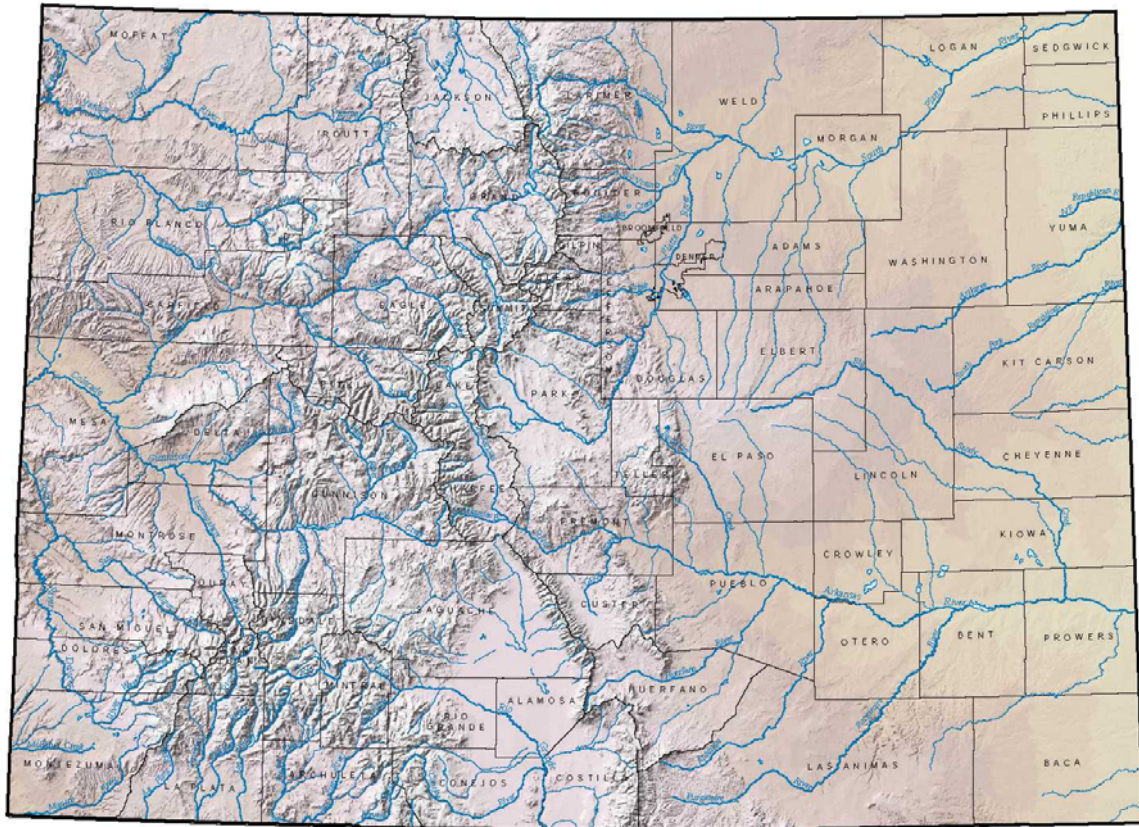


# Colorado

## Flood Map Modernization

### **Business Case Plan-Final Draft**

### Fiscal Years 2004–2008



Prepared by:



Colorado Water Conservation Board

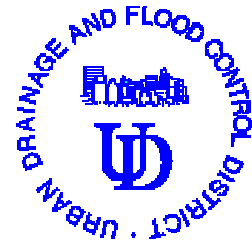
Submitted to:  
FEMA Region 8  
March 2004

# Colorado Flood Map Modernization Business Case Plan Fiscal Years 2004–2008

Prepared by:



Colorado Water Conservation Board



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The Colorado Water Conservation Board (CWCB) understands well that current and accurate flood hazard maps provide the cornerstone for effective floodplain management. The Federal Emergency Management Agency's (FEMA's) Flood Insurance Rate Maps (FIRMs) are also recognized as one of the essential tools for flood hazard mitigation in the United States. Unfortunately, many of these maps have become outdated, and significant areas of the country remain unmapped. To address this problem, the President's budget for Fiscal Year (FY) 2003 included \$351 million for initiating FEMA's national Multi-hazard Map Modernization Program, with an actual FY 03 approved amount by Congress of \$150 million for the Program. Similar or higher funding levels are proposed for subsequent fiscal years, including the appropriation of \$200 million for FY 2004 by Public Law (P.L.) 108-90.

### **Program Vision**

This 2004 Business Case Plan (Plan) for the State of Colorado serves as the State's "notice of interest" to participate in Flood Map Modernization activities. This Plan was prepared to assist the CWCB with identifying statewide map update goals and objectives and to assist FEMA in the development of regional and national plans for implementing the Multi-hazard Map Modernization Program. This Plan summarizes the role that Colorado intends to play in completing the required mapping activities and the way that these activities will be managed and performed. This Plan also identifies mapping priorities and outlines an approach for addressing these priorities.

### **Program Plan - Objectives**

The CWCB, in conjunction with the Denver metropolitan area's Urban Drainage and Flood Control District (UDFCD) for communities within the UDFCD's jurisdiction, will coordinate Colorado's floodplain mapping program in accordance with the guidelines provided by the FEMA, by implementing the following program management objectives:

- Assess floodplain mapping and other hazard needs within Colorado on a yearly basis.
- Update the Business Case Plan, the prioritization parameters, and the prioritized list of studies on a yearly basis.
- Educate the public on the risk that flood hazards pose as well as proper floodplain management practices and partner with communities to collect accurate base map and flood hazard information.
- Perform community outreach activities and conduct pre-scoping meetings and scoping meetings that lead to completion of flood studies and map updates based upon the yearly needs assessment and prioritization, maximizing local ownership of these products.
- Provide new and updated digital flood hazard data to Colorado residents through the Internet and other appropriate means, taking full advantage of local digital resources.
- Compile the digital data into a statewide base map database for use as a scoping and assessment tool, and to facilitate flood hazard mapping activities in the future.
- Evaluate conditions and make recommendations to restudy flood hazards where development occurs, watershed conditions change, maps become outdated, or new information and/or methods become available.

The CWCB is interested in performing these duties in partnership with FEMA, as we believe that only through partnership will we be able to leverage our resources so that both FEMA’s performance goals and CWCB’s goal to provide accurate flood hazard data to residents of Colorado can be achieved.

**Program Plan – Required Resources**

Achieving the above objectives will require added Digital Flood Insurance Rate Map (DFIRM) production capability and increased project management and Information Technology (IT) resources. The resources that the CWCB has identified to achieve the above objectives include:

- Engineering Consultants for DFIRM production
- Mapping Coordinator for program management assistance
- Information Technology hardware, software, and database maintenance

To date the CWCB has selected two contractor teams and is producing its first DFIRMs. There is, however, still much ground to cover in the areas of program management and IT. There is also a need for sufficient additional funding to utilize the contractors to their full capability.

**Performance Goals**

FEMA has established performance goals attached to Map Modernization funding. These goals can only be achieved if adequate funding is provided by FEMA and sufficient commitment and capabilities come from the local level. The CWCB is committed to helping FEMA achieve these objectives, provided that Map Modernization in Colorado is adequately funded. . This Plan demonstrates that achieving the performance targets will require a substantial increase in funding compared to current levels, even at the lowest level described in this report.

<b>FEMA’s Performance Elements</b>	<b>FEMA Targets</b>					
	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Percentage of population (as represented by communities) have digital GIS flood hazard data available on-line	20	50	65	75	85	100
Percentage of population (as represented by communities) have adopted modernized GIS flood maps	10	20	35	50	70	90
Percent of dollars leveraged effort toward digital GIS flood hazard data	20	20	20	20	20	20
Percentage of Map Modernization (appropriated) funding put through to CTPs (States and locals)	20	25	35	45	50	60

**Funding Options and Schedule**

Four (4) funding levels and a projected program schedule are included in Section Four of this document. Per FEMA’s request, funding levels of Full, Medium, and Low are included in this Business Plan. In addition to these three levels, a fourth level has been added that is representative of the funding received to date. Additionally, a program schedule has been included that accommodates the three different fiscal schedules that are impacted by a DFIRM revision; Federal (October – September), State (July – June), and Local (January – December). It is important to plan for these three fiscal schedules, because governmental decisions about

budgets are made at completely different times of the year by the different levels of government. The funding options mentioned above are included in detail in Section Four, and a summary of the results of this analysis is included below.

This State Plan is intended to be a comprehensive and living document that can be used as a guidance tool for the CWCB's flood mapping program regardless of future technological advances, shifts in policy guidance, or changes in funding level. While the authors of this Plan acknowledge that there is no way to create a document that can account for all unforeseen future events, an attempt has been made to create a document that addresses a variety of options that may at some point be available for the CWCB's flood mapping program. Through this Plan it is envisioned that the goal of providing digital, high quality, accurate, up-to-date, and geographically comprehensive flood hazard information to residents of Colorado will be achieved, while concurrently working with FEMA to meet their performance goals. A cooperative effort designed to simultaneously meet local, state, and federal goals will assist in making Map Modernization a success.

The CWCB requests funding for the Medium funding level, at a minimum, that would allow the State to develop accurate and up-to-date DFIRM's and perform much needed site specific hydrologic/hydraulic studies within the counties being re-studied. Map revision studies have been identified and requested by various communities within the State and the CWCB supports the need for more accurate and up-to-date flood hazard information. The CWCB would heartily endorse a Full funding level (\$59 million for five years), but currently it appears unlikely that FEMA would provide 80% of that, an average of \$9.4 million per year for each of the next five years. Instead, CWCB requests Medium funding, with an 80% FEMA share of the total of \$33.5 million, resulting in an average of \$5.4 million of FEMA funds per year. That level of funding will ensure that all counties in Colorado will have digital maps and 50% of the hydrologic and hydraulic (H&H) engineering needs in Colorado will be addressed. As a comparison, actual FY '03 funding, including the local and state shares, has been approximately \$1.5 million. To ensure Map Modernization success in Colorado, a substantial increase in funding will be needed, starting in Fiscal Year 2004.

## **Colorado's Business Plan at a Glance**

- ✓ **Colorado Specific Prioritization Ranking** – Accounting for both FEMA performance measures and Coloradoans' concerns.
- ✓ **Full, Medium, Low, and Current Funding Levels** – Our business plan is weighed against these four funding options.
- ✓ **Outreach Prior to Contracting to Perform Mapping** – Initial coordination meetings in counties prior to contracting with FEMA; electronic information distributed to all local officials.
- ✓ **Integrated Outreach Approach During and After Performance of DFIRM Studies** – Cooperative meetings and coordination for every DFIRM study; training and workshops in addition to DFIRM efforts.
- ✓ **Disseminating Data to End Users** – Using the Internet and other tools to provide static ("read-only") images and interactive flood data to end users.
- ✓ **Hiring a Mapping Coordinator** – Using FEMA funding, hire a state mapping coordinator to assist with overall program management.
- ✓ **Active Participation in Map Maintenance** – Expanding our roles; working toward in-state processing of PMRs, LOMRs, and CLOMRs.
- ✓ **Being an Innovator for FEMA** – Expanding our role in the NFIP through partnership with FEMA to become a national leader in the industry.
- ✓ **Promote Digital Mapping and Eliminate Paper Products**– Migrating as quickly as possible away from a paper environment to a digital environment.
- ✓ **Site-Specific Mapping** – Recommending new hydrologic and hydraulic analyses where existing data is unavailable or inadequate.
- ✓ **Maintain Current CTP Status in Colorado** – FEMA is discouraged from signing CTP agreements in Colorado outside of the CWCB and UDFCD in order to maximize efficiency in meeting Map Modernization goals.
- ✓ **And of course, In-State DFIRM Production...**

### **In-State DFIRM Production**

- ✓ Using CWCB and UDFCD contractors (only through CTP agreements; no IAA or IDIQ contracts)
- ✓ Full cycle DFIRM production (from preliminary maps to GPO deliverables)
- ✓ Focus funding on communities participating in the NFIP
- ✓ Emphasize technical quality
  - Best available base maps for planimetrics: Local GIS is preferred!
  - Hydrology that has been approved by the State and Locals
  - Hydraulics that match highest quality existing topography
- ✓ High priority hydrology and hydraulics takes precedence over low priority countrywide DFIRM conversion work



## Colorado's Business Plan at a Glance

### Proposed Projects and Estimated Costs – 2004 Through 2008

		2004	2005	2006	2007	2008	TOTALS
	<b>Counties</b>	Larimer Mesa Adams Arapahoe	El Paso Pueblo Teller Douglas (H&H) Eagle (H&H)	Garfield Weld Park La Plata San Miguel Montezuma Fremont Gunnison Mineral	Archuleta Ouray Pitkin Delta Logan Summit Clear Creek Boulder (H&H) Jefferson (H&H) Routt (H&H)	33 Counties Remain  (21 participate in the NFIP; 12 do not participate in the NFIP)	
<b>Low</b>	<b>DFIRM Creation</b>	\$2,600,000	\$2,600,000	\$2,900,000	\$2,000,000	\$5,100,000	\$15,000,000
	<b>Mgmt. And Support</b>	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$750,000
	<b>TOTAL *</b>	\$2,750,000	\$2,750,000	\$3,050,000	\$2,150,000	\$5,250,000	\$15,750,000
	<b>Adjusted TOTAL **</b>	\$3,200,000	\$3,700,000	\$4,100,000	\$3,700,000	\$6,300,000	\$21,000,000
<b>Medium</b>	<b>DFIRM Creation</b>	\$4,200,000	\$4,400,000	\$4,300,000	\$3,600,000	\$8,100,000	\$25,000,000
	<b>Mgmt. And Support</b>	\$170,000	\$170,000	\$170,000	\$170,000	\$170,000	\$850,000
	<b>TOTAL *</b>	\$4,370,000	\$4,570,000	\$4,470,000	\$3,770,000	\$8,270,000	\$25,850,000
	<b>Adjusted TOTAL **</b>	\$5,200,000	\$6,100,000	\$6,200,000	\$5,900,000	\$10,100,000	\$33,500,000
<b>Full</b>	<b>DFIRM Creation</b>	\$7,600,000	\$8,300,000	\$7,400,000	\$7,300,000	\$13,900,000	\$40,200,000
	<b>Mgmt. And Support</b>	\$235,000	\$235,000	\$235,000	\$235,000	\$235,000	\$1,175,000
	<b>TOTAL *</b>	\$7,835,000	\$8,535,000	\$7,635,000	\$7,535,000	\$14,135,000	\$40,400,000
	<b>Adjusted TOTAL **</b>	\$9,600,000	\$11,200,000	\$10,000,000	\$10,800,000	\$17,400,000	\$59,000,000

\*Based on median level unit costs

\*\*Cost estimates adjusted to reflect an 80-percent confidence level for planning purposes

## 1.1 VISION STATEMENT

The CWCB will act as the coordinating and implementing agency for FEMA, providing accurate digital floodplain management tools and flood insurance information to as many Colorado residents as possible. A high emphasis on areas where existing flood hazard information needs to be updated and revised, areas where flood hazard risk is high, and areas where future development is anticipated, will be provided while maximizing local resources to complement the provided FEMA funding and ensuring that floodplain mapping is being performed in a fair and equitable manner throughout Colorado.

## 1.2 CURRENT PROGRAM

The CWCB has a long-standing history of floodplain management in Colorado, beginning with the creation of the Board's Flood Protection Program in 1937 and the first designated floodplain study dated October 1963. The Flood Protection Program has evolved over time and expanded its operations to include numerous flood-related activities that assist in the prevention of loss of life and damage to property caused by flooding events. There are currently two entities in Colorado that have been designated by FEMA as Cooperating Technical Partners (CTPs) and that play major roles in floodplain management and floodplain mapping activities within the state. Those organizations are the CWCB and UDFCD. The CWCB is interested in continuing an active role in floodplain management throughout the State of Colorado and is currently drafting a "Statewide Floodplain and Stormwater Criteria Manual" that will provide guidance and consistency to help ensure responsible growth based on sound engineering and planning practices. In addition to the CWCB's long history in floodplain management, the UDFCD has a long history in floodplain management in the Denver metro area. The UDFCD has an existing Urban Storm Drainage Criteria Manual and an operating budget that allows it to monitor flood hazards and revise delineations of those hazards as needs are identified. With approximately 2 million people living within its boundaries, UDFCD addresses the needs of approximately half of the residents of Colorado and approximately one quarter of the population of Region VIII.

### 1.2.1 Colorado Water Conservation Board

The CWCB is a state agency under the umbrella of the Colorado Department of Natural Resources (Russell George, Executive Director). The CWCB is funded through the CWCB Construction Fund. This fund was created by the Colorado General Assembly in 1971 to provide low interest loans to water users in the development of water resource projects. The fund and its use are governed by § 37-60-121 through 125 C.R.S. The CWCB Construction Fund is a partially self-supporting revolving loan fund. Sources of revenue are from the return of principal and interest on outstanding loans, interest earned on the cash balance of the fund through investments by the state Treasurer, mineral lease fund distributions, and occasional cash transfers from the General Assembly. The Flood Protection Program represents one of the six major programmatic areas for the CWCB. The other five programs are: 1) Water Supply Protection, 2) Water Supply Planning and Finance, 3) Stream and Lake Protection, 4) Water Conservation and Drought Planning, and 5) Decision Support Systems.

The Flood Protection Program staff is responsible for floodplain management programs and activities. The Flood Protection Program is directed in several citations of the Colorado Revised

Statutes to prevent flood damages, review and approve floodplain designations prior to adoption by local government entities, and provide local jurisdictions with technical assistance and floodplain information. In addition, an August 1, 1977, Executive Order requires the CWCB and the Colorado Land Use Commission to provide assistance to entities in meeting the requirements of the National Flood Insurance Program. The Flood Protection Program conducts the following activities:

<p><b>Hazard Identification:</b> The Board assists with, performs, and reviews floodplain delineation studies ensure compliance with the Board’s Rules and Regulations for the delineation of 100-year floodplains.</p>
<p><b>Floodplain Designations &amp; Regulations:</b> The Board reviews and formally approves all floodplain delineations contained in floodplain information reports. The official Board action allows all Colorado communities to adopt legally enforceable floodplain information for regulatory purposes.</p>
<p><b>Community/Basin Planning:</b> The Board provides technical assistance to local governments and watershed groups for flood mitigation planning activities, multi-objective projects, and stream restoration programs.</p>
<p><b>Project Implementation:</b> The Board staff provides technical, design, financial and construction assistance to communities who need to pursue structural and non-structural measures for the reduction of flood risks to life and property and for enhancement and restoration of watershed resources.</p>
<p><b>Preparedness/Flood Response:</b> This entails analyzing 1) any spring snowmelt flooding threat, 2) response to an actual flood event, and 3) and post flood recovery activities. The Board works with the Governor’s Office, OEM, NRCS, CDOT, DWR, DNR, DOLA, NWS, FEMA, Corps of Engineers, and local governments regarding advanced measures and preparedness, flood fight activities, and post flood recovery operations.</p>
<p><b>Engineering/Technical Assistance:</b> This activity ensures that reasonably uniform standards are applied to hydrologic and hydraulic study investigations, identification and designation of all floodplains, and the design and construction of flood control projects.</p>
<p><b>Information Management/Education:</b> Colorado floodplain and technical information and data are supplied to entities such as the engineering community, local officials, and all other floodplain users. Technical standards ensure that the information is representative and/or identifies floodplain lands and properties which are in a known or identified flood risk area.</p>
<p><b>Federal-State Program Coordination:</b> The Board staff coordinates Board sponsored flood-related programs, studies and project activities with federal and local governments and other financial assistance that is made available to Colorado interests.</p>

To date the CWCB has designated and approved 573 floodplain studies over a period of more than 40 years. Using the local knowledge of flood risk, growth, and watershed conditions the CWCB is strategically positioned to help FEMA achieve their goal of providing the most reliable flood hazard information possible to the residents of Colorado.

### 1.2.2 Urban Drainage and Flood Control District

The UDFCD encompasses all of two counties and portions of another five counties. It is funded through taxes within those seven Denver metropolitan area counties. With these funds the UDFCD conducts master planning efforts to plan for future growth and identify projects to mitigate flood hazards and enhance water quality, identifies flood hazards through Flood Hazard Area Delineation (FHAD) maps, and constructs flood protection and flood management structures and assists local governments with maintenance activities. The UDFCD has its own Storm Drainage Criteria Manual and has many flood management practices that exceed the minimum federal requirements (such as their 0.5' rise requirement for floodways).

To date the UDFCD has signed CTP agreements with FEMA to perform a pilot DFIRM conversion for the City and County of Broomfield, perform DFIRM conversions for the City and County of Denver and the northern half of Douglas County, and for a pilot project to perform Letter of Map Revision (LOMR) and conditional LOMR (CLOMR) reviews on behalf of FEMA. The District provides equipment (computers and software), staff expertise, and funds that greatly enhance the ability of local governments to prepare first-rate floodplain mapping. District staff and consultants have perhaps the greatest degree of experience in Colorado (and some of the greatest degree of experience in the country) in doing precisely what the Map Modernization program developed by FEMA calls for. With District participation, the CWCB is confident that the Map Modernization effort in Colorado will have a significantly greater chance of success.

### 1.3 COLORADO'S VISION FOR PARTICIPATION IN MAP MODERNIZATION

The CWCB, in conjunction with the UDFCD for counties with the UDFCD's jurisdiction, will coordinate Colorado's floodplain mapping program in keeping with State and local goals and in accordance with the guidelines provided by the Federal Emergency Management Agency, by implementing the following program management objectives:

- Assess flood mapping and other hazard needs within Colorado on a yearly basis.
- Update the Business Case Plan, the prioritization parameters, and the prioritized list of studies on a yearly basis.
- Educate the public on the risk that flood hazards pose as well as proper floodplain management practices and partner with municipalities to collect accurate base map and flood hazard information.
- Perform community outreach activities, including Initial Coordination Meetings in counties being considered for possible flood studies, and conduct Scoping Meetings that lead to completion of flood studies and map updates based upon the yearly needs assessment and prioritization, maximizing local ownership of these products.
- Provide new and updated digital flood hazard data to Colorado residents through the Internet and other appropriate means, taking full advantage of local digital responses.

- Compile the digital data into a statewide base map database for use as a scoping and assessment tool, and to facilitate flood hazard mapping activities in the future.
- Evaluate conditions and make recommendations to restudy flood hazards where development occurs, watershed conditions change, maps become outdated, or new information and/or methods become available.

To implement these objectives the CWCB has developed a prioritization process that is based on both a quantitative and qualitative analysis of map update needs throughout Colorado. The CWCB has also selected two engineering consultant teams with flood map production experience to perform map updates during the first two fiscal years of the Map Modernization Program. Evaluation of those contracts will take place in late 2004 and the State's Purchasing Division may require re-advertisement and selection of engineering consultants for studies beyond those two years. The CWCB is currently performing map updates in Douglas and Boulder counties based on local Geographic Information System (GIS) data. Similarly, UDFCD has performed a study in the City and County of Broomfield utilizing local GIS data and is currently completing a study in the City and County of Denver and Douglas County utilizing local data. These studies are being produced as countywide Digital Flood Insurance Rate Maps according to FEMA's guidelines and specifications, and are all being performed in the vertical datum of NAVD 88, horizontal datum of NAD 83, and Universe Transverse Mercator (UTM) coordinates. It is the CWCB's intention and UDFCD's intention to perform all studies in this datum and projection so that future efforts to distribute and use the data will be as seamless as possible. It is acknowledged however, that local data may dictate the use of alternate horizontal or vertical datum, and those issues will be addressed as they arise.

The CWCB will evaluate the map maintenance and flood hazard update needs on a yearly basis to ensure that the flood hazard data produced remains as accurate as possible given available funding and other resources. Below is the annual program schedule for achieving the aforementioned objectives. The schedule assumes an estimated starting month of July, corresponding to the start of the state fiscal year. Actual implementation of that annual schedule in any particular year will vary based on the approval of FEMA funding to the State.. This schedule will be fluid. While planning will begin each July, scoping, contracting, and actual mapping will be "initiated" on the date that FEMA Map Modernization funding is allocated to the State. A Gantt chart is included below in Figure 1.1 to visually depict how the bullets listed below correspond to the CWCB's fiscal year (July – June).

- **July through August** – Perform Initial Coordination Meetings for the next FY.
- **September through November** – Compute cost estimates for counties that had an Initial Coordination Meeting for the next FY and submit cost estimates to FEMA.
- **December** – Reevaluate statewide needs based upon the results of Initial Coordination Meetings, annual needs assessment, and feedback from FEMA.
- **January through February** – Update scoping tool(s), prioritization parameters, prioritization list, and Business Case Plan based upon findings from initial coordination meetings and needs assessment. Revise cost estimating tool(s) for studies based upon any new or revised unit cost data. Prepare to use revised tools and information for developing a map revision plan for the next year.

- **March** – Receive funding notification from FEMA and select areas (counties) for flood mapping studies for the current Federal Fiscal Year (FY).
- **April through May** – Conduct Scoping Meetings for each selected county for the current FY and finalize Scopes of Work.
- **May through June** – Approve finalized contract, initiate map updates for DFIRMs funded in the current FY, and attempt to maintain a maximum one-year schedule to produce preliminary DFIRM products.
- **July through following June** – Complete preliminary DFIRM products.
- **Ongoing** – Update prioritization list to reflect map update needs that are addressed when new DFIRMs become effective. Post effective FIRM and FIS information on the Internet as it becomes effective.

The schedule above will have to be altered considerably for FY '04 to meet FEMA's expectations while taking account of the fact that CWCB staff time from July 2003 through February 2004 was taken with three major activities:

- *Establishment of the Colorado Map Modernization Program;*
- *Implementation of the FY '03 mapping projects; and*
- *Completion of the Business Case Plan.*

The proposed FY '04 schedule is shown below:

- **March 2004** – Perform Initial Coordination Meetings
- **March through mid-April 2004**– Compute and submit cost estimates
- **April 2004** – Reevaluate statewide needs
- **Not Needed Because BCP Report Just Completed** – Updating scoping tools, etc.
- **April 2004** – Receive funding notification from FEMA
- **Mid-April through May 2004** – Conduct Scoping Meetings and finalize Scopes of Work
- **May through June 2004** – Approve finalized contracts; initiate map updates
- **July 2004 through June 2005** – Complete preliminary DFIRM products

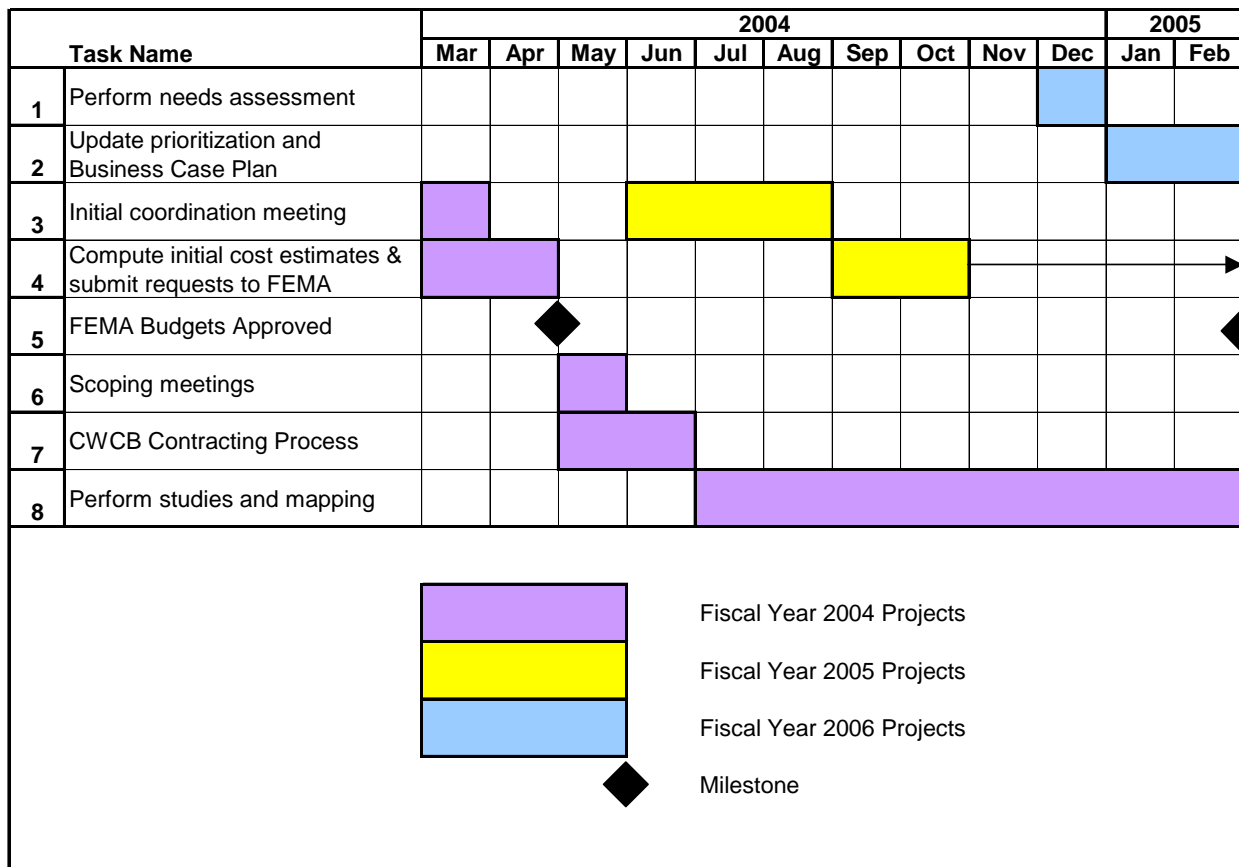
Through the implementation of the above schedule and the procedures outlined in this Plan, the CWCB intends to partner with FEMA to help them achieve their goals as follows:

- Achieve effective program management*
- Build and maintain mutually beneficial partnerships*
- Expand and better inform the user community*
- Establish and maintain a premier data collection and delivery system*

Following is a map summarizing the CWCB vision for Map Modernization in Colorado. It shows all of the update work that has already happened, the work that is currently underway, and the work that is proposed for Fiscal /year 2004 and 2008.

**Figure 1.1**

**Proposed Colorado Map Modernization Timeline for Upcoming Year**



Please see Figure 4.1 for a complete listing of projects (Fiscal Year 2004 through 2008) as well as the proposed schedule for post preliminary processing, including FEMA’s review and appeal period, the community’s ordinance adoption period, and the issuance of FISs and FIRMs.

## 2.1 PROGRAM PLAN – OBJECTIVES

The State of Colorado’s Business Case Plan supports the following objectives.

- Perform a 2-phased statewide needs assessment on a yearly basis in order to determine the upcoming year’s restudy and map update priorities. The first phase of this needs assessment process will be quantitative and will identify the top 25 percent of counties eligible for funding. (For FY ’08 the top 50% of counties will be identified.) The second phase will be a qualitative analysis of only those counties within the top 25 percent (the top 50% for FY ’08).
- Conduct community outreach activities, with the culmination being Initial Coordination Meetings. Counties being considered for possible floodplain studies and map updates, including municipalities in those counties, will be visited for two purposes. The first purpose will be to provide them with information about the work involved in preparing floodplain studies in their communities. The second purpose will be to determine preliminarily the local mapping needs, the available resources for map updates, and the general readiness of local officials to play their part in the preparation of a countywide DFIRM study.
- Perform Scoping Meetings in coordination with FEMA, the engineering consultants, and impacted communities within each county that is to be studied. This process will conclude with the completion of a Scope of Work for each county that is being mapped.
- Work with the engineering consultants and local officials to produce maps that meet FEMA’s technical and graphical requirements within the agreed upon timeframe, while simultaneously utilizing local resources and meeting local needs.
- Establish and manage an Internet-enabled distribution system that will allow users to both view and access the digital data used to produce the Digital FIRM. Ultimately this system should support the submittal of new data to be reviewed and considered for future map updates and revisions, including the processing of LOMRs.

In addition to the yearly production goals mentioned above, the CWCB seeks to achieve the following goals as Map Modernization progresses.

- Assume responsibility for long-term, periodic maintenance of Colorado DFIRMs.
- Continue and enhance outreach to the public and communities (counties and municipalities).
- Update the Business Case Plan on a yearly basis.
- Produce data in a consistent statewide format (NAVD 88, NAD 83, UTM) that can be used to produce a statewide base map and scoping tool to facilitate flood hazard mapping in the future.
- Produce and publish multi-hazard data (primarily flood hazards and debris flows) in support of FEMA’s multi-hazard objective. This includes the creation and maintenance of a statewide GIS environment that will support and encourage mapping of other hazard data such as erosion risk, stream instability and channel migration, landslides, avalanche



risks, ice jam flooding, dam failure inundation hazards, potential for wildfires, boundaries of actual wildfires, and exacerbated flood risks associated with wildfires.

- Support FEMA’s initiative to publish digital flood maps in-lieu of the traditional paper FIRMs and encourage the most rapid migration possible to digital maps. This includes the CWCB’s advocacy of a true digital mapping environment and total elimination of printed map panels (or print on demand only) by January 2006.

These objectives, along with the details of how these activities will help achieve the Map Modernization goals, are described in more depth in the sections below. After these objectives are discussed below, the requirements to achieve these objectives are detailed in section 2.2. Section 3 will show how the program plan will be evaluated against FEMA performance measures. Lastly, the program objectives and requirements will be weighed against each other for varying levels of funding in Section 4.

### 2.1.1 Statewide Needs Assessment

The State of Colorado initially identified a prioritized list of counties to receive map updates as part of the 2002 Map Modernization Implementation Plan (MMIP), which was submitted to FEMA in 2002 and is included herein by reference only. It is available from the CWCB for review upon request. Since the creation of the MMIP, both FEMA and the state have reviewed their initial guidance for prioritizing and selecting counties for map updates and determined that some changes are warranted. As a result, the CWCB has revised its initial prioritization criteria and intends to update them on an annual basis so the priority list can be a “living” document. In doing this, the CWCB hopes to accommodate not only changes to guidance or criteria, but also changes to watershed conditions that will alter flood risk, as well as development booms that are anticipated or that may occur within the next 5-years. This approach will also accommodate other factors such as “completed” mapping studies, funding availability, and local floodplain mapping activities.

Due to changes in the natural environment and the human-impacted environment, flood risk within the state is dynamic and should be evaluated on a yearly basis. As state agencies are involved with or aware of many of these changes, there is frequently enough in-house knowledge to update needs within a county or specific geographic area without additional input from local officials every year. However, the CWCB will make a concerted effort to conduct community outreach by contacting local governments via email, telephone, regular mail, or other methods to convey and obtain relevant information flood-related information that will assist in assessing flood hazard risk within the state.

**Countywide Mapping Needs Assessment** – The CWCB prioritization process involves a quantitative, or primary, ranking of all 64 counties within Colorado, regardless of whether or not they have received a Digital Flood Insurance Rate Map (Digital FIRM). Once this quantitative ranking is completed, the counties are divided into equal groups, or tiers of general priority. The highest-ranking group (top 25% of counties) is then evaluated based on a qualitative, or secondary, set of criteria to determine the map updates that will be performed for any given fiscal year. For the final year of the initial 5-year Map Modernization program the top 50% of counties will be evaluated, because the current schedule calls for so many counties to be mapped in FY 2008 (33 out of 64 total counties). The prioritization parameters and the rankings for the quantitative portion of the needs assessment will be revisited on a yearly basis, and the remaining

candidates for map updates will be re-ranked yearly prior to evaluating the highest-ranking group qualitatively. More detailed information on the primary and secondary screening categories, along with the prioritization results for fiscal year 2004, is presented in Appendix A. Below are the results of both the primary and secondary prioritization results for the top group for 2004.

Table 2.1

**Prioritization of Countywide Mapping – (1<sup>st</sup> Priority Group)**

County	Primary Prioritization		Secondary Prioritization
	Ranking Score	Initial Rank	
Douglas	29.8	1	<i>In Progress</i>
El Paso	28.8	2	Low
Eagle	28.6	3	<i>In Progress</i>
Larimer	28.6	4	High
Garfield	27.5	5	Medium
Boulder	27.3	6	<i>In Progress</i>
Weld	27.1	7	Medium
Mesa	26.6	8	High
Jefferson	26.3	9	<i>Countywide DFIRM Exists</i>
Adams	25.8	10	High
Park	25.6	11	Medium
Arapahoe	25.3	12	High
Elbert	25.3	13	<i>Not Participating in NFIP</i>
Pueblo	25.0	14	Low
La Plata	24.8	15	Medium
Teller	24.7	16	Low

It should be noted that four of the counties listed above (Douglas, Eagle, Boulder, and Jefferson) have studies that are already in existence or in progress. For each of these counties, and for an additional county (Routt) it is true that DFIRMs exist or are in progress, but in each case there is a substantial unmet map revision need, with a large number of stream miles needing hydrologic and hydraulic (H&H) engineering updates. Those 5 counties will be included in each future year's annual needs priority listing until those engineering update needs are met. It has been assumed in this report that H&H engineering needs will be addressed at least to a 50% level for all counties besides the 5 counties listed above. Should that prove to be an incorrect assumption, other counties will also be included in future annual needs priority listings until their needs are met. Clearly if only 50% of the H&H engineering needs are met, then there will inherently be unmet engineering update needs.

**Site Specific Needs Assessment** – In addition to the effort to provide counties with digital flood maps, the CWCB is committed to the goal of ensuring Colorado residents that those maps will contain the most current and accurate flood hazard information possible. To achieve this goal, the CWCB will evaluate statewide flood hazard mapping needs and will also inventory and

evaluate local engineering needs and resources on a case-by-case basis. Such a case-by-case evaluation for each county is consistent with the discussion above about including in the annual priority list any counties with unmet H&H engineering needs. It is important to determine the need for site-specific flood hazard data updates in addition to creating a countywide DFIRM mapping framework. The CWCB believes this secondary effort is necessary to account for changes to watershed conditions that may require the creation of updated flood hazard data, unanticipated development, shortages in funding, or a variety of other factors that may limit the ability of a countywide mapping effort to address all of a community's flood hazard mapping needs. Additionally, the CWCB wants to avoid the trap of viewing the mere creation of a countywide digital floodplain mapping foundation as sufficient to warrant moving on to other counties.

Through the implementation of the countywide mapping and site-specific needs assessments, the CWCB will be able to more easily work towards achieving their goal of providing "accurate and comprehensive floodplain management tools and flood insurance information to as many Colorado residents as possible". By documenting these procedures and results the CWCB will also assist FEMA in supporting the regulatory requirement to perform a needs assessment of flood hazard data on the FIRM on a 5-year basis, as indicated by Section 575 of the National Flood Insurance Reform Act of 1994, which mandates that FEMA must: "*... once during each 5-year period... assess the need to revise and update all floodplain areas and flood risk zones identified, delineated, or established (under Section 1360 of the Act) based on an analysis of all natural hazards affecting flood risks.*"

Information on the processes and documentation procedures for both the Countywide Mapping and Site Specific Needs Assessment, as well as templates for surveys submitted to communities and worksheets to assist communities with needs assessment activities are included in Appendix A.

### 2.1.2 Initial Coordination Meetings

Once a group of counties or sites has been identified for possible revision in a given fiscal year, Initial Coordination Meetings will be conducted to gather data, obtain the pulse on community readiness and willingness, and re-evaluate needs that have been previously identified by the CWCB and communities in a preliminary manner. Additionally, many local officials are unaware of the significant effort involved in preparing a countywide DFIRM study. The earlier they are introduced to the potential work that lies ahead, the more they can be meaningfully involved in the preparation of their maps and in the ultimate ownership of the final products. Once the Initial Coordination Meetings have occurred, those counties can be weighed against one another to determine which counties have the greatest needs and most likelihood of success. It is also necessary to perform initial coordination meetings to get an initial idea of the geographic and technical scope of work to be performed within a county or site to make the scoping and contracting process with engineering consultants more efficient, and in order to provide accurate information to FEMA regarding anticipated work for the upcoming fiscal year. This effort will greatly enhance the ability of CWCB and FEMA to estimate study costs. Additional information that will be distributed to communities before and at the meeting, as well as examples of some of the tools to be used at these meetings is included in Appendix B.

### 2.1.3 Scoping Meetings

Once individual counties have been identified and agreed upon by CWCB and FEMA (and, as appropriate, by UDFCD), detailed Scoping Meetings need to be conducted in order to:

- Ensure significant community involvement in the map revision process;
- Acquire and assess the completeness and quality of available data to be used in the restudy or remapping;
- Determine the need for additional data to ensure final products of high quality and geographic comprehensiveness; and
- Clearly identify the scope of the project so that the needs and concerns of all parties are addressed and a contract can be completed with the consultant

Scoping Meetings will be conducted within the framework and guidelines on scoping documented in FEMA's scoping document titled "Guidance for Scoping Flood Mapping Projects". Scoping Meetings will be conducted in coordination with and with the support of FEMA Regional personnel to support FEMA's objectives of building and maintaining mutually beneficial partnerships and expand and better inform the user community. The CWCB believes that early and active participation in meetings with the communities impacted by these map updates will create buy-in at the local level, which will directly result in a mutually beneficial cooperative relationship. For many years CWCB has wanted an opportunity to improve such partnerships, particularly with local governments in Colorado. It has been clear just in conducting Early Implementation Success studies in the City and County of Denver and in Douglas County, as part of FY' 03 efforts, the greatly enhanced partnerships with local officials have paid major dividends in return for the extra effort entailed. Additional information that will be distributed to communities before and at the meeting, as well as examples of some of the tools to be used at these meetings is included in Appendix C.

### 2.1.4 Perform Hydrologic and Hydraulic Studies and Mapping

In accordance with the existing CTP partnership with FEMA, the CWCB is currently undergoing an effort to update FEMA's paper inventory of FIRMs to DFIRMs. Updating a manual FIRM to a DFIRM provides communities with a more accessible floodplain management tool than was previously available, and often provides improved flood hazard data for floodplain management purposes. However, there are instances where funding is limited or conditions change once the DFIRM is completed. In these instances an adequate plan for maintenance of planimetric, hydrologic, and hydraulic information must be in place to ensure that underlying planimetric data and hydrologic and hydraulic data overlaid on the planimetric information are accurate and that the flood maps for Colorado do not become outdated and unreliable. To address these concerns, the CWCB would like to conduct flood mapping on both a countywide and site-specific basis.

The CWCB will coordinate mapping updates in coordination with FEMA's current Guidelines and Specifications for Flood Hazard Mapping Partners. The CWCB supports FEMA's efforts to make floodplain information available digitally, and is interested in pursuing the initiative to give digital floodplain maps the same legal authority that the paper maps currently have. To support this initiative, Colorado's flood mapping program is designed to be flexible enough to support

the creation of solely digital floodplain maps in the future. CWCB believes that occasional needs for paper maps can be met through “print-on-demand” technology.

The CWCB strives to create countywide mapping in the NAVD 1988 vertical datum, NAD 83 horizontal datum, and Universe Transverse Mercator projection for the sake of statewide consistency, however it is recognized that available local data or local desire may make the conversion from one datum or projection to another infeasible. Those issues can , therefore be addressed during the scoping process as they arise.

#### *2.1.4.1 Topographic and Base Mapping*

Topographic and base mapping are the foundation components of any flood map update. The CWCB is committed to utilizing base map information from available sources that meet FEMA specifications. The CWCB prefers to use local vector GIS as the source for DFIRM creation, however in areas where a local GIS is not available the U.S.G.S. Digital Orthophoto Quarter Quads (DOQQ’s) can be used. For topographic mapping, the CWCB will use locally available or locally developed topographic mapping. The required level of topographic mapping will be study- specific; however the CWCB encourages the use of topographic data that meets the State’s Drainage Criteria Manual. Topographic mapping that does not meet the state’s minimum standards will be evaluated on a study-by-study basis to determine if the use of such data would be an improvement to the data that is currently represented on the effective FIRM, and is accurate enough to be defensible. Topographic data that is developed by the CWCB for a flood study will be generated by the Study Contractor according to the terms of their contract, or will be developed by the local communities in coordination with the CWCB and with possible financial assistance from FEMA. The CWCB feels that up-to-date and accurate base and topographic mapping are extremely important in the flood mapping process and FEMA is hereby requested to consider the funding or partial funding of such activities in the future.

#### *2.1.4.2 Countywide Mapping*

After studies are identified for countywide mapping in a particular fiscal year, a Scoping Meeting will be held and a Site Specific Needs Assessment will be performed in each selected county. Utilizing data gathered prior to and during Initial Coordination Meetings, the identified needs will be incorporated into the countywide mapping effort to the extent possible based upon available funding. Site-specific needs that are identified but which cannot be addressed due to a lack of funding will be documented according to the Site Specific Needs Assessment procedures outlined in Appendix A.

Once the scope for a countywide mapping effort has been completed, the selected engineering consultant will, in addition to the standard DFIRM tasks associated with the map update for the selected county, generate planimetric information and base topography and conduct hydrologic and hydraulic analysis and mapping as needed based upon the scope of the study and terms of their contract. In addition, the engineering consultant will update non-revised areas, either using available topography, a Limited Method analysis, or digitization of effective flood hazards based upon the scope of the study and terms of their contract. The CWCB recognizes the varying level of effort to update flood hazards and the varying level of accuracy of each one of them.

CWCB believes that the most succinct description of technical standards for accuracy and quality of floodplain delineation information is contained in a formal resolution adopted by the Board of Directors of the Association of State Floodplain Managers (ASFPM) at its annual conference in St. Louis, Missouri on May 12, 2003. The resolution in its entirety is included in Appendix H of this report. The technical standards included within the resolution are listed below:

- *“The flood elevations and the floodplain delineations on the maps must correlate reasonably to the best available topographic information for the stream and adjacent corridor.*
- *The planimetric features on the floodplain maps (streets and highways, stream centerlines, bridges and other critical hydraulic features, corporate limits, section lines and corners, survey benchmarks, etc.) must correlate reasonably to the best available aerial photos or other suitable imagery for the stream and the adjacent corridor.*
- *The flood hydrology used to develop the floodplain map must still reasonably reflect the flood hazard and meet pertinent local, regional, state and federal technical standards.”*

All Map Modernization projects in Colorado will be expected to meet these technical criteria.

The CWCB has identified 16 study tasks that could potentially be implemented in a countywide map update. These tasks are listed in Table 2.1 below. More information on these tasks, including definitions, “desired minimum standards”, and cost estimating tools is included in Appendix D.

**Table 2.1**  
**Study Tasks for DFIRM Production**

<b>Task</b>	<b>Description</b>	<b>Unit</b>
A	Project Scoping	Project
B	DFIRM Database Creation	Panel
C	Base map upgrade for Old Specification DFIRM	Panel
D	DFIRM Conversion of Manual FIRM	Panel
E	Redelineation based on existing topography	Linear Mile
F	Topographic Data Collection (LIDAR or Photogrametry)	Square Mile
G	Topographic Data Collection (Survey)	Linear Mile
H	Approximate Analysis (Limited Method) and Redlineation	Linear Mile
I	Riverine Study (Hydrology)	Linear Mile
J	Riverine Study (Hydraulics - Detailed Method)	Linear Mile
K	Riverine Study (Floodplain Delineation)	Linear Mile
L	Detailed Study for Unique Flood Hazards	Linear Mile
M	Independent QC of topography	Square Mile
N	Independent QC of hydrology & hydraulics	Linear Mile
O	Independent QC of mapping	Panel
P	Appeal resolution contingency	Percent of Total

### 2.1.4.3 Site Specific Mapping

Due to the uncertainties associated with a 5-year plan the CWCB has established site-specific flood hazard mapping alternatives to be implemented, as the CWCB and communities jointly deem necessary and as funding is available, in order to increase the flexibility of Colorado's flood mapping program. Most site-specific mapping will involve a Detailed Method analysis of flooding hazards, but such mapping could include any of the study tasks identified in Appendix D. The following methods have been identified to publish site-specific mapping data. From most to least preferred, the methods are:

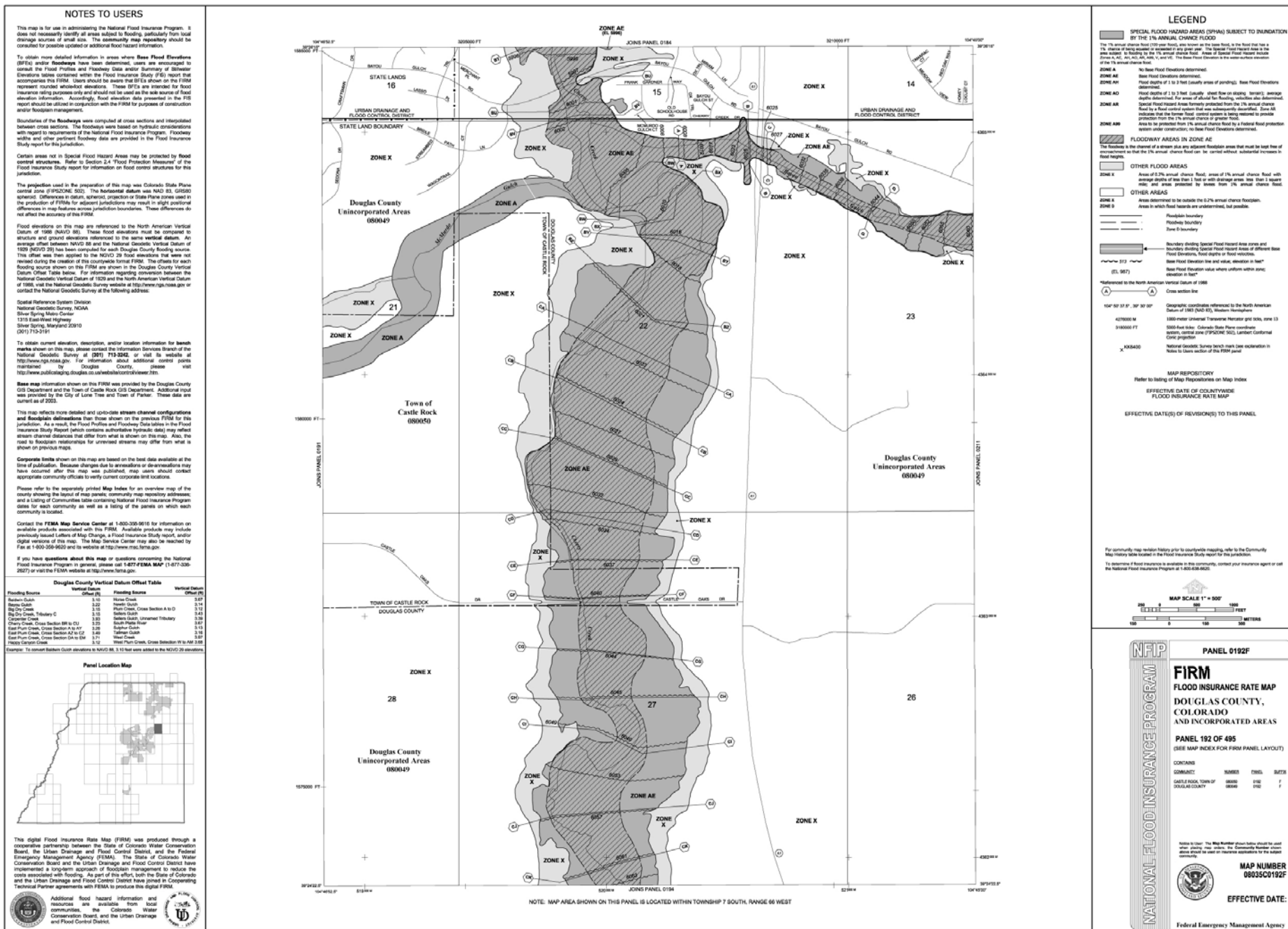
- Physical Map Revision (PMR)
- Letter of Map Revision (LOMR)
- Best Available Data (BADL)

The CWCB is currently contracting DFIRM production that includes printing of the preliminary FIRMs and preparation of final Government Printing Office (GPO) deliverables. Colorado is prepared to perform this function for areas where existing flood maps warrant a physical map revision (i.e. the effective information is inadequate) including printing and issuing preliminaries as well as preparing negatives for the GPO. These tasks can be performed for studies that revise one or more FIRM panels, provided adequate funding is available from FEMA. In other words, once a countywide DFIRM has been completed, if there is a need for a revised hydraulic analysis and subsequent revised map panel from FEMA the CWCB is willing to produce the preliminary maps and finalize the maps for GPO as long as there is funding in our budget from FEMA to perform those tasks. Colorado does not have the desire or ability to assume any of GPO's responsibilities at this time..

### 2.1.4.4 Mapping for the Digital Future

The CWCB acknowledges that digital floodplain maps may be considered legal documents and that they may be distributed based on a "mapping on demand" format in the future. Therefore, the CWCB intends to position itself to contribute to the future of floodplain mapping by building into this Plan the capability to distribute the data in a digital format in future years. In doing this, the CWCB also hopes to realize efficiencies in map production costs by eliminating paper map production thereby allowing the CWCB to perform more floodplain studies with the same amount of funding. (It is anticipated that the shift to digital floodplain maps will reduce the amount of funding that is spent to comply with FEMA's current Graphical Specifications). **For the short-term interim period when paper maps are still being produced, the CWCB stipulates that a custom collar be used for all Colorado studies that is not necessarily consistent with the national collar standard that may be used by FEMA or its National Service Provider.** See Figure 2.1 below for a preliminary draft of the Douglas County DFIRM that we are currently producing for FEMA as an "early implementation success story" which includes the custom collar referenced above.

Figure 2.1 – Draft Douglas County FIRM Panel and Custom Collar





### 2.1.5 Map Maintenance

CWCB is currently contracting DFIRM production that includes printing of the preliminary FIRMs and preparation of final Government Printing Office (GPO) deliverables. The CWCB is committed to long-term, periodic maintenance of the state's DFIRMs, once they have been produced. The CWCB believes that completion of needed hydrologic and hydraulic engineering updates in counties that already have DFIRMs is just as important as completion of DFIRMs in counties that have no DFIRMs. Without comprehensive and up-to-date flood hazard information floodplain managers throughout Colorado will not have the tools necessary to practice sound floodplain management. In addition to updating of outdated flood hazard data through the Site-Specific Mapping program that was outlined above, CWCB believes that an adequate map maintenance program is essential. Otherwise we may find ourselves in this situation in another 20 years. As map maintenance is a very broad topic we have identified the following areas that the CWCB would have an interest in participating in some capacity:

**Maintenance Level 1** – The CWCB is currently considering a more active role in Letters Of Map Change (LOMC) that could potentially involve a State review fee as well as preparation of Letter Of Map Revision (LOMR) documents for FEMA. The UDFCD is currently performing a similar function for FEMA under a separate CTP agreement. Unfortunately, current staffing levels are not adequate for the CWCB to take on an active role in LOMC review. However, with FEMA assistance we would be willing to expand our LOMC responsibilities. The progression of responsibilities the CWCB is interested in assuming is detailed below.

- a) CWCB perform a cursory review of all LOMRs and CLOMRs
- b) CWCB perform a detailed engineering review of all LOMRs and CLOMRs
- c) CWCB perform a complete review of LOMRs and CLOMRs, including preparation of the LOMR and CLOMR, including all relevant attachments.

The UDFCD is currently performing this function for FEMA within their jurisdiction under a separate CTP agreement, and performing it in a very effective and efficient manner. For several years UDFCD has demonstrated its ability to perform this work while saving FEMA money. CWCB is very confident that the UDFCD program can be modeled to initiate similar activities by the CWCB (for areas outside of the UDFCD's jurisdiction) for a successful statewide program.

**Maintenance Level 2** – If funding is available for a revision within areas where revised hydrologic and hydraulic analyses are required, a Physical Map Revision (PMR) will be processed in a similar fashion to the Site-Specific map update section above. If FEMA funding is not available for a PMR, but there is enough funding to prepare a LOMR, the CWCB will perform the LOMR technical review through one of their engineering consultants and submit a LOMR to FEMA for issuance. The CWCB believes that cost and performance of LOMC's remain the responsibility of the development proponent and the communities that are affected by the development. The CWCB will then file and store the LOMR information according to the procedures outlined in the section below.

**Maintenance Level 3** – UDFCD's FHADs are constantly being updated through funding provided by the UDFCD, based upon an internal analysis of the accuracy of existing flood hazards. The UDFCD would be interested in FEMA funding to support the maintenance of the

FEMA flood maps in accordance with the standards established in Availability and Uses of Digital Data section and Appendix E. Likewise, CWCB would be interested in FEMA funding to support such maintenance in the 57 counties outside the UDFCD boundaries and within those portions of 5 UDFCD counties that do not lie within the boundaries.

For maintenance levels 1 through 3, updated flood hazards will be catalogued and tracked electronically in accordance with the procedures outlined in the Availability and Uses of Digital Data section and Appendix E. Flood hazards within the UDFCD will be catalogued and tracked internally.

### 2.1.6 Quality Control / Quality Assurance

Quality assurance (QA) and quality control (QC) is an important component of producing accurate flood hazard data. Currently the CWCB is coordinating the production of flood hazard studies that have two review components. Data that is generated by our contractors are reviewed internally through established quality control procedures. This same data is then reviewed in part by FEMA's national contractor, Michael Baker Jr.

At this time the CWCB feels that this two-phased review process is adequate for the production of flood hazard maps for Colorado. At the same time, there is a realization that the scope of the projects that have been produced thus far will expand in the future (to include new hydrologic and hydraulic studies), and that the role that FEMA asks Michael Baker Jr. to fulfill is currently under negotiation. Due to these potential changes, the QA/QC procedures may need to be modified in the future to redefine the specific roles of the study partners such as:

- Increased or decreased reliance on Michael Baker Jr.
- Level of internal review by the CWCB
- Independent review from an additional CWCB engineering consultant

The need to modify our QA/QC procedures will be evaluated on a study-by-study basis and this Plan will be updated in the future to reflect any changes that may occur. Additionally, in anticipation of potential changes we have included independent QA/QC into our cost estimation template presented in Appendix D to assist with future planning efforts.

### 2.1.7 Multi-Hazard Data

The CWCB has identified several types of hazards throughout Colorado that are potentially available for incorporation into a statewide multi-hazard mapping effort. It must be understood that all of this information is not necessarily available, in a digital or other format, for public distribution; however the Map Modernization effort will support the development of multi-hazard data and build a framework to incorporate and store the data in the future. Examples of other natural hazards affecting Colorado are:

- Debris flows and mudflows
- Dam break flooding
- Wildfires
- Risk of exacerbated flood hazard due to wildfire

- Erosion hazards
- Stream instability and channel migration
- Ice-jam flooding
- Landslides
- Earthquakes
- Water supply susceptibility
- Avalanches
- Other geologic hazards

As Map Modernization progresses, the CWCB will make the digital flood map information available to agencies that are responsible for the generation and storage of this data and will encourage multi-hazard workshops that educate the public and/or communities on multi-hazards and the use of the DFIRM for multi-hazard purposes. The CWCB will coordinate with the agencies below to the extent practicable to incorporate this data into the Map Modernization effort.

- State Office of Emergency Management (OEM)
- Colorado Division of Water Resources (SEO)
- Colorado Department of Public Health and Environment (CDPHE)
- Colorado Department of Transportation (CDOT)
- Colorado Geological Survey (CGS)
- Colorado State Forest Service
- United States Geologic Survey (USGS)
- United States Forest Service (USFS)
- Bureau of Reclamation (USBR)

### 2.1.8 Availability and Uses of Digital Data

The CWCB is committed to providing communities and the public with the best available tools for flood hazard mapping. Currently, there are two general types of FEMA flood hazard information available to the public; the new “modernized” (or GIS-based flood hazard mapping) and the “non-modernized” (or old-format FIRM maps and LOMCs). The CWCB intends to provide this information (both the “modernized” data and the “non-modernized” data) to citizens through the UDFCD (for areas within the UDFCD boundary) and CWCB (for areas in Colorado but outside of the UDFCD). As the UDFCD currently serves as the repository for information within their jurisdiction, the section below details the role the CWCB will fulfill as a repository for information pertaining to areas outside of the UDFCD boundary.

**Modernized NFIP Data** – The CWCB will encourage communities to use DFIRM data within their existing Geographic Information Systems (GIS) by making this information available to them electronically. Additionally, the CWCB will work to make the information available to the

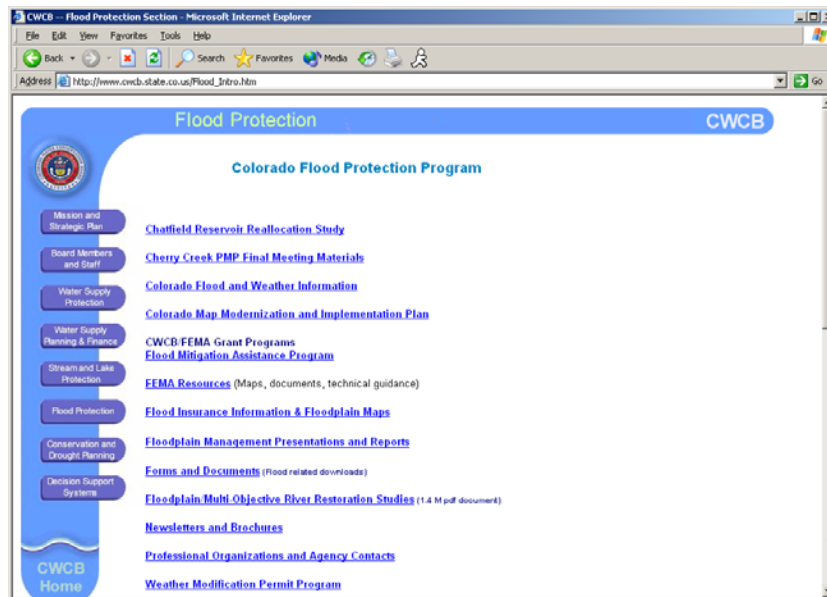
public via an Internet viewing tool. The state will also enhance their ability to access the data more efficiently by generating a GIS tool that will allow them to track the status of flood hazards on streams throughout the state and generate information to be used in the scoping process. The CWCB intends to make modernized data available through the following means:

- Once FEMA has issued the DFIRM (i.e. once the DFIRM becomes effective) the CWCB will make the GIS information available to the public in a digital format one of two ways.
  - Uploading the data onto [www.hazardmaps.gov](http://www.hazardmaps.gov). Harvard Design & Mapping Co., Inc, currently manages this public domain Internet site for FEMA. By uploading relevant DFIRM information to this site we will not only be providing the data in a public forum that everyone can access, but we will also encourage users to become aware of other hazards that they may be exposed to.
  - Providing the data to the public through a CWCB server which will allow the public to download relevant DFIRM layers in one of the three FEMA distributed formats: ArcInfo, ArcView, or Map Info.
- The CWCB will provide the registered raster images of the FIS and FIRM panels issued by the GPO through a downloadable Internet connection. This information will reside on a DNR or CWCB server.
- The CWCB will also provide the technical back-up information used to create the DFIRM, such as hydrologic and hydraulic data, topography, workmaps, Technical Support Data Notebook (TSDN), etc. This information will reside on a DNR or CWCB server.
- The CWCB will upload the information to a viewer using the ESRI ArcIMS software. The aim of the ArcIMS initiative is to provide citizens and interested parties with a tool to easily view available flood hazard data, thereby increasing awareness and furthering the education of flood risk.
- The CWCB will also use the data to populate the flood hazard tracking and scoping support database. The intent of the scoping tool is to create a method that will help the CWCB focus its efforts and funding in the most efficient way possible for the foreseeable future. Through GIS the CWCB will be able to analyze flood risk throughout the state and perform analysis and queries to assist with decision-making, the end result of which should be an accurate an efficient process for scoping flood mapping studies.

The website for the Flood Protection Section is shown below in Figure 2.1. Additional information on the conceptual plans for the systems mentioned above as well as information on how this information will be distributed through the CWCB's website can be found in Appendix E.

Figure 2.2

## Colorado Water Conservation Board – Flood Protection Section Website



**Non-Modernized NFIP Data** – Currently, the CWCB does not have a complete set of the raster images for existing FEMA studies and maps in Colorado, because a complete set was not provided by FEMA. The CWCB is, however, interested in providing to its customers a complete set of these FIRM maps for download via a CWCB server. The CWCB is interested in providing the non-modernized flood hazard information listed below that will be stored on a CWCB server, however it is acknowledged that this may not necessarily be part of the Map Modernization effort, and therefore may be considered an additional activity. Clarification from FEMA is needed regarding whether the items listed below are consistent with FEMA’s vision for Map Modernization. In the event that these activities fall outside of Map Modernization, the CWCB is interested in managing these activities on FEMA’s behalf with appropriate funding to do so. The non-modernized flood hazard information consists of:

- Raster FIRMs; downloadable via the Internet
- Technical back-up information used for past FIRM updates; downloadable via the Internet.
- Letters of Map Change issued after 2003; downloadable via the Internet
- Pre-2003 LOMC’s that will be electronically imaged by the CWCB and provided via the internet to customers
- Pre-Map Mod flood studies and maps (FEMA and non-FEMA) that have been electronically imaged and will be provided via the internet to customers

**Multi-Hazard Data** – As stated above, there are many hazards in addition to flood-hazards that may be of interest to the public or local governments. Much of this data is managed by other state agencies and may not yet be digital or available for public distribution. However, the CWCB believes that Map Modernization will provide a solid foundation for the storage, use and

distribution of this data in the future and it is envisioned that some or all of the data listed in Section 2.17 would be available at some point in the future.

**Additional Data** – The CWCB acknowledges that there is additional flood hazard information that will assist floodplain managers and the public to become more knowledgeable of flood hazard risk. Examples of information that is currently distributed by the CWCB, as well as information that the CWCB would like to make available in the future, are listed below. The CWCB is aware that the information listed below is outside of the realm of the NFIP and, therefore, would most likely not be eligible for Map Modernization funding by FEMA. However, the information is presented here to for informational purposes and to illustrate potential growth areas for the CWCB program. In addition, CWCB encourages and will continue to encourage the addition by local officials of all hazard data they deem pertinent to their local digital database. Examples of additional data are:

- Unique flood hazard data such as wildfire risk areas and post-wildfire flood hazard analyses, debris flow hazards, and ice jam flooding areas.
- Geologic hazard data
- Erosion-prone and unstable stream corridors
- Documentation from Presidentially-declared and non-declared disasters.
- Other flood-related documentation including inundation maps, photographs (aerial and non-aerial) and videos.
- Site-specific cross-sectional and profile data identifying infrastructure (i.e. highways, water treatment plants, sewer plants) at risk.

### 2.1.9 Enhance Existing and New Partnerships (Outreach)

The CWCB places a high emphasis on communication during the map production process in order to produce a useful product for the end-users. Therefore, it is important to have both a robust outreach program (stressing meetings before and throughout the map revision process) and product delivery system (ensuring that effective digital data are readily available to interested parties). In particular, local governments must be fully involved in the preparation of maps for their communities.

#### *2.1.9.1 Urban Drainage and Flood Control District*

The seven counties in the District include one county that is entirely within its jurisdiction (City and County of Denver), one county that is almost entirely within its jurisdiction (City and County of Broomfield) and five counties that are partially within its jurisdiction (Adams, Arapahoe, Boulder, Douglas and Jefferson). CWCB staff has already proposed to UDFCD staff that the District might manage the preparation of DFIRMs for the entire county of the six counties not entirely within the District, not just the portions within the District. The UDFCD staff expressed interest in serving that study manager function, with the exception of Boulder County since the current DFIRM study is being managed by the CWCB at this time. The District is an experienced CTP entity and the staff at the District already has a working relationship with local floodplain managers for the six counties (in addition to Denver). Those factors place

Colorado into an enviable position of having a state agency that is a CTP and an Internationally recognized flood control district that is also a CTP. Both CTP's in Colorado are interested in participating actively in the preparation of high quality floodplain mapping that serves local, regional, state and federal needs. In fact, the District is already doing some of this work.

Approximately half of the population of Colorado lives within the District's boundaries and would benefit directly from this proposed partnership. In addition, if the District is willing to take on the management function for the non-District portions of the counties mentioned above, a very large part of the management of Colorado Map Modernization effort could be undertaken by an entity other than CWCB. That partnership would greatly enhance CWCB capabilities.

### *2.1.9.2 CWCB's Partnerships with Local Governments and the Public*

Since the inception of the Map Modernization concept the CWCB has worked to establish strong local partnerships as a foundation for our map modernization program. A summary of our efforts to date, proposed outreach efforts directly related to DFIRM projects, and additional proposed outreach efforts are listed below:

#### **Outreach to Date**

- For the original outreach effort we contacted all 64 counties within Colorado, as part of the 2002 MMIP project, to solicit their input on the accuracy of their current flood hazard maps. For this effort a survey was distributed and the results were tabulated in a database that can be referenced for future scoping and restudy efforts. Topics addressed included new developments or construction within the floodplain, the availability of existing topographic, hydrologic, or hydraulic data, and the community's assessment of the need for new topographic, hydrologic, and/or hydraulic data to be developed.
- The CWCB and its consulting team (PBS&J and Moser Associates) conducted regional workshops during the summer of 2002 to provide a forum for information exchange related to Map Modernization efforts. Every county and community in Colorado was invited to attend a workshop, with attendance by a significant number of community officials.
- The CWCB currently conducts "Floodplain Management 101" workshops, in cooperation with the Colorado Association of Stormwater and Floodplain Managers (CASFM), to assist local floodplain managers.
- The CWCB maintains an interactive dialogue with all communities in Colorado through regular telephone contacts and on-site meetings.
- CWCB was actively involved in outreach efforts related to the development of DFIRMs prior to FY 2003 for Jefferson County (in cooperation with UDFCD), Eagle County, Routt County, and some of the municipalities in Grand County. UDFCD provided similar assistance to the City and County of Broomfield as they prepared their DFIRM.
- CWCB (with UDFCD, as appropriate) has been actively involved in outreach efforts in the FY 2003 studies in the City and County of Denver, Douglas County, and Boulder County.

- Outreach efforts have already begun for the four proposed counties for FY 2004 (Larimer, Mesa, Adams and Arapahoe) to prepare them for the possibility of DFIRMs in their communities.

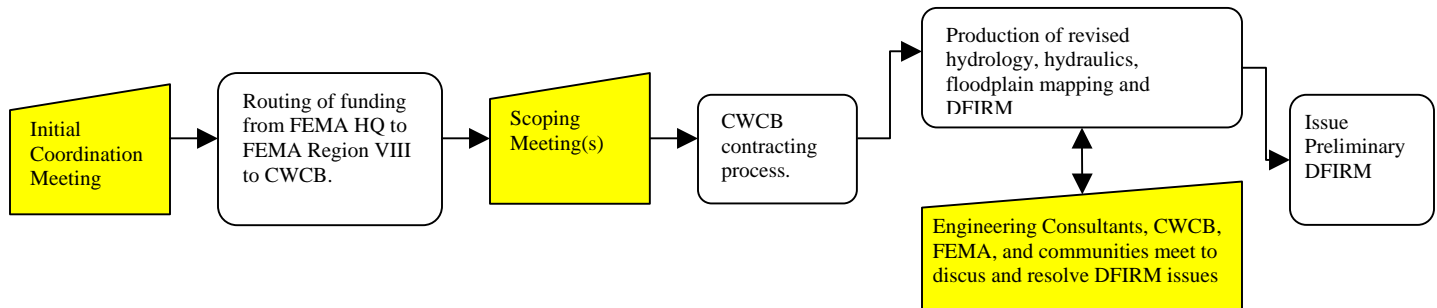
**DFIRM-Related Outreach**

As the CWCB takes a more active role in Map Modernization we have outlined the following outreach goals related to our flood map production role. A schedule of the DFIRM project schedule, with the outreach steps highlighted, is included in Figure 2.3 below.

- Ensure that local governments are as informed as possible, as early as possible, about mapping efforts proposed or going on in their communities and the procedures being followed to conduct those efforts
- Develop strategies to motivate partners to actively contribute to map updates
- Share map update and map maintenance costs
- Ensure that data layers are consistent with local digital resources and capabilities
- Create added value to flood mapping deliverables for the mapping partners

**Figure 2.3**

**Outreach Steps in the Map Production Process – Initiation to Preliminary**



**Additional Proposed Outreach Efforts**

As we take a more active role in Map Modernization we have outlined the following outreach plan to address concerns that are not directly related to our flood map production role:

- The CWCB will continue their “Floodplain Management 101” workshops and is considering offering courses on other topics such as the Community Rating System (CRS) and regulations. Courses on preparation of DFIRMs and on ongoing maintenance and utilization of DFIRMs will need to be developed.
- Produce reports (progress and other) to increase general knowledge and support for Map Modernization.
- Work with Federal and local governments so that mutually acceptable local data (e.x. 0.5’ floodways, post-fire flood hazards, or other more restrictive requirements) can be published on the FIRM.



### 2.1.9.3 CWCB's Partnerships with Other Federal and State Agencies

As we propose to integrate flood information with other hazard data, we realize the need to enhance our coordination with other federal and state agencies. Currently the Colorado State Patrol and other State officials outside of the CWCB have primary roles for coordinating with the Department of Homeland Security (DHS). As stated in the multi-hazard section above, there are at least 5 agencies besides the State Patrol, CWCB, and UDFCD that may have hazard data to contribute, or may have sister programs to the CWCB's flood hazard mapping program. We intend to coordinate with various state agencies in order to maximize efficiency and to establish and maintain mutually-beneficial partnerships.

Likewise, we recognize the need to reach out to and partner with federal agencies that may be impacted by Map Modernization. To this end we have begun to establish contacts with regional representatives from federal agencies, and have been successful to date at communicating the need to partner and share data. At our most recent DFIRM production workshop we received good input from a member of the Census Bureau regarding community boundary and other GIS data that is stored and maintained by the Census Bureau.

### 2.1.10 Cost Share

The State of Colorado supports FEMA's objective of leveraging State and Local resources, including achieving a significant local cost share. The CWCB is committed to achieving a 20 percent cost share on flood mapping projects within Colorado for the duration of Map Modernization, to the extent such funding is supported by the Board and the State Legislature. The CWCB will match 10 percent in a cash contribution and will coordinate with local officials to achieve the remainder of the 20 percent (10 percent local share). In addition, the CWCB will work with local communities to leverage in-kind services in addition to any cash contribution that may be available. In return for the cash or in-kind services provided by localities, the CWCB will work to ensure that communities get a return on their investment commensurate with their contribution. In facilitating this cost share and return on investment, the CWCB intends to foster mutually-beneficial relationships that will result in a product that benefits all participants involved in the map revision process. Table 2.3 below illustrates the CWCB, UDFCD, and local cost-share efforts related to the three FY 2003 counties (Denver, Douglas, and Boulder).

**Table 2.3**

**Fiscal Year 2003 Project Cost and Local Cost Share**

<b>Study</b>	<b>FEMA Grant</b>	<b>Total Contract</b>	<b>Cost Share</b>	<b>Lead Agency</b>
Denver DFIRM	\$150,000	\$193,000	25%	UDFCD
Southern Douglas DFIRM	\$260,000	\$344,000	24%	CWCB
Northern Douglas DFIRM	\$240,000	\$300,000	20%	UDFCD
Boulder County DFIRM	\$315,000	\$375,000	16%	CWCB
South Boulder Creek H&H	\$140,000	\$500,000	72%	CWCB
Plum/East Plum Creek H&H	\$75,000	\$100,000	25%	UDFCD

### 2.1.11 Reporting

To support both the State's outreach initiatives and the obligations to FEMA, there is a commitment to provide regular reports on the progress of Colorado's Map Modernization plan. These reports will summarize the activities to date and highlighting compliance with FEMA's performance matrices and success stories of the Map Modernization effort. This information will be made available to FEMA and will be posted on the CWCB website for public information. Required quarterly performance reports for the CTP funded activities will also be submitted to FEMA. The CWCB requests that FEMA Region VIII provide a 30-day reminder prior to submission deadlines for quarterly reports, including a list of all active studies in Colorado that require the reports.

## 2.2 PROGRAM PLAN – REQUIRED RESOURCES

This section details the project management, engineering consultant, and information technology (IT) resources that would be required to achieve the objectives detailed above. Section Three evaluates the objectives stated above and the resources listed below against three separate funding levels to accurately communicate what objectives are achievable for varied levels of funding.

### 2.2.1 Project Management

Managing Map Modernization activities already has resulted in an increased project management burden on the CWCB and will continue to place such a burden into the future. The CWCB does not currently possess the resources to continue its present coordination role or to achieve all of the objectives listed above in the future without additional funding or staff. It will be important to strike an acceptable balance between funding and objectives to ensure that the project management burden does not hinder the success of Colorado's flood mapping program, so that each individual mapping project is of the highest quality.

The following duties have been identified as possible project management duties:

- Yearly update of the State Business Case Plan
- Yearly update of the individual prioritization parameters and of the Prioritization List
- Completing Statewide Needs Assessments and updating them annually
- Conducting initial coordination meetings in all potential candidate counties in a given fiscal year
- Evaluating data from communities (i.e. digital topography, GIS, hydrologic and hydraulic studies) for completeness and acceptability
- Conducting scoping meetings and completing Mapping Activity Statements
- Contracting flood study updates
- Resolving issues, disputes, and changes to scopes and contracts as needed
- Documenting resolutions to issues and new policy initiatives
- Monitoring engineering consultants performing flood study updates

- Invoicing and project tracking related to engineering consultants performing flood study updates
- Generating summary and progress reports for FEMA and the public
- Conducting public outreach regarding Colorado’s map modernization efforts, including preparation and regular updating of all needed training materials
- Generating CTP agreements as needed
- Maintaining the Arc-IMS website
- Maintaining the scoping tool(s)
- Coordinating the resolution of appeals and protests
- Coordinating progress meeting with communities and mapping partners

The CWCB, through cooperative funding from FEMA and CWCB, previously conducted a pilot study of the tasks involved in DFIRM production and the management tasks associated with flood study production. The results of that investigation found that sufficient work exists to support additional project management staff, identified as a “Mapping Coordinator” in the report titled “Colorado’s Map Modernization Program – Updating Colorado’s Flood Maps”. This report is included herein by reference only, and a copy of this report has been submitted to FEMA and can be requested and obtained from the CWCB. Additionally, the Mapping Coordinator has been identified as a required entity in Section Four of this report, Funding Options, and is accounted for in the budget of this Plan.

### 2.2.2 Study Contractors

As the CWCB does not have an in-house engineering staff solely devoted to floodplain mapping efforts in Colorado, the use of engineering consultants is essential to make the floodplain mapping program a success. To support the floodplain mapping program, the CWCB has secured two engineering consultants to perform flood study updates in Colorado during the first two federal fiscal years of the Map Modernization Program. Both of the selected engineering consultants have substantial flood mapping experience on a national level as well as a local Colorado presence. The consulting contracts will be reviewed and evaluated every two years, and the DNR Purchasing Division may require re-advertisement and selection of consultants on that basis. As previously stated, the CWCB intends to assume responsibility for long-term, periodic maintenance of Colorado DFIRMs. To support this goal the CWCB has selected engineering consultants that are familiar with all phases of flood map production, including scoping, preliminary map production, and post-preliminary processing. The tasks that the engineering consultants may be responsible for on any given project are:

- Project Scoping
- DFIRM database creation
- Base map upgrade for DFIRM that no longer meets FEMA specifications
- DFIRM conversion of manual FIRM

- Redelineation of detailed flood hazards based on new topography and/or new engineering data
- Topographic data collection (LIDAR or Photogrammetry)
- Topographic and hydraulic structure data collection (Survey)
- New approximate analysis (Limited Method) and redelineation
- Riverine Study (Hydrology)
- Riverine Study (Hydraulics – Detailed Method)
- Riverine Study (Floodplain delineation)
- Detailed Study (Unique flood hazards)
- Independent QC of topography
- Independent QC of hydrology and hydraulics
- Independent QC of mapping
- Assist with the resolution of appeals, protests, and comments

At present, CWCB believes that contracting with these engineering consultants represents the most effective means for conducting Map Modernization activities in Colorado. CWCB does not wish to have any Map Modernization activities in Colorado conducted through IAA or IDIQ contracting procedures. CWCB strongly urges FEMA to support the utilization of the CTP mechanism as the only mechanism for contracting of FEMA-funded floodplain studies in Colorado.

It is the CWCB's intent to produce publication ready DFIRMs. Therefore, included within the definition of DFIRM creation or conversion are tasks and costs associated with the publication and finalization of DFIRMs. These tasks include, but are not limited to, distribution of preliminary FIS' and FIRMs, ensuring that 6-month compliance period requirements are met, and preparing final deliverables (negatives for the Government Printing Office (GPO) etc.). The CWCB does not intend to assume any of the current responsibilities of the GPO, and in fact discourages the future production of paper mapping products in light of the recommended digital distribution of flood hazard data for Colorado.

Additional information regarding the administrative and technical requirements and procedures for the production of DFIRMs in Colorado, including compliance with state and FEMA requirements, can be found in "Colorado's Map Modernization Program – Updating Colorado's Flood Maps". More information on these tasks, including detailed definitions and cost estimating tools, are included in Appendix D.

### **2.2.3 Information Technology and Database Management**

Many of the information technology (IT) requirements established for flood hazard analysis and DFIRM production are not direct requirements of the CWCB. Those non-CWCB requirements have been and will be transferred to the flood mapping engineering consultants. However, the CWCB is interested in storing and distributing some of the final deliverables, which will result in

a need to upgrade to the current IT resources available within the Colorado DNR. The following IT deliverables have been identified as part of the floodplain mapping program:

- Repository for final DFIRM GIS deliverables. GIS data would be available for download in the three FEMA distributed formats, ArcInfo, ArcView, and Map Info. The basic requirements to make this service available are server space, interface development, and maintenance costs. There is a process to expand the IT program and to establish an on-site IT staff responsible for interface development and maintenance costs. Additionally, it is anticipated that the space requirements of the GIS data will be within the limits of the existing server space (distribution of the three formats is anticipated at 10-15 MB per county). Therefore, the CWCB anticipates a minor amount of assistance for additional IT requirements to support this function.
- Repository for final DFIRM graphical deliverables. Graphical displays of the FIS and FIRM panels would be available for download in Adobe Acrobat or similar format. The basic requirements to make this service available are server space, interface development, and maintenance costs. We are currently expanding the IT program to establish an on-site IT staff responsible for interface development and maintenance costs. Server space for the distribution of this data is anticipated at 10-15 MB per FIRM panel and 10-50 MB per FIS. The CWCB anticipates additional IT requirements to support this function.
- Repository for back-up information used to create the DFIRM, such as hydrologic and hydraulic data, topography, workmaps, Technical Support Data Notebook (TSDN), etc. This information will reside on a CWCB server. The basic requirements to make this service available are server space, interface development, and maintenance costs. There is a process to expand the IT program to establish an on-site IT staff responsible for interface development and maintenance costs. The CWCB anticipates additional IT requirements to support this function.
- Creation of a GIS viewing tool. The CWCB would make GIS information available for online viewing for the general public that may not have access to their own GIS software or that may reside in a county with limited or no GIS capabilities. This information would be stored on a DNR or CWCB server using ARC-IMS or another similar Internet/GIS software tool. The basic requirements to make this service available are server space, interface development, and maintenance costs. The CWCB IT staff would be responsible for the interface development and maintenance. Additionally the CWCB currently has licensed Internet/GIS software, however the state does not currently have a server box for the software. The CWCB anticipates additional IT requirements to procure an adequate server box.
- Creation of a GIS project management tool. A GIS project management tool would assist with future floodplain analyses, flood risk analysis, and floodplain mapping planning. The CWCB has laid out the conceptual framework to create a project management tool that will allow them to track study status within the state, evaluate the age of the source data for effective flood hazards, analyze flood hazard risk on a stream-by-stream basis, etc. The CWCB anticipates additional IT requirements to support this function.

- CWCB recognizes the need for ongoing coordination with local GIS officials (county and municipal officials). This coordination will ensure that local officials remain aware of the GIS flood hazard data available to them, future needs for updates, changes in software, and new uses for the data. In addition, CWCB needs to be aware of changes in local data, local capabilities, new local software, and the interaction between flood data and other GIS data. Besides verbal communications, CWCB anticipates an electronic information-sharing network of local, state, federal, and private GIS floodplain officials in Colorado.

### 3.1 COMPLIANCE WITH FEMA'S PERFORMANCE METRICS

In November 2003, FEMA announced performance metrics for Fiscal Years 2004 through 2008. For each fiscal year in that five-year period, FEMA stated its expectations with regard to four categories of performance (*% of population served by on-line GIS data; % of population with adopted GIS maps; % of dollars leveraged; % of funding provided through CTPs*). The following specific standards were adopted for FY 20.04:

- 20 percent of population (as represented by communities) have digital GIS flood data available on-line
- 10 percent of population (as represented by communities) have adopted modernized GIS flood maps
- 20% leveraged effort toward digital GIS flood hazard data
- 20 percent of Map Modernization (appropriated) funding put through to CTPs (States and locals)

CWCB, with significant cooperation from UDFCD, is already making significant progress toward the first two goals, both of which relate to the percentage of population served. The third and fourth goals were already met for FY 2003 and CWCB anticipates that they will be met for all future program years. The accomplishments through FY 2003 funding are shown below.

- **First Performance Goal** - 14.8% of Colorado's population has DFIRMs in progress or completed as a result of work prior to FY '03; an additional 23.5 % of Colorado's population has DFIRMs in progress as a result of work funded in FY '03. Once all of these maps are available on-line, the total population served will be 38.3% of Colorado's population, or almost 20% of the population of all 6 states in FEMA Region VIII.
- **Second Performance Goal** - Only the Jefferson County DFIRM has been completed to date. Jefferson County represents 12.1% of Colorado's population. Once FEMA and Baker Engineers have completed their review of and finalization of the Colorado preliminary DFRIMs, for FY '03 and all subsequent years, CWCB and UDFCD will work with all counties as their maps are finalized to ensure that the adoption process goes as quickly and smoothly as possible.
- **Third Performance Goal** - CWCB and UDFCD, along with several of the local governments, collectively exceeded the 20% target for local cost share in FY '03, as demonstrated in Table 2.3, shown in Section 2.1.10 of this report.
- **Fourth Performance Goal** - All of the studies being funded with FY '03 moneys are being implemented through the two CTPs in Colorado.

Table 3.1 below shows the performance metrics for the future years of map modernization.

**Table 3.1**  
**FEMA Performance Metrics for Map Modernization**

Elements		Targets (by Fiscal Year)					
		2004	2005	2006	2007	2008	2009
1	Percentage of population (as represented by communities) have digital GIS flood hazard data available on-line	20	50	65	75	85	100
2	Percentage of population (as represented by communities) have adopted modernized GIS flood maps	10	20	35	50	70	90
3	Percent of dollars leveraged effort toward digital GIS flood hazard data	20	20	20	20	20	20
4	Percentage of Map Modernization (appropriated) funding put through to CTPs (States and locals)	20	25	35	45	50	60

The state of Colorado (combined grants to CWCB and UDFCD) received approximately \$1,000,000 in FEMA CTP funding during FY 03, with total statewide expenditures on the order of \$1.5 million, once local and state shares are included. This amount is significantly less than the estimated annual cost that would be required to implement this Plan. In fact, \$1,500,000 per year represents about one third of the “low” funding level indicated in Table 3.2 below.

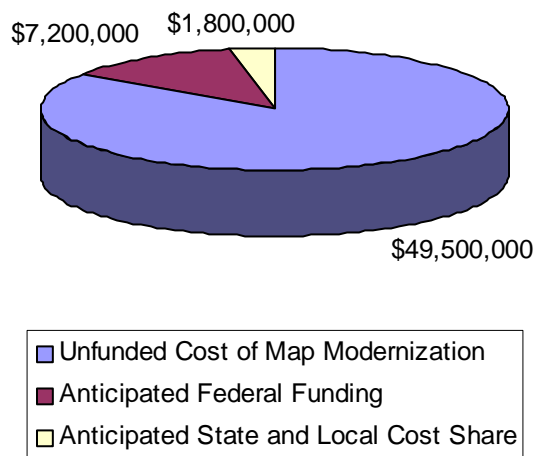
**Table 3.2**  
**Projected Funding Levels**

Funding Level (Total federal and non-federal sources)	Estimated Cost
Full Funding	\$59,000,000
Medium (approximately 2/3 funding)	\$33,500,000
Low (approximately 1/3 funding)	\$21,000,000
FY 03 (Funding Projected Through 2008)	\$9,000,000



Figure 3.1

**Unmet Funding Needs for Colorado's Map Modernization Plan**  
(Anticipated FEMA Funding Levels Through 2008 based on current funding)



**At the current (FY 03) funding levels it will not be possible to meet FEMA's performance metrics listed in Table 3.1 above.** Colorado would require full funding in order to achieve all of FEMA's performance metrics and the CWCB's goals as outlined in this Plan. The CWCB would require somewhere between the low and medium levels listed above to perform the minimum, (still unacceptable) digitization of the effective FIRM panels to create DFIRMs to meet the 2008 population goal. Solely focusing on the performance metrics (i.e. population) with little regard for quality would represent a terrible disservice to the residents of Colorado. There are numerous well-documented cases where new or revised hydrology and hydraulics (H&H) are desperately needed for various stream reaches throughout the state. The following recommendations are provided to address the four metrics summarized in Table 3.1:

**Element 1 (GIS Maps Available On-Line)** – Colorado would require the low level listed above at a minimum just to perform the digitization of the effective FIRM panels to create digital flood hazard data for 85% of the population by 2008. Every county in Colorado is flood prone but several of those counties have limited or no flood hazard data. Therefore, sufficient funding is needed to generate and map new flood hazard information with a minimum level of engineering acceptability, revise existing flood hazard information, and to digitize the effective FIRM panels, as appropriate, for creation of GIS flood hazard data throughout the state.

**Element 2 (Adopted GIS Maps)** – The same recommendations described in element 1 apply to this element. The CWCB currently works with communities to help them update their flood hazard ordinances, and will continue to do so in the future. However, the flood hazard data will have to be created and/or digitized as outlined in Element 1 before this happens.

**Element 3 (Dollars Leveraged)** – The CWCB is committed to providing cash and in-kind services for a portion of the non-federal cost share requirements and will expect to gain similar support from local governments that benefit from Map Modernization services. The CWCB will serve as the coordinating agency for local governments to provide funding for mapping updates,

as indicated in Section 2.1.10 above. The CWCB is able to provide its share of non-federal cost matching for federal grants totaling up to about \$4,000,000 per year and will continue to work with local communities in an effort to obtain additional cash matches and in-kind services.

**Element 4 (Funding Through CTPs)** – Goal 4 appears to be directed to FEMA Regional personnel. However, the CWCB stands ready to assist in this regard and is willing, able, and eager to be an active CTP with FEMA to help Region VIII achieve this objective. This Plan is intended to demonstrate the CWCB’s ability to succeed as a CTP for the region. Because Colorado represents approximately half of the population of Region VIII, we strongly believe that success in Colorado will largely dictate the success of the region as a whole!

### 3.2 IMPLEMENTATION PLAN

This section details a proposed plan for performing DFIRM updates to achieve the targets in Element 1 above. Given the projected lack of funding if current funding levels are continued, a plan that is based on current funding levels that claims to meet the FEMA performance goals is a plan that is guaranteed to fail. Therefore, the CWCB presents below a schedule that could be achieved with an increase in funding levels beyond current levels. The schedule includes the identification of potential obstacles and shortcomings. Note that one of the CWCB’s goals is to provide new flood hazard data to residents that need it; therefore Site Specific Mapping updates (H&H needs) have been included in the projected schedule. A summary of the work that can be performed for each level of funding is listed in Section Four below.

Table 3.3 – Proposed Map Modernization Projects for Years 2004-2006

Year	Study Type	County	Population	Cumulative Percent of Population	Target	Target Met ?
Pre-2004	DFIRMs that are already complete or are in progress (i.e. digital flood hazard data is already available)	Jefferson	527,056	12.4%	Not Applicable	
		Broomfield	38,272	13.2%		
		Eagle	41,659	14.2%		
		Grand	12,442	14.5%		
		Routt	19,690	15.0%		
		Douglas	175,766	19.1%		
		Denver	554,636	32.1%		
		Boulder	219,296	37.2%		
2004	Countywide Mapping (hopefully funding will be provided)	Adams	363,857	45.8%	20	Yes
		Arapahoe	487,967	57.2%	20	Yes
		Larimer	251,464	63.1%	20	Yes
		Mesa	116,255	65.8%	20	Yes
2005	Countywide Mapping	El Paso	516,929	77.9%	50	Yes
		Pueblo	141,472	81.2%	50	Yes
		Teller	20,555	81.7%	50	Yes
	Site Specific	Douglas		81.7%	50	Yes
		Eagle		81.7%	50	Yes
2006	Countywide Mapping	Weld	180,936	86.0%	65	Yes
		Garfield	43,791	87.0%	65	Yes
		Park	14,523	87.3%	65	Yes
		La Plata	43,941	88.4%	65	Yes
		San Miguel	6,594	88.5%	65	Yes
		Montezuma	23,830	89.1%	65	Yes
		Fremont	46,145	90.1%	65	Yes
		Gunnison	13,956	90.5%	65	Yes
		Mineral	831	90.5%	65	Yes
	Site Specific (if not funded in 2004)	Adams		90.5%	65	Yes
		Arapahoe		90.5%	65	Yes
		Larimer		90.5%	65	Yes
		Mesa		90.5%	65	Yes

\* Assumes funding will be provided for Site Specific (H&H) Mapping as well.

Table 3.3 assumes that funding for Site Specific (H&H) analyses will be provided by FEMA to the CTP from this point forward (FY 2004 and beyond) when Countywide Mapping studies are initiated. The CWCB believes that **performing site specific (H&H) mapping in some areas should take precedence over low priority countywide conversion mapping**. Therefore this Plan integrates some of the areas that are considered to have high priority flood hazard data needs into the proposed schedule for Countywide Mapping. Priorities in the table above were established by the CWCB BCP prioritization methodology without considering whether a county already has a DFIRM or not. If a county that already has a DFIRM that is missing critical H&H information scores higher than a county without a DFIRM, CWCB will endorse that county that already has a DFIRM as a higher priority than the county without a DFIRM. The CWCB prefers to fund certain Site Specific Mapping studies in the order they are presented regardless of the

level of funding that is provided by FEMA. Table 3.4 below lists proposed studies for 2007 and 2008.

**Table 3.4 – Proposed Map Modernization Studies for Years 2007-2008**

Year	Study Type	County	Population	Cumulative Percent of Population	Target	Target Met ?
2007	Countywide Mapping	Logan	20,504	91.0%	75	Yes
		Summit	23,548	91.5%	75	Yes
		Pitkin	14,872	91.9%	75	Yes
		Archuleta	9,898	92.1%	75	Yes
		Ouray	3,742	92.2%	75	Yes
		Delta	27,834	92.8%	75	Yes
		Rio Grande	12,413	93.1%	75	Yes
	Site Specific Mapping	Boulder		93.1%	75	Yes
		Jefferson		93.1%	75	Yes
		Route		93.1%	75	Yes
2008	Countywide Mapping	Clear Creek	9,322	93.4%	85	Yes
		Chaffee	16,242	93.7%	85	Yes
		Otero	20,311	94.2%	85	Yes
		Montrose	33,432	95.0%	85	Yes
		Gilpin	4,757	95.1%	85	Yes
		Morgan	27,171	95.7%	85	Yes
		Alamosa	14,966	96.1%	85	Yes
		Prowers	14,483	96.4%	85	Yes
		Huerfano	7,862	96.6%	85	Yes
		Hinsdale	790	96.6%	85	Yes
		Las Animas	15,207	97.0%	85	Yes
		Conejos	8,400	97.2%	85	Yes
		Rio Blanco	5,986	97.3%	85	Yes
		Dolores	1,844	97.4%	85	Yes
		Moffat	13,184	97.7%	85	Yes
		Phillips	4,480	97.8%	85	Yes
		Lake	7,812	98.0%	85	Yes
		Yuma	9,841	98.2%	85	Yes
		Costilla	3,663	98.3%	85	Yes
		San Juan	558	98.3%	85	Yes
		Bent	5,998	98.4%	85	Yes
Counties Currently Not in NFIP (12)	66,528	100.0%	85	Yes		
2009					100	

Tables 3.3 and 3.4 above show a dramatic increase in the number of studies that will need to be performed in 2006, 2007, and 2008 as compared to 2004 and 2005. This is due in some part to the population distribution among the counties, which relate to lower costs associated with producing a DFIRM for rural counties. It is also due to data limitations in those counties. Please note that the source data used for costs estimates is based in large part on data provided by communities. The CWCB recognizes and understands that considerable time and effort is

required to perform pre-scoping and scoping activities prior to finalizing cost estimates for each county. In the event that a community has not reported or has underestimated the flood mapping needs within its jurisdiction, the cost to actually update the FIRM maps in these areas will be higher than the current estimates.

**The CWCB is currently unable to estimate, with any certainty, the actual cost to perform these studies until initial coordination and scoping meetings are conducted and more accurate panel counts and stream miles are established.** The estimates provided in this report should be used for planning purposes only. These estimates will be revised as part of the annual update of the Business Case Plan as studies are completed and as more information is gathered on the potential scope of work for each of these county mapping efforts.

The CWCB would like illustrate the point that the current funding levels severely inhibit Colorado's ability to reach FEMA's performance goals. To illustrate this point, at the rate of current FEMA funding (~\$1,000,000 per year) the CWCB would need to produce 11 countywide DFIRMs per year at a ridiculously low cost of approximately \$85,000 per county in order to achieve all of the performance metrics in Table 3.1. More information on the difficulty of achieving this performance goal is outlined in Appendix F.

A summary of the counties and a description of the tasks that can be performed for the three funding levels outlined above, as well as a year-by-year cost breakdown and projected Map Modernization schedule, is included in Section Four.

**4.1 FUNDING LEVELS**

Three levels of funding have been assumed as part of this Business Case Plan. A fourth level of funding that is examined to a lesser degree in this report is the simple extrapolation of current funding levels. Since that fourth level of funding is insufficient to achieve FEMA’s performance targets, it was not deemed worthy of the same degree of examination as the other three funding levels. The CWCB previously established cost estimates as part of its Map Modernization and Implementation Plan in August 2002. This Plan updates the MMIP cost estimates based on additional information and revised cost estimating methodologies. Additionally this Plan identifies tasks for each of the three levels of funding, as indicated in the table below.

**Table 4.1  
Levels of Funding and Associated Tasks**

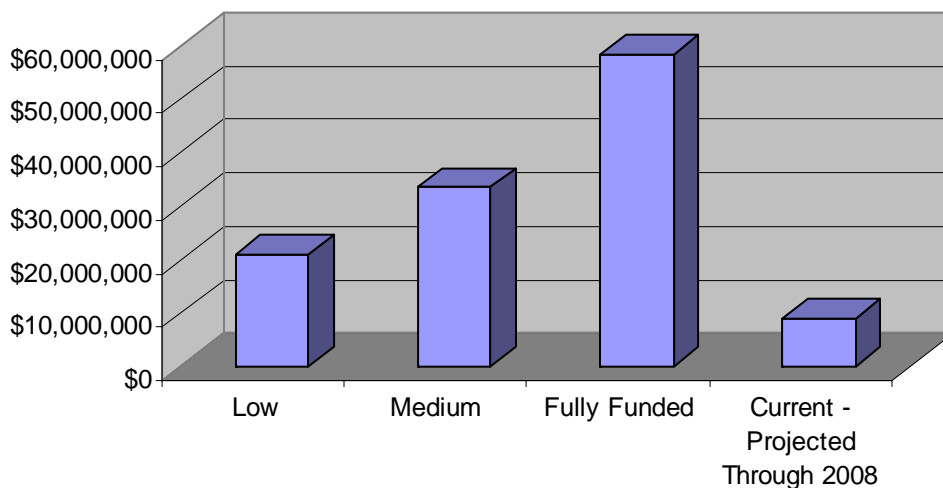
Objectives	Funding Levels		
	Full Funding (\$59,000,000)	Medium (\$33,500,000)	Low (\$21,000,000)
Countywide DFIRM Mapping	Countywide mapping can be achieved for prioritized counties in Colorado. This includes a complete countywide DFIRM conversion, full coordination (including initial coordination and scoping meetings), re-delineation of detailed flood hazards on any existing topography, digitization of all approximate floodplain and a limited amount of Limited Method hydrologic/hydraulic studies.		
Site Specific Mapping	New hydrologic and hydraulic studies can be completed for <b>100%</b> of the areas in the state that are in need of new or revised flood hazard data.	New hydrologic and hydraulic studies can be completed for <b>50%</b> of the areas in the state that are in need of new or revised flood hazard data.	New hydrologic and hydraulic studies can be completed for <b>10%</b> of the areas in the state that are in need of new or revised flood hazard data.
Mapping Coordinator	The hiring of a mapping coordinator is essential to the success of our program. The mapping coordinator will assist with all of the tasks below.		
Distribution of Digital Data	Provide new and updated digital flood hazard data to Colorado residents through the Internet and other appropriate means, taking full advantage of local digital resources. This may include the following medium: <ul style="list-style-type: none"> <li>• Internet viewing tool</li> <li>• DFIRM Download</li> <li>• PDF FIRM and FIS</li> </ul>		
Update the Business Case Plan	Update the Business Case Plan, the prioritization parameters, and the prioritized list of studies on a yearly basis. Enhance the existing sections.		

<p>Initial Coordination Meeting</p>	<ul style="list-style-type: none"> <li>• Production of an initial coordination meeting map detailing U.S.G.S. DOQQ boundaries, Q3 data, political boundaries, etc.</li> <li>• Travel to the meeting</li> </ul>	
<p>Scoping Meeting(s)</p>	<ul style="list-style-type: none"> <li>• Review of base mapping, etc. gathered from the initial coordination meeting prior to the scoping meeting.</li> <li>• Two scoping meetings, the first to discuss the scope and the second to present the results from the first.</li> <li>• Travel to the meetings</li> </ul>	
<p>Community Outreach</p>	<p>Perform outreach, including meetings and workshops, as well as email and other methods of survey and data gathering.</p>	
<p>Statewide Needs Assessment</p>	<p>Verify that the data used to identify needs is accurate using yearly surveys, site visits, and other methods and update the needs assessment database on a yearly basis.</p>	<p>Verify that the data used to identify needs is accurate using yearly surveys, and other methods and update the needs assessment database on a yearly basis.</p>
<p>Creation of Statewide Base Map and Scoping and Assessment Tool</p>	<p>Compile the digital data into a statewide base map database for use as a scoping and assessment tool, and to facilitate flood hazard mapping activities in the future.</p>	

**Please note that the current level of funding that Colorado has received for Map Modernization does not meet even the lowest of the three funding levels presented above. In fact, the current level of funding is slightly less than half of the lowest level of funding.** Projecting the approximately \$1,500,000 of FY 03 total dollars (federal and non-federal) that the Colorado has expended into a 5-year plan yields just under \$9,000,000 (if credit is given for the FY '03 funding as well as funding for the five years from FY '04 through FY '08) for the duration of Map Modernization. Figure 4.2 below depicts the projected funding based on FY 03 studies, as well as the low, medium, and full levels of funding listed in the table above.

Figure 4.1

## Comparison of Projected Funding to Low, Medium, and Fully Funded Options



**Please note that the CWCB believes that performing site specific (H&H) mapping within some counties should take precedence over countywide conversion mapping in low priority counties.** This is true specifically when comparing areas where new growth and development is occurring to counties with low populations and low population growth that may also have low flood hazard risk.

The funding levels listed above were analyzed using the unit costs provided in Appendix D and a log normal distribution to determine the 80% confidence interval for planning purposes. As this distribution was applied to the total yearly estimates for all of the tasks listed above, all references in this document to cost estimates per year or for the entire 5-year program are based upon this 80% confidence interval (to account for uncertainty in the unit cost estimates for mapping and hydrologic/hydraulic investigations). The pro-forma's presented in the next section can be referenced for more specific information.

## 4.2 PRO-FORMA

Once the funding levels above were defined, cost estimates were generated for years 2004-2008 for specific project activities through the use of a "pro-forma". A pro-forma is defined as a financial projection of expected costs and revenues for a business for a given financial period. The pro-formas below list project categories and project activities by year. For each project activity a low, medium, and fully funded cost is estimated based upon the definitions provided above. These project activities are then totaled for each project category, which are then summed to determine the total low, medium, and fully funded cost estimate for each year.

A probability distribution is then applied to these yearly totals to determine the 15%, 65%, 80%, and 95% confidence intervals, as mentioned in the section above. This probability distribution was applied to the computed cost estimates mainly to address some of the uncertainty inherent in a large-scale planning effort, where cost estimates from a small sample of data are applied to a large number of individual projects. This Plan uses the 80% confidence interval for planning



estimates and the 15% and 95% confidence intervals for informational purposes only. Figure 4.2 below depicts the projected low, medium, and fully funded program costs by year. Specific information on the tasks proposed for each year is included in the pro-formas in Tables 4.2 through 4.6.

These pro-formas include five counties for which DFIRMs have already been prepared but for which identified H&H engineering needs have been left unmet as part of those DFIRM projects. The pro-formas assume that these five counties (Douglas, Eagle, Boulder, Jefferson and Routt Counties) will need a separate year for completing updates of H&H engineering to bring their DFIRMs closer to compliance with expressed mapping needs. They assume that none of the other counties to be mapped in the future will experience this situation. However, if future projects from FY '04 through FY '08 also fail to meet identified H&H engineering needs, then pro-formas for those counties will have to be revised in the future to reflect those unmet needs.

**Figure 4.2**  
**Program Cost By Year – 80% Confidence Interval**

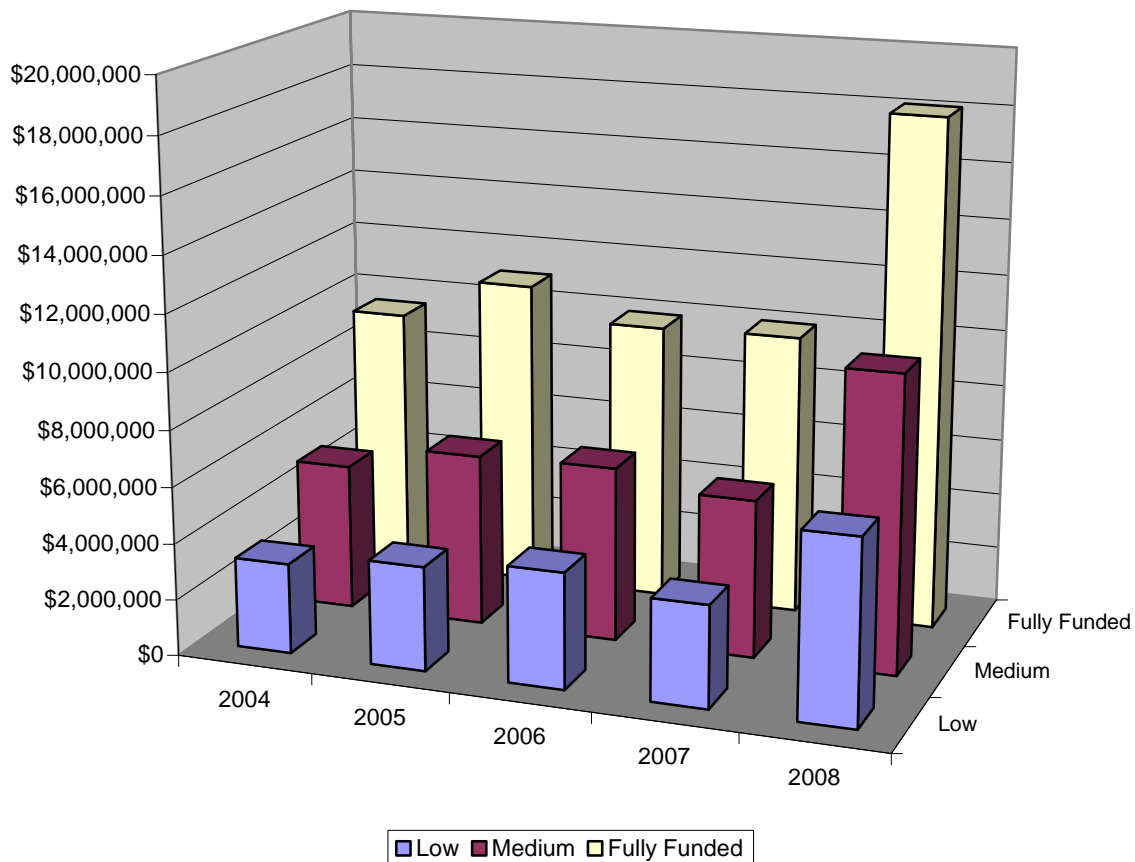


Table 4.2 - Pro Forma 2004

	Low	Medium	Full
<b>DFIRM Mapping Studies</b>			
Adams	\$866,402	\$1,389,010	\$2,494,200
Arapahoe	\$591,901	\$907,505	\$1,560,600
Larimer	\$738,953	\$1,102,765	\$1,843,800
Mesa	\$408,372	\$813,360	\$1,724,700
<b>Mapping Studies Total</b>	<b>\$2,605,628</b>	<b>\$4,212,640</b>	<b>\$7,623,300</b>
<b>Program Management</b>			
Mapping Coordinator	\$26,000	\$32,500	\$65,000
CWCB Costs	\$16,250	\$32,500	\$65,000
<b>Program Management Total</b>	<b>\$42,250</b>	<b>\$65,000</b>	<b>\$130,000</b>
<b>Database Development and Management</b>			
Labor	\$25,000	\$25,000	\$25,000
Hardware	\$25,000	\$25,000	\$25,000
Software Development	\$15,000	\$15,000	\$15,000
<b>Database Development and Management</b>	<b>\$65,000</b>	<b>\$65,000</b>	<b>\$65,000</b>
<b>Outreach</b>			
Web Page	\$15,000	\$15,000	\$15,000
Misc. Outreach	\$25,000	\$25,000	\$25,000
<b>Outreach Total</b>	<b>\$40,000</b>	<b>\$40,000</b>	<b>\$40,000</b>
<b>Total Estimated Program Costs</b>			
		<b>\$2,752,878</b>	<b>\$4,382,640</b>
			<b>\$7,858,300</b>
<b>15-percent confidence level</b>	\$1,763,792	\$3,157,142	\$5,995,912
<b>65-percent confidence level</b>	\$2,731,960	\$4,564,714	\$8,526,926
<b>80-percent confidence level</b>	\$3,165,781	\$5,238,328	\$9,523,764
<b>95-percent confidence level</b>	\$4,136,119	\$6,536,361	\$11,799,577
<b>Funding Sources</b>			
FEMA (80%)	\$2,260,000	\$3,860,000	\$7,300,000
CWCB (10%)	\$320,000	\$520,000	\$950,000
Local Funds (10%)	\$320,000	\$520,000	\$950,000
UDFCD	\$300,000	\$300,000	\$300,000
Other Grants	\$0	\$0	\$0
Credit for LOMC Review	\$0	\$0	\$0
<b>Funding Total</b>	<b>\$3,200,000</b>	<b>\$5,200,000</b>	<b>\$9,500,000</b>

Table 4.3 - Pro Forma 2005

	Low	Medium	Full
<b>DFIRM Mapping Studies</b>			
El Paso	\$1,804,266	\$2,730,330	\$4,632,600
Pueblo	\$421,280	\$810,400	\$1,680,000
Teller	\$300,966	\$411,330	\$620,100
Douglas (H&H)	\$42,435	\$212,175	\$621,000
Eagle (H&H)	\$53,300	\$266,500	\$780,000
<b>Mapping Studies Total</b>	<b>\$2,622,247</b>	<b>\$4,430,735</b>	<b>\$8,333,700</b>
<b>Program Management</b>			
Mapping Coordinator	\$26,000	\$32,500	\$65,000
CWCB Costs	\$16,250	\$32,500	\$65,000
<b>Program Management Total</b>	<b>\$42,250</b>	<b>\$65,000</b>	<b>\$130,000</b>
<b>Database Development and Management</b>			
Labor	\$25,000	\$25,000	\$25,000
Hardware	\$25,000	\$25,000	\$25,000
Software Development	\$15,000	\$15,000	\$15,000
<b>Database Development and Management</b>	<b>\$65,000</b>	<b>\$65,000</b>	<b>\$65,000</b>
<b>Outreach</b>			
Web Page	\$15,000	\$15,000	\$15,000
Misc. Outreach	\$25,000	\$25,000	\$25,000
<b>Outreach Total</b>	<b>\$40,000</b>	<b>\$40,000</b>	<b>\$40,000</b>
<b>Total Estimated Program Costs</b>			
		<b>\$2,769,497</b>	<b>\$4,600,735</b>
			<b>\$8,568,700</b>
	<b>15-percent confidence level</b>	\$1,999,066	\$3,618,379
	<b>65-percent confidence level</b>	\$3,163,704	\$5,296,811
	<b>80-percent confidence level</b>	\$3,694,390	\$6,068,280
	<b>95-percent confidence level</b>	\$4,858,098	\$7,631,452
			\$11,024,969
			\$13,676,120
<b>Funding Sources</b>			
	FEMA (80%)	\$2,760,000	\$4,680,000
	CWCB (10%)	\$370,000	\$610,000
	Local Funds (10%)	\$370,000	\$610,000
	UDFCD	\$200,000	\$200,000
	Other Grants	\$0	\$0
	Credit for LOMC Review	\$0	\$0
	<b>Funding Total</b>	<b>\$3,700,000</b>	<b>\$6,100,000</b>
			<b>\$11,000,000</b>

Table 4.4 - Pro Forma 2006

	Low	Medium	Full
<b>DFIRM Mapping Studies</b>			
Weld	\$574,020	\$1,007,100	\$1,953,000
Garfield	\$620,490	\$928,950	\$1,558,500
Park	\$360,220	\$478,100	\$693,000
La Plata	\$266,320	\$386,600	\$627,000
San Miguel	\$221,819	\$326,095	\$536,400
Montezuma	\$177,400	\$266,000	\$447,000
Fremont	\$243,280	\$325,398	\$476,700
Gunnison	\$264,035	\$402,175	\$687,000
Mineral	\$142,190	\$224,875	\$374,550
Note: If Site Specific Funding is not available for Adams, Arapahoe, Mesa, and Larimer in 2004 then Site-Specific studies will be planned/budgeted for 2006.			
<b>Mapping Studies Total</b>	<b>\$2,869,774</b>	<b>\$4,345,293</b>	<b>\$7,353,150</b>
<b>Program Management</b>			
Mapping Coordinator	\$26,000	\$32,500	\$65,000
CWCB Costs	\$16,250	\$32,500	\$65,000
<b>Program Management Total</b>	<b>\$42,250</b>	<b>\$65,000</b>	<b>\$130,000</b>
<b>Database Development and Management</b>			
Labor	\$25,000	\$25,000	\$25,000
Hardware	\$25,000	\$25,000	\$25,000
Software Development	\$15,000	\$15,000	\$15,000
<b>Database Development and Management</b>	<b>\$65,000</b>	<b>\$65,000</b>	<b>\$65,000</b>
<b>Outreach</b>			
Web Page	\$15,000	\$15,000	\$15,000
Misc. Outreach	\$25,000	\$25,000	\$25,000
<b>Outreach Total</b>	<b>\$40,000</b>	<b>\$40,000</b>	<b>\$40,000</b>
<b>Total Estimated Program Costs</b>	<b>\$3,017,024</b>	<b>\$4,515,293</b>	<b>\$7,588,150</b>
<b>15-percent confidence level</b>	\$2,472,368	\$3,685,954	\$6,460,797
<b>65-percent confidence level</b>	\$3,590,719	\$5,407,080	\$8,851,162
<b>80-percent confidence level</b>	\$4,067,321	\$6,223,207	\$9,914,112
<b>95-percent confidence level</b>	\$5,150,967	\$7,694,789	\$12,039,034
<b>Funding Sources</b>			
FEMA (80%)	\$3,080,000	\$4,760,000	\$7,720,000
CWCB (10%)	\$410,000	\$620,000	\$990,000
Local Funds (10%)	\$410,000	\$620,000	\$990,000
UDFCD	\$200,000	\$200,000	\$200,000
Other Grants	\$0	\$0	\$0
Credit for LOMC Review	\$0	\$0	\$0
<b>Funding Total</b>	<b>\$4,100,000</b>	<b>\$6,200,000</b>	<b>\$9,900,000</b>

Table 4.5 - Pro Forma 2007

	Low	Medium	High
<b>DFIRM Mapping Studies</b>			
Logan	\$307,850	\$486,250	\$861,000
Summit	\$243,915	\$328,575	\$486,000
Pitkin	\$356,150	\$430,750	\$540,000
Archuleta	\$212,097	\$466,485	\$1,048,200
Ourray	\$117,680	\$210,400	\$414,000
Delta	\$421,665	\$650,325	\$1,125,000
Clear Creek	\$81,480	\$137,400	\$258,000
Boulder (H&H)	\$35,465	\$177,325	\$519,000
Jefferson (H&H)	\$91,266	\$456,330	\$1,335,600
Route (H&H)	\$9,430	\$47,150	\$138,000
<b>Mapping Studies Total</b>	<b>\$1,876,998</b>	<b>\$3,390,990</b>	<b>\$6,724,800</b>
<b>Program Management</b>			
Mapping Coordinator	\$26,000	\$32,500	\$65,000
CWCB Costs	\$16,250	\$32,500	\$65,000
<b>Program Management Total</b>	<b>\$42,250</b>	<b>\$65,000</b>	<b>\$130,000</b>
<b>Database Development and Management</b>			
Labor	\$25,000	\$25,000	\$25,000
Hardware	\$25,000	\$25,000	\$25,000
Software Development	\$15,000	\$15,000	\$15,000
<b>Database Development and Management</b>	<b>\$65,000</b>	<b>\$65,000</b>	<b>\$65,000</b>
<b>Outreach</b>			
Web Page	\$15,000	\$15,000	\$15,000
Misc. Outreach	\$25,000	\$25,000	\$25,000
<b>Outreach Total</b>	<b>\$40,000</b>	<b>\$40,000</b>	<b>\$40,000</b>
<b>Total Estimated Program Costs</b>			
	<b>\$2,024,248</b>	<b>\$3,560,990</b>	<b>\$6,959,800</b>
<b>15-percent confidence level</b>	\$1,765,989	\$3,193,640	\$6,131,028
<b>65-percent confidence level</b>	\$2,982,523	\$4,892,073	\$8,873,127
<b>80-percent confidence level</b>	\$3,558,497	\$5,644,277	\$9,952,864
<b>95-percent confidence level</b>	\$4,803,633	\$7,340,871	\$12,542,207
<b>Funding Sources</b>			
FEMA (80%)	\$2,740,000	\$4,280,000	\$7,800,000
CWCB (10%)	\$360,000	\$560,000	\$1,000,000
Local Funds (10%)	\$300,000	\$560,000	\$1,000,000
UDFCD	\$200,000	\$200,000	\$200,000
Other Grants	\$0	\$0	\$0
Credit for LOMC Review	\$0	\$0	\$0
<b>Funding Total</b>	<b>\$3,600,000</b>	<b>\$5,600,000</b>	<b>\$10,000,000</b>

Table 4.6 - Pro Forma 2008

	Low	Medium	Full
<b>DFIRM Mapping Studies</b>			
Rio Grande	\$197,296	\$392,480	\$831,600
Chaffee	\$217,320	\$330,600	\$564,000
Otero	\$201,300	\$277,500	\$423,000
Montrose	\$297,127	\$378,635	\$517,200
Gilpin	\$29,923	\$41,615	\$64,140
Morgan	\$219,413	\$395,063	\$781,500
Alamosa	\$41,150	\$70,750	\$135,000
Prowers	\$195,150	\$246,750	\$333,000
Huerfano	\$154,563	\$205,306	\$264,713
Hinsdale	\$139,150	\$182,750	\$261,000
Las Animas	\$107,225	\$158,125	\$261,000
Conejos	\$130,680	\$383,400	\$978,000
Rio Blanco	\$485,762	\$1,105,810	\$2,530,200
Dolores	\$112,000	\$128,000	\$144,000
Moffat	\$116,510	\$150,550	\$210,000
Phillips	\$156,400	\$202,400	\$248,400
Lake	\$62,150	\$94,750	\$162,000
Yuma	\$56,000	\$64,000	\$72,000
Costilla	\$102,860	\$190,300	\$384,000
San Juan	\$156,400	\$202,400	\$248,400
Bent	\$156,400	\$202,400	\$248,400
Total of 12 non-participating counties	\$1,927,899	\$2,984,367	\$4,821,638
<b>Mapping Studies Total</b>	<b>\$5,262,677</b>	<b>\$8,387,950</b>	<b>\$14,483,190</b>
<b>Program Management</b>			
Mapping Coordinator	\$26,000	\$32,500	\$65,000
CWCB Costs	\$16,250	\$32,500	\$65,000
<b>Program Management Total</b>	<b>\$42,250</b>	<b>\$65,000</b>	<b>\$130,000</b>
<b>Database Development and Management</b>			
Labor	\$25,000	\$25,000	\$25,000
Hardware	\$25,000	\$25,000	\$25,000
Software Development	\$15,000	\$15,000	\$15,000
<b>Database Development and Management Total</b>	<b>\$65,000</b>	<b>\$65,000</b>	<b>\$65,000</b>
<b>Outreach</b>			
Web Page	\$15,000	\$15,000	\$15,000
Misc. Outreach	\$25,000	\$25,000	\$25,000
<b>Outreach Total</b>	<b>\$40,000</b>	<b>\$40,000</b>	<b>\$40,000</b>
<b>Total Estimated Program Costs</b>			
		<b>\$5,409,927</b>	<b>\$8,557,950</b>
			<b>\$14,718,190</b>
	<b>15-percent confidence level</b>	\$4,409,903	\$7,132,453
	<b>65-percent confidence level</b>	\$5,831,029	\$9,451,366
	<b>80-percent confidence level</b>	\$6,505,667	\$10,481,439
	<b>95-percent confidence level</b>	\$7,773,911	\$12,319,523
			\$21,641,007
<b>Funding Sources</b>			
FEMA (80%)	\$5,200,000	\$8,400,000	\$14,480,000
CWCB (10%)	\$650,000	\$1,050,000	\$1,810,000
Local Funds (10%)	\$650,000	\$1,050,000	\$1,810,000
UDFCD	\$0	\$0	\$0
Other Grants	\$0	\$0	\$0
Credit for LOMC Review	\$0	\$0	\$0
<b>Funding Total</b>	<b>\$6,500,000</b>	<b>\$10,500,000</b>	<b>\$18,100,000</b>

### 4.3 SCHEDULE

Due to differing fiscal cycles of the Federal, State, and local governments, the process and schedule to implement Map Modernization efforts is quite complex. The beginning and ending dates of these fiscal years are detailed in Table 4.7 below.

**Table 4.7**  
**Fiscal Year Comparison**

Entity	Beginning Date	Ending Date
Federal Government	October 1	September 30
State Government	July 1	June 30
Local Government	January 1	December 31

The annual program schedule (assuming an estimated starting month of March that will vary based on actual approval of FEMA funding to the State) is listed below for achieving the aforementioned objectives. This schedule applies to FY 2005 – 2008, and will be fluid and is “initiated” on the date that FEMA Map Modernization funding is allocated to the State. A modified version of this schedule for FY 2004 is presented in Section One. A Gantt Chart is included in Figure 4.8 below to depict the proposed CWCB Map Modernization schedule through the end of June 2008.

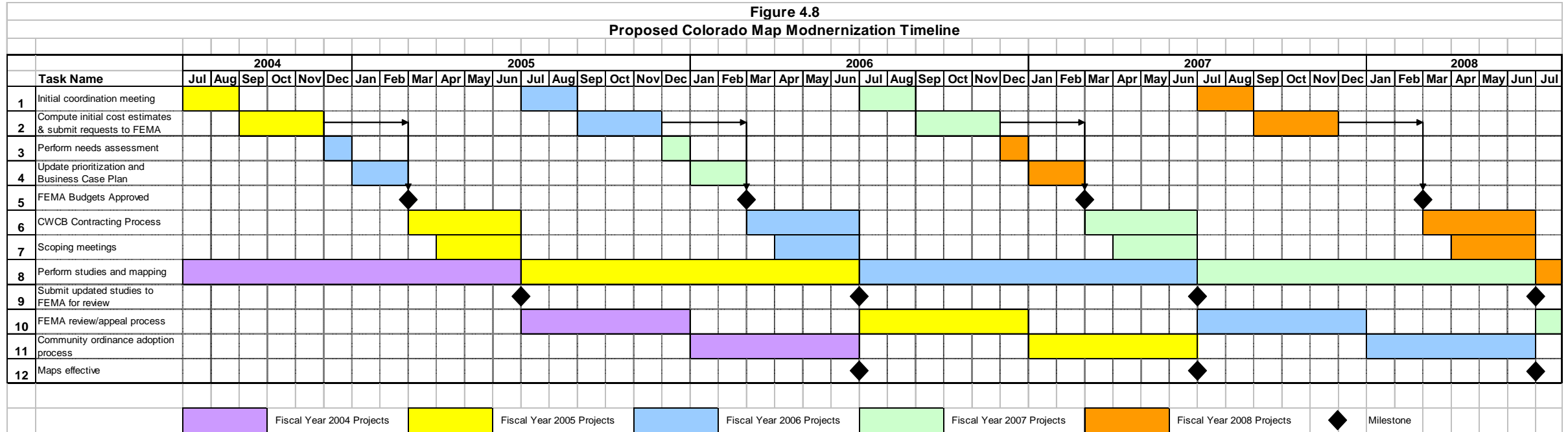
- **December** – Re-evaluate statewide needs based upon the results of Initial Coordination Meetings, annual needs assessment and feedback from FEMA.
- **January through March** – Update scoping tool(s), prioritization parameters, prioritization list, and Business Case Plan based upon findings from Initial Coordination Meetings and needs assessment. Revise cost estimating tool(s) for studies based upon any new or revised unit cost data. Prepare to use revised tools and information for developing a map revision plan for the next year.
- **June through July** – Perform Initial Coordination Meetings for the next FY.
- **August through October** – Compute cost estimates for counties that had an Initial Coordination Meeting for the next FY and submit cost estimates to FEMA.
- **March** – Receive funding notification from FEMA and select areas (counties) for flood mapping studies for the current Federal Fiscal Year (FY).
- **March through April** – Conduct Scoping Meetings for each selected county for the current FY and develop Mapping Activity Statements with FEMA and Scopes of Service with engineering consultants
- **May through June** – Approve finalized consultant contracts, initiate map updates for the current FY, and attempt to maintain a maximum one-year schedule to produce preliminary DFIRM products.

- **July through following June** – Complete preliminary DFIRM products.
- **Ongoing** – Update prioritization list to reflect map update needs that are addressed when new DFIRMs become effective. Post effective FIRM and FIS information on the Internet as it becomes effective.

Note that the schedule for FY2004 is different from the schedule for all subsequent fiscal years. The first task in 2004 did not really start until November, 2003 instead of December, 2002. Even with that date start, map preparation for FY2004 is scheduled to begin in July, 2004.



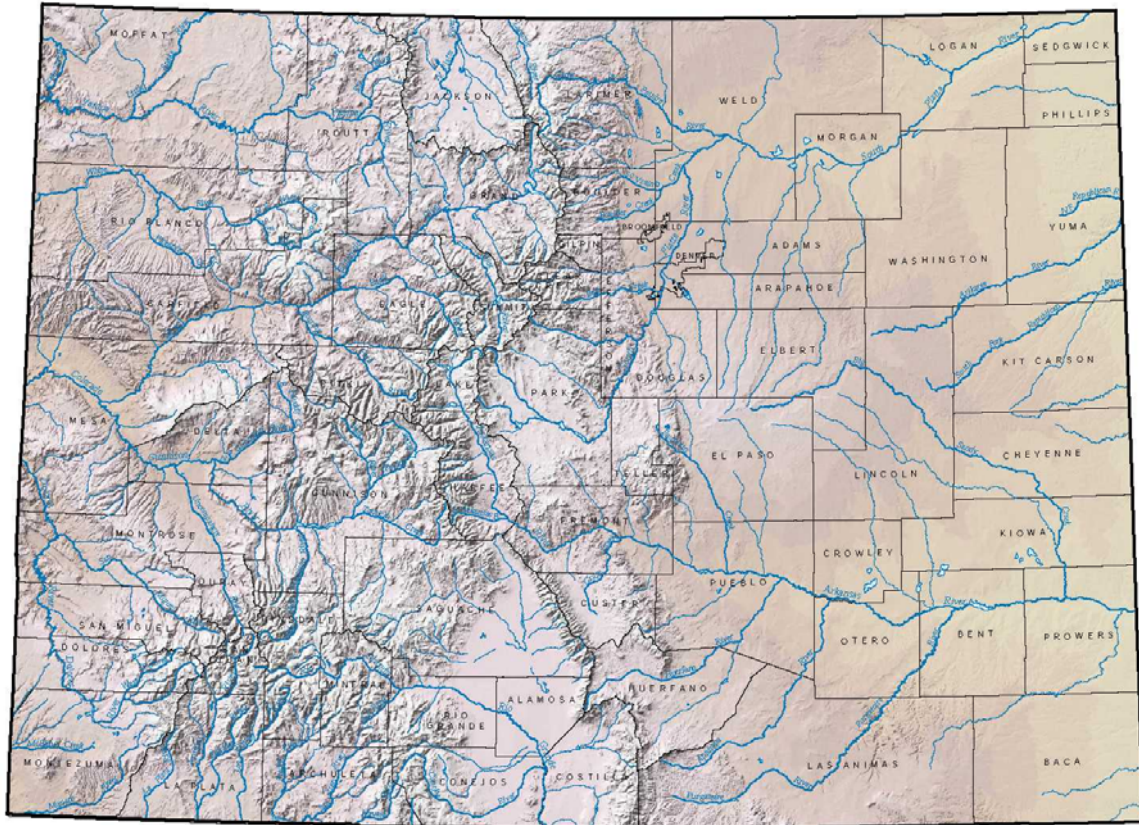
Figure 4.8  
Proposed Colorado Map Modernization Timeline



“Colorado’s Map Modernization Program, Updating Colorado’s Flood Maps”, Draft, 2003, URS.

“Colorado Map Modernization Plan (MMIP), 2002. PBS&J and Moser Associates.

**Colorado**  
**Flood Map Modernization**  
**Business Case Plan-Final Draft**  
**Fiscal Years 2004–2008**  
**Appendices**



Prepared by:



Colorado Water Conservation Board

Submitted to:  
FEMA Region 8  
March 2004

**Appendix A**  
**Statewide Needs Assessment**

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### **Prioritization Criteria – Countywide Map Updates**

The CWCB has revised their initial prioritization criteria to be a “living” document. In doing this the CWCB hopes to accommodate not only changes to guidance or criteria, but also changes to watershed conditions that will alter flood risk and development booms that may occur within the next 5-10 years.

The revised process involves a quantitative, or primary, ranking of those counties within Colorado that have not yet received a Digital Flood Insurance Rate Map (DFIRM). Once this qualitative ranking is completed, the resulting counties are divided into four equal “groups” (top 25%, second 25%, third 25%, and last 25%). The top 25% of the counties is then evaluated based on a qualitative, or secondary, set of criteria to determine the map updates that will be performed for any given fiscal year. The rankings for the quantitative portion of the needs assessment will be revisited on a regular basis, and all counties that do not have a DFIRM will be re-ranked yearly prior to evaluating the top 25% “group” qualitatively.

Below are definitions of the primary and secondary scoring categories as well as a table summarizing the standardized scoring and weights for the primary categories.

#### **Primary Prioritization Categories**

2000 Population - Using the website of the Colorado Department of Local Affairs (DOLA), the population of each county in Colorado according to the 2000 US Census was entered into the database. Because of the diversity of counties in Colorado, from small mining and agricultural counties to the City and County of Denver in the heart of the state’s biggest metropolitan area, there was a very large range. The smallest counties had total populations less than 1000. Denver has a population of over 500,000. To simplify the scoring procedure, the population figures for the counties were divided into ranges and assigned values from 1 for the smallest counties to 5 for the largest counties. Table B.1 below shows the ranges that were used to standardize population.

To ensure that population data does not become outdated it will be updated once during the 5-year plan. The population data will be updated using the best data available in 2005 and the updated data will be used in the 2005 prioritization.

Map Quality – Map quality is viewed as an important factor in determining areas in need of updated flood mapping. Map quality is interpreted to mean areas that have erroneous or outdated flood hazard data, or flood hazard data that has been superseded by other circumstances, such as development that has not been reflected on the map. CWCB staff felt that standardized scores provided the best way to compare counties to one another. Counties deemed by the CWCB to have good quality maps were given a score of 1. Counties with adequate flood mapping were given a score of 2. Counties with a known minor flooding problem that is not reflected accurately on the FEMA maps were given a score of 3. Counties with a known minor flooding problem that is not reflected accurately on the FEMA maps were given a score of 4. Counties with flood maps that did not provide a minimum level of accuracy or were considered to be inadequate as a floodplain management tool were given a score of 5.

As flooding conditions and development occurs on a yearly basis the CWCB will review the previous year’s map quality rankings on a yearly basis to determine if they are still accurate, and

make any changes to the previous year's scoring that is required. The results of this review will be used in the yearly prioritization effort.

Population Growth – Population growth was measured in terms of percentage growth from the 1990 Census to the 2000 Census. Rapidly growing counties were viewed as facing development pressure, including pressure on their floodprone areas. They were viewed as having already experience pressure on those lands in the 10-year measurement period, and as being likely to continue experiencing such pressure. Several Colorado counties are among the most rapidly growing counties in the country in terms of rate of population growth, with Douglas County sometimes being ranked as the fastest growing county in the entire country. On the other hand, some rural Colorado counties are experiencing declines in their population. The range of growth rates went from –25.1% (a decline) to 191.0%. CWCB staff felt that standardized scores provided the best way to compare counties to one another. Because some counties have negative values for population growth rate, it was decided to have a range of standardized values from 0 to 5, with 0 representing no growth or negative growth.

To ensure that population growth data used does not become outdated it will be updated once during the 5-year plan. The population data will be updated using the best data available in 2005 and the updated data will be used in the 2005 prioritization. Table B.1 below shows the ranges that were used to standardize population growth.

Flood Hazard Risk – This parameter attempts to address the question, “Which counties face the greatest likelihood of loss of life and damage to property due to flood hazards?” Two of the three CWCB staff members who scored the 332 individual communities for this parameter have worked for the CWCB for more than 20 years. They have seen Presidential Disaster Declarations in 1982, 1984, 1997 and 1999. The third staff member witnessed the Buffalo Creek flood and the two most recent Presidential Disasters. All three have traveled throughout Colorado and met with officials from many local governments. They have helped develop floodplain maps and flood hazard mitigation plans and projects for numerous communities. They have also witnessed severe erosion and channel migration, debris flows, and ice jam floods. With that experience, staff felt that they were very well qualified to assign scores from 0 to 5 for the flood hazard risk faced by each community in Colorado. Communities deemed by the CWCB to have no flood hazard (not floodprone) were assigned a score of 0. The communities in Colorado facing the greatest danger with regard to flood hazard risk were assigned a score of 5. After CWCB staff had assigned scores to all of the individual communities in the state, composite scores were assigned to each of the 64 counties, taking into account the relative significance of the hazard in each community within a county in the big picture for that county.

Although it is unlikely that the flood risk that a county is subject to will change on a yearly basis the CWCB will perform a cursory review of the previous year's flood hazard risk rankings on a yearly basis to ensure that they are still accurate. The results of this review will be used in the yearly prioritization effort.

Unique Watershed Conditions – 2002 was a devastating year in Colorado with regard to wildfires, as it was in other western states. Unfortunately, the impacts of wildfires are not over once the fires have been extinguished. In 1996, Jefferson County, Colorado learned that painful lesson with a deadly flood approximately two months after the Buffalo Creek fire was put out.

Hydrophobic (water-repelling) soils left behind by intense fire, sticks and stumps instead of green forest, and sterilized growing conditions limiting revegetation success all conspire to make

watershed hydrology change radically. The Buffalo Creek watershed experienced flood flows 5 to 30 times the published FEMA 100-year flows from rains on the order of 2 to 5 inches in a few hours. Buildings outside the 100-year mapped floodplain were damaged or destroyed. The fires of 2002 have already produced frightening events in several counties, as a result of rather modest rainstorms in most cases.

However throughout Colorado wildfire is not the only unique watershed condition that impacts flooding within the state. In addition to wildfires, Colorado residents are exposed to the threats posed by ice jam flooding, alluvial fan flooding, and debris flow. Due to the complexity and the potentially severe impact that these unique flood hazards pose, the CWCB believes counties that are subject to unique watershed conditions should receive special consideration. As CWCB staff feel that standardized scores provided the best way to compare counties to one another, they have assigned a value of 0 to counties with no unique watershed conditions, a score of 3 to counties with a moderate level of unique watershed conditions, and a score of 5 to counties with a severe level of unique watershed conditions.

As some watershed conditions (such as wildfires) occur on a yearly basis the CWCB will review the previous year's unique watershed conditions rankings on a yearly basis to determine if they are still accurate, and make any changes to the previous year's scoring that is required. The results of this review will be used in the yearly prioritization effort.

Priority from MMIP Report – As part the 2002 Map Modernization Implementation Plan prioritized all of the study needs within Colorado. As part of the Business Case Plan these prioritized rankings are changing based on new criteria, and hence the original prioritization list from the MMIP report will be superceded in the near future. To ensure that the work performed under the MMIP report is adequately considered in the revised prioritization, the CWCB has included the rankings within the standardized scoring system for this year by standardizing their weighted 2002 ranking.

After the first year of the new prioritization system the MMIP prioritization list will be superceded, and will no longer be considered in the yearly prioritization. Table B.1 below shows the ranges of weighted 2002 scores that were used to standardize the MMIP scoring.

Policy Base Per Capita – As an indicator for the percentage of population in the floodplain per county, and therefore the percentage of population that may be impacted by an updated map revision, the CWCB calculated flood insurance policies per capita for each county. While the CWCB acknowledges that there are flaws in using this data (for example, not everyone that should have flood insurance does) they believe it may be an indicator of the number of structures in a floodplain. As CWCB staff feels that standardized scores provided the best way to compare counties to one another policy base per capita has been applied to the standardized ranking as a value of “policies per 1,000 residents”. Table B.1 below shows the ranges that were used to standardize policy base per capita, and Table B.2 shows the resulting prioritized list of counties.

**Table A.1**  
**Primary Prioritization Categories and Ranking Values**

Category	Weight	Update Schedule	Standardized Value					
			0	1	2	3	4	5
Population	1.75	2005	N/A	< 5000	5000 to 9,999	10,000 to 39,999	40,000 to 99,999	> 100,000
Map Quality	1.50	Yearly	Standardized rankings provided by CWCB staff, therefore no ranges exist for this category.					
Population Growth	1.25	2005	0% or less	0.1% to 20.0%	20.1% to 40.0%	40.01% to 60.0%	60.01% to 80.0%	> 80.0%
Flood Hazard Risk	1.00	Yearly	Standardized rankings provided by CWCB staff, therefore no ranges exist for this category.					
Unique Watershed Conditions	0.60	Yearly	Standardized rankings provided by CWCB staff, therefore no ranges exist for this category.					
Score from MMIP Report	0.50	N/A	N/A	0 to 15	15 to 19	19 to 22	22 to 25	> 25
Policies Per 1,000 Residents	0.50	2005	N/A	0 to 1	1 to 2	2 to 4	4 to 9	> 10



**Appendix A**  
**Statewide Needs Assessment**

**Table A.2**  
**Prioritization List – March 2004**

Priority	County	2000 Population	2000 Population Standardized Score	Quality of Current Map	Population Growth	Flood Hazard Risk	Unique Watershed Conditions	Priority from Previous Year	NFIP Policy Base	BCP Score (Weighted)
1	Douglas	175,766	5.0	3.0	5.0	5.0	3.0	5.0	2	29.8
2	El Paso	516,929	5.0	4.0	2.0	5.0	5.0	4.0	3	28.8
3	Eagle	41,659	4.0	2.5	5.0	4.7	4.0	5.0	4	28.6
4	Larimer	251,494	5.0	4.0	2.0	5.0	3.0	5.0	4	28.6
5	Garfield	43,791	4.0	3.0	3.0	4.7	5.0	5.0	4	27.5
6	Boulder	291,288	5.0	3.0	2.0	4.7	3.0	5.0	5	27.3
7	Weld	180,936	5.0	4.0	2.0	4.0	3.0	5.0	3	27.1
8	Mesa	116,255	5.0	4.0	2.0	4.5	3.0	4.0	2	26.6
9	Jefferson	527,056	5.0	3.0	2.0	4.7	3.0	5.0	3	26.3
10	Adams	363,857	5.0	4.0	2.0	5.0	0.0	4.0	3	25.8
11	Park	14,523	3.0	4.0	5.0	2.7	1.5	5.0	4	25.6
12	Arapahoe	487,967	5.0	4.0	2.0	5.0	0.0	4.0	2	25.3
13	Elbert	19,872	3.0	4.5	5.0	4.0	0.0	5.0	1	25.3
14	Pueblo	141,472	5.0	3.5	1.0	4.3	4.0	4.0	2	25.0
15	La Plata	43,941	4.0	2.5	2.0	4.0	5.0	4.0	5	24.8
16	Teller	20,555	3.0	3.0	4.0	4.0	4.0	5.0	2	24.7
17	San Miguel	6,594	2.0	3.0	5.0	3.3	5.0	3.0	5	24.6
18	Montezuma	23,830	3.0	4.5	2.0	4.5	3.0	3.0	4	24.3
19	Fremont	46,145	4.0	3.0	3.0	4.0	1.5	4.0	4	24.2
20	Gunnison	13,956	3.0	4.0	2.0	3.5	4.0	4.0	5	24.2
21	Mineral	831	1.0	5.0	3.0	4.0	4.0	4.0	5	23.9
22	Archuleta	9,898	2.0	3.5	5.0	3.0	3.0	4.0	4	23.8
23	Ouray	3,742	1.0	3.5	4.0	4.7	5.0	3.0	5	23.7
24	Pitkin	14,872	3.0	3.5	1.0	4.7	5.0	3.0	5	23.5
25	Delta	27,834	3.0	4.0	2.0	3.3	4.0	4.0	3	23.0
26	Logan	20,504	3.0	4.0	1.0	4.5	3.0	3.0	5	22.8
27	Summit	23,548	3.0	1.5	5.0	3.7	0.0	4.0	5	22.0
28	Clear Creek	9,322	2.0	4.0	2.0	4.0	3.0	3.0	5	21.8
29	Routt	19,690	3.0	1.5	2.0	4.7	3.0	5.0	5	21.5
30	Chaffee	16,242	3.0	3.5	2.0	3.7	1.5	3.0	4	21.1
31	Rio Grande	12,413	3.0	3.0	1.0	4.0	3.0	4.0	4	20.8
32	Denver	554,636	5.0	0.5	1.0	5.0	0.0	4.0	3	19.3
33	Otero	20,311	3.0	3.5	1.0	4.0	0.0	3.0	4	19.3
34	Montrose	33,432	3.0	3.0	2.0	3.3	1.5	2.0	3	19.0
35	Gilpin	4,757	1.0	3.0	3.0	5.0	1.5	2.0	4	18.9
36	Morgan	27,171	3.0	2.5	2.0	3.3	0.0	4.0	4	18.8
37	Grand	12,442	3.0	2.0	3.0	3.0	0.0	3.0	4	18.5
38	Custer	3,503	1.0	3.5	5.0	2.7	0.0	3.0	1	18.0

## Appendix A Statewide Needs Assessment

39	Alamosa	14,966	3.0	3.0	1.0	3.0	1.5	2.0	4	17.9
40	Saguache	5,917	2.0	3.5	2.0	3.3	1.5	3.0	1	17.5
41	Prowers	14,483	3.0	2.5	1.0	3.3	0.0	4.0	3	17.1
42	Huerfano	7,862	2.0	2.5	2.0	3.7	0.0	2.0	5	17.0
43	Hinsdale	790	1.0	1.5	4.0	3.7	2.5	2.0	3	16.7
44	Las Animas	15,207	3.0	2.0	1.0	3.7	0.0	4.0	3	16.7
45	Conejos	8,400	2.0	3.5	1.0	1.7	4.0	2.0	3	16.6
46	Rio Blanco	5,986	2.0	2.0	0.0	4.7	3.0	3.0	4	16.5
47	Broomfield	38,272	3.0	0.0	3.0	3.7	0.0	5.0	2	16.2
48	Crowley	5,518	2.0	4.0	2.0	2.7	0.0	2.0	1	16.2
49	Dolores	1,844	1.0	3.5	2.0	3.3	3.0	1.0	2	16.1
50	Lincoln	6,087	2.0	3.5	2.0	2.3	0.0	2.0	3	16.1
51	Moffat	13,184	3.0	1.5	1.0	2.7	1.5	2.0	3	14.9
52	Phillips	4,480	1.0	3.5	1.0	4.0	0.0	3.0	2	14.8
53	Lake	7,812	2.0	2.0	2.0	2.7	0.0	3.0	2	14.2
54	Kit Carson	8,011	2.0	3.5	1.0	2.0	0.0	1.0	1	13.0
55	Washington	4,926	1.0	3.5	1.0	3.0	0.0	1.0	1	12.3
56	Yuma	9,841	2.0	1.0	1.0	3.0	0.0	2.0	3	11.8
57	Sedgwick	2,747	1.0	3.0	1.0	3.0	0.0	1.0	1	11.5
58	Costilla	3,663	1.0	2.0	1.0	2.7	1.5	1.0	2	11.1
59	San Juan	558	1.0	1.5	0.0	2.7	3.0	1.0	4	11.0
60	Bent	5,998	2.0	1.5	1.0	2.3	0.0	1.0	2	10.8
61	Cheyenne	2,231	1.0	3.5	0.0	2.3	0.0	1.0	1	10.3
62	Kiowa	1,622	1.0	3.5	0.0	2.3	0.0	1.0	1	10.3
63	Baca	4,517	1.0	3.5	0.0	2.0	0.0	1.0	1	10.0
64	Jackson	1,577	1.0	3.5	0.0	2.0	0.0	1.0	1	10.0
<b>Weighting Factors</b>			<b>1.75</b>	<b>1.50</b>	<b>1.25</b>	<b>1.00</b>	<b>0.60</b>	<b>0.50</b>	<b>0.50</b>	

### Secondary Prioritization Categories

Readiness & Likelihood of Success – The CWCB is aware that there are many parties interested in the success that the Map Modernization effort will enjoy once it actually begins. It is important to have the first year or two of the effort be as successful as possible. Much of the “likelihood of success” is dependent on the capabilities and commitment of the involved local governments. Local GIS’ efforts will play a large part in preparing floodplain maps. Local funding will be required. Any pertinent data in the hands of local officials can help. Once the maps have been prepared, local traditions and political support with regard to floodplain management will determine how well the maps are used. CWCB has been working with Colorado communities and their floodplain managers for a very long time. The CWCB staff feels that this experience in working with local governments’ and their cooperation and commitment to the NFIP should be reflected in the prioritization.

CWCB staff scored communities individually for the MMIP report. Communities that were represented at the workshops and/or filled out questionnaires and/or worksheets were automatically given a score of at least 3 points out of 5. After all communities were scored, countywide composite scores were assigned. Because scores were averaged between two

CWCB staff members, scores of 1.5, 2.5, 3.5, or 4.5 were possible. The CWCB will take these rankings into account on a yearly basis, but will not officially update these rankings.

Federal Leveraging or Local Leveraging Above and Beyond Required Match – Communities within counties, counties, or federal agencies other than FEMA contributing funding to the update of flood hazards or contributing funding to the update of the FEMA FIRM may receive additional consideration within their “group”.

Colorado Regional Considerations – The CWCB would like to make sure that all areas of Colorado receive equitable consideration for countywide map updates. Therefore, counties in areas of the state that have not received an update for some time, in relation to other areas, may receive additional consideration within their “group”.

Immediate Availability of Existing Data – Communities or counties that have non-FEMA hydrologic or hydraulic analyses or topography immediately available may receive additional consideration within their “group”. Non-FEMA data is defined as hydrologic, hydraulic, or topographic data that has not been reflected on the FEMA map.

Immediate Availability of GIS – Communities or counties that have a Geographic Information System (GIS) that meets FEMA specifications, has countywide coverage, and that the communities and county agree upon for use as the foundation of their FEMA FIRM may receive additional consideration within their “group”.

### **Prioritization Criteria – Site-Specific Map Updates**

Site-specific map updates are stream specific projects to update flood hazards that are known to be inaccurate or outdated. Typically these updates will be performed during countywide updates, however there may be instances where watershed conditions change or the inadequacy of the effective data requires an independent site-specific map update. The CWCB anticipates generating a list of streams in need of a site-specific update in the process of performing a mapping update. Site-specific needs that are not addressed in the mapping update will then be compiled into a statewide list of needs to be addressed in the future, as funding allows. Additionally, other site-specific needs that are identified by CWCB staff (such as wildfire impacted areas) will be incorporated into the site-specific needs list as appropriate.

**Appendix B**  
**Initial Coordination Meeting**





**Appendix C**  
**Scoping Meeting**

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Scoping is a vital part of the map production process. Scoping meetings are essential to outreach, data gathering, and defining an accurate scope. The checklist below is a tool from FEMA's Scoping guidance that is currently being considered for our scoping efforts to ensure that the correct questions are being asked at the scoping meeting so that an accurate scope can be established.

This checklist is used to inventory base map, topographic, and hydrologic and hydraulic data, and floodplain mapping information and data available or currently underway that may be useful for this project. Use the checklist below to help solicit the information you will need to answer the key questions.

**BASE MAP INFORMATION**

Are U.S. Geological Survey (USGS) Digital Orthophoto  
Quadrangles (DOQs) available for this community or  
county?  Yes  No

What community base map data are available? From whom?

What is the source of the base map data and how were the data created?

Are the owners of the data willing to allow FEMA to  
release the base map data to the public with the  
DFIRMs?  Yes  No

**If you checked "No," to the above question you do not need to complete the rest of the Base Map Information section of this checklist.**

<b>Contact Information for Data Source</b>	
Name:	
Organization:	
Telephone No.:	
E-Mail Address:	
Facsimile No.:	

If the base map data are in vector format and the owner is  
not willing to release the data, will the owner allow  
FEMA to make a raster image of the vector base map  
data and release that?  Yes  No

Do the data cover the entire community or county being  
restudied (not just the streams being studied)?  Yes  No

Are the data available now? If not, what is the projected completion date?  Yes  No

What is the accuracy or resolution of each data set or type?

When were the base map data created, last updated, or reviewed for update needs?

Created	Last Updated	Reviewed

Is the base map in the process of being revised? If yes, what is being done and when will it be completed?  Yes  No

What projection, horizontal datum, and vertical datum were used for the base map data sets?

Projection	5.1.1 Horizontal Datum	Vertical Datum

In what file format(s) are the data available?

How are the data tiled?

Is a data dictionary or metadata available?  Yes  No

What feature types do the base map data sets contain? (Check all that apply.)

- Roads
- Road Names
- Railroads/railroad names
- Airports
- Rivers, streams, lakes, shorelines, coastline
- Are political boundaries (corporate, county, etc.) current?
- Parks, military reservations, Native American lands
- Range, township, section lines
- Building footprints
- Parcels



- Bridges
- Flood control structures (e.g., culverts, levees, dams, weirs, etc.)
- What bench marks, Elevation Reference Marks, or other vertical control data are available for the community, county, or study area?

**TOPOGRAPHIC INFORMATION**

What elevation data are available?

What is the source of the topographic data (how were the data created)?

Do the data cover the floodplains for the flooding sources in the entire community or county being restudied?  Yes  No

Are the data available now? If not, what is the projected completion date?  Yes  No

What is the accuracy or resolution of the topographic data?

When were the topographic data created, last updated, or reviewed for update needs?

Created	Last Updated	Reviewed

{Insert notes.}

What projection, horizontal datum, and vertical datum were used for the topographic data?

Projection	Horizontal Datum	Vertical Datum

In what format(s) are the data available?

Contours	Digital Elevation Model (DEM)	Digital Terrain Model (DTM)	Triangulated Irregular Network (TIN)

**FLOOD HAZARD DATA**

Are digital flood hazard data available? If so, from whom?  Yes  No

Have flood hazard data that have been converted to digital format been compared to the effective FIRMs to ensure that base map to flood hazard relationships have been preserved?  Yes  No

What was the source of the digital flood hazard data and how were the data created?

Do any new data tie in to the existing effective information?  Yes  No

Do the data cover the entire community or county being restudied?  Yes  No

Are the data available now? If not, what is the projected completion date?  Yes  No

What is the accuracy or resolution of each data set or type?

When were the data created, last updated, or reviewed for update needs?

Created	Last Updated	Reviewed

Are Letters of Map Change (LOMCs) included in any digital data sets?  Yes  No

What projection, horizontal datum, and vertical datum were used for the flood hazard data sets?

Projection	Horizontal Datum	Vertical Datum

In what file format(s) are the data available?

{Insert notes.}

How are the data tiled?

{Insert notes.}

Is a data dictionary or metadata available?

Yes     No

{Insert notes.}

Have flood hazard data that have been converted to digital format been compared to the effective FIRMs to ensure that base map to flood hazard relationships have been preserved?

Yes     No

{Insert notes.}

What feature types do the flood hazard data sets contain? (Check all that apply.)

- 1% annual chance flood hazard areas
- 0.2% annual chance flood hazard areas
- Floodways
- Alluvial fans
- Base flood elevations, velocities, or depths
- Cross sections
- Elevation Reference Marks (ERMs)
- LOMCs
- Are data for other flood frequencies available?

Yes     No

Do the flood hazard boundaries need to be fitted to newer or more detailed stream locations and/or topography than was previously used for the existing FIRM?

Yes     No

Are new hydrologic and hydraulic models available? If so, please describe them.

Yes     No

Do hydrologic and hydraulic models need inclusion?

Yes     No

Were the hydrologic and hydraulic data developed using automated modeling and mapping techniques? If so, describe them.  Yes  No

Are digital files containing data needed for hydrologic or hydraulic modeling (e.g., land use or soils) available?  Yes  No

Are supplemental data (e.g., photographs, etc.) available?  Yes  No

Are supplemental data in digital format?  Yes  No

Are there levees in this community?  Yes  No

If levees are present, do they provide protection from the 1% annual chance flood event?  Yes  No

Is U.S. Army Corps of Engineers certification available for these levees?  Yes  No

Does the community maintain hydrologic and hydraulic analyses that reflect future conditions?  Yes  No

Are other hazard data available? If yes, what are they?  Yes  No

Are elevation certificates for floodprone structures available in a database or other electronic format?  Yes  No

**Appendix D**  
**Studies And Mapping**

Several tasks have been established as potential activities in either Countywide Mapping or Site Specific Mapping updates. These tasks are listed in Table D.1 below. These tasks are also defined in detail in Table D.2. Unit costs for these tasks are provided in Table D.3.

**Table D.1**  
**Study Tasks for DFIRM Production**

<b>Task</b>	<b>Description</b>	<b>Unit</b>
A	Project Scoping	Project
B	DFIRM Database Creation	Panel
C	Base map upgrade for Old Specification DFIRM	Panel
D	DFIRM Conversion of Manual FIRM	Panel
E	Redelineation based on existing topography	Linear Mile
F	Topographic Data Collection (LIDAR or Photogrametry)	Square Mile
G	Topographic Data Collection (Survey)	Linear Mile
H	Approximate Analysis (Limited Method) and Redlineation	Linear Mile
I	Riverine Study (Hydrology)	Linear Mile
J	Riverine Study (Hydraulics - Detailed Method)	Linear Mile
K	Riverine Study (Floodplain Delineation)	Linear Mile
L	Detailed Study for Unique Flood Hazards	Linear Mile
M	Independent QC of topography	Square Mile
N	Independent QC of hydrology & hydraulics	Linear Mile
O	Independent QC of mapping	Panel
P	Appeal resolution contingency	Percent of Total

**Table D.2  
Flood-Mapping Task Definitions and Criteria**

<b>Task</b>	<b>Definition</b>	<b>Desired Minimum Level</b>
Project Scoping	Obtain and perform cursory review of existing data. Produce scoping map and determine number of revised panels and number of stream miles in need of revision. Determine which mapping partners will perform which tasks.	
DFIRM database creation	Creation of a DFIRM database in compliance with FEMA specifications for an existing DFIRM that meets FEMA base map specifications.	
Base map upgrade for DFIRM that no longer meets FEMA specifications	Upgrade of existing base map to base map that meets FEMA base map and graphical specifications, which may include reformatting of road text and other graphical edits.	
DFIRM conversion of manual FIRM	Collect source data; determine paneling scheme; conduct initial coordination meetings; obtain source materials (FIS, FIRM, and quads); register flood information to the base map; research effective data; perform agreement checks, contiguous study check and LOMC check; complete FIS history; organize/tie in profiles; prepare FDTs/profiles; populate database; prepare text and maintain correspondence file; prepare news release; perform datum conversion and panel template preparation; and issue preliminary FIS and FIRM. Products should meet the requirements of: Volume 1, Section 1.4; and Appendices K, L, and M of FEMA's <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i> .	

**Appendix D  
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<p>Redelineation of detailed flood hazards based on new topography</p>	<p>Delineate detailed flood hazard areas on new topography; tie into adjacent floodplains; resolve potential floodway anomalies; internal quality review; and incorporate comments from independent quality reviewer. Products should meet the requirements of: Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.3); Appendix C, Sections C.4 and C.6; and Appendices D, K, L, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	
<p>Topographic data collection (LIDAR or Photogrammetry)</p>	<p>Contour mapping and/or digital elevation models that meet the requirements of: Volume 1, Section 1.4 (specifically Subsection 1.4.2.1); Appendix A, Sections A.2 and A.3; and Appendix M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	<p>The desired level for restudied areas is 2-foot, although 5-foot can be acceptable on a case-by-case basis. For Zone-A areas a 10-foot minimum contour interval is required in urban areas, best available data in rural areas. It is not acceptable “go backwards” in topographic contour definition as compared to the previous FIS.</p>
<p>Topographic data collection (Survey)</p>	<p>Identify and/or establish elevation reference marks (ERMs); identify and obtain cross-section data; obtain physical dimensions of hydraulic structures; internal quality review; and incorporate comments from independent QA/QC reviewer. Products should meet the requirements of: Volume 1, Sections 1.2, 1.3, 1.4 (specifically Subsection 1.4.2.1); Appendix A, Sections A.5, A.6, A.7, and A.8; and Appendices B, C, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	



**Appendix D  
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<p>Approximate analysis (Limited Method) and redelineation</p>	<p>Regression equations or similar approach for discharge calculations; compute 1% annual chance water-surface elevations using Manning’s equation or similar simplified approach; contiguous study check; internal quality review;and incorporate comments from independent quality reviewer. Products should meet the requirements of Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.3); Appendix C, Sections C.4 and C.6; and Appendices D, K, L, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	
<p>Riverine Study (Hydrology)</p>	<p>Review and recommend appropriate methodology; delineate drainage area; limited detailed methods (research on land-use data and basin characteristics for regression equations, obtain gage records, compute 10%, 2%, 1% and 0.1% annual chance flood discharge) or detailed hydrologic analyses (research on land-use and precipitation data, compute curve numbers, compute time of concentrations, compute channel routing, detention routing, build hydrologic model, calibrate/validate models); prepare draft FIS text; internal quality review; and incorporate comments from independent quality reviewer. Products should meet the requirements of: Volume 1, Section 1.4 (specifically Subsections 1.4.1, 1.4.2.2 and 1.4.2.4); and Appendix C, Sections C.1, C.2, and C.7; and Appendices E, F, G, H, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	<p>CWCB or UDFCD Criteria Manual Guidance or locally acceptable criteria.</p>

**Appendix D  
Studies And Mapping**

<p>Riverine Study (Hydraulics – Detailed Method)</p>	<p>Field visit to verify roughness coefficient and verify structural details (inlet types, conditions etc.); integrate field survey data into modeling; prepare multi-frequency models; prepare a floodway model; calibrate/validate models; prepare draft FIS text; prepare floodway data tables; prepare FIS profiles; internal quality review; and incorporate comments from independent quality reviewer. Products should meet the requirements of: Volume 1, Section 1.4 (specifically Subsections 1.4.1, 1.4.2.2 and 1.4.2.4); Appendix A, Section A.4 (specifically Subsection A.4.7); Appendix C, Sections C.3, C.5, and C.7; and Appendices B, E, F, G, H, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	
<p>Riverine Study (Floodplain delineation)</p>	<p>Integrate field survey data into mapping; delineate 1% and 0.2% annual chance floodplain; delineate floodway; contiguous study check; internal quality review; and incorporate comments from independent quality reviewer. Products should meet the requirements of: Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.3); Appendix C, Sections C.4 and C.6; and Appendices D, K, L, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	

**Appendix D  
Studies And Mapping**

<p>Detailed Study (Unique flood hazards)</p>	<p>Field visit to verify site conditions and structural details (inlet types, conditions etc.); integrate field survey data into modeling; prepare multi-frequency models; prepare a floodway model; calibrate/validate models; prepare draft FIS text; prepare floodway data tables; prepare FIS profiles; internal quality review; and incorporate comments from independent quality reviewer. Products should meet the requirements of: Volume 1, Section 1.4 (specifically Subsections 1.4.1, 1.4.2.2 and 1.4.2.4); Appendix A, Section A.4 (specifically Subsection A.4.7); Appendix C, Sections C.3, C.5, and C.7; and Appendices B, E, F, G, H, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	
<p>Independent QC of topography</p>	<p>Review submitted topography to ensure that the minimum specifications outlined in Appendix B of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i> is met. A high level of effort would include establishing control points and performing the QA/QC. A low level of effort would include reviewing the control data submitted by another entity. A high level of effort would be several times more expensive than a low level of effort.</p>	

**Appendix D  
Studies And Mapping**

<p>Independent QC of hydrology and hydraulics</p>	<p>Review hydrology for compliance with FEMA standards. Products should meet the requirements of: Volume 1, Section 1.4 (specifically Subsections 1.4.1, 1.4.2.2 and 1.4.2.4); and Appendix C, Sections C.1, C.2, and C.7; and Appendices E, F, G, H, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p> <p>Review hydraulics for compliance with FEMA standards. Products should meet the requirements of: Volume 1, Section 1.4 (specifically Subsections 1.4.1, 1.4.2.2 and 1.4.2.4); Appendix A, Section A.4 (specifically Subsection A.4.7); Appendix C, Sections C.3, C.5, and C.7; and Appendices B, E, F, G, H, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i>.</p>	
<p>Independent QC of mapping</p>	<p>Review floodplain mapping for compliance with FEMA standards. Products should meet the requirements of: Volume 1, Section 1.4 (specifically Subsections 1.4.1 and 1.4.2.3); Appendix C, Sections C.4 and C.6; and Appendices D, K, L, and M of FEMA’s <i>Guidelines and Specifications for Flood Hazard Mapping Partners</i></p>	
<p>Appeal/protest/comment resolution</p>	<p>Review and provide comment on any appeal submitted. If the appeal is valid and can be incorporated within the appeal contingency established in the contract, revise the data and issue revised preliminary FIRM and FIS. If the appeal is not valid or if the submitted data exceeds the appeal contingency in the contract, consult FEMA for additional resources, guidance, and/or funding.</p>	

**Table D.3  
Cost Estimating Template for Countywide and Site-Specific Mapping Updates**

[COUNTY NAME]	Task	Description	Unit	# of Units	Unit Cost Range		Unit Cost	Cost Estimate
	A	Project Scoping	Project		\$5,000	\$15,000		\$0
	B	DFIRM Database Creation	Panel		\$200	\$300		\$0
	C	Base map upgrade for Old Specification DFIRM	Panel		\$1,250	\$2,000		\$0
	D	DFIRM Conversion of Manual FIRM	Panel		\$3,000	\$4,500		\$0
	E	Redelineation based on existing topography	Linear Mile		\$375	\$600		\$0
	F	Topographic Data Collection (LIDAR or Photogrametry)	Square Mile		\$400	\$800		\$0
	G	Topographic Data Collection (Survey)	Linear Mile		\$500	\$1,000		\$0
	H	Approximate Analysis (Limited Method) and Redlineation	Linear Mile		\$500	\$850		\$0
	I	Riverine Study (Hydrology)	Linear Mile		\$800	\$1,400		\$0
	J	Riverine Study (Hydraulics - Detailed Method)	Linear Mile		\$2,000	\$3,000		\$0
	K	Riverine Study (Floodplain Delineation)	Linear Mile		\$375	\$600		\$0
	L	Detailed Study for Unique Flood Hazards	Linear Mile		\$2,000	\$5,000		\$0
<b>Subtotal - Production of Draft Preliminary DFIRM:</b>								\$0
M	Independent QC of topography	Square Mile		\$500	\$800		\$0	
N	Independent QC of hydrology & hydraulics	Linear Mile		\$100	\$300		\$0	
O	Independent QC of mapping	Panel		\$150	\$480		\$0	
<b>Subtotal - Independent QC:</b>								\$0
P	Appeal resolution contingency	% of Total		5%	10%		\$0	
<b>Cost Estimate For This Project:</b>								\$0

Fiscal Year 2003 Estimate

**Appendix E**  
**Availability And Uses Of Digital Data**







**Appendix F**  
**Addressing Colorado's Map Modernization "Population Conundrum"**

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**Addressing Colorado's Map Modernization "Population Conundrum"**

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**Addressing Colorado's Map Modernization "Population Conundrum"**

As is the case in many of the other 49 states, Colorado does not have a very even distribution of population among its counties. Almost 85% of Colorado's residents live in 11 counties out of 64; 89% - 90% live in 17 counties; approximately 92.5% live in 24 counties. All of the remaining 7.5% of the people of Colorado reside in the other 40 counties of the state. With a total of 64 counties, the state has a sizeable number of counties to map. Prior to federal Fiscal year 2003 (FY '03), 5 of those 64 counties were considered by FEMA to have DFIRMs complete or in progress. FY '03 funding from FEMA is supporting the preparation of DFIRMs for 3 more counties. Preliminary indications from FEMA are that there will be FY '04 funding for DFIRMs for 4 additional counties, bringing the total after FY '04 to 12 out of 64 counties with DFIRMs. If all of Colorado's counties are to be mapped, a large number of counties with small populations will have to be studied. There are 15 counties with populations less than 5,000 each, and 28 counties with populations with populations less than 10,000 each, each of which will need mapping to ensure 100% of the counties in Colorado are mapped.

Based on recent FEMA funding levels, one would project that between FY '05 and FY '08 (*the remaining fiscal years in the five-year initial Map Modernization study period*) that an additional 16 to 24 counties may be mapped (4 to 6 counties per year) in Colorado. The Map Modernization "population conundrum" is that FEMA has stated in its performance targets that it wishes to have provided 100% of the country's population with "digital GIS flood hazard data available on line" by 2009, but Colorado's counties are not being mapped fast enough to achieve that goal. While FEMA has adopted the performance targets that anticipate mapping for all of Colorado's counties, so far the agency has not been providing Colorado with sufficient funding to complete DFIRMs for 13 counties per year for FY '05 through FY '08 (*the annual rate needed to map all 64 counties by 2008*) and to ensure that those 13 countywide studies per year would meet applicable state and local standards and expectations for engineering accuracy, technical quality, and comprehensive geographic extent.

**CURRENT LEVELS OF MAP MODERNIZATION FUNDING FOR COLORADO WILL NOT ALLOW COLORADO TO SIMULTANEOUSLY ACHIEVE ADEQUATE TECHNICAL PERFORMANCE AND COMPLY WITH FEMA'S "SUB-PROGRAM ELEMENT PERFORMANCE MEASURES."**

The problem is not in reaching 85% compliance (FEMA's FY '08 target) or in reaching 90% compliance or 92.5% compliance. It is in addressing the final 7.5% of Colorado's population that resides in 40 counties with populations less than 20,000 per county. 100% compliance is FEMA's FY '09 target. Those last 40 counties (the 40 smallest counties in Colorado in terms of population) will cost a lot to map adequately when one considers their relatively small population contribution toward reaching the FEMA performance targets.

CWCB has developed a prioritization scoring methodology that considers population and several other very important parameters for evaluating map update needs in Colorado. While CWCB is

## Addressing Colorado's Map Modernization "Population Conundrum"

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fully aware of FEMA's performance targets, and their reliance on mapping with population in mind, the State of Colorado's position is that these other mapping objectives must also be addressed. Efforts to reach FEMA's performance goals in Colorado must take into account two considerations:

- 1) Current levels of Map Modernization funding for Colorado preclude achieving FEMA's performance goals within the specified performance period.
- 2) Population is not the only parameter guiding CWCB's Map Modernization plan; it is the single most important parameter, but it is not the only parameter.

CWCB has developed a performance plan with three funding scenarios. A fourth scenario, based strictly on current trends in FEMA funding, would achieve preparation of countywide DFIRMs for 28 to 36 total counties by FY '09 (depending on specific funding levels). Those counties would represent approximately 93% to 96% of Colorado's population. This fourth scenario also proposes to address a small part of the hydrology and hydraulics (H&H) engineering needs in each county. The other three levels of annual funding would support mapping of all 64 counties and completion of more "H&H" engineering for more counties. The "population conundrum" states, however, that meeting the flood hazard mapping needs of the last 6% to 7% of Colorado's population (*residing in approximately 32 of the 64 counties*) and meeting the state's "H&H" needs will require a major increase in annual Map Modernization funding for future fiscal years.

The tables and maps that follow illustrate the dilemma discussed above. Tables 1 through 7 collectively list all of Colorado's 64 counties, grouped by population ranges, as follows:

Table 1	11 counties with population $\geq$ 100,000
Table 2	6 counties with 50,000 $\geq$ population $\geq$ 30,000 *
Table 3	7 counties with 30,000 $\geq$ population $\geq$ 20,000
Table 4	12 counties with 20,000 $\geq$ population $\geq$ 10,000
Table 5	13 counties with 10,000 $\geq$ population $\geq$ 5,000
Table 6	8 counties with 5,000 $\geq$ population $\geq$ 2,500
Table 7	7 counties with population $\leq$ 2,500

- **There are no counties with population between 50,000 and 30,000**

## Addressing Colorado's Map Modernization "Population Conundrum"

Table F.1

## Highest Population Counties (greater than 100,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Denver	554,636	12.8	-	-	9.9	1
Jefferson	527,056	12.1	1,081,692	24.9	20.2	2
El Paso	516,929	11.9	1,598,692	36.8	30.2	2
Arapahoe	487,967	11.2	2,086,588	48.1	24.6	1
Adams	363,857	8.4	2,450,445	56.5	37.3	1
Boulder	291,296	6.7	2,741,741	63.2	29.3	1
Larimer	251,494	5.8	2,993,235	69.0	35.1	1
Weld	180,936	4.2	3,174,171	73.1	37.3	1
Douglas	175,766	4.0	3,349,937	77.2	191.0	1
Pueblo	141,472	3.3	3,491,409	80.4	15.0	2
Mesa	116,255	2.7	3,607,664	83.1	24.8	1

Table F.2

## Moderately High Population Counties (from 30,000 to 50,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Fremont	46,145	1.1	3,653,809	84.2	43.0	2
La Plata	43,941	1.0	3,697,750	85.2	36.1	2
Garfield	43,791	1.0	3,741,541	86.2	46.1	1
Eagle	41,659	1.0	3,783,200	87.2	90.0	1
Broomfield	38,272	0.9	3,821,472	88.1	55.3	1
Montrose	33,432	0.8	3,854,904	88.8	36.9	3

## Addressing Colorado's Map Modernization "Population Conundrum"

Table F.3

## Medium Population Counties (from 20,000 to 30,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Delta	27,834	0.6	3,882,738	89.5	32.7	2
Morgan	27,171	0.6	3,909,909	90.1	23.8	2
Montezuma	23,830	0.5	3,933,739	90.6	27.6	3
Summit	23,548	0.5	3,957,287	91.2	82.8	2
Teller	20,555	0.5	3,977,842	91.7	64.9	1
Logan	20,504	0.5	3,998,346	92.1	16.7	3
Otero	20,311	0.5	4,018,657	92.6	0.6	3

Table F.4

## Medium/Small Population Counties (from 10,000 to 20,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Elbert	19,872	0.5	4,038,529	93.1	106.0	1
Routt	19,690	0.5	4,058,219	93.5	39.8	1
Chaffee	16,242	0.4	4,074,461	93.9	28.1	3
Las Animas	15,207	0.4	4,089,668	94.2	10.5	2
Alamosa	14,966	0.3	4,104,634	94.6	9.9	4
Pitkin	14,872	0.3	4,119,506	94.9	17.5	3
Park	14,523	0.3	4,134,029	95.3	102.4	1
Prowers	14,483	0.3	4,148,512	95.6	8.5	2
Gunnison	13,956	0.3	4,162,468	95.9	35.9	2
Moffat	13,184	0.3	4,175,652	96.2	16.1	3
Grand	12,442	0.3	4,188,094	96.5	56.2	2
Rio Grande	12,413	0.3	4,200,507	96.8	15.3	1

## Addressing Colorado's Map Modernization "Population Conundrum"

Table F.5

## Small Population Counties (from 5,000 to 10,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Archuleta	9898	0.2	4,210,405	97.0	85.2	2
Yuma	9841	0.2	4,220,246	97.2	9.9	4
Clear Creek	9322	0.2	4,229,568	97.5	22.4	3
Conejos	8400	0.2	4,237,968	97.6	12.7	4
Kit Carson	8011	0.2	4,245,979	97.8	12.2	4
Huerfano	7862	0.2	4,253,841	98.0	30.8	3
Lake	7812	0.2	4,261,653	98.2	30.0	3
San Miguel	6594	0.2	4,268,247	98.3	80.5	2
Lincoln	6087	0.1	4,274,334	98.5	34.4	3
Bent	5998	0.1	4,280,332	98.6	18.8	4
Rio Blanco	5986	0.1	4,286,318	98.8	-1.1	3
Saguache	5917	0.1	4,292,235	98.9	28.1	3
Crowley	5518	0.1	4,297,753	99.0	39.8	4

Table F.6

## Very Small Population Counties (from 2,500 to 5,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Washington	4926	0.1	4,302,679	99.1	2.4	4
Gilpin	4757	0.1	4,307,436	99.2	55.0	4
Baca	4517	0.1	4,311,953	99.4	-0.9	4
Phillips	4480	0.1	4,316,433	99.5	6.9	3
Ouray	3742	0.1	4,320,175	99.5	63.1	3
Costilla	3663	0.1	4,323,838	99.6	14.8	4

## Addressing Colorado's Map Modernization "Population Conundrum"

Custer	3503	0.1	4,327,341	99.7	81.9	2
Sedgwick	2747	0.1	4,330,088	99.8	2.1	4

Table F.7

## Smallest Population Counties (Less than 2,500)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Cheyenne	2231	0.1	4,332,319	99.8	-6.9	4
Dolores	1844	< 0.1	4,334,163	99.9	22.6	4
Kiowa	1622	< 0.1	4,335,785	99.9	-3.9	4
Jackson	1577	< 0.1	4,337,362	99.9	-1.7	4
Mineral	831	< 0.1	4,338,193	100.0	48.9	2
Hinsdale	790	< 0.1	4,338,983	100.0	69.2	3
San Juan	558	< 0.1	4,339,541	100.0	-25.1	4

If FEMA funding is sufficient to prepare DFIRM's for the top 28 counties, as ranked by CWCB's prioritization methodology rather than being ranked by population alone, all but 3 of the 24 most populous counties would have been studied. If funding is sufficient for 36 counties, again as ranked by CWCB's prioritization methodology, all of the 24 most populous counties, and all but 5 of the 36 most populous counties would have been studied. Roughly half of Colorado's counties would not have DFIRM's, but those unmapped counties would represent 4% to 7% of the state's population (*approximately 175,000 to 300,000 people*). On the next five pages are maps which show the geographic distribution of the counties discussed above in map view, as follows:

Map 1	11 counties with population $\geq$ 100,000	(83.1% of total pop.)
Map 2	17 counties with population $\geq$ 30,000	(88.9% of total pop.)
Map 3	24 counties with population $\geq$ 20,000	(92.6% of total pop.)
Map 4	40 counties with population $\leq$ 20,000	(7.4% of total pop.)
Map 5	all 64 counties, grouped by population range	(100.0 % of total pop.)

Insert Map 1 (*Counties with population greater than 100,000*)



Insert Map 2 (*Counties with population greater than 30,000*)

Insert Map 3 (*Counties with population greater than 20,000*)

Insert Map 4 (*Counties with population less than 20,000*)

Insert Map 5 (*Population Distribution*)

**Addressing Colorado's Map Modernization "Population Conundrum"**

Recent history would not indicate such funding levels are likely, but those levels must be met if the performance targets are to be achieved. CWCB would like to support FEMA's performance goals, including the goals for FY '09, but meeting those goals will require increased funding. Colorado's proposed realistic response to the "population conundrum" is to achieve 93% compliance with funding through FY 2007 by mapping the 31 highest priority counties out of 64 total counties.

Then it will be up to FEMA whether to provide in the critical year of FY 2008 the large amount of funding needed to complete maps for those final 33 counties and the 7% of statewide population that those counties represent. CWCB firmly believes the proposed plans for FY 2004 through FY 2007 are realistic. The facts discussed in this Appendix demonstrate that it is FY 2008 that represents performance expectations that cannot be met under present funding conditions and, therefore, serves as the crux of the "population conundrum."

Section Four of this Plan outlines CWCB's proposed approach to the "population conundrum", but that approach requires a massive increase in the number of counties studies in FY 2008, as compared to the other fiscal years, and a major increase in the funding to support mapping those counties. The proposed schedule involves mapping a total of 19 counties in the three years from FY '05 to FY '07, or about 6 counties per year. *(That presumes that funding will be provided to adequately map the 4 counties already proposed for FY '04.)* In FY '08 the proposal is to map 33 counties in the one year (21 counties that participate in the NFIP and 12 counties that do not participate in the NFIP). The table below shows by fiscal year the number of counties to be mapped and the percentage of statewide population to be served by the maps.

**Table F.8**

**Proposed Plan Summary Table**

<b>Fiscal Year</b>	<b># of Counties</b>	<b>Cumulative # of Counties</b>	<b>% Statewide Population</b>	<b>Cumulative % Statewide Population</b>
Pre- 2003	5	5	14.8	14.8
FY 2003	3	8	23.5	38.3
FY 2004	4	12	28.1	66.4
FY 2005	3	15	15.7	82.1
FY 2006	9	24	8.6	90.7
FY 2007	7	31	2.4	93.1
FY 2008 (participating counties)	21	52	5.3	98.4
FY 2008 (non-participating counties)	12	64	1.6	100.0

## Addressing Colorado's Map Modernization "Population Conundrum"

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The final year would, under the proposed plan, involve mapping 33 counties while serving 6.95 of the state's population (*approximately 300,000 people*). The average population per county mapped in FY 2008 would be approximately 9100 people.

The three sets of annual mapping plans that have been examined in great detail in this Plan (Full, Medium, and Low) range from "very optimistic" (six times current funding levels) to "realistic" (double current funding levels). In other words, current annual funding levels represent approximately 50% of the "Low" level of funding. "**Full funding**" is based on Colorado's 2002 MMIP report and its estimate of mapping costs, as updated in this 2004 BCP report. CWCB recognizes that if funding levels remain in the "pessimistic" range of current funding levels, a great deal of valuable mapping will be accomplished over the next 5 years. CWCB will, however, be waiting with great interest for FEMA's solution to the "population conundrum" if performance expectations remain in the "very optimistic" range while funding levels do not rise significantly beyond the "pessimistic" range, at least to the "minimally realistic" range of the "Low" level of funding. There are fixed costs associated with preparing DFIRMs in even the smallest, least populous, and least flood-prone counties in Colorado. The unit costs of map panel preparation and stream-mile mapping can only be dropped so low before quality and accuracy suffer unacceptably. Reaching FEMA's performance goals, particularly as work shifts to the smaller and less populous counties, will have to deal with those fixed costs and unit costs one way or another.

**Appendix G**  
**A Regional View Of Colorado's Map Modernization Program**

## **A Regional View of Colorado's Map Modernization Program**

Colorado is a diverse state in terms of topography, hydrometeorology, economic characteristics, and population distribution. Floodplain mapping needs are different in the various geographic portions of the state. In an attempt to take a geographic view of Colorado's floodplain mapping needs that is broader than looking at individual counties but not as broad as looking at the entire state, CWCB staff divided the state regionally. Staff defined 12 unofficial regions for the 64 counties.

These regions are not entirely coincident with watersheds. They are not Council of Governments (COG) regions. They are not Congressional Districts. Too many of Colorado's county boundaries cross watershed lines or Congressional District lines, and some counties do not even participate in COGs. Instead, these regions are aggregations of entire counties that are near one another, generally but not entirely within the same major watershed, and somewhat similar in terms of flood threat. Sometimes they are similar in terms of population distribution and economic characteristics.

Even though these regions are unofficial, examining the progress of Colorado's Map Modernization Program through the filter of regions is instructive. Looking at the 8 counties already studied or currently being studied shows that 5 counties are in one region, and the other 3 counties are in another. Projecting into the future one year, with 12 total counties (*including the 4 counties proposed by CWCB and UDFCD*), shows that there are 7 counties in one region (*accounting for the entire region*), 3 counties in another region, and 1 county each in two more regions. That means that the remaining 8 of 12 regions would be completely unserved after FY '04. Just asking the question, "Which regions of Colorado are having their mapping needs met at certain times in the initial 5-year program?" allows CWCB to consider from a different perspective how well the mapping needs of the entire state are being met.

With that objective in mind, a brief description of each region will be provided. The 12 regional descriptions are preceded by a map of the entire state showing the boundaries of all 12 regions, along with all of the county boundaries. Each regional description includes a text description of the region followed by a tabular description. That tabular description shows population and population growth (1990-2000) characteristics of each county in the region and of the region as a whole. After the tabular description for the region is a map of the entire state **highlighting only the counties in the particular region in question**. The regional map shows the BCP priority (1<sup>st</sup> priority counties, 2<sup>nd</sup> priority, 3<sup>rd</sup> priority, 4<sup>th</sup> priority) of each county in the region. There will be 12 such regional descriptions.



## A Regional View Of Colorado's Map Modernization Program

### NORTHEASTERN COLORADO REGION

This region includes 9 counties. It straddles portions of three major watersheds (South Platte River, Republican River, and Arkansas River). Much of this region includes agricultural lands, both irrigated and dryland. 5 of the 9 counties in this region do not participate in the NFIP. According to the 2004 BCP prioritization methodology, one county in this region (Elbert County) ranks in the 1<sup>st</sup> priority group, although it must be noted that Elbert County does not participate in the NFIP. Another county ranks in the 2<sup>nd</sup> priority group.

#### Population Distribution in Northeastern Colorado Region

##### Medium Population Counties (from 20,000 to 30,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Morgan	27,171	0.6	-	-	23.8	2
Logan	20,504	0.5	47,675	1.1	16.7	3

##### Medium/Small Population Counties (from 10,000 to 20,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Elbert	19,872	0.5	67,547	1.6	106.0	1

##### Small Population Counties (from 5,000 to 10,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Yuma	9,841	0.2	77,388	1.8	9.9	4
Kit Carson	8,011	0.2	85,399	2.0	12.2	4
Lincoln	6,087	0.1	91,486	2.1	34.4	3

## A Regional View Of Colorado's Map Modernization Program

### Very Small Population Counties (from 2,500 to 5,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Washington	4,926	0.1	96,412	2.2	2.4	4
Phillips	4,480	0.1	100,892	2.3	6.9	3
Sedgwick	2,747	0.1	103,639	2.4	2.1	4

### Population Growth in Northeastern Colorado Region

#### Medium Population Counties (from 20,000 to 30,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Morgan	21,939	27,171	-	-	23.8	27.2
Logan	17,567	20,504	39,506	47,675	16.7	27.2

#### Medium/Small Population Counties (from 10,000 to 20,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Elbert	9,646	19,872	49,152	67,547	106.0	27.2

#### Small Population Counties (from 5,000 to 10,000)

**A Regional View Of Colorado's Map Modernization Program**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative Regional 2000 Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Yuma	8,954	9,841	58,106	77,388	9.9	27.2
Kit Carson	7,140	8,011	65,246	85,399	12.2	27.2
Lincoln	4,529	6,087	69,775	91,486	34.4	27.2

**Very Small Population Counties (from 2,500 to 5,000)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Washington	4,812	4,926	74,587	96,412	2.4	27.2
Phillips	4,189	4,480	78,776	100,892	6.9	27.2
Sedgwick	2,690	2,747	81,466	103,639	2.1	27.2

## Map of Northeastern Colorado

## A Regional View Of Colorado's Map Modernization Program

### SOUTHEASTERN COLORADO REGION

There are 7 counties in this region. It is all in the Arkansas River watershed except for a very small area in the Cimarron River watershed in the extreme southeastern corner of the state. This region consists primarily of irrigated and dryland agricultural areas. 4 of the 7 counties do not participate in the NFIP. No counties in this region rank in the 1<sup>st</sup> or 2<sup>nd</sup> BCP priority groups.

#### Population Distribution in Southeastern Colorado Region

##### Medium Population Counties (from 20,000 to 30,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Otero	20,311	0.5	-	-	0.6	3

##### Medium/Small Population Counties (from 10,000 to 20,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Prowers	14,483	0.3	34,794	0.8	8.5	2

##### Small Population Counties (from 5,000 to 10,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Bent	5,998	0.1	40,792	0.9	18.8	4
Crowley	5,518	0.1	46,310	1.1	39.8	4

##### Very Small Population Counties (from 2,500 to 5,000)

### A Regional View Of Colorado's Map Modernization Program

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Baca	4,517	0.1	50,827	1.2	-0.9	4

#### Smallest Population Counties (Less than 2,500)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Cheyenne	2,231	0.1	53,058	1.2	-6.9	4
Kiowa	1,622	-	54,680	1.3	-3.9	4

#### Population Growth in Southeastern Colorado Region

#### Medium Population Counties (from 20,000 to 30,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Otero	20,185	20,311	-	-	0.6	6.9

#### Medium/Small Population Counties (from 10,000 to 20,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Prowers	13,347	14,483	33,532	34,794	8.5	6.9

#### Small Population Counties (from 5,000 to 10,000)

**A Regional View Of Colorado's Map Modernization Program**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Bent	5,048	5,998	38,580	40,792	18.8	6.9
Crowley	3,946	5,518	42,526	46,310	39.8	6.9

**Very Small Population Counties (from 2,500 to 5,000)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Baca	4,556	4,517	47,082	50,827	-0.9	6.9

**Smallest Population Counties (Less than 2,500)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Cheyenne	2,397	2,231	49,479	53,058	-6.9	6.9
Kiowa	1,688	1,622	51,167	54,680	-3.9	6.9

**A Regional View Of Colorado's Map Modernization Program**

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Map of Southeastern Colorado Region



**A Regional View Of Colorado's Map Modernization Program**

**NORTHERN FRONT RANGE REGION**

There are 2 counties in this region. It is mostly in the South Platte River watershed, but a small portion is in the North Platte River watershed. This region includes a great deal of agricultural land, but it also includes significant urbanized areas. Both counties participate in the NFIP, as do many municipalities. The two counties (Larimer County and Weld County) both rank in the 1<sup>st</sup> BCP priority group.

**Population Distribution in Northern Front Range Region**

**Highest Population Counties (greater than 100,000)**

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Larimer	251,494	5.8	-	-	35.1	1
Weld	180,936	4.2	432,430	10.0	37.3	1

**Population Growth in Northern Front Range Region**

**Highest Population Counties (greater than 100,000)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Larimer	186,136	251,494	-	-	35.1	36.0
Weld	131,821	180,936	317,957	432,430	37.3	36.0

## Map of Northern Front Range

## A Regional View Of Colorado's Map Modernization Program

### SOUTHERN FRONT RANGE REGION

This region includes 4 counties. It is almost entirely in the Arkansas River watershed, although a small portion is in the South Platte River watershed. The region includes a great deal of agricultural land, but there are also significant urbanized areas. All 4 counties participate in the NFIP, as do many of the municipalities. Two counties (El Paso County and Pueblo County) rank in the 1<sup>st</sup> BCP priority group. No counties rank in the 2<sup>nd</sup> priority group.

#### Population Distribution in Southern Front Range Region

##### Highest Population Counties (greater than 100,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
El Paso	516,929	11.9	-	-	30.2	2
Pueblo	141,472	3.3	658,401	15.2	15.0	2

##### Medium/Small Population Counties (from 10,000 to 20,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Las Animas	15,207	0.4	673,608	15.5	10.5	2

##### Small Population Counties (from 5,000 to 10,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Huerfano	7,862	0.2	681,470	15.7	30.8	3

## A Regional View Of Colorado's Map Modernization Program

### Population Growth in Southern Front Range Region

#### Highest Population Counties (greater than 100,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
El Paso	397,014	516,929	-	-	30.2	26.2
Pueblo	123,051	141,472	520,065	658,401	15.0	26.2

#### Medium/Small Population Counties (from 10,000 to 20,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Las Animas	13,765	15,207	533,830	673,608	10.5	26.2

#### Small Population Counties (from 5,000 to 10,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Huerfano	6,009	7,862	539,839	681,470	30.8	26.2

## **Map of Southern Front Range**

## A Regional View Of Colorado's Map Modernization Program

### DENVER METRO AREA REGION

This region includes 7 counties. It is entirely in the South Platte River watershed. The region does include some agricultural land, but it is by far the most urbanized region in Colorado. Approximately 56% of Colorado's population lives in the Denver Metro Area. All 7 counties participate in the NFIP. Five counties (Adams, Arapahoe, Boulder, Douglas, and Jefferson) rank in the 1<sup>st</sup> BCP priority group, and the other two counties rank in the 2<sup>nd</sup> priority group.

#### Population Distribution in Denver Metro Area Region

##### Highest Population Counties (greater than 100,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Denver	554,636	12.8	-	-	9.9	1
Jefferson	527,056	12.1	1,081,692	24.9	20.2	2
Arapahoe	487,967	11.2	1,569,659	36.2	24.6	1
Adams	363,857	8.4	1,933,516	44.6	37.3	1
Boulder	291,296	6.7	2,224,812	51.3	29.3	1
Douglas	175,766	4.0	2,400,578	55.3	191.0	1

##### Moderately High Population Counties (from 30,000 to 50,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Broomfield	38,272	0.9	2,438,850	56.2	55.3	1

**A Regional View Of Colorado's Map Modernization Program**

**Population Growth in Denver Metro Area Region**

**Highest Population Counties (greater than 100,000)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Denver	467,610	554,636	-	-	9.9	30.1
Jefferson	438,430	527,056	906,040	1,081,692	20.2	30.1
Arapahoe	391,511	487,967	1,297,551	1,569,659	24.6	30.1
Adams	266,038	363,857	1,563,589	1,933,516	37.3	30.1
Boulder	225,339	291,296	1,788,928	2,224,812	29.3	30.1
Douglas	60,391	175,766	1,849,319	2,400,578	191.0	30.1

**Moderately High Population Counties (from 30,000 to 50,000)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Broomfield	24,638	38,272	1,873,957	2,438,850	55.3	30.1

## Map of Denver Metro Area



## A Regional View Of Colorado's Map Modernization Program

### FOOTHILLS AND UPPER ARKANSAS REGION

There are 8 counties in this region. It includes portions of the foothills and mountains immediately west of the Denver and Colorado Springs/Pueblo metropolitan areas. It is partly in the South Platte River watershed and partly in the Arkansas River watershed. There is forest, high mountain valley agricultural land, mining land, and some urbanized area, including Colorado's highest municipality, Leadville. This is Colorado's second fastest growing region, with a regional growth rate from 1990 to 2000 of 47.6%. 1 of the 8 counties (Custer County) does not participate in the NFIP. Two counties (Park County and Teller County) rank in the 1<sup>st</sup> BCP priority group, and three more rank in the 2<sup>nd</sup> priority group.

#### Population Distribution in Foothills and Upper Arkansas Region

#### Moderately High Population Counties (from 30,000 to 50,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Fremont	46,145	1.1	-	-	43.0	2

#### Medium Population Counties (from 20,000 to 30,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Teller	20,555	0.5	66,700	1.5	64.9	1

#### Medium/Small Population Counties (from 10,000 to 20,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Chaffee	16,242	0.4	82,942	1.9	28.1	3
Park	14,523	0.3	97,465	2.2	102.4	1

**A Regional View Of Colorado's Map Modernization Program**

**Small Population Counties (from 5,000 to 10,000)**

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Clear Creek	9,322	0.2	106,787	2.5	22.4	3
Lake	7,812	0.2	114,599	2.6	30.0	3

**Very Small Population Counties (from 2,500 to 5,000)**

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Gilpin	4,757	0.1	119,353	2.8	55.0	4
Custer	3,503	0.1	122,856	2.8	81.9	2

**Population Growth in Foothills and Upper Arkansas Region**

**Moderately High Population Counties (from 30,000 to 50,000)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Fremont	32,273	46,145	-	-	43.0	47.6

**Medium Population Counties (from 20,000 to 30,000)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Teller	12,468	20,555	44,741	66,700	64.9	47.6

## A Regional View Of Colorado's Map Modernization Program

### Medium/Small Population Counties (from 10,000 to 20,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Chaffee	12,684	16,242	57,425	82,942	28.1	47.6
Park	7,174	14,523	64,599	97,465	102.4	47.6

### Small Population Counties (from 5,000 to 10,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Clear Creek	7,619	9,322	72,218	106,787	22.4	47.6
Lake	6,007	7,812	78,225	114,599	30.0	47.6

### Very Small Population Counties (from 2,500 to 5,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Gilpin	3,070	4,757	81,295	119,353	55.0	47.6
Custer	1,926	3,503	83,221	122,856	81.9	47.6

## Map of Foothills and Upper Arkansas

**A Regional View Of Colorado's Map Modernization Program**

**NORTH PLATTE REGION**

There is only 1 county in this region. It is entirely in the North Platte River watershed. The region is made up primarily of high mountain valley agricultural land, along with mountain forest. Jackson County does not participate in the NFIP, but the one municipality in the county, Walden, does participate. The county does not rank in the 1<sup>st</sup> or 2<sup>nd</sup> BCP priority groups.

**Population Distribution in North Platte Region**

**Smallest Population Counties (Less than 2,500)**

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Jackson	1,577	-	1,577	-	-1.7	4

**Population Growth in North Platte Region**

**Smallest Population Counties (Less than 2,500)**

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Jackson	1,605	1,577	1,605	1,577	-1.7	-1.9

## Map of North Platte

## A Regional View Of Colorado's Map Modernization Program

### SAN LUIS VALLEY REGION

There are 6 counties in this region. It is primarily a broad, flat high mountain valley on an ancient lake bed, one of the largest of its kind in the world. The San Luis Valley itself is entirely in the Rio Grande watershed, but there are portions of some of the 6 counties that lie in the Arkansas River watershed, the San Juan/Dolores River watershed, and the Gunnison River watershed. The region includes irrigated and dryland agricultural land, forest, mining areas in the mountains, and a small portion of urbanized land. 1 county of the 6, Saguache County, does not participate in the NFIP. None of the 6 counties rank in the 1<sup>st</sup> BCP priority group, but two counties rank in the 2<sup>nd</sup> group.

#### Population Distribution in San Luis Valley Region

##### Medium/Small Population Counties (from 10,000 to 20,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Alamosa	14,966	0.3	-	-	9.9	4
Rio Grande	12,413	0.3	27,379	0.6	15.3	1

##### Small Population Counties (from 5,000 to 10,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Conejos	8,400	0.2	35,779	0.8	12.7	4
Saguache	5,917	0.1	41,696	1.0	28.1	3

##### Very Small Population Counties (from 2,500 to 5,000)

	2000 Pop.	% of State Pop.	Cumulative Regional 2000 Pop.	Cumulative Regional % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Costilla	3,663	0.1	45,359	1.0	14.8	4

## A Regional View Of Colorado's Map Modernization Program

### Smallest Population Counties (Less than 2,500)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Mineral	831	-	46,190	1.1	48.9	2

### Population Growth in San Luis Valley Region

#### Medium/Small Population Counties (from 10,000 to 20,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Alamosa	13,617	14,966	-	-	9.9	14.9
Rio Grande	10,770	12,413	24,387	27,379	15.3	14.9

#### Small Population Counties (from 5,000 to 10,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Conejos	7,453	8,400	31,840	35,779	12.7	14.9
Saguache	4,619	5,917	36,459	41,696	28.1	14.9

#### Very Small Population Counties (from 2,500 to 5,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Costilla	3,190	3,663	39,649	45,359	14.8	14.9



**A Regional View Of Colorado's Map Modernization Program**

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**Smallest Population Counties (Less than 2,500)**

	<b>1990 County Pop.</b>	<b>2000 County Pop.</b>	<b>Cumulative 1990 Regional Pop.</b>	<b>Cumulative 2000 Regional Pop.</b>	<b>County Pop. Growth (% from 1990 - 2000)</b>	<b>Regional Pop. Growth (% from 1990 - 2000)</b>
Mineral	558	831	40,207	46,190	48.9	14.9

## Map of San Luis Valley

## A Regional View Of Colorado's Map Modernization Program

### CENTRAL MOUNTAINS REGION

This region includes 6 counties. It is very mountainous, interspersed with high mountain valleys. It is the home of many of Colorado's mountain resort communities. The region is in the Yampa/White River watershed, the Colorado River mainstem watershed, and the Gunnison River watershed. It includes forest and high valleys with some agriculture and mining mixed with resort and residential development in the urbanized areas. This is Colorado's fastest growing region, with a regional growth rate from 1990 to 2000 of 58.1%. 1 of the 6 counties, Grand County, does not participate in the NFIP. One of the 6 counties (Eagle County) ranks in the 1<sup>st</sup> BCP priority group, and four counties rank in the 2<sup>nd</sup> group.

#### Population Distribution in Central Mountains Region

##### Moderately High Population Counties (from 30,000 to 50,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Eagle	41,659	1.0	-	-	90.0	1

##### Medium Population Counties (from 20,000 to 30,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Summit	23,548	0.5	65,207	1.5	82.8	2

##### Medium/Small Population Counties (from 10,000 to 20,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Routt	19,690	0.5	84,897	2.0	39.8	1
Pitkin	14,872	0.3	99,769	2.3	17.5	3
Gunnison	13,956	0.3	113,725	2.6	35.9	2
Grand	12,442	0.3	126,167	2.9	56.2	2

## A Regional View Of Colorado's Map Modernization Program

### Population Growth in Central Mountains Region

#### Moderately High Population Counties (from 30,000 to 50,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth  (% from 1990 - 2000)	Regional Pop. Growth  (% from 1990 - 2000)
Eagle	21,928	41,659	-	-	90.0	58.1

#### Medium Population Counties (from 20,000 to 30,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth  (% from 1990 - 2000)	Regional Pop. Growth ( % from 1990 - 2000)
Summit	12,881	23,548	34,809	65,207	82.8	58.1

#### Medium/Small Population Counties (from 10,000 to 20,000)

	1990 County Pop.	2000 Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth  (% from 1990 - 2000)	Regional Pop. Growth  (% from 1990 - 2000)
Routt	14,088	19,690	48,897	84,897	39.8	58.1
Pitkin	12,661	14,872	61,558	99,769	17.5	58.1
Gunnison	10,273	13,956	71,831	113,725	35.9	58.1
Grand	7,966	12,442	79,797	126,167	56.2	58.1

## Map of Central Mountains

## A Regional View Of Colorado's Map Modernization Program

### NORTHWESTERN COLORADO REGION

This region includes 4 counties. It consists of high river valleys, plateaus, and foothills. It is mostly in the Yampa/White River watershed and the Colorado River mainstem watershed, with smaller areas in the Gunnison River watershed and the San Juan/Dolores River watershed. It consists of agricultural lands, forest, some mining, and urbanized land, including Western Colorado's largest urban area, Grand Junction/Palisade/Fruita. All 4 counties participate in the NFIP. Two counties (Garfield County and Mesa County) rank in the 1<sup>st</sup> BCP priority group. No counties rank in the 2<sup>nd</sup> priority group.

#### Population Distribution in Northwestern Colorado Region

##### Highest Population Counties (greater than 100,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Mesa	116,255	2.7	-	-	24.8	1

##### Moderately High Population Counties (from 30,000 to 50,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Garfield	43,791	1.0	160,046	3.7	46.1	1

##### Medium/Small Population Counties (from 10,000 to 20,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Moffat	13,184	0.3	173,230	4.0	16.1	3

##### Small Population Counties (from 5,000 to 10,000)

### A Regional View Of Colorado's Map Modernization Program

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Rio Blanco	5,986	0.1	179,216	4.1	-1.1	3

#### Population Growth in Central Mountains Region

##### Highest Population Counties (greater than 100,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Mesa	93,145	116,255	-	-	24.8	27.5

##### Moderately High Population Counties (from 30,000 to 50,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Garfield	29,974	43,791	123,119	160,046	46.1	27.5

##### Medium/Small Population Counties (from 10,000 to 20,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Moffat	11,357	13,184	134,476	173,230	16.1	27.5

##### Small Population Counties (from 5,000 to 10,000)

**A Regional View Of Colorado's Map Modernization Program**

	<b>1990 County Pop.</b>	<b>2000 County Pop.</b>	<b>Cumulative 1990 Regional Pop.</b>	<b>Cumulative 2000 Regional Pop.</b>	<b>County Pop. Growth  (% from 1990 - 2000)</b>	<b>Regional Pop. Growth  (% from 1990 - 2000)</b>
Rio Blanco	6,051	5,986	140,527	179,216	-1.1	27.5



# Map of Northwestern Colorado

## A Regional View Of Colorado's Map Modernization Program

### WESTERN VALLEYS REGION

There are 4 counties in this region. It includes foothills and valleys, along with mountains and high mountain valleys. It is in the Gunnison River watershed and the San Juan/Dolores River watershed, with a smaller area in the Rio Grande watershed. The region consists of agricultural lands, mining, and forest land, with some urbanized areas. All 4 counties participate in the NFIP. None of the 4 counties rank in the 1<sup>st</sup> BCP priority group, but two of them rank in the 2<sup>nd</sup> priority group.

#### Population Distribution in Western Valleys Region

##### Moderately High Population Counties (from 30,000 to 50,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Montrose	33,432	0.8	-	-	36.9	3

##### Medium Population Counties (from 20,000 to 30,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Delta	27,834	0.6	61,266	1.4	32.7	2

##### Very Small Population Counties (from 2,500 to 5,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Ouray	3,742	0.1	65,008	1.5	63.1	3

##### Smallest Population Counties (Less than 2,500)

### A Regional View Of Colorado's Map Modernization Program

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Hinsdale	790	-	65,798	1.5	69.2	3

#### Population Growth in Western Valleys Region

##### Moderately High Population Counties (from 30,000 to 50,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Montrose	24,423	33,432	-	-	36.9	36.6

##### Medium Population Counties (from 20,000 to 30,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Delta	20,980	27,834	45,403	61,266	32.7	36.6

##### Very Small Population Counties (from 2,500 to 5,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Ouray	2,295	3,742	47,698	65,008	63.1	36.6

##### Smallest Population Counties (Less than 2,500)

**A Regional View Of Colorado's Map Modernization Program**

	<b>1990 County Pop.</b>	<b>2000 County Pop.</b>	<b>Cumulative 1990 Regional Pop.</b>	<b>Cumulative 2000 Regional Pop.</b>	<b>County Pop. Growth  (% from 1990 - 2000)</b>	<b>Regional Pop. Growth  (% from 1990 - 2000)</b>
Hinsdale	467	790	48,165	65,798	69.2	36.6

## Map of Western Valleys

## A Regional View Of Colorado's Map Modernization Program

### SOUTHWESTERN COLORADO REGION

This region includes 6 counties. It consists of mountains, foothills, plateaus and valleys in the Four Corners portion of Colorado. It is entirely in the San Juan/Dolores River watershed. It includes agricultural lands, mining, and forest land, with some urbanized areas. All 6 counties participate in the NFIP. One of the 4 counties (La Plata County) ranks in the 1<sup>st</sup> BCP priority group, and three rank in the 2<sup>nd</sup> priority group.

#### Population Distribution in Southwestern Colorado Region

##### Moderately High Population Counties (from 30,000 to 50,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
La Plata	43,941	1.0	-	-	36.1	2

##### Medium Population Counties (from 20,000 to 30,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Montezuma	23,830	0.5	67,771	1.6	27.6	3

##### Small Population Counties (from 5,000 to 10,000)

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Archuleta	9,898	0.2	77,669	1.8	85.2	2
San Miguel	6,594	0.2	84,263	1.9	80.5	2

##### Smallest Population Counties (Less than 2,500)

### A Regional View Of Colorado's Map Modernization Program

	2000 Pop.	% of State Pop.	Cumulative 2000 Pop.	Cumulative % of State Pop.	Population Growth (% from 1990 - 2000)	2002 MMIP Priority Group #
Dolores	1,844	-	86,107	2.0	22.6	4
San Juan	558	-	86,665	2.0	-25.1	4

#### Population Growth in Southwestern Colorado Region

##### Moderately High Population Counties (from 30,000 to 50,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
La Plata	32,284	43,941	-	-	36.1	39.3

##### Medium Population Counties (from 20,000 to 30,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Montezuma	18,672	23,830	50,956	67,771	27.6	39.3

##### Small Population Counties (from 5,000 to 10,000)

	1990 County Pop.	2000 County Pop.	Cumulative 1990 Regional Pop.	Cumulative 2000 Regional Pop.	County Pop. Growth (% from 1990 - 2000)	Regional Pop. Growth (% from 1990 - 2000)
Archuleta	5,345	9,898	56,301	77,669	85.2	39.3
San Miguel	3,653	6,594	59,954	84,263	80.5	39.3

**A Regional View Of Colorado's Map Modernization Program**

**Smallest Population Counties (Less than 2,500)**

	<b>1990 County Pop.</b>	<b>2000 County Pop.</b>	<b>Cumulative 1990 Regional Pop.</b>	<b>Cumulative 2000 Regional Pop.</b>	<b>County Pop. Growth (% from 1990 - 2000)</b>	<b>Regional Pop. Growth (% from 1990 - 2000)</b>
Dolores	1,504	1,844	61,458	86,107	22.6	39.3
San Juan	745	558	62,203	86,665	-25.1	39.3



## Map of Southwestern Colorado

## A Regional View Of Colorado's Map Modernization Program

### A BRIEF STATEWIDE SUMMARY

The following table provides a short summary of the statewide population share and the regional population growth rate of each of the 12 regions. It offers a “quick and dirty” look at the regions in a statewide context.

**Table G.1**  
**Summary of Regions in Colorado**

Region Name	# of Counties	Regional Share of Statewide Population	Regional Rate of Population Growth (1990 – 2000)
Northeastern Colorado	9	2.4%	27.2%
Southeastern Colorado	7	1.3%	6.9%
Northern Front Range	2	10.0%	36.0%
Southern Front Range	4	15.7%	26.2%
Denver Metro Area	7	56.2%	30.1%
Foothills and Upper Arkansas	8	2.8%	47.6%
North Platte	1	< 0.1%	-1.9%
San Luis Valley	6	1.1%	14.9%
Central Mountains	6	2.9%	58.1%
Northwestern Colorado	4	4.1%	27.5%
Western Valleys	4	1.5%	36.6%
Southwestern Colorado	6	2.0%	39.3%

CWCB staff will update this regional view of Map Modernization in Colorado on an annual basis. This yearly review will ensure that the map update needs of every geographic portion of the state are considered regularly. Given the objectives of serving population with digital maps and of mapping the most pressing flood risks earliest, and given the lack of homogeneity in Colorado's counties, it would be a major challenge to serve all geographic regions equally. The purpose of this Appendix is simply to provide a means for **considering the floodplain map update needs of all counties in an equal manner**, regardless of where in Colorado they may be located.

**Appendix G**

**A Regional View Of Colorado's Map Modernization Program**

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**Appendix H**  
**ASFPM Floodplain Map Modernization Resolution –**  
**May 12, 2003**

**Appendix H**

**ASFPM Floodplain Map Modernization Resolution - May 12, 2003**

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This resolution was adopted by the ASFPM Board of Directors at the annual meeting in St. Louis on May 12, 2003