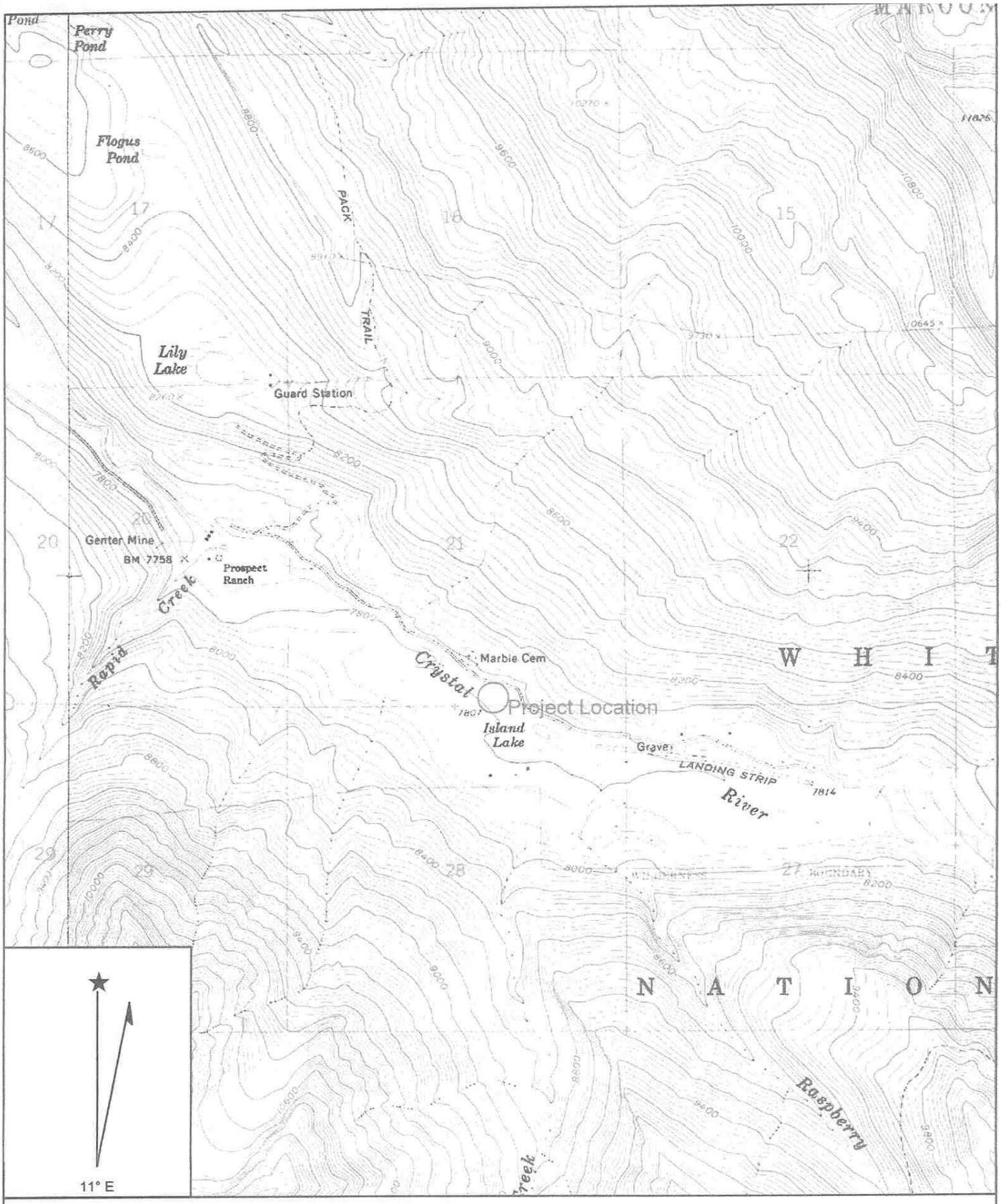

Name: MARBLE
Date: 1/23/2004
Scale: 1 inch equals 2000 feet

Location: 039° 04' 54.9" N 107° 13' 32.2" W
Caption: Figure 1.
Darien River Stabilization

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LOT 3 DARIEN RIVER SUBDIVISION

Marble, Gunnison County, CO

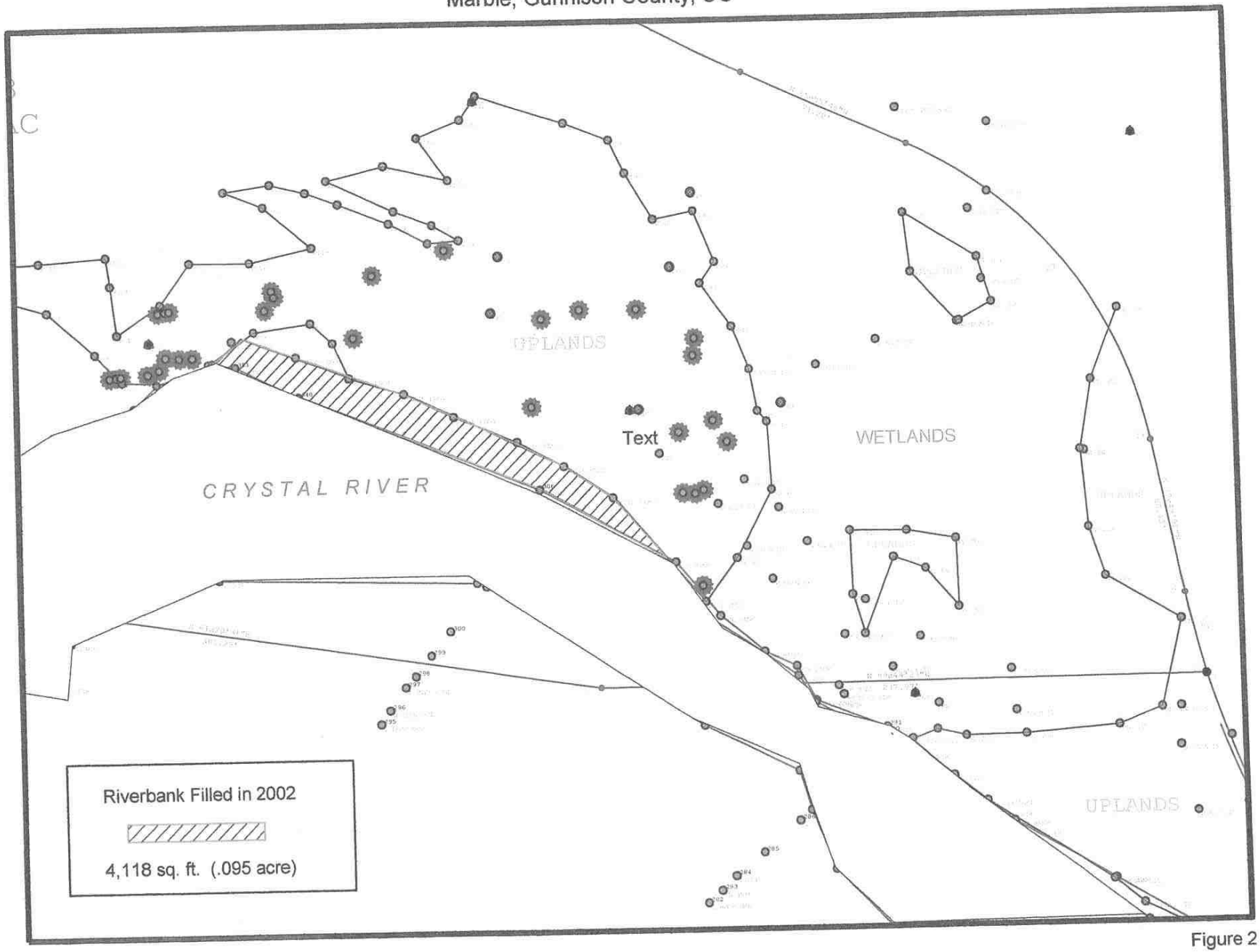

Figure 2

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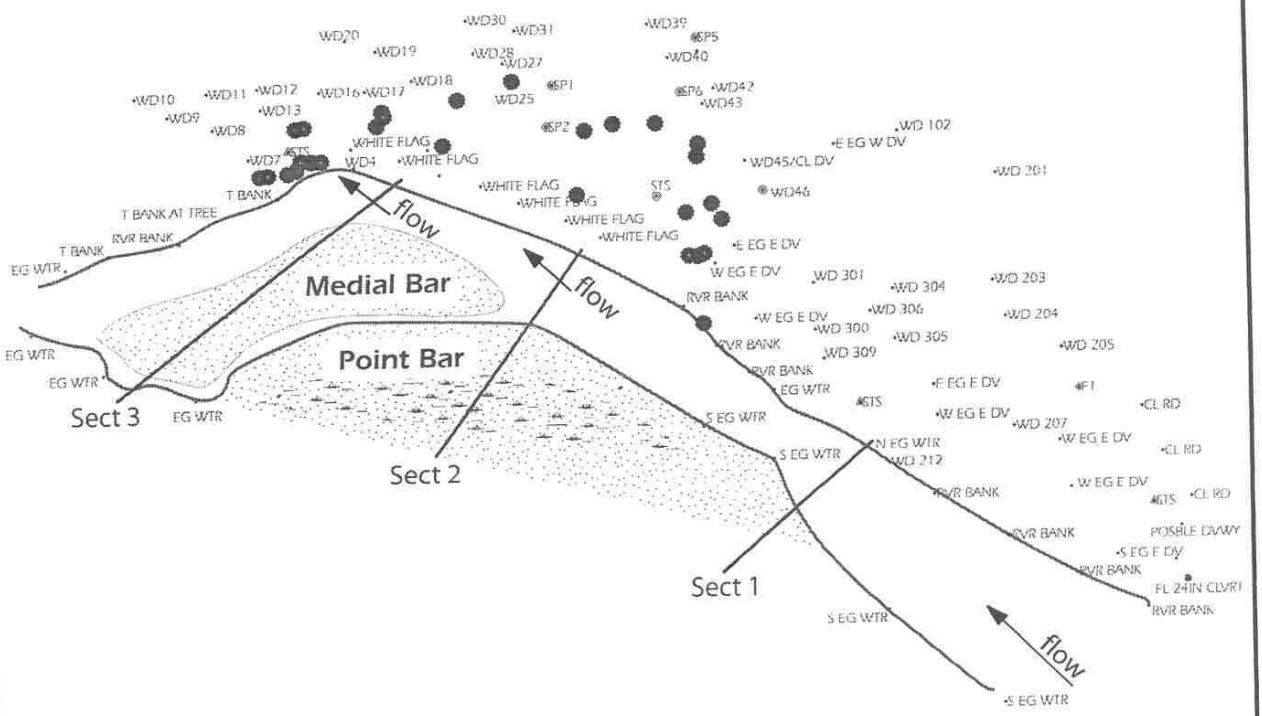
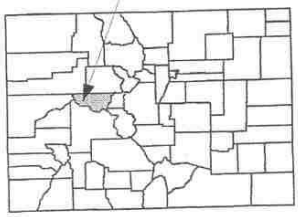


Map Location



COLORADO

TN MN
11

0 30' 60'
15' 45'
SCALE

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Reach Map and Cross-Sections

Date: 11/24/03 Sheet 2 of 12

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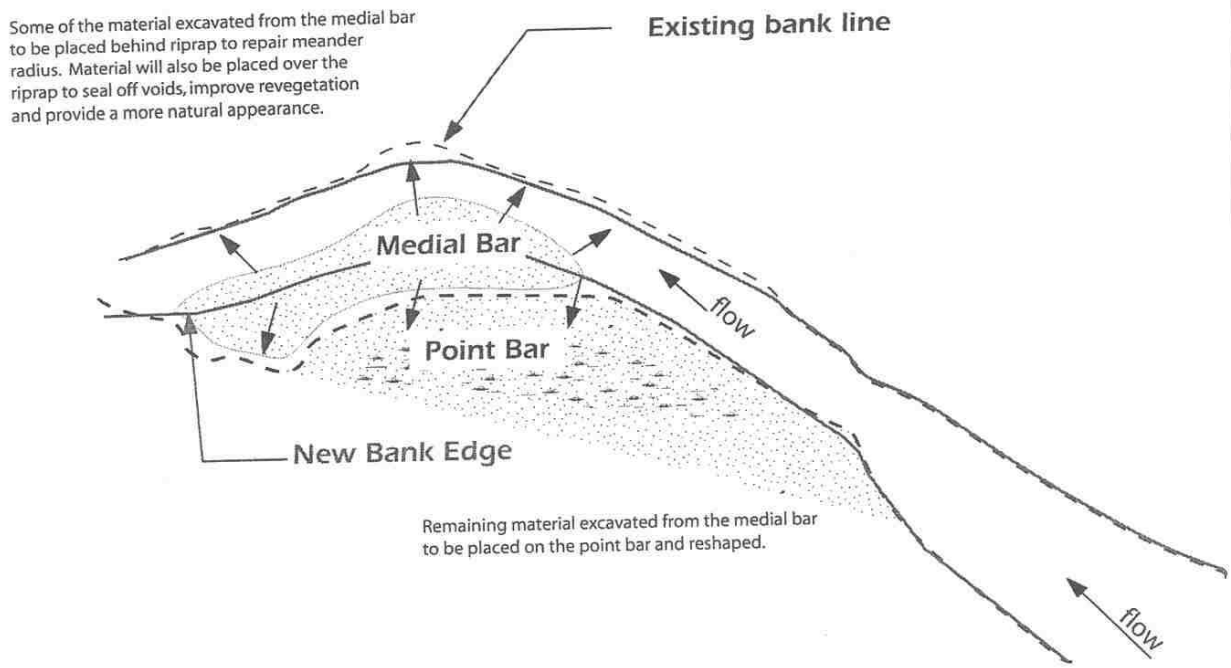

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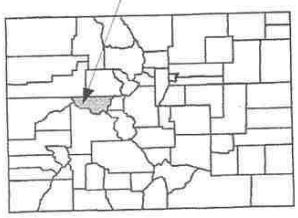


COLORADO

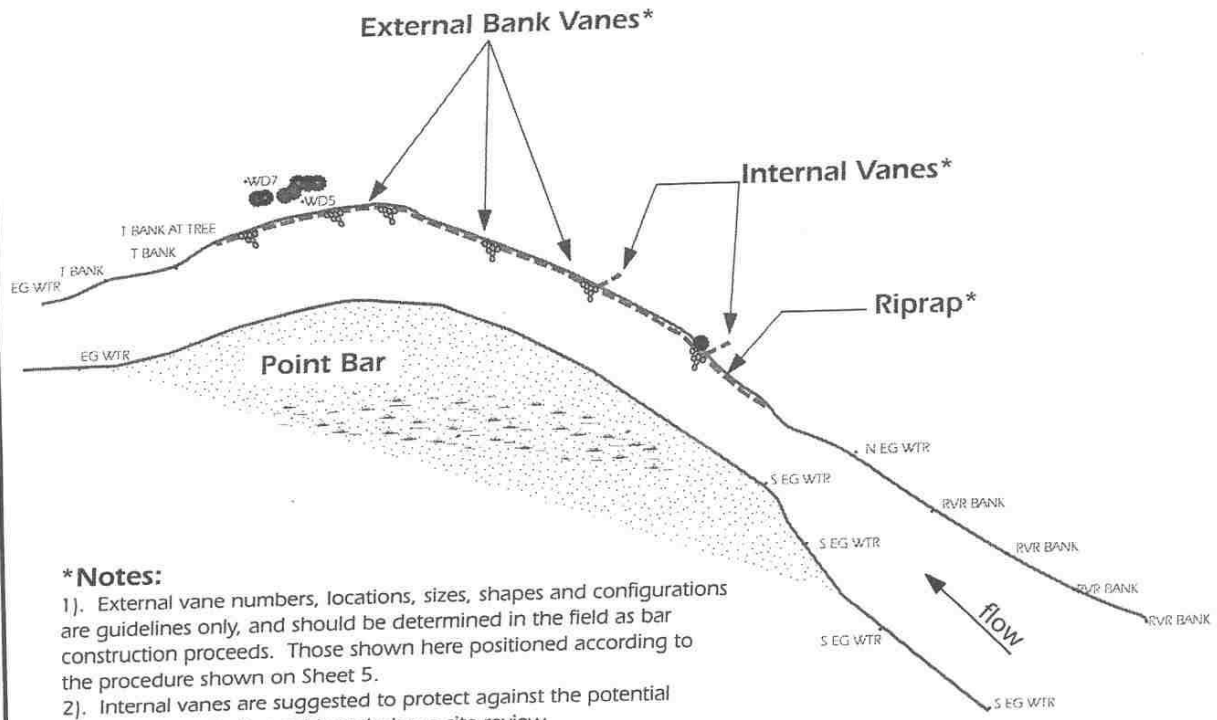
TN MN
11

15' 45'
0 30' 60'
SCALE

AquaTerra Services, LLC

Design Plan Outline

Date: 11/24/03 Sheet 3 of 12



***Notes:**

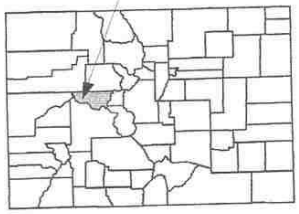
1). External vane numbers, locations, sizes, shapes and configurations are guidelines only, and should be determined in the field as bar construction proceeds. Those shown here positioned according to the procedure shown on Sheet 5.

2). Internal vanes are suggested to protect against the potential for erosive penetration evident during a site review.

3). Existing riprap should be rebuilt and resloped to 2:1 (h/v) and backfilled with gravel; riprap should be extended well downstream of the bend apex; actual extent to be determined in the field according to the flowlines developed following bar reshaping.

4). A portion of the medial bar to be integrated into the exisitng point bar; other material to be placed behind and over the riprap and any remainder pulled back toward the left descending bank.

Map Location



COLORADO

TN MN 11

15' 45'
0 30' 60'
SCALE

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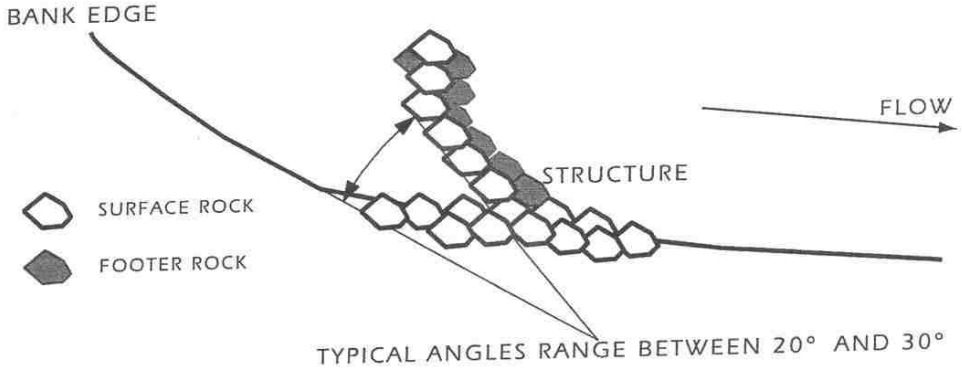
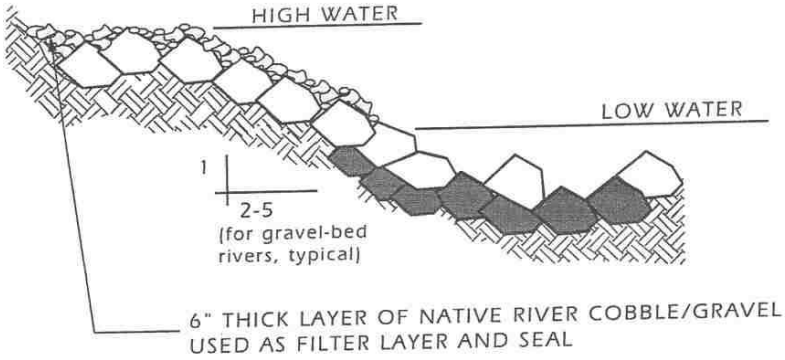
Vane & Riprap Placement

Date: 11/24/03 Sheet 4 of 12

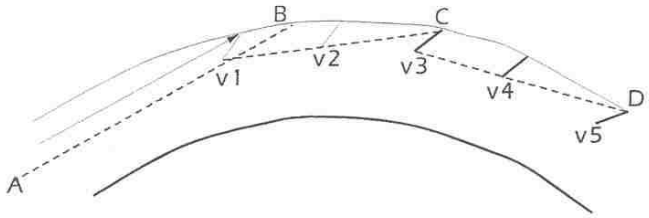
PLAN VIEW



SECTION VIEW



POSITIONING



Vane 1 (v1) is located at the intersection of the flow line and the eroding bank. Vane 2 (v2) is located by drawing the line AB parallel to the flow and across the toe of Vane 1. Vane 3 is located by projecting a line across the toe of vanes 1 & 2. Vane 2 is one-half the distance between Vane 1 and Vane 3.

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Vane Design Typicals

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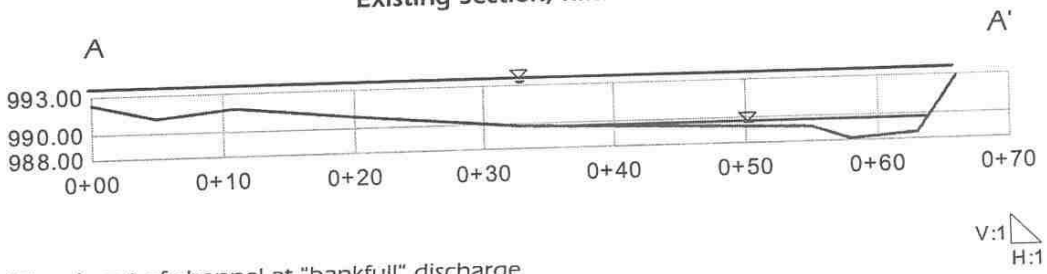
Low-Flow Summary

Q	47 cfs
Slope	0.018 ft/ft
Flow Area	15 ft²
Wp	28 ft
TW	27 ft
Velocity	3.3 ft/s
Fr	0.71

High-Flow Summary*

Q	2,270 cfs
Slope	0.018 ft/ft
Flow Area	275 ft²
Wp	105 ft
TW	89 ft
Velocity	10 ft/s
Fr	0.98

Existing Section, Riffle Toe



*Flow is out of channel at "bankfull" discharge

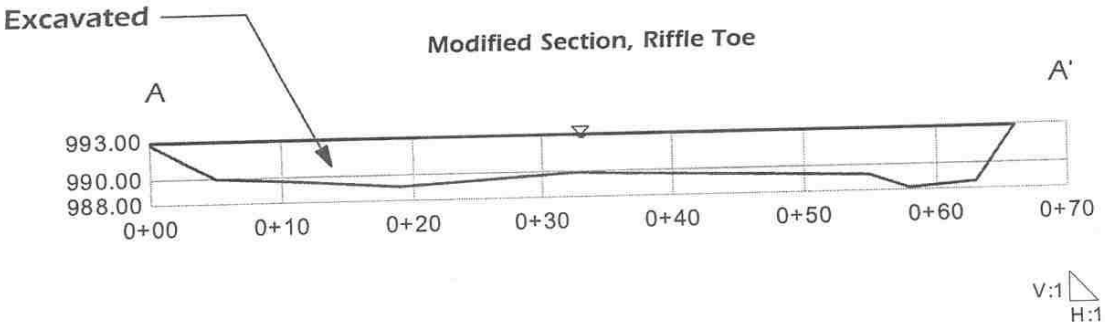
Low-Flow Summary

Q	47 cfs
Slope	0.018 ft/ft
Flow Area	15 ft²
Wp	28 ft
TW	27 ft
Velocity	3.0 ft/s
Fr	0.71

High-Flow Summary*

Q	2,270 cfs
Slope	0.018 ft/ft
Flow Area	215 ft²
Wp	70 ft
TW	66 ft
Velocity	10 ft/s
Fr	1.03

Modified Section, Riffle Toe



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Cross-Section 1,
Hydraulic Comparisons

Date: 11/24/03 Sheet 6 of 12

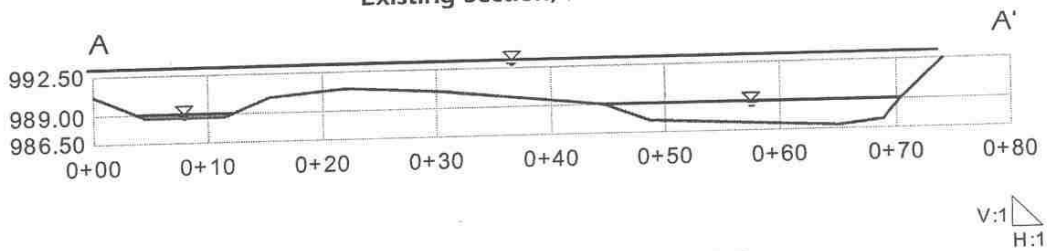
Low-Flow Summary*

Q	47 cfs
Slope	0.0014 ft/ft
Flow Area	43 ft²
Wp	35 ft
TW	34 ft
Velocity	1.0 ft/s
Fr	0.17

High-Flow Summary*

Q	2,271 cfs
Slope	0.015 ft/ft
Flow Area	280 ft²
Wp	80 ft
TW	74 ft
Velocity	8 ft/s
Fr	0.74

Existing Section, Mid-Pool



*Flow is divided at low flow, and out of channel at "bankfull" discharge

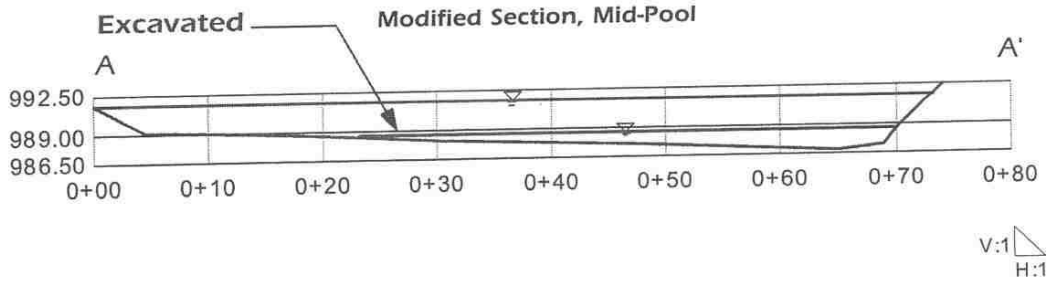
Low-Flow Summary

Q	47 cfs
Slope	0.0014 ft/ft
Flow Area	39 ft²
Wp	47 ft
TW	47 ft
Velocity	1.2 ft/s
Fr	0.23

High-Flow Summary

Q	2,271 cfs
Slope	0.015 ft/ft
Flow Area	243 ft²
Wp	76 ft
TW	73 ft
Velocity	9.4 ft/s
Fr	0.90

Modified Section, Mid-Pool



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Cross-Section 2,
Hydraulic Comparisons

Date: 11/24/03 Sheet 7 of 12

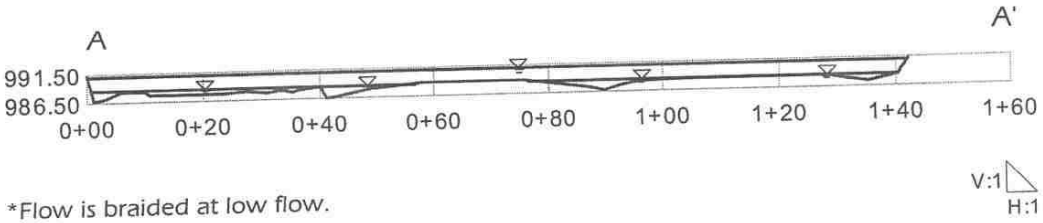
Low-Flow Summary*

Q	47 cfs
Slope	0.0014 ft/ft
Flow Area	77 ft²
Wp	124 ft
TW	120 ft
Velocity	0.6 ft/s
Fr	0.13

High-Flow Summary

Q	2,273 cfs
Slope	0.015 ft/ft
Flow Area	351 ft²
Wp	148 ft
TW	141 ft
Velocity	6.5 ft/s
Fr	0.72

Existing Section, Pool Tail-Out



*Flow is braided at low flow.

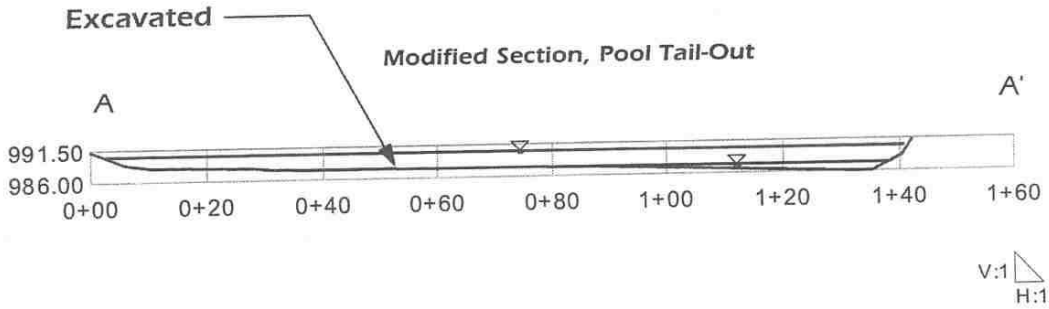
Low-Flow Summary

Q	47 cfs
Slope	0.0015 ft/ft
Flow Area	42 ft²
Wp	53 ft
TW	53 ft
Velocity	1.2 ft/s
Fr	0.23

High-Flow Summary

Q	2,276 cfs
Slope	0.015 ft/ft
Flow Area	363 ft²
Wp	140 ft
TW	138 ft
Velocity	6.3 ft/s
Fr	0.68

Modified Section, Pool Tail-Out



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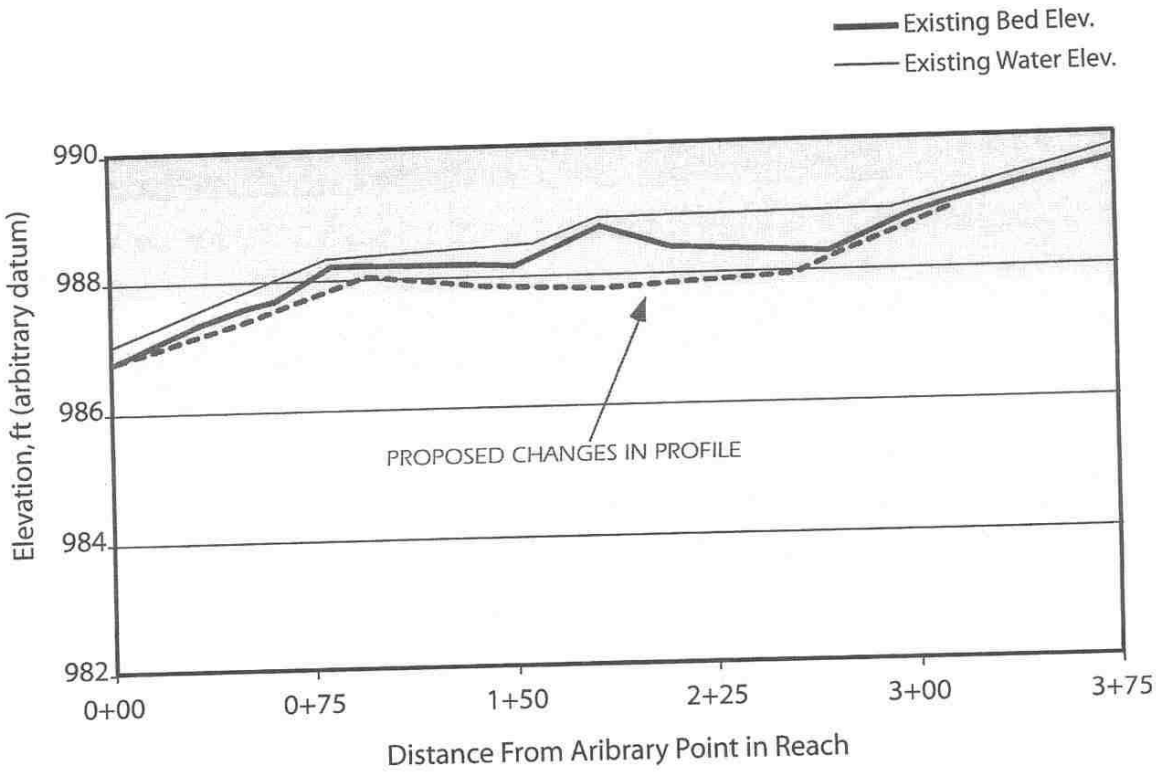
Cross-Section 3,
Hydraulic Comparisons

Date: 11/24/03 Sheet 8 of 12



Notes:

Thalweg represented. Slug in center of profile to be removed and placed on point bar out of zone of maximal transport. Goal for reach is to restore natural competence through the pool and maintain this power by strengthening the right descending bank and by increasing the turbulence off this bank edge.

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Longitudinal Profiles, Existing & Proposed

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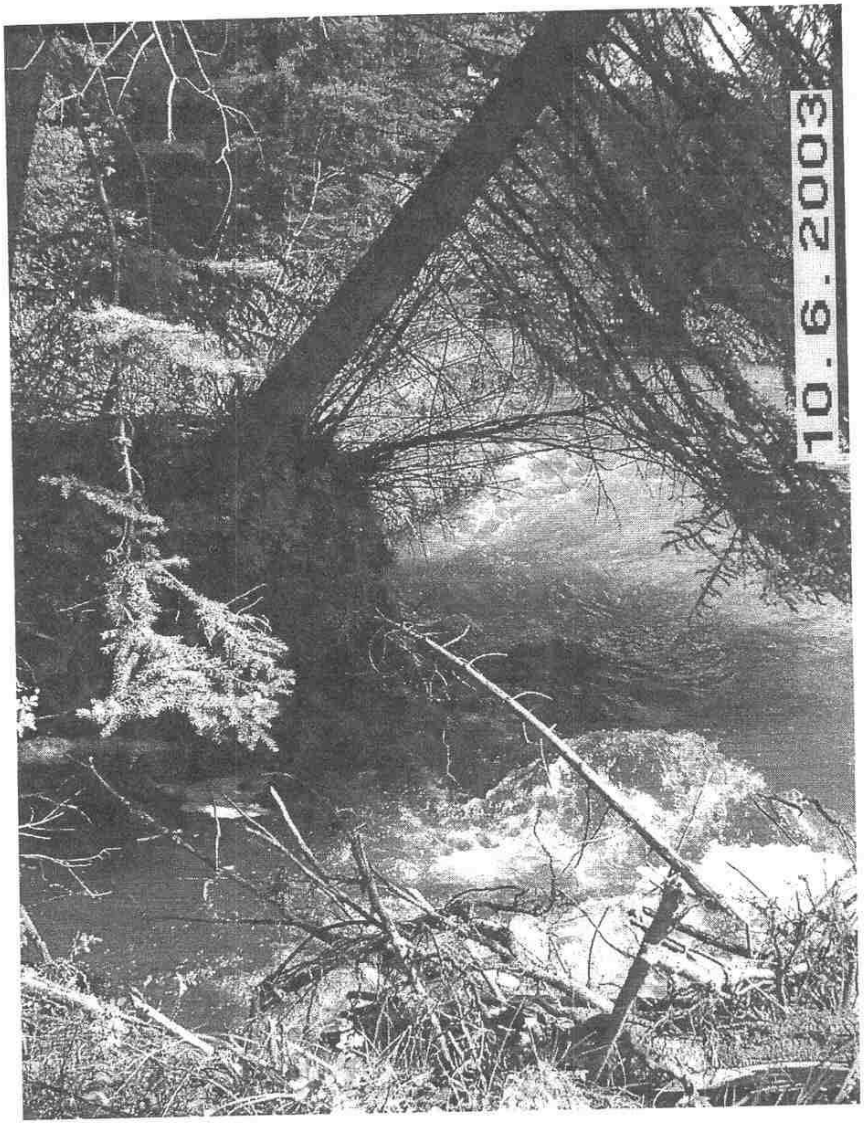

Figure 1. Close view of typical tree throw and bank erosion in progress. Bank retreat is exacerbated by intense beaver activity within the bank profile.

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Reach Views: tree throw

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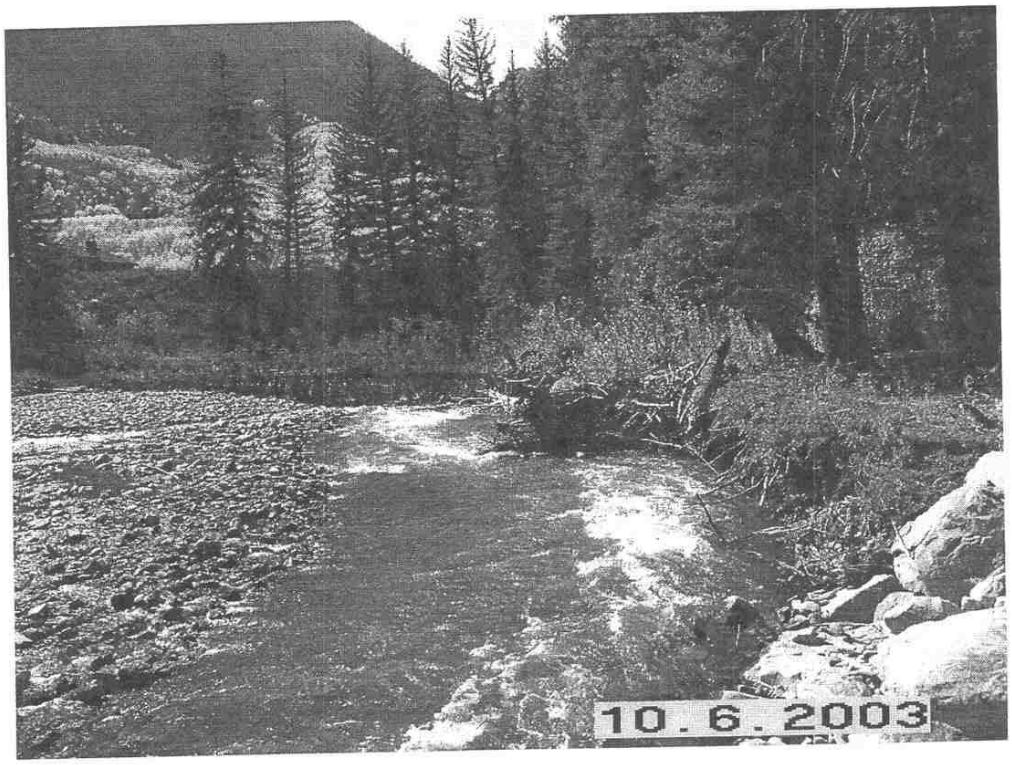

Figure 2. Tree throws and bank erosion caused by flow convergence off medial bar.

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Reach Views: scour off bar edge

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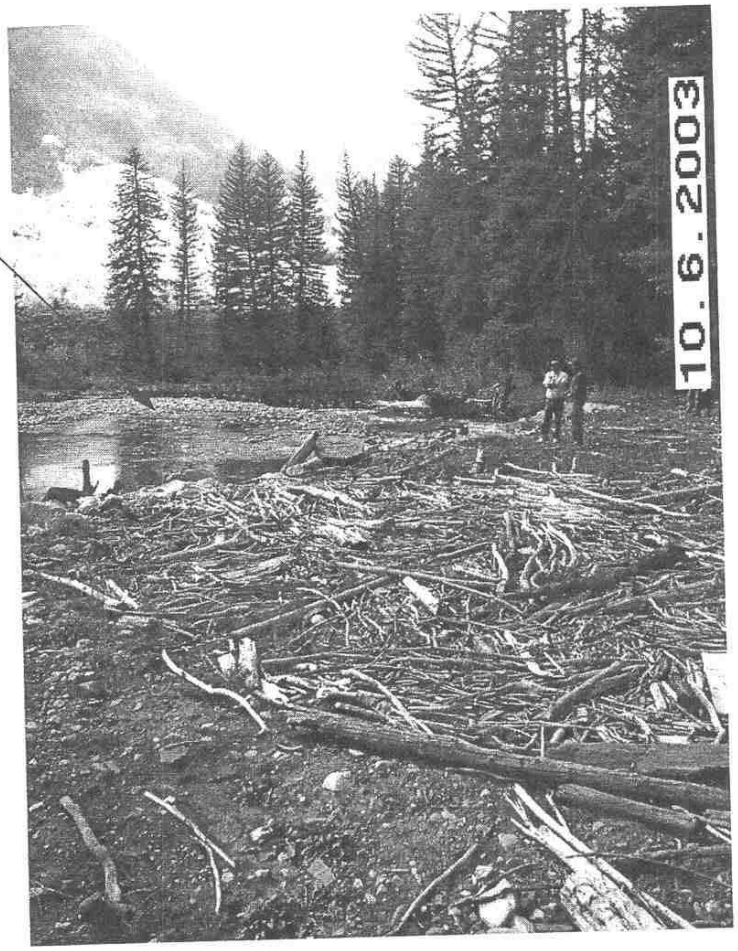

Medial Bar

Figure 3. Overbank wash produced from runoff in 2002; when discharge was less than half of the annual series bankfull discharge. Debris illustrates the severe lack of channel capacity caused by the sediment slug in mid-ground.

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Reach Views: sheet wash

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