TOWN OF GRAND ISLE
BEAUTY SPOT OF VERMONT
CHARTERED 1779

Town of Grand Isle

2024 Local Hazard Mitigation Plan

Prepared for the Town of Grand Isle
by Threat Owl LLC.

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CERTIFICATE OF ADOPTION

December 16, 2024
Town of Grand Isle, Vermont Selectboard
A Resolution Adopting the Town of Grand Isle 2024 Local Hazard Mitigation Plan

WHEREAS the town Grand Isle Selectboard recognizes the threat that natural hazards pose to people and property within Grand Isle; and

WHEREAS the Grand Isle Selectboard has prepared a multi-hazard mitigation plan, hereby known as the Town of Grand Isle 2024 Local Hazard Mitigation Plan in accordance with federal laws, including the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended; the National Flood Insurance Act of 1968, as amended; and the National Dam Safety Program Act, as amended; and

WHEREAS Town of Grand Isle 2024 Local Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Grand Isle from the impacts of future hazards and disasters; and

WHEREAS adoption by the Grand Isle Selectboard demonstrates its commitment to hazard mitigation and achieving the goals outlined in the Town of Grand Isle 2024 Local Hazard Mitigation Plan.

NOW THEREFORE, BE IT RESOLVED BY THE Grand Isle, Vermont Selectboard, THAT:

Section 1. The Grand Isle Selectboard herby adopts the Town of Grand Isle 2024 Local Hazard Mitigation Plan. While content related to Grand Isle may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Grand Isle to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

ADOPTED by a vote of 5 in favor and 0 against, and 0 abstaining, this 16th day of December, 2024.

By: _______________________________ (print name)

ATTEST: By: _______________________________ (print name)

APPROVED AS TO FORM: By: _______________________________ (print name)

EXECUTIVE SUMMARY

The Grand Isle Local Hazard Mitigation Plan is a comprehensive strategy designed to reduce the risks posed by natural hazards and enhance the resilience of the community. Developed through a collaborative and participatory process involving stakeholders from various sectors, this plan identifies key hazards, assesses vulnerabilities, and outlines mitigation strategies to protect lives, property, and the environment.

The hazard identification and risk assessment process identified a range of hazards with the potential to impact our community, including floods, winter storms, and severe thunderstorms. Analysis of historical data, modeling, and stakeholder input informed the identification of high-risk areas, critical infrastructure, and vulnerable populations.

The vulnerability analysis highlighted the susceptibility of critical infrastructure, essential services, and environmental resources to various hazards. Vulnerable populations were identified, along with areas prone to certain hazards. Understanding these vulnerabilities is essential for prioritizing mitigation efforts and targeting resources where they are most needed.

The Hazard Mitigation Plan establishes clear goals and objectives to guide mitigation efforts and measure progress over time. These goals include reducing the loss of life and property damage from hazardous events, enhancing the resilience of infrastructure and natural systems, promoting equitable access to resources and information, and fostering a culture of preparedness and community engagement.

The plan outlines a set of mitigation strategies and actions aimed at reducing risk, enhancing preparedness, and promoting resilience across Grand Isle. These strategies include structural measures such as infrastructure upgrades and retrofits, non-structural measures such as land use planning and zoning, policy changes, and public education and outreach initiatives.

Implementation of the Local Hazard Mitigation Plan will be a collaborative effort involving local government agencies, emergency responders, community organizations, businesses, residents, and other stakeholders. Monitoring and evaluation mechanisms were established to track progress, assess effectiveness, and adapt strategies as needed to address changing conditions and emerging threats.

The Grand Isle Local Hazard Mitigation Plan represents a proactive and coordinated approach to reducing the risks associated with natural and human-made hazards and building a more resilient community. By working together and implementing targeted mitigation measures, we can protect lives, property, and the environment, and ensure a safer and more sustainable future for all residents of the community.

PLAN REVIEW AND REVISION SUMMARY

The below table should be utilized to document any review and revision of the plan, including the annual plan maintenance process.

Section Reviewed	Summary of Changes	Person Making Changes	Date of Changes

Figure 1 - Plan Review and Revision Summary

INTRODUCTION AND PURPOSE

Introduction
Grand Isle faces a variety of natural and human-made hazards that pose risks to the safety, well-being, and prosperity of the community members. From severe weather events like floods, hurricanes, and severe thunderstorms to technological accidents and infrastructure failures, the potential for hazards to disrupt daily life and cause significant damage is ever-present. As a proactive measure to safeguard the residents, infrastructure, economy, and environment, Grand Isle and Threat Owl LLC. has developed this Local Hazard Mitigation Plan (LHMP).

Purpose
The purpose of the LHMP is multifaceted, aimed at minimizing the vulnerability of the community to hazards and enhancing resilience in the face of adversity. Through this plan, the community seeks to:

1. Identify Hazards: The first step in effective hazard mitigation is understanding the full spectrum of risks facing the community. This plan comprehensively catalogs and assesses natural hazards, including their likelihood, potential impacts, and spatial distribution within Grand Isle

2. Assess Vulnerabilities: Understanding the vulnerabilities of the community is crucial for targeted mitigation efforts. By analyzing the exposure of critical infrastructure, essential facilities, populations, and environmental assets to various hazards, the community can pinpoint areas of high risk and prioritize mitigation actions accordingly.

3. Engage Stakeholders: Successful hazard mitigation requires collaboration among government agencies, community organizations, businesses, and residents. Through inclusive stakeholder engagement processes, this plan fosters dialogue, consensus-building, and shared responsibility for reducing risk and building resilience across all sectors of our community.

4. Develop Mitigation Strategies: Building upon the insights gained from hazard identification, vulnerability assessment, and stakeholder engagement, this plan outlines a set of tailored mitigation strategies and actions designed to reduce risk, enhance preparedness, and promote adaptive capacity across the community.

5. Integrate with Comprehensive Planning: Hazard mitigation cannot occur in isolation but must be integrated into broader planning processes. This plan aligns with existing comprehensive planning efforts, ensuring that mitigation considerations are incorporated into land use decisions, infrastructure investments, development regulations, and other policy instruments.

6. Access Funding Opportunities: Implementing hazard mitigation measures often requires financial resources beyond the capacity of local government alone. This plan facilitates access to various funding sources, including federal grants, state assistance programs, private sector partnerships, and community-based initiatives, to support the implementation of priority mitigation actions.

7. Monitor and Update: Hazard profiles, vulnerabilities, and community priorities evolve over time. Therefore, this plan includes mechanisms for ongoing monitoring, evaluation, and periodic updates to ensure its continued relevance, effectiveness, and responsiveness to changing conditions and emerging threats.

In summary, the Local Hazard Mitigation Plan serves as a roadmap for building a safer, more resilient community, by systematically identifying risks, reducing vulnerabilities, and enhancing our collective capacity to withstand and recover from hazardous events. By working together and taking proactive measures today, we can better protect the well-being and prosperity of current and future generations.

COMMUNITY PROFILE

Location and Geography
Grand Isle, Vermont, is a picturesque town located in Grand Isle County, nestled in the northwest corner of Vermont's Champlain Valley. Situated on the largest island in Lake Champlain, Grand Isle offers stunning views of the lake and the distant Adirondack Mountains of New York. The town covers an area of approximately thirty-five square miles, with diverse landscapes ranging from farmland and forests to waterfront properties along the lake's shore.

Demographics
The latest US Census estimated the population of Grand Isle to be 2,086, as compared to 2,067 in 2010. The median age of Grand Isle is 42.8, with 51% of the population being male. The average per capita income is $46,801, with 8.4% of the population being below the poverty line. There are 1,167 number of housing units in Grand Isle, with 82% of them being single unit.

Land Use
The following are the Grand Isle Land Use Zoning Districts:

- Village District
- Commercial and Industrial Light District
- Rural Residential and Agricultural District
- Commercial Recreation Shoreline District
- Residential Shoreline District
- Small Off-shore Island District
- Flood Hazard Overlay

For additional information on land use zoning districts, please refer to the Grand Isle Town Plan.

Economy and Recreation
Grand Isle's economy is primarily driven by agriculture, tourism, and outdoor recreation. The fertile soils of the Champlain Valley support a variety of agricultural activities, including dairy farming, orchards, and specialty crops. Tourism plays a significant role, especially during the summer months when visitors flock to the area for boating, fishing, and other lakefront activities.

Education
The Grand Isle Supervisory Union schools specialize in educating grades K-6/K-8, while some students in grades 7 & 8, and all students in grades 9-12 have the choice of attending High Schools in neighboring counties.

Infrastructure and Services
Grand Isle is well-connected to neighboring towns and cities via a network of roads and highways, including Interstate 89, U.S. Route 2, VT Route 314, and the nearby Lake Champlain Bridge. The town provides essential services such as public safety, water supply and solid waste management to ensure the well-being of its residents. Fire protection is provided by the Grand Isle Volunteer Fire Department. Grand Isle/North Hero Rescue Squad provide EMS services. Additionally, the town is a member of the Grand Isle County Mutual Aid Agreement. The purpose of the Corporation shall be to assist, foster and coordinate activities among the emergency service agencies of Grand Isle County and Clarenceville/Noyan and whenever

possible, pursue, receive, and distribute gifts, grants of monies and or/equipment, etc. to enhance and support the response activities within the county. The Corporation is a private, non-profit, volunteer organization dedicated to uniting Grand Isle County and Clarenceville/Noyan.

PLANNING MILESTONES, AREA, AND RESOURCES

Planning Milestones

The town of Grand Isle and Threat Owl LLC. were tasked with updating the 2024 Local Hazard Mitigation Plan. Threat Owl LLC. managed the planning process and development of the Plan. The town of Grand Isle was responsible for implementing stakeholder engagement and public outreach, attending planning meeting, reviewing data providing input, and reviewing the draft Plan. The below figure outlines the planning milestones to develop the 2024 Local Hazard Mitigation Plan.

1. Initial Considerations
2. Organizing Resources
3. Building the Planning Team
4. Creating a Stakholder Engagement and Outreach Strategy
5. Conducting a Risk Assessment
6. Reviewing Community Capabilities
7. Keeping the Plan Current
8. Reviewing and Adopting the Plan

Figure 2- Planning Process Overview

Initial Considerations

The 2024 Grand Isle Local Hazard Mitigation Plan is an update to the standalone single-jurisdictional 2018 Local Hazard Mitigation Plan. The town of Grand Isle and Threat Owl LLC. conducted a thorough review of the 2018 Local Hazard Mitigation Plan at the beginning of the process and used it as a foundation to develop the 2024 Local Hazard Mitigation Plan.

Like most communities in Vermont, Grand Isle has seen a slight change in population dynamics, economic development, environmental changes, community initiatives, and infrastructure upgrades since the development of the 2018 Local Hazard Mitigation Plan. The town of Grand Isle is looking to create a Municipal Town Center of the town’s 6.7 acre parcel on Hyde Road, where the Town Office and Fire Department are located. The Selectboard has prioritized a new Library and additional space for the Town Office for this property by committing over $600,000 in the Town’s ARPA (covid recovery) funds towards the project. Additionally, with the Town

Plan update, the town is looking at future proposed land use map updates. Updates include, proposing a village center designation, which would provide tax credits to incoming generating property owners and grant opportunities for the town. The Village Center Designation is not a zoning district. With input from the community at large, proposed town vision includes maintaining natural landscapes and native forests, and flood resilient development adapts to new climate patterns, businesses reducing pollution. These changes have been incorporated into the overall planning process.

The most significant change from the 2018 Local Hazard Mitigation Plan is the stronger focus on climate change altering the frequency, intensity, and distribution of natural hazards. The 2024 Local Hazard Mitigation plan considers climate change projections and incorporates adaptive strategies to minimize the impact of the changing climate.

Organizing Planning Resources

Hazard mitigation planning, and emergency management planning in general, does not occur in a vacuum. The 2024 Grand Isle Local Hazard Mitigation Plan supports and is supported by other local plans and policies. Local, regional, state, and federal plans, studies, data, and technical information are important inputs for the planning process. The below figure outlines the various documents that were reviewed, referenced, and incorporated into the planning process.

Plan / Study / Data / Technical Information	Review and Incorporation
2018 Grand Isle Local Hazard Mitigation Plan	The entire plan was reviewed and referenced throughout the planning process.
2017 Grand Isle Town Plan	The chapters reviewed in depth include existing land use, land use zoning districts, public facilities and services, preservation plan, and flood resilience. The plan was referenced throughout the planning process.
2023 Grand Isle Local Emergency Management Plan	The entire plan was reviewed and referenced throughout the planning process.
2017 Grand Isle Zoning Bylaws and Subdivision Regulations	The sections reviewed in detail include areas of special flood hazard, shoreline district regulations, wetland regulations, road erosion and sediment control, and regulations for areas of special flood hazard.
2018 Bridges and Roads Standards	This document was referenced during the capabilities and mitigation projects meetings.
2024 Emergency Relief Assistance Fund (ERAF) Score	This data was referenced throughout the planning process.
Northwest Regional Planning Commission Website	Various resources, publications and data posted on the website were referenced throughout the planning process.
Vermont Agency of Transportation Bridges and Culverts Inventory Online Database	This data was referenced throughout the planning process.
Natural Resources Atlas	This tool was referenced throughout the planning process.

Vermont Dam Inventory	This tool was referenced during the hazard profile chapter development.
Vermont Agency of Natural Resources	The VANR map hub was referenced during the hazard profile chapter development.
State of Vermont Hazard Mitigation Plan	The entire plan was reviewed and referenced throughout the planning process.
State of Vermont Hazard Mitigation Website	Various resources, publications and data posted on the website were referenced throughout the planning process.
FEMA Local Mitigation Planning Handbook	The entire handbook was reviewed and referenced throughout the planning process.
FEMA Local Mitigation Plan Review Tool	The entire review tool was reviewed and referenced throughout the planning process.
FEMA Disaster and Other Declarations Website	The data posted on the website was referenced during the hazard profile chapter development.
FEMA Risk Mapping, Assessment and Planning (Risk Map) Products	The FEMA Risk Maps were referenced during the hazard profile, mitigation actions, and town capabilities chapters development.
FEMA Flood Insurance Study	The FEMA Flood Insurance Study was referenced during the hazard profile, mitigation actions and town capabilities chapters development.
FEMA Repetitive Loss Structure Website	The FEMA Repetitive Loss database was referenced during the hazard profile and town capabilities chapters development.
NOAA Storm Events Database Website	The data posted on the website was referenced during the hazard profile chapter development.
U.S. Census Bureau Community Profile Website	The data posted on the website was referenced during the community profile chapter development.
FEMA Disaster Declarations Website	A database of declared disasters in Washington County, Vermont.

Figure 3 - Planning References

BUILDING THE PLANNING TEAM

Bringing together a diverse and inclusive planning team is an essential task in the planning process. The Town actively invited and involved various stakeholders, including residents, local business, and local and regional government agencies in the planning process. The below figure details individuals that were members of the 2024 planning team, or stakeholders of the planning process:

Name	Affiliation	Role
Shawna Pinette	Threat Owl LLC.	Planning Team – Plan Developer
William Baron	Grand Isle Emergency Management Director	Planning Team – Member
Brad Sheridan	Grand Isle Highway	Planning Team – Member
Emily Clark	Grand Isle Planning	Planning Team – Member
Melissa Boutin	Grand Isle Clerk/Treasurer	Planning Team – Member
Jeff Parizo	Grand Isle Selectboard	Planning Team – Member
Chief Adam White	Grand Isle Fire	Planning Team – Member
Ray Mitchell	Grand Isle EMS	Planning Team – Member
Mike Clark	Grand Isle School	Planning Team – Member
Shaun Coleman	Northwest Vermont Regional Planning Commission	Planning Team – Member
Jay Moody	Vermont State Fire Marshall	Planning Team – Member
Naomi King	South Hero Town Clerk	Planning Team – Member
Corinn Julow	North Hero Town Clerk	Planning Team – Member
Danielle James Choiniere	Alburgh Town Clerk	Planning Team – Member
Vermont Electric Co-op		Planning Team – Stakeholder (Energy Lifeline)
Champlain Islands Food Shelf		Planning Team – Stakeholder (Food, Water, Shelter Lifeline)
Champlain Islanders Developing Essential Resources		Planning Team – Stakeholder (Transportation Lifeline)

Vermont Cares	Planning Team – Stakeholder (Health and Medical Lifeline)
Senior Meals on Wheels	Planning Team – Stakeholder (Food, Water, Shelter Lifeline)
Support and Services at Home	Planning Team – Stakeholder (Health and Medical Lifeline)
Visiting Nurse VT and NH	Planning Team – Stakeholder (Health and Medical Lifeline)

Figure 4 – Planning Team Members and Stakeholders

STAKEHOLDER ENGAGEMENT AND OUTREACH

A Stakeholder Engagement and Outreach Plan for hazard mitigation planning is essential for several reasons. Key reasons include, but are not limited to, inclusive decision-making, enhanced community resilience from community buy-in, improved risk awareness and preparedness through education, increased plan effectiveness and sustainability, enhanced trust and transparency through partnerships, and consensus building. To adhere to federal regulations, Threat Owl LLC. and the Planning Team developed a stakeholder engagement and outreach plan that ensured various stakeholders and the public were given opportunities to be involved in the plan's development process. The Stakeholder Engagement and Outreach Plan included:

- **Defining Engagement Goals:**
  - Inclusive Participation: Ensure all stakeholder voices are heard, especially persons with disabilities, access, or functional needs
  - Awareness and Education: Increase understanding of hazard risks and mitigation strategies
  - Collaboration: Foster cooperative relationships among stakeholders
  - Feedback Collection: Gather input to inform the hazard mitigation plan and ensure the stakeholder and public feedback is incorporated into the plan
  - Transparency: Maintain open communication about the planning process and decisions

- **Identifying Stakeholders:** (Please refer to Figure 3 – Planning Team Members and Stakeholders for specific stakeholder representation)
  - Local and regional agencies involved in hazard mitigation activities - public works/highway department, emergency management, local floodplain administration, and regional planning.
  - Entities that have the authority to regulate development - zoning, planning, health, building inspection, or other elected officials.
  - Neighboring communities.
  - Representatives of businesses, schools/academia, and other private organizations that sustain community lifelines - utilities. Community lifelines are safety and security; health and medical; communications; hazardous materials; food, water, shelter; energy (power and fuel); and transportation.
  - Representatives of nonprofit organizations, including community-based organizations that work directly with or provide support to vulnerable populations or frontline communities - housing, healthcare, etc.

- **Identifying Outreach Methods:**
  - Flyers
  - Social media
  - Websites
  - Email notifications
  - Surveys

- **Establishing Feedback Mechanisms:**
  - Public comment periods
  - Public meetings
  - Feedback requests

- Online Feedback Email Link
- Regular Updates and Follow-Ups
- Feedback Analysis

- **Implementing Communication and Outreach Methods**
  - Meetings were publicly noticed with minimum of two days' notice
  - Meeting information (purpose, agenda, slides, zoom link) was posted electronically on the town's website
  - Meeting information (purpose, agenda, slides, zoom link) was posted electronically on the town's social media sites
  - Meeting information (purpose, agenda, slides, zoom link) was posted, hard copy, at municipal buildings (e.g., town hall)
  - Meeting information (purpose, agenda, slides, zoom link) was posted, hard copy, at non-municipal buildings (e.g., post office)
  - Meeting information (purpose, agenda, slides, zoom link) was posted, hard copy, at municipal buildings (e.g., town hall)
  - Meeting information (purpose, agenda, slides, zoom link) was sent via email to all planning team members and stakeholders (Please refer to Figure 3 – Planning Team Members and Stakeholders for specific stakeholder representation)

- **Implementing Feedback**
  - Any feedback that was received from the public, planning team or stakeholders, was implemented during the plan update

By employing a comprehensive, multi-faceted approach to stakeholder engagement and public outreach, Threat Owl LLC. and the Planning Team ensured broad and effective community engagement in the hazard mitigation planning process. This not only helps to create a more robust and inclusive plan but also builds a stronger, more resilient community prepared to face future hazards.:

PLAN DEVELOPMENT PROCESS

Updating a hazard mitigation plan is a comprehensive process that involves several key steps to ensure the plan remains relevant and effective. The below figure is a record of how the Local Hazard Mitigation Plan was developed:

#	Action Name	Date	Action Details (Goal, location, etc.)	Public/Stakeholder Opportunity
1	Request for Proposal (RFP) Published	9/11/23	Town public RFP soliciting proposals to update LHMP.	Yes – public meeting and document
2	RFP Submitted	9/29/23	Threat Owl submitted a response to RFP	N/A
3	RFP Awarded	10/10/23	Proposal awarded to Threat Owl LLC	Yes – public meeting
4	LHMP Contract Agreement	10/19/23	Threat Owl LLC and Grand Isle entered a contract	N/A
5	Planning Team Developed	10/19/23	Threat Owl LLC and Grand Isle developed planning team	N/A
6	Stakeholder Engagement and Outreach Plan Developed	10/26/23	Threat Owl LLC and Grand Isle developed a stakeholder engagement and outreach plan	N/A
7	Hazard Mitigation Kickoff Meeting	11/6/23	Threat Owl facilitated hazard mitigation kickoff meeting	Yes – public meeting Public comment received and implemented
8	Hazard Mitigation Kick Off Meeting Notes	11/6/24	Threat Owl developed and distributed meeting notes	N/A
9	Hazard Assessment Review Meeting	12/4/23	Threat Owl facilitated hazard review / risk assessment meeting	Yes – public meeting
10	Hazard Assessment Review Meeting Notes	12/4/23	Threat Owl developed and distributed meeting notes	N/A
11	Town Capabilities Review Meeting	2/1/24	Threat Owl facilitated town capabilities meeting	Yes – public meeting Public comment received and implemented
12	Town Capabilities Review Meeting Notes	2/1/24	Threat Owl developed and distributed meeting notes	N/A
13	Previous and New	3/14/24	Threat Owl facilitated	Yes – public

	Mitigation Projects Meeting		hazard mitigation projects meeting	meeting
14	Previous and New Mitigation Projects Meeting Notes	3/14/24	Threat Owl developed and distributed meeting notes	N/A
15	Draft Plan Developed and Request for Review	6-26-24	Draft plan was reviewed by the planning team, stakeholders, selectboard and the public was given time for public comment.	Yes – public meeting
16	Selectboard Meeting	8/19/24	Draft Plan Reviewed at Selectboard Meeting	Yes – public meeting

Figure 5 - Planning Process Table

RISK ASSESSMENT

Risk Assessment Process

The risk assessment process is a critical component of hazard mitigation planning. It involves identifying potential hazards, assessing vulnerabilities, and evaluating the potential impacts of those hazards on the community. Due to changes to the community profile, potential impacts of climate change, historical data and social and economic challenges, the hazard ranking varied from the 2018 Local Hazard Mitigation Plan. The Planning Team discussed how the town may be more vulnerable to certain hazards due to climate change, land use, and demographics. Climate change will exacerbate vulnerabilities for the town with increased frequency and severity of weather events and altered weather patterns. Changing demographics can significantly impact the town's vulnerability to hazards. Aging population, increased density population, increased socioeconomic disparities, cultural and linguistic diversity, population growth and urbanization, transient and migrant populations, and increased number of persons with disabilities, access and functional needs exacerbates vulnerabilities. The Planning Team made decisions by majority consensus.

Risk Assessment Calculation

The risk assessment score is determined by using the following calculation: (Impacted Area + Health & Safety + Property + Environment + Economic) x Frequency of Occurrence = Total. (see below table).

The risk assessment score are categorized as the following:

- 0-24 LOW
- 25-49 MODERATE
- 50-75 HIGH

Score	Impacted Area (% Community Affected)	Frequency of Occurrence	Health & Safety	Property	Environment	Economic
0	Negligible: < 10% of properties damaged.	N/A	No health and safety impact	No health and safety impact	Little or no environmental damage	No economic disruption
1	Limited: 10% to < 25% of properties damages/Loss of essential facilities /services for up to 7 days/few (<1% of population) injuries possible.	Rare: Unknown but rare occurrence	Few injuries or illnesses	Few properties destroyed or damaged	Resources damaged with short term recovery practical	Low direct and/or indirect costs
2	Critical: 25% to 50% of properties damaged/Loss of essential facilities/services for > 7 days < 14	Unlikely: Unknown but anticipate an occurrence	Few fatalities but many injuries or illnesses	Few destroyed but many damaged	Resources damaged with long term recovery feasible	High direct and low indirect costs

	days/Major (< 10% of population) injuries/few deaths possible.					
3	Catastrophic: > 50% of properties damaged/ loss of essential facilities/services for > 14 days/Severe (> 10% of population) injuries/multiple deaths possible.	Possible: 1% to 10% probability in the next year, or at least one chance in the next 100 years.	Numerous fatalities	Few damaged but many destroyed	Resourced destroyed beyond recovery	Low direct and high indirect costs
4	N/A	Likely: 10% to 100% probability in the next year, or at least one chance in the next 10 years.	N/A	Many properties destroyed and damaged	N/A	High direct and high indirect costs
5	N/A	Highly Likely: Near 100 % chance in the next year.	N/A	N/A	N/A	

Figure 6 - Risk Assessment Calculation

The planning team also considered and reviewed declared disaster declarations for Grand Isle County. Below is a summary of declared disasters:

Declaration Date	Disaster Number	Information
2023-07-14T00:00:00.000Z	DR-4720-VT	SEVERE STORMS, FLOODING, LANDSLIDES, AND MUDSLIDES
2023-03-20T00:00:00.000Z	DR-4695-VT	SEVERE STORM AND FLOODING
2014-01-29T00:00:00.000Z	DR-4163-VT	SEVERE WINTER STORMS
2018-07-30T00:00:00.000Z	DR-4380-VT	SEVERE STORM AND FLOODING
2011-09-01T00:00:00.000Z	DR-4022-VT	TROPICAL STORM IRENE
2021-08-22T00:00:00.000Z	EM-3567-VT	TROPICAL STORM HENRI
2020-04-08T00:00:00.000Z	DR-4532-VT	COVID-19 PANDEMIC
2011-08-29T00:00:00.000Z	EM-3338-VT	HURRICANE IRENE
2001-04-10T00:00:00.000Z	EM-3167-VT	SNOW
2011-06-15T00:00:00.000Z	DR-1995-VT	SEVERE STORMS AND FLOODING
2008-08-15T00:00:00.000Z	DR-1784-VT	SEVERE STORMS, A TORNADO, AND FLOODING

1998-01-15T00:00:00.000Z	DR-1201-VT	SEVERE ICE STORMS, RAIN, HIGH WINDS AND FLOODING
1993-05-12T00:00:00.000Z	DR-990-VT	HEAVY RAIN, SNOWMELT & FLOODING
1973-07-06T00:00:00.000Z	DR-397-VT	SEVERE STORMS, FLOODING, & LANDSLIDES
2018-01-02T00:00:00.000Z	DR-4356-VT	SEVERE STORM AND FLOODING
2023-07-10T00:00:00.000Z	EM-3595-VT	FLOODING
2020-03-13T00:00:00.000Z	EM-3437-VT	COVID-19

Figure 7 - FEMA Declared Disasters

Risk Assessment

Hazard	Impacted Area	Community Vulnerability					Total	Risk Category
		Frequency of Occurrence	Health & Safety	Property	Environment	Economic		
Lakeshore Flooding	1	5	1	2	2	2	40	Moderate
Severe Thunderstorms (Lightning, High Winds, Hail)	1	5	1	2	2	2	40	Moderate
Flooding (non-lakeshore events)	1	5	1	1	1	3	35	Moderate
Severe Winter Storm (Snow / Ice Storm / Extreme Cold)	1	5	1	1	1	3	35	Moderate
Invasive Species	1	3	1	1	2	1	18	Low
Disease Outbreak	0	3	2	0	0	2	12	Low
Wildfire	1	2	1	1	1	1	10	Low
Drought and Extreme Heat	1	1	1	1	2	2	7	Low
Tornado	1	1	1	1	1	2	6	Low
Landslide	1	1	1	1	1	2	6	Low
Earthquake	1	1	1	1	1	2	6	Low
Human-caused Hazards (not profiled in the LHMP)								
Structure Fire	1	2	1	1	1	1	10	Low
Hazardous Materials	1	2	1	1	1	1	10	Low
Loss of Electrical Service	1	2	1	1	0	2	10	Low
Terrorism	1	1	1	1	0	2	5	Low
Chemical, Biological, Radiological, Nuclear	1	1	1	1	0	2	5	Low

Figure 8- Grand Isle, VT Local Hazard Mitigation Plan – Risk Assessment Scores

All hazards identified in the state hazard mitigation plan were considered for incorporation into the Grand Isle Local Hazard Mitigation Plan. Some hazards were intentionally excluded from the Grand Isle Local Hazard Mitigation Plan, as they were not hazards the town would experience. The hazards not addressed in this plan update along with the justification for not including them are outlined in the following table.

Hazard Not Profiled	Justification
Fluvial Erosion	There are no rivers in Town. There are only smaller intermittent and perennial streams that drain from springs and wetlands. This hazard is not a threat to the Town.
Ice Jams	There are no rivers in Town. Ice Jams are not a risk.

Figure 9 - Hazards not Profiled

Readers looking for additional information on fluvial erosion and ice jams should review the State Hazard Mitigation Plan.

The planning team also considered previous

HAZARD PROFILES

A hazard profile is a detailed description and analysis of a specific hazard that could potentially impact a community. The purpose of a hazard profile is to provide comprehensive information about the nature, history, and potential future occurrences of a hazard, as well as its impacts on the community. This information is crucial for developing effective hazard mitigation strategies. Key components of a hazard profile include:

- Hazard Description
- Hazard Extent
- Hazard Location
- Hazard History
- Town Vulnerability
    - People
    - Built Environment
    - Natural Environment
    - Economy
- Potential Future Impacts
    - Climate Change
    - Change in Land Use/Development
    - Change in Demographics

A hazard profile can be found below for each identified hazard in the Grand Isle, VT Local Hazard Mitigation Plan – Risk Assessment table. Due to similar descriptions, extent, impact, location vulnerability, hazard history and potential future impacts, some hazards are combined in the hazard profiling.

Lakeshore Flooding and Inundation Flooding Profile

Hazard Description: Lakeshore flooding refers to the inundation of coastal areas along lakes, particularly large lakes, such as Lake Champlain. This type of flooding can be caused by a combination of factors, including heavy rainfall, snowmelt, high winds, and changes in lake levels. Inundation flooding can occur rapidly during heavy rainfall, snowmelt, or dam releases, or more slowly in cases of prolonged rainfall. Floods in Grand Isle have occurred in every season of the year. Flooding in the spring is common and is caused by rainfall combined with snowmelt. Floods in late summer and fall are usually the result of above normal precipitation. Winter floods result from occasional thaws, particularly in years of heavy snow cover.

Hazard Extent: Flooding in Grand Isle has been caused primarily by high levels of Lake Champlain and the consequent erosion of the bank materials along the shore. The maximum elevation observed at USGS gaging station No. 04295000 on the Richelieu River (Lake Champlain) at Routes Point, New York (18 miles away and closest gauge), for the period of record from May 1871 to September 2015, is 102.77 feet on May 6, 2011. The below graphic highlights flood impacts, flood traces and thresholds (observed and official forecast), along with the highest flood record.

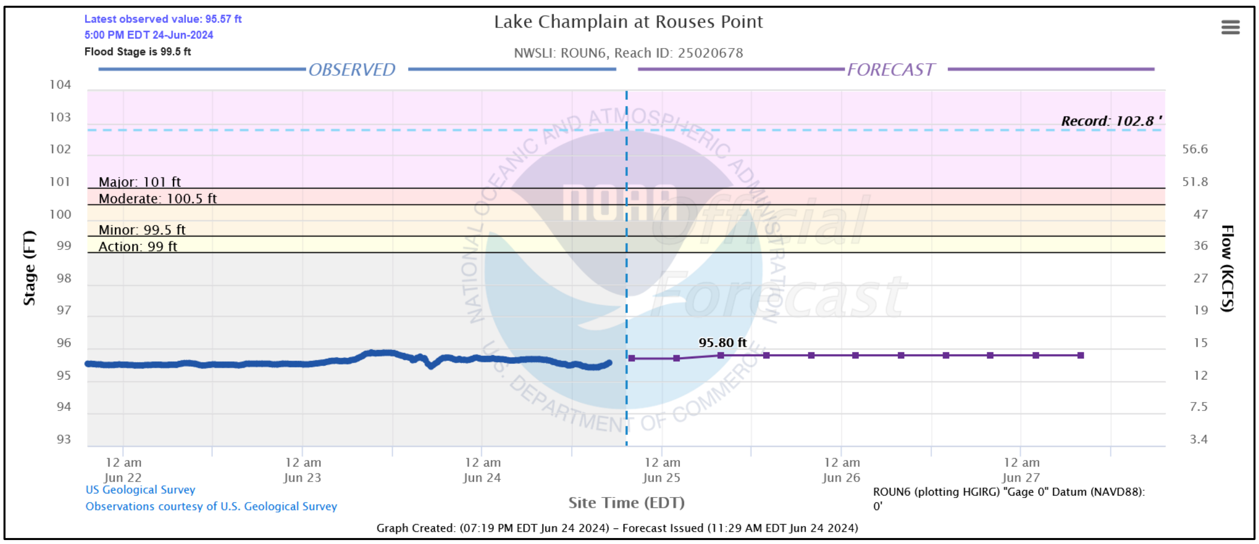

Figure 10 - Lake Champlain at Rouses Point Flood Data

Hazard Location: The lake shoreline areas of Grand Isle are subject to periodic flooding caused by high water levels in Lake Champlain. Seasonal camps and private residences are clustered along the lake shore. The primary concentrations for these structures are along Cooper Bay, Pearl Bay, Ladd Bay, Wilcox Bay, and Phelps Point. In addition, there are other areas, including tributaries to the lake, Pearl Swamp and wetlands that have been designated as within the 100-year flood levels. Floods typically occur along drainage areas because of summer thunderstorm activity. Drainage ditches and culverts are the biggest concern for local flash flooding events. Areas in Grand Isle that are particularly susceptible include West Shore Road and East Shore Road. Past impacts have also been seen on Hyde Road Allen Road, Pearl Street, Griswold Road, Moccasin Avenue, Simms Pont Road, Donaldson Road and Faywood Road.

The below Flood Insurance Rate Map (FIRM) is the official FIRM map of Grand Isle, which defines both the special flood hazard areas and the flood zones. The Grand Isle FIRM was last updated in 1988.

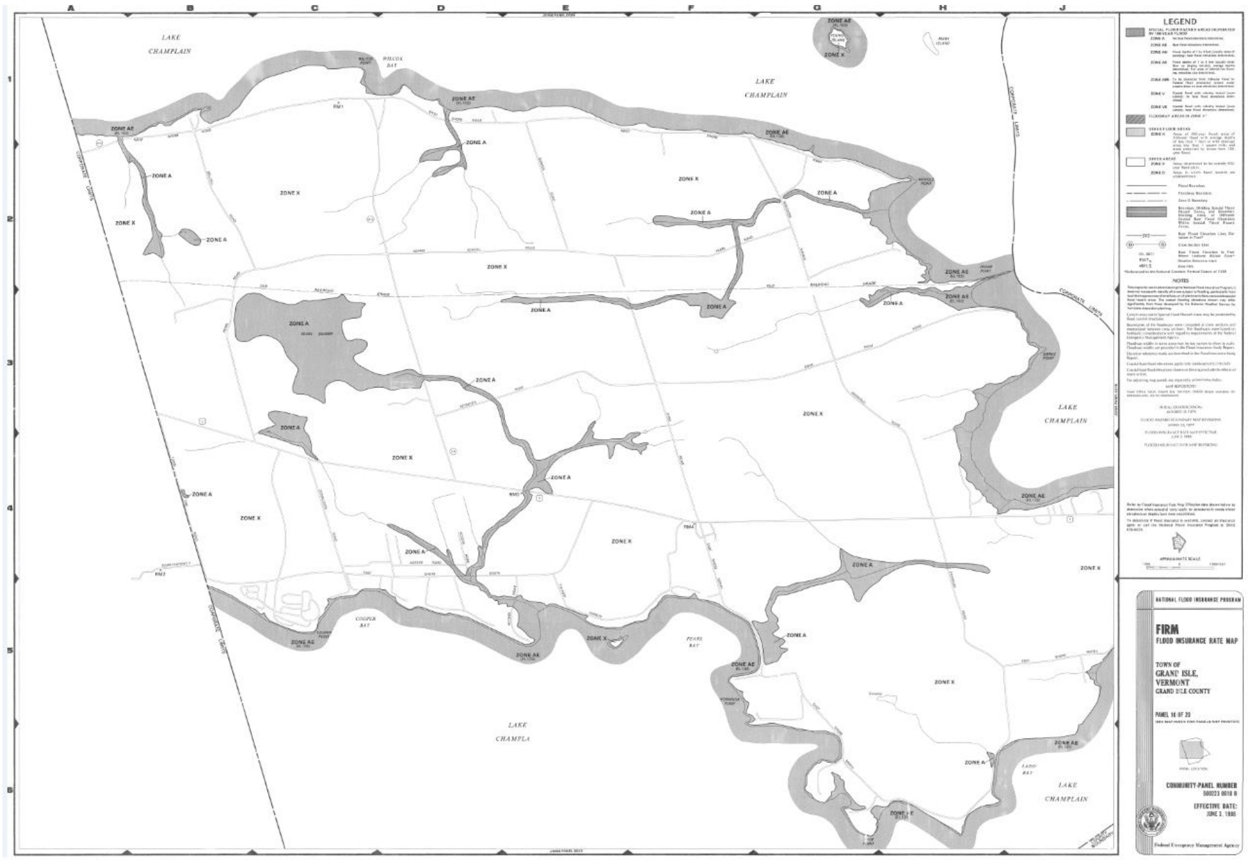

Figure 11 - Grand Isle FIRM

The following maps were created using the Vermont Agency of Natural Resources (ANR) ‘Natural Resources Atlas’ which is an online mapping tool. The below maps depict the northern and southern half of Grand Isle. The green shaded areas are the ANR River Corridors.

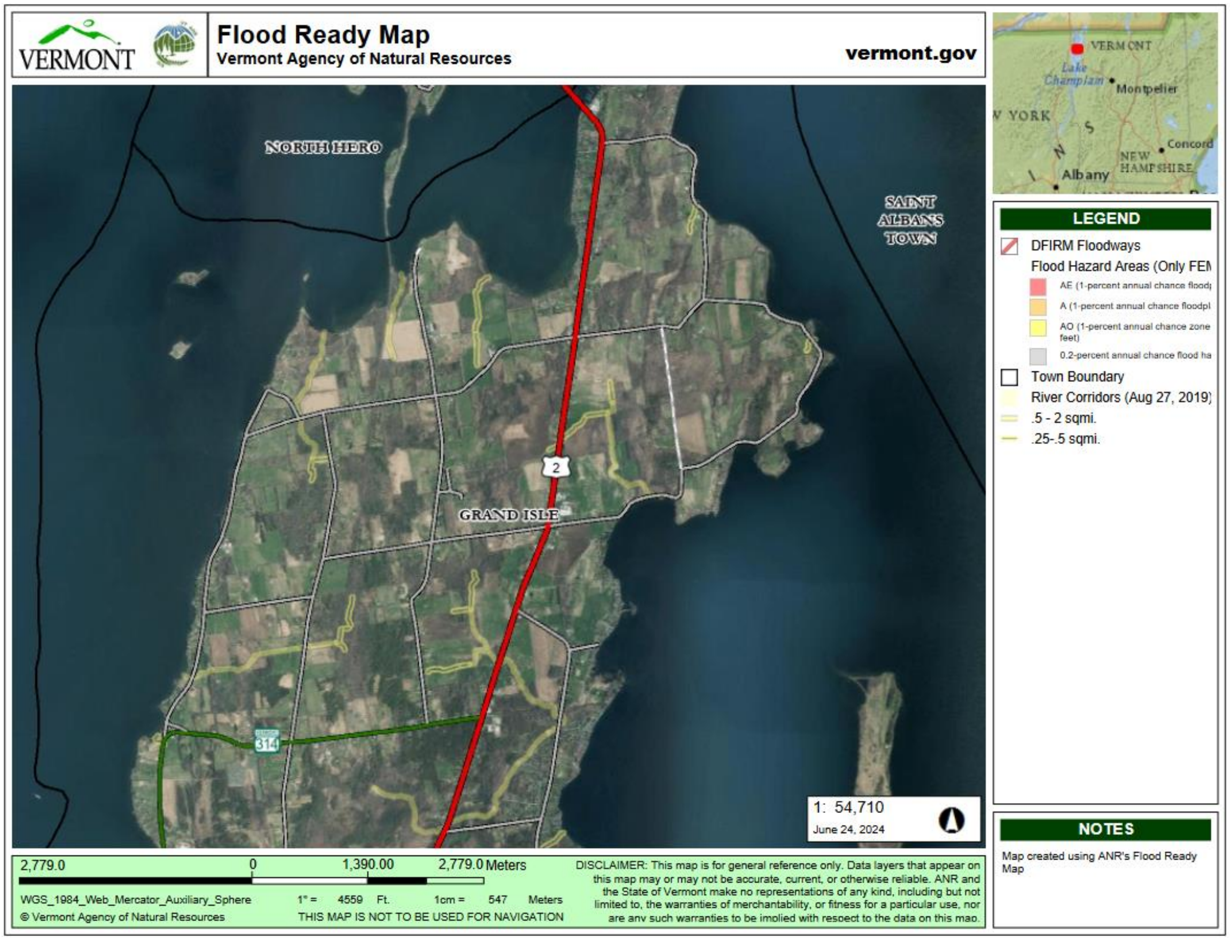

Figure 12 - Figure 9 - VANR Flood Ready Map (northern Grand Isle)

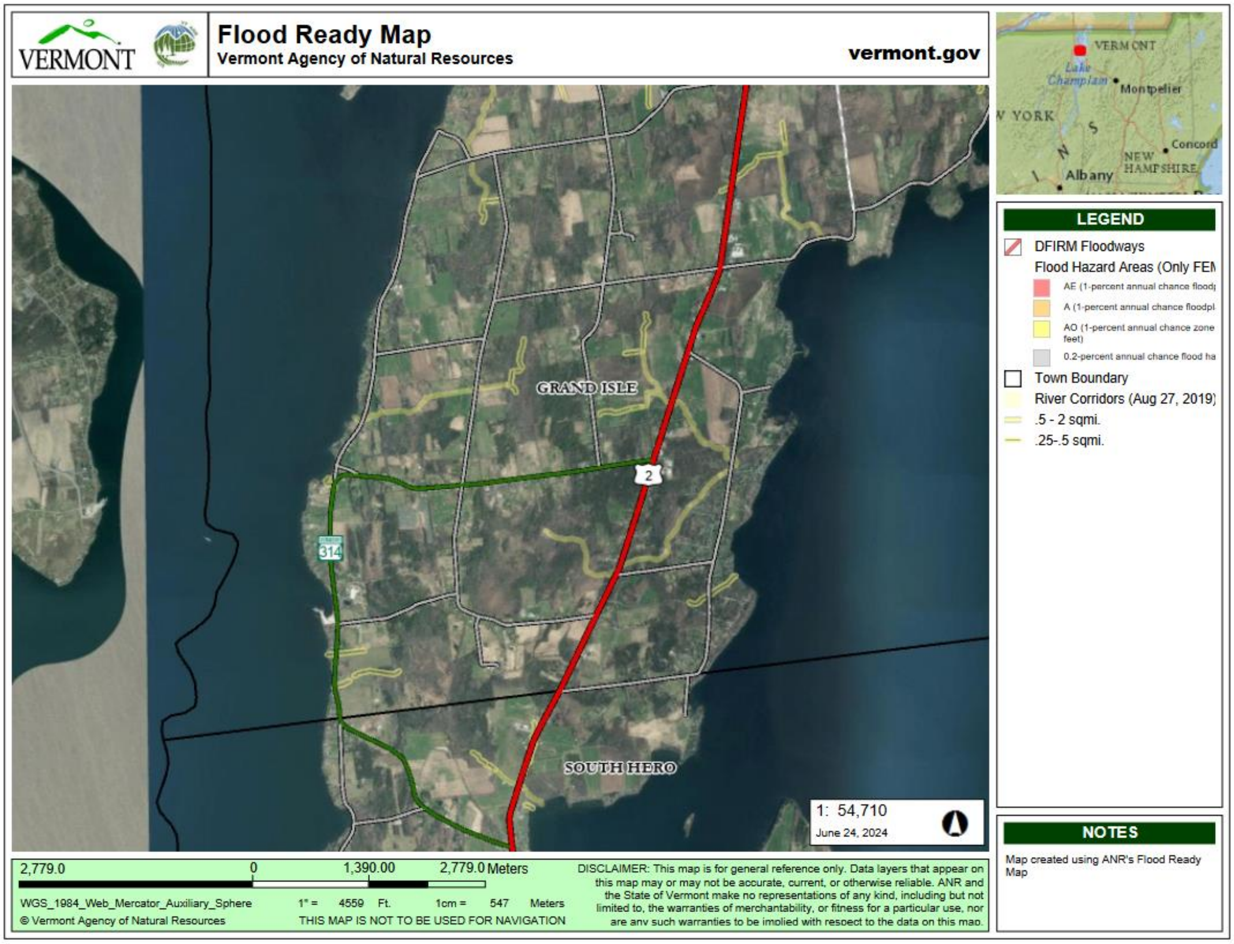

Figure 13 - VANR Flood Ready Map (Southern Grand Isle)

Hazard History: The below table identifies a history of occurrences. Please refer to Appendix A for additional information.

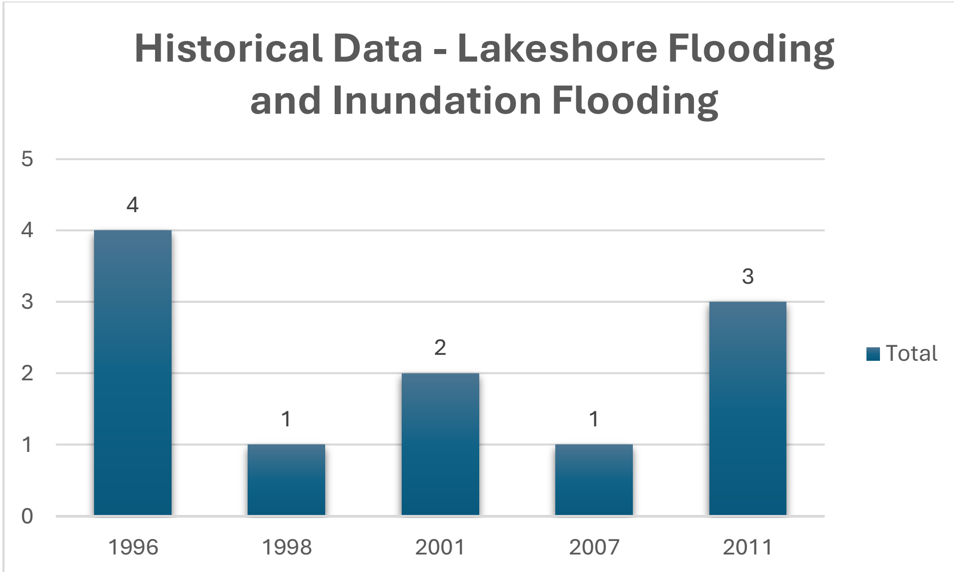

Figure 14 – Lakeshore Flooding and Inundation Flooding History of Occurrences

Town Vulnerability:

- **People:** Lakeshore flooding and inundation flooding events can cause injuries or fatalities to people who do not evacuate in time. Delayed evacuation can be caused by no-noticed events, or by individuals who are hesitant to leave their houses. The elderly, the homeless, residents with special needs and those without proper transportation may potentially be impacted more than other residents.
- **Built environment:** Lakeshore flooding and inundation flooding events can cause damage to town and private property, including roads (i.e., Route 2, and the causeway), culverts, driveways, bridges, wells, sewage facilities/septic systems, ferry crossing to New York and buildings. These impacts could cause disruption of the transportation system to and from the community and county.
- **Natural environment:** Lakeshore flooding and inundation flooding events can cause damage to the environment and fragile ecosystems. Vulnerabilities and impacts include algae blooms (harmful to the environment, and toxic to animals/people), transportation of invasive species, soil and bank erosion, and pollution.
- **Economy:** Lakeshore flooding and inundation flooding can cause major economic impacts to the town. Impacts include disruption or closure of impacted businesses, homelessness due to house damage, and recovery costs, including employee overtime, time and equipment spent on the repairs.

Potential Future Impacts:

- **Climate Change:** Climate change has profound effects on weather patterns, precipitation, and temperature, all of which significantly impact Lakeshore flooding and inundation flooding. Increased lake height, earlier and rapid snowmelt, more severe storms, vegetation loss and soil saturation, because of climate change, may cause lakeshore flooding and inundation flooding event frequency and intensity.
- **Change in Land Use/Development:** The creation of the Flood Hazard District in the Town’s Subdivision and Zoning bylaws enabled Grand Isle to be eligible for FEMA’s

National Flood Insurance Program (NFIP), which permits residents within the Flood Hazard District to purchase flood insurance. The purpose of the district is to prevent increases in flooding caused by development in flood hazard area, to minimize future public and private losses due to floods, and to promote public health, safety, and general welfare. The Town is committed to enforcing floodplain regulations and ordinances to be eligible to participate in the NFIP program and protect the people and property of Grand Isle by restricting development in flood prone areas. Therefor change in development and land use is not expected to increase impacts of lakeshore or inundation flooding on current or future assets.

- **Change in Demographics:** Grand Isle's population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

Severe Thunderstorms (Lightning, High Winds, Tornadoes, Hail)

Hazard Description: Lightning is a natural electrical discharge of very short duration and high voltage between a cloud and the ground or within a cloud. It poses significant risks to people, structures, and natural environments. Wind hazards include high winds from thunderstorms, hurricanes, tropical storms, and winter storms. These winds can cause damage to buildings, power lines, trees, and other infrastructure. Wind events can vary in intensity, duration, and geographic extent. Hail is a type of precipitation that consists of solid ice balls or lumps (hailstones) that form within strong thunderstorm clouds, particularly those with intense updrafts. Hailstones form when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze. Layers of ice accumulate as the stones are repeatedly lifted and dropped within the storm before falling to the ground when they become too heavy.

Hazard Extent: Lightning strikes are more common in regions with high humidity and frequent thunderstorms, such as tropical and subtropical areas. Lightning can carry a current of up to 300,000 amperes and temperatures can reach up to 30,000 Kelvin (53,540 degrees Fahrenheit). The intensity of lightning strikes can vary, with some causing minor damage and others resulting in severe impacts, including fatalities. Modern meteorological technology can predict thunderstorms with reasonable accuracy, providing some advance warning.

Wind speeds can vary significantly, with gusts reaching 40-60 mph during severe thunderstorms and higher during hurricanes or tropical storms. Wind advisories and warnings are issued by the National Weather Service, often providing several hours to days of advance notice. Wind events can last from a few minutes during thunderstorms to several days during hurricanes and nor'easters. High wind events occur several times a year, particularly during hurricane season (June to November) and winter months. Significant wind events in Grand Isle have been associated with hurricanes, tropical storms, and nor'easters. The Beaufort Wind Scale measures wind speeds and anticipated damage. Grand Isle may experience wind event intensities anywhere on the Beaufort Wind Scale. The Saffir-Simpson Hurricane Wind Scale measures hurricane wind speeds and anticipated damage. It is reasonably anticipated that Grand Isle will not experience a greater than Category 2 Hurricane on the Saffir-Simpson Scale. The Enhanced Fujita Scale measures tornado wind speeds. While very unlikely, Grand Isle could experience a tornado falling anywhere on the Enhanced Fujita Scale. Please refer to the State Hazard Mitigation Plan for additional information on the Beaufort Wind Scale, Saffir-Simpson Hurricane Wind Scale and the Enhanced Fujita Scale.

Hail events can occur year-round but are most common in late spring and summer during thunderstorms. Hailstone size can range from the size of a pea to the size of a melon. Given the State’s historical data, hail size is anticipated to be smaller than five inches, however hailstones can be of any size. Hail greater than in inch was reported during thunderstorms in 2005 (7/22), 2010 (7/21), 2012 (5/16 & 5/29), and 2022 (5/21)

Hazard Location: Severe Thunderstorms (lightning, high winds, and hail) events have impacted the town of Grand Isle town wide. Unlike lakeshore flooding, which occurs on and around Lake Champlain, thunderstorm events can occur and have occurred throughout the town.

Hazard History: The below table identifies a history of occurrences. Please refer to Appendix A for additional information.

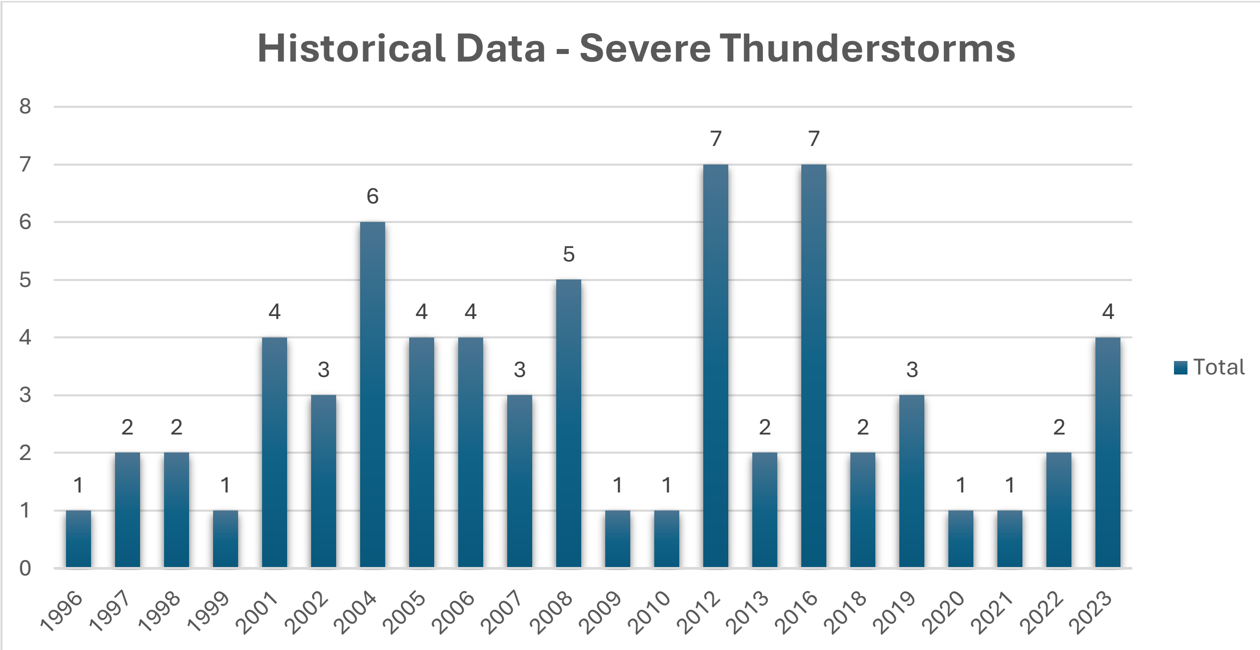

Figure 15 - Severe Thunderstorms History of Occurrences

Town Vulnerability:

- **People:** Severe Thunderstorms (lightning, high winds, and hail) events can cause injuries or fatalities to people who do not shelter-in-place in time, or who do not have adequate shelter. Delayed sheltering-in-place can be caused by no-noticed events, or by individuals who do not heed the warning. The elderly, the homeless, residents with special needs and those without proper transportation may potentially be impacted more than other residents.
- **Built environment:** Severe Thunderstorms (lightning, high winds, and hail) events can cause damage to town and private property, including buildings (windows and roofs), downed road signs, utility poles and power lines, overturned vehicles, ferry crossing to New York, and roads (i.e., Route 2 and the causeway). These impacts could cause disruption of the transportation system to and from the community and county.
- **Natural environment:** Severe Thunderstorms (lightning, high winds, and hail) events can cause damage to the environment with downed trees, and uprooted trees and plants.
- **Economy:** Severe Thunderstorms (lightning, high winds, and hail) events can cause major economic impacts on the town. Impacts include disruption or closure of impacted businesses, homelessness due to house damage, and recovery costs, including employee overtime, time and equipment spent on the repairs.

Potential Future Impacts:

- **Climate Change:** Climate change has significant effects on weather patterns and atmospheric dynamics, which in turn influence severe thunderstorms (lightning, high winds, and hail) events. These changes can alter the frequency, intensity, and geographic distribution of severe thunderstorms (lightning, high winds, and hail) events.
- **Change in Land Use/Development:** No changes to asset impacts due to severe thunderstorms (lightning, high winds, and hail) events because of development or land use changes could be identified.

- **Change in Demographics:** Grand Isle's population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

Severe Winter Storm / Ice Storm Profile

Hazard Description: Severe winter storms with snow, ice and freezing temperatures in various combinations are commonplace in Grand Isle. Such storms are accompanied by strong winds creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chill. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Winter storms can cause roofs to collapse and limit access to areas and buildings around Town. Extreme cold often accompanies a severe winter storm or is left in its' wake. Prolonged exposure to the cold can cause frostbite or hypothermia and become life-threatening. Ice events include ice storms, freezing rain, sleet, and ice accumulation on surfaces. Ice accumulation occurs when rain falls through a layer of subfreezing air near the surface, causing it to freeze on contact with surfaces. Sleet involves small ice pellets that bounce upon hitting the ground, while freezing rain creates a glaze of ice. Snow hazards include heavy snowfall, blizzards, and snowdrifts. Snow events vary in intensity and duration, from light snowfalls to severe blizzards with high winds and significant accumulation.

Hazard Extent: Ice and snow events occur several times each winter season, with major storms happening every few years. Significant winter and ice storms have occurred in Grand Isle, with notable events causing widespread power outages and transportation disruptions. For example, the Ice Storm of 1998 heavily impacted the region.

Ice accumulation can range from a light glaze (less than 0.25 inches) to significant buildup (greater than 0.50 inches). Severe ice storms can lead to widespread damage. The Valentine's Day Blizzard of 2007 also caused widespread power outages and transportation disruptions.

Snowfall accumulation can range from a few inches to several feet during severe storms. Blizzards can produce wind speeds exceeding 35 mph, causing whiteout conditions and significant snowdrifts. Ice and snow storm warnings and advisories are issued by the National Weather Service, typically providing 24-48 hours of advance notice. Ice and snow events can last from a few hours to several days, with lingering effects due to ice accumulation and cold temperatures. On March 6, 2007, Grand Isle County recorded a record low of -19 degrees Fahrenheit.

The National Weather Service may issue the following watches, warnings or advisories.

- Wind Chill Warning: Dangerously cold wind chill values are expected or occurring.
- Wind Chill Watch: Dangerously cold wind chill values are possible.
- Wind Chill Advisory: Seasonably cold wind chill values but not extremely cold values are expected or occurring.
- Hard Freeze Warning: Temperatures are expected to drop below 28°F for an extended period of time, killing most types of commercial crops and residential plants.
- Freeze Warning: Temperatures are forecasted to go below 32°F for a long period of time, killing some types of commercial crops and residential plants
- Freeze Watch: Potential for significant, widespread freezing temperatures within the next 24-36 hours.
- Frost Advisory: Areas of frost are expected or occurring, posing a threat to sensitive vegetation

Additionally, NOAA uses the "Potential Winter Storms Impact" prediction tool to indicate the level of winter event and severity. For more information on the severe winter weather scales, please refer to the State Hazard Mitigation Plan.

Hazard Location: All areas of Grand Isle can be affected by ice and snow events.

Hazard History: The below table identifies a history of occurrences. Please refer to Appendix A for additional information.

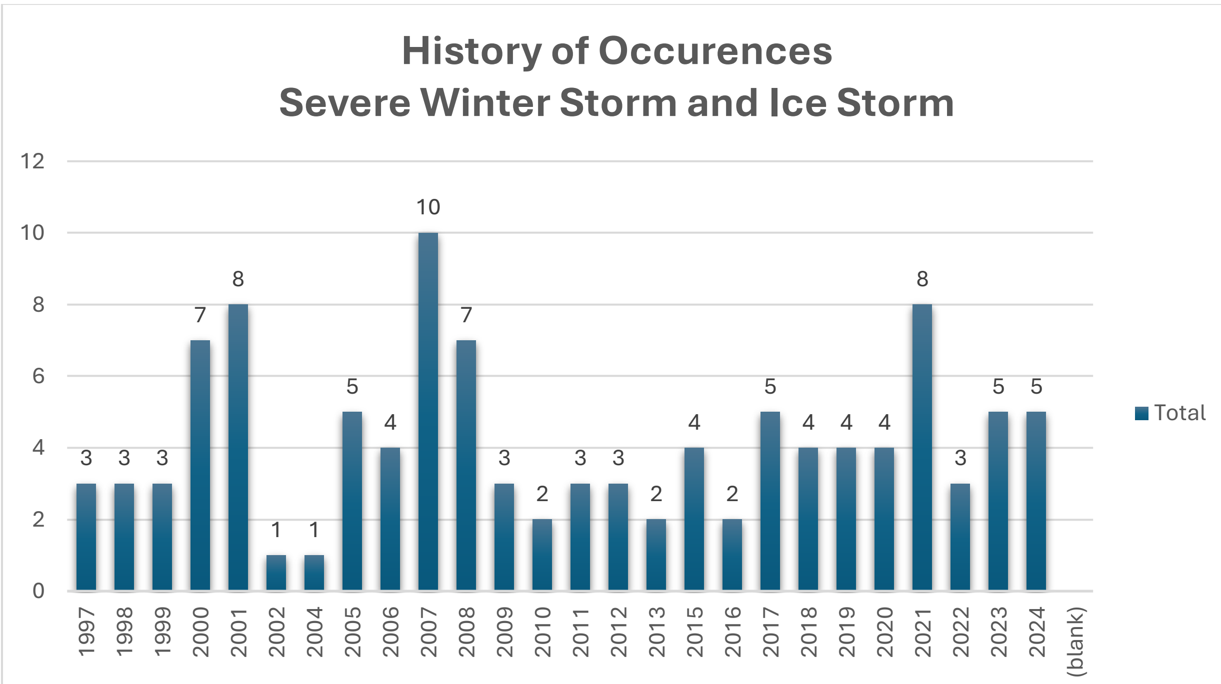

Figure 16 – Severe Winter Storm and Ice Storm History of Occurrences

Town Vulnerability:

- **People:** Severe winter weather and ice storms events can cause injuries or fatalities to people who do not shelter-in-place, or who do not have adequate shelter. Delayed sheltering-in-place can be caused by no-noticed events, or by individuals who do not heed the warning. The elderly, the homeless, residents with special needs and those without proper transportation may potentially be impacted more than other residents.
- **Built environment:** Severe winter weather and ice storms events can cause damage to town and private property, including buildings (roof collapse), blocked egress routes, blocked evacuation routes, frozen pipes, downed powerlines, ferry crossing to New York and roads (i.e., Route 2 and the causeway). These impacts could cause disruption of the transportation system to and from the community and county.
- **Natural environment:** Severe winter weather and ice storms events can cause damage to the environment with downed trees.
- **Economy:** Severe winter weather and ice storms events can cause economic impacts to the town. Impacts include disruption or closure of impacted businesses, and recovery costs, including employee overtime, time and equipment spent on the repairs

Potential Future Impacts:

- **Climate Change:** Climate change significantly affects weather patterns, including the frequency, intensity, and geographic distribution of severe winter weather and ice storms. These changes can increase frequency and intensity of severe winter weather and ice storms, change snowfall patterns, leading to more ice accumulation and reduce snowpack.
- **Change in Land Use/Development:** No changes to asset impacts due to severe winter weather and ice storms events because of development or land use changes could be identified.
- **Change in Demographics:** Grand Isle's population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

Invasive Species Profile

Hazard Description: Invasive species are non-native organisms that, when introduced to an area, cause harm to the environment, economy, or human health. These species can outcompete native species, disrupt ecosystems, and cause significant ecological and economic damage. Invasive species can be plants, animals, fungi, or microorganisms. They often have high reproductive rates, few natural predators in their new environment, and the ability to thrive in a wide range of conditions.

Hazard Extent: The extent of impact can vary from localized infestations to widespread ecological disruption.

Hazard Location: All ecosystems in Grand Isle, including forests, wetlands, agricultural lands, and waterways, are susceptible to invasion by non-native species.

Hazard History: According to the Vermont Forest Invasive Pests Status Map, Emerald Ash Borer was found in Grand Isle in 2021. Additionally, Lake Champlain is home to fifty aquatic non-native and invasive species. Of these fifty known species in the Lake, several are high priorities for management:

- Alewife
- Asian Clam
- Eurasian Watermilfoil
- Japanese Knotweed
- Purple Loosestrife
- Water Chestnut
- Zebra Mussel
- Spiny Water Flea

Town Vulnerability:

- **People:** People may be infected or made ill by invasive species events (e.g., swimming in an active milfoil bloom).
- **Built environment:** Invasive species may cause overgrowth or damage to various built environments, such as, powerlines and culverts. The damage can be minor to catastrophic.
- **Natural environment:** Invasive species can wipe out an entire local ecosystem, causing complete devastation to the local natural environment. Bodies of water may become uninhabitable, and forests can see complete devastation. Ash trees and the health of Lake Champlain are of particular concern.
- **Economy:** Invasive species can impact the tourism industry with the closure of local bodies of waters and outdoor recreation trails.

Potential Future Impacts:

- **Climate Change:** Warmer temperatures and altered precipitation patterns can create more favorable conditions for invasive species to thrive and expand their range. Species that were previously limited by cold temperatures may be able to establish populations in new areas, including higher elevations and latitudes. Climate change can influence the distribution and abundance of vectors (e.g., mosquitoes, ticks) that transmit invasive species and vector-borne diseases. Warmer temperatures and changes in precipitation patterns can expand the geographic range of these vectors, increasing the risk of invasive species introductions and disease transmission. Invasive species themselves can contribute to climate change through various mechanisms, such as altering carbon cycling, disrupting ecosystem services, and promoting changes in land cover and vegetation dynamics. These feedback loops can further exacerbate the impacts of climate change on ecosystems.

- **Change in Land Use/Development:** Increased recreational use or development in forest reserve districts can lead to habitat modification, fragmentation of natural habitats, altered disturbance regimes, changes in hydrology and drainage and loss of native biodiversity.
- **Change in Demographics:** Grand Isle's population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

Disease Outbreak Profile

Hazard Description: Infectious disease outbreaks refer to the occurrence of cases of disease more than what is normally expected in a population or geographic area. These diseases are typically caused by bacteria, viruses, fungi, or parasites.

Hazard Extent: Outbreaks can last from days to years, influenced by factors such as the nature of the pathogen, public health response, and population immunity. Some diseases have seasonal patterns (e.g., influenza in winter, vector-borne diseases in warmer months).

Hazard Location: Infectious disease outbreaks can occur anywhere in Grand Isle. Recently, Grand Isle, as did the entire United States, saw direct impacts from the COVID-19 pandemic.

Hazard History: Per the State Hazard Mitigation Plan, the following disease outbreak events have occurred in Vermont:

- 1918, 1957, 1968 – Pandemic Influenza
- 2009 – H1N1 strain
- 2015 – Sika virus
- 2020 – COVID-19

Town Vulnerability:

- **People:** People with disabilities, access and functional needs may be most vulnerable to disease outbreak events. A disease outbreak event can impact any person.
- **Built environment:** A disease outbreak can cause a strain on local health care facilities. Additionally, facilities may need to be modified to respond to the crisis (e.g., school turned into a triage center).
- **Natural environment:** Infectious disease outbreak events can originate from local environments (e.g., farms, lakes, etc.) and mitigative measures may need to be taken to prevent future spread (e.g., treatment of a body of water).
- **Economy:** Infectious disease outbreak events can cause economic impacts to the town. Impacts include disruption or closure of impacted businesses, and costs to operate immunization clinics.

Potential Future Impacts:

- **Climate Change:** Climate change has the potential to increase the frequency and intensity of disease outbreak events through various mechanisms. Temperature changes may increase vector-borne disease and pathogen survival. Extreme weather events (e.g., hurricanes) can disrupt infrastructure, leading to breakdowns in sanitation, clean water supply, and healthcare services. Climate-induced displacement and migration can lead to overcrowded living conditions, which can facilitate the spread of infectious diseases.
- **Change in Land**
- **Use/Development:** No changes to asset impacts due to infectious disease outbreak events because of development or land use changes could be identified.
- **Change in Demographics:** Grand Isle's population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

Wildfire Profile

Hazard Description: Wildfires are uncontrolled fires that spread rapidly through vegetation, forests, grasslands, and other flammable materials. Wildfire may be a result of natural causes (lightning, volcanic eruptions), human activities (arson, campfires, machinery sparks), and weather conditions (high temperatures, drought, strong winds).

Hazard Extent: Wildfires in Vermont can spread quickly through dense forests, particularly in dry conditions. Wildfires can last from several hours to several days depending on conditions and response efforts. There is a higher risk of wildfires during late spring, summer, and early fall when vegetation is driest. The National Weather Service (NWS) issues a "Red Flag Warning" when conditions are conducive for wildfires. A Red Flag Warning means warm temperatures, very low humidities, and stronger winds are expected to combine to produce an increased risk of fire danger. In 2021 Grand Isle County experienced one wildfire that burned approximately one acre of land. On December 13, 2022, 40 cows were lost in a barn fire in Grand Isle. The fire was started accidentally with a propane torch.

Hazard Location: Throughout Grand Isle, there are large tracks of forested land in the southwest portion of Town that could be at risk during sustained dry periods.

Hazard History: Per the Vermont Hazard Mitigation Plan, there has not been a major wildfire in Grand Isle history, or in Vermont history in the past 50 years.

- **Wildfire Smoke, July 5 – 7, 2002:** Smoke, from many forest fires across the Nemiscau region of northern Quebec, became trapped under a subsidence inversion, and was transported south across southern Vermont from the evening hours of July 5, to the late evening of July 7. The forest fires were sparked by exceptionally hot and dry weather over that part of Canada followed by an unusual amount of thunderstorm activity, resulting in many lightning strikes. The circulation between high pressure over Hudsons Bay and a low pressure off the Canadian Maritimes transported the smoke southward. The smoke obscured the sky, and even reduced surface visibilities to as low as one mile, especially on the early morning of July 7. Advisories were issued warning people with respiratory problems to remain indoors and all individuals to curb outside activity. No major problems were reported to the National Weather Service because of this smoke. By late Sunday, July 7, the low pressure weakened and moved further east, allowing the wind to back into more of a westerly direction, finally dissipating the smoke.[1]
- **Wildfire Air Quality Alert, June 5 – 8, 2023:** The entire state experienced poor air quality, especially in the southwestern corner of the state from wildfires in Canada.

Town Vulnerability:

- **People:** Wildfire events can cause injuries or fatalities to people who do not evacuate in time. Delayed evacuation can be caused by no-noticed events, or by individuals who do not heed the warning. The elderly, the homeless, residents with special needs and those without proper transportation may potentially be impacted more than other residents.
- **Built environment:** Wildfire events can cause damage to town and private property, including buildings (burn damage), blocked egress routes, blocked evacuation routes, ferry crossing to New York, loss of electrical power, and roads (i.e.., Route 2 and the

[1] https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5309250

causeway). These impacts could cause disruption of the transportation system to and from the community and county.

- **Natural environment:** Wildfire events can cause damage to the environment with acres of forests and farmlands being burned.
- **Economy:** Wildfire events can cause economic impacts to the town. Impacts include disruption or closure of impacted businesses, and recovery costs, including employee overtime, time and equipment spent on the repairs.

Potential Future Impacts:

- **Climate Change:** Climate change has the potential to increase the frequency and intensity of wildfires due to rising temperatures and changing precipitation patterns.
- **Change in Land Use/Development:** Development within the Forest Reserve District could increase assets vulnerable to wildfire, however no known development is anticipated.
- **Change in Demographics:** Grand Isle's population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

Drought and Extreme Heat Profile

Hazard Description: Drought is a prolonged period of abnormally dry weather characterized by a deficiency in precipitation, resulting in water scarcity and environmental stress. Droughts can have significant impacts on agriculture, water resources, ecosystems, and socio-economic systems. Droughts manifest gradually and can vary in duration, intensity, and spatial extent. They may be triggered by natural climate variability, such as atmospheric circulation patterns, or exacerbated by human activities, such as land use changes and water management practices. Heat hazards result from prolonged periods of high temperatures, often accompanied by high humidity levels. Heatwaves can pose significant risks to human health, infrastructure, agriculture, and ecosystems. Heatwaves are characterized by extended periods of unusually hot weather, with daytime temperatures exceeding normal seasonal averages and limited relief during the nighttime hours.

Hazard Extent: Droughts can affect large geographic regions, including urban and rural areas, agricultural lands, forests, and waterways. Drought severity is often categorized based on indicators such as precipitation deficits, soil moisture levels, streamflow, and water storage reservoir levels. Severe droughts can lead to significant water shortages, ecological disturbances, and socio-economic impacts. Severe droughts can result in reduced water availability for drinking, irrigation, and industrial uses, leading to economic losses, environmental degradation, and social disruption. Grand Isle and the surrounding region have experienced heatwaves in the past, with notable events leading to heat-related illnesses, increased energy demand, and stress on infrastructure. Heat advisories, watches, and warnings are issued by the National Weather Service and local authorities to alert residents to the risks of impending heatwaves. Grand Isle may experience a heat advisory, watch of warning, however given historical data, it’s likely that Grand Isle would be issued with a heat advisory.

Hazard Location: All areas of Grand Isle are susceptible to drought and extreme heat events.

Hazard History: Per the Vermont Hazard Mitigation Plan:
“The droughts in the mid-1960s were the most severe in Vermont. Every county in the The state experienced Exceptional Drought (D4) conditions in May of 1965. Since the 1960s Vermont has experienced several less severe periods of drought. There were two declared statewide droughts in June and July 1995. The drought persisted through the summer of 1995, and a third, more severe drought affected Southern Vermont in August of that year. In 2001-2002, Vermont was affected by a Severe Drought (D2), which peaked at over 14% of the State at the D2 level between November and December of 2001 and nearly 100% of the State in at least Moderate Drought (D1). Portions of Vermont were in Severe Drought (D2) from October 2016 through April 2017, peaking at 29.15% of Vermont in October and November 2016 and 80% of the State was in at least Moderate Drought (D1) (Figure 50). Moderate Drought conditions returned in October of 2017 and again in June 2018. From September to November of 2018 the State experienced another Severe Drought. Then from June 2020 to October 2021 much of the State was under Moderate Drought to Abnormally Dry conditions. From September to October of 2020 29.4% of the State was under Severe Drought conditions.”

Per the State Hazard Mitigation Plan, the following extreme heat events had occurred:

- **August 1-2, 2006:** A heat ridge moved into Vermont during the early morning of August 1. Temperatures soared into the 90s but significantly more important were dewpoints that reached the middle to upper 70s to produce excessive heat index values of 100°F to 105°F, some of the highest values in nearly a decade.

- **July 21, 2011:** Temperatures across much of southern Vermont warmed into 90s with dew points in the 70s, combined with the hot temperatures and resulted in heat indices of 100°F to 104°F. This was the 2nd day of a 3 to 4-day heat wave across a large portion of Vermont with heat index values of 100°F to 108°F across the Champlain and Connecticut valleys as well as some interior valleys. One death is attributed to this event in Windsor County.
- **March 17, 2012:** Winter of 2011-12 had temperatures that averaged 4-5°F above normal and snowfall 40-60% of normal. This combination accounted for snow pack across the region to be below normal or even non-existent by mid-March. In Vermont, temperatures climbed into the 70s March 18 and low-80s March 19-22. Record heat was recorded across all of Vermont with maximum temperatures 30-40°F above normal and some daily records being broken by 10°F or more. This event caused an estimated reduction of 30% of maple sugar production, resulting in an estimated impact of nearly $10 million. In addition, there was a significant loss of ski industry revenue due to a 25-50% reduction in snow loading.
- **July 1, 2018:** High temperatures affected zones in all 14 of Vermont's counties through Independence Day. Temperatures reached the mid-90s, and heat indices were recorded within the range of 95 -110 degrees. The heat wave continued for 6 consecutive days, and Burlington, VT saw the warmest 5 day stretch since 1892. It is important to note that the all-time minimum temperature also broke a previous record of 78 degrees, on July 2nd, 2018, at 80 degrees. Four deaths were attributed to this event, one recorded in Washington County and three in Chittenden County, all related to excessive indoor residential temperatures. Nearly 100 heat-related emergency department visits occurred state-wide during this heat wave, and more than 10 percent of Emergency Medical Service calls on July 1st were heat related.
- **June 18, 2020:** Areas of Vermont and New York experienced the 2nd longest heatwave duration with temperatures in the 90s for six days straight in northwestern Vermont. Burlington recorded the highest temperature in its history on June 22nd and 23rd with a reading of 96 degrees. Zones in 8/14 of Vermont's counties recorded high temperatures during this period of time. One death in Orleans County was associated with this heat wave.

Additionally, areas of Vermont and other states in New England experienced a heatwave with temperatures in the 90s for three days starting on June 17, 2024.

Town Vulnerability:

- **People:** Heat events can cause injuries or fatalities to people who do not head advisories. People, especially those with disabilities, access, and functional needs, may be more susceptible to heat related injuries, such as heat stroke. Droughts can cause issues to homeowner's wells, leading to compromised drinking water, which could result in health issues.
- **Built environment:** Heat events can cause a strain on the town's electrical system, leading to brown or blackout events. Extreme heat can also cause thermal expansion of concrete and steel and swelling on connection bridges. Droughts are not likely to cause

any impacts to the built environment, however dried up wells may cause the need to dig a new well or replace well parts.

- **Natural environment:** Heat events can increase the occurrences of droughts and wildfires. Droughts can cause minor to catastrophic issues for the natural environment. Local wild plants and crops may be lost during a prolonged drought event. Additionally, a drought can lead to streams and groundwater being depleted, which impacts wild and domesticated animals.
- **Economy:** Heat events can cause economic impacts to the town. Impacts include disruption or closure of impacted businesses and the costs to operate a cooling shelter. Droughts can impact the tourism industry, with depleted streams or areas for water activity. Additionally, droughts may impact 'leaf peeping season.'

Potential Future Impacts:

- **Climate Change:** Climate change has the potential to increase extreme heat occurrences, therefore there is an increased likelihood of future drought events, both in frequency and magnitude.
- **Change in Land Use/Development:** No changes to asset impacts due to extreme heat and drought events because of development or land use changes could be identified.
- **Change in Demographics:** Grand Isle's population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

Landslide Profile

Hazard Description: Landslides are the movement of rock, soil, and debris down a slope, often triggered by factors such as heavy rainfall, rapid snowmelt, earthquakes, and human activities. Landslides can pose significant risks to infrastructure, property, ecosystems, and human lives. Landslides can occur suddenly or develop gradually, with varying types and mechanisms, including rockfalls, debris flows, and slope failures.

Hazard Extent: Landslides can affect localized areas or larger regions, depending on the size and scale of the landslide event. There have been no reported landslides in the town of Grand Isle.

Hazard Location: Landslides can affect localized areas or larger regions, depending on the size and scale of the landslide event.

Hazard History: Per Vermont ANR landslide inventory, there have been no reported landslides in the town of Grand Isle.

Town Vulnerability:

- **People:** Residents living in or near steep slopes may face increased risks of property damage and loss of life. Landslides can impact hikers and other people engaged in outdoor recreation.
- **Built environment:** Transportation networks, utilities, buildings, and critical infrastructure located in landslide-prone areas may be exposed to damage or disruption during landslide events.
- **Natural environment:** Landslides can have ecological impacts, including habitat destruction, soil erosion, sedimentation of waterways, and loss of biodiversity in affected areas.
- **Economy:** Landslides can damage or destroy buildings, roads, bridges, utilities, and other infrastructure in their path, leading to economic losses and disruption of services.

Potential Future Impacts:

- **Climate Change:** Climate change may lead to increased frequency and intensity of flooding events, fluvial erosion, rain/snow events and changes to material’s strength through weathering, resulting in a higher probability of future landslides.
- **Change in Land Use/Development:** Increased recreational use or development in landslide or fluvial erosion prone areas may lead to increased impacts of landslides.
- **Change in Demographics:** Grand Isle’s population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

Earthquake Profile

Hazard Description: An earthquake is the shaking of the surface of the Earth resulting from a sudden release of energy in the Earth's lithosphere that creates seismic waves.

Hazard Extent: An earthquake is measured by magnitude, energy released by an earthquake, and intensity, effect and damage caused by the earthquake. The most used scale is the Richter Scale. Although difficult to predict, given the State's historical earthquake data, Grand Isle may anticipate an earthquake measuring very low on the Richter Scale.

Hazard Location: While earthquakes occur on fault lines, the entire town of Grand Isle is susceptible to an earthquake.

Hazard History: Per the Vermont Hazard Mitigation Plan, since 1900, Vermont has only experienced three earthquakes registering 2.5 or greater of the Richter Scale.

Town Vulnerability:

- **People:** People could become injured or trapped during an earthquake. However, given the situation in Vermont, this is a low possibility.
- **Built environment:** Buildings could become damaged or collapse during an earthquake. Earthquake events could also cause impact on the ferry crossing to New York, and roads (i.e., Route 2 and the causeway). These impacts could cause disruption of the transportation system to and from the community and county. However, given the situation in Vermont, this is a low possibility.
- **Natural environment:** An earthquake could trigger secondary hazards, such as landslides, dam failures and flooding. However, given the situation in Vermont, this is a low possibility.
- **Economy:** Earthquakes could result in the closure (temporary or permanent) of local businesses due to damage sustained during the earthquake. However, given the situation in Vermont, this is a low possibility.

Potential Future Impacts:

- **Climate Change:** Climate change primarily affects atmospheric and oceanic processes, but there is emerging evidence suggesting that it can indirectly influence seismic activity, including earthquakes. It is not currently possible to predict when or where an earthquake may occur.
- **Change in Land Use/Development:** No changes to asset impacts due to earthquakes because of development or land use changes could be identified.
- **Change in Demographics:** Grand Isle's population demographics are not expected to change significantly in the next five years, though an increase in the average age of the population may increase the vulnerabilities of the population.

COMMUNITY CAPABILITIES

A hazard mitigation capabilities assessment evaluates a community's ability to reduce and manage risks associated with natural hazards. This assessment involves analyzing existing policies, programs, and resources to identify strengths and areas for improvement in mitigating hazards. The four key types of mitigation capabilities include, planning and regulatory, administrative, and technical, financial and education and outreach. Below are the definitions of each key type:

- **Planning and regulatory:** Planning and regulatory capabilities are the codes, ordinances, policies, laws, plans and programs that guide growth and development.
- **Administrative and Technical:** Administrative and technical capabilities are the participant's staff, skills, and tools. These capabilities can be used for mitigation planning and to conduct specific mitigation actions.
- **Financial:** Financial capabilities are the resources to fund mitigation actions.
- **Education and Outreach:** Education and outreach capabilities are programs and methods that can communicate about and encourage risk reduction.

Capability Assessment

Capability	Hazard Mitigation Support	Improvement Opportunities
Planning and Regulatory Category		
Town Plan	Flooding	Incorporate hazard mitigation projects into the Flood Resilience Chapter.
Emergency Management Plan	All-hazards	Ensure plan is reviewed and adopted in a timely manner.
Zoning Bylaws and Subdivision Regulations	Flooding	Promote sustainable development practices that consider long-term flood risks and environmental impacts.
Ordinance for Areas of Special Flood Hazard	Flooding	
Building Codes	All-hazards	Town does not currently have a building code and does not currently plan to adopt one, however new construction is expected to meet state energy requirement. The town may consider adopting building codes in the future.
Capital Plan	All-hazards	Budget for long-term hazard mitigation projects
Power Utility Efforts to Protect Utility Corridors	Severe thunderstorms, severe winter weather, ice storms, wildfire, tornado	Document emergency tree trimming procedure in the Emergency Management Plan

Surface Dressing Roads	Flooding	Prioritize areas that were washed out due to run-off water events
National Flood Insurance Program (NFIP)	Flooding	Provide additional educational information to the public.
Flood Insurance Rate Maps	Flooding	Due to the age of the town's FIRM, it is very difficult to use the regulatory flood map product for accurate planning purposes. Future FIRM updates will be incorporated into the town's capabilities.
Administrative and Technical Category		
Emergency Management Director and EOC staff	All-hazards	Candidates for volunteering is limited
Zoning Administrator	All-hazards	Filling multiple roles. Dedicated time on hazard mitigation may be limited.
Highway Department Director	All-hazards	Filling multiple roles. Dedicated time on hazard mitigation may be limited.
Town Selectboard	All-hazards	Filling multiple roles. Dedicated time on hazard mitigation may be limited.
Fire Chief	All-hazards	Filling multiple roles. Dedicated time on hazard mitigation may be limited.
EMS Chief	All-hazards	Filling multiple roles. Dedicated time on hazard mitigation may be limited.
Planning Commission	All-hazards	Filling multiple roles. Dedicated time on hazard mitigation may be limited.
Financial Category		
Participation in ERAF	All-hazards	Ensure requirement deadlines are met to obtain/maintain highest ERAF score possible.
Town Budget	All-hazards	Aging equipment, infrastructure and systems may require additional funding. The Town of Grand Isle has a general fund and several item specific reserve funds. The General fund is used for day -to-day operations where income comes in and expenses

		are paid out. Reserve funds are a way for the Town to build up monies for specific purpose, big dollar, expenses. Voters allocate many requested monies into reserve funds at Town Meeting. These specific-use monies are then available to be drawn down through the year, but only for the specific purpose such as paying for a Reappraisal, Capital Equipment fund, Fire Department Trucks and Equipment. The Selectboard , Road Commissioner and Town Clerk, Town Treasurer annually prepare budgets for General Government expenses and Highway expenses including payrolls. The Grand Isle Volunteer Fire Department, The Cemetery Commission and the The Grand Isle Free Library, Grand Isle Recreation Committee, Grand Isle Rescue Department each prepare an operating budget for their needs. At Town Meeting in March, these budgets are each presented to the taxpayers who vote to approve the allocation, with or without voter amendments. In early July, once the town has received both the updated Municipal Grand List from the Town Listers and the School Tax rate for the school district, the selectboard sets the Town tax rate for the coming year.
Education and Outreach		
Town Website and Social Media Sites	All-hazards	Research and consider purchasing an emergency / mass notification system.

Figure 17 - Capabilities Assessment

National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a federal program in the United States aimed at providing insurance coverage for properties at risk of flooding. The NFIP was established in 1968 with the passage of the National Flood Insurance Act to address the lack of affordable flood insurance in high-risk areas and to reduce the financial burden on taxpayers for flood disaster relief.

NFIP Participation and Adoption of NFIP Standards and Maps

Grand Isle has been enrolled in the NFIP since January 1988 and is currently in compliance. The adopted 2017 Grand Isle Zoning Bylaws and Subdivision regulations regulate development in the NFIP floodplain according to 1988 Flood Insurance Rate Maps. The Town is committed to enforcing floodplain regulations and ordinances to be eligible to participate in the NFIP program and protect the people and property of Grand Isle by restricting development in flood prone areas.

Staffing, Enforcement and Continued Compliance in the NFIP

As outlined in Zoning Bylaw and Subdivision regulations, the Zoning Administrator Officer is responsible for staffing, enforcement, and continued compliance with the NFIP.

Substantial Damage and Substantial Improvement

A permit and conditional use approval by the appropriate municipal panel is required for substantial improvement of existing buildings. Prior to issuing a permit, a copy of the application and supporting documentation shall be submitted by the administrative officer to the State National Floodplain Insurance Program Coordinator at the Vermont Agency of Natural Resources, Department of Environmental Conservation, River Management Section. Substantial improvement includes any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the start of the construction of the improvement. This term includes structures which have incurred substantial damage. Substantial damage includes damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged conditions would equal or exceed 50% of the mark value of the structure before the damage occurred.

Repetitive Loss

According to FEMA repetitive losses / BCX claims, Grand Isle has had no repetitive loss structures.

Structures in the Special Flood Hazard Areas and River Corridor Hazard Area

According to the Flood Hazard Summary report, Grand Isle has 84 structures in the Special Flood Hazard Areas. There are five flood insurance policies in the SFHA zone.

MITIGATION STRATEGY

Hazard mitigation is a critical component of safeguarding communities against natural and human-made disasters. The hazard mitigation strategy section of the local hazard mitigation plan outlines a comprehensive approach to reducing the long-term risks and impacts associated with various hazards. By identifying potential threats, assessing vulnerabilities, and implementing targeted actions, we aim to enhance community resilience, protect lives and property, and ensure sustainable development. This strategy reflects a collaborative effort involving local government, businesses, residents, and other stakeholders, all committed to creating a safer and more prepared community.

Mitigation Goals

- Minimize loss of life, injury and damage to property, the economy, and the environment from natural hazards.
- Reduce the financial losses and infrastructure damage incurred by municipal, residential, industrial, agricultural, and commercial establishments due to disasters.
- Include hazard mitigation planning in the municipal planning process including the Town Plan, Capital Improvement Plan and Local Emergency Operations Plan.
- Increase cooperation and coordination among the public, private entities, local agencies, state agencies and federal agencies.
- Increase hazard mitigation public education and outreach.
- Take action to reduce or eliminate the long-term risk to human life and property from:
  - Lakeshore flooding
  - Inundation flooding
  - Severe thunderstorms
  - Severe winter storms
  - Severe ice storms
  - Invasive species
  - Disease outbreak
  - Wildfire
  - Drought and extreme heat
  - Tornado
  - Earthquake

Mitigation Action Prioritization

Prioritizing hazard mitigation projects involves a systematic approach that considers numerous factors to identify and address the most pressing risks within a community. Discussions focused on:

- Hazard Assessment: How did the hazard rank compare to other hazards in the community?
- Vulnerability Analysis: How vulnerable is the community to this hazard?
- Stakeholder Input: What are the stakeholders concerned about? Gather input from community members, stakeholders, and local experts. Understanding the concerns and priorities of the community members is crucial for identifying specific projects that align with their needs and expectations.
- Cost-Benefit Analysis: What is the cost-benefit effectiveness of the mitigation action?
- Lifesaving and Life-Sustaining Activities: Will this action focus on lifesaving and life-sustaining activities?
- Critical Infrastructure: Does this action focus on critical infrastructure?
- Equity and Vulnerable Populations: Does this action consider the needs of vulnerable populations?
- Compliance and Regulations: Does this action align with existing regulations and ordinances?

- Long-term Sustainability: Does this action promote long-term sustainability and resilience?
- Funding Availability: Can this action be funded by grants?
- Current Community: Do the actions reflect the changes in the community and changes in priorities?
- Climate Change: Do the actions take into consideration the impacts of climate change?
- Plan Integration: Can these actions be integrated into another planning mechanism?

The following list documents the questions (criteria) considered in establishing an order of priority. Each of the following criteria was rated according to a numeric score of “1” (indicating Poor), “2” (indicating Average) and “3” (indicating Good). The highest possible score is 36.

1) Does the action reduce damage?
2) Does this action contribute to community objectives?
3) Does the action meet existing regulations?
4) Does the action protect historic structures or structures critical to Town operations?
5) Can the action be implemented quickly?
6) Is the action socially acceptable?
7) Is this action technically feasible?
8) Is the action administratively possible?
9) Is the action politically acceptable?
10) Is the action legal?
11) Does the action offer reasonable benefits compared to its cost of implementation?
12) Is the action environmentally sound?

Mitigation projects are listed in terms of mitigating threat or risk to public health and safety, reduction of hazard to community assets, adherence to Town plan and local ordinances, cost, and feasibility.

Projects are classified as either short – term, medium–term or long - term activities.

- Short –term action items are activities which the municipality may be capable of implementing within six months to one year.
- Medium-term action items may be capable of implementing from one to five years.
- Long-term action items may require 5 to 10 years, new or additional resources, funding, or authorities.

There was a rough cost/benefit analysis done for each action listed in the table. The below cost and benefits tables address the priorities for the mitigation strategies that are stated in the Mitigation Actions Table.

Cost Estimates

- High => $100,000
- Medium =$25,000 – 100,000
- Low =< $25,000

Benefit Estimates

- High: Public Safety
- Medium: Infrastructure / Functionality

- Low: Aesthetics / General Maintenance

2018 Mitigation Action Update

Hazard Mitigation Action	Hazard Addressed	Responsible Party	Est. Timeline for Completion	Funding Source	Action Prioritization	Status
Replace/ Upgrade Two Undersized Culverts in Flood Prone Area on West Shore Road to 18" Minimum	Flooding	Selectboard and Highway Department	Short – term June 2018 start to August 2018 finish.	Town Capital Budget / State transportation grant funding	36 Medium/High	Complete
Construct New Fire Station	All-hazards	Selectboard and Fire Department	Short Term May 2017 start to May 2018 finish	Town Budget/Bond	36 High/High	Complete
Stabilize 160 feet of lakeshore bank that threatens to undermine East Shore Road North	Flooding	Road Foreman / Selectboard	Short – term May 2018 start to July 2018 finish.	VT Better Roads Grant / Local	36 Medium / High	Complete
Community Education: How to Prepare for Severe Winter Conditions	Severe Winter Storm/Ice Storm.	Emergency Management Director/VEM	September 2018 – March 2019	Town Budget	36 Low/High	On-going (carry over)
Protect Critical Facilities and Infrastructure from Lightning Damage	Severe Thunderstorm, High Wind, Lightning and Hail	Selectboard, Highway, Road Foreman	May 2018 to December 2018	Town Budget	36 Low/High	Complete
School Crisis Education	All hazards	Grand Isle Sherriff's Department	On-going	Town Budget	36 Low/High	On-going
Alter Floodplain bylaw as needed to maintain Stream (River) Corridor protections with latest VT ANR guidelines to	Flooding	Planning Commission / Zoning Administrator / Selectboard	Start early 2018. complete by Oct 2018	Town Budget	36 Low/High	Not complete (carry over)

maintain 17.5% ERAF rate						
Road Stormwater Erosion Inventory	Flooding, High Wind, Lightning, and Hail	Selectboard and Highway Department	Short term May 2018 to July 2018	DEC grant / NRPC assist	32 Low/High	Complete
Incorporate updated flood and emergency planning information in Town Plan Update	Flooding	Planning Commission	Long-term February 2025	Local / DHCA Municipal Planning Grants	32 Low/High	On-going (carry over)
Construct new Salt/Sand Shed and Identify New Sand Supply Resource for winter road application	Flooding, Severe Winter Storm (Ice Storm), Severe Thunderstorm (High Wind, Lightning, and Hail)	Selectboard and Highway Department	Medium Term Summer 2018 – Fall 2019	General Fund, Salt Shed Reserve Fund, Transportation Alternatives Grant	35 High/High	Complete
Support Power Utility Efforts to Protect Utility Corridors	Severe Winter Storm (Ice Storm), Severe Thunderstorm	Selectboard	Short Term Start: May 2018 End: October 2018	Local	34 Low/High	On-going (carry over)

Figure 18 - 2018 Mitigation Action Update

2024 Mitigation Actions

Hazard Mitigation Action	Hazard Addressed	Hazard Mitigation Action Category	Responsible Party (bolded text = primary POC)	Estimated Timeline for Completion	Funding Source	Action Prioritization
Provide community education and awareness on how to prepare for various hazards	All-hazards (All natural hazards identified in the risk assessment chart)	Education and Awareness Programs	**Emergency Management Director**/VEM	October 2024 – March 2025	Town Operating Budget	36 Low/High
Alter Floodplain bylaw as needed to maintain Stream (River) Corridor protections with latest VT ANR guidelines to maintain 17.5% ERAF rate	Flooding	Local Plans and Regulations	**Planning Commission** / Zoning Administrator / Selectboard	October 2024 – January 2025	Town Operating Budget	36 Low/High
Incorporate updated flood and emergency planning information in Town Plan Update	Flooding	Local Plans and Regulations	Planning Commission	October 2024 - February 2025	Local / DHCA Municipal Planning Grants	34 Low/High
Develop a continuity of Operations Plan	All-hazards (All natural hazards identified in the risk assessment chart)	Local Plans and Regulations	Selectboard	January 2025 – January 2028	Town Operating Budget, VEM Grants (EMPG)	34 Low/High
Incorporate hazard mitigation (e.g., storm water runoff, drought resistant vegetation, etc.) into construction planning for proposed municipal center	Flooding,	Structure and Infrastructure / Local Plans and Regulations	Selectboard / **Planning Commission**	September 2024 – July 2028	Town Operating Budget, ARPA funds	34 Low/High

Upgrade culvert on Hyde Road at Moccasin Ave. Incorporate natural system protection (e.g., ditch lining) into upgrade	Flooding	Structure and Infrastructure / Natural Systems Protection	Highway Department	October 2024 – July 2028	Town Operating Budget, Town Highway Structures Program Grant Awards	34 High/High

Figure 19 - 2024 Mitigation Actions

Mitigation Action	Criteria 1	2	3	4	5	6	7	8	9	10	11	12	Score
Provide community education and awareness on how to prepare for various hazards	3	3	3	3	3	3	3	3	3	3	3	3	**36**
Alter Floodplain bylaw as needed to maintain Stream (River) Corridor protections with latest VT ANR guidelines to maintain 17.5% ERAF rate	3	3	3	3	3	3	3	3	3	3	3	3	**36**
Incorporate updated flood and emergency planning information in Town Plan Update	3	3	1	3	3	3	3	3	3	3	3	3	**34**
Support Power Utility Efforts to Protect Utility Corridors	3	3	1	3	3	3	3	3	3	3	3	3	**34**
Continue to side dress roads, especially those areas that were washed out due to run-off water events	3	3	3	3	3	3	3	3	3	3	3	3	**36**
Develop a continuity of Operations Plan	3	3	1	3	3	3	3	3	3	3	3	3	**34**
Incorporate hazard mitigation (e.g., storm water runoff, drought resistant vegetation, etc.) into construction planning for proposed municipal center	3	3	3	3	1	3	3	2	3	3	3	3	**33**
Upgrade culvert on Hyde Road at Moccasin Ave. Incorporate natural system protection (e.g., ditch lining) into upgrade	3	3	3	3	2	3	3	3	3	3	3	3	**35**

Figure 20 - 2024 Mitigation Actions Calculation

Mitigation Action Changes in Priorities

Mitigation actions changed priorities for several reasons, reflecting the evolving nature of risks, community needs and resource availability. Key factors that drove changes in mitigation actions and priorities may include:

- **Evolving risk landscape**
  - **Climate Change:** As the impacts of climate change become more pronounced, priorities may shift towards addressing related risks like sea-level rise, increased frequency of extreme weather events, and changing precipitation patterns
- **Updated Hazard Data:**
  - **Improved Understanding**: Advances in science and technology provide better data and modeling, leading to new insights about hazard risks and vulnerabilities.
  - **Recent Disasters**: Experiences from recent disasters can highlight previously underestimated risks and lead to a re-evaluation of priorities.
- **Community and Stakeholder Input:**
  - **Public Concerns**: Community feedback and concerns can bring attention to specific vulnerabilities or areas in need of mitigation.
  - **Stakeholder Engagement**: Involvement of local businesses, non-profits, and other stakeholders can influence which mitigation actions are prioritized based on their expertise and needs.
- **Changes in Resources:**
  - **Funding Availability**: New funding opportunities or changes in budget allocations can shift which projects are feasible and prioritized.
  - **Technological Advances**: New technologies can provide more effective or cost-efficient mitigation solutions, altering priority actions.
- **Policy and Regulatory Changes:**
  - **New Legislation**: Changes in local, state, or federal regulations can necessitate updates to mitigation priorities to ensure compliance.
  - **Policy Shifts**: Shifts in government policy focus, such as increased emphasis on sustainability or climate resilience, can change priorities.
- **Demographic and Economic Changes:**
  - **Population Growth**: Increased population density in certain areas can raise the priority of mitigating risks in those regions.
  - **Economic Development**: As areas develop economically, there may be a higher priority placed on protecting new infrastructure and investments.
- **Critical Infrastructure Needs:**
  - **Infrastructure Vulnerabilities**: Identification of weaknesses in critical infrastructure (e.g., utilities, transportation networks) can lead to a prioritization of actions to fortify these systems.
  - **Lifeline Services**: Ensuring the resilience of essential services like water, power, and healthcare can become a higher priority in mitigation planning.
- **Previous Hazard Mitigation Projects:**
  - Project Completion: The completion of previous hazard mitigation projects may have resolved a hazard in a particular area that was of previous concern.

Integration Into Existing Plans and Procedures

For Grand Isle to succeed in reducing long-term risk, information from this Plan should be integrated throughout town operations. Integration actions include:

- The mitigation goals and risk assessment information can be incorporated into the next Town Plan update and into future inundation hazard area regulations
- Funding mitigation actions can be prioritized in the annual budget process
- Funding mitigation actions can be prioritized in grant research
- The risk assessment information can be incorporated into future training plans and budgets
- The hazard mitigation risk assessment and actions can be embedded into the LEMP
- Provide adequate EMS services

The following hazard mitigation information was captured in the 2017 Town Plan and should be captured in the Town Plan rewrite:

- To encourage replacement or renovation of structures beyond their useful life
- To enhance environmental quality, preserve the character of Grand Isle and protect its natural assets.
- Encourage clean and environmentally sound commercial and/or light industrial development in appropriate areas in the town.
- Promote the clustering of commercial activities and discourage suburban sprawl and strip development.
- Protect natural areas and the working landscape from development through zoning regulations.
- To broaden access to educational and vocational training opportunities sufficient to ensure the full realization of the abilities of current and future residents.
- Work in the future to identify methods to fund and enhance the police protection in our community, especially increased hours of coverage.
- Prepare for a future where adequate fire protection coverage may over burden volunteer capacity.
- Identify equipment and facilities that need to be upgraded and develop methods of financing the replacement.
- Identify and promote the development of recreational and tourist activities, services and facilities placing emphasis on the use of natural and existing human-caused resources and on development which does not contribute to pollution of the lake.
- To help conserve public resources, encourage clustered development wherever possible, and encourage energy efficient site design.
- Encourage the development of alternative and renewable energy resources.
- Maintain a road maintenance and improvement program for the repair and/or rebuilding of the existing road network in an orderly cycle.
- Work with state officials and residents to continue protection of Lake Champlain shorelines, water quality, and overall well-being.
- Encourage sound agricultural and forestry practices which minimize impacts on the environment.
- Regulate the excavation of minerals and other deposits to ensure continuous erosion control during excavation operations; complete restoration of the landscape to its original condition with appropriate contouring, site drainage and replanting.

PLAN MAINTENANCE

Plan Maintenance Overview

This section outlines the procedures and responsibilities for maintaining and updating the Grand Isle Location Hazard Mitigation Plan in accordance with local, state, and federal requirements. Regular maintenance ensures that the plan remains current, relevant, and effective in reducing the risks associated with natural hazards and enhancing the resilience of the community. Key components of this process includes:

- Monitoring: Tracking implementation of the plan over time.
- Evaluating: Assessing how well the plan meets its stated purpose and goals.
- Updating: Reviewing and revising the plan at least once every five years.

The below table provides an overview of the plan maintenance process:

Plan Maintenance Step	When	How	Who
Monitoring and Evaluating	Once per year – April Selectboard Meeting	Get status updates on mitigation actions, compile progress reports and identify mid-course corrections.	Emergency Management Director
Evaluating	Once per year – April Selectboard Meeting or after a disaster event.		
Updating	Every 5 years.	Review the plan and update it, as necessary.	Emergency Management Director

Figure 21 - Plan Maintenance Overview

Annual Plan Monitoring and Evaluation

Plan monitoring means tracking how the plan is carried out over time. This includes any progress made on goals, actions, plan integration and public involvement. Plan evaluating means looking at how well the plan is meeting its goal. Plan monitoring and evaluation may also take place after a disaster event. During the annual plan monitoring and evaluation process, the below planning cycle should be followed.

1 Plan Review Preparation

- Approximately three months before the April Selectboard meeting, the EMD and the Selectboard should review the town's LHMP planning committee members and update as necessary.
- Approximately two months before the April Selectboard meeting, the EMD, with assistance from the LHMP planning committee, should review and status the plan. The EMD should consider:
  - What disasters has the town or region experienced since promulgation?
  - Has staffing or roles changed since promulgation?
  - Is the mitigation strategy and actions being implemented?
  - Were the mitigation action estimated costs and completion timeframes accurate?
  - Should mitigation actions be updated, removed or added?
- These questions and review will help determine how effective the plan is.

2 Public Input

- The public should be allowed an opportunity to review the plan and provide updates prior to the April Selectboard meeting. This should be done approximately one month before the April Selectboard meeting.

3 April Selectboard Meeting

- The status plan and any public input should be reviewed at the April Selectboard meeting. Documentation of the annual plan monitoring and evaluation should be captured in the "Plan Review and Revision" Section of the plan.

Plan Updating:

Plan updating means reviewing and revising the plan at least once every five years. During the update process, the below planning cycle should be followed:

1 Funding

- Approximately 24 months prior to plan expiration, the town's EMD should contact VEM to apply for grant funding to update their LHMP.

2 Requests for Proposals

- Once funding is secured and the grant agreement between the Town and the State is in place, the town can issue a request for proposal (RFP) to procure planning services in accordance with the grant agreement. The RFP should be issued approximately 20 months prior to the plan expiration.

3 Contractor Selection

- Once RFPs are received, the Selectboard, or designated person/committee, should review proposals and provide recommendation to the Selectboard. The contractor should be selected approximately 18 months prior to the plan expiration.

4 Building the Planning Team

- A Planning Team made up of local, regional and state resources should be assembled to assist with the plan update.

5 Stakeholder Engagement and Outreach Strategy

- The consultant, in conjunction with the Planning Team, should develop a comprehensive stakeholder engagement and outreach strategy plan to solicit input from the public.

6 Planning Meetings

- A series of planning meeting, facilitated by the consultant, should be held to solicit input from the planning team and public.

7 Draft Plan Development

- The consultant, with input from the Planning Team and the public, will develop a draft plan. The plan should be reviewed by the planning team and Selectboard prior to submission to VEM. The draft plan should also be made available for public comment and input.

8 Draft Plan Submission

- After local review, the consultant shall submit the draft plan, along with supporting documentation (e.g., FEMA Crosswalk) to VEM. The consultant shall be responsible for incorporating all edits from VEM.

9 Plan Adoption

- Upon plan approval pending adoption (APA) from VEM, the Selectboard shall adopt the plan. The Plan shall also be distributed to interested parties (e.g., posting on webpage, final copy submitted to VEM and FEMA).

10 Plan Monitoring and Evaluating

- The town will then be responsible for the annual plan monitoring and evaluating.

Public Involvement

The public will be given numerous opportunities to be involved in keeping the plan current. The public will be kept involved through the following methods:

- Public meetings
- Website postings
- Hard copy notices
- Social media postings

Public input will be captured and incorporated into the plan, as necessary.

APPENDIX A: HAZARD PROFILES – DETAILED HISTORY OF OCCURRENCE

Lakeshore Flooding and Inundation Flooding History

Begin Date	End Date	Event Description and Extent
1/19/1996	1/20/1996	A strong storm system moved into the Great Lakes on Thursday (1/18/96) and then moved into Canada thereafter on Friday (1/19/96) and Saturday (1/20/96). The circulation associated with this storm resulted in above normal temperatures, strong winds and flooding due to snow melt and rainfall. Two deaths were attributed to the flooding. A young girl drowned (1/19/96) trying to rescue her father when car was swept by water. The father died 2 days later (1/21/96) from injuries and hypothermia suffered from the accident on 1/19/96. Numerous roads were washed out due to the flooding statewide. Water was reported up to the level of car doors in Berlin (Washington County). Strong winds buffeted the state during Friday and Friday evening (1/19/96). A few of the higher gusts were: 79 mph at Pleasant Valley, 70 mph at Underhill and 63 mph at Jericho all located in Chittenden County. Numerous power outages across the state were reported.
5/2/1996	5/8/1996	Runoff from melting snow and rainfall resulted in the Lake Champlain Lake level reaching or exceeding 100 feet. There was some minor flooding along the lake shore during this period.
5/12/1996	5/24/1996	Continued runoff into Lake Champlain resulted in the lake level rising above the 100 foot mark with minor lake shore flooding. The highest level recorded during this period in May of 1996 was 100.90 feet on May 16, 1996.
11/9/1996	11/9/1996	A strong cold front moved slowly across New York State Friday and Friday night (11/8/96) and across Vermont Saturday (11/9/96). Periods of heavy rain resulted from late Friday night into Saturday. Culvert and field flooding was reported in Vermont's Grand Isle County Saturday morning (11/9/96). South Hero, Vermont reported a storm total rainfall of 4.46 inches.
4/1/1998	4/13/1998	Spring runoff and flood waters resulting in the lake level of Lake Champlain rising to equal or exceed the 101 foot level during this period. The maximum level reached this year was 101.82 feet on April 5. Flooding of lake shore areas became widespread with water closing some roads and flooding some private property. Due to the high lake level water back flowed up the rivers that flow into the lake. Some residents were forced to sandbag to protect property.
4/23/2001	4/30/2001	Snow melting and associated runoff due to the spring melt resulted in flooding along the shores of Lake Champlain. Lake levels reached the 100.99 foot level (flood stage is 100 feet). Lakeshore flooding continued into the month of May.
5/1/2001	5/9/2001	Snow melting and associated runoff due to the spring melt continued to result in flooding along the shores of Lake Champlain into May 2001. Lake levels remained above flood stage (100 feet) through May 9th, with minor flooding reported.
4/20/2007	4/30/2007	The melting of snow from an above normal snow pack established in February, March, and early April, as well as several rain events during the latter half of April, contributed to a significant run-off into streams and rivers of the Lake Champlain basin, which eventually deposited into

		Lake Champlain. Lake Champlain had been rising steadily since mid-month, and at 7:15 pm LST on April 20th, finally exceeded its flood stage of 100.0 feet. Primarily...only minor shoreline flooding but was occasionally exasperated due to strong winds and wave action along the Vermont shoreline. Several summer camps and cottages experienced flooding as well as a few docks damaged as well. The lake would remain above flood stage through the end of April.
4/13/2011	4/30/2011	Record Flooding occurred along the shores of Lake Champlain from mid-April to mid-June. NWS Flood Stages for the United States Geological Survey (USGS) gages on Lake Champlain at the ECHO Center in Burlington, VT and Rouses Point, NY are 100.0 feet and were surpassed on April 13th and finally receded below flood stage on June 18th. Major flooding occurs with lake levels at or above 101.5 feet, which were surpassed from April 27th to June 8th as the lake level exceeded its flood stage of 100 feet from April 13th to June 18th. Further, the lake level exceeded its previous flood of record of 102.1 feet on April 28th and crested at 103.26 feet on May 6th, before eventually receding below the previous record on June 5th.‖In addition, strong south to southeast winds of 25 to 35 mph (greater at times) caused extensive damage due to 3 to 5 foot wave action as well as 0.5-1 foot seiches on windward facing shores (New York and Vermont). These episodes occurred on April 23rd, May 2nd, May 22-23rd and June 1st. North to northwest winds of 20 to 30 mph caused extensive damage due to 2 to 4 foot waves and seiches around a half foot on windward shorelines (Vermont) on May 9-10th and June 1st-2nd. These record lake levels were attributed to a combination of a 125-150 percent of normal winter snowfall, subsequent melting of that snow pack and an abnormally wet meteorological spring (March, April, and May). Normal precipitation for meteorological spring within the Lake Champlain basin is 8.5-10 inches, yet observed precipitation was 16 to 26 inches (> 200 percent). Serious and extensive flooding to dozens of lake shore roads, 500-1000 houses and dozens of businesses. In addition, the periodic closing of the Lake Champlain ferry from Grand Isle, Vermont to Plattsburgh, New York, and the delayed opening of two additional ferry crossings. Damage estimates will be incorporated into the May storm data, representing the crest of the flood waters, thus the time of the most significant impact and damage.
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Severe Thunderstorm (Lightning, High Wind, Hail) History

Begin Date	End Date	Event Description and Extent
6/5/1996	6/5/1996	A cold front moved across Vermont during the late morning and afternoon hours of Wednesday, June 5, 1996. Scattered thunderstorms were accompanied by small hail at several locations including. Sutton, Vermont (Caledonia County) pea size hail at 1030 am Est, North Hero, Vermont (Grand Isle County) 1/4 inch hail at 1055 am Est with gusty winds. Burlington, Vermont (Chittenden County) pea size hail at 11 am est.
8/22/1997	8/22/1997	An unstable atmosphere across the region associated with an upper level low over the Great Lakes resulted in numerous thunderstorms with reports of some hail.
8/28/1997	8/28/1997	A cold front moved across Vermont during the afternoon hours. Heavy rain and locally large hail accompanied a few of the thunderstorms with this front. The Grand Isle ferry reported wind gust to 43 knots and nickel size hail in the Vermont waters of Lake Champlain, approximately 2 miles Southwest of Grand Isle Station, Vt.
6/22/1998	6/22/1998	Lightning struck and damaged a barn in South Hero, Vermont (Grand Isle County).
9/6/1998	9/6/1998	A cold front moved southeast from Canada across Vermont during the night of Sunday, September 6th, and triggered thunderstorms. Locally strong winds and hail accompanied a few of the storms. Specifically, near Alburg (Grand Isle County), strong winds blew down power lines.
7/5/1999	7/5/1999	A mesoscale convective system consisting of a cluster of thunderstorms moved across northern NY and northern Vermont during the early morning hours of Monday, July 5th. There were numerous reports of trees and power lines blown down. For example, in Grand Isle County of Vermont, trees and large branches were blown down in Alburg Springs.
6/16/2001	6/16/2001	A cold front moved from west to east across Vermont Saturday evening. Thunderstorms preceded and accompanied the front with heavy rain and gusty winds across the county. In North Hero, the wind gusted to 28 mph (24 knots) between 6 and 630 PM EDT (5 and 530 PM EST).
7/9/2001	7/9/2001	A moist unstable air mass was in place across Vermont, as an area of weak low pressure moved across southern New England and triggered late afternoon and evening thunderstorms. A thunderstorm produced nickel size hail in the town of Alburg.
7/10/2001	7/10/2001	Thunderstorms developed in an unstable airmass ahead of a surface trough during the afternoon and evening hours. Large hail was reported with locally gusty winds.
8/10/2001	8/10/2001	Early morning thunderstorms resulted in a lightning strike which set fire to and destroyed a garage attached to a house.
6/23/2002	6/23/2002	A cold front moved southeast from Canada, and triggered thunderstorms during the evening hours. A few storms reached severe criteria. Thunderstorms in North Hero, VT resulted in wind gust to 60 mph (52 kts) while thunderstorm winds blew down trees in the town of Grand Isle, VT.
6/23/2002	6/23/2002	A cold front moved southeast from Canada, and triggered thunderstorms during the evening hours. A few storms reached severe criteria. Thunderstorms in North Hero, VT resulted in wind gust to 60 mph (52 kts) while thunderstorm winds blew down trees in the town of Grand Isle, VT.

7/3/2002	7/3/2002	A cold front along the Canadian-United States border triggered locally severe thunderstorms Wednesday night, July 3rd.
6/9/2004	6/9/2004	A low pressure system moved across southern Quebec on Wednesday, June 9th. The associated trailing cold front tracked slowly across northern New York and Vermont during the morning and afternoon hours. This front was preceded and accompanied by thunderstorms with damaging winds. In Grand Isle (Grand Isle County) trees were blown down, while in Chittenden County, trees and limbs were blown down with one tree on a house in the town of Milton, and in the town of Hinesburg trees were snapped. In Fairfax (Franklin County), trees and power lines were blown down.
7/8/2004	7/8/2004	An area of low pressure moved across Quebec, Canada during Thursday, July 8th. The associated cold front moved across the area in the afternoon, preceded and accompanied by thunderstorms. In Vermont's Grand Isle County , the towns of Grand Isle and Alburg both reported nickel size hail from late afternoon thunderstorms. In addition, trees and branches were blown down in Alburg.
7/8/2004	7/8/2004	An area of low pressure moved across Quebec, Canada during Thursday, July 8th. The associated cold front moved across the area in the afternoon, preceded and accompanied by thunderstorms. In Vermont's Grand Isle County , the towns of Grand Isle and Alburg both reported nickel size hail from late afternoon thunderstorms. In addition, trees and branches were blown down in Alburg.
7/8/2004	7/8/2004	An area of low pressure moved across Quebec, Canada during Thursday, July 8th. The associated cold front moved across the area in the afternoon, preceded and accompanied by thunderstorms. In Vermont's Grand Isle County , the towns of Grand Isle and Alburg both reported nickel size hail from late afternoon thunderstorms. In addition, trees and branches were blown down in Alburg.
8/29/2004	8/29/2004	A frontal boundary across northern Vermont and northern New York helped focus thunderstorms across this area. The airmass was very humid along and south of the front. Very heavy rainfall accompanied the thunderstorms. A few thunderstorms were severe, with trees blown down across roads in both Alburg and South Alburg. In addition, a trailer was blown over in Alburg.
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7/5/2005	7/5/2005	Thunderstorms resulted in strong winds which blew down trees in the Vermont town of North Hero.
7/22/2005	7/22/2005	A cold front extended from northern Maine to extreme northern New York and then into Pennsylvania early on Friday, July 22. The front helped trigger thunderstorms as it moved across northern NY by early afternoon, and across Vermont during the afternoon. Thunderstorms developed along a boundary in northeast NY in the late morning and they quickly intensified into severe thunderstorms with strong winds and large hail as they moved east and southeast across the area. In the Vermont town of North Hero, hail up to 1 3/4 inch in diameter fell, with

		power outages reported. Lightning struck a boat on Lake Champlain near Grand Isle Station, with extensive damage resulting.
7/22/2005	7/22/2005	A cold front extended from northern Maine to extreme northern New York and then into Pennsylvania early on Friday, July 22. The front helped trigger thunderstorms as it moved across northern NY by early afternoon, and across Vermont during the afternoon. Thunderstorms developed along a boundary in northeast NY in the late morning and they quickly intensified into severe thunderstorms with strong winds and large hail as they moved east and southeast across the area. In the Vermont town of North Hero, hail up to 1 3/4 inch in diameter fell, with power outages reported. Lightning struck a boat on Lake Champlain near Grand Isle Station, with extensive damage resulting.
8/2/2005	8/2/2005	A humid airmass was in place with dew points 65 to 70 as an upper level disturbance contributed to thunderstorm development. Thunderstorms were severe in the northwest Vermont county of Grand Isle where trees were blown down across Rte. 2 in Alburg.
6/19/2006	6/19/2006	A surface trough and mid-level atmospheric disturbance encountered a very warm and humid airmass across northern New York around midday on the 19th and developed a line of thunderstorms, which intensified as they moved into the Champlain Valley by early afternoon. These thunderstorms produced severe weather, in the form of wind damage, across Grand Isle County, Vermont with numerous trees down in Isle LaMotte as well as large branches and trees down in Grand Isle and North Hero.
6/19/2006	6/19/2006	A surface trough and mid-level atmospheric disturbance encountered a very warm and humid airmass across northern New York around midday on the 19th and developed a line of thunderstorms, which intensified as they moved into the Champlain Valley by early afternoon. These thunderstorms produced severe weather, in the form of wind damage, across Grand Isle County, Vermont with numerous trees down in Isle LaMotte as well as large branches and trees down in Grand Isle and North Hero.
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8/7/2006	8/7/2006	A strong westerly low-level flow interacted with a moderately unstable airmass across northern New York and northern Vermont on the afternoon of the 7th. The result was scattered thunderstorms across the region, including a supercell structure that developed over Clinton County, New York and crossed Lake Champlain into Isle LaMotte in Grand Isle County, Vermont. Numerous trees were downed, uprooted, and snapped and powerlines were downed by damaging winds along West Shore Road, Main Street and School Street. There was some property damage due to trees falling on structures and vehicles, but also a garage door was partially blown in due to excessive winds.
7/13/2007	7/13/2007	An unseasonably cool and strong upper level trough moved across northern New York and Vermont during the late morning and early

		afternoon hours of the 13th. A few thunderstorms developed in northern New York and moved into northwest Vermont. A few thunderstorms became locally severe and caused wind damage in the form of a few downed trees in Milton (Chittenden County) and Isle La Motte (Grand Isle County).
8/16/2007	8/16/2007	Scattered thunderstorms developed in a moderately unstable airmass across the Champlain Valley of New York during the afternoon of the 16th. One thunderstorm developed in a favorable, highly sheared wind environment which eventually intensified into a supercell thunderstorm in Clinton County, NY. This supercell then proceeded to travel into Vermont affecting numerous communities between Grand Isle (Grand Isle County) and Concord (Essex County). Significant straight-line wind damage (estimated between 60 and 80 mph) in the form of snapped, uprooted and downed trees, downed power lines and some structural damage occurred in Grand Isle, Georgia (Franklin county), Westford (Chittenden county) and Hardwick (Caledonia county).||Also, there were several thunderstorms, including a supercell that developed in the northern Hudson Valley of New York and moved across Rutland and Windsor counties in southern Vermont. Significant straight-line wind damage (estimated between 60 and 80 mph) in the form of snapped, uprooted, and downed trees, downed power lines and some structural damage occurred as well in Rutland (Rutland County) and surrounding communities.
8/16/2007	8/16/2007	Scattered thunderstorms developed in a moderately unstable airmass across the Champlain Valley of New York during the afternoon of the 16th. One thunderstorm developed in a favorable, highly sheared wind environment which eventually intensified into a supercell thunderstorm in Clinton County, NY. This supercell then proceeded to travel into Vermont affecting numerous communities between Grand Isle (Grand Isle County) and Concord (Essex County). Significant straight-line wind damage (estimated between 60 and 80 mph) in the form of snapped, uprooted and downed trees, downed power lines and some structural damage occurred in Grand Isle, Georgia (Franklin county), Westford (Chittenden county) and Hardwick (Caledonia county).||Also, there were several thunderstorms, including a supercell that developed in the northern Hudson Valley of New York and moved across Rutland and Windsor counties in southern Vermont. Significant straight-line wind damage (estimated between 60 and 80 mph) in the form of snapped, uprooted, and downed trees, downed power lines and some structural damage occurred as well in Rutland (Rutland County) and surrounding communities.
6/10/2008	6/10/2008	A very energetic mid-atmospheric disturbance moved across the Great Lakes during the afternoon and evening of June 10th. This developed a surface low along a cold front, which moved across Vermont during the afternoon and evening hours. These features moved into a very warm, humid, and unstable airmass draped across Vermont that resulted in two rounds of widespread severe thunderstorms. The first round moved across Vermont during the early to midafternoon hours and the second round occurred during the evening. In Vermont...hundreds to thousands of trees were damaged, downed or uprooted which caused downed power lines and structural damage to numerous buildings and vehicles.

		Tens of thousands of customers lost power due to the storms, with some outages that lasted several days.
6/10/2008	6/10/2008	A very energetic mid-atmospheric disturbance moved across the Great Lakes during the afternoon and evening of June 10th. This developed a surface low along a cold front, which moved across Vermont during the afternoon and evening hours. These features moved into a very warm, humid, and unstable airmass draped across Vermont that resulted in two rounds of widespread severe thunderstorms. The first round moved across Vermont during the early to midafternoon hours and the second round occurred during the evening. In Vermont...hundreds to thousands of trees were damaged, downed or uprooted which caused downed power lines and structural damage to numerous buildings and vehicles. Tens of thousands of customers lost power due to the storms, with some outages that lasted several days.
7/18/2008	7/18/2008	Several mid-atmospheric impulses traveled along a stationary boundary across northern Vermont during the early afternoon and evening hours of July 18th. This stationary boundary separated warm, humid air across much of Vermont from cooler, drier air across the international border with Canada. Several rounds of thunderstorms moved across northern Vermont during the afternoon of July 18th. A developing squall line across the Champlain Valley of New York moved into northwest Vermont by mid-afternoon and continued across the state. Widespread tree and structural damage occurred with this system in Grand Isle, Franklin, Lamoille, and Orleans counties. This squall line interacted with an individual thunderstorm near Fletcher, that eventually produced an extensive damage path around 7 miles in length between North Cambridge and Waterville (Lamoille County), caused by straight-line winds of 60 to 80 mph. However, within this greater damage field was a tornadic storm with two very brief touchdown with EF0 and EF1 damage.‖Another area of thunderstorms moved across central Vermont with pockets of significant damage across Addison, Washington, and Orange counties.
7/18/2008	7/18/2008	Several mid-atmospheric impulses traveled along a stationary boundary across northern Vermont during the early afternoon and evening hours of July 18th. This stationary boundary separated warm, humid air across much of Vermont from cooler, drier air across the international border with Canada. Several rounds of thunderstorms moved across northern Vermont during the afternoon of July 18th. A developing squall line across the Champlain Valley of New York moved into northwest Vermont by mid-afternoon and continued across the state. Widespread tree and structural damage occurred with this system in Grand Isle, Franklin, Lamoille, and Orleans counties. This squall line interacted with an individual thunderstorm near Fletcher, that eventually produced an extensive damage path around 7 miles in length between North Cambridge and Waterville (Lamoille County), caused by straight-line winds of 60 to 80 mph. However, within this greater damage field was a tornadic storm with two very brief touchdowns with EF0 and EF1 damage. Another area of thunderstorms moved across central Vermont with pockets of significant damage across Addison, Washington, and Orange counties.
7/26/2008	7/26/2008	A mid-atmospheric disturbance moved across northern New York and the northern Champlain Valley of Vermont during the afternoon of July

		26th. Scattered thunderstorms developed in the Adirondacks and moved across the northern Champlain Valley of Vermont. There were some isolated reports of wind damage in Grand Isle, Chittenden, and Franklin counties in Vermont.
6/26/2009	6/26/2009	On the afternoon of June 26th, an unseasonably cold and strong upper level low pressure system was located across eastern Canada. Mid-level shortwave energy rotated around this upper low into a moderately unstable air mass across northern New York and Vermont. This resulted in widespread thunderstorm activity, some of which produced large hail and brief strong winds across portions of Vermont.
7/21/2010	7/21/2010	On July 21st, a developing surface low across the Great Lakes traveled along a stationary boundary draped across the North Country. Surface conditions became increasingly unstable during the afternoon with temperatures in the 80s and dewpoints in the 60s and lower 70s. More importantly, an unseasonably strong mid-atmospheric shortwave and winds aloft tracked across this region as well, which allowed for thunderstorms to develop rapidly, intensify, and maintain longevity.||During the afternoon and evening, scattered to numerous thunderstorms developed traveled across northern New York and through Vermont. Several storms strengthened into supercells that produced widespread wind damage to trees, power poles and structures as well as large hail more than golf ball size in diameter.||Some of the communities affected were Milton, Colchester, Essex, Jericho, Stowe, Brookfield, Chelsea, and Rutland. In addition, very heavy localized rains caused some temporary problems in many communities, but did result in washed out roads, culverts in Chelsea.
5/16/2012	5/16/2012	A cold front and mid-atmospheric disturbance moved across Vermont during the afternoon of May 16th. Scattered thunderstorms developed with a few of them containing hail up to one inch in diameter.
5/29/2012	5/29/2012	A warm front moved across Vermont during the morning hours of May 29th, which lead to numerous thunderstorms with heavy rain, damaging lightning and some isolated large hail and strong winds. Some of these thunderstorms deposited up to 2 inches of rainfall in portions of north-central and northeast Vermont.||A warm, humid, and unstable air mass was draped across the region in the afternoon with an approaching cold front from Ontario, Canada. Numerous thunderstorms developed ahead of the cold front during the afternoon crossing New York into Vermont. There were numerous reports of hail greater than an inch in diameter, damaging winds, along with a confirmed EF0 tornado in West Glover VT. ||Some of these storms trained across the same areas, including those that witnessed two inches of rain earlier in the day. The result was flash flooding in portions of north-central, northeast Vermont and Addison County with radar estimated storm total rainfall of 3 to 5 inches.
5/29/2012	5/29/2012	A warm front moved across Vermont during the morning hours of May 29th, which lead to numerous thunderstorms with heavy rain, damaging lightning and some isolated large hail and strong winds. Some of these thunderstorms deposited up to 2 inches of rainfall in portions of north-central and northeast Vermont.||A warm, humid, and unstable air mass was draped across the region in the afternoon with an approaching cold front from Ontario, Canada. Numerous thunderstorms developed ahead of the cold front during the afternoon crossing New York into Vermont.

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7/4/2012	7/4/2012	A moderately strong upper level disturbance ahead of a surface cold front moved across southern Quebec during the afternoon and evening hours of July 4th. These disturbances moved into a warm and unstable air mass and developed thunderstorms in southern Quebec, which moved across northeast Vermont during the afternoon hours and the Champlain Valley during the evening. ||Both episodes contained widespread wind damage and frequent lightning. In the afternoon, the communities of Walden, Cabot, West Danville, and Danville were most affected. During the evening storms, significant damage occurred in the Champlain Valley in communities like Colchester, Burlington, South Burlington, Essex, and Hinesburg. A wind gust of 65 knots was observed at Diamond Island on Lake Champlain and 55 knots was observed at the NWS office at Burlington Int'l airport. ||Despite the holiday festivities, no serious injuries were reported.
7/4/2012	7/4/2012	A moderately strong upper level disturbance ahead of a surface cold front moved across southern Quebec during the afternoon and evening hours of July 4th. These disturbances moved into a warm and unstable air mass and developed thunderstorms in southern Quebec, which moved across northeast Vermont during the afternoon hours and the Champlain Valley during the evening. ||Both episodes contained widespread wind damage and frequent lightning. In the afternoon, the communities of Walden, Cabot, West Danville, and Danville were most affected. During the evening storms, significant damage occurred in the Champlain Valley in communities like Colchester, Burlington, South Burlington, Essex, and Hinesburg. A wind gust of 65 knots was observed at Diamond Island on Lake Champlain and 55 knots was observed at the NWS office at Burlington Int'l airport. ||Despite the holiday festivities, no serious injuries were reported.
7/23/2012	7/23/2012	A quick moving disturbance across Ontario and Quebec provinces in Canada pushed a warm front across the region during the morning and early afternoon of the 23rd, followed by a cold front during the night. Numerous thunderstorms developed ahead of the cold front in northern New York and intensified as they moved into Vermont during the late afternoon and evening hours. There were numerous reports of damaging winds and large hail.
9/8/2012	9/8/2012	A rapidly intensifying area of low pressure moved from the eastern Great Lakes across Quebec province Canada during the afternoon and evening hours of September 8th. A tight pressure gradient created strong surface southerly winds of 20 to 30 mph with frequent gusts more than 40 mph across the region. In addition, these strong winds delivered an abnormally warm and unstable air mass ahead of the surface low and cold front. As the cold front moved across New York during the afternoon, a squall line of severe thunderstorms developed and pushed east into Vermont.||There was isolated minor wind damage in the form of large tree branches or small trees prior to any thunderstorms. Wind

		damage associated with thunderstorms was more widespread and significant.
6/25/2013	6/25/2013	A warm moist airmass provided the fuel for severe storms and flash flooding on June 25, 2013.
9/11/2013	9/11/2013	A weak area of low pressure traveling along a stationary front, draped across NY and VT, embedded in an unseasonably warm and unstable air mass resulted in a series of thunderstorms that moved across Vermont during the late afternoon and evening. Some of these thunderstorms produced damaging winds of downed trees and utility lines.
6/28/2016	6/28/2016	A cold front moves across a marginally unstable air mass during the afternoon of June 28th developing thunderstorms in the Adirondacks of New York that eventually moved into the Champlain Valley and elsewhere in Vermont. A few isolated thunderstorms did deliver strong gusty winds and hail just under an inch in diameter. Some slow moving and training storms did deliver localized 2 to 4 inches of rain in north-central and northeast Vermont for some minor flash flooding. A lightning struck a large home in South Hero Vermont which caused a fire that destroyed the home.
7/22/2016	7/22/2016	A disturbance moved across the Canadian border during the overnight of July 22-23rd and developed some strong to severe thunderstorms with a few producing locally damaging winds.
7/22/2016	7/22/2016	A disturbance moved across the Canadian border during the overnight of July 22-23rd and developed some strong to severe thunderstorms with a few producing locally damaging winds.
7/23/2016	7/23/2016	A significant cold front and strong mid-level disturbance caused numerous thunderstorms to develop in Quebec province Canada by late morning then travel and intensify across VT during the afternoon. Significant and widespread damage occurred with more than 20,000 utility outages.
8/28/2016	8/28/2016	Scattered thunderstorms developed ahead of a cold front across northern VT during the afternoon of August 28th. A few of these storms did produce isolated wind damage to trees.
8/28/2016	8/28/2016	Scattered thunderstorms developed ahead of a cold front across northern VT during the afternoon of August 28th. A few of these storms did produce isolated wind damage to trees.
9/11/2016	9/11/2016	A cold front moved across New York during the early morning hours and Vermont during the morning hours of September 11th. Preceding this cold front was a solid line of showers and thunderstorms that stretched from the Canadian border south to the Massachusetts border that moved across VT in the pre-dawn hours. Scattered severe thunderstorms knocked down numerous trees and caused subsequent power outages. In addition, numerous clouds to ground lightning strikes caused power outages and caused a fire that destroyed an historic dairy barn at the Shelburne Farms in Shelburne.
5/4/2018	5/4/2018	An energetic storm system moved from the Great Lakes across the St. Lawrence Valley into Ontario/Quebec during the afternoon and evening hours of May 4th. Instability was marginal for thunderstorm development during the evening hours with thunderstorms ahead of a cold front. However, winds were unseasonably strong in the atmosphere, accounting for some thunderstorms to produce damaging winds and there was some localized damage in non-thunderstorm winds accompanying the arrival of colder air.||Very brief heavy rainfall of up to

		2 inches in less than an hour accounted for localized flash flooding and a mudslide. Strong winds and a lake level at/above flood stage caused for 4 to 6 foot waves to batter a causeway between Colchester and Grand Isle on Lake Champlain, resulting in numerous washouts and a closure of the causeway.
6/30/2018	6/30/2018	Vermont and northern NY influenced by heat ridge but just on the periphery, thus thunderstorm clusters riding over the ridge across Ontario/Quebec into VT/NY along the international border. Thunderstorms moved into VT/NY just around midnight on July 1st.
7/30/2019	7/30/2019	A weak upper level disturbance moving through a very warm, humid, and unstable air mass lead to scattered thunderstorms, including several severe storms in the Champlain Valley of Vermont. Severe storms caused damaging winds in the form of downed tree limbs, trees, and utility lines. An elderly couple drowned while kayaking on Mallets Bay as the storm moved through.
7/30/2019	7/30/2019	A weak upper level disturbance moving through a very warm, humid, and unstable air mass lead to scattered thunderstorms, including several severe storms in the Champlain Valley of Vermont. Severe storms caused damaging winds in the form of downed tree limbs, trees, and utility lines. An elderly couple drowned while kayaking on Mallets Bay as the storm moved through.
7/30/2019	7/30/2019	A weak upper level disturbance moving through a very warm, humid, and unstable air mass lead to scattered thunderstorms, including several severe storms in the Champlain Valley of Vermont. Severe storms caused damaging winds in the form of downed tree limbs, trees, and utility lines. An elderly couple drowned while kayaking on Mallets Bay as the storm moved through.
8/24/2020	8/24/2020	A mid-level disturbance moved through a moderately unstable air mass across eastern NY and western VT during the afternoon of August 24th. Scattered thunderstorms developed with a few producing localized damaging winds and large hail.
7/20/2021	7/20/2021	A healthy upper level trough and frontal boundary moved from Ontario into VT during the overnight hours of July 20th. Ahead of this system, a vigorous squall line of thunderstorms that developed in Ontario during the early afternoon hours moved across northern NY from mid-afternoon into the evening hours and evening hours across VT with numerous reports of damaging winds.
5/21/2022	5/21/2022	A mid-level disturbance moved into a moderately unstable airmass across Vermont during the late afternoon/early evening of May 21st. Scattered thunderstorms developed in NY and southern Quebec and intensified as they moved east into VT. Several reports of damaging winds and a few observations of hail greater than one inch in diameter were reported.
7/12/2022	7/12/2022	A strong mid-level disturbance moved into a moderately unstable airmass across VT during the afternoon of July 12th. Scattered showers and thunderstorms developed across the state with scattered damage in southern-eastern VT and some isolated damage near the Canadian border. Some more organized wind damage occurred in the communities of Chester, Wood stock-Hartford, and White River Junction.
7/4/2023	7/4/2023	A mid atmospheric disturbance moved over an unstable airmass across northern Vermont during the afternoon hours of July 4th. Scattered

		thunderstorms rotated north to southeast across the region, some of them providing localized damaging winds.
7/4/2023	7/4/2023	A mid atmospheric disturbance moved over an unstable airmass across northern Vermont during the afternoon hours of July 4th. Scattered thunderstorms rotated north to southeast across the region, some of them providing localized damaging winds.
7/21/2023	7/21/2023	A weak area of low pressure moved across a marginally unstable air mass across Vermont on July 21st. Scattered thunderstorms developed and moved across Vermont, some of these storms brought damaging winds.
7/21/2023	7/21/2023	A weak area of low pressure moved across a marginally unstable air mass across Vermont on July 21st. Scattered thunderstorms developed and moved across Vermont, some of these storms brought damaging winds.

Severe Winter Storm and Ice Storm History

Begin Date	End Date	Event Description and Extent
1/22/1997	1/22/1997	Cold air was entrenched at the surface as a warm front moved north across the region into Canada. A mixture of light snow, sleet and freezing rain fell across the area. There were numerous automobile and truck accidents. Portions of Interstate 89 were closed in Washington and Chittenden Counties due to extremely slippery conditions. Burlington International Airport was closed during part of the morning with numerous flight delays.
3/21/1997	3/22/1997	An area of low pressure moved across the Great Lakes late Friday (3/21/97) and reached the New England coast near Cape Cod, Massachusetts Saturday morning (3/22/97). Snow fell across the area during Friday night ending early Saturday morning. Between 3 and 5 inches of snow fell across the area...with the greatest amounts in the mountains.
12/1/1997	12/2/1997	An area of low pressure off the Middle Atlantic coast Sunday night (11/30/97) moved to near Cape Cod early Monday (12/01/97) and continued to move northeast thereafter. Snow and freezing rain developed during late Sunday night (11/30/97) and continued in the form of periods of snow Monday (12/01/97) into early Tuesday (12/02/97) with up to 5 inches accumulating.
1/4/1998	1/6/1998	A cold front moved south out of Canada Sunday (January 4) and Monday (January 5). This front resulted in a low level flow of cold air across northern Vermont. Moist air riding over this front resulted in freezing rain across the area Sunday night and Monday with freezing drizzle Monday night into Tuesday morning. Power failures due to down trees and power lines resulted with numerous traffic accidents and several roads closed due to icy conditions.
1/6/1998	1/9/1998	A storm system moved from the Tennessee Valley on Wednesday (January 7) and Thursday (January 8) into New England thereafter. A cold front across New England and New York associated with an Arctic High Pressure system across Canada resulted in a flow of low level cold air into northern Vermont. Warm moist air riding over this low level cold air resulted in a major ice storm across northwest Vermont. During Friday afternoon (January 9), a few thunderstorms with gusty winds and small hail moved across the Champlain Valley of Vermont. Ice accumulations during this event were between 1 and 2 inches with locally greater accumulations over portions of Grand Isle County Vermont. The impact on the region was dramatic. The ice accumulations resulted in damage to tens of thousands of trees. Trees and power lines snapped due to the weight of the ice with 60 to 80 thousand without power for several days. Damage to the utility companies ran in the millions. The economic impact ranged from stores and shopping malls closed, banks closed with ATMs not working due to lack of power. With no electricity, the agricultural community was unable to milk cows with loss of income and damage to cows. Automobile and air travel was dramatically impacted with Burlington International Airport closed and many roads and bridges closed due to ice and fallen trees. There were numerous traffic accidents. Several radio stations were knocked off the air. There was one DIRECT injury when an ice laden tree fell on a pickup truck, in Chittenden County on Thursday, January 8. Other INDIRECT injuries were due to carbon monoxide poisoning while

		improperly using generators. One person died from a heart attack after the storm while cleaning up debris. The National Guard assisted with cleanup operations after the storm. Falling tree limbs and other debris was a significant hazard during and following the storm.
3/14/1998	3/15/1998	An area of low pressure moved across northern New York and northern New England during Saturday (March 14) and then into the Canadian Maritimes Sunday (March 15). A complex pattern of snowfall resulted in accumulations of 3 to 6 inches in the Champlain Valley of Vermont. Several traffic accidents were reported in Addison County.
1/13/1999	1/13/1999	An area of low pressure moved from Tennessee Valley Tuesday afternoon (January 12) into southern New England Wednesday (January 13). Light snow accumulating to between 3 and 6 inches and colder air accompanied this system. A few snowfall reports were: Springfield (Windsor County).......6 inches Orwell (Addison County)......4 inches East Berkshire (Franklin County)...3.5 inches Rutland (Rutland County).......3 inches Colchester (Chittenden County)....3 inches South Newbury (Orange County)...3 inches
1/27/1999	1/29/1999	During the period from late Wednesday (1/27/99) through early Friday (1/29/99) a series of low pressure systems moved to the south of New England. During this extended period of several episodes of snowfall, accumulations ranged from as little as 3 inches in northeast Vermont up to around 9 inches in Rutland County. A few specific accumulations were: Rutland (Rutland county)........9.0 inches Ludlow (Windsor county).......8.3 inches Waitsfield (Washington county)...8.0 inches Hanksville (Chittenden county).....7.9 inches Chelsea (Orange county)..........7.5 inches So. Lincoln (Addison county).......6.6 inches W. Danville (Caledonia county).....6.5 inches St. Albans (Franklin county).........5.0 inches Morrisville (Lamoille county)..........4.7 inches Albany (Orleans county).........4.0 inches Island Pond (Essex county)..........3.0 inches
12/14/1999	12/15/1999	A complex storm system moved across the region Tuesday night, December 14th and into Quebec on Wednesday, December 15th. A mixture of rain, snow, and sleet during the evening of December 14th changed to light snow overnight . Between 2 and 4 inches of snow fell across the area. A few reports included: 3 inches in Orwell (Addison County), 3 inches in Worcester (Washington county), 3 inches in St Albans (Franklin County) with around 2 inches reported in the Burlington area (Chittenden County). Throughout the state roads were reported slippery.
1/3/2000	1/4/2000	A storm system moved through the eastern Great Lakes Monday night, January 3rd and then into Canada on Tuesday, January 4th. Across the area, between 2 and 3 inches of snow fell with up to 1/4 inch of ice in

		some areas from freezing rain. The precipitation changed to rain Tuesday.
1/30/2000	1/31/2000	A complex storm pattern with one system over the Ohio Valley and another one over the southeast US Sunday, January 30th organized into one system off the mid-Atlantic coast Sunday night, January 30th. It then moved northeast across southern New England on Monday, January 31st. Snowfall in these areas was between 3 and 6 inches. A few specific reports included: Burlington (Chittenden County) 5.6 inches, Bethel (Windsor County) 6.2 inches, South Hero (Grand Isle County) 4 1/2 to 5 inches and St Albans (Franklin County) 3 inches.
2/18/2000	2/19/2000	A storm system moved from Ohio Valley Friday afternoon, February 18th and moved to the southern New England coast Saturday morning before reorganizing and moving out to sea. In general, between 3 and 6 inches fell across the area.
4/11/2000	4/12/2000	An area of low pressure moved across central and southern New England Tuesday night (April 11th) and early Wednesday (April 12th) then into the Canadian Maritimes. Light snow fell across the area with accumulations of 3 to 6 inches. Specifically, the following accumulations were reported: Sutton (Caledonia county) 6.3 inches, Greensboro (Orleans county) 5.8 inches, Morrisville (Lamoille county) 5.5 inches, Essex Jct. (Chittenden county) 5.2 inches, Enosburg Falls (Franklin county) 5 inches, Brookfield (Orange county) 5 inches, Waitsfield (Washington county) 5 inches, South Lincoln (Addison county) 4.2 inches, East Haven (Essex county) 4 inches, and South Hero (Grand Isle county) 2.5 inches. There were a few higher amounts in the mountains, such as: Jay Peak (Orleans County) with 7 inches.
10/29/2000	10/29/2000	A storm system over the Canadian Maritimes resulted in wrap around moisture with precipitation falling in the form of snow. Between 1 and 3 inches of snow fell in these areas.
11/26/2000	11/26/2000	A complex area of low pressure with one center that moved along the New England coast and the other center through the Great Lakes region spread freezing rain, mixed at times with sleet, across the area. Roads became slippery and several accidents were reported on roadways. In Pittsfield (Rutland County) a bus overturned on an icy road.
12/19/2000	12/20/2000	A storm system developed along the Atlantic coast Tuesday night, December 19th and moved northeast to Cape Cod Wednesday morning, December 20th. Snow fell across the area Tuesday evening into Wednesday morning. The amounts were between 3 and 6 inches. A few reports included: Burlington in Chittenden County...6.1 inches, Castleton in Rutland County 6 inches, South Lincoln in Addison County 5.8 inches, Springfield in Windsor County 5 inches and Brookfield in Orange County 5 inches.
1/30/2001	1/30/2001	A large sprawling area of low pressure over the Great Lakes region spread moisture across the area. The low level temperatures were at or below freezing. Thus, there was a mixture of light freezing rain, snow, and sleet. Roads were reported as slippery by Vermont State Police.
2/5/2001	2/6/2001	A storm system developed off the coast of Virginia early Monday, February 5, 2001, and moved northeast . It moved across extreme southeast coastal New England late Monday night and into the Gulf of Maine early Tuesday, February 6th. Steady snow spread across the area during the afternoon and evening hours of Monday, February 5th, with the heavier snow later Monday night before it tapered off to flurries

		early Tuesday, February 6th. Across the counties, 4 to 6 inches of snow fell.
2/9/2001	2/9/2001	A storm system moved from the Great Lakes region Friday, February 8th and into Canada Friday night. Mixed precipitation spread across the area with less than 2 inches of snow. Roads became slippery with numerous minor accidents reported. Northern portions of I-89 and I-91 were closed at times.
2/25/2001	2/25/2001	A storm system moved from the northern Great Lakes into and across southern Canada during Sunday, February 25th. Snow spread across the area during the early morning then mixed with it and changed to sleet, freezing rain, and just plain rain. Roads did become icy after between 1 and 3 inches of snow fell...with a few higher amounts.
3/9/2001	3/10/2001	A low pressure system reorganized off New England during Friday, March 9th. It then moved northeast away from the area on Saturday, March 10th. Snowfall accumulations were 2 to 4 inches with locally higher amounts in the mountains. Slippery roads were reported.
11/29/2001	11/29/2001	A mixture of light snow, sleet and freezing rain changed to all light freezing rain. There were slippery spots reported across the area. Across the northern third of Vermont, 1 to 3 inches of snow fell before the changeover...with the greatest snowfall in the mountains.
12/14/2001	12/15/2001	An area of low pressure over the Ohio Valley Friday morning, December 14th, moved northeast and reorganized over southern New England the night of the 14th. The storm system then continued east and moved offshore by Saturday morning, December 15th. Light rain quickly changed to wet snow across the area Friday evening (December 14th) and tapered off to flurries Saturday morning. Accumulations were 2 to 5 inches. A few reports included: Sutton (Caledonia County) 5.4 inches while Enosburg Falls (Franklin County) received 4 inches. Waitsfield (Washington county) reported 4 inches. It was very wet snow. A few minor automobile accidents were reported in Addison and Caledonia counties.
12/17/2001	12/18/2001	An area of low pressure over the Ohio Valley Monday, December 17th moved to the New Jersey coast the night of the 17th and then to off the southern New England coast Tuesday morning, December 18th. Light snow spread north across the area during the afternoon...mixing with freezing rain during the evening hours then back to all snow. Accumulations were 3 to 6 inches. A few reports included: In Addison County, Cornwall reported 5.8 inches while in Chittenden County, Hanksville reported 4.8 inches. In Orleans County, Newport reported 5.5 inches with 5 inches in Waitsfield (Washington county). Numerous minor automobile accidents were reported across the entire area.
2/17/2002	2/17/2002	A storm system over western New York combined with another system which reorganized off the southern New England coast and then moved east. These systems spread light snow across the area from the early morning hours into the afternoon of February 17th. Accumulations were 3 to 6 inches regionwide. There were a few isolated higher amounts with : Jay Peak 11.8 inches, and 7 inches locally reported in the towns of Springfield, East Albany, and Brookfield. Several automobile accidents were reported in both Chittenden and Washington counties.
12/27/2004	12/27/2004	A storm system off the southeast US coast Sunday morning, December 26th moved northeast to a position south of Nova Scotia, Canada Monday morning, December 27th. Brisk north winds pulled down cold

		air from Canada. This resulted in a band of steady snow in portions of central Vermont. Snow developed Sunday night, December 26th and continued into the morning of December 27th. By the morning of December 27th, between 3 and 6 inches of snow fell in both Grand Isle and Lamoille counties, and between 3 and 4 inches in Washington and Eastern Franklin counties.
1/2/2005	1/2/2005	An area of low pressure over the northern Great Lakes region early Sunday, January 2, 2005, moved northeast into southern Canada. It reached the James Bay area of Canada the night of January 2nd. High pressure across southern and eastern Canada resulted in a low level flow of cold air. Freezing rain and sleet spread across western Vermont by mid-afternoon ending later at night. Roads became very slippery with several accidents reported. Portions of I-89 were closed in Chittenden County and portions of Rte. 4 in Rutland County were closed. Burlington International Airport was closed for a few hours due to icy runways.
1/6/2005	1/6/2005	An area of low pressure moved across western New York during the afternoon of Thursday, January 6, 2005. This system continued to move northeast down the St Lawrence Valley and into southern Canada the night of January 6th. Light snow overspread the Champlain Valley of Vermont around noon and continued through the evening. Accumulations were 2 to 4 inches. A few minor accidents were reported.
1/12/2005	1/12/2005	Warm air associated with a warm front gradually over ran a shallow layer of cold surface air. This resulted in light snow during the morning of January 12th changing to light freezing rain and sleet during the afternoon. Eventually the precipitation changed to plain rain during the evening. A few minor accidents were reported.
2/16/2005	2/16/2005	An area of low pressure over the Ohio Valley late Tuesday afternoon, February 15th moved northeast during the night of February 15th. This system passed across Vermont during the day of Wednesday, February 16th and east of the area by the evening of the 16th. A mixture of rain and snow developed during the late morning of the 16th and changed to steady snow by early afternoon. Snow accumulations were between 3 and 6 inches across the counties of Chittenden and Franklin. Across the counties of Grand Isle, Lamoille and eastern Addison, snow accumulations were 2 to 4 inches. Roads and walkways were very slippery with the wet snow. Several cars were off the road in eastern Chittenden County.
12/16/2005	12/16/2005	A storm system developed over the lower Mississippi Valley early on the 15th of December and moved northeast to western Long Island of New York early on the 16th of December. The storm continued northeast into the Gulf of Maine by the evening of December 16th. Snow, sleet, and freezing rain overspread the area during the late night of December 15th and early morning of December 16th. During the morning of the 16th, a mixture of snow and sleet fell as warm air moved in aloft. Accumulations of snow and sleet across much of the Champlain Valley region of Vermont was between 2 1/2 and 5 inches. Winds were gusty.
1/15/2006	1/15/2006	An arctic cold front moved across Vermont during the night of the 14th and early morning of the 15th. Record warm temperatures in the 40s and 50s on Saturday (14th), were replaced with temperatures in the single numbers and teens Sunday. Low pressure moved along this arctic front

		and across eastern New England with rain changing to snow across the region late Saturday night through Sunday morning. It was quite blustery with Northwest winds 20 to 30 mph and gusts to 40 mph causing blowing and drifting snow. Snowfall amounts of 1 to 3 inches were common across western Vermont.
1/25/2006	1/26/2006	An Alberta Clipper moved across northern Vermont during the early morning hours of the 25th depositing a dusting to locally up to 2 inches of snow. A significant upper level disturbance and cold, unstable air aloft redeveloped snow showers and localized snow squalls during the evening and continued until early morning on the 26th. Total snowfall was 3 to 6 inches across the northern Champlain Valley of Vermont. Snowfall amounts include Milton and Saint Albans with 4 inches and South Burlington with 6 inches.
2/6/2006	2/6/2006	Low pressure moved into the eastern Great Lakes on the 5th and then moved northeast across Quebec province on the 6th. On the 6th, a cold polar vortex located across Quebec created a persistent west-southwest cold flow over the mild lake waters of the eastern Great Lakes. A series of Lake effect snowbands developed off Lake Ontario during the evening of the 5th, reaching northern Vermont overnight and continued until the late evening of the 6th. Some of the heaviest snowbands moved across Grand Isle and Franklin counties around 3 pm on the 6th of February. An 18 vehicle accident occurred on Interstate 89 near Exit 21 (Highgate) due to the slippery roads. General snowfall was 1 to 3 inches in the valleys but favored upslope regions witnessed 4 to 6 inches. Snowfall amounts included: 2 inches in South Burlington (Chittenden County), East Haven (Essex County), St. Albans (Franklin County), Waitsfield (Washington county), while 3 inches of snow fell in Newport (Orleans County), Waterbury Center (Washington county) and Island Pond (Essex County). Snowfall of 4 inches was reported in Jericho (Chittenden county), Morrisville (Lamoille county), and Greensboro (Orleans county), while 5 inches accumulated in Westford (Chittenden county), Sutton (Caledonia county), and 6 inches was reported in North Underhill (Chittenden county), Jeffersonville and Eden (Lamoille county) and a localized 12 inches at Jay Peak.
2/25/2006	2/25/2006	An unusually strong Alberta clipper moved across southern Vermont during the afternoon of the 25th. Snow started across northern Vermont by midday and continued into the evening, then tapered off before midnight. Snowfall was much more limited, the further away from the storm track. Snowfall amounts ranged from an inch to 4 inches across portions of northern Vermont. Some specific snowfall totals included: 1 inch in Underhill (Chittenden county), Island Pond (Essex county) and Newport (Orleans county)...2 inches in Greensboro (Orleans county) and Sutton (Caledonia county)...3 inches in South Burlington (Chittenden county), Morrisville (Lamoille county) and East Albany (Orleans county) with 4 inches in Enosburg Falls (Franklin county). Several traffic accidents were reported due to slippery roads.
1/1/2007	1/1/2007	A weak area of low pressure moved across Ontario and Quebec provinces in Canada during the morning and afternoon of the 1st. Mild, moist air traveled over a seasonably cool airmass across Vermont and this resulted in a period of freezing rain from shortly after Midnight to mid-morning on the 1st. Freezing rain accumulated to between 1/4 to 3/8

		of an inch across Vermont, resulting in slick roads and several vehicle accidents.
1/15/2007	1/15/2007	Surface low pressure traveled along a stationary boundary draped across New England on the 15th. Snow began across the Champlain Valley and Washington county during the early morning hours of the 15th and eventually changed to sleet and freezing rain during the morning and continued through the afternoon. Total snow and sleet accumulations ranged from 2 to 4 inches with an additional 1/4 inch or less of ice accumulation.
2/2/2007	2/3/2007	A significant surface low traveled along an arctic cold front that moved across northern Vermont during the late night of the 2nd and into the early morning hours of the 3rd. This clipper system delivered snow to Vermont by late afternoon/evening on the 2nd and continued at night, before it tapered off to snow showers early morning of the 3rd. Snowfall accumulations ranged from 2 to 6 inches, with the lighter amounts within the Champlain Valley and the heaviest amounts in the hilly terrain of North Central and Northeast Vermont. Some specific snowfall totals included; 6 inches in Sutton (Caledonia), Island Pond (Essex) and Eden (Lamoille), 5 inches in Walden (Caledonia), Canaan (Essex), Corinth (Orange), Newport (Orleans) and Springfield (Windsor), 4 inches in Jerusalem and South Lincoln (Addison), North Underhill (Chittenden), Highgate (Franklin), Rutland (Rutland), Waitsfield and Northfield (Washington) and Chester (Windsor).
4/4/2007	4/4/2007	A complex storm system moved across Ontario and Quebec on the 4th with a frontal boundary that moved across Vermont during the afternoon. Meanwhile, a coastal low developed off the New Jersey coast during the late afternoon and evening of the 4th, which maintained the precipitation across the area through the evening hours. Rain mixed with and then changed to sleet and snow across the Champlain Valley during the afternoon and evening hours of the 4th before ending around Midnight. |Combined snow and sleet accumulations in the immediate Champlain Valley was generally a few inches. This caused some treacherous travel for the late afternoon and evening commute with numerous motor vehicle accidents reported. Some specific snowfall accumulations included 3 inches in Bridport (Addison County), South Burlington (Chittenden County) and Swanton (Franklin County) with 4 inches in Enosburg Falls (Franklin County) and 6 inches in Rutland (Rutland County).
4/12/2007	4/12/2007	Strong low pressure moved into the Great Lakes on the morning of the 12th. Meanwhile, a secondary area of low pressure developed off the Delmarva peninsula during the afternoon of the 12th. Both systems eventually moved into the Gulf of Maine during the early morning hours of the 13th.|Precipitation was a wintry mix of heavy wet snow, sleet, and rain with the most persistent snows in the higher elevations and during the hours after sunset with the loss of solar insolation. Snowfall totals in the Champlain Valley of Vermont were 2 to 5 inches. Some specific snowfall totals include; 2 inches in Cornwall (Addison county), Swanton (Franklin county) and Rutland (Rutland county)...3 inches in Charlotte (Chittenden county), St. Albans (Franklin county) and Danby Four Corners (Rutland county)...4 inches in Grand Isle (Grand Isle county) and Richford (Franklin county) with 5 inches in Hanksville (Chittenden county).

4/15/2007	4/16/2007	A storm system initiated across the southern Rockies on the 12th and moved across the southern Plains on the 13th into the Gulf coast states on the 14th. On the 14th, this storm intensified rapidly across the southeast United States and continued to intensify rapidly as it moved along the Eastern seaboard on the 15th to the western tip of Long Island, NY on the morning of the 16th. Thereafter, this powerful Nor'easter drifted east of New England. In the Champlain Valley of Vermont, snow overspread the area by late morning on the 15th, but mixed with and changed to sleet and rain several times from early afternoon through the night of the 15th, before gradually ending during the morning of the 16th.|Strong east to southeast winds, down-sloping, off the Green Mountains accounted for less precipitation and milder temperatures within the Champlain Valley. Snowfall totals were 3 to 5 inches in the Champlain Valley. This was a heavy, wet snow that caused scattered power outages, as well as extremely slick and treacherous roads that resulted in numerous vehicle accidents. Some specific snowfall totals included: 3 inches in Highgate Center (western Franklin County) and Pawlet (western Rutland County) with 4 inches in St. Albans (western Franklin County), North Hero (Grand Isle County) as well as Burlington and Colchester (western Chittenden County).
12/11/2007	12/12/2007	An upper level disturbance helped initiate the development of a weak surface low along a frontal boundary, all of which moved across Vermont during the night of December 11th and into the morning hours of the 12th. A wintry mix of snow, sleet and freezing rain overspread Vermont during the evening hours of the 11th but changed to accumulating snow during the early morning hours of the 12th before ending by mid-morning. Combined snow and sleet accumulations across Vermont were 2 to 5 inches. Some specific accumulations included 5 inches in North Underhill (Chittenden County), 4 inches in Wheelock (Caledonia County), St. Albans (Franklin County), Morrisville (Lamoille County) and East Albany (Orleans County) with 3 inches in Marshfield (Washington county), West Topsham (Orange County) and South Lincoln (Addison County).
12/13/2007	12/13/2007	An upper level disturbance moved across northern New York and southeast Canada, while a weak surface low moved across southeast Canada during the evening of December 13th. Meanwhile, a surface low tracked from the southeast United States to just south of southern New England on the night of the 13th. Snow overspread Vermont during the early to midafternoon of the 13th and ended prior to midnight. Snow accumulations across Vermont were 3 to 6 inches. ||Some specific snowfall accumulations included; 5 inches in Eden (Lamoille county), Newport (Orleans county), Brookfield (Orange county) and Springfield (Windsor county) with 4 inches in New Haven (Addison county), St. Johnsbury (Caledonia county), North Underhill (Chittenden county), Morrisville (Lamoille county), Rutland (Rutland county), Northfield (Washington county) and Woodstock (Windsor county).
12/19/2007	12/20/2007	An upper level disturbance and weak area of low pressure moved east from the Great Lakes and then across Vermont during the night of December 19th into the morning hours of the 20th. Light snow overspread Vermont by late afternoon on the 19th and exited the region by early afternoon on the 20th. Snowfall accumulations from this system was 2 to 4 inches across Vermont.

12/31/2007	12/31/2007	An upper level disturbance moved across northern New York and Quebec during the early morning hours of December 31st. At the same time, a surface low moved north along the mid-Atlantic coast to southeast of Cape Cod by daybreak on the 31st. ‖Snow overspread Vermont around Midnight on the 31st and ended around daybreak on the 31st, with snowfall amounts 3 to 6 inches across the region. Some specific snowfall totals included; 7 inches in South Burlington (Chittenden county) 6 inches in Jericho (eastern Chittenden county), Corinth (Orange county)...5 inches in Bridport (Addison county), Essex (Chittenden county), Chelsea (Orange county), Moretown (Washington county) and 4 inches in Berkshire (Franklin county), Eden (Lamoille county), Sutton (Caledonia county) and Island Pond (Essex county).
1/1/2008	1/2/2008	Low pressure across the Great Lakes on the morning of January 1st moved across New York and New England during the late afternoon and evening hours. Meanwhile, a secondary area of low pressure developed across southern New England during the afternoon of the 1st and moved into the Gulf of Maine during the night. Snow overspread Vermont by early afternoon on the 1st and continued into the early morning hours of the 2nd.‖Snowfall amounts with this storm were 3 to 7 inches across the Champlain Valley of Vermont. Some specific snowfall amounts included 7 inches in Shoreham (Addison County), 6 inches in Burlington (western Chittenden County), 5 inches in St. Albans (western Franklin County) and 3 inches in New Haven (Addison County) and Rutland (Rutland County).
1/14/2008	1/14/2008	An upper atmospheric disturbance moved across northern New York, while a developing surface low moved well southeast of southern New England and Cape Cod during the morning hours of January 14th. Snow overspread Vermont during the early morning hours of the 14th and continued until the early afternoon. Snowfall amounts ranged from 2 inches along the Canadian border to 4 to 6 inches in the Connecticut River Valley.
2/1/2008	2/2/2008	An arctic high pressure system was located across New England and New York on January 31st into the morning hours of February 1st. Meanwhile, a powerful storm system moved from the southern Plains on the morning of January 31st into the Ohio River Valley by the morning of February 1st and then across New England during the night of February 1st. This storm system transported a great deal of moisture and milder air above a surface that had a cold, dry airmass established across the region. ‖This resulted in a wintry mix of snow, sleet, freezing rain, and rain across portions of Vermont. Snow began by late morning on February 1st across Vermont and changed to sleet, freezing rain and rain during the afternoon, which continued during the night before changing back to snow showers prior to ending during the early morning hours of the 2nd. ‖Combined snow and sleet accumulations across portions of north central and northeast Vermont was 2 to 5 inches along with accumulating ice around one quarter of an inch. This wintry mix accounted for hazardous road conditions, vehicle accidents and multiple school, civic and government closings on February 1st. In addition, very strong winds along the exposed hilltops in eastern Rutland, eastern Addison and eastern Chittenden counties resulted in scattered wind gusts more than 50 mph and isolated power outages.

2/12/2008	2/13/2008	Low pressure across the southern Mississippi River Valley on the morning of February 12th moved across the Ohio River Valley during the 12th and into New York and New England on the 13th. Snow overspread Vermont during the late evening hours of the 12th and continued into the morning hours of the 13th, where it mixed with and changed to sleet and freezing rain before it tapered to snow showers during the evening of the 13th. ||Combined snow and sleet accumulations of 3 to 6 inches, along with icing around 1/4 inch thick was found across much of Vermont. Power outages were recorded across southern Vermont and a two vehicle accident resulted in three fatalities near Middlebury (Addison County).
3/1/2008	3/1/2008	A fast moving storm system raced across the eastern Great Lakes on February 29th and New England on March 1st. Snow overspread Vermont just after midnight on March 1st and continued until midday. Snowfall accumulations of 3 to 7 inches were observed throughout much of western Vermont.
12/17/2008	12/17/2008	A weak surface low developed across the Great Lakes on December 16th and moved into northern New York by the morning of December 17th. A secondary low formed south of New England during the early morning hours of December 17th and moved east of New England by the evening.||Snow overspread Vermont after midnight on the 17th and accumulated 3 to 6 inches before tapering to snow showers and ending by early afternoon.
12/19/2008	12/20/2008	On the morning of December 19th, low pressure was located across the mid-Mississippi River Valley. This low moved across the Ohio River Valley during the afternoon of the 19th and then offshore south of New England during the evening.||Snow overspread Vermont by early afternoon on December 19th and ended just after midnight on the 20th. Snowfall accumulations of 3 to 6 inches were common across the Vermont counties along the Canadian border.
1/7/2009	1/8/2009	Primary low pressure traveled from the Great Lakes across the Vermont/Canadian border on January 7th. Meanwhile, a coastal low slowly developed south of New England during the late afternoon of the 7th and eventually intensified as it moved into the Gulf of Maine during the night. ||Snow overspread Vermont during the early morning hours of the 7th but changed to a prolonged period of sleet and freezing rain as milder air aloft dominated due to the slow development of the coastal low. Precipitation changed back to light snow and snow showers before ending during the early morning hours of the 8th. ||Total snowfall accumulations were 3 to 6 inches along with sleet and freezing rain with little to no ice accretion. Nonetheless, there were numerous motor vehicle accidents due to the wintry conditions that occurred both during the morning and evening commutes.
12/9/2009	12/9/2009	A very powerful low pressure system (980mb) moved across the Great Lakes into Ontario province Canada on December 9th.||Snow overspread the region before dawn with snowfall rates more than an inch per hour during the morning commute along with brisk winds of 15 to 25 mph with higher gusts. The snowfall ended by early to midafternoon. Snowfall amounts ranged from a few inches in the northern Champlain Valley and along the western slopes of the Green Mountains to 6 to 12 inches in favored up slope communities along and east of the Green Mountains. Some specific snow totals; 14 inches in Chester, 12 inches in

		Cavendish and Springfield, 9 inches in Bridport, 8 inches in Moretown, Rutland and Walden. This was the first widespread snow event for the 2009-10 winter season with numerous vehicle accidents throughout Vermont.||More importantly, this powerful storm delivered a low-level jet stream of 80 to 100 mph around 3000 feet that flowed across the Green Mountains and downsloped into the communities along the western slopes of the Green Mountains. Surface wind gusts of 60 to 85 mph during the afternoon downed numerous tree branches and trees which knocked down power lines and caused some structural damage to several homes as well. More than 10,000 residents lost power in the peak of the storm.||Some observed peak wind gusts included 108 mph atop of Mount Mansfield (4000 feet), 87 mph in Huntington, 74 mph in Cambridge, 66 mph in Nashville, 65 mph in East Clarendon, 62 mph in Bolton and 52 mph in Rutland.
12/28/2009	12/29/2009	An upper atmospheric area of low pressure and weak surface low moved across Vermont on the morning of December 28th. Periods of light snow occurred from daybreak through the late afternoon hours on December 28th which resulted in 2 to 4 inches of snow accumulation with localized higher amounts.||An arctic cold front and upper atmospheric disturbance moved across Vermont during the morning commute of December 29th with snow showers and localized snow squalls. Widespread snowfall accumulations of 1 to 3 inches occurred with localized amounts up to 4 inches.||Two-day storm totals were 4 to 12 inches across much of Vermont. Some specific higher snowfall totals included; 12 inches in Killington (Rutland county), 11 inches in Westfield (Orleans county) and North Underhill (Chittenden county), 10 inches in Lincoln (Addison county), 9 inches in Jay (Orleans county) and Richmond (Chittenden county), 7 inches in Sutton (Caledonia county), South Burlington (Chittenden county), Eden (Lamoille county), Rutland (Rutland county), Northfield (Washington county) and Sheldon Springs (Franklin county) with 6 inches in Stowe (Lamoille county), Newport (Orleans county), Waterbury (Washington county) and Bethel (Windsor county).||Rapidly falling temperatures to the single digits above zero degrees along with falling and blowing snow during the morning commute of December 29th accounted for roads to flash freeze that resulted in numerous vehicle accidents, especially along Interstate 89 between Montpelier and St. Albans.
4/27/2010	4/28/2010	Surface low pressure across the Ohio River Valley on April 26th slowly moved across the southern New England coast into the Gulf of Maine on the 27th and 28th. Meanwhile, a cold, strong upper atmospheric area of low pressure moved from Quebec across northern New England.||This resulted in an abnormally cold, unstable and moist air mass across northern New York and northern Vermont which produced largely orthographically enhanced snowfall across the Vermont-Canadian border as well as the higher terrain of the northern Green Mountains, northern Champlain Valley and northern Connecticut River Valley.||The snow began in western Vermont by mid-morning of the 27th and across eastern Vermont during the afternoon and continued overnight before it slowly diminished during the late morning and afternoon hours of the 28th. Accumulations of heavy, wet snow ranged from 4 to 12 inches in the valleys with 10 to 24 inches above 800 feet elevation in favored northwest facing slope communities. This heavy wet snowfall resulted in numerous downed tree limbs, branches and trees which caused scattered

		power outages that affected over 20,000 customers.||Some specific snowfall totals included; 4 inches in Cornwall (Addison county), Isle La Motte (Grand Isle county), Chelsea (Orange county), 6 inches in Swanton (Franklin county), NWS Burlington in South Burlington (Chittenden county), 8 inches in Essex Junction (Chittenden county), Stowe (Lamoille county), Newport (Orleans county) and Waterbury (Washington county) with 12 inches in South Lincoln (Addison county), Lyndonville (Caledonia county), Enosburg Falls (Franklin county), Brownington (Orleans county) and Marshfield (Washington county), 16 inches in Hardwick (Caledonia county), Sheldon Springs (Franklin county) and North Calais (Washington county), 20 inches in Walden (Caledonia county) and 24 inches in Jeffersonville (Lamoille county), Nashville and North Underhill (Chittenden county).
12/13/2010	12/14/2010	A deep and strong low pressure system traveled across the central United States into the lower Great Lakes on December 12th. Meanwhile, low pressure developed along the frontal boundary of the Great Lakes storm in the mid-Atlantic states and strengthened as it moved north across New York and western New England late on the 12th and 13th.||Rain that had fallen on December 12th changed to snow during the afternoon on the 13th as the cold front swept across Vermont accounting for rapidly falling temperatures and a quick freeze. Numerous vehicle accidents occurred due to wet roads that quickly became snow covered and icy. ||Snowfall accumulations across Vermont were 3 to 7 inches with localized higher amounts in the mountains. Some specific snowfall amounts include 8 inches in Cornwall (Addison County), Jericho (Chittenden County) Pittsford (Rutland County), 7 inches in Westford (Chittenden County), Morses Mills (Lamoille County), 6 inches in Georgia Center (Franklin County), 5 inches in Eden (Lamoille County) and Cabot (Washington county).
2/7/2011	2/8/2011	A weak surface low across the Great Lakes moved across New York and New England on the night of February 7th and morning of February 8th. At the same time, a coastal low that originated in the lower Mississippi, moved well southeast of Cape Cod. ||Snow overspread the region during the late evening of February 7th and tapered off during the midday hours of February 8th. Snowfall amounts across Vermont were 4 to 7 inches with locally 8 inches along some communities immediately along the western slopes of the Green Mountains like Lincoln, Underhill, and Jericho.
2/25/2011	2/25/2011	A storm that brought severe weather to portions of the Mississippi River Valley on February 24th was located in the Ohio River Valley on the morning of the 25th and into the Gulf of Maine by that evening.||Snow overspread southern Vermont before daybreak on the 25th and reached the Canadian border by mid-morning and fell heavy at times. Snowfall rates of 2-3 inches an hour were observed across much of central and southern Vermont. Snowfall totals ranged from 3 to 6 inches along the Canadian border with 8 to 12 inches in the central and southern Vermont. Some specific totals include 14 inches in Springfield (Windsor County), 12 inches in Chester (Windsor County), 10 inches in Sutton (Caledonia County and at the NWS office in South Burlington (Chittenden County). ||There were numerous vehicle accidents but most schools in the state were already closed due to vacation week.||NWS

		Burlington office set a new February monthly snowfall record with 43.1 inches, surpassing the old mark of 42.3 inches in 2008.
11/23/2011	11/23/2011	A storm system in the Mid-Mississippi Valley on November 22nd tracked just south of the New England shoreline on November 23rd. ||Snow began across Vermont before midnight on the 23rd and reached its maximum intensity prior and during the morning commute, then dissipated by midday. Snow mixed with freezing rain and rain at times, accounting for a heavy, wet accumulation. Snowfall accumulations in Vermont ranged from several inches in the Champlain Valley to 6 to 12 inches across central and eastern Vermont.||This snowfall accounted for numerous vehicle accidents during the morning commute as well as isolated to scattered power outages due to wet, heavy snow bending or breaking tree limbs onto power lines.
2/24/2012	2/25/2012	A dual, elongated area of low pressure moved across the Great Lakes into New England during the afternoon and night of February 24th. A secondary area of low pressure significantly developed across Cape Cod and the Gulf of Maine during the early morning hours of February 25th.||The first part of this system deposited 2 to 5 inches of snow across much of Vermont during the late afternoon and evening hours of the 24th, then the wrap-around, orographically enhanced snowfall across the Green Mountains continued overnight into Saturday with total storm snowfall accumulations ranging from 3 to 36 inches. The heaviest orographic snowfalls fell across the higher terrain in the northern third of Vermont, especially along the Green Mountains. The greatest impacted locations included eastern Franklin, Orleans, Lamoille, and eastern Chittenden counties.
2/29/2012	2/29/2012	A powerful winter storm that brought blizzard conditions to portions of Wisconsin and Minnesota and severe weather to portions of the Tennessee River Valley on February 29th weakened as it moved across the Northeast on March 1st.||There were two rounds of snowfall that moved across the North Country, the first during the evening and overnight of February 29th and the second during the daylight hours of March 1st. The first round delivered widespread 1-3 inches across much of Vermont with 6 to 10 inches along the east slopes of the central and southern Green Mountains. The second round delivered another 1-3 inches with some areas that witnessed 3 to 5 inches additional accumulation.
3/1/2012	3/1/2012	A powerful winter storm that brought blizzard conditions to portions of Wisconsin and Minnesota and severe weather to portions of the Tennessee River Valley on February 29th weakened as it moved across the Northeast on March 1st. ||There were two rounds of snowfall that moved across the North Country, the first during the evening and overnight of February 29th and the second during the daylight hours of March 1st. The first round delivered widespread 1-3 inches across much of Vermont with 6 to 10 inches along the east slopes of the central and southern Green Mountains. The second round delivered another 1-3 inches with some areas that witnessed 3 to 5 inches additional accumulation.
12/14/2013	12/15/2013	A dual area of low pressure moved across New York and just south of New England on December 15th to bring the first widespread snowfall of the 2013-14 winter season. The coastal storm became the most dominate system and delivered 10 to 15 inches across southeast

		Vermont with 3 to 6 inches across northwest Vermont. The typical impacts associated with this storm were the numerous vehicle accidents, especially being the first storm of the season.
12/20/2013	12/22/2013	A stationary boundary was draped across the Adirondacks of New York into portions of central and northern New England from December 20th through 22nd with several disturbances delivering precipitation. An impressive battle between mild to warm moist air, south of the boundary with temperatures in the 50s, overriding a very cold, dense shallow air mass with temperatures in the teens and 20s in northwest Vermont but single digits just north across the border into Canada.||First round of wintry precipitation fell across northwest Vermont, especially along the Canadian border during Friday afternoon and evening (December 20th). Most of the precipitation fell as freezing rain, 1/4 to 1/3 of ice accumulation, along with some sleet. The second round began during the early afternoon hours of December 21st and peaked during the evening and overnight hours. An additional 1/2 to 3/4 inch of ice accumulation as well as 1 to 2 inches of sleet occurred in portions of northern Vermont. Very cold temperatures (-10 to teens) followed the event with no melting, thus ice stayed on trees and utility lines through December 28th-29th, thus prolonging recovering efforts.||The greatest impact was in northwest Vermont, especially along the Canadian border, with widespread tree and utility line damage as well as numerous vehicle accidents. More than 75,000 customers were without power from hours to days across the region. The areas impacted were like the Ice Storm of January 1998, but not the severity as precipitation and ice accumulation were half of the 1998 storm.||Ice jams also developed during this time as runoff from melting snow and rainfall swelled area rivers. River rises were enough to break up and move ice cover, resulting in scattered ice jams.
1/3/2015	1/4/2015	A series of weak low pressure systems and frontal boundaries delivered a mix of snow, sleet, and freezing rain during the evening of January 3rd and eventually changed to rain during the morning of January 4th. Widespread snowfall of 2 to 4 inches was common along with up to a tenth of an inch of icing. In Northeast Vermont, widespread snowfall was 3 to 7 inches with up to one-quarter of an inch of ice.
1/27/2015	1/27/2015	A powerful nor'easter brought blizzard conditions to much of southern and eastern New England on January 26-27th. However, in Vermont, snowfall was moderate across the region with snowfall totals ranging from a few inches in much of western and northern Vermont to 6 to 10 inches in southeast Vermont.
1/30/2015	1/30/2015	A vigorous clipper with decent snowfall followed by a deep arctic air mass moved across Vermont during the early morning hours of January 30th and ended by early afternoon. Snowfall amounts across Vermont were 2 to 6 inches with some isolated higher amounts in northern Vermont.
12/29/2015	12/29/2015	The remnants of a powerful winter storm that brought blizzard conditions to New Mexico and Texas, tornadoes in Texas and record flooding rains to portions of the Mississippi River Valley moved into the Great Lakes on December 29th bringing the first winter storm of the 2015-16 season to northern New York.||Snow overspread Vermont around Midnight on December 29th and ended by mid to late afternoon, changing to sleet and freezing rain before ending. Snowfall amounts

		across the area was 3 to 7 inches with limited icing. Routine impacts of vehicle accidents across the region occurred except for a tractor-trailer, SUV crash along Route 4 near Killington, VT during the afternoon of December 29th that resulted in 3 indirect fatalities.
2/15/2016	2/16/2016	A coastal low across the Carolinas on the morning of February 16th raced northward across the Champlain Valley of VT/NY during the day. This allowed for a wintry mix of snow, sleet, freezing rain and rain across the region and a strong east-southeast wind across portions of Vermont. Snowfall averaged 2 to 4 inches across much of Vermont with only 1 to 2 inches in the immediate Champlain Valley. Ice accretion was a tenth of an inch or less. Main impacts were slick, sloppy roads but some isolated power outages due to wind gusts more than 40 mph along the western slopes of the green mountains.
4/6/2016	4/7/2016	A slow moving storm in the Great Lakes region delivered mild, moist air into an unseasonably cold, dry airmass across Vermont during the afternoon and evening of April 6th. Snow developed during the afternoon hours and remained stationary across the Canadian border through the evening and night hours. Snowfall ranged from less than an inch across the southern Champlain Valley and southern Vermont to 4 to 6 inches along the Canadian border.
3/31/2017	3/31/2017	A storm system moved from the Ohio River Valley on March 31st to south of New England and then out to sea on April 1st. Wet snow, occasionally mixed with rain began across Vermont by midday on the 31st, but accumulations were limited due to above freezing temperatures and March solar radiation. The increase in snow intensity and lack of solar radiation, along with temperatures near freezing allowed for significant snowfall accumulations above 1000-1200 feet, especially in eastern and central parts of Vermont. ||Snowfall totals were 3 to 6 inches in the Champlain Valley and a. g the Canadian border with 6 to 12 inches elsewhere. The snow load of the heavy, wet snow did allow for some scattered power outages and numerous vehicle mishaps as well.
4/1/2017	4/1/2017	A storm system moved from the Ohio River Valley on March 31st to south of New England and then out to sea on April 1st. Wet snow, occasionally mixed with rain began across Vermont by midday on the 31st, but accumulations were limited due to above freezing temperatures and March solar radiation. The increase in snow intensity and lack of solar radiation, along with temperatures near freezing allowed for significant snowfall accumulations above 1000-1200 feet, especially in eastern and central parts of Vermont. ||Snowfall totals were 3 to 6 inches in the Champlain Valley and along the Canadian border with 6 to 12 inches elsewhere. The snow load of the heavy, wet snow did allow for some scattered power outages and numerous vehicle mishaps as well.
12/12/2017	12/13/2017	An energetic clipper system with abundant moisture moved across the eastern Great Lakes, NY, and New England during the afternoon/evening of December 12th. A coastal storm developed in the Gulf of Maine that help deliver more precipitation westward into eastern VT. A widespread 4 to 8 inches of snow fell across Vermont with areas of 8 to 12 inches and localized amounts more than 12 inches. Snow arrived during the morning commute on December 12th and impacted travel through the evening commute and beyond. Brisk winds caused considerable blowing snow.

12/22/2017	12/22/2017	A quick moving storm system moved from the Ohio River Valley across southern New England and brought snow to Vermont during the morning commute on December 22nd and ending shortly after the evening commute. A widespread 5 to 10 inches of snow fell across central VT. The timing and intensity of the snowfall lead to hundreds of vehicle accidents and blocked highways for several hours.
12/25/2017	12/25/2017	A clipper storm system moved from the northern Great Lakes on December 24th to New England on Christmas Day with a secondary development off the New England coast. A widespread 4 to 8 inches of snow fell across Vermont.
1/4/2018	1/5/2018	A powerful Nor'easter developed off the SE CONUS on January 3rd and proceeded to move on shore between eastern Maine and western Nova Scotia late on the day of January 4th. Widespread snow moved across Vermont during the morning hours, becoming steadier/heavier for much of eastern VT during the 4th. Wraparound snowfall during the night of the 4th and the day of the 5th added snowfall to Vermont's northern peaks and western slope communities. Overall snowfall statewide was 3 to 7 inches with upwards of 8-12 inches along the northern western slopes of the Green Mountains.
3/7/2018	3/9/2018	A coastal low developed off the Mid-Atlantic coast by the morning of March 7th and moved into the Gulf of Maine on March 8th, then closed and filled with the upper level low across New England. snow began by midday on March 7th and lingered with mountain snow showers on the 9th. Snowfall intensities were light to moderate with some heavy snow across eastern and southern Vermont, closer to the coastal storm. Impacts were mainly travel related, especially eastern Vermont. Snowfall accumulations across the state ranged from 5 to 8 inches across northwest Vermont to 12 to 18 inches across eastern Vermont with southeast Vermont witnessing reports of more than 2 feet in the higher terrain. Some power outages were reported with the high amounts and denser snow across the lower Connecticut River valley.
3/13/2018	3/15/2018	Another Nor'easter swept across eastern New England on March 13th and remained stationary across eastern Quebec/Nova Scotia on the 14th-15th. This allowed a long duration snowfall event across Vermont with snow beginning during the morning of March 13th but the heaviest occurring during the night of March 13th through March 14th. The greatest snowfall occurred across the higher elevations of central and eastern VT with 1 to 2 feet, or more being reported. Elsewhere snowfall totals were 8 to 18 inches. Limited impact as accumulating snowfall on roadways was limited to nighttime hours.
11/27/2018	11/28/2018	A storm that brought blizzard conditions to parts of the Midwest on Sunday, November 25th moved into the Ohio River Valley - Southern Great Lakes on 11/26. The storm slowed considerably in the eastern Great Lakes, thus allowing a secondary low pressure system to develop near the Delmarva Peninsula during the evening of 11/26 and proceeded to move to near Boston by the morning of November 27th.||Precipitation moved into the North Country by the afternoon of November 26th, falling as snow at elevations above 1500 feet and rain at lower elevations. By the early morning of November 27th, the atmosphere cooled enough to allow for precipitation to changeover to snow. Highest snowfall totals at elevations above 1500 feet, where more than 12-15 inches fell. The heavy wet snow accounted for more than 40,000

		outages, effecting 100,000 customers without power due to snow loading on power lines.
1/8/2019	1/9/2019	A weak surface low across the Great Lakes on January 8th received upper atmospheric support during the night of the 8th and developed a significant winter storm off the NH/ME coast by the morning of January 9th as it slowly moved into Newfoundland by January 10th.||Precipitation started as light rain, freezing rain and snow across Vermont during the evening of January 8th, changing to accumulating snow after midnight of January 9th. Snowfall was largely confined to mountain communities by midday of January 9th and continued until ending by late evening of January 10th.||Snowfall amounts varied greatly (3-18+ inches) with the highest amounts along the west-northwest facing higher elevation communities of the Green Mountains in northern VT, due to a prolonged and climatological wrap-around/northwest up slope event. The heavy wet nature of the initial snowfall, as well as mixed with freezing rain, accounted for hundreds of school closings for the morning of January 9th. Some scattered power outages were observed with the heavy, wet snow as well.
1/29/2019	1/30/2019	A storm system across the Great Lakes on the morning of January 29th traversed across NY and Northern New England during the afternoon and nighttime hours. A widespread 3 to 6 inches were observed across much of northern VT with 5 to 10 inches across central and southern VT.
3/22/2019	3/23/2019	Low pressure moved from the mid-Atlantic coast on March 21st and intensified rapidly as it moved to just off the Maine-New Hampshire coast on the 22nd. Precipitation started as rain in the valleys and wet snow in higher elevations during the overnight of the 21st/22nd and changed to wet snow for much of the 22nd before ending around daybreak Saturday (23rd) in the mountains. ||Snowfall totals ranged from 3 to 6 inches in the valleys below 500 feet, 6 to 12 inches around 1000 feet and 12 to 20+ inches in elevations above 1500 feet, especially in northern sections of the state.||These wet snow conditions and eventual brisk winds of 15 to 25 mph with higher gusts later Friday and Friday night combined with the snow weighted trees and power lines to cause thousands of power outages...approximately 10,000-15,000 customers.
12/29/2019	12/30/2019	A large, complex winter storm moved across the Great Lakes on December 29th and eventually stalled on December 30th and 31st. Meanwhile, secondary low pressure developed near Pennsylvania on December 30th and moved across southern New England on the 31st.||A wintry mix of freezing rain, sleet and some snow moved into Vermont by the evening of December 29th and continued steadily until midday on December 30th before tapering to showers of mixed precipitation and snow on the afternoon of the 30th.||Predominantly freezing rain and sleet fell across southern VT with sleet, freezing rain and some snow in central VT with snow and sleet in northern VT. Freezing rain accumulated 1/3 inch or less across Vermont's southern four counties with a sloppy 1-3 inches of snow, sleet, and freezing rain in the Champlain Valley and 3 to 7 inches across north-central and northeast Vermont.||Main impacts were hazardous road conditions Sunday night (29th) and Monday morning (30th). Strong wind gusts more than 40 mph occurred at times along the immediate western slope communities.

		Approximately 5000 customers without power for the event, a combination of ice and wind effects.
1/12/2020	1/12/2020	A moisture laden storm system tracked along an old cold front from the Gulf of Mexico up across NY and VT. On Saturday, January 11th, the front was positioned across southern Canada with temperatures in the 50s/60s across VT. As the front slowly progressed south into northwest VT during the late evening and overnight hours, moderate to heavy rain fell across the region. during the early morning hours of January 12th, the cold front slipped south into the southern portions of the Champlain Valley.||Widespread 1/4 to 1/2 inches of ice accretion with locally up to 3/4 inch was observed along the international border, resulting in hazardous travel and scattered power outages.
1/16/2020	1/16/2020	A clipper-like system quickly moved from the lower Great Lakes on the evening of January 15th, across central NY during the early morning hours of January 16th into the Gulf of Maine by midday.||A west to east band of moderate to occasionally heavy snow moved across the southern Adirondacks and central VT during the overnight and morning hours of January 16th, where 4 to 8 inches of snow was observed. Lesser snowfall totals were measured across northern NY, northern VT, and southern VT.
1/18/2020	1/19/2020	A quick moving area of low pressure, which originated in the Pacific northwest on January 15-16, moved across the central CONUS and eventually across New England on January 19th. ||Snow moved into northern NY during the afternoon of the 18th and exited by daybreak of the 19th. A widespread 2 to 4 inches fell across the central and southern Champlain Valley of VT, 4 to 7 inches across the rest of central and southern VT and 6 to 10 inches across portions of northern VT.
3/23/2020	3/24/2020	A late season weak area of low pressure moved across the Ohio River valley and developed a secondary area of low pressure south of New England during the afternoon and evening hours of March 23rd.||Snow moved into northern NY by early afternoon and across Vermont by mid-afternoon. Initially surface/ground temperatures were above freezing but fell below freezing with accumulating snow as the snowfall rates approached up to 3 inches per hour.||Total snowfall ranged from 2 to 4 inches in northwest VT to 4 to 7 inches across much of the state with pockets of 7 to 10 inches in eastern VT.
1/2/2021	1/2/2021	A weak to moderate upper level and surface storm system moved across the northeast, including New England late on New Year's into January 2nd. Snowfall was a general 4 to 8 inches across northern VT with the higher amounts across the counties bordering with Canada.
1/16/2021	1/16/2021	A winter storm in the Great Lakes on January 15th transferred energy to a developing coastal low of the NJ coast during the morning of the 16th. Precipitation began late evening on the 15th across VT with rain in the valleys and wet snow in the higher elevations. During the early morning hours and through midday on January 16th, rain changed to heavy, wet snow that accumulated 3 to 6 inches in the valleys with 8 to 18 inches in higher elevations, especially along the spine of Vermont's Green Mountains. The weight of the heavy wet snow led to scattered to numerous power outages across VT with more than 30,000 customers without power.
2/2/2021	2/2/2021	The same storm that brought 6+ inches of rainfall and flash flooding to California as well as 6+ feet to the Sierra Nevada late the previous week

		moved into the Great Lakes on January 31st and February 1st. This system joined with another system to develop a coastal low off the NJ coast during the night of February 1st and slowly moved across the Gulf of Maine on February 2nd. A Nor'easter with snowfall of 18 inches in NYC and more than 2 feet in parts of Northern NJ/Eastern PA during the 31st and 1st slowly spread snow northward into Vermont.||Snowfall developed during the late evening hours of February 1st in southern VT and didn't reach the Canadian border until the early morning hours of February 2nd.||The initial snow band delivered 5 to 10 inches with locally higher amounts in southern Vermont as it crawled northward. In the early morning hours, this band increased forward speed and only delivered 2 to 3 inches elsewhere before ending just after sunrise. A secondary band of snow, with snowfall rates of 1-2+ inches an hour, moved across sections of central and northern VT into the northern Champlain Valley during the later afternoon and early evening causing hazardous driving conditions during the evening commute. ||Snowfall amounts ranged from 5 to 12 inches in the southern Green Mountains and lower Connecticut Valley as well as the northern Champlain Valley. Elsewhere, snowfall amounts were 3 to 6 inches.
2/16/2021	2/16/2021	A cross country storm system, responsible for heavy snows in Seattle, snow, ice and report cold in the southern Plains and the Tennessee valley moved into New England during the overnight hours of February 15-16th. ||Snow overspread Vermont around midnight on the 16th, mixing with sleet and freezing rain before sunrise and ending by mid-morning. Combined snow and sleet accumulations were 3 to 6 inches with minimal icing from freezing rain. However, many roads were treacherous due to the wintry mix and many schools cancelled classes.
4/21/2021	4/21/2021	Surface low pressure developed along a frontal boundary and moved northeast across SE New York, western southern New England and central New England on the 21st. Precipitation developed in the morning and mostly in the form of snow or mixed snow and rain, then as the intensity of the precipitation increased during the afternoon and evening hours, fell primarily as wet snow. Snowfall amounts across Vermont ranged from 2 to 6 inches with a few localized amounts around 8 inches. In Rutland and Windsor counties south, it was primarily a rain event. Roads remained primarily wet, thus limited impacts.
11/26/2021	11/27/2021	Weak low pressure moved along a cold front that moved across NY/VT during November 26th. Rain and rain showers transitioned into wet snow beginning at higher elevations around noon and eventually into the Champlain Valley by early evening. Snowfall amounts ranged from a wet few inches in the Champlain Valley with 4 to 8 inches in the some of the higher elevations in the Green Mountains. The wet nature of the snow led to scattered power outages in the foothills.
12/18/2021	12/18/2021	A weak area of low pressure moved from the Ohio River Valley to southeast of New England on Saturday, December 11th. Snow moved into VT during the early afternoon and exited around midnight. Snow fell moderately at times, especially across central and southern VT. A widespread 4 to 6 inches fell across the northern third of the state with 5 to 8 inches in the central and south central VT with lesser amounts in extreme southern VT due to mixed precipitation. There was no major impacts, just the typical travel disruptions and accidents on the last shopping weekend before the Christmas holiday.

12/25/2021	12/26/2021	Low pressure across the Great Lakes on Christmas Eve (December 24th) slowly traveled and transferred energy to a new coastal low near Cape Cod during the night of December 25th. This delivered a wintry mix of mainly light freezing rain and freezing drizzle beginning the morning of December 25th and ending as freezing drizzle and light snow on the morning of December 26th.||Snow accumulations were an inch or two across the northern mountains and NE VT with ice accumulations generally a tenth of an inch or less, except locally up to 1/4 inch in the lower Connecticut River Valley with little activity along the Canadian border.||Significant travel issues across VT during Christmas morning, especially in central and eastern VT with numerous vehicle accidents and the closure of portions of Interstate 89/91 and other roads at times.
1/17/2022	1/17/2022	A long tracked and powerful winter storm, with a history from the Mississippi River valley through the southeast and north along the Appalachians into the northeast, impacted VT on January 17th. Snow moved into VT around midnight of January 17th with snowfall rates of 1-2 inches per hour at times during the morning, eventually ending by early afternoon with residual snow showers during the evening and night.||General snowfall accumulations in VT was 4 to 8 inches with the complexity of the storm due to its strength and strong low level jet accounted for mesoscale features of snowfall distribution with east-side upslope regions witnessing higher totals and west-side downwind communities witnessing less snowfall.||In addition these strong low-level easterly winds did cause some downslope wind gusts (in excess of 50 mph) in the foothills of the western slopes of the Green Mountains and in the higher terrain in northeast VT which resulted in scattered power outages.
2/18/2022	2/18/2022	An arctic front slowly moved from northwest to southeast across VT during the morning hours of February 18th, bringing much colder air. Meanwhile, a weak surface wave was traveling northeast along this boundary. The combination allowed for light rain to change to freezing rain and eventually sleet and snow through the midday hours of February 18th.||Ice accumulations were around a tenth (0.10) of an inch with sleet/snowfall totals of 1 to 2 inches that created hazardous travel.
3/12/2022	3/12/2022	A series of weak low pressure areas traversed along a cold front that moved across VT during the day of March 12th. Rain/snow mixed developed in the early morning hours changing to snow around sunrise and continuing until early to midafternoon. Snowfall amounts ranged from several inches in the lower Connecticut River Valley with 4 to 7 inches in the Champlain Valley with 6 to 12 inches elsewhere with the higher amounts in northern sections.||The initial wet nature of the snow led to numerous slick and icy roads accounting for numerous vehicle accidents.
1/12/2023	1/13/2023	Low pressure moved from the Ohio River Valley on January 12th across central/northern New England on January 13th. Snow overspread northwest Vermont during the evening of January 12th and continued overnight before exiting around midday on the 13th.||Snowfall totals across the region were 2 to 4 inches and restricted to northwest and northern Vermont due to milder temperatures and rain/snow mixed elsewhere across the state.
1/19/2023	1/20/2023	Low pressure moved from the mid-Mississippi Valley on January 19th into New York during by January 20th. In the meantime, an area of low

		pressure was developing across southeast Massachusetts and moving offshore. ‖Snow and sleet overspread Vermont during the evening of January 19th, but then drier air allowed a lull in precipitation for much of the overnight hours before more snow and snow showers redeveloped and fell through the afternoon hours of the 20th.‖Widespread snowfall totals of 4 to 7 inches were observed, the higher totals across the higher elevations of the Green Mountains.
1/25/2023	1/26/2023	Low pressure moved from the Ohio River Valley on Wednesday 1/25 to upstate New York and northern New England on Thursday 1/26. Meanwhile an area of low pressure developed along the associated boundary with the parent low across the tri-state region and moved across eastern New England.‖Snow overspread Vermont during the afternoon and evening hours of January 25th, heaviest during the evening hours before a lull in the steadiest precipitation as well as a change to mixed sleet and rain occurred during the nighttime hours. Light snow and snow showers redeveloped and moved across Vermont Friday before ending by evening.‖Snowfall amounts across Vermont ranged from 1 to 3 inches in southern VT, 3 to 6 inches in central Vermont with 6 to 12 inches in northern VT, especially in the higher elevations.
2/23/2023	2/23/2023	A weak area of low pressure tracked west to east along a stationary boundary, south of New England during the overnight of February 22nd into February 23rd. The storm was a quick mover with about 6-8 hours of snowfall that accumulated 3 to 8 inches across the region, the heaviest in the southern and central Green Mountains.
3/3/2023	3/4/2023	A double barreled low pressure system moved across southern New England on March 4th. Snow and snow/rain mixed developed late night on the 3rd and continued through the morning hours of the 4th.‖Snowfall totals were 7 to 12 inches across Vermont with 3 to 6 inches across the central and northern Champlain Valley.
1/6/2024	1/7/2024	Low pressure developed across the northern Gulf of Mexico coast during the evening hours of January 5th and traveled along the east coast moving off the southeast coast of New England by the afternoon of January 7th.‖Snow moved into Vermont during the evening hours of January 6th and exited by midafternoon of January 7th. Snowfall amounts across VT were 4 to 12+ inches with the lighter amounts in the northern Champlain Valley and Essex County with the higher snowfall totals *8-12+ inches) across the eastern slope communities of the southern and central Green Mountains. The main impacts from this storm were hazardous road conditions.
1/16/2024	1/16/2024	A weak coastal storm moved past southern New England on January 16th. Light snow overspread Vermont during the morning and ended during the evening. Snowfall totals ranged from 3 to 7 inches across the region with the higher totals in the higher terrain of central VT. The main impacts were numerous traffic accidents, despite the dryness of the snow.
1/24/2024	1/25/2024	A stationary surface boundary draped across northern NY/VT, during the evening and overnight hours of January 24th, was the focusing mechanism for moisture that entrained along the boundary and across the area. Temperatures were below freezing across much of central and eastern VT that allowed for several hours of light freezing rain during the evening and overnight hours. Flat ice accumulations were 0.1 to 0.2

		inches with isolated amounts around 0.25 inches. The main impacts were icy, hazardous travel.
3/9/2024	3/11/2024	Low pressure across the Carolinas during the afternoon of March 9th moved slowly northeast along the coast across southeast Massachusetts during the morning of March 10th and lingered along the Maine/Nova Scotia border through the early morning hours of March 11th.||The impactful weather occurred in two phases. The first phase occurred during the evening and overnight hours of March 9th with valley rain and elevated mountain wet and heavy snowfall, especially in the central and southern Green Mountain communities. The heavy wet snow impacted the higher terrain and resulted in numerous tree damage, power outages (>30,000 outages) and travel disruptions. Snowfall was less prevalent in the valleys. The second phase occurred during the evening on March 10th through early afternoon on March 11th with northwest upslope enhanced snowfall across the northwest slopes of the central and northern Green Mountains as well as some interior valleys. This, combined with wind gusts of more than 30 mph led to numerous travel disruptions. During the afternoon hours as the snow waned, northwest winds increased with frequent gusts in excess of 40 mph which led to delays in power restoration.||Storm total snowfall from the evening of March 9th through the afternoon hours of March 11th ranged from 2 to 5 inches across the valley floors of the Champlain and the mid to lower Connecticut River valleys, 4 to 8 inches in elevations above 1000 feet and 10 to 18+ inches in the higher elevations (1500-2000+ feet), especially the northwest slopes.
3/23/2024	3/23/2024	An area of low pressure moved from the southeast United States on March 22nd up the eastern seaboard to the NJ/DE coast by midday on March 24th and offshore by Cape Cod late at night on March 24th. ||Snow overspread Vermont, south to north, during the early morning hours of March 23rd and then exiting from west to east during the evening hours of March 23rd. The higher snowfall accumulations were across south central and southern VT, except along the MA/VT border where some mixed precipitation types occurred.||Snowfall totals ranged from 3 to 6 inches in northwest VT, 6 to 12 inches across the rest of the Champlain Valley and northern VT, 12 to 18 inches in central VT with 18 to 24+ inches across south central VT with these higher totals mainly across Windsor and eastern Rutland counties.||Impacts were largely travel related.

Extreme Cold History

Begin Date	End Date	Event Description and Extent
1/25/2007	1/26/2007	An arctic cold front moved across Vermont on the 24th and delivered very cold temperatures of zero to 25 degrees below zero by the morning of the 25th. However, on the night of the 25th into the morning of the 26th, a secondary cold front combined with a strengthening area of low pressure near New Brunswick, accounted for the combination of brisk northwest winds of 10 to 15 mph and temperatures 5 to 20 degrees below zero for wind chill readings of 25 to 40 degrees below zero. Some morning lows on the 25th included: -29 degrees in Island Pond (Essex), -21 degrees in Sutton (Caledonia) and Morrisville (Lamoille), -19 degrees in East Haven (Essex), Canaan (Essex) and Enosburg Falls (Franklin), -15 degrees in Greensboro (Orleans), -14 degrees in Montpelier (Washington), East

		Albany and Newport (Orleans), -10 degrees in Bethel (Windsor), Westford (Chittenden) and Alburgh (Grand Isle).| |Some morning lows on the 26th included: -20 degrees in Island Pond, East Haven, Canaan (Essex) and Sutton (Caledonia), -16 degrees in East Albany (Orleans), -15 degrees in Montpelier (Washington), -14 degrees in St. Johnsbury (Caledonia) and Eden (Lamoille) with -11 degrees in South Lincoln (Addison), Woodstock (Windsor), Rutland (Rutland) and the NWS office in South Burlington (Chittenden). Northwest winds of 10 to 15 mph created wind chill values of 25 to 40 degrees below zero. The cold wave diminished slightly on the 27th-29th, due to a slight airmass modification and clouds across the region, but it remained some 10 to 20 degrees below normal. However, another arctic front pushed across the area on the 29th with a replenishment of arctic air that brought early morning low temperatures on the 30th of 10 to 30 degrees below zero. Some morning low temperatures on the 30th included -32 degrees at Island Pond (Essex), -27 degrees in Sutton (Caledonia), -25 degrees in East Haven (Essex), -24 degrees in Enosburg Falls (Franklin), -22 degrees in Morrisville (Lamoille) and -18 degrees in Hanksville (Chittenden) and Newport (Orleans).
3/6/2007	3/6/2007	An arctic cold front swept across Vermont during the afternoon and evening of the 5th and delivered frigid temperatures along with blustery winds. Temperatures plummeted to below zero just after midnight on the 6th and were 5 to 20 degrees below zero by dawn. These frigid temperatures, accompanied by winds of 15 to 30 mph created dangerously cold wind chills of 20 to 40 degrees below zero. Brisk winds with temperatures around zero continued through the daylight hours of the 6th with wind chill readings in the 20s to around 30 degrees below zero. The winds subsided after sunset on the 6th, but it remained extremely cold through the morning of the 7th with overnight minimum temperatures of 10 to 30 degrees below zero. Some morning lows on the 6th included: -20 degrees at East Albany (Orleans), -15 degrees at Sutton (Caledonia) and Eden (Lamoille), -12 degrees at Island Pond (Essex), Chelsea (Orange), Newport (Orleans) and Waitsfield (Washington) with -11 degrees at South Lincoln (Addison), Hanksville and Westford (Chittenden), -10 degrees at St. Albans (Franklin), Alburg (Grand Isle) and Danby (Rutland) and -8 degrees in Rochester (Windsor).|Some morning lows on the 7th included: -35 degrees in East Haven and Island Pond (Essex), -32 degrees in Gallup Mills (Essex), -30 degrees in Canaan (Essex), -27 degrees in Morrisville (Lamoille), -25 degrees in Waitsfield (Washington) and Bethel (Windsor), -24 degrees in St. Johnsbury (Caledonia) and Plainfield (Washington), -21 degrees in Sutton (Caledonia), Hanksville (Chittenden), Union Village (Orange), Newport (Orleans), Northfield (Washington) and Rochester (Windsor), -20 degrees in Cornwall and South Lincoln (Addison), Essex Junction (Chittenden), East Albany (Orleans) and Woodstock (Windsor), -19 degrees in Alburg (Grand Isle), Rutland (Rutland) and -18 degrees at the NWS office in South Burlington (Chittenden).
3/9/2007	3/9/2007	Arctic high pressure settled across New England during the night of the 8th and morning of the 9th with more frigid temperatures, like a few days earlier across Vermont. Morning lows on the 9th were 10 to 34 degrees below zero, which included record lows at the following three sites: Burlington, Montpelier, and St. Johnsbury. Some morning lows on the 9th included: -34 degrees at Island Pond (Essex), -31 degrees at Sutton (Caledonia), -30 degrees at East Haven (Essex), -28 degrees at Gallup Mills (Essex), -26 degrees in Morrisville (Lamoille), -23 degrees in St.

		Johnsbury (Caledonia) and Bethel (Windsor), -22 degrees in Newport (Orleans) and Montpelier (Washington), -21 degrees in Enosburg Falls (Franklin), -20 degrees in Plainsfield and Waitsfield (Washington), -19 degrees in Hanksville (Chittenden)and Northfield (Washington), -18 degrees in East Albany (Orleans), -17 degrees in Woodstock (Windsor), -16 degrees in New Haven (Addison) and Alburgh (Grand Isle), -15 degrees in Cornwall (Addison), Rutland (Rutland) and at the NWS office in South Burlington (Chittenden).
1/14/2009	1/18/2009	An arctic cold front moved across Vermont during the early morning hours of January 14th which delivered some of the coldest temperatures across the region in several years. As the arctic front passed across northern Vermont, temperatures dropped over 20 degrees within several hours. ||Temperatures averaged 20 to 25 degrees below normal values, which were already at climatological winter minimums. Daytime maximum temperatures ranged from single digits above and below zero during this stretch while nighttime minimums were 10 to 30 below zero with isolated readings colder than 40 below zero at times.||Some observed minimum temperatures for January 15th included: 32 degrees below zero at Island Pond (Essex county), 31 degrees below zero in Canaan (Essex county), 24 degrees below zero at North Troy (Orleans county), Granby and Gallup Mills (Essex county) with 22 degrees below zero at Plainfield and Marshfield (Washington county), 21 degrees below zero at Morrisville (Lamoille county) and 20 degrees below zero at Lyndonville (Caledonia county), Newport (Orleans county) and Waltham (Addison county).||Some observed minimum temperatures for January 16th included: 42 degrees below zero in Island Pond (Essex county), 37 below zero in Sutton (Caledonia county), 34 degrees below zero in Walden (Caledonia county), 32 degrees below zero in Gallup Mills (Essex county), 31 degrees below zero in East Berkshire (Franklin county), 30 degrees below zero in Granby (Essex county), Enosburg Falls (Franklin county), and St. Johnsbury (Caledonia county) and 29 degrees below zero at Plainfield and Waitsfield (Washington county) and Bethel (Windsor county).||Record cold daily temperatures were set on January 16th for the following sites; Morrisville-Stowe Airport with 32 degrees below zero, St. Johnsbury Fairbanks Museum with 30 degrees below zero, Montpelier-Barre Airport at 26 degrees below zero and Burlington International Airport at 21 degrees below zero.||These extremely cold temperatures led to numerous cold weather related problems including numerous dead vehicle batteries and broken home/business water pipes.
1/7/2015	1/8/2015	An arctic cold front pushed across Vermont during the afternoon hours of January 7th with plummeting temperatures and brisk, strong winds (15 to 30+ mph) causing dangerously cold wind chills of 25 to 40 degrees below zero during the evening of January 7th into the morning hours of January 8th. These dangerously cold wind chills lead to delayed school openings of 2 hours or cancelled classes on the morning of January 8th. Actual minimum ambient temperatures on the morning of January 8th were 15 to 30 below zero across northern New York. Observed wind chills in the mountains ranged from 40 to 70 below zero.
1/11/2022	1/12/2022	Arctic high pressure moving from central Canada across the Great Lakes into the northeast on January 11th. Brisk northwest winds of 10 to 20 mph delivered sub-zero air temperatures, which combined created apparent temperatures (wind chill) in the 20 to 35 below zero range across north-

		central and northeast VT and higher elevations with 15 to 25 below zero elsewhere by daybreak on January 11th. ||High temperatures on the 11th ranged from single numbers above and below zero with wind chills still in the teens below zero. Low temperatures during the early night of the 11th were sub-zero and began to rise overnight due to a south wind. However, brisk south winds of 15 to 25 mph created wind chills in the 10 to 20 below zero range.||Numerous school districts closed school and after school activities due to the cold and COVID related complications according to local media.
1/14/2022	1/15/2022	An arctic cold front moved across VT Friday night (1/14) with a strong area of high pressure across south-central Canada building into VT by late Saturday into Sunday delivering sub-zero temperatures Friday night through Sunday morning. Simultaneously, a powerful ocean storm was moving into Newfoundland Canada Friday afternoon that creating brisk north-northwest winds of 15 to 25 mph with higher gusts that combined with the arctic airmass created dangerously cold wind chills of 25 to 40 below zero overnight Friday night into Saturday morning.||Overnight air temperatures were 10 to 20 below zero Friday night-Saturday morning and 10 to 25 below zero Saturday night-Sunday morning.||These dangerously cold temperatures caused some postponements of outdoor activities, including festivals and some ski resorts.
2/3/2023	2/4/2023	An arctic airmass entered Vermont during the morning hours of February 3rd (Friday) and continued through the evening hours of February 4th (Saturday).||Daytime actual temperature readings fell during Friday to zero to 15 below zero and still falling by mid-afternoon with brisk west winds creating wind chills of 20 to 40 below zero. Overnight lows Friday night were 15 to 30 below zero with minimum wind chill values of 30 to 45 below zero and it wasn't until Saturday afternoon when actual air temperatures surpassed zero in spots but developing south winds still produced sub-zero wind chills.||The last occurrence of something this widespread and intense, although brief was in January 26-27, 1994.||Numerous schools and businesses closed as well as outdoor events, including ski resorts.

Hail History

Begin Date	End Date	Event Description and Extent
7/7/1997	7/7/1997	A cold front moved across Vermont during the afternoon and evening of Monday, July 7, 1997. Thunderstorms preceded and accompanied this front with heavy rain and many reports of hail. There were reports of large hail, and damage was reported to cars in Middlebury, VT (Addison County) due to the hail (1 1/4 inch diameter). There were reports of small hail in Essex County VT near East Haven (1/2 inch diameter) .
8/3/1997	8/3/1997	During the early morning hours of August 3, 1997, a cold front moved south from Canada into northern Vermont. Thunderstorms with very heavy rain, large hail and deadly lightning moved across the area. A store in Waitsfield, VT was struck by lightning and set on fire with considerable damage.
7/22/1999	7/22/1999	A large thunderstorm developed during the late afternoon and evening hours over the Green Mountains in Washington county Vermont. Large hail, 1 inch in diameter, was reported in North Fayston while hail 1 1/2 inches in diameter was reported in Waitsfield. In Moretown, Vermont hail was reported the size of marbles.

7/22/1999	7/22/1999	A large thunderstorm developed during the late afternoon and evening hours over the Green Mountains in Washington county Vermont. Large hail, 1 inch in diameter, was reported in North Fayston while hail 1 1/2 inches in diameter was reported in Waitsfield. In Moretown, Vermont hail was reported the size of marbles.
7/14/2000	7/14/2000	An upper level low and cold pool aloft along with a weak surface disturbance both moving across southern Canada resulted in scattered thunderstorms across Vermont. In Middlesex Vermont (Washington county), pea size hail (1/4 inch) was reported by the State Police along with brief heavy rain.
7/10/2001	7/10/2001	Thunderstorms developed in an unstable airmass ahead of a surface trough during the afternoon and evening hours. Large hail was reported with locally gusty winds.
7/4/2002	7/4/2002	A cold front moved across the area with thunderstorms during the afternoon and evening of July 4th. A few storms were severe.
7/4/2002	7/4/2002	A cold front moved across the area with thunderstorms during the afternoon and evening of July 4th. A few storms were severe.
6/9/2005	6/9/2005	A frontal boundary across southern Vermont moved slowly north and focused afternoon thunderstorms across Vermont. In the Washington county town of Calais, numerous large trees were blown down with hail reported in the East Montpelier area. Power outages were also reported. Very heavy rain also accompanied this storm.
8/1/2005	8/1/2005	A weak surface trough combined with surface dew points around 65 degrees and an upper level disturbance to produce severe thunderstorms across north central Vermont. In Washington county, a thunderstorm produced hail 1 inch in diameter in Waterbury Center.
7/1/2006	7/1/2006	A mid-level atmospheric disturbance and cold temperature pool aloft moved across the region during the late morning and early afternoon of the 1st. This caused the development of widely scattered thunderstorms across the Champlain Valley that moved into central Vermont with isolated, short-lived pulse type severe weather. Quarter size hail was reported in Waitsfield.
6/2/2007	6/2/2007	A backdoor cold front and mid-level disturbance moved into a moderately unstable airmass during the afternoon of the 2nd, which resulted in the development of showers and thunderstorms across northern New York that moved into Vermont. Some of these thunderstorms were locally severe, which produced damaging winds that knocked down trees and powerlines in South Burlington and Richmond (Chittenden County) as well as Barre (Washington county) and North Williamstown (Orange County). A tin barn collapsed by thunderstorm winds in Bradford (Orange County). In addition, some of these severe storms produced large hail of 3/4 inch in diameter or greater, including just shy of golf ball size in Moretown (Washington county), nickel size hail in South Burlington (Chittenden County) and East Barre (Washington). ||In addition, the bell tower of the Old Brick Church in Williston (Chittenden County) was struck by lightning that caused a fire to the structure. Also, lightning struck a home in South Burlington (Chittenden County) which resulted in a minor fire and structural damage.
6/2/2007	6/2/2007	A backdoor cold front and mid-level disturbance moved into a moderately unstable airmass during the afternoon of the 2nd, which resulted in the development of showers and thunderstorms across

		northern New York that moved into Vermont. Some of these thunderstorms were locally severe, which produced damaging winds that knocked down trees and powerlines in South Burlington and Richmond (Chittenden County) as well as Barre (Washington county) and North Williamstown (Orange County). A tin barn collapsed by thunderstorm winds in Bradford (Orange County). In addition, some of these severe storms produced large hail of 3/4 inch in diameter or greater, including just shy of golf ball size in Moretown (Washington county), nickel size hail in South Burlington (Chittenden County) and East Barre (Washington). ||In addition, the bell tower of the Old Brick Church in Williston (Chittenden County) was struck by lightning that caused a fire to the structure. Also, lightning struck a home in South Burlington (Chittenden County) which resulted in a minor fire and structural damage.
7/9/2007	7/9/2007	An area of low pressure moved across Ontario and Quebec provinces in Canada on the 9th, while its associated occluded frontal boundaries moved across Vermont during the late morning through early evening hours. Numerous areas of thunderstorms occurred across the region with a wide variety of weather conditions, which included very large hail, damaging winds and several structures struck by lightning. Baseball size hail was reported in Duxbury (Washington county). Lightning struck a house in Barre (Washington county), destroyed a barn in Bakersfield (Franklin County) as well as destroyed one camp and severely damaged another camp in Randolph (Orange County).
7/9/2007	7/9/2007	An area of low pressure moved across Ontario and Quebec provinces in Canada on the 9th, while its associated occluded frontal boundaries moved across Vermont during the late morning through early evening hours. Numerous areas of thunderstorms occurred across the region with a wide variety of weather conditions, which included very large hail, damaging winds and several structures struck by lightning. Baseball size hail was reported in Duxbury (Washington county). Lightning struck a house in Barre (Washington county), destroyed a barn in Bakersfield (Franklin County) as well as destroyed one camp and severely damaged another camp in Randolph (Orange County).
8/25/2007	8/25/2007	A very warm, humid, and unstable airmass was located across Vermont during the afternoon of the 25th, with temperatures in the upper 80s to lower 90s and dewpoints around 70 degrees. A surface cold front was located across Ontario and Quebec, with a mid-atmospheric disturbance that moved across the North Country during the afternoon and early evening. This triggered numerous thunderstorms in New York, which intensified as they moved across Vermont. An unseasonably strong wind field aloft fueled the development of severe thunderstorms that produced widespread damaging winds and some large hail across central, southern, and eastern Vermont. Some of the hardest hit communities included Barre (Washington county), Rutland and vicinity (Rutland County) and Woodstock (Windsor County).
7/18/2008	7/18/2008	Several mid-atmospheric impulses traveled along a stationary boundary across northern Vermont during the early afternoon and evening hours of July 18th. This stationary boundary separated warm, humid air across much of Vermont from cooler, drier air across the international border with Canada.||Several rounds of thunderstorms moved across northern Vermont during the afternoon of July 18th. A developing squall line

		across the Champlain Valley of New York moved into northwest Vermont by mid-afternoon and continued across the state. Widespread tree and structural damage occurred with this system in Grand Isle, Franklin, Lamoille, and Orleans counties. ||This squall line interacted with an individual thunderstorm near Fletcher, that eventually produced an extensive damage path around 7 miles in length between North Cambridge and Waterville (Lamoille County), caused by straight-line winds of 60 to 80 mph. However, within this greater damage field was a tornadic storm with two very brief touchdown with EF0 and EF1 damage.||Another area of thunderstorms moved across central Vermont with pockets of significant damage across Addison, Washington, and Orange counties.
7/18/2008	7/18/2008	Several mid-atmospheric impulses traveled along a stationary boundary across northern Vermont during the early afternoon and evening hours of July 18th. This stationary boundary separated warm, humid air across much of Vermont from cooler, drier air across the international border with Canada.||Several rounds of thunderstorms moved across northern Vermont during the afternoon of July 18th. A developing squall line across the Champlain Valley of New York moved into northwest Vermont by mid-afternoon and continued across the state. Widespread tree and structural damage occurred with this system in Grand Isle, Franklin, Lamoille, and Orleans counties. ||This squall line interacted with an individual thunderstorm near Fletcher, that eventually produced an extensive damage path around 7 miles in length between North Cambridge and Waterville (Lamoille County), caused by straight-line winds of 60 to 80 mph. However, within this greater damage field was a tornadic storm with two very brief touchdown with EF0 and EF1 damage.||Another area of thunderstorms moved across central Vermont with pockets of significant damage across Addison, Washington, and Orange counties.
5/9/2009	5/9/2009	On May 9th, a surface low and cold front moved from the Great Lakes across northern New York and Vermont, along a stationary boundary draped across the Adirondacks and central Vermont. This stationary boundary separated the cool, moist, and stable air to the north, from the warm, moist, and unstable air south. In addition a long-lived, strong mid-level shortwave and associated thunderstorm complex traveled across the Great Lakes and along this boundary across Vermont during the afternoon hours.||Severe thunderstorms and a developing squall line produced large hail up to an inch in diameter as well as damaging winds that knocked down trees and power lines to portions of central Vermont, especially the Middlebury vicinity. In addition, an EF1 tornado developed and briefly touched down in advance of the squall line in the town of Washington (Orange County). Some structural damage occurred to an apartment roof, school awning and destroyed a 60 foot hoop barn made of fabric and steel tubing.
7/21/2010	7/21/2010	On July 21st, a developing surface low across the Great Lakes traveled along a stationary boundary draped across the North Country. Surface conditions became increasingly unstable during the afternoon with temperatures in the 80s and dewpoints in the 60s and lower 70s. More importantly, an unseasonably strong mid-atmospheric shortwave and winds aloft tracked across this region as well, which allowed for thunderstorms to develop rapidly, intensify, and maintain

		longevity.‖During the afternoon and evening, scattered to numerous thunderstorms developed traveled across northern New York and through Vermont. Several storms strengthened into supercells that produced widespread wind damage to trees, power poles and structures as well as large hail more than golf ball size in diameter.‖Some of the communities affected were Milton, Colchester, Essex, Jericho, Stowe, Brookfield, Chelsea, and Rutland. In addition, very heavy localized rains caused some temporary problems in many communities, but did result in washed out roads, culverts in Chelsea.
7/21/2010	7/21/2010	On July 21st, a developing surface low across the Great Lakes traveled along a stationary boundary draped across the North Country. Surface conditions became increasingly unstable during the afternoon with temperatures in the 80s and dewpoints in the 60s and lower 70s. More importantly, an unseasonably strong mid-atmospheric shortwave and winds aloft tracked across this region as well, which allowed for thunderstorms to develop rapidly, intensify, and maintain longevity.‖During the afternoon and evening, scattered to numerous thunderstorms developed traveled across northern New York and through Vermont. Several storms strengthened into supercells that produced widespread wind damage to trees, power poles and structures as well as large hail more than golf ball size in diameter.‖Some of the communities affected were Milton, Colchester, Essex, Jericho, Stowe, Brookfield, Chelsea, and Rutland. In addition, very heavy localized rains caused some temporary problems in many communities, but did result in washed out roads, culverts in Chelsea.
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7/21/2010	7/21/2010	On July 21st, a developing surface low across the Great Lakes traveled along a stationary boundary draped across the North Country. Surface conditions became increasingly unstable during the afternoon with temperatures in the 80s and dewpoints in the 60s and lower 70s. More importantly, an unseasonably strong mid-atmospheric shortwave and winds aloft tracked across this region as well, which allowed for thunderstorms to develop rapidly, intensify, and maintain longevity.‖During the afternoon and evening, scattered to numerous thunderstorms developed traveled across northern New York and through Vermont. Several storms strengthened into supercells that produced widespread wind damage to trees, power poles and structures as well as

		large hail more than golf ball size in diameter.||Some of the communities affected were Milton, Colchester, Essex, Jericho, Stowe, Brookfield, Chelsea, and Rutland. In addition, very heavy localized rains caused some temporary problems in many communities, but did result in washed out roads, culverts in Chelsea.
8/9/2010	8/9/2010	A mid atmospheric disturbance combined with a moderately unstable air mass to promote the development of scattered thunderstorms during the afternoon and evening of August 9th in Vermont. One isolated thunderstorm was strong enough to produce hail up to one inch in diameter as well as a brief wind gust that knocked down trees in Fayston.
5/26/2011	5/26/2011	A surface low as well as upper atmospheric energy traveled along a quasi-stationary boundary across northern New York and Vermont during the afternoon and evening of May 26th. The air mass ahead of this boundary was moderately to unstable and the combination led to numerous reports of damaging winds and very large hail (up to 2.5 inches in diameter). Some 25,000+ customers lost power during these storms. ||In addition, several rounds of thunderstorms traversed the same areas in central Vermont near the Route 2 corridor between Middlesex and Lunenburg. The result of 3 to 5+ inches of rainfall and severe flash flooding and resultant river flooding as well.
5/26/2011	5/26/2011	A surface low as well as upper atmospheric energy traveled along a quasi-stationary boundary across northern New York and Vermont during the afternoon and evening of May 26th. The air mass ahead of this boundary was moderately to unstable and the combination led to numerous reports of damaging winds and very large hail (up to 2.5 inches in diameter). Some 25,000+ customers lost power during these storms. ||In addition, several rounds of thunderstorms traversed the same areas in central Vermont near the Route 2 corridor between Middlesex and Lunenburg. The result of 3 to 5+ inches of rainfall and severe flash flooding and resultant river flooding as well.
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5/27/2011	5/27/2011	A surface low as well as upper atmospheric energy traveled along a quasi-stationary boundary across northern Vermont during the afternoon of May 27th, the same system responsible for the May 26th severe storms and flash flooding. The air mass ahead of this boundary was moderately unstable and lead to scattered severe thunderstorms and localized flash flooding in central and eastern Vermont.
5/27/2011	5/27/2011	A surface low as well as upper atmospheric energy traveled along a quasi-stationary boundary across northern Vermont during the afternoon of May 27th, the same system responsible for the May 26th severe storms and flash flooding. The air mass ahead of this boundary was moderately unstable and lead to scattered severe thunderstorms and localized flash flooding in central and eastern Vermont.
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6/18/2011	6/18/2011	A cold front along with a cold upper level disturbance moved across a moderately unstable air mass across Vermont during the afternoon of June 18th. Thunderstorm activity was scattered, but a few of the stronger storms produced large hail greater than an inch diameter, including one report of near golf ball size near Enosburg in Franklin County.
5/29/2012	5/29/2012	A warm front moved across Vermont during the morning hours of May 29th, which lead to numerous thunderstorms with heavy rain, damaging lightning and some isolated large hail and strong winds. Some of these

		thunderstorms deposited up to 2 inches of rainfall in portions of north-central and northeast Vermont.||A warm, humid, and unstable air mass was draped across the region in the afternoon with an approaching cold front from Ontario, Canada. Numerous thunderstorms developed ahead of the cold front during the afternoon crossing New York into Vermont. There were numerous reports of hail greater than an inch in diameter, damaging winds, along with a confirmed EF0 tornado in West Glover VT. ||Some of these storms trained across the same areas, including those that witnessed two inches of rain earlier in the day. The result was flash flooding in portions of north-central, northeast Vermont and Addison County with radar estimated storm total rainfall of 3 to 5 inches.
5/29/2012	5/29/2012	A warm front moved across Vermont during the morning hours of May 29th, which lead to numerous thunderstorms with heavy rain, damaging lightning and some isolated large hail and strong winds. Some of these thunderstorms deposited up to 2 inches of rainfall in portions of north-central and northeast Vermont.||A warm, humid, and unstable air mass was draped across the region in the afternoon with an approaching cold front from Ontario, Canada. Numerous thunderstorms developed ahead of the cold front during the afternoon crossing New York into Vermont. There were numerous reports of hail greater than an inch in diameter, damaging winds, along with a confirmed EF0 tornado in West Glover VT. ||Some of these storms trained across the same areas, including those that witnessed two inches of rain earlier in the day. The result was flash flooding in portions of north-central, northeast Vermont and Addison County with radar estimated storm total rainfall of 3 to 5 inches.
6/8/2012	6/8/2012	A strong mid-atmospheric and surface cold front moved across Vermont during the late afternoon and evening hours of June 8th. A series of thunderstorms developed and moved across the region with a few storms that produced damaging winds and large hail.
6/8/2012	6/8/2012	A strong mid-atmospheric and surface cold front moved across Vermont during the late afternoon and evening hours of June 8th. A series of thunderstorms developed and moved across the region with a few storms that produced damaging winds and large hail.
7/4/2012	7/4/2012	A moderately strong upper level disturbance ahead of a surface cold front moved across southern Quebec during the afternoon and evening hours of July 4th. These disturbances moved into a warm and unstable air mass and developed thunderstorms in southern Quebec, which moved across northeast Vermont during the afternoon hours and the Champlain Valley during the evening. ||Both episodes contained widespread wind damage and frequent lightning. In the afternoon, the communities of Walden, Cabot, West Danville, and Danville were most affected. During the evening storms, significant damage occurred in the Champlain Valley in communities like Colchester, Burlington, South Burlington, Essex, and Hinesburg. A wind gust of 65 knots was observed at Diamond Island on Lake Champlain and 55 knots was observed at the NWS office at Burlington Int'l airport. ||Despite the holiday festivities, no serious injuries were reported.
7/23/2012	7/23/2012	A quick moving disturbance across Ontario and Quebec provinces in Canada pushed a warm front across the region during the morning and early afternoon of the 23rd, followed by a cold front during the night. Numerous thunderstorms developed ahead of the cold front in northern New York and intensified as they moved into Vermont during the late

		afternoon and evening hours. There were numerous reports of damaging winds and large hail.
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8/4/2015	8/4/2015	The last in a series of mid-atmospheric disturbances rotated across Vermont during the late morning-early afternoon hours of August 4th. Numerous showers and scattered thunderstorms occurred. There were numerous hail reports but only one isolated hail report of one inch diameter or greater.
8/4/2015	8/4/2015	The last in a series of mid-atmospheric disturbances rotated across Vermont during the late morning-early afternoon hours of August 4th. Numerous showers and scattered thunderstorms occurred. There were numerous hail reports but only one isolated hail report of one inch diameter or greater.
5/18/2017	5/18/2017	Record setting heat set the stage for an moderately unstable air mass, while a mid-level atmospheric disturbance provided the forcing and strong winds to develop scattered thunderstorms by late afternoon into early evening, some of which produced damaging winds and hail.||A strong micro-burst produced 80-100 mph winds and destructive hail in West Addison with a seasonal camp destroyed with one occupant receiving minor injuries. More than 15,000 customers were without power due to storms across VT.
6/27/2017	6/27/2017	The combination of an unseasonably cold air mass and moderately unstable atmosphere accounted for the development of showers and thunderstorms during the afternoon of June 27th across eastern NY into VT. Due to the cold air mass, a few of these thunderstorms produced hail with one report of one inch in diameter in Calais, VT.
6/27/2017	6/27/2017	The combination of an unseasonably cold air mass and moderately unstable atmosphere accounted for the development of showers and thunderstorms during the afternoon of June 27th across eastern NY into VT. Due to the cold air mass, a few of these thunderstorms produced hail with one report of one inch in diameter in Calais, VT.

APPENDIX B: STAKEHOLDER ENGAGEMENT AND OUTREACH EXAMPLES

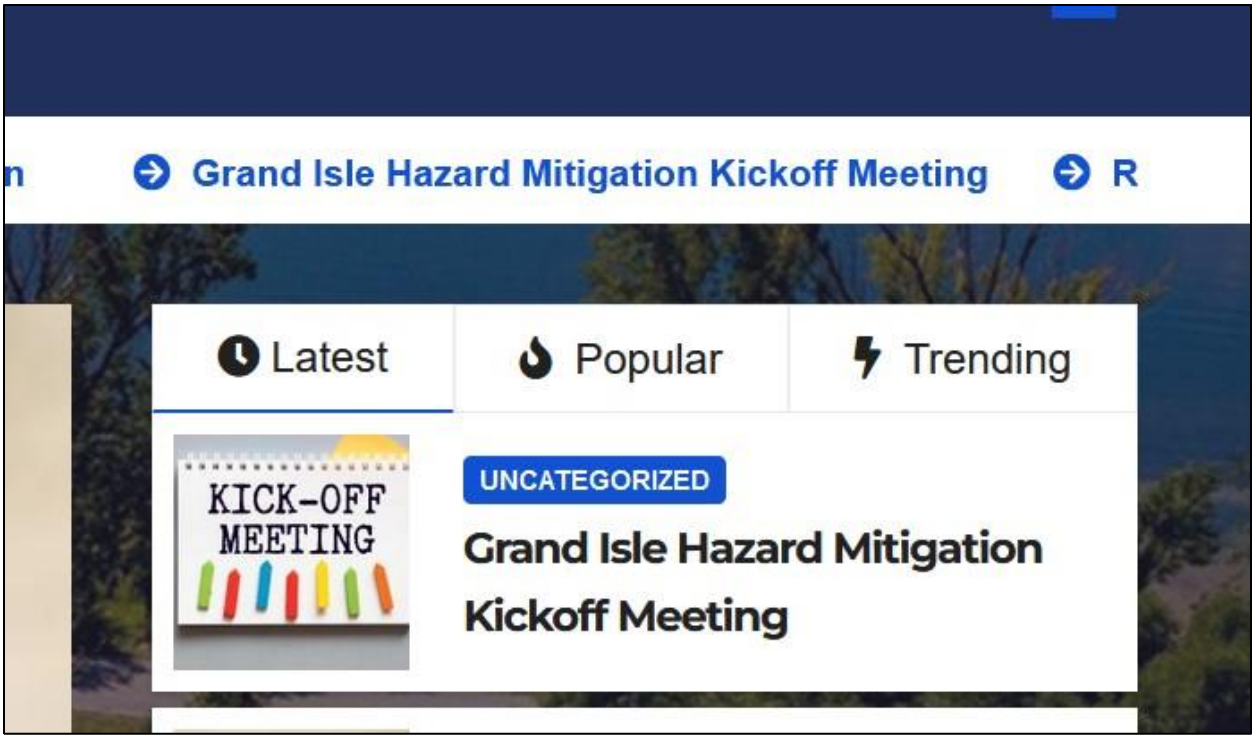
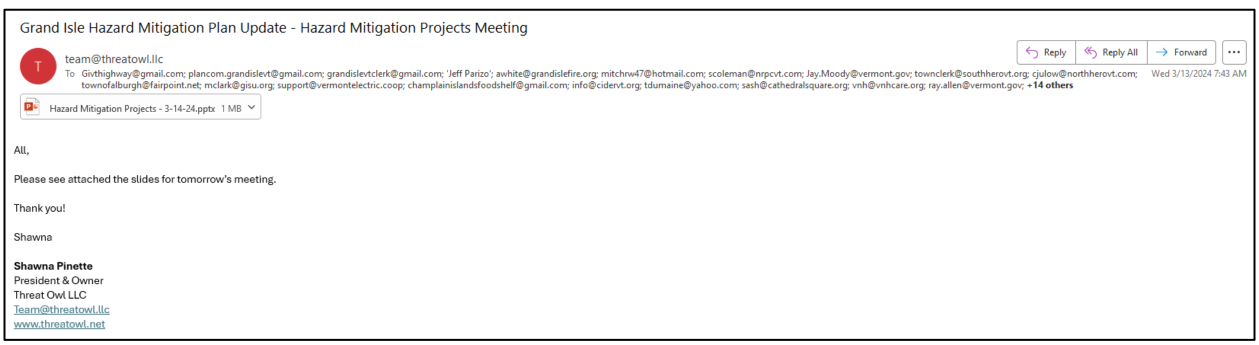


Figure 22 – Outreach via Website



Grand Isle Hazard Mitigation Plan Update - Hazard Mitigation Projects Meeting

team@threatowl.llc

To Givthighway@gmail.com; plancom.grandislevt@gmail.com; grandislevtclerk@gmail.com; 'Jeff Parizo'; awhite@grandislefire.org; mitchrw47@hotmail.com; scoleman@nrpcvt.com; Jay.Moody@vermont.gov; townclerk@southherovt.org; cjulow@northherovt.com; townofalburgh@fairpoint.net; mclark@gisu.org; support@vermontelectric.coop; champlainislandsfoodshelf@gmail.com; info@cidervt.org; tdumaine@yahoo.com; sash@cathedralsquare.org; vnh@vnhcare.org; ray.allen@vermont.gov; **+14 others**

Reply | Reply All | Forward

Wed 3/13/2024 7:43 AM

Hazard Mitigation Projects - 3-14-24.pptx 1 MB

All,

Please see attached the slides for tomorrow's meeting.

Thank you!

Shawna

Shawna Pinette
President & Owner
Threat Owl LLC
Team@threatowl.llc
www.threatowl.net

Figure 23 – Outreach via Email

Grand Isle Hazard Mitigation Kickoff Meeting

Hosted by Threat Owl LLC

Date: 6 November 2023
Time: 10:00AM – 10:30AM
Venue: Zoom

Join Zoom Meeting
https://us06web.zoom.us/j/85095387166?pwd=I1GbaSiCsYTXqipblshaGp7NnuOnua.1

Meeting ID: 850 9538 7166
Passcode: 296162

We invite you to the Grand Isle Hazard Mitigation Kickoff Meeting hosted by Threat Owl LLC. This crucial meeting will mark the beginning of our collaborative efforts to enhance disaster resilience and reduce risks within the community.

Figure 24 – Meeting Outreach via Website

Grand Isle, VT
https://grandislevt.org › uploads › 2024/07 › Gra... PDF

Town of Grand Isle - 2024 Local Hazard Mitigation Plan

Jul 24, 2024 — WHEREAS the Grand Isle Selectboard has prepared a multi-hazard mitigation plan, hereby known as **the Town of Grand Isle 2024 Local Hazard** ...

Figure 25 - Draft Plan Public Posting

APPENDIX C: MEETING SLIDES

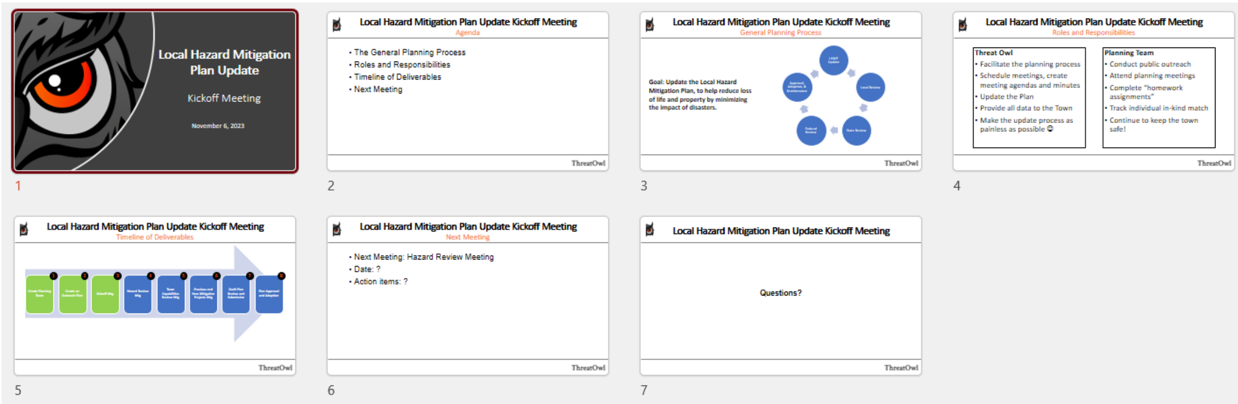


Figure 26 - Kick-off Meeting Slides

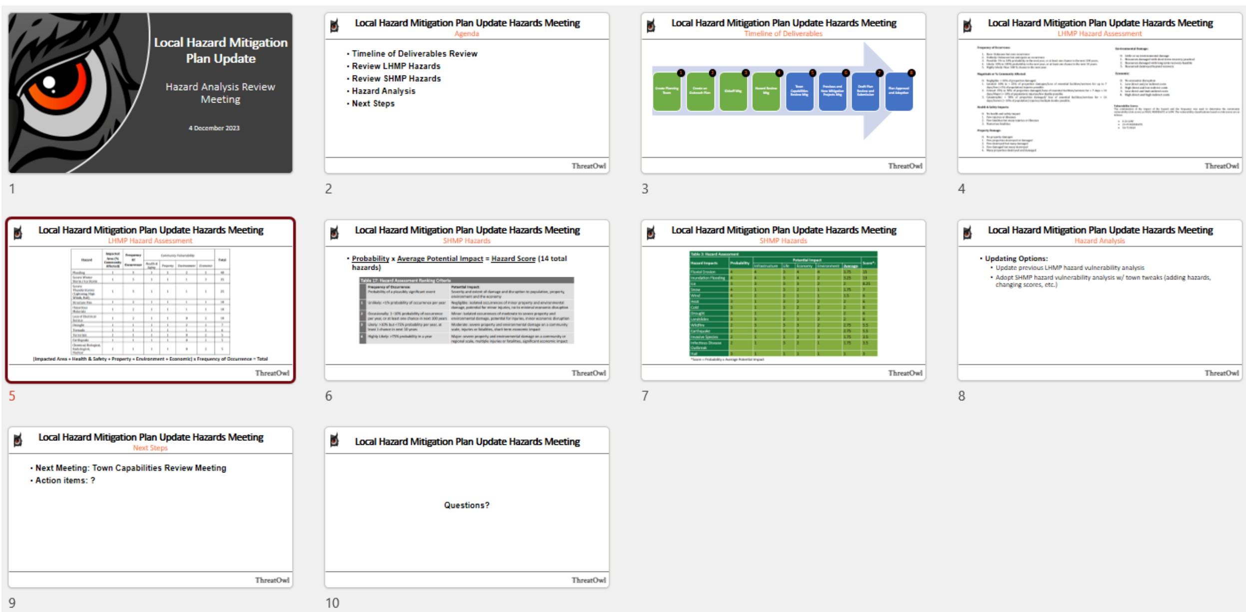


Figure 27 - Hazard Review Meeting Slides

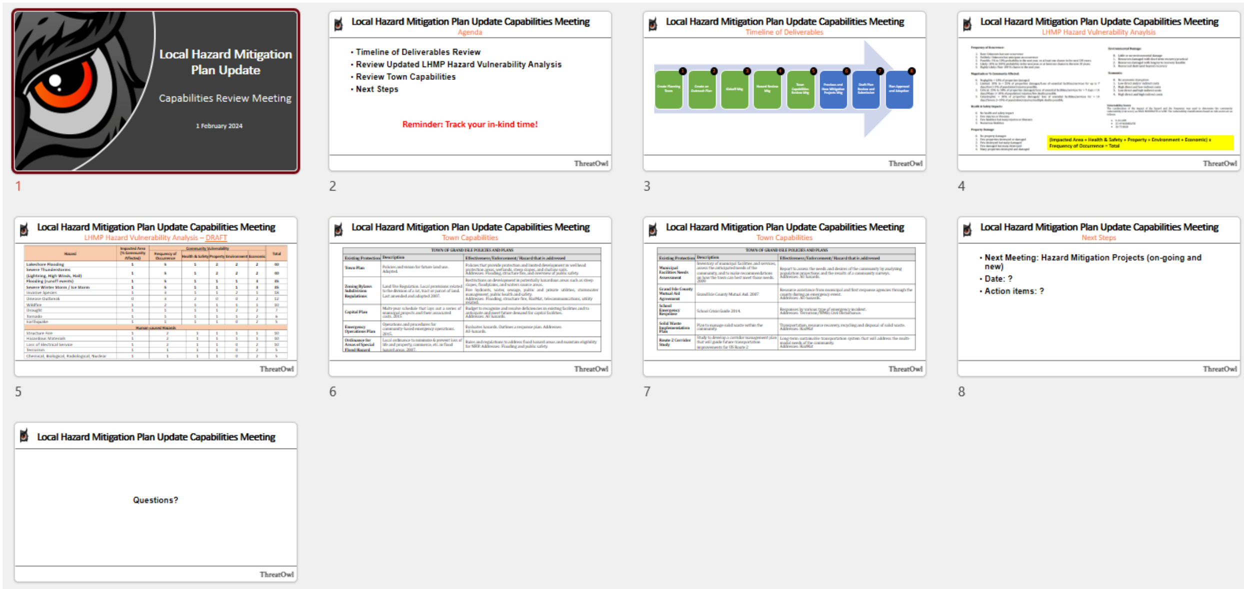


Figure 28 - Capabilities Review Meeting Slides

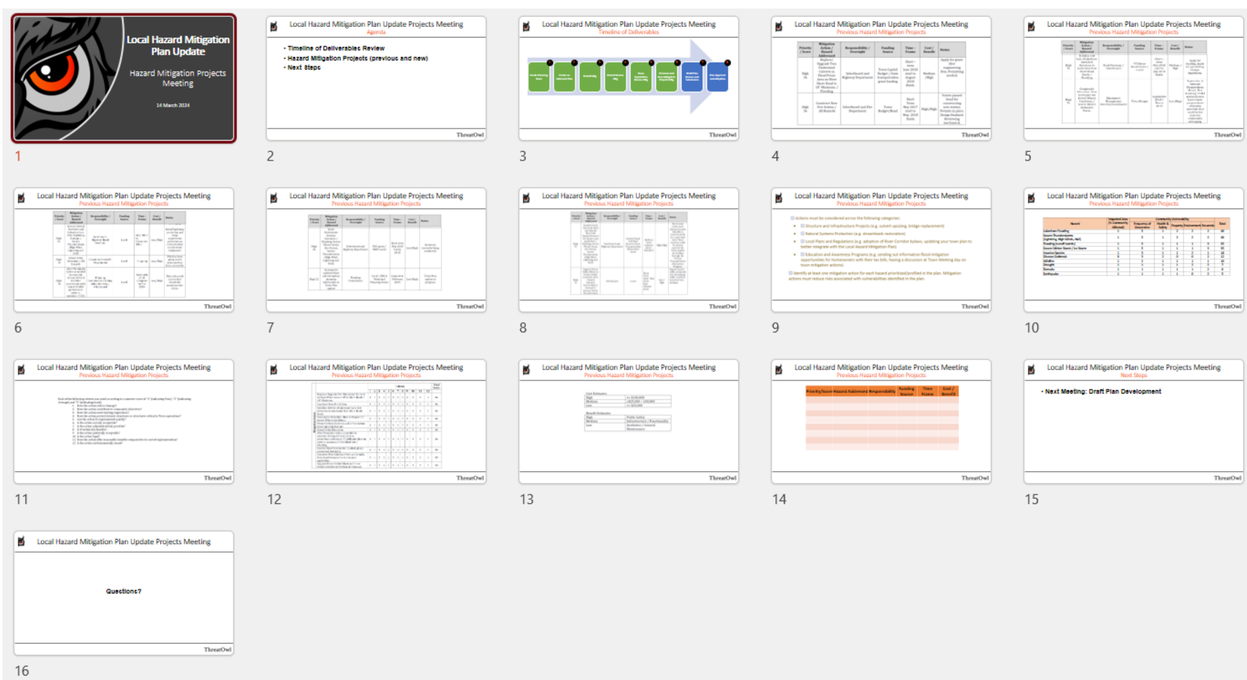


Figure 29 - Hazard Mitigation Projects Meeting Slides

APPENDIX D: SUPPORTING CHARTS, MAPS AND DATA

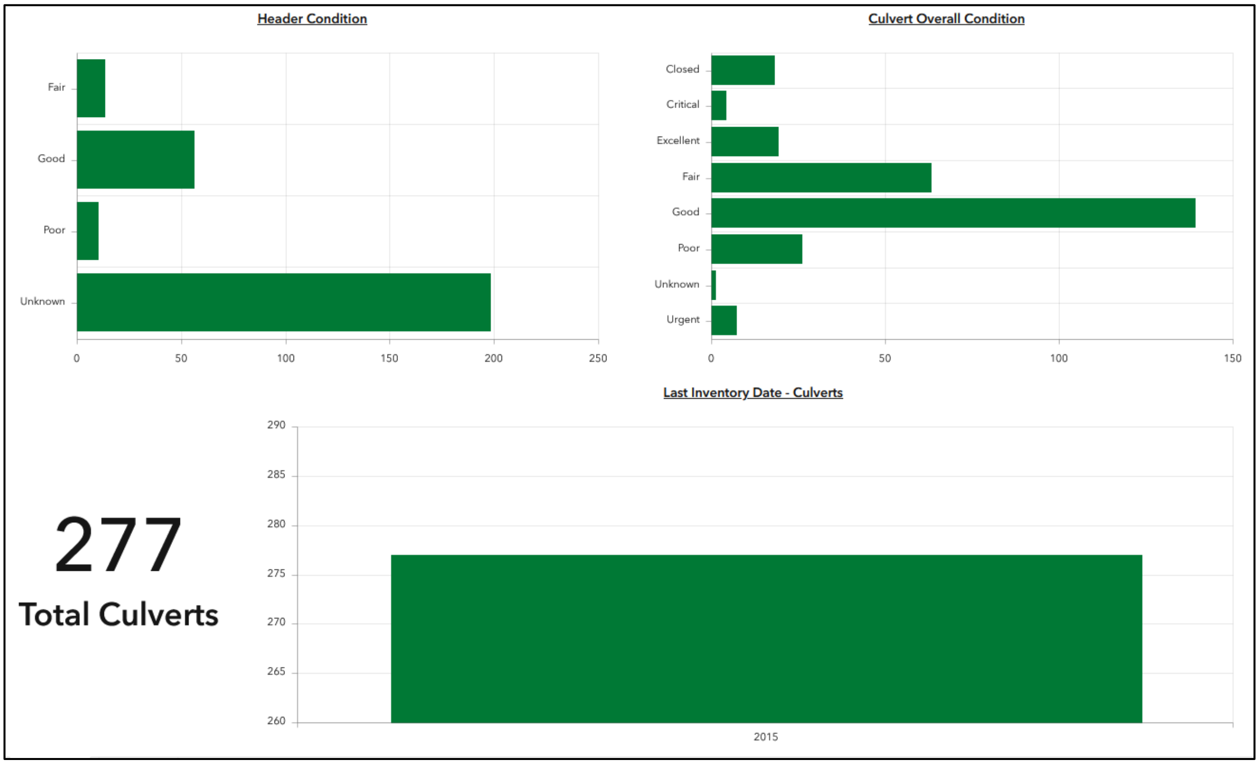


Figure 30 – Grand Isle Culvert Inventory Status

Figure 31 - Grand Isle Current Land Use Map

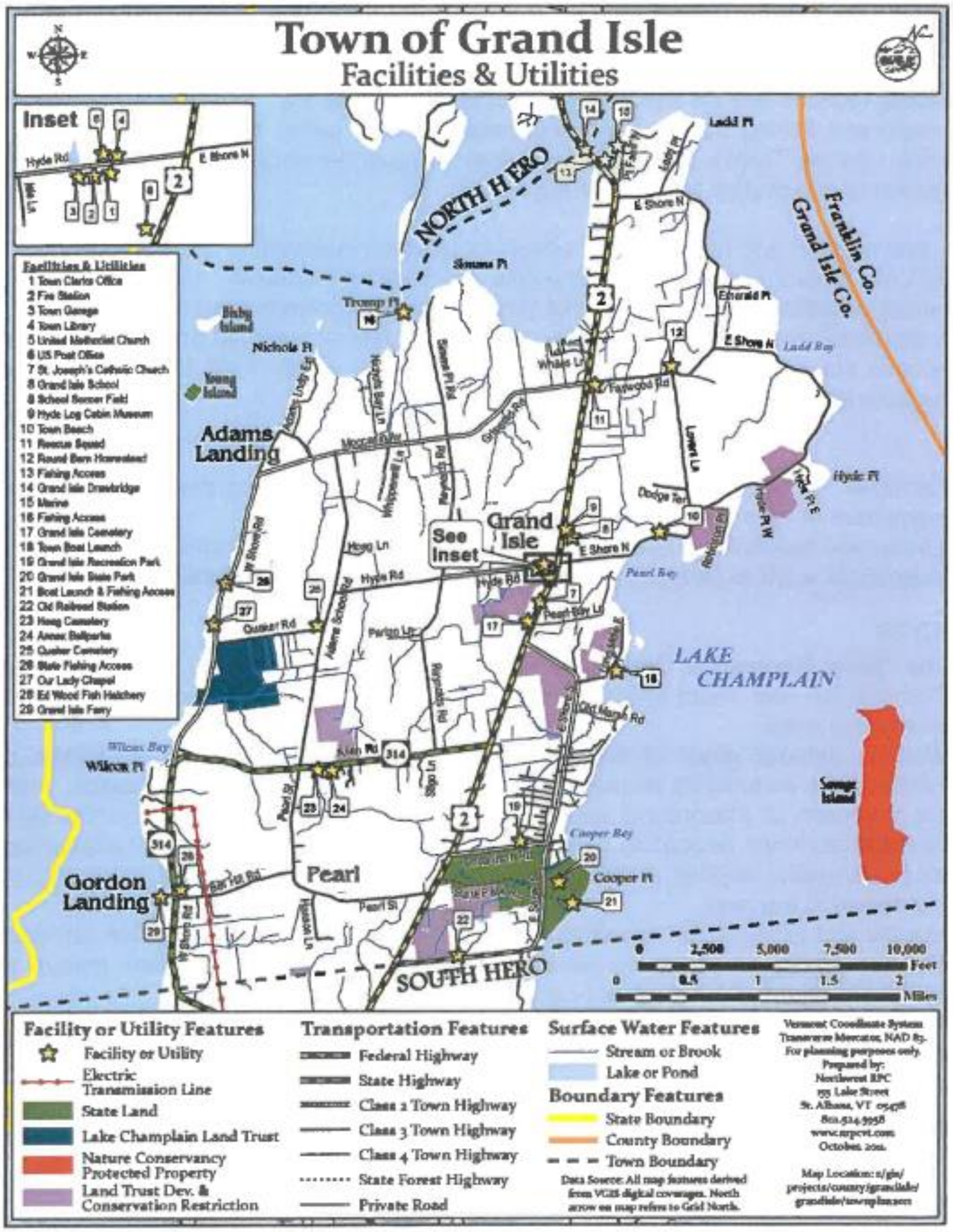


Figure 32 - Grand Isle Facilities and Utilities Map

APPENDIX E: TABLE OF FIGURES