# Washington State Integrated Streambank Protection Guidelines

Prepared by:
Department of Fish and Wildlife and Inter-Fluve, Inc.

Funded by: Salmon Recovery Funding Board, WDFW, WSDOT, and DOE

# Cost Cutting Suggestions

e to the current status of the budget, all employees are ncouraged to adopt the following cost cutting measures

DGING: All employees are encouraged to stay with relatives nd friends while on business travel. If weather permits, public reas such as parks should be used as temporary lodging. Bus erminals, train stations, and office lobbies may provide shelter n periods of inclement weather.

ALS: Expenditures for meals will be limited to an absolute inimum. It should be noted that certain grocery chains such s Costco and Sam's stores often provide free samples of romotional items. Entire meals can be obtained in this anner. Travelers should also be familiar with indigenous roots nd berries available at their destinations. If restaurants must e utilized, travelers should use "all you can eat" salad bars. his is especially effective for employees traveling together, as ne plate can be used to feed the entire group.

# Cost Cutting Suggestions

TRANSPORTATION: Hitchhiking is the preferred mode of travel in lieu of commercial transport. Luminescent safety vests will be issued to all employees prior to their departure on business trips

MISCELLANEOUS: All employees are encouraged to devise innovative techniques to save money. One individual has already suggested that money could be raised during airport layover periods. In support of this idea, red caps will be issued to all employees prior to their departure so that they may earn tips by helping others with their luggage.

THANK YOU FOR YOUR COOPERATION

# Integrated Streambank Protection Guidelines

Traditional Streambank Protection

Integrated Streambank Protection

# What is INTEGRATED Streambank Protection?

- Recognize and address causes
- Actions based on reach and site health
- Integrate mitigation with project
- Preserve natural stream processes

# What is ISPG?

- Reach-based design and selection tool for bank protection projects
- Approach to bank protection, not a cookbook
- Communication not regulation
- Expands the definition of mitigation
- Bolsters planning, funding, design and permitting efforts

# Audience

- Landowners
- Resource Managers
- Engineers
- Scientists
- Politicians

# Table of Contents

# Appendices

- Hydrology
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- Biological Considerations
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- Construction
- Anchoring & LWD Placement Considerations
- Monitoring
- ACOE's Literature Review of Revetment and Channelization Impacts
- Cost of Techniques

# Guiding Principles

1. Natural erosion processes and rates are essential for ecological health of the aquatic system.
2. Human-caused erosion that exceeds natural rates is usually detrimental to ecological functions.
3. Natural processes of erosion are expected to occur throughout the channel migration zone. Project considerations should include the channel migration zone and potential upstream and downstream effects.
4. Preservation of natural channel processes will sustain continued habitat formation and maintenance.


Site Assessment

# Toe Erosion

# Toe Erosion

- Reduced bank vegetation
- Smoothed channel
- Along a meander bend


Scour

# Scour

(turbulence or jet)

- Constriction
- Obstruction
- Woody debris
- Mid-channel bar
- Drop/weir


Avulsion

# Chute Cutoff

# Avulsion and Chute cutoff

- Natural processes
- Floodplain activities
- Excessive coarse bedload


Mass Failure

# Sub-surface Entrainment

- Seepage
- Rapid drawdown

# Reach Assessment

- Physical conditions of channel
- Natural and human-induced processes
- Is the channel unstable?
- If so, why?

# Equilibrium vs. Dis-equilibrium

## Dis-Equilibrium

- Aggradation
  - Reduced Flow Regime
  - Increased Sediment Supply
  - Downstream Constriction
  - Alluvial Fan
- Degradation
  - Increased Peak Flows
  - Reduced Sediment Supply
  - Headcutting
- Avulsion
  - Aggradation
  - Braided Channel

## Equilibrium

- Imports and exports of water, sediment, and energy are balanced.


Aggradin
Channel


Degrading Channel


eander Migration

# Mitigation in ISPG

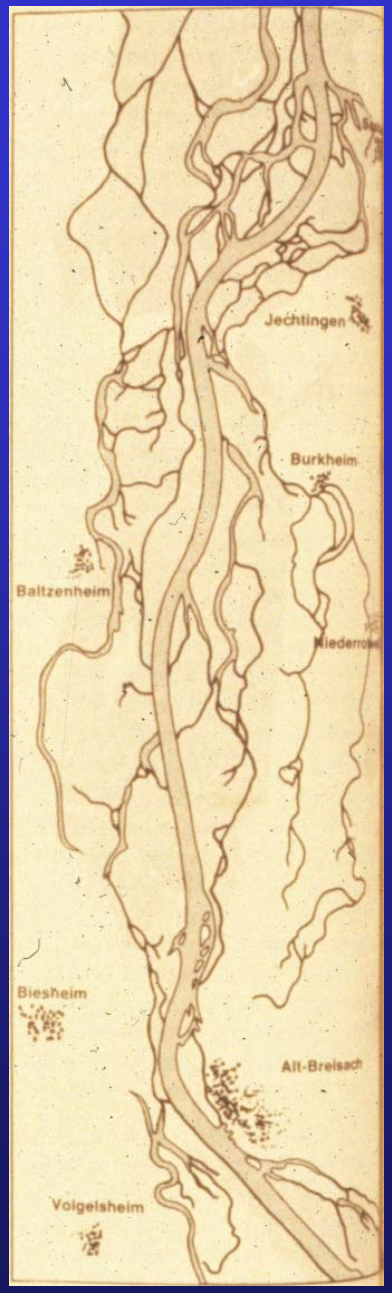
- We typically try to mitigate for
  - Direct habitat loss
  - Construction impacts

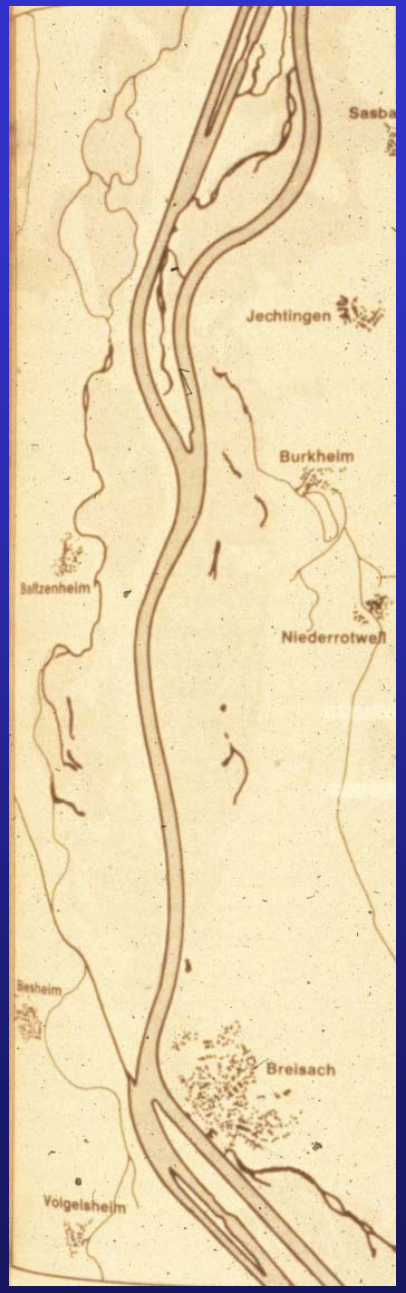
- We usually don't mitigate for
  - Channel response impacts; on site, off site
  - Lost opportunity impacts
  - Duration of the impact

# What is "Lost Opportunity"?

- Bank protection project constrains/prevents natural channel processes from occurring
- Specifically: side channels, debris sources, sediment sources, disturbance, channel and habitat diversity


Sasbach
Jechtingen
Burkheim
Baltzenheim
Niederrotweil
Alt-Breisach
Volgelsheim


Jechtingen
Burkheim
Baltzenheim
Biesheim
Alt-Breisach
Volgelsheim


Jechtingen
Burkheim
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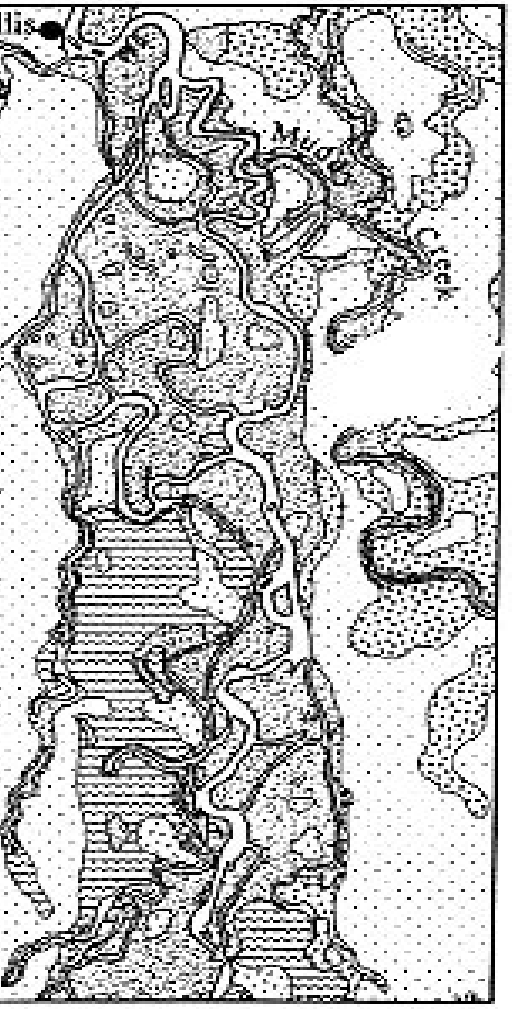
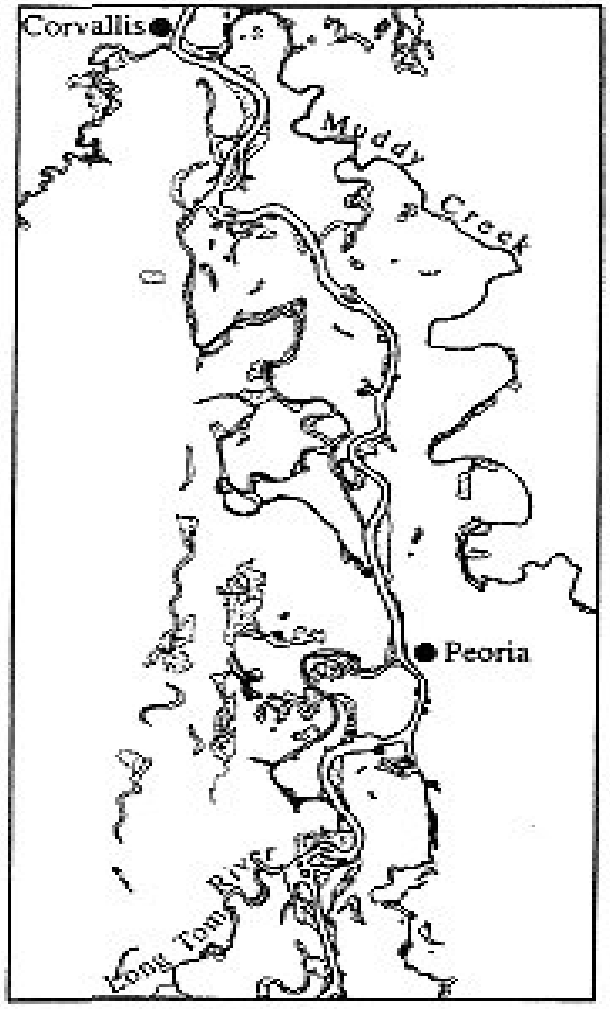
Biesheim
Breisach
Volgelsheim




1852-54




1986

Willamette River Vegetati

"Land low river bottom subj inundation. Timbered with maple, alder, willow and Balm of [cottonwood]. Dense under-growth maple, hazel, briers & c." [no cottonwood along Muddy Creek].

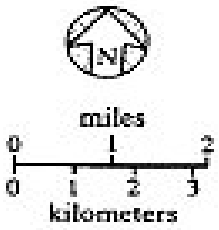
"Prairie" or fern clearings withi timber; a few oak present.

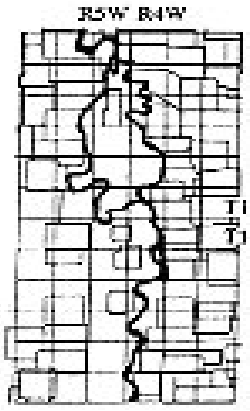
"Oak and yellow pine openings: su inundation;" open understory.

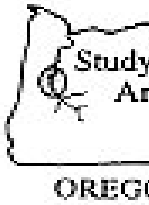
"Oak openings" or "Scattering o open understory.

"Level prairie," "High prairie" prairie."

Predominantly farmland and residences (1986).




Donation land and township survey lines (

Figure 6. River bottomland forests upriver of Corvallis, 1852-54 and 1986 (Benner and Sedell, 1997).

# Technique Categories

- Flow Redirection
- Structural
- Biotechnical
- Buffer Management
- Internal Bank Drainage
- Avulsion Prevention
- Channel Modifications
- No Action

# Flow Redirection Techniques

- Drop Structures
- Porous Weir
- Engineered Log Jams

- Groins
- Buried Groins
- Barbs

# Biotechnical Techniques

- Woody Plantings
- Herbaceous Cover
- Soil Reinforcement
- Coir Logs
- Bank Reshaping

# Structural Techniques

- Anchor Points
- Roughness Trees
- Riprap
- Log Toe

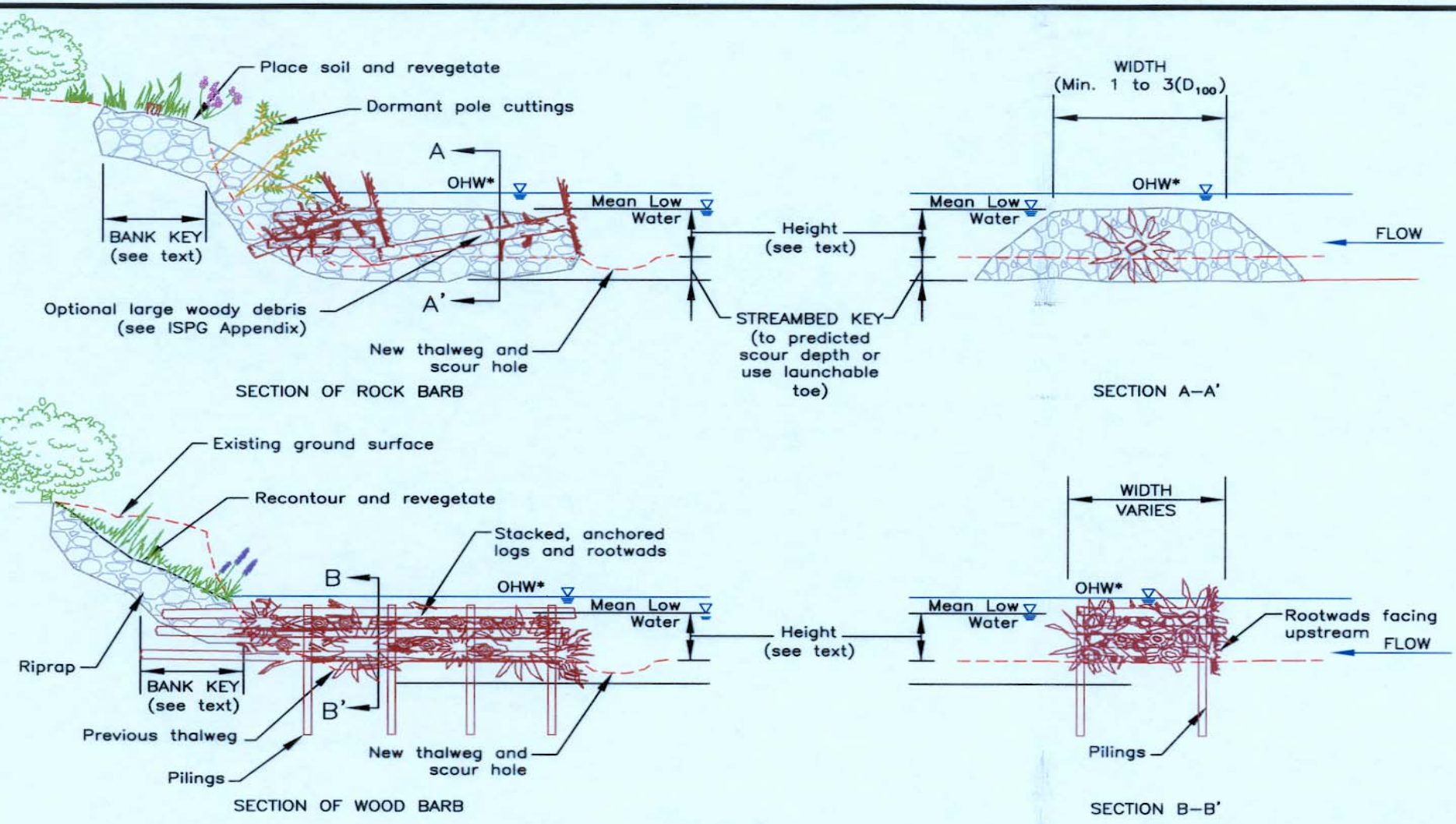
- Rock Toe
- Log Cribwall
- Artificial Materials & Systems

# Avulsion Techniques

- Floodplain Roughness
- Headcut Prevention (Grade Control)
- Floodplain Flow Spreader
- (Coarse Bedload Management)

# Information for Each Technique

- Description
- Application
- Effects
- Design
- Risk
- Biological Considerations
- Construction Considerations
- Operation & Maintenance
- Monitoring
- Cost
- Examples
  - Conceptual drawings, photos




CROSS–SECTION VIEWS

* See ISPG Appendix for definition of Ordinary High Water (OHW)

NOT TO SCALE

FIGURE 6–3, BARBS CONCEPTUAL DESIGN

INTEGRATED STREAMBANK PROTECTION GUIDELINES

www.wa.gov/wdfw/hab/salguide/strmbank.htm

# Design Considerations

- Bank Resistance to Shear
- Potential Scour Depth
- Channel Geometry and Roughness
- Gradual Bank Deformability
- Soils and Subsurface Materials
- Composite Treatments
- Construction Limitations
- Aquatic and Fisheries Habitat
- Channel/Floodplain Connectivity
- Plant Ecology and Riparian Habitat

# Screening Techniques Based on Site Conditions

| TECHNIQUES / TE CAUSES of EROSION | No Action | Flow Redirection | | | | Structural | | | | | Biotech | | | | Avulsion and Chute Cutoff | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Groins | Barbs | ED Jams | Drops | Anchor Pts | Trees | Riprap | Log Toe | Rock Toe | Plants | Soil Reinforce | Coir Logs | Bank Reshape | Roughness | Grade Ctrl | Flow Spreader | Flow Channels |
| neral Bank Erosion | | | | | | | | | | | | | | | | | | |
| Reduced Vegetative Structure | I | I | G2 | G2 | I | G2 | G | G | G2 | G2 | G | G | G | G2 | I | I | I | |
| Along a Bend | S | G | G2 | G | S | I | G | G | G | G2 | G2 | G2 | G2 | F | I | I | I | |
| our | | | | | | | | | | | | | | | | | | |
| ocal Scour | | | | | | | | | | | | | | | | | | |
| Associated with Woody Debris | S | S | S | F-G | F | G | G | S | G2 | G2 | G2 | G2 | G2 | G2 | I | I | I | |
| onstriction Scour | | | | | | | | | | | | | | | | | | |
| Associated with LWD Jam | S | I | I | S | P | S | F | F | F | F | F2 | F2 | F2 | F-G | G | S | G | F |
| rop/Weir/Sill Scour | S | P | P | P-F | G | S | I | G | G | G | F2 | F2 | F2 | F-G | I | I | I | |
| et Scour | | | | | | | | | | | | | | | | | | |
| Subchannels in a Braided Channel | S | P | P | P | I | P | F | G | G | G | F2 | F2 | F2 | F2 | I | I | I | |
| At an Abrupt Energy Sink Channel | S | G | G2 | G | I | G | P | G | G | G | F2 | F2 | F2 | F2 | I | I | I | |
| osurface Entrainmnet | | | | | | | | | | | | | | | | | | |
| Groundwater Seepage | S | I | I | I | I | I | I | G2 | F | F | P-F | F-G | P | G | I | I | I | |
| Rapid Drawdown | S | I | I | I | I | I | I | G2 | F | F | P-F | F-G | P | G | I | I | I | |
| ss Failure | | | | | | | | | | | | | | | | | | |
| Saturated Soils | S | I | I | I | I | I | I | G2 | P | P | P-F | F-G | I | F-G | I | I | I | |
| Increased Surcharge | I | I | I | I | I | I | I | G | P-F | P-F | I | F-G | I | F-G | I | I | I | |
| Loss of Root Structure | S | I | I | I | I | I | I | G | P-F | P-F | G | F-G | P | F-G | I | I | I | |
| Removal Of Underlying Support | S | I | I | I | I | I | I | G | G | G | P | F-G | I | F-G | I | I | I | |
| lsion and Chute Cutoff Potential | | | | | | | | | | | | | | | | | | |
| Natural Conditions | G | I | I | I | I | I | I | I | I | I | I | I | I | I | G | G | G | |
| Floodplain Activities | S | I | I | I | I | I | I | I | I | I | I | I | I | I | G | G | G | |

# Screening Techniques Based on Reach Conditions

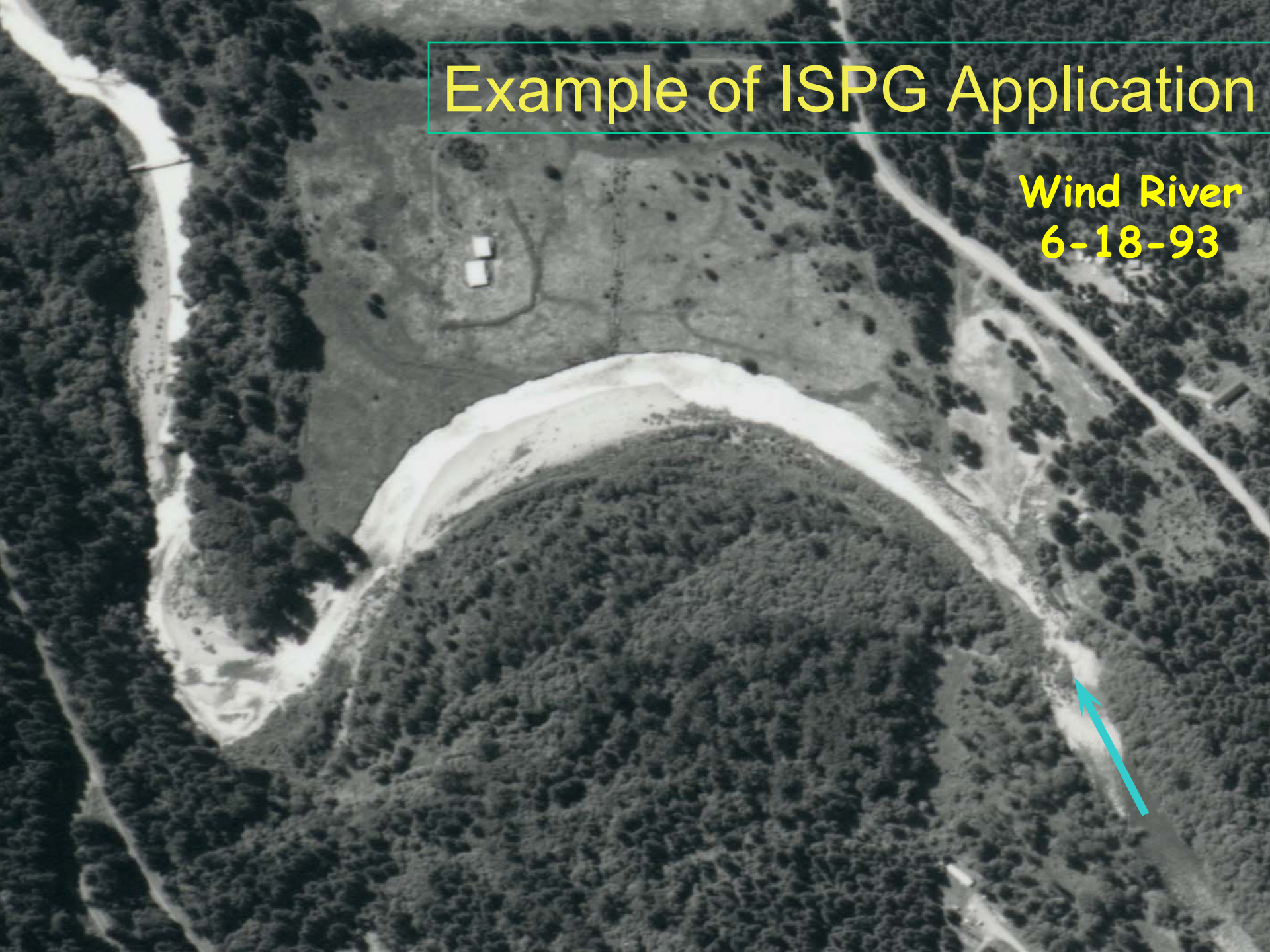
| TECHNIQUES / ACH CAUSES OF EROSION | No Action | Flow Redireton | | | | Structural | | | | | Biotech | | | | Avulsion and Chute Cutof | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Grains | Barbs | ED Dams | Drop s | Anchor Pts | Trees | Riprap | Log Toe | Rock Toe | Plantings | Soil Reinforce | Coir Logs | Bark Reshape | Roughness | Grade Ctrl | Flow Spreader | Flow Channels |
| ch In Equilibrium | | | | | | | | | | | | | | | | | | |
| ander Migration | | | | | | | | | | | | | | | | | | |
| Within Channel Migration Zone | G | P | P | F-G | P | F-G | G | P | F-G | P | G | G | G | G | I | I | I | |
| At Edge of Channel Migration Zone | G | G | G | G | P | F-G | G | F-G | G | G | G | G | G | G | I | I | I | |
| ited Meander Migration | G | F | F-G | F-G | P | F-G | G | F | G | F-G | G | G | G | G | I | I | I | |
| ch in Dis-Equilibrium | | | | | | | | | | | | | | | | | | |
| ge Storm Event | S | S | S | S | S | S | S | S | S | S | G | G | G | G | S | S | S | |
| grading Reach | | | | | | | | | | | | | | | | | | |
| Hydrology/Sediment Supply | S | F-G | P | F-G | I | I | F-G | F-G | P-F | P-F | G | G | G | G | G | S | G | F |
| Downstream Constriction | I | S | I | I | I | I | F-G | F-G | P-F | P-F | G | G | G | G | G | S | G | F |
| Reduced Slope/DS Constriction | S | S | I | I | I | I | F-G | F-G | P-F | P-F | G | G | G | G | G | G | G | |
| Confined Channel (Dikes/Berms) | S | F-G | P | I | I | I | F-G | F-G | P-F | P-F | G | F-G | P | G | I | I | I | |
| grading Reach | | | | | | | | | | | | | | | | | | |
| Hydrology/Sediment Supply | S | F | I | G2 | G | I | G | P | F2 | F2 | F | P | P | P | I | I | I | |
| Localized Shortened channel | S | G2 | I | G2 | G | I | P | P | F2 | F2 | F | P | P | P-F | I | I | I | |
| Natural Channel Evolution | G | G2 | I | G | G | I | P | P | F2 | F2 | F | P | P | P | I | I | I | |
| Change in Long-Term Hydrology | S | G2 | I | G | G | I | P | P | F2 | F2 | F | P | P | S | I | I | I | |
| lsion | | | | | | | | | | | | | | | | | | |
| Aggrading Reach | S | F2 | I | F2 | I | I | I | I | I | I | F-G | I | I | I | G | G | G | |
| Localized Downstream Constriction | I | F2 | I | F2 | I | I | I | I | I | I | F-G | I | I | I | G2 | G2 | G2 | G |
| Previously Relocated Channel | S | F2 | I | F2 | I | I | I | I | I | I | F-G | I | I | I | G | G | G | |
| Braided Channel | S | F2 | I | P | I | I | I | I | I | I | F-G | I | I | I | G | P-F | F-G | F |
| Large Storm Event | S | F2 | I | F2 | I | I | I | I | I | I | F-G | I | I | I | G | G | G | |

# Screening Techniques Based on Habitat

| TECHNIQUES / HABITAT FUNCTION IMPACTED | No Action | Flow Redirection | | | | Structural | | | | | Biotech | | | | Avulsion and Chute Cutoff | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Groins | Barbs | Elbjams | Drops | Anchor Pts | Trees | Riprap | Log Toe | Rock Toe | Plants | Soil Reinforce | Coir Logs | Bank Reshape | Roughness | Grade Ctrl | Flow Spreader | Flow Channels |
| arian Function | S | M | M | A | A | L | A | H | L | H | A | L | A | A | A | A | A | |
| | | | | | | | | | | | | | | | | | | |
| er | S | L | L | A | A | A | A | H | L | M | A | A | A | A | A | A | A | |
| | | | | | | | | | | | | | | | | | | |
| wning | S | M | M | A | L | A | A | H | L | M | A | A | A | A | A | A | A | |
| | | | | | | | | | | | | | | | | | | |
| nplexity & Diversity | S | A | A | A | A | A | A | H | A | M | A | A | A | A | A | A | A | |
| | | | | | | | | | | | | | | | | | | |
| t Opportunity | A | M | M | A | A | L | A | H | L | M | A | A | A | A | A | A | A | |
| | | | | | | | | | | | | | | | | | | |
| struction | A | M | M | M | H | L | L | H | L | L | A | L | L | L | A | A | A | |
| | | | | | | | | | | | | | | | | | | |
| od Refuge | A | A | A | A | A | A | A | H | L | H | A | A | A | A | A | A | A | |

vel of Impact
= Avoids Impact
Low Impact
= Medium Impact
= High Impact
= Site Dependent

# Example of ISPG Application




Wind River
7/19/99

# Wind River ISPG Example

Site Assessment:

Mechanism of Failure:
General Bank Erosion Along a Bend

Reduced Bank Strength Due to Removal of Riparian Vegetation

# Screening Techniques Based on Site Conditions

| TECHNIQUES / TE CAUSES OF EROSION | No Action | Flow Redirection | | | | | Structural | | | | | Biotech | | | Avulsion and Chute Cutoff | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Grains | Woody Grains | Barbs | EDJs | Drops | Anchor Pts | Trees | Riprap | Log Toe | Rock Toe | Plants | Soil Reinforce | Bank Reshape | Roughness | Grade Ctrl | Flow Spreader | Flow Channels |
| e Erosion | | | | | | | | | | | | | | | | | | |
| Reduced Vegetative Structure | I | F2 | G2 | G2 | G2 | I | G2 | G | G | G2 | G2 | G | G | G2 | I | I | I | |
| Along a Bend | S | G | G | G | G | S | I | G | G | G | G2 | G2 | G2 | F | I | I | I | |
| our | | | | | | | | | | | | | | | | | | |
| ocal Scour | | | | | | | | | | | | | | | | | | |
| Associated with Woody Debris | S | S | S | S | F-G | F | G | G | S | G2 | G2 | G2 | G2 | G2 | I | I | I | |
| onstriction Scour | | | | | | | | | | | | | | | | | | |
| Associated with LWD Jam | S | I | I | I | S | P | S | F | F | F | F | F2 | F2 | F-G | G | S | G | F |
| rop/Weir/Sill Scour | S | P | P | P | P-F | G | S | I | G | G | G | F2 | F2 | F-G | I | I | I | |
| et Scour | | | | | | | | | | | | | | | | | | |
| Subchannels in a Braided Channel | S | P | P | P | P | I | P | F | G | G | G | F2 | F2 | F2 | I | I | I | |
| At an Abrupt Energy Sink Channel | S | G | G | G2 | G | I | G | P | G | G | G | F2 | F2 | F2 | I | I | I | |
| subsurface Entrainmnet | | | | | | | | | | | | | | | | | | |
| Groundwater Seepage | S | I | I | I | I | I | I | I | G2 | F | F | P-F | F-G | G | I | I | I | |
| Rapid Drawdown | S | I | I | I | I | I | I | I | G2 | F | F | P-F | F-G | G | I | I | I | |
| ss Failure | | | | | | | | | | | | | | | | | | |
| Saturated Soils | S | I | I | I | I | I | I | I | G2 | P | P | P-F | F-G | F-G | I | I | I | |
| Increased Surcharge | I | I | I | I | I | I | I | I | G | P-F | P-F | I | F-G | F-G | I | I | I | |
| Loss of Root Structure | S | I | I | I | I | I | I | I | G | P-F | P-F | G | F-G | F-G | I | I | I | |
| Removal Of Underlying Support | S | I | I | I | I | I | I | I | G | G | G | P | F-G | F-G | I | I | I | |
| lsion and Chute Cutoff Potential | | | | | | | | | | | | | | | | | | |
| Natural Conditions | G | I | I | I | I | I | I | I | I | I | I | I | I | I | G | G | G | |
| Floodplain Activities | S | I | I | I | I | I | I | I | I | I | I | I | I | I | G | G | G | |

# Wind River Technique Selection by Site Assessment

- Site Assessment
  - No Action
  - Buffer Mgmt
  - Rock Groins & Barbs
  - Woody Groins
  - Porous Weir
  - Roughness Trees
  - Riprap
  - Log Toe
  - Rock Toe
  - Log Cribwall
  - Revegetation
  - Soil Reinforcement
  - Bank Reshaping

# Wind River ISPG Example

Site Assessment:

Mechanism of Failure:
General Bank Erosion Along a Bend
Reduced Bank Strength Due to Removal of Riparian Vegetation

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Reach Assessment:

Reach Cause of Failure:
Meander Migration within Channel Migration Zone

# Screening Techniques Based on Reach Conditions

| TECHNIQUES / ACH CAUSES OF EROSION | No Action | Flow Redireton | | | | | Structural | | | | | Biotech | | | Avulsion and Chute Cutoff | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Grains | Woody Grains | Barbs | EDJams | Drop s | Anchor Pts | Trees | Riprap | Log Toe | Rock Toe | Plants | Soil Reinforce | BankReshape | Roughness | Grade Ctrl | Flow Spreader | Flow Channels |
| ch In Equilibrium | | | | | | | | | | | | | | | | | | |
| ander Migration | | | | | | | | | | | | | | | | | | |
| Within Channel Migration Zone | G | P | G | P | F-G | P | F-G | G | P | F-G | P | G | G | G | I | I | I | |
| At Edge of Channel Migration Zone | G | G | G | G | G | P | F-G | G | F-G | G | G | G | G | G | I | I | I | |
| ited Meander Migration | G | F | F-G | F-G | F-G | P | F-G | G | F | G | F-G | G | G | G | I | I | I | |
| ch in Dis-Equilibrium | | | | | | | | | | | | | | | | | | |
| ge Storm Event | S | S | S | S | S | S | S | S | S | S | S | G | G | G | S | S | S | |
| rading Reach | | | | | | | | | | | | | | | | | | |
| Hydrology/Sediment Supply | S | F-G | F-G | P | F-G | I | I | F-G | F-G | P-F | P-F | G | G | G | G | S | G | F |
| Downstream Constriction | I | S | S | I | I | I | I | F-G | F-G | P-F | P-F | G | G | G | G | S | G | F |
| Reduced Slope/DS Constriction | S | S | S | I | I | I | I | F-G | F-G | P-F | P-F | G | G | G | G | G | G | |
| Confined Channel (Dikes/Berms) | S | F-G | F-G | P | I | I | I | F-G | F-G | P-F | P-F | G | F-G | G | I | I | I | |
| rading Reach | | | | | | | | | | | | | | | | | | |
| Hydrology/Sediment Supply | S | F | F-G | I | G2 | G | I | G | P | F2 | F2 | F | P | P | I | I | I | |
| Localized Shortened channel | S | G2 | G2 | I | G2 | G | I | P | P | F2 | F2 | F | P | P-F | I | I | I | |
| Natural Channel Evolution | G | G2 | G2 | I | G | G | I | P | P | F2 | F2 | F | P | P | I | I | I | |
| Change in Long-Term Hydrology | S | G2 | G2 | I | G | G | I | P | P | F2 | F2 | F | P | S | I | I | I | |
| lsion | | | | | | | | | | | | | | | | | | |
| Aggrading Reach | S | F2 | F2 | I | F2 | I | I | I | I | I | I | F-G | I | I | G | G | G | |
| Localized Downstream Constriction | I | F2 | F2 | I | F2 | I | I | I | I | I | I | F-G | I | I | G2 | G2 | G2 | G |
| Previously Relocated Channel | S | F2 | F2 | I | F2 | I | I | I | I | I | I | F-G | I | I | G | G | G | |
| Braided Channel | S | F2 | F2 | I | P | I | I | I | I | I | I | F-G | I | I | G | P-F | F-G | F |
| Large Storm Event | S | F2 | F2 | I | F2 | I | I | I | I | I | I | F-G | I | I | G | G | G | |

# Wind River Technique Selection by Reach Assessment

- Site Assessment
  - No Action
  - Buffer Mgmt
  - ~~Rock Groins & Barbs~~
  - Woody Groins
  - Porous Weir
  - ~~Roughness Trees~~
  - ~~Riprap~~
  - Log Toe
  - ~~Rock Toe~~
  - ~~Log Cribwall~~
  - Revegetation
  - Soil Reinforcement
  - Bank Reshaping

- Reach Assessment
  - No Action
  - Buffer Mgmt
  - Woody Groins
  - Roughness Trees
  - Log Toe
  - Revegetation
  - Soil Reinforcement
  - Bank Reshaping

# Screening Techniques Based on Habitat

| TECHNIQUES / BITAT FUNCTION IMPACTED | Nb Action | Flow Redirection | | | | | Structural | | | | | Biotech | | | Avulsion and Chute Cutoff | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Groins | Wood Grain | Barbs | Ellams | Drops | Anchor Pts | Trees | Riprap | Log Toe | Rock Toe | Woody Plants | Soil Reinforce | Bank Reshape | Regress | Grade Ctrl | Flow Spreader | Flow Armor |
| arian Function | S | A | L | L | A | A | L | A | H | L | H | A | L | A | A | A | A | A |
| | | | n/a | | | | | C | | n/a | | C | C | C | | | | |
| er | S | L | A | L | A | A | A | A | H | L | M | A | A | A | A | A | A | A |
| | | | C | | | | | C | | C | | C | C | C | | | | |
| wning | S | M | A | M | A | L | A | A | H | L | M | A | A | A | A | A | A | A |
| | | | n/a | | | | | n/a | | n/a | | n/a | n/a | n/a | | | | |
| plexity & Diversity | S | A | A | A | A | A | A | A | H | A | M | A | A | A | A | A | A | A |
| | | | C | | | | | C | | C | | C | C | C | | | | |
| t Opportunity | A | M | L | M | A | A | L | A | H | L | M | A | A | A | A | A | A | A |
| | C | | n/a | | | | | C | | C | | C | C | C | | | | |
| struction | A | M | M | M | M | H | L | L | H | L | L | A | M | M | A | A | A | |
| | C | | n/a | | | | | n/a | | n/a | | n/a | n/a | n/a | | | | |
| od Refuge | A | A | A | A | A | A | A | A | H | L | H | A | A | A | A | A | A | A |
| | C | | C | | | | | C | | C | | C | C | C | | | | |

vel of Impact
= Avoids Impact
Low Impact
= Medium Impact
= High Impact
= Site Dependent

# Wind River Techniques Selected

- Reach Assessment
  - No Action
  - Buffer Mgmt
  - Woody Groins
  - Roughness Trees
  - Log Toe
  - Revegetation
  - Soil Reinforcement
  - Bank Reshaping
- Techniques Selected by Habitat Screening
  - Buffer Mgmt
  - Woody Groins
  - Revegetation
  - Bank Reshaping


Wind River
July 1999


Wind River
April 2000

# ISPG – A Final Caveat

- We believe that ISPG is a good approach to streambank protection. Unfortunately, an ISPG project is not necessarily a good project. A good project will always require a thoughtful, site-specific approach.

# ISPG Products

- ISPG currently available on the web
  http://www.wa.gov/wdfw/hab/ahg/index.htm
- Hard copy and cd available from Washington Department of Fish and Wildlife-Habitat Program
- Training (Rootwad & Willow Seminar)-Cosponsored by WDFW, WSDOT, DOE
  - Beginning Summer 2003