

A photograph of a large lake with a forested shoreline under a cloudy sky. The text is overlaid on the upper portion of the image.

# 2011 Flood Effects on Vermont Lakes

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*Healthy Shores, Healthy Lakes*

# Significant Floods of 2011

- **May-June  
Continuous Rains**

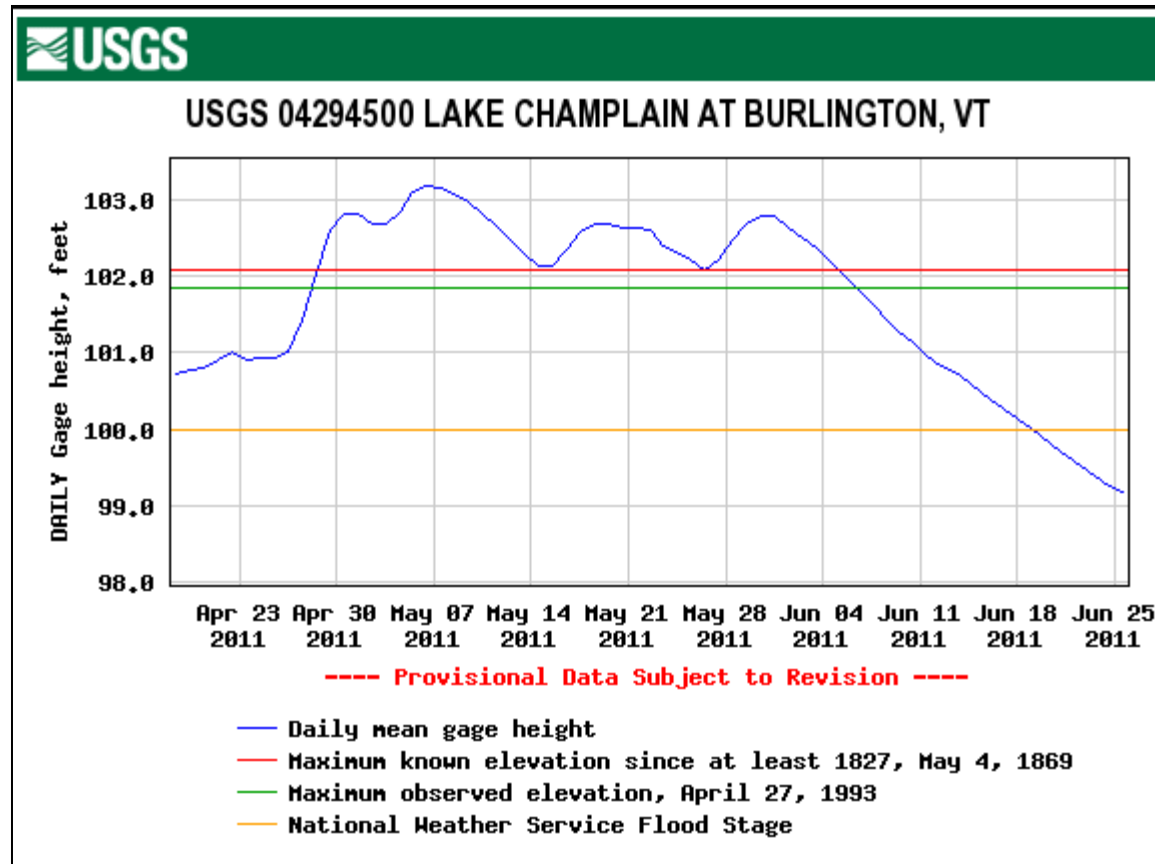
Severe shoreland property damage on  
Lake Champlain

- **Aug-Sept Hurricane Irene  
Flash Floods**

Severe sediment loading to inland  
lakes



# Lake Champlain Flooding



Prolonged flooding event, with lake being above flood stage (100 ft) from April 12 – June 19 as a result of the snow melt and the wettest spring on record.



**Flooded fishing access, West Shore, Isle LaMotte, VT**

**4/30/11**

*Photo by Lake Champlain Basin Program*

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# Lake Champlain Shoreline Erosion



Shoreline erosion often occurs as a result of wave action, especially against unbuffered shores where the natural vegetation has been removed and replaced by lawns.



Sediment plume from shoreline erosion on South Hero, VT -  
4/30/2011

*Photo by Lake Champlain Basin Program*

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# Lake Champlain Flooding

**The reality of building too close to Lake Champlain**



*Photo by S. Hogan*

April 29, 2011 - King Street Ferry Dock in Burlington, VT



*Photo by C. Hanley*

May 7, 2011 - Charlotte Ferry Dock in Charlotte, VT

# Lake Champlain

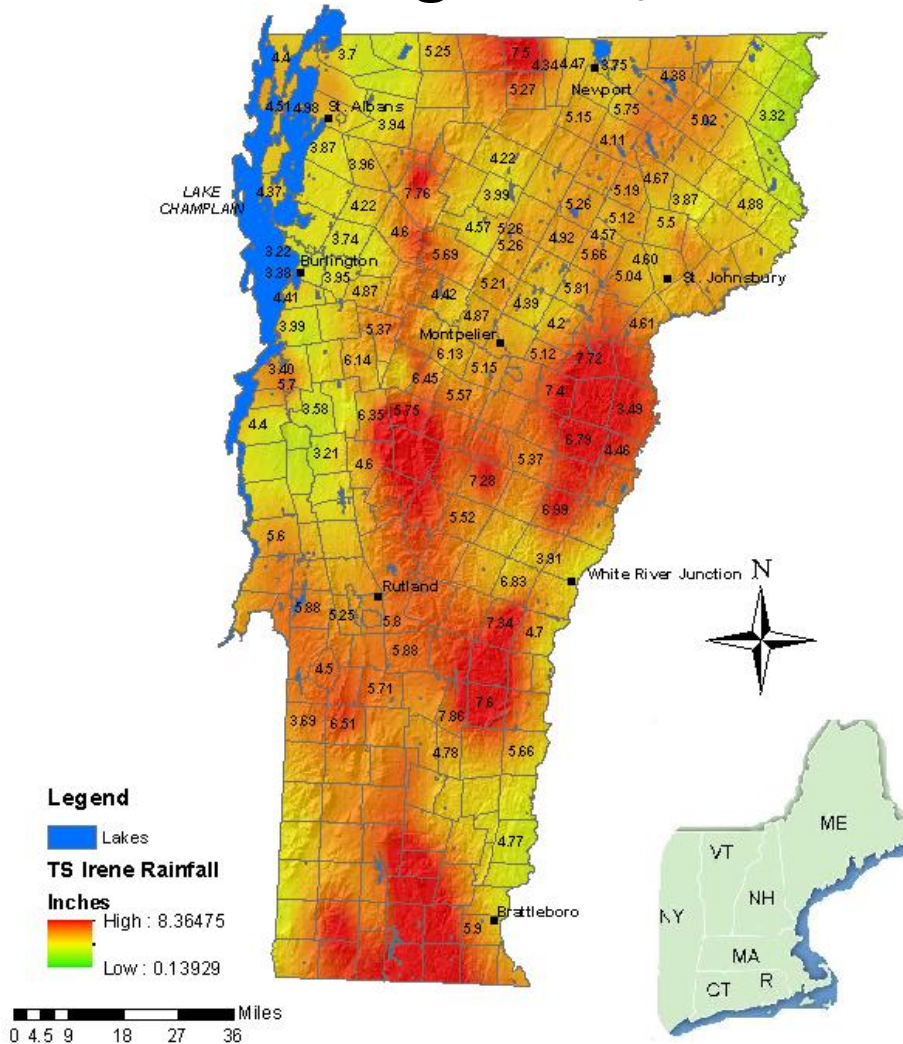
## Economic Costs of Flood Damage

- Increased phosphorus loading, increasing likelihood of algae blooms
- Estimated loss of business related to flooding events (*Business was off by 30% in 2011 summer because of the prolonged flood event.* – South Hero Business Owner)
- Delay in the 2011 boating and swimming season – loss of recreation activities on shore (i.e. bike and walking trails)

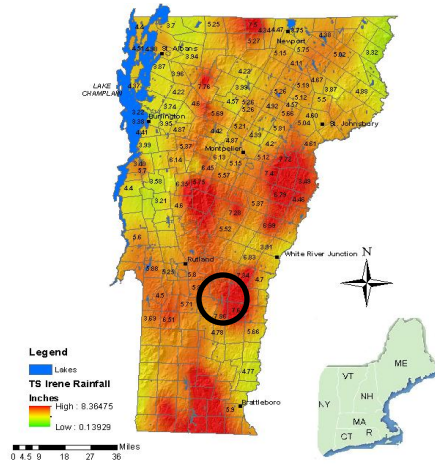


**Estimated \$100 million cost for the state in damage to property and infrastructure.**

# Hurricane Irene - Total Rainfall Distribution August 28, 2011



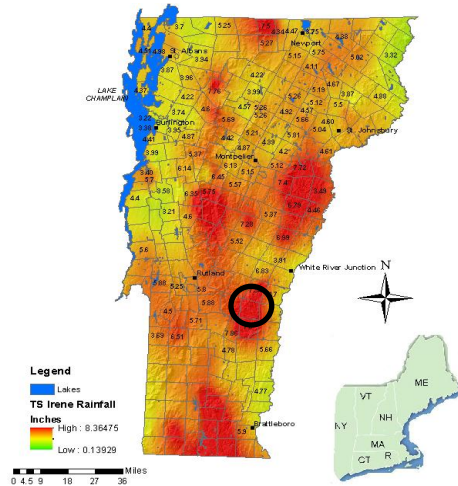
*Red areas  
measured  
highest  
rainfall  
totals*



Ludlow, Vermont received 7.86 inches of rain from Irene.

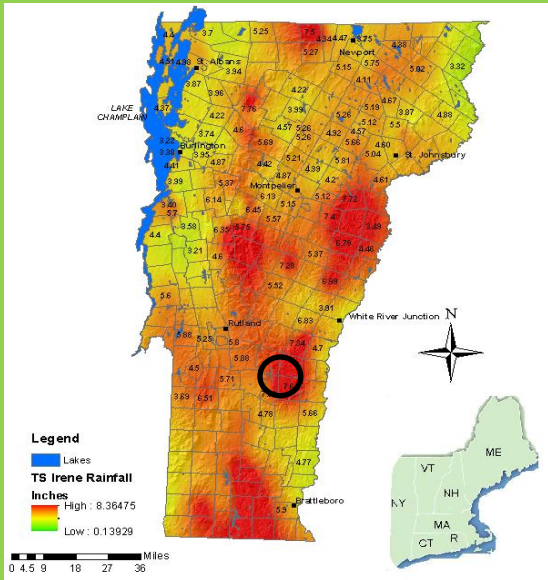
Roads washed out around Lake Rescue and sediment flowed into the lake.

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Lake Rescue residents estimated the water level rose six feet.

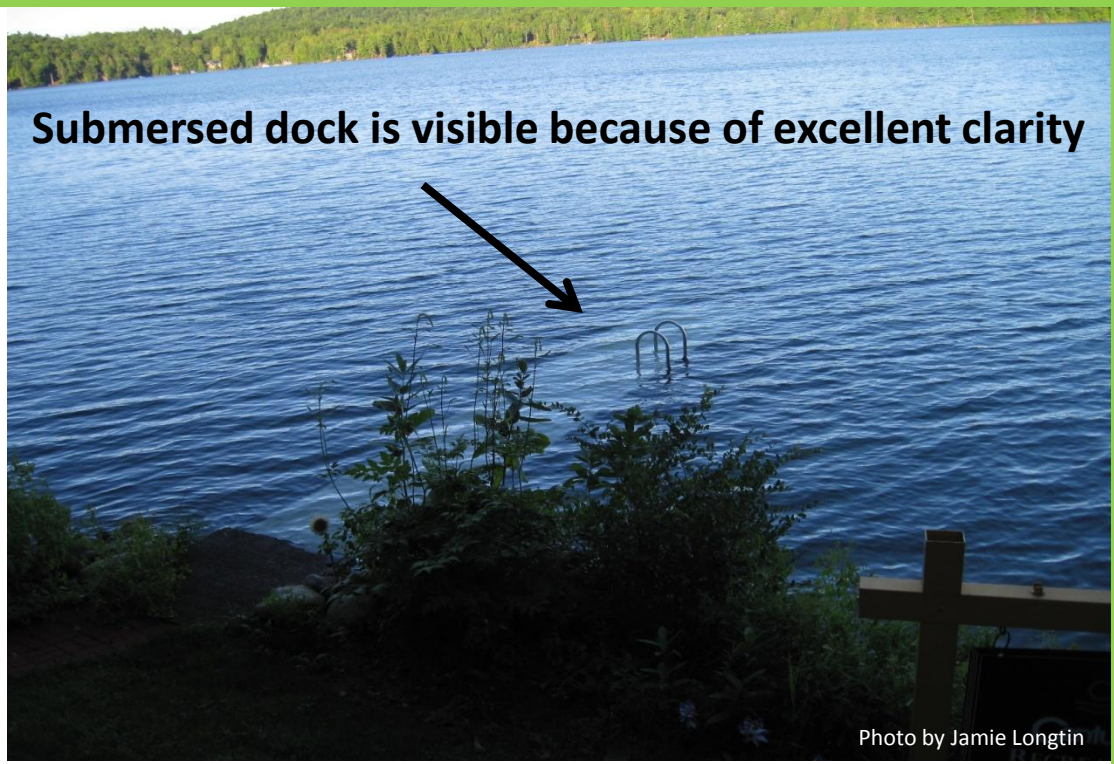
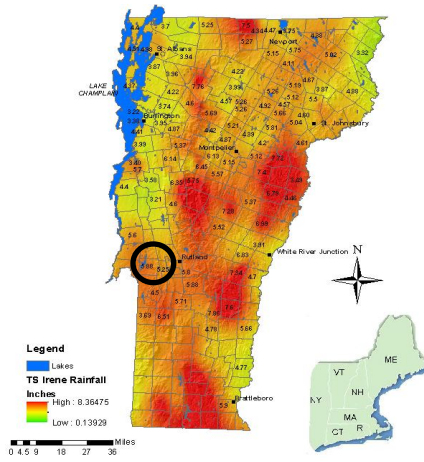
High amounts of sediment flowed into the lake, causing extremely turbid lake conditions. Debris was deposited along the shore and shoreline property was damaged.



**Suspended Sediment in Lake Rescue in Ludlow, VT – 9/12/2011**

*Photo by Lake Champlain Basin Program*

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Submersed dock is visible because of excellent clarity

Photo by Jamie Longtin

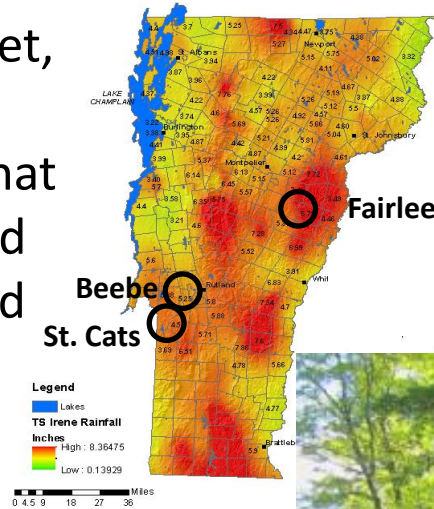


Photo by Jamie Longtin

5.88 inches of rain fell at Sunset Lake in Benson. The lake rose about 2.5 feet and roads washed out around the lake. **Yet, water clarity remained high because much of the run-off was filtered by the lake's vegetated, buffered shores.**

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Beebe Pond rose 2.5 feet, washing out roads and docks. Residents said that over a foot of gravel and sediment was deposited into the lake.



Lake Fairlee spillway, 8/29/2011  
*Level of the lake was higher than anyone remembers (Lake Fairlee Association).*

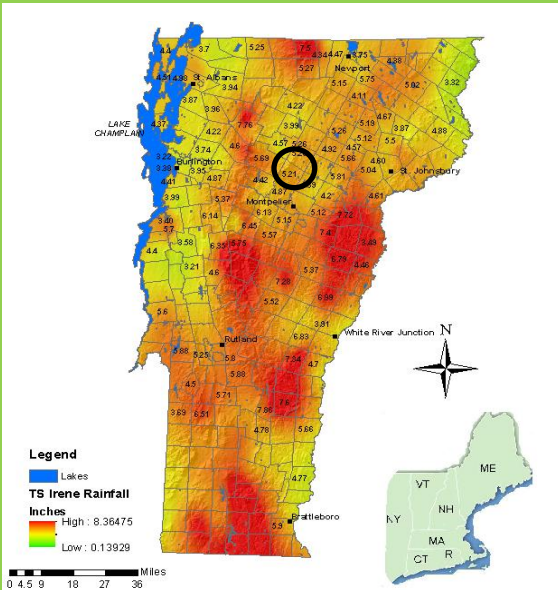
Lake St. Catherine received 4.5 inches of rain, causing high levels of suspended sediment in the lake.

*Resulting in a fish kill from the fish inhaling the water causing gill irritation reducing their capacity to absorb oxygen*

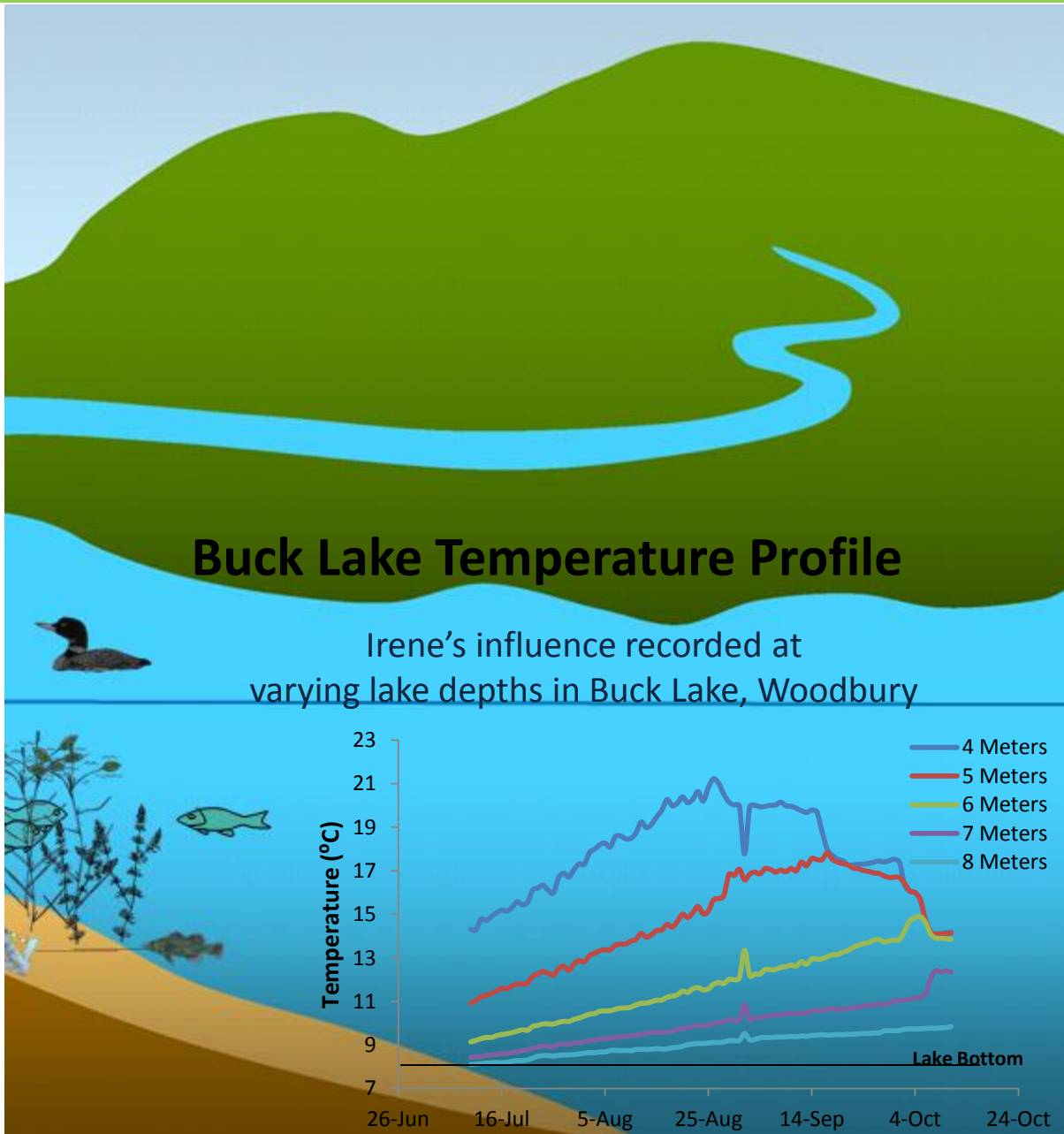
*(Lake St. Catherine Association).*



*photo from blog.lakefairlee.org*

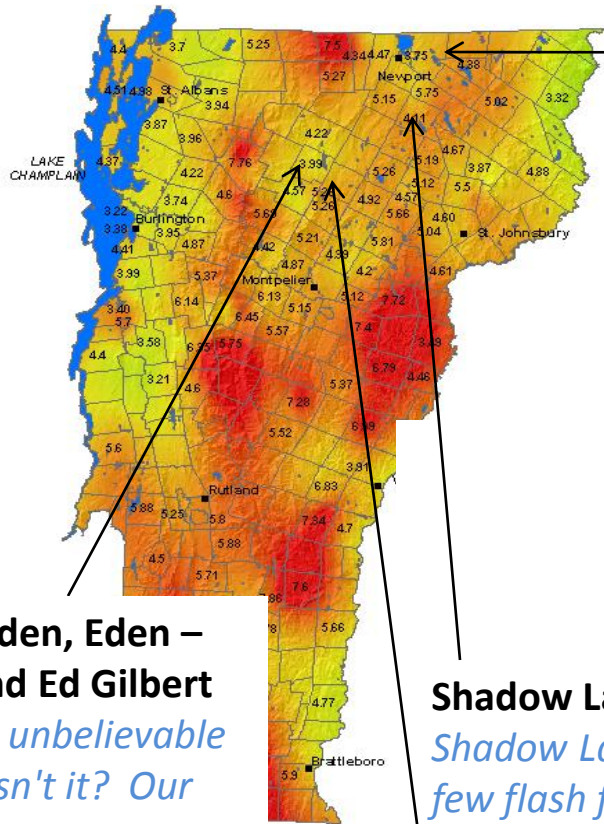


During Irene, temperatures decreased in the upper layer, yet increased at lower depths. Based on this data, it seems that Buck Lake “turned-over,” meaning the entire lake mixed from surface to bottom.



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# Lay Monitoring Accounts of Lake Conditions Following Hurricane Irene, August 28, 2011



## Echo Lake, Charleston – Peter Engles

*Greetings from Echo Lake in Charleston. First, we have had much less damage than what I've seen from South of here. We had 4.6 inches of rain, and Echo Lake rose about a foot, but that was OK. One bridge is out on the road to Island Pond. We didn't lose power. Right now the lake is pretty cloudy, and a lot cooler -- although still swimmable -- I had a nice swim yesterday. ...I know that F&W's offices, records and labs got mostly destroyed also. The State hatchery in Roxbury where we usually get trout eggs for the hatchery in Morgan is essentially gone.*

## Lake Eden, Eden – Sue and Ed Gilbert

*Wow - unbelievable mess isn't it? Our daughter was "marooned" in Pittsfield where she lives...[but, Lake Eden fared okay].*

## Shadow Lake, Glover – Sarah Gluckman

*Shadow Lake survived Irene and we had no problems- a few flash floods across the road but no washouts and we didn't even lose power. The lake is still high so hopefully we don't get too much rain.*

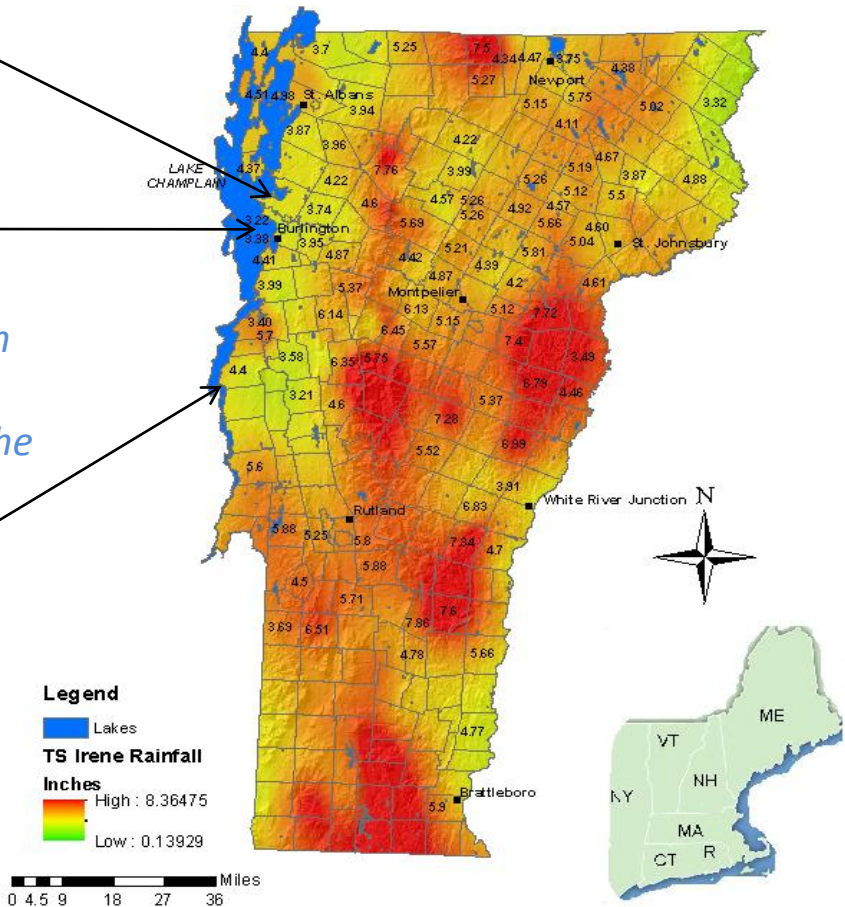
## Nichols Pond, Woodbury - Ellie Hayes & Michael Gray

*No extreme damage on or around Nichols Pond but lots of sediment in suspension from Irene, naturally.*

**Lake Champlain, Malletts Bay – Steffen Parker**  
*Mother Nature is sure kicking our butts this year.'*

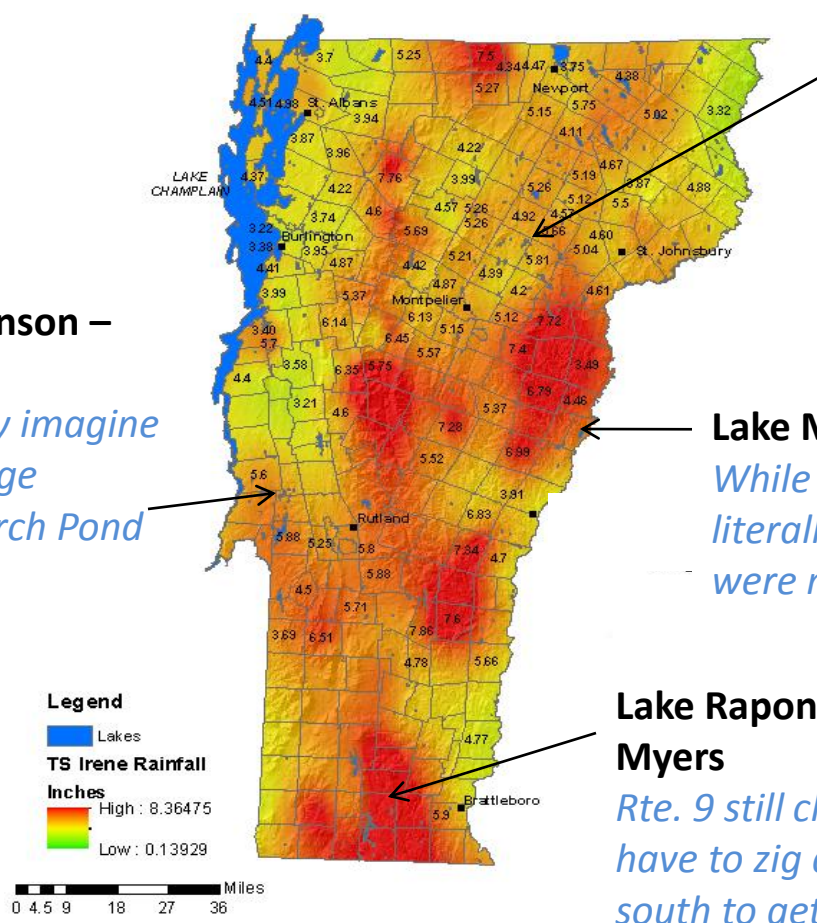
**Lake Champlain, Burlington Community Sailing Center/North Beach – Jen Guimareas**  
*My goodness what a tough time you all must be having in Waterbury. I wish you the best of luck in this recovery period (I can absolutely empathize after what we went through this spring [during the June floods] at the Sailing Center !).*

**Lake Champlain, Crown Point Bridge -- Chip Morgan**  
*Only interesting notes here near the bridge are that we saw several floating "islands" in the water post Irene and the lake conditions are very spring-like. EXTREMELY muddy water with the worst visibility I've seen here ever...less than half a meter Secchi. The flooding hasn't really affected much along the lake here - just heavy inflows and lots of debris in the lake that washed down the streams and rivers. As Winston Churchill once said, "If you're going through Hell, keep going!"*



**Perch Pond, Benson –  
Dwight Fowler**

*Wow... I can only imagine  
[the flood damage  
elsewhere as Perch Pond  
faired well].*



**Caspian Lake, Greensboro –  
Andy Dales**

*FYI, there has been minimal  
damage at Caspian and the  
surrounding Greensboro area.  
Lake level rose ~8", Secchi  
clarity down 1m to 7.5m.*

**Lake Morey, Fairlee - Don Weaver**

*While the eye of the storm went,  
literally, over Lake Morey. The winds  
were minimal.*

**Lake Raponda, Wilmington -- Cindy  
Myers**

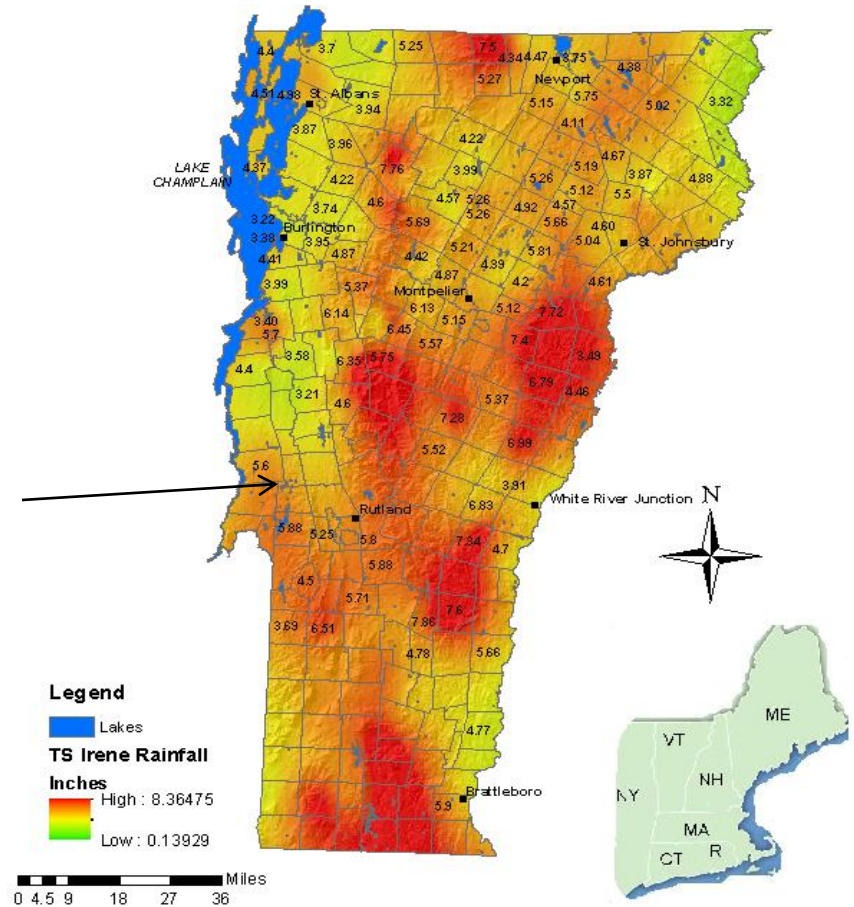
*Rte. 9 still closed east and west, and you  
have to zig and zag to the north and  
south to get anywhere. The village really  
got slammed! We didn't have any  
problems at our house or on the lake...*

## Beebe Lake, Hubbardton/Brandon – Barb Cooley

*Beebe Lake fared fairly well. I'm not aware of folks that had serious home damage and we didn't even lose our power! My cottage is off shore (across the camp road) along with my septic system so I was high and dry as was Mary Sondergeld. Many of us do not have basements which was a plus! I don't even have a foundation!*

*Waterfronts were a different issue, however! I have a small stream that runs below my cottage and it roared, filled my front lawn (if you can call it that - not planted) washed out the camp road, and took alternate routes into the lake, especially at my path down to the lake which was a waterfall! Several docks were washed away, including mine. It took those of us in residence a week to get things back in order and the rest were up for the holiday weekend and are assessing waterfront damage.*

*But what this does to the lake, I do not know! The lake rose about 2 1/2 ft. but the contents of the road as well as the silt from the stream are in the lake. I have no idea how this will impact the lake as a whole. I do know that I had to shovel over a foot of gravel and silt from my dock site before it could be repositioned. There was a similar breach on the other stream which closed route 30 for a few days (one of 2 places) and I suspect they have a similar situation over there. I will take the kayak out when the rain stops to check it out over there. A few of us still took our daily swim (except Sun. and Mon. last week). My swimming partner stated that it was like swimming in foreign waters - it was so opaque! It is improving slowly, or was till the rain began again, but the stream is within its banks this time. My last swim was a few days ago but the pristine waters are still not back.*



# Overall Flood Damage to Lakes

- **May-June Continuous Rains**

- Gradual rising of lake level
- Property flood damage
- Prevention of lake access



- **Aug-Sept Hurricane Irene Flash Floods**

- Severe sediment loading to inland lakes
- Strong erosive affects on the shoreline



# Will There Be More “Record” Breaking Flood Events In Vermont?

- Climatologists predict that flooding that occurred throughout Vermont in 2011 could happen with greater frequency under predicted scenarios of climate change.
- The first line of defense a lake uses to prevent sediment loading and shoreline erosion from flooding is a naturally vegetated shore.

**Future Lakeshore Flood Damage Can Be Prevented By Better Shoreline Development**



**This**



**Not This**

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