

Stream Channel Repair and Restoration Following Extreme Flooding Damage – Part 1

1. NRCS planning process (9 steps)
2. Why are the streambanks unstable? (geotechnical)
3. What is the stream trying to do? (geomorphology)
4. Will the stream tolerate the project? (hydrology)
5. What NRCS programs apply? (Emergency Watershed Protection [EWP], etc.)

This webinar will present information important to the work NRCS does for the repair and restoration of stream channels after extreme flood events.

1. As with all good conservation work, a planning process is necessary.
2. An understanding of the geotechnical processes involved that disrupt bank stability can help frame the channel repair alternatives considered.
3. Reading the stream dynamics to understand the geomorphology is important as to how and why the stream channel changes are occurring.
4. Also an awareness of the watershed and the regional precipitation can inform the necessary hydraulic channel capacity requirements.
5. And after the flood event it is important to know the possible funding assistance and limitations of programs the Natural Resources Conservation Service has available.

1. NRCS 9-step planning process (for stream projects as for all conservation work)

- 1) Identify Problems and Opportunities
- 2) Determine Objectives
- 3) Inventory Resources
- 4) Analyze Resource Data
- 5) Formulate Alternatives
- 6) Evaluate Alternatives
- 7) Make Decisions
- 8) Implement the Plan
- 9) Evaluate the Plan

Stream channel repair and restoration after an extreme flood event does not eliminate the need for the planning process!

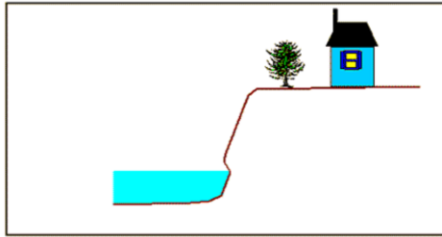


Good planning can prevent an emergency from occurring again!

The NRCS 9-steps of planning are shown here. Those of you with the Agency I am sure are familiar with this process.

It is important to remember that damage from a flood event, although it may be an emergency, does not eliminate the need for a planning process. This process may be streamlined with technical staff assistance but a good planning process of these projects can prevent a similar emergency from happening again.

I would now like to turn the webinar over to Kip Yasumiishi to talk about the geotechnical processes.



Post Flood Stream Restoration and Repair

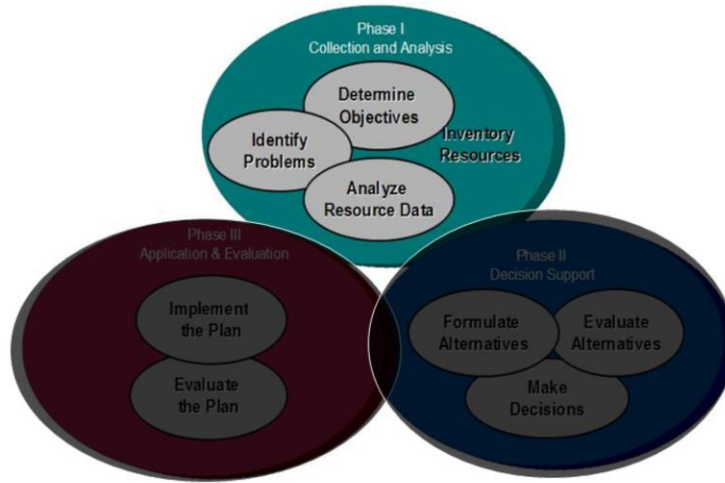
Why are streambanks unstable?

Geotechnical processes

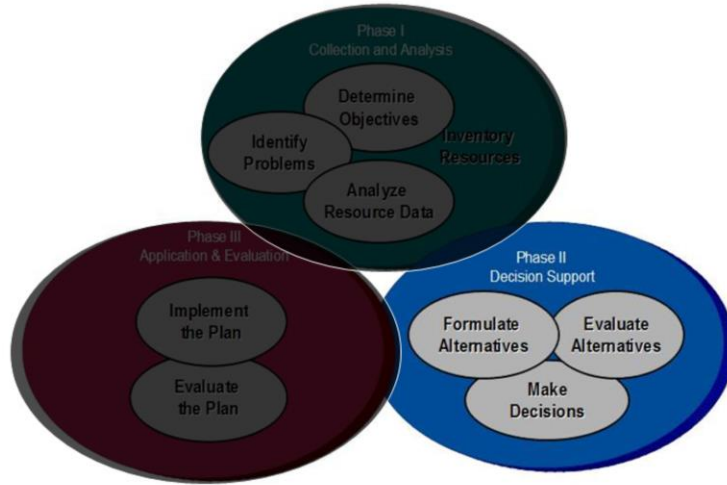
Kip Yasumiishi, P.E.
Civil Engineer
WNTSC, Portland, OR



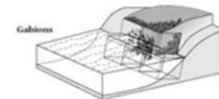
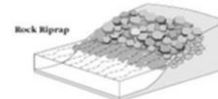
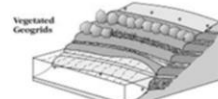
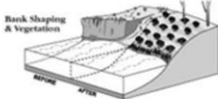
NRCS Planning Process



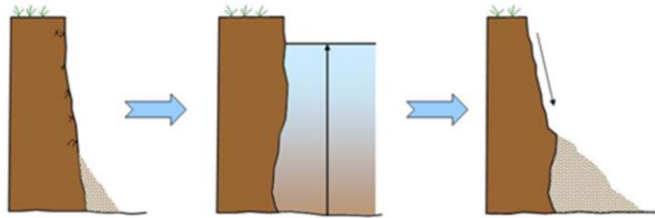
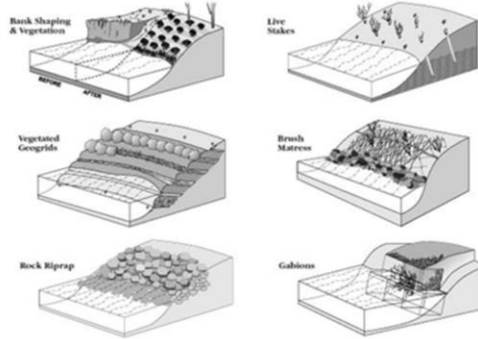
NRCS Planning Process



Stabilization Alternatives



Stabilization Alternatives



How Streambanks Fail

- Tractive mechanisms (fluvial process)

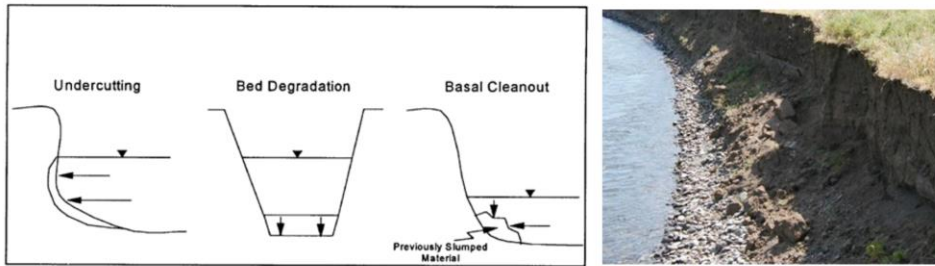


Figure 2. Tractive Erosion Mechanisms.

Source: O'Neill and Kuhns, Streamnotes USFS 1994

How Streambanks Fail

- Gravitational mechanism

Table 1.

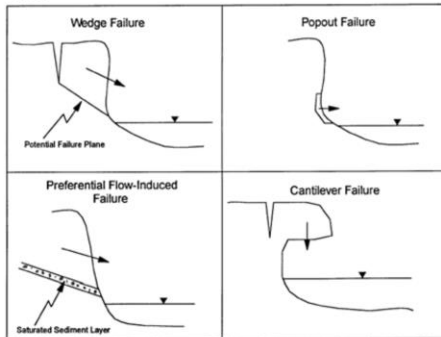


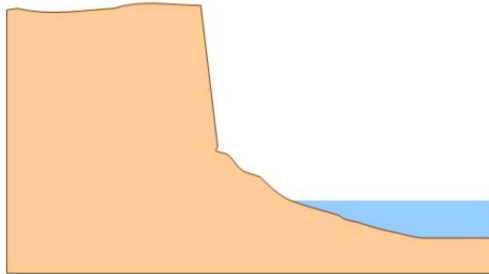
Figure 1. Gravitational Failure Mechanisms.



Source: O'Neill and Kuhns, Streamnotes USFS 1994

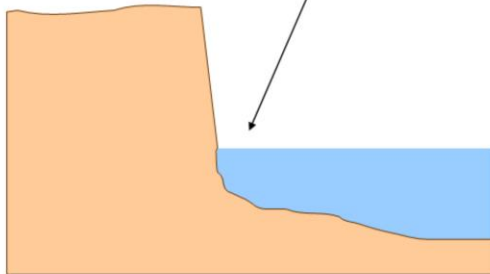
How Streambanks Fail

Vertical face

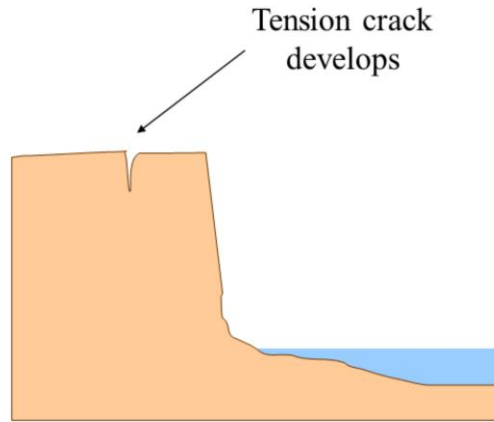


How Streambanks Fail

Toe erosion
steepens bank



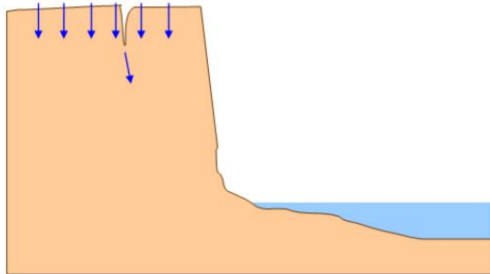
How Streambanks Fail



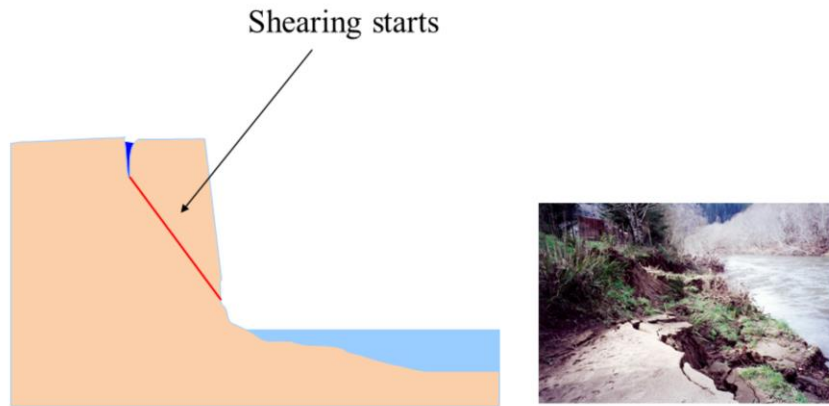
strong in compression weak in tension

How Streambanks Fail

Infiltration raises pore-water pressure

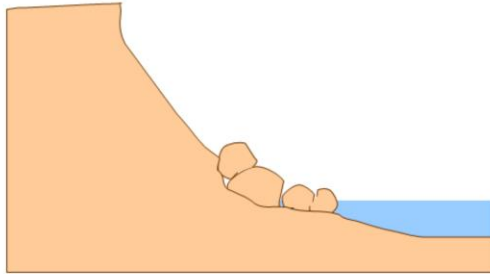


How Streambanks Fail



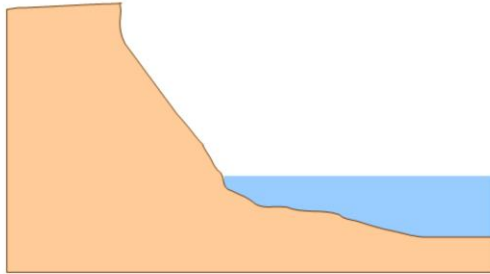
How Streambanks Fail

Bank failure
occurs



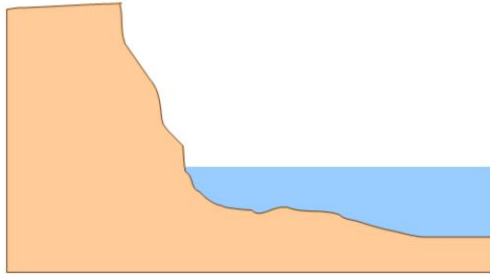
How Streambanks Fail

Erosion removes
the failed debris

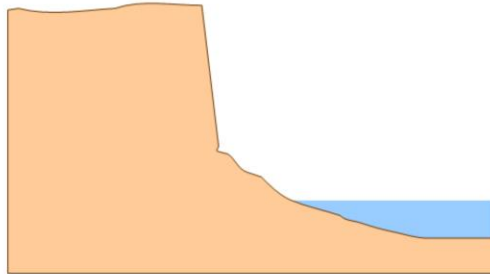


How Streambanks Fail

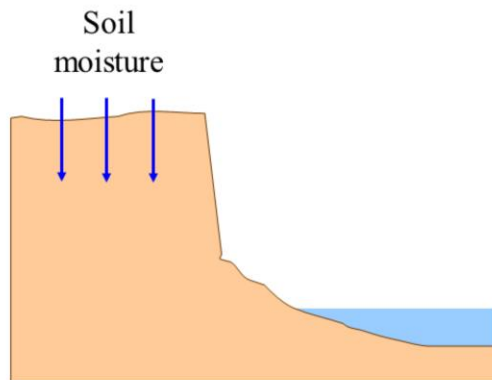
Bank steepening
starts again



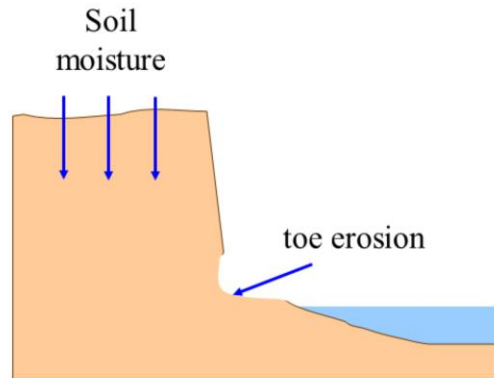
Bank stability is decreased by....



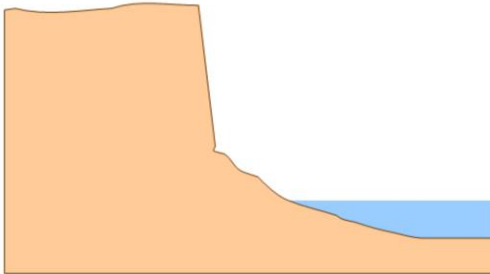
Bank stability is decreased by....



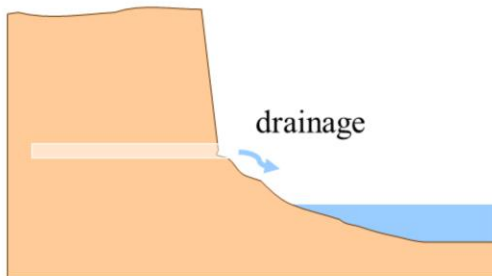
Bank stability is decreased by....



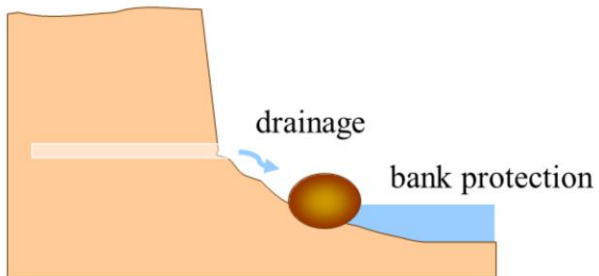
Bank stability is increased by....



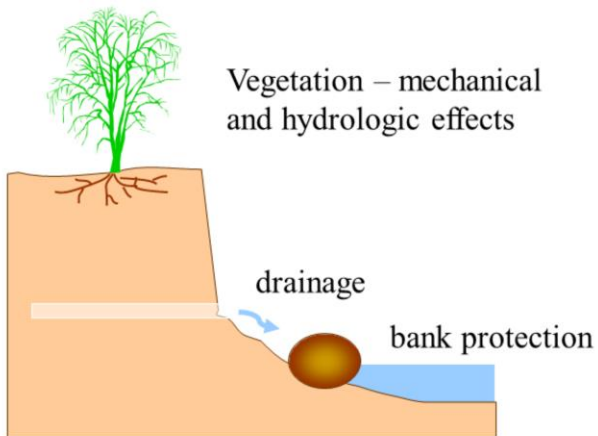
Bank stability is increased by....



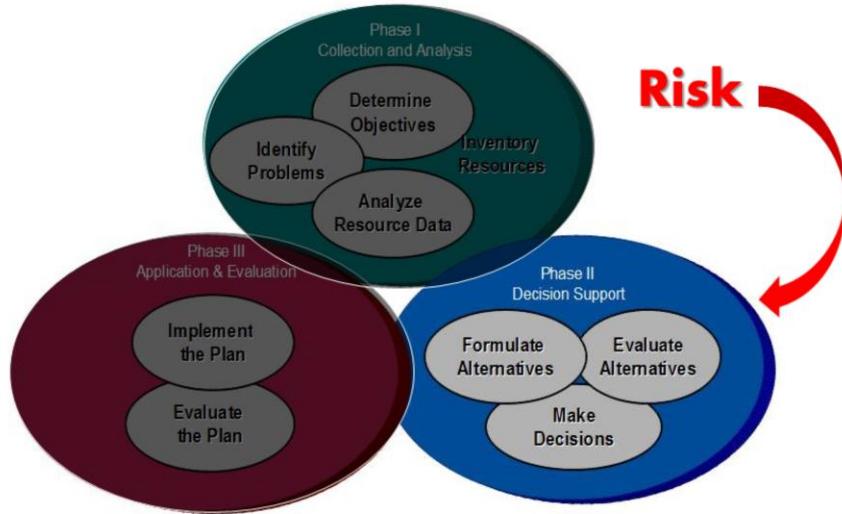
Bank stability is increased by....



Bank stability is increased by....



NRCS Planning Process



Risk = Probability x Consequence

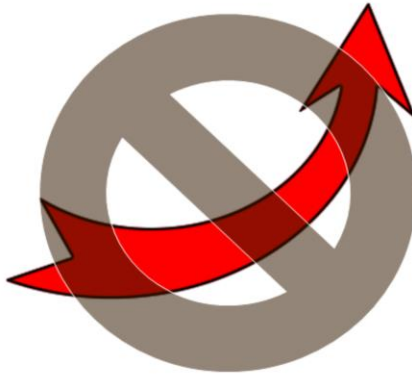
- risk to species
- risk to owners
- risk to ecosystem
- social risk
- institutional risk



LIKELIHOOD	5	A5	B5	C5	D5	E5
	4	A4	B4	C4	D4	E4
	3	A3	B3	C3	D3	E3
	2	A2	B2	C2	D2	E2
	1	A1	B1	C1	D1	E1
		A	B	C	D	E
		CONSEQUENCES				



Risk Management



Project Risk Screening Matrix 2011

Scale of Disturbance (multiple of channel width)
 1x 3x 5-7x 10x 20+

Planning Context
 Coordinated Watershed Plan
 Artificial Bed and/or Bank Stabilization
 Removed Left in place Added (deformable)
 Isolated Action Multiple
 Monitoring and Maintenance Plan
 Adaptive Management Monitoring only None

Stand-alone Project
 Added (non-deformable)
 Pervasive
 None



Stream Sensitivity / Stream Type

Source (>10%) Bedrock	Colluvial	Transport (3-10%) Alluvial	Response (<3%) Incised Channel / Alluvial Fan
Riparian Corridor Continuous/Wide	Semi-continuous/Wide	Discontinuous/Narrow	Urbanized or Levee Confined
Bank Erosion Potential Naturally Non-erodible		Erosion Resistant	Highly Erodible or Revetted
Bed Scour Potential Boulder/Clay Bed (low)		Gravel/Cobble Bed (moderate)	Sand/Silt Bed (high)
Dominant Hydrologic Regime Spring-fed	Snowmelt	Rain	Rain-on-Snow Thunderstorm/Monsoon

Project

Welcome to River Restoration Analysis Tool, or RiverRAT. River RAT is a river project development and evaluation tool. It was developed to facilitate consistent and thorough evaluation of the potential impacts of proposed projects on river habitat. The tool is supported by a source document that provides a comprehensive synthesis of the watershed and river sciences relevant to restoration planning and design, a project risk evaluation matrix, and a separate comprehensive checklist of information necessary to review project proposals.

The RiverRAT tool will walk you through a series of 16 questions that parallel the phases of restoration project development. Each question is designed to help you evaluate whether a project has addressed fundamental considerations at each step of the project development process. You will be able to record your responses and thoughts for each question, and print a final report to document your review.

If you would like to explore RiverRAT [click here](#). If the tool suits your needs, please visit the NOAA homepage to request a user account and password. A link to the NOAA site is provided under "Notice to Users" at right.

[Download the Science Base for Evaluating Stream Project Proposals - \(PDF 4MB\)](#)

[Download the Screening Matrix](#)

[Download the Project Information Checklist](#)

[RiverRAT Framework](#)

[RiverRAT Overview](#)

[RiverRAT Development Team and Information](#)

Notice to Users

The River RAT application has moved to a new domain. Your username is still your e-mail address (john.smith@noaa.gov), but you must contact the SDM help desk at 206-860-3433 to set a temporary password.

After you log on with your temporary password, you must change your password by clicking the 'Change Password' tab or the 'Change Password' link below your username.

[Click this link to redirect to the new domain.](#)

restorationreview.com

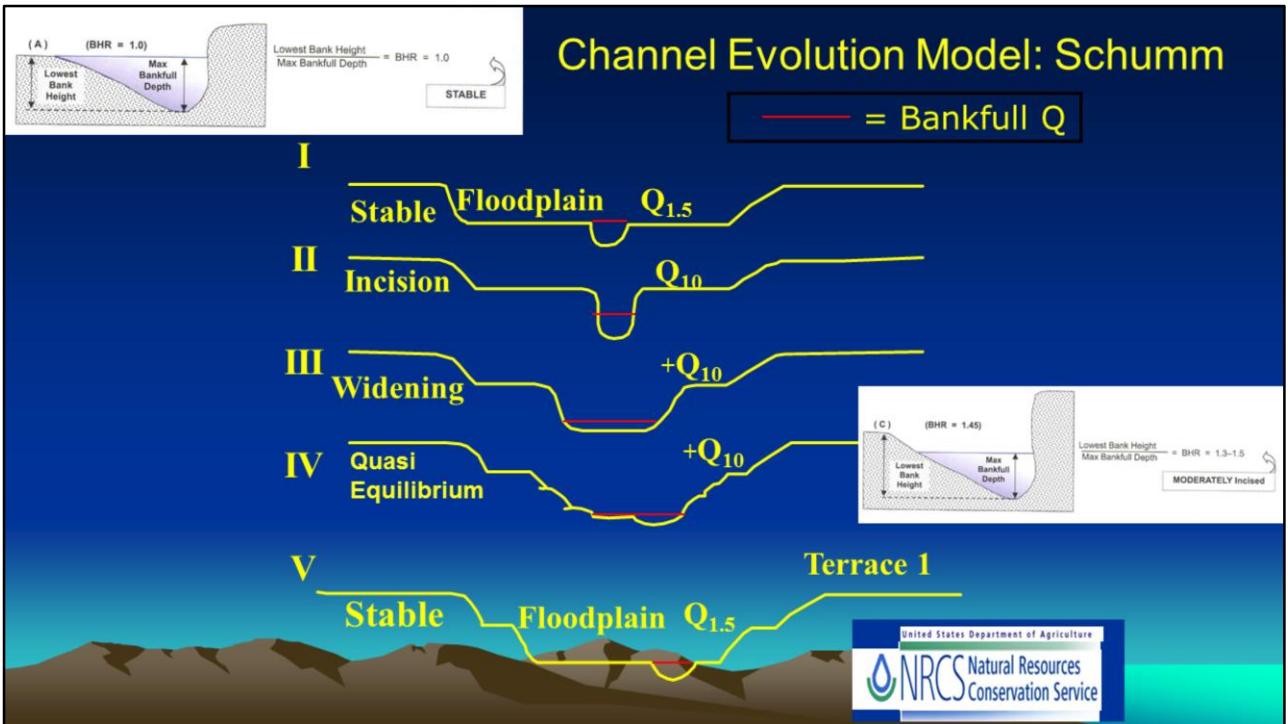
Janine Castro, Geomorphologist
US Fish and Wildlife Service
National Marine Fisheries Service
Portland, Oregon
503.231.6977

What is the stream or river trying to do? (Stream Geomorphology)

In the short time we have to discuss the fluvial geomorphology of rivers there are several principles essential to planning in post-flood recovery

W. Barry Southerland, PhD
Fluvial Geomorphologist,
CPESC#514





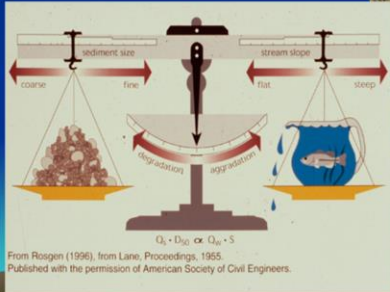
The planning and potential repair if any incised system has a stage that is critical to generating alternatives- not just geomorphic alternatives. The Schumm Channel Evolution Stage is critical.

Is the system incising, aggrading or is the bed stable?



Why is this important? If the bed is still downcutting in a Schumm II or III stage, the practices will involve another suite of alternatives and considerations before selecting structures or actually even deciding to work at a site

Restoration from and incised Stage 2 to a Stage 5 CEM



“Natural stream channel stability is achieved by allowing the river to develop a stable dimension, pattern, and profile such that, over time, the stream system neither aggrades or degrades (incision). For a stream to be stable it must be able to consistently transport its sediment load, both is size and type, associated with local deposition and scour.”

Landscape Setting	# of Bridges	# of Homes	Risk and Uncertainty (Liability Issues)
Urban	Most	Most	Highest
Urban Fringe	More	Low to Medium	Higher
Ag Landscape	More	Low Density	High
Meander Migration Free Zone (MMFZ)	Least	Least	Low to potentially high

Risk and Landscape Setting

Geomorphic Risks and Considerations: Post-Flood Treatment

Landscape Setting	Propensity to allow Meander Migration	Structures moving off-site (i.e. Risk)
Urban	Very little, often non-existence	High risk unless property is upstream of a specific outlet such as delta, ocean ..etc.
Urban Fringe	Low, Little tolerance to property loss	High risk unless property is upstream of a specific outlet such as delta, ocean ..etc.
Ag Landscape	Landowners are skeptical but some possibilities e.g. M. Belt Width	May be high risk and depending on landowner's position and relationship with others on the stream corridor
Meander Migration Free Zone (MMFZ)	High	Low risk unless the site is located near a high risk setting or specific infrastructure

Urban includes city or characteristically the infra-structure of a city

Urban Fringe - an urban fringe area is defined as a stream corridor segment located outside concentrated urban areas, not in agriculture areas, and meander migration is limited due to property considerations, risk, liability, infrastructure - such as essential roads, county sheds, and so forth.

Ag Landscape – the dominate product is agriculture such as hayland, row crops, orchards, pastureland and so forth

Meander Migration Free Zone – Public or Private ownerships where the unimpeded migration of stream channels has little risk and consequences to the shareholder. Migration can potentially yield a positive net gain in functions and values in the stream corridor.

LAST Cell: Is the MMFZ where you are going to accommodate for meander migration just upstream of urban fringe with a subdivision? Perhaps there is a natural bedrock control with a valley type change.

I came up with these four after spending nearly twenty years dealing with distinct issues within each category. I would suggest that there may be one or two more. But a safe bet is that most issues involving stream work, in general, are easier to understand as a division within these four landscape settings.

4) Will the stream tolerate the project?



4) Will the stream tolerate the project?

topic area: **Hydrology and Hydraulics**

discussed by: Dan Moore, P.E., Hydraulic Engineer
WNTSC, Water Quality & Quantity Team
Portland Oregon

Hydrology...

The watershed delivers varying flow to the project location.

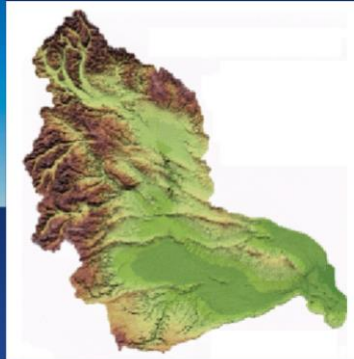
How much flow?

When?

How much flow?



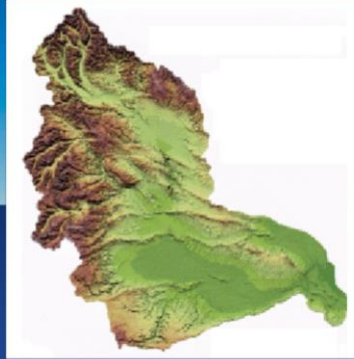
When?



How much flow?



When?



Ways to establish recurrence probability of various flow levels:

Ways to establish recurrence probability of various flow levels:

the fastest way:

stream gage: annual peak frequency analysis

generally very good reliability

spreadsheet download: <http://go.usa.gov/KS6>

4) Will the stream tolerate the project?



spreadsheet download: <http://go.usa.gov/KS6>

Ways to establish recurrence probability of various flow levels:

a fairly fast way:

USGS StreamStats regression equations

the statistical correlation is often poor

StreamStats regression equation example

Table 10. Prediction equations for estimating peak discharges for ungaged watersheds in Region 1, coastal watersheds.

[Variables: Q(n), discharge in cubic feet per second for the n-year recurrence interval; Area, drainage area, in square miles; I24-2, 2-year 24-hour precipitation intensity, in inches; MxJanT, mean maximum January temperature, in degrees Fahrenheit; Soil C, soil storage capacity, in inches; Soil P, soil permeability, in inches per hour]

Prediction equation	Percent standard error of the model, in percent	Average standard error of sampling, in percent	Average prediction error, in percent	Average equivalent years of record
$Q(2) = 0.05056 \text{Area}^{0.9489} \text{I24-2}^{1.360} \text{MxJanT}^{1.240} \text{Soil C}^{-0.442} \text{Soil P}^{-0.1576}$	25.5	8.19	26.8	2.4
$Q(5) = 0.01316 \text{Area}^{0.9385} \text{I24-2}^{1.272} \text{MxJanT}^{1.738} \text{Soil C}^{-0.502} \text{Soil P}^{-0.2234}$	23.9	8.23	25.3	3.7
$Q(10) = 0.008041 \text{Area}^{0.9324} \text{I24-2}^{1.226} \text{MxJanT}^{1.926} \text{Soil C}^{-0.526} \text{Soil P}^{-0.2552}$	23.9	8.68	25.6	5.0
$Q(25) = 0.005122 \text{Area}^{0.9258} \text{I24-2}^{1.179} \text{MxJanT}^{2.109} \text{Soil C}^{-0.5484} \text{Soil P}^{-0.2888}$	24.8	9.44	26.6	6.4
$Q(50) = 0.003888 \text{Area}^{0.9215} \text{I24-2}^{1.151} \text{MxJanT}^{2.223} \text{Soil C}^{-0.5605} \text{Soil P}^{-0.3111}$	25.8	10.1	27.8	7.2
$Q(100) = 0.003048 \text{Area}^{0.9176} \text{I24-2}^{1.126} \text{MxJanT}^{2.325} \text{Soil C}^{-0.5701} \text{Soil P}^{-0.3319}$	26.9	10.7	29.1	7.9
$Q(500) = 0.001890 \text{Area}^{0.9099} \text{I24-2}^{1.070} \text{MxJanT}^{2.527} \text{Soil C}^{-0.5855} \text{Soil P}^{-0.3770}$	30.0	12.2	32.6	8.9

StreamStats regression equation example

$$Q_{2yr} = 0.05056 A^{0.9489} * (JanT_{max})^{1.280} * (C_{soil})^{-0.4421} * (P_{soil})^{-0.1576}$$

StreamStats regression equation example

$$Q_{2yr} = 0.05056 A^{0.9489} * (JanT_{max})^{1.280} * (C_{soil})^{-0.4421} * (P_{soil})^{-0.1576}$$

drainage area
44.46 mi²

avg max T
48.1°F

soil storage
capacity
7 inches

soil permeability
0.8
inches/hr

StreamStats regression equation example

$$Q_{2yr} = 0.05056(44.46)^{0.9489} * (48.1)^{1.280} * (7)^{-0.4421} * (0.8)^{-0.1576}$$

$$Q_{2yr} = 115 \text{ cfs}$$

...plus or minus what?

Ways to establish recurrence probability of various flow levels:

the slow way:

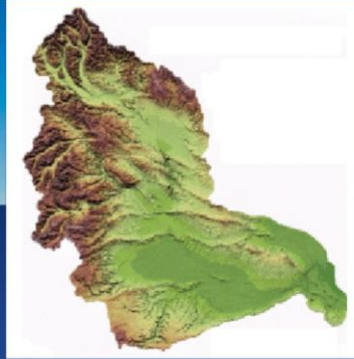
watershed modeling (HecHMS or WinTR-20)

but rainfall probability NOT equal to runoff probability!

How much flow?



When?



Why do we need to know?

How powerful
is this stuff?



How deep
will it get?



How fast
will it flow?



Can it move these rocks?



Hydraulics...

Future flooding will impact the project with varying...

depth

velocity

streampower

Ways to establish hydraulic parameters:

Ways to establish hydraulic parameters:

the fast way:

at-a-section
Mannings
analysis

	A	B	C	E	F	G	H	I	J	K	L	M	N	O	P
	station	elevation	n-value	w.s. elev	flow area	wetted P	hyd. radius	top width	hyde. depth	n value	decay-wid	conveyance	discharge	velocity	shear
15	0	100	0.05	100.00	494.5	201.1	2.46	200	2.47	0.048	0.1476	32391	1212	2.45	0.215
16	0	100	0.05	99.50	395.7	196.0	2.02	195	2.03	0.048	0.1456	23652	885.0	2.24	0.176
17	10	98		99.00	299.5	190.9	1.57	190	1.58	0.048	0.1376	16227	607.2	2.03	0.137
18	100	97.6	0.04	98.50	205.7	185.8	1.11	185	1.11	0.048	0.1155	10226	382.6	1.86	0.097
19	105	95.2	0.03	98.00	114.5	180.7	0.63	180	0.64	0.048	0.0624	5857	219.1	1.91	0.055
20	110	95		97.50	61.3	30.5	1.22	49.8	1.24	0.042	0.0899	3634	136.0	2.21	0.106
21	120	95.1	0.04	97.00	41.9	29.3	1.43	28.8	1.46	0.035	0.1287	2238	83.7	2.00	0.125
22	130	97	0.05	96.50	28.4	25.5	1.11	25.1	1.13	0.034	0.1337	1317	49.3	1.73	0.097
23	130	97.5		96.00	16.8	21.7	0.78	21.4	0.78	0.033	0.1417	630.6	23.6	1.40	0.068
24	190	98		95.50	7.01	17.8	0.39	17.7	0.40	0.032	0.1610	175.9	6.58	0.94	0.034
25	200	100		95.00	0.0	0.0	0.00	0.0	0.00	0.033	0.1417	0.00	0.00	0.00	0.000

spreadsheet download: <http://go.usa.gov/0Eo>

4) Will the stream tolerate the project?

Ways to establish hydraulic parameters:

the fast way:

at-a-section
Mannings
analysis

	A	B	C	E	F	G	H	I	J	K	L	M	N	O	P
	station	elevation	n-value	w.s. elev	flow area	wetted P	hyd. radius	top width	hyd. depth	n value	arcy-weis / conveyance	discharge	velocity	shear	
15	100	97.6	0.04	98.50	205.7	185.8	1.11	200	2.47	0.048	0.1476	3239	1212	2.45	0.215
16	0	100	0.05	99.50	395.7	196.0	2.02	195	2.03	0.048	0.1456	2362	885.0	2.24	0.176
17	10	98		99.00	299.5	190.9	1.57					1627	607.2	2.03	0.137
18	100	97.6	0.04	98.50	205.7	185.8	1.11					1626	382.6	1.86	0.097
19	105	95.2	0.03	98.00	114.5	100.7	0.63					857	219.1	1.91	0.055
20	110	95		97.50	61.3	30.5	1.22					434	136.0	2.21	0.106
21	120	95.1	0.04	97.00	41.9	29.3	1.43					238	83.7	2.00	0.125
22	130	97	0.05	96.50	28.4	25.5	1.11					137	49.3	1.73	0.097
23	130	97.5		96.00	16.8	21.7	0.78					63	23.6	1.40	0.068
24	190	98		95.50	7.01	17.8	0.39					175.9	6.58	0.94	0.034
25	200	100		95.00	0.0	0.0	0.00					0.00	0.00	0.00	0.00

rating table of
flow,
velocity,
shear force

spreadsheet download: <http://go.usa.gov/0Eo>

Ways to establish hydraulic parameters:

the fast way:

at-a-section
Mannings
analysis

station	elevation	n-value	w.s. elev	shear
0	100	0.05	99.50	0.215
10	98		99.00	0.176
100	97.6	0.04	98.50	0.137
105	95.2	0.03	98.00	0.097
110	95		97.50	0.055
120	95.1	0.04	97.00	0.106
130	97	0.05	96.50	0.125
130	97.5		96.00	0.097
190	98		95.50	1.75
200	100		95.00	0.068
				0.034
				0.000

drawback:
cannot accommodate
backwater effects

Ways to establish hydraulic parameters:

a more accurate, but more involved way:

HecRAS reach analysis

requires significant field measurements

4) Will the stream tolerate the project?

design lifetime and flow recurrence

for example:

given **design life of 50 years**

should design flow level be a **50-year flood**?

Thinking about **design lifetime** and **flow recurrence**...

A **100-year** flood has a 1 percent chance
of happening in any given year.

...a **50-year** flood has a 2 percent chance
...a **25-year** flood has a 4 percent chance

Thinking about **design lifetime** and **flow recurrence**...

What about the chance of a **100-year** flood during
a design lifetime of 50 years?

What about the chance of a 100-year flood during a design lifetime of 50 years?

$$P_{recurInPeriod} = 1 - \left(1 - \frac{1}{recur} \right)^{Period}$$

What about the chance of a 100-year flood during a design lifetime of 50 years?

$$P_{100In50} = 1 - \left(1 - \frac{1}{100}\right)^{50} = 0.39$$

39 percent!

What about the chance of a **100-year** flood during
a design lifetime of 50 years?

39 percent

You may want to analyze the effect of
flows with a more rare recurrence
than your project design lifetime.

Sooner or later
the project is
going to get wet!





United States Department of Agriculture

Stream Channel Repair and Restoration

NRCS Programs

Presented By: Larry Johnson, P.E.
USDA – NRCS
State Conservation Engineer
EWP Program Manager

Webinar Presentation 2/25/2015

Stream Channel Repair and Restoration

Stream restoration projects can be very costly;

What does NRCS have to offer?



NRCS Programs

Disclaimer: The following information is not intended to provide all of the details and requirements of the discussed programs. For more information please contact your local NRCS Office.

NRCS Programs

- Environmental Quality Incentive Program (EQIP)
- Emergency Watershed Protection Program (EWPP)
- Floodplain Easement Program (FPE)

Environmental Quality Incentive Program (EQIP)

Eligibility Requirements

1. Must meet the requirements as an Agricultural Producer.
2. Must have full control of the land where practice(s) are to be applied.
3. Capable of completing Operation & Maintenance.

Environmental Quality Incentive Program (EQIP)

Program Sign-Up

1. Traditional Sign-Up

- a. Payment Rates Established in Fiscal Year Payment Rates.
- b. Rates subject to Hold Downs by Local Working Group.

2. State Initiative

- a. Payment Rates Established in Fiscal Year Payment Rates.
- b. Rates not subject to Hold Downs by Local Working Group.
- c. Can limit to certain practices.

Environmental Quality Incentive Program (EQIP)

Limitations

1. EQIP payment scenarios may provide limited funding for complex restoration projects.
2. Complicated when project is on multiple landowners property.



United States Department of Agriculture

Emergency Watershed Protection Program (EWPP)

Overview

The EWP Program is a
“Post Event”
Recovery Program

Emergency Watershed Protection Program (EWPP)

Overview

EWP Assistance can be provided when the following criteria are met:

1. Must be a "Sudden Watershed Impairment",
2. Impairment must create an "Imminent Threat to Health, Life or Property".

Emergency Watershed Protection Program (EWPP)

Overview

EWP Assistance can be provided after:

1. A Presidential Disaster Designation or,
2. State Conservationist Designation of a local emergency.

Emergency Watershed Protection Program (EWPP)

Overview

EWP Financial Assistance:

1. 75% Financial assistance toward all project related costs.
2. 25% match can be Cash, In-Kind or a combination.

NOTE: 25% match cannot include other Federal Funds.

Emergency Watershed Protection Program (EWPP)

NRCS Responsibilities

- Technical Assistance
- Administrative Assistance



Emergency Watershed Protection Program (EWPP)

Sponsorship

A Project Sponsor is required for EWP and can be:

Any legal subdivision of State Government:
Cities, Counties, Municipal Authorities,
Conservation Districts, Flood Control Districts,
Irrigation Districts and Tribes.

Emergency Watershed Protection Program (EWPP)

Eligible Measures

NRCS will only provide assistance for measures that:

1. Reduce threats to life or property from a watershed impairment,
2. Provide protection from additional flooding or erosion by retarding runoff,
3. Remove debris deposited by natural disaster that would effect runoff or erosion,

Emergency Watershed Protection Program (EWPP)

Eligible Measures

NRCS will only provide assistance for measures that:

4. Restore the hydraulic capacity to the maximum extent possible based on pre-event conditions,
5. Economically, socially and environmentally defensible and technically sound.

Emergency Watershed Protection Program (EWPP)

Limitations

EWP Funds cannot be used to:

1. Provide assistance on any Federal Lands,
2. Provide recovery assistance for structural measures to a site more than twice in any 10-year period,
3. Solve watershed or natural problems that existed prior to natural disaster,

Emergency Watershed Protection Program (EWPP)

Limitations

EWP Funds cannot be used to:

4. Repair, rebuild or maintain public or private transportation facilities,
5. Increase the pre-disaster capacity of a channel by constructing a new channel, enlarging the old channel or relocation of the stream (see exceptions).

Emergency Watershed Protection Program (EWPP)

Typical Measures

Flood Damage:

- Streambank Protection,
- Sediment Removal,
- Channel Cleaning/Debris Removal,
- Levee Breach Repair.

Floodplain Easement Program (FPE)

Overview

- FPE provides an alternative measure to traditional EWP recovery, where it is determined that acquiring a permanent easement in lieu of recovery measures is the more economical and prudent approach to reducing a threat to life or property.

Floodplain Easement Program (FPE)

Overview

- The easement area will be restored to the maximum extent practicable to its natural condition.
- Restoration utilizes structural and nonstructural practices to restore the flood storage and flow, erosion control, and improve the practical management of the easement.

Floodplain Easement Program (FPE)

Overview

- Floodplain easements restore, protect, maintain and enhance the functions of floodplains while conserving their natural values such as fish and wildlife habitat, water quality, flood water retention and ground water recharge.



Floodplain Easement Program (FPE)

LAND ELIGIBILITY

NRCS may purchase FPE permanent easements on floodplain lands where:

1. The floodplain lands were damaged by flooding at least once within the previous calendar year, or
2. have been subject to flood damage at least twice within the previous 10 years.



Floodplain Easement Program (FPE)

ENROLLMENT OPTION

Permanent FPE easements are available on:

1. Agricultural or open lands.
2. Lands primarily used for residential housing.



United States Department of Agriculture

Floodplain Easement Program (FPE)

EASEMENT PAYMENTS

NRCS may pay up to 100% of the restoration costs.

Questions?