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Better Roads, Cleaner Streams

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Potomac Watershed Partnership June 5, 2012

Project Site – “Allegany Forests Project Area”

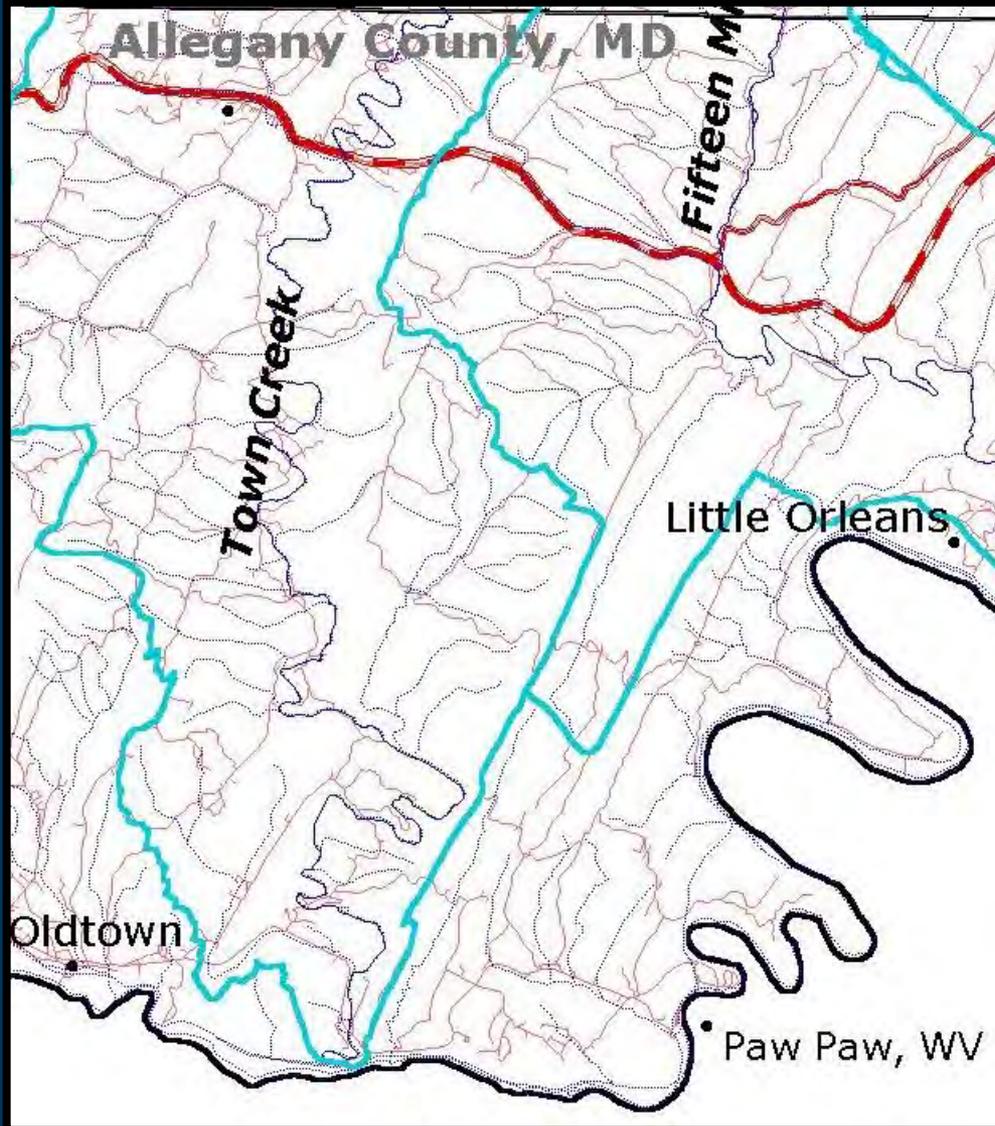


262,000 acres, about half in public lands in MD and PA

Only see one road on this map... but Zoom in --



Roads and Streams together



**300 miles
unpaved,
public roads**

- red = local roads,
- blue = stream network

Land Use – predominately forested

- – 82% forested,
 - 15% agriculture,
 - 1% development scattered/rural residential
- conservation plan – assigned high rank to threat of sediment pollution from unpaved roads – based on observation/expert opinion

Problem roads causing problems



Key Partner and Resource



state-wide program of the State Conservation Commission, administered through county conservation districts and implemented through local projects — secured state funding — technical expertise, training, quality control, tracking provided by the Center under contract.

www.dirtandgravelroads.org

Center for Dirt and Gravel Road Studies



Providing education, guidance, and technical assistance to minimize the impact of unpaved roads and trails on natural landscapes and hydrology.



The Center is a non-profit entity associated with the Thomas D. Larson Pennsylvania Transportation Institute under the College of Engineering at Penn State University.

www.dirtandgravelroads.org

PA program inspired by concern about sediment runoff from roads into trout streams, extensive inventory work begun in EV/trout streams in PA by Trout Unlimited chapters in the early 1990's –

Center has built extensive technical expertise – inventory/ranking of problem road segments, tool box of techniques/design practices to reduce chronic maintenance problems that create poor driving conditions, expensive damage to road infrastructure, and sediment runoff into surface waters. Successfully framed their program as a “win-win”

Public: county, township, state (WV)

Public land agencies: state, federal, county

Private:

- Gas operations

- Coal mining

- Timber operations

- Wind power installations

- Agricultural land

- Home Owners Associations

- ??

Data

- Location/extent of pollution hotspots
- Measure of sediment from roads
- Regional-scale assessment of the problem?

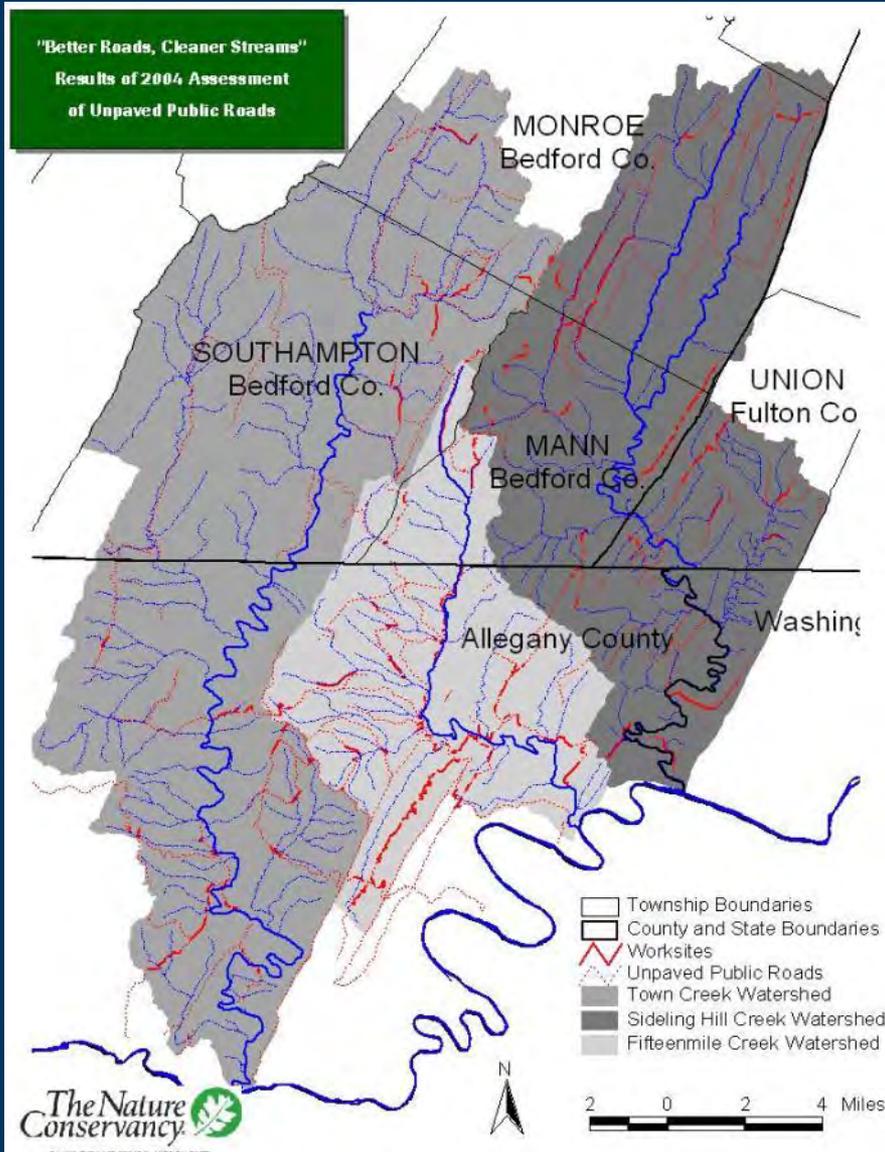
Demonstration/Outreach

- Make an impression with the problem
- Illustrate solutions – cost effective, win-win

Training

- Training for public and private road managers

Data -- Inventory and ranking of hot spots



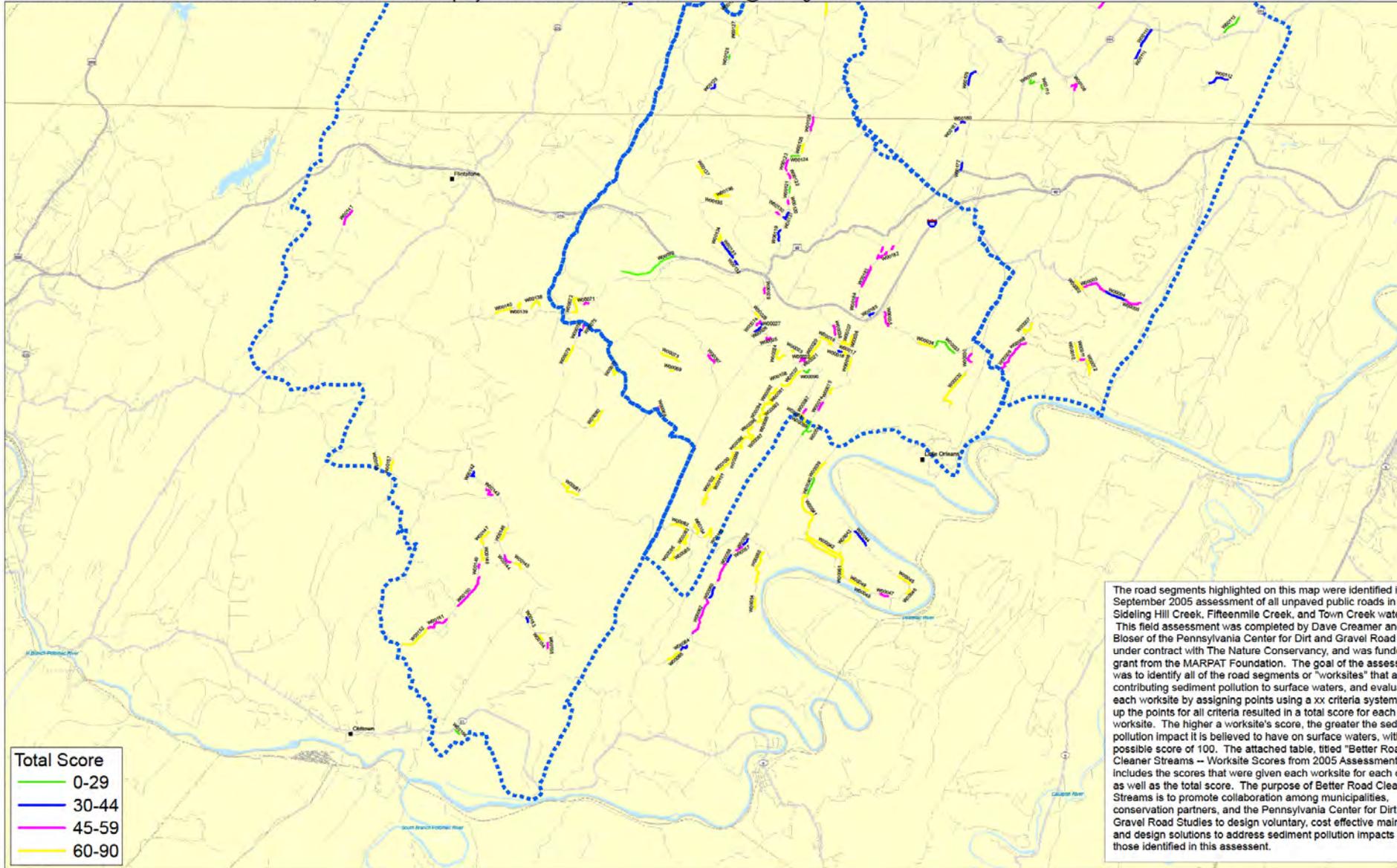
We produced base maps of public unpaved roads. They used their manual for identifying and evaluating -- 12 point criteria for evaluating and ranking

- 233 segments
- Range 200 ft - 2 miles
 - Almost half <1000 feet,
 - Just over dozen >.5 mile
- Assigned numerical score based on criteria

Better Roads, Cleaner Streams Assessment

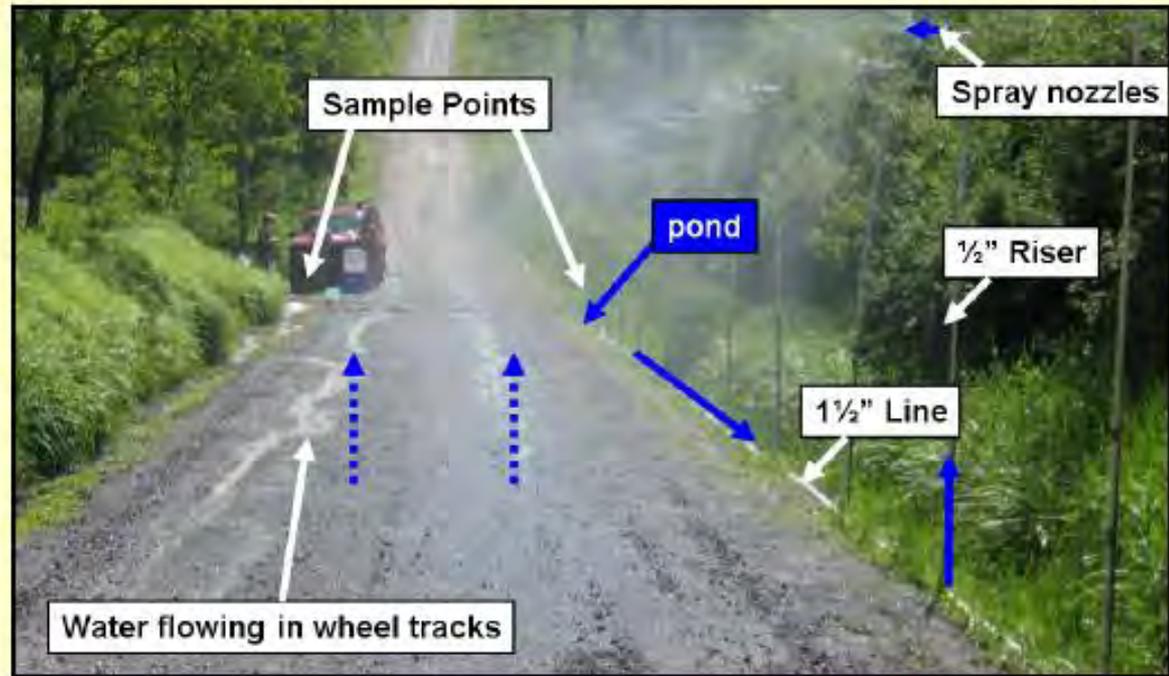
Hot spots for sediment pollution to surface waters from unpaved public roads in the Sideling Hill Creek, Fifteenmile Creek, and Town Creek watersheds

For more information on the Better Roads, Cleaner Streams project contact Donnelle Keech dkeech@tnc.org or 301-842-0300



Meet the Rainmaker, a Rainfall Simulator for Roadways...

The “rainmaker” is a rainfall simulator developed by the Center that creates a 0.55” rainfall event in 30 minutes over a 100’ length of road. This is equivalent to a 1-month return interval for a 30 minute storm for most of Pennsylvania. The rainmaker creates a controlled, repeatable rainfall event that is run both before and after ESM practices are installed on the road. By comparing runoff and sediment concentrations, sediment reductions can be calculated for the various ESM practices. Rainmaker layout and components are illustrated to the right.



Sediment in streams is very tricky to measure, and isolating a single land-based source even trickier

– but quantifying sediment from roads and reductions in sediment resulting from practices has been a priority for the Center for their entire existence.

– The Rainmaker : simulates a repeatable, rain event -- enables collection of runoff, quantification flows and TSS

Document, outreach

– bring partners along in common understanding of problem, introduce them to mutually beneficial solutions; start outreach to policy makers re: problem

“Rainmaker” at Green Ridge State Forest







“Rainmaker” at Green Ridge State Forest

100 ft. test segments: 8.3, 11.5, 34.3 lbs per 30 minute test

At least 13-54 tons
sediment discharged to
these streams during a
1 inch/hour rain event

Demonstration of Best Practices

Environmentally
Sensitive
Maintenance of

Dirt & Gravel Roads

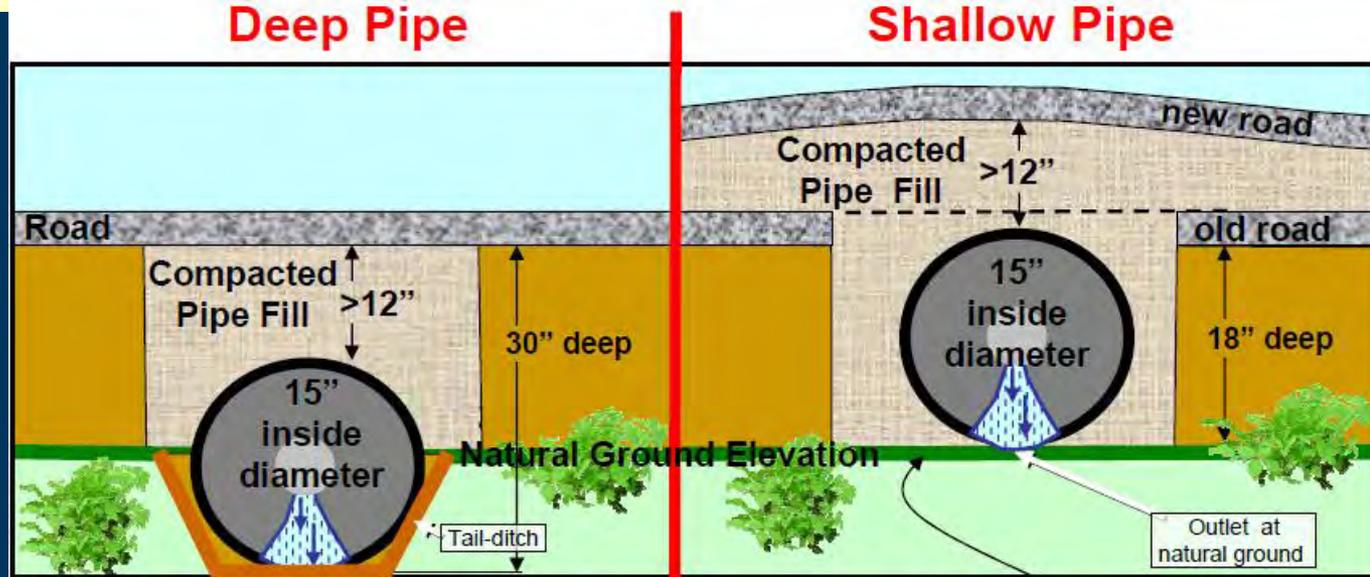
Innovative and effective practices to reduce maintenance costs and sediment pollution from unpaved roads

Baseline data will demonstrate the problem – seeking funding to demonstrate solutions: Environmentally Sensitive Maintenance Practices from Center's toolkit

About 20 technical bulletins on tools, techniques to deal with common situations found on unpaved, low volume roads

Shallow Crosspipes

Shallow Crosspipes: A drainage culvert (not stream pipe) that is installed so the pipe outlet discharges at natural ground elevation, avoiding the need for outlet trenches or "tail-ditches."



Side View, looking through crosspipe from outlet, comparing deep and shallow pipe placements. Note the green "natural ground elevation" line. Deep pipes dig down to obtain pipe cover. Shallow pipe placements are based off the natural ground elevation, and use fill to achieve pipe cover.



What is an Underdrain?

An underdrain is a drainage system installed under a road or road ditch to collect and transport subsurface water. These buried conduits come in a variety of shapes and sizes and are usually wrapped in geotextile fabric which allows water to enter the conduit while keeping sediment out.

How do Underdrains Work?

The purpose of an underdrain is to collect subsurface water before it appears on the road surface or in the road ditch. By intercepting this water, underdrains can help dry out road base, ditches, and banks that would otherwise be wet from emerging springs and seeps. Underdrains also prevent subsurface water from mixing with sediment-laden surface runoff during storm events. The clean water collected by an underdrain can then be directed to a stable outlet location separate from road surface drainage.



The ditch above carries water from roadside springs. An underdrain can collect this flow to keep the roadbed and ditch dry.

Benefits of Underdrains

- Inexpensive and easily installed
- Decrease volume of water on road surface
- Allows road bank, ditch, and base to dry out
- Separates clean subsurface water from road runoff
- Saves money by reducing maintenance time and

Where to Use Underdrains

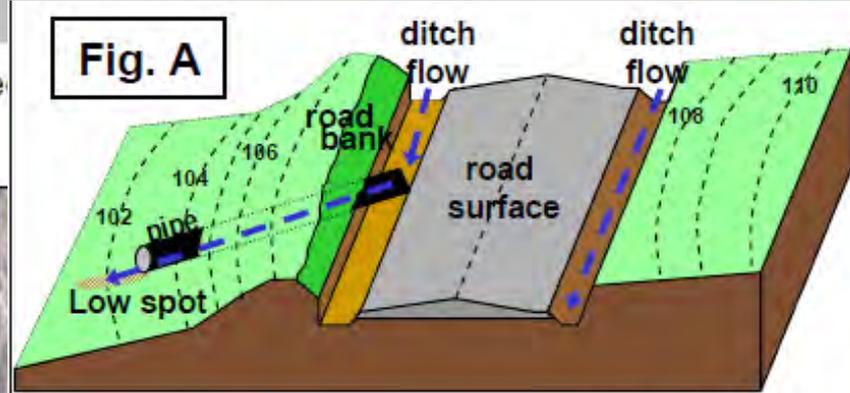
- Where spring flow discharges onto the road
- Where seeps appear on the surface of the road
- Where road shoulders are continually wet and rutting
- Where road ditches have frequent standing water

“Through-the-Bank” Pipes

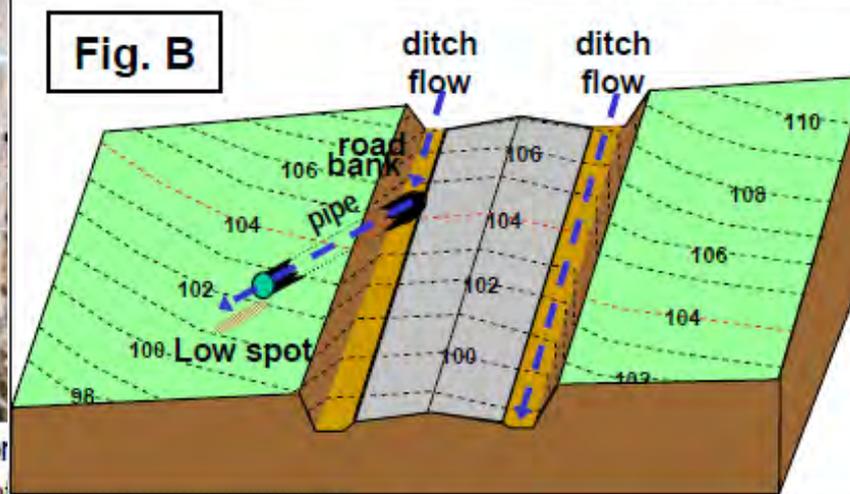
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drainage

“THROUGH-THE-BANK” PIPE – A pipe placed through the bank and away from the road.



Figures not drawn to scale.



banks. The road.

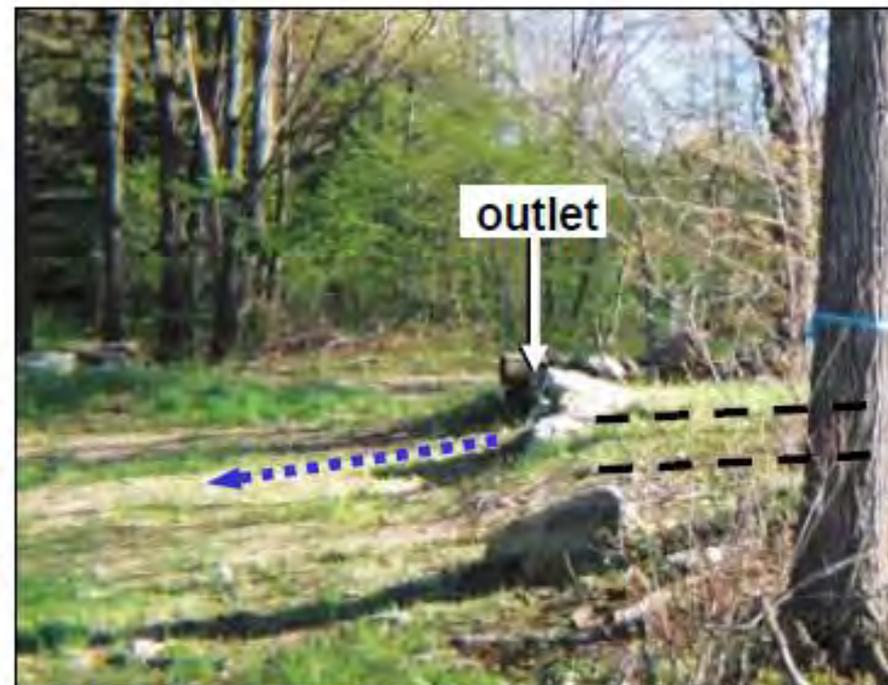


Photo 1. This “Through-the-Bank” pipe provides an outlet for pipe inlet is located in the road ditch, and the outlet is at the na

Figure A shows how a “through-the-bank” pipe can be used to “punch a hole” in an immovable bank or berm to get water off the road. Figure B shows a less obvious scenario where the “through-the-bank” is installed on an entrenched road. Using a level is important in these situations because the pipe may actually appear to run uphill with the naked eye, especially on steeper roads!

- MD DNR – funding road projects in western MD State
Forests
- Allegany County Roads – interested, need \$\$
- Quantify before and after sediment runoff ??
- Video, fact sheets, field tours – targeted audiences (\$\$)

- VA DOT training Feb-March 2012
- ESM training in MD, May 2012
- ESM training in WV, June 12-13, 2012
- Stream Simulation for Culvert Design
 - **Introductory webinar July 25, 2012**
- More training needed?

Financing Strategy – the critical nut to crack



Environmental Finance Center of
University of Maryland
Scale – county? State?

Options for short-term/one-off funding for demonstration projects,
assessment/inventory

What is needed|: Sustained, reliable funding for ongoing maintenance

Better Road, Cleaner Streams

QUESTIONS?