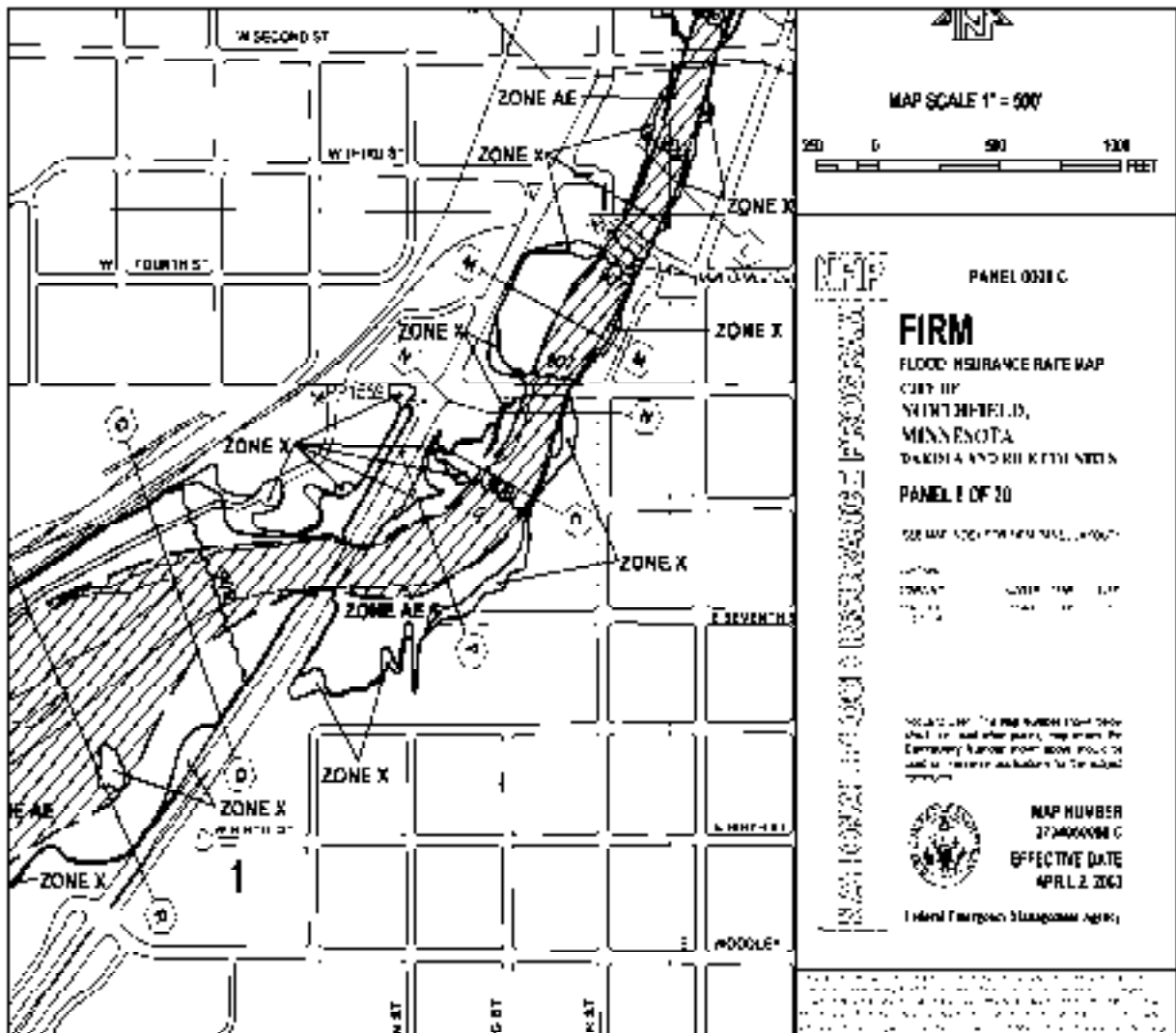


Minnesota Map Modernization Business Plan



January 2004

Minnesota Department of Natural Resources
DNR Waters

EXECUTIVE SUMMARY

Since 1971, the Flood Insurance Rate Maps (FIRM) in Minnesota have provided basic information to community zoning and building officials, lending institutions and insurance providers to use in decision making regarding development in floodplains. Some updating of the maps has occurred in the ensuing years, but many of the maps have data that is out-of-date and/or insufficient for the current development needs. Map Modernization is intended to update the FIRMs, as well as transfer the information into electronic format.

The Minnesota Map Modernization Plan describes the strategy for cost effectively updating the FIRMs in Minnesota. The mission statement for Minnesota Map Modernization is as follows:

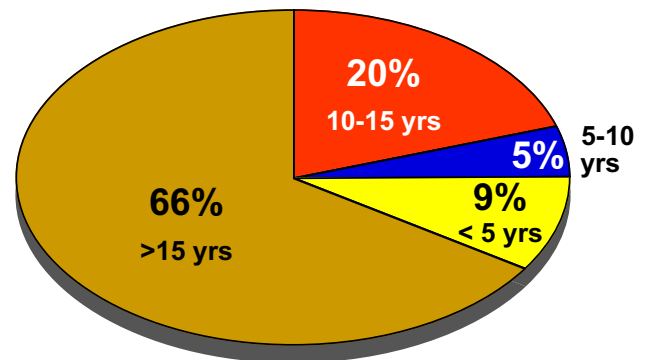
To produce (for every Minnesota county) accurate, digital countywide floodplain maps that are usable to local officials, lending institutions and insurance agents and to produce them using available information and new information, including high resolution digital elevation data, funded from FEMA's Map Modernization Program funds.

Minnesota needs the information on the maps be updated when the transfer to the electronic format occurs and want all identified floodplain areas to have at a minimum estimated Base Flood Elevations. Minnesota intends to become a Cooperating Technical Partner (CTP) State, and manage and coordinate CTP activities in the state. CTP funds would be used to support a State Mapping Engineer to manage and coordinate mapping activities and a Hydraulic Engineer to determine Base Flood Elevations for Limited Detail study areas.

PRESENT STATUS OF MINNESOTA FLOODPLAIN MAPS

FEMA's flood hazard maps are essential tools for flood hazard mitigation, local building officials, lending institutions and insurance agents. As shown in the figure below, most of the flood hazard maps in Minnesota have become greatly outdated reducing their utility.

About two-thirds of the maps are older than 15 years and over four-fifths older than 10 years.



9%, <5 years
5%, 5-10 years
20%, 10-15 years
66%, >15 years

Minnesota's Age Distribution of FEMA Floodplain Maps

In many cases, the older maps reflect outdated flood hazard information that limits their utility for floodplain management and insurance purposes. Additionally, most of the flood hazard maps were prepared using now-outdated base maps, road network information and manual cartographic techniques, which make the maps difficult and inaccurate for the state, floodplain communities and customers to use and expensive for FEMA to maintain.

To address this problem, FEMA has initiated the Flood Map Modernization Program. Funding in FY03 and FY04 has been appropriated for this program and similar funding levels are proposed for subsequent fiscal years.

In Minnesota, Map Modernization efforts funded to date are the digitizing of the FIRMs for the 45 communities in Hennepin County, remapping of 3 CTP counties, and mapping of six counties on the Upper Minnesota River supplementing hydraulic data prepared by the USACE and funded by the Minnesota DNR Waters and Section 22 funds obtained through the USACE. FY04 funding has not been allocated at this time.

OBJECTIVES

This plan is prepared to assist FEMA in developing regional and national plans for implementing the Map Modernization Program. This plan summarizes Minnesota's role in completing the required mapping activities and how these activities will be managed and performed. This plan identifies mapping priorities, explains how these priorities were established, and outlines an approach for addressing these mapping priorities. This plan addresses how implementing the priorities meets the sub-program element performance measures FEMA established in December 2003.

There are five objectives in the Minnesota Floodplain Map Modernization Plan.

1) The maps will be digital and countywide. Municipalities will be remapped as part of the county maps. This helps with continuity of data at the edge of municipal boundaries and easy modification of maps after annexations. FEMA's new map panel scheme will be used. In Minnesota we recommend not mapping DFIRM panels where the entire area is Voyageurs National Park, or state and federal forests with no or little development potential.

2) The map delineation will be based on a Digital Elevation Model (DEM) used to produce contour maps

with appropriate intervals. In the Red River valley counties there is a need for one-foot contour interval or better base map to delineate the floodplain, but the majority of the state would require two-foot topography with possibly some areas needing only four-foot topography. Since FEMA funds the collection of detailed topography in areas of detailed hydraulic analysis, Minnesota expects FEMA to fund a portion of the DEM development.

3) The maps will represent accurate flood hazard information. All mapped Zone A areas will have at minimum a Limited Detailed analysis with an estimated Base Flood Elevation and if economically feasible, a natural floodway.

4) Minnesota will become a Cooperating Technical Partner (CTP) State and will continue to encourage counties to join the CTP program. Minnesota envisions the CTP program to involve counties on two levels, Tier one and Tier two. Tier one CTP counties will be full CTP partners with FEMA. Currently, six counties in Minnesota have become CTP partners and others have expressed interest. Tier two CTP counties do not have the resources to be full CTP partners; Minnesota DNR Waters will form a three-way partnership between the county, the state, and FEMA in these counties. The counties will generally provide coordination of local communities, collection of data from local sources including surveying, and contracting for detailed analyses. In addition to its overall CTP management role, the state will provide technical guidance, limited detailed analyses, and clearinghouse for the final maps. FEMA will provide funds for detailed analyses and map preparation. Several rural counties have expressed interest in participation at this level.

5) The Minnesota Flood Map Modernization Plan will meet the sub-program element performance measures in the Proposed National Milestones for Map Modernization FY2004-2009. Funding has been completed for updating 8 of Minnesota's 87 counties. Meeting these performance measure-ments assumes that each year an additional fifteen counties will become part of the map modernization program for five years with remaining four counties starting in the sixth year. This plan includes cost estimates for completing the county floodplain remapping.

PRIORITIES

Prioritization of counties for remapping the flood hazard maps is driven by cost efficiency while maintaining the objective for maps with accurate flood hazard information. Therefore, there is an emphasis on CTP counties or blocks of counties along major watercourses. The four priorities are listed below followed by a discussion of the logic for the priorities and their implementation.

First Priority –
Completion of existing remapping projects

Second Priority –
CTP counties

Third Priority –
Major watercourses and counties along them

Fourth Priority –
Remapping repetitive loss areas not in CTP program

Existing Projects - First Priority

In the late 1990s the Minnesota DNR Waters contracted with the US Army Corps of Engineers to provide new hydrologic and hydraulic information for the Minnesota River from New Ulm to Big Stone Lake and for most of the tributaries to the Minnesota River in the five counties south of the river. The impetus for this was the need for better flood hazard data and topographic, cross-sectional and hydrologic data available from a Section 639 Area study the USACE and the NRCS had conducted. FEMA appropriated FY2002 funds to complete hydrologic and hydraulic analyses and remap ten counties in the area – five counties included the DNR Waters study and the five counties abutting the Minnesota River on the north.

The funds were adequate to complete the analysis for six of the counties; Big Stone, Brown, LacQuiParle, Lyon, Swift, and Yellow Medicine. New preliminary maps for these six counties should be completed in 2004. Completing the remaining four counties, Chippewa, Nicollet, Renville, and Redwood, is a high priority for Minnesota.

Prior to 2003, two Minnesota counties were in the CTP program, Clay and Washington. The work for completing the remapping of these counties has been funded; Washington County preliminary maps should be completed in 2004 if problems with the logistics of review of the technical data can be resolved and Clay County preliminary maps should be completed in 2005.

CTP Counties - Second Priority

Minnesota plans to have two tiers of CTP counties as discussed earlier in the plan. Tier one CTP counties will be full CTP partners with FEMA. Tier two CTP counties will not have the resources to be full CTP partners; Minnesota DNR Waters will form a three-way partnership between the county, the state, and FEMA in these counties.

Four Minnesota counties have been added to the Tier one CTP program in 2003; Dakota, Goodhue, Scott, and Sherburne. Dakota County has a FY03 Mapping Activity Statement addressing the first half of the activities needed for remapping. The other three counties have completed Mapping Needs Assessment and could quickly prepare Mapping Activity Statements in FY04. Other counties have expressed interest in becoming CTPs. We anticipate that 2-3 counties will become Tier one CTPs in each of the first three years of the Map Modernization plan. We anticipate that 4-6 counties will become Tier two CTPs in each year of years 2-6 of the Map Modernization plan.

This listing will change as more CTP counties are identified. Table 1 lists by year the prioritized for remapping. New CTP counties each year could bump counties with lower priorities. The CTP counties offer services and information that allow more cost effective map production. To reduce the costs for map production the counties that are willing to contribute are rewarded by receiving higher priority for completion.

Minnesota DNR Waters sent a questionnaire to the County Zoning Administrators to determine which counties are interested in and capable of being CTPs. The information from the questionnaires will guide the CTP recruiting efforts.

Major Watercourses - Third Priority

Minnesota has many major watercourses, specifically the Mississippi River, the Minnesota River, and the Red River. Recently, the hydrology and hydraulic analyses have been updated for the Red River from Breckenridge, Minnesota to the Canadian border, the Minnesota River from New Ulm to Big Stone Lake, the Minnesota River from St. Paul to Jordan, and the Mississippi River from the Iowa border to Hastings, Minnesota. Updated data for the upper reaches of the Minnesota River was the impetus to update ten counties in southwestern Minnesota. Using the updated data to remap the Red River counties would have been the next priority except that one-foot topography is necessary to delineate the floodplain in the Red River. These counties will be a third priority when adequate topography is available. The data for the Minnesota River from St. Paul to Jordan will be used in remapping two of the current CTP counties. The lower Mississippi River floodway analysis will be available this summer. Floodway discussions with the counties will occur this spring, and we will determine their interest in the CTP program. Again, the data will be used in remapping of two CTP counties.

Minnesota's big concern on major watercourses is the Mississippi River from St. Paul to Bemidji. Long reaches of the Mississippi River do not have computed BFEs, and the most of the detailed analyses haven't been updated since the 1970s. This area of the state has major development pressure and the communities are expanding. They need to have accurate, detailed floodplain maps in areas currently unmapped or mapped with approximate methods. We feel that having the whole reach studied at one time would be cost effective. We request FY2004 funding for this effort. With this analysis complete, it will be easier to map abutting counties in the following years.

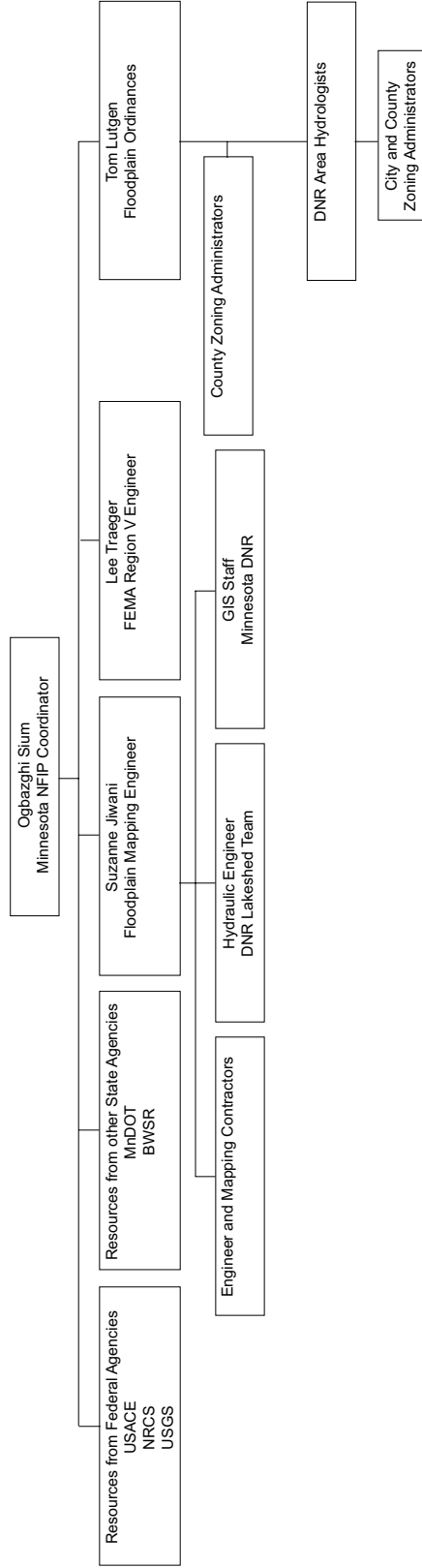
Repetitive Loss Areas not in CTP Program - Fourth Priority

Minnesota DNR Waters reviews FEMA's Repetitive Loss information for the state of Minnesota in mitigation efforts. The October 31, 2003 FEMA repetitive loss report indicates that the top eight repetitive loss counties are either CTP counties or have major mitigation projects completed or nearly completed. The remaining counties have fewer than ten repetitive losses reported. The FEMA repetitive loss information will be used to prioritize among the remaining counties after the first three priorities have been satisfied.

MANAGEMENT OF MINNESOTA MAP MODERNIZATION PROGRAM

Minnesota DNR Waters is the National Flood Insurance Program Coordinating agency for FEMA. They will be the lead in Minnesota's CTP program. The NFIP Coordinator, Ogbazghi Sium, will be the team manager. Implementation of the county remapping will be led by the Minnesota State Floodplain Mapping Engineer, Suzanne Jiwani, and implementation of adoption of the new maps by the communities will be led by the State Floodplain Ordinance Hydrologist, Tom Lutgen. Coordination with resources from Minnesota and Federal Agencies, FEMA Region V, and County Zoning Administrators will be tasked to this team.

Minnesota Floodplain Map Modernization Team



As a CTP State, FEMA and Minnesota will share the financial responsibility for funding the positions needed to fulfill the Map Modernization Plan. Minnesota requests the funding of 2.5 FTE positions to implement the plan. Two of the positions will be DNR Waters, the State Floodplain Mapping Engineer and the Hydraulic Engineer. To support the work in establishing and providing a website clearinghouse for FEMA's floodplain maps and electronic connections to the counties for the underlying data, Minnesota requests funding of a 0.5 FTE GIS position. In addition, Minnesota requests funding for software licenses needed for fulfilling the program and a server for the FEMA data. Cost estimates for these expenditures are shown in Appendix A.

STATE ROLE IN THE FLOOD HAZARD MAPPING PROGRAM

The State will perform, through the State mapping Engineer (SME), and/or manage the mapping activities in the State. The specific activities that the State of Minnesota will perform or manage are:

- promote, coordinate, provide technical guidance and review of the Cooperating Technical Partners;
- support FEMA scoping activities;
- review maps and liaison to counties for FEMA;
- perform hydrologic and hydraulic analysis for approximate study areas;
- review hydrology reports through the Interagency Hydrology Review Committee;
- establish website clearinghouse for floodplain maps:
- provide internet access to counties of data behind FEMA's floodplain maps: and
- promote and manage the proposed statewide digital elevation model (DEM) and floodplain mapping program

FEMA will provide the State with appropriate funds, including funding for a SME and an Hydraulic Engineer, to perform specific mapping activities; these funds will be subject to a 20 percent soft match requirement, including in-kind services, from the state and CTP communities. The nature and scope of the activities will be detailed in the CTP partnership agreements, and will be based on the results of the statewide mapping needs assessments.

Minnesota Department of Natural Resources Waters Division (DNR Waters) will take the lead for the state floodplain mapping program. DNR Management Information Services Bureau will install and maintain links to the completed floodplain maps from the DNR website. Currently, DNR Waters is leading a coalition of over 18 organizations to obtain funding for a statewide DEM program with projected costs of \$40 million. Several federal, state, county, township, city and professional organizations are part of the coalition.

ESTIMATED COSTS TO COMPLETE PROPOSED MAPPING ACTIVITIES

The costs to complete the proposed floodplain remapping activities used the data from the 2002 mapping needs assessment and unit costs from FEMA's Blue Book. A description of the methods used to develop the 2002 mapping needs assessment follows. The cost calculations are in Appendix A. A summary of the costs by county for FY04 is given in Table 2.

Description 2002 Mapping Needs Assessment

DNR Waters performed a mapping needs assessment in 2002 to fully evaluate the mapping needs in Minnesota. This mapping needs assessment was described in August 2002 Map Modernization Plan of State of Minnesota that was submitted to FEMA. This mapping needs assessment was undertaken in cooperation with FEMA and FEMA's Flood Map Production Coordination Contractor (MCC). DNR Waters redeployed an engineer since March, a GIS specialist, and a hydrologist since May to collect the following data on a county-by-county basis:

- Age of the existing maps;
- Status of existing maps (digital, manual, none);
- Existing or potential local mapping partners;
- Number of unmapped, floodprone communities;
- Number of communities;
- Availability of existing base map, topographic data, and/or flood hazard data.
- Letters of Map Change processed during the last 10 years;
- Population and population growth (U.S. Census and/or State-developed figures);

- Flood insurance policies and repetitive losses;
- Availability of State and/or local funding;
- Format of existing maps (countywide or community-based format); and
- Ongoing map updates, including updates being undertaken by regional agencies or communities under the Cooperating Technical Partners (CTP) Program.
- Number of perennial stream miles, mapped and unmapped, and mapped intermittent streams for each panel in each county
- Arcview shape files for FEMA Q3 and map panel data, and streams from USGS 1:24000 quad rangles

DNR Waters undertook additional data collection and outreach activities to supplement the MNUSS data,

other data provided by FEMA, and data available in various State agency offices. A compilation was made by county for each FEMA flood map panel of the number of mapped river miles and the number of unmapped perennial stream miles. The data was used to estimate costs for the hydraulic analyses for a DEM floodplain mapping model and cost estimates for this proposal.

DNR Waters contacted counties through its network of 28 on-site area hydrologists. These hydrologists supplied information on floodplain mapping needs based on their first hand knowledge of the local communities and associated floodplain issues.

Data was collected for each county identifying all cities in the county and the following information for each community: the FEMA Community ID number, status of non-unrolled communities, DNR Waters area hydrologist, date of current effective map, population change from the latest census, and the area hydrologist's priority ranking in floodplain issues.

DNR GIS-MAPPING SUPPORT

The Minnesota Department of Natural Resources (DNR) proposes to develop and maintain a floodplain data access capability to enhance the availability and usability of these information resources for federal, state, and local government cooperators. This would be accomplished through the development of specific software applications and technology capabilities conforming to common industry standards.

Proposed Applications

Minnesota DNR proposes that the following five software applications be developed under the grant-funding agreement:

<i>Application Name</i>	<i>Application Description</i>	<i>Application Assumptions</i>	<i>Application Outcomes</i>
FIRM Map Product Distribution	A web-based application featuring an interactive map-index to available FIRM panels. When the user clicks on a panel, the map is displayed in a separate window.	A separate contractor will prepare the published electronic maps and deliver them to DNR in a consistent, standardized format. DNR will maintain the application as new maps become available. Contractor will provide updated master FIRM panel map index as needed.	Provides easy access to FIRM map products to citizens, government cooperators, and private companies seeking floodplain maps.
Floodplain Data Download	Integration of FEMA floodplain delineation data into DNR's existing data download application. Data will be distributed in ESRI shapefile format.	Floodplain delineation data are delivered to DNR from outside contractor in highly standardized and consistent formats. Contractor will provide updated master FIRM panel map index as needed.	GIS-ready FEMA floodplain delineation data will be made available to citizens, government cooperators, educators and private companies seeking to conduct spatial analysis in a wide variety of application areas.
Interactive Floodplain Mapping	A publicly-available web-based application that allows users to interactively view floodplain delineations in conjunction with a variety of spatial reference data, including aerial photography and scanned map products.	Floodplain data are delivered to DNR from outside contractor in highly standardized and consistent formats. Contractor will provide updated master FIRM panel map index as needed.	Allows anyone to quickly navigate to a location in Minnesota and identify the floodplain delineations associated with a site.
Floodplain Data Streaming	A technological capability that would allow government and business partners to directly incorporate floodplain data through Web Mapping Services (WMS) or ArcIMS vector streaming to Arc8/9 or ArcIMS clients.	Floodplain data are delivered to DNR from outside contractor in highly standardized and consistent formats. Contractor will provide updated master FIRM panel map index as needed. Also assumes that government and business partners have independently acquired and/or developed the client capabilities to access the services described.	Provides direct access to the most current floodplain delineations without download and subsequent processing. Partners have the option directly incorporating these data sources into their business applications.
Hydrologic Analysis Model Hosting	A quick data file download capability for technical partners seeking Hydrologic Models used to develop floodplain delineations. This application will not have a mapping interface.	A file naming convention will be developed that will serve as the basis for site users to identify and acquire data from the site.	Provides access to hydrologic models to government and private sector hydrologists.

Developing the software applications and technical capabilities described above will require expenditures in two cost categories: 1) software development and maintenance, and 2) computing facilities. The cost proposal, shown in Appendix A, is broken out into separate subsections related to these categories.

PLAN'S ADHERENCE TO FEMA'S PERFORMANCE MEASURES

FEMA Region V sent Minnesota DNR Waters the Multi-Hazard Flood Map Modernization Proposed National Milestones, FY2004-2009 Sub-Program Element Performance Measures. In addition, the Region suggested phasing the work with fifteen additional counties added each year. Minnesota DNR Waters developed a prioritization for work in the counties that adheres to FEMA Region V's guidance and performance measures. This prioritization plan is subject to change with the addition of CTP tier one and tier two counties. Table 3 lists for each county its population and the work plan by year: map production begins, map production completion, and map adoption.

There are four sub-program element performance measures:

- 1) Measure one is percentage of population that has digital GIS flood hazard data available on-line. The adherence of the Minnesota plan to this performance measure is shown on Figure 1. The Minnesota plan meets this performance measure in all six years.
- 2) Measure two is percentage of population that has adopted modernized GIS flood maps. The adherence of the Minnesota plan to this performance measure is shown on Figure 2. The Minnesota plan meets this performance measure in all six years.
- 3) Measure three is leveraged effort toward digital GIS flood hazard data. FEMA requires a twenty percent leverage for appropriated funding. Minnesota meets this performance measure in FY04. Additional CTP efforts are needed to meet future years.
- 4) Measure four is percentage of Map Modernization funding put through to CTPs. If Minnesota becomes a CTP state this performance measure will be met for all six years of the plan. The Minnesota plan meets this performance measure for the first three years with the county CTP effort.

A comparison of the Minnesota plan and FEMA's sub-program element measurement goals is shown on Table 4.

Cost estimates for implementing Minnesota's plan are shown in Appendix A. The costs are estimated by year prioritizing the counties in each year. For example, in 2004 the first five counties listed are existing projects (Redwood, Renville, Nicollet, Chippewa, and Hennepin), the next four counties are CTP counties (Dakota, Scott, Goodhue, Sherburne), the next item is hydrology and hydraulics for the Upper Mississippi River, and the remaining counties are potential CTP partners. The costs for each county are divided into five categories: topography, outreach, hydrology and hydraulics, internet access to maps, and map production. The costs for two categories, outreach and internet access to maps are assumed to be born by the CTP. The costs for the other three categories are split between the CTP and FEMA. The total estimated costs for FEMA and for the CTPs are given.

In the event that FEMA cannot allocate the estimated costs for a specific year, Minnesota recommends that funding be allocated from the top of the list for a specific year. The Minnesota plan will be adjusted by reprioritizing counties in future years. The reprioritization will use the four Minnesota priorities: completing existing remapping projects, CTP counties, major watercourses, and remapping repetitive areas not in CTP counties. The listing of counties in Table 3 limits the number of new CTP counties in a year, assuming 2-3 tier one CTP counties and 4-6 tier two CTP counties in each year. Therefore, reprioritizing subsequent years doesn't necessarily place the last counties in Year One at the top of the Year Two list. Meeting FEMA's sub-element performance measures will be a goal in the reprioritization.

The effect of the implementation of the Minnesota plan is shown on Figures 3-8. These figures show the counties that have started map production, have completed maps, and have adopted the completed maps into their floodplain ordinance for each year of the plan.

Table 3. DETAIL BY COUNTY OF YEARLY MAP PRODUCTION, COMPLETION & ADOPTION

Map production		Map Completion		Map Adoption	
County	2000 Pop	County	2000 Pop	County	2000 Pop
2003		2003		2003	
Big Stone	5820				
Brown	26911				
Clay	51229				
Lac qui Parle	8067				
Lyon	25425				
Swift	11956				
Washington	201130				
Yellow Medicine	11080				
Population with data	341618				
% pop with data	6.94%				
2004		2004		2004	
Chippewa	13088	Big Stone	5820	Hennepin	1116200
Chisago	41101	Brown	26911	Lac qui Parle	8067
Dakota	355904	Chippewa	13088	Lyon	25425
Goodhue	44127	Hennepin	1116200	Yellow Medicine	11080
Hennepin	1116200	Lac qui Parle	8067	Population map adopted	1160772
Isanti	31287	Lyon	25425	% pop with map adopted	23.60%
Meeker	22644	Nicollet	29771		
McLeod	34898	Redwood	16815		
Nicollet	29771	Renville	17154		
Ramsey	511035	Swift	11956		
Redwood	16815	Washington	201130		
Renville	17154	Yellow Medicine	11080		
Saint Louis	200528	Population map done	1483417		
Scott	89498	% pop with map done	30.15%		
Sherburne	64417				
Upper Mississippi River					
Population with data	2588467				
% pop with data	59.56%				
2005		2005		2005	
Aitkin	15301	Chisago	41101	Big Stone	5820
Benton	34226	Dakota	355904	Brown	26911
Blue Earth	55941	Goodhue	44127	Chippewa	13088
Carver	70205	McLeod	34898	Nicollet	29771
Cass	27150	Meeker	22644	Redwood	16815
Crow Wing	55099	Ramsey	511035	Renville	17154
Houston	19718	Scott	89498	Swift	11956
Itasca	43992	Sherburne	64417	Washington	201130
Kandiyohi	41203	Population map done	1163624	Population map adopted	322645
Lincoln	6429	% pop with map done	53.81%	% pop with map adopted	30.15%
Morrison	31712				
Pine	26530				
Stearns	133166				
Todd	24426				
Wright	89986				
Population with data	675084				
% pop with data	73.28%				

Minnesota Map Modernization Plan for Updating the FEMA Flood Insurance Rate Maps

2006		2006		2006	
Anoka	298084	Aitkin	15301	Chisago	41101
Beltrami	39650	Benton	34226	Dakota	355904
Jackson	11268	Blue Earth	55941	Goodhue	44127
LeSueur	25426	Carver	70205	McLeod	34898
Mahnomen	5190	Clay	51229	Meeker	22644
Mower	38603	Crow Wing	55099	Ramsey	511035
Nobles	20832	Houston	19718	Scott	89498
Olmsted	124277	Isanti	31287	Sherburne	64417
Pipestone	9895	Lincoln	6429	Population map adopted	1163624
Rice	56665	Morrison	31712	% pop with map adopted	53.81%
Roseau	16338	Saint Louis	200528		
Wabasha	21610	Todd	24426		
Wadena	13713	Population map done	596101		
Wilkin	7138	% pop with map done	65.92%		
Winona	49985				
Population with data	738674				
% pop with data	88.30%				
2007		2007		2007	
Clearwater	8423	Cass	27150	Aitkin	15301
Dodge	17731	Itasca	43992	Benton	34226
Fillmore	21122	Jackson	11268	Blue Earth	55941
Freeborn	32584	Kandiyohi	41203	Carver	70205
Hubbard	18376	LeSueur	25426	Clay	51229
Kanabec	14996	Mahnomen	5190	Crow Wing	55099
Kittson	5285	Nobles	20832	Houston	19718
Marshall	10155	Pine	26530	Isanti	31287
Mille Lacs	22330	Pipestone	9895	Lincoln	6429
Norman	7442	Roseau	16338	Morrison	31712
Ottertail	57159	Stearns	133166	Saint Louis	200528
Polk	31369	Wabasha	21610	Todd	24426
Sibley	15356	Wadena	13713	Population map adopted	596101
Steele	33680	Winona	49985	% pop with map adopted	65.92%
Traverse	4134	Wright	89986		
Remaining Minnesota River		Population map done	536284		
Population with data	300142	% pop with map done	76.83%		
% pop with data	94.40%				
2008		2008		2008	
Carlton	31671	Anoka	298084	Cass	27150
Cottonwood	12167	Clearwater	8423	Itasca	43992
Douglas	32821	Dodge	17731	Jackson	11268
Faribault	16181	Fillmore	21122	Kandiyohi	41203
Grant	6289	Freeborn	32584	LeSueur	25426
Koochiching	14355	Hubbard	18376	Mahnomen	5190
Lake of the Woods	4522	Kanabec	14996	Nobles	20832
Martin	21802	Kittson	5285	Pine	26530
Murray	9165	Marshall	10155	Pipestone	9895

Minnesota Map Modernization Plan for Updating the FEMA Flood Insurance Rate Maps

2008 (continued)		2008 (continued)		2008 (continued)	
Pennington	13584	Mille Lacs	22330	Roseau	16338
Pope	11236	Mower	38603	Stearns	133166
Red Lake	4299	Norman	7442	Wabasha	21610
Rock	9721	Olmsted	124277	Wadena	13713
Stevens	10053	Polk	31369	Winona	49985
Watonwan	11876	Rice	56665	Wright	89986
Population with data	209742	Rock	9721	Population map adopted	536284
% pop with data	98.66%	Sibley	15356	% pop with map adopted	76.83%
		Steele	33680		
		Traverse	4134		
		Wilkin	7138		
		Population map done	777471		
		% pop with map done	92.63%		
2009		2009		2009	
Becker	30000	Becker	30000	Anoka	298084
Cook	5168	Beltrami	39650	Clearwater	8423
Lake	11058	Carlton	31671	Dodge	17731
Waseca	19526	Cook	5168	Fillmore	21122
		Cottonwood	12167	Freeborn	32584
Population with data	65752	Douglas	32821	Hubbard	18376
% pop with data	100.00%	Faribault	16181	Kanabec	14996
		Grant	6289	Kittson	5285
		Koochiching	14355	Marshall	10155
		Lake	11058	Mille Lacs	22330
		Lake of the Woods	4522	Mower	38603
		Martin	21802	Norman	7442
		Murray	9165	Olmsted	124277
		Ottertail	57159	Polk	31369
		Pennington	13584	Rice	56665
		Pope	11236	Rock	9721
		Red Lake	4299	Sibley	15356
		Stevens	10053	Steele	33680
		Waseca	19526	Traverse	4134
		Watonwan	11876	Wilkin	7138
		Population map done	362582	Population map adopted	777471
		% pop with map done	100.00%	% pop with map adopted	92.63%

2000 MN Population = 4,919,479

Table 4 - YEARLY SUMMARY OF PERCENTAGE OF MINNESOTA POPULATION WITH GIS FLOOD HAZARD MAPS & Flood Hazard Maps ADOPTED

Year	% of Population Mapped		% of Population Map Adopted	
	FEMA Targets	Minnesota Plan	FEMA Targets	Minnesota Plan
2004	20%	30%	10%	24%
2005	50%	54%	20%	30%
2006	65%	66%	35%	54%
2007	75%	77%	50%	66%
2008	85%	93%	70%	77%
2009	100%	100%	90%	93%

Figure 1. PERCENT OF POPULATION WITH DIGITAL GIS FLOOD HAZARD MAPS

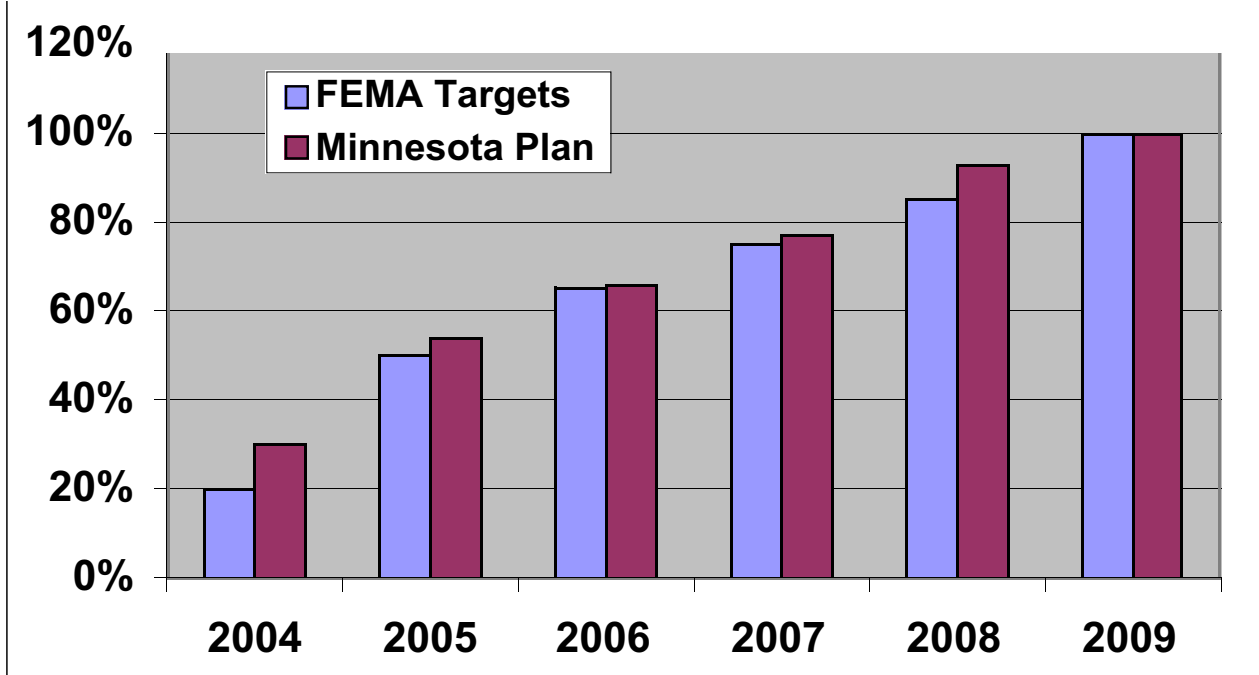
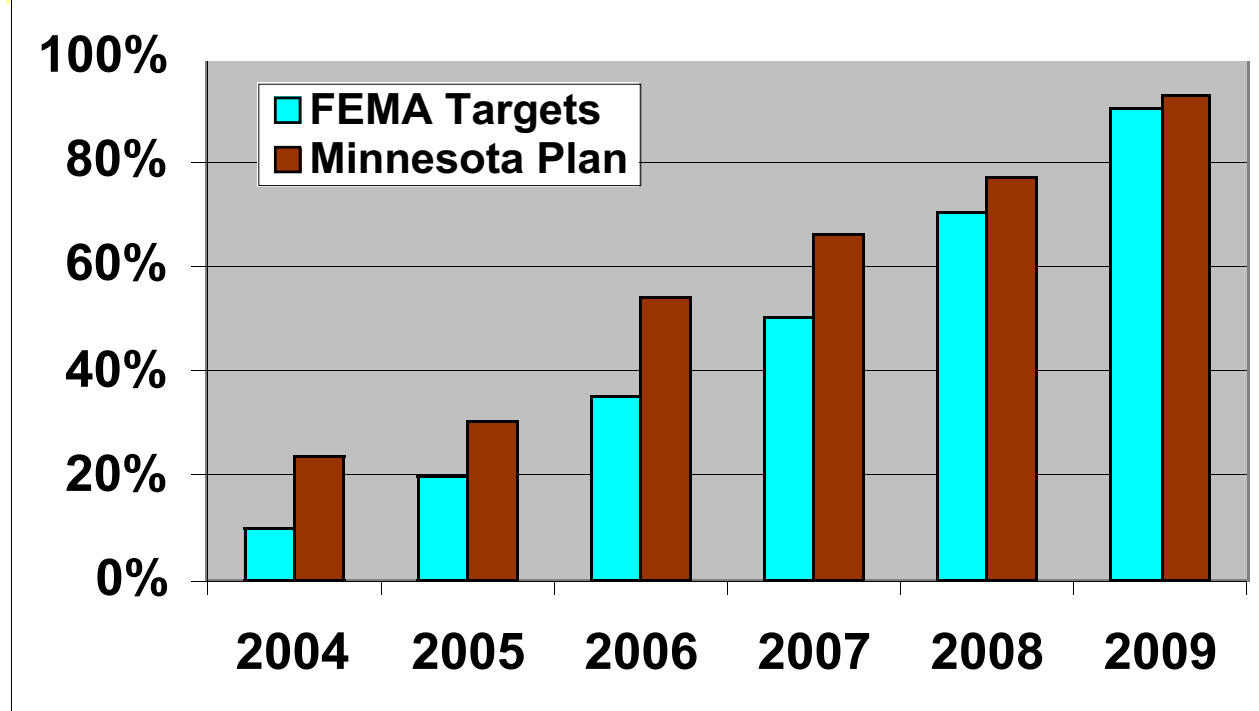


Figure 2. PERCENT OF POPULATION WITH ADOPTED GIS FLOOD MAPS



Appendix A

COST ESTIMATES FOR IMPLEMENTING MINNESOTA'S FLOODPLAIN MAP MODERNIZATION PLAN

The cost estimates for implementing Minnesota's Floodplain Map Modernization Plan are shown in this appendix. Table A1: Remapping Costs shows the work plan for each year and lists the counties for that year and the costs implementing the plan. The counties are listed according to priority within a year, with the highest priority projects first. The costs for each county are divided into five categories: topography, outreach, hydrology and hydraulics, internet access to maps, and map production. The costs for two categories, outreach and internet access to maps are assumed to be born by the CTP. The costs for the other three categories are split between the CTP and FEMA. The total estimated costs for FEMA and for the CTPs are given.

Existing CTP counties have completed mapping needs assessments; this increases the accuracy of the hydrology and hydraulics cost estimates in Table A1. Cost estimates for non-CTP counties use data from the 2002 Map Modernization Plan for State of Minnesota.

Included in the cost estimates for each year is funding from FEMA to the Minnesota DNR for coordination and management of the State CTP. Minnesota's match for this funding is shown in item Outreach CTP. Details for the funding to the state follow in this Appendix.

CTP Coordination and Management Annual Costs

Activities	NFIP Coordinator	Floodplain Map Engineer	Floodplain Ordinance Hydrologist	Hydraulic Engineer	Area Hydrologists	Expenses
Program Management	\$15,000					
CTP Coordination		\$50,000				\$4,000
Community Outreach		\$15,000			\$20,000	\$4,000
H&H Analysis		\$35,000		\$80,000		\$12,000
Ordination Adoption			\$50,000		\$40,000	
Total Annual Cost	\$15,000	\$100,000	\$50,000	\$80,000	\$60,000	\$20,000

GIS-Mapping Support for Minnesota DNR FEMA Proposal Costs

Developing the software applications and technical capabilities described above will require expenditures in two cost categories: 1) software development and maintenance, and 2) computing facilities. This cost proposal is broken out into separate subsections related to these categories.

Cost Category 1: Software Development and Maintenance

All labor costs reflect burdened rates at the State of Minnesota Information Technology Specialist 3-GIST option with salary escalation (\$120/hour).

<i>Application Name</i>	<i>Initial Development Person-Hours</i>	<i>Initial Development Burdened Costs</i>	<i>On-Going Support Person-Hours (Annual)</i>	<i>On-Going Support Burdened Costs (Annual)</i>
FIRM Map Product Distribution	40	\$4,800	20	\$2,400
Floodplain data Download	20	\$2,400	5	\$700
Interactive Floodplain Mapping	20	\$2,400	10	\$1,200
Floodplain Data Streaming	120	\$14,400	40	\$4,800
Hydrologic Analysis Model Hosting	10	\$1,200	10	\$1,200
TOTALS	210	\$25,200	85	\$10,300

Maintenance costs over five years: \$51,500

Total Costs for Initial Software Development and Five Years Software Product Maintenance: \$76,700

Cost Category 2: Computing Facilities

<i>Computing Component Name</i>	<i>Initial Cost</i>	<i>Product License Maintenance (per year)</i>	<i>Comments</i>
ArcSDE 8.X	\$10,000	\$3,000	Support high-speed simultaneous data serving to multiple clients, plus facilitates data maintenance processes with production contractors
ArcIMS	\$12,500	\$2,500	Supports vector data streaming to business partners and map mapping applications
HP ProLiant DL380 Server, Linux OS	\$16,000	N/A	Host ArcSDE and ArcIMS services.
TOTALS	\$38,500	\$5,500	

Initial cost: \$44,000
 Maintenance costs over four years (first year free): \$22,000
 Total Costs for Computing Facilities: \$66,000

Total Costs for all categories

<i>Computing Component Category</i>	<i>Initial Cost</i>	<i>Five Years of Maintenance and Administration</i>	<i>Cost by Computing Category</i>
Software Development and Maintenance	\$25,200	\$51,500	\$76,700
Computing Facilities	\$44,000	\$22,000	\$66,000
	\$62,900	\$28,650	
		TOTAL:	\$142,700

Minnesota Map Modernization Plan for Updating the FEMA Flood Insurance Rate Maps

Table A1: Remapping Costs

Counties listed by Priority within Year												
FY04												
Costs in thousands of \$												
County	Topographic		Outreach	Hydrology and		ITS	Map Production			Total County Costs		
	Funding Source			Funding Source			Number	Funding Source		CTP	FEMA	Total
	CTP	FEMA	CTP	CTP	FEMA	CTP	of Panels	CTP	FEMA			
CTP funding to DNR			125		250					125	250	375
Redwood		10			100	14	80		272	14	382	396
Renville		10			20	17	95		323	17	353	370
Nicollet		10			30	10	54		184	10	224	233
Chippewa		30			230	11	61		207	11	467	478
Hennepin						36	198		297	36	297	333
Dakota			40	150	220	11	59	201		401	220	621
Scott	250		35		300	10	56		190	295	490	785
Goodhue	600		40		450	14	79		269	654	719	1,373
Sherburne	300		35		200	8	43		146	343	346	689
Upper Mississippi River		450			1500	0				0	1950	1,950
Ramsey	200		35	50	50	9	49		167	294	217	510
St. Louis		200	40	70	600	90	500		1700	200	2500	2,700
Chisago	30	60	35	30	220	8	47		160	103	440	543
Isanti			30	20	20	9	50			59	20	79
McLeod		70		20	150	8	44		150	28	370	398
Meeker		35		50	150	10	58		197	60	382	443
Total Cost												12,277
CTP Total Cost	1380		415	390		265		201		2651		
FEMA Total Cost		875			4490				4261		9626	

Table A1: Remapping Costs (continued)

Counties listed by Priority within Year												
FY05												
Costs in thousands of \$												
County	Topographic		Outreach	Hydrology and		ITS	Map Production			Total County Costs		
	Funding Source			Funding Source			Number	Funding Source		CTP	FEMA	Total
	CTP	FEMA	CTP	CTP	FEMA	CTP	of Panels	CTP	FEMA			
CTP funding to DNR			125		250					125	250	375
Carver		40	40	10	120	8	46		156	58	316	375
Stearns*		70	40	30	250	21	119		405	91	725	816
Benton*		60		25	200	7	40		136	32	396	428
Blue Earth		60		75	225	13	70		238	88	523	611
Crow Wing*				100	10	19	104		354	119	364	482
Lincoln				20	10	8	42		143	28	153	180
Pine		160		25	300	21	116		394	46	854	900
Todd		40		25	100	14	80		272	39	412	451
Houston					75	5	30		102	5	177	182
Aitkin*					100	23	126		428	23	528	551
Morrison*		80			200	20	112		381	20	661	681
Wright*		70		75	325	12	69		235	87	630	717
Cass*				50	70	32	178		605	82	675	757
Itasca*				75	100	28	156		530	103	630	733
Kandiyohi		10		50	50	13	72		245	63	305	368
Total Cost												8,609
CTP Total Cost			205	560		245				1,010		
FEMA Total Cost		590			2385				4624		7599	

* cost assumes that Upper Mississippi River study completed

Minnesota Map Modernization Plan for Updating the FEMA Flood Insurance Rate Maps

Table A1: Remapping Costs (continued)

Counties listed by Priority within Year												
FY06												
Costs in thousands of \$												
County	Topographic		Outreach	Hydrology and		ITS	Map Production			Total County Costs		
	Funding Source		CTP	Funding Source		CTP	Number of Panels	Funding Source		CTP	FEMA	Total
CTP	FEMA	CTP		FEMA	CTP			CTP	FEMA			
CTP funding to DNR			125		250					125	250	375
Anoka*		120		150	700	14	80		272	164	1092	1,256
Olmsted		100		25	125	11	63		214	36	439	476
Rice		80		50	250	9	52		177	59	507	566
Nobles				25	25	11	60		204	36	229	265
Roseau	180			150	50	23	129		439	353	489	842
Jackson					200	12	66		224	12	424	436
Pipestone					100	7	37		126	7	226	232
Mower					150	11	62		211	11	361	372
LeSueur				30	200	9	48		163	39	363	402
Beltrami*				50	50	41	226		768	91	818	909
Winona					50	11	59		201	11	251	261
Wabasha					100	9	51		173	9	273	283
Wadena				25	50	9	49		167	34	217	250
Mahnomen				25	75	9	48		163	34	238	272
Wilkin					100	12	68		231	12	331	343
Total Cost												7,541
CTP Total Cost	180		125	530		198				1033		
FEMA Total Cost		300			2475				3733		6508	

* cost assumes that Upper Mississippi River study completed

Table A1: Remapping Costs (continued)

Counties listed by Priority within Year												
FY07												
Costs in thousands of \$												
County	Topographic		Outreach	Hydrology and		ITS	Map Production			Total County Costs		
	Funding Source		CTP	Funding Source		CTP	Number of Panels	Funding Source		CTP	FEMA	Total
CTP	FEMA	CTP		FEMA	CTP			CTP	FEMA			
CTP funding to DNR			125		250					125	250	375
Marshall		60		75	75	27	148		503	102	638	740
Polk		60			150	31	170		578	31	788	819
Kittson		60			150	19	105		357	19	567	586
Norman		60		40	100	11	59		201	51	361	411
Traverse				15	50	13	72		245	28	295	323
Fillmore					75	12	64		218	12	293	304
Freeborn					75	14	78		265	14	340	354
Hubbard		20			100	15	81		275	15	395	410
Clearwater				25	50	6	36		122	31	172	204
Dodge					100	10	54		184	10	284	293
MilleLacs				25	150	10	54		184	35	334	368
Ottertail				100	200	35	196		666	135	866	1,002
Remaining Minnesota River					400	0			0	0	400	400
Sibley*						10	54		184	10	184	193
Steele					75	8	42		143	8	218	225
Kanabec					100	9	49		167	9	267	275
Total Cost												6,908
CTP Total Cost	0		125	280		227				632		
FEMA Total Cost		260			1850				3788		5898	

* cost assumes Minnesota River analysis completed

Minnesota Map Modernization Plan for Updating the FEMA Flood Insurance Rate Maps

Table A1: Remapping Costs (continued)

Counties listed by Priority within Year												
Costs in thousands of \$												
County	Topographic		Outreach	Hydrology and		ITS	Map Production			Total County Costs		
	Funding Source			Funding Source			Number	Funding Source		CTP	FEMA	Total
	CTP	FEMA	CTP	CTP	FEMA	CTP	of Panels	CTP	FEMA			
CTP funding to DNR			125		250					125	250	375
Douglas				20	100	11	63		214	31	314	346
Pope				20	100	11	60		204	31	304	335
Carlton					75	14	80		272	14	347	361
Martin					75	11	63		214	11	289	301
Faribault					75	11	60		204	11	279	290
Koochiching				50	150	24	133		452	74	602	676
Pennington					25	11	60		204	11	229	240
Cottonwood					75	11	62		211	11	286	297
Watonwan					50	7	40		136	7	186	193
Stevens					75	9	48		163	9	238	247
Grant					75	9	48		163	9	238	247
Rock				25	50	8	42		143	33	193	225
Murray				30	50	11	60		204	41	254	295
Lake of the Woods				50	50	16	89		303	66	353	419
Red Lake				25	25	9	48		163	34	188	222
Total Cost												5,067
CTP Total Cost	0		125	220		172				517		
FEMA Total Cost		0			1300				3250		4550	

FY09												
CTP funding to DNR			125		250					125	250	375
Waseca					50	8	42		143	8	193	200
Becker				50	50	22	121		411	72	461	533
Cook				50		18	100		340	68	340	408
Lake				50		22	124		422	72	422	494
Total Cost												2,010
CTP Total Cost			125	150		70				275		
FEMA Total Cost		0			350				1316		1735	