

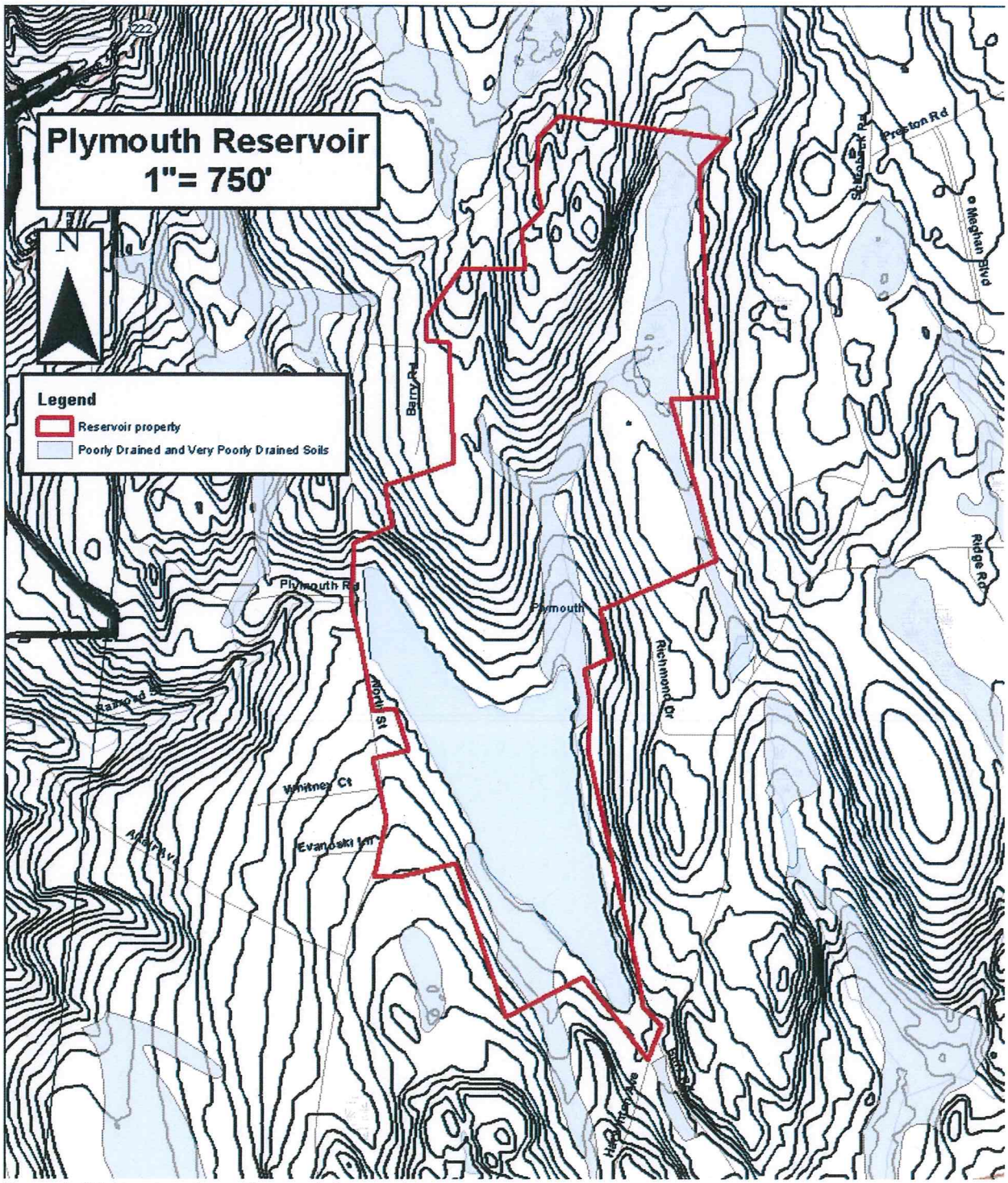


Figure 4. Wetlands soils on Plymouth Reservoir property

Soil Descriptions (refer to soils map for soils codes)

SOILS CODE	SOILS NAME	DESCRIPTION
3	Ridgebury, Leicester, and Whitman soils, extremely stony	Wetlands soils, poorly drained.
17	Timakwa and Natchaug soils	Wetlands soils, very poorly drained, mucky.
45B	Woodbridge fine sandy loam, 3-8% slopes	Moderately well-drained soil with a hardpan; perched water table from fall through spring (18-30" below the surface).
52C	Sutton fine sandy loam, 2-15% slopes	Moderately well-drained soil with a hardpan; perched water table from fall through spring (18-30" below the surface).
61C	Canton and Charlton soils, 8-15% slopes, very stony	Well-drained soil, fertile. Quick to dry out in spring.
62C &D	Canton and Charlton soils, 3-35% slopes, extremely stony	Well-drained soil, fertile. Quick to dry out in spring.
73C &E	Charlton-Chatfield complex, 3-45% slopes, very rocky	Well-drained soil. Quick to dry out in spring.
75C	Hollis-Chatfield Rock outcrop complex, 3-15% slopes.	Rock ledge, shallow to bedrock.
85B &C	Paxton and Montauk soils, 3-15% slopes, very stony.	Moderately well-drained soil with a hardpan; perched water table from fall through spring (18-30" below the surface).
309	Udorthents, flood control	Manmade dam.

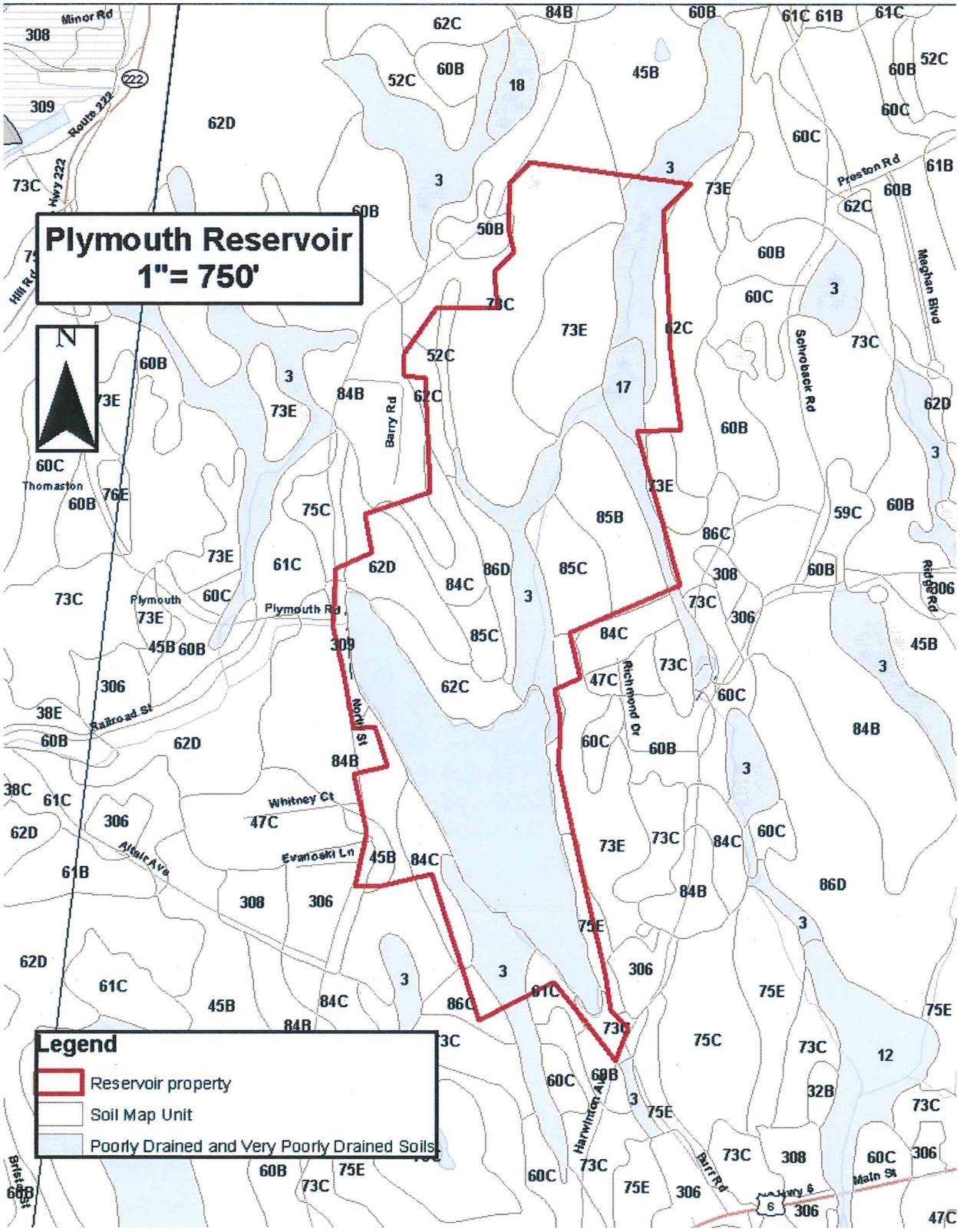


Figure 5. Soils Map for Plymouth Reservoir property

Recreational Uses-*to be provided by Subcommittee*

Fisheries *(to be provided by DEEP Fisheries-electroshocking study scheduled for May 2013)*

Wildlife

The land provides upland forested habitat for a variety of animals common to Connecticut, including white-tailed deer, raccoon, bobcat, gray squirrel, black bear, and wild turkey, and coyote. Interior forest birds such as veery, wood and hermit thrush, and red-eyed vireo are likely found here also. Conifer cover is mostly confined to the white pine plantations, which can provide habitat for red squirrels and owls. There is also some scattered hemlock and mountain laurel that provide cover also.

The wetlands are breeding habitat, foraging sites, and travel corridors for reptiles and amphibians. Wetlands are also used by upland wildlife species for seasonal habitat requirements. The reservoir provides habitat for turtles and waterfowl, including wood ducks and Canada geese. Vegetation adjacent to the reservoir or flowing water provides nesting sites for migratory songbirds during the breeding season and resting and foraging locations during the migration season. Two or three wood duck boxes could be installed in the reservoir.

According to the DEEP Wildlife Division, the property is suitable for bowhunting for deer and turkey, at the recommended rate of one permit per 20 acres of huntable land. Permits can be issued by the Town on a daily, weekly, monthly, or seasonal basis if desired. The land north of the Reservoir would be most suitable for hunting, with access at the northern end of North Street.

Endangered, Threatened, or Species of Concern

Natural Diversity Database maps maintained by the Connecticut Department of Energy and Environmental Protection (revised June 2012) indicate that there are no listed species on the property.

Forest Condition

Management plan provided by CWC's forestry consultant is attached

The management plan provided by CWC indicates that most of the stands are overstocked. In other words, the trees are growing too closely for optimum growth. There is potential for revenue from sustainable timber harvesting of sawlogs and firewood by carefully selecting trees for removal. Trees to be removed would primarily be those with poor form (crooked, forked), undesirable species, trees not likely to survive in the next 10 years, or to provide better quality trees more growing space.

At one of our meetings, Allyson Clarke, DEEP representative said that timber harvesting would be permitted under the conservation easement held by DEEP as long as there was an approved forest management plan.

Forest Health

Non-native (exotic) invasive plants- roughly 10 acres of the forest immediately east of the dam and north of the reservoir has a thick understory of Japanese barberry (this is part of Stand 1 from the CWC forest management plan). This shrub often grows in the understory of forests that were formerly in agriculture. Research (Ward, 2013) has shown that deer tick populations are much higher in areas with thick barberry compared to areas where native plants predominate. This is probably because of the higher humidity near the forest floor. In addition, the percentage of ticks carrying the Lyme Disease bacteria is much higher. As a result, the incidence of Lyme Disease can be much greater. In addition, any openings in the forest canopy from storms, timber harvesting, or dying trees (such as from Emerald Ash Borer) will allow the barberry to flourish at the expense of native shrubs.

Reducing the size of the barberry thickets causes a large decline in tick populations.

The most effective way to kill the barberry is to hire a licensed applicator to selectively spray herbicide on the barberry in mid-April when it is greening up, before the native shrubs begin to grow. It would cost about $450 per acre.

Non-native insects and diseases- the primary threat to forest health are exotic insects and diseases for which native trees have no defense mechanisms. For example, Emerald Ash Borer, a native of Asia, was recently discovered in New Haven County. This insect has killed millions of ash trees in the Mid-West since the infestation first became apparent in the 1990s.

The Reservoir property has ash trees in Stand 1 which could be killed by the Emerald Ash Borer within the next 10 years. This needs to be taken into account when planning trails and other recreational activities.

Natural Resource Recommendations for the next 10 years

1. **Maintain boundary lines**

   Mark all boundary lines with yellow paint while the old CWC paint is still visible and the survey markers are easily identified. Remove the "CWC No Trespassing" signs and replace with "Town Property" signs. Boundary lines should be remarked every 10 years.

2. **Conduct a small timber harvest in the southwest portion of Stand 1 and in Stand 6, as recommended by the CWC forest management plan.**

   Revenue from the timber harvest could be allocated to improvements in the property such as parking, signs, trails, and controlling invasive plants, such as barberry.

3. **Control barberry north of reservoir to restore native habitat and reduce tick population.**

   This involves selective spraying of approved herbicide to kill barberry plants.

4. **Institute a bowhunting program for deer and turkey, in accordance with DEEP hunting regulations.**

   Permits to be issued by the Town at the rate of 1 permit per 20 huntable acres.

References

Atwater, Francis. History of the Town of Plymouth Connecticut. 1895.
Leach, Marshall. Annals of an Old New England Church. 1939.
Ward, Jeffrey, Williams, Scott, and Worthley, Thomas. Japanese Barberry Control Methods, Special Bulletin, February 2013.
Connwood Foresters, Forest Management Plan for Plymouth Reservoir. 2003.

Appendix

Aerial photo of Forest Stands (Figure 6)
Forest Stand Descriptions (Figures 7 and 8)
Japanese Barberry Control Methods, Reference Guide (pages 1,2,3 and 11 from the publication)

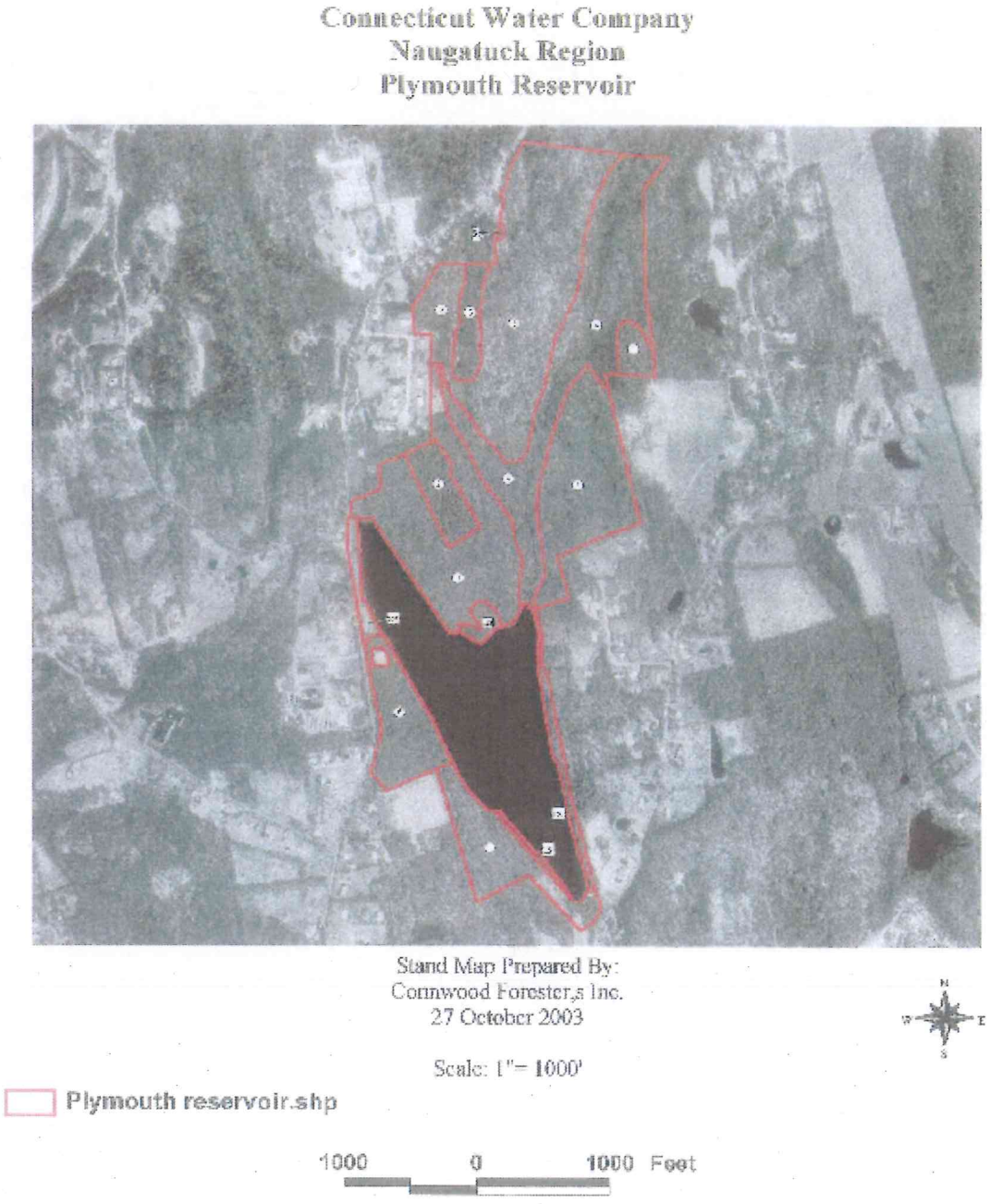


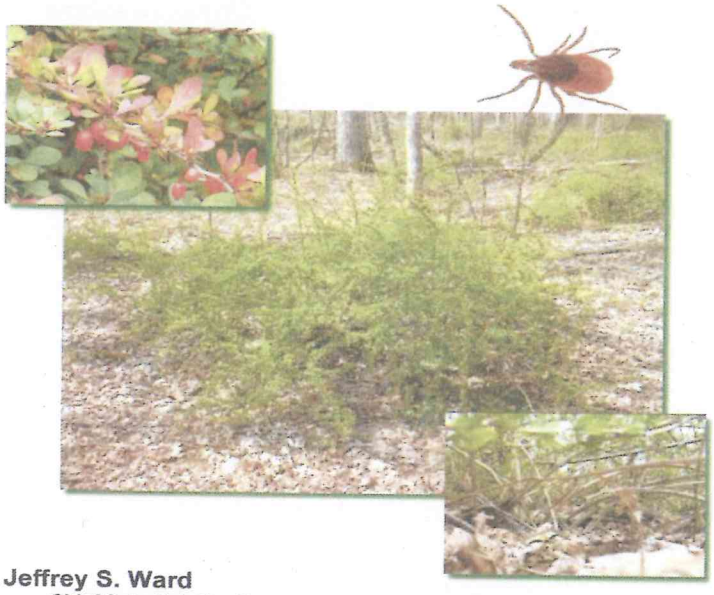
Figure 6. Map of Forest Stands for Plymouth Reservoir

Japanese Barberry Control Methods

Reference Guide for

Foresters and Professional Woodland Managers

Special Bulletin – February 2013



Jeffrey S. Ward
Chief Scientist, The Connecticut Agricultural Experiment Station

Scott C. Williams
Assistant Scientist, The Connecticut Agricultural Experiment Station

Thomas E. Worthley
Associate Extension Professor, University of Connecticut

In conclusion, the final activities and uses of the property will require the working together of many boards and commissions within the town for the benefit of the residents of the town and state.

NORTH ST RESERVOIR AD HOC COMMITTEE SUBMISSION

6/9/2013

1) Charge: from pg 13 of the June 5th council meeting minutes:

"...to establish an Ad Hoc Committee, which would be charged with the responsibility of developing appropriate recreational activities, as well as rules and procedures for the Plymouth Reservoir."

2) Members:

David Dudley	Mark Galvin	Howard Gomme
David Goodwin	Diane Gore	William Hamzy
Rick Hebert*	William Lawrence	David LeClerc
Marie MacDermid	Jerry Milne	Robert Nelson**
John Pajeski	Roxanne Peruginio*	Frank Porter
Elizabeth Sterner	John Wunsch	

* - resigned, ** - passed away

Liaisons:

Vicky Carey - Finance	Jim Deutsch - Wetlands	Sue Murawski - Council
Jim Schultz - Public Works	Gerry Bourbonniere - Park & Rec	

3) Grant easement:

Constituent Affairs\Land Management Division VOLUME_____

Department of Energy and Environmental Protection

79 Elm Street PAGE

_____

Hartford, CT 06106-5127

EXHIBIT C

CONSERVATION AND PUBLIC RECREATION EASEMENT AND AGREEMENT

MUNICIPALITY OF PLYMOUTH PLYMOUTH RESERVOIR OSWA-393

TO ALL PEOPLE TO WHOM THESE PRESENTS SHALL COME, GREETING:

WHEREAS, The Town of Plymouth holds title to 178.28± acres of real property in the territorial limit of the Town of - Plymouth, formerly of Connecticut Water Company, 93 West Main Street, Clinton, Connecticut.

WHEREAS, in addition to its value as a natural area, said property is also a scenic resource of the State of Connecticut and can provide access to especially valuable water-related recreational opportunities for the general public;

WHEREAS, the preservation of the above mentioned land and water resources will yield a significant public benefit for passive recreation and open space protection;

WHEREAS, the anticipated use of the land by the Town of Plymouth is consistent with the Department of Energy and Environmental Protection's (DEEP) conservation and preservation interests, and the Town of Plymouth has a shared interest with DEEP in seeing that these conservation-minded practices continue;

WHEREAS, the State of Connecticut has established The Open Space and Watershed Land Acquisition Grant Program to provide grants to municipalities and nonprofit land conservation organizations to acquire land or permanent interests in land for open space and watershed protection and to water companies, as defined in Connecticut General Statutes (CGS) Section 25-32a, to acquire and protect land which is eligible to be classified as Class I or Class II land, as defined in CGS Section 25-37c, after acquisition;

WHEREAS, all lands or interests in land acquired under The Open Space and Watershed Land Acquisition Grant Program shall be preserved in perpetuity predominantly in their natural and scenic and open condition for the protection of natural resources while allowing for recreation consistent with such protection and, for lands acquired by water companies, allowing for the improvements necessary for the protection or provision of potable water;

WHEREAS, a permanent Conservation Easement, as defined in CGS Section 47-42a, shall be executed for any property purchased with grant funds through The Open Space and Watershed Land Acquisition Grant Program and which Conservation

Easement shall provide that the property shall remain forever predominately in its natural and open condition for the specific conservation, open space or water supply purpose for which it was acquired;

WHEREAS, the Conservation Easement shall be in favor of the State acting through its Commissioner of Energy and Environmental Protection;

WHEREAS, such Conservation Easement shall include a requirement that the property be made available to the general public for appropriate recreational purposes, the maintenance of which recreational access shall be the responsibility of the Town of Plymouth;

WHEREAS, the Town of Plymouth and the State of Connecticut agree that limited public recreation on said property can be provided without significant impact to the natural resources on said property, conservation of those resources having been the primary reason for its acquisition by the Town of Plymouth.

NOW, THEREFORE, the TOWN OF PLYMOUTH, a municipal corporation having its territorial limits within the County of Litchfield and State of Connecticut, (the "Grantor"), for One Dollar ($1.00) and other good and valuable consideration received to its full satisfaction of the STATE OF CONNECTICUT, a sovereign, (the "Holder") and in consideration of the mutual covenants, terms, conditions and restrictions herein contained, GRANTOR, its successors and assigns, does hereby give, grant, bargain, sell, convey and confirm in perpetuity unto the HOLDER and its successors or assigns forever with Warranty Covenants, a Conservation and Public Recreation Easement ("Conservation Easement") in perpetuity, of the nature and character and to the extent hereinafter set forth, over property situated in the Town of Plymouth, County of Litchfield, State of Connecticut, (the "Protected Property"), as described in Schedule A.

1. Purpose. It is the purpose of this Conservation and Public Recreation Easement to assure that the Protected Property will be retained forever predominantly in its natural, scenic, forested, and/or open space condition, and to provide opportunities for public recreation on the Protected Property, while preventing any use of the Protected Property that will significantly impair or interfere with the conservation values or interests of the Protected Property, described above. It is the intent of this Conservation Easement that any management activities or alterations of the natural landscape or provision for access or recreation shall be consistent with the conservation purposes above.

2. Development Rights and Restrictions. No building, residential dwelling, structure, parking lot, driveway, road or other temporary or permanent structure or improvement requiring construction shall be placed upon the Protected Property except as provided hereinbelow, the following reservations to be consistent with the conservation and public recreation purposes above:

a) Grantor reserves the right to maintain existing unpaved driveways, footpaths and other minor surface alterations; to excavate and fill as necessary to accomplish permitted building, recreational and silvicultural activities; and to construct, maintain and reconstruct additional unpaved footpaths or minor, roofless rustic improvements necessary or appropriate to assure safe passage, prevent erosion, or to enhance or protect the natural habitat.

b) All rights reserved herein by the Grantor may only be exercised subject to all applicable governmental permits and approvals required by law. Nothing herein shall commit the Holder to grant any such approval or permit.

c) Grantor reserves the right to add: sand to the beach/swimming area; a gravel parking area; port-o-pots; a dog park; paddle boating area; bocci ball courts and horseshoe pits.

d) Grantor reserves the right to manage and monitor the Protected Property for rare and endangered species, such activities including, but not limited to:

1) The rerouting or closing of trail segments or public access points that pose a substantial threat to protected species, provided that a system of public access trails remains open to the public at all times;

2) The right to grant access to the site for research;

3) Use of the Protected Property for educational and outreach purposes, including limited attendance walks and on-site stewardship training programs.

Grantor agrees that the activities or uses contemplated above shall not unreasonably interfere with the use of the Protected Property by the general public. All rights not specifically granted are hereby reserved by Grantor.

3. Provision of Public Recreation. The Grantor agrees to allow the public access to the Protected Property for passive recreational purposes and to use such trails or other facilities as they may exist or be developed, or where such use is permitted by the Department of Health on Class I and Class II Watershed Land. The public shall be defined as any resident of any municipality, state, country or nation. The Grantor may develop passive recreational facilities and support facilities for those passive activities on the Protected Property if none exists. Except as provided above, passive recreation shall be defined as recreational trail usage (non-motorized), recreational activities which do not require a formalized delineated playing field or area, picnicking, fishing, hunting, cross-country skiing, non-motorized boating and environmental education.

4. Other activities. No commercial, industrial, quarrying, or mining activities are permitted on the Protected Property.

5. Water Protection and Waste Disposal. The use of chemical herbicides, pesticides, fungicides, fertilizers and other agents must be limited to prevent any demonstrable adverse effect on wildlife, waters, and other important conservation interests to be protected by this Conservation Easement.

It is forbidden to dispose of or to store rubbish, garbage, debris, abandoned equipment, parts thereof, or other unsightly, offensive, toxic or hazardous waste material on the Protected Property except that vegetative waste may be composted, and other waste generated by permitted uses on the Protected Property may be stored temporarily in appropriate containment for removal at reasonable intervals, subject to all applicable local, state, and federal laws and regulations.

The Grantor covenants and represents that, to the best of Grantor's knowledge, no hazardous substance or toxic waste exists nor has been generated, treated, stored, used, disposed of, or deposited in or on the Protected Property, and that there are not now any underground storage tanks located on the Protected Property.

6. Costs and Taxes. Grantor acknowledges that the Holder has no possessory rights in the Protected Property, nor any responsibility or right to control, maintain, or keep up the Protected Property. Grantor is responsible to pay and discharge

when due all property taxes and assessments and to avoid the imposition of any liens that may impact Holder's rights hereunder. Grantor is responsible for all costs and responsibility of ownership, control, operation, maintenance, and upkeep of the Protected Property and will, to the fullest extent permitted by law, defend, release, relieve, hold harmless, and indemnify Holder, its officers, directors, agents, and employees therefrom and from any claims for damages which arise therefrom, except for harm caused by the negligent act or misconduct of Holder, or as may arise out of its workers' compensation obligations. This provision shall not be construed as a waiver of sovereign immunity.

Grantor shall pay before delinquency all taxes, assessments, fees, and charges of whatever description levied on or assessed against the Protected Property by competent authority (collectively "taxes"), and shall furnish Holder with satisfactory evidence of payment upon request. In order to assure the continued enforceability of this Conservation Easement, the Holder is authorized, but in no event obligated, to make or advance any payment of taxes, upon three (3) days prior written notice to Grantor, in accordance with any bill, statement, or estimate procured from the appropriate authority, without inquiry into the validity of the taxes or the accuracy of the bill, statement, or estimate, and the obligation created by such payment shall bear interest until paid by Grantor at the lesser of two (2) percentage points over the prime rate of interest from time to time announced by J.P. Morgan Chase Bank or the maximum rate allowed by law. Holder shall have the right to place a lien on property of the Grantor in the event that the payment is not reimbursed to Holder within thirty (30) days.

7. Subdivision Limitation and Subsequent Transfers. The Protected Property must remain as an entity in a single ownership, and may not be divided, subdivided, partitioned or otherwise separated into parcels or lots, whether or not said Protected Property may be described herein, or have been described in any prior deed, as more than one piece or parcel of land.

Grantor agrees that the terms, conditions, restrictions, and purposes of this grant or reference thereto will be inserted by Grantor in any subsequent deed or other legal instrument by which the Grantor divests either the fee simple title or possessory interest in the Protected Property, and Grantor further agrees to notify Holder of any transfer at least thirty (30) days in advance thereof.

8. Miscellaneous.

a) Grantor represents that as of the date of this grant there are no liens or mortgages outstanding against the Protected Property. The rights of the Holder to enforce the terms, restrictions and covenants created under this Conservation Easement shall not be extinguished by foreclosure of any mortgage or any publicly or privately placed lien, regardless of any subsequently placed mortgage or lien.

b) If any provision(s) of this Conservation Easement or the application thereof to any person or circumstance is found to be invalid, the remainder of the provisions of this Conservation Easement and the application of such provisions to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

c) Any uncertainty in the interpretation of this Conservation Easement should be resolved in favor of conserving the Protected Property in its natural and scenic state.

d) If this Conservation Easement is extinguished by court order, or the powers of eminent domain, the proceeds of any taking or sale of the unrestricted property shall be divided between Grantor and Holder in the same proportion as the value of their respective interests, so calculated, as of the date of this grant, excepting any part of such proceeds attributable to improvements to the Protected Property made after the date of this grant. Holder will use such proceeds for its conservation purposes.

9. Remedies and Enforcement.

a) This Conservation Easement granted hereby constitutes a Conservation Restriction on the Protected Property in favor of the Holder and its successors and assigns pursuant to CGS Section 47-42a, as amended. Pursuant to CGS Section 47-42b, as amended, this Conservation Easement shall not be unenforceable on account of lack of privity of estate or contract or lack of

benefit to particular land. Pursuant to CGS Section 47-42c, this Conservation Easement may be enforced by injunction or proceedings in equity, or in any other manner permitted by law. It is further agreed by the parties that the Conservation Easement granted hereby may be enforced at law or in equity.

b) The failure or delay of the Holder, for any reason whatsoever, to enforce this Conservation Easement shall not constitute a waiver of its rights and Grantor hereby waives any defense of laches, prescription, or estoppel.

c) Grantor is not responsible for injury to or change in the Protected Property resulting from "acts of God" so called, such as, but not limited to, fire, flood, storm, and earth movement, or from any prudent action taken by Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Protected Property resulting from such causes. If a Court (or other decision maker chosen by mutual consent of the parties) determines that this Conservation Easement has been breached, Grantor will reimburse Holder for any reasonable costs of enforcement, including court costs, reasonable attorneys' fees, and any other payments ordered by such Court.

d) The terms and conditions of said Conservation Easement hereinabove set forth shall be binding upon and inure to the benefit of the Holder and its successors or assigns. However, said Conservation Easement shall not entitle the Holder or its successors or assigns to any right of entry or use of the Protected Property except as provided herein and for periodic inspections in a reasonable manner and at reasonable times to ensure compliance with the conservation and recreation purposes above.

e) The captions herein have been inserted solely for convenience of reference and are not a part of this Conservation Easement and shall have no effect upon construction or interpretation.

10. Notices. Any notice to Holder required hereunder must be made by certified mail, return receipt requested, addressed to:

State of Connecticut

Department of Energy and Environmental Protection

Office of the Commissioner

79 Elm Street

Hartford, CT 06106

or such other address as may be furnished in writing.

Any notice to Grantor required hereunder must be made by certified mail, return receipt requested, addressed to:

Office of the Mayor

Town of Plymouth

80 Main Street

Terryville, CT 06786

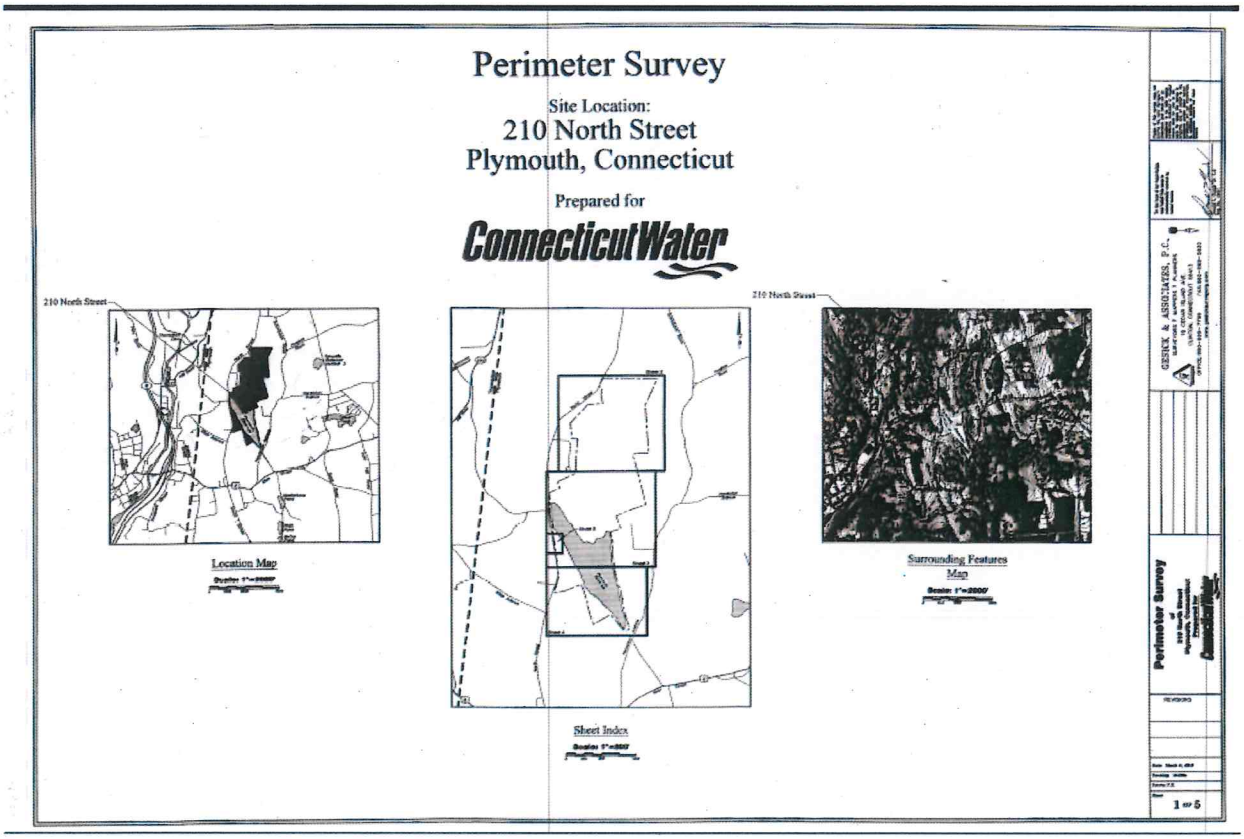
or such other address as may be furnished in writing.

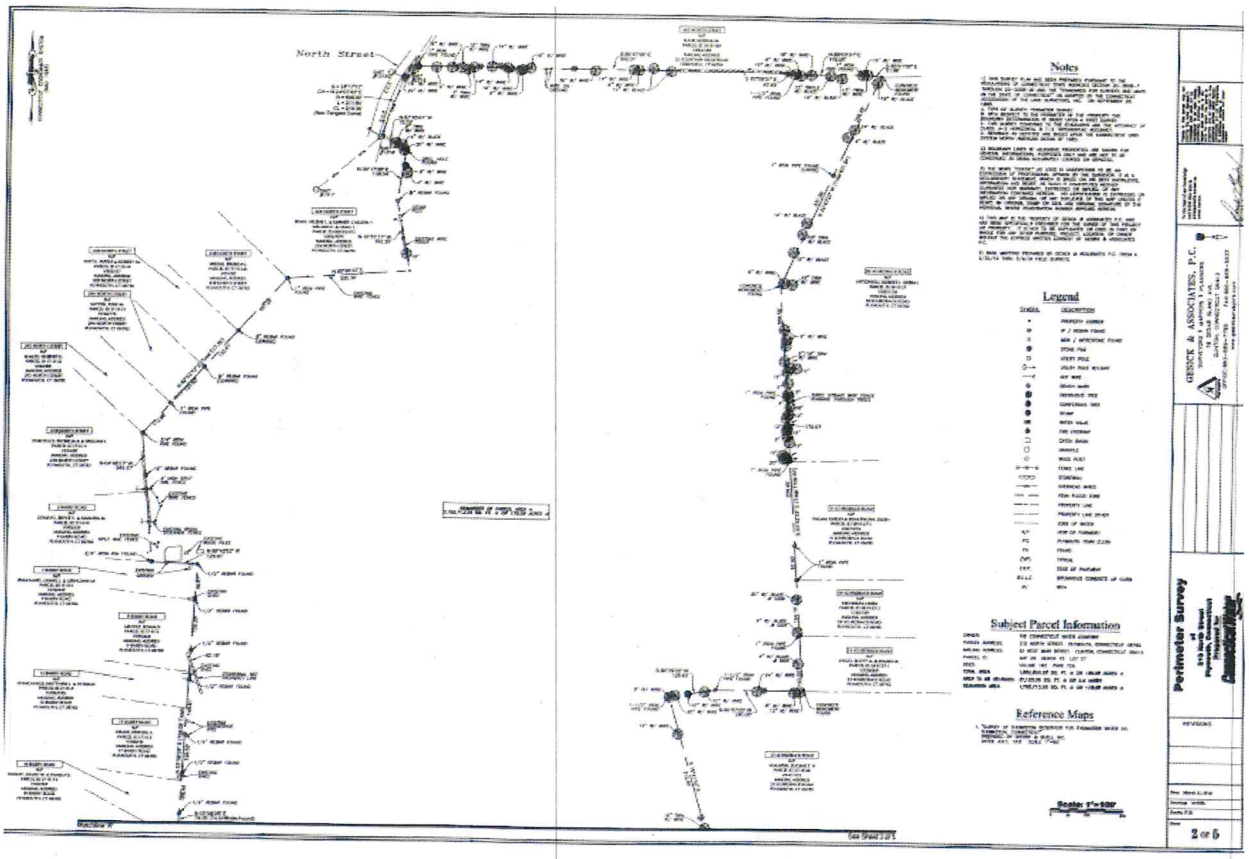
Any notices to Holder or requests for Holder consent, required or contemplated hereunder, must include, at a minimum, sufficient information to enable the Holder to determine whether proposed plans are consistent with the terms of this Conservation Easement and the conservation and recreation purposes hereof.

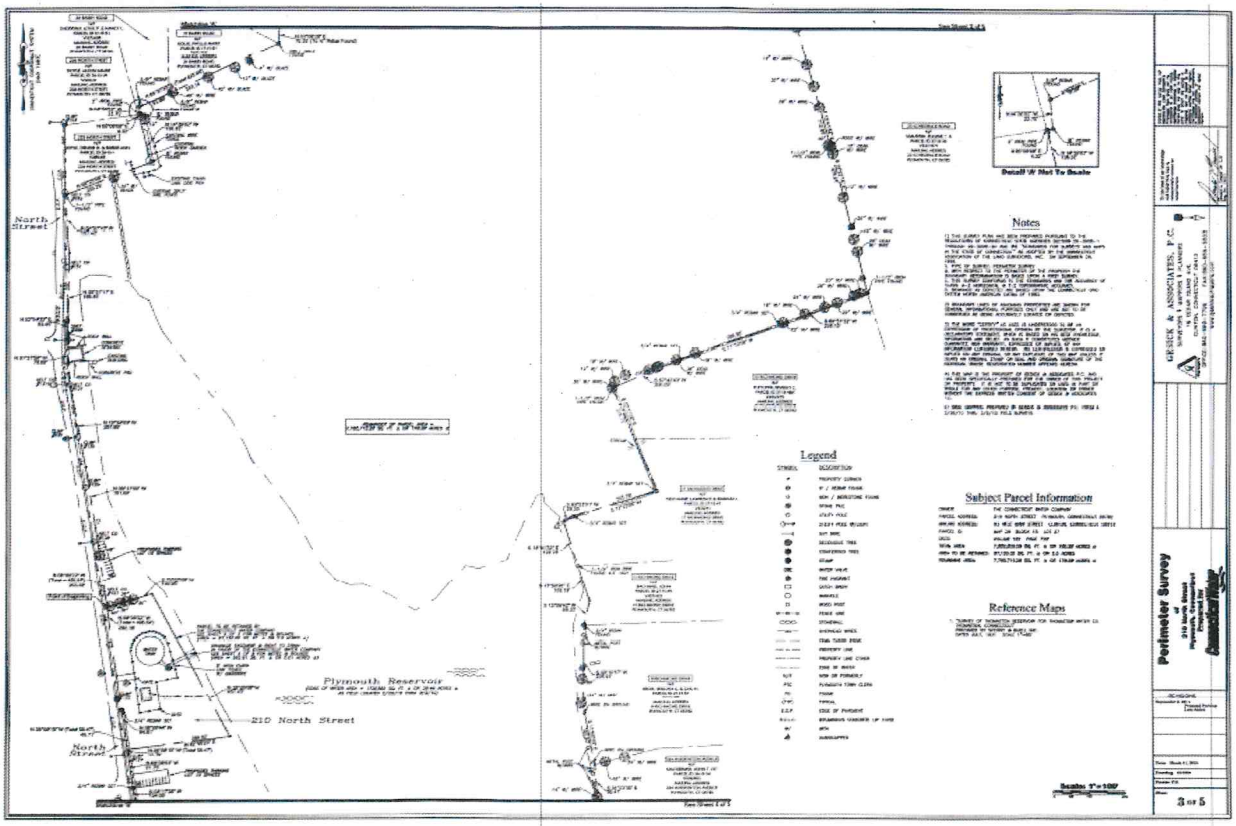
TO HAVE AND TO HOLD the above granted and bargained Conservation Easement unto the said Holder and its successors and assigns forever.

AND THE GRANTOR, its successors and assigns, does COVENANT with the Holder that it will WARRANT AND DEFEND the Protected Property to the said Holder and its successors and assigns forever, against the lawful claims and demands of all persons claiming by, through or under it.

4) Map:




North Street
Notes
Legend
Subject Parcel Information
Reference Maps
Perimeter Survey
GESICK & ASSOCIATES, P.C.
2 of 5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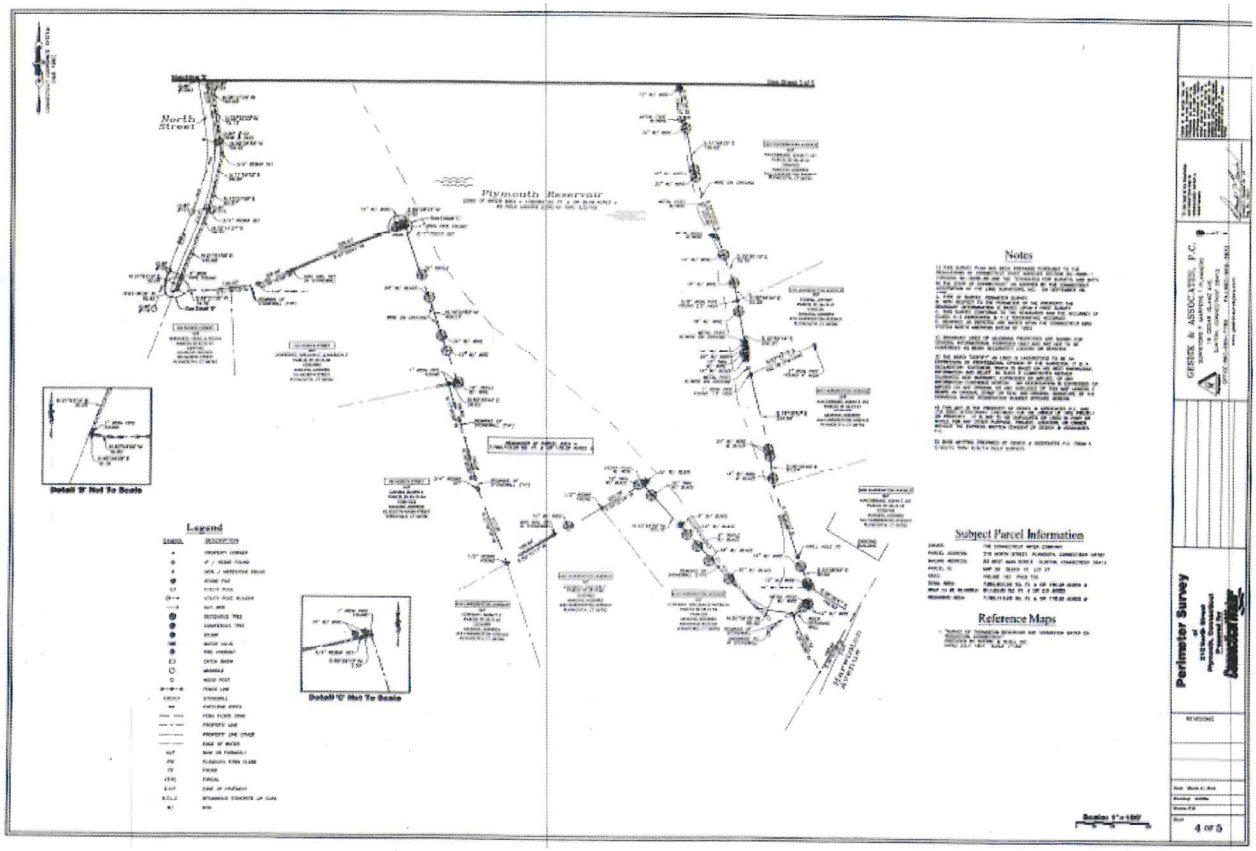
Plymouth Reservoir
210 North Street
Notes
Legend
Subject Parcel Information
Reference Maps
Perimeter Survey
GESICK & ASSOCIATES, P.C.
3 of 5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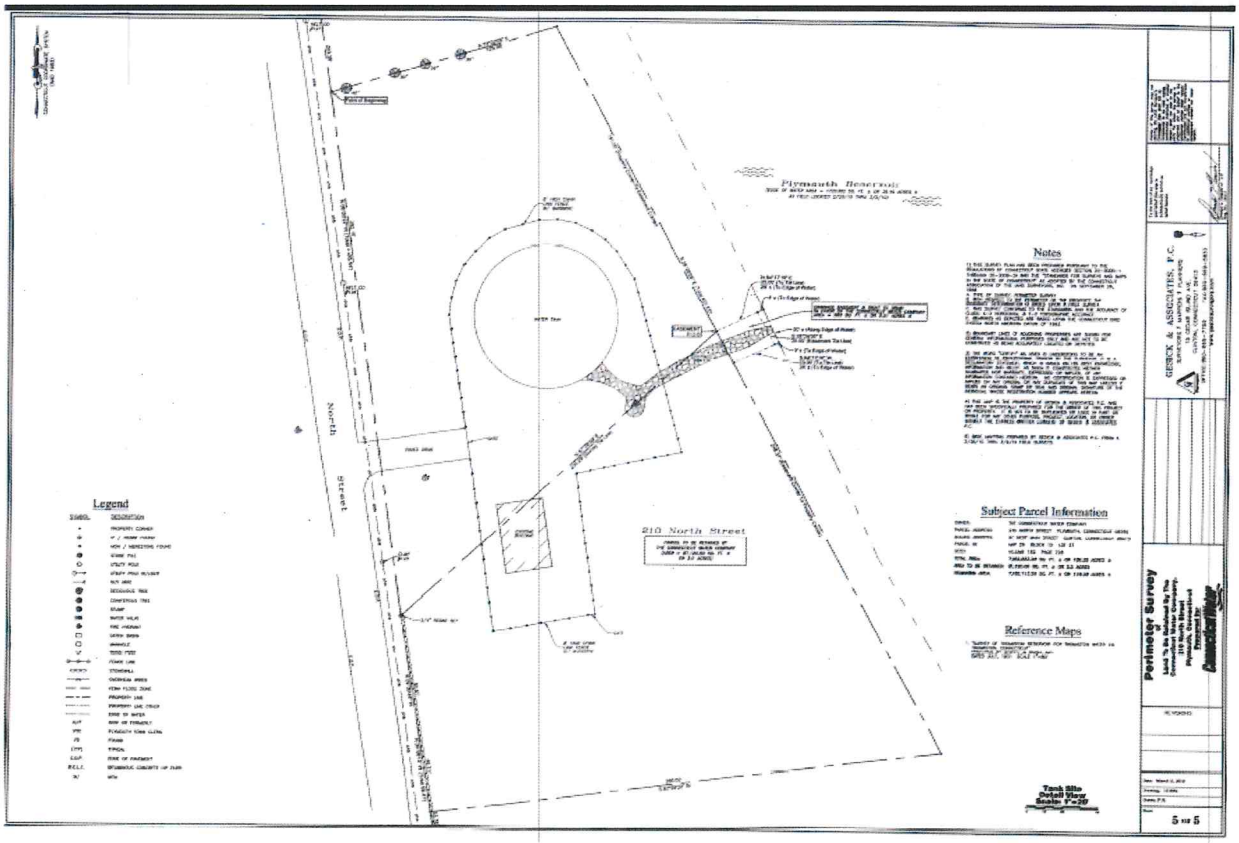
Notes
Subject Parcel Information
Reference Maps
Perimeter Survey
4 of 5


Plymouth Reservoir
North Street
210 North Street
Legend
Notes
Subject Parcel Information
Reference Maps
Tank Site Detail Plan
Perimeter Survey
5 of 5

5) Committee narrative:

A short description is in order due to the designation of the property. This parcel has been classified by the DEEP as a "conservation" area versus "recreation" area. While it may not seem a title would matter much, in this case it does.

With this in mind, we believe the town currently has "recreational" property which is used to the benefit of residents. A "conservation" area allows use by residents, but with minimal disruption of the property. The easement allows for a combination of active (swimming, fishing) and passive (walking) activities. These differences may require a change or addition to current town ordinances to cover the unique use of this property.

This group has been meeting since September 2012, and has many sub-committees which have also met numerous times.

We met with the CWC representative, Cindy Gaudino, for the purpose of gaining insight into any useful information they could offer us.

We met with the DEEP representative, Allyson Clark, responsible for the grant the town received to discuss allowable uses of the property.

We met with the DEEP fish biologist, Ed Machowski, to understand the whys of setting limits on fishing in order to maintain a stable fish population.

We met with the DEEP wildlife biologist, Pete Picone, to get a vision of the need to maintain a balanced wildlife population. And also to discuss the same possibility of allowing limited bow hunting and trapping.

We met with Reed Reynolds of the Connecticut Water Company, who oversaw the property for many years and could offer much insight.

We as a group have discussed and voted on all the following recommendations using all the information presently available to us. Some were not unanimous within the group, and some may be controversial within the town, but within the limits of the easement we feel we have offered a wise list of potential uses.

We have included a list of starting points for general rules which will change as areas and activities are opened.

It is also understood that the maintenance of the property as far as the dam and gatehouse go will fall to Public Works. We believe also the current employees of the town have been trained in the operation of the drainage system and normal dam maintenance by CWC employees. The town will also need to provide funding to each and all departments that will be finally charged with the administration of this property.

As a committee we would like to offer the following suggestions as possible names for this property, each has their own special appropriate connection to the property:

PLYMOUTH RESERVOIR

PLYMOUTH CONSERVATION AREA

Our understanding is also that before any future project is actually started, the DEEP must be contacted and involved in all discussions.

We would suggest that the following items be open to public use ASAP:

Site improvements:

Establish a parking area

Install a sign listing general permitted rules and uses

Install a natural barrier separating the parking area from the dam

Install protective fencing along the dam/spill way

Activities:

Allow the use of boats

Open the property to fishing - catch and release until study completed and recommendations are made.

Allow walking on the property

6) General Rules:

Rules –Day One:

A. Hours of Operation - Sunrise to Sunset
B. No horses or farm animals
C. No motorized vehicles of any type
D. No fires
E. No smoking or alcohol
F. No picking or removal of flowers or any vegetation
G. Fishing - catch and release only, artificial lures only no minnows
H. No trapping
I. Wood cutting - by permit only
J. No motorized boats of any kind
K. No feeding of the wildlife
L. Do not disturb nesting birds
M. All pets must be leashed
N. All garbage and animal waste must be removed upon exiting the area
O. All walking, hiking and bicycling, etc. must remain on the trails
P. Parking only in designated areas

Watch for hazards and follow all the rules. Remember proper clothing, sunscreen, hats, first aid kits, and plenty of drinking water. Use the buddy system. Make sure you carry your family's name, phone number, and address.

Stay on marked trails whenever possible. Short-cutting trails causes the soil to wear away or to be packed, which eventually kills trees and other vegetation. Trampled wildflowers and vegetation take years to recover. Stick to trails!

Managing your pet will keep people, dogs, livestock, and wildlife from feeling threatened. Make sure your pet is on a leash & controlled at all times. Do not let your pet approach or chase wildlife.

Take care of your pet's waste. Take a small shovel or scoop and a pick-up bag to **pick up your pet's waste**.

When visiting any outdoor area, try to leave it the same as you find it. The less impact we each make, the longer we will enjoy what we have. Even picking flowers denies others the opportunity to see them and reduces seeds, which means fewer plants next year.

Graffiti and vandalism have no place anywhere, and they spoil the experience for others. Leave your mark by doing an approved conservation project.

Expect to meet other visitors. Be courteous and make room for others. Control your speed when biking or running. Pass with care and let others know before you pass. Avoid disturbing others by making noise or playing loud music.

Respect "No Trespassing" signs. If property boundaries are unclear, do not enter the area.

7) History of property:

Plymouth's open space land on North Street includes acres of woodlands and water sources. It will serve both present and future generations as a passive recreation area and nature preserve. In the deed of 1881, rights to overflow pastures and wooded lots were granted to the Thomaston Water Company by Elbert Atwater . The parcel was cleared of standing timber, leaving the stonewalls and tree trunks to be flooded over. Waters from the streams were held back by the dam on the western border.

In an additional deed of 1912, Silas Richmond granted 1 ¾ acres as a perimeter along the reservoir's east side. The deed of May 15, 2012 transfers 40+/- acres of reservoir and 139+/- acres of woodland from the Connecticut Water Company to the Town of Plymouth.

Quoting the deed:

By acceptance of the Deed, the Grantee agrees that the Premises shall be permanently reserved as open space, shall not be used for development and shall be subject to all conditions as further described in a Conservation and Public Recreation Easement and Agreement between the State of Connecticut and the Town of Plymouth to be filed on the Plymouth Land Records.

8) Grants:

Many grants are available toward projects for on this property, most need a comprehensive plan in place before actual application for these. Among those are:

DEEP - Recreation Trail Program

CCRPA

The town has applied for help from - CT. Environmental Review Team- applied 4/2013.

We have met once 6/2013

9) Site Improvements:

Once ownership of the property was transferred to the town, the safety of anyone using the property becomes in part the responsibility of the town, along with the person using the property. With this in mind we have compiled a list of our recommendations to make the site safer for residential use.

Land Boundary needs to have permanent markers:

The committee was unable to locate several boundary markers. This requires further investigation. However, the property lines can still be designated by re-marking the yellow painted blazes established by CWC. This should be done before the paint fades, ideally sometime between the fall of 2013 and the spring of 2014.

Public Safety Concerns:

Create Access trails

Emergency Vehicle Access

Brush trucks and 4X4 emergency vehicles

Clean Existing Interior Roads and Trails and remove remains of Old Vehicles from Property

Clean Up All Refuse Points On Property – one of the locations may need Historical society involvement (possible Depression era work site – May not last more than another year)

Clear Widow Makers from Last October Storm

Place large stone or boulders at entrance to dam area to deter parking in that area or establish a natural barrier to prevent vehicles from rolling into reservoir.

Reestablish high grass at water edge near dam to control erosion.

Natural fencing around dam area to prevent people from climbing on the rocks around the dam outlet

Reestablish conifer barrier around reservoir it is now one of the attractive points of the conservation area

Establish a designated area to launch canoes, kayaks, etc...

Establish parking areas:

Parking locations:

Survey map shows 2 possible sites along North St

Parking areas at the other 2 access locations would need study to determine size

Future Improvements:

Handicap access (for fishing and trails)

Lighting in commonly used areas - low impact using self-generating power

Porto potties

Refuse Receptacles as appropriate

Have common signage for all trails, and access points

Have a covered bulletin board to post rules and regulations, and public notices

Gazebo for picnic area (limited number of tables) – some nice areas in the south part of the property between the east and west

Community Projects to begin the opening of the property:

Sources of possible help - youth groups, scouts, community service, volunteers

Trail Head Project:

Identify and layout access trails to the interior (3 access points involved)

Determine impact to conservation area

Determine signage

Present to DEEP and Town Department(s)

Begin work

Interior Trails Project:

Identify and create trail maps

Identify missing wetlands and update maps

Identify areas that need to be cleared of trails

Present to DEEP and Town department(s)

Begin work

Clean – up Project:

Identify areas to be cleaned – (many small to large garbage sites)

Determine best method of or leave car relics

Present to Town Department

Begin work

Geocaching and Letter boxing:

Determine plan for establishing and supporting

Determine sites

Present to DEEP and Town

Join organizations for Geocaching and letter boxing

Begin work and posting to organizations

Avian and Bat house site Placement Project:

Determine with DEEP species and type of houses

No feeders

Present to Town Department

Begin work

Cotton tail habitat Project:

The property might be suitable for the DEEP cottontail habitat program. Because it would involve extensive clearcutting, it should be included in an overall forest management plan before proceeding.

Tree Identification Marking:

Determine a plan to identify and mark foliage along trails

Present to Town

Begin work

Camping Sites:

Identify primitive camping sites targeting youth groups

Create a plan to establish and use constraints to support for no fires and no impact/leave no trace camping

Get DEEP approval

Present to Town Department

Begin work

Invasive Species Project:

Work Deep and additional town resources to determine species

Projects for Emerald Ash borer, Red pine beetle, invasive plants

Identify and mark species that will be affected

Determine a plan including replacement

Present to DEEP and Town

Begin work

10) Activities:

The following list should not be considered as final. It was the challenge of this committee to provide a list of what it considered as any possible uses within the scope of the easement. While some items will require funds to proceed, many can be started without any cost to taxpayers. While we tried to open the list of activities to a varied group, many of these will be open for further discussion.

Swimming:

Very limited access to the water's edge without cutting an area for beach access (limited cutting per easement), shallow water depth and possible under water obstacles (based on neighbors information) will require addition investigations.

Refer to the following sites:

Swimming - www.cdc.gov/features/dsdrowningrisk/

Bow hunting:

Other towns (Southington) have similar property and have been doing this without issues for awhile. This use allows the maintaining of a healthy balanced population of a renewable resource. This would require a possible charter change. The number of users, cost of permit, areas, and dates will need to be determined.

Mountain Biking Paths:

Pedal Bikes Only No ATV Or Dirt Bikes Per Easement

Bird Watching

Boating:

Car Top Only

Canoes, Kayak, Row, and Sail Boats No Longer Than 16'

No Gas Or Electric Motors Allowed Per Easement

Seasonal Per CT Safe Boater Guide Regulations

Camping:

Seasonal, No Open Fires, Limited Number Of Sites

Cross Country Skiing

Dive Training for Emergency Services

Dog Park:

Plan Would Need To Be Submitted To DEEP For Approval

This Activity Will Be Difficult Since No Clearing Of Land Is Permitted Per Easement

Rockwell Park in Bristol as an example

Dog Sledding (winter):

Reuse Existing Biking Or Walking Trails

Fishing:

Catch & Release only - artificial lures only

Rules Could Be Amended Depending On Results Of Electro Fishing From DEEP done on 5/9/2013

No Ice Fishing

Geo Caching- Search for pre determined points with a GPS

Hiking

Horse Shoe Pits:

Temporary Only

Ice Skating

Letter Boxing

Mushroom Picking

Orienteering - Search for pre determined points with a map and compass

Picnicking:

Certain Areas To Be Determined By Department Maintaining Area

No Open Fires

Bring Out What You Brought In

Radio Controlled Boating:

Temporary Tethered Buoys For Races

Snow Shoeing

Forest Management:

See plan for details

Volley Ball:

Temporary Nets Only No Permanent Fixtures Allowed Per Easement

Walking Trails:

No Clearing Allowed

Minor Brush Cutting Allowable With DEEP Consultation

About the Team

The King's Mark Environmental Review Team (ERT) is a group of environmental professionals drawn together from a variety of federal, state and regional agencies. Specialists on the Team include geologists, biologists, soil scientists, foresters, climatologists and landscape architects, recreational specialists, engineers and planners. The ERT operates with state funding under the aegis of the King's Mark Resource Conservation and Development (RC&D) Area - an 83 town area serving western Connecticut. (www.kingsmark.org)

As a public service activity, the Team is available to serve towns within the King's Mark RC&D Area - *free of charge.*

Purpose of the Environmental Review Team

The Environmental Review Team is available to assist towns in the review of sites proposed for major land use activities or natural resource inventories for critical areas. For example, the ERT has been involved in the review of a wide range of significant land use activities including subdivisions, sanitary landfills, commercial and industrial developments and recreation/open space projects.

Reviews are conducted in the interest of providing information and analysis that will assist towns and developers in environmentally sound decision making. This is done through identifying the natural resource base of the site and highlighting opportunities and limitations for the proposed land use.

Requesting an Environmental Review

Environmental reviews may be requested by the chief elected official of a municipality or the chairman of an administrative agency such as planning and zoning, conservation or inland wetlands. Environmental Review Request Forms are available at your local Conservation District and through the CTERT Coordinator. This request form must include a summary of the proposed project, a location map of the project site, written permission from the landowner / developer allowing the Team to enter the property for the purposes of a review and a statement identifying the specific areas of concern the Team members should investigate. When this request is reviewed by the local Conservation District and approved by the CTERT Subcommittee, the Team will undertake the review. At present, the ERT can undertake approximately two reviews per month depending on scheduling and Team member availability.

For additional information regarding the Environmental Review Team, please contact the CT ERT Coordinator, Connecticut Environmental Review Team, P.O. Box 70, Haddam, CT 06438. The telephone number is 860-345-3977, connecticutert@aol.com, www.cterg.org.