

Introduction to Floodplain Mapping and Concepts

(and the NH Coastal Project)

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Building Resilience Through Better Floodplain Management
April 24, 2013

Presentation Outline

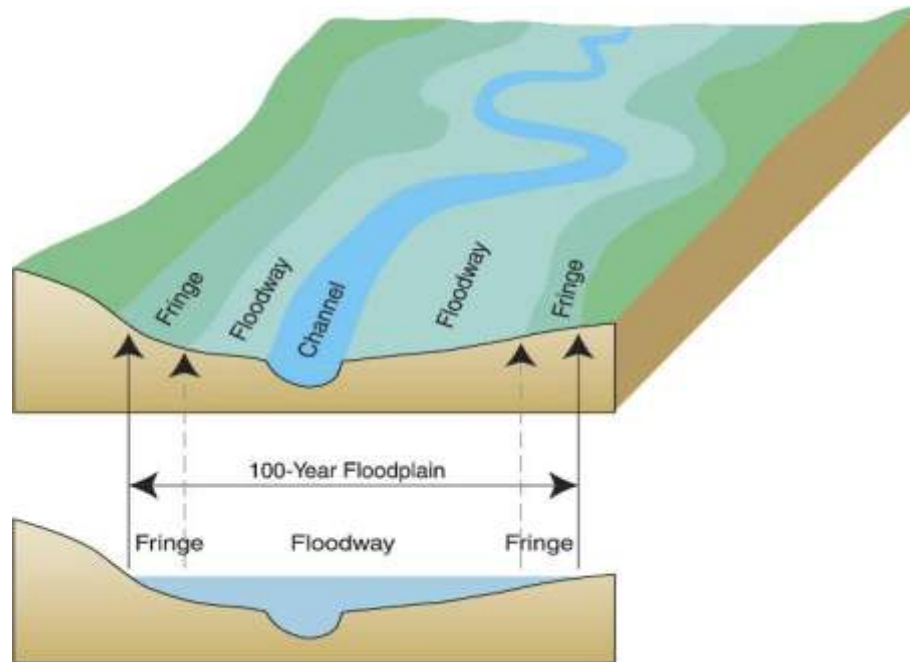
1. Floodplains defined
2. Methods for mapping floodplains
 - a) Riverine
 - b) Coastal
3. Risk MAP Overview
4. Current NH Coastal Risk MAP Project
5. Finding the Maps/Data



Definition of Floodplains

(from <http://fema.gov>)

“Any land area susceptible to being inundated by flood waters from any source. “



100-Year Floodplain

Base Flood – the flood having a 1-percent chance of being equaled or exceeded in any given year. Also known as the 1 percent chance or 100-year flood.

Base Flood Elevation (BFE) – the elevation of surface water resulting from a flood that has a 1 percent chance or greater of occurring in any given year.

Chance of Flooding over Time

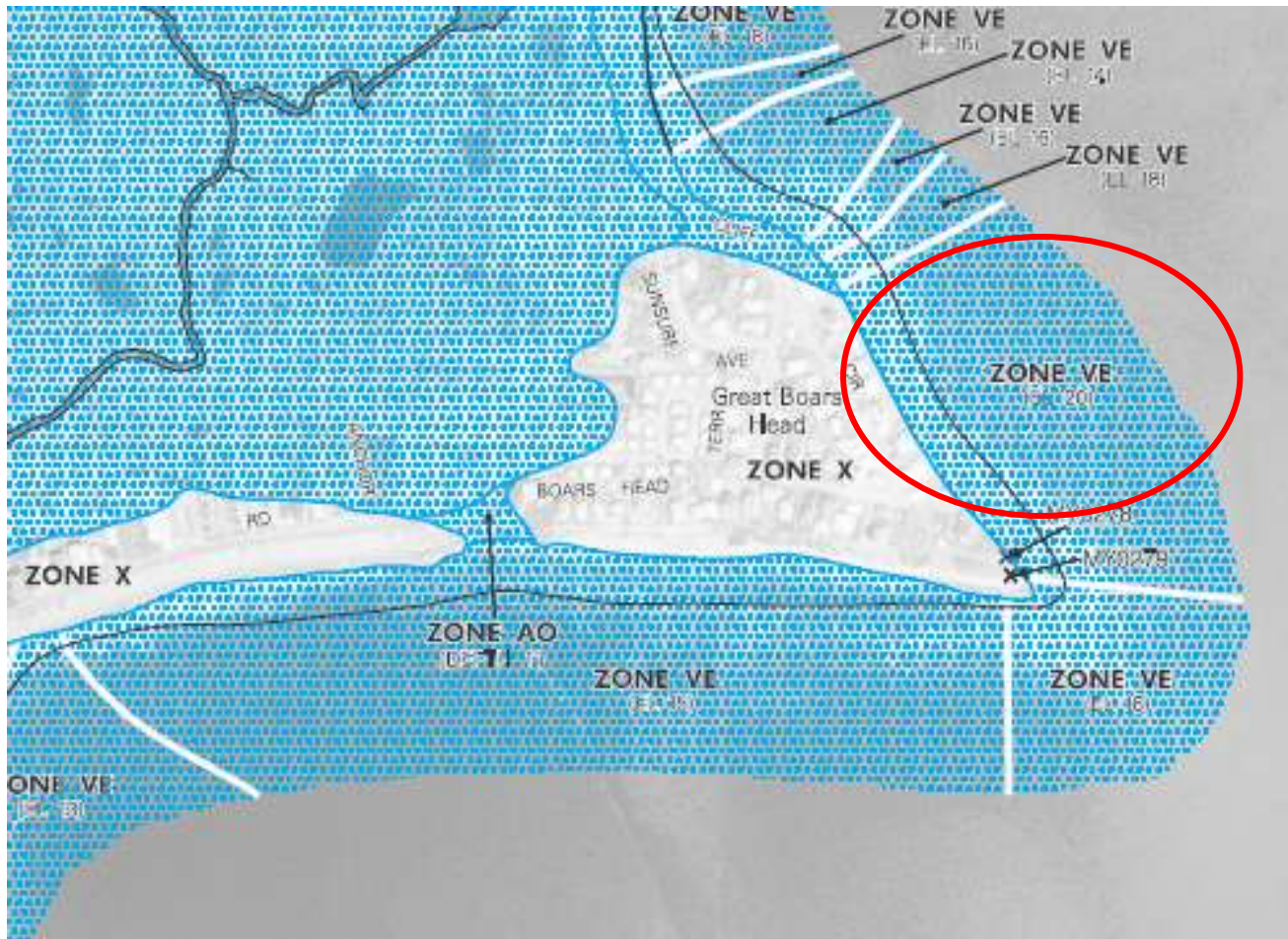
| Time Period | Flood Size | | | |
|-------------|------------|---------|---------|----------|
| | 10-year | 25-year | 50-year | 100-year |
| 1 year | 10% | 4% | 2% | 1% |
| 10 years | 65% | 34% | 18% | 10% |
| 20 years | 88% | 56% | 33% | 18% |
| 30 years | 96% | 71% | 45% | 26% |
| 50 years | 99% | 87% | 64% | 39% |

Source: ASFPM

Flood Insurance Rate Map Zones (partial listing)

| Zone | Description |
|--------------|----------------------------------------------------------------------------------------------------|
| A | 100-year flood hazard zone with no BFE determined |
| AE | 100-year flood hazard zone with BFE determined |
| AH | 100-year flood hazard zone with flood depths of 1-3 ft.; BFE determined |
| AO | 100-year flood hazard zone with flood depths of 1-3 ft.; average depths determined |
| X (shaded) | Riverine/coastal floodplain areas between the 100-year flood and 500-year flood |
| X (unshaded) | Outside of the limits of the 500-year flood |
| V | Coastal high hazard areas (100-year flood and wave effects of 3 ft. or greater); no BFE determined |
| VE | Coastal high hazard areas (100-year flood and wave effects of 3 ft. or greater); BFE determined |

Flood Insurance Rate Map



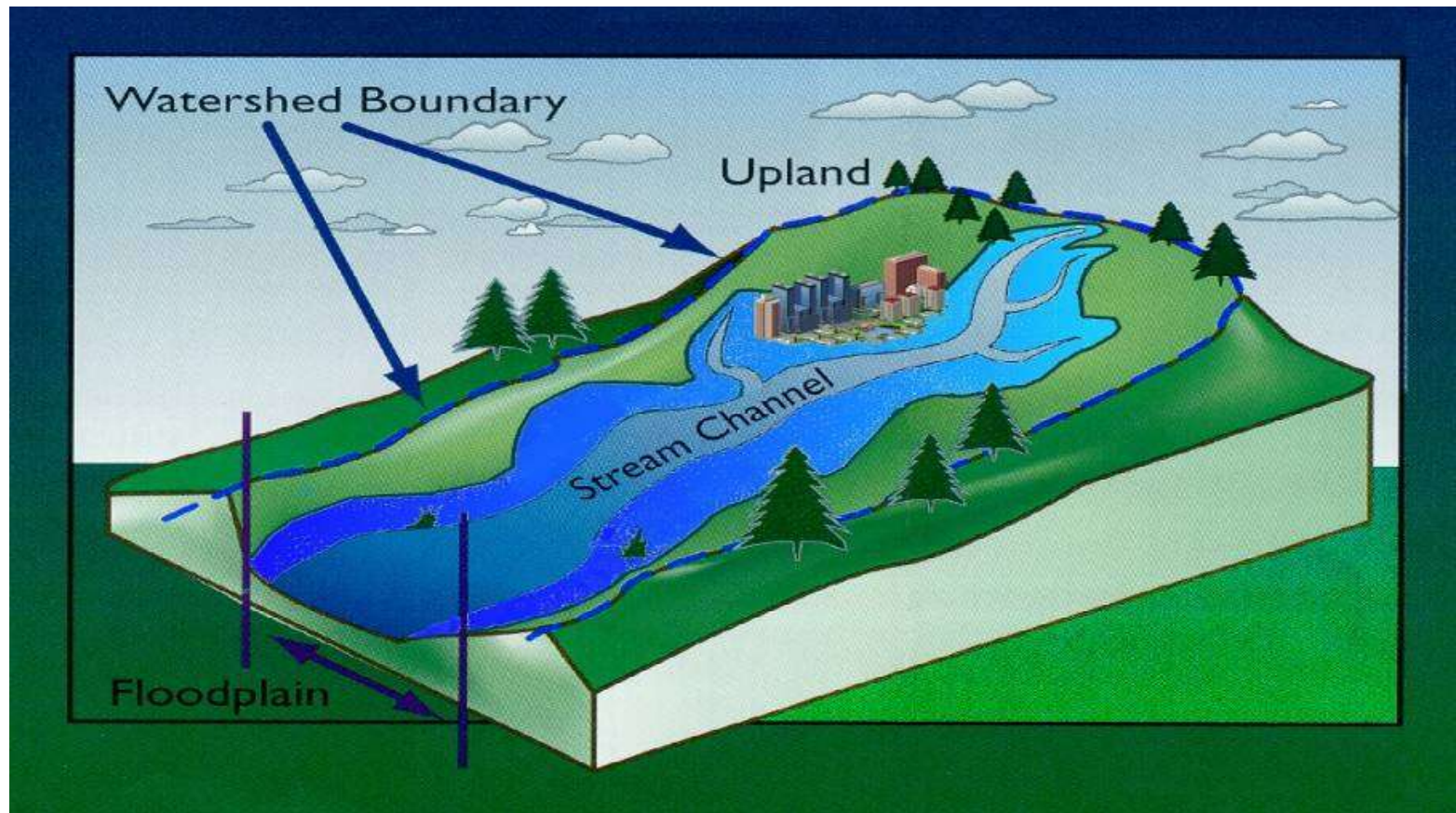
Mapping Methodologies

Riverine Studies:

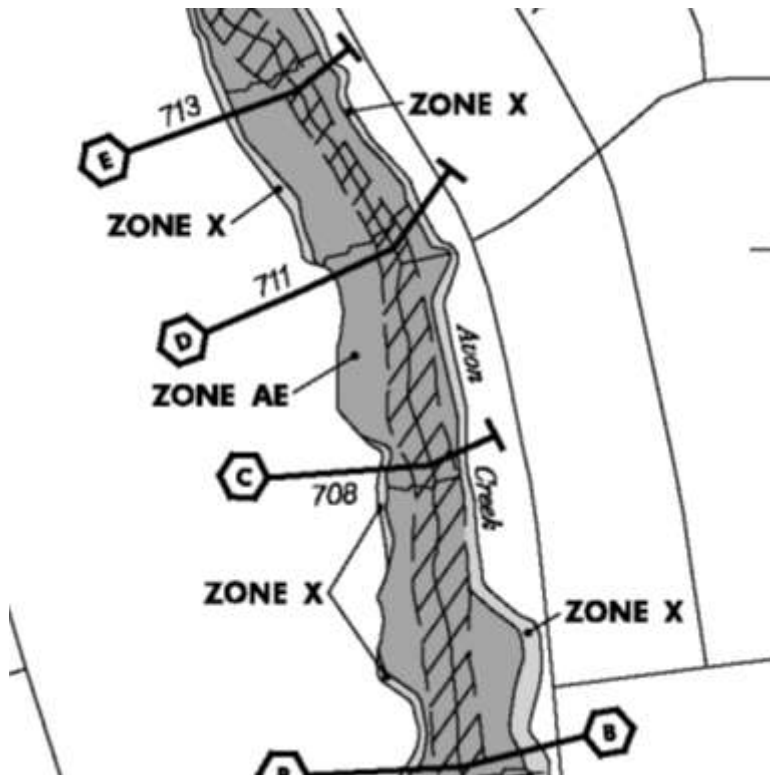
- Enhanced (or detailed) study – Zone AE
- Basic study (model-backed, approximate methods) – Zone A
- Revisions due to updated topographic data

Coastal Studies

Mapping Riverine Floodplains: Zone AE Enhanced Study

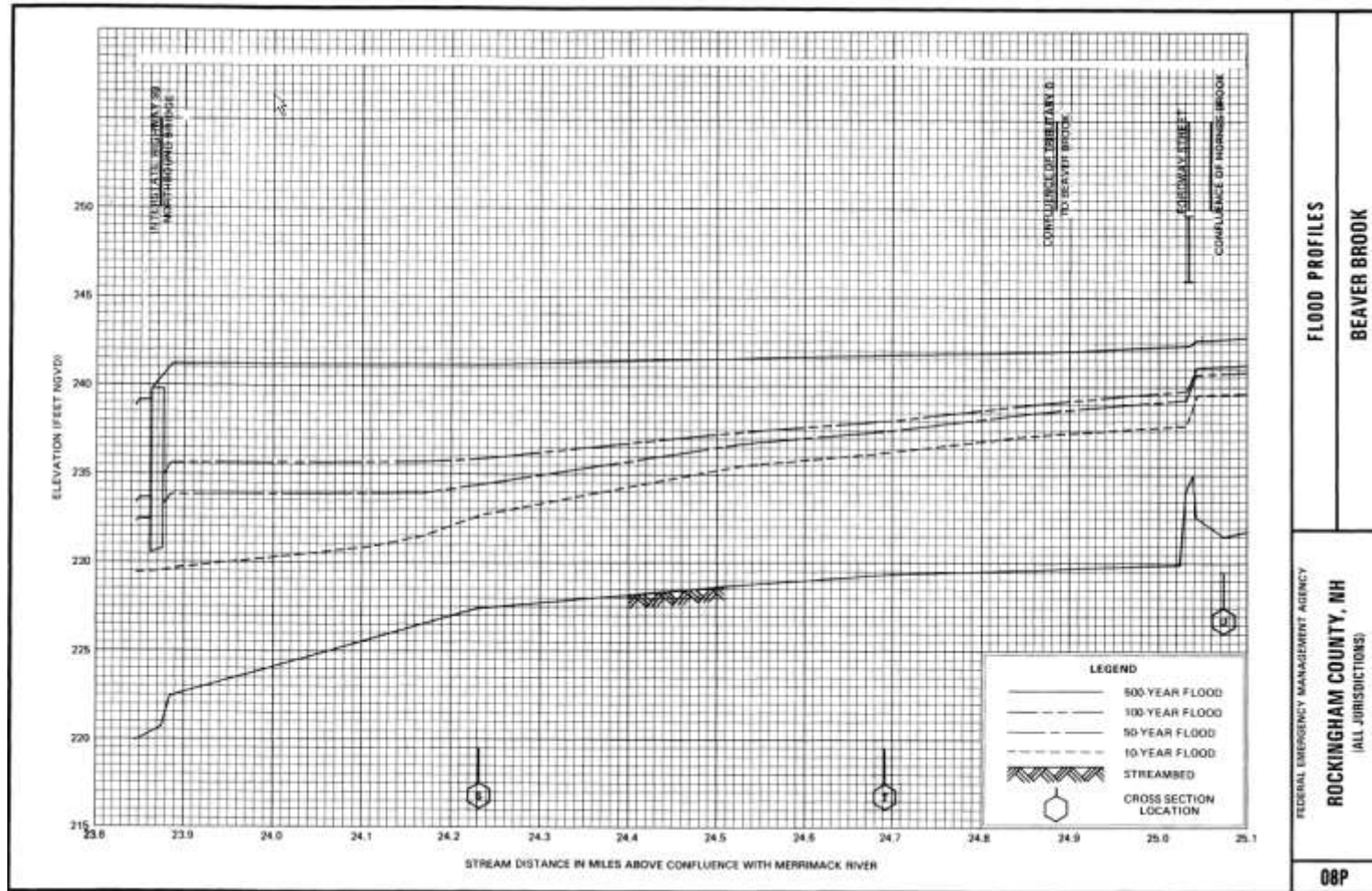


Mapping Riverine Floodplains: Zone AE Enhanced Study

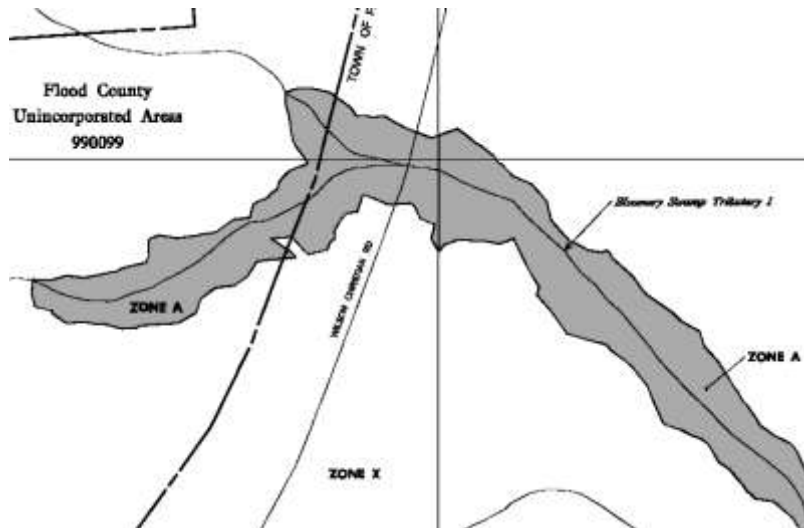


- Traditional detail study
- Sections field surveyed
- All hydraulic structures surveyed
- Detailed hydrologic analysis
- Traditional mapping
 - ◆ Floodways
 - ◆ Floodway Data Table
 - ◆ Flood Profile

Flood Profiles

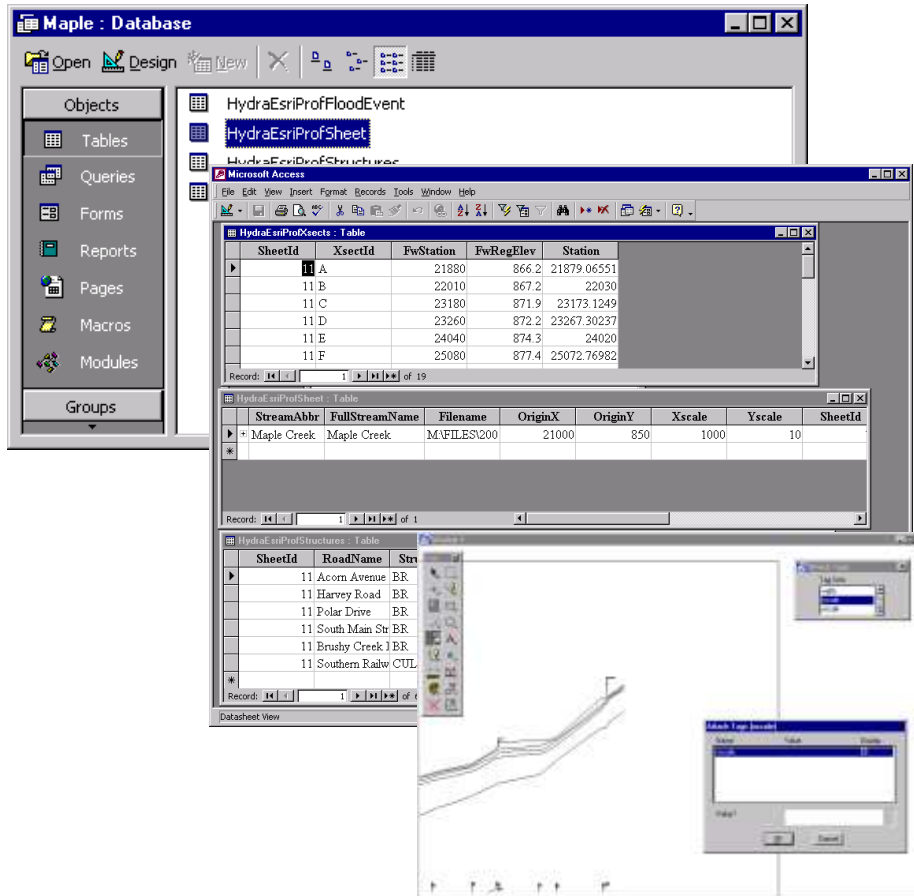


Mapping Riverine Floodplains: Zone A Basic Study



- Replaces Unnumbered A Zones
- Much more automated approach
- Hydrology from Regional Equations
- Hydraulic Models Developed
- Flood boundaries mapped from model output

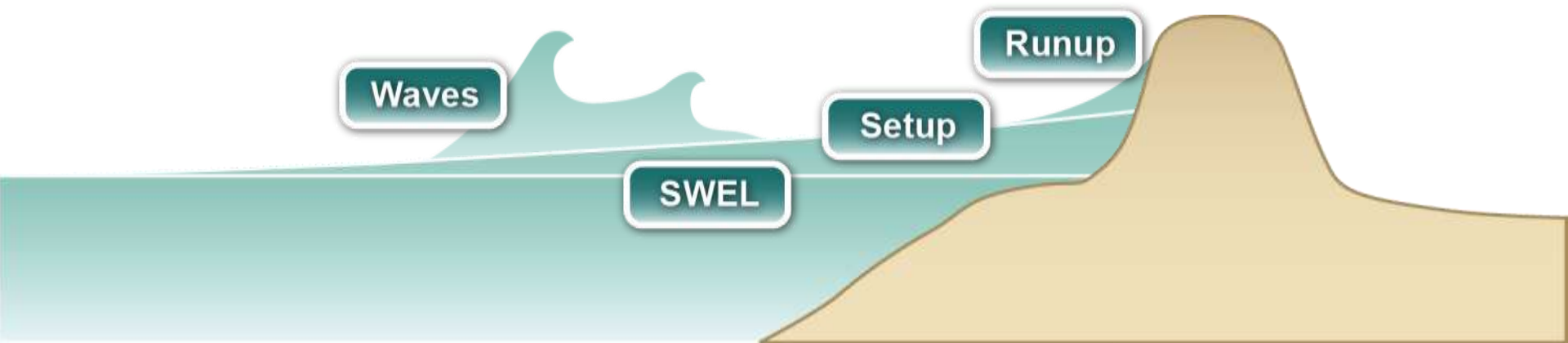
Mapping Riverine Floodplains: Revisions due to Updated Topography



- Used to Update Effective Mapping with new Terrain Data
- Foundation is the FEMA Profile

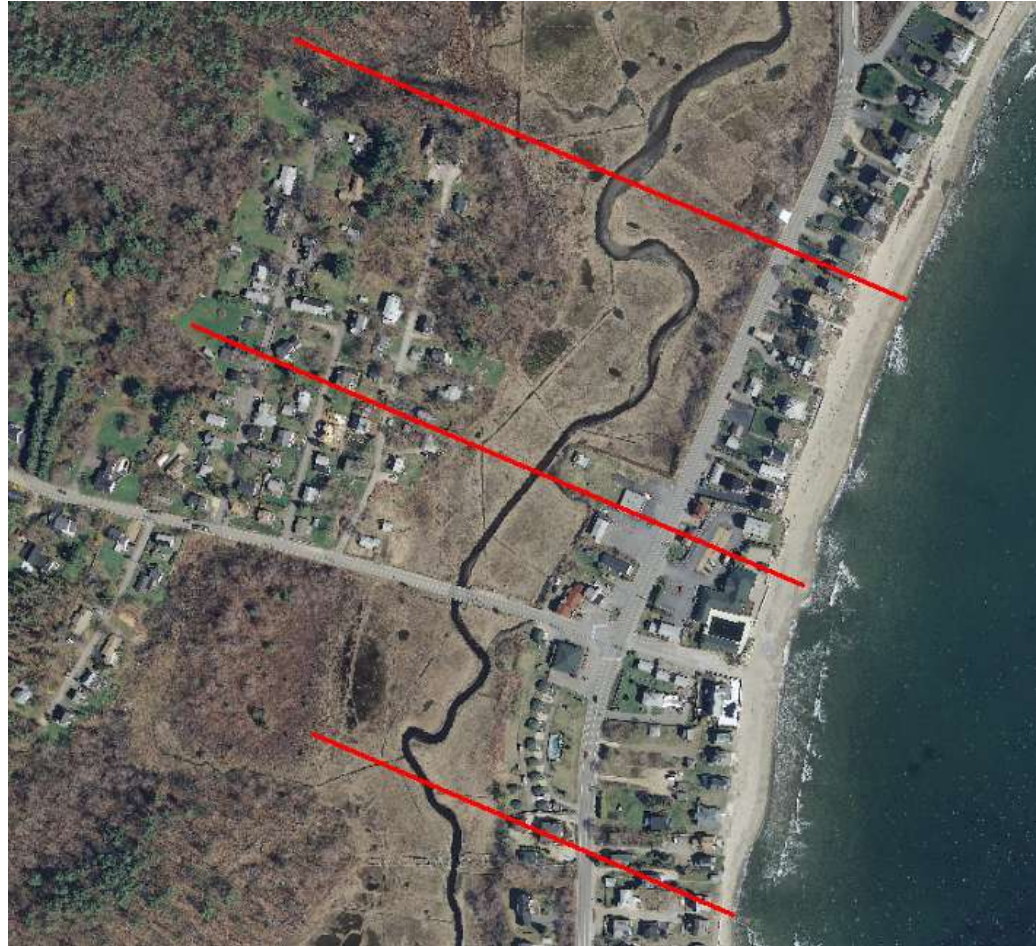
Coastal Methods: Components to Base Flood Elevation

1. Storm surge stillwater elevation (SWEL)
2. Amount of wave setup
3. Wave height above storm surge (stillwater + setup) elevation
4. Wave runup above storm surge elevation (where present)



Coastal Methods: Field Reconnaissance

- Observe features that cannot be seen from imagery
 - Classify terrain
 - Identify raised buildings
 - Determine vegetation density
- Reality check for model results



Risk MAP (Mapping, Assessment, and Planning) Vision

Vision Statement:

With State, Local, Tribal, Non-Profit and Private-Sector collaboration, Risk MAP delivers quality data that increases public awareness and leads to action that reduces risk to life and property



Coastal Map Updates Underway

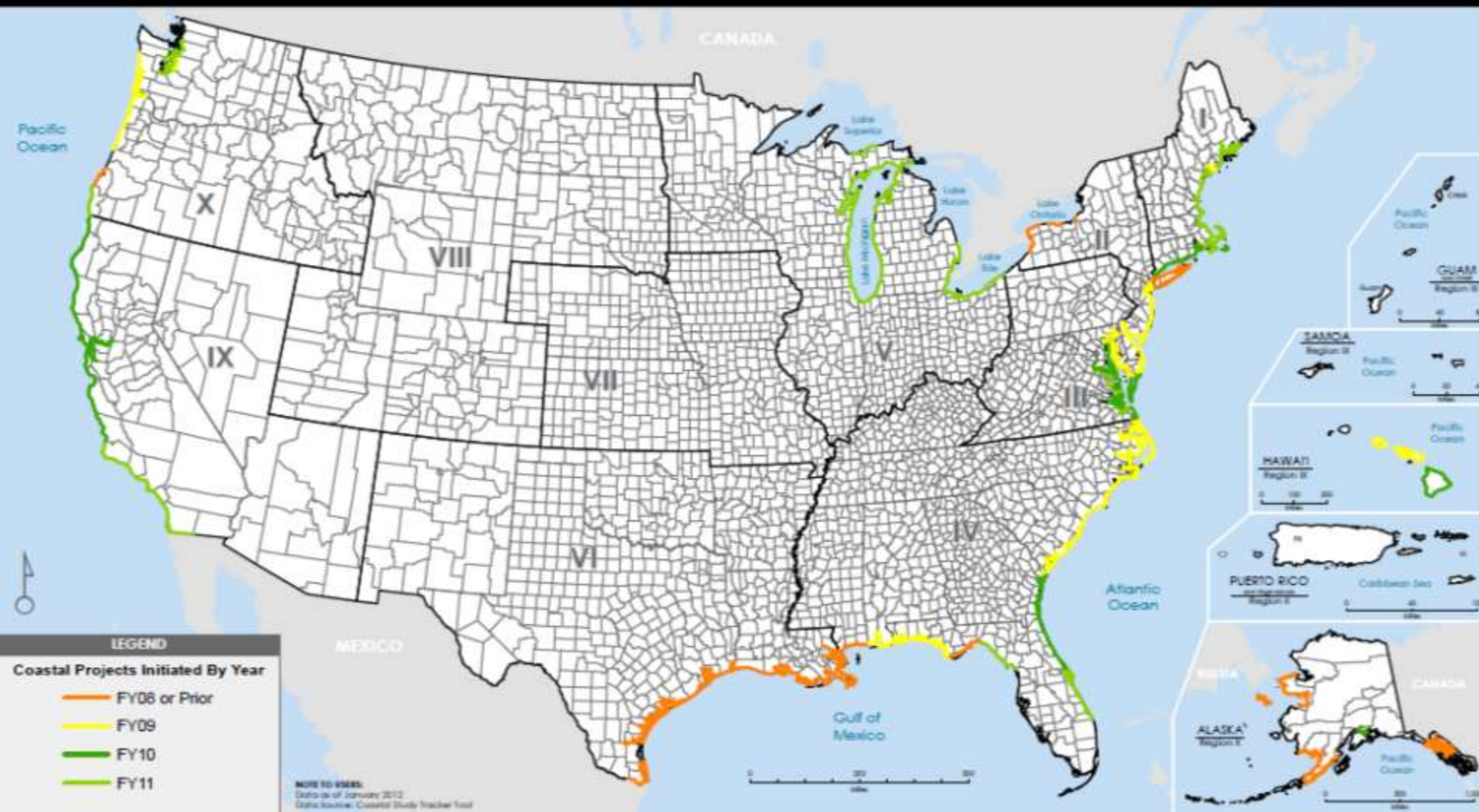
NATIONAL FLOOD INSURANCE PROGRAM

Coastal Projects Initiated By Year



FEMA

March 28, 2012



NH Coastal Project Footprint

Study Type

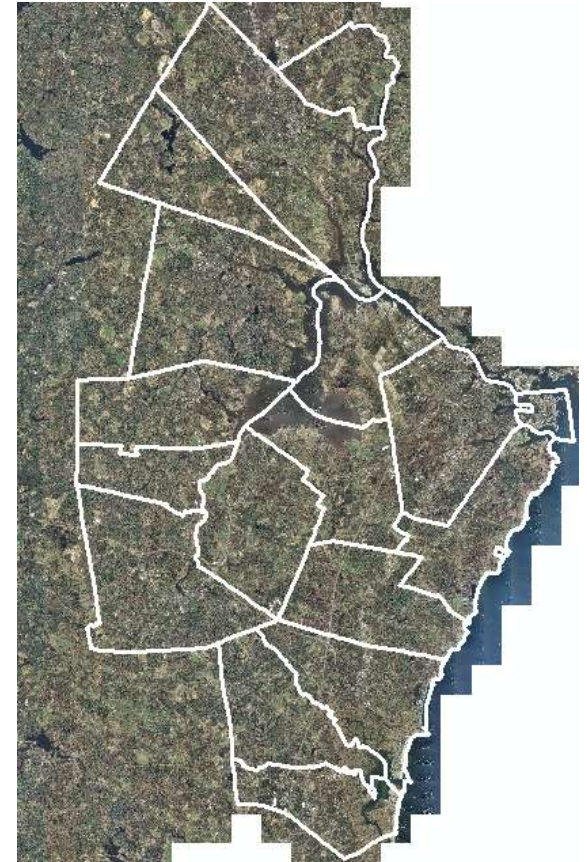
| Flooding Source | | Study Type: | | | |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------|------------------------|----------------------------|----------------------------------------------|
| | | Coastal | Zone A/ Basic Study | Zone AE/ Enhanced Study | Revisions due to updated topographic data |
| 1 | Atlantic Ocean | 17.7 | | | |
| 2 | Piscataqua River | | | | 13.1 |
| 3 | Great Bay shoreline | | | | 32.0 |
| 4 | Squamscott River | | | 0.8 | 5.0 |
| 5 | Exeter River | | | 7.53 | 0.5 |
| 6 | Lamprey River | | | 4.5 | |
| 7 | Little River No. 1 (Exeter) | | | | 2.3 |
| 8 | Pickering Brook | | | | 1.8 |
| 9 | Piscassic River | | | | 3.4 |
| 10 | Bellamy River | | | | 2.6 |
| 11 | Cocheco River | | | | 2.3 |
| 12 | College Brook | | | | 1.7 |
| 13 | Oyster River | | | 3.75 | |
| 14 | Hamel Brook/Longmarsh Brook | | | | 1.1 |
| 15 | Pettee Brook | | | | 1.3 |
| 16 | Winnicut River | | | | 3.7 |
| 17 | Woodman Brook | | | | 1.2 |
| Zone A restudies | | | 136.4 | | |
| | | | | | |
| Total | | 17.7 | 136.4 | 16.58 | 72.0 |
| | | | | | |
| All distances reported in miles. Distances reflect Coordinated Needs Management Strategy (CNMS) results for the study area. | | | | | |

Project Partners

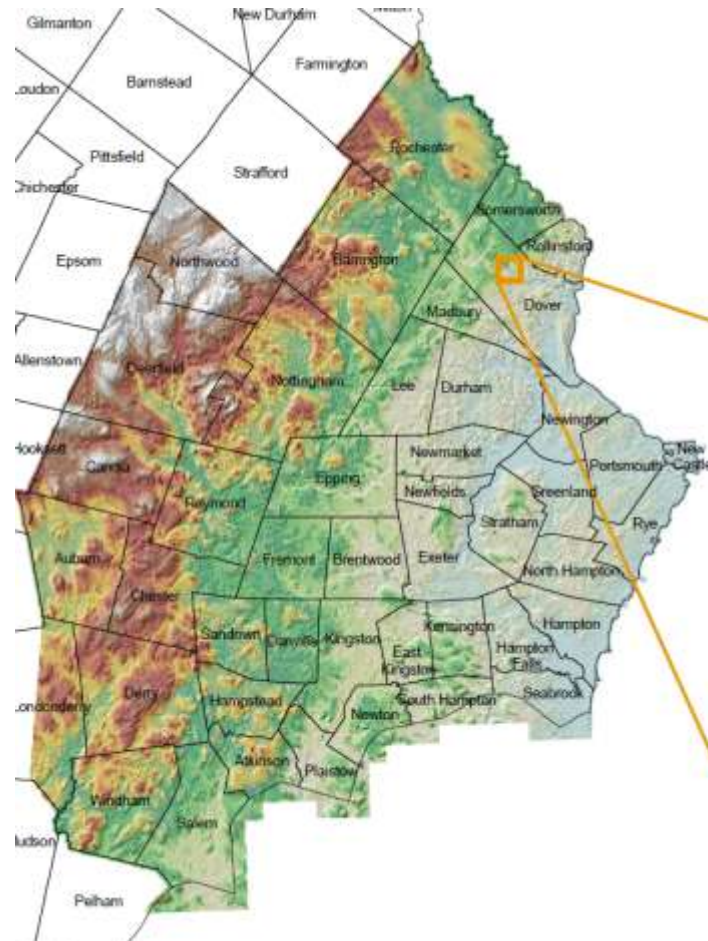
| Role | Partner |
|-----------------------------------------------|-------------------------------------------|
| Project Management | UNH |
| Riverine Analysis – H&H Modeling | USGS Water Resources Center (Pembroke) |
| Coastal Analysis | AECOM (Boston) |
| Database Compilation, DFIRM/FIS Production | UNH |
| Outreach | NH Office of Energy and Planning |
| Non-Regulatory Products | UNH, AECOM |

NH Coastal Project: Best Available Data

- 2010 1-ft. Orthophotography
- Coastal LiDAR – 2 meter Digital Elevation Model; 30 cm vertical accuracy
- Field Data Collection



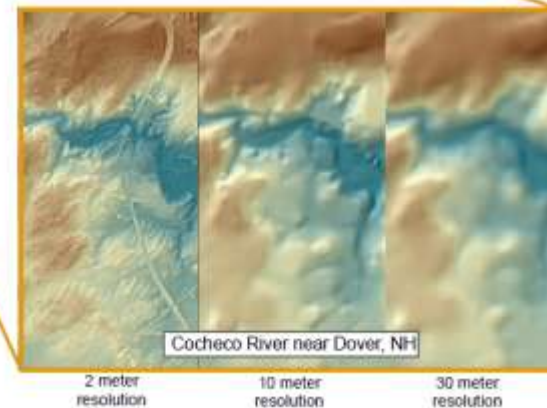
Mapping Riverine Floodplains: Revisions due to Updated Topography



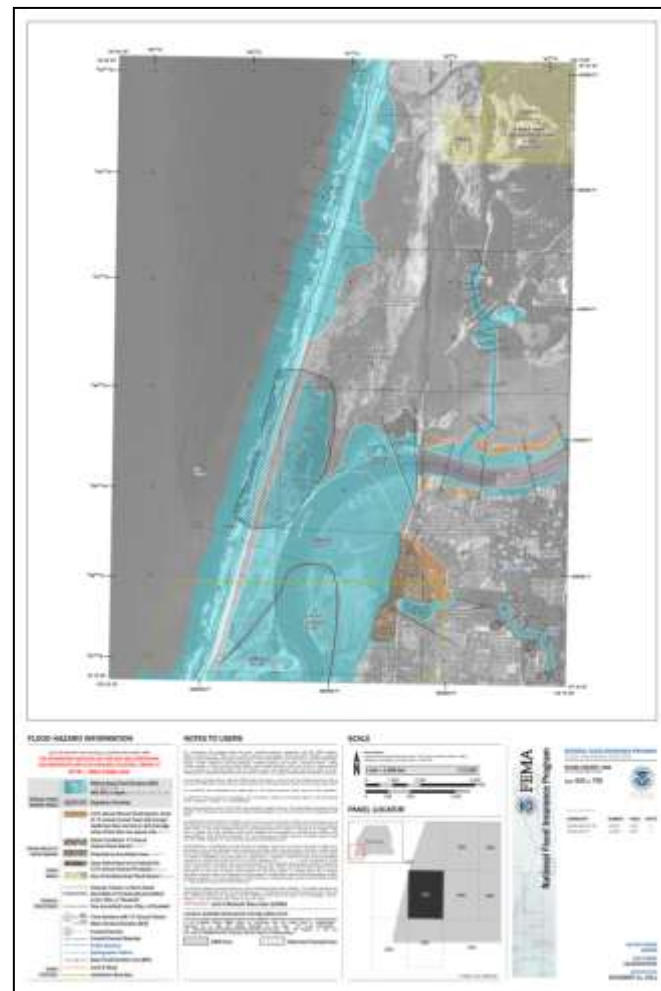
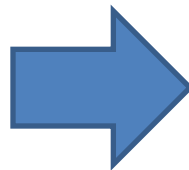
Coastal LiDAR Acquisition 2-Meter Resolution

The map displays the data acquisition footprint for the coastal LiDAR data set. The data provides coverage for 45 communities, extending over approximately 900 square miles.

The graphic below illustrates the increased information content provided by the 2-meter topographic data, as contrasted with the lower resolution data sets (10-meter and 30-meter) available for the rest of New Hampshire.

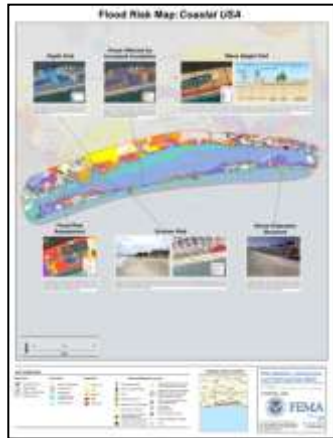


Regulatory Products: FIS and DFIRMs

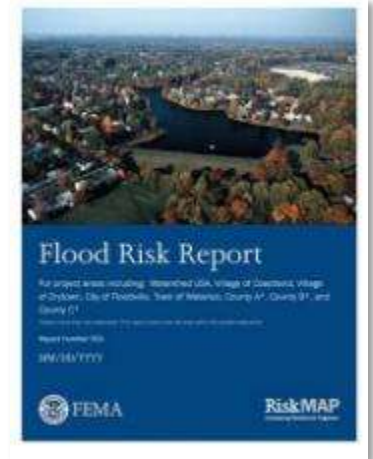
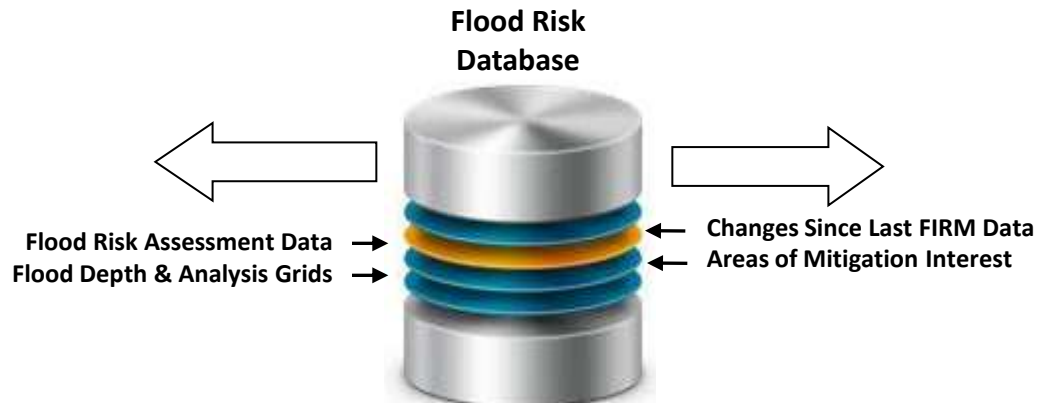


Coastal Nonregulatory Products:

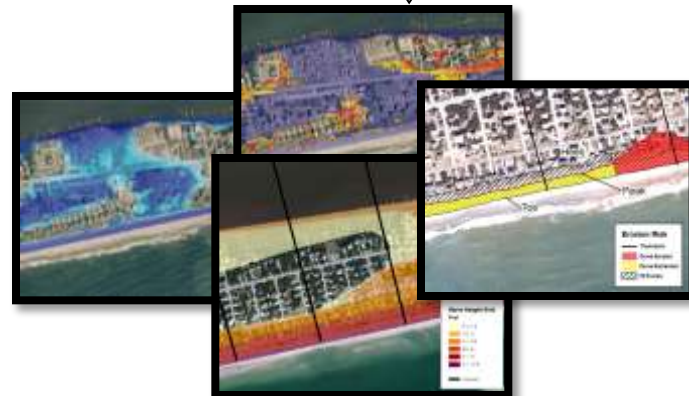
1. Flood Risk Map and Report



Flood Risk Map



Flood Risk Report



Ad-Hoc Flood Risk Analyses





2. Changes Since Last FIRM

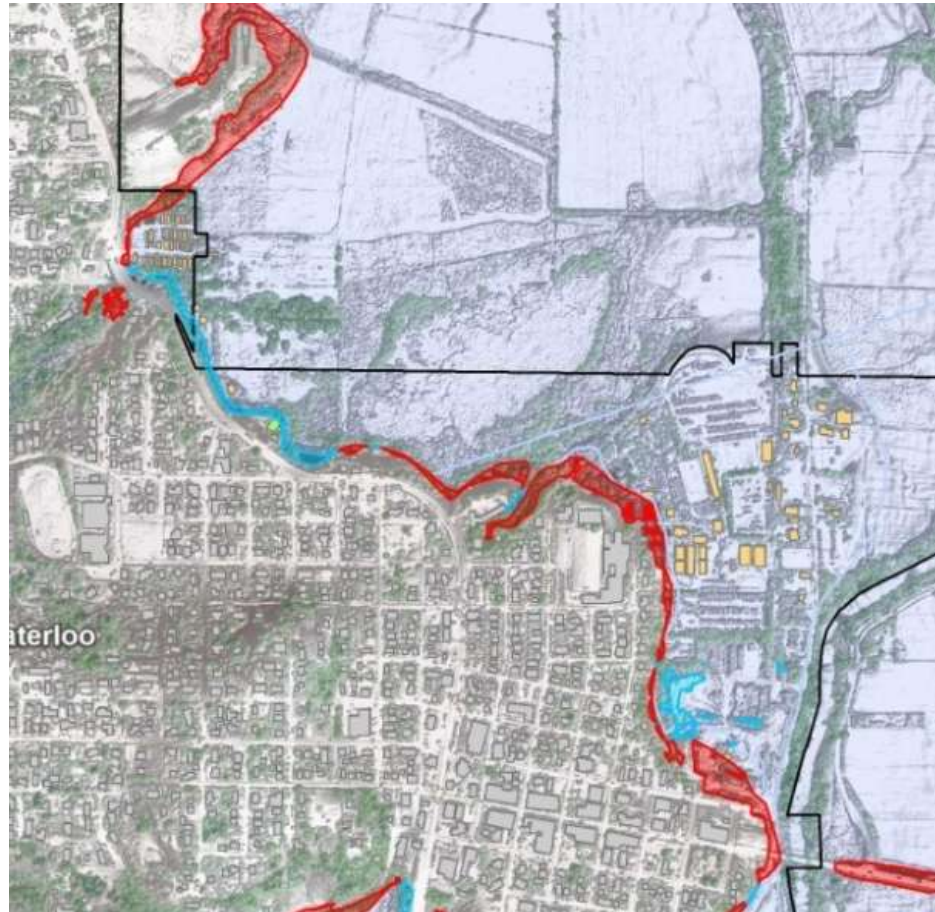
Legend

SFHA

-  SFHA Added
-  SFHA Removed
-  SFHA Unchanged

Structures

-  Now In SFHA
-  In SFHA
-  No Longer in SFHA
-  Not In SFHA

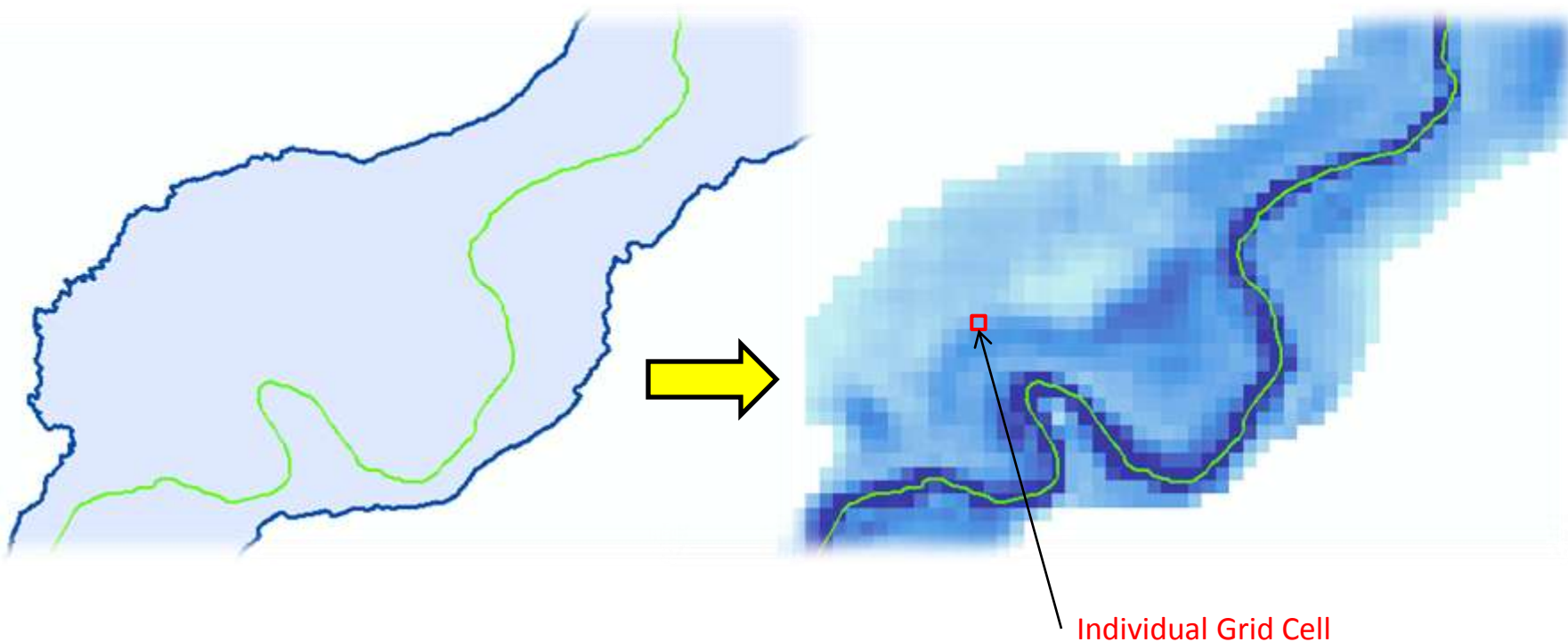


3,4. Riverine/Coastal Depth Grids

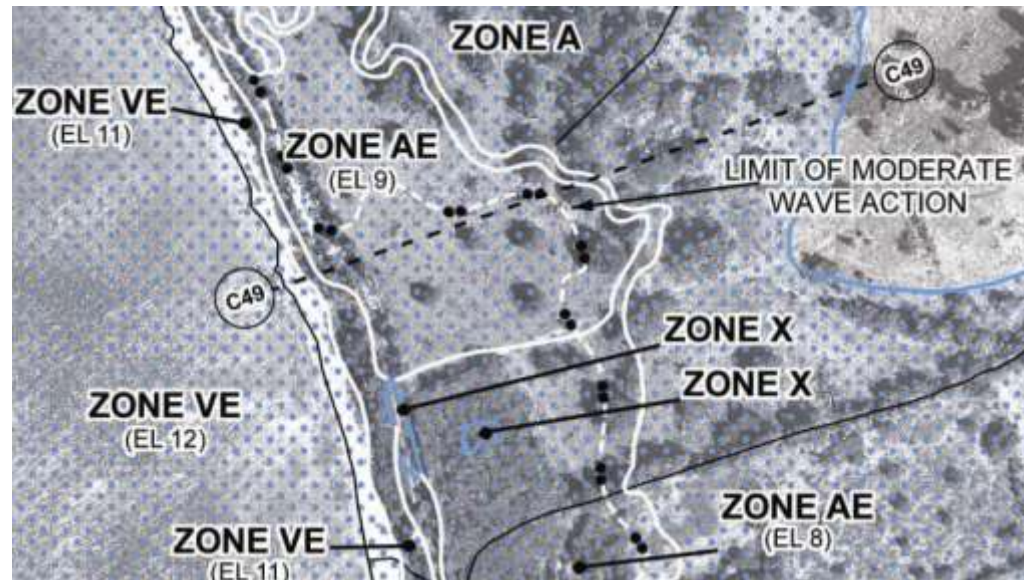
- Each Grid Cell has a Unique Value

FIRM 1% Annual Chance (100-yr) Floodplain

1% Annual Chance Depth Grid



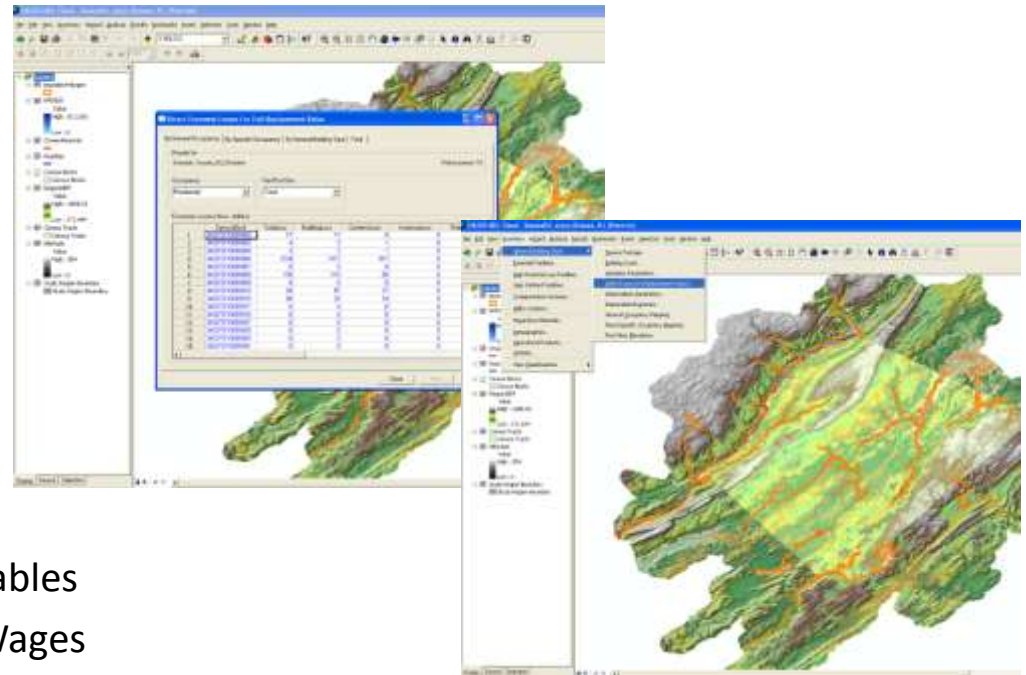
5. Limit of Moderate Wave Action (LimWA)



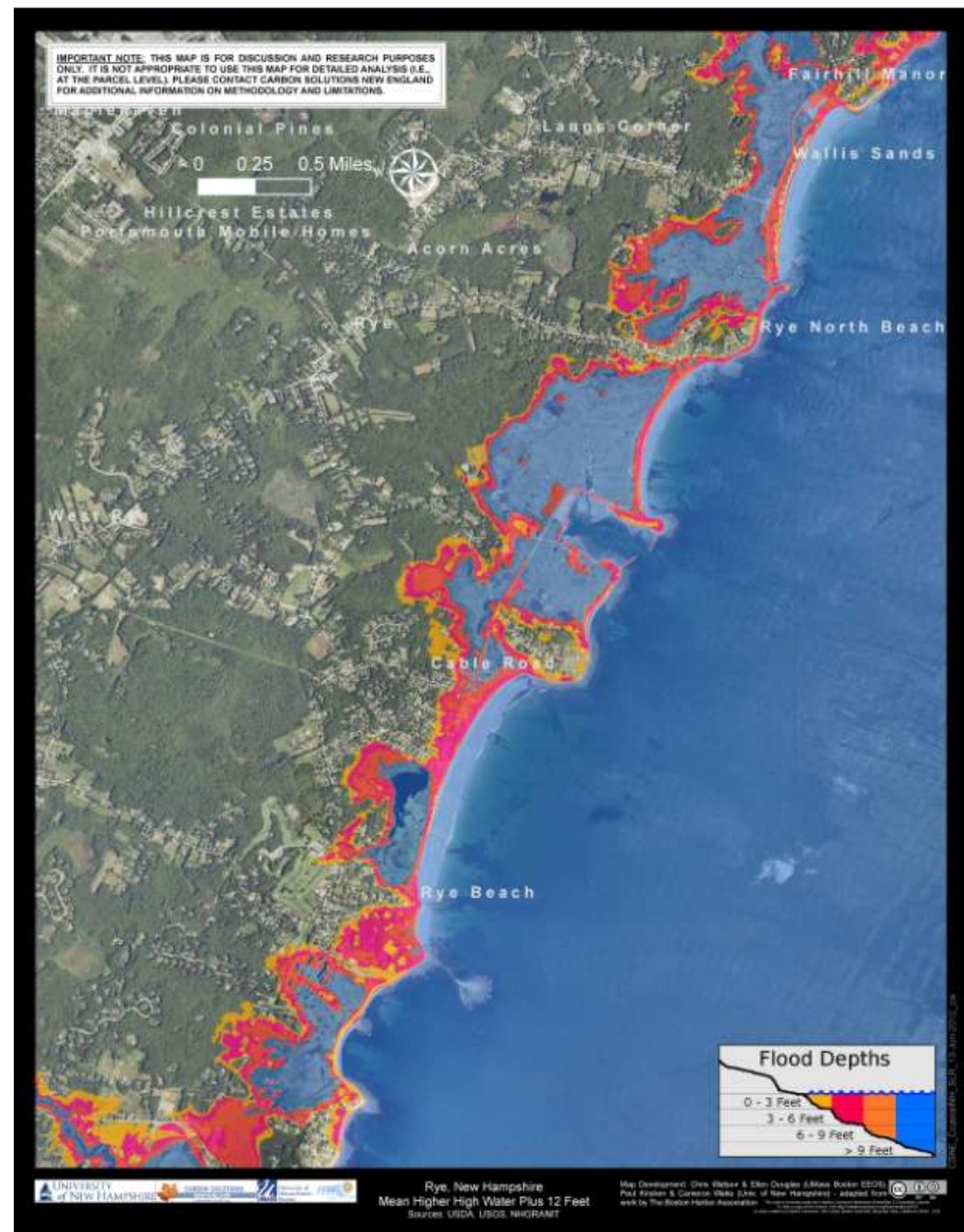
- Areas subject to wave heights greater than 1.5 feet
- Coastal A Zone

6. Hazus MH Analysis

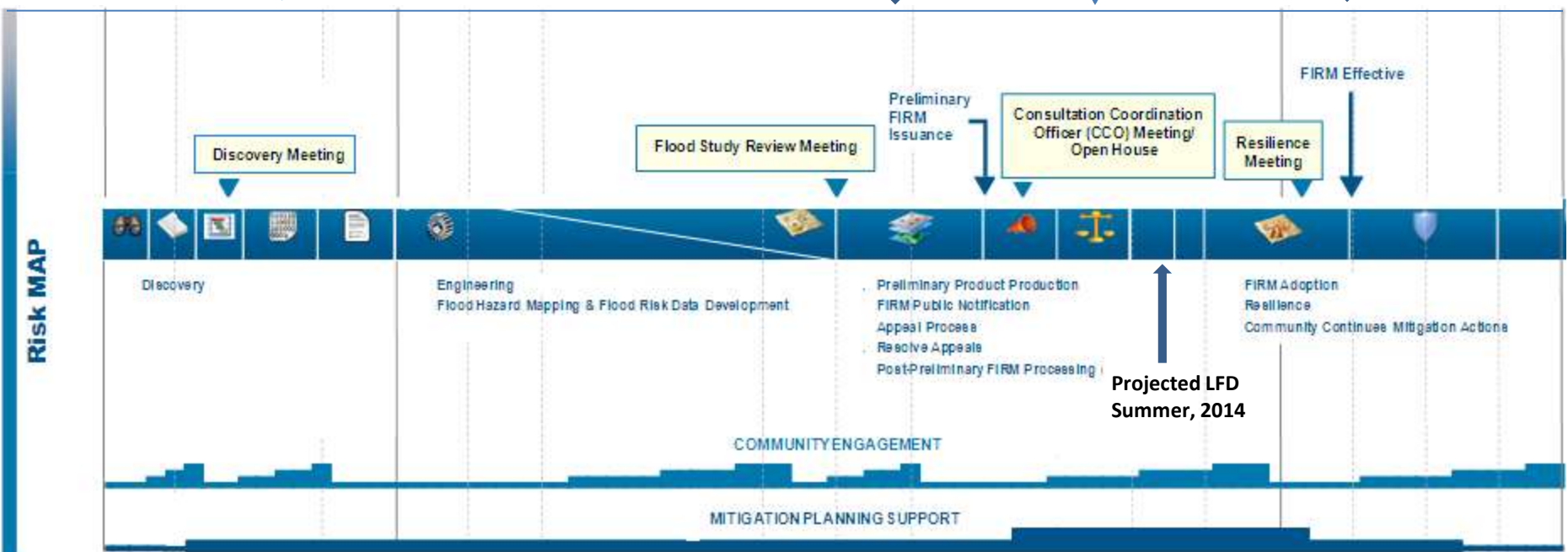
- Dollar Losses
 - Residential Loss
 - Commercial Loss
 - Other Asset Loss
- Percent Damage
 - Evaluates Building Stock
 - Structure and Contents
- Business Disruption
 - Considers Total Occupancy Tables
 - Considers Lost Income and Wages
- Social Impacts
 - Estimates Displaced Households
 - Anticipated Shelter/Hospitalization Requirements



7. Sea Level Rise Analysis




NH Coastal Project Timeline



Finding the Maps/Data


- **FEMA Map Store** (www.msc.fema.gov) for viewing, printing a FIRMette, and purchase of digital data only
- **NH GRANIT** (www.granit.unh.edu/dfirms) for DFIRMs: on-line viewing of pdf copies maps and studies, free download of GIS data, and purchase of paper copies
- **GRANITView** (<http://granitview.unh.edu>) for interactive mapping of floodplain data

NH GRANIT



GRANIT

New Hampshire's Statewide GIS Clearinghouse



Home | Flood Insurance Study | DFIRMs | Related Links

Home

Welcome to the New Hampshire GRANIT Flood Insurance Study (FIS) and Digital Flood Insurance Rate Maps (DFIRMs) repository. The purpose of this site is to disseminate digital versions (pdfs) of the FEMA (Federal Emergency Management Agency) FIS and DFIRM panels to the public. We anticipate having all New Hampshire countywide FIS and DFIRMs (preliminary and/or effective) available for viewing and downloading.

GRANIT is pleased to announce that the effective FIS and DFIRMs for Cheshire, Grafton, Hillsborough, Merrimack, Rockingham, Strafford, and Sullivan Counties are now available through this website. In addition, the preliminary FIS and DFIRMs are available for Carroll and Coos Counties. The [NH Floodplain Management Program](#) at the [NH Office of Energy and Planning](#) has developed helpful fact sheets for [Carroll County](#) and [Coos County](#) that inform communities about important facts and dates related to the preliminary products.

Previously, FEMA created paper versions of the Flood Insurance Rate Maps for individual communities. As part of its [Map Modernization](#) activities, FEMA and its mapping partners are now creating digital, seamless, countywide products. These improved products incorporate updated base maps, letters of map change (LOMCs), and revised studies (where conducted). In addition, their digital format will allow for more efficient and timely future map updates.

The [Flood Insurance Study](#) tab links you to digital versions of countywide Flood Insurance Study documents.

The [DFIRMs](#) tab allows you to access the formatted map panels.

[Related Links](#) is a list of project participants and helpful links.


For information on New Hampshire's involvement in the National Flood Insurance Program (NFIP), please visit the NH Office of Energy and Planning [website](#).


If you have questions about the FIS report or the DFIRM content, please contact the Director of Federal Insurance and Mitigation Division, FEMA Region 1 in Boston at (617) 956-7573.

If you have questions on the DFIRM adoption process, please contact [Ms. Jennifer Gilbert](#), NH NFIP State Coordinator.

**Status
December, 2012**

- DFIRMs scheduled effective 2013
- DFIRMs effective 2010
- DFIRMs effective 2009
- DFIRMs effective 2008
- DFIRMs effective 2006
- DFIRMs effective 2005
- DFIRM effective date undetermined



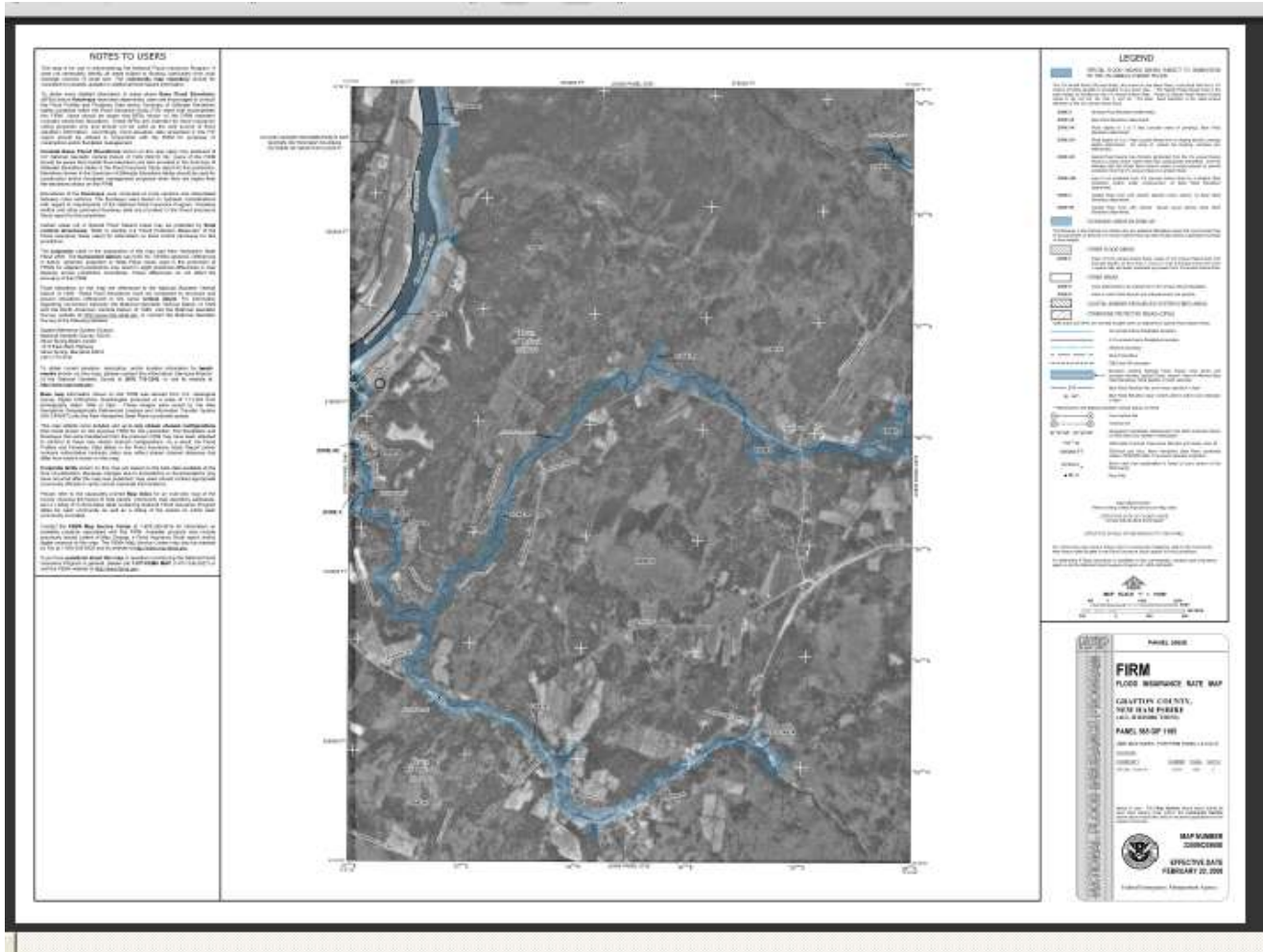


NATIONAL
FLOOD
INSURANCE
PROGRAM

Community Index Map



PDF Copies of Entire Panel Available



Accessing the GIS Data

The screenshot shows the NH GRANIT website interface. At the top is a navigation bar with links: Home, About Us, News, Projects, Resource Library, and a highlighted 'DATA' section with sub-links: Data 101, Download Free Data, Order Data, Online Maps & Services, and Map Library. Below the navigation bar is a search bar with the text 'Search GRANIT'. To the left of the main content area is a sidebar with 'QUICK LINKS' including 'Search Database using Data Discovery Tool', 'Layer List: Alphabetical Order', 'Layer List: Data Category', 'Tax Parcel Information', and 'GRANIT Data Questions?'. Below these are 'Login' and 'Contact Us' links, and a 'GIS Event Calendar' for January. The main content area is titled 'GRANIT Data Discovery Tool' and shows search results for the keyword 'flood'. It indicates '7 records match your search criteria'. Below this is a table with columns: Dataset, Metadata, Sample Image, Format, and Download. The table lists six datasets related to 'DIGITAL FLOOD INSURANCE RATEMAP DATABASE' for various New Hampshire counties. Each row has a 'Full Record Status Map' link, a sample image, a 'gdb' format, and a 'Download Now' button with a checkbox to 'Mark as part of set'.

| Dataset | Metadata | Sample Image | Format | Download |
|--------------------------------------------------------------------------------------------------|----------------------------------------|--------------|--------|------------------------------------------------------------------------------|
| DIGITAL FLOOD INSURANCE RATEMAP DATABASE, CHESHIRE COUNTY, NEW HAMPSHIRE | Full Record Status Map | | gdb | Download Now <input type="checkbox"/> Mark as part of set |
| DIGITAL FLOOD INSURANCE RATEMAP DATABASE, GRAFTON COUNTY, NEW HAMPSHIRE | Full Record Status Map | | gdb | Download Now <input type="checkbox"/> Mark as part of set |
| DIGITAL FLOOD INSURANCE RATEMAP DATABASE, HILLSBOROUGH COUNTY, NEW HAMPSHIRE (ALL JURISDICTIONS) | Full Record Status Map | | gdb | Download Now <input type="checkbox"/> Mark as part of set |
| DIGITAL FLOOD INSURANCE RATEMAP DATABASE, MERRIMACK COUNTY, NH, USA | Full Record Status Map | | gdb | Download Now <input type="checkbox"/> Mark as part of set |
| DIGITAL FLOOD INSURANCE RATEMAP DATABASE, ROCKINGHAM COUNTY, NEW HAMPSHIRE | Full Record Status Map | | gdb | Download Now <input type="checkbox"/> Mark as part of set |
| DIGITAL FLOOD INSURANCE RATEMAP DATABASE, STRAFFORD COUNTY, NEW HAMPSHIRE | Full Record Status Map | | gdb | Download Now <input type="checkbox"/> Mark as part of set |

<http://www.granit.unh.edu/data/search>

Keyword search: flood

GRANITView

The screenshot displays the GRANITView web application interface. At the top, a green banner features the GRANITView logo and navigation links: Map Layers, Tools, and Help. Below the banner, a map of New England is shown, centered on the area around Grafton, New Hampshire. The map includes various geographical features, roads, and place names. A sidebar on the left, titled "Map Layers", contains a list of layers with checkboxes. The "Floodplains (DFIRMS)" layer is highlighted with a red circle. The map also includes a scale bar at the bottom, indicating a current scale of 1:2,311,162. The date 4/24/2013 is displayed in the bottom left corner. The Esri logo is visible in the bottom right corner.

Map Layers

- ☒ Label Features
- ☒ Base Layers
- ☒ Floodplains (DFIRMS)
- ☐ Geodetic Control
- ☐ Land Conservation
- ☐ Recreation
- ☐ Soils
- ☐ Water Resources
- ☐ Wildlife
- ☐ Orthophotography
- ☐ Topography

Map Layers | Bing Topo | Bing Aerial | Bing Hybrid | Blank Background

Visit the GRANIT website at www.granit.unh.edu/

4/24/2013

Current Scale = 1:2,311,162

Latitude: 44.634662 Longitude: -70.591449

POWERED BY esri

GRANITView



QUESTIONS?



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