

FLOODS

AND

DREDGING

A Position Paper
West Virginia Council of Trout Unlimited
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WVCTU Dredging Committee:

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Abstract

Floods are a major problem for many citizens of West Virginia and often result in death and major damage to private and public property. After most major floods there is some dredging of stream segments by landowners and by various governmental agencies as well as the removal of trees and vegetation from the stream banks. These actions are usually conducted in the name of flood prevention, but actually lead to more damage during future high water events and do serious damage to the stream. Dredging and bank clearing causes increased stream bank erosion and increases the velocity and force of the flood waters.

The West Virginia Council of Trout Unlimited (WVCTU) recommends that all non-permitted and unnecessary dredging and bank clearing be terminated. The laws and regulations covering the dredging of streams should be enforced. The WVCTU recommends that a program to plant native trees, bushes, and grasses on bare stream banks be initiated.

Other recommendations on projects to reduce flooding and details of the WVCTU position on dredging are included in this report.

Floods

Floods have been occurring in West Virginia since the mountains started rising. With the very rugged terrain in much of WV the only level places to build homes and other structures is on the floodplains. The American Indians built their villages on the floodplains of various streams such as Adena Village on the Kanawha River. When the European settlers moved into WV, roads, railroads, houses, businesses and factories were constructed primarily on floodplains.

Minor floods usually occur every year in most regions of WV and do not create a lot of damage. Major floods are often described by giving the expected recurrence interval such as a 25 year flood, a 50 year flood, or a 100 year flood. We will define a major flood as a flood that is normally expected to occur once in 25 or more years, a flood where the water rises above the designated flood stage for the location, a flood where water covers a significant portion of the floodplain, and a flood that results in significant property damage. Major floods are not normally expected to occur very often, but two major floods occurred in an 8 day period in WV during November, 2003.

One of the worst floods to hit WV in recent history was the November 5-7, 1985 flood when the Potomac River at Paw Paw crested at 54 feet which was 29 feet above flood stage. Other streams where major flooding occurred at that time included the Cheat, West Fork, Shenandoah, Tygart, Little Kanawha, and Greenbrier rivers. Thirty eight people died in this flood and about 4,400 homes were destroyed.

In 1996 there were major flood events in January, May, July, and September. There were floods in March 1997, June 1998, February 2000, and May 2001. The southern region of WV was hit hard by a flood on July 8, 2001 which resulted in 2 deaths and extreme damage to houses, buildings, roads, railroads, and schools. The total Federal Emergency Management Agency (FEMA) expenditures (included some WV funds) on flood related items in WV during 1996-2001 was \$295 million. The WV Department of Transportation expenditures on these same floods were over \$25 million.

On May 1, 2002 there was a major flood in McDowell County and surrounding areas that resulted in 7 deaths and extensive property damage to houses, businesses, schools, and roads. The Tug Fork at Williamson crested at 42 feet which was 15 feet above the flood stage at 27 feet.

On June 11, 2003 there was a major flood in Charleston. During the fall of 2003 there was flooding in the Charleston region on November 12 and then major flooding again on November 19 in Charleston and 29 WV counties. In the November floods there were two deaths, 182 homes destroyed, 547 homes received major damage, and 1119 homes had moderate damage.

Between 1960 and 1996 there were 252 flood related deaths in WV (1.).

Factors in Flooding

There are numerous factors involved in the severity of a flood including the amount and intensity of the rainfall, the type of vegetative cover, time of year (when trees are in full leaf the low level to moderate floods will be reduced), the type of soil, the amount of surface covered by buildings or pavement, the degree of ground saturation, the amount of snow and ice on the ground, the steepness of the terrain, and failure of ponds or dams.

Land uses are known to have an impact on the severity of flooding. A stable forest, where there have not been any recent logging or forest fires, is the best at absorbing rainfall and reducing the speed of the runoff. Grasslands with a good stand of tall grass are next best in reducing the runoff.

The worst situation for runoff is paved areas such as roads and parking lots and areas with a lot of buildings. For these areas all of the rainfall is runoff and the lag time between the storm event and peak flow in the stream is reduced. Other situations that produce a lot of quick runoff are areas disturbed by mining, recently logged areas with a lot of logging roads, construction sites, cultivated fields, and pasture fields with very short grass.

On unsaturated ground any ground cover that absorbs rainfall and reduces the speed of the runoff will reduce the severity of the flooding. Any cover that prevents or reduces absorption by the ground will increase the amount of and speed up the runoff and cause more severe flooding.

When the ground is saturated, the amount and intensity of the rainfall become the overriding factors in flooding.

Dredging After Flooding

After a major flood there is always a call from some of the residents who were impacted by the flood and some politicians to dredge the stream or for other projects that they sincerely believe will help to protect against future flooding. In some cases property owners will start clearing obstructions and dredging the stream (sometimes with and sometimes without proper permits). The WV Department of Highways sometimes dredges sections of streams at bridges and along roads.

It would appear that the dredging activity is usually about the same whether it is done by a private citizen (or a contractor for a private citizen) or a contractor for a governmental agency. The dredging may be done by bulldozer, front end loader, backhoe or other equipment. The stream is usually widened, straightened, and the channel deepened. All trash, trees, boulders and other items are removed from the stream channel. The work on the stream banks usually includes removal of the remaining vegetation, sloping, and covering

with materials dredged from the stream channel. Excess dredged materials are sometimes used to create some sort of unstable levee or may be hauled away. On projects supported with public funds, the stream banks and other disturbed areas usually get a layer of mulch and are seeded.

Debris Removal

Bridges that have piers in the stream channel and small culverts are great trash catchers during floods. Trees and other debris may pile up against a bridge or culvert and create a small dam which may cause increased flooding in the areas below and above the structure. It is necessary to remove the trees and other large debris trapped by bridges and culverts. Trees in close proximity to bridges or culverts may need to be removed to prevent them from blocking the bridge or culvert during the next flood.

In addition to the debris deposited at bridges, floods often leave large debris at many other places along the stream. Items such as house trailers, cars, refrigerators, lawn mowers, tractors, tires, and other similar items should be removed from the stream. In a few cases trees and other large debris may have piled up and created a dam which should be removed. Trees that are not blocking a bridge or a culvert, are not in close proximity to a bridge or a culvert, or are not creating a dam should not be removed from the stream.

The equipment used to remove the debris should not enter the stream except in the case where using the stream channel will minimize the overall damage to the stream by the equipment.

Impacts of Dredging on the Stream and Flooding

If activities on the watershed are fairly constant, a stream will develop a fairly stable channel (dimension, pattern and profile) that does not change significantly during low level to moderate floods (there isn't major filling up of the stream channel with sediment or major down-cutting of the stream channel). A stable stream is a stream system that is in balance with the amount and size of the sediment inputs and the slope and discharge of the stream. Dredging destroys this balance in a stream.

“Attempts to increase channel capacity by altering the dimension, pattern, and profile of a stream will cause bank erosion, lateral stream migration, channel down-cutting and increased sedimentation. Ultimately this will lead to increased flooding and flood related damages both upstream and downstream from the dredged segment.” (1.)

Dredging a short section of a stream can possibly reduce the height of the flood waters in the project area during low level to moderate flooding, but will not have any significant impact on the water level in a major flood. (See Ref. 1, p. J-7&8 for an example.) The dredging will result in increased water velocities in the project area during floods and will lead to even higher water levels and greater flood damage downstream.

After the May 2, 2003 flood there was extensive dredging at many highway and railroad bridges along Elkhorn Creek in McDowell County. The materials were dredged from the stream bed under the bridge and for several hundred feet downstream with the dredged materials being deposited on the stream banks or hauled away. This created pools in the stream that were 40 to 50 feet wide and 200 to 500 feet long. These pools were simply sediment traps that are already filled with mud, coal fines, sand, gravel, and rocks.

If the dredged materials are placed on the stream banks, these banks are very unstable and subject to severe erosion during the next major flood. Dredging will destabilize the base

of the banks leading to increased bank erosion. The eroding banks will add sediment to the stream leading to increased gravel bar formation in the dredged section and downstream.

Increasing the width of the channel by dredging reduces the sediment transport capacity of the stream resulting in a filling up of the stream channel and reduced capacity. Straightening of the stream channel to eliminate meanders increases the slope of the channel which often results in a head-cut working upstream. Natural meanders are very good at dissipating energy during floods, so flooding problems will increase when the meanders are eliminated by dredging.

In summary, stream dredging after flooding increases rather than decreases future flooding problems and is a waste of taxpayers' money.

Impacts of Dredging on Fish and Wildlife

Dredging eliminates the pools, pockets, rocks, trees, root wads, snags, and other structures that provide hiding places for trout and other fish. Dredging may destroy the spawning areas that had been used by reproducing fish populations in the project area and downstream of the project area (3.). Increased sediment due to bank erosion and scouring may smother eggs in redds. The increased sediment may reduce or eliminate aquatic insect populations that are an important food source for trout and other fish. "Increased turbidity due to erosion and scouring can also reduce light penetration that is vital to aquatic plant photosynthesis." (2.)

Tree and brush removal on the stream banks often goes along with dredging. With a wide channel, shallow water, and reduced shade the water temperatures will rise which can create problems for trout and other fish species that prefer cool water. When the water temperature rises, the oxygen content of the water will decrease. When streamside vegetation is removed, much of the materials for the basic food chain in the stream are eliminated.

The reduction of stream bank vegetation and the reduction in fish populations in a dredged section of stream will result in reduced animal and bird populations for that stream reach.

"Stream dredging causes environmental impacts to the aquatic and riparian communities located within and along the stream channel. These impacts are long-term due to the need for annual maintenance of the channel." (1.)

Trees

One of the activities that often takes place with dredging is the removal of trees, brush, and other vegetation from the stream banks. In other cases, trees and other vegetation are cut under the mistaken belief that removing trees will help reduce flooding problems. After the July 8, 2001 flood and again after the May 2, 2002 flood there was extensive tree and brush removal on the banks of Elkhorn Creek (McDowell County) and Dunloup Creek (Fayette County).

Removing trees and other vegetation from stream banks is absolutely the wrong thing to do as it leads to future bank erosion (5.). Stream banks that are covered with trees and brush are, in general, the most stable stream banks and suffer the least damage during major floods. Trees, brush, and other vegetation on the stream banks reduce bank erosion, reduce the amount of runoff, and help to reduce overall flood damage.

Trees provide hiding and feeding places for animals, perching and nesting places for birds, and shade for the stream. The root systems of trees, root wads, and downed trees at the edge of the stream provide hiding places for fish. Trees and bushes provide resting places for many species of aquatic insects as they molt and go through the mating and egg laying process. Many terrestrial insects drop from or are blown from the trees into the stream and become food for the fish population. Trees that fall into the stream provide hiding places for fish, hiding places for aquatic insects, and contribute to the food chain. Trees contribute leaves, twigs, and limbs that form the basis of much of the food chain in the stream.

Most game fish species prefer shaded locations near the stream banks when available.

Permits and Enforcement

Any citizen, corporation, or governmental unit must obtain a Section 404 permit from the U.S. Army Corps of Engineers (USACE) which must include Section 401 certification by the West Virginia Division of Environmental Protection (WVDEP) for most stream work. A USACE permit may not be required for dredging if the equipment does not enter the stream and the dredged materials are not placed in the stream channel or on the stream banks. A separate Public Lands Corporation (PLC) of the West Virginia Division of Natural Resources (WVDNR) permit is required for any work in the stream channel, even in cases where the equipment does not enter the stream.

“The placement of dredged or fill material into waters of the United States, including wetlands, requires authorization under Section 404 of the Clean Water Act (CWA). The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (USEPA) are the regulatory agencies charged with implementing Section 404 permitting and enforcement. The Corps manages the program with oversight by the USEPA. Pursuant to the Fish and Wildlife Coordination Act (FWCA) and CWA the U.S. Fish and Wildlife Service, West Virginia Field Office (Service), West Virginia Department of Natural Resources, (WVDNR), and West Virginia Department of Environmental Protection (WVDEP) participate in the process by providing comments and recommendations in response to public notices describing proposed dredge and fill actions. WVDEP must issue, deny or waive Section 401 water quality certification for each project involving the placement of dredged or fill material. If the WVDEP denies 401 certification, the Corps must deny their permit without prejudice.” (2.)

“The Corps and USEPA share CWA enforcement responsibility under a 1989 Memorandum of Agreement. Generally, the USEPA has first rights of refusal for repeat or flagrant violations, while the Corps has first right of refusal for noncompliance of issued permits.” (2.)

In 1996 WVDEP waived its Section 401 Certification to expedite the National Resource Conservation Service (NRCS) Emergency Watershed Protection Work (EWP). EWP work is authorized by the Corps’ Nationwide Permit 37 for work by the NRCS qualifying as an exigency situation. On December 9, 1996 the Huntington District of the USACE issued a General Permit similar to Nationwide Permit 37 to allow the West Virginia Conservation Agency (WVCA) to conduct emergency stream channel and stream bank rehabilitation with WV funds. On November 26, 2001 the Pittsburgh District issued a regional permit for stream restoration work by the WVCA in West Virginia (8.).

“This regional permit will be used by the WVCA to assist public or private landowners in alleviating hazards to life and property resulting from sudden watershed

impairment. The permit authorizes debris/deposition removal, bank stabilization, stream erosion repair and restoration of channel alignments.” (8.)

On September 30, 2003 the Pittsburgh District of the USACE issued Public Notice No. CELRP-OR 03-R3 for renewal of the Regional Landowner Permits (9.). The Huntington District of the USACE has a similar procedure for Regional Landowner Permits. The Regional Landowner Permits cover in-stream work such as: “(1) excavation of silt, sand and/or rock deposits; (2) reduction of sand and gravel bars; (3) bank stabilization; (4) channel restorations; and (5) maintenance of approved work.” (9.) Individuals requesting a permit must contact a WVCA office to request assistance in developing a plan. A Stream Review Team made up of representatives from the WVCA, USACE, USF&WS, WVDNR and WVDEP is involved in the planning and inspection of the project. The USACE has a list of special and general conditions that become a part of any permit issued to a landowner. The special conditions include such items as: “Will not exceed a cumulative total of 1000 linear feet per management plan.”. (9.)

Problems with the Regional Landowner Permits include a lack of site inspection during work activities, no significant review of completed projects to evaluate the overall benefits and impacts, no enforcement when projects limits are exceeded, and an underutilization of the Stream Review Team. The USACE special conditions that allows up to 1000 feet of stream and 3000 cubic yards of materials need to be reduced. Also, allowing the use of unconsolidated dredged materials for bank stabilization is not appropriate.

According to a Charleston Gazette article on September 10, 2003 the WV Division of Highways agreed to pay \$13,500 in fines to settle enforcement actions by USEPA. Three violations were involved including the dredging of 4,500 feet of Beaver Creek in Raleigh County in 2001 without a permit.

Projects to Reduce Flood Impacts

There are several projects that can be undertaken that will help to reduce runoff and flooding, but there isn't any project or combination of projects that will result in a major reduction of the height of the flood waters during a major flood. Flooding will always be with us.

Here are projects that will help to reduce flooding problems:

1. Plant native trees, bushes and grasses on bare stream banks to stabilize the banks and to reduce erosion.
2. All areas stripped of vegetation by the flood or by heavy equipment after the flood should immediately be mulched and seeded.
3. Coal waste piles and other areas disturbed by mining that are not being reclaimed by the Abandoned Mines Land Program should be seeded with grasses and planted with trees.
4. Natural Stream Restoration projects can help to reduce bank erosion and provide better habitat for trout and other game fish. (10. & 11.)

Recommendations

Here are recommendations from the WVCTU:

1. Eliminate all dredging done in the name of flood control except for very short sections at bridges and culverts.
2. The dredging at bridges should not go below the stable stream bed and should not extend upstream or downstream more than the span length of the bridge.
3. When it is necessary to remove large debris from the stream, the equipment used should stay out of the stream except in situations where working from the stream would minimize overall damages.
4. Enforcement of dredging regulations and permit conditions needs to be improved.
5. Do not cut trees or other vegetation on the stream banks.
6. Plant native trees, bushes, and grasses on bare stream banks.
7. The upper limits on stream length and number of cubic yards of dredged materials in the USACE special conditions for Regional Landowner Permits should be reduced to 500 feet and 1000 cubic yards.
8. Boulders placed to stabilize stream banks should not be sprayed with concrete.
9. Natural Stream Restoration projects designed by qualified individuals are recommended to increase stream stability and to improve habitat for fish.
10. All timbering jobs should follow Best Management Practices.
11. Ordinances and regulations that discourage building on the floodplain should be established.
12. Financial assistance should be provided to citizens who are willing to move out of the floodplain.

References

1. West Virginia Regional Flood Protection Plan – Boone, Fayette, McDowell, Mercer, Raleigh, and Wyoming, West Virginia Flood Protection Task Force, October 2002.
2. Resource Impacts Associated With Authorized and Unauthorized Stream Dredging in Grant, Hardy, and Pendleton Counties; U.S. Fish and Wildlife Service, prepared by West Virginia Ecological Service Field Office, April 2001.
3. Manual of Stream Channelization Impacts on Fish and Wildlife; P.W. Simpson, J.R. Newman, M.A. Keirn, R.N. Matter, and P.A. Guthrie; U.S. Fish and Wildlife Service Biological Services Program; FWS/OBS-82/24; July 1982.
4. Stream Restoration after Flooding, a pamphlet by WVDEP, WVCA, and WVDNR, October, 2001.
5. The Value of Trees During Floods, Alvan Gale, Trout Lines – Newsletter of the Kanawha Valley Chapter of Trout Unlimited, November, 2001.
6. A View of the River, Luna B. Leopold, Harvard University Press, 1994.

7. Stream Corridor Restoration, Principles, Processes and Practices, Federal Interagency Stream Restoration Working Group, NRCS, October 1998.
8. Regional Permit For Stream Restoration to be Performed by the WV Conservation Agency Within the Pittsburgh District in West Virginia, Public Notice No. 01-R4, US Army Corps of Engineers – Pittsburgh District, November 26, 2001.
9. Regional Permit for Stream Restoration and Management by Individual Landowners Within the Pittsburgh District in the State of West Virginia, Public Notice No. CELRP-OR 03-R3, US Army Corps of Engineers – Pittsburgh District, September 30, 2003.
10. River Restoration and Natural Channel Design Manual, David Rosgen, Wildland Hydrology, 2002.
11. The Reference Reach – A Blueprint For Natural Channel Design, David Rosgen, ASCE Wetlands and Restoration Conference, Denver, Colorado, March 1998.

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Note: This position paper was approved by the Executive Committee of the WV Council of Trout Unlimited on May 8, 2004.

DREDGING OF TROUT STREAMS

Whereas, the goal of Trout Unlimited in West Virginia is to protect, preserve, and improve the trout streams in West Virginia; and

Whereas, floods are a major problem for many citizens of West Virginia and often result in death and major damage to private and public property; and

Whereas, dredging of streams is a very common activity by governmental agencies and private citizens after a major flood; and

Whereas, dredging results in unstable stream banks, results in an unstable stream channel, leads to increased flood damage during the next major flood, and destroys fish and wildlife habitat; and

Whereas, standing trees and other vegetation are often removed from the stream banks which results in unstable stream banks, the loss of fish and wildlife habitat, the loss of shade for the stream; and the loss of woody debris for the food chain in the stream; and

Whereas, the West Virginia Council of Trout Unlimited is very concerned about the potential increase in future flood damage and the damage to the stream caused by dredging and tree removal; therefore be it

Resolved, that the West Virginia Council of Trout Unlimited recommends that all dredging done in the name of flood control be eliminated except for very short sections at bridges and culverts; and further

Resolved, that the practice of cutting trees and other vegetation on the stream banks be terminated and replaced with a program to plant native trees and other native vegetation on the stream banks; and further

Resolved, that all dredging regulations and dredging permit conditions be enforced.

Passed by the West Virginia
Council of Trout Unlimited
On May 15, 2004