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.

The 44 CFR §201.6(c)(2) outlines specific information that Hancock County must consider when completing the risk assessment portion of this mitigation plan. Our local risk assessments provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. This plan includes detailed descriptions of all the potential hazards that could affect the jurisdiction along with an analysis of the jurisdiction's vulnerability to those identified hazards. Specific information about numbers and types of structures, potential dollar losses, and an overall description of land use trends in the jurisdiction are included in this analysis. Because this is a multi-jurisdictional plan, those risks with potential to impact only portions of the County were assessed separately in the context of the plan.

Climate

No risk assessment of Hancock County's flood and related 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 flooding and related hazards.

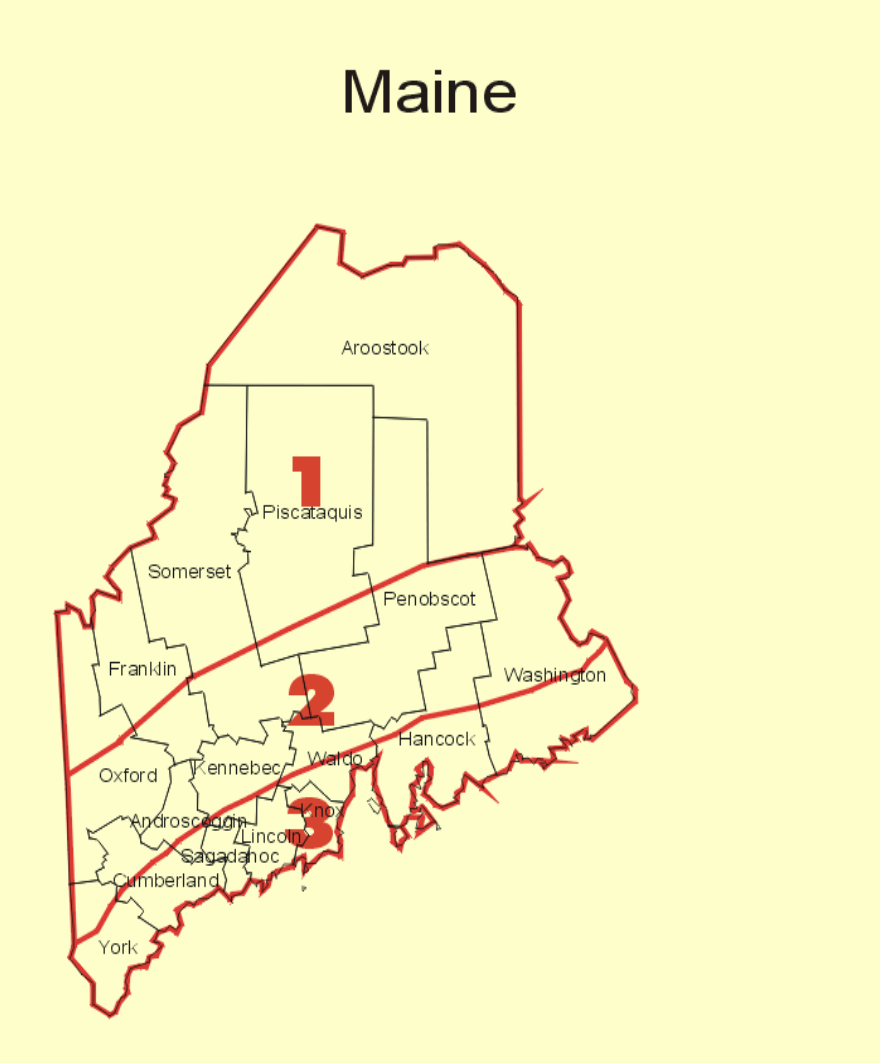
The southern half of Hancock County is located in the Coastal Division of Maine's three climatic divisions. The Coastal Division encompasses a 20-30 mile band along the coast of 4,992 square miles (15%) of the State. This division is most affected by the ocean, but has minimal elevation change and thus, minimal climatic impact from any topographic controls. The northern half of Hancock County is located in the Southern Interior climate division of Maine (see map). This division contains approximately 10,307 square miles, and is only partially subject to marine influences. It consists of 10,307 square miles adjacent to the Northern Division and represents 31% of the state's area.

Temperature: Average annual temperature is about 41 degrees Fahrenheit. Temperatures average about 64 degrees Fahrenheit in July and August, and about 18 degrees Fahrenheit in January and February.

Precipitation: Hancock County's average amount of precipitation, based on long-term records dating back to 1895, is 42.6 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 Hancock 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 Hancock 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 heavily forested state in the United States with 90% of its land area in woodland. 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 Variation

The purpose of this part of the plan is not to debate climate change or its causes, but to provide an overview of how climate has changed over time, as documented in various scientific studies, and how that change may be impacting the occurrence and severity of natural hazards in Hancock County. Projecting future climate change can be problematic because, as stated in the document "Maine's Climate Future, 2015 Update," by the University of Maine, "Climate projections are uncertain for several reasons: natural climate variability, incomplete descriptions of the climate system in computer models, and difficulty in predicting future greenhouse gas emissions" (page 6).

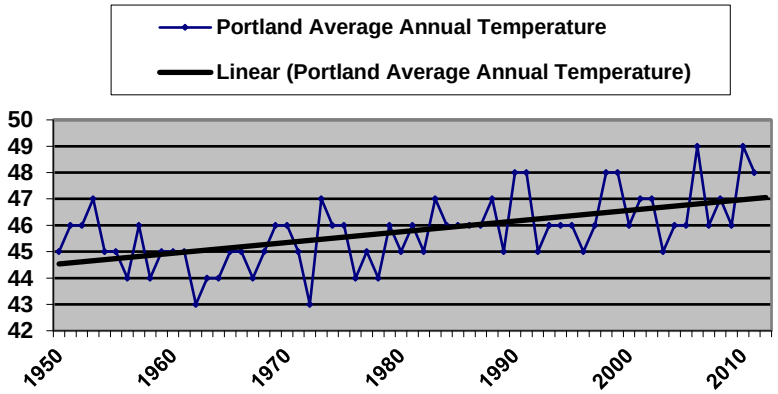
Temperature Changes: Excerpts from the report "Maine's Climate Future, 2015 Update," prepared by the University of Maine, include the following:

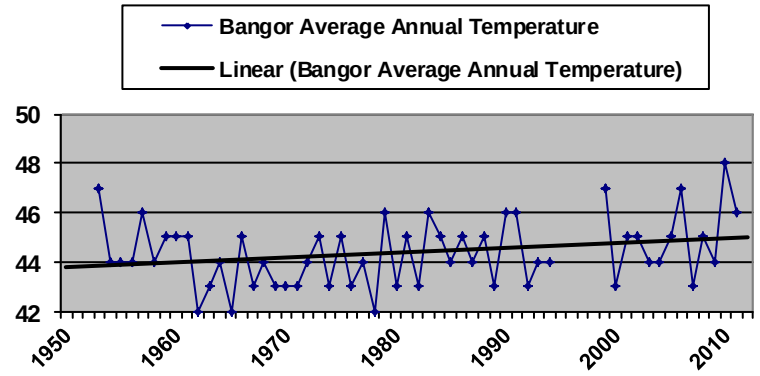
> "Average annual temperature across Maine warmed by about 3.0 degrees F between 1895 and 2014….Although the overall warming trend…is clear, Maine's temperature signal also features significant year to year fluctuations superimposed on a distinct pattern with periods of relative cold…and warmth…" (page 2).
>
> "Numerical models of the global atmosphere and ocean have been in development for over three decades. The most sophisticated of these models, such as those used by the Intergovernmental Panel on Climate Change (IPCC)…predict that annual temperature will increase another 3.0 – 5.0 degrees F…across Maine between now and 2050" (page 3).
>
> "Maine's warm season…increased by two weeks from the early 1900s to the 2000s. Global climate models predict that the warm season will increase by an additional two weeks over the next 50 years. Winter is warming at a faster rate than summer" (page 3).

The following is an excerpt from the Maine State Hazard Mitigation Plan 2013 Update: "The National Weather Service in Gray, Maine, has compiled monthly average and annual average temperatures for a long period of time at three locations in Maine: The Portland International Jetport (1940-present); the Bangor International Airport (1953-1994 and 1999-present), and the Caribou Airport. The data from all three measuring stations show that annual average temperatures have gradually increased at all three locations…although the increase has been greatest at the Portland Jetport station" (page 3-4).

While none of these locations are close to Hancock County, it is reasonable to assume that trends occurring throughout Maine are also occurring in Hancock County.

According to "Maine's Climate Future, 2015 Update," the impacts of rising temperature in Maine include an increase in Lyme disease resulting from more suitable habitat for deer ticks and their hosts, and stresses on Maine's plant and animal species.





Precipitation Changes: Excerpts from the report "Maine's Climate Future, 2015 Update," include the following:

"Since 1895, total annual precipitation has increased by about six inches…or 13%, with most of the additional amount falling in summer and fall. IPCC models predict that precipitation will continue to increase across the Northeast by 5-10% between now and 2050, although the distribution is likely to vary across the climate zones. Model predictions show greater increases in precipitation in interior Maine…whereas measurements to date from the weather stations across the Maine landscape show that precipitation has increased most along the coast" (page 8).

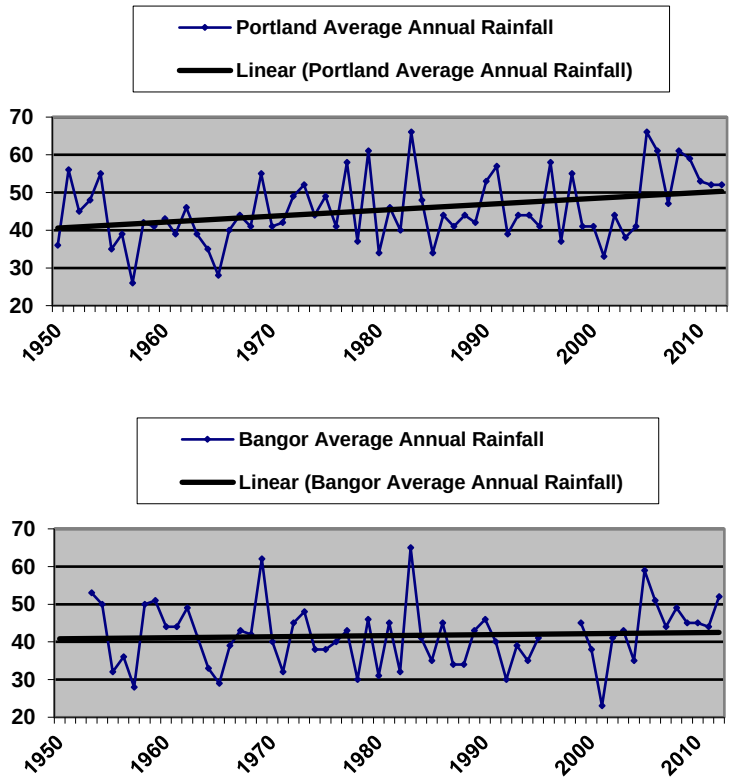
"A significant increase in extreme precipitation events (more frequent and intense storms) has been observed across Maine and other parts of the eastern U.S.…we define an extreme precipitation event for this analysis as one in which two or more inches (five or more cm) of precipitation falls within a 24-hour period. Historical measurements show that extreme events vary across the state, occurring most often in the coastal zone and western mountains. The northernmost sites, like Millinocket and Caribou, show fewer extreme events overall, but with similar relative increases over the most recent decade" (page 9).

"In general, the snow season has declined on average across Maine since the late 1800s…On a simplified linear trend, the snowfall has declined by about 15%....although the amount and duration of snow may decline in the future, extreme snowfall events with significant accumulation – strong nor'easters – are likely to increase in frequency" (page 10).

"The Northeast has experienced a greater recent increase in extreme precipitation than any other region in the U.S.; between 1958 and 2010, the Northeast saw more than a 70% increase

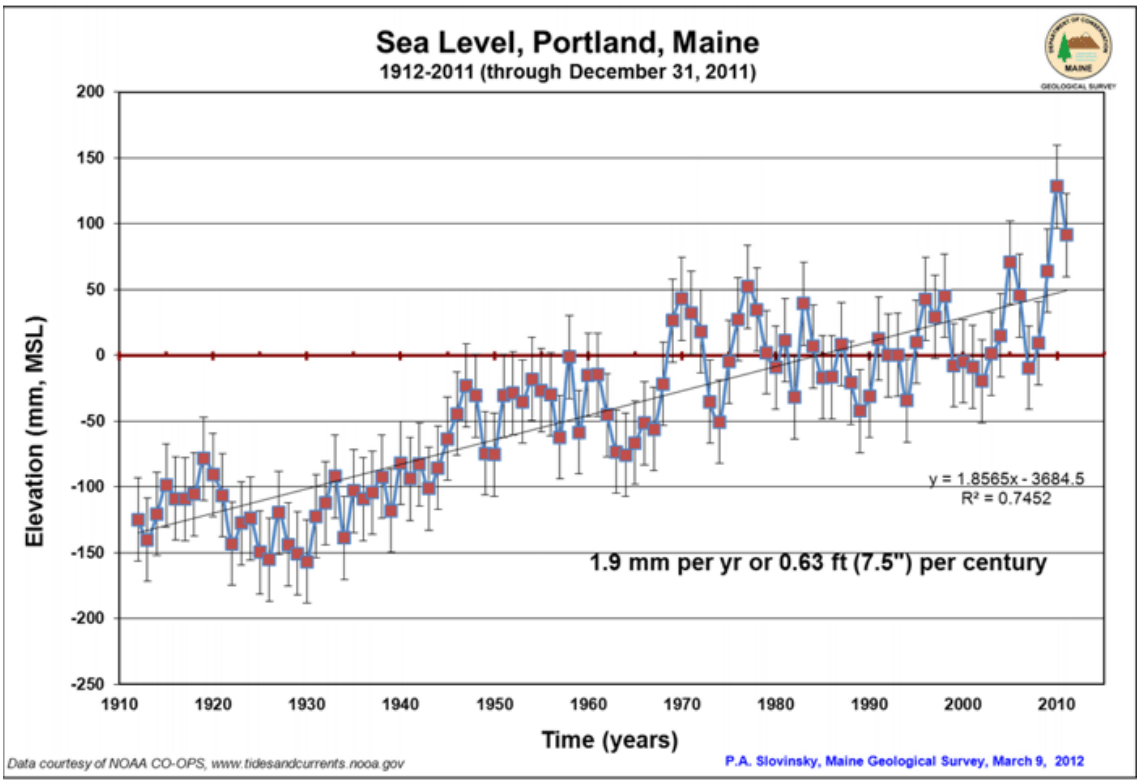
in the amount of precipitation falling in very heavy events, taxing an already stressed and aging infrastructure" (page 11).

The following is an excerpt from the Maine State Hazard Mitigation Plan 2013 Update: "The National Weather Service has also compiled monthly average and annual average precipitation at the Portland Jetport, the Bangor International Airport and the Caribou Municipal Airport. The data from all three measuring stations show that average annual precipitation …has gradually increased at all three locations…The increase has been greatest at the Portland Jetport and the Caribou Municipal Airport" (page 3-5).

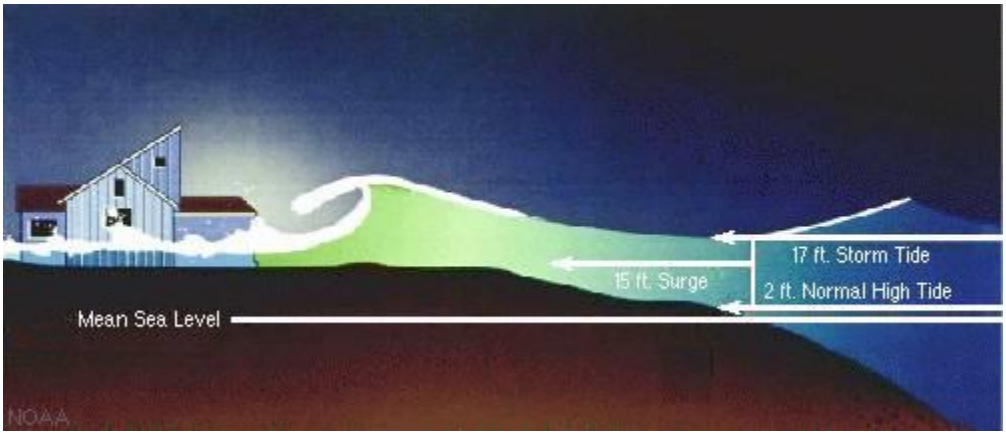


Sea Level Rise. According to the State's Hazard Mitigation Plan, Maine's coast has been and will continue to be profoundly affected by an increase in sea level. Based on information from the Maine Geological Survey's website, the Portland, Maine, tidal station measures water levels in real-time, six-minute intervals, 24 hours a day. The Portland tidal station is one of the longest continuously operating tidal stations in the United States. For annualized data from 1912 through the end of 2011, the Portland gauge has shown an increase in mean sea level of approximately 1.9 mm per year, or about 7.5 inches over the past 100 years, as shown in the chart on the next page.

The result of the gradual increase in sea level has been increased flooding, erosion of coastal bluffs and landslides. The consensus of the scientific community, reflected in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) is that sea level will continue to rise at an accelerating rate through the year 2100.



One of the consequences of sea level rise is the damage that can occur from storm surges. Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm as well as low barometric pressure. This advancing surge combines with the normal tides to create the storm tide. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides. The following illustration shows how storm surge can increase flooding risk.



No one knows for sure how high the sea will rise or how quickly it will occur, but the IPCC has prepared a range of scenarios based on a scientific analysis of a number of variables including glacial ice melt, thermal expansion of water due to global warming, slowing of the Gulf Stream (there has been a 25% reduction during the past decade), and the melting of ice caps in Greenland and Antarctica. Based on the IPCC's projections, the Maine Geological Survey (MGS) is using for its studies a conservative, mid-range estimate of two (2) additional feet of sea level rise by the year 2100.

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?

Description of Hazards Profiled in this Plan

The Hancock County Hazard Mitigation Planning Team identified and rated four natural hazards that are addressed in the County Hazard Mitigation Plan. These hazards were identified through a process that utilized input from members of the Hazard Mitigation Planning Team, public input, researching past disaster declarations in the County, a review of current maps, and a risk assessment completed by the County Emergency Management Agency and the Hazard Mitigation Planning Team. Past disasters were used as a guideline to complete the risk assessment. Other sources of information include a review of the Maine State Hazard Mitigation Plan 2013 update, and hazard mitigation meetings.

The four 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
Severe Winter Storms	Review of Maine State Hazard Mitigation Plan 2013 Update, past disaster declarations, input from residents, input from municipalities, Risk Assessment on the following pages.	Maine is frequently hit with blizzards and Northeaster storms. These can cause power outages, coastal erosion and transportation challenges. Hancock County coastal communities are often subject to ice storms such as the 1998 Ice Storm.
Flooding	Review of Maine State Hazard Mitigation Plan 2013 Update, 2016 and 2017 hazard mitigation meetings, review of FIRM Maps, Storm Surge Maps and input from residents.	Associated with the effects of coastal storms, spring runoff and severe summer storms. Gravel roadways are often damaged during these events. The County contains two major rivers and many streams and lakes, and is located along the coast. Dams are also included in this section since a breach would cause a flash flood.
Severe Summer Storms	Review of past disaster declarations input from residents, Risk Assessment	Hancock County has a large coastal area and exposed islands which are prone to potential tropical cyclone storm surge and associated strong winds and gusts.

Summary of Hazards Profiled in this Plan		
Hazard	**How Identified**	**Why Identified**
Wildfire	Review of Maine Forest Service records, input from residents, Risk Assessment ~~on page 21~~	Hancock County is about 70% forested. Consistent early spring fire threat when debris burning occurs. One of the worst fires in Maine history burned a large portion of the County in October 1947.

Description of Natural Hazards deleted from further Consideration

The following table identifies the natural hazards that were eliminated from further consideration in the Plan, due to a lack of historical evidence, lack of overall county-wide severity or a low likelihood for the event to occur. Although these disaster events were not profiled in the hazard mitigation plan, it is not the intent to state that these events will not nor could not occur, resulting in great damage. It was decided by the Hancock County Hazard Mitigation Planning Team to only profile the top four natural hazards most likely to occur.

Hazards Deleted from Further Consideration		
Hazard	**How Identified**	**Reason for Non-Inclusion**
Avalanche	Review of USGS Maps, Maine Geological Survey Records	There are no county mountains that hold amounts of snow capable of causing avalanches and no documented cases of avalanches in the County.
Blight/ Infestation	Review of State Entomological Office historical records Inputs from residents Risk Assessments	Though Hancock County is heavily dependent on its agricultural production, to include forestry, blueberries, and fishing, there are no historical records of major damage to these products that have caused serious economic conditions.
Coastal Erosion	Input from State Planning Office (pre-2012) Input from NRCS, Input from Maine DEP, Input from residents	Hancock County is undergoing development pressure along the coast. This could exacerbate erosion along local roads. See flooding section, subcategory of severe storms.
Dam Failure	Review of Historical Records Risk Assessment	Dam failure is considered in the flooding section of the plan. There has been only one dam failure in the history of the county (caused only minor localized flooding). Likelihood of catastrophic failure low.
Drought	Review of State EMA records Review of NOAA records	Rainfall data doesn't show a serious problem although drought conditions

Hazards Deleted from Further Consideration		
Hazard	**How Identified**	**Reason for Non-Inclusion**
		affected Hancock County in 2016. The drought effects have never been long-term or sufficient enough to result in serious economic losses for a disaster, but are included in the wildfire profile.
Earthquake	Review of Maine Geological Survey records	Although Earthquakes are common in Maine, no significant damaging movement has occurred in 20,000 years. Numerous minor quakes, none exceeding a 4.2 magnitude, occurred in the Mt Desert area of Hancock County in 2006. In 2011, there were some "swarms" of minor earthquakes but no serious property damages resulted.
Hurricane	Review of past disaster declarations, Review of library historical data Input from residents Risk assessments	The County is hit about every decade by a hurricane. Most hurricanes have been downgraded to tropical storms when they reach Hancock County. They do not cause any significant damage people and property. Flooding from this event will be discussed under the Flooding Hazard. One life was lost from storm surge as Hurricane Bill passed 200 miles off shore because spectators were too close to the shoreline.
Landslide	Review of Maine Geological Survey	Landslides are not common in Hancock County.
Subsidence	Review of Maine Geological Survey and Soil and Water Conservation report on soil types in Hancock County.	No known cases of subsidence within the County.
Tornado & Severe Wind Storms	Review of NWS records, State Plan	On average several F-2 category tornadoes occur in Maine each year. There has been no loss of life or major damages in many years. Strong winds associated with severe winter and summer storms are included under severe winter storms and severe summer storms.

Profiling Hazard Events	
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?
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Severe Winter Storms

General Definition: Severe winter weather conditions are distinguished by low temperatures, strong winds, and often with large quantities of snow.

Types of Winter Storms in Hancock County:

- **Blizzard:** Sustained winds of 40 miles per hour (mph) 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 traveling conditions.

- **Ice Storms:** Rain which freezes upon impact. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires, and similar objects and to produce widespread power outage.

- **Nor'easter:** Nor'easters are extratropical coastal storms that can produce tremendous amounts of precipitation and strong winds that can cause coastal flooding damage. 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. Does not stick to 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 public safety departments' response capability.

Location of Hazard

Neither the State of Maine nor the National Weather Service provides data on snowfall and ice storm on a town by town basis. Normally there are only one or two locations within a Maine county that records weather data. For Hancock County, the only weather station is located on Mount Desert Island. Therefore, the entire county is modeled as one entire hazard area for severe winter storms.

While the entirety of Hancock County is subject to major snowfall events, its northern half is typically prone to higher precipitation amounts. The entire County can experience a major ice storm, as it did in January 1998. However, the coastal communities on the mainland and on the islands, which contain the vast majority of the population, experience icing conditions more frequently.

Finally, the entire County is very susceptible to "Nor'easter" winter storms and severe coastal storms, especially from the very high winds that are involved in such a storm.

Extent of Hazard

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. Since 1993, Hancock County has been included in two Federally-declared winter storm disaster events, and six emergency "snow" declarations. For Hancock County, as for the State of Maine, the worst winter storm is the ice storm of 1998. Damages in Hancock County exceeded one million dollars and statewide more than forty-seven million. It was the worst storm in the past two decades and caused damages throughout the entire County. This storm, which nearly destroyed the electrical transmission system in the State of Maine, caused major damage to the forests, covered many roadways with debris and ice, and caused some limited building damages. However, most winter storms in the County are large snow storms which can overwhelm the highway snow removal operations and cause localized power outages. Frost heaves have also caused damages to road surfaces.

Previous Occurrences

Some of the more notable storms of the last 30 years, as reflected in Presidential Disaster Declarations or Presidential Emergency Declarations, are summarized in the table below.

Month	Year	Damage (as noted in the declaration) General Description	Number
Feb. 19 Snowstorm	1972	n/a	State Aid
Jan 10 Rain/Snow/Ice	1978	n/a	*n/a*
Mar 13-14 Blizzard	1993	Statewide; Blizzards, severe winds and snowfall, coastal storm	*Presidential* FEMA-3099-EM-ME
Jan 5-25 "Great Ice Storm of 98"	1998	Statewide; Power outages Forestry damage	*Presidential* FEMA-1198-DR-ME
Mar 5-31	2001	Maine severe winter storm,	*Presidential* FEMA-3164-EM-ME
Dec 17 2002 - Jun 1, 2003	2003	Extreme winter weather; severe cold and frost	*Presidential* FEMA-1468-DR-ME
Dec 6-7	2003	Winter storms and extreme cold	*Presidential* FEMA-3190-EM-ME
Dec 14-15	2003	Winter storms and extreme cold	*Presidential* FEMA-3194-EM-ME
Feb 10-11	2005	Winter storms and extreme cold	*Presidential* FEMA-3206-EM-ME
March 9	2005	Winter storms and extreme cold	*Presidential* FEMA-3209-EM-ME

Note: Hancock County has not been in a presidential declaration for winter storms since 2005.

Probability of Occurrence

No probability studies have been done, but the County's location in the extreme Northeast and its long experience with winter storms indicate that every year, between November and April there is a high probability that winter 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, as was the case in the record-breaking "snow year" of 2014-2015 that blanketed the Northeast.

Flooding (includes potential dam failure)

General Definition: A temporary inundation of normally dry land as a result of: 1) the overflow of inland or tidal waters; and/or 2) the unusual and rapid accumulation of runoff or surface waters from any source. Note: the nature of Hancock's geology and hydrology is such that flooding is usually fast rising but of short duration.

Types of Flooding: There are several different types of potential flooding in Hancock County:

- **Erosion/coastal erosion.** As defined in FEMA's Coastal Construction Manual, this includes a) beach erosion; b) bluff erosion; and c) coastal landslides. Under the National Flood Insurance Program, it's defined as the gradual wearing away of land masses. In general, erosion involves the detachment and movement of soil and rock fragments during a flood or storm or, over a period of years, through the action off wind, water, or other geological processes. Episodic erosion is induced by a single storm event.

- **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. Ice flows 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 can suddenly release water downstream. Damages from ice jam flooding usually exceed those of clear water flooding. Such sudden release can cause higher than predicted flood elevations, a 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.

- **Riverine/riparian.** Periodic overbank flow of rivers and streams, usually the result of spring runoff, but can also be caused by major rain storms.

- **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 increase in water surface elevations on most Maine lakes and ponds range from 1 to 5 feet.

- **Urban.** Overflow of storm sewer systems, following heavy rain or rapid snowmelt. 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. In Hancock County, flood damages from beaver dams have included some washouts of roadways.

Hancock County is subject to riverine, storm surge, and wetland area flooding. The County EMA has reviewed the County's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) to compile

a profile of the flooding hazard in the County. The EMA staff completed research on flooding history in the County and indicated this data on the GIS base maps. Where the layers were available, the Municipal Base Maps show the areas susceptible to potential flooding.

Location of Flooding Hazard

There are two major rivers located in or along Hancock County. The Penobscot River and Penobscot Bay border on the towns of Bucksport, Verona Island, Orland, Penobscot, and Castine. The municipality most susceptible to Penobscot riverine flooding is Bucksport. There are no dams on this river in Hancock County, although there are a large number of dams further north in Penobscot County.

Most of the dams in Hancock County are small and would not have a major flooding impact to the Hancock County towns. However, if a large dam, such as the Dolby Dam further upstream in Penobscot County were to fail it would take several days for the flooding to occur in Bucksport.

The Union River discharges from Graham Lake and flows through the City of Ellsworth and discharges into the Union River Bay with shores in the towns of Trenton and Surry. The Union River Dam did fail in April 1923 and caused major flooding in downtown Ellsworth and destroyed a bridge. The present dam has procedures in place for effective flood management. While flooding from the Penobscot and Union Rivers is not expected to be likely, it could be catastrophic if it were to occur.

There are four high hazard dams in Hancock County. The Verso Paper Dam, at Silver Lake, would impact the Town of Bucksport. The other three are owned by Black Bear LLC and would impact the City of Ellsworth. Emergency Action Plans (EAPs) are required of the owners of all high and significant hazard dams and must be reviewed and regularly updated according to Maine State Law 37-B.

Extent of the Hazard

Extent of the hazard from dam failure. Maine law, MRSA Title 37-B, Chapter 24, also known as Maine's Dam Safety Law, classifies dams into three hazard potential ratings: H-high, S-significant and L-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.

Each rating carries different responsibilities for the dam owners and situational awareness on the part of downstream residents and businesses. Dam owners with "high" or "significant" potential hazard ratings must produce an emergency action plan (EAP) and forward it to MEMA for compliance with the law. The primary purpose of the EAP is to alert and warn potentially affected residents and businesses in the listed "call down area" when there is a threat of failure or actual breach. Copies are kept by the owner, relevant local, county and state agencies and must be updated every two years.

MEMA maintains a database of 1079 dam sites, including dams in New Hampshire that share rivers with Maine. Within Hancock County there are 4 High (H) Hazard dams, 6 Significant (S) Hazard dams, and numerous Low (L) Hazard dams. The hazard classification is based on severity of effect from failure: H dams could cause loss of life; S could cause significant loss of property and L would probably only damage the owner's property.

Hancock County High and Significant Hazard Dams

MEMA ID	Dam Name	Dam Owner	Town	River	Hazard	Regulator
105.0	Silver Lake	Bucksport Generation, LLC	Bucksport	Tannery	H	MEMA
508.0	Ellsworth	Brookfield Renewable Energy Group-Northeast operations	Ellsworth	Union	H	FERC
509.1	Graham Lake	Brookfield Renewable Energy Group-Northeast operations	Ellsworth	Union	H	FERC
509.2	Graham Lake Flood Control	Brookfield Renewable Energy Group-Northeast operations	Ellsworth	Union	H	FERC
106.0	Lily Pond	Island Heritage Trust	Deer Isle	Lily Br.	S	MEMA
107.0	Branch Lake	Ellsworth	Ellsworth	Branch Lake St.	S	MEMA
108.0	Lower West Bay Pond	Gouldsboro	Gouldsboro	Lower West Bay Stream	S	MEMA
112.0	Long Pond	Mount Desert	Mt. Desert	Long Pond Brook	S	MEMA
110.0	Alamoosook Lake	Bucksport Generation, LLC	Orland	Narramissic River	S	MEMA
111.0	Toddy Pond	Bucksport Generation, LLC	Orland	Brook to Alamoosook	S	MEMA
301.0	Ulmer Brook	Evelyn Joost	Verona	Ulmer Brook	S	MEMA

Source: Maine Emergency Management Agency

Extent of hazard from coastal storm surge. Most of the population of Hancock County resides near the coast and is therefore susceptible to storm surge created by a severe storm. The towns of Bar Harbor, Blue Hill, Brooklin, Brooksville, Bucksport, Castine, Cranberry Isle, Deer Isle, Ellsworth, Frenchboro, Gouldsboro, Hancock, Lamoine, Mount Desert, Orland, Penobscot, Sedgwick, Sorrento, Southwest Harbor, Stonington, Sullivan, Surry, Swans Island, Tremont, Trenton, Verona Island and Winter Harbor all have inhabited coastlines. The flooding caused by storm surges has also aggravated the coastal erosion problems in several towns. Bar Harbor has experienced erosion damages on the Old Bar Harbor Road; Castine has experienced erosion in the Back Shore Beach and Wadsworth Cove area; Cranberry Isle is subject to coastal flooding throughout town; Frenchboro has erosion and flooding at the Head of the Harbor area; Hancock has erosion at Carter's Beach; Lamoine has wash outs on the Berry Cove Road; Penobscot has erosion on the Northern Bay Road; Sedgwick has flooding and erosion in the Steam Boat Landing area; Tremont has erosion on the Cape Road; and Winter Harbor has a flooding problem in the Bay Street area. This is an annual problem in many of the towns. Deer Isle and Stonington can be cut off from the mainland when Sunshine Causeway is flooded by a storm surge event. The result of a flash flooding could and did necessitate the evacuation and temporary closure of Blue Hill Memorial Hospital until cleaned and water supplies were tested.

Storm surges can cause localized flooding and erosion along the coast and on Mount Desert Island. There have been five Category One hurricanes that have hit the Maine coast in the past century. These have caused flooding along the coast and on the islands and the high winds have damaged large amounts of trees, which in turn have created major electrical outages.

Extent of hazard from winter runoff. The majority of the flood damage in the County is caused by winter runoff in the spring time which undercuts or overtops rural 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 quicker than the watersheds can handle. This causes local water bodies to overflow their boundaries and flood nearby road surfaces. This has happened in the towns of Aurora, Bar Harbor, Brooklin, Bucksport, Castine, Eastbrook, Ellsworth, Franklin, Hancock, Lamoine, Mariaville, Osborn, Penobscot, and Sedgwick. Typically, this road damage is not major, though in severe weather events, it can absorb the municipal road maintenance budget for an entire year and does happen in several of the towns every year.

The Town of Dedham sustained $30,000 of damage to the Mountain Pond Road. The City of Ellsworth has had repetitive washouts on the Shore Road, Winkumpaugh Road, Happytown Road, Spindle Road, Union Street, Boggy Brook Road, Scotts Neck Way, Cove Way, Nicolin Road, and Bohn Road. The Town of Mariaville has erosion on the River Road. The Town of Mount Desert has had flooding at Bruey Cove and Seal Harbor beach. The Town of Sullivan has roadway flooding issues on Long Cove, Preble Cove, Sullivan Harbor, and Vista Way, and culvert overflow problems on Thorne Road, Morancy Road, and Bert Gray Road.

Previous Flooding Occurrences

Following is a table of major flooding occurrences for Hancock County as reflected primarily in federal disaster declarations or federal emergency declarations.

History of Flood Occurrences

Month	Year	County	Damages	Declaration
Feb 8	1978	*Statewide*, including Hancock	High winds, tidal surge,coastal flooding	*Presidential* FEMA-550-DR-ME
April 1 (The "April Fool's Storm")	1987	Hancock (1 town)	Flooding especially to dirt roads	*Presidential* FEMA-788-DR-ME
April (The "Easter Flood")	1993	Hancock	Flooding from heavy rains and snow melt	*Presidential* FEMA-988-DR-ME
Mar 29 – May 3	2005	Hancock	Severe storms, flooding, snow melt and ice jams	*Presidential* FEMA-1591-DR-ME
March 16-18	2007	Hancock	Rains and snow melt	*Presidential* FEMA-1691-DR-ME
April 15-23 (Patriot's Day Storm")	2007	Hancock	Severe storms, inland and coastal flooding	*Presidential* FEMA-1693-DR-ME
Sept 6	2008	Hancock	Severe storms, flooding	N/A did not meet state threshold

History of Flood Occurrences				
Month	**Year**	**County**	**Damages**	**Declaration**
Oct 8	2008	Hancock	Severe storms, flooding	N/A did not meet state threshold
June 18 -July 8	2009	Hancock	Severe storms, flooding	*Presidential* FEMA-1852-DR-ME
Mar 12 - Apr 1	2010	Hancock	Severe storms, flooding	*Presidential* FEMA-1920-DR-ME

Note: Hancock County has not been in a presidential declaration for flooding since 2010.

Probability of Occurrence

It can be expected that a major flood event will cause mostly road damage in Hancock County several times every decade. Known flood zones are shown on the municipal base maps included in this section.

Floods are described in local flood hazard studies in terms of their extent, including the horizontal area affected, and the related 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 government buildings and critical facilities located in flood-prone areas is 1% in any given year.

Severe Summer Storms

Severe summer storm damages typically involve downed power lines, flooding from heavy rains, debris in the roadways and erosion along the coast from storm surge. Severe summer storms can have an immediate impact on flooding, primarily as a result of heavy downpours.

Types of Severe Summer Storms in Hancock County:

- **Hurricane:** An intense, tropical cyclone, formed in the atmosphere over warm ocean areas, in which the maximum sustained surface wind is 74 miles per hour or more, and blow in a large spiral around a relatively calm center called the "eye." See Saffir Scale on the following pages.

- **Lightning:** a positive charge to build up on the ground beneath the cloud. The ground's electrical charge concentrates around anything that is elevated above it, such as mountains, lone trees, people, or even blades of grass. The charge streaming up from these points eventually connects with a charge reaching down from the clouds. Lightning strikes kill more people annually than tornadoes and hurricanes combined.

- **Thunderstorm:** a violent, short-lived weather disturbance that is almost always associated with lightning, thunder, dense clouds, heavy rain or hail, and strong winds.

- **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. See Fujita Scale on the following pages.

- **Microburst:** A small, extremely intense downdraft which descends to the ground creating strong wind divergence. Microbursts are typically limited to area 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.

Location of Severe Summer Storm Hazard

The entire County is vulnerable to one or more severe summer storms each year, usually in the form of thunderstorms. Due to the cooling effects of the ocean which tend to suppress thunderstorm activity, the coastal towns are less affected. Therefore, the effects of summer storms are usually more common in the inland areas of the County.

Extent of the Hazard

During the summer months, southwest to southerly winds become quite prevalent across the State. Because of the frequent formation of sea breezes, southerly winds are prevalent. When severe summer storms arrive in Hancock County, 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 Hancock County is usually restricted to flooding and erosion caused by the large amounts of moisture these storms can carry. Summer storms can cause damage to the low lying coastal roads and certainly to boats, beaches or seawalls.

The most damaging types of summer storms in Hancock 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 following tables provide information on various categories of hurricanes and tornados.

Saffir-Simpson Hurricane Scale		
Category	**Wind Speed**	
	mph	**Knots**
5	≥156	≥135
4	131-155	114-134
3	111-130	96-113
2	96-110	84-95
1	74-95	65-83
Non-Hurricane Classifications		
Tropical Storm	39-73	34-64
Tropical Depression	0-38	0-33

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

In 2007, the Blue Hill Peninsula (particularly in the town of Castine) was impacted by a microburst. Fourteen stately Elm trees were destroyed and roads blocked. Some property damages included homes in the area and equipment in the athletic field of Maine Maritime Academy. The micro burst also cut across the Towns of Brooklin and Blue Hill.

Photo by: Tony Sturey NWS Caribou

In 2009, Hurricane Bill's slow northward track off the eastern seaboard created a dynamic fetch and helped to produce a series of large open ocean waves aimed at coastal New England. Wave periods reached into the 15-17 second range. These large swells began arriving along the coast overnight Saturday into Sunday, and compounded with an abnormally high tide Sunday afternoon at 1:30 pm. As the swells arrived waves of 12 to 15 feet were common with occasionally larger waves.

On Sunday, August 23, 2009, as Hurricane Bill (downgraded to Tropical Storm) passed 200 nautical miles off the Hancock County coastline the large waves reached the surf zone, successive waves piled up along the shore, known as "wave setup". It was responsible for raising the mean water level between the breaking waves and the shore line. As breaking waves get larger, wave setup is amplified and raises the surf zone ambient water level allowing waves to surge up higher along the shore, closer to spectators watching the surf. The "wave setup" associated with Hurricane Bill along coastal Maine took many on-lookers by surprise, and certainly factored into the tragedy at Acadia National Park, when 10 spectators were sweep into the ocean. The result was that there was one loss of life and many injured.

Historical Summary of Hurricanes and Severe Summer Storms

Month	Year	County	Damages	Declaration
Sept. 11 "Edna"	1954	Hancock	Power outages; flooding and debris	Presidential #24
Oct. 29 "Ginny[i]"	1963	Hancock	Power outages; flooding and debris	No declaration
Sept. 6 "David"	1979	Coastal communities in Hancock County	Minor Damage	No declaration

Historical Summary of Hurricanes and Severe Summer Storms				
Month	**Year**	**County**	**Damages**	**Declaration**
Sept. "Diana"	1984	Coastal communities in Hancock County threatened	Minor Damages	No declaration
Aug	2007	Hancock (1 town; Castine)	Downed trees; road blockages	No declaration
Aug 23 "Bill"	2009	Hancock	1 death from large breaking wave	No declaration
Mar 12 Apr 1	2010	Hancock	Severe summer storm; flooding	Presidential DR-1920-ME
Aug 27-29 Tropical Storm "Irene"	2011	N/A	Though Western Maine experienced damages, Hancock County did not have significant damages	Presidential DR-4032
October Hurricane "Sandy"	2012	N/A	Though NY and NJ had billions in damages, Hancock County was not affected	N/A

Photo - Hurricane Bill Surf A.N.P.

Probability of Occurrence

There have been no probability studies to indicate the frequency of summer storms. However, Hancock County's location in the northeast, and its long experience with summer storms, indicate that each summer, such 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 Hancock County.

Wildfire

All parts of Hancock County could be subject to wildfires. The northern portion of the county has the least accessibility to the productive forest land due to the lack of roads and development, and the southern portion of the county has more homes and businesses within the wildland-urban interface.

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

- Wildland fires are defined as those fires that burn vegetative cover: grass, brush, timber, blueberry barrens or slash.

- Wildland urban interface (WUI) fires are created where homes meet with highly volatile forest fuels.

Location of Hazard

All parts of the County are potentially subject to wildfire. However, the northern portion of the county presents the greatest acreage of productive forestland and the southern portion, especially Acadia National Forest on Mount Desert Island, presents the greatest danger to destruction of homes and businesses. The most common causes of wildfire are man-made due to ~~a)~~ debris burning (this includes permitted burns such as the burning of blueberry barrens), machine uses, campfires, arson and smoking. The Maine Forest Service has made great strides in educating the public, through the internet and media outlets, on the dangers of wildland fires and mitigation activities.

Extent of the Hazard

Nearly 70% of the County is forest land and the northern half of the County contains vast tracks of unbroken forests. The most severe wildland fire in the County's recent history occurred in October of 1947, burned 17,846 acres, approximately 400 homes and caused 3 deaths on Mount Desert Island.

Previous Occurrences

The largest wildfires affecting Hancock County (those over a thousand acres) were in 1947. Part of this is due to today's prevention and suppression efforts which have been able to keep fires relatively small and contained, but again, this could be a challenge in prolonged drought conditions.

HISTORY- MAJOR WILDFIRES

Month	Year	County	Damages	Acreage	Declaration
Oct 23	1947	Hancock	Unknown for county	Unknown for county	n/a
Sep 5	1960	Hancock	Unknown for county	Unknown for county	n/a
Aug	1989	Hancock	Shut down of Jackson lab	n/a	n/a

Source: MEMA State Hazard Mitigation Plan, 2013; local knowledge
Note: there have been no significant wildfire events since August, 1989, as referenced above.

Probability of Occurrence

It is expected that low acreage wildland fire events will cause damages in Hancock County several times each year. However, they do not rise to the level of the 1947 fire as there have been considerable mitigation efforts through suppression and training. Hancock County has an active countywide fire fighters' association, automatic mutual aid, up-to-date fire-fighting resources and communication systems in place. The Maine Forest Service has made exceptional contributions in public education.

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; 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?

B3. Vulnerability of Hancock County to each Hazard and impacts of each Hazard on the County

Severe Winter Storms

Since Hancock County is located in the Northeast it is at high risk for winter storms. Therefore, the most likely damages from a severe winter storm event are the loss of electrical power, from downed power transmission lines, and the blockage of roadways, from tree debris, winter snow or ice. The coastal areas along the mainland and on the islands, which contain the vast majority of the county's population, are more likely to experience ice storms as opposed to the northern sections of the County, which are more likely to experience significant snowfall. The entire County is very susceptible to blizzards.

There is potential for loss of life caused by delayed responses from emergency services, carbon monoxide poisoning from the improper use of backup heat sources, such as portable generators, freezing conditions, and from storm-related vehicle accidents. Other types of general damage to personal and real property may be caused by blizzard or hurricane force winds. The very presence of a blizzard will hamper transportation routes in the area, resulting in some elderly or access and functional needs population isolated in their homes and at risk of hypothermia, lack of medications or food. Additionally there could be losses of income for local businesses.

While the majority of winter storms in Hancock 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 commute 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 throughout Central Maine in 1998 could impact nearly all of Hancock County and threaten overhead electric and telephone lines. Roads may be closed or partially blocked due to debris in roads from trees and utility lines.

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, when melting snows combine with rainstorms, the volume of water can overwhelm watersheds, ditches and culverts, leading to road and property damages.

Flooding

Some of the County's most serious flooding has been in coastal area, where flooding is worsened by tidal action which can result in coastal erosion. Many communities in Hancock County are rural in nature and are served by roads that do not have proper storm drainage systems. Spring run-off in areas with significant elevation may be impacted by flowing water undermining road beds and culverts, such as Blue Hill and Schoodic Peninsula, Northern Hancock County and Mount Desert Island. Most of the developed areas are located outside of designated flood plains. Though there are very few critical facilities in the 100 year flood zone, there are several facilities that are located in the Hurricane Surge Inundation Areas. In the event of a storm surge from a Cat 2 storm, flooding would likely impact communities in the Penobscot Bay area.

In Hancock County, the most likely damages caused by flooding are the destruction of roadways caused by washouts and undercutting. There could be loss of life caused by delayed responses from emergency services during high water (river and lake) conditions. Flood waters may also contaminate public and private water supplies and damage personal and real property. Flooding may shut down businesses, resulting in losses of income for local businesses and residents.

Severe Summer Storms

The entire county is vulnerable to thunderstorms, microbursts and high winds, especially high winds associated with severe coastal summer storms. The heavy, sudden rains from thunderstorms or the wind driven rains from tropical storms can overwhelm less than adequate drainage infrastructure and cause severe road washouts on interior gravel roads or erode roads along the coast. The damages from summer storms typically involve the washout of roads, downed utility lines and debris clearance. If severe enough, this can result in the loss of income to businesses and individuals due to business closures.

Wildfires

Because much of the county is forested, it can be vulnerable to wildfires. If a wildfire were to overwhelm the resources of municipal fire-fighting organizations, homes in the wildland-urban interface could be destroyed and valuable timber lands lost. Well-distributed rainfall normally reduces forest fire risks, but seasonal variations, rapidly draining soils and unusually dry periods can set the stage for major blazes. In addition, insect damage (such as the hemlock woolly aphid and spruce budworm) diseases, severe weather, and residential and commercial developments in wooded areas can greatly increase the potential for catastrophic fires. As modest growth is occurring largely in the remote areas of the county, mostly in the form of seasonal camps, the Maine Forest Service has increased fire safety education through its "Firewise" program.

B4. Repetitive Loss Properties

The National Flood Insurance Program (NFIP) maintains a file of repetitive loss properties (properties that have experienced more than one flood loss). Based on a review of repetitive loss properties contained in an Excel spreadsheet from the NFIP dated 11 September, 2015, there are no repetitive loss properties in Hancock County.

Assessing Vulnerability: Identifying Structures

The Hazard Mitigation Team identified 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 the County, or fulfills important public safety, emergency response, and/or disaster recovery functions.

The critical infrastructure facilities identified in Hancock County are municipal offices, fire and police stations, post offices, town garages and salt/sand sheds, hospitals and clinics, electric and communication utilities, water and wastewater treatment facilities, and schools.

Please note that 90% of fire fighters are volunteers and that "fire houses" are quite often older buildings that might shelter only one fire truck. These structures should not be confused with "fire stations" that are found in more densely populated towns.

Vulnerability of existing buildings, infrastructure, and critical facilities

The Hancock County Emergency Management Agency used existing Maine GIS map data and a handheld GPS data collector to map and locate the county's critical facilities and determine which are most likely to be affected by hazards. The four hazards most likely to impact the County are severe winter and summer storm events, wildland fires and flooding. The analysis revealed the following:

Severe Winter Storms.

A "Nor'easter", blizzard, ice storm or severe coastal storm of the severity that occurs at least once every 3-5 years would have an impact on all roads in the County and on all overhead electrical power and telephone lines. Roads may be covered in snow, washed out, or blocked with tree debris. Utility lines and poles will be felled. No critical structures were identified as being in danger from a severe winter storm. A coastal storm could cause general erosion and wind damage to coastal areas and buildings.

- **Buildings.** All buildings in Hancock County are vulnerable to winter storms. Damages can include burst water pipes during prolonged 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 Hancock 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.

Flooding

A 100-year flood would have an impact on many roadway surfaces, two major highway bridges, a municipal dock, a municipal sewer system, four fire stations, a municipal office, and a library. The most likely coastal flooding will occur with a Category 1 Hurricane. The downtown areas of Bar Harbor, Blue Hill, Castine, Gouldsboro (Prospect Harbor), Sedgwick, Southwest Harbor, Tremont and Winter Harbor, residential areas in Blue Hill, Brooksville, Castine, Cranberry Isles, Deer Isle, Frenchboro, Gouldsboro, Hancock, Lamoine, Orland, Penobscot, Sedgwick, Sorrento, Stonington, Sullivan, Surry, Swan's Island, Trenton and Winter Harbor will be impacted by a Category 1 Hurricane. Bar Harbor, Castine Village, Deer Isle, Mount Desert, Southwest Harbor, Stonington and Tremont would be cut off from the rest of the mainland.

- **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 Summer Storms.

A coastal storm of the severity that occurs at least once every 3-5 years would have an impact on all roads in the County and on all overhead electrical power and telephone lines. Roads may be washed out, or blocked with tree debris. Utility lines and poles will be felled. No critical structures were identified as in danger from a severe summer storm. A coastal storm could cause general erosion and wind damage to coastal areas and buildings.

- **Buildings.** All buildings in Hancock County are vulnerable to summer storms. Damages can include debris from broken 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 sudden debris buildup.

- **Critical facilities**. All critical facilities in Hancock 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

Forest fires would have a tremendous impact on the large number of homes located in the wildland-urban interface. We estimated that nearly 11,200 homes or 34% of the homes in Hancock County are located in the Wildland-Urban Interface.

- **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 Hancock 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.

Vulnerability of future buildings, infrastructure and critical facilities

There has been modest growth in Hancock County in the last 10 years, but very little growth is expected during the next five years. Between 1990 and 2000, Hancock County's population grew from 46,948 to 51,791, a gain of 4,843 people or 10%. Between 2000 and 2010, the County's population grew from 51,791 to 54,418, a gain of 2,627 people or 5%. Maine's Office of Policy and Management estimates that the county's population will decrease to 53,966, by 2017 (a loss of 452 people) and decline further to 53,140 by 2022. Given these projected declines, there are likely to be very few if any future buildings, infrastructure or critical facilities that will be vulnerable to the identified hazards.

Assessing where future development will occur in the towns in Hancock County is difficult due to a lack of municipal data, policies and programs. Most of the Hancock County towns are very small and rural and do not have planning departments, building codes or even a full time code enforcement officer. There is very little commercial, industrial and public construction completed in many of these communities. Floodplain ordinances, State mandated shoreland zoning ordinance and septic system designs are about the only controlling guidance.

Severe Winter Storms

- **Buildings.** New buildings in Hancock 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 Hancock County will experience much new road construction, with the possible exception of small road segments serving subdivisions.

- **Critical facilities**. Future critical facilities in Hancock 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.

Flooding:

The majority of damages from flooding in Hancock County affect the roads, not structures. We were unable to find any records of structures being lost in the County due to flooding in the last 65 years. However, most towns do have floodplain ordinances that provide some control over development in flood zones. Those towns that do not have flood zone ordinances do not have any special flood hazard areas that could ever flood structures. There are primarily streams that could potentially overtop local roads and most of those would be the old gravel roads with insufficient storm drainage.

- **Buildings.** The municipalities in Hancock 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 Hancock 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 Hancock 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 Summer Storms

It is very unlikely that a severe ~~winter or~~ summer storm will have any impact on future structures. Both of these hazards primarily impact local roads and overhead utility lines.

- **Buildings.** New buildings in Hancock County will be less vulnerable to summer storms. There may be damage to roofs, windows, and electrical systems 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 as older ones 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 Hancock County will experience much new road construction, with the possible exception of small road segments serving subdivisions.
- **Critical facilities**. Future critical facilities in Hancock County will be vulnerable to summer storms in the same manner that individual buildings will be vulnerable.

Wildfires

Forest fires in Hancock County towns primarily threaten residential structures in the wildland-urban interface. In all Hancock County communities, homes are allowed to be built anywhere, in any land use zone. Some communities may decide to provide wildland fire protection information to new residents who wish to build new homes at the time they are issued a land use permit.

- **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 Hancock County, it is unlikely there will 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 growth 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.

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 over 4,000 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.

Asset Inventory by Municipality

	Town Office	Fire Houses	Police	Public Works	School	Hospitals	Sewage Treatment	Water Supply	High or Significant Dams
Amherst	1	1	-	-	-	-	-	-	-
Aurora	-	-	-	-	1	-	-	-	-
Bar Harbor	1	1	1	1	1	1	1	1	-
Blue Hill	1	1	-	-	1	1	1	1	-
Brooklin	1	1	-	-	1	-	-	-	-
Brooksville	1	1	-	-	1	-	-	-	-
Bucksport	1	1	1	1	1	-	1	1	1
Castine	1	1	-	1	1	-	1	1	-
Cranberry Isle	1	1	-	-	-	-	-	-	-
Dedham	1	1	-	-	1	-	-	-	-
Deer Isle	1	1	-	1	-	-	-	-	1
Eastbrook	1	1	-	-	1	-	-	-	-
Ellsworth	1	1	1	-	3	1	1	1	4
Franklin	1	1	-	-	-	-	-	-	-
Frenchboro	1	1	-	-	-	-	-	-	-
Gouldsboro	1	1	1	-	1	-	-	-	1
Great Pond	-	1	-	-	-	-	-	-	-
Hancock	1	1	-	-	-	-	-	-	-
Lamoine	1	1	-	-	-	-	-	-	-
Mariaville	1	1	-	-	-	-	-	-	-
Mount Desert	1	1	1	1	1	-	1	1	1
Orland	1	1	-	-	-	-	-	-	2
Osborn	1	1	-	-	-	-	-	-	-
Otis	1	1	-	-	-	-	-	-	-
Penobscot	1	1	-	-	-	-	-	-	-
Sedgwick	1	1	-	-	-	-	-	-	-
Sorrento	1	1	-	-	-	-	-	1	-
Southwest Harbor	1	1	1	1	1	-	1	1	-
Stonington	1	1	-	1	-	-	1	1	-
Sullivan	1	1	-	-	1	-	-	1	-
Surry	1	1	-	-	1	-	-	-	-
Swans Island	1	1	-	-	1	-	-	-	-
Tremont	1	1	-	1	1	-	-	-	-
Trenton	1	1	-	-	1	-	-	-	-
Verona	-	-	-	-	-	-	-	-	1
Waltham	1	1	-	-	-	-	-	-	-
Winter Harbor	1	1	1	-	-	-	2	2	-

Assessing Vulnerability: Estimating Potential Losses

Historical data was used to estimate the potential dollar losses if the County were to experience severe winter storms, flooding, summer storms, or wildfires.

- Historical damage estimates have been updated, using the Consumer Price Index shown below.
- Presidential Disaster Declarations have been used where possible, updated for inflation using the Consumer Price Index.
- Where statewide or county damages are used to determine damages for a specific jurisdiction, the damages are pro-rated using the 2010 Census.

The average annual Consumer Price Index for various years is shown below based on a value of 100 for the years 1982 – 1984.

Consumer Price Index 1982-1984 = 100		
1947 = 22.3	1992 = 140.3	2005 = 195.3
1980 = 82.4	1993 = 144.5	2006 = 201.6
1981 = 90.9	1994 = 148.2	2007 = 207.3
1982 = 96.5	1995 = 152.4	2008 = 215.3
1983 = 99.6	1996 = 156.9	2009 = 214.5
1984 = 103.9	1997 = 160.5	2010 = 218.1
1985 = 107.6	1998 = 163.0	2011 = 224.9
1986 = 109.6	1999 = 166.6	2012 = 229.6
1987 = 113.6	2000 = 172.2	2013 = 233.0
1988 = 118.3	2001 = 177.1	2014 = 236.7
1989 = 124.0	2002 = 179.9	2015 = 237.0
1990 = 130.7	2003 = 184.0	2016 = 240.0
1991 = 136.2	2004 = 188.9	

Potential Severe Winter Storm Losses

The plan uses worst-case real-life damages to calculate potential winter storm damages and assumes that historic patterns will hold for the future. For Hancock County, the worst storm is the ice storm of 1998, which resulted in a statewide Presidential Disaster Declaration for damages of $47,748,466. The actual damages were closer to $100,000,000 because the Disaster Declaration did not cover damages to power lines and private structures. Using the Consumer Price Index, the $47.7 million in damages would be $70 million in 2016 dollars (multiply $47.7 million by 240.0, and divide by 163.0 – the CPI for 1998. The 1998 ice storm damages for each town (column A) is updated to 2016 dollars by multiplying each town's actual 1998 damages by 240 and dividing by 163 (Column B)

A second methodology for calculating potential losses in Hancock County is to assume severe winter storm losses based on $53 per capita. The $53 figure is calculated by taking the population of the 16 counties (1,328,361) and dividing it into total 1998 ice storm damages in 2016 dollars ($70.2 million) to get a per capita cost of $53. Each town's 2010 population is multiplied by $53 to get potential damages (column C).

The maximum potential winter storm damages (column D) is the greater of Column A or Column B.

Potential Winter Storm Damages in Hancock County

Town	A. Actual 1998 Ice Storm Damages in $	B. Updated 1998 Ice Storm Damages in $	C. Winter Storm Losses based on $53/capita	D Maximum Potential Winter Storm Losses $
Amherst	3,638	5,357	14,045	14,045
Aurora	8,126	11,965	6,042	11,965
Bar Harbor	52,138	76,768	277,455	277,455
Blue Hill	85,293	125,585	142,358	142,358
Brooklin	5,514	8,119	43,672	43,672
Brooksville	33,721	49,651	49,502	49,651
Bucksport	100,756	148,353	260,972	260,972
Castine	35,253	51,907	72,398	72,398
Cranberry Isles	0	0	7,473	7,473
Dedham	52,018	76,591	89,093	89,093
Deer Isle	23,198	34,157	104,675	104,675
Eastbrook	53,930	79,407	22,419	79,407
Ellsworth	215,744	317,661	410,273	410,273
Franklin	17,504	25,773	78,599	78,599
Frenchboro	0	0	3,233	3,233
Gouldsboro	6,209	9,142	92,061	92,061
Great Pond	0	0	3,074	3,074
Hancock	22,691	33,410	126,882	126,882
Lamoine	31,547	46,450	84,906	84,906
Mariaville	21,794	32,089	27,189	32,089
Mount Desert	0	0	108,809	108,809
Orland	48,953	72,078	117,925	117,925
Osborn	-	0	3,551	3,551
Otis	18,412	27,110	35,616	35,616
Penobscot	35,149	51,753	66,939	66,939
Sedgwick	15,784	23,240	63,388	63,388
Sorrento	7,665	11,286	14,522	14,522
Southwest Harbor	10,480	15,431	93,492	93,492
Stonington	21,560	31,745	55,279	55,279
Sullivan	2,064	3,039	65,508	65,508
Surry	22,115	32,562	77,698	77,698
Swans Island	-	0	17,596	17,596
Tremont	-	0	82,839	82,839
Trenton	8,594	12,654	78,493	78,493
Verona Island	18,860	27,769	28,832	28,832
Waltham	16,121	23,737	18,709	23,737
Winter Harbor	12,432	18,305	27,348	27,348
Unorganized Territory	16,560	24,383	11,289	24,383
Other	82,435	121,377	0	121,377
Total	**1,106,258**	**1,628,854**	**2,884,154**	**3,091,613**

Potential Flooding Losses

This plan uses worst-case, real-life damages to calculate potential flood losses, and assumes that historic patterns will hold for the future. Statewide, the worst-case flood is the April Fool's Day flood of 1987, which resulted in a Presidential Disaster Declaration of $100,000,000 in damages to 10 counties. While only one Hancock County town was included in that declaration, there is the potential that a similar storm in Hancock County could cause damages similar to flooding damages that occurred in other parts of the state in 1987.

Using the Consumer Price Index, the damages in 2016 dollars would be $211,268,000 (multiply $100 million by 240.0 and divide by 113.6). The methodology for calculating potential losses in Hancock County is to assume flood losses based on damages of $181 per capita. The $181 figure is calculated by taking the population of the 10 counties that suffered damages in 1987 (1,167,044) and dividing it into total 1987 flood damages in 2016 dollars ($211,268,000) to get a per capita cost of $181. Each town's 2010 population is multiplied by $181 to get potential flood damages.

Potential Flooding Damages in Hancock County

Town	Year-Round Population	Potential Flooding Damages (Population x $181)
Amherst	265	$47,965
Aurora	114	$20,634
Bar Harbor	5,235	$947,535
Blue Hill	2,686	$486,166
Brooklin	824	$149,144
Brooksville	934	$169,054
Bucksport	4,924	$891,244
Castine	1,366	$247,246
Cranberry Isles	141	$25,521
Dedham	1,681	$304,261
Deer Isle	1,975	$357,475
Eastbrook	423	$76,563
Ellsworth	7,741	$1,401,121
Franklin	1,483	$268,423
Frenchboro	61	$11,041
Gouldsboro	1,737	$314,397
Great Pond	58	$10,498
Hancock	2,394	$433,314
Lamoine	1,602	$289,962
Mariaville	513	$92,853
Mount Desert	2,053	$371,593
Orland	2,225	$402,725
Osborn	67	$12,127
Otis	672	$121,632
Penobscot	1,263	$228,603
Sedgwick	1,196	$216,476
Sorrento	274	$49,594
Southwest Harbor	1,764	$319,284
Stonington	1,043	$188,783

Potential Flooding Damages in Hancock County		
Town	**Year-Round Population**	**Potential Flooding Damages (Population x $181)**
Sullivan	1,236	$223,716
Surry	1,466	$265,346
Swans Island	332	$60,092
Tremont	1,563	$282,903
Trenton	1,481	$268,061
Verona Island	544	$98,464
Waltham	353	$63,893
Winter Harbor	516	$93,396
Unorganized Terr.	213	$38,553
Total	**54,418**	**$9,849,658**

Potential Severe Summer Storm Losses

Hurricane damages are included in the Severe Summer Storms category profiled in this Plan, and not as a separate category due to the low occurrence of hurricanes in Hancock County, as noted earlier in this Plan. Worst case, real life damages were used to calculate potential damages from hurricanes. Hurricane Edna produced statewide hurricane damages of $7 million in 1954. Maine's 1950 population was 913,774, resulting in per capita damage costs of $8. In 2016 dollars this would be $71 (multiply $8 by the 2016 CPI of 240.0 and divide by the 1954 CPI of 26.9).

The following table includes a town-by-town estimate of potential hurricane damages based on the 2010 Census and a per capita damage figure of $71.

Potential Severe Summer Storm Losses in Hancock County		
Town	**Year-Round Population**	**Potential Severe Summer Storm Losses (Population x $71)**
Amherst	265	$18,815
Aurora	114	$8,094
Bar Harbor	5,235	$371,685
Blue Hill	2,686	$190,706
Brooklin	824	$58,504
Brooksville	934	$66,314
Bucksport	4,924	$349,604
Castine	1,366	$96,986
Cranberry Isles	141	$10,011
Dedham	1,681	$119,351
Deer Isle	1,975	$140,225
Eastbrook	423	$30,033
Ellsworth	7,741	$549,611
Franklin	1,483	$105,293
Frenchboro	61	$4,331
Gouldsboro	1,737	$123,327

Potential Severe Summer Storm Losses in Hancock County		
Town	**Year-Round Population**	**Potential Severe Summer Storm Losses (Population x $71)**
Great Pond	58	$4,118
Hancock	2,394	$169,974
Lamoine	1,602	$113,742
Mariaville	513	$36,423
Mount Desert	2,053	$145,763
Orland	2,225	$157,975
Osborn	67	$4,757
Otis	672	$47,712
Penobscot	1,263	$89,673
Sedgwick	1,196	$84,916
Sorrento	274	$19,454
Southwest Harbor	1,764	$125,244
Stonington	1,043	$74,053
Sullivan	1,236	$87,756
Surry	1,466	$104,086
Swans Island	332	$23,572
Tremont	1,563	$110,973
Trenton	1,481	$105,151
Verona Island	544	$38,624
Waltham	353	$25,063
Winter Harbor	516	$36,636
Unorganized Terr.	213	$15,123
Total	**54,418**	**$3,863,678**

Potential Wildfire Losses. This plan uses worst-case, real-life damages to calculate potential wildfire losses, and assumes that historic patterns will hold for the future. The 1947 fire was the worst on record, although it was actually a series of wildfires that flared over Eastern and Southern Maine. The 1947 fire caused an estimated $30,000,000 in damages to Cumberland, Hancock, Oxford and York Counties. The damage in 2016 dollars would be about $323 million (multiply $30 million by 240.0, which is the consumer price index for 2016, and divide by 22.3, which is the consumer price index for 1947). While there is significantly more development in each of these counties today than there was in 1947, fire-fighting capabilities have also increased substantially since that time so there may be no need to further increase the damage estimate. The probability that a wildfire such as the 1947 fire will hit Maine during the five-year period covered by this Plan is not high.

The methodology for calculating potential wildfire losses in Hancock County is based on the damages that occurred in the 1947 fire in Cumberland, Hancock, Oxford and York Counties. The population of the four counties is 558,900. Divide $323 million (the 1947 fire in 2016 dollars) by 558,900 to get a per capita cost of $578. Multiply each town's 2010 population by $578 to get potential wildfire damages.

Potential Wildfire Losses in Hancock County		
Town	**Year-Round Population**	**Potential Wildfire Losses (Population x $578)**
Amherst	265	$153,170
Aurora	114	$65,892
Bar Harbor	5,235	$3,025,830
Blue Hill	2,686	$1,552,508
Brooklin	824	$476,272
Brooksville	934	$539,852
Bucksport	4,924	$2,846,072
Castine	1,366	$789,548
Cranberry Isles	141	$81,498
Dedham	1,681	$971,618
Deer Isle	1,975	$1,141,550
Eastbrook	423	$244,494
Ellsworth	7,741	$4,474,298
Franklin	1,483	$857,174
Frenchboro	61	$35,258
Gouldsboro	1,737	$1,003,986
Great Pond	58	$33,524
Hancock	2,394	$1,383,732
Lamoine	1,602	$925,956
Mariaville	513	$296,514
Mount Desert	2,053	$1,186,634
Orland	2,225	$1,286,050
Osborn	67	$38,726
Otis	672	$388,416
Penobscot	1,263	$730,014
Sedgwick	1,196	$691,288
Sorrento	274	$158,372
Southwest Harbor	1,764	$1,019,592
Stonington	1,043	$602,854
Sullivan	1,236	$714,408
Surry	1,466	$847,348
Swans Island	332	$191,896
Tremont	1,563	$903,414
Trenton	1,481	$856,018
Verona Island	544	$314,432
Waltham	353	$204,034
Winter Harbor	516	$298,248
Unorganized Terr.	213	$123,114
Total	**54,418**	**$31,453,604**

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.

There has been no known change in vulnerability in Hancock County over the past five years. Hancock County is located along the Downeast coastline of Maine and is largely rural. Much of the County's land use is designated as rural and is primarily forestland or farmland. The largest city, Ellsworth, which now has a year-round population of 7,741, is located in the southern half of the County. The land uses within the county generally consist of: residential, resource protection, agricultural, industrial, institutional and commercial areas.

The State of Maine Legislature enacted the Growth Management Act in 1989 (Title 30-A, Chapter 187, subchapter 2) which requires each community to develop a Municipal Comprehensive Plan. The municipal comprehensive plans allow development to occur in appropriate areas taking into account the environment, physical constraints, location of utility services, similarity to existing development, and proximity to flood zone areas.

The municipalities must review existing conditions and predict future needs in order to develop their own plans, policies, and ordinances. Most municipalities in Hancock County have enacted floodplain management, shoreland zoning, and other land use ordnances.

Severe winter and summer storms will have little impact on all land use areas and zones within the 37 communities in Hancock County because this hazard has the primary impact of shutting down transportation and power, which will shut down business, industry, commerce and schools and stop all social and emergency services.

Flooding will have an impact on land use areas in flood zones within the 37 communities in Hancock County. This hazard has the primary impact of shutting down transportation, since it is primarily the roads that are the object of flooding in the County. This could impact business, industry, commerce and schools and delay many social and emergency services.

The majority of the municipalities (35 of 37) and any unorganized townships within Hancock County's portion of the Unorganized Territory have current floodplain ordinances to prevent new commercial, industrial, and institutional development within flood zones. The Town of Amherst is not in the Flood Insurance Program. The Town of Aurora is not listed in FEMA's Community Status Book as either a participating or non-participating town. The Town of Verona joined the Flood Insurance Program in 2016. There are some existing commercial developments within flood zones in the County. However, many of these are fishing related. These businesses have been in place for many years and are upgraded to meet floodplain ordinances as the structures are renovated or replaced. Additionally, there are a number of homes and seasonal camps that are within the flood zones. Likewise, as maps are updated and these properties are mortgaged, they may be required to be upgraded in order to meet ~~the~~ ordinance requirements.

Wildfires will have an impact on the residential properties located within the wildland-urban interface. Because Hancock County is a very densely forested, sparsely populated area, there are a great number of homes that are at risk to destruction by forest fires. Currently, no municipality in Hancock County has wildfire restrictions or requirements on residential development.

The Hancock County Planning Commission has found that "Hancock County is facing very uneven growth", with the coastal communities having a relatively slow rate of year-round population while inland communities grow rapidly. For example, the Mount Desert Island towns had a 7% population increase between 1990 and 2000, while Mariaville experienced a 50% increase in the same time period. (Statistics can be deceiving, however. Statistically, Great Pond had an increase of 23.4% between 2001 and 2010 when the population of 47 people increased to 58 people.) Overall, the county's year-round population increased by about 50% between 1970 and 2000 compared to a 28% increase for the state as a whole. This imbalance is due in part to high coastal real estate values and taxes that force more people to move to less costly inland locations. Unfortunately, some of these cost savings are being offset by the cost of gasoline and maintenance for long commutes into the coastal employment centers.

The Hancock County Planning Commission also determined that another potential land development issue is the rapid increase in the number of second homes, whose numbers increased from 5,536 in 1970 to 10,672 in 2000 (that number was about 16,000 in 2010). Most of these have been built in waterfront and water view locations. In many cases, these homes have been built on roads with poor access for emergency services. These homes are often converted to year-round use when the owners retire."

As shown in the table below, Hancock County's population increased from 46,948 in 1990 to 51,791 in 2000, for a gain of 10%. A majority of the County's municipalities gained population during that same period. Between 2000 and 2010, the growth rate slowed to 5% as the County's population grew from 51,791 to 54,418.

Population Changes in Hancock County					
Town	**1990**	**2000**	**2010**	**% Change 1990-2000**	**% Change 2000-2010**
Amherst	226	230	265	2	15
Aurora	82	121	114	48	-6
Bar Harbor	4,443	4,820	5,235	8	9
Blue Hill	1,941	2,390	2,686	23	12
Brooklin	785	841	824	7	-
Brooksville	760	911	934	20	3
Bucksport	4,825	4,908	4,924	2	-
Castine	1,161	1,343	1,366	16	2
Cranberry Isles	189	128	141	-32	10
Dedham	1,229	1,422	1,681	16	18
Deer Isle	1,829	1,876	1,975	3	5
Eastbrook	289	370	423	28	14
Ellsworth	5,975	6,456	7,741	8	20
Franklin	1,141	1,370	1,483	20	8
Frenchboro	44	38	61	-14	61
Gouldsboro	1,986	1,941	1,737	-2	-11
Great Pond	59	47	58	-20	23
Hancock	1,757	2,147	2,394	22	12
Lamoine	1,311	1,495	1,602	14	7
Mariaville	270	414	513	53	24
Mount Desert	1,899	2,109	2,053	11	-3
Orland	1,805	2,134	2,225	18	4
Osborn	72	69	67	-4	-3
Otis	355	543	672	53	24
Penobscot	1,131	1,344	1,263	19	-6
Sedgwick	905	1,102	1,196	22	9
Sorrento	295	290	274	-2	-6
Southwest Harbor	1,952	1,966	1,764	1	-10
Stonington	1,252	1,152	1,043	-8	-9
Sullivan	1,118	1,185	1,236	6	4
Surry	1,004	1,361	1,466	36	8
Swans Island	348	327	332	-6	2
Tremont	1,324	1,529	1,563	15	2
Trenton	1,060	1,370	1,481	29	8
Verona Island	515	533	544	3	2
Waltham	276	306	353	11	15
Winter Harbor	1,157	988	516	-15	-48
Unorganized Terr.	178	215	213	21	-1
Total	**46,948**	**51,791**	**54,418**	**10**	**5**

Despite the modest population increases noted above for the two-decade period 1990 to 2010, Maine's Office of Policy and Management projects that Hancock County will gradually lose population in the coming years. The Office's projections show a 2017 population of 53,966, which is a decline of 452 people, or 1% from the 2010 population of 54,418. By 2022, the County's population is expected to decline further to 53,140, which is a loss of 826 people, or 2%, from the projected 2017 population of

53,966. Given this declining population, there is very little likelihood that new buildings, infrastructure or critical facilities would be vulnerable to the identified hazards. The table below shows projected population changes to 2022. Note that by 2022, most communities shown in the table are expected to lose population during the period 2010 to 2022.

Population Projections - Hancock County

Town	Census 2010	Projections 2017	Projections 2022	# Change 2010-2022
Amherst	265	260	256	-9
Aurora	114	109	104	-10
Bar Harbor	5,235	5259	5227	-8
Blue Hill	2,686	2668	2639	-47
Brooklin	824	791	760	-64
Brooksville	934	905	876	-58
Bucksport	4,924	4,789	4,637	-287
Castine	1,366	1,335	1,302	-64
Cranberry Isles	141	140	138	-3
Dedham	1,681	1,710	1,720	39
Deer Isle	1,975	1,953	1,918	-57
Eastbrook	423	422	419	-4
Ellsworth	7,741	7,997	8,118	377
Franklin	1,483	1,466	1,442	-41
Frenchboro	61	65	68	7
Gouldsboro	1,737	1,634	1,537	-200
Great Pond	58	59	59	1
Hancock	2,394	2,361	2,324	-70
Lamoine	1,602	1,628	1,627	25
Mariaville	513	535	547	34
Mount Desert	2,053	1,996	1,932	-121
Orland	2,225	2,171	2,114	-111
Osborn	67	64	61	-6
Otis	672	685	692	20
Penobscot	1,263	1,206	1,150	-113
Sedgwick	1,196	1,174	1,151	-45
Sorrento	274	260	248	-26
Southwest Harbor	1,764	1,669	1,576	-188
Stonington	1,043	985	931	-112
Sullivan	1,236	1,223	1,201	-35
Surry	1,466	1,449	1,425	-41
Swans Island	332	322	312	-20
Tremont	1,563	1,572	1,558	-5
Trenton	1,481	1,521	1,530	49
Verona Island	544	533	519	-25
Waltham	353	348	343	-10
Winter Harbor	516	503	489	-27
Unorganized Terr.	213	199	190	-23
Total	**54,418**	**53,966**	**53,140**	**-1,278**

Multi-Jurisdictional Risk Assessment

Hancock County is a mid-sized county of 54,418 people living in 1,522 square miles located along the coast of Maine within the eastern half of the state. There are 37 municipalities and 15 Unorganized Townships within the County's portion of the Unorganized Territory. All thirty-seven municipalities contributed to the risk assessment analyses performed for the Hancock County Hazard Mitigation Plan in the previous pages of this section.

Winter Storms: The Planning Team identified severe winter storms as the most significant natural risk to the entire County. All areas of Hancock County are susceptible to ice storms, blizzards and "Nor'easters," as well as severe summer storms. Severe winter and summer storms can shut down transportation and power which, in turn, can shut down businesses, industry and commerce, and/or impede social and emergency services. However, the risks vary between the two primary regions of the County - the coastal communities and the inland communities.

Flooding: All areas are at risk from flooding caused by coastal storms and hurricanes. However, the coastal and island communities face the greatest potential losses. The towns of Bar Harbor, Blue Hill, Brooklin, Brooksville, Castine, Cranberry Isle, Deer Isle, Gouldsboro, Hancock, Lamoine, Mount Desert, Penobscot, Sedgwick, Sorrento, Southwest Harbor, Stonington, Sullivan, Surry, Swans Island, Tremont, Trenton and Winter Harbor all have inhabited coastlines. Additionally, these communities contain 67% of the County's summer population, many of whom are seasonal visitors. The remediation of severe storms and the subsequent risks from coastal erosion and storm surge flooding identified in the Mitigation Plan is limited to these communities.

Wildfire: Although all areas are potentially at risk from forest fires, it is the sparsely-populated areas of the northern parts of the county that could face extensive acreage losses and the communities in and around Acadia National Park, which contains 10,000 acres of forestland, that could face extensive damages to homes and businesses. The northern part of the county contains fifteen unorganized townships in Hancock County's portion of the Unorganized Territory and the towns of Amherst, Aurora, Eastbrook, Great Pond, Mariaville, Osborn, and Waltham. These communities account for 3% of the County's year round population. Resources from the municipal fire departments are very limited for wildland firefighting.

Base Maps

This section contains a base map for each of the 36 towns, 1 city and a general base map of the county that also shows the 15 townships within Hancock County's portion of the Unorganized Territory. The maps were revised in 2011 by LatLong Logic and if the layers were available, they contained the following:

- Municipal Boundaries
- State and Local Roads
- USGS Topographical Contours
- Lakes, Ponds, Rivers, Streams, and Wetlands
- Locations of critical facilities
- FEMA FIRM Flood zone Areas
- Evacuation routes