

Practice Title

Gravel Bar Removal

Photo(s)



Summary of Practice

Gravel bars are natural components of some stream types. Gravel accumulates on the inside of stream meanders or mid-channel because the water velocity in that location is not sufficient to carry the sediment load delivered by the stream. Some locations are naturally subject to gravel deposition (such as where the slope of a tributary stream changes as its confluence with the large stream (e.g. Batavia Kill entering Schoharie Creek). If a new gravel bar forms, it may be due to an increase in the sediment that is washed into the stream or it may be due to a local reduction in the stream's energy, and hence its ability to transport sediment. A gravel bar that is removed will almost always reform in the same place during the next high flow event. Removing a gravel bar may temporarily treat a symptom, but it doesn't solve the problem and may cause bank erosion as the stream finds an alternate supply of sediment to replace what was removed.

Impact on Stream and Floodplain Processes and Functions

Point bars: Point bars that form on the inside edge of meander bends are classic examples of sediment in temporary storage between high flow events. These low, curved ridges of sand and gravel along the inner bank of a meandering stream are a



natural and necessary part of the stream system. If a point bar is removed, the stream's energy may cause it to erode gravel from the streambed or banks to replace the gravel in the bar.

Altered Slope: The slope of a stream influences the velocity of the water and consequently the amount of sediment the stream can carry. Unfortunately, many small-scale dredging projects pay little attention to slope—even though the projects are intended to resolve sediment problems. The area with gravel buildup is generally deepened, creating a flattened streambed, which provides an ideal location for sediment deposition. The stream bottom quickly fills back in, making the dredging effort obsolete.

Headcut: The resulting problems become more serious if a dredging project causes a headcut. This occurs when a section of the channel is deepened, causing a small “waterfall” at the upstream end of the excavation. Upstream migration of this headcut often generates much more sediment than is needed to fill up the hole that was excavated. Wherever the stream deposits all of this extra sediment, it's likely to cause new problems as the shape of the channel adjusts to the new conditions.



Headcut moving up birch creek – note the bank erosion following the headcut upstream.

Loss of Low Flow Channel: Narrow deep channels move water and sediment more efficiently than shallow wide channels. Undisturbed natural streams typically have a deep channel that continues to flow throughout dry periods. However, once a channel is bulldozed it tends to be a shallow wide channel. If there is no longer a low flow channel, the water spreads out over a wider area and loses its ability to convey sediment, resulting in increased



Over-widened channel in the East Kill – this site has since been restored.

deposition. The resulting deposition may be even more pronounced if the stream has been widened to make more room in the channel for high flows in an effort to protect floodplain development from flooding.

Impact on Your Property

Removal of gravel bars is often used in an attempt to reduce flooding and widen the active stream channel. This can actually worsen the situation in the event of a large flood. Increasing the channel depth and removing gravel bars creates a stream with more concentrated energy and greater erosion forces that can increase damage and loss of property. Those who have removed point bars can attest that these features almost always return, supplied by fresh sediment during the next high flow event.

Impact on Neighbor's Property

Any excavation of gravel effects properties both upstream and downstream of the reach. Increased erosion often ensues, leading to excess sediment deposition downstream while headcutting can occur upstream of the reach. The bottom line is that the stream system as a whole must be taken into account before conducting many site specific projects. Gravel bars are likely to end up either returning or simply moving the problem up or downstream if proper stream morphology is not considered.

Recommended Use

New York's rivers and streams carry massive amounts of water and sediment during flood flows. Gravel bars accumulate quickly when the flood waters begin to drop, but they generally are mobilized the next time water rises and do not necessarily cause increased flooding. Because gravel provides excellent habitat for fish and other animals, its removal is generally discouraged. Further more, the existence of a gravel bar is likely due to stream morphology characteristics. Its removal will not be permanent and will have to be repeated again and again.

Permits Needed

In-stream work will require a DEC Article 15 Stream Disturbance Permit. An ACOE permit is required when more than 25 cubic yards of fill material will be used below the "ordinary high water mark" (the approximate yearly flood level); the DEC can advise you about

determining these limits. Please contact info@catskillstreams.org to schedule a site visit from a local resource professional that can advise on the best options for your streamside.

Resources (Links, Articles, etc.)

<http://swr.nmfs.noaa.gov/hcd/gravelsw.htm>

http://mo.water.usgs.gov/fact_sheets/wtrqual/Gravel/index.htm

Photo Sources

New York City Department of Environmental Protection

Gary Kramer, USDA Natural Resources Conservation Service

Mark Watts, Chemung County Soil and Water Conservation District

Text Sources

Thigpen, Janet. 2006. Stream Processes: A Guide to Living In Harmony with Streams. Chemung County Soil & Water Conservation District. Available of web: <http://www.chemungcountyswcd.com/homepage.html>.