State of Maine
Risk MAP Business Plan

March 2016

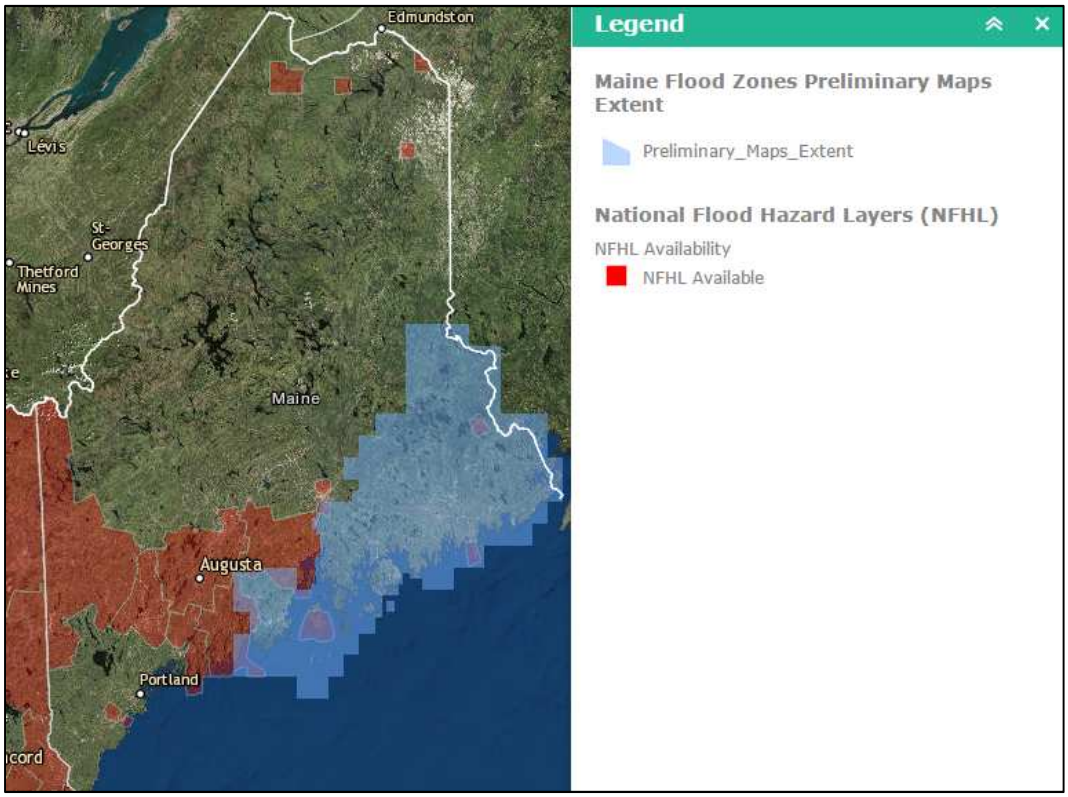
Prepared by:

DEPARTMENT OF Agriculture Conservation & Forestry

Maine Floodplain Management Program

Prepared for:

FEMA **Region 1 – Mitigation Department**



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Maine Department of Agriculture, Conservation and Forestry
Floodplain Management Program
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This plan is prepared in accordance with the Department of Homeland Security's Federal Emergency Management Agency grant guidelines for the Cooperating Technical Partners (CTP) Program.

The CTP program derives its authority from the Housing and Urban Development Act of 1968, also known as National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4101; the Housing and Urban Development Act of 1969; the Flood Disaster Protection Act of 1973, as amended; the National Flood Insurance Reform Act of 1994; and Biggert-Waters Flood Insurance Reform Act of 2012. This program provides funding to Cooperating Technical Partners for CTP program related mapping projects.

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Cover Photo: Screenshot from the Maine Flood Hazard Map taken 3-28-16
Courtesy of Maine Floodplain Management Program

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Introduction

The State of Maine Department of Agriculture, Conservation, and Forestry (MDACF), Floodplain Management Program (FMP) is a Federal Emergency Management Agency (FEMA) "Cooperating Technical Partner (CTP)". In this role, the State actively participates in and helps FEMA implement its "Risk MAP" program, to identify and reduce flood risk. As a CTP, the FMP is required to state its goals and objectives in a "State Business Plan", and provide periodic updates. The State Business Plan was published in December 2010. This document is the fourth update to that plan.

Summary of Recent Program Accomplishments

In just a few short years, floodplain-mapping efforts in Maine have progressed rapidly:

- The State now has more than 12,000 square miles of digital topography (2' or better LiDAR) coverage for populated areas in the state.
- The amount of floodplain stream miles that meets FEMA's quality standards has more than doubled since 2014.
- In 2015 the Maine Flood Hazard Map served up information on preliminary, pending and effective Flood Insurance Rate Maps(FIRMs) and Letter of Map Amendment (LOMA) data in concert with other State of Maine hosted layers, such as the statewide parcel layers and a variety of topography and orthoimagery layers to the public. In the summer of 2015 the CTP hosted a workshop introducing community officials to use of both it and the interactive map feature on the FEMA Map Service Center, which became operable as the coastal DFIRMs became effective.
- A multi-program agency collaboration between the Maine Floodplain Management Program, Maine Geological Survey (MGS), Maine Municipal Planning Assistance Program, and Maine Emergency Management Agency, as well as the Department of Agriculture Conservation and Forestry (DACF) Director of Communications coordinated roll-out of the outreach effort for the state-wide GIS dataset of the maximum potential inundation depths associated with Category 1 and Category 2 Hurricanes land-falling at mean tide and mean high tide using a combination of output SLOSH MOMs (Maximum of the Maximum Envelopes Of Water formed from several similar hypothetical storms run parallel to each other) and an accurate LiDAR bare-earth DEM. The SLOSH modeling information was released publicly and made available on an ArcGIS web mapping platform at http://www.maine.gov/dacf/mgs/hazards/phim/
    a. In 2015 USACE finished processing and released Category 3 and Category 4 SLOSH modeling data. The Maine Geological Survey incorporated it into its publicly available online mapping platform, previously hosting the Category 1 and Category 2 data. Now that all four categories of storm have been modeled and validated, the data will be recognized as the official SLOSH data for the state, replacing the old SLOSH data. The significance of this substantial upgrade to our coastal surge inundation mapping data really can't be over-stated. In addition, this is truly a shining example of a successful collaborative agency project from start to finish, with the Cat 1 and 2 modeling work

being funded by FEMA, performed by MGS in cooperation with multiple state partners, and the Cat 3 & 4 projects finished off by the USACE, using tools and methods provided by MGS, and with the final product being hosted on the MGS website and used by all of our collective agencies and more.

The Maine Cooperating Technical Partners project was featured in Cooperating Technical Partners Collaboration Monthly Communication Volume 1, Edition 5.

RiskMAP
Increasing Resilience Together

COOPERATING TECHNICAL PARTNERS (CTP)
COLLABORATION MONTHLY

INSIDE
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PHIM Model Output for Portland, Maine During a Category 1 Storm at High Tide

CTP Spotlight: Maine Interactive Potential Hurricane

Inundation Application and Outreach

An Interagency Success Increasing Flood Risk Awareness

In 2013, CTP funds were used to produce potential hurricane inundation maps (PHIM), using the National Hurricane Center Sea, Lake and Overland Surges from Hurricanes (SLOSH) model and newly available coast-wide LiDAR data. The PHIMs depict likely worst-case impacts of storm inundation for Category 1 and 2 storms making landfall at mean tide or mean high tide. In early 2014, this data was released via an interactive online Web-mapping application where users can select a scenario and view the predicted impacts.

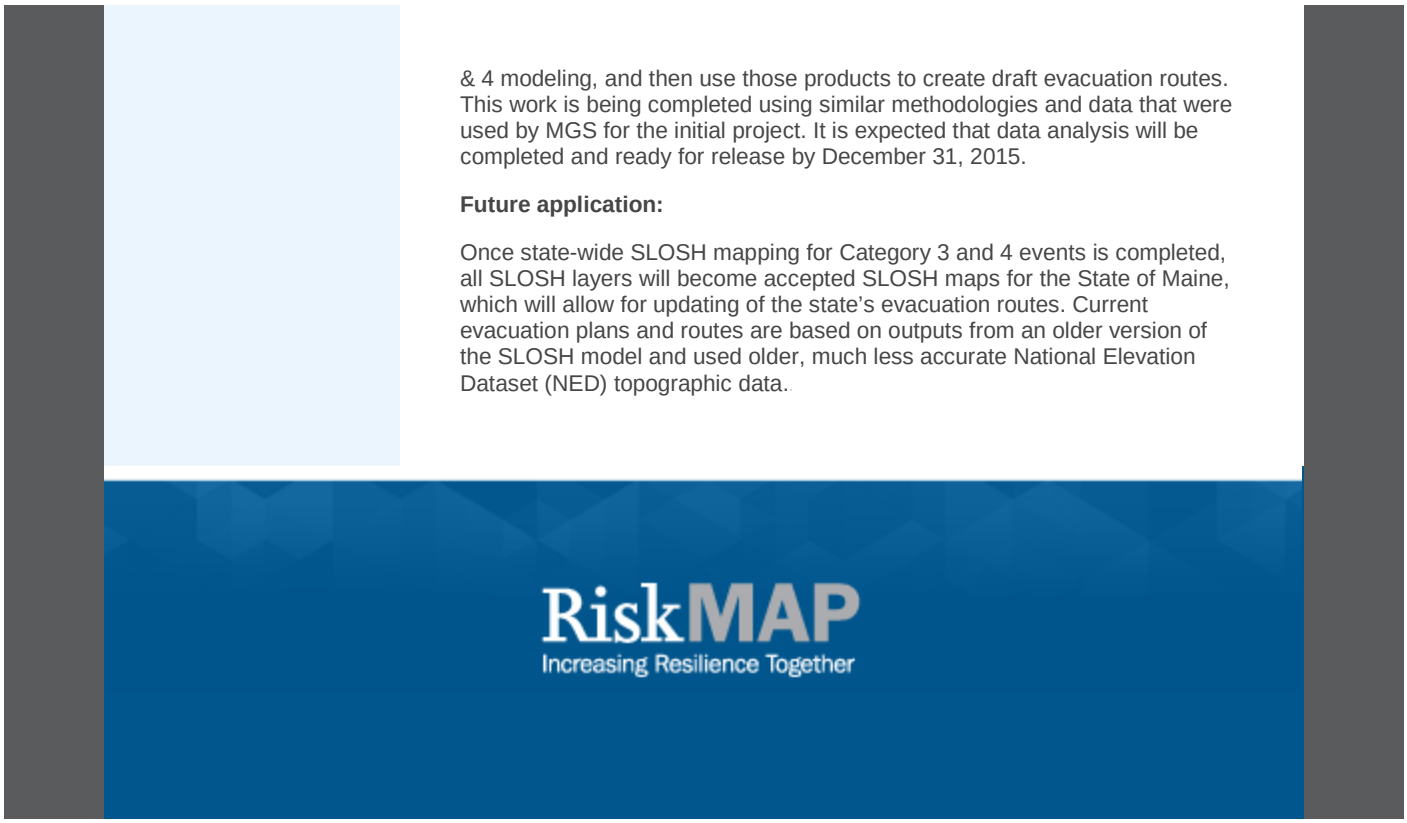
To get the word out to key stakeholders, an outreach plan was developed and executed through a multi-agency collaboration process between Maine Department of Agriculture, Conservation and Forestry (DACF) programs, including the Maine Floodplain Management Program (MFPM), Maine Geological Survey (MGS) and Maine Municipal Planning Assistance Program (MPAP), the Maine Emergency Management Agency (MEMA), and Federal National Hurricane Program (NHP) partners at FEMA and the US Army Corps of Engineers (USACE).

The project plan, as implemented, included the following:

- Initial outreach and consultation on proposed project and methodology with NHP partners with FEMA and the USACE;
- Development of an ArcGIS-based extension tool for handling SLOSH model outputs and LiDAR datasets;
- Data development and quality-control by ground-truthing outputs with previously created SLOSH maps;
- Final data development for Category 1 and 2 hurricanes at mean and mean high tide;
- Creation of county-based mailable postcards depicting potential inundation at well-known sites within each county, with information about the application's uses and availability; postcards were mailed to the head administrator, chief elected official, code enforcement officer, planner, fire chief, road commissioner, and police chief for all coastal towns and also to county emergency management officials; additional postcards have been handed out at conferences, speaking engagements, and to all state legislators;
- A State of Maine & DACF joint press release announced the availability of the data that included quotes from the governor and commissioner;
- Multiple informative news pieces followed the press release, and the Maine Public Broadcasting Network aired a news piece about it during "Maine Things Considered" on the day following the press release; and
- Development and release of the ArcGIS online web mapping tool.

Ongoing work:

The feedback about the modeling and Web application has been enormously positive. In late 2014, discussions with the Maine Silver Jackets team resulted in USACE using internal funding to continue the work to complete category 3



- The Maine CTP has developed ongoing partnerships with other local, state and federal agencies as well as private and non-profit entities to promote better floodplain mapping.
- The Maine CTP is continuing to participate in Silver Jackets partnership, which recently assessed 698 stream crossings inventoried by the Maine Stream Connectivity working group for capacity to handle the expected water flows of 5, 10, 20, 50 and 100 year return events.

Risk MAP Status

Table 1 below presents Maine's current floodplain mapping inventory. Detailed studies of floodplain miles are the most precise, but also most expensive and therefore sometimes cost prohibitive. They require engineering analysis of flooding hydrology (essentially, the amount of water that will be carried by a flooding source during a flood event) and hydraulics (how the characteristics of the flooding source will impact the level of flooding). Approximate studies of floodplain miles are the next best option and rely on Flood data and may rely on information from a variety of sources such as soil maps, high water profiles, aerial images of previous floods, and topo maps to approximate the base floodplain. In Maine, there are thousands of miles of floodplains that are managed by the Land Use Planning Commission (LUPC). These miles are often unmapped entirely, as the population and development rates in LUPC areas are so low as to not warrant the expense of floodplain mapping.

The information in Table 1 reflects the mapping that has recently been done for the coastal counties as well as mapping that has taken place on streams that Maine shares with New Hampshire.

Table 1. Maine's Floodplain Mapping Inventory.

Watershed	Detailed Miles	Approximate Miles	Total Mapped	Unmapped Miles	% Mapped
Allagash		10	10	862	1%
Aroostook	89	488	577	1304	31%
Dead		64	64	556	10%
East Branch Penobscot	5	51	56	804	6%
Fish	13	207	220	435	34%
Lower Androscoggin	564	743	1307	319	80%
Lower Kennebec	532	1548	2080	700	75%
Lower Penobscot	258	893	1151	690	63%
Maine Coastal	132	836	968	1310	42%
Mattawamkeag	23	582	605	626	49%
Meduxnekeag	18	294	312	209	60%
Piscataqua-Salmon Falls	284	378	662	67	91%
Piscataquis	129	358	487	662	42%
Presumpscot	212	537	748	145	84%
Saco	307	625	932	158	86%
St. Croix	25	255	280	535	34%
St. George-Sheepscot	122	733	855	41	95%
Upper Androscoggin	72	102	174	518	25%
Upper Kennebec	2	68	70	1059	6%
Upper St. John	39	285	324	1369	19%
West Branch Penobscot	6	21	27	1511	2%
Total	**2831**	**9079**	**11910**	**13881**	**46%**

Activities in Maine Counties Effected by Risk MAP projects

Summary:

Androscoggin County Digital Flood Insurance Rate Maps (DFIRMs) became effective on July 8, 2013. Sagadahoc, Lincoln, and Waldo County DFIRMs became effective in July 2015. Each of the counties has new detailed coastal analysis for all coastal special flood hazard areas (SFHA). Maps in Hancock and Knox County are scheduled to become effective in July 2016. Washington County preliminary DFIRMs were released in December 2015 and Cumberland and York County draft maps were released in August of 2015.

Cumberland County

New preliminary maps were developed for Cumberland County as part of the Risk MAP conversion process. All communities with Atlantic Ocean coastal exposure are being updated with new coastal

models based on the latest coastal analysis methods. This new analysis combined with 2006 LiDAR data was used to do a complete update of coastal floodplain data. All floodplain maps in the county have been converted to digital format with new ortho photo base mapping.

The map finalization process was put on hold in February 2014 pending the Scientific Resolution Panel (SRP) decision for Plymoth County, MA as the outcome would impact the appeals for Cape Elizabeth, Falmouth, Harpswell, Portland, and South Portland in Cumberland County.

FEMA notified communities that they would be going back to the work-map stage and using newly available LiDAR for the inland areas of the county as a basis to re-delineate selected detailed riverine SFHAs and provide new, model-backed SFHAs for some inland riverine areas.

The SRP issued a ruling on July 10, 2015 finding that "Based on the submitted scientific and technical information, and within the limitations of the SRP, the Panel has determined that the Community's (Scituate, MA and Marshfield, MA) data and methodology does not satisfy NFIP standards, therefore FEMA's data is not corrected, contradicted, or negated"

FEMA issued draft maps in August, 2015 depicting the updated inland zone A modeling and zone AE redelineation.

York County

New preliminary maps were developed for York County as part of the Risk MAP conversion process. All communities with Atlantic Ocean coastal exposure are being updated with new coastal models based on the latest coastal analysis methods. This new analysis combined with 2006 LiDAR data was used to do a complete update of coastal floodplain data. All floodplain maps in the county have been converted to digital format with new ortho photo base mapping.

The map finalization process was put on hold in February 2014 pending the Scientific Resolution Panel (SRP) decision for Plymoth County, MA as the outcome may impact the appeals for Biddeford, Kennebunk, and Kennebunkport in York County.

FEMA notified communities that they would be going back to the work-map stage and using newly available LiDAR for the inland areas of the county as a basis to re-delineate selected detailed riverine SFHAs and provide new, model-backed SFHAs for some inland riverine areas.

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FEMA issued draft maps in August, 2015 depicting the updated inland zone A modeling and zone AE redelineation.

Androscoggin County

Androscoggin County was the first county undertaken in the Risk MAP program, the successor to the Map Mod program. The work in Androscoggin County included:

- Acquisition of high-resolution topography for the whole county
- 140 miles of new detailed study
- 191 miles of new approximate study
- 111 miles of re-delineated floodplains

All communities within Androscoggin County are being shown on a single set of Countywide FIRMS. The most significant change is that the new maps have an ortho photo base map that will greatly improve the accuracy of floodplain determinations. In addition, all floodplain boundaries have been updated. Floodplains with elevations have been re-delineated using LiDAR data. Floodplains without elevations were recalculated using the LiDAR and new engineering techniques. Preliminary DFIRM maps were issued in May of 2011 and will became effective on July 8 of 2013. This is the first county in Maine to achieve nearly 100% of its stream miles meeting NVUE standards.

Sagadahoc, Lincoln, and Waldo Counties

The Risk MAP Discovery process of stakeholder communication was completed in June of 2012 for 73 communities in Sagadahoc, Lincoln and Waldo counties.

Risk MAP work in the area included new coastal analysis for the entire coast within each of the four counties, new delineation of inland Zone A's, and re-delineation of existing inland Zone AE studies. The Risk MAP work leveraged recently acquired LiDAR data covering each of the four counties. Updated DFIRMs became effective in July 2015.

Knox, Hancock and Washington Counties

Risk MAP Discovery in the area was completed for Knox, Hancock and Washington Counties in June of 2012. The Discovery process involved data collection, community engagement, discovery meetings, and development of recommendations based on analysis of data and information gathered. The Discovery entailed a significant collection of tabular and spatial data for all communities from Federal and State sources, as well as local information collected through community questionnaires.

Preliminary maps were produced for Hancock County in 2014, and work maps were produced for Washington County. The updated maps include new coastal analysis for the entire coastline of Hancock and Washington counties. The Risk MAP work leveraged new topographic data from the 2010 Northeast LiDAR Project. Unfortunately, LiDAR data was only available for coastal communities and in most of those communities provides just partial coverage.

Maps in Hancock and Knox County are scheduled to become effective in July 2016. Washington County preliminary DFIRMs were released in December 2015.

Aroostook County

A few communities in Aroostook County have been updated with new DFIRMs. Allagash DFIRMs became effective in 2003, Eagle Lake's became effective in 2006, Van Buren's in 2008, and Mapleton's in 2009. A new study was initiated in 2009 for Fort Kent and includes the Saint John River and the Fish River. New high-resolution topographic data has been acquired for both of these rivers. The community received an updated base map using the latest available orthoimagery, however, unnumbered A-zones unaffiliated with the two rivers will not be updated with model based engineering. Fort Kent contracted with an engineer to recertify the levee built along the St. John River to protect its downtown area. Fort Kent DFIRMs are scheduled to become effective in July 2016.

Southern Portion of Lower Penobscot Watershed

The CTP is in the process of completing a Discovery project for the southern portion of the Lower Penobscot Watershed, shown selected in blue in the below map "Communities in Area of Interest". The purpose of this Discovery phase is to assess the extent to which further Risk MAP activities will be required. This assessment requires detailed consideration of the accuracy of Flood Insurance Rate Maps (FIRMs) in the project area of interest. It is the first step in the Risk MAP project cycle. If the Risk MAP work is continued, at some point in time it will lead to updating and replacement of the current Flood Insurance Study (FIS), including updated FIRMs. At the time of the production of this report, community officials had been contacted and requested to fill out a questionnaire regarding the status of the flood insurance rate mapping in their community, and to attend a Discovery meeting inthe watershed on April 26, 2016.

Communities in Area of Interest

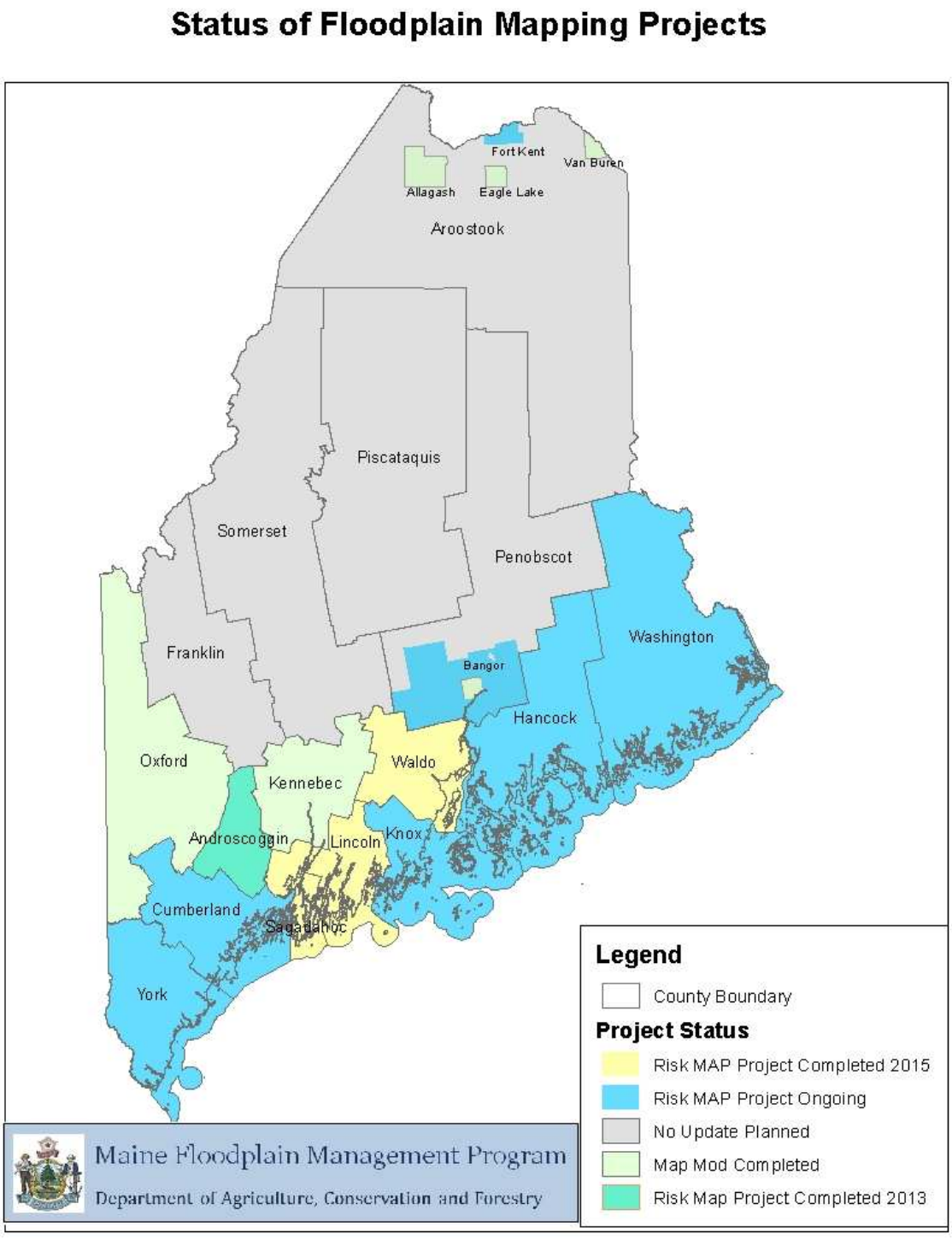


Figure 1 Status of Floodplain Mapping Projects in Maine

Targeting Mitigation Efforts Using Flood Risk Reports

(Significant authorship of this section attributed to Brent McCarthy of Booz Allen Hamilton Risk MAP PM Team, under contract to FEMA Region 1)

FEMA's Risk MAP program provides a series of tools to help identify flood risk (See Appendix A: Risk MAP Metrics for Application in Maine). One available tool is the "Flood Risk Report" which is one of the main non-regulatory products often provided when FEMA produces updated regulatory Flood Insurance Rate Maps. One of the key features of the report is an estimate of the damages, in dollars, should a flood occur. At a minimum, this information is available for the 1% flood event (previously called the "100-year flood") for each city or town being studied. The report also provides the ratio of flood damages to total value of the building stock in a community.

The flood risk reports for York, Cumberland, Sagadahoc, Lincoln, Waldo, and Hancock counties are currently available. The data presented in the table below was extracted from those reports. In addition to the estimated damages from a 1% flood, and the percentage this represents of the entire building stock, information was also extracted on the number of flood insurance policies in the community and the number of repetitive loss properties to further help identify where to target mitigation efforts.

The table lists communities by county (from southwest to northeast) that meet one of the following criteria:

- More than $20M damage expected to buildings in a community during a 1% flood event, or
- At least 5% of the community's building value is expected to be destroyed during a 1% event.

Table 3: Estimated Damages from Flood Risk Reports

County	Community	Estimated Damages from a 1% Flood	Damage as a % of Building Stock	# Flood Insurance Policies	# Repetitive Loss Properties
York	Kennebunk	$59.7M	4%	353	19
	Kennebunkport	$48.0M	6%	418	10
	Kittery	$35.4M	3%	52	2
	Ogunquit	$26.5M	5%	81	8
	Old Orchard Beach	$115.1M	15%	535	7

	Saco	$31.2M	2%	273	11
	Sanford	$29.5M	1%	43	3
	Wells	$208M	12%	860	15
	York	$62.9M	3%	613	26
Cumberland	Falmouth	$27.5M	2%	39	1
	Harpswell	$31.5M	4%	166	0
	Portland	$99.1M	1%	286	0
	South Portland	$49.4M	1%	80	0
	Scarborough	$168M	6%	285	2
	Westbrook	$94.5M	4%	36	1
Sagadahoc	Arrowsic	$3.3M	5%	1	0
	Bath	$21.2M	2%	38	1
Lincoln	Boothbay	$20.8M	4%	75	2
	Boothbay Harbor	$19.6M	3%	94	1
	Edgecomb	$9M	6%	8	0
	Newcastle	$13.7M	5%	10	0
	South Bristol	$9.8M	5%	26	1
Waldo	Islesboro	$8.6M	5%	18	0
Hancock	Bar Harbor	$20M	2%	27	0
	Cranberry Isles	$4.7M	6%	12	0
	Southwest Harbor	$21.5M	5%	30	0

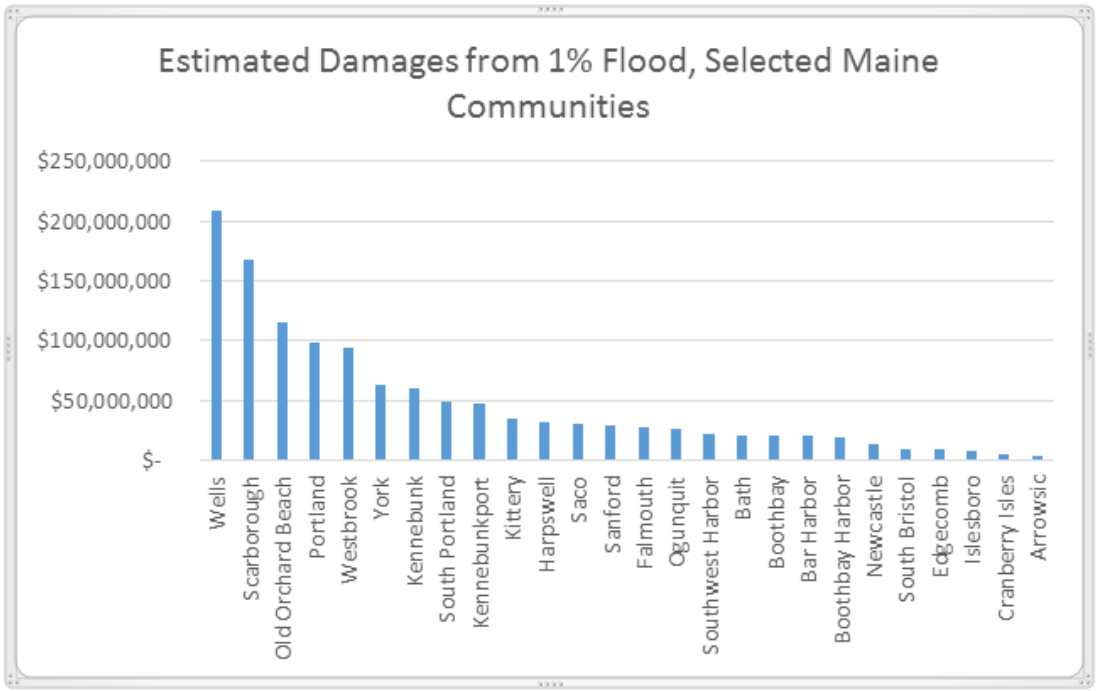
To further grasp where flood damages are the most severe, the information in the table was sorted according to the estimated damages from the 1% flood, as presented in the table and chart below.

Table 4: Estimated damages sorted by cost of damages from 1% flood

Community	County	Estimated Damages from a 1% Flood	Damage as a % of Building Stock	# Flood Insurance Policies	# Repetitive Loss Properties
Wells	York	$208,000,000	12%	860	15
Scarborough	Cumberland	$168,000,000	6%	285	2
Old Orchard Beach	York	$115,100,000	10%	535	7
Portland	Cumberland	$99,100,000	1%	286	0
Westbrook	Cumberland	$94,500,000	4%	36	1
York	York	$62,900,000	3%	613	26
Kennebunk	York	$59,700,000	4%	353	19
South Portland	Cumberland	$49,200,000	1%	80	0
Kennebunkport	York	$48,000,000	6%	418	10
Kittery	York	$35,400,000	3%	52	2
Harpswell	Cumberland	$31,500,000	4%	166	0
Saco	York	$31,200,000	2%	273	11
Sanford	York	$29,500,000	1%	43	3
Falmouth	Cumberland	$27,500,000	2%	39	1
Ogunquit	York	$26,500,000	5%	81	8
Southwest Harbor	Hancock	$21,500,000	5%	30	0
Bath	Sagadahoc	$21,200,000	2%	38	1
Boothbay	Lincoln	$20,800,000	4%	75	2
Bar Harbor	Hancock	$20,000,000	2%	27	0

Boothbay Harbor	Lincoln	$19,600,000	3%	94	1
Newcastle	Lincoln	$13,700,000	5%	10	0
South Bristol	Lincoln	$9,800,000	5%	26	1
Edgecomb	Lincoln	$9,000,000	6%	8	0
Islesboro	Waldo	$8,600,000	5%	18	0
Cranberry Isles	Hancock	$4,700,000	6%	12	0
Arrowsic	Sagadahoc	$3,200,000	5%	1	0

Table 5: Estimated Damages from 1% Flood, bar graph



This information helps clarify how devastating a 1% flood would be should it occur. Easily, over $1 billion in damages could occur in such an event. It also demonstrates that for the six counties examined, the damages are concentrated primarily in coastal communities in York and Cumberland counties. Though the information is not statewide, it can be used to help prioritize mitigation investigations. The table also shows the relative impact of the 1% event. Such an event would likely be more disruptive on a per capita basis in communities such as Edgecomb, where 6% of the value of its buidings is estimated to be destroyed, than in Portland, where 1% is estimated.

Each flood risk report also identifies potential mitigation activities that can be further examined for their applicability to site specific circumstances in Maine. They are broken down into the following categories:

- Preventative Measures to reduce future vulnerability to flooding, such as zoning, open space preservation, and building codes.
- Property Protection Measures to protect existing building by building relocation, acquisition, building elevation, barrier installation, or building retrofit
- Natural Resource Protection Activities such as wetland protection, erosion and sediment control, and primary frontal dune protection.
- Structural Mitigation Projects such as reservoirs, retention and detention basins, levees, floodwalls, and coastal protection measures.
- Public Education and Awareness Activities such as updated flood maps, and outreach projects.
- Emergency Service Measures such as hazard warning systems, critical facilities protection.

Some of the measures that may be appropriate for Maine include:

Preventative Measures – An example that is common in other New England locations (Connecticut and Rhode Island) is adopting the Limit of Moderate Wave Action (LiMWA) in the building code. This would apply to beach-type settings and would require higher building standards for locations within the LiMWA.

Property Protection Measures – This could include measures as simple as elevating utilities and moving valuables from basements to more complex measures such as elevating or relocating buildings. Elevation, relocation, and acquisition type mitigation activities may be attractive especially for repetitive loss properties, where insurance claims are much higher than other properties.

Natural Resource Protection – Erosion has been identified as a concern in the flood risk reports in many bluff areas. Erosion and sediment controls are appropriate mitigation activities. Protection of primary frontal dunes in beach areas is an effective mitigation activity for protecting property landward of the dune.

Structural Mitigation Projects – The USGS has evaluated many of the culverts within the State to establish their condition and capacity. This database is very useful in identifying culverts for renovation or replacement. Seawalls (and other coastal infrastructure) could be examined to assess their condition and whether they are serving the function for which they were designed. They could also be examined to assess whether they can be cost-effectively retrofitted for a higher level of protection. In conjunction with the Maine Emergency Management Agency, dams can be rehabilitated, retrofitted, or removed to help mitigate flood impacts.

Status of Collection of High Resolution Topography

As stated in the 2010 Business Plan, accurate topographic data, typically high resolution Light Detection and Ranging (LiDAR) data, is the cornerstone to improved flood mapping, and is also a product desired by private organizations and all levels of government. The FMP has devoted significant time and effort towards mobilizing partnerships amongst stakeholders to increase the inventory of high resolution topography. That, combined with direct FEMA funding for LiDAR missions, has accelerated LiDAR coverage within the State. At the time of the 2010 business plan, there were 2,300 square miles of LiDAR coverage in the State. This has increased significantly to 12,000 square miles. There will be 2,800 additional square miles of data available for use by June 2016, and an additional 5,000 square miles worth of data are being collected this year.

The 2010 Business Plan identified outdated and inaccurate floodplain maps as a major problem, with a cost to property owners correcting mapping deficiencies through FEMA's Letter of Map Change (LOMC) process of over $3M and rising. High resolution topography is an essential component in the process of accurately updating the flood mapping inventory. Though there is still no high resolution topography for large areas of Maine, the dramatic increase in coverage is a major step forward in achieving accurate floodplain mapping.

Most of the areas of the state that currently have LiDAR coverage have been or will soon be digitally re-mapped through the Map Mod or Risk MAP program. Areas with LiDAR coverage that have not yet been digitally re-mapped and are relatively well-developed are the upper portion of the Lower Kennebec watershed, as well as portions of the Aroostook and the Meduxnekeag watersheds. Areas that are soon to get LiDAR coverage that are relatively well-developed and either have never been digitally mapped or were digitally mapped based on modeling that did not use LiDAR include the upper portion of the Lower Androscoggin in southern Oxford County, and the northwestern portion of the Lower Kennebec Watershed as well as the Dead Watershed in Franklin County.

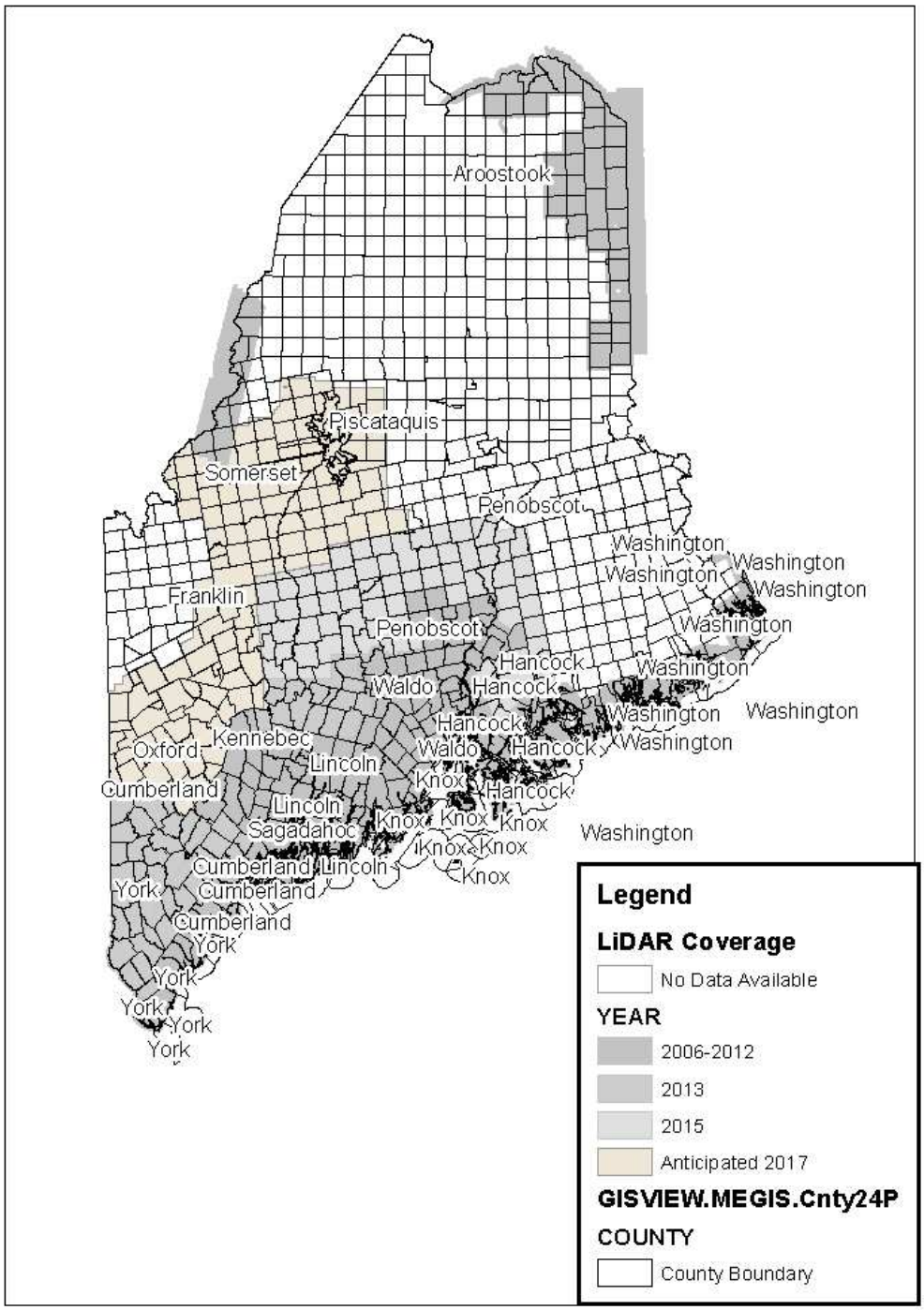


Figure 2 Maine LiDAR Coverage Status

Recent and Proposed Efforts with Other Maine Partners

In 2013 FEMA allocated nearly $47,000 to LiDAR acquisition. The Maine CTP leveraged this resource with funding from other state and Federal agencies to acquire 2,200 square miles of new LiDAR data meeting USGS V13 level 2 specifications. The data acquired in this project supported 9cm vertical accuracy and 1' equivalent contours. This partnership included the federal agencies of USGS, Natural Resources Conservation Service (NRCS) Maine, NRCS National Geospatial Center of Excellence (NGCE) and FEMA. State agencies participating included were the Maine Department of Transportation, Maine Emergency Management Agency and the Department of Health and Human Services. The total project leveraged FEMA funding at a ratio of almost 12 to 1 with a final project acquisition cost of $562,572.

In 2016, the FMP will continue to collaborate with other government entities, to emulate the success achieved by the Maine GeoLibrary Board in 2010, where they leveraged a $20,000 commitment of state funds to achieve a $2.47M project led by USGS to acquire LiDAR along the coastline from Maine to New York. The Maine Geolibrary is a strong CTP partner, and continues to make exceptional gains in state LiDAR coverage. By the middle of 2017, Maine will have approximately double the amount of LiDAR coverage that was available in 2010.

The list of other potential LiDAR acquisition partners are listed in Table 6.

Table 6. Potential LiDAR Acquisition Partners for the State of Maine.

Federal Agencies:	State, Local and Private Agencies and Organizations:
USGS	Department of Environmental Protection
FEMA	Department of Transportation
	Local Communities
USDA	Counties
	The Nature Conservancy
US DOT, Federal Highway	Maine Coast Heritage Trust
	Maine GeoLibrary
NGA	University of Maine
	Maine Department of Human Services
	Maine Department of Agriculture, Conservation, and Forestry

The Benefits of New Zone A Mapping

In the past, floodplain mapping was accomplished through both "detailed" and "approximate" methods. The floodplain maps where detailed methods were used are typically shown as Zone AE, and Zone A where approximate methods were used. The 2010 Business Plan identified the State's inventory of Zone A floodplain mapping as most problematic and most cost effective to fix. Property at risk is often shown outside the regulatory floodplain, and property with less chance of flooding is often shown within the regulatory floodplain. The inventory of Zone A mapping is more than twice the number of miles as the Zone AE mapping. As shown in Figures 3 through 6, this has resulted in a large number of requests to correct mapping deficiencies. Since 1983, there have been 5,117 Letters of Map Amendment (LOMAs) and 124 Letters of Map Revision (LOMR) completed in Maine. On a per capita basis, the rate of Letters of Map Change (LOMC) in Maine is the highest in the country.

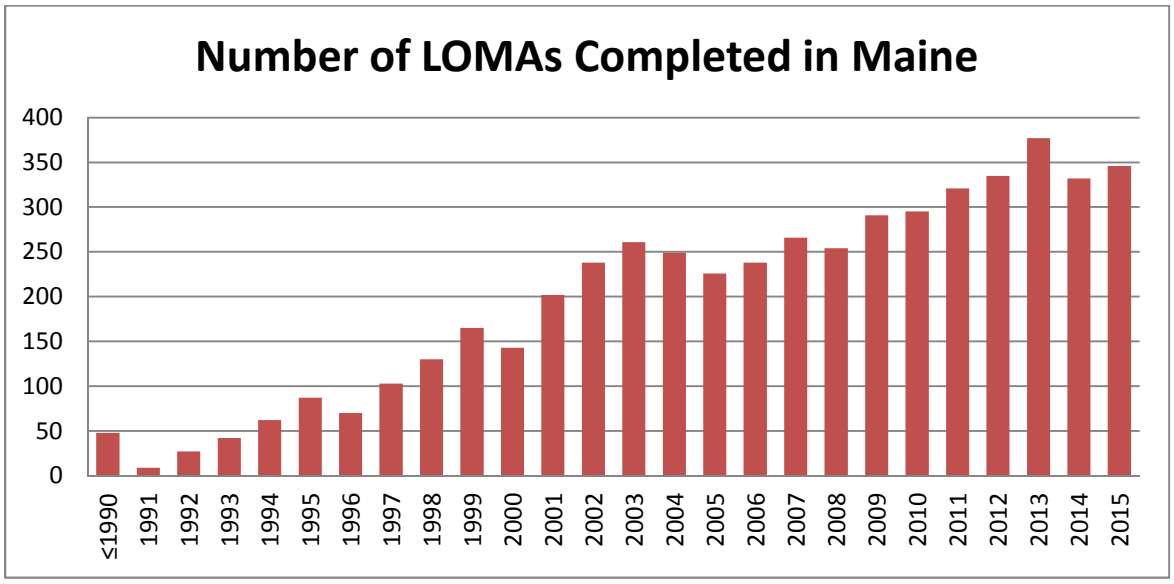


Figure 3. LOMAs Completed in Maine since 1983.

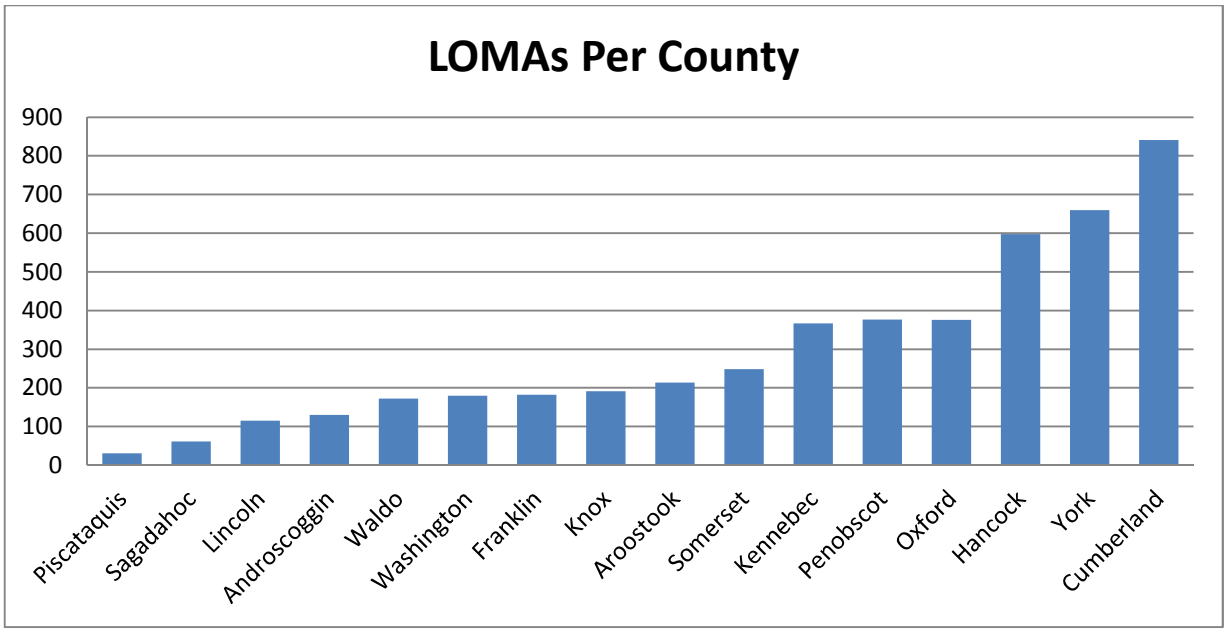


Figure 4. LOMAs Completed in Maine by County.

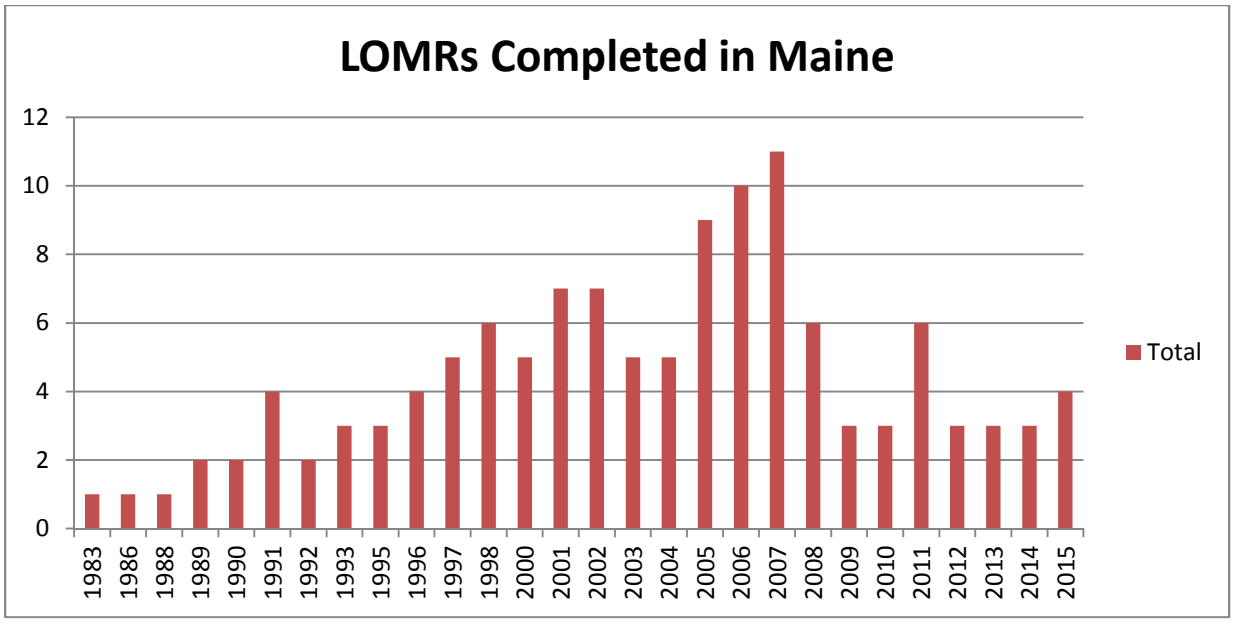


Figure 5. LOMRs Completed in Maine since 1983.

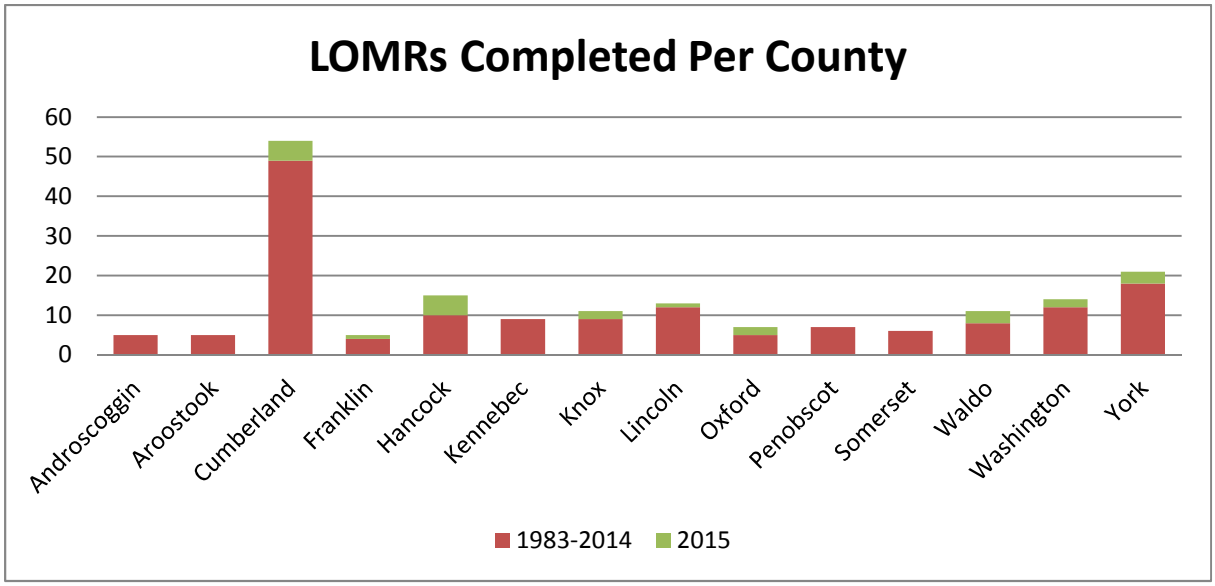


Figure 6. LOMRs Completed in Maine by County.

Maine's Coordinated Needs Management Strategy Validation and Maintenance

The Coordinated Needs Management Strategy (CNMS) is a geospatial representation of flooding source centerlines of FEMA's Flood Insurance Rate Maps (FIRMS). The centerlines enable calculation of New, Validated, or Updated Engineering (NVUE) metrics. FEMA measures the quality of floodplain mapping through its CNMS inventory. Regular maintenance of the CNMS database is important for understanding and managing Maine's inventory of flood studies.

Table 7 provides a breakdown of the estimated costs for annual study validation and maintenance of the Coordinated Needs Management Strategy (CNMS) database within the State of Maine. CNMS validation involves assessing the validity of engineering study data to determine whether or not there is an adequate level of flood hazard risk identified on a community's FIRM. For floodplains studied by detailed methods (e.g., Zone AE, AH or AO), the process evaluates the existing floodplain against a list of critical and secondary elements defined in Appendix A of the CNMS Technical Reference. These elements include changes in land use, new/removed bridges and culverts, and accounting for recent flood events captured by gage data. When a floodplain study is found to be deficient as a result of the validation process, it is labeled as "Unverified" in the CNMS database. Procedures for evaluating the validity of Zone A (approximate) floodplains are defined in FEMA's First Order Approximation Guidance Procedures. Zone A validation procedures include assessment of topographic data sources, changes in hydrology, checking for significant development in the watershed, and checking if the Zone A study is supported by modeling or sound engineering judgment. When all initial Zone A validation checks have

been conducted, Zone A studies may also be compared to results of a First Order Approximation (FOA) to determine validation status.

Estimated unit costs for conducting CNMS validation on detailed or approximate studies is based on per county rather than per mile. The level of effort to assess 30 miles of Zone AE in a county is basically the same if there were 200 miles of Zone AE in the same county. For Zone A assessments, there are several preparatory steps that can be done at the State level (e.g., inventory of best available topography, inventory of regression equations, and preparation of NUCI/NLCD data for checking significant development). Validation of approximate or detailed studies both require some research of the effective FIS for each county. Both types of studies also require documentation of the methods, assumptions, and data sources used for validation.

The validity of a floodplain study is required by FEMA to be assessed every 5 years. The five-year expiration date of a valid study in CNMS is determined by adding 5 years to the STATUS_DATE attribute in CNMS. When a study reaches its expiration date in CNMS it becomes UNVERIFIED unless determined otherwise through the validation assessment steps. The annual distribution of expiring valid miles in Maine may require rebalancing among Maine's 16 counties so as not to have all valid miles in the State expire in the same year – referred to as an "NVUE cliff". Rebalancing involves evaluation of expiring miles in upcoming year(s) and planning which studies to perform validation work on so that a relatively equal balance of CNMS validation effort can be applied every year so as to avoid an NVUE cliff.

The validation status of a study represented in CNMS is also impacted by Letters of Map Revisions (LOMRs) and regular update of the CNMS database to reflect recently completed LOMRS is an important aspect of annual CNMS maintenance.

Table 7: State of Maine CNMS Validation and Maintenance Estimate

State of Maine CNMS Validation & Maintenance							
Estimated Average Annual Breakdown & Five Year Plan Total							
Task Description	Unit	Hours	Rate	Cost	Quantity	Total Cost	Notes
1.0 CNMS Validation						**$18,400**	
1.1 Detailed Study Validation (critical & secondary element evaluations)	County	40	$100	$4,000	3.2	$12,800	Quantity = 16 Counties in Maine, spread over 5 years
1.2 Approximate Study Validation (prepare state-wide assessment data)	State	40	$100	$4,000	1	$4,000	
1.2.1 Approximate Study Validation Checks	County	1	$100	$100	3.2	$320	Quantity = 16 Counties in Maine, spread over 5 years
1.3 CNMS database updates and Validation documentation	County	4	$100	$400	3.2	$1,280	Quantity = 16 Counties in Maine, spread over 5 years
2.0 CNMS Maintenance						**$4,200**	
2.1 LOMR Integration	1 LOMR	2	$100	$200	5	$1,000	Based on average of 5 LOMRs per year since 2010. Average of 5.6 LOMRs per year since 1983
2.2 Quarterly updates of ongoing studies, QA/QC, delivery to R1 for national roll-up	Each Fiscal Quarter	8	$100	$800	4	$3,200	
2.3 Rebalance of expiring miles	State	4	$100	$400	1	$400	
Annual Total						**$22,600**	
Five Year Plan						**$113,000**	
Notes: Actual breakdown of annual expiring miles may vary, resulting in some variability in annual costs							
Costs do not include CNMS training or project management							

Maine's CNMS Status

FEMA measures the quality of floodplain mapping through its Coordinated Needs Management Strategy (CNMS), where it establishes the portion of its national mapping inventory (riverine) that is New, Validated, or Based on Updated Engineering (NVUE). FEMA's national goal is for 80% of study miles to meet the NVUE standard. An analysis of the current NVUE status of Maine's floodplain miles was completed as part of this business plan. Maine has nearly fifty percent of the land area in Region 1 and its 12,656 miles of mapped riverine floodplains represent more than 35% of the SFHA miles in this region. Table 8 shows the state's CNMS status as of mid-March 2016.

Though only 21% (2,618 miles) of the total inventory is considered valid, this is more than double the NVUE compliant miles at the time of the 2010 Business Plan, and represents a 10% increase from 2014. Significant increases in NVUE compliance are highlighted in red in Table 8 below. This does not account for mapping in process that cannot be counted until the maps are presented to the public in final form. Relative to other study methods, performing new Zone A analysis using high resolution digital topography to replace the outdated and antiquated Zone A floodplains is a cost-effective way to improve Maine's floodplain mapping inventory. More miles will be added as Hancock, Knox, Washington and eventually Cumberland and York mapping becomes effective in 2016 and beyond.

While the inventory of detailed study streams has not changed significantly, floodplain mapping updates along the entire Maine coast is on-going and parts of the inland area are being studied or are under consideration to be studied. At a national level, the focus of Risk MAP has been and continues to be to

update the flood hazard identification of 100 percent of the nation's populated shoreline. This translates to 1,666 miles of coastline in Maine.

Table 8. Maine's NVUE Inventory by Watershed Miles

	Detailed						Approximate				Total		
Watershed	Unknown To Be Assessed	Unverified Being Studied	Unverified To Be Studied	Valid Being Studied	Valid NVUE Compliant	Total	Unkown Being Studied	Unverified To Be Studied	NVUE Compliant	Total	Inventory	Valid Miles	% Valid
Allagash						0		10		10	10	**0**	**0%**
Aroostook	71		1		17	89		488		488	577	**17**	**3%**
Dead						0		64		64	64	**0**	**0%**
East Branch Penobscot	5					5		51		51	56	**0**	**0%**
Fish	6	1	6			13		207		207	220	**0**	**0%**
Lower Androscoggin	176	106	44		283	609	65	505	236	806	1415	**519**	**37%**
Lower Kennebec	276		86		170	532	122	501	122	745	1277	**292**	**23%**
Lower Penobscot	237		8		14	259	22	753	119	894	1153	**133**	**12%**
Maine Coastal	131					131	357	484	352	1193	1324	**352**	**27%**
Mattawamkeag	23					23		582		582	605	**0**	**0%**
Meduxnekeag	18					18		294		294	312	**0**	**0%**
Piscataqua-Salmon Falls		5	127	30	152	314	378	427	144	949	1263	**296**	**23%**
Piscataquis	129					129		358		358	487	**0**	**0%**
Presumpscot	2		43		166	211	456	44	37	537	748	**203**	**27%**
Saco	67		119		121	307	496	128		624	931	**121**	**13%**
St. Croix	18				7	25	5	249		255	280	**7**	**2%**
St. George-Sheepscot	120				2	122	688	62	670	1420	1542	**672**	**44%**
Upper Androscoggin	27					27		33		33	60	**0**	**0%**
Upper Kennebec	2					2		68		68	70	**0**	**0%**
Upper St. John	12	4	4		6	26		210		210	235	**6**	**2%**
West Branch Penobscot	6					6		20		20	27	**0**	**0%**
Grand Total	**1326**	**116**	**437**	**30**	**938**	**2847**	**2590**	**5539**	**1680**	**9809**	**12656**	**2618**	**21%**

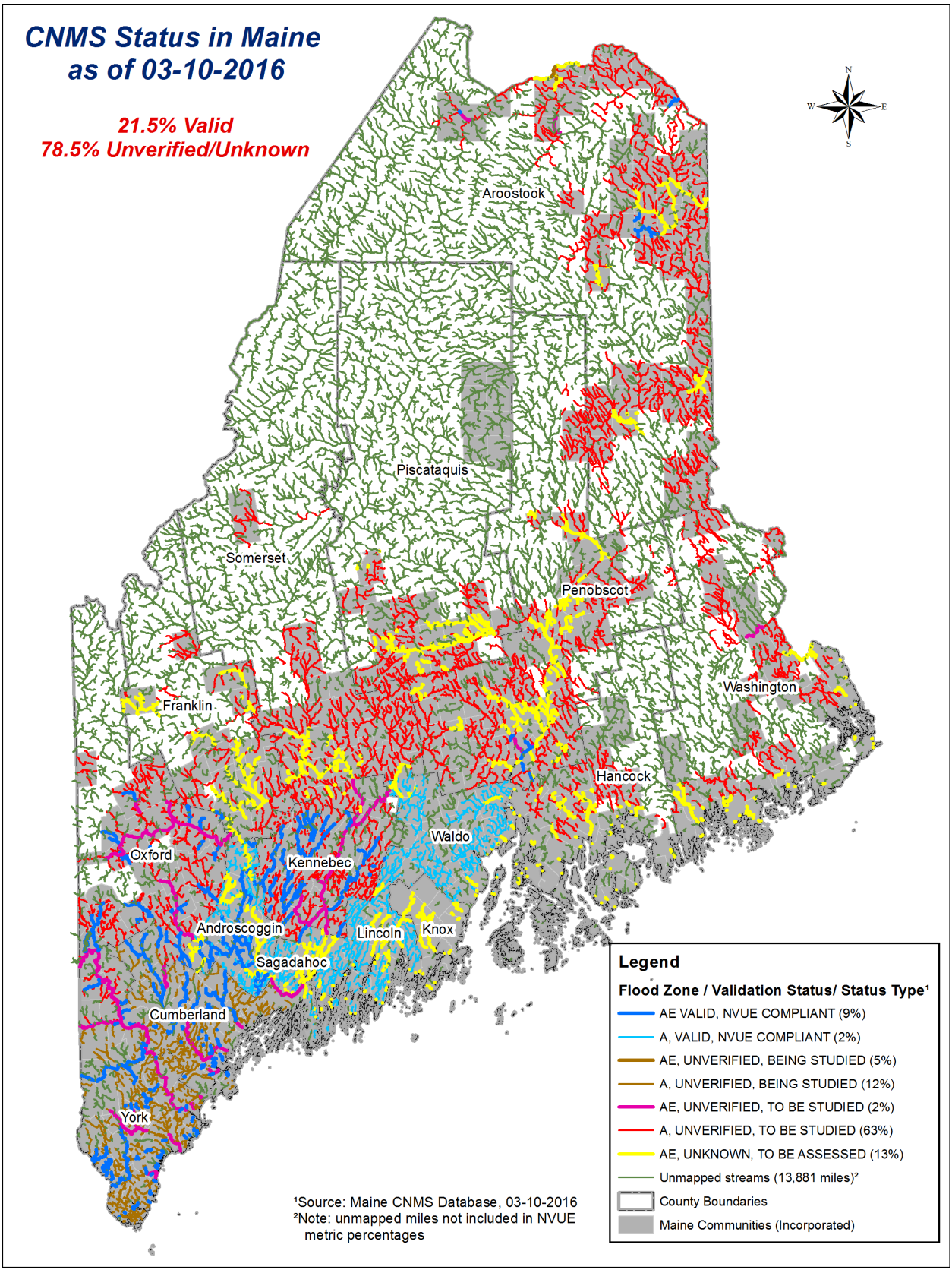


Figure 7. CNMS Status of Maine Riverine SFHA's

Planned Sequencing and Cost Estimates for Updating Maine's Floodplain Maps

For planning purposes, updating floodplain maps in many communities requires higher resolution topographic data than is currently available. Fortunately, new high resolution data is being collected all the time, as referenced in the above section on LiDAR. Furthermore, the state is currently working to complete a five year plan for acquiring a complete statewide LiDAR data set. It makes the most sense for the planned sequencing of floodplain mapping to follow the acquisition of LiDAR data and may need to be adjusted if LiDAR data acquisition deviates from the planned sequence of acquisition.

Below are estimated costs for new or updated watershed mapping. These estimates are for budgeting purposes and would need to be updated during the Discovery process to provide a more accurate assessment of estimated cost.

2016 – The Lower Penobscot River Watershed

1,540 Square Miles: LiDAR contribution value/cost = $616,000
Products Delivered:

- HUC 8 Discovery
- 2, 364 sq. miles of Terrain Processing
- 914 miles Approximate H&H
- 283 miles AE re-delineated
- 218 DFIRM Panels
- FIS
- Risk Map Products
- Post Preliminary Processing
- FEMA Cost $1,096,000

2017 - The Aroostook River and Meduxnekeag River Watersheds.

1902 Square Miles: LiDAR contribution value/cost = $760,800
Products Delivered:

- HUC 8 Discovery
- 3,034 sq. miles of Terrain Processing
- 783 miles approximate H&H
- 107 miles AE re-delineated
- 392 DFIRM Panels
- FIS
- Risk Map Products
- Post Preliminary Processing
- FEMA Cost $1,554,500

2018 – Lower and Upper Kennebec River Watershed (Somerset County, Kennebec)

3,597 Square miles LiDAR contribution value/cost = $1,438,800
Products delivered:

- HUC 8 Discovery
- 5,039 sq. miles of Terrain Processing
- 1616 miles Approximate H&H

533 miles AE re-delineated
616 DFIRM Panels
FIS
Risk MAP products
Post Preliminary Processing
FEMA Cost $2,552,000

2019 – West Branch of the Penobscot River Watershed (Piscataquis County)

2,007 Square Miles: LiDAR contribution value/cost = $802,800
Products Delivered:

HUC 8 Discovery
2,133 sq. miles of Terrain Processing
20 miles Approximate H&H
6 miles AE re-delineated
101 DFIRM Panels
FIS
Risk Map Products
Post Preliminary Processing
FEMA Cost $489,500

Looking Ahead

As we move into the next years, we will build on the above accomplishments and continue our efforts to:

- Work with FEMA and partners to ensure ongoing projects are completed with the best outcomes for the public in terms of cost savings and map product quality and usefulness
- Continue to partner with entities interested in expanding the LiDAR footprint across the state to accomplish the goal of 100% LiDAR coverage by 2019.
- Help FEMA accomplish its goals of increasing NVUE cost effectiveness by focusing on replacing antiquated paper Zone A mapping with new Zone A mapping using automated techniques on good quality digital mapping.
- Seeking ways to improve the quality of the floodplain mapping locally, thus reducing the need for property owners to pay for LOMCs
- Continue to seek new and innovative ways to bring matching funds into the program, to leverage recent and ongoing efforts to improving Maine's inventory of mapped flood hazards.
- Increase effectiveness of outreach activities, leading to better understanding of flood risks and actions to mitigation flood risk in communities

Glossary

Approximate flood studies: studies completed without full details of hydraulic structures in the flooding source and other parameters that may alter the flow and impact of storm waters.

CTP: Cooperating Technical Partners. Read more about the CTP program here at http://www.fema.gov/cooperating-technical-partners-program

Detailed flood study: studies that include a comprehensive inventory of hydraulic structures, bathymetry and other factors affecting the flow and impact of storm waters

Discovery process: developing a more comprehensive and holistic understanding of the flood risk and mitigation capabilities within those watersheds. The first step in the Risk MAP process

FIS: Flood Insurance Study

LiDAR data: Light detection and ranging technology that measures ground contours with a high degree of accuracy

Map MOD: FEMA's flood map modernization process, which has now been replaced by Risk MAP

NVUE: New, Validated, or Updated Engineering – a system of classifying the studies of flood hazard areas

Ortho photo base mapping: flood data depicted over aerial images, as opposed to the old system of depicting it over topographical contour maps

Risk MAP: Risk Mapping, Assessment, and Planning - is the Federal Emergency Management Agency (FEMA) Program that provides communities with flood information and tools they can use to enhance their mitigation plans and take action to better protect their citizens

Regulatory floodplain: Special Flood Hazard Area (SFHA)

SFHA: Special Flood Hazard Area (SFHA) or regulatory floodplain

Zone A: Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

Appendix A: Risk MAP Metrics for Application in Maine

Risk MAP Metrics for Application in Maine

There are four important metrics that are used as a measure of success within the Risk MAP program, NVUE, Action, Awareness and Deployment. The following describes how each of these metrics are being implemented within Risk Map and recommendations how the State of Maine will implement these metrics going forward.

NVUE

New, Validated, or Updated Engineering (NVUE) is a defined as a method to describe studies completed using engineering methods that are considered to be valid/appropriate, and which were conducted in areas which have not seen significant climatological, engineering or physical changes since the date of effective study. The CNMS database is used to identify NVUE compliant studies (valid) and studies that are non-compliant (unverified), due to a deficiency in one of the aforementioned categories which define FEMA NVUE Compliance.
The NVUE percentage is a ratio of the miles of validated (NVUE Compliant) flood hazard studies to the miles of all FEMA flood hazard studies with a given geography (watershed, region, state, county, etc..). The CNMS Inventory is currently utilized by FEMA as the sole mechanism for reporting NVUE metrics.

The State of Maine has recently updated its CNMS inventory to correctly attribute the validation status (Valid, Unverified, or Unknown) and Study Type (Being Studied, To Be Studied, To be Assessed, or NVUE Compliant). The State is prepared to continue to maintain the database as new studies are conducted, expiring miles are reviewed for validation and/or the First Order Approximation initiative is implemented.

Action

The Action metric is measured through local communities taking action to reduce risks that can be identified within their jurisdictions. The Action metric is a multi-tiered approach where community officials can document ideas and track the risk through to completion of the mitigation of that risk or completion of a Risk Map project. There are five action categories; Land use ordinances, local building codes, management best practices, mitigation projects and community identified mitigation programs. Actions are measured through the two metrics defined below:

1. The percentage of population (2010 Census) where Risk MAP helped identify new strategies or improve current planned mitigation actions, in direct collaboration with communities. There is a one year grace period once an idea is documented to allow for planning of risk mitigation during the Discovery process.

2. The percentage of population that has advanced identified mitigation actions. There is a two year delay for measuring this metric to allow for Risk Map progression.

Maine will begin to track and document ideas through the FEMA Mitigation Action Tracker (http://mat.msc.fema.gov/Default.aspx). Currently, there are no Actions identified on the Tracker for the State of Maine. The State of Maine will begin tracking Actions to be mitigated during FY14 with the expectation that funding opportunities will be identified to reduce risk within the State of Maine.

Risk Awareness

The Awareness metric is measured by the percentage of local officials (both inside and outside Risk MAP project areas) that are aware that flood risk is present in their Risk MAP communities. FEMA conducts an annual Flood Risk Awareness Survey to measure success. In addition to other important questions, officials are asked whether they believe their community is at risk of flooding. The national target for success was 68%- 70% nationwide in FY12 and maintain that level in FY13 and beyond.

The State of Maine will assist FEMA in increasing awareness for communities in Maine that are at risk from flooding. Outreach materials and newly developed DFIRM maps created by FEMA will be used to raise awareness of flood risk. Local officials managing areas that have been identified for new studies will be notified early on (before Discovery) that there are plans to study/update the maps in their jurisdictions. This will foster communication and raise awareness of potential flooding issues. In addition, the State of Maine will make the CNMS inventory available, so local officials and citizens are aware of studies that are valid, unverified or unknown. They will also be provided information on studies that will expire in any given year.

Deployment

The deployment metric is measured by the percentage of the population where Risk MAP has been deployed. The Deployment metric is developed as a ratio between populations receiving Risk MAP (numerator) updates over the entire national population (denominator). The target by the end of FY14 is 50%.

The State of Maine will assist FEMA Region 1 by developing a list tracking studies that have been deployed since the inception of Risk MAP. The percentage of studies deployed will also be tracked in a geospatial format, so that study extents can be tracked based on the geographic extents of the project. These tasks will be completed at the end of the Discovery process, once the final schedule is developed.

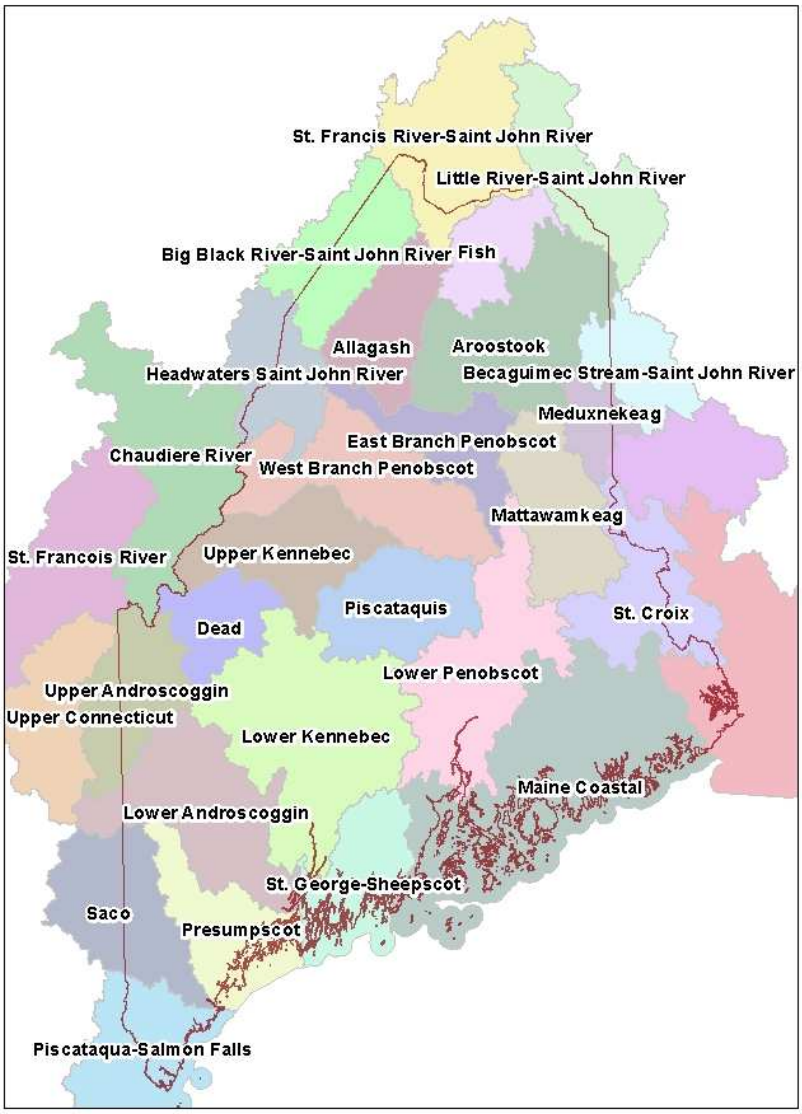
Appendix B: Maine Floodplain Mapping Cost Estimates

By HUC 8 Watershed

December 17, 2014

Cost estimate data provided by AECOM

Maine HUC 8 Watersheds



Purpose

Below are detailed estimated costs for updated floodplain mapping of Maine's HUC 8 watersheds. These estimates are for budgeting purposes and would need to be updated during the Discovery process to provide a more accurate assessment of estimated cost.

Data Origins

These cost estimates were produced by AECOM, a key partner in a team holding an IDIQ contract for Production and Technical Services for FEMA's Risk MAP program for several regions and FEMA headquarters. The estimates are based on state-of-the-art FEMA standards and specifications for producing Risk MAP products, both regulatory and non-regulatory.

First Order Approximate (FOA)

New to these cost estimates from previous years are estimates for conducting First Order Approximation (FOA). FEMA may require this for all new Risk MAP projects as part of discovery phase. FOA involves generating approximate flood hazard boundaries using mostly automated tools. The results of an FOA can be used for validation of existing Zone A's as well as for outreach and risk communication. FOA results are also scalable for eventual production of regulatory Zone A boundaries. If an FOA is performed on a watershed, then the standard Approximate H&H costs would be reduced if conversion to a regulatory product is required. That is why these detailed estimates include a line item for FOA upgrade – basically the estimated cost for taking the FOA to a regulatory product. Standard Approximate H&H cost line item (red text) is included for now and is not reflected in the total. Note that if the FOA + FOA Upgrade Costs = the total cost for Standard Approximate H&H.

ALLAGASH

HUC-8 Watershed:	**Allagash**				
Summary Data:					
Area (Sq Miles):					1228
Number of Communities:					50
Population (2010 Census Block Data):					42
Current Sources of Topography:				Sq Miles	%Coverage
		LiDAR		0	0%
		IFSAR		1228	100%
		USGS		1228	100%
Number of DFIRM Panels:					95
CNMS Inventory (miles):					
	Valid	Unverified		Unknown	Total
Detailed:	0	0		0	0
Approximate:	0	10.1		0	10.1
Coastal:	0	0		0	0
Unmapped:	0	0		862.1	862.1
Cost Estimate:		**Unit**		**Unit Cost**	**Cost**
New Topography:					
Estimated # of Square Miles of new LiDAR needed:		1228	$	400	$ 491,200
Discovery:	Per HUC 8	1	$	40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	10.1	$	75	$ 758
Terrain Processing:	Square Miles	1228	$	35	$ 42,980
Approximate H&H:	*Per Mile*	*10.1*	*$*	*175*	*$ 1,768*
Approximate H&H (FOA Upgrade):	Per Mile	10.1	$	100	$ 1,010
Redelineation Detailed:	Per Mile	0	$	650	$ -
Mapping / DFIRM Production:	Per Panel	95	$	1,250	$ 118,750
FIS Production:	Lump Sum	1	$	40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$	100,000	$ 100,000
Post Preliminary Processing:	Per Panel	95	$	1,000	$ 95,000
Total Planning level Estimate:					**$ 929,698**

AROOSTOOK

HUC-8 Watershed:	**Aroostook**				
Summary Data:					
Area (Sq Miles):					2401
Number of Communities:					81
Population (2010 Census Block Data):					33460
Current Sources of Topography:				Sq Miles	%Coverage
		LiDAR		701	29%
		IFSAR		2401	100%
		USGS		2401	100%
Number of DFIRM Panels:					282
CNMS Inventory (miles):					
	Valid	Unverified		Unknown	Total
Detailed:	16.6	0.6		71.3	88.5
Approximate:	0	488.4		0	488.4
Coastal:	0	0		0	0
Unmapped:	0	0		1303.9	1303.9
Cost Estimate:		**Unit**		**Unit Cost**	**Cost**
New Topography:					
Estimated # of Square Miles of new LiDAR needed:		1700	$	400	$ 680,000
Discovery:	Per HUC 8	1	$	40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	488.4	$	75	$ 36,630
Terrain Processing:	Square Miles	2401	$	35	$ 84,035
Approximate H&H:	*Per Mile*	*488.4*	*$*	*175*	*$ 85,470*
Approximate H&H (FOA Upgrade):	Per Mile	488.4	$	100	$ 48,840
Redelineation Detailed:	Per Mile	88.5	$	650	$ 57,525
Mapping / DFIRM Production:	Per Panel	282	$	1,250	$ 352,500
FIS Production:	Lump Sum	1	$	40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$	100,000	$ 100,000
Post Preliminary Processing:	Per Panel	282	$	1,000	$ 282,000
Total Planning level Estimate:					**$ 1,721,530**

DEAD

HUC-8 Watershed:	Dead			
Summary Data:				
Area (Sq Miles):				880
Number of Communities:				39
Population (2010 Census Block Data):				1164
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	0	0%
		IFSAR	880	100%
		USGS	880	100%
Number of DFIRM Panels:				66
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	0	0
Approximate:	0	64.4	0	64.4
Coastal:	0	0	0	0
Unmapped:	0	0	556.2	556.2
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		880	$ 400	$ 352,000
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	64.4	$ 75	$ 4,830
Terrain Processing:	Square Miles	880	$ 35	$ 30,800
Approximate H&H:	*Per Mile*	*64.4*	*$ 175*	*$ 11,270*
Approximate H&H (FOA Upgrade):	Per Mile	64.4	$ 100	$ 6,440
Redelineation Detailed:	Per Mile	0	$ 650	$ -
Mapping / DFIRM Production:	Per Panel	66	$ 1,250	$ 82,500
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	66	$ 1,000	$ 66,000
Total Planning level Estimate:				**$ 722,570**

EAST BRANCH PENOBSCOT

HUC-8 Watershed:	**East Branch Penobscot**			
Summary Data:				
Area (Sq Miles):				1114
Number of Communities:				39
Population (2010 Census Block Data):				1418
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	0	0%
		IFSAR	1114	100%
		USGS	1114	100%
Number of DFIRM Panels:				66
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	4.9	4.9
Approximate:	0	50.8	0	50.8
Coastal:	0	0	0	0
Unmapped:	0	0	803.9	803.9
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		1114	$ 400	$ 445,600
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	50.8	$ 75	$ 3,810
Terrain Processing:	Square Miles	1114	$ 35	$ 38,990
Approximate H&H:	*Per Mile*	*50.8*	*$ 175*	*$ 8,890*
Approximate H&H (FOA Upgrade):	Per Mile	50.8	$ 100	$ 5,080
Redelineation Detailed:	Per Mile	4.9	$ 650	$ 3,185
Mapping / DFIRM Production:	Per Panel	66	$ 1,250	$ 82,500
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	66	$ 1,000	$ 66,000
Total Planning level Estimate:				**$ 825,165**

FISH

HUC-8 Watershed:	**Fish**			
Summary Data:				
Area (Sq Miles):				892
Number of Communities:				39
Population (2010 Census Block Data):				5786
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	255	29%
		IFSAR	892	100%
		USGS	892	100%
Number of DFIRM Panels:				66
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	5.9	5.9
Approximate:	0	7.1	0	7.1
Coastal:	0	0	0	0
Unmapped:	0	0	435.3	435.3
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		637	$ 400	$ 254,800
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	7.1	$ 75	$ 533
Terrain Processing:	Square Miles	892	$ 35	$ 31,220
Approximate H&H:	*Per Mile*	*7.1*	*$ 175*	*$ 1,243*
Approximate H&H (FOA Upgrade):	Per Mile	7.1	$ 100	$ 710
Redelineation Detailed:	Per Mile	5.9	$ 650	$ 3,835
Mapping / DFIRM Production:	Per Panel	66	$ 1,250	$ 82,500
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	66	$ 1,000	$ 66,000
Total Planning level Estimate:				**$ 619,598**

LOWER ANDROSCOGGIN

HUC-8 Watershed:	**Lower Androscoggin**			
Summary Data:				
Area (Sq Miles):				1967
Number of Communities:				76
Population (2010 Census Block Data):				179974
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	689	35%
		IFSAR	1967	100%
		USGS	1967	100%
Number of DFIRM Panels:				435
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	324.4	43.7	175.9	544
Approximate:	171.6	505.3	64.8	741.7
Coastal:	0	0	0	0
Unmapped:	0	0	319.5	319.5
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		1278	$ 400	$ 511,200
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	741.7	$ 75	$ 55,628
Terrain Processing:	Square Miles	1967	$ 35	$ 68,845
Approximate H&H:	*Per Mile*	*741.7*	*$ 175*	*$ 129,798*
Approximate H&H (FOA Upgrade):	Per Mile	741.7	$ 100	$ 74,170
Redelineation Detailed:	Per Mile	544	$ 650	$ 353,600
Mapping / DFIRM Production:	Per Panel	435	$ 1,250	$ 543,750
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	435	$ 1,000	$ 435,000
Total Planning level Estimate:				**$ 2,222,193**

LOWER KENNEBEC

HUC-8 Watershed:	**Lower Kennebec**			
Summary Data:				
Area (Sq Miles):				3451
Number of Communities:				131
Population (2010 Census Block Data):				217111
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	1322	38%
		IFSAR	3451	100%
		USGS	3451	100%
Number of DFIRM Panels:				505
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	234.4	21.7	275.7	531.8
Approximate:	0	1426.1	122.2	1548.3
Coastal:	0	0	0	0
Unmapped:	0	0	700.2	700.2
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		2129	$ 400	$ 851,600
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	1548.3	$ 75	$ 116,123
Terrain Processing:	Square Miles	3451	$ 35	$ 120,785
Approximate H&H:	*Per Mile*	*1548.3*	*$ 175*	*$ 270,953*
Approximate H&H (FOA Upgrade):	Per Mile	1548.3	$ 100	$ 154,830
Redelineation Detailed:	Per Mile	531.8	$ 650	$ 345,670
Mapping / DFIRM Production:	Per Panel	505	$ 1,250	$ 631,250
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	505	$ 1,000	$ 505,000
Total Planning level Estimate:				**$ 2,905,258**

LOWER PENOBSCOT

HUC-8 Watershed:	**Lower Penobscot**			
Summary Data:				
Area (Sq Miles):				2364
Number of Communities:				101
Population (2010 Census Block Data):				146777
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	824	35%
		IFSAR	2364	100%
		USGS	2364	100%
Number of DFIRM Panels:				218
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	14.4	7	261.2	282.6
Approximate:	0	768.8	145.4	914.2
Coastal:	0	0	0	0
Unmapped:	0	0	690.3	690.3
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		1540	$ 400	$ 616,000
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	914.2	$ 75	$ 68,565
Terrain Processing:	Square Miles	2364	$ 35	$ 82,740
Approximate H&H:	*Per Mile*	*914.2*	*$ 175*	*$ 159,985*
Approximate H&H (FOA Upgrade):	Per Mile	914.2	$ 100	$ 91,420
Redelineation Detailed:	Per Mile	282.6	$ 650	$ 183,690
Mapping / DFIRM Production:	Per Panel	218	$ 1,250	$ 272,500
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	218	$ 1,000	$ 218,000
Total Planning level Estimate:				**$ 1,712,915**

MAINE COASTAL

HUC-8 Watershed:	**Maine Coastal**			
Summary Data:				
Area (Sq Miles):				4838
Number of Communities:				146
Population (2010 Census Block Data):				108696
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	2106	44%
		IFSAR	4838	100%
		USGS	4838	100%
Number of DFIRM Panels:				352
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	155.7	155.7
Approximate:	0	483.9	356.9	840.8
Coastal:	1107	0	0	1107
Unmapped:	0	0	1310.1	1310.1
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		2732	$ 400	$ 1,092,800
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	840.8	$ 75	$ 63,060
Terrain Processing:	Square Miles	4838	$ 35	$ 169,330
Approximate H&H:	*Per Mile*	*840.8*	*$ 175*	*$ 147,140*
Approximate H&H (FOA Upgrade):	Per Mile	840.8	$ 100	$ 84,080
Redelineation Detailed:	Per Mile	155.7	$ 650	$ 101,205
Mapping / DFIRM Production:	Per Panel	352	$ 1,250	$ 440,000
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	352	$ 1,000	$ 352,000
Total Planning level Estimate:				**$ 2,482,475**

MATTAWAMKEAG

HUC-8 Watershed:	Mattawamkeag			
Summary Data:				
Area (Sq Miles):				1509
Number of Communities:				60
Population (2010 Census Block Data):				8798
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	18	1%
		IFSAR	1509	100%
		USGS	1509	100%
Number of DFIRM Panels:				136
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	22.5	22.5
Approximate:	0	582.4	0	582.4
Coastal:	0	0	0	0
Unmapped:	0	0	625.8	625.8
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		1491	$ 400	$ 596,400
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	582.4	$ 75	$ 43,680
Terrain Processing:	Square Miles	1509	$ 35	$ 52,815
Approximate H&H:	*Per Mile*	*582.4*	*$ 175*	*$ 101,920*
Approximate H&H (FOA Upgrade):	Per Mile	582.4	$ 100	$ 58,240
Redelineation Detailed:	Per Mile	22.5	$ 650	$ 14,625
Mapping / DFIRM Production:	Per Panel	136	$ 1,250	$ 170,000
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	136	$ 1,000	$ 136,000
Total Planning level Estimate:				**$ 1,251,760**

MEDUXNEKEAG

HUC-8 Watershed:	Meduxnekeag			
Summary Data:				
Area (Sq Miles):				633
Number of Communities:				28
Population (2010 Census Block Data):				16731
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	431	68%
		IFSAR	633	100%
		USGS	633	100%
Number of DFIRM Panels:				110
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	18.2	18.2
Approximate:	0	294.3	0	294.3
Coastal:	0	0	0	0
Unmapped:	0	0	209.5	209.5
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		202	$ 400	$ 80,800
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	294.3	$ 75	$ 22,073
Terrain Processing:	Square Miles	633	$ 35	$ 22,155
Approximate H&H:	*Per Mile*	*294.3*	*$ 175*	*$ 51,503*
Approximate H&H (FOA Upgrade):	Per Mile	294.3	$ 100	$ 29,430
Redelineation Detailed:	Per Mile	18.2	$ 650	$ 11,830
Mapping / DFIRM Production:	Per Panel	110	$ 1,250	$ 137,500
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	110	$ 1,000	$ 110,000
Total Planning level Estimate:				**$ 593,788**

PISCATAQUA-SALMON FALLS

HUC-8 Watershed:	**Piscataqua-Salmon Falls**			
Summary Data:				
Area (Sq Miles):				584
Number of Communities:				21
Population (2010 Census Block Data):				115094
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	584	100%
		IFSAR	584	100%
		USGS	584	100%
Number of DFIRM Panels:				126
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	101.7	25.8	0	127.5
Approximate:	0	378.1	0	378.1
Coastal:	71	0	0	71
Unmapped:	0	0	67.2	67.2
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		0	$ 400	$ -
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	378.1	$ 75	$ 28,358
Terrain Processing:	Square Miles	584	$ 35	$ 20,440
Approximate H&H:	*Per Mile*	*378.1*	*$ 175*	*$ 66,168*
Approximate H&H (FOA Upgrade):	Per Mile	378.1	$ 100	$ 37,810
Redelineation Detailed:	Per Mile	127.5	$ 650	$ 82,875
Mapping / DFIRM Production:	Per Panel	126	$ 1,250	$ 157,500
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	126	$ 1,000	$ 126,000
Total Planning level Estimate:				**$ 632,983**

PISCATAQUIS

HUC-8 Watershed:	Piscataquis			
Summary Data:				
Area (Sq Miles):				1439
Number of Communities:				53
Population (2010 Census Block Data):				15668
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	0	0%
		IFSAR	1439	100%
		USGS	1439	100%
Number of DFIRM Panels:				114
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	129.2	129.2
Approximate:	0	357.8	0	357.8
Coastal:	0	0	0	0
Unmapped:	0	0	661.9	661.9
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		1439	$ 400	$ 575,600
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	357.8	$ 75	$ 26,835
Terrain Processing:	Square Miles	1439	$ 35	$ 50,365
Approximate H&H:	*Per Mile*	*357.8*	*$ 175*	*$ 62,615*
Approximate H&H (FOA Upgrade):	Per Mile	357.8	$ 100	$ 35,780
Redelineation Detailed:	Per Mile	129.2	$ 650	$ 83,980
Mapping / DFIRM Production:	Per Panel	114	$ 1,250	$ 142,500
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	114	$ 1,000	$ 114,000
Total Planning level Estimate:				**$ 1,209,060**

PRESUMPSCOT

HUC-8 Watershed:	Presumpscot			
Summary Data:				
Area (Sq Miles):				1245
Number of Communities:				46
Population (2010 Census Block Data):				292467
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	1118	90%
		IFSAR	1245	100%
		USGS	1245	100%
Number of DFIRM Panels:				420
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	179.9	29.9	2	211.8
Approximate:	36.9	499.5	0.2	536.6
Coastal:	277	0	0	277
Unmapped:	0	0	144.7	144.7
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		127	$ 400	$ 50,800
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	536.6	$ 75	$ 40,245
Terrain Processing:	Square Miles	1245	$ 35	$ 43,575
Approximate H&H:	*Per Mile*	*536.6*	*$ 175*	*$ 93,905*
Approximate H&H (FOA Upgrade):	Per Mile	536.6	$ 100	$ 53,660
Redelineation Detailed:	Per Mile	211.8	$ 650	$ 137,670
Mapping / DFIRM Production:	Per Panel	420	$ 1,250	$ 525,000
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	420	$ 1,000	$ 420,000
Total Planning level Estimate:				**$ 1,450,950**

SACO

HUC-8 Watershed:	Saco			
Summary Data:				
Area (Sq Miles):				833
Number of Communities:				33
Population (2010 Census Block Data):				79936
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	716	86%
		IFSAR	833	100%
		USGS	833	100%
Number of DFIRM Panels:				235
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	163	48.9	0	211.9
Approximate:		346.5	0	346.5
Coastal:	0	0	0	0
Unmapped:	0	0	157.6	157.6
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		117	$ 400	$ 46,800
Discovery/Scoping:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	346.5	$ 75	$ 25,988
Terrain Processing:	Square Miles	833	$ 35	$ 29,155
Approximate H&H:	*Per Mile*	*346.5*	*$ 175*	*$ 60,638*
Approximate H&H (FOA Upgrade):	Per Mile	346.5	$ 100	$ 34,650
Redelineation Detailed:	Per Mile	211.9	$ 650	$ 137,735
Mapping / DFIRM Production:	Per Panel	235	$ 1,250	$ 293,750
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	235	$ 1,000	$ 235,000
Total Planning level Estimate:				**$ 983,078**

ST CROIX

HUC-8 Watershed:	**St. Croix**			
Summary Data:				
Area (Sq Miles):				985
Number of Communities:				41
Population (2010 Census Block Data):				7815
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	33	3%
		IFSAR	985	100%
		USGS	985	100%
Number of DFIRM Panels:				77
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	6.9	0	18.2	25.1
Approximate:	0	249.3	5.5	254.8
Coastal:	0	0	0	0
Unmapped:	0	0	535	535
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		952	$ 400	$ 380,800
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	254.8	$ 75	$ 19,110
Terrain Processing:	Square Miles	985	$ 35	$ 34,475
Approximate H&H:	*Per Mile*	*254.8*	*$ 175*	*$ 44,590*
Approximate H&H (FOA Upgrade):	Per Mile	254.8	$ 100	$ 25,480
Redelineation Detailed:	Per Mile	25.1	$ 650	$ 16,315
Mapping / DFIRM Production:	Per Panel	77	$ 1,250	$ 96,250
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	77	$ 1,000	$ 77,000
Total Planning level Estimate:				**$ 829,430**

ST GEORGE-SHEEPSCOT

HUC-8 Watershed:	**St. George-Sheepscot**			
Summary Data:				
Area (Sq Miles):				1242
Number of Communities:				52
Population (2010 Census Block Data):				75227
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	1141	92%
		IFSAR	1242	100%
		USGS	1242	100%
Number of DFIRM Panels:				221
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	2	0	233.3	235.3
Approximate:	0	62.2	688.1	750.3
Coastal:	232	0	0	232
Unmapped:	0	0	40.7	40.7
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		101	$ 400	$ 40,400
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	750.3	$ 75	$ 56,273
Terrain Processing:	Square Miles	1242	$ 35	$ 43,470
Approximate H&H:	*Per Mile*	*750.3*	*$ 175*	*$ 131,303*
Approximate H&H (FOA Upgrade):	Per Mile	750.3	$ 100	$ 75,030
Redelineation Detailed:	Per Mile	235.3	$ 650	$ 152,945
Mapping / DFIRM Production:	Per Panel	221	$ 1,250	$ 276,250
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	221	$ 1,000	$ 221,000
Total Planning level Estimate:				**$ 1,045,368**

UPPER ANDROSCOGGIN

HUC-8 Watershed:	**Upper Androscoggin**			
Summary Data:				
Area (Sq Miles):				836
Number of Communities:				32
Population (2010 Census Block Data):				1891
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	0	0%
		IFSAR	836	100%
		USGS	836	100%
Number of DFIRM Panels:				76
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	27.3	27.3
Approximate:	0	32.6	0	32.6
Coastal:	0	0	0	0
Unmapped:	0	0	518	518
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		836	$ 400	$ 334,400
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	32.6	$ 75	$ 2,445
Terrain Processing:	Square Miles	836	$ 35	$ 29,260
Approximate H&H:	*Per Mile*	*32.6*	*$ 175*	*$ 5,705*
Approximate H&H (FOA Upgrade):	Per Mile	32.6	$ 100	$ 3,260
Redelineation Detailed:	Per Mile	27.3	$ 650	$ 17,745
Mapping / DFIRM Production:	Per Panel	76	$ 1,250	$ 95,000
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	76	$ 1,000	$ 76,000
Total Planning level Estimate:				**$ 738,110**

UPPER KENNEBEC

HUC-8 Watershed:	**Upper Kennebec**			
Summary Data:				
Area (Sq Miles):				1588
Number of Communities:				71
Population (2010 Census Block Data):				3108
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	120	8%
		IFSAR	1588	100%
		USGS	1588	100%
Number of DFIRM Panels:				111
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	2.1	2.1
Approximate:	0	68	0	68
Coastal:	0	0	0	0
Unmapped:	0	0	1058.9	1058.9
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		1468	$ 400	$ 587,200
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	68	$ 75	$ 5,100
Terrain Processing:	Square Miles	1588	$ 35	$ 55,580
Approximate H&H:	*Per Mile*	*68*	*$ 175*	*$ 11,900*
Approximate H&H (FOA Upgrade):	Per Mile	68	$ 100	$ 6,800
Redelineation Detailed:	Per Mile	2.1	$ 650	$ 1,365
Mapping / DFIRM Production:	Per Panel	111	$ 1,250	$ 138,750
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	111	$ 1,000	$ 111,000
Total Planning level Estimate:				**$ 1,085,795**

UPPER ST JOHN

HUC-8 Watershed:	**Upper St. John**			
Summary Data:				
Area (Sq Miles):				2136
Number of Communities:				81
Population (2010 Census Block Data):				10872
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	325	15%
		IFSAR	2136	100%
		USGS	2136	100%
Number of DFIRM Panels:				196
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	5.8	7.7	12	25.5
Approximate:	0	209.8	0	209.8
Coastal:	0	0	0	0
Unmapped:	0	0	1369.5	1369.5
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		1811	$ 400	$ 724,400
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	209.8	$ 75	$ 15,735
Terrain Processing:	Square Miles	2136	$ 35	$ 74,760
Approximate H&H:	*Per Mile*	*209.8*	*$ 175*	*$ 36,715*
Approximate H&H (FOA Upgrade):	Per Mile	209.8	$ 100	$ 20,980
Redelineation Detailed:	Per Mile	25.5	$ 650	$ 16,575
Mapping / DFIRM Production:	Per Panel	196	$ 1,250	$ 245,000
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	196	$ 1,000	$ 196,000
Total Planning level Estimate:				**$ 1,473,450**

WEST BRANCH PENOBSCOT

HUC-8 Watershed:	**West Branch Penobscot**			
Summary Data:				
Area (Sq Miles):				2133
Number of Communities:				89
Population (2010 Census Block Data):				6021
Current Sources of Topography:			Sq Miles	%Coverage
		LiDAR	126	6%
		IFSAR	2133	100%
		USGS	2133	100%
Number of DFIRM Panels:				101
CNMS Inventory (miles):				
	Valid	Unverified	Unknown	Total
Detailed:	0	0	6.3	6.3
Approximate:	0	20.3	0	20.3
Coastal:	0	0	0	0
Unmapped:	0	0	1511.1	1511.1
Cost Estimate:		**Unit**	**Unit Cost**	**Cost**
New Topography:				
Estimated # of Square Miles of new LiDAR needed:		2007	$ 400	$ 802,800
Discovery:	Per HUC 8	1	$ 40,000	$ 40,000
First Order Approximation (FOA):	Per Mile	20.3	$ 75	$ 1,523
Terrain Processing:	Square Miles	2133	$ 35	$ 74,655
Approximate H&H:	*Per Mile*	*20.3*	*$ 175*	*$ 3,553*
Approximate H&H (FOA Upgrade):	Per Mile	20.3	$ 100	$ 2,030
Redelineation Detailed:	Per Mile	6.3	$ 650	$ 4,095
Mapping / DFIRM Production:	Per Panel	101	$ 1,250	$ 126,250
FIS Production:	Lump Sum	1	$ 40,000	$ 40,000
Risk MAP Products:	Lump Sum	1	$ 100,000	$ 100,000
Post Preliminary Processing:	Per Panel	101	$ 1,000	$ 101,000
Total Planning level Estimate:				**$ 1,292,353**