

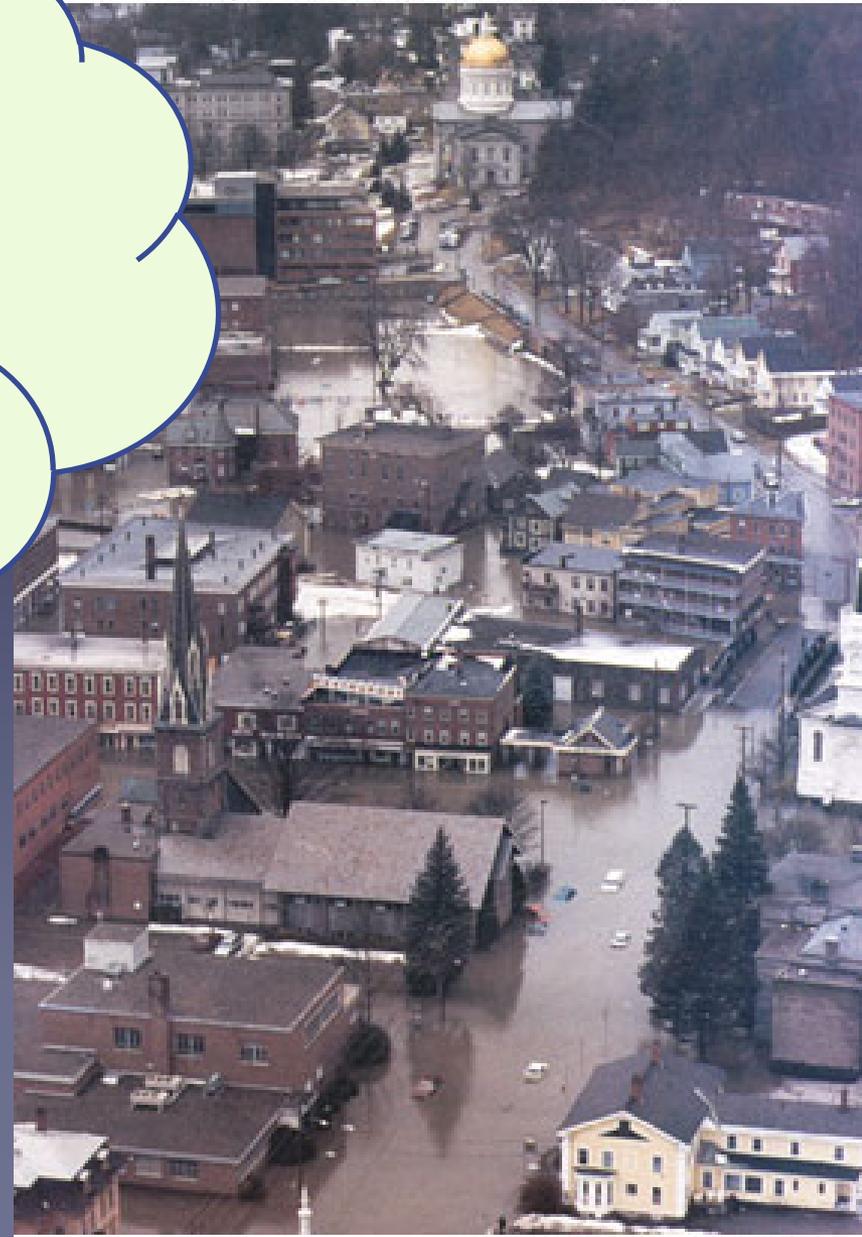
# Flooding

VT's

most common type  
of natural disaster



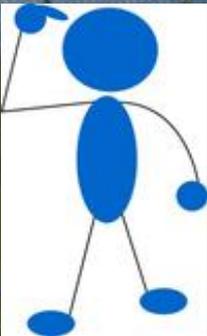
Aerial view of the Montpelier 1992 flood.  
Cover photo of the *Ice and Water* book.



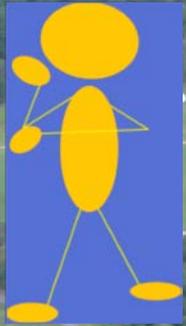
Jim Cole, Associated Press  
Copyright 1992 "Ice and Water" Committee



# Inundation



cars @ the  
Richmond Park &  
Ride 8/29/11



Where did my yard  
go?!

Erosion



# In Vermont, most flood damages are caused by Fluvial Erosion

- Geography & Climate
- Historic Patterns of Human Settlement
- Stream Alterations



Kate Brook, Hardwick, 1995

# Traditional Approach to River Management:



## Channel Straightening, Armoring, Berming, Dredging



# Fluvial Geomorphology

Fluvial



Geo



Earth



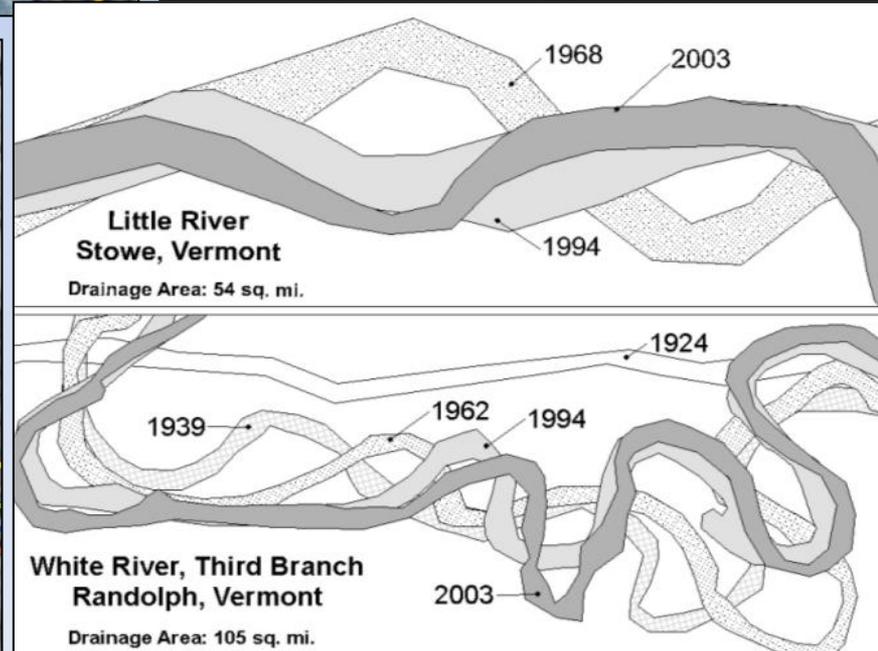
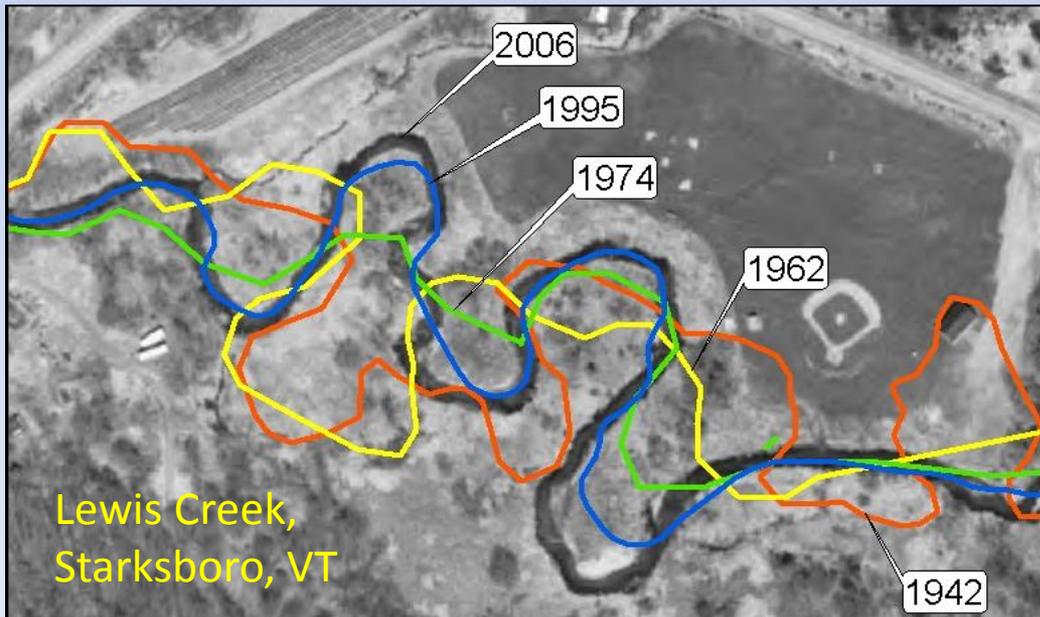
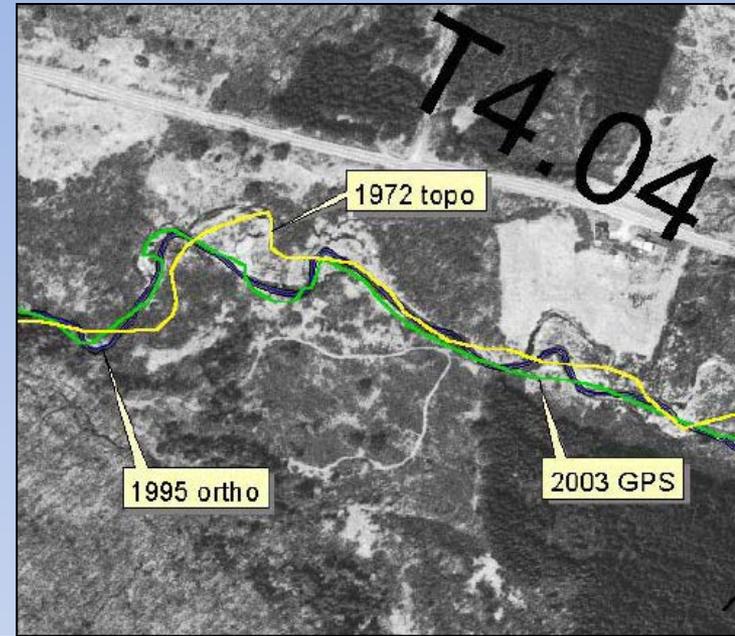
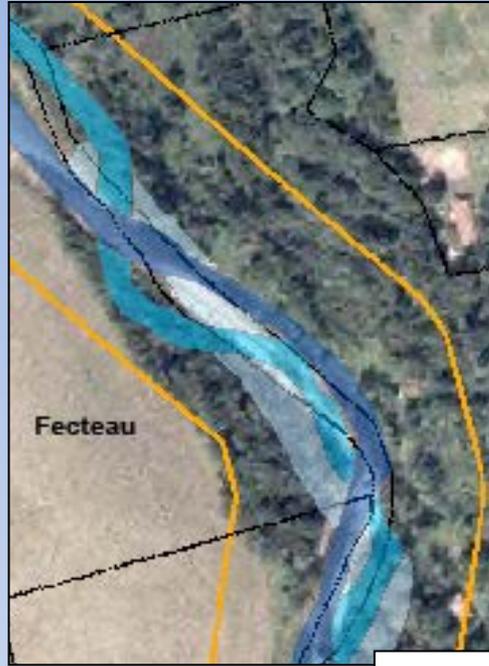
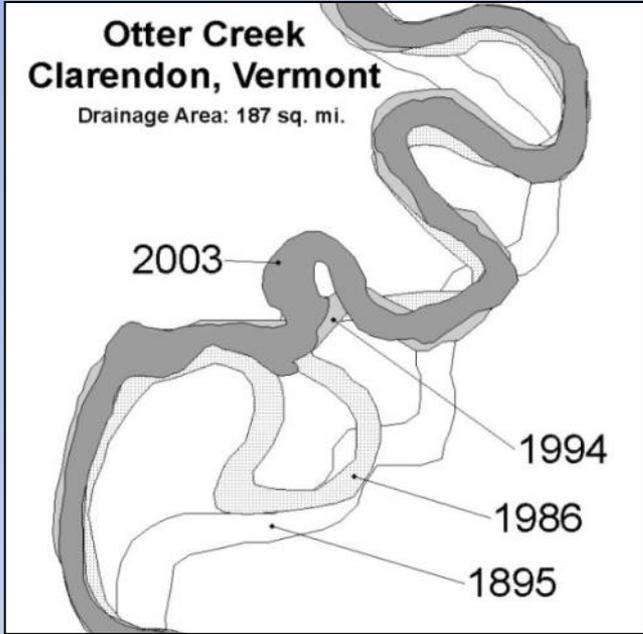
Morphology



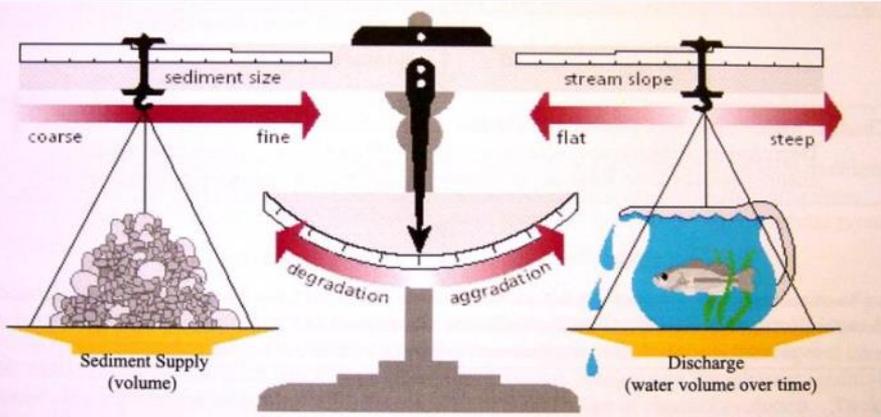
Shape

Fluvial **Geomorphology** = Study of how moving water shapes the land

# Rivers Adjust– Stable does not mean Static!

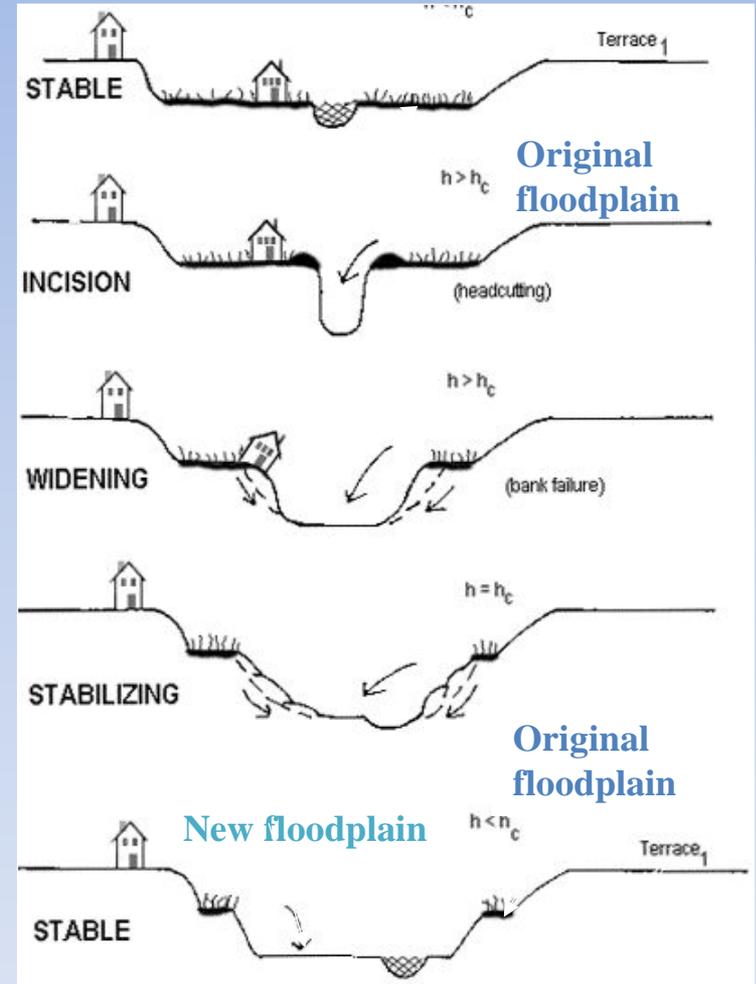


# Channel Evolution



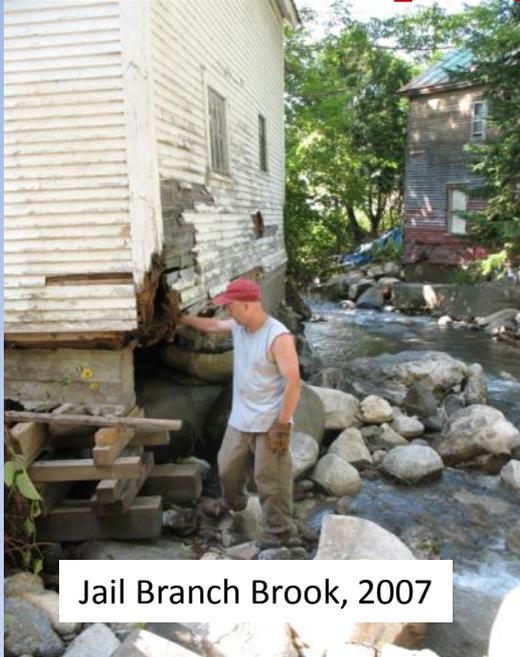
Caused by changes to:

- Flow regime
- Sediment regime
- Slope
- Cross section
- Boundary condition
- Channel Roughness



# Channel adjustments during floods can have devastating consequences

## Private Property



Jail Branch Brook, 2007

## Public Investments



Jones Road, Wolcott 1995



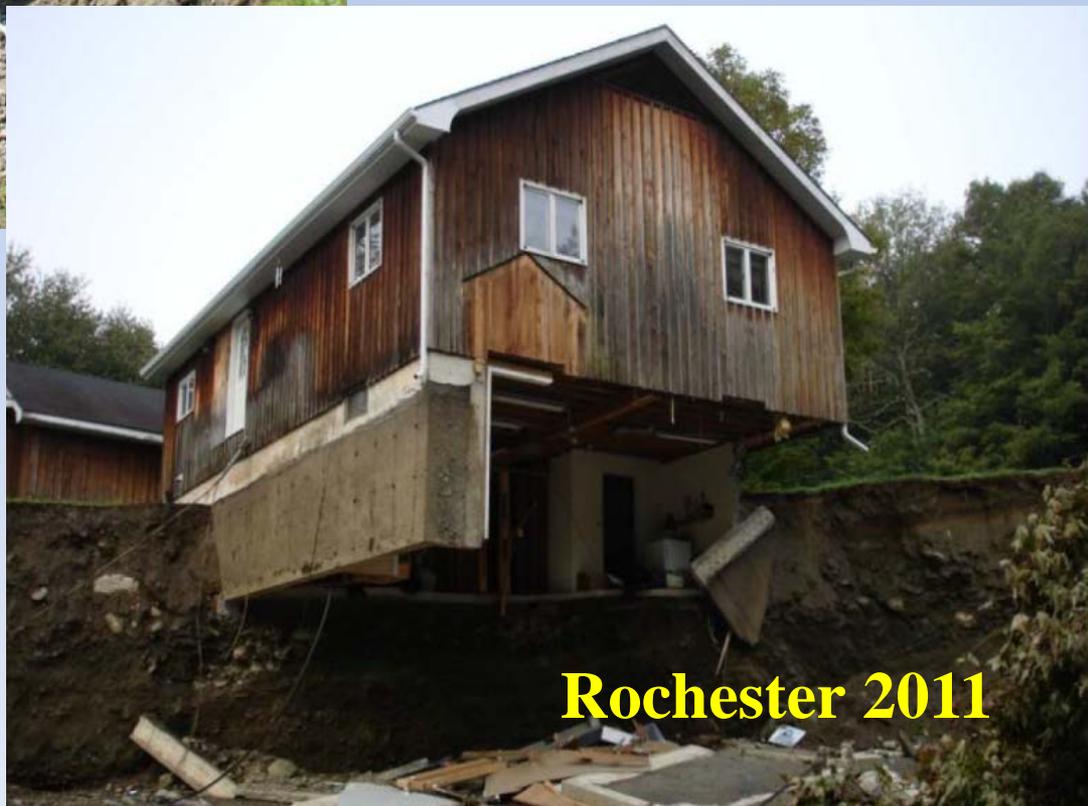
Hancock Branch, Hancock, 2008



Honey Brook, Barre 2007



**Rochester 2011**



**Rochester 2011**

# River Corridor Aspect of Floodplain Protection Efforts



# Recent Legislation



## Act 110(2010):

- ◆ State policy to protect river corridors
- ◆ ANR - promote river corridors and establish river corridor protection procedures
- ◆ Include a riparian buffer component to the corridor

## Act 138(2012)

- ◆ ANR - regulate activities exempt from municipal regulation
- ◆ ANR -develop and make available river corridor maps for all municipalities

**Public Safety and  
Property  
Protection**

**Protection of  
Floodplains  
& Stream  
Equilibrium**

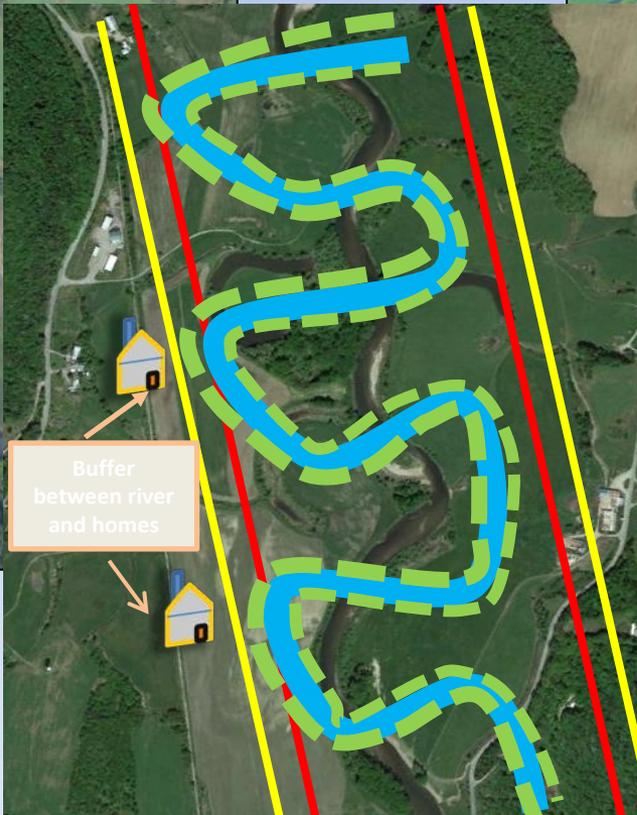
**Ecological  
Integrity and  
Fish & Wildlife  
Resource**

**Water Quality  
and Quantity**

# River Corridors – What Are They

Area for the stream to move

Provide space for Buffers



Protect current & future development

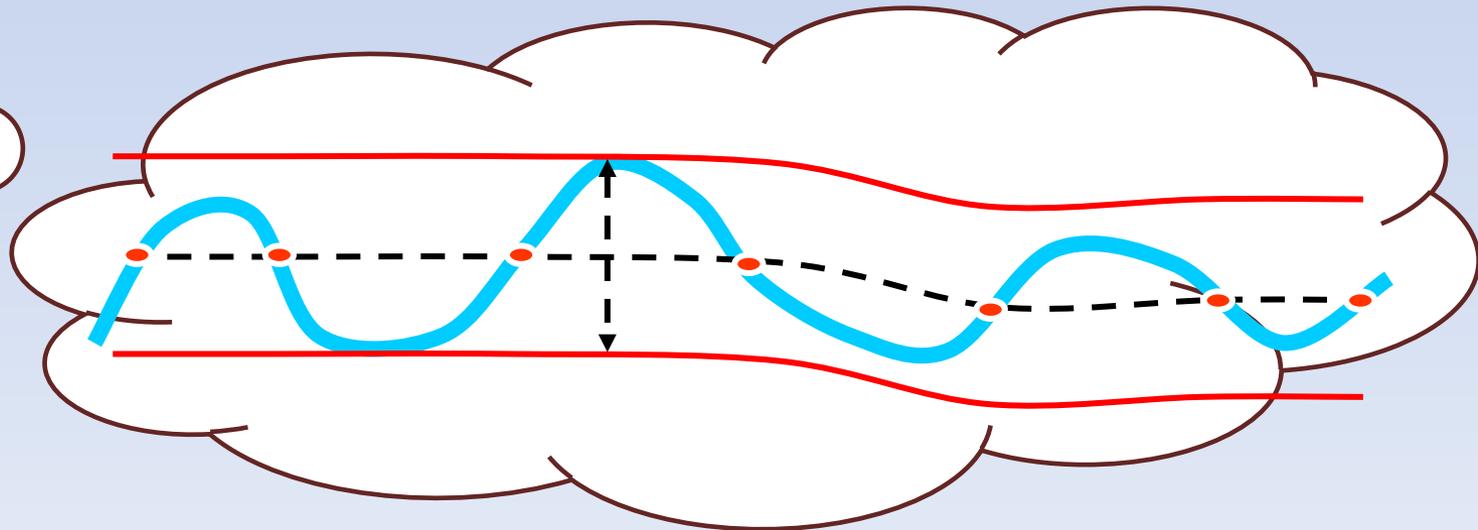
# Components of the River Corridor

1) All streams w/ a Watershed size  $> 2$  sq. miles

Width of the corridor based on channel width, valley width, and stream data.

2) Streams  $\leq 2$  sq. mile watershed –

A standard setback of 50 feet is applied to both sides of the channel



# Two options for community to consider

- 1) River Corridor Protection Area
- 2) River Corridor



## River Corridor Protection Area

Boundary of the River Corridor Protection Area (RCPA)  
(= Fluvial Erosion Hazard Area)

The RCPA is the minimal area required to accommodate the meander geometry and stable slope of the river's least erosive, equilibrium condition (i.e., belt width).

Old meander scars of the Lamoille River affirm the minimal meander belt width.



# River Corridor

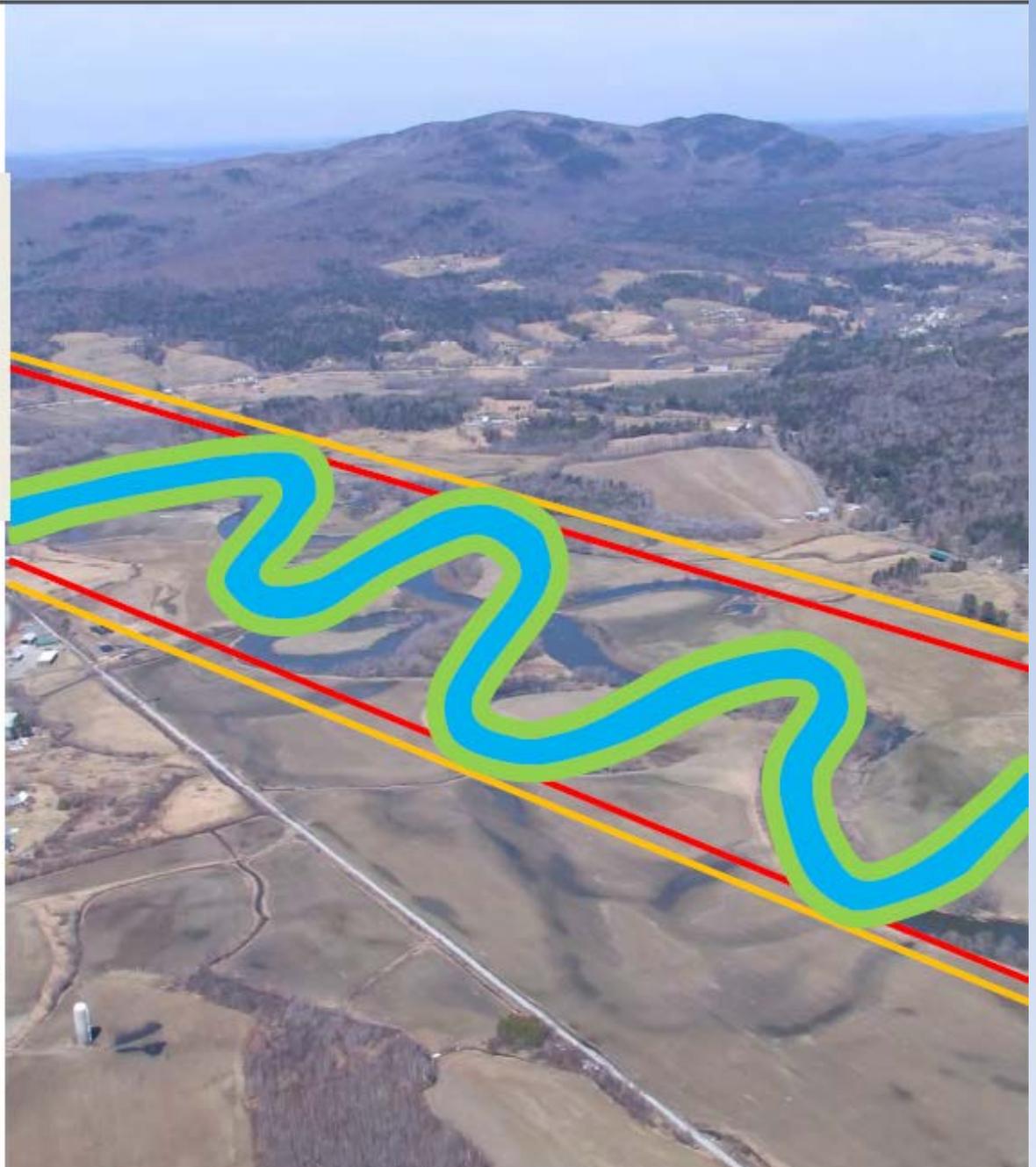
Boundary of the River Corridor

Boundary of the River Corridor  
Protection Area (RCPA=FEH)

Future Lamoille River at  
Equilibrium Slope + 50 ft Buffer

Act 110 requires the ANR to create River Corridors that include riparian buffers.

River Corridors provide a set-back area that includes the 50' buffer when the equilibrium slope is achieved and the meanders have become fully extended.



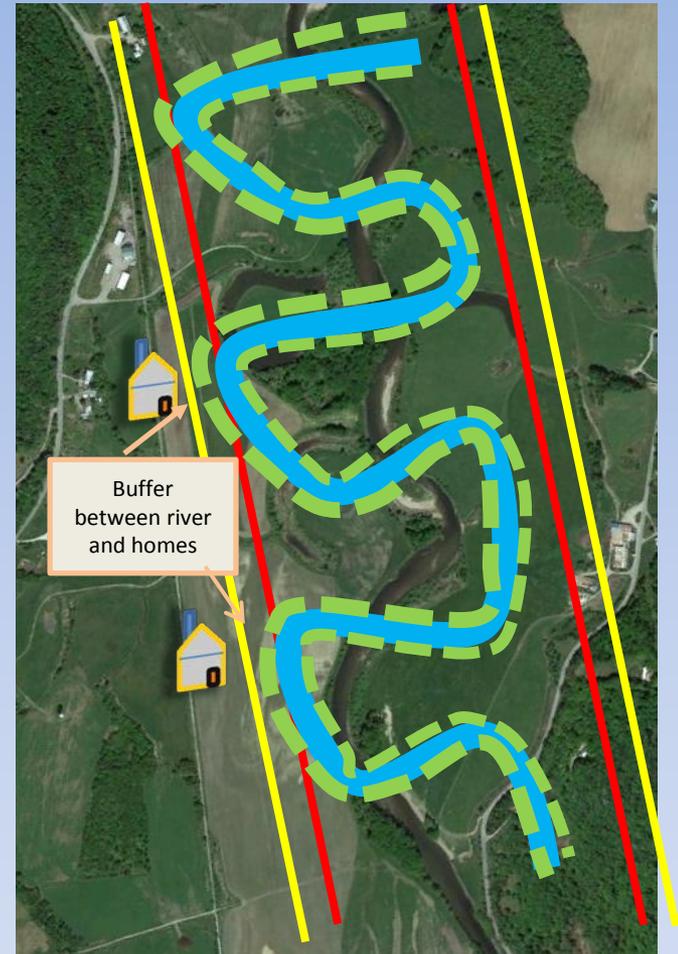
# Looking at the Legislative Buffer Requirement



**River Corridor Protection Area (RCPA)** provides stream equilibrium needs



Development at edge of RCPA prevents minimum buffer setback when the stream reaches equilibrium at outer edge of RCPA



A **River Corridor** includes an additional 50 ft. either side to provide a minimum buffer setback when the stream reaches equilibrium at outer edge of RCPA

# Difference between River Corridor 50' and Town 50' buffer

- **Town Buffer**

- May focus on vegetation management
- Provides for: water quality, habitat and stream stability benefits
- Setback from current stream location

If a house is built at the edge of the current 50' buffer setback, no room for future buffer if stream moves

- **River Corridor**

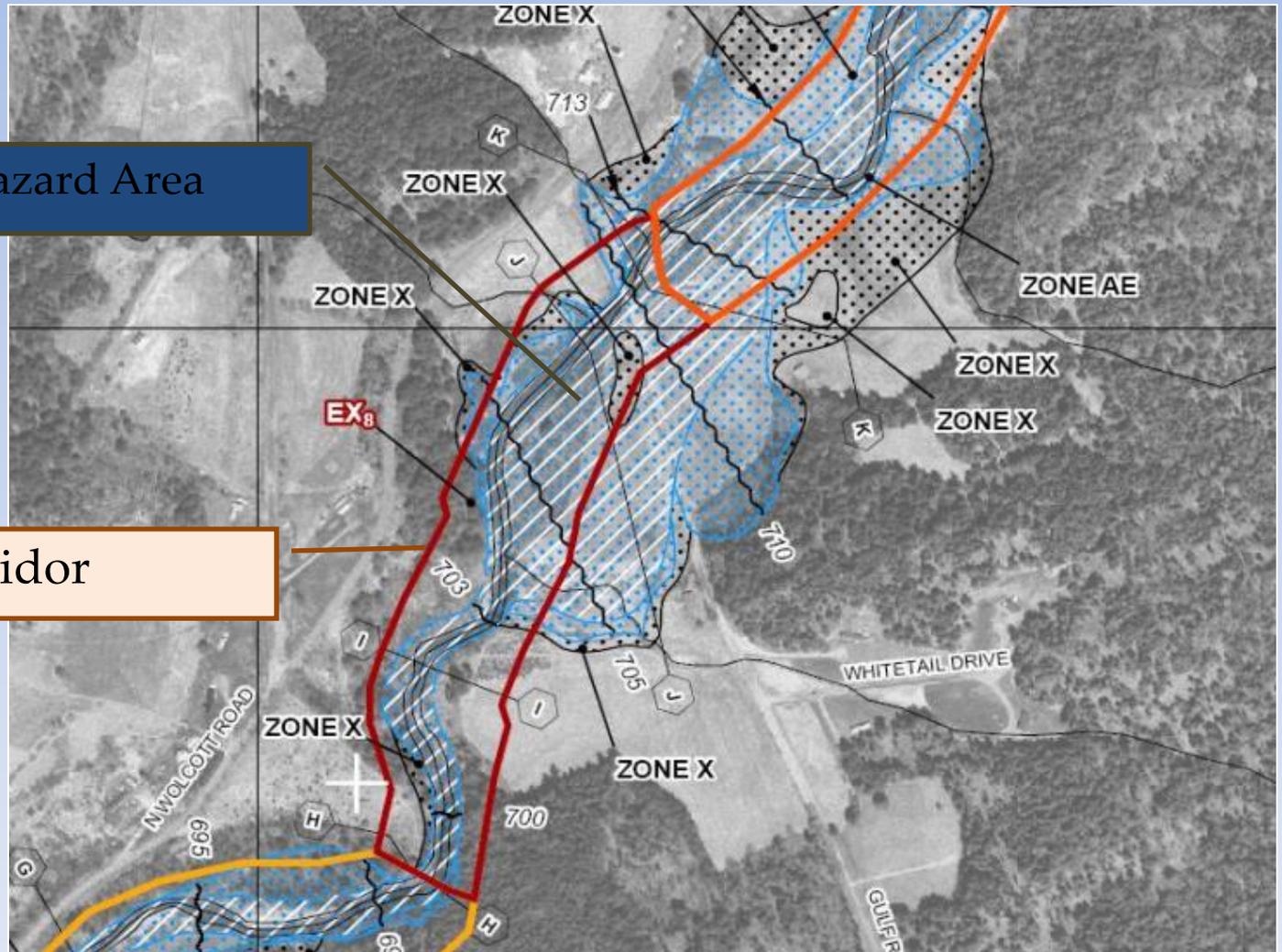
- No management requirements on buffer vegetation
- Provides : water quality, habitat and stream stability benefits
- Provides for current and future buffer needs

Helps maintain area for town buffer regulation needs as stream moves over time

# Looking At NFIP and River Corridors

Inundation Hazard Area

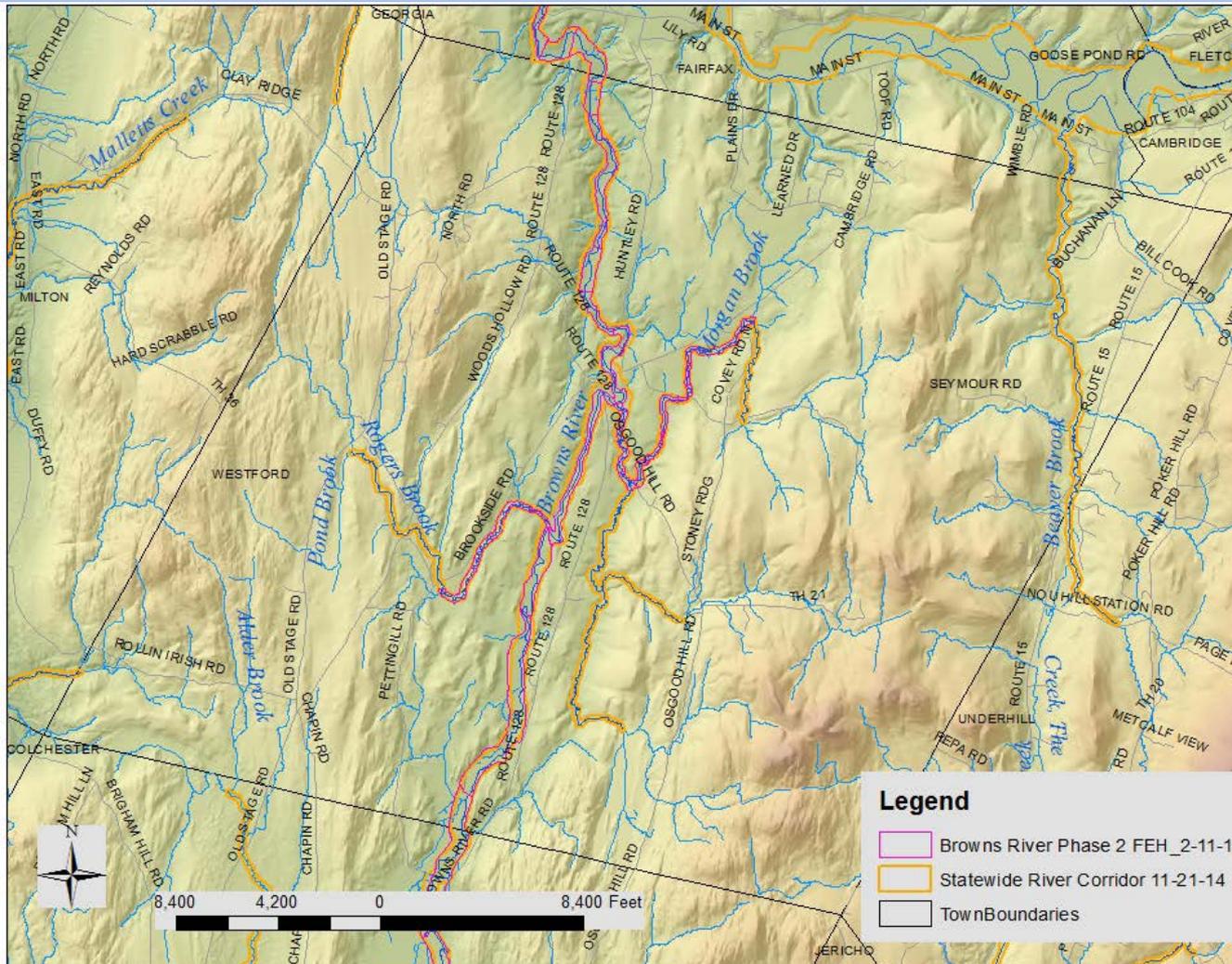
River Corridor



# Westford's River Corridors and Small Streams

Streams > 2 sq. mile watershed that would be included in River Corridors

- Browns River
- Rogers Brook
- Morgan Brook
  - \* Unnamed tributary to Morgan Brook
- Beaver Brook



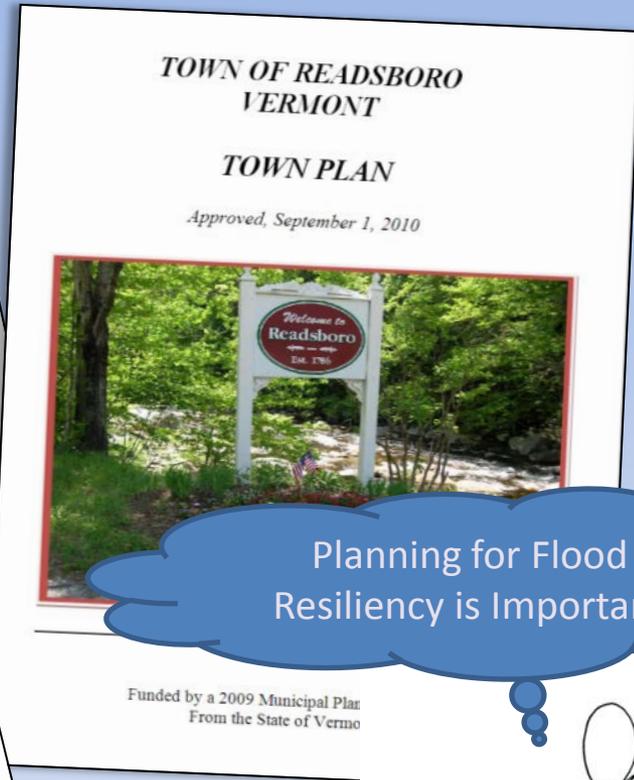
# Municipal and Regional Planning

**BASIC EMERGENCY OPERATIONS PLAN**

City/Town of: \_\_\_\_\_ in \_\_\_\_\_ County  
Date Approved: \_\_\_\_\_ Date Updated: \_\_\_\_\_  
Name of Senior Local Official Reviewing this plan: \_\_\_\_\_  
Municipal Business Address: \_\_\_\_\_ E-mail: \_\_\_\_\_  
Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

**Emergency Steps**

- 1) Establish an Incident Command Structure and make appropriate local decisions
- 2) Alert Vermont Emergency Management if additional help or resources may be needed (800-347-0488)
- 3) Alert the general population and evacuate as needed. (ex: siren, PA, Door-to-door, etc.)
- 4) Activate your Emergency Operations Center to support the Incident Commander as needed
- 5) Utilize your Delegation of Authority
- 6) Contact the Shelter Coordinator to arrange a shelter opening if needed
- 7) Expand the ICS Structure as needed
- 8) Determine if additional operational shift staffing is needed
- 9) Conduct damage assessment
- 10) Document emergency repairs



**Chittenden County, Vermont  
Multi-Jurisdictional  
All-Hazards Mitigation Plan**

Prepared by:  
Chittenden County Regional Planning Commission  
110 W. Canal Street, Suite 202  
Winooski, VT 05404  
(802) 846-4490

Month 20XX

**TOWN OF GUILDHALL, VERMONT**

**ZONING BYLAW**

Adopted March 5, 1985  
Amended March 23, 1987  
Amended November 4, 2004

APPROVED 03/01/05

Amended and APPROVED 08/19/2013

Effective 09/10/2013

Re-edited 9/21/2012 by Jay and Eileen Thietten

Planning for Flood Resiliency is Important



**Adopted RC / RCPA become part of the Municipal Flood Hazard Area Regulation**

# State Providing Financial Incentive for Communities To Become More Flood Resilient

**The Emergency Relief and Assistance Fund (ERAF)** provides State funding to match [Federal Public Assistance](#) after [federally-declared disasters](#).

Eligible public costs are reimbursed by federal taxpayers at 75%.

Remaining 25% costs to be paid by town and state

As of October 23, 2014, the State of Vermont will contribute:

- **7.5%** - for towns with out minimum 4 criteria
- **12.5%** - Towns with minimum 4 criteria :
  - Participate in NFIP ,
  - Adopted Orange Book Town Road & Bridge Standards
  - Local Emergency Operation Plan
  - Local Hazard Mitigation Plan
- **17.5%** - Town with minimum 4 criteria and has adopted :
  - River Corridor **or** River Corridor Protection Area
  - or** participates in FEMA Community Rating System



# To qualify for ERAF increased funding level

## A Community may choose to adopt either:

- River Corridor Protection Area  
or
- River Corridor

COMMUNITY  
CHEST



	7.5% ERAF RATE	12.5% ERAF RATE	17.5% ERAF RATE
FEDERAL SHARE	\$750,000	\$750,000	\$750,000
STATE SHARE	\$75,000	\$125,000	\$175,000
MUNICIPAL SHARE	\$175,000	\$125,000	\$75,000
TOTAL	\$1,000,000	\$1,000,000	\$1,000,000

# State Regulatory Authority use the River Corridor

- Stream Alteration Rules
- Act 250 / Sect. 248 regulation
- State Floodplain Rule



# Is Your Community Flood Ready? Visit Flood Ready Vermont

VERMONT  
Flood Ready  
State of Vermont

Home  
Rising Danger - Flood Costs  
Community Risk Assessment  
Update Your Plans  
Use Natural Flood Protection  
Improve Infrastructure  
Find Funding  
Making It Happen  
Get Help

**Map Your Community**

**FLOOD READY VERMONT**  
Disaster is not necessary  
The case for taking action

**Welcome to Flood Ready Vermont**  
Flood damage has become more common and more costly – *but it doesn't have to be that way.*  
We can become flood ready together – developing in safer places, protecting the functions of the watersheds that protect us, adapting our critical infrastructure and preparing for emergencies.  
All over the state, select board members, planning commission members, town officials, planners, and citizens are working to make our communities flood resilient. Is your community flood ready?  
[Find out what steps your community can take to become flood resilient and qualify for post-disaster funds through the Emergency Relief and Assistance Fund / ERAF.](#)  
[Talk to us!](#) Ask questions, suggest improvements, and share your stories!  
[Thank you to everyone who helped launch this site!](#)

**NEWS**  
December 10, 2014  
**High Meadows Fund Dedicates \$240,000 to Building Resilience in Vermont's Watersheds**  
December 10, 2014  
**Flood Hazard Area and River Corridor Protection Procedure**  
November 25, 2014  
**River Corridor Base Map Posted** more

**GET FLOOD READY**  
[Community Reports - summaries of risk data and community efforts](#)  
[Vermont FloodReady Atlas - online map with popup reports](#)  
[Update Your Plans - municipal development planning and other community efforts](#)  
[Emergency Relief and Assistance Fund \(ERAF\) - qualify for more aid after a disaster](#)  
[ERAF Summary Report - community mitigation actions and ERAF rate](#)

## Vermont Flood Ready Atlas

[Click here to explore the atlas in full screen.](#)

To print the map, your browser must allow popups.

**Flood Ready Tools**

- Toggle Flood Data On**  
Turn on the Atlas flood data.
- Toggle River Corridor Base Map On**
- Toggle Flood Data Off**  
Turn flood data from the Atlas OFF.
- Toggle River Corridor Base Map Off**
- Find Address**  
Find an address.
- Zoom to Town**  
Specify a town to zoom to.
- Create a printable map**

