Factors Influencing Dredging Dimensions
Upper Mississippi River - St. Paul District

The District is committed to minimizing overall dredging quantities and costs, while maintaining the necessary project dimensions. The objective is to optimize a balance between dredging frequency, quantity and cost without compromising safety and reliability for the project user. There are numerous factors that influence a determination of dredging dimensions for a given location and dredging event. Some of the factors are related to the hydraulics of the river system and others are operational in nature. They may affect the determination of dredging depth, width or timing of the event. Not all factors are considered for each dredging event. Some are evaluated over a period of time and may consider a history of dredging events. The factors are discussed below.

1. Location to Tributaries - Deeper dredging depths are favored for cuts located just downstream of a heavily sediment laden tributary.

2. Type of Reach - A straight, divided river reach favors deeper dredging while an undivided bend in a stable meandering reach is better suited for shallower dredging depths.

3. Location of Cut with Respect to the Thalweg - A cut in alignment with and on the thalweg is considered a positive factor for shallower dredging. A cut on or near a point bar favors deeper dredging depths.

4. Cut Stability - If experience indicates that a cut does not fill or scours under low flow conditions shallower dredging may be justified. Cuts filling under low flows support deeper dredging.

5. Dredging Frequency/Volume - Actual experience dredging to different depths is valuable. If overall volume and frequency is lower because of shallower depth dredging, it would favor continuation of the practice.

6. Surrounding Depths - Dredging depth consistency with surrounding depths outside of the cut area is a consideration to avoid creating significant variation in contours.

7. Equipment Efficiency - Dredging equipment is generally more efficient with deeper depths because the average dredging face (layer being removed) is closer to the equipment's design for optimum performance.

8. Placement Site Factors - A site with limited capacity favors reduced dimensions to minimize dredging quantities and maximize site longevity. A related factor for hydraulic dredging is the placement site's tolerance for a high water ratio in the slurry. If the site cannot tolerate large volumes of water, a deeper depth is favored to increase the sand portion of the slurry. A related factor for mechanical dredging is the placement sites distance from the dredge cut. Sites requiring a long transport would favor minimizing quantities.

9. Dredging Requirements - Emergency conditions or an overall heavy dredging workload favor reduced dimensions to expedite the process.

10. User Feedback & Maintenance Experience - Input from vessel operators and general experience and past practices both from a navigation and channel maintenance perspective is an indispensable factor for determining appropriate dimensions.