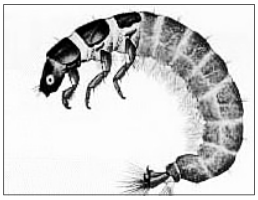
7.0 OTHER TOOLS

Insects that are indicators of excellent water quality and provide nutrition for stream trout

Caddis Larvae
Net-spinning Caddis Larva
Order Trichoptera, Family Hydropsychidae



- ❑ Larvae measure up to 3/4 inch in length.
- ❑ Three pairs of legs.
- ❑ Body is caterpillar-like and strongly curved.
- ❑ Antennae reduced and inconspicuous.
- ❑ Color varies from bright green to dark brown.
- ❑ Gill tufts on lower half of body.
- ❑ 3 hard plates on dorsal thorax (adjacent to legs).
- ❑ Brush of hairs at tip of prologs (found at the posterior end of the abdomen).
- ❑ Net-spinning caddisfly larvae are widespread and may be abundant in poor quality streams.
- ❑ As their name suggests, netspinners construct a silken mesh net which they use to filter organic particles from the water column.

Great Lakes Trivia Test (answers on back):

1) Name two toxic substances of concern in Great Lakes fish.

2) What is the greatest source of human exposure to Great Lakes toxic substances? (a) swimming (b) drinking water (c) eating fish

3) How many U.S. citizens live in the Great Lakes basin?
(a) 27 million (b) 36 million (c) 43 million

4) Name a glacial lake plain area.

5) Name the process whereby toxic substances accumulate throughout the food chain.

GUIDING PRINCIPLES

1. Plan projects. (All projects should be planned!)
2. Move water off road surfaces as soon as possible.
3. Direct runoff into vegetated filter areas or rock-lined turnouts.
4. Address road runoff from the top of both approaches.
5. **Avoid directing runoff into surface waters.**
6. Stabilize bare areas.
7. **Keep runoff velocities low and avoid concentrating runoff.**
8. Minimize areas of disturbance.
9. Revegetate disturbed areas ASAP.
10. Maintain and monitor all practices.

Answers:

1) PCBs (polychlorinated biphenyls), mercury, dioxin, PAHs (polycyclic aromatic hydrocargons), PBBs (polybrominated biphenyls), or chlordane

2) (c) eating fish

3) (b) 36 million

4) Saginaw Bay or Detroit (area north and west of Lake Erie)

5) biomagnifications (or bioaccumulation)

7.0 OTHER TOOLS

7.1 Grade Stabilization Structures

Grade Stabilization Structures are permanent structures that stabilize grades in natural or artificial channels by carrying runoff from on e grade to another. These structures include vertical drop structures, chutes, pipe drop structures, and downdrains. They may be made of rock riprap, concrete, metal, wood, and/or heavy plastic.

In natural streams, every effort should be made to reduce stormwater inputs which may increase stream velocities.

Grade stabilization structures are designed to prevent banks from slumping, reduce the velocity with which water runs off the land, and prevent erosion of a channel that results from excessive grade in the channel bed. Proper grade stabilization, combined with adequately protected outlet structures, can reduce the likelihood that soil will be detached and transported to surface water.

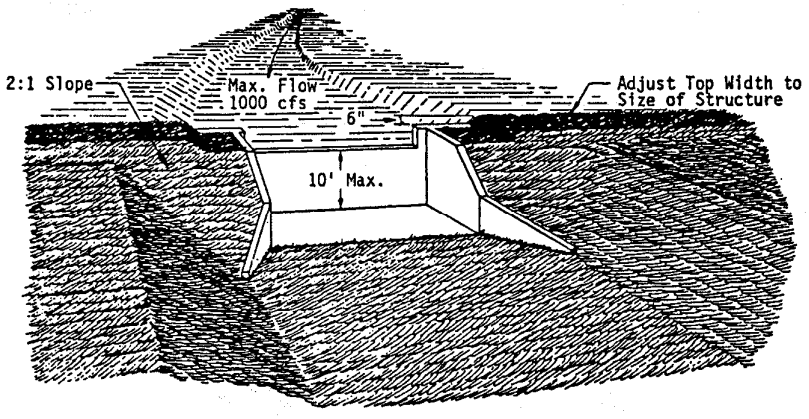


Figure 43—GRADE STABILIZATION STRUCTURE

7.2 Sediment Controls & Traps

Sediment controls and traps are erosion controls used for the removal of sediments. Types of sediment controls and traps include:

7.2.1 Silt Fence-Short Term

Used to removed sediments from sheet flows and often used at the toe of a slope.

- Short term

7.2.2 Straw Bales-Short Term

Used to remove sediments from sheet flows and often used at the toe of a slope. They can be used at culvert outlet or around drains to remove sediments.

- Replace after heavy rains or every 3 months.
- For more information see Velocity Controls & Energy Dissipaters, Section 3.6.

7.2.3 Rock Filters/Check Dams-Long Term

Used in conveyance channels to remove sediments.

- Long term
- Need to remove and replace if filter becomes clogged
- For more information see Velocity Controls & Energy Dissipaters, Section 3.6.

7.2.4 Sediment Traps-Long Term

Small temporary excavations or embankments designed to intercept, trap, and retain sediment from runoff during construction. They handle flows larger than other controls. Sediment traps are also a useful tool for stream rehabilitation.

- Should be at least twice as long as it is wide.
- No maintenance - capacity is equal to volume of sediment for life of structure if used on short term projects.
- Not a substitute for handling on-site erosion.
- Requires appropriate technical guidance and permits.

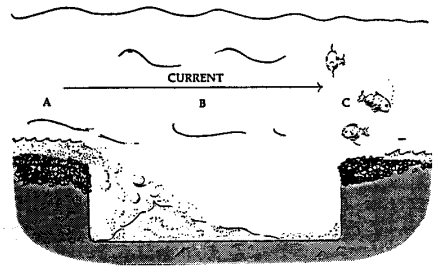


Figure 44—SEDIMENT TRAP PROFILE

7.3 Storage & Borrow Areas

Areas where soil for use in road construction or maintenance is either kept for future use or taken from, as in a sand pit.

- Develop an erosion and sediment control plan for the specific site.
- Divert runoff from the face of exposed slopes.
- Only leave areas in current use unvegetated.
- Stabilize exposed areas immediately after use.
- Locate storage areas on the uphill side of a disturbed area so they can act as a diversion for runoff.
- Control any sediment from storage and borrow areas with previously described temporary controls.

7.4 Level Spreaders

Bermed trench used to intercept and discharge water flow over a wide linear area. They prevent gullies by discharging over a wide linear area and are generally used at the toe of a slope.

- Construct a long, level, bermed trench - water will discharge evenly over berm when trench is full.

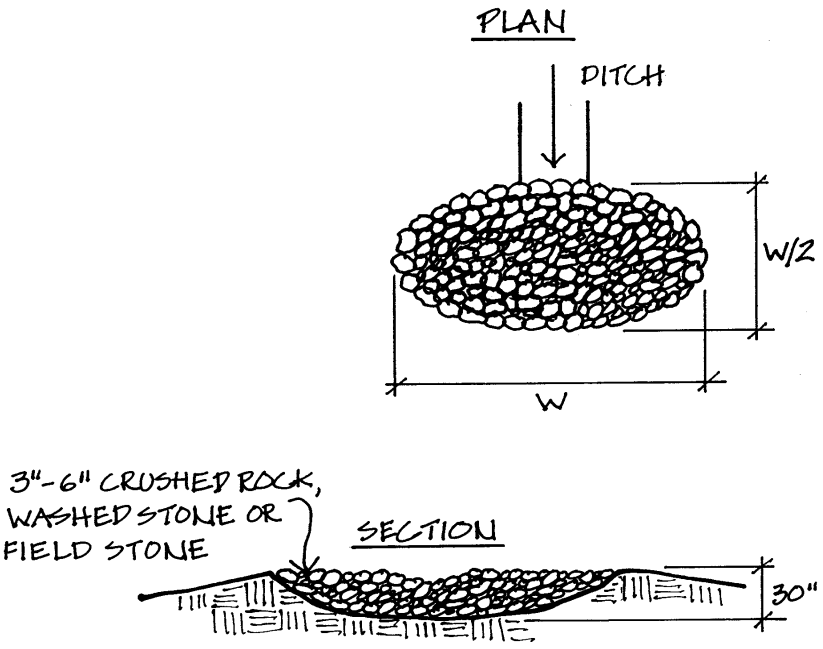


Figure 45—LEVEL SPREADER

7.5 Water Bars

Berm or open culvert constructed across road used to divert water flowing down the road. Use only on very low traffic volume roads. They prevent gullies in the road and eliminate concentrated sediment deposits.

- Construct low enough for traffic to pass over and angle across road to direct runoff flow off the road.
- Spacing of berms is dependent upon road slope.
- Need to be rebuilt periodically.
- Inexpensive means for controlling and diverting water.
- Refer to Outlets (especially for concentrated flows).

Table 7 - SPACING FOR WATER BARS

Road Grade (percent)	Distance Between Water Bars (feet)
2	250
5	135
10	80
15	60
20	45
30	35

- Proper spacing between water bars can be determined from the above table.
- Installation should be at an angle of 30 or more degrees down slope or to turn surface water off the road or trail.
- A shallow trench, 12 to 18 inches below the surface of the road or trail would extend beyond both sides.
- The uphill end of the bar extends beyond the side ditch line of the road and ties into the bank to fully intercept any ditch flows.

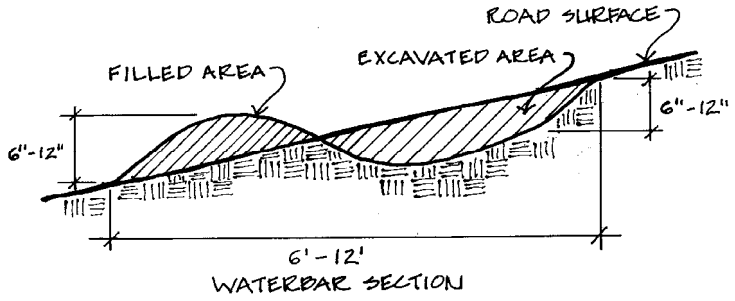


Figure 46—WATER BAR SECTION

7.6 Broad-based Dip

Provides cross drainage on backroads and logging or timber operation haul roads to prevent buildup of excessive surface runoff and subsequent erosion. Broad-based dips can be used on haul roads and heavily used skid trails having a gradient of 12% or less. They are not used for cross draining spring seeps, intermittent or permanent streams. This practice may be substituted for other surface water cross drain practices such as pipe or box culverts. An inherent problem in construction of a broad-based dip is to recognize that this roadbed consists of two planes rather than one unbroken plane. One plane is the 15 to 20 foot reverse grade toward the uphill grade and outlet. The second plan is the long grade from the top of a hump or start of a down grade and ends at the outlet of the dip. Neither the dip nor the hump should have a sharp angular break, but be rounded, allowing a smooth flow of traffic. Only the dip itself should be outsloped since the dip provides sufficient break in grade to turn the water.

The “broad-based dip” removes water from the backroad and allows flow onto natural forest floor (from Kochenderfer 1970).

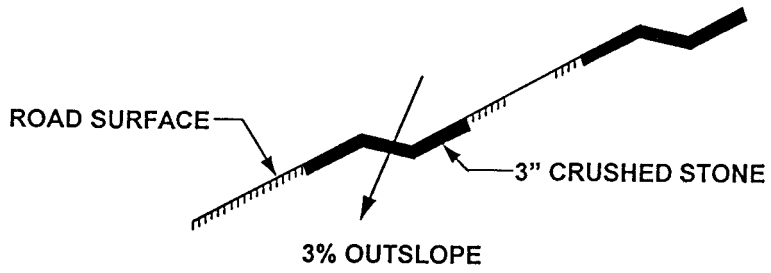


Figure 47—BROAD-BASED DIP

Specification for Broad-based Dips

- Installation takes place following basic roadbed construction.
- 1 20-foot long, 3% reverse grade is constructed into the existing roadbed by cutting from upgrade of the dip location and using cut material to build up the mound for the reverse grade.

Table 8 - SPACING FOR BROAD-BASED DIPS

Road Grade (percent)	Spacing Between Dips (feet)
2	300
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140
12	100

- Cross drain must slope to a controlled discharge at no more than a 30% slope.
- An energy dissipater should be installed at the outfall of the dip to dissipate water velocity assuring no erosion of cast fill.
- The dip and reverse grade section may require a surface of at least 3 inches of crushed stone, in some soils, to avoid rutting of the road surface.