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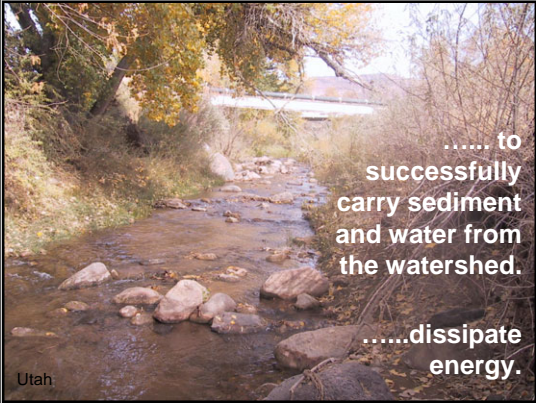
Utah

Sevier River

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Channel Function...



..... to successfully carry sediment and water from the watershed.

.....dissipate energy.


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ALLUVIAL FEATURES

The purpose of a stream is to carry water and sediment...



FLOODPLAIN
Carries high flows

TERRACE
Abandoned floodplain

BANKFULL CHANNEL
Carries sediment

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CHANNEL DIMENSION

Channel width and depth is determined by stream flows, sediment supply, and bank stability.



Wide, shallow channels are less effective at transporting sediment.

Narrow, deep channels are more effective at transporting sediment.

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CHANNEL MEANDER

MEANDERING IS COMMON TO ALL STREAM CHANNELS

STRAIGHT CHANNELS WORK TO CREATE MEANDER

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CHANNEL BEDFORMS

Riffle bedforms provide natural grade control

Runs and pools dissipate energy through turbulence

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CHANNEL BEDFORMS

Riffles are located in transitions between meanders

Point bars are depositional and form on inside of meanders

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NATURAL STREAM CHANNELS FLOODING

Large floods less common than small floods

Width of flooding is related to elevation

Elevation increases away from central channel

Lower velocities/stress Greatest velocities/stress

Uplands	Terrace	Floodplain	Central Channel
Floods rarely	Floods infrequently	Floods often	Floods Annually
1% - 4% Probability	10% - 25%	50%	100%

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NATURAL STREAM CHANNELS GEOMORPHOLOGY

Uplands

Alluvial features rise in elevation away from central channel

Terrace

Floodplain

Central Channel

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NATURAL STREAM CHANNELS VELOCITIES

Highest velocities occur in central channel
Channel bed has greatest inherent strength

Velocities decrease away from central channel
Bank strength decreases away from channel

Lower velocities/stress Greatest velocities/stress

Every 25 - 50 years
Every 10 - 25 years
Every 3 - 5 years
Annually

Uplands	Terrace	Floodplain	Central Channel
Floods rarely 1% - 4% Probability	Floods infrequently 10% - 25%	Floods often 50%	Floods Annually 100%

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NATURAL STREAM CHANNELS VELOCITIES

CHANNEL ALTERATIONS:
Narrowing the floodplain increases velocities drastically!!
Increased velocities means increased erosion potential
Narrow floodplain increases flood risk

Every 25 - 50 years
Every 10 - 25 years
Every 3 - 5 years
Annually

Uplands	Terrace	Floodplain	Central Channel
Floods rarely 1% - 4% Probability	Floods infrequently 10% - 25%	Floods often 50%	Floods Annually 100%

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NATURAL STREAM CHANNELS DISTURBANCE

Disturbance is function of velocity, slope, & water depth

Disturbance- velocities/stress decreases
Soil moisture decreases

Disturbance greatest around central channel

Every 25 - 50 years
Every 10 - 25 years
Every 3 - 5 years
Annually

Uplands	Terrace	Floodplain	Central Channel
Rarely disturbed Low soil moisture	Infrequently disturbed Low soil moisture	Often disturbed Mod. soil moisture	Annually disturbed Highest soil moisture

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STREAM MEANDER

Meander creates zones of deposition & erosion

Deposition on point bars (low shear stress)

Erosion along outer meander banks (high shear stress)

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STREAM MEANDER

Velocity & stress are non-uniform in meanders

High velocity High shear stress

Low velocity Low shear stress

High velocity High shear stress in Central channel

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NATURAL STREAM CHANNELS VEGETATION

Vegetation creates roughness; slows velocities

Roughness should increase

Least roughness in central channel

Uplands | Terrace | Floodplain | Central Channel

Keep high velocities in central channel

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NATURAL STREAM CHANNELS VEGETATION

Strengthens stream banks to reduce erosion.

Perennial Streams

Roughness dissipates energy: reduces velocities.

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Ephemeral Streams

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STREAM STABILITY

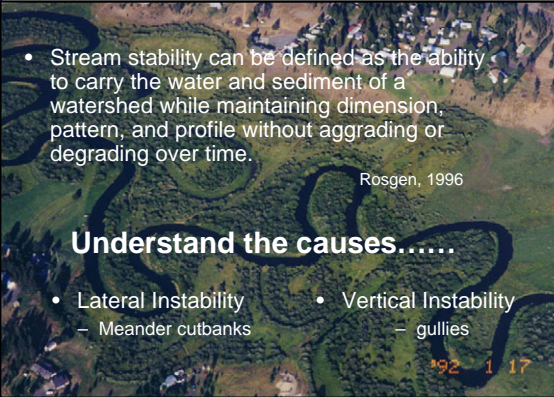
- Stream stability can be defined as the ability to carry the water and sediment of a watershed while maintaining dimension, pattern, and profile without aggrading or degrading over time.

Rosgen, 1996

Understand the causes.....

- Lateral Instability
 - Meander cutbanks
- Vertical Instability
 - gullies

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LATERAL INSTABILITY

Lateral instability is characterized by eroding banks.

Generally eroding banks are in meanders.

Alternating banks erode.



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VERTICAL INSTABILITY

After channel incision... ...narrow channels widen.

Commonly both banks are actively eroding.



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REVIEW

STREAM CHANNEL FUNCTIONS

FUNCTION	→	FORM
<ul style="list-style-type: none"> • Transports sediment • Carries water • Dissipates energy 		<ul style="list-style-type: none"> • Bankfull channel carries sediment • Floodplain/terraces spread high flows • Meander and bedforms dissipate energy

Stream channels are dynamic



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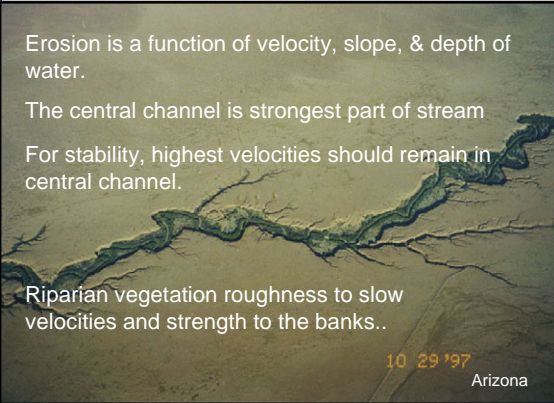
REVIEW VELOCITY/VEGETATION

Erosion is a function of velocity, slope, & depth of water.

The central channel is strongest part of stream

For stability, highest velocities should remain in central channel.


Riparian vegetation roughness to slow velocities and strength to the banks..



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QUESTIONS?



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