Interagency Ice Jam Flood Preparedness Support to Communities

Nathan Robbins, Climate Change Specialist
Climate and Adaptation Program
Commissioner’s Office
Context…

• 14:16 Counties
• Ice Jams 1970 – Present = >$38M in Presidential Disaster Declarations

Ice Jams and Flooding Along the Allagash River, Dickey, Maine

April 11, 1991

Historic Flooding in Maine’s Major Rivers
1970-2006

### Events by County 1970-present

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<tr>
<th>County</th>
<th>Franklin</th>
<th>Oxford</th>
<th>Piscataquis</th>
<th>Somerset</th>
<th>Aroostook</th>
<th>Kennebec</th>
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Aroostook River, April 1994

Aroostook River, Main Street Fort Fairfield, April 1994
Maine River Flow Advisory Commission

- Meets Each Spring - 1st Thursday of March
- Augusta or Impacted Locations - Maine Emergency Management Agency
- Statewide Assessment of Water-Related Risks
- Determination of Overall Flood Risk

Flooding is the Most Common Natural Hazard in Maine

Further References: http://www.maine.gov/rfac/
Science Informed Decision-Making

- **Groundwater, Streamflow, and River Ice Conditions** US Geological Survey
- **Reservoir Storage** ME DEP and River Basin Managers
- **Meteorological Outlook – Weather/Climate and Outlook** National Weather Service – Gray and Caribou
- **Ice Breaking Operations** US Coast Guard
- **Floodplain Insurance Updates** ME Floodplain Management Program

Determination of Overall Flood Risk
Maine Cooperative Snow Survey

“collects, interprets, and distributes information on the depth and water content of Maine's snowpack... when the danger of flooding in Maine's rivers and streams is greatest.”

- 17 Cooperators
- Prediction and Timing of Flooding
- Management of Basin Storage and Releases
- Data Collected and Maps Posted Weekly (Late Winter – Early Spring)

https://www.maine.gov/rfac/rfac_snow.shtml

The data are obtained from a variety of sources, including:
- Allagash Wilderness Waterway
- Brookfield Renewable Energy Group
- Cobbossee Water District
- College of the Atlantic
- Great River Hydro, LLC
- Maine Environmental Science Academy - Fryeburg
- Maine Forest Service
- Maine Geological Survey
- National Weather Service Forecast Office, Caribou
- National Weather Service Forecast Office, Gray
- Nestle - Poland Spring Water Company
- New Brunswick Environment and Local Government
- New Hampshire Department of Environmental Services
- SAPPI Limited
- U.S. Geological Survey, New England Water Science Center, Maine Office
- University of Maine – School of Earth and Climate Sciences
- University of Maine at Farmington – Division of Natural Sciences

Date Ranges

- **518** stations in the database
- Not all included in all surveys
- Attempt collection **2-3 days** (sometimes longer)

**Courtesy:** Maine Geological Survey - Daniel B. Locke, Amber H. Whittaker, Christian H. Halsted; U.S. Geological Survey - James M. Caldwell
2008 Early March - Equivalent Water Content (inches) 2019

Maine Cooperative Snow Survey Program
Equivalent water content in snowpack (in inches) – March 2–4, 2008

Contributors:
U.S. Geological Survey
Maine Department of Conservation
Maine Forest Service
National Weather Service – Gray National Weather Service – Caribou
New Hampshire Department of Environmental Services
FPL Maine, LLC
Mead Power Co.
Brookfield Power
Domtar Inc.
Sappi Limited

Maine Cooperative Snow Survey Program
Equivalent Water Content in Snowpack: March 1–8, 2019

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PROVISIONAL


MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION www.mainegovernor.com/dep
Fort Kent International Bridge

April 30, 2008 Fort Kent Flooding

- The western section of the town is protected by a levee/dike system.
- The eastern side is not afforded this same protection.
- At this point, the St. John River was still ice covered except in places where current was strong in the main channels. The new bridge was constructed 2012-2014.
Rain, Snowpack, and Rising Temps

April 28 – May 1, 2008

- >$5 Million Damage
- 2” – 4” of rain + above average snow + warm temps

Fort Kent, ME
USGS Flood of April and May 2008 in Northern Maine
Streamflow & River Ice

St. John River

Diamond River

USGS

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION www.maine.gov/dep
Weather/Climate and Outlook

Northeast Regional Climate Center

Spring Flood Outlook 2019

National Weather Service Climate Prediction Center
Basin Storage and Releases

River Basin Managers
- Androscoggin River
- Kennebec River
- Penobscot River
- Presumpscot River
- Saco River
- St. Croix River
- Union River
Where to Access Mapped Flood Hazard Areas?

- Red or Blue shaded – FEMA Map Service Center
- Orange shaded – Maine Flood Hazard Map for Q3
Risk Communication and Planning

• Published March 2019
  – Fuel Storage and Spill Response
  – Debris Management / Solid Waste
  – Emergency Repairs to Infrastructure
  – Stormwater, Wastewater, and Drinking Water

• Ice Jam Flooding Technical Assistance - Aroostook County (RFAC)

• 2020 Updates - Emergency Management/Response and Preparedness/Adaptation

Flood Reference Guide for Municipalities
Looking Ahead at Resilience…

- Resilient Design
- Development in At-Risk Areas
- Incorporation of Climate Data
- ...

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
Legacy of Action

Mitigation | Impact Assessment | Adaptation | Preparedness > Unified


Progress every 2 years | Update 2015 | Sector Specific Planning | 1st 1987 Update every 5 years | Progress every 2 years

Saco, Damariscotta and South Berwick made ordinance changes to increase freeboard to three feet above the 100-year Base Flood Elevation (BFE).
Adaptation Practices

✓ Identify possible **short-term** adaptation practices
✓ Identify possible **long-term** adaptation practices
✓ Present **recommendations** that build resiliency to the critical assets

How far above floodplain should we be considering “resilient”?  

- Pertinent TR-16 Standards


Base flood elevation (BFE)

[Maine Memory Network](https://www.mainememory.net/)

[Maine Memory Network](https://www.mainememory.net/)
Implementation Plan

✓ Develop a **plan to implement** the recommended adaptation practices
  • Reduce damage to equipment
  • Or interruption to service

✓ Include an **implementation schedule**
Reduce Human & Environmental Risk

“Adaptable” Regulations:

Sea Level and Floodplains are changing....and meanwhile Maine is also getting wetter.

Coastal Sand Dune Rules

Mandatory Shoreland Zoning

Stormwater Management

- 2’ SLR by 2100
- Highest Annual Tide
- 250 feet from 100-year BFE
- 1’ above 100-year BFE
- River & Tidal Erosion Areas
- Slopes >20%
- Current 24-hour Duration Rainfall Table
Develop and integrate a **Climate Lens**...

“co-beneficial action to existing actions”

- **Basic Level of Information**
  - Environmental Change
  - Impacts
  - Process (e.g. vulnerability assessment, plan, implement, evaluate)
  - Best Practices
  - Regulations
  - Funding

- **Outreach, Education, and Technical Assistance**
  - **101 Level** - 'getting up to speed' (e.g. storming/norming)
  - **Technical level** - 'taking action' (e.g. performing)
  - **Vehicle for Delivery**
    - web, workshop, training, certificates, recognition programs, etc.

- **Secondary Level of Information**
  - Tracking and Reporting
  - Evaluation and Change (policy, regulatory, behavioral, etc.)
  - Research (historical actions, emerging issues, etc.)
Additional Resources

- Maine Climate Hub | https://www.maine.gov/dep/sustainability/climate/
- Maine Ice Out Dates | www.maine.gov/dacf/iceout
- Northeast River Forecast Center | www.weather.gov/nerfc
- USGS NE Water Science Center/Maine | https://www.usgs.gov/centers/new-england-water
- Advanced Hydrologic Prediction Center | http://www.nws.noaa.gov/oh/ahps/
- Weather Ready Nation | https://www.weather.gov/wrn/
- National Water Center | http://water.noaa.gov/
- National Water Model | http://water.noaa.gov/about/nwm
- Meteorological Model Ensemble River Forecasts (MMEFS) | https://www.weather.gov/erh/mmefs
Contact:

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207-592-6590

www.maine.gov/dep