
Aerial Imagery by Chris Boyer


SMOKEY

MONTANA'S CREDENTIALS

1 Million	2012 Population
147,000 SM	Area (4.1% of the U.S.)
6.8	Population Density (U.S is 87.4)
56	Counties
73,000	Stream Miles


THIS IS
GRIZZLY BEAR
COUNTRY


Purcell Mts.
L. Koocanusa
Milk R.
Mt. Cleveland 10,466 ft.
N. Fork Flathead R.
Cut Bank Cr.
Fresno Res.
Medicine L.
Kootenai R.
Hungry Horse Res.
L. Elwell
Milk R.
Poplar R.
Cabinet Mts.
Flathead L.
Lewis Range
Marias R.
Bearpaw Mts.
Missouri R.
Clark Fork
Flathead R.
S. Fork Flathead R.
Fort Peck L.
Coeur d'Alene Mts.
Mission Range
Missouri R.
NORTH DAKOTA
ROCKY MOUNTAINS
Red Mtn. 9,411 ft.
Missouri R.
GREAT PLAINS
Yellowstone R.
Clark Fork
Big Belt Mts.
Little Belt Mts.
Big Snowy Mts.
Clark Fork
Bitterroot R.
Canyon Ferry L.
Musselshell R.
Crazy Mts.
Bitterroot Range
Saddle Mtn. 10,793 ft.
Jefferson R.
Crazy Peak 11,209 ft.
Powder R.
Yellowstone R.
Pioneer Mts.
Tongue R.
Madison R.
Tweedy Mtn. 11,154 ft.
Bighorn R.
Little Missouri R.
Mt. Cowen 11,206 ft.
Granite Peak 12,799 ft.
Beaverhead R.
Absaroka Range
Bighorn Mts.
Red Rock R.
Hilgard Peak 11,297 ft.
Eighteenmile Peak 11,141 ft.
Centennial Mts.
IDAHO
SOUTH DAKOTA
48° N
46° N
44° N


ARCTIC OCEAN
Chuckchi Sea
Bering Sea
Beaufort Sea
Lincoln Sea
Baffin Bay
Northwestern Passages
Davis Strait
Hudson Strait
Gulf of Alaska
Coastal Waters of Southeastern Alaska & British Columbia
Labrador Sea
Hudson Bay
PACIFIC OCEAN
Snow Dome
Triple Divide Peak
Gulf of St. Lawrence
Bay of Fundy
ATLANTIC OCEAN
CONTINENTAL DIVIDES
Great
Laurentian
Arctic
St. Lawrence
Eastern
Great Basin
Gulf of California
Gulf of Mexico
Caribbean Sea

Big Hole River, Montana

Image by Chris Boyer, Kestrel Aerial Services, Inc.

PRESENTATION OVERVIEW – WHAT'S THIS ABOUT?

- Advantages of Collaborating w/USGS for Hydrologic Updates
- Challenges & Solutions
- Audience Assumptions:
  - Familiar w/RiskMAP
  - General Hydrology Knowledge

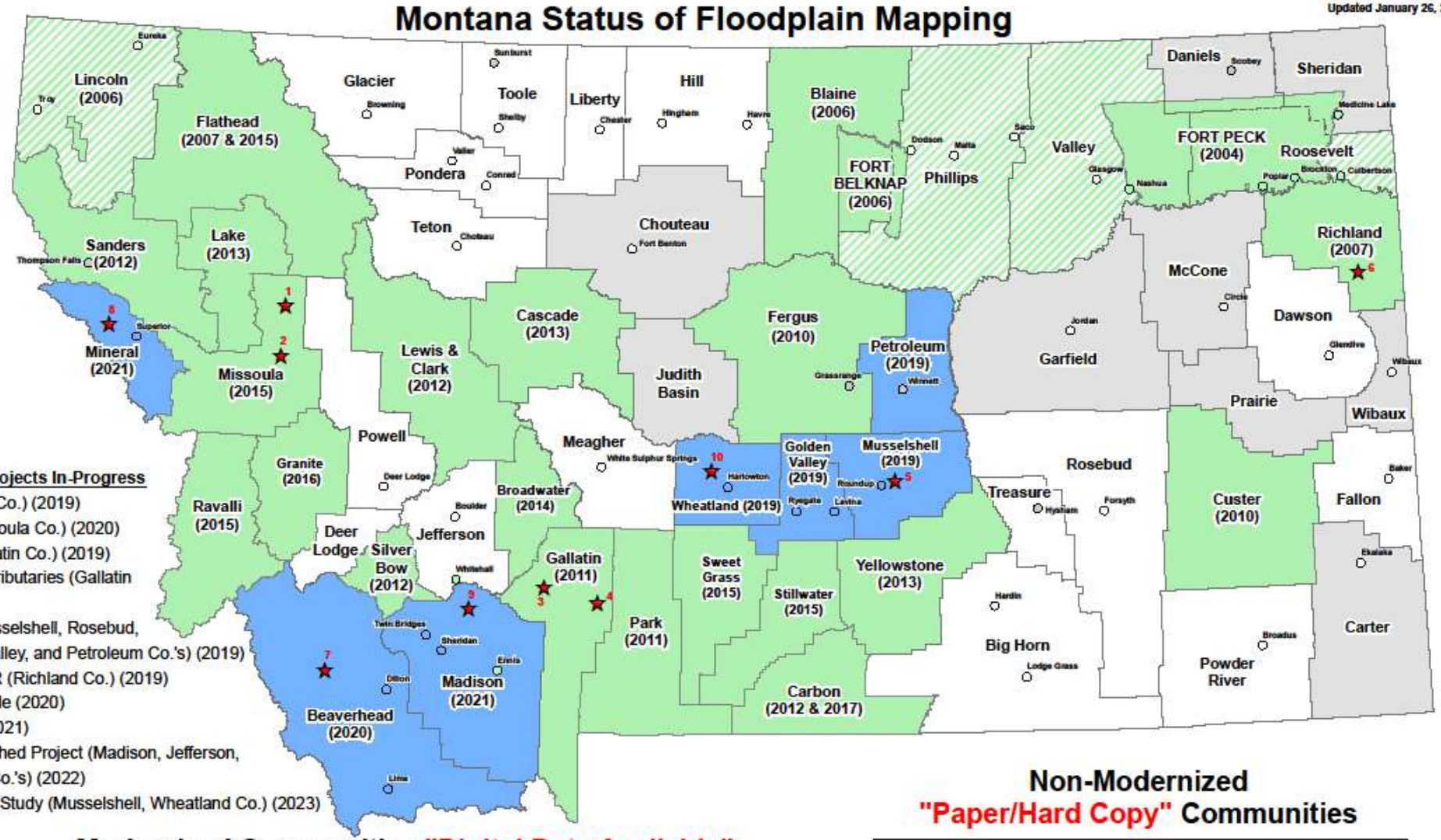
State Floodplain Program

CTP	Since 2005 (Robust!)
12,000	Miles of Mapped Floodplain
LiDAR	Sparse (stream corridor based)
6	Passionate Staff
$1M-$3M	Annual Project Budget (mostly FEMA)

= Contract Out our Project Work

Montana Status of Floodplain Mapping

Updated January 26, 2018



Risk Map/PMR Study Projects In-Progress

1. Swan River (Missoula Co.) (2019)
2. Clearwater River (Missoula Co.) (2020)
3. W. Gallatin River (Gallatin Co.) (2019)
4. Bozeman Creek and Tributaries (Gallatin Co.) (2019)
5. Musselshell River (Musselshell, Rosebud, Wheatland, Golden Valley, and Petroleum Co.'s) (2019)
6. Yellowstone River PMR (Richland Co.) (2019)
7. Beaverhead Countywide (2020)
8. Mineral Countywide (2021)
9. Jefferson River Watershed Project (Madison, Jefferson, Broadwater, Gallatin Co.'s) (2022)
10. Musselshell Tributary Study (Musselshell, Wheatland Co.) (2023)

Modernized Communities "Digital Data Available"

Completed ("Year" Effective)

- 20 - Countywide
- 2 - Reservations
- 7 - City/Town ONLY
- 4 - Partial Countywide (Lincoln, Phillips, Roosevelt, and Valley Co.'s)

In Progress (Scheduled "Year" Effective)

- 7 Countywide
- 10 New Enhanced RiskMap or PMR Study Projects (see list at Left)

Non-Modernized "Paper/Hard Copy" Communities

NFIP Participating Community

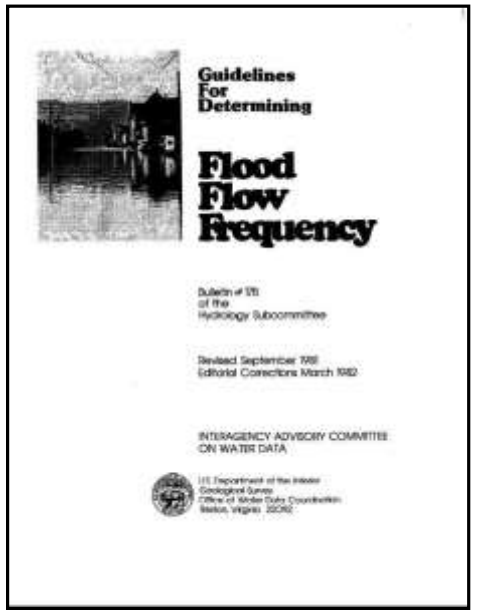
- 16 Counties
- 27 Municipalities

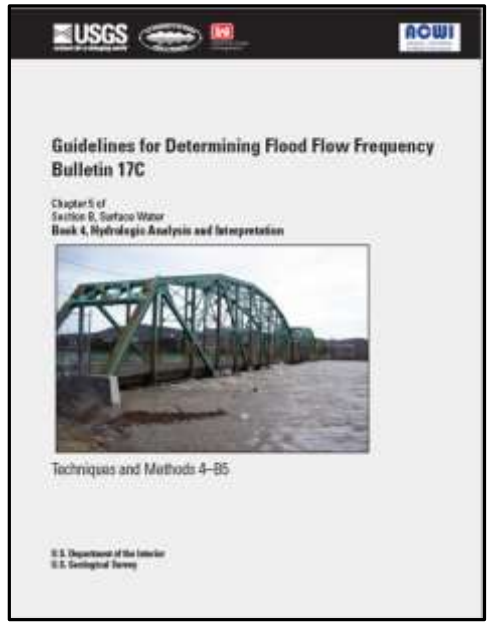
Non-Participating or Suspended Community

- 9 Counties
- 6 Municipalities

Flood Frequency Guidelines

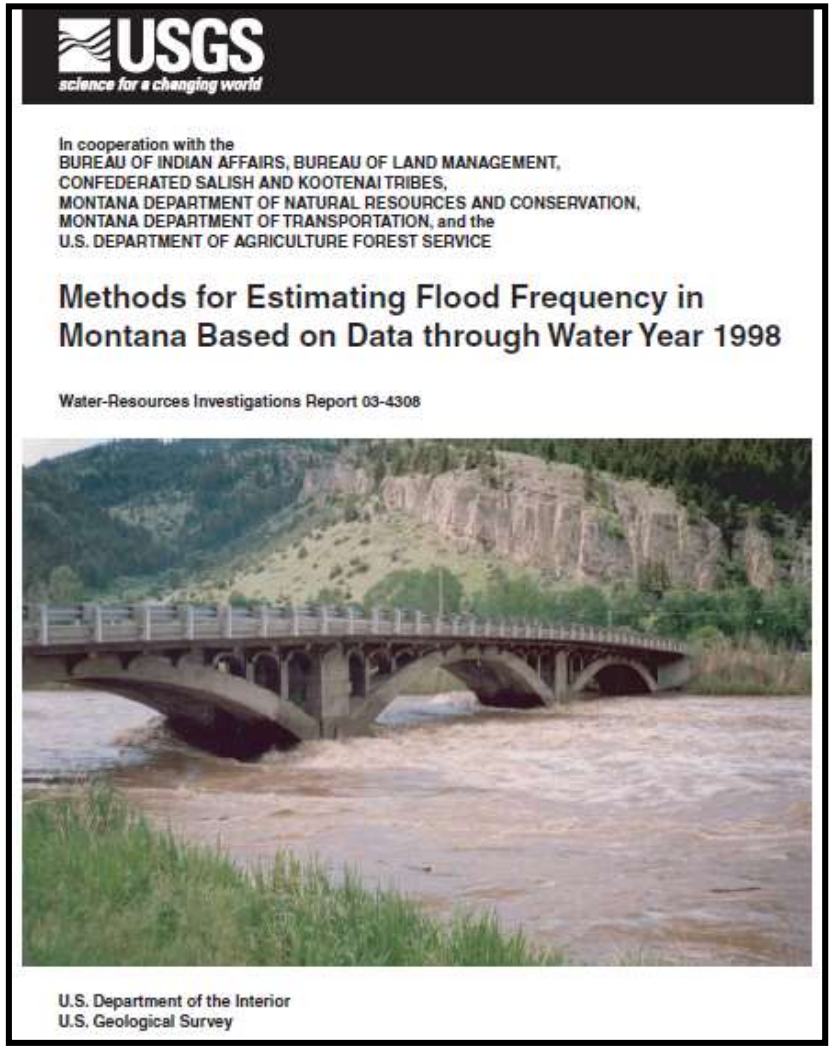
- Bulletin 17C
  - Published **March 29, 2018** by USGS
  - Replaces Bulletin 17B (March 1982)
  - Federal Agencies requested to use 17C
  - State & Private encouraged to use 17C





2016 New RiskMAP Projects

- New Watershed Studies
  - Clark Fork River (NW MT)
  - Beaverhead River (SW MT)
- SOP = Update Hydrology
  - Stream Gages – Flood Frequency Updates = Newer Methods since last USGS Reports
  - Use published data or update?


USGS
science for a changing world

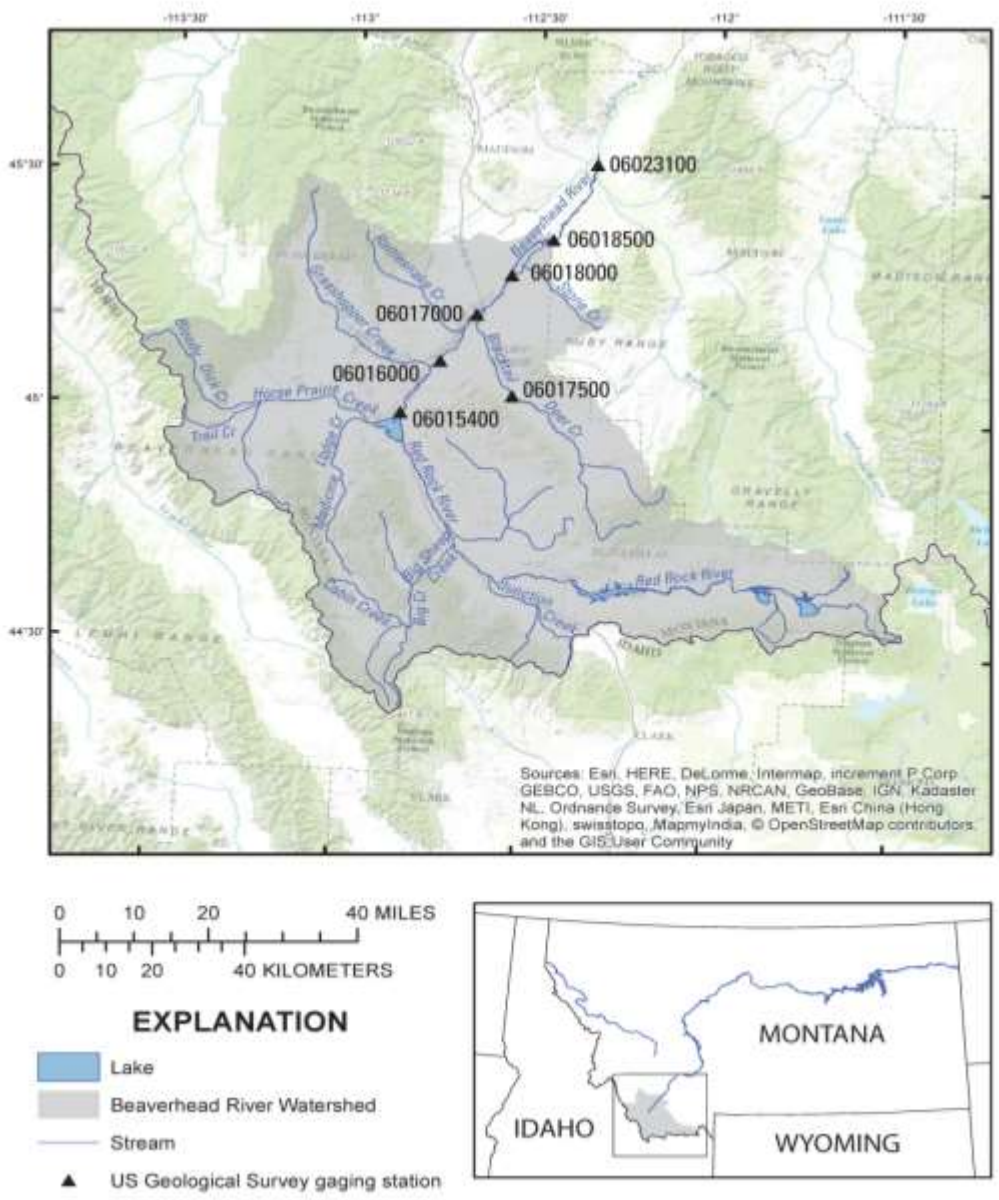
In cooperation with the
BUREAU OF INDIAN AFFAIRS, BUREAU OF LAND MANAGEMENT,
CONFEDERATED SALISH AND KOOTENAI TRIBES,
MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION,
MONTANA DEPARTMENT OF TRANSPORTATION, and the
U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE

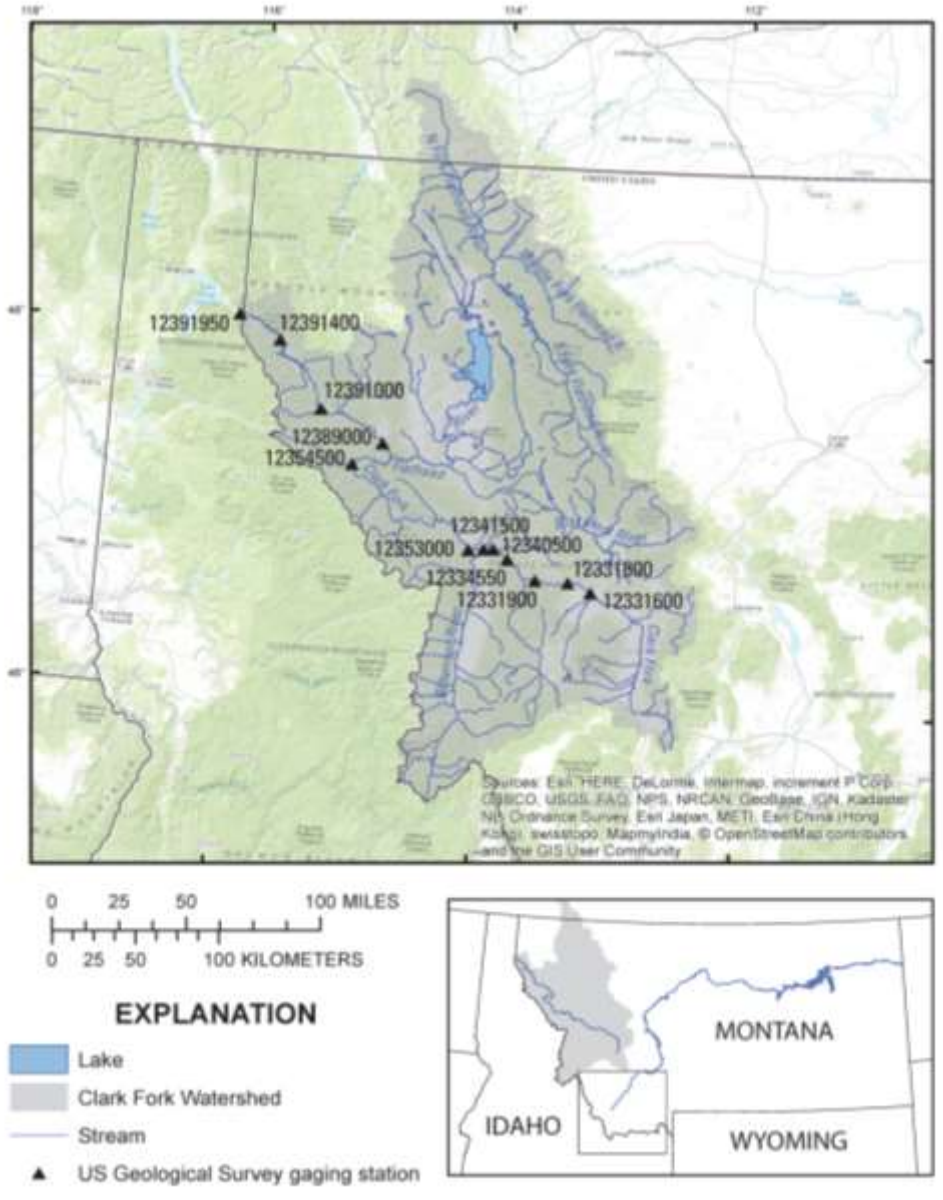
Methods for Estimating Flood Frequency in Montana Based on Data through Water Year 1998

Water-Resources Investigations Report 03-4308

U.S. Department of the Interior
U.S. Geological Survey

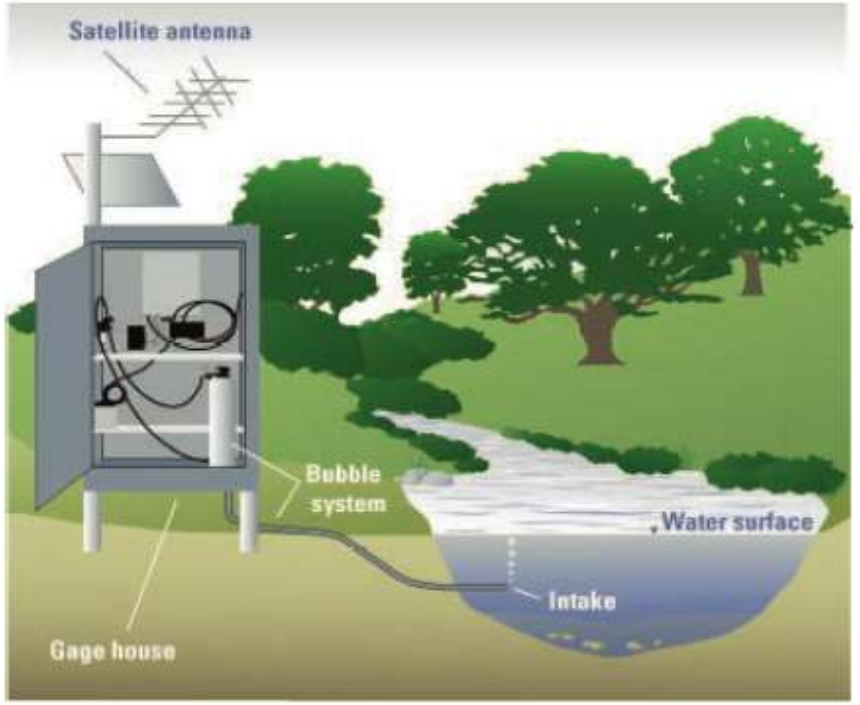
2016 New RiskMAP Projects





WORKING WITH USGS

- Strong Relationship with USGS MT Staff
  - Previous collaboration
  - Trust
- USGS
  - Experts in Hydrologic Analyses
  - Reports are the definitive resource for peak flow hydrology
  - Accepted by FEMA



WORKING WITH USGS

- CONCERNS & CHALLENGES…
  - Meeting the Project Schedule
  - Cost?
  - Providing proper deliverables for RiskMAP project
  - Unknowns – computing 1% Plus & Confidence Intervals
  - Joint Funding Agreement Processing
  - Coordination with Project Team/Contractors

JOINT FUNDING AGREEMENT (JFA)

USGS Water Science Center

20% cost share

Montana Department of Natural Resources & Conservation

80% cost share

- 14 Gage Updates (17C), Develop Methods Report, & Publish

HISTORY OF FLOOD FREQUENCY ANALYSIS IN MT

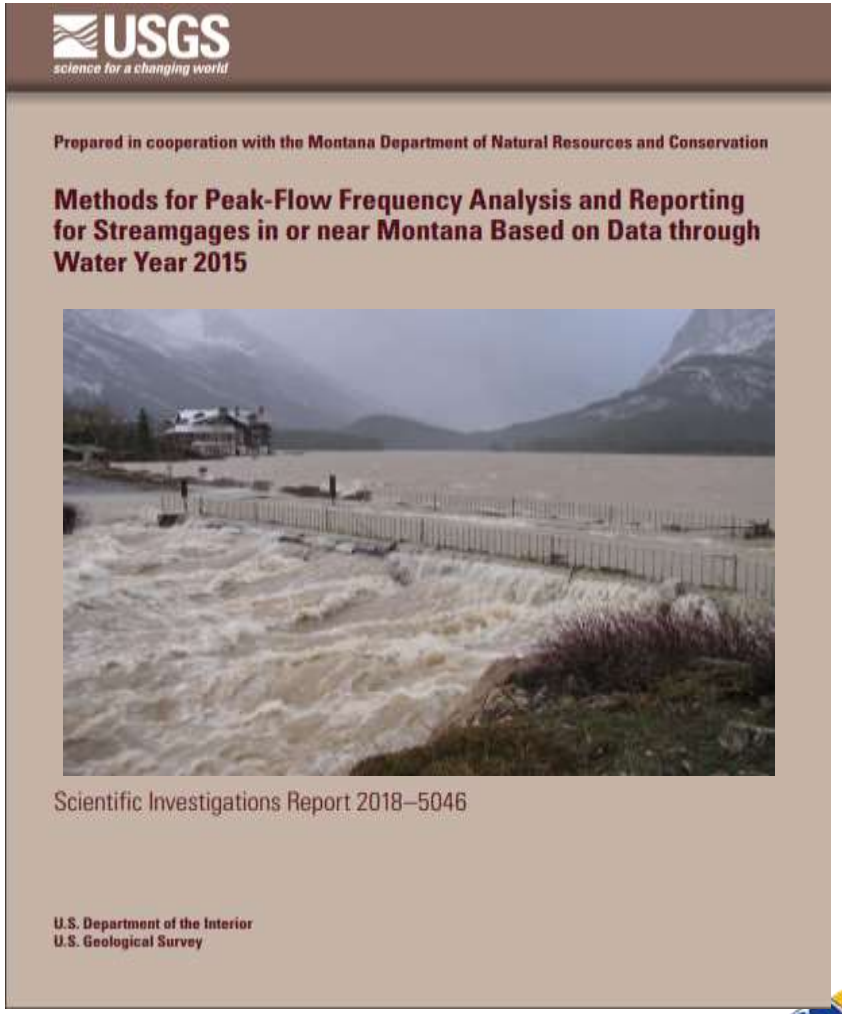
- USGS statewide analyses
- Every 10-15 years
- Extended timelines
- Large cost
- Can be difficult to find funding for a large project
- USGS policy: Interpretive science requires USGS report

NECESSITY-DRIVEN CHANGE

- Flood frequency analyses used by our cooperators should use current data
- Project timelines
- Better investigations into historic information with B17C
- Regulation, ice jams, record extension, etc.

MODEL FOR PUBLISHING FLOOD FREQUENCIES

- Methods report
  - Hydrologic overview of region
  - Detailed B17C methods
  - Detailed methods and reasons for deviations from B17C
  - General description of flood history and flood mechanisms
  - Examples of analyses



https://pubs.usgs.gov/sir/2018/5046/sir20185046.pdf

USGS science for a changing world

MONTANA DNRC

MODEL FOR PUBLISHING FLOOD FREQUENCIES

- Data Releases
  - Summary of input and output data and processing methods or steps
  - PEAKFQ specification file and input file
  - Detailed analysis information
  - Station files with plots, peak flow data, and confidence intervals

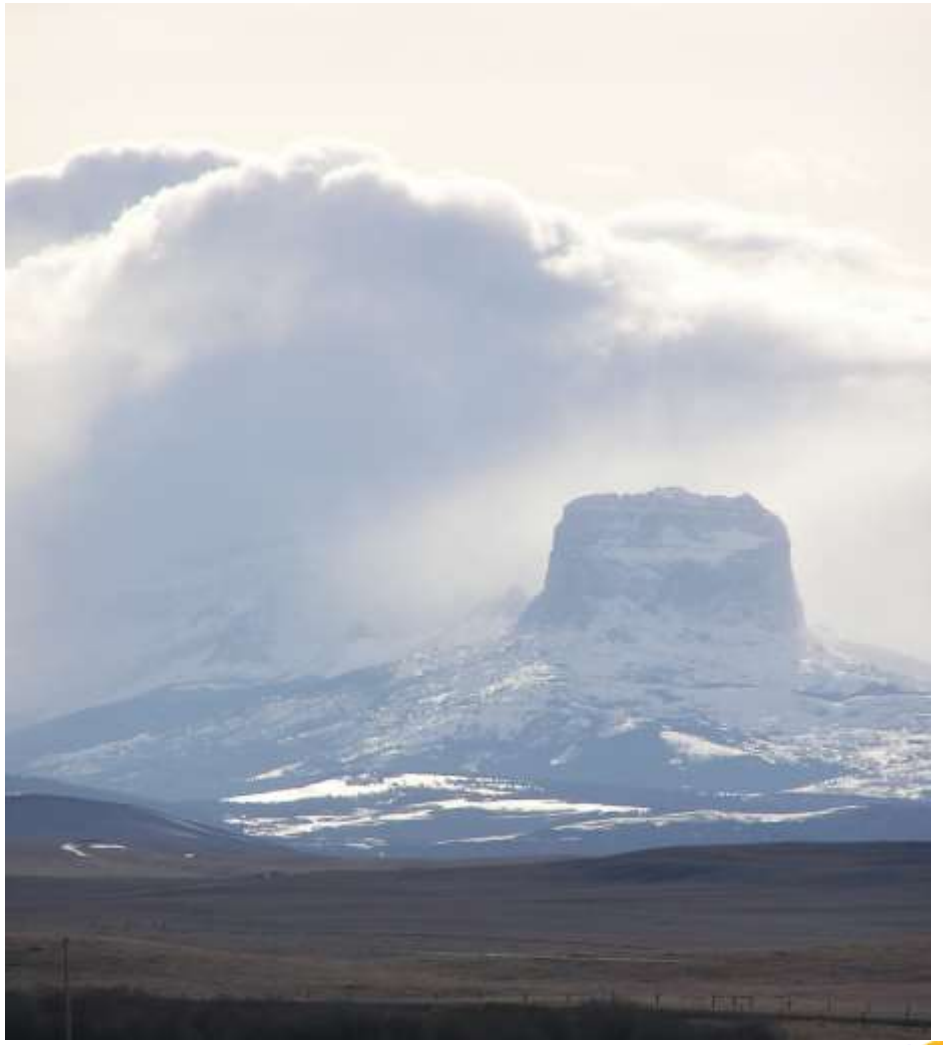
https://www.sciencebase.gov/catalog/item/5852f60be4b0e2663625ee71

IMPROVED WORKFLOW

- Analyses by basin
- Improved timelines
- Less expensive (each year, more expensive per gage)
- Improved documentation
- Availability of analyses

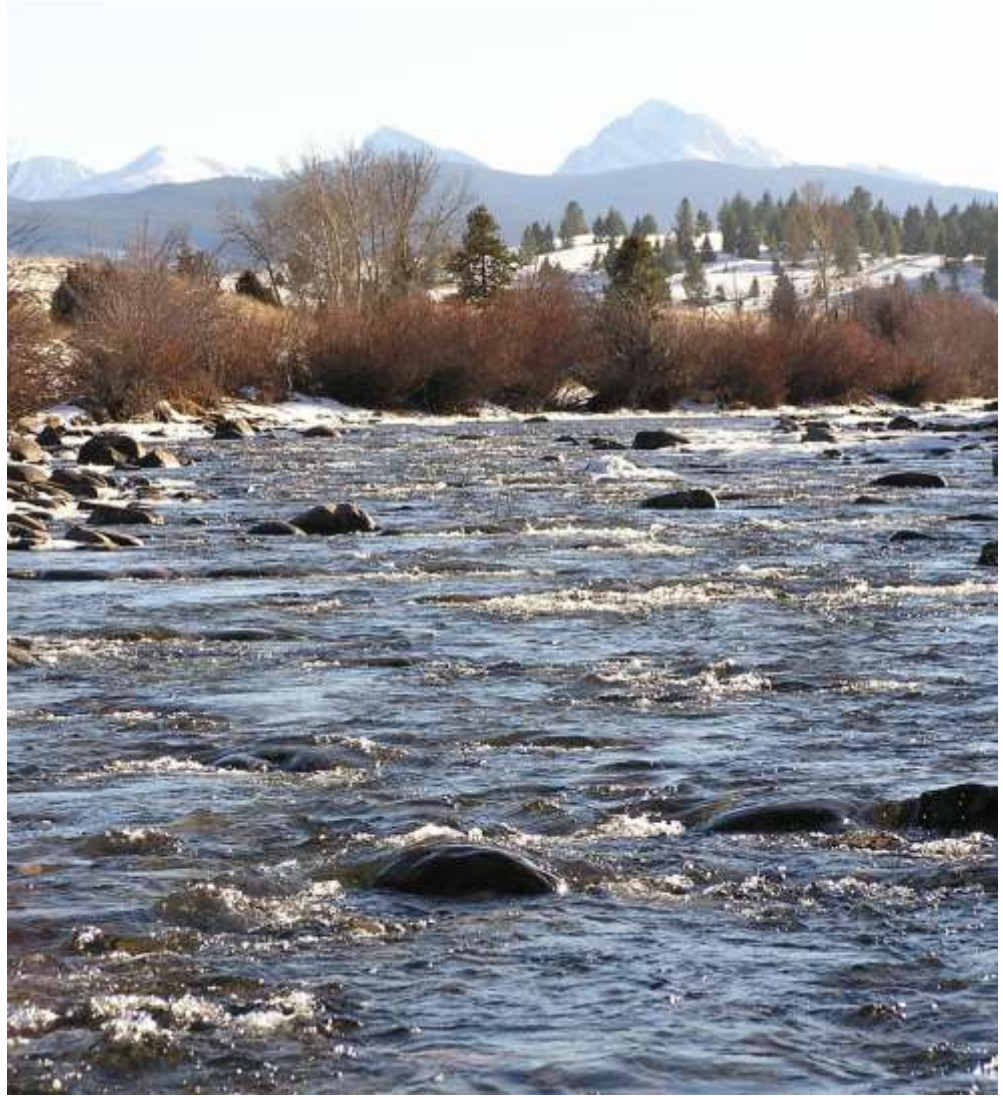
TITLE: "…PILOT STUDY…"

- USGS is currently drafting a policy memo to enable the pilot study to become common practice
  - Frequency analyses will be restricted to the geographical area described in the Methods report
  - Data releases will require specific information to be published
  - Exploring an the idea of a national database for USGS published flood frequencies (in addition to StreamStats)
  - Policy memo still has several hurdles to clear and could substantially change



FUTURE DIRECTIONS

- Streamlined data tabling and reporting
- Improved peak flow file
- National database
- Annual updates of flood frequency
- Improved capability to publish analyses in a timely and cost effective manner



OUTCOMES AND FUTURE

- Advantages of Collaborating w/USGS:
  - New streamlined process for publishing Flood Frequency Updates
  - Future Projects = lower cost and higher cost share
  - Schedules/Deadlines Prioritized
  - Credibility
- Challenges & Solutions
  - Strong Relationships make a difference

Thank You

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Aerial Images by Chris Boyer, Kestrel Aerial Services, Inc.