Stream Gage Oversight Work Group

Subcommittee of the Governor's Drought and Water Supply Advisory Committee
http://dnrc.mt.gov/stream-gage-oversight

MEETING #5 SUMMARY NOTES

DATE: August 12, 2020
TIME: 10:00 – 12:30
LOCATION: ZOOM Webinar

Summary
This was the 5th meeting of the Stream Gage Oversight Work Group. Kirk Miller from the USGS gave a presentation on the USGS stream gage network, how the network is funded, and the costs associated with stream gaging. Nikki Sandve updated Work Group members on the status of the stream gage survey. Work Group members approved their work plan.

Action Items
- Paul will post approved summary notes from meeting #4 to web site.
- Paul will send approved Work Plan to Work Group members and post a copy to web site.

Member Present:
- Stephen Begley – Fish Wildlife & Parks – Co-Chair
- Paul Azevedo – Dept of Natural Resources – Co-Chair
- John Peterson – Dept of Ag
- Darrin Kron – Dept of Environmental Quality
- Mike Honeycutt – Dept of Livestock

Attendees: Pedro Marques – Big Hole Watershed Committee, Ethan Kunard – MWCC, Bill Milton & Laura Nowlin- Musselshell Watershed Coalition, Tracy Wendt – Sun River Watershed, Madeline Gotkowitz-MBMG; Krista Lee Evens – Blackrock, Mike Murphy – MT Water Users Association, Stephanie Adams – MACD, Robin Baker – Office of Senator Daines, Morgan Case-MT Trout Unlimited, Kirk Miller-USGS, John Kilpatrick-USGS, Nikki Sandve-DNRC,

Review of the June 16th meeting
- Paul provide a recap of June 16th meeting.
- June Action Items
    - Ask USGS to give a presentation on gage funding at the next Stream Gage Work Group meeting.
    - Promote stream gage survey.
    - Work Group members should look through the work plan and identify tasks where they can add value.
    - Work with Bill Milton and other stakeholders to develop a process for incorporating their efforts into work plan implementation.
- Work Group approved June meeting summary.

Stream Gage Funding Presentation – Kirk Miller, USGS
Kirk Miller oversees the USGS stream gage program in Montana and Wyoming. His PowerPoint presentation can be found on the Stream Gage Work Group website HERE.

USGS Stream Gaging Network

USGS stream gaging network is a national network of over 10,000 stream gages. The network is composed of several smaller networks making it a "network of networks". Data collected by the network is available to anyone.

- National Streamflow Network (NSN)
    - 8,200+ stream gages nationwide providing continuous stream flow data
    - Funding provided by ~1,400 federal, state, tribal and local partners
    - Gages in this network serve both partner and USGS objectives.
    - Gages in this network are eligible to receive Congressionally Appropriated Cooperative Matching Funds.

- Federal Priority Stream Gage Network (FPS)
    - Conceived in 1999 to be a core, federally funded network to address long-term National priorities and responsibilities.
    - Stream gages must meet one or more of 5 Congressionally Authorized criteria
        - Forecasting – floods, droughts, etc.
        - Support water quality assessments of major rivers
        - Support Interstate and International Compacts and Agreements
        - Track streamflow in major rivers and contributions from key basins to the next downstream basin,
        - Describe long-term trends in streamflow at sentinel sites that typify major ecoregions and river basins.
    - 4,700 gages nationwide meet the criteria.

Funding for the USGS stream gage network comes from a several sources.

- Congress appropriates funds to the USGS for stream gaging. There are two sources of these funds.
    - Cooperative Matching Funds. These funds support studies and data collection serving both partner and USGS objectives. The USGS can use Cooperative Matching Funds to offset up to 50% of partner costs. However, Congressional funding has not kept pace with cost increases and partner demands so actual offset is closer to 40%.
    - Federal Priority Funds. These funds can only be used for gages in the Federal Priority Network. Although 4,700 gages are eligible, Congress has never fully funded the program so only a small fraction of eligible gages are fully funded by the USGS. Montana has 156 active, discontinued or proposed sights that meet FPS criteria. Only 50 are fully funded with FPS dollars. Three are partially funded by FPS with the balance covered by Army Corps.
- Funds provided by other federal agencies such as the Army Corps of Engineers, and Bureau of Reclamation.
- Funds provided by state, tribal, and local governments.
- Funds provided by private entities and organizations.

- Congress occasionally appropriates funds for targeted purposes. For example, Congress recently appropriated funds to support stream gages tied to Indian Water Right settlements. USGS can only use these funds to support stream gaging with Tribal partners.

Funding sources for USGS gages in Montana can be roughly broken down into

- ~1/3 from state, tribal, local sources and FERC licenses (hydropower)
- ~1/3 from other federal agencies
- ~1/3 from USGS
    - Cooperative Matching Funds
    - Federal Priority Stream Gage Funds

Sharing the cost over multiple funding sources results in the operation of far more stream gages than would be possible if funded solely by USGS appropriations. Current USGS appropriations are enough to fully support about 1/3 of Montana's 230 USGS stream gages.

Kirk talked about the different types of funding agreements the USGS has with various partners. The source of funds determines the type of agreement

1. Joint Funding Agreements (JFA)
    - Between USGS and entities having taxing authority (state and local governments).
    - Gages covered by a JFA are eligible for Cooperative Matching Funds
    - There are 18 partners in Montana with at least one JFA.
    - Keeping track of the JFAs can be difficult because
        - A single JFA can cover numerous gages or a single gage
        - An individual partner can have multiple JFAs
        - A single gage can have multiple JFA's if it has multiple funding partners
2. Interagency Agreements
    - Between USGS and other Federal agencies.
    - Gages funded through interagency agreements are not eligible for cooperative matching funds
3. Collaborative Agreements
    - Between USGS and private entities and organizations i.e. entities without taxing authority.
    - Gages covered by these agreements do not qualify for cooperative matching funds
4. Agreements with FERC licensees – Hydropower generation.

Kirk noted that a single gage may be supported through a Joint Funding Agreement with a state partner, an Interagency Agreement with a federal partner and a Collaborative Agreement with a private partner. Tracking the myriad of funding agreements on different fiscal years can be complex.

Stream Gaging Costs

- Cost are broken into two categories, installation, and operation and maintenance.

Installation

- Installation is considered a onetime expense. Installation costs include:
    - Site reconnaissance and selection
    - Equipment
    - Site prep and construction

    - Surveying reference datum
    - Database configuration
    - Other: Cableway or other means for measuring streamflow at sites that are too wide and/or swift to wade.
- Installation cost vary widely depending on location and site conditions. Three recent installations at sites with easy access on wadable streams averaged about $7,800 each. On the flip side, recent replacement of cableway across Clark Fork River near Missoula cost over $100,000.

Operation and Maintenance

- Operation and Maintenance (O&M) includes everything that goes into collecting and publishing publicly accessible stream flow data. “Gage to Page”. O&M costs include:
    - Continuous year-round collection of gage-height and stream flow data at 15-minute intervals
    - Establishment and maintenance of stage-discharge relation i.e. rating curve
    - USGS personnel collecting 8-10 discharge measurements per year
    - Satellite telemetry
    - Quality assurance measures including field validation of stream gage datum; analysis and approval of all measurements and records
    - Repair and/or replacement of equipment and instrumentation
    - Database maintenance and permanent archival of all data and records
    - Support:
        - USGS National Stream Flow Program – access to technical specialists, periodic audits, and database enhancements
        - Local USGS Science Center – management, administrative functions, IT infrastructure, facilities, vehicles.
- For the purposes of O&M costs the stream gage network is managed as a complete system. Total cost is equally allocated to each gage in the network. The inclusion of Cooperative Matching Funds can reduce the total costs for partners.
- Annual O&M costs (late FY20).
    - $18,265 – Year-round stream gage
    - $12,800 – 7-month seasonal gage
- Cost Distribution (O&M)
    - Salary 43.6%
    - Travel/vehicles 9%
    - Equip/supplies 7.8%
    - Support 39.6%

Why Does It Cost So Much?

To understand the cost, it is important to understand how stream gages monitor stream flow.

- The objective of a stream gage is to provide a continuous record of stream flow or discharge. However, stream gages do not measure discharge. Stream gages only measure stream stage; the height of water above a surveyed local datum point. Stage is also referred to as gage height. Stream gages measure stage every 15 minutes.
- Discharge is a rate of flow generally expressed as cubic feet per second. Discharge is a function of the cross-sectional area of the stream channel at the gage site multiplied by the average velocity of the water flowing through the channel.

- To convert stage (measured by the gage) to discharge requires knowing the connection between stage and discharge. This is done by developing a stage-discharge rating curve depicting the relation between stream stage and stream discharge at the stream gage site.
- Each stage-discharge rating curve is site dependent. They are developed by taking numerous physical stream discharge measurements over a period of time and over a range of stages (from low flow to flood stage). Each point on the stage-discharge graph represents one discharge measurement. Connecting each point with a smooth line allows estimating the discharge at any given stage.
- The rating curve for almost every stream gage will vary over time due to changes in the stream channel resulting from sedimentation, scour, ice, debris, growth of aquatic vegetation, etc. The growth of aquatic vegetation in late summer when flows are low will raise the measured stream stage creating an error, or drift, in the stage-discharge curve.
- To keep rating curves accurate and up-to-date, USGS personnel visit each stream gage 8 – 10 times per year to make a discharge measurement. Adjustments or shifts are made to the rating curve as stream channel conditions change.
- Kirk stressed that developing and maintaining the validity of the stage-discharge rating curve is the core of USGS stream gaging. The validity of any discharge measurement you see on your computer screen hinges on USGS personnel maintaining the accuracy and legitimacy of the rating curve. This requires time, travel, field work in all conditions, special equipment, and a trained workforce to bring it all together.

Work Plan – Stephen Begley

- Stephen led a discussion on draft work plan. Version dated August 10.
- Work plan was revised based on input received since June meeting.
- Work Group members approved the work plan.
- Action Item – Paul will send approved Work Plan to Work Group members and post a copy to web site.

Report to WPIC – Paul Azevedo

- Paul attended July 14 meeting of the Water Policy Interim Committee (WPIC) to give them a report the Stream Gage Work Group's activities.
    - Update on accomplishments and outreach to date.
    - Senator Sesso – seemed disappointed that Group would not deliver a work plan and recommendations by the end of the year.
    - Committee was interested in Work Group's relationships with stakeholders. Were we working with them?
    - Senator Cohenour offered to have WPIC write a letter of encouragement to USGS.
    - Committee was interested in gage at Muddy Creek at Vaughn. Interested in funding and how cost share worked.

Update on Stream Gage Survey – Nikki Sandve

- There have been about 25 or 30 more respondents since the June update
- Most respondents say they check gage readings either daily or weekly in the spring or summer. Many respondents have been checking stream flow data for over 7 years.

- 93% of respondents get their information from the USGS web site at www.waterdata.usgs.gov. A website run by American Whitewater (https://www.americanwhitewater.org/) showed up in several responses.
- Most responders do not realize the operation and maintenance costs.
- Responses have been received from all thirteen of the HUC 4 watersheds in MT.
- Personal/Recreation seems to be the most popular interest in checking stream flow data Irrigated agriculture does not seem to be responding to survey. Outreach information has been sent to numerous ag related groups. SWCDM has posted a survey link in 3 of their newsletters.
- We are also not seeing many responses from tribal interests. Nikki will try additional outreach
- Survey will remain open until the end of September.

Stakeholder Meeting – Paul Azevedo, Bill Milton

- Stephen Begley and Paul held a conference call on Wednesday August 5th with representatives of stakeholder originally involved in SB32.
- Participants were Bill Milton and Laura Nowlin – Musselshell, Stephanie Adams -SWCDM, Pedro Marquis – BHWC, Jennifer Schoonen – Blackfoot Challenge, Tracy Wendt – Sun River Watershed, & Ethan Kinard – MWCC.
- Discussed progress to date and a process for stakeholders to engage more with Work Group.
- Bill Milton – Stakeholders have agreed to set up their own information working group that would parallel and support the Stream Gage Work Group. Will also try to get more agricultural people involved in stream gage survey. Bill hopes informal group can move something forward that will result in sustained funding for stream gages.

Public Comment

- Stakeholders provided input throughout the meeting. There was no additional input during public comment period.

Next meeting

- Next meeting will be in October. Date and time will be determined by Doodle Poll