Discovery Report

Lake Champlain Watershed
HUC 04150408

Clinton, Essex, Warren, and Washington Counties, New York*

These counties span more than one watershed; please see the following page for a list of communities fully or partially located in the watershed. This report covers only the Lake Champlain Watershed and selected adjacent portions of the Mettawee River Watershed in the State of New York.

September 14, 2016

Federal Emergency Management Agency
Department of Homeland Security
26 Federal Plaza
New York, NY

Project Area Community List

This list includes all communities located fully or partially within the Lake Champlain Watershed and selected communities located within the adjacent Mettawee River Watershed. While all communities may be under consideration for a revised Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM), not all communities will receive new/updated FEMA FISs or FIRMs as a result of this watershed Discovery project. For the purposes of this Discovery report, the term "Lake Champlain Watershed" refers to all communities included in this Discovery project, including those communities within the Mettawee River Watershed that are listed in the table below.

Clinton County

- Altona, Town of
- Ausable, Town of
- Beekmantown, Town of
- Black Brook, Town of
- Champlain, Town of
- Champlain, Village of
- Chazy, Town of
- Clinton, Town of
- Dannemora, Town of
- Ellenburg, Town of
- Mooers, Town of
- Peru, Town of
- Plattsburgh, City of
- Plattsburgh, Town of
- Saranac, Town of
- Schuyler Falls, Town of
- *Rouses Point, Village of* **

Essex County

- Chesterfield, Town of
- Crown Point, Town of
- Elizabethtown, Town of
- Essex, Town of
- Keene, Town of
- Lewis, Town of
- Moriah, Town of
- Port Henry, Village of
- Ticonderoga, Town of
- Westport, Town of
- Willsboro, Town of
- *Jay, Town of***
- *North Hudson, Town of***

Warren County

- Bolton, Town of
- Hague, Town of
- Horicon, Town of
- Lake George, Town of*
- Lake George, Village of
- Queensbury, Town of*
- Warrensburg, Town of
- *Lake Luzerne, Town of***

Washington County

- Dresden, Town of
- Fort Ann, Town of*
- Fort Ann, Village of*
- Granville, Town of*
- Granville, Village of*
- Hampton, Town of*
- Putnam, Town of
- Whitehall, Town of*
- Whitehall, Village of*

* Located in both the Lake Champlain and Mettawee River Watersheds **or** only within the Mettawee River Watershed and included in this Discovery project.

***Partially within the Lake Champlain Watershed, but not included in this Discovery Report due to inclusion within other Discovery processes, lack of flooding sources, and/or unpopulated area or development.*

Study Date

The information and data presented in this report are static and were current as September 2016. The Discovery process for the Lake Champlain Watershed began in early 2016. Data collection was completed between March and May 2016. The in-person Discovery Meetings were held in June 2016. Additional details on meetings and stakeholder involvement can be found in Sections IV and V of this report. As applicable, dates of data creation are noted throughout the report.

Table of Contents

FIGURES

TABLES

APPENDICES

Acronyms and Abbreviations

APA	Adirondack Park Agency
AAL	Average Annualized Loss
BFE	Base Flood Elevation
CAC	Community Assistance Contact
CAV	Community Assistance Visit
CFR	Code of Federal Regulations
CID	Community Identification Number
CIS	Community Information System
CNMS	Coordinated Needs Management Strategy
CRS	Community Rating System
FEH	Fluvial Erosion Hazard
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FIPS	Federal Information Processing Standard
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
Hazus-MH	Multi-Hazard Risk Assessment and Loss Estimation Software Program
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HWM	High Water Mark
HUC	Hydrologic Unit Code
IJC	International Joint Commission
LiDAR	Light Detection and Ranging
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR	Letter of Map Revision
LOMR-F	Letter of Map Revision based on Fill
MS4	Municipal Separate Storm Sewer System
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration

NRCS	National Resources Conservation Service
NWS	National Weather Service
NYSDEC	New York State Department of Environmental Conservation
NYSDHSES	New York State Division of Homeland Security and Emergency Services
PDM	Pre-Disaster Mitigation
Risk MAP	Risk Mapping, Assessment, and Planning
RL	Repetitive Loss
SFHA	Special Flood Hazard Area
SPDES	State Pollutant Discharge Elimination System
SRL	Severe Repetitive Loss
SWCD	Soil and Water Conservation District
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey

Glossary of Terms

1-Percent-Annual-Chance Flood: The flood having a 1-percent chance of being equaled or exceeded in any given year. This is the regulatory standard also referred to as the "100-year flood" or "base flood". The base flood is the national standard used by the National Flood Insurance Program (NFIP) and all Federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development. Base Flood Elevations (BFEs) are typically shown on Flood Insurance Rate Maps (FIRMs). (Federal Emergency Management Agency [FEMA])

0.2-Percent-Annual-Chance Flood: A flood that has a 0.2-percent chance of being equaled or exceeded in any given year (also known as a 500-year flood). (FEMA)

Approximate Study: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no BFEs or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. An approximate study is represented on a FIRM as a Zone A. (FEMA)

Average Annualized Loss (AAL): AAL is the estimated long-term value of losses to the general building stock averaged on an annual basis for a specific hazard type. Annualized loss considers all future losses for a specific hazard type resulting from possible hazard events with different magnitudes and return periods averaged on a "per year" basis. Like other loss estimates, AAL is an estimate based on available data and models. Therefore, the actual loss in any given year can be substantially higher or lower than the estimated annualized loss. (FEMA)

Base Flood Elevation (BFE): The computed elevation to which floodwater is anticipated to rise during the base flood. BFEs are shown on FIRMs and on the flood profiles. The BFE is the regulatory requirement for the elevation or floodproofing of structures. The relationship between the BFE and a structure's elevation determines the flood insurance premium. (FEMA)

Coordinated Needs Management Strategy (CNMS): A FEMA Geographic Information System (GIS) tool that identifies and tracks the lifecycle of mapping requests and needs for the flood hazard mapping program. (FEMA)

Dam: An artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water. (FERC)

Declared Disaster: Local and State governments share the responsibility for protecting their citizens and for helping them recover after a disaster strikes. In some cases, disasters are beyond the capabilities of local, State, and tribal government. In 1988, the Stafford Act was enacted to support local, State and tribal governments and their citizens when disasters overwhelm and exhaust their resources. This law, as amended, established the process for requesting and obtaining a Presidential Emergency or Disaster Declaration, defined the type and scope of assistance available from the Federal Government, and set the conditions for obtaining assistance.

Steps for a Disaster Declaration include: (1) Local government responds, supplemented by neighboring communities and volunteer agencies. If the local government is overwhelmed, the (2) State responds, (3) damage assessments are completed to determine total losses and recovery needs, (4) Disaster Declaration is requested by the governor of the state or by a tribal Chief Executive Officer (CEO), based on damage assessments, (5) FEMA evaluates the request, and then the (6) President approves or denies the request. (FEMA)

Detailed Study: A flood hazard mapping study done using hydrologic and hydraulic methods that produce BFEs, floodways, and other pertinent flood data. Detailed study areas are shown on the FIRM as Zones AE, AH, AO, AR, A99, A1-A30, and in coastal areas Zones V, VE, and V1-30. (FEMA)

Flood Insurance Rate Map (FIRM): The official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community. (FEMA)

Flood Insurance Study (FIS): A compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community. When a flood study is completed for the NFIP, the information and maps are assembled into an FIS. The FIS report contains detailed flood elevation data in flood profiles and data tables. (FEMA)

Flood Mitigation Assistance (FMA): The FMA program provides funds for projects to reduce or eliminate risk of flood damage to buildings that are insured under the NFIP on an annual basis. There are three types of FMA grants available and include (1) planning grants, (2) project grants, and (3) management cost grants. (FEMA)

Multi-Hazard Risk Assessment and Loss Estimation Program (Hazus-MH): Hazus-MH is a nationally applicable standardized methodology that estimates potential losses from earthquakes, hurricane winds and floods. FEMA developed Hazus-MH under contract with the National Institute of Building Sciences (NIBS). Hazus-MH uses state-of-the-art GIS software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of earthquakes, hurricane winds and floods on populations. (FEMA)

Hazard Mitigation Assistance (HMA): FEMA's HMA grant programs provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages including the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). (FEMA)

Hazard Mitigation Grant Program (HMGP): The HMGP provides grants to States or tribes and local governments (as sub-grantees) to implement long-term hazard mitigation measures after a major disaster declaration. Each State or tribe (if applicable) administers the HMGP in their jurisdiction. The purpose of the HMGP is to reduce the loss of life and property due to natural

disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Individual homeowners and businesses may not apply directly to the program; however, an eligible applicant or sub-applicant may apply on their behalf. (FEMA)

HUC (Hydrologic Unit Code): The United States Geological Survey (USGS) divides and sub-divides the area of the United States into successively smaller hydrologic units which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. The hydrologic units are arranged or nested within each other, from the largest geographic area (regions) to the smallest geographic area (cataloging units). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system. (USGS)

Hydraulics: The science that deals with fluids in motion, is used to determine how a quantity of water will flow through a channel or floodplain. For purposes of floodplain analysis, hydraulics is the study of floodwaters moving through the stream and the floodplain. (FEMA)

Hydrology: The science that encompasses the occurrence, distribution, movement, and properties of the waters of the earth and their relationship to the environment within each phase of the hydrologic cycle. The water cycle, or hydrologic cycle, is a continuous process by which water is purified by evaporation and transported from the earth's surface (including the oceans) to the atmosphere and back to the land and oceans. (USGS)

Light Detection and Ranging (LiDAR**):** is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses— combined with other data recorded by the airborne system— generate precise, three-dimensional information about the shape of the Earth and its surface characteristics. LIDAR systems allow scientists and mapping professionals to examine both natural and manmade environments with accuracy, precision, and flexibility. (NOAA)

Letter of Map Amendment (LOMA): A LOMA is an official amendment, by letter, to an effective NFIP map. A LOMA establishes a property's location in relation to the Special Flood Hazard Area (SFHA). LOMAs are usually issued because a property has been inadvertently identified as being in the floodplain, but is actually on natural high ground above the BFE or out as shown on the FIRM. Because a LOMA officially amends the effective National Flood Insurance Program (NFIP) map, it is a public record that the community must maintain. Any LOMA should be noted on the community's master flood map and filed by panel number in an accessible location. (FEMA)

Letter of Map Change (LOMC): LOMC is a general term used to refer to the several types of revisions and amendments to FEMA maps that can be accomplished by letter. They include

LOMAs, Letter of Map Revision (LOMR), and Letter of Map Revision based on Fill (LOMR-F). (FEMA)

Letter of Map Revision (LOMR): FEMA's modification to an effective FIRM. LOMRs are generally based on the implementation of physical measures that affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective BFEs, or the SFHA. The LOMR officially revises the FIRM and sometimes the FIS report. (FEMA)

Letter of Map Revision Based on Fill (LOMR-F): A LOMR-F is FEMA's modification of the SFHA shown on the FIRM based on the placement of fill outside the existing regulatory floodway. (FEMA)

Levee/Floodwall: A man-made structure designed to contain or control the flow of water. Levees and floodwalls are constructed from earth, compacted soil, or artificial materials, such as concrete or steel. To protect against erosion and scouring, earthen levees can be covered with grass and gravel or hard surfaces like stone, asphalt, or concrete. (FEMA)

Map Modernization: A multi-year Presidential initiative funded by Congress from fiscal year (FY) 2003 to FY2008, improved and updated the nation's flood maps and provided 92 percent of the nation's population with digital FIRMs. (FEMA)

Mitigation: Any cost-effective action taken to eliminate or reduce the long-term risk to life and property from natural and technological hazards, including, but not limited to, flooding. Flood mitigation measures include: elevation, floodproofing, relocation, demolition, or any combination thereof. (FEMA)

Pre-Disaster Mitigation (PDM): The PDM grant program provides funds for hazard mitigation planning and projects on an annual basis. The PDM program was put in place to reduce overall risk to people and structures, while at the same time reducing reliance on Federal funding if an actual disaster were to occur. (FEMA)

Repetitive Loss (RL) property: A RL property is any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period since 1978. A RL property may or may not be currently insured by the NFIP. (FEMA)

Risk Mapping, Assessment, and Planning (Risk MAP) program: The FEMA program that provides communities with flood risk information and tools to support mitigation planning and risk reduction actions. (FEMA)

Severe Repetitive Loss (SRL) property: A SRL property is a single family property (consisting of 1 to 4 residences) covered by flood insurance underwritten by the NFIP and has incurred flood-related damage for which four or more separate claim payments have been paid with the amount

of each claim payment exceeding $5,000 and with cumulative amount of such claim payments exceeding $20,000; or for which at least two separate claim payments have been made with the cumulative amount of such claims exceeding the market value of the property. (FEMA)

Special Flood Hazard Area (SFHA): SFHAs are high-risk areas subject to inundation by the base (1-percent-annual-chance) flood; they are also referred to as 1-percent-annual-chance floodplains, base floodplains, or 100-year floodplains. (FEMA)

Stakeholder: An individual or group that has an interest in a decision or proposed action. A stakeholder may have none, one, or more of the following roles: has authority or decision-making power over some aspect of the project, is affected by the outcome of the project, will be a part of implementing the project, and/or can stop or delay the project (through litigation or other means). A project may have multiple stakeholders, and these stakeholders often have conflicting interests and want competing outcomes. (FEMA)

Watershed: A watershed is a basin-like landform defined by highpoints and ridgelines that descend into lower elevations and stream valleys. A watershed carries water from the land after rain falls and snow melts. Drop by drop, water is channeled into soils, aquifers, creeks, and streams, making its way to larger rivers and eventually the sea. (Watershed Atlas)

Water Year: The 12-month period beginning on October 1 for any given year and ending on September 30 of the following year. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 2013, is called the "2013" water year. (USGS)

Executive Summary

The Federal Emergency Management Agency (FEMA) Lake Champlain Watershed Discovery Report provides users with a comprehensive understanding of historical flood risk, existing flood-related data, local needs concerning FEMA Flood Insurance Studies and Flood Insurance Rate Maps, and current flood mitigation activities within the Oneida Lake Watershed in New York.

In 2016, FEMA, in coordination with the New York State Department of Environmental Conservation (NYSDEC), implemented a Risk MAP Discovery Project for the Lake Champlain Watershed. The Discovery process involved significant watershed-wide data collection and outreach efforts with local stakeholders using several methods, including individual phone calls, webinars, and in-person meetings. During the outreach process, the emphasis was placed on opportunities for stakeholders to provide their comments and concerns and provide input for future mapping projects. Conversations during the meetings were focused on the types of existing data sources that could be used as part of a Risk MAP project, community mapping needs, locations of development pressure, and mitigation assistance requirements. Data collected from stakeholders within the Lake Champlain Watershed during this Discovery process can be found in Section III: *Summary of Watershed-Wide Data*.

In addition to collecting information about mapping needs and existing data sources, the Discovery project also discussed mitigation activities within the watershed. Local Hazard Mitigation Plans (HMPs) were reviewed to better understand existing flood risks within communities in the watershed. These plans are developed as part of the local planning process and are primarily multi-jurisdictional. Stakeholders provided additional information about ongoing mitigation activities in the watershed, and a number of communities requested specific training focused on hazard mitigation planning and future projects. More information on flood hazard mitigation projects and actions identified during the Discovery process can be found in Section III: *Summary of Watershed-Wide Data* in this report.

Using community mapping needs and information about existing data collected through the stakeholder engagement process, a recommended scope of work for the Lake Champlain Watershed Discovery project was developed. This watershed consists of four counties and 43 communities.

Using community mapping needs and information about existing data collected through the stakeholder engagement process, a recommended scope of work for the Lake Champlain Watershed Discovery project area was developed. The project area consists of four counties and 43 communities. Communities in the Lake Champlain Watershed have a mix of updated digital countywide FIRMs and older community based, paper FIRMs developed between 1984 and 1997. While communities in Clinton County have an updated countywide FIRM, communities in Essex, Warren, and Washington Counties would benefit from a modernized countywide FIRM in a digital format. Community officials find the existing maps difficult to work with. In particular, stakeholders noted it is challenging to locate structures on these maps accurately. Many of the communities noted there is growth along major water bodies, such as Lake Champlain and Lake

George. While a wholesale restudy of each county may not be warranted, there are several key stream segments in each county which require a new detailed study. The new detailed studies, combined with updated approximate studies in a new digital format would assist both the communities and the counties in enforcing floodplain regulations and managing development. Beyond upgrading existing detailed and approximate mapping for Essex, Warren, and Washington Counties to a digital format, the resulting scope of work also included 13 high priority stream/lake study requests with a total detailed stream study mileage of 269.71 miles, a total detailed lake study mileage of 293.4 miles, and a total approximate riverine study mileage of 31.1. More specific information on stream study requests and other community needs collected through the Discovery process can be found in Section VI of this report. A copy of the recommended scope of work can be found in Appendix N: *Lake Champlain Watershed Recommended Scope of Work Memorandum*.

I. Discovery Overview

The Federal Emergency Management Agency's (FEMA's) Risk MAP program helps communities identify, assess, and reduce their flood risk. Through Risk MAP, FEMA provides information to enhance local hazard mitigation plans, improve community outreach, and increase local resilience to floods.

The Lake Champlain Watershed Discovery project is an interactive process that gathers existing data useful in updating Flood Insurance Studies (FISs), and results in a watershed-wide assessment of existing flood hazard mapping needs, and ultimately, recommendations for the development of updated Risk MAP products, such as revised Flood Insurance Rate Maps (FIRMs).

Discovery occurs after FEMA's planning and budgeting cycle, when watersheds of interest have been selected for further examination in coordination with Federal and State-level stakeholders. Watersheds are selected based on risk, need, available topographic data, and other factors. The data that FEMA has readily available is gathered and prepared at the national and regional level and augmented by community-supplied flood risk information and data collected during the Discovery process. Community participation is necessary to assure that FEMA has the most up-to-date understanding of a community's flood risk.

The Discovery process does not necessarily mean that a new Risk MAP project will take place – instead, it is the process through which FEMA and NYSDEC learn about local flooding issues and prioritize the need for new studies or other support that may be provided under the Risk MAP program. Additional support may include the development of new training programs, or providing assistance to selected communities to advance mitigation actions or join the Community Rating System (CRS).

During Discovery, FEMA, NYSDEC, and partners:

- Gather information about local flood risk and flood hazards;
- Review mitigation plans to understand local mitigation capabilities, hazard risk assessments, and current or future mitigation activities;
- Support communities within the watershed to develop a vision for the watershed's future;
- Collect information from communities about their flooding history, effective FIRM usability, development plans, daily operations, and stormwater and floodplain management activities;
- Use all information gathered to identify and prioritize areas of the watershed that require revised mapping, risk assessment, or mitigation planning assistance through a Risk MAP project; and
- Develop a Discovery Report and Maps that summarize and display the Discovery findings.

II. Lake Champlain Watershed Overview

Watershed Characteristics and Geography

As described by the U.S. Geological Survey (USGS), watersheds in the United States are "divided and sub-divided into successively smaller hydrologic units (watersheds) which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system."[1]

The Lake Champlain Watershed boundary is determined at the HUC-8 hydrologic unit level, meaning it is comprised of 8 digits. The HUC-8 code for the Lake Champlain Watershed is 04150408. The first two digits of the 8 digit HUC number are the code for the Regional Boundary (e.g., 04, for the Great Lakes Region). The next two digits of the HUC are the code for the Subregional Boundary (e.g., 0415, Northeastern Lake Ontario-Lake Ontario-St. Lawrence). The next two digits are the code for the Accounting Unit (e.g., 041504, Lake Champlain-Richelieu River). The next two digits of the HUC are the Cataloging Unit (e.g., 04150408, Lake Champlain). For the purposes of this Discovery project, several communities located within the adjacent Mettawee River Watershed (HUC-8 code 04150401) are included in the project area. Figure 1 shows the boundaries of the watersheds.

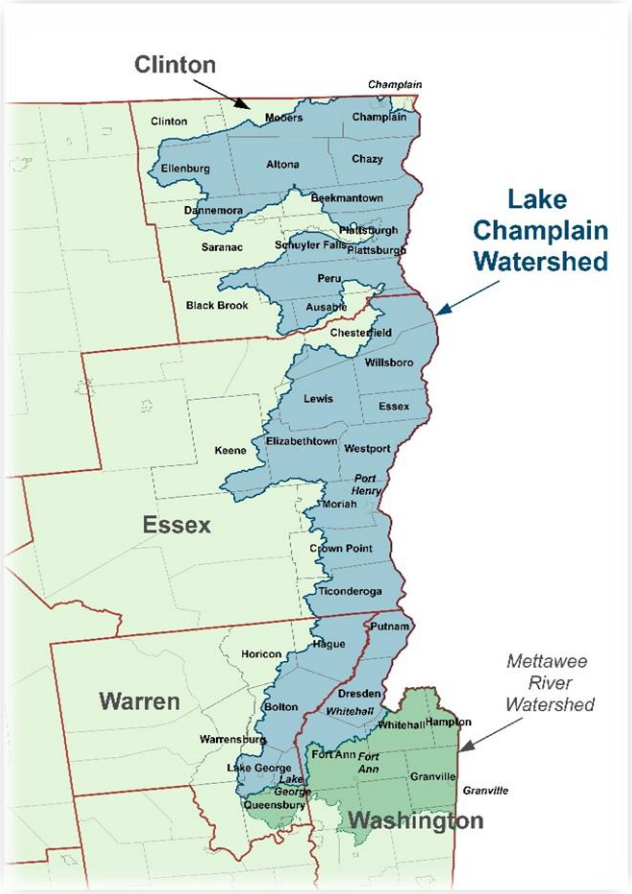

Figure 1: Lake Champlain Watershed

The Lake Champlain Watershed is located in eastern New York State and extends into Vermont and Canada. Portions of Clinton, Essex, Warren, and Washington Counties lie within the watershed as well as Addison, Chittenden, Franklin, Grand Isle, and Rutland Counties in Vermont. The watershed occupies 2,792 square miles, of which 32% (894 square miles) is in New York State.[2] With the exception of small urbanized areas like the City of Plattsburgh, the

[1] *Hydrologic Unit Maps, U.S. Geological Survey. usgs.gov. http://water.usgs.gov/GIS/huc.html.*
[2] *Lake Champlain Rapid Watershed Assessment Profile, Natural Resources Conservation Service*

watershed is primarily rural, dotted with small towns and villages. As seen in *Figure 2*, a large portion of the Lake Champlain watershed is forested; 41% of the land area is located entirely within the Adirondack Park[3]. The watershed is dominated by agriculture along Lake Champlain and in the northern portion outside of Adirondack Park.

Situated in the Lake Champlain Valley within the Green Mountains of Vermont and the Adirondack Mountains of New York, Lake Champlain flows 120 miles from Whitehall, New York to its outlet at the Richelieu River in Quebec. It also receives water from Lake George in the southern portion of the watershed. Within the Lake Champlain Watershed, there are several sub-basins.[4] Major rivers in the watershed include the Boquet River and the Great Chazy River.

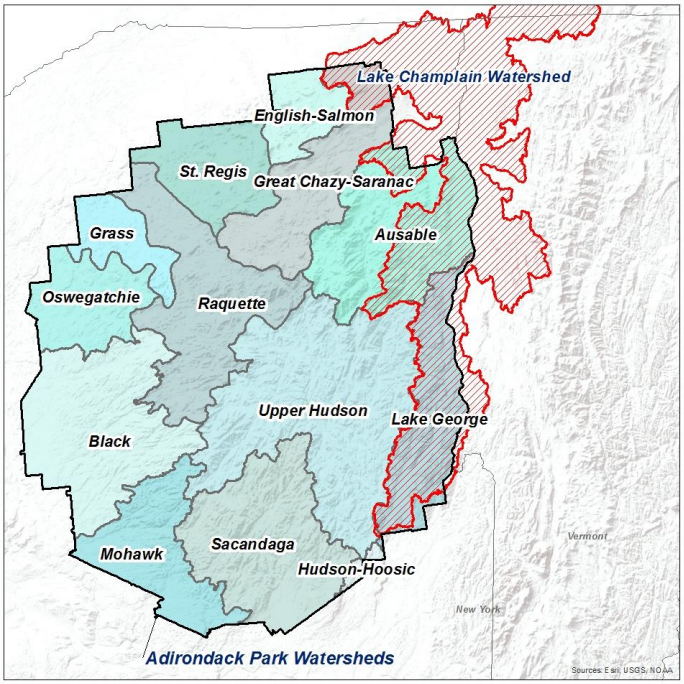

Figure 2: Adirondack Park Watersheds

Demographics

Population

In New York, the Lake Champlain Watershed covers all or part of 44 towns, cities and villages in Clinton, Essex, Warren, and Washington Counties and has a population of 79,686[5]. The largest jurisdiction within the watershed is the City of Plattsburgh in Clinton County, with a population of 19,989. The City and Town of Plattsburgh are located in the Plattsburgh Micropolitan Statistical Area (MSA), which shares the same boundaries as Clinton County. As noted earlier, a significant part of the watershed is located in Adirondack Park. The distribution of population can be seen in *Table 1: Approximate 2010 Population in the Lake Champlain Watershed*. There are also a large number of farms in the watershed, with 597 in the New York portion.

[3] ibid.
[4] http://www.lcbp.org/about-the-basin/facts/
[5] *Lake Champlain Rapid Watershed Assessment Profile, Natural Resources Conservation Service*

Table 1: Approximate 2010 Population in the Lake Champlain Watershed

County	Total County Population (2010 data)	Percent of County Population in Lake Champlain Watershed	2010 Estimated Population in the Lake Champlain Watershed (Based on % in Watershed * Total Population)	Square Miles in Lake Champlain Watershed
Clinton	82,128	58%	47,635	644
Essex	39,370	32%	12,598	615
Warren	65,707	19%	12,484	189
Washington	63,216	17%	10,746	143

Source: Lake Champlain Watershed Rapid Assessment Profile, 2010 US Census

Government and Representatives

Clinton County

The Clinton County Legislature serves as the county's policy-making body. The Legislature is responsible for establishing county policies, reviewing the administration of government, appropriating funding, levying taxes, reviewing and adopting the annual budget and enacting resolutions and local laws. There are ten equal population legislative districts in the county, some encompassing more than one municipality. The ten Legislators are elected to four-year terms and represent the citizens residing in each district. Town governments consist of an elected Board of Supervisors and Supervisor whose responsibilities include maintaining town infrastructure and roads. An elected Mayor and Board govern villages and cities such as the City of Plattsburgh in Clinton County[6].

Essex County

The Essex County Board of Supervisors serves as the county's policy- making body. Eighteen supervisors represent their individual towns, and decisions are determined on a system of weighted voting based on population. The Chairman of the Board of Supervisors is the chief elected official in the county[7].

Warren County

The Warren County government consists of a Board of Supervisors representing the executive and legislative branch of county government. A total of 20 supervisors represent the towns in Warren County. As in Essex County, decisions in Warren County are determined on a basis of weighted voting based on population[8]. The Chairman of the Board of Supervisors is the chief elected official in the county.

Washington County

The Washington County government consists of a Board of Supervisors representing the 17 towns

[6] *Clinton County Hazard Mitigation Plan*
[7] *Essex County Hazard Mitigation Plan*
[8] *Warren County Hazard Mitigation Plan*

in the county. The Board has both legislative and executive power. As in Essex and Warren County, decisions in Washington County are determined on a basis of weighted voting based on population[9]. The Chairman of the Board of Supervisors is the chief elected official in the county.

Property Ownership

Land ownership in the watershed is diverse. Clinton County accounts for 23% of the land area, followed by Essex County with 22%, Warren County with 6% and Washington County with 5%. Urban areas make up 1.7% of the watershed and include the City of Plattsburgh. There are 597 farms in the New York portion of the watershed[10]. Farm operations in the watershed are dominated by horses, milk cows, and beef cows. The predominant crops are dry hay and haylage followed by corn for silage and soybeans[11].

As noted earlier and shown in *Figure 2*, a significant area (41%) of the watershed is located within the Adirondack Park, the largest contiguous park in the United States. More than half of the park is private land comprised of hamlets, forestry, agriculture, and open space recreation, and conservation easements administered by New York State. The remaining 45% is publicly owned Forest Preserve. More information on land use in the Adirondack Park is discussed in the Land Use section. More information on property ownership can be found on each county's Real Property webpage as noted in *Table 2.*

Table 2 : Links to County Real Property Webpages

County	Hyperlink to Real Property Webpage
Clinton	http://www.clintoncountygov.com/departments/realproperty/rphome.html
Essex	http://www.co.essex.ny.us/realproperty.asp
Warren	http://www.warrencountyny.gov/rp/
Washington	http://www.co.washington.ny.us/263/Real-Property-Tax-Service

[9] *http://www.co.washington.ny.us/27/Your-Government*
[10] *U.S. Department of Agriculture, Agricultural Census 2012*
[11] *Lake Champlain Rapid Watershed Assessment Profile, NRCS*

Clinton County

Clinton County is located in the northeast corner of New York State, bordered on the east by Lake Champlain, to the west by Franklin County, to the south by Essex County and to the north by Canada. Clinton is primarily a rural county of 1,037 square miles and 78.7 square miles of water, with almost half of the county located within Adirondack Park. The total population is 82,128[12] with an average of 79 persons per square mile. The main population center is the City of Plattsburgh (population 19,989), which also functions as the county seat. Farmland covers 149,219 acres within the county, with farms averaging 253 acres in size. Top industries in Clinton County include manufacturing, utilities, and industrial development[13].

Figure 3: Clinton County

Figure 4: Essex County

Essex County

Essex County is located in northeastern New York State, entirely within Adirondack Park. The county is bordered to the east by Lake Champlain and Vermont, the Adirondack Mountains to the west, Clinton County to the north and by Warren County to the south. The total population is 39,370 with an average of 13 people per square mile[14]. Tourism increases population throughout the year, and the county has 6,331 seasonal residents. Farmland covers 50,226 acres with a total of 243 farms in the county.

Warren County

Warren County is located in northeastern New York State, between Lake Champlain and Vermont in the east, and Hamilton and Saratoga County in the west. Essex and Hamilton Counties border the county to the north and Saratoga County borders the county to the south. Warren County is primarily a rural county with a total land area of 932 square miles, 95% of which is forested and 6.6% is water. The total population

[12] http://www.census.gov/quickfacts/table/POP010210/36019,00
[13] *Clinton County Hazard Mitigation Plan*
[14] http://www.census.gov/quickfacts/table/POP010210/36031,36019,00

is 65,707 with an average of 75 people per square mile[15]. The vast majority of the county lies within the Adirondack Park, and farmland covers 8,555 acres of the county. The main population centers in the county are the City of Glens Falls and the Town of Queensbury. The Glens Falls region in Warren County is a major producer of medical devices and provider of medical services in the State[16].

Figure 5: Warren County

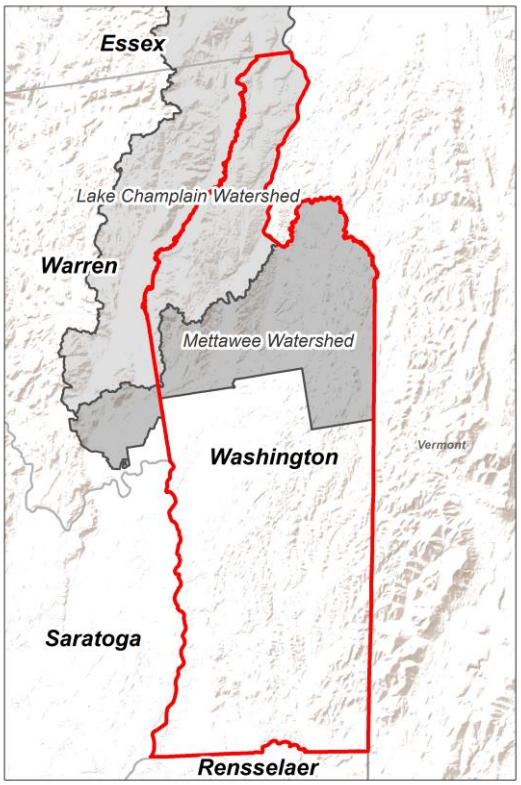

Figure 6: Washington County

Washington County

Washington County is located in eastern New York State, bordered to the north by Essex County, to the east by Vermont, to the south by Rensselaer County, and to the west by Lake George and the Hudson River. The Towns of Dresden and Putnam and part of the Town of Fort Ann are located inside the Adirondack Park[17]. The county is located within the Glens Falls Metropolitan Statistical Area. Washington County is primarily a rural county with a total land area of 831 square miles and an average of 76 people per square mile. The county is known for its rich farmland; over a third of the county is agricultural, with a total of 202,877 acres of farmland and over 800 farms[18]. It is one of New York State's leading dairy counties, and maple syrup and apples are important cash crops.

[15] http://www.census.gov/quickfacts/table/POP010210/36113,36031,36019,00
[16] *Warren County Hazard Mitigation Plan*
[17] http://www.wcldc.org/DocumentCenter/View/2588
[18] http://www.census.gov/quickfacts/table/PST045215/36115

Land Use

A comprehensive plan is a land-use document providing framework and policy direction for land-use decisions. Comprehensive plans usually include chapters detailing policy direction affecting land use, transportation, housing capital facilities, utilities, and rural areas. Comprehensive plans identify where and how growth needs will be met. For the sake of floodplain management and hazard mitigation, a land-use management plan can be a powerful tool to guide the community to increased resilience. If a community has a comprehensive plan, it needs to be in compliance with both the local flood damage prevention ordinance and local Hazard Mitigation Plan (HMP).

The 2001 National Land Cover Database (NLCD) divides the land cover of the United States into sixteen land cover classes. New York State contains fifteen of these classes. In the Lake Champlain Watershed, forests account for 43.7% of the land cover, followed by open water (17.2%), grassland (10.5%), wetland (6.5%), cultivated crops (6.1%), developed open space/low intensity (4.2%), shrub/scrub (1.5%), developed medium/high intensity (.6%) and barren land (.1%).[19]

As noted earlier, 41% of the watershed is located within the Adirondack Park. Land management planning for municipalities located within the Adirondack Park falls under the jurisdiction of the Adirondack Park Agency (APA). Upon its creation in 1971, the APA's first task was to develop, in consultation with NYSDEC, a management plan for the administration of all State land in the Adirondack Park. The resulting plan, the Adirondack Park State Land Master Plan, is a refinement of the previous studies and by law, still governs the management of State land. The APA provides land-use and density maps and comprehensive technical assistance and oversight for commercial and residential development proposals within their jurisdiction; local zoning regulations still apply both inside and outside of the Adirondack Park. The permitting process is administered according to project classification and land use classification. The APA State land use classifications are:

- Wilderness
- Primitive
- Canoe
- Wild forest
- Intensive use
- Historic
- State Administrative

The Adirondack Park Agency Act allows any local government within the Park to develop an APA Approved Local Land Use Program (ALLUP), which, if approved by the Agency, may transfer some permitting authority from the agency to the local government's jurisdiction[20].

[19] *Lake Champlain Rapid Watershed Assessment Profile, Natural Resources Conservation Service*
[20] *Clinton County Hazard Mitigation Plan*

Clinton County

In Clinton County, the Towns of Ausable, Black Brook, Dannemora, and Saranac are completely within the Adirondack Park and are subject to land use regulations of the APA. The portions of the Towns of Peru, Ellenburg, and Altona are within the park are also subject to APA land use regulations[21]. The Town and City of Plattsburgh have seen a decline in development since the closure of the Plattsburgh Air Force Base (PAFB) in 1995, which led to the departure of approximately 6,000 residents and military personnel. The site is now home to an industrial park and Plattsburgh International Airport[22]. The Town and City of Plattsburgh are part of the Plattsburgh Micropolitan Statistical Area (MSA), which shares the same boundary as Clinton County and encompasses all of its municipalities.

Essex County

Essex County is located entirely in the Adirondack Park. The APA plan/permit review process regulates future development in the region. The following towns in Essex County have APA approved land use plans: Chesterfield, Willsboro and Westport[23].

Warren County

The vast majority of Warren County lies within the Adirondack Park, and the APA plan/permit process regulates land use accordingly. Portions of the Town of Queensbury and the City of Glens Falls are outside of the park. The Towns of Horicon, Hague, Bolton and Lake George (including the Village of Lake George) and Queensbury have plans meeting the APA guidelines[24]. The Warren County Planning Department also manages the First Wilderness Heritage Corridor, a 40-mile rail corridor traveling from the Town of Corinth in Saratoga County to the Hamlet of North Creek in Warren County. The line is a focus of tourism development activities along the Hudson River and operates round trips from North Creek to Saratoga Springs[25].

Washington County

The northern portion of Washington County including the Towns of Putnam, Dresden, and part of the Town of Fort Ann are located within the Adirondack Park and are regulated by the APA plan/permit process accordingly. The county has no comprehensive land use plan. The county's *Agricultural and Farmland Protection Plan* was adopted in 1996 to identify strategies to promote agricultural viability and protect farmland. The plan is currently being updated with the assistance of the Washington County Agricultural Stewardship Association (ASA) to better serve the county[26].

Links to the County planning departments have been compiled in *Table 3: Links to County Planning Departments.*

---

[21] *Clinton County Hazard Mitigation Plan*
[22] *http://townofplattsburgh.com/dept_planning/planning_files/Comprehensive Plan (No Appendix).pdf*
[23] *Essex County Hazard Mitigation Plan*
[24] *Warren County Hazard Mitigation Plan*
[25] *https://firstwilderness.wordpress.com/plan-your-visit/attractions/*
[26] *http://www.co.washington.ny.us/963/Agriculture-and-Farmland-Protection-Plan*

Table 3: Links to County Planning Departments

County	Hyperlink to Planning Department Webpage
Clinton	https://www.clintoncountygov.com/Departments/Planning/index.html
Essex	https://www.co.essex.ny.us/wp/community-resources/?target=planning
Warren	http://www.warrencountyny.gov/planning/
Washington	http://www.co.washington.ny.us/316/Planning

Table 4: USDA Census of Agriculture 2012

County	Land Area (Square Miles)	Farm Land (Acres)	Farm Land (Acres) Within Watershed	Total Farms Within Watershed
Clinton	1,039	147,229	86,547	348 (603 total, 58% of county is in watershed)
Essex	1,916	54,837	16,072	83 (261 total, 32% of county is in watershed)
Warren	932	9,528	1,625	22 (117 total, 19% of county is in watershed)
Washington	830	189,391	34,489	144 (851 total, 17% of county is in watershed)

Source: Lake Champlain Watershed Rapid Assessment Profile, USDA Census of Agriculture 2012

Media

The Lake Champlain Watershed covers a vast amount of land but is primarily rural. Two media markets serve the watershed: the Burlington-Plattsburgh media market and the Albany-Schenectady-Troy market. The Albany-Schenectady-Troy media market, covering Warren and Washington County, includes 46 radio stations and eight television stations[27]. The Burlington-Plattsburgh media market, covering Clinton and Essex County, includes seven radio stations and six television stations[28].

The main newspapers in the northern area of the watershed include:

- *The Clinton County Free Trader Today*
- *The Plattsburgh Press Republican*
- *Plattsburgh Burgh*
- *Lake Champlain Weekly*

[27] *http://www.polidata.us/pub/maps/rq2000/vt_req.pdf*
[28] *http://bl.ocks.org/simzou/6459889*

In the southern portion of the watershed, the *Albany Times Union*, *The Post-Star, and the Glens Falls Chronicle* serve Warren and Washington Counties. Other media outlets in Washington County include:

- *The Eagle*
- *Salem Press*
- *Main Street*
- *Granville Sentinel*
- *Greenwich Journal*
- *Whitehall Times*

Historic Flooding Problems

Overview

Throughout the recorded history of the Lake Champlain Watershed, flooding has been a constant threat. The elevation of the Adirondack Mountains serves to wring out moisture, squeezing copious amounts of rain and snow from storm systems flowing across the United States. These steep mountains, narrow valleys, high snowfall and humid summers make the watershed especially prone to flooding. Floods in the summer months are often associated with tropical systems moving north along the Atlantic coast. This extreme weather can bring about high lake levels, as seen in 2011 with Tropical Storm Irene. During the winter, flooding is a threat when ice jams impede the free flow of rivers.[29] Flooding usually occurs in the late winter and early spring when the ground is still frozen and snowmelt adds to heavy rainfall to produce increased runoff.

The flood events of 2011 severely impacted the watershed and its residents. High snowfall and heavy spring rains combined to raise lake levels; Lake Champlain reached flood stage on April 13, 2011 and remained above this level for 67 days, until June 19, 2011[30], damaging properties and eroding large amounts of shoreline. In August 2011, Tropical Storm Irene brought significant rainfall once again to the region, causing severe flash flooding and impacting thousands of residents in New York and Vermont.

Clinton County

Flooding is a serious and often costly hazard in Clinton County. The county sits on the western shore of Lake Champlain and includes an extensive network of rivers, streams, and lakes that are prone to flooding. Heavy rains and ice jams contribute to riverine and flash flooding. Between 1950 and 2005, 25 flood events were reported. According to the National Climate Data Center (NCDC), Clinton County has experienced 16 flash floods or flooding events including lakeshore flooding since 2000. Thirteen of those events occurred from 2007-2012. Clinton County's HMP noted that Perry Mills and the Town of Champlain, and the Town of Black Brook show signs of

[29] http://www.lcbp.org/wp-content/uploads/2013/04/FloodReport2013_en.pdf
[30] ibid.

consistent ice jams on the Great Chazy River and the East Branch of the Ausable River respectively, leading to flooding in those jurisdictions[31].

Essex County

Long winters, high snowfall, and high annual precipitation make ice jams the primary cause of flooding in Essex County. According to NCDC records, Essex County had 54 days of reported floods between 1993 and 2007, with reported property damage of approximately $32.6 million dollars. NCDC identified 20 of these events as "flash floods"[32].

Warren County

According to National Weather Service (NWS) records, Warren County had 41 reported floods between 1993 and 2008, with reported property damage of approximately $13 million dollars. A causal factor of flooding in the county (and surrounding areas) is heavy rainfall forcing the destruction of beaver dams on lakes, rivers and streams that have cascade effects of downstream flooding of roadways. Repeated flood events occur in two regions of Warren County: the Schroon River, and along the Hudson River. The Town of Horicon is classified as a vulnerable area[33].

Washington County

Washington County's HMP expired in March 2015, and an update is in progress. In July 2005, a flash flooding episode resulted in the breach of Hadlock Pond Dam in the Town of Fort Ann, destroying homes below the dam and producing an estimated $5 million in property damage overall. The flood did not occur due to weather; rather it resulted from the disintegration of the dam structure over an extended period of time[34].

Significant flood events were included in several of the HMPs and are summarized in *Table 5: Hazard Mitigation Plan Significant Flood Events*.

Table 5: Hazard Mitigation Plan Significant Flood Events

County	Community	Flood Events of Significance
Clinton County	Altona, Town of	August 2010-Flash Flood, $500,000 in damages
	Black Brook, Town of	April 2010- Flash Flood, $15,000 in damages
	Champlain, Town of	August 2011-Flash Flood, $8.5 million in damages and 2 deaths
	Clinton, Town of	April 2011-Flash Flood, $15,000 in damages
	Dannemora, Town of	July 2007- Flash Flood, $45,000 in damages
	Ellenburg, Town of	August 2010-Flash Flood, $25,000 in damages April 2015- Flash Flood, $500,000 in damages, second Flash Flood with $15,000 in damages

[31] *Clinton County Hazard Mitigation Plan*
[32] *Essex County Hazard Mitigation Plan*
[33] *Warren County Hazard Mitigation Plan*
[34] *Washington County Hazard Mitigation Plan*

Table 5: Hazard Mitigation Plan Significant Flood Events

County	Community	Flood Events of Significance
Clinton County	Mooers, Town of	July 2007-Flash Flood, $45,000 in damages April 2011-Flash Flood, $15,000 in damages
	Peru, Town of	May 2011-Flash Flood, $300,000 in damages
	Plattsburgh, Town of	October 2010-Flash Flood, $150,000 in damages August 2011- Flash Flood, $8.5 million in damages and 2 deaths
	Plattsburgh, City of	April 2011-Flash Flood, $10,000 in damages
	Saranac, Town of	April 2011- Flash Flood with $15,000 in damages and Flash Flood with $10,000 in damages
	Schuyler Falls, Town of	August 2011- Flash Flood, $8.50 million in damages and 2 deaths
Essex County	Chesterfield, Town of	No events in HMP
	Crown Point, Town of	No events in HMP
	Elizabethtown, Town of	No events in HMP
	Essex, Town of	No events in HMP
	Keene, Town of	2003- Snow melt and ice jams along East Branch of Ausable River, $1,000 in damages
	Lewis, Town of	No events in HMP
	Moriah, Town of	No events in HMP
	Port Henry, Village of	No events in HMP
	Ticonderoga, Town of	No events in HMP
	Westport, Town of	March 1993- Melting snow and heavy rainfall caused Lake Champlain shoreline flooding and erosion of Amtrak tracks and roads. $5 million in damages
	Willsboro, Town of	March 1993- Melting snow and heavy rainfall caused Lake Champlain shoreline flooding and erosion of Amtrak tracks and roads. $5 million in damages 6/18/98, 6/25/98, 7/1/98, 8/11/98 Road washouts, railroad tracks in Chesterfield washed out causing derailment. $3.1 million in damages
Warren County	Bolton, Town of	June 2005- Flood, $6.5 million in damages
	Hague, Town of	January 1996- Flood, $3 million in damages
	Horicon, Town of	April 2001-Flood, $500,000 in damages June 2005-Flood, $6.5 million in damages September 2006- Flood, $500,00 in damages

Table 5: Hazard Mitigation Plan Significant Flood Events

County	Community	Flood Events of Significance
	Lake George, Town of	No events in HMP
	Lake George, Village of	January 1996- Flood, $3 million in damages
	Queensbury, Town of	No events in HMP
	Warrensburg, Town of	April 2001-Flood, $500,000 in damages June 2005-Flood, $6.5 million in damages
Washington County	Dresden, Town of	No events in HMP
	Fort Ann, Town of	July 2005- Flash flood produced an estimated $5 million in estimated property damage. Hadlock Pond Dam breached, which caused road washouts and destroyed homes below the dam. The flood did not occur due to weather (occurred under a clear sky); rather it resulted from the disintegration of the dam structure over an extended period of time.
	Fort Ann, Village of	No events in HMP
	Granville, Town of	2005- Flooding; shoulder and partial lane washout; culverts under road are too small
	Granville, Village of	1996- North Street – Culvert backed up. $1,670 in damages
	Hampton, Town of	1996- South Road (1/4 mile east of County Route 21) - some FEMA funds received.
	Putnam, Town of	No events in HMP
	Whitehall, Town of	12/1996- Flash flooding caused $50,000 in estimated property damage.
	Whitehall, Village of	No events in HMP

Source: Clinton County, Essex County, Warren County, and Washington County Hazard Mitigation Plans

High Water Marks

To make risk assessments for flooding events, certain types of data are needed. This data consists of physical evidence, such as High Water Marks (HWMs) left by a flood event. Often, HWM evidence is transitory and can only be collected within a short span of time after an event, after which the evidence disappears. The HWM is the most important piece of information to describe the severity of a flood and it is essential that high water marks are recorded quickly after a flood event.

The publication *High-Water Marks from Flooding in Lake Champlain from April through June 2011 and Tropical Storm Irene in August 2011 in Vermont* prepared by the U.S. Geological Survey contains HWM information, including geospatial files, for Lake Champlain for the flood events indicated.

HWMs identified by watershed stakeholders during this Discovery projects are summarized in *Appendix G: Discovery Meeting Summary Memorandum.*

Disaster Declarations

Like much of the eastern United States, one of the most frequent, widespread, and damaging natural disasters affecting the watershed is flooding from rainfall events, especially tropical systems tracking inland from the Atlantic Seaboard. With full records beginning in the 1950s, the watershed has repeatedly been subject to flooding from tropical storms, hurricanes, and other non-cyclonic events, most recently in Summer 2013.

Often in the aftermath of a major flooding event, the Federal Government will make funding available for homeowners, businesses, and local communities to aid in disaster relief and recovery. The major flood-related disaster declarations for the study area are listed in *Table 6: Major Disaster Declarations (as of April 2016).* Since 1972 there have been 13 flood-related declared disasters within the study area. FEMA's disaster and emergency declarations history can be viewed at FEMA's website.

Table 6: Major Disaster Declarations (as of April 2016)

Date	Title of Event	Number of Counties Declared Within Study Area
July 1976	Severe Storms & Flooding	2
January 1996	Severe Storms & Flooding	4
December 1996	Severe Storms, High Winds, Rain, and Flooding	2
July 1998	Severe Storms & Flooding	2
September 1999	Hurricane Floyd	2
July 2000	Severe Storms & Flooding	1
August 2004	Severe Storms & Flooding	4
October 2004	Severe Storms & Flooding	1
April 2007	Severe Storms & Inland and Coastal Flooding	1
April 2010	Severe Storms & Flooding	1
June 2011	Severe Storms, Flooding, Tornadoes, and Straight-Line Winds	3
August 2011	Hurricane Irene	4
July 2013	Severe Storms & Flooding	3

Ice Jams

As explained by the NWS, "ice jams cause localized flooding and can quickly cause serious problems. Rapid rises behind the jams can lead to temporary lakes and flooding of homes and roads along rivers. A sudden release of a jam can lead to flash flooding below with the addition of large pieces of ice in the wall of water which will damage or destroy most things in its path.[35]"

There are two types of ice jams: freeze up and break up. Freeze up jams usually occur in early to mid-winter during extremely cold weather. Break up jams usually occur in mid to late winter with thaws. NWS notes the conditions of both below:

Freeze Up Jam Criteria:

Three consecutive days with daily average temperatures of less than 0°F. Early to mid-winter formation, fairly steady discharge, frazil and broken border ice, unlikely to release suddenly, smooth to moderate surface roughness.

Break Up Jam Criteria:

Ice around one foot thick or more (presumed) and daily average temperature forecast to be greater than 42°F or more. Direct sunlight plays a large role as open water areas absorb sunlight. A break up jam can occur at any time after ice cover formation, but generally takes place in mid to late winter. Break up jams are highly unstable with sudden failures.

The daily average temperature is determined by the following equation:

(Tmax (maximum temperature) + Tmin (minimum temperature))/2.

Rainfall or snowmelt with a thaw will enhance the potential for break up jams as rising water helps to lift and break up the ice. A very short thaw with little or no rain or snowmelt may not be enough to break up thick ice.

Flooding caused by ice jams is not calculated nor shown on FEMA's FIRMs. Furthermore, NWS's statement on ice jams also explains that river forecasts found on its website do not take into account the effect of ice on river levels. The complete list with fuller descriptions of the circumstances of jamming at each location can be found on the U.S. Army Corps of Engineers (USACE) website: http://icejams.crrel.usace.army.mil/

Clinton County

Known "trouble spots" of ice jamming in the watershed include areas in Clinton County along the Great Chazy River and the East Branch of the Ausable River, leading to flooding in Perry Mills, and the Towns of Champlain and Black Brook. Clinton County has had 15 ice jam events from 2004-2011[36].

[35] *http://www.weather.gov/media/aly/Hydrology/IceJamInfo.pdf*

[36] *Clinton County Hazard Mitigation Plan*

Essex County

In Essex County, ice jam events in 1996, 1998, 2000, and 2005 occurred along the Ausable and Boquet Rivers. The "Ice Storm of 1998" led to severe icing throughout the area and seriously impacted residents[37].

Warren County

In Warren County, ice storms follow flooding as the next highest-ranking natural disaster risk within the county. Between 1993 and 2009, there were 121 heavy snow or ice events (NCDC). In March 2008, over one inch of freezing rain accumulated, leading to as many as 1,000 downed trees and extended power outages. According to the Albany Times Union, as many as 5,700 people were without power[38].

Washington County

There are streams prone to ice jams in Warren County. However the most significant events have occurred outside of this Discovery project area[39].

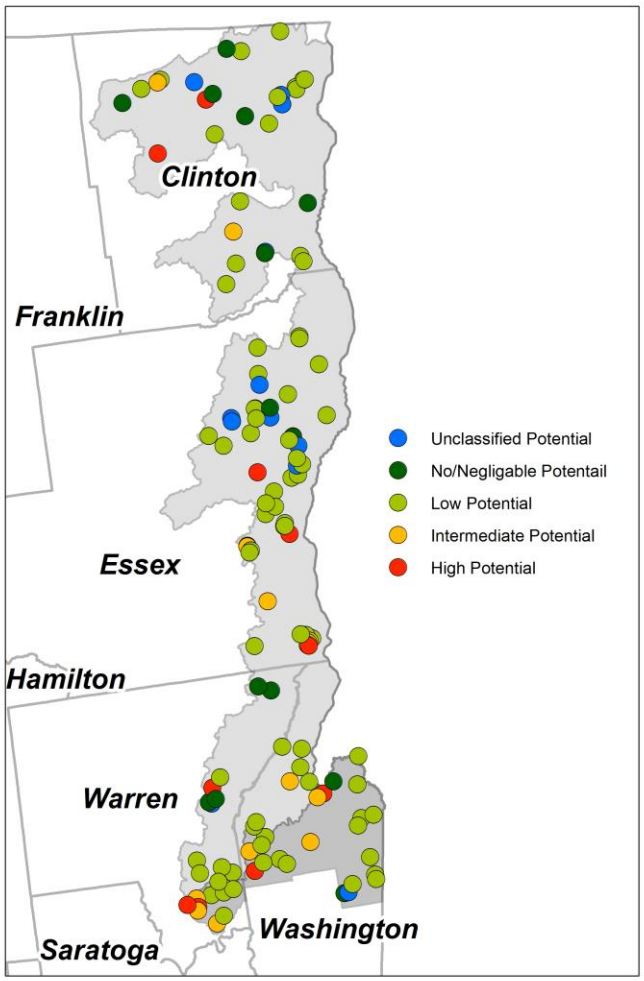

Figure 7: Location of Dams

Dams

According to the NYSDEC Dam Safety Section's dam inventory, the Lake Champlain Watershed contains 134 dam structures (*Table 7: Dams in the Lake Champlain Watershed*). NYSDEC uses a classification scale of A to D to assign hazard potential to each of the dam structures contained within the inventory. NYSDEC classifies dams in the State using the following criteria:

> Class A-Low Hazard Potential: Resulting damages from a dam failure would likely be minimal and not interfere with any critical infrastructure; personal injury and substantial economic loss is unlikely to occur.
>
> Class B-Intermediate Hazard Potential: A dam failure may result in damage to isolated homes, roads, and railways; critical facilities may experience disruption; personal injury or substantial economic loss is likely, but loss of human life is not expected.

[37] *Essex County Hazard Mitigation Plan*
[38] *Warren County Hazard Mitigation Plan*
[39] *http://www.weather.gov/media/aly/Hydrology/IceJamInfo.pdf*

Class C-High Hazard Potential: Dam failure may result in widespread or serious damage to homes; damage to roads, railroads, commercial buildings, and critical infrastructure is expected; loss of human life and substantial economic loss is expected.

Class D-Negligible or No Hazard Potential: Dam has been breached, removed, or otherwise has failed or no longer materially impounds waters, or the dam was planned, but never constructed at this location. Class D dams are considered to be defunct dams posing negligible or no hazard.

Class 0-Unclassified Hazard Potential: Hazard code has not yet been assigned.

Table 7: Dams in the Lake Champlain Watershed

County	Class A	Class B	Class C	Class D	Unclassified	Total
Clinton	16	2	2	6	7	33
Essex	33	4	3	3	7	50
Warren	11	3	3	5	1	23
Washington	19	4	2	2	1	28
Total	**79**	**13**	**10**	**16**	**16**	**134**

Source: NYSDEC

Recent Media Coverage of Natural Hazards

A summary of recent media coverage of natural hazards in the Lake Champlain Watershed is provided below.

- During the process of updating HMPs, counties underwent review of local press coverage on natural disasters. In Clinton County, this included review of the *Press-Republican* publications titled "*North Country Century*" and "*Storm '98: A North Country Disaster*"[40].
- In January 1998, severe icing throughout the area seriously impacted residents in Essex County. Several media outlets covered the storm. A federal disaster was declared and led to improvements in the county's emergency response, recovery, and mitigation strategies. Media also covered sleet/freezing rain events in January 1999, January 2002, January 2005, and March 2008.
- A record Lake Champlain flood stage of 103.27 feet in May 2011 was covered by media throughout the North Country and the Lake Champlain Basin[41].
- Tropical Storm Irene in August 2011 led to record rainfalls throughout the Lake Champlain Watershed. The greatest 24 hour single day rainfall in 2011 was August 28th, with 3.38 inches of rain. Extensive flooding and millions of dollars of damages in the watershed produced extensive media coverage[42].

[40] *Clinton County Hazard Mitigation Plan*
[41] *http://www.weather.gov/media/btv/events/Top5_2011.pdf*
[42] *ibid.*

- Hurricane Sandy in October 2012 led to billions of dollars of damages along the East Coast and impacted the Lake Champlain Watershed. Media coverage was widespread throughout the watershed including in the *Press Republican.*
- In December 2013, an ice storm emergency was declared for New York State and a state of emergency was declared in Clinton and Essex Counties. The North Country Public Radio station covered the emergency[43].
- The Queensbury *Post-Star* and the *Adirondack Almanack* reported on severe flooding along the Schroon River in 2011.
- The Queensbury *Post-Star* reported on severe flooding in February 2016 in several towns in Essex and Warren County[44].

[43] *http://blogs.northcountrypublicradio.org/inbox/2013/12/21/north-country-braces-for-ice-storm/*
[44] *http://poststar.com/news/local/flooding-inundates-region-thursday/article_2d0a671c-dbaa-11e5-8bec-8bc8507650b3.html*

III. Summary of Watershed-Wide Data

National Flood Insurance Program (NFIP) Data

Effective Regulatory FIRMs

As noted in earlier sections of this report, the Lake Champlain Watershed covers portions of four counties in the State. While the FIRMs for Clinton County were revised within the past decade, the FIRMs for communities in Warren, Washington, and Essex County are much older.

Clinton County currently has a countywide FIRM, effective as of 2007. Project communities in Essex County have community-based FIRMs, with map effective dates ranging from 1984 to 1996. Project communities in Warren County have community-based FIRMs, with map effective dates ranging from 1984 to 1996. Project communities in Washington County have community-based FIRMs, with map effective dates ranging from 1985 to 1997.

The Village of Fort Ann in Washington County has no FIRM and is participating in the NFIP with no Special Flood Hazard Areas (SFHA) identified. Even though the community does not have a FIRM, residents are still eligible to purchase flood insurance.

To date, the Town of Dannemora in Clinton County is not participating in the NFIP. As a result, the economic consequences of Sections 201(d) and 202 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) may apply. Flood insurance is not available in communities that do not participate in the NFIP.

The effective FIRM dates for each of the participating communities is shown in *Table 8: FIRM Effective Dates (as of May 2016)*.

Table 8: FIRM Effective Dates (as of May 2016)

County	Community	FIRM Effective Date	Notes
Clinton County (Countywide FIRM)	Altona, Town of	9/28/2007	
	Ausable, Town of	9/28/2007	
	Beekmantown, Town of	9/28/2007	
	Black Brook, Town of	9/28/2007	
	Champlain, Town of	9/28/2007	
	Champlain, Village of	9/28/2007	
	Chazy, Town of	9/28/2007	
	Clinton, Town of	9/28/2007	
	Dannemora, Town of	N/A	Not participating in NFIP
	Ellenburg, Town of	9/28/2007	
	Mooers, Town of	9/28/2007	
	Peru, Town of	9/28/2007	
	Plattsburgh, City of	9/28/2007	

Table 8: FIRM Effective Dates (as of May 2016)

County	Community	FIRM Effective Date	Notes
Clinton County (Countywide FIRM)	Plattsburgh, Town of	9/28/2007	
	Saranac, Town of	9/28/2007	
	Schuyler Falls, Town of	9/28/2007	
Essex County	Chesterfield, Town of	5/4/1987	
	Crown Point, Town of	7/16/1987	
	Elizabethtown, Town of	1/20/1993	
	Essex, Town of	4/3/1987	
	Keene, Town of	6/5/1985	
	Lewis, Town of	5/15/1985	
	Moriah, Town of	9/24/1984	
	Port Henry, Village of	7/16/1987	
	Ticonderoga, Town of	9/6/1996	
	Westport, Town of	9/4/1987	
	Willsboro, Town of	5/18/1992	
Warren County	Bolton, Town of	8/16/1996	
	Hague, Town of	9/29/1996	
	Horicon, Town of	2/15/1985	
	Lake George, Town of	8/16/1996	
	Lake George, Village of	9/29/1996	
	Queensbury, Town of	8/16/1996	
	Warrensburg, Town of	3/1/1984	
Washington County	Dresden, Town of	9/20/1996	
	Fort Ann, Town of	11/5/1997	
	Fort Ann, Village of	N/A	No SFHAs mapped
	Granville, Town of	8/5/1985	
	Granville, Village of	4/17/1985	
	Hampton, Town of	4/17/1985	
	Putnam, Town of	11/20/1996	
	Whitehall, Town of	7/3/1986	
	Whitehall, Village of	6/3/1985	

Letters of Map Change (LOMCs)

Due to limitations in the scale or topographic detail of the source maps used to prepare a FIRM, on occasion, small areas of elevated land may be included in an SFHA. When property owners feel that this has occurred, they may request a Letter of Map Change (LOMC) for their property or structure.

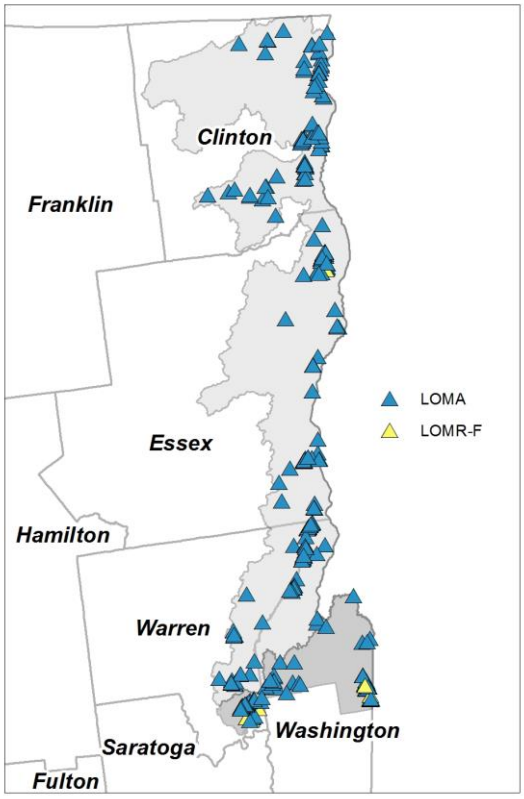

Figure 8: LOMCs in the Lake Champlain Watershed

A LOMC is the general term for a suite of methods FEMA uses to make an official flood hazard determination for a structure or property. The Letter of Map Amendment (LOMA) process, for properties on natural high ground, or the Letter of Map Revision based on Fill (LOMR-F) process, for properties elevated by the placement of fill, are the most common ways used to amend the FIRM. These methods do not physically change the FIRM for a community; rather they amend, *by letter*, the FIRM for the benefit of accurate site information without the cost of publishing a revised FIRM panel. By comparison, a Letter of Map Revision (LOMR) is commonly used by community officials to request FIRM changes stemming from completed development (e.g. the construction of a bridge), flood-control projects (e.g., the construction of a levee), or other larger-scale changes in the floodplain (e.g., the paving of the channel of a stream).

Figure 8: LOMCs in the Lake Champlain Watershed highlights the areas within the watershed that have LOMCs. There are a total 376 LOMAs/LOMR-F and no LOMRs located in the watershed. Clinton County has 147 LOMAs/LOMR-Fs. Essex County has 64 LOMAs/LOMR-Fs. Warren County has 69 LOMAs/LOMR-Fs. Washington County has 96 LOMAs/LOMR-Fs (*Table 9: LOMCs in the Project Area (as of May 2016)*).

More information on the LOMA and LOMR-F processes can be found on FEMA's LOMC website.

Table 9: LOMCs in the Project Area (as of May 2016)

County	Community	Number of LOMA/LOMR-Fs	Number of LOMRs	FIRM Effective Date
Clinton County	Altona, Town of	0	0	9/28/2007
	Ausable, Town of	2	0	9/28/2007

Table 9: LOMCs in the Project Area (as of May 2016)

County	Community	Number of LOMA/LOMR-Fs	Number of LOMRs	FIRM Effective Date
Clinton County	Beekmantown, Town of	7	0	9/28/2007
	Black Brook, Town of	12	0	9/28/2007
	Champlain, Town of	7	0	9/28/2007
	Champlain, Village of	0	0	9/28/2007
	Chazy, Town of	19	0	9/28/2007
	Clinton, Town of	0	0	9/28/2007
	Dannemora, Town of	N/A	N/A	N/A
	Ellenburg, Town of	27	0	9/28/2007
	Mooers, Town of	4	0	9/28/2007
	Peru, Town of	10	0	9/28/2007
	Plattsburgh, City of	19	0	9/28/2007
	Plattsburgh, Town of	26	0	9/28/2007
	Saranac, Town of	9	0	9/28/2007
	Schuyler Falls, Town of	5	0	9/28/2007
Essex County	Chesterfield, Town of	2	0	5/4/1987
	Crown Point, Town of	19	0	7/16/1987
	Elizabethtown, Town of	0	0	1/20/1993
	Essex, Town of	4	0	4/3/1987
	Keene, Town of	2	0	6/5/1985
	Lewis, Town of	1	0	5/15/1985
	Moriah, Town of	0	0	9/24/1984
	Port Henry, Village of	0	0	7/16/1987
	Ticonderoga, Town of	5	0	9/6/1996
	Westport, Town of	2	0	9/4/1987
	Willsboro, Town of	29	0	5/18/1992
Warren County	Bolton, Town of	5	0	8/16/1996
	Hague, Town of	1	0	9/29/1996
	Horicon, Town of	9	0	2/15/1985
	Lake George, Town of	6	0	8/16/1996

Table 9: LOMCs in the Project Area (as of May 2016)

County	Community	Number of LOMA/LOMR-Fs	Number of LOMRs	FIRM Effective Date
Warren County	Lake George, Village of	3	0	9/29/1996
	Queensbury, Town of	42	0	8/16/1996
	Warrensburg, Town of	3	0	3/1/1984
Washington County	Dresden, Town of	11	0	9/20/1996
	Fort Ann, Town of	23	0	11/5/1997
	Fort Ann, Village of	N/A	N/A	N/A
	Granville, Town of	13	0	8/5/1958
	Granville, Village of	10	0	4/17/1985
	Hampton, Town of	4	0	4/17/1985
	Putnam, Town of	32	0	11/20/1996
	Whitehall, Town of	0	0	7/3/1986
	Whitehall, Village of	3	0	6/3/1985

Coordinated Needs Management Strategy (CNMS) and NFIP Mapping Needs

Coordinated Needs Management Strategy (CNMS) is a FEMA initiative to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities. CNMS defines an approach and structure for the identification and management of flood hazard mapping needs that supports data-driven planning and the flood map update investment process in a geospatial (or GIS) environment. The goal is to identify areas where existing flood maps are not up to FEMA's mapping standards.

There are three classifications within the CNMS: "Valid," "Unverified," and "Unknown." New and updated studies (i.e., those with new hydrologic and hydraulic models) performed during FEMA's Map Modernization program were automatically determined to be "Valid" and the remaining studies went through a 17 element validation process with seven critical and ten secondary elements. Validation elements apply physical, climatological, and environmental factors to stream studies to determine validity. A stream study has to pass all of the critical elements and at least seven secondary elements in order to be classified as "Valid." The remainder of the streams are classified as "Unverified."

The following seven Critical Elements or "checks" must be answered satisfactorily in order for a stream reach to be determined "valid":

- Change in the Gage Record: Has a major flood event caused a major change in gage record since the effective analysis?

- Change in Discharge: Do the updated and effective peak discharges differ significantly based on confidence limit criteria in *FEMA's Guidelines and Specifications* (G&S)?
- Model Methodology: Is the model methodology no longer appropriate based on FEMA's G&S?
- Hydraulic Change: Has a major flood-control structure (dam/levee/floodwall/other change) been added or removed from the surface water reach?
- Channel Reconfiguration: Is the current channel reconfiguration outside the effective SFHA? (Has the stream moved?)
- Other Hydraulic Changes: Have more than five hydraulic structures (bridge/culvert) been added or removed that impact Base Flood Elevations (BFEs) on the reach?
- Channel Area Change: Has there been significant channel fill or scour?

If one or more of the above noted elements are true, then the flood hazard information for the reach is "invalid." Not all elements may be applicable for all flooding sources.

In addition to the seven Critical Elements, if four or more of the following Secondary Elements are true then the flood hazard information must be recorded as "Invalid."

- Regression Equation: Has a rural regression equation been used in a now urbanized area?
- Repetitive Loss: Are there repetitive losses outside the SFHA?
- Impervious Area: Has there been an increase in impervious area in the sub-basin of equal to or greater than 50 percent?
- Hydraulic Structure: Have more than one, but less than five, hydraulic structures (bridge/culvert) been added or removed that impact BFEs on the reach?
- Channel Improvements: Have there been channel improvements or shoreline changes?
- Topography Data: Is better topography and/or bathymetry available?
- Vegetation or Land Use: What changes to vegetation or land use have occurred in the area?
- Coastal Dune: Is there a failure to identify primary frontal dune in coastal areas?
- High Water Mark: Have significant storms occurred with recorded HWMs?
- Regression Equation: Are new regression equations available?

CNMS is a living database that is continuously updated whenever new or revised studies become available. As part of that update, valid stream reaches will be reassessed every 5 years and invalid streams will be prioritized for potential funding. Watershed Discovery meetings provide an opportunity for the gathering and prioritization of CNMS community requests. *Table 10: Current Status of CNMS (as of May 2016)* shows the status of the portions of each county in this project area *prior* to the Discovery process.

Table 10: Current Status of CNMS (as of May 2016)

County	FIPS	Stream Mileage Within Lake Champlain Watershed			
		Valid	Unverified	Unknown	Total
Clinton	36019C	64	33	480	577
Essex	36031C	0	0	128	128
Warren*	36113C	9	33	40	82
Washington*	36115C	67	0	130	197

**Values include a portion of the Mettawee River Watershed*

Source: FEMA

The CNMS Data Viewer can be accessed online at https://msc.fema.gov/cnms/. More information about CNMS can also be found on FEMA's CNMS fact sheet at http://www.fema.gov/media-library/assets/documents/21436?id=4628.

Flood Insurance Policies and Claims

A community's agreement to adopt and enforce floodplain management ordinances as part of the NFIP, particularly with respect to new construction, is an important risk reduction element in making federally backed flood insurance available to property owners.

As part of this Discovery project, data regarding NFIP flood insurance policies in the watershed were collected. As of March 2016, 603 policies were in-force accounting for $131,877,500 in insurance coverage within the Lake Champlain Watershed. The number of policies and total coverage cost are listed in *Table 11: Flood Insurance Policy and Claims Data (as of March 2016)*.

The communities within the watershed in Clinton County have 242 flood insurance policies with $49.2 million in insurance coverage. In Essex County, there are 139 policies with $29.3 million in insurance coverage within watershed communities. In Warren County, there are 156 policies with $40.2 million in coverage within watershed communities. In Washington County, there are 66 policies with $7 million in coverage within watershed communities.

Table 11: Flood Insurance Policy and Claims Data (as of March 2016)

County	Community	Number of Policies	Total Amount of Coverage	Number of Claims	Total Claims Paid
Clinton County	Altona, Town of	10	$1,286,100	4	$60,732
	Ausable, Town of	10	$1,756,100	18	$510,630
	Beekmantown, Town of	18	$4,405,800	12	$174,912
	Black Brook, Town of	14	$3,130,100	21	$495,149
	Champlain, Town of	0	0	0	0
	Champlain, Village of	8	$730,400	33	$131,527
	Chazy, Town of	35	$6,858,800	18	$333,018
	Clinton, Town of	1	$136,700	2	$32,159

Table 11: Flood Insurance Policy and Claims Data (as of March 2016)

County	Community	Number of Policies	Total Amount of Coverage	Number of Claims	Total Claims Paid
Clinton County	Dannemora, Town of	N/A	N/A	N/A	N/A
	Ellenburg, Town of	15	$1,694,400	7	$185,154
	Mooers, Town of	6	$492,000	2	$7,061
	Peru, Town of	11	$2,538,000	23	$424,453
	Plattsburgh, City of	43	$8,899,300	25	$1,280,088
	Plattsburgh, Town of	47	$12,906,900	43	$565,905
	Saranac, Town of	11	$1,327,800	8	$45,832
	Schuyler Falls, Town of	13	$3,065,000	25	$232,595
Essex County	Chesterfield, Town of	10	$2,647,900	11	$230,558
	Crown Point, Town of	14	$2,840,000	4	$7,014
	Elizabethtown, Town of	20	$3,821,700	27	$273,106
	Essex, Town of	5	$861,700	7	$17,651
	Keene, Town of	37	$9,906,500	38	$922,336
	Lewis, Town of	3	$832,400	3	$81,087
	Moriah, Town of	3	$649,000	0	$0
	Port Henry, Village of	2	$550,000	1	$0
	Ticonderoga, Town of	14	$1,700,900	4	$41,614
	Westport, Town of	5	$611,000	16	$169,545
	Willsboro, Town of	26	$4,938,300	13	$104,698
Warren County	Bolton, Town of	10	$2,337,000	5	$40,328
	Hague, Town of	14	$3,261,700	4	$8,021
	Horicon, Town of	22	$4,957,200	6	$104,431
	Lake George, Town of	10	$2,130,000	8	$54,722
	Lake George, Village of	5	$2,150,000	6	$102,648
	Queensbury, Town of	73	$19,259,000	52	$1,159,851
	Warrensburg, Town of	22	$6,118,400	8	$11,648
Washington County	Dresden, Town of	12	$3,680,700	14	$154,154
	Fort Ann, Town of	12	$2,426,700	5	$132,754
	Fort Ann, Village of	0	0	0	0
	Granville, Town of	3	$921,000	5	$156,319
	Granville, Village of	12	$1,781,500	14	$165,199
	Hampton, Town of	2	$226,000	3	$1,597
	Putnam, Town of	8	$1,852,000	8	$9,831
	Whitehall, Town of	11	$1,404,100	10	$60,954

Table 11: Flood Insurance Policy and Claims Data (as of March 2016)

County	Community	Number of Policies	Total Amount of Coverage	Number of Claims	Total Claims Paid
Washington County	Whitehall, Village of	6	$785,400	40	$301,223

Source: FEMA

Repetitive Loss/Severe Repetitive Loss Properties

A Repetitive Loss (RL) is a property that has received two or more claim payments of more than $1,000 from the NFIP within any rolling 10-year period. In the Lake Champlain Watershed, there were 42 repetitive losses within the study area accounting for $1,980,267 in claims paid as of May 2016. The data are shown in *Table 12: Repetitive Losses in Study Area (as of March 2016).*

A Severe Repetitive Loss (SRL) property is defined as a residential property that is covered under an NFIP flood insurance policy and (a) has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; and (b) for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. For both (a) and (b), at least two of the referenced claims must have occurred within any 10-year period, and must be greater than 10 days apart. There is 1 SRL property in the Lake Champlain Watershed. This property is located in the Town of Chesterfield in Essex County and has a total paid claim amount of $159,532.

Table 12: Repetitive Losses in Study Area (as of March 2016)

County	Community	Number of Repetitive Loss Properties	Total Claims Paid
Clinton County	Altona, Town of	0	N/A
	Ausable, Town of	2	$48,968
	Beekmantown, Town of	0	N/A
	Black Brook, Town of	3	$58,344
	Champlain, Town of	4	$114,043
	Champlain, Village of	5	$67,808
	Chazy, Town of	1	$18,500
	Clinton, Town of	2	$74,268
	Dannemora, Town of	N/A	N/A
	Ellenburg, Town of	1	$117,111
	Mooers, Town of	1	$18,437
	Peru, Town of	3	$269,075
	Plattsburgh, City of	1	$75,836

Table 12: Repetitive Losses in Study Area (as of March 2016)

County	Community	Number of Repetitive Loss Properties	Total Claims Paid
Clinton County	Plattsburgh, Town of	2	$257,350
	Saranac, Town of	1	$8,812
	Schuyler Falls, Town of	0	N/A
Essex County	Chesterfield, Town of	1	$159,532
	Crown Point, Town of	0	N/A
	Elizabethtown, Town of	3	$110,000
	Essex, Town of	0	N/A
	Keene, Town of	3	$433,059
	Lewis, Town of	0	N/A
	Moriah, Town of	0	N/A
	Port Henry, Village of	0	N/A
	Ticonderoga, Town of	0	N/A
	Westport, Town of	1	$10,136
	Willsboro, Town of	2	$80,467
Warren County	Bolton, Town of	0	N/A
	Hague, Town of	0	N/A
	Horicon, Town of	0	N/A
	Lake George, Town of	1	$4,960
	Lake George, Village of	1	$24,854
	Queensbury, Town of	2	$16,308
	Warrensburg, Town of	0	N/A
Washington County	Dresden, Town of	0	N/A
	Fort Ann, Town of	0	N/A
	Fort Ann, Village of	0	N/A
	Granville, Town of	0	N/A
	Granville, Village of	0	N/A
	Hampton, Town of	0	N/A
	Putnam, Town of	0	N/A
	Whitehall, Town of	2	$12,399
	Whitehall, Village of	0	N/A

Source: FEMA

Structures that flood frequently strain the NFIP Fund. In fact, RL properties are the biggest draw on the Fund. FEMA has paid almost $3.5 billion in claims for RL properties. RL properties not

only increase the NFIP's annual losses and the need for borrowing funds from Congress, but also drain funds needed to prepare for future catastrophic events.

Clusters of RL and previous NFIP assistance are used to identify "hot spot" areas within communities. This information can be used to identify areas of mitigation interest and updated mapping needs and products for individual communities.

Community Assistance Visits (CAVs)

Statewide Community Assistance Visits (CAVs) are part of the evaluation and review process used by FEMA, NYSDEC Floodplain Management staff, and local officials to ensure that each community adequately enforces local floodplain management regulations to remain in compliance with NFIP requirements. Generally, a CAV consists of a tour of the floodplain, an inspection of community permit files, and meetings with local appointed and elected officials. During a CAV, observations and investigations will focus on identifying issues in various areas, such as community floodplain management regulations/ordinances, community administration and enforcement procedures, engineering or other issues related to FIRMs, and other problems related to community floodplain management.

Any administrative problems or potential violations identified during a CAV will be documented in the CAV findings report. The community will be notified and given the opportunity to correct administrative procedures and remedy any violations to the maximum extent possible within established deadlines.

CAVs are also a way to provide technical assistance to communities. If administrative problems or potential violations are identified, the community will be notified and given the opportunity to correct those administrative procedures and remedy the violations to the maximum extent possible within established deadlines. FEMA or the State will work with the community to help bring the program into compliance with NFIP requirements. In extreme cases where the community does not take action to bring itself into compliance, FEMA may initiate an enforcement action against the community. A program deficiency is a defect in a community's floodplain management regulations or administrative procedures that impacts effective implementation of floodplain management regulations of the standard in 44 CFR Sections 60.3, 60.4, or 60.6. "Open" CAVs can be indicative of unresolved violations.

Community Assistance Contacts (CACs)

Community Assistance Contacts (CACs) in the watershed have been more sporadic during the last 20 years. CACs are a tool employed by the State of New York and FEMA to periodically contact a community to see if they are having any difficulties in administering the local floodplain management ordinance or program. A CAC is an additional way of determining if a CAV should be scheduled. CACs are also a means of encouraging Code Enforcement Officers to attend annual floodplain management workshops. CACs can serve to support local officials when they need help to effectively administer the NFIP in their community.

Table 13: CAVs and CACs Performed within the Project Area (as of March 2016) lists the most recent CAVs and CACs performed for communities located within the project area.

Table 13: CAVs and CACs Performed within the Project Area (as of March 2016)

County	Community	Most Recent CAV Date	Most Recent CAC Date
Clinton County	Altona, Town of	N/A	N/A
	Ausable, Town of	10/01/14	09/30/11
	Beekmantown, Town of	08/01/14	07/19/11
	Black Brook, Town of	10/28/13	09/28/15
	Champlain, Town of	09/28/06	07/19/11
	Champlain, Village of	09/28/07	N/A
	Chazy, Town of	09/27/91	07/19/11
	Clinton, Town of	N/A	N/A
	Dannemora, Town of	N/A	N/A
	Ellenburg, Town of	09/30/15	N/A
	Mooers, Town of	05/15/91	03/22/07
	Peru, Town of	09/13/91	07/21/11
	Plattsburgh, City of	09/27/06	07/20/11
	Plattsburgh, Town of	09/27/06	07/20/11
	Saranac, Town of	08/26/14	02/14/11
	Schuyler Falls, Town of	N/A	N/A
Essex County	Chesterfield, Town of	N/A	N/A
	Crown Point, Town of	06/04/14	09/28/11
	Elizabethtown, Town of	09/18/13	09/07/11
	Essex, Town of	N/A	09/28/11
	Keene, Town of	09/18/13	09/28/11
	Lewis, Town of	09/29/94	09/28/11
	Moriah, Town of	N/A	09/28/11
	Port Henry, Village of	N/A	N/A
	Ticonderoga, Town of	N/A	09/29/11
	Westport, Town of	09/18/15	N/A
	Willsboro, Town of	N/A	09/28/11
Warren County	Bolton, Town of	06/06/13	10/08/15
	Hague, Town of	10/01/10	08/28/95
	Horicon, Town of	08/22/95	07/13/11
	Lake George, Town of	09/10/15	N/A
	Lake George, Village of	N/A	N/A
	Queensbury, Town of	05/06/14	N/A
	Warrensburg, Town of	08/12/09	N/A
Washington County	Dresden, Town of	08/26/09	N/A

Table 13: CAVs and CACs Performed within the Project Area (as of March 2016)

County	Community	Most Recent CAV Date	Most Recent CAC Date
Washington County	Fort Ann, Town of	N/A	N/A
	Fort Ann, Village of	N/A	N/A
	Granville, Town of	N/A	N/A
	Granville, Village of	N/A	05/14/09
	Hampton, Town of	N/A	04/16/07
	Putnam, Town of	04/02/92	N/A
	Whitehall, Town of	07/17/15	N/A
	Whitehall, Village of	N/A	N/A

Ordinances

The project area's local jurisdictions have a patchwork of regulations regarding development within known SFHAs, ranging from ordinances with minimum NFIP requirements to strong, pro-active ordinances that not only regulate and protect new and improved development in existing SFHAs, but seek to mitigate the growth of SFHAs caused by increased runoff from developed areas and the degradation of natural flood control areas, such as wetlands and forests. The NFIP uses six different ordinance levels (60.3 land-use classification levels).

The following summarizes the three different ordinance levels New York State uses, and which will be located in the local law for the community.

1. The "A" type should be used when 1-percent-annual-chance floodplains have not yet been identified.

2. The "D" type should be used when 1-percent-annual-chance floodplains without BFEs have been identified; 1-percent-annual-chance floodplains with BFEs, but without floodways have been identified; and 1-percent-annual-chance floodplains with BFEs and a floodway have been identified. If the community also has coastal flooding, but does not have coastal high-hazard areas (V Zones), it is a "D" type.

3. The "E" type should be used when coastal high-hazard areas (V Zones) have been identified.

Table 14 lists the Program Status and Ordinance Level for each community in the Lake Champlain Watershed.

Table 14: Program Status and Ordinance Level (as of May 2016)

County	Community	Program Status	Ordinance Level	Ordinance Effective Date
Clinton County	Altona, Town of	Regular	D	7/9/2007
	Ausable, Town of	Regular	D	7/16/2007
	Beekmantown, Town of	Regular	D	8/23/2007
	Black Brook, Town of	Regular	D	9/4/2007
	Champlain, Town of	Regular	D	7/27/2007
	Champlain, Village of	Regular	D	6/11/2007
	Chazy, Town of	Regular	D	7/16/2007
	Clinton, Town of	Regular	D	7/25/2007
	Dannemora, Town of	Not participating	N/A	N/A
	Ellenburg, Town of	Regular	D	7/17/2007
	Mooers, Town of	Regular	D	7/10/2007
	Peru, Town of	Regular	D	9/25/2007
	Plattsburgh, City of	Regular	D	8/2/2007
	Plattsburgh, Town of	Regular	D	9/10/2007
	Saranac, Town of	Regular	D	5/21/2007
	Schuyler Falls, Town of	Regular	D	6/26/2007
Essex County	Chesterfield, Town of	Regular	D	5/4/1987
	Crown Point, Town of	Regular	D	7/16/1987
	Elizabethtown, Town of	Regular	D	7/20/1984
	Essex, Town of	Regular	D	4/3/1987
	Keene, Town of	Regular	D	6/5/1985
	Lewis, Town of	Regular	D	5/15/1985
	Moriah, Town of	Regular	D	10/29/1992
	Port Henry, Village of	Regular	D	7/16/1987
	Ticonderoga, Town of	Regular	D	5/17/1988
	Westport, Town of	Regular	D	9/4/1987
	Willsboro, Town of	Regular	D	3/18/1987
Warren County	Bolton, Town of	Regular	D	7/3/1986
	Hague, Town of	Regular	D	5/15/1985
	Horicon, Town of	Regular	D	4/20/1989
	Lake George, Town of	Regular	D	4/30/1986
	Lake George, Village of	Regular	D	6/22/1984

Table 14: Program Status and Ordinance Level (as of May 2016)

County	Community	Program Status	Ordinance Level	Ordinance Effective Date
Warren County	Queensbury, Town of	Regular	D	7/16/1984
	Warrensburg, Town of	Regular	D	3/1/1984
Washington County	Dresden, Town of	Regular	D	7/3/1986
	Fort Ann, Town of	Regular	D	4/17/1985
	Fort Ann, Village of	Regular	A	12/19/1984
	Granville, Town of	Regular	D	8/5/1985
	Granville, Village of	Regular	D	4/17/1985
	Hampton, Town of	Regular	D	4/17/1985
	Putnam, Town of	Regular	D	8/19/1986
	Whitehall, Town of	Regular	D	7/3/1986
	Whitehall, Village of	Regular	D	6/3/1985

The NFIP-participating communities within the watershed have floodplain management regulations in place and have a mechanism for updating their ordinances.

Community Rating System (CRS)

The Community Rating System (CRS) is a voluntary incentive program that provides flood insurance premium discounts to NFIP-participating communities that take extra measures to manage floodplains above the minimum requirements. A point system is used to determine a CRS rating. The more measures a community takes to minimize or eliminate exposure to floods, the more CRS points are awarded and the higher the discount on flood insurance premiums. As a result, flood insurance premium rates are discounted from 5 to 45 percent to reflect the reduced flood risk resulting from a community's actions to successfully meet the three CRS goals:

1. Reduce flood damage to insurable property;
2. Strengthen and support the insurance aspects of the NFIP; and
3. Encourage a comprehensive approach to floodplain management.

Currently there are no communities in the project area that participate in CRS. For more information on CRS, visit FEMA's website at https://www.fema.gov/community-rating-system.

Additional information on the CRS program would be of benefit to all watershed communities to ensure they are fully aware of what the CRS is, if a community is eligible to apply, and what level of effort is required to make CRS participation beneficial for a community. Local communities may wish to consider pooling resources and efforts or work on a countywide basis to ease the level of effort to comply with the requirements of joining the CRS program.

Other Data Useful for Flood Risk Assessment and Mitigation

Topographic Data

Topography is the description of surface shapes and features. Today topographic data is commonly captured using Light Detection and Ranging (LiDAR) techniques. LiDAR is a state-of-the-art method for collecting accurate topographic elevation information using an instrument that measures distance to a reflecting object by emitting timed pulses of laser light and measuring the time between emission and reception of reflected pulses. More information on LiDAR is available on NOAA's website. LiDAR elevation data are only available for some portions of the Lake Champlain Watershed at this time, although there is currently an ongoing project to obtain the remainder of the data. Information about the coverage of LiDAR data in New York State is available at the NYSGIS Clearinghouse.

Dams

Please refer to the Historic Flooding Problems subsection in Section II of this report for information about dams in the Lake Champlain Watershed.

Levees

A levee or floodwall is defined in the Code of Federal Regulations (CFR), Title 44, Section 59.1 as "a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding".

There is an inactive flood control project in the Village of Whitehall on Wood Creek that is in unacceptable condition. Project details are available on NYSDEC's website. No other floodwalls or levees were identified in data collection efforts for this Discovery project.

Stream Gages and Flows

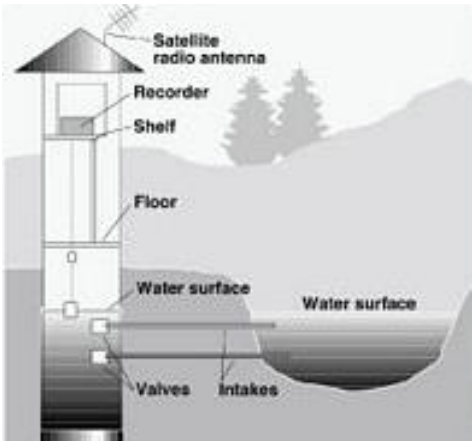

Figure 9: Typical Modern USGS Stream Gage

According to the U.S. Geological Survey (USGS), most USGS stream gages operate by measuring the elevation of the water in the river or stream and then converting the water elevation (called "stage") to a stream flow ("discharge") by using a curve that relates the elevation to a set of actual discharge measurements.

The USGS standard is to measure river stage to 0.01 inches. This is accomplished by the use of floats inside a stilling well, by the use of pressure transducers that measure how much pressure is required to push a gas bubble through a tube (related to the depth of water), or with radar. Figure 3: *Typical Modern USGS Stream Gage* illustrates the design of a river gaging station.

At most USGS stream gages, the stage is measured every 15 minutes and the data are stored in an electronic data recorder. At set intervals, usually between every one to four hours, the data are transmitted to USGS using satellite, phone, or radio. At the USGS offices, the curves relating stage to stream flow are applied to determine stream flow estimates and both the stage and stream flow data are then displayed on the USGS website. For more information on how stream gages work, please see the USGS's factsheet on stream gaging.

There are eight known active and inactive gages in the watershed. *Table 15: USGS Gages in the Lake Champlain Watershed* shows the gage identification number, location, drainage area, status, and county for all USGS gages identified in the watershed. Additional information on gages in the watershed may be found by visiting the USGS's website.

Table 15: USGS Gages in the Lake Champlain Watershed

Gage ID	Gage Location	Drainage Area (sq. miles)	Gage Status	County
4278300	Northwest Bay Brook Near Bolton Landing, NY	22.280	Inactive	Warren
4279000	La Chute at Ticonderoga, NY	258.966	Inactive	Essex
4276842	Putnam Creek East of Crown Point Center, NY	52.023	Active	Essex
4276500	Bouquet River at Willsboro, NY	268.082	Active	Essex
4273800	Little Ausable River Near Valcour ,NY	68.308	Active	Clinton
4273700	Salmon River at South Plattsburgh, NY	65.581	Active	Clinton
4271815	Little Chazy River near Chazy, NY	50.401	Active	Clinton
4271500	Great Chazy River at Perry Mills, NY	243.399	Active	Clinton

Rain Gages

The National Oceanic and Atmospheric Administration's (NOAA) Cooperative Observer Program is a weather and climate observing network of more than 11,000 volunteers who take observations nationwide on farms, in urban and suburban areas, National Parks, seashores, and mountaintops. When appropriate, FEMA will utilize the NOAA information from these gages in developing meteorological models for the watershed that will employ rainfall runoff models and calibration.

Additional information on rainfall in New York State can be found in NOAA Technical Paper No. 49 and in the Technical Memorandum NWS HYDRO-35, both on NOAA's website. It should be noted that data has been updated through a joint collaboration between the National Resources Conservation Service (NRCS) and the Northeast Regional Climate Center (NRCC) and is available at Extreme Precipitation in New York and New England webpage.

Average Annualized Loss (AAL) Data

The AAL data provide a general understanding of the dollar losses associated with a certain flood event frequency within a county and are used to get a relative comparison of flood risk. It is

determined by using FEMA's Multi-Hazard Risk Assessment and Loss Estimation Program, otherwise known as Hazus-MH.

The Hazus Flood Model analyzes both riverine and coastal flood hazards. Flood hazard is defined by a relationship between depth of flooding and the annual chance of inundation to that depth. Probabilistic events are modeled by looking at the damage caused by an event that is likely to occur over a given period of time, known as a return period or recurrence interval (10-, 25-, 50-, 100-, and 500-year). Annualized losses are the summation of losses over all return periods multiplied by the probability of occurrence. Loss estimation for this Hazus module is based on specific input data. The first type of data includes square footage of buildings for specified types or population. The second type of data includes information on the local economy that is used in estimating losses.

AAL data summarized at the census block level are shown on the Discovery Maps and provided in tabular format in Appendix J. Total losses for the communities included in the Lake Champlain Watershed project area are estimated at over $7.9 million for AAL.

Municipal Separate Storm Sewer Systems (MS4s)

As noted on the NYSDEC's website, Federal Stormwater Phase II regulations require permits for stormwater discharges from MS4s in urban areas and for construction activities that disturb one or more acres of land. To implement the law, NYSDEC has developed two general permits, one for MS4s in urbanized areas and one for construction activities. The permits are part of the State Pollutant Discharge Elimination System (SPDES). Operators of regulated MS4s and operators of construction activities must obtain permit coverage under either an individual SPDES permit or one of the general permits prior to commencement of construction.

Guidance for local officials on complying with State and Federal stormwater management requirements, Minimum Measures 4 and 5, can be found on the NYSDEC's website.

Detailed maps that depict where the regulated MS4 boundaries lie can be found on the NYSDEC's website.

Transportation

Transportation is the movement of people and goods from location to location. These features include roads, rail, and air. Planning for these features allows for utilization and function within communities and interaction with other communities. They are the backbone of economies and diversity. These features are critical for community planning related to risk assessments for evacuation routes and potential flooding issues that could occur. Transportation features were obtained from the applicable FIRM databases and supplemented with data from communities and the New York State GIS Clearinghouse.

Jurisdictional Boundaries

Jurisdictional boundaries used for this Discovery project, including boundaries for cities, towns, villages, and counties, were also obtained from NYSDEC and are also available through the New York State GIS Clearinghouse.

Hazard Mitigation Planning and Activities

Summary of Hazard Mitigation Plans

A local HMP is a long-term strategic/guidance document used by an entity to reduce future risk to life, property, and the economy in a community. The purpose of the HMP is to:

- Identify vulnerabilities to natural hazards and provide for potential projects to reduce those vulnerabilities in the future;
- Protect life, safety, and property by reducing the potential for future damages and economic losses that result from natural hazards;
- Qualify for additional grant funding, in both the pre-disaster and post-disaster environment;
- Speed recovery and redevelopment following future disaster events;
- Demonstrate a firm local commitment to hazard mitigation principles; and
- Comply with both State and Federal legislative requirements for local HMPs.

The HMPs outline mitigation actions that officials believe are attainable and can be implemented. More information on such actions can be found in the "Mitigation Projects Completed or Underway" section.

Status of Approved Hazard Mitigation Plans

As of July 2016, 27 communities within the watershed had approved HMPs. The New York State Division of Homeland Security and Emergency Services (NYSDHES) reviews the local HMPs prior to FEMA review and approval. These plans identify potential hazards and threats that face each community. Subsequent to approval and adoption of the HMPs, the communities are eligible to receive grants for future mitigation projects through the Hazard Mitigation Grant Program. There are numerous advantages to mitigation. The creation of a mitigation plan helps local officials identify potential future hazards. Once the threats are identified, the communities can identify mitigation activities, projects, and strategies to eliminate or minimize the impact a potential hazard would cause. Preventative measures are also cost effective; preventing the impact of a hazard will cost less than cleaning up after a disaster occurs. Mitigation can prevent the loss of lives as well as property damage. These plans focus on the exposure of critical facilities and community-owned assets to potential hazards and address ways to reduce the vulnerability to these threats. Some of these actions, projects, and strategies may take little time to employ while others may take years to implement.

HMPs are often completed at the county or regional level. At the local level, each municipality government also adopts the HMP as an individual plan or regional plan. Each municipality that adopts the HMP must develop specific mitigation actions to address vulnerabilities. The status of approved HMPs is shown in *Table 16: Approved Hazard Mitigation Plans (as of July 2016)*. Communities without a current HMP, such as communities in Warren and Washington Counties, are in the process of updating their plans.

Table 16: Approved Hazard Mitigation Plans (as of July 2016)

County	Community	Approval Date	Plan Expiration
Clinton County (County HMP approved 10/15/2014)	Altona, Town of	10/15/2014	10/15/2019
	Ausable, Town of	10/15/2014	10/15/2019
	Beekmantown, Town of	10/15/2014	10/15/2019
	Black Brook, Town of	10/15/2014	10/15/2019
	Champlain, Town of	10/15/2014	10/15/2019
	Champlain, Village of	10/15/2014	10/15/2019
	Chazy, Town of	10/15/2014	10/15/2019
	Clinton, Town of	10/15/2014	10/15/2019
	Dannemora, Town of	10/15/2014	10/15/2019
	Ellenburg, Town of	10/15/2014	10/15/2019
	Mooers, Town of	10/15/2014	10/15/2019
	Peru, Town of	10/15/2014	10/15/2019
	Plattsburgh, City of	10/15/2014	10/15/2019
	Plattsburgh, Town of	10/15/2014	10/15/2019
	Saranac, Town of	10/15/2014	10/15/2019
	Schuyler Falls, Town of	10/15/2014	10/15/2019
Essex County (County HMP approved 9/28/2011)	Chesterfield, Town of	9/28/2011	9/28/2016
	Crown Point, Town of	9/28/2011	9/28/2016
	Elizabethtown, Town of	9/28/2011	9/28/2016
	Essex, Town of	9/28/2011	9/28/2016
	Keene, Town of	9/28/2011	9/28/2016
	Lewis, Town of	9/28/2011	9/28/2016
	Moriah, Town of	9/28/2011	9/28/2016
	Port Henry, Village of	9/28/2011	9/28/2016
	Ticonderoga, Town of	9/28/2011	9/28/2016

Table 16: Approved Hazard Mitigation Plans (as of July 2016)

County	Community	Approval Date	Plan Expiration
	Westport, Town of	9/28/2011	9/28/2016
	Willsboro, Town of	9/28/2011	9/28/2016
Warren County (Plan Expired)	Bolton, Town of	7/7/2011	Plan expired 7/7/2016; New plan in progress
	Hague, Town of	7/7/2011	Plan expired 7/7/2016; New plan in progress
	Horicon, Town of	7/7/2011	Plan expired 7/7/2016; New plan in progress
	Lake George, Town of	7/7/2011	Plan expired 7/7/2016; New plan in progress
	Lake George, Village of	7/7/2011	Plan expired 7/7/2016; New plan in progress
	Queensbury, Town of	7/7/2011	Plan expired 7/7/2016; New plan in progress
	Warrensburg, Town of	7/7/2011	Plan expired 7/7/2016; New plan in progress

Table 16: Approved Hazard Mitigation Plans (as of July 2016)

County	Community	Approval Date	Plan Expiration
Washington County (Plan Expired)	Dresden, Town of	4/22/2010	Plan expired 4/22/2015; New plan in progress
	Fort Ann, Town of	4/22/2010	Plan expired 4/22/2015; New plan in progress
	Fort Ann, Village of	4/22/2010	Plan expired 4/22/2015; New plan in progress
	Granville, Town of	4/22/2010	Plan expired 4/22/2015; New plan in progress
	Granville, Village of	4/22/2010	Plan expired 4/22/2015; New plan in progress
	Hampton, Town of	4/22/2010	Plan expired 4/22/2015; New plan in progress
	Putnam, Town of	4/22/2010	Plan expired 4/22/2015; New plan in progress
	Whitehall, Town of	4/22/2010	Plan expired 4/22/2015; New plan in progress
	Whitehall, Village of	4/22/2010	Plan expired 4/22/2015; New plan in progress

Source: Clinton County, Essex County, Warren County, and Washington County Hazard Mitigation Plans

Critical Facilities and Other Important Properties in the SFHA

Critical facilities are those structures essential to the community's health and welfare. Critical facilities included in the HMPs vary based on how the locality defines a critical facility/infrastructure and the types of data available. Typically, critical facilities are defined as community assets whose presence is vital to that jurisdiction's continued ability to operate. Critical facilities often include 911 and emergency services facilities, airports, colleges and universities, schools, fire departments, police departments, sewage treatment plants, hospitals and nursing homes.

Table 17: Critical Facilities and Infrastructure Noted in HMPs as at Risk of Flooding

County	Community	Facilities Located within SFHA
Clinton County	Altona, Town of	$7,419,400 building asset value estimated in SFHA (2013)
	Ausable, Town of	$7,261,974 building asset value estimated in SFHA (2013)
	Beekmantown, Town of	$19,502,400 building asset value estimated in SFHA (2013)
	Black Brook, Town of	$14,522,300 building asset value estimated in SFHA (2013)
	Champlain, Town of	$20,583,100 building asset value estimated in SFHA (2013)
	Champlain, Village of	$1,933,100 building asset value estimated in SFHA (2013)
	Chazy, Town of	$25,133,300 building asset value estimated in SFHA (2013)
	Clinton, Town of	$0 building asset value estimated in SFHA (2013)
	Dannemora, Town of	$0 building asset value estimated in SFHA (2013)
	Ellenburg, Town of	$15,653,500 building asset value estimated in SFHA (2013)
	Mooers, Town of	$11,645,000 building asset value estimated in SFHA (2013)
	Peru, Town of	$26,261,400 building asset value estimated in SFHA (2013)
	Plattsburgh, City of	$73,368,653 building asset value estimated in SFHA (2013)
	Plattsburgh, Town of	$55,153,500 building asset value estimated in SFHA (2013)
	Saranac, Town of	$1,5272,400 building asset value estimated in SFHA (2013)
	Schuyler Falls, Town of	$7,771,100 building asset value estimated in SFHA (2013)
	Chesterfield, Town of	Total estimated flood loss $2,759,811.90 4 critical facilities
	Crown Point, Town of	Fire Houses, Town Hall, Water Plant Total estimated flood loss $2,676,558.45
	Elizabethtown, Town of	None, Total estimated flood loss $1,641,017.25

Discovery Report:
Lake Champlain Watershed, New York

Table 17: Critical Facilities and Infrastructure Noted in HMPs as at Risk of Flooding

County	Community	Facilities Located within SFHA
Essex County	Essex, Town of	None Total estimated flood loss $3,096,222.00
	Keene, Town of	Four Total estimated flood loss $4,126,922.55
	Lewis, Town of	None Total estimated flood loss $319,410.00
	Moriah, Town of	None Total estimated flood loss $542,055.00
	Port Henry, Village of	Included in Town of Moriah flood loss estimate
	Ticonderoga, Town of	Total estimated flood loss $18,063,181.05
	Westport, Town of	Total estimated flood loss $4,184,415.00
	Willsboro, Town of	Total estimated flood loss $8,006,437.50
Warren County	HMP is expired	HMP is expired
Washington County	HMP is expired	HMP is expired

Source: Clinton County, Essex County, Warren County, and Washington County Hazard Mitigation Plans

Hazard Mitigation Grants

FEMA provides funding for various types of mitigation projects. These funds are granted through several mechanisms including the Pre-Disaster Mitigation Grant Program (PDM), Hazard Mitigation Grant Program (HMGP), and Flood Mitigation Assistance (FMA).

The PDM program provides funds for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event to states, territories, and Tribal governments (and through them, local communities). Funding these plans and projects reduces overall risks to residents and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.

Like PDM, the HMGP provides grants to states (who may then award funding to local governments), to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented state-wide during the immediate recovery from a disaster.

Lastly, the FMA provides funds for projects to reduce or eliminate risk of flood damage to buildings that are insured under the NFIP on an annual basis through three types of grants: Planning Grants to prepare flood mitigation plans; Project Grants to implement measures to reduce flood losses, such as elevation, acquisition or relocation of NFIP-insured structures; and Management Cost Grants so that the grantee may administer the FMA program and activities. FMA grants are only available to state (and state-equivalent) and Tribal governments; however, local governments may be named as sub-applicants.

Mitigation Projects Completed or Underway

The HMPs identified mitigation projects, actions, and strategies to reduce long-term vulnerability to hazards. Each county listed several mitigation projects related to reducing local flooding issues. Based on the date of each of the HMPs, certain projects listed below may have already been completed.

At the time of the preparation of the Clinton County HMP, efforts were underway by the county to purchase and demolish two flood prone properties in the Towns of Ausable and Black Brook with FEMA funding to decrease flooding vulnerability in both areas.

Essex County communities have various activities in their mitigation strategy, including replacing a bridge and culverts in the Town of Chesterfield, and increasing culvert size in the Town of Ticonderoga. The Brownfield Remediation project in the Town of Willsboro is focused on the Boquet River and Gilliland Lane.

Warren County communities included mitigation projects related to installing larger culverts, eliminating areas of erosion around bridges in the Town of Bolton, stabilizing ditches in the Town of Horicon, and reconstructing and upgrading drainage areas in the Town of Lake George. Two other ongoing projects in the Town of Horicon are a new gate installation for the lower dam on Mill Pond and wing wall repair on the upper dam on Mill Pond.

Washington County's mitigation strategy was focused on improving drainage at sites where roads have washed out due to natural hazards in the past, purchasing equipment to provide for local personnel to conduct drainage improvement, conducting engineering assessments on site feasibility, and improving dams to prevent flooding causing roads to wash out.

IV. Discovery Outreach and Engagement Strategy

Prior Engagement Efforts

Prior outreach and engagement efforts related to flood risk (separate from this Discovery project) have been performed by NYSDEC and FEMA for certain communities within the Lake Champlain Watershed recently. These projects and activities are summarized in *Table 18* below.

Table 18: Prior Engagement Efforts in Project Area

County	Name of Project	Project Outreach and Engagement Efforts
Clinton	Clinton County Countywide FIRM Project	• Final Consultation Coordination Officer (CCO) meeting held September 2006. Map effective September 28, 2007.
Essex	None	N/A
Warren	Hudson-Hoosic Watershed Discovery Project	• Initial project stakeholder meetings held in March 2012; • 2nd round of stakeholder meetings in October 2012; Project completed and final reports delivered to FEMA in April 2014.
Washington	Hudson-Hoosic Watershed Discovery Project	• Initial project stakeholder meetings held in March 2012; • 2nd round of stakeholder meetings in October 2012; Project completed and final reports delivered to FEMA in April 2014.

Stakeholder Identification

As part of this Discovery process for the Lake Champlain Watershed, the NYSDEC Floodplain Management Section compiled an extensive list of contact information for community officials and other stakeholders within the watershed. In an effort to gather as much local feedback as possible, over 370 watershed stakeholders including local officials from individual communities and counties, representatives from Federal and State agencies, non-governmental organizations, and other local groups were invited to participate in the Discovery process.

Key Stakeholder Groups and Influencers

In addition to municipal officials, planning and emergency agencies, and local residents, there are other stakeholders with an interest in floodplain mapping and management: Other Federal and State agencies, major landowners, large employers, academic institutions, and environmental organizations all have a role to play, and can offer valuable information when developing both pre-mapping data and final mapping products. Examples of such organizations in the Lake Champlain Watershed include:

- Lake Champlain Basin Program
- Lake Champlain U.S. Fish and Wildlife Conservation Office

- Greater Adirondack Resource Conservation and Development Council
- Lake George Association
- International Lake Champlain-Richelieu River Technical Working Group
- Lake Champlain-Lake George Regional Planning Board
- State University of New York (SUNY) Plattsburgh

Pre-Meeting Engagement and Information Exchange

Exchanging information with key stakeholders is a critical part of the Lake Champlain Watershed Discovery project. There were two primary goals of the initial outreach and engagement activities associated with this project: 1) to communicate the purpose of the Discovery project and the role of local stakeholder input in the process and 2) to obtain key information upfront related to existing flood risk in the watershed, flood hazard mapping needs, mitigation activities, and other existing information useful in updating the FIRMs.

Pre-Discovery Webinars

The project team conducted two Pre-Discovery webinar sessions on April 5th and 7th 2016, via WebEx/conference call for the Lake Champlain Watershed. The purpose of the sessions was to introduce the planning team, explain the Discovery process and how it can benefit the communities in the watershed; and how stakeholders can participate in the process. The sessions were also used to obtain input on best locations for in-person Discovery Meetings, who should be included in the process, and ideas for encouraging participation in the meetings.

Correspondence/Survey Form

Prior to the webinars, a Lake Champlain Watershed Risk MAP Discovery Project Stakeholder Survey was sent to all stakeholders invited to the webinars. The survey was available online via Survey Monkey. Digital PDF copies of the survey were also provided. Stakeholders were asked to submit the survey no later than May 6th, 2016 in order for the Discovery team to gather and develop preliminary materials for the in-person Discovery meetings. The survey gathered information from stakeholders on:

- Flood mapping needs, FIRM inaccuracies, and historical flood problems
- High water marks within the community
- Community planning, ongoing projects, and recent residential, commercial, or industrial development
- Flood mitigation activities
- Training needs
- NFIP and floodplain management information
- GIS data: base map data, engineering data, and risk assessment data
- Other community officials or groups to include in the Discovery project

The list of identified stakeholders used for pre-meeting engagement communications is provided in Appendix A of this report.

V. Discovery Meetings

The purpose of the in-person Discovery meeting is to review any information previously provided by communities, State and regional agencies, and local stakeholders; discuss each community's floodplain mapping needs and floodplain management activities, mitigation plans and projects, and flood risk concerns; and gather additional feedback for FEMA to consider when developing Risk MAP products, including the development of new FIRMs where needed.

Appendices to this report include the Discovery meeting preparation and meeting materials:

- Meeting Invitation
- Meeting Invitation Mailing List
- Meeting Agenda
- Meeting Sign-In sheets
- Meeting Presentations
- Meeting Summary Memorandum

Invitees to the in-person Discovery meetings, included not only those stakeholders initially identified to participate in the Pre-Discovery webinars, but also other stakeholders identified by participants during the Pre-Discovery webinars and in the completed Discovery Stakeholder Survey forms received prior to the meetings. Invitations were sent by e-mail and hard copy. Additionally, phone calls to communities who had not RSVP'd for the meetings were made the week prior to the meetings to encourage attendance.

A series of four in-person meetings in the Lake Champlain Watershed were held at the dates and times listed below.

Table 19: Lake Champlain Watershed Discovery Meetings

Date	Time	County	Location
6/7/2016	1:30 PM - 4:00 PM	Clinton County	Clinton County Office of Emergency Services 16 Emergency Services Drive, Plattsburgh, NY 12903
6/8/2016	9:00 AM - 11:30 AM	Essex County	Town of Westport Town Hall 22 Champlain Avenue, Westport, NY 12993
6/8/2016	2:00 PM - 4:30 PM	Warren County	Town of Lake George Office 20 Old Post Road, Lake George, NY 12845
6/9/2016	9:30 AM - 12:00 PM	Washington County	Town of Whitehall Courthouse 57 Skenesborough Drive, Whitehall, NY 12887

Community officials and other stakeholders who attended the Discovery meetings were interviewed by project team members on a variety of flood and mitigation-related topics. Of particular importance to the project was the identification of mapping, training, and mitigation needs in the watershed. This information was captured in copies of the Discovery Stakeholder Survey form by project team members and on scoping maps created by NYSDEC for each community and county. The map allowed stakeholders to pinpoint flooding hot spot areas, locations of past, ongoing, or desired mitigation projects, and areas with mapping needs.

Post-Meeting Follow Up

Additional outreach to communities in the Lake Champlain Watershed was performed after the meetings. Follow up letters were sent to communities that had not participated in the Discovery process to date (i.e., did not submit a Stakeholder Survey Form or attend one of the Discovery meetings) that again requested their input in the process. For communities that did participate in the process, letters summarizing the mapping needs identified by their communities were sent to the relevant community officials to ensure their needs were correctly summarized. The letter requested that community officials review the summarized needs and either return a signed copy of the letter to NYSDEC if the needs were summarized correctly or contact NYSDEC if changes were needed. Copies of the community acknowledgment letters sent are provided in Appendix I.

VI. Discovery Findings

Summary of Stakeholder Comments and Needs

Following the completion of the Discovery meetings, the information gathered during the face-to-face consultations with community officials and other watershed stakeholders was combined with additional information provided by stakeholders through the Discovery Stakeholder Survey forms completed in hard copy or online outside of the meetings. A summary of identified needs related to flood mapping, mitigation, and training are provided in the sections below based on the information provided by stakeholders during the Discovery process.

Additionally, detailed summaries of the data provided by stakeholders during the project are available in the following appendices to this report:

- Appendix H: Discovery Meeting Summary Memorandum
- Appendix M: Community Requests and Floodplain Mapping Priorities Summary Memorandum
- Appendix N: Watershed Recommended Scope of Work Memorandum

Flood Mapping Needs

Communities in the Lake Champlain Watershed have a mix of updated digital countywide FIRMs and older community based, paper FIRMs developed between 1984 and 1997. While communities in Clinton County have an updated countywide FIRM, communities in Essex, Warren, and Washington Counties would benefit from a modernized countywide FIRM in a digital format. Based on stakeholder input received during this project, it was made clear that many community officials find the existing maps very difficult to work with. In particular, stakeholders noted it is challenging to locate structures on these maps accurately. Many of the communities noted there is growth along major water bodies, such as Lake Champlain and Lake George.

Beyond the upgrade of mapping for Essex, Warren, and Washington Counties to a digital format, specific stream restudy priorities were also identified based on the data gathered and stakeholder input provided during this Discovery project. A total of 40 separate detailed riverine/lake study mapping needs and four approximate studies were identified by watershed stakeholders. There were also a number of stream study requests for flooding sources outside of the project area.

Table 20 summarizes all of the mapping needs identified by communities and other stakeholders during the project. The Discovery Maps prepared for the Lake Champlain Watershed show the locations of the identified mapping needs. A detailed summary of community requests and floodplain mapping priorities is also provided in Appendix M.

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Clinton County	Altona, Town of	9/28/2007	1. Great Chazy River is in need of a revised approximate study. The river has changed course, especially along Joe Wood Road. The floodplain in the vicinity of Woodsfalls Road is not accurate. 2. Tributary of Witherspoon Brook needs an updated detailed study to show the removal of a dam.
	Ausable, Town of	9/28/2007	1. Little Ausable River from the northern corporate limits to approximately 20,955 feet upstream to Clintonville Road needs an new detailed study, including BFEs, due to development in the area.* *The following request is the highest priority for the town. However, this area is outside of the Lake Champlain Watershed: Ausable River Reach Two, from 1.3 miles upstream of the confluence with Lake Champlain to 3,100 feet downstream of western corporate limit needs a new detailed study. This area has experienced past flooding and is in the middle of two areas with detailed studies.
	Beekmantown, Town of	9/28/2007	No needs identified
	Black Brook, Town of	9/28/2007	No needs identified
	Champlain, Town of	9/28/2007	No needs identified
	Champlain, Village of	9/28/2007	No needs identified
	Chazy, Town of	9/28/2007	No needs identified
	Clinton, Town of	9/28/2007	No needs identified
	Dannemora, Town of	N/A	No needs identified
	Ellenburg, Town of	9/28/2007	No needs identified
	Mooers, Town of	9/28/2007	No needs identified
	Peru, Town of	9/28/2007	A new detailed study for the Peru Water Supply Dam Lake/Furnace Brook is needed. This area has experienced prior flooding.
	Plattsburgh, City of	9/28/2007	1. A revised detailed study of Scomotion (Dead) Creek from its confluence with Lake Champlain to

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Clinton County			the northern corporate limit is needed due to repeat flooding in the area along with new development. 2. A revised detailed study of the Saranac River from the confluence with Main Mill Dam Lake to the confluence with Lake Champlain is needed due to repeat flooding.
	Plattsburgh, Town of	9/28/2007	No needs identified
	Saranac, Town of	9/28/2007	No needs identified
	Schuyler Falls, Town of	9/28/2007	No needs identified
	Clinton County	9/28/2007	1. Lake Champlain shoreline is in need of an updated detailed study. There has been significant development along the shoreline. 2. Great Chazy River is in need of an updated detailed study. The flow of the river has changed and dams have been removed. 3. Little Chazy River is in need of a new detailed study. <u>General comments about the FIRMs:</u> Most of the FIRMs in Clinton County are not accurate. There are towns with no floodplain information and some with partial information - these towns have as much likelihood for flooding as many of the others. Many streams in Clinton County have floodplain boundaries that are unrealistic. <u>Comments on flooding sources outside of the Lake Champlain watershed</u> (These needs will be entered into FEMA's Coordinated Needs Management Strategy tracking system): Saranac and Ausable Rivers are in need of updated detailed studies. There have been buyouts of properties along these flooding sources. True Brook is in need of a new detailed study in the Town of

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Clinton County	Clinton County	9/28/2007	Saranac. There have been homes recently built in this area.
Essex County	Chesterfield, Town of	5/4/1987	No needs identified
	Crown Point, Town of	7/16/1987	A new detailed study of Putnam Creek is needed. The upstream reach of this stream is already detailed. However the downstream reach has an approximate study and it is not accurate.
	Elizabethtown, Town of	1/20/1993	1. A detailed restudy of the Boquet River is needed as it frequently floods and the mapping is inaccurate. 2. A detailed restudy of The Branch at the confluence with the Boquet River is needed as it is a heavily populated area.
	Essex, Town of	4/3/1987	No needs identified
	Keene, Town of	6/5/1985	No needs identified
	Lewis, Town of	5/15/1985	1. A new detailed study of the North Branch Boquet River is needed due to repetitive flooding that occurs in the spring. 2. A new detailed study of the Spruce Mill Brook is needed due to repetitive flooding that occurs in the spring. 3. A detailed study of the Boquet River is needed, especially near Steele Woods Road.
	Moriah, Town of	9/24/1984	1. A detailed study of Mill Brook from Ensign Pond to Lake Champlain is needed. 2. An approximate study of McKenzie Brook from its headwaters to Lake Champlain is needed.
	Port Henry, Village of	7/16/1987	1. A new detailed study of Mill Brook is needed. This stream frequently floods and causes major damages, including damage to bridges.

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Essex County	Port Henry, Village of	7/16/1987	2. A new detailed study of McKenzie Brook is needed. This stream causes frequent flooding near the railroad. 3. A revised detailed study of Lake Champlain is needed.
	Ticonderoga, Town of	9/6/1996	1. A new detailed study for Trout Brook is needed due to frequent flooding and damage to houses in this area. 2. An updated detailed study is needed along the shoreline of Lake Champlain in order to show more accurate floodplain boundaries. 3. A new detailed study for the La Chute River is needed due to frequent flooding in this area. 4. A new detailed study for the shoreline of Lake George is needed due to frequent shoreline flooding and culvert washouts.
	Westport, Town of	9/4/1987	1. A detailed restudy of the Lake Champlain shoreline is needed due to inaccuracies in the topographic data that does not show cliffs and bluffs. There are also Letters of Map Amendment (LOMAs) in the area. 2. The Boquet River is in need of a new detailed study. There are flooding problems and buyouts in this area. There are mapping inaccuracies that are likely due to topographic limitations.
	Willsboro, Town of	5/18/1992	No needs identified
	Essex County	N/A	1. A new approximate study is needed for Spruce Mill Brook from Boquet River to the headwaters. A recent flood event washed out 3 bridges. 2. A revised approximate study is needed for North Branch Boquet

Discovery Report:
Lake Champlain Watershed, New York

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Essex County	Essex County	N/A	River. There are residential properties in the floodplain. 3. A revised approximate study is needed for La Chute River. 4. A new approximate study is needed for Trout Brook from Lake Champlain to the headwaters. There is frequent flooding in this area. 5. A new detailed study is needed for McKenzie Brook from the mouth to Moriah Center. This area is subject to flooding. 6. A new detailed study is needed for Mill Brook from the mouth to Moriah Center. 7. A new detailed study is needed for Putnam Creek from the mouth to County Route 7. There is development pressure in this area. 8. A new approximate study is needed for Roaring Brook. There are historical flooding problems in the area. 9. A revised detailed study is needed for Boquet River. There are serious flooding problems in this area. 10. A revised detailed study is needed along the Lower Boquet River. A dam has been removed along the river. Ausable River in Ausable Forks was also identified as a priority for a detailed restudy. However this stream is not part of the Discovery project area.
	Bolton, Town of	8/16/1996	1. A new detailed study is needed for Finkle Brook There is significant development in this area.

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Warren County			2. A new detailed study is needed for Huddle Brook. There is a dam present near Potter Hill Road that should be modeled.
	Hague, Town of	9/29/1996	1. Hague Brook (also known as Sucker Brook) is in need of a new detailed study. This area currently has a very old approximate study and the floodplain boundaries are not accurate. 2. Lake George is in need of a revised detailed study. The floodplain boundary is inaccurate and there is significant Letter of Map Change activity in the area.
	Horicon, Town of	2/15/1985	No needs identified
	Lake George, Town of	8/16/1996	1. Lake George is in need of a revised detailed study. There are properties in the vicinity of Lakeview Estates near the lakeshore that have been recently affected by flooding. The area near Michelle Road and Middle Road to South Shore has been developed and flooding has occurred along Route 76 nearby. 2. English Brook is need of a new detailed study. There are properties in the vicinity that have been recently affected by flooding. 3. Smith Brook is in need of a revised detailed study. This is a major stream in the town. 4. West Brook is in need of a revised detailed study. This is a major stream in the town.
	Lake George, Village of	9/29/1996	1. Prospect Mountain Brook, Tributary to Prospect Mountain Brook, and unnamed tributary to Lake George. They are not currently mapped. These tributaries commonly flood after storms which affects various properties in the area.

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Warren County	Lake George, Village of	9/29/1996	2. English Brook is in need of a new detailed study. This stream is prone to repeated flooding and residences are affected.
	Queensbury, Town of	8/16/1996	1. Halfway Brook Reach 2 (east of Chestnut Ridge to approximately 8,225 feet upstream, west of I-87) is in need of a revised detailed study. Areas of the same elevation are shown outside of the floodplain in some areas and inside of the floodplain in other areas. 2. Halfway Brook Reach 3 (west of I-87 to approximately 2,845 feet upstream, north of Peggy Ann Road) is in need of a new detailed study. There is a potential for development in this area and it would be helpful to have BFEs established.
	Warrensburg, Town of	3/1/1984	No specific inaccuracies were noted, but digital FIRMs are badly needed.
	Warren County	N/A	1. Halfway Brook needs a revised detailed study. There have been repeated flooding events along this stream. (Note: upper portion of stream may be along state regulated wetland) 2. English Brook needs a new approximate study. Roads were flooded in this area during Hurricane Irene. 3. West Brook needs a new detailed study from the confluence with Lake George to the state land boundary. There is development along the stream in the vicinity of Lake George. 4. Prospect Mountain Brook needs a new detailed study from the confluence with Lake George to the state land boundary. There is

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Warren County	Warren County	N/A	development along the stream in the vicinity of Lake George. 5. A new detailed study is needed for Lakeview Circle Tributary/Tahoe Outlet from the confluence with Lake George to Route 9. 6. A revised approximate study is needed for Glen Lake Outlet. Dams at both Glen Lake and Dream Lake (downstream of Glen Lake) failed in this area in 2011-2012. Glen Lake dam has since been repaired. 7. Other streams that are in need of a restudy are Cemetery Brook, Finkle Brook, and Indian Brook, and within the Town of Hague, Hague Brook and Trout Brook. General comment: there has been widespread development and changes in hydrology that have impacted the county. Urban areas should be prioritized for new or updated studies. There were other tributaries noted that are located on state land that currently have approximate studies. These areas should be reviewed, but given that they are on state land, updates are not a high priority.
Washington County	Dresden, Town of	9/20/1996	No needs identified
	Fort Ann, Town of	11/5/1997	1. Hadlock Pond is in need of a new detailed study due to the installation of a new dam and a previous dam failure. 2. Champlain Canal is in need of a new detailed study. 3. Halfway Creek is in need of a new detailed study.
	Fort Ann, Town of	11/5/1997	4. Hog Pond area is in need of a new approximate study. There is

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Washington County			development in the area, steep slopes, and spring flooding occurs. 5. Greenland Brook/South Bay is in need of a new detailed study. There are major flows during the spring.
	Fort Ann, Village of	N/A	No needs identified
	Granville, Town of	8/5/1985	1. Indian River (from south corporate limit with the Town of Hebron to the confluence with the Mettawee River) is in need of a new detailed study. This flooding source currently has an outdated approximate study from 1985 and there is considerable development pressure in the area. 2. Mettawee River (from the Vermont border through the Village of Granville to the north corporate boundary with the Town of Whitehall) is in need of a new detailed study. This flooding source currently has an outdated approximate study from 1985 and there is considerable development pressure in the area.
	Granville, Village of Granville, Village of	4/17/1985 4/17/1985	The Mettawee River is in need of a new detailed study. It currently has an approximate study that is very old and inaccurate. This area commonly floods and is the primary flooding source in the community. Some areas of high ground are incorrectly shown as being located in the floodplain currently.
	Hampton, Town of	4/17/1985	No needs identified
	Putnam, Town of	11/20/1996	No needs identified
	Whitehall, Town of	7/3/1986	1. The Mettawee River is in need of a revised approximate study to reflect updated topography. Digital floodplain boundaries are needed. 2. A digital mapping product including floodplain boundaries are needed for

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Washington County			Lake Champlain, Wood Creek, Mud Brook, and Poultney River.
	Whitehall, Village of	6/3/1985	1. The Champlain River Canal is in need of a new detailed study. The current approximate floodplain boundaries are inaccurate and development has occurred in the area. 2. Wood Creek north of South Williams Street is in need of a new detailed study. Flooding has occurred in this area recently and there is a dike that should be modeled in the study. There are also culverts by the railroad that should be modeled as part of the study. 3. Lake Champlain is in need of a new detailed study. General comment: Digital FIRMs would be very useful for the village.
	Washington County	N/A	1. In general, the maps for most of the county are very old (produced in the 1970s) with a scale that makes it impossible to determine the floodplain boundaries accurately enough for building permit issuance in many cases. Revision of the maps with appropriate scale in a digital format is of primary importance. 2. Batten Kill from the Vermont border to the confluence with the Hudson River is in need of a revised detailed study. There are major inaccuracies on the FIRM and a high level of vulnerability to flooding in this area. 3. Given past flooding incidents, restudies of the Mettawee River and Indian River within the Towns of Whitehall and Granville are also desired.

Discovery Report:
Lake Champlain Watershed, New York

Table 20: Summary of Mapping Needs Identified by Municipalities/Counties

County	Community	FIRM Effective Date	Mapping Needs Identified by Municipalities/ Counties
Washington County	Washington County	N/A	Restudies of the Hudson River (Towns of Fort Edward, Greenwich, and Easton) and White Creek (Town of Salem, Cambridge, White Creek) were also requested. However, these areas are outside of the Discovery project area.
Lake George Association	N/A	N/A	Lake George watershed has a mix of concentrated urban/residential area along with lots of undeveloped steep slopes. Prioritize urban areas with streams.
NYSDEC Region 5	N/A	N/A	We always have the need for better detailed maps. We still have a lot of communities working from the old converted flood hazard boundary maps and those, quite frankly, are hard to take seriously.

Mitigation and Risk Reduction Project Needs

Communities and other stakeholders provided their input on mitigation and risk reduction project needs as part of the Discovery project. The most common needs identified included the replacement/resizing of culverts and bridges, dam maintenance, and bank erosion remediation. *Table 21* provides a summary of such needs identified by communities and stakeholders during this Discovery project.

Table 21: Summary of Mitigation and Risk Reduction Project Needs

County	Community	Mitigation and Risk Reduction Project Needs Identified
Clinton County	Altona, Town of	No needs identified
	Ausable, Town of	No needs identified
	Beekmantown, Town of	No needs identified
	Black Brook, Town of	No needs identified
	Champlain, Town of	1. There is a proposed project to dredge the Great Chazy River at its mouth due to 2011 floods. 2. Route 11 at Beaver Road - culvert is still too small.
	Champlain, Village of	No needs identified
	Chazy, Town of	No needs identified
	Clinton, Town of	No needs identified
	Dannemora, Town of	No needs identified
	Ellenburg, Town of	No needs identified

Table 21: Summary of Mitigation and Risk Reduction Project Needs

County	Community	Mitigation and Risk Reduction Project Needs Identified
	Mooers, Town of	No needs identified
	Peru, Town of	No needs identified
	Plattsburgh, City of	No needs identified
	Plattsburgh, Town of	No needs identified
	Saranac, Town of	No needs identified
	Schuyler Falls, Town of	No needs identified
	Clinton County	The county has concerns about fluvial erosion.
Essex County	Chesterfield, Town of	No needs identified
	Crown Point, Town of	There are some dam-related issues in the vicinity of Furnace Road at Ironville.
	Elizabethtown, Town of	1. There is a property that should be considered for a buyout at Elizabethtown Wadhams Road and Boquet River. 2. There needs to be a wider bridge/culvert replacement for U.S. Route 9 over Boquet River. 3. There is an unstable dam that leaks on sides at Lincoln Pond near Kingdom Road.
	Essex, Town of	No needs identified
	Keene, Town of	No needs identified
	Lewis, Town of	Two 3-foot culverts are awaiting replacement at Roscoe Road and Phelps Brook.
	Moriah, Town of	No needs identified
	Port Henry, Village of	No needs identified
	Ticonderoga, Town of	No needs identified
	Westport, Town of	No needs identified
	Willsboro, Town of	No needs identified
Essex County	Essex County	No needs identified
Warren County	Bolton, Town of	No needs identified
	Hague, Town of	No needs identified
	Horicon, Town of	No needs identified
	Lake George, Town of	No needs identified
	Lake George, Village of	No needs identified
	Queensbury, Town of	1. The town is interested in implementing mitigation activities for Halfway Brook to improve water quality. 2. There are concerns about dam break inundations since there are four dams in the community, include Glen Lake Dam and several other smaller reservoirs.
	Warrensburg, Town of	No needs identified

Table 21: Summary of Mitigation and Risk Reduction Project Needs

County	Community	Mitigation and Risk Reduction Project Needs Identified
	Warren County	There are issues with undersized culverts that exacerbate flooding problems (e.g., English Brook at Route 9N and Foster Brook at County Route 6).
Washington County	Dresden, Town of	1. A mitigation priority is needed to place sewer lines underground at Hulett's Landing near Lake George shoreline. 2. Culverts in some areas are unable to handle volume including along Pike Brook/Pike Brook Road.
	Fort Ann, Town of	1. There is bank erosion and stream migration occurring along Halfway Creek at Tripoli Road. 2. Another portion of the bank washed away along Halfway Creek at the Bentley Road crossing.
	Fort Ann, Village of	No needs identified
	Granville, Town of	No needs identified
	Granville, Village of	No needs identified
	Hampton, Town of	No needs identified
	Putnam, Town of	No needs identified
	Whitehall, Town of	No needs identified
	Whitehall, Village of	There are undersized culverts at the railroad for Mettawee River along Wood Creek.
	Washington County	Culverts in some areas are unable to handle volume including along Pike Brook/Pike Brook Road.

Training, Outreach, and Planning Support Needs

In terms of training, outreach, and planning support needs, Floodplain Management Administration was the most commonly requested training topic by community officials. Training on Building Code Requirements, Hazard Mitigation and Grant Programs, and Effective Public Outreach was also requested by many communities. Training on FEMA tools and products including the FEMA Map Service Center, regulatory floodways, and additional emergency management topics were also identified as needs. *Table 22: Summary of Training Needs Identified by Municipalities/Counties* provides a summary of the training, outreach, and planning support needs identified by communities and stakeholders during this Discovery project.

Table 22: Summary of Training Needs Identified by Municipalities/Counties

County	Community	Floodplain Management Administration	Building Code Requirements	Hazard Mitigation and Grant Programs	Effective Public Outreach	Other
Clinton County	Altona, Town of	-	-	**X**	**X**	-
	Ausable, Town of	**X**	**X**	-	-	-
	Beekmantown, Town of	-	-	-	-	-

Table 22: Summary of Training Needs Identified by Municipalities/Counties

County	Community	Floodplain Management Administration	Building Code Requirements	Hazard Mitigation and Grant Programs	Effective Public Outreach	Other
	Black Brook, Town of	-	-	-	-	-
	Champlain, Town of	**X**	-	-	-	-
	Champlain, Village of	-	-	-	-	-
	Chazy, Town of	-	-	-	-	-
	Clinton, Town of	-	-	-	-	-
	Dannemora, Town of	-	-	-	-	-
	Ellenburg, Town of	-	-	-	-	-
	Mooers, Town of	-	-	**X**	-	-
	Peru, Town of	-	-	-	-	How to use online flood maps to locate properties/ identify flood hazards
	Plattsburgh, City of	**X**	**X**	-	-	-
	Plattsburgh, Town of	**X**	-	**X**	**X**	-
	Saranac, Town of	-	-	-	-	-
	Schuyler Falls, Town of	-	-	-	-	-
	Clinton County	**X**	**X**	**X**	**X**	-
Essex County	Chesterfield, Town of	**X**	**X**	**X**	-	-
	Crown Point, Town of	**X**	**X**	-	-	-
	Elizabethtown, Town of	-	-	-	-	-
	Essex, Town of	**X**	-	**X**	-	-
	Keene, Town of	-	-	-	-	-
	Lewis, Town of	-	-	-	-	Emergency management topics
	Moriah, Town of	**X**	**X**	-	-	-
	Port Henry, Village of	**X**	**X**	-	-	-
	Ticonderoga, Town of	**X**	**X**	-	-	-
	Westport, Town of	**X**	**X**	**X**	**X**	-
	Willsboro, Town of	-	-	-	-	-
	Essex County	**X**	**X**	**X**	**X**	-

Table 22: Summary of Training Needs Identified by Municipalities/Counties

County	Community	Floodplain Management Administration	Building Code Requirements	Hazard Mitigation and Grant Programs	Effective Public Outreach	Other
Warren County	Bolton, Town of	**X**	-	-	-	-
	Hague, Town of	-	-	-	**X**	-
	Horicon, Town of	-	-	-	-	-
	Lake George, Town of	**X**	-	**X**	**X**	-
	Lake George, Village of	**X**	-	**X**	**X**	-
	Queensbury, Town of	**X**	-	**X**	**X**	Watershed management
	Warrensburg, Town of	**X**	**X**	**X**	**X**	-
	Warren County	**X**	**X**	**X**	**X**	-
Washington County	Dresden, Town of	-	-	-	-	-
	Fort Ann, Town of	**X**	-	-	-	-
	Fort Ann, Village of	-	-	-	-	-
	Granville, Town of	-	-	-	-	-
	Granville, Village of	-	-	-	**X** (FIRMs, floodway requirements, general preparedness)	-
	Hampton, Town of	-	-	-	-	-
	Putnam, Town of	-	-	-	-	-
	Whitehall, Town of	**X**	-	-	-	-
	Whitehall, Village of	**X**	-	-	-	-
Washington County		**X**	**X**	**X**	**X**	-
NYSDEC Region 5		**X**	-	-	**X**	-
Lake Champlain Trout Unlimited	N/A	**X**	-	**X**	-	First responder training

Additional Resources

A number of additional reports were identified by Discovery stakeholders that relate to flood risk and mitigation in the Lake Champlain Watershed. These resources are summarized below. Additional useful resources are also listed in Appendix O of this report.

- **Flood Resilience in the Lake Champlain Basin and Upper Richelieu River**
  This 2013 report prepared by the Lake Champlain Basin Program in conjunction with the International Joint Commission (IJC) provides a comprehensive review of the May 2011 Lake Champlain flood event. It includes a series of policy recommendations for New York, Quebec, Canada, and Vermont to consider for increasing resilience to future flood events in the region. These recommendation include, but are not limited to:
    - Developing a comprehensive hydrological model for Lake Champlain, including flood frequency and severity analyses for flood hazard mapping;
    - Identifying Fluvial Erosion Hazard (FEH) areas;
    - Promoting community acceptance of floodplain management principles and regulations; and
    - Establishing floodplain development standards to reduce or restrict development in and near critical areas.

- **Plan of Study for the Identification of Measures to Mitigate Flooding and the Impacts of Flooding of Lake Champlain and Richelieu River**
  This 2013 plan of study prepared by the International Joint Commission (IJC) examines the casus and impacts of the May 2011 flooding on Lake Champlain and the Richelieu River. It includes recommendations for 3 study options which include updated hydrological and hydraulic modeling, more the, examination of floodplain management best practices, and the evaluation of structural and non-structural mitigation measures.

- **A Real-Time Flood Forecasting and Flood Inundation Mapping System for the Lake Champlain-Richelieu River Watershed**
  This 2015 report prepared by the IJC reviews progress made by the IJC's Technical Working Group to address and close data gaps impeding real-time flood forecasting and inundation mapping system and creation of static flood inundation maps. Accomplishments have included:
    - the collection of new LiDAR data;
    - the collection of new hydrologic and watershed data for certain areas of the Lake Champlain-Richelieu River basin;
    - vertical datum corrections for critical lake and river water level measuring points so that a common datum could be used on both sides of the international border;
    - experimental 2-D hydrodynamic lake modeling for Lake Champlain and the Richelieu River;
    - Static flood inundation maps for portion of the Lake Champlain shoreline; and
    - Recommendations for future improved and coordinated flood forecasting.

  The report also recommends implementing the full scope of the 2013 Plan of Study referenced above to fully evaluate past impacts, floodplain management practices, and adaptation strategies, and to assess structural and non-structural mitigation measures and their impacts.

- **Flood-Inundation Maps for Lake Champlain in Vermont and in Northern Clinton County, New York**
  This 2016 USGS publication prepared in conjunction with the IJC contains recommendations released as part of the 2013 Lake Champlain Basin Program Report referenced above. The report includes inundation mapping (also referenced above) with a comparison of static flood boundary extents based on the May 2011 flood developed using LiDAR data acquired in 2013-2014.

- **Assessment of the Spatial Extent and Height of Flooding in Lake Champlain During May 2011, Using Satellite Remote Sensing and Ground-Based Information**
  This 2014 USGS publication provides additional information on the development of the inundation mapping referenced above and also includes appendices of established high water marks from the May 2011 flood.

- **Essex County Soil and Water Conservation District Stream Inventory Report (Appendix P)**
  This 2012 report prepared by the Essex County Soil and Water Conservation District summarizes data collected from streams in Essex County affected by Hurricane Irene. The data was used to prioritize stream restoration needs within the county. Descriptions of the prioritized restoration needs are also provided in the report.

Recommendations for Future Risk MAP Project Scope

Based on the stakeholder input and other data collected during this Discovery project, a recommended scope of work was developed for consideration for a future Risk MAP project that may be implemented by FEMA if available funding permits. In addition to upgrading existing detailed and approximate mapping in Essex, Warren, and Washington Counties to a digital format, 13 high priority new or revised detailed riverine and lake studies, 15 medium priority detailed studies, and ten lower priority detailed studies were also identified as desirable for inclusion in a future Risk MAP project scope. Six updated approximate studies were also identified for inclusion in the scope.

High priority detailed studies were recommended for the following flooding sources:

- Lake Champlain
- Lake George
- Great Chazy River
- Spruce Mill Brook
- Halfway Brook
- Hadlock Pond
- Mettawee River
- Mill Brook
- Trout Brook

- Little Chazy River
- Furnace Brook
- Prospect Mountain Brook
- English Brook

These new detailed studies, combined with updated approximate studies in a new digital format, would assist both the communities and the counties in the Lake Champlain Watershed in effectively enforcing floodplain regulations and managing development, thereby significantly reducing flood risk within the watershed.

The complete recommended scope of work for the Lake Champlain Watershed is provided in Appendix N.