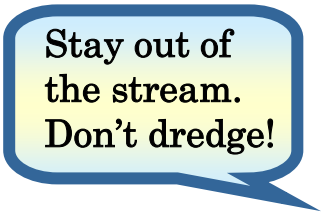
# DREDGING

## Is it a Good Solution to Flooding Problems?

Dredging seems like a simple and cost effective way to address flooding by increasing the size of the channel. If the channel is deeper, water won't spill out onto the floodplain and will move through the area faster. Isn't this a good way to "fix" flooding problems?

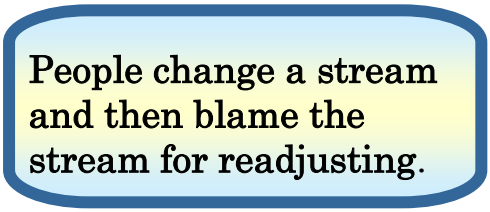

Unfortunately, dredging can actually increase flood damage. Some of the stream problems we see today are the result of past disturbance of stream channels. Unanticipated consequences can take the form of increased erosion and/or excessive sediment deposition. Altering stream channels without considering the long-term channel stability is—at best—a short term fix and—quite often—the beginning of maintenance nightmares.

### Streams and rivers are active systems

We know, of course, that streams and rivers collect and move water and that too much water causes flooding. Another, less obvious, function of streams is to move sediment. In the process of moving water and sediment downhill, a stream dissipates energy. Streams are dynamic systems that naturally adjust to changes in flow, sediment load, and energy distribution. A stream with excess energy will pick up more sediment, often by eroding the banks or channel. Conversely, if the stream lacks the energy needed to transport its sediment load, deposition occurs. A stream or river system is said to be in "dynamic equilibrium" if these changes and adjustments occur relatively slowly. When this balance is disrupted, the stream adjusts to find a new equilibrium. These adjustments can be sudden and destructive to property and infrastructure.

### Streams adjust to disturbance

Floodplains, meanders, and riffle-pool sequences are natural features that manage the stream's energy. Disrupting these features disrupts the system's balance. The stream will respond, restoring its dynamic equilibrium.




### What dredging does:

- Dredging removes compacted sediment that armors the stream bed, thus increasing the susceptibility to erosion.
- Dredging disrupts the alternating deep and shallow areas called pools and riffles, which serve as speed bumps for the stream, slowing the water and absorbing energy. Without these features, the stream has more energy to use eroding its bed and banks.
- Dredging creates a flattened streambed without a low-flow channel where concentrated flow has enough energy to transport sediment through the system. This can result in deposition of far more sediment than the amount removed by dredging.
- If a dredged channel is also straightened, the water velocity is increased significantly, due to increased slope and the loss of energy dissipation at bends. Faster water causes much more damage during floods.
- Dredging creates a deeper channel with high banks that are often susceptible to erosion or slumping. In addition, the lower water level can stress adjacent plant communities, reducing the ability of their root systems to stabilize the banks.

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- Dredging disconnects the stream from its floodplain, so there is no longer space where the water can spread out and slow down. All of the stream's energy is confined to the channel, where it tears at the banks and scours the bed.
- Dredging alters the channel slope, which can increase erosion, particularly at the upstream end of the excavation, where water flows faster over the steepened streambed. This eroding slope, called a headcut, shifts upstream and can continue to generate sediment long after the dredged channel is filled.
- Increased erosion of the bank and bed results in sediment deposition within the downstream channel and degraded water quality.

**Deeper + Steeper = Faster.**
This means more scour, more erosion, and more property damage.

## Is dredging a good solution?

Increased erosion and deposition of sediment are ways that the stream responds to the altered shape of a dredged channel. But are there also benefits? Does a dredged channel reduce flooding?

- In some cases, dredging can create enough space to confine moderate flood events to the channel. However, this increased capacity is quickly lost due to increased sediment deposits caused by the disturbance.
- The volume of material removed by dredging is insignificant compared to the volume of water in a major flood event.
- To the extent that dredging conveys water more quickly through one area, it increases the overall severity of flooding.
- Damage from high velocity flood waters is increased by dredging.

**Dredging creates more problems than it solves!**

*Headcuts and bank failures worked their way upstream (photo by US Army Corps of Engineers).*

*This stream segment was over-widened with bulldozers to make room for floodwater (photo by NY City Department of Environmental Protection).*

## Is there a better approach?

Flooding is a natural process and there is no single answer or simple solution. Whenever possible, development should be located away from streams and outside of floodplains. Some streams do benefit from active management, but each project must be carefully designed to work with the stream system, helping it achieve dynamic equilibrium. Another way to reduce the severity of flooding is to manage water where it falls with stormwater management practices that slow it down, spread it out, and soak it in.

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