OHIO STREAM MANAGEMENT GUIDE

Tree Kickers

TREE KICKERS

Tree "kickers" are hardwood logs which are used to deflect stream flow away from an unstable bank area. One or more logs are anchored to the streambank on an outside curve and placed at an angle to "kick" stream flow away from the bank and toward the middle of the stream. Brush is tied between the log and the bank to prevent scour erosion. Kickers are often used with other practices such as evergreen revetments (see Guide No. 12 Evergreen Revetments) which further protect streambanks from eroding forces, and with dormant cuttings and hardwood plantings which reestablish root systems in the bank. See Guides No. 07 Restoring Streambanks with Vegetation, No. 08 Trees for Ditches, and No. 13 Forested Buffer Strips for detailed information on these practices.

A kicker is one of several biotechnical practices described in the Ohio Stream Management Guides. These practices use vegetative or other natural materials to achieve stream management objectives, usually erosion control. One of the chief advantages of biotechnical practices is that they help restore natural stream features, like in-stream habitat and streambank vegetation. Guide No. 10, Biotechnical Projects in Ohio, provides an overview of biotechnical practices. It also maps over 50 project sites and lists contacts who can arrange for site visits.

Some site conditions and/or project objectives (such as protecting existing structures on the streambank) will require use of more traditional, structurally engineered solutions. This is particularly true where high velocity flows can be expected. In other situations, a combination of structural and biotechnical practices may provide both strength and habitat. No project should be undertaken without an understanding of the functions of stream energy and the source of any problem to be corrected. Guide No. 03, Stream Management and the Stream's Natural Processes, will provide an overview of stream dynamics and the impacts land and channel management practices have on streams. Technical assistance about stream dynamics can also be obtained at your local Soil & Water Conservation District. The phone numbers are listed under county government in your local phone directory.

The purpose of this Ohio Stream Management Guide is to describe the generally suitable site conditions and the design, installation and maintenance steps for tree kickers. The guidelines provided are based on years of field experience in Ohio, particularly on Scenic Rivers. As with any construction project in a stream, the Ohio Department of Natural Resources recommends you consult with the applicable local, state and federal authorities listed in Guide No. 06, Permit Checklist for Stream Modification Projects, prior to construction. The extent of permit requirements will depend on the location and design of your project.

WHERE TO USE KICKERS

Tree kickers are most often used to correct bank undercutting, especially where the crest of the cut bank is five feet (ft.) or more above normal water levels. A kicker deflects the concentration of stream energy away from the bank. In addition, kickers help rebuild the bank by providing an area for sediments to deposit and provide underwater structure for fish and aquatic insects. The construction guidelines in this Guide apply to this use of the kicker practice. Tree kickers are occasionally used to deflect flows into a point bar on an opposite bank to erode sediment deposits. The sediments will then redeposit downstream where stream velocity slows.

Always look for the cause of erosion when considering how to solve it. If the bank is eroded from flow coming over the bank from adjacent land, kickers are not applicable. If the stream is just naturally meandering, protection measures should not be installed unless really necessary. Tree kickers will not correct erosion due to lack of root structure. In that case, new vegetation should be planted. However, banks which lack vegetation and root structure are vulnerable to undercutting, so a kicker might be needed in addition to the new vegetation.

Channel depth at the construction site needs to be shallow enough for a person to safely stand and work during low flows. Kickers work best where there are trees, preferably live ones, on the bank onto which one or more logs can be anchored. Since the kicker practice alone does not include planting vegetation, it can be used in shady areas. Kickers are most often installed in streams where the channel width is less than 100 ft. but wide enough so that deflected stream flows do not cause erosion on the opposite bank.

DESIGN AND CONSTRUCTION GUIDELINES

Choosing a Kicker Log — Any available tree can be used for the deflecting log, including those found in the channel. In fact, woody debris found in stream channels can be put to good use in constructing kickers. Excess debris (that which is causing an obstruction) should be removed from both the channel and the floodplain. The best species for kicker logs are hardwood trees, which deteriorate slowly, and/or trees with dense branches, which slow stream flow and catch sediments. The size of the log(s) should be compatible with the channel width and stream flow at the site. Of course, the anchor trees should be as large or larger than the kicker log.

Brush or evergreen trees should be cabled to the kicker log in the area between the log and the bank (see Figure 1). Small trees with crowns intact can also be used. This prevents bank scour and traps sediments in the slower, "backwater" area. If the kicker log still has its root wad attached, extra care should be taken to tie brush around the wad on the side toward the bank. Root wads are excellent for instream habitat structure but increase the likelihood of bank scour.

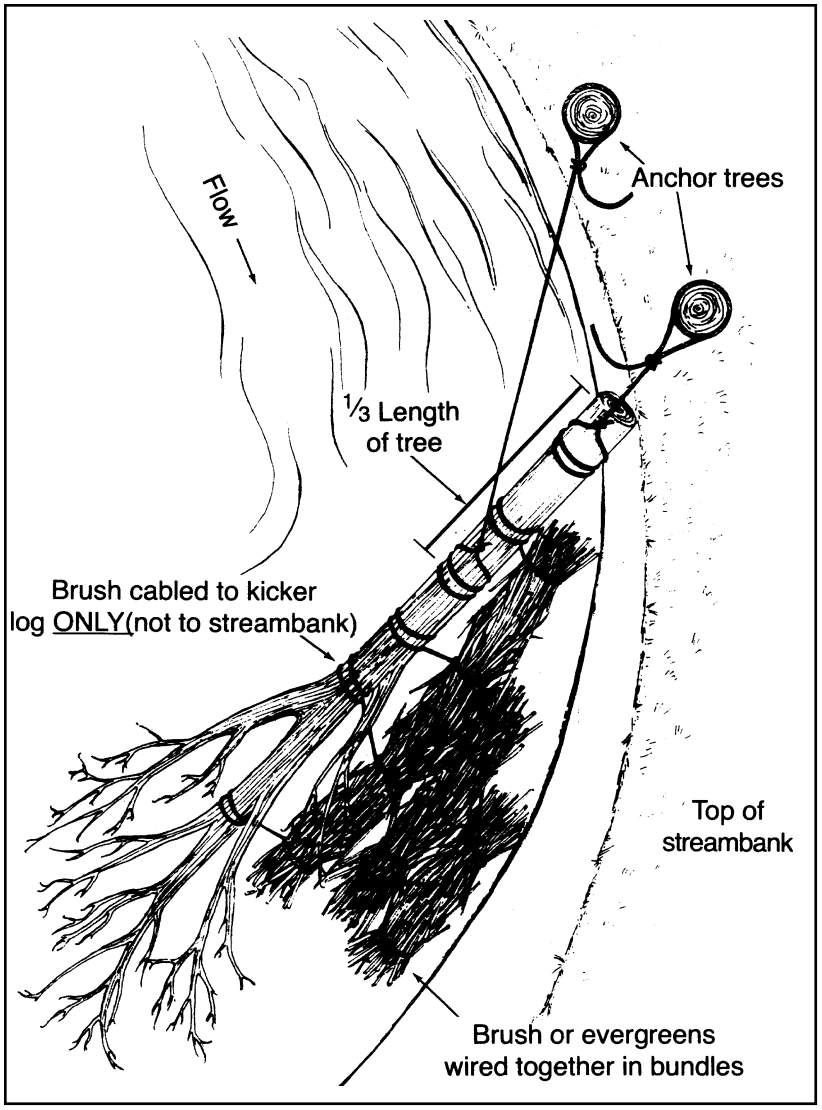

Figure 1. Tree Kicker Construction

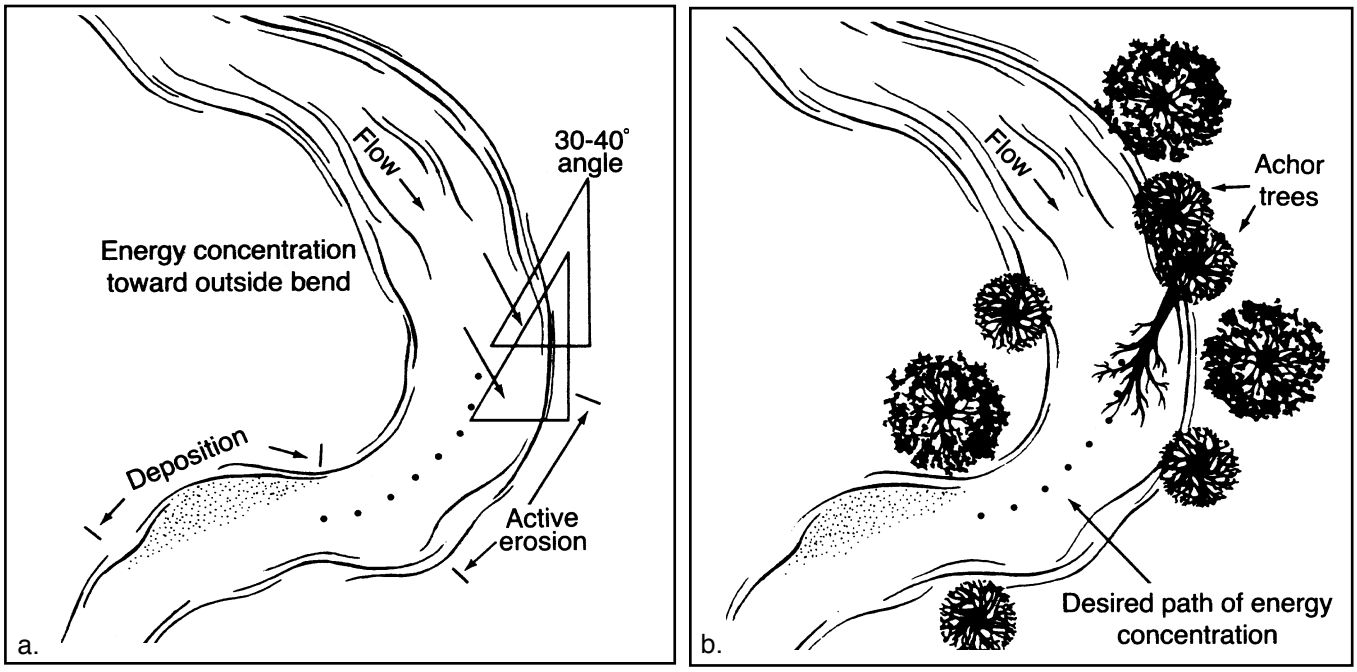

Figure 2. Placement of Kickers

Do not anchor the kicker log or the brush to the streambank. During high flows the log and attached brush need to be able to rise with the water. If high velocity flows occur before sediments have a chance to build up and "attach" the kicker log to the bed and bank, those flows may scour under the kicker structure. Choosing logs with large and dense branches helps prevent this scour. Repair or replacement may, however, be necessary. If this is a concern, and the stream size and project design allows the kicker log diameter to be about 6 inches or less, you can try anchoring the top end of the kicker log into the stream bed or bank to prevent it from floating. Anchoring methods are discussed in Guide No. 12, Evergreen Revetments.

Placement of the Kicker(s) — Each stream channel and erosion problem is different. The decision about where to start and stop placing kickers will depend on the site conditions, especially the location of trees onto which the kicker log can be anchored. Install the first kicker upstream of the eroded area at a 30-40˚ angle to the streambank (see Figure 2-a). Afterward, toss some small, floatable debris in the stream and observe where the current takes it. If the current is now deflected toward the center of the channel and avoids the eroded area, one kicker will suffice (see Figure 2-b). If not, adjust the angle or install another kicker downstream of the first. Be careful not to deflect the flows all the way over to the opposite bank.

Anchoring a Kicker — Kickers need to be securely anchored to the streambank. Anchoring it to two live anchor-trees on the stream bank is best. The root structure of a dead tree may or may not be dense enough to hold a kicker in place during high flows, and there is no way to find out prior to construction. To secure the kicker log to the anchor trees, cable needs to be amply wrapped around both the log and the trees. As shown in Figure 3, cable should be wrapped two full circumferences around the log or anchor tree beyond what is needed to simply clamp the cable together.

When attaching cable to live an-

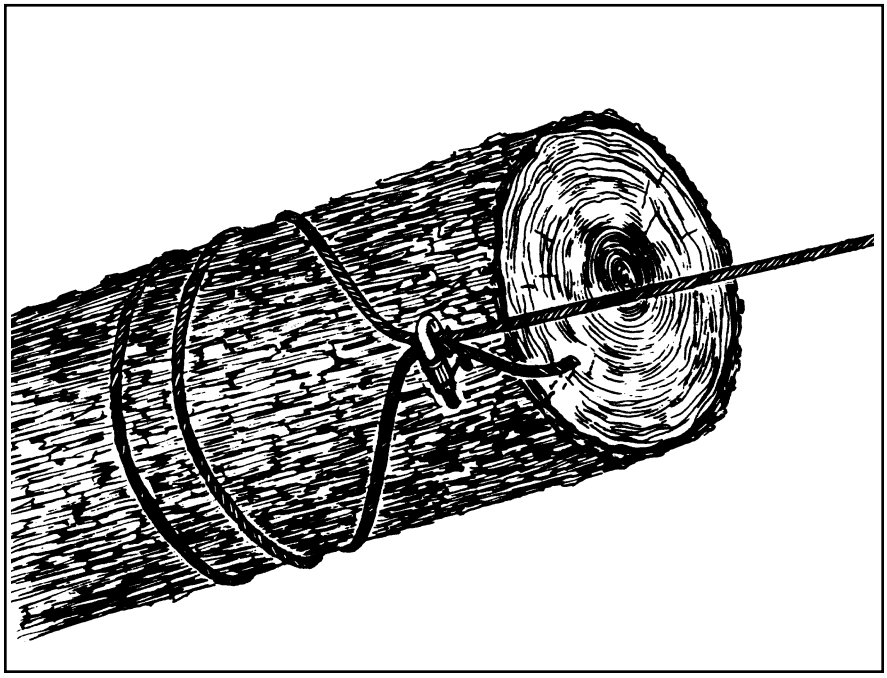

Figure 3. Securing Cables: Use two full wraps of cable around the kicker log and the anchor trees in addition to what is needed for clamping.

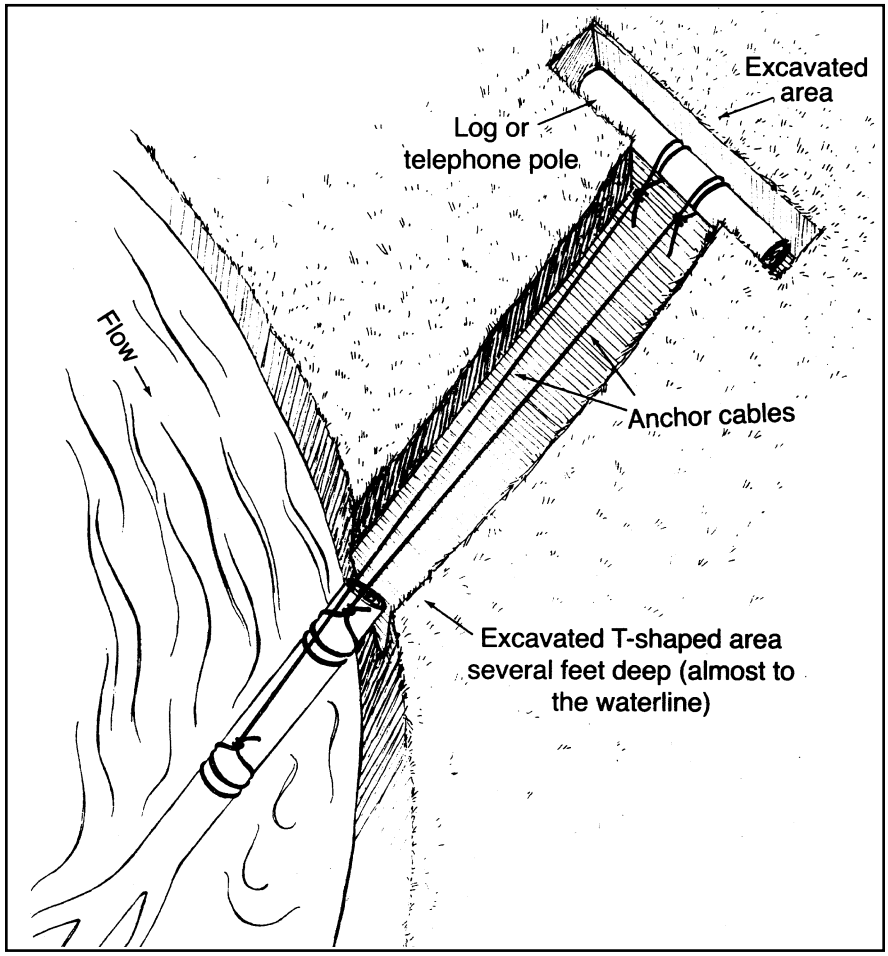

Figure 4. Dead Man Anchor

chor trees, three feet or more extra cable should be left loose, beyond the clamp (see Figure 1). Use this during maintenance improvements as the tree grows to loosen the tightness of the cable's wrap around the live tree and prevent girdling. Placing about 6 blocks of wood (1 to 2 inch squares) between the cable and the tree bark also reduces stress on the trees as they grow.

If no anchor trees are available, and a tree kicker is the most practical solution to the problem, consider installing a dead man anchor, as shown in Figure 4. The same 30-40˚ angle is used for placing the kicker log. Excavate a T-shaped trench and cable the kicker log to a large log or telephone pole placed in the cross bar of the "T." The anchor log or pole should be placed several feet below the ground surface, just above normal water elevation. The excavated soil should be replaced and tightly compacted over the anchor and cable lines.

It is important to avoid hitting any utility lines during excavation and it is easy to be safe by using the "Call Before You Dig" service (1-800/362-2764) 48 hours prior to digging. They will contact local utility companies and have them flag any lines located near your project.

Kicker Construction — A four-wheel drive truck or small tractor can be used to pull the kicker logs into place. Cable and two or three snatch block pulleys can be used to angle the logs without moving the truck more than necessary. A manual come-along can be used if the logs are not too large. At least two people should work together to safely place and angle the logs correctly. Secure the logs with cables and clamps as shown in Figures 1 and 3. After construction, be sure to reseed any areas disturbed by the vehicle.

Equipment — In addition to the items mentioned above, you will need:

- A first aid kit
- Chain saw and appropriate safety equipment: hard hat and goggles, chaps and gloves
- Saw or loppers for harvesting brush
- Steel aircraft cable, 3/8, 1/2 or 5/8 inch, depending on the kicker log's size.
- Clamps sized to match the cable; bring extra to replace any lost in the water. Some lost clamps can be recovered with a large magnet.
- Standard deep well 3/8 drive socket set with 9/16, 1/2, 5/8 inch extensions - or
  Open end wrench set, 5 pieces including 9/16, 1/2, 5/8 inch sizes
- Wire and/or 1/4 inch cable to tie the brush together and secure it to the deflector log
- Pliers and wire cutters, if using wire
- Sledge hammer and sledge-type cable cutter
- Chest waders
- A back hoe if excavating trench for a dead man anchor

Maintenance — During the first year or two after construction at least two people should inspect the kicker(s) after high water events and make any necessary repairs. Check the angle of the kicker and adjust it as necessary. Make sure the cable on the deflector logs and brush is wrapped tight, add more brush if you find evidence of scouring, and tighten any loose clamps. Inspect and maintain the kicker annually after that.

An important factor in every maintenance check is to make sure the cable around the live trees is not too tight. If the bark on the trunk is expanding beyond the cable, the tree is being girdled and its life is being threatened. Use the extra cable which you left loose during the installation to ease the wrapped cable as the tree grows. Use the wooden blocks, too, to ease pressure on the live trees. After several years it may be possible to eliminate the cable on the anchor trees altogether. This is only possible where enough new sediment has settled in to solidly re-establish the bank so that the kicker is secure without it being anchored to the trees.

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This Guide is one of a series of Ohio Stream Management Guides covering a variety of watershed and stream management issues and methods of addressing stream related problems. The overview Guides listed below, are intended to give the reader an understanding of the functions and values of streams. For more information about stream management programs, issues and methodologies, see Guide 05 Index of Titles or call the ODNR Division of Soil and Water Resources at 614/265-6740. All Guides are available from the Ohio Department of Natural Resources. Single copies are available free of charge and may be reproduced. Please contact:

ODNR
Division of Soil and Water Resources
2045 Morse Road, Bldg. B
Columbus, Ohio 43229-6693
614/265-6740

The guides are also available on-line as web pages and PDF files so you may print high quality originals at your location. You will find the guides on-line at:

http://www.ohiodnr.gov/soilandwater/

Prepared by the Ohio Department of Natural Resources, Roger Barber, Division of Natural Areas and Preserves and Margo Fulmer, Division of Soil and Water Resources, co-authors. Input from staff of several ODNR divisions, and local, state and federal agencies are used in the development of the Ohio Stream Management Guides.

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