

# Chapter 5 Natural Resources

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## 1. Introduction

This chapter of the comprehensive plan examines the natural environment within Windham. Natural environment is a broad term which encompasses a variety of features including the town's topography, soils, wetlands, water resources, and fish and wildlife habitat. These resources are part of a natural system that provides the underlying environment on which all man-made development within the town occurs. Proper management of this system is therefore important for maintaining its ability to function effectively, as well as to support the quality of life that Windham's residents have come to appreciate.

The town's 1993 comprehensive plan presented a brief inventory of natural resources as well as an assessment of their existing conditions and potential threats. The plan also provided extensive policy guidance and implementation strategies for protecting and preserving these resources. These policies and implementation strategies are presented in the Appendix of this plan along with an assessment of what has been accomplished over the past decade. This comprehensive plan expands upon the previous natural resource inventory based on updated information that has been compiled by a variety of state and federal agencies as well the use of a geographical information system (GIS), which allowed for more detailed mapping to support the review process.

## 2. Major Findings and Conclusions

- Water resources represent a shared regional asset. It has become increasingly important for Windham to work with its neighboring communities to insure that land use activities do not have adverse impacts within watersheds that cross municipal boundaries.
- Windham lies partially within the Sebago Lake watershed which encompasses one of the

state's largest public drinking water supplies which is also the source of the town's public water system. There are many potential threats to the water quality of the lake that are posed by the commercial and industrial uses located in the North Windham area that will need to be continually monitored in order to protect this drinking water supply.

- Overall, the quality of Windham's surface waters is very good. However, there will be a need for greater caution and monitoring in more heavily developed watersheds, such as in the North Windham area, to prevent a degradation of water quality in the future.
- Updated mapping of Windham's high yield groundwater aquifers by the Maine Geological Service has determined that the size of these aquifers is considerably larger in area than previously estimated. The town will need to re-evaluate existing zoning regulations for these areas based on this new information.
- There are only a few large tracts of land in Windham that remain unfragmented by roads and other development.

### 3. Topography

Topography is defined by the change in elevation of the land's surface above sea level and is reflected in the hills and valleys across the town's landscape. Windham's topography is illustrated on Map 5-1 entitled Elevation and Slope. The map illustrates only major changes in elevation in Windham which are depicted by contour lines showing 100 foot changes in elevation. The map also highlights the slope of the terrain throughout the town. Slope is an indication of the steepness of the land's surface, such as on a hillside, which is based on the change in elevation versus the change in horizontal distance (also referred to as rise over run and represented as a percent change on the map). The slope information is derived from county-wide soils mapping, prepared by the U.S.D.A. Soil Conservation Service, which assigns an average slope to each soil type. This generalized slope information is useful for town-wide planning purposes since it identifies areas that may be less suitable for various types of development due to the steepness of the terrain. Slopes in excess of 15% can place limitations on septic system installation and operation, add cost to the construction of buildings and roads, increase surface runoff, and can result in erosion from poorly managed construction sites.

Elevation changes in Windham have a general northeast to southwest trend. This characteristic is evident in the pockets of steeper slopes that create small ravines which flank the rivers and streams draining towards the Presumpscot River. The lowest elevations in town, which drop below 100 feet, are found along the Presumpscot River corridor near the southern tip of the town. The highest elevations, ranging from 500 to 600 feet, occur on Mount Hunger, to the west of Little Sebago Lake, and Atherton Hill, which is southwest of Forest Lake. Mount Hunger and Atherton Hill represent the edges of a wide drainage area that creates a "funnel" through which water from Little Sebago

INSERT MAP 5-1 ELEVATION AND SLOPE

BACK OF MAP 5-1

Lake and the Pleasant River flow to its confluence with the Presumpscot River.

For the most part, Windham has only isolated pockets of very steep terrain with slopes in excess of 15%. However, slopes ranging between 8% and 15% can also be a concern where they are adjacent to lake shorefronts and river corridors, because they can contribute to the more rapid runoff of chemicals and eroded soil into these water bodies. This has historically been a concern around the town's lakes where high density seasonal housing, on-site septic systems, and gravel roads, can result in problems associated with sediment and nutrient runoff into the lake environment if not monitored carefully.

## 4. Water Resources

### A. Surface Water

Windham's surface water resources are comprised of lakes and ponds, rivers and streams, and wetlands. Each of these water bodies is located within its own watershed area which are depicted on Map 5-2 entitled Watersheds and Wetlands. A watershed represents the dividing line where rainfall and other surface runoff drain to the streams, rivers, or ponds contained within that boundary line. Watershed boundaries are delineated based on the hills and valleys of the town's topography, as well as man-made features such as roads, which also affect surface drainage patterns.

Watersheds can be viewed at the regional and townwide levels of geography, as well as at the subwatershed level which considers smaller areas within the town. At the townwide level, all surface waters in Windham flow into the Presumpscot River, which in turn drains into the Casco Bay Basin and the Atlantic Ocean in the Portland area. Within the town there are numerous subwatersheds that collect drainage from smaller catchment areas around individual rivers, streams and ponds, prior to entering the Presumpscot River. Table 5-1 lists the town's water bodies based on the subwatershed in which they are located.

From a regional perspective, Windham lies partially within the Sebago Lake watershed, which is comprised all or parts of 23 towns and covers approximately 300,000 acres (450 square miles). The Lake is managed as a water supply for customers in 11 towns in the Greater Portland area, including Windham, by the Portland Water District (PWD). The PWD withdraws an average of approximately 24 million gallons a day from the Lake from an intake point which is located in the Lower Bay area, which is located "upstream" of Windham's portion of lake frontage. Water quality in the Lake is considered to be excellent and as such, requires only minimal treatment for use as a public drinking supply.<sup>1</sup>

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<sup>1</sup>2001 Annual Water Quality Report, Portland Water District.

<b>Table 5-1 Watershed Areas in Windham</b>			
<b>Watershed</b>	<b>Water Bodies</b>	<b>Watershed</b>	<b>Water Bodies</b>
Sebago Lake/ Presumpscot River	Sebago Lake Basin North Windham Pond Dundee Pond Anderson Brook	Little Sebago Lake/ Pleasant River	Baker Brook Ditch Brook Mud Ponds Tarkill Pond Mill Pond Collins Pond Varney's Mill Pond
Highland Lake	Little Duck Pond McIntosh Brook	Forest Lake	Unnamed Tributaries
Black Brook	Unnamed Tributaries	Inkhorn Brook	Small Brook Milliken Brook Lincoln Weeks Brook
Colley Wright Brook	Unnamed Tributaries	Otter Brook	Unnamed Tributaries
Hyde Brook	Unnamed Tributaries	Outlet Brook	Pettengill Pond Chaffin Pond
Source: Maine Department of Inland Fisheries, U.S. Geological Survey, and the Federal Emergency Management Administration.			

Of the total 23 towns in the watershed seven have frontage on the Lake including the towns of Standish, Sebago, Naples, Casco, Raymond, Windham, and Frye Island. Due to their proximity, development of watershed properties in these towns has the greatest potential to impact Sebago Lake. The total Sebago Lake watershed land area in these seven towns is 86,440 acres, ranging from 862 acres in Frye Island to 20,452 acres in Naples. Given the regional nature of this resource and its importance as a drinking water supply it will require a cooperative effort on the part of all towns within the watershed to maintain the high water quality level that exists today.

Windham has approximately 1,900 acres of land within the Lake's watershed. The subwatersheds in Windham that drain into the Lake include Hyde Brook, Outlet Brook, and two others with unnamed tributaries, as illustrated on Map 5-2. These watersheds include a portion of the town's more urbanized development in North Windham as well as the Enterprise Zoning District, which is planned to be a non-residential growth area. The Maine Drinking Water Program (MDWP), a state agency within the Department of Human Services, is working with the PWD in accordance with the Source Water Assessment Program, to assess potential sources of contamination throughout the entire Sebago watershed. A report of this work effort is expected to be completed in 2003 and should be used by the town to update the comprehensive plan when it becomes available.

The Presumpscot River is the outlet for Sebago Lake. The River has been damned over the years at a number of locations along the Windham/Gorham town line for power generation purposes, which has created several impoundments including the Sebago Lake Basin, North Gorham Pond and Dundee Pond.

The largest of the town's subwatersheds is associated with the Pleasant River, which includes the outlet brook (Ditch Brook) from Little Sebago Lake. The Pleasant River subwatershed is the only drainage basin in Windham that receives contributing flow from significant land area outside the town. The Pleasant River's headwaters are located in the adjoining Town of Gray and Little Sebago Lake's drainage area also includes portions of Gray and Raymond. Little Sebago Lake itself is divided by the Windham/Gray town line with over two-thirds of the lake's approximate 1,300 acres located in Gray.

Highland Lake and Forest Lake are other Great Ponds (ponds larger than 10 acres) that Windham shares with adjoining communities. Forest Lake straddles the town lines of Gray and Cumberland. The headwaters of Highland Lake are located in Windham with the southern third of the lake in Falmouth. Further, the outlet stream of the lake, Mill Pond, is actually located in Westbrook, where it flows into the Presumpscot River. The lake is approximately 650 acres (one square mile) with a maximum depth of 67 feet and an average depth of 22 feet. The lake's watershed encompasses approximately 8.5 square miles within the three towns mentioned above.

The Highland Lake watershed has had periodic monitoring of the lake's water quality since the mid-1970s and annual monitoring throughout the 1990s. This monitoring has been conducted by volunteers of the Highland Lake Association (HLA) with assistance from the Cumberland County Soil and Water Conservation District (CCSWCD). In 1998/99, these groups prepared a lake survey assessment/implementation strategy and management plan for the watershed.<sup>2</sup> The assessment report noted that dissolved oxygen in the lake has been steadily declining since 1978 as has the clarity of the lake's water. According to the report, these conditions are attributable to increases in algae, phosphorus, and sedimentation associated with increased development in the watershed. In total, 104 sites were identified as potential sediment and phosphorus sources to the lake, all of which were associated with roadways and residential land uses.

The study also noted that there are over 700 homes in the watershed which all rely on septic systems to dispose of their wastewater. Many of these houses are situated on small lots adjacent to the lake's shore. A survey was also conducted by the Town of Windham in 1994 to assess conditions of septic systems within 250 feet of the lake. The study concluded that there were no problems with 98% of the 205 surveyed homes. However, 30% of the systems were over 16 years old with a typical life expectancy of 20-25 years indicating that a number of systems could require replacement in the near future.

The management plan presented a *Watershed Action Plan* which included the following goal and objectives for the watershed.

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<sup>2</sup>*Highland Lake Watershed Survey and Implementation Plan* (June 1998) and *Highland Lake Watershed Management Plan* (January 1999), prepared by the Cumberland County Soil and Water Conservation District, Maine Department of Environmental Protection, and the Highland Lake Watershed Steering Committee.

Goal: Improve or maintain water quality, and reduce symptoms of eutrophication in the Highland Lake Watershed.

Objectives:

- Reduce the amount of phosphorus-loaded stormwater runoff from the watershed.
- Conduct systematic sampling of the water quality of the lake and its feeder streams.
- Build consensus on watershed management strategies and actions, and promote public stewardship and education about the watershed.

These objectives had 15 related action steps that were expected to take 10 to 15 years to fully implement. In addition, the management plan laid out a series of *best management practices* to be implemented with the goal of minimizing the non-point sources of pollution identified within the watershed.

The Maine Legislature, through the Department of Environmental Protection (DEP), has created a water quality classification system for all surface waters in Maine. Based on this classification system, the DEP has established “attainment goals”, which is the minimum desirable water quality, for all water bodies. The classification is intended to be more of a hierarchy of risk rather than one of use or quality. Under this approach risk rates the possibility of a breakdown in the ecosystem and loss of use due to either natural or human causes. Ecosystems that are more natural in their structure and function can be expected to be more resilient to stresses and recover more rapidly from those stresses. The DEP does periodic sampling of the state’s water bodies and produces a bi-annual report on attainment levels. The water quality category of the lakes and ponds in Windham are as follows.

- Chaffin Pond - sensitive
- Forest Lake - sensitive
- Highland Lake - sensitive
- Little Duck Pond - sensitive
- Little Sebago Lake - sensitive
- Pettingill Pond - sensitive
- Sebago Lake - outstanding

Until recently, Chaffin Pond was a water source for the Portland Water District which provides water services to the Greater Portland area. Sebago Lake is the Portland Water District’s source with the intake and treatment plant located in Standish. The quality of the Sebago Lake water is outstanding and only minimal treatment is required.

Windham is unique with regard to its topography and geology in that almost all of the town’s surface area is located within the direct watershed of either a great pond or river. Historically, the town managed development immediately adjacent to these water resources to a higher standard than properties more distant from these waterbodies. This was accomplished through the conventional application of Windham’s version of the State’s Shoreland Zoning Ordinance. The town has

INSERT MAP 5-2 WATERSHEDS AND WETLANDS

BACK OF MAP 5-2

demonstrated the value placed on the long-term health of their many and varied water resources through their advocacy for progressively more effective ordinances. The town has also provided evidence of their understanding of the relationship between development activities and the potential for erosion and sedimentation events, contamination from untreated stormwater and the potential for excessive nutrient loading associated with these activities. Additionally, the town has recognized the negative impacts these occurrences can have on water resources. Conversely, the town has also recognized the importance of employing proper erosion and sedimentation control planning, stormwater treatment and the proper management of nutrients in creating a compatible relationship between well-designed development and preservation of the quality of Windham's water resources.

One of the areas addressed in the original Shoreland Zoning Ordinance was Erosion and Sedimentation Control (E&S). However, few towns ever required E & S plans until Windham initiated such a program in 1998. These plans required property owners to seek professional assistance in identifying the potential for negative impacts associated with proposed projects, and to prescribe appropriate measures in order to minimize or eliminate the potential for the negative impacts associated with these types of projects during the construction phase and to assist in the development of a long-term stable situation. The town continued to raise the bar when they developed and adopted the Surface Water Protection Ordinance in 2002. This ordinance took the provisions found in the Shoreland Zoning Ordinance and applied them to entire watersheds, thereby applying these standards to almost all construction projects.

Most of the excess phosphorus found in our lakes comes from stormwater runoff associated with gravel camp roads. Pollution from stormwater runoff and soil erosion is one of the most significant problems contributing to the decline in water quality in many lakes, rivers and streams. **Soil erosion is the single largest pollutant (by volume) to our surface waters, and up to 85% of all erosion and sedimentation problems in lake watersheds originates from improper construction and maintenance of camp roads.** Proper camp road maintenance helps prevent this form of pollution and preserves our splendid water resources.<sup>3</sup> Phosphorus is the prime nutrient, (pollutant), carried by these eroded sediments. Now that the source has been identified, it can be managed. Both public and private road construction, repair and maintenance projects are now being designed to minimize the potential for erosion and sedimentation during the construction phase of the project and also to contribute to a more stable permanent situation. Silt fences, stone check dams and erosion control blankets are now common sights at road construction projects. Ditches are revegetated to provide long-term stabilization and culverts have riprap aprons to prevent washouts and undermining. Gravel roads utilize ditch turnouts and level lip spreaders to disburse smaller quantities of concentrated stormwater and return it to sheet flow and promote its infiltration back into the soil of a stable vegetated buffer. Maine's version of the NPDS II stormwater management law is in its final phases of consideration before it is adopted and becomes law. This expanded program will require greater

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<sup>3</sup>*Camp Road Maintenance Manual* produced jointly by the Kennebec County Soil and Water Conservation District with the Maine Department of Environmental Protection Bureau of Land and Water Quality in 1987 with updates and revisions in 1995, 1999 and in 2000.

treatment of not just the quantity of stormwater, but also the quality of the stormwater. These techniques will be applied to even smaller projects that are currently not covered under the original NPDS program now in effect. State and local road crews are now commonly sent to seminars where they learn of the potential negative consequences of their everyday activities and are provided with effective alternative methods to accomplish their projects utilizing appropriate environmentally responsible practices.

Individuals and businesses involved in the application of nutrients and pesticides are following similar paths as the road crews mentioned above. They are being made aware as to the potentially harmful short and long term implications their practices could have if left to a business-as-usual work pattern. They are being provided with the tools to manage the application of their products better, to select less harmful alternatives and to apply them in a more environmentally friendly manner. This group is also benefitting from attendance at State-sponsored seminars in concert with the availability of technical assistance programs to assist them in developing better plans and implementing those plans in a more effective manner.

Windham relies on septic systems to provide treatment for most of its residential and commercial wastewater generators. Properly designed, installed, utilized and maintained systems provide effective long-term treatment of nitrates, phosphorus, and pathogens found in these wastewater sources. While malfunctioning, abused and neglected systems do not provide adequate treatment and may become non-point sources of excess nutrients with the potential to have a negative impact on a nearby water resource. Threat levels associated with this potential non-point source are diminishing with time due to several factors. An increasing percentage of pre-1974 installed systems are being replaced with new systems that have been designed by State licensed professionals. Progressively better-qualified excavating contractors install all new systems based on these ever-evolving design standards. Most of these installing contractors have attended installation seminars to ensure their technical expertise to install these new systems as designed. A growing percentage of local contractors have enrolled in a voluntary certification program; this program will likely evolve to become a mandatory program. Additionally, the State has been aggressive in supporting their ongoing education efforts for the system inspectors, the town's Code Enforcement Officers. Windham has three full time Code Enforcement Officers and a reputation among contractors for making sure the systems are installed as designed. The State has recently added the requirement for another inspection point during the construction of the system to insure the installation follows the design. People who own septic systems have become more aware of what represents proper care and maintenance of their septic systems and have demonstrated a general desire to do their part in supporting proper care and maintenance of their systems.

In summary, additional development consistent with this plan will occur in Windham, but does not have to be threatening to our valued resources. The potential threats have been identified, assessed and strategies devised to minimize their potential for negative impact on our water resources. Windham must remain vigilant in our efforts to protect our water resources. This effort should include ongoing monitoring of water quality, continued encouragement for the application of the best

available design standards, persistence in the ongoing education of the contractors, designers, regulators and homeowners and continued application of the inspection and enforcement duties of our Code Enforcement Officers to ensure the integrity of the design is delivered during the construction phase of the project.

## B. Groundwater

Groundwater is found below the surface of the ground in the soil and rock formations that make up Windham's surficial and bedrock geology. The amount of groundwater occurring at a given location depends on the characteristics of these soil and bedrock formations, such as the natural features ability to store water, a characteristic referred to as porosity. Groundwater is the source of water for many residential and non-residential wells in Windham, but is not presently the source of any municipal wells.

Groundwater occurring in sufficient quantities to yield useable amounts of water to a well is referred to as an aquifer. Although groundwater aquifers occur throughout Windham in various geologic formations, the amount of water available for public or private water supplies can vary considerably. While it may be possible to obtain a supply of water in most locations that is adequate to serve individual households or businesses, there are only a few areas in town where more significant quantities of water may be obtained from a properly installed well. These areas are illustrated on Map 5-3 entitled High Yield Aquifers. The mapping of these aquifers was completed by the Maine Geological Survey (MGS) in 1997. These significant aquifers are generally comprised of coarse grained sand and gravel material with the potential to yield 10 or more gallons-per-minute (gpm) to a well.

The map shows that the largest area of high yield aquifers is concentrated around Little Sebago Lake, extending toward Sebago Lake and the Presumpscot River. Other smaller areas have been delineated around Windham Center Road and River Road, as well as adjoining Forest Lake. Of these areas, only the aquifer adjacent to Little Sebago Lake has been identified as having the potential to yield more than 50 gallons per minute, according to the MGS. The update aquifer data prepared by MGS considerably expands this area of highest yield (>50gpm) as compared to previous aquifer maps. Windham's zoning ordinance currently includes an aquifer protection district that was based on these earlier mapping efforts. The ordinance presently regulates an area that is much smaller in size, which is primarily centered around Chaffin Pond and Pettengill Pond.

Until the mid-1990s, the Portland Water District operated two wells in the Chaffin Pond area that were used to supplement the district's primary drinking water supply in Sebago Lake. In 1998, a contamination problem was discovered from a leaking underground storage tank (UST) at a gasoline station in North Windham. This leak resulted in significant levels of MTBE (a gasoline derivative) and other contaminants being detected in area groundwater. This contamination reached both the monitoring and production wells operated by the PWD, which are approximately 500 to 1,000 feet from the gasoline station. Sebago Lake is approximately one mile from the site. Although

groundwater monitoring indicated that contamination levels in the area decreased relatively quickly the PWD discontinued use of these wells and a new water line was extended to the area from the district's primary supply, Sebago Lake. Clean-up of contaminated soil at the gas station has been completed and the Maine Department of Environmental Protection (DEP) required the property owner to comply with numerous requirements prior to resuming the sale of gasoline. One of the State's stipulations was that quarterly groundwater monitoring be conducted which have shown that concentrations of MTBE have remained below drinking water standards established by the Maine Department of Human Services.

In 1994, the town hired the consulting firm of Robert G. Gerber, Inc. to conduct an assessment of groundwater quality in Windham. The study area was confined primarily to the large sand and gravel aquifer in North Windham, which was in the process of being redefined by the USGS at the time, as discussed above. The objective of the study was to establish the impact of current development and project the impact of future development within the study area. The consultant presented the findings of this analysis in two reports in 1995 and 1997.<sup>4</sup> According to these studies, recharge to the aquifer is primarily from precipitation falling directly on the aquifer and from runoff from adjacent uplands. Recharge to the aquifer also includes septic loading from septic systems in the area. The aquifer discharges to Sebago Lake and the Presumpscot River to the west and south and to Little Sebago Lake, Tarkill Pond, Mill Pond, Collins Pond, and Ditch Brook to the east and south. Contaminants introduced into the aquifer therefore have the potential to be transported with the groundwater into these surface water bodies.

The studies noted that there are many potential threats to groundwater quality in the study area. Since there is no municipal sewer system, commercial, industrial and residential development all employ on-site wastewater disposal methods. The increasing density of on-site septic systems in this area pose a potential threat to groundwater quality in the form of nitrogen compounds, bacteria, or viruses. Other compounds such as chlorinated solvents, volatile organics, and other industrial byproducts may be introduced to the groundwater through improper disposal into on-site wastewater disposal systems. Large impervious, paved areas for parking also provide the potential for substances such as oil, fuel, antifreeze, and road salt to enter the groundwater with runoff from precipitation. In addition, underground storage tanks for petroleum products in the study area, the locations of which are identified in the appendix of the studies, pose a potential risk to groundwater due to spills or leaks. Based on analysis conducted in the two-phase study the consultant presented the following conclusions.

Based on the water chemistry data collected for this project from numerous test wells, the groundwater in the sand and gravel aquifer has good quality. Some of the test wells had nitrate concentrations greater than 6 milligrams per liter (mg/l) but these appear to represent water quality in small, localized areas and are probably due to adjacent septic systems. The Maximum

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<sup>4</sup>Town of Windham, *Ground Water Resource Evaluation Phase 1 - February 1995 and Phase 2 - May 1997*, prepared by Robert G. Gerber, Inc., Freeport, Maine.

INSERT MAP 5-3 HIGH YIELD AQUIFERS

BACK OF MAP 5-3

Contaminant Level (MCL) for nitrates, as specified by the State of Maine is 10 mg/l. Organic chemicals were not detected for the parameters analyzed within the study.

The build-out analysis based on the town's present zoning concluded that concentrations of nitrates in the aquifer would not be expected to exceed the MCL of 10 mg/l and had simulated average concentrations of 6 mg/l in the Commercial 1 and Medium Residential zoning districts that overly the sand and gravel aquifer. It was also noted that higher values may be expected for portions of the study area that are comprised of materials other than sand and gravel, as well as during periods of seasonal low water or for areas down gradient of large septic systems.

A summary of the report's recommendations are as follows.

- If the loading for a proposed development is greater than 300 gpd/acre or if the septic system is an engineered system (>2000 gpd), require a site specific analysis.
- Detailed surficial geology mapping should be performed to more accurately defined the extent and properties of the glacial till in the Commercial 2 zoning district. If the existing mapping is correct, future calculated concentrations of nitrates would be 11 mg/l in this area.
- Detailed surficial geology mapping should be performed to more accurately define the extent and properties of the clay-silt deposit located in the southern portion of the study area. Modeling indicated that potential nitrate concentrations could exceed 10 mg/l in this area based on build-out under existing zoning.
- Implement a program of on-going water quality monitoring for groundwater.
- Require that septic systems in the area be pumped out every five years, at a minimum.
- Implement a public education program concerning maintaining water quality.

### C. Wetlands

Wetlands is a broad term that includes, but is not limited to, swamps, marshes, bogs, floodplains and other areas that may develop between upland areas and deep water habitats. Wetlands perform a myriad of functions that are of value to the community. From a water quality perspective these include the filtering of pollutants from the water, groundwater recharge and discharge, and nutrient cycling. Wetlands also provide socio-economic values by slowing the rate of flow during peak flood periods, which helps to protect property by reducing erosion and minimizing damage to shoreline areas. They also offer opportunities for recreation, education, and research, and can help to delineate open space areas within a community. The importance of wetlands to fish and wildlife includes providing a critical habitat component for many mammals, reptiles, waterfowl and other bird species; and augmenting productivity for aquatic species such as fish and shellfish.

Wetlands are defined based on a combination of plant species, soils types, and duration of flooding/saturation by water. For town-wide comprehensive planning purposes, one of the information sources used to identify wetlands is the National Wetlands Inventory (NWI). The NWI was produced during the mid-1980s by the U.S. Fish and Wildlife Service (USFWS) based on aerial photography from that time period. This method of identifying wetlands allowed the USFWS to map wetlands for the entire country, but also made some types of wetlands more difficult to identify if they were obscured by tree cover. Therefore, certain types of wetlands, such as forested wetlands, may be under-represented by the data.

Map 5-2 illustrates the NWI wetlands located in Windham which are categorized as either Riverine, Lacustrine, or Palustrine.

- Riverine – All wetlands and deep water habitats contained within a river or stream channel that are not dominated by trees, shrubs, or emergent vegetation. Only a few of these areas were noted by the NWI in Windham, although more are likely to exist.
- Lacustrine – Wetlands and deep water habitats that are situated in a topographic depression or dammed river channel and are lacking trees, shrubs, and persistent emergent vegetation. All of Windham's lakes and ponds fall into this category according to the NWI.
- Palustrine – All nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens.

Also illustrated on Map 5-2 are hydric soils. These soils are typically associated with wetlands<sup>5</sup>, although the NWI mapping did not identify the existence of wetland vegetation based on aerial photo interpretation. However, it is likely that at least a portion of these soils are supporting the type of vegetation required to be designated as a true wetland. This would suggest that the amount of wetlands existing in Windham is under-reported and may need additional consideration from a regulatory and conservation standpoint. Part of the reason that the NWI may have excluded these areas of poorly/very poorly drained soils is due to the amount of agricultural land in Windham. The use of these soils for agricultural purposes would prevent the growth of wetland vegetation, thus, they would not meet the definition of wetland from a regulatory perspective.

## 5. Soils

The soils in Windham have certain characteristics that have been shaped over a long period of time due to the region's topography, climate, and the effects of living organisms acting on the soil. These soil characteristics make them more or less suited for various types of development or conservation activities. Soils have been mapped for Windham by the U.S. Department of Agriculture's Natural

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<sup>5</sup>Hydric soils delineated on Map 5-2 are those which have been identified by the USDA Natural Resources Conservation Service in *Soil Survey Data for Growth Management, Cumberland County*, March 2000.

Resources Conservation Service (NRCS). These maps are contained in the Soil Survey of Cumberland County which is on file at the Windham Town Offices. The level of detail and accuracy of maps contained in the Soil Survey is well suited for planning purposes at the town-wide level of analysis. However, these maps are not intended for site-specific analysis and should be supplemented with a high intensity soil survey in order to assess the development potential of individual parcels of land.

The County Soil Survey rates each soil type based on a variety of factors. These include the soils' ability to accommodate on-site septic systems, the suitability for the construction of buildings, roads, and other types of development, as well as the soils suitability for growing crops and other agricultural uses. In this comprehensive plan the County Soil Survey has been used to identify steep slopes (refer to Map 5-1) and hydric soils typically associated with wetland areas<sup>6</sup> (refer to Map 5-2).

## 6. Wildlife Resources and Important Habitat Areas

The term "wildlife" encompasses reptiles and amphibians, insects, birds and fish as well as mammals. The major threat to wildlife today is the physical loss of suitable habitat and reduction in habitat quality. As the farms and forest areas are developed, habitat is lost or degraded. The five basic components of wildlife habitat are food, water, shelter, breeding areas and space. If any one of these is missing or of poor quality (such as polluted water), it will be impossible for the species of interest to survive, let alone thrive.

Map 5-4 presents important wildlife habitat areas that have been identified within the Town of Windham, by IF&W and the U.S. Fish and Wildlife Service (USFWS). Some of these habitat areas, such as streams, ponds, and wetlands, have been discussed to some degree previously in this chapter. However, this map illustrates how those resources are integrated within the town's larger ecosystem.

The information presented on the Map and in the following narrative has been compiled within the Maine Natural Areas Program (MNAP). This program inventories lands that support rare and endangered plants and animals, rare natural communities, and outstanding examples of representative natural communities. The program maintains a cross-referenced data management system that consists of automated and manual maps as well as information regarding natural features. The program also exchanges information on animals and their habitat needs with the Department of Inland Fisheries and Wildlife (MDIFW). MNAP and MDIFW use standard methodology in the management of information, and cooperate on a variety of conservation efforts.

Riparian Habitat - Highlighted on the map are the corridors abutting rivers and streams which are referred to as riparian areas. These buffers encompass 150 feet around streams (75 feet on either side) and 500 feet around the Presumpscot and Pleasant Rivers (250 feet on either side). These

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<sup>6</sup>Ibid

setbacks are the minimum prescribed by Shoreland Zoning regulations although not all streams in Windham are currently protected by these regulations. This type of habitat is important for many species and the corridors formed by these buffers can also serve as travel corridors for animals and provide “linkages” between patches of habitat that are otherwise separated by development. However, the 150 foot buffer around streams is generally considered to be an insufficient width, by wildlife biologists, for use by larger mammals.

Waterfowl/Wading Bird Habitat - These areas, identified by IF&W, are comprised of freshwater wetlands and surface waters of small ponds. This habitat provides nesting/feeding/roosting areas for ducks, herons and other wading birds and song birds, as well as various aquatic species. The adjacent upland areas are also used by other species as well. Only several small isolated areas of this habitat have been noted in Windham, as illustrated on Map 5-4.

Priority Trust Species Habitat - As part of its program to protect and restore the Gulf of Maine watershed, the USFWS has mapped habitat which is important for 64 species of birds, mammals, fish, plants, invertebrates, and reptiles that regularly inhabit this region. These species must meet one of the following criteria: be federally threatened or endangered; be identified as threatened or endangered by two of the three states in the Gulf of Maine watershed; or be a species which has a significantly declining population nationwide. The important habitat for these species, as illustrated on the map, includes freshwater wetlands, forested wetlands and upland forest areas. It also includes areas identified as grasslands, which in Windham’s case, includes many of the areas cultivated for agricultural purposes.

Deer Wintering Areas - As the name implies, deer wintering areas (DWA) are used by these animals as a protected refuge through the harsh winter months. A DWA is defined as a forested area used by deer when snow depth in the open/hardwoods exceeds 12 inches, when the deer are prone to sink in more than 8 inches, and the mean daily temperatures are below 32 degrees. As illustrated on Map 5-4, there are several small DWAs scattered throughout the town. The boundaries of these DWAs have not been recently verified by IF&W, but land use development patterns indicate that the forest cover in these areas appears to be still largely intact.

Rare, Threatened and Endangered Species - The MNAP IF&W also tracks the occurrence and status of animal and plant species that are rare, threatened, or endangered within the state as well as rare or exemplary natural communities. Two species have been observed in Windham which includes the Brook Floater and the Norther Black Racer. The map illustrates the approximate location where these species were observed along with a generalized buffer for habitat protection, which would need to be field verified. In addition to these two sites, Highland Lake has also been identified as containing Spotted Pondweed, an aquatic plant which is considered to be highly imperiled in Maine. The MNAP has not identified any rare or exemplary natural communities within Windham.

INSERT MAP 5-4 IMPORTANT WILDLIFE HABITAT

BACK OF MAP 5-4

Unfragmented Habitat Blocks - This final category of important habitat addresses the concept discussed previously in this chapter which noted that the fragmentation of habitat into tracts of smaller sizes tends to diminish the potential for those areas to support viable wildlife populations. Map 5-4 illustrates larger tracts of land in Windham, as delineated by IF&W, that have not been bisected by improved roads or other types of development. A 1,000 foot buffer has been created around roadways (500 feet on either side) to delineate these unfragmented habitat blocks. *It should also be noted that in many instances the blocks located along the town's border extend into adjoining communities, making them bigger than they appear on this map.* The multi-town aspect of these blocks is a particularly important feature and one of the reasons that IF&W is promoting a regional approach to habitat management and protection.

Overlaying other important habitat areas onto these unfragmented blocks, as shown on the map, provides a useful perspective for identifying opportunities for future conservation efforts, as well as where important habitat is being encroached on by development. A review of these unfragmented blocks reveals that Windham has few remaining *large* tracts of land with the exception of the area around Atherton Hill, in the eastern corner of town. However, there are a number of smaller blocks that could potentially be "linked together" by stream and river corridors with suitable buffers.

## 7. Implications for the Future

All land use recommendations that are developed as part of this comprehensive plan have the potential to impact the features of the natural environment discussed in this chapter. Even if no changes are made to the town's land use regulations as a result of this comprehensive plan update, this lack of action will have an impact on the town's natural environment because the town will continue to grow in the future. The key then is to determine which areas are most appropriate for accepting future growth. This decision should not be based just on which portions of town are most suitable for development due to soil characteristics or highway access. It should also take into consideration the long-term safety of the town's water quality, maintaining a diversity of natural habitat and preserving a quality of life that is appropriate for the community.

Information presented in this chapter emphasizes the fact that the natural resources in Windham and its adjoining region function as an integrated system. The effects of land use activities in one portion of town have the potential to impact other parts of the town, as well as neighboring communities. Conversely, land use activities in neighboring towns can affect the quality of Windham's natural environment. Therefore, it will be important for Windham to coordinate its planning efforts related to natural resources with the towns of Gray, Raymond, Cumberland, Falmouth, Westbrook and Gorham. From a regional perspective, Windham will also need to work cooperatively with the Portland Water District and other towns located in the Sebago Lake watershed in order to protect this important public drinking water supply from the potential negative impacts of future development.

Although there is no evidence to suggest that water quality is an issue water quality in Windham at this time is still considered to be good, continued monitoring and education will be warranted as the

town grows in the future. The use of *best management practices* for agricultural, forestry, and other resource-based land use activities should also be implemented on all properties engaging in these activities. Watersheds with higher development densities, such as those around the North Windham/Little Sebago Lake area, need to be closely monitored in the future. These areas are the most densely developed portions of the town and are also the areas currently zoned for future commercial and industrial growth. Commercial and industrial land uses tend to have more impervious surfaces, such as larger buildings and parking areas, which can increase runoff into surface waters.

These same watersheds also overlay the town's high yield groundwater aquifer. Although no municipal wells are presently located in this aquifer, continued oversight and regulation will help to preserve water quality for potential use in the future. It will also serve to protect the public water supply in Sebago Lake which is hydraulically linked to the groundwater in that portion of Windham. The town will also need to consider revising its zoning regulations, with regard to the aquifer protection district, based on updated mapping of this resource. contained in this plan.

From a wildlife perspective the town still has good opportunities to preserve significant tracts of land for habitat and link these areas together along protected stream and river corridors. However, if the current low density residential development patterns continue to occur in the future it will encroach on these areas and fragment larger tracts of land into isolated islands of wildlife habitat. Windham still has a considerable amount of agricultural land as well as parcels that are being managed for timber products. Both of these resource based industries maintain land that is important for wildlife, which illustrates habitat preservation can both serve the needs of wildlife and also support the local and state economies.