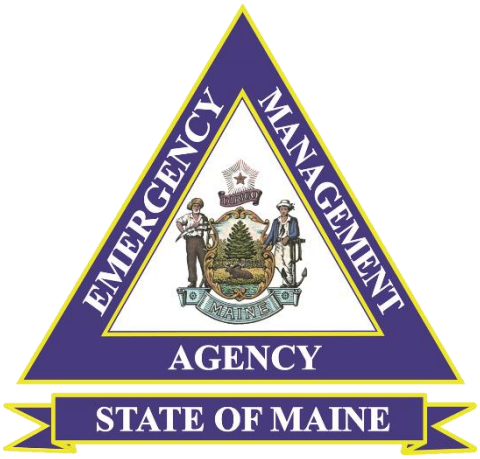
MAINE STATE HAZARD MITIGATION PLAN

2019

Abstract

"Natural hazard mitigation planning is a process used by state, tribal, and local governments to engage stakeholders, identify hazards and vulnerabilities, develop a long-term strategy to reduce risk and future losses, and implement the plan, taking advantage of a wide range of resources."
FEMA

Maine Emergency Management Agency
45 Commerce Dr. Augusta, ME 04333



OCTOBER 2019

Peter J. Rogers, Acting **Director**

Maine Emergency Management Agency

Joe Legee**,** Acting **Deputy Director**

Maine Emergency Management Agency

Prepared By:

MEMA State Hazard Mitigation Officer & Natural Hazards Planner

MAINE STATE HAZARD MITIGATION PLAN – 2019 Update

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

Background

Maine's geography and climate exert great influence on the occurrence and severity of the State's natural hazards. Although the State is usually able to handle these hazards, overwhelming events, such as the April 1987 Flood, the 1998 Ice Storm, and most recently the 2017 Wind Storm have all required federal assistance. *The Maine State Hazard Mitigation Plan* was originally prepared to refine mitigation efforts and eligibility for federal disaster relief in 1987. In accordance with Federal Emergency Management Agency (FEMA) guidelines, this 2018 version reflects the most recent research, analysis and mitigation planning. Following the Disaster Mitigation Act of 2000, the State has updated the Plan as follows:

Table 1.1: State of Maine Natural Hazard Mitigation Plan History

Plan	FEMA Approval Date
Maine Natural Hazards Mitigation Plan	2004
Maine Natural Hazards Mitigation Plan	2007
Maine Natural Hazards Mitigation Plan	2010
Maine Natural Hazards Mitigation Plan	2013*

*After 2013 State Natural Hazard Mitigation Plans were converted to 5-year plans

Authority

The *Maine State Hazard Mitigation Plan - 2018 Update* has been adopted to satisfy the requirements outlined in Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-288, as amended) for federal disaster assistance and enacted under the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390).

Purpose

The reason this *Plan* exists is to provide strategic guidance for a hazard resilient state that vigilantly assesses, plans for, and mitigates risk associated with natural disasters that pose a threat to the State of Maine.

Scope

This *Plan* addresses mitigation of all known *natural* hazards in the State of Maine. Natural hazards are defined as extreme weather events that can cause damage to people or property. Natural hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.

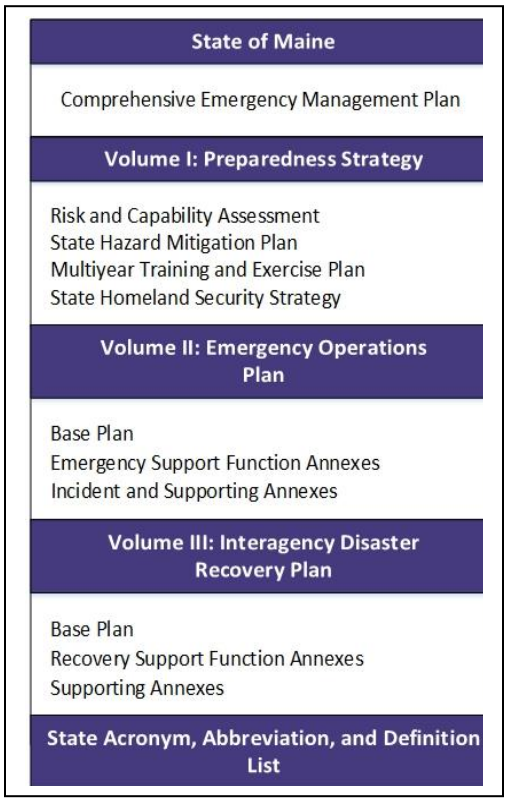


Figure 1.1: Comprehensive Emergency Management Plan (CEMP) Organizational Chart

This *Plan* is part of the state's comprehensive emergency planning and resides in Volume I: Preparedness Strategy of Maine's Comprehensive Emergency Management Plan (CEMP).

This *Plan* places natural hazards that rarely occur, that have relatively small impacts, or are difficult to individually profile, under broader seasonal headings. Events that tend to occur in the summer, such as thunderstorms and tornados, are included under "Severe Summer Weather" though it is possible for them to occur at other times of year. Accordingly, blizzards, ice storms, nor'easters, and snow storms are grouped under "Severe Winter Weather" even though nor'easters can occur in other seasons. The hurricane hazard is a notable exception. Based on its potential for catastrophic damages, it is profiled separately in the "Hurricane" section.

To coordinate planning efforts, material for these sections of the *Plan* were drawn largely from meetings, notes and records of the Department of Agriculture Conservation and Forestry, the Maine Geological Survey, and the Maine Department of Transportation as well as the National Weather Service and the United States Geological Survey.

State Profile

Maine's geography, climate, and demography significantly affect the state's potential natural hazards and the state's vulnerability to those hazards. The purpose of the State Profile section is to outline and add context to the factors that determine Maine's risk to natural hazards.

Geographic Profile

The State of Maine covers 35,385 square miles, spanning 210 miles from east to west and 320 miles from north to south. As the largest of the six New England states, the land area of Maine accounts for nearly half of the 71,992 square miles that make up the New England region.

Physical Geography

The present-day landscape is a direct result of glacial erosion and deposition from the large ice sheets that completely covered Maine approximately 14,000 years ago. A variety of glacial deposits cover the state, 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 for household and industrial water supplies.

Maine is a water rich state with five major rivers and 5,779 lakes and ponds. Water accounts for 13.5 percent of Maine's land cover. Much of Maine is under coastal influence, as the easternmost state in the United States. The State's tidally influenced coastline stretches 3,478 miles and is characterized by its rugged shape, numerous islands, peninsulas, bays, and inlets.

River Basins

There are seven major river basins across Maine, summarized below in Table 1.2, and described in further detail in the proceeding paragraphs.

Table 1.2: Major River Basins in Maine

River Basin	River Length	Drainage Area (miles ²)	Population	Counties	Jurisdictions
Androscoggin	169 miles	3,500 (portion in NH)	169,000	6	66 plus UT*
Kennebec	145 miles	5,900	211,000	9	90 plus UT*
Penobscot	26 miles	8,570	172,000	7	111 plus UT*
Presumpscot	105 miles	1,070	73,000	2	12
Saco	75 miles	1,700 (portion in NH)	67,1000	3	31 plus UT*
St. Croix	71 miles	1,650 (portion in Canada)	7,900	4	18 plus UT*
St. John	420 miles	21,400 (portion in Canada)	69,000	4	46 plus UT*

NOTE: UT = Unorganized Territory, or area that lacks local, incorporated municipal government.

Androscoggin River Basin:
The Androscoggin River runs 169 miles from its Umbagog Lake source in Errol, New Hampshire to its mouth at Merrymeeting Bay near the borders of Cumberland, Lincoln, and Sagadahoc Counties. The Androscoggin River Basin drains from the western boundaries of Maine and New Hampshire. While it drains less area than the Kennebec River Basin, the river has a more rapid fall (1,245 feet from its source) with an average slope of almost eight feet per mile. The river's steep slope has historically attracted mill-based industries and towns such as Livermore Falls, Lewiston, Auburn, Lisbon Falls and Topsham along its course. Before offshore outsourcing, the mills manufactured products as diverse as paper, textiles and shoes. Floods have historically

been severe in some of the downtown locations where development was extensive, particularly in Oxford County which has been the most vulnerable to floods in the last 36 years. After major ice jam flooding in December 2003, the Town of Canton located in Oxford County, applied for and won a $3 million FEMA Pre-Disaster Mitigation acquisition/demolition project. Due to the proximity of the river to Oxford County, York County, and the state of New Hampshire, mutual aid agreements have been established to emphasize cooperation across emergency plans.

Kennebec River Basin:
The Kennebec River Basin occupies approximately 5,900 square miles of southwestern Maine. The river basin originates at Moosehead Lake and flows south approximately 145 miles to Merrymeeting Bay. The Kennebec River joins the Androscoggin River in Merrymeeting Bay before exiting to the ocean at Fort Popham. The upper two-thirds of the basin are hilly and mountainous and the lower third of the basin has gentle topography representative of a coastal drainage area. Major communities in this basin include Bingham, Anson, Madison, Norridgewock, Skowhegan, Waterville, Winslow, Augusta, Hallowell, and Gardiner. Storage dams, such as Wyman Dam in Somerset County, control the upper part of the Kennebec River Basin, and the basin below the dams is largely uncontrolled affecting communities built extensively in floodplains. Notably, the lower third of the river basin is also relatively susceptible to tidal influence as far north as Augusta.

Presumpscot River Basin:
Sebago Lake is the source of the Presumpscot River which drains into Casco Bay in Portland, 26 miles downstream. The basin includes some area to the north of Sebago Lake, and the terrain across the basin is generally hilly. While the Presumpscot River Basin covers a small geographic area, it is home to some of the highest population density in the state of Maine.

Penobscot River Basin:
The Penobscot River runs 105 miles from its source at the confluence of its east and west Branches in Medway to its mouth in Penobscot Bay. With a land area of 8,570 square miles, the Penobscot River Basin drains almost as large an area as the Kennebec and Androscoggin Rivers combined. It drains a large portion of the north-central part of the state from the Canadian border to Penobscot Bay. It includes most of Maine's pristine bogs and ponds and includes Baxter State Park near its center. A system of upstream dams, the relatively gradual fall of the river averaging only three feet per mile, and the presence of extensive wetlands in the eastern part of the basin have in the past prevented massive floods. The Piscataquis River in the upper part of the basin, however, passes through a series of small communities with many downtown areas vulnerable to spring flooding. The Kenduskeag River flows through Bangor and joins the Penobscot in the downtown area. It has occasionally caused considerable flooding damage to Bangor's downtown.

Saco River Basin:
With a land area of 1,700 square miles, the Saco River Basin has approximately a quarter of the drainage area of the Kennebec River but no upstream storage dams. The Saco Basin is generally described as embracing all of York County, as well as most of Cumberland County, and the southern portion of Oxford County. The Saco River runs 75 miles from Crawford Notch in New Hampshire to Biddeford. Several small rivers with small exclusive basins comprise this area. It includes small rivers like the Kennebunk, Mousam, Presumpscot, Royal, Ogunquit and the Maine portion of the Piscataqua and Salmon Rivers. Many of the smaller rivers such as the Mousam have experienced significant flooding in recent years.

St. Croix River Basin:
At 1,650 square miles, the St. Croix River Basin has as much drainage area as the Saco River Basin, but it is controlled by upstream storage dams. The Saco, St. Croix, and St. John rivers do not have the extensive floodplain development of the Kennebec and Androscoggin Rivers. The St. Croix River runs 71 miles from the Chiputneticook Lakes to Passamaquoddy Bay and serves as the international border between Maine and Canada. The basin includes the area known as "Down East". Most of the basin is subject to tidal influence, but it is also comprised of many smaller rivers such as the Dennys, Pleasant, Machias, Narraguagus and Union Rivers. This area has historically been sparsely populated, but has experienced increasing pressures for development. Most flood damages in this basin are to infrastructure rather than residential and commercial structures.

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

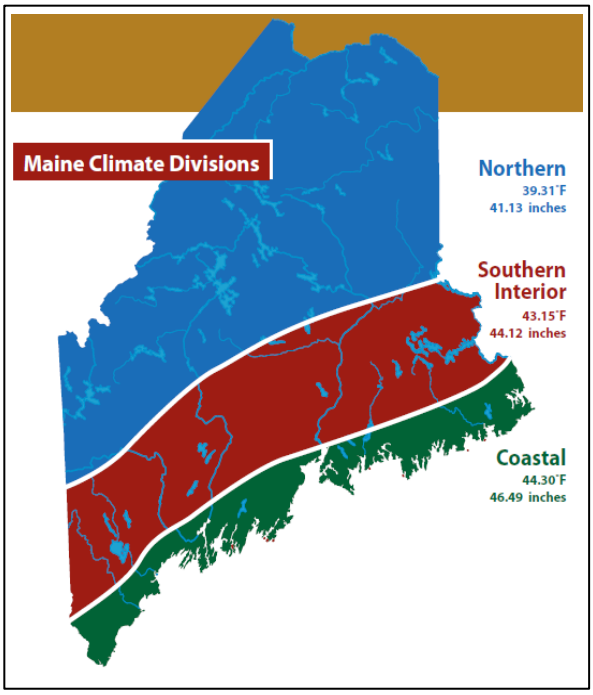
Topography and Land Cover

Maine is a heavily forested state. 7,016,000 hectares of forested land account for 83 percent of Maine's land area, making it the most heavily forested state in the country[1]. As home to the Appalachian Mountain Range, ground elevations range in Maine from sea level to over 5,000 feet. Mount Katahdin, the northern terminus of the Appalachian Trail, is the highest elevation in Maine at 5,268 feet. There are a total of fourteen mountains over 4,000 feet in Maine. Overall, the terrain across much of the state is hilly with elevations in the southeastern part of the state generally below 500 feet. The terrain rises northward from this coastal plain to heights of 1,000 feet in northernmost Maine and northwestward to the peaks within the central to western part of the state. Peaks within the central to western part of the state top out in the 3,000 to 5,000-foot range. The highest elevations in the northwestern-most part of the state are in the 1,000 to 1,500-foot range.

Climate

Maine is in a humid continental climate region which is characterized by large seasonal temperature differences, with warm to hot summers and cold winters. Within Maine there are three climate divisions, whose boundaries run roughly parallel to the coast, as classified in Figure 1.2, by the National Oceanic and Atmospheric Administration (NOAA). The northern interior, southern interior, and coastal.

[1] https://www.nrs.fs.fed.us/pubs/jrnl/2012/nrs_2012_nowak_002.pdf



The Northern Division: Encompasses the northernmost 17,916 square miles (54%) of the state. This division is least affected by marine influences and it contains most of the central and western mountainous regions.

The Southern Interior Division: Contains the 10,307 square miles adjacent to the Northern Division and represents 31% of the state's area.

The Coastal Division: Occupies the smallest area, a 20 to 30-mile band along the coast or 4,992 square miles (15% of the state's area). This division is most affected by the ocean but has minimal elevation change and thus, minimal climatic impact from any topographic controls.

Figure 1.2: Maine's Climate Divisions.
Source: Maine's Climate Future – 2015 Update

Maine's climate gradient, a way to quantify rate of change in temperature and precipitation, is extraordinary across the state. A depicted in Figure 1.3, the climate gradient that exists in three degrees of latitude in Maine occurs over 20 degrees of latitude in Europe, a distance approximately twice the length of California.

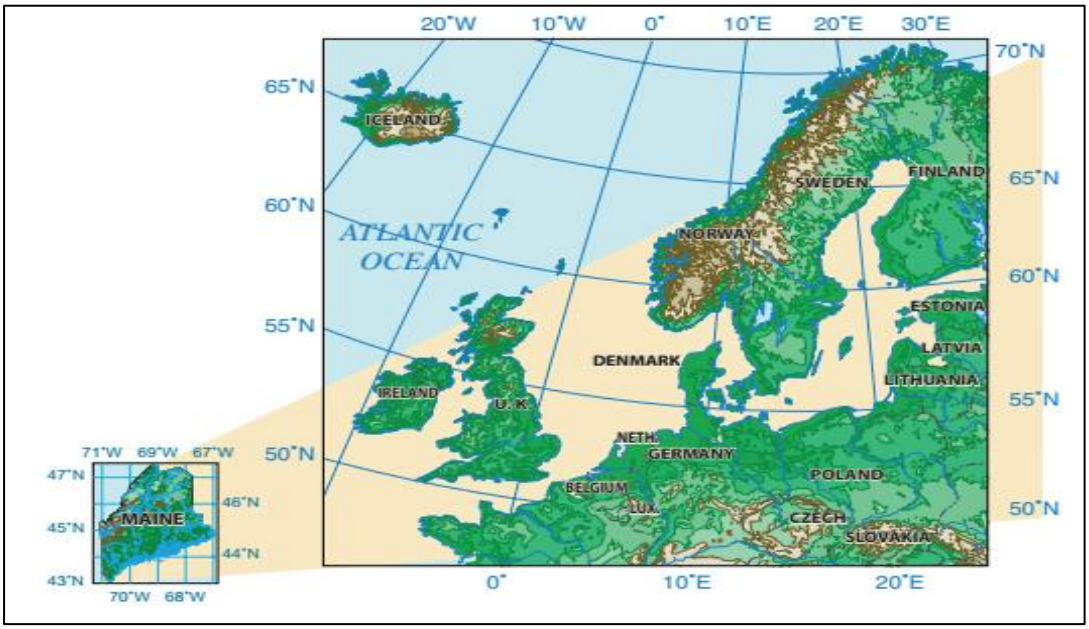


Figure 1.3: The climate gradient of Maine compared to the climate gradient of northern Europe. Source: Maine's Climate Future – 2015 Update

Temperature

The mean statewide annual temperature is 40.3˚F based on NOAA data collected between 1895 and 2016, though that figure varies amongst the climate divisions (as depicted in Figure 1.2). To date, the highest temperature ever recorded in the state was 105˚F, with the lowest at –50˚F. This range demonstrates the broad "variability" that can occur during the seasons, and from year to year. On average Maine is considered a cool weather state. Figure 1.4 depicts statewide mean monthly temperatures, average high monthly temperatures, and average low monthly temperatures.

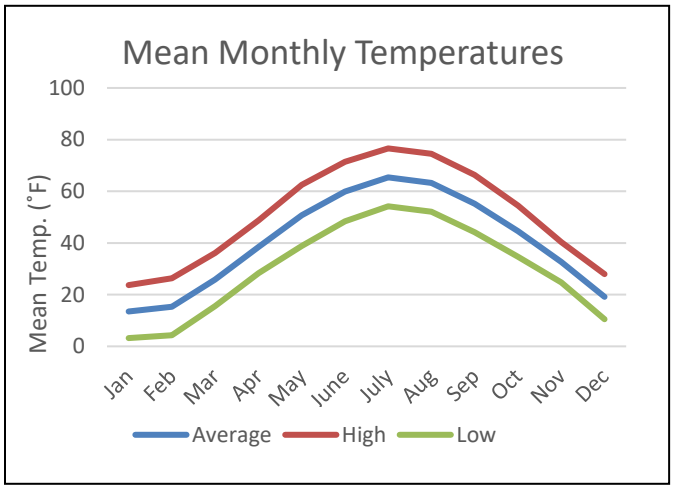


Figure 1.4: Mean Monthly Temperatures

The mean annual temperature varies greatly across the state of Maine. The mean annual temperature in the coastal region is 43.8˚F. The mean annual temperature in the northern interior is 38. The mean annual temperature in the southern interior is 42.5˚F. On average, July is the warmest month in Maine, with a statewide mean temperature of 65.4˚F. Conversely, January is the coldest month on average, with a statewide mean temperature of 13.5˚F. These temperature variations demonstrate the distinct climate divisions and seasons across the state of Maine.

Precipitation

Maine averages 42.6 inches of precipitation annually statewide, based on precipitation data collected between 1895 and 2016. The mean annual precipitation across each area is depicted to the right in Figure 1.5. This includes the conversion of all snowfall to water-equivalent.

On average, the coastal division receives the most annual precipitation, at 46.1 inches, followed by the southern interior at 44.1 inches and the northern interior at 40.9 inches annually on average.

Average monthly precipitation statewide ranges from a low of 2.6 inches in February to a high of 4.0 inches in November. Figure 1.6 graphically depicts mean annual precipitation statewide, and mean annual precipitation by climate division.

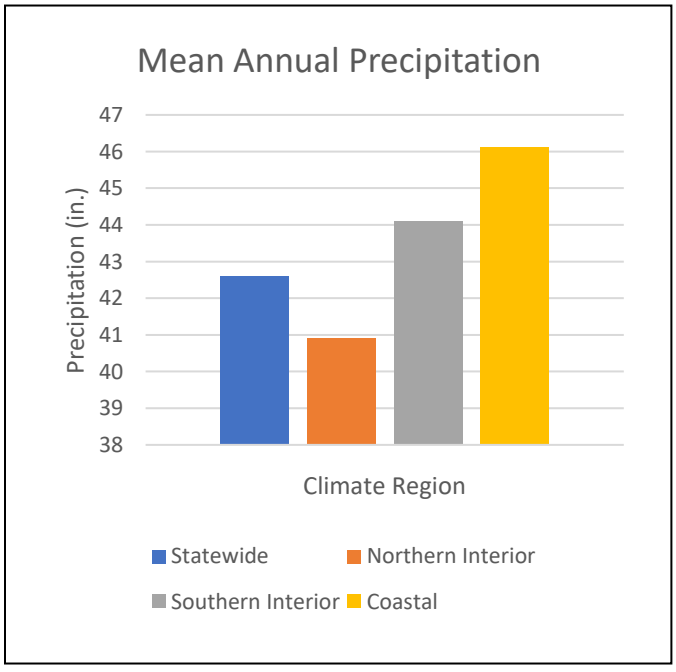
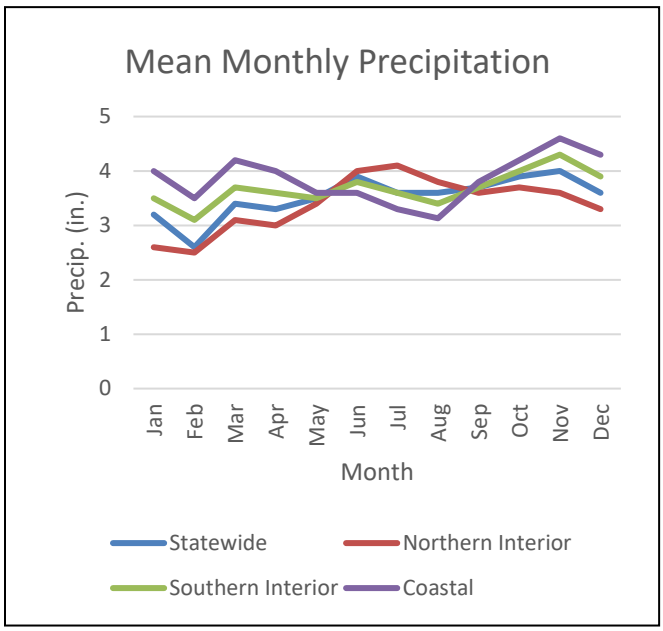


Figure 1.5: Mean Annual Precipitation



The fairly equal distribution of precipitation during the year is driven, in part, by winter precipitation amounts that are greater than summer precipitation amounts. The easternmost portion of Maine is the only place east of the Rocky Mountains, except for the lee side of the Great Lakes, that receives more precipitation during the winter than the summer. Coastal storms provide abundant winter precipitation, whereas the cool ocean water and sea breeze help to limit convective activity during the summer, thus inhibiting abundant thunderstorm activity that is responsible for so much of the summer precipitation in the rest of the central and eastern parts of the country.

Figure 1.6: Mean Monthly Precipitation

Prevailing Winds

Prevailing wind direction varies across the state 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 state 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 across the state. In fact, southerly winds prevail along the Mid-Coast and ""Down East"" portions of the state during the summer. Part of the reason for the prevalence of winds from these directions during the summer is the frequent formation of a sea breeze. A sea breeze can kick-in anywhere along the coast during the spring as well. The formation of a sea breeze especially occurs when regional winds are weak during the summer months. The sea breeze produces the cool, refreshing temperatures during the summer along the coast.

Climate Change

The following portion of the introduction focuses on long term climate trends which include changes in temperature, precipitation, and sea level. The acute short-term weather events such as rain storms, heat waves, or drought referred to in this plan are generally considered isolated potentially hazardous natural weather events and will therefore not be covered in the section. For clarification, the National Aeronautics and Space Administration (NASA) uses the following definitions to describe climate and weather:

Climate: The description of the long-term pattern of weather in a particular area.[2]

Weather: The description of the way the atmosphere is behaving in the short term, from minute to minute, hour to hour, day to day, and season to season.

[2] https://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html

As Mainers are aware, the state has long had a highly variable climate, characterized by abrupt weather variations day-to-day, month-to-month, and year-to-year.

Temperature

Average annual temperature in Maine has warmed by about 3° F (1.7° C) between 1895 and 2014. Although the warming trend over the past 120 years across Maine is clear, Maine's temperature signal demonstrates significant year to year variations characterized by periods of relative cold (circa 1900-1925, 1965-1990) and periods of relative warmth (1930-1960).

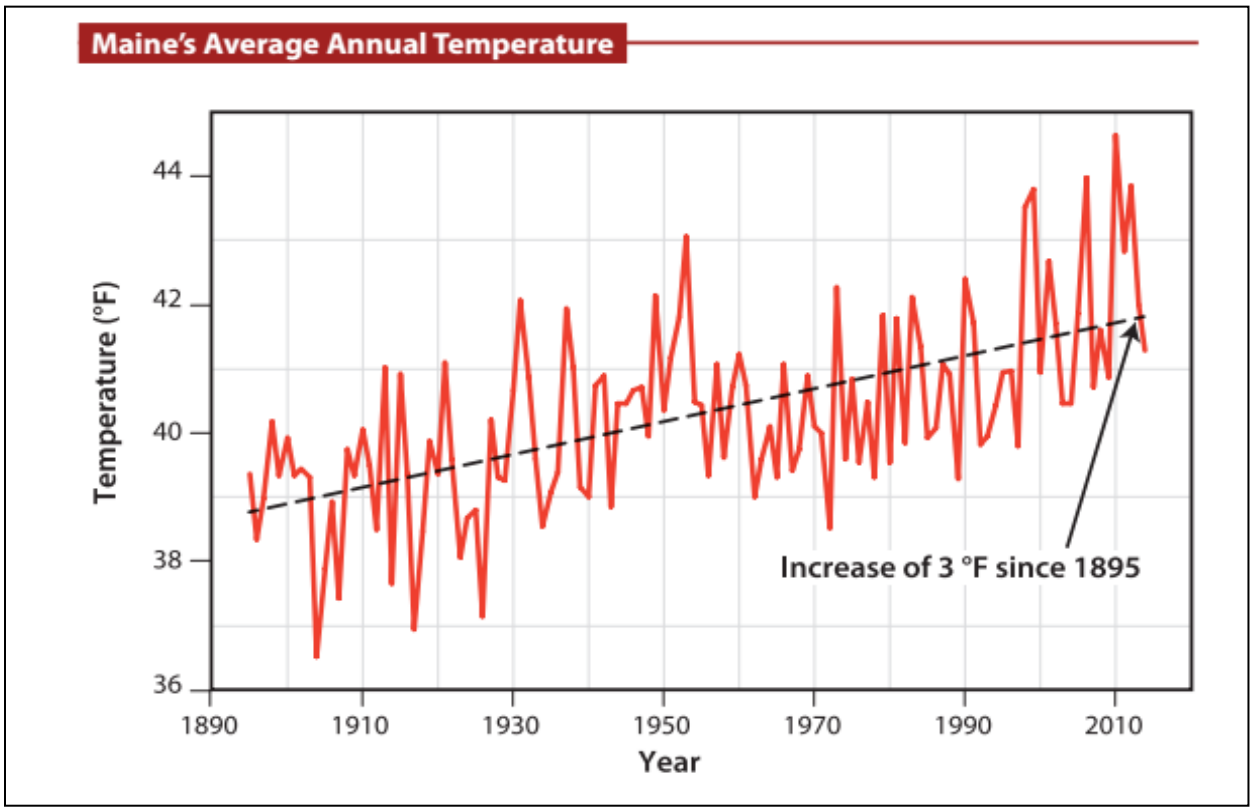


Figure 1.7: Maine's Average Annual Temperature, 1895-2014.
Source: Maine's Climate Future – 2015 Update.

<u>Seasonal Temperatures Statewide:</u>
Average seasonal temperatures have warmed in all four of Maine's distinct seasons; winter, spring, summer, and fall. Winter is warming at a faster rate than summer. Resultantly, the warm season in Maine from 1995 to 2014 was two weeks longer than the warm season from 1895 to 1914.

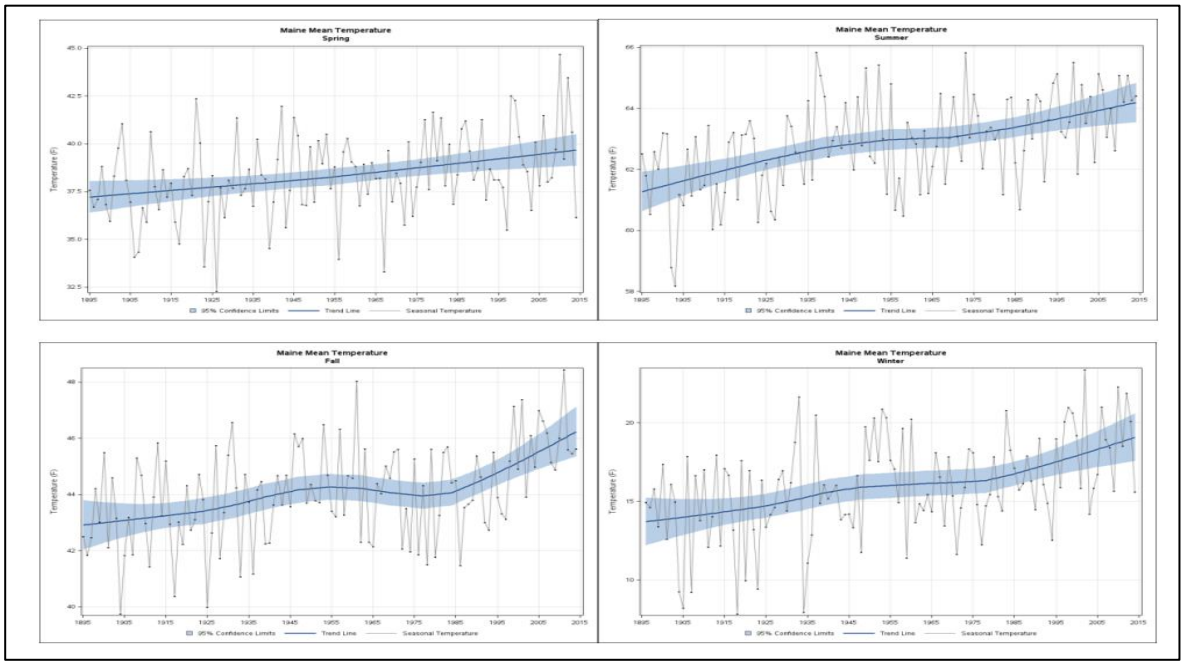


Figure 1.8: Temperatures warmed in all four seasons between 1895 and 2014. That trend is indicated by the mean temperature graphs above, clockwise from top left: spring, summer, fall, winter. Source: https://www.ncdc.noaa.gov/temp-and-precip/state-temps/

Maine's warm season increased by two weeks from the early 1900's to the present, as indicated by Figure 1.9, based on NOAA climate data. Winter is warming at a faster rate than summer state wide. From 1995 to 2014 Maine's warm season, which the University of Maine's Climate Change Institute defines as when daily average temperature is above freezing, now extends from March 26 to November 20. Maine's warm season from 1895 to 1914 lasted from April 1 to November 12, or two weeks shorter.

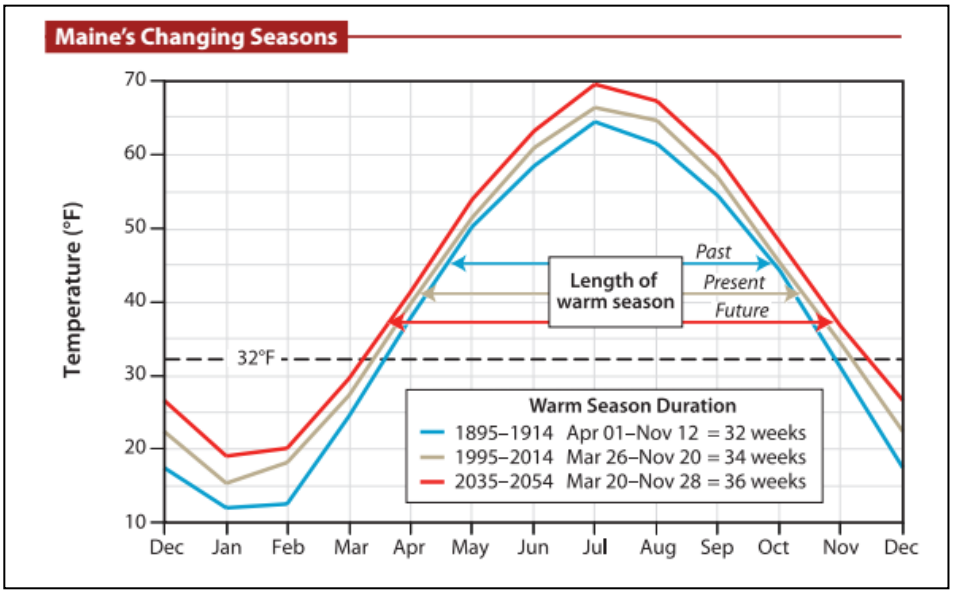


Figure 1.9: Maine's Changing Seasons.
Source: Maine's Climate Future – 2015 Update.

Annual Temperature by Climate Region:
Average annual temperatures have warmed in all three of Maine's climate regions, which include the coastal, southern interior, and northern interior regions.

Table 1.3: Changes in mean annual temperature by climate region based on 30-year normal temperatures from time periods 1895-1924 and 1987-2016. Data compiled from NOAA's National Centers for Environmental Information.

	Mean Annual Temperature 1895-1924	Mean Annual Temperature 1987-2016	Change in Mean	Percent Change in Mean
Coastal	42.5 ˚F	45.1 ˚F	2.6 ˚F	6.1
Southern Interior	41.2 ˚F	43.7 ˚F	2.5 ˚F	6.0
Northern Interior	37.0 ˚F	39.3 ˚F	2.3 ˚F	6.2

Future Temperature Projections:
Based on information compiled by the University of Maine's Climate Change Institute, the International Panel on Climate Change (IPCC) models predict that annual temperature in Maine will increase another 3 to 5° F between now and 2050. The rate of temperature increase is predicted to rise from the coastal climate region to the northern interior climate region.

Precipitation

Total annual precipitation increased by about 6 inches, or 13%, between 1895 and 2014.

Statewide Seasonal Precipitation:
Most of the increased precipitation occurs in the summer and fall. While average annual precipitation has increased, the average annual snowfall across Maine decreased by approximately one inch, or 15%, from 1895 to 2014. This information is graphed in Figures 1.10 and 1.11.

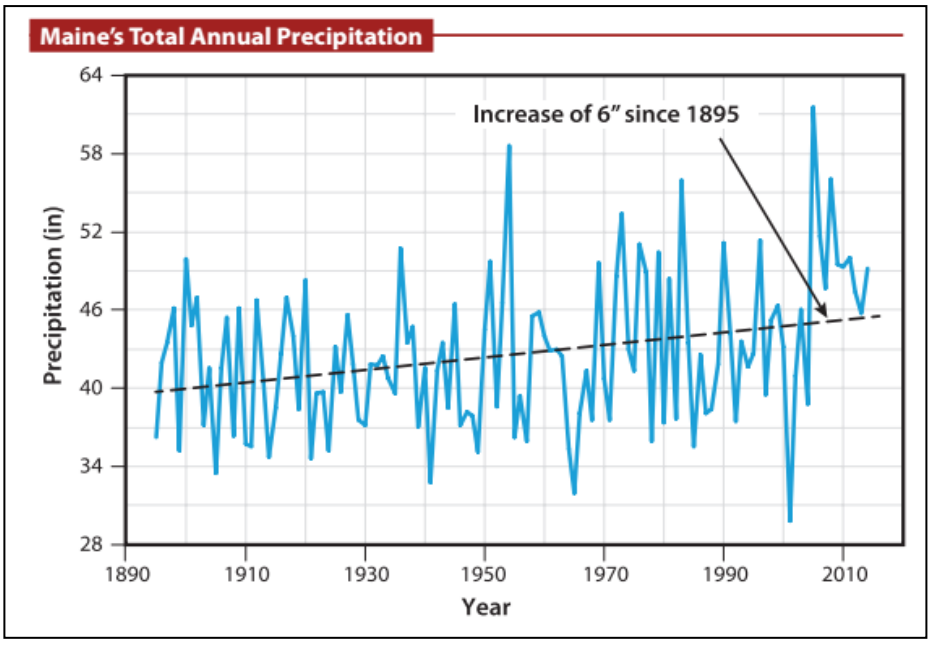


Figure 1.10: Maine's Total Annual Precipitation.
Source: Maine's Climate Future – 2015 Update.

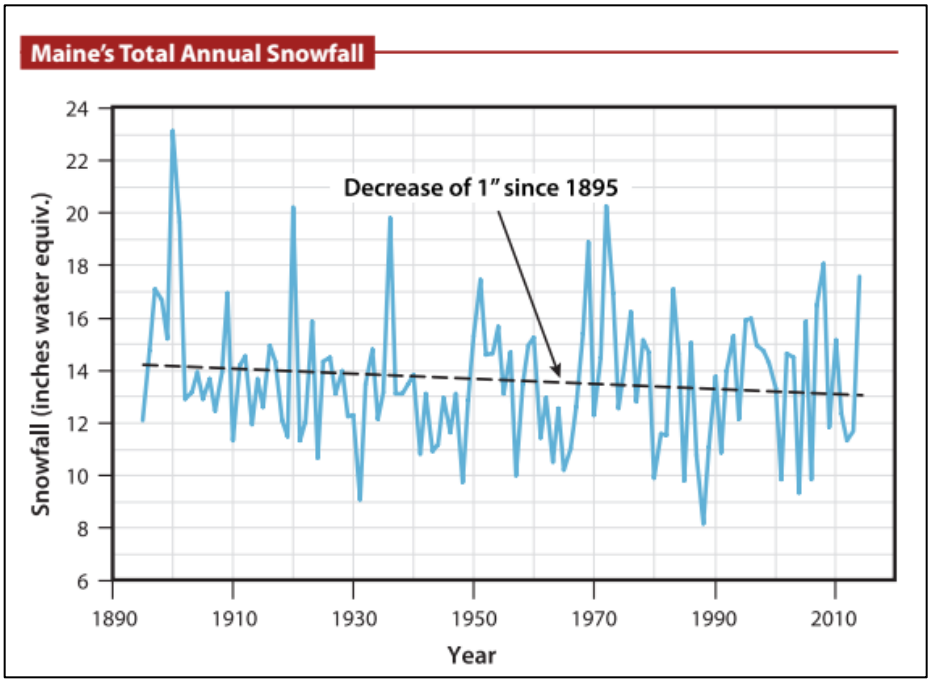


Figure 1.11: Maine's Total Annual Snowfall.
Source: Maine's Climate Future – 2015 Update.

Annual Precipitation by Climate Region:
While annual precipitation increased in all three of Maine's climate regions, those changes have not all been constant. The coastal climate division saw the greatest increase in mean precipitation from the time period between 1895 and 1924 compared to 1987 to 2016, followed by the northern interior division and the southern interior division.

Table 1.4: Changes in mean annual precipitation by climate region based on 30-year normal precipitation from time periods 1895-1924 and 1987-2016. Data compiled from NOAA's National Centers for Environmental Information.

	Mean Annual Precipitation 1895-1924 (inches)	Mean Annual Precipitation 1987-2016 (inches)	Change in Mean Precipitation (inches)	Percent Change
Coastal	44.14	48.62	4.48	10.2
Southern Interior	42.67	46.07	3.40	8.0
Northern Interior	39.07	43.25	4.18	10.7

Future Precipitation Projections:
Based on information compiled by the University of Maine's Climate Change Institute, the IPCC models predict that annual precipitation will increase by 5-10% across the northeast between now and 2050, though the distribution of increase will likely vary across the climate zones. In general terms, IPCC models predict the rate of increase to be greater inland than on the coast.

Sea Level

Global sea level is rising at a rate of 0.07 inches per year (1.9mm), though that rate varies significantly for a specific location based on topography, ocean circulation, and geologic variations. Table 1.5 below demonstrates documented sea level changes over various time periods based on available data across several locations in Maine, from south to north.

Table 1.5: Documented sea level rise across Maine. Data collected from NOAA.
Source: https://tidesandcurrents.noaa.gov/sltrends/sltrends.html

Location	Time Period	Total Change (100-year equivalent)	Average Annual Change
Seavey Island, Maine	1926-2001	0.58 feet	1.76 mm
Portland, Maine	1912-2016	0.61 feet	1.86 mm
Bar Harbor, Maine	1947-2016	0.72 feet	2.2 mm
Cutler, Maine	1979-2010	0.77 feet	2.34 mm
Eastport, Maine	1929-2016	0.70 feet	2.12 mm

Impacts of Climate Trends on Natural Hazards

While the trends of increased temperatures, increased precipitation, and sea level rise are clear across Maine, the impacts of those trends on specific hazardous weather events is less certain. The International Panel on Climate Change (IPCC) models predict that precipitation is likely to increase in the northeast. However, that increased precipitation is expected to occur in more extreme precipitation events with longer dry periods in between. This means that Maine could experience a higher frequency of flooding and drought.

Human Geography

Maine's location in the northeastern most corner of the United States also means that connecting Maine's population (or tourists) to goods and services requires an extensive network of highways and bridges. This infrastructure must withstand the movement of heavy equipment, such as logging trucks, and the wide extremes of a variable climate. Unlike the highways in the south and southwestern states, Maine highways must be sanded, salted and plowed during the winter months, placing an additional expense in wear and tear on equipment and staffing. Accordingly, the operating costs of maintaining the State's highway infrastructure are a very significant budget item.

Demographic Profile

Maine has a population of 1,328,361 per the 2010 U.S. Census. Information on population breakdown, household size, and age distribution can be found in tables 1.6-1.8.

Table 1.6: Population breakdown in Maine compared to the United States. Data from 2010 U.S. Census.

Population	**2000 Maine**	**2010 Maine**	**2010 USA**
Total Population	1,274,923	1,328,361	308,745,538
% White	96.9	95.4	63.4
% Black	0.5	1.3	13.1
% American Indian	0.6	0.7	1.2
% Asia	0.7	1.1	5.0
% Hispanic Origin	0.7	1.4	16.7

Table 1.7: Household breakdown in Maine compared to the United States. Data from 2010 U.S. Census.

Households	2000 Maine	2010 Maine	2010 USA
Total Households	518,200	557,219	131,704,730
Household Units	651,901	721,830	116,716,292
Average Household Size	2.39	2.43	2.58

Table 1.8: Age breakdown in Maine compared to the United States. Data from 2010 U.S. Census.

Age	2000 Maine	2010 Maine	2010 USA
Median Age, Total Population	38.6	42.7	37.2
% Under 5 Years	5.5	5.2	6.5
% 18 Years and over	76.4	79.3	76.0
% 65 Years and over	14.4	15.9	13.0

While Maine has the third highest population of the New England states, it's population density of 43.1 residents per square mile is less than half of the national average. Two thirds of the population reside in the southern-most counties of the State, the other third is scattered throughout the northern, western, and "Down East" counties.

The median annual household income in Maine was $46,933, the lowest in New England.

Table 1.9: Population and geographic information of Maine compared to New England and the United States. The table ranks New England states from highest to lowest for all classifications. Data from the 2010 U.S. Census.

State	Population (ranking)	Land Area (ranking)	Population Density (ranking)	Median Household Income (ranking)	Median Age - 2010 (ranking)
Maine	**1,328,361 (3)**	**30,841 (1)**	**43.1 (6)**	**$46,933 (6)**	42.7 (1)
Connecticut	3,574,097 (2)	4,840 (5)	738 (3)	$67,740 (1)	40 (4)
Massachusetts	6,547,629 (1)	7,801 (4)	839.3 (2)	$64,509 (2)	39.1 (6)
New Hampshire	1,316,470 (4)	8,952 (3)	147.1 (4)	$63,277 (3)	41.1 (3)
Rhode Island	1,052,567 (5)	1,034 (6)	1018.0 (1)	$54,902 (4)	39.4 (5)
Vermont	625,741 (6)	9,217 (2)	67.9 (5)	$51,841 (5)	41.5 (2)
United States	308,745,538	3,797,000	81.3	$49,445	37.2

The tables above demonstrate that Maine is older, more rural, and less wealthy when compared to the other five New England States and the United States.

Governing Profile

Maine is a home rule state made up of several sub-units of government, which are organized as follows.

Counties

Maine is composed of 16 counties, ranging extensively in physical size and population (see Table 1.8 below). County government in America was adapted from the British system of "shires." It was adapted in Maine from the county system in Massachusetts. County government in many states, particularly those of the South and West, has extensive legislative and executive powers, operating schools, public safety agencies and other services that in Maine are municipal responsibilities. In New England, town government developed earlier than county government, and county governments were granted authority only for specific tasks by the Legislature. There are no home rule provisions in the state Constitution for counties like those provided for municipalities.

The state also designated a community to serve as the county seat or "shire town." Each Maine county has a courthouse, and all but one has a jail in the county seat. Sometimes, the county seat is also the largest municipality, as with Portland in Cumberland County. In other cases, it is simply near the geographic center, as with Alfred in York County.

The citizens in each county typically elect three commissioners (in York County five are elected) to administer the county government. In addition, counties have a treasurer, sheriff, judge of probate, register of probate and a register of deeds, all of them elected. The communities within each county finance their county government through a county tax in proportion to taxable property valuation.

Table 1.10: 16 Counties in Maine. Data compiled from the 2000 and 2010 U.S. Census.

County (Incorporated)	Land Area (mi^2)	2010 Population	**% Change 2000-2010**	Population Density (residents/square mile)	Jurisdictions
Androscoggin (1854)	497	107,233	3.8	216	14
Aroostook (1839)	6,829	68,628	-2.8	10	56
Cumberland (1761)	1,761	289,977	6.0	164	28
Franklin (1838)	1,744	26,991	4.4	15	17
Hancock (1790)	2,351	54,659	5.1	23	36
Kennebec (1799)	951	119,980	4.3	126	29
Knox (1860)	1,142	39,855	0.3	35	17
Lincoln (1760)	700	33,969	2.5	49	19
Oxford (1805)	2,175	57,202	5.6	26	38
Penobscot (1816)	3,556	152,692	6.2	43	52
Piscataquis (1838)	4,377	16,931	1.7	4	17
Sagadahoc (1854)	370	35,149	0.2	95	9
Somerset (1809)	4,095	51,113	2.6	12	27
Waldo (1827)	853	39,155	6.9	46	26
Washington (1790)	3,255	31,625	-3.2	10	45
York (1652)	1,271	201,169	5.6	158	29

Local Jurisdictions;

Cities

There are 23 cities in the state of Maine. All cities in Maine have local charters granted by the Maine Legislature that provide for a representative form of government - meaning they have a city council that serves as the legislative body. The city council is elected by and answerable to the citizens. The office of mayor varies considerably from city to city, with only a few acting as chief executive officer. Some mayors are elected by the vote of the people, while others are elected by a vote of their fellow councilors.

Table 1.11: 10 largest jurisdictions in Maine, based on the 2010 U.S. Census.

Municipality	County	2010 Population
Largest		
Portland	Cumberland	66,194
Lewiston	Androscoggin	36,592
Bangor	Penobscot	33,039
Auburn	Androscoggin	25,055
South Portland	Cumberland	24,002
Biddeford	Saco	21,277
Sanford	Saco	20,798
Brunswick	Cumberland	20,278
Augusta	Kennebec	19,136
Scarborough	Cumberland	18,919

Towns

There are 465 towns in Maine. Towns remain the cornerstone of local government. A Maine community becomes a town when it is incorporated by a special act of the legislature. At that time, it is given certain privileges and responsibilities. Under Home Rule, towns may take any action or change their form of government in any way not denied or precluded by state or federal law. The voters of the town constitute its legislative body. In increasing numbers of towns, the day-to-day
governance has expanded from the original board of selectmen to include town managers, town councils, budget committees, municipal departments and various professional managers. In a small number of mostly larger towns, the council exerts legislative control without a town meeting. In others, a ballot vote is used to approve the budget rather than the open town meeting.

Table 1.12: 10 smallest jurisdictions in Maine, based on the 2010 U.S. Census. Note: Bancroft was absorbed into the Unorganized Territory since the last Census.

Municipality	County	2010 Population
Smallest		
Beddington	Washington	50
Deblois	Washington	57
Great Pond	Hancock	58
Frenchboro	Hancock	61
Westmanland	Aroostook	62
Talmadge	Washington	64
Osborn	Hancock	67
Bancroft*	Aroostook	68
Caratunk	Somerset	69
Isle au Haut	Knox	73

Because they are both granted authority under Home Rule provisions, the terms “local,” “jurisdiction,” or “community” may refer to a city or a town. The median population of a local jurisdiction in Maine is 1,263, which demonstrates the rural nature of Maine.

See Figure 1.12: Population Density, on the following page.

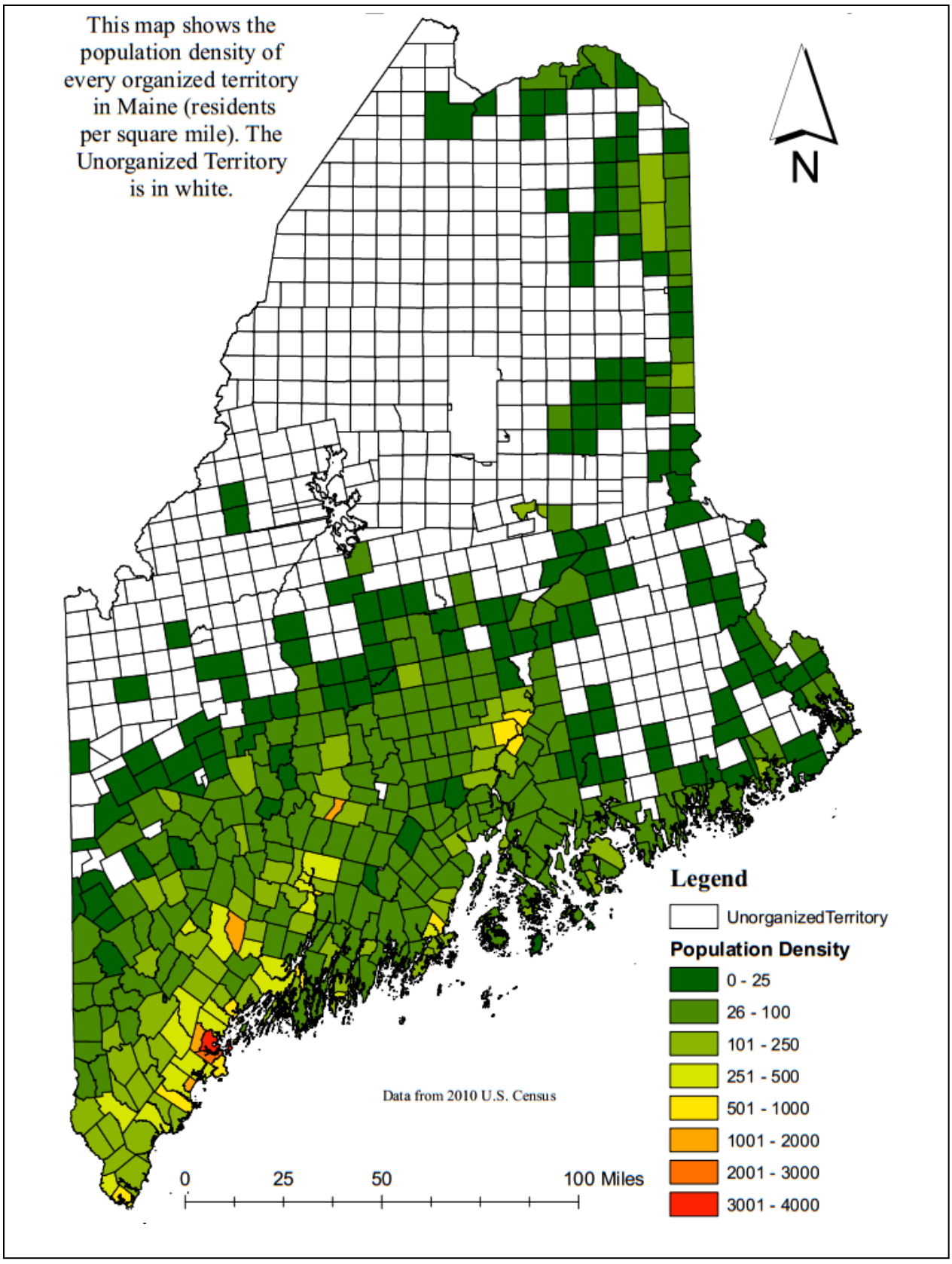


Figure 1.12: Maine Population Density

Unorganized Territory

The Unorganized Territory of Maine (UT) is the area of Maine that lacks local, incorporated municipal government. Maine is unique among eastern states to have Unorganized Territory, which accounts for half of the state's land mass, or 10,000 acres, and is home to 9,000 residents, or 0.68 percent of the state's population. Twelve of the 16 counties in Maine have some portion of the UT within their boundaries, with most of that land located in the western, northern, and easternmost counties.

State, county, and in some case local governments, share governing responsibilities in the UT. County governments are responsible for providing law enforcement and road maintenance services within their portions of the UT. The State Property Tax Division is responsible for collecting property taxes in the UT and the State Land Use Planning Commission (LUPC) maintains planning and zoning authority over the UT, which manages it as one entity participating in the National Flood Insurance Program.

While some portions of the UT are classified as Townships or Plantations, those areas do not have local governing authority.

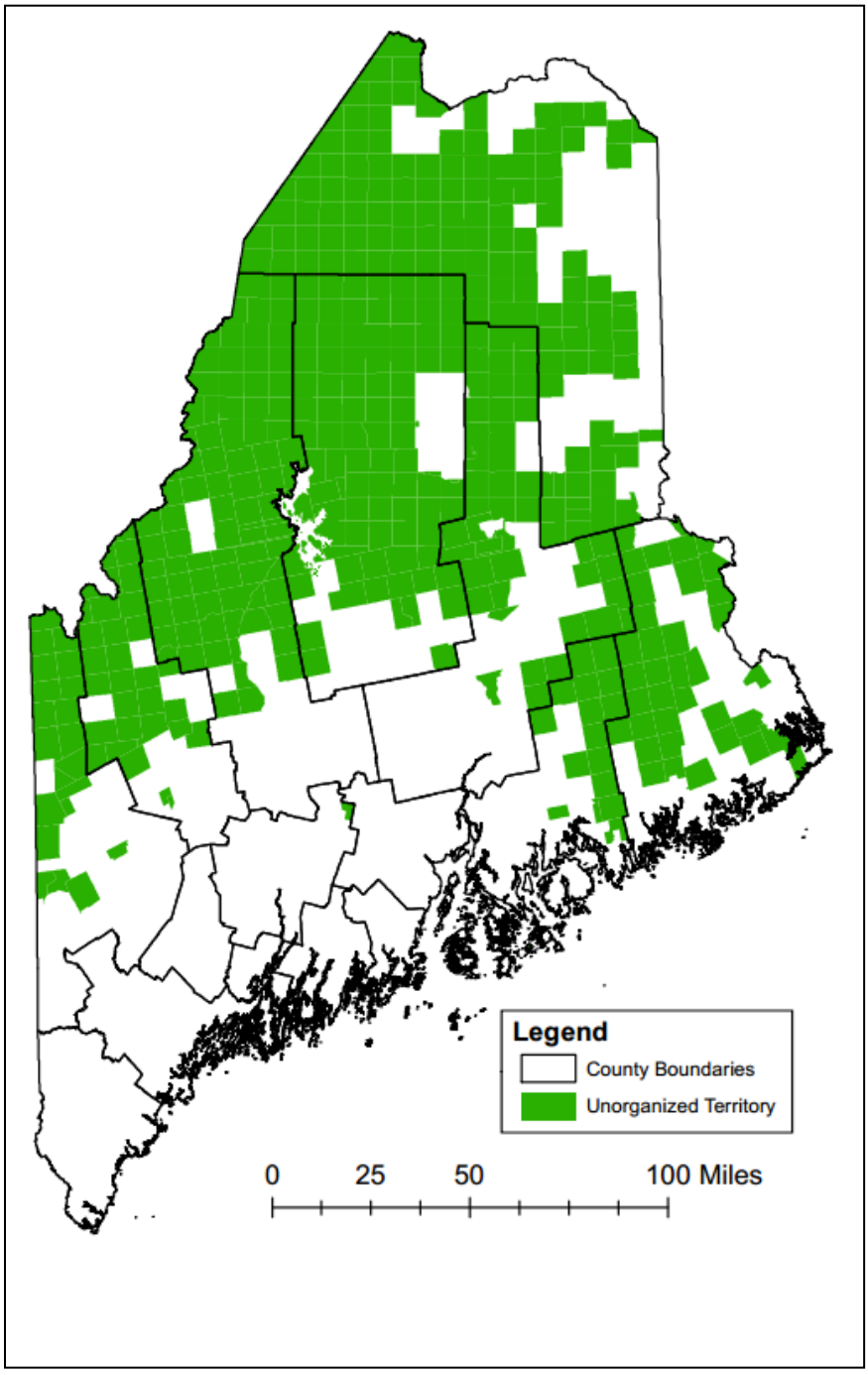


Figure 1.13: Unorganized Territory of Maine

Economic Profile

Maine has traditionally had a natural resource based economy. In past, Maine's vast forests supported a robust timber and wood product economy that allowed for a profitable lumber, paper, and ship building manufacturing economy.

Agriculture continues to provide a large portion of Maine's economic activity. Notable agricultural products include potatoes, blue berries, and maple syrup. Commercial fishing and aquaculture maintain a heavy presence in the state's economy.

Like many parts of the country, the decline of the manufacturing industry has affected Maine's economy in recent years. Maine's Gross Domestic Product was $54.3 billion in 2014, which was 46th in the United States. Comparatively, Maine's Gross Domestic Product ranked 42nd nationwide in 2004, at $44.6 billion. Per capita personal income was 33rd in the country in 2014, at $40,745, less than the national per capital personal income of $46,049. Mainers have also experienced a relative decline in per capita personal income since 2004 when Maine's per capita personal income ranked 28th nationally.

While the transition to a new economy is still being defined, the tourism sector is responsible for an increasing share of Maine's economy. Maine's natural resources attract tourists and outdoor recreationists to enjoy hiking, camping, boating, snow mobiling, hunting, and fishing among other activities across Maine.

Conclusion

It is critical to understand Maine's rural nature, aging population, great geographic distances, and median household income to plan for and mitigate natural hazards.

SECTION 2 – THE PLANNING PROCESS

Documentation of the Planning Process	
Requirement §201.4(c)(1). [The state must include a] description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated.	
Element	*A. Does the plan provide a narrative description of how the new or updated plan was prepared?*
	B. Does the new or updated plan indicate who was involved in the current planning process?
	C. Does the new or updated plan indicate how other agencies participated in the current planning process?
	D. Does the updated plan document how the planning team reviewed and analyzed each section of the plan?
	E. Does the updated plan indicate for each section whether or not it was revised as part of the update process?

The “Great Ice Storm of 1998” brought representatives together from most state agencies to share the Emergency Operation Center (EOC) at Maine Emergency Management Agency (MEMA) in for twenty-eight days and nights. The events underwent by the Emergency Response Team (ERT), with support from the towns and counties, resulted in a “collective knowledge” that is still used as a “worst case scenario” for planning purposes in the state of Maine today.

A. How the Plan was Prepared

The 2018 State Hazard Mitigation Plan revision was developed utilizing input from:

- Review of the 2013 Plan
- Review of New England and other state plans, especially coastal and rural states
- Review of FEMA and MEMA records and websites related to Federal Disaster Declarations and Emergency Declarations
- Review of MEMA records on dams
- Review of materials, reports and data provided by other agencies
- One-on-one meetings with federal and state officials
- Periodic meetings of the Hazard Mitigation Team
- Information obtained during preparation of the 2013-2018 county plan updates

NOTE: All plans were re-approved by FEMA between 2013 and 2018.

Maine Emergency Management agency has been heavily involved in the preparation of the Multi-jurisdictional (County) Mitigation Plans, as well as the University of Maine Hazard Mitigation Plan. In 2009, MEMA prepared a guide to expedite preparation of the Multi-jurisdictional (County) Plans so that all plans would follow a standardized format. As anticipated, this has made it easier to review and extract information for inclusion in the state plan. Since all multi-jurisdiction plans, as well as the University of Maine System plan, utilized the suggested format contained in the guide, this greatly expedited the preparation of the updated 2013 and 2018 State Hazard Mitigation plans.

All Hazard Mitigation Plans continue to be organized by:

Section 1 – Introduction/Overview
Section 2 – Adoption
Section 3 – Planning
Section 4 – Risk
Section 5 – Strategies
Section 6 – Plan Maintenance

Furthermore, to unify plans, all counties were encouraged to use tables to capture items such as the history of hazard occurrences. Counties were also encouraged to use the Consumer Price Index to capture costs.

B. Who Was Involved

The 2018 State Hazard Mitigation Plan update was led by the State Hazard Mitigation Officer and the Natural Hazards Planner. Participants of the planning process are included in the tables below.

Table 2.1: Federal Participants

Department	Agency	Participants	Title
Interior	United States Geological Survey (USGS)	Robert Lent Nicholas Stasulis	Director, Maine Office Data Section Chief
Commerce	National Weather Service (NWS)	John Jensenius Thomas Hawley	Meteorologist Service Hydrologist

Table 2.2: State Participants

Department	Agency / Office / Bureau	Participants	Title
Agriculture, Conservation, and Forestry (DACF)	Maine Geologic Survey (MGS)	Robert Marvinney Henry Berry Lindsay Spigel Steven Dickson Peter Slovinsky	State Geologist, Director MGS Bedrock Geologist Bedrock Geologist Coastal Geologist Coastal Geologist
	National Floodplain Management Program	Sue Baker	Coordinator
	Maine Forest Service (MFS)	Bill Greaves	Regional Ranger
	Soil and Water Conservation Program	Tom Gordon	Coordinator
Environmental Protection (DEP)	Office of the Commissioner	Christina Zabierek Erle Townsend	Director of Policy Policy Development Specialist
	Bureau of Land Resources	Nathan Robbins	Sustainability Coordinator
Health and Human Services (DHHS)	Center for Disease Control	Andrew Smith Jessica Meeks	State Toxicologist Hydrologist
Marine Resources (DMR)	Bureau of Marine Science	Carl Wilson	Director
Inland Fisheries and Wildlife (IFW)	Bureau of Resource Management	Amanda Shearin	Wildlife Biologist
Transportation (DOT)	Environmental Office	Judy Gates	Director
Executive	Governor's Energy Office	Lisa Smith	Senior Planner
	Maine Historic Preservation Commission	Christi Mitchell Megan Hopkin	Assistant Director

C. Agency Participation in the Planning Process

Overview of Partner Participation

The State Hazard Mitigation Officer and the Natural Hazards Planner served as planning leads by both collaborating with existing state and county partners, and by corroborating information supplied by partners. The River Flow Advisory Commission, Drought Task Force, Climate Adaptation Workgroup, and 16 County Emergency Managers all greatly contributed their input for the plan update. If subject matter expertise was necessary in any area of the Plan, then leads coordinated meeting events with alternate agencies as depicted below.

Meetings included a review of pertinent sections of the plan, so most of the discussions were aimed at supplementing, correcting, and/or updating what was in the 2013 plan.
The meetings also included a review of the goals, objectives and actions to determine the results, status and relevance of the goals, and objectives and actions related to the programs of each respective agency interviewed. The following are key points from meetings and workgroups that were held with federal, state and county officials during the preparation of the *Maine State Hazard Mitigation Plan –2018 Update.*

Significant Meetings with Federal, State and County Officials

County and Local Directors
Meeting Dates: February 2016 – July 2017

The State Hazard Mitigation Officer and Natural Hazards Planner had numerous meetings, phone calls, and email exchanges with County Emergency Management Directors and local officials to create evacuation zones for the 142 cities and towns statewide that are vulnerable to storm surge from hurricanes. The evacuation zones will be used to update the remainder of the statewide Hurricane Evacuation Study.

Emergency Management Institute
Meeting Dates: July 5th-8th 2016; May 31st -June 2, 2017; March 12th–16th 2018

The State Hazard Mitigation Officer and Natural Hazards Planner attended the Mitigation Stakeholder Workshop with partners from FEMA and other states to share mitigation ideas.

Maine Interagency Climate Adaptation Workgroup
Meeting Dates: August 2016-present

The Maine Interagency Climate Adaptation (MICA) Workgroup is led by the Sustainability Specialist and Climate Change Coordinator at the Department of Environmental Protection. The workgroup includes representatives from the following departments: Agriculture, Conservation, and Forestry (Maine Geological Survey and Maine Soil and Water Conservation Districts), Health and Human Services (Center for Disease Control), Inland Fisheries and Wildlife, Marine Resources, Transportation, and the Governor's Energy Office.

The signature product of the workgroup is the *Maine Prepares for Climate Change – 2018 Update* report, which was developed for the Commissioners of the agencies participating in the workgroup to document existing climate adaptation activities. The workgroup meets routinely to provide a forum for state-level resource and activity coordination related to climate change adaptation.

Drought Task Force
Meeting Dates: August 2016 - December 2016

The Drought Task Force, led by members of the state's River Flow Advisory Commission, convened in August 2016 for the first time since 2002 and continued to meet monthly through December 2016. The Drought Task Force is co-chaired by MEMA and USGS and brought representatives from the National Weather Service, Maine Geological Survey, Maine Center for Disease Control, the Department of Environmental Protection, and the Maine Public Utilities Commission.

Maine Department of Transportation
Meeting Dates: Throughout 2017

The State Hazard Mitigation Officer and Natural Hazards Planner had a series of meetings throughout 2017 with Maine DOT's Environmental Office. Meeting attendees included Judy Gates (Director), Nate Kane, and Bradford Folta. Meeting highlights included the review of the Hurricane Evacuation Route Network that was established in the *2007 State of Maine Hurricane Evacuation Study*, and collaboration on DOT's pilot Transportation Risk Assessment for Planning and Project Delivery (TRAPPD) decision support tool.

Maine Forest Service (Dept. of Agriculture, Conservation, Forestry)
Meeting Date: January 10, 2017

The State Hazard Mitigation Officer and Natural Hazards Planner met with Regional Ranger Bill Greaves of the Maine Forest Service to discuss wildfire risk across Maine and to review the wildfire profile in the Risk Assessment of this Plan. Discussion points from the meeting included impacts of the 2016 drought on wildfire potential, Maine's increasing vulnerability to wildfires due to Maine's aging housing stock, and how the shrinking population base in rural areas makes it more difficult to support volunteer fire departments.

National Weather Service, Gray, Maine
Meeting Dates: January 24, 2017

The State Hazard Mitigation Officer and the Natural Hazards Planner met with officials from the National Weather Service (John Jensenius, Meteorologist, and Thomas Hawley, Service Hydrologist) to discuss updating the weather data contained in this plan. Meeting highlights included the discussion of historic Maine winters and traditional weather patterns, the review of past climate data which demonstrates an overall warming trend, and overall coordination between USGS and NWS.

River Flow Advisory Commission
Meeting Dates: March (annually) and April 2017

The River Flow Advisory Commission, which is co-chaired by the Maine Emergency Management Agency and the United States Geological Survey, meets annually in March to facilitate communication of river flow data between dam operators, river basin managers, and state and federal agencies. The Maine River Flow Advisory Commission is composed of representatives from eight major river basin management operations, seven state agencies, two federal agencies and the University of Maine.The Commission also met in April 2017 due to elevated flood potential compared to conditions at the March 2017 meeting.

Maine Partners in Preparedness
Meeting Dates: April 25th - 26, 2017

The ninth annual Maine Partners in Preparedness Conference was attended by nearly 500 participants from both the private and public sectors. Each year this statewide conference features keynote speakers who address current situations. Since the first conference, topics have ranged widely from the H1N1 virus, to the tsunami in Japan, to cybersecurity, to the Boston Marathon bombing. Keynote speakers in 2017 were Kurt Schwartz, Director of Massachusetts Emergency Management Agency, and Mike Sprayberry, Director of the North Carolina Emergency Management Agency. Director Schwartz explained the agency's preparedness for the Boston Marathon post the 2013 bombings, and Director Sprayberry spoke about the effects of Hurricane Matthew on North Carolina. Breakout sessions ranged widely from preparedness to mitigation with topics including school safety, floodplain management and mapping, pet sheltering, and community resilience efforts in coastal Maine.

Maine Cooperative Snow Survey
Meeting Dates: December 20, 2017

The United States Geological Survey hosted a Maine Cooperative Snow Survey kick-off meeting to discuss field procedures, monitoring equipment, data presentation, and to review snow survey dates with primary partners. The Maine Cooperative Snow Survey is made up of representatives from Maine Geological Survey, the United States Geological Survey, the National Weather Service, MEMA, and representatives from the major hydroelectric power generators. The Snow Survey collects field observations on snow depth and snow density leading up to and following the River Flow Advisory Commission to assess flood risk statewide. Representatives from the Maine Geological Survey introduced an updated website platform designed to improve accessibility of the information, with improvements allowing stakeholders to compare snow data from various dates and years side-by-side.

Maine Historic Preservation Commission and Department of Environmental Protection
Meeting Date: April 11, 2018

The State Hazard Mitigation Officer met with representatives from the State Historic Preservation Office and the State Sustainability Specialist to align climate adaptation and hazard mitigation strategies with historic preservation priorities in order to establish a framework to leverage resources in future projects. The meeting established a framework for collaboration amongst agencies to facilitate a more proactive approach in environmental and historic preservation review during mitigation project development. The State Historic Preservation Commission was incorporated into the "Strategy Section" of this plan as a result of the meeting.

University of Maine Climate Change Institute
Meeting Date: April 13, 2018

The State Hazard Mitigation Officer and other members of the Maine Interagency Climate Adaptation Workgroup met with faculty from the University of Maine Climate Change Institute to examine opportunities to integrate the University's work as it relates to climate change with the State's climate adaptation efforts. State participants included Kathleen Leighton (Maine Coastal Program), Amanda Shearin (Department of Inland Fisheries and Wildlife), Judy Gates (Department of Transportation's Environmental Office), Pete Slovinski (Maine Geological Survey), and Nathan Robbins (State Climate Change Coordinator). University of Maine participants included Aaron (School of Marine Sciences), Ivan Fernandez (School of Forest Resources), Sean Birkel (School of Earth and Science), Cindy Isenhour (Professor of

Anthropology and Climate Change), and Esperanza Stancioff (Maine Cooperative Extension and Climate Change Institute).

The group discussed opportunities to collaborate with students on projects pertaining to climate change mitigation, adaptation, and how to incorporate land use planning with post-disaster recovery.

Workshops / Training Sessions

Training

The Maine Emergency Management Agency Training Program offers at a minimum 24 Emergency Management Institute courses annually to approximately 600 local, county, and state emergency managers across Maine. The top training courses include Intermediate Incident Command System, Basic Public Information Officer training, and Incident Command System / Emergency Operations Center Interface.

Exercises

LANTEX Tsunami Table Top
Exercise Date: March 2016

Maine Emergency Management Agency used the LANTEX Tsunami Table Top Exercise as an opportunity to bring together the natural science community, first responders, and communications to analyze statewide risk and vulnerability to tsunamis in Maine. The Senior Planner and the Natural Hazards Planner used the findings to update the Tsunami Incident Annex to the State Emergency Operations Base Plan.

Fire and Ice Full Scale Exercise
Exercise Dates: December 2016 – October 2017

Led by the State Exercise Officer in coordination with FEMA, State and County Emergency Management participated in a full scale exercise to practice sustained activation in state and local Emergency Operations Centers.

Tri-Cat Hazardous Materials Exercise Series
Exercise Dates: 2015-2016

MEMA sponsored three regional exercise series across the state in 2016 to test and exercise response and recovery efforts in a serious hazardous materials release scenario. Each exercise consisted of a simulated train with multiple derailed rail cars. A locomotive along with two rail cars was used for the scenario, although the locomotive was used only to bring the railcars to the exercise site. During the derailment, two railcars showed signs of chemical reactions and gaseous releases. Each exercise consisted of a tabletop, functional and full-scale exercise located in Houlton, Augusta, and Gray. In total, well over 150+ first responders and emergency management personnel participated in the exercise series.

Point LePreau Generating Station Nuclear Release-Full Scale Exercise
Exercise Dates: November 17th-18th, 2015

This exercise was a full-scale exercise planned for two days at multiple locations across New Brunswick and Maine. New Brunswick sites included the Point Lepreau Nuclear Generating Station (PLGS), the city of Fredericton, and the city of St. John. Maine sites included the city of Augusta and the town of Machias. The exercise was conducted at the Point Lepreau

Generating Station (PLGS), in partnership with the Province of New Brunswick and supported by federal authorities and neighboring jurisdictions. As part of the exercise, the Maine Emergency Operations Center (EOC) and the Emergency Response Team (ERT) was activated. The scenario was set for the morning of November 17, 2015, when a severe storm hit the PLGS area. The storm eventually caused a loss of offsite power connections at the station. This loss of power compounded when the reactor shutdown system activated and a coolant leak began. Containment seals failed & an uncontrolled release began and continued until the end of the exercise.

Technical Assistance to Jurisdictions

(2013 – 2018)

Funded by a PDM grant, all sixteen of the county (multi-jurisdictional) hazard mitigation plans and the University of Maine System plan are in the process of being updated by the end of 2018. During this time, the state has provided technical assistance through workshops, individual planning meetings, and individual plan reviews. To save on time and travel, plan update information was made available through the monthly EMA Director agenda so that common topics, such as repetitive loss properties and status of mitigation activities, could be mutually addressed. After initial meetings with planners, most of the draft section reviews were conducted through email and phone calls.

TABLE 2.3: The Status of All 16 County Hazard Mitigation Plans as of October 2019

	Participating Towns	Participating Cities	Participating Unorganized Territories/Townships	Participating Plantations	Participation TOTAL	FEMA APPROVAL DATE
Androscoggin	*12* out of 12	*2* out of 2	0 out of 0	0 out of 0	**100%**	18-Mar-19
Aroostook	42 out of 53	2 out of 2	109 out of 109	5 out of 11	**90%**	12-Apr-17
Cumberland	25 out of 25	3 out of 3	0 out of 0	0 out of 0	**100%**	12-Apr-17
Franklin	17 out of 17	0 out of 0	24 out of 24	4 out of 4	**100%**	19-Jun-17
Hancock	33 out of 33	1 out of 1	14 out of 14	3 out of 3	**100%**	18-Apr-18
Kennebec	25 out of 25	4 out of 4	1 out of 1	0 out of 0	**100%**	15-May-17
Knox	16 out of 16	1 out of 1	2 out of 2	1 out of 1	**100%**	21-Aug-19
Lincoln	18 out of 18	0 out of 0	1 out of 1	1 out of 1	**100%**	25-Jan-18
Oxford	22 out of 34	0 out of 0	19 out of 19	2 out of 2	**67%**	29-Aug-18
Penobscot	51 out of 51	3 out of 3	39 out of 39	4 out of 4	**100%**	8-Mar-17
Piscataquis	17 out of 17	0 out of 0	91 out of 91	2 out of 2	**100%**	26-Mar-18
Sagadahoc	9 out of 9	1 out of 1	1 out of 1	0 out of 0	**100%**	26-Apr-17
Somerset	11 out of 27	0 out of 0	83 out of 83	*0* out of 6	**81%**	29-Jan-19
Waldo	12 out of 25	0 out of 1	1 out of 1	0 out of 0	**48%**	25-May-17
Washington	*25* out of 39	2 out of 2	2 out of 2	1 out of 3	**67%**	5-Oct-18
York	26 out of 26	3 out of 3	0 out of 0	0 out of 0	**100%**	26-Apr-17

NOTE: Maine tribal communities (the Passamaquoddy, Penobscot, Maliseet and Micmac tribes) are not included in the count. Each of these four federally recognized tribes, consisting of five tribal communities, hosts its own government and is not represented within the above table.

See **Appendix A** for the jurisdictions that are participating in each of the FEMA approved multi-jurisdiction plans listed above as well as the campuses of the University of Maine System. Current non-participants will be invited to join the next updates.

D. How the Planning Team Reviewed Each Section of the Plan

As with previous updates of the State Hazard Mitigation Plan, MEMA took a focused and targeted approach to update the plan in order to efficiently manage resources. This means the Lead Planners worked together to revise the plan internally while coordinating with partners for revisions to re-draft Sections 1, 2, 5, and 6 of the Plan. The planning leads met with the State Exercise Officer and State Training Officer to compile the summary of significant workshop and training sessions that took place over the previous five years.

The Lead Planners took a two-pronged approach to update the Plan's Risk Assessment (Section 3). First, they leveraged findings and input from scheduled meetings, on-going workgroups, and relevant events, such as the LANTEX Tsunami Table Top Exercise, the Maine Interagency Climate Adaptation Workgroup, and the Drought Task Force meetings, respectively. Second, the Lead Planners consulted with relevant experts from the natural science community, such as Maine Geological Survey, the US Geological Survey, and the National Weather Service for specific guidance as needed to complete each natural hazard profile. Finally, the Lead Planners re-distributed each hazard profile to the appropriate member of the natural science community for review.

The planning leads worked closely with MEMA's Senior Planner to incorporate the State's working risk assessment, located alongside this plan in Volume I of the State Comprehensive Emergency Management Plan, into Section 3 of this plan.

In updating the Strategy (Section 4), the Lead Planners refined the inventory of existing state agencies, bureaus, and programs that support the Mitigation Program. Similar to updating the Risk Assessment, the Lead Planners leveraged existing workgroups, and incorporated members into the planning process by seeking their input. Examples include the River Flow Advisory Commission, Drought Task Force, and Silver Jackets. The State Hazard Mitigation Officer and Natural Hazards Planner each participated in the Maine Interagency Climate Adaptation Workgroup, which met monthly from 2016 to 2018, to publish the Maine Prepares for Climate Change report that includes a comprehensive inventory of on-going climate adaptation activities across State Government.

E. How Changes in the Plan are Shown

In the draft phase, as posted on the MEMA website and in the meetings, additions were shown in red font; deletions were shown by cross-outs. Both a draft document with revisions and a final version without tracked changes were supplied to FEMA during the approval process.

Coordination among Agencies	
Requirement §201.4(b): The [state] mitigation planning process should include coordination with other state agencies, appropriate federal agencies and interested groups.	
Element	*A. Does the new or updated plan describe how federal and state agencies were involved in the current planning process?*
	B. Does the new or updated plan describe how interested groups (e.g., businesses, non-profit organizations, and other interested parties) were involved in the current planning process?
	C. Does the updated plan discuss how coordination among federal and state agencies changed since approval of the previous plan?

A. How Federal, State and County Agencies Were Involved

As indicated in the previous discussion under *Documentation of the Planning Process*, information flows back and forth on a frequent basis between towns, their respective counties and the state, particularly during the development of Multi-Jurisdictional County Hazard Mitigation Plans. Concurrently, agencies were involved through their participation on the Planning Team, and through individual meetings and contacts with MEMA. Perhaps more important from a coordination standpoint is that there has been a great deal of coordination on mitigation issues between federal, state and county officials. The operation of FEMA's Joint Field Offices (JFOs) provides excellent venues for this cooperation. The results of this coordination work include:

- **Awareness of issues**: A greater awareness of some of the issues facing Maine, such as increased flood flows resulting from upstream development in a given watershed (enhanced awareness has helped in the development of mitigation strategies);
- **Opportunities for mitigation:** A greater awareness of the need to use the 406 program for mitigation purposes has continued since 2007
- **Local Outreach:** Ongoing workshops by the Maine Department of Transportation for local officials on the use of geosynthetics and general "best management practices" in road and ditch work
- **Multi-jurisdictional Coordination:** Continuous trainings and exercises with state, county and local participation
- **GIS Information:** A greater use of GIS-based mapping and the continued close cooperation between state agencies in the sharing of GIS data.

Federal officials were also involved through their participation in various MEMA-sponsored conferences and exercises on hazard mitigation and disaster assistance.

B. How Interested Groups Were Involved

Interested local groups were involved in the preparation of county and local plans and through participation in MEMA workshops, exercises and training sessions. Additionally, since the Plan has been posted on the MEMA website, public comments were taken into consideration in this update. To date, several residents have been interested in coastal effects (storm surge) and

evacuation routes, one about climate and several students (from out of state) wanted to know about the planning process in general as part of their studies.

Outreach to businesses, non-profit organizations and professional associations such as the Maine Municipal Association and Associated General Contractors will continue. Again, more detailed maps showing vulnerable areas would be very useful documentation in this outreach. Additionally, based on annual conference feedback, the case study approach is the best way to showcase mitigation projects. More of these should help local businesses to thrive, and should continue to save tax dollars after hazard effects have been reduced.

C. How Coordination Has Changed Since Approval of Last Plan

Since approval of the 2013 State Hazard Mitigation Plan, coordination between state and federal agencies has taken place at various workshops, through federal, state and local participation in the plan review process, and through close working relationships established as a result of the state's recent disaster declarations.

In addition to the current updates of the 16 county plans and the University of Maine System Plan, MEMA has placed a major emphasis on outreach to the general public as well as state and federal agencies through continuous expansion of workshops, training and exercises that bring public participants together.

As detailed in Section 3, the Maine Legislature passed a law in 2009 requiring the Maine Department of Environmental Protection to prepare a climate change report that builds on the 2009 climate impact assessment prepared by the University of Maine. The Department developed a report in 2010 entitled "People and Nature, Adapting to a Changing Climate." The report contains 60 recommendations that were developed with the assistance of a stakeholders group consisting of 57 organizations and 19 state and federal agencies.

A notable difference in changes to coordinating the update of this Plan came with the addition of a Natural Hazards Planner and Deputy State Hazard Mitigation Officer in January 2016. This provided the Mitigation Program with greater resources and opportunities to leverage findings of existing workgroups into the Plan, and increased exposure of the Mitigation Program and awareness of the Plan Update.

Program Integration	
Requirement §201.4(b) (The state mitigation planning process should) be integrated to the extent possible with other ongoing state planning efforts as well as other FEMA mitigation programs and initiatives.	
Element	*A. Does the new or updated plan describe how the state mitigation planning process is integrated with other ongoing state planning efforts?*
	B. Does the new or updated plan describe how the state mitigation planning process is integrated with FEMA mitigation programs and initiatives?

A. Integration with Other State Planning Efforts

Since flooding is the state's primary hazard, most mitigation planning efforts have been integrated with those of state's NFIP program, which, as a result of government reorganization, is now located in the Department of Agriculture, Conservation and Forestry.-The State Planning Office was abolished by an act of the Legislature in 2012.

MEMA has also worked closely with and supported the mapping efforts of the Maine Geological Survey (MGS). MEMA initially provided funds to MGS to map landslide hazards in four inland communities. Through the Joint Field Office, FEMA also funded an expansion of the demonstration program to fund inland mapping of all communities in York and Cumberland Counties that are seaward of the ancient marine limit.

In the future, MEMA will look to partner with other state agencies to incorporate economic and housing development into the State Hazard Mitigation Plan. With factors such as disabled and/or aging populations, and economic development particularly within coastal communities it is essential that collaboration amongst groups occurs as a proactive means to address changing or increasing vulnerability. The extent of current exposure to economic development and/or housing factors resides within applicant interest in FEMA funded grant programs. Such issues are not usually brought to MEMA's attention until a person or party inquires about federal funding.

B. Integration with FEMA Mitigation Programs

Since a pre-requisite of FEMA funding is the existence of approved local and state plans, the three programs that are most integrated to the plans are: the Pre-Disaster Mitigation (PDM) grant program; the Hazard Mitigation Grant Program (HMGP); and the Flood Mitigation Assistance (FMA) grant program. Going forward, the projects identified in the local plans will continue to be linked to the overarching goals of the state plan, especially with regard to flooding, which is the state's number one hazard. MEMA will also continue to explore greater use of the 406 program to implement more mitigation projects, and continue to target mitigation assistance to the areas of greatest need. MEMA and other state agencies will also continue to work with and support FEMA's Risk Map program which, in turn, will lead to better flood plain management through better maps, education, and state support of local code enforcement officers.

Issues and Challenges

The following is a partial list of some of the planning issues and challenges facing Maine. These issues have arisen from MEMA's experience managing FEMA programs (PDM, HMGP, and FMA), working with Joint Field Offices when available, and assisting counties and municipalities with the preparation of hazard mitigation plans.

1. **Rural Nature**
   With a population of 1,328,361 dispersed throughout 492 jurisdictions, many jurisdictions have a population under 5,000. Resultantly, staff in town offices often have many responsibilities where nearly all local emergency managers wear several hats. While they understand the importance of mitigation and planning activities, more immediate responsibilities often take priority over long term planning.

   Regional multi-jurisdictional planning is challenging with the rural nature of Maine because attendance at meetings often requires commutes of significant time and distance to attend meetings. The challenge of time and distance is exasperated in the most rural parts of Maine because many of them to not have reliable communication infrastructure to support remote meetings.

2. **Retiring Workforce**
   With a small economy, Maine's greatest resource is its people. However, Maine has the oldest median age in the country, and many employees and volunteers across the state are within retiring age. This means a significant number of state employees, whose decades of institutional knowledge contribute to this Plan, will retire in the coming years.

Maine continues to have a high rate of volunteerism, which is critical to the operation of local fire departments and shelters. However, volunteer participation rates are in decline as Maine's population continues to age.

3. **Mitigation Versus Resources/Capabilities**
   The 16 county mitigation plans include 2,058 potential mitigation projects. Assuming an average of about $100,000 per project (some are much more) the total need is over $205,800,000. By comparison, Tropical Storm Irene produced only $297,000 in HMGP funds for Maine. The largest HMGP available to the state since 2000 was $3,800,000. The PDM program offered a federal share of $3,000,000 per project, and Maine won several PDM grants. However, Congress continually reduced the funding, and most communities do not have the resources for a nationally competitive process. Resource constraints for the vast majority of the towns prevent most communities from applying for either. It has become clear to state officials that the 406 Program must be better utilized to meet mitigation needs.

4. **Smaller Towns Lack Planning Capacity**
   Approximately 56% of Maine's 492 local jurisdictions have populations under 2,500. None are known to have the engineering, planning or other staff expertise needed to prepare nationally competitive applications for FEMA's PDM-C program. Most of the projects identified by smaller towns are road-related mitigation projects that probably would not compete well against more pressing national needs.

5. **Lack of Local Match**
   With economic conditions little better than they were three years ago, and the existence of a state-imposed spending cap (LD 1), towns are severely limited in how much they can raise.

SECTION 3 – RISK ASSESSMENT

Risk Assessment

Requirement: §201.4(c)(2): (The state plan must include a risk assessment) that provides the factual basis for activities proposed in the strategy portion of the mitigation plan. Statewide risk assessments must characterize and analyze natural hazards and risks to provide a statewide overview. This overview will allow the state to compare potential losses throughout the state and to determine their priorities for implementing mitigation measures under the strategy, and to prioritize jurisdictions for receiving technical and financial support in developing more detailed local risk and vulnerability assessments.

INTRODUCTION

In compliance with *Requirement §201.4(c)(2)* the following section identifies, profiles and assesses the vulnerability of the state of Maine to natural hazards. Maine's climate, geography, and demography significantly influence the State's risk and vulnerability to impacts from natural hazards. This risk assessment will begin by overviewing all potential natural hazard events that might occur in Maine, incorporating information outlined in the State Profile (Section 1) that may influence overall vulnerability to natural hazards. This assessment uses historical events, potential loss estimates, and probability of occurrence to determine and prioritize the natural hazards that are most likely to impact Maine.

Notable Changes in the 2018 Update

- Relocation of state climate and geographic profile to the State Profile in Section 1.
- Relocation of climate change to the State Profile in Section 1.
- Changing "Summer Storms" heading to "Severe Summer Weather" to more accurately reflect the range of hazards within.
- Including "Extreme Heat" as a hazard under "Severe Summer Weather."
- Enhanced Drought profile following the drought events of 2016 and 2017.
- Enhanced Hurricane profile to include updated storm surge modeling maps.
- Enhanced Landslide profile based on Maine Geological Survey's field study.
- Updated Hazard Identification tables.
- Updated Hazard Ranking criteria.
- Updated Maine Hazards Priorities based on 2018 multi-jurisdictional study.
- Incorporation of "Landslides" under "Mass Wasting" for geologic accuracy.

This section is organized in the following manner to satisfy all elements of *§201.4(c)(2):*

Identifying Natural Hazards
§201.4(c)(2)(i)

Description of Hazard Types
Hazard Omissions

Profiling Natural Hazards
§201.4(c)(2)(i)

General Definition
Types of Events
Nature of Hazard
Location of Hazard
Extent of Hazard
Impact
Vulnerability
Previous Occurrences
Probability of Occurrence
Issues and Challenges

State Vulnerability Assessment
§201.4(c)(2)(ii)

State Risk Assessment
Multi-jurisdictional (County) Risk Assessments
Vulnerability Assessment

Potential Losses
§201.4(c)(2)(iii)

Vulnerable Structures
Estimated Potential Losses

Identifying Natural Hazards

Identifying Hazards	
Requirement §201.4(c)(2)(i) [The state risk assessment shall include an] overview of the type … of all natural hazards that can affect the state …	
Element	*A. Does the new or updated plan provide a description of the type of all natural hazards that can affect the state? If the hazard identification omits (without explanation) any hazards commonly recognized as threats to the state, this part of the plan cannot receive a satisfactory score).*

A. Description of Hazards Types

After reviewing FEMA's list of natural hazards, the lead planners prepared **Table 3.1** to use as an overview of all the natural hazards that could potentially impact Maine. After reviewing the Hazard Types, it became clear that many events ultimately share the same end result. For instance, dam failure and tsunamis both lead to the temporary inundation of normally dry land, or flooding. Likewise, storm surge, inland flooding, and urban flooding are all different classifications of flooding.

Many natural hazards can also occur during a single hazardous weather event. For instance, hurricane events introduce the hazards of storm surge, wind, inland flooding, and tornados, while blizzards introduce the hazards of wind, snow, and ice. Furthermore, natural hazards tend to occur in seasonal groups. While thunderstorms, tornados, hail, and extreme heat events can occur at any time of the year, they tend to occur during the summer months and will thus be found under the hazard category of "Severe Summer Weather." By the same token, blizzards, ice storms, nor'easters, and snow storms are grouped as "Severe Winter Storms" even though such hazards can occur in other seasons.

The identification process has therefore narrowed the scope of the risk assessment to the following nine hazards:

Severe Summer Weather
Severe Winter Weather
Flooding
Wildfire
Drought
Hurricane
Erosion
Earthquake
Landslides (Mass Wasting)

TABLE 3.1: Maine Natural Hazard Identification Summary

Hazard Type	Sources of Information	Location in Plan: Section 3 – Risk Assessment
Dam Failure	MEMA, Dam Safety Program FEMA Disaster Reports Association of Dam Safety Officials News articles	Flood
Drought	Department of Agriculture, Conservation and Forestry Drought Task Force	Drought
Earthquake (5.0 magnitude)	Maine Geological Survey United States Geological Survey Historical records	Earthquake
Erosion: · Beach erosion · Bluff erosion	Department of Agriculture, Conservation and Forestry State Marine Geologist, ME Geological Survey FEMA Disaster Reports Newspaper articles	Erosion
Landslides	Department of Agriculture, Conservation and Forestry Flood Plain Management State Marine Geologist, ME Geological Survey FEMA Disaster Reports Newspaper articles	Mass Wasting
Fire: · Urban · Wildfire	Forestry, Fire Protection Division State Fire Marshall's Office Wildfire Loose: The Year Maine Burned	Wildfire
Flooding: · Coastal · Flash Flood · Ice Jam · Riverine/Riparian · Storm Surge · Spring and storm water runoff · Heavy rains · Tsunami · Urban	MEMA records Flood Plain Management programs FEMA Disaster Reports County EMA Directors Newspaper articles Maine Geological Survey	Flood Hurricane
Tropical Cyclone · Hurricane · Tropical Storm	MEMA records FEMA Disaster Reports National Weather Service NOAA website Maine Hurricane Evacuation Study	Hurricanes & Major Tropical Storms

Severe Summer Weather: · Lightning · Thunderstorms · Tornado · Extreme Heat	National Weather Service NOAA website	Severe Summer Weather
Severe Winter Weather: · Blizzard · Ice Storm · Nor'easters · Sleet Storm · Snow Storm	MEMA records FEMA Disaster Reports National Weather Service NOAA website Newspaper articles	Severe Winter Weather
Other:		
Avalanche	FEMA hazards	Not included
Subsidence	MEMA and FEMA reports	Not included
Blight/infestation	MEMA records	Not included

Updated by Maine Emergency Management Agency – 2018

Hazard Omissions

Hazards not profiled because of little or no hazardous impact on Maine include avalanches, subsidence, and blight/infestation.

Hazard Classification

It should be noted that some potential hazards can occur across several hazardous weather events. For instance, strong winds can occur in summer weather, winter storms, and hurricanes while precipitation and hurricanes can cause inland flooding. **Table 3.2** demonstrates the profiled meteorological and geological hazards that share mutual potential hazards.

TABLE 3.2: Profiled Meteorological and Geological Hazards Sharing Mutual Potential Hazards

	Hazard Profile									
Hazard Type	Flooding	Severe Winter Weather	Hurricane	Erosion	Mass Wasting	Wildfire	Severe Summer Weather	Drought	Earthquake	Not Profiled
Avalanche										X
Blight / Infestation										X
Blizzard		X								
Bluff Erosion				X						
Coastal Erosion				X						
Coastal Flooding	X									
Dam Failure	X									
Drought								X		
Earthquake									X	
Erosion				X						
Extreme Heat							X			
Flash Flood	X									
Hail		X					X			
Hurricane			X							
Ice Jam	X									
Ice Storm		X								
Inland Flooding	X		X							
Landslide					X					
Lightning							X			
Nor'easter		X								
Precipitation (extreme)	X						X			
Riverine / Riparian	X									
Sleet Storm		X								
Snow Quake		X								
Storm Surge	X		X							
Subsidence										X
Thunderstorm							X			
Tornado			X				X			
Tropical Cyclone			X							
Tropical Storm			X							
Tsunami	X									
Urban (flood)	X									
Wildfire						X				
Wind		X	X				X			
Hazardous Events	10	7	7	3	1	1	7	1	1	N/A

Profiling Natural Hazards

Profiling Hazards	
Requirement §201.4(c)(2)(i) [The state risk assessment shall include an overview of the] location of all natural hazards that can affect the state, including information on previous occurrences of hazard events, as well as the probability of future hazard events using maps where appropriate …	
Elements	*A. Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the new or updated plan?*
	B. Does the new or updated plan provide information on previous occurrences of each hazard addressed in the plan?
	C. Does the new or updated plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the plan?

The nine natural hazards types identified in **Table 3.1** are further profiled in this section. Most hazards will have tables documenting their occurrence by date, affected county (jurisdiction) and the overall damage caused.

A prioritization of hazards was put together based on feedback from risk assessments completed by emergency managers across Maine's sixteen counties. The state of Maine conducted a risk assessment in 2018, updating both the methodology and data from the previous risk assessment conducted in 2013. **Figure 3.1** below identifies the results of the assessment, depicting the prioritization of natural hazards. The below results are a reflection of natural hazards ranked by counties based on the (1) likelihood of each natural hazard occurring, and (2) the vulnerability to each hazard across four factors. The details of the study are discussed further in the Multi-Jurisdictional Assessment section and are showcased in **Appendix B** at the end of the plan.

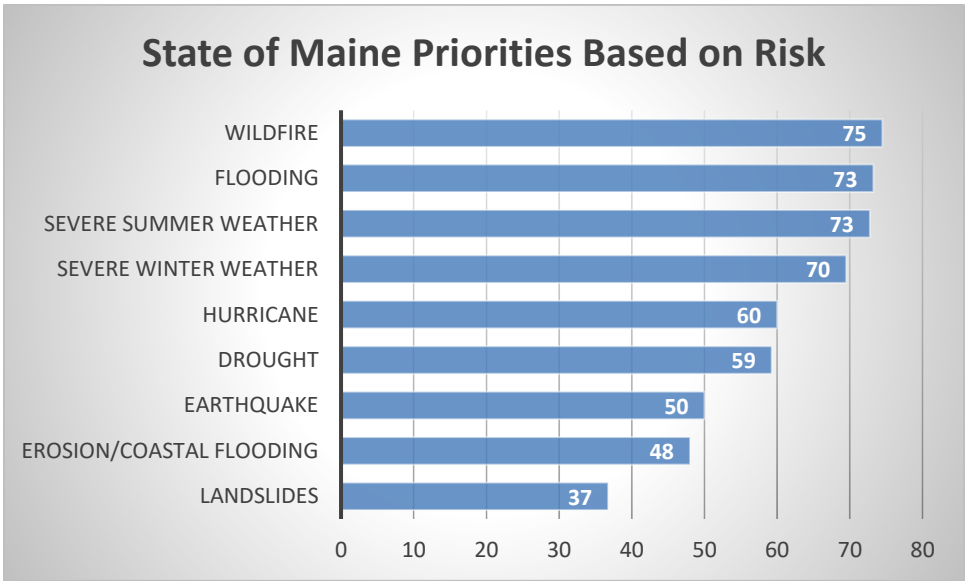


Figure 3.1: The probability of each Hazard Type to occur based on the 2018 State of Maine Risk Assessment. Results are based on the contributions of emergency managers in each of the state's (16) counties.

WILDFIRE

General Definition

A wildfire or wildland fire is a fire in an area of combustible vegetation that occurs in the countryside or rural area.

Types of Events

Wildland Fires:
Any non-structure fire, other than prescribed fire, that occurs in the wildland.[1] Wildfire is a natural phenomenon initially finding its origin in lightning. However, humans have become the greatest cause of fires in Maine.

Wildland Urban Interface:
Fires that are created where homes meet with highly volatile forest fuels.[2]

Nature of Hazard

Maine has 17.7 million acres of forest land that provide more than 500 different wood products and lumber. Maine continues to be the most heavily forested state in the nation at 90%. The state's forest land base has remained essentially stable for the last several decades and is close to the estimated acreage of forest land present at the time of European settlement.

Well-distributed rainfall normally reduces forest fire risks, but seasonal variations, rapidly draining soils, and unusually dry periods can induce major blazes. In addition, insect damage (such as the hemlock woolly adelgid and spruce budworm) diseases, severe weather, and residential and commercial developments in wooded areas greatly increase the potential for catastrophic fires. Over time, a considerable fuel supply can accumulate from the ignitable slash of some logging operations and/or from dead trees left standing on the forest floor after insect infestations.

The Maine Forest Service (MFS) employs 48 field Forest Rangers, who are the state's experts in forest protection, including wildfire management, natural resource law enforcement, and incident management. This number has recently been reduced from the 57 previously reported. Given current staffing levels and regular days off, a Maine Forest Ranger can be responsible for responding to a wildfire or complaints in an area covering more than 1 million acres. The Division of Forest Protection, like most agencies in Maine State Government, has been plagued by budget cuts, resulting in cuts to the field staff and loss of funding for capital wildfire equipment purchases.

Several demographic factors make Maine's rural areas less resistant to the threat of fires. First, the shrinking tax base is putting a strain on local funding for volunteer fire departments. Second, as in all of New England, Maine's housing stock is also aging. When old farm homes and wood frame buildings are located in remote areas, it can be very challenging for volunteer firefighters to respond before the structures are destroyed, especially since 90% of all firefighters in Maine are volunteers. In many areas of the state, fulltime fire departments are scarce. These departments often contract their services with adjoining towns which stretches them even further. They are not available for out-of-area fire response.

[1] https://www.fs.fed.us/nwacfire/home/terminology.html
[2] https://www.fs.fed.us/nwacfire/home/terminology.html

Location of Hazard

The Department of Agriculture, Conservation, and Forestry; Maine Forest Services; Forest Protection Division, tracks all reported fire occurrences in the state on an annual basis. These are coded by cause such as: campfire, children, debris burning – which can include backyard burning as well as the agricultural practice of "burning over" blueberry fields, incendiary (includes arson) lightning, machinery, miscellaneous, railroad, and smoking. Currently, efforts are being made to integrate the state fire reporting system with the new Integrated Reporting of Wildland Fire Information (IRWIN) national fire reporting system.

The Maine Forest Service's (MFS) Forest Protection Division provides wildfire protection services for all of Maine's forest lands. In the Unorganized Territory of Maine, which account for 44 percent of the state's total land area, MFS is the only fire suppression entity and is often requested to respond to structure and vehicle fires as well as wildland fires. Their goals are to keep the number of forest fire starts to less than 1,000 and annual acreage loss to less than 3,500. MFS has met those goals in recent years because of:

- Quick and effective initial attack on all fires;
- Effective air detection and aerial suppression;
- Modern forest firefighting 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.

Extent of Hazard

With 17.7 million acres of forested land covering 90 percent of the state of Maine, the entire state remains at risk for wildfires. With an increase in drought conditions seen across the state wildland fires could originate anywhere, potentially placing a large burden on the state's limited resources.

Impact

Fire occurrences in 2016 came in with a record total of 747 events, up about 32 percent from a five-year average of 504 fires. Acreage burned also increased by 30% from the previous five-year average of 599 acres to a total of 907 acres. Traditional leading causes prevailed with debris burning and equipment use topping the list, with drought conditions exacerbating fire occurrence and intensity.

Also of note, Maine Forest Rangers investigated 1,733 fire related complaints in 2016, accounting for approximately 40 percent of all Forest Ranger law enforcement activity. Forest Rangers collected $20,311 in fines related to open burning violations and recovered $64,052 in restitution including the reimbursement of fire departments for suppression costs. With suppression costs reaching $1.3 million and damages reaching $3.6 million in 2016, there would be some added value in a more aggressive approach to enforcing open burning regulations.

The most significant findings from the 2016 fire season were related to cost **(Figure 3.2).** Statewide suppression costs totaled $1,351,525. This is an increase of 49% over the five-year average. Damages for 2016 were also up with $3,681,501. This is an increase of 54% over the five-year average. Comparisons to the 2015 statistics seem even more alarming; however, this increase could be attributed to a more comprehensive method of capturing cost for Fire Mitigation Assistance Grant (FMAG) Program purposes. In any event, suppression costs, damages, and acreage are all increasing.

Cause	2012	2013	2014	2015	2016	5 Year Avg.	5 Year Totals
CAMPFIRE	$ 65,348.26	$ 29,585.33	$ 78,850.10	$ 53,101.16	$ 280,879.01	$ 101,552.77	$ 507,763.86
CHILDREN	$ 14,213.93	$ 17,631.90	$ 6,272.87	$ 16,132.19	$ 20,338.35	$ 14,917.85	$ 74,589.24
DEBRIS	$ 187,303.06	$ 95,335.29	$ 74,490.45	$172,941.08	$ 240,680.84	$ 154,150.14	$ 770,750.72
ARSON	$ 36,247.30	$ 85,769.70	$ 31,328.82	$ 42,819.32	$ 58,910.78	$ 51,015.18	$ 255,075.92
LIGHTNING	$ 100,009.26	$ 19,226.95	$ 4,867.52	$ 23,102.58	$ 250,968.20	$ 79,634.90	$ 398,174.51
UIPMENT USE	$ 124,747.86	$180,973.48	$ 38,696.62	$ 51,011.53	$ 151,963.29	$ 109,478.56	$ 547,392.78
MISCELLANEOUS	$ 68,157.44	$ 61,933.50	$ 16,279.95	$ 47,290.91	$ 124,010.81	$ 63,534.52	$ 317,672.61
RAILROAD	$ 9,894.42	$ 13,785.14	$ 27,515.53	$ 2,554.50	$ 72,933.09	$ 25,336.54	$ 126,682.68
SMOKING	$ -	$ -	$ -	$ 8,010.36	$ 59,028.62	$ 13,407.80	$ 67,038.98
FIREWORKS	$ -	$ -	$ -	$ 983.47	$ 5,805.77	$ 1,357.85	$ 6,789.24
POWERLINE	$ -	$ -	$ -	$ 14,562.90	$ 61,301.95	$ 15,172.97	$ 75,864.85
PRESCRIBED FIRE	$ 16,464.83	$ 11,482.65	$ 4,038.04	$ 23,720.92	$ 8,355.05	$ 12,812.30	$ 64,061.49
STRUCTURE	$ -	$ -	$ -	$ 83,902.63	$ 16,349.20	$ 20,050.37	$ 100,251.83
Totals	$ 622,386.36	$515,723.94	$282,339.90	$540,133.55	$ 1,351,524.96	$ 662,421.74	$ 3,312,108.71

Figure 3.2: 2012 – 2016 Forest Fire Suppression Costs by Cause

MFS has 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.

Vulnerability

Recent staff reductions have impacted the ability to train on-call firefighters and conduct prevention activities. This with constant strains on enforcement activities will reduce the effectiveness of the overall fire management program. The success of past years may be diminished in future years.

The Division utilizes fixed and rotary wing aircraft [helicopters] in its wildfire prevention, detection, and suppression missions. Currently, the inventory includes four Bell UH-1H “Huey” helicopters, acquired from the Department of Defense through a loan agreement brokered by the U.S. Forest Service. These aircraft, which are the backbone of the state’s suppression fleet, were reaching the end of their useful age. Two of the Huey’s were recently refurbished and another is in the process. This should provide suppression aircraft for the next ten years. In 2007, the Division purchased a Bell 407 helicopter for its forest protection mission. During the

current budget process for the 2018/19 budget year, the administration is proposing elimination of one pilot position, which is needed to fly the third refurbished Huey.

Recent history has also shown a disturbing trend toward government and large landowners being accepting of an allowable loss due to wildland fire. This is evident with staff reductions and proposals to "break-off" law enforcement related prevention activities. The 2016 fire season began in March with 32 fires. Fire activity increased in April with 236 fires and continued with a steady pace through the end of the year. Some of the increase in fire activity could be related to fire weather conditions and a drought throughout the state for most of the summer and fall.

Figure 3.3 depicts the historical weather for Bangor in 2016. Rainfall for the year was about 23 percent below normal and temperatures were near normal. This drought pattern continued through fall until snowfall.

NOAA weather service report from Bangor;

...THE BANGOR ME CLIMATE SUMMARY FOR THE YEAR OF 2016...
CLIMATE NORMAL PERIOD 1981 TO 2010
CLIMATE RECORD PERIOD 1925 TO 2017

WEATHER	OBSERVED VALUE	DATE(S)	NORMAL VALUE	DEPART FROM NORMAL	LAST YEAR`S VALUE	DATE(S)
TEMPERATURE (F)						
RECORD						
HIGH	104	08/19/1935				
LOW	-32	02/10/1948				
HIGHEST	91	09/09 08/11	MM	MM	90	08/18
LOWEST	-17	02/15	MM	MM	-23	02/14
AVG. MAXIMUM	56.3		54.7	1.6	54.3	
AVG. MINIMUM	35.5		34.0	1.5	32.8	
MEAN	45.9		44.3	1.6	43.6	
DAYS MAX >= 90	2		4.3	-2.3	1	
DAYS MAX <= 32	47		55.3	-8.3	68	
DAYS MIN <= 32	157		160.2	-3.2	161	
DAYS MIN <= 0	12		20.8	-8.8	38	
PRECIPITATION (INCHES)						
RECORD						
MAXIMUM	MM	MM				
MINIMUM	MM	MM				
TOTALS	34.35			-7.58		
DAILY AVG.	0.09		0.11	-0.02	0.10	

Figure 3.3: 2016 Climate summary for Bangor, Maine depicting abnormally dry conditions.

Previous Occurrences

The Maine Forest Service; Forest Service Division has identified a total of 1,850,662 acres burned across 55,004 wildfires since 1903 **(Table 3.3).** While historically major wildfires have correlated more with a higher number of acres burned, wildfire trends now reflect a higher number of smaller, more destructive fires due to an increase of people living in the wildland-urban interface. On average, the Maine Forest Service responds to 500 acres and fires annually. As of August 2018, there have already been a reported 477 wildfires meaning that Maine will likely have an above average year for wildfires. Although **Figure 3.5** depicts the numerous causes of wildfire origin across the state between 2007 and 2016, moderate drought conditions, such as the July 2018 conditions depicted below, inevitably help to exacerbate the likelihood of an event occurring.

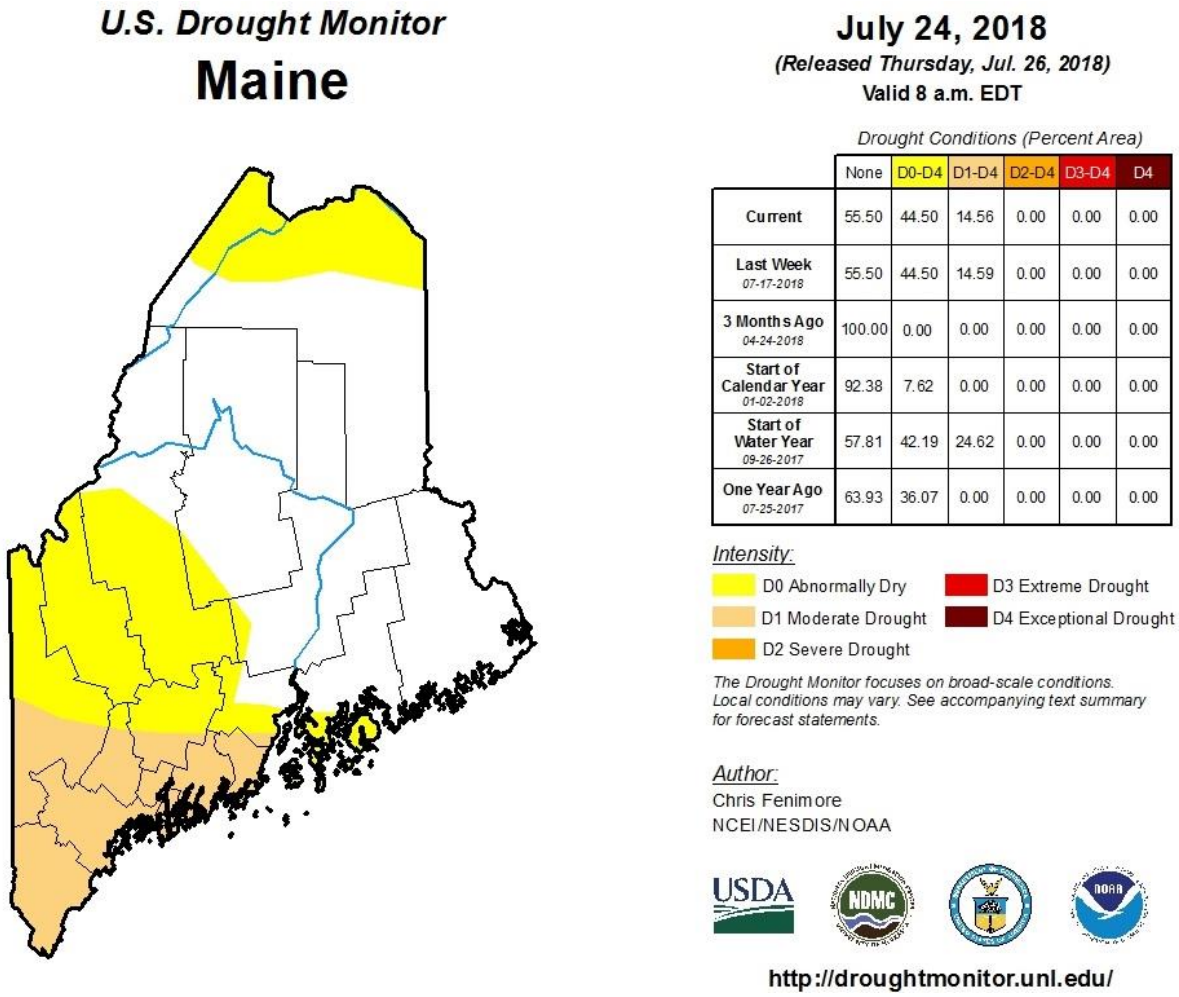


Figure 3.4: Map depicting the extent of abnormally dry and moderate drought conditions across Maine in late July of 2018.

TABLE 3.3: Maine Forest Service; Forest Service Division
Forest Fire Record 1903-2017

Year	Number of Fires	Acreage
1903	345	267,587
1904	31	6,958
1905	142	20,316
1906	67	7,621
1907	33	4,524
1908	237	142,130
1909	157	39,028
1910	30	848
1911	202	111,077
1912	99	20,240
1913	194	30,214
1914	157	15,716
1915	156	25,657
1916	72	11,616
1917	28	458
1918	79	8,938
1919	104	5,020
1920	165	39,803
1921	362	68,830
1922	216	21,388
1923	181	70,339
1924	220	40,357
1925	115	6,053
1926	144	12,212
1927	109	11,620
1928	64	2,814
1929	168	2,465
1930	263	33,309
1931	226	4,807
1932	321	42,827
1933	281	15,294
1934	266	136,370
1935	301	18,828
1936	136	1,640
1937	262	5,713
1938	173	16,139
1939	287	7,433
1940	240	4,111
1941	481	40,350
1942	225	4,993
1943	131	7,168
1944	408	24,203
1945	214	4,950
1946	576	10,327
1947	700	213,547
1949	763	21,052
1950	951	18,051
1951	421	3,685
1952	948	24,695
1953	877	14,558
1954	341	3,180
1955	490	1,782
1956	443	2,580
1957	726	30,967
1958	221	1,562
1959	485	6,571
1960	472	2,810
1961	402	2,481
1962	463	3,438
1963	544	1,808
1964	695	3,582
1965	972	16,480
1966	580	1,361
1967	347	1,619
1968	516	6,248
1969	300	2,399
1970	430	1,011
1971	476	767
1972	430	1,652
1973	374	1,508
1974	684	2,266
1975	911	1,973
1976	727	6,360
1977	975	10,075
1978	1,024	3,170
1979	851	3,829
1980	1,029	2,255
1981	1,027	3,905
1982	840	1,529
1983	651	1,197
1984	955	4,653
1985	1,402	5,460
1986	752	2,904
1987	850	3,537
1988	857	2,375
1989	651	2,404
1990	657	1,275
1991	1,110	2,797
1992	761	4,427
1993	824	1,800
1994	609	2,046
1995	1,054	1,180
1996	342	419
1997	667	919
1998	677	1,533
1999	786	1066
2000	383	393
2001	980	2220
2002	719	766
2003	634	844
2004	534	983
2005	480	729
2006	619	1772
2007	491	425
2008	456	544
2009	484	481
2010	562	342
2011	310	118
2012	579	474
2013	579	730
2014	334	226
2015	412	645
2016	742	858
2017	521	408.4
2018*	477	665

TOTAL	55,004	1,850,662

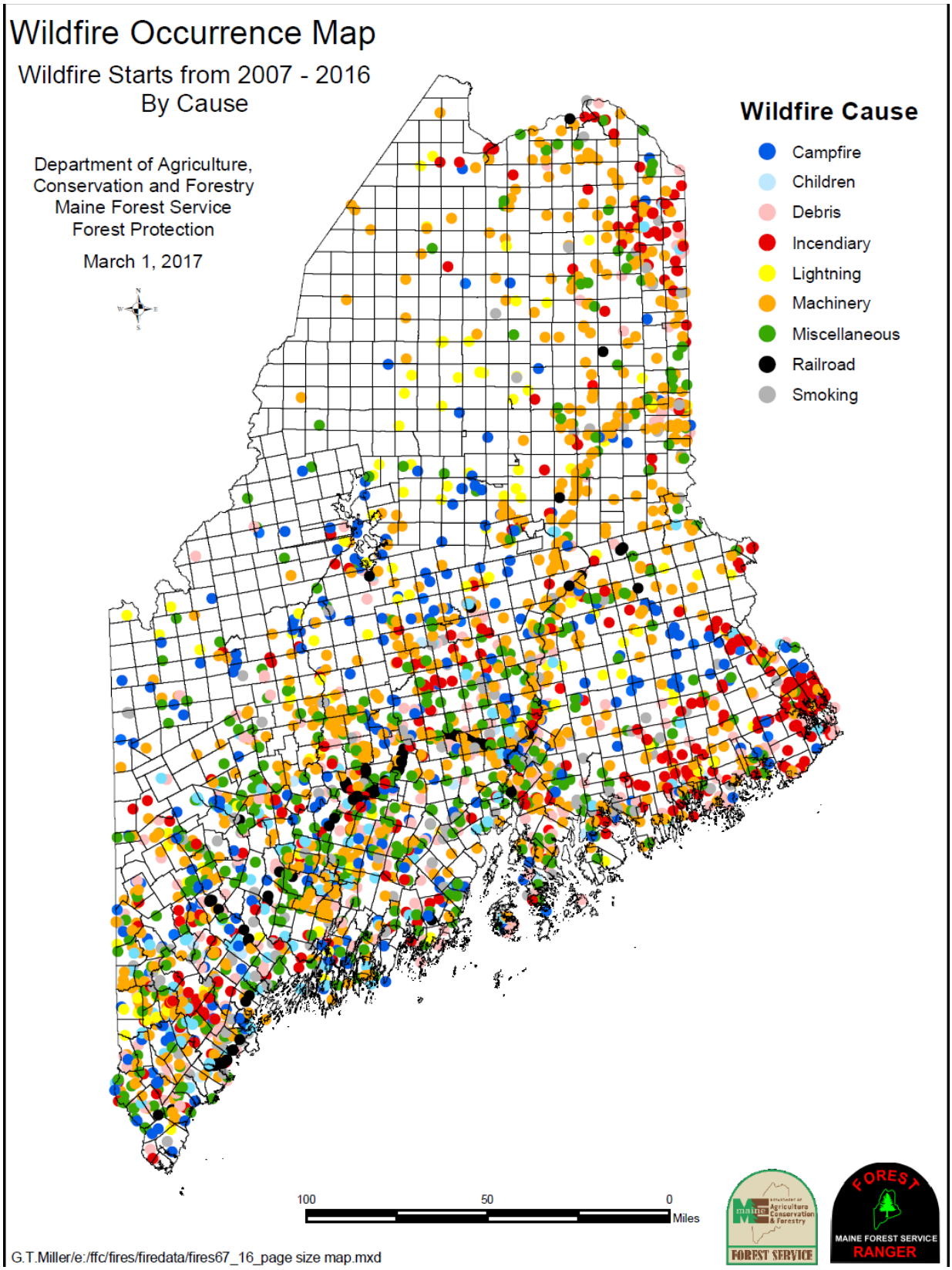


Figure 3.5: Map depicting wildfires by cause across Maine.

Fire of Record: The "Great Fire of 1947"

The worst fires in Maine's history occurred in the fall of 1947. In the spring of that year, probably no one could have imagined such a disaster. Winter had been mild with a normal snowfall. When unseasonably warm March weather had briefly pushed temperatures into the 80's, the prospect of an early spring seemed possible. But then, typical of Maine weather, it changed dramatically. The months of April, May, and June were not only cold but filled with days and days of rain. Of necessity, farmers had to plant their crops late, and even then, the seed was slow to sprout.

Only Maine's forest wardens must have welcomed the rain. To them the early melting of the snow had been an ominous sign, for forest fire danger is heightened when the snow disappears early from the woods. Until 1947, Maine's record for a low incidence of fires was one of the best of the eastern states. Unfortunately, that was about to change as the climate and human activities slowly intertwined for disastrous results.

It was after World War II, and returning veterans had created a post-war building boom. In response, lumbermen had set up dozens of portable and stationary sawmills to meet the demand for new houses. As a result, piles of slash had built up in the forests and sawmill yards. There was also nature's slash, the debris left behind after the 1938 Hurricane. While the fire wardens were concerned about this, the public was generally unaware of any threat.

When the rains finally gave way to sunshine at the end of June, the business of summer went forward. Crops responded to the good weather, and the truck gardeners of York County, the potato farmers of Aroostook, and the blueberry growers of Washington County looked forward to a good harvest. Sports camp owners hosted fisherman and made plans for the fall hunting season. Although ammunition was still scarce, hunters from all over the country were making reservations for the deer season. Farm wives were filling their pantries and cellars with preserves, while along the coast, cottagers were anticipating long, lazy days of swimming, boating, and visiting.

The beautiful weather continued into fall. Maine, indeed all of New England, enjoyed one of the most glorious Indian Summers in living memory. Eventually, it would be apparent that the state was experiencing its severest drought in 30 years, but it wasn't until the opening of bird hunting season that the hunters realized just how serious conditions had become. Leaf mold, pine needles, and moss were parchment dry. Streams, lakes, and ponds had shrunk from their banks. By then, of course, farmers were keenly aware of the drought. Their wells had been going dry and the primary chore of tending livestock had become the daily transportation of water. Some farmers resorted to using empty vinegar and molasses barrels from local stores.

On Friday, October 3rd, a fire got out of hand when a crew was clearing brush for the new turnpike. With the help of local firefighters, they thought that it had been extinguished, but on Sunday, it flared up, burning underground along the roots of trees. By then, other fire reports were coming into the Office of the Forest Service in Augusta. As sunny, dry weather continued, more fires burst to life:

> **October 7** - fires were burning in the Topsham and Bowdoin areas, the Wells-Sanford Road in York County, and in Portland.
>
> **October 16** - there were 20 files burning – double the number of 24 hours earlier.

October 17 - there were 50 fires burning; Gov. Hildreth closed the Maine woods to hunting, and a season of revenue.

October 18 - the Topsham-Bowdoin blaze was two weeks old, still out of control, and had consumed 1,000 acres of slash and timber.
October 23 – "Red Thursday" the day of the big wind that spread the fire through Newfield, Shapleigh, Alfred, and Lyman.

October 24 – rumors were rampant; Central Maine Power, the state's largest utility, had to issue a statement to stop further erosion of its stock value.

October 29 – there were 40 fires still burning; there was a second attempt to "make rain" by combined efforts of "Project Cirrus."

With hand pumps, brooms, shovels, bucket brigades, old fire trucks, and whatever could be used as makeshift water tanks, the citizens and firefighters did their best, but such equipment proved inadequate to the sheer magnitude of the task. Without a central command structure, or training at the local level, many well intentioned efforts could not be managed effectively. Without tracking and communications equipment, strategic information could not be passed quickly to where it was most needed.

In just a week, nine communities had been practically wiped out, four more had suffered severe damage, and scores of others had lost buildings. Property damage was estimated at $30,000,000. Fifteen had died. Many thousands of acres of trees were blackened stubble, and 3,000,000 feet of cut lumber had been destroyed. In many sections, the earth itself had been consumed.

Families returned to the smoking cellar holes of what had been their homes. Farmers returned to find the charred remains of livestock that had been caught by the fire. Town officials returned to the ash of post offices, churches, town halls, tax records, and the property on which the taxes were based. Cottagers returned to chimneys standing in the spaces where their beautiful summer homes had once faced the sea.

Frequency of Occurrence

Historically, forest fires are one of the state's most significant hazards, and Maine averages about 700 low acreage forest fires annually. Today, about 90 percent of all forest fires are caused by human activity while lightning causes about ten percent. During dry periods, fire danger increases rapidly. Profiled in this section is the "1947 Fire," which was actually a series of wildfires that flared all over Eastern and Southern Maine. Several fires that burned concurrently leveled nine towns in Southern Maine before the blazes were controlled. A similar situation occurred in Bar Harbor during the same period. In July 1977, a forest fire, started by lightning in Baxter Park, burned more than 3,500 acres and seriously threatened the entire park and surrounding developed areas.

Probability of Occurrence

Based on historical records of fires, the Department of Agriculture, Conservation and Forestry, Maine Forest Service Forest Protection Division anticipates that there will be an average of 500 low acreage fires (from all causes) each year (a low acreage fire is less than 1,000 acres). Ironically, even though Maine has seen record drought conditions since the publication of the

2013 Plan, anticipated wildfires are still down from the 600-700 predicted five years ago. While the probability of a major wildfire, based on the last 115 years of wildfire data, is once a decade it is currently unclear as to how changing climate conditions may either contribute to or inhibit future wildfire events. Most wildfires, however, are likely to occur between the months of April and October.

One aspect of risk analysis for wildfires in Maine which deserves attention is that of a "complex" of wildfires at the same time. Recent lightning events have resulted in this type of scenario, with multiple fires being reported simultaneously. While these fires are generally not large, challenges for managing multiple incidents exist. Recently, a single lightning storm caused over a dozen fires across the Unorganized Territory of Maine, resulting in fires ranging in size from one to twelve acres.

Issues and Challenges

As a rural state, the biggest issues Maine continues to face in terms of mitigating wildfire revolves around limited resources. With a significant portion of the population living in wooded areas and limited capabilities to both monitor conditions and suppress fire hazards, a higher risk does exist. In recent years, Maine has also experienced exceedingly dry conditions posing the extra challenge of educating the public on prevention of fires and basic fire suppression techniques.

FLOODING

General Definition

A temporary inundation of normally dry land as a result of: 1) the overflow of inland or tidal waters, or 2) the unusual and rapid accumulation or runoff of surface waters from any source.

Types of Flooding Events

Coastal Flooding:
The temporary inundation of beaches and other land areas by the sea, either as a result of coastal storms, hurricanes (see profile of hurricanes contained in this assessment), or erosion or landslides (see separate profiles of erosion and mass wasting contained in this assessment). Coastal flooding comes with two significant components: still water and storm surge. The typical high winds associated with coastal flooding exacerbate the flooding by "pushing" more water toward land. A nor'easter can cause a storm surge along the coast of Maine. Fetch, or the distance the wind can blow toward the shore from out at sea is a significant factor in coastal flooding depths. The shape of the ocean floor just offshore is another variable.

Dam Failure/Breach:
The sudden release of water resulting from structural collapse or improper operation of the impounding structure. Dam breach can cause rapid downstream flooding, loss of life, damage to property, and the forced evacuation of people. A dam breach has a low probability of occurring, but a potentially high impact. It's different than the other types of flooding due to man-made causes, but it is included under flooding because the results and impacts are the same as flooding.

Flash Flood:

A flood event occurring with little or no warning where water levels rise rapidly due to heavy rains, ice jam release, or rapid snow melt.

Ice Jam:
An accumulation of floating ice fragments that blocks the normal flow of a river. During a thaw or rainstorm, the rapid increase in discharge from snow melt and/or rainfall can rapidly lift and break up a thick ice cover and carry it downstream as an ice run. Ice runs can jam in river bends, shallows, bridges or against ice sheets covering flatter reaches. The resulting ice jams can block flow so thoroughly that serious flooding may result within an hour of their formation. Failure of an ice jam suddenly releases water downstream. Damages from ice jam flooding usually exceed those of clear water flooding because of higher than predicted flood elevations, rapid increase in water levels upstream and downstream, and physical damage caused by ice chunks. Moving ice masses can shear off trees and destroy buildings and bridges above the level of the flood waters.

Lacustrine:
(Lake Flooding) occurs when the outlet for the lake cannot discharge the flood waters fast enough to maintain the normal pool elevation of the lake. During a base flood event, normal increases in water surface elevations on most Maine lakes and ponds range from 1 to 5 feet. However, in Maine there are some examples where the base flood event will reverse the flow of the outlet stream. In such instances, river and base flood elevations can rise more than 15 feet above normal pool. Maine's mandatory shore land zoning and floodplain management elevation requirements do much to mitigate for lake and pond development by imposing significant setbacks from the water's edge. While this type of flooding can impact older individual camps built near the water's edge, there are no records of major damages so this type of flood will not be further addressed in the Plan.

Riverine/Riparian:
Periodic overbank flow of rivers and streams, usually the result of spring runoff, but can also be caused by major rain storms. See "Location of River Basin" section for flooding details.

Storm Surge:
Storm surge is an abnormal rise of water that is generated by a storm, over and above the predicted astronomical tide. See hurricane profile for more information.

Tsunami:
A wave produced by a disturbance that displaces a large mass of water – usually the result of geologic activities such as earthquakes, volcanic eruptions, underwater landslides, or in rare geologic cases, meteor strikes. After such a disturbance, displaced water travels outward from its site of origin as a series of unusually large waves at great speeds.[3] All areas with elevation less than 100 feet and within a mile of the coast could be impacted by a tsunami. Based on information obtained from the Maine Geological Survey, the chances of a catastrophic event are minimal. Moreover, with the presence of the relatively shallow Georges Bank offshore, Maine remains protected from the full force of an Atlantic Ocean tsunami.

Urban:
Overflow of storm sewer systems, usually due to poor drainage, following heavy rain or rapid snow melt. The combined sanitary and storm water systems that some urban areas installed

[3] **KOMAR**, P.D., **1996**. Tidal-Inlet Processes and Morphology Related to the Transport of Sediments. Journal of Coastal Research, Special Issue No. 23, 23-45.

years ago cause flooding of sanitary sewerage when riparian or coastal floods occur. Runoff is increased due to a large number of impervious surfaces such as roof tops, sidewalks and paved streets.

Nature of Hazard

Due to the nature of Maine's geographic features, many of its rivers flow steeply from the mountains eastward toward the sea. Rivers in mountainous regions tend to rise very quickly after heavy rainfall because of the gradient of beds and drainage areas. Generous precipitation (about 42.6 inches a year) contributes to the flood potential. The low-pressure system over the seaboard and the tendency of some storms to follow one another in rapid succession provide heavy, combined moisture.

NOTE: The nature of Maine's geography, geology and hydrology is such that flooding is usually fast rising but of short duration.

With five major rivers, more than 5,000 streams and brooks, 6,000 ponds and lakes, and 3,500 miles of coastline, water abundance is one of the state's most valuable natural resources as well as its primary hazard. Maine's geography and climate are critical factors which affect the flows of these water bodies.

Location of Hazard

All of Maine has locations that are susceptible to flooding, from flood types listed above. Notable locations of potential flooding by flood type are listed below.

Location of Riverine/Riparian

Some of Maine's rivers have overflowed many times, but recent flooding has caused much more damage because of the extensive development and denser population of the floodplains. For example, the floods of 1896 and 1936 were more severe but much less destructive than the flood of 1987. By the late 20th century, a much larger population was living and working in the floodplain areas and more people, businesses and infrastructure were affected. Maine's susceptibility to flooding is further exacerbated by the wide-ranging weather variables as discussed in the climate section. Due to seasonal (and regional) factors such as heavy rains, rapidly melting snow pack and/or ice jams, major flooding most frequently occurs between December and May. The most flood prone months are April, January and March respectively. Floods can also be caused by hurricanes. (See "Hurricane" section of the Plan.) Flooding often occurs along the state's major river basins, outlined below. The most vulnerable of Maine's rivers are the Kennebec and Androscoggin.

NOTE: This information can also be found in the "Section 1 – Introduction- Geographic Profile"

Androscoggin River Basin:
The Androscoggin River Basin runs 169 miles from its Umbagog Lake source in Errol, New Hampshire to its mouth at Merrymeeting Bay near the borders of Cumberland, Lincoln, and Sagadahoc Counties. The Androscoggin River Basin drains from the western boundaries of Maine and New Hampshire. While it drains less area than the Kennebec River Basin, the river has a more rapid fall (1,245 feet from its source) with an average slope of almost eight feet per mile. The river's steep slope has historically attracted mill-based industries and towns such as

Livermore Falls, Lewiston, Auburn, Lisbon Falls and Topsham along its course. Before offshore outsourcing, the mills manufactured products as diverse as paper, textiles and shoes. Floods have historically been severe in some of the downtown locations where development was extensive, particularly in Oxford County which has been the most vulnerable to floods in the last 36 years. After major ice jam flooding in December 2003, the Town of Canton located in Oxford County, applied for and won a $3 million FEMA Pre-Disaster Mitigation acquisition/demolition project. Due to the proximity of the river to Oxford County, York County, and the state of New Hampshire, mutual aid agreements have been established to emphasize cooperation across emergency plans.

Kennebec River Basin:
The Kennebec River Basin occupies approximately 5,900 square miles of southwestern Maine. The river basin originates at Moosehead Lake and flows south approximately 145 miles to Merrymeeting Bay. The Kennebec River joins the Androscoggin River in Merrymeeting Bay before exiting to the ocean at Fort Popham. The upper two-thirds of the basin are hilly and mountainous and the lower third of the basin has gentle topography representative of a coastal drainage area. Major communities in this basin include Bingham, Anson, Madison, Norridgewock, Skowhegan, Waterville, Winslow, Augusta, Hallowell, and Gardiner. Storage dams, such as Wyman Dam in Somerset County, control the upper part of the Kennebec River Basin, and the basin below the dams is largely uncontrolled affecting communities built extensively in floodplains. Notably, the lower third of the river basin is also relatively susceptible to tidal influence as far north as Augusta.

Presumpscot River Basin:
Sebago Lake is the source of the Presumpscot River which drains into Casco Bay in Portland, 26 miles downstream. The basin includes some area to the north of Sebago Lake, and the terrain across the basin is generally hilly. While the Presumpscot River Basin covers a small geographic area, it is home to some of the highest population density in the state of Maine.

Penobscot River Basin:
The Penobscot River Basin runs 105 miles from its source at the confluence of its east and west Branches in Medway to its mouth in Penobscot Bay. With a land area of 8,570 square miles, the Penobscot River Basin drains almost as large an area as the Kennebec and Androscoggin Rivers combined. It drains a large portion of the north-central part of the state from the Canadian border to Penobscot Bay. It includes most of Maine's pristine bogs and ponds and includes Baxter State Park near its center. A system of upstream dams, the relatively gradual fall of the river averaging only three feet per mile, and the presence of extensive wetlands in the eastern part of the basin have in the past prevented massive floods. The Piscataquis River in the upper part of the basin, however, passes through a series of small communities with many downtown areas vulnerable to spring flooding. The Kenduskeag River flows through Bangor and joins the Penobscot in the downtown area. It has occasionally caused considerable flooding damage to Bangor's downtown.

Saco River Basin:
With a land area of 1,700 square miles, the Saco River Basin has approximately a quarter of the drainage area of the Kennebec River but no upstream storage dams. The Saco Basin is generally described as embracing all of York County, as well as most of Cumberland County, and the southern portion of Oxford County. The Saco River runs 75 miles from Crawford Notch in New Hampshire to Biddeford. Several small rivers with small exclusive basins comprise this area. It includes small rivers like the Kennebunk, Mousam, Presumpscot, Royal, Ogunquit and

the Maine portion of the Piscataqua and Salmon Rivers. Many of the smaller rivers such as the Mousam have experienced significant flooding in recent years.

St. Croix River Basin:
At 1,650 square miles, the St. Croix River Basin has as much drainage area as the Saco River Basin, but it is controlled by upstream storage dams. The Saco, St. Croix, and St. John rivers do not have the extensive floodplain development of the Kennebec and Androscoggin Rivers. The St. Croix River runs 71 miles from the Chiputneticook Lakes to Passamaquoddy Bay and serves as the international border between Maine and Canada. The basin includes the area known as "Down East". Most of the basin is subject to tidal influence, but it is also comprised of many smaller rivers such as the Dennys, Pleasant, Machias, Narraguagus and Union Rivers. This area has historically been sparsely populated, but has experienced increasing pressures for development. Most flood damages in this basin are to infrastructure rather than residential and commercial structures.

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

Location of Dams The result of a dam failure is a flood. The location of each dam is, therefore, a location of potential flooding from a dam breach or failure. The below map identifies the extent of dams spread throughout the state. The Dam Safety Team continues to maintain records indicating the level of hazard associated with each unique structure.

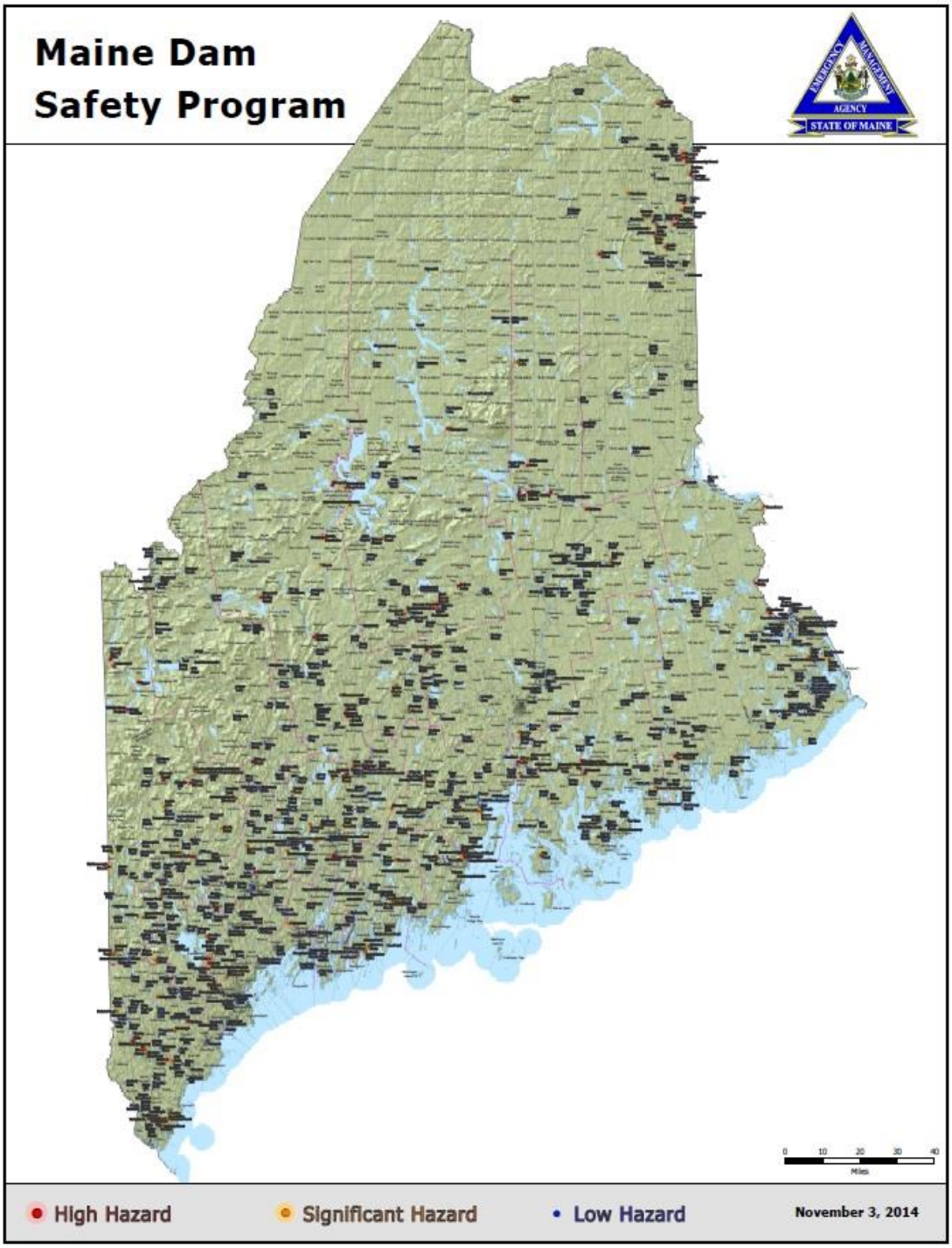


Figure 3.5 – An overview of dam locations in the state of Maine. Coordinates were last updated by the MEMA Dam Safety Team in 2014.

The terms “high”, “significant” and “low” refer to the downstream hazard potential of the dams as defined within *Title 37B MSRA,* Chapter 24. *Title 37B MSRA* assigns administration of the Maine Dam Safety Program (DSP) to the Maine Department of Defense, Veterans and Emergency Management.

High Hazard Potential Dam:

A dam assigned the high hazard potential classification where failure or misoperation will probably cause loss of human life; [2001, c. 460, §3 (NEW).]

Low Hazard Potential Dam:

A dam assigned the low hazard potential classification where failure or misoperation results in no probable loss of human life and low economic and environmental losses. Losses are principally limited to the owner's property; and [2001, c. 460, §3 (NEW).]

Significant Hazard Potential Dam:

A dam assigned the significant hazard potential classification where failure or misoperation results in no probable loss of human life but can cause major economic loss, environmental damage or disruption of lifeline facilities or affect other concerns. Significant hazard potential dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure. [2001, c. 460, §3 (NEW).]

While the Maine Dam Safety Program maintains records of 1,072 dams, only 571 dams are regulated by the MEMA Dam Safety Program. The Federal Energy Regulatory Commission (FERC) regulates 162 dams resulting in a total of 733 overseen dams.

TABLE 3.6: State and FERC Regulated Dams in the State of Maine (August 16, 2018)

	State Regulated Dams	FERC Regulated Dams	Totals
Hazard	**# Dams**	**# Dams**	**Dams**
High	32	32	64
Significant	72	9	81
Low	467	121	588
Total	571	162	733

Maine law requires that High and Significant dams be inspected every six years respectively and that High and Significant dams have Emergency Action Plans (EAPs) to mitigate the effects of a failure. The FERC regulates 32 High Hazard and 9 Significant hazard dams in Maine and has up to 5 engineers to do the inspections. The state regulates 32 High Hazard and 72 Significant hazard dams and employs one engineer.

In its most basic form, the Emergency Action Plan requires a Notification Flowchart and Inundation Map. The Flowchart is a communications tool, a call down list, based on the Incident Command System for use by first responders and emergency personnel in notifying and evacuating downstream populations. The complexity of the inundation map is largely determined by the population downstream and available resources for producing such documents. Dams that produce electricity tend to have the most engineered inundation maps because their owners

have a vested interest in their continued operation. For dams that no longer serve their original purpose of power production and/or that lack engineering staffs, the state has accepted maps from “www.terraserver-usa.com” or hand drawn flood lines on copies of Gazetteer maps. Current EAP compliance includes 100% of High Hazard and 60% of Significant hazard dams. According to the Association of Dam Safety Officials (ASDSO) website, this is one of the highest compliance rates in the nation.

Location of Coastal Flooding/Storm Surge

143 jurisdictions in ten Counties in Maine are vulnerable to flooding from storm surge. See the hurricane section for more information on storm surge.

Extent of Hazard

Maine uses the ‘probability of occurrence’ of a flood event to measure the magnitude of a flood event. Flooding from a 10-year rainfall event is less severe than flooding from a 100-year rainfall event, which is less severe than flooding from a 500-year rainfall event (see probability of occurrence).

Through coordination with the United States Geological Survey, Maine uses stream gauges to measure river levels, which can also be used to measure the magnitude of a flood. Maine also uses inundation depths at specific locations to measure localized extent of flooding.

Impact

Severe flooding can cause loss of life, property damage, disruption of communications, transportation, electric service and community services, crop and livestock damage, health issues from contaminated water supplies, molds and mildew within structural components, and loss and interruption of business. Ironically, firefighting efforts can be compromised if fire fighters and equipment are responding to a flood emergency.

Flood damages to roads, bridges and ditches continue to be a common occurrence throughout the state. Most washouts are quickly repaired, but often are not mitigated. As a result, replacement culverts, ditching and fill are just as susceptible to future flood damages as they were before the storm event. In order to provide mitigation leadership, the Maine Emergency Management Agency has partnered with the Local Road Center of the Maine Department of Transportation to provide workshops for local officials on the use of geo-synthetics to stabilize and protect transportation infrastructure from flooding. Workshops on the use of geo-synthetics have been included as part of the Local Road Center’s continuing series of workshops for local transportation officials. Mitigation leadership is also provided on a continuing basis through the Department of Economic and Community Development’s Code Enforcement Officer Certification and Training Program.

Impact from Coastal Flooding

As previously noted in the introduction to this section, the gradual rise in the level of the sea is having a profound effect on the nature of coastal flooding. The sea has risen about 7.5 inches since 1900, and is conservatively projected by the Maine Geological Survey to rise by roughly two additional feet by 2100. Along the Maine Coast, if the 10-year and 100-year storm elevations are only one foot apart, a sea level rise of one (1) foot means that a storm that had a 1 percent chance of occurring in any one year (the 100-year storm) at the original elevation will have a 10 percent chance of occurring in any one year (the 10-year storm) at the new elevation. As a result, more homes, businesses, public infrastructure such as roads, and entire communities will be

subject to more devastating coastal storms, as well as coastal erosion and landslides, on a more frequent basis. There is also concern in the scientific community that global warming may be increasing the intensity of coastal storms.

Wave action generated by winter storms, particularly northeasters, is the most threatening cause of coastal flooding. The Patriot's Day storm that occurred on April 16, 2007, was a northeaster.

Hurricanes occur far less frequently than winter storms, but can be just as, if not more devastating than, a winter storm (see separate profile on hurricanes contained in this assessment).

Coastal erosion and landslides can be triggered by a storm event, although a slow, steady rise in sea level is the underlying reason for erosion along the coast (see separate profiles on landslides and erosion contained in this assessment).

Impact of a Dam Failure/Breach

Maine dams were constructed incrementally over a period of 300 years. Businesses harnessed the abundant fast flowing rivers and rocky rapids for the development of energy and transportation. Many dams throughout the country are now aged, and in Maine the majority of these structures are nearly 100 years old and beyond the normal design life of civil engineering works. Many are low head dams constructed by using local materials of stone, timber and earth. Some old dams have now been removed or lie in ruins. Unfortunately, some of the old (or unmonitored) sites have been built upon by beavers, impounding enough water to cause road washouts when they breach after heavy rains.

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

Vulnerability

All structures in the floodplain are vulnerable to damages from flooding; particularly capital that is situated below the base flood elevation (BFE). Utilities such as furnaces, generators, oil tanks, and electricity meters, often situated near or below ground level, are especially susceptible to water damage from flood events.

The susceptibility of the major river basins to flooding, and the counties within them, is dependent upon three factors:

a) Extent of the drainage area;
b) Fall of the river; and
c) Extent of development on the floodplain

NOTE: Even the smallest county in the state has at least two river basins.

Previous Occurrences

TABLE 3.7: Major Floods by County

Major Floods	AN	AK	CD	FN	HK	KC	KX	LN	OD	PT	PS	SC	ST	WO	WN	YK	Total Counties
Jan 1970				X					X		X		X				4
Feb 1972			X													X	2
Apr 1973		X		X					X	X				X	X		6
May1973		X															1
Jul 1973		X		X					X	X				X			5
Dec 1973		X				X		X		X		X	X	X			7
May 1974		X															1
May 1975			X				X									X	3
Feb 1976										X					X		2
Apr 1976		X															1
Aug 1976		X															1
Mar 1977	X		X						X							X	4
Apr 1979		X				X				X	X						4
Jun 1984	X		X			X				X		X	X				6
Jan 1986	X		X	X		X		X	X			X	X			X	9
Apr 1987	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**14**
May1989	X			X					X								3
Apr 1991		X															1
Mar 1992	X		X	X		X	X		X	X			X	X		X	10
Apr 1993	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**		**X**	**X**		**X**	**13**
Apr 1994		X															1
Oct 1995				X			X		X								3
Jan 1996	X			X					X	X	X		X	X			7
Apr 1996	X		X				X		X							X	5
Oct 1996			X						X							X	3
Jan 1998	X			X		X			X				X			X	6
Oct 1998			X													X	2
Mar 2000	X	X		X		X			X		X		X		X		8
Mar 2001				X		X			X	X					X	X	6
Dec 2004				X		X			X		X	X	X	X			7
Mar 2005	**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**		**X**		**X**	**X**	**X**		**12**
May2006																X	1
Mar 2007					X		X	X						X			4
Apr 2007	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**			**X**	**X**	**X**	**X**	**X**	**13**
Jul 2007									X								1
Apr 2008		X					X	X		X	X		X	X			7
Jul 2008	X		X													X	3
Dec 2008	X		X				X	X				X		X		X	7
Jun 2009				X	X		X	X	X		X		X	X	X		9
Feb-Mar 2010			X				X	X				X				X	5
Dec 2010		X									X				X		3
Mar 2018																X	1
TOTALS	**15**	**15**	**15**	**17**	**6**	**13**	**12**	**11**	**21**	**12**	**11**	**8**	**15**	**14**	**8**	**18**	**211**

Flooding* **Occurrence by County**

21 - OD
17 - FN
17 - YK
15 - ST
15 - CD
15 – AN
14 – AK
14 - WO
13 - KC
12 – PT
12 - KX
11 - LN
10 - PS
8 - SC
7 - WN
6 - HK

*floods resulting from coastal storm, heavy rains, snowmelt and/or ice jams

KEY: County Codes			
AN = Androscoggin	HK = Hancock	OD = Oxford	ST = Somerset
AK = Aroostook	KC = Kennebec	PT = Penobscot	WO = Waldo
D = Cumberland	KX = Knox	PS = Piscataquis	WN = Washington
FN = Franklin	LN = Lincoln	SC = Sagadahoc	YK = York

Table 3.7 Summarizes a 48-year record of major seasonal flooding occurrence and the counties most susceptible to this natural hazard. Major flood occurrences are defined as Presidential Declarations, Emergency Declarations, or Small Business Administration claims. Though the 70's, 90's, and the first decade of the twenty-first century were flood prone decades, note that the spring seasons of 1987, 1993, 2005 and 2007 (highlighted with bold **X's**) were the years where at least 75 percent of all Maine counties were affected. (County abbreviations are explained above). Since 1987 was a 100-year event flood, it is further profiled below.

NOTE: No major flood occurrences have taken place in the state of Maine between December 2010 and March 2018.

Storm of Record: The "April Fools Flood of 1987"

"Records of past floods indicate that the April 1987 flood was one of the most significant in Maine's history. At selected sites, it was the worst since the area was settled more than 200 years ago. Flood damage in the Penobscot and Kennebec River basins in 1987 was the greatest for any flood (including March 1936) for which data is available."

"Hydrometeorology conditions before the April 1987 flood gave no clear indication of the severity of the flooding that was to come. From December 1986 through March 1987, precipitation was below normal. In early March, the snowpack was below normal in northern Maine, normal in southern interior sections and above normal in coastal areas."[4] However, as spring approached, climatic conditions began to change and set the stage for trouble. March temperatures had finally gone above freezing, and then above normal, rapidly melting off the snowpack. Runoff was then above normal in upland areas of western Maine. From March 20 through April 2, an area of low pressure moved slowly northeast toward Maine, bringing two storms that unleashed heavy rains. The resulting floods had only one missing factor – ice. Had there been ice jams, the damage would have been far worse. "In contrast to the 1936 flood, during which backwater from ice jams was common, peak stages for the 1987 flood reflect primarily free-flowing conditions."[5]

Still, the damages were far reaching, affecting 14 of the 16 counties and a wide range of enterprises. Many businesses had waterways instead of streets. Even in the first estimations, the Small Business Administration thought that 400 businesses had sustained losses totaling approximately $36,000,000. The Agricultural Stabilization and Conservation Service reported $300,000 worth of equipment and $100,000 in livestock losses. Pollutants in flood waters contaminated clam beds at the mouth of rivers, putting clam diggers out of business. That alone necessitated Disaster Unemployment Assistance funding of over $300,000.[6]

[4] "Flood of April 1987 in Maine," US Geological Survey Water Supply Paper 2424, p.37
[5] Ibid, p.27
[6] Interagency Hazard Mitigation Report, FEMA-788-DR-Maine, April 1987, p.2.

According to MEMA accounting records, the "April Fool's Flood" of 1987 was a $100,000,000 event. Were it to happen today, nearly 20 years later, the costs would be much higher, primarily because real estate and infrastructure values have continued to rise.

Storm of Record: The 2007 "Patriot's Day Storm"

According to the Gulf of Maine Ocean Observing System website, the Patriot's Day Storm of 2007 will be long remembered for its meteorological significance and devastating power. Violent waves destroyed homes, businesses, coastal roads and beaches, while forceful winds tore down power lines, leaving many residents in the dark for days. Portland had a peak wind of 59 mph measured on April 16th. An abnormally high spring tide plus a storm surge of 3 feet (2.72 feet at the Portland tide gauge) produced a high tide of 13.28 feet (the 7th highest tide measured since the early 1900's).

The National Weather Service's models had predicted a large snowstorm the week before that didn't occur. Instead, the jet stream carried the storm's energy over New England, dropping five to eight inches of rain along the coast, resulting in a significant coastal flooding event. During the Patriot's Day storm, there were four high tide cycles in which the water was near or above flood stage and the waves were greater than 10 feet in height. This combination caused the tremendous amounts of damage seen during the storm (Gulf of Maine Ocean Observing System web site).

Figure 3.6: Damage from the Patriot's Day Storm, 2007.
Photo by John Cannon, National Weather Service.

TABLE 3.8: Previous Flood Occurrences

Key:

DR: Disaster Declaration
EM: Emergency Declaration
SBA: Small Business Administration
TBD: To be Determined

Month of Event	Year	County (ies)	Damages	Declaration
Mar 2	1896	Androscoggin	Unknown	n/a
Apr 30	1923	Kennebec Penobscot	**$2,000,000**	n/a
Mar 19	1936	Cumberland	**$25,000,000** **5 deaths**	n/a
Aug. 28	1946	Cumberland	**$200,000**	n/a
Apr 22	1950	Franklin Kennebec	3 bridges	n/a
Apr 12	1951	Aroostook		n/a
Mar. 27-30	1953	Androscoggin Cumberland Kennebec Oxford		n/a
May 28	1961	Washington (Machias)	**$1,000,000**	n/a
Jan-Feb	1970	Franklin Oxford Piscataquis Somerset	**$3,000,000** Severe storms, ice jams, flooding	***Presidential*** **FEMA-284-DR-ME**
Feb 12	1972	Cumberland York		n/a
Apr. 24	1973	Aroostook Franklin Oxford Penobscot Waldo Washington	**$908,404**	***Presidential*** ***Request – denied***
May 6	1973	Aroostook		SBA
July 1	1973	Aroostook Franklin Oxford Penobscot Waldo		SBA
Sept 24	1973			***Pres Request – denied***

Month of Event	Year	County (ies)	Damages	Declaration
Dec	1973	Aroostook Kennebec Lincoln Penobscot Sagadahoc Somerset Waldo	**$3,000,000**	n/a
May 26	1974	Aroostook	**$3,000,000**	n/a
May 8	1975	Cumberland Knox York	**$300,000**	SBA
Feb. 9	1976	Penobscot (Bangor) Washington		SBA
Apr. 2	1976	Aroostook	**$200,000**	n/a
August	1976	Aroostook	Crop Damage	SBA
Mar 20	1977	Androscoggin Cumberland Oxford York		SBA
Feb 8	**1978**	Statewide (16 Counties)	**$20,693,181** High winds, tidal surge, coastal flooding	***Presidential*** **FEMA-550-DR-ME**
Apr 30	1979	Aroostook Kennebec Penobscot Piscataquis	**$648,500**	SBA
June	1984	Androscoggin Cumberland Kennebec Penobscot Sagadahoc Somerset		n/a
Jan	1986	Androscoggin Cumberland Franklin Kennebec Lincoln Oxford Sagadahoc Somerset York	Roads, bridges, dams, clean up	n/a

Month of Event	Year	County (ies)	Damages	Declaration
April 1 (The "April Fool's Storm")	1987	Androscoggin Cumberland Franklin Hancock (1 town) Kennebec Knox (1 town) Lincoln (3 towns) Oxford Penobscot Piscataquis Sagadahoc Somerset Waldo York (2 towns)	**$100,000,000** Major damage to homes, businesses, public buildings (town halls, fire stations, libraries) parks and recreation areas, agricultural equipment and livestock; the pollution closed clam beds downstream and severely damaged water and sanitation district facilities; erosion to river banks.	***Presidential*** **FEMA-788-DR-ME**
May	1989	Androscoggin Franklin Oxford	**$1,396,120** Severe storms, flooding	***Presidential*** **FEMA-830-DR-ME**
Apr 10-12	1991	Aroostook (from ice jamming)	**$14,400,000** Severe ice jams and flooding caused evacuations and destroyed homes, roads and bridges resulting in a relocation project	***Presidential*** **FEMA-901-DR-ME**
March 27	1992	Androscoggin Cumberland Franklin Kennebec Knox (3 towns) Oxford Piscataquis Somerset, Waldo York[7]	**$3,462,787** Heavy rains and ice jams severely damaged gravel roads and culverts. Many small, rural communities could not cover the recovery costs.	***Presidential*** **FEMA-940-DR-ME**
April (The "Easter Flood")	1993	Androscoggin Aroostook Cumberland Franklin Hancock Kennebec Lincoln	**$3,476,507** Heavy rains, snow melt and ice jams damaged dirt roads and culverts damage, exceeding the annual road repair and	***Presidential*** **FEMA-988-DR-ME**

[7] Maine State Hazard Mitigation Plan 1993

Month of Event	Year	County (ies)	Damages	Declaration
		Oxford Penobscot Piscataquis Somerset Waldo York	maintenance budgets in a number of rural towns	
April 15	1994	Aroostook (Fort Fairfield)	**$5,700,000** Flooding and ice jams after mild temperatures and rain damaged 71 homes and businesses	***Presidential*** **FEMA-1029-DR-ME**
Oct 21	1995	Franklin Knox Oxford		n/a
Jan	1996	Androscoggin Franklin Oxford Penobscot[8] Piscataquis Somerset Waldo	**$2,181,170** Dramatic January thaw and heavy rains caused flooding and ice jams that damaged culverts, roads and drainage systems.	***Presidential*** **FEMA-1106-DR-ME**
Apr 16-17	1996	Androscoggin Cumberland Knox Oxford York	**$2,671,119** Flooding and mudslides from heavy rains and snowmelt damaged roads, seawalls, several dams, 2 homes, and washed out culverts[9]	***Presidential*** **FEMA-1114-DR-ME** **(addendum to 1106)**
Oct 20-21	1996	Cumberland Oxford York	**$8,998,501** Record breaking rains (in excess of 19 inches at Camp Ellis) from combined effects of a strong northeaster and Hurricane Lily. 1,000 structures were inundated, several dams breached, and roads, bridges and culverts were destroyed	***Presidential*** **FEMA-1143-DR-ME**
Jun 13 to July 1	1998	Androscoggin Franklin Kennebec Oxford Somerset York	**$2,519,458** Infrastructure damage from heavy rains to public roads and drainage systems in rural areas	***Presidential*** **FEMA-1232-DR-ME**

[8] Interagency Hazard Mitigation Team Report, FEMA-DR-1106-ME, April 1996, pp. 11-22.
[9] Interagency Hazard Team Report FEMA-DR-1114-ME, May 1996

Month of Event	Year	County (ies)	Damages	Declaration
Oct 8-11	1998	Cumberland York	**$1,997,555** Inland and coastal flooding; erosion resulting from slow moving storm, heavy rains	***Presidential*** **FEMA-1263-DR-ME**
Sep 11	1999			SBA
March 28, April 26	2000	Androscoggin Aroostook Franklin Kennebec Oxford Piscataquis Somerset Washington	**$2,884,207** Flooding from heavy rains, spring run-off, ice jams	***Presidential*** **FEMA-1326-DR-ME**
Mar 5-31	2001	Franklin Kennebec Oxford Penobscot Washington York	**$1,761,573** Flooding from severe winter storms, record snowfall, high winds, heavy rains & run-off, ice jams	***Presidential*** **FEMA-1371-DR-ME**
Dec 10-31	2004	Franklin Kennebec Oxford Piscataquis Sagadahoc Somerset Waldo	**$1,500,000** (est.) Severe storms, flooding, snow melt and ice jams	***Presidential*** **FEMA-1508-DR-ME**
Mar 29 – May 3	2005	Androscoggin Aroostook Franklin Hancock Kennebec Knox Lincoln Oxford Piscataquis Somerset Waldo Washington York	Severe storms, flooding, snow melt and ice jams	***Presidential*** **FEMA-1591-DR-ME**
May 13 and counting (The "Mother's Day Storm")	2006	York	$2,800,000 Severe storms and flooding	***Presidential*** **FEMA-1644-DR-ME**

Month of Event	Year	County (ies)	Damages	Declaration
March 16-18	2007	Hancock Knox Lincoln, Waldo	**$22,000,000** Flooding	***Presidential*** **FEMA-1691-DR-ME**
April 15-23 (The "Patriot's Day Storm")	2007	Androscoggin Cumberland Franklin Hancock Kennebec Knox Lincoln Oxford Sagadahoc Somerset Waldo Washington York	**$22,000,000** Severe storms and inland and coastal flooding	***Presidential*** **FEMA-1693-DR-ME**
July 11-12	2007	Oxford	**TBD** Severe storms and flooding	***Presidential*** **FEMA-1716-DR-ME**
April 28 – May 14	2008	Aroostook Knox Lincoln Penobscot Piscataquis Somerset Waldo	**$5,000,000** Severe storms and flooding	***Presidential*** **FEMA-1755-DR-ME**
July 18 to August 16	2008	Androscoggin Cumberland York	**TBD** Severe storms, flooding, and tornadoes	***Presidential*** **FEMA-1788-DR-ME**
Dec 11-29	2008	Androscoggin Cumberland Knox Lincoln Sagadahoc Waldo York	**$10,000,000** Severe winter storm and flooding	***Presidential*** **FEMA-1815-DR-ME**
June 18– July 8	2009	Franklin Hancock Knox Lincoln Oxford	**$2,500,000** Severe storms, flooding, landslides	***Presidential*** **FEMA-1852-DR-ME**

Month of Event	Year	County (ies)	Damages	Declaration
		Piscataquis Somerset Waldo Washington		
Feb 23 – Mar 2	2010	Cumberland Knox Lincoln Sagadahoc York	**TBD** Severe winter storms, flooding	***Presidential*** **FEMA-1891-DR-ME**
Mar 12 – Apr 1	2010	Hancock York	**TBD** Severe winter storms, flooding	***Presidential*** **FEMA-1920-DR-ME**
Dec 12-19	2010	Aroostook Piscataquis Washington	**TBD** Severe winter storms, widespread flooding	***Presidential*** **FEMA-1953-DR-ME**
Spring	2015	N/A		***N/A*** ***Starting in March 2015, there were six meetings of the River Flow Advisory Commission, but the potential for spring flooding from the extensive snow pack and ice jams was gradually abated by the extreme cold that persisted throughout the spring.***
Mar. 2-8	2018	York	Severe storm and flooding	***Presidential*** ***FEMA-4367-DR-ME***

Sources: FEMA website and MEMA records

History of Dam Failure/Breach
Known dam failures/breaches include the following:

- In 1952, Lovell Dam breached during a flood, washing away two mills. It was subsequently repaired.
- In the storm of October 20, 1996, Willet Brook Dam, owned by the town of Bridgton in Cumberland County, failed and affected the public water supply for the town (population 4,307).
- In Alfred, York County, the Littlefield River Dam, owned by the Town of Alfred, was washed out.
- In 1997, the Owens Marsh Dam in Concord Township, owned by the Department of Inland Fisheries and Wildlife, had been built upon by beavers, and breached after three days of heavy rains causing over a million dollars in road damages.
- In 1997, the Apple Valley Dam in Monmouth breached, causing about $350,000 in damages.
- In 2000, Mt. Zircon Dam showed signs of extensive toe seepage; water level lowered as safety measure, but dam not repaired.
- In 2004, the Meadow Cove Dam in Boothbay breached, causing about $30,000 in damages.
- In 2005, during the April flooding events, the Sherman Lake Dam in Newcastle washed out.
- In 2008, Appalachee Pond showed signs of movement, subsequently repaired to include new spillway.
- In the spring runoff of March 30, 2010, Colcord Pond in Porter gave way, washing out two county roads. It has since been repaired.
- In 2011, the Southport Water Supply Dam showed signs of embankment leakage. It has since been repaired.

Repetitive Loss Properties

FEMA maintains a file of repetitive loss properties (properties that have experienced more than one flood loss). The following is a summary of the repetitive loss properties by county and municipality.

TABLE 3.9: Repetitive Loss Properties

County	Town/City	Residential Structures			Non-Residential Structures		
		# Properties	# Losses	# Mitigated	# Properties	# Losses	# Mitigated
Androscoggin	Greene	1	2				
	Mechanic Falls	1	2				
	Wales	1	2				
Aroostook	Eagle Lake	1	2				
	Fort Fairfield	11	37	11	5	12	5
	Fort Kent	4	8	1	3	13	2
	Island Falls	1	2				
	Oakland	1	2				
	Sherman	1	2				
Cumberland	Cape Elizabeth	1	3				
	Casco	3	8				
	Falmouth	1	2				
	Gorham	1	2				
	Gray	1	3				
	Harrison	1	2				
	Scarborough	2	5				
	South Portland	1	2				
	Westbrook				1	3	
	Yarmouth				1	2	
Franklin	Carrabassett Val	1	2				
	Farmington				1	2	
	Temple	1	2	1			
Hancock	Blue Hill	1	2	1			
Kennebec	Augusta	2	5	1	7	30	1
	Gardiner	1	2		6	17	1
	Hallowell				7	22	

TABLE 3.9: Repetitive Loss Properties							
County	**Town/City**	**Residential Structures**			**Non-Residential Structures**		
		# Properties	**# Losses**	**# Mitigated**	**# Properties**	**# Losses**	**# Mitigated**
	Wayne	3	7				
	Winslow	2	5		2	4	
Knox	Owls Head	1	2				
Lincoln	Boothbay Harbor				1	7	
	Boothbay	1	2		1	2	1
	Bristol	1	2				
	South Bristol				1	2	
	Southport	1	2				
Oxford	Bethel	1	2				
	Canton	5	12				
	Fryeburg	5	15				
	Mexico				1	2	
	Norway	1	2				
	Rumford	1	2	1	1	2	
Penobscot	Bradley	2	9				
	Chester	1	2				
	Drew Plantation	1	2				
	Glenburn	1	2				
	Grindstone T1 R7	4	10	3			
	Medway	2	5				
	Milford	4	11				
	Old Town	2	4				
Piscataquis	Brownville	1	2				
	Dover-Foxcroft	1	3	1	1	3	
	Guilford	4	10	2	1	2	
	Milo	2	5				
Sagadahoc	Bath				1	4	
	Bowdoinham	1	2				
	Phippsburg	1	3				
Somerset	Anson	1	3				
	Fairfield	1	2				

TABLE 3.9: Repetitive Loss Properties							
County	**Town/City**	**Residential Structures**			**Non-Residential Structures**		
		# Properties	**# Losses**	**# Mitigated**	**# Properties**	**# Losses**	**# Mitigated**
	Hartland	1	2				
	Norridgewock	1	2				
	Skowhegan	1	2	1			
Waldo	Belfast	1	3				
	Lincolnville				1	3	
	Unity	1	3				
York	Acton	2	8				
	Arundel	1	2				
	Berwick	1	2		1	2	
	Biddeford	6	12	2			
	Buxton	1	2				
	Dayton	1	2				
	Hollis	1	2				
	Kennebunk	18	46		2	5	
	Kennebunkport	7	15		3	16	
	Kittery	1	2		1	3	
	North Berwick	1	3				
	Ogunquit	7	15		7	27	1
	Old Orchard Beach	7	18		1	2	
	Saco	13	33	4	2	5	
	Sanford	2	5		1	3	
	South Berwick	3	10				
	Wells	15	37				
	York	16	41	1	11	27	

Probability of Occurrence

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies use historical records to determine the probability of occurrence for different flood recurrence intervals. The probability of occurrence is expressed in percentages as the chance of a flood of a specific recurrence interval in any given year. 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, or regulatory flood, has a 1 percent chance of happening in any particular year. It is also often referred to as the "100-year flood." This expression is, however, merely a simple and general way to express the statistical likelihood of a flood. Actual recurrence periods are variable from place to place.

Smaller floods occur more often than larger (deeper and more widespread) floods. Thus a "10-year" flood has a greater likelihood of occurring than a "100-year" flood. The following table shows a range of flood recurrence intervals and their probabilities of occurrence.

Table 3.10: Flood Recurrence Intervals and Probabilities

Flood Recurrence Intervals	Percent Chance of Occurrence Annually	Percent Chance of Occurring in an Interval	Percent Chance of Occurring in a 30-year Mortgage
10-year	10.0%	65%	95.8%
50-year	2.0%	64%	45.5%
100-year	1.0%	63.4%	26.0%
500-year	0.2%	63.2%	5.8%

Source: FEMA 386-2, August 2001

Probability of Dam Failure/Breach

As previously described, Maine Dam Safety Law requires regular inspections, maintenance and current EAPs. Maine's approach to dam management recognizes that dam failure probability studies are prohibitively expensive, and that establishing a definitive risk of failure for specific dams is virtually impossible. Rather than insisting on the preparation of expensive dam failure studies, Maine has chosen to require that EAPs be prepared for the possibility of dam failure.

National Flood Insurance Program (NFIP)

Flood Insurance Rate Maps (areas with a 1 percent or greater chance of flooding annually)

Readers with Internet access can go to the FEMA website to view Flood Insurance Rate Maps (FIRMs). However, for most Maine residents, it will be easier to go to the town office or city hall where the maps will be specific to their community.

Q3 Data. A number of years ago, half the 16 counties in Maine were mapped with Q3 data. The Q3 mapping that was done was primarily for the southern part of the state. Q3 mapping was essentially the process of scanning into a digital overlay the current floodplain boundaries. Q3 mapping, which has been discontinued, is not the same as a digital FIRM that is the end product associated with FEMA's RiskMap Program which is ongoing.

FEMA RiskMAP Program. In the past, FEMA's National Flood Insurance Program (NFIP) remapping efforts have been limited by technology and funding. In recognition, in 2003, Congress committed to a five-year Flood Map Modernization Program (FMMP), also known as

Map Modernization. The goal of Map Modernization was to upgrade flood hazard data and mapping to create a more accurate digital product to improve floodplain management across the country. This was undertaken with priority given to areas of greater population, need and ability to leverage resources. The former State Planning Office, Floodplain Management Program was designated by FEMA to coordinate mapping for Maine. Since that time, Maine's Floodplain Management Program has been relocated to the Maine Department of Agriculture, Conservation and Forestry.

Under the RiskMap Program, FEMA has been converting Flood Insurance Rate Maps to a digital format. Digitizing is one more step towards FEMA's goal to acquire more accurate mapping. Digitizing does not address all of the flaws in existing maps. However, it will make it easier to change the maps in the future and reduce the costs of printing maps in the long run. The first counties to be remapped into a completely digital format are Oxford, Kennebec, Androscoggin, Hancock, Knox, Lincoln, Sagadahoc, Waldo and Washington. Cumberland and York Counties are currently underway.

Issues and Challenges

The following is a partial list of the more important flooding issues and challenges facing Maine:

1. **Flood mitigation needs exceed available resources**. As noted previously in the 2010 and 2013 Plans, and again in this update, the completion of FEMA-approved hazard mitigation plans for 16 counties and the jurisdictions within them, and the University of Maine System has resulted in the identification of 2,058 hazard mitigation projects amounting to $205.8 million. At least 90 – 95 percent of these projects are flood mitigation projects.

2. **A number of repetitive loss properties are not insured.** FEMA's statistics on repetitive loss properties include only properties that have flood insurance. There are other properties that suffer repetitive flood losses but which are not insured and often unreported. Therefore, statistics on these properties are not tabulated unless damaged during a declared individual disaster.

SEVERE SUMMER WEATHER

General Definition

For the purposes of this plan, severe summer weather events are defined as those characterized by violent weather phenomenon producing winds, heavy rains, excessive heat, lightning, and hail that can cause injuries, and destruction of property, crops, and livestock. Note: While considered "summer weather," drought and hurricanes are not included in this profile as they are profiled separately within this section of the plan.

Types of Summer Weather Events

Extreme Heat:
Extreme heat is generally defined as summer temperatures that are much hotter and/or humid than average (https://www.cdc.gov/disasters/extremeheat/heat_guide.html). Maine's Center for Disease Control classifies an extreme heat event as one with temperatures above 90 degrees lasting for three or more days.

Thunderstorm:
A thunderstorm is formed from a combination of moisture, rapidly rising warm air, a force capable of lifting air such as a warm or cold front, or a sea breeze. All thunderstorms have lightning and

can occur singly, in clusters or in lines. Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt." This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches a temperature approaching 50,000 degrees Fahrenheit in a split second. The rapid heating and cooling causes thunder.

Tornado:
A violently rotating column of air extending downward from a thunderstorm to the ground. The distinctive slender, funnel shaped cloud, with wind velocities of up to 300 miles per hour at the central core, destroys everything along its narrow ground path.

Location of Hazard

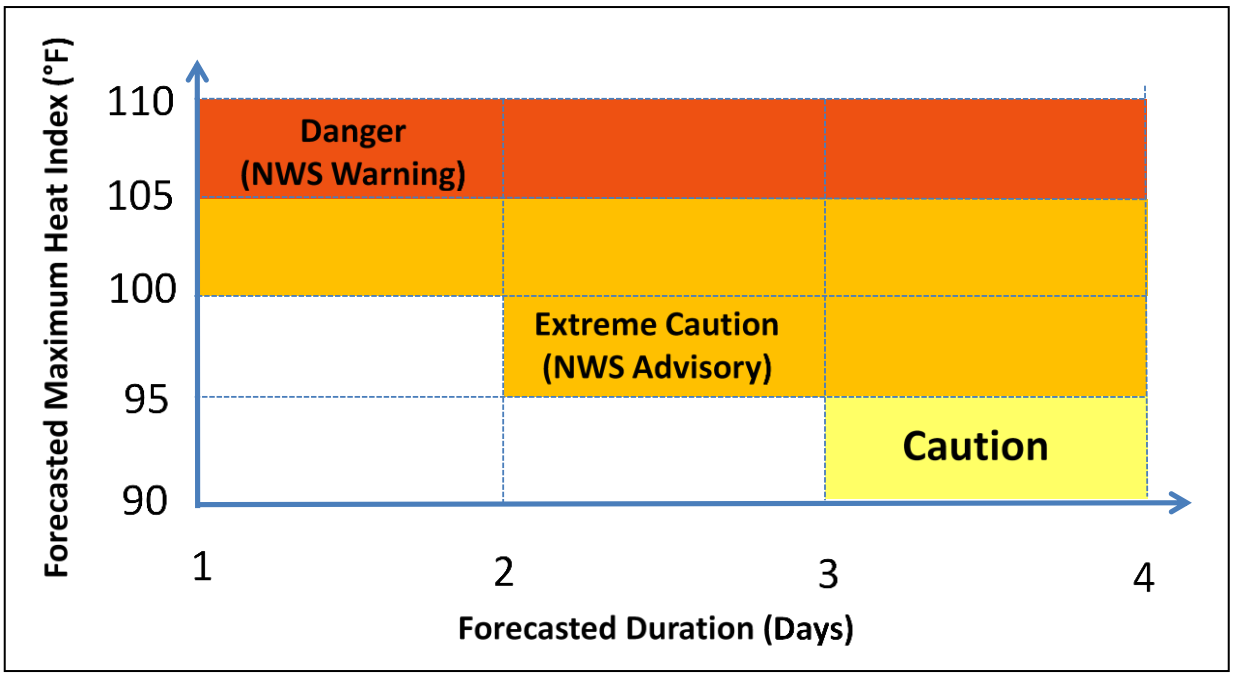
The entire state is vulnerable to one or more severe summer storms each year, usually in the form of thunderstorms. Fortunately, the effects are usually more common in the less populated areas of the western, mountainous regions, and less noticeable along the more populated Atlantic coast where the cooling effects of the ocean tend to suppress thunderstorm conditions.

Extent of Hazard

The methods outlined below are used to classify the strength or magnitude of possible severe summer weather events.

Extreme Heat:
The severity of an extreme heat event can be a result of one exceptionally warm day or from the cumulative effect of a series of consecutive warm days. Maine CDC uses the thresholds depicted in **Figure 3.7,** and the following terminology to categorize an extreme heat event.

FIGURE 3.7: Categorization of Heat Events



Danger (NWS Warning): Temperatures above 105 degrees.

Extreme Caution (NWS Advisory): Temperatures above 95 degrees for two or more days or above 100 degrees for one day.

Caution: Temperatures above 90 degrees for three or more days.

NOTE: The highest temperature ever recorded in Maine is 105° F.

Lightning:
The extent of a lightning event can be measured by the amount of energy discharged. However, *all* lightning strikes present an immediate threat to life safety, so the extent of a lightning event will not be discussed further in this plan.

Thunderstorm:
The extent of a thunderstorm can be classified by measuring wind speeds, storm size, precipitation quantities, and lightning strikes.

Tornado:
Maine uses the Enhanced Fujita Tornado Scale to classify the extent of a tornado.

TABLE 3.11: The Enhanced Fujita Tornado Scale (abbreviated)

Tornado Category	3 Second Gust	Typical Effects
EF0	65-85 mph	Gale tornado (weak); light damage to chimneys; breaks twigs and branches off trees; pushes over shallow-rooted trees; damages signboards; some windows broken.
EF1	86-110 mph	Moderate tornado (weak); Moderate damage: peels surface off roofs; mobile homes pushed off foundations or overturned; outbuildings demolished; moving autos pushed off roads; trees snapped or broken.
EF2	111-135 mph	Significant tornado (strong); 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.
EF3	136-165 mph	Severe tornado (strong); 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.
EF4	166-200 mph	Devastating tornado (violent); 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.
EF5	Over 200 mph	Incredible tornado (violent); Strong-framed, well-built houses leveled; steel-reinforced concrete structures damaged, tall buildings collapse or have severe deformations; some vehicles can be thrown great distances

Source: The Enhanced Fujita Scale (EF Scale), National Weather Service.
(https://www.weather.gov/oun/efscale)

Impact

In the summer, southwest to southerly winds may become quite prevalent across the state. Because of the frequent formation of sea breezes, southerly winds prevail along the Mid-Coast and "Down East" portions during the summer months. When severe summer storms arrive in the state, 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. Hail can cause crop damage for farmers and backyard gardeners. Lightning strikes can start fires. Any of these weather events can cause personal injury or property damage.

The impact of summer storms in Maine is usually restricted to flooding caused by the copious amounts of moisture these storms can carry. Interestingly, the interaction of extratropical storms *and* hurricanes can produce events of a significant magnitude such as the floods of October 1996 and, in particular, the All Hallows Eve or "The Perfect Storm" of October 1991. The latter storm produced tremendous coastal damage in Southern Maine from several days of excessive waves and tidal levels. Most recently, the "October Wind Storms" of October 29, 2017 resulted in nearly 500,000 power outages and extensive damages across 13 counties. Extensive damages resulted in the Presidential Declaration FEMA-DR-4354-ME.

Vulnerability

Maine generally experiences comfortable summer weather, which encourages residents from in state and away to recreate out of doors, and often times away from permanent structures. Those recreating on trails, in boats, or in camp grounds are vulnerable to immediate physical damage from a severe summer weather event. Economic stakeholders of Maine's tourism industry are susceptible to economic damage in the event of hazardous summer weather. According to the U.S. Center for Disease Control, older adults, the very young, and people with mental illness and chronic diseases are the most vulnerable to feeling the impacts of an extreme heat event (https://www.cdc.gov/disasters/extremeheat/heat_guide.html).

Previous Occurrences

Unlike the other hazards, "Severe Summer Weather" does not have a table of occurrence since the most severe form, hurricanes, has already been profiled in its own section (see Hurricanes). However, since tornados in Maine have been documented on the NOAA website, a table of occurrence is shown below. Because there have been no F3 or greater tornados reported, only the worst occurrences, F2s, are captured below. When the history of occurrences in Maine is considered, there have been a total of 20 F2 tornados over a 63-year period, averaging 0.317 tornadoes per year.

Table 3.12: F2 & EF1 Tornados in Maine
1950 –2017

Date	County	Magnitude	Deaths	Injuries
7 July 1954	Waldo	F2	0	1
11 August 1954	Aroostook	F2	1	1
16 September 1957	Aroostook	F2	0	0
15 August 1958	Aroostook	F2	0	0
16 August 1959	Penobscot	F2	0	0
4 September 1961	Somerset	F2	0	0
15 September 1961	Washington	F2	0	1
20 August 1962	Somerset	F2	0	0

14 May 1963	York	F2	0	0
10 October 1966	York	F2	0	0
30 June 1971	Penobscot	F2	0	0
31 July 1971	Androscoggin Androscoggin Kennebec	F2 F2 F2	0 0 0	1 0 0
7 November 1971	Somerset Penobscot Penobscot.	F2 F2 F2	0 0 0	0 0 0
8 July 1996	Kennebec	F2	0	0
9 August 2000	Somerset	F2	0	0
24 May 2009	Aroostook	EF1	0	0
31 May 2009	Aroostook Aroostook	EF1 EF1	0 0	0 0
21 August 2009	Oxford	EF1	0	0
5 June 2010	Oxford	EF1	0	0
21 July 2010	York York	EF1 EF1	0 0	0 0
1 June 2011	Oxford Somerset	EF1 EF1	0 0	0 0
19 July 2013	Piscataquis	EF1	0	0
15 July 2014	Somerset	EF1	0	0
28 July 2014	York	EF1	0	0

Developed by MEMA using NOAA website information – 2017.

Because of Maine's sparse population, there have been no significant amounts of property damage or personal injury. Reports of tornado damage are usually limited to individual properties that have been struck. If a tornado were to strike a mobile home park, there would inevitably be substantial damage. The tornados experienced in recent history in Maine have been generated by severe summer storms with the southwestern and central sections of the state most often affected.

Probability of Occurrence

Summer Storm:

Based on past experiences, and the frequency of National Weather Service Warnings, there is a high probability that the state can expect thunder and lightning every year, especially in the summer months. According to NOAA, there were 210 lightning events recorded in Maine between 1950 and 2017. Based on historical records, Maine can expect several lightning events each year. Maine can also expect multiple thunderstorms each summer.

EF2-5 Tornado:

While the state has not done probability studies, historically, the probability of an EF2 strength tornado or greater is low. The National Weather Service recorded 79 tornados with a magnitude of (E)F1 or greater in Maine between 1954 and 2014. Based on that history of previous occurrences, Maine can expect an average of approximately 1.33 tornados a year.

Issues and Challenges

Due to severity of summer storms Maine residents often experience brief power outages, posing an increased risk to elderly and disabled populations.

Severe Winter Weather

General Definition

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

Types of Winter Weather Events

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.

Heavy Snow Storm:
A snowfall of 15 inches or more within 12 to 24 hours which disrupts or slows transportation systems and public safety departments' response capability.

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 to produce widespread power outages.

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. Sleet does not stick to objects, but produces hazardous driving conditions in accumulated depths of two inches or more.

Snow Quakes:
While not a storm, this is an occasional winter phenomenon, usually occurring in January or February, when a very localized section of earth suddenly freezes. Since it most often happens during the coldest hours of the day – between midnight and dawn – the sudden shaking, and/or noise, can be very startling. [see also "Cryoseism" in the earthquake section]

Nature of Hazard

During the winter months Maine often has heavy snowfall, snow combined with high winds, freezing rain, or ice storms. Nor'easters, the most severe form, occur during the winter, spring, and fall. They rarely develop during the summer. Precipitation amounts can exceed several inches of water equivalent (20-30 inches of snow or more), while wind speeds can be equal to or greater than those for hurricanes that reach Maine. As an example, the Groundhog Day nor'easter in 1976 produced 100-knot (115 mph) winds at Southwest Harbor. A loss of electrical power and communication services can occur when utility lines yield under the weight of ice and snow. These conditions can impede the response time of ambulance, fire, police, and other emergency services, especially to remote or isolated residents.

Average seasonal snowfall amounts generally increase north and northwestward from the coastal region. Total seasonal snowfall ranges between 50 and 80 inches in the Coastal Division, between 60 to 90 inches in the Southern Interior Division, and 90 to 110-plus inches in the Northern Division. The largest average seasonal snowfall totals on record are the 118 inches per winter season from Jackman and the 116 inches per winter season from Caribou. Higher snowfall totals may be found locally, particularly at higher elevations in the northwest mountains.

The snowfall season usually runs from late October (in the north) or November (mid to lower portion of the state) through to April and sometimes into May. Occasionally an early season storm can bring snow in the first weeks of October even along the coast. January is usually the snowiest month throughout the state with many stations averaging over 20 inches of snow. December typically averages out to be the second snowiest month.

The snowpack makes an important contribution to both surface and groundwater supplies, and years with a low snowpack can lead to water shortages by late summer. Melting of the snowpack in April and May is often gradual enough to prevent serious flooding, although there have been times when a quick melt has led to disastrous conditions.

Location of Hazard

The entire state is subject to severe storms every winter. Western areas, however, historically receive more snowfall while coastal areas are more likely to have freezing rain, sleet, tide surges and flood damage.

Extent of Hazard

The extent of severe winter weather related hazards is dependent on factors such as temperature, snow fall, ice cover, sustained wind speed, speed of wind gusts, duration of event, and time between events. The extent of one winter weather event can be exacerbated if it occurs shortly after a previous weather event.

Impact

A severe winter weather event can down power lines and cause widespread outages, shut down roads, and close businesses. Even in the absence of a major snowfall event, the accumulation of multiple snowfall events can come at high costs to local governments. Roof collapses can occur on residential and commercial properties when snow loads become extreme.

Vulnerability

All of Maine is vulnerable to severe winter weather events every year. In general, the Southern Interior and Northern Climate Divisions receive more snow fall while the Coastal Climate Division experiences more ice storms. Severe winter weather of all types can still happen anywhere in Maine. In the event of an extended power outage residents without an alternate heating source are vulnerable to cold temperatures, and remote populations could be without power for a upwards to several weeks.

Previous Occurrences

The following is a summary of some of the most severe winter storms during the past 41 years.

TABLE 3.13: Severe Winter Storm History

Month of Occurrence	Year	County (ies)	Damage (as noted in the declaration)	Declaration
December	1929	Unknown	Ice storm extended from western New York into Maine; wide spread power outages from tree and overhead line damage. Part of historical summary to the DR-1198 FEMA Interagency Report.	N/A Source: Cold Regions Research Engineering Laboratories (CRREL).
Feb. 19 Snowstorm	1972	Hancock Knox Washington		State Aid
March 7 Ice Storm	1972	Cumberland Lincoln Sagadahoc York	$413,682 Severe storms, flooding	***Presidential*** **FEMA-326-DR-ME**
Jan 10 Rain/Snow/Ice	1978	***Statewide***		
March 15 Ice jams & heavy rains	1978	Franklin Kennebec Somerset		State Aid
Mar 13-14 Blizzard	1993	***Statewide***	Maine blizzards, severe winds and snowfall, coastal storm	***Presidential*** **FEMA-3099-EM-ME**
Jan 5-25 "Great Ice Storm of 98"	**1998**	***Statewide*** As in 1929, this storm extended from western New York into all of Maine.	$47,748,466 Power outages [Loss of heat, refrigeration, sanitation services] Forestry damage	***Presidential*** **FEMA-1198-DR-ME**
Mar 5-31	2001	Androscoggin Aroostook Cumberland Franklin Hancock Lincoln Oxford Penobscot Piscataquis Sagadahoc Somerset Washington York	$4,483,918 Maine severe winter storm.	***Presidential*** **FEMA-3164-EM-ME**
Dec 17 2002 - Jun 1, 2003	2003	Androscoggin Aroostook	$2,144,457	***Presidential***

Month of Occurrence	Year	County (ies)	Damage (as noted in the declaration)	Declaration
		Cumberland Franklin Hancock Kennebec Lincoln Oxford Penobscot Piscataquis Washington	Maine Extreme winter weather; severe cold deep and frost; the "frozen pipes" disaster	**FEMA-1468-DR-ME**
Feb 2-4	2003	Aroostook	$1.6 million Maine snowstorms Winter storms and extreme cold	***Presidential*** **FEMA-3174-EM-ME**
Dec 6-7	2003	Aroostook Cumberland Franklin Hancock Kennebec Oxford Penobscot Piscataquis Somerset	$1.7 million Maine snow, winter storms, and extreme cold	***Presidential*** **FEMA-3190-EM-ME**
Dec 14-15	2003	Aroostook Franklin Hancock Penobscot Piscataquis Somerset Washington	Maine snow, winter storms, and extreme cold	***Presidential*** **FEMA-3194-EM-ME**
Jan 22-23	2005	Cumberland York	$10 million Maine snow, winter storms and extreme cold	***Presidential*** **FEMA-3205-EM-ME**
Feb 10-11	2005	Androscoggin Aroostook Cumberland Franklin Hancock Knox Oxford Penobscot Piscataquis Somerset York	$10 million Maine snow, winter storms, and extreme cold	***Presidential*** **FEMA-3206-EM-ME**
March 9	2005	Androscoggin Aroostook Cumberland Franklin Hancock Oxford Penobscot	$10 million Maine snow, winter storms, and extreme cold	***Presidential*** **FEMA-3209-EM-ME**

Month of Occurrence	Year	County (ies)	Damage (as noted in the declaration)	Declaration
		Piscataquis Somerset York		
March 11-12	2005	Androscoggin Cumberland Oxford	$10 million Maine snow, winter storms, and extreme cold	***Presidential*** **FEMA-3210-EM-ME**
Dec 25-27 "Christmas Storm"	2005	Aroostook	Maine snow, winter storms, and extreme cold	***Presidential*** **FEMA-3265-EM-ME**
Dec 11	2008	Cumberland Knox Lincoln Sagadahoc Waldo York	Maine severe winter storm, winter storms and, and extreme cold	***Presidential*** **FEMA-3298-EM-ME**
Feb 8-9	2013	Androscoggin Cumberland Knox Sagadahoc Washington York	Severe winter storm (blizzard)	***Presidential*** **FEMA-4108-DR-ME**
Dec 21-26 "Christmas Ice Storm"	2013	7 / 16 Counties: Androscoggin Kennebec Knox Lincoln Penobscot Waldo Washington	Severe ice storm caused extended power outages. Accompanied by the "Polar Vortex" it kept subfreezing conditions in place, also resulting in frozen pipes and water damage to homes; at least two deaths from CO poisoning.	***Disaster Declaration denied***
Nov 1-2	2014	Kennebec Lincoln Knox Penobscot Waldo	Heavy, wet snow, accompanied by winds caused severe power outages for several days.	***None requested***
Jan 26-28	2015	Androscoggin Cumberland Sagadahoc York	Blizzard that closed state and town offices. Highways were treacherous due to winds and drifting snow.	***Presidential FEMA-4208-DR-ME***
13 Feb	2017	Statewide	Blizzard closed state and town offices. Public was warned to avoid	***N/A***

Month of Occurrence	Year	County (ies)	Damage (as noted in the declaration)	Declaration
			any unnecessary travel which made snow removal efforts timely.	
14 Mar	2017	Statewide	Blizzard conditions along the coast and heavy snow fell throughout the state. School and meeting cancellations. State offices closed at 2PM.	***N/A***

Storm of Record: The "Great Ice Storm of '98"

The storm began January 5th and continued through January 25, 1998. During this time, residents experienced effects from freezing rain, high winds, snow, and ice.

Advisories for freezing precipitation from The National Weather Service (NWS) in Gray, Maine, began during Sunday, January 4, 1998. On Monday morning, freezing drizzle and rain began in several areas and continued through Tuesday. On January 6th, the NWS advised Maine Emergency Management Agency (MEMA) to expect a major ice storm. While temperatures warmed above freezing in some parts of Southern Maine, areas in the central part of the state remained below freezing. Ice buildup was reported in several isolated areas.

From January 7th through January 9th, heavier freezing rain developed over Central and Southern Maine. To the north of the front, cold air remained entrenched near the ground as warm, moist air moved northward from the Mid-Atlantic states over the wedge of colder air. The combination of peak low-pressure areas, abundant moisture in the atmosphere, and cold temperatures near the ground caused significant rainfall and severe icing to occur in Central and Southern Maine, with increased amounts of sleet in the central areas. In Northern Maine more than two feet of snow fell during this same period of time creating severe conditions and safety concerns.

On January 10th and 11th, a weak cold front passed through the state and brought drier, colder air. Mixed precipitation developed on January 13th, as the low-pressure system moved eastward. A cold front that evening was preceded by strong southerly winds followed by west to northwest winds. Gusts were reported up to 50 mph and brought much colder air into the state. Temperatures dropped into the single digits in Central Maine, and below zero temperatures in both the mountains and the northern part of the state. Wind chills were in the minus 20 to minus 40-degree range.

The evening of January 15th brought a low-pressure system to the mid-Atlantic coast that deposited four to eight inches of snow in extreme Southwestern Maine, three to six inches across the central part of the state, and five to ten inches in the western mountains.

Periods of light snow developed January 18th through the morning of January 20th, as a huge low-pressure system moved across the Atlantic Ocean to the south of the state. An area of high pressure moving into the state on January 21st brought cold sunny weather that lasted through January 22nd.

On January 23rd, snow developed from south to north during the day, changing to sleet and then to freezing rain in Southern and Central Maine. The mixture of precipitation continued into the afternoon of January 25th, with significant icing along the southwestern coast of Maine. Skies then cleared in southern and central areas, but remained mostly cloudy with flurries in the north. Temperatures climbed to the mid-thirties in the south and to the mid-twenties in the north.

The residents of Northern New England will never forget the Ice Storm of 1998. In Maine, more than six hundred thousand customers were without power. Extending from Western New York to Maine, below-freezing temperatures combined with record rainfall contributed to the formation of a blanket of solid ice. In some places, more than three inches of ice coated the rural and urban landscape.

On January 13th, President Clinton declared 15 of Maine's 16 counties as a federal disaster area eligible for infrastructure support assistance. The Disaster Declaration was amended to

cover Individual Assistance on January 15th, and Aroostook, the final county, was added to the declaration. Hazard Mitigation funds to reduce future disaster risks were made available on January 13th.

At its peak, more than half of Maine's population was without power, caused by ice that coated lines and branches an inch thick. Many state and secondary roads were closed because of downed trees on power lines. State government offices were closed, and innumerable businesses were forced to close and remain closed because of blocked roadways and power outages. As a result, 130 emergency shelters were opened throughout the state.

Heat, electricity, refrigeration, running water, and sanitary facilities were all interrupted by the power outage. Maine Public Television and Radio remained unavailable to most viewers for more than a week. Other commercial radio and television stations in South-Central Maine lost communication towers and/or electrical power and were unable to broadcast. Even the Emergency Alert System failed.

Across the Northeast states, 17 deaths were attributed to the storm. The fast response of voluntary organizations, local and state governments prevented many more casualties. Utility crews partnered with the Maine Department of Transportation (DOT) and the Maine Army National Guard (MENG) to restore power to the region. All worked through frigid temperatures and snow to clear debris and keep roads open so utility crews could reconnect downed lines.

Central Maine Power (CMP) estimated their cost to restore power to the more than 600,000 residents at 60 million dollars. Clean-up and repair costs of local and state government agencies increased the estimate to more than 87 million dollars.

Long-term impacts of the widespread devastation continue to be identified. More than 17,000,000 acres of urban and rural forest in the four-state area sustained some degree of damage, creating an immediate safety hazard and potentially threatening the long-term regional economy.

The Salvation Army and The American Red Cross (ARC) estimated their recovery costs at $600,000 on March 4, 1998, and the Maine State Bureau of Insurance (MSBI) issued a report indicating $28,353,000 in claims had been paid. The Maine Forest Service (MFS) reported as much as $28,000,000 in forest damage, along with devastating losses to blueberry farmers, maple syrup producers, and beekeepers. An agribusiness survey taken by the Farm Bureau in each county summarized a total damage estimate of $24,970,890.

Probability of Occurrence

Records dating as far back as 1972 indicate that every year, between November and April, there is a high probability that severe winter weather will occur. On average, the length of annual maximum snow cover ranges from about 50 days along the coast to over four months in the northern and particularly the northwestern part of the state. Climate models suggest that Maine is likely to get more ice storms in the future because of warmer temperatures. However, 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 blanked the northeast.

Issues and Challenges

Lack of resources continues to be the greatest issue for severe winter storms. For larger storms, snow removal resources are often maxed out leaving some of the more rural areas more vulnerable to isolation and loss of power.

HURRICANES & MAJOR TROPICAL STORMS

General Definition

Hurricanes and tropical storms are classifications of tropical cyclones which are relatively large and long lasting rotating low-pressure weather systems over tropical or sub-tropical waters. These swirling masses of wind and rain are born in tropical waters and require an intricate combination of atmospheric processes to develop. They need organized thunderstorm activity, a well-defined center, and warm ocean waters to form, and they dissipate rapidly once they reach waters of colder temperature or landfall. Tropical cyclones rotate counter clockwise in the northern hemisphere. For general understanding, the term “hurricane” will be used to describe the hazard.

Types of Hurricanes & Tropical Storm Events

Tropical cyclones are essentially a bundle of natural hazards. The primary hazards associated with tropical cyclones, as identified by the National Hurricane Center, are listed and defined below:

Inland Freshwater Flooding:
The inundation of normally dry land from heavy precipitation during tropical cyclones. It is common for tropical storms to provide between 6 to 12 inches of precipitation. The heavy rainfall associated with hurricanes is more common during landfall and can cause flooding hundreds of miles inland.

Storm Surge:
Storm surge is an abnormal rise of water that is generated by a storm, over and above the predicted astronomical tide.

Tornadoes:
Tornadoes are violently rotating columns of wind that most often occur in the rain bands well away from the center of a storm.

Wind:
The bulk movement of air which is the basis of tropical cyclone classification.

Nature of Hazard

Tropical cyclones that can threaten Maine originate in the Atlantic basin which includes the Atlantic Ocean, Caribbean Sea, and the Gulf of Mexico. The development phases and progression of a tropical cyclone is captured in The Saffir-Simpson Hurricane Scale on the following page.

Hurricane season in the Atlantic runs from June 1 to November 30, and hurricane threats increase late in the summer as ocean temperatures have warmed. Hurricanes typically weaken before reaching Maine, but it is possible for strong storms to reach the state. Hurricane forecasts will have uncertainty due to variables of the hazard which include forward tract and approach, storm speed, wind speed, storm size, and precipitation.

Location of Hazard(s):

All of Maine is susceptible to high winds and inland flooding that is associated with hurricanes. Starting in York County and traveling north up the Maine coast to Washington County, there are 142 local jurisdictions within the following ten counties that are vulnerable to inundation from storm surge, either from coastal or riverine:

- York County
- Cumberland County
- Sagadahoc County
- Lincoln County
- Knox County
- Waldo County
- Hancock County
- Washington County
- Kennebec County (riverine)
- Penobscot County (riverine)

Extent of Hazard

Maine uses wind speed to classify the strength of a hurricane.

TABLE 3.14: The Saffir-Simpson Hurricane Scale

Category	Definition	Effects
Tropical Depression	Winds: up to 38 mph	N/A: Tropical disturbances originate in tropical waters
Tropical Storm	Winds: 39-73 mph	Sustained winds capable of causing structural damage
1	Winds: 74–95 mph	Very dangerous winds will produce some damage
2	Winds: 96–110 mph	Extremely dangerous winds will cause extensive damage
3	Winds: 111–129 mph	Devastating damage will occur
4	Winds: 130–156 mph	Catastrophic damage will occur
5	Winds: 157+ mph	Catastrophic damage will occur

Note: Hurricanes with winds greater than 110 mph (Category 3, 4, and 5) are major hurricanes.

The extent of hurricane associated hazards is also dependent on the factors described below:

Inland Freshwater Flooding:
The extent of inland flooding is influenced by the forward speed of a storm, the terrain and topography a storm encounters, the storm's interaction with other weather systems, and existing ground and surface water conditions. The threat of inland flooding is relatively independent of a storm's classification on the Saffir-Simpson Hurricane Scale because tropical cyclones are classified by wind speed.

Storm Surge:
The extent of storm surge depends upon topography and elevation, the storm's forward speed and approach, and the size of a storm.

Tornadoes:
While tornadoes are known to occur in the outer bands of the front right quadrant of a tropical cyclone, meteorologists are unsure of the factors that influence a tornado's formation and extent in a tropical cyclone.

Wind:
The extent of wind in any given area depends upon the cyclone intensity at landfall and the rate of weakening. Location in a tropical cyclone is another factor, as wind speeds are strongest in the front right quadrant of a tropical cyclone and wind speeds are generally stronger at higher altitudes above ground level.

Impact

The impact of a tropical storm will vary significantly depending on whether it strikes a rural or urban population. Based on historic events, hurricanes are the most likely natural hazard to cause deaths in Maine. Potential impacts of each hurricane associated hazard are as follows:

Inland Flooding:
Inland flooding can also cause loss of life, rainfall accounted for 27 percent of tropical cyclone related deaths between 1963 and 2012, according to the National Hurricane Center. Inland flooding can also damage property and lifeline utilities.

Storm Surge:
According to the National Hurricane Center, storm surge is potentially the deadliest hazard associated with hurricanes, accounting for 49 percent of tropical cyclone related deaths in the United States between 1963 and 2012. Storm surge can also cause extensive damage to property and lifeline utilities.

Tornadoes:
Tornadoes can also threaten life safety and cause damage to property and lifeline utilities.

Wind:
Storm force winds can cause extensive damage to structures and trees, and wind-blown debris can become deadly projectiles during hurricanes and tropical storms. The impacts of storm force winds based on hurricane category are further described in Figure 1 above.

Vulnerability

All of Maine is vulnerable to tropical cyclone induced hazards, depending on the location of the storm track. Many structures in Maine are not designed to handle sustained storm force winds. Vulnerabilities to each tropical cyclone related hazard are listed below:

Inland Flooding:
Residents located in the base floodplain are vulnerable to rainfall induced inland flooding.

Storm Surge:
In general, coastal communities are vulnerable to storm surge, though the potential extent of storm surge is greater in the lower lying southern counties, which are also the most densely populated. Maine Geological Survey collaborated with the U.S. Army Corps of Engineers to update Hurricane Storm Surge Inundation Maps for every coastal community using the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model in 2015. These maps are

available on Maine Geological Survey's website (http://www.maine.gov/dacf/mgs/hazards/slosh/index.shtml).

Wind:
Mobile homes (trailers) and substandard structures are highly vulnerable to storm force winds, as are glass structures that can be shattered from flying debris. Powerlines are vulnerable to damage from wind induced flying debris and fallen trees. Roads can become inaccessible from the debris. The same can be said for tornadoes.

> *NOTE: See Flood and Severe Summer Weather profiles for additional detailed descriptions of extent, impact, and vulnerability for each of the tropical storm associated natural hazards.*

Previous Occurrences

The following table summarizes the occurrences and estimated damages of hurricanes dating back to 1938.

TABLE 3.15: History of Hurricanes

Month of Occurrence	Category	Year	County (ies)	Estimated Damage	Declaration
Sep 21	Tropical Storm	1938	Androscoggin Cumberland York	$135,000	
Sep 14	Tropical Storm	1944	Cumberland		
Aug 31 "Carol"	Category 1	1954	Cumberland Knox Lincoln Sagadahoc Waldo York	$5,000,000 3 Deaths Power outages Downed trees	SBA
Sep 11 "Edna"	Category 1	1954	***STATEWIDE*** (flooding)	$7,000,000 8 Deaths Power outages	***Presidential #24***
Sep 12 "Donna"	Tropical Storm	1960	Cumberland	$250,000 Power outages	
Oct 6 "Daisy"	Category 1	1962	Cumberland (flooding)	2 Deaths Power outages	
Oct 29 "Ginny"	Category 2	1963	***STATEWIDE***		
Aug 9-19 "Belle"	Post-Tropical Storm	1976	Aroostook (flooding)	$4,000,000 Agricultural loss (potato crop)	SBA
Sep 6 "David"	Tropical Storm	1979	Coastal	Minor Damage	

Month of Occurrence	Category	Year	County (ies)	Estimated Damage	Declaration
Sep "Diana"	Tropical Storm (did not make landfall)	1984	Coastal Counties Threatened		
Sep 17 "Gloria"	Tropical Storm	1985	Androscoggin Cumberland Franklin Kennebec Somerset York	3 Injuries Downed trees Power failures (up to 14 days, 250,000 people affected)	
Sep 10 "Bob"	Tropical Storm	1991	Androscoggin Cumberland Franklin Kennebec Sagadahoc York	$5,523,665 3 Deaths Power outages	***Presidential FEMA-915-DR-ME***
Sep 16-19 "Floyd"	Tropical Storm	1999	Androscoggin Cumberland Kennebec Oxford Somerset	$1,210,205	***Presidential FEMA-1308-DR-ME***
Aug 27-29 Tropical Storm "Irene"	Tropical Storm	2011	Franklin Lincoln Oxford York	$2,659,694.63 Extensive flooding Power Outages Debris cleanup from high winds	***Presidential FEMA-4032-DR-ME***
October "Sandy"	Tropical Storm (did not make landfall)	2012	N/A	Though NY and NJ had billions in damages, the storm did not cause any significant damages in Maine	***N/A***
July "Arthur"	Tropical Storm (did not make landfall)	2014	Washington Hancock		***N/A***
	Note: *There have been no declarations for hurricanes in Maine since 2011.*				

In 1954 Carol and Edna occurred within a two-week period, a highly unusual pairing that caused deaths and extensive damage. Hurricane Donna in 1960 also caused damage in Maine. The experiences of Hurricane Gloria in September 1985 and Hurricane Bob in 1991 raised awareness of the state's vulnerability; but event memories and lessons learned often fade within a period of only two or three years.

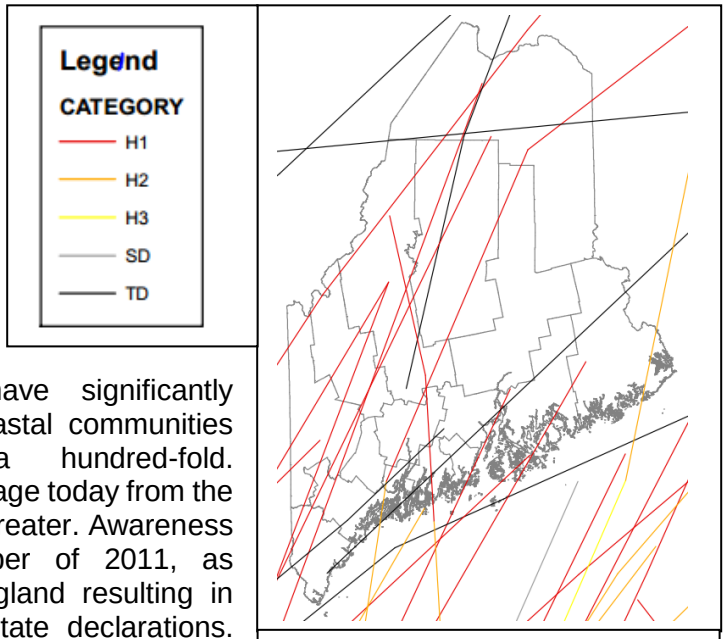


Figure 3.8: Hurricane tracts near Maine, 1850-present. Source: Maine office of GIS.

Since then, coastal populations have significantly increased and valuations of many coastal communities have increased more than a hundred-fold. Consequentially, it is expected that damage today from the likes of an Edna would be many times greater. Awareness did become heightened in September of 2011, as Hurricane Irene tracked into New England resulting in record breaking damages and multi-state declarations. When it reached Maine as a tropical storm, Irene resulted in declaration DR-4032 because of the extensive flooding to roads from the heavy rains and the debris cleanup and power outages from the high winds. The four counties of Franklin, Lincoln, Oxford, and York were part of the declaration. In 2012, Hurricane Sandy devastated much of the northeast coast but spared Maine. Had Irene or Sandy affected more of the coastal counties, fishing, commercial and pleasure boating losses would have been significant if boats, gear, piers, and wharfs had been severely damaged.

Through repeated social media warnings and advisories prior to Irene, the general population was very aware of the impending storm. Stores were busy as customers stocked up and utility crews were prepositioned. However, the lack of recurrent Category 1-5 hurricanes for the last four decades tends to moderate local attitudes toward making extensive preparations.

Storm of Record: Hurricanes Edna & Carol in 1954

The worst hurricane damage occurred in 1954 when Hurricanes Edna and Carol swept into the state within a two-week period. Maine suffered a total of 11 deaths and damages of $17 million as a result of these two storms. Storm force winds took down trees, debris, and powerlines. Precipitation induced inland flooding washed cars into ditches.

Probability of Occurrence

Recent NOAA 21st century projections of hurricane activity originating in the Atlantic Basin support the notion of an increased intensity of approximately four percent, and higher rainfall rates of between 10 and 15 percent.[10] While historically, hurricanes tend to weaken before hitting the Maine coastline, rising sea levels combined with a projected increase in intensity could result in an increase of the number of hurricanes actually reaching the coast. Based on the last 80 years of occurrences, there is a high probability that Maine can expect as many as three hurricanes or major tropical storms per decade to track over the state.

[10] https://www.gfdl.noaa.gov/global-warming-and-hurricanes/

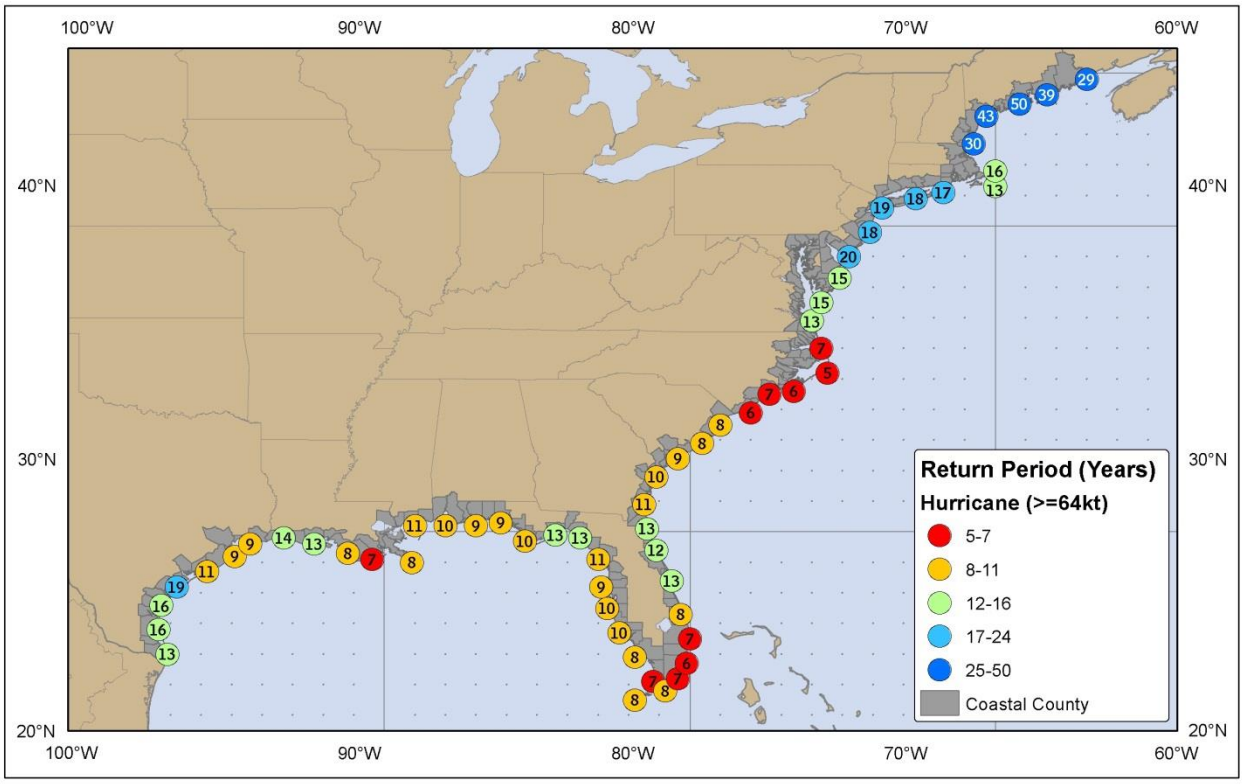


Figure 3.9: Estimated return period in years for hurricanes passing within 50 nautical miles of various locations on the U.S. Coast. (*Source*: http://www.nhc.noaa.gov/climo/#returns)

Issues and Challenges

1. **Public Doubt.** In 2017, the Maine Emergency Management Agency distributed digital copies of the hurricane surge inundation maps to coastal communities as a first step in raising public awareness about the extent to which hurricanes may impact coastal areas and to develop evacuation zone maps. To date, however, there still seems to be very little public concern about the extent to which low-lying coastal areas, particularly in Southern Maine, may be inundated by even the lowest category of hurricanes, a Category 1 hurricane. If people do not believe the risks, they may inadvertently build in areas subject to inundation and/or fail to construct hurricane-resistant structures.

2. **No State Hurricane Policies.** To date, the State of Maine does not have any specific policies that would direct public facilities away from potential hurricane storm surge inundation areas. Maine's Uniform Building and Energy Code (MUBEC) requires cities and towns with a population greater than 4,000 to adopt the International Building Code's wind resistant standard.

DROUGHT

General Definition

Drought is a period of below-average precipitation in a given region, resulting in prolonged shortages in its water supply. This can include atmospheric, surface water, or groundwater.

Types of Drought Events

Meteorological Drought:
When dry weather patterns dominate an area.

Hydrologic Drought:
When low water supply becomes evident in streams, reservoirs, and groundwater levels. Hydrologic drought indicators lag significantly behind meteorological drought indicators.

Agricultural Drought:
When precipitation deficits, soil water deficits, reduced ground water, or reduced reservoir levels impact agricultural yields.

Socioeconomic Drought:
When physical drought conditions impact the supply and demand of economic goods and services.

Nature of Hazard

Drought is a normal recurring feature in *all* climatic regions. While all droughts originate with a deficiency of precipitation, drought is a unique hazard due to the usually slow progression of the phenomenon.[11] Drought impacts respond to precipitation anomalies on varied timescales (see "Impacts" on following pages). This makes it difficult to determine a clear beginning or end to any drought event, particularly ones that are prolonged. The duration of drought can vary from several weeks to several years.

Location of Hazard:

Due to the fact that drought classification is relative to average local precipitation, surface, and groundwater levels, the entire state is susceptible to drought.

Extent of Hazard:

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

Maine uses the U.S. Drought Monitor's (USDM) classification method **(Table 3.16)** to measure the extent of drought events as they occur.

[11] http://drought.unl.edu/Education/DroughtBasics.aspx

TABLE 3.16: U.S. Drought Monitor Drought Classification

Category & Description	Possible Impacts	PDSI	CPC Soil Moisture Model	USGS Weekly Streamflow	SPI	Objective Drought Indicator Blends
D0 Abnormally Dry	- Short term dryness slowing planting, growth of crops or pastures	-1 to -1.9	21 to 30	21 to 30	-.5 to -.7	21 to 30
D1 Moderate Drought	- Some damage to crops, pastures - Streams, reservoirs, or wells low, some water shortages developing or imminent	-2 to -2.9	11 to 20	11 to 20	-.8 to -1.2	11 to 20
D2 Severe Drought	- Crop/pasture losses likely - Water shortages common	-3 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3 Extreme Drought	- Major crop/pasture losses - Widespread water shortages	-4 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4 Exceptional Drought	- Exceptional and widespread crop/pasture losses - Shortages of water creating emergencies	-5 or less	0 to 2	0 to 2	-2 or less	0 to 2

Impact

A drought impact is defined by the World Meteorological Organization (WMO) as an observable loss or change at a specific time because of drought.[12] It is uncommon for drought to significantly impact Maine because of typical precipitation levels, the state's ground water hydrology, and a relatively low statewide demand for water compared to available resources. Still, all Maine communities can be vulnerable to impacts of drought. Drought events can impact several stakeholders, which include homeowners (on private and public water supply), hydroelectric generators, the agriculture economy, and those with interest in the forest community.

Vulnerability

All Maine residents are vulnerable to drought if it affects the water supply. However, households on private wells are more vulnerable to water shortages because they are dependent on local ground water levels, which may already be in short supply, and are thus more susceptible to water scarcities. Private well owners do not benefit from the redundant measures that are set to protect public water supply. There are limited resources available to private homeowners with dry wells. With 42 percent of the state on private water supply, or 561,000 residents, Maine has the highest proportion of residents not served by a public water supplier.[13] Recent estimates indicate that closer to half of Maine's population may depend on

[12] http://www.droughtmanagement.info/literature/GWP_Handbook_of_Drought_Indicators_and_Indices_2016.pdf
[13] https://pubs.usgs.gov/circ/1405/pdf/circ1405.pdf

private wells. Because many of these private wells are dug or shallow, any prolonged drought period can have significant impact.

The agricultural community is also vulnerable to drought, as drought is historically the most significant risk factor to the sector. Maine agriculture is the basis of over 1.2 billion dollars of food and fiber products annually. It employs 22,000 workers statewide and there are an estimated 8,000 family farms in Maine.[14]

Forest health is also vulnerable to drought events, as drought conditions can lead to high threat of forest fires. Forest and brush fire hazards are also common in early spring prior to leaf-out. Forest litter from the previous year may be especially dry if insufficient spring rains follow an early melting of the snowpack. Both of these situations occurred in 1947 as detailed in the Wildfire section. Residents in rural parts of Maine are the most susceptible to forest fires due to possible urban wildfire interface. The vulnerability of rural residents to drought events is compounded because rural residents make up most of the population on private wells.

Previous Occurrences

Maine's 1999-2002 drought period was the most damaging to date. There were an estimated 17,000 private wells that ran dry in the nine months prior to April 2002, and farmers lost more than 32 million dollars in crop yield between 2001 and 2002.[15]

Maine's Drought Task Force convened in August 2016 for the first time in 14 years and continued to meet monthly through December. The 2016 drought was a result of three years of below average precipitation which led to low groundwater levels statewide, but particularly in the southern portion of Maine. As of this writing, the final impacts of the drought are undetermined, but it is reasonable to assume that the significant investments water utilities have made after the 2001 drought mitigated the impacts of the 2016 drought. Hundreds of millions of dollars have been spent replacing antiquated water mains. That has resulted in reduced loss of water through leakage. Additionally, many of those projects upgraded interconnections which have improved the ability of water utilities to purchase water from neighboring systems when the need has arisen. It was the new information gathered from members of the Drought Task Force that drove a substantial rewrite of this hazard profile.

[14] https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=MAINE

[15] 1999-2002 USGS report, "Drought Conditions in Maine, 1999-2002: A Historical Perspective" [Lombard, 2002]

Table 3.17: Chronology of Major Droughts in Maine

Date	Affected Areas	Average Recurrence Range	Remarks
1938-1943	Western Areas	15 to > 30	Severe in Androscoggin and Kennebec River Basins
1947-1950	Statewide	25	Severe in central coastal region
1955-1957	Nearly entire state	20	Severe in northern and eastern parts of state
1963-1969	Statewide	70	Longest endured drought, stream flows in southern portions of Maine reached 100 year lows
1984-1988	Statewide	20	Severe in northern Maine
1999-2002	Statewide	60	2001 was driest year on record (to date), August 2002 was driest month on record
2015-2016	Statewide	40 to 50	Most severe in York and parts of Cumberland Counties[1]

Information compiled from the following sources:
USGS Report: Lombard, Pamela J. Drought Conditions in Maine, 1999-2002: A Historical Perspective. Augusta, ME (2004). 24.
USGS Report: Water Supply Paper 2375; National Water Summary 1988-89 – Floods and Droughts
[1]Remarks on the 2016 drought were estimated using USDM data.

Probability of Occurrence

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

Furthermore, it is difficult to determine probability of occurrence for future drought events because "the global hydrological cycle is exhibiting significant variability, especially in the geographic distribution and intensity of precipitation, the availability of water resources, [and] prolongation of periods of drought."[16]

For prediction purposes, this plan will compare the Standard Precipitation Index (SPI) value associated with each drought intensity classification level used in the USDM to estimate the recurrence interval for each drought level. The World Meteorological Association endorsed the SPI as the standard for determining the existence of meteorological drought.

[16] *(http://pubs.usgs.gov/pp/p1386a/pdf/pp1386a-1-web.pdf)*

Table 3.18: Recurrence Intervals for U.S. Drought Monitor Classifications

Intensity	SPI Trigger	SPI Recurrence Range[1]	USDM Recurrence Interval[2]
D0 (Abnormally Dry)	-0.5	3.25	3 - 5
D1 (Moderate Drought)	-0.8	4.75	5 - 10
D2 (Severe Drought)	-1.3	10.5	10 - 20
D3 (Extreme Drought)	-1.6	18.25	40 - 50
D4 (Exceptional Drought)	-2.0	44	50 - 100

NOTE: [1] The USDM uses a variety of indicators and indices to determine drought intensity in addition to the SPI. See table in Extent. The above recurrence intervals use the 30-day SPI timescale. [2] The authors of the USDM use objective and subjective input to develop their finished product. They design the USDM to have the recurrence intervals stated in USDM column (Rippey, Brad. Northeast Drought Outlook Forum. Boston, MA, 11 October 2016).

Issues and Challenges

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

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

EARTHQUAKE

General Definition

A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates. This complex motion is caused by a sudden shifting or breaking of subsurface rock to relieve built up stress. The energy released at the center produces a variety of seismic waves that travel out in all directions through the surrounding rock. Some of these waves make their way to the surface and travel out across the countryside.

Types of Events

Tectonic Earthquake:
The result of the earth's crust breaking due to geological forces on rocks and adjoining plates that cause physical and chemical changes.

Explosive Earthquake:
The result of the detonation of a nuclear and/or chemical device.

Collapse Earthquake:
A small earthquake(s) in underground caverns and mines caused by seismic waves produced from the explosion of rock on the surface.

Volcanic Earthquake:
A result of tectonic forces which occur in conjunction with volcanic activity.

Nature of Hazard

Volcanic earthquakes play an enormous part in Maine's geological history, although there has not been an active volcano in Maine for approximately 420 million years. Currently, a tectonic earthquake is considered the most likely of earthquake events while still considered as a low likelihood event. Explosive earthquakes and collapse earthquakes could occur as the result of a human-induced event, nut are not likely to occur as a natural hazard in the state of Maine.

Location of Hazard

Earthquakes have been reported from all 16 counties in Maine, thereby indicating some level of statewide exposure, with a somewhat higher activity in the eastern, central, and southern parts of the state. As indicated on the map below, the three areas of most seismic activity in Maine are in: northwestern Aroostook, Eastport in Washington County, and York County. Seismic activity in Maine is typical of the Appalachian region of Northeastern North America where there is a slow but steady rate of earthquake occurrence. The earthquakes are presumably caused by modern stress being released occasionally along zones of weakness in the earth's crust, but a more specific cause for the earthquake activity is not known. Recorded earthquake locations and detailed seismic motion studies do not show any clear correlation with either local or regional geologic features.

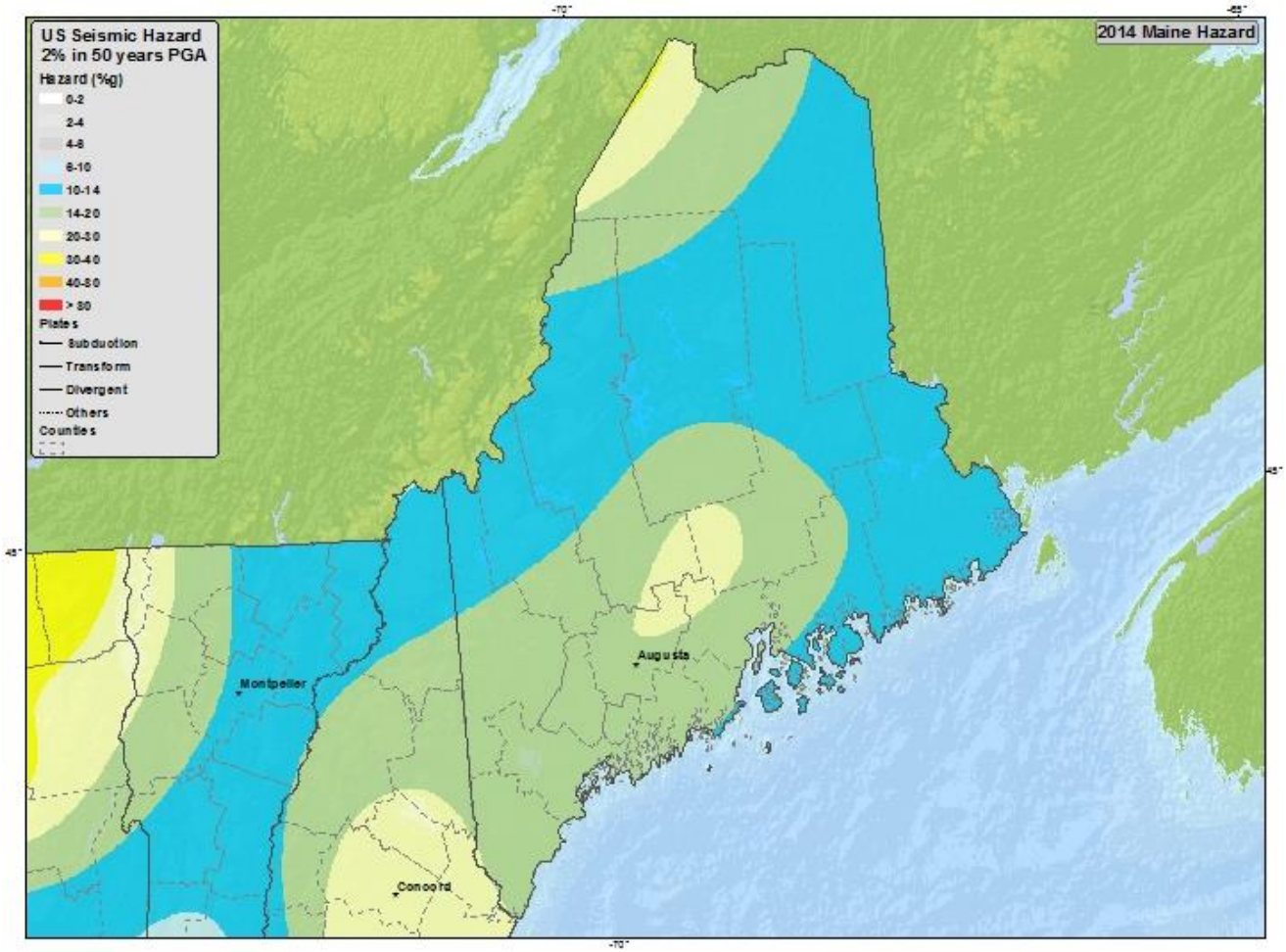


Figure 3.10: 2014 USGS Seismic Hazard Map for Maine. Source: USGS.

Extent of Hazard

Geologists use the Richter Scale to measure the strength, or magnitude, of an earthquake at its epicenter. However, geologists use the term 'intensity' to measure the extent of an earthquake at a given location, and use the Mercalli Intensity Scale to measure intensity.

TABLE 3.18: Richter Scale and Mercalli Intensity Scale

Magnitude	Mercalli Intensity	Average Effects
1	I	Microearthquakes not felt.
2	I	Minor earthquakes felt slightly by some people.
3	II to III	Minor earthquake often felt by people but rarely causes damage.
4	IV to V	Light earthquake with noticeable shaking of indoor objects but little damage.
5	VI to VII	Moderate earthquake felt by everyone and can damage poorly constructed buildings.
6	VII to IX	Strong earthquake that can cause damage to well-constructed buildings.
7	VIII or greater	Damages most buildings, some of which partially or completely collapse.
8	VIII or greater	Major damage to buildings. Structures likely to be destroyed.
9	VIII or greater	Permanent changes in ground topography. Severe damage or collapse to all buildings.

Source: https://earthquake.usgs.gov/learn/topics/mag_vs_int.php

Impact

Most Maine earthquakes are of small magnitude (less than 2.0 on the Richter scale), and are therefore too small to feel. No Maine earthquake has caused significant damage to date. The persistent activity, however, indicates that some crystal deformation is occurring and that a larger earthquake cannot be ruled out.

Vulnerability

Most Maine buildings are not constructed to withstand the lateral motion of a significant earthquake (magnitude six or higher). Brick and masonry structures that have not been reinforced are especially prone to earthquake damage. Coastal and lakefront structures built on water-saturated, unconsolidated material such as artificial fill may be vulnerable to liquefaction in a severe earthquake (liquefaction is a loss of cohesion between particles due to lubrication by water during vibration causing a sudden loss of strength). Most death and injury during earthquakes results from people being struck or trapped by falling debris.

Other possible concerns in an earthquake emergency would be the disruption of infrastructure facilities, such as road access, gas and oil pipelines, sewer systems, electricity and water supplies, and the disruption of emergency services such as police, firefighting, ambulance, and hospital services.

With increased development, the likelihood of marked destruction escalates. Metropolitan areas encounter far more structural damage because of the density and design of urban buildings, especially multi-story structures.

Previous Occurrences

No significant amount of motion has been shown for any fault since the last Ice Age about 20,000 years ago, and geologic evidence demonstrates that many faults have been inactive since the formation of the Appalachians, over 300,000,000 years ago. None of the ancient faults in Maine have been identified as active.

As of this update, the largest earthquake recorded in Maine since 1747 was near Eastport in 1904 with an estimated intensity of VII. The largest accurate measurement was in 1973 just on the Quebec side of the border from Oxford County, with a magnitude 4.8.

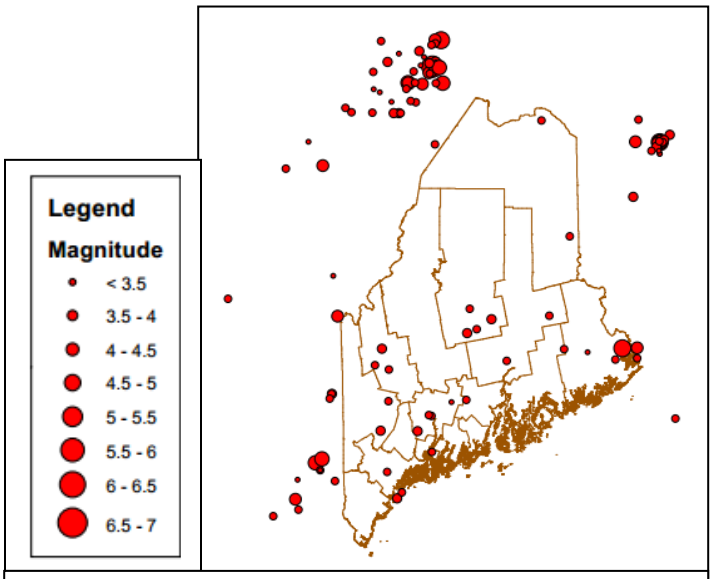


Figure 3.11: Earthquakes with a magnitude greater than 3.5 within 100 miles of Maine since 1850. Source: Maine Geological Survey.

Historic Record

Earthquakes have been reported from all counties in Maine, thereby indicating some level of statewide exposure, with a somewhat higher activity in the eastern, central, and southern parts of the state.

TABLE 3.19: EARTHQUAKES WITH INTENSITY VI OR GREATER IN MAINE

Date	Place (County)	Intensity	Magnitude	Comments
1755	Cape Ann, Massachusetts	VIII	6.0	Toppled chimneys in Boston.
1857	Lewiston (Androscoggin)	VI	5.0 – 5.9	
1869	Passamaquoddy Bay (Washington)	VI	5.0 – 5.9	
1904	Eastport (Washington)	VII	*5.0 – 5.9*	Maine's largest earthquake.
1905	Sabattus (Androscoggin)	VI	5.0 – 5.9	
1912	Eastport (Washington)	VI	5.0 – 5.9	
1918	Bridgton/Norway (Cumberland/Oxford)	VI	5.0 – 5.9	
1925	La Malbaie, Quebec	IX	6.4-6.6?	90 miles from Quebec City. Damaged some types of stone and brick walls over 100 miles away.
1928	Milo (Piscataquis)	VI	5.0 – 5.9	
1935	Temiscaming, Quebec	VII	6.2	
1940	Ossipee, NH (2 events)	VII	5.5 & 5.5	Some chimneys in Augusta cracked.
1949	Houghton (Piscataquis)	VI	5.0 – 5.9	
1957	Portland (Cumberland)	VI	5.0 – 5.9	
1973	Bowmantown Twp. (Oxford)	VI	5.0 – 5.0	
1982	Miramichi, N.B.	VII	5.7	Felt across Maine.
1988	Chicoutimi, Quebec	VIII	6.0	Felt in New York City. Largest in Eastern North America since 1935.
1997	Quebec City	VII	5.1	Felt across Maine.
2002	Near Plattsburgh, N.Y.		5.3	
2005	Northeast of Quebec City		5.4	
2010	Canada, about 35 miles north-northeast of Ottowa			Felt in southwestern Maine.
2012	Canada, near La Malbaie, Quebec		4.4	Felt in northernmost Maine.

NOTE: the earthquake in Virginia in 2011 that damaged structures in DC, including the National Monument certainly heightened awareness of east coast earthquake possibilities. Source: Maine Geological Survey

Modern Record

The following is a summary of significant earthquakes with a magnitude of 3.4 from the modern record (since 1975). Data are from the New England Seismic Network operated jointly by Weston Observatory of Boston College and MIT, Massachusetts.

TABLE 3.20: EARTHQUAKES WITH A MAGNITUDE OF 3.0 OR HIGHER

Month	Year	Location	Magnitude	Intensity
Apr 17	1979	Bath	4.0	V
May 29	1983	Dixfield	3.9	V
Jan 19	1984	Machias	3.8	IV
Dec 28	1988	Albion	4.0	IV
Sep 15	1994	Springfield	3.9	IV
Apr 29	1997	Near Wilton	3.0	
Feb 25	1999	Approximately 7 miles SE of Waterville	3.7	
Dec 24	1999	Newport-Etna area	3.0	
Jan 3	2000	Turner-Livermore area	3.4	
Jan 17	2000	Approximately 10 miles N of Rumford	3.4	
Sep 7	2000	Approximately 15 miles SE of Waterville	3.2	
Oct 24	2001	Approximately 2 miles S of Howland	3.3	
Sep 25	2005	8 miles NW of Pembroke	3.5	
Jul 14	2006	15 miles NW of Portage, Aroostook Co	3.8	
Sep 22	2006	E of Cadillac Mountain, Mount Desert Island	3.4	
Oct 2	2006	E of Cadillac Mountain, Mount Desert Island	4.2	
Dec 20	2006	E of Cadillac Mountain, Mount Desert Island	3.1	
Mar 30	2010	Near Orrington-Bucksport line, about 7 miles N of Bucksport	3.0	
General	2011	“Swarms” of minor earthquakes at MDI	Less than 2.5	
Oct 16	2012	E Waterboro, about 13 miles NW of Saco	4.5	
Feb 3-9	2016	Earthquake swarm of 20 small earthquakes.		
Feb 2	2017	Passamaquoddy Bay, 6 miles northeast of Eastport	3.3	

Source: Maine Geological Survey

To date, the worst earthquake in Maine history occurred in 1904 in Eastport (Washington County).

The Maine Geological Survey (MGS) provides advisory and interpretive information on earthquakes for planning and regulatory agencies. After an earthquake event, the MGS collects information from people in the area and through an earthquake questionnaire made available to the general public and to county emergency management agencies.

The New England Seismic Network, operated by USGS, maintains a network of seismic stations across New England that monitors, analyzes, and reports earthquake activity in Maine.

Probability of Occurrence

Based on 124 years’ worth of data, the probability of a major earthquake (intensity VI or higher) occurring in Maine is about once every 11.5 years. However, the table above also

shows that major earthquakes do not occur on a regular basis. They may come in clusters, as they did in the early 1900s, or "swarms" as they did in 2011, then skip several decades before occurring again. To date, there is no accurate way to predict when another major earthquake will occur in Maine.

Based on past earthquake data collected over a limited time span (1975-1982) from New England and assuming that Maine is a representative part, John Ebel, of Weston Observatory, has estimated the return times for earthquakes.

TABLE 3.21: Return Times for Earthquakes of Different Magnitudes in Maine

Magnitude	**4.6**	**5.0**	**5.5**	**6.0**	**6.5**	**7.0**
Return Time (Years) (+/-) (20-30%)	24	52	138	363	955	2512

NOTE: Sources for the above paragraphs: Henry Berry, Physical

Issues and Challenges

1. **Aging Infrastructure.** The majority of infrastructure across the state of Maine is aging and unable to sustain the impact of a significant earthquake event. Should an event occur there is a likelihood that significant damages would occur at a high-cost to the affected area. Both public and private aging infrastructure remain vulnerable to damages associated with an earthquake event, however the cost of bringing an older facility up to code is usually excessive and unfeasible.

EROSION/COASTAL EROSION

General Definition

The process of 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 of wind, water, or other geologic processes.

Types of Events

Coastal Beach Erosion:
Occurs in widely scattered locations, primarily on the state's larger beaches and sand dune systems located in York, Cumberland and Sagadahoc Counties.

Coastal Bluff Erosion:
Occurs throughout the coast on highly unstable and unstable bluffs less than 20 feet in height.

Nature of Hazard

Maine is famous for its rockbound coast, buttressed by rugged, unchanging cliffs of stone. Rocky points such as Portland Head, photographed a century ago, show little change after a hundred

years of storms. This is because Maine's bedrock is very strong and consolidated, so that it resists erosion from waves and weather.

Other parts of Maine, however, have a "soft coast" of loose or unconsolidated materials that are subject to erosion. Maine's "soft coast" includes coastal beaches and coastal bluffs that are composed of sediment. Although a slow, steady rise in sea level is the underlying reason for erosion along the coast, the most noticeable erosion occurs quickly during individual storms or landslide events.

When it comes to coastal bluff erosions, coastal bluff faces above the high tide line are classified by MGS as follows:

Highly Unstable:
Near vertical or very steep bluffs with little vegetation and common exposure of bare sediment. Fallen trees and displaced blocks of sediment are common on the bluff face and at the base of the bluff.

Unstable:
Steep to gently sloping bluffs, mostly covered by shrubs with a few bare spots. Bent and tilting trees may be present.

Stable:
Gently sloping bluffs with continuous cover of grass, shrubs or mature trees. A relatively wide zone of ledge or sediment occurs at the base of the bluff.

No Bluff:
Broad, gently sloping vegetated land or bare ledge with less than three feet of sediment cover.

Maine Geological Survey Coastal Bluffs Maps also describe the shoreline at or below the high tide line. The shoreline can consist of ledge, salt marsh, a beach or tidal flat, or it may be armored (protected by man-made interventions such as riprap, seawalls or other engineered structures).

Location of Hazard

Coastal Beach Erosion

Beaches, which are part of Maine's "soft coast," only account for about 2 percent of the state's 3,478 miles of tidal shoreline. Most of the larger beaches are concentrated in York and Cumberland Counties. Beaches are dynamic systems subject to erosion and accretion (building up) throughout the year, but because of the rising sea level, erosion is expected to continue to dominate over accretion in most beach locations. Chronic long-term erosion along many beaches is on the order of a foot or more per year.

Coastal Bluff Erosion

Coastal bluffs are also part of Maine's "soft coast." A bluff is a steep shoreline slope formed in sediment (loose material such as clay, sand and gravel) that has three feet or more of vertical elevation just above the high tide line. Cliffs or slopes in bedrock (ledge) surfaces are not bluffs and are not subject to significant erosion in a century or more. Beaches and dunes do not form bluffs, except along the seaward dune edge as a result of erosion.

Roughly half the coast of Maine consists of coastal bluffs. Those that are less than 20 feet in height are subject to coastal erosion. Bluff erosion is part of a natural cycle with consequences for the land below and above the bluff. Fine-grained silt and clay eroded from bluffs may be

deposited on mud flats or salt marshes which help reduce wave energy at the base of a bluff and slow the overall rate of bluff erosion. Coarse-grained sediments, such as sand and gravel, eroded from bluffs become part of a beach at the base of the bluff and help stabilize the shoreline position.

Bluff erosion can result in a landward shift of the top edge of the bluff. This shoreline change is a natural process that, by itself, is not a coastal hazard. It becomes a hazard when it threatens something of value, such as a building near the edge of the bluff.

Coastal bluffs erode episodically. Some bluffs may not change much over many years, even though there are steep banks along the shore. Bluffs may not lose much ground in any one year but may slump a large amount of sediment every few years. Coastal bluffs that are classified as being either highly unstable or unstable are retreating at an average rate of about one (1) foot per year.

Extent of Hazard

Coastal Beach Erosion

The Maine Geological Society (MGS) and the University of Maine's Department of Earth Sciences have used Maine Sea Grant and Maine Coastal Program grants since 1999 to monitor beach levels through the State of Maine Beach Profiling Project. In general, this project has documented a decline in beach profiles due to a net loss of beach sand through erosion (Slovinsky and Dickson, 2007). Not all beaches are eroding. Profiled beaches (from north to south) include:

- Willard (South Portland)
- Higgins (Scarborough)
- Scarborough (Scarborough)
- Western/Ferry (Scarborough)
- East Grand (Scarborough)
- Kinney Shores (Saco)
- Ferry Beach (Saco)
- Biddeford Pool/Fortune's Rocks (Biddeford)
- Gooch's (Kennebunk)
- Laudholm (Wells)
- Drakes Island (Wells)
- Wells (Wells)
- Ogunquit (Ogunquit)
- Long Sands (York)

In April of 2013, the Army Corps of Engineers released a draft study aimed at mitigating erosion along Camp Ellis Beach. The study calls for the construction of a 750-foot long spur jetty that would be attached to the existing north jetty, the placement of about 365,000 cubic yards of sand on Camp Ellis Beach and beach nourishment about every 12 years.

Coastal Bluff Erosion

The risk of coastal bluff erosion is described on Maine Geological Survey's (MGS) Coastal Bluffs Maps which cover about 75 percent of the coast.

Impact

As ocean levels rise, coastal storm flooding is able to reach farther inland and overtop low-lying dunes and coastal bluffs more frequently. Net loss of sand to the offshore seafloor may occur

as a result of coastal erosion. However, some sand may be preserved in the sand dune system if storm waves wash over the dunes and carry the sand in a landward direction. In time, the erosion and landward deposition of sand may shift the frontal dune landward, over the back-dune environment. In some locations, back dunes may form over adjacent salt or fresh water marshes. If dune areas are open to the flow of flood waters, the dunes can naturally migrate and build upward as sea level rises. Beach, dune, and bluff erosion is a natural process that, by itself, is not a hazard. It becomes a hazard when erosion threatens man-made structures such as dwellings that are in a fixed location on the coastline.

Vulnerability
All of coastal Maine is vulnerable to coastal erosion, but particularly the highly populated areas of southern Maine. As indicated by "Previous Occurrences", eroding coastlines are having a huge effect on public and private infrastructure.

Previous Occurrences

According to the Maine Geological Survey, during the past century, 30-40 buildings have been destroyed by beach erosion in Maine:

- A minimum of 22 houses have been lost at Camp Ellis in Saco and 33 lots are now in the ocean.
- At least 10 buildings, including a hotel, were lost at Popham Beach in Phippsburg. A number of others were undermined and threatened by erosion and have since been moved landward and elevated.
- A hotel at Higgins Beach in Scarborough was destroyed by erosion.

In the last 20 years, five houses in Saco were completely destroyed by erosion. Many others were damaged. Erosion of coastal beaches and bluffs occurs on a continuous basis along many parts of the Maine coast, resulting in an average annual loss of a foot or more on some beaches, and about a foot on highly unstable/unstable bluffs.

Probability of Occurrence

Maine's experience with erosion, coupled with the continual rise in the level of the sea, indicate that there is a high probability that erosion will continue to occur on an annual basis in various locations along the Maine coast.

> *NOTE: Sources for the above paragraphs: Documents on the Maine Geological Survey Website, and MGS staff Stephen M. Dickson, Ph.D., State Marine Geologist, and Michael Foley, Geologist.*

Issues and Challenges

The following is a partial list of some of the erosion issues and challenges facing Maine.

1. **Discontinuation of the Beach Profiling Program.** The beach profiling program has been a cost-effective way to gather detailed information on changes in beach profiles every month. A grant program paid for a coordinator who guided the work of volunteers. Grant funds have now run out, so it is possible that without additional funding, the program will be discontinued.

2. **Maine's Commitment to Coastal Geology is Small.** Maine funds only one full-time, General Fund position in the Maine Geological Survey to deal with the complexity of issues surrounding the geology of Maine's coast. MGS relies heavily on grant funds for most of its data collection and mapping.

3. **No User-Friendly Program for Mitigating Erosion.** Erosion problems that threaten or damage structures are widely scattered throughout the state and are not concentrated in a single political jurisdiction. While the Natural Resources Conservation Service provides some stabilization assistance, there really is no user-friendly program to comprehensively address the issue, or to provide assistance to homeowners who cannot afford to pay to "armor" their property.

4. **Limited Insurance for Geological Risks.** It may be extremely difficult or prohibitively expensive for individuals to purchase erosion insurance for their properties. As such, many of the erosion hazards represent uninsurable risks.

5. **Increasing Mitigation Need.** As sea level continues to rise, and perhaps even accelerate, erosion will continue along the waterfront. Mitigation, including relocation of structures, infrastructure and environmentally sound coastal engineering, will be increasingly important in the coastal zone.

Mass Wasting

General Definition

Mass wasting is the downslope movement of earth materials under the force of gravity. There are many types of mass wasting, and the definition of their characteristics vary worldwide. The following sections describe the most common types of mass wasting in Maine and are generally aligned with the definitions set by the U.S. Geological Survey. [17]

Types of Events

Creep:
Creep is the gradual downslope movement of soil or other unconsolidated earth materials due to freeze-thaw action (Figure 3.12). Creep does not pose a direct risk to human life, but it can impact infrastructure over time by tilting fences and utility poles that were not properly driven below the frost line. In some cases, creep *may* indicate an unstable slope prone to other types of mass wasting, but this is not always a reliable indicator. Creep may be identified on a slope by curved tree trunks, tilted fences and utility poles, cracks in pavement, or soil ripples.

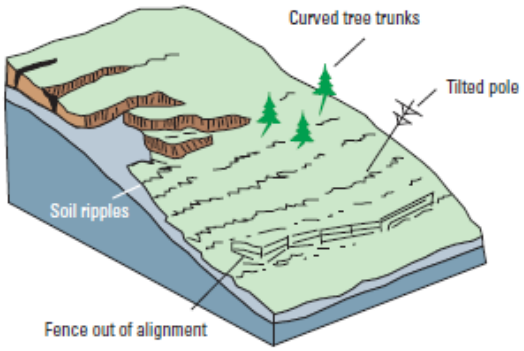


Figure 3.12: Illustration of features resulting from creep (from Highland and Bobrowsky, 2008).

[17] Highland, L.M., and Bobrowsky, P., 2008, The landslide handbook—A guide to understanding landslides: Reston, Virginia, U.S. Geological Survey Circular 1325, 129 p.

Rockfall:
A rockfall is the sudden and rapid downslope movement of rocks (Figure 3.13). The rocks may bounce and break into smaller pieces as they move and tend to continue until they reach an obstruction or flatter topography. Rockfalls may occur in areas with steep slopes and exposed bedrock (natural or manmade). Freeze-thaw action tends to slowly loosen rock blocks from slopes along pre-existing fractures until they fall, but earthquakes may also trigger rockfalls.

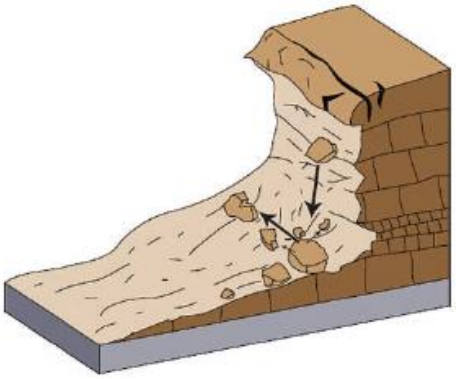


Figure 3.13: Illustration of a rockfall (from Highland and Bobrowsky, 2008).

Landslides:
A landslide is the downslope movement of earth materials (due to gravity) along a rupture surface (shear plane). The following factors or a combination of these factors may trigger a landslide:

1. **Undermining Slope.** Removing the base or toe of a slope through natural or human processes, resulting in unstable areas upslope.

2. **Adding weight to slope.** Overloading a slope due to human alteration (buildings, roads) or natural processes (growth of large trees, addition of water weight from snowmelt or rainfall).

3. **Wet conditions.** High water content in the pore spaces of unconsolidated earth materials decreases friction between particles and reduces slope strength. Wet conditions also add water weight to a slope. Snowmelt and heavy rain are the most common causes of wet conditions, but other sources include septic leach fields and other manmade drainage outlets.

4. **Earthquakes.** Shaking causes a slope to lose strength. Man-made vibrations (drilling, blasting, etc.) can also trigger landslides.

There are many different types of landslides, and sometimes an individual landslide can have the characteristics of multiple types. When assessing a landslide, it is best to categorize it as the type it most resembles since a perfect match is unlikely. Landslides may start with slow movement (inches to feet per day) that ends in very rapid movement (feet per second), or they may happen very rapidly without warning. The most common types of landslides in Maine are described in detail below.

Rotational landslide/slump:

A rotational landslide (sometimes called a slump) is the down and outward movement of earth materials along a curved plane (Figure 3.14). This type of landslide may be triggered by undermining the base of a slope, adding weight to a slope, wet conditions, an earthquake, or a combination of these factors.

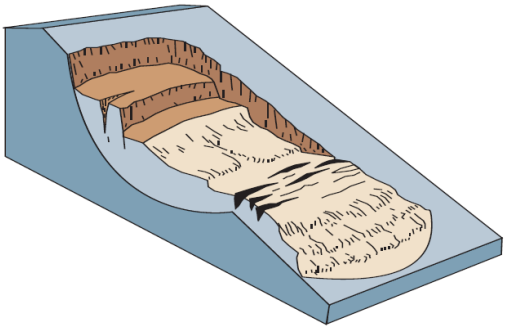


Figure 3.14: Illustration of a slump (from Highland and Bobrowsky, 2008).

Translational landslide:

A translational landslide is the downslope movement of earth materials along a plane with little to no rotational movement (Figure 3.15). This type of landslide may be triggered by undermining the base of a slope, adding weight to a slope, wet conditions, an earthquake, or a combination of these factors.

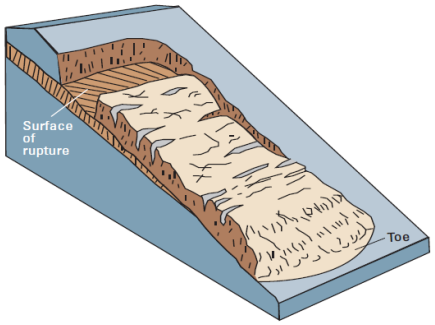


Figure 3.15: Illustration of a translational landslide (from Highland and Bobrowsky, 2008).

Flow:

A flow is the downslope movement of water-saturated earth materials (Figure 3.16). There is little structure to a flow, with materials often moving as a slurry. This type of landslide requires wet conditions but may also be triggered by undermining the base of a slope, adding weight to a slope, an earthquake, or a combination of these factors. Flows are often confused with gullies and vice versa. In a gully, sediments are picked up and carried downslope by flowing water, not by gravity alone. Gullies often originate in areas of concentrated surface runoff, such as a culvert or drain pipe outlet. It is important to recognize the difference, as flows tend to be one event, while gullies can remain active, resulting in long-term erosion problems.

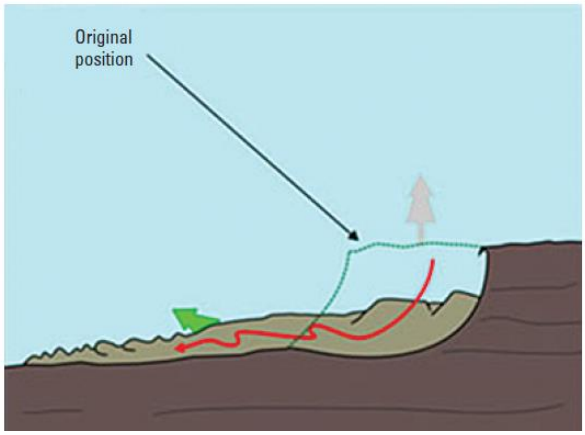


Figure 3.16: Illustration of flow (from Highland and Bobrowsky, 2008).

Spread:
Spread landslides occur when a stronger earth material layer breaks apart and moves along and/or sinks into a weaker/softer underlying layer (Figure 3.17). This type of landslide requires unstable earth materials at depth and may be triggered by undermining the base of a slope, adding weight to a slope, wet conditions, an earthquake, or a combination of these factors.

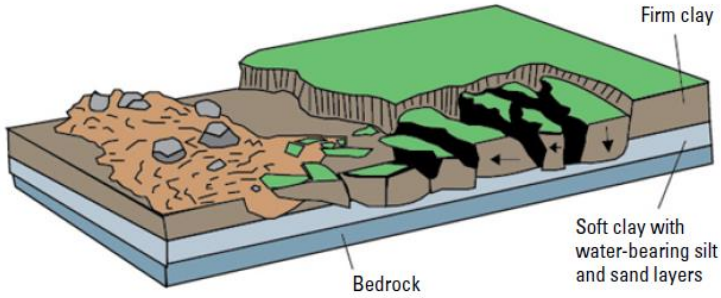


Figure 3.17: Illustration of a spread (from Highland and Bobrowsky, 2008). In Maine, the "clay" layers would most likely be the Presumpscot Formation (described in the following section).

Nature of Hazard:

Mass wasting is a hazard that has been occurring for thousands of years in the state of Maine, but new technology such as lidar topographic data has allowed greater understanding of its extent and characteristics. Instability associated specifically with sediment known as the Presumpscot Formation has raised major concern within the highly populated coastal communities. The Presumpscot Formation is a glaciomarine mud that was deposited in areas of southern Maine that were covered by the ocean at the end of the last Ice Age.[18] The mud can be very soft and can liquefy and flow when disturbed (earthquakes, man-made vibrations) or exposed in a slope by excavation, stream cut bank or coastal bluff erosion).

Location of Hazard(s):

Mass wasting may occur statewide, but specific types are more common in different areas of the state as described below:

Creep:
Common statewide on slopes consisting of unconsolidated earth materials.

Rockfalls:
Most common in areas with exposed bedrock on steep slopes, such as in the mountainous western and central regions of the state (Oxford, Franklin, Somerset, and Aroostook Counties). May also occur anywhere there are steep man-made exposures of bedrock, such as road cuts.

Rotational Landslides/Slumps:
May occur statewide on slopes of unconsolidated earth materials, but most common in river cut bank and coastal bluff areas shortly after periods of high water, especially where the Presumpscot Formation is present. In river corridors, erosion tends to occur during high flows at the outside of a channel bend. The base of the river bank is eroded/undermined leading to slumping or sliding as flood waters recede and expose the now unstable bank.

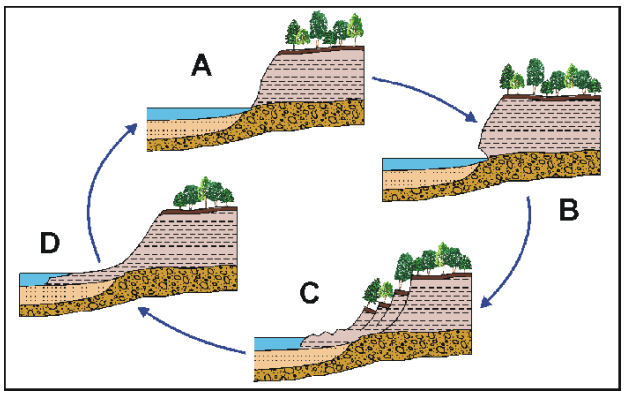


Figure 3.18: Side view of the coastal bluff erosion process. Graphic: Maine Geological Survey**.**

In coastal bluff areas consisting of unconsolidated earth materials, wave action may undermine the base of a bluff, particularly during strong storms (Figure 3.18). This process may lead to slumping and sliding, especially when combined with other triggers such as wet conditions.

Translational Landslides:
Most common in mountainous areas with thin soils on steep slopes. Most likely to occur during or after prolonged wet periods when water adds weight to the slope and/or reduces the strength of the earth materials.

Flows:
May occur on slopes of unconsolidated earth materials statewide, but require water-saturated earth materials making flows more likely after prolonged wet conditions. Flows may also result from disturbance and liquefaction of the Presumpscot Formation.

Spread Landslides:
May occur in areas of southern Maine where the Presumpscot Formation glaciomarine deposit is present, usually at lower elevations in valleys. Lidar topographic data recently revealed many prehistoric spread landslides associated with the Presumpscot Formation.

Extent of the Hazard

An accepted standardized scale to classify mass wasting event magnitudes does not currently exist, but landslides can be assessed in terms of the land area disturbed by the events. An analysis of existing lidar hillshade imagery was conducted to assess the sizes of Maine landslides that could be recognized and measured in a GIS program (Figures 3.19 and 3.20). This analysis does not include every landslide in Maine due to lack of full lidar coverage for the state and natural or human processes that may have altered a landslide beyond recognition, but it is a large enough sample size to portray the magnitude of these events in Maine. The average disturbed area for the 281 landslides that could be mapped in GIS is about 25 acres, although there are situations that could increase or decrease this value. When a landslide occurs along a river channel or coastal area, the lower margin of the landslide (known as the "toe") can be washed downstream or eroded over time making it difficult to determine the full landslide extent. This is a common scenario in Maine, although this underestimation may be offset by very small slumps and slides that are difficult to map in GIS (<0.1 acre). If a landslide

occurs along a river channel, the affected area may be increased substantially if the landslide toe blocks the river causing flooding upstream and potential flash flooding downstream once the river breaches the landslide toe.

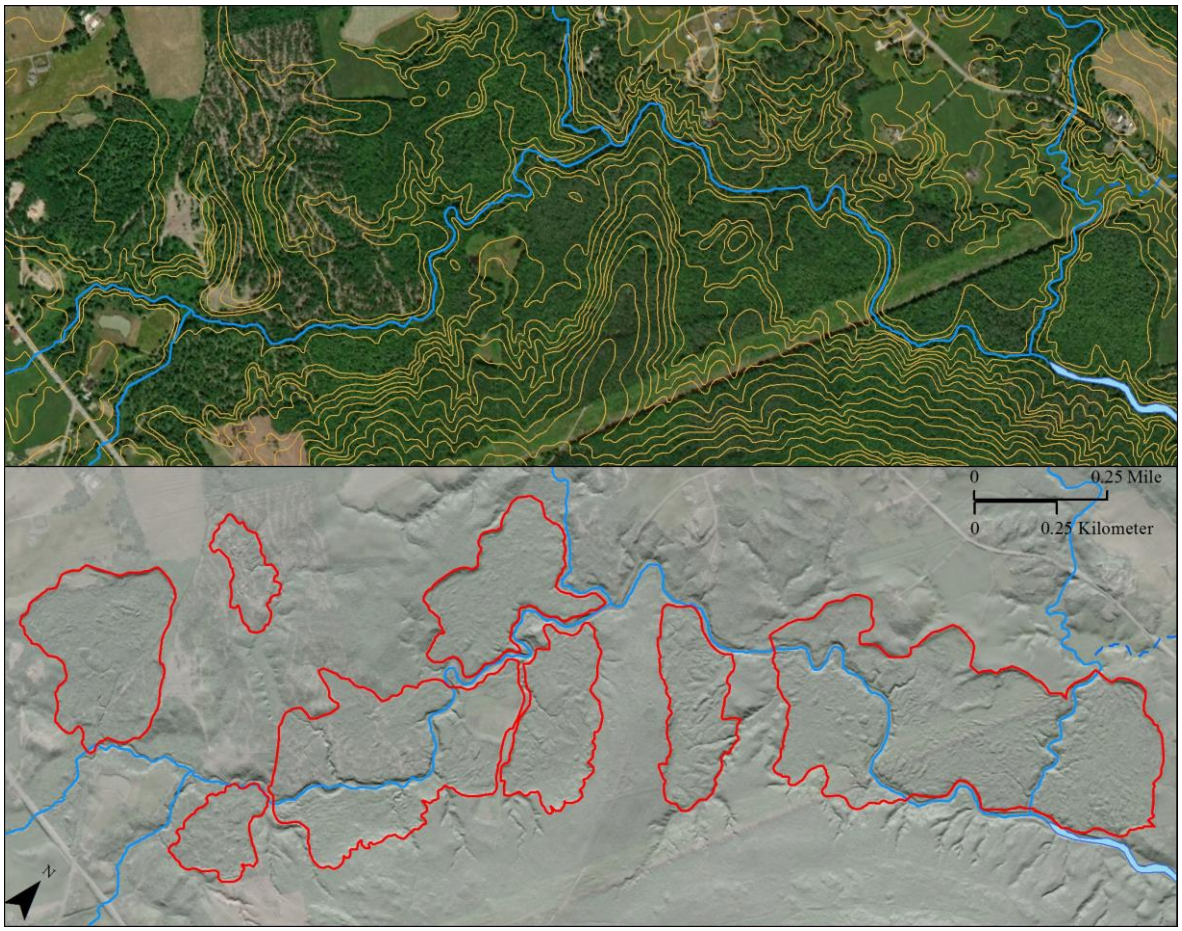


Figure 3.19: Lidar hillshade imagery revealed many landslides in this river valley (bottom image, outlined in red) that were not recognizable with traditional topographic maps and aerial imagery (top image).

Impact

The impact of a mass wasting event varies substantially based on its size and location within the state. A rockfall in a rural mountainous area may go completely unnoticed, while a landslide in more populated southern Maine may take lives, destroy homes and infrastructure.

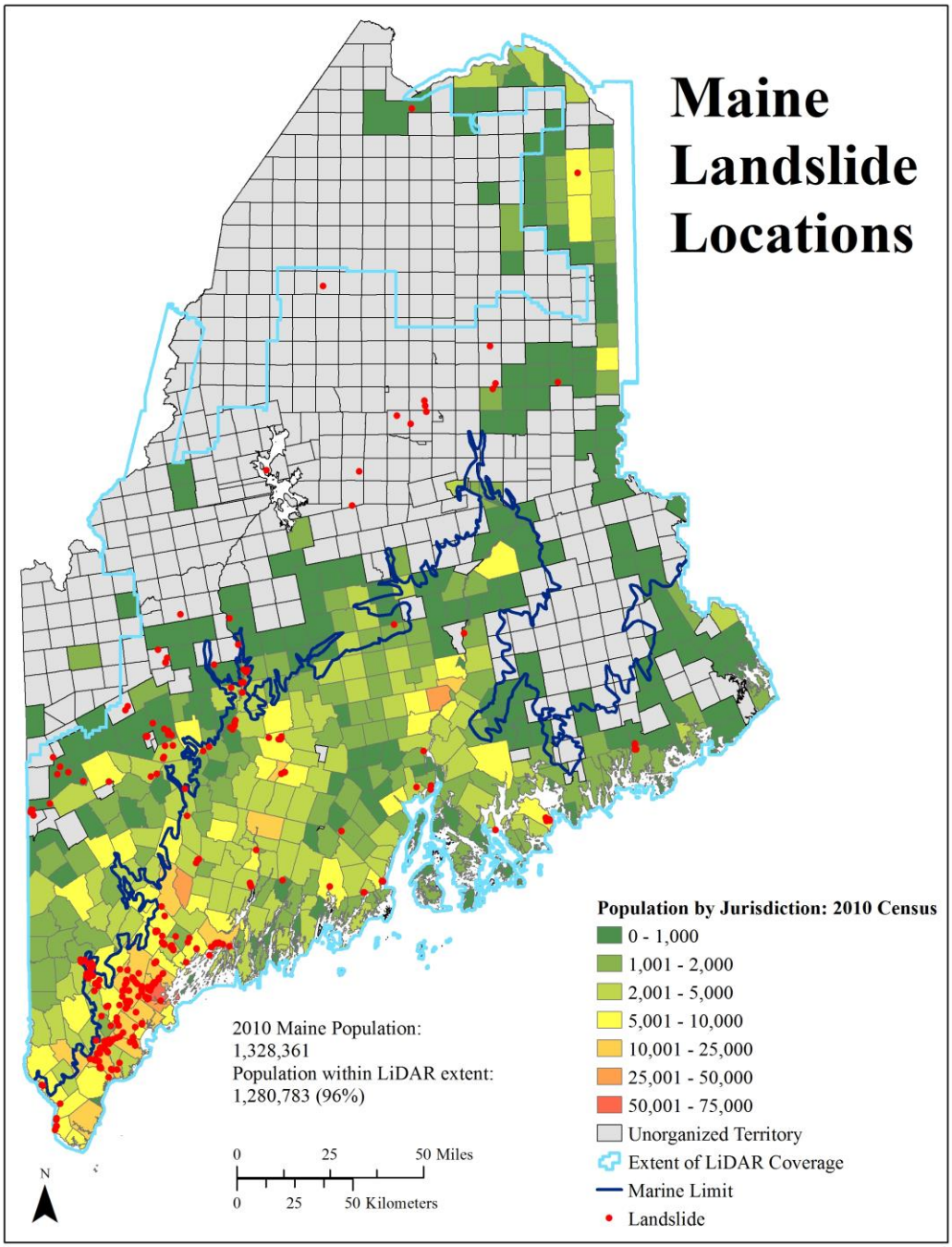


Figure 3.20: Map of landslide locations mapped from lidar as of January 2019. The highest density of landslides coincides with the most populated area of the state. The Presumpscot Formation may be present in areas south of the dark blue line (known as the "marine limit") and is likely related to the high number of landslides in southern Maine. This map will be updated as more lidar data becomes available. Map: Maine Geological Survey.

Vulnerability

The entire state is vulnerable to some type of mass wasting, but events are much more likely to occur due to the following conditions:

- Steep slopes with thick deposits of unconsolidated earth materials, especially in areas where the Presumpscot Formation is present.
- River cut banks and coastal bluff areas that have been undermined by high flow/tides or storm events, especially where the Presumpscot Formation is present.
- Prolonged wet periods that add water weight and reduce slope strength, usually in spring when snowmelt is followed by persistent rain. Persistent rain is also frequently associated with high river flow or storm surges, which can undermine river cut banks and coastal bluffs.
- Earthquakes, which can occur throughout the state but are usually low magnitude (2 or less). The earthquake magnitude threshold trigger for mass wasting in Maine is unknown, but a 2006 swarm of earthquakes in the Mount Desert Island area (magnitude 2.3-4.2) was enough to cause several rockfalls.

Previous Occurrences

A complete list of mass wasting events in Maine does not exist in part because these events tend to affect individual properties and not entire communities. The following list is a sub-sample of known events for the modern, historic, and pre-historic eras.

Modern Landslides (1950-present):

- 2016, Brunswick, Maine: A rotational landslide occurred in the Bugnanuc coastal bluff area with a history of similar events.
- 2010, Sandy River, Chesterville, Maine: A rotational landslide along the river forced the town to relocate a road.
- 2007, Brunswick and Gilead, Maine: The “Patriot’s Day Storm” triggered a coastal bluff landslide in Brunswick and gullying/possible flows along the Wild River in Gilead. A house was condemned due to the Brunswick landslide. A similar event was noted along the Wild River in 1998.
- 2006, Greenbush, Maine: A rotational landslide along the Penobscot River threated U.S. Route 2 .
- 2006, Mount Desert Island, Maine: Earthquakes trigger roadcut and mountainside rockfalls in Acadia National Park, blocking roads and hiking trails (Figure 8).
- 2005, Wells, Maine: A rotational landslide along the Merriland River resulted in removal of at least one nearby home . In March 2019, another small rotational landslide occurred in this area.
- 1996, Rockland, Maine: A coastal bluff rotational landslide destroyed two homes that had been evacuated . A similar event occurred in the same harbor in 1973.
- 1990, Grafton, Maine: A translational landslide occurred on Mount Hittie.
- 1983, Gorham, Maine: A spread landslide along the Stroudwater River destroyed a home that was under construction.
- 1966, Waterville, Maine – a rotational landslide occurred along the Kennebec River, threatening a local park known as Couture Field.

Historic Landslides (1600s-1950):

- 1927: Grafton, Maine: A landslide in the Grafton Notch area was noted in historical records.
- 1917, Jackman, Maine: A landslide on Mount Sally was noted in historical records.
- 1868, Westbrook, Maine: The largest landslide witnessed in recorded Maine history occurred on the Presumpscot River. This flow landslide affected about 40 acres and blocked the river, flooding the paper mill upstream until workers dug out a path for the river by hand.
- 1849, Westbrook, Maine: A spread landslide occurred along the Stroudwater River.
- 1826, Gilead, Maine: A landslide on Peaked Hill was noted in historical records.
- 1670, Kennebunk, Maine: A landslide along the Kennebunk River was noted in historical records.

Prehistoric Landslides:

Lidar topographic data recently revealed over 200 landslides of unknown age that are concentrated in the most populated area of the state. Working in cooperation with MEMA, the Maine Geological Survey determined the ages of 28 prehistoric landslides in southern Maine through radiocarbon dating of vegetation buried by, caught up in, or deposited on top of the landslides (Figures 3.21-3.23). Prior to this study, only one prehistoric landslide (about 13,500 years old) had been studied when a large construction project in Portland (Bramhall Site) revealed trees that were buried by the event. The oldest landslide in the current study is about 12,000 years old and occurred just south of Sebago Lake. Ten landslides occurred from about 500 to 700 years ago and three landslides occurred around 3,500 years ago. This clustering of activity suggests a more regional trigger, such as earthquakes or wet conditions. Other landslides occurring somewhat randomly over time may have more complex causes, such as the convergence of multiple factors like river cut bank erosion and wet conditions at that location. The youngest landslide in the study was determined to be the 1849 Stroudwater River landslide – the exact location was previously unknown. This research indicates that the previously unknown landslides are not as ancient as the Bramhall landslide – some are quite young, indicating that large landslides may be possible into the future.

Figure 3.211: A soil core revealing a soil that was buried by a landslide in Lyman, Maine. The darkest layer in the middle of the core was the topsoil and the grey layer on the right was the bottom of the landslide (in this case, consisting of Presumpscot Formation). Plant fragments from the buried soil layer were sent for radiocarbon analysis to estimate the landslide age. Photo: Maine Geological Survey

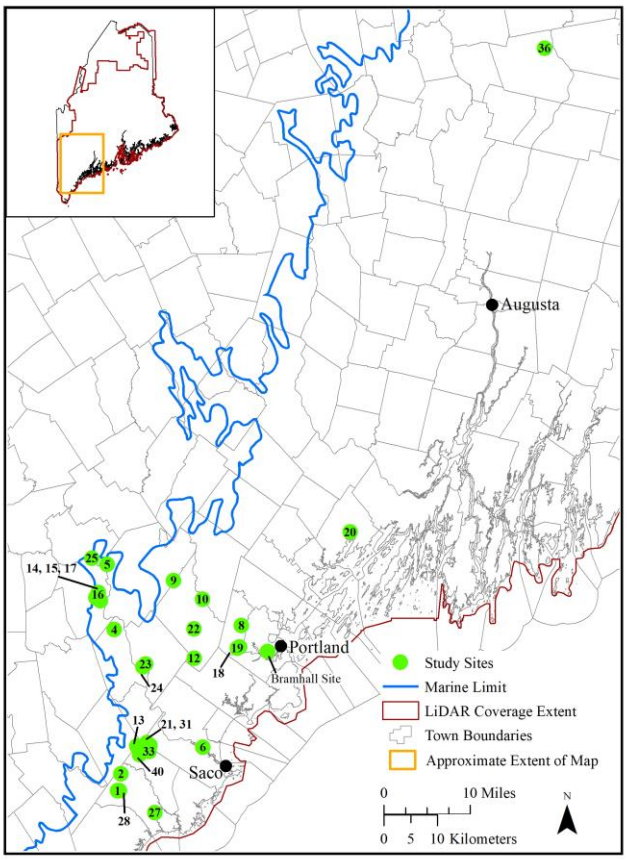
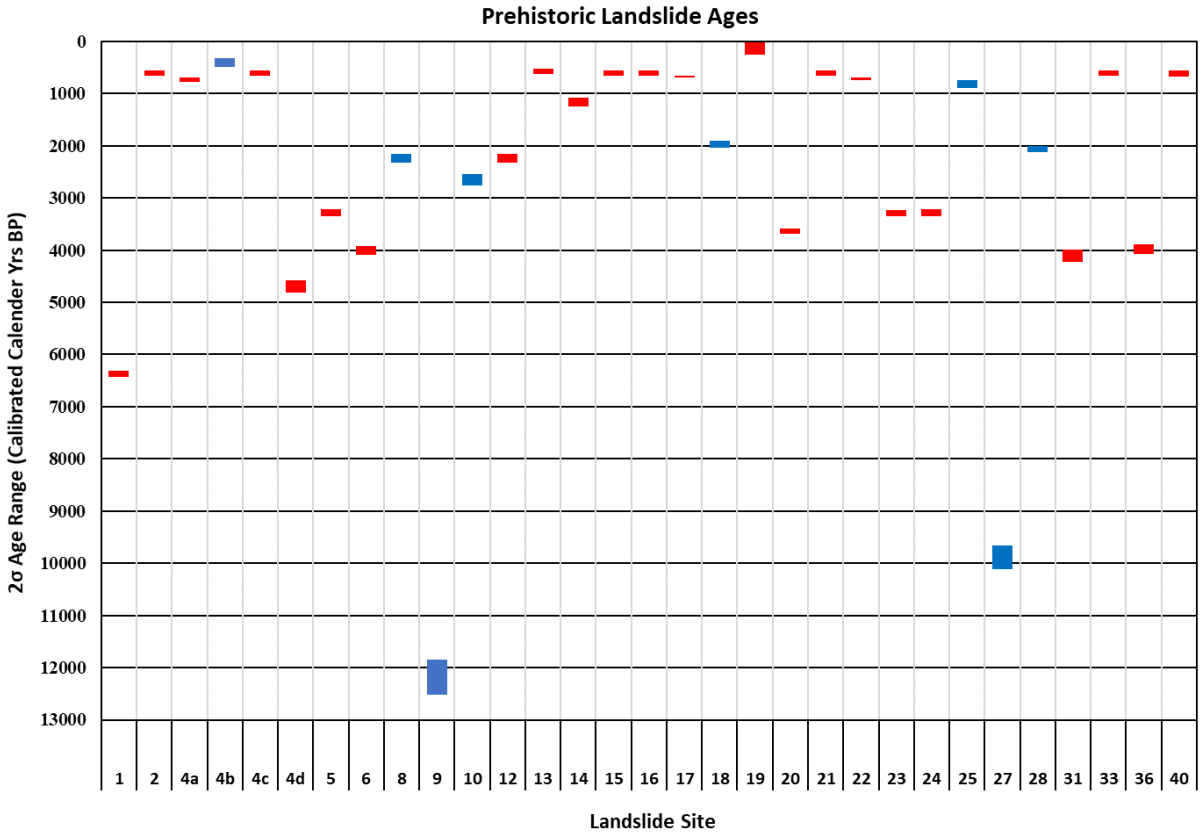


Figure 3.22 (left): Locations of 28 prehistoric landslide sites with estimated ages. Forty sites were originally proposed, but access was not granted for nine sites and three sites did not yield any suitable samples for radiocarbon analysis (theses sites omitted from map).

Figure 3.23 (below): Graph of estimated landslide ages (2σ ranges are reported to account for error in radiocarbon analysis and conversion to calendar years before present). Blue ranges are from samples deposited on top of the landslide after it occurred, which provide a minimum age estimate. Red ranges are from samples that were buried by or caught up in the landslide, which provide a maximum age estimate. Ages shown are the best estimate from each site, which may have been selected from multiple samples at a site. Site 4 is a very large landslide complex (about 1 square mile) that was active at different times (shown as 4a-d).



Probability of Occurrence

There are no specific statistical studies of mass wasting probability in Maine due to the small sample size of events with a known age and/or location. Geologic research can increase the sample size of dated prehistoric landslides, but the locations of landslides included in this sample is heavily dependent on permission to access features on private property. Many historic landslides have been documented, but their exact locations are often unknown or have been altered beyond recognition. Modern landslides are increasingly difficult to document, as landowners become hesitant to report any issues that may affect their property values, especially in coastal areas.

Landslide susceptibility maps exist for portions of southern Maine, but new lidar topographic data and advances in GIS could greatly improve these maps. Despite the limitations described above, history indicates that mass wasting is more likely in areas of Maine with:

- Steep slopes (natural or manmade) that have been undermined or overloaded;
- River cut banks and coastal bluffs that have been undermined and/or overloaded, especially where the Presumpscot Formation is present.

As population increases in southern Maine, these communities should be encouraged to avoid development in river corridors and coastal bluff areas, especially where the Presumpscot Formation is present. Mountain recreation towns should consider the potential for mass wasting when developing these areas as well.

NOTE: The above paragraphs about mass wasting were provided by Lindsay Spigel of the Maine Geological Survey; Maine Department of Agriculture, Conservation, and Forestry.

Issues and Challenges:

The following is a partial list of some of the landslide issues and challenges facing Maine.

1. Maine's commitment to coastal geology is small. Maine funds only one full-time, General Fund position in the Maine Geological Survey to deal with the complexity of issues surrounding the geology of Maine's coast. MGS relies heavily on grant funds for most of its data collection and mapping.

2. No user-friendly program for mitigating landslides. Landslide problems that threaten or damage structures are widely scattered throughout the state and are not concentrated in a single political jurisdiction. While the Natural Resources Conservation Service provides some stabilization assistance, there really is no user-friendly program to comprehensively address the issue, or to provide assistance to homeowners who cannot afford to pay to "armor" their property.

3. Limited insurance for geological risks. It may be extremely difficult or prohibitively expensive for individuals to purchase landslide insurance for their properties. As such, many of the landslide hazards represent uninsurable risks.

4. Increasing mitigation need. As sea level continues to rise, and perhaps even accelerate, coastal landslides will continue along the waterfront. Mitigation, including relocation of structures, infrastructure and environmentally sound coastal engineering, will be increasingly important and increasingly expensive in the coastal zone.

Assessing Vulnerability by Jurisdiction (County)	
Requirement §201.4(c)(2)(ii). The risk assessment shall include an] overview and analysis of the state's vulnerability to the hazards described in this paragraph (c)(2), based on estimates provided in local risk assessments as well as the state risk assessment. The state shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events. State owned critical or operated facilities located in the identified hazard areas shall also be addressed.	
Requirement §201.4(d). (The) plan must be reviewed and revised to reflect changes in development.	
Element	*A. Does the new or updated plan describe the state's vulnerability based on estimates provided in local risk assessments as well as the state risk assessment?*
	B. Does the new or updated plan describe the state's vulnerability in terms of the jurisdictions most threatened and most vulnerable to damage and loss associated with hazard events?
	C. Does the updated plan explain the process used to analyze the information from the local risk assessments, as necessary?
	D. Does the updated plan reflect changes in development for jurisdictions in hazard prone areas?

A. Description of State's Vulnerability Based on Local and State Assessments

As the Mitigation Act of 2000 requires every jurisdiction to have a hazard mitigation plan in order to be eligible for grant funding, and due to the large number of small Maine municipalities, it was decided to define a "jurisdiction" in Maine as a county. Although county government in Maine is very small, the preparation of county plans was determined to be the best way to create a regional approach to creating these plans. All sixteen Maine counties were offered FEMA Pre-Disaster Mitigation funds in order to develop and complete their hazard identification, risk assessment, and mitigation strategy and to publish a County Hazard Mitigation (HM) Plan. As of this writing, the County HM Plans are in their third version.

In 2018, the state of Maine conducted a risk assessment, updating both the methodology and data from the previous risk assessment conducted in 2013. The intent of this process was to provide emergency management planners a broad perspective on the hazards and threat that pose a risk to the state of Maine. The selection of hazards and threats presented in the tool was derived from existing literature within the emergency management community, to include the 2018 State Hazard Mitigation Plan. The methodology used in the risk assessment process is based on the Code of Federal Regulations, Emergency Management Accreditation Program Standards, and best practices in the field of risk assessment to include the assessment conducted in 2017 by the Rhode Island Emergency Management Agency. Execution of this methodology was primarily virtual, leveraging the emergency managers in each of the state's (16) counties.

Counties were asked to rank the likelihood and vulnerability associated with each of the nine natural hazards in their respective communities based on both historical data and projected events. Vulnerability was assessed based on a composite of rankings across the below four factors:

1) Impact to the operations of essential services and/or critical infrastructure
2) Impact to people in terms of casualties and/or fatalities
3) Impact in terms of damage and/or destruction to residential and commercial property
4) Impact to natural resources

Vulnerability scores across each of the four factors were averaged out and combined with the likelihood of each respective hazard for a final score identifying the quantified level of risk. Natural Hazards with a quantified risk of over four, identified in **Table 3.22**, are considered to pose a moderate to significant risk to the respective county.

B. Jurisdictions Most Threatened and Vulnerable to Damages from Hazards

Based on the recent State of Maine Risk Assessment, the following table identifies the jurisdictions most threatened by various hazards, as determined by the methodologies listed above. Individual county results can be observed in **Appendix B** of this plan.

TABLE 3.22: JURISDICTIONS MOST THREATENED BY HAZARDS

County	Wildfire	Flooding	Severe Summer Weather	Severe Winter Weather	Hurricane	Drought	Earthquake	Erosion	Landslides (Mass Wasting)
Androscoggin	X	X	X	X	X		X		
Aroostook	X	X		X		X	X		
Cumberland		X	X	X	X			X	
Franklin	X	X	X	X	X	X			
Hancock	X		X	X	X		X		
Kennebec	X	X	X	X	X	X	X		
Knox	X	X	X	X	X			X	X
Lincoln	X	X	X	X	X	X	X		
Oxford	X	X	X	X	X	X	X		
Penobscot	X	X	X	X	X	X			
Piscataquis	X	X	X	X		X	X		
Sagadahoc	X	X	X	X	X	X	X	X	
Somerset	X	X	X	X					
Waldo	X	X	X	X	X	X		X	
Washington	X	X	X	X	X	X	X	X	X
York	X	X	X			X	X	X	

C. Process Used to Analyze Information from County Risk Assessments

In the preparation of this Plan, all of the county plans were evaluated to determine the nature of hazards and how they differed throughout the state, as well as the extent to which specific hazards contribute to the overall statewide hazard risk. Flooding, Severe Winter Weather, Severe Summer Weather, and Wildfires are considered the highest priority hazards for nearly all areas of Maine. The estimate of potential dollar losses contained in this Plan was also obtained from each of the county plans. In general, the jurisdictions with the highest potential damages are the ones with the most risk.

The following paragraphs represent a composite summary of the findings from the various county plans as well as the knowledge gained in the preparation of this Plan.

Wildfires
All Maine counties are susceptible to wildfires. The primary damage is to homes located in the wildland-urban interface and loss of valuable timberland. A larger percentage of homes in rural counties are located within the wildland-urban interface, however, wildfires are still a major threat to the higher population-density southern counties. The northern counties have vast tracts of undeveloped forestland that could be damaged by wildfires.

Severe Summer Weather
Severe summer storms, in the form of thunderstorms, microbursts, tornadoes, and severe storms can occur in any county in Maine. Damages typically involve the washout of roads, downed utility lines and trees crashing onto homes.

Flooding
In all Maine counties, the greatest amount of damage from flooding events occurs to the state and local roadway system. This is followed in severity and probability with damage to homes and businesses located along the shores of rivers, lakes and the coastal waters.

Severe Winter Weather
In all Maine counties, severe winter weather can damage overhead utility lines, cause flooding (ice jams and spring melt off), and dump debris and large amounts of snow in the roads. Although the entire state can experience ice storms, it is the southern coastal counties that experience ice storms most often. Conversely, the more northern and western counties experience greater snowstorms.

Hurricanes
Hurricanes tend to downgrade to a Category 1 by the time they reach Maine. These events typically follow either a coastal, diagonal, or northern route. Maine hurricane events have caused widespread inland flooding, coastal storm surge and wind damage. Damages usually range from washed out roads, flooded homes and businesses, downed utility lines, and trees crashing onto homes. All Maine counties can experience the effects of a hurricane.

Erosion/Landslides
Although profiled in only a few county plans, it has become clear through this planning effort, and recent mitigation projects, that coastal erosion and landslides along the coast and in some interior locations are a growing problem. Erosion is affecting Maine's beaches and about half of the state's coastal shoreline. The problem is most severe in coastal York and Cumberland counties in Southern Maine. At approximately $100,000 per 100 feet of mitigation, the challenge for Maine is finding the funding to address the issue.

Drought
Drought has occurred in all counties in Maine. The primary damage is low water wells in all counties, and damages to crop production in the agricultural counties.

Earthquake
Earthquakes have not caused any structural damages in Maine in the past and statistically, are not likely to cause such damage in the future.

D. Changes in Development for Jurisdictions in Hazard Prone Areas

All the county plans used 2010 Census data in the preparation of their risk assessments, as the next Census update will not be ready until 2020. The latest Census data shows that Maine grew by 4.2 percent between 2000 and 2010. However, the growth was not evenly distributed throughout the state. Together, York and Cumberland County (the state's largest county on the basis of population) grew by a total of 26,451 people, or 49 percent of the state's total growth during that period. Growth pressures along the coastal areas of both counties continued to push seaside housing and lot prices higher, including areas that may be subject to coastal erosion, coastal landslides and hurricane storm surges. Increasing development around lakes in those two counties (and elsewhere) probably hasn't resulted in much of an increase in hazard potential because shore land zoning setbacks and floodplain management ordinance elevation requirements do a great deal to mitigate risk in those areas.

TABLE 3.23: Change in County Population 2000 – 2010

County	2000 Population	2010 Population	Change 2000-2010	
			#	%
Androscoggin	103,793	107,702	3,909	3.8
Aroostook	73,938	71,870	-2,068	-2.8
Cumberland	265,612	281,674	16,062	6.0
Franklin	29,467	30,768	1,301	4.4
Hancock	51,791	54,418	2,627	5.1
Kennebec	117,114	122,151	5,037	4.3
Knox	39,618	39,736	118	0.3
Lincoln	33,616	34,457	841	2.5
Oxford	54,755	57,833	3,078	5.6
Penobscot	144,919	153,923	9,004	6.2
Piscataquis	17,235	17,535	300	1.7
Sagadahoc	35,214	35,293	79	0.2
Somerset	50,888	52,228	1,340	2.6
Waldo	36,280	38,786	2,506	6.9
Washington	33,941	32,856	-1,085	-3.2
York	186,742	197,131	10,389	5.6
Maine - Total	**1,274,923**	**1,328,361**	**53,438**	**4.2**

Source: 2000 and 2010 U.S. Census

Assessing Vulnerability of State Facilities	
Element	*A. Does the new or updated plan describe the types of state owned or operated facilities located in the identified hazard areas?*

The Maine Emergency Management Agency hosted and facilitated a State Hazard Mitigation Planning Team. The State Mitigation Planner used a multi-criteria spreadsheet that multiplied severity values by occurrence values to determine a priority rating of the hazards in order to identify and profile the hazards that the state could experience. The Mitigation Team members provided information in the form of e-mail messages and attachments, phone calls, and person-to-person visits to provide the data necessary to calculate the severity and occurrence values. The hazards identified for profiling in the state plan include flooding, winter storms, hurricanes, erosion, landslides, wildfires, blight & infestation, summer storms, drought and earthquakes.

The State Hazard Mitigation Plan Risk Assessment was accomplished independently of the county risk assessments, yet in both the state and county assessments, flooding, winter storms and wildfires are considered the highest priority hazards for nearly all areas of Maine. The state also assessed hurricanes as a top priority. However, the most damaging effects of hurricanes in Maine is flooding which is already identified as the top hazard.

All of the hazards identified, except flooding and wildfires, can happen at any and all locations within the State of Maine. Therefore, it is not possible to select only those facilities located in these unquantifiable hazard areas. It is not possible to cause structural damage from the hazards of blight & infestation and drought, and it is generally unlikely in Maine to have structural damage caused by winter storms, hurricanes, summer storms, and earthquakes. A remote chance exists for such things as a lightning strike causing a building fire or a wind-damaged tree to fall on a certain building, but these are impossible to determine or map in advance. Finally, there is no data available in Maine to map the wildland-urban interface, using geographic information systems (GIS), and therefore it is not possible to specifically identify state structures located in this ambiguous interface area.

Flooding is the only hazard that has been modeled as a quantifiable area. The Maine Department of Administration and Financial Services provided a spreadsheet containing location data on all state-owned and operated facilities. With this information, the Northeast States Emergency Consortium (NESEC) used GIS to map and identify those state facilities which are located in areas of the state subject to flooding. Unfortunately, nearly half of the counties in the state do not have FIRM data in GIS format and so this also makes it very difficult to determine what state facilities are located in flood zones in those areas.

From this analysis, it was determined that no state facilities that would be used during an emergency or disaster for response or recovery are located in the flood zone. There were two facilities valued over a million dollars which are potentially located within the flood zone. Both of these facilities (a classroom/shop and an administration building) are located at the Port Authority in the City of Eastport in Washington County. The next two most expensive state facilities on this list of potential flood zone facilities are also located at the Port Authority in Eastport.

Critical Infrastructure and Key Resources (CIKR) have been identified throughout the State of Maine in accordance with the sectors found at the following link: http://www.dhs.gov/critical-infrastructure-sectors. An all-hazards risk assessment of Maine's CIKR in each sector has been done. Natural hazards identified in this plan continue to pose the greatest risk to Maine's CIKR particularly those located near flood prone areas. Identification and risk assessment of Maine's CIKR have been done in accordance with the National Infrastructure Protection Plan (NIPP).

Estimating Potential Losses
Requirement §201.4(c)(2)(iii). [The state risk assessment shall include an] overview and analysis of potential losses to identified vulnerable structures, based on estimates provided in local risk assessments as well as the state risk assessment. The state shall estimate the potential dollar losses to state owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas.
Requirement§201.4(d). (The) Plan must be reviewed and revised to reflect changes in development

Estimating Potential Losses by Jurisdiction	
Element	*A. Does the new or updated plan present an overview and analysis of the potential losses to the identified vulnerable structures?*
	B. Are the potential losses based on estimates provided in local risk assessments as well as the state risk assessment?
	C. Does the updated plan reflect the effects of changes in development on loss estimates?

A. Overview and Analysis of Potential Losses to Identified Vulnerable Structures

This section will incorporate the findings of the county hazard mitigation plans to provide an overview of the total loss estimates for the state. This review will describe the distribution of losses across the state, with specific reference to quantifying losses to local critical facilities.

The following table represents the estimated losses to critical facilities, roads, bridges, utilities and homes by county. The estimates were taken from the submitted local county hazard mitigation plans. Several counties did not provide estimates for one or more of the hazards identified in their hazard mitigation plans, as noted in the table below.

B. Potential Losses Identified in Local Risk Assessments

TABLE 3.24: POTENTIAL LOSSES IDENTIFIED IN COUNTY HAZARD MITIGATION PLANS

County	Wildfire	Flooding	Severe Summer Weather	Severe Winter Weather	Hurricane	Drought	Earthquake	Erosion	Landslides
Androscoggin		$507,432	$373,925	$3,221,999	$765,952				
Aroostook	$549,423,300	$12,059,658	$36,997,761	$36,997,761					
Cumberland	$152,103,960	$8,168,691	$46,757,884	$8,397,780					
Franklin	$17,506,992	$6,066,261		$1,954,915					
Hancock	$31,453,604	$9,849,658	$3,863,678	$3,091,613					
Kennebec	$65,839,389	$22,195,434		$8,105,121	$8,550,570				
Knox	$4,000,000	$6,536,500		$1,983,380	$5,110,722				$1,180,390
Lincoln	$18,572,323	$2,086,680		$1,806,217	$7,546,083				
Oxford	$33,427,474	$10,927,309	$4,106,143	$3,065,149					
Penobscot	$3,019,125,488	$2,681,927		$6,928,265					
Piscataquis	$10,012,485	$3,138,765		$911,820	$1,227,450				
Sagadahoc	$18,969,566	$867,353		$1,735,143	$7,742,680				
Somerset	$54,943,856			$2,976,996	$3,655,960				
Waldo		$1,980,000	$2,816,000	$836,000	$2,816,000				
Washington	$18,990,768	$5,954,851		$2,916,735	$2,332,776				
York									
Total	**$3,994,369,205**	**$93,020,519**	**$94,915,391**	**$84,928,894**	**$39,748,193**				**$1,180,390**

Source: County Hazard Mitigation Plans

NOTE: Majority of County Plans utilized a culmination of base population and inflated costs associated with historical events to estimate potential losses in a worst case-scenario across their top three to four hazards. Estimated potential losses across drought, earthquake, erosion, and landslide hazards are not discussed within the County Hazard Mitigation Plans and have therefore been left blank. Majority of plans also combined severe summer weather with hurricanes and did not distinguish potential losses. Potential cost estimates associated with severe summer weather and hurricanes are therefore not accurately represented in the above table. The York County Hazard Mitigation Plan did not define potential losses in terms of monetary losses per hazard, so total potential losses across the state are also not accurately represented.

C. Effects of Changes in Development on Loss Estimates

Most of the losses cited above will not change as a result of the development that has taken place since preparation of the county plans. In general, each county has about the same number of roads, bridges, critical facilities and utility distribution lines in 2013 as it had when the county plans were prepared between 2010 and 2012.

As the population growth table on page 3-85 demonstrates, for the most part there were relatively minor changes in Maine's population during the 2000-2010 period, with slight gains in some counties, and minor population decreases in others. In the 2000-2010 timeframe, there were no significant large-scale increases in either commercial or residential development in Maine. Multi-jurisdictional plans covering each of the state's 16 counties affected by new development have noted these minor changes and the potential impact on areas of vulnerability. See discussion on page 3-90 for more analysis of growth during the 2000-2010 period.

Estimating Potential Losses of State Facilities	
Element	*A. Does the new or updated plan present an estimate of the potential dollar losses to state owned or operated buildings, infrastructure, and critical facilities in the identified hazard area?*

Potential Dollar Losses to State owned buildings, infrastructure, critical facilities

Wildfires (50 Year Events)

The State of Maine is unable to determine the proximity of state-owned and operated facilities in the wildland-urban Interface. However, the most likely structures are small buildings operated by the Department of Agriculture, Conservation and Forestry at state parks that would not be considered critical or of high value. Costs typically come from the overtime use of Maine Department of Agriculture, Conservation and Forestry and municipal firefighters and equipment to fight wildfires.

Flooding (100 Year). Flooding is Maine's major natural hazard and the only hazard that the state can currently identify state owned or operated facilities that are potentially located within the flood zone. The following chart identifies those state owned or operated facilities that are potentially located in a flood zone. The chart includes the name and address of the facility name, the value of the contents, the building value and the total valuation. Those facilities which show a zero figure for building value are leased facilities. As of this writing, the state has no information on state-owned buildings, infrastructure, or critical facilities that are in an identified hazard area.

TABLE 3.25: STATE FACILITIES WITH POTENTIAL VULNERABILITY TO FLOODING

PROPERTY NAME	STREET ADDRESS	TOWN	CONTENT VALUE	BLDG VALUE	TOTAL VALUE
Bar Harbor District Court	93 Cottage Street	Bar Harbor	173,400	0	173,400
Three Bay Garage	70 Fish Hatchery Road	Casco	40,950	34,125	75,075
Generator Building	70 Fish Hatchery Road	Casco	20,474	16,381	36,854
Cold Storage Building	70 Fish Hatchery Road	Casco	20,474	68,249	88,724
Hatchery Pool Roofs	70 Fish Hatchery Road	Casco	0	76,296	76,296
Dwelling	70 Fish Hatchery Road	Casco	39,097	346,800	385,897
Two Car Garage	70 Fish Hatchery Road	Casco	1,214	23,120	24,334
Ultra Violet Building	70 Fish Hatchery Road	Casco	137,984	115,600	253,584
Dwelling	62 Fish Hatchery Road	New Gloucester	3,035	74,482	77,517
Pump House	500 State Park Road	Dover-Foxcroft	17,340	34,680	52,020
Ranger's Residence	500 State Park Road	Dover-Foxcroft	9,589	86,700	96,289
Tool Shed	500 State Park Road	Dover-Foxcroft	5,780	11,560	17,340
Service Building	500 State Park Road	Dover-Foxcroft	23,120	115,600	138,720
Bathhouse & Latrine	500 State Park Road	Dover-Foxcroft	1,457	138,720	140,177
Check in Station	500 State Park Road	Dover-Foxcroft	6,936	69,360	76,296
Bathhouse & Latrine	500 State Park Road	Dover-Foxcroft	1,965	138,720	140,685
Woodshed	500 State Park Road	Dover-Foxcroft	2,913	24,519	27,432
Bathhouse & Latrine	500 State Park Road	Dover-Foxcroft	1,965	138,720	140,685
Bathhouse & Latrine	500 State Park Road	Dover-Foxcroft	1,965	138,720	140,685
Bathhouse & Latrine	500 State Park Road	Dover-Foxcroft	2,312	138,720	141,032
Bathhouse & Latrine	500 State Park Road	Dover-Foxcroft	2,312	138,720	141,032
Administration Building	16 Deep Cove Road	Eastport	142,766	4,036,727	4,179,493
Boiler Building	16 Deep Cove Road	Eastport	115,600	807,346	922,946
Pier	16 Deep Cove Road	Eastport	0	924,800	924,800
Classroom and Shop	16 Deep Cove Road	Eastport	1,095,310	4,036,727	5,132,037
Shelter & Tool Shed	Warren Island	Islesboro	2,312	13,872	16,184
Float & Pier	Warren Island	Islesboro	0	173,400	173,400
Office Cabin	Warren Island	Islesboro	9,248	34,680	43,928
Information Center	Warren Island	Islesboro	0	4,248	4,248
Shelter	Warren Island	Islesboro	0	11,560	11,560
Shelter	Warren Island	Islesboro	0	11,560	11,560
				Total	13,864,229

It is not expected that the state-owned and operated buildings will suffer 100% losses from a flooding event in Maine. It is estimated that flood damages will account for approximately 20% of the building valuation. Because flooding in Maine is usually a slow process, it is not expected that there will be any losses to the contents in these facilities. During a flood event, state employees would relocate the building contents to prevent content loss.

The total building valuation is $13,864,229. Therefore, 20% would equal $2,772,846. Figures have been adjusted from the 2010 State Hazard Mitigation Plan based on a 15.6 percent inflation rate per the Consumer Price Index. All state facilities are insured for flood damages.

Severe Summer Weather (1-3 Years)

Summer storm damages such as thunderstorms and F0-F2 tornadoes to state owned or operated buildings or infrastructure are no more likely than damages to other buildings or infrastructure. General damage can be caused by flooding or wildfires, but these are covered in their own sections. Costs typically come from the overtime use of Maine Department of Transportation and National Guard personnel and equipment to clear state-maintained roads of debris. Although utilities can be damaged during summer storms, the utilities are owned and operated by private utility companies.

Severe Winter Weather (Every few years).

Winter storm damages to state-owned or operated buildings or infrastructure are no more likely than damages to other buildings or infrastructure. Costs typically come from the overtime use of Maine Department of Transportation and National Guard personnel and equipment to clear state-maintained roads of ice, snow and debris. Although utilities can be damaged during winter storms, the utilities are owned and operated by private utility companies (see Winter Storm profile on 3-40).

Hurricanes (Category 1)

Hurricane damages to state owned or operated buildings or infrastructure are no more likely than damages to other buildings or infrastructure. Costs typically come from the overtime use of Maine Department of Transportation and National Guard personnel and equipment to clear state-maintained roads of debris. Although utilities can be damaged during winter storms, the utilities are owned and operated by private utility companies.

Drought (10 Year Events)

Damages to state-owned or operated buildings or infrastructure are not likely from drought events. Costs typically come from the overtime use of Maine Department of Agriculture, Conservation and Forestry personnel to assist farmers and private well owners.

Earthquakes (R 5)

Earthquake damages to state owned or operated buildings or infrastructure are no more likely than damages to other buildings or infrastructure because Maine does not have earthquakes that cause structural damages.

Erosion/Landslides

Damages to state owned or operated buildings or infrastructure are not likely from erosion/landslides, because none are known to be in areas subject to erosion and/or landslides.

SECTION 4 – MITIGATION STRATEGY

Mitigation Strategy
Requirement §201.4(c)(3): [To be effective, the plan must include a] Mitigation Strategy that provides the state's blueprint for reducing the losses identified in the risk assessment.

INTRODUCTION

According to §201.4(c)(3) the State of Maine Hazard Mitigation Plan includes a mitigation strategy that provides the State of Maine with a blueprint for reducing the losses identified in the risk assessment. The strategy includes goals, objectives and actions that are based on the risk assessment and are consistent with goals from other state and local plans and policies. The goals, objectives and actions contained in this section are aimed at achieving long-term hazard protection. The state has also assessed its own as well as its local jurisdictions' capabilities to staff programs or projects and fund measures to achieve the goals of the plan. The state has identified funding from federal, local, and private sources to complement its own limited resources.

This section is organized in the following manner to satisfy all elements of *201.4(c)(3):*

State Capability Assessment
§201.4(c)(3)(i)-(ii)

Local Capability Assessment
§201.4(c)(3)(ii)

Goals, Objectives and Strategic Measures
§201.4(c)(3)(iii)

Funding Sources
§201.4(c)(3)(iv)

Hazard Mitigation Goals	
Requirement §201.4(c)(3)(i): (The state mitigation strategy shall include a) description of state goals to guide the selection of activities to mitigate and reduced potential losses.	
Requirement §201.4(d): The) plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities…	
Elements	*A. Does the new or updated plan provide a description of state mitigation goals that guide the selection of mitigation activities?*
	B. Does the updated plan demonstrate that the goals were assessed and either remain valid or have been revised?

A. Description of goals

See pages 4-21 through 4-33 for the state's hazard mitigation goals, objectives and actions, including changes from the 2013 plan.

B. Assessment of Goals

Each of the goals was assessed during individual meetings with state, county and federal agencies (see *Section 2 – Planning Process* for a more complete description of this process).

STATE CAPABILITY ASSESSMENT	
Requirement §201.4(c)(3)(ii). [The state mitigation strategy shall include a] discussion of the state's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including: an evaluation of state laws, regulations, policies and programs related to hazard mitigation as well as development in hazard-prone areas; and a discussion of state funding capabilities for hazard mitigation projects.	
Elements	*A. Does the new or updated plan include an evaluation of the state's pre-disaster hazard management policies, programs and capabilities?*
	B. Does the new or updated plan include an evaluation of the state's post-disaster hazard management policies, programs and capabilities?
	C. Does the new or updated plan include an evaluation of the state's policies related to development in hazard prone areas?
	D. Does the new or updated plan include a discussion of state funding capabilities for hazard mitigation projects?
	E. Does the new or updated plan address any hazard management capabilities of the state that have changed since approval of the previous plan?

The Lead Planners changed the format of the State Capability Assessment since the 2013 Update to streamline the Assessment, with the intent to add clarity by reducing redundancy. The State Mitigation Capability Assessment Matrix depicted in **Table 4.1** inventories programs, plans, policies, regulations, or practices to support mitigation and evaluates their effect on mitigation initiatives. The matrix includes the specific hazard each program, plan, policy, regulation, or practice is intended to mitigate, and includes a pre- or post-disaster status, thus satisfying Elements A and B of the State Capability Assessment.

The matrix organizes efforts by function, rather than at the departmental level. The Lead Planners organized the matrix in this manner to accommodate the occasional relocation of efforts that does not affect the mission of each effort.

A. Evaluation of State's Pre-disaster Hazard Mitigation Policies, Programs, and Capabilities.

See **Table 4.1** – State Mitigation Capability Assessment Matrix located on pages 4-8 through 4-14 for a complete assessment of pre-disaster hazard mitigation policies, programs, and capabilities.

B. Evaluation of State's Post-Disaster Hazard Mitigation Policies, Programs, and Capabilities.

See **Table 4.1** – State Mitigation Capability Assessment Matrix for a complete assessment of post-disaster hazard mitigation policies, programs, and capabilities.

C. Evaluation of State's Policies Related to Development in Hazard Prone Areas.

Table 4.1 below lists hazard management policies, programs, and capabilities across state government to mitigate the hazards in the area, including a description and evaluation. The table classifies policies, programs, and capabilities as pre-disaster or post-disaster and includes policies related to development in hazard prone areas.

Evaluation of Capabilities by Hazard as They Relate to Hazard Mitigation

The goals of the State Hazard Mitigation Plan are to provide guidance and incentives to assist state, county, and local government, elected and appointed officials, and public and private agencies to mitigate against the impacts of natural hazards.

There are several effective mitigation programs in place to deal with the impacts of flooding and wildland fires. Additionally, hurricane pre-disaster mitigation and coastal landslide hazard mitigation are handled directly by the Floodplain Management Program via floodplain management ordinance development standards for coastal construction and the adoption of the *FEMA Coastal Construction Manual* (FEMA 55). There has been and continues to be a concerted effort to deal with these hazard events. Conversely, there is little mitigation effort in terms of dealing with the impacts of severe winter weather, erosion, severe summer weather, drought and earthquakes. These are dealt with in the all-hazard mitigation programs and efforts shown in the State Mitigation Capability Assessment Matrix.

Through the development of the State Hazard Mitigation Plan, the State of Maine seeks to review and assess the state's financial, legal and programmatic ability to initiate and complete the mitigation efforts which will reduce the impacts of its identified natural disaster hazard events. This assessment of state capabilities is defined by the natural disaster hazard events expected to have the greatest impact on the State of Maine.

Wildfire

Although Wildfires normally do not cause a great deal of destruction in Maine, they have a terrible potential, as evidenced in the forest fires of 1947 (*Section 3 - Risk Assessment*). Land use planning, regulation and building codes in Maine do not deal at all with the wildland-urban interface issues. Mitigation efforts in the state are limited to the Maine Forest Service which performs forest health and monitoring, oversees forest firefighting efforts, and provides financial and equipment grants to local fire departments. Within the past eight years or so, the Maine Forest Service has initiated a community assessment program aimed at helping communities and rural homeowners at the wildland/urban interface better protect their properties from the threat of wildfire. The assessment is a voluntary program that relies on public education to reach its intended audience.

Flooding

In Maine, the greatest amount of damage from flooding events occurs to the roadway system, both state and municipal roads, bridges, culverts and ditches. This is followed in severity and probability with damage to homes and businesses located along the shores of rivers, lakes and the coastal waters. Currently, there are four major state programs that work to mitigate the effects of flooding.

1. **Road Repair and Local Technical Assistance**
   The Maine Department of Transportation is responsible for the repair, maintenance, and upgrade work to state-owned highways. When funds are available, the Maine DOT upgrades and/or elevates road surfaces to reduce the possibility of flood damage to roads. The Maine DOT also maintains the Maine Local Roads Center which provides technical assistance to municipalities for completing the same actions. There is seldom sufficient funding, either at the state or municipal level, to complete all the road work that is necessary.

   Maine, however, has made significant progress in recent years by helping communities mitigate flood damages to roads, bridges, ditches and culverts. The Maine Emergency Management Agency has partnered with the Local Roads Center to sponsor a series of ongoing workshops throughout the state on the use of geo-synthetics to mitigate flood

damages to local transportation systems through the stabilization of banks, fill, rip-rap, improvements to road surfaces and other structures. On a continuous, annual basis, the Local Roads Center workshops help local officials understand how they can plan for and implement infrastructure improvements that are likely to withstand the impacts of various hazards including flooding. On the downside, not all communities have been represented at the workshops. There continues to be a constant turnover of elected local officials, including road commissioners, therefore training is not always consistent.

2. Floodplain Management Program

Maine Department of Agriculture, Conservation and Forestry's Floodplain Management Program provides technical assistance, model floodplain ordinances to municipalities, training for local officials and professional groups (e.g. professional land surveyors, insurance agents and lenders), and manages the National Flood Insurance Program (NFIP) within the state. The effort to enact floodplain ordinances in every Maine community has had the greatest effect of loss reduction on real property in the state. The requirement for every municipality to have a floodplain ordinance is not mandatory. Some 47 percent of Maine's communities have not been mapped. However, 94.5 percent of the communities and all the unorganized townships in the State's Unorganized Territory have enacted a floodplain management ordinance. Because Maine has the largest number of communities in New England (490 organized towns and 400+ unorganized townships) this represents a very high participation rate over all.

Banks and other financial institutions have been instrumental in the success of local floodplain management efforts because they will not issue mortgages for structures in identified flood hazard areas unless the applicant purchases flood insurance.

Maine is also pro-active with the NFIP Community Rating System (CRS) that recognizes communities with good performance in floodplain management. Based on a point system for activities that enhance flood mitigation and floodplain management beyond the minimum NFIP regulations, communities may improve their standing in the NFIP which results in lower flood insurance premiums. Maine has more communities than any other New England state with 17 communities currently enrolled in the CRS Program. The 17 communities represent about a quarter of the state's flood insurance policy base.

The 2010 State Hazard Mitigation Plan recognized that Maine's flood hazard mitigation efforts were somewhat limited by the aging Flood Insurance Rate Maps. Within the past eight years or so, progress has been made.

- Hurricane Surge Inundation Maps have been completed by the Army Corps of Engineers, and MEMA has distributed copies to all affected municipalities.

- FEMA's Risk Map Program has produced a number of new, digital floodplain maps that are much more detailed and easier to use than the earlier FIRMS. Updated maps for Waldo, Lincoln, and Sagadahoc Counties became effective in July of 2015 and updated maps for Fort Kent (Aroostook), Hancock, and Knox became effective in July of 2016. Washington County had updated maps go effective in July of 2017. Cumberland and York Counties have had updated preliminary maps issued and anticipate a mid-2019 effective date.

- LIDAR data has been generated by a consortium of agencies including NOAA and the Army Corps of Engineers for York and Cumberland Counties, the entire coast, and for portions of Androscoggin, Oxford, and Kennebec

Counties. The LIDAR data has been used to develop better coastal flood modeling for some areas at the local level.

The State has also continued to make significant progress updating flood risk maps to support mitigation efforts since the 2013 State Hazard Mitigation Plan. Specific projects include:

- Sea, Lake, and Overland Surges from Hurricanes (SLOSH) Maps: With support from U.S. Army Corps of Engineers, FEMA, MEMA, and the Maine Geologic Survey potential hurricane inundation from storm surge for Category 1 and 2 hurricanes was modeled in 2013. The U.S. Army Corps of Engineers has since modeled potential storm surge inundation from Category 3 and 4 hurricanes using the same methodology. All 138 jurisdictions that are vulnerable to hurricane storm surge have storm surge inundation maps for Category 1-4 hurricanes.

- LIDAR Mapping: The Maine Office of Geographic Information Systems continues to acquire LIDAR coverage across Maine. As of 2018, approximately 50 percent of the state's land has LIDAR coverage, accounting for 86 percent of the state's population.

- FEMA Flood Insurance Rate Maps: Many counties in Maine have recently had their FIRMs updated or are in the process of doing so. For more information on the map status, please see the Flooding profile of the Risk Assessment.

3. DEP Programs

The last set of state programs that effectively deal with flooding are through the Department of Environmental Protection (DEP). DEP offers Stormwater Management, Shoreland Zoning and Dam Licensing statutes, regulations and programs. These programs and regulations deal with the man-made causes of stormwater reduction capability and water body retention. The Stormwater Management Law does not apply to small projects, including the construction of single family dwellings. The Shoreland Zoning Program now requires that significant coastal landslide hazard areas be included in a Resource Protection District in which development is prohibited. This effectively prohibits development in these hazard areas.

4. FEMA Mitigation Grant Programs

While ultimately funded by FEMA, the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and Pre-Disaster (PDM) programs are all administered by the Maine Emergency Management Agency (MEMA) to sub-applicants upon award. MEMA is responsible for the maintenance of the State Emergency Operations Plan (EOP) and State Hazard Mitigation Plan (HMP) which helps state agencies to prepare for and respond to natural disaster hazard events. However, due to insufficient agency staffing, more technical assistance is needed by county and municipal governments in order for local officials to have a better awareness and understanding of hazard mitigation policies, plans and programs. In addition, the completion of 16 county hazard mitigation plans, and one University of Maine System plan have made it clear that hazard mitigation needs far exceed available resources. These plans have collectively identified over $205,800,000 in hazard mitigation needs.

Severe Summer Weather

The types of severe summer weather in Maine include extreme heat, thunderstorms, and tornadoes *(Section 3 - Risk Assessment).* There are no mitigation programs in the State of

Maine dedicated solely to lessening the impacts of severe summer weather, excluding that of all-hazards emergency management planning and emergency response agencies.

Severe Winter Weather

The second greatest amount of damage caused by a natural disaster hazard event is severe winter weather. Winter storm damages typically involve downed overhead utility lines, flooding from ice jams and melt runoff, and debris in the roads (since flooding has been covered in the preceding section, it will not be reviewed in this section). Currently, there is one major state program that works to mitigate the effects of severe winter storms.

The Maine DOT is responsible for snow and debris removal on all state highways. Maine DOT garages are well placed around the state to complete this task in a timely manner. Maine DOT also provides technical assistance to municipalities for road debris clearance with the Maine Local Roads Center. At times, the Maine DOT will even assist with the actual debris clearance on select local roads. However, in many cases, a bad winter storm can overwhelm the financial and equipment capabilities of many municipalities.

Hurricanes

Historically, hurricanes either reach Maine as a Category 1 or are downgraded to a Tropical Storm. Hurricanes typically do not cause significant destruction. The damaging effects of hurricane storm surge and flooding, however, have caused major damage in the past. As such, state programs that work to mitigate the effects of flooding have already been described in a preceding section. There are no mitigation programs in the State of Maine dedicated solely to lessening the impacts of hurricanes.

Drought

In response to drought conditions, the River Flow Advisory Commission morphs into the Drought Task Force and convenes to assess drought impacts and report on drought conditions. Due to Maine's nature as a home rule state, and because a large percentage of the population relies on private wells for water supply, the State has limited capability to mitigate drought. The Maine Public Utilities Commission overseas that each water supplier has an Emergency Action Plan for times of water shortages, and Maine State Housing Authority can provide emergency assistance in times of drought.

Earthquake

The 2006 magnitude 4.3 earthquake in Bar Harbor demonstrates that earthquakes of this size can cause damage. Although the statistical estimate for return time of a magnitude 6.0 earthquake in Maine is approximately 363 years, little monitoring and research have been done to substantiate this estimate *(Section 3 - Risk Assessment).* Continued instrumental earthquake monitoring in New England is funded entirely by the federal government, with some in-kind contribution by state agencies. There are no mitigation programs in the State of Maine dedicated solely to lessening the impacts of earthquakes, excluding that of all-hazards emergency management planning and emergency response agencies.

Erosion

Some inland areas and about half of the Maine coast, including many of its beaches, are slowly eroding. Unfortunately, erosion generally goes unnoticed until a home or other structure is threatened or destroyed. Eroding bluffs can be "armored" by the use of sea walls, rocks, riprap or other engineered solutions, but there is no state program to support such efforts. Many individuals cannot afford to pay for the protection needed to save their properties.

Unfortunately, federal rules governing the HMGP and PDM programs are such that municipal applications aimed at helping individuals protect their properties are very competitive.

Mass Wasting (Landslides)
Coastal landslides can occur in areas of chronic bluff erosion in areas with mud banks that exceed 20 feet in height. The only mitigation program in the state that deals with landslides is the Shoreland Zoning Program which prohibits development near areas where the landslide hazard is great. There are no mitigation programs for homeowners already located in a landslide hazard area.

As evaluated in the State Mitigation Capability Assessment Matrix on the following page, Maine has the following policies related to development in hazard prone areas:

- Executive Order dated March 4, 1968
- Mandatory Shoreland Zoning Act
- Growth Management Act
- Municipal Planning Assistance Program
- Land Use Planning Commission

TABLE 4.1: Maine Hazard Mitigation Strategy
State Mitigation Capability Assessment Matrix

Agency, Bureau, Office, or Program (Department)	Programs, Plans, Policies, Regulations, or Practices to **Support Mitigation**	**Evaluation of Effect on Mitigation Initiatives**	**Hazard**	**Pre- or Post-Disaster**
Governor's Office (Executive Branch)	Executive Order dated March 4, 1968, precluding the uneconomic, hazardous, or unnecessary use of flood plains in connection with state facilities.	Essentially prohibits new state facilities from being located in flood plains – still in effect.	Flooding	Pre-disaster
American Red Cross	Disaster Management Program	Provides emergency relief immediately following disasters.	All-hazards	Post-disaster
Bureau of Resource Information and Land Use Planning (Agriculture, Conservation, and Forestry)	Maine Cooperative Snow Survey	• Collects, interprets, and distributes information on the depth and water content of Maine's snowpack in the late winter and early spring to assess annual spring flood risk. • MGS prepares maps showing the water content and snowpack across the state; USGS and MGS analyze the data collected by private organizations as well as state and federal partners.	Flooding	Pre-disaster
	Maine Natural Areas Program • Inventories lands that support rare and endangered plants and rare natural communities and ecosystems. • Inventories and maps Maine's tidal marshes. Models marsh migration and susceptibility to sea level rise and storm surge to support coastal resilience.	While the Natural Areas Program's priority is not hazard mitigation, their efforts to preserve wetlands and prevent floodplain development lessens susceptibility to sea level rise and flooding and mitigates the impacts of those events.	Flooding	Pre-disaster
	Maine Geological Survey • Coastal Hazards (beach mapping & beach erosion) • Hazards (tsunamis) • Coastal Bluffs Mapping • Coastal Landslide Mapping • Landslide Hazard Mapping	The Maine Geological Survey collects data and produces reports about groundwater, mineral resources, surface deposits and bedrock materials, stability of coastal properties, and geologic hazards such as storm surge, sea level rise, floods, landslides, erosion, earthquakes, and tsunamis. By researching past geologic events and mapping Maine's geology, MGS's efforts support risk assessments for the purposes of this Plan as well as for	Geologic Hazards	Pre-disaster

Agency, Bureau, Office, or Program (Department)	Programs, Plans, Policies, Regulations, or Practices to **Support Mitigation**	**Evaluation of Effect on Mitigation Initiatives**	**Hazard**	**Pre- or Post-Disaster**
		local jurisdictions and the private sector which are the basis for recurrence interval estimates. The MGS website has been effective in providing accessible relevant information regarding geologic hazards. MGS's hazard maps effectively help communities and stakeholders understand their vulnerability to the hazards, including storm surge, sea level rise, erosion, earthquakes, and erosion.		
	Land Use Planning Commission (LUPC)	• Planning and zoning authority for the 10.4 million acres of unorganized territory in Maine. • By regulating development in the Unorganized Territory (UT), the LUPC ensures that development is either directed away from hazard areas or that proposed activities in hazard areas meet applicable development standards. • LUPC continues to enforce strong standards for development in the UT, including inappropriate floodplain development. However, the agency's work is hamstrung by the lack of detailed flood data throughout the UT.	Flooding	Pre-disaster
	Maine Floodplain Management Program (includes Risk Map Program)	• Works with individuals, communities, and professionals to reduce the risk of flooding. • Administers the NFIP in Maine. • Provides technical information including flood risk maps and model ordinances, and inventories vulnerable structures statewide. • Provides training on reading and using flood maps, ordinance interpretation, and floodplain management. Provides interagency reviews of proposals in the floodplain for state and federal agencies. Reviews local ordinances for compliance with the NFIP standards. • This program has been effective, as evidenced by the high rate of municipal participation and the relatively low number of repetitive loss properties.	Flooding	Pre-disaster
	Municipal Planning Assistance Program (MPAP)	• Provides land use planning expertise by way of technical and financial assistance to municipalities, citizens, regional planning organizations, and the Legislature to support development of comprehensive plans and zoning ordinances. Under the Growth Management Act, MPAP grants	All-hazards	Pre-disaster

Agency, Bureau, Office, or Program (Department)	Programs, Plans, Policies, Regulations, or Practices to **Support Mitigation**	**Evaluation of Effect on Mitigation Initiatives**	**Hazard**	**Pre- or Post-Disaster**
		jurisdictions the authority to enact local land use ordinance on the condition they have a comprehensive plan. • Advocates for sound holistic planning, covering the topic areas of community development, transportation planning, hazard mitigation planning, growth management, and smart growth / low impact development. While not directly hazard mitigation, the program has effectively helped many municipalities prepare comprehensive plans. Sound planning has helped communities enact ordinances to better guide growth.		
Maine Forest Service (Agriculture, Conservation, and Forestry)	Federal Excess Property Program	• Allows MFS to acquire federal surplus property and loan or transfer it to Maine fire departments.	Wildfire	Pre-disaster
	Forest Protection Division	• Manages Maine's forests to protect homes and forest resources from wildfire and to respond to disasters and emergencies. • Oversees the pre-suppression, suppression and investigation of Maine forest fires. • Provides trained and equipped Forest Rangers. MFS has been very effective in its wildfire prevention efforts as noted in the Wildfire hazard profile.	Wildfire	Post-disaster
	Volunteer Fire Assistance Program	• Provides Federal financial, technical, and other assistance to State Foresters and other appropriate officials to organize, train and equip fire departments in rural areas and rural communities to prevent and suppress wildfires.	Wildfire	Post-disaster
Maine Emergency Management Agency (Department of Defense, Veterans,	Dam Safety Program (Law 37-B, Chapter 24)	• Inspects existing dams and reservoirs to rate their hazard potential based on downstream vulnerabilities. • Assists dam owners develop EAPs to minimize the impacts of dam failure.	Flooding	Pre-disaster

Agency, Bureau, Office, or Program (Department)	Programs, Plans, Policies, Regulations, or Practices to **Support Mitigation**	**Evaluation of Effect on Mitigation Initiatives**	**Hazard**	**Pre- or Post-Disaster**
and, Emergency Management)	River Flow Advisory Commission (RFAC)	• Facilitates coordination of hydrological information between dam operators, river basin managers, state agencies, USGS, and NWS to communicate flood risk. • Co-chaired by MEMA and USGS, the RFAC is composed of representatives from eight major river basin management operations, seven state agencies, two federal agencies, and the University of Maine. • Statute requires Commission to convene each March following the largest statewide snow survey; Commission may convene throughout the spring during seasons of high flood risk.	Flooding	Pre-disaster
	Disaster Preparedness Information & Education	• Provides educational materials to support the four phases of emergency management: mitigation, preparedness, response, and recovery.	All-hazards	Pre-disaster
	Drought Task Force	• Convenes when drought conditions emerge to assess water conditions and their impacts statewide • Co-chaired by MEMA and USGS, the DTF is composed of representatives from state and federal agencies and the University of Maine.	Drought	Post-disaster
	Emergency Management Education	Coordinates the protection of Maine citizens from All-Hazards emergencies; coordinates disaster mitigation, preparedness, response and recovery actions; and assists county and local governments in protecting life and property. MEMA has been effective in building hazard mitigation partnerships with other agencies, counties and towns.	All-hazards	Pre-disaster
	Emergency Management Performance Grants (EMPG)	• Oversees and manages the federal funding of the Emergency Management program in Maine. • Provides personnel for planning and mitigation efforts at the state and county level. MEMA has been effective in building hazard mitigation partnerships with other agencies, counties and towns.	All-hazards	Pre-disaster
	Hazard Mitigation Grant Program (HMGP)	• Manages federal funding of post-disaster hazard mitigation projects.	All-hazards	Post-disaster

Agency, Bureau, Office, or Program (Department)	Programs, Plans, Policies, Regulations, or Practices to **Support Mitigation**	**Evaluation of Effect on Mitigation Initiatives**	**Hazard**	**Pre- or Post-Disaster**
		Mitigation grants effectively help to mitigate hazards when available, but the need far exceeds available funds. Maine's rural nature, characterized by undeveloped land, leaves many project sites vulnerable to expensive and lengthy environmental and historic review. The lack of available HMGP funds in recent years has reduced the incentive for full participation in the latest update of local hazard mitigation plans.		
	Pre-Disaster Mitigation Grants (PDM)	• Manages federal funding of pre-disaster mitigation grants. • Supports hazard mitigation plan development and project construction. PDM funding has successfully supported local and state plan development. However, many potential mitigation projects struggle to compete on a national scale. It has been over ten years since the last PDM funded project in Maine was completed.	All-hazards	Pre-disaster
Land and Water Programs (Environmental Protection)	Watershed Management	Provides education grants to local schools for educating students about watershed protection. This is not a direct mitigation activity, but well-informed students may become more responsible adults.	Flooding	Pre-Disaster
	Stormwater	Works to protect and restore surface and groundwater impacted by stormwater flows.	Flooding	Pre-Disaster
	Erosion & Sediment Control	Requires anyone filling, displacing, or exposing soil or other earthen materials to take measures to prevent unreasonable erosion of soil or sediment beyond the project site or into a protected natural resource.	Erosion	Pre-Disaster
	Hydropower & Dams	Permits construction, reconstruction, or structural alteration of new or existing hydropower projects to ensure water quality standards are met.	Flooding	Pre-Disaster
	Natural Resources Protection Act	Requires a permit for any activity located in a protected natural resource or is adjacent to a wetland, great pond, river or brook, or significant wildlife habitat.	All-hazards	Pre-Disaster
	Shoreland Zoning	Requires municipalities to adopt, administer, and enforce local ordinances that regulate land use activities in the shoreland zone (land area within 250 feet of river, pond, wetland, or outer limits of the intertidal zone).	Flooding	Pre-Disaster
Sustainability Programs	Maine Interagency Climate Adaptation (MICA) Work Group	• Coordinated by DEP with representatives from eight state agencies • Established an interagency effort to coordinate state climate change adaptation activities	All hazards	Pre-disaster

Agency, Bureau, Office, or Program (Department)	Programs, Plans, Policies, Regulations, or Practices to **Support Mitigation**	**Evaluation of Effect on Mitigation Initiatives**	**Hazard**	**Pre- or Post-Disaster**
(Environmental Protection		• Members consolidate resources for adaptation, resilience, and mitigation, and collaborate on opportunities for cross-agency projects		
Office of Community Development (Economic and Community Development)	Municipal Code Enforcement Training and Certification Program	• Trained, testing and certifying in all land use codes, including building, shoreland zoning, and floodplain management. This is not a mitigation activity, but it has resulted in better trained and better-informed code enforcement officers.	All-hazards	Pre-disaster
	Community Development Block Grant Program (CDBG)	The CDBG program is not a source of mitigation funds, but some grant categories may include mitigation as a co-benefit (e.g. a new storm drain system to reduce flooding on local streets). Includes public projects for flood and drainage improvements and for the construction of fire stations, homeless shelters, piers and dams in qualifying areas. Projects must meet flood protection standards.	All-hazards	Pre-disaster
Maine Coastal Program (Marine Resources)	Coastal Community Planning	• Provides technical assistance to municipalities, advises the legislature, coordinates with other state agencies, and advocates for sound land use planning in Maine coastal areas. • Grant Program (awarded through MPAP) supports implementation of projects that will restore commercial fisheries habitat, mitigate pollution from stormwater run-off, provide data to plan cost-effective storm drainage infrastructure improvements, and vulnerability and adaptation options for historic coastal downtowns subject to flooding from storm surge and sea level rise.	Flooding	Pre-disaster
	Maine Coastal Mapping Initiative (MCMI)	Acquires data about the sea floor and oceanic environment to increase Maine's resiliency to environmental changes among other initiatives not related to hazard mitigation.	Coastal	Pre-disaster
	Maine Coastal Program	Partnership among local, regional, and state agencies for the purpose of managing Maine's coastal resources for the public benefit.	Coastal	Pre-disaster
	Maine Local Roads Center	Provides training, technical assistance, and information to municipalities for constructing, maintaining, and managing local roads & bridges.	All-hazards	Pre-disaster

Agency, Bureau, Office, or Program (Department)	Programs, Plans, Policies, Regulations, or Practices to **Support Mitigation**	**Evaluation of Effect on Mitigation Initiatives**	**Hazard**	**Pre- or Post-Disaster**
Bureau of Maintenance and Operations (Transportation)		• Training brings to local officials the most up-to-date information on managing local infrastructure.		
	Natural Resources Mitigation Program	• Directs and coordinates compensatory mitigation for impacts to wetland resources caused by state transportation projects. This mitigates the loss of wetlands, but is not mitigation of a hazardous area.	N/A	
	Capital Improvement Projects	Potential to incorporate mitigation principles based on scope of capital improvement project and funds available to project.	All-hazards	Pre-disaster
Environmental Office (Transportation)	Transportation Risk Assessment for Planning and Project Delivery (TRAPPD)	Tool to predict when transportation infrastructure project schedules and budgets would be at risk due to the presence of Atlantic salmon.	N/A	Pre-disaster
Emergency Services Communication Bureau (Public Utilities Commission)	Enhanced 911	Allows for the location identification of mobile users resulting in a more efficient and effective response effort. The enhanced system directly relates to reducing negative impact associated with natural hazards to people.	All-hazards	Post-disaster
Bureau of General Services (Administrative and Financial Services)	Planning, Design, & Construction	Responsible for the planning, design and construction administration of all State public improvements and public-school projects.	All-hazards	Pre-disaster
	Property Management	Provides operation, maintenance and building control services to 73 state-owned structures located on 5 campuses.	All-hazards	Pre-disaster
	Risk Management	Insures state assets.	All-hazards	Pre-disaster

D. Summary State Funding Capabilities for Hazard Mitigation Projects

Because the State of Maine has a small population of 1,328,361 people it does not have significant state, county and local government staff or budgets dedicated to hazard mitigation.[1] There are no state-funded grants for local floodplain projects. There are only three state personnel working in the Local Roads Center, providing technical assistance to communities. There are no state personnel who deal solely with hurricane, earthquake, drought or severe summer weather mitigation. There does appear to be sufficient staffing for the annual spread of wildfires, however, there is a severe shortage of trained and equipped state and local manpower for a wildfire disaster of the 1947 magnitude. Many of these existing programs are already funded in part by federal sources. Since the publication of the 2013 State Hazard Mitigation Plan, there has been no improvement in state funding for hazard mitigation.

E. Hazard Management Capabilities of the State that have Changed

The following depict improvements from the last plan to the State's hazard management capabilities:

- Staff with GIS mapping capabilities brought onto staff;
- Streamlined Public Assistance and Mitigation through combined briefings;
- Revised and streamlined the state HMGP application to make it easier for towns to apply and for the State and FEMA to review;
- Revised and streamlined grant workshops for applicants;
- Utilized, and continue to utilize, the FEMA 406 Program to a far greater extent than it did just a few years ago to implement hazard mitigation projects at less cost to the towns; and
- Partnered with the Local Roads Center to sponsor a series of ongoing workshops throughout the state on the use of geo-synthetics to mitigate flood damages to local transportation systems by stabilizing banks, fill, rip-rap, road surfaces and other structures.

Other changes that were not related to specific disaster events included:

- Updated hurricane storm surge maps were developed by the Army Corps of Engineers and distributed to the coastal counties;
- Shoreland Zoning regulations were strengthened to protect against mass wasting hazards;
- State adopted the International Building Codes effective December 2010. All state code officers are required to be retrained and recertified before they can inspect using the new standards;
- FEMA's Risk Map Program has produced a number of new, digital floodplain maps that are much more detailed and easier to use than the earlier FIRMS. Updated maps for Waldo, Lincoln, and Sagadahoc Counties became effective in July of 2015 and updated maps for Fort Kent (Aroostook), Hancock, and Knox became effective in July of 2016. Washington County had updated maps go effective in July of 2017. Cumberland and York Counties have had updated preliminary maps issued and anticipate a mid-2019 effective date.
- LIDAR data has been gathered along the coast of Maine and for portions of Androscoggin, Oxford and Kennebec Counties.

[1] https://www.census.gov/prod/cen2010/cph-2-21.pdf

- Coastal bluff erosion and landslide maps were completed for virtually the entire Maine coast as well as some inland areas;
- The Maine Geological Survey has studied the potential impacts on Maine from tsunamis;
- All 16 county hazard mitigation plans have been updated, 15 approved; and
- More county directors continue to be heavily involved in post disaster work.

LOCAL CAPABILITY ASSESSMENT	
Requirement §201.4(c)(3)(ii): [The state mitigation strategy shall include] a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.	
Elements	*A. Does the new or updated plan present a general description of the local mitigation policies, programs, and capabilities?*
	B. Does the new or updated plan present a general analysis of the effectiveness of local mitigation policies, programs and capabilities?

A. General Description and Analysis of Local Mitigation Policies, Programs and Capabilities

Since 2003, the Maine Emergency Management Agency has worked with the county emergency management agencies on the development of their county multi-jurisdictional Hazard Mitigation Plans. Based on the knowledge and experience gained throughout the course of this effort, this section describes and analyzes the effectiveness of existing local mitigation capabilities and the expected effectiveness of the general trend of future local mitigation activities.

The majority of Maine's communities have less than 5,000 residents. Especially in many of the smaller, rural communities, there are few if any regulations other than the municipal shoreland zoning ordinance and a floodplain management ordinance. This is because Maine has a history and culture that is steeped in independence, a distrust of big government, a belief in personal responsibility, respect for the property of others, and a tradition of neighbor helping neighbor in times of need. These small-town values, rather than government mandates, govern much of life throughout rural Maine. Many of Maine's smaller towns do not have the staff or money to undertake much in the way of hazard mitigation. That being said, there are a number of very positive trends:

- Most of Maine's towns conduct business with computers, use digital cameras to document events, and communicate via email and teleconferencing, all of which tend to reduce time and distance factors;
- The use of modern technology has led to greater documentation and mapping capabilities; and
- There are increasing instances of local communities responding effectively with a high level of sophistication to emergency needs.

B. General Analysis of Effectiveness of Local Policies, Programs and Capabilities.

Wildfire

Forest fires have the potential for causing a huge loss of residential structures in Maine communities, due to the very high percentage of Maine homes located in the wildland-urban interface. A major wildfire that destroys trees and ground cover in a previously forested river basin could result in increased runoff from storms, thereby increasing downstream flooding

potential. Land use planning and regulation and building codes in Maine seldom deal with the wildland-urban interface issues. Mitigation efforts at the local level are limited to the forest firefighting efforts of local volunteer or municipal fire departments.

The Maine Forest Service has initiated a community assessment program for communities with a history of wildfire. The program, which is voluntary, is aimed at educating local officials and homeowners about inexpensive steps (such as the removal of overhanging tree limbs) they can take to protect their structures. Local officials in a number of communities have formally agreed to take the steps recommended in their community assessments.

Flooding

Some Maine communities have taken advantage of the Maine Department of Transportation's Maine DOT Maine Local Roads Center and have acquired technical assistance and training on maintenance and upgrades to local roads, especially in terms of storm water management. MEMA has partnered with the Local Roads Center to sponsor a series of workshops for local officials on the use of geo-synthetics to mitigate damages from future flooding/storm events. MEMA expects that in the future, more communities will use geo-synthetics to reduce repetitive losses to local roads, bridges, culverts and ditches. After education, road maintenance and upgrades are usually the second largest municipal budget item.

Most Maine communities (94.5 percent) participate in the National Flood Insurance Program and have received technical assistance and guidance from the Department of Agriculture, Conservation and Forestry's Floodplain Management Program, have floodplain ordinances and are members of the National Flood Insurance Program (NFIP). In addition, there are 17 communities in the CRS Program. This represents a higher level of floodplain management than the federal minimums. This program has probably had the greatest effect on loss reduction on real property in the state. FEMA's Risk Map Program will allow more municipalities to better manage their floodplains, especially where local flood insurance rate maps are based on LIDAR topographic mapping. Many Maine communities did not receive an updated map within the time frame originally envisioned by Congress (2009). Moreover, there are still a number of smaller communities in Maine that have not ever received a Flood Insurance Rate Map. Most of LUPC's jurisdiction is not mapped but citizens participate by virtue of LUPC's permit review process.

Some municipalities have received hazard mitigation grants for structural mitigation projects, usually road upgrades. Over time, those communities that have participated have eliminated their road washout problems. One such community is the town of Searsmont, which has received several mitigation grants and has effectively protected all of its local roads from flooding damage. In Franklin County, many of the projects identified in their 2005 plan have been implemented, primarily with the help of FEMA PA funds. Unfortunately, the mitigation needs documented in the 16 County plans, and one University of Maine System Plan, far outweigh available funding. Just the approved county mitigation plans include 2,058 mitigation projects. Assuming an average of about $100,000 per project (some are less, but some are a lot more), the total need is $205,800,000. Over the past three years, Maine received about $300,000 annually in HMGP funding. Even if no new projects were added to the list, it would take over 100 years to address all of the previously identified needs!

Every municipality in the State of Maine is required to have a state-certified Code Enforcement Officer (CEO). Most municipalities also have a local comprehensive plan and a set of land use ordinances. The CEO enforces not only the local ordinances but provides advice and a second set of eyes for state environmental permit programs in stormwater management and shoreland zoning. However, state law does not make local comprehensive plans and ordinances mandatory and many smaller towns do not have these mitigation tools.

Severe Summer Weather
A number of communities, including larger cities such as Portland and Lewiston, have enacted local stormwater regulations that mirror those of the Department of Environmental Protection. Tornadoes are too rare and lightning affects too few people (an occasional home fire somewhere in the state). Thunderstorms can cause localized power outages and leave storm debris in the roads, but these will only take a few hours to repair and clean up. Occasionally a severe summer storm will result in a road washout which may take several weeks to repair.

Severe Winter Weather
The biggest impact to many municipal budgets from severe winter weather is the expense of unplanned debris removal and extra snow and ice removal costs. In many cases, a bad winter storm can overwhelm the financial and equipment capabilities of many smaller municipalities. Many communities will spread calcium chloride on roads prior to a storm to help reduce the amount of icing, and some communities will cut back trees within the municipal road easement. However, a majority of communities do not have the extra budget or resources to accomplish these pre-disaster mitigation activities.

Hurricanes
Coastal Maine communities are typically the only ones to experience most hurricane damages and much of this is from storm surge flooding. Based on a review of the Storm Surge Inundation Maps, there are more areas subject to flooding than what are shown on the FIRM maps. Unfortunately, Maine communities have used the FIRM maps for their floodplain ordinances, but a full-blown Category 1 hurricane could exceed the 1 percent return frequency and consequently cause flooding beyond the National Flood Insurance Program's 1 percent or regulatory "100-year" flood event.

While higher category storms are more frequent in other parts of the country, one of the natural mitigating factors for hurricanes in Maine is the fact that Maine's coastal waters are colder and cannot support higher category hurricanes. As the flooding history in Maine continues to expand and as the ocean's temperatures continue to rise there may be an increase in the more severe hurricanes. Major structures have been built on the coast recently that were outside the FIRM Special Flood Hazard Areas, that could possibly be endangered by the storm surge flooding from even a Category 1 Hurricane. MEMA has sent a digital copy of the hurricane surge inundation maps to every affected community along Maine's coast.

Drought
Maine communities are impacted by drought by the increase in possibility of forest fires, dry wells and poor crops. Forest fires and poor crops were discussed in other paragraphs of this section. Individuals and public water suppliers typically deal with dry wells through their own investment in new wells. There are no mitigation programs at the local level in Maine dedicated solely to lessening the impacts of drought.

Earthquake
The recent magnitude 4.3 earthquake in Bar Harbor demonstrates that earthquakes of this size can cause damage. Although the statistical estimate for return time of a magnitude 6.0 earthquake in Maine is approximately 363 years, little monitoring and research have been done to substantiate this estimate. Although earthquake probability in Maine is relatively low compared to other areas of the country, the risk to property is moderate to high because of inadequately designed and aging structures. Continued instrumental earthquake monitoring in New England is funded entirely by the federal government, with some in-kind contribution by state agencies. There are no mitigation programs at the local level in Maine dedicated solely to

lessening the impacts of earthquakes, excluding that of all-hazards emergency management planning and emergency response agencies.

Erosion
The Maine Geological Survey (MGS) has completed coastal bluff erosion maps for Maine's coast. The covered area extends from York County in Southern Maine to Washington County (Maine's eastern-most county). The information provided on these maps is available on the MGS web site, and copies of the maps have been provided to the affected municipalities. Many communities are beginning to use this information to mitigate the impacts of erosion and sedimentation. The Maine Department of Environmental Protection has incorporated MGS Coastal Bluffs Maps into its Shoreland Zoning rules. There is now a requirement that municipal shoreland zoning ordinances include greater setbacks for development near unstable bluff areas.

Mass Wasting (Landslides)
MGS has prepared a parallel set of Landslide Hazard Maps that details historical and potential landslide areas along the coast. MGS is also mapping landslides in non-coastal areas. A pilot project in 2006 developed the method of identifying historical landslide areas, and also established methods of terrain analysis for landslide susceptibility. About one third of the state has geological sediments that make the land potentially vulnerable to landslides. In addition to earth materials, slopes, regional geomorphology and ground and surface water affect landslide hazards.

TABLE 4.2: General Summary
Local Mitigation Activities by Hazard Matrix*

HAZARD	TYPICAL DAMAGES or LOSSES	ACTIVITY TASKED	PROGRAMS	PRE- OR POST-DISASTER
Flooding	All Structures	Code Enforcement Officer or Municipal Planning Board	Floodplain Ordinance	Pre-disaster
	Local Roads	Road Commissioner or Public Works Director	• Maine Local Roads Center • Municipal Capital Improvement Projects	Pre-disaster
	Environment	Code Enforcement Officer	• Municipal land use ordinances • Erosion & sedimentation control • Natural Resources Protection Act • Shoreland Zoning & Stormwater Program • Wildland Firefighting Program	Pre-disaster
Severe Winter Weather	Roads	Road Commissioner or Public Works Director	Winter Road Maintenance program.	Post-disaster
Severe Summer Weather/ Hurricanes	Environment	Code Enforcement Officer	Shoreland Zoning & Stormwater Program	Pre-disaster
Wildfires	Residential Structures	Municipal/Volunteer Fire Department	Wildland Firefighting program	Post-disaster
Drought	Agricultural, Residential	MEMA/USGS	Drought Task Force/River flow Commission	Pre-disaster
Erosion/ Landslides	All structures	Maine Geological Survey	• Costal bluffs/coastal landslide hazard maps • Inland landslide hazard mapping	Pre-disaster
All-Hazards	All Types	Municipal Emergency Management Director	Public education & information	Pre-disaster
	All types	Municipal Elected Officials	Hazard Mitigation Program Grants	Post-disaster

MITIGATION ACTIONS	
Requirement §201.4(c)(3)(iii): (state plans shall include an) identification, evaluation, and prioritization of cost-effective, environmentally sound, and technically feasible mitigation actions and activities the state is considering and an explanation of how each activity contributes to the overall mitigation strategy. This section should be linked to local plans, where specific local actions and projects are identified.	
Requirement §201.4(d): (The) Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities…	
Elements	*A. Does the new or updated plan identify cost-effective, environmentally sound, and technically feasible mitigation actions and activities the state is considering?*
	B. Does the new or updated plan evaluate these actions and activities?
	C. Does the new or updated plan prioritize these actions and activities?
	D. Does the new or updated plan explain how each activity contributes to the overall state mitigation strategy?
	E. Does the mitigation strategy in the new or updated section reflect actions and projects identified in local plans?

A. Identification of Goals, Objectives, and Strategic Measures (Actions

The actions set forth on the following pages relate to the role that the Maine Emergency Management Agency has assumed relative to mitigation:

- The provision of technical assistance and training;
- The preparation of plans and updates;
- Support for improved information including better hazard-related maps; and
- Support for county and municipal hazard mitigation projects.

> ***NOTE:*** *All actions have been evaluated relative to environmental soundness, technical feasibility and cost effectiveness. Those that require additional funding beyond day-to-day agency operations will be further evaluated, using these criteria, prior to funding.*

KEY TO ABBREVIATIONS

Abbreviations used in the following table include the following:

$F	Federal funds
$S	State funds
$C	County funds
$L	Local funds
DEP	Maine Department of Environmental Protection
FEMA	Federal Emergency Management Agency
MEMA	Maine Emergency Management Agency
MFS	Maine Forest Service
MGS	Maine Geological Survey
ACF	Maine Department of Agriculture, Conservation and Forestry

GOALS/OBJECTIVES AND STRATEGIC MEASURES (ACTIONS)

TABLE 4.3: ADMINISTRATION

Goals: Enhance the state hazard mitigation capabilities.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
1. 406 Program. Utilize the 406 program to the maximum extent possible to implement mitigation projects.	**A. Education**. Immediately following a disaster, use the most appropriate means to inform officials of 406 program requirements.	Existing Staff $ F, S,	MEMA	Education of local officials on opportunities for implementation of mitigation projects	2013 – 2018 MEMA has included information on the 406 program in all briefings and workshops (DR 1053, DR 4032, DR 4108, DR-4208, DR-4354, and DR-4367). As planned.
	B. Project Identification. Use county and local mitigation plans as a basis for identifying infrastructure improvements that might be funded under the 406 program.	Existing Staff $ F, S,	MEMA	Maximum completion of hazard mitigation projects	Since Patriot's Day Disaster in 2007 MEMA and County Directors have advised towns to seek 406 funding for projects already listed in the plans. As planned.
2. Long-Range Planning. Continue long-range hazard mitigation planning efforts.	**A. Plan Integration.** Integrate county hazard mitigation plans into an overall state plan and establish overall, statewide hazard mitigation priorities.	Consultant $ F, S	MEMA	Integration of multi-jurisdictional plans	County Plans were updated 2015-2017 so State Plan has 100% "rollup." This is the first-time county plans have been concurrent with the state plan since 2012, there has been more opportunity for integration. As planned.

	B. County Plan Updates. Provide leadership and guidance to county EMA offices and local officials as county multi-jurisdictional plans are updated, giving priority attention to counties with the most serious hazard mitigation issues.	Existing Staff $ F, S, C, L	MEMA	More effective county-wide, multi-jurisdictional plan updates	2009 –MEMA developed plan guidance for the 2010-2013 county plan updates and provided technical assistance to the counties during the plan update process. As planned.
	C. State Plan. Maintain and update a State Hazard Mitigation Plan, including the State Administrative Plan.	Existing Staff $ F, S	MEMA	Better protection of Maine residents	MEMA is committed to updating the State Plan every five years, and the State Administrative Plan with each new disaster or significant weather event. As planned.
3. Mitigation Awareness. Build county and municipal officials' and residents' awareness of mitigation and proven, cost-effective mitigation measures and the need for mitigation.	**A. Website.** Continue to use MEMA's website to post the State's Hazard Mitigation Plan as well as articles and other educational materials dealing with hazard mitigation, and to post notice of meetings, workshops and training exercises.	Webpage $ S	MEMA	Provision of mitigation information to local officials and the general public	2010-2018 MEMA has used its website to post the State Mitigation Plan, training, exercises and workshops. As planned.
	B. Social Media. Leverage existing social media platforms to distribute information to the public.	Existing Staff $ S	MEMA	Provision of mitigation to local officials and the general public	Twitter and Facebook are also used as media tools. As planned.
	C. Community Outreach · Continue the highly successful annual Maine Preparedness Conference. Continue to revise, update, and make available materials aimed at educating	Existing Staff $ F, S	MEMA	Provision of mitigation to local officials and the general public	MEMA has held the Maine Partners in Preparedness Conference annually since 2009. Other outreach efforts are ongoing. As planned.

	local officials and the public about hazard mitigation.				
	D. Workshops. Continue to hold mitigation workshops for local officials, interested engineering firms and others, focusing on parts of the state with the most serious hazard mitigation issues.	Existing Staff$ F, S, L	MEMA	Provision of mitigation information where it is most needed	2010-2018 MEMA held workshops on a continuing, statewide basis. As planned.
4. Technical Assistance. Continue to provide technical assistance to and coordinate with local jurisdictions on state, county and municipal level mitigation efforts.	**A. Additional Staff.** Hire additional staff to improve the agency's hazard mitigation capabilities.	Additional Staff $ F, S	MEMA	More effective hazard mitigation program	MEMA hired a new Natural Hazards Planner and Cyber Security Coordinator in 2016, as well as a Critical Infrastructure, adding significant GIS capacity.
	B. Prioritization. Develop agency priorities so that MEMA staff resources can be directed to the most important tasks and the areas of the state with the greatest need, within the limits of maintaining a manageable workload.	Existing Staff $S	MEMA	Targeting of mitigation technical assistance to public officials for effective mitigation decision-making	Due to its limited resources, MEMA has to prioritize based on plan life spans, disasters and budget cycles. As planned.
5. Better Coordination. Better coordinate the mitigation and data collection efforts of state agencies.	**A. Mitigation Committee Working Group.** Meet with mitigation experts consisting of MEMA and key state agency leaders to review state programs for opportunities to combine capabilities and resources on mitigation strategies.	Existing Staff $S	MEMA & State Agencies	Cost-effective hazard mitigation with every public dollar	2013-2018 MEMA continues to meet with federal and state mitigation experts. As planned.

	B. Leveraging Partnerships. Continue holding Maine Preparedness Conferences undertaken with state and federal partners. Continue disaster-response partnerships with Associated General Contractors, Wal-Mart, Poland Springs and other businesses. Continue to meet annually in March with the River Flow Advisory Commission to assess flooding potential (the Commission includes MEMA, local EMAs and dam owners). Continue to work with Maine DEP, DOT, MGS, USGS and other agencies to monitor the impacts of climate change including	Existing Staff $S	MEMA	Pooling of resources for maximum effectiveness; better preparedness for disaster response	2013-2018, Ongoing; have held conferences, done outreach, signed contracts, and/ or had presence at the meetings or conferences of "old" and "new" state partners. Further state work on the climate change adaptation report has been halted due to budgetary and other constraints. As planned.
	C. Potential Losses. Collect vulnerability and potential loss data to estimate losses for state-owned and operated buildings, infrastructure and critical facilities associated with the most likely hazard events.	Consultant $ S, L	MEMA	Better data for hazard mitigation assessment and decision making	2011 – MEMA began initial work but staff member doing the work left, so work has not been completed.
6. State Projects. Develop a process for better review and evaluation of state-funded or managed projects for compliance with good mitigation practices and standards.	**A. Administration Plan.** Revise the hazard mitigation prioritization criteria in the Administration Plan to include communities at highest risk, with consideration for repetitive loss and most intense development pressures.	Existing Staff $ S	MEMA	Simplification of the process for choosing Hazard Mitigation Projects	Plan was re-updated for DR-4208 and 4354, and 4367. As planned.

TABLE 4.4: WILDFIRE

Goals: Reduce loss of life, injury and property damage in Maine caused by wildfire.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
1. County plan updates. Provide guidance to county EMAs and others involved in updating county hazard mitigation plans.	**A. Strategy guidance.** As county plans are updated, encourage consideration of consistent wildfire strategies including, but not limited to: • Continuing public education service announcements; • Maintaining awareness of people with disabilities who would be adversely impacted by wildfires; and • Participating in hazard mitigation grant programs, particularly the 406 program, where applicable	Existing Staff $ F, S, C, L	MEMA and Counties	Development of more effective county plans	2009 - MEMA developed plan guidance including recommended strategies and a standardized format for easier reviews and cross referencing. 2010-2018 all 16 Counties used the plan guidance to develop consistent plans. As planned.
2. Monitoring. Continue to monitor wildfires.	**A. Monitoring**. Continue monitoring of wildfire occurrences and collection of intensity reports.	Existing Staff $ F, S, L	ACF	Compilation and analysis of data base on earthquake occurrences and effects	Maine ACF currently monitors conditions and maintains records as to occurrences.
	B. Communication. Communicate with regional to gather information. Continue to educate and inform the public and other state and local agencies.	Existing Staff $ S	ACF, MEMA, and Counties	Guidance to private and public decision-makers	Maine ACF currently runs Maine's Wildfire Danger Report.

TABLE 4.5: FLOODING:

Goals: To reduce the risk of loss to life and property from flooding through state level agency coordination and support.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
1. Outreach. Help local officials develop more effective ways of mitigating flood damages.	**A. Workshops on Geo-Synthetics.** Continue to sponsor workshops through the Local Roads Center on the use of geo-synthetics to better mitigate flood damages to local roads, bridges, culverts and ditches. **B. NFIP Workshops.** Continue to sponsor NFIP training workshops for local officials to help them properly administer and enforce local floodplain management regulations. **C. Oversee Community Compliance with the NFIP.** Continue to monitor and assist communities with maintaining compliance with the NFIP, which allows federally backed flood insurance to be sold in their communities.	Existing Staff $ F, S	MDOT Local Roads Center/ MEMA DACF DACF	Promote sound mitigation practices. Sound local floodplain management practices Reasonably priced flood insurance policies for compliant buildings.	Workshops were held as planned.
2. Improved Flood Hazard Mapping. Support efforts to improve floodplain mapping. **(see also summer storms/hurricanes)**	**A. Risk Map.** Coordinate and Support FEMA's Risk Map Program and provide support to communities undergoing updated flood hazard mapping. • Preparation of a updated Flood Insurance Rate Maps (FIRMs) for all counties in Maine; • Continued acquisition of LiDAR data to the maximum extent possible.	Existing Staff $ F	State Agencies	FIRMs that accurately reflect flood risk.	2010 – 2013: FIRMs for York, Cumberland, Androscoggin, Kennebec and Oxford County maps digitized. New maps effective in Oxford, Kennebec and Androscoggin counties. 2013 – 2018: FIRMs for Knox, Lincoln, Sagadahoc, Hancock, Waldo, and Washington digitized and effective. All new coastal studies, additional modelling of Zone A, and re-delineation to 2' topography, where available.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
	B. Coastal LIDAR. As time and resources permit, use LiDAR- data to prepare detailed maps of potential storm flooding and extreme tidal flooding events for coastal communities.	$ F, S	MGS	Better prediction of infrastructure and evacuation routes subject to frequent coastal flooding	2010 – 2012 Data gathering flights have been completed. As planned.
	C. Early Warning Systems. Within the limits of available funding, support improvements to the state's early warning capabilities, such as river gauges and NOAA alerting systems, giving priority to areas with the most serious hazard issues.	$ F, S, L	MEMA	More time and data for emergency managers for effective decision-making	2009-2010 new river gauges funded through HMPG for Mousam, Kennebec, Kenduskeag and Penobscot Rivers. As planned. 2012 many gauges discontinued due to federal sequester of funds.
3. Sea level rise. Continue to monitor sea level rise and its implications for Maine.	**A. Monitoring.** Continue to track changes in sea level and evaluate future projections and: • Recommend priorities to FEMA for updating inundation maps (e.g., FIRMS, hurricane surge: tidal rise scenarios) giving priority to the areas most vulnerable to storm surge flooding and hurricane surge inundation; • Provide information to municipalities, utilities and the public on the implications of sea level rise.	Existing Staff $ F, S	MGS	Improved geographic information on flooding vulnerability created by rising floodplains and tides	MGS continues to monitor sea level rise; information including maps and presentations continues to be provided to towns and public. As planned. The re-introduction of the Maine Interagency Climate Adaptation Workgroup has better coordinated monitoring resources as they pertain to sea level rise.
4. Watershed management. Minimize increased downstream flooding caused by runoff from upstream development.	**A. Monitoring.** In developing areas of the state, monitor the extent to which upstream development may or may not be contributing to the potential for increased, downstream flooding.	Existing Staff $ F, S, L	DEP	Development of information on how the dynamics of watershed development adversely impact	FEMA was involved in developing info for Mousam River watershed in Southern Maine – 2007. No similar monitoring since that time.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
				downstream properties	
5. Dams. Improve state management of dams.	**A. GIS mapping.** Refine GIS mapping of high hazard and significant hazard dam locations at the time of inspections and through Emergency Action Plan revisions.	Existing Staff $ S	MEMA	Assessment of downriver flooding vulnerabilities from dam failures (breaches) for better land use and emergency planning	New GIS staff member hired in 2018 to complete.
6. County plan updates. Provide guidance to county EMAs and others involved in updating county hazard mitigation plans.	**A. Strategy guidance.** As county plans are updated, encourage consideration of consistent flood strategies including, but not limited to: • Monitoring preparation of Emergency Action Plans (EAPs) for dams, and participation in EAP drills; • Encouraging municipalities to incorporate updated flood hazard information such as coastal surge/SLOSH maps, and hurricane inundation maps into their ordinances; • Maintaining awareness of people with disabilities who would be adversely impacted by flooding; • Participating in hazard mitigation grant programs, particularly the 406 program, where applicable; • Developing plans to upgrade roads, culverts, ditches and drainage systems to make roads and structures safe from flooding.	Existing Staff $ F, S, C, L	MEMA	Development of more effective county plans	2013-2018 All County Plans updated and available for roll up to State Plan. 2010-2013 all 16 Counties used the plan guidance to develop consistent plans. As planned. 2009 - MEMA developed plan guidance including recommended strategies and a standardized format for easier reviews and cross referencing. 2010-2018 all 16 Counties used the plan guidance to develop consistent plans. As planned.
7. Repetitive loss properties. Take steps to reduce repetitive loss properties	**A. Priority for assistance.** Give priority to repetitive loss properties, as long as it is cost beneficial.	Existing Staff $ F, S	MEMA	Reduction of repetitive loss properties	2009 MEMA developed guidance including recommended strategies; this guidance continues to be in effect. As planned.

TABLE 4.6: SEVERE WINTER WEATHER

Goals: Reduce loss of life, injury and property damage in Maine caused by severe winter weather.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
1. County plan updates. Provide guidance to county EMAs and others involved in updating county hazard mitigation plans.	**A. Strategy guidance.** As county plans are updated, encourage consideration of consistent winter weather strategies including, but not limited to: • Continuing public education service announcements; • Maintaining awareness of people with disabilities who would be adversely impacted by winter storms; • Participating in hazard mitigation grant programs, particularly the 406 program, where applicable • Installing back-up power at all critical facilities.	Existing Staff $ F, S, C, L	MEMA And Counties	Development of more effective county plans	2009 - MEMA developed plan guidance including recommended strategies and a standardized format for easier reviews and cross referencing. 2010-2018 all 16 Counties used the plan guidance to develop consistent plans. As planned.

TABLE 4.7: SEVERE SUMMER WEATHER/HURRICANES

Goals: Reduce loss of life, injury and property damage in Maine caused by severe summer weather and hurricanes.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
1. Coastal storm surge flooding/hurricane surge inundation. Provide for better management of potential damages from coastal storm surge flooding and hurricane surge inundation.	**A. State Floodplain Management Program.** Develop recommendations for the use of hurricane surge inundation maps in: • Local ordinances; • Public education and awareness efforts.	Maps and model ordinances $ S	MEMA ACF	Better regulation of development in all flood zones	As part of the Hurricane Evacuation Study, the Natural Hazards Planner and State Hazard Mitigation Officer coordinated across 10 counties to develop 140 hurricane evacuation zones.
	B. Public Education. Within the limits of available resources, continue to provide public education at the local level about areas subject to hurricane surge inundation.	Existing Staff $ S	DEP	Better management of areas subject to hurricane inundation	MGS has worked with individual communities on modeling the impacts of storm surges. As planned.
	C. Action Plan. Natural Hazards Planner and Senior Planner worked to revise the Hurricane Incident Annex. A notable change is the transition from a prescriptive checklist to a proactive, scenario driven decision timeline.	Existing Staff	MEMA	More coordinated and organized response to hurricane potential.	Expected completion in 2018.
2. County plan updates. Provide guidance to county EMAs and others involved in updating county hazard mitigation plans.	**A. Strategy guidance.** As county plans are updated, encourage consideration of consistent severe summer weather/hurricane strategies including, but not limited to: • Continuing public education service announcements; • Maintaining awareness of people with disabilities who would be adversely impacted by winter storms; • Participating in hazard mitigation grant programs, particularly the 406 program, where applicable; • Installing back-up power at all critical facilities; • Developing plans to upgrade roads, culverts, ditches and drainage systems to make roads safe from hurricanes.	Existing Staff $F, S, C, L	MEMA	Development of more effective county plans	2009 - MEMA developed plan guidance including recommended strategies and a standardized format for easier reviews and cross referencing. 2010-2018 all 16 Counties used the plan guidance to develop consistent plans. As planned.

TABLE 4.8: DROUGHT

Goals: Reduce loss of life, injury and property damage in Maine caused by drought.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
1. Management. Continue to provide for management of drought	**A. Monitoring**. Continue to monitor drought conditions on an as-needed basis.	Existing Staff $ S, L	Drought Task Force	Guidance to Governor and state on what to do in the event of another drought	The Drought Task Force, comprised of the RFAC with the addition of Maine Forest Service and the agriculture community, met in 2016 for the first time since 2003. Monthly meetings continued through December, and the task force co-chairs met again in 2017. There have been no droughts since 2003. The River Flow Advisory Commission becomes the Drought Task Force as necessary.
	B. Action Plan. Advise the Governor, as needed, on emergency actions the Governor can take to lessen the impacts of drought. The Drought Incident Annex was updated in 2017 following the drought of 2016, and revised to better define drought conditions and triggers for advising the Governor, state partners, and the public as needed.	Existing Staff $ S	Drought Task Force	Guidance to Governor and state on what to do in the event of another drought	Updated in 2017.

TABLE 4.9: EARTHQUAKE

Goals: Reduce loss of life, injury and property damage in Maine caused by earthquake.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
1. Monitoring. Continue to monitor earthquakes.	**A. Monitoring**. Continue instrumental monitoring of earthquake occurrences and collection of intensity reports.	Existing Staff $ F, S, L	MGS	Compilation and analysis of data base on earthquake occurrences and effects	MGS monitors seismic activity throughout the state. As planned.
	B. Communication. Communicate with regional seismologists to gather information. Continue to educate and inform the public and other state and local agencies.	Existing Staff $ S	MGS	Guidance to private and public decision-makers	USGS now managing system.

TABLE 4.10: EROSION/LANDSLIDES

Goals: Reduce property damage in Maine caused by erosion and landslides.

Objectives	Actions	Resources	Agency	Results of Action	Status Report 2018
1. Landslide assessment. Provide information for local regulation of high hazard landslide areas in interior Maine.	**A. Inland Landslide Mapping.** Map inland landslide risk areas.	$ F, S	MGS	Better management of high hazard landslide areas	Mapping has been done for Wells, Cumberland, Greenbush and Bangor. As planned.
2. **Beach monitoring.** Enhance decision-making by providing better information on beaches and coastal sand dunes and their vulnerability to erosion.	**A. Coastal Beach Mapping.** Update geological boundaries of the coastal sand dune system in GIS and release the update via web products. Provide DEP with digital data.	Maine Coastal Program $ F	MGS	Increased community resiliency, Enhanced storm protection through natural dunes, Expedited permitting	2012 Data gathering flights have been completed. As planned.
	B. Analysis. Calculate beach erosion rates and map erosion hazard areas for short- and long-term processes and sea level rise.	Maine Coastal Program $F	MGS	Increased community resiliency, Enhanced storm protection through natural dunes, Expedited permitting	Beach erosion documented, but updates are unfunded.
	C. Maine Beach Monitoring Project. Continue to monitor the change in beach profiles and dune edge along the southern and mid-coast regions.	Sea Grant $ F, S, L	MGS	Documentation of erosion trends for beach management and planning	Beach monitoring funds have lapsed.

B, C. Evaluation and Prioritization of Actions

Each of the preceding goals, objectives and actions were analyzed, evaluated and prioritized by the Hazard Mitigation Team using the following criteria:

- Population benefited
- Environmental soundness
- Probability of funding
- Technical feasibility for implementation
- Improved information for better hazard mitigation

The criteria table that was used to evaluate and prioritize the preceding actions is shown below.

TABLE 4.11: MITIGATION ACTION CRITERIA TABLE

Criteria Category	3 Points	2 Points	1 Point
Population Benefited	Over 1 Million	500,000 to 999,999	Up to 500,000
Environmental Soundness	Improvement to environment	Neutral impact to environment	May require environmental accommodations
Probability of Funding	Funds are already available	Grants with matching funds required	No existing funding source
Technical Feasibility	Able to implement immediately	Can implement with effort	Not feasible under existing regulations and statutes
Cost Effectiveness	Highly Cost Effective	Moderately Cost Effective	Somewhat Cost Effective

The criteria points worksheet used to evaluate each of the actions is shown on the next page.

TABLE 4.12: MITIGATION ACTIONS – CRITERIA POINTS WORKSHEET

Actions	Population Benefited	Environmental Soundness	Probability of Funding	Technical Feasibility	Cost Effectiveness	Total Points
Administration						
1A 406 program education	3	2	3	3	3	**14**
1B 406 program - project identificatior	3	2	3	3	3	**14**
2A Plan integration	3	2	2	2	3	**12**
2B County plan updates	3	2	2	2	3	**12**
2C Standardization	3	2	3	3	3	**14**
2D State plan update	3	2	2	3	3	**13**
3A MEMA website	3	2	3	3	3	**14**
3B Community outreach	3	2	3	2	3	**13**
3C Workshops	3	2	3	2	3	**13**
3D Early warning systems	3	2	2	2	3	**12**
4A Additional staff	3	2	1	3	3	**12**
4B Prioritization MEMA staff	3	2	3	3	3	**14**
5A Mitigation committee	3	2	3	3	3	**14**
5B Leveraging partnerships	3	3	3	3	3	**15**
5C Hazard additions to GIS system	3	3	2	2	3	**13**
5D Potential loss data, state facilities	3	2	2	2	2	**11**
6A Best practices manual	3	3	2	2	2	**12**
6B Administration Plan	3	2	3	3	2	**13**
Wildfires						
1A Community assessments	1	2	2	2	3	**10**
2A County plan updates	3	2	2	2	3	**12**
Flooding						
1A Workshops on geo-synthetics	3	3	2	2	3	**13**
2A Map modernization	3	3	3	3	3	**15**
2B Coastal LIDAR maps	3	3	2	3	3	**14**
3A Monitor sea level rise	3	3	2	3	3	**14**
4A Monitor watershed development	3	3	2	2	3	**13**
5A GIS mapping of dams	1	2	2	2	2	**10**
6A County plan updates	3	2	2	2	3	**12**
7 Priority for assistance	0	2	2	2	3	**9**
Severe Winter Weather						
1A County plan updates	3	2	2	2	3	**12**
Severe Summer Weather/Hurricanes						
1A Floodplain management recommer	1	2	2	2	2	**9**
1B DEP project review	1	3	2	3	2	**11**
2A County plan updates	3	2	2	2	3	**12**
Drought						
1A Continue monitoring	3	3	3	3	3	**15**
1B Action plan when needed	3	3	2	3	3	**14**
Earthquake						
1A Continue monitoring	3	2	3	3	3	**14**
1B Communication	3	2	3	3	3	**14**
Erosion/Landslides						
1A Inland landslide mapping	1	3	2	2	3	**11**
2A Coastal beach mapping	1	2	2	2	3	**10**
2B Analysis	1	2	2	2	3	**10**
2C Maine Beach Monitoring Project	1	2	3	3	3	**12**

D. How Each Activity Contributes to the Overall State Mitigation Strategy. The format of the goals, objectives and actions contained on the previous pages demonstrates how each action relates to the overall strategy:

- The overall strategy is arranged by topic area (Flooding, Winter Storms, Wildfire, etc.).
- For each topic area, there is a general goal (e.g." reduce loss of life, injury and property damage caused by flooding").
- For each topic area, there are a series of broad objectives aimed at achieving the goal(s).
- For each objective, there are one or more actions aimed at implementing the objective.
- For each action, there is an indication of the resources required for implementation, the responsible agency, the time frame, and a summary of the results of the action.
- The "Results of Action" column contains a brief description of how the specific action contributes to the overall strategy.
- The "Status Report" column describes what has been done to implement the strategies.

E. Actions and Strategies Contained in County, Local and University System Plans

This 2018 Plan reflects the priorities and thinking that went into the preparation of 16 county plans and the University of Maine System plan, in large part because of MEMA's extensive involvement with the planning processes of these various jurisdictions. Inclusion of all of the goals, objective, strategies and recommended projects from these plans would be very cumbersome and redundant. Copies of these plans are on file with MEMA and some are available online on county websites. MEMA has prepared a guide for use in the preparation of county plans to encourage a consistent format as well as similar actions where appropriate. The counties used this guidance during the preparation of their most recent updates.

FUNDING SOURCES	
Requirement §201.4(c)(3)(iv). [The state mitigation strategy shall include an] identification of current and potential sources of federal, state, local, or private funding to implement mitigation activities.	
Elements	*A. Does the new or updated plan identify current sources of federal, state, local or private funding to implement mitigation activities?*
	B. Does the new or updated plan identify potential sources of federal, state, local or private funding to implement mitigation activities?
	C. Does the updated plan identify the sources of mitigation funding used to implement activities in the mitigation strategy since approval of the previous plan?

A, B. Current and Potential Sources of Federal, State, Local or Private funding for Mitigation. The State of Maine and local jurisdictions use several funding sources to implement hazard mitigation activities. The majority of funding comes from federal and municipal programs. Federal funds are typically managed by the state. The two most recent disasters, DR-4354 and DR-4367, have led to new funding opportunities through mitigation 406 and 404 programs.

The state is interested in pursuing other sources of funds and encouraging municipalities, Maine residents and local businesses to invest in hazard mitigation measures as well. Some existing and potential funding sources are included in **Table 4.13.**

TABLE 4.13 – FUNDING SOURCES AVAILABLE FOR MITIGATION EFFORTS

Current and Potential Funding Source	Purpose	Hazard	Pre- or Post-Disaster	Estimated Amount (Annual)
FEDERAL				
Hazard Mitigation Grant Program **(HMGP)**	Implement long-term mitigation strategies	All-Hazards	Post	15% of declared Disaster damage
Pre Disaster Mitigation Grant **(PDM)**	Provide planning and projects to lessen impacts of disasters	All-Hazards	Pre	Determined each FY
Flood Mitigation Assistance Program **(FMA)**	Planning, Project & Technical Assistance Grants	Flooding	Pre	Determined each FY
Community Development Block Grant **(CDBG)**	Improve community services and facilities	Flooding	Pre	$3,000,000
FEMA FIRE Grants	Upgrade community emergency services	All-Hazards	Post	$10,000,000
Homeland Security Grants	Upgrade community emergency response and homeland security capabilities	All-Hazards	Post	$3,400,000 in 2013
US DOA National Resources Conservation Service **(NRCS)**	Provide funds to farmers and individuals to incorporate erosion control and stormwater management into their farming practices or private property.	Flooding	Pre/post	Varies
Emergency Management Performance Grants	Funds to help educate the public on natural and technological hazards	All-Hazards	Pre	$1,700,000
Disaster Housing Program	Small grants to incorporate hazard mitigation into home repairs	All-Hazards	Pre	% of disaster
STATE				
Maine Highway Fund **(Maine DOT)**	Provide funding for highway road maintenance and capital improvements	All hazards	Post	Varies
Environmental Protection Permits **(DEP)**	Enforce compliance with stormwater management and erosion control	Flooding	Pre	Varies
MUNICIPAL				
Municipal Mitigation Projects	Construct long-term upgrades to local roads and bridges	Flooding	Pre	Varies by community
Municipal rainy-day funds	Funding for unanticipated needs including emergencies	All-Hazards	Post	Varies
PRIVATE				
Individual households	Purchase flood insurance	Flooding	Pre	Varies
Individual households	Purchase homeowners' insurance	Fire, wind, other	Pre	Varies

The majority of these funding sources are highly competitive and the amounts can differ greatly. In addition, some funding sources (Community Development Block Grants, Maine Highway Fund, Land Use Impact Fees) are only marginally related to hazard mitigation.

C. Sources of Potential Mitigation Funding The following is a summary of the funding sources that were used to implement various mitigation opportunities.

- Hazard Mitigation Grant Program (HMPG)
- Pre-Disaster Mitigation Grant Program (PDM)
- Flood Mitigation Assistance – for insured policy holders only (FMA)
- Homeland Security Grants
- Emergency Management Performance Grants (EMPG)

SECTION 5 – COORDINATION OF LOCAL MITIGATION PLANNING

Local Funding And Technical Assistance	
Requirement §201.4(c)(4)(i) [The section on the Coordination of Local Hazard Mitigation Planning must include a] description of the state process to support, through funding and technical assistance, the development of local mitigation plans.	
Element	*A. Does the new or updated plan provide a description of the state process to support, through funding and technical assistance, the development of local mitigation plans?*
	B. Does the new or updated plan describe the funding and technical assistance the state has provided in the past three years to assist local jurisdictions in completing approvable mitigation plans?

A. Description of State Process to Support Development of Local Plans

Through the FEMA PDM grants, administered through MEMA, Maine's 16 counties received funding for updating their Multi-Jurisdictional Hazard Mitigation Plans. Also, while not directly funded through grants, the state's 800 number, classroom space for meetings, and staff travel time have all made it easier and less expensive for the local municipalities to participate in the planning process.

In addition, the majority of MEMA staff members are involved in constant workshops and training exercises. Providing technical assistance to the towns and counties is greatly affected by distances and weather conditions. It requires a day of driving to travel the miles between the towns of Kittery (York County) and Fort Kent (Aroostook County). However, as previously documented in *Section 2 - Planning*, representatives from the state and FEMA have provided technical assistance by driving to all sixteen counties and all corners of Maine, quite literally to the furthest points east, south, north and west. This effort has ultimately paid off, as demonstrated in the table of re-approved FEMA plans contained in *Section 2*.

Additional face-to-face meetings have occurred monthly when the County Directors met at MEMA. Time on the agenda was often used to update information relevant to the county and state plans. When travel or meetings are not possible, emails and telephone conference calls (TELCOMs) are used extensively to answer questions ranging from mapping hazards to writing narratives.

A combination of mail, email, and MEMA website calendar notices are used to inform the 492 jurisdictions and 16 County Directors, respectively, of the FEMA "Grant Development and Cost Benefit Workshops."

Lastly, TELCOMs between FEMA, MEMA, counties, consultants and local officials assure that all parties are getting the same information in real time. Topics range widely from TELCOMs used for planning, alerting and state response during a disaster, to narrative descriptions to mapping to documentation. This clarified plan requirements as well as minimized travel.

B. Description of Funding and Technical Assistance, Last Five Years

Section 2 of this plan includes a summary of key planning meetings and conferences that were held since 2018 as the counties updated their plans. Additionally, in each county plan there are details of planning meetings with state and/or federal staff. As previously stated, there are no state funds for mitigation assistance, but Maine has provided workshops, training exercise, conferences and technical assistance.

To provide technical assistance on a broader scope, an annual schedule of workshops was delivered throughout the state. Despite the distances, it was rare that a county did not receive at least one workshop per year. In instances when the state receives multiple declarations, a number of the hardest hit counties may receive multiple workshops. Between 2013 and 2018, there were three disaster declarations in Maine. These declarations, and the counties they included, are:

DR-4208:
York, Cumberland, Sagadahoc, and Androscoggin County

DR-4354:
Cumberland, Franklin, Hancock, Kennebec, Knox, Lincoln, Oxford, Penebscot, Piscataquis, Sagadahoc, Somerset, Waldo, and York County

DR-4367:
York County

Technical assistance was also steadily available through FEMA Disaster Assistance Employees (DAEs). Depending on their areas of expertise, they have been deployed in Maine to assist in project identification, planning guidance, hazard analysis and/or to provide additional technical information.

Local Plan Integration	
Requirement §201.4(c)(4)(ii) ***Local Plan Integration.*** *[The section on the Coordination of Local Mitigation Planning must include a] description of the state process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan.*	
Element	*A. Does the new or updated plan provide a description of the process and timeframe the state established to review local plans?*
	B. Does the new or updated plan provide a description of the process and timeframe the state established to coordinate and link local plans to the State Mitigation Plan?

A. Description of Process and Timeframe to Review County Multi-Jurisdiction Plans

For the first time in 10 years, the multi-jurisdiction plans were updated at a similar time to when the state hazard mitigation plan was being updated (2012-2013). This allowed for better roll-up of information from the county multi-jurisdiction plans from then moving forward. As previously described in the risk assessment, MEMA provided guidance so that the county plans followed a standardized format. MEMA reviewed each section of the plans as they were completed and, where warranted, suggested changes to better address the requirements.

B. Description of Process and Timeframe to Coordinate and Link Local Plans to the State Mitigation Plan

As previously described, MEMA developed plan guidance in 2009 that the counties used to update their multi-jurisdictional hazard mitigation plans between late 2009 and the end of 2012. The guidance required consistent formats for easier comparisons. These included checklists for participation in the planning section and profiling each hazard in the “location, extent, occurrence, probability” sequence required by the federal code in the risk section. This greatly facilitated the state review process of the county plans and the incorporation of relevant information from them into the state plan.

Prioritizing Local Assistance	
Requirement §201.4(c)(4)(iii): ***Prioritizing Local Assistance.*** *[The section on the Coordination of Local Mitigation Planning must include] criteria for prioritizing communities and local jurisdiction that would receive planning and project grants under available funding programs, Which should include consideration for communities with the highest risks, repetitive loss properties, and most intense development pressures.* *Further, that for non-planning grants, a principal criterion for prioritizing grants shall be the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated costs.*	
Requirement §201.4(d): (The) Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities…	
Element	*A. Does the new or updated plan provide a description of the criteria for prioritizing those communities and local jurisdictions that would receive planning and project grants under available mitigation funding programs?*
	B. For the new or updated plan, do the prioritization criteria include, for non-planning grants, the consideration of the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated costs?
	C. For the new or updated plan, do the criteria include considerations for communities with the highest risk?
	D. For the new or updated plan, do the criteria include considerations for repetitive loss properties?
	C. For the new or updated plan, do the criteria include considerations for communities with the most intense development pressure?

A. Description of Criteria for Prioritizing Jurisdictions that Would Receive Planning and Project Grants

The criteria for planning and project grants are specific and are spelled out in the Administrative Plan that is at the end of this section. The latest approved Administration Plan from June 9, 2015 for DR-4208 is represented from pages 5-5 on. MEMA is currently waiting for approval on Administrative Plans for DR-4354 and DR-4367. All plans clearly identify the following factors:

- All projects must have a benefit/cost ratio of at least one
- Eligibility
- Applicant notification
- Project identification
- Application procedures
- Review, ranking and selection of projects
- Project management, including closeout

B. Consideration of Cost Benefit Analysis

The cost benefit criteria are heavily stressed in the following ways:

- stressed in all field work and technical assistance meetings
- stressed in mailings to towns announcing new rounds of hazard mitigation funding
- stressed in MEMA's "Grant Development Workshops"
- stressed in MEMA's brochures and handouts
- It has been prominent on the YES/NO eligibility page on MEMA's web site for ten years

C. Consideration of Communities with Highest Risk

See Section on the "Review, Ranking and Selection of Projects" on page 5-12.

D. Consideration for Communities with Repetitive Loss Properties

A few communities with repetitive loss properties were identified in the updated versions of the county hazard mitigation plans. When potential projects meet the new benefit to cost analysis (BCA), and where communities are willing to apply on behalf of the owners, applications with scores of 70 or greater from the Review Council are forwarded to FEMA for funding consideration.

E. Consideration for Communities with Most Intense Development Pressure

The strategy for considering which communities need the most assistance is based on jurisdictions with the most repetitive damages as evidenced by declarations, public assistance records, and grant requests.

SECTION 6 – PLAN MAINTENANCE PROCESS

Monitoring, Evaluating, and Updating the Plan	
*Requirement §201.4(c)(5)(i) [The Standard State Plan Maintenance Process **must** include an] established method and schedule for monitoring, evaluating, and updating the Plan.*	
Element	*A. Does the new or updated plan describe the method and schedule for monitoring the plan? (e.g., identifies the party responsible for monitoring, includes schedule for reports, site visits, phone calls, and/or meetings)*
	B. Does the new or updated plan describe the method and schedule for evaluating the plan? (e.g., identifies the party responsible for evaluating the plan, includes the criteria used to evaluate the plan)
	C. Does the new or updated plan describe the method and schedule for updating the plan?
	D. Does the updated plan include an analysis of whether the previously approved plan's methods and schedule worked, and what elements or processes, if any, were changed?

A. Monitoring the Plan

Since mitigation actions are now tied to the goals in the Plan, Section 4 of the Plan has been monitored monthly as part of regular meetings with county and state officials, after significant weather events, and also after Disaster Declarations as described in the next portion on "Activities." As previously noted in the Planning section, the county directors meet monthly at MEMA and immediate concerns about the Plan can be addressed then. The public is on occasion in attendance to state or county meetings, offering the public the opportunity to provide input to the plan. Lastly, the Plan has resided on the MEMA website since 2010, giving the public immediate access to all State Hazard Mitigation Plan information.

B. Evaluating the Plan

As before, the Plan will also be monitored relevant to any disasters (and new lessons learned, especially as described in the planning section) or new legislation. Reports are due on a quarterly basis as part of both MEMA and FEMA protocols. MEMA's evaluation of the Plan will be based on state needs, budget, laws or new federal guidelines. It will be updated as needed to reflect hazard changes, additional mapping resources, regulatory changes or to generally improve mitigation program management.

C. Updating the Plan

The Plan will continue to be updated every five years. To accomplish this, it will be reviewed on an annual basis by the State Hazard Mitigation Officer and the Senior Planner. A review will occur after the winter and usual spring flooding months to properly assess any changing storm impacts and to review reports from the River Flow Advisory Commission. It will also be in conjunction with 2nd Quarter Work Reports, when the Mitigation Officer would normally report on any mitigation activities within the agency.

D. Evaluation of Whether Previous Plan's Methods and Schedules Worked

The previous plan's methods and schedules worked reasonably well, but some adjustments are needed to ensure greater consistency between plans. To expedite the planning process, in 2009 MEMA developed a guide for the preparation of hazard mitigation plans so that as county or University of Maine plans were updated, they will follow the same format, thus allowing better coordination between local

plans and the State Plan. The guide has proven to be extremely beneficial and simplified the process of updating both the 2013 and 2018 State Hazard Mitigation Plan. Further standardization is still needed to include one methodology for assessing financial impacts of the profiled hazards.

Monitoring Progress of Mitigation Activities	
Requirement §201.4(c)(5)(ii) [The Standard State Plan Maintenance Process must include a] system for monitoring implementation of mitigation measures (actions) and project closeouts.	
Requirement §201.4(c)(5)(iii) Monitoring Progress of Mitigation Activities [The Standard State Plan Maintenance Process must include a] system for reviewing progress on achieving goals as well as activities and projects in the Mitigation Strategy.	
Element	*A. Does the new or updated plan describe how mitigation measures and project closeouts will be monitored?*
	B. Does the new or updated plan identify a system for reviewing progress on achieving goals in the Mitigation Strategy?
	C. Does the new or updated plan describe any modifications, if any, to the system identified in the previously approved plan to track the initiation, status and completion of mitigation activities?
	D. B. Does the new or updated plan identify a system for reviewing progress on implementing activities and projects of the Mitigation Strategy?
	E. Does the updated plan discuss if mitigation actions were implemented as planned?

A. How Mitigation Measures and Closeouts will be Monitored

PDM, HMGP, and FMA grant project activities have been monitored monthly according to Section 8, Project Management of the State's Hazard Mitigation Grant Program Administrative Plan. This includes the administration, roles and responsibilities, and financial administration of projects. MEMA has developed spreadsheets for tracking the status of plans and projects. The State Administration Plan has been updated after every declaration for the last two decades. After the February 2013 blizzard declaration (DR-4108) it was decided that, going forward, the cover of the plan and footers would be named by the declaration number instead of a "version number."

Due to resource limitations, and the previously described distances across the state, site visits will usually be limited to the pre-application and final inspection process. Wherever possible, multiple site visits will be the norm to keep a "working inventory" and to reduce travel time and costs. Phone calls will substitute for travel or face-to-face meetings in many cases. However, complex projects, such as, but not limited to acquisition/demolition, will receive much more frequent monitoring based on circumstances.

Specifically, the close out process includes the following steps:

- Monthly or quarterly reports (depending on size and scope of project)
- Matching of invoices to expenses
- Final site inspection (dual inspection by MEMA and FEMA whenever possible)
- Final documents signed by sub-grantee
- Written request to MEMA business office to pay final amount
- Written notification to sub-grantee that payment has been processed
- Written notification to FEMA that the project has been closed

B. System for Reviewing Progress on Achieving Goals in the Mitigation Strategy

Since mitigation activities will be occurring at the local and state levels, there will be two processes for monitoring progress. For local activities, the County Directors will provide annual updates to the Mitigation Planner and/or as part of the agenda at one of the above referenced monthly meetings. Progress of state mitigation activities will be coordinated on an annual basis or after a Disaster Declaration by TELCOMs between the Mitigation Planner and the agencies identified in the State Capability Assessment table.

C. Modifications to Track Initiation, Status and Completion of Mitigation Activities

The current system used to track the initiation, status and completion of mitigation activities appears to be working well. No modifications are proposed, other than the timeframes noted above. If any deficiencies are identified, they will be addressed in the new HMA Plan.

D. System for Reviewing Progress on Implementing Activities and Projects

The "Goals/Objectives and Strategic Measures (Actions)" table in *Section 4 – Mitigation Strategy* contains a column entitled "Status Report." As each action is completed, the status report column is updated.

E. Implementation of Mitigation Actions from Previous Plan

Refer to the "Status Report" column contained in the "Goals/Objectives and Strategic Measures (Actions)" table in *Section 4* of this plan. The "Status Report" dictates the implementation of mitigation efforts, and summarizes how hazard mitigation capabilities have changed since the 2013 plan (if relevant).

APPENDIX A:

COUNTY HAZARD MITIGATION PLAN

FEMA APPROVAL LETTERS

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

APR 0 5 2019

Angela Molino, Director
Androscoggin County Emergency Management
2 College Street
Lewiston, ME 04240

Dear Director Molino:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region I Mitigation Division, Risk Analysis Branch has approved the Androscoggin County Hazard Mitigation Plan Update effective **March 18, 2019** through **March 17, 2024** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

This plan approval includes the following participating jurisdictions:

- Auburn
- Durham
- Greene
- Leeds
- Lewiston
- Lisbon
- Livermore
- Livermore Falls
- Mechanic Falls
- Minot
- Poland
- Sabattus
- Turner
- Wales

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region I Mitigation Division for approval every five years in order to remain eligible for FEMA mitigation grant funding.

Thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms

cc:
Anne Fuchs, Maine State Hazard Mitigation Officer

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

APR 12 2017

Darren R. Woods, Director
Aroostook County EMA
158 Sweden Street
Caribou, ME 04730

Dear Mr. Woods:

We would like to congratulate the Aroostook County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Aroostook County Hazard Mitigation Plan – 2016 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Aroostook Band of Micmacs
Aroostook Unorganized Territory
Town of Allagash
Town of Ashland
Town of Blaine
Town of Bridgewater
City of Caribou
Town of Mapleton
Town of Caswell
Town of Mapleton
Cary Plantation
Town of Dyer Brook
Town of Eagle Lake
Town of Easton
Town of Fort Fairfield
Town of Fort Kent
Town of Frenchville
Garfield Plantation
Town of Grand Isle
Town of Hamlin
Town of Haynesville
Town of Hodgdon
Town of Houlton
Town of Island Falls
Town of Limestone
Town of Linneus
Town of Littleton
Town of Madawaska
Town of Mapleton
Town of Mars Hill
Town of Monticello
Town of New Sweden
Town of Oxbow
Town of Perham
Town of Portage
City of Presque Isle
Reed Plantation
Town of St. Agatha
Town of St. Francis
Town of St. John Plantation
Town of Sherman
Town of Van Buren
Town of Washburn
Town of Wallagrass
Town of Washburn
Town of Westfield
Town of Westmanland
Town of Weston
Winterville Plantation
Town of Woodland

APR 12 2017

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

The Aroostook County Hazard Mitigation Plan – 2016 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of February 18, 2016** in order to maintain eligibility for mitigation grant funding. We encourage Aroostook County's participating communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms
cc:

JoAnn Mooney, State Hazard Mitigation Officer, Maine
Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator
Jonathan P. Cote, Aroostook Band of Micmacs Emergency Management Coordinator
Doug Beaulieu, Aroostook UT County Administrator

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

APR 12 2017

James Budway, Director
Cumberland County EMA
22 High Street – Unit 1
Windham, ME 04062

Dear Mr. Budway:

We would like to congratulate the participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Cumberland County, ME Hazard Mitigation Plan – 2017 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Baldwin	Falmouth	Long Island	Scarborough
Bridgton	Freeport	Naples	Sebago
Brunswick	Frye Island	New Gloucester	South Portland
Cape Elizabeth	Gorham	North Yarmouth	Standish
Casco	Gray	Portland	Westbrook
Chebeague	Harpswell	Pownal	Windham
Cumberland	Harrison	Raymond	Yarmouth

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

APR 12 2017

The Cumberland County, ME Hazard Mitigation Plan – 2017 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of April 6, 2017** in order to maintain eligibility for mitigation grant funding. We encourage Cumberland County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms
cc:

JoAnn Mooney, State Hazard Mitigation Officer, Maine Emergency Management Agency
Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

JUN 19 2017

Tim Hardy, Director
Franklin County EMA
140 Main Street
Farmington, ME 04938

Dear Mr. Hardy:

We would like to congratulate the Franklin County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Franklin County Hazard Mitigation Plan – 2016 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Avon	Eustis	New Vineyard	Temple
Carrabassett Valley	Farmington	Phillips	Franklin County UT
Carthage	Industry	Rangeley	Weld
Chesterville	Jay	Rangeley Plantation	Wilton
Coplin Plantation	Kingfield	Sandy River Plantation	
Dallas Plantation	New Sharon	Strong	

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

JUN 19 2017

The Franklin County Hazard Mitigation Plan – 2016 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of June 12, 2017** in order to maintain eligibility for mitigation grant funding. We encourage Franklin County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms
cc:

Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
JoAnn Mooney, State Hazard Mitigation Officer, Maine
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

APR 18 2018

Andrew Sankey, Director
Hancock County EMA
50 State Street
Ellsworth, ME 04605-1924

Dear Mr. Sankey:

We would like to acknowledge the Hancock County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Hancock County, Maine Hazard Mitigation Plan - 2018 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Amherst	Deer Isle	Mount Desert	Surry
Aurora	Eastbrook	Orland	Swans Island
Bar Harbor	Ellsworth	Osborn	Tremont
Blue Hill	Franklin	Otis	Trenton
Brooklin	Frenchboro	Penobscot	UT
Brooksville	Gouldsboro	Sedgwick	Verona Island
Bucksport	Great Pond	Sorrento	Waltham
Castine	Hancock	Southwest Harbor	Winter Harbor
Cranberry Isles	Lamoine	Stonington	
Dedham	Mariaville	Sullivan	

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

APR 18 2018

The Hancock County, Maine Hazard Mitigation Plan - 2018 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of April 3, 2018** in order to maintain eligibility for mitigation grant funding. We encourage Hancock County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms

cc:
Thomas Redstone, Acting State Hazard Mitigation Officer, Maine
Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

MAY 15 2017

Sean Goodwin, Director
Kennebec County EMA
125 State Street
Augusta, ME 04330

Dear Mr. Goodwin:

We would like to congratulate the Kennebec County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Kennebec County Hazard Mitigation Plan – 2016 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Albion	Fayette	Pittston	Waterville
Augusta	Gardiner	Randolph	Wayne
Belgrade	Hallowell	Readfield	West Gardiner
Benton	Litchfield	Rome	Windsor
Chelsea	Manchester	Sidney	Winslow
China	Monmouth	Unity (UT)	Winthrop
Clinton	Mount Vernon	Vassalboro	
Farmingdale	Oakland	Vienna	

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

MAY 15 2017

The Kennebec County Hazard Mitigation Plan – 2016 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of May 12, 2017** in order to maintain eligibility for mitigation grant funding. We encourage Kennebec County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms
cc:
Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
JoAnn Mooney, State Hazard Mitigation Officer, Maine
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

AUG 2 7 2019

Ray Sisk, Director
Knox County EMA
62 Union Street
Rockland, Maine 04841

Dear Director Sisk:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region I Mitigation Division has approved the Knox County, Maine Hazard Mitigation Plan – 2019 Update effective **August 21, 2019** through **August 20, 2024** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

- Appleton
- Camden
- Cushing
- Friendship
- Hope
- Isle au Haut
- Matinicus Isle Plantation
- North Haven
- Owls Head
- Rockland
- Rockport
- St. George
- South Thomaston
- Thomaston
- Union
- Knox County UT
- Vinalhaven
- Warren
- Washington

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for funding will be evaluated according to the eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in the community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region I Mitigation Division for approval every five years in order to remain eligible for FEMA mitigation grant funding.

Thank you for your continued commitment and dedication to risk reduction demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

Captain W. Russ Webster, USCG (Ret.), CEM
Regional Administrator
FEMA Region I

WRW:ms

cc: Anne Fuchs, Maine State Hazard Mitigation Officer

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

JAN 25 2017

JoAnn Mooney
State Hazard Mitigation Officer
Maine Emergency Management Agency
72 State House Station
Augusta, ME 04333-0072

Dear Ms. Mooney:

We would like to congratulate the participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Lincoln County Hazard Mitigation Plan – 2016 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Alna	Edgecomb	Southport
Boothbay	Jefferson	Unorganized Territory
Boothbay Harbor	Monhegan Island Plantation	Waldoboro
Bremen	Newcastle	Westport Island
Bristol	Nobleboro	Whitefield
Damariscotta	Somerville	Wiscasset
Dresden	South Bristol	

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

JAN 25 2017

The Lincoln County Hazard Mitigation Plan – 2016 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of January 13, 2017** in order to maintain eligibility for mitigation grant funding. We encourage Lincoln County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Regional Administrator

PFF: ms
cc:
Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
Tod Hartung, Director, Lincoln County EMA
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

AUG 29 2018

Allyson Hill, Director
Oxford County EMA
26 Western Avenue
South Paris, ME 04281

Dear Ms. Hill:

We would like to acknowledge the Oxford County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Oxford County Hazard Mitigation Plan – 2017 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Andover	Fryeburg	Norway	Roxbury
Bethel	Greenwood	Otisfield	Rumford
Brownfield	Hebron	Oxford County UT	Stoneham
Buckfield	Lovell	Oxford	Sweden
Canton	Mexico	Paris	Waterford
Dixfield	Newry	Peru	West Paris
			Woodstock

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

AUG 2 9 2018

The Oxford County Hazard Mitigation Plan – 2017 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of July 24, 2018** in order to maintain eligibility for mitigation grant funding. We encourage Oxford County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Douglas F. Wolcott Jr.
Acting Deputy Regional Administrator

PFF: ms

cc:

Anne Fuchs, Maine State Hazard Mitigation Officer
Sue Baker, Maine State NFIP Coordinator

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

MAR 0 8 2017

Michelle Tanguay, Director
Penobscot County Emergency Management Agency
97 Hammond Street
Bangor, ME 04401

Dear Ms. Tanguay:

We would like to congratulate the participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Penobscot County Multi-Jurisdictional Hazard Mitigation Plan – 2016 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Alton	Bangor	Bradford	Bradley	Brewer	Burlington
Carmel	Carroll Plantation	Charleston	Chester	Clifton	Corinna
Corinth	Dexter	Dixmont	Drew Plantation	East Millinocket	Eddington
Enfield	Etna	Exeter	Garland	Glenburn	Greenbush
Hampden	Hermon	Holden	Howland	Hudson	Kenduskeag
Lagrange	Lakeville	Lee	Levant	Lincoln	Lowell
Mattawamkeag	Maxfield	Medway	Milford	Millinocket	Mount Chase
Newburgh	Newport	Old Town	Orono	Orrington	Passadumkeag
Patten	Plymouth	Seboeis Plantation	Springfield	Stacyville	Stetson
Veazie	Webster Plantation	Winn	Woodville	Unorganized Territory	

MAR 0 8 2017

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

The Penobscot County Multi-Jurisdictional Hazard Mitigation Plan – 2016 must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of February 6, 2017** in order to maintain eligibility for mitigation grant funding. We encourage Penobscot County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms
cc:

Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
JoAnne Mooney, State Hazard Mitigation Officer, Maine
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

MAR 26 2018

Tom Capraro
Director, Piscataquis County EMA
163 East Main Street
Dover-Foxcroft, ME 04426

Dear Mr. Capraro:

We would like to acknowledge the Piscataquis County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Piscataquis County Hazard Mitigation Plan 2017 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

- Abbot
- Atkinson
- Beaver Cove
- Bowerbank
- Brownville
- Dover-Foxcroft
- Greenville
- Guilford
- Kingsbury Plantation
- Lakeview Plantation
- Medford
- Milo
- Monson
- Parkman
- Piscataquis County Unorganized Territory
- Sangerville
- Sebec
- Shirley
- Wellington
- Willimantic

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

MAR 26 2018

The Piscataquis County Hazard Mitigation Plan 2017 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of March 23, 2018** in order to maintain eligibility for mitigation grant funding. We encourage Piscataquis County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms

cc:

Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

APR 26 2017

Sarah J. Bennett, Director
Sagadahoc County EMA
County Courthouse
752 High Street
Bath, ME 04530

Dear Ms. Bennett:

We would like to congratulate the Sagadahoc County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Sagadahoc County Hazard Mitigation Plan – 2016 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Arrowsic	Georgetown	Perkins Twp UT
Bath	Phippsburg	West Bath
Bowdoin	Richmond	Woolwich
Bowdoinham	Topsham	

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

APR 26 2017

The Sagadahoc County Hazard Mitigation Plan – 2016 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of April 14, 2017** in order to maintain eligibility for mitigation grant funding. We encourage Sagadahoc County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms
cc:

Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
JoAnn Mooney, State Hazard Mitigation Officer, Maine
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

Michael Smith, Director
Somerset County EMA
8 Country Drive
Skowhegan, ME 04976

Dear Director Smith:

The U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA) Region I Mitigation Division, Risk Analysis Branch has approved the Somerset County, ME Hazard Mitigation Plan effective **January 29, 2019** through **January 28, 2024** in accordance with the planning requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, the National Flood Insurance Act of 1968, as amended, and Title 44 Code of Federal Regulations (CFR) Part 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

- Anson
- Canaan
- Detroit
- Harmony
- Pittsfield
- Somerset County UT
- Bingham
- Caratunk
- Embden
- Palmyra
- Smithfield
- Solon

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The plan must be updated and resubmitted to the FEMA Region I Mitigation Division for approval every five years in order to remain eligible for FEMA mitigation grant funding.

Thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms

cc:

Anne Fuchs, Maine State Hazard Mitigation Officer
Sue Baker, Maine State NFIP Coordinator

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

MAY 25 2017

Dale Rowley, Director
Waldo County EMA
4 Public Safety Way
Belfast, ME 04915

Dear Mr. Rowley:

We would like to congratulate the Waldo County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the Waldo County Hazard Mitigation Plan - 2017 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Freedom	Lincolnville	Palermo	Searsport
Knox	Montville	Prospect	Unity
Liberty	Northport	Searsmont	UT of Waldo
			Winterport

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

MAY 25 2017

The Waldo County Hazard Mitigation Plan - 2017 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of May 15, 2017** in order to maintain eligibility for mitigation grant funding. We encourage Waldo County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms
cc:

Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
JoAnn Mooney, State Hazard Mitigation Officer, Maine
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

JAN 0 7 2019

Michael Hinerman, Director
Washington County EMA
28 Center Street
PO Box 297
Machias, ME 04654

Dear Mr. Hinerman:

Thank you for the opportunity to review the Washington County ME Hazard Mitigation Plan 2018 Revision. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I has evaluated the plan for compliance with 44 C.F.R. pt. 201. The plan satisfactorily meets all of the mandatory requirements set forth by the regulations.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan. Newly approved jurisdictions are highlighted in **bold**.

- Addison
- Alexander
- Baileyville
- Calais
- Charlotte
- Cherryfield
- Columbia
- Columbia Falls
- Cooper
- Danforth
- Deblois
- East Machias
- Eastport
- Grand Lake Stream
- Jonesboro
- Jonesport
- Lubec
- Machias
- **Machiasport**
- Marshfield
- Meddybemps
- Milbridge
- Pembroke
- Princeton
- Robbinston
- Steuben
- Topsfield
- Whiting

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

The Washington County ME Hazard Mitigation Plan 2018 Revision must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of October 5, 2018** in order to maintain eligibility for mitigation grant funding. We encourage Washington County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

JAN 0 7 2019

The plan must be updated and resubmitted to the FEMA Region I Mitigation Division for approval every five years in order to remain eligible FEMA for mitigation grant funding.

Thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please contact Melissa Surette at (617) 956-7559 or Melissa.Surette@fema.dhs.gov.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms

cc: Anne Fuchs, Maine State Hazard Mitigation Officer
Sue Baker, Maine State NFIP Coordinator

U.S. Department of Homeland Security
FEMA Region I
99 High Street, Sixth Floor
Boston, MA 02110-2132

FEMA

APR 26 2017

Art Cleaves, Director
York County EMA
149 Jordan Springs Road
Alfred, ME 04002

Dear Mr. Cleaves:

We would like to congratulate the York County participating jurisdictions and the State of Maine for their dedication and commitment to mitigation planning. The Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region I Mitigation Planning Team has completed its review of the York County, Maine Hazard Mitigation Plan - 2015 Update and determined it meets the requirements of 44 C.F.R. Pt. 201.

This plan approval includes the following participating jurisdictions that provided copies of their resolutions adopting the plan.

Acton	Dayton	Limerick	Parsonsfield
Alfred	Eliot	Limington	Saco
Arundel	Hollis	Lyman	Sanford
Berwick	Kennebunk	Newfield	Shapleigh
Biddeford	Kennebunkport	North Berwick	South Berwick
Buxton	Kittery	Ogunquit	Waterboro
Cornish	Lebanon	Old Orchard Beach	Wells
			York

With this plan approval, the communities listed above are eligible to apply to the Maine Emergency Management Agency for mitigation grants administered by FEMA. Requests for mitigation funding will be evaluated individually according to the specific eligibility requirements identified for each of these programs. A specific mitigation activity or project identified in your community's plan may not meet the eligibility requirements for FEMA funding; even eligible mitigation activities or projects are not automatically approved.

Approved mitigation plans are eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Complete information regarding the CRS can be found at http://www.fema.gov/national-flood-insurance-program-community-rating-system, or through your local floodplain administrator.

APR 26 2017

The York County, Maine Hazard Mitigation Plan - 2015 Update must be reviewed, revised as appropriate, and resubmitted to FEMA for approval within **five years of the plan approval date of April 24, 2017** in order to maintain eligibility for mitigation grant funding. We encourage York County communities to continually update the plan's assessment of vulnerability, adhere to its maintenance schedule, and implement, when possible, the mitigation actions proposed in the plan.

Once again, thank you for your continued dedication to public service demonstrated by preparing and adopting a strategy for reducing future disaster losses. Should you have any questions, please do not hesitate to contact Melissa Surette at (617) 956-7559.

Sincerely,

Paul F. Ford
Acting Regional Administrator

PFF: ms
cc:

Dwane Hubert, Mitigation, Preparedness & Recovery Director, Maine
JoAnn Mooney, State Hazard Mitigation Officer, Maine
Thomas Redstone, Assistant State Hazard Mitigation Officer, Maine
Sue Baker, Maine State NFIP Coordinator

Enclosure

APPENDIX B:
Natural Hazards Risk Assessment

State Risk Assessment (Based on Participation From 16 Counties)

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	Type	Cumulative Total of 16 Counties	Cumulative Total of 16 Counties	Cumulative Total of 16 Counties	Cumulative Total of 16 Counties	Cumulative Total of 16 Counties		Total Score
Wildfire	Natural	42	32	22	36	40	32.5	75
Flooding	Natural	45	32	17	34	30	28.25	73
Severe Summer Weather	Natural	47	29	19	27	28	25.75	73
Severe Winter Weather	Natural	45	32	17	27	22	24.5	70
Hurricane	Natural	31	33	20	33	30	29	60
Drought	Natural	36	23	16	25	29	23.25	59
Earthquake	Natural	27	26	19	27	20	23	50
Erosion/Coastal Flooding	Natural	28	19	16	22	23	20	48
Landslides	Natural	18	18	15	20	22	18.75	37

APPENDIX B:
Natural Hazards Risk Assessment

Androscoggin County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	2	2	1	3	3	2.25	4
Flooding	Natural	3	2	1	2	2	1.75	5
Severe Summer Weather	Natural	3	2	2	1	2	1.75	5
Severe Winter Weather	Natural	3	2	1	1	1	1.25	4
Hurricane	Natural	2	2	1	2	2	1.75	4
Drought	Natural	2	1	1	1	2	1.25	3
Earthquake	Natural	1	3	2	3	2	2.5	4
Erosion/Coastal Flooding	Natural	1	1	1	1	1	1	2
Landslides	Natural	1	1	1	1	1	1	2

APPENDIX B:
Natural Hazards Risk Assessment

Aroostook County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	2	2	2	3	3	2.5	5
Flooding	Natural	2	2	1	2	2	1.75	4
Severe Summer Weather	Natural	2	2	1	1	1	1	3
Severe Winter Weather	Natural	2	2	1	2	2	1.75	4
Hurricane	Natural	1	1	1	1	1	1	2
Drought	Natural	2	2	1	2	2	1.75	4
Earthquake	Natural	2	2	1	2	1	1.5	4
Erosion/Coastal Flooding	Natural	1	1	1	1	1	1	2
Landslides	Natural	1	1	1	1	1	1	2

APPENDIX B:
Natural Hazards Risk Assessment

Cumberland County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	1	1	1	1	3	1.5	3
Flooding	Natural	3	1	1	2	1	1.25	4
Severe Summer Weather	Natural	3	1	1	1	1	1	4
Severe Winter Weather	Natural	3	1	1	1	1	1	4
Hurricane	Natural	2	2	1	2	2	1.75	4
Drought	Natural	2	1	1	1	2	1.25	3
Earthquake	Natural	1	1	1	1	1	1	2
Erosion/Coastal Flooding	Natural	3	1	1	2	2	1.5	5
Landslides	Natural	1	1	1	1	3	1.5	3

APPENDIX B:
Natural Hazards Risk Assessment

Franklin County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	3	1	3	3	2.5	6
Flooding	Natural	3	2	1	2	2	1.75	5
Severe Summer Weather	Natural	3	2	1	3	3	2	5
Severe Winter Weather	Natural	3	2	1	2	2	1.75	5
Hurricane	Natural	2	2	1	2	2	1.75	4
Drought	Natural	3	2	1	2	2	1.75	5
Earthquake	Natural	1	1	1	1	1	1	2
Erosion/Coastal Flooding	Natural	1	1	1	1	1	1	2
Landslides	Natural	1	1	1	1	1	1	2

APPENDIX B:
Natural Hazards Risk Assessment

Hancock County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	3	2	3	3	2.75	6
Flooding	Natural	1	2	1	2	2	2	3
Severe Summer Weather	Natural	3	2	2	2	2	2	5
Severe Winter Weather	Natural	3	2	1	2	2	1.75	5
Hurricane	Natural	2	3	2	3	2	2.5	5
Drought	Natural	2	1	1	1	2	1.25	3
Earthquake	Natural	3	2	1	2	1	1.5	5
Erosion/Coastal Flooding	Natural	1	1	1	2	2	1.5	3
Landslides	Natural	1	2	1	2	2	1.75	3

APPENDIX B:
Natural Hazards Risk Assessment

Kennebec County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	2	1	1	2	2	2	4
Flooding	Natural	3	2	1	2	1	1.5	5
Severe Summer Weather	Natural	3	2	1	2	2	1.75	5
Severe Winter Weather	Natural	2	2	1	2	1	1.5	4
Hurricane	Natural	2	2	1	2	1	1.5	4
Drought	Natural	3	1	1	2	2	1.5	5
Earthquake	Natural	1	2	3	3	2	2.5	4
Erosion/Coastal Flooding	Natural	1	1	1	1	1	1	2
Landslides	Natural	1	1	1	1	1	1	2

APPENDIX B:
Natural Hazards Risk Assessment

Knox County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	2	1	2	2	1.75	5
Flooding	Natural	3	2	1	2	2	1.75	5
Severe Summer Weather	Natural	3	2	1	2	1	1.5	5
Severe Winter Weather	Natural	3	2	1	2	1	1.5	5
Hurricane	Natural	2	2	1	2	2	1.75	4
Drought	Natural	2	1	1	1	1	1	3
Earthquake	Natural	1	1	1	1	1	1	2
Erosion/Coastal Flooding	Natural	2	2	1	2	1	1.5	4
Landslides	Natural	2	2	1	2	1	1.5	4

APPENDIX B:
Natural Hazards Risk Assessment

Lincoln County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	2	2	3	3	2.5	6
Flooding	Natural	3	2	1	1	1	1.25	4
Severe Summer Weather	Natural	3	2	3	2	2	2.25	5
Severe Winter Weather	Natural	3	2	1	2	1	1.5	5
Hurricane	Natural	2	2	1	2	2	1.75	4
Drought	Natural	2	2	1	3	1	1.75	4
Earthquake	Natural	2	3	3	3	1	2.5	5
Erosion/Coastal Flooding	Natural	1	1	1	1	1	1	2
Landslides	Natural	1	2	1	3	1	1.75	3

APPENDIX B:
Natural Hazards Risk Assessment

Oxford County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	2	1	3	2	2	5
Flooding	Natural	3	2	1	3	2	2	5
Severe Summer Weather	Natural	3	2	1	2	2	1.75	5
Severe Winter Weather	Natural	3	2	1	2	2	1.75	5
Hurricane	Natural	2	2	1	2	2	1.75	4
Drought	Natural	2	2	1	1	2	1.5	4
Earthquake	Natural	3	1	1	1	1	1	4
Erosion/Coastal Flooding	Natural	1	1	1	1	1	1	2
Landslides	Natural	1	1	1	1	1	1	2

APPENDIX B:
Natural Hazards Risk Assessment

Penobscot County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	1	1	1	1	1	4
Flooding	Natural	3	2	1	2	2	1.75	5
Severe Summer Weather	Natural	3	1	1	1	1	1	4
Severe Winter Weather	Natural	3	2	1	2	1	1.5	5
Hurricane	Natural	2	2	1	2	1	1.5	4
Drought	Natural	3	1	1	1	1	1	4
Earthquake	Natural	1	1	1	1	1	1	2
Erosion/Coastal Flooding	Natural	2	1	1	1	1	1	3
Landslides	Natural	1	1	1	1	1	1	2

APPENDIX B:
Natural Hazards Risk Assessment

Piscataquis County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	2	3	2	3	2.5	6
Flooding	Natural	3	2	1	2	2	1.75	5
Severe Summer Weather	Natural	3	2	1	2	2	1.75	5
Severe Winter Weather	Natural	3	2	1	1	1	1.25	4
Hurricane	Natural	1	1	1	1	1	1	2
Drought	Natural	2	2	1	2	2	1.75	4
Earthquake	Natural	2	2	1	2	2	1.75	4
Erosion/Coastal Flooding	Natural	1	1	1	1	1	1	2
Landslides	Natural	1	1	1	1	2	1.25	2

APPENDIX B:
Natural Hazards Risk Assessment

Sagadahoc County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	1	1	1	1	1	4
Flooding	Natural	3	2	1	3	2	2	5
Severe Summer Weather	Natural	3	2	1	1	1	1.25	4
Severe Winter Weather	Natural	3	2	1	1	1	1	4
Hurricane	Natural	2	1	1	2	2	2	4
Drought	Natural	3	1	1	1	2	1.25	4
Earthquake	Natural	3	1	1	1	1	1	4
Erosion/Coastal Flooding	Natural	3	1	1	1	1	1	4
Landslides	Natural	1	1	1	1	1	1	2

APPENDIX B:
Natural Hazards Risk Assessment

Somerset County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	2	1	1	2	1.5	5
Flooding	Natural	3	2	1	2	2	1.75	5
Severe Summer Weather	Natural	3	2	1	2	2	1.75	5
Severe Winter Weather	Natural	3	2	1	1	1	1.25	4
Hurricane	Natural	1	2	1	2	2	1.75	3
Drought	Natural	1	1	1	1	2	1.25	2
Earthquake	Natural	1	2	1	2	2	1.75	3
Erosion/Coastal Flooding	Natural	1	1	1	1	2	1.25	2
Landslides	Natural	1	1	1	1	1	1	2

APPENDIX B:
Natural Hazards Risk Assessment

Waldo County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	2	1	2	3	2	5
Flooding	Natural	3	2	1	2	2	1.75	5
Severe Summer Weather	Natural	3	1	1	1	1	1	4
Severe Winter Weather	Natural	2	2	1	2	1	1.5	4
Hurricane	Natural	2	3	3	3	3	3	5
Drought	Natural	2	1	1	2	2	1.5	4
Earthquake	Natural	1	1	1	1	1	1	2
Erosion/Coastal Flooding	Natural	3	1	1	1	2	1.25	4
Landslides	Natural	1	1	1	1	2	1.25	2

APPENDIX B:
Natural Hazards Risk Assessment

Washington County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	3	3	1	2	3	2.25	5
Flooding	Natural	3	2	1	2	2	1.75	5
Severe Summer Weather	Natural	3	2	1	2	3	2	5
Severe Winter Weather	Natural	3	2	1	2	2	1.75	5
Hurricane	Natural	3	2	1	2	2	1.75	5
Drought	Natural	3	2	1	2	3	2	5
Earthquake	Natural	3	1	1	1	1	1	4
Erosion/Coastal Flooding	Natural	3	1	1	3	3	2	5
Landslides	Natural	2	1	1	2	3	1.75	4

APPENDIX B:
Natural Hazards Risk Assessment

York County Risk Assessment

Risk Assessment Tool (RAT)		Likelihood	Vulnerability					
			Continuity of Operations	People	Property	Environment	Composite	
		Likelihood of one incident within a defined period of time	Impact to the operations of essential services and/or critical infrastructure	Impact to people in terms of casualties and/or fatalities	Impact in terms of damage and/or destruction to residential and commercial property	Impact to natural resources	Average of all four impact areas	
Hazard	**Type**	**Unlikely** - 1 point: within the next 10 years or more; **Likely** - 2 points: within the next 6-10 years; **Highly likely** - 3 points: within the next 5 years or less	**Low or no impact** -1 point; **Temporary disruption** - 2 points; **Permanent damage** - 3 points	**Low or no casualties and/or fatalities** - 1 point; **Multiple casualties and/or fatalities** - 2 points; **Significant casualties and/or fatalities** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points	**Low or no damage** - 1 point; **Temporary damage** - 2 points; **Permanent destruction** - 3 points		**Total Score**
Wildfire	Natural	2	3	3	3	3	3	5
Flooding	Natural	3	3	2	3	3	2.75	6
Severe Summer Weather	Natural	3	2	1	2	2	1.75	5
Severe Winter Weather	Natural	3	3	2	2	2	2.25	5
Hurricane	Natural	3	3	3	3	3	3	6
Drought	Natural	1	2	1	2	1	1.5	3
Earthquake	Natural	1	2	1	2	1	1.5	3
Erosion/Coastal Flooding	Natural	3	3	2	3	3	2.75	6
Landslides	Natural	1	1	1	1	1	1	2

State of Maine

Hazard Mitigation Grant Program

Administrative Plan

DR-4354 / DR-4367

August 2019

Section 1: Introduction

Table of Contents

1.2 Purpose

The purpose of the State Administrative Plan is to outline how the Maine Emergency Management Agency (MEMA) will administer the Hazard Mitigation Grant Program (HMGP) on behalf of the State of Maine.

1.3 Authorities and References

The State will comply with the following:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, Pub. L. No. 93-288, §§ 322 and 404 (1974) (codified as amended at 42 U.S.C. § 5165 and 5170c)
- Flood Disaster Protection Act of 1973, Pub. L. No. 93-234, §§ 102 and 202 (1973) (codified as amended at 42 U.S.C. §§ 4012a and 4106)
- Single Audit Act Amendments of 1996, 31 U.S.C. §§ 7501-7507
- 44 C.F.R. Part 80 (Property Acquisition and Relocation for Open Space)
- 44 C.F.R. Part 201 (Mitigation Planning)
- 44 C.F.R. Part 206, Subparts A (General), B (Declaration Process), M (Minimum Standards), and N (Hazard Mitigation Grant Program)
- Disaster Recovery Reform Act of 2018; Interim Policy #104-11-1-HMGP-MC (Management Costs)
- 2 C.F.R. Part 200 (Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards)
- 31 C.F.R. pt. 205 (Rules and Procedures for Efficient Federal-State Funds Transfers)
- Federal Emergency Management Agency, *Hazard Mitigation Assistance Guidance* (2015)
- FEMA-State Agreement
- Treasury-State Agreement (**Only if Maine's Treasury State Agreement includes the HMGP)
- Department of Homeland Security Standard Terms and Conditions

1.4 Definitions

Applicant: The State agency, local government, Indian tribal government, or eligible private nonprofit organization, submitting an application to the recipient for assistance under HMGP.

Application: the formal request for funding, submitted to FEMA by the State of Maine.

Benefit-Cost Analysis (BCA): All projects must be cost effective and substantially reduce the risk of

future damage, hardship, loss, or suffering resulting from a major disaster, as calculated by FEMA's BCA Toolkit.

Governor's Authorized Representative (GAR): The person empowered by the Governor to execute, on behalf of the State, all necessary documents for FEMA disaster assistance and who shall administer the FEMA disaster assistance on behalf of the State and local governments and other non-Federal entities. The GAR's responsibilities include, among other things, providing technical assistance to eligible applicants and ensuring they are aware of available assistance and the required application documents.

Federal Award: The Federal financial assistance that a non–Federal entity receives directly from a Federal awarding agency or indirectly from a pass-through entity. Under the HMGP, FEMA provides Federal financial assistance in the form of a grant to the State of Maine.

Hazard Mitigation Grant Program (HMGP): the program authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

(Local) Hazard Mitigation Plan (HMP): is the mitigation plan required for local government acting as a Subrecipient as a condition of receiving a project sub-grant under the HMGP as outlined in 44 CFR 201.6. All local mitigation plans in Maine are multi-jurisdictional, and are managed by the county emergency management agencies.

(State) Hazard Mitigation Plan (HMP): is the hazard mitigation plan approved under 44 CFR part 201, as a condition of receiving Stafford Act assistance outlined in § 201.4.

Indirect Costs: Means those costs incurred for a common or joint purpose benefitting more than one cost objective, and not readily assignable to the cost objectives specifically benefitted, without effort disproportionate to the results achieved

Interagency Hazard Mitigation Team (IHMT): the mitigation team that is activated following declared disasters.

Management Costs: any indirect cost, any indirect administrative cost, and any other administrative expense associated with a specific project under a major disaster, emergency or disaster preparedness or mitigation activity or measure.

Preliminary Damage Assessment (PDA): a mechanism used to determine the impact and magnitude of damage and the resulting unmet needs of individuals, businesses, the public sector, and the community. PDA's are performed jointly by combining State and Federal personnel resources.

Project: Any mitigation measure or action proposed to reduce the risk of future damage, hardship, loss, or suffering from disasters.

Recipient: a government to which a grant is awarded and which is accountable for use of the funds provided. The Recipient is the entire legal entity even if only a particular component of the entity is designated in the grant award document. The State of Maine is the Recipient except as noted.

State Hazard Mitigation Officer (SHMO): the official representative of State government who is the primary point of contact with FEMA, other Federal agencies, and local governments in mitigation

planning and implementation of mitigation programs and activities under the Stafford Act.

State Hazard Mitigation Review Council: The State Hazard Mitigation Officer and their appointed panel. The Council represents appropriate State agencies and other representatives who assist the SHMO in identifying and ranking potential impacts.

Subaward: means an award provided by a pass-through entity to a subrecipient for the subrecipient to carry out part of a Federal award received by the pass-through entity. It does not include payments to a contractor or payments to an individual that is a beneficiary of a Federal program. A subaward may be provided through any form of legal agreement, including an agreement that the pass-through entity considers a contract.

Subrecipient: Subrecipient means a non–Federal entity that receives a subaward from a pass-through entity to carry out part of a Federal program; but does not include an individual that is a beneficiary of such program.

Section 2: Responsibilities

2.1 State Government

1. 44 CFR part 206; Subpart N, § 206.433 a-c states:
   a. Recipient: The State will be the Recipient to which funds are awarded and will be accountable for the use of those funds.
   b. Priorities: The State will determine priorities for funding. This determination must be made in conformance with 44 CFR § 206.435.
   c. State Hazard Mitigation Officer: The State must appoint a Hazard Mitigation Officer who serves as the responsible individual for all matters related to the Hazard Mitigation Grant Program, per 44 CFR § 206.435 (c).
   d. Administrative Plan: The State must have an approved Administrative Plan for the Hazard Mitigation Grant Program per 44 CFR § 206.437.
2. MEMA, within the Department of Defense, Veterans, and Emergency Management (DVEM), is designated to administer all Hazard Mitigation Programs including Section 404 programs as defined in this Plan.
3. The State Hazard Mitigation Team members are designated by the appropriate Directors or Commissioners of State Agencies having hazard mitigation expertise and responsibilities. State agencies represented on the State Hazard Mitigation Team are listed in Appendix B to this plan.
4. In the event of a catastrophic disaster, MEMA will contract with consultants and subject matter experts to augment the existing staff.
5. The State Hazard Mitigation Officer, within MEMA, is designated to manage activities of the State Hazard Mitigation Team and is responsible for project management activities including but not limited to:
   a) Fulfilling the various requirements for pass-through entities set forth at 2 C.F.R. § 200.331;
   b) Identifying and notifying potential applicants of the availability of HMGP funding and providing them information on the application process, program eligibility, and key deadlines;
   c) Providing technical assistance to applicants;
   d) Determining applicant eligibility;
   e) Establishing priorities for the selection of mitigation projects;
   f) Conducting environmental and historic preservation reviews;
   g) Submitting a HMGP application meeting the requirements set forth at 44 C.F.R. § 206.436;
   h) Submitting initial, interim, and final requests for HMGP management costs on behalf of the state in compliance with FEMA Policy #104-11-1-HMGP-MC (Interim).
   i) Monitoring, evaluating, and disbursing Subrecipient management costs in compliance with FEMA Policy #104-11-1-HMGP-MC (Interim).
   j) Monitoring and evaluating the progress and completion of projects and ensuring projects are completed within the project completion deadlines.
   k) Making project payments to applicants.
   l) Reviewing and approving cost overruns.
   m) Preparing and submitting quarterly and final federal financial reports and performance reports.
   n) Completing all project closeout, subrecipient closeout, and grant closeout requirements.
   o) Processing appeals.

2.2 Local Government

The local jurisdiction's (Subrecipient) Chief Executive Officer will designate the point(s) of contact on all matters related to the application.

Section 3: Available Funding

1. HMGP Lock-In

   FEMA will determine the funding that it will make available for HMGP by a lock-in, which will act as a ceiling for funds available to the Recipient, including its subrecipients. The level of HMGP funding for a major disaster is based on a percentage of the estimated total federal assistance under the Stafford Act, excluding administrative costs, for that major disaster as detailed in 44 C.F.R. § 206.432.

   a. FEMA will provide an initial estimate of the HMGP lock-in within 30 days of the major disaster declaration or soon thereafter in conjunction with calculation of the preliminary lock-in amount(s) for management costs. This estimate does not represent a minimum or floor amount.
   b. FEMA will provide a revised estimate of the HMGP lock-in within six months of the major disaster declaration or soon thereafter in conjunction with calculation of the 6-month lock-in for management costs. This estimate does not represent a minimum or floor amount.
   c. FEMA will establish the HMGP funding ceiling at 12 months after the date of the major disaster declaration, or after determination of the total HMGP award, whichever is later.

2. Cost Sharing

   FEMA may contribute up to 75 percent of the cost of mitigation measures approved for funding under the HMGP. The federal funds provided by FEMA will be based on the cost-sharing provisions outlined in the FEMA-State Agreement and FEMA will not contribute to costs above the HMGP funding ceiling. The nonfederal share may exceed the federal share and the general requirements for matching funds and all contributions can be found at 2 C.F.R. § 200.306 and the *Hazard Mitigation Assistance Guidance (2015)*

Section 4: Eligibility Requirements

This section describes the State of Maine's eligibility requirements to conform to or exceed federal standards. The Mitigation Program uses federal definitions to determine eligibility.

4.1 Applicant Eligibility

The following are eligible to apply for HMGP funding:

1. State agency and a local government. A local government includes any Indian tribe or authorized tribal government that is not an Indian tribal government.
2. Indian tribal government, which is the governing body of any Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe under the Federally Recognized Indian Tribe List Act of 1994.
3. Private nonprofit organization that own or operate a private nonprofit facility as defined in 44 C.F.R. § 206.221(e). A qualified conservation organization as defined at 44 C.F.R. § 80.3(h) is the only private nonprofit organization eligible to apply for acquisition or relocation for open space projects.

Local and Indian tribal government applicants for HMGP project subawards must have an approved local or tribal mitigation plan in accordance with 44 C.F.R. pt. 201 before receiving HMGP funding. In addition, for projects sited in the Special Flood Hazard Area (SFHA), the jurisdiction within which the project is located must be participating in the National Flood Insurance Program (NFIP).

4.2 Project Eligibility

HMGP Projects must meet the eligibility requirements set forth in 44 C.F.R. § 206.434 and the *HMA Guidance (2015).* This includes, among other things, the following:

1. Solve the problems they are intended to address.
2. Conform to the State and County Multi-Jurisdictional Hazard Mitigation Plans.
3. Address a problem that has been repetitive, or a problem that poses a significant risk to health and safety if left unsolved.
4. Have a cost to benefit ratio of at least 1.0, as measured by FEMA's BCA Toolkit.
5. Be the most practical, effective, and environmentally sound alternative among a range of alternatives that have been considered.
6. Contribute, to the extent practicable, to a permanent or long-term rather than a temporary or short-term solution to the problem that it is intended to address and avoid unintended consequences.
7. Have a direct beneficial impact upon the designated disaster area, whether or not the project is located in the designated area (IAW 44 CFR 206.434[c][2]) and benefit the community rather than an individual.
8. Meet all local, state, and federal codes, standards, and regulations applicable to the locale.

Section 5: Project Identification

5.1 List of Projects

Potential Hazard Mitigation Projects have been identified and are contained in both the FEMA-approved county wide multi-jurisdictional hazard mitigation plans, and the State's GIS database for mitigation projects. These projects can be updated at any time by the communities through notification of the County Emergency Management Agency (EMA) director and the State Hazard Mitigation Officer.

Local jurisdictions can apply for 406 mitigation projects through the new FEMA Public Assistance Portal.

5.2 Public Damage Assessment Teams

In addition to the projects already identified in the FEMA approved local multi-jurisdictional hazard mitigation plans, information acquired during the Preliminary Damage Assessments (PDA's) may highlight additional projects. Prior to fieldwork, PDA teams will be briefed on HMGP project eligibility requirements. The PDA teams will forward potential projects directly to the SHMO and not to potential applicants.

Section 6: Applicant Notification

6.1 Public Assistance Briefings

The State will coordinate the presentation of information on the Hazard Mitigation Grant Program at Public Assistance (PA) and Applicant Briefings. The intent of Applicant Briefings is to create an early awareness of 406 and 404 Mitigation opportunities.

6.2 Notice to Potential Candidates

When sufficient funding is available for the Hazard Mitigation Grant Program (HMGP) to warrant the solicitation of new applications, an invitation to apply will be sent to the chief elected official of each community and the County Emergency Management Directors in Maine. The State will solicit projects already developed and ranked by the communities from the continuously updated Mitigation Project List GIS database in the FEMA-approved multi-jurisdictional Hazard Mitigation Plans.

6.3 Special Briefings and Workshops

As necessary, detailed Hazard Mitigation Grant Program briefings or workshops will be scheduled in areas that have been most impacted. The briefings or workshops will describe eligible activities, application procedures, benefit-cost analysis, key deadlines, the Environmental and Historic Preservation (EHP) review process, the floodplain management review process, the award and funding process, and Sub- Recipient administrative requirements.

Section 7: Application and Review Procedures

7.1 Submitting Applications to the State

Submission of Applications to the State:

1. Application forms, ranking criteria, and guidelines are available online at the MEMA website. Additionally, informational materials and workshops will be provided on an as-needed basis.
2. Applications from Subrecipients will be completed by the responsible community entity or private non-profit organization and signed by the Chief Executive Officer of the jurisdiction or organization and signed by the County Emergency Management Agency Director.
3. Applications must indicate that the work can be completed during the performance period as stated on the FEMA grant award. An exception to this requirement may be awarded if the circumstances warrant.
4. Applications must include a detailed scope of work that matches the cost estimates of the project budget.
5. Sub Recipient applicants must include a Letter of Commitment to its cost share and to future maintenance of the completed project.
6. Applications must be submitted to the SHMO by 5:00 PM on the announced due date.

7.2 Review, Ranking, and Selecting Projects

1. **Review:** The State Hazard Mitigation Grant Program Review Council reviews and recommends 404 grant projects to the SHMO for funding after the SHMO has completed the *Basic Eligibility Criteria* check ensuring all 44 CFR § 206.434 have been met (Appendix C).
2. **Ranking:** Upon confirmation that the application meets all federal requirements, the SHMO will call together all members of the State Hazard Mitigation Team (Appendix B) to formally review and rank all qualified applications across 10 State selected criteria listed in the *State Review Ranking Criteria* (Appendix C). Applicants will be ranked by:

    (1) Benefit to Cost Result
    (2) Average Household Income Across Applicant Municipality
    (3) Impoverished Community
    (4) Public Safety Benefits
    (5) Historical Benefits
    (6) Critical Infrastructure Protection
    (7) Environmental Benefits
    (8) Disaster Declaration Frequency
    (9) Economic Impact of Project
    (10) Resiliency

3. **Submission:** All applicants that have met all requirements of the *Basic Eligibility Criteria* check and that have been ranked by the State Hazard Mitigation Team will be submitted to FEMA for formal review. Assuming the total project costs across all submitted applications exceeds the available funding, only the highest ranked projects will undergo formal FEMA review while the remaining applications undergo a waitlisted status. Notification of the decision to applicants following selection of projects to be submitted to FEMA for 404 funding, the SHMO will notify each applicant of the decision, including their scores and Council comments and any requests for improvements.

a. Submission of Selected Projects to FEMA

1. The SHMO will ensure that program requirements are met and that each application contains the items listed in Appendix A and Appendix C.
2. The SHMO will send a complete package of applications to FEMA for review. If application packages should exceed the confirmed HMGP application ceiling, the State will provide a letter of request for FEMA to review applications in an order of highest to lowest ranking. Projects that exceed available funding may be waitlisted and considered for funding only if a higher priority project falls out or is withdrawn from FEMA's formal application review.

Section 8: Project Management

8.1 Administration

1) All 404-mitigation funding approval for the Recipient and Subrecipient is based on the 75-25 cost sharing provisions outlined in the FEMA-State Agreements or other published guidance. The Non-Federal share may exceed the Federal share and may be a combination of other state, local, or private funding.
2) Obligation of Federal Funds will not take place until approval has been received for the project from FEMA.
3) A financial record keeping system will be implemented for the duration of the project and archived. The Subrecipient will submit quarterly progress reports to the SHMO, beginning the first full quarter after receipt of funding. These reports will describe the status and projected completion date of the project, any problems affecting the completion date, scope, or cost, which could result in non-compliance with approved grant conditions, and requests for management costs. The SHMO will submit reports to FEMA as required. The SHMO's final report to FEMA will be a complete assessment of project accomplishment.
4) Roles and responsibilities:
   a) Sub Recipient
      i) Insures that all work complies with local, state, and federal codes, specifications and standards;
      ii) Implements monitoring procedures and submits quarterly progress reports to the SHMO as directed at the time the grant is awarded;
      iii) Maintains financial records, receipts, invoices, and proof of payment to document all expenditures connected with the project;
      iv) Maintains financial records, receipts, invoices, and proof of payment to document all expenditures connected with management costs;
      v) Files quarterly financial and progress reports to the State on January 15th, April 15th, July 15th, and October 15th until the project is formally closed out by FEMA;
      vi) Completes the Subrecipient Federal Funding Accountability & Transparency Act (FFATA) Grant reporting Questionnaire for Federal Funds Greater than $25,000
      vii) Completes the Subrecipient Transparency Act Grant Reporting Information for Federal Awards Greater than $25,000
   b) Recipient (SHMO)
      i) Is responsible for overall grant administration;
      ii) Serves as Project Manager, overseeing project from conception through completion;
      iii) Monitors and evaluates the project, adherence to work schedule and budget, EHP compliance, and reviews all documents leading to project completion;
      iv) Reconciles Subrecipient management costs against actual costs of the total award on a quarterly basis;
      v) Maintains financial records and progress reports documenting how funds were distributed to Sub Recipient(s);
      vi) Requests the de-obligation of unused project and management costs on behalf of the sub-recipient at the completion of a project;
      vii) Reviews and submits quarterly reports to FEMA on January 30th, April 30th, July 30th, and October 30th until projects and program are formally closed out by FEMA;
      viii) Provides technical assistance to Subrecipients as necessary;

ix) Assures necessary interagency coordination on all aspects of the Program;
x) Provides verbal and written guidance, structured timelines, and increased monitoring to subrecipient as a means to bring non-compliant subrecipients back into conformance;
xi) Reserves the authority to withhold reimbursement payments if the subrecipient is not able to conform to state and federal requirements enlisted within the HMGP; and
xii) Certifies that all claims and costs are eligible and in compliance with provisions of the FEMA / State Agreement. Submits claims to the Regional Administrator for payment.

8.2 Financial Administration

MEMA is the Recipient for project financial administration in accordance with 2 CFR Part 200 Subparts A-F. Subrecipient(s) are accountable to the Recipient for project and management funds that have been awarded. Allowable costs associated with administering the program are authorized in accordance with Section 206-439, 44 CFR and FEMA Policy #104-11-1-HMGP-MC (Interim) under directive of the Disaster Relief and Recovery Act of 2018.

1) Project Costs: Funding for approved projects shall be disbursed after all the following conditions have been met:
   a. A fully executed grant agreement is in place between the Maine Emergency Management Agency and the jurisdiction responsible for implementing the project. Costs incurred prior to the date that the agreement is fully executed will not be reimbursed unless otherwise agreed upon with FEMA.
   b. MEMA must have received a quarterly report for each quarter that the grant agreement has been active prior to any imbursements/advancements are provided
   c. MEMA must have received the invoices/receipts for all expenses including the local match requirement for which the Subrecipient is seeking reimbursement. Accounting records must be supported by such source documentation as cancelled checks, paid bills, payrolls, time and attendance records, contract and Subrecipient award documents, all other supporting documentation must be approved by the state prior to request for reimbursement. Multiple reimbursement requests may be submitted preceding 30 days following the grants expiration.
   d. MEMA shall transfer funds to reimburse the requesting agency or jurisdiction up to the approved amount identified within the State Grant Agreement after documentation has been reviewed and approved by the Maine Emergency Management Agency. It shall be the responsibility of the requesting agency or jurisdiction fiscal/legal agent to ensure that all parties eligible for reimbursement receive payment.
   e. The reimbursement provided shall not exceed the amount of the signed Subrecipient agreement. All cost over runs shall be the responsibility of the Subrecipient unless there are remaining funds in the program and approval is granted by MEMA and FEMA.

2) Management Costs: The recipient will be reimbursed not more than 15 percent of the total amount of HMGP grant award of which not more than 10 percent may be used by the recipient, and 5 percent by the recipient. All management costs provided will be obligated in increments sufficient to cover recipient and subrecipient needs for no more than one year unless contractual agreements require additional funding.

a. Subrecipient Management Costs

i. Subrecipient management cost awards will be available to the recipient at the time of award based on the total non-management cost HMGP project amount. Upon receipt of Notice of Award, a Subrecipient may decline or apply for up to 5% of the apportioned award amount in management costs through the State with a proposed budget (Appendix G).

ii. All costs must be reasonable, allowable, allocable, and necessary as required by 2 CFR Part 200 Subpart EE, applicable program regulations, and HMA Guidance (2015).

iii. The Subrecipient may submit for the reimbursement of documented actual management costs as needed, however they must file progress and financial reports on a quarterly basis with the SHMO on the established dates of January 15th, April 15th, July 15th, and October 15th.

iv. The subrecipient can claim management costs incurred up to whichever of the following occurs first:

- 180 days after work is completed for the non-management cost HMGP project for the declaration; or
- 180 days after the latest performance period for the non-management cost HMGP project; or
- The recipient management cost award has been closed out.

b. Recipient (SHMO) Management Costs

i. Upon receipt of the initial Lock-In notice, MEMA will request 25 percent funding of management costs identified in that notice. A six-month request may be placed on an as-needed basis. When the 12 Month Lock-In amount is established, MEMA will place a final request for no more than 15 percent of the total amount of HMGP grant award, 5 percent of which will be maintained and distributed to grant Subrecipients as submission requests are reconciled.

ii. The recipient can claim management costs incurred up to whichever of the following occurs first:

- 180 days after work is completed on the last non-management cost HMGP project for the declaration; or
- 180 days after the latest performance period of the last non-management cost HMGP project for the declaration; or
- 8 years from the date of a major disaster declaration

3) Advancement of Funds Request

c. Subrecipients with approved Grants and who meet the requirements of 2 C.F.R. § 200.305(b) can make requests for an advance of funds using the Grant Program Request for Payment form (Appendix E) at least 4 – 6 weeks prior to the actual need for the funds. Advanced funds must be expended within thirty (30) days of receipt. Any interest earned on advanced funds will be remitted promptly or at least quarterly to the State to be returned to FEMA.

d. The advance of funds request shall specify how the funds would be utilized. For example, project costs, what supplies or equipment, and or number of structures to be acquired or demolished. Supporting documentation must be

provided with the advance of funds request.

e. The final payment of grant funds for planning grants will be held until FEMA has received adoption signatures from all involved parties in accordance with the FEMA approved plan. The amount held will not exceed 10% of the total project cost.
f. The Subrecipient will follow established fiscal procedures and comply with the 2 CFR pt. 200. Expenditures will be tracked by funding source and show the balance of federal and local funding.

4) Audit Requirements
   a. In accordance with 2 CFR 200 Uniform Administrative Requirements, Cost Principles and Audit Requirements, found in §200.501(a), audit requirements for Federal awards, nonfederal entities that expend $750,000 or more in federal awards from all federal funding sources during their fiscal year, must agree to have a Single Audit conducted in accordance with §200.514 Scope of Audit. Further, §200.512 requires that the final report for such audit be completed within nine (9) months of the entity's fiscal year end.
   b. Following this reporting timeframe, MEMA requests the completion of an Audit Certification Form (appendix G) identifying whether the Subrecipient has met or exceeded the federal expenditure threshold of $750,000. If they have, a copy of the Single Audit must be returned with the completed form.
   c. The state reserves the right to audit projects and management costs, including those not subject to the federal requirements, at any time.

8.3 Appeals

An eligible applicant or Subrecipient may appeal any decision that determines that assistance is not available such as the ineligibility of a project and allowability of costs. The appeal must be in writing and contain sufficient additional information beyond that submitted with the original application, to warrant consideration.

Appeals related to state decisions based on state policies such as determinations made by the NFIP compliance, state mitigation priorities, state/local agreement issues, reasonable and necessary costs associated with project management, etc. are usually state appeals.

For issues regarding program eligibility, time extensions beyond the FEMA approved time for the grant overall, determination of allowable project management costs, allowable project costs, and other project implementation requirements, or the state's interpretation of any Federal policy related to these issues is usually a Federal appeal. Any appeal disputing the benefit-cost ratio (BCR) for a specific property or project must be accompanied by a benefit-cost analysis (BCA) conducted by the appellant in accordance with FEMA guidelines.

1. State Appeals

   There are two levels of state appeal. The State Hazard Mitigation Officer is the decision-maker for the first appeal. If a second appeal is necessary, the Governor's Authorized Representative (GAR) makes the decision on the second appeal.

   a. All applicant appeals must be submitted in writing to the SHMO within thirty (30) days of the date of the letter notifying the applicant of the State Mitigation Officer's decision.

The SHMO will respond within thirty (30) days of the applicant's letter.

b. If the applicant does not agree with this decision, they can appeal to the GAR. The applicant must provide additional information supporting their position to the GAR within thirty (30) days of the first decision letter. The GAR will respond within thirty (30) days of receipt of the request for appeal. The GAR's decision is final and no other state appeals will be considered.
c. The GAR may, on behalf of an applicant or the state, request guidance and/or a decision from FEMA related to a recipient's appeal to the state. If guidance is requested from FEMA, the GAR will notify the applicant and an additional thirty (30) days will be added to the time frame for response from the GAR.

2. Federal Appeals

FEMA will only review appeals under 44 C.F.R. § 206.440 as it relates to FEMA determinations. An eligible applicant, Subrecipient, or Recipient may appeal any determination previously made related to an application for or the provision of Federal assistance according to the procedures below. Per the 44 C.F.R. 206.440-Appeals.

a. Format and Content

The applicant or Subrecipient will make the appeal in writing through the Recipient to the Regional Administrator. The Recipient shall review and evaluate all Subrecipient appeals before submission to the Regional Administrator. The Recipient may make Recipient-related appeals to the Regional Administrator. The appeal shall contain documented justification supporting the appellant's position, specifying the monetary figure in dispute and the provisions in Federal law, regulation, or policy with which the appellant believes the initial action was inconsistent.

b. Levels of Appeal
   i. The Regional Administrator will consider first appeals for hazard mitigation grant program-related decisions under subparts M and N of this part.
   ii. The Assistant Administrator for the Mitigation Directorate will consider appeals of the Regional Administrator's decision on any first appeal under paragraph (b)(1) of this section.
c. Time Limits
   i. Appellants must make appeals within 60 days after receipt of a notice of the action that is being appealed.
   ii. The Recipient will review and forward appeals from an applicant or Subrecipient, with a written recommendation, to the Regional Administrator within 60 days of receipt.
   iii. Within 90 days following receipt of an appeal, the Regional Administrator (for first appeals) or Assistant Administrator for the Mitigation Directorate (for second appeals) will notify the Recipient in writing of the disposition of the appeal or of the need for additional information. A request by the Regional Administrator or Assistant Administrator for the Mitigation Directorate for additional information will include a date by which the information must be provided. Within 90 days following the receipt of the requested additional information or following expiration of the period for providing the information, the Regional Administrator or Assistant Administrator for the Mitigation

Directorate will notify the Recipient in writing of the disposition of the appeal. If the decision is to grant the appeal, the Regional Administrator will take appropriate implementing action.

d. Technical Advice

In appeals involving highly technical issues, the Regional Administrator or Assistant Administrator for the Mitigation Directorate may, at his or her discretion, submit the appeal to an independent scientific or technical person or group having expertise in the subject matter of the appeal for advice or recommendation. The period for this technical review may be in addition to other allotted time periods. Within 90 days of receipt of the report, the Regional Administrator or Assistant Administrator for the Mitigation Directorate will notify the Recipient in writing of the disposition of the appeal.

8.4 Cost Overruns

1. Before doing work that might incur cost overruns, the Subrecipient must notify the SHMO in writing and provide justification.
2. Cost overruns which can be met without additional Federal funds need not be submitted to the FEMA Regional Administrator for approval, so long as the full scope of work on all affected projects can still be met.
3. The SHMO and GAR evaluate every cost overrun that exceeds Federal obligated funds and when justified, and funds are available, may approve an additional amount if it meets the cost-benefit criteria. Cost overruns will be approved only when grant funds are available.
4. The SHMO will forward cost overruns exceeding 10 percent of project cost to the FEMA Regional Administrator for appropriate action.
5. All requests that are not justified shall be denied by the Governor's Authorized Representative.

8.5 Project Closeout

1. Project/Subaward Closeout
    a. General

    Within 180 days from the date the State or a subrecipient completes each non-Management Cost HMGP project, the State shall submit a payment of claim to FEMA as required by 44 C.F.R. § 206.438(d), the *Hazard Mitigation Assistance Guidance (2015)*, Part VI, ¶ F, and FEMA- State Agreement, ¶ V.C.

    b. Project Closeout Content

    The payment of claim will include a letter signed by the Governor's Authorized Representative that certifies that the reported costs were incurred in the performance of eligible work, the approved work was completed, and the mitigation measure complies with the provisions of the FEMA-State Agreement. The payment of claim package shall also include the following:

        i. Verification that any program income has been deducted from total project costs as specified in 2 C.F.R. § 200.307.
        ii. Final site inspection report that includes photographs of the completed project.
        iii. Final site inspection report that includes photographs of the completed project.
        iv. Final project costs, including Federal share, non-Federal share, administrative allowance (if applicable), and cost underrun and overruns.
        v. Geospatial coordinates, in the form of latitude and longitude with an accuracy of +/- 20 meters (64 feet), have been provided for the project. For flood reduction, hazardous fuels

reduction, and soil stabilization projects, an accurate recording of the official acreage, using open file formats geospatial files (i.e., shapefiles), must be submitted.

vi. Certification and documentation to support that the project was completed in compliance with environmental conditions, required permits, and applicable building codes.
vii. Certification that the project meets NFIP insurance requirements (if applicable).
viii. For new or updated hazard mitigation plans, a final copy of the FEMA-approved and community-adopted plan has been submitted.
ix. For planning-related activities, the activity is consistent with 44 CFR Part 201 or 206.
x. Other supporting documents required by FEMA to close mitigation project types as outlined in the HMA Job Aids: (1) Closeout Toolkit: Checklist for Hazard Mitigation Grant Program and (2) Closeout Toolkit: Hazard Mitigation Grant Program Subaward Closeout FAQs.

2. Subrecipient Closeout
   a. General
   The State must submit a subrecipient final expenditure report to FEMA for all projects and management costs approved under the HMGP grant for a subrecipient as required by the FEMA-State Agreement. This report is submitted after the State has submitted all payment of claim information and certifications for a subrecipient's project.
   b. Content
   The report is submitted as part of the quarterly SF-425 report by noting the following in the remarks section:
      i. That the report represents the final expenditures for a subrecipient;
      ii. The name of that subrecipient; and
      iii. The date on which the recipient submitted to FEMA a payment of claim for each of that subrecipient's approved projects and management costs, or reference to other document submitted to FEMA that includes this information.
3. Grant Closeout
   a. General
   The State will submit a HMGP grant closeout request within 90 days from the end of the State's management cost project period of availability as required by 2 C.F.R. § 200.343. FEMA will withhold 3 percent of the recipient's management costs until the closeout of the last non-management cost HMGP project.
   b. Content
   The closeout request will include a letter from the Governor's Authorized Representative with supporting documentation, including the following:
      i. Statement that the scope of work has been completed as approved;
      ii. Final Federal Financial Report (SF-425);
      iii. Final performance/progress report;
      iv. SF-428, *Report on Government Property*, if applicable;
      v. SF-270, Request for Advance or Reimbursement, if applicable, or request for de-obligation of unused funds, if applicable; and a Statement that no inventions were made, or patents applied for in the implementation of the award.

Section 9: Plan Review

To ensure compliance and implementation of new local, state, and federal laws, policies, and regulations, this plan will be reviewed annually, or at the time of a disaster declaration or program administration changes. The State will then submit the plan to FEMA Region I for approval.

This administrative plan is part of Volume I of the state's Comprehensive Emergency Management Plan.

Section 10: Appendices

Appendix A: State of Maine HMGP Application

Appendix B: State Hazard Mitigation Team

Appendix C: Basic Eligibility & Review Criteria

Appendix D: Submitting Revised Plan

Appendix E: Grant Program Request for Payment Form

Appendix F: FAFTA Form

Appendix G: Sub-Recipient Management Cost Application

Appendix H: Audit Certification Form

APPENDIX A: HMGP APPLICATION

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND EMERGENCY MANAGEMENT
MAINE EMERGENCY MANAGEMENT AGENCY

Hazard Mitigation Grant Program
PROJECT APPLICATION

Disaster Number:	FEMA- DR-	ME	**Date Submitted to MEMA:**		

Part 1:	**Applicant Information**
Applicant Name: *(Eligible Applicant i.e. local government, state agency, non-profit)*	
County:	
Project Title:	

Primary Contact Information

Name:			
Title:			
Organization:			
Mailing Address:			
Work Phone Number:		**Fax Number**	
Email			

Secondary Contact Information

Name:			
Title:			
Organization:			
Mailing Address:			
Work Phone Number:		**Fax Number**	
Email			

Fiscal Agent Contact Information

Name:					
Title:					
Organization:					
Mailing Address:					
Work Phone Number:		**Fax Number**			
Email					
Federal Tax ID #		**DUNS #**		**Fiscal Year (Start-End)**	

Part 2:	Local Hazard Mitigation Plan Compliance				
Has the applicant adopted an approved County Hazard Mitigation Plan, or does the applicant reside in an area with an approved County Hazard Mitigation Plan?			☐ **Yes**	☐ **No**	☐ **NA**
Name of County Hazard Mitigation Plan (CHMP): (please include link to plan)					
If Yes:			**If No:**		
Does the project support CHMP Goals & Objectives?	☐ **Yes**	☐ **No**	Town Commits to Securing a FEMA-Approved LHMP Within 12 Months of HMGP Submittal to FEMA.		☐ **Yes**
Is the project listed in the CHMP?	☐ **Yes**	☐ **No**			☐ **No**

Part 3:	Problem Description
Problem Statement: *(What's Happening?) NOTE: Include description of prior actions taken to remedy, study, or alleviate the problem, and their results.*	
Has the municipality taken any other measures to reduce vulnerability?	

Location of Project:	Latitude:		Longitude:		*(in decimals)*

History of Damages
(At least three separate damage events required. Please do not include maintenance work.)

Date	Event	Description of Direct Damages	Description of Indirect Damages	Cost of Damage
			Total Damage	$0.00

Part 4:	Project Objective
Project Objective (What will your project fix and how?)	

Part 5:	Analysis of Alternative Solutions	
Alternative Solutions		
Alternative Solution	**Brief Title**	**Description of Alternative**
1 (Preferred Alternative)		
2 (alternate solution)		
3	**No Action**	**No Action**
Please attach supporting documentation for alternatives analysis, if available		
Preferred Alternative		
Preferred Alternative:		
Justification:		

Part 6:	Project Description (for the Preferred Alternative)
Project Description (Include project specifications: addresses, culvert dimensions, generator specs, etc.)	
Expected Life of Project	

Project Timeline (for the Preferred Alternative)

Task Description (Describe the individual tasks that will be completed)				**Weeks to Complete**	
					Weeks
					Weeks
					Weeks
					Weeks
					Weeks
					Weeks
					Weeks
Total Time Planned for Completion of Project				**0**	**Total Weeks**

Part 7:	Additional Application Documentation Checklist

Required Application Forms
(Attach with your application if a check box resides within the cell)

Name of Form	Planning Initiatives	5% Initiative Projects	Infrastructure Projects		Acquisition/ Demo Projects		
			Infrastructure Project with BCA	Elevation with BCA Exemption: Project is in SFHA and	Acquisition with BCA	Acquisitions with BCA Exemption: Substantial Damage	Acquisitions with BCA Exemption: Project is in SFHA and
Benefit-Cost Analysis (BCA), with Supporting Documentation, and BCA Memo *(explaining assumptions made and data used)*	N/A	N/A	☐	N/A	☐	N/A	N/A
A narrative description of the project's cost effectiveness in lieu of a conventional benefit-cost analysis	☐	☐	N/A	N/A	N/A	N/A	N/A
Budget with Total Project Costs < $175,000 (Elevation) / < $276,000 (Acquisition)	N/A	N/A	N/A	☐	N/A	N/A	☐
FIRM Showing Project is in SFHA	N/A	N/A	N/A	**THIS** ☐	N/A	☐	**THIS** ☐
Elevation Data Showing FFE is near or below BFE	N/A	N/A	N/A	**OR THIS** ☐	N/A	N/A	**OR THIS** ☐
Elevation Certificate (Elevation Projects Only)	N/A	N/A	☑		N/A		
Assurances and Certifications SF-424D & 112-0-3C	☐	☐	☐		☐		
Commitment Letter to Non-Federal Match & Future Maintenance (on formal letterhead)	☐	☐	☐		☐		
Project Plan (Project/Engineering Drawings)	N/A	☐	☐		☐		
Engineering Information to Support Project Design (i.e. - H&H Study, Sea Level Rise Projections, Electrical Analysis)	N/A	IF APPLICABLE ☐	IF APPLICABLE ☐		IF APPLICABLE ☐		
Endorsement of Project Design by Appropriate Agencies (SHPO, USFW, DEP, NMFS, USACOE)	N/A	IF APPLICABLE ☐	IF APPLICABLE ☐		IF APPLICABLE ☐		
Confirmation From the Local Floodplain Manager that the Proposed Project Conforms to No Adverse Impact Standards	N/A	N/A	IF APPLICABLE		IF APPLICABLE		
Aerial Image of Project Site (with marked project site and equipment storage sites)	N/A	☐	☐		☐		
Digital Photos of All Sides of Project Site	N/A	☐	☐		☐		
Topographical Maps (with marked project site)	N/A	☐	☐		☐		
Flood Insurance Rate Map (FIRM) (with marked project site)	N/A	☐	☐		☐		
Justification of Historical or Expected Damages	N/A	☐	☐		☐		
Tax/Lister Card of Building(s) in Project (Showing Year Built)	N/A	IF APPLICABLE ☐	IF APPLICABLE ☐		☐		
Parcel Map	N/A	IF APPLICABLE ☐	IF APPLICABLE ☐		☐		
FEMA Model Statement of Assurrances	N/A	N/A	N/A		☐		
FEMA Declaration and Release Form	N/A	N/A	N/A		☑		
Statement of Voluntary Participation	N/A	N/A	N/A		☐		
Hazardous Materials Survey	N/A	N/A	N/A		☐		
Duplication of Benefits Affidavit	N/A	N/A	N/A		☐		
FEMA Model Deed Restriction	N/A	N/A	N/A		☐		

Part 8:	Project Costs (for the Preferred Alternative)

Project Costs for Preferred Alternative

☐ Elevation, Buyout & Public Infrastructure Applications: Attach a professional estimate to support any cost figures in your budget

Item	Category	Unit Qty.	Unit Measurement	Unit Cost	Cost Estimate
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
				Total Project Cost	$0.00

Summary of Project Costs

A		**Total Project Costs**			**$0.00**
B		**FEMA Share (75% of Line A)**			**$0.00**
C		**Local Share (25% of Line A)**			**$0.00**
Identify source of local non-federal match: (cash, in-kind, alternate grant, etc.)					

Please note, if this project is awarded, the subgrantee will be required to submit quarterly financial and programmatic reports

Part 9:	Environmental and Historical Preservation Impacts		
"Yes" indicates that the environmental regulation or statute may apply to your project.			
Environmental Regulation or Statute		**Yes**	**No**
	National Historic Preservation Act		
1.A	Would the proposed project affect, or is the proposed project in close proximity to, any buildings or structures 50 years or mon in age?	☐	☐
1.B	Will the proposed project involve disturbance of ground?	☐	☐
Endangered Species Act and Wildlife Coordination Act			
2.A	Are federally listed or endangered species, or their critical habitat, present in or near the project area and, if so, which species are present?	☐	☐
2.B	Will the proposed project remove or affect vegetation?	☐	☐
2.C	Is the proposed project in or near (within 200 feet), or likely to affect, any type of waterbody or body of water?	☐	☐
Clean Water Act, Rivers and Harbors Act			
3.A	Will the proposed project involve dredging or disposal of dredged material, excavation, the addition of fill material, or result in any modification to water bodies or wetlands designated as "waters of the United States" as identified by the U.S. Army Corps of Engineers or on the National Wetland Inventory?	☐	☐
Executive Order 11988 (Protection of Floodplains) and Executive Order 11990 (protection of Wetlands)			
4.A	Does a Flood Insurance Rate Map, Flood Hazard Boundary Map, hydrological study, or some other source indicate that the project is located in, or will affect, a 100-year floodplain, a 500-year floodplain (if a critical facility), an identified regulatory floodway, or an area prone to flooding?	☐	☐
4.B	Is the proposed project located in, or will it affect, a wetland as listed in the Naitonal Wetland Inventory?	☐	☐
4.C	Will the proposed project alter a watercourse, water flow patterns, or a drainage way, regardless of its floodplain designation?	☐	☐
4.D	Is the proposed project located in, or will it affect, a floodplain or wetland? If yes, the 8-step process summarized in Appendix J must be completed	☐	☐
Coastal Zone Management Act			
5.A	Is the proposed project located in the State's designated coastal zone?	☐	☐
Farmland Protection Policy Act			
6.A	Will the proposed project convert more than 5 acres of "prime or unique" farmland outside city limits to a non-aricultural use?	☐	☐
Resource Conservation Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act			
7.A	Is there reason to suspect there are contaminants from a current or past use on the property associated with the proposed project?	☐	☐
7.B	Are there are any studies, investigations, or enforcement actions related to the property associated with the proposed project?	☐	☐
7.C	Will any project construction or operation activities involve the use of hazardous or toxic materials?	☐	☐
7.D	Are any of the current or past land uses of the property associated with the proposed project or are any of the adjacent properties associated with hazardous or toxic materials?	☐	☐
Executive Order 12898 (Envrinmental Justice for Low Income and Minority Populations)			
8.A	Are there any low-income or minority populations in the project's area of effect or adjacent to the project area?	☐	☐
Other Environmental/Historic Preservation Laws (including applicable State laws) or Issues			
9.A	Are other environmental/historic preservation requirements associated with this project?	☐	☐
9.B	Are any controversial issues associated with this project?	☐	☐
9.C	Have any public meetings been conducted, or public comment solicited, on the proposed project?	☐	☐

Part 10:	Authorized Signature
I certify that I am the authorized agent for the applicant and have responsibility for the development and completion of this application and all the information contained herein is true and accurate.	
Authorized Agent's Signature / Title	*Date*
County EMA Director Signature	*Date*

Please submit a copy of the application as a scanned Adobe PDF (in color) by email to:
anne.p.fuchs@maine.gov

Anne Fuchs
State Hazard Mitigation Officer
Maine Emergency Management Agency
Office: #207-624-4466
Cell: #207-557-3669

APPENDIX B: STATE HAZARD MITIGATION TEAM

The following State of Maine Agencies will be considered and enlisted, when appropriate, to serve on the State Hazard Mitigation Team when necessary to accomplish the purposes of this Plan and the State's Hazard Mitigation Grant Program:

Maine Department of Agriculture, Conservation, and Forestry – Maine Geological Survey
Maine Department of Economic and Community Development
Maine Department of Environmental Protection
Maine Department of Inland Fisheries and Wildlife
Maine Department of Marine Resources
Maine Department of Public Safety
Maine Department of Transportation
Maine Department of Defense, Veterans, and Emergency Management – Maine Emergency Management Agency
Maine Public Utilities Commission
Maine State Housing Authority

The following Federal Agencies may also be requested to provide expertise:

Federal Emergency Management Agency
Natural Resource Conservation Service
National Weather Service
Small Business Administration
Army Corps of Engineers
United States Geological Survey
United States Department of Agriculture

Hazard Mitigation Grant Program
Basic Eligibility Criteria
(Per 44 CFR § 206.434 - Eligibility)

A project must receive a score of 13 to proceed to the State Review Council for ranking

ELIGIBILITY CRITERIA	YES (1)	NO (0)	COMMENTS
Is the applicant a state or local government, private nonprofit organization, Indian tribe or authorized tribal organization?			
Does the applicant have an approved local or tribal Hazard Mitigation Plan?			
Is the project in compliance with the state, local, or tribal Hazard Mitigation Plan?			
Does the project have a beneficial impact upon the designated disaster area, whether or not located in the designated area?			
Is the project in conformance with local and federal floodplain management and environmental protection regulations?			
Does the project solve a problem independently, or constitute a functional portion of a solution where there is assurance that the project as a whole will be completed?			
Is the project cost-effective?			
Does the project substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster?			
Does the project address a problem that has been repetitive, or a problem that poses a significant risk to public health and safety if left unsolved?			
Does the project exhibit that it will not cost more than the anticipated value of the reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur?			
Was the project determined to be the most practical, effective, and environmentally sound alternative after consideration of a range of options?			
Does the project contribute, to the extent practicable, to a long-term solution to the problem it is intended to address?			
Does the project consider long-term changes to the areas and entities it protects, and have manageable future maintenance and modification requirements?			
BASIC ELIGIBILITY SCORE:			

Hazard Mitigation Grant Program
State Review Ranking Criteria

Members of the State Review Council to include members of the State Hazard Mitigation Team

REVIEW CRITERIA	SCORING CRITERIA		SCORE
Benefit-to-Cost Result (applicants with the highest BCR given highest ranking) *population served incorporated into this analysis*	Ranking (from highest to lowest) based on number of applications received		
Average Household Income Across Applicant Municipality (applicants with the lowest average household income given highest ranking)	Ranking (from lowest to highest) based on number of applications received		
Impoverished Community (as per Sec. 203. Predisaster Hazard Mitigation (42 U.S.C. 5133) Stafford Act)	Yes - 1 Point	No - 0 Points	
Public Safety Benefits (Does project improve public safety access to communities?)	Yes - 1 Point	No - 0 Points	
Historical Benefits (Does the project protect a Maine Historic Site or National Historic Landmark?)	Yes - 1 Point	No - 0 Points	
Critical Infrastructure Protection (Does the project improve protection of critical infrastructure?)	Yes - 1 Point	No - 0 Points	
Environmental Benefits (Does the project positively contribute to the environment?)	1 point per environmental benefit: Fish Restoration Improved Streamflow Wildlife Passage Soft Engineering/Natural Solutions Other:		
Disaster Declaration Frequency (points based on number of presidentially declared disasters in applying municipality)	1 Declaration - 1 Point 2 Declarations - 2 Points 3 Declarations - 3 Points		
Economic Impact (points based on the project's positive impact to the economy)	1 point per positive impact: Improved Access to/for a Major Employer Improved tourism access Other:		
Resiliency (points based on maximum engineered level of protection)	100 Year Event: 1 point	500 Year Event: 3 points	
FINAL STATE REVIEW RANKING	**Total Possible Points:**		**Applicant Score:**

STATE REVIEW COUNCIL COMMENTS:

APPENDIX D: SUBMITTING REVISED ADMINISTRATIVE PLANS

STATE OF MAINE

JANET T. MILLS
GOVERNOR
MAJ GEN DOUGLAS A.
FARNHAM
COMMISSIONER

STATE OF MAINE
DEPARTMENT OF DEFENSE, VETERANS AND
EMERGENCY MANAGEMENT
MAINE EMERGENCY MANAGEMENT AGENCY
72 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0072
PHONE: 207-624-4400/800-452-8735
FAX: 207-287-3178

PETER J. ROGERS
ACTING DIRECTOR

DATE

XXXX
Regional Administrator
FEMA – Region I
99 High Street, 6th Floor
Boston, MA 02110

ATTN: (current FEMA Mitigation Specialist)

RE: **Updated Maine Hazard Mitigation Administrative Plan – DR 4354**
Dear XXX:

This is a request to FEMA Region I to review the updated Maine Hazard Mitigation Administrative Plan. The State has revised the Administrative Plan as a result of Disaster XXXX that occurred in Maine between [insert date(s)].

Also enclosed is the FEMA Hazard Mitigation Grant Program Administrative Plan Checklist indicating the location(s) in the plan where change and required components can be found. Please feel free to call me at 207-624-4466 if you have any questions.

Sincerely,

XXXX
State Hazard Mitigation Officer

CC: XXX, Senior Grants Specialist
XXX, Director of Mitigation, Preparedness, and Recovery, MEMA

APPENDIX E: GRANT PROGRAM REQUEST FOR PAYMENT

MAINE EMERGENCY MANAGEMENT AGENCY

REQUEST FOR ADVANCEMENT OF HMGP

GRANT PROGRAM FUNDS

RECIPIENT NAME: _____

ADDRESS: _____

CITY, STATE, ZIP CODE: _____

PAYMENT No: _____ :

FEMA Tracking Numbers:

Eligible Amount 100%	Obligated Federal 90%, 75% or 50%	Obligated Non-Federal 10%, 25% or 50%	Previous Payments	Current Request	HSEM Use Only	
					Approved	Comments

TOTAL CURRENT REQUEST $ 0

I certify that to the best of my knowledge and belief the above accounts are correct, and that all disbursements were made in accordance with all conditions of the MEMA agreement and payment is due and has not been previously requested for these amounts.

RECIPIENT SIGNATURE _____

NAME AND TITLE _____ DATE _____

TO BE COMPLETED BY MAINE EMERGENCY MANAGEMENT AGENCY

APPROVED PROJECT TOTAL $_____

ADMINISTRATIVE COST $ _____

_____
Program Manager Signature

APPROVED FOR PAYMENT $_____

_____
DATE

This form must be accompanied with all supporting documentation for the request (Invoices, Price Quotes, Signed Contracts, Purchase orders, Payment Vouchers, Canceled Checks) All advanced funds must be expended within 30 days.

APPENDIX F: SUB-RECIPIENT TRANSPARENCY ACT GRANT REPORTING INFORMATION FOR FEDERAL AWARDS GREATER THAN $25,000

Sub-Recipient Name:
Federal Awarding Agency:
Grant Performance Year:
Grant Identification #:
CFDA #:
DUNS #:

CONTRACT #:
Award Amount:
Program Performance Period:
MOU Effective Date:
MOU Termination Date:
Vendor Customer #:

Doing Business as Name if Applicable:

Sub-Recipient Address:

Sub-Recipient Place of Performance:

Congressional District:

Sub-Recipient Parent DUNS (9 digit):
(If different from above)

Sub-Recipient Parent DUNS (Registration: Current ☐ Yes ☐ No

Please sign below to confirm the DUNS number, associated address and Congressional District are correct. If the information is not current, please return the form with current information and signature.

_____ _____
Signature Date

_____
Printed Name and Title

APPENDIX F: SUB-RECIPIENT TRANSPARENCY ACT GRANT REPORTING INFORMATION FOR FEDERAL AWARDS GREATER THAN $25,000

Sub-Recipient Name:
Federal Awarding Agency:
Grant Performance Year:
Grant Identification #:
CFDA #:
DUNS #:

CONTRACT #:
Award Amount:
Program Performance Period:
MOU Effective Date:
MOU Termination Date:
Vendor Customer #:

Q1. In your business or organization's previous fiscal year, did your business or organization (including parent organization, all branches, and all affiliates worldwide) receive 80 percent or more of your annual gross revenues in U.S. federal contracts, subcontracts, loans, grants, sub-grants, and/or cooperative agreements; **AND** 25,000,000 or more in annual gross revenues from U.S. federal contracts, subcontracts, loans, grants, sub-grants, and/or cooperative agreements?

(If answer is Yes, go to Q2. If answer is No, sign, date, and return questionnaire with MOU)

☐ Yes _____ ☐ No _____

Q2. Does the public have access to information about the compensation of the senior executives in your business or organization (including parent organization, all branches, and all affiliates worldwide) through periodic reports filed under section 13(a) or 15 (d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986? (If answer is No, please provide name and amount of compensation for top 5 executives below.

(If answer is Yes, sign date, and return questionnaire with MOU)

☐ Yes _____ ☐ No _____

Executive 1 Name _____ Compensation
Executive 2 Name _____ Compensation
Executive 3 Name _____ Compensation
Executive 4 Name _____ Compensation
Executive 5 Name _____ Compensation

_____ _____
Signature Date

_____
Printed Name and Title

APPENDIX G: SUB-RECIPIENT MANAGEMENT COST APPLICATION

HAZARD MITIGATION GRANT PROGRAM
Sub-Recipient Management Cost Application

Applicant Name: _____ **Project Title:** _____

Sub-Recipient Management costs are available at no more than 5% of the final project cost to Sub-Recipients who apply and meet all federal grant requirements. To obtain management costs a Sub-Recipient must provide a detailed budget of the management cost request. Management costs may include any indirect cost, any indirect administrative cost, and any other administrative expense associated with a specific project under a major disaster, emergency or disaster preparedness or mitigation activity or measure. All costs must be reasonable, allowable, allocable, and necessary as required by 2 CFR Part 200 Subpart E, applicable program regulations, and HMA Guidance (2015). Sub-Recipients may opt to decline management costs if they do not wish to manage further federal funding.

Please check ONE:

☐ I DO NOT wish to receive Sub-Recipient management costs for this project.

☐ I wish to receive Sub-Recipient management costs for this project.
(Sub-Recipient agrees to submit quarterly financial reports to the Recipient[1])

_____ _____
Authorized Signatory Name (Print) Title

_____ _____
Signature Date

BUDGET:

Total Sub-Grant Award: $ _____

Total Management Cost Requested: $ _____
(Maximum of 5% total sub-grant award)

MANAGEMENT COST BUDGET

Line Item	Description	Cost
Personnel/Salary[2]		
Travel		
Equipment		
Supplies		
TOTAL		

[1] Quarter 1 (Oct.-Dec.) due 1/15, Quarter 2 (Jan.-Mar.) due 4/15, Quarter 3 (Apr.-Jun.) due 4/15, Quarter 4 (Jul.-Sep.) due 10/15

[2] Salaries that are federally funded or that require a cost share to federal funding are not eligible costs. Normal duties are not eligible, only time associated with the additional task of managing the Hazard Mitigation Grant Program are eligible. All time and associated tasks must be fully documented and represented in quarterly reports.

APPENDIX H: MAINE EMERGENCY MANAGEMENT AGENCY AUDIT CERTIFICATION

Single Audit Act Amendments of 1996

In accordance with 2 CFR 200 Uniform Administrative Requirements, Cost Principles and Audit Requirements, found in §200.501(a), audit requirements for Federal awards, non-federal entities that expend $750,000 or more in federal awards from all federal funding sources during their fiscal year, must agree to have a Single Audit conducted in accordance with §200.514 Scope of Audit. Further, §200.512 requires that the final report for such audit be completed within nine (9) months of the entity's fiscal year end.

Please refer to the directions on page 2 of this document.

Sub-recipient (community/agency): _____

Fiscal Year : MM/DD/YY to MM/DD/YY

Section A – Check the appropriate box:

☐ We did **NOT** exceed the federal expenditure threshold of $750,000 for the fiscal year referenced above. A Single Audit is not required for this fiscal year. **If checked, skip Section B.**

☐ We **DID** meet or exceed the federal expenditure threshold of $750,000 for the fiscal year referenced above. **If checked, complete Section B.**

☐ We are exempt from the Single Audit Requirement – explain below. **If checked, skip Section B.**

Section B – Complete if a Single Audit is required. Check the appropriate box:

☐ We completed our Single Audit for the above fiscal year and our report is attached.

☐ Our Single Audit for our fiscal year referenced above will be completed on: _____
and will be submitted to MEMA by: _____

*I certify that I am an individual authorized to complete this form. I further certify that the above information is accurate and, if required, the audit report will be submitted **no later than nine (9) months** after the fiscal year ending noted above.*

Name: _____ **Title:** _____
Authorized Chief Financial Officer

Signature: _____ **Date:** _____

Phone: _____ **Email:** _____

MEMA USE ONLY:
Date Received: SFY: FFY: Exp. Date:

APPENDIX H: MAINE EMERGENCY MANAGEMENT AGENCY AUDIT CERTIFICATION

DIRECTIONS: Your entity's Chief Financial Officer, or other official authorized to certify financial documents, must certify if your organization is subject to the Single Audit requirement according to the above citations by completing the information on page 1, checking the appropriate boxes in Sections A and B, and signing and dating the form.

The completed and signed form must be returned to MEMA **no later than 60 days after the fiscal year end date** noted on Page 1 of this form to anne.p.fuchs@maine.gov or mail to MEMA Attn: Hazard Mitigation Officer,

45 Commerce Drive, Suite 2
72 State House Station
Augusta, Maine 04333

Submission of this form prior to the fiscal year end is permitted; however, if unanticipated Federal funding is received by your entity, bringing the expended amount of federal funding above $750,000.00, you must submit a revised Audit Certification Form and include the Single Audit report.

Failure to return a completed form may affect your ability to participate in future federally funded programs from the Maine Emergency Management Agency.