Natural Resources

Gardiner's 20 square miles of streams, forests, and farmland provide many benefits to residents and the community as a whole. Preserving Gardiner's land and water resources is what maintains productive forests, farmland, clean water for recreation and drinking, wildlife for hunting and tourism and the overall natural beauty of the city. Healthy ecosystems are vital in sustaining healthy and prosperous communities – and Gardiner's goals should reflect this.

There are several threats to Gardiner's ecological landscape – some ongoing and some anticipated within the next decade – these include overdevelopment in fragile environments, indiscriminate pesticide use, invasive species (both aquatic and terrestrial flora and insects), pollution, and climate change. This Plan should ensure that new development occurs without diminishing the natural environment, encourage landowners to protect and steward the natural resources on their properties, and spur city officials to provide resources and information to help protect Gardiner's environment.

The following chapter summarizes information about the landscape of Gardiner to help explain why the city's natural resources are important, identifies the most pressing concerns facing these various but connected ecosystems, and proposes goals and policies to support the conservation and rehabilitation of these resources.

Land Forms

Surficial Geology

Gardiner's soils, and the rock below, influence the topography, the type of vegetation and, therefore, wildlife and available options for development, farming, and forestry. The advance and retreat of glaciers long ago molded the landscape in Gardiner. As glaciers advanced, the icy formation scoured the ground, as they retreated, they left a mixture of sand silt, clay, and stone.

While Maine is known for having a rocky and rugged landscape, most of the state, including Gardiner, is covered in a layer of blue-gray clay like material from what geologists call the Presumpscot Formation.

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 are:

Biddeford silt loam Monarda silt loam Walpole fine sandy loam

Leicester stony loam Peat and Muck Limerick silt loam

Gardiner'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 instances of reduced property values and recreational opportunities.

The United States Department of Agriculture's Natural Resources Conservation Service maps soil type and publishes them to use in mapping. The type, quantity, and quality of minerals and organic particles are what determine a soil type. In different sizes and ratios, these particles form soil types that may be well-suited for a variety of uses, and ill-suited for others. Some soil is particularly fertile, making it particularly well suited for agriculture. Some types are a very stable combination of sand, silt, and clay particles, making it ideally suited for building homes, businesses, and roads. Some other types of soil, especially those that are saturated for an extended part of the year, are unsuitable for development, while at the same time providing great environmental value. The Maine State Plumbing Code takes these ratings into account when determining which soil types may or may not be suitable for subsurface wastewater disposal systems.

Topography

The topography of Gardiner is predominantly gentle hills, with the exception being along the Kennebec River and the two streams in Gardiner, Cobbosseecontee Stream, and Rolling Dam Brook (stream) where these portions have somewhat steep grades. Areas of steeper slopes, while valuable for scenic and recreation opportunities, can contribute to increased run off, erosion, removal of vegetation, all of which can increase pollution of water bodies.

These areas can also pose a challenge for the development of basements, septic systems, and storm water drainage systems. The Maine Subsurface Wastewater Disposal Law prohibits new subsurface waste disposal systems on slopes greater than 20%.

Slopes and Landslide Risks

Landslides and slumping are a known hazard in Maine. Steep slopes are more susceptible to landslide events, particularly when found alongside moving water. The water and runoff combine to erode the bank causing it to become unstable. While certainly dramatic, these events are a natural part of river bank life cycles.

Soil creep is the most common type of slide, but many other types, such as flows, spreads, and rotational slumps are possible. Landslides are most likely to occur along river corridors (especially cut banks), bluffs with active erosion, and areas with unconsolidated surficial materials, especially the Presumpscot formation. Events are also more likely to occur in areas where the base of the slope has been undermined, such as where roads have been cut into hillsides or development sites. Areas that have not been manipulated by humans can also fail after significant events such as intense storms or water-saturated soils in the spring. As climate change brings more extreme weather events, the risk of landslides will increase. While more likely to occur in spring and early summer due to snowpack melt and/or spring rains, they can happen at any time of year when significant amounts of water flow through an area.

Scenic Resources

As with much of Maine, the local topography is a primary component of scenic resources. While it is said the quality of a scenic vista is "in the eye of the beholder," it is often the case that varied topography and overlooking perspectives rank consistently high. While the rolling topography of Gardiner does not lend itself to high peaks and deep valleys, the stream and river frontage gives as many opportunities for scenic views as in mountainous areas.

River Road, State Rt. 24, travels roughly north to south along the western shore of the Kennebec River. This road has excellent views of the eastern bank of the Kennebec as well of the river itself.

The Waterfront Park and Observation Deck, Steamboat Trail, the Overlook, views along Riverside and Riverview Drives, Views of Cobbosseecontee Steam at West St. Parking lot. Need to double check this section next week.

Floodplains

In the most simple of terms, a floodplain is an area adjacent to a waterbody that is subject to periodic flooding. Gardiner'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 1-percent chance of flooding in any given year. The 100-year designation is significant because federal law requires local regulation of 100-year floodplains. Gardiner has an approved local Floodplain Management Ordinance, which is enforced, consistent with state and federal standards, and requires periodic reviews and updates.

The Federal Emergency Management Agency is responsible for mapping floodplains in the United States and managing the National Flood Insurance Program. The last floodplain mapping for Gardiner was conducted in 2011 with the Flood Insurance Rate Maps becoming effective in 2011 as well.

The existing maps for Gardiner distribute land into three zones:

- Zone A/AE – Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. This is classified as a Special Flood Hazard Area by FEMA. This indicates that the area will be inundated by the flood event have a 1 percent chance of being equaled or exceeded in any given year.
- Zone X – Areas of moderate risk falling between the 100 year (1%) and 500 year (.20%) floodplain.
- Regulatory Floodway - the channel of a river and adjacent land areas that must remain free of obstruction to discharge the base flood (1% annual chance flood) without increasing water surface elevations more than a designated height (often 1 foot). It is the most hazardous part of the special flood hazard area.

The entirety of Gardiner's eastern bank on the Kennebec River and it's border on both sides of Cobbosseeconttee Stream is classified as being in the floodplain. The vast majority of that is in Zone AE. There are large portions of both banks that are Zone X.

As stated in the Historic Resources chapter, the entirety of Gardiner's historic downtown area, as well as the commercial infrastructure just north of the Cobbosseeconttee Stream outlet is located in the regulatory floodway.

The city of Gardiner has developed a floodplain ordinance. Article II of the Floodplain Management Ordinance mandates that prior to any construction or other development, including the placement of manufactured homes, a Flood Hazard Development Permit must be obtained from the City Code Enforcement Officer.

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.

Gardiner is divided by two watersheds and three subwatersheds.

Most of the city lies within the Lower Kennebec Watershed. This basin spans 2,195,636 acres across Central Maine. This watershed contains much of the Kennebec River from Wyman Lake down to where it meets the tidal waters in South Gardiner. A small portion of Gardiner in the south west corner is part of the St. George-Sheepscot Watershed. This major watershed is 876,271.98 acres and spans from Gardiner east to Rockland and Searsmont and south to the Atlantic Ocean. These major watersheds are divided into the subwatersheds of Togus Stream-Kennebec River, Cobbosseeconttee Stream, and the Kennebec River Estuary. These are then broken down into numerous minor watersheds.

The minor Unnamed Pond Watershed surrounding Rolling Dam Brook (stream) has been identified as being Threatened, meaning that the watershed has been polluted. While only a small portion of it is in Gardiner, the lake watershed of Pleasant Pond has been identified as a NPS Priority Impaired watershed. This designation has been given due to Pleasant

Pond not meeting water quality standards due to polluted run off. Watershed with this designation are also those most often targeted for restoration and management plans as they are deemed most likely to benefit from those efforts.

Significant Sand and Gravel Aquifers

The significant sand and gravel aquifers consist of ice-contact and outwash deposits which occur primarily in the valleys of major river systems (Kennebec River) and their tributaries (Togus Stream). The aquifer boundaries and estimated yield zones for Gardiner is shown on the Maine Geological Survey, Significant Sand and Gravel Aquifers, Map XX. Last updated in 2020, the Maine Geologic Survey shows one large aquifer in Gardiner. The mapped aquaifer stretches along the western bank of the Kennebec from the confluence of the Cobosseeconttee Stream to roughly the northern intersection of Riverside Road and River Rd. (Rt. 24). There are a few small non-plotting pockets dispersed through the aquifer. Non-plotting is characterized by thin or unsaturated deposits that typically cannot sustain a well.

Sand and gravel aquifers provide an excellent water source but they are also vulnerable to pollution due to its rapid rate of water absorption. Stormwater runoff containing chemicals, leaks from underground tanks, material spills along roadways, malfunctioning septic systems, improper disposal of hazardous materials all pose a threat to the water quality. It would be advisable for the City to include in its ordinances aquifer protection standards that would make sure sand and gravel aquifers are not endangered from pollution sources.

Groundwater

Water which saturates the soil and bedrock is called groundwater. The rate at which water percolates into the ground depends upon the porosity of both the soil and the bedrock. Groundwater levels vary depending upon the season and precipitation. Groundwater flows similar to surface water and is influenced by the type of parent soil or bedrock.

Groundwater typically comes from one of two sources -- water flowing through cracks and fissures in the bedrock, and from sand and gravel aquifers. Local groundwater is the source of drinking water for all residents who are not serviced by public drinking water systems along with local businesses. Groundwater is also a potential future source for public drinking water supplies. All groundwater should be protected from contamination by oil, chemicals, or other sources.

Drilled wells are the most reliable because they extend deep into bedrock depending upon the water yield need to supply the home or business. They are also less prone to be impacted from drought conditions. However, the depth of the well, water demand, and the density of development in an area can create problems for wells. Another critical concern is making sure that the groundwater is not polluted which would make the well unfit for use. The slow rate of ground water recharge and flow in many areas will often mean that

a pollution source at a distance or past occurrence might not be discovered for a considerable length of time.

The Drinking Water Program is a division of the Maine Center for Disease Control. The Drinking Water Program (DWP) promotes the establishment of Wellhead Protection Planning for public water supplies. Plans are prepared by the well owners but should be implemented with the cooperation of the town. A minimum 300-foot radius of restricted land use around a wellhead (more for larger systems) is recommended, although most existing water supplies do not have this level of control or protected area. The DWP provides source water assessments for public water supplies in Maine towns, as well as maps showing potential threats to public water sources (Public Water Sources Map in the Appendix).

In Gardiner, there is one public drinking water system. A drinking water supply is considered public if it has at least 15 service connections, bottles water for sale or serves at least 25 individuals for at least 60 days out of the year.

Table 1: Public Water Sources in Gardiner

PWSID#	PWS Name	PWS Type	Comments
PWS Type Key: C=Community, NC= Non Community, NTNC= Non Transient, Non Community			
ME0090610	Gardiner Water District	C	Served by three wells, two primary, one back up.

Source: Maine Drinking Water Program

**Maine Drinking Water Program has no record of a Source Water Assessment for this ID number.*

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 includes current and potential future risks to public water supply sources.

The assessment evaluation is based on the Environmental Protection Agency's (EPA) approved evaluation methodology. Categories evaluated include risk based on:

- Well type and geology;
- Existing and future risk of acute contamination; and
- Existing and future risk of chronic contamination.

While no drinking water source is completely free from threats to water quality, some wells, by nature of their construction and the geology of their site, are more at risk than others. For example, dug wells and springs test positive for coliform bacteria more frequently than drilled wells; thus, drilled wells are evaluated as being a lower risk for contamination.

Table 2: Registered Underground Storage Tanks

FACILITY_NAME	FACILITY_STREET_ADDRESS	TANK_STATUS	VOLUME	DATE INSTALLED
STEVENS, EMBERT G MRS	PRIVATE RESIDENCE	ACTIVE	375	12/31/1976
SLH HOLDINGS LLC	17 COBBOSSEE AVE	ACTIVE	12,000	11/11/2003
CORE-MARK	47 MARKET ST	ACTIVE	15,000	4/19/1998
AINSLIES MARKET	526 BRUNSWICK AVE	ACTIVE	8,000	9/28/1995
AINSLIES MARKET	526 BRUNSWICK AVE	ACTIVE	12,000	9/28/1995
AINSLIES MARKET	526 BRUNSWICK AVE	ACTIVE	15,000	9/28/1995
CORE-MARK	47 MARKET ST	ACTIVE	10,000	4/19/1998
BIG APPLE	65 BRUNSWICK AVE	ACTIVE	25,000	2/16/2004
CUMBERLAND FARMS	146 BRIDGE ST	ACTIVE	20,000	6/17/2013
CUMBERLAND FARMS	146 BRIDGE ST	ACTIVE	20,000	6/17/2013

Source: Maine DEP

FACILITY_NAME	FACILITY_STREET_ADDRESS	TANK_STATUS	VOLUME	DATE INSTALLED
MSAD 11 BUS GARAGE	PUSHARD LANE	ACTIVE	10,000	3/10/1995
MSAD 11 BUS GARAGE	PUSHARD LANE	ACTIVE	4,000	3/10/1995
WINTHROP FUEL CO INC	180 WEST HILL RD	ACTIVE	20,000	9/7/2005
WINTHROP FUEL CO INC	180 WEST HILL RD	ACTIVE	20,000	9/7/2005
WINTHROP FUEL CO INC	180 WEST HILL RD	ACTIVE	6,000	9/7/2005
DRILLING & BLASTING ROCK SPECIALISTS	28 D & B ROCK DRIVE	ACTIVE	5,000	12/11/2018
GARDINER CO	16 BRUNSWICK AVE	ACTIVE	750	6/25/2019

Source: Maine DEP

There are always risks associated with chemical storage tanks, both above and below ground. Leaks are possible due to the age of tanks, the effects of weather, damage through weather events, or even accidental or intentional tampering. There are three registered tanks that have been abandoned in place, two below ground and one above.

Surface Water

Many land-use practices can impact surface water quality. Improperly functioning or unsuitably located systems for sanitary waste may cause bacteria to contaminate surface waters. Poor agricultural practices can result in nutrient enrichment of ponds and lakes (e.g., phosphorus). Construction creates erosion and siltation, potentially reaching waterbodies. Any improperly managed land use or land-based activity can accelerate degradation of water quality. All construction in the city uses erosion control measures. There is one known septic system that has polluted a nearby wetland- . The Paperboard Mill has several suspected contaminants on site, that run the risk of being washed into

Cobbossee Stream. The first step in managing the community's surface waters is to understand the systems, their existing quality, and factors that influence their quality.

Rivers

The Kennebec River is the largest body of water associated with the City of Gardiner with the entirety of the eastern border of the town bordering the Kennebec.

Spanning approximately 170 miles from Moosehead Lake to the Atlantic Ocean, the Kennebec River provides critical energy, habitat and infrastructure for dozens of towns and cities in Maine. While once filled with anadromous fish species such as the Atlantic Sturgeon *(Acipenser oxyrhinchus oxyrhinchus)*, Atlantic Salmon (*Salmo salar*), and Alewife (*Alosa pseudoharengus*), after years of overfishing, and the effect of numerous hydro-electric dams took their toll.

The water courses in Gardiner are part of the Kennebec River watershed, which drains a major portion of the central and northwestern part of Maine. The river is a large, flat-water, tidal water, with flows of between 470 and 200,000 cubic feet per second. When at its maximum flow during flooding, this section of the Kennebec has risen as much as 27.9 feet above its normal level.

Although the Kennebec River does not carry salt water beyond Chops Point in Woolwich, it is under the influence of the tides up to Augusta. The tides affect the river's recreational and navigational use and offer a view of a tidal river ecosystem and its marine geology.

Despite its large size the Kennebec River has a long history of flooding, ranging from nuisance to disastrous. Flooding is typically caused by high levels of rain or ice jams, both of which have caused serious and expensive damage in recent history. Flooding is a major factor in development along the river and should be taken into consideration during development and land conservation efforts.

Streams

Cobosseeconttee Stream is the other major watercourse in Gardiner. The stream runs through 15 municipalities and has a watershed of roughly 240 acres. A historical habitat for Atlantic Sturgeon and other anadromous fish, Cobosseeconttee once helped form the industrial backbone of Gardiner. Now, the stream provides fishing and wildlife viewing opportunities as well as being a hiking trail feature.

Rolling Dam Brook is a small stream that originates from a wetland area south of Capen Road. The stream crosses Capen road and meanders northeast before discharging into the Kennebec River near Bisbee Lane. The brook has a couple small picturesque waterfalls, however the main feature is the Lower Rolling Brook Dam Bridge. Constructed around 1936 during President Theodore Roosevelt’s New Deal, the 29 foot concrete span is now only accessible to pedestrians.

Lakes & Ponds

Water Quality Assessment is based off a number of factors that are explained below. Each factor is a key determinant of the health of species dependent on the lake as well as a guide for future development and protection measures.

Table 3: Water Quality Assessment

Water Quality Assessment	
Transparency	Transparency is a measure of how clear the lake water is. Factors that reduce water clarity are algal blooms, zooplankton, watercolor, and silt, with algae being the most abundant.
Chlorophyll	This test measures the green pigment found in all plants, including microscopic plants such as algae. For this reason, it is used to estimate algal biomass; the higher the chlorophyll content, the higher the algae in the lake.
Phosphorous	This is one of the major nutrients plants need for growth. While it is often the limiting factor in aquatic plant growth, high phosphorous levels are often a sign of pollutants entering the waterbody. As levels of phosphorous increase, the amount of algae increases, resulting in reduced water quality.
Color	This measure refers to the amount of dissolved organic acids such as tannins and lignins, which make water look tea-colored. The unit of measure for color is Standard Platinum Units or SPU. Color reduces the lake's transparency and increases phosphorus readings.
Alkalinity	This is the measure of the capacity of the water to neutralize acids, or the buffering capacity. A lake's ability to buffer acids is affected by the natural geology of the surrounding area, and the presence of naturally available bicarbonate, carbonate, and hydroxide ions. It is measured in mg/L.
pH	Similar to alkalinity, pH is the measure of acidity of the water. How acidic or basic the water is will determine which plant and animal life will be present. The measure of acidity is on a scale of 1-14 with 7 indicating neutral acidity. A one-unit change in pH represents a 10-fold change in the concentration of hydrogen ions (H+), which determines the acidity of the water.
Conductivity	Specific conductivity measures the ability of the water to carry an electrical current and is directly related to the dissolved ions (charged particles) in the water. Conductivity is measured in microSiemens per centimeter. This quality is used to calculate fish yield estimates. Specific conductivity will increase if there is an increase in pollutants entering the waterbody, usually in the form of runoff from urban or residential areas and roadways.
Dissolved Oxygen	Adequate levels of dissolved oxygen (DO) in waterbodies is essential to most life in the lake. DO is an important indicator of water quality and it influences water chemistry. DO levels are strongly affected by water

	temperature: warmer water is less dense and its ability to hold oxygen is reduced.
Flush Rate	The average time required to completely renew a lake's water volume (lake volume divided by outflow rate)

Source: Maine Lakes Association

Pleasant Pond – MIDAS # 5254

Surface Area: 797 Acres
Maximum Depth: 26 ft
Mean Depth: 10 ft
Fisheries Management: Warmwater
Key Species:
Largemouth Bass (*Micropterus salmoides*)
Yellow Perch (*Perca flavescens*)
Invasive Species: Variable Leaf Milfoil
Swollen Bladderwort

Table 4: Pleasant Pond Water Quality Assessment Comparison

Variable	State Average	Pleasant Pond
Transparency	5.3M	3.5M
Chlorophyll	5.7 ppb	7.8 ppb
Phosphorous	11.2 ppb	23 ppb
Color	20.1 SPU	26 SPU
Alkalinity	11.11 mg/L	16.6 mg/L
pH	7.23	6.84
Conductivity	52.6 µS/cm	76 µS/cm
Flush Rate	1-1.5	8.99

Source: Lakes of Maine

Pleasant Pond is a mostly shallow warmwater fishery home to a handful of species both native and introduced. Along with Largemouth Bass and Pumpkinseed, other reported populations include, Black Crappie (*Pomoxis nigromaculatus*), Smallmouth Bass (*Micropterus dolomieu*), and Chain Pickerel (*Esox niger*). Plant species have not been extensively catalogued for Pleasant Pond however there are some variation of water lilyies and pickerel weed present. There are also two invasive plan species present, Variable Leaf Milfoil and Swollen Bladderwort. The pond supports a small loon population, which is not expected to grow significantly due to size and water quality constraints.

The pond is accessible by a public launch on Thorofare Rd. This is the only public launch for the lake. Parking is available on both sides of the road, however this frequently leads to very high levels of congestion and narrowed roads.

Wetlands

Wetlands serve many important functions. They act as stormwater storage areas and surface water filtration systems. They also provide critical habitat for certain species of

birds, fish and aquatic mammals and are particularly important as breeding grounds. They provide unique environments necessary for certain aquatic vegetation. In addition, wetlands provide open space for some forms of recreational enjoyment or aesthetic appreciation. Maps provided by the Maine Natural Areas Program, the National Wetlands Inventory, and Maine Inland Fisheries and Wildlife (IFW) show wetlands information for Gardiner. Wetlands are shown on several maps in the Appendix to this plan.

Wetlands can be identification by looking for the following three conditions:

- The presence of hydric soils (soil is usually dark in color, consists of silt or muck)
- The presence of mostly wetland type vegetation (plants that can live in an environment lacking oxygen, saturated in water)
- The presence of water or a high-water table. (Water could be at the surface only seasonally)

The United States Fish and Wildlife Service has classified wetlands into five major systems: Marine, Estuarine, Riverine, Lacustrine and Palustrine. These five systems are then broken into an extensive sub system based on the habitat they contain and are located in. Most of the wetlands located in Gardiner are Palustrine and typically either Emergent or Forested habitat and broken down by where the dominant vegetation species are classified as Forested, Forested/Scrub, and Emergent species. There are a handful of small riverine wetland areas, along the Kennebec River and Cobosseeconttee Stream.

Wetlands are found throughout the City and can usually be found near waterbodies. Wetlands exist when an area is poorly drained and has a high-water table at or near the surface. The soils are saturated and are lacking in oxygen that in turn provides an environment for a special group of trees, shrubs, and grasses.

Historically, wetlands were viewed as having no value and were frequently filled. However, wetlands are an essential part of the natural ecosystem and are not easy to remake or recover. Attempts to engineer man-made wetlands have met with limited success due to their complex nature. The benefits of wetlands to the ecosystem are diverse and are protected by federal, state and local regulations.

The City's Shoreland Zoning Ordinance along with state and federal regulations protect wetlands from development regardless of size. Some limited wetland alterations are allowed after obtaining a state permit under some circumstances. The Natural Wetlands Inventory Map in the Appendix shows most of Gardiner's wetlands of one acre or more in size.

Vernal pools

Vernal pools are shallow depressions, typically in wetland forests, that contain water for only part of the year. These critical wildlife habitats occur only in specific biomes, one of which is in the glaciated areas of the northeast. Vernal pools typically only contain water late winter through spring and then disappear for the summer and fall months.

A subset of vernal pools is those that have been categorized as “significant”. Significant vernal pools (SVPs) are those that are comprised of high value habitat. Habitat would be considered high value due to:

1. A state listed threatened, endangered or rare species uses the vernal pool to complete a critical stage of its life history,
2. There is a high abundance of specific species of flora or fauna.

The following table is an incomplete list of species that rely on vernal pools and the population classification according to the Maine Endangered Species Act.

Table 5: Vernal Pools

Species Reliant on Vernal Pools	
Fairy Shrimp (Order: *Anostraca*)	Common, life cycle spent in pools
Blue Spotted Salamander *(Ambystoma laterale)*	Conservation Needed
Spotted Salamander *(Ambystoma maculatum)*	Common
Wood Frog *(Lithobates sylvaticus)*	Common, breeding reliant on pools
Spotted Turtle (*Clemmys guttata)*	Rare
Ribbon Snake (*Thamnophis sauritus)*	Of Special Concern
Blanding’s Turtle (*Emydoidea blandingii)*	Rare
Ringed Boghunter (*Williamsonia lintneri)*	Rare
Featherfoil *(Hottonia inflata)*	Threatened
Tuckerman’s Sedge *(Carex tuckermanii)*	Rare

Source: Maine IF&W Beginning with Habitat

Avoiding impact to significant vernal pools and their surroundings is critical. Many amphibian species return to the pool in which they were born to breed with their eggs needing to remain in the pool to survive.

Significant vernal pool habitat is protected by the Maine Department of Environmental Protection. These protections apply to the pool itself as well as a 250-foot radius of the spring or fall high water mark of the pool. That radius encompasses critical terrestrial habitat. Gardiner currently has no Vernal Pools identified as significant. There are a handful of vernal pools mapped by Maine Beginning with Habitat, however they do not meet the definition of significant.

MARINE RESOURCES

While Gardiner is a marine community in the sense that the Kennebec River is brackish up the head of tide in Augusta, residents are not reliant on traditional marine resources. As such, many of the Comprehensive Plan Review Criteria do not apply.

Table 6: Marine Licensing 2026

Commercial Shellfish	Lobster/Crab Class 1	Lobster/Crab Non-Commercial	Recreational Saltwater Registry	Vibrio Harvester	Total
135	490	891			

Source: Maine Department of Marine Resources

In 2025 Gardiner collected $$3636.10 in Watercraft Excise Tax from 161 vessels registered with the city.

Gardiner employs harbor master who is responsible for managing the city docks located at Waterfront Park. These slips are available for rent with residents getting slight priority over non-residents. The docks are put into the river late spring and removed mid-October.

A maritime dependent industry that Gardiner has access to is that of Rainbow Smelt *(Osmerus mordax)*. Also known as sea run smelt, these small fish migrate through tidal rivers in order to reach breeding grounds. Once and if the Kennebec freezes, smelt camps are placed on the ice where long troughs are then cut in the ice to fish through. Gardiner does not have any commercial smelting camps; however the Kennebec River provides access to residents should they wish to fish.

UNIQUE NATURAL AREAS AND WILDLIFE HABITATS

Water bodies, watercourses, and wetlands provide habitats necessary for the continued survival of many wildlife species. Lakes and their shorelines, streams, brook, and wetlands provide suitable habitats, nesting areas or travel corridors for fish, beaver, muskrats, mink, otter, fisher, raccoon, deer, moose, waterfowl, and other birds to name just a few of the wildlife species indigenous to Gardiner.

Natural Areas and Wildlife Habitat

Gardiner, specifically South Gardiner, provides ample habitat for many species of plants and wildlife. The extent and quality of wildlife habitat is an indicator of not just the abundance of animals but the overall health of the ecosystem. The Maine Department of Inland Fisheries and Wildlife (MDIFW) administers a program called Beginning with Habitat (BwH) to illustrate information on wildlife habitat and critical natural areas. Habitat is given a moderate to high value when it is comprised of freshwater wetland and open water areas plus a 250-foot wide area surrounding the wetland habitat where inland species of waterfowl and wading birds nest.

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. Gardiner has significant amounts of land that offer quality habitat for a variety of species. 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 proactively.

Rare, Endangered and Valuable Species and Habitats

The City contains habitat for a diverse assortment of mammals, birds, reptiles, and amphibians. The City does not contain any endangered species, however, it is important to note that Bald Eagle Nests are found along the Kennebec River and Cobosseeconttee Stream is habitat for Atlantic Sturgeon as well as Atlantic Salmon.

The following list is a small number of species that live in the habitats that Gardiner provides.

Table 6: Species of Note

Species of Note	Conservation Status
Great Blue Heron *(Ardea Herodias)*	Special Concern
Bald Eagle *(Haliaeetus leucocephalus)*	Least Concern
Osprey *(Pandion haliaetus)*	Least Concern
Shortnose Sturgeon *(Acipenser brevirostrum)*	Endangered
Atlantic Sturgeon *(Acipenser oxyrinchus oxyrinchus)*	Threatened
Barrow's Goldeneye *(Bucephala islandica)*	Threatened
Peregrine Falcon *(Falco peregrinus)*	Endangered

Source: Beginning with Habitat

Portions of Pleasant Pond and the Kennebec are identified as Inland Waterfowl and Wading Bird Habitat.

Deer Wintering Areas

Although Whitetail Deer *(Odocoileus virginianus)* are reasonably common in Gardiner, their existence is predicated on sufficient habitat. Summer habitat is commonly referred to as "edge". Farm fields, orchards, and open areas adjacent to forested lands are all examples of summer habitat. The habitat limitations for deer occur in the winter when there is heavy snow cover with 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 8 inches and mean daily temperatures are below 32 degrees Fahrenheit. 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. A rating of "indeterminant" means that no professional survey has been done to assess the value of the habitat and at this time the MDIFW is classifying all deeryards as indeterminant and calling areas "Candidate Deer Wintering Areas" that would need verification on the ground.

Gardiner has nine locations that have been identified as deer wintering areas, with four locations contiguous with a neighboring town. These areas are threatened by development, both residential and commercial. MDIFW does not recommend regulatory standards with respect to preserving deer wintering areas, but is willing to work with landowners to adapt management practices that will preserve their integrity.

Conserved Lands

There are three parcels of land that are conserved in Gardiner. Two parcels are owned by the City with the other being owned by the Kennebec Land Trust. The Kennebec Land Trust also maintains an easement alongside the Harrison Ave Trail for connectivity purposes.

Table 7: Conserved Lands

Conserved Lands in Gardiner		
Name	**Ownership**	**Acreage**
Rolling Dam Brook Preserve	Kennebec Land Trust	?
Cobbossee Stream Conservation Area	City of Gardiner	14
Harrison Ave. Nature Trail	City of Gardiner	15

Source: Beginning with Habitat

Undeveloped Habitat Blocks, connectors

The Beginning with Habitat Undeveloped Wildlife Blocks map shows large undeveloped land areas that provide habitat for many species. These large tracts of land are essential for maintaining a diverse plant and animal habitat. There are several blocks of land in South Gardiner over or close to 1,000 acres

Flood Hazard Areas

Areas defined as flood hazard areas are those areas, adjacent to a water source, which overflow their normal defined boundaries and inundate adjacent lands. Flood prone areas are defined by the Federal Emergency Management Agency and represented by maps which show areas that are likely to be flooded on a statistical average of once every hundred years or once every five hundred years. The City has adopted a Floodplain Management Ordinance which regulates development proposed in areas shown on the Flood Maps. As a result of adopting this Ordinance residents of the city can obtain flood insurance for their properties. A map showing the flood hazard areas is contained in the Map Appendix.

The City will need to keep their Floodplain Ordinance current with Federal and State regulations so that residents may continue to have the opportunity to obtain flood insurance. Gardiner municipal staff are involved in the Kennebec County Hazard Mitigation Plan update each cycle and will continue to be involved so that they can best prepare for disasters and be eligible for grant programs through the Federal Emergency Management Agency.

Shoreland Zoning

The City has a Shoreland Zoning Ordinance which regulates certain waterbodies and the land surrounding these water sources. A map showing the Shoreland Zoning Districts is shown on the next page.

It is important to note that not all streams and wetlands are regulated by Shoreland Zoning. A comparison of the Water Resource map and the Shoreland Zoning Map will quickly illustrate this fact. While Shoreland Zoning does a good job of protecting waterbodies from poor development practices that occur close to the shore, other areas within the watershed are not regulated.

Development can be designed to minimize phosphorus runoff, by mandating best management practices (BMPs) for construction and Low Impact Development (LID) design criteria. LID describes land use 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 ordinances regulating development are reviewed and updated regularly. Regular updates will ensure the most current standards and practices are included, such as LID and BMPs for phosphorus control and stormwater management.

All water bodies are required by state law to be locally protected through the Shoreland Zoning Ordinance. Gardiner has stringent regulations based on variations of the base Shoreland Zoning Ordinance. The zones are described below:

- Shoreland District. Covers land areas within 250 feet of major water bodies which are not heavily developed yet and are capable of supporting limited development. Development in these Shoreland areas, due to their proximity to surface waters, require close scrutiny in order to prevent and control water pollution, protect drinking water supplies, minimize flood damage and conserve shore cover.
- Shoreland Overlay District. Covers land areas within 250 feet of major water bodies which are heavily developed. These areas are primarily devoted to commercial, industrial or intensive recreational activities, or a mix of activities, including, but not limited to, the following: manufacturing, fabricating, wholesaling, warehousing, retail trade, service activities, amusement parks, and fairgrounds. Portions of the Shoreland Overlay District also include existing, dense residential development. Development within this district must consider a combination of Shoreland Zoning Performance Standards and those standards of the underlying zoning district.
- Shoreland Overlay Limited Residential District. Includes areas other than those in the Resource Protection District, Shoreland or Shoreland Overlay District. Development within this district must consider a combination of Shoreland Zoning Performance Standards and the uses and standards as required in the underlying district.

THREATS TO RESOURCES

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.

Manmade

Industrial contractors, junkyards, and other locations that have generators, fuels, and chemicals on site all pose a level of risk to the environment and groundwater. As products are used in the course of day-to-day operation, they are at risk of being impacted by storms causing runoff into adjacent bodies of water and in some cases produce leachate into aquifers.

Gardiner's Land Use Ordinance Section 10 regulates junkyards and contains provisions on the operations of those facilities. This section has precautions on distance from wells, bodies of water, roadways, and disposal of materials.

Records from the City show there is one location that, under Gardiner's Section 10, are classified as illegal junkyards. There is one licensed junkyard in Gardiner.

An ongoing and constantly emerging pollution concern is the presence of so called "forever chemicals." Forever chemicals refer to the group of man-made chemicals that include those known as PFAS. Studies have found accumulation of these chemicals in samples of water, soil, wildlife, and fish across Maine. The most common ways that PFAS has been introduced into the environment is the spreading of sludge, septage and landfill material, as well as through the use of some fire-fighting foams commonly found at airports. Due to the long lifespan of these chemicals, they can build up in natural systems.

One location in Gardiner has been sampled by the Maine DEP and Maine DACF to determine PFAS/PFOS levels. In close proximity to this site, eight wells have been tested to determine contamination levels, all of which have been below the drinking water standard. Gardiner Wastewater Treatment Facility was sampled as a result of LD1911,

Faulty or failing septic systems in older or poorly maintained homes are another threat to water quality. 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 subsurface waste disposal systems in Shoreland Zones remain in good working condition to prevent water quality degradation. The City of Gardiner requires building permits that require state review, also require review by Gardiner Code Enforcement.

Fertilizer associated with agricultural activities can run off land into surface water, resulting in algal blooms. If severe enough, algal blooms can drastically reduce water quality. Additionally, what was traditionally considered a well-manicured lawn is also a source of

pollutants. Lawn maintenance, in particular the use of fertilizers, and lack of a natural vegetative buffer are increasingly known to cause water-quality degradation.

Work on public infrastructure near 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 city-maintained. Public supplies of salted sand are stored in a Maine DEP-approved building and erodible materials are stored away from drainage areas and waterbodies. Best management practices 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.

Naturally Occurring

While Gardiner is known for its natural setting, there are natural elements that pose a risk to residents. Three known contaminants in the environment that may be present are Arsenic (As), Uranium (U), and Radon (Rn). All elements are known carcinogens or are otherwise hazardous to humans and can be found in the air and drinking water. Some locations have higher concentrations due to the soil and bedrock. Arsenic is also produced due to manmade industrial and agricultural practices.

While Gardiner is not isolated from invasive populations of both plant and wildlife species, the introduction to new terrestrial locations and spread within a body of water, while either intentional or accidental, is a threat to native populations. Measures should continue to be taken and supported to further protect the resources of Gardiner. The state maintains a list of plants that are now illegal to import, export, buy, sell or propagate due to their invasive natures. Some species on this are very common and have long been used by home gardeners and commercial landscapers alike.

Table 8: Common Species on the Do Not Sell List

Scientific Name	Common Name
Acer platanoides	Norway Maple
Euonymous alatus	Winged Euonymous (Burning Bush)
Fallopia japonica	Japanese Knotweed
Lythrum salicaria	Purple Loosestrife
Pyrus calleryana	Callery Pear (Bradford Pear)
Robinia pseudiacacia	Black Locust

Source: State of Maine DACF

Point Source/Non-Point Source 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 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.

--Point/Non-Point source pollution locations in Gardiner? Non known

Remediation Sites

Maine DEP files indicate there are over twenty location in Gardiner involved in a contamination remediation program. Some of these have been remedied through the Brownfields or Voluntary Response Action Program (VRAP). Others are still under investigation or awaiting resources. Of the locations identified by Maine DEP, 16 of those are located within Gardiner's Downtown area.

Local and Regional Coordination

Gardiner is in the service area of the Kennebec Land Trust. Kennebec Land Trust owns two parcels in the City. While the City does not have a Conservation Commission, the City Parks Committee has some oversight to work on protecting, improving, and maintaining access to Gardiner's public spaces.

Impacts of Climate Change

1. What are important community assets? Are they vulnerable to climate change impacts such as sea-level rise or flooding?
2. Where are areas that need improvement to withstand future storms and/or other climate-related events?
3. Does the city have a Climate Resilience Committee? If not, is there interest in forming one?
4. Have other resilience-related projects been completed in the last 5 years?