Environmental Resources

Introduction

Bingham is fortunate to be surrounded by exceptional natural beauty and a high-quality environment. Bingham consists of 22,604 acres, of which roughly 262 acres are water. Bingham's natural resources are responsible for the abundant productive forest covering most of the town, clean water, and copious amounts of wildlife habitat.

Bingham's land, water, and forest resources provide the base for an income for many of the town's residents, as well as for growth and development. Preserving these resources equates to maintaining productive forests, clean water, wildlife habitat, tourism, and the natural beauty of the area.

Perhaps the most prominent natural features in Bingham are the presence of the Kennebec River and the two peaks in town over 1,200 feet in elevation. The resulting change in elevation between the tall peaks and the Kennebec River presents unusual challenges unique to the town, but also provide rich natural beauty.

One of the functions of this plan is to ensure that growth and development can occur concurrently without diminishing the natural environment. While achieving this balance is possible, it does require some foresight. Some parts of town are more suitable for development than others, likewise some forms of development have more of an environmental impact than others. It is in the town's best interest to consider future development and ensure it is in an appropriate area to best maintain the environment and minimize any negative impacts.

This chapter identifies and documents Bingham's natural and water resources and identifies the physical limitations the natural environment imposes on the planning process for future development.

Natural Land Resources

Geology and Soils

Topography and soil unsuitable for building are possibly the biggest constraints to development in Bingham. They do not just present a challenge in construction; they also present financial challenges. Additionally, the town's soil and the rock that supports them-influence the topography, type of vegetation, and were detrimental to early endeavors of farming.

Topography

The topography of an individual site accounts for much of the cost, difficulty, and potential adverse impact of land development. Development on slopes greater than 15 percent accelerates stormwater runoff velocity, erosion, and sedimentation, particularly in sensitive watersheds. The state Plumbing Code limits the installation of septic systems to land with an original slope of 20 percent or less. Road construction on steep slopes becomes expensive and road maintenance costs increase significantly. Therefore, large contiguous areas with slopes of more than 20 percent are impractical for new construction.

Bingham's topography is courtesy of the town's position at the gateway to the mountains of Maine. The town's challenging topography can be seen on the *Topographic Map* in the Appendix of this Plan. Mahoney Hill, in the center of town, reaches a peak height of 1,230 feet of elevation, while Johnson Mountain in the northeast corner of town rises to a height of 1,550 feet of elevation. In contrast, the lowest point of elevation in town, the location where the Kennebec River exists, is around 352 feet above sea level.

The drastic elevation differences seen in Bingham mean increased likelihood of construction in locations with steep slopes. Areas of slope exceeding 20 percent (20-foot rise for every 100 feet horizontal run) show up on topographic maps, but those are only as accurate as the scale of the map. On slopes over 30 percent grade, it becomes difficult to put in a foundation, and the chances of erosion and slumping increase considerably. Bingham's Shoreland Zoning Ordinance classifies areas of two or more contiguous acres, with sustained slopes of 20 percent or greater, as a Resource Protection District. Resource Protection Districts fall under the state's mandatory Shoreland Zoning guidelines, which include standards governing allowable land uses for these areas.

Slopes that exceed these parameters can be found in several locations in Bingham, primarily in the back country in the rural parts of town. Due to the elevation of Mahoney Hill, steeps slopes can be found here and on the southeast slope of Johnson Mountain. While these locations are not accessible and present no concern, there are other areas in town that are accessible and have steep slopes.

Another area known for its steep slopes is along Route 201. For approximately a mile north of the Frank Savage Road, the land above the roadway is too steep for development, as is the land on the opposite side of the road, going towards the Kennebec River. These features impose a definite limitation to development along the town's main economic corridor.

The topography of the land results in lakes, waterbodies, drainage basins or watersheds. A watershed is the area of land within which all precipitation drains to a single water body. The delineation of watersheds (*Water Resources Map*) shows how water runs off the land, where it accumulates, and how it collects into larger bodies of surface water. Bingham is within the watershed of the Kennebec River.

Since planning for water quality is closely integrated with watershed planning, information on watersheds can be found in the analysis of each waterbody below.

Soil

The historic advance and subsequent retreat of glaciers molded Bingham's landscape. As glaciers advanced, the ice mass scoured the ground. Retreating, they left a mixture of sand, silt, gravel, clay, and stones. Today, much of Bingham is covered by this glacial till, consisting of a heterogeneous mixture of a variety of soil types, shown on the *Soil Map* in the Appendix of this Plan. Till usually overlies bedrock but may underlie or include sand and gravel. Additionally, glacially formed hills may consist of till deposits over 100 feet thick.

The soils of Bingham are as important to development as topography. Soils are, quite literally, the basis for all development. There are some soils which are prohibitive, in terms of constructing septic systems, foundations, and roads. Others, for example well-drained loams, are not only good for building but significantly less expensive to build on. Further complicating the issue, some soils are clearly better than others for growing -- farming and timber-growing. Ironically, the best soils for growing are also the best for building. So, every acre of good, productive land that is developed is an acre less for producing timber.

It is immediately apparent that flat, well-drained land is good for both farming and forestry practices, as well as development, resulting in an inherent conflict between the competing land uses. Due to its more lucrative nature, development usually wins out over farming and forestry.

Soil types vary widely within Bingham. Some are very gravelly, some are rich, deep loams, some are rocky or hardpan clay. This is a result of how they were formed. The Kennebec River valley, for example, was the prehistoric location where the glaciers met the sea. Much of the Kennebec River shore has marine sediments and glacial debris. The hill just to the east of downtown is a glacial esker. Glacial eskers are defined as ridges made up of sands and gravel, deposited by glacial meltwater that flowed through tunnels within and underneath glaciers, or through meltwater channels on top of glaciers. Over time, the channel or tunnel became filled up with sediments. As the ice retreated, the sediments were left behind as a ridge in the landscape.

The mouth of Austin Stream is an ocean delta formed after the glaciers had retreated. Elsewhere, the soil basically reflects how exposed the topography was to the glacier. The northern half of town is a thin drift (10 feet or less) of soil over bedrock, where the glaciers scraped material off the surface. The remainder is a glacial till, where more material was deposited than removed by the glaciers.

Soil characteristics are particularly important to farming/forestry practices, roadbuilding, construction, and septic system installation.

The prominent soils in Bingham are Dixmont variants, Monarda variants, Plaisted Loam, and Thorndike variants.

The State Plumbing code also has its list of soils that are unsuitable for subsurface waste disposal. The plumbing code concentrates on those soils in which septic systems will not function, because water is too near the surface, or the slope is too steep. Soils with water too near the surface include:

Biddeford silt loam	Monarda silt loam	Walpole fine sandy loam
Leicester stony loam	Peat and muck	Limerick silt loam

There are several pockets of the soil determined to be unsuitable for subsurface waste disposal scattered throughout Bingham. Bingham's *Soils Map* (Appendix) shows soils by type and location. Maps of these soils involve a degree of generalization. A mapped area of poor soil does not by itself exclude development; however, it does make potential developers aware of challenges.

Regardless of soil type, when cleared of vegetation, all soils are subject to accelerated erosion. Eroding soil contributes to the degradation of water quality. Silt can reduce visibility, harm fish populations, and contribute phosphorus and other destabilizing nutrients into waterbodies. Phosphorus is a naturally occurring nutrient that, when present in high concentrations, can cause algal blooms. Eroding soil and unmanaged stormwater runoff have been documented as the primary source of increased phosphorus levels in Maine's lakes, resulting in reduced property values and recreational opportunities.

Bingham's Shoreland Zoning Ordinance includes the state's minimal regulatory requirements to prevent soil erosion and manage stormwater during before, during and after construction.

Scenic Resources

Topography and geography are the primary components of scenic vistas and resources. While it is said that the quality of a scenic view is "in the eye of the beholder," it is often the case that varied topography and overlooking perspectives rank consistently high. Bingham's large expanse of undeveloped land and proximity to the Kennebec River ensure there is a plethora of scenic resources.

Below is an incomplete list of noteworthy views:

- The view of the Kennebec River from the Route 16 bridge,
- The view of the Kennebec River from several points along Route 201,
- The mountain view from several points along Route 201,
- The stretch of Route 201 from Solon to the Canadian border a National Scenic Byway, which includes the entire town of Bingham,
- There are numerous trails or seasonal roads to the mountain peaks in or near Bingham that offer scenic views.

All these locally important views originate from private property owned by Weyerhaeuser, and none are threatened by development.

Water Resources

Floodplains

A floodplain is an area adjacent to a water body that is subject to periodic flooding. Historically, much of Bingham's village area was subject to flooding; however, after the construction of the Wyman Dam flooding in this area is no longer an issue.

Currently in Bingham, the only areas located in a floodplain are around the mouth of Austin Stream. The remaining floodplain is entirely west of Route 201 and the abandoned railroad bed. The floodplains in Bingham do not contribute significantly to constraints on development. Bingham can thank its naturally hilly topography for minimizing the number of floodplains adjacent to its larger waterbodies.

Bingham's 100-year floodplains are depicted on the *Critical Natural Resources Map* in the Appendix. A 100-year flood is one in which there is a one percent chance of flooding in any given year. The 100-year designation is significant because federal law requires local regulation of 100-year floodplains. Bingham has a local Floodplain Management Ordinance, and while it is enforced, it is outdated and needs to be brought up to state and federal standards.

Groundwater

Enough groundwater exists in Bingham, as throughout Maine, to support residential uses. Larger supplies of groundwater exist in underground aquifers in sand and gravel deposits. These supplies are large enough to fuel a municipal water supply or a community system for a mobile home park, or a substantial number of residential wells near each other.

A "significant aquifer" provides a water supply in large enough volumes for commercial use, but all groundwater in the town should be protected from potential contamination by oil, chemicals, or other sources. Because of the abundance of water, and the fact that aquifer-related soils tend to be good for septic systems, aquifers tend to be good places to build. But development itself puts the aquifer at risk, not from depletion of the resource, but from pollution. Industrial and commercial development risks polluting the groundwater with chemicals or petroleum products. To a lesser extent, a high density of residential septic systems could contaminate the aquifer, but those densities are not approached in Bingham.

Bingham protects the groundwater, surface water supplies, and their recharge area by maintaining an extensive wastewater system in the village area. There is also a stormwater drainage system in place. Groundwater and the aquifer are further protected to a greatest extent by state regulations. Bingham currently does not have an ordinance

to specifically protect the aquifer. Such regulation would most likely only control the type of commercial and industrial development that would be using chemicals that could enter and contaminate the groundwater. Bingham's groundwater protection is limited to the standards in the Shoreland Zoning and Subdivision ordinances.

Bingham's aquifer lies in the gravel deposits along the Kennebec River. Most of the village area west of the old railroad bed as far south as the sewage treatment plant, overlies an aquifer that is projected to yield over 50 gallons per minute. One of the land uses that overlies a portion of the aquifer is the airport. The aquifer also runs adjacent to Austin Stream, including the site of the old town well which is no longer in use. It then bulges out at the southern end of town. This aquifer is naturally self-replenishing during precipitation events.

Currently, Bingham gets its water from a well in Concord, which taps the same aquifer that underlies Bingham. Details of the public supply well from the aquifer, as reported by the Maine Department of Human Services, Bureau of Health Drinking Water Program, which regulates public water supplies, are as follows:

PWSID#: ME0090180
PWS Name: Bingham Water District
PWS: Community
Source ID#: 9180201; 9180202

The Department of Health and Human Services, Bureau of Health, Division of Health Engineering, oversees the Drinking Water Program (DWP), based on the Federal Safe Drinking Water Act (SDWA). The SDWA requires each state to complete an assessment for each public water source, which identifies and describes conditions that may threaten the quality of water available. The DWP is responsible for these assessments through the Maine Source Water Assessment Program (SWAP), which include current and potential future risks to public water supply sources.

The Maine Drinking Water Program Annual Compliance Report for 2022 noted Bingham had one violation to the Lead and Copper Rule; however, the violation was not that there were any contaminants found in the water. Instead, the violation was due to failure to conduct follow-up/routine tap sampling.

The Bingham Water District Well's 2023 Compliance Sample Results Report showed data collected monthly. None of the data collection results exceeded the allowable limits. The 2024 Compliance Sample Results Report showed data collected up until May 2024, all of which were acceptable, as well.
In short, the well from which Bingham Water District acquires water is in excellent condition with consistently high-water quality.

Surface Waters

An interconnected system of surface waters begins as brooks and flow through a system of streams, ponds, and wetlands, eventually reaching the sea. Wetlands and lakes are critical points along this network of surface waters. Wetlands serve important natural functions such as wildlife habitat and stormwater regulation and are particularly susceptible to development. Lakes and rivers contribute to the natural beauty of any area. They are an attraction for residents, economic development, and outdoor recreation. All waterbodies are vulnerable to pollution and overuse, which in turn lowers property values.

The surface water resources in Bingham are a critical factor in environmental quality. Not only do they provide an essential element in the natural beauty of Bingham, but they also contribute considerably to the health and welfare of the town's residents and wildlife alike.

Many land-use practices can impact surface water quality. For example, improperly functioning or unsuitably located wastewater disposal systems may cause bacteria to contaminate surface waters. Poor agricultural practices can result in nutrient enrichment of waterbodies (e.g., phosphorus). Construction activities create erosion and siltation, potentially reaching waterbodies. Any improperly managed land use or land-based activity can accelerate degradation of water quality. The first step in managing the community's surface waters is to understand the systems, their existing quality, and factors that influence their quality.

All water bodies are required by state law to be locally protected through the Shoreland Zoning Ordinance. Bingham has a 250-foot shoreland area established under the state guidelines, along its larger wetlands, rivers, and streams. These restrictions affect what people may do with their land in the immediate vicinity of the shoreland to protect water quality.

Rivers and Streams

There are several perennial streams in Bingham; however, because the Kennebec River is the primary focal point, the streams are less conspicuous. Over the years, streams have only played a minor role in the development of Bingham. The principal stream is Austin Stream, which runs through the upper part of the village. Austin Stream is primarily located in Moscow – only a small portion cuts through the northwestern comer of town. An artificial channel was created for Austin Stream years ago to assist in flood control and highway reconstruction, although the channel currently needs reconstruction.

Other streams in town include Jackson Brook, Johnson Brook, and Fall Brook. Jackson Brook flows into the Kennebec River just below the village. Johnson and Fall Brooks join up in the southern part of town before flowing into Solon. Austin Stream and Jackson Brook are notable for providing a fish spawning habitat for the Kennebec River.

The Kennebec River is the prominent surface water feature in Bingham, forming the western boundary of the town. The segment of the Kennebec River that forms Bingham's

boundary begins just short of the Wyman Hydroelectric Dam and flows past the village heading south.

Several studies associate this portion of the Kennebec River with high geologic, historic, and ecological values. It also provides numerous economic opportunities, with excellent fishing, boating, and scenic viewsheds. Fisheries include brook and rainbow trout and landlocked salmon. Unfortunately, bass have been introduced into the Kennebec River as an invasive species, as well. Overall, fish populations are affected by the variability in volume of releases from the dam.

The lower part of the Kennebec River in Bingham is impounded by Williams Dam in Solon.

The state has four classifications for freshwater rivers, streams, and brooks: AA, A, B, and C. The classification system should be viewed as a hierarchy of risk more than for use or quality assessment. Ecosystems that are more natural in their structure and function can be expected to be more resilient to new stressors and to show more rapid recovery. The classifications are detailed below.

- **Classes AA** involve little risk since activities such as waste discharge and impoundment are prohibited. The expectation to achieve natural conditions is high and degradation is unlikely.
- **Class A** waters allow impoundments and very restricted discharges, so the risk of degradation, while quite small, does increase since there is some small human intervention in the maintenance of the ecosystem.
- **Classes B** has fewer restrictions on activities but still maintain high water quality criteria. Class B is considered more at risk than a Class A stream. The risk is the possibility of a breakdown of the ecosystem and loss of use due to either natural or human-caused events.
- **Classes C** has the least restrictions on use and the lowest (but not low) water quality criteria. Classes C waters are still good quality, but the margin for error before significant degradation might occur in these waters in the event of an additional stress being introduced (such as a spill or a drought) is the least.

Austin Stream, in the portion that runs from approximately Rt 201 to the Kennebec River is a Class B stream. The portion of Austin Stream from Rt 201 northeast, is a Class A waterbody. The Kennebec River is a Class A waterbody. All other rivers and streams in Bingham, including Jackson Brook, Johnson Brook, and Fall Brook are Class B waterbodies.

Class B waterbodies are suitable for drinking water supply, recreation in and on the water, fishing, industrial processes and cooling water supply, hydroelectric power generation, navigation and an unimpaired habitat for fish and other aquatic life.

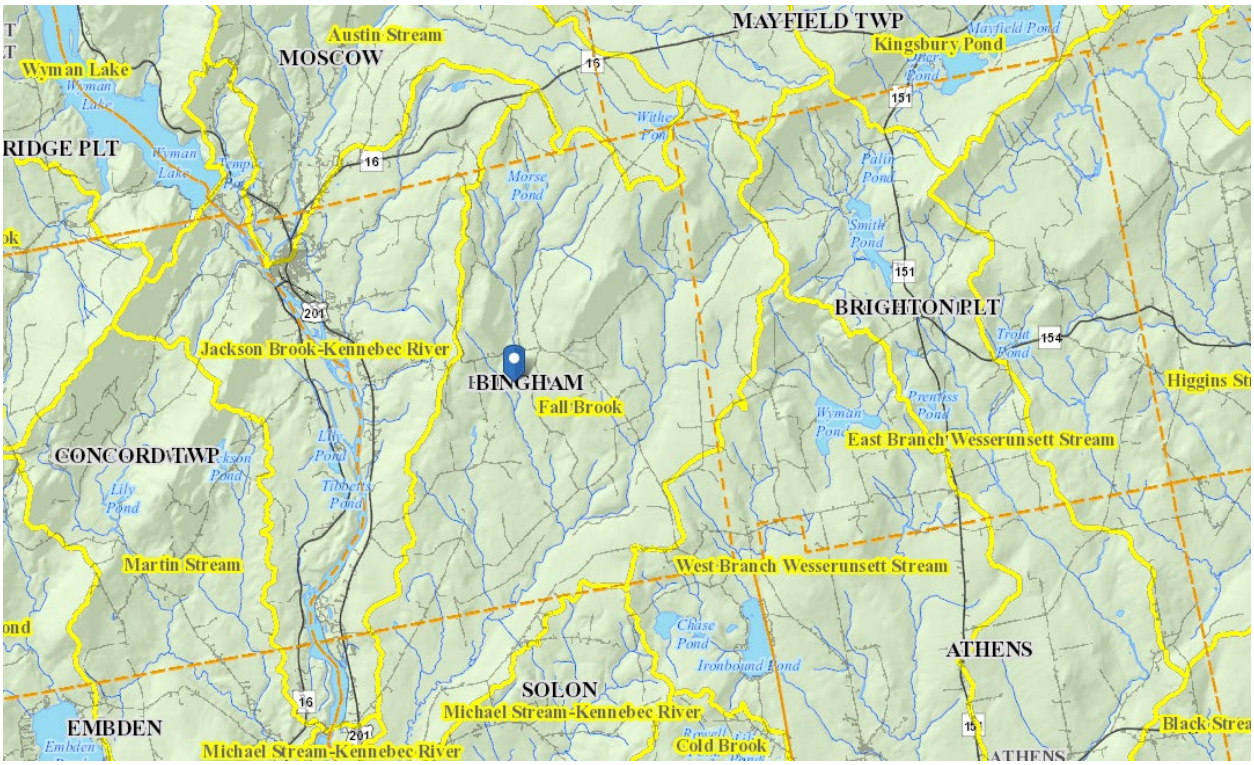
The *Water Resources Map* (Appendix) shows Bingham's streams, lakes, ponds, and wetlands. Most streams are bounded by the Stream Protection District, as set forth in the Shoreland Zoning Ordinance. The Stream Protection District establishes a 75-foot

building setback from the stream high-water mark (see Bingham's Shoreland Zoning Ordinance for more information).

Watersheds

A watershed is a natural drainage basin that collects precipitation and sends it to a body of water through an interconnected system of streams, brooks, and other wetlands. Unmanaged or improper human activities in any part of a watershed can negatively affect the water quality of the waterbody into which the watershed drains. The watersheds in Bingham are depicted in Figure 1.

FIGURE 1: DRAINAGE DIVIDES IN BINGHAM



Source: Beginning with Habitat

Bingham is bisected north to south on a slight diagonal between the two predominant watersheds in town: the Jackson Brook-Kennebec River Watershed to the west and Fall Brook Watershed to the east. Austin Brook Watershed claims a small amount of land in the northeast and northwest corners of Bingham, and West Branch-Wesserunsett Stream claims the southeast corner of town. A miniscule portion of the Michael Stream-Kennebec River Watershed is located on Bingham's southern border with Solon.

Bingham shares the Jackson Brook-Kennebec River Watershed primarily with Concord Township, and minimally with Moscow, Solon, and Embden. The Fall Brook Watershed is in Bingham, Solon, Brighton Plantation, Moscow, and Mayfield Township. The other watersheds are mainly in other towns.

Wetlands

Wetlands are essential parts of a healthy environment. As natural low points, they absorb flood waters. As a lush and moist habitat, they are the best and sometimes only breeding areas for fish and wildlife, including most waterfowl. They have been proven to hold sediments and nutrients from waters before they reach streams, straining out pollutants. Wetlands also serve as important travel corridors for many species of wildlife and provide open space for some forms of recreational enjoyment and/or aesthetic appreciation.

While a precise definition of a wetland is not universally accepted, making it difficult for local authorities to enforce the laws, wetlands share three essential elements. They all have non-permeable soils, a water table at or near the surface, and there is a presence of water-loving vegetation (rushes, cattails, red maple).

There are at least 10 such wetlands in Bingham (*Water Resources Map*, *Critical Natural Features Map* in the Appendix). The most significant wetlands are often associated with open water. The Kennebec River and other small lakes and ponds all have at least some wildlife wetlands connected to them. Although not all meet the state criteria for protection under Shoreland Zoning, those that do not are still protected through the National Resource Protection Act.

There is a sizable wetland area on Bingham's southern border with Solon. The wetland is part of Fall Brook, and part of an unnamed tributary originating from an unnamed pond between Lake Road and Frank Savage Road. This wetland area is home to an endangered species who is unidentified to the public for its protection.

Among other standards, the Bingham Shoreland Zoning Ordinance provides protection of wetlands through setback requirements consistent with the mandatory Shoreland Zoning Ordinance. The town is in the beginning stages of discussions on updating their Shoreland Zoning Ordinance and Shoreland Zoning Map. Reduced or relaxed protections for wetlands that were previously protected have spurred the town to consider adopting standards above and beyond the minimal state mandates.

Vernal Pools

A vernal pool is defined as a naturally occurring, temporary to permanent inland body of water that forms in a shallow depression and typically fills during the spring or fall and may dry during the summer. Vernal pools contain no viable populations of predatory fish, and it provides the primary breeding habitat for wood frogs, spotted salamanders, blue spotted salamanders, and fairy shrimp. The presence of any one or more of these species is usually conclusive evidence of a vernal pool.

Vernal pools do not fall under the protection provided to wetlands by Maine Natural Areas Program, a facet of the Department of Agriculture, Conservation and Forestry that maintains a database of areas designated as ecological reserves. But, as of September 2007, significant vernal pool habitats are protected under the Natural Resources Protection Act (NRPA). A vernal pool is considered “significant” if it has a high habitat value, either because 1) a state-listed threatened or endangered species uses it to complete a critical part of its life history, or 2) there is a notable abundance of specific wildlife. This regulation protects areas within a 250-foot radius of the spring or fall high-water mark of a significant vernal pool, which is considered critical terrestrial habitat. Any activity on, in, or over these areas must be approved by the Maine DEP and requires either a Permit by Rule or individual NRPA approval.

To date, significant vernal pools have yet to be mapped in Bingham. And unfortunately, the Beginning with Habitat data does not have significant vernal pools information for every town, Bingham included.

With new attention to their importance in the ecosystem, the town should consider conducting a vernal pool survey and incorporating some protection for vernal pools into its development standards. Extra protection through the Shoreland Zoning Ordinance is a consideration for these sites, as well.

Currently, there are seven known vernal pools in Bingham, which have been mapped and surveyed in the field. These vernal pools have been classified as ‘not significant’; however, that classification does not mean they do not warrant protection.

Lakes and Ponds

Bingham's lakes and ponds are overshadowed by the presence of the Kennebec River, which is the defining feature of the town's landscape. There are lakes and ponds scattered throughout Bingham; however, they are far less prominent. In fact, many are unnamed or known only to locals who are familiar with the area.

Nevertheless, open bodies of water provide scenic views, a variety of recreational opportunities, important fish and wildlife habitats, sources of drinking water, and prime real estate development opportunities.

The quality of water in any lake or pond depends on many factors, including the surface area and depth of the lake; the flushing rate of the lake; the size of the watershed surrounding the lake; the extent of development along the shore; the extent of agricultural activity in the watershed; and the degree to which obvious sources of pollution, such as septic effluent, sewage, agricultural fertilizers, and manure are kept from entering the water body.

The state designates waterbodies encompassing 10 acres or more as Great Ponds. Great Ponds and their shorelands are subject to special regulations through Shoreland Zoning and Maine's Natural Resources Protection Act. The state has one standard of classification for both Great Ponds and natural lakes and ponds less than 10 acres in size; this classification is GPA. The water quality attainment goal for Class GPA waterbodies is that they are suitable for drinking water, recreation, fishing, hydro-electric power generation and as natural habitat for fish and other aquatic life. If a water body is not meeting its attainment goal, it is described as a "nonattainment" lake.

Bingham does not have any waterbodies large enough to classify as Great Ponds. The only pond with any water quality information available in Bingham is Morse (Moss) Pond. The information available for Morse Pond did not include the classification status.

Morse (Moss) Pond

Area: Approximately 2 acres
Maximum Depth: No Information
Mean Depth: No Information
Perimeter: 0.3 miles
Invasive species: unknown
Fisheries management: unknown
Dams on Lake: 0

While no information is available on water quality, flora, or fauna found in Morse Pond, it is drained by Johnson Brook, which is a Class B waterbody.

Threats to Bingham's Water and Natural Resources

Threats to natural resources in Bingham are not immediate, but potentially include logging, spreading of sludge, and any of the power line corridors directly over the aquifer. This is not a complete list, for obvious reasons.

The single greatest threat to water quality at present is the introduction of phosphorus through runoff from within the watershed. Phosphorus is a naturally occurring element and a plant nutrient; however, in excess, phosphorus is responsible for causing nuisance algae blooms and extreme aquatic plant growth. Algal blooms can result in reduced dissolved oxygen levels which lead to fish die-offs.

The level of phosphorus entering a waterbody is a direct function of disruption in the watershed, primarily from human-induced activities. Since most of Bingham falls in either one of two major watersheds- the Jackson Brook-Kennebec River Watershed to the west and Fall Brook Watershed to the east, there is potential for pollution introduction through development.

Sources of potential threats to water quality are too numerous to list extensively, but a few include increased and poorly managed development, impervious surfaces related to development, faulty or failing septic systems, agricultural fertilizers, poor stormwater management, erosion, and much more. Typically, the erosion related to poorly maintained camp roads and gravel driveways within watersheds are the biggest contributors to runoff and increased phosphorus intake in waterbodies.

Impervious surfaces can cause runoff and result in erosion during precipitation events if not effectively managed. When the water runs off impervious surfaces, it collects pollutants that end up in stormwater drains and eventually find their way into waterbodies.

Faulty or failing septic systems in older or seasonal homes in the Shoreland Zone are another threat to water quality. Many seasonal homes that have been converted to year-round use may have septic systems that are inadequate. Many older homes may have faulty septic systems.

The state now has a requirement of filing a septic inspection report for any transfer of title within a Shoreland Zone. The purpose of this requirement is to provide proof of inspection to ensure adequate subsurface waste disposal systems in Shoreland Zones to prevent water quality degradation. This septic inspection requirement has limitations, however. One example is when a property within the Shoreland Zone is passed down generationally without benefit of officially changing documented ownership, the requirement of a septic inspection is not triggered. While some towns require that a copy of the inspection report also be submitted to the town, Bingham does not yet have such a requirement.

Fertilizer associated with agricultural activities or used on lawns can run off land into surface water, resulting in algal blooms. If severe enough, algal blooms can drastically reduce water quality. The lack of natural, vegetative buffer from lawn to waterbody is known to cause serious water quality degradation.

Work on public infrastructure near and in the water is managed to avoid erosion and sedimentation. Careful consideration must be given to the miles of ditching, and hundreds of road culverts that are town-maintained. Bingham has plans for the construction of a DEP-approved salt and sand shed to store erodible materials away from drainage areas and waterbodies. This structure will be covered to prevent erosion. Currently, Bingham takes delivery of salt and sand one truckload at a time so there is not usually an excessive amount of salt or sand stored for long periods of time.

Best Management Practices (BMPs) for activities such as culvert replacement, street sweeping, public works garage operations, and salt/sand pile maintenance are essential in protecting water quality. BMPs and strategies are gathered and utilized from many sources but primarily from Maine DOT. Bingham's Public Works Department takes careful measures to incorporate BMPs into their daily work routines. The public works building was constructed in 2014, and it is in good working order.

An increasing concern in relation to water quality is the threat of invasive water plants. Maine, for years isolated from the plague of milfoil, is now seeing increasingly frequent occurrences. Fortunately, no invasive aquatic species have been identified in Bingham yet.

Point and Nonpoint Sources of Pollution

Point Source Pollution can be linked back to one location, or point, such as a leaking oil tank. Point sources come from a direct source and are easily identified and managed.

Nonpoint Source Pollution (NPS pollution) cannot be traced to one sole source. One example is stormwater runoff. Stormwater can come from anywhere, especially impervious surfaces. Stormwater is water that does not soak into the ground during a precipitation event, but flows on top of the ground instead, to a body of water. As this water travels across the surface of the ground, it collects pollutants such as petroleum products, heavy metals, fertilizers, and manure, which can originate from any location within a watershed. Where stormwater runoff erodes soil, the soil itself transports phosphorus into waterbodies.

According to the DEP, there are no known nonpoint sources of pollution in Bingham, nor are there NPS priority watersheds or NPS impaired watersheds. There are currently no known point sources of pollution in Bingham, either.

Bingham has two wastewater facilities, considered to be minor facilities by the Maine Department of Environmental Protection (DEP). One is operated by Cooke Aquaculture USA, Inc. This facility has two permitted, active outfalls into the Kennebec River, slightly downstream from the mouth of Austin Stream. The other is Bingham Wastewater Treatment Facility, with one permitted, active outfall on Johnson Brook.

Bingham does not have any other regulatory protection aside from the Shoreland Zoning Ordinance, which sets standards and requirements for any activity within the Shoreland Zone.

Remediation Sites

Bingham has 2 remediation sites listed by the DEP. They are as follows:

Location: Clarks Hardware, 406 Maine Street
Program: VRAP
Status Date: 09/02/2020
Status: Investigation Stage- Need (awaiting resources)

Location: Quimby Mill, Landler Avenue
Program: Brownfields
Status Date: 04/30/2019
Status: Investigation Stage- Ongoing

Wildlife Habitat in Bingham

Waterbodies, watercourses, and wetlands are necessary habitats for the continued survival of many wildlife species. Unfragmented blocks of land are as essential to high-quality habitat as are the many watercourses and wetlands found in Bingham because they provide sanctuary for woodland birds, and other wildlife species, including critical habitat for some rare or endangered species.

The extent and quality of wildlife habitat is an indicator of not just the richness and diversity of the flora and fauna in Bingham, but the overall health of the ecosystem. The availability of high-quality habitat for plants, animals, and fish is essential to maintaining abundant and diverse populations for ecological, economic, and recreational purposes.

The Maine Department of Inland Fisheries and Wildlife (MDIF&W) administers a program called Beginning with Habitat (BwH) to identify significant wildlife habitat and critical natural areas under the National Resources Protection Act.

BwH, a collaborative program of federal, state, and local agencies, as well as non-governmental organizations, is a habitat-based approach to conserving wildlife and plant habitat on a landscape scale. The goal of the program is to maintain sufficient habitat to support all native plant and animal species currently growing and breeding in Maine. BwH compiles habitat information from multiple sources, integrates it into one package, and makes it accessible to towns, land trusts, conservation organizations, and others to use in a proactive approach to conservation via their webpage (https://www.maine.gov/ifw/fish-wildlife/wildlife/beginning-with-habitat/maps/index.html). This information can be seen on Bingham's *Critical Natural Resources Map* in the Appendix, with descriptions of essential features below.

Significant habitats, as defined by MDIF&W, includes species appearing on the official state or federal list of endangered or threatened species, high and moderate value deer wintering areas, and high and moderate value waterfowl and wading bird habitats.

Before conducting any activities in, on, or over significant wildlife habitats, a National Resources Protection Act (NRPA) permit must be obtained. Activities include construction, repair, or alteration of any permanent structure; dredging, bulldozing, removing or displacing soil, sand, or vegetation; and drainage or filling. The standard for protecting significant habitats highlights mitigation and compensation. Actions must be taken to A) avoid negative impacts on habitats, B) minimize the impacts if unavoidable, C) restore or rehabilitate impacted habitats, D) reduce an impact over time, or E) replace the affected habitat.

In Bingham, except for the cleared area developed portion of the Kennebec valley along Route 201, the town is nearly entirely forested. A significant portion of the forested land is privately owned and actively managed and harvested. Due to the vast undeveloped, forested area and unpolluted water, Bingham has an abundance and variety of wildlife. Deer, bear, and moose are common, as are all species of small game and fur-bearing animals and waterfowl.

Wildlife is an economic as well as natural resource, as evidenced by the number of tourists and hunters that frequent Bingham. There is a direct correlation between the proportion of undeveloped land and quality habitat with the amount of wildlife; however, each species has its own requirements. Those are detailed further below.

Deer Wintering Areas

Although white-tailed deer (*Odocoileus virginianus*) are common in Bingham, their existence is predicated on sufficient habitat. Summer habitat is commonly referred to as “edge habitat,” which includes farm fields, orchards, and open areas adjacent to forested lands. The habitat limitations for deer occur in the winter when there is heavy snow and extreme cold. Deer wintering areas (DWA) are defined as a forested area used by deer when snow depth in the open/hardwoods exceeds 12 inches; deer sinking depth in the open/hardwoods exceeds eight inches and mean daily temperatures are below 32^{o} F. Non-forested wetlands, non-stocked clear cuts, hardwood types, and stands predominated by Eastern Larch are included in DWAs only if less than 10 acres in size. Agricultural and development areas within DWAs are excluded regardless of size. Deer wintering areas that have yet to be confirmed through professional survey are considered “Candidate Deer Wintering Areas” until otherwise verified through a survey.

FIGURE 2: CANDIDATE DEER WINTERING AREAS IN BINGHAM

Source: Beginning with Habitat

Bingham has approximately three "Candidate Deer Wintering Areas," either entirely or partially within town boundaries, shown in brown on Figure 2 (also depicted on the *Critical Natural Resources Map* in Appendix). The status of these "Candidate Deer Wintering Areas" is unknown, as there has been logging activities in and around these areas.

Other Wildlife

Raccoon, beaver, and red fox are the most abundant species of furbearers in Bingham. Other abundant species include mink, fisher, coyote, and otter.

Bingham is also home to various waterfowl; however, accurate or even estimated population counts for waterfowl populations are not available, aside from the loon survey by the Maine Audubon Society. The Maine Department of Inland Fisheries and Wildlife has been conducting an ongoing survey of wild duck populations, of which the information is not yet available.

Other than generalized habitat protection measures, primarily for wetlands, the state has no coordinated program for maintaining species populations. Various conservation groups engage in programs to promote local populations such as putting out nesting boxes for ducks or platforms for loons.

There are two waterfowl and wading bird habitats in the center of Bingham, varying in size. Both these waterfowl and wading bird habitat areas are on the unnamed tributary feeding Fall Brook. These habitats provide breeding, migration, and wintering grounds for a multitude of bird species. Since 2006, Maine's Shoreland Zoning Regulation requires that waterfowl and wading bird habitats, as designated by MDIF&W, must be protected by a 250-foot buffer.

These known inland waterfowl/wading bird habitats have been designated by MDIF&W and can be seen on the *Critical Natural Resources Map* in Appendix.

The BwH maps also show an abundance of wetland areas, predominantly along the Kennebec River but also throughout town, which are valuable for wildlife that are not regulated as inland waterfowl and wading bird habitats, so they are not afforded the protection of the 250-foot buffer.

There are numerous locations throughout Bingham that have been delineated by the National Wetlands Inventory (NWI). The NWI uses aerial photography to approximate wetland locations; it is not a comprehensive mapping wetland resources and typically under-represents the presence of wetlands on the landscape. Because of this, the presence of wetlands needs to be determined in the field prior to conducting activities that could result in wetland disturbance.

Rare, Endangered, and Valuable Species and Habitats

Beginning with Habitat compiles data on rare, endangered, and valuable species and habitats in Bingham (see *Critical Natural Resources Map* in Appendix). This information includes rare, threatened, or endangered wildlife, rare or exemplary plants and natural communities, essential wildlife habitats, and significant wildlife habitats. This information is based on field observations. The names of some species is marked as 'Rare Plant' for further protection.

The 2000 Comprehensive Plan lists the long leaved bluet (*Houstonia Longifolia*) as an "imperiled" species found in Bingham at the time. It was discovered along the bank of the Kennebec River, north of Austin Stream. Today, BwH maps show the long leaved bluet still just north of Austin Stream, but located in Moscow, not Bingham.

BwH delineates one area providing habitat for a rare, threatened, or endangered species, whose name has been withheld to provide the utmost protection. Endangered or Threatened fish and wildlife species in Maine are afforded protection either under Maine's Endangered Species Act (MESA) or the U.S. Endangered Species Act (ESA), or both. Species listed under MESA receive state protection; species listed under ESA receive federal protection; and species listed under both state and federal protection.

There are currently 26 inland fish species and wildlife species listed and as Endangered and 31 listed as Threatened under Maine's Endangered Species Act, some of which are also listed under the U.S. Endangered Species Act.

The location for the rare, threatened, or endangered species is the southern part of town, along the unnamed brook that flows into Fall Brook, and partially along Fall Brook. The habitat continues along Fall Brook into Solon. The unnamed tributary to Fall Brook in this part of town is a Candidate Deer Wintering Area, although it has been logged, and habitat to inland waterfowl and wading bird.

Brook Trout Habitat

Maine supports the most extensive distribution and abundance of wild brook trout (*Salvelinus fontinalis*) in their native range within the United States; more than 1,200 lakes and ponds are managed for brook trout, of which approximately 60 percent are sustained by natural reproduction. In addition, brook trout occur in an estimated 22,248 miles of stream habitat, the vast majority of which are wild. Although brook trout populations are declining across their historic range within the United States (Maine to Georgia), a 2006 range-wide assessment by the Eastern Brook Trout Joint Venture found that Maine is the only state with extensive, intact populations of wild, self-reproducing brook trout in lakes and ponds, including some lakes over 5,000 acres in size. Lake populations of brook trout are intact in 185 sub-watersheds (18 percent) of their historic range in Maine, and only six intact watersheds throughout the 16 other states. Maine is the last true stronghold for stream dwelling populations of wild brook trout, supporting more than twice the number of intact sub-watersheds as the other 16 states in the eastern range combined.

In Bingham, there are several streams delineated by BwH that are wild brook trout priority areas. They include Fall Brook, Johnson Brook, Jackson Brook, Austin Stream, and their numerous tributaries. These habitat areas are priority conservation areas for wild brook trout and include a recommended 100-foot, no disturbance buffer around the waterbodies on either side. These areas may also be candidates for instream habitat restoration actions and/or stream connectivity enhancement.

Consideration should be given to providing the utmost protection to these valuable resources. With Bingham's reliance on outdoor recreation and tourism, protecting these areas and the wildlife that depends upon them should be paramount. When updating the Shoreland Zoning Ordinance, stricter standards of protection should be discussed and considered.

Important Habitat

Also noted by BwH is a Rare/Exemplary Natural Community, with the common name **Upper Floodplains Hardwood Forest** (scientific name: Hardwood River Terrace Forest), that has been identified on Big Island in the Kennebec River, in the northern part of Bingham. Two other occurrences of this community have been identified along the banks of the Kennebec River slightly south of Big Island.

Community Description: An almost complete canopy is dominated by sugar maple, red oak, or yellow birch, with red maple and ash often common and basswood or black cherry occasional. The understory is open, and shrubs are sparse. The lush carpet of herbs changes from spring ephemerals such as trout lily and bloodroot to variable cover of mixed graminoids and forbs in summer. Bryoid cover is minor.

Soil and Site Characteristics: Sites occur on slightly elevated terraces flanking low-gradient rivers at elevations typically <1,000'. Flooding is occasional, sometimes less frequent than annually. These forests have lower frequency and duration of flooding than silver maple floodplain forests. Most known examples are along medium to larger rivers. Soils are fine sand or silt, usually with good drainage capacity and relatively high nutrient levels; pH is 5.0-6.2.

Diagnostics: Sites occupy floodplain or river terrace settings with mineral soil. The canopy is dominated by sugar maple, red oak, or yellow birch. Silver maple and red maple may be present. A dense herb layer that includes species not typical of wetlands (e.g. starflower, zig-zag goldenrod, big-leaved aster, silvery spleenwort). Sensitive ferns are often present but not dominant. Spring ephemerals are often abundant.

Upper Floodplains Hardwood Forest Conservation and Management: Virtually all these forests have been harvested, and many have been converted to agriculture. Non-native plant species such as Japanese knotweed and Asiatic bittersweet, which may displace those native to our area, represent a threat to the integrity of these forests and have degraded at least some Maine examples.

The northern waterthrush, barred owl, belted kingfisher, bank swallow, scarlet tanager, and green heron are associates of this community type. Wood turtles overwinter in river channels and forage in floodplain forests where they may feed on amphibian egg masses in vernal pools. The silver-haired bat often roosts in riparian habitats in trees with loose bark. Fairy shrimp may also occur in isolated vernal pools. Wood turtles are rare animals often associated with these communities.

This forest type has a state ranking of S3, which means it is vulnerable in Maine**,** and at moderate risk of extirpation due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

Undeveloped Habitat Blocks, Connectors, and Conserved Land

There is a distinct, direct relationship between the quantity and variety of wildlife and the size of their habitat. Of course, there is urban wildlife such as skunks and mourning doves that do not require significant portions of land to thrive. However, many other types of animals are much less conspicuous and depend upon unbroken stretches of forest for survival. As roads, farms, and houses intrude on the habitats of these creatures, the large habitat blocks become fragmented, displacing the wildlife that relies on them.

Development in rural areas often causes these fragmentations, reducing the land's value as wildlife habitat. Wildlife travel corridors linking individual habitat blocks together are critical to accommodate animal movement. Ensuring wildlife travel corridors helps preserve the region's biodiversity and maintains rural community character. Limiting development at the edges of unfragmented habitat also helps maintain environmental integrity by giving forest-dwelling creatures a natural buffer.

The Beginning with Habitat program maps these unfragmented habitat blocks. If the parcel is permanently protected, the BwH maps include information such as who owns the habitat block and how it is conserved (federally protected, state protected, municipally owned and protected, or through conservation easement). The *Critical Natural Resources Map* in the Appendix shows these unfragmented blocks, as well. However, not all unfragmented blocks are conserved or protected, as is the scenario with most of the land in Bingham.

Bingham has remained relatively undeveloped, in large part because so much of the land is privately owned by forestry operations and managed for optimal timber production. The only piece of land formally preserved through an easement held by the Maine Bureau of Parks and Land is a 35-acre parcel adjacent to Wyman Lake.

The largest parcel of unfragmented land, containing 9,002 acres and approximately 2,000 acres larger than any other block, is in the northeast part of town and extends across the town line into Brighton Plantation. The second largest is in the northern part of town, along the Moscow border; it is 7,154 acres. The third largest unfragmented block is 3,489 acres and extends into the town of Solon. The other unfragmented parcels range in size from 1,121 acres to as few as 108 acres. They are scattered throughout town in no distinct pattern.

Regulatory Protections

Currently, none of Bingham's natural resources are threatened by development, overuse, or other activities.

In addition to state and federal standards to protect water quality, Bingham's Shoreland Zoning Ordinance includes language to provide further protection of natural and water resources. The latest amendment to the Shoreland Zoning Ordinance was in 2008 and the state's most recent amendment to their mandatory shoreland zoning guidelines was in 2015. Bingham's Shoreland Zoning Ordinance should be updated to be consistent with and reflect the most recent amendment by the state, at a minimum. Bingham's Shoreland Zoning Ordinance are consistent to the extent possible with the standards for shoreland zoning in neighboring communities.

The town's Shoreland Zoning Ordinance designates three zoning districts for the purpose of protecting water resources:

- Resource Protection
- Stream Protection
- Commercial Fisheries

And four district in which to direct development:

- Limited Residential
- Limited Commercial
- General Development I
- General Development II

Resource Protection District (RP): The Resource Protection District includes areas in which development would adversely affect water quality, productive habitat, biological ecosystems, or scenic and natural values. This district shall include the following areas when they occur within the limits of the shoreland zone, exclusive of the Stream Protection District, except that areas which are currently developed and areas which meet the criteria for the Limited Commercial or General Development I Districts need not be included within the Resource Protection District.

(I) Areas within 250 feet, horizontal distance, of the upland edge of freshwater wetlands, and wetlands associated with great ponds and rivers, which are rated "moderate" or "high" value waterfowl and wading bird habitat, including nesting and feeding areas, by the Maine Department of Inland Fisheries and Wildlife (MDIF&W) that are depicted on a Geographic Information System (GIS) data layer maintained by either MDIF&W or the Department as of May 1, 2006. For the purposes of this paragraph "wetlands associated with great ponds and rivers" shall mean areas characterized by non-forested wetland vegetation and hydric soils that are contiguous with a great pond or river, and have a surface elevation at or below the water level of the great pond or river during the period of normal high water. "Wetlands associated with great ponds or rivers" are considered to be part of that great pond or river.

(II) Floodplains along rivers and floodplains along a1tificially fanned great ponds along rivers, defined by the 100-year floodplain as designated on the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps or Flood Hazard Boundary Maps, or the flood of record, or in the absence of these, by soil types identified as recent floodplain soils.

(III) Areas of two or more contiguous acres with sustained slopes of20% or greater.

(IV) Areas of two (2) or more contiguous acres supporting wetland vegetation and hydric soils, which are not part of a freshwater wetland as defined, and which are not surficially connected to a water body during the period of normal high water.

(V) Land areas along rivers subject to severe bank erosion, undercutting, or riverbed movement.

Stream Protection District (SP): The Stream Protection District includes all land areas within seventy-five (75) feet, horizontal distance, of the normal high-water line of a stream, exclusive of those areas within two-hundred and fifty (250) feet, horizontal distance, of the normal high-water line of a great pond, or river, or within two hundred and fifty (250) feet, horizontal distance, of the upland edge of a freshwater wetland. Where a stream and its associated shoreland area are located within two-hundred and fifty (250) feet, horizontal distance, of the above water bodies or wetlands, that land area shall be regulated under the terms of the shoreland district associated with that water body or wetland.

Commercial Fisheries District: The Commercial Fisheries District includes areas where the existing predominant pattern of development is consistent with the allowed uses for this district as indicated in the Table of Land Uses, Section 14, and other areas which are suitable for functionally water-dependent uses, taking into consideration such factors as*:*

(I) Shelter from prevailing winds and waves;
(II) Slope of the land within 250 feet, horizontal distance, of the normal high-water line;
(III) Depth of the water within 150 feet, horizontal distance, oftl1e shoreline;
(IV) Available support facilities including utilities and transportation facilities; and
(V) Compatibility with adjacent upland uses.

Bingham's Shoreland Zoning and Subdivision Ordinances are the first lines of protection for watersheds and water quality, since development and other human-related activities within a watershed are the largest contributors to degraded water quality. Development can be designed to minimize phosphorus runoff, by mandating BMPs for construction and Low Impact Development (LID) design criteria (*LID Guidance Manual for Maine Communities, Approaches for Implementation of Low Impact Development Practices at the Local Level*, 2007). LID describes land planning and engineering design approaches to manage stormwater runoff that mimics natural processes, resulting in the infiltration, evapotranspiration, or use of stormwater to protect water quality and associated aquatic habitats.

To preserve and protect water quality, it is imperative that the Shoreland Zoning and Subdivision ordinances are reviewed and updated regularly. Currently, both ordinances are out of date and do not reflect the most recent state requirements. Regular updates will ensure the most current standards and practices are included, such as LID and BMPs for phosphorus control and stormwater management.

Local and Regional Coordination

The Town of Bingham recently upgraded their pump station and their wastewater treatment facility proactively, to mitigate a potential source of pollution. Given Bingham's reliance on tourism, continued vigilance in protecting natural resources is essential to the town.

<u>Local Partners:</u>

In the past, Bingham partnered with Trout Unlimited to dredge waterways and save fish. The town currently does not have any regional or local projects that need collaboration, although the town is open to potentially partnering and collaborating on future projects.

<u>Regional Partners:</u>

Bingham has partnered with the Old Cananda Road National Scenic Byway on several projects in the past and continues discussions on future projects.

Analysis

Bingham is a place of abundant, well-preserved natural beauty which leads to numerous outdoor recreational opportunities. The town has remained well-forested with large parcels of undeveloped, unfragmented habitat blocks without any formal protection necessary. This, in turn, has created an area rich in wildlife and nature.

Bingham's economy is dependent on the constant stream of tourists, drawn to the area for wildlife and natural beauty, so preservation of these limited resources is essential. For this reason, consideration should be given to updating the Shoreland Zoning Ordinance and Subdivision Ordinance. The Building Permit and Lot Requirement Ordinance should be reviewed for areas where it may need updating as well to provide further protection of the environment.

Bingham is home to one rare, threatened or endangered species, has three Candidate Deer Wintering Areas, numerous waterfowl habitats, rare forest community, and several brook trout priority streams. And these are only the areas documented by Beginning with Habitat. There is, no doubt, other fragile resources that need protection, as well.

The biggest threat to natural resources is residential development, particularly in rural areas or open spaces. The town has little in the way of nonregulatory incentives to encourage development in appropriate, designated growth areas. This is explored more extensively in the Existing and Future Land Use chapters. Bingham will need to find a balance between the need to draw people to town, economic development pressures, and the importance of preserving the essential natural resources outlined here.

Additionally, natural resources do not stop at the town's boundaries, nor are they the exclusive responsibility of the town. Successful protection of valuable resources depends on cooperation with neighboring towns, conservation organizations, and private landowners.