

# Meeting

From Page 1

three feet higher on my house (than it did during this summer's flooding). I have a problem with that. You need to step back and take a deep breath."

The Corps had a perfect opportunity to implement flushing with this year's releases of 160,000 cfs at Gavins Point and Fort Randall dams, said Doug Larson of Yankton, who saw inundation of his Larson's Landing recreational vehicle and mobile home park.

"You say this study didn't take economic and other factors into account. I just got wiped out for a half-million dollars," he said.

"You're talking about 8 days of 176,000 cfs. That's 16,000 cfs more than what we had (all summer). Why, after 30 days (of flooding), didn't you say, let's drop Lewis and Clark Lake and flush it out and get it over with?"

"Now, I sit here wondering if you're going to drop this (high release) on me again," he added.

The flooding was unforeseen because of unprecedented snowmelt and spring flooding, said John Remus, chief of the hydrologic engineering branch of the Corps' Omaha District.

"We didn't have the opportunity to take advantage of (the historic releases), to lower the lake," Remus said, adding that the sediment study was not connected to this summer's flooding.

Remus added that, while scenarios called for releases of 176,000 cfs, he didn't think the Corps would choose figures that high.

Wagner farmer Dan Cimpl pointed to the losses sustained by property owners with flushing of the river.

"Are you looking at what it's costing us as farmers every time you flush? We experience the flushing, and it fills up our sloughs and potholes, and we lose our crops," he said.

"Does your study figure what it costs our cropland for what it benefits you (as the Corps)? Every time you flush, I have sand on my land."

State Rep. Frank Kloucek of Scotland and Yankton resident Ed Lammers asked whether the Corps considered putting dams on the Niobrara River to stop sediment from entering the Missouri River.

The Corps wasn't authorized to put dams on the Niobrara River, and it wasn't included in the Corps' sediment study, Remus said.

He also noted the construction of dams on the Niobrara River wouldn't stop sediment from entering the Missouri River.

"We can't eliminate sediment in the Niobrara. It's not possible," he said.

Omaha attorney Rick Spellman, who owns a home at Niobrara, Neb., and has handled litigation against the Corps, asked if it was possible to reverse sedimentation with adequate funding.

Remus noted the financial and political limitations for sediment efforts.

"(The term) 'adequate funding' is somewhat nebulous," he said. "If money was no object, there are all types of means, like flushing, bypass and dredging. And is it sustainable? That's the question."

Corps engineer Paul Boyd explained the sediment study, noting it used computer models. A physical model is very expensive and would need to include the entire dam system, he said.

The deposition of sediments in reservoirs along the mainstem of the Missouri River is an important concern of the U.S. Army Corps of Engineers, Boyd said. Sedimentation at Lewis and Clark Lake is of particular interest due to the subsequent loss of water storage capacity and increased water elevation.

This deposition impacts species habitat, recreation, private property and infrastructure of both the lake and the Missouri River.

In response to the current and future impacts to the Missouri River and the reservoir, the Corps is conducting the LCLSMS at the request of the Missouri River Recovery Program to examine ways of restoring the balance of sediment in the lake and river. This study was recommended by the 2003 Amended Missouri River Biological Opinion issued by the U.S. Fish and Wildlife Service.

Sedimentation in Lewis and Clark Lake has been occurring as a result of the Gavins Point Dam closure in 1955, according to the Corps. During the past 50 years, this sedimentation has caused the delta to expand in the Springfield and Niobrara/Santee, Neb., area and build in both the upstream and downstream directions.

More than 2,400 acre-feet of water storage is lost each year in Lewis and Clark Lake because of sedimentation. As of 2007, the lake had lost about 22 percent of its original storage capacity. More than half of the sediment flowing into the lake comes from the Niobrara River.

The loss of sediment in the river below the dams resulted in degraded channels with high

banks and limited access, according to the Corps. This degradation has also resulted in significant loss of fish and wildlife habitat that is built through sediment transport and deposition.

The LCLSMS is an engineering viability study that will examine the possibilities for moving sediment in the delta by controlling water levels and flows from Fort Randall and Gavins Point dams. The study will evaluate alternatives that use currently existing infrastructure as well as alternatives that incorporate a lowering of the spillway gates at Gavins Point Dam.

The developed alternatives include variations in water flow, reservoir elevations and flow duration.

The U.S. Army Corps of Engineers has worked with Colorado State University and Dr. C.T. Yang to develop a hybrid model based



Boyd

on the Generalized Sediment Transport Model for Alluvial River Simulation (GSTARS). This model was calibrated with historic data on the Missouri River and tested with reservoir flushing data from Pakistan and China.

Five scenarios were tested, all including temporarily draining Lewis and Clark Lake to maximize sediment movement. These scenarios are

- 176,000 cfs for eight days;
- 88,000 cfs for 10 days;
- discharge of the annual load of 2,400 acre feet;
- the first scenario with the spillway lowered 10 feet;
- the third scenario with the spillway lowered 10 feet.

A hydrograph was developed

for each of the scenarios to model the discharge, which included draining the lake, releasing the flushing flow and refilling afterwards.

For all five scenarios, more than 99.9 percent of flushed sediment was silt and clay. Significant amounts of sand were moved by the water, but were re-deposited in the deepest part of the lake before reaching the spillway.

For each scenario, maximum sediment transport occurred at the start of the high flows, when the river collected silt and clay particles, to carry past the dam. The transport declined during the high flow, likely due to reduced availability of fine sediment.

The modeling conclusions were as follows:

- Sediment can be flushed from Lewis and Clark Lake with the current infrastructure.
- The sediment flushed is comprised of silt and clay particles.

Sand is transported to the deep area of the lake.

The flushing flows result in channel degradation in the Niobrara River delta and the Missouri River delta in Lewis and Clark Lake.

For one scenario, fine sediment delivered below Gavins Point Dam may deposit within the channel banks, causing minor temporary aggradation.

Flushed sediment that reaches the channelized river below Ponca, Neb., will likely continue to move through the system.

While high flows transport the greatest volume of sediment, lower flows may be effective due to the shortened remaining lake.

Flushing is not highly effective for building fish and wildlife habitat with sand below Gavins Point Dam.

Changes in reservoir geometry — including lower outlets,

shorter reservoir and channelization — would aid in flushing efficiency.

At this point, flushing doesn't appear feasible for transporting sediment on a long-term basis for the entire basin, Remus said.

"If we make operational changes, we need to have the confidence in a model," he said. "You can't implement this (study) just at Gavins Point Dam. You would have to make changes at all six dams. For an operational change, we would need to look at the entire scope."

The LCLSMS is undergoing final work before it is released, Remus said. If found physically feasible from an engineering standpoint, more public meetings and gathering of input would be held before taking any final action, he said.

"We are making the determination if we will take it to the next level," he said.

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