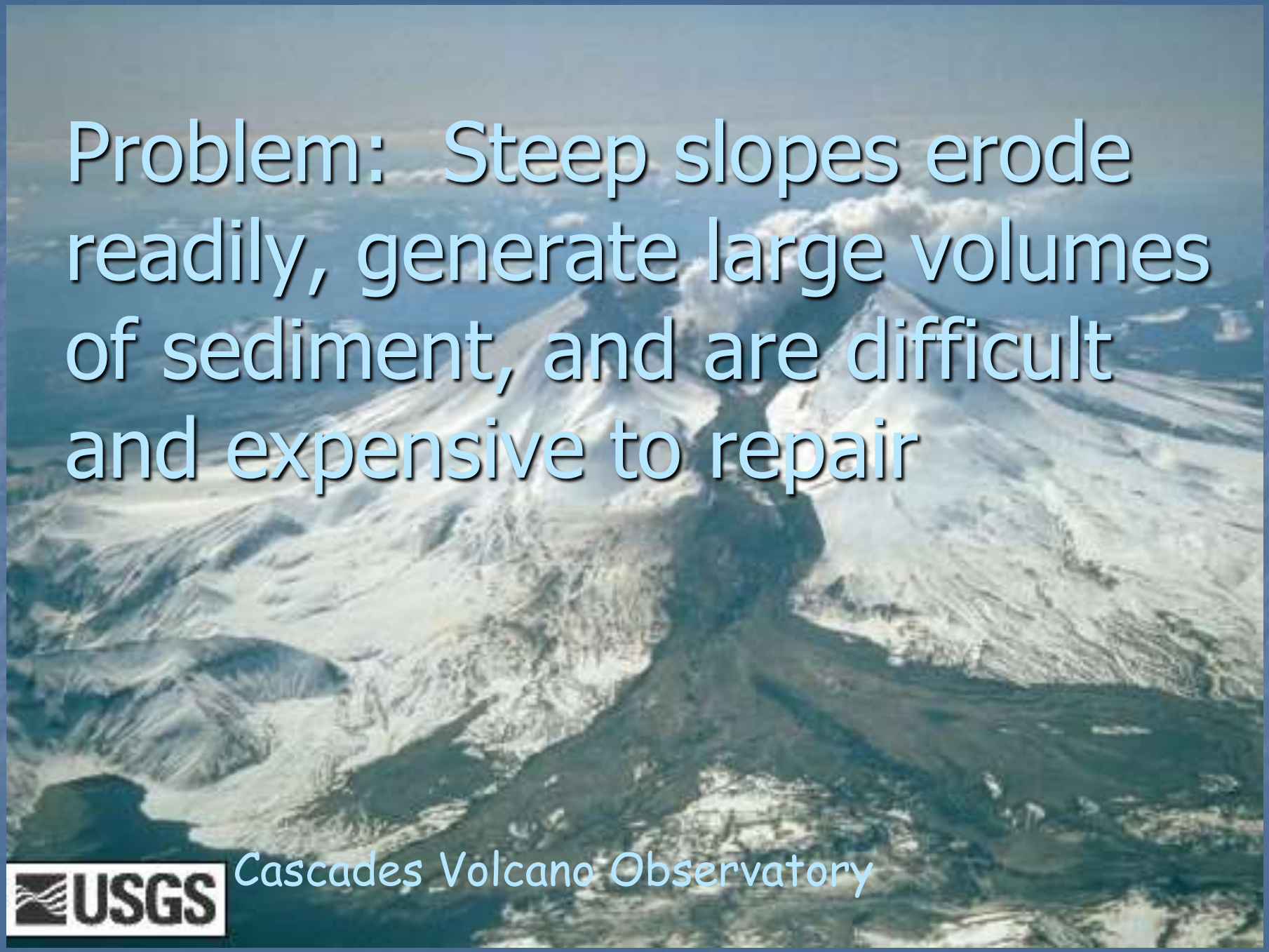
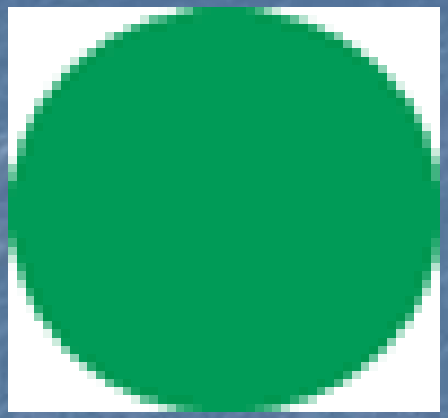
SWPPP Element 6: Protect Slopes



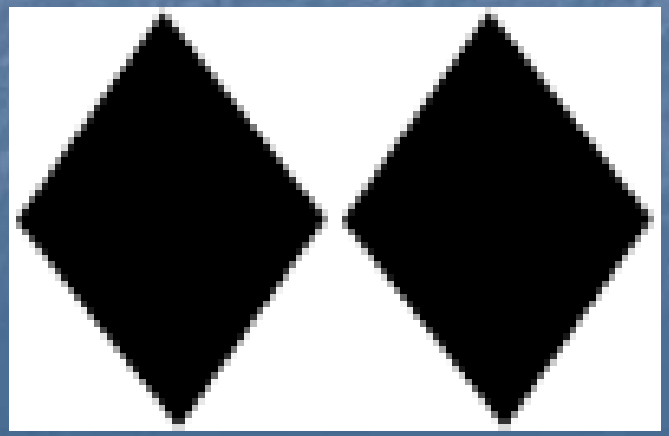
Problem: Steep slopes erode readily, generate large volumes of sediment, and are difficult and expensive to repair

USGS Cascades Volcano Observatory

Erosion Control on Slopes from



to



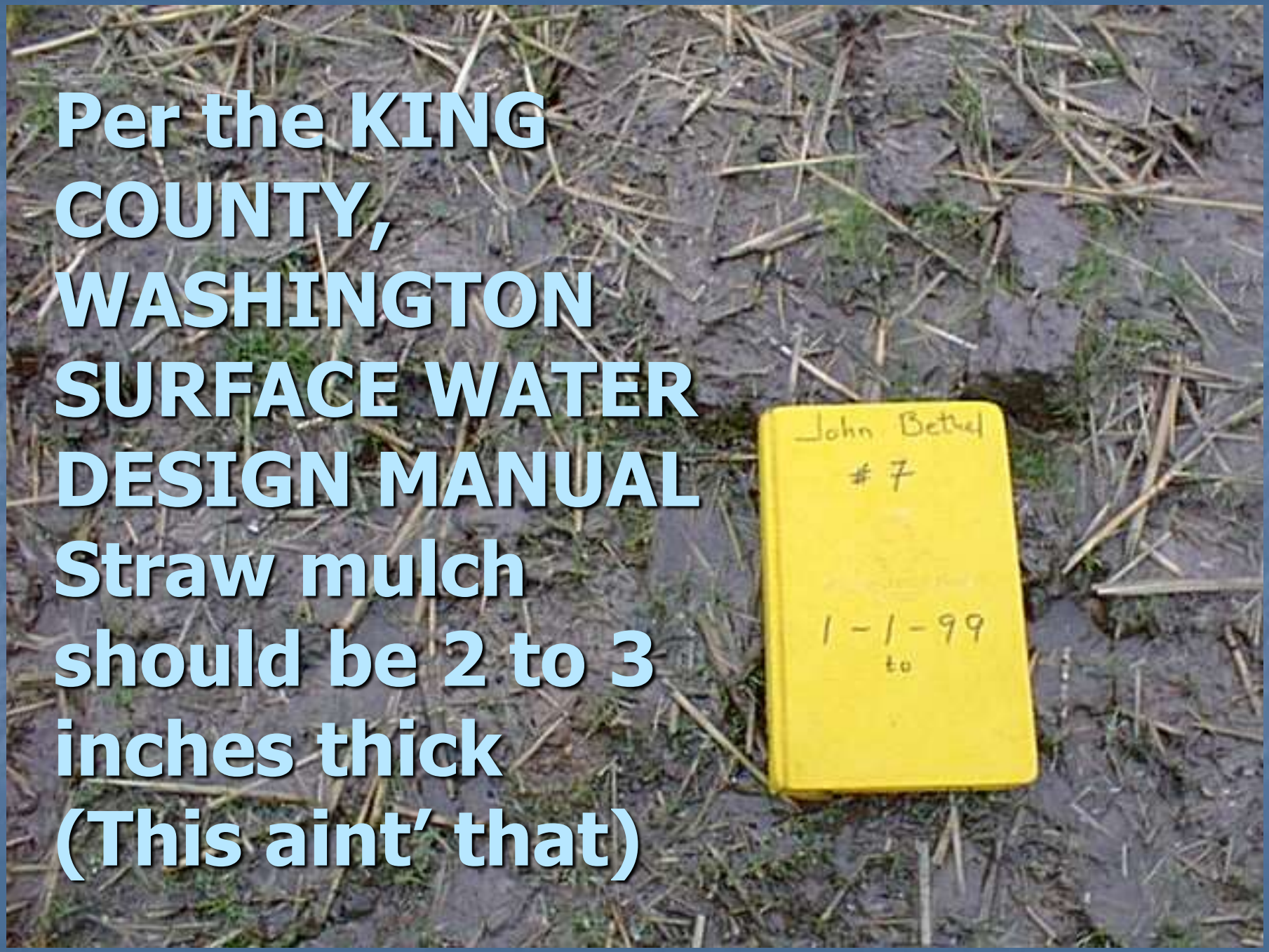
Mulch

Protects the soil from erosion,
Reduces compaction from the impact of heavy rains,
Conserves moisture, reducing the need for frequent waterings,
Maintains a more even soil temperature,
Prevents weed growth,

NRCS Natural Resources Conservation Service

Straw Mulch
Hamm Creek

Straw mulch is often preferred because it is **CHEAP** and readily available.



Per the KING COUNTY, WASHINGTON SURFACE WATER DESIGN MANUAL Straw mulch should be 2 to 3 inches thick (This aint' that)

Compost
Mulch

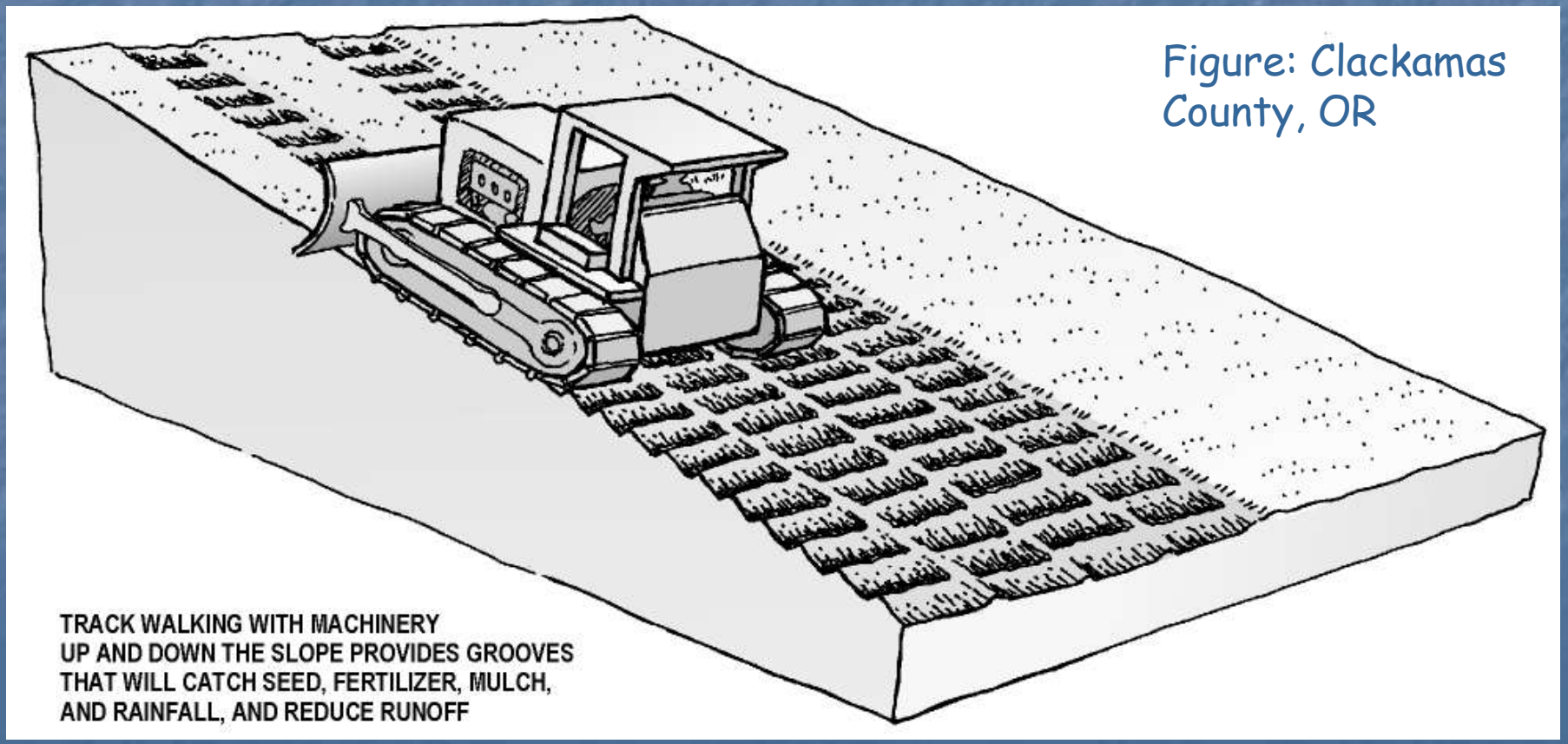
Bark mulch is generally not effective on slopes because it is readily displaced by flowing water

Benefits of WoodStraw® ECM

- High performance erosion control
- 100% weed & plant seed free
- No chemicals or pesticides
- Resistant to high & sustained winds
- Effective on slopes up to and over 60%
- Can be used with seeding and hydroseeding
- Promotes revegetation
- Minimal dust during application
- Long lasting after application
- Easily applied by hand, blower and helicopter
- Durable – can be walked or driven on after application
- Attractive

forestconcepts™

Track-walking Roughens Slopes to Lessen Erosion Potential up to 55%



Track Walking

Photo: Clackamas County, OR

WashDOT SR 520 Project

What's wrong with this picture?

Photo: US EPA

Exposed soils can be temporarily stabilized by driving a tractor over the surface

Track-walking may be less effective on very steep slopes

Hydroseeding (=hydraulic mulch seeding, hydro-mulching, hydraseeding)

Hydroseed is a slurry of seed and mulch, often also including fertilizer, tackifying agents, and green dye.

It can be sprayed from a hose, truck-mounted monitor, or…

Photo: Erickson Air-Crane

Photo: Ted Stallings

For larger sites

SPECIAL DOUBLE OFFER

Now Only $19.95 +S&H

Order Now!

VISA

Covers up to 100 SQUARE FEET!

with Spray n' Stay Technology

Made In The USA

John Bethel

Mulch alone is generally not effective on steep slopes or when subject to concentrated flow

Rolled Erosion Control Products

Rolled erosion control products, vary by density, strength, and permanence. They are often made with a combination of materials

Jute netting, Rutherford Creek
Jute netting is:
Cheap
Widely Available
More stable than loose mulch

SR 202 At Tokul Creek

Nice Jute
Installation
(with a
Lake view!)

John Bethel

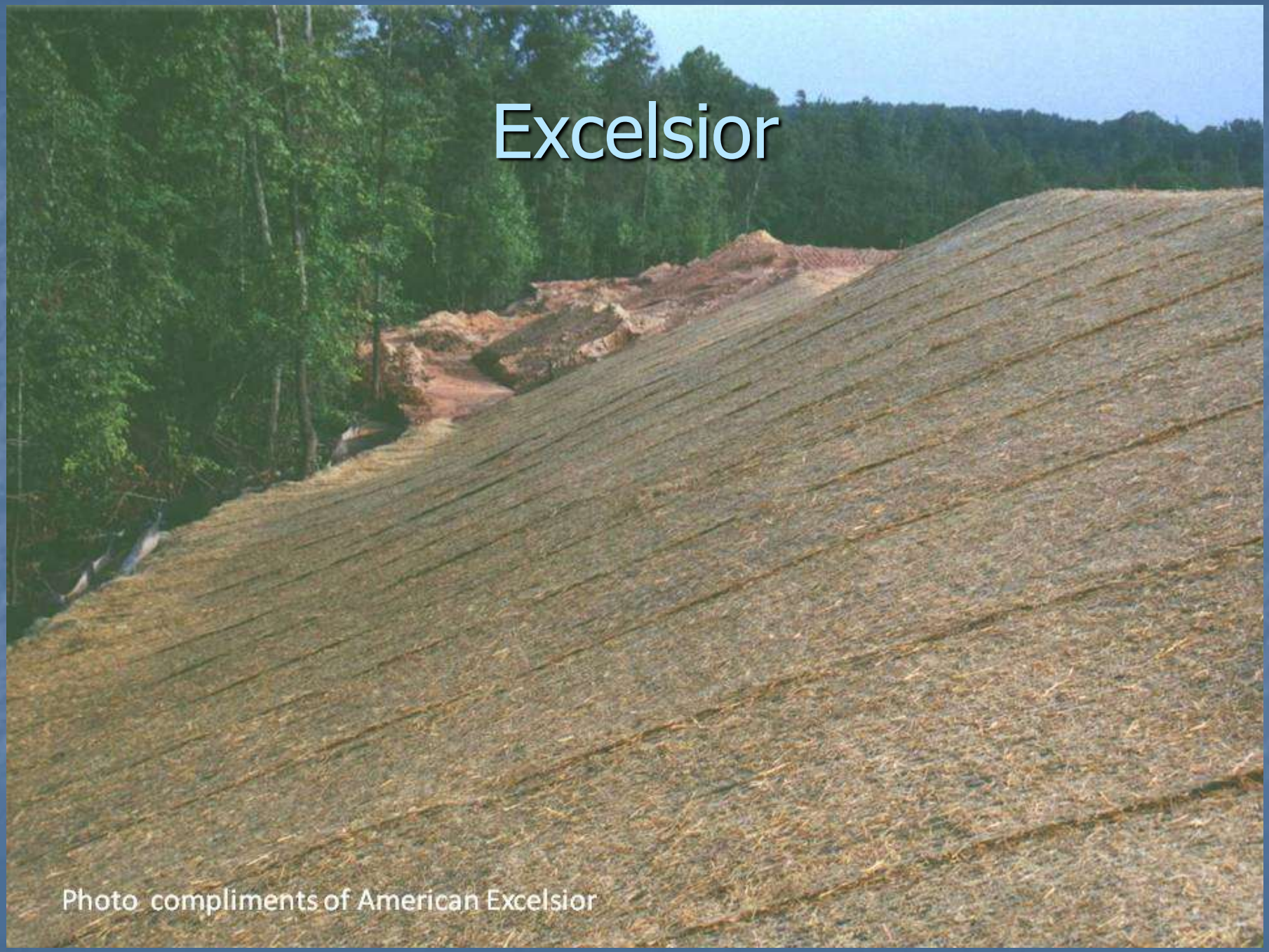
However, jute netting is:

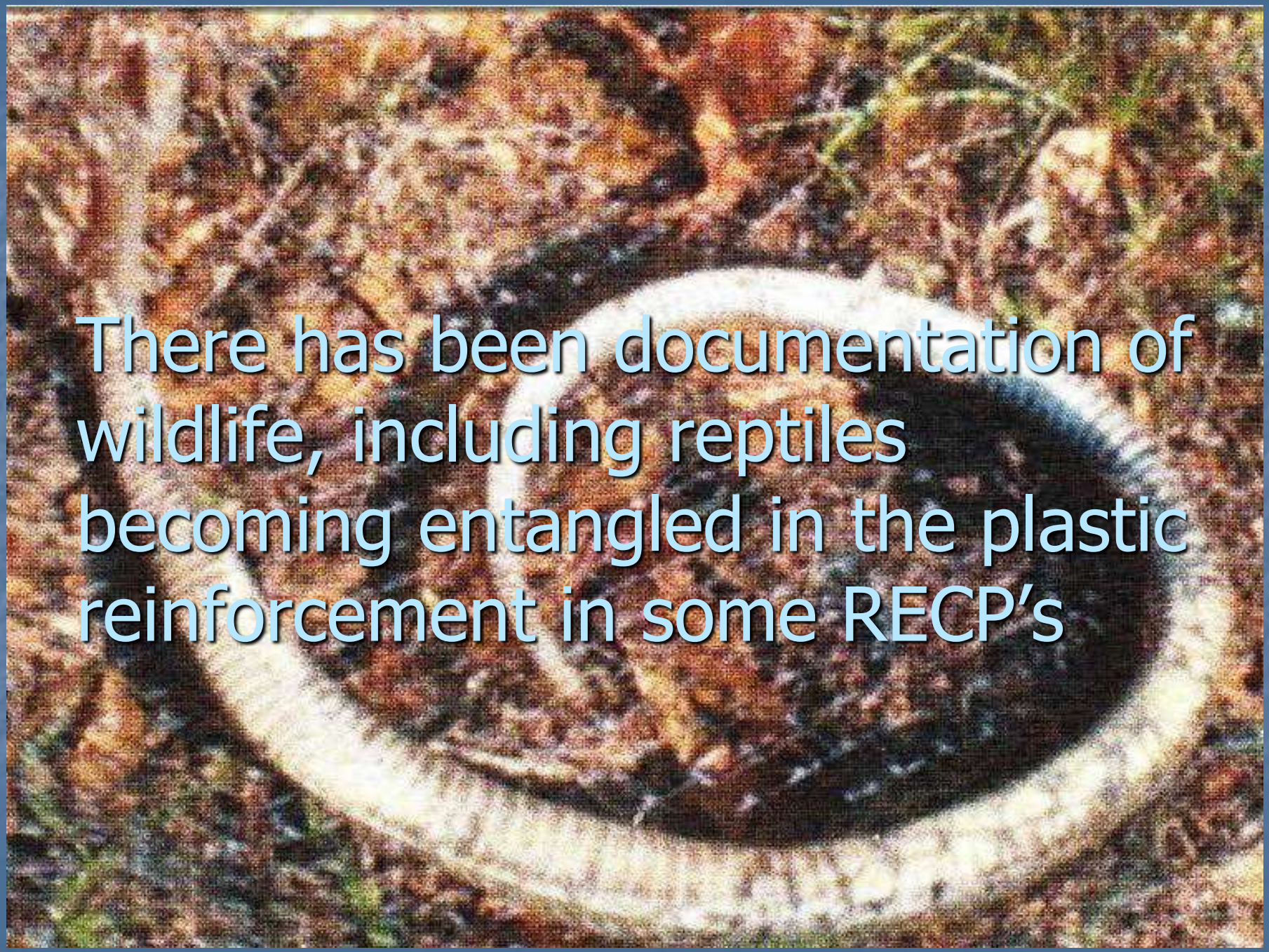
-Short-lived,

-Mechanically weak,

-Has large voids.

Excelsior





There has been documentation of wildlife, including reptiles becoming entangled in the plastic reinforcement in some RECP's

Use of coir fabric for stabilizing banks following stream work
Photo: Gary-Paul Reinke

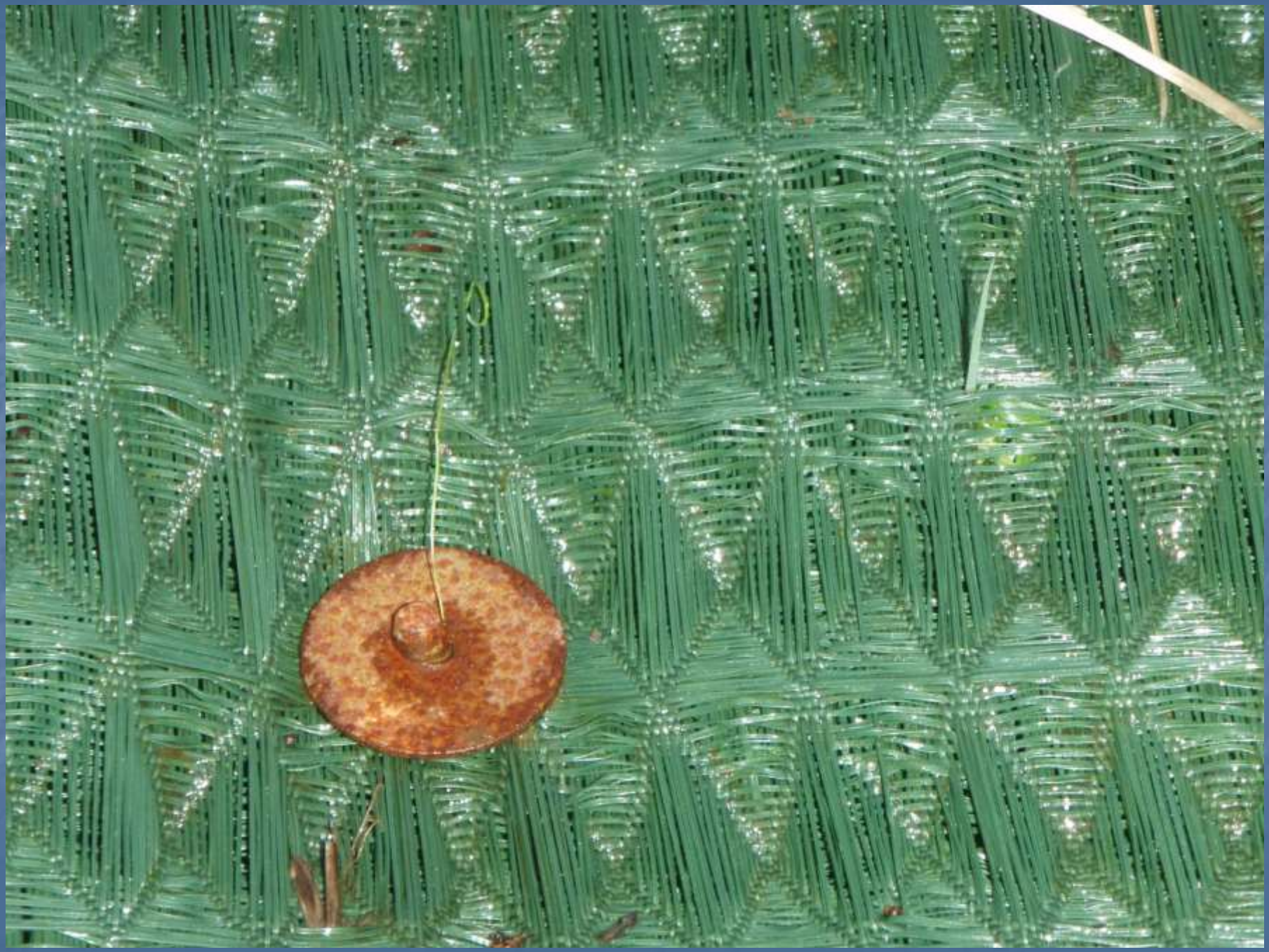
Plastic turf reinforcement mats

Enkamat Install

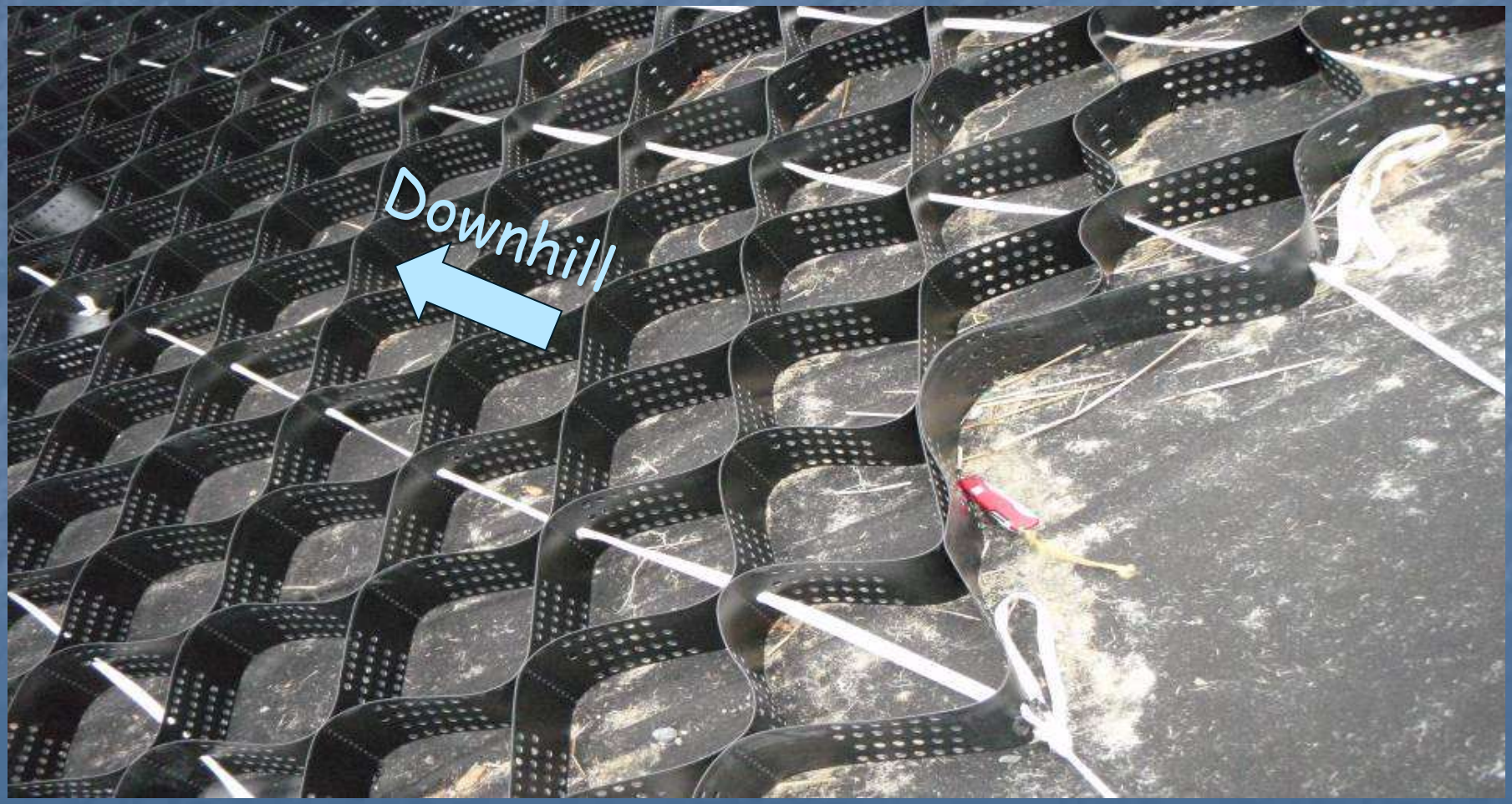
Hydroseeding over Enkamat

One month later

King County Fay
Road Slope Reapair



Geoweb (=cellular containment) prior to filling



Geoweb product used to
stabilize R/D pond slopes

396th Dr SE
08-21-07

Hertz

Terracing at Issaquah Highlands

Photo from
MNDOT

Photo compliments of American Excelsior

Wattles rather than terraces to reduce slope length

Here's the
problem

Live wattles for slope stabilization

After sprouting

CA.GOV CALIFORNIA DEPARTMENT OF TRANSPORTATION

Home | Travel | Business | Engineering | News | Maps | Jobs | About Caltrans | Contact Us

District Page | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

Erosion Control Toolbox

Welcome to the Caltrans Erosion Control Toolbox, a one-stop reference for erosion control standards and guidance. The purpose of this site is to provide Caltrans Landscape Architects wit
single location that provides access to the information necessary to design successful, effective and cost efficient erosion control treatments.

Click here to view the 2010 Standards Erosion Control Plan Preparation Guidance

http://www.dot.ca.gov/hq/LandArch/16_la_design/guidance/ec_toolbox/index.htm

Erosion Control Toolbox

PROVIDE LONG TERM SOIL COVER

	MAX. SLOPE (H:V)						BENEFITS			COST
	4:1	3:1	2:1	1.5:1	1:1	Cut or Fill?	Soil Cover (1)	Soil Health (2)	Infil-tration (3)	Cost/ Acre (4)
RECP Netting (Type A)	🟢	🟢	🔴	🔴	🔴	C/F	⚫	⚪	⚪	$35,000
RECP Netting (Type B)	🟢	🟢	🟢	🟢	🟡	C/F	⚫	⚪	⚪	$35,000
RECP Netting (Type C)	🟢	🟢	🟢	🟢	🟡	C/F	⚫	⚪	⚪	$35,000
RECP Blanket (Type A)	N/A	N/A	🟢	🟢	🟡	C/F	⚫	⚪	⚪	$25,000
RECP Blanket (Type B)	N/A	N/A	🟢	🟢	🟡	C/F	⚫	⚪	⚪	$25,000
RECP Blanket (Type C)	N/A	N/A	🟢	🟢	🟡	C/F	⚫	⚪	⚪	$25,000
RECP TRM (Type A)	N/A	N/A	🟢	🟢	🔴	C/F	⚫	⚪	⚪	$30,000
RECP TRM (Type B)	N/A	N/A	🟢	🟢	🟢	C/F	⚫	⚪	⚪	$37,000
RECP TRM (Type C)	N/A	N/A	🟢	🟢	🟢	C/F	⚫	⚪	⚪	$45,000

CA.GOV CALIFORNIA DEPARTMENT OF TRANSPORTATION

SWPPP Element 7: Protect Drain Inlets

Problem: Keeping construction site sediment out of the constructed drainage system.

02/29/2008

01/03/2008

Sediment in here

Means Sediment out here

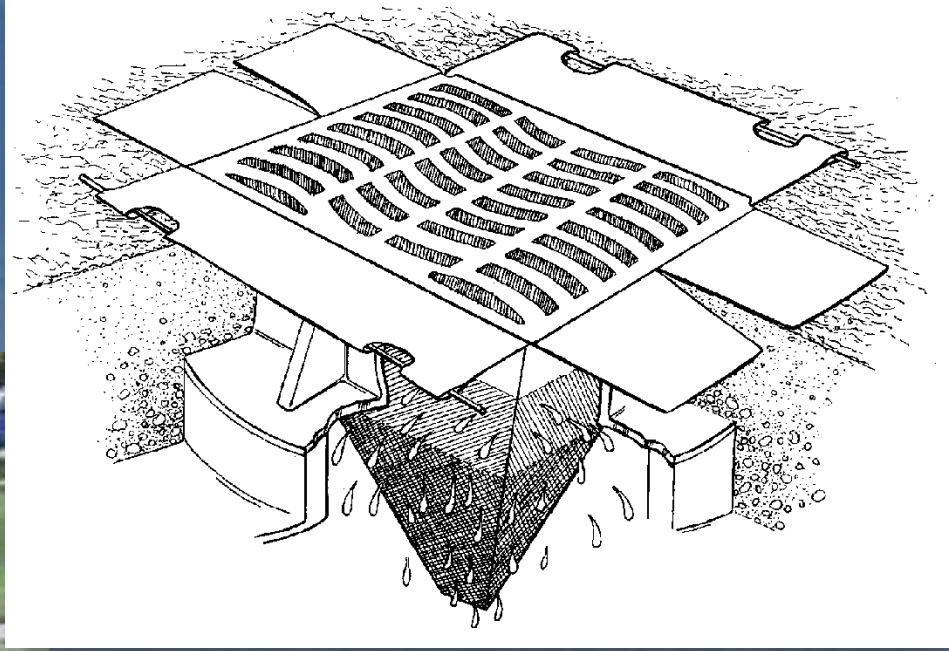
Old solution: cover CB inlets
with filter fabric

Typical road failure due to catch basin "protection"

Above-grade inlet protection

Compost Tubes provide both physical and chemical pollutant control

Below grade



Inlet Protection

SWPPP Element 8: Stabilize Channels & Outlets

Problem: Flow generated on-site, or flowing through the site has to be conveyed and discharged w/o mobilizing and carrying sediment.

These BMP's generally apply in one of three circumstances:

1. Conveying water that originates on the site from rainfall of seepage,
2. Conveying water that originates off site but flows through the project site, and
3. Protecting water quality when the project entails work in in the water.

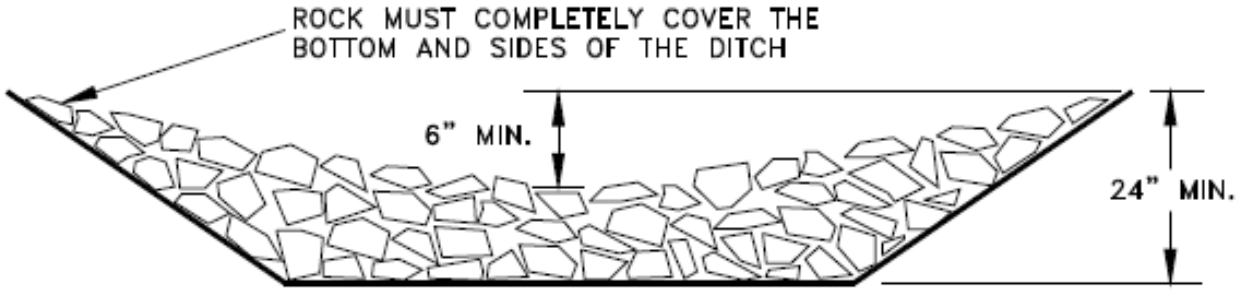
Rip rap-lined channel

03/06/2008

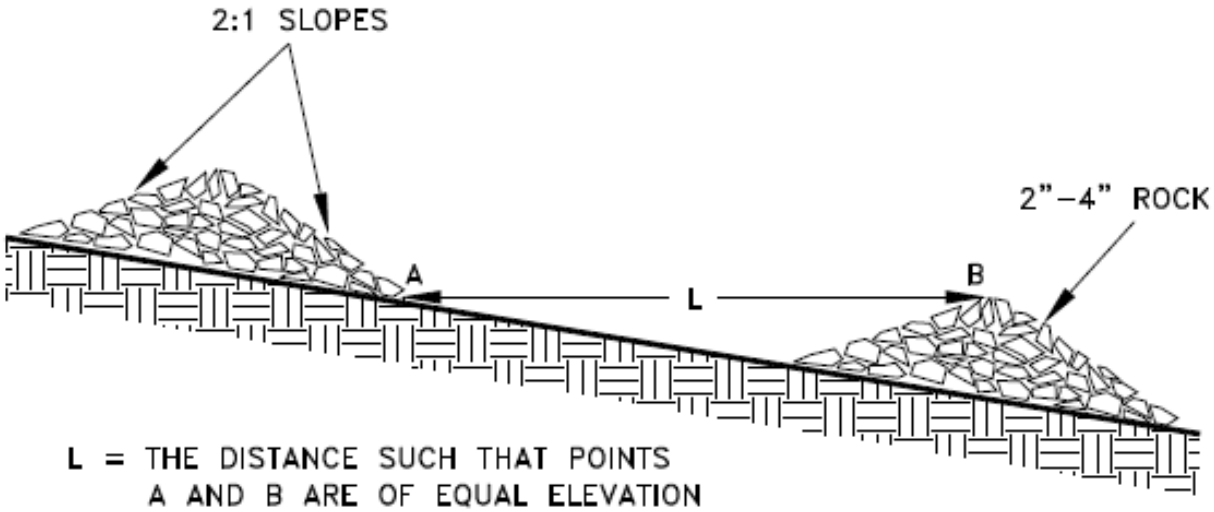
Stream
12/20/2007

Check Dams

Rock check dam detail from K. C. Small Project Drainage Requirements



CROSS SECTION



CHECK DAM SPACING

How about this check dam?

Or this one?
AUG 21 2008
Photo: Cecil County, MD

Manufactured triangular (foam rubber??) check dams

Manufactured coir check dam

Hay bale check dams

Hay bale check dams

Photo: IECA

Or These,

Photo: Maine BLWQ

Or This,
Photo: Maine BLWQ

How bout:

Photo: MoDOT

Live brush bundles as check dams

Photo: Vancouver Island. University

Shopping Basket Gabions

Slope Drains

ADS Slope drains can make things worse rather than better

Articulated drain tiles in Italy

Live Pole Drains

King County Novelty Hill Project, Gravity Bypass

Stensland (sp?) Creek

Culvert Fish Passage Construction Guidelines For Maintenance Crews

Produced by:
King County Department of Transportation
Roads Services Division
Roads Maintenance Section
Environmental Unit
Special Operations Unit

October 25, 2004

Contributing Staff:
Stephen Conroy, Senior Ecologist
Rob Fritz, Supervising Ecologist
Linda Goheen, Crew Lead
Janine Johansen, Ecologist
John Schut, Equipment Operator
Grant Smith, Senior Ecologist

Report Coordinator:
Michael O'Neil, Senior Engineer

Contact any of the above staff at (206) 296-8100

Cary Creek culvert Replacement

Inlet Close-up

Photo: Arny Stonkus

1993
KOMATSU

Isolating Construction Work from Adjacent Natural Water Courses

Silt curtains can help protect adjacent waters but:

1) They are not dams

2) What happens to the sediment when they are removed?

Auburn Narrows, First Try

Auburn Narrows, Round 2

Photo: Mason Bowles

An alternative to silt curtains

Chinook Bend, Installing Porta-Dam Frames

Chinook Bend-Installing Frames

Chinook Bend-Porta-Dam in operation

Chinook Bend-
Porta-Dam and
silt curtain

Water-Inflated Dam

Installing Super Sacks at the Belmondo site, Cedar River

Completed Super Sack diversion

Questions???