3.4 - Flood Hazard Profile

The Mitigation Plan Development Team researched the flood hazard as it affects New York State. Contents of this section result from research and outreach including the following sources:

- The New York State Department of Environmental Conservation, Bureau of Flood Protection and Dam Safety, Division of Water, staff and web site, http://www.dec.state.ny.gov/lands/316

- The Federal Emergency Management Agency (FEMA) National Flood Insurance Program staff and web site, http://www.fema.gov/hazards/floods/.

- The US Army Corps of Engineers, Cold Regions Research Laboratory (CRREL) at www.crrel.usace.mil/ice jams.

- National Oceanic and Atmospheric Administration (NOAA), National Climate Data Center at www.ncdc.noaa.gov.

- The United States Geological Survey (USGS) web site http://www.usgs.gov/themes/flood.html, including the USGS Circular 1245, http://water.usgs.gov/pubs/circ/2003/circ1245/

- New York State Climate Office, Department of Earth and Atmospheric Sciences at Cornell University web site, http://nysc.eas.cornell.edu, http://nysc.eas.cornell.edu/climate_of_ny.html

The following chart provides the definition of flooding:

Term	Definition
Flooding	A general and temporary condition of partial or complete inundation on normally dry land from the following: • Riverine flooding, including overflow from a river channel, flash floods, alluvial fan floods, and ice-jam floods. • Riverine flooding including dam-break floods; • Local drainage or high groundwater levels; • Fluctuating lake levels; • Coastal Flooding; • Coastal erosion

The Concept of Flooding

According to USGS, floods are the most frequent and costly natural disaster in terms of human hardship and economic loss. As much as 90% of damage related to natural disasters (excluding drought) are caused by floods and associated mud and debris flows. Between 1985 and 1994 floods cost the Nation $3.1 billion annually.

Flooding is the primary natural hazard in the State of New York. Damaging floods occur somewhere in the State each year. Depending on where they occur, floods can pose significant risks to health and safety or interruption to transportation and other services. Annual economic

losses due to flooding are estimated to be as high as $100 million. Collateral losses such as disruption of commerce, unemployment due to flooded workplaces and inundated transportation systems, expenses for disaster relief and cleanup, and other related costs, add millions of additional dollars to this figure.

As an example of the costs that could actually be associated with flooding disasters, it is necessary to go no farther than the National Flood Insurance Program. Based on National Flood Insurance Program (NFIP) statistics, as of April 26, 2004 Statewide there were 96,372 NFIP insured structures in New York State. Information provided by NYSDEC indicates that on average, only 30% of at-risk structures are covered by flood insurance. Assuming that the number of NFIP structures represents only about 30% of properties that should be insured, approximately 321,240 additional properties could be at risk in the Special Flood Hazard Areas of the State. On the basis of the current number of properties insured, the annual premium paid amounts to $63,661,489. If all potentially eligible properties were insured, the premium would be slightly in excess of $212,204,963. The corresponding value of coverage for the currently insured properties is just over $16 billion. This coverage would have been increased to over $53 billion if all flood prone properties were insured. More than 67,000 claims have been filed since 1978. Assuming all potentially insurable properties were indeed insured, claims since the same period could have numbered 223,333. Finally, the total statewide NFIP claims paid since 1978 exceed $364,688,528. Again, assumed that all potentially eligible properties were insured, more than $1.2 billion could have been paid in claims since 1978.

Eight-hundred and eighteen (818) flood events were reported in New York between 01/01/2004 and 03/31/2007. Of those 818 events, 427 were undeclared flooding events with no recorded damages. 225 were undeclared flooding events with recorded damages (not sufficient to meet Presidential Disaster threshold) resulting in $72.7M in property damage and $850K in crop damage and 166 were major incidents of flooding resulting in a Presidential Disaster Declaration resulting in $1.123B in property damage and $1M in crop damage.

Geographic Location/Extent/Severity and History of Flood Hazards

Flooding is truly a Statewide concern. Although some areas are more prone to flooding than others, there is no area of the State that is exempt from flood hazards. In New York State there are over 52,000 miles of rivers and streams. Along their banks, there are 1480 communities that are designated as flood prone. It is estimated that one and a half million people live in these flood prone areas. Millions more work, travel through or use recreational facilities located in areas subject to flooding. Areas outside recognized and mapped flood hazard zones can also experience flooding. The Federal Emergency Management Agency reports that over thirty percent of the claims filed under the National Flood Insurance Program are from damages incurred outside of the 100 year floodplain. An example of this type of area is the common "urban flooding" resulting from undersized or poorly maintained drainage systems.

Based on information including historical flooding and flood disaster declarations, flood problems are most acute in the Delaware, Susquehanna, Genesee, Chemung, Hudson, Mohawk, and Allegheny River Basins. These major waterways, along with the tributary streams in the basins, are subject to direct flooding. Tributary streams also imperil persons and property by backwater flooding associated with the major waterways in the basins.

River basins are not the only areas of New York State that are exposed to flood hazards. New York has over 3000 miles of marine and lacustrine coastline that are often causes of flooding.

This includes the lands adjacent to Lake Erie and Lake Ontario, the St. Lawrence and Niagara Rivers, the Hudson River estuary, the Kill van Kull and Arthur Kill, Long Island Sound and the Atlantic Ocean and their connecting bays, harbors, shallows, and marshes. Long Island alone has over 1200 miles of coastline. There are another 1000 miles of shoreline along the Great Lakes. Located on these shorelines are 25 cities, 112 towns, and 103 villages, all of which face the possibility of being affected by flooding.

Flood Hazard Types Defined and Located

According to the Federal Interagency Floodplain Management Task Force, flooding in the United States can be separated into several types including the following:

- Riverine flooding, including overflow from a river channel, flash floods, alluvial fan floods, and ice-jam floods.
- Riverine flooding including dam-break floods;
- Local drainage or high groundwater levels;
- Fluctuating lake levels;
- Coastal Flooding;
- Coastal erosion

Riverine Flooding

Riverine flood problems are most severe in the following River Basins: Delaware, Susquehanna and Chemung, Erie-Niagara, Genesee, Allegany, Hudson and Mohawk.

Overbank flooding of rivers and streams is the most common type of flood event. Riverine floodplains range from narrow, confined channels in the steep valleys of hilly and mountainous areas to wide, flat areas along major rivers and low-lying coastal regions. The volume of water in the floodplain is a function of the size of the contributing watershed and topographic characteristics such as watershed shape and slope, and climatic and land-use characteristics.

In steep, narrow valleys, flooding usually occurs quickly, is of short duration, and floodwaters are likely to be rapid and deep. In relatively flat floodplains, areas may remain inundated for days or even weeks, but floodwaters are typically slow-moving and relatively shallow, and may accumulate over long periods of time.

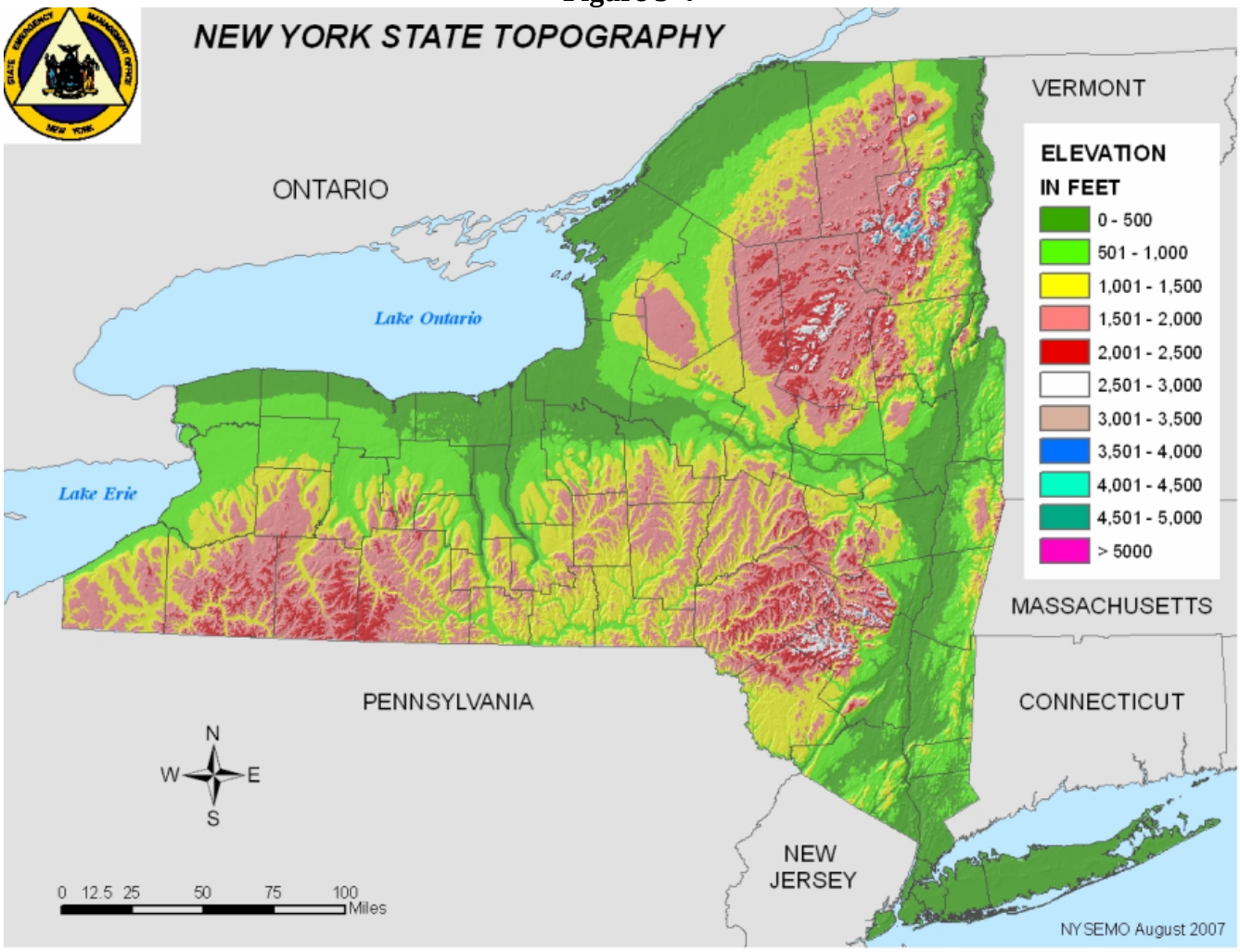
Flooding from large rivers usually results from large-scale weather systems that generate prolonged rainfall over wide areas. These same weather systems may cause flooding in hundreds of smaller basins that drain to major rivers. Small rivers and streams are susceptible to flooding from more localized weather systems that cause intense rainfall over small areas. In some parts of the State, annual spring floods result from snowmelt, and the extent of flooding depends on the depth of winter snowpack and spring weather patterns. In the northeast, winter thaws, sometimes combined with rain, can also cause significant flooding.

Flash Floods

Based on the characterization of the flash flood hazard noted below, flash flooding can occur almost anywhere in New York State, however the distinctive flashflood event that is characterized by fast moving water and violent damaging results requires a steep topography. Although, steep topography can be found locally anywhere, they prevail in the following general regions: the Allegany-Catskill plateau of which runs the entire width of New York States

Southern Tier region and the Adirondack mountains of the northern plateau. See **Figure 3-4** which includes a topographical representation of New York State.

Figure 3-4



"Flash flood" is a term widely used by flood experts and the general population. However, there is no single definition, and a clear means to separate flash floods from the rest of the spectrum of riverine floods does not exist.

Flash floods are characterized by a rapid rise in water level, high velocity, and large amounts of debris. They are capable of tearing out trees, undermining buildings and bridges, and scouring new channels. Major factors causing flash flooding are the intensity and duration of rainfall, the steepness of watershed and stream gradients. The extent and density of watershed vegetation, the natural and artificial flood storage areas and the configuration of the stream bed and floodplain are also important.

Flash floods may result from the failure of a dam, the sudden breakup of an ice jam, or an intense rainfall over a very short duration. All of these events can cause the release of a large volume of water in a short period of time. Flash flooding in urban areas is an increasingly serious problem due to removal of vegetation, paving, and replacement of ground cover with impermeable surfaces that increase runoff, and construction of drainage systems that increase the speed of runoff.

The tragic flash flood event of June 19, 2007 in the Town of Colchester, Delaware County is a text book example of the potential for loss of property, infrastructure, and lives due to flash flooding. Approximately 8" of rain fell over a two hour period on the very steep slopes of the Catskill Mountains in the Delaware County, Town of Colchester. The resulting flash flood sent a wall of water down tributaries of the upper East Branch of the Delaware River and washed away roads, bridges, homes, and took the lives of four people.

Ice Jam Floods

Flooding caused by ice jams is similar to flash flooding. Ice jam formation causes a rapid rise of water at the jam and extending upstream. Failure or release of the jam causes sudden flooding downstream.

The formation of ice jams depends on the weather and physical conditions in river channels. Unlike the typical violent flash flooding occurrences where steep terrain is present, ice jams are most likely to occur where the channel slope naturally decreases, where culverts freeze solid at headwaters of reservoirs, at natural channel restrictions such as bends and bridges, and along shallows where channels may freeze solid. Ice jams are common in the Northeast United States and New York is not an exception, in fact, according to the US Army Corps of Engineers, New York State ranks second in the Nation for total number of ice jam events. **Table 3-5** presents a comparison of total ice jam events by State, for the period of February 1, 1867 thru March 16, 2007.

Table 3-5 Ice Jam Database
Ice Jam Event Ranking by State

State	No. of Ice Jams	State	No. of Ice Jams
Montana	1476	Oregon	161
New York	**1435**	Indiana	146
Pennsylvania	1102	New Jersey	98
Minnesota	1079	West Virginia	62
Wisconsin	1065	Maryland	46
North Dakota	995	Utah	44
Nebraska	989	Washington	30
Alaska	925	Kentucky	26
South Dakota	888	Virginia	22
Vermont	842	Kansas	19
Maine	658	Rhode Island	10
Illinois	615	Arkansas	5
New Hampshire	579	District of Columbia	4
Ohio	519	Tennessee	3
Michigan	383	Alabama	2
Idaho	267	North Carolina	2
Wyoming	249	New Mexico	2
Massachusetts	217	Texas	1
Missouri	213	Delaware	1
Iowa	206	Arizona	1
Connecticut	197	Nevada	1
Colorado	187		

Source: US Army Corps of Engineers, Engineering Research & Development Center, Cold Region Research &Engineering Laboratory (CRREL)

Ice jams and resulting floods can occur during fall freeze-up from the formation of frazil ice, during midwinter periods when stream channels freeze solid forming anchor ice, and during spring breakup when rising water levels from snowmelt or rainfall break existing ice cover into large floating masses that lodge at bridges, or other constructions. Damage from ice jam flooding

usually exceeds that caused by open water flooding. Flood elevations are usually higher than predicted for free-flow conditions and water levels may change rapidly. Additional physical damage is caused by the force of ice impacting buildings and other structures. Because of the sometimes unpredictable nature of ice jam floods, FEMA's Flood Insurance Rate Maps often do not reflect ice jam flood threats.

It is difficult to identify particular areas that are generally prone to ice jam flooding because the hazard can be very localized. Although, based on the causal characteristics, ice jam flood hazard is most prevalent in locations of flat terrain but also where climate includes extended periods of below freezing temperatures. Areas of New York that include characteristics lending to ice jam flooding include the northern counties of the Finger Lakes region and far western New York, the Mohawk Valley of central and eastern New York and the North Country. Analysis of various historical records support the indications of causal characteristic but also point out that there are few regions of the State that can be considered exempt from ice jam flooding hazard. **Table 3-6** lists documented ice jam flooding events.

The US Army Corps of Engineers (USACE), in conjunction with their Center of Expertise in Hanover, New Hampshire at the Cold Regions Research and Engineering Laboratory (CRREL) can provide assistance to communities in New York State to address ice jam problems. This assistance can take the form of short term mitigation of an on-going or anticipated event or the long term mitigation of recurring ice jam flooding events with various structural and non-structural solutions.

As one example of the type of assistance that the USACE and CRREL can provide: in 2007, the USACE and CRREL constructed an Ice Jam Hazard Mitigation project along the Cazenovia Creek. The community of West Seneca along Cazenovia Creek experienced repeated ice jam flooding. On average, they experienced an ice jam flood every 2 to 3 years, resulting in over $1 million in damages for each event. The USACE and CRREL, at the request of NYSDEC and the Town of West Seneca, undertook a feasibility study and then designed and constructed an innovative ice jam control structure that captured the ice upstream of the population center and then allowed the resulting flooding to occur within a vacant wooded floodplain. The same year that the project was constructed, during the winter of 2007, the project experienced an ice jam event. The project performed as designed, mitigating significant damages for local residents.

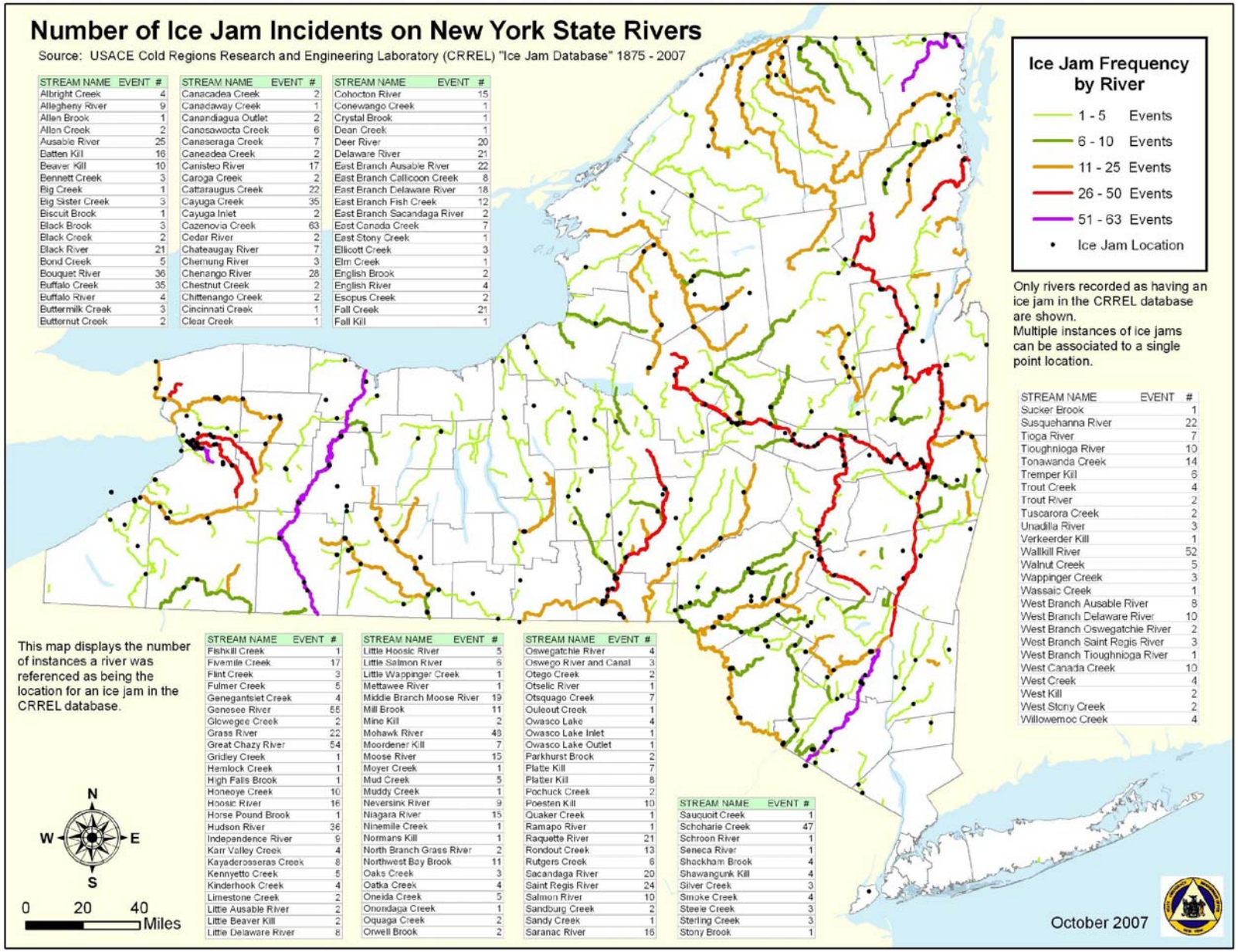
Table 3-6 Ice Jam Flooding Events Over the Last Five Years in New York State

Date	Location of Ice Jam Flooding (water body and community)
2007, March	**Hudson River** / Troy and Schylerville
2007, March	**Genesse River** / Wellsville
2007, March	**Cattaragus Creek** / Gowanda and Sunset Bay
2007, March	**Mohawk River** / Fort Plain, Sprakers, Canajoharie, Schenectady
2007, March	**Susquehanna River** / Corbettsville and Waverly
2007, March	**E. Branch Ausable River** / Ausable Forks
2007, March	**Wallkill River** / Gardiner
2007, March	**Wallnut Creek** / Silver Creek
2007, March	**Buffalo Creek** / Gardenville
2007, March	**Great Chazy River** / Perry Mills
2006, March	**Mohawk River** / Fulmer Creek
2006, January	**Great Chazy River** / Perry Mills
2006, January	**Cedar River** / Indian Lake
2005, December	**Cazenovia Creek** / Ebenezer and West Seneca

Table 3-6 Ice Jam Flooding Events Over the Last Five Years in New York State	
Date	Location of Ice Jam Flooding (water body and community)
2005, December	**Buffalo River** / Buffalo
2005, April	**Great Chazy River** / Perry Mills
2005 February	**Mohawk River** / Scotia
2005, February	**Silver Creek** / Silver Creek
2005, February	**Walnut Creek** / Silver Creek
2005, January	**Chenango River** / Dickinson and Binghamton
2005, January	**Great Chazy River** / Perry Mills
2005, January	**Grasse River** / Chase Mills
2005, January	**Ausable River** / Ausable Forks
2004, December	**Cazenovia Creek** / Buffalo and Ebenezer
2004, December	**Salmon River** / Malone
2004, March	**Hudson River** / Thruman
2004, March	**Mohawk River** / Utica, Vishers Ferry, Rexford, Niskayuna, Schenectady, and Herkimer
2004, March	**Great Chazy River** / Perry Mills
2004, March	**Sacandaga River** / Hope
2004, March	**Great Chazy River** / Champlain
2004, March	**Schoharie Creek** / Prattsville, Fort Hunter, Lexington, Mill Point, Glen, Florida, Lost Valley and Burtonsville
2004, March	**Fulmer Creek** / Mohawk
2004, March	**Chenango River** / Chenango Bridge and Chenango Fork
2004, March	**Buffalo Creek** / Elma
2004, March	**Cazenovia Creek** / Buffalo and West Seneca
2004, March	**Cattarugus Creek** / Sunset Bay
2004, February	**Saranac River** / Morrisonville
2004, January	**Caroga Creek** / North Bush
2004, January	**Allegheny River** / Salamanaca
2004, January	**Hudson River** / Warrensburg and Corinth
2004, January	**Mohawk River** / Little Falls
2004, January	**Schoharie Creek** / Prattsville
2004, January	**Chittenango Creek** / Chittenango
2004, January	**Seneca River** / Jacks Reef
2004, January	**Oswego River** / Fulton and Minetto
2004, January	**Salmon River** / Malone

Additional information on ice jam events in NYS is available at https://rsgis.crrel.usace.mil/icejam

Figure 3-5 Number of Ice Jam Incidents on New York State Rivers



STREAM NAME	EVENT #
Albright Creek	4
Allegheny River	9
Allen Brook	1
Allen Creek	2
Ausable River	25
Batten Kill	16
Beaver Kill	10
Bennett Creek	3
Big Creek	1
Big Sister Creek	3
Biscuit Brook	1
Black Brook	3
Black Creek	2
Black River	21
Bond Creek	5
Bouquet River	36
Buffalo Creek	35
Buffalo River	4
Buttermilk Creek	3
Butternut Creek	2

STREAM NAME	EVENT #
Canacadea Creek	2
Canadaway Creek	1
Canandiagua Outlet	2
Canasawocta Creek	6
Canaseraga Creek	7
Caneadea Creek	2
Canisteo River	17
Caroga Creek	2
Cattaraugus Creek	22
Cayuga Creek	35
Cayuga Inlet	2
Cazenovia Creek	63
Cedar River	2
Chateaugay River	7
Chemung River	3
Chenango River	28
Chestnut Creek	2
Chittenango Creek	2
Cincinnati Creek	1
Clear Creek	1

STREAM NAME	EVENT #
Cohocton River	15
Conewango Creek	1
Crystal Brook	1
Dean Creek	1
Deer River	20
Delaware River	21
East Branch Ausable River	22
East Branch Callicoon Creek	8
East Branch Delaware River	18
East Branch Fish Creek	12
East Branch Sacandaga River	2
East Canada Creek	7
East Stony Creek	1
Ellicott Creek	3
Elm Creek	1
English Brook	2
English River	4
Esopus Creek	2
Fall Creek	21
Fall Kill	1

STREAM NAME	EVENT #
Fishkill Creek	1
Fivemile Creek	17
Flint Creek	3
Fulmer Creek	5
Genegantslet Creek	4
Genesee River	55
Glowegee Creek	2
Grass River	22
Great Chazy River	54
Gridley Creek	1
Hemlock Creek	1
High Falls Brook	1
Honeoye Creek	10
Hoosic River	16
Horse Pound Brook	1
Hudson River	36
Independence River	9
Karr Valley Creek	4
Kayaderosseras Creek	8
Kennyetto Creek	5
Kinderhook Creek	4
Limestone Creek	2
Little Ausable River	2
Little Beaver Kill	2
Little Delaware River	8

STREAM NAME	EVENT #
Little Hoosic River	5
Little Salmon River	6
Little Wappinger Creek	1
Mettawee River	1
Middle Branch Moose River	19
Mill Brook	11
Mine Kill	2
Mohawk River	43
Moordener Kill	7
Moose River	15
Moyer Creek	1
Mud Creek	5
Muddy Creek	1
Neversink River	9
Niagara River	15
Ninemile Creek	1
Normans Kill	1
North Branch Grass River	2
Northwest Bay Brook	11
Oaks Creek	3
Oatka Creek	4
Oneida Creek	5
Onondaga Creek	1
Oquaga Creek	2
Orwell Brook	2

STREAM NAME	EVENT #
Oswegatchie River	4
Oswego River and Canal	3
Otego Creek	2
Otselic River	1
Otsquago Creek	7
Ouleout Creek	1
Owasco Lake	4
Owasco Lake Inlet	1
Owasco Lake Outlet	1
Parkhurst Brook	2
Platte Kill	7
Platter Kill	8
Pochuck Creek	2
Poesten Kill	10
Quaker Creek	1
Ramapo River	1
Raquette River	21
Rondout Creek	13
Rutgers Creek	6
Sacandaga River	20
Saint Regis River	24
Salmon River	10
Sandburg Creek	2
Sandy Creek	1
Saranac River	16

STREAM NAME	EVENT #
Sauquoit Creek	1
Schoharie Creek	47
Schroon River	1
Seneca River	1
Shackham Brook	4
Shawangunk Kill	4
Silver Creek	3
Smoke Creek	4
Steele Creek	3
Sterling Creek	3
Stony Brook	1

STREAM NAME	EVENT #
Sucker Brook	1
Susquehanna River	22
Tioga River	7
Tioughnioga River	10
Tonawanda Creek	14
Tremper Kill	6
Trout Creek	4
Trout River	2
Tuscarora Creek	2
Unadilla River	3
Verkeerder Kill	1
Wallkill River	52
Walnut Creek	5
Wappinger Creek	3
Wassaic Creek	1
West Branch Ausable River	8
West Branch Delaware River	10
West Branch Oswegatchie River	2
West Branch Saint Regis River	3
West Branch Tioughnioga River	1
West Canada Creek	10
West Creek	4
West Kill	2
West Stony Creek	2
Willowemoc Creek	4

Dam Break Floods
Dam failures can occur as a result of structural failures, such as progressive erosion of an embankment or overtopping and breaching by a severe flood. Earthquakes may weaken dams. Disastrous floods caused by dam failures, although not in the category of natural hazards, have caused great loss of life and property damage, primarily due to their unexpected nature and high velocity floodwater.

Local Drainage or High Groundwater Levels
Locally heavy precipitation may produce flooding in areas other than delineated floodplains or along recognizable drainage channels. If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding problems. During winter and spring, frozen ground and accumulations of snow may contribute to inadequate drainage and localized ponding. Similar to ice jams, poor drainage flooding problems are localized but generally occur in areas with flat gradients and generally increase with urbanization which speeds the accumulation of floodwaters because of the addition of impervious areas. Shallow sheet flooding may result unless channels have been improved to account for increased flows.

High groundwater levels may be of concern and can cause problems even where there is no surface flooding. Basements are susceptible to high groundwater levels. Seasonally high groundwater is common in many areas, while in others, high groundwater occurs only after long periods of above-average precipitation. High groundwater problems are also known to occur in urban areas where groundwater pumping has ended and aquifer levels have rebounded.

Areas of New York that include characteristics lending to poor drainage type flooding include the Long Island communities, western New York and, in general, the more urbanized areas.

Fluctuating Lake Levels
Water levels in lakes can fluctuate on a short-term seasonal basis or on a long-term basis over periods of months or years. Heavy seasonal rainfall can cause high lake levels for short periods of time, and snow melt can result in higher water levels during the spring. Long-term fluctuations are a less-recognized phenomenon that can cause high water and subsequent flooding problems lasting for years or even decades.

In New York, Lakes Ontario and Erie experience seasonal and long term fluctuations due to precipitation patterns over the vast Great Lakes drainage basin. The lakes have been known to exhibit high water levels for significant periods, in spite of the limited amount of relief offered to Lake Ontario downstream along the St. Lawrence River. Even during low water periods, however, storms can cause significant flooding when strong winds cause surges. Other large lakes in New York, including the Finger Lakes and Lake Champlain, also experience seasonal and long term fluctuations in mean water levels.

Coastal Flooding
There are two major types of coastal storm events that impact the State's marine coastline and the communities located on those shores. Hurricanes and tropical storms are one major type. Originating in the warm waters of the South Atlantic these storms are high energy storm systems. The usual path of these storms, from south to north, puts Long Island's south shore at great risk. They can produce both high winds and heavy rainfall. When one of these storms makes landfall coincident with high tide, the wind driven storm surge can overtop barrier dunes, threatening the

areas behind them. Nor'easters can also cause flooding on our marine coasts. These storms form in the gap between a high and low pressure system and are sometimes referred to as "precipitation machines". They bring sustained high winds and heavy snow or rain, and are often responsible for storm surges on the north shore of Long Island. These coastal storms including, Nor'easters, Tropical storms, and hurricanes, can reach the inland and upland portions of the State bringing torrential rains.

Communities along the shores of Lake Erie and Lake Ontario also are faced with coastal flooding. High water levels in lakes, sometimes due to seasonal runoff, sometimes due to above normal runoff over a longer term period can cause near shore flooding (see discussion in the preceding section). But flooding along the Great Lakes can also come from a seich. Like water sloshing in a bathtub, seiches are tide-like rises and drops in Great Lakes coastal water levels caused by prolonged strong winds that push water toward one side of the lake, causing the water level to rise on the downwind side of the lake and to drop on the upwind side. When the wind stops, the water sloshes back and forth, with the near shore water level rising and falling in decreasingly small amounts on both sides of the lake until it reaches equilibrium.

Table 3-7: 46 COASTAL FLOODING event(s) were reported in **New York** between **09/01/1815** and **03/31/2007**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

New York								
Location or County	**Date**	**Time**	**Type**	**Mag**	**Dth**	**Inj**	**PrD**	**CrD**
1 Long Island – "The Great Gale of 1815" – many structures damaged	Sept., 1815	N/A	Coastal Flooding	N/A	N/A	N/A	N/A	N/A
2 Long Island	Sept., 1821	N/A	Coastal Flooding	N/A	21	N/A	N/A	N/A
3 Long Island	Sept., 1944	N/A	Coastal Flooding	N/A	N/A	N/A	800K	N/A
4 SUFFOLK	March, 1962	N/A	Coastal Flooding	N/A	N/A	N/A	N/A	N/A
5 Nassau - Fire Island	Sept., 1966	N/A	Coastal Flooding	N/A	N/A	N/A	N/A	N/A
6 Atlantic Coastal New York	June, 1972	N/A	Coastal Flooding	N/A	N/A	N/A	N/A	N/A
7 Long Island	12/21/92	N/A	Coastal Flooding	N/A	N/A	N/A	31.2M	N/A
8 WESTCHESTER and SUFFOLK	11/19/96	N/A	Coastal Flooding	N/A	N/A	N/A	16.1M	N/A
9 SUFFOLK	01/09/1993	1800	Coastal Flood	N/A	0	0	0	0

10 SUFFOLK	02/13/1993	0000	Coastal Flood	N/A	0	0	0	0
11 Coastal New York	03/04/1993	1800	Coastal Flood	N/A	0	0	0	0
12 Atlantic Coastal New York	03/13/1993	1200	Coastal Flood	N/A	0	0	0	0
13 SUFFOLK	04/07/1993	2000	Coastal Flood	N/A	0	0	0	0
14 Nassau - Fire Island	08/31/1993	2000	Coastal Flood	N/A	0	0	0	0
15 Atlantic Coastal New York	12/14/1993	0700	Coastal Flood	N/A	0	0	0	0
16 Atlantic Coastal New York	01/04/1994	1000	Coastal Flood	N/A	0	0	0	0
17 Atlantic Coastal New York	03/02/1994	2300	Coastal Flooding	N/A	0	0	0	0
18 Suffolk – North and South Fork	12/24/1994	0000	Coastal Flooding	N/A	0	0	0	0
19 Atlantic Coastal New York	02/04/1995	1000	Coastal Flood	N/A	0	0	0	0
20 NASSAU	11/14/1995	1730	Coastal Flood	N/A	0	0	0	0
21 QUEENS	11/14/1995	1730	Coastal Flood	N/A	0	0	0	0
22 SUFFOLK	11/14/1995	1730	Coastal Flood	N/A	0	0	0	0
23 WESTCHESTER	11/14/1995	1730	Coastal Flood	N/A	0	0	0	0
24 Long Island	12/20/1995	0600	Coastal Flood	N/A	0	0	0	0
25 Long Island	12/20/1995	0600	Coastal Flood	N/A	0	0	0	0
26 Nassau - Fire Island Suffolk - Hamptons	08/29/1996	07:00 AM	Coastal Flooding	N/A	0	0	0	0
27 Bronx, New York, Queens, Westchester Nassau – East Bayville & Freeport	10/19/1996	11:00 AM	Coastal Flood	N/A	0	0	11.5M	0

Suffolk – Asharoken & Orient Point								
28 Bronx, Kings, Queens, New York, Richmond, & Westchester Nassau – Freeport Suffolk – Babylon & Lindenhurst	12/13/1996	09:00 AM	Coastal Flood	N/A	0	0	0	0
29 Atlantic Coastal New York	01/10/1997	09:00 AM	Coastal Flood	N/A	0	0	0	0
30 Atlantic Coast New York	01/10/1997	09:00 AM	Coastal Flood	N/A	0	0	0	0
31 Atlantic Coast New York	01/10/1997	09:00 AM	Coastal Flood	N/A	0	0	0	0
32 Nassau - Freeport	08/20/1997	09:00 PM	Coastal Flood	N/A	0	0	0	0
33 Suffolk - Babylon	08/20/1997	11:00 PM	Coastal Flood	N/A	0	0	0	0
34 Queens, Suffolk Nassau – Freeport & Bayville	11/14/1997	07:00 AM	Coastal Flooding	N/A	0	0	0	0
35 Bronx – Edgewater Suffolk – Patchogue, Hamptons, Bayport, Bellport, & Blue Point	12/29/1997	11:42 PM	Coastal Flooding	N/A	0	0	0	0
36 Nassau- Freeport Suffolk - Bridgehampton	01/29/1998	05:30 AM	Coastal Flood	N/A	0	0	0	0
37 Staten Island – Oakwood Beach & Crescent Beach Nassau – Freeport & Massapequa Suffolk – Babylon, Ocean Beach, S. Hampton, Smith Point	02/05/1998	01:00 AM	Coastal Flood	N/A	0	0	750K	0
38 Nassau – Freeport Suffolk – Port Jefferson, East Hampton, Montauk, New Suffolk	02/24/1998	05:00 AM	Coastal Flood	N/A	0	0	0	0
39 Erie - Buffalo	12/12/2000	05:40 AM	Seiche	N/A	0	0	50K	0
40 Erie - Angola	03/09/2002	09:45 PM	Seiche	N/A	0	0	35K	0

41 Nassau – Freeport Suffolk - Amityville	10/16/2002	04:30 PM	Coastal Flood	N/A	0	0	0	0
42 CHAUTAUQUA and ERIE Ripley to Buffalo	11/06/2005	06:15 PM	Seiche	N/A	0	0	25K	0
43 Nassau - Freeport	01/03/2006	10:30 AM	Coastal Flood	N/A	0	0	0	0
44 Nassau - Freeport	10/07/2006	06:00 AM	Coastal Flood	N/A	0	0	0K	0K
45 Nassau - Freeport	10/28/2006	10:00 AM	Coastal Flood	N/A	0	0	0K	0K
46 CHAUTAUQUA and ERIE	12/01/2006	11:00 AM	Seiche	N/A	0	0	40K	0K
				TOTALS:	30	0	60.5M	0

Coastal Erosion

Hurricanes, tropical storms, severe storms, and high wind events have played important roles in the shaping of the present-day shoreline, as a result of the erosion and movement of sand by these storms. The drive to develop housing along the coastline has placed many New Yorkers in areas of high vulnerability due to the lack of hurricane protection, as well as the erosion of supportive and protective landforms. Long Island is especially vulnerable to erosion due to its composition of a loose mixture of sand and gravel and its location facing the ocean in direct opposition to the prevailing wind and water currents moving up the Atlantic Coast. DEC has estimated that a significant portion of Long Island's coastline is in high erosion hazard areas.

Storm-induced shore erosion is also a major problem along the Great Lakes shorelines. Caused primarily by storm-induced wave action, and associated long shore currents, the problem becomes critical when high lake levels have submerged the beaches which protect adjoining upland areas that are highly erosion-prone. Raised above the beaches, wave forces can work directly on the toe of bluffs and dunes, resulting in rapid erosion. New York State has more than 1000 miles of coastline bordering the Great Lakes and its connecting rivers. Of these, some 200 miles are subject to significant erosion, with the most critical areas lying along the south shore of Lake Ontario. Property damage caused by erosion of Lake Ontario’s shoreline during high water periods has been estimated in the millions of dollars. Lake Erie's historical high water levels were reached in the mid-1980's, a period which saw much erosion and damage.

While all shore lines are subject to wind, water and gravitational forces of erosion, some shorelines are at greater risk than others. New York State’s Coastal Erosion Hazard Area (CEHA) program was established both to protect lives and property from the threat of coastal erosion as well as protect the natural protective features that mitigate or slow the forces of coastal erosion. (See the Coastal Erosion Hazard Area (CEHA) program of the DEC’s Bureau of Flood Protection and Dam Safety in **Section 2**.)

New York State currently has 86 municipalities under the CEHA program and where coastal erosion is of significant concern. These communities are identified in **Table 3-8**.

Table 3-8
Coastal Erosion Hazard Areas Communities
6NYCRR Part 505, the Coastal Erosion Hazard Management Regulations

Cayuga County
1. Fair Haven (V) +
2. Sterling (T) *

Chautauqua County
3. Dunkirk (C) +
4. Dunkirk (T) *
5. Hanover (T) +
6. Pomfret (T) +
7. Portland (T) +
8. Ripley (T) +
9. Sheridan (T) *
10. Silver Creek (V) +
11. Westfield (T) +

Erie County
12. Brant (T) +
13. Evans (T) +
14. Hamburg (T) *

Jefferson County
15. Ellisburg (T) *

Monroe County
16. Greece (T) *
17. Hamlin (T) *
18. Irondequoit (T) +
19. Parma (T) +
20. Penfield (T) +
21. Rochester (C) *
22. Webster (T) +

Nassau County
23. Atlantic Beach (V) *
24. Bayville (V) *
25. Centre Island (V) +
26. Glen Cove (C) *
27. Hempstead (T) *
28. Kings Point (V) *
29. Lattingtown (V) *
30. Long Beach (C) +
31. Oyster Bay (T) +
32. Sands Point (V) *

New York City
33. Queens County +
34. Richmond County +
35. Kings County +

Niagara County
36. Newfane (T) +
37. Porter (T) +
38. Somerset (T) +
39. Wilson (T) *
40. Wilson (V) +

Orleans County
41. Carlton (T) +
42. Kendall (T) *
43. Yates (T) *

Oswego County
44. Mexico (T) +
45. New Haven (T) +
46. Oswego (C) *
47. Oswego (T) +
48. Richland (T) +
49. Sandy Creek (T)+
50. Scriba (T) +

Suffolk County
51. Asaroken (V) #
52. Babylon (T) *
53. Belle Terre (V) *
54. Brookhaven (T) *
(North and South Shore)
55. East Hampton (T) +
56. East Hampton (V) *
57. Huntington (T) *
58. Islip (T) +
59. Lloyd Harbor (V) *
60. Nisseqougue (V) +
61. Ocean Beach (V) *
62. Old Field (V) *
63. Port Jefferson (V) *
64. Quogue (V) *

Suffolk Co. (continued)
65. Riverhead (T) *
66. Sagaponack (V)*
67. Saltaire (V) *
68. Shelter Island(T)+
69. Shoreham (V) *
70. Smithtown (T) +
71. Southampton (T)*
72. Southampton (V)*
73. Southold (T) *
74. Westhampton * Beach (V)
75. West Hampton * Dunes (V)

Wayne County
76. Huron (T) *
77. Ontario (T) +
78. Sodus (T) *
79. Sodus Point (V) +
80. Williamson (T) +
81. Wolcott (T) +

Westchester County
82.Larchmot (V) +
83. Mamaroneck (T)+
84. Mamaroneck (V)+
85. NewRochelle(C)*
86. Rye (C) +

Legend

+ CEHA program admin. by DEC

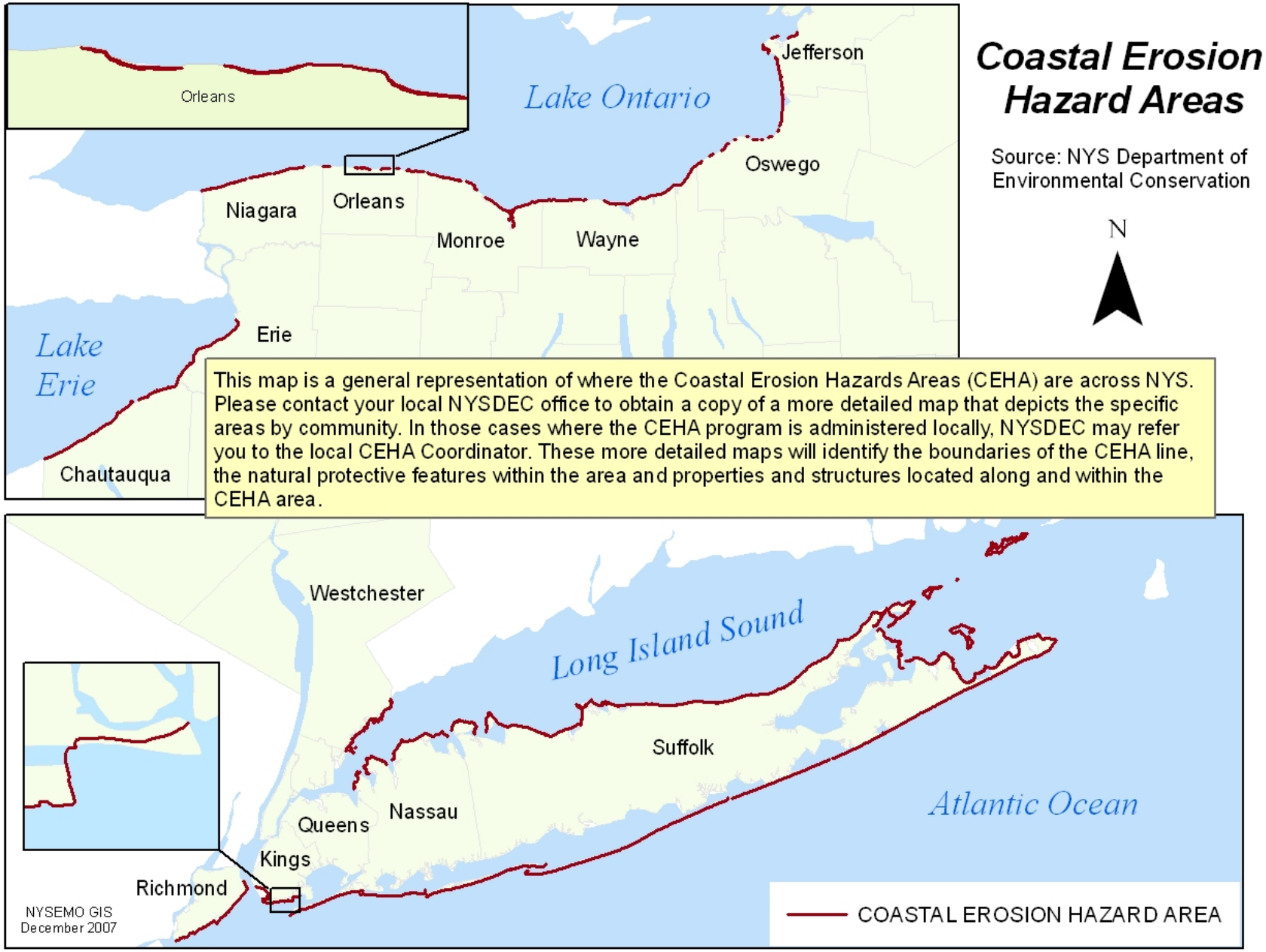
* CEHA program admin locally

CEHA approval under review

The following two maps provide additional information on NYS CEHA program. **Figure 3-7** highlights the areas in NYS where coastal erosion has been identified as a problem and where the CEHA regulations are in-place and detailed maps which delineate the hazard areas have been developed. **Figure 3-6** displays a sample CEHA map. The area that is "seaward" of the red line is the area regulated under the CEHA program. In many communities detailed ortho-imagery (as shown in the sample map) is available so that individual roads, structures, and land features can be identified. Please contact your local NYSDEC office to obtain a copy of the CEHA map that depicts the specific community you are interested in. In those cases where the CEHA program is administered locally, NYSDEC may refer you to the local CEHA Coordinator.

Figure 3-6

Figure 3-7


Coastal Erosion Hazard Areas
Source: NYS Department of Environmental Conservation
N
Orleans
Lake Ontario
Jefferson
Oswego
Niagara
Orleans
Monroe
Wayne
Lake Erie
Erie
Chautauqua
This map is a general representation of where the Coastal Erosion Hazards Areas (CEHA) are across NYS. Please contact your local NYSDEC office to obtain a copy of a more detailed map that depicts the specific areas by community. In those cases where the CEHA program is administered locally, NYSDEC may refer you to the local CEHA Coordinator. These more detailed maps will identify the boundaries of the CEHA line, the natural protective features within the area and properties and structures located along and within the CEHA area.
Westchester
Long Island Sound
Suffolk
Nassau
Queens
Kings
Richmond
Atlantic Ocean
NYSEMO GIS
December 2007
COASTAL EROSION HAZARD AREA

Affecting Conditions – Flood Hazard
Variables that determine the overall flood hazard risk include: Natural - the weather or climatological and meteorological factors and the land or geographic features including topography and Human Caused – land use.

Weather: New York State exhibits a unique blend of weather (climatological and meteorological) features that influence the potential for flooding. Factors include temperature, which is affected by latitudes, elevation, proximity to water bodies and source of air masses; and precipitation which includes snowfall and rainfall. Precipitation intensities and effects are influenced by temperature, proximity to water bodies, and general frequency of storm systems.

Temperature (snow pack and ice) - A climate summary of New York State prepared by the New York State Climate Office, Department of Earth and Atmospheric Sciences at Cornell University, http://nysc.eas.cornell.edu/climate_of_ny.html, reports; "the greatest potential and frequency for floods occurs in the early spring when substantial rains combine with rapid snowmelt to produce a heavy runoff". The depth of annual snow pack is recognized as a major factor affecting the potential for spring flooding. Annual spring floods can result from snowmelt, and the extent of flooding depends on the depth of winter snow pack and spring weather pattern. Deep snow pack is possible in most of New York State with the exception of the lower Hudson River valley and Long Island. The highest potential for deep snow pack are those locations that receive the highest snowfall and the coldest temperatures including the Catskill's and Adirondack mountains, and the lake effect snow belt areas of central and western New York. Certain areas of New York, including the Catskill Plateau, Tug Hill Plateau, and the Adirondack mountains, experience a higher total number of inches of annual snowfall and/or accumulate a deeper snow pack. This tends to create a higher potential for flooding induced by rapid snowmelt during spring thaw. Additionally, this annual spring thaw, with the concurrent breakup of river ice, leads to the possibility of ice dams (jams) and can result in flooding.

Precipitation - The Cornell Climate Report also indicates that the geographic position of the State (Northeast U.S.) makes it vulnerable to frequent precipitation events. This is because nearly all storms and frontal systems moving eastward across the continent pass through, or are in close proximity to, New York State. Additionally, the potential for prolonged periods of heavy precipitation is increased because of the available moisture of the Atlantic Ocean. This heavy rain can quickly saturate the ground leading to increased runoff and flooding. The heavy rain makers New York State is subject to come in the form of coastal storms (Nor'easters, Tropical Storms, and Hurricanes) as well as thunderstorms.

There are two major types of coastal storm events that impact the State's marine coastline and the communities located on those shores. Hurricanes and tropical storms are one major type. Originating in the warm waters of the South Atlantic these storms are high energy storm systems. The usual path of these storms, from south to north, puts Long Island's south shore at great risk. They can produce both high winds and heavy rainfall. When one of these storms makes landfall coincident with high tide, the wind driven storm surge can overtop barrier dunes, threatening the areas behind them. Nor'easters can also cause flooding on our marine coasts. These storms form in the gap between a high and low pressure system and are sometimes referred to as "precipitation machines". They bring sustained high winds and heavy snow or rain, and are often responsible for storm surges on the north shore of Long Island. These coastal storms including,

nor'easters, tropical storms, and hurricanes, can reach the inland and upland portions of the State bringing torrential rains.

Thunderstorms are also a problem for communities in New York State. Though localized, thunderstorms have the characteristic of releasing large amounts of precipitation in a short period of time. This makes them especially dangerous in the mountainous regions of New York where there is a very real possibility of flash flooding.

Variations in precipitation amounts at any given location and during any given month lends to the unpredictability of potential flooding. Average precipitation in New York State is estimated to be 90 billion gallons per day (bgd), or 40 inches per year. Across the State, the average annual rainfall varies from 30 to 50 inches per year with locally higher and lower amounts experienced. Variations from month to month are widely ranging from one inch to about six inches; in extreme cases, the variation is from less than one inch to ten inches or more. Almost any calendar month has the potential of receiving the lightest or heaviest, monthly accumulation within a calendar year at a given location.

Geography: New York State exhibits a diverse blend of geo-physical features that influence the potential for flooding. These factors include topography, elevations, latitudes, and water bodies (including waterways).

Water: It is safe to say New York State has a significant exposure to water. In the interest of identifying the obvious factors, this is a major causal element of the flood hazard. According to the New York State Department of Environmental Conservation, Bureau of Flood Protection and Dam Safety, Division of Water, this water exposure includes the following;

- 52,337 miles Rivers and streams
- 7,849 lakes*/ponds/reservoirs (790,782 acres *not including Great Lakes)
- 1,637 square miles of inland water, exclusive of the boundary water areas of Long Island Sound and New York Harbor which is 1,530 sq miles (includes NYS portion of L.I. Sound), Lake Ontario and Lake Erie
- 577 miles Great Lakes shoreline
- 117.5 miles Atlantic shoreline

- ***Land*** characteristics affecting the flood hazard can be described using the following classifications: the effects of elevation (altitude), latitudes, and topography.

- ***Elevations*** in New York State range from 5,000 ft above sea level in the high peaks of the Adirondacks to sea level. Simply put, rising elevations can affect the flood hazard by having a tendency to increase precipitation amounts from storm systems; this effect is called orographic lift and increase the depth of snow pack leading to spring flooding events.

- ***Latitudes*** of New York State include those subject to frequent cold weather as air masses are modified moving over the cold far northern reaches of North America. This cold air movement predominates the weather pattern six months out of the year resulting in large amounts of snowfall, particularly from lake effect (or enhanced) snow fall and increases the threat of spring floods as moisture is released from the deep snow pack.

- ***Topography*** variations, commonly referred to as steep slopes and hilly terrain are common in many areas of New York State. Simply put, steep slope features can cause large accumulations of water in the associated valleys or ravines especially during intense or long duration rainfalls.

Human Caused: Human use of land affects the hydraulics of effluent. Changes in land cover including agriculture and development and re-development can have a significant causal effect on the flood hazard potential. For instance, development leading to increased amounts of impervious surfaces such as roads, parking lots and buildings can increase rainwater runoff, and development in floodplains or wetlands can both potentially result in an increased floodplain level.

Previous Flood Hazard Occurrences

SEMO Mitigation staff researched several data sources for historical flood records including SEMO archives, FEMA statistics, Disaster Declaration data, and NOAA's National Climatic Data Center storm event database.

According to FEMA, nationwide 78 flood events classified "significant" have occurred since 1978. A significant event is one with $1,500 or more paid losses (NFIP). Eight of those significant flood events, or 1 in 10, has impacted New York State to one degree or another.

The National Climatic Data Center (NCDC) Storm Events Database of the National Oceanic and Atmospheric Administration includes records indicating 818 individual flood events occurred in New York State for the period January 1, 2004 through March 31, 2007. The combined total property damage for the 818 events is estimated at $1.195 billion. Additionally, $1.85 million in reported crop damage occurred due to flooding over this same time period along with seven injuries and nine deaths directly related to the flooding events.

Further analysis of this NCDC storm event data indicates of the 818 individual flood event records, approximately 430 or 53% are classified as "flash floods", 385 or 46% are characterized as "floods", 3 are characterized as coastal flood events.

Table 3-9 presents a record of flood incidents for the period *1635 through 1994* as compiled through research from various sources including NYSEMO and partnering state agency archives. It should be noted that **Table 3-9** is not intended to be all inclusive. **Table 3-10** is the most recent record of flood incidents (2004 – 2007).

Table 3-9 Historical Incidents of Flooding (undeclared events)			
Date	**Location and Information (if available)**	**Date**	**Location and Information (if available)**
1635, August	Long Island, 1st recorded hurricane in NY. Storm surge 14' above high tide.	1974, June	Western District Counties
1815, September	Long Island, "Great September Gale of 1815" . Many structures damaged.	1974, July	Onondaga, Oswego, Oneida, Herkimer
1821, September	Long Island, Tropical Storm, 21 deaths.	1974, September	Westchester County
1865, March	Genesee River, central Rochester under water. One million $ in damage. Recurrence interval > 100-yr.	1974, November	Monroe County
1869, April	Black River, Recurrence Interval 50 – 100-yr.	1974, December	Schoharie and Delaware Counties
1875, March	Genesee River, Ice Jam	1975, January	Wyoming County
1903, October	Delaware River, Recurrence Interval > 100-yr	1975, February	Chemung, Tioga, Steuben, Cattaraugus, Niagara, Chautauqua, Erie, Wyoming, Allegany Counties
1913, March	Hudson, Genesee, Black and Mohawk R., Recurrence Interval 25 to > 100yr.	1975, May	Delaware County
1936, March	Mohawk, Hudson and Susquehanna R., Recurrence Interval Approx. 100-yr.	1975, May	Allegany and Wyoming County
1938, September	Ausable R. and Southeastern NY. Hurricane related. Damages to So. Shore of L.I. >$6million. Recurrence Interval 25 to 100-yr.	1975, June	Erie and Cattaraugus Counties
1944, September	Long Island, Tropical Storm related. Damages > $800,000.	1975, July	Dutchess and Sullivan Counties
1948 Dec. – 1949 Jan.	Northeastern NY. Tropical Storm related. $4 million damages. Recurrence Interval 25 > 100-yr.	1975, February	Chemung, Tioga, Steuben, Cattaraugus, Niagara, Chautauqua, Erie, Wyoming, Allegany Counties
1955, August	Southern NY Counties	1975, July	Rockland and Westchester Counties
1955, October	Southern NY Counties	1975, July	Chemung, Schenectady, Saratoga, Rensselaer, Albany, Washington, Greene, Delaware, Columbia, Dutchess, Sullivan, Putnam, Orange, Broome Co.
1956, March	Cattaraugus Co.	1975, August	Erie County
1957, December	Hudson	1975, August	Chautauqua County
1960, June	Broome Co.	1975, October	Otsego, Schoharie, Rensselaer, and Chenango Counties
1960, April	Ogdensburg	1975, October	Tioga, Washington, Oneida, Albany, Delaware, Broome, Chenango, Otsego
1960, February	Schenectady Co.	1975, November	Chautauqua and Erie Counties
1960, September	Long Island, Hurricane Donna, $1.9 million in damages.	1976, January	Ulster, Dutchess, Washington, Rensselaer, Westchester, Orange, Saratoga, Jefferson, Sullivan Counties
1962, March	Suffolk Co.(Floods, High Tides)PL875	1976, January	Otsego County
1963, August	Erie Co.	1976, February	Tioga, Allegany, Chautauqua, Greene, Broome, Delaware, Columbia, Chemung, Cattaraugus, Counties
1963, March	Chautauqua Co.	1976, March	Allegany and Chautauqua Counties
1963, August	Erie Co. PL875	1976, April	Fulton and Warren Counties
1964, March	Central NY State	1976, April	Wayne, Saratoga, Chenango Co.
1964, July	Rensselaer Co.	1976, May	Oswego County
1966, February	Chautauqua County	1976, June	Rockland, Otsego, Delaware, Chenango, Schoharie Co.'s
1966, September	Fire Island (Suffolk Co.) High Tide	1976, June	Genesee County
1967, September	Cattaraugus and Allegany Co. PL875,	1976, June	Chemung, Steuben, Wayne, Schuyler

Table 3-9 Historical Incidents of Flooding (undeclared events)			
Date	**Location and Information (if available)**	**Date**	**Location and Information (if available)**
	Two deaths, several million $ damages.		
1969, February	Delaware County	1976, July	Erie County
1969, April	Franklin County	1976, July	Cortland, Broome, Warren, Tompkins, St. Lawrence Counties
1969, May	Dexter and Jefferson Co.'s	1976, July	Erie County
1969, June	McGraw, Cortland County	1976, August	Chemung, Tioga, Broome Counties
1969, July	Sullivan County	1976, August	New York City, Nassau, Suffolk Co.'s
1969, August	Orange County	1977, April	No Information Available
1970, February	Eagle Bridge, Rensselaer County	1977, November	No Information Available
1970, February	Blenheim, Schoharie County	1978, March	No Information Available
1970, February	Hazel, Sullivan Co. and West Seneca, Erie Co.	1980, May	No Information Available
1970, February	Prattsville, Gilboa Reservoir, Greene Co. and Rockdale, Dutchess Co.	1981, February	Delaware River
1970, April	Wallkill, Orange County	1981, May	No Information Available
1970, April	Milford,Town Goodyear Lake Otsego Co	1986, September	Chautauqua and Cattaraugus Co.'s
1970, July	Schuyler, Tompkins, Broome, and Delaware Counties	1989, August	Peekskill, City $3 Mil.
1970, July	Cattaraugus County	1990, August	Westchester Co. $3.5 Mil.
1970, October	Schuyler County	1990, August	Putnam Co. $ 1.5
1970, October	Sullivan County	1993, May	Central New York $6.1 Mil.
1971, August	Erie, Monroe, Onondaga, and Oneida Co.	1993, May	Great Lakes Region $ 1 Mil.
1971, August	Wayne, Seneca, Cayuga, Tompkins Co.	1994, February	Herkimer Co. (ice jam flood) $ 687K
1971, September	Eastern Counties	1994, August	Chemung Co. $ 7 Mil.
1972, March	Prattsville, Greene Co.		
1972, March	Menands, Albany Co.		
1972, March	Sunset Bay, Chautauqua Co.		
1972, March	Town of Seneca, Erie Co.		
1972, March	Waterford, Saratoga Co.		
1972, May	Herkimer, Montgomery, Rensselaer, Saratoga, and Schenectady Co.'s		
1972, May	Cicero, Onondaga Co.		
1972, June	Statewide Coastal Storm, Agnes		
1973, March	Village of Champlain, Clinton Co.		
1973, April	Genesee, Livingston, Monroe, Ontario, and Wyoming Co.		
1973, June	Plattsburgh, Clinton Co.		
1973, June	Columbia, Delaware, Dutchess, Rensselaer, Sullivan, Ulster Co.'s		
1973, December	Albany, Broome, Columbia, Delaware, Greene, Rensselaer, and Schenectady Co.		
1974, March	St. Lawrence County		
1974, May	Monroe and Orleans County		

Source: NY State Emergency Management Office and Department of Environmental Conservation Archives

Table 3-10
Incidents of Flooding (undeclared events) 2004 - 2007

PrD: **Property Damage**
CrD: **Crop Damage**

Location or County	Date	Type	PrD	CrD
1 St. Lawerence County (St.Regis R.)	01/2004	Flood	10K	0
2 Franklin County (Salmon R.)	01/2004	Flood	30K	0
3 Chenango Bridge/Broome Co (Chenango R.)	03/2004	Flash Flood	50K	0
4 Broome, Chenango, Cortland, Tioga (Susquehanna and the Tioughnioga and Chenango Rivers)	03/2004	Flood	40K	0
5 Clinton County (Great Chazy R.)	03/2004	Flood	20K	0
6 Cortland/Cortland Co(Tioughnioga R)	03/2004	Flood	5K	0
7 De Ruyter / Madison Co.	05/2004	Flash Flood	20K	0
8 Conesus / Livingston Co.	05/20/2004	Flash Flood	200K	0
9 Sodus / Wayne Co.	05/24/2004	Flash Flood	10K	0
10 Irondequoit / Monroe Co.	05/24/2004	Flash Flood	10K	0
11 Mt Morris / Livingston Co.	05/25/2004	Flash Flood	10K	0
12 Guilford / Chenango Co.	05/26/2004	Flash Flood	25K	0
13 Erin / Chemung Co.	07/07/2004	Flash Flood	5K	0
14 Spencer / Tioga Co.	07/07/2004	Flash Flood	150K	0
15 Theresa / Jefferson Co.	07/12/2004	Flash Flood	25K	0
16 Seneca County (North Portion)	07/14/2004	Flash Flood	5K	0
17 Addison / Steuben Co.	07/14/2004	Flash Flood	10K	0
18 New Hartford / Oneida Co.	07/17/2004	Flash Flood	40K	0
19 Addison / Steuben Co.	07/17/2004	Flash Flood	20K	0
20 Ray Brook / Essex Co.	07/18/2004	Flash Flood	20K	0
21 St. Lawrence County (Countywide)	07/18/2004	Flood	5K	0
22 Bridgewater / Oneida Co.	07/18/2004	Flash Flood	20K	0
23 Lewiston / Niagara Co.	07/20/2004	Flash Flood	15K	0
24 Sullivan County (Northeast Portion)	07/23/2004	Flash Flood	50K	0
25 Hamilton / Madison Co.	07/28/2004	Flash Flood	10K	0
26 Exeter Center / Otsego Co.	07/28/2004	Flash Flood	10K	0
27 Chenango County (Chenango R.)	07/28/2004	Flood	10K	0
28 Barryville / Sullivan Co.	08/12/2004	Flash Flood	500K	0
29 Livingston Manor / Sullivan Co.	08/12/2004	Flash Flood	20K	0

30 Elmira / Chemung Co. (Chemung R)	08/30/2004	Flash Flood	5K	0
31 Scott / Cortland Co.	08/30/2004	Flash Flood	5K	0
32 Canaan / Columbia Co.	08/30/2004	Flash Flood	280K	0
33 Moravia / Cayuga Co.	08/30/2004	Flash Flood	20K	0
34 Essex County (Countywide)	08/30/2004	Flood	20K	0
35 Elmira/Chemung Co (Chemung R.)	09/09/2004	Flood	500K	0
36 Elizabethtown/Essex Co(Bouquet R)	09/09/2004	Flood	5K	0
37 Chemung/Chemung Co(ChemungR)	09/10/2004	Flood	50K	0
38 Chemung County (Countywide)	09/17/2004	Flash Flood	1.0M	0
39 Otsego County (SE Portion)	09/18/2004	Flash Flood	1.0M	0
40 Elmira/Chemung Co (Chemung R.)	09/18/2004	Flood	100K	0
41 Fishes Eddie/Delaware Co. (Delaware R.)	09/18/2004	Flood	1.0M	0
42 Chemung/Chemung Co (Chemung R)	09/18/2004	Flood	100K	0
43 Broome County (Countywide)	11/28/2004	Flash Flood	50K	0
44 Delaware County (Countywide)	11/28/2004	Flash Flood	20K	0
45 Madison County (Countywide)	11/28/2004	Flash Flood	10K	0
46 Buffalo/Erie Co. (Cazenovia Creek)	12/31/2004	Flood	3K	0
47 Amsterdam / Montgomery Co.	01/14/2005	Flash Flood	10K	0
48 Olean/Cattaraugus Co (Allegany R.)	01/14/2005	Flood	2K	0
49 Tompkins County (Fall Creek)	01/29/2005	Flood	100K	0
50 Gilbertsville / Otsego Co.	03/28/2005	Flash Flood	5K	0
51 Tioga County (Owego Cr.)	03/28/2005	Flash Flood	50K	0
52 Waverly/Tioga Co (Susquehanna R)	03/28/2005	Flood	20K	0
53 Delaware County (Beaverkill R.)	03/28/2005	Flood	10K	0
54 Bainbridge/Chenango Co. (Susquehanna R.)	03/28/2005	Flood	10K	0
55 Greene County (Countywide)	03/28/2005	Flood	100K	0
56 Conklin/Broome Co (Susquehanna R)	03/29/2005	Flood	20K	0
57 Vestal/Broome Co (Susquehanna R)	03/29/2005	Flood	20K	0
58 Bloomingburg /Sullivan Co.	03/29/2005	Flash Flood	10K	0
59 Columbia County (Countywide)	03/29/2005	Flood	100K	0
60 Bainbridge/Chenango Co. (Susquehanna R.)	03/31/2005	Flood	5K	0
61Cortland/Cortland Co(Tioughnioga R)	03/31/2005	Flood	5K	0
62Sherburne/Chenango Co(Chenango R)	03/31/2005	Flood	5K	0
63 Perry Mills/Clinton Co (Gr Chazy R.)	04/01/2005	Flood	5K	0
64 Seneca County (Countywide)	04/02/2005	Flash Flood	50K	0

65 Tompkins Co (Countywide – Taughannock Cr.)	04/02/2005	Flash Flood	200K	0
66 Schyler County (Countywide)	04/02/2005	Flash Flood	50K	0
67 Chemung County (Countywide)	04/02/2005	Flash Flood	100K	0
68 Yates County (Countywide)	04/02/2005	Flash Flood	100K	0
69 DeWitt, East Syracuse, Manlius, and La Fayette / Onondaga Co.	04/02/2005	Flash Flood	50K	0
70 Kirkland/Oneida Co. (Oriskany Cr.)	04/02/2005	Flash Flood	5K	0
71 Steuben Co (SE Portion- Corning, Campbell, Lindley, and Prattsburg)	04/02/2005	Flash Flood	50K	0
72 Syracuse/Onondaga Co(OnondagaCr)	04/02/2005	Flood	50K	0
73 Elmira/Chemung Co. (Chemung R.)	04/02/2005	Flood	50K	0
74 Chemung/Chemung Co (Chemung R)	04/03/2005	Flood	100K	0
75 Essex Co. (E. Portion–Ausable R)	04/03/2005	Flood	6K	0
76 Champlain/Clinton Co (Gr Chazy R)	04/24/2005	Flood	1K	0
77 Essez Co. (E. Portion - Ausable, Bouquet and Putnam Creek)	04/24/2005	Flood	25K	0
78 Essex County (Ausable R.)	04/27/2005	Flood	2K	0
79 Olean / Cattaraugus Co.	06/08/2005	Flash Flood	15K	0
80 Essex Co. (E. Portion – Towns of Crown Point and Moriah)	06/09/2005	Flash Flood	200K	0
81 Varysburg / Wyoming Co.	06/09/2005	Flash Flood	30K	0
82 Orchard Park / Erie Co.	06/09/2005	Flash Flood	200K	0
83 Livonia / Livingston Co.	06/10/2005	Flash Flood	25K	0
84 Cheektowaga / Erie Co.	06/10/2005	Flash Flood	25K	0
85 Mc Graw/Cortland (Mosquito Cr.)	06/10/2005	Flash Flood	50K	0
86 Bradford / Steuben Co.	06/10/2005	Flash Flood	100K	0
87 Monterey / Schuyler Co.	06/10/2005	Flash Flood	50K	0
88 Barton / Tioga Co.	06/10/2005	Flash Flood	20K	0
89 Big Flats / Chemung Co.	06/10/2005	Flash Flood	20K	0
90 Greece / Monroe Co.	06/10/2005	Flash Flood	20K	0
91 Chestertown / Warren Co.	06/13/2005	Flash Flood	6.5M	0
92 Livonia / Livingston Co.	06/13/2005	Flash Flood	25K	0
93 Essex County (East Portion)	06/15/2005	Flash Flood	50K	0
94 Essex County (Countywide)	06/16/2005	Flash Flood	630K	0
95 Clinton County (East Portion)	06/16/2005	Flash Flood	230K	0
96 South Bristol / Ontario Co.	06/29/2005	Flash Flood	25K	0

97 Centerville / Allegany Co.	06/29/2005	Flash Flood	15K	0
98 West Fort Ann / Washington Co. (Hadlock Pd. Dam Breach)	07/02/2005	Flash Flood	5.0M	0
99 Syracuse, DeWitt, & Mattydale / Onondaga Co.	07/14/2005	Flash Flood	500K	0
100 Turin / Lewis Co. (Fish Cr.)	07/14/2005	Flash Flood	25K	0
101 Chili Center / Monroe Co.	07/14/2005	Flash Flood	50K	0
102 St. Lawrence Co. (SW Portion)	07/17/2005	Flash Flood	75K	0
103 Boonville / Oneida Co.	07/17/2005	Flash Flood	20K	0
104 Constableville / Lewis Co.	07/17/2005	Flash Flood	10K	0
105 St. Lawrence Co. (S Portion)	09/16/2005	Flash Flood	500K	0
106 Antwerp / Jefferson Co.	09/16/2005	Flash Flood	15K	0
107 Sullivan Co. (SE Portion – Westbrookville)	10/08/2005	Flash Flood	50K	0
108 Nassau Co. (Countywide)	10/14/2005	Flash Flood	11.0M	0
109 Suffolk Co. (Countywide)	10/14/2005	Flash Flood	11.0M	0
110 Waverly/Tioga Co (Susquehanna R)	10/25/2005	Flood	20K	0
111 Steuben Co. (Countywide)	11/29/2005	Flood	10K	0
112 Wellsville / Allegany Co.	11/29/2005	Flash Flood	20K	0
113 Chemung Co. (Urban flooding)	11/29/2005	Flood	10K	0
114 Watkins Glen / Schuyler Co.	11/29/2005	Flood	10K	0
115 Cooks Falls/Delaware Co (Beaverkill R)	11/30/2005	Flood	10K	0
116 Elmira / Chemung Co. (Chemung R)	11/30/2005	Flood	5K	0
117 Waverly/Tioga Co (Susquehanna R)	11/30/2005	Flood	20K	0
118 Waverly/Tioga Co (Susquehanna R)	12/01/2005	Flood	5K	0
119 Essex County (E Portion)	01/18/2006	Flood	25K	0
120 St. Lawrence County (Countywide)	01/18/2006	Flood	2K	0
121Sherburne/ChenangoCo(ChenangoR)	01/18/2006	Flood	10K	0
122 Ausable Forks/Essex Co(Ausable R)	01/18/2006	Flood	2K	0
123 Barton / Tioga Co. (Susquehanna R)	01/18/2006	Flood	10K	0
124 Vestal/Broome Co (Susquehanna R)	01/18/2006	Flood	10K	0
125Conklin/Broome Co(Susquehanna R)	01/18/2006	Flood	20K	0
126 Cooks Falls/Delaware Co. (Beaverkill Cr.)	01/18/2006	Flood	10K	0
127 Perry Mills to Champlain / Clinton Co. (Great Chazy R.)	01/19/2006	Flood	5K	0
128 Bainbridge/Chenango Co (Susquehanna R)	01/19/2006	Flood	10K	0
129 Homer / Cortland Co.	03/13/2006	Flash Flood	50K	0
130Cortland/CortlandCo(TioughniogaR)	03/14/2006	Flood	10K	0

131 Van Buren / Onondaga Co.	04/15/2006	Flash Flood	10K	0
132 Wampsville / Madison Co.	04/15/2006	Flash Flood	10K	0
133 Sullivan / Madison Co.	04/15/2006	Flash Flood	25K	0
134 Schroon Lake / Essex Co.	05/30/2006	Flash Flood	100K	0
135 Woodhull / Stueben Co.	05/30/2006	Flash Flood	10K	0
136 Troupsburg / Steuben Co.	05/30/2006	Flash Flood	10K	0
137 Addison / Steuben Co.	05/31/2006	Flash Flood	10K	0
138 Bath / Steuben Co.	06/01/2006	Flash Flood	50K	0
139 Jasper / Steuben Co.	06/26/2006	Flash Flood	5K	0
140 Pottersville / Warren Co. (Fish Cr.)	06/26/2006	Flash Flood	40K	0
141 Essex County (Countywide)	06/26/2006	Flood	25K	0
142 Bath / Steuben Co	06/27/2006	Flash Flood	5K	0
143 Burdett / Schuyler Co.	06/27/2006	Flash Flood	15K	0
144 Cortland County (Countywide)	06/27/2006	Flash Flood	25K	0
145 Caroline / Tompkins Co.	06/27/2006	Flash Flood	50K	0
146 Madison County (N Portion)	06/27/2006	Flash Flood	200K	0
147 Chemung County (E Portion)	06/27/2006	Flash Flood	5K	0
148 Addison / Steuben Co.	06/27/2006	Flash Flood	5K	0
149 Madison Co (Countywide including Georgetown, Lebanon, Hamilton, and De Ruyter)	06/27/2006	Flash Flood	25.0M	0
150 Keene / Essex Co. (E. Br Ausable R)	06/28/2006	Flood	5K	0
151 Cortland / Cortland Co.	07/10/2006	Flash Flood	2K	0
152 Albion / Orleans Co.	07/12/2006	Flash Flood	200K	500K
153 Rochester / Monroe Co.	07/12/2006	Flash Flood	500K	0
154 Conquest / Cayuga Co.	07/12/2006	Flash Flood	300K	150K
155 Rose / Wayne Co.	07/12/2006	Flash Flood	1.5M	200K
156 Liverpool / Onondaga Co.	07/12/2006	Flash Flood	1K	0
157 Baldwinsville / Onondaga Co.	07/12/2006	Flash Flood	2K	0
158 Cicero / Onondaga Co. (Volmer Cr.)	07/12/2006	Flash Flood	20K	0
159 Auburn / Cayuga Co.	07/12/2006	Flash Flood	10K	0
160 Baldwinsville / Onondaga Co.	07/12/2006	Flash Flood	5K	0
161 Auburn / Cayuga Co.	07/12/2006	Flash Flood	1K	0
162 Liverpool / Onondaga Co.	07/12/2006	Flash Flood	1K	0
163 Morrisville / Madison Co.	07/12/2006	Flash Flood	5K	0
164 Utica / Oneida Co.	07/12/2006	Flash Flood	5K	0

165 Moravia / Cayuga Co.	07/12/2006	Flash Flood	2K	0
166 Sauquoit / Oneida Co.	07/12/2006	Flash Flood	10K	0
167 New Hartford / Oneida Co.	07/12/2006	Flash Flood	2K	0
168 Cuyler / Cortland Co.	07/12/2006	Flash Flood	1K	0
169 De Ruyter / Madison Co.	07/12/2006	Flash Flood	1K	0
170 Vienna / Oneida Co.	07/21/2006	Flash Flood	1K	0
171 Bainbridge / Chenango Co.	07/22/2006	Flash Flood	2K	0
172 Richfield Spgs / Otsego Co.	07/22/2006	Flash Flood	5K	0
173 Guilford / Chenango Co.	07/22/2006	Flash Flood	2K	0
174 Norwich / Chenango Co.	07/22/2006	Flash Flood	2K	0
175 Oxford / Chenango Co.	07/22/2006	Flash Flood	2K	0
176 Smyrna / Chenango Co.	07/22/2006	Flash Flood	2K	0
177 Camden / Oneida Co. (NW Portion)	07/25/2006	Flash Flood	5K	0
178 Mc Donough / Chenango Co.	07/28/2006	Flash Flood	2K	0
179 Cortland / Cortland Co.	07/28/2006	Flash Flood	4K	0
180 Mc Graw / Cortland Co.	07/28/2006	Flash Flood	3K	0
181 Kenmore / Erie Co.	07/28/2006	Flash Flood	100K	0
182 Lockport / Niagara Co.	07/28/2006	Flash Flood	100K	0
183 Sodus / Wayne Co.	07/28/2006	Flash Flood	100K	0
184 Fair Haven / Cayuga Co.	07/28/2006	Flash Flood	50K	0
185 Hannibal / Oswego Co.	07/28/2006	Flash Flood	100K	0
186 Groton / Tompkins Co.	07/28/2006	Flash Flood	3K	0
187 Cortland / Cortland Co.	07/28/2006	Flash Flood	2K	0
189 Vermontville / Franklin Co.	08/01/2006	Flash Flood	25K	0
190 Bloomingdale / Essex Co.	08/01/2006	Flash Flood	100K	0
191 Rome / Oneida Co.	11/16/2006	Flash Flood	25K	0K
192 Cortland / Cortland Co.	11/16/2006	Flash Flood	25K	0K
193 Ithaca / Tompkins Co.	11/16/2006	Flash Flood	25K	0K
194 Auburn / Cayuga Co.	11/16/2006	Flash Flood	10K	0K
195 Cazenovia / Madison Co.	11/16/2006	Flash Flood	10K	0K
196 Utica / Oneida Co.	11/16/2006	Flash Flood	20K	0K
197 Boonville / Oneida Co.	11/16/2006	Flash Flood	10K	0K
198 Monticello / Sullivan Co.	11/16/2006	Flash Flood	5K	0K
199 Eaton / Madison Co.	11/16/2006	Flash Flood	10K	0K

200 Churchville / Monroe Co.	03/14/2007	Flood	25K	0K
201 Ebenezer / Erie Co.	03/14/2007	Flood	25K	0K
202 Lancaster / Erie Co.	03/14/2007	Flood	50K	0K
203 West Seneca / Erie Co.	03/14/2007	Flood	25K	0K
204 Oneida / Madison Co. (Oneida Cr.)	03/14/2007	Flood	5K	0K
205Sherburne/ChenangoCo(ChenangoR)	03/14/2007	Flood	10K	0K
206 Batavia / Genesee Co.	03/15/2007	Flood	125K	0K
207 Garbutt / Monroe Co.	03/15/2007	Flood	25K	0K
208 Salamanca / Cattaraugus Co.	03/15/2007	Flood	50K	0K
209 Olean / Cattaraugus Co.	03/15/2007	Flood	100K	0K
210 Portageville / Wyoming Co.	03/15/2007	Flood	25K	0K
211 Silver Creek / Chautauqua Co.	03/15/2007	Flood	75K	0K
212Cortland/CortlandCo(TioughniogaR)	03/15/2007	Flood	10K	0K
213 Williamsville / Erie Co.	03/15/2007	Flood	25K	0K
214 Bainbridge/Chenango Co. (Susquehanna R.)	03/15/2007	Flood	10K	0K
215 Barton / Tioga Co. (Chemung R.)	03/15/2007	Flood	5K	0K
216 Perrys Mills to Champlain / Essex Co. (Gr Chazy R.)	03/15/2007	Flood	25K	0K
217 Ausable Forks/Essex Co(Ausable R)	03/15/2007	Flood	25K	0K
218 Wellsville / Allegany Co.	03/15/2007	Flood	25K	0K
219 Elmira/Chemung Co. (Chemung R.)	03/15/2007	Flood	5K	0K
220 Vestal/Broome Co (Susquehanna R)	03/15/2007	Flood	5K	0K
221 Rapids/Niagara Co. (Tonawanda Cr)	03/16/2007	Flood	25K	0K
222Conklin/Broome Co(Susquehanna R)	03/16/2007	Flood	250K	0K
223Conklin/Broome Co(Susquehanna R)	03/25/2007	Flood	10K	0K
224Cortland/CortlandCo(TioughniogaR)	03/26/2007	Flood	10K	0K
225 Bainbridge/Chenango Co. (Susquehanna R.)	03/27/2007	Flood	5K	0K
TOTAL:			**$72.7M**	**$1.0M**

Source: NOAA website, http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

Eight hundred eighteen (818) flooding incidents were reported in New York between 01/01/2004 and 03/31/2007. Of those 818 incidents; 427 were undeclared flooding incidents with no recorded damages, 225 were undeclared flooding incidents with recorded damages (not sufficient to meet Presidential Disaster threshold) resulting in $72.7M in property damage and $850K in crop damage, and 166 were major incidents of flooding resulting in a Presidential Disaster Declaration resulting in $1.123B in property damage and $1M in crop damage. [Please note that the flooding events of June 2006, FEMA-1650-DR were the largest and most costly natural

disaster that NYS has encountered since Hurricane Agnes hit the State in 1972. Please see Figure 3-17 on page 3-63 for a representation of the extent and magnitude in dollar damages under the Public Assistance Program that resulted from the June 2006 flooding events.]

Table 3-11 lists historical major flood disaster declarations in New York State thru end of 2003. **Table 3-12** lists the most recent flood disaster declarations starting in January 2004 thru July 2007.

Table 3-11
Major Flood Disaster Declarations (1954 – 2003)

Disaster No.	Type/Location	Date Declared	Damages
DR-26	Hurricane Carol, Long Island	August 31, 1954	Property damage, road closures. Damages: Approximately $3 million.
DR-45	Hurricane Diane, Southeastern N.Y.	August 12 -19, 1955.	Property damage, road closures, four (4) deaths. Damages in millions, but not quantified.
DR-52	Eastern Catskills and Lower Hudson Tributaries	October 16, 1955.	Flooding, Eleven (11) deaths. Damages: $11 million.
DR-338	Hurricane Agnes, Western and Central NY	June 20-25, 1972	5000 Homes destroyed or badly damaged. Twenty-four (24) deaths. Damages: $703 million.
DR-702	Flooding, Southeastern N.Y.S.	April 17, 1984	Total Eligible Damages: $11.9 million
DR-725	Flooding, Western N.Y.S., declared 9/25/84	September 25, 1984	Total Eligible Damages: $3.3 million
DR-733	Flooding, Northern N.Y.S.	March 21, 1985	Total Eligible Damages: $1.6 million

Table 3-11 Major Flood Disaster Declarations (1954 – 2003)			
Disaster No.	**Type/Location**	**Date Declared**	**Damages**
DR-734	Flooding, Buffalo/Niagara Falls Area	March 22, 1985	Total Eligible Damages: $1.1 million
DR-750	Hurricane Gloria, Long Island	October 18, 1985	Flooding, Property damage. Damages: $48.5 million.,
DR-792	Flooding, East Central N.Y.S.	May 15, 1987	Total Eligible Damages: $3.6 million
DR-918	Hurricane Bob, Long Island	September 16, 1991	Flooding, Property damage. Damages: $11.7 million.
DR-974	Coastal Storm, Nor'Easter.	December 21, 1992	Damages: $31.2 million
DR-1146	Severe coastal storm, flooding / wind including Westchester and Suffolk Co.	November 19, 1996	Total Eligible Damages: $16. million
DR-1095	Severe Flooding	January 25, 1996	Road closures, property damages, closed businesses and ten (10) deaths. Total Eligible Damages: $160 million
DR-1148	Severe Flooding	December 9, 1996	Total Eligible Damages: $25.6 million
DR-1233	Severe flooding	July 7, 1998	Property damages, road closures. Two (2) deaths. Total Eligible Damages: $27.8 million

Table 3-11 Major Flood Disaster Declarations (1954 – 2003)			
Disaster No.	**Type/Location**	**Date Declared**	**Damages**
DR-1296	Flood/Wind, Hurricane Floyd	September 19, 1999	Property damages and debris accumulation. Total Eligible Damages: $62.2 million
DR-1335	Flooding	July 21, 2000	Total Eligible Damages: $34.6 million
DR-1486	Flooding	September 29, 2003	Property damages, road closures. Total Eligible Damages: $23 million

Table 3-12 Major Flood Disaster Declarations (2004-2007)			
Disaster No.	**Type/Location** **Individual Assistance (IA)** **Public Assistance (PA)**	**Declared Date & Incident Period**	**Damages**
DR- 1534	Severe storms and flooding IA – no counties declared PA - Allegany, Cattaraugus, Chautauqua, Delaware, Erie, Hamilton, Herkimer, Ontario, Saratoga, Schoharie, Steuben, Ulster, Washington, and Yates Counties.	8/03/04 5/13/04-6/17/04	$14M
DR- 1564	Severe storms and flooding IA – Allegany, Broome, Cattaraugus, Madison, Monroe, Niagara, Oneida, Onondaga, Orleans, Steuben, Sullivan, Ulster, and Wayne Counties PA -Allegany, Broome, Cattaraugus, Chautauqua, Columbia, Delaware, Monroe, Niagara, Onondaga, Orange, Orleans, Steuben, Sullivan, Ulster, and Warren Counties	10/01/04 8/29/04 – 9/16/04	$18.03M
DR - 1565	Tropical Depression Ivan IA - Broome, Chenango, Delaware, Orange, Sullivan, and Ulster Counties PA - Broome, Chenango, Delaware, Orange, Schoharie, Steuben, Sullivan, Tioga and Ulster Counties	10/01/04 9/16/04 – 9/24/04	$15.10M

Table 3-12 Major Flood Disaster Declarations (2004-2007)			
Disaster No.	**Type/Location** **Individual Assistance (IA)** **Public Assistance (PA)**	**Declared Date & Incident Period**	**Damages**
DR - 1589	Severe storms and flooding IA - Broome, Chenango, Cortland, Delaware, Orange, Rensselaer, Schenectady, Schoharie, Sullivan, Tioga, and Ulster Counties. PA -Broome, Chenango, Cayuga, Chautauqua, Columbia, Cortland, Delaware, Greene, Madison, Montgomery, Niagara, Orange, Otsego, Putnam, Rensselaer, Schoharie, Sullivan, Tioga, Westchester, and Ulster Counties.	4/19/05 4/02/05- 4/04/05	$66.21M
DR - 1650	Severe storms and flooding IA - Broome, Chenango, Delaware, Herkimer, Montgomery, Oneida, Orange, Otsego, Schoharie, Sullivan, Tioga, and Ulster Counties. PA - Broome, Chenango, Delaware, Herkimer, Montgomery, Otsego, Sullivan, Ulster, and Westchester Counties.	7/01/06 6/26/06 – 7/10/06	$246.33M
DR - 1665	Severe storms and flooding IA - Erie, Genesee, Niagara, and Orleans Counties. PA – Erie, Genesee, Niagara, and Orleans Counties.	10/24/06 10/12/06 –10/13/06	$141.58M
DR - 1670	Severe storms and flooding IA – Broome and Chenango PA - Broome, Chenango, Delaware, Hamilton, Herkimer, Montgomery, Otsego, Sullivan, andTioga Counties.	12/12/06 11/16/06 –11/17/06	$32.59M
DR - 1692	Severe Storms and Inland and Coastal Flooding IA - Orange, Rockland, Ulster and Westchester Counties. PA - Albany, Columbia, Dutchess, Essex, Greene, Montgomery, Orange, Putnam, Rockland, Schoharie, Suffolk, Ulster and Westchester Counties.	4/27/07 4/14/07 – 4/18/07	$12.76M
DR - 1710	Severe Storms and Flooding IA – No counties declared PA – Delaware County	7/02/07 6/19/07	Not Yet Available

Source SEMO Financial Records

Figure 3-7A

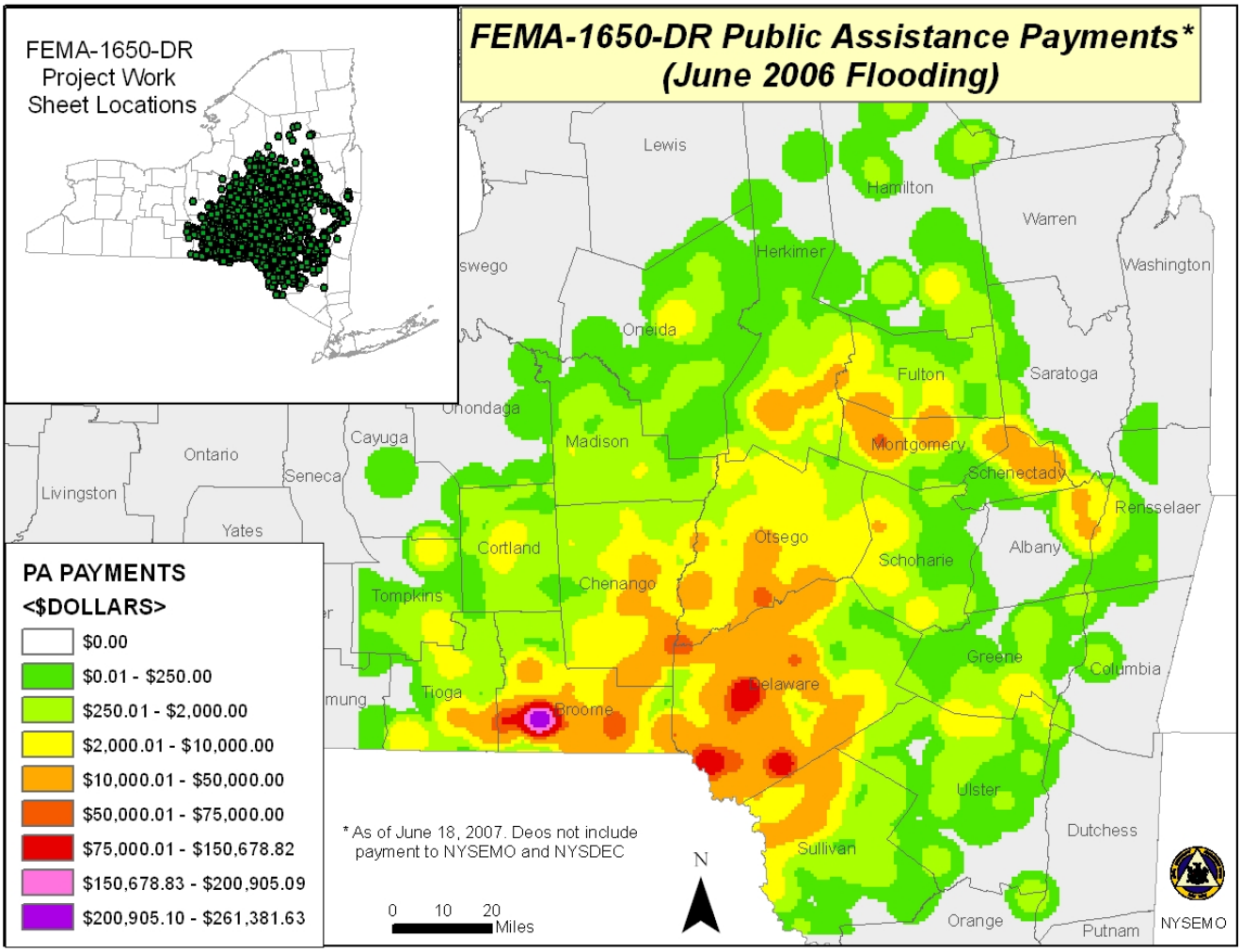
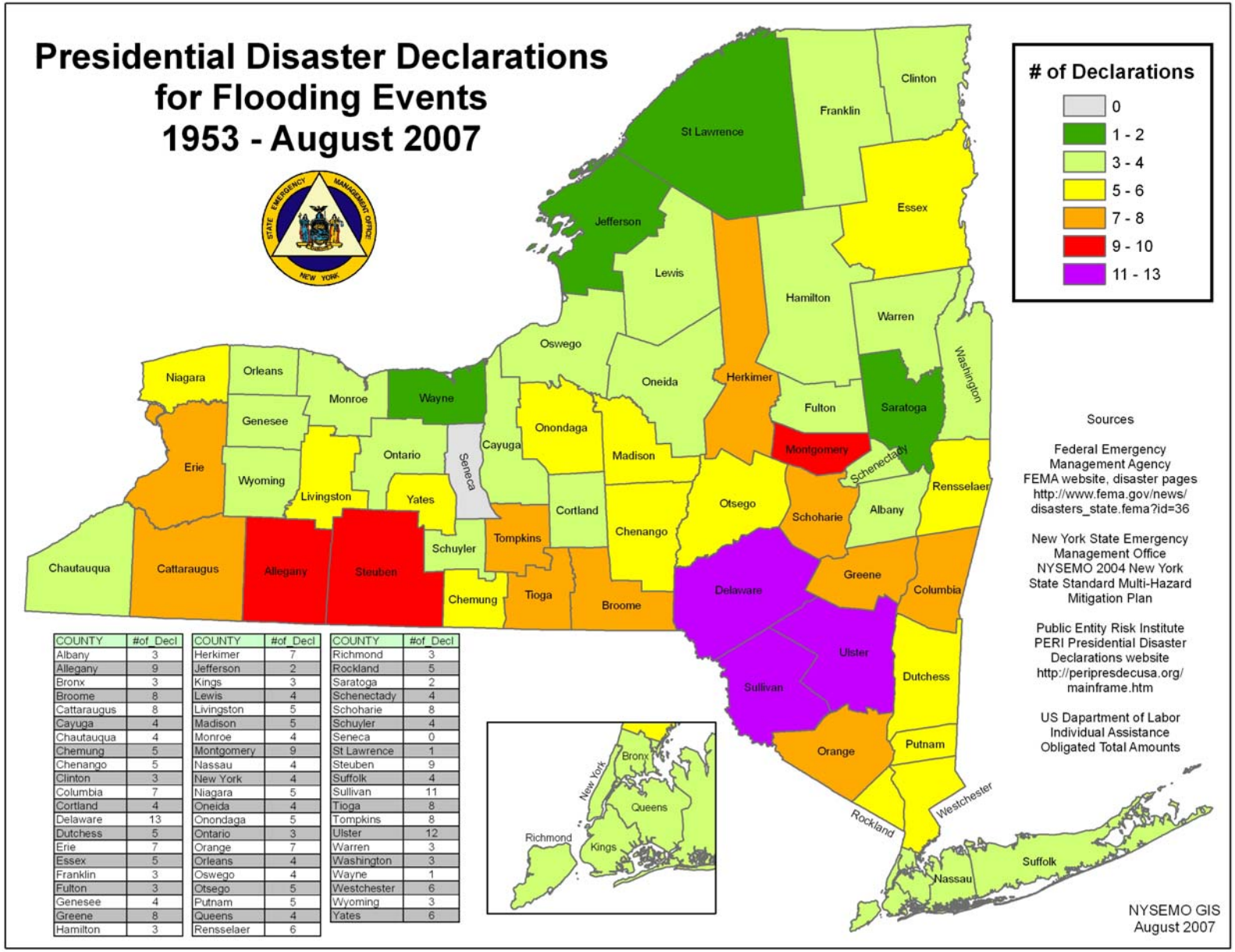


Figure 3-8 summarizes total number of flood related disaster declarations by county sorted highest to lowest through August 2007. Between the dates of January, 2004 and July, 1, 2007, there were 9 Presidential Disasters declared in New York State because of flooding. **Table 3-13** identifies the number of times a county was determined to be eligible for either Public Assistance and/or Individual Assistance, during that time period.

Figure 3-8



COUNTY	#of_Decl
Albany	3
Allegany	9
Bronx	3
Broome	8
Cattaraugus	8
Cayuga	4
Chautauqua	4
Chemung	5
Chenango	5
Clinton	3
Columbia	7
Cortland	4
Delaware	13
Dutchess	5
Erie	7
Essex	5
Franklin	3
Fulton	3
Genesee	4
Greene	8
Hamilton	3

COUNTY	#of_Decl
Herkimer	7
Jefferson	2
Kings	3
Lewis	4
Livingston	5
Madison	5
Monroe	4
Montgomery	9
Nassau	4
New York	4
Niagara	5
Oneida	4
Onondaga	5
Ontario	3
Orange	7
Orleans	4
Oswego	4
Otsego	5
Putnam	5
Queens	4
Rensselaer	6

COUNTY	#of_Decl
Richmond	3
Rockland	5
Saratoga	2
Schenectady	4
Schoharie	8
Schuyler	4
Seneca	0
St Lawrence	1
Steuben	9
Suffolk	4
Sullivan	11
Tioga	8
Tompkins	8
Ulster	12
Warren	3
Washington	3
Wayne	1
Westchester	6
Wyoming	3
Yates	6

Table 3-13 Flood Disasters by County between 1/1/04 and 7/1/07	
Number of Flood Disasters	**County**
7	Delaware
6	Ulster
5	Broome, Orange, Schoharie and Sullivan
4	Chenango, Montgomery, and Tioga
3	Chautauqua, Columbia, Herkimer, Niagara, Otsego, and Steuben
2	Allegany, Cattaraugus, Erie, Greene, Hamilton, Madison, Oneida, Orleans, Putnam, and Westchester
1	Albany, Cayuga, Cortland, Dutchess, Essex, Genesse, Monroe, Onondaga, Ontario, Rensselaer, Rockland, Saratoga, Schenectady, Suffolk, Washington, Warren, Wayne, Yates