

**Fiscal Year 2009**

**Flood Hazard Mapping Plan for  
The State of Wisconsin**

**Prepared by:**

Wisconsin  
Department of Natural Resources  
Madison, Wisconsin

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# Wisconsin Flood Hazard Mapping Plan

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# Wisconsin Flood Hazard Mapping Plan

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## Introduction and Background at the National Level

Through the Map Modernization Initiative, which provided a two year funding cycle starting each year from FY03 to FY08, significant improvements have been made to many of the Nation's floodplain maps. At the end of the FY08 funding cycle it is estimated that 70% of the Nation's population will be covered by modernized maps. In addition, 75% of those maps will meet the horizontal accuracy standards and 30% of the detailed flood hazard data on those maps will have been refreshed to meet current conditions.

Mid-Course Adjustments made to the Map Modernization project in 2006 began to address the unmet need for better analysis of the flood hazard in many places. However, as FEMA worked through the Map Modernization program a better understanding of critical needs was developed beyond those originally identified. The Map Modernization program will achieve its performance goals, but will not address all of the unmet needs.

FEMA is now headed into a map maintenance type of phase that will build on the foundation of Map Modernization and strive to meet unmet needs. Nationwide, their efforts will focus on three main areas: Coastal Flood Studies, Mapping of Levee Areas and Addressing Other Significant Flood Hazard Engineering Needs.

During FY09, FEMA will develop a robust multi-year plan to address the full scope of the remaining needs. The multi-year plan will ensure that FEMA fulfills its statutory mandate (42 U.S.C. 4101) to assess and review all of the flood maps on a five-year cycle and address new needs that arise from physical changes, climate changes, or engineering methodology changes. FEMA expects to better target flood map updates by focusing on areas where there are properties insured by the NFIP, establishing standards that identify areas that are adequately mapped (unless the community demonstrates the need for an update), and identifying areas where FEMA will initiate updates based on unacceptable risks to the NFIP or the community.

The multi-year plan will build on the strong foundation of Map Modernization that is in place. The plan will articulate a fairly significant philosophical and tactical shift in how it delivers information necessary for flood hazard reductions. This significantly improved integrated flood risk management approach will weave county-level flood hazard data developed in support of the NFIP into watershed-based risk assessments that serve as the foundation for local Hazard Mitigation Plans and targeted risk communication activities. FEMA will focus on filling flood hazard data needs and expanding and improving utility and accessibility of the flood hazard and risk data. FEMA will build on the benefits of digital flood hazard data, allowing easy access through FEMA's web-based portal and enabling powerful data analysis that quantifies flood risk in ways that facilitate improved mitigation planning and measures flood risk reduction.

The maps and the engagement of local governments and citizens both facilitates the reduction of flood losses through local and individual action and provides a sound footing for other Mitigation programs and the NFIP to be successful. As FEMA develops and rolls out updated flood hazard data, provides the public information they need to make informed risk reduction decisions, and improves the actuarial soundness of the NFIP, the public is reminded of the flood threat before the next disaster and can take action to reduce risk.

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States with interest and capability to assist with FEMA's flood mapping effort have been asked to prepare a Business Plan detailing how the state and local mapping activities will contribute to FEMA's goals and objectives.

The State of Wisconsin has a Cooperating Technical Partner agreement with FEMA, which was signed in 2001. This plan is based on FY09 CTP Guidance and will outline what WDNR would like their role to be in FY09.

## Background on the Wisconsin Experience

### Wisconsin Floodplain Management Legislation

When Wisconsin became a state in 1848, rights of navigation of state waterways were incorporated into the State Constitution. The Wisconsin constitution indicates that navigable waters in the State of Wisconsin are held in trust for the citizens of the United States. Since becoming a state, a sizeable body of common law has established that the State has the affirmative duty to protect and preserve these public trust waters. This is called the Wisconsin Public Trust Doctrine.

Following major floods in 1965, the state legislature created Chapter 87.30. This chapter of the state statutes requires communities to enact floodplain zoning and requires the State to "ensure that hydrologic and engineering studies are reasonable and accurate". Since this chapter of the statutes was created, Wisconsin has reviewed and if "reasonable and accurate", approved hydrologic and engineering studies used to develop floodplain zoning maps. WDNR maintains an archive of these approved flood hydrologic and hydraulic models.

Wisconsin has developed floodplain engineering standards specific to Wisconsin:

- Wisconsin has what is called a "zero rise floodway". Model encroachments are not allowed. Once the "zero-rise" floodway is established, before any encroachment into the floodway that causes a measurable rise (.01 feet) can occur, easements must be obtained from the affected landowners.
- Wisconsin floodplain standards require that for any flood hazard area to be removed from the floodplain, the area must be filled to one foot above the regulatory flood elevation and the first floor of any structure built on the fill must be 2 feet above the regulatory flood elevation. This helps account for ice and debris blockages and other uncertainties associated with flood height predictions when landowners are building in a mapped flood hazard area.

In addition to authorizing legislation and higher engineering standards than the minimum required by federal law, WDNR has the in-house engineering and Geographic Information System (GIS) technical expertise needed to successfully manage floodplain studies and mapping projects in Wisconsin. WDNR has sixteen (16) Water Management engineers trained in hydrology and hydraulics working in floodplain management, dam safety and water regulation permitting. WDNR Water Management Engineers assist zoning administrators by doing the modeling necessary to set Regulatory Flood Elevations (RFEs) in Approximate Zones.

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In August of 2000, the Wisconsin legislature provided WDNR with funding to enhance the use of information technology (specifically GIS) to improve staff effectiveness and customer service in the water management programs. This budget item (called the Wisconsin Waters Initiative) provided funding to:

- Improve WDNR's IT infrastructure;
- Provide GIS tools and training for staff;
- Georeference FEMA's scanned FIRMs;
- Develop a GIS data layer identifying the streams with detailed studies and streams with approximate studies;
- Link the archived models associated with detailed studies to the related stream segment;
- Enhance the georeferenced FIRMs so that they can be viewed over Digital Orthophotos or USGS scanned topographic maps;
- Make the georeferenced floodplain maps and the associated models available over the web via a "clickable map" <http://maps.dnr.state.wi.us/fad>; and
- Develop an inventory of digital elevation data in Wisconsin.

## State Role in the Flood Hazard Mapping Program

### Level of Participation—Wisconsin is a Managing State.

*Lead agency:* The Wisconsin Department of Natural Resources is the agency responsible for the floodplain management program mandated by state statutes.

*Other agencies and/or organizations involved, and their roles:*

- **The Wisconsin Land Information Program (WLIP)**— Wisconsin passed legislation in 1989 funding the automation of land records. The legislation listed zoning as one of the six foundational elements. Funding from this program has enabled all 71 non-tribal counties in Wisconsin to develop GIS capability and create extensive local base data. Because of the Wisconsin Land Information Program, the quality and extent of base mapping available has substantially improved the integrity of the DFIRMs and minimized data acquisition costs.
- **Wisconsin Land Information Board (WLIB)** – The legislature created this board to oversee the implementation of the WLIP. Although this board has now dissolved, it had representatives from DOA, DNR, DOT, the Department of Agriculture, Trade and Consumer Protection (DATCP), local governments and is chaired by the State Cartographer. The Board played a major role in getting Map Modernization started by funding six counties with "Strategic Initiative" grants to improve their local base layers.
- **Wisconsin Emergency Management (WEM)** – Flood Insurance Rate Maps are used by WEM for disaster response and flood hazard mitigation. WEM develops the State Hazard Mitigation Plan and manages FEMA funding to communities for development of community Hazard Mitigation Plans and flood hazard mitigation projects.
- **Wisconsin Dept. of Transportation (DOT)** – WDOT conducts hydrologic and hydraulic analyzes on proposed bridges over waterways to determine if proposed bridges will increase flood profiles. WDNR and WDOT have a Memorandum of Understanding to address situations where the flood profile upstream of bridges is increased. WDOT

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develops topographic data when building bridges. Since bridges create restrictions that backup water and increase flood heights, topographic data at stream crossings is useful for hydraulic modeling. In addition, WDOT has led a height modernization project to upgrade the vertical control network in Wisconsin.

- **Wisconsin Department of Administration (DOA)** – Wisconsin’s Geographic Information Officer (GIO) resides at this office and may offer assistance to WDNR on issues relating to spatial data that affect other State agencies.
- **Wisconsin State Cartographers Office (SCO)** – Wisconsin’s State Cartographer attended some Map Modernization planning meetings and provided guidance on mapping related issues that affect other State partners. Staff at SCO may provide assistance with maintaining inventories of elevation and bench mark data. They may also offer technical guidance on issues pertaining to local map projections to WDNR GIS staff.
- **Farm Service Agency (FSA)** – The FSA has been responsible for creating the National Agricultural Imagery Program and making Digital Orthophotos available to WDNR, which has been used as a base layer on many DFIRM map panels.
- **Southeast Wisconsin Regional Planning Commission (SEWRPC)** – SEWRPC has engineering staff devoted to floodplain and stormwater modeling and mapping. Much of their data was used to create the new DFIRM products throughout their region. WDNR will continue to work with SEWRPC on flood hazard mapping projects in the future.

## Wisconsin Map Modernization Accomplishments

WDNR started working with FEMA as a Cooperating Technical Partner in 2001. After successfully running pilot projects in Winnebago and St. Croix Counties, we were funded in 2003 to start working through the Map Modernization process for six of our most populous counties in Wisconsin. We were able to leverage contributions by each county for their terrain, study data or bench mark inventory. These counties included Ozaukee, Washington, Waukesha, Dane, Rock and Milwaukee and started with a scoping phase.

Eight years and forty seven counties later, the last leg of Map Modernization is upon us. We have learned a great deal about managing a large number of projects and datasets at the same time, working with very detailed terrain and engineering data, managing contracts with local engineering firms, keeping staff onboard, trained and engaged, staying on top of FEMA regulations, guidelines and quality review procedures and many, many other things. We have built a number of efficiencies into our daily work that put us in a great position to continue updating flood hazard maps well into the future.

We have also spent a lot of time working with our local zoning partners to ensure that we have produced quality map products that they can support and feel comfortable using.

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## **FY03 – FY08 Ending Projections**

By the end of the FY08 funding cycle, WDNR plans to have achieved the following:

- 47 counties will have adopted countywide Digital Flood Insurance Rate Maps (DFIRMs). Only 25 counties will still have the old format FIRMs;
- The average age of Flood Insurance Rate Maps (FIRMs) in Wisconsin will increase to 2001 (It was 1985 at the beginning of the project);
- Coverage of modernized maps will include 91% of the State's population;
- Coverage of modernized maps will include 62% of the State's land area;
- At least 70% of the flood hazard boundaries on modernized maps will meet the standards for horizontal accuracy.
- At least 39% of the detailed flood hazard data on modernized maps will represent current conditions;
- Millions of dollars will be leveraged through community partners and the State;
- MIP workflow tool and data storage folders will be fully populated and up to date;
- Partial integration with the CAP program.

## **Staffing Levels and Infrastructure**

WDNR has worked hard since 2003 to build our staff to the appropriate level so that we are prepared to take on flood hazard mapping work. Our current employees assigned to the Map Modernization project include the following:

- A GIS Manager, Engineer and Project Manager who oversee the entire project (3 FTE)
- 3 Engineer Project Leads and 3 GIS Project Leads (5 Federal Project positions and 1 contractor)
- 3 full time and 1 part time GIS Analysts (4 LTE)
- 2 part time planners (2 LTE)

The State of Wisconsin has invested a lot of resources ensuring that WDNR staff has the tools needed to work on this project. All WDNR employees working on the Map Modernization project (except the planners) have high end Dell or IBM PCs capable of computing dense datasets. The State has also contributed a number of software programs for all staff working on this project including ESRI products such as ArcINFO, Spatial Analyst and 3D Analyst, Adobe products like Photoshop and Acrobat, and Microsoft products including Word, Excel and Access.

Free software programs are installed and maintained by WDNR's Information Technology Coordinators. They help us with programs including Hec-GeoRAS, Hec-HMS, WISCON, Flood Map Desktop (FMD) and many others.

GIS assistance to our program is also provided by our Bureau of Technology Services. Staff time is used to answer general GIS data questions and these hours are funded with State dollars.

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## Wisconsin DNR's Flood Hazard Mapping Goals

1. To serve our customers, the local communities and public of Wisconsin, and to ensure that flooding sources depicted on FEMA Flood Insurance Rate Maps are accurate enough for local zoning administrators to make reasonable determinations on a property by property basis.
2. To facilitate partnerships with Wisconsin communities and leverage existing resources when available.
3. To reduce appeals and minimize future maintenance costs.

***All floodplain maps provided to communities for adoption will be "reasonable and accurate" when compared to best available topographic and community base map data.***

## Wisconsin Flood Hazard Mapping Priorities

With these goals established, and attempting to meet the criteria established by FEMA for future funding, WDNR's flood hazard mapping program priorities are:

1. Continue to collect and refine unmet needs through various means including conducting an annual survey of our regional engineers. The following factors will be considered when collecting unmet needs:
  - a. Climate change issues including flood events and damage
  - b. Physical changes to the landscape, such as manmade influence which may include new bridges, culverts, levees, development in the floodplain. We will also attempt to collect information about potential development pressure, but only if well documented.
  - c. Engineering methodology changes, such as improved computer models and better understandings of the physics of water flow.
  - d. Number and location of LOMAs and flood insurance claims
2. Stay up to date on technology, tools and guidelines related to flood hazard mapping.
3. Maintain a GIS base layer inventory and continue to collect information on County leverage.
4. Remain fully staffed so as to be well positioned to take on additional work.
5. Continue to finish counties funded under Map Modernization.

## Wisconsin's Plan for FY09 Funds

The Floodplain Program at Wisconsin DNR will continue to prepare and position itself for addressing needs that were not met through Map Modernization. We will collect a list of unmet needs for FY09, prioritize them and submit them to FEMA with a request for funding. Our requests this year will focus on watersheds or reaches that are in need of restudy, or new study, based on one of three factors: climate change, physical change or methodological problems.

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If funded, we will either perform or manage all tasks from the Fundable Technical Mapping Activities list on Table 2-3 of the FY09 CTP Program Guidance document. WDNR will perform the following tasks in-house with WDNR staff:

- Base Map Acquisition;
- Scoping;
- Outreach;
- Refinement or Creation of Approximate Zone A Boundaries;
- DFIRM Preparation;
- Independent QA/QC Reviews; and
- Post-Preliminary Processing.

WDNR will contract out and manage the following tasks:

- Hydrology and Hydraulic Analyses and Floodplain Mapping (Riverine);
- Coastal Flood Hazard Analyses and Floodplain Mapping (if appropriate); and
- Redelineation of Detailed Floodplain boundaries Using Updated Topographic Data.

In FY09, WDNR will only propose new studies and mapping to reaches in counties that are already modernized. However, in the future we do plan to submit a proposal to address needed reaches in non-modernized counties. We plan to maintain a detailed inventory of base layers that will allow us to be prepared to produce new DFIRM panels for minimal costs. The efficiencies that we have gained with the mapping process will enable us to produce new map panels in non-modernized counties in the same amount of time as it would in a modernized one.

We will also propose to use the Program Management funds to gather spatial information on LOMAs and recent flood insurance claims so that we can look for trends that would indicate a need for attention in the future. Unmet needs falling in this category would be addressed in future funding cycles, but not in FY09.

In addition to new work, WDNR will continue to finish up modernizing the counties that are still in progress. This work will include finishing distributing preliminary and final products for Oconto, Dunn, Lincoln, Polk, Manitowoc, Grant, Crawford and Vernon counties, as well as working through the post preliminary processing phase for Barron, Sauk, Waupaca, Dodge and Outagamie counties. In addition, we will continue to work with CDM to finalize the map products for the counties that they are managing.

## **LOMR Delegation**

WDNR plans to apply for LOMR Delegation in FY09 and will be submitting details of their plan with their formal application in May, 2009.

As a successful Mapping State, Wisconsin performs each and every technical workflow item identified in the Mapping Information Platform (MIP), as well as community outreach and engineering analysis throughout the DFIRM production process. There are very few states with this level of expertise and willingness to take complete responsibility for the Map Modernization program. Building on this experience, the State of Wisconsin aims to take ownership of its NFIP maps, including a plan for maintenance of those maps in a digital format. This plan identifies the current processes for DFIRM updates and revisions to DFIRMs, and proposes a new DFIRM maintenance plan for the state.

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Clearly there is a nexus between data submitted to DNR to meet State regulatory requirements and data submitted to FEMA primarily for insurance requirements, and finally, between both types of data and the statewide Digital Flood Insurance Rate Maps being developed by DNR through Map Modernization. This plan would combine those now separate efforts into one more efficient action that will serve both State standards and FEMA requirements.

## Program Management Support (previously MMMS)

We plan to apply for these funds and will use them to aid in managing multiple flood hazard mapping projects. They will be used for Business Plan updates, Managing Technical Mapping Activities, Outreach, Training and Staffing.

The majority of the dollars will be applied toward salary and benefits of our GIS Manager and CTP Project Manager. We would also like to use the funds for travel to regional FEMA meetings, quarterly WDNR meetings, FEMA sponsored trainings and annual conferences, such as ASFPM and WAFSCM. All of the travel would involve some training of State staff and Local Officials as our staff would either be attending workshops to stay up to date on FEMA guidelines, or would be training others on the status of flood hazard mapping in the State. We would also use the funds to continue operating an internal Project Management program with a very minimal cost.

We would also like to propose a pilot project to spatially enable information on LOMAs and flood insurance claims. This will allow us to look for trends that would indicate a need for attention and may result in additions to our unmet needs list.