

DNRC Floodplain Engineering 101 Seminar

University of MT – Helena College of Technology
Helena, MT
July 21, 2010



ASSOCIATION OF
Montana
FLOODPLAIN
MANAGERS

DNRC Floodplain Engineering 101 Seminar

WELCOME
INTRODUCTIONS



Image Courtesy Watershed Sciences, Inc.

Morning

8:00 am – 8:15 am

Session Description

Welcome and Course Introduction

Presenter(s)

Steve Story, PE, CFM, DNRC
Larry Schock, CFM, DNRC

8:15 am – 9:00 am

Floodplain Program Overview

- NFIP, State, Local Regs
- Roles & Responsibilities
- State Programs & Organization
- Technical Resources

Traci Sears, CFM, DNRC
Steve Story, PE, CFM DNRC
Celinda Adair, CFM, DNRC
Larry Schock, CFM, DNRC

9:00 am – 9:30 am

DNRC's Engineering Technical
Assistance Program for Communities

Steve Story, PE, CFM, DNRC
Larry Schock, CFM, DNRC

9:30 am – 10:00 am

LOMC Overview & LOMRs

Joe Kuechenmeister, PE, CFM,
Michael Baker Jr. Inc.

10:00 am – 10:15 am

Break –

10:15 am – 10:45 am

LOMRs (cont.) & Common Errors

Joe Kuechenmeister, PE, CFM,
Michael Baker Jr. Inc.

10:45 am – 11:30 am

Approximate Zone A Review & Issues

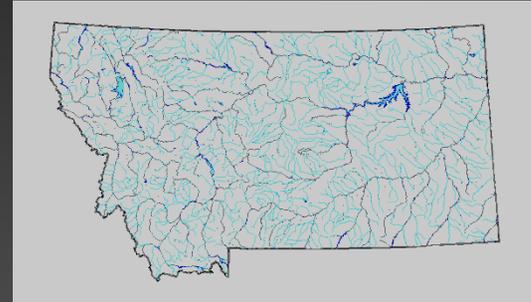
Marijo Brady, PE, CFM, FEMA

11:30 am – 12:45 pm

Lunch – On your own

<u>Afternoon</u>	<u>Session Description</u>	<u>Presenter(s)</u>
12:45 pm – 1:45 pm	Floodway Encroachment No-Rise Analysis and LOMR requirements	Steve Story, PE, CFM, DNRC
1:45 pm – 2:15 pm	Floodplain Surveying	Roger Austin, PLS, CFM, PCI
2:15 pm – 3:15 pm	USGS Program Overview Hydrology - Peak Flow Estimation Methods	Peter McCarthy, USGS
3:15 pm – 3:30 pm	Break –	
3:30 pm – 4:00 pm	Hydrology - Determining Basin and Climate Characteristics Using ArcGIS	Chad Hill, DNRC
4:00 pm – 4:30 pm	Floodplain Project Scoping	Larry Schock, CFM, DNRC
4:30 pm – 5:00 pm	Scoping Case Study (Consultant Overview)	Dan March, PE, CFM, PBS&J
5:00 pm – 5:30 pm	Open Topic – Question/Discussion Forum	Informal
6:00 pm	Social – Blackfoot River Brewery Taproom 54 S. Park Ave. Downtown Helena	

Seminar Goal



Target Audience: Engineers, Surveyors, Architects and other Professionals (in both the public and private sectors) that perform work in Montana's regulatory floodplains.

Our Goal is to better equip you with the knowledge, tools, and skill set needed to successfully scope and complete projects within the floodplain.

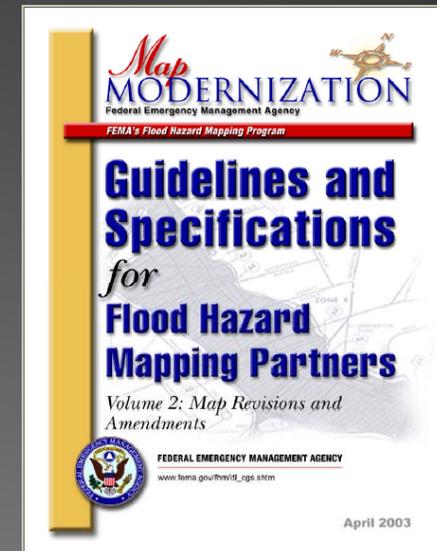
“Chance favors the prepared mind.”

Louis Pasteur

Course Introduction

Ideas for Floodplain Eng. 201/301 Course Topics:

- Case Study Example Workshops:
 - LOMA (MT-1/MT-EZ Forms)
 - LOMR (MT-2 Forms)
 - Elevation Certificate
 - Permit Application
 - Hydrology – Peak Flow Determination
 - Hydraulics – HEC-RAS Modeling & Floodway
- Other ??

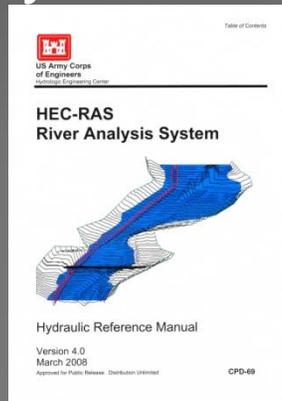


Course Introduction

Additional Training:



- ASFPM Certified Floodplain Manager (CFM):
 - 55 and growing in MT
 - FEMA 480 – Study/Reference Guide
<http://www.floods.org/index.asp?menuid=388&firstlevelmenuid=180&siteid=1>
- 2-3 Day Course: Introduction to Floodplain Hydraulics Using HEC-RAS
Denver Course in May was \$595.00



Floodplain Program Overview



Traci Sears, CFM – State NFIP Coordinator

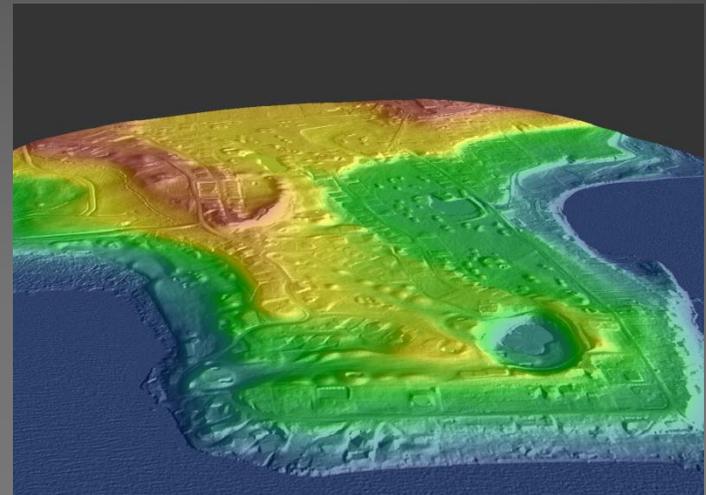
Celinda Adair, CFM, CPP – MapMod/RiskMap Coordinator

Steve Story, PE, CFM – State Floodplain Engineer

Floodplain Program Overview

Presentation Topics:

- NFIP Introduction/Review
- Regulations
- Roles & Responsibilities
- DNRC Floodplain Program
- Technical Resources



Images Courtesy Watershed Sciences, Inc.

National Flood Insurance Program (NFIP)

The NFIP is based upon a voluntary mutual agreement between the federal government (administered by DHS/FEMA) and participating communities (counties & municipalities) across the country.

The Agreement....

Community must:

- Adopt/enforce local floodplain regulations

And in return, Federal Government provides:

- Availability of flood insurance



NFIP History

- 1968** The NFIP was established by Congress on August 1, 1968 with the passage of the National Flood Insurance Act.
- 1973** The program was broadened and modified with the passage of the Flood Disaster Protection Act of 1973.
- 1994** Additional modifications were incorporated through the National Flood Insurance Reform Act of 1994.



The NFIP is administered by the Federal Emergency Management Agency (FEMA); a division of the Department of Homeland Security (DHS).

NFIP Participation

- Community participation is voluntary
- However, there are ramifications of non-participation:
 - Federal Flood Insurance not available
 - Non-eligibility of post-disaster financial assistance
 - NFIP participation required to receive assistance

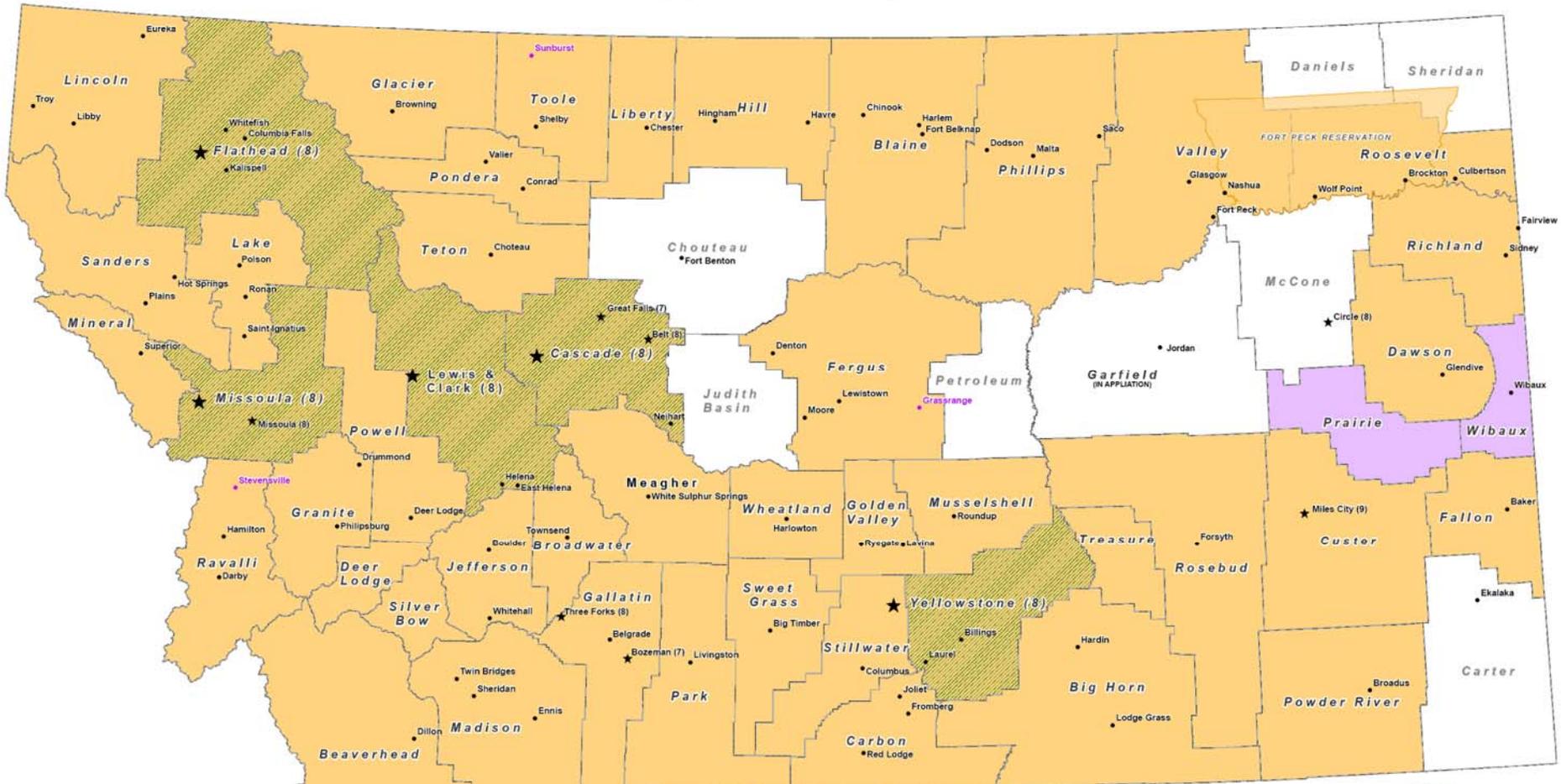


NFIP Participation Requirements

- Participating communities must adopt & enforce a floodplain management ordinance that meets or exceeds the minimum NFIP criteria (specified under Chapter 44, Section 60.3 of the Code of Federal Regulations (CFR))
- Continued Eligibility based on compliance with program regulations and enforcement of the adopted ordinance.
- Compliance is monitored by FEMA via an audit process called a Community Assistance Visit (CAV).



National Flood Insurance Program (NFIP) Montana's Participating Counties, Municipalities, and Reservations (Updated 2/2009)



Participating Counties and Reservations

- NFIP Sanctioned**
- NFIP Participant in CRS Program* with class rating
- NFIP Participant

Participating Municipalities

- NFIP Sanctioned
- NFIP Participant in Community Rating System (CRS) Program* with class rating
- NFIP Participant

NFIP Community Status Book
<http://www.fema.gov/fema/csb.shtm>

* Policy holders in CRS communities receive premium discounts. The lower the class rating, the higher is the premium discount, i.e. a community with a class rating of 9 receives a discount of 5%. A community with a rating of 8 receives a 10% discount.

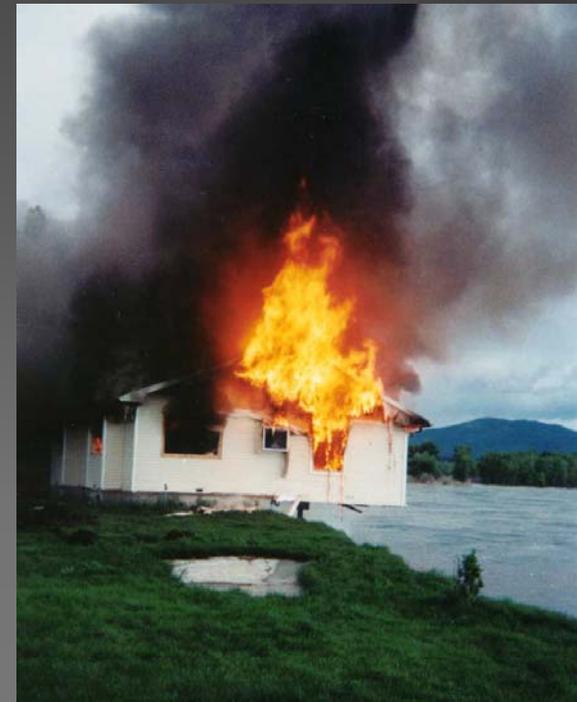
** In most cases a community was sanctioned as a result of not adopting a map which was developed by FEMA. Citizens in a community which has been sanctioned are ineligible for NFIP flood insurance. Federally backed loans for acquisition or construction purposes which lie in a FEMA designated Special Flood Hazard Area (SFHA) are prohibited in a sanctioned community.

NFIP Framework



There are 3 basic parts to the NFIP

- 1.) Regulations
 - 2.) Insurance
 - 3.) Mapping
- ** Mitigation



Clark Fork R. near Plains, Sanders County

NFIP Regulations



- The NFIP underwrites insurance coverage only in those communities that adopt and enforce regulations.
- The regulations are designed to protect new structures from the flood levels projected on the FEMA regulatory flood maps (FIRM – Flood Insurance Rate Map)
- Regulations focus on protecting “insurable” buildings.
- **Communities must meet NFIP criteria of 44 CFR 60.3.**
http://www.access.gpo.gov/nara/cfr/waisidx_08/44cfrv1_08.html

NFIP Regulations



NON-COMPLIANCE – Failure to enforce an ordinance

- 1.) Reclassification under the Community Rating System (CRS)
- 2.) Probation – Policy holders pay additional \$50 premium during this period
- 3.) Suspension – Community no longer in NFIP

NFIP Regulations



SANCTIONS FOR NON-PARTICIPATION/SUSPENSION

- Flood Insurance will not be available
- Existing insurance policies not renewed
- No Federal grants or loans available for development within the SFHA
- No Federal disaster assistance available
- No Federal mortgage insurance or loan guarantees may be provided in SFHA

Knowing the Regulations

Floodplain Regulations/Ordinances

- Must meet or exceed requirements specified in 44 CFR 60.3.

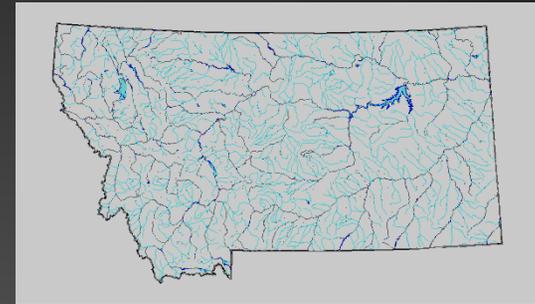


- Must meet or exceed requirements of the Montana Administrative Rules.



Knowing the Regulations

State Regulations



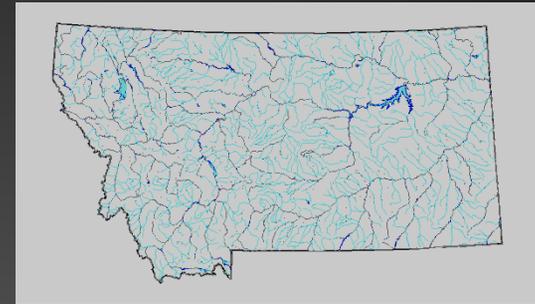
- MT CODE ANNOTATED (MCA) - STATUTES: laws passed by the legislature. All changes must go through the legislative process and be passed into law before they become effective.

Montana Floodplain and Floodway Management Act

- MCA Title 76, Chapter 5

Knowing the Regulations

State Regulations



- ADMINISTRATIVE RULES of MT (ARMs): written and adopted by State agencies. The State agencies write rules in order to administer the laws over which the Legislature has given the agencies authority. Rules can be changed by going through the rule making procedure and do NOT go through the Legislative process.

DNRC Floodplain Management Engineering Bureau

- ARM Rule 36, Chapter 15 (adopted 12/31/1989)

The Montana Rules vs. NFIP Minimum Requirements

Standard	Montana Administrative Rules	NFIP Minimum Requirements
Freeboard	2 Feet	No freeboard required
Floodway Standards	1/2 foot Surcharge	1 Foot Surcharge
Floodway Uses	Prohibits habitable structures with/in the floodway	Allows structures in Floodway with documentation of zero-rise
Mobile Home Applications	Requires all mobile homes to be elevated to the freeboard protection level.	Will allow for mobile home placed in and existing mobile home park to be elevated to 36" above the adjacent grade.

The Montana Rules

ARM 36.15.501(6)...

The designated floodplain boundary is based on base flood elevations. The mapped floodplain boundary may be used as a guide for determining whether property is within the designated floodplain, but the exact boundary shall be determined according to the base flood elevation.

If the local administrator determines it is unclear whether property is in or out of the floodplain, the local administrator shall require the applicant to provide additional information which may include elevations obtained through a level survey performed by a PE or PLS.

Floodplain Management – Roles & Responsibilities

The FEDERAL ROLE (FEMA):

- Administers the NFIP through Regional Offices – MT is in Region VIII (<http://www.fema.gov/about/regions/regionviii/>)



Floodplain Management – Roles & Responsibilities

The FEDERAL ROLE (FEMA):



- Monitors community compliance with NFIP requirements.
- Provides guidance & assistance to State and community administrators.
- Provides information, training, and outreach.
- Helps review and adopt new maps and data.

Floodplain Management – Roles & Responsibilities

The STATE ROLE (DNRC):



- Enable communities with the legal authorities needed to adopt and enforce floodplain management regulations.
- Establish minimum State regulatory standards consistent with the NFIP.
- Provide program and technical assistance to participating local governments.
- Coordinate activities of various State agencies that affect the NFIP.

Floodplain Management – Roles & Responsibilities

The COMMUNITY ROLE:

- Local adoption and enforcement of floodplain management regulations – meeting or exceeding the minimum NFIP criteria.
- Require floodplain development permits for development within the 1-percent-annual-chance flood inundation area (aka Special Flood Hazard Area (SFHA) or 100-year floodplain).
- Additional requirements per 44 CFR 60.3.



DNRC State Floodplain Management Program

- Program Organization & Staff
- State Floodplain Programs

WEBSITE:

www.mtfloodplain.mt.gov

with contact, permitting, regulation,
resource info & more...

Image Courtesy Watershed Sciences, Inc.

Montana Department of Natural Resources and Conservation

FLOODPLAIN MANAGEMENT PROGRAM

Serving Montana's Communities Since 1974

HIGHGROUND

February 2010

This newsletter and other state floodplain management activities are funded, in part, through grants from FEMA.

Wetlands, Riparian Areas and Floodplains

Information shared by Lynda Saul, Wetland Program Coordinator, Montana Department of Environmental Quality

On the Montana Front

Floodplains, wetlands and riparian areas share common ground. Aply, more sharing is occurring between wetland and floodplain professionals. For example, land use planning resources for local governments, including floodplain administrators are now available as a result of a Montana DEQ grant, administered through the Wetland Program. Resources can be found at the Montana Audubon website: <http://www.mtaudubon.org/issues/wetlands/planning.html>. View floodplain and other regulations adopted by different local governments, see pictures of Montana property in jeopardy from flooding or river meandering and more.

On the National Front

The Association of State Floodplain Managers, (ASFPM), a non-profit professional organization dedicated to reducing flood losses and protecting floodplain functions and resources in the United States has prepared a position paper that may be useful in your work as floodplain managers, titled "Natural and Beneficial Floodplain Functions: Floodplain Management—More than Flood Loss Reduction" http://www.floods.org/PDF/WhitePaper/ASFPM_NBF%20White_Paper_%200908.pdf

ASFPM points out that current floodplain management in this country has twin goals: (1) flood loss reduction and (2) the conservation and protection of the natural and beneficial functions of our water resources. Although considerable effort has been expended on the first goal (with mixed success), the second has received only minor consideration. They have recommended a call for renewed direction and a new approach to floodplain management.

Funding from a Montana DEQ/ EPA grant is furthering progress on a floodplain wetland mapping plan and report. As a result of this wetland/floodplain cooperation, the production of a state-wide map, the WORM map, showing the squiggly stretches of floodplains that have been studied by Approximate, Limited Detail or Detailed levels for Flood Insurance Rate maps will resume! For earlier story see Highground September, 2008. The WORM map and resulting data layer, scheduled

Contents to Identify Unmet Floodplain Mapping Needs 2

Training and Conferences 2

Missoula City Hosts Second River Adventure Summit 3

What Is LEEDAP? 5

Joint (Multi-Agency) Site Visits 5

DNRC Floodplain Website Tools and Resources 6

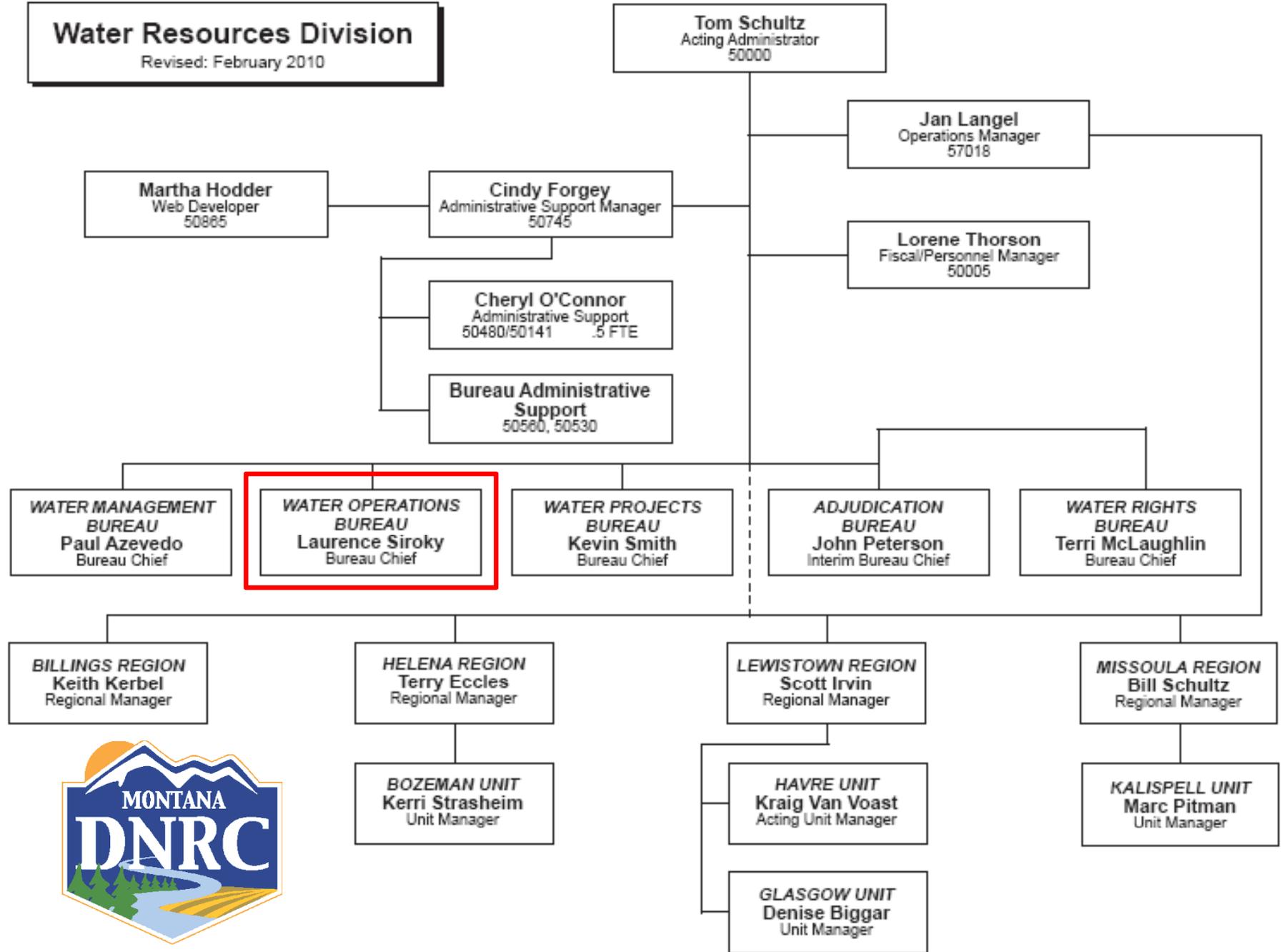
Neighbors Corner 7

Revisiting History In Your County 8

Sun River - photo by Mark Boesch

Water Resources Division

Revised: February 2010



Water Operations Bureau

Revised: February 2010

Laurence Siroky
Bureau Chief
50009

Briona Shipman
Administrative Support
50530

Board of Water Well Contractors

Dam Safety Program

Floodplain Management Program

Water Measurement Program

Water Well Contractors Program

Michele Lemieux
Dam Safety Engineer
50261

Ali Cornwell
Administrative Support
35038 .5

Chad Newman
Dam Safety Specialist
35031

Traci Sears
CAP-SSE
Program Specialist
50340

Steve Story
Floodplain Engineer
50500

Celinda Adair
Map Mod Program Specialist
35085

Mary Guokas
Floodplain Outreach
35031

Sam Johnson
Floodplain Engineer
56580

Chad Hill
Civil Eng. Specialist

Dave Amman
Program Specialist
24015

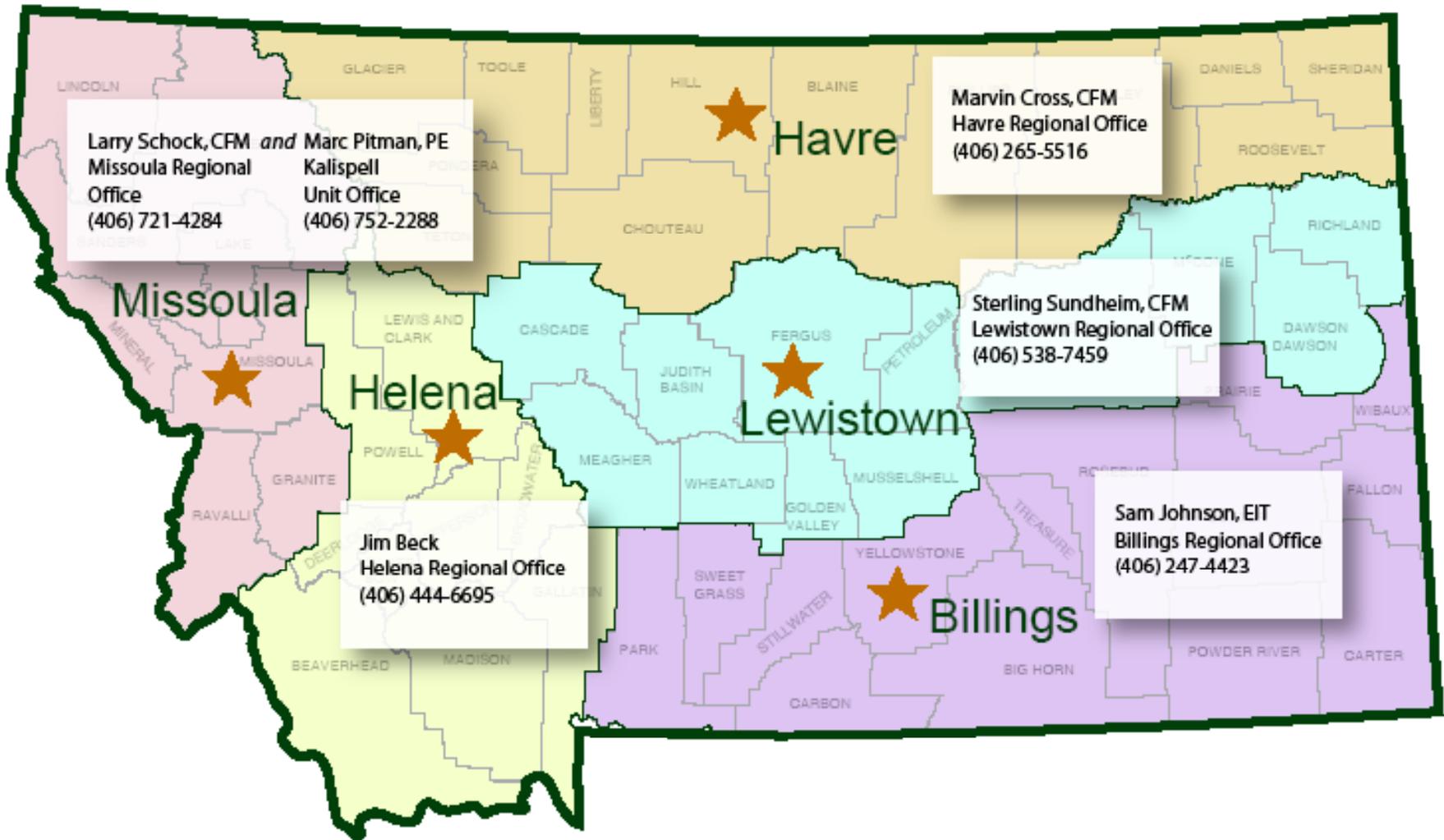
Art Robinson
Program Specialist
58000



1424 9th Avenue

PO Box 201601

Helena, MT 59620-1601 406-444-0862



DNRC Regional Engineering Specialists



DNRC State Floodplain Management Program

Floodplain Hazard Mitigation Assistance Program (FHMAP)

- Community Assistance Program (CAP) – Traci Sears

Activities

- Community Compliance - CAV/CACs
- Ordinance Assistance
- Updating data into Community Info System (CIS)
- 5 year plan updates
- State model ordinance updates
- Outreach, workshops, & training
- General Technical Assistance
- Map Coordination, Disaster Assistance & more...



DNRC State Floodplain Management Program

Floodplain Hazard Mitigation Assistance Program (FHMAP)

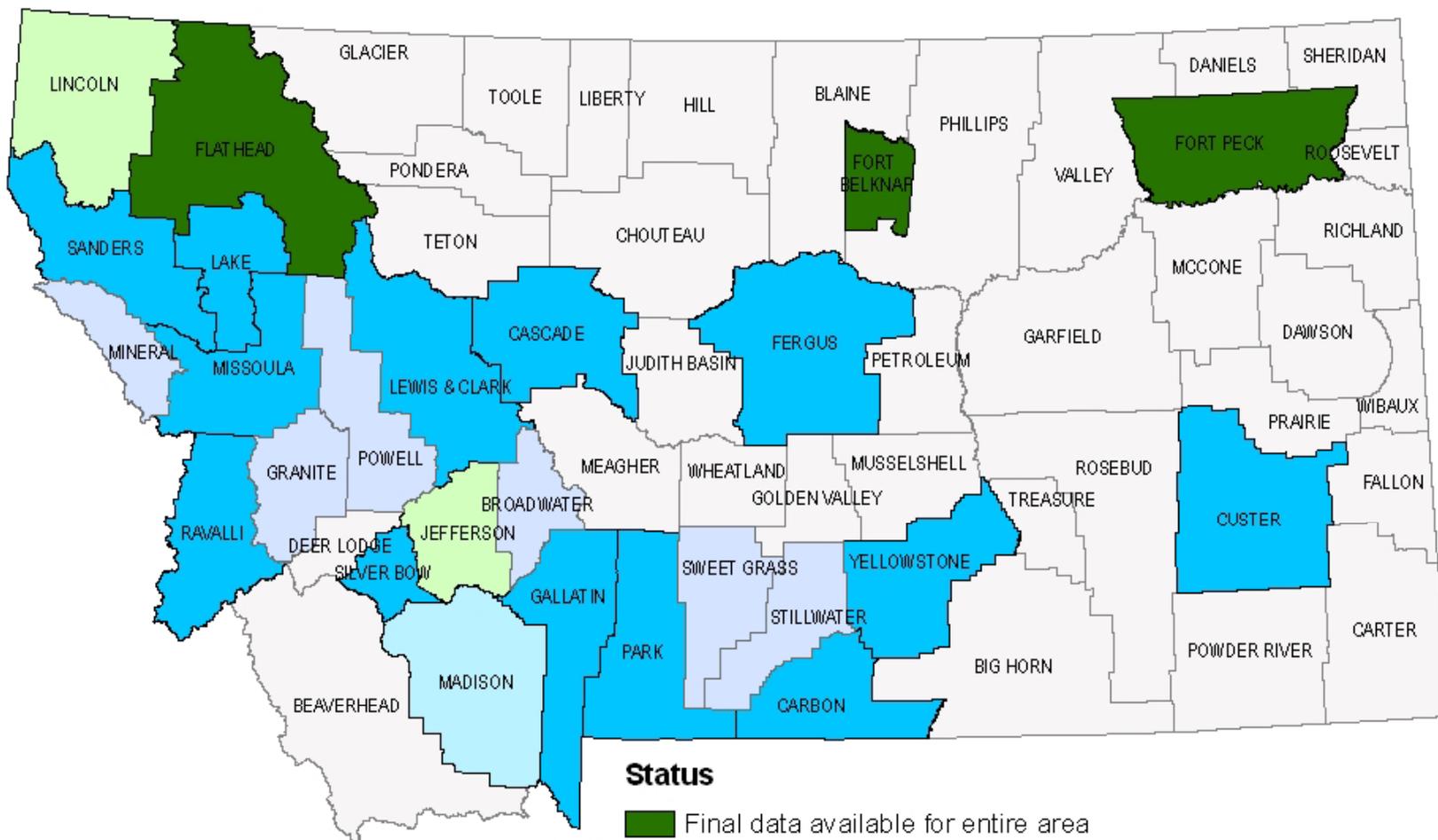
- Map Mod/Risk MAP Program – **Celinda Adair**

Activities:

- Grant Writing, Contract/Grant Administration, & Project Management – FEMA funded Map Mod/Risk MAP projects
- Business Plan Creation - MT Map Mod/Risk MAP program
- Floodplain Mapping Needs Identification/Prioritization
- Program/Project Related Outreach & Training
- Building Match, Partnerships, Collaboration
- DFIRM Distribution & Maintenance
- Earned Value Tracking – Mapping Information Platform (MIP)

Montana Map Modernization & Risk MAP Project Status

as of 7/13/2010



State of Montana Map Modernization/Risk MAP DFIRM Conversion Project Schedules

	Jurisdiction(s)	Estimated Preliminary DFIRM Release Date	Estimated Effective Date for DFIRM & Associated Flood Report
CTP Projects	Missoula County	Preliminary 3 - 12/20/2010	2/16/2012
	Yellowstone County	Released 3/8/2010	5/24/2011
	Cascade County	Unknown at this time	Unknown at this time
	Fergus County	Released 3/25/2009	7/22/2010
	Sanders County	2/13/2011	4/13/2012
	Lake County	5/16/2011	7/16/2012
	Lewis and Clark County	Released 10/1/2008 (Revised Prelim. 11/21/2010)	2/16/2012
IDIQ Projects	Gallatin County	Released 11/20/2009	1/20/2011
	Custer County	Released 10/1/2008	7/22/2010
	Park County	Released 7/6/2010	Unknown at this time
	Ravalli County	9/20/2010	11/16/2011
	Silver-Bow County	Released 5/14/2010	7/18/2011
	Town of Ennis - Physical Map Revision (PMR)	Released 5/27/2009	Unknown at this time
	Carbon County	Unknown at this time	Unknown at this time

Updated July 2010 CA

Use of FIS Data as Available Data

FEMA Floodplain Management Bulletin 1-98:

http://www.fema.gov/plan/prevent/floodplain/fis_data.shtm

- Covers Community use of Draft or Preliminary FIS data as best available data
 - * Constitutes available data under 44 CFR 60.3(b)(4) -
Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source...



DNRC State Floodplain Management Program

Floodplain Hazard Mitigation Assistance Program (FHMAP)

- State Floodplain Engineer – **Steve Story**

Provides engineering technical assistance to state programs (CAP, Map Mod/Risk Map), performs/reviews floodplain studies, community assistance, special projects, training & outreach.

- Outreach Coordinator – **Mary Guokas**

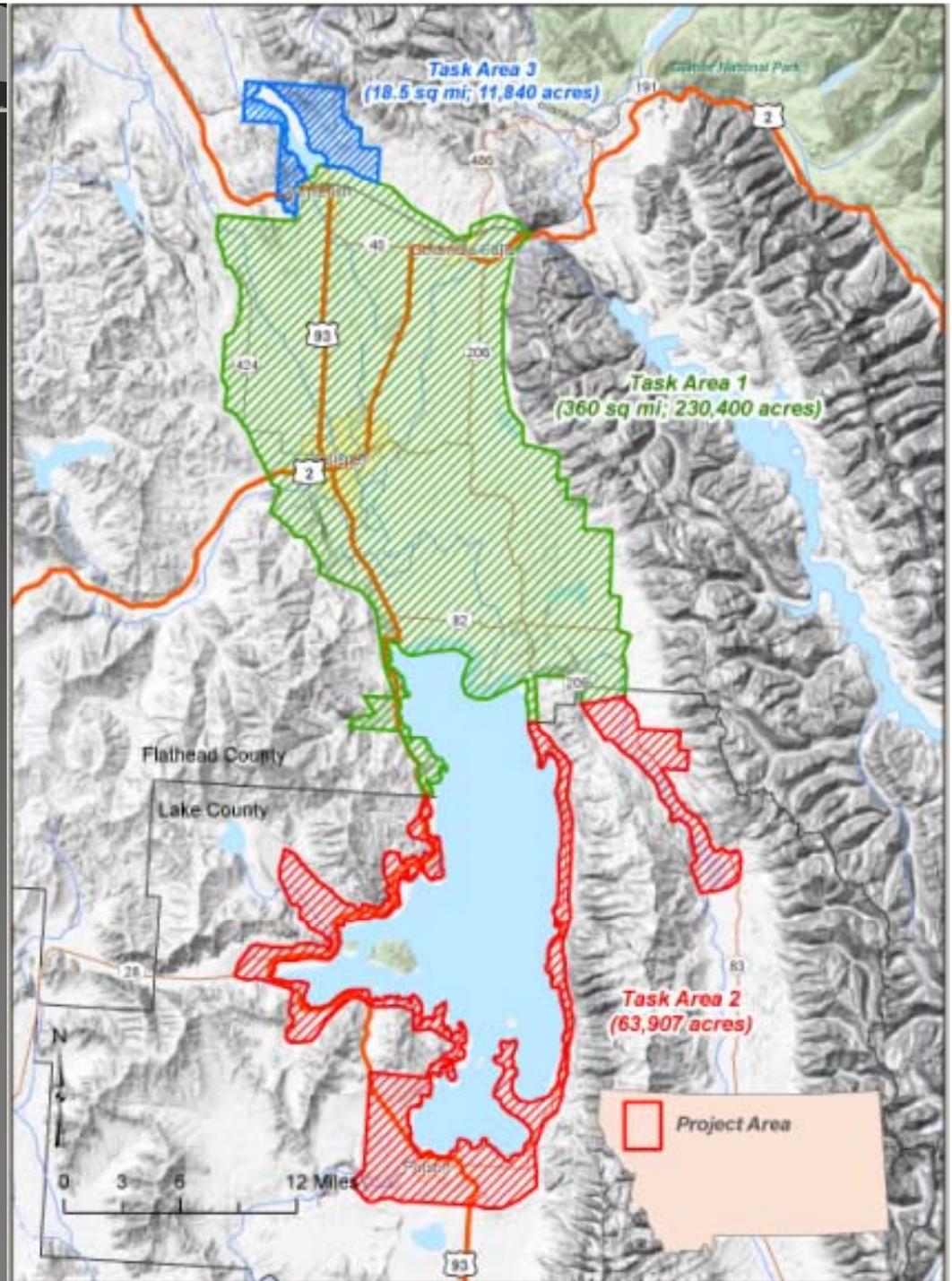
Leads outreach efforts in coordination with CAP and Map Mod/Risk Map programs, prepares quarterly Highground Newsletters, attends conferences, & more...

Flathead Basin Lidar & Imagery Project

- Funding Partners: FBC, Lake County, & City of Whitefish
- 500 sq mi Coverage Area
- Products: 2' Contours, DEMs, True Color & Color Infrared



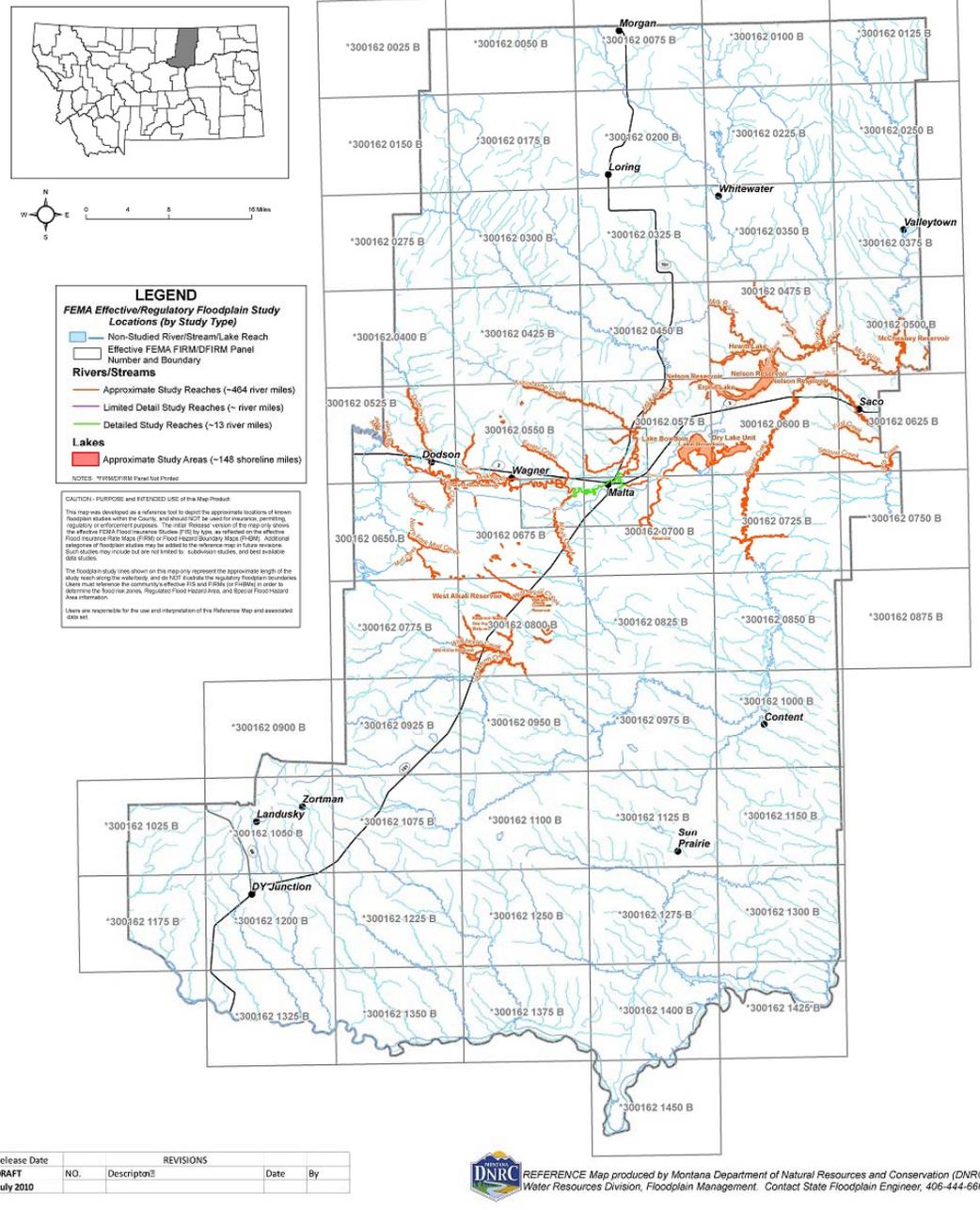
Images Courtesy Watershed Sciences, Inc.



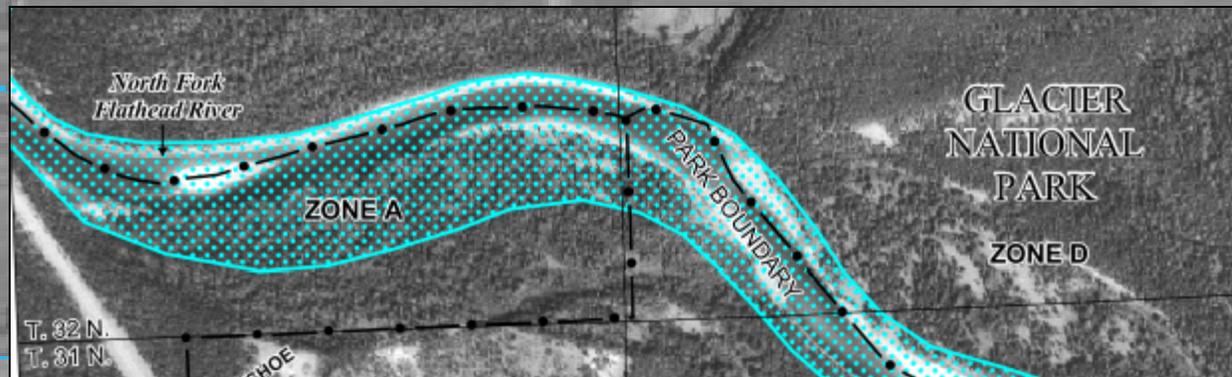
WORM Map Project

- One of several tasks funded through EPA Grant
- Work completed using DNRC GIS & Engineering Staff
- GIS layers created that show effective FIRM/FHBM regulatory floodplains. Lines only, not boundaries. Does NOT replace FIRM/FHBMs.
- Categories: Detailed, Limited Detail, & Approximate
- Status: Drafts being distributed this fall to communities

FLOODPLAIN STUDY REFERENCE MAP PHILLIPS COUNTY, MONTANA DRAFT



DNRC Technical Resources



For Approximate Zone A or
Unmapped Areas

Surveying, Hydrology, and Hydraulics

Larry Schock, CFM – Missoula Regional Engineering Specialist

DNRC Technical Resources

Introduction

- Since the DNRC offers complimentary engineering technical support to the NFIP communities, there arose a need to provide technical resources for the consulting sectors.
- The technical resources that have been developed by the DNRC are basic guidelines to help explain some of the more complex tasks in the floodplain process.
- Some sections of these documents have become dated and being updated, therefore they should be considered **DRAFT** documents.

DNRC Technical Resources

Surveying Guidelines

“Guidelines For Water Course Surveys In Undesignated or Zone A Flood Zones”

- This can be found at the DNRC Floodplain Website
- www.mtfloodplain.mt.gov/
- www.dnrc.mt.gov/wrd/water_op/floodplain/default.asp

DNRC Technical Resources

Surveying Guidelines

- The document is intended to describe the minimum topographic requirements needed in order to construct a reasonably reliable hydraulic model.
- The process described within the document is only intended for use on limited reaches of the water course.
- The document also outlines submittal requirements.

DNRC Technical Resources

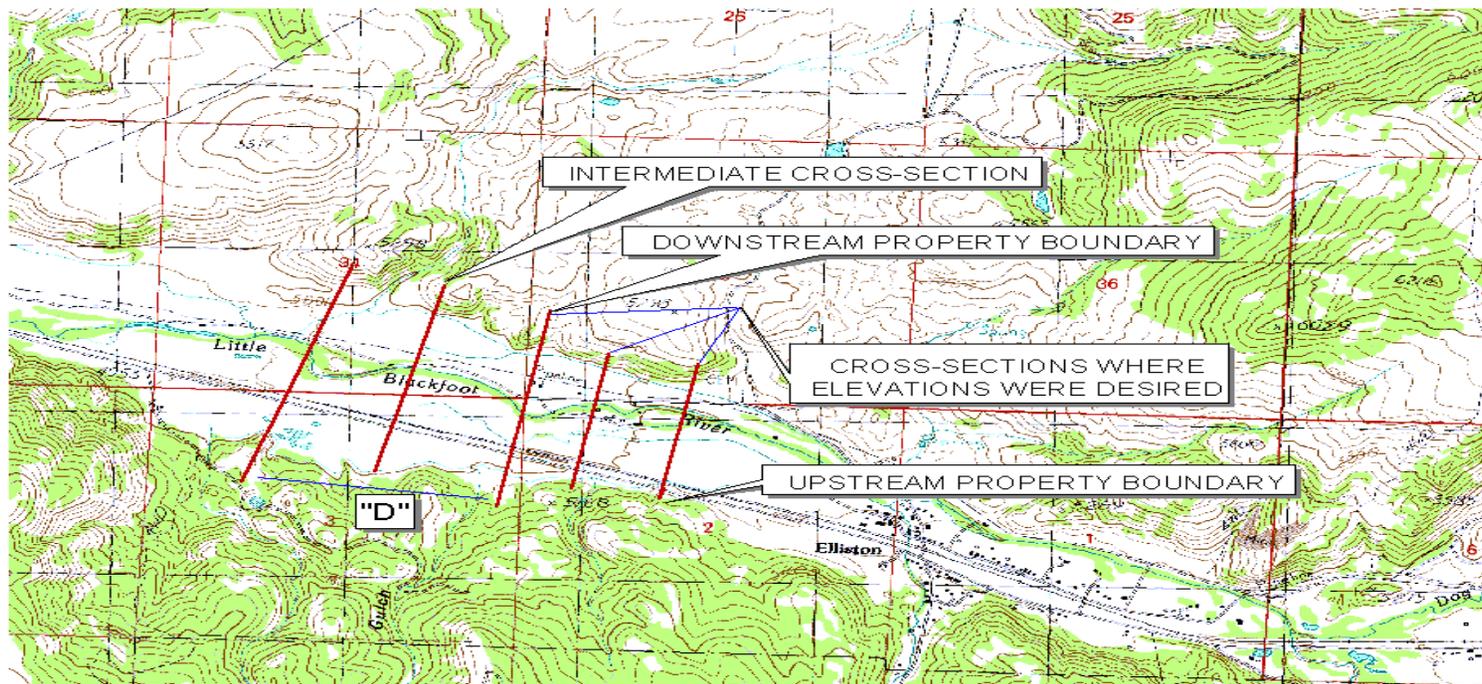
Surveying Guidelines

- Each site is unique and can pose distinct problems.
- It is important for the landowner, surveyor, and the engineer to review the proposed project to insure that everyone understands the scope of the survey.
- A site visit by all parties will insure all of the features needed to construct a reliable model are surveyed.

DNRC Technical Resources

Surveying Guidelines

FIGURE 2 - EXAMPLE OF CROSS SECTION LOCATIONS



"D" - SEE TABLE 1

DNRC Technical Resources

Surveying Guidelines

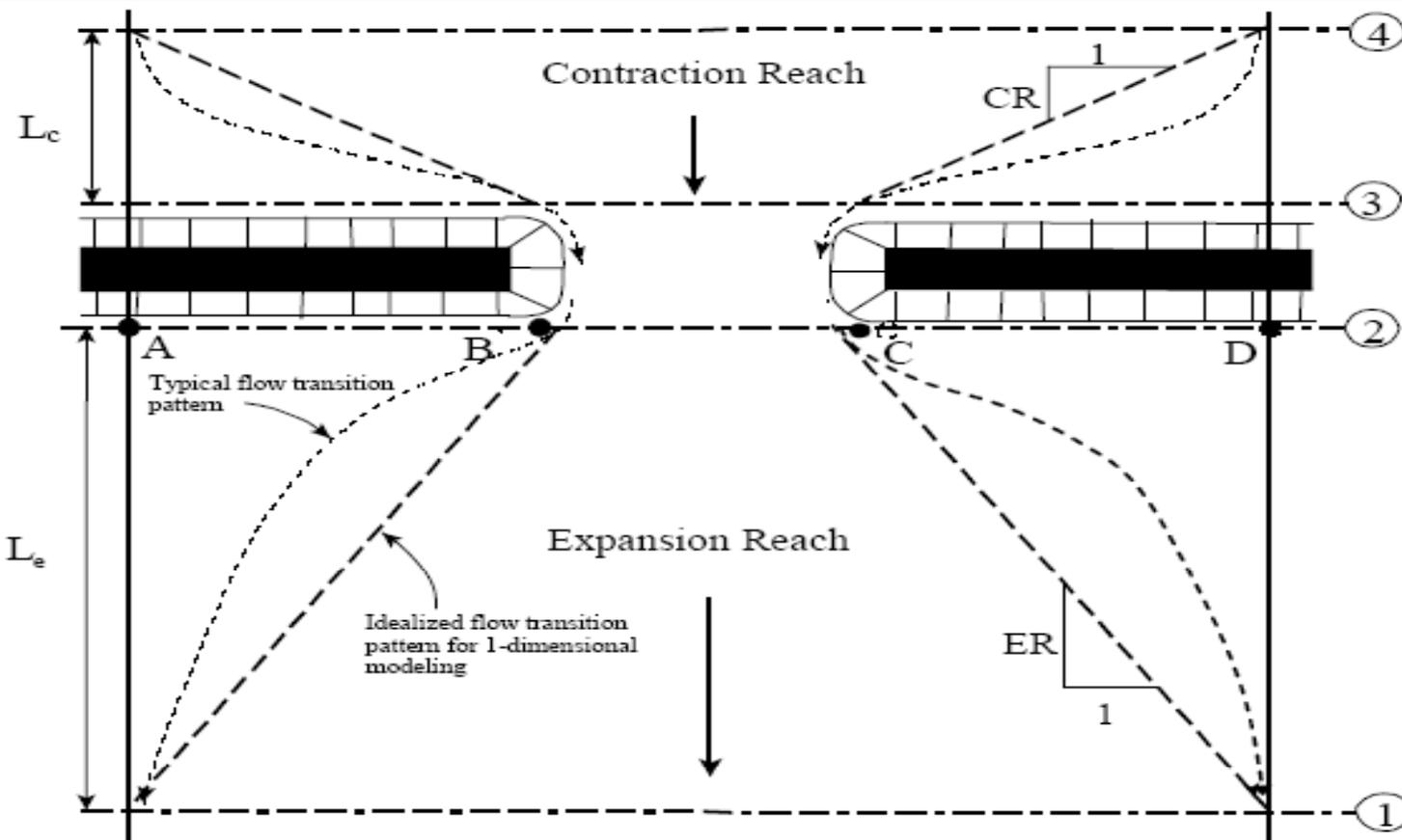
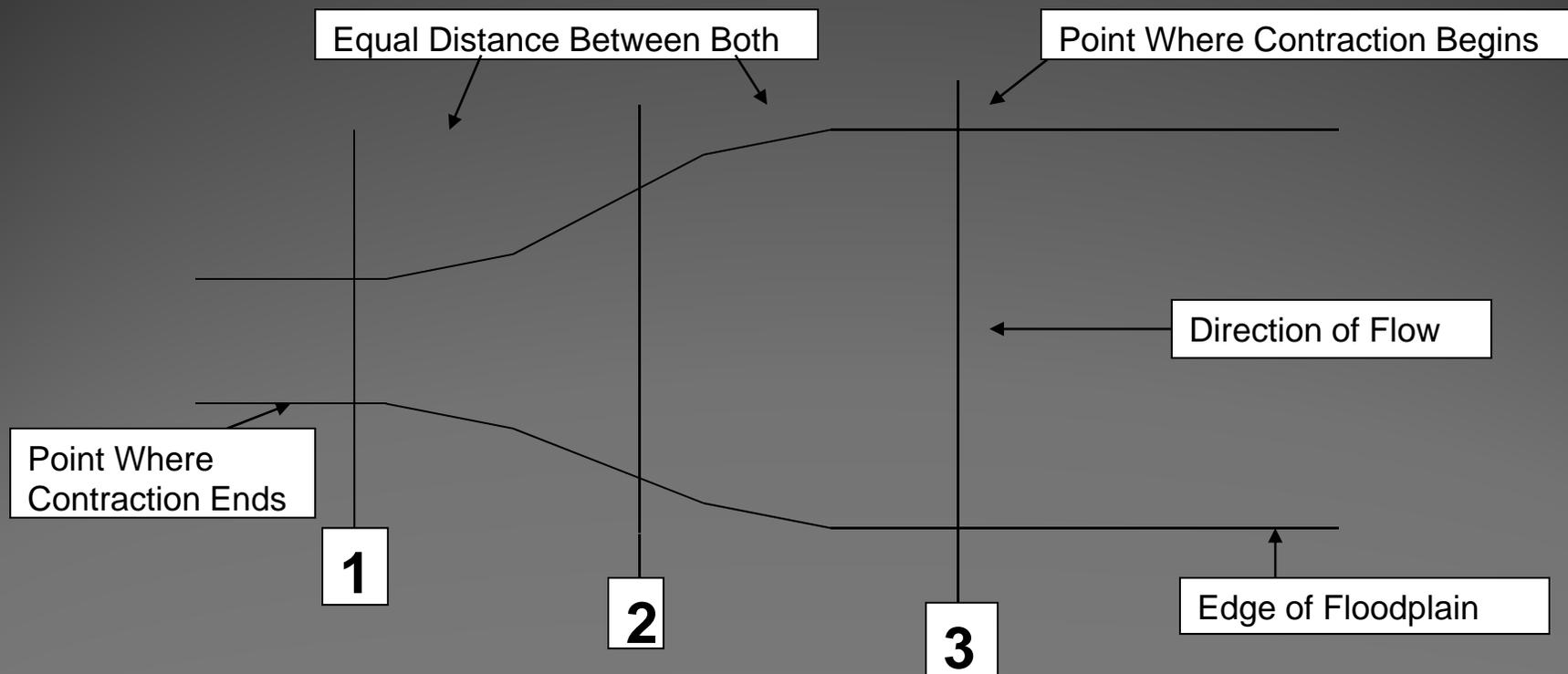


Figure 6-11 Cross Section Locations at a Bridge or Culvert

DNRC Technical Resources

Surveying Guidelines

- Special attention should be taken at abrupt channel constrictions and expansions.



DNRC Technical Resources

Surveying Guidelines

The document :

- Discusses the level of data and documentation that must be submitted in order for DNRC review the project.
- Provides examples of the format that should be used when submitting the data.
- Failure to submit all of the required data, in the proper format, may result in DNRC review delays.

DNRC Technical Resources

Hydrology and Hydraulic Guidelines

“Guidelines For Obtaining 100 Year Flood Elevations In Approximate Zone A or Unmapped Areas”

- This document is intended to describe the minimum requirements needed in order to construct a reasonably reliable hydraulic model
- The guidelines are for models to determine the 100 yr. Base Flood Elevations (BFE) on limited reaches of a water course

DNRC Technical Resources

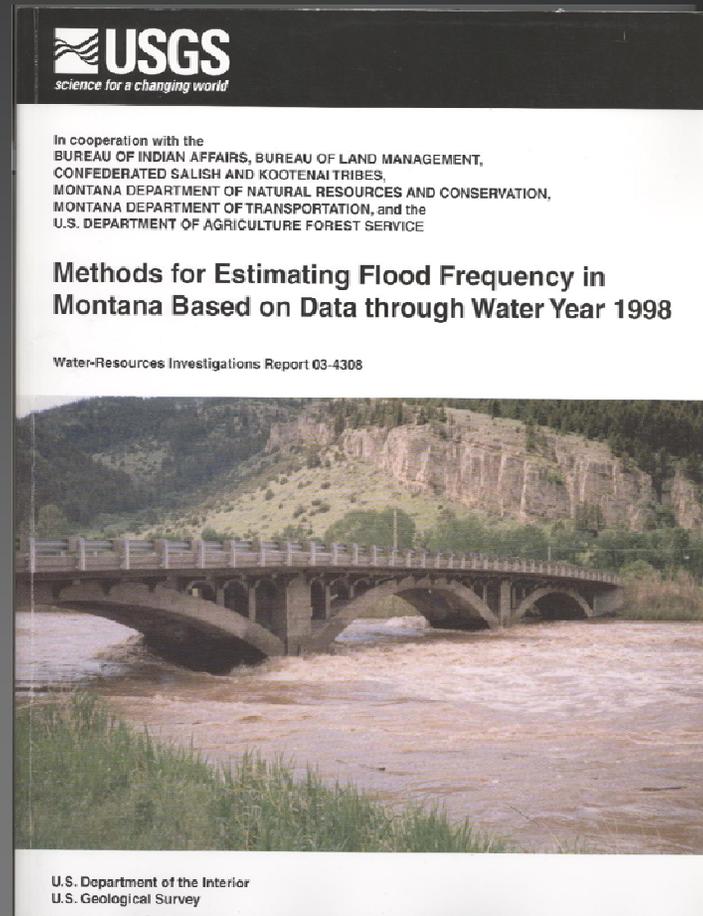
Hydrology and Hydraulic Guidelines

- Some sections of this document has become dated and is being updated, therefore it should be considered a **DRAFT** document
- These guidelines are not all encompassing
- The DNRC recognizes the many situations and sites are unique and may require analyses not covered in the guideline

DNRC Technical Resources

Hydrology and Hydraulic Guidelines

- Hydrology is based upon the protocol and guidelines established in USGS Water-Resources Investigations Report 03-4308, “Methods for Estimating Flood Frequency in Montana Based on Data through Water Year 1998”



DNRC Technical Resources

Hydrology and Hydraulic Guidelines

- Depending upon the type of proposed development, a hydraulic analysis can be completed using either a normal depth method or a standard step backwater methodology
- Normal Depth Method = Manning's Equation
- Standard Step Backwater Methodology = HEC-RAS

DNRC Technical Resources

Hydrology and Hydraulic Guidelines

- The Standard Step Backwater Method is almost exclusively done using computer programs, and HEC-RAS is the FEMA and DNRC preferred program
- Use of other programs should be approved prior to submittal
- A disc with the HEC-RAS input and output files is required for DNRC review

DNRC Technical Resources

Hydrology and Hydraulic Guidelines

- If your intent is to perform a detailed study which includes a regulatory Floodway and Floodfringe for the LOMR process you must refer to FEMA guidelines
- If your intent is to provide a “No Rise Certification” for a project within a FEMA detailed study area you must refer to FEMA guidelines.

DNRC Technical Resources

Hydrology and Hydraulic Guidelines

- Submittal Requirements are listed in Appendix A of the document.
- Floodplain applications, and materials used in their preparation, fall within the public domain.
- Failure to submit the required data will delay the review of the application.

DNRC Technical Resources

Surveying, Hydrology, and Hydraulics

- The DNRC is currently in the process of updating existing resources and developing new resources
- Currently soliciting for your input, comments, and recommendations.... please submit to:

Bri Shipman: bshipman@mt.gov



Questions? Thank You

Traci Sears, CFM
TSears@mt.gov
406.444.6654

Celinda Adair, CFM, CPP
cadair@mt.gov
406.444.6656

Steve Story, PE, CFM
sestory@mt.gov
406.444.6664

Larry Schock, CFM
lschock@mt.gov
406.721.4284