LOWER MINNESOTA RIVER
WATERSHED DISTRICT

Executive Summary for Action

Lower Minnesota River Watershed District Board of Managers Meeting
Wednesday, July 18, 2018

Agenda Item
Item 5. A. - USGS

Prepared By
Linda Loomis, Administrator

Summary
The LMRWD has been a partner with the USGS to maintain a stream gauge to measure Minnesota River flow a Fort Snelling for several years. The District has also partnered with the USGS and the US Army Corps of Engineers to monitor sediment loading in the Minnesota River. The partnership agreements have expired and the USGS would like to continue to partner with the LMRWD and the Corps.

On Wednesday, June 11, Della Young and I met with Joel Groten and James Fallon from the USGS and with Jon Hendrickson from the Corps of Engineers. All parties are interested in continuing the partnership. The USGS provided some information for the Managers, which is attached. Mr. Groten and Mr. Fallon will attend the Board meeting to answer any questions. We also discussed approaching others who use the information about the flow and sediment to participate financially. If other partners are found, the agreements can be amended to include new partners. The MPCA and Met Council are the most likely partners.

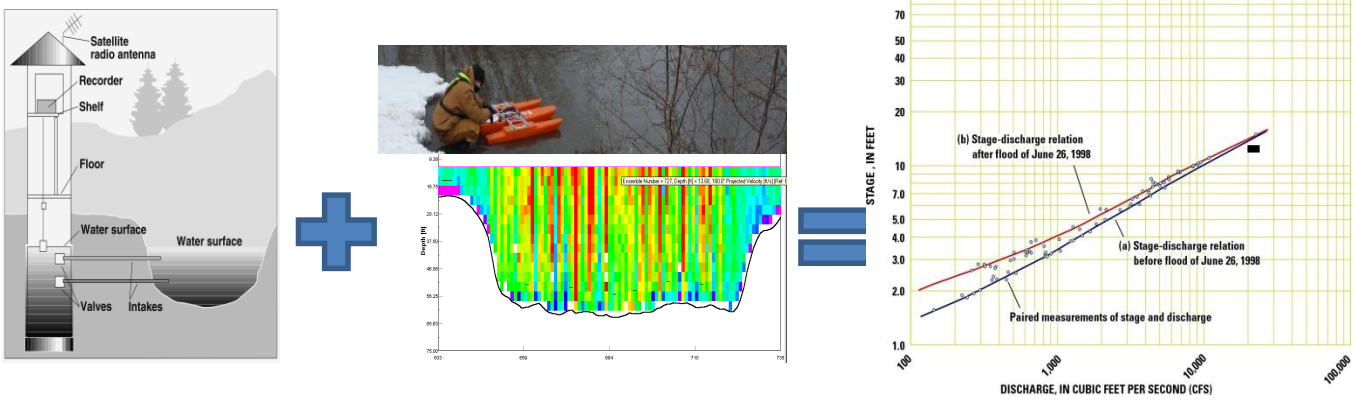
Attachments
USGS handout

Recommended Action
Authorize participation in USGS flow and sediment monitoring.

Summary of Streamgage and Sediment Monitoring Operations at Minnesota River at Ft Snelling

Streamflow computation at Ft Snelling requires extra sensors & parameters

Discharge computed from relationship between continuously recorded stage & frequently measured discharge (stage-discharge relation)

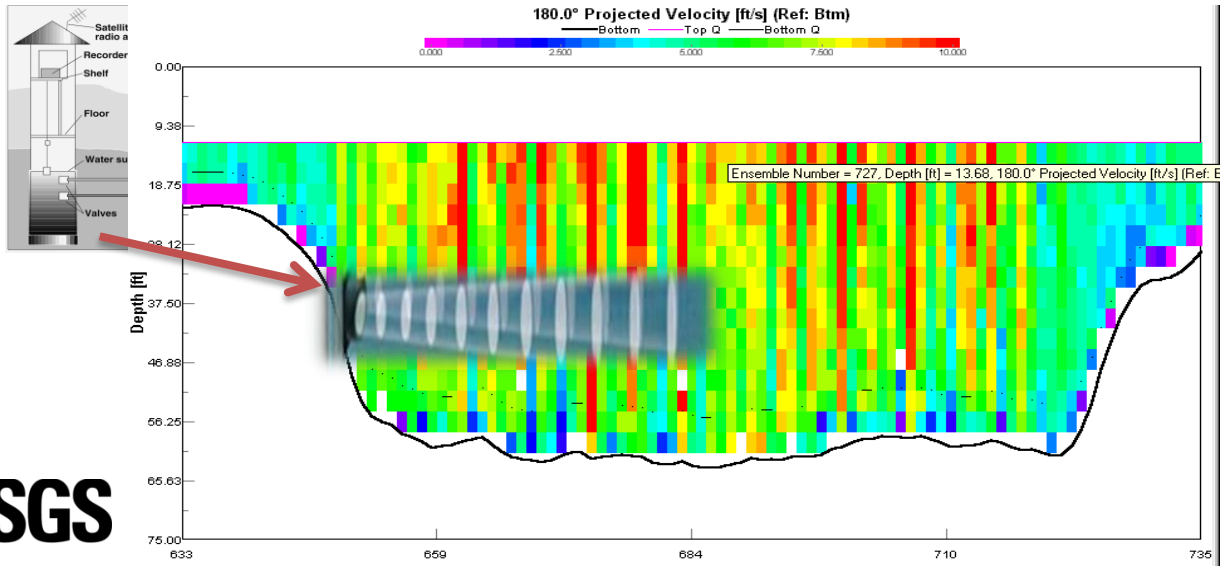


Backwater from downstream nullifies relation at Snelling

- To compute discharge, need 2 more parameters:

  Stream velocity + cross-sectional area

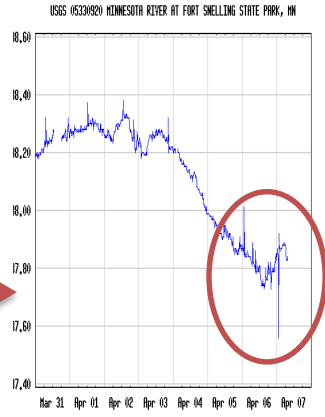
- Discharge = stage + area + velocity relation (with additional sensor)



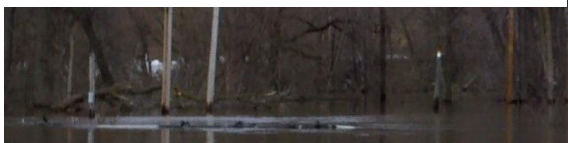
USGS

History of Gage

- 2004-06 3-yr funding for O&M by USGS, MCES & LMRWD
- 2004 Jan. Real-time index-velocity streamgage established. Shelter mounted on Airport runway-lights structure 17 ft above floodplain; sensor in river on MCES pier
- 2004 Gage records passing barge that causes 0.3 ft drop in stage & reverse velocities of -1.0 ft/sec for 30-60 minutes
- 2004 Dec Electrical contractor severs ADVM cable ($3750)
- 2006 Flood damages pier securing ADVM sensor
- 2007 Lower Minnesota RWD assumes funding agreement
- 2008-10 3-year Funding Agreement with USGS & LMRWD
- 2010 Mar Flood & channel changes require new index-velocity rating (#4). KSTP-5 meets USGS at gage for flood.
- 2010 Jul Met Council announces plans to reconstruct pier. Reschedules for December 2010, then…
- 2010 Sep Floods destroy pier housing ADVM; ADVM lost
- 2011 1-funding agreement: LMRWD & USGS
- 2011 Feb New ADVM sensor temporarily deployed on remaining pier, provisional discharge posted to web
- 2011 Oct USGS Nebraska staff use side-scanning sonar to locate ADVM & contract diver recovers unit ($2K), but damaged. New sensor (~$15K)
  - Continuous sediment load monitoring study begins, which requires data from streamgage and ADVM
- 2011 Nov Met Council contractor finishes pier construction, USGS installs new ADVM sensor on new pier.
- 2012 Changes to channel from flooding and new location of ADVM sensor require complete new development of stage-area-velocity relation for real time discharge
- 2012-16 5-year funding agreement: LMRWD & USGS
  Various upgrades to loggers, instrumentation, etc
- 2017 1-year funding agreement 2017
- 2018 Streamflow gage currently operating as unfunded



USGS



USGS Data Available from Gage

- Real-time stage, discharge, velocity, …
- WaterAlert – receive text/email alerts based on your values
- WaterWatch streamgage dashboard
  https://waterwatch.usgs.gov/?id=wwsa&site_no=05330920
- Archive of instantaneous discharge data
- Annual peak streamflows (used in flood-frequency analyses)
- On-line access to discharge measurements, sediment, WQ data
- Annual Data Report & summary statistics
- StreamStats
- Other features…

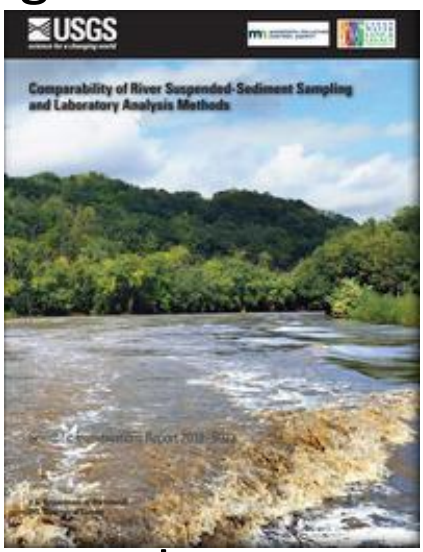
Many Agencies, Corporations & public use Ft Snelling data

- USGS uses flow to verify flows downstream on Mississippi
- NWS uses to improve upstream & downstream river forecasting
- USACE for navigation and dredging
- USFWS monitors gage for their Nat'l Wildlife Refuge Operations
- MPCA water-quality studies
- Met Council
  - Discharge for MCES WQ monitoring at site
  - MCES Lower Minnesota modeling study
  - MCES - Discharge for MCES Blue Lake WWTP
- Metropolitan Mosquito Control District monitors for operations
- Excel Energy monitors for power plant operations
- Discharge for suspended & bed sediment studies with LMRWD & USACE
- Navigation industry for barge operation
- Wenck and other consulting firms
- Public for recreation, fishing, cycling, etc
- Site used as USGS demonstration for NWS, Minnehaha Cr WD, for USGS measurement methods on big rivers, ADCPs, ADVMs, local media.

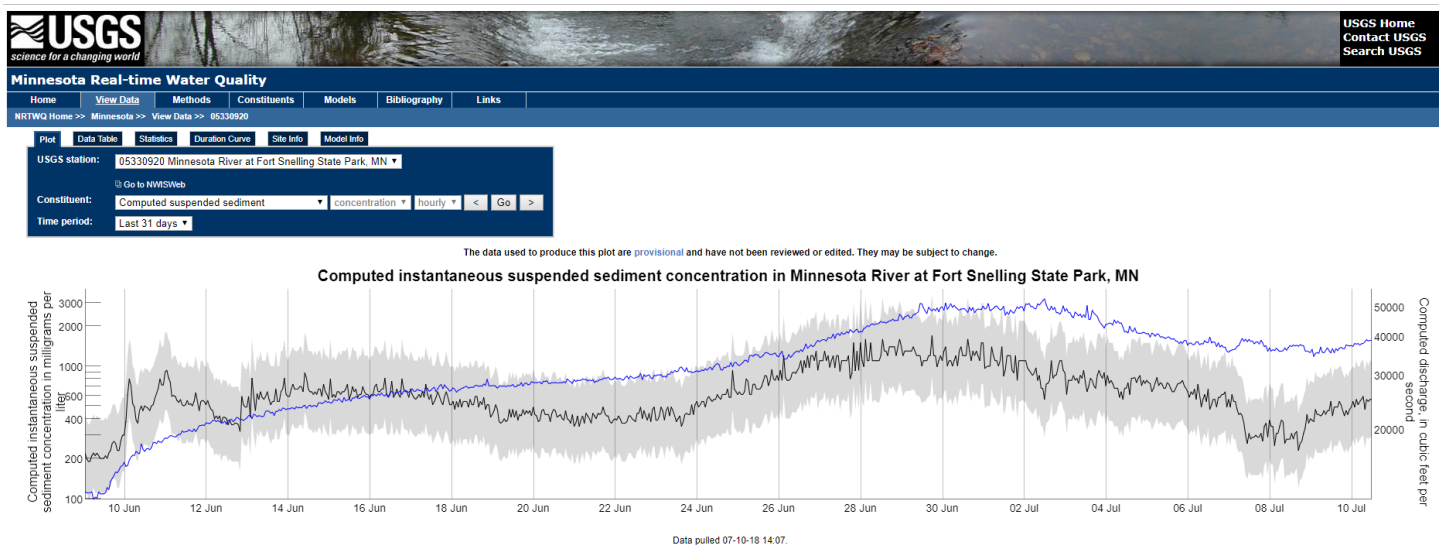
USGS

Using Data from Gage and Interpreting

- 2 Peer-Reviewed Reports
  - 2016 published report that was important in understanding sediment transport mechanisms

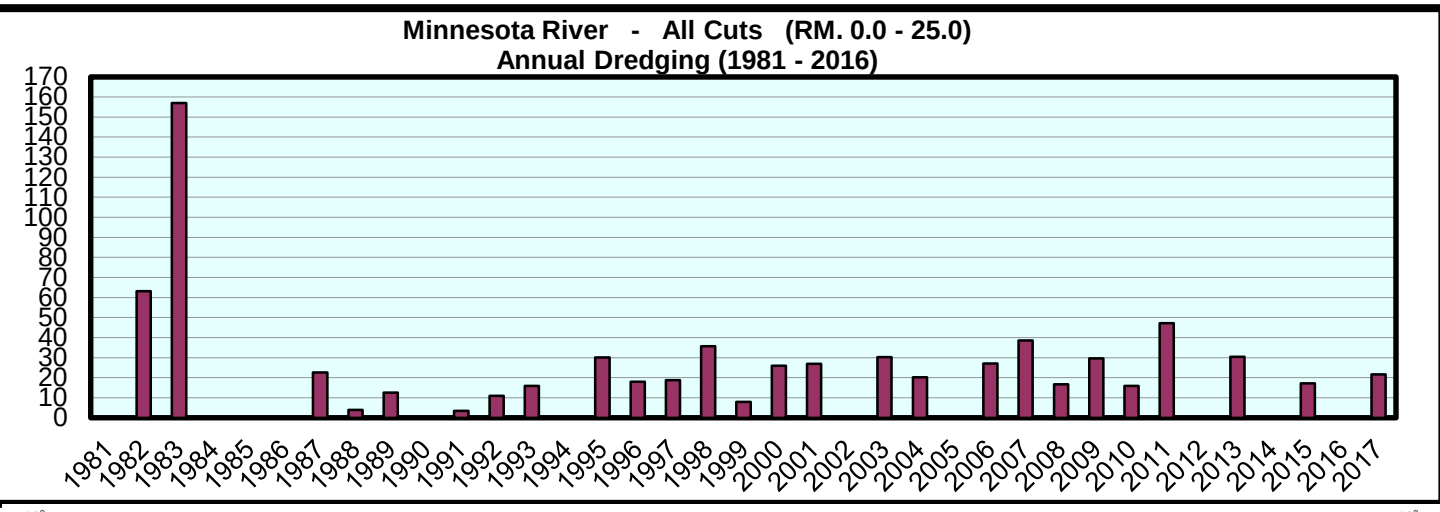


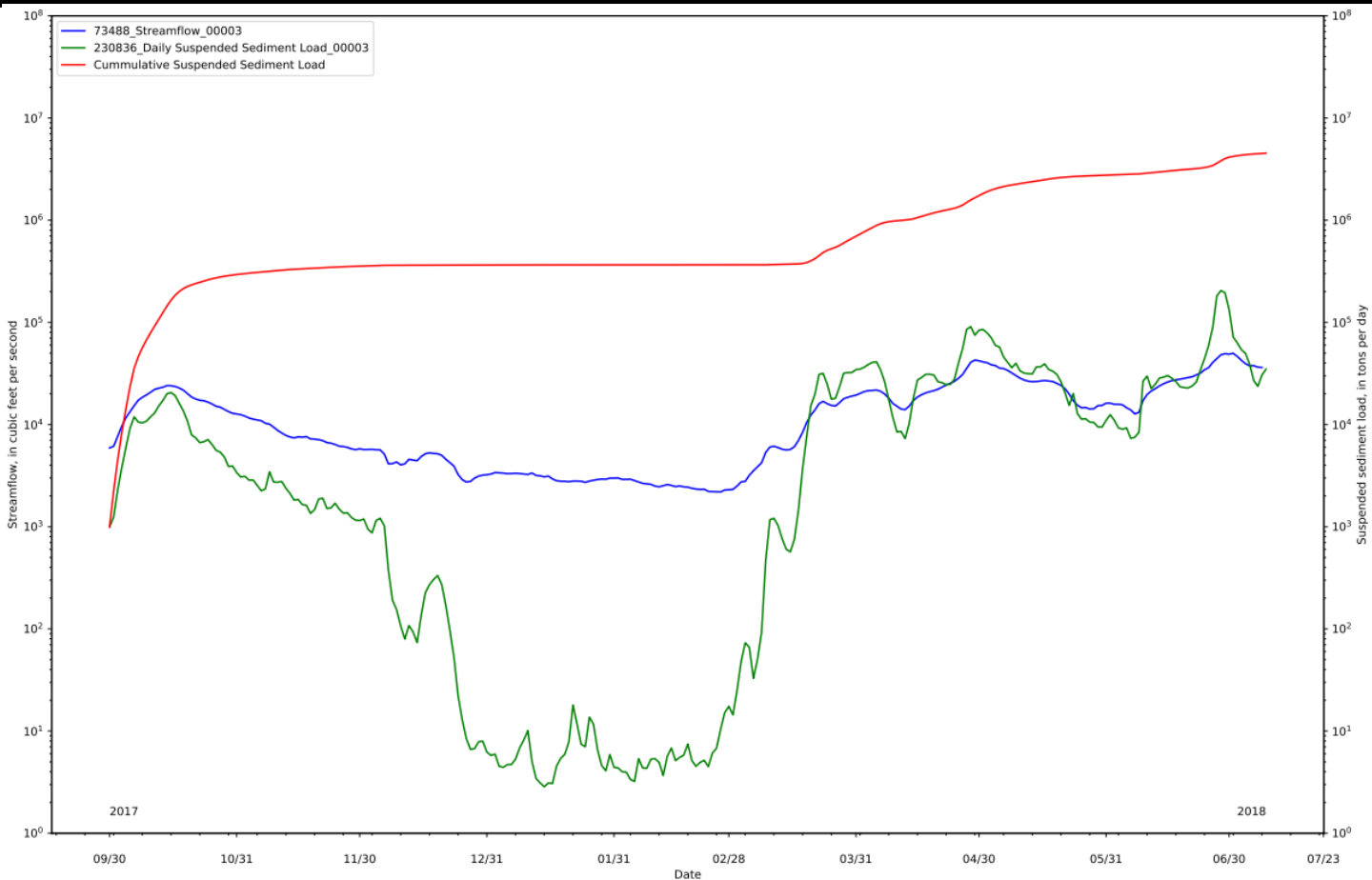
  - 2018 publishing another report on new technology to improve loads
- Continuous Estimates of SSC on USGS NRTWQ Website for Fort Snelling, Jordan Possible



Using Data from Gage and Interpreting

- Using suspended sediment data to inform dredging





Recent & Proposed Funding

Streamgage

- FY17 Agreement
  - USGS: $6,295 LMRWD: $10,391 Total: $16,686
- Our average operating cost for “index velocity” gages is $21,800
- Propose a modest increase, recognizing there is some cost savings in shared work with sediment
- USGS matching funds are used competitively, so a longer-term agreement would help secure those funds into the future.

Proposed funding for streamgage O&M at the Minnesota River at Ft Snelling				
Fiscal Year	Total Funding	USGS Matching Funds	Lower Minnesota River Watershed District	Comments
2018	$ 18,900	$ 8,000	$ 10,900	
2019	$ 19,278	$ 8,160	$ 11,118	Assume 2% inflation for out-years of multi-year agreements
2020	$ 19,664	$ 8,323	$ 11,340	
2021	$ 20,057	$ 8,490	$ 11,567	
2022	$ 20,458	$ 8,659	$ 11,799	
TOTAL	$ 98,356	$ 41,632	$ 56,724	

Sediment

- Sediment work in the last 3 Years USGS received $8,000 in 2016, $8,240 in 2017, and $8,500

We’re grateful the funding support you’ve provided for an important monitoring site for the Minnesota River and Twin Cities. Are there concerns we can address?

USGS

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Joel Groten jgroten@usgs.gov 763-783-3149

Field operations

Gage installation, Oct. 2003

Sensor installation, 2003

Flood damage, sensor lost 2011

Discharge measurement & sampling, 2011

Winter measurement, Feb 2017

Sensor line damage and repair, 2016

Removing debris from sensor, 2017

Sensor maintenance

Radio upgrade, 2017

Flood, 2017, turbidity sensor & gage