National Regional Sediment Management Program Seattle District (NWS):

Optimization of Reach Scale Gravel Nourishment on the Green River below Howard Hanson Dam, King County, WA

Description

This project leverages historical monitoring data and numerical modeling to estimate optimal gravel nourishment loading volumes and size specifications below Howard Hanson Dam on the Green River in Washington State. The gravel nourishment is necessary to replace sediments captured by the reservoir and is required by biological opinions issued under the Endangered Species Act (ESA).

Green River Gravel Nourishment Detailed Study Reach (RM 58-60) and Treatment Reach (RM 30-60)

Issue/Challenge To Address

Currently up to 12,000 tons of spawning rock are loaded annually below Howard Hanson Dam on the Green River in Western Washington State to comply with Endangered Species Act Biological Opinions related to endangered Chinook salmon recovery and compensating for the gravel starvation impacts of Howard Hanson Dam on the Green River. This costs $100,000-$200,000 per year. This ecosystem restoration project is expected to last for at least 50 years and treats a 30 mile long reach of the Green River (see image above).

The goal of this RSM project is to determine the appropriate gravel size and loading rate to promote dispersal under high flows and remain stable under moderate flows so that most spawning events are successful while also minimizing costs. This will be done by first using hydraulic models to understand what the range in flood event bed elevation fluctuations are and how varying loading rates and sizes of nourishment gravel influences those fluctuations, if at all. The loading rate and grain size that results in the least amount of reach-averaged vertical fluctuation in the bed for scour events will be considered optimal. This work will be followed by numerical simulations of long-term bed conditions resulting from repeated gravel nourishment using the optimal loading rate and grain size.

Successes Lessons Learned

New Start

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Projected Benefits Cost Savings Value Added

- Reduced monitoring and gravel placement costs
- Improvements to spawning habitat endangered salmon populations
- Improved understanding of the navigation and flood risk management implications of gravel nourishment below dams

Expected Products

- ERDC Technical Report
- HEC-RAS Sediment Hot Start improvements

Stakeholders/Users

The project stakeholders in the Seattle District are operations staff at Howard Hanson Dam, project biologist, and H&H branch. External stakeholders include the State of Washington, City of Tacoma, and Muckleshoot Indian Tribe.

Leveraging Opportunities

This project leverages more than 15 years of data collection in an intensively monitored reach below an ongoing gravel nourishment project below a Corps operating project that has a continuous hydrologic record dating back to the 1930s. Limited O&M funding will be available to perform maintenance updates to the modeling resulting from this effort. The State of Washington, City of Tacoma, and Muckleshoot Indian Tribe are all very interested in the continued gravel nourishment as part of the salmon restoration efforts on the Green River.

Points of Contact

Zachary Corum
CENWS-ENH-H
Hydraulic Engineer
206-764-6581
Zachary.P.Corum@usace.army.mil

Travis Dahl, CEERD-HF-R
Research Hydraulic Engineer
601-634-2371
Travis.A.Dahl@usace.army.mil

Participating Partners

USACE ERDC Coastal & Hydraulics Laboratory
USACE IWR-HEC
State of Washington
City of Tacoma
Muckleshoot Indian Tribe