SECTION 4 RISK ASSESSMENT

Risk Assessment
Requirement: §201.6(c)(2): (The plan must include) a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

It is essential in any hazard mitigation plan to identify the hazards that exist in the town or multi-town region and how vulnerable the community is to the particular hazard. This is known as the hazard identification and vulnerability analysis process.

Climate

No risk assessment of Aroostook County's natural hazards would be complete without first considering its climate and geography. Factors such as seasonal temperatures, annual precipitation, prevailing wind directions and geographical features can all profoundly affect both the occurrence and severity of these hazards.

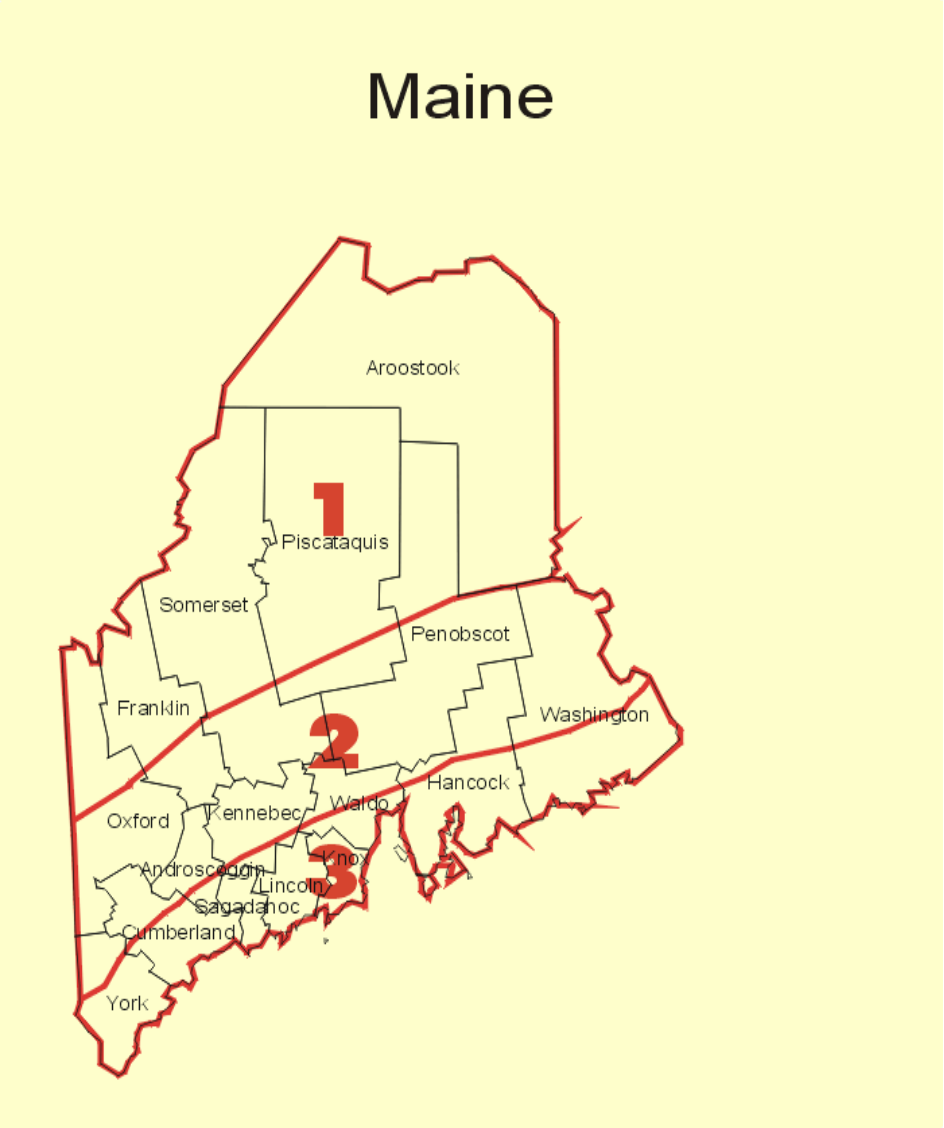
Aroostook County is located entirely in the northernmost of Maine's three climatic divisions. The northern division (#1 on the map on the next page) encompasses 17,916 square miles (54%) of the state. This division is least affected by marine influences and it contains most of the central and western mountainous regions. It includes all of Aroostook County.

Temperature: According to the Maine State Hazard Mitigation Plan 2019, the mean annual temperature in the northern division is about 38 degrees Fahrenheit. Temperatures average about 64 degrees Fahrenheit in July and August, and about 18 degrees Fahrenheit in January and February.

Precipitation: The northern division's average annual amount of precipitation, based on long-term records dating back to 1895, is 40.9 inches. This includes the conversion of all snowfall to a water-equivalent. Average monthly precipitation is between three and four inches, with November being the wettest month, and February being the driest month.

Prevailing Winds: Prevailing wind direction varies with both season and location. Local influences such as orientation of a valley also may play a key role in dictating prevalent wind direction at any one location. Most of the county is under northwest to west-northwest winds throughout much of the year and particularly during the winter. During the summer, southwest to southerly winds may become quite frequent.

Climate Divisions of Maine



Geography: Overall, the terrain across much of Aroostook County is hilly. The present-day landscape is a direct result of glacial erosion and deposition from the large ice sheets that completely covered Maine as recently as about 14,000 years ago. A variety of glacial deposits cover the county, providing a rich variety in the overall landscape as well as abundant sand and gravel for construction material. Many of these deposits also are excellent sources of ground water (that is, aquifers) for household and industrial water supplies. In addition, glacial deposits and erosion are directly responsible for the lakes found in Aroostook County.

Extensive wetland areas that provide habitat for many ecosystems are also a result of past glaciations in combination with existing climatic conditions. Maine is the most forested state

in the United States with 90% of its land area in woodland (about 85% in Aroostook County). Historically, this has supported a considerable lumber and paper products industry. Many logging roads provide the only access into vast unsettled areas. These forests also provide habitat for abundant wildlife, and together with the large number of lakes are a great resource for sports and recreation.

Climate Change

A detailed evaluation of climate change is beyond the scope of this plan, but suffice it to say that long term global climate trends, which include changes in temperature and precipitation, may affect the State of Maine and Aroostook County. As stated in the Maine State Hazard Mitigation Plan 2019:

> "For clarification, the National Aeronautics and Space administration (NASA) uses the following definitions to describe climate and weather:
>
> Climate: The description of the long-term pattern of weather in a particular area.
>
> Weather: The description of the way the atmosphere is behaving in the short term, from minute to minute, hour to hour, day to day, and season to season.
>
> As Mainers are aware, the state has long had a highly variable climate, characterized by abrupt weather variations day-to-day, month-to-month, and year to year (pages1-8 to 1-9)."

The report "Maine's Climate Future, 2020 Update," prepared by the University of Maine, reports that "Rapid warming in the Arctic can affect the weather we experience in Maine and conditions in the Gulf of Maine (Schmitt 2007). As arctic air warms, there is less of a temperature difference between the North Pole and the continental United State, leading to weaker westerly winds. Recent studies have suggested that weakened westerlies may lead to a more wavy Jet Stream, so called "blocking" storm patterns, and Polar Vortex dips that allow Artic air, still very cold, to plunge into Maine during winter (page 14)."

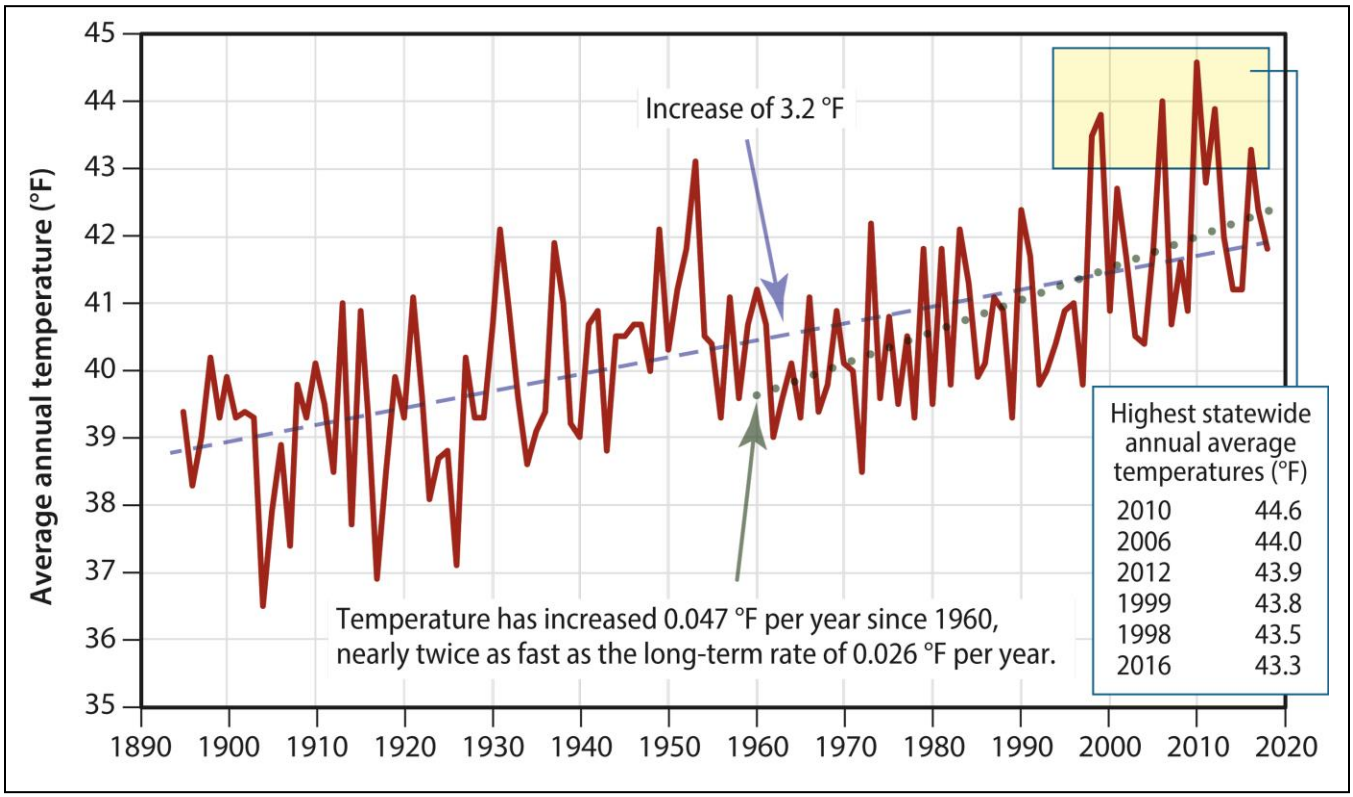
"Changes in the distribution of winds and sea-surface temperature across the North Atlantic, and Gulf Stream position, are likely amplifying regional warming and precipitation cycles, and have the potential to further affect seasonal shifts in the environment over the coming decades (Saba et.al. 2016, Thomas et.al.2017) (page 14)."

Temperature Changes in Maine.: Excerpts from the report "Maine's Climate Future, 2020 Update," prepared by the University of Maine, include the following:

> "Temperatures are increasing statewide. Average annual temperature has increased 3.2 degrees Fahrenheit in the last 124 years, and the rate of warming has increased most notably since 1960. The six warmest years on record have occurred since 1998. Indeed, the Northeast is warming faster than any other region in the U.S., and is projected to warm 5.4 degrees Fahrenheit when the rest of the world reaches 3.6 degrees Fahrenheit (page 3)…The growing season (the period between the last frost

and first frost) is more than two weeks longer than it was in 1950, mostly due to later frosts in the fall (page 4)."

The following chart, taken from the "Maine's Climate Future, 2020 Update," demonstrates significant year-to-year variations in Maine's average annual temperature with periods of relative cold and relative warmth, but an upward trend in annual average temperatures.

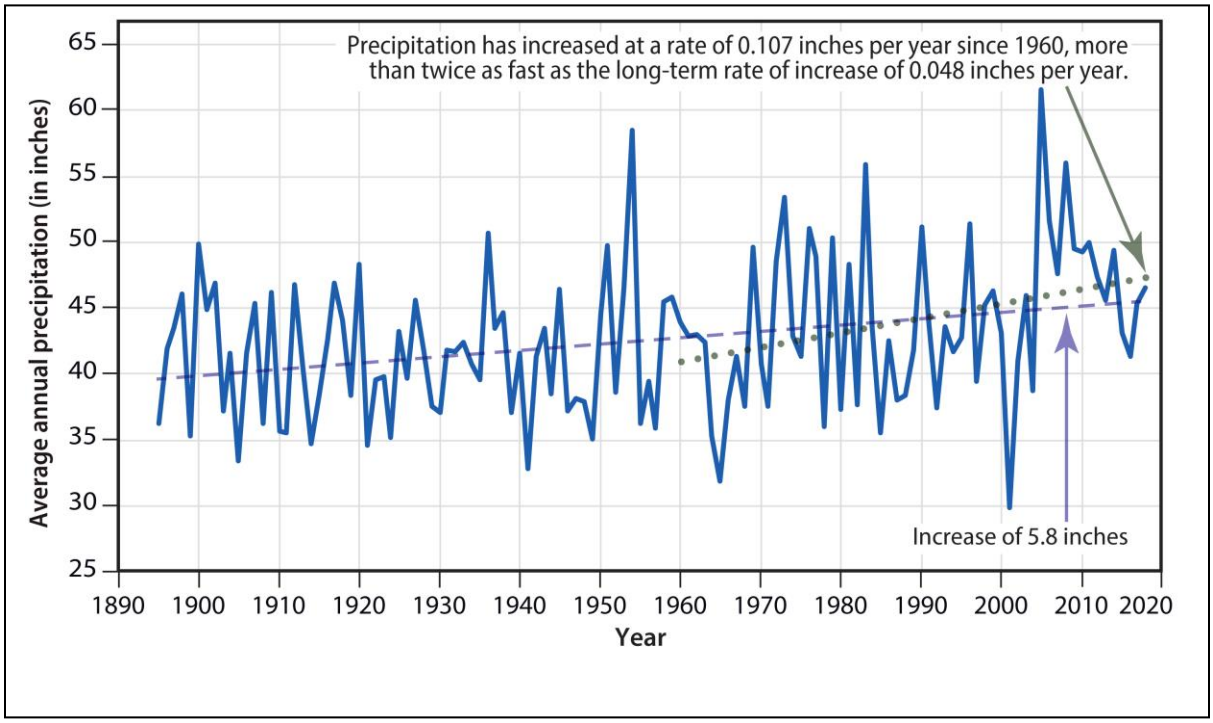


Source: Maine's Climate Future, 2020 Update, University of Maine, page 3.

Precipitation Changes in Maine. Maine's Climate Future, 2020 Update, reports that:

"Average annual precipitation has increased 15 percent (5.8 inches) since 1895, and the increase has come in the form of more rain and less snow. Since 1895, depth of annual snowfall has decreased 20 percent (2.3 inches). As with temperature, the rate of increase has accelerated in recent decades (page 5).

"Communities across the state are experiencing more heavy or "intense" precipitation events (Fernandez et. al. 2015)…Increased precipitation means increased volume of runoff to local streams, rivers, and ultimately the Gulf of Maine (Vincent et. al. 2015, Huntington et. al. 2016). These higher floods and flows can…damage roads, bridges and properties (page 6)."



Source: Maine's Future, 2020 Update, University of Maine, page 5.

Description of Hazards	
Requirement §201.6(c)(2)(i): (The plan shall include) a description of the type, location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	
Element	B1. Does the Plan include a description of the type, location and extent of all natural hazards that can affect each jurisdiction?
	B2. Does the plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction?

During meetings throughout the county, participating towns discussed hazards that face their community. The following table notes each hazard, Aroostook County's vulnerability to that hazard and the probability that each hazard will occur in the future.

The following hazards will be examined in detail in this mitigation plan: Flooding, Severe Summer and Winter Storm, Wildfire and drought. A determination that these are the most significant hazards in Aroostook County was made through personal communication and by reviewing data, reports, and records. While several hazards have a high likelihood of occurring, the other factors of the hazard/vulnerability analysis relegate them to non-significant/lower priority hazards.

The Aroostook County Hazard Mitigation Planning Team agreed that flooding was the most serious hazard in Aroostook County. There was general agreement that ice jams, combined with spring snow melt and sometimes heavy rains are a leading cause of flooding in Aroostook County. The year 2008 proved to all participants that the focus on flooding was a valid concern and area to elaborate on. The year 2008 was devastating to many communities especially the ones near the St. John River along the St. John Valley corridor. Fort Kent was hit the hardest followed by Van Buren. Other communities that received a great deal of damages included Island Falls, Washburn and the community of Wallagrass, more specifically the Soldier Pond area. Having had to deal with such major flooding, proved to all participants that mitigation should be addressed in greater detail and in some areas expanded. Identifying projects for mitigation is now on every one's radar and is being addressed.

Flooding and related hazards were identified through an extensive process that utilized input from members of the Hazard Mitigation Planning Team (comprised of representatives from State, County and municipal governments), survey returns from Aroostook County municipalities, a review of the Maine State Hazard Mitigation Plan 2019, hazard mitigation zoom workshops, public input, researching past disaster declarations in the county, and a review of current maps.

The hazards profiled in this Plan, and the basis for their selection, are summarized in the table below.

Summary of Hazards Profiled in this Plan		
Hazard	**How Identified**	**Why Identified**
Flooding	Review of 2020 hazard mitigation survey returns from Aroostook County municipalities, a review of the Maine State Hazard Mitigation Plan 2019, hazard mitigation zoom workshops, FEMA flood studies, flood maps, state data on disaster declarations, committee and local knowledge, Flood of 2008	There is a history of flooding in many parts of the county, particularly along the Aroostook and St. John Rivers. The County also contains twelve high hazard dams and six significant hazard dams that could, in the event of a dam failure, cause loss of life or serious property damage. There have been no major dam failures in the county in recent decades, but In 1954, a hurricane washed out dams in Mars Hill and Easton.
Severe Winter Storms	Review of past disaster declarations, committee and local knowledge, records from 1998 ice storm, Maine State Hazard Mitigation Plan 2019	Maine is frequently hit with blizzards and major "northeaster" storms. In 1998, a major ice storm hit Maine, knocking out power in many locations for days. The impacts of winter storms include wind damage. Summer storms are often accompanied by high winds, road and culvert washouts.
Severe Summer Storms	Review of past disaster declarations, Committee and local knowledge, State Plan	Summer storms are often accompanied by high winds, road and culvert washouts.
Wildfires	Review of Maine Forest Service records, committee and local knowledge, State Hazard Mitigation Plan 2019	Many areas of the county are forested. Wildfires have been numerous but they have generally been small. Wildfires can destroy land cover which, in turn, can cause erosion and sedimentation and exacerbate flooding.
Drought	Drought Advisory Committee, Planning Team and local input, State Plan, 2020 experience with drought.	Severe, multi-year droughts occurred in Maine in the 1960's, 1980's and 2000 to 2003, 2016, 2018 and 2020. In 2020, Aroostook County experienced severe drought condition. The U.S. Department of Agriculture designated Aroostook County as a drought disaster area

The following table identifies the hazards that were either eliminated from further consideration in the Plan or included in other hazard profiles**.** Factors for eliminating them from further consideration include a lack of historical evidence, lack of overall county-wide

severity, or a low likelihood for the event to occur. Even though these potential hazards are not profiled in the Plan, there is no guarantee that they would not or could not occur and cause damage. The Hazard Mitigation Planning Team made the decision to keep this Plan simple by profiling only the top four hazards.

Hazards that were Eliminated from Further Consideration

Hazard	How Identified	Why Eliminated
Avalanche	Review of USGS Maps	There are no mountains in the county that hold large amounts of snow that would create avalanches.
Blight/Infestation	State Plan, Planning Team, and local knowledge State Plan	Even though the county is heavily dependent on potato farming and timber production, state government, private businesses and the general public have responded to incidents of blight and infestation with spray programs, surveys, and restrictions on plant/aquaculture cultivation and plant importation.
Earthquake	Maine Geological Survey, historical records, State Plan	Although earthquakes are common in Maine, no significant motion has been shown for any fault since the last ice age about 20,000 years ago. Northwestern Aroostook County is one of three areas in Maine with the most seismic activity, but this area is largely uninhabited, and there has been only one earthquake with a magnitude greater than 3 (3.8) since 1979.
Hurricanes	Review of past disaster declarations, historical data, Planning Team, input State Plan	Maine is hit by a hurricane about every 10-20 years. However, the hurricanes are not very powerful by the time they hit Aroostook County. Strong, localized, and brief gusts approaching hurricane strength are sometimes experienced with winter and summer storms (see profile for summer storms).
Landslides	Review of Maine Geological Survey records, State Plan	Landslides are virtually unknown in Aroostook County. However, sometimes steep embankments can be subject to landslides, as was the case along a small section of Bradbury Road in Fort Kent. Aroostook County does not have any mountains or areas of steep terrain that could potentially be subject to landslides. However, this does not mean that landslides cannot occur.
Subsidence	Review of Maine Geological Survey records	There have been no known cases of land subsidence in Aroostook County.
Tornado, severe winds	Review NWS records, State Plan	On average, 1-2 tornadoes occur in the State of Maine every year, but there has been no loss of life or major damage in many years (but see profiles of winter and summer storms for high wind damages).
Winds	Review NWS records State Plan Local Surveys	Strong winds associated with severe winter and summer storm events are included in those hazard descriptions.
Pandemic	Statewide experience, 2020, news reports, AKEMA monitoring	AKEMA has a separate pandemic plan which is available from AKEMA

The following chart is a compilation of the Hazard Mitigation Planning Team's research efforts to determine what disaster events have occurred in Aroostook County during the last century. The team found few disasters during the first half of the 20th century. This is due in part to the poor records that were kept at the time, the fact that there was very little development in the county before 1950; and the fact that the residents mostly lived in homes built in the 19th Century which were built to withstand winter storms and were built out of known flood areas. After 1950, people began to build in flood-prone areas and in less hardy structures. In addition, there was very little threat from wildfire before the 1950's, because most of the land had been cleared for farming. After the 1950s, many farms fell to ruin and the fields grew up into forests.

Historical Summary of Hazard Events in Aroostook County

Year	Month	Day	Estimated Damage	Type of Damage	Declaration
1934	June	3-5	$300,000 Multi-County	Fire	n/a
1951	April	12		Flood	n/a
1973	May	6		Flood	SBA
1973	July	1		Flood	SBA
1973	Dec		$3,000,000 Multi-County	Flood	n/a
1974	May	26	$3,000,000 Aroostook	Flood	n/a
1976	April	2	$200,000 Aroostook	Flood	n/a
1976	August			Crop Damage	SBA
1976	Aug	9-19	"Belle" Aroostook	Flooding, Agricultural (potato) loss	SBA
1977	Aug	10	$4,000,000 Aroostook	Hurricane	SBA
1978	Jan	10	Unknown	Winter storm	Presidential
1979	April	30	$648,500 Multi-County	Flood	SBA
1991	April	10-12	$14,400,000 Aroostook	Severe ice jams & Flooding	Presidential
1992	May	19	Aroostook - Allagash	1,150 acre Fire	no
1993	Mar	13-14	unknown	Winter storm	EM-3164
1994	April	15	$5,700,000 Aroostook, Fort Fairfield	Flooding, ice jams, damage to 71 homes and businesses	Presidential
1998	Jan	5-25	$1,496,635	Ice storm, power outages, loss of heat, refrigeration, sanitary services, forestry damages	DR-1198
2000	Mar-Apr		$448,690	Flood	DR-1326
2003	Jan-Mar		$312,475	Severe winter conditions: frozen pipes	DR-1468
2003	Feb	2-4	$345,182	Severe Winter Storm	EM-3174

Historical Summary of Hazard Events in Aroostook County					
Year	**Month**	**Day**	**Estimated Damage**	**Type of Damage**	**Declaration**
2003	Dec	6-15	$202,126	Severe Winter Storm	EM-3190
2003	Dec	14-15	Unknown	Severe winter storms and severe cold	EM 3194
2005	Feb	10-11	$334,405	Severe Winter Storm	EM-3206
2005	March	9	$498,000	Severe Winter Storm	EM-3209
2005	March-May	28-3	$262,989	Flood	DR-1591
2005	Dec	25-27	$512,603	Severe Winter Storm	EM-3265
2008	Apr-May	30-3	$TBD	Flood	DR-1755
2009	July		$200,000 (Insured) T17-R3 & Fort Kent	Micro-burst – NWS Caribou	No
2010	Dec	12-19	TBD	Severe winter storms, widespread flooding	DR-1953
2017	Feb	13	Unknown	Statewide blizzard, winter storm	n/a
2017	Mar	14	Unknown	Statewide blizzard	n/a
2020	Jan	Ongoing	TBD	Covid-19 pandemic	DR-4522
2020	Sept		Unknown	Severe drought conditions	U.S. Dept. of Agriculture

Fort Kent-May 2008 Photo courtesy of Maine Forest Service

Flooding

"St. John River Basin. The St. John River Basin includes portions of Aroostook, Somerset, Piscataquis, and Penobscot Counties. The river basin drains 1,650 square miles from a vast area in both Canada and northern Maine. The St. John River runs 420 miles and has a considerable drop in elevation in the upper section followed by generally flat topography with rolling hills. The state's only National Scenic Waterway, the Allagash, which forms the headwaters of the St. John basin, is world renowned for its wilderness canoeing. The St. John forms Maine's northernmost border. Because of the wide channel and steep banks, the main stem of the St. John River has relatively moderate flooding. Some tributaries of the St. John, such as the Aroostook River, are prone to flooding. There is, however, very little development at risk in the St. John Basin. Maine's two most significant levees, Fort Kent and Fort Fairfield, are in this basin. The Fort Kent levee was built in the late 1980's, and has since seen numerous updates. The Fort Fairfield levee was built in 2001. In 2008, a flood on the Saint John River came within three inches of the top of the levee but did not overtop it. Despite the height of the water, the levee withstood the flood (Maine State Hazard Mitigation Plan, 2019, page 1-5)."

Flooding in Aroostook County has many causes. Ice jams from the spring thaw, severe storms and saturated farm fields are just some examples of the causes. The Aroostook County Emergency Management Agency (AKEMA) has copies of flood maps for the towns that participate in the National Flood Insurance Program.

In the springtime, AKEMA monitors the following rivers at the following points:

1. **Aroostook River:** Masardis, Washburn
2. **St. John River:** 9 Mile Bridge, Dickey, Fort Kent
3. **St. Francis River:** Connors
4. **Big Black River:** Depot Mountain
5. **Fish River:** Fort Kent
6. **Allagash River:** Allagash

AKEMA has also conducted a survey of all Aroostook County dams. This was done by visiting each dam, getting pictures and creating site maps. Once that was complete, the information was placed in a resource guide, divided by town, which also includes dam owners, ID numbers and emergency contact information.

Types of Flooding in Aroostook County: Flooding is a temporary inundation of normally dry land as a result of: 1) the overflow of inland waters; and/or 2) the unusual and rapid accumulation or runoff of surface waters from any source. Note: the nature of Aroostook County's geology and hydrology is such that flooding is usually fast rising but of short duration. There are several different types of potential flooding in Aroostook County:

- **Dam failure**: The sudden release of water resulting from structural collapse or improper operation of the impounding structure. Dam failure can cause rapid downstream flooding, loss of life, damage to property, and the forced evacuation of people.
- **Flash flood**: A flood event occurring with little or no warning where water levels rise rapidly due to heavy rains, ice jam release, or rapid snow melt.
- **Ice jam**: An accumulation of floating ice fragments that blocks the normal flow of a river. During a thaw or rainstorm, the rapid increase in discharge from snow melt and/or rainfall can rapidly lift and break up a thick ice cover and carry it downstream as an ice run. Ice runs can jam in river bends or against the sheet ice covering flatter reaches. The resulting ice jams can block flow so thoroughly that serious flooding may result within an hour of their formation. Failure of an ice jam suddenly releases water downstream. Damages from ice jam flooding usually exceed those of clear water flooding because of higher than predicted flood elevations, rapid increase in water levels upstream and downstream, and physical damage caused by ice chunks. Moving ice masses can shear off trees and destroy buildings and bridges above the level of the flood waters.
- **Lacustrine**: (Lake Flooding) occurs when the outlet for the lake cannot discharge the flood waters fast enough to maintain the normal pool elevation of the lake. During a base flood event, normal increases in water surface elevations on most Maine lakes and ponds range from 1 to 5 feet. However, in Maine there are some examples where the base flood event will reverse the flow of the outlet stream. In such instances, river and base flood elevations can rise more than 15 feet above normal pool. While this can impact individual sport camps built near the water's edge, there are no records of major damages so this type of flood will not be further addressed in the Plan.

- **Riverine/riparian**: Periodic overbank flow of rivers and streams, usually the result of spring run-off, but can also be caused by major rain storms. This is the major type of flooding in Aroostook County.
- **Urban**: Overflow of storm sewer systems, usually due to poor drainage, following heavy rain or rapid snow melt. The combined sanitary and storm water systems that some urban areas installed years ago cause flooding of sanitary sewerage when riparian floods occur. Runoff is increased due to a large amount of impervious surfaces such as roof tops, sidewalks and paved streets.
- **Beaver Dam Flooding**: Flooding resulting from back-up and overflow of water resulting from beaver dams.

Nature of the Hazard from Dam Failure: Maine dams were constructed incrementally over a period of 300 years. Businesses harnessed the abundant fast flowing rivers and rocky rapids for the development of energy and transportation. Many dams throughout the country are now aged, and in Maine the majority of these structures are nearly 100 years old and beyond the normal design life of civil engineering works. Many are low head dams constructed using local materials of stone, timber and earth. Based on anecdotal information obtained at a September 19, 2006 meeting in Caribou, a 1954 hurricane resulted in a deluge that washed out the Mars Hill and Easton dams, as well as several roads. Dam failure is not a frequent occurrence, but it can and does occur.

Maine law, consistent with federal law, classifies the hazard potential of dams as High, Significant or Low. If they failed, High Hazard dams could cause loss of life; Significant Hazard dams could cause significant property damage and Low Hazard dams would generally cause damage only to the owner's property. Therefore, it's possible that a small (low head) dam located above a large community could be rated High Hazard while a structurally larger dam sited in an unpopulated area could be a Low Hazard potential.

In Aroostook County, there are 12 High Hazard dams and six Significant Hazard dams, as shown in the table below. Only one of the dams shown in the table, Sco Pan Plant, is regulated by the Federal Energy Regulatory Commission (FERC). The rest are regulated by the Maine Emergency Management Agency. The County also has 38 low hazard dams that are not included in the table.

Aroostook County High Hazard and Significant Hazard Dams					
MEMA ID	**Dam Name**	**Other Name**	**Dam Owner**	**Town**	**River**
High Hazard Dams					
134	Josephine	Lake Josephine	McCain Foods	Easton	Unnamed
135	Christina	Lake Christina	McCain Foods	Easton	Prestile Stream
136	Bryant Pond	n/a	Fort Fairfield	Fort Fairfield	Libby Brook
138	Libby Brook	n/a	Fort Fairfield	Fort Fairfield	Libby Brook
141	Durepo Brook	n/a	Limestone	Limestone	Durepo Brook
142	Trafton Lake	Webster Brook	Limestone	Limestone	Limestone Stream
143	Noyes Mill	n/a	Limestone	Limestone	Noyes
144	Community Pond	Limestone Community	Limestone	Limestone	Limestone
148	Mantle Lake	Mantle Lake Outlet	Presque Isle	Presque Isle	Mantle Brook
151	Hanson Brook	n/a	Presque Isle	Mapleton	Hanson Brook
154	Violette Brook	n/a	Van Buren Water District	Cyr Plantation	Violette Brook
414	Scopan Plant	Squa Pan	Algonquin Northern Maine GenCo Liberty Power.	Masardis/ Ashland	Squa Pan Stream
Significant Hazard Dams					
150	Arnold Lake	n/a	Presque Isle	Presque Isle	Arnold Brook
152	Hunnewell Lake	n/a	IFW/State of Maine	St. John Plantation	Thibeault Stream
653	Smith Farm	n/a	H.Smith Farm Family Limited Partnership	Westfield	Smith Brook
823	McCrum's Pond	n/a	Neil Grass	Westfield	Rideout Brook
999	Jack's Pond	n/a	Laurice Grass-Bell & Michael Foster	Monticello	?
1006	Schools Farm Dam	Littleton Irrigation Pond	Schools Real Estate Holdings, LLC	Littleton	?

Source: MEMA and AKEMA

Nature of Flood Hazard other than Dam Failure. Severe flooding can cause loss of life, property damage, disruption of communications, transportation, electric service and community services, crop and livestock damage, health issues from contaminated water supplies, and loss and interruption of business. Ironically, firefighting efforts can be compromised if fire fighters and equipment are responding to a flood emergency.

Generous precipitation (about 41 inches a year) contributes to the flood potential. The low pressure system over the eastern seaboard and the tendency of some storms to follow one another in rapid succession provide heavy, combined moisture. Water abundance is one of Aroostook County's most valuable natural resources and its primary hazard.

Location of Flooding Hazard: Aroostook County's susceptibility to flooding is further exacerbated by the wide-ranging weather variables as discussed in the climate section. Due to seasonal (and regional) factors such as heavy rains, rapidly melting snow pack and/or ice jams, major flooding most frequently occurs between December and May. Based on MEMA data, the most flood prone months are April, January and March respectively. Floods can also be caused by hurricanes.

Location of Municipal Flood-Prone Areas. The following is a summary of areas that are subject to flooding and/or that have had repeated flood damages in specific jurisdictions, as identified in the Aroostook County Hazard Mitigation Planning Municipal Survey 2015 and susequently modified in 2020 and 2021.

- **Allagash:** Allagash-St. Francis town line; Dickey Road; Ferry Road; Frank Mack Road; Walker Brook Road.
- **Aroostook Band of Micmacs:** Tribal Farm, Doyle Road-Caribou Housing, and Littleton Housing.
- **Amity:** At times we have flooding on all our town roads. Where there is a culvert, it is usually caused by freezing or beavers plugging them: Monument Road, Estabrook Road, Tracy Road and Lycette Road.
- **Ashland:** Anywhere along the Aroostook River on Route 11 and Garfield Road as well as Route 11 by the Sqo Pan stretch on the Ashland/Masardis line.
- **Blaine:** Dam at Robinson Pond, low areas of the Kinney Road, E Plantation Road and East Blaine Road.
- **Bridgewater:** Route 1 corridor between Fire Station and Boundary Line Road; Dead Brook area of Packard Road; Whitney Brook Bridge on Tannery Street; and Boundary Line Road.
- **Caribou:** Aroostook River and tributaries including Grimes Road, East Presque Isle Road, West Presque Isle Road, Albair Road, Main Street-Collins Bridge.
- **Castle Hill:** The Wadell Road has an issue with flooding and the Dudley Road swamp.
- **Chapman:** The area of Littlefield Road in the swamp has been an issue in the past; Grendell Road has flooding in the swamp.
- **Crystal:** Most flooding incidents only cause road closures, usually minimal property damage, depending on the flood conditions and severity. Areas where Fish Stream crosses Crystal Road (state road). Crystal Road (5 Mile Corner) where it crosses Crystal Brook – does not usually flood, but has a very old bridge, and is a major artery – this could cause travel disruptions if this area flooded or bridge was to be damaged.

Retreat Road (local road) – poor drainage of large swampy area floods road from several up to 24 hours after heavy spring rains. Pine Tree Road at Crystal/Island Falls Town Line – Cold Brook Bridge (US Route #2). Winding Hill Road (local road) poor drainage in areas causes areas of road to wash out.

- **Cyr Plantation:** Madore Road.
- **Dyer Brook:** None.
- **Eagle Lake:** Areas in Plaisted, areas around Eagle Lake.
- **Easton:** Lakes Christina and Josephine are floodplains. Route 10 (at Presque Isle/Easton border) and Route 1A (north of Easton Center).
- **Fort Fairfield:** Fort Fairfield has three major hazards – the Aroostook River in the spring, Libby Brook Dam, and Bryan Pond Dam. A dam failure at Bryan Pond dam would contribute to a failure at Libby Brook Dam creating a flood area that would impact a majority of the urban area of the community. A dike failure along Main Street would affect the major artery of town and most local businesses.
- **Fort Kent:** St. John River; Fish River; Cross culvert and driveway culvert on North Perley Brook Road near Black Lake Road (Fort Kent has been awarded a Hazard Nitigation Grant to remediate the issue); Bradberry Road along Fish River to old Fish River bridge site; Riverside Park; most of East Main Street; Quigley's Lumberyard; and the Blockhouse picnic area.
- **Grand Isle:** River flooding always being monitored, but with very limited damages recorded.
- **Hamlin:** Hammond Brook area; Martin Brook area.
- **Hodgdon:** Jackins Settlement Road; Little Road; Hillview Avenue.
- **Houlton:** Green Street area, Sugarloaf Street, Pearce Brook area. Morning Star culvert (scheduled for major repair summer 2021). Snowmelt combined with heavy rainfall causes flooding of Meduxnekeag River, streams and low-lying areas throughout Houlton.
- **Houlton Band of Maliseet Indians:** The HBMI is situated along the Meduxnekeag River in Littleton and Houlton. This river is susceptible to ice jams and flooding in the spring, but it is not typical that any home or structures wuld be threatened. There is an un-named tributary which has washed out on the Bell Road, preventing access to the Tribal Administration buildingh and the EOC.2
- **Island Falls:** Mattawamkeag River at Old Patten Road/Sewall Street and at Houlton Road; Fish Stream at Old Patten Road; Dyer Brook at Houlton Road; Sly Brook at Sherman Street Bridge Crossing.
- **Limestone:** The Town of Limestone currently has four man-made flood control dams: 1) Durepo; 2) Noyes; 3) Community Pond; 4) Trafton. These dams could cause extensive flood damage if they should become breached. These dams hold back large watersheds, and are covered under an EAP on file with MEMA. Residents at the end of Tardy Road could possible become trapped if Durepo Dam is breached.
- **Linneus:** Bither Brook crossing on Folsom Road and Burton Road; Beaver Brook crossing of South Oakfield Road; intersection of Bates Ridge Road and Drews Mills Road; Erosion of gravel surface; Burton Road Hill; Erosion of gravel surface heavy rain event and spring melt South Oakfield Road Crow Hill; Gravel surface erosion during spring melt and heavy rain events.
- **Littleton:** Foster Road.

- **Ludlow:** Lamb Brook at Ludlow Road.
- **Madawaska:** Pelletier Ave – bottom of the hill due to excessive wood cutting the water runoff goes over the 30" culvert when it rains hard. Aspen Road - due to excessive wood cutting the water runoff after a heavy rain goes over the 30" culvert and washes out the road.
- **Mapleton:** Tea Kettle Brook has had a new culvert and the road has been improved a couple of years ago (it may not be a problem now). Parsons Road – Aroostook River.
- **Mars Hill:** The area from the Prestile Stream dam south along the Prestile Stream has in the past been susceptible to high water, particularly during the spring runoff period.
- **Monticello:** Portions of the Hoyt Road, Fullerton Road, McCluskey Road, Bell Road.
- **Nashville:** None.
- **New Limerick:** Area between 678 Drews Lake Road and 731 Drews Lake Road is low; west end of Drews Lake Road is also vulnerable.
- **New Sweden:** Rista Road, Jepson Road, School Land Road, Thomas Road.
- **Orient:** Properties near East Grand Lake.
- **Perham:** Tangle Ridge Road (Hanford Siding).
- **Portage Lake:** All low land around the lake, especially the south end and east side.
- **Presque Isle:** Homes on the west side of Main Street (Presque Isle Stream), homes around the state park and along the Chapman Road due to dams in these areas for flood control.
- **Reed Plantation:** All areas around Mattawamkeag River.
- **St**. **Agatha:** The shores of Long Lake; the cove near the Town Office; with the spring melt and rain we had a washout from a beaver pond up behind a road that damaged a culvert (Morneault Rd).
- **St. Francis:** ice jam flooding at Kelly Crossing west to 337 Main Street; Thibodeau Brook west to 985 Main Street; Narrow Gauge west to St. Francis/Allagash town line.
- **St. John Plantation:** St. John Plantation is along the St. John River, so all low lying areas are susceptible.
- **Sherman:** Along Molunkus Stream.
- **Stockholm:** Areas along the Madawaska River would be about the only places that could potentially flood. No flood damage in recent years.
- **Unorganized Territory:** E-Township - E-Plantation Road (Three Brooks Crossing); Sinclair (T17R4) - Sinclair Road; Benedicta (TIR5) - Aroostook Road.
- **Van Buren:** River flooding always being monitored, but with very limited damages recorded.
- **Wade:** Residents along the Aroostook River on Gardner Creek Road always have the issue of flooding during the ice out period in the spring. Quite often they find themselves stranded for several days or more.
- **Wallagrass:** Soldier Pond Village in Wallagrass; Wallagrass Stream; Michaud Stream in Soldier Pond; and Clark Brook.
- **Washburn:** Gardner Creek Road; a bridge just below the old McCains site. The Annis Road floods most years; when that floods, there is no other alternative route to get off that road.
- **Westfield:** Tweedie Road.
- **Westmanland:** Little Madawaska Lake Road used to flood yearly. The community did some repairs there and hope that is taken care of.

- **Weston:** N/A.
- **Winterville Plantation:** Red River Road near Route 11. In 2008, area camps flooded.

Extent. The majority of the flood damage in the county is caused by winter runoff in the springtime, which undercuts or overtops local roads. When Maine has an above average snowfall for the winter and then warmer temperatures and rainfall suddenly arrive in the spring, the snow pack melts off more quickly than the watersheds can handle. This can cause local water bodies to overflow their boundaries and flood nearby road surfaces. Typically, the road damage is not major, although it can absorb the municipal road budget for an entire year and does happen in several towns every year.

The St. John River Basin drains a vast area in Canada and Northern Maine and has a considerable drop in elevation in the upper section. Because of the wide channel and steep banks, the main stem of the St. John River has relatively moderate flooding. Some tributaries of the St. John, such as the Aroostook River, are prone to flooding.

The following is a summary of the extent of flooding, based on data obtained from the National Weather Service in Caribou:

St. John River at Fort Kent:

Flood Crests
- Flood Stage: 22 feet
- Moderate Flood Stage: 24 feet
- Major Flood Stage: 26 feet

Recent Crests
- 23.39 feet on 4/23/2019
- 22.60 feet on 5/1/2018
- **27.74 feet on 4/30/2008**
- 19.19 feet on 4/20/2008
- 18.09 feet on 4/25/2007

The flood flow at this location is greater than 56,800 cfs (exact flow not available).

Aroostook River at Washburn

Flood Crests
- Flood Stage: 14 feet
- Moderate Flood Stage: 17 feet
- Major Flood Stage: 20 feet

Recent Crests
- 19.66 feet on 4/20/2019
- 14.99 feet on 4/21/2018
- **21.14 feet on 4/18/2015**
- 16.43 feet on 4/7/2009
- 14.40 feet on 4/18/2008

- 14.10 feet on 4/09/2005

The flood flow at this location is greater than 35,700 cfs (exact flow not available).

Fish River at Fort Kent

Flood Crests

- Flood Stage: 11 feet
- Moderate Flood Stage: 12 feet
- Major Flood Stage: 13 feet

Recent Crests

- 11.20 feet on 4/28/2019
- 12.02 feet on 5/3/2018
- **13.93 feet on 4/30/2008**
- 10.88 feet on 5/01/2005
- 10.01 feet on 4/28/1996

The flood flow at this location is greater than 8,800 cfs (exact flow not available).

Previous Occurrences. Some flooding occurs every year, but some of the most significant and widespread flooding events are shown in the table below. Some of these flooding events resulted in disaster declarations.

Historical Summary of Flooding in Aroostook County

Year	Month/Day	Estimated Damage	Type of Damage	Declaration
1951	Apr 12	Unknown	Flood	n/a
1973	Apr 24	Unknown	Flood	Declaration denied
1973	May 6	$908,404	Flood	SBA
1973	Jul 1	Unknown	Flood	SBA
1973	Dec ?	$3,000,000 Multi-County	Flood	Declaration denied
1974	May 26	$3,000,000 Aroostook	Flood	n/a
1976	Apr 2	$200,000 Aroostook	Flood	n/a
1976	Aug ?	Unknown	Crop Damage	SBA
1979	Apr 30	$648,500 Multi-County	Flood	SBA
1991	Apr 10-12	$1,899,139	Severe ice jams & Flooding	DR-901
1993	Apr ?	$240,396	Flooding	DR-988
1994	Apr 15	$5,700,000 Aroostook, Fort Fairfield	Flooding, ice jams, damage to 71 homes and businesses	DR-1029
2000	Mar 28-Apr 26	$448,690	Flood	DR-1326
2005	Mar 29-May 8	$262,989	Flood	DR-1591
2008	Apr 28-May 14	$TBD	Flood	DR-1755
2010	Dec 12-19	TBD	Severe winter storms, widespread flooding	DR-1953

Fort Fairfield – 1994 Flood. On Saturday night, April 16, 1994, Fort Fairfield was deluged by a massive flood of historic proportions. The following is an excerpt from a New York Times article dated April 18, 1994:

> "Spring arrived with a vengeance over the weekend in this town in northeastern Maine when an ice jam clogging the Aroostook River burst, sending large blocks of ice into town on a wave of frigid waters."
>
> "Like outsized pieces of some frozen jigsaw puzzle, the ice slammed into buildings and cars on Saturday night, forcing 60 people to evacuate their homes. Ten feet of water flooded Main Street, damaging more than a score of businesses…."

> Two Canadian Customs officers from nearby Perth-Andover, New Brunswick, were drowned when the ice jam broke and the flood trapped them in their car at the border five miles east of here."

The information contained in the paragraphs below was obtained from Fort Fairfield's Community Development Director/Floodplain Coordinator, Tony Levesque. This brief overview focuses on major outcomes and does not describe the challenges, setbacks, unanticipated expenses or the many complications that were encountered.

The deluge of 1994 affected approximately 130 single family homes and apartment units, and 43 businesses. Six of the homes were rendered uninhabitable. Most of the businesses and homes were located in and around the downtown on the south side of the river. Approximately 35 dwellings, two mobile home parks and an apartment building were located on the north side.

The Town teamed up with a number of federal, state and local agencies, as well as the Maine Congressional Delegation, to respond to the devastation. All parties worked hard and cooperatively on desired outcomes. The town hired a relocation coordinator and administrative assistant to help with the workload.

Actions included using a patchwork quilt of grant funds to develop a plan of action, move people out of the floodplain on the north side of the river, and build a dike to protect the downtown. By 1997, the Town had completed all of its prioritized purchases as outlined in the plan of action. On the north side of the river, several structures were elevated out of the floodplain. A number of people were relocated to one of two town-created subdivisions as well as other available properties in Fort Fairfield. A park and a boat ramp were established on the now-vacant floodplain properties. Acquisition and relocation costs totaled about $2.95 million.

On the south side of the river, grant funds were used to construct a 2,100 foot dike in the year 2000 to protect the downtown. This involved purchasing property for the dike, establishing interceptors, gates and pump stations to manage sanitary waste, storm water, streams and ground water flowing from terrain above the downtown. During flooding events, gates are closed on storm drains that normally flow by gravity through the dike to the river so that water is diverted to the interceptor and discharged by high pressure pumps through the dike and into the river.

The dike has subsequently protected the town from a number of floods, including several that potentially would have been worse than the flood of 1994. Fort Fairfield's efforts have resulted in the elimination of all 17 repetitive loss structures.

Fort Kent Flood of 2008. As reported in various newspaper and other accounts, between April 30 and May 1, 2008, heavy rains combined with snowmelt to create record flooding of the St. John and Fish Rivers. In Fort Kent, flood waters caused the evacuation of over 600 people and flooded many homes and businesses, an elderly apartment complex, and many roads including Routes 1 and 161.

Five feet of water entered Fort Kent Housing, an apartment complex for senior and disabled residents. The century-old St. Louis Catholic Church, caught between the rushing waters of the two rivers, suffered extensive damage when three feet of water entered the church, ruining pews, carpeting, a new organ, furniture and electronics and filling the 10-foot basement. A 31-foot levee protecting a portion of the downtown was almost overtopped when flood waters reaching an elevation of 30.14 feet. Flood waters also came within a foot of the International Bridge connecting Fort Kent with New Brunswick, Canada. The sanitary sewer system stopped working when sewer collection pumps went offline.

The response to the disaster was immediate. The Red Cross, Border Patrol, State Police, Game and Fire Wardens, and Fire Department were on the scene to assist in the evacuation and provide support. Approximately 70 National Guard personnel assisted homeowners in the St. John Valley in cleaning out their homes and property and piling trash at the roadside to be picked up by town crews. Residents who did not suffer damage helped others to clean out their homes and cellars. Volunteer firefighters pumped water from the church (one cellar wall crumbled from the pressure of the water). Firefighters also used huge pump trucks to wash the mud and debris from East Main Street. Public Works Department employees removed a temporary gravel berm that had been created to stop the waters of Fish River from flooding the west side business district. Volunteers from outside the community came to help. Following initial cleanup efforts, five private homes and the senior housing complex were acquired and demolished through a combination of HMGP grant funds and private money.

Probability of Occurrence: Floods are described in local flood hazard studies in terms of their extent, including the horizontal area affected, and the related probability of occurrence. Flood studies use historical records to determine the probability of occurrence for different extents of flooding. The most widely adopted design and regulatory standard for floods in the United States is the 1-percent annual chance flood and this is the standard formally adopted by FEMA. The 1-percent annual flood, also known as the base flood, has a 1 percent chance of happening in any particular year. It is also referred to as the “100-year flood.” The probability of flooding of homes, commercial and governmental buildings and critical facilities located in flood-prone areas is 1% in any given year.

Severe Winter Storms

Aroostook County has had severe frost and freeze-ups, extreme snowfall amounts, and ice jams. Maintaining heavy equipment, properly insulating pipes and mitigating water runoff issues are just a few of the things that are being done to reduce the effects of some of these storms.

Severe winter storms do not ordinarily have an immediate impact on flooding. They add to the snow pack, which in the January thaw or springtime can lead to rapid snowmelt, runoff and flooding. Ice jams can exacerbate flooding by temporarily blocking, then releasing, large volumes of water, often with disastrous downstream impacts.

Severe winter weather conditions are characterized by low temperatures, strong winds, and often large quantities of snow.

Types of Severe Winter Storms in Maine. A single winter storm may include one or more of the following:

- **Blizzard**: Sustained winds of 40 mph (miles per hour) or more or gusting up to at least 50 mph with heavy falling or blowing snow, persisting for one hour or more, temperatures of ten degrees Fahrenheit or colder and potentially life-threatening travel conditions.
- **Ice storms**: Rain which freezes upon contact. Ice coatings of at least one-fourth inch in thickness are heavy enough to damage trees, overhead wires, and similar objects and to produce widespread power outages.
- **Northeaster**: Northeasters (or nor'easters) are extra-tropical coastal storms that can produce tremendous amounts of precipitation and strong winds. When the precipitation is in the form of snow, sleet or freezing rain, it can damage overhead utility lines and become a highway driving hazard.
- **Sleet storm**: Frozen rain drops (ice pellets) which bounce when hitting the ground or other objects, but in accumulated depths of two inches or more, produces hazardous driving conditions.
- **Heavy snow storm**: A snowfall of fifteen inches or more within 12 to 24 hours, which disrupts or slows transportation systems and the response time of public safety departments.

Caribou - Jan. 2008 Photo courtesy of Vern Ouellette

Aroostook County is subject to severe winter storm events in the form of ice storms and blizzards, accompanied by high winds and flooding. Winter storms can threaten Aroostook County any time from November through April. The Gulf Stream follows a path up the eastern seaboard, bringing major storms with it to the Gulf of Maine. Air streams containing much colder air flow down from Canada and collide with the Gulf Stream over the New England region. Nor'easters, the most severe storms in Aroostook County, occur during the winter, spring and fall. They rarely develop during the summer.

Precipitation amounts can exceed several inches of water equivalent (20-30 inches of snow or more). Loss of electrical power and communication services can impede the response of ambulance, fire, police and other emergency services, especially to remote or isolated residents. Roads can become impassable as the result of snow accumulation and drifting. Business closings can occur due to road conditions and loss of power. Structural failures are possible as the result of snow loads on roofs. This is of particular concern with respect to older structures built prior to the advent of snow-load design standards. Heavy snow loads can also result in the formulation of ice dams on roofs, leakage and damage to building interiors.

Location of Hazard. The entire county is subject to severe storms every winter, but there have been a number of storms that have been worse than others.

Location of Severe Winter Storm Impact areas. The following is a summary of areas that are susceptible to severe winter storms, as identified in the Aroostook County Hazard Mitigation Planning Municipal Survey 2015 and susequently modified in 2020 and 2021.

- **Allagash:** Due to warm ups, we currently have early ice jams from the Allagash Bridge to the town line.
- **Amity:** Frozen culverts on Monument Road, Estabrook Road, Tracy Road and Lycette Road. The whole town is susceptible to losing power during severe winter storms.
- **Aroostook Band of Micmacs:** Bon Aire Housing – Presque Isle; Connor Housing; Littleton Housing; Tribal Farm and Doyle Road – Caribou Housing.
- **Ashland:** Anywhere along the Aroostook River on Route 11 and Garfield Road as well as Route 11 by the Sqo Pan stretch on the Ashland/Masardis line.
- **Blaine:** Ice jam, dam at Robinson Pond.
- **Bridgewater:** Route 1 by fire station is susceptible to ice jams under the bridge of Dead Brook and Route 1; ice jams under Whitney Brook bridge and Route 1; Whitney Brook bridge on Tannary Street. Power outages at Wicklow Place senior housing complex, and throughout town if it is an extended outage. Drifting snow on many secondary roads, on the Route 1 corridor the length of town and especially on the Bunker Hill area around Bunker Hill.
- **Caribou:** Severe winter storms and power outages – city wide; Ice jams – Aroostook River, Grimes Road.
- **Castle Hill:** All the north/south roads are problems for blowing and drifting snow.
- **Chapman:** West Chapman Road is a north/south road and is a problem for drifting and blowing snow.
- **Crystal:** Crystal has an aging population, making snow removal/clean-up for some, from roofs and yards, difficult. Most residents live on state or local maintained/plowed roads, but some live on private roads. Severe snow storm may disrupt all residents from accessing local services, or leave residents without power for extended periods. Most residents do not have back up power systems, and less are using wood stoves as primary and back up heating sources. Ice jams mostly cause road closures due to flooding usually 24 hours or less, very few residences get property damage by flood waters, unless it is an unusually severe flood.
- **Cyr Plantation:** Omer Dumond Road; Madore Road.
- **Dyer Brook:** Basically the whole town if the power goes out depending on which power company is affected.
- **Eagle Lake:** Gilmore Brook Road – rural desolate and not maintained by the municipality; Red River Road – flooding; Old Main Street – flooding.
- **Easton:** Conant Road, Route 1A, Ladner Road, and Mahany Road all are problematic for snow blowing over the road and stranding motorists, most notably transports to and from McCain Foods and Huber. Power outages have severe consequences as Easton does not have warming and other generator-driven shelters.
- **Fort Fairfield:** Ice james occur during the winter months after a thaw. Ice build-up from the Caribou/Fort Fairfield town line contributes to a blockage of ice at Tinker Dam. The backflow of water creates a substantial hazard to the town if the pumping system at the dike were to fail. Severe winter storms have been known to shut off travel and strand residents in rural areas of the communityu. Areas on Forest Avenue, Center Limestone, and West Limestone Roads and their connecting roads have lost access to emergemncy services in the past due to heavy snow.
- **Fort Kent:** The entire community is subject to severe storms every winter, but there have been several storms that have been worse than others. Ice jams occur on the St. John River at the mouth of the Fish River; also up river from the St. John River bridge.
- **Grand Isle:** Heaavy and wet snow always a major factor but again very limited concerns, just have to monitor when melting occurs ijn the spring.
- **Hamlin:** Hammond Brook and Martin Brook areas.
- **Hodgdon:** Not had an issue with ice jams or power outages.
- **Houlton:** Smyrna Street/Meduxnekeag bridge is susceptible to ice jams. Due to the rural wooded nature of the farm areas in Houlton, massive power outages have been experienced

throughout town. Disruption in the electrical transmission system from New Brunswick due to winter storms and downed trees can cause major disruption to power services.

- **Houlton Band of Maliseet Indians:** Power outages and wintrer storms in the Clover Circle area are of primary concern. With a high percentage of elderly population who are food assistant dependent, and unable to travel in snow conditions, there is a need to provide them with basic needs.
- **Island Falls:** The downtown area is probably the most susceptible to severe winter storms, due to limited snow storage and narrow town street. The whole town is susceptible to power outages. The town has many elderly citizens with single source heating and no generators.
- **Limestone:** A severe winter storm with power outages could potentially cause issues, as we are not equipped in our community with a large generator to set up a temporary shelter. Residents at the ends of dead end roads could be trapped due to heavy drifting of snow as we have a lot of open fields.
- **Linneus:** All areas of the town. Power outages from wind, overloaded power lines-snow; downed trees from wind, or snow load or a combination of both. Loss of access from heavy snow events, particularly on privately maintained roads such as the South Shore Road which provides access to varioius homes on Meduxnekeag Lake; or the Fire Road which provides access to a few individuals who are living off the grid.
- **Littleton:** None.
- **Ludlow:** The western side of town has issues with power failures. The east is served by Houlton Water Company and seems fine.have severe drifting along the open fields. All the roads running north and south can experience problems from blowing and drifting snow and possible blockages. The entire town could be at risk for a power outage.
- **Madawaska:** The boat landing is susceptible to ice jams. It happened on April 18, 2019 where the had jammed, and water backed up into the public bathrooms.
- **Mars Hill:** We have several roads that run in a north/south orientation that are susceptible to drifting snow during and immediately after sever winter weather. These roads include, but are not limited to all or portions of the West Ridge Road, the East Blaine Road, th Westfield Road, the East Ridge Road, the Boyd Road and the Kearney Road.
- **Monticello:** portions of the Westr Road, Fletcher Road, Hare Road, Lynds Road, Lake Road.
- **Nashville:** None.
- **New Limerick:** None.
- **New Sweden:** None, unless severe wind storm taking down trees
- **Orient:** The town has had a number of power outages this year. We are small so this affects the whole town.
- **Perham:** Higher elevation areas.
- **Portage Lake:** We are part of the Fish River chain and experience fluctuations in water levels due to flowage into St. Froid lake.
- **Presque Isle:** All parts of Presque Isle are susceptible to severe winter storms, ice jams along Presque Isle Stream and Aroostook River.
- **Reed Plantation:** The entire town is susceptible to power outages.
- **Sherman:** N/A
- **St Agatha:** The entire town and especially the back settlements where there are farm fields with open space along the road.
- **St. Francis:** The town has not had any issues with severe winter storms.
- **St. John Plantation:** All areas.
- **Stockholm:** Power outages in the area.
- **Unorganized Territory:** Unorganized Territory to the west and south of Allagash - St. John; Big Black; Little Black, and Allagash Rivers (Ice Jams); E-Township - E-plantation Road (Power Outages).

- **Van Buren:** Heavy and wet snow always a major factor but again very limited concerns, just have to monitor when melting occurs in the spring.
- **Wade:** The North Wade Road and the Howe Road are very hard roads to keep open during the winter. With wide open spaces, heavy snow and wind cause these two roads to become plugged during a heavy storm.
- **Wallagrass:** Strip Road and Sly Brook Road are susceptible to road closures with heavy wind drifts. Wallagrass stream with ice jams. Carter Brook Tote Road along Hillside Road.
- **Washburn:** Basically the entire town. We have several roads that if left for any extended period of time during a large snow storm with wind will get plugged.
- **Westfield:** Shorey Road.
- **Westmanland:** Power outages happen on a regular basis and create the biggest hazard for our residents.
- **Weston:** Ice jams are N/A. Power outages to those in lake neighborhoods; generally, on private roads.
- **Winterville Plantation:** Winter storms – Winterville. Ice jams – areas around lake.

Extent. Total snowfall in Aroostook County typically ranges between 90 to 110 plus inches. The county's largest average seasonal snowfall totals from lengthy records are 116 inches per winter season in Caribou. January is usually the snowiest month throughout, with many stations averaging over 20 inches of snow during that month. December usually averages out to be the second snowiest month.

Previous Occurrences. Some of the most significant storms over the past 30 years are summarized in the table below.

Historical Summary of Major Winter Storms in Aroostook County					
Year	**Month**	**Day**	**Estimated Damage**	**Type of Damage**	**Declaration**
1978	Jan	10	Unknown	Winter storm –snow, rain , ice	n/a
1993	Mar	13-14	Unknown	Winter storm	EM-3099
1998	Jan	5-25	$1,496,635	Ice storm, power outages, loss of heat, refrigeration, sanitary services, forestry damages	DR-1198
2001	Mar	5-31	$139,226	Severe winter storm	EM-3164
2003	Dec 02 –Jan 03	17 1	$312,475	Severe winter conditions: frozen pipes	DR-1468
2003	Feb	2-4	$345,182	Severe winter storm	EM-3174
2003	Dec	6-7	$202,126	Severe winter storm	EM-3190
2003	Dec	14-15	Unknown	Severe winter storms and severe cold	EM 3194
2005	Feb	10-11	$334,405	Severe winter storm	EM-3206
2005	Mar	9	$498,000	Severe winter storm	EM-3209
2005	Dec	25-27	$512,603	Severe winter storm	EM-3265
2010	Dec		TBD	Severe winter storms, widespread flooding	DR-1953
2017	Feb	13	Unknown	Statewide blizzard, winter storm	n/a
2017	Mar	14	Unknown	Statewide blizzard	n/a

Probability of Occurrence. No probability studies have been done, but Aroostook County's location in the Northeast, and its long experience with winter storms, indicate that between November and April of every year, such storms will occur. The locations where such storms are the most intense will vary from year to year. Climate models suggest that Maine is likely to get more ice storms in the future because of warmer temperatures, but it is not known whether the severity of ice storms will be affected by warmer temperatures. If colder temperatures prevail, the precipitation will be in the form of snow.

Severe Summer Storms

Severe summer storms and hurricanes can have an immediate impact on flooding, primarily as a result of heavy downpours.

Types of Severe Summer Weather Events in Aroostook County: A severe summer weather event is a violent weather phenomenon producing winds, heavy rains, lightning, and hail that can cause injuries and destruction of property, crops and livestock. There are several different types of summer weather events in Aroostook County:

- **Hurricane**: An intense, tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74 miles per hour or more and blow in a large spiral around a relatively calm center called the "eye."
- **Lightning**: An electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lighting appears as a "bolt." This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches a temperature approaching 50,000 degrees Fahrenheit in a split second. The rapid heating and cooling causes thunder.
- **Thunderstorm**: A storm formed from a combination of moisture, rapidly rising warm air and a force capable of lifting air such as a warm or cold front. All thunderstorms have lightning and can occur singly, in clusters or in lines.
- **Tornado**: A violently rotating column of air extending downward from a thunderstorm to the ground. The distinctive, slender, funnel shaped cloud, with wind velocities up to 300 miles per hour at the central core, destroys everything along its narrow ground path.
- **Microburst.** A small, extremely intense downdraft which descends to the ground creating strong wind divergence. Microbursts are typically limited to areas less than 2.5 miles across. This weather phenomenon is capable of producing damaging surface winds in excess of 100 mph. Generally, a microburst event will last no longer than 15 minutes.

Microburst in Fort Kent – 2008 Photos courtesy of John Bannen

Aroostook County is subject to summer storms. During summer months, southwest to southerly winds become quite prevalent. When severe summer storms arrive, high winds

can fell trees and branches onto power lines, causing power and communication outages. Heavy rains that often accompany thunderstorms can result in flash flooding or erosion. Lightning strikes can start fires. Any of these weather events can cause personal injury or property damage.

The impact of summer storms in Aroostook County is usually restricted to flooding and erosion caused by the large amounts of moisture these storms can carry, as well as downed power lines and tree branches.

Location of Hazard. All of Aroostook County is vulnerable to one or more severe summer storms each year, usually in the form of thunderstorms. The following is a summary of areas that are susceptible to severe summer storms, as identified in the Aroostook County Hazard Mitigation Planning Municipal Survey 2015 and susequently modified in 2020 and 2021.

- **Amity:** Monument Road, Estabrook Road, Tracy Road and Lycette Road have debris that needs to be cleared after severe storms.
- **Allagash:** Walker Brook Road and Inn Road.
- **Aroostook Band of Micmacs:** Bon Aire Housing – Presque Isle; Connor Housing; Littleton Housing; Tribal Farm and Doyle Road – Caribou Housing.
- **Ashland:** Sheridan Road due to trees too close to roadway.
- **Blaine:** All major areas on E Plantation Road and Kinney Road.
- **Bridgewater:** Flooding and debris Dead Brook bridge on Route 1 by fire station; Whitney Brook bridge on Route 1; Whitney Brook bridge on Tannary Street. Power outages throughout town for an extended period especially Wicklow Place senior housing complex. All areas of the community are vulnerable to high wind events with downed trees and power lines.
- **Caribou:** Severe summer storms, including power outages, debris removal and flash flooding.
- **Castle Hill:** Portions of MacDonald Road and Richardson Road are heavily wooded areas that are problems during summer storms.
- **Chapman:** The area of Littlefield Road is a hazard in summer storms.
- **Crystal:** Severe summer storms usually affect power to residents, and create road closures or blockages due to debris or flash flooding. Lightning strikes can cause wildland and forest fires in areas that may take days to detect. Crystal has area known as Crystal Station on the southeast side of town that can get really severe summer storms, but there are few residents located in that area.
- **Cyr Plantation:** Madore Road.
- **Dyer Brook:** The Town Line Road as well as the Pond Road.
- **Eagle Lake:** We have had trees down on Sly Brook Road, erosion on Gilmore Brook Road, Makayka Drive.
- **Easton:** All areas of Easton can be affected. West Ridge Road frequently has field runoffs. The industrial area suffers in high winds.
- **Fort Fairfield:** Low lying areas and crop fields have suffered damage due to summer storms and heavy rain. Temporary flooding on the North Caribou Road has shut down the route during summer storm events. The Aroostook River is a common recreational area and has had to be evacuated previously due to severe lightning storms. Unfortunately, there is no standard way to warn users of the river before a pending storm.
- **Fort Kent:** The entire community is subject to severe summer storms, with the increase of flooding in areas by Quigley's Lumberyard, the Blockhouse picnic area and Riverside Park.
- **Grand Isle:** No major issues have been happening to local folks, just have to keep a close eye on snow melt and any major power concerns. Back-up generator is available if needed.

- **Hodgdon:** Areas susceptible to downed trees and debris removal: Summer roads located on Westford Hill; Horseback Road; South McIntyre Road.
- **Hamlin:** Albert Cyr Road; Fournier Road; Leon Cyr Road; Jovin Road.
- **Hodgdon:** Areas susceptible to downed trees and debris removal: Summer roads locat3ed on Westford Hill, Horseback Road, South McIntyre Road.
- **Houlton:** Farmers' crop fields typically suffer from severe summer storms and heavy rain. Calais Road to Whigte Settlement Road, Hillview Avenue, B-Road, Ludlow Road areas are especially susceptible areas of Houlton.
- **Houlton Band of Maliseet Indians:** Summer storms are not a large concern other than typical basement floooding, or the occasional high winds causing roof damage.
- **Island Falls:** Intown area due to copncentrated housing and narrow streets.
- **Limestone:** Severe summer storms could cause flooding within our community. Many of our roads are rural with timber on both sides that could fall in the roadway. Culverts and ditches can become blocked with debris. Power outages could also cause issues for citizens in our community. Some specific areas:
- Bog Road: wooded area approximately 3.5 miles from Route 1A: possible flooding concerns
- 2)Tardy Road: flooding concern, culvert crossing roadway
- Long Road, approximately 1 mile east of Route 1A has flooded many times, as culvert is not large enough to handle water flow
- Blake Road: Approximately 1/2 miles from Grand Falls Road (Rt. 227), Cross-road culvert in poor condition threating road washout.
- **Linneus:** All areas of the town. Power outages from downed trees on power lines; high wind and heavy rain in combination or by themselves. Flash flooding along roads and cross culverts. Tree and branch removal from power lines and roads during and after a storm. Repair of road surfaces.
- **Littleton:** None.
- **Ludlow:** Western side of town.
- **Madawaska:** The most susceptible places for power outages are Bay Cruise area and Grand Isle section on Lavertu Road.
- **Mapleton:** The same areas that have problems in the winter are problems in the summer as well.
- **Mars Hill:** There are areas, mostly located in the rural parts of town that can be susceptible to flash flooding, particularly in the watersheds draining from Mars Hill Mountain. Other hazards include downed trees, primarily along the Mountain Road.
- **Monticello:** Hoyt Road, Curtis Road.
- **Nashville:** None.
- **New Limerick:** None.
- **New Sweden:** Bondeson Road and Hedmen Road.
- **Orient:** Most of the town. We are very rural and wooded.
- **Perham:** Higher elevation for power outages and debris removal.
- **Portage Lake:** All of our municipality is supplied by power coming in from Ashland and when we have large scale storms the power is often lost.
- **Presque Isle:** Entire community is susceptible to severe summer storms. Flash flooding has occurred in Phair Junction and Marston Road in years past.
- **Sherman:** N/A
- **St. Agatha:** Properties along the lake, back settlements where culverts could wash out and limit access to the rest of town and delay emergency services.
- **St. Francis:** On occasion, summer storms affect an area known as Sunset Drive due to its hilly terrain. Occasionally, flash flooding occurs on a few intermittent streams which connect to one brook that crosses Sunset Drive. Debris sometimes clogs three-foot culverts.

- **St. John Plantation:** All areas.
- **Stockholm:** Power outages in the area.
- **Unorganized Territory:** Same as Flooding question.
- **Van Buren:** No major issues have been happening to local folks, just have to keep a close eye on snow melt and any major power concerns. Back-up generator is available if needed.
- **Wade:** The Town of Wade does not really have too much worry for summer flooding. Power outages happen town-wide when they occur.
- **Wallagrass:** Sly Brook Road, Michaud Road, Carter Brook Tote Road, Clark Brook Road.
- **Washburn:** Any areas with heavy tree coverage. There is always the issue of falling trees in these locations.
- **Westfield:** None.
- **Westmanland:** Downed trees and power ines have the potential to isolate most of our residents.
- **Weston:** Power outages and debris (trees) removal town wide but may impact private roads more.
- **Winterville Plantation:** Red River Road brook areas; Pinette Brook has caused road and culvert damage due to micro bursts; Also Birch Road, Goss Brook.

Extent. The most damaging types of summer storms in Aroostook County are F1 tornados and microbursts with winds in excess of 100 miles per hour, and thunderstorms of more than an inch of rain per hour that can wash out roads and result in flash flooding. The table below provides information on various categories of tornados.

The Fujita Tornado Scale (abbreviated)

Maximum Wind Speeds	Tornado Category	Equivalent Saffir-Simpson Scale (for hurricanes)	Typical Effects
40-72 mph	F0	NA	Gale tornado; light damage to chimneys; breaks twigs and branches off trees; pushes over shallow-rooted trees; damages signboards; some windows broken.
73-112 mph	F1	Cat 1/2/3	Moderate tornado. Moderate damage: peels surfaces off roofs; mobile homes pushed off foundations or overturned; outbuildings demolished; moving autos pushed off roads; trees snapped or broken.
113-157 mph	F2	Cat 3/4/5	Significant tornado; considerable damage: roofs torn off frame houses; mobile homes demolished; frame houses with weak foundations lifted and moved; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
158-206 mph	F3	Cat 5	Severe tornado; severe damage: roofs and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted; heavy cars lifted off the ground and thrown; weak pavement blown off roads.
207-260 mph	F4	NA	Devastating tornado; devastating damage: well-constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and disintegrated; large missiles generated; trees in forest uprooted and carried some distance away.

Previous Occurrences. The following table summarizes the occurrences and estimated damages of hurricanes in Aroostook County going back to 1938. Historically, of all Maine's natural hazards, hurricanes are the most likely to cause deaths. The impact will vary widely, depending on whether it strikes a rural or urban population.

Historical Summary of Hurricanes in Aroostook County

Year	Month	Day	Statewide Estimated Damage	Type of Damage	Declaration
1976	Aug	9-19	"Belle" Aroostook	Flooding, Agricultural (potato) loss	SBA

Probability of Occurrence. There have been no probability studies to indicate the frequency of summer storms. However, Aroostook County's location in the northeast, and its long experience with summer storms, indicate that each summer, summer storms will occur. The locations where such storms are the most intense will vary from year to year. The most severe forms of summer storms, hurricanes and tornadoes, occur very infrequently in Aroostook County.

Wildfire

Wildfire can have an impact on flooding, primarily by denuding the landscape which, in turn can lead to erosion and sedimentation. Sedimentation of streams and rivers can block the natural flow of water, resulting in flooding. In 2006, erosion and sedimentation from a logging operation caused minor flooding in Frenchville.

Types of Wildfires in Aroostook County: A wildfire is a fire that burns vegetative cover such as grass, timber, or slash. A wildfire is a natural phenomenon initially finding its origin in lightning. However, humans have become the greatest cause of wildfires in Maine. There are two types of wildfires:

- Wildland fires burn vegetative cover or forest fuel.
- Wildland Urban Interface fires are created where homes meet with highly volatile forest fuels.

Aroostook County is subject to wildfires. A wildfire in October, 1825, burned 3,000,000 acres in Maine and New Brunswick, Canada. A severe wildland fire occurred in October of 1947. This fire burned 205,678 acres statewide and caused 16 deaths.

Several demographic factors make Aroostook County's rural areas vulnerable to the threat of wildfires. Out-migration from rural areas often leaves an older, more vulnerable population and shrinking tax bases to fund local, usually volunteer fire departments. In Aroostook County, as in all of New England, the housing stock is also aging. When old farm homes and wood frame buildings are located in remote areas, it can be very challenging for volunteer fire fighters to respond before the structures are destroyed.

Location of Hazard. The Maine Department of Conservation, Forest Service Forest Protection Division tracks all reported fire occurrences in the State on an annual basis. These are coded by cause: campfire; children; debris burning – which can include backyard burning, incendiary (includes arson lightning, machinery, miscellaneous, railroad and smoking).

Location of Wildfire Impact areas. The following is a summary of areas that could be susceptible to wildfires, as identified in the Aroostook County Hazard Mitigation Planning Municipal Survey 2015 and susequently modified in 2020 and 2021.

Allagash: We have many camps on the Walker Brook and Old School House Roads.
Amity: The Cone Road and Williams Road are private roads but there are several year round residents living there. These two roads are in the woods. We have camps and residents living on Monument and Suckertown Roads, both wooded areas. These are way back where the road is not maintained by the town.

- **Aroostook Band of Micmacs:** Littleton Housing, Connor Housing, Tribal Farm, and Loring Property.
- **Amity:** Cone Road, Williams Road, Monument and Suckertown Roads are all heavioy wooded and susceptible.

- **Ashland:** Fields in late summer.
- **Blaine:** All roads have homes that would be vulnerable.
- **Bridgewater:** Several properties throughout the commuinity are very susceptible to fire spread as there has been a lot of logging in the recent past causing a massive amount of slash adding to the risk and spread of fire.
- **Caribou:** None.
- **Castle Hill:** Several Properties are located in the wildland urban interface.
- **Chapman:** There are several homes built in the woods in Chapman.
- **Crystal:** Crystal is a rural community mostly wooded with large fields, most of the town would and could be susceptible to wildland and forest fires. Homes are located near wood lines and on edges of fields and could become easily involved in fires. Most brroks, streams and rivers are low in the summer months making water supply/access difficult for fire suppression.
- **Cyr Plantation:** Omer Dumond Road.
- **Dyer Brook:** We have a lot of wooded area common and undivided with Irving, so yes, we are susceptibkle to forest fires.
- **Eagle Lake:** Devoe Brook Road, Sly Brook Road.
- **Easton:** All of Easton. There are many wildland places and fields of grass.
- **Fort Fairfield:** The majority of Fort Fairfield is farm and woodland. Fires have caused damage to crops and forested areas in the past.
- **Fort Kent:** Certain homes built in North/South Perley Brook and the top of Belon Hill are located within the forest that would be considered susceptible to wildfires.
- **Grand Isle:** Very limited concerns for the local community, just a close eye is kept on any minor concerns.
- **Hodgdon:** Camps located on lower end of South Town Line Road by the State of Maine game reserve. Subdivision located off Skedgll Road.
- **Houlton:** Houlton consists of predominantley potatoes and vegetable farm and woodland. In the past, fire have caused major damage to crops and the woodland-forested areas of Houlton.
- **Houlton Band of Maliseet Indians:** The residential area near Clover Circle is in an agricultural community. During periods of drought, the fine fuels associated with hay and grain fields can be of concern.
- **Island Falls:** Island Falls has Mattawamkeag Lake and Pleasant Pond. All of those areas are susceptible to wildfires. Cottages are close together, ground is kind of duffy making fire spread easily, access to some are limited to small hilly and winding roads not built for larger fire apparatus. Most of Island Falls population is a rural setting, some located on old farm land, others located in dense forest area. Some Homes are year round and some are seasonal.
- **Limestone:** Much of our community is forest and agricultural land. Given the right conditions of the season could potentially cause wildfire. Our current water system for fire protection (hydrants) is only available within the MaineDOT compact zone. In the rural areas water has to be pumped from ponds, lakes, dry hydrants, or brought in by tanker truck.
- **Linneus:** Area south of the South Oakfield Road and the Hodgdon Mills Road; also the Northwest quarter of the town, west of the New Limerick Road. These areas are more heavily covered with unbroken forest.
- **Littleton:** None.
- **Ludlow:** North edge of town.
- **Madawaska:** Outside of downtown, we have rural areas that could be susceptible to wildfires.
- **Mapleton:** Hanson Lake area – Bagley Road, Flagstone Ridge Road, Creasey Ridge Road; Moose Ridge subdivision off of the State Road (wooded area around developoment).
- **Mars Hill:** Although we have wooded areas throughout the community, the residential areas on the eastern slopes of Mars Hill Mountain could be adversely impacted by wildfire.

- **Monticello:** Areas on the Curtis Road, West Road to Harvey Siding, Lake Road, Wotton Road, Hoyt Road.
- **Nashville:** None.
- **New Limerick:** Areas around the lakes and most areas in town – very rural and a lot of trees.
- **New Sweden:** None.
- **Orient:** Most of the town. We are very rural and wooded.
- **Perham:** Much of Perham is forest.
- **Portage Lake:** Portage residents are surrounded by forest.
- **Presque Isle:** Few homes are of concern for wildfire in the area of our strate park.
- **Reed Plantation:** The entire town is rural in nature and thus susceptible to wildfire and forest fires.
- **St. Agatha:** We have a couple camps off of Plien Road with season camps in the woods.
- **St. Francis:** 90% of the structures on the south side of Route 161 are built close to the tree line which is mostly softwood stands of either mature or natural softwood regeneration. Some properties may have hayfields or tall grass between the structure and the tree line which are susceptible to wildfire in the forest in the high risk months.
- **St. John Plantation:** All areas.
- **Sherman:** N/A
- **Stockholm:** No areas susceptible to wildfires.
- **Unorganized Territory:** Northern Maine Woods. Remote areas with structures throughout the Unorganized Territory.
- **Van Buren:** Very limited concerns for the local community, just a close eye is kept on any minor concerns.
- **Wade:** The Town of Wade sits on the edge of the North Maine woods. We have several thousand acres of woods. The threat of wildfire is great for this town especially on the ends of the North Wade Road, Howe Road, New Dunntown Road, Gardner Creek Road, South Wade Road and Haynes Road.
- **Wallagrass:** 1st Wallagrass Lake region with camps as well as a few homes built out in the woods throughout the Town of Wallagrass.
- **Washburn:** Any areas that have large amounts of trees. Not too much in the Town of Washburn.
- **Westfield:** All lands in western half of town.
- **Westmanland:** Wildland fires are a big concern in our area due to most structures in our area being very close to woodland.
- **Weston:** The entire town is a rural wildland interface area. The most susceptible would be those in lake neighborhoods where the buildings are more surrounded by forested areas. Several large tracts of forest have public access via logging roads and ATV trails.
- **Winterville Plantation:** The Winterville woodlot. 11,000 acres of working forest. The plantation relies on the woodlot income for taxes.

Extent. Aroostook County could be subject to wildfires. There was a major wildfire in Aroostook County in May 1992 that burned 1,150 acres. There were six separate wildfires in Aroostook County in October of 1994 which burned a total of 225 acres, but there have been no major wildfires (over 1,000 acres) since then. The most severe forest fire in the State of Maine's recent history was in October, 1947, devastating 205,687 acres and causing 16 deaths. However, most of the damages were confined to Cumberland, Hancock, Oxford and York Counties.

Previous Occurrences. Historically, forest fires were one of the State's most significant hazards. Maine averages about 700 low acreage forest fires annually. However, in 2020, the

Maine Forest Service responded to 800 fires, affecting close to 900 acres, as of July 25, 2020. The increase in the number of fires is due to widespread drought conditions. Today, about 90% of all forest fires are caused by human activity, while 10% are caused by lightning. During dry periods, fire danger increases rapidly. The following table summarizes the most significant wildfires that have occurred in Aroostook County.

Historical Summary of Major Wildfires in Aroostook County

Year	Month	Day	Estimated Damage	Acreage	Declaration
1992	May	19	Aroostook - Allagash	1,150	no

Based on information obtained from the Maine Forest Service, there have been no major fires in Aroostook County in recent years. All of the wildfires known to have occurred were confined to relatively small land areas.

Probability of Occurrence. While probability studies have not been done, based on historical records of fires, the Maine Department of Conservation, Maine Forest Service, Forest Protection Division, anticipates that there will be between 600 and 700 low acreage ires (from all causes) each year. However, using the last three years of fire records, the probability of a major wildfire statewide is once a decade.

Drought

Although Maine is considered a "wet" state, drought conditions can occur about every decade. During late summer to early fall, these conditions can also lead to a very high forest fire threat.

"Drought is the number one risk factor for the state's agricultural economy which provides over $1.2 billion of food and fiber products annually. It employs 22,000 workers across the state, supports 5,500 families and provides stewardship of over 1.5 million acres of land and wildlife habitat. Since about 45% of the state's population relies on dug or shallow wells, a prolonged drought increases the risk of wells going dry." (Maine Emergency Management Agency)

In 2020, Aroostook County experienced severe drought conditions that began in the spring and extended into October when rainfall was sufficient to bring the county close to coming out of drought status. Impacts throughout the county included private wells going dry, public water systems strained, and crop yields diminished. The Maine Department of Environmental Protection reported that water levels in many streams, rivers, lakes, ponds and wetlands were below the summer season August median since early June. In September, the U.S. Department of Agriculture designated Aroostook County as a drought disaster area, making farm operators in Aroostook and its four contiguous counties eligible for assistance from the Farm Service Agency.

General Definition. Drought is a prolonged period of below-average precipitation in a given region, resulting in prolonged shortages in its water supply.

Nature of Hazard. Drought is a normal recurring feature in all of Maine's climatic regions. While all droughts originate with a deficiency of precipitation, drought is a unique hazard due to the usually slow progression of the phenomenon. Drought impacts respond to precipitation anomalies on varied timescales. This makes it difficult to determine a clear beginning or end to any drought event, particularly ones that are prolonged. The duration of drought can vary from several weeks to several years.

Location of hazard. Due to the fact that drought classification is relative to average local precipitation, surface and ground water levels, the entire county is susceptible to drought. Most of Aroostook County was affected by severe drought conditions in 2020.

- **Aroostook Band of Micmacs:** Tribal Farm, Littleton Housing, Doyle Road, Caribou Housing, and Connor Housing.
- **Bridgewater:** The farming community in our area is very susceptible to a drought as there are few bodies of water that will allow for extended irrigation operations, thereby jeopardizing the local food chain.
- **Caribou:** Drought city-wide.
- **Crystal:** All of Crystal's residents rely on drilled/dug wells for water supply (no town water system). More than 50% of wells in Crystal are hand dug or points in the ground which are not very deep and have very little storage in them.
- **Dyer Brook:** This summer the town's people have had some issues with wells going dry.
- **Eagle Lake:** Outside the hydrant district.

- **Easton:** Easton does not have a public water facility so all private wells are susceptible. Farm crop losses and erosion can also occur. Drought increases the wildland fire risk exponentially.
- **Fort Fairfield:** Areas of the community that are not on the water district have experienced dry wells due to drought. Crop fields have suffered damage due to water restrictions.
- **Fort Kent:** Drought such as wells running dry in some areas, have never been sufficient to create disaster conditions, although (there has been an) increase in danger of wildfires.
- **Grand Isle:** No major issues for the local community.
- **Hodgdon:** The triangle (center of town) Calais Road to Hodgdon Mills Road to Corner Road to Calais Road.
- **Houlton:** The portions of Houlton community not served by the Houlton Water Company (not a municipal department) are the most susceptible to drought. Crops have suffered damage due to the drought conditions as recently as the 2020 drought which severely affected crop yields.
- **Houlton Band of Maliseet Indians:** homes and buildings in the Tribal community are often surrounded by agricultural crops or grassland. When droughts occur, grass fires can be of great concern.
- **Linneus:** All areas of town. Those most vulnerable are the properties that rely on shallow wells, or surface springs for water supply. Fire-fighting capability is also impacted, as the Fire Department relies on a ready supply of surface water to effectively fight any fire.
- **Littleton:** None.
- **Madawaska:** This year 2020, Maine was in the worst drought ever. A lot of wells were drying up. Fire dangers were high. Lakes and rivers were very low. This affected a lot of people in rural areas outside of town.
- **Mapleton:** Mill Pond – town's water supply with pump station (need to monitor farmers with irrigation fields in the summer).
- **Mars Hill:** We have several large areas of agricultural land, primarily to the north of town which are dependent upon sufficient rainfall for potato/broccoli/grain crops.
- **Monticello:** Most of area is agricultural – irrigation for crops. Town wide – rely on private wells. Fire suppression – dry hydrants.
- **New Limerick:** Everyone.
- **Perham:** Summer of 2020, all cropland and pasture land experienced drought.
- **Presque Isle:** Homes outside of the water district, in short anything outside the compact zone, were at risk.
- **Sherman:** N/A
- **St. John Plantation:** All areas.
- **Stockholm:** No droughts in the area that we know of.
- **Van Buren:** No major issues for this local community.
- **Wade:** Town-wide.
- **Wallagrass:** Houses away from Fish River or streams.
- **Washburn:** Town-wide.
- **Westfield:** Entire town.
- **Westmanland:** All areas in our community are susceptible to drought as evidenced in 2020.
- **Weston:** The majority of the dwellings with wells have drilled ones. The couple of dozen "dug" wells experienced very low or no water this past summer.
- **Winterville Plantation:** Private wells for residents.

Extent. The extent of drought can vary significantly from localized events in a specific watershed to a statewide occurrence, from short term (one summer) to long germ duration (several years), or from an abnormally dry spell to a drought of exceptional intensity.

Maine uses the U.S. Drought Monitor's (USDM) classification method to measure the extent of drought events as they occur. A partial summary of USDM's classification system is shown in the following table.

USDM Drought Classification System (partial criteria)	
Category and Description	**Possible Impacts**
D0 Abnormally Dry	Short term dryness – slowing planting growth of crops or pastures
D1 Moderate Drought	Some damage to crops, pastures; Streams, reservoirs, or wells low, some water shortages developing or imminent
D2 Severe Drought	Crop/pasture losses likely, water shortages common
D3 Extreme Drought	Major crop/pasture losses, widespread water shortages
D4 Exceptional Drought	Exceptional and widespread crop/pasture losses, shortage of water creating emergencies

Previous Occurrences. Maine's 1992-2002 drought period was very damaging.. There were an estimated 17,000 private wells that ran dry in the nine months leading to April 2002, and farmers lost more than $32 million in crop yields between 2001 and 2002. The 2016 drought was a result of three years of below average precipitation which led to low ground water levels statewide, but particularly in the southern portion of Maine. The severe drought of 2020 may have exceeded conditions in prior drought years. Estimates of losses are not yet available. Maine's Drought Task Force convened, actively monitored and reported on the droughts of 2016 and 2020.

Chronology of Major Droughts in Maine		
Date	**Affected Areas**	**Remarks**
1938-1943	Western Areas	Severe in Androscoggin and Kennebec River Basins
1947-1950	Statewide	Severe in central coastal region
1955-1957	Nearly entire state	Severe in northern and eastern parts of state
1963-1969	Statewide	Longest endured drought, stream flows in southern portions of Maine reached 100 year lows
1984-1988	Statewide	Severe in Northern Maine
1999-2002	Statewide	2001 was driest year on record (to date) August 2002 was driest month on record
2015-2016	Statewide	Most severe in York and parts of Cumberland Counties
2020	Statewide	Severe drought conditions in Aroostook County

Source: Maine Emergency Management Agnecy

Probability of Occurrence. Similar to floods, which are driven primarily by precipitation, meteorologists and hydrologists define the extent of drought by probability of occurrence. While there are widely accepted occurrence levels for flooding, there is not extensive historical data for drought events. Most USGS ground water monitoring stations in Maine have been installed within the past 40 years.

Furthermore, it is difficult to determine probability of occurrence for future drought events because the global hydrological cycle is exhibiting significant variability, especially in the geographic distribution and intensity of precipitation, the availability of water resources and prolonged periods of drought.

Issues and Challenges

1. **Ineligibility for Hazard Mitigation Assistance.** Since droughts do not receive presidential declarations, common drought mitigation activities, which include measures to increase efficiency and/or drilling wells deeper into the water table, are not eligible for funding through FEMA's Individual Assistance Program.

2. **Residents on Private Wells.** With nearly half of the state's population relying on private wells for water supply, the state has limited capacity for managing individual wafter supply.

Assessing Vulnerability: Overview	
Requirement §201.6(c)(2)(ii): (The risk assessment shall include a) description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions	
Elements	B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction?
	B4. Does the Plan address NFIP insured structures within each jurisdiction that have been repetitively damaged by floods?
	D1. Was the plan revised to reflect changes in development?

A. Vulnerability of Aroostook County to each hazard

- **Flooding**. Some of the county's most serious flooding has been in areas where there are residential and/or commercial structures including along the Aroostook River and St. John River. With the exception of the aforementioned areas, most of the developed areas in Aroostook County are located outside of designated flood plains, and are thus not very vulnerable to flooding. On the other hand, much of the county is very rural in nature, and is served by a network of rural roads that do not have proper storm drainage systems. These roads are very vulnerable to flooding caused by heavy downpours and/or the blockage of drainage systems by ice or debris, even though these roads may not be in an identified flood plain.

- **Severe Winter storms.** Aroostook County's location in Northern New England places it in a high-risk area for winter storms. While the majority of winter storms in Aroostook County occur during the winter season of December through March, there are occasional winter storms in the late fall (November and early December) and in the spring (March – April). However, the severity of storms is typically most serious in January and February, with storms in the earlier and later parts of the seasons usually being of lesser magnitudes.

  The time of day at which storms occur is also important, as overnight storms allow for the closure of schools, and businesses, whereas storms during the day force people to travel home during storm conditions. Based on past experience, storms are most likely to occur overnight or during the morning, but afternoon storms are still somewhat likely.

A major blizzard of the severity that occurred in 1998 would impact nearly all of Aroostook County and threaten the overhead electric and telephone lines. Roads may be closed due to washouts and debris in roads from trees and utility lines.

As noted earlier in this Assessment, Aroostook County has been included in a number of Presidential Disaster Declarations for winter storms. Aroostook County contains at-risk populations that could be impacted by a major winter storm.

- **Severe Summer Storms.** The entire county is vulnerable to thunderstorms, microbursts, and high winds. During the summer months, southwest to southerly winds are prevalent in the county. Severe high winds generally fell trees and branches onto power lines, causing power and communication outages. Heavy rains usually result in flash flooding or erosion. As previously noted, there have been more occurrences of severe summer storms in recent years.

- **Wildfires.** The western part of Aroostook County is heavily forested, and could be vulnerable to forest fires. However, all of the organized municipalities in Aroostook County are served by capable fire departments. The Maine Forest Service has been very active in forest fire prevention activities, and, through meetings convened by the Aroostook County Emergency Management Agency, meets periodically with municipal fire chiefs on matters related to wildfire prevention and response activities.

  The western part of Aroostook County consists of large forests with no homes. Well-distributed rainfall normally reduces forest fire risks, but seasonal variations, rapidly draining soils and unusually dry periods can induce major blazes. In addition, insect damage (such as the hemlock woolly adelgid and spruce budworm) diseases, severe weather, and residential and commercial developments in wooded areas can greatly increase the potential for catastrophic fires. Over time, a considerable fuel supply can accumulate from the ignitable slash of some logging operations and/or from dead trees left standing on the forest floor after insect infestations.

- **Drought.** The entire county is vulnerable to drought. During summer months, below average precipitation can lead to declining water levels in rivers, streams, lakes, ponds and wetlands, as well as declining ground water levels.

B. Impacts of each hazard on Aroostook County

- **Flooding**. In addition to damages to residential and commercial structures in some locations, the typical damages resulting from flooding in Aroostook County include damages to roads and their respective drainage systems. Historically, flood damages have included partial or complete road washouts, as well as severe erosion of roadside ditches, resulting in hazards to motorists if their vehicles go off the road. In some cases, entire communities have been partly or completely isolated because the only road serving the town has been damaged by floods.

- **Severe Winter Storms.** The impacts of severe winter storms include road closures (and the subsequent inability of emergency vehicles to provide help), the loss of power

for extended periods of time, high costs to local governments for snow removal efforts, and loss of income to businesses and individuals due to business closures. Roof collapses, both residential and commercial, are rare but they can occur when snow loads become extreme.

The snow pack makes an important contribution to both surface and groundwater supplies, and years with a low snow pack can lead to water shortages by late summer. Melting of the snow pack in March and April is usually gradual enough to prevent serious flooding. However, in Aroostook County, when melting snows combine with rainstorms, the volume of water can overwhelm watersheds, ditches and culverts, leading to road and property damages. Such was the case in 2008, when major flooding resulted in Disaster Declaration DR-1755.

- **Severe Summer Storms**. The damages from summer storms typically involve the washout of roads, downed utility lines and debris clearance. If severe enough, this could result in the loss of income to businesses and individuals due to business closures.

- **Wildfires.** The primary impacts include damages to homes located in the wildland-urban interface and loss of valuable timberland. A larger percentage of homes in rural towns are located in the wildland-urban interface than homes in village areas. The western part of the county includes vast tracts of forestland that could be damaged by wildfires.

- **Drought.** The primary impacts include damages to crop yields, private wells running dry, public water supplies running low and/or experiencing water quality problems, and forested areas of the county threatened by wildfires.

Repetitive Loss Properties. The following table represents repetitive loss properties in Aroostook County. Privacy laws prohibit reporting any more information than is shown below. The NFIP definition of a repetitive loss property is any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period since 1978.

Repetitive Loss Properties				
Town/City	Residential Structures		Non-Residential Structures	
	# Properties	# Losses	# Properties	# Losses
Eagle Lake	3	6		
Easton	1	2		
Fort Kent	3	7	1*	7
Island Falls	1	2		
Oakfield	1	2		
Sherman	1	2		
Wallagrass	1	2		

*This property is a Severe Repetitive Loss (SRL)
Source: NFIP Program 10/23/2020

Mitigated repetitive loss properties include Fort Fairfield (11 residential and 5 non-residential properties) and Fort Kent (1 residential and 3 non-residential properties).

Aroostook County Flood Insurance Information as of 10/22/2020, according to information obtained from the State NFIP Coordinator, includes:

- Number of policies: 165
- Total coverage: $27,967,200
- Total premium: $148,084
- Claims since 1978: 378
- Total claims: $4,713,169
- CRS: Fort Fairfield is a class 7, saving policy holders 15% on all policies in the SFHA.:

Assessing Vulnerability: Identifying Structures

The Hazard Mitigation Planning Team identified existing buildings, infrastructure and critical facilities located within the County and the hazards to which these facilities are susceptible.

A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in Aroostook County, or fulfills important public safety, emergency response, and/or disaster recovery functions. The critical facilities in Aroostook County are municipal offices, fire, police stations, town garages, hospitals and clinics, water and waste water treatment facilities, and hazardous material sites.

A. Vulnerability of existing buildings, infrastructure, and critical facilities

Flooding

- **Buildings.** Some of the county's most serious flooding has been in areas where there are residential and/or commercial structures.
- **Infrastructure.** Roads and their associated storm drainage systems are the most vulnerable category of infrastructure. Much of the county is very rural in nature, and is served by a network of rural roads that do not have proper storm drainage systems. These roads are very vulnerable to flooding caused by heavy downpours and/or the blockage of drainage systems by ice or debris.
- **Critical facilities**. Due to the varied topography within the county and the availability of higher elevation sites within all municipalities, nearly all critical facility structures are located outside of floodplains. Possible exceptions include some wastewater treatment plants, due to the need to locate these facilities at lower elevations.

Severe Winter Storms.

- **Buildings.** All buildings in Aroostook County are vulnerable to winter storms. Damages can include burst water pipes during power outages, interior water damages due to ice dams forming on roofs, and occasionally, roof collapses due to heavy snow loads.
- **Infrastructure.** Roads and their associated storm drainage systems are the most vulnerable category of infrastructure. They can become temporarily blocked due to heavy snow falling over a short period of time, or ice which can build on their surfaces. Water main breaks due to cold weather can also occur. Roads and their storm drainage systems can become blocked due to heavy snow and ice and debris such as tree limbs.
- **Critical facilities**. All critical facilities in Aroostook County are vulnerable to winter storms in the same manner that individual buildings are vulnerable. However, some of the critical facilities throughout the county have back-up generator systems which allow heating systems to continue operating during a power outage.

Severe Summer Storms.

- **Buildings.** All buildings in Aroostook County are vulnerable to summer storms. Damages can include debris like tree limbs; and from high winds, interior water damages due to wind- driven heavy rain.
- **Infrastructure.** Roads and their associated storm drainage systems are the most vulnerable category of infrastructure. They can become temporarily blocked due to heavy rain and debris over a short period.
- **Critical facilities**. All critical facilities in Aroostook County are vulnerable to summer storms in the same manner that individual buildings are vulnerable. However, some of the critical facilities throughout the County have back-up generator systems, which allow building systems to continue operating during a power outage.

Wildfires

- **Buildings.** Buildings located in the wildland/urban interface are vulnerable to wildfires. Damages can include fire, smoke and water from fire-fighting efforts.
- **Infrastructure.** Power, phone and cable lines can be damaged during a wildfire. Roads and their storm drainage systems are much less vulnerable, although road access to certain areas can be blocked by fires and by emergency fire-fighting vehicles.
- **Critical facilities.** Wildfires in Aroostook County have tended to be relatively small, and have not been a threat to critical facilities. In the event of a very large wildfire, some critical facilities could be damaged by fire and smoke.

Droughts

- **Buildings.** Buildings in Aroostook County are not directly vulnerable to droughts, but buildings in the wildland/urban interface are vulnerable to wildfires resulting from dry conditions.
- **Infrastructure.** Power, phone and cable lines are not directly vulnerable to droughts, but can be damaged by wildfires resulting from dry conditions. Roads and drainage system are much less vulnerable, although roads can be blocked by fires and emergency fire-fighting vehicles.
- **Critical facilities.** Critical facilities are not directly vulnerable to droughts, but any that are located in the wildland/urban interface may be vulnerable to wildfires resulting from dry conditions.

B. Vulnerability of future buildings, infrastructure and critical facilities

There has been very little growth in Aroostook County in the last 10 years, and very little growth is expected during the next 10 years. Between 2010 and 2019, Aroostook County's population declined from 71,870 to 67,055, a loss of 4,815 people or 7%. There will be very few if any future buildings, infrastructure or critical facilities that will be vulnerable to the identified hazards.

Flooding:

- **Buildings.** The municipalities in Aroostook County that are in the flood insurance program all have municipal shoreland zoning ordinances that generally prohibit the construction of residential, commercial and industrial structures in floodplains. Unlike other parts of the country, Maine does not experience the cycle of widespread flooding devastation in its floodplains, followed by intensive development pressures and subsequent rebuilding. Very little, if any growth is expected. Therefore, flooding of future buildings is not likely to be a serious issue in Aroostook County.
- **Infrastructure.** Future roads and their associated storm drainage systems would seem to be the most likely category of infrastructure that would be vulnerable to flooding. However, State and local road construction standards generally ensure that new roads are properly constructed with adequate storm drainage systems. Most if not all roads in the public domain must be designed by a registered professional engineer. Therefore, flooding of future roads is not likely to be a serious issue in Aroostook County.
- **Critical facilities**. Because of the requirements of the Flood Insurance Program, as well as shoreland zoning requirements and a greater awareness of flooding in all communities, future critical facilities will continue to be located outside floodplain areas. The exception may be wastewater treatment plants, due to the need to locate these facilities at lower elevations.

Severe Winter storms

- **Buildings.** New buildings in Aroostook County will be less vulnerable to winter storms. Damages may include burst water pipes, but many newer buildings will be better insulated than older ones, thus being better able to retain heat during longer periods of time when there is a power outage. There will be less interior water damage due to ice dams forming on roofs because the roofs of newer buildings generally are properly vented, which allows the roofs to remain cold. Roof collapses due to heavy snow loads will be very rare because newer roofs are designed to withstand heavy snow loads.
- **Infrastructure.** Roads will continue to be the most vulnerable category of infrastructure. New roads can be just as easily blocked on a temporary basis due to heavy snowfall, ice building up on the road surface, and debris such as tree limbs accumulating on the road surface during a storm event. However, it is unlikely that Aroostook County will experience much new road construction, with the possible exception of small road segments serving subdivisions.
- **Critical facilities**. Future critical facilities in Aroostook County will be vulnerable to winter storms in the same manner that individual buildings will be vulnerable. However, some of them will have back-up generator systems which will allow heating systems to continue operating during a power outage.

Severe Summer Storms

- **Buildings.** New buildings in Aroostook County will be less vulnerable to summer storms. There may be damage to roofs, windows, and electrical during

a severe summer storm. However, new roofs are designed to withstand high winds and heavy rain.

- **Infrastructure.** Roads will continue to be the most vulnerable category of infrastructure. New roads can be just as easily blocked on a temporary basis due to heavy rainfall, water building up on the road surface, and debris such as tree limbs accumulating on the road surface during a summer storm event. However, it is unlikely that Aroostook County will experience much new road construction, with the possible exception of small road segments serving subdivisions.
- **Critical facilities**. Future critical facilities in Aroostook County will be vulnerable to summer storms in the same manner that individual buildings will be vulnerable.

Wildfires

- **Buildings.** Future buildings located in the wildland/urban interface may be vulnerable to wildfires. Damages can include fire, smoke and water from fire-fighting efforts. However, given the very low growth rate projected for Aroostook County, there will not be many new buildings located in the wildland/urban interface.
- **Infrastructure.** Future power, phone and cable lines can be damaged during a wildfire, although the level of future development is expected to be minimal, primarily because of the very low growth rate projected for the county.
- **Critical facilities.** Future critical facilities may be vulnerable to a very large wildfire. However, the expectation is that there will be very few new critical facilities constructed during the life of this plan.

Droughts

- **Buildings.** Future buildings in Aroostook County may not be directly vulnerable to droughts, but if located in the wildland/urban interface, may be vulnerable to wildfires resulting from dry conditions.
- **Infrastructure.** Future power, phone and cable lines may not directly vulnerable to droughts, but if located in the wildland/urban interface, might be damaged by wildfires resulting from dry conditions. Future roads and drainage system are much less vulnerable, although roads can be blocked by fires and emergency fire-fighting vehicles.
- **Critical facilities.** Future critical facilities may not directly vulnerable to droughts, but any that are located in the wildland/urban interface may be vulnerable to wildfires resulting from dry conditions.

The Maine Forest Service‘s (MFS) Forest Protection Division provides forest fire protection services for all of Maine’s forest lands. MFS’ goals are to keep the number of forest fire starts to less than 1,000 and annual acreage loss to less than 3,500. Since 2002, MFS has met those goals because of:

- Quick and effective initial attack on all fires;
- Effective air detection and aerial suppression;

- Modern forest fire-fighting equipment;
- Strong emphasis on fire prevention, including state control of statewide burning permits;
- Aggressive training and preparation;
- Improved access to remote areas of the state;
- Northeast Forest Fire Compact membership, providing resources during periods of high fire danger;
- Proactive public information campaigns;
- Law enforcement; and
- Extensive automated weather stations providing accurate daily information used to assist in planning fire operations.

In 2001, the MFS developed a Wildland Urban Interface Committee. This committee was assigned the responsibility of assessing the risk of wildfire to homes within and near forested areas. MFS has printed and distributed brochures and has developed public service announcements alerting homeowners to the potential threat of wildfire in interface areas and what they can do to limit their exposure to the threat of wildfires. MFS has also partnered with the National Park Service to deliver software that can determine risk in Maine communities.

MFS has also launched a community assessment program aimed at focusing its fire prevention efforts on geographical areas of the state with relatively high occurrences of wildfires. The assessment involves working with local officials and the public to identify vulnerable homes in the urban/wildland interface. MFS then prepares a community wildfire protection plan that contains guidelines that homeowners can use to protect their homes. The emphasis is on maintaining a 30-foot defensible space around homes.

County Asset Inventory

The following chart identifies the type and number of critical facilities in each municipality in Aroostook County.

Being Updated with 2020 Survey Results

	Town Office	Fire/Rescue	Police	Public Works, Salt/Sand	State Highway Maintenance Lots	Hospital/Health	Sewage Treatment	Water Supply	Dams
Allagash	X	X							
Aroostook	X			X		X			X

	Town Office	Fire/Rescue	Police	Public Works, Salt/Sand	State Highway Maintenance Lots	Hospital/Health	Sewage Treatment	Water Supply	Dams
Band of Micmacs									
Ashland	X	X	X	X	X	X	X	X	X
Blaine	X			X			X	X	X
Bridgewater	X	X		X		X			
Caribou	X	X	X	X	X	X	X	X	X
Castle Hill									
Caswell	X			X					X
Crystal					X				
Cyr Plt.				X					X
Dyer Brook	X								
Eagle Lake	X	X		X			X	X	
Easton	X	X		X					X
Fort Fairfield	X	X	X	X	X	X	X	X	X
Fort Kent	X	X	X	X	X	X	X	X	
Frenchville	X	X		X	X				
Grand Isle	X			X			X		
Haynesville	X	X							
Hodgdon	X	X							X
Houlton	X	X	X	X	X	X	X	X	X
Island Falls	X	X						X	X
Limestone	X	X	X	X		X	X	X	X
Linneus	X	X			X				X
Littleton	X	X		X					
Madawaska	X	X	X	X	X	X	X	X	
Maliseets, Houlton Band									
Mapleton	X	X		X			X		X
Mars Hill	X	X		X	X	X	X	X	X
Masardis	X	X							X
Monticello	X	X		X					
New Canada	X								
Oakfield	X	X		X	X				
Oxbow Plt.									
Perham	X								
Portage Lake	X	X		X					
Presque Isle	X	X	X	X	X	X	X	X	X
Saint Agatha	X	X		X					

	Town Office	Fire/Rescue	Police	Public Works, Salt/Sand	State Highway Maintenance Lots	Hospital/Health	Sewage Treatment	Water Supply	Dams
St. John Plt	X								X
Sherman	X	X			X	X			
Stockholm	X	X							
Unorganized Territory									
Van Buren	X	X	X	X	X	X		X	
Wade									
Wallagrass	X								
Washburn	X	X	X			X			X
Westfield	X			X					X
Westmanland	X			X					X
Weston	X			X					
Winterville Plt.	X			X					
Woodland	X			X	X				

Future Critical Facilities

Most municipalities in Aroostook County are very small and rural and do not have planning departments, building codes or even a full time code enforcement officer. Some towns lack a town office. There is very little in the way of commercial, industrial or public construction in many communities. There has been some commercial development in several of the larger communities, as well as some second home construction. All new residential, commercial and industrial structures are now subject to the Maine Uniform Building and Energy Code.

Flooding hazard: Most of damage from flooding is to roads, not structures. Most municipalities have floodplain ordinances that provide some control over development in flood prone areas, and these ordinances would also regulate the location of future critical facilities.

Severe winter and severe summer storm hazard: It is unlikely that a severe winter storm will have any impact on future critical facilities. This hazard primarily impacts local roads and overhead utility lines. It is unlikely that a severe summer storm will have any impact on future critical facilities, with the possible exception of a hurricane which is a very rare event in Aroostook County.

Wildfire hazard: It is unlikely that wildfire will have any impact on future critical facilities. Forest fires in Aroostook County primarily threaten residential structures in the wildland/urban interface.

Drought hazard. It is unlikely that a drought will have any impact on future critical facilities. A drought can increase the threat of a wildfire, but future critical facilities are not likely to be located in the wildland/urban interface.

Assessing Vulnerability: Estimating Potential Losses

Potential Flood Losses. The primary damage losses that would be expected in Aroostook County during any flood event would be damage to local roads. In calculating the damage costs, the Aroostook County Hazard Mitigation Teams assumed that all roads that were either in the 100-year flood zone or had experienced flooding in the past would be affected. The Team used the summary of local mitigation projects in Section 5 of this Plan to estimate the cost of replacing a bridge, culvert, corrugated metal pipe or home destroyed by a flood.

There are no critical facilities that have been identified by any community that are known to be built in flood zones. The most likely infrastructure that would be damaged would be roadways.

Update to be consistent with new and completed projects

Municipality	Critical Facility	Function Lost	One Time Damage Cost/Event
Allagash	Frank Mack Road	Transportation	$13,500
	Walker Brook Road	Transportation	$9,000
	Inn Road	Transportation	$5,000
	Old rapid Road culvert	Transportation	$60,000
Ashland	Wrightville Road	Transportation	$120,000
Blaine	Grass Road	Transportation	$8,000
	Robinson Road	Transportation	$10,500
	Barrett Road	Transportation	$6,500
	Pierce Road	Transportation	$3,000
	Libby Road	Transportation	$6,000
Bridgewater	East Blaine Road	Transportation	$95,000
	Packard Road	Transportation	$33,000
Caribou	Madawaska Road	Transportation	$10,000
	Plant Road	Transportation	$15,000
	Ogren Road	Transportation	$9,000
	River Road	Transportation	$156,000
Caswell	Willard Road	Transportation	$73,000
Cyr Plantation	Laplante Road	Transportation	$14,000
	Madore Road	Transportation	$37,500
	Michell Cross Rd	Transportation	$95,000
	Omer Dumond Rd	Transportation	$5,500
	Laplante Rd	Transportation	$37,500
Eagle Lake	Gillmore Brook Rd	Transportation	$129,000
Easton	Graham Road	Transportation	$68,000
	Ladner Road	Transportation	$73,000
Fort Fairfield	Currier Road	Transportation	$149,000
Fort Kent	Shore Guard Levee Protection	Flooding	$120,000

Municipality	Critical Facility	Function Lost	One Time Damage Cost/Event
	Bradbury Road	Transportation	$1,000,000
	Charette Hill Road	Transportation	$120,000
	Heritage Trail	Transportation	$5,000
	North Perley Brook Road	Transportation	$18,837
Frenchville	Gagnon Road	Transportation	$110,000
	Starbarn Ave	Transportation	$7,822
	Pelletier Ave.	Transportation	$14,062
	Church Ave.	Transportation	$9,541
	Pelletier Ave.	Transportation	$9,059
	Starbarn Ave	Transportation	$26,362
	Starbarn Ave	Transportation	$5,322
	Bourgoin Ave.	Transportation	$5,567
	Pelletier Ave.	Transportation	$5,287
	Pelletier Ave.	Transportation	$3,067
	Pelletier Ave.	Transportation	$1,362
Garfield Plt.	Roads and bridges	Transportation	$25,000
Grand Isle	Grivois Road	Transportation	$75,000
Haynesville	Skagrock Road	Transportation	$58,000
Hodgdon	McIntyre Road	Transportation	$37,500
	Westford Hill Road	Transportation	$27,500
	North Town Line Road	Transportation	$47,500
	Green Road	Transportation	$95,000
	South McIntyre Rd	Transportation	$3,000
Houlton	Morningstar Road	Transportation	$100,000
Island Falls	Old Patten Road	Transportation	$22,000
	Jacob Shur Road	Transportation	$15,000
	Merrimam Road	Transportation	$25,000
	South Shore Road	Transportation	$15,000
	Sewall Street	Transportation	$20,000
	Church Street	Transportation	$20,000
Limestone	Burleigh Street	Transportation	$64,000
	Silver Spring Brook	Flooding	$20,000
	Bank to protect sewer	Flooding	$87,000
	Madawaska Dam	Flooding	$100,000
Linneus	South Oakfield Rd	Transportation	$18,000
	Folsom Road	Transportation	$8,500
	Fire Station Floor	Flooding	$30,000
Littleton	Carson Road	Transportation	$85,000
	Wiley Road	Transportation	$25,000
	Hillsiding Road	Transportation	$25,000
	Shanks Road	Transportation	$8,000
	Gillian Road	Transportation	$14,000
	Ingraham Road	Transportation	$5,000
	Front Ridge Road	Transportation	$30,000

Municipality	Critical Facility	Function Lost	One Time Damage Cost/Event
Madawaska	Grandmaisson Avenue	Transportation	$4,380
	Gendreau Road	Transportation	$96,000
	Golf Course Road	Transportation	$30,000
Mapleton	NOMACCA Drive	Transportation	$1,000,000
	Teakettle Brook	Transportation	$150,000
Mars Hill	Clark Road	Transportation	$25,000
	Mountain Road	Transportation	$25,000
Monticello	Fullerton Road	Transportation	$25,000
Perham	High Meadow Road	Transportation	$295,000
Portage Lake	West Road	Transportation	$4,160
	West Road	Transportation	$5,100
	West Road	Transportation	$1,900
Presque Isle	Burlock Road	Transportation	$14,000
	Lombard Road	Transportation	$10,000
	Henderson Road	Transportation	$5,000
St. Agatha	Brook Road	Transportation	$50,000
	Flat Mountain Rd	Transportation	$10,000
	Plein Road	Transportation	$12,000
St. Francis	Sunset Drive	Transportation	$20,000
Unorganized Territories	Aroostook Rd - Benedicta	Transportation	$50,000
	E. Plantation Road, E. Township	Transportation	$80,000
	Kinney Rd E. Township T.D.R.2	Transportation	$15,000
	Dubay Pit Rd, Connor	Transportation	$10,000
	Damboise Rd., Connor	Transportation	$8,000
	Pelletier Rd,Cross Lake	Transportation	$15,000
	Townline Rd., Connor	Transportation	$5,000
	Cote Rd, Connor	Transportation	$55,000
Van Buren	St. Mary's Road	Transportation	$45,000
	Lake Road	Transportation	$78,000
	Alexander Road	Transportation	$90,000
	DOT drainage project with Van Buren	Transportation	Unknown
	DOT drainage project with Van Buren	Transportation	$7,500
Wade	New Dunton Rd.	Transportation	$11,000
	South Wade Rd.	Transportation	$29,000
Wallagrass	Stream bed	Transportation	$11,830
	Soldier Pond Rd.	Shelter	$120,000
	Church Street	Transportation	$22,500
Washburn	Porter, Woodman, Wilder, Berce Streets	Transportation	$4,000,000

Municipality	Critical Facility	Function Lost	One Time Damage Cost/Event
	Mill Pond	Flooding	$250,000
	Gardner Creek Rd	Transportation	$1,000,000
	Caribou Lake Road	Transportation	$4,000
Westfield	Tweedie Road	Transportation	$60,000
	Miller Road	Transportation	$40,000
	Shorey Road	Transportation	$10,000
	Cambridge Road	Transportation	$2,500
	Simpson Road	Transportation	$4,000
	Young Lake Road	Transportation	$6,000
	Viner Road	Transportation	$2,500
Westmanland	Little Madawaska Lake Road	Transportation	$100,000
Weston	Harris Hill Road	Transportation	$7,000
	180 Cropley Road	Transportation	$2,000
	E of 180 Cropley Road	Transportation	$2,500
	W of 7 Cropley Road	Transportation	$2,000
	N of 106 Springer Road	Transportation	$2,000
Winterville Plt.	Goss Brook	Transportation	$25,000
	Red River Road	Transportation	$75,000
	North Shore Road	Transportation	$20,000
	Station Road	Transportation	$10,000
Woodland	McIntyre Road	Transportation	$7,500
	Skidgel Road	Transportation	$15,000
	Pratt Road	Transportation	$25,000
	Davis Road	Transportation	$25,000
	Everett Road	Transportation	$20,000
	Thibodeau Road	Transportation	$15,000
	Brown Road	Transportation	$20,000

Severe Winter and Summer Storm Losses. The primary losses that are expected in Aroostook County during a "Northeaster," blizzard or ice storm would be to overhead utility lines and local roads. In calculating the damage costs, the Aroostook County Hazard Mitigation Team assumed that all local roads would be covered in snow or ice or blocked with tree and utility line debris. The Team used a figure of $620/mile for road debris or snow removal. The team also assumed, as a worst case scenario, the total loss of all utility lines and poles from a major winter or hurricane disaster. The Planning Team was not able to obtain information on the quantity of electrical and communication lines, so it assumed that these service wires would be located on the same poles and would follow all paved and gravel roads. The value of these facilities was obtained from the municipal valuation returns filed with the Department of Maine Revenue Services, Property Tax Division, 2018 (some towns reported zero valuation).

Municipality	Critical Facility	Function Lost	Quantity (Miles)	Damage Cost
Allagash	Electric, Telephone	Electricity, communications	17.79	$442,272
	Paved road surfaces	Transportation	12.15	$7,553
	Gravel road surfaces	Transportation	5.64	$3,497
Amity	Electric, Telephone	Electricity, communications	15.81	$202,670
	Paved road surfaces	Transportation	11.25	$6,975
	Gravel road surfaces	Transportation	4.56	$2,887
Ashland	Electric, Telephone	Electricity, communications	53.27	$4,708,368
	Paved road surfaces	Transportation	38.68	$23,982
	Gravel road surfaces	Transportation	14.59	$9,046
Blaine	Electric, Telephone	Electricity, communications	28.68	$1,596,478
	Paved road surfaces	Transportation	18.05	$11,191
	Gravel road surfaces	Transportation	10.63	$6,591
Bridgewater	Electric, Telephone	Electricity, communications	30.88	$2,425,500
	Paved road surfaces	Transportation	23.59	$14,626
	Gravel road surfaces	Transportation	7.29	$4,520
Caribou	Electric, Telephone	Electricity, communications	151.98	$8,875,100
	Paved road surfaces	Transportation	146.5	$90,830
	Gravel road surfaces	Transportation	5.48	$3,398
Castle Hill	Electric, Telephone	Electricity, communications	24.84	$1,579,600
	Paved road surfaces	Transportation	21.87	$13,559
	Gravel road surfaces	Transportation	2.97	$1,841
Caswell	Electric, Telephone	Electricity, communications	20.62	$889,323
	Paved road surfaces	Transportation	16.22	$10,056
	Gravel road surfaces	Transportation	4.4	$2,728
Chapman	Electric, Telephone	Electricity, communications	17.71	$515,400
	Paved road surfaces	Transportation	14.52	$9,002
	Gravel road surfaces	Transportation	3.19	$1,978
Crystal	Electric, Telephone	Electricity, communications	19.93	$769,568
	Paved road surfaces	Transportation	15.04	$9,325
	Gravel road surfaces	Transportation	4.89	$3,032
Cyr Plantation	Electric, Telephone	Electricity, communications	19.43	$227,883
	Paved road surfaces	Transportation	9.2	$5,704
	Gravel road surfaces	Transportation	10.23	$6,343
Dyer Brook	Electric, Telephone	Electricity, communications	14.35	$551,600
	Paved road surfaces	Transportation	13.47	$8,351
	Gravel road surfaces	Transportation	0.88	$546
Eagle Lake	Electric, Telephone	Electricity, communications	19.85	$929,700
	Paved road surfaces	Transportation	14.34	$8,891
	Gravel road surfaces	Transportation	5.51	$3,416
Easton	Electric, Telephone	Electricity, communications	53.15	$4,292,800
	Paved road surfaces	Transportation	43.07	$26,703
	Gravel road surfaces	Transportation	10.08	$6,250
Fort Fairfield	Electric, Telephone	Electricity, communications	124.94	$4,868,300
	Paved road surfaces	Transportation	115.98	$71,908
	Gravel road surfaces	Transportation	8.96	$5,555
Fort Kent	Electric, Telephone	Electricity, communications	74.17	$5,400,100
	Paved road surfaces	Transportation	53.37	$33,089
	Gravel road surfaces	Transportation	20.8	$12,896
Frenchville	Electric, Telephone	Electricity, communications	37.64	$1,670,500

Municipality	Critical Facility	Function Lost	Quantity (Miles)	Damage Cost
	Paved road surfaces	Transportation	26.75	$16,585
	Gravel road surfaces	Transportation	10.89	$6,752
Garfield Plt	Electric, Telephone	Electricity, communications	5.9	$133,690
	Paved road surfaces	Transportation	5.45	$3,379
	Gravel road surfaces	Transportation	0.45	$279
Grand Isle	Electric, Telephone	Electricity, communications	21.12	$1,284,300
	Paved road surfaces	Transportation	14.88	$9,226
	Gravel road surfaces	Transportation	6.24	$3,869
Hamlin	Electric, Telephone	Electricity, communications	15.61	$1,040,116
	Paved road surfaces	Transportation	11.38	$7,056
	Gravel road surfaces	Transportation	4.23	$2,623
Hammond	Electric, Telephone	Electricity, communications	6.59	$35,130
	Paved road surfaces	Transportation	3.94	$2,443
	Gravel road surfaces	Transportation	2.65	$1,643
Haynesville	Electric, Telephone	Electricity, communications	13.95	$4,089,500
	Paved road surfaces	Transportation	11.66	$7,229
	Gravel road surfaces	Transportation	2.29	$1,420
Hersey	Electric, Telephone	Electricity, communications	9.58	$71,800
	Paved road surfaces	Transportation	7.02	$4,352
	Gravel road surfaces	Transportation	2.56	$1,587
Hodgdon	Electric, Telephone	Electricity, communications	49.31	$135,722
	Paved road surfaces	Transportation	24.73	$15,333
	Gravel road surfaces	Transportation	24.58	$15,240
Houlton	Electric, Telephone	Electricity, communications	79.81	$2,103,800
	Paved road surfaces	Transportation	68.0	$42,160
	Gravel road surfaces	Transportation	11.81	$7,322
Island Falls	Electric, Telephone	Electricity, communications	28.91	$1,738,300
	Paved road surfaces	Transportation	19.62	$12,164
	Gravel road surfaces	Transportation	9.29	$5,760
Limestone	Electric, Telephone	Electricity, communications	53.09	$5,169,000
	Paved road surfaces	Transportation	48.1	$29,822
	Gravel road surfaces	Transportation	4.99	$3,094
Linneus	Electric, Telephone	Electricity, communications	33.33	$3,191,034
	Paved road surfaces	Transportation	18.07	$11,203
	Gravel road surfaces	Transportation	15.26	$9,461
Littleton	Electric, Telephone	Electricity, communications	48.98	$2,182,700
	Paved road surfaces	Transportation	35.83	$22,215
	Gravel road surfaces	Transportation	13.15	$8,153
Ludlow	Electric, Telephone	Electricity, communications	19.26	$636,300
	Paved road surfaces	Transportation	8.2	$5,084
	Gravel road surfaces	Transportation	11.06	$6,857
Macwahoc Plt	Electric, Telephone	Electricity, communications	11.46	$7,062,708
	Paved road surfaces	Transportation	11.25	$6,975
	Gravel road surfaces	Transportation	0.21	$130
Madawaska	Electric, Telephone	Electricity, communications	87.38	$4,699,700
	Paved road surfaces	Transportation	73.91	$45,824
	Gravel road surfaces	Transportation	13.47	$8,351
Mapleton	Electric, Telephone	Electricity, communications	48.81	$2,378,200
	Paved road surfaces	Transportation	38.16	$23,659

Municipality	Critical Facility	Function Lost	Quantity (Miles)	Damage Cost
	Gravel road surfaces	Transportation	10.65	$6,603
Mars Hill	Electric, Telephone	Electricity, communications	44.54	$3,230,248
	Paved road surfaces	Transportation	29.5	$18,290
	Gravel road surfaces	Transportation	15.04	$9,325
Masardis	Electric, Telephone	Electricity, communications	18.12	$549,710
	Paved road surfaces	Transportation	16.59	$10,286
	Gravel road surfaces	Transportation	1.53	$949
Merrill	Electric, Telephone	Electricity, communications	18.78	$319,700
	Paved road surfaces	Transportation	11.72	$7,266
	Gravel road surfaces	Transportation	7.06	$4,377
Monticello	Electric, Telephone	Electricity, communications	45.68	$2,204,300
	Paved road surfaces	Transportation	25.41	$15,754
	Gravel road surfaces	Transportation	20.27	$12,567
Moro Plt	Electric, Telephone	Electricity, communications	12.29	$112,800
	Paved road surfaces	Transportation	9.92	$6,150
	Gravel road surfaces	Transportation	2.37	$1,469
Nashville Plt	Electric, Telephone	Electricity, communications	5.37	$228,600
	Paved road surfaces	Transportation	5.21	$3,230
	Gravel road surfaces	Transportation	0.16	$99
New Canada	Electric, Telephone	Electricity, communications	13.46	$787,027
	Paved road surfaces	Transportation	12.78	$7,924
	Gravel road surfaces	Transportation	0.68	$422
New Limerick	Electric, Telephone	Electricity, communications	19.26	$75,300
	Paved road surfaces	Transportation	16.4	$10,168
	Gravel road surfaces	Transportation	2.86	$1,773
New Sweden	Electric, Telephone	Electricity, communications	38.99	$1,610,173
	Paved road surfaces	Transportation	28.06	$17,397
	Gravel road surfaces	Transportation	10.93	$6,777
Oakfield	Electric, Telephone	Electricity, communications	30.07	$1,120,000
	Paved road surfaces	Transportation	16.48	$10,218
	Gravel road surfaces	Transportation	13.59	$8,426
Orient	Electric, Telephone	Electricity, communications	16.94	$1,883,696
	Paved road surfaces	Transportation	15.54	$9,635
	Gravel road surfaces	Transportation	1.4	$868
Perham	Electric, Telephone	Electricity, communications	31.19	$619,900
	Paved road surfaces	Transportation	19.82	$12,288
	Gravel road surfaces	Transportation	11.37	$7,049
Portage Lake	Electric, Telephone	Electricity, communications	16.25	$706,000
	Paved road surfaces	Transportation	15.45	$9,579
	Gravel road surfaces	Transportation	0.8	$496
Presque Isle	Electric, Telephone	Electricity, communications	148.46	$18,600,600
	Paved road surfaces	Transportation	137.53	$85,269
	Gravel road surfaces	Transportation	10.93	$6,777
Reed Plt	Electric, Telephone	Electricity, communications	16.77	$0
	Paved road surfaces	Transportation	16.4	$10,168
	Gravel road surfaces	Transportation	0.37	$229
Saint Agatha	Electric, Telephone	Electricity, communications	35.25	$786,584
	Paved road surfaces	Transportation	21.16	$13,119
	Gravel road surfaces	Transportation	14.09	$8,736

Municipality	Critical Facility	Function Lost	Quantity (Miles)	Damage Cost
Saint Francis	Electric, Telephone	Electricity, communications	13.47	$639,450
	Paved road surfaces	Transportation	11.64	$7,217
	Gravel road surfaces	Transportation	1.83	$1,135
St. John Plt	Electric, Telephone	Electricity, communications	7.29	$271,629
	Paved road surfaces	Transportation	6.79	$4,210
	Gravel road surfaces	Transportation	0.5	$310
Sherman	Electric, Telephone	Electricity, communications	35.6	$1,253,000
	Paved road surfaces	Transportation	27.7	$17,174
	Gravel road surfaces	Transportation	7.9	$4,898
Smyrna	Electric, Telephone	Electricity, communications	17.07	$479,500
	Paved road surfaces	Transportation	14.84	$9,201
	Gravel road surfaces	Transportation	2.23	$1,383
Stockholm	Electric, Telephone	Electricity, communications	14.24	$392,316
	Paved road surfaces	Transportation	11.24	$6,969
	Gravel road surfaces	Transportation	3.0	$1,860
Van Buren	Electric, Telephone	Electricity, communications	46.46	$1,010,800
	Paved road surfaces	Transportation	28.45	$17,639
	Gravel road surfaces	Transportation	18.01	$11,166
Wade	Electric, Telephone	Electricity, communications	15.08	$570,100
	Paved road surfaces	Transportation	5.49	$3,404
	Gravel road surfaces	Transportation	9.59	$5,946
Wallagrass	Electric, Telephone	Electricity, communications	17.02	$616,900
	Paved road surfaces	Transportation	16.62	$10,304
	Gravel road surfaces	Transportation	0.4	$248
Washburn	Electric, Telephone	Electricity, communications	47.12	$2,081,600
	Paved road surfaces	Transportation	42.83	$26,555
	Gravel road surfaces	Transportation	4.29	$2,660
Westfield	Electric, Telephone	Electricity, communications	26.27	$1,085,425
	Paved road surfaces	Transportation	16.87	$10,459
	Gravel road surfaces	Transportation	9.4	$5,828
Westmanland	Electric, Telephone	Electricity, communications	7.21	$254,934
	Paved road surfaces	Transportation	4.15	$2,573
	Gravel road surfaces	Transportation	3.06	$1,897
Weston	Electric, Telephone	Electricity, communications	20.83	$272,200
	Paved road surfaces	Transportation	19.05	$11,811
	Gravel road surfaces	Transportation	1.78	$1,104
Winterville Plt	Electric, Telephone	Electricity, communications	13.76	$502,000
	Paved road surfaces	Transportation	11.64	$7,217
	Gravel road surfaces	Transportation	2.12	$1,314
Woodland	Electric, Telephone	Electricity, communications	51.19	$1,438,147
	Paved road surfaces	Transportation	44.58	$27,640
	Gravel road surfaces	Transportation	6.61	$4,098

Potential Wildfire Losses. The primary damage losses that would be expected in Aroostook County during any wildfire event would be destruction of single family homes. In calculating damage costs, the Aroostook County Hazard Mitigation Planning Team assumed that all homes located in the wildland-urban interface would be destroyed in a worst case fire scenario. The Teams used the number of housing units as reported in the 2014-2018

American Community Survey (U.S. Census) and the August,2019 median sales price of a single family home in Aroostook County ($100,000) to calculate the dollar loss of residential dwelling units. For each community, the "Community Size" percentage was added to the "Land Cover" percentage (the land cover fire hazard was assumed to be low in all communities) to arrive at a total percentage which is the percentage of homes that the Teams assumes would be lost in a devastating fire the size of the 1947 fire.

Community Size
Very rural = 25%
Village = 10%
Suburban = 5%

Fire hazard by land cover
Moderate = 25%
Low = 10%

Potential Homes Lost in Worst Case Scenario Wildfire

Town/City	Total Housing Units	% Lost	# Lost	Damage Cost
Allagash	317	35%	111	11,100,000
Amity	170	35%	60	6,000,000
Ashland	755	20%	151	15,100,000
Blaine	386	20%	77	7,700,000
Bridgewater	315	20%	63	6,300,000
Caribou	4,077	15%	612	61,200,000
Castle Hill	184	35%	64	6,400,000
Caswell	168	35%	59	5,900,000,
Chapman	222	35%	78	7,800,000
Crystal	152	35%	53	5,300,000
Cyr Plt	40	35%	14	1,400,000
Dyer Brook	139	35%	49	4,900,000
Eagle Lake	626	20%	125	12,500,000
Easton	505	20%	101	10,100.000
Fort Fairfield	1,643	15%	246	24,600,000
Fort Kent	1,893	15%	284	28,400,000
Frenchville	487	20%	97	9,700,000
Garfield Plt	81	35%	28	2,800,000
Glenwood Plt	33	35%	12	1,200,000
Grand Isle	281	35%	98	9,800,000
Hamlin	92	35%	32	3,200,000
Hammond	88	35%	31	3,100,000
Haynesville	102	35%	36	3,600,000
Hersey	47	35%	16	1,600,000
Hodgdon	608	20%	122	12,200,000
Houlton	3,088	15%	463	46,300,000
Island Falls	680	20%	136	13,600,000
Limestone	981	15%	147	14,700,000
Linneus	502	20%	100	10,000,000

Town/City	Total Housing Units	% Lost	# Lost	Damage Cost
Littleton	276	20%	55	5,500,000
Ludlow	276	35%	97	9,700,000
Macwahoc Plt	79	35%	28.	2,8.00,000
Madawaska	2,323	15%	348	34,800,000
Mapleton	922	15%	138	13,800,000
Mars Hill	651	15%	98	9,800,000
Masardis	157	35%	55	5,500,000
Merrill	136	35%	48	4,800,000
Monticello	422	35%	148	14,800,000
Moro Plt	51	35%	18	1,800,000
Nashville Plt	24	35%	8	800,000
New Canada	167	35%	58	5,800,000
New Limerick	393	35%	138	13,800,000
New Sweden	298	35%	104	10,400,000
Oakfield	488	20%	98	9,800,000
Orient	280	35%	98	9,800,000
Perham	192	35%	67	6,700,000
Portage Lake	542	35%	190	19,000,000
Presque Isle	4,594	15%	689	68,900,000
Reed Plt	124	35%	43	4,300,000
Saint Agatha	539	20%	108	10,800,000
Saint Francis	295	35%	103	10,300,000
St John Plt	176	35%	62	6,200,000
Sherman	493	20%	99	9,900,000
Smyrna	201	35%	70	7,000,000
Stockholm	135	35%	47	4,700,000
Van Buren	1,103	15%	165	16,500,000
Wade	174	35%	61	6,100,000
Wallagrass	312	35%	109	10,900,000
Washburn	769	20%	154	15,400,000
Westfield	227	35%	79	7,900,000
Westmanland	94	35%	33	3,300,000
Weston	376	35%	132	13,200,000
Winterville Plt	242	35%	85	8,500,000
Woodland	597	20%	110	11,000,000
Unorganized	2,857	35%	1,000	100,000,000
Total	39,647	-	8,408	827,910,110

Source:

Assessing Vulnerability: Analyzing Development Trends

Requirement (201.6(c)(2)(ii)(C): (The plan shall describe vulnerability in terms of) providing a general description of land uses and development trends within the community, so that mitigation options can be considered in future land use decisions.

Aroostook County is located in extreme Northern Maine and is largely rural. A majority of the land consists of farmland (most of which is used for potato production), forests, wetlands and water bodies. The largest community is the City of Presque Isle, which contains 9,007 people. There are no suburbs in Aroostook County. Most of the developed land is used for residential purposes, but the developed portions of the bigger communities include some commercial, institutional and industrial uses.

There is very little land use regulation in Aroostook County. Land use controls consist primarily of municipal and state-imposed shore land zoning ordinances, floodplain management ordinances, and some subdivision and site plan review ordinances. Very few communities have zoning ordinances. The plantations and unorganized townships in Aroostook County are governed by the Maine Land Use Planning Commission.

A large number of communities have prepared comprehensive plans, and many of these can be used to support municipal zoning ordinances in the event that these communities choose to enact such controls.

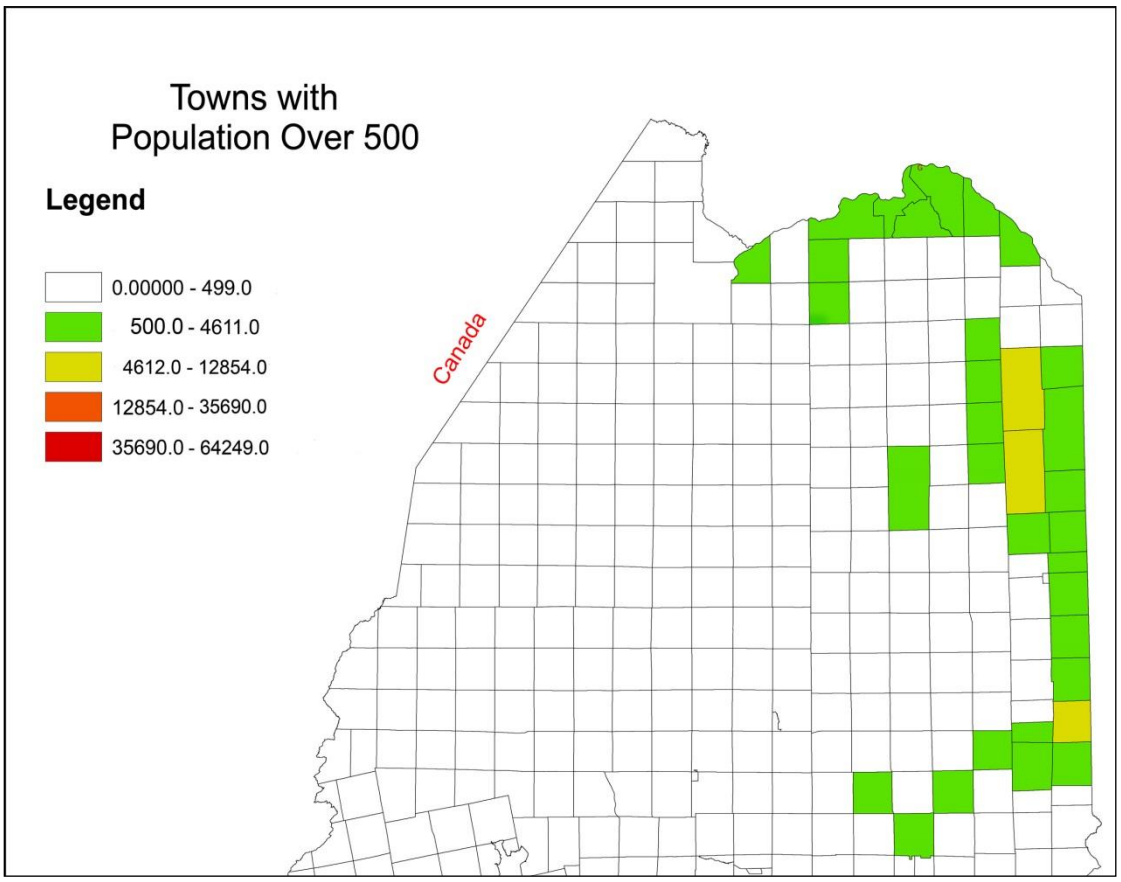
Development Trends. As previously stated, there has been very little growth in Aroostook County in the last 10 years, and very little growth is expected during the next 10 years. According to 2019 census estimates, Aroostook County had a 2019 population of 67,055 which represents a decline of 7% from the 2010 figure of 71,870. Aroostook County's estimated 2019 population is less than it was in 1910 (74,664), but there have been considerable fluctuations between 1910 and 2019.

The State Economist has projected that Aroostook's population will increase slightly from the estimated 2019 level of 67,055 to 67,929 by 2021, and then decrease slightly to 67,736 by 2026.

Most towns in Aroostook County are very small and rural and do not have planning departments, building codes or even a full-time code enforcement officer. Very little commercial, industrial or public development is anticipated over the next 10 years, although it is expected that a modest number of single family dwellings will be built. In most communities, the only regulations impacting home construction are shoreland zoning and floodplain management ordinances and the state's subsurface wastewater disposal rules.

Beginning December 1, 2010, the International Building Code must be enforced in a municipality that has more than 2,000 residents and that has adopted any building code since August 1, 2008. The International Building Code must be enforced through inspections that comply with Title 25, section 2373.

Below is a map indicating population in Aroostook County.



Impact of Hazards on Future Development

Flooding will have an impact on floodplains and as roads in vulnerable locations. This hazard will continue to have the primary impact of shutting down transportation in some areas, since it is primarily the roads that are the objects of flooding in the County. Flooded roads could impact businesses, industry, commerce and schools, and could also delay many social and emergency services.

A total of 52_municipalities in Aroostook County have joined the National Flood Insurance Program (NFIP) and as a condition of participation in the program, have enacted floodplain management ordinances that limit new development in floodplain areas.

All of the plantations and unorganized townships in Aroostook County are under the jurisdiction of Maine's Land Use Planning Commission (LUPC). LUPC has agreed to administer and enforce the NFIP for all communities that are under its control and has modified its requirement to include floodplain management regulations. Nine plantations are in the NFIP by virtue of the fact that they are under the jurisdiction of the LUPC.

Severe winter and summer storms will have an impact on all land areas within Aroostook County. These two hazards will have the primary impact of shutting down transportation and power which, in turn, will shut down businesses, industry, commerce and schools and will stop or impede social and emergency services.

Wildfires could have an impact on residential properties located within the wild land/urban interface. Because Aroostook County is a very densely forested, sparsely populated area, there are a number of homes within the wild land/urban interface that are at risk of destruction by forest fires. Currently, no municipality in Aroostook County has imposed wildfire restrictions on residential development.

Droughts could have several impacts on the county including damages to crop yields, private wells running dry, public water supplies running low and/or experiencing water quality problems, and forested areas of the county being threatened by wildfires.

Multi-Jurisdictional risk Assessment

> **Requirement (201.6(c)(2)(iii)** For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

Aroostook County is a large, sparsely populated, rural county located in extreme Northern Maine. There are 67,055 people living in 6,672 square miles. The overall density is 10.0 persons per square mile.

The Aroostook County Hazard Mitigation Team analyzed and discussed flooding and county-wide and municipal impacts of flooding over the past decade. Based on the flooding of 2008 and the two most recent declarations (DR-1755 and DR-1953) Team members agreed that flooding is still the most serious hazard in Aroostook County. There was general agreement that ice jams, combined with spring snow melt and sometimes heavy rains, are a leading cause of flooding in Aroostook County. Members also discussed the fact that wildfires could denude the landscape, and the resulting erosion and sedimentation could exacerbate flooding.

For a discussion of hazards that vary from the risks facing the entire planning area, see:

- Flooding Location: Pages 4-15
- Winter Storms Location: Pages 4-25
- Summer Storms Location: Pages 4-30
- Wildfire Location: Pages 4-34
- Drought Location: 4-38