Floodstage

Watershed Protection & Flood Mitigation Section

COLORADO WATER CONSERVATION BOARD | MARCH 2010

FLOODPLAIN MANAGEMENT IN COLORADO

Past, Present, and Future

Floodplain management activities throughout Colorado have been occurring since the inception of recorded history, and include a broad range of structural and non-structural measures. The effectiveness of these measures varies as widely as their costs and complexity. Simple, low-cost, privately funded projects can provide ample flood protection for small areas or site-specific needs, while more expensive, regional, government projects may be justified for larger areas where significant public safety and property risks are known. On one end of the spectrum, structural flood protection may involve a small channel or pipe that carries away excess rainfall. At the other end, it may involve an impressively large dam and reservoir to hold back thousands of acre-feet of floodwater within a major river basin. Non-structural measures can include sensible concepts such as federally-backed flood insurance policies or removing/elevating flood-prone structures from harm's way.

To the trained eye, flood protection measures can be seen in just about every community in the state. Some are much more obvious than others, and some may be aimed at preventing damage to crops and farmland while others may have the goal of keeping nature's fury away from entire subdivisions or business districts.

Since Colorado is so geographically and meteorologically diverse, it is prone to every type of non-coastal flooding including flash floods, snowmelt floods, general rain floods, ice jam floods, rain

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Upcoming Events

Workshop on State Floodplain Rules and Regulations and CRS Activity 430, April 2010. For more information visit http://www.casfm.org/

NFIP National Flood Conference, April 11-14, 2010, San Diego, CA. For more information please visit http://www.nfipiservice.com/nfc.html

2010 ASFPM Annual Conference May 16-21, 2010, Oklahoma City, OK. Conference details can be obtained by visiting http://www.floods.org/

Annual Colorado Municipal League Conference, June 22-25, 2009, Breckenridge, CO. For more information, please visit http://www.cml.org/training/conference/conference.aspx

CASFM Conference, September 22-24, 2009, Snowmass Village, CO, Conference details can be found at http://www.casfm.org/

FEMA—EMI training Some of the best professional training on floodplain management and emergency management in the U.S. is offered at EMI. For more info visit http://training.fema.gov/EMIWeb/

ASFPM website, the ASFPM contains a comprehensive list of regional trainings and workshops visit them at www.floods.org

Please contact Cristina Martinez at cristina.martinez@state.co.us for more information about floodplain training opportunities.

www.cwcb.state.co.us | 303.866.3441
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FLOODPLAIN MANAGEMENT IN COLORADO: Past, Present, and Future

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on snow floods, and dam break floods. Believe it or not, a remnant of a tropical storm from the Gulf of Mexico made its way north to Colorado and caused significant flooding problems during the mid- 20th century.

Looking back at the history of floodplain management in the U.S. and in Colorado, engineers have utilized various hydrologic and hydraulic formulas, equations, and industry-standard practices in the prevention of flooding and flood damages there from. For many decades, on-the-ground projects resulting from analyses, planning studies, and designs were utilitarian in nature and typically solved a given problem with the most practical and cost-effective solution possible. Oftentimes, the solutions did not necessarily take into account factors such as aesthetics, environmental concerns, or recreational needs. Despite what we now know to be obvious shortcomings of historic flood protection projects, their overall effectiveness has been tremendous and they have no doubt saved many lives.

Present-day initiatives include new and modern methodologies that provide additional engineering detail with more accuracy and better results due to computer capabilities and robust quality control processes. Three-dimensional floodplain modeling, for example, is more commonly practiced and can provide insights into variations and nuances of floodwater characteristics across the stream or river of interest. In addition, careful consideration of multiple objectives is typical today so that flood protection can be combined with community needs such as water supply, stream restoration, habitat protection, and boating opportunities.

A glimpse into the future might indicate to us that further innovations, efficiencies, and practices will lead to even better studies and more effective projects. Lessons learned from past experiences, both locally and globally, help us to tailor our thought processes and think outside of the box. Flooding disasters in Colorado always have been, and always will be, a part of the natural hydrologic cycle with rare but sometimes catastrophic man-made failures adding to the list of events. Proper floodplain management has certainly reduced the extent of property damage and loss of human lives, but continued population growth and resulting development pressures increase the number of properties and people that are potentially at risk. A balance must be struck between the need for public safety, the need for cost-effective use of public funding, and the need for property owners to utilize their lands to a reasonable degree. Government laws, regulations, and policies seek to achieve that balance. Floodplain management will always be an important function and will continue to guide the wise use of flood-prone lands as communities grow and flourish into the future.

View north up mud and debris-filled street from the disastrous Cornet Creek flood on July 27, 1914, Telluride, Colorado. Photo: Denver Public Library, Western History Collection.

Colorado Floodplain Rules and Regulations Revisited

Colorado Floodplain Rules and Regulations Revisited Staff from the Colorado Water Conservation Board (CWCB) have commenced a process to revise and update the Floodplain Rules and Regulations (Rules) governing flood issues within the State of Colorado. The Rules were initially promulgated in 1987 and later revised in 2005 prior to this proposed revision. As provided in the Colorado Revised Statutes, flooding is considered to be an issue of statewide concern, and therefore any Rules governing it will apply statewide in all municipalities and counties, regardless of home rule status.

A number of goals were formulated by staff leading to the stimulus to initiate the revision process. First and foremost, the need for increased public safety in times of ever-growing flood losses around the country was considered. A number of activities that would result in lower flood insurance premiums statewide were also desired. A clarification that all state agencies must comply with the Rules was added. Finally, some language clarifications and other small housekeeping items to correct known problems from the prior revision were included.

In early 2009, a rulemaking advisory committee was established to oversee the initial drafting of the Rules. This committee included members of municipal, county, state, and federal governments as well as representatives from the private consulting sector. In addition, the Colorado Association of Stormwater and Floodplain Managers (CASFM) and the Colorado Division of Water Resources had representation on the Committee. The draft set of rules was completed in December 2009 and were presented to the Board Members of the CWCB at their January 2010 meeting in Denver.

Historically, the Rules focused on floodplain mapping standards and the potential impacts of various activities on regulatory floodplain maps. This revision marks the first time that statewide floodplain management standards in excess of minimum standards required by the National Flood Insurance Program are proposed for implementation. The three primary floodplain management provisions proposed to be added under this process include the following:

- A one-foot freeboard for all new and substantially changed structures;
- A ½ foot floodway to be regulated on all stream reaches for which a ½ foot mapped floodway exists. This will include a requirement that new map updates shall use a ½ foot surcharge, opposed to the 1 foot surcharge as historically used; and
- A 500-year standard for protection of critical facilities. Critical facilities are defined in the Rules. The Rules will not mandate avoidance of the 500-year floodplain; they simply require protection to the 500-year level, similar to the current 100-year floodplain management requirements.

Although some Colorado communities already regulate according to these proposed revisions due to local initiative, this revision would make these changes mandatory statewide. It is important for both elected officials and local staff to be aware of these changes and the potential impacts these changes could have on administration of local ordinances. In most cases, this will require an update of the local ordinance to be consistent with State rules. A transition period will be proposed (e.g. three years) outlining the period in which local ordinances may be updated to comply with the new Rules once they become effective. The draft Rules may be viewed on either the CWCB website (www.cwcb.state.co.us) or on the CASFM website (www.casfm.org), and CWCB staff can be contacted at 303-866-3441 for any questions. CWCB staff and the committee are seeking public comment through the end of April. All feedback will be considered for the final version of the rules presented to the Board for adoption. To provide feedback, please send correspondence to Tom Browning, Chief of the Watershed Protection and Flood Mitigation Section of the CWCB, 1313 Sherman Street, Room 721, Denver, CO 80203, or contact Tom at tom.browning@state.co.us.

The current proposed timeline requires the Notice of Hearing to be filed with the Secretary of State by April 10, 2010 for publication in the Colorado Register by April 25, 2010. The Rulemaking Hearing is tentatively planned to be held at the May meeting of the CWCB in Denver. The Rules would become effective July 15, 2010.

First and foremost, the need for increased public safety in times of ever-growing flood losses around the country was considered.

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2009 Highlights

Watershed Protection and Restoration

The Colorado Water Conservation Board supports watershed planning and projects designed to restore and protect watersheds. This is more clearly defined in the Board's Policy Implementation Objectives, which include multi-objective planning, project development, and stream restoration. In order to achieve this objective, the Board will participate with partners to plan and undertake multi-objective projects designed to reduce flood hazards, stabilize and restore stream channels, provide habitat, reduce erosion, and increase the capacity to utilize water. Inter and Intra agency coordination, communication, and prioritization are essential components of this objective. Board Staff with the Watershed Protection and Flood Mitigation Section achieve these goals through administration of the Colorado Watershed Restoration Program, the Colorado Healthy Rivers Fund, and the Fish and Wildlife Resources Fund. The Board administers the Colorado Healthy Rivers Fund in cooperation with the Colorado Water Quality Control Division.

The **Colorado Water Conservation Board** supports watershed planning and projects designed to restore and protect watersheds.

Programs & Funds

Colorado Watershed Restoration Program (CWRP) is a non-reimbursable program designed to support multi-objective watershed planning and project implementation. The CWRP objectives are to provide grants for planning, engineering, and construction for watershed/stream studies and projects. Special consideration is reserved for planning and project efforts that integrate multi-objectives in restoration and flood mitigation. This may include stream channel restoration, habitat improvements, riparian re-vegetation, erosion reduction, flood hazard mitigation, and efforts to increase the capacity to utilize water.

Grant applicants must meet minimum qualifications by demonstrating:

- a commitment to collaborative approaches, involving diverse local or regional interests within the watershed, with participation open to all interested parties.
- a commitment to restoring or protecting ecological processes that connect land and water while protecting life and property from flood hazards
- a purpose to implement or plan for a project intended to restore/protect water, lands, and other natural resources within the watershed, mitigate flood hazards or integrate a multi-objective approach.
- a broad based involvement in and support for the grant application, including relevant local, state, and federal governmental entities.
- an ability to provide the appropriate cash and in-kind match for the activities proposed.

Application must be submitted by January 31st. Applications are reviewed and applicants are notified by April 15th. Non-reimbursable awards are made on July 1st. The Program began in January 2009. It has funded 8 projects with $333,500.

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The **Colorado Healthy Rivers Fund** helps support local watershed organizations in their efforts to provide clean water, protect wildlife and their habitat, and improve recreation and accessibility.

Programs & Funds

Colorado Healthy Rivers Fund (CHRF) is part of the Check-off Colorado effort. Taxpayers can make donations to the CHRF when filing their Colorado State Income Tax. CHRF helps support local watershed organizations in their efforts to provide clean water, protect wildlife and their habitat, and improve recreation and accessibility. The Fund was originally legislated in 2002, and it was most recently re-authorized in 2008. The legislative declaration states:

> *The general assembly hereby finds and declares that the natural heritage and quality of life in Colorado are of fundamental importance to the citizens of the state, and the protection of this natural heritage and quality of life are essential to sustain economic development in the state. The general assembly further finds and declares that locally based watershed groups have emerged around the state over the past decade that are committed to collaborative approaches to the restoration and protection of lands and natural resources within Colorado's watersheds in concert with economic development. The general assembly recognizes that the Colorado Watershed Assembly, a nonprofit corporation, serves as a state-level umbrella organization for such local groups. The general assembly further recognizes that the citizens of Colorado may be willing to provide funds to assist in the restoration and the protection of lands and natural resources within watersheds of the state. It is therefore the intent of the general assembly enacting this part 23 to provide Colorado citizens the opportunity to support local watershed efforts by allowing citizens to make a voluntary contribution on their state income tax returns for such purpose.*

CHRF is administered by the Colorado Water Conservation Board and the Colorado Water Quality Control Division, in cooperation with the Colorado Watershed Assembly. Grant applications may be submitted for locally based watershed protection efforts, provided that the applicant is committing to a collaborative approach to the restoration and protection of lands and natural resources with Colorado's watersheds in concert with economic development. CHRF has funded 50 projects since its inception for a total of $680,000. CHRF funding is typically matched with larger amounts of project funding from other governmental and private entities.

Planning grants are available for up to $25,000. Project grants are available for up to $50,000. Applications are available annually on March 1st. The deadline to submit applications is April 30th.

Programs & Funds

Fish and Wildlife Resources Fund is set up to provide funding to mitigate the effects of the construction, operation, and maintenance of water diversion, delivery, and storage facilities. The Colorado Water Conservation Board will accept applications throughout the year for grants for the appropriation or acquisition of instream flow water rights and river restoration construction projects. Grant applications will be considered for the following two categories:

- The appropriation or acquisition of water rights for the purpose of preserving or improving the natural environment to a reasonable degree to mitigate the impact of an existing water facility.

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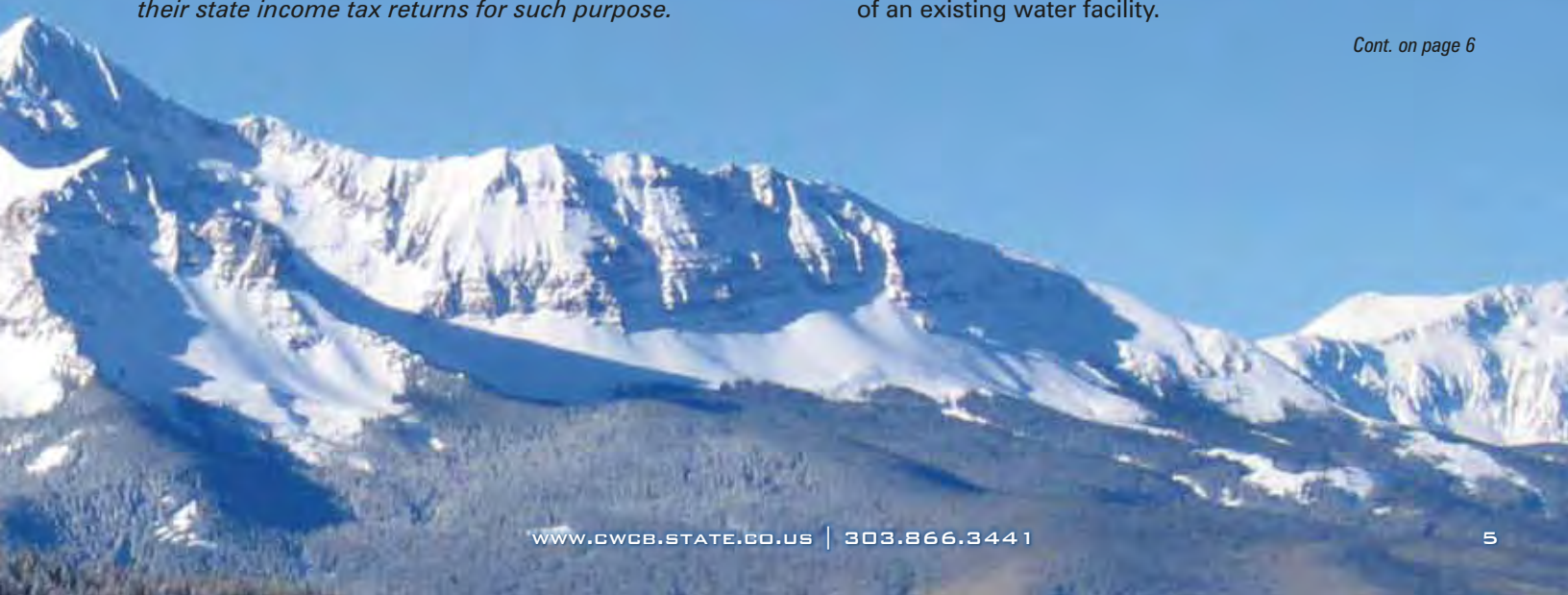

Watershed Protection & Flood Mitigation Section

Programs & Funds

Fish and Wildlife Resources Fund

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- River restoration feasibility studies and construction projects that are designed to directly mitigate or significantly improve the environmental impacts of existing water facilities.

Past projects include funding to mitigate for channel geometry changes associated with trans-basin diversions and funding to provide for a fish ladder study/design for warm water fish species.

For more information, please contact:

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Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO 80203
Phone: 303-866-3441, ext. 3236
Fax: 303-866-4474

Or visit http://cwcb.state.co.us/WatershedProtection-FloodMitigation/Watershed/ for more specific information regarding the programs above.

Upcoming Events

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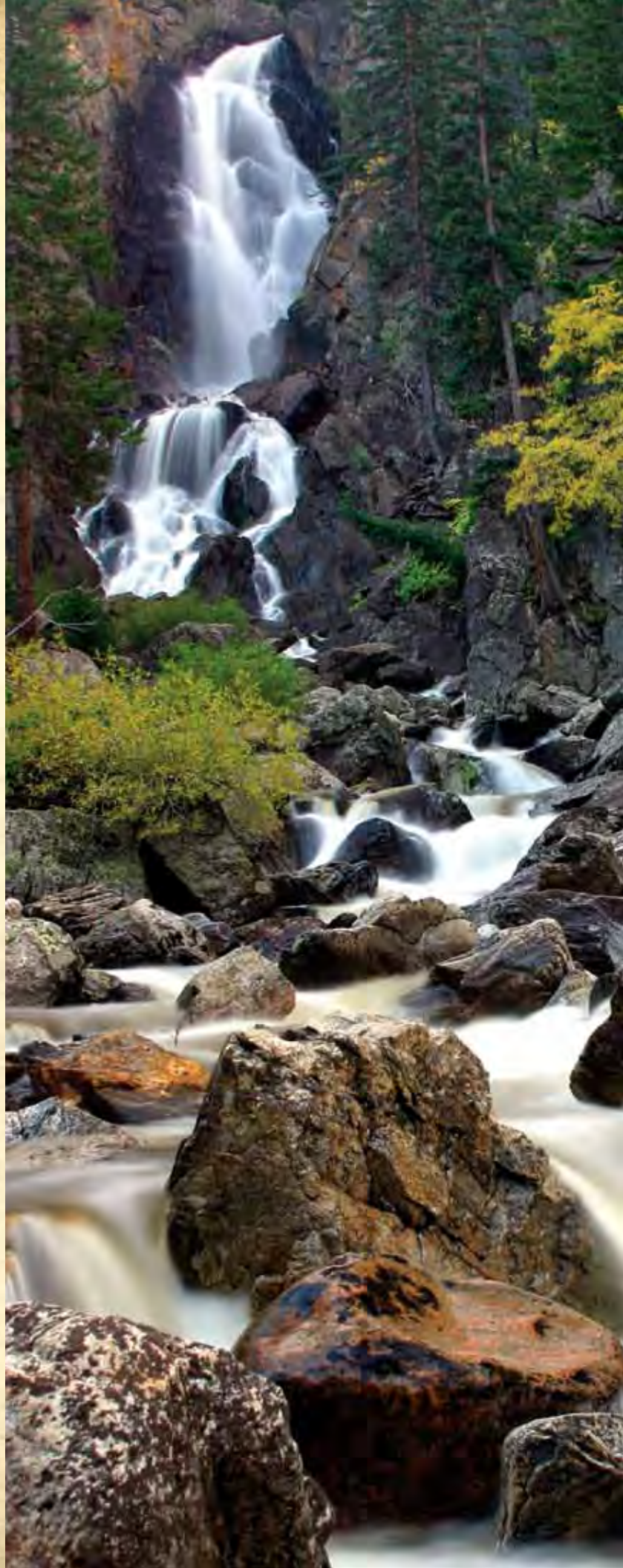


Community Rating System Program

The objective of the Community Rating System (CRS) is to reward communities doing more than the minimum National Flood Insurance Program (NFIP) requirements to prevent or reduce flood losses, and to provide incentives for communities to improve their flood protection programs. Under the CRS, flood insurance premium rates are lowered when a community takes extra action to reduce flood damages. The insurance savings can range from 5% to 45%. Most practices are implemented at the local level to get credits, although some state and district program activities can increase local credits.

This past year, the CWCB contracted with French & Associates to provide assistance in efforts to improve community floodplain management practices in Colorado through the CRS. French & Associates has been working in coordination with various state agencies and the Urban Drainage and Flood Control District (UDFCD) to develop a strategy designed to increase CRS participating communities' credits and add new communities to the CRS program, resulting in better floodplain management in the state and lower flood insurance premiums for the state's residents.

The strategy report focuses on various levels of state and district involvement:

- Uniform minimum credits, where state activities provide automatic credits to affected communities.
- Community-specific credits, where state activates are credited, but the credit criteria and scores have to be determined on a community by community basis.
- Models and templates that a state or district agency can provide to facilitate the design of a community program; and
- Training in applying for or administering a CRS program in the activities that receive credit.

The final strategy report is expected to be completed in April and will be posted to the CWCB website, http://cwcb.state.co.us/. The next phase of the project is expected to evaluate the recommendations of the strategy report followed by implementation of some or all of the recommended action items detailed in the report.

In April, CASFM's CRS Committee will be sponsoring two workshops combining CRS Activity 430 (Higher Regulatory Standards) and the proposed State Floodplain Rules and Regulations. One workshop will be held in the Denver Metro area, while the other will be in Glenwood Springs. For more information about the upcoming CRS Workshops and/or the CRS Committee, visit the CASFM website: http://www.casfm.org/.

Fish Creek Falls near Steamboat Springs. Photo ©2010 iStock.com

Watershed Protection & Flood Mitigation Section

Floodplain Map Modernization Program

FEMA has operated the Map Modernization program since 2004. This was a five year program with a nationwide budget of $1 billion. The next phase of Map Modernization is now underway. RiskMAP will combine flood hazard mapping, risk assessment tools and Hazard Mitigation Planning into one seamless program.

FEMA, with the support of Congress, will continue the nationwide RiskMAP program starting in FY10. The budget for RiskMAP will be determined on an annual basis.

Colorado has been the leading state for FEMA Region VIII in terms of helping achieve mapped population and stream miles, the goals of the first phase of Map Modernization. Colorado typically receives $1-1.5 million dollars worth of grant money each year and this amount is expected to decrease slightly this year due to the amount of money available from Congress. Colorado continues to provide cost sharing leverage for DFIRM and future RiskMAP projects.

The CWCB recently submitted the FY10 Business Case Plan to FEMA, which encompasses Colorado's successes and challenges over the past few years. It also discusses federal, state and local funding as well as future mapping needs for the State.

Since the five-year program began, federal, state and local funding, as well as in-kind contributions, has totaled approximately $11.5 million. The goal, to achieve a federal/state/local cost share (80/10/10 split, respectively), has been generally maintained with an actual funding of 80/14/6 split as a whole. This year FEMA contributed approximately $1 million for Colorado studies; the State $111,000; and the local funding and in-kind match has been $120,000.

In the Business Case Plan, CWCB provided FEMA with a priority list of about 10 counties to be considered for RiskMap for the upcoming year. These counties were selected based on levee issues, engineering needs, risk assessment, local contributions and other related needs and includes: Chaffee, Logan, Las Animas, Alamosa, Otero, Bent, Pitkin, San Miguel, Hinsdale and Ouray Counties.

FY10 Scoping projects: Funding amount of $20K from FEMA has been approved for scoping of counties for RiskMAP for FY10. The two counties planned for scoping this year are Logan and Las Animas Counties.

FY09 Scoping projects: Funding amount of $35K from FEMA has been approved and spent on scoping Prowers, Morgan and Chaffee Counties.

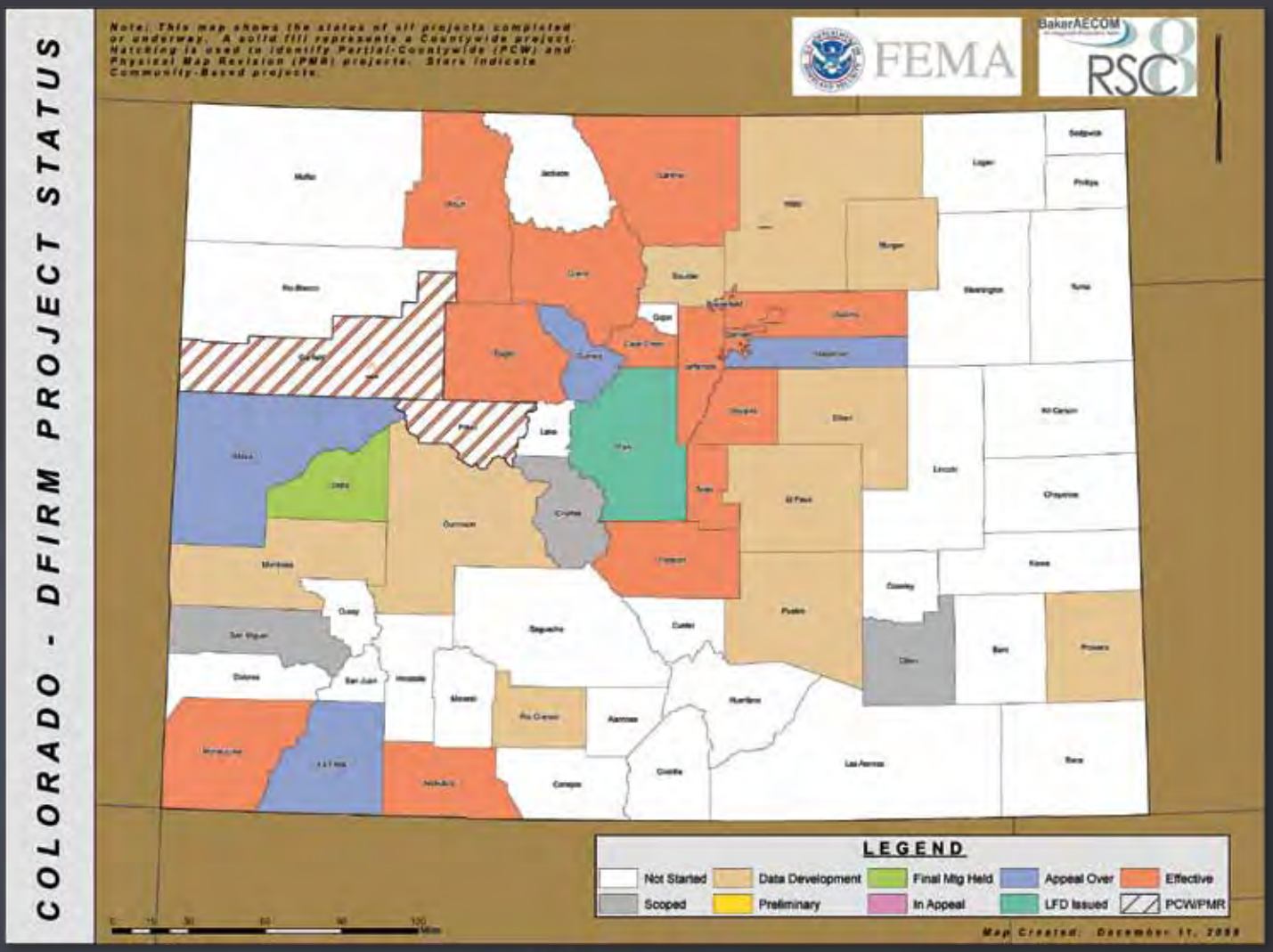
FY09 projects: The counties that have contracts approved and work has begun include Morgan and Prowers Counties. In addition, additional FEMA funding was provided to map the Wild Horse and Goodnight Arroyo in Pueblo County.

Older Projects: Montezuma County went effective in September 2008. Archuleta and Teller Counties went effective in September 2009 and Park County went effective in December 2009. The counties that are currently in the preliminary phase: Mesa, Summit, La Plata, and Delta counties. The counties that are anticipated to enter the preliminary phase in January 2010 include: Boulder, Fremont, Montrose, Elbert, and Rio Grande counties.

The remaining counties are continuing along in the DFIRM process at various stages. These counties include: Gunnison, Morgan, Prowers, El Paso, Pueblo, Weld, Garfield, and Clear Creek counties.

The launch of the map modernization website has been completed and can be found on the CWCB website.

Colorado has been the leading state for FEMA Region VIII in terms of helping achieve mapped population and stream miles



NOAA Mobile Radar Projects

Figure 1—Mobile radar unit in Gunnison, Colo.

Through the CWCB Flood Response Fund the NOAA National Severe Storms Laboratory (NSSL) in Norman, Oklahoma deployed a mobile radar (Figure 1) in the town of Gunnison during the summer of 2009. If funding and agreements are in place by summer 2010, NSSL will deploy a mobile radar near Durango, Colorado during August 2010. The Durango project is funded by the State Division of Emergency Management, Southwestern Water Conservation District, and the Colorado Water Conservation Board. The CWCB interest in these projects concerns advances in the spatial data sets radars provide and the resultant forecasts from those radar estimates.

Water is a critical resource in the western U.S. with an ever-increasing need to improve quantitative precipitation estimates (QPE). The primary sources of QPE are weather radars and precipitation gauges. Yet due to the complex terrain of the Rocky Mountains, observations from these sensors have great uncertainty due to large gaps in radar coverage and sparse gauge networks. In order to better understand these uncertainties, a mobile Doppler radar and a special rain gauge network were deployed in near Gunnison, Colorado during the summer of 2009. The primary mobile radar was the NSSL's NOAA/OU X-band Polarized (NO-XP) research radar. Along with the mobile radar, eleven portable recording tipping bucket rain gauges and four optical disdrometers were deployed along the eastern slopes of the West Elk mountains, an area of preferred storm development.

The gauges and disdrometers provided a measure of ground truth and were complemented by existing hourly gauge observations and 24 hour totals from CoCoRaHS gauges.

The objectives of the Gunnison project were to document the fine-scale spatial rainfall coverage and intensity, determine the potential for correction factors to KGJX data for improved operational QPE, and investigate the utility of dual-polarization technology.

Figure 2 shows a comparison of data in vertical planes from a) the NSSL mobile radar deployed on Cupola Hill just above Western State College in the town of Gunnison and b) the NWS KGJX radar on top of the Grand Mesa. Clearly the mobile radar was much more effective at storm detection over Gunnison County. This example illustrates the challenges to operational radars in complex mountainous terrain where beam blockage is a serious issue. Observations of precipitation are most accurate close to the ground while in many areas in Colorado the NWS radars don't see below 8,000 ft or more.

The NWS is tasked with severe weather, flash flood and snow forecasts for public safety. Working with NOAA and other researchers and Weather Forecast Offices, the CWCB hopes that these two data collection projects can help build a case for additional radars in complex terrain and improve radar precipitation estimates used by the NWS. For more information about these projects contact joe.busto@state.co.us or steven.vasiloff@noaa.gov.

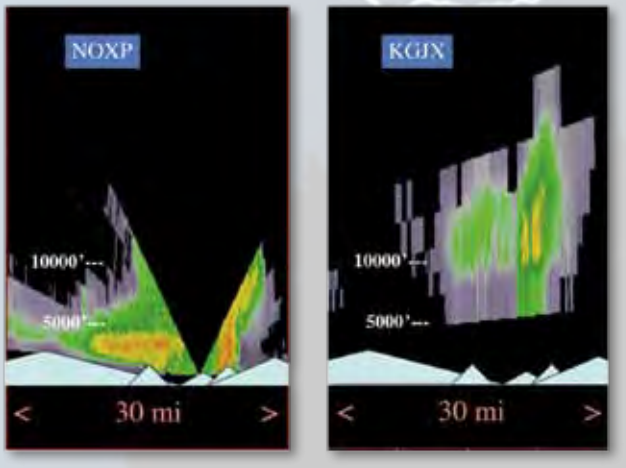


Figure 2 —Mobile radar data from Gunnison and Grand Mesa.

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Browning


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Patton


Sturm

Tom Browning—(303) 866-3441 ext 3208 Section Chief, Oversees all program areas including: flood risk identification, designation of floodplains, flood risk reduction and mitigation, response and recovery, watershed restoration, storage reallocation, and weather modification.

Joe Busto—(303) 866-3441 ext 3209 Floodplain Information Officer, Weather Modification Permitting, South Platte River easements, Flood Task Force, Flood Response Program, and graphics/publications.

Kevin Houck—(303) 866-3441 ext 3219 Senior Engineer, designation of floodplains, engineer lead for flood hydrology, alluvial fans, debris flow, and post-wildfire studies, response and recovery.

Cristina Martinez—(303) 866-3441 ext 3215 Community Assistance Program Coordinator for the NFIP, performs community assistance visits, conducts public outreach and training, coordinates with FEMA and other State Programs, and provides technical assistance to communities.

Thuy Patton—(303) 866-3441 ext 3230 Floodplain Mapping Coordinator, manages the FEMA Floodplain Map Modernization and the Risk Map Program for the State, development of scopes of work, acts as liaison between FEMA and local governments.

Chris Sturm—(303)866-3441 ext 3236 Stream Restoration Coordinator, responsible for implementing the goals and objectives of the stream restoration/multi-objective stream management work in the state. Chris's duties include managing the CWCB Stream Restoration Program, implementing the CWCB Watershed Protection Fund and the Fish and Wildlife Resources Fund Planning strategies to support water supply needs in Colorado, GIS analysis and cartographic design, and Community outreach, education and general technical assistance.

MARCH 2010
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