

# **Foothills Stream Crossing Program**

## **Prioritizing Watersheds for Remediation**

**November 29, 2010**

# Requirements for prioritization

- Quality stream crossing data across entire study area
- Ratings based on fish passage, sedimentation, and safety
- Delineated watersheds
- Multi-stakeholder collaboration

# Inspection priorities

- **Safety**
- **Water quality**
- **Fish passage**



# Safety



# Sedimentation



# Fish Passage



# Inspection Protocol

FISH PASSAGE PARAMETERS								
Hang height (0.01m)	Riffle Crest depth (0.01m)	Outlet drop (0.01m)	Effective depth of pool (0.01m)	Backwater in culvert (%)	Substrate in culvert (%)	Substrate Type	Culvert slope uniform?	Fish barrier present?

CULVERT PARAMETERS											
Type	Culvert Material	Road surface material	Diameter (0.01m)	Length (m)	Height of fill over culvert (m)	Bankfull channel width (0.01m)	Bankfull channel depths (0.01m)			Armour Inflow	Outflow

BRIDGE PARAMETERS							PERFORMANCE AND SAFETY			
Type	Total deck length (m)	Deck Width (# of lanes)	Decking material	Decking pattern	Curb type	Road surface material	Blockage of opening (%)	Cause of blockage	Grader markers/Bridge reflectors	
Abutment type	Abutment functioning?	Wingwalls functioning?	Armour	Bankfull channel width (0.01m)	Bankfull channel depths (0.01m)		Bankfull width under bridge (0.01m)	Bridge signs	Structural problems	

EROSION AND SEDIMENTATION										
1. Preliminary Inspection				3. Sediment Source Inspection						
Evidence of sedimentation?	Source of Sediment			Location	Length	Width	Veg. cover class	Remediation type		
				R. Dwnstrm						
				R. Upstrm						
2. Ditch Inspection				L. Dwnstrm						
Location	Length	Drainage improvement type		L. Upstrm						
R. Dwnstrm				Above Inlet						
R. Upstrm				Above Outlet						
L. Dwnstrm				<b>4. External Sediment Sources (road, bridge deck, etc.)</b>						
L. Upstrm				Rating:		Source/Action:				

## FISH PASSAGE PARAMETERS

Hang height (0.01m)	Riffle Crest depth (0.01m)	Outlet drop (0.01m)	Effective depth of pool (0.01m)	Backwater in culvert (%)	Substrate in culvert (%)	Substrate Type	Culvert slope uniform?	Fish barrier present?

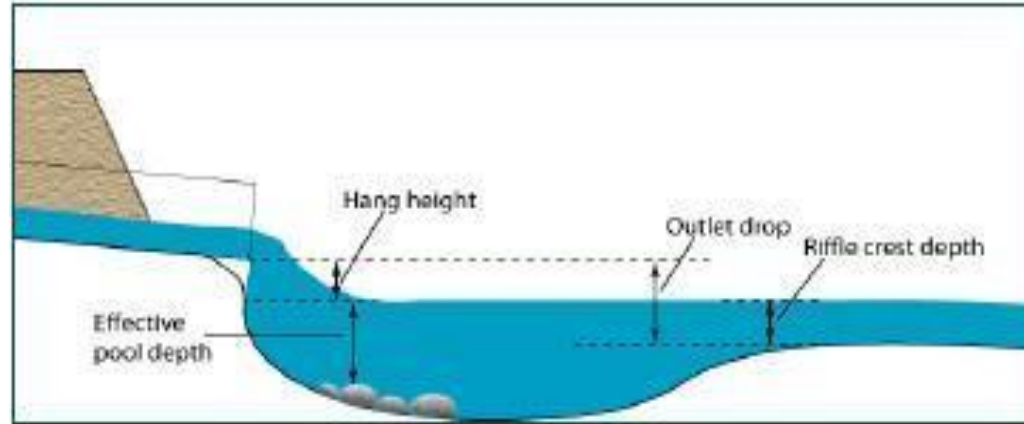
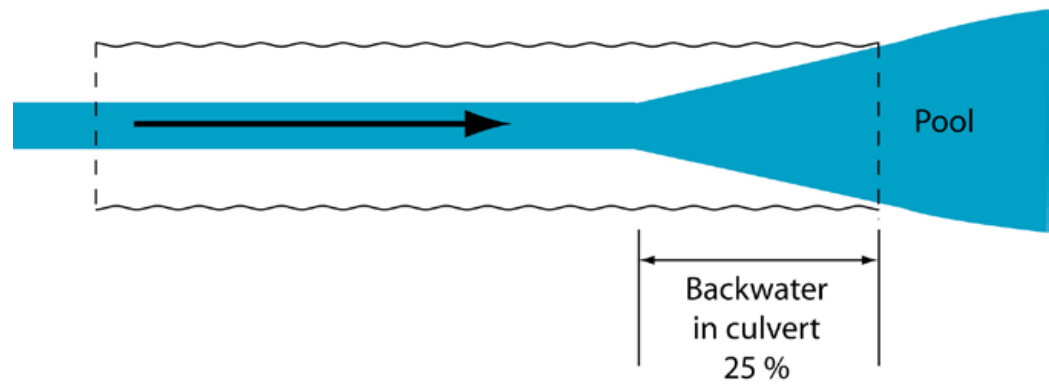


Figure 1. Measuring the hang height, effective pool depth and riffle crest depth

TOP VIEW





### CULVERT PARAMETERS

Type	Culvert Material	Road surface material	Diameter (0.01m)	Length (m)	Height of fill over culvert (m)	Bankfull channel width (0.01m)	Bankfull channel depths (0.01m)			Armour Inflow	Outflow

### BRIDGE PARAMETERS

Type	Total deck length (m)	Deck Width (# of lanes)	Decking material	Decking pattern	Curb type	Road surface material
Abutment type	Abutment functioning?	Wingwalls functioning?	Armour	Bankfull channel width (0.01m)	Bankfull channel depths (0.01m)	Bankfull width under bridge (0.01m)

### PERFORMANCE AND SAFETY

Blockage of opening (%)	Cause of blockage	Grader markers/Bridge reflectors
Bridge signs	Structural problems	



# EROSION AND SEDIMENTATION

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# Why do we prioritize

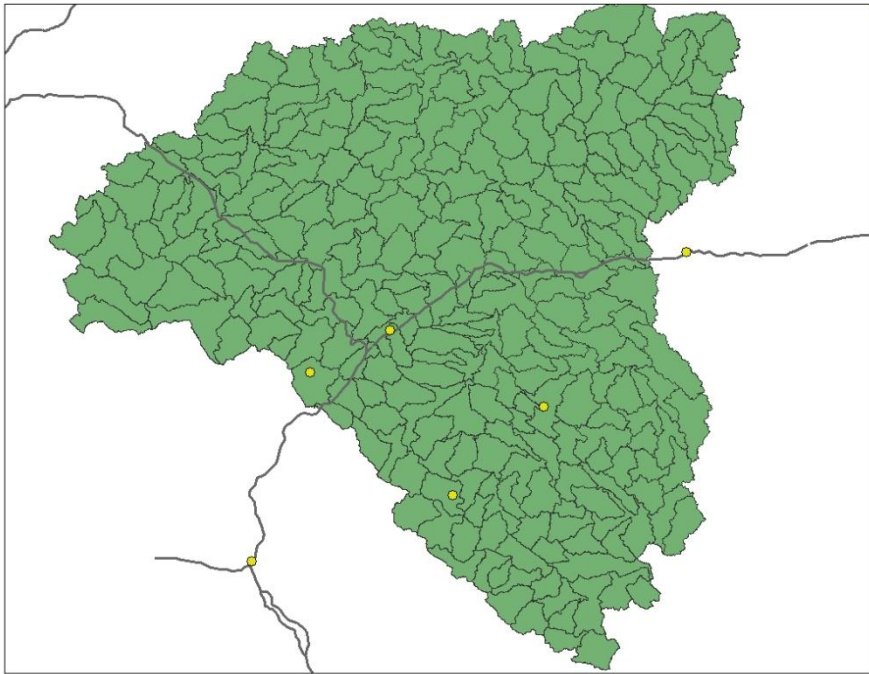
- Large landscape scale problem (can not fix all problems at once or in a short period of time)
- Maximize environmental benefits with available funds
- Allows for collaboration between companies (crossing owners) and with the regulators
- Allows for planning over time (manage the problem as opposed to an ad hoc approach)

# Watershed Priorities

Based on

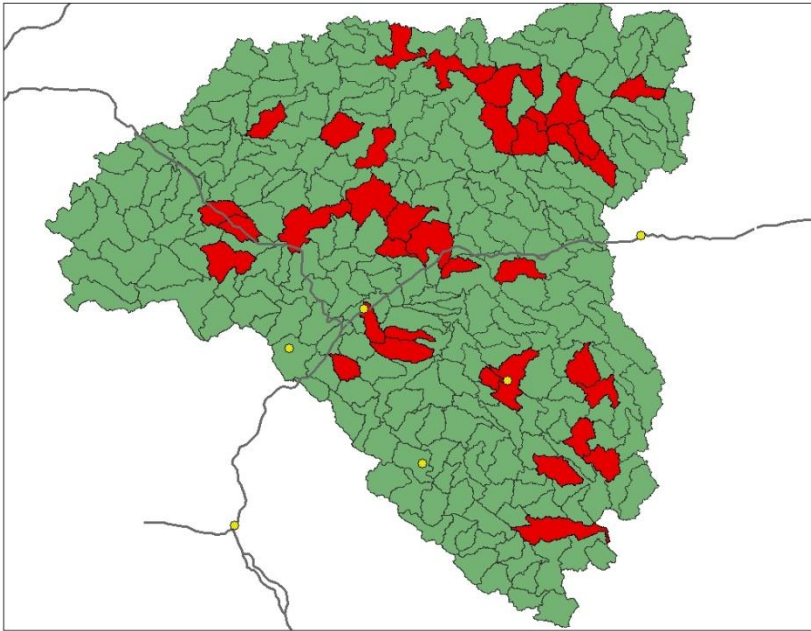
- Size
- Kilometers of blocked fish habitat (based on the *Fish Probability Model*) due to crossings
- Confirmed fish presence
- Sedimentation risk ratings

# Watershed Prioritization (Work in progress)



- **266 delineated watersheds**
- Next Step
- Select for watersheds with greater than 1km of blocked stream

# Watershed Prioritization (Work in progress)



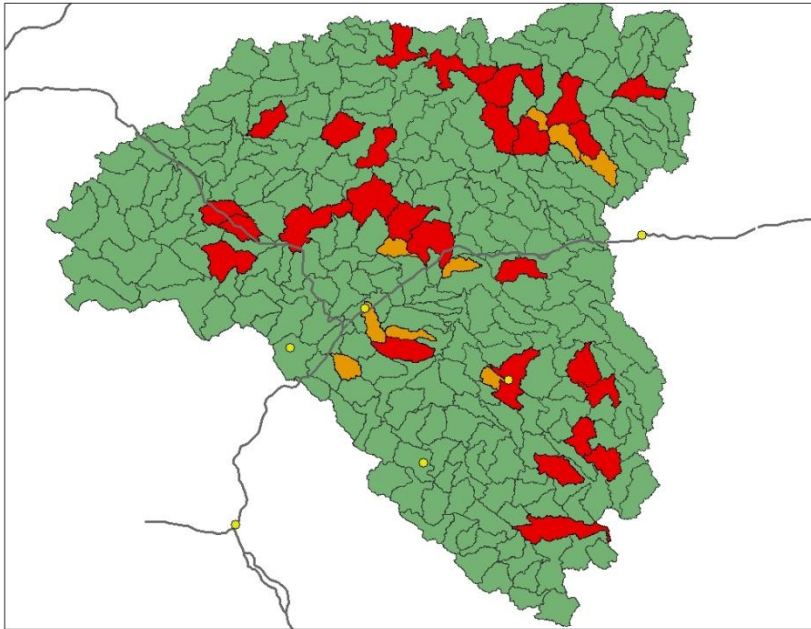
– Greater than 1km  
blocked stream

## Next Step

- Select for watersheds greater than 50km<sup>2</sup>



# Watershed Prioritization (Work in progress)

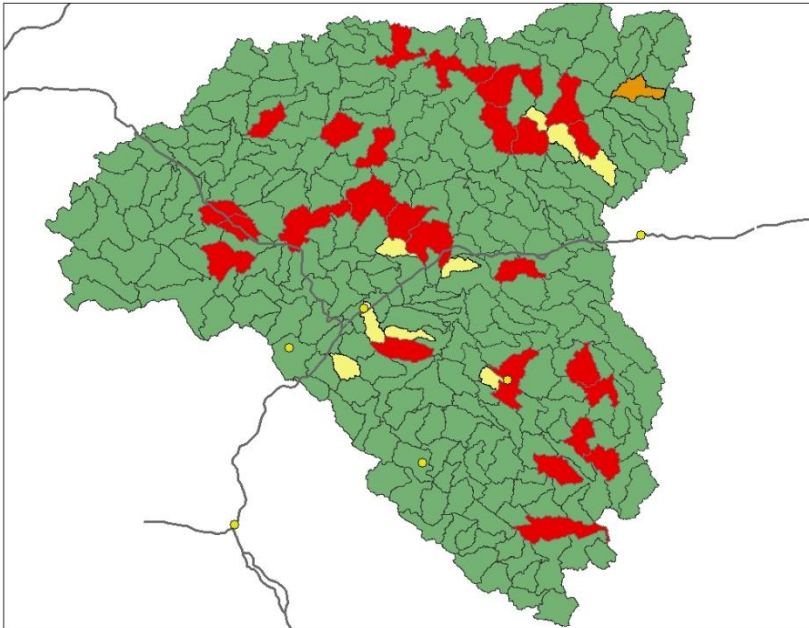


- > 1km blocked
- > 50km<sup>2</sup>

## Next Step

- Select for watersheds with confirmed fish presence

# Watershed Prioritization (Work in progress)



- > 1km blocked
- > 50km<sup>2</sup> area
- > Confirmed fish presence

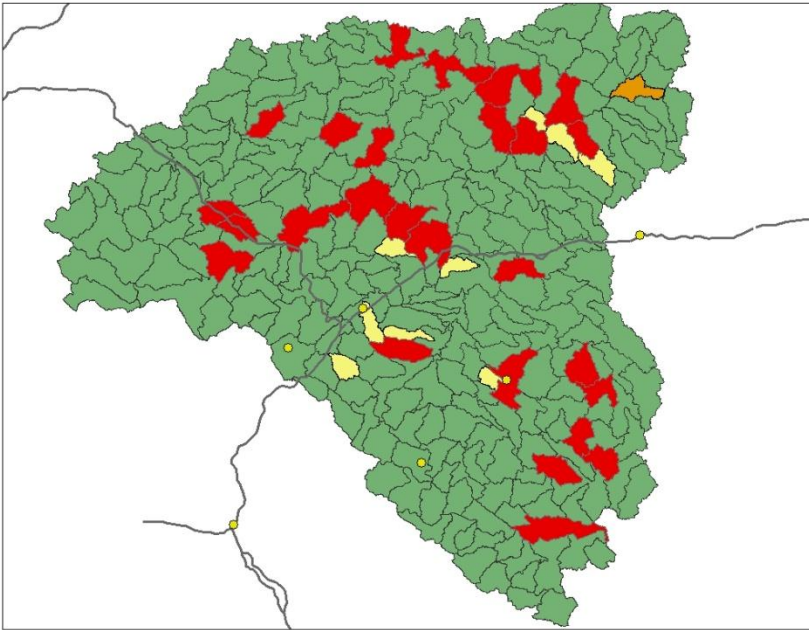
## Next Step

Select for watersheds with 3 or more high sedimentation risks





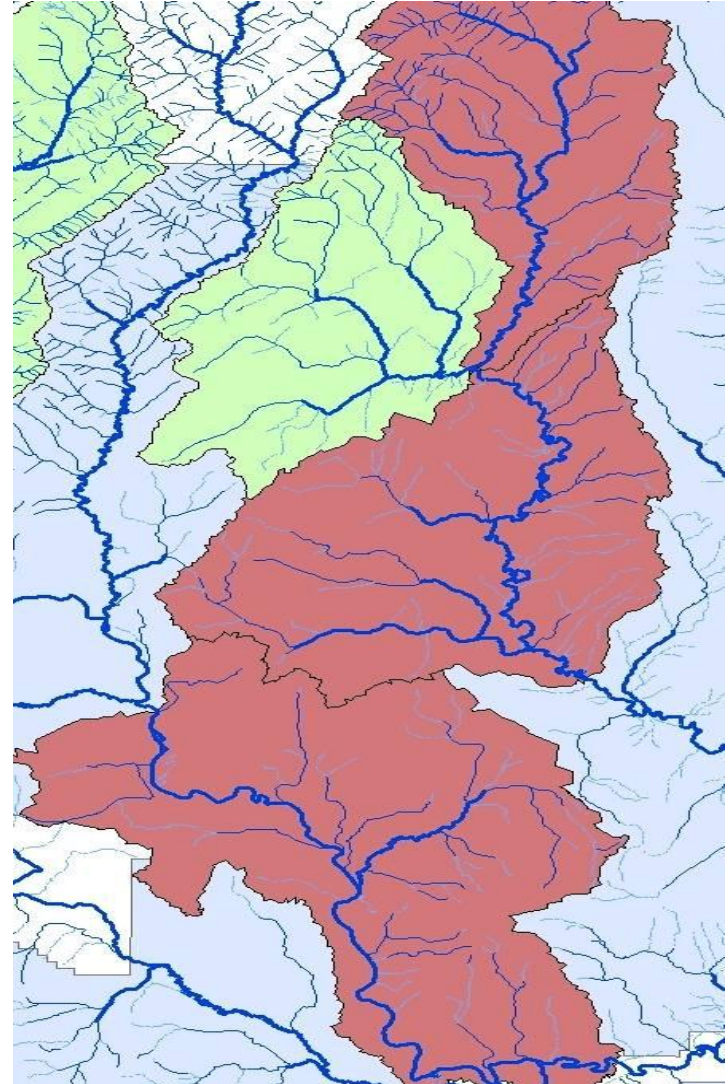
# Watershed Prioritization (Work in progress)



- > 1km blocked
- > 50km<sup>2</sup> area
- > Confirmed fish presence
- Containing 3 or more high sediment risks

# Fish Probability Model

- Drainage area
- Basin slope
- Basin elevation
- Percent wetlands
- Reach elevation
- Reach slope



# Fish Probability Model

## Pros

- Prioritizes a huge number of crossings and watersheds
- Quick
- Easy to use
- Best available management tool

## Cons

- Uses best available data but some gaps are present
- Only extends to FMA border
- Like all models, not 100% accurate

# Summary

- A good protocol is in place for inspecting crossings and for identifying problems
- There is strong collaboration between companies and the regulators
- Need a way to prioritize on a watershed basis
- Prioritization provides a way to manage crossing issues over an agreed to time period and ensures dollars are spent with the best return for the environment