

HISTORY OF SIGNIFICANT MAD RIVER FLOOD EVENTS

1798

1806

1814

1824

1830

1834

1838

1850

1858

1869

1870

IT'S A MAD RIVER

1903

1912

A LOOK AT FLOODING IN THE MAD RIVER VALLEY
AND THE EVOLUTION OF RIVER MANAGEMENT

1927

Presentation led by river scientists from the
Vermont Department of Environmental Conservation,
local river experts & historians.

1938

Thursday, Nov. 10th
6:30pm to 8:30pm

1969

1971

1973

1976

1824 House Inn
2150 Main St., Waitsfield

1998

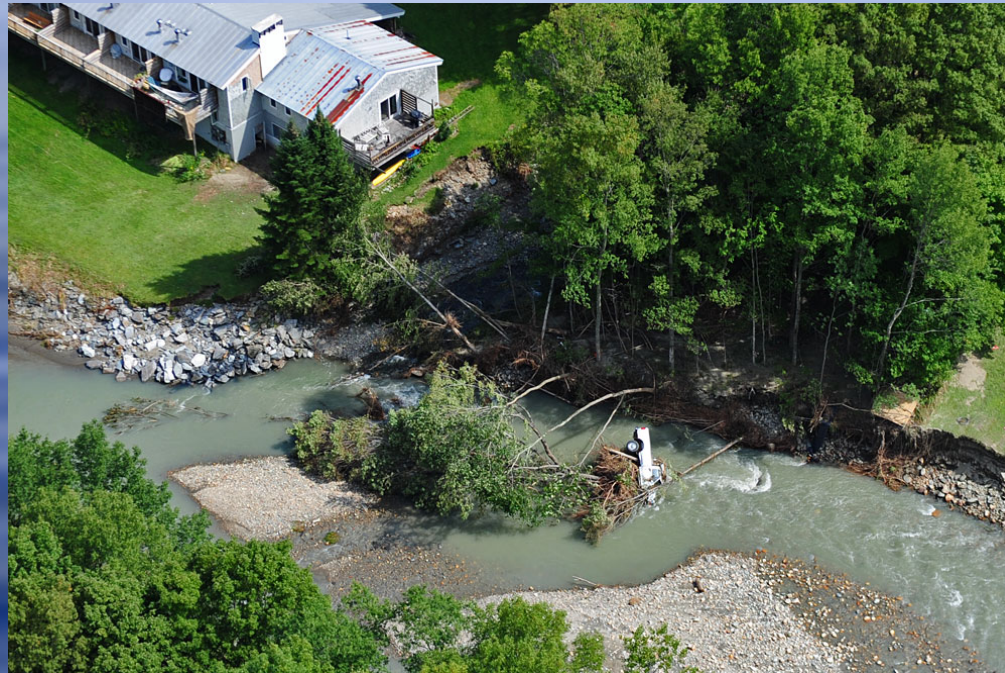
2011



Sponsored by the Mad River Watershed Conservation
Partnership, a consortium of the Vermont Land Trust, Friends
of the Mad River and the Mad River Valley Planning District.

PHOTO BY CHRIS STECHER

It's a 'MAD' RIVER



A look at flooding in the Mad River Valley
& the evolution of river management

Presented By

The Mad River Watershed Conservation Partnership

Caitrin Noel, Director, Friends of the Mad River

Joshua Schwartz, Director, Mad River Valley Planning
District

Liza Walker, Director, Vermont Land Trust Mad River Valley

&

Gretchen Alexander, River Management Scientist, Vermont
Department of Environmental Conservation

Mary Gow, Historian, Town of Warren

Agenda



Water washes over Route 100 near Bridge Street, Waitsfield, 8/28/11; Credit: David Garten

- ◆ Welcome
- ◆ Irene in Review
- ◆ Mad River History
- ◆ River Dynamics & Management
- ◆ Success stories: planning, conservation, & restoration
- ◆ Questions?

Irene: holy cow, THAT was a lot of water

- ◆ **66** cubic feet per second at 2:45am on 8/28/11
- ◆ **23,600** cubic feet per second at 8:30pm¹
- ◆ **23,800** cfs is 500-yr flow
- ◆ Rainfall: ~**4.5-5.7 inches** total^{1,2}



Warren Village, approx. 5pm on 8/28
Credit: Dorothy Tod

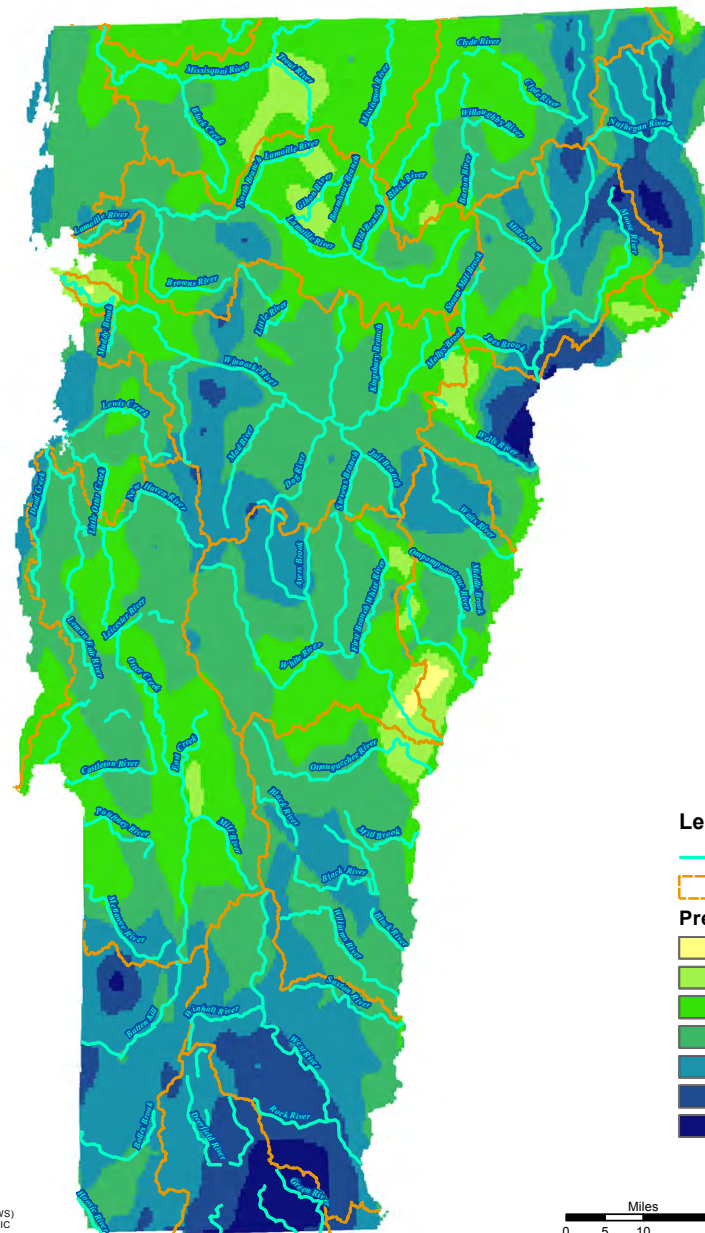
¹ USGS gage, Moretown

²FEMA



FEMA-4022-DR-VT TROPICAL STORM IRENE

Total Rainfall in Inches 27 August - 1 September 2011



Legend

Flowlines

HUC 8 Boundaries

Precipitation in Inches

2.250 - 2.512
2.512 - 3.316
3.316 - 4.143
4.143 - 4.947
4.947 - 5.752
5.752 - 6.579
6.579 - 7.797

SOURCE - NATIONAL
WEATHER SERVICE (NWS)
ADVANCED HYDROLOGIC
PREDICTION SERVICE
GRIDDED RAINFALL DATA

Miles
0 5 10 20



FEMA-4022-DR-VT
Geographic Information Unit
10/1/2011 - 10/1/2011
IR0101_P001000000000

How Does Irene Stack Up?



Above: about 3:30 pm. Below: water level around 530pm



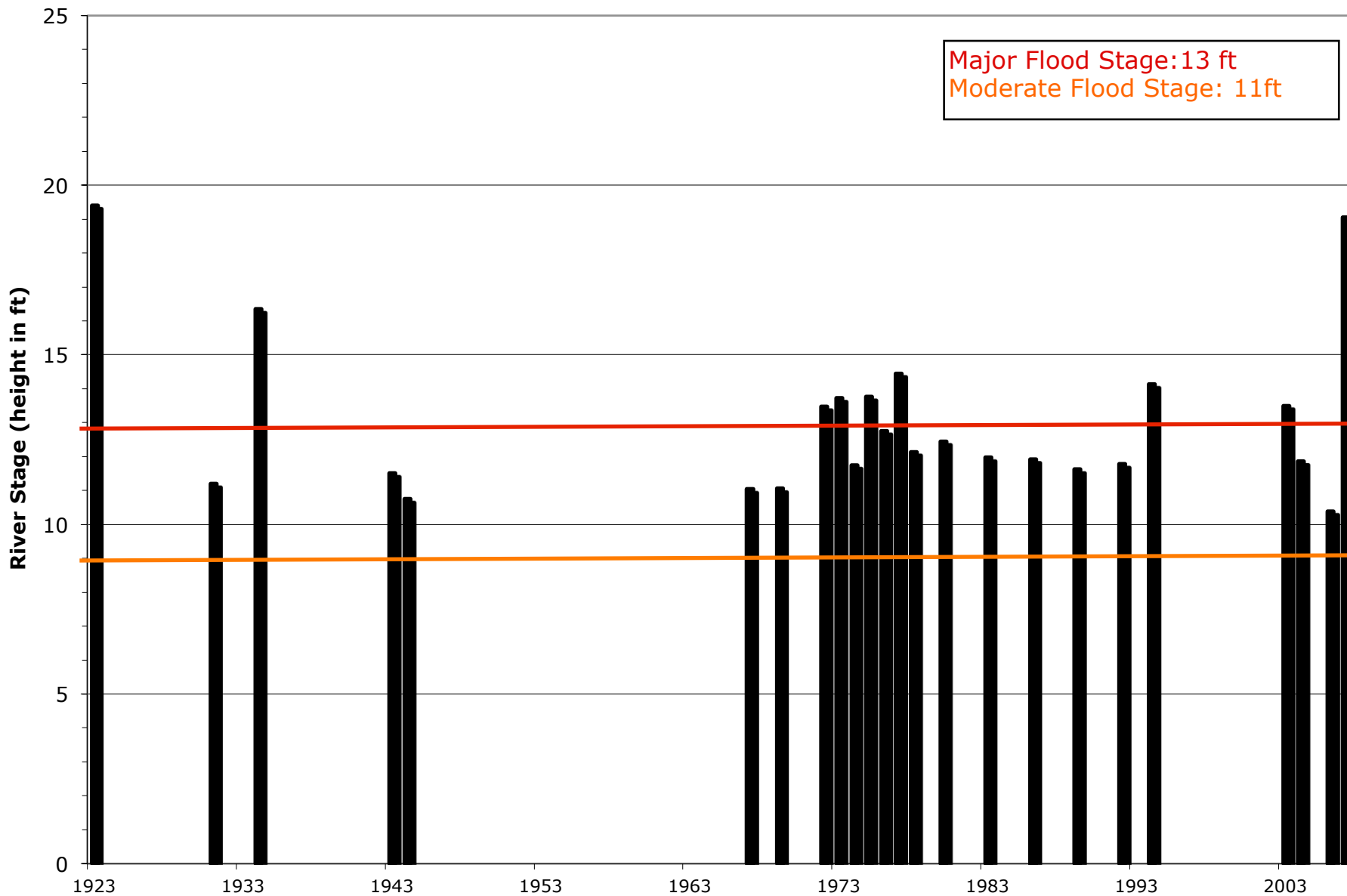
Top five floods on record:

- ◆ 19.40 ft¹--November 1927
- ◆ 19.06 ft--August 2011
- ◆ 16.34 ft--September 1938
- ◆ 14.45 ft--February 1981
- ◆ 14.13 ft--June 1998

Credit: Jeff Knight

¹River height, USGS stream gage, Moretown

Mad River: Top 25 Historical Crests



IMPORTANT NOTES:

1. Visible limits of the lateral extent of inundation as well as visible high water marks on building and other features were mapped by WCA on September 1, 2011. Features were mapped using a mapping grade GPS unit (Trimble GeoXH) with sub-foot post-processing accuracy. Data was post-processed using Pathfinder Office Software and exported to Shapefile Format.
2. This map is intended for planning purposes only and should not be relied upon for flood determinations.
3. Limits of inundation between mapped high water marks were determined by available topography, mapped floodplain, and personal accounts. These interpolated limits were not field verified and should not be relied upon in any way.

- WCA highwater point 9-1-11
- WCA highwater lateral extent 9-1-11
- FEMA DFIRM 100 YEAR FLOODPLAIN
- FEMA DFIRM FLOODWAY
- inundation area

Town of Waitsfield, Vermont
Tropical Storm Irene Limit of Inundation
as Mapped on September 1, 2011

1 inch = 200 feet

0 200 400
Feet



WATERSHED
CONSULTING ASSOCIATES, LLC

www.watershedca.com

How did the river change?



Left: New gravel bar formation, Bridge Street, Waitsfield

Right: Looking south from Lareau Park, Waitsfield

Photo Credit: Charlie Hosford

Damage estimates--Roads

Statewide

- ◆ Initial estimates: \$700 million in road damages¹
- ◆ Revised to \$175-250M
- ◆ 500 miles of damaged road and 200 bridges²

Locally³

- ◆ Warren: \$177k
- ◆ Waitsfield: \$98k
- ◆ Fayston: \$150k



An excavator finishes work on one of the Route 100B bridges in Moretown that was damaged by the floods

Photo Credit: Bob Kinzel, VPR

¹"Road Repairs Will Top \$700 Million, But Federal Aid Uncertain", VPR 9/27/11

²"Governor Shumlin Updates Vermonters on Tropical Storm Irene damage estimates", <http://governor.vermont.gov>

³As of 11/9/11, as reported to the MRV Planning District, does not include all necessary work

Damage Estimates-- Homes and Businesses



Damaged home in Moretown, 8/29/11

Photo Credit: Mansfield Flight

Homes and businesses

- ◆ FEMA Statewide¹
 - ◆ 6,727 registrations received
 - ◆ 3,169 Vermonters given housing assistance
 - ◆ \$36 million total aid to date
- ◆ FEMA Locally²
 - ◆ Waitsfield 56 registrations
 - ◆ Warren 45
 - ◆ Moretown 90

¹ "Vermont Helped By \$36 Million in Federal Aid", 10/28/11, www.fema.gov

² As reported by the MR Flood HQ, 11/9/11

Damage Estimates--Agriculture

Crops damaged/destroyed¹

◆ Waitsfield & Moretown

- ◆ Corn: 389 acres
- ◆ Hay: 871 acres
- ◆ Vegetables: 18.3 acres
- ◆ Pasture: 13 acres

Other Damage

◆ Waitsfield & Moretown

- ◆ Silt & gravel deposits: 314 acres
- ◆ Debris deposits: 215 acres
- ◆ Land gouges: 28 acres
- ◆ 2 greenhouses and a tool shed destroyed
- ◆ 3+ miles of fence destroyed



Damaged crop land north of Tremblay Road, Waitsfield

Photo Credit: Mansfield Flight

¹As of 11/9/11, as reported to the USDA Farm Service Agency

Community Response



➤ Volunteer efforts: ~500 people and 14,300 hours¹

➤ River clean up: ~250 people and 600 hours²

¹Estimate as of 11/7/11, MRV Volunteer HQ staff

²Estimate as of 11/7/11, Friends of the Mad River staff

Top: Clean up effort, Moretown; Burlington Free Press
Left: Volunteers clean up ag film, Carpenter Farm
Bottom: Bridge Street; David Garten

Community Response

MRV Flood HQ

- ◆ Connecting resources

Mad River Flood Recovery - Long Term Recovery Committee

- ◆ Coordinate & facilitate more effective disaster response

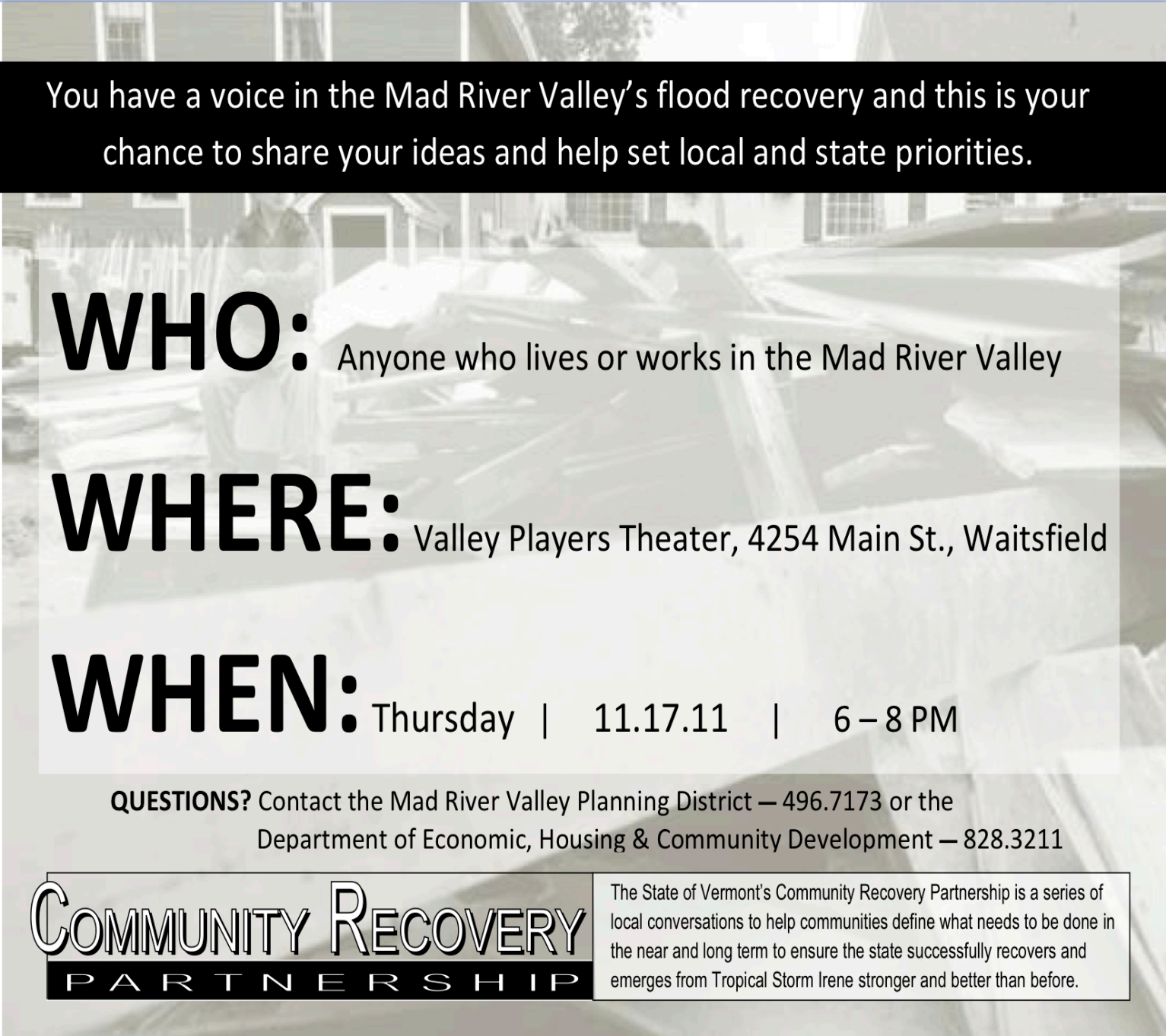


Community Response



MRV Community Fund

- Raised to date
 - \$950K
- Grants & loans committed
 - \$650k
- www.mrvcommunityfund.org



You have a voice in the Mad River Valley's flood recovery and this is your chance to share your ideas and help set local and state priorities.

WHO: Anyone who lives or works in the Mad River Valley

WHERE: Valley Players Theater, 4254 Main St., Waitsfield

WHEN: Thursday | 11.17.11 | 6 – 8 PM

QUESTIONS? Contact the Mad River Valley Planning District — 496.7173 or the Department of Economic, Housing & Community Development — 828.3211

COMMUNITY RECOVERY
PARTNERSHIP

The State of Vermont's Community Recovery Partnership is a series of local conversations to help communities define what needs to be done in the near and long term to ensure the state successfully recovers and emerges from Tropical Storm Irene stronger and better than before.

The History of the Mad River

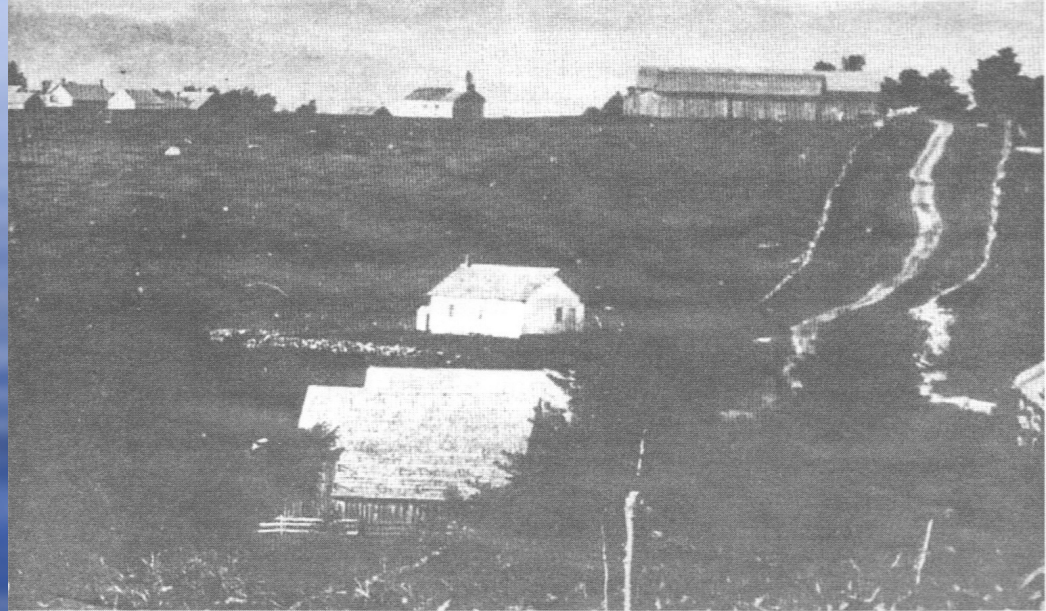


The Mad River Valley circa 1900. Credit: UVM Landscape Change Program

The History of the Mad River

A Changing Watershed

- ◆ First settled commons, then moved into the Valley to use the river
- ◆ “Historically the people chose the hills or high terraces on which to build their homes and roads... the Valley was marshy and the Mad River flooded frequently.”



*Waitsfield Common -Church with Steeple- Lower Center #3 School-
Barns at Savage/Tucker/von Trapp Farm*

Credit: History of the Town of Waitsfield, Vermont
1789-2000, Richard Bisbee

The History of the Mad River

A Changing Watershed

- ◆ Deforestation & reforestation
- ◆ Agriculture
- ◆ Tourism & development



Credit: UVM Landscape Change program

The History of the Mad River

A Changing Watershed

- ◆ Dams and the use of the River

Pictured: Richardson Dam on lower Mill Brook. The dam was destroyed in 1858, 1869, 1906 (fire), 1927 and 1938.

*From The History of the Town on
Waitsfield 1789-2000 by Richard Bisbee*



Richardson Mill Dam and corner of the Mill Prior to 1907



Richardson Mill after the 1945 flood...Taken by Willis Bragg



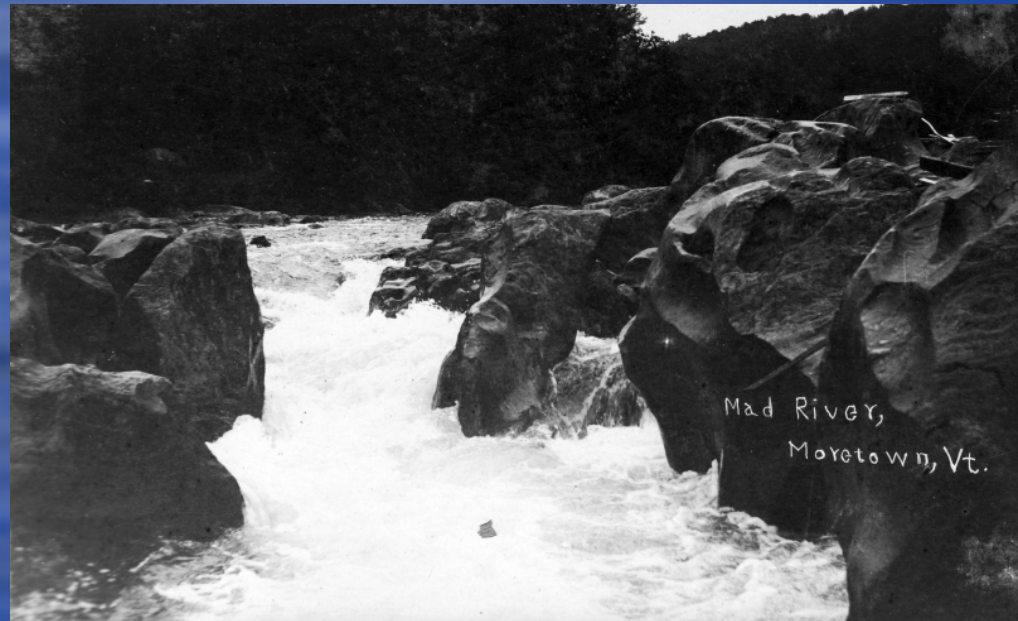
Richardson Mill after the 1945 flood...Taken by Willis Bragg

The History of the Mad River

“Memories have a way of forgetting the past. New people to Waitsfield...are frequently brought to understand the meaning of ‘Mad River.’ History verifies that the river is untamed and frequently rises over its banks unpredictably.” -Richard Bisbee



LINCOLN BROOK, WARREN, VT.



Mad River,
Moretown, Vt.

The History of the Mad River

Flooding over the years

- ◆ Major destruction--1798, 1806, 1814, 1824, 1830, 1834, 1838
- ◆ 1850—"entire valley flooded"
- ◆ 1858--a.k.a. "the Fayston Burst", near as bad as 1850
- ◆ 1869--Pine Brook took out all 7 bridges
- ◆ 1870—"about as bad as 1850"
- ◆ 1903, 1912--major floods
- ◆ 1927--road repairs cost \$5,334.37 in 1928 and \$12,560.45 in 1929
- ◆ 1938--hurricane causes damage throughout NE
- ◆ 1955, 1969, 1973, 1976, 1977, 1998--major floods¹

¹"History of the Town of Waitsfield, Vermont 1789-2000" by Richard Bisbee



Mill Brook Route 100 Flood 1971



Credit: David Garten



*Flood Hurricane Doria 1971...Rider/Palmer/Messer Bridge Meadow
Note this is no longer a covered bridge*



Flooding, 10-1-10, Meadow Road; Credit: Caitrin Noel

Credit: Richard Bisbee

The River's Corridor

Southern Waitsfield

- ◆ 2004
- ◆ 1973 (blue)



The River's Corridor

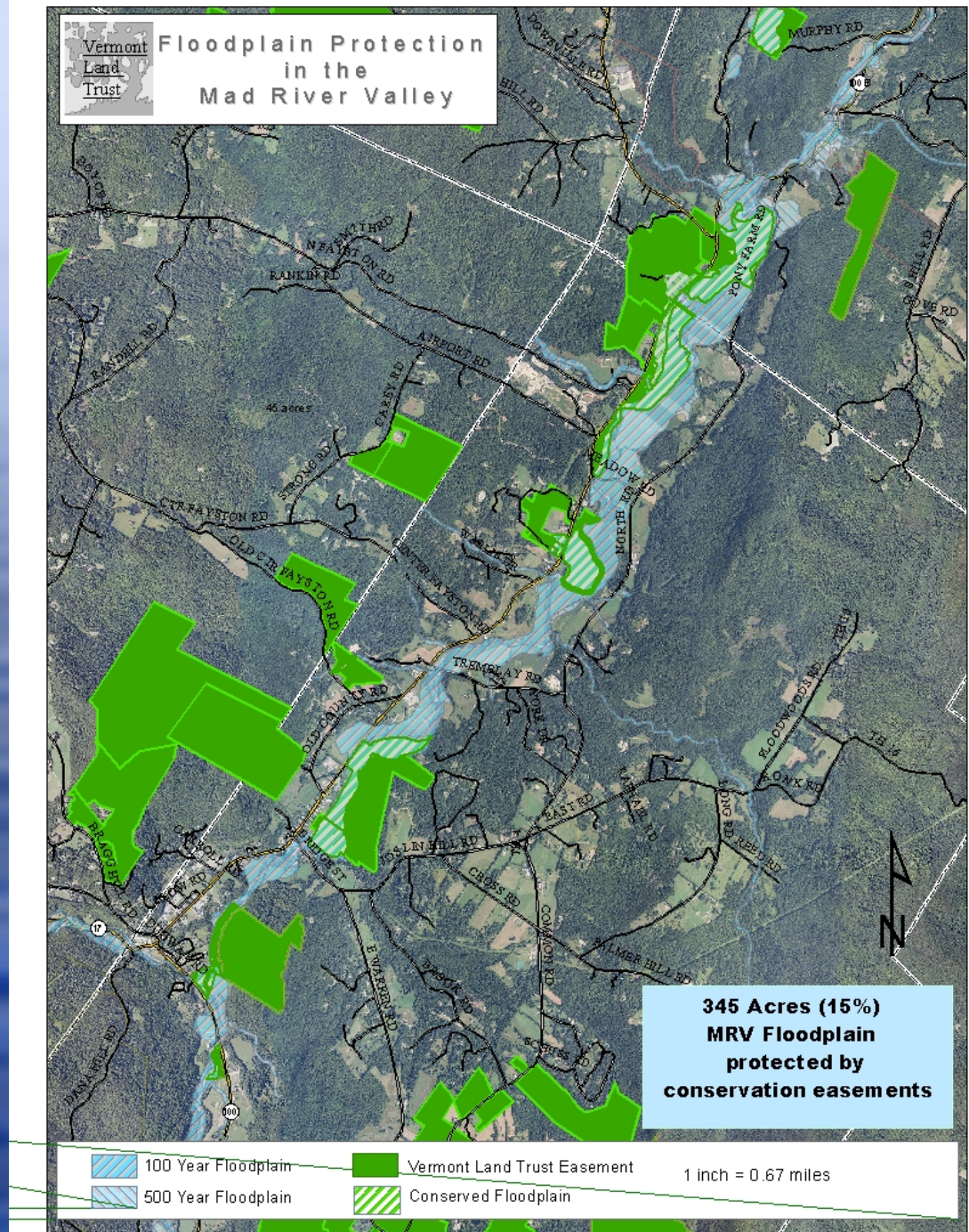
Waitsfield Village

- ◆ 2004 (photo)
- ◆ 1973 (blue)



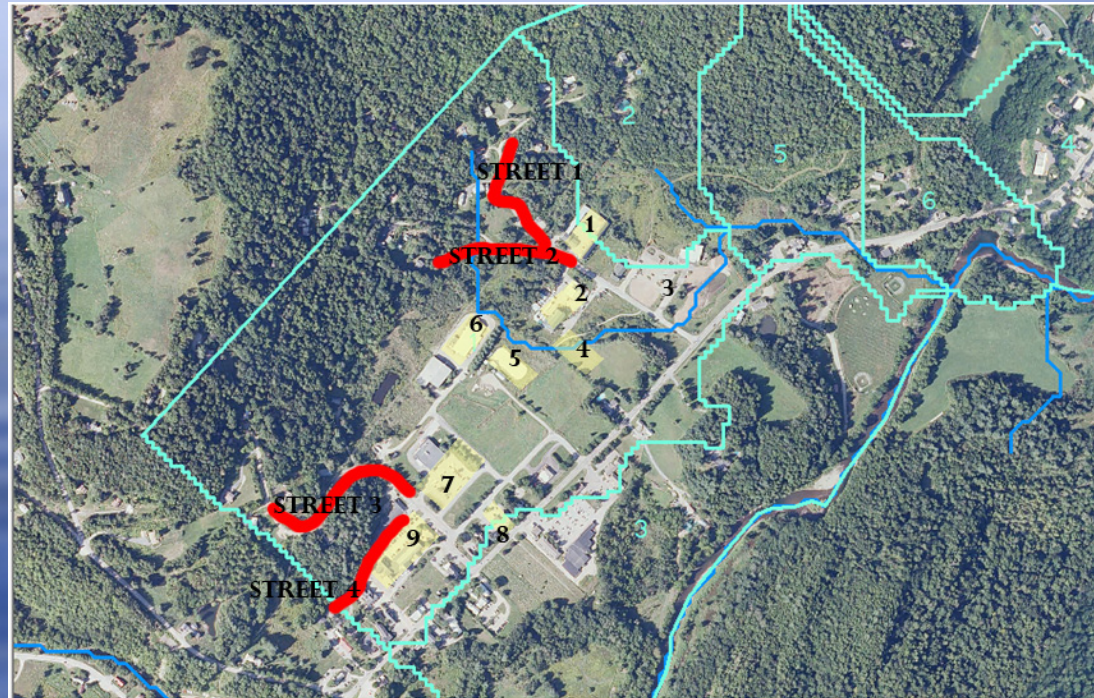
Success Stories

345 acres
(~15%) of the
MRV Floodplain
is protected by
conservation
easements



Success Stories

- ◆ Stormwater planning & low impact development
- ◆ Fluvial Erosion Hazard Zoning
- ◆ Improving road infrastructure



UVM Stormwater Planning Project:
Analysis of sub-watersheds and impervious
surface, Irasville.

Success Stories

Damage to Riverside Park, owned by the Town of Warren, is repaired after Irene.

Homes were destroyed at this site during the 1998 flood, but were not rebuilt, lessening future impacts.

Photo Credit: Caitrin Noel

