

Chapter 6

NATURAL RESOURCES

Life relies on natural resources such as air, land, water, plants and wildlife. The local economy depends on wise use and conservation of these resources. Continued development can have serious and cumulative adverse impacts on the natural resources and systems that support the economy and quality of life in Bridgton. Bridgton's natural resources are shown on maps contained in the appendix of this plan.

Groundwater Resources

The major source of Bridgton's drinking water is groundwater: precipitation that does not flow away as surface water infiltrates into the soil. Some may remain near the surface as soil moisture, where it is available for plants, but much percolates downward, becoming groundwater.

Bedrock and Sand and Gravel Aquifers

Wells drilled in bedrock usually yield a relatively low flow, and sometimes wells must be drilled to depths of several hundred feet to obtain adequate yields for household use. Where fractures in the bedrock are numerous, flows may increase significantly. These areas are called bedrock aquifers. In other locations, groundwater is available in higher yields from sand and gravel deposits that lie below the ground surface, but above the bedrock. These deposits, known as sand and gravel aquifers, are highly porous and allow for both storage and release of greater volumes of water through shallower wells that do not need to penetrate bedrock. Sand and gravel aquifers are important resources for large-scale community, agricultural and industrial water supplies, as well as an economical water source for individual homeowners.

Sand and gravel aquifers have been mapped by the Maine Geological Survey. In Bridgton, all sand and gravel aquifers have an estimated yield of between 10 and 50 gallons per minute. The town has three sand and gravel aquifers. They are located along the Bear River, along Willett Brook, including downtown Bridgton, and in the far northwestern corner of town along Sawyer Brook and the southeast shore of Kezar Pond. Of these, the largest is the Willett Brook aquifer, which extends for the entire length of the brook within Bridgton, including downtown Bridgton.

The location of the Bear River and Sawyer Brook aquifers within both Bridgton and neighboring towns makes these resources both available for use by and vulnerable to pollution from land use and development in any or all of the towns sharing them. No one town, therefore, can fully protect these shared resources by itself. To achieve this end, some form of regional cooperation may be required.

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The Bear River Aquifer serves as a public water supply for the Harrison Water District, which draws from a central well located in Harrison, just west of Harrison Village. The Town of Bridgton contracts with the Harrison Water District for service to North Bridgton. The estimated recharge area for this aquifer is north and west from the Bear River into the Towns of Bridgton and Waterford, encompassing over 130 acres. The central well supplies over 240 customers in Harrison Village and in North Bridgton. The Town of Bridgton, Parks and Recreation Department utilizes a spring for a public water supply at the Salmon Point Campground. The Department of Human Services lists more than 40 other private community water supplies that draw on groundwater—mostly camps, cottages, campgrounds, inns, and restaurants.

The Bear River Aquifer is located within Bridgton, Harrison and Waterford. Bridgton has an aquifer protection overlay district, which applies to the Bear River Aquifer and its recharge area. The rules of the overlay district limit the density and the nature of permitted uses, prohibiting uses which are incompatible with the long term water quality of the aquifer. Harrison also has an aquifer protection ordinance for the Bear River aquifer, and Bridgton's ordinance makes protection compatible across town boundaries.

The Bridgton Water District selected a well site in the Willett Brook aquifer to serve its nearly 2,000 customers and received funding to develop this source. The well is located upstream of the Sandy Creek gasoline spill, the town's transfer station, and downtown Bridgton, in order to ensure a clean supply. The western portion of the Willett Brook aquifer is the only viable source of groundwater for the District's public water supply.

The Bridgton Water District has implemented the Maine Department of Human Service's Wellhead Protection Program to help protect this last remaining source. This implementation occurred in three stages: (1) 100% protection of an area 300' in diameter around the wellhead; (2) protection of the aquifer as mapped by a hydro-geologist; and (3) protection of the watershed through the Willett Brook Aquifer Protection Ordinance, similar to the standards contained in the Town's Bear River Aquifer Ordinance. Clearly it will be especially important to ensure that development in the recharge area of this aquifer does not adversely affect its water quality.

Threats to Groundwater Quality

Because sand and gravel aquifers are porous and transmit water rapidly, they are also susceptible to pollution from septic tank effluent, landfill effluent, leakage from above ground or underground storage tanks, hazardous materials used or stored at industrial sites, floor drains in garages or other work areas, road salt, sand-salt storage piles, fertilizers and pesticides. The productivity of an aquifer can be limited by covering the ground surface above it with impervious area.

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Extensive paving and building coverage can prevent water from quickly entering the ground and replenishing the groundwater supply. Removal of overlying sands and gravels may expose the water table to direct pollution and may result in increased evaporation.

Because Bridgton's aquifers occur in areas which are primarily flat or gently sloping and within areas with soils suitable for septic systems, the area may be easily excavated and easily developed and may be in demand for many uses. The town's planning process should carefully assess the availability of the aquifer in terms of present and future demands for water; the potential lasting values of aquifers should not be jeopardized by excessive exploitation of their other values.

In addition to existing conditions that may pose a threat to groundwater quality, the town should also consider the land use patterns that are expected to occur in the future. If growth and development is anticipated to occur in a way that would create or compound threats to groundwater resources, policy decisions should be made to address these issues. Development standards need to address some of this concern.

One of the Federal Safe Drinking Water Standards relates to the permissible concentration of nitrates in groundwater. Nitrates are a significant health hazard because they inhibit the ability of human blood to transport oxygen throughout the body. In infants, an excessive level of nitrate consumption can cause what is commonly known as "blue baby syndrome", in which the baby's skin actually appears to have a bluish hue. In fact it is an indication that the child's tissues and organs are seriously deprived of needed levels of oxygen. Nitrates are normally present in very low concentrations in groundwater. They are also present in human waste, and higher nitrate concentrations become distributed into groundwater through underground plumes of septic system effluent. Because nitrates are also present in fertilizer, including manure and synthetic fertilizers, agriculture is another significant source. Nitrates in groundwater from residential development can be problematic due to two causes. First, older developments and densely developed areas may contain a high proportion of homes with inadequately designed septic systems which have inadequately functioning septic systems, or cesspools or some other poorly designed or maintained systems. These systems may be located too close to adjacent wells. Second, the septic systems may meet the Maine Subsurface Wastewater Disposal Rules, but also may be located on such marginal soils that they are still too densely located to prevent excessive nitrate levels. The Maine Subsurface Wastewater Disposal Rules are designed to protect against bacterial and viral health hazards but the standards do not address nitrate levels.

Current Groundwater Protection Measures and Policy Issues

Bridgton's current Subdivision Regulations and Site Plan Review Ordinance prohibit a development from adversely affecting the quantity or quality of groundwater.

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State law requires that each town in Maine notify public water suppliers of proposed developments that would be located within the area that their well uses to obtain its source water (the source water protection area). Bridgton's aquifer protection ordinances apply special aquifer protection standards to proposed development when it is proposed over or in the recharge area for a sand and gravel aquifer.

Rivers, Streams and Brooks

State law defines a "river, stream or brook" as a channel between defined banks that is created by the action of surface water having two or more of the following characteristics:

- A. It is depicted as a solid or broken blue line on the most recent edition of the U.S. Geological Survey 7.5-minute series topographic map or, if that is not available, a 15-minute series topographic map.
- B. It contains or is known to contain flowing water continuously for a period of at least 6 months of the year in most years.
- C. The channel bed is primarily composed of mineral material such as sand and gravel, parent material or bedrock that has been deposited or scoured by water.
- D. The channel contains aquatic animals such as fish, aquatic insects or mollusks in the water or, if no surface water is present, within the streambed.
- E. The channel contains aquatic vegetation and is essentially devoid of upland vegetation.

"River, stream or brook" does not mean a ditch or other drainage way constructed, or constructed and maintained, solely for the purpose of draining storm water, or a grassy swale.

For the purposes of this Plan, we will use the term "river" to include rivers, streams and brooks. Bridgton has only one river, since a river is considered to be a flowing water body that drains 25 or more square miles of land area. At the confluence of Willett Brook and Steven's Brook near Depot Street, Stevens Brook meets that definition. Bridgton's only river is that segment of Steven's Brook from that confluence downstream to Long Lake. Bridgton has 526,889 linear feet or about 100 miles of streams and river. About 277,960 linear feet or about 53 miles are protected by Bridgton's Shoreland Zoning Ordinance.

The State has established Water Quality classifications for all rivers and streams in Bridgton. All have been classified "A" except for Steven's Brook which is classified "B".

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Class A is defined as water quality capable of supporting "drinking water supply, recreation in or on the water, fishing, industrial process and cooling water supply, hydroelectric power generation, navigation and a natural habitat for fish and other aquatic life." Class B is defined as being capable of supporting all Class A uses, except that it is capable of supporting "unimpaired" habitat, as opposed to the "natural" habitat of Class A.

Many of Bridgton's streams are protected by shoreland zoning with a 75 foot buffer zone and structure setback. Again, Steven's Brook is the exception since the portion designated as river has a 250 foot shoreland zone and a portion of the downtown section is zoned as General Development District, allowing a reduced setback and buffer area. Timber harvesting activities and development along the Town's streams could damage water quality, wildlife habitat and fisheries if not conducted properly or if conducted extensively.

Lakes

There are eleven lakes and ponds within Bridgton's borders. These lakes are intensively used for recreational purposes throughout the year, with the highest level of use during the summer months. Much of the Town's real estate value is found within the shoreland zone of its lakes and streams, making lakes and streams a key factor in much of the Town's economic activity. All lakes and ponds in Bridgton are legally considered Great Ponds, which are defined as "any inland body of water which in a natural state has a surface area in excess of 10 acres and any inland body of water artificially formed or increased that has a surface area in excess of 30 acres." For the purposes of this plan, we will use the term "lake" to include great ponds, lakes and ponds.

The surface water system within Bridgton is complex and diverse. Much of the town's land area, including the Adams Pond, Foster Pond, Holt Pond, Highland Lake, Long Lake, Otter Pond, Peabody Pond and Woods Pond watersheds, drain to Sebago Lake. Western portions of Bridgton contained in the Beaver Pond, Kezar Pond and Moose Pond watersheds drain to the Saco River. Bridgton shares the watersheds of most of these lakes with neighboring towns. Bridgton also contains some watershed lands for Berry Pond which is located in Sweden and Hancock Pond which is located in Denmark and Sebago. Responsible and consistent joint management of these watershed areas is essential for protecting water quality.

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Maine's Water Quality Goals for Lakes and Streams

The Maine Water Quality Classification System currently classifies all lakes in Bridgton as GPA. It is the State's goal that these waters remain Class GPA. GPA waters "shall be of such quality that they are suitable for.... drinking water after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other aquatic life. The habitat shall be characterized as natural." (38 MRSA Section 465-A.) Highland Lake and Long Lake were recently added to the GPA attainment list after Total Maximum Daily Load (TMDL) assessments were completed for both lakes and large-scale, multi-year water quality improvement projects were implemented in both watersheds by the Lakes Environmental Association and Cumberland County Soil and Water Conservation District.

Threats to Lake Water Quality

Development within lake watersheds and the use of the lakes themselves pose several kinds of threats to stream and lake water quality. The threats to groundwater listed above are also threats to stream and lake water quality because lakes and streams are fed partially by groundwater flow. Beyond this however, there are several kinds of land use and development impacts that can have an adverse effect on both streams and lakes. Erosion and sedimentation from agriculture, timber harvesting, existing and new roads, ditches, building sites and driveways can add to the sediment loading and phosphorus loading of lake waters. Failing, poorly designed and/or maintained septic systems can add unacceptable nitrate and phosphorus loads plus bacterial and/or viral contaminants to surface waters. Pesticides and fertilizers in storm water runoff can pose a hazard to water quality. Point sources of pollution also pose a variety of hazards to surface waters. Gas and oil, and human waste discharges from boats on lakes can also pollute lake waters. And heavy powerboat use and/or poor regulation of water levels in lakes can erode shorelines and beaches. In recent years, a new threat has been added to the list: invasive aquatic plants.

Erosion and Sedimentation

Common land use and development practices, including agriculture, site development and timber harvesting, can often increase erosion resulting in sedimentation and the loss of valuable topsoil. Eroded sediment and topsoil can clog culverts, storm drains and ditches. It also contains phosphorus that will ultimately raise the phosphorus concentration and contribute to decline of lake water quality. To help minimize erosion and sedimentation, the Town of Bridgton has adopted erosion and sedimentation control requirements in its Site Plan Review, Shoreland Zoning, and Subdivision ordinances.

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Lake Phosphorus Levels

One of the most potentially serious impacts on lake water quality is the gradual increase in phosphorus concentrations in lake water due to additional phosphorus loading from development in lake watersheds. Phosphorus is a natural element that is a fertilizer for plants. It attaches to soil particles that are transported to lakes and streams through erosion and sedimentation during storm events. Other sources of this nutrient are pet wastes, lawn fertilizers, septic systems constructed in porous soils and decomposing organic matter. Maine's lakes are highly vulnerable to phosphorus loading. The cumulative impact of minute amounts of phosphorus coming from multiple sources throughout a lake's watershed can result in phosphorus levels that support regular algae blooms. The decomposition of short-lived algae also robs the lake of oxygen. This threatens many fish species, especially trout and salmon, and can trigger the release of additional phosphorus into the lake waters through a process called phosphorus recycling. With little or no oxygen at the lake bottom, phosphorus that is chemically bound to bottom sediments can be released into the water column. If a lake reaches this stage, this added phosphorus, combined with phosphorus already entering the lake from runoff, can lead to permanent changes in lake water clarity, loss of cold water fisheries and other economically and ecologically adverse effects.

Invasive Aquatic Species

Lake ecosystems in the United States and Canada face threats from at least eleven invasive aquatic plants. The aquatic plants now in Maine include variable-leaf and Eurasian milfoil, plus hydrilla, curly-leaf pondweed and European naiad. Hydrilla poses an especially serious threat because it is one of the most aggressive of the invasive species. The other six invasive plant species, not yet established in Maine, include parrot feather, Brazilian elodea, fanwort, water chestnut, European frog-bit, and yellow floating heart. Each of these species is established in at least one state or province adjacent to or near Maine.

There are also several invasive aquatic animals that pose a threat to Bridgton's waterbodies. These species include the Asian clam, Chinese mitten crab, Chinese mystery snail, northern pike, Quagga mussels, rusty crayfish, spiny waterflea and the zebra mussel. Of those species, the Chinese mystery snail is known to be in several of Bridgton's lakes and the northern pike, which is robust relative of our native chain pickerel is now known to be in nearby Sebago Lake.

Invasive wetland plants such as European common reed (phragmites), purple loosestrife and flowering rush also pose a significant risk to Bridgton's wetlands.

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Purple loosestrife and European common reed populations have grown dramatically in the area during the last decade and it is likely that they will continue to alter wetland habitat and displace native wetland species like cattails which provide a food source and habitat for a tremendous amount of wildlife.

The invasive algae known as didymo or “rock-snot” is also a problem that is rapidly spreading in New England. This species spreads rapidly in cool, low nutrient streams and rivers and can quickly cover valuable rocky habitat with a thick, yellowish layer coating of this matting algae. Didymo has not yet been found in Bridgton.

Invasive plants and animals are alien to Maine’s lake ecosystems, brought in by various means. Plants can be spread by boaters, carrying plant fragments from one lake to another on boats, trailers or fishing equipment. Where invasive plants become established, they can have severe impacts on lake ecosystems by displacing native species, decreasing biological diversity, changing habitat and biotic communities and disrupting the food chain. These changes can have significant socioeconomic consequences, such as the impairment of fishing, boating and other forms of recreation as well as reducing property values.

Local Actions and Regulations

Phosphorus controls have been implemented through the subdivision regulations, site plan review ordinance and shoreland zoning. While this is an important step toward keeping long-term phosphorus concentrations in lake water within biologically acceptable limits, they do not control phosphorus from individual lot development outside the shoreland zone that is not subject to subdivision review. Since single lot development can amount to more than half of all new residential development, and since phosphorus runoff from everywhere within a lake’s watershed eventually reaches the lake, phosphorus runoff from this kind of development still may pose a significant hazard to lake ecosystems over the long term. Bridgton’s site plan review ordinance, subdivision ordinance and shoreland zoning ordinances all require written erosion and sedimentation control plans as a condition of approval for new development plans.

Bridgton’s shoreland zone goes beyond the 250’ state minimum on lakes to a zone that extends 500’ inland from the normal high water mark. Bridgton’s shoreland zone also includes protection for streams and stream segments that are not mandated by the state. A new rule recently adopted by the Maine DEP, that is not part of shoreland zoning, now extends this protection to headwaters of all USGS mapped streams. The new rule requires a 75-foot buffer on streams *above* the juncture where shoreland zoning stops.

Bridgton’s shoreland zoning ordinance also protects steep slopes, islands, wetlands, some floodplains and fragile bays and coves by placing them in a Resource Protection

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District. This designation helps to protect areas unsuitable for development and important habitat areas.

Bridgton’s Subdivision Regulations require a phosphorus loading study for all subdivisions. Subdivisions must use the Maine Department of Environmental Protection's “Phosphorus Control in Lake Watersheds” manual (this manual has been updated and renamed “Stormwater Management for Maine”) and methodology to keep phosphorus export from new developments within lake watersheds at safe levels. The phosphorus control standard used is unique to each lake watershed and is expressed as the amount of phosphorus that can be exported from each new development on a per acre per year basis. This standard is called the Per Acre Phosphorus Allocation.

The Lakes Environmental Association has monitored water quality in all lakes in Bridgton. The monitoring results have been used to determine the Per Acre Phosphorus Allocations for each lake. The phosphorus control method involves policy decisions concerning the level of protection for each lake and the future area estimated to be developed over the next fifty years within each watershed.

Table 6.1
Per Acre Phosphorus Allocation

	Protection Level In PPB of Phosphorus	Total Watershed Acres	Acres Available for Development	Growth Factor	Acres Estimated for Development In Next 50 Years	Per Acre Phosphorus Allocation
Adams Pond	0.75	172	155	.35	54	0.038
Beaver Pond	1.00	1653	1353	.4	541	0.024
Hancock Pond	0.75	358	318	.3	95	0.049
Highland Lake	0.75	3600	3240	.4	1296	0.033
Holt Pond	1.00	1877	1477	.35	517	0.029
Foster Pond	1.00	1030	930	.35	326	0.037
Kezar Pond	1.00	2651	2401	.3	720	0.049
Long Lake	0.75	17672	16096	.4	6438	0.029
Moose Pond Basin 1	0.75	773	623	.35	218	0.03
Moose Pond Basin 2	0.75	2777	2377	.35	832	0.041
Otter Pond	1.00	790	711	.4	284	0.025
Peabody Pond	0.75	516	464	.3	139	0.052
Woods Pond	1.00	3266	2939	.35	1029	0.036

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Protection Level

This is expressed in parts per billion of phosphorus. The protection level is a community's goal for phosphorus control that sets a maximum allowable increase in phosphorus concentration for each lake. The higher the number, the more phosphorus is allowed to be added to the lake. A 1 ppb increase means that inputs into the lake in the next fifty years should keep the in-lake increase to 1 ppb or less. A 1 ppb increase is the threshold at which a noticeable decrease in water clarity would occur. Lakes with a .75 protection level are considered either unusually pristine, have an excellent cold water fishery or have very fragile water quality. The protection level would need to be adjusted if water quality conditions were to change significantly.

Total Watershed Acres

This is the number of acres of each lake's watershed in Bridgton.

Acres Available for Development

This is the number of acres that are not already developed and are suitable for development.

Growth Factor

This is the percentage of acres available that is estimated to be developed in the next fifty years. This figure may need to be adjusted if actual growth rates significantly exceed or fall below this estimated rate.

Acres Estimated for Development

This number is derived by multiplying numbers in the previous two columns.

Per Acre Phosphorus Allocation

This is the key number for phosphorus protection and control. For land developers, it constitutes the phosphorus budget for a particular project. To develop this figure, you must:

1. Take the amount of phosphorus that would cause a 1 ppb change in water quality. This amount is determined by the DEP and is not shown in the chart. It is computed using lake volume and flushing rate.

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2. Multiply the amount of phosphorus that would cause a 1 ppb change by the protection level.
3. Divide the number just calculated by the acres estimated for development.

The Lakes Environmental Association has been actively monitoring the water quality on Bridgton’s lakes since 1970 and works with municipal officials to develop and refine planning, prevention and management tools. The Association has developed a water quality rating system for Bridgton’s lakes. LEA classifies lakes by dividing them into categories based on their overall health and susceptibility to algal blooms. Lakes in the *Average Degree of Concern* category are those lakes that are currently in good health. The *Moderate Degree of Concern* category describes lakes where testing shows a potential or actual decline in water quality. The *High Degree of Concern* category is reserved for those lakes that appear to be near a fragile equilibrium point where detrimental algal blooms might occur.

**Table 6.2
Basic Lake Information**

Lake	Surface Area (acres)	Max Depth (feet)	Flushing rate (per year)	Long-Term Average Phosphorus as of 2011 (ppb)	Degree of Concern
Adams Pond	42	51	.54	7.0	High
Beaver Pond	69	35	3.7	9.2	High
Foster (Ingalls) Pond	136	28	.93	7.1	Average
Highland Lake	1,295	50	.94	6.7	High
Holt Pond	30	10	unknown	13.3	Average
Kezar Pond	1,447	12	unknown	19.3	Average
Long Lake	5,181	59	.94	7.1	High
Moose Pond	1,617	70	3.69	6.0	High
Otter Pond	86	21	.7	12.5	Moderate
Peabody Pond	701	64	.3	6.0	High
Woods Pond	452	29	.77	7.8	Mod/High

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Bridgton has been a leader in the effort to prevent the spread of invasive aquatic plants by establishing boat washing facilities, billboards and a courtesy inspection program in conjunction with the Lakes Environmental Association. The enormous impact an invasive plant infestation would have on the Lake Region's ecology and economy have prompted most area towns to establish local programs to augment the state's efforts.

State Actions and Regulations

State Non-point Source Pollution Controls

Larger development projects are subject to a permit requirement under Maine's Stormwater Management Law. For those projects that are subject to the law, the requirements are more stringent in watersheds that are 'Most at Risk from New Development.' Smaller projects are not subject to the law, but are subject to Maine's Erosion Control Law.

DEP List of Watersheds 'Most at Risk from New Development'

Maine's Stormwater Management Law, which regulates both stormwater volume and quality from new development to which it applies, uses a two-tier level of regulation. The more restrictive standards applied under this law apply in watersheds that the DEP has classified as "Most at Risk from New Development". Most at Risk lakes are identified by the Maine DEP as being particularly sensitive to eutrophication (premature aging and algae blooms) based on current water quality, potential for internal recycling of phosphorus, potential as a cold water fishery, volume and flushing rate, or projected growth rate in the watershed.

DEP Nonpoint Source Priority Watersheds List

The Maine DEP also lists lake watersheds that are high priority for financial and technical assistance related to nonpoint source pollution control. This is called the Nonpoint Source Priority Watersheds List. There is also a subsection of this list that includes 180 "highest priority" lakes. Waters within designated NPS Priority Watersheds have significant value from a regional or statewide perspective and have water quality that is either impaired, or threatened to some degree due to nonpoint source water pollution. This list, which was adopted by the Land & Water Resources Council in October 1998, will be used to help identify watersheds where state and federal agency resources for NPS water pollution prevention or restoration should be targeted.

The following table shows the listings of each lake within Bridgton or outside Bridgton but impacted by drainage from within Bridgton.

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**Table 6.3
Most at Risk**

Lake	On 'Most at Risk from New Development' List	On NPS Priority Watershed List	On Highest Priority Subsection of NPS Priority Watershed List
Adams Pond	YES		
Beaver Pond	YES	YES	
Foster Pond	YES	YES	
Highland Lake	YES	YES	YES
Holt Pond			
Kezar Pond			
Long Lake	YES	YES	YES
Moose Pond			
Otter Pond	YES	YES	
Peabody Pond		YES	
Woods Pond	YES	YES	

Surface Use and Lake Access

The increased popularity of boating and a steadily increasing public demand for lake access has pushed these issues to the forefront. As these pressures continue, Bridgton may want to consider joining Naples and Harrison in establishing mooring, harbormaster and marine patrol programs. The Town has already had discussions about a regional approach to these problems that may be the best resolution.

Lake access for swimming and boat launching is a demand that Bridgton has done well addressing historically. There are established public beaches at Woods Pond, Highland Lake, Moose Pond and at Salmon Point on Long Lake. There is primitive or undeveloped swimming access at Long Lake at the State Boat Launching Site and at Plummer's Landing and at Foster Pond. There are public launching sites at all major lakes: Long Lake, Highland Lake, Moose Pond, Peabody Pond and Woods Pond. Boat washing stations have been constructed at Highland Lake, Woods Pond and Moose Pond however a wash station is still needed at the Long Lake launch. There are private launching sites on Otter Pond and Adams Pond that have been used by the public. As demands change over time, the Town will need to continually assess and address the adequacy of public access to its lakes.

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Summary

The issue of water quality is tied particularly closely to the need for cooperation between neighboring towns. The Bear River, Bridgton's shared lakes (Holt Pond, Long Lake, Moose Pond, Kezar Pond and Peabody Pond) and shared watershed lands for Hancock Pond and Highland Lake are the most obvious examples of surface water resources that warrant cooperative protection. Streams and groundwater also cross town boundaries and will require similar cooperation between towns for effective long-term protection. Bridgton's water resources are significant in all aspects and, because of their fragile and vulnerable nature, will require vigilance to protect them in their existing condition. The fact that the town's economy is tied so closely to these resources gives added impetus for proper management.

Wetlands

Wetlands are vital natural resources that have both ecological and economic importance. They provide unique habitat, spawning and nesting areas for a broad spectrum of plants, animals and fish, including birds, waterfowl, shellfish, fish, insects, reptiles, amphibians, and many mammals. Wetlands serve as water purifiers for groundwater recharge and discharge, and help protect surface water quality downstream. Wetlands reduce flood hazard by absorbing rapid runoff like a sponge and then releasing it slowly to surface waters and, in some cases, groundwater. They reduce erosion and sedimentation in both stream channels and lake margins. And, in some cases they have scenic, historic and archaeological values.

Numerous wetlands exist in Bridgton covering over 2,100 acres. These include swamps, marshes, bogs, fens and the streams and numerous rivulets and springs that feed them. The most prominent are part of the wetland system associated with Willett Brook. Other wetlands in Bridgton are associated with streams that feed each of the lakes. Still others are not associated with streams, but simply occupy low-lying areas. About 1,100 acres of wetlands are protected under shoreland zoning.

"Wetlands" refers to the group of soils that are commonly found in a waterlogged condition. Some of these soils are ponded or have standing water on them most of the year. Wetland soils typically include soils that are poorly or very poorly drained, as defined by the Soil Conservation Service (SCS). In a wetland, the water table is typically at or near the ground surface for enough of each year to produce wetland vegetation.

The sensitive ecological balance of a wetland can be easily disrupted by many human activities. Historically, wetlands have often been filled, drained, or excavated to expand the amount of developable land. Their functions can also be severely impaired through clearing, paving or other development of adjacent land, causing reduced wildlife habitat,

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loss of groundwater recharge area, loss of scenic value, increased flood hazard, and other adverse impacts.

The Casco Bay Watershed Wetlands Functional Assessment

Update

The State Planning Office has developed a method of characterizing wetlands in Bridgton and other towns within the Casco Bay Watershed. This method provides a functional assessment of each wetland to rate its relative importance in each of five wetland function categories. These categories include: plant and animal habitat, sediment retention, flood flow alteration, fisheries habitat, and cultural and educational value.

A wetland that meets the rating system's threshold characteristics in any of these categories receives a "1". If it does not meet the threshold it receives a "0" for that category.

The Bridgton Wetlands Map shows the score each wetland received. Each wetland also has an identification number under this system. In the Appendix there is a table that shows for each wetland the threshold criteria against which each wetland was measured in all five categories. All wetlands are important. This new rating system provides a systematic approach to determining which wetlands are most important for providing each type of wetland function. It also lets us see which function or combination of functions each wetland is playing an especially important part in providing for the ecosystem as a whole.

Wetland Regulations

Because wetlands are ecologically important in all the ways described above, filling, dredging, draining and other alterations are regulated by federal, state and local government. At the local level, the subdivision law requires that all wetlands regardless of size must be shown on proposed subdivision plans.

Vernal Pools

Vernal pools are a category of wetland not currently mapped because there is no published source of information to document their locations. Vernal pools annually fill with water, but may dry out in some or most years. They lack fish populations making them a safe place for many amphibian species to lay their eggs in the spring. Vernal pools are permanent fixtures on the landscape and range in size from a few square feet to several acres. In addition to providing critical habitat for frogs, salamanders and fairy shrimp, vernal pools provide food and water for numerous upland forest animals such

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as deer, moose and ermine. Destruction of vernal pools means a decrease in biodiversity as amphibians are lost and the upland species that rely on them decline.

The state of Maine has laws protecting significant vernal pools but these laws only apply if the vernal pool has been identified. Planning boards can request that properties being developed under site plan or subdivision criteria be surveyed for vernal pools. Vernal pool surveys should be done by qualified professionals with their findings documented and presented to the board as part of the application along with the date of the survey(s).

Floodplains

Many of Bridgton's lake, river, stream and wetland shorelines areas are susceptible to flooding, especially during spring rains when frozen ground and remaining snow can produce excessive amounts of runoff.

On the National Flood Insurance Program maps, the 100-year floodplain is defined as the area that would be inundated by the flood from a storm of such intensity and duration that it statistically will occur, on average, once every 100 years.

Construction in these areas is restricted by local ordinance and federal flood insurance regulations. Under the National Flood Insurance Program, the federal government provides flood insurance to property owners within a community's 100-year floodplain at reduced rates, provided that that community adopts a floodplain ordinance that meets federal standards for building construction and flood-proofing. The Town of Bridgton has participated in the National Flood Insurance Program since 1982. Permitted uses in Bridgton's 100-year flood plain are limited to those allowed within the Resource Protection District of the Bridgton Shoreland Zoning Ordinance. Over time those federal standards have historically been subject to change and local floodplain management ordinance standards have had to be adjusted accordingly. This is an ongoing process and the Town will need to monitor its compliance to continue to meet the requirements for property owners' eligibility for NFIP coverage.

Forest Resources

Forests occupy more than half of Bridgton's land area and are composed mainly of softwoods including balsam fir, white pine, spruce, hemlock and hardwoods including maples, beech, birches, and red oaks. The forest provides habitats for plants and animals and serves important environmental functions such as protecting soils, filtering water and supplying oxygen, and they have scenic and recreational value for hikers, hunters, fishing, snowmobilers and cross country skiers.

Forests also are sources of employment. The harvesting of timber for production of lumber, pulpwood, firewood and other wood products has long been a major

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component of Bridgton's local economy. As a renewable natural resource, woodlands that are properly managed will continue to provide many jobs. There are currently over 10,000 acres of land in Bridgton taxed under the Maine Tree Growth Tax Law that provides some property tax relief for forest land.

Timber harvesting is sometimes done improperly or in wet conditions, resulting in erosion and sedimentation, phosphorus pollution of streams and lakes, and unsightly rutted logging roads. Logging in certain areas, or the cumulative impact of many logging operations, can radically reduce the ability of land to absorb runoff. On a widespread basis, this can lead to more marked changes in the water level of streams and rivers during storms and dry periods.

Bridgton's forests require careful management to ensure they remain environmental and economic assets.

The State of Maine currently regulates timber harvesting to prevent adverse impacts on the forest resource itself, and its ability to support wildlife and protect lake watersheds and fisheries. The Town of Bridgton currently has timber harvesting standards only in its Shoreland Zoning Ordinance.

Access to forests and open space areas for recreational uses is also a growing issue. With more private land being posted, hunters, hikers and nature enthusiasts will find access increasingly limited. The Town may wish to plan now to reserve land for recreational and other uses before particular valuable tracts are bought up or real estate prices become prohibitive.

Wildlife Habitats

Bridgton has always had an abundance of wildlife and a diverse range of habitats for plants and animals. This level of abundance and diversity has historically been supported by the large areas of undeveloped land and the many riparian and wetland habitats that link these larger undeveloped blocks. With the rapid development of the last decade, including new roads to support the new residential development in Bridgton and surrounding towns, a phenomenon known as habitat fragmentation has gradually been taking place. The size of the large blocks of unbroken habitat has decreased as new roads have extended into or crossed them. Similarly, the links between such blocks, the riparian areas along streams, lakeshores, and associated wetlands have been narrowed or interrupted and less able to function effectively as wildlife travel corridors between habitat areas.

The "Beginning With Habitat" Project, a joint partnership of several state agencies, including the Maine Department of Inland Fisheries and Wildlife, the Maine Natural Areas Program, the Maine State Planning Office, the US Fish & Wildlife Service, and the Maine Audubon Society, has mapped large habitat blocks remaining in Bridgton, many of which extend into neighboring towns. These areas are shown on the Habitat Blocks

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Map for the Town of Bridgton. Riparian Areas that link and penetrate into the habitat blocks are also shown on this map. And state conservation lands that are extremely unlikely to ever be developed are also shown. Note that riparian areas shown do not reflect existing development along lakeshores, streams or wetlands, which, if present, may detract from the use of particular areas and potential linkages between habitat blocks some types of wildlife. Bridgton currently has 2 parcels of 500 acres or more (totaling 1,113 acres), 8 parcels between 250 and 499 acres (totaling 2,420 acres) and 44 parcels between 100 and 249 acres (totaling 6,025 acres).

The presence of wildlife species on smaller undeveloped habitat blocks also occurs. This is often due to the presence of undeveloped riparian areas or other wildlife travel corridors linking smaller blocks to larger blocks beyond the area of the sighting. And various species of wildlife typically only found in large undeveloped habitat blocks, do occasionally venture into more densely developed areas than indicated on the chart.

As the density of development increases over time, the table shows the typical effects of habitat fragmentation on the diversity and composition of species remaining.

**Table 6.4
Habitat Block Sizes – Species Present**

1-19 Acres	20-99 Acres	100-499 Acres	500-2500 Acres	Undeveloped
RACCOON	RACCOON	RACCOON	RACCOON	RACCOON
	HARE	HARE	HARE	HARE
SMALL RODENT	SMALL RODENT	SMALL RODENT	SMALL RODENT	SMALL RODENT
	PORCUPINE	PORCUPINE	PORCUPINE	PORCUPINE
				BOBCAT, FISHER and COYOTE
COTTONTAIL	COTTONTAIL	COTTONTAIL	COTTONTAIL	COTTONTAIL
	BEAVER	BEAVER	BEAVER	BEAVER
SQUIRREL	SQUIRREL	SQUIRREL	SQUIRREL	SQUIRREL
	WEASEL	WEASEL	WEASEL	WEASEL
		MINK	MINK	MINK
	WOODCHUCK	WOODCHUCK	WOODCHUCK	WOODCHUCK
		DEER	DEER	DEER
MUSKRAT	MUSKRAT	MUSKRAT	MUSKRAT	MUSKRAT
			MOOSE	MOOSE
RED FOX	RED FOX	RED FOX	RED FOX	RED FOX
SONGBIRDS	SONGBIRDS	SONGBIRDS	SONGBIRDS	SONGBIRDS
		SHARP-SHINNED HAWK	SHARP-SHINNED HAWK	SHARP-SHINNED HAWK
			BALD EAGLE	BALD EAGLE
SKUNK	SKUNK	SKUNK	SKUNK	SKUNK

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		COOPER'S HAWK	COOPER'S HAWK	COOPER'S HAWK
		HARRIER	HARRIER	HARRIER
		BROAD-WINGED HAWK	BROAD-WINGED HAWK	BROAD-WINGED HAWK
		KESTREL	KESTREL	KESTREL
		HORNED OWL	HORNED OWL	HORNED OWL
		BARRED OWL	BARRED OWL	BARRED OWL
		OSPREY	OSPREY	OSPREY
		TURKEY VULTURE	TURKEY VULTURE	TURKEY VULTURE
		TURKEY	TURKEY	TURKEY
MOST REPTILES	MOST REPTILES	REPTILES	REPTILES	REPTILES
	GARTER SNAKE	GARTER SNAKE	GARTER SNAKE	GARTER SNAKE
	RING-NECKED SNAKE	RING-NECKED SNAKE	RING-NECKED SNAKE	RING-NECKED SNAKE
MOST AMPHIBIANS	MOST AMPHIBIANS	MOST AMPHIBIANS	AMPHIBIANS	AMPHIBIANS
		WOOD FROG	WOOD FROG	WOOD FROG

Source: A Response to Sprawl: Designing Communities to Protect Wildlife Habitat and Accommodate Development, Maine Environmental Priorities Project, July 1997.

Conservation Lands

Bridgton has several important blocks of conservation lands: The Holt Pond Preserve owned by the Lakes Environmental Association, and the Sebago Headwaters Preserve, Bald Pate Mountain Preserve, Pleasant Mountain Preserve and Pondicherry Park all owned by the Loon Echo Land Trust and a preserve at the northwest corner of Highland Lake owned by the Hancock Foundation. While there are numerous smaller parcels of parkland and preserved land, these are currently the most significant in terms of acreage.

Plant and Wildlife Habitat of Statewide Significance

The Beginning With Habitat project has compiled a High Value Plant and Wildlife Habitat Map for the Town of Bridgton. This map includes the locations of two types of Significant Wildlife Habitat: Deer Wintering Areas and Waterfowl and Wading Bird Habitat. The map also shows habitat locations for species of rare plants and wildlife that are endangered, threatened or of special concern.

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Significant Wildlife Habitat

Significant Wildlife Habitat is defined by the Maine Natural Resources Protection Act (NRPA), which became effective in 1988. It was intended to define, designate and protect Significant Wildlife Habitats from adverse effects of development. In the years since the Act's adoption, various state agencies have been developing statewide maps of the many types of Significant Wildlife Habitats. Those present in Bridgton are described below and shown on the High Value Plant and Wildlife Habitat Map.

Deer Wintering Areas

Areas of forest in which the combination of cover, remoteness, and availability of food are optimal for deer to gather and survive the winter. There are currently 11 deer wintering areas in Bridgton shown on the map, amounting to about 2,100 acres. Deer Wintering Areas as mapped have not been adopted as an NRPA-regulated habitat.

None of the deer wintering areas are protected from potential development under current state law, but habitat issues are considered under local subdivision review.

Waterfowl and Wading Bird Habitat

Areas used by waterfowl and/or wading birds for breeding, feeding, roosting, loafing and migration. The areas are shown on the map and generally occupy portions of streams and wetlands associated with those streams.

Rare Plants

Bridgton has several locations where rare or threatened plants exist. The approximate locations of these areas are shown on the Town of Bridgton Development Constraints Map. The locations are intentionally given as approximate because the resource is potentially threatened by exact knowledge of its whereabouts, and because the living resource may shift its location over the years.

Ground-fir, whose scientific name is *Lycopodium sabinifolium*, occurs in fewer than 6 locations in Maine, of which one is in Bridgton in the area of Choate Hill. This small plant's occurrence in Maine represents the southern limit of its range that extends from Newfoundland to Alaska. Its last recorded sighting was in September 1964. Its current status in this location is unknown. Ground-fir is listed as "threatened in Maine" by the State's Endangered Species Program.

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Central New England Mesic Transitional Forest, commonly known as mesic oak-pine forest, occurs in Bridgton, also near Choate Hill. This uncommon forest community type is less rare than ground-fir.

Next to Adams Pond there are approximately 15 acres of old growth hemlock forest. Old growth forest has never been cut. This stand of nearly pure hemlock is extremely rare, not because it is hemlock, but because it is an old growth stand.

None of these areas are protected from development. The Maine Natural Areas Program recommends to towns that are interested in protecting such areas that they refer applications for development or other land use within these areas to the Maine Natural Heritage Program for review and comment and to establish communications between the landowner and the Maine Natural Heritage Program, so that appropriate protection measures may be encouraged.

Rare Animals

The Maine Department of Inland Fisheries and Wildlife tracks the status, life history, conservation needs, and occurrences for animal species that are Endangered, Threatened or otherwise rare. Rare animal species and their habitat or locations in Bridgton are listed below and are shown on the High Value Plant and Wildlife Habitat Map for the Town of Bridgton. Rare animal habitat locations need field verification.

Table 6.5
Rare Animals

Map Number	Animal Name	State Rarity	State Status
74	Blanding's Turtle	S2	Endangered
75	Blanding's Turtle	S2	Endangered
76	New England Bluet	S1	Special Concern
76	Pine Barrens Bluet	S?	
77	Spotted Turtle	S3	Threatened
78	Ribbon Snake	S3	Special Concern

High Value Habitat for USFWS Priority Trust Wildlife Species

The U.S. Fish & Wildlife Service (USFWS) has responsibility under federal law for tracking and protecting migratory birds and federally listed endangered species. There are 64 Priority Trust Species in all, and the USFWS Gulf of Maine office has produced a map that identifies a composite of the top 25% of high value habitats for these species. There are three inland categories of these habitats. They include non-forested freshwater

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wetlands, lakes and rivers; grass shrub and bare ground; and forest, including forested wetlands.

Other Wildlife Resources

The Maine Audubon Society has conducted an annual loon inventory in Bridgton since 1984. Many of Bridgton's lakes still have suitable chick rearing areas and safe nesting sites and support nesting loons. Several of Bridgton's lakes and streams, including Steven's Brook, support cold water fisheries. Maintaining current phosphorus levels in Bridgton's lakes is essential for protecting these fisheries. Maintaining water quality and retaining shoreline shade vegetation is essential for protecting the fisheries in flowing waters.

The Beginning With Habitat Program, using expertise from the Maine Natural Areas Program and the Department of Inland Fisheries & Wildlife, has identified a set of Focus Areas of Statewide Ecological Significance which are intended to provide guidance to towns and other groups about what areas of the landscape contain concentrations of important habitats. Three of these Focus Areas, the Upper Saco River, Holt Pond and Otter Pond Focus Areas, fall completely or partly within the Town of Bridgton.

High Elevation Points and Steep Slope Areas

There are a large number of mountaintops and ridges in Bridgton and the surrounding towns. These areas are important scenic areas for the Town. These points of high elevation also serve as vista points from which views of the Region's lakes and the White Mountains can be obtained. Areas above 600 feet in elevation are considered particularly important.

Given Bridgton's varied topography, it is no surprise that there are areas with steep slopes in excess of 15 to 20 percent. Currently, Maine's Subsurface Wastewater Disposal Rules prohibit new septic systems on slopes of 20 percent or more. Steep slopes pose severe constraints to building construction and are therefore generally unsuitable for development.

Areas with Visual Significance

There are several scenic views and vista points in Bridgton. There are many high elevation points with dramatic views of nearby lakes and mountains and of the White Mountains.

Natural Resource Constraints To New Development

To provide adequate protection for valued natural resources, new development can be subjected to varying degrees of constraint, depending on which natural resources are

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present on or adjacent to the land where development is being proposed. These varying degrees of constraint are shown on the Natural Resources Constraints Map of the Town of Bridgton. This map shows where land is relatively difficult to develop, where development would adversely affect natural resources present if special precautions are not taken, and sometimes where development is already legally prohibited or needs to be if the resource present is to be protected.

The map reflects four categories of natural constraints to development: Few, Moderate, Severe, and Resource Protection. The latter category reflects only those natural resources that are currently zoned Resource Protection under shoreland zoning. The categories have been derived by overlaying all of the natural resource maps from this section on top of one another.

Land has been assigned to each category depending on the particular combinations of resources that occur. Note that the Development Constraints map does not show existing land use.