

# **Chapter M**

## **Climate Change**

### **1. Purpose**

Climate change and its associated impacts will negatively affect humans and non-humans in a wide variety of aspects. This chapter assesses projected impacts to the community, including: coastal infrastructure, human habitation, coastal habitats, inland habitats, food security, and loss of historical and archeological assets. Specifically, this chapter:

1. notes that climate change will impact coastal habitats and infrastructure and the occupations that rely upon them;
2. note that current municipal operations depend upon use of fossil-fuels, and;
3. looks at ways the Town of Brooksville can mitigate and adapt to projected future impacts.

### **2. Key Findings & Issues in 2020**

As noted below in Section 6, sea level rise, shoreline erosion, increased ocean and air temperatures, and increased pest infestation are likely to impact Brooksville during the coming decade.

### **3. Key Findings & Issues from the 2006 Plan**

In 2006, the terms “climate change” and “sea level rise” were just gaining attention. The 2006 Comprehensive plan began investigating climate change and assessing coastal flood mitigation. At that time, the town used maps that incorporated National Oceanographic and Atmospheric Administration (NOAA) and U.S. Federal Emergency Management Agency (FEMA) coastal flooding maps.

### **4. 2018 Public Opinion Survey Results**

In 2018, the Committee’s survey asked respondents to report whether their observations of various effects of climate change during the prior three years had been frequent or somewhat frequent. They reported their observations as follows:

1. Increased property damage from natural storm events = 46% frequent or somewhat frequent during past three years
2. More frequent utility outages during storm events = 45%
3. Higher coastal water temperatures = 44%
4. Increased operational and maintenance repairs following storm = 40%
5. Changes in trees and plant life = 38%
6. Changes in habitat for non-marine species, e.g., wildlife, birds = 36%
7. Unusually high tides = 31%

## **5. Current Infrastructure and Habitats**

### **Municipal Services:**

Currently all municipal operations in Brooksville rely on fossil fuels for running municipal vehicles, or for heating and hot water. There are no immediate plans to convert the Town House or other municipal buildings to full or partial solar electric or solar hot water. The Town is encouraging the use of electric vehicles by enabling installation of two Level 2 charging stations, funded by an anonymous private donor, one at the Town House. Under consideration is the installation of one fast charger (Level 3) at the Community Center.

Brooksville has been engaged in a lengthy process of converting its electricity source from fossil fuels to solar. It began in the spring of 2018 with several solar contractors being invited to assess the economics of Brooksville Elementary School's conversion to solar. The legislative constraints (solar regulations) at that time limited the cost-benefit of such a conversion until Maine LD 1711 was enacted, which granted special consideration to municipalities. The law allows a solar contractor and Town to enter into a long-term contract (Power Purchase Agreement) that reduced Town electricity costs and fossil fuel emissions. The following events culminated in Brooksville signing such a contract with Revision Energy (RE).

- The Town convened an ad-hoc Solar Committee to evaluate the conversion to solar.
- Revision Energy provided an overview of converting to solar to the Select Board in a meeting open to the Town.
- A warrant was drafted and a special Town meeting was convened on December 19, 2019 during which the town residents granted the Select Board the authority to enter into such a contract (PPA).
- The committee circulated a Request for Qualifications in order to select a local solar contractor (RE).
- The Solar Committee evaluated the various options offered by RE and recommended participation in a remote-located solar array at a guaranteed savings of 15% off supply charges.
- The recommendation was detailed to the Select Board, which approved and signed the contract 25 August 2020.
- Arrangements are being made at this time to finalize the processing of the "execution contract" with an expected date of service to begin late in 2021 or early in 2022.

### **Floodplain Mapping:**

Between 2006 and 2011, the Hancock County Planning Commission produced updated FEMA floodplain maps for all municipalities and the Unorganized Territories within the county. These maps were based upon data provided by NOAA and the Maine Geologic Survey. These maps are still current and provide valuable information to Brooksville concerning projected coastal flooding associated with sea level rise and extreme tidal flooding events.

Recent efforts on coastal floodplain mapping include those of “Peninsula Tomorrow”, a regional coalition of towns on the Blue Hill Peninsula. More information on this effort is on the following website: <http://hcpcme.org/environment/peninsulatomorrow/index.htm>.

### **Stormwater Management Infrastructure:**

Much of the coastal infrastructure in Hancock County consists of underperforming culverts and stormwater drainage systems. Many coastal culverts throughout Brooksville face either partial or complete failure during major tidal inundation events. Such examples include the culverts on Coastal Road (SR 176), Poor Farm Road, and Bagaduce Road.

Certain road segments are also projected to be reclaimed by the sea, including portions of Dodge Point Road, Indian Bar Road, Back Road, Weir Cove Road, Undercliff Road, Dog Island Road, Bridge Road and the Reversing Falls bridge, Breezemere Rd and adjacent sections of Coastal Rd. For more information see the interactive web-app produced for Peninsula Tomorrow at the following web address: <https://hancockcountypla.maps.arcgis.com/apps/interactivelegend/index.html?appid=6c11a5f347e747d8a954df9ac43474ee>. This interactive web app will show coastal inundation areas such as road segments, culverts in peril, and marsh migration scenarios.

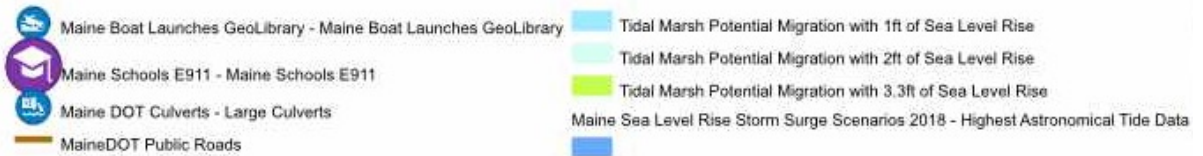
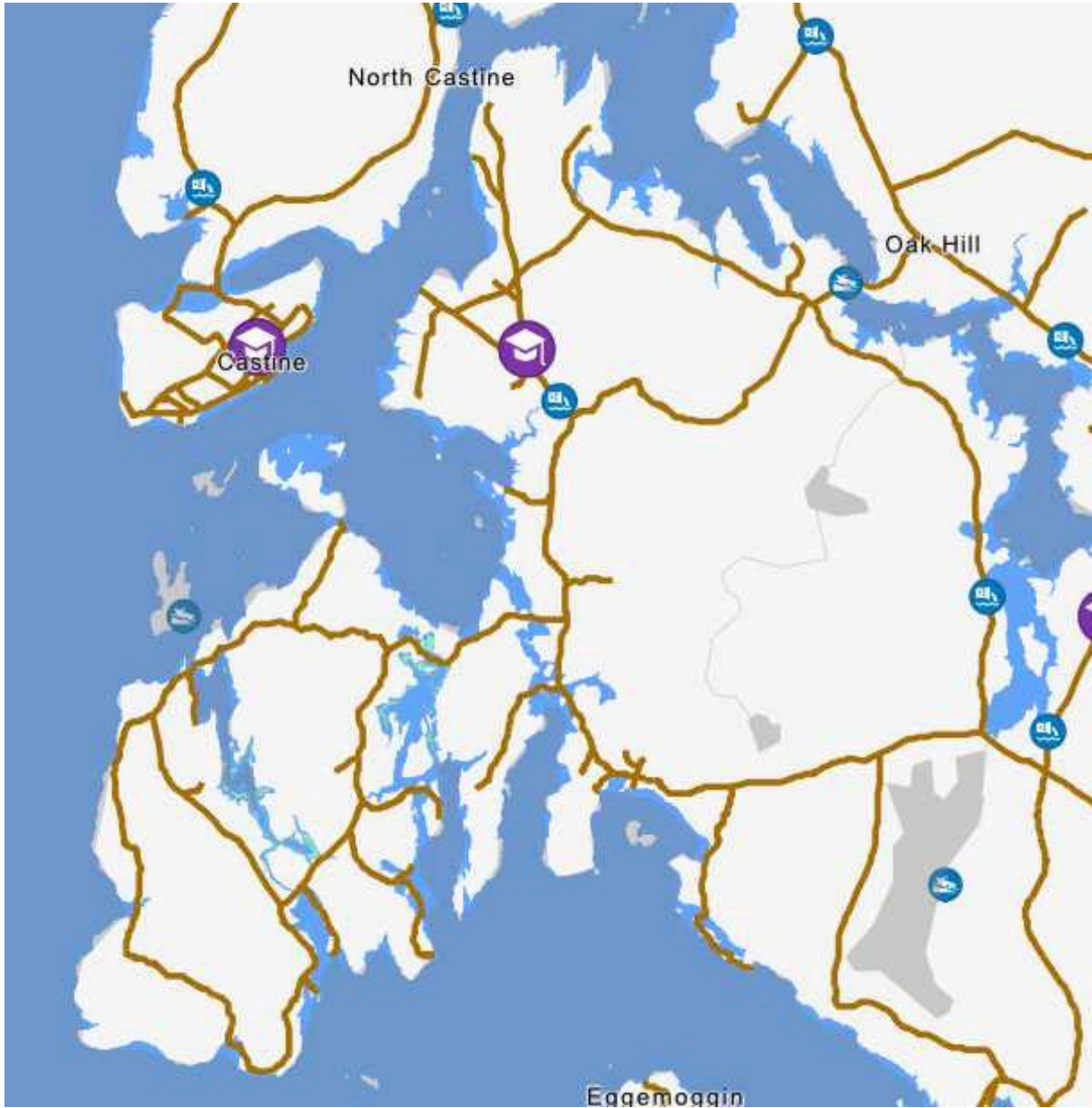
### **Future Development and Climate Change:**

Brooksville’s subdivision ordinance guides large-scale residential development. Other than this ordinance, there are no land-use development controls that would mitigate climate change impacts upon any future developments, residential, commercial or industrial. Brooksville could consider revising the subdivision ordinance to account for climate change projections and adopting a land use ordinance that integrates those projections. Brooksville also does not have any stormwater management plans, capital improvement plans or economic development plans that take into account climate change projections.

### **Barriers to Marsh Migration:**

There are no barriers to marsh migration in Brooksville. See Map M – 1: Projected Marsh Migrations below. The light green sections are predicted marsh-migrations based upon a projected 3.3-foot tidal inundation. Marsh migration can help counteract the loss of marsh habitat that is drowning with higher sea levels. Because of its topography as a fairly hilly area due to volcanic activity about 500 million years ago, Brooksville is predicted to incur less marsh migration than more low-lying towns. Still, transportation issues are predicted. Weir Cove Road, which skirts the edge of Bakeman Beach and separates it from a marsh, is already frequently littered with beach sand, seaweed and other tide-swept materials, and occasionally is partially under water at high tide. The beach, or even the ocean, eventually will reclaim the road.

## Map M – 1 Projected Marsh Migrations in Brooksville



## 6. Conditions and Trends

*Maine's Climate Future: 2020 Update*, prepared by the University of Maine Climate Change Institute, provides a range of projections for Maine towns and cities. These include changes to precipitation, increased drought periods, less snow pack and warmer winters, and increases in water temperature in the Gulf of Maine and associated impacts on coastal communities and working waterfronts. Brooksville will face all of these scenarios, as will neighboring towns and the entire State of Maine.

The most pressing economic impact to Brooksville from climate change is the result of changing water temperatures and ocean chemistry. As the Gulf of Maine warms, so will the waters surrounding Brooksville. The warming water temperatures result in decreased populations of *Calanus finmarchius*, a species of zooplankton and an essential food source for larval lobster. Other events include “sea-water heat waves” that cause shellfish closures, and also could result in local species extinction, as lobsters would not survive in the warmer water temperatures.

One potential boon could be increased blueberry crop production associated with increased air temperatures. However, blueberry production is not as major an economic asset for Brooksville as lobster and other shellfish harvesting.

Other projections include increased flooding and tidal inundation associated with increased frequency of extreme weather events. As much of Brooksville is coastal, public infrastructure such as the town landings, particularly Betsy's Cove Town Landing and Boat Launch could be damaged in said events. Many coastal properties in low-lying areas could also be inundated in such an event, with attendant erosion and saltwater intrusion into wells and existing septic systems.

An increase in drought conditions could also lead to greater risk of forest fires in Brooksville and throughout the state, a concern that most communities have not yet addressed in climate adaptation planning.

An additional climate change risk is associated with infestation of new insect species, which can severely affect trees and other plant species.

The Maine Historic Preservation Commission's 2021 report on climate change and historic and archeological assets also describes threats from climate change and sea level rise. Many historic indigenous sites associated with pre-contact and pre-colonial Passamaquoddy and Penobscot could be damaged or fully lost to sea level rise. Historical buildings also face threats from increased frequency of severe weather. Brooksville should consider assessing potential impacts to the current and known historic and archeological inventory. (See Chapter K, Historical and Archaeological Resources.) However, it is difficult to determine a course of action to protect these resources. Perhaps like so many other historic resources that have been obliterated by change, the best that can be done is to accelerate efforts to document them.

Brooksville takes note of two important developments: publication of *Maine Won't Wait: A Four-Year Plan for Climate Action*, produced by the Maine Climate Council, and guidance to municipalities from the State Planning Office on how to address climate change in the preparation of comprehensive plans. That guidance is reproduced below:

**Guidance language for considerations of climate change in comprehensive plans**

The State Planning Office has been exploring how to incorporate climate change into the comprehensive plan framework. It is our hope that providing this guidance language will both streamline comprehensive planning for climate change, as well as provide the Office with insight to how communities choose to address climate change.

Feel free to use this guidance language as either a stand-alone section to your comprehensive plan, or to insert select pieces into the appropriate topic areas.

**A. Analyses and Key Issues**

Use Conditions and Trends data in Section 14(C) to answer the following questions:

- (1) How does the current delivery of municipal services contribute to greenhouse gas emissions? For example, what are the sources of greenhouse gas emissions such as tailpipe emissions from municipally owned and operated vehicles, streetlights, energy use in municipal buildings, waste collection and disposal, etc.?
- (2) Are current floodplain maps accurate and up to date? If not, how could the community consider a buffer around floodplains to accommodate for greater flooding?
- (3) Does the community have sufficient stormwater management infrastructure? What is the ability to accommodate anticipated increased frequency and intensity of precipitation events?
- (4) How does the community consider and build preparedness for climate change impacts when updating land use plans, as well as municipal capital improvements, economic development plans, stormwater management standards and floodplain regulations?

For coastal communities:

- (5) What are the barriers to landward migration of coastal marshes, beaches, and other intertidal natural communities?

**B. Conditions and Trends**

- (1) Most recent analysis of likely foreseeable climate change effects on the state of Maine prepared by the University of Maine Climate Change Institute: *Maine's Climate Future: An Initial Assessment*. This resource provides insight to what the impacts will be on recreation, forest resources, transportation, water resources, etc.
- (2) Assessment of the community's risk and vulnerability to climate change based on local knowledge of both historical and developing hazards and challenges.

**C. Policies**

- (1) To reduce greenhouse gas emissions resulting from the delivery of municipal services.
- (2) To reduce the impacts of climate change effects on the community's economic development and quality of life.

*Continued on next page*

- (3) To discourage growth and new development in areas where, because of coastal storms, flooding, changes in precipitation, landslides or sea level rise, it is hazardous to human health and safety.

#### D. Strategies

- (1) The municipality collaborates with surrounding municipalities to strengthen comprehensive climate change adaptation and mitigation planning.

##### Education/Outreach:

- (2) Identify opportunities to reduce greenhouse gas emissions in the community, for example, implement anti-idling regulations for vehicles in the municipal fleet, rerouting school buses to decrease vehicle miles traveled (VMT).
- (3) Inform residents about ways to save money by reducing energy consumption, such as connecting residents with local, regional, state, or national energy programs.

##### Capital Investments:

- (4) Evaluate municipal stormwater management infrastructure for ability to meet or exceed anticipated needs.

##### Land Use Regulations:

- (5) Promote development outside of floodplains, and encourage 2'+ freeboard, i.e., designate floodplains as identified by Federal Emergency Management Agency as resource protection areas within shoreland zoning ordinances.
- (6) Update and effectively implement building codes, shoreland and floodplain zoning provisions to ensure that municipal facilities are designed and sited to reduce the impacts of flooding and retain normal mobility of emergency and community services during extreme weather events.

##### For coastal communities:

- (7) Reduce future development and subsequent costs in damages in areas vulnerable to sea level rise or other coastal hazards.
- (8) Require that physical public access to coastal resources is sited, designed and managed to avoid significant adverse impacts from sea level rise or other coastal hazards.
- (9) Limit public expenditures within undeveloped coastal barrier systems to acquisition for purposes of conservation, public safety, education, restoration and removal of exotic vegetation, recreational use, and/or research facilities.
- (10) Promote conservation of low-lying, undeveloped uplands where coastal marshes, beaches, and other intertidal natural communities can migrate inland with sea level rise.

The guidance above could constitute a good “action” plan for Brooksville’s Sea Level Rise and Climate Change Committee to address.

In addition, Brooksville will do well to monitor the ongoing work of the Maine Climate Council and consider local and regional initiatives to implement strategies of the Council as appropriate.

## 7. Goals & Objectives

<b>Goal: Adapt to Climate Change and Attempt to Mitigate its Negative Impacts on Brooksville</b>			
<b>Objectives</b>	<b>Strategy(ies)</b>	<b>Responsible Party(ies)</b>	<b>Timeline</b>
Reduce Brooksville's contributions to climate change	Continue reducing reliance on fossil fuels for Town facilities, plant and equipment.	Select Board Sea Level Rise and Climate Change Committee	Immediate and ongoing
	Increase the capture of carbon dioxide (carbon sequestration) by such activities as marshland restoration, seaweed cultivation, planting of trees on land unsuitable for agriculture		
	Increase the use of electric vehicles of all types by encouraging public and/or philanthropic funding for affordable, conveniently located electric-vehicle supply equipment (EVSE)		
	Participate in interlocal mitigation efforts, e.g., Peninsula Tomorrow		
Identify and Mitigate Local Climate Change Risks	Commission vulnerability and risk assessment of all tidal waterfronts, including recommendations for addressing those risks.	Select Board Sea Level Rise and Climate Change Committee	Immediate and ongoing
	Consider need for other mitigation efforts related to drought, water supply, forest fires or other emerging climate change vulnerabilities		
	Inform the community about climate risks and how to prepare for them (e.g., emergency evacuation procedures and warning systems; avoiding flood risks; reducing fire risks)		

*Table continues on next page*



<b>Objectives</b>	<b>Strategy(ies)</b>	<b>Responsible Party(ies)</b>	<b>Timeline</b>
Recognize transportation's impact on climate change	Support increased electrification of vehicles	Sea Level Rise and Climate Change Committee	Immediate and ongoing
	Offer Brooksville as a pilot project for climate-mitigating transportation policies and programs		
Adapt to Climate Change	Explore the importance and feasibility of participating in the National Flood Insurance Program	Select Board Sea Level Rise and Climate Change Committee	Immediate and ongoing
	Explore programs to help transition workers in the most affected livelihoods, e.g., those working with fossil fuels or in affected fisheries		
	Develop land use planning processes that recognize and prepare for climate change risks		
	Prepare local services such as fire volunteers to deal with emerging climate change risks (e.g., heat waves, droughts, flooding), including improved communication systems as needed		
	Participate in interlocal adaptation efforts, e.g., Peninsula Tomorrow		