# *Section I*

## *Hazard Evaluation*

## Hazards Impacting the Capitol Region

The Capitol Region is vulnerable to the following natural hazards. While flooding, winter storms and high wind events are the natural hazards that most frequently occur with enough severity to cause loss of life or property, this plan covers all of the natural hazards that have the potential to cause damage anywhere in the Region.

### Hurricanes

The hurricane season extends from June 1st through November 30th each year. Hurricanes that hit Connecticut normally form in the tropical waters of the Atlantic, Caribbean, or Gulf of Mexico. While the Capitol Region is spared the coastal storm surges associated with hurricanes, it is not immune from damaging winds and rain. According to the State's Hazard Mitigation Plan, a moderate category II hurricane can be expected to hit Connecticut once every ten years. A major category III or IV hurricane may occur before 2040, based on 20th century trends. See the following figure for an explanation of hurricane categories.

The Saffir-Simpson Hurricane Scale rates a hurricane's intensity at a given time. The rating gives an estimate of the potential property damage and flooding for coastal areas from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf in the landfall region.

**Category I Hurricane:**

Winds 74-95 mph. Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage.

**Category II Hurricane:**

Winds 96-110 mph. Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings.

**Category III Hurricane:**

Winds 111-130 mph. Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Damage to shrubbery and trees with foliage blown off trees and large tress blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the hurricane center. Flooding near the coast destroys smaller structures with larger structures damaged by battering of floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles or more. Evacuation of low-lying residences with several blocks of the shoreline may be required.

**Category IV Hurricane:**

Winds 131-155 mph. Storm surge generally 13-18 ft above normal. More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the hurricane center. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles.

**Category V Hurricane:**

Winds greater than 155 mph. Storm surge generally greater than 18 ft above normal.

Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the hurricane center. Major damage to lower floors of all structures located

less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles of the shoreline may be required.

Both the 1938 and 1944 hurricanes that hit Connecticut were Category III hurricanes. The 1938 Hurricane is still considered the greatest natural disaster to hit the State, as it killed 125 people and caused an estimated $53 million (1938 dollars) in damage across the state. Hurricane Carol in 1954 also caused widespread damage across the state. Remnants of two hurricanes (Connie and Diane) struck Connecticut in the same week in August 1955 causing massive flooding and 70 deaths throughout the state. A category II hurricane, Gloria, made land fall in Connecticut in 1985 downing and damaging several thousand trees, and causing widespread power outages, but with little rain or flooding. Numerous less intense hurricanes, and tropical storms have affected the region and state, some causing significant damage. Hurricane Floyd, downgraded to a tropical storm prior to making landfall in Connecticut, resulted in presidential disaster declarations for Fairfield, Hartford and Litchfield Counties.

The State Hazard Mitigation Plan states that hurricanes pose the most destructive risk of all natural disasters for Connecticut. They occur relatively frequently, and cause structural damage, loss of life, felled trees, flooding, power outages and other damages. However, hurricanes pose a greater risk for coastal Connecticut because of storm surges and associated flooding risks.

Appendix A contains the Hurricane Event Report generated by HAZUS loss estimation methodology software provided by FEMA. According to the analysis for a hurricane with a 1% chance of occurring in a year, the Capitol Region would suffer minor losses, chiefly from tree damage. HAZUS software estimates that there are over 193 thousand buildings in the Capitol Region that have an aggregate total replacement value of over 47 billion dollars. The HAZUS analysis for a 100-year hurricane event estimates 59 million dollars in property damage on residential properties, and some tree debris. While the Region could experience more losses from a more rare, strong hurricane, this hazard poses moderate risk, given that coastal Connecticut bears the initial brunt of such storms.

## Floods

The Capitol Region's numerous rivers and streams, as well as its urbanized areas, make floods and flash floods a regular risk. There is not a "flood season" per se in Connecticut; however, waterways are normally higher during spring, and are thus especially vulnerable to flooding from intense precipitation. According to the State's Plan, major flooding of small rivers and loss of life can be expected every 5-10 years throughout the State. Major flooding of larger rivers, such as the Connecticut and Farmington, with loss of life and structural damage can be expected once every 30 years.

The State and region have benefited from flood control projects spawned by the historic floods of the 1930s and 1950s, as well as innovations in response measures, such as the Automated Flood Warning System, which followed major flooding in 1982. Nevertheless, the severe flooding of October 2005 demonstrated once again the region's vulnerability to this hazard.

Two heavy rainfalls during the week of October 7-15, 2005 caused major flooding in several small rivers in Hartford and Tolland Counties, and moderate flooding elsewhere.

Several dams were breached, and roads and bridges washed out. The storms flooded many basements, and some towns conducted evacuations because of severe urban flooding. Interstate 91 developed a sinkhole in Windsor. The storms produced sufficient damage to provoke a federally declared major disaster in certain counties, including Tolland ($1.16 million), and eventually, Hartford County ($2.52 million).

**Route 191, East Windsor**
**Downloaded from http://ct.water.usgs.gov/DATA/floodindex.html**

| Municipality | Rainfall for Week of Oct. 7-15, 2005 |
|---|---|
| Enfield | 15.90" |
| Farmington | 11.61" |
| Glastonbury | 13.27" |
| Hartford | 10.51" |
| South Windsor | 15.90" |
| Wethersfield | 13.22" |
| Windsor Locks | 13.12" |

The National Weather Service's Storm Events Database lists several other flooding events in the Capitol Region over the last ten years, including the following:

> July 8, 1995
> Thunderstorms produced very heavy rainfall... One road was reported to be impassable between Ellington and Stafford Springs and overflow and street flooding was reported on secondary roads off of Route 84.
>
> January 24, 1996
> Strong south winds with gusts to 40 to 60 mph and isolated gusts to hurricane force preceded a sharp cold front... Peak wind gusts to 58 mph were recorded at both Bradley International Airport in Windsor Locks and at Glastonbury. There were scattered reports of wind damage including downed trees, downed tree limbs, and scattered power outages. Part of a roof of a Hartford apartment building was damaged, displacing about 15 people. Power outages affected up to 41,000 electric customers statewide... The high winds also brought a strong January thaw with temperatures rising into the 50s. This combined with rain and melting snow to cause some street flooding. Flash flooding occurred in West Hartford and Hartford, where homes flooded and roads washed out along the upper portion of the South Branch of the Park River and also along the North Branch of the Park River in the parking lots at the University of Hartford and Hartford Community College…
>
> April 16, 1996
> Two to 3 inches of rain fell on April 16th in northern Connecticut, with totals of 3 to 5 inches in the south portion of Hartford and Tolland Counties. All of the rain fell in about a 12-hour period. The ground had remained saturated from heavy snowmelt during the previous week and this combined with the heavy rain to produce urban flooding, flooding of small streams, and finally minor to moderate flooding of the major rivers... resulting in the most significant main stem river flooding along the Connecticut River in 9 years… In general, during this event low-lying riverfront land and some roads were flooded, but no significant damage was reported.
>
> July 13, 1996

Tropical Storm Bertha brought heavy rainfall totals of three to five and one-half inches as the center of the storm passed over the southeast part of Connecticut, moving northeast. The maximum rainfall reported was 5.5 inches at Vernon. Urban street flooding occurred throughout the area and minor river flooding occurred along the North Branch of the Park River in Hartford...

December 2, 1996

Heavy rainfall amounts of 2 to 3 inches on the first and second of the month combined with some snow melt in the Connecticut River Basin to produce runoff, which resulted in minor flooding of several small streams and flooding along the Connecticut River below Thompsonville...

August 29, 1997

A cold front moving very slowly across Connecticut caused an area of showers and thunderstorms that produced intense rainfall amounts of 3 to 6 inches in 1 to 3 hours across parts of Hartford County. A flash flood occurred in Manchester where Bigelow Brook rose at least 6 feet out of its banks, flooding roads and basements. Sixteen homes received extensive water damage. A majority of these had basement flooding. Three homes had total basement failure or collapse. One home was completely flooded out of commission. Many residents had to be evacuated to local shelters. Electric power was disrupted for 1,200 customers. A local shopping area also was flooded. An estimated 6 to 12 automobiles received extensive water damage when water rose to at least as high as the windows. Property damage was likely a half of a million dollars. Maximum rainfall totals reached 5 to 6 inches in the area of the flash flood and there was extensive urban street flooding in addition to the flash flood. The cloudburst was really confined to Manchester. Only one town away in Vernon, there was heavy rain but no flooding was reported.

March 9, 1998

A powerful storm system moving slowly northeast from the Ohio Valley to the eastern Great Lakes brought strong winds and heavy rainfall to Connecticut, which resulted in urban street flooding, basement flooding, small stream flooding, and main stem river flooding. At times, the rainfall was torrential, especially in thunderstorms during the evening of March 9th… Several small streams flooded…

June 30, 1998

An area of heavy showers and thunderstorms associated with a slow moving warm front brought 2 to 4 inches of rainfall, resulting in urban street, basement, small stream, and river flooding in Hartford County… in West Hartford, the Trout Brook went over its banks flooding nearby areas. Urban street flooding was reported with water four feet deep on Pen Drive and one foot deep in some other areas.

September 16, 1999

Tropical Storm Floyd brought torrential rainfall and strong winds to northern Connecticut, as it tracked up the Connecticut River valley into central Massachusetts. Although many areas received torrential rainfall, with totals between 4 and 8 inches, the heaviest rain fell in western Hartford County where as much as 10.80 inches was reported in Bristol. The rainfall produced widespread flooding of low-lying areas, especially in Hartford County… Surprisingly, no flood damage was reported, even in those areas where the smaller rivers rose rapidly. Strong winds were also felt in northern Connecticut as Floyd passed. There were scattered reports of small trees or branches downed, which did not cause significant damage.

June 2, 2000

Severe thunderstorms moved across northern Connecticut in advance of a strong cold front. The storms moved through late in the afternoon and early evening. In

Hartford County, a spotter in Granby reported nickel to quarter size hail, and observed a funnel cloud near State Route 20. The hail accumulated two inches deep. In Ellington, in Tolland County, thunderstorm winds downed two large trees, and torrential rainfall caused flash flooding of a small stream in the vicinity of Pinney Road…

May 28, 2003

A slow moving severe thunderstorm produced penny sized hail in Enfield and Manchester. The storm then dumped 3 to 4 inches of rain in Bloomfield, West Hartford, and Hartford in less than one hour. This resulted in flash flooding on Beamans Brook in Bloomfield, and significant urban flooding in West Hartford and Hartford. Dozens of cars were submerged in flood waters and several people needed to be rescued. The north end of West Hartford along Trout Brook Drive was hardest hit, along with the neighborhood surrounding Bloomfield High School. There were no injuries reported. Lightning from the storm struck several houses in West Hartford causing minor damage. Power was briefly knocked out in West Hartford and Windsor, cutting off service to thousands of customers.

July 15, 2005

Slow moving (nearly stationary) thunderstorms produced heavy downpours that lead to flash flooding in Hartford County, Connecticut. In particular, Rainbow and Hamilton Roads were closed due to flooding from these storms. No direct injuries resulted from these storms.

July 27, 2005

A hot and humid air mass combined with an approaching cold front sparked strong to severe thunderstorms… These thunderstorms produced severe winds, damaging lightning, and flash flooding across north central and northeast Connecticut, especially Hartford County. The severe winds brought trees, utility poles, and power lines down. In Hebron, approximately 40 trees were knocked down as these storms pushed through the area. Lightning and flash flooding were also produced from these storms. In Hartford, lightning destroyed a wooden shed. In East Hartford, flash flooding left cars stranded on a road. No injuries directly resulted...

Analysis of the types of land uses within FEMA designated 100 and 500-year flood zones gives some indication of the type of damage that flooding can cause in the region.

Figure 1 and Table 4 reveal percentages of general land uses, based on 2003 zoning districts (the most recent and suitable regional data available), in flood zones in each municipality. Generally, about half of the Region's land in flood zones is zoned residential, while about one third is zoned resource or recreation. Residential areas in flood zones are of particular concern for risk from this hazard.

**Figure 1: Land Uses in FEMA Flood Zones**

**Table 4: Percent of Land Uses (by Zoning District) in FEMA Flood Zones**

| | General Zoning | Percentage of Land Use in Total Area | | General Zoning | Percentage of Land Use in Total Area |
|---|---|---|---|---|---|
| Capitol Region | Business/Commercial/Office | 2.9 | East Windsor | Business/Commercial/Office | 1.3 |
| | Industrial | 8.1 | | Industrial | 8.1 |
| | Mixed Use | 0.9 | | Mixed Use | 0.8 |
| | ROW (Right Of Way) | 0.1 | | ROW (Right Of Way) | 0.0 |
| | Residential | 47.7 | | Residential | 32.2 |
| | Resource/Recreation | 31.3 | | Resource/Recreation | 42.1 |
| | Water | 9.1 | | Water | 15.4 |
| | Totals | 100.0 | | Totals | 100.0 |
| Andover | Business/Commercial/Office | 3.4 | Ellington | Business/Commercial/Office | 2.8 |
| | Industrial | 11.9 | | Industrial | 13.5 |
| | Mixed Use | 0.0 | | Mixed Use | 0.0 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 34.1 | | Residential | 63.8 |
| | Resource/Recreation | 26.8 | | Resource/Recreation | 1.7 |
| | Water | 23.7 | | Water | 18.2 |
| | Totals | 100.0 | | Totals | 100.0 |
| Avon | Business/Commercial/Office | 1.9 | Enfield | Business/Commercial/Office | 6.1 |
| | Industrial | 4.2 | | Industrial | 18.5 |
| | Mixed Use | 0.6 | | Mixed Use | 0.0 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 1.8 |
| | Residential | 41.5 | | Residential | 58.0 |
| | Resource/Recreation | 51.9 | | Resource/Recreation | 0.0 |
| | Water | 0.0 | | Water | 15.6 |
| | Totals | 100.0 | | Totals | 100.0 |
| Bloomfield | Business/Commercial/Office | 2.0 | Farmington | Business/Commercial/Office | 3.3 |
| | Industrial | 7.8 | | Industrial | 10.8 |
| | Mixed Use | 4.4 | | Mixed Use | 0.1 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 85.7 | | Residential | 30.7 |
| | Resource/Recreation | 0.0 | | Resource/Recreation | 46.8 |
| | Water | 0.0 | | Water | 8.3 |
| | Totals | 100.0 | | Totals | 100.0 |
| Bolton | Business/Commercial/Office | 2.1 | Glastonbury | Business/Commercial/Office | 0.6 |
| | Industrial | 1.7 | | Industrial | 2.7 |
| | Mixed Use | 0.0 | | Mixed Use | 6.4 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 71.7 | | Residential | 8.9 |
| | Resource/Recreation | 0.0 | | Resource/Recreation | 66.4 |
| | Water | 24.6 | | Water | 15.1 |
| | Totals | 100.0 | | Totals | 100.0 |
| Canton | Business/Commercial/Office | 3.6 | Granby | Business/Commercial/Office | 1.7 |
| | Industrial | 9.5 | | Industrial | 0.0 |
| | Mixed Use | 0.0 | | Mixed Use | 0.0 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 69.8 | | Residential | 98.3 |
| | Resource/Recreation | 0.0 | | Resource/Recreation | 0.0 |
| | Water | 17.0 | | Water | 0.0 |
| | Totals | 100.0 | | Totals | 100.0 |
| East Granby | Business/Commercial/Office | 1.4 | Hartford | Business/Commercial/Office | 2.7 |
| | Industrial | 10.8 | | Industrial | 10.2 |
| | Mixed Use | 0.0 | | Mixed Use | 2.5 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 26.3 | | Residential | 35.4 |
| | Resource/Recreation | 61.5 | | Resource/Recreation | 49.2 |
| | Water | 0.0 | | Water | 0.0 |
| | Totals | 100.0 | | Totals | 100.0 |
| East Hartford | Business/Commercial/Office | 12.1 | Hebron | Business/Commercial/Office | 0.0 |
| | Industrial | 11.7 | | Industrial | 1.7 |
| | Mixed Use | 0.0 | | Mixed Use | 0.4 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 63.1 | | Residential | 97.9 |
| | Resource/Recreation | 0.0 | | Resource/Recreation | 0.0 |
| | Water | 13.1 | | Water | 0.0 |
| | Totals | 100.0 | | Totals | 100.0 |

| | General Zoning | Percentage of Land Use in Total Area | | General Zoning | Percentage of Land Use in Total Area |
|---|---|---|---|---|---|
| Manchester | Business/Commercial/Office | 4.8 | Suffield | Business/Commercial/Office | 1.1 |
| | Industrial | 19.8 | | Industrial | 11.9 |
| | Mixed Use | 0.6 | | Mixed Use | 0.0 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 69.2 | | Residential | 76.0 |
| | Resource/Recreation | 0.0 | | Resource/Recreation | 0.0 |
| | Water | 5.6 | | Water | 11.0 |
| | Totals | 100.0 | | Totals | 100.0 |
| Marlborough | Business/Commercial/Office | 1.5 | Tolland | Business/Commercial/Office | 0.0 |
| | Industrial | 3.2 | | Industrial | 4.3 |
| | Mixed Use | 0.4 | | Mixed Use | 0.0 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 71.3 | | Residential | 95.7 |
| | Resource/Recreation | 23.6 | | Resource/Recreation | 0.0 |
| | Water | 0.0 | | Water | 0.0 |
| | Totals | 100.0 | | Totals | 100.0 |
| Newington | Business/Commercial/Office | 14.2 | Vernon | Business/Commercial/Office | 14.0 |
| | Industrial | 34.1 | | Industrial | 1.4 |
| | Mixed Use | 0.0 | | Mixed Use | 9.1 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 51.0 | | Residential | 56.6 |
| | Resource/Recreation | 0.7 | | Resource/Recreation | 1.6 |
| | Water | 0.0 | | Water | 17.3 |
| | Totals | 100.0 | | Totals | 100.0 |
| Rocky Hill | Business/Commercial/Office | 1.2 | West Hartford | Business/Commercial/Office | 2.7 |
| | Industrial | 4.6 | | Industrial | 8.3 |
| | Mixed Use | 1.1 | | Mixed Use | 0.1 |
| | ROW (Right Of Way) | 1.4 | | ROW (Right Of Way) | 0.0 |
| | Residential | 10.8 | | Residential | 88.9 |
| | Resource/Recreation | 80.9 | | Resource/Recreation | 0.0 |
| | Water | 0.0 | | Water | 0.0 |
| | Totals | 100.0 | | Totals | 100.0 |
| Simsbury | Business/Commercial/Office | 0.4 | Wethersfield | Business/Commercial/Office | 5.7 |
| | Industrial | 6.4 | | Industrial | 3.4 |
| | Mixed Use | 0.0 | | Mixed Use | 0.0 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 67.5 | | Residential | 26.9 |
| | Resource/Recreation | 12.7 | | Resource/Recreation | 64.0 |
| | Water | 13.1 | | Water | 0.0 |
| | Totals | 100.0 | | Totals | 100.0 |
| Somers | Business/Commercial/Office | 0.2 | Windsor | Business/Commercial/Office | 1.6 |
| | Industrial | 2.2 | | Industrial | 6.1 |
| | Mixed Use | 0.0 | | Mixed Use | 0.6 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 0.0 |
| | Residential | 97.6 | | Residential | 18.6 |
| | Resource/Recreation | 0.0 | | Resource/Recreation | 50.4 |
| | Water | 0.0 | | Water | 22.7 |
| | Totals | 100.0 | | Totals | 100.0 |
| South Windsor | Business/Commercial/Office | 2.1 | Windsor Locks | Business/Commercial/Office | 1.9 |
| | Industrial | 3.8 | | Industrial | 45.7 |
| | Mixed Use | 0.0 | | Mixed Use | 0.2 |
| | ROW (Right Of Way) | 0.0 | | ROW (Right Of Way) | 2.6 |
| | Residential | 30.5 | | Residential | 9.1 |
| | Resource/Recreation | 63.6 | | Resource/Recreation | 0.0 |
| | Water | 0.0 | | Water | 40.5 |
| | Totals | 100.0 | | Totals | 100.0 |

Finally, a review of flood insurance loss claims, and repetitive flood loss claims, from the past three decades indicates that flooding is a significant risk to the region not only because of its frequency, but also because of its damage potential. The maps and data on the following pages show the FEMA flood zones and the moderate to high hazard dams (discussed in the following section) in the Capitol Region, flood insurance claims by town and repetitive flood loss claims.

**Table 5: National Flood Insurance Program Claims 1978-2006**

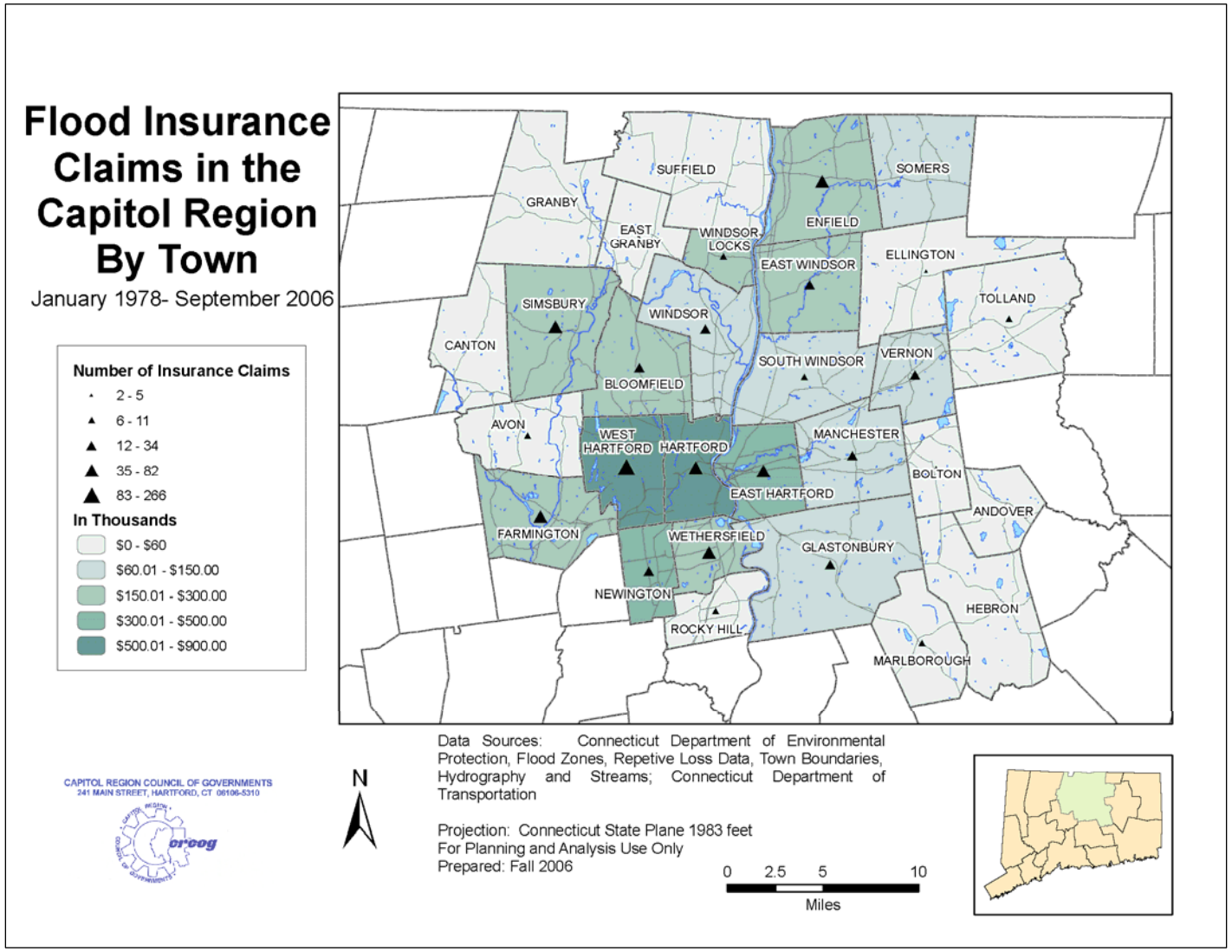
**Repetitive Flood Loss Properties (Not Including Mitigated Properties)**

| Community Name | Building Payments | Contents Payments | Total Losses | Total Properties |
|---|---|---|---|---|
| Canton | $30,544.35 | $10,945.35 | 7 | 2 |
| East Hartford | $129,122.59 | $9,216.69 | 10 | 5 |
| Enfield | $109,508.16 | $30,731.06 | 11 | 4 |
| Farmington | $153,829.87 | $55,587.76 | 6 | 1 |
| Granby | $14,146.60 | $8,898.02 | 4 | 1 |
| Hartford | $37,726.31 | $80,029.08 | 11 | 3 |
| Marlborough | $6,386.46 | $14.20 | 2 | 1 |
| Newington | $75,042.35 | $277,620.15 | 12 | 4 |
| Simsbury | $69,503.02 | $41,418.85 | 23 | 9 |
| South Windsor | $0.00 | $29,046.50 | 3 | 1 |
| Trumbull | $170,846.04 | $125,168.26 | 40 | 16 |
| Vernon | $15,608.40 | $35,684.19 | 5 | 1 |
| West Hartford | $177,408.60 | $84,838.25 | 46 | 17 |
| Wethersfield | $3,969.27 | $1,794.00 | 3 | 1 |
| Windsor | $26,579.85 | $5,058.57 | 4 | 2 |

**Repetitive Flood Loss Properties and Mitigated Properties**

| Community Name | Building Payments | Contents Payments | Total Losses | Total Properties |
|---|---|---|---|---|
| Canton | $34,541.77 | $15,524.85 | 9 | 3 |
| East Hartford | $129,122.59 | $9,216.69 | 10 | 5 |
| Enfield | $109,508.16 | $30,731.06 | 11 | 4 |
| Farmington | $155,523.82 | $57,130.72 | 8 | 2 |
| Granby | $14,146.60 | $8,898.02 | 4 | 1 |
| Hartford | $37,726.31 | $80,029.08 | 11 | 3 |
| Manchester | $0.00 | $17,295.00 | 2 | 1 |
| Marlborough | $6,386.46 | $14.20 | 2 | 1 |
| Newington | $75,042.35 | $277,620.15 | 12 | 4 |
| Simsbury | $69,503.02 | $41,418.85 | 23 | 9 |
| South Windsor | $0.00 | $29,046.50 | 3 | 1 |
| Tolland | $6,063.45 | $0.00 | 2 | 1 |
| Vernon | $15,608.40 | $40,967.36 | 7 | 2 |
| West Hartford | $377,159.88 | $155,074.47 | 74 | 28 |
| Wethersfield | $3,969.27 | $1,794.00 | 3 | 1 |
| Windsor | $26,579.85 | $5,058.57 | 4 | 2 |

**Map 3: Capitol Region Flood Insurance Claims**



## Dam Failure

According to the DEP Dams List, there are 471 dams in the region. Dams are rated by their hazard potential. The Capitol Region has 22 Class C, or high hazard, dams (see Table 6 below). Failure of a Class C dam would result in probable loss of life, major damage to habitable structures, damage to major highways and great economic loss. The region also has 52 Class B, or significant hazard, dams. Failure in these dams would result in similar, but less severe damage. Following is a list of the high hazard potential dams located within the Capitol Region. According to Jim Sangivanni in the Dam Safety Section of DEP's Inland Water Resources Division, all of the Class C dams in the region are in good condition. The CT DEP, MDC or towns own the majority of these dams, which serve in flood control, or water supply.

**Table 6: Capitol Region High Hazard Dams (Class C)**

| Municipality | Dam Name | Ownership |
|---|---|---|
| BLOOMFIELD | BLOOMFIELD DAM | State |
| | WINTONBURY SITE #1 DAM | State |
| | BLUE HILLS RESERVOIR SITE #2 DAM | State |
| | COLD SPRING DAM | State |
| ENFIELD | FRESHWATER POND DAM | Private |
| FARMINGTON | SOUTH RESERVOIR DAM | State |
| | BATTERSON PARK POND DAM | Local |
| | FARMINGTON RESERVOIR DAM | Private |
| MANCHESTER | UNION POND DAM | Local |
| | HOWARD RESERVOIR DAM | Local |
| VERNON | SHENIPSIT LAKE DAM | Private |
| | ANO COIL POND DAM | Private |
| | PAPER MILL POND DAM | Private |
| WEST HARTFORD | HARTFORD RESERVOIR DAM #6 | Private |
| | TALCOTT RESERVOIR DAM #1 | State |
| | BUGBEE RESERVOIR DAM | State |
| | TALCOTT RESERVOIR DAM #2 | State |
| | HARTFORD RESERVOIOR DAM #2 | Private |
| | HARTFORD RESERVOIR DAM #3 | Private |
| | HARTFORD RESERVOIR DAM #1 | Private |
| | BURNT HILL RESERVOIR DAM | State |
| WINDSOR | RAINBOW RESERVOIR DAM | Private |

Once again, the floods of October 2005 demonstrated the Region's vulnerability to localized storm impacts on dams. Several low and moderate hazard potential dams suffered some impact from localized major flooding. Table 7 on the following page shows a list of dams within the Region that were breached or damaged in October 2005.

**Table 7: Capitol Region Dams Impacted by October 2005 Flooding**

| Location | Dam | Ownership | Dam Class | Impact on Dam |
|---|---|---|---|---|
| Bloomfield | ABB Pond Dam | Private | unknown | Damaged |
| Somers | Somerville Pond Dam | DEP | unknown | Partially Breached |
| East Windsor | Windsorville Dam | Private | BB | Damaged |
| Enfield | Springborn Dam | DEP | BB | Damaged |
| Suffield | Cains Pond | Private | A | Fully Breached |
| | Schwartz Pond Dam | Private | BB | Partially Breached |

## Winter Storms

Connecticut is subject to blizzards, ice storms and nor'easters, storms characterized by strong, possibly damaging northeasterly winds. The Capitol Region receives an average annual snowfall of about 50", although snowfall amounts can vary dramatically across the Region in any given storm. Severe winter storms can result in damage to buildings and infrastructure, loss of life, and disruptions to regional transportation and communication systems. Indeed, five out of six federal emergency declarations for Connecticut over the past 30 years have followed major winter storms. Federal assistance is frequently used to offset the snow/ice removal costs the State and municipalities incur. The frequency, intensity and timing of winter storms dramatically impacts snow removal budgets. Municipalities incur higher labor costs for snow removal on weekends and holidays. For example, a federal emergency was declared for the February 11-12, 2006 snowstorm in certain counties in Connecticut (including Hartford and Tolland) to help share the costs of snow removal.

Notable winter storms such as the blizzards of 1888 and 1978 delivered nearly an entire season's worth of snow in single events to the Region. Other notable winter storms in Connecticut include nor'easters in 1979, 1983, 1988, 1992, 1996 and 2003. Following is a description of some of the winter storms that have hit the Region in the last 10 years, and their impacts, from the National Weather Service's Storm Events Database. As is evident from these descriptions, individual winter storm events need not be unusually intense to cause damages and even loss of life.

> January 7, 1996
> This storm was one of the most significant winter storms to hit southern New England in the past 20 years and was named the "Blizzard of '96" from the Middle Atlantic states to southern New England. However, by National Weather Service definition, no actual blizzard conditions occurred in the state. Snowfall across the north and northeast portions of the state ranged from 15 to 23 inches. In Hartford County, Bradley International Airport recorded 18.2 inches. New Britain had 18 inches and Wethersfield, 15.3 inches. In Tolland County, there was 22.5 inches in Mansfield... This storm disrupted transportation systems and closed schools and businesses. A barn roof collapsed in Simsbury within a week or so following this very heavy snowfall.
>
> March 2, 1996
> A total of 6 to 7 inches of snow fell across the northern part of the state. There were 391 skidding accidents reported to the state police. Three people were killed and dozens injured on the icy roadways. A number of state highways were closed for a time due to the numerous accidents and very slippery conditions, including Route 30 in Tolland and Route 195 in Mansfield.

December 6, 1996

An intensifying storm system moving eastward from the southeast tip of Long Island caused heavy, wet snow across northern Connecticut. The greatest totals were reported from the higher elevations... Several thousand electric customers lost power, including a total of 1700 in Avon. In Simsbury, a town-owned tobacco barn collapsed under the weight of the snow. The barn was in rough shape to start with, but the collapse amounted to approximately $37,000, according to the Simsbury Assessors' Office. Road conditions became very poor as the snow continued to fall throughout the day.

December 7, 1996

This storm brought heavy, wet snow and resulted in widespread power outages. There had been another heavy, wet snow event the day before, too. A total of 225,000 electric customers lost power statewide, including 100,000 in central Connecticut and 95,000 in the eastern part of the state. Power remained out for several days, despite the efforts of dozens of electric company repair crews, many from out-of-state. Many roads remained unplowed until the utility companies could clear away fallen wires. A firefighter died instantly while on duty in Somers when he came in contact with a 23,000 volt power line that had been knocked down by the heavy snow. Route 44 was closed for 15 hours due to a fallen power line. Up to 22 shelters were opened across the region and many residents left their unheated and darkened homes. Many vehicles and homes were damaged by falling tree limbs and damage was estimated in the millions of dollars...

January 24, 1997

Light freezing rain created very treacherous driving conditions and caused numerous skidding accidents, including many multiple-car accidents. State police at the Tolland barracks reported 60-80 accidents, mostly minor, late Friday night, January 24th. Several bridges had to be closed in the Hartford area when more than a dozen cars collided. Several other highways also were closed in northern Connecticut due to icing conditions. A spotter in Windsor reported 1/4" to 1/3" of ice on trees during the early morning hours on January 25th.

December 20, 1999

Light freezing rain fell in the deeper valleys of northern Connecticut, as rain fell into a shallow layer of below freezing air at the surface. The resultant light coating of ice formed "black ice" on many roadways, which caused many accidents. It was estimated that there were nearly one hundred accidents, mostly fender benders, throughout Hartford, Tolland, and Windham Counties as a result of the slick driving conditions.

November 26, 2000

Low pressure moving north up the mid Atlantic coast brought a period of light freezing rain to much of northern Connecticut. Ice accretion was under one quarter inch, but the freezing rain left black ice on roads, causing dozens of accidents at the end of the Thanksgiving weekend, usually a busy travel day. Temperatures warmed into the 40s by late morning, ending the danger of icing.

February 5, 2001

A major winter storm brought heavy snow and strong winds to northern Connecticut. The highest snowfall totals, between 12 and 24 inches, were reported in Hartford County. Totals of 12 to 18 inches were widely observed in Tolland and Windham Counties. Several minor accidents were attributed to the storm, and traffic in greater Hartford was brought to a standstill during the height of the storm. Several thousand electric customers were left without power.

November 16, 2002

A major ice storm caused significant damage in north central Connecticut. There were numerous reports of downed trees, limbs, and power lines as a result of one-half to three-quarters of an inch of icing. An estimated 100,000 customers in Hartford and Tolland Counties were left without power because of the storm. Damage was especially severe in western Hartford County, where entire communities such as Hartland, Granby, Simsbury, and Canton were left without power for as much as five days. Sections of Canton were completely isolated due to

downed trees and wires, according to local police. The damage from the ice storm was compounded by high winds one day later. Gusts as high as 50 mph hampered the cleanup effort, downing more trees and branches which were weighted down by ice. Total damage from the storm in Hartford County was estimated at two million dollars. The damage was less severe in neighboring Tolland County, but there were still many reports of downed trees, limbs, and wires countywide. Total damage was estimated at half a million dollars.

January 8, 2005

Low pressure quickly strengthened as it passed south of New England and brought a mix of snow, sleet and freezing rain to much of interior southern New England. North central Connecticut was especially hard hit by freezing rain, where as much as one half inch of glaze brought down trees, tree limbs and power lines. There was no estimate of how many customers lost power, but dozens of accidents were reported as a result of icy roads.

March 8, 2005

Low pressure strengthened rapidly off the Delaware coast and tracked southeast of New England, bringing heavy snow and high winds to parts of northern Connecticut... Several highways, including Interstate 84, were described by state police as "barely passable" during the height of the storm. In Hartford, downtown streets were jammed with cars as many businesses and state offices closed early. Commuting times were doubled or tripled in many locations.

## Tornadoes/High Winds

Connecticut averages approximately three tornadoes every two years. Between 1950 and 2003, Hartford County experienced 14 tornadoes and Tolland County experienced 10. These tornadoes occurred between April and October. Hartford and Litchfield Counties are at the highest risk for tornadoes within the state based on historical patterns and locations of their occurrence.

One of the country's most destructive tornadoes touched down in Windsor Locks and Windsor on October 3, 1979. The F4 tornado had winds in excess of 200 miles per hour, and tore an 11-mile path from Windsor to Suffield. The tornado killed 3 people, injured 500 and caused an estimated $250 million in damage, in part because it struck the New England Air Museum destroying several planes and hangars. The 1979 tornado still ranks as the 9$^{th}$ most costly single tornado in the United States, according to the Storm Prediction Center of the National Oceanic & Atmospheric Administration.

**Windsor Locks, 1979**

**From the New England Air Museum Tornado Page: http://www.neam.org/tornado5.htm**

Table 8 displays a list of all the tornadoes that have occurred in Hartford and Tolland Counties from 1950 to 1995. The majority of tornadoes that touch down in the Capitol Region are of a lesser intensity; however, the 1979 Windsor Locks tornado illustrates that the Region is vulnerable to tornadoes as strong as those that occur in the Midwest.

**Table 8: Tornadoes in Hartford and Tolland Counties 1950-1995**

| | Hour | Dead | Injured | F Scale |
|---|---|---|---|---|
| **Hartford County** | | | | |
| August 21, 1951 | 1715 | 0 | 9 | F2 |
| May 10, 1954 | 1255 | 0 | 0 | F2 |
| October 24, 1955 | 1735 | 0 | 0 | F1 |
| June 19, 1957 | 1500 | 0 | 0 | F1 |
| May 30, 1959 | 1530 | 0 | 0 | F1 |
| May 24, 1962 | 1700 | 0 | 5 | F3 |
| October 3, 1970 | 1700 | 0 | 1 | F1 |
| June 28, 1973 | 1345 | 0 | 1 | F1 |
| August 31, 1973 | 1730 | 0 | 0 | F2 |
| September 6, 1973 | 1000 | 0 | 0 | F2 |
| October 3, 1979 | 1400 | 3 | 500 | F4 |
| July 5, 1984 | 1657 | 0 | 0 | F2 |
| August 4, 1992 | 1505 | 0 | 0 | F0 |
| June 29, 1994 | 1416 | 0 | 0 | F0 |
| **Tolland County** | | | | |
| August 20, 1951 | 1630 | 0 | 0 | F2 |
| May 10, 1954 | 930 | 0 | 2 | F3 |
| August 8, 1956 | 1630 | 0 | 0 | F0 |
| September 7, 1958 | 1610 | 0 | 2 | F2 |
| April 26, 1961 | 1115 | 0 | 0 | F1 |
| August 19, 1965 | 1705 | 0 | 0 | F2 |
| August 17, 1968 | 1800 | 0 | 0 | F1 |
| September 18, 1973 | 1208 | 0 | 0 | F1 |

Source: The Tornado Project, www.tornadoproject.com

## Earthquake

Connecticut has a moderate risk of earthquakes based on the frequency of their occurrence, not the intensity of individual earthquakes. Between 1568 and 1989, the state had 137 recorded earthquakes. Earthquakes in Connecticut are intra-plate or intra-tectonic, as opposed to occurring at fault lines. In these types of earthquakes, soil composition determines the magnitude of the impact. Soft soils, and filled wetlands conduct energy better than bedrock. A magnitude 5.1 earthquake outside of Plattsburgh, New York in April 2002 was felt in Hartford and lower-lying areas in western Connecticut because of ground-motion amplification resulting from the soft soils located in these areas. Many of the recent earthquakes felt in Connecticut had epicenters in upstate New York, New Hampshire and Massachusetts.

Map 4 on the following page shows that in the Capitol Region an earthquake that has a 10% chance of being exceeded in 50 years has a peak ground acceleration between four and five percent of gravity. The U.S. Geological Survey (USGS) estimates that a peak ground acceleration

greater than 10% of gravity represents shaking that would damage older dwellings and dwellings not made to resist earthquakes. Connecticut incorporated building codes for seismic activity into the state building code in 1992. There were no requirements prior to that. So, while the risk for a very damaging earthquake is relatively low in the region, some structures may be impacted by less intense earthquakes depending on the soil and integrity of the structure. Based on this reasoning, a HAZUS Analysis for earthquake hazard was not performed at this stage.

## Drought

Droughts periodically occur in Connecticut and can have serious economic and social impacts. While a drought does not pose immediate threats to life and property, it can have severe economic, environmental and social consequences. See the following page for a checklist of potential consequences from the National drought Mitigation Center. A lack of precipitation can affect not only agricultural production, but also tourism, water utilities, residential wells, businesses and more.

Scientists have classified types of droughts: meteorological, hydrological and agricultural. Meteorological droughts are periods in which precipitation is below normal. In hydrological droughts, deficient precipitation, usually over a period of months, causes surface and subsurface waters to be low. It can take months to recover from hydrological droughts. Agricultural droughts occur during the growing season, when there is insufficient precipitation to support crop production. The region can recover from an agricultural drought more quickly than from a hydrological drought; however, an agricultural drought can result in significant economic losses for the agricultural community. Finally, a lack of precipitation is the primary cause for any drought; however, land use also influences the severity and timing of droughts. Areas with vast impervious-surface coverage inhibit groundwater recharge and can therefore hasten the on-set of a hydrological drought or increase its intensity.

Connecticut experienced droughts in 1957, 1964-67, 1980-81 and in 2002. During the most recent drought, several water utilities imposed mandatory water conservation and restriction measures on their customers, while most other companies imposed voluntary restrictions. Such restrictions can impact businesses as well as residences. The state responded to the most recent drought by developing a drought management plan, which established monitoring and assessment protocols. During the height of the 2002 drought, some municipalities conducted public outreach and education regarding water conservation. Following is a list of the potential impacts of drought that municipalities and the Region may be concerned about.

Checklist Potential Drought Impacts

**Economic:**

Costs and losses to agricultural producers—

- Annual and perennial crop losses
- Damage to crop quality
- Income loss for farmers due to reduced crop yields
- Reduced productivity of cropland (wind erosion, long-term loss of organic matter, etc.)
- Insect infestation
- Plant disease
- Wildlife damage to crops
- Increased irrigation costs
- Cost of new or supplemental water resource development (wells, dams, pipelines)

*Costs and losses to livestock producers—*

- Reduced productivity of rangeland
- Reduced milk production
- Forced reduction of foundation stock

- Closure/limitation of public lands to grazing
- High cost/unavailability of water for livestock
- Cost of new or supplemental water resource development (wells, dams, pipelines)
- High cost/unavailability of feed for livestock
- Increased feed transportation costs
- High livestock mortality rates
- Disruption of reproduction cycles (delayed breeding, more miscarriages)
- Decreased stock weights
- Increased predation
- Range fires

*Loss from timber production—*

- Wildland fires
- Tree disease
- Insect infestation
- Impaired productivity of forest land
- Direct loss of trees, especially young ones

*Loss from fishery production—*

- Damage to fish habitat
- Loss of fish and other aquatic organisms due to decreased flows

*General economic effects—*

- Decreased land prices
- Loss to industries directly dependent on agricultural production (e.g., machinery and fertilizer manufacturers, food processors, dairies, etc.)
- Unemployment from drought-related declines in production
- Strain on financial institutions (foreclosures, more credit risk, capital shortfalls)
- Revenue losses to federal, state, and local governments (from reduced tax base)
- Reduction of economic development
- Fewer agricultural producers (due to bankruptcies, new occupations)
- Rural population loss

*Loss to recreation and tourism industry—*

- Loss to manufacturers and sellers of recreational equipment
- Losses related to curtailed activities: hunting and fishing, bird watching, boating, etc.

*Energy-related effects—*

- Increased energy demand and reduced supply because of drought-related power
- curtailments
- Costs to energy industry and consumers associated with substituting more expensive fuels (oil) for hydroelectric power

*Water suppliers—*

- Revenue shortfalls and/or windfall profits
- Cost of water transport or transfer
- Cost of new or supplemental water resource development

*Transportation industry—*

- Loss from impaired navigability of streams, rivers, and canals

*Decline in food production/disrupted food supply—*

- Increase in food prices
- Increased importation of food (higher costs)

**Environmental:**

*Damage to animal species—*

- Reduction and degradation of fish and wildlife habitat
- Lack of feed and drinking water
- Greater mortality due to increased contact with agricultural producers, as animals seek
- food from farms and producers are less tolerant of the intrusion
- Disease
- Increased vulnerability to predation (from species concentrated near water)
- Migration and concentration (loss of wildlife in some areas and too many wildlife in other areas)
- Increased stress to endangered species
- Loss of biodiversity

*Hydrological effects—*

- Lower water levels in reservoirs, lakes, and ponds
- Reduced flow from springs
- Reduced streamflow
- Loss of wetlands
- Estuarine impacts (e.g., changes in salinity levels)
- Increased groundwater depletion, land subsidence, reduced recharge
- Water quality effects (e.g., salt concentration, increased water temperature, pH, dissolved
- oxygen, turbidity)

*Damage to plant communities—*

- Loss of biodiversity
- Loss of trees from urban landscapes, shelterbelts, wooded conservation areas
- Increased number and severity of fires
- Wind and water erosion of soils, reduced soil quality
- Air quality effects (e.g., dust, pollutants)
- Visual and landscape quality (e.g., dust, vegetative cover, etc.)

**Social:**

*Health—*

- Mental and physical stress (e.g., anxiety, depression, loss of security, domestic violence)
- Health-related low-flow problems (e.g., cross-connection contamination, diminished
- sewage flows, increased pollutant concentrations, reduced fire fighting capability, etc.)
- Reductions in nutrition (e.g., high-cost food limitations, stress-related dietary
- deficiencies)
- Loss of human life (e.g., from heat stress, suicides)
- Public safety from forest and range fires
- Increased respiratory ailments
- Increased disease caused by wildlife concentrations

*Increased conflicts—*

- Water user conflicts
- Political conflicts
- Management conflicts
- Other social conflicts (e.g., scientific, media-based)

*Reduced quality of life, changes in lifestyle—*

- In rural areas
- In specific urban areas
- Population migrations (rural to urban areas, migrants into the United States)
- Loss of aesthetic values
- Disruption of cultural belief systems (e.g., religious and scientific views of natural
- hazards)
- Reevaluation of social values (e.g., priorities, needs, rights)
- Public dissatisfaction with government drought response
- Perceptions of inequity in relief, possibly related to socioeconomic status, ethnicity, age,
- gender, seniority
- Loss of cultural sites
- Increased data/information needs, coordination of dissemination activities
- Recognition of institutional restraints on water use

Source: National Drought Mitigation Center, http://drought.unl.edu/risk/checklist.pdf

## Forest Fires

Forest fires can cause not only long-term damage to vegetation and ecosystems, but also damage to developments, especially as residential development has increased in woodland areas. The Connecticut Department of Environmental Protection Division of Forestry issues forest fire danger ratings. The ratings are: low, moderate, high, very high and extreme. These are based on an index of how quickly a fire is likely to spread and measures of drought. In addition, the National Weather Service issues “Red Flag” warnings. A Red Flag warning means that if a fire occurs, firefighters can expect it to behave erratically due to weather conditions.

There are three fire seasons in Connecticut. The spring season runs from mid-March to mid-May. Prior to leaf-out, fuels such as grasses, dead leaves, branches and twigs on the forest floor, are heated and dried out by the sun. These fuels cause spring fires to tend to spread quickly, though they tend to cause little, long-term damage to the forest. The summer fire season lasts from mid-May through September and is largely dependent on precipitation, or lack thereof. Summer fires tend to spread less quickly than spring fires because they burn deeper into the ground. However, the burning of organic material in the soil makes summer fires more difficult to suppress. Summer fires are the most destructive to vegetation. Consequently, erosion usually follows summer forest fires. The fall fire season runs from October through the first snowfall. Fall fires can spread rapidly because of drying leaves that have fallen.

In the last 10-12 years, a few forest fires have occurred in the Capitol Region. Throughout Connecticut, 1999 was a particularly busy fire year because of drought conditions. Following are descriptions of forest fires within the Region, as reported in the *Hartford Courant*.

> May 1995: A forest fire burned nearly 40 acres on a ridge near the Sweetheart Lake area of Tolland. Officials believed the fire was started accidentally. Unusually dry conditions contributed to the fire's spread. Approximately 50 firefighter from seven departments laid nearly 2,000 feet of hose to contain the fire at its perimeter.
>
> April 1999: A brush fire in the Talcotville section of Vernon burned about 40 acres. Eight fire departments battled the blaze, hauling water in tanker trucks. The fire came within 100 feet of houses in a nearby neighborhood.
>
> April 2005: A fire burned about eight acres near the Farmington River in Avon. About 30 firefighters from five departments put the fire out. The DEP Division of Forestry reported a "high" forest fire danger level for that day.

## Hazards Summary

### Dam Failure

| | |
|---|---|
| Frequency: | The likelihood of dam failure is greatest in conjunction with floods, hurricanes and earthquakes. |
| Potential Impacts: | Bodily harm and loss of life and property. A water shortage may occur if a dam failure impacts an active reservoir. |
| Vulnerable Locations: | Stream reaches below dams. |
| Economic Loss: | Repair and replacement costs, business disruption, debris removal and clean-up costs. |

### Drought

| | |
|---|---|
| Frequency: | A drought occurs about once every seven years or has a 14% chance of occurrence in any given year. |
| Potential Impacts: | Water shortages, environmental and human health issues, and increased risk of wildfires, especially in low-density, forested areas. |

| | |
|---|---|
| Vulnerable Locations: | Entire region. |
| Economic Loss: | Agricultural and water-dependent businesses may experience losses. |

## Earthquake

| | |
|---|---|
| Frequency: | A magnitude four or higher earthquake is likely to occur approximately once every 25 years, or a 4% chance of occurrence in any given year. |
| Potential Impacts: | Minimal property and content damage. |
| Vulnerable Locations: | Entire region. |
| Economic Loss: | Repair and replacement costs. |

## Floods

| | |
|---|---|
| Frequency: | Major flooding of small rivers and loss of life can be expected every 5-10 years throughout the State. Major flooding of larger rivers, such as the Connecticut and Farmington, with loss of life and structural damage can be expected once every 30 years. |
| Potential Impacts: | Breached dams, street closures, power outages, utility damage, property and content damage, basement flooding, bodily harm and death. |
| Vulnerable Locations: | Flood prone and poorly drained areas. |
| Economic Loss: | Repair and replacement costs, business disruption, debris removal and clean-up costs. |

## Forest Fires

| | |
|---|---|
| Frequency: | Very low likelihood. |
| Potential Impacts: | Property and content damage, bodily harm and death. |
| Vulnerable Locations: | At the woodland/suburban interface. |
| Economic Loss: | Repair and replacement costs, business disruption, debris removal and clean-up costs. |

## Hurricanes

| | |
|---|---|
| Frequency: | A moderate category II hurricane can be expected to hit the State once every ten years. A major category III or IV hurricane may hit before 2040, based on 20$^{th}$ century trends. |

| | |
|---|---|
| Potential Impacts: | Street closures, power outages, tree damage, utilities damage, property and content damage, bodily harm and death. |
| Vulnerable Locations: | Flood prone and poorly drained areas. |
| Economic Loss: | Repair and replacement costs, business disruption, debris removal and clean-up costs. |

## Tornadoes

| | |
|---|---|
| Frequency: | An average of three tornadoes every two years occur in the State. |
| Potential Impacts: | Bodily harm and death, tree damage, utilities damage, property and content damage. |
| Vulnerable Locations: | Entire region, although Hartford County is at highest risk. |
| Economic Loss: | Repair and replacement costs, business disruption, debris removal and cleanup costs. |

## Winter Storms

| | |
|---|---|
| Frequency: | A severe winter storm (Blizzard, Nor'easter, Ice storm) is likely to occur once every five years or 20% chance of occurrence in any given year. |
| Potential Impacts: | Street closures, power outages, schools closures, utility damage, property and content damage, car accidents, tree damage, bodily harm and death. |
| Vulnerable Locations: | Entire region. |
| Economic Loss: | Repair and replacement costs, business disruption, debris removal and cleanup costs. |