



Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

PUBLIC AFFAIRS

July 3, 2007

In reply refer to: DK-7

Ms. Katie Fite
Biodiversity Director
Western Watersheds Project
PO Box 2863
Boise, ID 83701

RE: Freedom of Information Act (NOAA Request #2007-00287)

RE: BPA FOIA Request #07-031

Dear Ms. Fite:

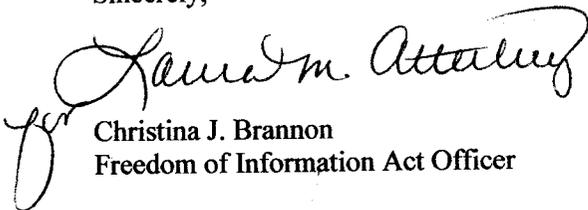
This is in response to the enclosed National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS) response to your FOIA Request dated April 23, 2007. In that request, you asked for NOAA documents pertaining to grazing activity conducted on the Washington Department of Fish and Wildlife owned and managed lands or acquisitions.

The NOAA NMFS identified nine responsive documents to your request and forwarded them to our Agency, the Bonneville Power Administration (BPA), on June 25, 2007. The documents they identified either originated with or contained information that originated with BPA, for that reason they asked BPA for a determination regarding their release. BPA's Authorizing Official, Mark Shaw, Manager, Unified Plan Implementation, Environment, Fish and Wildlife, has reviewed these documents and determined that they be released to you in their entirety.

If you are dissatisfied with our determination, you may make an appeal within thirty (30) days of receipt of this letter to Director, Office of Hearings and Appeals, Department of Energy, 1000 Independence Avenue SW, Washington, DC 20585. Both the envelope and the letter must be clearly marked "Freedom of Information Act Appeal."

I appreciate the opportunity to assist you with this matter. If you have any questions about this response, please contact my FOIA Specialist, Laura M. Atterbury, at (503) 230-7305.

Sincerely,


Christina J. Brannon
Freedom of Information Act Officer

Enclosures (responsive documents)

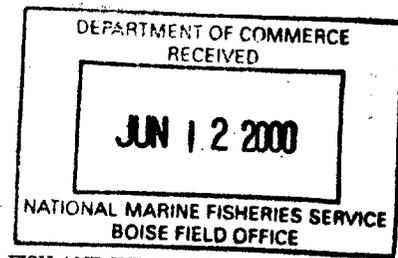
cc: Sheryl Robinson, NWFS NWR



copy Rick
Ed

Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621



ENVIRONMENT, FISH AND WILDLIFE
BFO FILE COPY

June 6, 2000

In reply refer to: KEWN-4

Mr. Ted Meyers
ATTN: Rick Edwards
National Marine Fisheries Service
10215 W. Emerald, Suite 180
Boise, ID 83704

Enclosed for your review are nine project sites on the Asotin Creek, tributary to the Snake River, southeast Washington, Asotin Creek Model Watershed. These projects are part of the Northwest Power Planning Council's Fish and Wildlife Implementation Program for fiscal year 2000.

We are requesting "Incorporation by Reference", using previously submitted Biological Assessments (BA), for the following projects:

- ASOTIN CREEK GENE THEISSEN PROJECT 1
- ASOTIN CREEK FRANK KOCH PROJECT 2
- CHARLEY CREEK PROJECT 1
- CHARLEY CREEK PROJECT 2
- CHARLEY CREEK PROJECT 3
- SOUTH FORK of ASOTIN CREEK PROJECT 1
- SOUTH FORK of ASOTIN CREEK PROJECT 2
- SOUTH FORK of ASOTIN CREEK PROJECT 3
- SOUTH FORK of ASOTIN CREEK PROJECT 4

The planned projects listed above involve similar effects to the same species in the same geographic area. No new species have been listed or proposed, and no new critical habitat has been designated for the action areas. There is no new relevant information to incorporate into last year's BA.

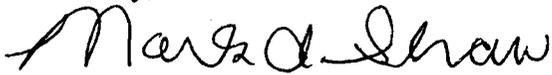
Enclosed are the locations, descriptions, and project drawings for the 2000 Asotin Creek projects located in Asotin County, Washington. There have been no new fish species listed, or change in river conditions, and structure types for 2000 are of the same type as 1998 and 1999. Therefore we have come to the same conclusion as 1999: "**May affect, not likely to adversely affect**" determination for the Snake River steelhead, and Snake River spring chinook and their critical habitat. We are basing this conclusion on the biological assessment submitted to the National Marine Fisheries Service (NMFS) over the past two years and NMFS's concurrence with our determination. Mitigation and monitoring for 2000 will follow the same protocols outlined in the biological assessment submitted to NMFS June 17, 1999.

Due to this determination, construction of these projects will begin on or about July 15, 2000. If no negative comments are received, it will be assumed that the proposals are acceptable and construction will begin as planned. All work window dates are coordinated with the Washington Department of Fish and Wildlife.

If you have any questions, please contact me at (503) 230-5239.

Thank you for your timely review of these projects.

Sincerely,

A handwritten signature in cursive script that reads "Mark A. Shaw".

Mark A. Shaw
Manager, Anadromous, Resident Fish and Wildlife

Enclosures

Biological Assessment

Asotin Creek Model Watershed

Asotin Creek 2000

In-Stream Habitat Projects

on Asotin Creek, WA

ASOTIN CREEK GENE THEISSEN PROJECT 1

ASOTIN CREEK FRANK KOCH PROJECT 2

CHARLEY CREEK PROJECT 1

CHARLEY CREEK PROJECT 2

CHARLEY CREEK PROJECT 3

SOUTH FORK of ASOTIN CREEK PROJECT 1

SOUTH FORK of ASOTIN CREEK PROJECT 2

SOUTH FORK of ASOTIN CREEK PROJECT 3

SOUTH FORK of ASOTIN CREEK PROJECT 4

Submitted by:

US DOE, Bonneville Power Administration

Submitted to:

National Marine Fisheries Service

Prepared by:

Asotin County Conservation District

USDA, Natural Resource Conservation Service

June 2000

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If you have any questions, please contact me at (503) 230-5239.

Thank you for your timely review of these projects.

Sincerely,

A handwritten signature in cursive script that reads "Mark A. Shaw".

Mark A. Shaw

Manager, Anadromous, Resident Fish and Wildlife

Enclosures

CHARLEY CREEK PROJECT #1

Sec 4, T10N, R44E
River Mile 0.7

This project site is located a short distance up Charley Creek from Asotin Creek Road. The purpose of this project is to install pool forming structures and place large woody materials for complex in-stream habitat. A total of three j-hook rock vanes will be placed on the left bank to encourage development of a narrow and deeper thalweg and to form adult resting pools. Woody materials will be incorporated into the vane construction to add complexity to the structure. The total project length is approximately 120 feet. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

CHARLEY CREEK PROJECT #2

Sec 4, T10N, R44E
River Mile 1.0

This project site is located 0.3 miles above the previous project. The purpose of this project is to create pool-forming structures, to stabilize an actively eroding bank, and place large woody materials for complex in-stream habitat. A total of five j-hook rock vanes will be placed on the left bank to encourage development of a narrow and deeper thalweg and to form adult resting pools. Woody materials will be incorporated into the vane construction to add complexity. Rootwad revetments will also be constructed on this stream section to provide bank stability and habitat. The total project length is approximately 130 feet. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

CHARLEY CREEK PROJECT #3

Sec 5, T 9N, R44E
River Mile 1.8

This site is located on a very sharp corner of Charley Creek that is lacking any type of materials that would reduce velocities. The bank is currently eroding rapidly and because of this, vegetation would be nearly impossible to establish and if it did establish, vegetative measures alone will not reduce the rate of bank sloughing. The corner will be treated with a 50-foot root wad revetment and one j-hook rock vane. This treatment will reduce the bank erosion, add complex cover from the woody material, and provide a resting pool on the lower end of the site where there is existing vegetation. The total project length is 75 feet. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

ASOTIN CREEK GENE THEISSEN PROJECT #1

**Sec 25, T10N, R44E
River Mile 10.7**

The upper most end of this project will be comprised of placing large woody materials on both the right and left bank for approximately 350 feet. The materials will be anchored in place with boulders. Boulder clusters will be placed at various locations to encourage pool development.

Further downstream is a project partially completed in 1999. This purpose of this year's work is to increase large woody materials on the stream banks and increase in-stream complex cover. Brushy trees were not available for incorporation into this project last year, so the goal is to blend materials with a greater roughness into the existing structures. The total length of the woody materials placement will be 300 feet on the right and left banks.

Although the entire length of this project area has been planted to native woody plant species, disturbed areas will be planted again in the spring of 2001.

ASOTIN CREEK FRANK KOCH PROJECT #2

**Sec 3, T9N, R44E
River Mile 13.5**

This site is located adjacent to the 1999 project site. Last year large woody materials were placed on the lower section of this project site, but enough large woody material to complete the job was not available. The purpose of this year's project is to extend the placement of large woody material on the right bank for approximately 350 feet. This will encourage bank stabilization, narrow the stream channel, and provide complex cover. The completion of this project will also provide greater benefit of existing large woody materials (log and root wads). Although the entire length of this project area has been planted to native woody plant species, all disturbed areas will be planted again in the spring of 2001.

SOUTH FORK of ASOTIN CREEK PROJECT #3

Sec 22, T9N, R44E
River Mile 2.6

This project site is located on WDFW lands approximately 1 mile downstream of the Smoothing Iron Ridge Road intersection with the South Fork Road. The purpose of this project is to use the existing rock and woody materials (with limited importing of materials) found on the site to increase the pool frequency and woody debris cover by mimicking the existing naturally made structures. At this site there is a lack of both woody materials and rock for structures. This site also has an actively eroding bank that will be treated with anchored large woody materials and two log vanes placed to reduce flow velocity at the bank toe and develop pools. Wood materials will be placed along both banks at various locations to encourage reduction in the width depth ratio and to provide complex cover. Entire trees with root wads attached will be placed with the root wad upstream and the branches trailing over the water. As seen on this river and other streams this is a natural way of creating a good downstream pool with cover and a narrow stream channel. We want to recreate what is shown in the reference photos with salvaged rock and wood materials found out of the ordinary high water flow. The total project length is 1000 feet, although structures will be placed sporadically throughout the project length based on available onsite materials and limited imported rock and wood. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

SOUTH FORK of ASOTIN CREEK PROJECT #4

Sec 2, T9N, R44E
River Mile 2.6

This project site is located on WDFW lands approximately 2 miles downstream of the Smoothing Iron Ridge Road intersection with the South Fork Road. The purpose of this project is to use the existing rock and woody materials (with limited importing of materials) found on the site to increase the pool frequency and woody debris cover by mimicking the existing naturally made structures. At this site there are sufficient boulders present to develop a number of fine resting pools. Woody materials may have to be imported to this site. This area has a very wide gravel area that would benefit from woody debris placement. Although some of the wood would not be in the stream at normal flows, when a high flow event occurs the wood placed on the gravel bar would collect suspended sediment by increasing the channel roughness. The deposited sediment would help to expedite the recovery of this section of stream. We want to recreate what is shown in the reference photos with salvaged rock and wood materials found out of the ordinary high water flow. The total project length is 400 feet, although structures will be placed sporadically throughout the project length based on available onsite materials and limited imported rock and wood. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

SOUTH FORK of ASOTIN CREEK PROJECT #1

**Sec 27, T9N, R44E
River Mile 3.5**

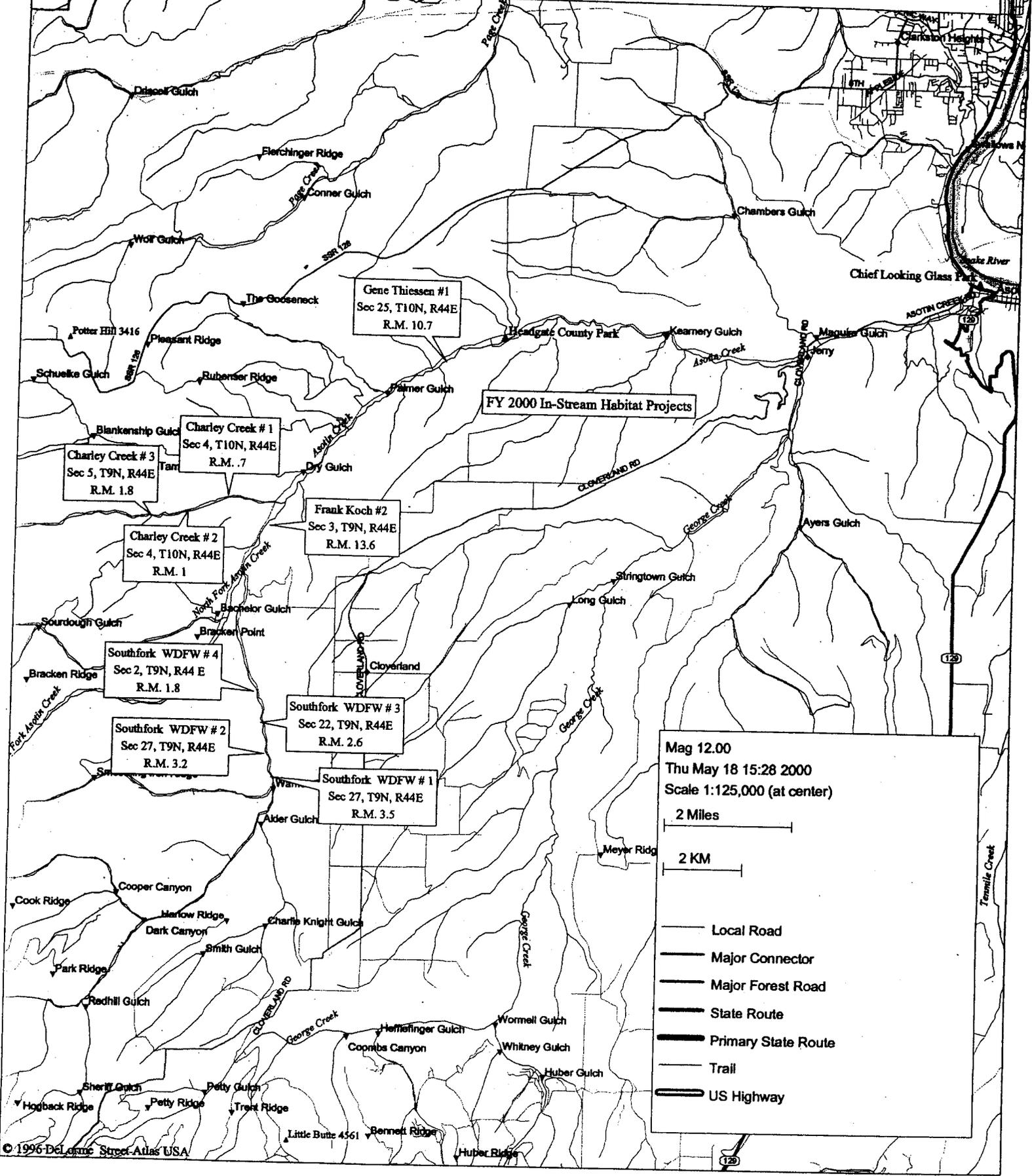
This project site is located on WDFW lands immediately below the Smoothing Iron Ridge Road intersection with the South Fork Road. This section of the South Fork has limited pools and woody material in the system. The purpose of this project is to use the existing rock and woody materials (with limited importing of materials) found on the site to increase the pool frequency and woody debris cover by mimicking the existing naturally made structures. Boulders will be placed to create step pools for adult steelhead. Large woody materials will be placed along the bank to reduce the width depth ratio and create pools and eddy areas on the downstream side. The reference photographs attached show how effective a small amount of rock and wood can be in forming pools and cover. What is shown in the photos is what we are going to re-create with salvaged rock and wood materials found out of the ordinary high water flow. The total project length is 200 feet. The site will be vegetated to native woody and herbaceous species in the spring of 2001.

SOUTH FORK of ASOTIN CREEK PROJECT #2

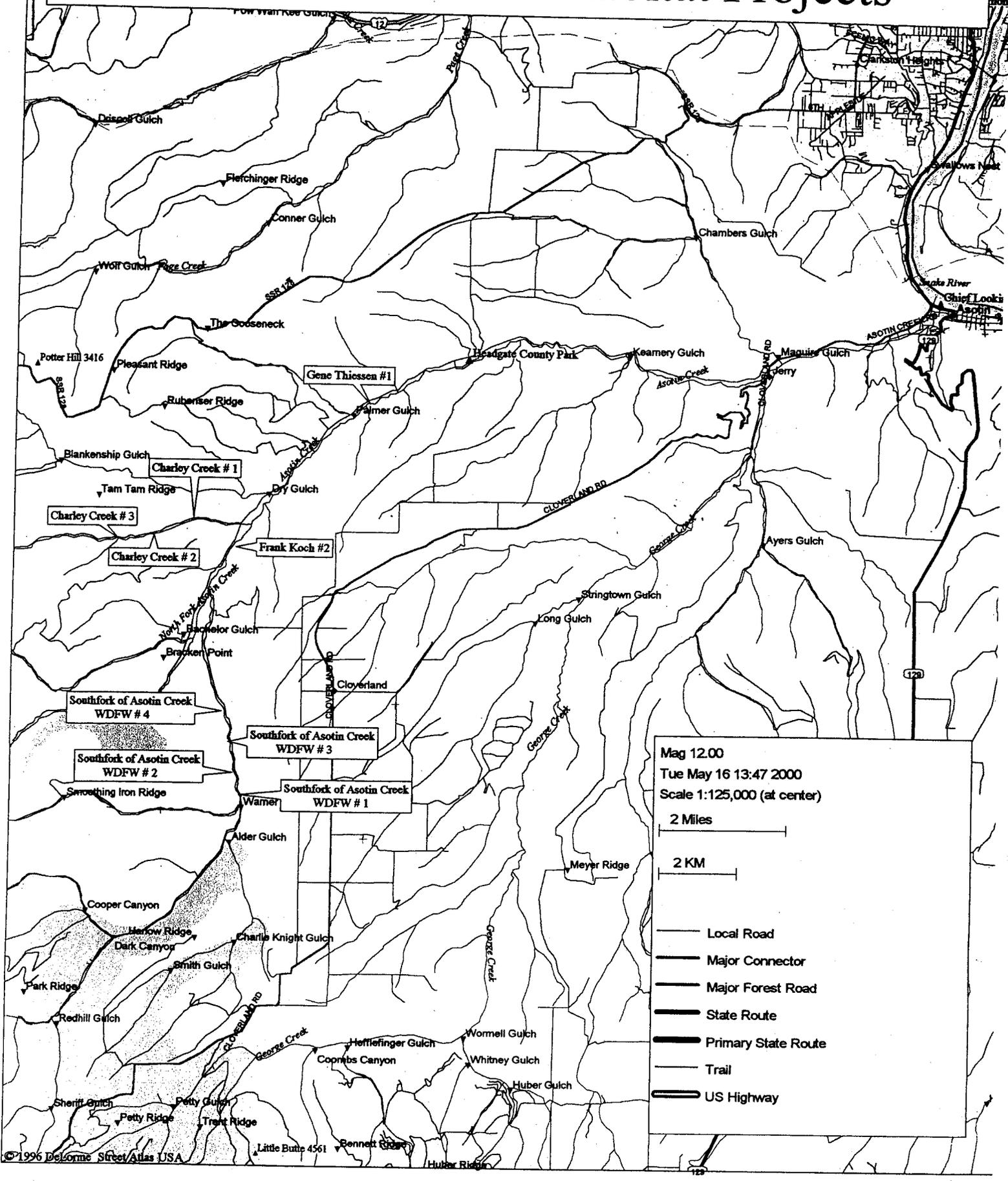
**Sec 27, T9N, R44E
River Mile 3.2**

This project site is located on WDFW lands approximately ½ mile downstream from the Smoothing Iron Ridge Road intersection with the South Fork Road. The purpose of this project is to use the existing rock and woody materials (with limited importing of materials) found on the site to increase the pool frequency and woody debris cover by mimicking the existing naturally made structures. Boulders will be placed to create step pools for adult steelhead. A large tree located on site and out of the flow area will be retrieved and used along the bank to deflect flows into a narrower channel and create a pool downstream. At other areas within this site large woody materials will be placed along the bank to reduce the width depth ratio and create pools and eddy areas on the downstream side. We want to recreate what is shown in the reference photos with salvaged rock and wood materials found out of the ordinary high water flow. The total project length is 600 feet, although structures will be placed sporadically throughout the project length based on available materials. The site will be vegetated with native woody and herbaceous species in the spring of 2001.

FY 2000 In-Stream Habitat Projects



FY 2000 In-Stream Habitat Projects



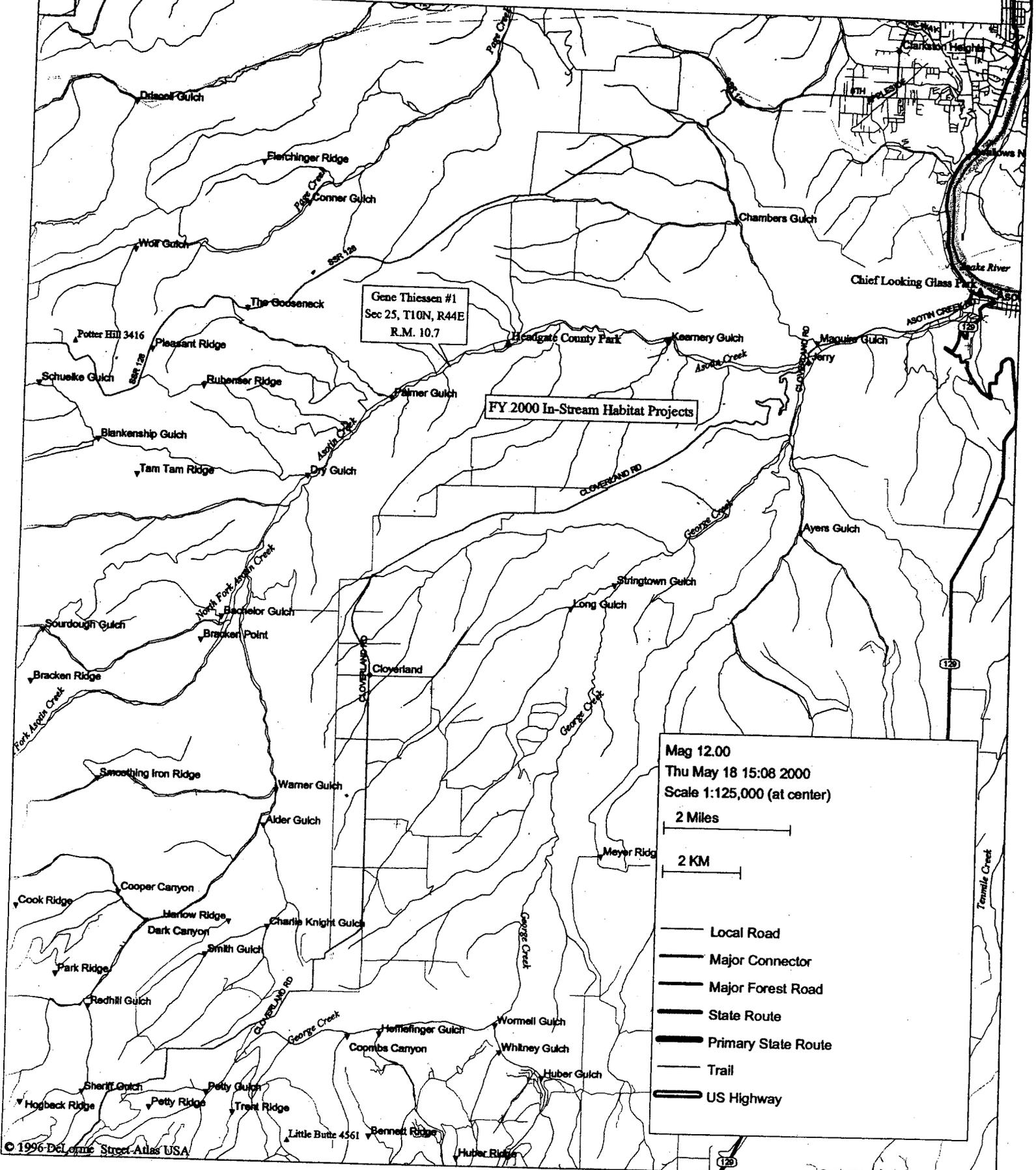
Mag 12.00
 Tue May 16 13:47 2000
 Scale 1:125,000 (at center)

2 Miles

2 KM

- Local Road
- Major Connector
- Major Forest Road
- State Route
- Primary State Route
- Trail
- US Highway

G. Thiessen #1 FY 2000 In-Stream



Gene Thiessen #1
Sec 25, T10N, R44E
R.M. 10.7

FY 2000 In-Stream Habitat Projects

Mag 12.00
Thu May 18 15:08 2000
Scale 1:125,000 (at center)

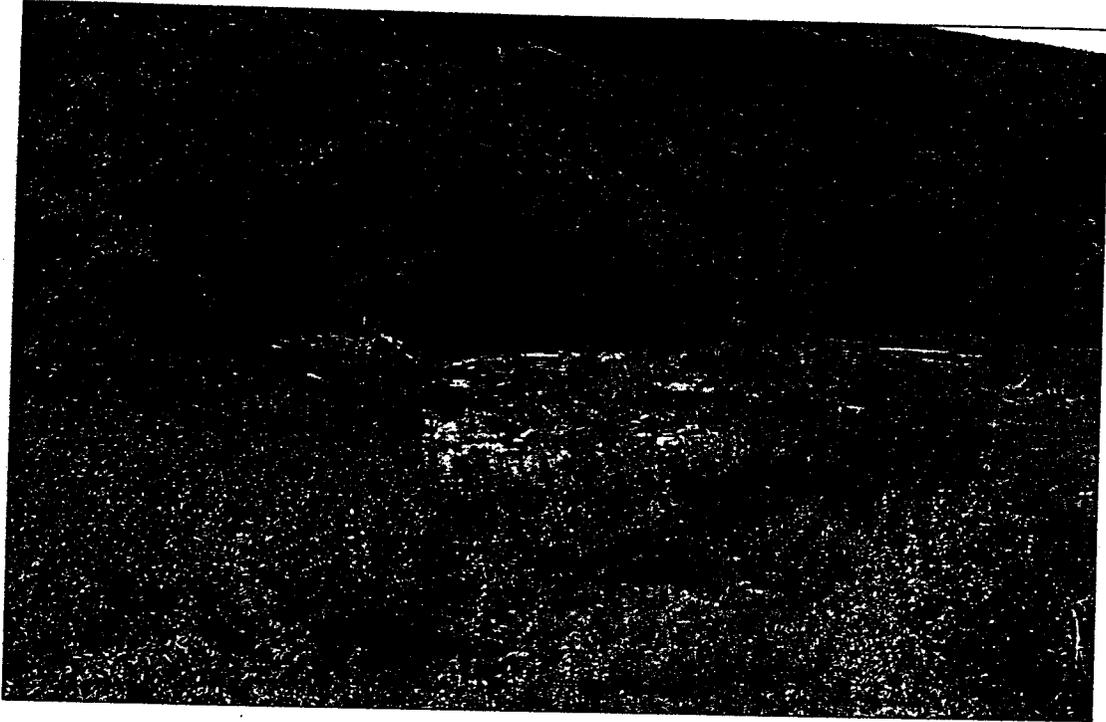
2 Miles
2 KM

- Local Road
- Major Connector
- Major Forest Road
- State Route
- Primary State Route
- Trail
- US Highway

Mainstem of Asotin Creek

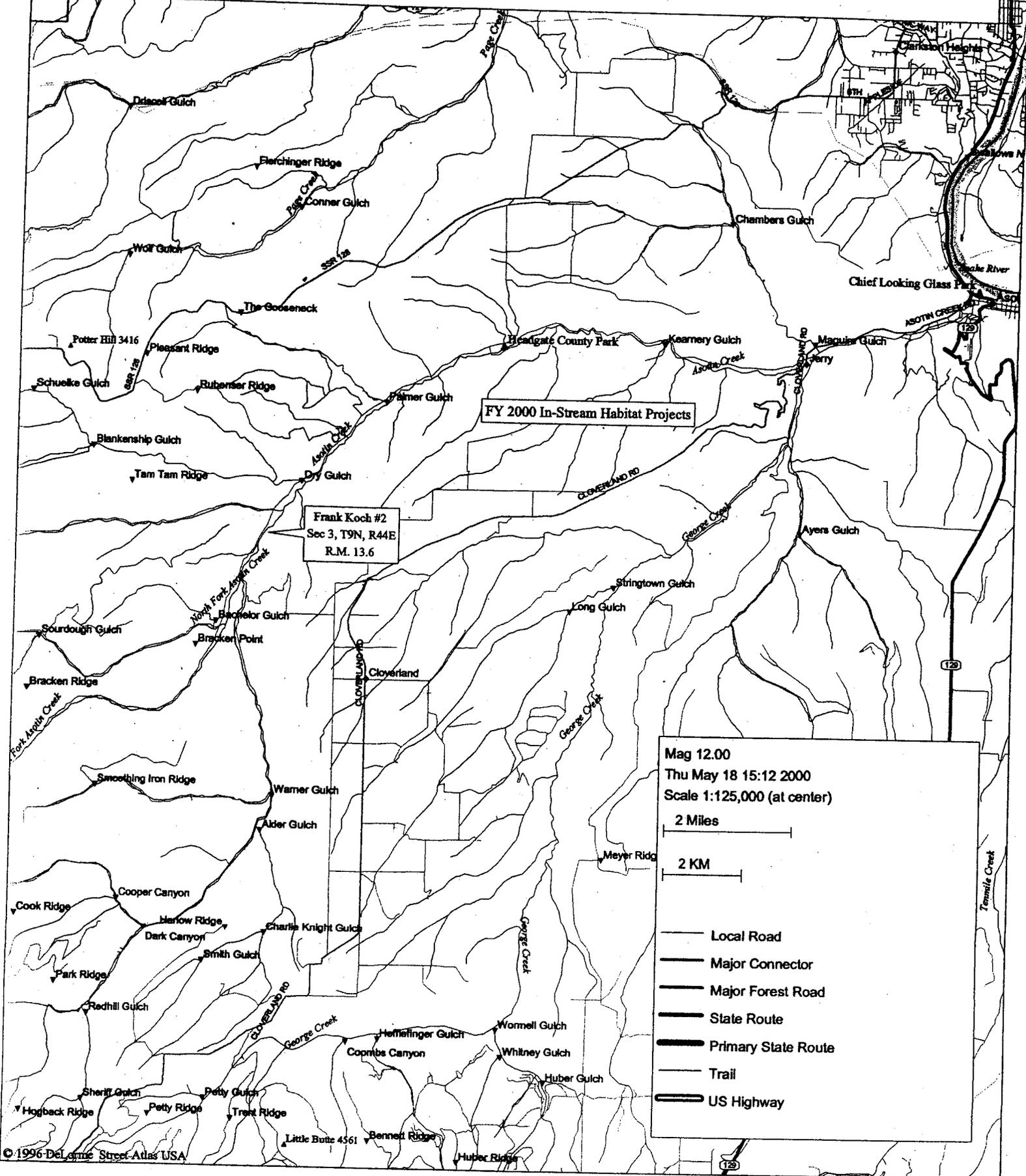
Asotin Creek 2000 In-Stream Habitat Projects

Thiessen Project #1



Upstream view. Above split channel woody debris placement on left side of channel to focus water into right channel and utilize deeper water.

F. Koch #2 FY 2000 In-Stream



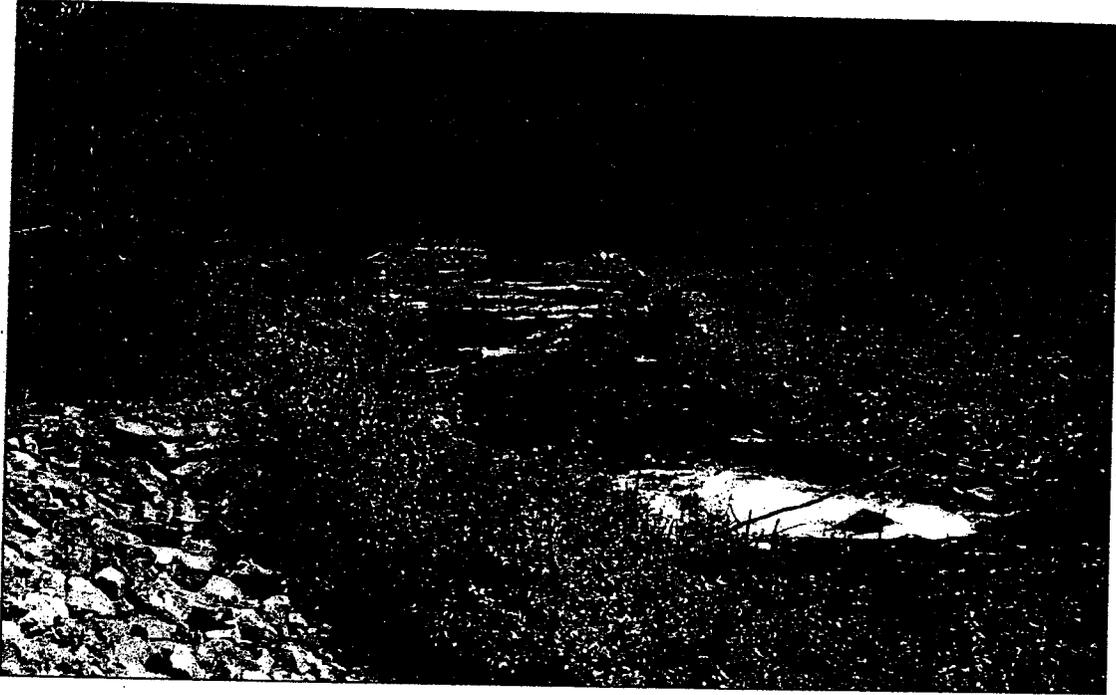
Mag 12.00
 Thu May 18 15:12 2000
 Scale 1:125,000 (at center)

2 Miles

2 KM

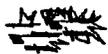
- Local Road
- Major Connector
- Major Forest Road
- State Route
- Primary State Route
- Trail
- US Highway

F. Koch Project #2



Downstream view. Woody debris placement on far bank above the split channel. Focus majority of flow into near channel to take advantage of complex habitat on lower left side of photo.

LEGEND

LARGE WOODY DEBRIS 

ASOTIN CREEK GENE THEISSEN PROJECT #1

NE 1/4 SEC 25 T10N R44E
R.M. 10.7

DATE 6/00
APPROVED BY APL
TITLE _____

DATE 6/00
DESIGNED R. Stucky
DRAWN _____
TRACED _____
CHECKED _____

PLANNED PLACEMENT
OF LARGE WOODY
DEBRIS

PLANNED PLACEMENT
OF LARGE WOODY
DEBRIS

The purpose of this project is to place large woody materials on both the right and left banks lacking large woody materials. The second part of the project will be to add additional brushy materials to the logs and root wads placed in 1999 in the lower section of this project area.

TOTAL LENGTH OF WOODY
MATERIALS IS APPROXIMATELY
350 FEET (150 ON EACH BANK).

DRAWING NOT TO SCALE

ASOTIN CREEK

ASOTIN CREEK ROAD

PLAN VIEW

GENE THEISSEN FISH HABITAT IMPROVEMENT
ASOTIN CREEK, ASOTIN COUNTY, WA.

USDA NATURAL RESOURCES CONSERVATION SERVICE

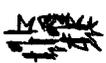
DRAWING NO.

SHEET 1 OF 1

Charley Creek Tributary to Asotin Creek

Asotin Creek 2000 In-Stream Habitat Projects

LEGEND

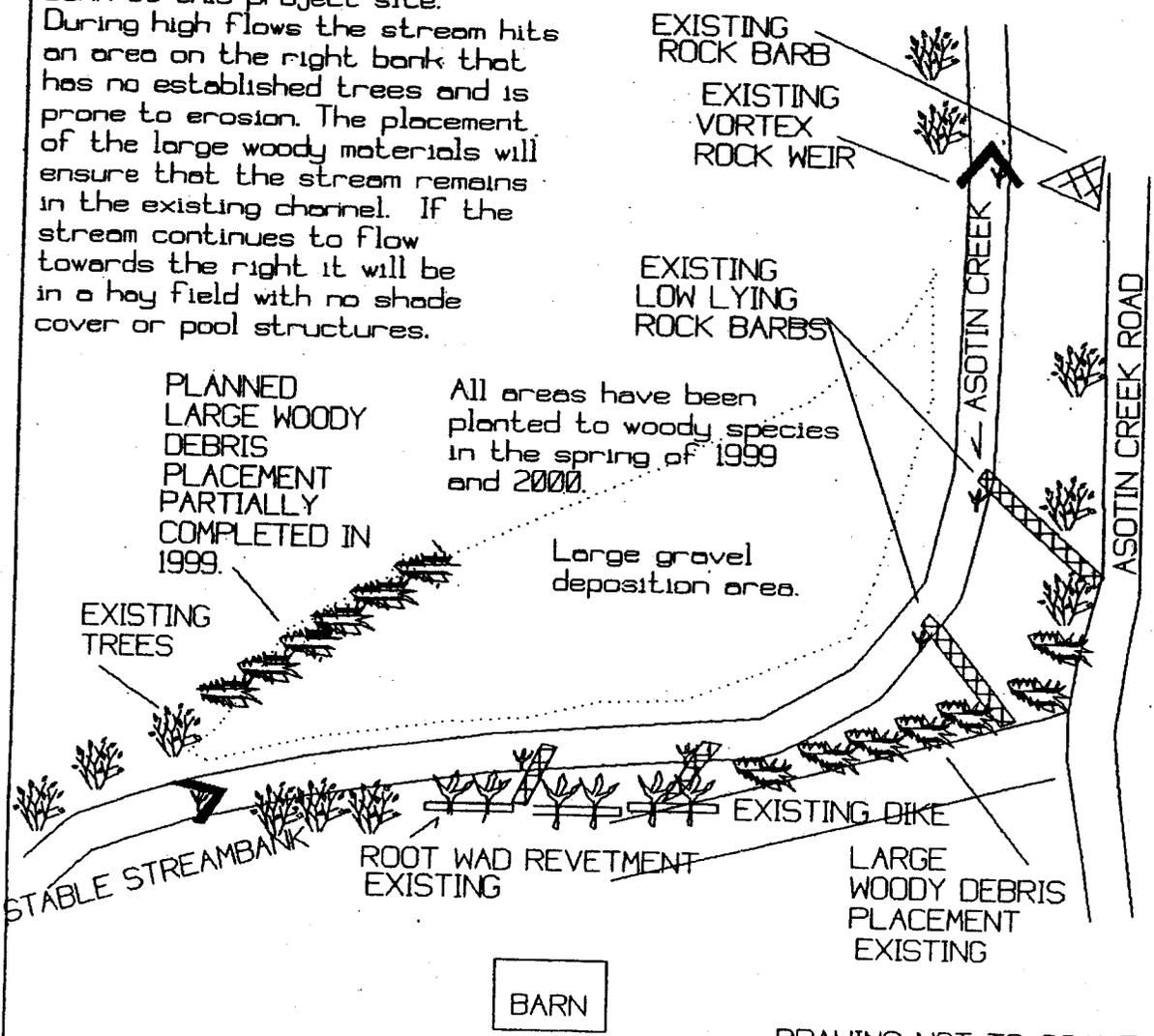
- VORTEX ROCK WEIR WITH ROOT WAD 
- ROCK VANE WITH ROOT WAD 
- LARGE WOODY DEBRIS 
- ROCK BARB WITH ROOT WAD 
- ROOT WAD REVETMENT 

ASOTIN CREEK FRANK KOCH #2
 SEC 3, T9N, R44E
 R.M. 13.5

DATE 6/0
 APPROVED BY ADS
 TITLE _____

DESIGNED RS Sturtevant
 DATE 6/00
 DRAWN _____
 TRACED _____
 CHECKED _____

The purpose of this project is to complete installation of large woody materials on the right bank at this project site. During high flows the stream hits an area on the right bank that has no established trees and is prone to erosion. The placement of the large woody materials will ensure that the stream remains in the existing channel. If the stream continues to flow towards the right it will be in a hay field with no shade cover or pool structures.

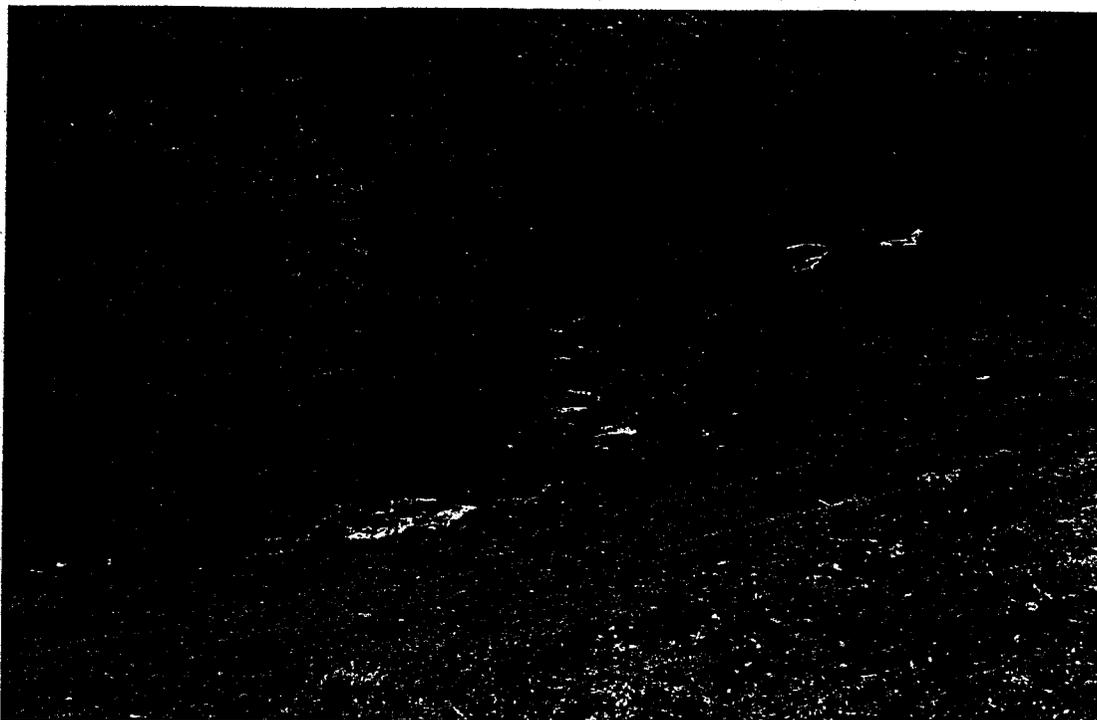


PLAN VIEW
 FRANK KOCH FISH HABITAT IMPROVEMENT
 ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

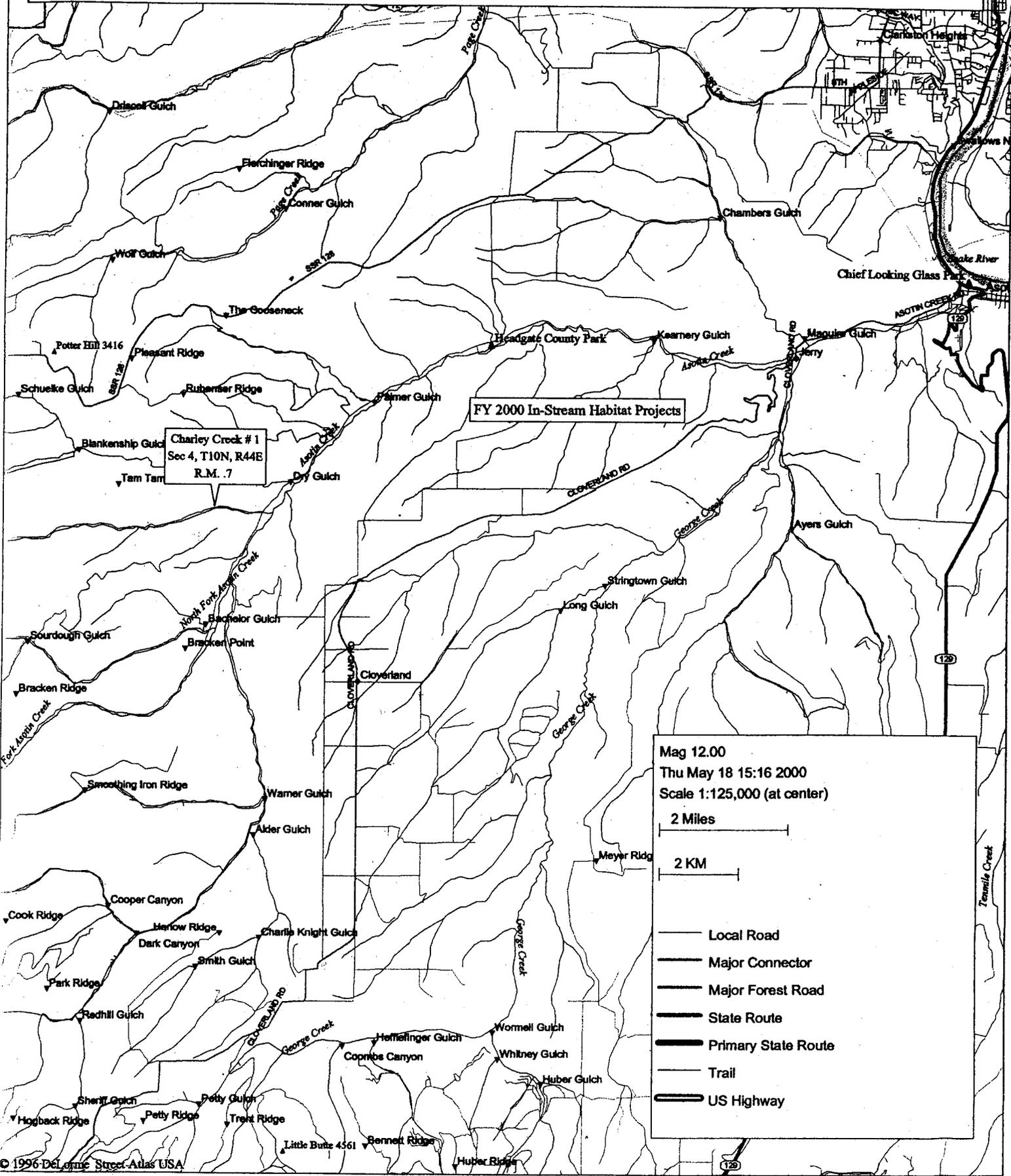
DRAWING NO. _____
 SHEET 1 OF 1

Charley Creek Project #1



Glide area with no pocket water, adding J-Hooked Rock Vanes & Woody Debris.

Charley Creek #1 FY 2000 In-Stream



Charley Creek # 1
 Sec 4, T10N, R44E
 R.M. 7

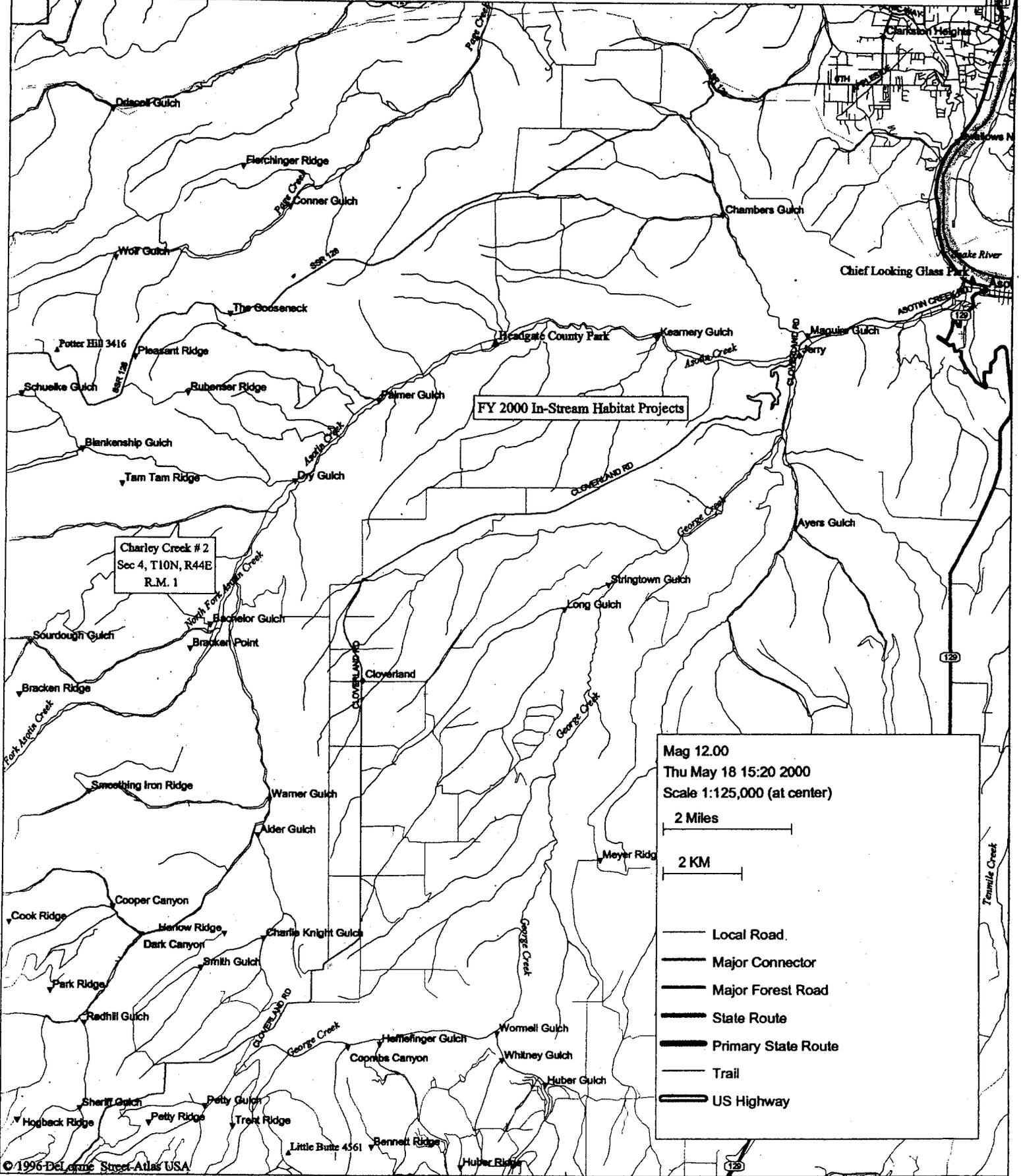
FY 2000 In-Stream Habitat Projects

Mag 12.00
 Thu May 18 15:16 2000
 Scale 1:125,000 (at center)

2 Miles
 2 KM

- Local Road
- Major Connector
- Major Forest Road
- State Route
- Primary State Route
- Trail
- US Highway

Charley Creek #2 FY 2000 In-Stream



Charley Creek # 2
 Sec 4, T10N, R44E
 R.M. 1

FY 2000 In-Stream Habitat Projects

Mag 12.00
 Thu May 18 15:20 2000
 Scale 1:125,000 (at center)

2 Miles

2 KM

- Local Road
- Major Connector
- Major Forest Road
- State Route
- Primary State Route
- Trail
- US Highway

LEGEND

J-HOOK ROCK VANE



LARGE WOODY MATERIALS

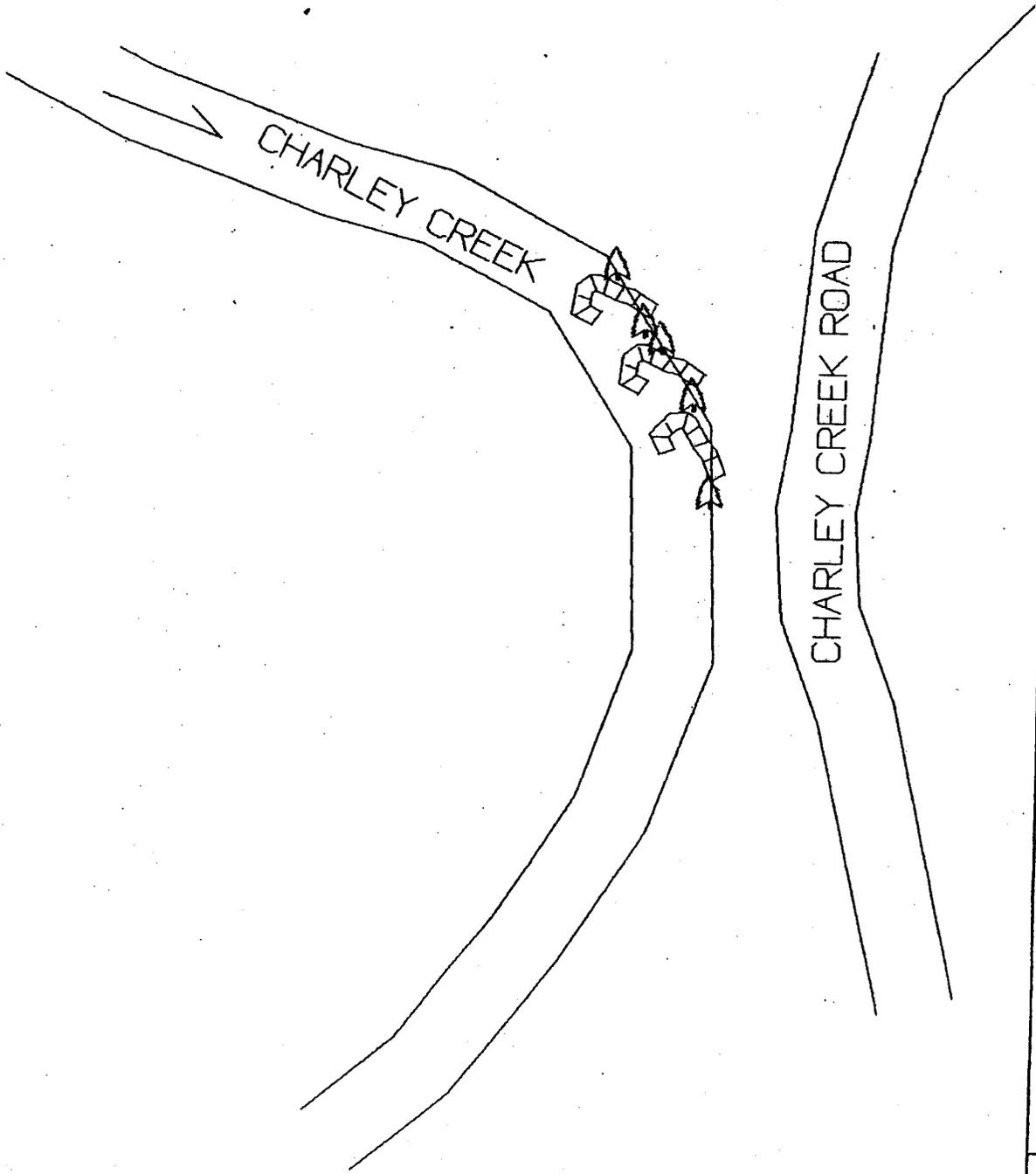


CHARLEY CREEK PROJECT #1
SEC 4, T10N, R44E
RIVER MILE 0.7

APPROVED BY	DATE
RDU	6/00
TITLE	
TITLE	

DESIGNED	DATE
BO STALLY	6/00
DRAWN	
TRACED	
CHECKED	

The purpose of this project is to create pool forming structures, to stabilize an actively eroding bank, and place large woody materials for complex cover.



CHARLEY CREEK PROJECT #1 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 CHARLEY CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.
SHEET 1 OF 1

DRAWING NOT TO SCALE

LEGEND

J-HOOK ROCK VANE



LARGE WOODY MATERIALS



ROOT WAD PLACEMENTS

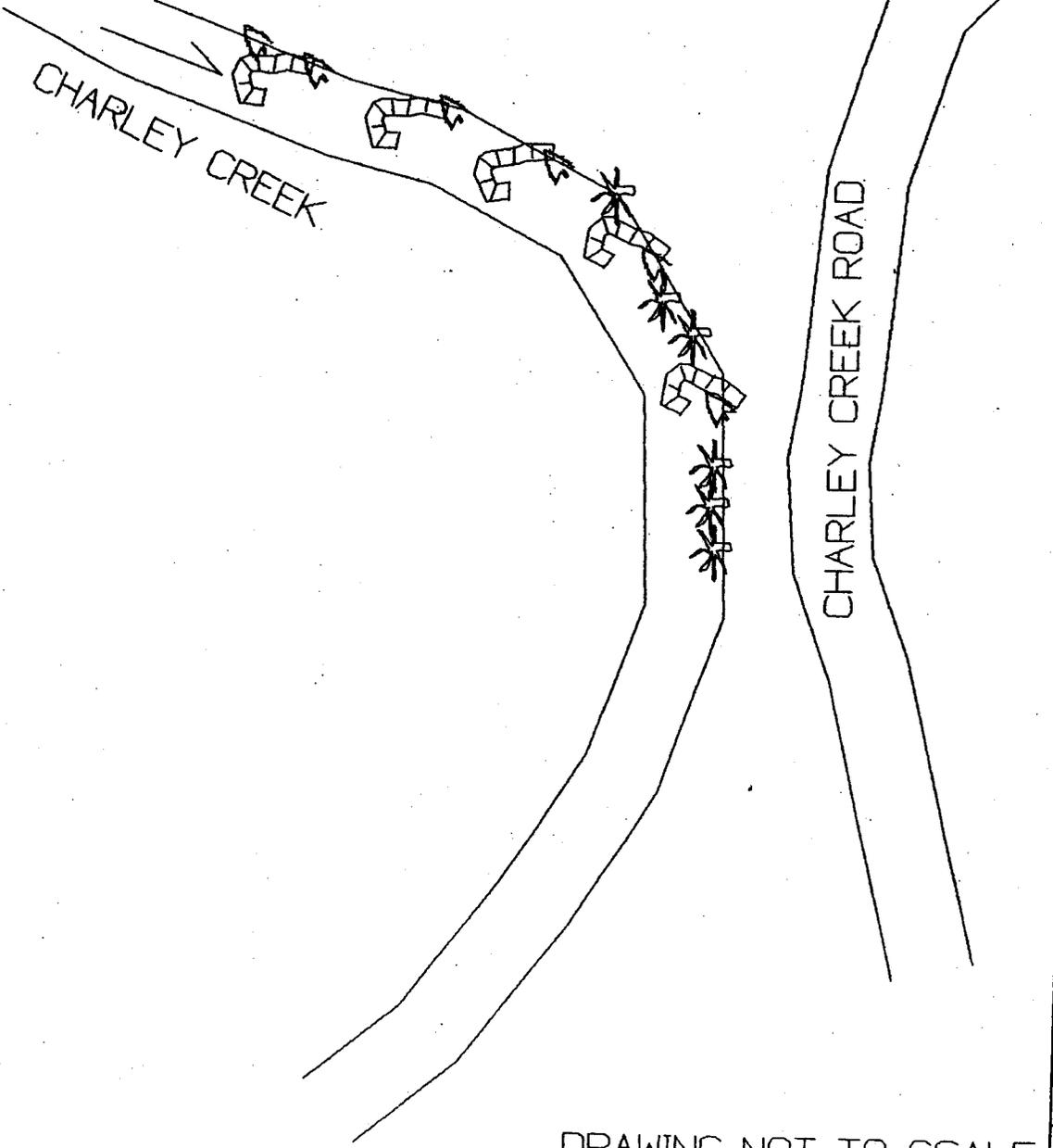


CHARLEY CREEK PROJECT #2
 SEC 4, T10N, R44E
 RIVER MILE 1.0

DATE _____
 APPROVED BY: ROD
 TITLE _____

DESIGNED ROD STANLEY DATE 6/00
 DRAWN _____ TRACED _____ CHECKED _____

The purpose of this project is to create pool forming structures, to stabilize an actively eroding bank, and place large woody materials for complex cover.



CHARLEY CREEK PROJECT #2 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 CHARLEY CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

DRAWING NO. _____
 SHEET 1 OF 1

Charley Creek Project #2



Glide area with good gradient just missing pools and woody debris.

LEGEND

J-HOOK ROCK VANE



ROOT WAD PLACEMENTS

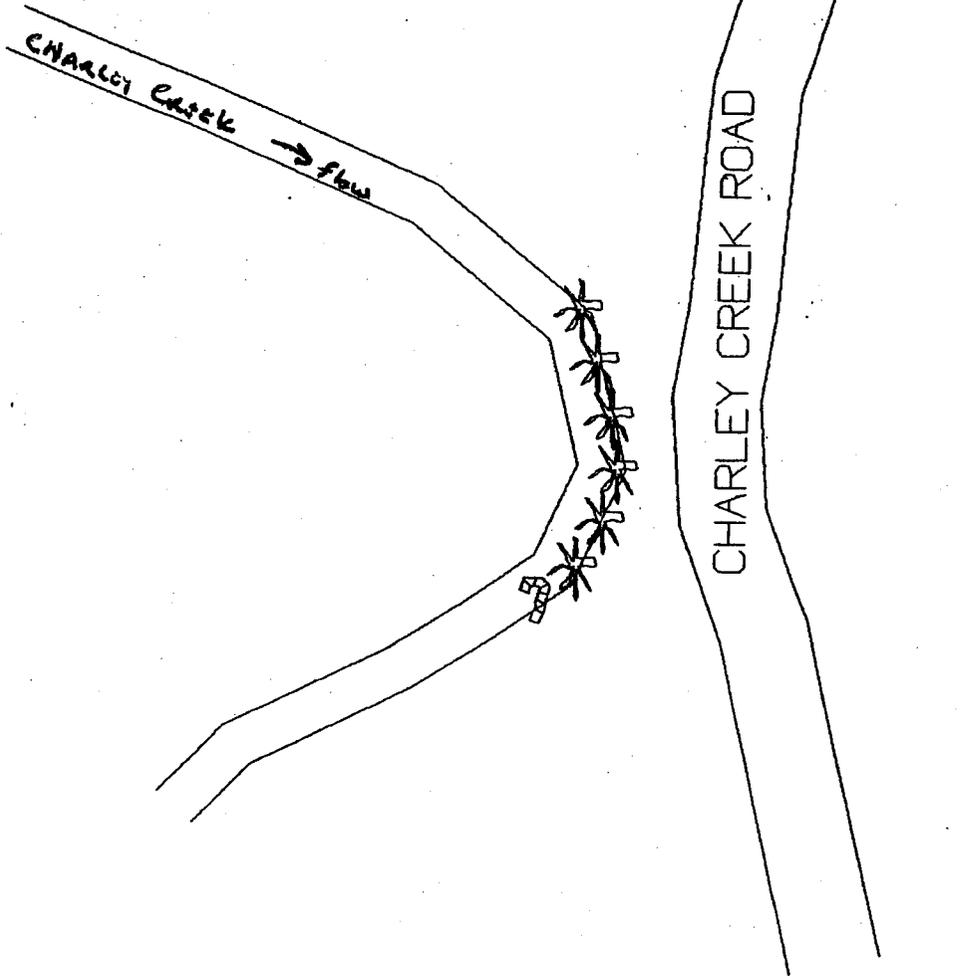


CHARLEY CREEK PROJECT #3
 SEC 5, T9N, R44E
 RIVER MILE 1.8

DATE _____
 APPROVED BY R.D.S. TITLE _____

DESIGNED RO STANTY DATE 9/00
 DRAWN _____ TRACED _____
 CHECKED _____

The purpose of this project is to reduce erosion on a very unstable bank this will be completed with a root wad revetment. This will also add complex cover. One j-hook vane will be placed to create a resting pool in conjunction with the woody materials.

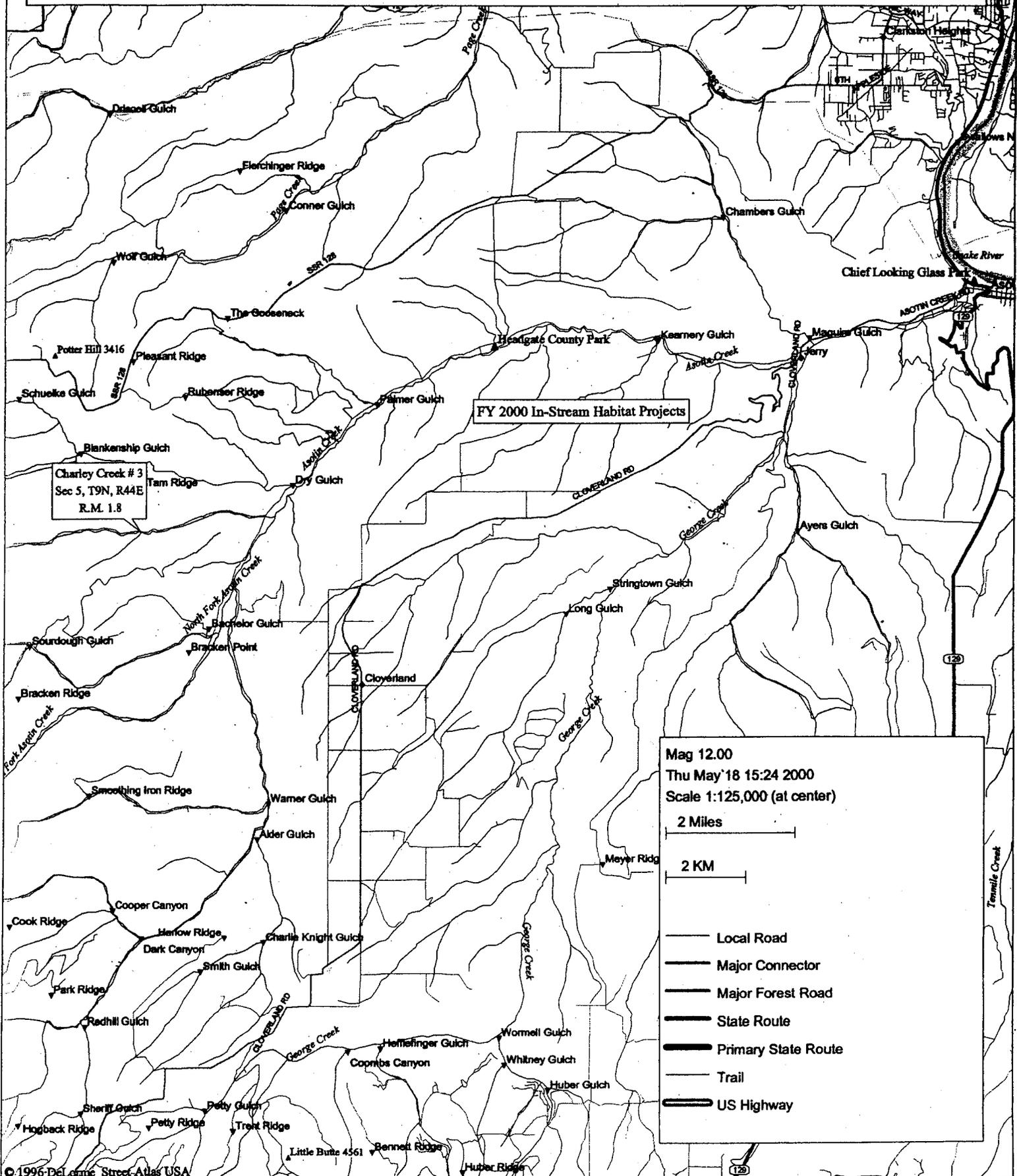


CHARLEY CREEK PROJECT #3 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 CHARLEY CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

DRAWING NO. _____
 SHEET _____ OF _____

Charley Creek #3 FY 2000 In-Stream



Charley Creek # 3
Sec 5, T9N, R44E
R.M. 1.8

FY 2000 In-Stream Habitat Projects

Mag 12.00
Thu May '18 15:24 2000
Scale 1:125,000 (at center)

2 Miles

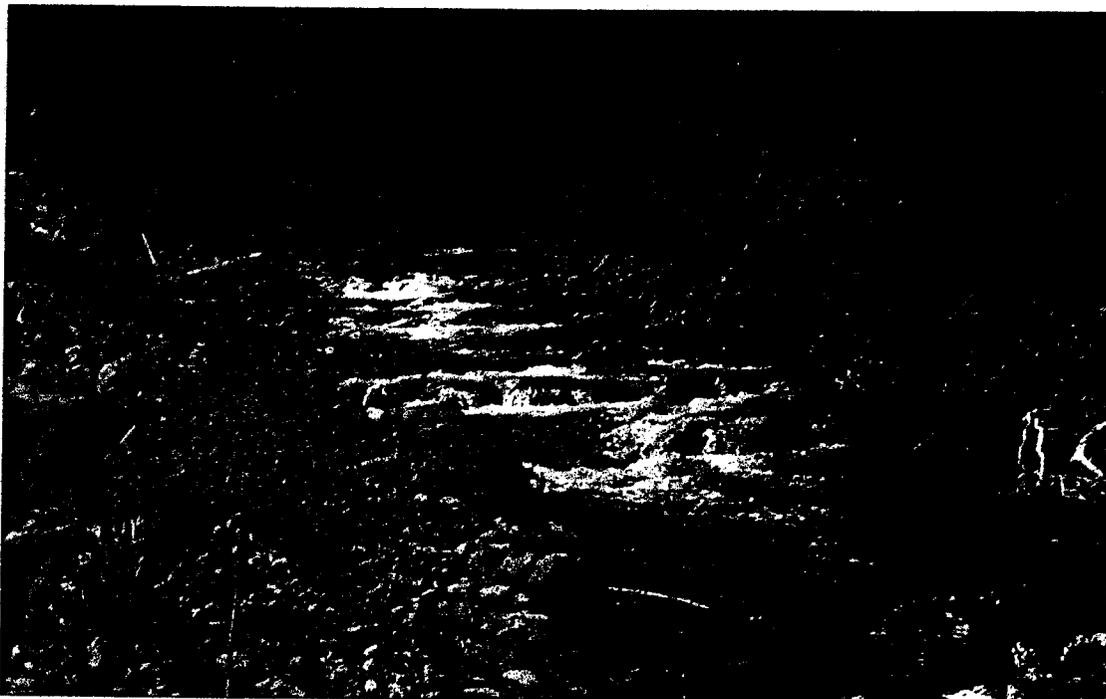
2 KM

Local Road
Major Connector
Major Forest Road
State Route
Primary State Route
Trail
US Highway

Step Pool Reference on Southfork of Asotin Creek



Reference of step pool conditions we are trying to mimic.

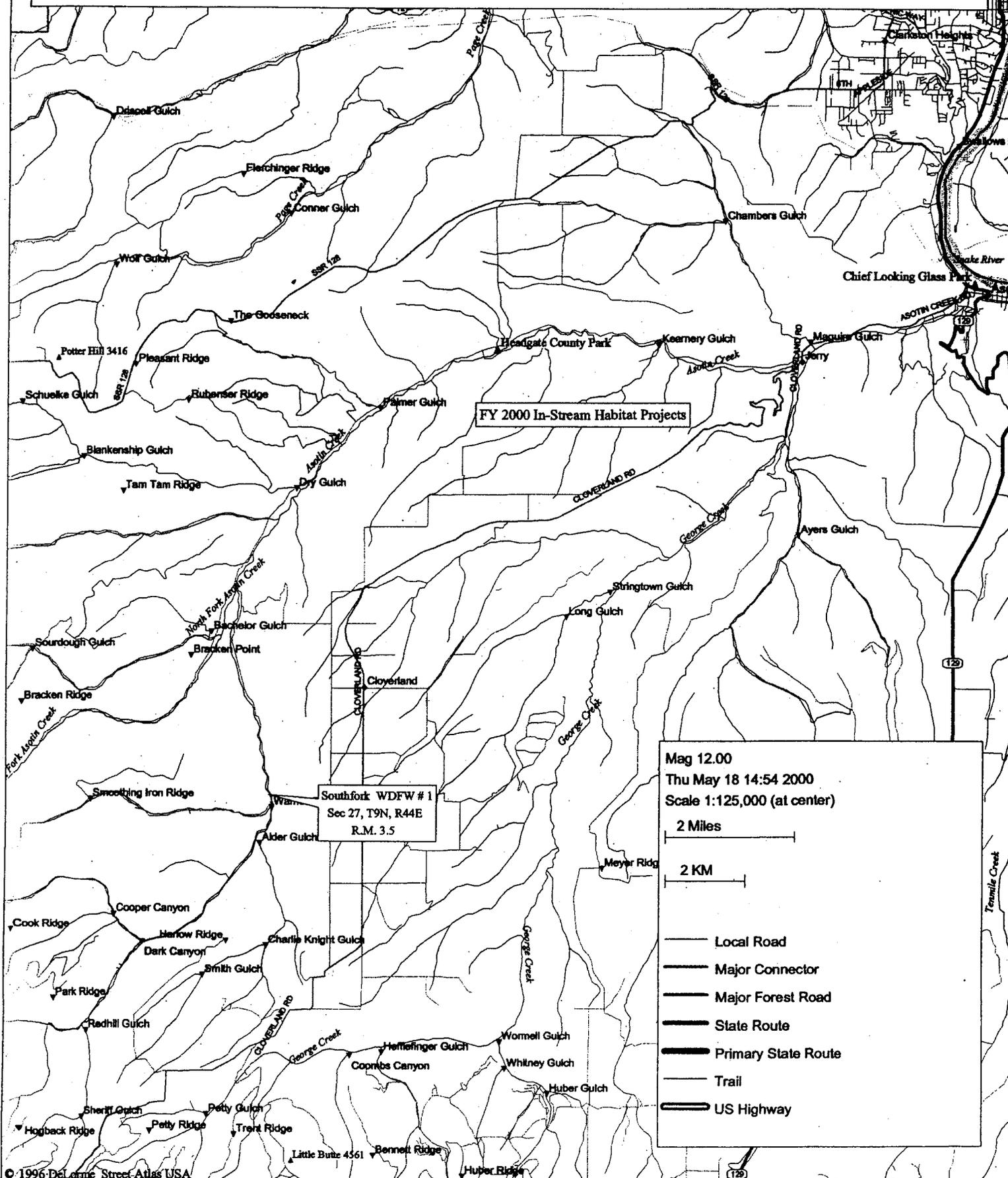


We will be adding wood to system, but this is an example of what we want to achieve.

Southfork of Asotin Creek Tributary to Asotin Creek

Asotin Creek 2000 In-Stream Habitat Projects

Southfork #1 FY 2000 In-Stream



FY 2000 In-Stream Habitat Projects

Southfork WDFW # 1
 Sec 27, T9N, R44E
 R.M. 3.5

Mag 12.00
 Thu May 18 14:54 2000
 Scale 1:125,000 (at center)

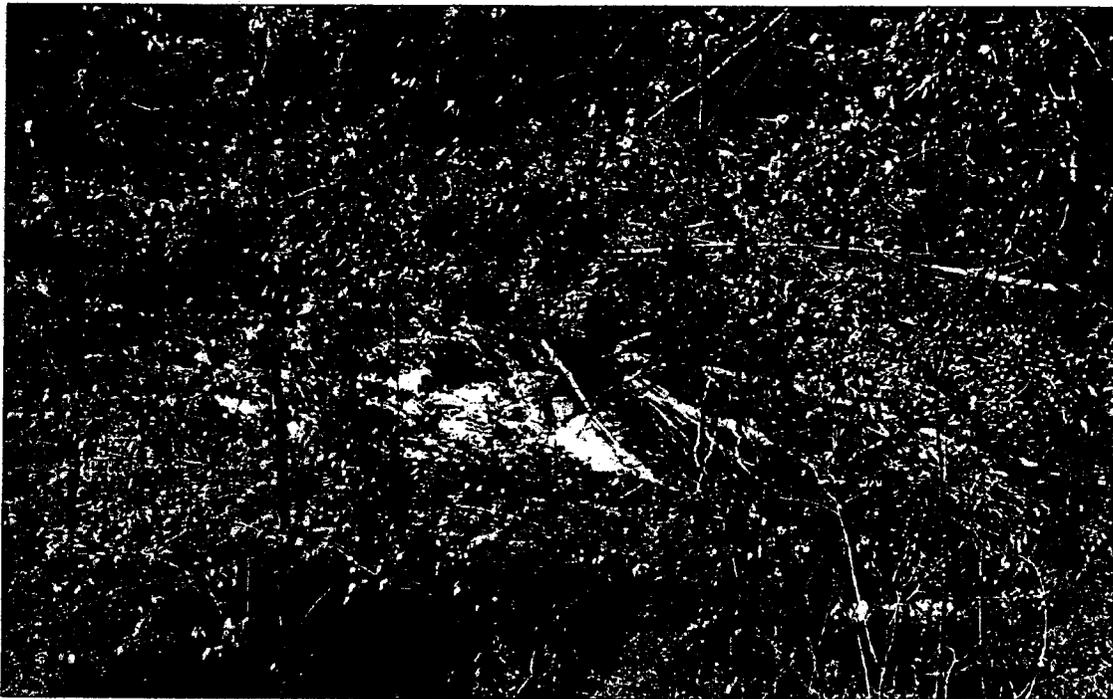
2 Miles
 2 KM

- Local Road
- Major Connector
- Major Forest Road
- State Route
- Primary State Route
- Trail
- US Highway

Woody Debris Reference on Southfork of Asotin Creek



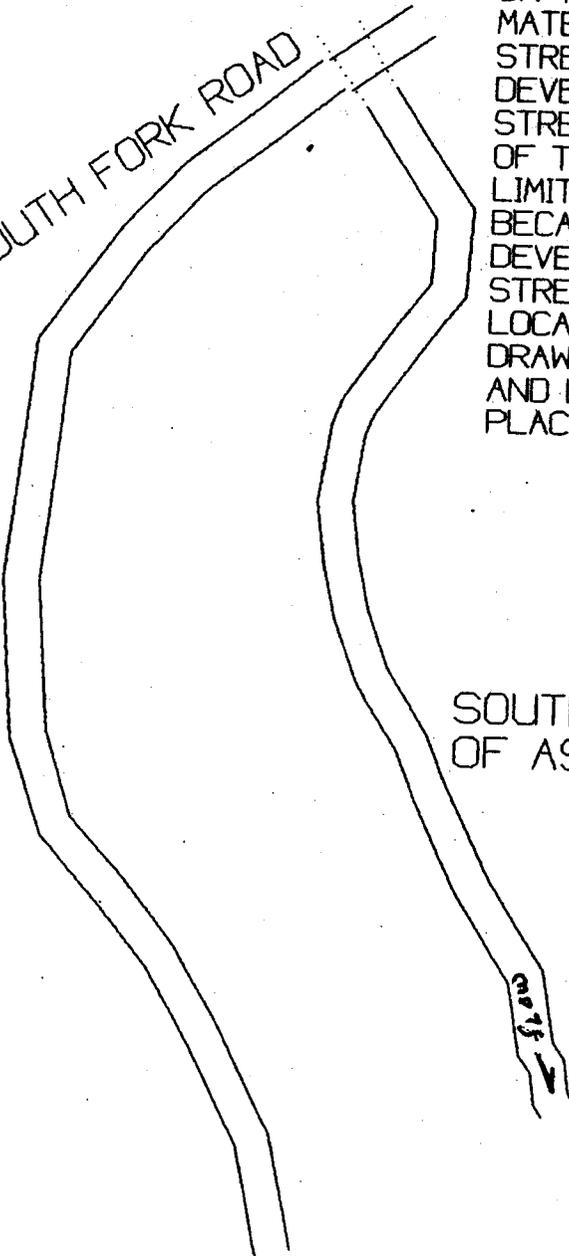
Woody debris changing direction of thalweg and scouring a pool below structure.



An example of what we will be trying to accomplish with woody debris placement

SOUTH FORK OF ASOTIN CREEK PROJECT #1
 SEC 27, T9N, R44E
 RIVER MILE 3.5

SOUTH FORK ROAD



SOUTH FORK
 OF ASOTIN CREEK

THE PURPOSE OF THIS PROJECT IS TO INSTALL RESTING POOLS IN THIS SECTION OF THE SOUTH FORK. ROCK AND WOODY MATERIALS FOUND ON THE SITE OR LIMITED IMPORTED MATERIALS WILL BE PLACED IN THE STREAM TO MIMIC NATURALLY DEVELOPED POOLS FOUND IN THIS STREAM SECTION. DISTURBANCE OF THE STREAM AND BANKS WILL LIMITED. BECAUSE THE POOLS WILL BE DEVELOPED WHERE THERE IS STREAM ACCESS. THE DRAWING IS FOR LOCATION ONLY. THE ATTACHED DETAIL DRAWINGS OF BOULDER PLACEMENTS AND LARGE WOODY MATERIALS PLACEMENT WILL BE USED.

DATE 6/8
 APPROVED BY ROS
 TITLE _____

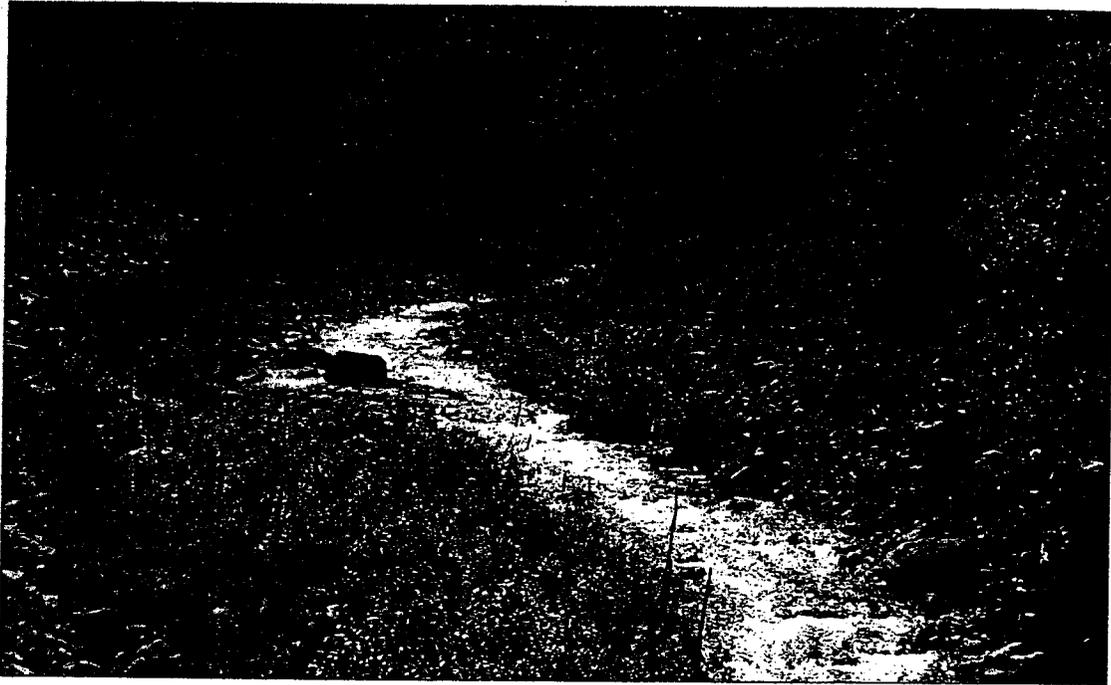
DATE 6/8
 DESIGNED R. RASTY
 DRAWN _____
 TRACED _____
 CHECKED _____

SOUTH FORK PROJECT #1 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

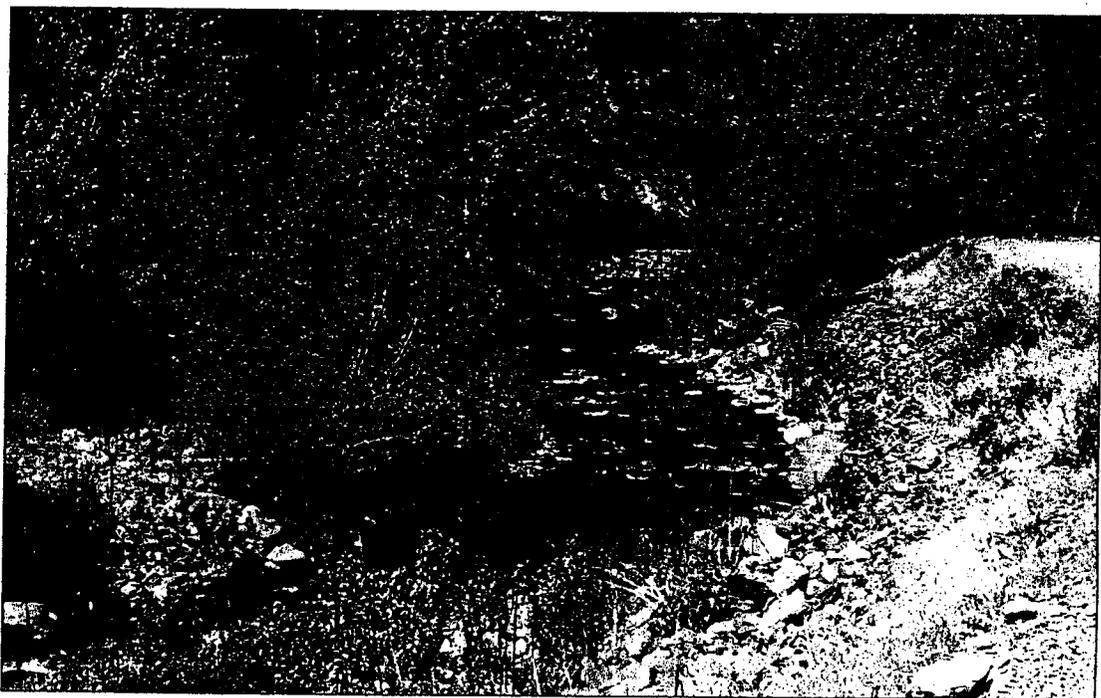
DRAWING NO.

SHEET 1 OF 1

Southfork Asotin Creek Project #1

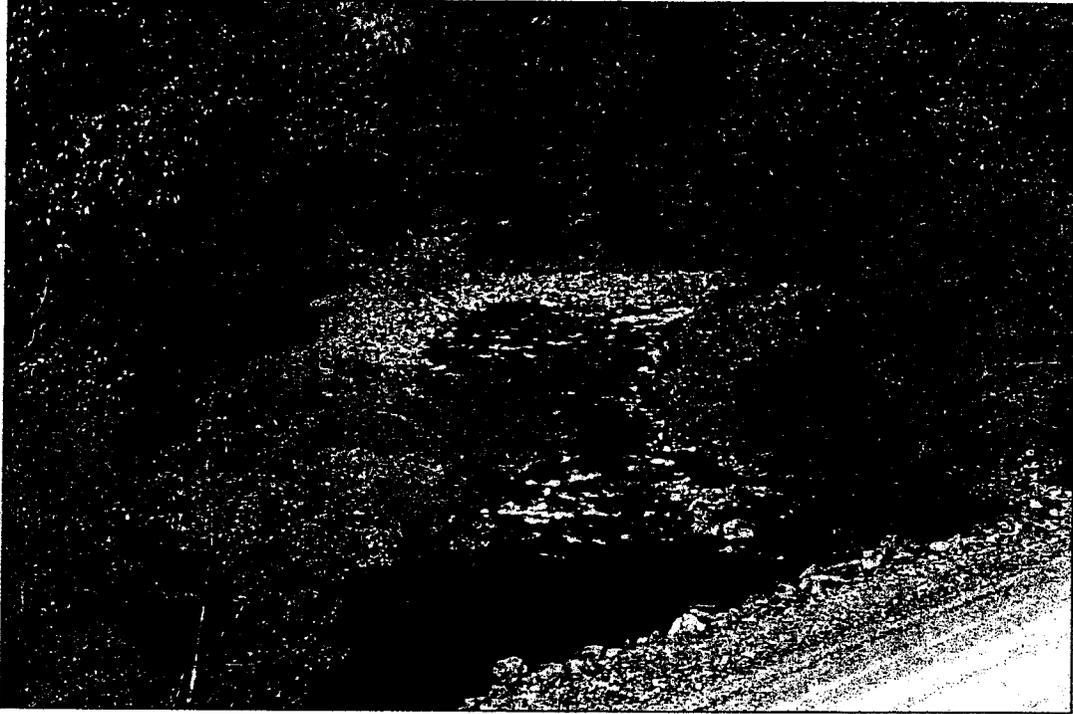


Up-stream view. Shallow w/ limited habitat, woody debris & step pool placement.



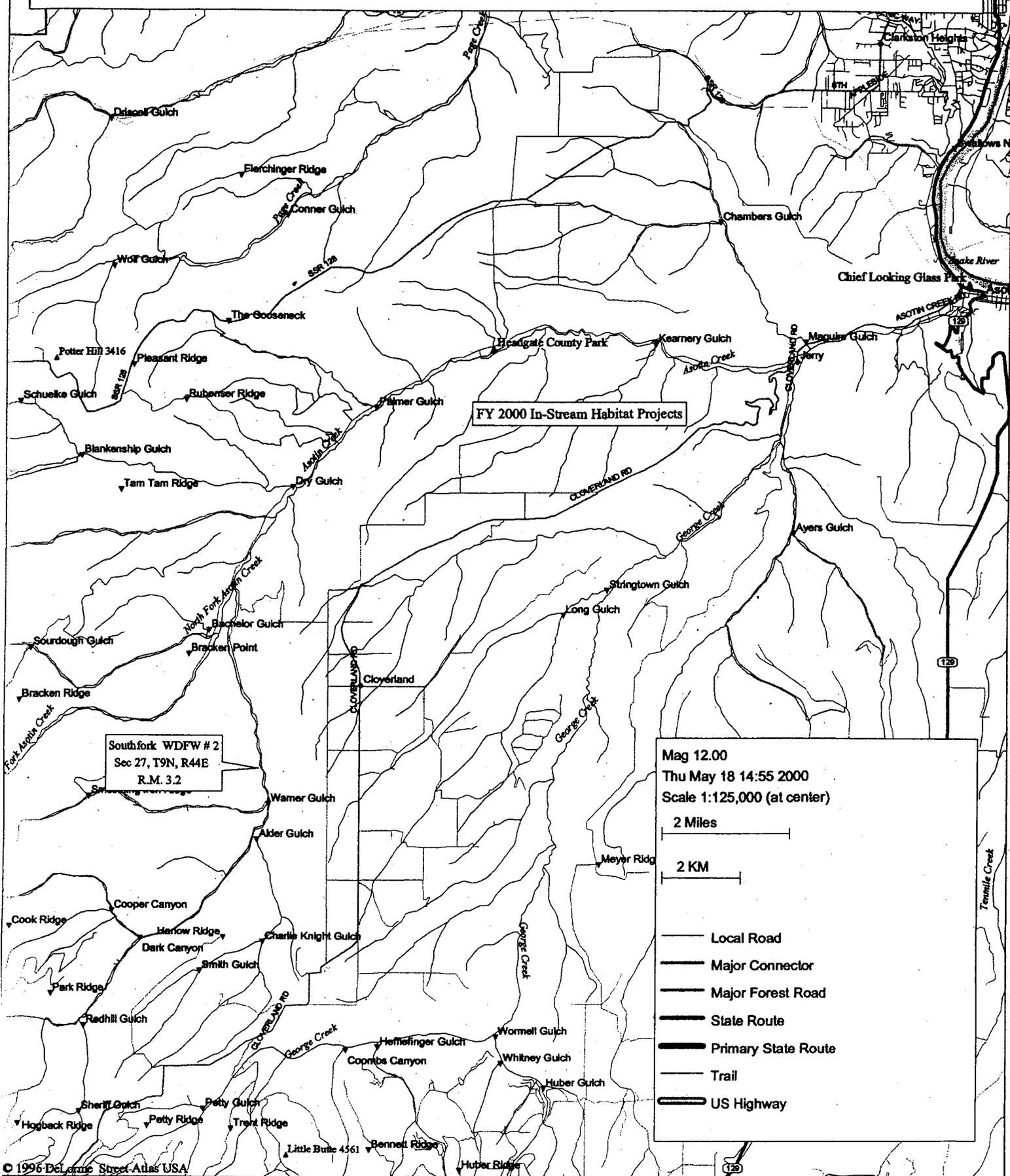
Downstream view. Woody debris placement & boulders in-stream for step pools.

Southfork Asotin Creek Project #2

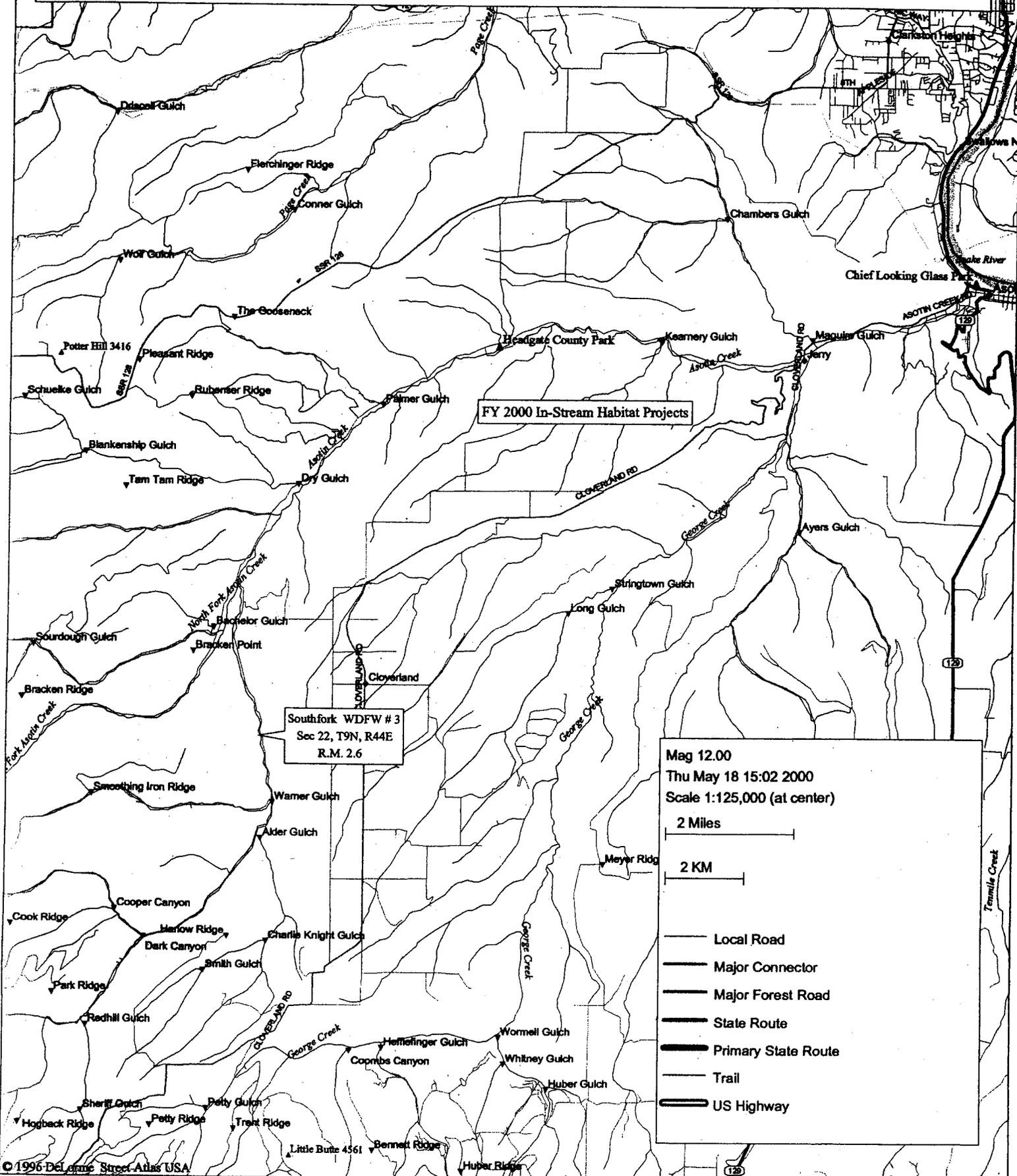


Downstream view. Outside corner and stream get wide and shallow. Woody debris placement on alternating banks to get narrow and deeper channel.

Southfork #2 FY 2000 In-Stream



Southfork #3 FY 2000 In-Stream



Mag 12.00
 Thu May 18 15:02 2000
 Scale 1:125,000 (at center)

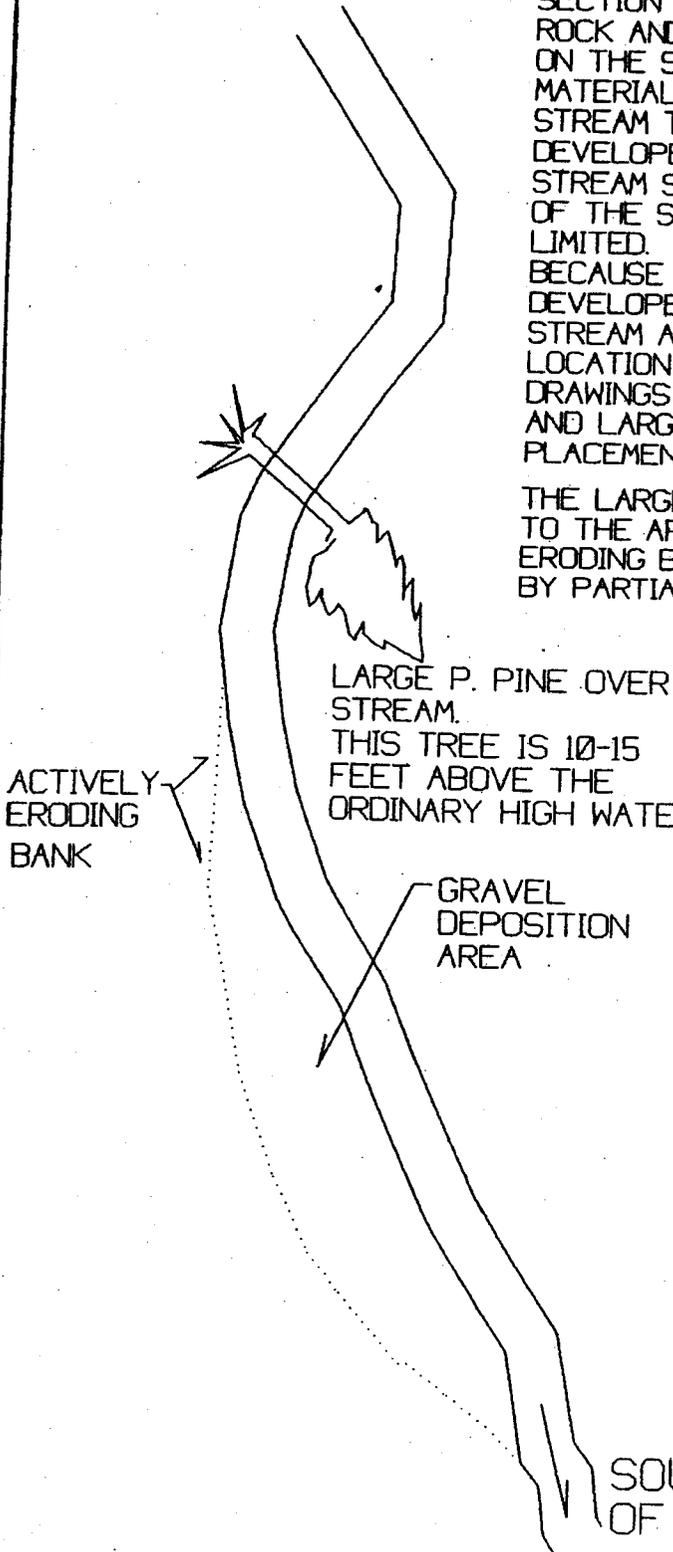
2 Miles
 2 KM

- Local Road
- Major Connector
- Major Forest Road
- State Route
- Primary State Route
- Trail
- US Highway

SOUTH FORK OF ASOTIN CREEK PROJECT #2
 SEC 27, T9N, R44E
 RIVER MILE 3.2

THE PURPOSE OF THIS PROJECT IS TO INSTALL RESTING POOLS IN THIS SECTION OF THE SOUTH FORK. ROCK AND WOODY MATERIALS FOUND ON THE SITE OR LIMITED IMPORTED MATERIALS WILL BE PLACED IN THE STREAM TO MIMIC NATURALLY DEVELOPED POOLS FOUND IN THIS STREAM SECTION. DISTURBANCE OF THE STREAM AND BANKS WILL BE LIMITED. BECAUSE THE POOLS WILL BE DEVELOPED WHERE THERE IS STREAM ACCESS, THE DRAWING IS FOR LOCATION ONLY. THE ATTACHED DETAIL DRAWINGS OF BOULDER PLACEMENTS AND LARGE WOODY MATERIALS PLACEMENT WILL BE USED.

THE LARGE P. PINE WILL BE MOVED TO THE AREA MARKED AS "ACTIVELY ERODING BANK". IT WILL BE ANCHORED BY PARTIAL BURIAL AND ROCK PLACEMENT.



DATE 4/60
 APPROVED BY RDJ TITLE _____

DESIGNED RA Stahly DATE 4/60
 DRAWN _____ TITLE _____
 TRACED _____
 CHECKED _____

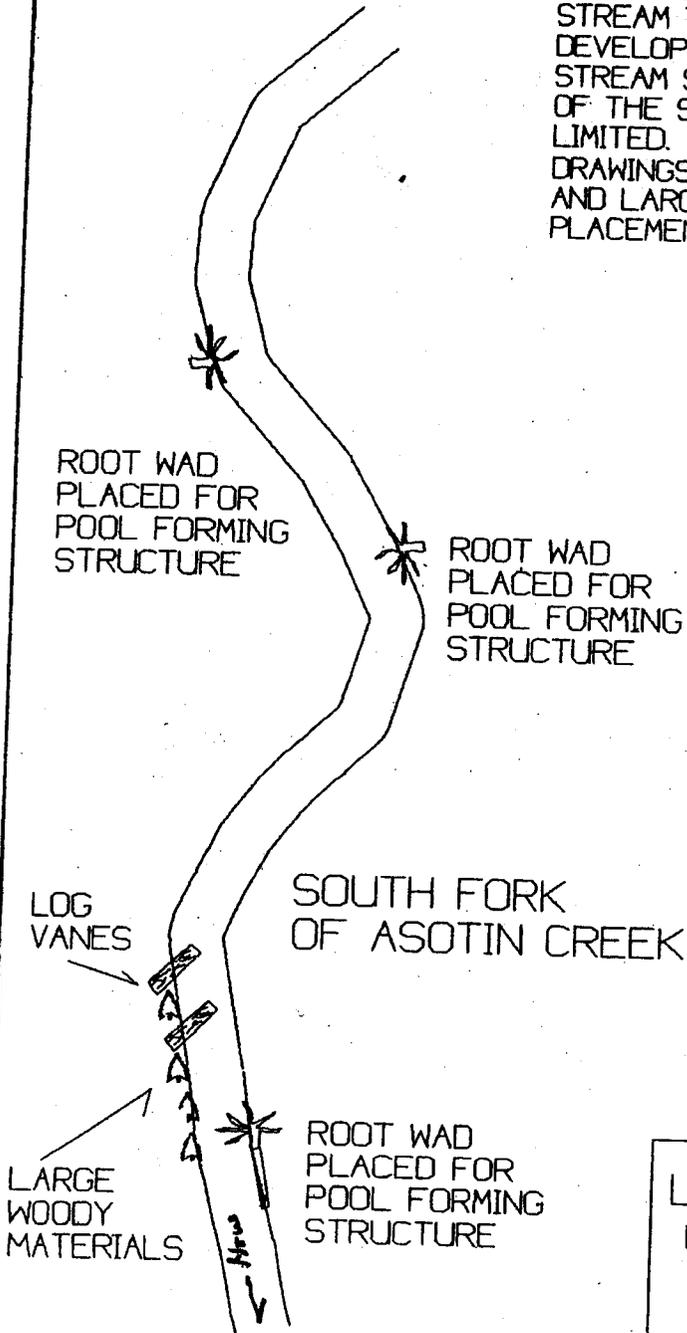
SOUTH FORK PROJECT #2 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

SHEET 1 OF 1

SOUTH FORK OF ASOTIN CREEK PROJECT #3
 SEC 22, T9N, R44E
 RIVER MILE 2.6

THE PURPOSE OF THIS PROJECT IS TO INSTALL RESTING POOLS IN THIS SECTION OF THE SOUTH FORK. ROCK AND WOODY MATERIALS FOUND ON THE SITE OR LIMITED IMPORTED MATERIALS WILL BE PLACED IN THE STREAM TO MIMIC NATURALLY DEVELOPED POOLS FOUND IN THIS STREAM SECTION. DISTURBANCE OF THE STREAM AND BANKS WILL BE LIMITED. DRAWINGS OF BOULDER PLACEMENTS AND LARGE WOODY MATERIALS PLACEMENT WILL BE USED.



DRAWING NOT TO SCALE

LEGEND

- LOG VANE 
- LARGE WOODY MATERIALS 
- ROOT WAD PLACEMENTS 

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ROSIARITY	6/00
DRAWN	
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APPROVED BY	TITLE
RAJ	
	TITLE

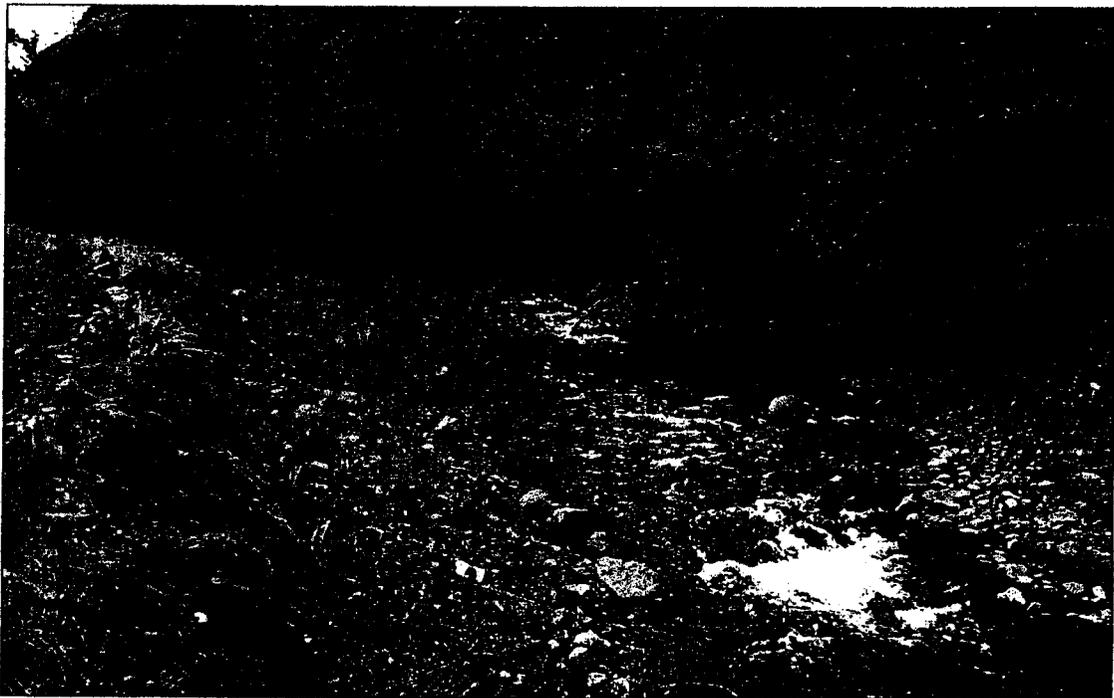
SOUTH FORK PROJECT #3 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO. _____
 SHEET 1 OF 1

Southfork of Asotin Creek Project #3

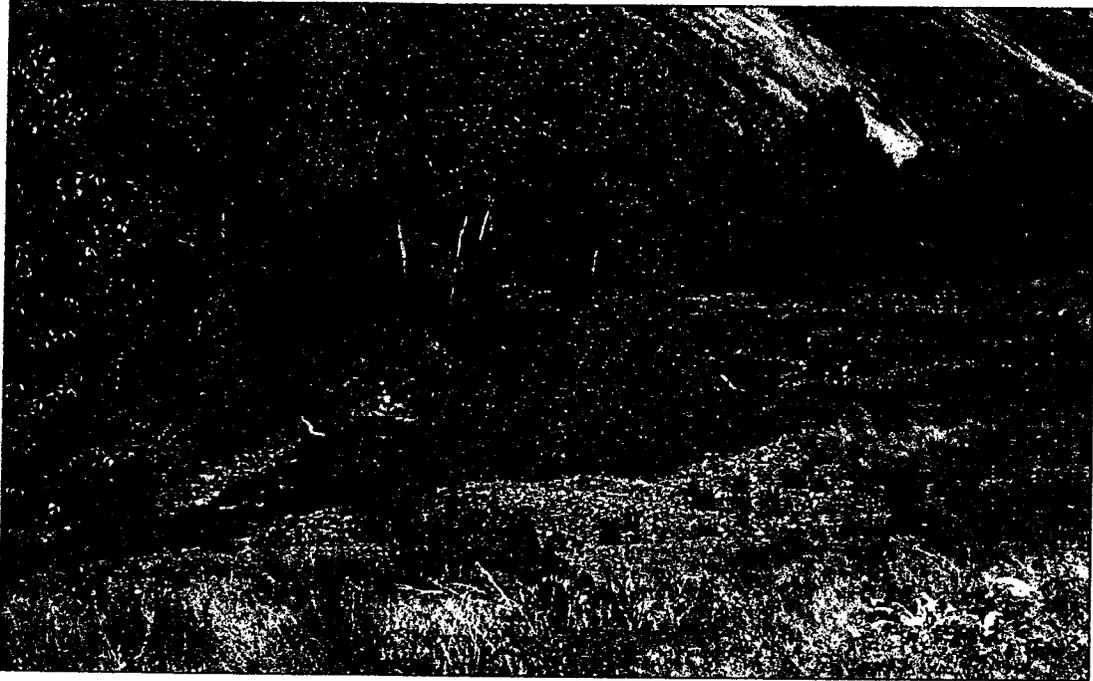


Pocket water on corners, utilize woody debris and increase number of step pools.



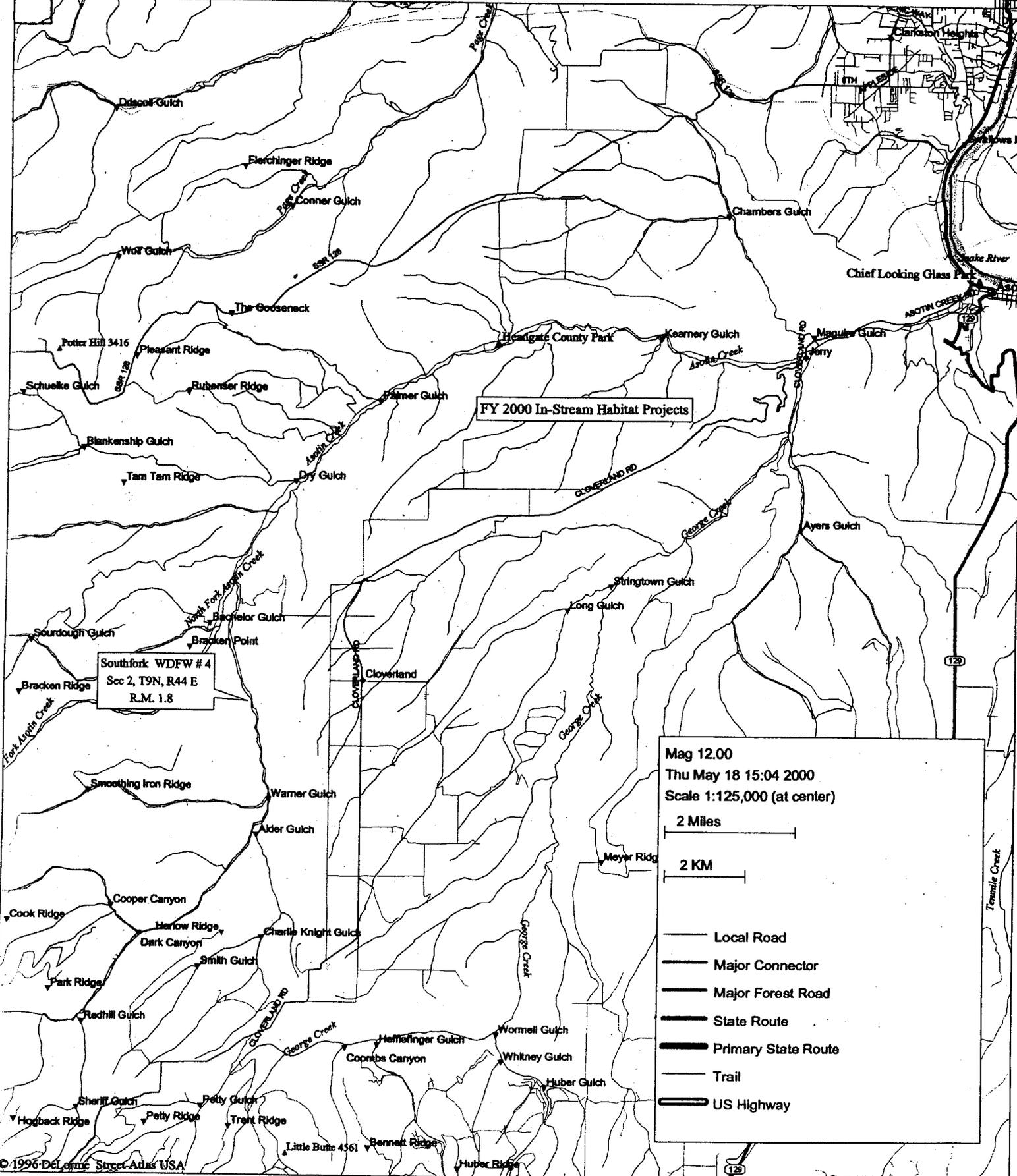
Lower Section, enhance pools below woody debris and increase complex cover.

Southfork Asotin Creek Project #4



Downstream view. Little or no complex habitat.
Woody debris placement and step pool formation structures
to sort and scour gravels.

Southfork #4 FY 2000 In-Stream



Southfork WDFW #4
 Sec 2, T9N, R44 E
 R.M. 1.8

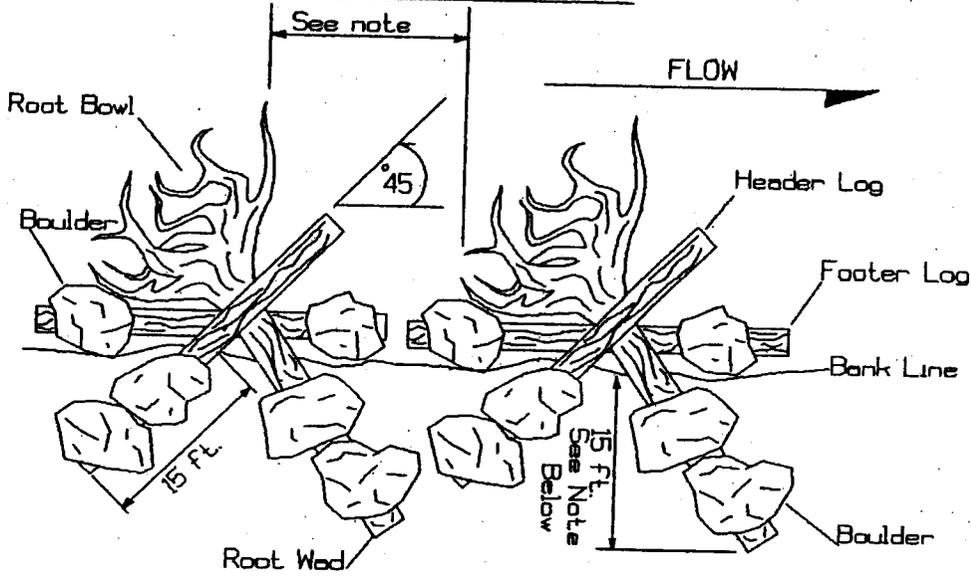
FY 2000 In-Stream Habitat Projects

Mag 12.00
 Thu May 18 15:04 2000
 Scale 1:125,000 (at center)

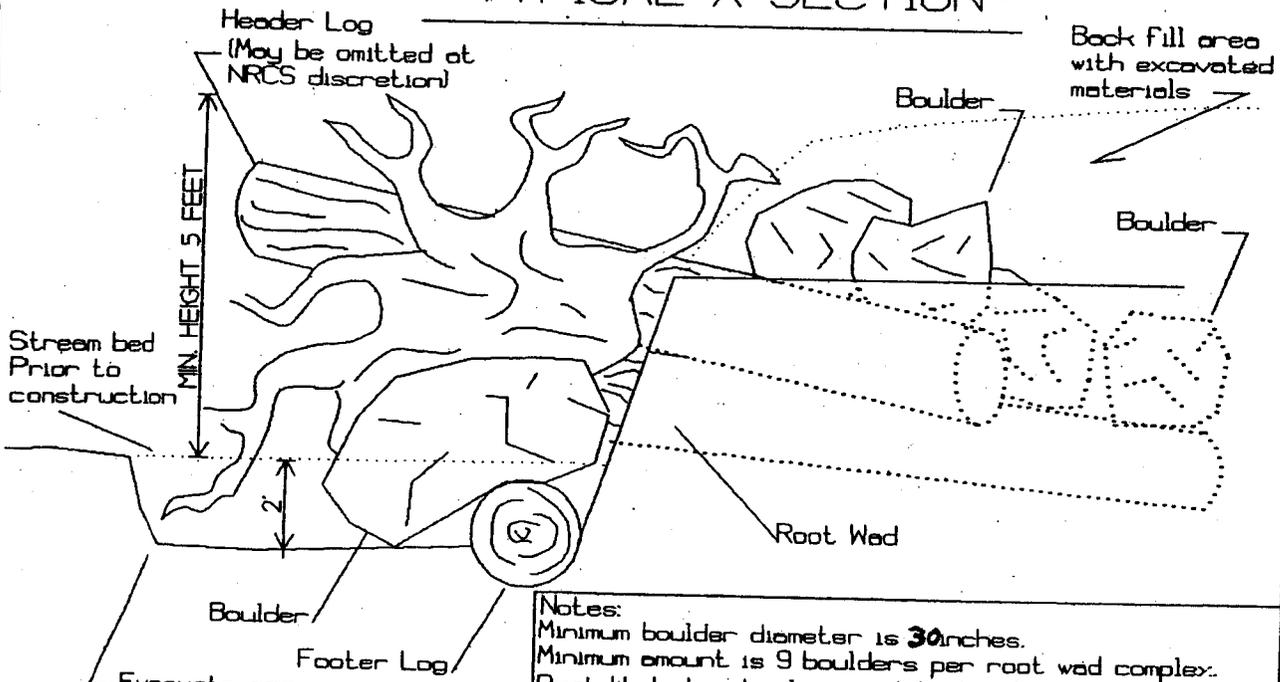
2 Miles
 2 KM

- Local Road
- Major Connector
- Major Forest Road
- State Route
- Primary State Route
- Trail
- US Highway

PLAN VIEW



TYPICAL X-SECTION



Notes:
 Minimum boulder diameter is **30** inches.
 Minimum amount is 9 boulders per root wad complex.
 Root Wads, header logs and footer logs are subject to NRCS approval prior to installation.
 Spacing between root wads (measured from the root bowl edge) will be 6 feet.
 If long stemmed root wads are not available, short stem root wads may be substituted providing that the stem is cabled to a minimum of two, 1 cubic yard boulders using 1/2 inch cable and double cable clamps.
 Installation will be completed with NRCS supervision.

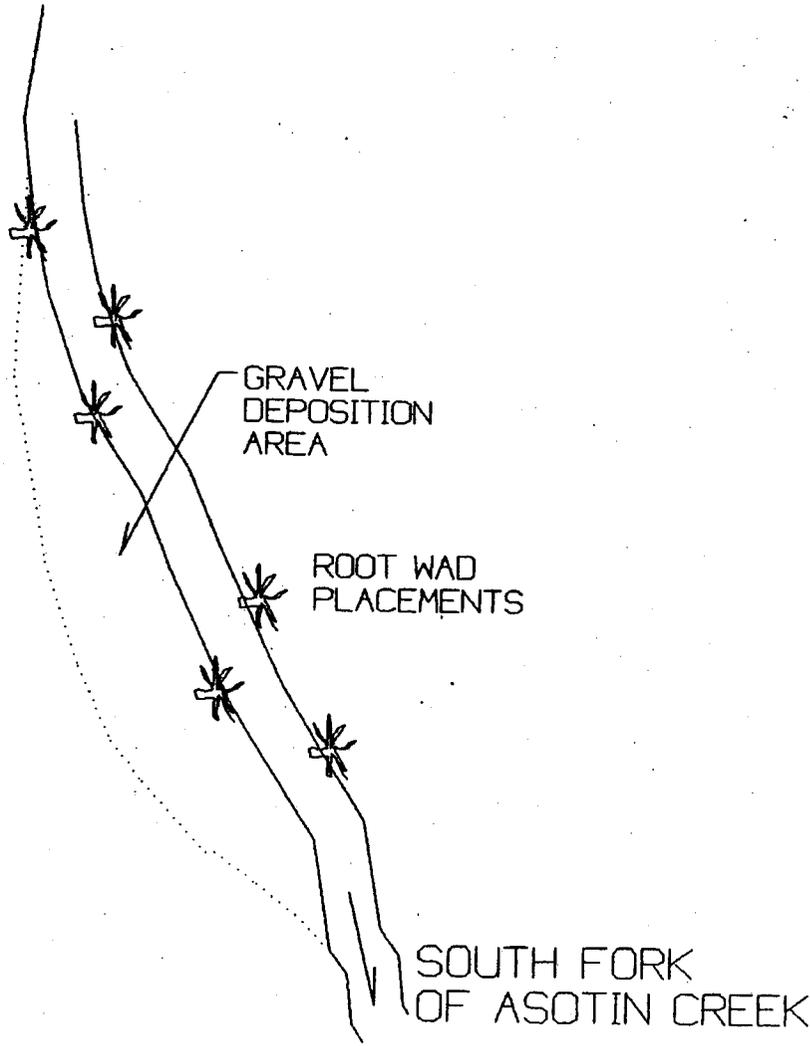
DATE	6/00
APPROVED BY	RDS
TITLE	
DESIGNED	RDS
DRAWN	RDS
TRACED	
CHECKED	

ROOT WAD REVETMENT DETAIL
 CHARLEY CREEK PROJECT #3
 CHARLEY CREEK, ASOTIN COUNTY, WA
 USDA NATURAL RESOURCES CONSERVATION SERVICE

SOUTH FORK OF ASOTIN CREEK PROJECT #4
 SEC 2, T9N, R44E
 RIVER MILE 2.6

THE PURPOSE OF THIS PROJECT IS TO INSTALL RESTING POOLS IN THIS SECTION OF THE SOUTH FORK. ROCK AND WOODY MATERIALS FOUND ON THE SITE OR LIMITED IMPORTED MATERIALS WILL BE PLACED IN THE STREAM TO MIMIC NATURALLY DEVELOPED POOLS FOUND IN THIS STREAM SECTION. DISTURBANCE OF THE STREAM AND BANKS WILL BE LIMITED.

BECAUSE THE POOLS WILL BE DEVELOPED WHERE THERE IS STREAM ACCESS, THE DRAWING IS MAINLY FOR LOCATION. THE ATTACHED DETAIL DRAWINGS OF BOULDER PLACEMENTS AND LARGE WOODY MATERIALS PLACEMENT WILL BE USED.



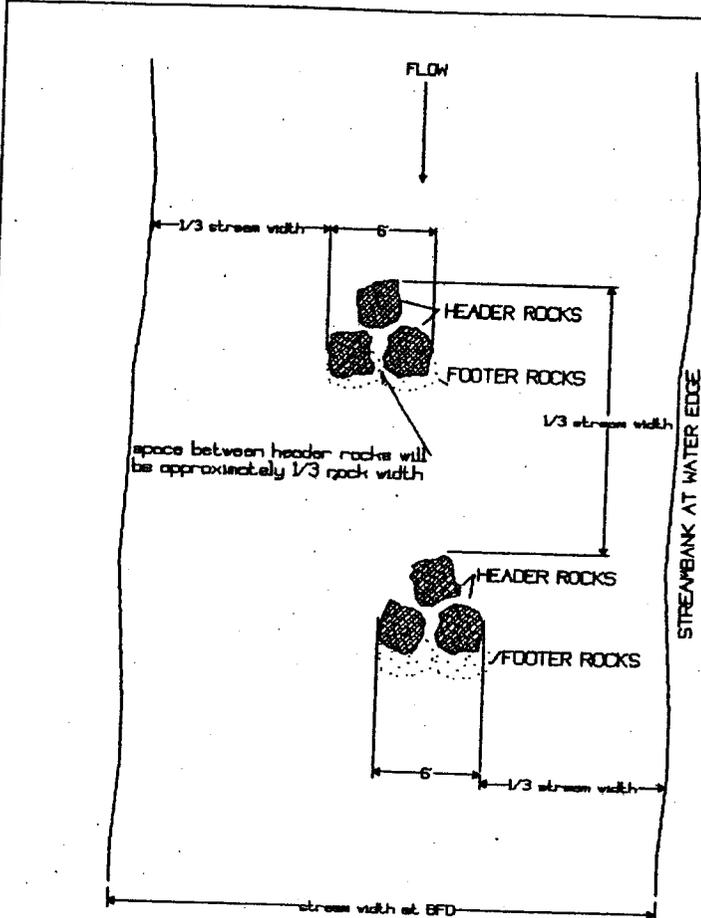
DATE 6/60
 APPROVED BY RAS
 TITLE _____

DATE 6/60
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SOUTH FORK PROJECT #4 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

SHEET 1 OF 1



NOTES:

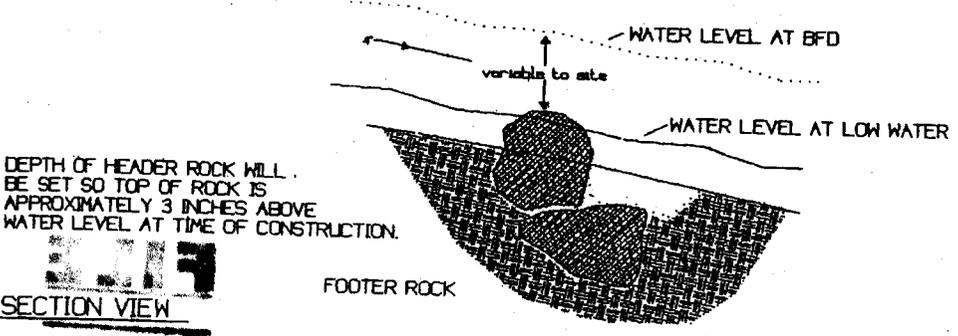
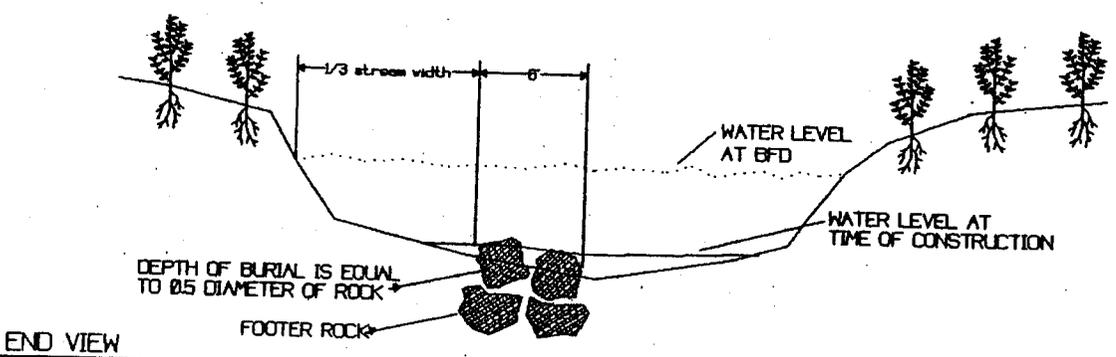
ROCK SIZE

Minimum Diameter = 30 inches

Maximum Diameter = 48 inches

BOULDERS ARE TO BE PLACED IN THE CROSS-OVER SECTION OF STREAM WHERE THE BANKS ARE MOST STABLE.

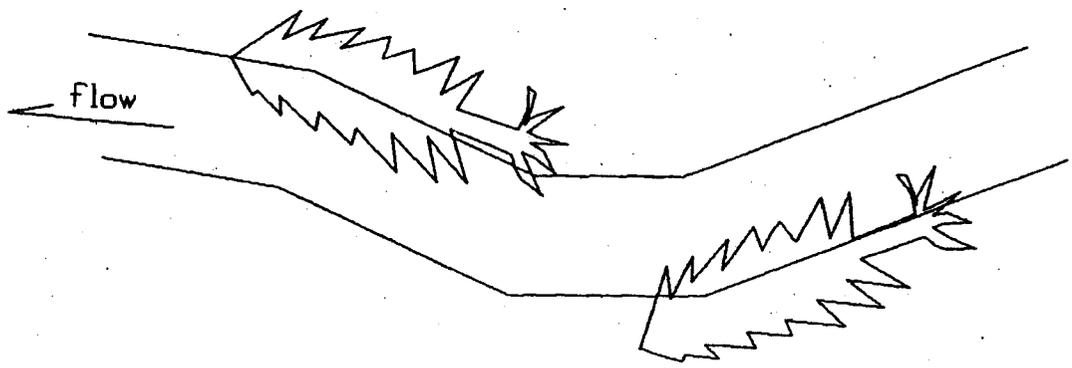
DESIGNED	DATE	TITLE
DRAWN	DATE	TITLE
TRACED	DATE	TITLE
CHECKED	DATE	TITLE



BOULDER PLACEMENT DETAILS

ASOTIN CREEK, ASOTIN COUNTY, WASHINGTON

USDA NATURAL RESOURCE CONSERVATION SERVICE



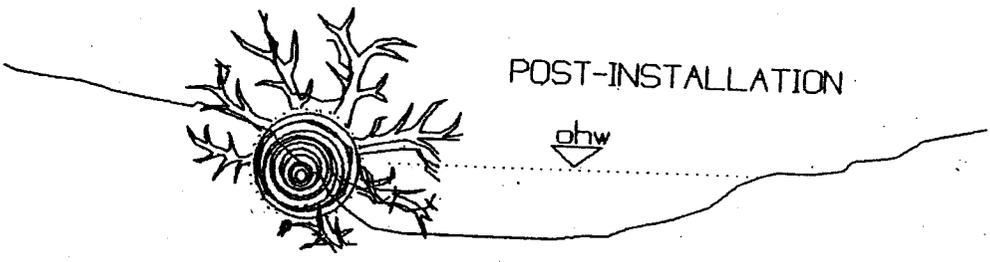
PLAN VIEW

DATE 4/00
 APPROVED BY RAS
 TITLE SC.

DESIGNED RASTA
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SECTION VIEW

TREE IS SHOWN WITHOUT ROOT WAD ATTACHED

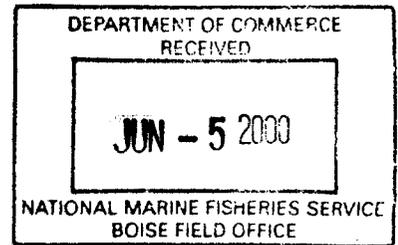


THE OBJECTIVE OF THIS STRUCTURE IS TO NARROW AND DEEPEN THE CHANNEL IN AREAS THAT HAVE A HIGH WIDTH/DEPTH RATIO. A NUMBER OF THESE TREES PLACED LIKE THIS DURING HIGH WATER EVENTS HAVE CREATED SUBSTANTIAL POOLS DOWNSTREAM OF THE ROOT WAD AND THE LIMBS PROVIDE COVER OVER AND IN THE POOL.

CONSTRUCTION WILL BEGIN BY EXCAVATING A TRENCH PARALLEL TO THE STREAM AND ADJACENT TO THE HIGH WATER LINE. THE TRENCH WILL BE DUG DEEP ENOUGH TO ALLOW APPROXIMATELY 1/2 OF THE TREE TO BE BELOW GROUND LEVEL. THE TREE WILL BE PLACED IN THE TRENCH, ROOT WAD UPSTREAM, AND EXCAVATED MATERIALS WILL BE BACK FILLED INTO THE TRENCH AND OVER THE TREE. THE MATERIALS WILL BE DEPOSITED SLOWLY ENOUGH TO ENSURE THAT THE COMPLETE TRENCH IS FILLED. IF POSSIBLE THE MATERIALS WILL BE COMPACTED IN THE TRENCH IF THIS CAN BE ACCOMPLISHED WITHOUT BREAKING MANY LIMBS. IF NEEDED A ONE CUBIC YARD ROCK ACHOR WILL BE PLACED IN THE TRENCH ON THE UPSTREAM END AND SECURED TO THE STEM WITH CABLE. THIS WILL BE DETERMINED ON SITE.

TREE PLACEMENT FOR FISH HABITAT IMPROVEMENT
 PLAN VIEW AND SECTION VIEW
 ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

copy Rick
Ed



Biological Assessment

Asotin Creek Model Watershed

BFO FILE COPY

***Asotin Creek 2000
In-Stream Habitat Projects
on Asotin Creek, WA***

***ASOTIN CREEK GENE THEISSEN PROJECT 1
ASOTIN CREEK FRANK KOCH PROJECT 2
CHARLEY CREEK PROJECT 1
CHARLEY CREEK PROJECT 2
CHARLEY CREEK PROJECT 3
SOUTH FORK of ASOTIN CREEK PROJECT 1
SOUTH FORK of ASOTIN CREEK PROJECT 2
SOUTH FORK of ASOTIN CREEK PROJECT 3
SOUTH FORK of ASOTIN CREEK PROJECT 4***

***Submitted by:
US DOE, Bonneville Power Administration***

***Submitted to:
National Marine Fisheries Service***

***Prepared by:
Asotin County Conservation District
USDA, Natural Resource Conservation Service***

June 2000

Mark,

This is what we need to do for this years BA on Asotin Creek.
Rather than submit the complete package again we should be able to do the following.

Please remember to send NMFS letter to their new address that we emailed to you.

Write a letter to both,

Philip Laumeyer, Field Supervisor,
Linda Hallock, Field Biologist
USFW,
Upper Columbia Basin Field Office,
11103 E. Montgomery Drive, Suite #2,
Spokane, WA 99206

We are requesting "Incorporation by Reference" using previously submitted biological assessments, for the following projects.

ASOTIN CREEK GENE THEISSEN PROJECT 1
ASOTIN CREEK FRANK KOCH PROJECT 2
CHARLEY CREEK PROJECT 1
CHARLEY CREEK PROJECT 2
CHARLEY CREEK PROJECT 3
SOUTH FORK of ASOTIN CREEK PROJECT 1
SOUTH FORK of ASOTIN CREEK PROJECT 2
SOUTH FORK of ASOTIN CREEK PROJECT 3
SOUTH FORK of ASOTIN CREEK PROJECT 4

The planned projects listed above involve similar impacts to the same species in the same geographic area; no new species have been listed or proposed and no new critical habitat has been designated for the action area; and there is no new relevant information to incorporate into the 1998 Asotin Creek biological assessment.

Attached are the locations, descriptions, and project drawings for the Asotin Creek 2000 In-Stream Habitat Projects. There have been no new fish species listed, or change in river conditions, and structure types for 2000 are of the same as 1998, therefore we have come to the same conclusion as 1998; "no effect" determination on the bald eagle or peregrine falcon and a "may affect, but is not likely to adversely affect" determination for the bull trout. We are basing this conclusion on the BA submitted to the service on June 9, 1998 FWS Reference # 1-9-98-I-108 (501.1000). Monitoring and mitigation measures outlined in the 1998 BA will be followed during the 2000 habitat structure installations. Also as a result of field investigation there is a "no effect" determination on the Ute ladies-tresses, and Spalding's catchfly. If no negative comments are received it will be assumed that the proposal is acceptable and construction will begin as planned. Construction of the projects will begin on or about July 15, 2000.

William Stelle, Jr., Regional Administrator
Rick Edwards, Staff Biologist
Northwest Region
7600 Sand Point Way, NE
Bin C15700, Building 1
Seattle, Washington 98115-0070

We are requesting "Incorporation by Reference" using previously submitted biological assessments, for the following projects.

ASOTIN CREEK GENE THEISSEN PROJECT 1
ASOTIN CREEK FRANK KOCH PROJECT 2
CHARLEY CREEK PROJECT 1
CHARLEY CREEK PROJECT 2
CHARLEY CREEK PROJECT 3
SOUTH FORK of ASOTIN CREEK PROJECT 1
SOUTH FORK of ASOTIN CREEK PROJECT 2
SOUTH FORK of ASOTIN CREEK PROJECT 3
SOUTH FORK of ASOTIN CREEK PROJECT 4

The planned projects listed above involve similar impacts to the same species in the same geographic area; no new species have been listed or proposed and no new critical habitat has been designated for the action area; and there is no new relevant information to incorporate into the 1998 Asotin Creek biological assessment.

Attached are the locations, descriptions, and project drawings for the Asotin Creek 2000 In-stream Habitat Projects located in Asotin County, Washington. There have been no new fish species listed, or change in river conditions, and structures for 2000 are of the same type as 1998, therefore we have come to the same conclusion as 1998; a "may affect, but is not likely to adversely affect" determination for the Snake River steelhead and Snake River salmon. We are basing this conclusion on the BA's submitted to the NMFS over the last two years and the service's concurrence with our determinations. Mitigation and monitoring for 2000 will follow the same protocols outlined in the BA submitted to the service on June 9, 1998. If no negative comments are received it will be assumed that the proposal is acceptable and construction will begin as planned. Construction of the projects will begin on or about July 15, 2000.

ASOTIN CREEK GENE THEISSEN PROJECT #1

**Sec 25, T10N, R44E
River Mile 10.7**

The upper most end of this project will be comprised of placing large woody materials on both the right and left bank for approximately 350 feet. The materials will be anchored in place with boulders. Boulder clusters will be placed at various locations to encourage pool development.

Further downstream is a project partially completed in 1999. This purpose of this year's work is to increase large woody materials on the stream banks and increase in-stream complex cover. Brushy trees were not available for incorporation into this project last year, so the goal is to blend materials with a greater roughness into the existing structures. The total length of the woody materials placement will be 300 feet on the right and left banks.

Although the entire length of this project area has been planted to native woody plant species, disturbed areas will be planted again in the spring of 2001.

ASOTIN CREEK FRANK KOCH PROJECT #2

**Sec 3, T9N, R44E
River Mile 13.5**

This site is located adjacent to the 1999 project site. Last year large woody materials were placed on the lower section of this project site, but enough large woody material to complete the job was not available. The purpose of this year's project is to extend the placement of large woody material on the right bank for approximately 350 feet. This will encourage bank stabilization, narrow the stream channel, and provide complex cover. The completion of this project will also provide greater benefit of existing large woody materials (log and root wads). Although the entire length of this project area has been planted to native woody plant species, all disturbed areas will be planted again in the spring of 2001.

CHARLEY CREEK PROJECT #1

**Sec 4, T10N, R44E
River Mile 0.7**

This project site is located a short distance up Charley Creek from Asotin Creek Road. The purpose of this project is to install pool forming structures and place large woody materials for complex in-stream habitat. A total of three j-hook rock vanes will be placed on the left bank to encourage development of a narrow and deeper thalweg and to form adult resting pools. Woody materials will be incorporated into the vane construction to add complexity to the structure. The total project length is approximately 120 feet. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

CHARLEY CREEK PROJECT #2

**Sec 4, T10N, R44E
River Mile 1.0**

This project site is located 0.3 miles above the previous project. The purpose of this project is to create pool-forming structures, to stabilize an actively eroding bank, and place large woody materials for complex in-stream habitat. A total of five j-hook rock vanes will be placed on the left bank to encourage development of a narrow and deeper thalweg and to form adult resting pools. Woody materials will be incorporated into the vane construction to add complexity. Rootwad revetments will also be constructed on this stream section to provide bank stability and habitat. The total project length is approximately 130 feet. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

CHARLEY CREEK PROJECT #3

**Sec 5, T 9N, R44E
River Mile 1.8**

This site is located on a very sharp corner of Charley Creek that is lacking any type of materials that would reduce velocities. The bank is currently eroding rapidly and because of this, vegetation would be nearly impossible to establish and if it did establish, vegetative measures alone will not reduce the rate of bank sloughing. The corner will be treated with a 50-foot root wad revetment and one j-hook rock vane. This treatment will reduce the bank erosion, add complex cover from the woody material, and provide a resting pool on the lower end of the site where there is existing vegetation. The total project length is 75 feet. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

SOUTH FORK of ASOTIN CREEK PROJECT #1

**Sec 27, T9N, R44E
River Mile 3.5**

This project site is located on WDFW lands immediately below the Smoothing Iron Ridge Road intersection with the South Fork Road. This section of the South Fork has limited pools and woody material in the system. The purpose of this project is to use the existing rock and woody materials (with limited importing of materials) found on the site to increase the pool frequency and woody debris cover by mimicking the existing naturally made structures. Boulders will be placed to create step pools for adult steelhead. Large woody materials will be placed along the bank to reduce the width depth ratio and create pools and eddy areas on the downstream side. The reference photographs attached show how effective a small amount of rock and wood can be in forming pools and cover. What is shown in the photos is what we are going to re-create with salvaged rock and wood materials found out of the ordinary high water flow. The total project length is 200 feet. The site will be vegetated to native woody and herbaceous species in the spring of 2001.

SOUTH FORK of ASOTIN CREEK PROJECT #2

**Sec 27, T9N, R44E
River Mile 3.2**

This project site is located on WDFW lands approximately ½ mile downstream from the Smoothing Iron Ridge Road intersection with the South Fork Road. The purpose of this project is to use the existing rock and woody materials (with limited importing of materials) found on the site to increase the pool frequency and woody debris cover by mimicking the existing naturally made structures. Boulders will be placed to create step pools for adult steelhead. A large tree located on site and out of the flow area will be retrieved and used along the bank to deflect flows into a narrower channel and create a pool downstream. At other areas within this site large woody materials will be placed along the bank to reduce the width depth ratio and create pools and eddy areas on the downstream side. We want to recreate what is shown in the reference photos with salvaged rock and wood materials found out of the ordinary high water flow. The total project length is 600 feet, although structures will be placed sporadically throughout the project length based on available materials. The site will be vegetated with native woody and herbaceous species in the spring of 2001.

SOUTH FORK of ASOTIN CREEK PROJECT #3

**Sec 22, T9N, R44E
River Mile 2.6**

This project site is located on WDFW lands approximately 1 mile downstream of the Smoothing Iron Ridge Road intersection with the South Fork Road. The purpose of this project is to use the existing rock and woody materials (with limited importing of materials) found on the site to increase the pool frequency and woody debris cover by mimicking the existing naturally made structures. At this site there is a lack of both woody materials and rock for structures. This site also has an actively eroding bank that will be treated with anchored large woody materials and two log vanes placed to reduce flow velocity at the bank toe and develop pools. Wood materials will be placed along both banks at various locations to encourage reduction in the width depth ratio and to provide complex cover. Entire trees with root wads attached will be placed with the root wad upstream and the branches trailing over the water. As seen on this river and other streams this is a natural way of creating a good downstream pool with cover and a narrow stream channel. We want to recreate what is shown in the reference photos with salvaged rock and wood materials found out of the ordinary high water flow. The total project length is 1000 feet, although structures will be placed sporadically throughout the project length based on available onsite materials and limited imported rock and wood. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

SOUTH FORK of ASOTIN CREEK PROJECT #4

**Sec 2, T9N, R44E
River Mile 2.6**

This project site is located on WDFW lands approximately 2 miles downstream of the Smoothing Iron Ridge Road intersection with the South Fork Road. The purpose of this project is to use the existing rock and woody materials (with limited importing of materials) found on the site to increase the pool frequency and woody debris cover by mimicking the existing naturally made structures. At this site there are sufficient boulders present to develop a number of fine resting pools. Woody materials may have to be imported to this site. This area has a very wide gravel area that would benefit from woody debris placement. Although some of the wood would not be in the stream at normal flows, when a high flow event occurs the wood placed on the gravel bar would collect suspended sediment by increasing the channel roughness. The deposited sediment would help to expedite the recovery of this section of stream. We want to recreate what is shown in the reference photos with salvaged rock and wood materials found out of the ordinary high water flow. The total project length is 400 feet, although structures will be placed sporadically throughout the project length based on available onsite materials and limited imported rock and wood. The site will be vegetated in the spring of 2001 with native woody and herbaceous species.

Mainstem of Asotin Creek

Asotin Creek 2000 In-Stream Habitat Projects

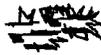
Thiessen Project #1



Upstream view. Above split channel woody debris placement on left side of channel to focus water into right channel and utilize deeper water.

LEGEND

LARGE WOODY DEBRIS



ASOTIN CREEK GENE THEISSEN PROJECT #1

NE 1/4 SEC 25 T10N R44E
R.M. 10.7

DATE

6/00

APPROVED BY *APS*

TITLE

TITLE

DATE

AP

DESIGNED

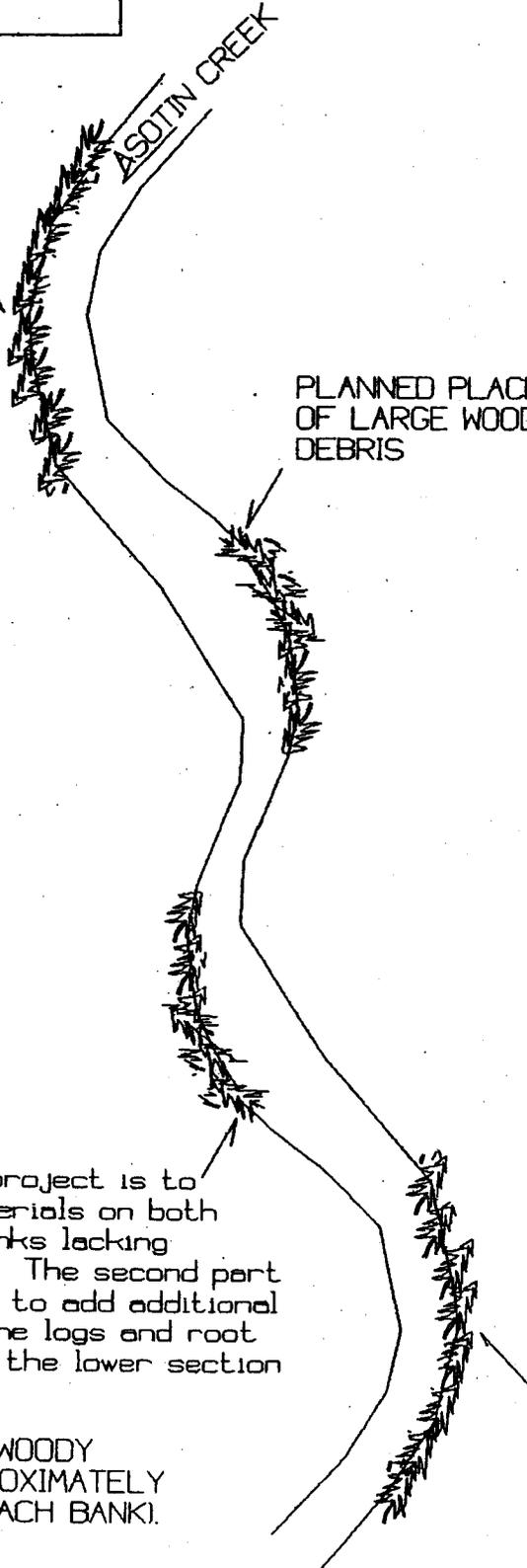
DRAWN

TRACED

CHECKED

PLANNED PLACEMENT
OF LARGE WOODY
DEBRIS

PLANNED PLACEMENT
OF LARGE WOODY
DEBRIS



The purpose of this project is to place large woody materials on both the right and left banks lacking large woody materials. The second part of the project will be to add additional brushy materials to the logs and root wads placed in 1999 in the lower section of this project area.

TOTAL LENGTH OF WOODY
MATERIALS IS APPROXIMATELY
350 FEET (150 ON EACH BANK).

DRAWING NOT TO SCALE

ASOTIN CREEK ROAD

PLAN VIEW

GENE THEISSEN FISH HABITAT IMPROVEMENT
ASOTIN CREEK, ASOTIN COUNTY, WA.

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

SHEET 1 OF 1

F. Koch Project #2



Downstream view. Woody debris placement on far bank above the split channel. Focus majority of flow into near channel to take advantage of complex habitat on lower left side of photo.

LEGEND

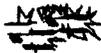
VORTEX ROCK WEIR WITH ROOT WAD



ROCK VANE WITH ROOT WAD



LARGE WOODY DEBRIS



ROCK BARB WITH ROOT WAD



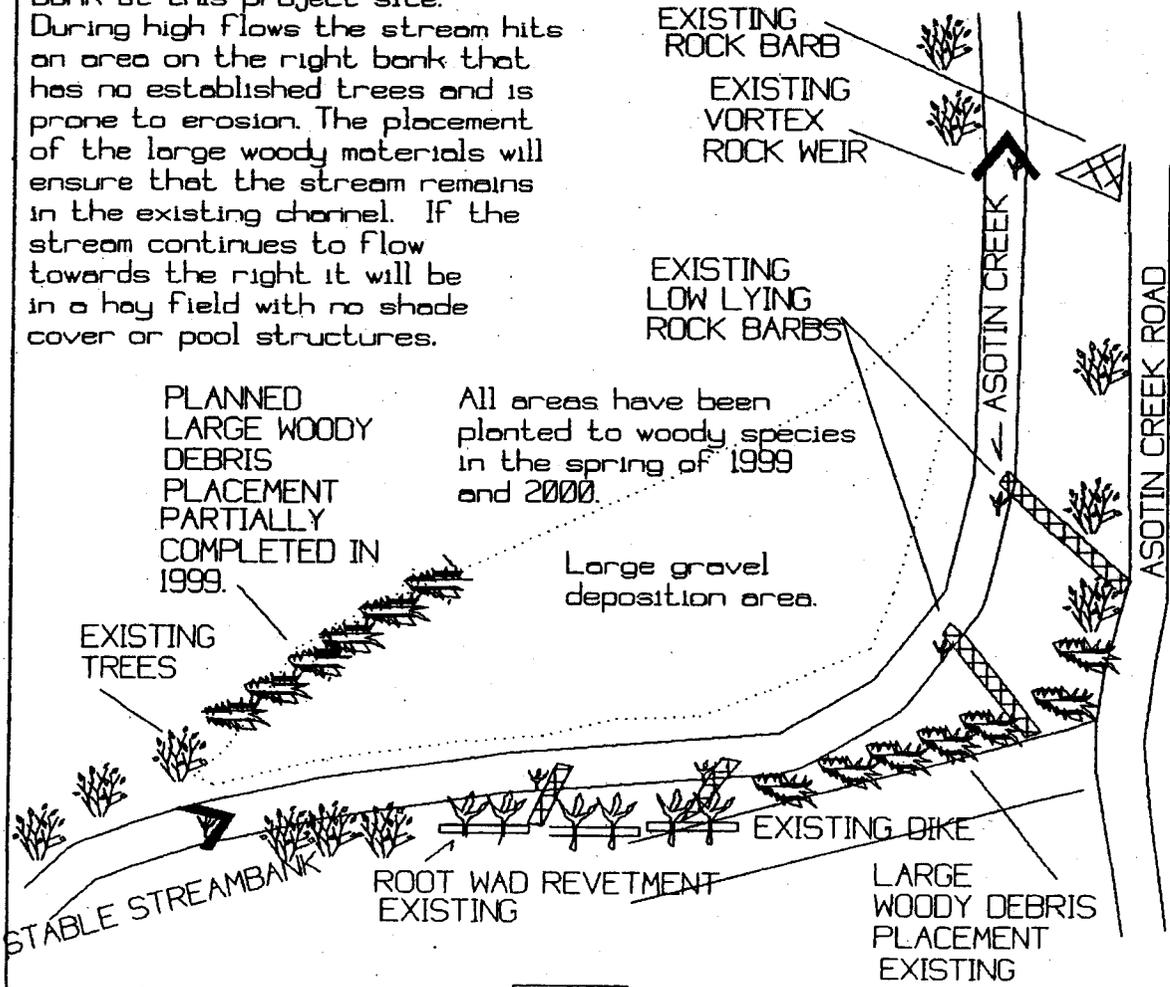
ROOT WAD REVETMENT



ASOTIN CREEK FRANK KOCH #2
SEC 3, T9N, R44E
R.M. 13.5

DESIGNED	DATE
<i>Rob Sturdy</i>	<i>4/00</i>
DRAWN	TITLE
TRACED	TITLE
CHECKED	TITLE

The purpose of this project is to complete installation of large woody materials on the right bank at this project site. During high flows the stream hits an area on the right bank that has no established trees and is prone to erosion. The placement of the large woody materials will ensure that the stream remains in the existing channel. If the stream continues to flow towards the right it will be in a hay field with no shade cover or pool structures.



All areas have been planted to woody species in the spring of 1999 and 2000.

USDA NATURAL RESOURCES CONSERVATION SERVICE
FRANK KOCH FISH HABITAT IMPROVEMENT
ASOTIN CREEK, ASOTIN COUNTY, WA.

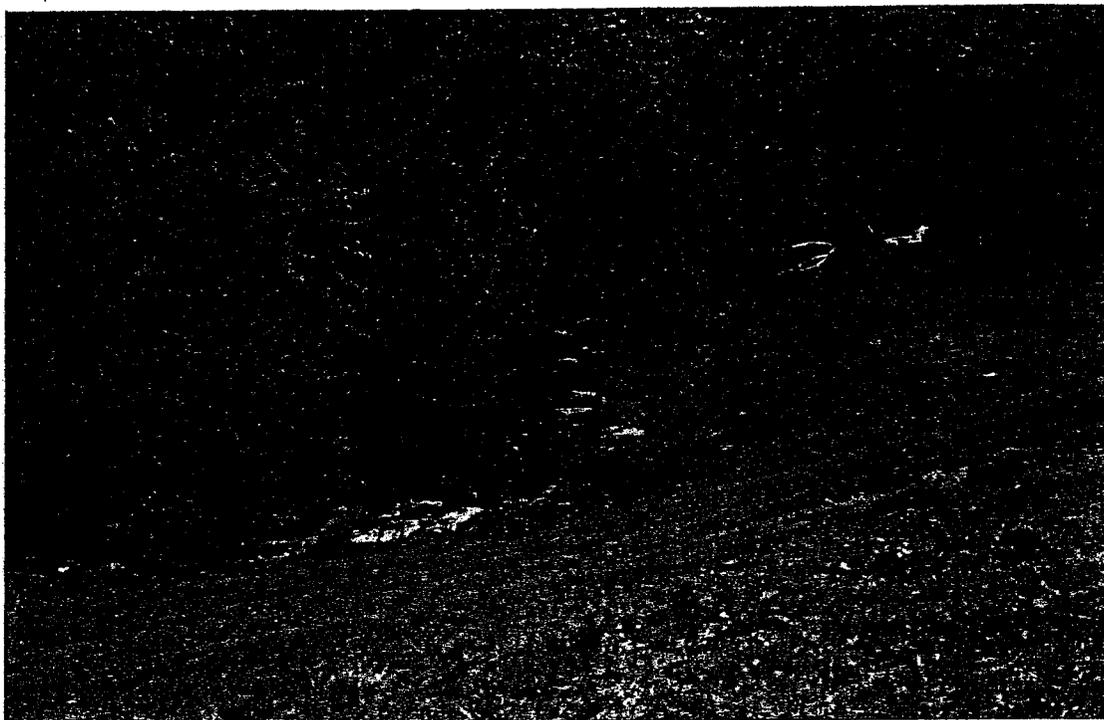
DRAWING NO.
SHEET 1 OF 1

DRAWING NOT TO SCALE

Charley Creek Tributary to Asotin Creek

Asotin Creek 2000 In-Stream Habitat Projects

Charley Creek Project #1



Glide area with no pocket water, adding J-Hooked Rock Vanes & Woody Debris.

LEGEND

J-HOOK ROCK VANE



LARGE WOODY MATERIALS



CHARLEY CREEK PROJECT #1
SEC 4, T10N, R44E
RIVER MILE 0.7

DATE

6/00

APPROVED BY RDU

TITLE

TITLE

DATE

6/00

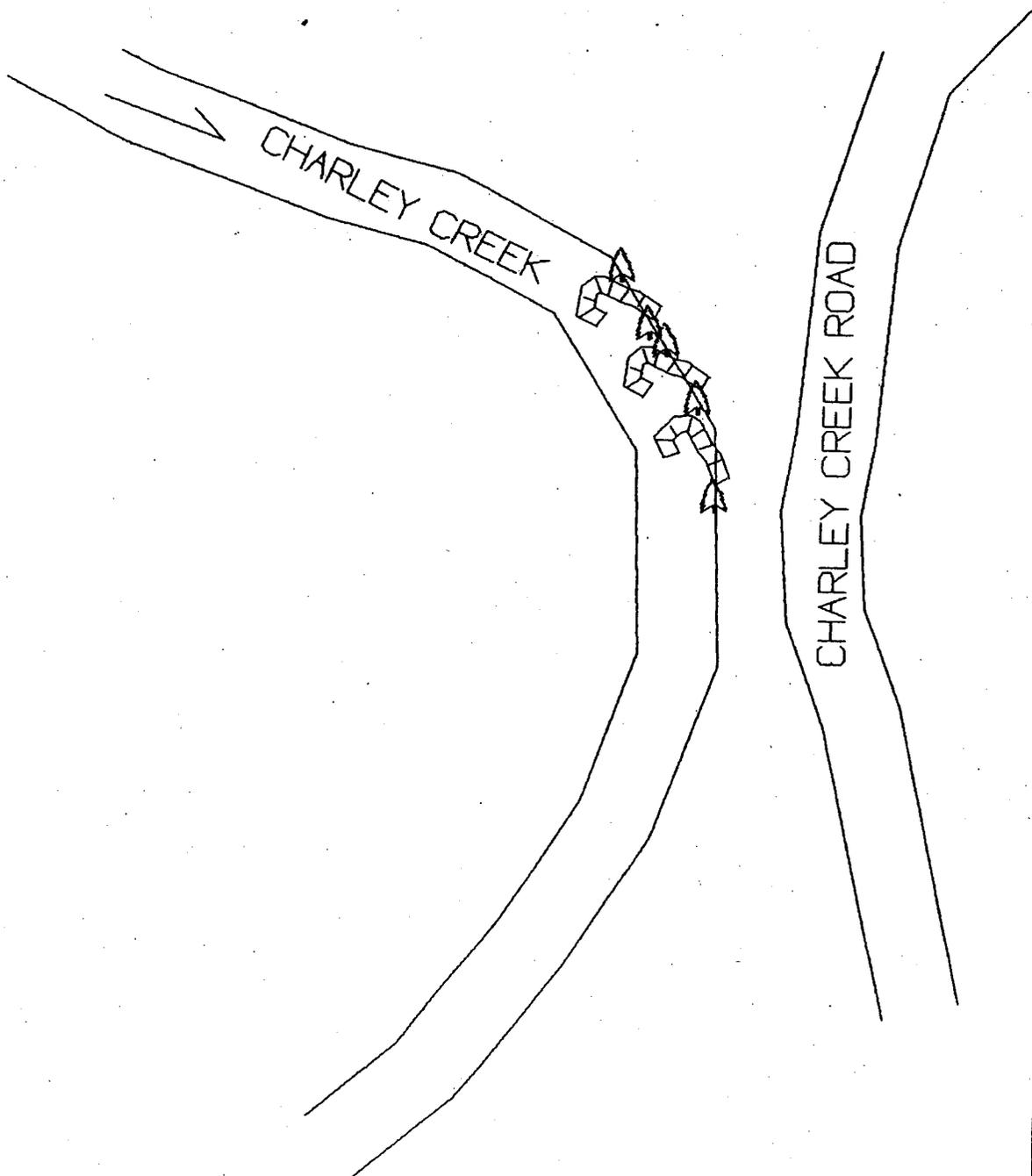
DESIGNED ROSTAD

DRAWN

TRACED

CHECKED

The purpose of this project is to create pool forming structures, to stabilize an actively eroding bank, and place large woody materials for complex cover.



CHARLEY CREEK PROJECT #1 FISH HABITAT IMPROVEMENT
PLAN VIEW
CHARLEY CREEK, ASOTIN COUNTY, WA.

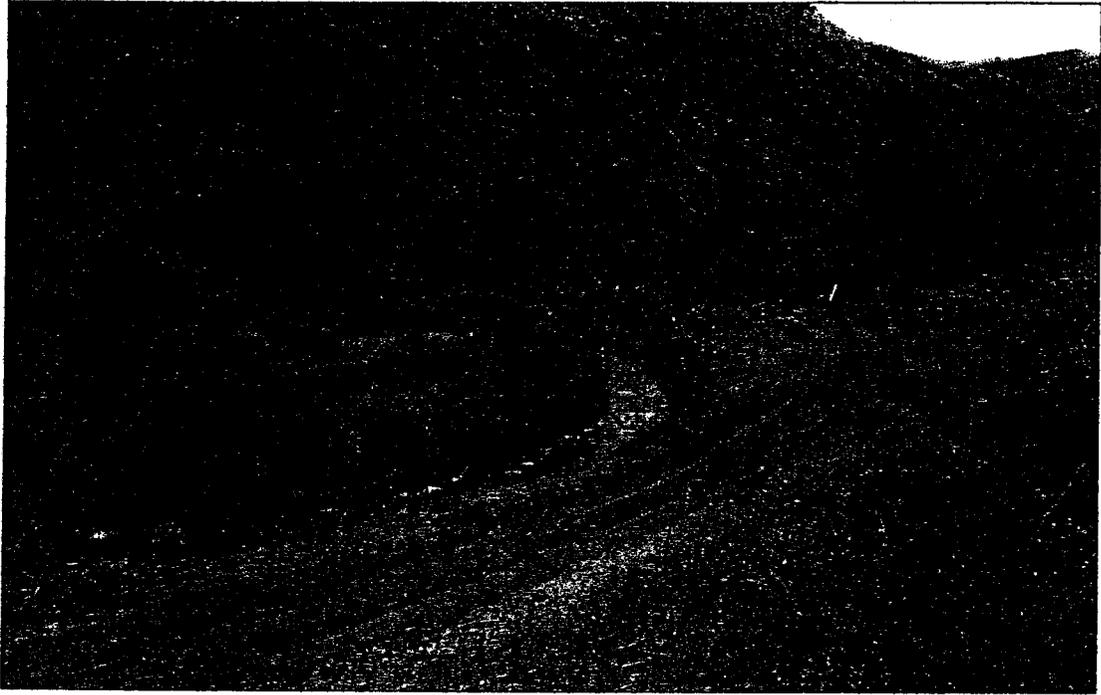
USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

DRAWING NOT TO SCALE

SHEET 1 OF 1

Charley Creek Project #2



Glide area with good gradient just missing pools and woody debris.

LEGEND

J-HOOK ROCK VANE



LARGE WOODY MATERIALS



ROOT WAD PLACEMENTS



CHARLEY CREEK PROJECT #2
SEC 4, T10N, R44E
RIVER MILE 1.0

DATE

6/10

APPROVED BY: RAS

TITLE

TITLE

DATE

20/5/2004

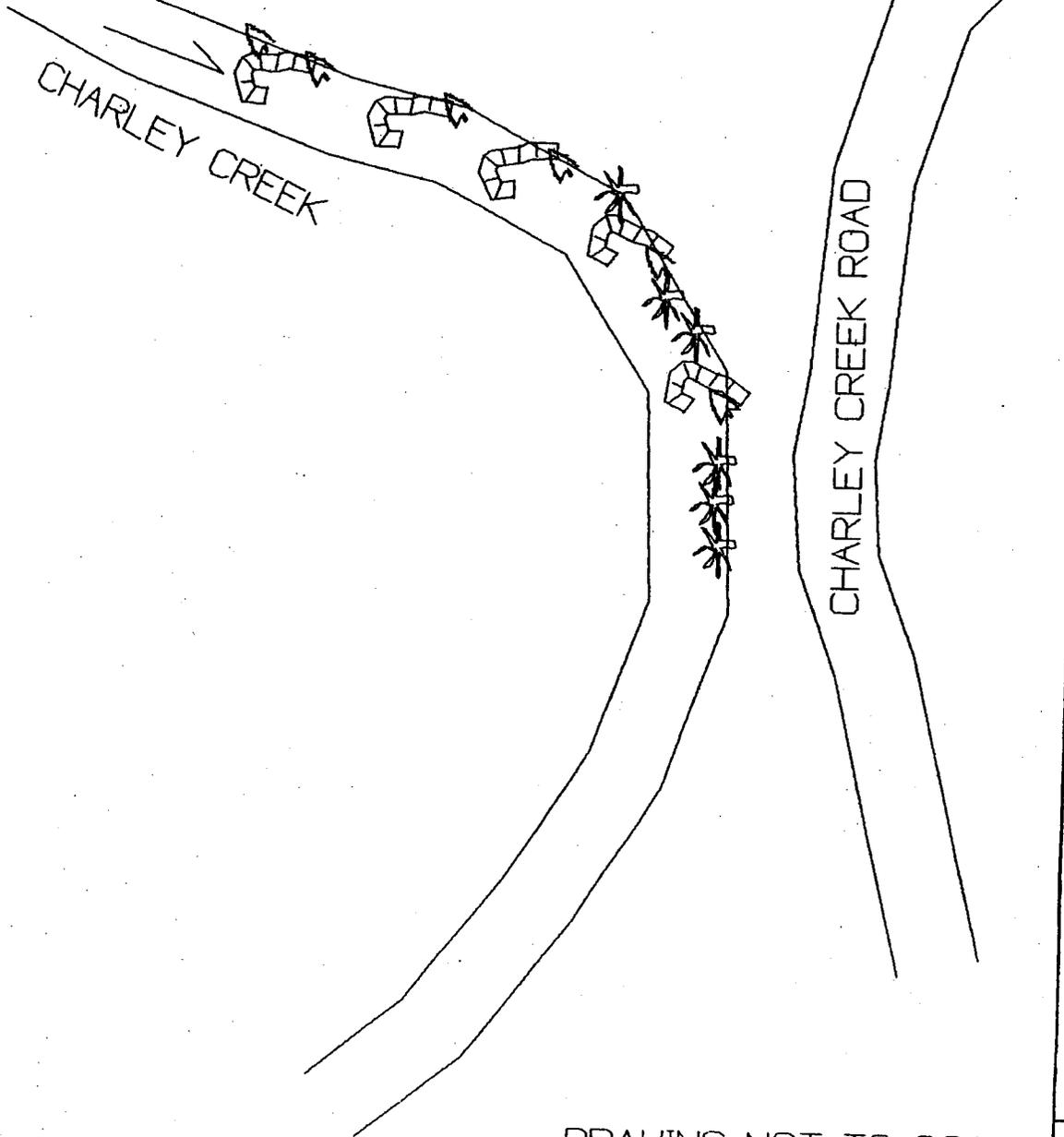
DESIGNED

DRAWN

TRACED

CHECKED

The purpose of this project is to create pool forming structures, to stabilize an actively eroding bank, and place large woody materials for complex cover.



CHARLEY CREEK PROJECT #2 FISH HABITAT IMPROVEMENT
PLAN VIEW
CHARLEY CREEK, ASOTIN COUNTY, WA.
USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

DRAWING NO.

SHEET

1 of 1

LEGEND

J-HOOK ROCK VANE

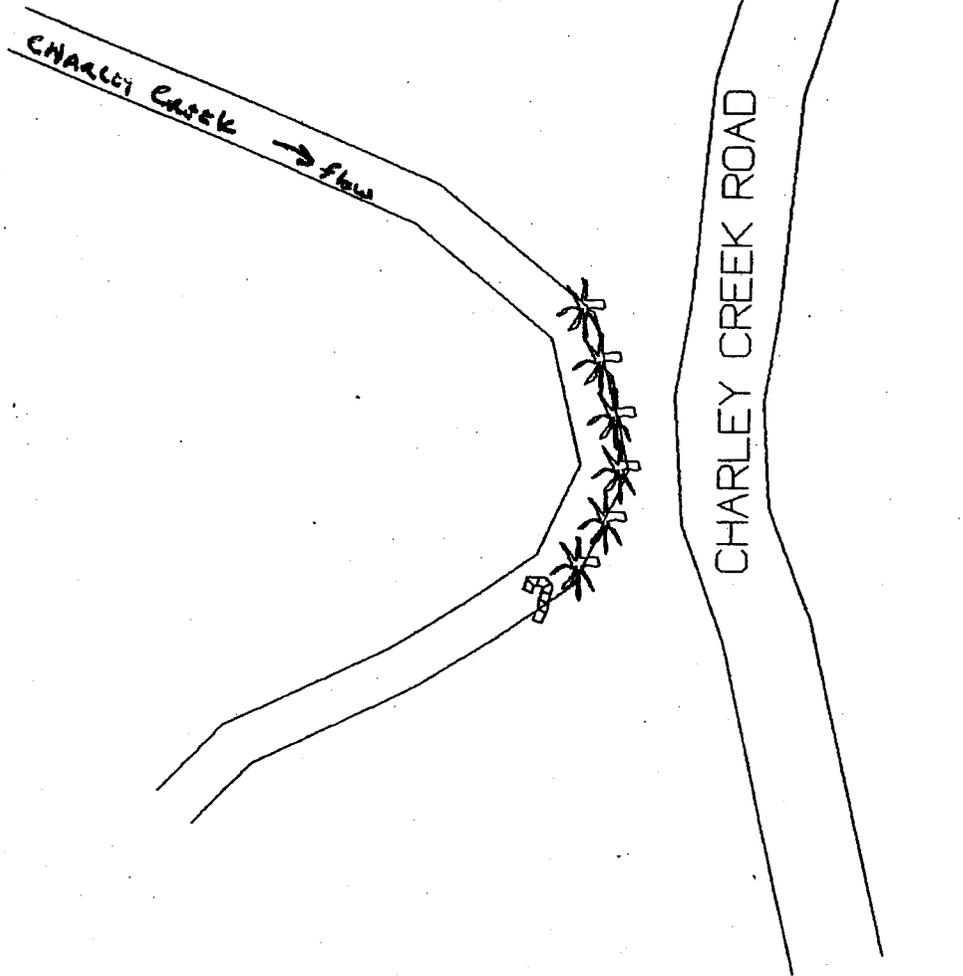


ROOT WAD PLACEMENTS



CHARLEY CREEK PROJECT #3
 SEC 5, T9N, R44E
 RIVER MILE 1.8

The purpose of this project is to reduce erosion on a very unstable bank this will be completed with a root wad revetment. This will also add complex cover. One j-hook vane will be placed to create a resting pool in conjunction with the woody materials.



DATE	6/00
APPROVED BY	R.D.S.
TITLE	

DATE	9/00
DESIGNED BY	R. Starnitzky
DRAWN	
TRACED	
CHECKED	

CHARLEY CREEK PROJECT #3 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 CHARLEY CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

DRAWING NO.	
SHEET	OF

Southfork of Asotin Creek Tributary to Asotin Creek

Asotin Creek 2000 In-Stream Habitat Projects

Step Pool Reference on Southfork of Asotin Creek

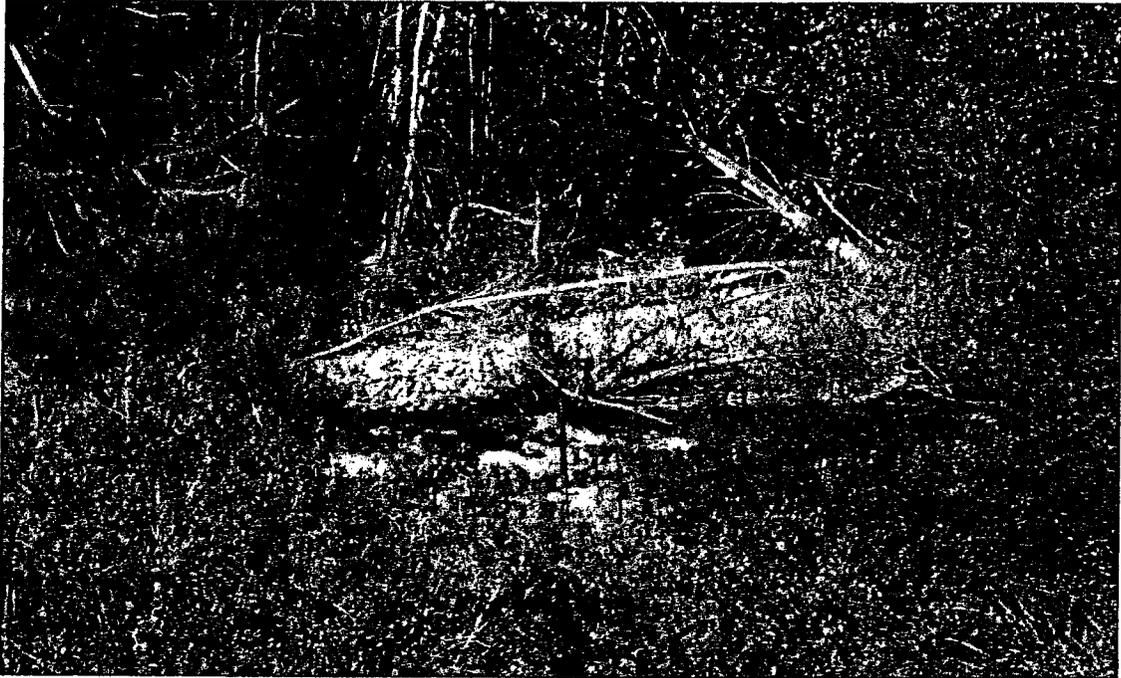


Reference of step pool conditions we are trying to mimic.



We will be adding wood to system, but this is an example of what we want to achieve.

Woody Debris Reference on Southfork of Asotin Creek



Woody debris changing direction of thalweg and scouring a pool below structure.



An example of what we will be trying to accomplish with woody debris placement

Southfork Asotin Creek Project #1

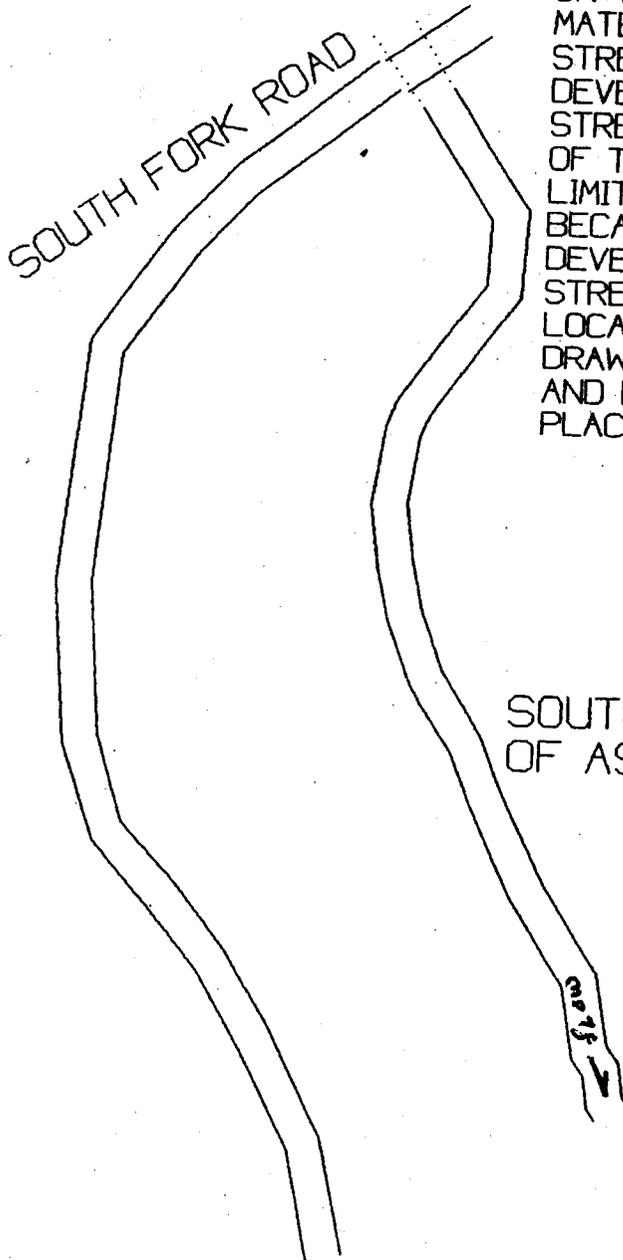


Up-stream view. Shallow w/ limited habitat, woody debris & step pool placement.



Downstream view. Woody debris placement & boulders in-stream for step pools.

SOUTH FORK OF ASOTIN CREEK PROJECT #1
 SEC 27, T9N, R44E
 RIVER MILE 3.5



THE PURPOSE OF THIS PROJECT IS TO INSTALL RESTING POOLS IN THIS SECTION OF THE SOUTH FORK. ROCK AND WOODY MATERIALS FOUND ON THE SITE OR LIMITED IMPORTED MATERIALS WILL BE PLACED IN THE STREAM TO MIMIC NATURALLY DEVELOPED POOLS FOUND IN THIS STREAM SECTION. DISTURBANCE OF THE STREAM AND BANKS WILL BE LIMITED. BECAUSE THE POOLS WILL BE DEVELOPED WHERE THERE IS STREAM ACCESS, THE DRAWING IS FOR LOCATION ONLY. THE ATTACHED DETAIL DRAWINGS OF BOULDER PLACEMENTS AND LARGE WOODY MATERIALS PLACEMENT WILL BE USED.

DATE 6/6
 APPROVED BY RS
 TITLE _____

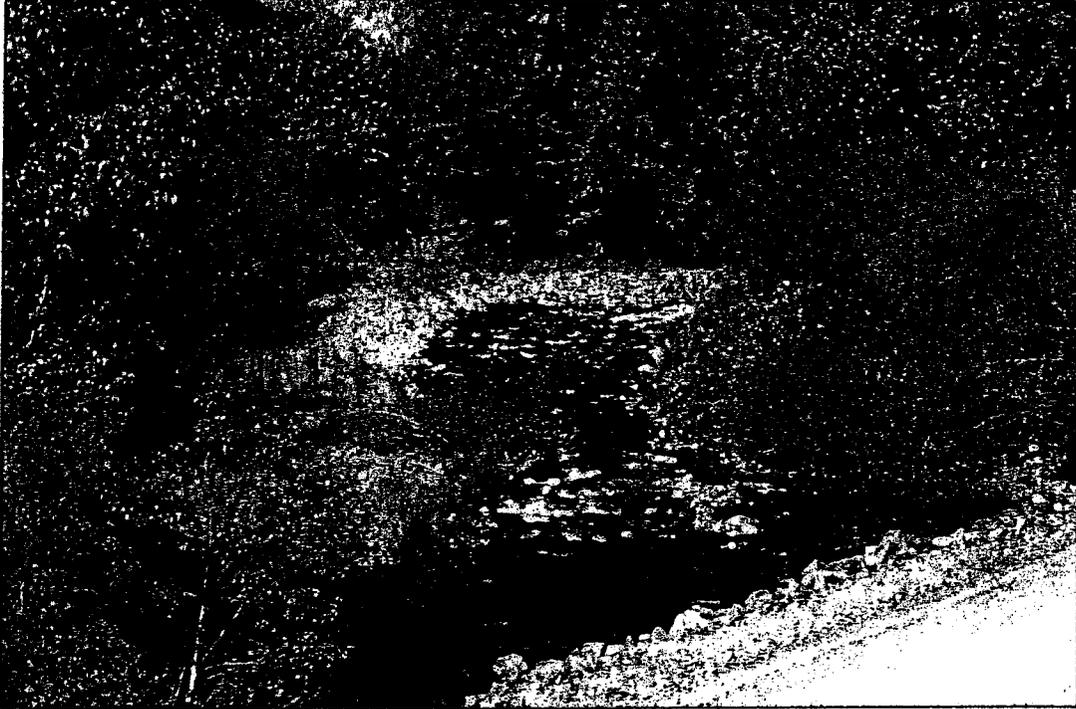
DATE 6/6
 DESIGNED RA
 DRAWN _____
 TRACED _____
 CHECKED _____

SOUTH FORK PROJECT #1 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO. _____

SHEET 1 OF 1

Southfork Asotin Creek Project #2

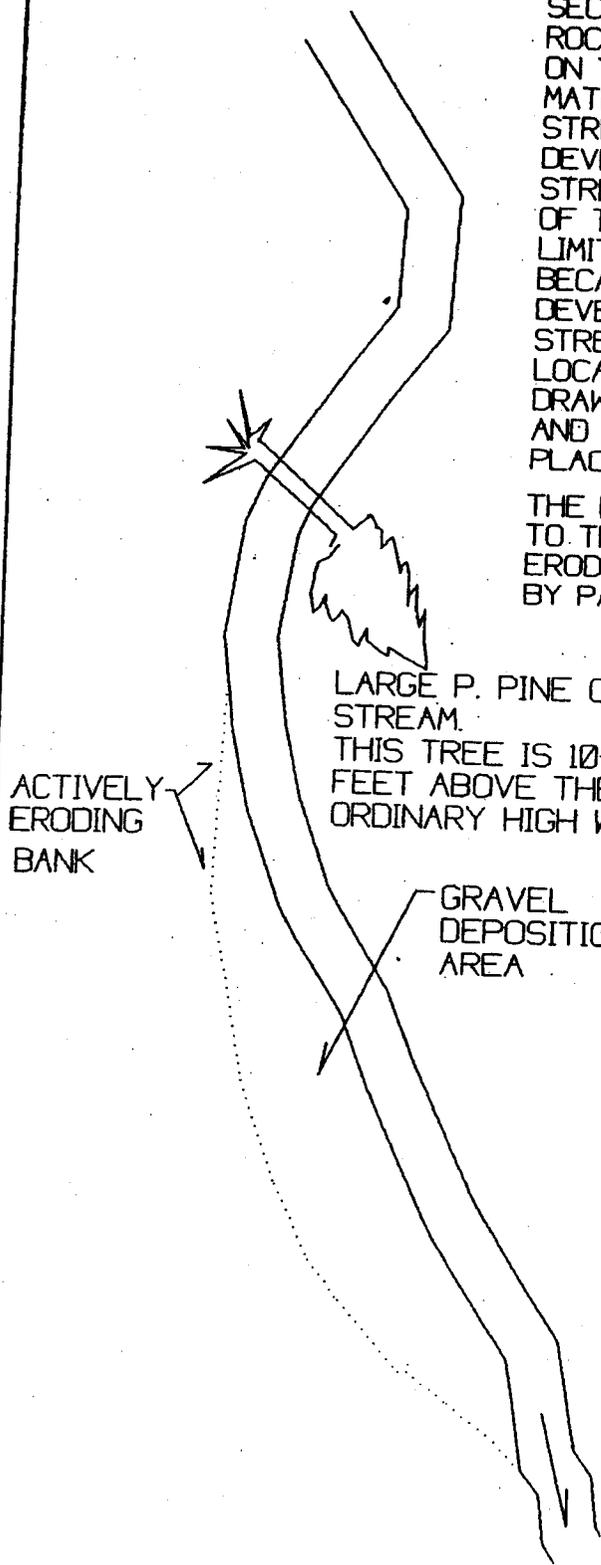


Downstream view. Outside corner and stream get wide and shallow.
Woody debris placement on alternating banks to get narrow and deeper channel.

SOUTH FORK OF ASOTIN CREEK PROJECT #2
 SEC 27, T9N, R44E
 RIVER MILE 3.2

THE PURPOSE OF THIS PROJECT IS TO INSTALL RESTING POOLS IN THIS SECTION OF THE SOUTH FORK. ROCK AND WOODY MATERIALS FOUND ON THE SITE OR LIMITED IMPORTED MATERIALS WILL BE PLACED IN THE STREAM TO MIMIC NATURALLY DEVELOPED POOLS FOUND IN THIS STREAM SECTION. DISTURBANCE OF THE STREAM AND BANKS WILL BE LIMITED. BECAUSE THE POOLS WILL BE DEVELOPED WHERE THERE IS STREAM ACCESS, THE DRAWING IS FOR LOCATION ONLY. THE ATTACHED DETAIL DRAWINGS OF BOULDER PLACEMENTS AND LARGE WOODY MATERIALS PLACEMENT WILL BE USED.

THE LARGE P. PINE WILL BE MOVED TO THE AREA MARKED AS "ACTIVELY ERODING BANK". IT WILL BE ANCHORED BY PARTIAL BURIAL AND ROCK PLACEMENT.



DATE 4/00
 APPROVED BY R. D. J.
 TITLE

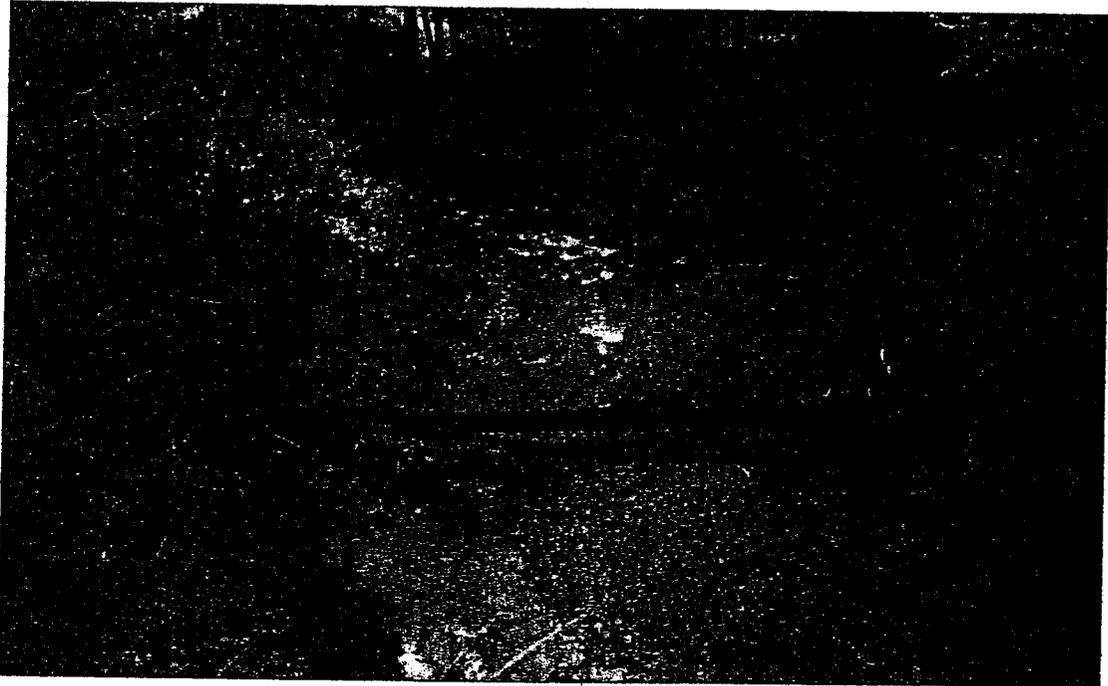
DESIGNED R. D. STANLEY
 DATE 4/00
 DRAWN
 TRACED
 CHECKED

SOUTH FORK PROJECT #2 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

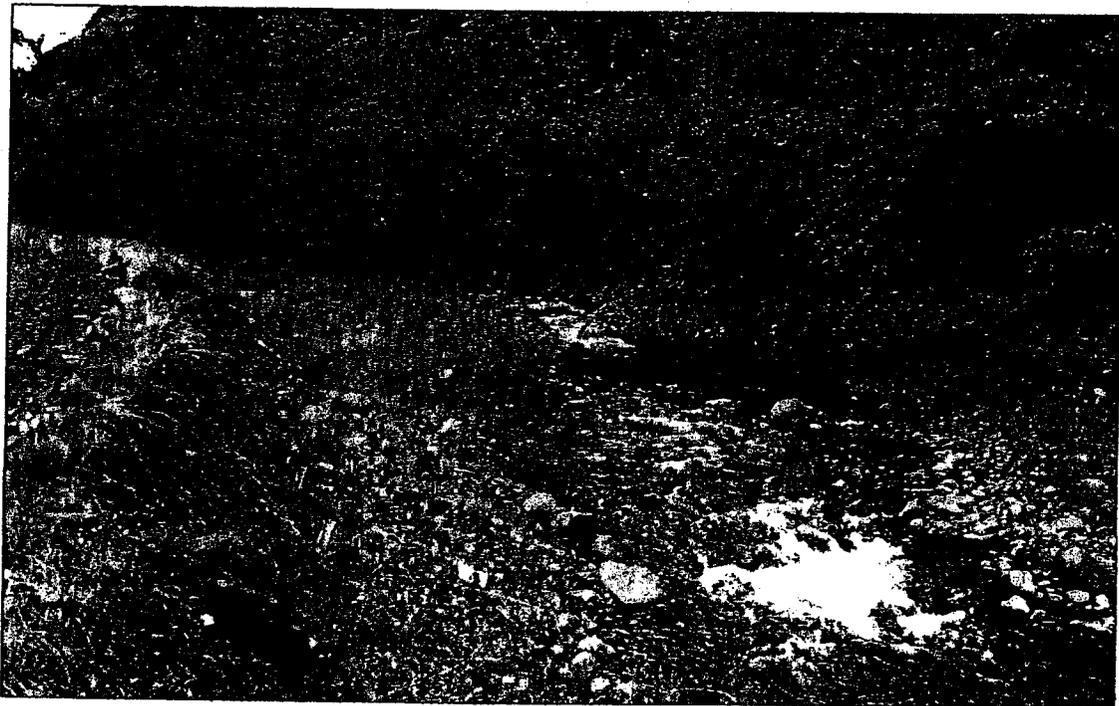
DRAWING NO.

SHEET 1 OF 1

Southfork of Asotin Creek Project #3



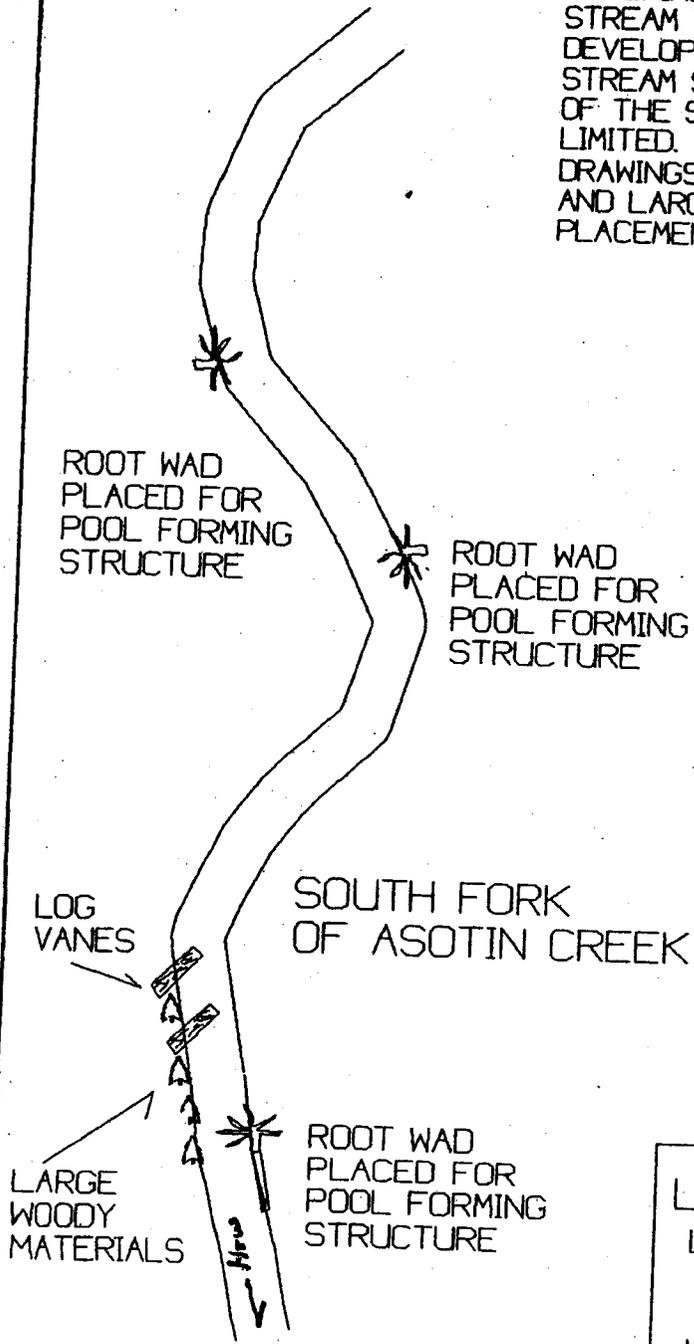
Pocket water on corners, utilize woody debris and increase number of step pools.



Lower Section, enhance pools below woody debris and increase complex cover.

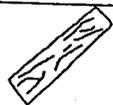
SOUTH FORK OF ASOTIN CREEK PROJECT #3
 SEC 22. T9N. R44E
 RIVER MILE 2.6

THE PURPOSE OF THIS PROJECT IS TO INSTALL RESTING POOLS IN THIS SECTION OF THE SOUTH FORK. ROCK AND WOODY MATERIALS FOUND ON THE SITE OR LIMITED IMPORTED MATERIALS WILL BE PLACED IN THE STREAM TO MIMIC NATURALLY DEVELOPED POOLS FOUND IN THIS STREAM SECTION. DISTURBANCE OF THE STREAM AND BANKS WILL BE LIMITED. DRAWINGS OF BOULDER PLACEMENTS AND LARGE WOODY MATERIALS PLACEMENT WILL BE USED.



DRAWING NOT TO SCALE

LEGEND

- LOG VANE 
- LARGE WOODY MATERIALS 
- ROOT WAD PLACEMENTS 

DATE 6/00
 APPROVED BY RDJ TITLE _____

DESIGNED ROSTADT DATE 6/00
 DRAWN _____ TRACED _____ CHECKED _____

SOUTH FORK PROJECT #3 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO. _____
 SHEET 1 OF 1

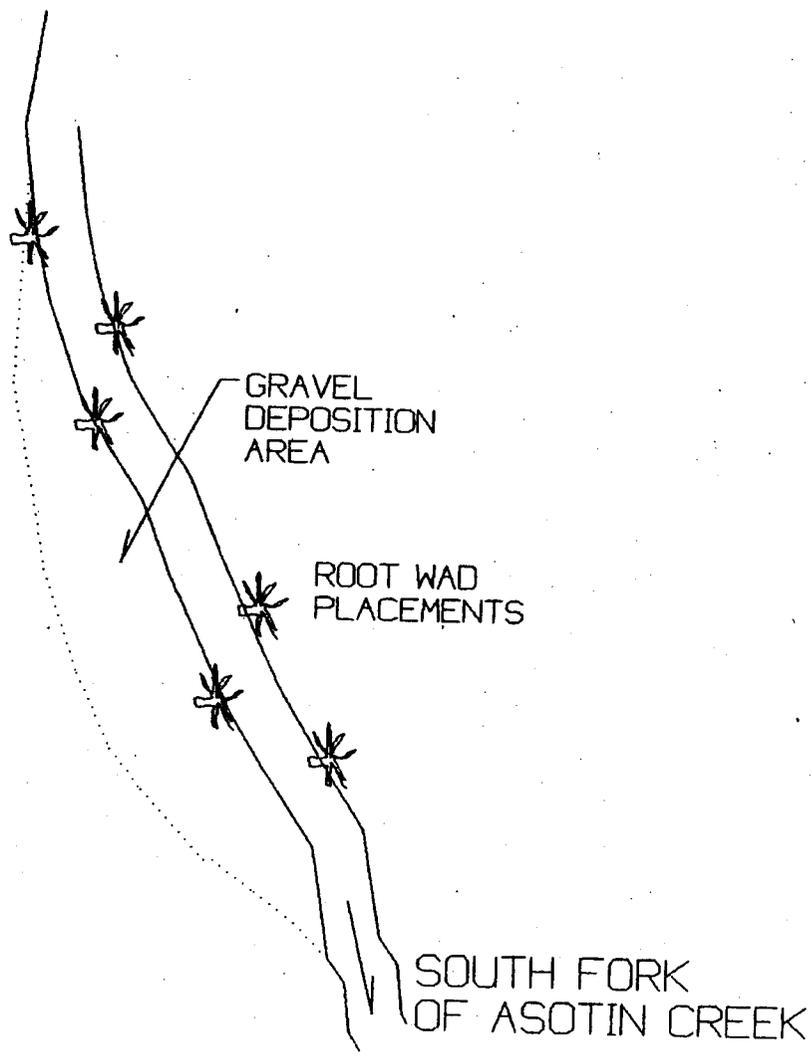
Southfork Asotin Creek Project #4



Downstream view. Little or no complex habitat.
Woody debris placement and step pool formation structures
to sort and scour gravels.

SOUTH FORK OF ASOTIN CREEK PROJECT #4
 SEC 2. T9N. R44E
 RIVER MILE 2.6

THE PURPOSE OF THIS PROJECT IS TO INSTALL RESTING POOLS IN THIS SECTION OF THE SOUTH FORK. ROCK AND WOODY MATERIALS FOUND ON THE SITE OR LIMITED IMPORTED MATERIALS WILL BE PLACED IN THE STREAM TO MIMIC NATURALLY DEVELOPED POOLS FOUND IN THIS STREAM SECTION. DISTURBANCE OF THE STREAM AND BANKS WILL BE LIMITED. BECAUSE THE POOLS WILL BE DEVELOPED WHERE THERE IS STREAM ACCESS, THE DRAWING IS MAINLY FOR LOCATION. THE ATTACHED DETAIL DRAWINGS OF BOULDER PLACEMENTS AND LARGE WOODY MATERIALS PLACEMENT WILL BE USED.



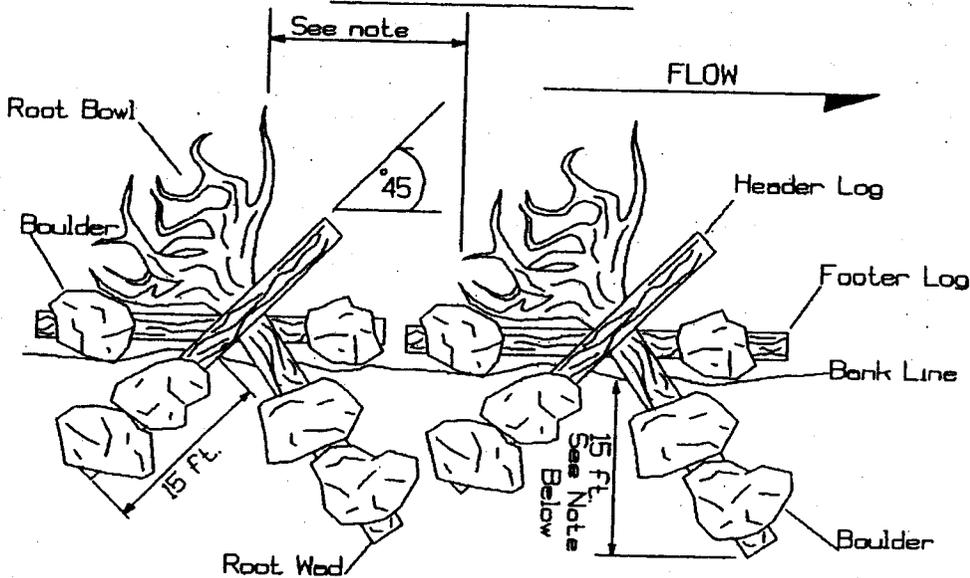
DATE 6/00
 APPROVED BY RAS
 TITLE

DATE 6/00
 DESIGNED RO STANLEY
 DRAWN
 TRACED
 CHECKED

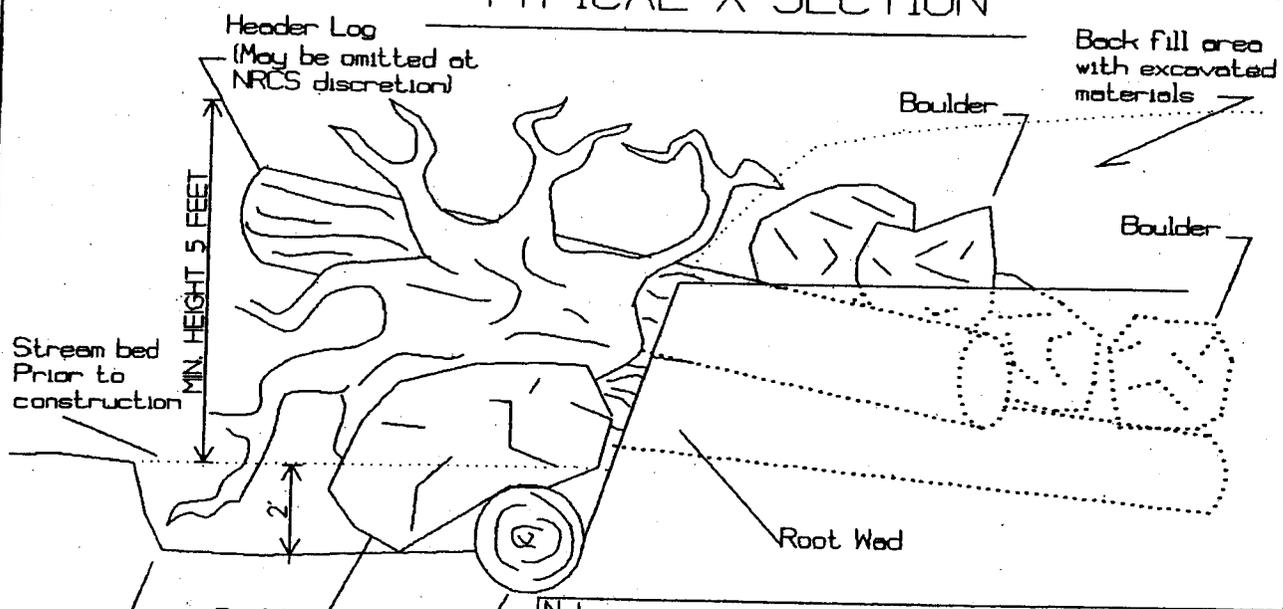
SOUTH FORK PROJECT #4 FISH HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.
 SHEET 1 OF 1

PLAN VIEW



TYPICAL X-SECTION

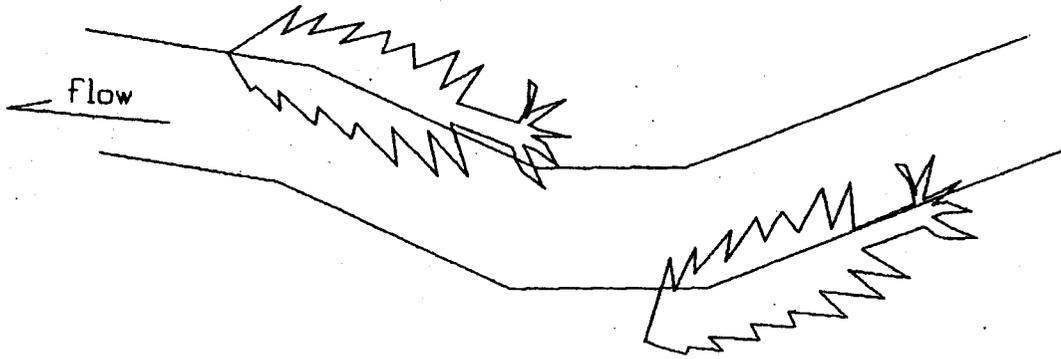


Notes:
 Minimum boulder diameter is 30 inches.
 Minimum amount is 9 boulders per root wad complex.
 Root Wads, header logs and footer logs are subject to NRCS approval prior to installation.
 Spacing between root wads (measured from the root bowl edge) will be 6 feet.
 IF long stemmed root wads are not available, short stem root wads may be substituted providing that the stem is cabled to a minimum of two, 1 cubic yard boulders using 1/2 inch cable and double cable clamps.
 Installation will be completed with NRCS supervision.

Excavate area for root wad placement.

DATE	5/00
APPROVED BY	RDS
TITLE	
DESIGNED	RDS
DRAWN	RDS
TRACED	
CHECKED	

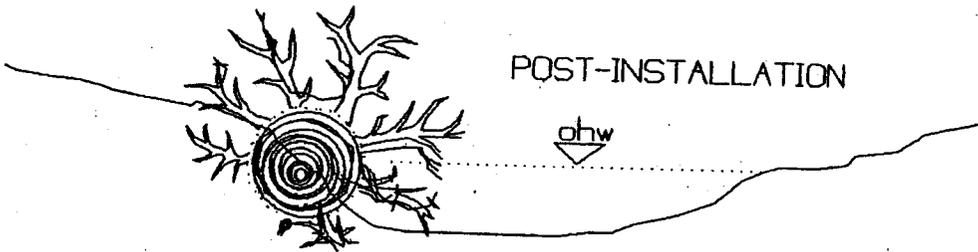
ROOT WAD REVETMENT DETAIL
 CHARLEY CREEK PROJECT #3
 CHARLEY CREEK, ASOTIN COUNTY, WA
 USDA NATURAL RESOURCES CONSERVATION SERVICE



PLAN VIEW

SECTION VIEW

TREE IS SHOWN WITHOUT ROOT WAD ATTACHED



POST-INSTALLATION

THE OBJECTIVE OF THIS STRUCTURE IS TO NARROW AND DEEPEN THE CHANNEL IN AREAS THAT HAVE A HIGH WIDTH/DEPTH RATIO. A NUMBER OF THESE TREES PLACED LIKE THIS DURING HIGH WATER EVENTS HAVE CREATED SUBSTANTIAL POOLS DOWNSTREAM OF THE ROOT WAD AND THE LIMBS PROVIDE COVER OVER AND IN THE POOL.

CONSTRUCTION WILL BEGIN BY EXCAVATING A TRENCH PARALLEL TO THE STREAM AND ADJACENT TO THE HIGH WATER LINE.

THE TRENCH WILL BE DUG DEEP ENOUGH TO ALLOW APPROXIMATELY 1/2 OF THE TREE TO BE BELOW GROUND LEVEL. THE TREE WILL BE PLACED IN THE TRENCH, ROOT WAD UPSTREAM, AND EXCAVATED MATERIALS WILL BE BACK FILLED INTO THE TRENCH AND OVER THE TREE. THE MATERIALS WILL BE DEPOSITED SLOWLY ENOUGH TO ENSURE THAT THE COMPLETE TRENCH IS FILLED. IF POSSIBLE THE MATERIALS WILL BE COMPACTED IN THE TRENCH IF THIS CAN BE ACCOMPLISHED WITHOUT BREAKING MANY LIMBS.

IF NEEDED A ONE CUBIC YARD ROCK ANCHOR WILL BE PLACED IN THE TRENCH ON THE UPSTREAM END AND SECURED TO THE STEM WITH CABLE. THIS WILL BE DETERMINED ON SITE.

DATE 9/00
 APPROVED BY RAS
 TITLE SC.

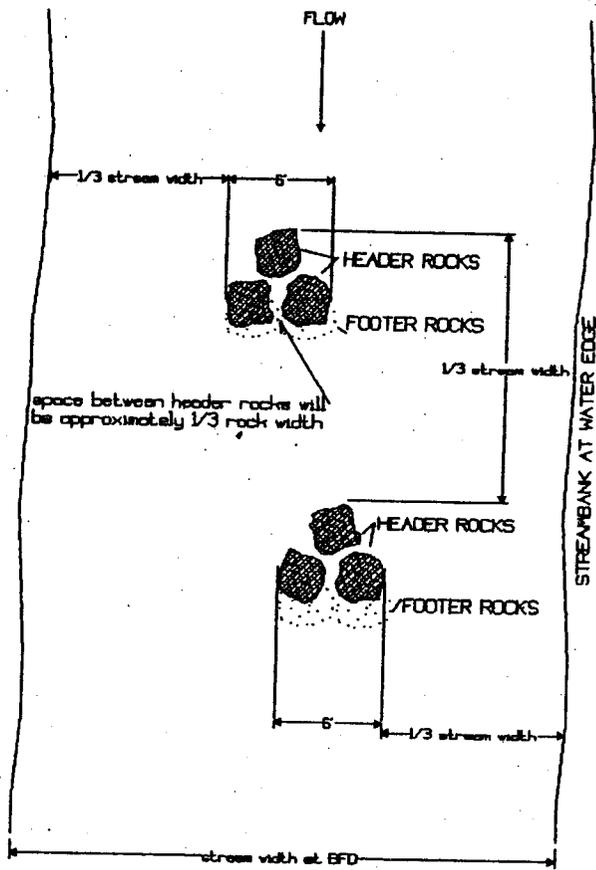
DESIGNED RASTINITY
 DRAWN RASTINITY
 DATE 9/00
 TRACED
 CHECKED

TREE PLACEMENT FOR FISH HABITAT IMPROVEMENT
 PLAN VIEW AND SECTION VIEW
 ASOTIN CREEK, ASOTIN COUNTY, WA.

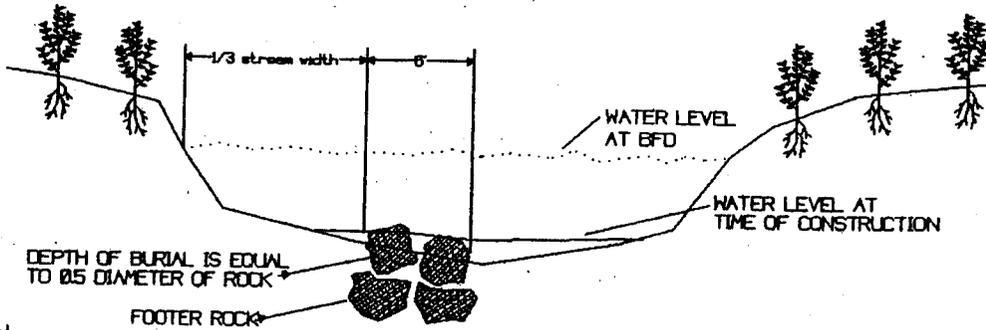
USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

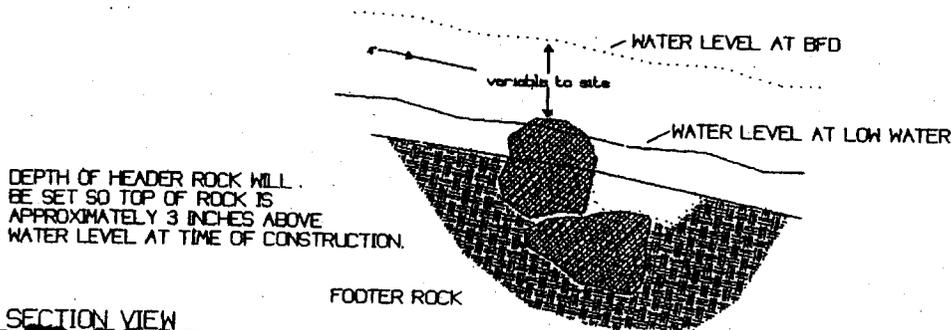
SHEET 1 OF 1



PLAN VIEW



END VIEW



SECTION VIEW

NOTES:

ROCK SIZE

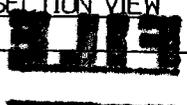
Minimum Diameter = 30 inches

Maximum Diameter = 48 inches

BOULDERS ARE TO BE PLACED IN THE CROSS-OVER SECTION OF STREAM, WHERE THE BANKS ARE MOST STABLE.

DATE	6/30
APPROVED BY	RCS
TITLE	SR
DESIGNED	R. J. Stucky
DRAWN	
TRACED	
CHECKED	

BOULDER PLACEMENT DETAILS
 ASOTIN CREEK, ASOTIN COUNTY, WASHINGTON
 USDA NATURAL RESOURCE CONSERVATION SERVICE





copy Rick Ed

Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

BFO FILE COPY
RECEIVED

JUN 24 1999

NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENT, FISH AND WILDLIFE FIELD OFFICE

June 17, 1999

In reply refer to: KEWN-4

Mr. Ted Meyers
ATTN: Rick Edwards
National Marine Fisheries Service
1387 South Vinell Way, Suite 377
Boise, ID 83709

Enclosed for your review are eight project sites on the Asotin Creek, tributary to the Snake River, southeast Washington, Asotin Creek Model Watershed. These projects are part of the Northwest Power Planning Council's Fish and Wildlife Implementation Program for fiscal year 1999.

We are requesting "Incorporation by Reference", using previously submitted Biological Assessments (BA), for the following projects:

- Project 1 USFS
- Project 2 Frank Koch
- Project 3 Wayne Heistuman
- Project 4 Wayne Heistuman
- Project 5 Gene Theissen
- Project 6 Leo Jungert
- Project 7 Schlee Meander
- Project 8 Koch Meander

The planned projects listed above involve similar effects to the same species in the same geographic area. No new species have been listed or proposed, and no new critical habitat has been designated for the action areas. There is no new relevant information to incorporate into last year's BA.

Enclosed are the locations, descriptions, and project drawings for the 1999 Asotin Creek projects located in Asotin County, Washington. There have been no new fish species listed, or change in river conditions, and structure types for 1999 are of the same type as 1998. Therefore we have come to the same conclusion as 1998: **"May affect, not likely to adversely affect"** determination for the Snake River steelhead, and Snake River spring chinook and their critical habitat. We are basing this conclusion on the biological assessment submitted to the National Marine Fisheries Service (NMFS) over the past two years and NMFS's concurrence with our determination. Mitigation and monitoring for 1999 will follow the same protocols outlined in the biological assessment submitted to NMFS June 9, 1998.

Due to this determination, construction of these projects will begin on or about July 15, 1999. If no negative comments are received, it will be assumed that the proposals are acceptable and construction will begin as planned. All work window dates are coordinated with the Washington Department of Fish and Wildlife.

If you have any questions, please contact me at (503) 230-5239.

Thank you for your timely review of these projects.

Sincerely,

A handwritten signature in black ink that reads "Mark A. Shaw". The signature is written in a cursive style with a large, prominent "M" and "S".

Mark A. Shaw
Fisheries Biologist

Enclosures

biological opinion issued after formal consultation if the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the early consultation. A written request for confirmation of the preliminary biological opinion should be submitted after the prospective applicant applies to the Federal agency for a permit or license but prior to the issuance of such permit or license. Within 45 days of receipt of the Federal agency's request, the Service shall either: (1) confirm that the preliminary biological opinion stands as a final biological opinion; or (2) if the findings noted above cannot be made, request that the Federal agency initiate formal consultation.

§402.12 Biological assessments.

(a) *Purpose.* A biological assessment shall evaluate the potential effects of the action on listed and proposed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action and is used in determining whether formal consultation or a conference is necessary.

(b) *Preparation requirement.* (1) The procedures of this section are required for Federal actions that are "major construction activities"; provided that a contract for construction was not entered into or actual construction was not begun on or before November 10, 1978. Any person, including those who may wish to apply for an exemption from section 7(a)(2) of the Act, may prepare a biological assessment under the supervision of the Federal agency and in cooperation with the Service consistent with the procedures and requirements of this section. An exemption from the requirements of section 7(a)(2) is not permanent unless a biological assessment has been prepared.

(2) The biological assessment shall be completed before any contract for construction is entered into and before construction is begun.

(c) *Request for information.* The Federal agency or the designated non-Federal representative shall convey to the Director either (1) a written request for a list of any listed or proposed species or designated or proposed critical habitat that may be present in the action area; or (2) a written notification of the species and critical habitat that are being included in the biological assessment.

(d) *Director's response.* Within 30 days of receipt of the notification of, or the request for, a species list, the

Director shall either concur with or revise the list or, in those cases where no list has been provided, advise the Federal agency or the designated non-Federal representative in writing whether, based on the best scientific and commercial data available, any listed or proposed species or designated or proposed critical habitat may be present in the action area. In addition to listed and proposed species, the Director will provide a list of candidate species that may be present in the action area. Candidate species refers to any species being considered by the Service for listing as endangered or threatened species but not yet the subject of a proposed rule. Although candidate species have no legal status and are accorded no protection under the Act, their inclusion will alert the Federal agency of potential proposals or listings.

(1) If the Director advises that no listed species or critical habitat may be present, the Federal agency need not prepare a biological assessment and further consultation is not required. If only proposed species or proposed critical habitat may be present in the action area, then the Federal agency must confer with the Service if required under §402.10, but preparation of a biological assessment is not required unless the proposed listing and/or designation becomes final.

(2) If a listed species or critical habitat may be present in the action area, the Director will provide a species list or concur with the species list provided. The Director also will provide available information (or references thereto) regarding these species and critical habitat, and may recommend discretionary studies or surveys that may provide a better information base for the preparation of an assessment. Any recommendation for studies or surveys is not to be construed as the Service's opinion that the Federal agency has failed to satisfy the information standard of section 7(a)(2) of the Act.

(e) *Verification of current accuracy of species list.* If the Federal agency or the designated non-Federal representative does not begin preparation of the biological assessment within 90 days of receipt of (or concurrence with) the species list, the Federal agency or the designated non-Federal representative must verify (formally or informally) with the Service the current accuracy of the species list at the time the preparation of the assessment is begun.

(f) *Contents.* The contents of a biological assessment are at the discretion of the Federal agency and will depend on the nature of the Federal

action. The following may be considered for inclusion:

(1) The results of an on-site inspection of the area affected by the action to determine if listed or proposed species are present or occur seasonally.

(2) The views of recognized experts on the species at issue.

(3) A review of the literature and other information.

(4) An analysis of the effects of the action on the species and habitat, including consideration of cumulative effects, and the results of any related studies.

(5) An analysis of alternate actions considered by the Federal agency for the proposed action.

(g) *Incorporation by reference.* If a proposed action requiring the preparation of a biological assessment is identical, or very similar, to a previous action for which a biological assessment was prepared, the Federal agency may fulfill the biological assessment requirement for the proposed action by incorporating by reference the earlier biological assessment, plus any supporting data from other documents that are pertinent to the consultation, into a written certification that:

(1) The proposed action involves similar impacts to the same species in the same geographic area;

(2) No new species have been listed or proposed or no new critical habitat designated or proposed for the action area; and

(3) The biological assessment has been supplemented with any relevant changes in information.

(h) *Permit requirements.* If conducting a biological assessment will involve the taking of a listed species, a permit under section 10 of the Act (16 U.S.C. 1539) and Part 17 of this Title (with respect to species under the jurisdiction of the FWS) or Parts 220, 222, and 227 of this Title (with respect to species under the jurisdiction of the NMFS) is required.

(i) *Completion time.* The Federal agency or the designated non-Federal representative shall complete the biological assessment within 180 days after its initiation (receipt of or concurrence with the species list) unless a different period of time is agreed to by the Director and the Federal agency. If a permit or license applicant is involved, the 180-day period may not be extended unless the agency provides the applicant, before the close of the 180-day period, with a written statement setting forth the estimated length of the proposed extension and the reasons why such an extension is necessary.

(j) *Submission of biological assessment.* The Federal agency shall

PROJECT 1

Landowner: USFS (United States Forest Service)
Location: Sec 24, 25, 26, 32, 33, 34, & 35 T9N R43E
River Mile: 18.0 North Fork of Asotin Creek, WA

On USFS lands located in the North Fork of Asotin Creek, large woody materials and random boulder placements will be completed where stream access is available. The structure locations will be selected at the time of construction based on limited stream corridor disturbance and maximum fish benefit potential. An existing forest road will be used to access the area with equipment and materials. This project is a joint agreement between the USFS and the conservation district. The site will be revegetated in the spring of 2000.

PROJECT 2

Landowner: Frank Koch
Location: Sec 3, T9N, R44E
River Mile: 13.6 Mainstem Asotin Creek, WA

This site is located adjacent to the 1998 project site. Last year three rock vanes were placed on the left bank to shift velocities away from a vulnerable bank and to begin establishment of a stream meander. Because of a lack of large woody materials last year, the right bank was not addressed, it is now important to complete the stream restoration efforts as the stream re-establishes a meander pattern in response to last years in-stream structure placements. To complete the project in 1999, large woody materials will be placed on approximately 200 feet of the right bank to enhance fish habitat potential, establish a bankline for the development of a riparian vegetative corridor, and to maintain the limited existing riparian vegetation. An area approximately 200 feet wide and 400 feet long at this project site was re-vegetated this spring. Any disturbance of the plantings will be replanted in the spring of 2000.

PROJECT 3

Leasee: Wayne Heitstuman
Location: SW ¼, Sec 35, T10N, R44E
River Mile: 12.6 Mainstem Asotin Creek, WA

This project site is located above where Dry Gulch enters Asotin Creek and up-stream of pool forming structures installed in 1997. An area, approximately 75 feet long, on the left bank on an outside corner will have large woody materials placed in the stream parallel to the bankline and on the bank woven between existing trees. The purpose for this project is to enhance the fish habitat cover and to catch floating woody materials and suspended sediment there by creating a more fertile and complex riparian vegetative zone. The site will be revegetated in the spring of 2000.

PROJECT 4

Leasee: Wayne Heitstuman
Location: SW ¼, Sec 35, T10N, R44E
River Mile: 12.4 Mainstem Asotin Creek, WA

Located approximately a half mile downstream of Project 3, large woody materials will be placed on the near bank region of the right bank. Large woody materials will be placed in the stream parallel to the bankline and on the bank woven between existing trees. The purpose for this project is to enhance the fish habitat cover and to catch floating woody materials and suspended sediment there by creating a more fertile and complex riparian vegetative zone. The site will be revegetated in the spring of 2000.

PROJECT 5

Landowner: Gene Theissen
Location: NE ¼, Sec 25, T10N, R44E
River Mile: 10.5 Mainstem Asotin Creek, WA

Large woody materials will be placed on the alternating near bank regions, first on the right bank and then on the left. Each section to be treated is approximately 150 feet long. The purpose of this project is to enhance fish habitat cover, to protect the existing riparian vegetation, and to begin developing a bankline and more complex riparian area by accumulating floating woody debris and suspended sediment. Project site will be revegetated in the spring of 2000.

PROJECT 6

Landowner: Leo Jungert
Location: NW ¼, Sec 26, T10N, R45E
River Mile: 6.5 Mainstem Asotin Creek, WA

This project is located along Asotin Creek Road and is lower in the watershed in relation to the other proposed projects. The benefit to fish habitat is not as high, but this site has numerous abandoned cars that are either in the stream or on the verge of entering the stream. Asotin County Emergency Service has received a grant from DOE to remove the vehicles and in their permit from WDFW it states that something needs to be done to protect the streambank and improve fish habitat. It is identified that the removal of the vehicles will be done during low flow and the possibilities of streambank protection and fish habitat could go hand-in-hand with 4 J hooked rock vanes on the left bank. The structure's would reduce the width to depth ratio and provide pool habitat for migrating adults and rearing for juveniles. WDFW redd surveys indicate that this section of the Mainstem is being used by spawning steelhead. Project site will be revegetated in the spring of 2000.

PROJECT 7

Landowner: Dan Schlee
Location: NE ¼, Sec 34, T9N, R44E
River Mile: 4 South Fork of Asotin Creek, WA

Upon monitoring and assessment of the Schlee Meander Reconstruction Project (installed in September of 1997), two minor operation and maintenance items need to be addressed. Discharges, exceeding bankfull flows by at least six times, have passed through this site and it has maintained its pattern well.

The assessment indicates two channel characteristics that need to be addressed in 1999.

1. A headcut migrated 100 feet from offsite location. The bottom vortex weir of the Schlee Site held in place, in spite of a 24" headcut. O&M is needed and an additional vortex rock weir is needed approximately 30 feet below the original weir. The low set vortex rock weir would provide toe protection to the original weir, in addition to, providing more pool habitat and a step pool morphology.
2. The width:depth ratio should be lowered from 16 to 13 feet to help facilitate bedload movement at bankfull discharge.

There were no structural failures in spite of high flows. These Operation and Maintenance adjustments are minimal, but due to the investment made during initial project construction are needed to maintain project integrity. The goal is to eventually develop a self maintaining-stable stream type with high fish habitat values. Project site will be revegetated in the spring of 2000.

PROJECT 8

Landowner: Frank Koch
Location: SW ¼, Sec3, T9N, R44E
River Mile: 14.1 Mainstem Asotin Creek, WA

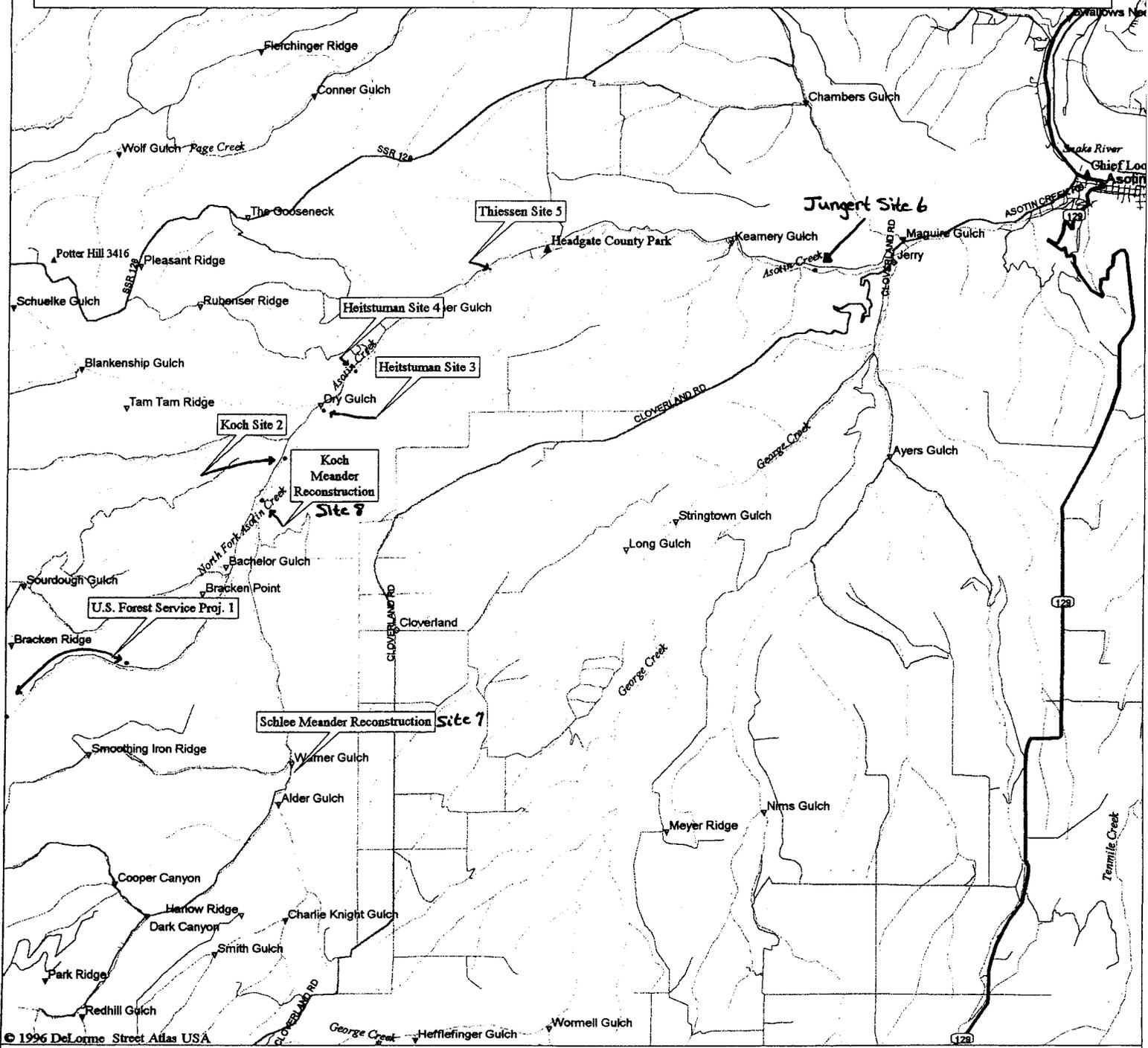
Upon monitoring and evaluation of Koch's Meander Reconstruction Project in May of 1999 (project completed in September of 1998), it was determined that the site survived flows 10 times the bankfull discharge, in spite of the initial lack of vegetation needed for root cohesion in the banks and reestablished floodplain. Some minor Operation and Maintenance and adjustments are needed.

The goal of these adjustments are to bring the current condition closer to a reference site condition (reference site condition would be defined as a natural site of the same stream type that maintains its dimensions, patterns, and profiles while being able to transport sediment, flows and detritus of the watershed) and support healthy riparian growth and root matrix.

The assessment indicated two minor O&M adjustments that are need to be addressed in 1999.

1. Lower the bankfull width:depth ratio from 17 to 12 feet. This will allow for adequate depth to achieve enough shear stress to more efficiently transport bedload and maintain a healthier thalweg.
2. Three additional J hook vanes at the end of the first three meander bends. These additions will help maintain a lower width to depth ratio while increasing the number of large pools for fish habitat. They would alternate from the left bank, to right bank, and left bank again to help maintain the meander pattern and reduce width to depth ratio.

1999 In-Stream Habitat Projects



© 1996 DeLorme Street Atlas USA

Mag 12.00

Thu Jun 03 08:04 1999

Scale 1:125,000 (at center)

2 Miles

2 KM

- | | |
|-----------------------|---------------------|
| — Local Road | ▲ Park/Reservation |
| — Major Connector | ◆ Locale |
| — Primary State Route | ☐ Cemetery |
| — Trail | ▭ County Boundary |
| — Utility/Pipe | ▭ State Boundary |
| ● County Seat | ▭ Population Center |
| ▲ Summit | ▭ Water |
| ▼ Geographic Feature | ▭ Woodland |

LEGEND

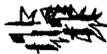
VORTEX ROCK WEIR WITH ROOT WAD



ROCK VANE WITH ROOT WAD



LARGE WOODY DEBRIS



ROCK BARB WITH ROOT WAD



ROOT WAD REVETMENT

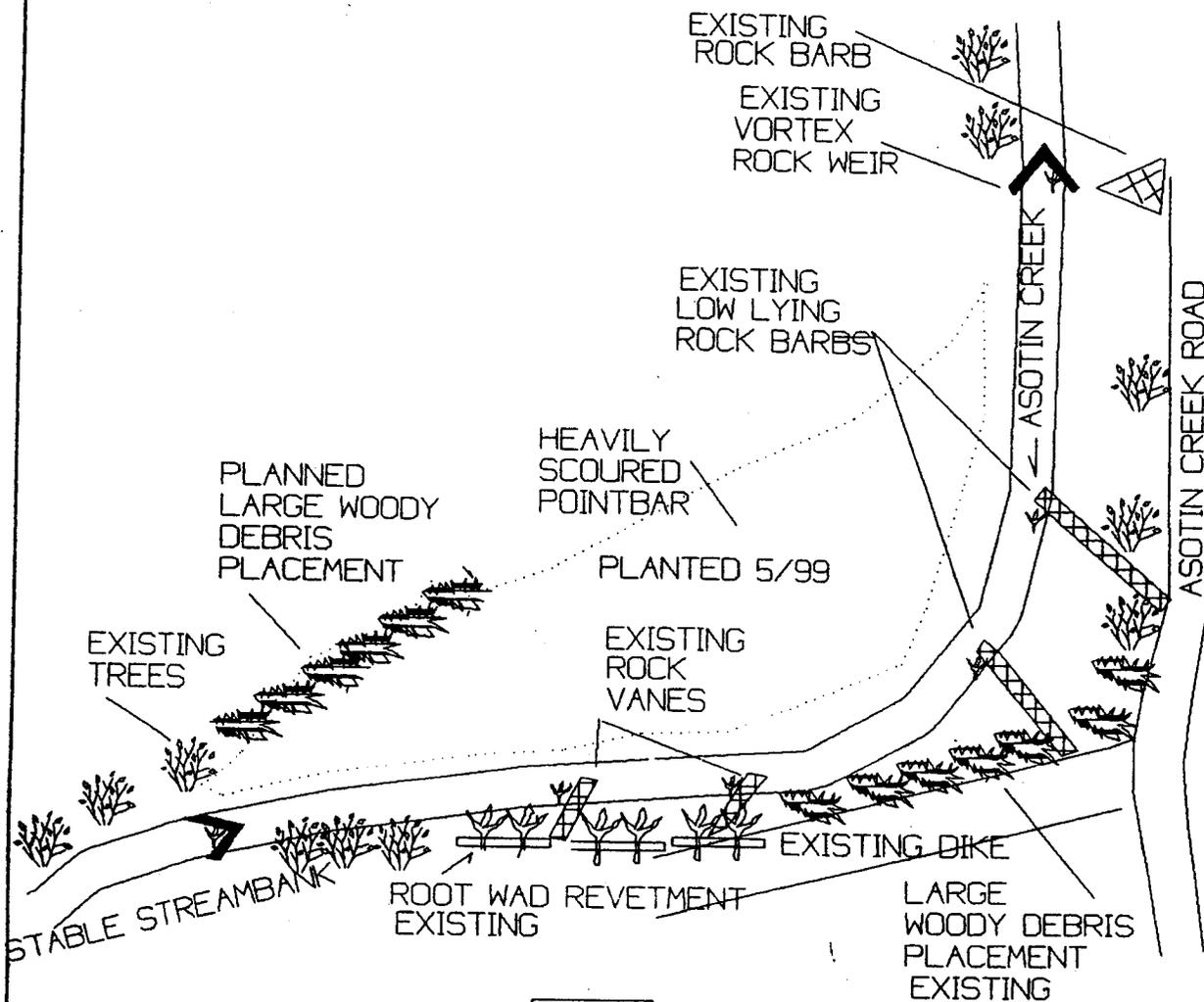


1999 PROJECT
LARGE WOODY DEBRIS PLACED ON RIGHT BANK APPROXIMATE LENGTH IS 200 FEET.

FRANK KOCH #2
SEC 3, T10N, R44E
R.M. 13.6

DATE _____
DESIGNED _____
DRAWN _____
TRACED _____
CHECKED _____

APPROVED BY: _____
TITLE _____
TITLE _____



BARN

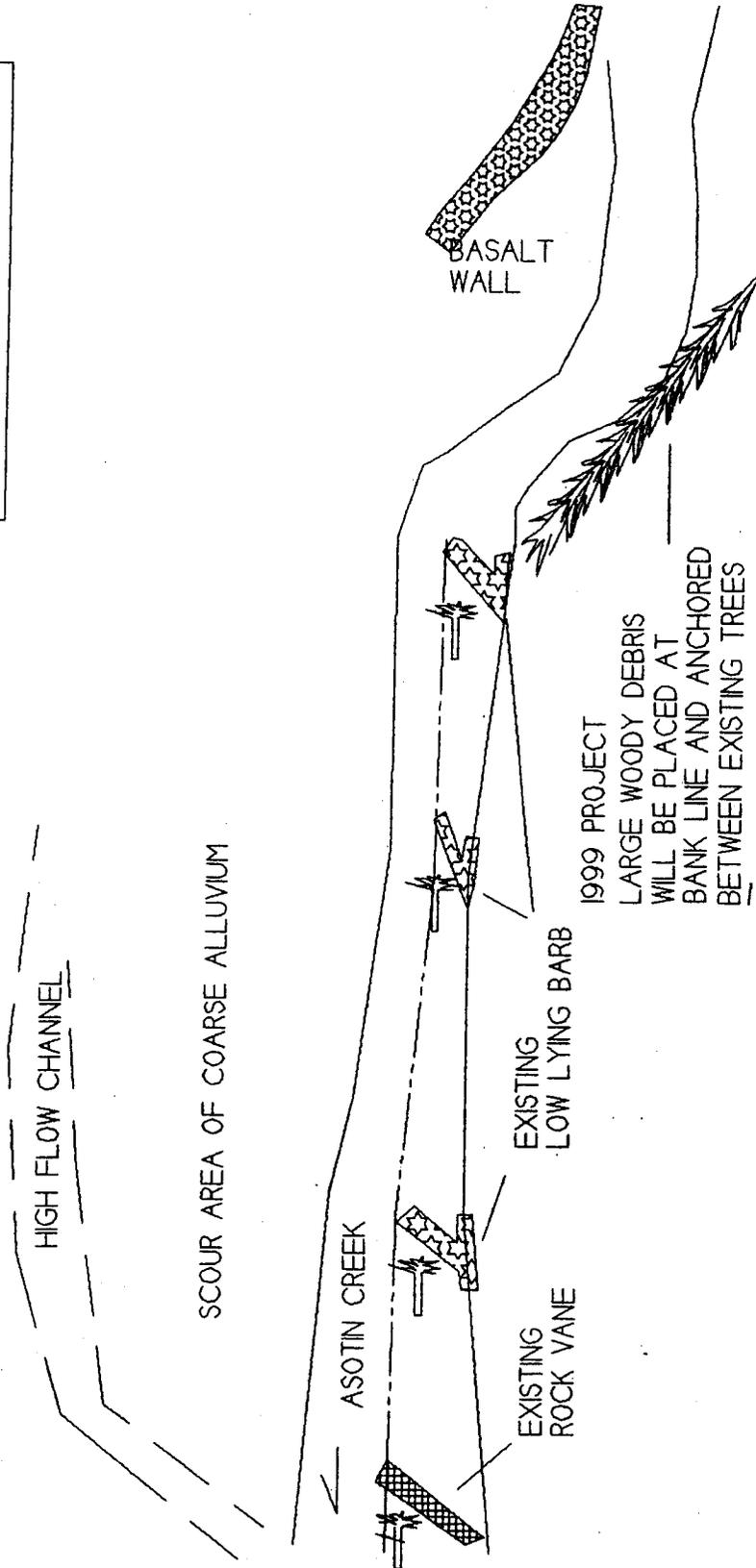
DRAWING NOT TO SCALE

USDA NATURAL RESOURCES CONSERVATION SERVICE
FRANK KOCH FISH HABITAT IMPROVEMENT
ASOTIN CREEK, ASOTIN COUNTY, WA.

DRAWING NO. _____
SHEET _____ OF _____

WAYNE HEITSTUMAN #3
 SW/4.SW/4.SEC35.T10N.R44E
 R.M. 12.6

LEGEND	
WOODY DEBRIS	
WATER EDGE	
STREAM CENTER LINE	
ROCK BARB	
ROCK VANE	
ROOT WAD/ BOULDER	



DRAWING NOT TO SCALE

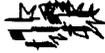
DESIGNED	DATE
DRAWN	APPROVED BY
TRACED	TITLE
CHECKED	TITLE

PLAN VIEW
 WAYNE HEITSTUMAN SITE 1 FISH HABITAT IMPROVEMENT
 ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.
 SHEET OF

LEGEND

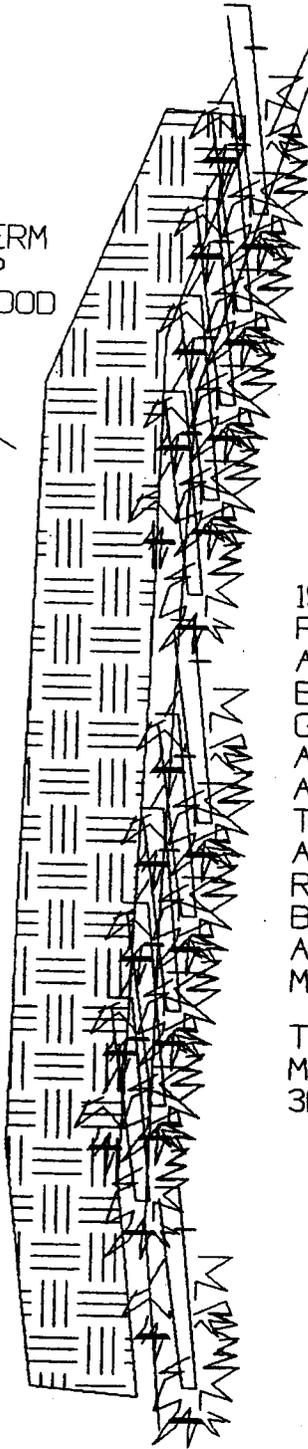
LARGE WOODY DEBRIS



WAYNE HEITSTUMAN #4
SW 1/4 SEC 35 T10N R44E
R.M. 12.4

GRAVEL BERM
PUSHED UP
DURING FLOOD
OF 1997

ASOTIN
CREEK



1999 PROJECT WILL BE TO PLACE LARGE WOODY DEBRIS ALONG THE RIGHT BANK AT THE BASE OF AND ON THE FACE OF GRAVEL BERM TO REDUCE VELOCITIES AT THE TOE OF THE SLOPE AND TO ADD FISH HABITAT COVER. THE WOODY MATERIALS WILL ALSO PROTECT EXISTING LIMITED RIPARIAN VEGETATION AND WILL BEGIN TO ESTABLISH A RIPARIAN AREA BY CAPTURING FLOATING MATERIALS AND SEDIMENT.

TOTAL LENGTH OF WOODY MATERIALS IS APPROXIMATELY 300 FEET.

DATE	APPROVED BY	TITLE

DESIGNED	DATE
DRAWN	
TRACED	
CHECKED	

PLAN VIEW
WAYNE HEITSTUMAN SITE 2 FISH HABITAT IMPROVEMENT
ASOTIN CREEK, ASOTIN COUNTY, WA.

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

DRAWING NO.

SHEET OF

LEGEND

LARGE WOODY DEBRIS



GENE THEISSEN #5

NE 1/4 SEC 25 T10N R44E
R.M. 10.5

DATE

APPROVED BY

TITLE

TITLE

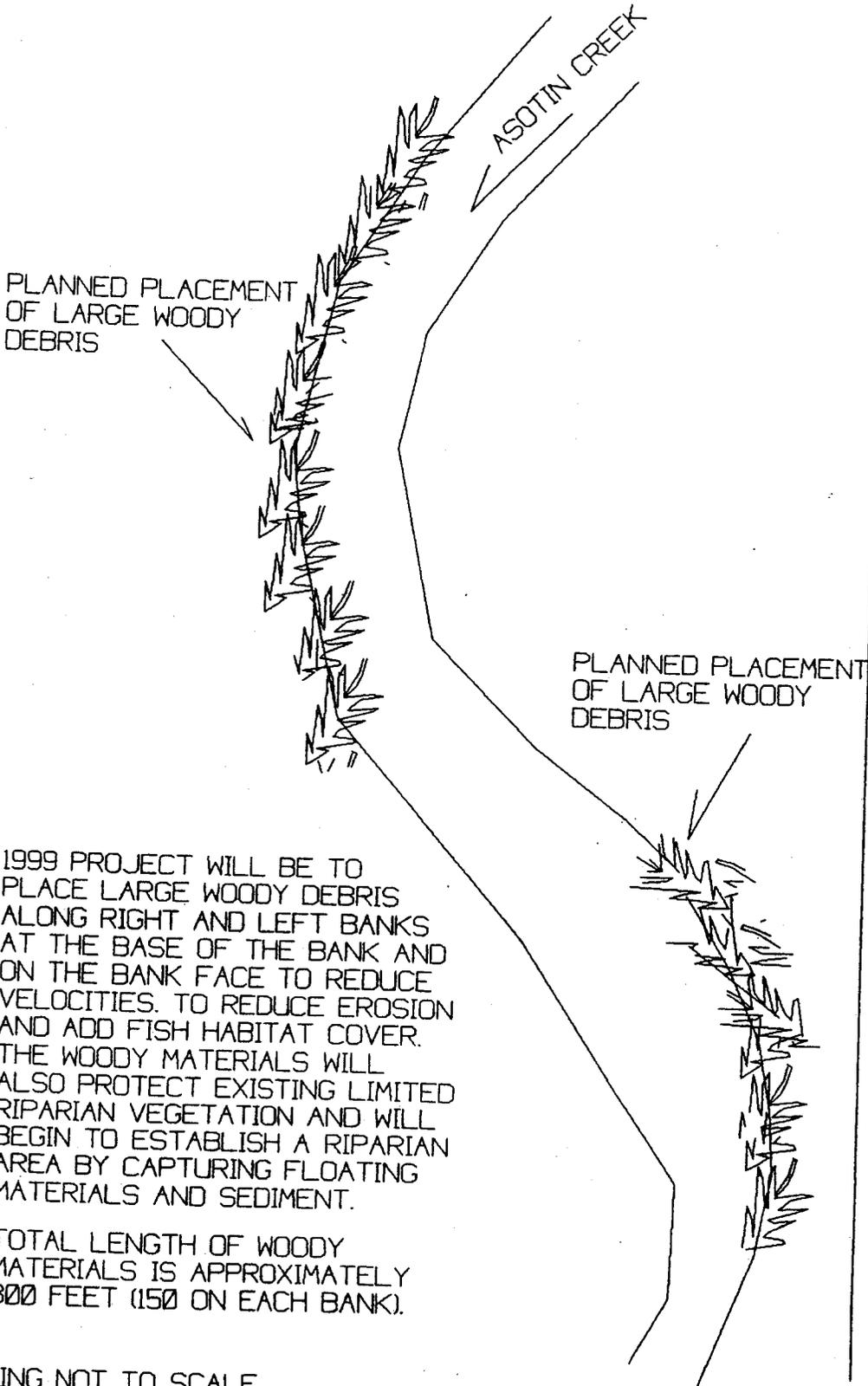
DATE

DESIGNED

DRAWN

TRACED

CHECKED



PLANNED PLACEMENT
OF LARGE WOODY
DEBRIS

ASOTIN CREEK

PLANNED PLACEMENT
OF LARGE WOODY
DEBRIS

ASOTIN CREEK ROAD

1999 PROJECT WILL BE TO PLACE LARGE WOODY DEBRIS ALONG RIGHT AND LEFT BANKS AT THE BASE OF THE BANK AND ON THE BANK FACE TO REDUCE VELOCITIES. TO REDUCE EROSION AND ADD FISH HABITAT COVER. THE WOODY MATERIALS WILL ALSO PROTECT EXISTING LIMITED RIPARIAN VEGETATION AND WILL BEGIN TO ESTABLISH A RIPARIAN AREA BY CAPTURING FLOATING MATERIALS AND SEDIMENT.

TOTAL LENGTH OF WOODY MATERIALS IS APPROXIMATELY 300 FEET (150 ON EACH BANK).

DRAWING NOT TO SCALE

PLAN VIEW
GENE THEISSEN FISH HABITAT IMPROVEMENT
ASOTIN CREEK, ASOTIN COUNTY, WA.
USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

SHEET 9F

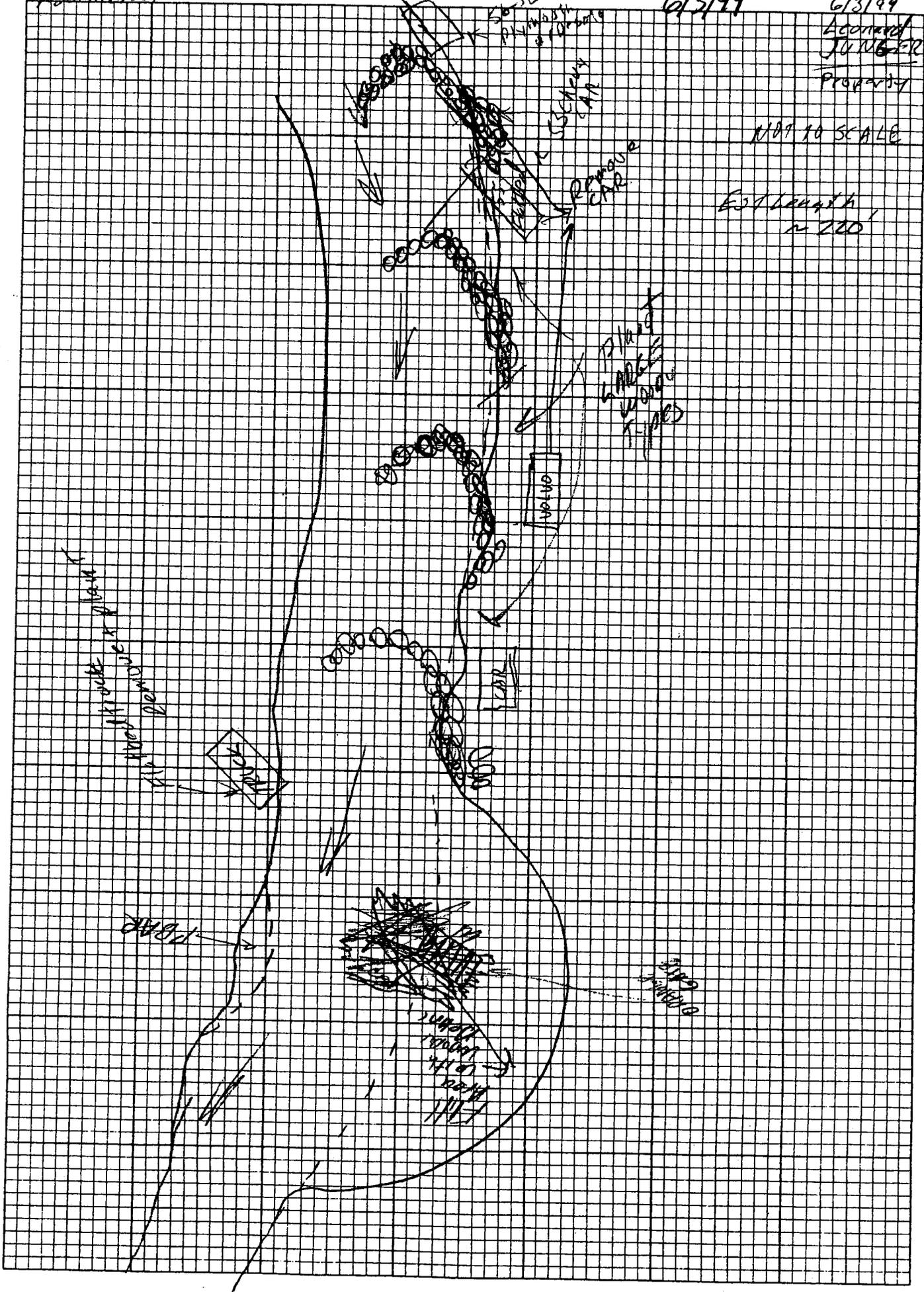
Jungert Site #6

Asotia Creek

6/3/99

6/3/99

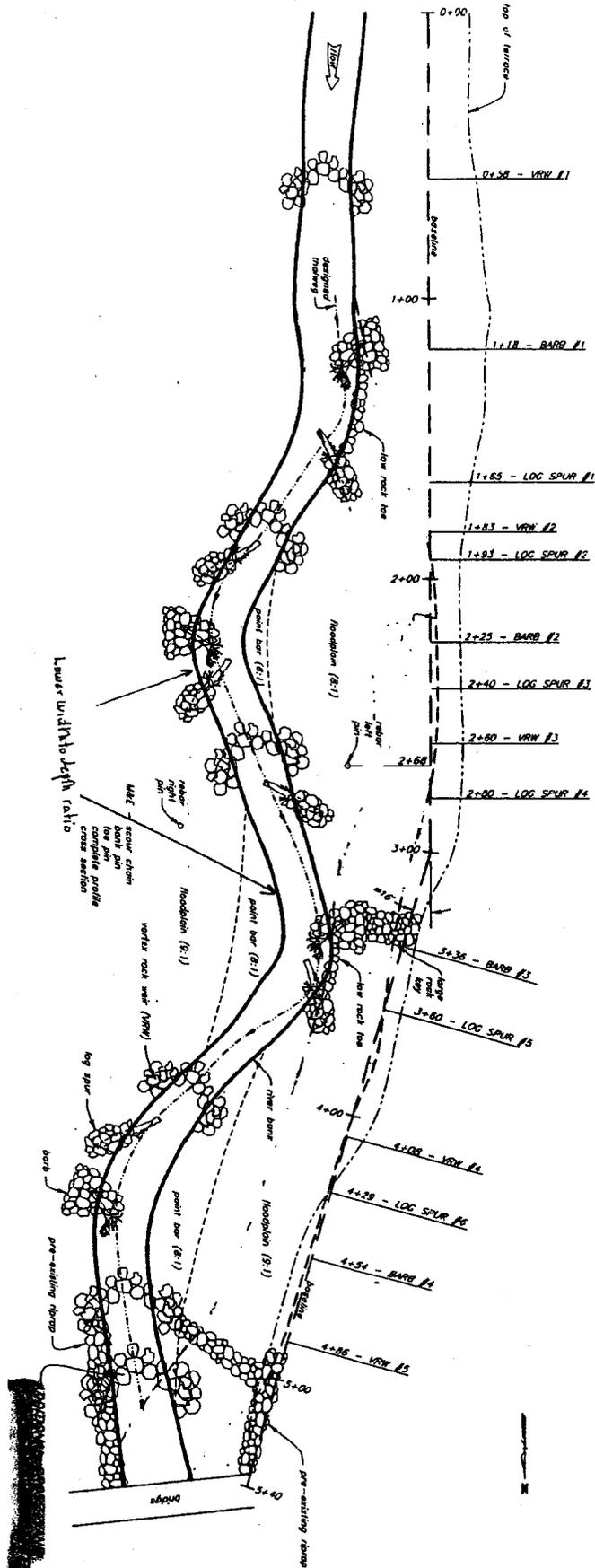
Agmond
JUNGERT
PROPERTY



SCALE - 1/4" = 10' TO 1" INCH
3/4" LINE ACCENTED, 10TH HEAVY

PLAN VIEW

SCALE 1" = 20'

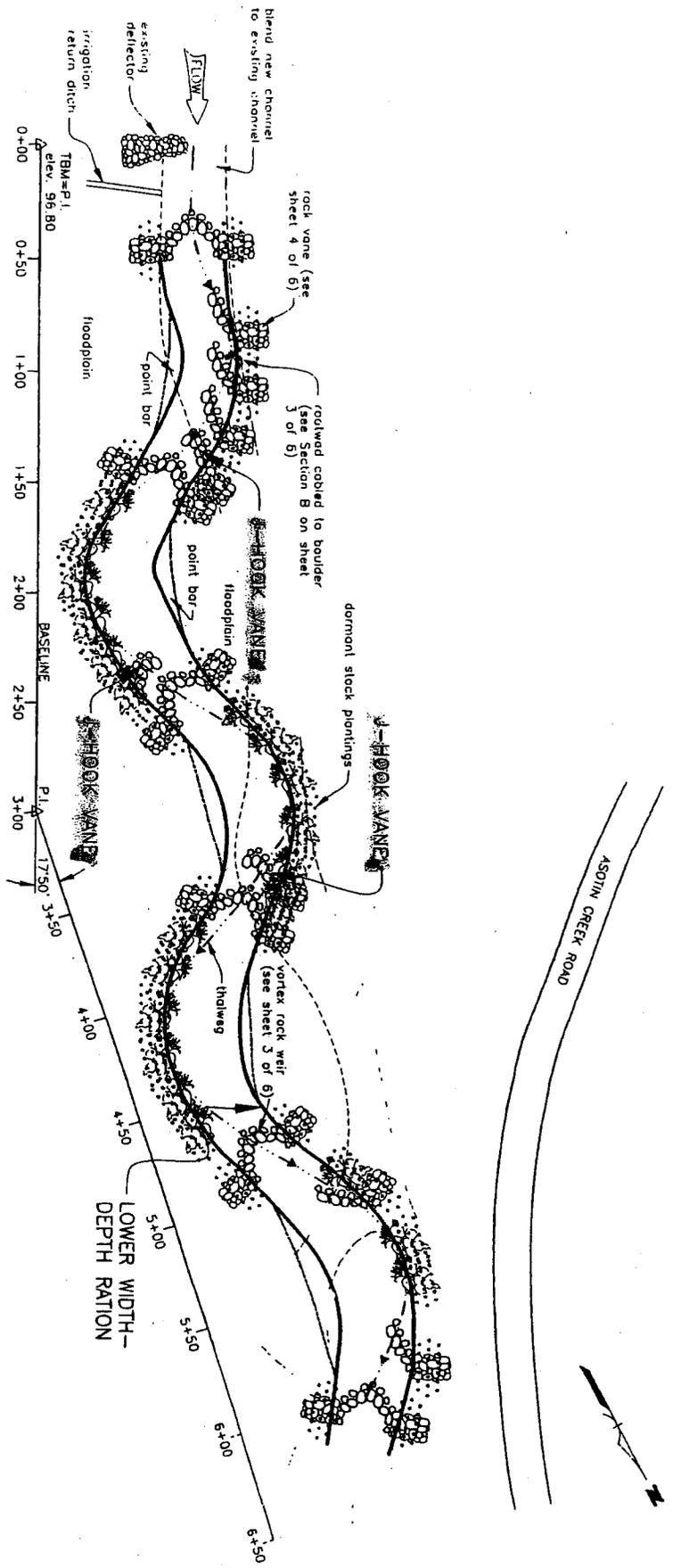


Dan Schlee #7

J-BAR RANCH - 1999 OPERATION & MAINTENANCE
 MEANDER RECONSTRUCTION
 SOUTH FORK ASOTIN CREEK
 ASOTIN CO., WASHINGTON

Designed	Steve Southard	DATE	_____
Drawn	Walt Reynolds	APPROVED	_____
Traced	_____	TITLE	_____
Checked	_____	TITLE	_____

30
 01 JUN 1999
 01 JUN 1999
 01 JUN 1999



PLAN VIEW
SCALE IN FEET
0 50

LEGEND
 - - - Existing Channel
 — Channel
 - - - - - Thoweg

Frank Koch #8

PLAN VIEW - 1999 OPERATION & MAINTENANCE
 FRANK KOCH - MEANDER RECONSTRUCTION

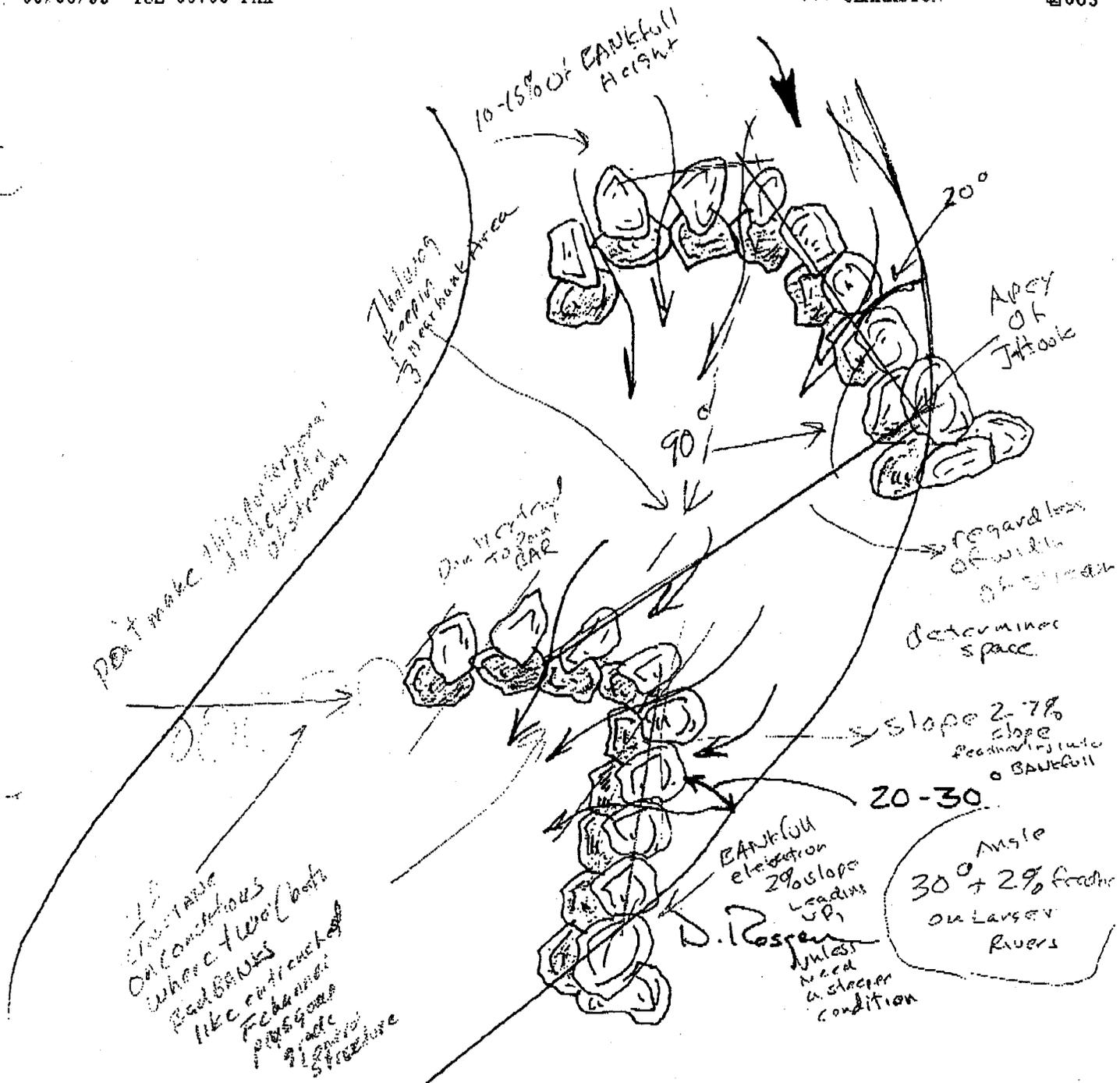
ASOTIN COUNTY, WASHINGTON

U.S.D.A. NATURAL RESOURCES CONSERVATION SERVICE

Checked	_____	Date	_____
Drawn	_____	Approved	_____
Project	_____	Time	0/22
Client	_____	Title	_____

CD REVIEWED
 KCOOZ-AZDMC
 DRAWING NO.

SHEET NO. 2 OF 6



Don't make this for bottom, just for top of stream

10-15% of BANKFULL HEIGHT

Theology keeping 3 ft gap bank area

20°

Apex of J hook

90°

Dike Vertical TO DOWN BAR

regard loss of width of stream determines space

slope 2-7% slope feeding into BANKFULL

20-30

BANKFULL elevation 2% slope leading UP, unless need a steeper condition

Angle 30° + 2% feeding on larger Rivers

Don't make this for bottom, just for top of stream

Plan View

"J hook" Vane

FILE

J Hook is not a grade control structure



Department of Energy
 Bonneville Power Administration
 P.O. Box 3621
 Portland, Oregon 97208-3621

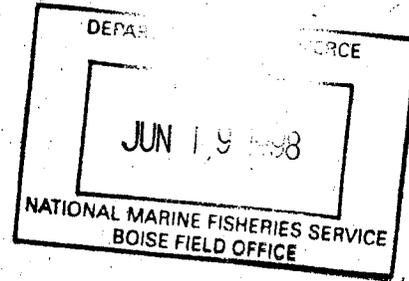
*Copy to Rick Edwards
 Rick has a BA
 copy*

ENVIRONMENT, FISH AND WILDLIFE

JUN 09 1998

In reply refer to: EW-4

Mr. Ted Meyers
 ATTN: Rick Edwards
 National Marine Fisheries Service
 1387 South Vinell Way, Suite 377
 Boise, ID 83709



Dear Mr. Meyers

Enclosed for your review are the Biological Assessments of nineteen new project sites on Asotin Creek and its major tributaries; tributary to the Snake River, southeast Washington, Asotin Creek Model Watershed. These projects are part of the Northwest Power Planning Council's Fish and Wildlife Implementation Program for Fiscal Year 1998.

These Biological Assessments were completed by the Natural Resources Conservation Service Blue Mountain field office and Spokane state office, in cooperation with Rick Edwards, Boise field office, National Marine Fisheries Service, Boise, Idaho. It was determined that the proposed actions "**May affect, not likely to adversely affect**" the listed species of spring chinook or their critical habitat.

Due to this determination, we ask that you review and approve the implementation of the proposed projects as soon as possible. The work window for these instream projects on Asotin Creek is July 15 to September 30 for all project sites. All work window dates are coordinated with Glen Mendell, Washington Department of Fish and Wildlife.

If you have any questions, please contact Mark Shaw at (503) 230-5239.

Thank you for your timely review of these projects.

Sincerely,

Original Signed by
 D. Robert Lohn

D. Robert Lohn
 Director, Fish and Wildlife

Enclosure

ASOTIN Conservation District

Date: Wednesday, June 17, 1998
To: File
From: Bradley J. Johnson *BJJ*
Subject: May Affect, Not Likely to Adversely Affect Determination for Snake River Spring Chinook Salmon and Summer Steelhead

The Asotin County Conservation District in cooperation with the Bonneville Power Administration (BPA) is proposing installation of fish habitat restoration projects on Asotin Creek under the *Asotin Creek Model Watershed Plan*. A brief project description and determination of May Affect, Not Likely to Adversely Affect, project site maps, and drawing are in the Biological Assessment completed for spring chinook salmon and summer steelhead submitted by BPA to the National Marine Fisheries Service Office, Boise, Idaho.

BIOLOGICAL ASSESSMENT
ASOTIN CREEK MODEL WATERSHED
1998
FISH HABITAT RESTORATION PROJECTS
On
ASOTIN CREEK, WASHINGTON

Koch #1
Koch #2
Koch #3
Charley Creek #4
Charley Creek #5
M. Koch #6
M. Koch #7
Hood #8
Thiessen #9
Thiessen #10

J. Koch #11
M. Bogar #12
Thompson #13
C. Flynn #14
Charley Creek #15
Charley Creek #16
Charley Creek #17
Charley Creek #18
South Fork

Submitted by
US DOE, Bonneville Power Administration

Submitted to
US DOC, National Marine Fisheries Service

Prepared by
Asotin County Conservation District
And
USDA, Natural Resources Conservation Service

June 1998

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APPENDIX B LOCATION MAPS AND PLAN DRAWINGS

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APPENDIX D MONITORING PLAN

INTRODUCTION:

The Northwest Power Planning Council as a "Model Watershed" has designated the Asotin Creek watershed. This designation has resulted in the Asotin County Conservation District (ACCD) sponsoring a watershed approach for inventory and analysis in order to develop the *Asotin Creek Model Watershed Plan*. The conservation district has ensured that the model watershed planning process is being driven by a locally based effort comprised of landowners, business people, user groups, civic organizations, recreationists, students, and other interested citizens. The *Asotin Creek Model Watershed Plan* provides a framework for improving the overall health of the Asotin Creek watershed, with an emphasis on improving fish habitat for Snake River spring/summer chinook (herein, spring chinook). Although the *Asotin Creek Model Watershed Plan* was developed with an emphasis on salmon, habitat improvements will compliment all fish species including Snake River Summer Steelhead and bull trout.

The ACCD is seeking funding from BPA and the proper permits to help fund landowners (or managers) enhance fish habitat by installing structures that will create or enhance pools, stabilize streambanks, add woody materials for complex cover, and plant trees/shrubs to develop a shaded riparian area.

I. PROJECT PURPOSE

In the *Asotin Creek Model Watershed Plan* the ACCD identified the following as primary fish habitat problems within the Asotin Creek watershed:

- - high stream temperatures
- - lack of in-stream fish resting and rearing habitat
- - sediment deposition in spawning gravels

These limiting factors focused the Technical Advisory Committee and the Landowner Steering Committee on the following goals for the *Asotin Creek Model Watershed Plan*.

The goals are:

- 1) reduce water temperatures,
- 2) create many large rearing and resting pools,
- 3) use conservation practices (such as fencing, tree planting, filter strips, and upland practices) to protect water quality, streambank integrity, and the riparian area.

The objectives of the 1998 projects are to meet the goals outlined above by using bioengineering methods of structural design applicable to stream type and conditions. The term bioengineering, as used in this document, refers to the use of living (tree and shrub plantings) and inert materials (rock, logs, and root wads) combined with sound engineering principles for the purpose of streambank stabilization, in-stream fish habitat development, and riparian habitat restoration. Nearly every structure planned, either as a single structure or as a component of a multiple structure system, will provide numerous benefits in progressing toward the above goals. **Appendix A** contains generic structure drawings, descriptions, construction, benefits and a description of the NRCS/District tree planting agreement and species list.

A. Individual Sites

An Interdisciplinary Team evaluated 19 sites on Asotin Creek, WA. The sites were evaluated according to fish and wildlife habitat needs in relation to the goals and objectives stated in the *Asotin Creek Model Watershed Plan*. The Technical Advisory Committee, Landowner Steering Committee and the Asotin County Conservation District Board of Supervisors then reviewed conceptual drawings of the sites with the recommended practices. These drawings are located in **Appendix B**.

Project Objectives: Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhances floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Sites will be revegetated with native trees and shrubs in the spring of 1999.

Project Timelines: are all the same with work beginning August 1, 1998 and completed on or before September 30, 1998.

Operation and Maintenance: Upon successful completion of the project, the operation and maintenance of each site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation at Koch #1 and Hood #8 will include:

1. Bank erosion pins for estimates of lateral migration.
2. Toe pins for vertical movement and measurement to the bank pins for estimate of streambank changes.
3. Scour chains to monitor incision.
4. Longitudinal profile referenced to two cross-sections (Profile ~ 1,000 ft.) for overall corridor changes.
5. Physical description of pools (width, depth & presence or absence of LWD).
6. Pebble counts in pool tailouts.
7. Photo plots – pictures before and after projects. Pictures of riparian development.
8. WDFW will conduct pre and post construction habitat and fish utilization surveys.
9. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

And the remainder of the sites will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Project: Koch #1 Meander Reconstruction Project
Landowner: Frank Koch
Location: SW ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 14.1

Project Description:

The January 1st flood of 1997 caused extensive damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 600 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. Restoration efforts installed in 1997 were successful and it is clear that the landowner understands that something else needs to be accomplished and has agreed to the following plans.

Site Description:

Geomorphic Meander Reconstruction: 750 ft reconstructed (presently 500 ft).
Root wad revetments – 320 ft
Vortex rock weirs - 6
Rock vanes – 4 on the left bank
LWD placements – 7 root wads placed into pools

Project: Koch #2 Channel Reconstruction Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 13.6

Project Description:

The January 1st flood of 1997 caused extensive damage to a pre-constructed dike and the adjacent stream corridor. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow). While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. This area is traditionally dozed to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Site Description:

Vortex rock weirs – 2
Rock vanes – 2 on the left bank
Rock barbs – 3 on the left bank
Root wad revetments – 150 ft on the left bank
LWD placements – 7 root wads placed into pools

Project: Koch #3 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 13.3

Project Description:

The January 1st flood of 1997 caused extensive damage to an irrigated field and the adjacent stream corridor. As a result, it has become braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. A single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. This area is traditionally dozed to keep channel clear of debris and vegetation. It is clear that he understands something needs to be accomplished and has agreed to the following plans.

Site Description:

Vortex rock weirs - 2
Rock vanes - 4 on the left bank
Off-channel depositional areas - 3 on floodplain on the left bank
LWD placements - 80 ft on left bank of off-channel

Project: Charley Creek #4 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Charley Creek @ RM .5

Project Description:

The January 1st flood of 1997 caused extensive damage to Charley Creek. As a result, the stream is denuded of vegetation and one constant depth. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. 200 ft needs to be treated to reduce lateral migration and potential incision. Charley Creek has the largest density of juvenile steelhead in SE Washington according to the Washington Department of Fish and Wildlife. This area is traditionally dozed to keep channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and has agreed to the following plans.

Site Description:

Vortex rock weir - 1
Rock vanes - 2 on the Right Bank
Root wad revetments - 100 ft on the right bank
LWD placements - 3 root wads placed into pools

Project: Charley Creek #5 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Charley Creek @ RM .1

Project Description:

The January 1st flood of 1997 caused the mouth of Charley Creek to become braided and the majority of the stream is running along the edge of an alfalfa field. It is potentially an adult passage barrier and needs to be put into two or three channels instead of the current conditions of 5 separate braided channels. Large woody debris will be used to help slow water velocities in the channels along the field edge and help maintain two existing channels through the riparian area. Two small rock vanes will be used to help maintain pools and velocities in the desired channel. Charley Creek has the largest density of juvenile steelhead in SE Washington according to the Washington Department of Fish and Wildlife.

Site Description:

Rock vanes – 2 one on left bank and one on right bank
LWD placements – 2 root wads placed into pools and also used to help reduce flows in undesirable channels

Project: M. Koch # 6 Habitat Restoration Project
Landowner: Marty Koch
Location: NE ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 12.6

Project Description:

The January 1st flood of 1997 caused extensive damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 200 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and has agreed to the following plans.

Site Description:

Vortex rock weirs - 2
Rock vanes – 3 on the left bank
LWD placements – 5 root wads placed into pools and 100 ft on left bank

Project: M. Koch #7 Habitat Restoration Project
Landowner: Marty Koch
Location: NE ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 12.3

Project Description:

The January 1st flood of 1997 caused extensive damage a field and the adjacent stream corridor at this site. As a result, the stream channel is wide and shallow. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 150 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and has agreed to the following plans.

Site Description:

Vortex rock weir - 1
Rock vanes – 2 on the left bank
LWD placement – 3 root wads placed into pools and 150 ft on left bank

Project: Hood #8 Habitat Restoration Project
Landowner: Larry Hood
Location: NE ¼, Sec 35, T10N, R44E Mainstem Asotin Cr. @ RM 12

Project Description:

The January 1st flood of 1997 caused extensive damage to pastureland, county road and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 200 ft need to be treated to reduce lateral migration and potential incision. The County Road Department rip rapped the road and the stream is currently 75 feet from the road. Cobble berms that were pushed up during construction are still intact need to be removed and pool forming structures need to be installed to help deepen the channel.

Site Description:

Vortex rock weirs - 2
Rock vane – 1 on the left bank
LWD placements – 3 root wads placed into pools and 75 ft on left bank backwater area

Project: Thiessen #9 Habitat Restoration Project
Landowner: Gene Thiessen
Location: NE ¼, Sec 25, T10N, R44E Mainstem Asotin Cr. @ RM 11

Project Description:

The January 1st flood of 1997 caused extensive damage to pastureland, county road and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 300 ft need to be treated to reduce lateral migration and potential incision.

Site Description:

Vortex rock weirs - 3
Rock vanes – 2 on the left bank
LWD placements – 5 root wads placed into pools and 175 ft on the left bank

Project: Thiessen #10 Habitat Restoration Project
Landowner: Gene Thiessen
Location: SW ¼, Sec 26, T10N, R44E Mainstem Asotin Cr. @ RM 10.9

Project Description:

The January 1st flood of 1997 caused extensive damage to pastureland and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 400 ft need to be treated to reduce lateral migration and potential incision. This area currently has a ten foot high raw, vertical bank exposed bank on the right bank. The water velocities and depths are consistent throughout the site without any pools along the exposed bank.

Site Description:

Vortex rock weirs - 2
Rock vanes – 3 on the right bank
LWD placements – 5 root wads placed into pools and 200 ft on the right bank

Project: J. Koch #11 Habitat Restoration Project
Landowner: Jim Koch
Location: SW ¼, Sec20, T10N, R44E Mainstem Asotin Cr. @ RM 9.4

Project Description:

The January 1st flood of 1997 caused extensive damage to an over-winter feeding area and the adjacent stream corridor at this site. As a result, the stream channel is wide and shallow. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 600 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and has agreed to the following plans.

Site Description:

Vortex rock weirs - 2
Rock vanes – 2 on the left bank
LWD placements – 4 root wads placed into pools

Project: M. Bogar #12 Habitat Restoration Project
Landowner: Mark Bogar
Location: SE ¼, Sec 24, T10N, R45E Mainstem Asotin Cr. @ RM 3

Project Description:

This site is on the mainstem of Asotin Creek directly below the mouth of George Creek. On the left bank the thalweg is directly below a four-foot bank with limited amount of riparian vegetation. The velocities and depths at this site are constant and it was identified for adult passage pool forming structures that will also help reduce pressure to the left streambank. The landowner has agreed to the following plans.

Site Description:

Vortex rock weir - 1
Rock vane – 1 on the left bank
LWD placements – 2 root wads placed into pools

Project: Thompson #13 Habitat Restoration Project
Landowner: Harold Thompson
Location: SE ¼, Sec 24, T10N, R45E Mainstem Asotin Cr. @ RM 2.7

Project Description:

The January 1st flood of 1997 caused damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream channel is wide and shallow. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 200 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and has agreed to the following plans.

Site Description:

Vortex rock weirs - 6
Rock vanes – 2 First one on the right bank, downstream second one on the left bank
LWD placements – 8 root wads placed into pools

Project: C. Flynn #14 Habitat Restoration Project
Landowner: Carl Flynn
Location: Sec 19, T10N, R46E Mainstem Asotin Creek @ RM 2

Project Description:

The January 1st flood of 1997 caused damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream channel is wide and shallow. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 200 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and has agreed to the following plans.

Site Description:

Rock vanes – 4 on the left bank
LWD placements – 4 root wads placed into pools

Project: Charley Cr. #15 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 1, T9N, R43E Charley Cr. Creek @ RM 5

Project Description:

The January 1st flood of 1997 caused damage to native rangeland and the adjacent stream corridor at this site. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 550 ft need to be treated to reduce lateral migration and potential incision. Charley Creek has the largest density of juvenile steelhead in SE Washington according to the Washington Department of Fish and Wildlife.

Site Description:

Vortex rock weirs - 3
LWD placements – 3 root wads placed into pools and 100 ft on the left bank

Project: Charley Cr. #16 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 16, T9N, R44E Charley Creek @ RM 4.5

Project Description:

The January 1st flood of 1997 caused damage to native rangeland and the adjacent stream corridor at this site. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 800 ft need to be treated to reduce lateral migration and potential incision. Charley Creek has the largest density of juvenile steelhead in SE Washington according to the Washington Department of Fish and Wildlife.

Site Description:

Vortex rock weirs - 3
Rock vanes – 1 on the left bank
LWD placements – 4 root wads placed into pools

Project: Charley Cr. #17 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 5, T9N, R44E Charley Creek @ RM 3

Project Description:

The January 1st flood of 1997 caused damage to native rangeland and the adjacent stream corridor at this site. As a result, the stream became braided. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 550 ft need to be treated to reduce lateral migration and potential incision. Charley Creek has the largest density of juvenile steelhead in SE Washington according to the Washington Department of Fish and Wildlife.

Site Description:

Vortex rock weirs - 1
Rock vanes – 3 on left bank
LWD placements – 4 root wads placed into pools

Project: Charley Cr. #18 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 5, T9N, R44E Charley Creek @ RM 2.7

Project Description:

The January 1st flood of 1997 caused damage to native rangeland and the adjacent stream corridor at this site. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 550 ft need to be treated to reduce lateral migration and potential incision. Charley Creek has the largest density of juvenile steelhead in SE Washington according to the Washington Department of Fish and Wildlife.

Site Description:

Vortex rock weirs - 2
Rock vanes – 5 two on left bank and three on right bank
LWD placements – 7 root wads placed into pools

Project: South Fork Riparian Restoration and In-stream Habitat Development
Landowner: Washington Department of Fish and Wildlife
Location: Sec 10, 15, and 22, T9N, R44E, South Fork Asotin Creek

Project Description:

Historically intensive land use has occurred on these sections resulting in degraded stream channel stability, a loss of riparian vegetation and subsequently poor in-stream habitat. This reach of the south fork of Asotin Creek is a potentially significant producer of wild steelhead trout. To assist the reach achieve it's full potential, we propose to place large woody debris along the streambank to provide bank stability, in-stream habitat and promote revegetation. In addition to the placement of LWD, we propose the installation of rock weirs and boulder placements so that pool habitat is created in this degraded stream reach. The area will be isolated from grazing, camping and motorized vehicles with a fence. The riparian corridor will be revegetated next spring (March 1999) with conifers, dogwood, cottonwood and willow plantings during the dormant season.

Site Description:

- Vortex rock weirs - 3
- Boulder placements - 3 (each containing 3 to 5 three feet diameter boulders)
- LWD placements – along 800 feet, not contiguous.

B. Location Maps and Plan Drawings

See Appendix B

C. Relationship to Regional Planning Documents

The *Asotin Creek Model Watershed Plan* was developed to improve the health of the watershed as it relates in general to the creek itself, but specifically as it relates to Asotin Creek spring chinook salmon, which are part of the endangered Snake River chinook stocks. During the development of the *Asotin Creek Model Watershed Plan*, numerous documents including the Northwest Forest Plan, PACFISH and the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP), were reviewed in order to determine the goals that would need to be met if the *Asotin Creek Model Watershed Plan* were to be successful. The projects were compared individually to the elements in **Table 1 (Appendix C)** for a properly functioning salmonid stream, as defined by NMFS and PACFISH. Each site was then rated for its environmental effects in **Table 2 (Appendix C)**. Since these three documents dealt primarily with federal lands, and since the USFS, as a major land manager in the watershed and an active member of the Asotin Creek Technical Advisory Committee, was already implementing most of the measures that these documents advised, the *Asotin Creek Model Watershed Plan* incorporated only those elements (such as pool frequency and size) that could be feasibly undertaken on private and state lands.

The summary of effects in **Table 2** appear to show no major fish habitat gains, primarily because: 1) The cumulative length of the projects is very small in relation to the entire stream length 2) The table does not give credit for localized improvements; and 3) The term LWD, as used by NMFS and supported by fish habitat literature, is restricted to downed trees or parts of trees that are at least 35 feet long, with a minimum diameter of 12 inches. Most of the described projects do not include material this large or a portion of the log may be buried in the bank.

The plans for each project site show improvements for fish habitat by means of riparian plantings and the installation of stumps, logs, vortex rock weirs, rock vanes, and barbs to form large pools. All of the weirs and rock deflectors/barbs will contain stumps and logs to add complexity and cover to each pool-forming structure.

II. Description of the Species Present:

Spring/Summer Chinook Salmon

Asotin Creek: Spring/summer chinook were first documented in Asotin Creek in the 1930s by the former Bureau of Commercial Fisheries (now US Fish & Wildlife Service). In the mid 1950s, the US Army Corps of Engineers (COE) estimated an average of 18 adult chinook passed Headgate Dam

The US Forest Service (USFS) conducted the first on-site chinook spawning surveys in 1972 and 1973. Only the North Fork was surveyed. Since both of these surveys were on National Forest lands, they would have missed any spawning which might have occurred in the five miles of similar habitat downstream of the Forest boundary. Washington Department of Fish and Wildlife (WDFW), beginning in 1984 then conducted yearly surveys. The high count of 76 fish and 12 redds made in 1972 had steadily declined, so that by 1985 the count was 8 fish and 8 redds. No adult salmon have been found since the 1993 count of 2 fish and 2 adults. The Asotin Creek chinook counts follows the same trend in relative numbers as do historic redd counts in the Imnaha River since 1957. The Imnaha is only 48 miles upstream of Asotin Creek and located on the same side of the Snake River. There are no dams between the two streams. The 1972 count was the third highest in the Imnaha since the construction of the Dalles Dam. The 1973 count was the highest.

The limited data that has been collected for Asotin Creek chinook indicates that their life history is similar to that of the Tucannon River spring/summer chinook. The adults enter the Columbia River in early spring, swim upstream 145 miles and cross the Bonneville Dam by August 15. They continue for another 324 miles and cross seven more dams before reaching the mouth of Asotin creek. These fish must negotiate two more dams than the Tucannon fish.

Most adults probably enter the creek during high flows in May and June. Once in the stream, they move at varying speeds from pool to pool until they find a suitable holding area where they may stay from one week to over three months prior to spawning. The preferred holding areas are usually pools which have cover in the form of large woody debris (LWD) or undercut banks. They spawn in the North Fork, between late August and late September.

Snake River Summer Steelhead

Snake River summer steelhead runs have fared much better in the Asotin Creek watershed than those of the salmon. According to Mark Schuck Washington Department of Fish and Wildlife (WDFW), Asotin Creek had runs that exceeded 1000 steelhead adults between 1954 - 1961. The States escapement goal for these fish is to have 225 spawners in the system each year. These fish seem to have suffered the current malaise that all anadromous fish have and are only returning in numbers between 120 - 170 fish annually. The steelhead found in Asotin Creek are now considered as "A" run fish which are smaller than their cousins, the "B" run fish, famous for the Clearwater River drainage. Most of these fish are "one ocean" fish, meaning they only spend one year in the ocean, returning in the following summer. Steelhead within the North Fork of the Asotin Creek watershed have been known to utilize almost all of the creeks in drainage with most of the spawning occurring in the main stem. Table 1 displays the results of spawning ground surveys within the Asotin Creek watershed since 1986 (Schuck, Viola and Keller 1994).

This winter/spring run fish enters the watershed during February through April, when water levels are highest and water temperatures are relatively cold. Spawning occurs in the North Fork

of Asotin Creek, South Fork of Asotin Creek, Charlie Creek, and a limited amount in the main stem of Asotin Creek above Headgate Dam. Peak spawning occurs in mid-April. Fry emerge from the gravels in late May through July and move into shallow riffle areas until the fall months when they move into side channels, deeper pools, and backwater areas. They usually spend two years in the stream before migrating to saltwater during April through June. This allows the fish to reach spawning grounds without much trouble, overcoming the migration barriers of low flow and warm water found later in the year.

Table 1. Summary of Steelhead Spawning Surveys reported total Redd/Mile by Washington Department of Wildlife

Year	North Fork Asotin	South Fork Asotin
1986	37.2	21.9
1987	25.6	10.3
1988	15.0	11.5
1989	5.2	3.2
1990	3.5	2.6
1991	5.4	0.0
1992	4.5	3.3
1993	5.4	7.1
1994	5.5	2.4

III. Description of the Action Area:

A. Environmental Baseline

Temperature: All of the project sites are in areas of poor temperature conditions for chinook, both for rearing and spawning. Water temperatures do not noticeably improve until about the North Fork (RM 15), although they approach the lethal limit (77°F) only in the South Fork and the very mouth of the creek. Data from the *Asotin Creek Model Watershed Plan* indicates that the stream is noticeably cooler than it was in 1984.

Dissolved Oxygen (DO): There is not much information regarding DO for the mainstem downstream of the USFS boundary. A study by WSU (Moore 1991) found that near the mouth of the creek, the DO was usually above the state standard of 8.0 mg/l during the hottest summer months and never went below 6.8 mg/l.

Turbidity: Frequently, Asotin Creek contains high amounts of suspended sediments. This usually occurs during spring runoff and during periods of heavy, long duration rains in late spring and intense thunderstorms in early summer. The sediment and turbidity increases dramatically downstream of the mouth of George Creek

IV. Effects of the Proposed Action on Proposed/Listed Species or Proposed/Designated Critical Habitat

A. Positive impacts: These projects will have several common components that will improve fish habitat, even though they may not be enough to raise the condition level of an indicator, as described in **Table 2 Appendix C**.

Structures will be designed to create and maintain sizable pools that will benefit both salmon and steelhead. Complex cover, interstitial spaces, and disrupted flows will greatly enhance the available habitat at all sites. Structures will disrupt flow patterns and create gravel "tail out" areas suitable for spawning steelhead and salmon. The majority of structures installed will have immediate benefits and all structures will provide long term fish benefits. Streambank stabilization structures will incorporate large woody materials and rock installed to protect the streambank from accelerated erosion, scour resting pools and adds woody debris to provide complex cover. Pool forming structures will also have large woody debris incorporated during construction. Root wads will be placed in or near the pool to provide the best cover possible without jeopardizing the structural integrity of the practice. Gravel sorting creating suitable spawning areas is another benefit of the pool forming structures.

All project sites will be planted to native vegetative species either during construction or the following year. The native plant materials will be dormant stock whips or poles and rooted stock.

B. Determination of Effects: The following questions were reviewed and addressed as part of the decision-making process to make the Section 7 determination of effect:

Are there any proposed/listed anadromous salmonids and/or proposed or designated critical habitat in the watershed or downstream from the watershed?

Answer: **yes.**

Do the proposed actions have the potential to hinder attainment of relevant properly functioning indicators?

Answer: **no.**

Do the proposed actions have the potential to result in "take" of proposed/listed anadromous salmonids or destruction/adverse modification of proposed/designated critical habitat?

Answer: **no.**

Determination: **May Affect, Not Likely to Adversely Affect**

V. Mitigation Measures

The goal of these projects are to make them part of a cumulative process, as described in the *Asotin Creek Watershed Plan*, that will lead to long term restoration of salmon and steelhead habitat in Asotin Creek, as part of the recovery effort for the Snake River. The long-term effects of the projects will help reach the goals in the *Asotin Creek Model Watershed Plan*. However, there may be some short-term negative effects that will have mitigation efforts designed for their reduction or elimination. The best mitigation is to perform the in-stream work only during those times of the year when the target fish species is least susceptible.

Work will only be performed during the "work window" established by WDFW. The window for working on in-stream projects in the mainstem Asotin Creek and the South Fork is from July 15 to September 30. If any condition changes during the window period and the WDFW Regional Habitat Biologist recognize that the project construction is causing adverse impacts to the listed species, the work will be shut down. Equipment such as track-hoes will be used for earth movement, rock placement and root wad installation with limited stream access. Rock used will be clean angular basalt. Earth stockpiles will be placed away from the stream to avoid soil movement into surface waters during periods of heavy rains. During runoff events construction will cease in order to avoid siltation of the stream and undesirable soil compaction.

VI. Monitoring

NRCS and the Asotin County Conservation District personnel will complete construction monitoring. The WDFW Regional Habitat Biologist will complete spot checks for permit compliance.

The Asotin Creek Monitoring Plan is divided into four areas: 1) Water quality; 2) Stream physical characteristics; 3) Fish utilization; and 4) Riparian vegetation enhancement.

Water quality monitoring is being completed by Washington State University; in cooperation with the conservation district. Copies of the testing parameters and preliminary results are included in **Appendix D**. The Asotin Conservation District and the Natural Resource Conservation Service in cooperation with either Washington Department of Fish and Wildlife or the Nez Perce Tribe will complete the remaining elements. Refer to **Appendix D** for detailed information.

APPENDIX A

Generic Structure Drawings

RIPARIAN PLANTING AND RIPARIAN BUFFER STRIPS

The conservation district has had an active planting program on both riparian areas and uplands for a number of years. During the initial phase of the Model Watershed planning process an agreement was developed between the NRCS and districts to propagate selected native species to insure an abundant supply of riparian plant materials. Native trees and shrubs were harvested during the winters of 1995 and 1996, from the local area and are being propagated at the Washington Association of Conservation District Nursery in Bow, Washington. Species include: Black Cottonwood, Red Osier Dogwood, Clematis, Blue Elderberry, willow varieties, conifer species, and other native shrubs.

Riparian plantings are an important component of all project sites not only to provide stream shading, but also as an initial development of a healthy riparian community.

The soil types along the Asotin Creek vary from very cobbly loam to very deep silt loam soils, in limited areas. Riparian plantings in the past have been marginally successful because of difficult soil planting conditions, flood events, and the extreme temperatures during summer months. Cottonwood poles, 3-6 inch diameter and 10 feet long, are now being grown at the nursery to try and speed up the plant establishment period by providing larger materials that can be buried to the subsurface water table. Planting materials of this size will require heavy equipment to either punch a hole into the streambank or to trench away from the streambank until a water table is found.

Many landowners along Asotin Creek have agreed to provide a buffer strip between grazing lands and the stream. These buffers are an important component of the project site. Filtering surface runoff, providing stable streambanks, and maintaining riparian vegetation are a few of the riparian buffer benefits.

Typically riparian fencing must accompany most riparian buffers. Fencing riparian areas is usually more costly than other fencing application because of the soil conditions and increased number of fence corners.

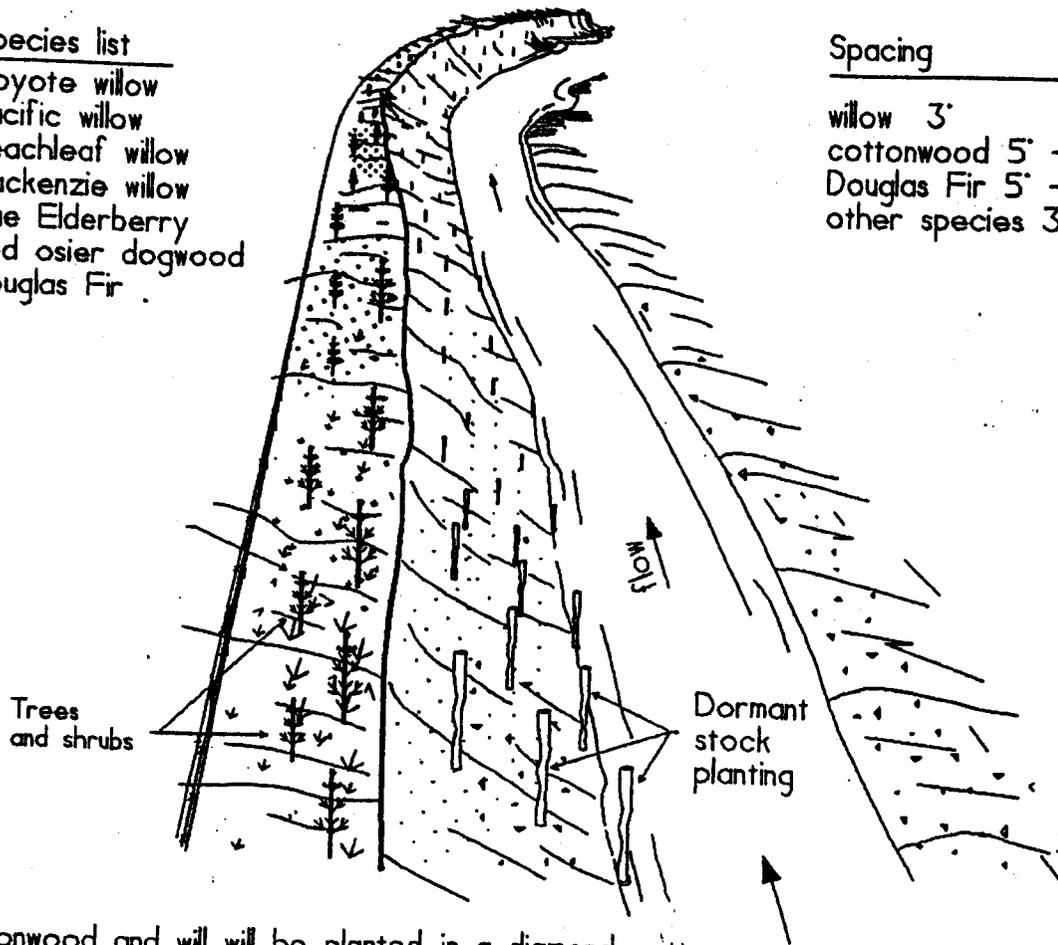
TREE AND SHRUB PLANTING DETAILS

Species list

- Coyote willow
- Pacific willow
- Peachleaf willow
- Mackenzie willow
- Blue Elderberry
- Red osier dogwood
- Douglas Fir

Spacing

- willow 3'
- cottonwood 5' - 8'
- Douglas Fir 5' - 8'
- other species 3' - 5'



Cottonwood and willow will be planted in a diamond pattern along the stream bank: deep enough to reach sufficient summer moisture. Other species will be planted in clumps or groups at staggered locations along the top of bank or field edge (as directed by District Manager or NRCS conservationist).

Location and layout for planting will be specified to planting crews on the job site.

PROJECT LAYOUT

DATE	DATE
APPROVED BY:	APPROVED BY:
TITLE	TITLE
TITLE	TITLE
DESIGNED	DESIGNED
DRAWN	DRAWN
TRACED	TRACED
CHECKED	CHECKED

USDA NATURAL RESOURCES CONSERVATION SERVICE

PLANTING DETAILS
 JOB NAME:
 COUNTY:

DRAWING NO.
 std/pnt
 SHEET 1 OF 1

VORTEX ROCK WEIR

Description:

A vortex rock weir is constructed from very large rocks (~48" dia.) placed in a "V" shape pointing up-stream. Vortex rock weirs are used to create a scour pool and help develop the thalweg (area of stream with the deepest and fastest moving water).

Construction:

Initially trenches are dug into the banks on the end of each leg of the "V" and filled with graded riprap, to prevent water from scouring a new channel around the weir. Trenches are then dug at approximately 45 degree angles from the bank up-stream to the planned apex of the weir. Footer rocks are placed into the trenches to act as supports for the upper rock layer and provide a hard surface for the cascading water. The header rocks are then placed directly onto and slightly up-stream of the footer rocks. Header rocks are arranged so water flows over the center rocks and the height of the weir rises as it approaches each bank. Gaps of approximately 8-12 inches are left between the header rocks to provide for fish and debris passage.

Hydraulic Action:

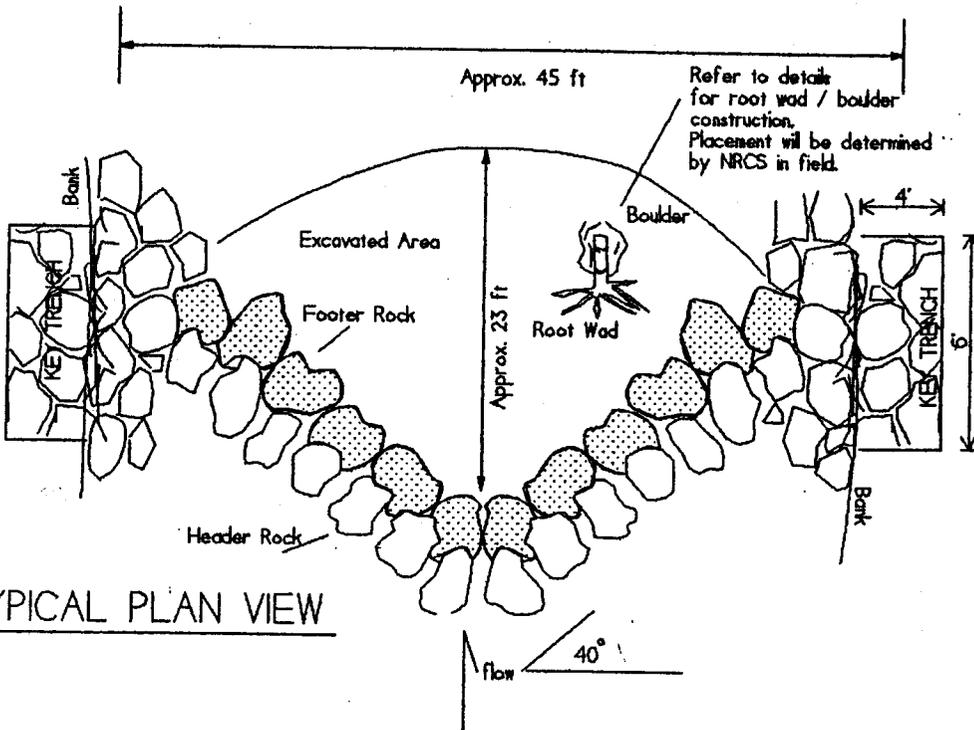
The gaps between the header rocks concentrate flows during low water periods to scour gravels below the weir and creating small eddies behind rocks. During high flow, the water cascades over the weir, creating a crest or wave that may be three feet high. As the water tumbles over each "leg" of the weir into the center of the stream, a scour pool is created. Gravels are sorted on the tail-out area of the pool making a suitable site for spawning salmonids. Depending on the intended results of weir, the "legs" of the weir can be of different lengths to concentrate flows to certain areas of the channel.

Benefits:

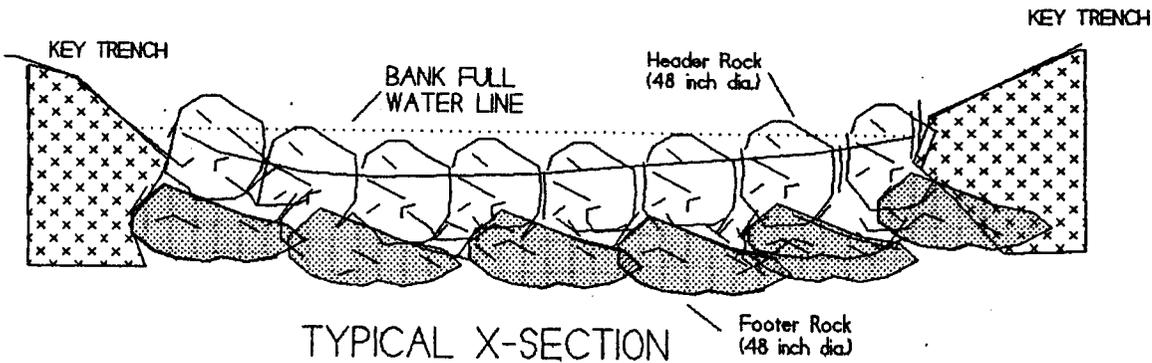
Vortex weirs will result in a narrower and deeper channel, minimizing thermal input, and providing increased cross sectional area for periods of high flow. The eddies and interstitial spaces between the rocks provide cover and resting areas for juveniles. Scoured gravels tail-out into spawning areas and the hole scoured during high flows provides hiding areas. Root wads anchored under the footer rocks or cabled to a rock and set into the pool of the weir, add complex cover.

PLAN VIEW

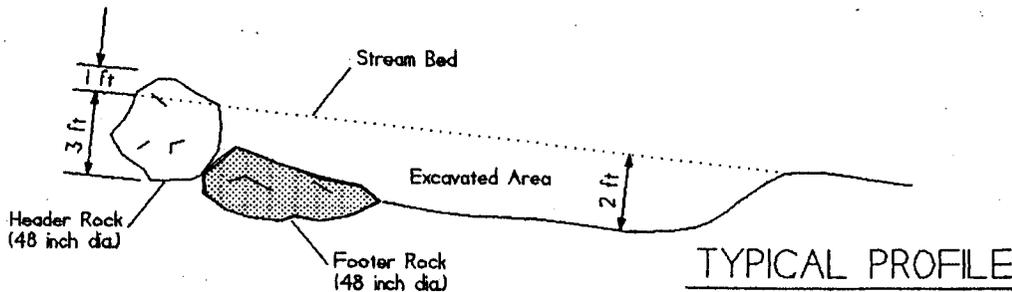
8 cuyd. of 36 inch graded riprap shall be placed on each end of the weir.
 Key vortex weir into bank a minimum of 4 feet on each side of channel.
 Key trench will be at the depth of the footer rocks and continue up the bank a minimum of 4 feet. Width is 6 feet.
 A space within the range of 8-12 inches will be maintained between the header rocks.
 Vortex weir location will be staked in the field by NRCS.



TYPICAL PLAN VIEW



TYPICAL X-SECTION



TYPICAL PROFILE

DATE	APPROVED BY	TITLE
7/97		

DESIGNED	DRAWN	TRACED	CHECKED
RDS	RDS		

ROCK VORTEX WEIR DETAIL

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.	SHEET	OF

ROCK VANE

Description:

A rock vane is constructed from very large rocks (~48" dia.) placed at an acute angle to the streambank and extending to or near the center of the stream.

Construction:

A key trench is dug at the bank-vane intersection and filled with graded riprap to prevent water from scouring a new channel around the vane. Then a deep trench is dug at an angle from 25-45 degrees from the rock key, up-stream to a planned distance. Footer rocks are placed into the trench; these rocks act as support for the upper rock layer and provide a hard surface for the cascading water to strike. The upper, or header, rocks are then placed onto and slightly up-stream of the footer rocks. Header rocks are placed so the water surface is just flowing over rocks at the end and gradually raised approaching the bank. Gaps of approximately 8-12 inches are left between the header rocks to provide for fish and debris passage.

Hydraulic Actions:

The gaps between the header rocks concentrate flows during low water periods, scouring gravel below the vane and creating small eddies behind each rock. Because the vane creates resistance to the water flow, a thalweg is developed at the end of the vane. During high flow the water shoots over the vane creating a crest or standing wave. As the water tumbles over the vane it strikes the thalweg, scouring out a pool and potentially redirecting the high flow towards the opposite bank. Vanes have the potential, if installed in a series of opposite bank installation, to create a narrow and deep thalweg that meanders within a straight stream section.

Benefits:

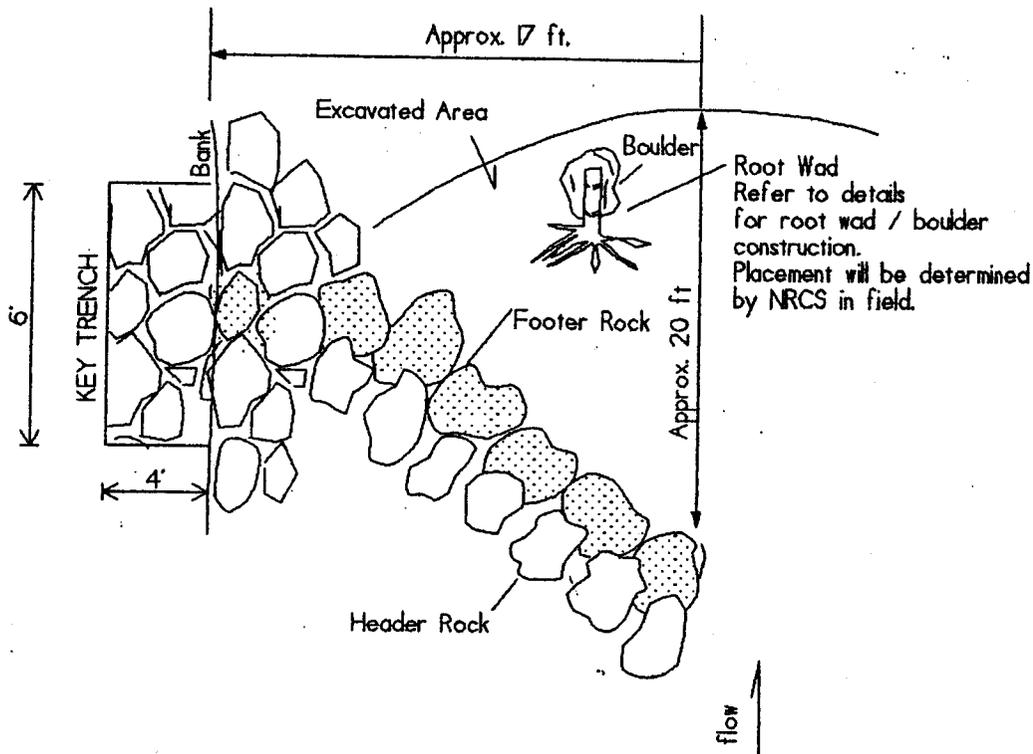
Vanes result in a narrower and deeper channel minimizing thermal input and increasing cross sectional area for periods of high flow. The eddies and interstitial spaces created provide cover and resting areas for juveniles. Scoured gravel tail-out into spawning areas and the hole scoured during high flows provides hiding areas and pools of cool water. The addition of root wads to the vane pool provides increased complex cover.

8 cuyd. of 36 inch graded riprap shall be placed on end of vane.

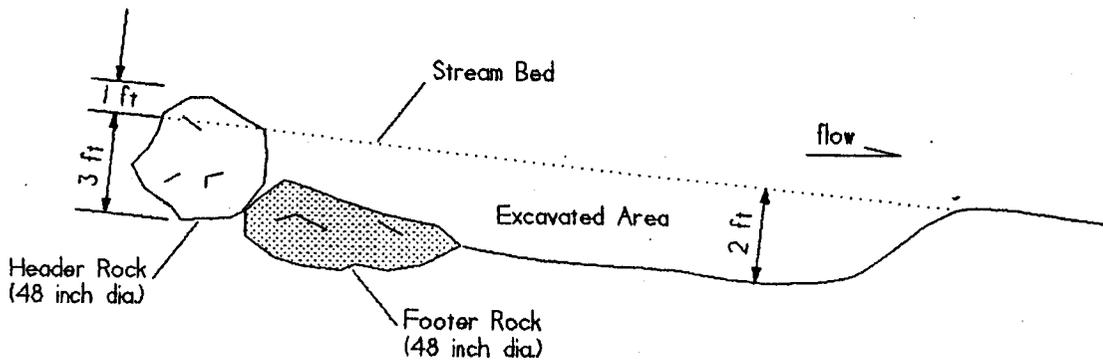
Key vane into bank a minimum of 4 feet.

Key trench will be at the depth of the footer rocks and continue up the bank a minimum of 4 feet. Width is 6 feet.

A space within the range of 8-12 inches will be maintained between the header rocks. Vane location will be staked in the field by NRCS.



TYPICAL X-SECTION



DATE	APPROVED BY	TITLE

DESIGNED	DATE	TRACED	CHECKED
RDS	7/97		
DRAWN	7/97		
RDS			

ROCK VANE DETAIL

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.	
SHEET	OF

WOODY DEBRIS

Description:

Large woody debris may be placed within or in conjunction with other structures or independently depending on the site conditions. It is usually composed of root wads or logs but, may also be bundles of brush. For this description, a root wad refers to a root mass with a 4-10 foot long log stem attached.

Construction:

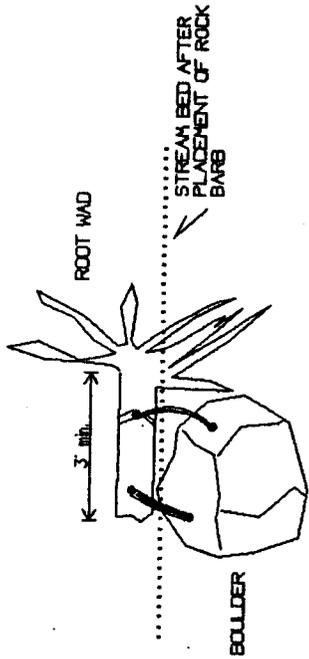
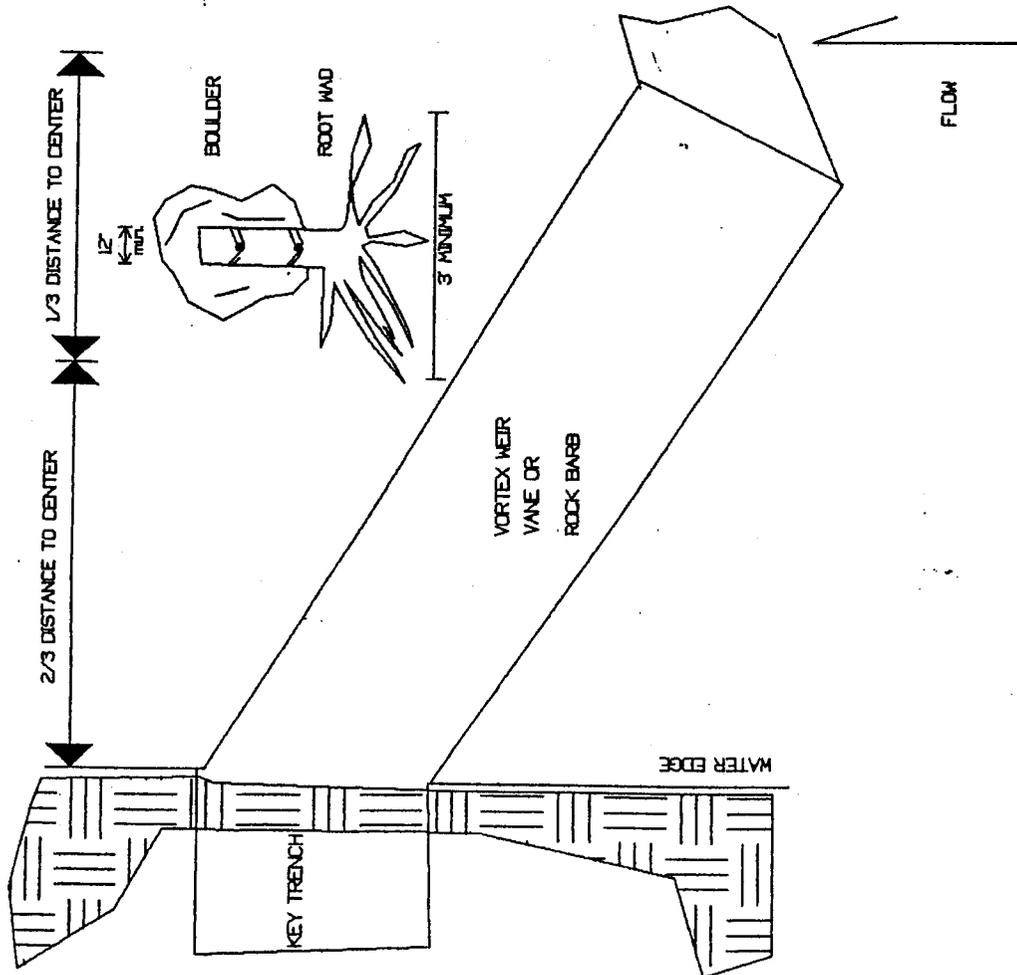
Root wads with the log stem attached are placed within the barb, weir, or vane by excavating a trench below the expected depth of the footer rock and aligning the root mass so it will be within the scour pool. The stem is laid parallel or slightly downward to the streambed and slightly upstream. Large rocks are placed onto the stem to secure the root wad within the bank. Root wads with short stems can be cabled directly to a large boulder and placed within the scour pool after construction of the weir, vane, or barb. Woody debris placed independently consists of excavating a small trench into the streambank, placing the root wad into the stream, with the root mass 2-6 feet from the bankline, and back filling the trench with large rock and graded riprap. The rock secures the root wad and prevents bank scouring as the water flows over and under the log stem. At sites where bank disturbance is unwanted woody debris can be laid along the bankline and either be cabled to a deadman or tree, or have large rock placed at points along its length to secure it in place.

Hydraulic Actions:

Root wads or logs projecting from the bankline into the stream flow force the water over and around the root wad scouring a hole and creating eddies. Brush, logs, or root wads placed along the bankline decrease erosion of a bankline while adding the benefit of interrupting a straight flow along the bank.

Benefits:

Woody debris, root wads, logs or brush, adds complexity to the pools developed by structure installation or along "sterile" banklines. Debris provides cover as well as habitat for aquatic insects. Scour pools provide deep cover and cooler water holding areas.



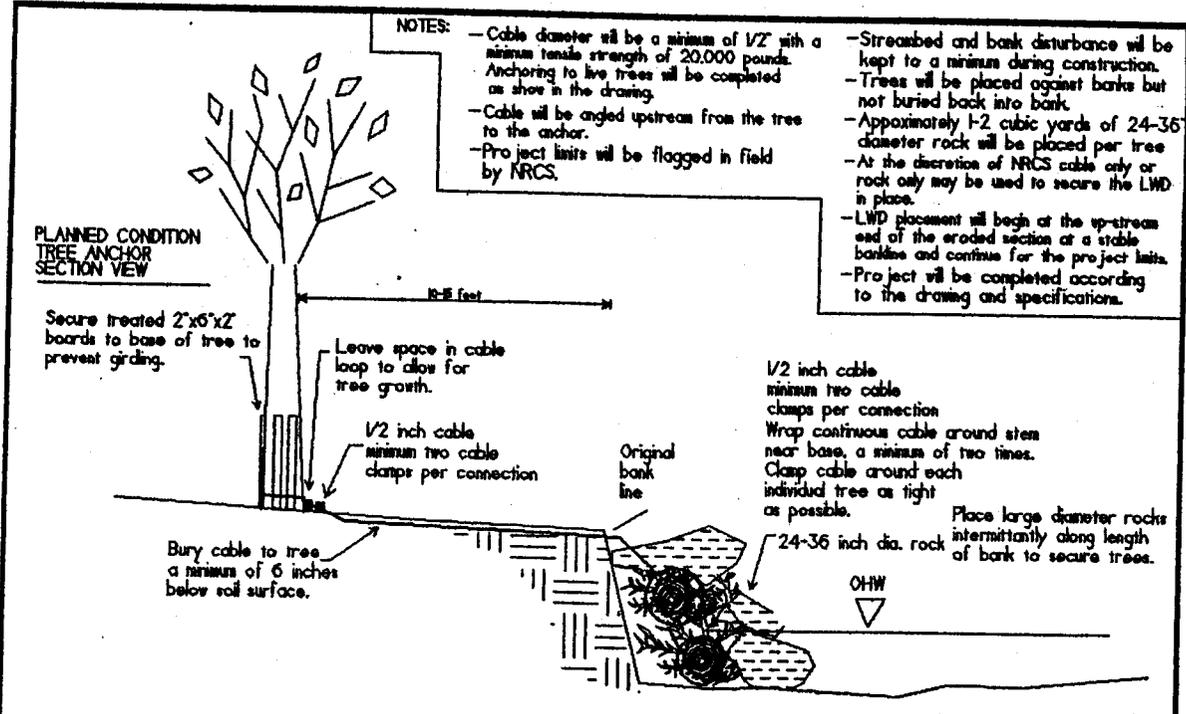
- NOTES:**
- ROOT WAD WILL BE CABLED TO BOULDER A MINIMUM OF 1/2 INCH CABLE.
 - CABLE WILL BE ATTACHED TO STEM EITHER BY DRILLING, WRAPPING TWICE WITH CABLE AND DOUBLE CABLE CLAMPS, OR TIGHTLY WRAPPING STEM TWICE WITH CABLE AND DOUBLE CLAMPING.
 - CABLE WILL BE ATTACHED TO BOULDER EITHER BY DRILLING COMPLETELY THROUGH BOULDER AND DOUBLE CABLE CLAMPING TO LINE OR DRILLING AND USING A THIRTE-ADHESIVE OR EQUIVILANT HAVING A 200000 POUND HOLDING CAPABILITY.
 - BOULDER WILL BE A MINIMUM OF 15 CUBIC YARDS. BOULDER WILL BE SET AT THE EXISTING STREAM BED A DEPTH EQUAL TO ITS HEIGHT AND THE ROOT WAD STEM SET PARALLEL TO THE STREAM BED WITH THE ROOTS POINTING UP STREAM.
 - ROOT WAD / BOULDER LOCATION WILL BE APPROXIMATELY 1/3 THE LENGTH OF THE BARB LANDWARD FROM THE TIP OF THE BARB. EXACT LOCATION WILL BE DETERMINED BY NRCS ON THE PROJECT SITE WITH THE CONTRACTOR.
 - ROOT WAD PLACEMENT FOR VANE WILL BE DETERMINED BY NRCS ON PROJECT SITE.
 - ROOT WAD SPECIES WILL BE CONIFER OR DECIDUOUS.

ROOT WAD DETAIL

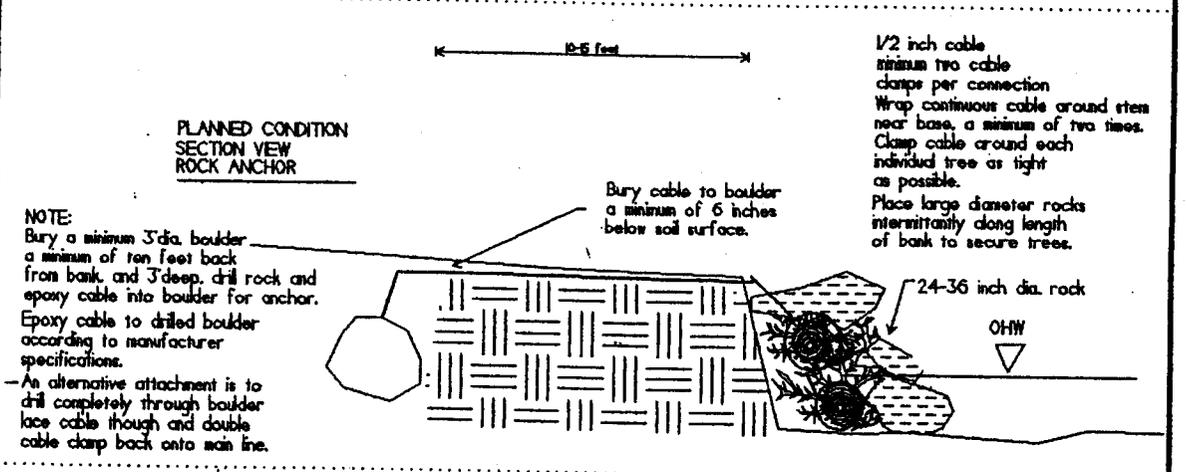
DRAWING NO.

DESIGNED	RCS	DATE	7/97	APPROVED BY		DATE	
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CHECKED				TITLE			

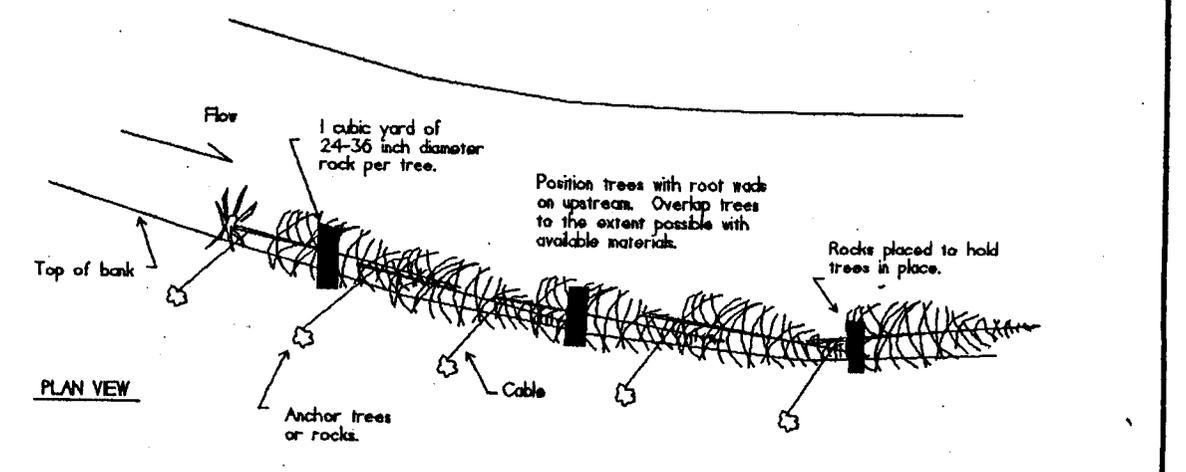
USDA NATURAL RESOURCES CONSERVATION SERVICE



- NOTES:**
- Cable diameter will be a minimum of 1/2" with a minimum tensile strength of 20,000 pounds. Anchoring to live trees will be completed as show in the drawing.
 - Cable will be angled upstream from the tree to the anchor.
 - Project limits will be flagged in field by NRCS.
 - Streambed and bank disturbance will be kept to a minimum during construction.
 - Trees will be placed against banks but not buried back into bank.
 - Approximately 1-2 cubic yards of 24-36" diameter rock will be placed per tree.
 - At the discretion of NRCS cable only or rock only may be used to secure the LWD in place.
 - LWD placement will begin at the up-stream end of the eroded section at a stable bankline and continue for the project limits.
 - Project will be completed according to the drawing and specifications.



NOTE:
 Bury a minimum 3" dia. boulder a minimum of ten feet back from bank, and 3" deep, drill rock and epoxy cable into boulder for anchor. Epoxy cable to drilled boulder according to manufacturer specifications.
 - An alternative attachment is to drill completely through boulder lace cable through and double cable clamp back onto main line.



STREAMBANK AND SHORELINE PROTECTION TREE REVETMENT TYPICAL DRAWING SECTION AND PLAN VIEW		DESIGNED BY: RDS DATE: 2/5/97	DRAWN BY: RDS DATE: 2/5/97
U.S.D.A. NATURAL RESOURCES CONSERVATION SERVICE		CHECKED BY: _____ DATE: _____	APPROVED BY: _____ DATE: _____

ROCK BARB

Description:

A rock barb is designed as a dual function structure: diverting the thalweg away from an eroding bank and to create a scour pool as the water rushes around the barb end. The structure is composed of a key trench, an area dug back into the bank at a depth below the streambed, filled with graded riprap and a rock mass (barb) projecting into the stream a planned distance and angled up-stream. The length of the barb and the up-stream angle area dependent on the planned result of the barbs actions. Typically the barb extends 1/3 to 1/2 of the stream width at a 30-90 degree angle to the up-stream bankline.

Construction:

A key trench is excavated 8-10 feet into the bank at a depth approximately 2-3 feet below the existing streambed. Because of the volatile water action at the intersection of the barb and the bankline, proper key trench installation is crucial in preventing the water from washing behind the barb. The graded riprap in the key trench prevents erosion during low and high flow events.

The portion of the barb in the stream may be composed of graded riprap (usually 48" minus) or solely constructed of large boulders (48"-72") placed with footer and header rocks. Barbs constructed of graded riprap (48 inch minus) typically have the benefit of increased stability (less rock movement within the stream portion) but, decreased interstitial spaces for juvenile fish. Boulder constructed barbs have interstitial spaces but, may have a greater tendency to scour beneath the footer rock on the down-stream side increasing the potential for partial failure of the structure. Both types of structures have been installed with great success and will be monitored for effectiveness.

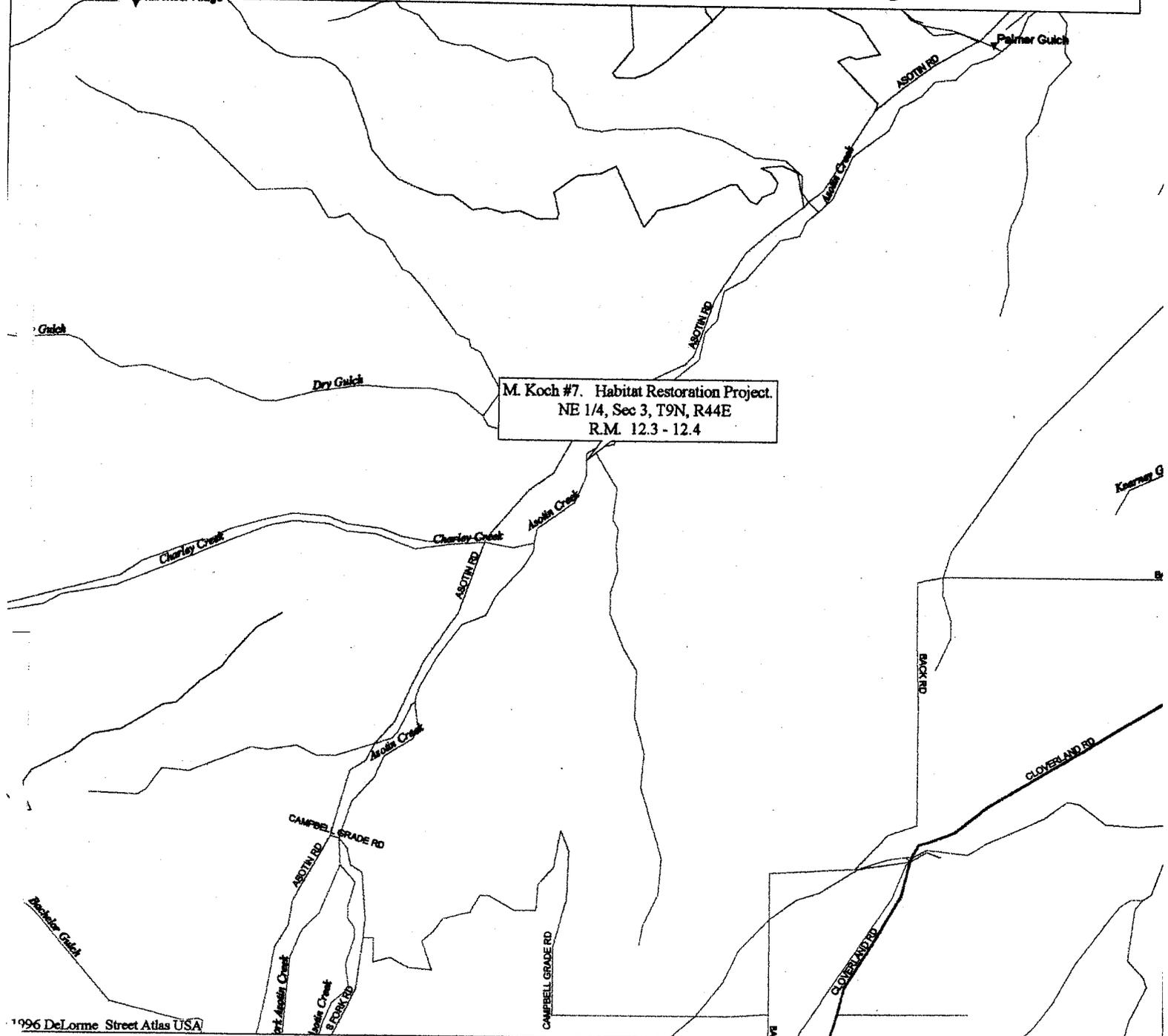
Hydraulic Action:

Redirecting the thalweg around barb can/may result in a tremendous scour pool at the tip and immediately down-stream of the barb tip. This creates an eddy at the down-stream bankline resulting in deposition of suspended materials. Barbs placed along the bankline, but not into the thalweg also create pools and eddies at a reduced size, while still preventing bank sloughing. Barbs will also create a narrow and deeper channel, increasing the cross sectional area at this point. Depending on the planned results of barb installation, the barbs can be used to redirect flows reducing the radius of curvature on a meander corner, or to produce meanders in straight stream section.

Benefits:

Scour pools formed at the barb tip, interstitial spaces within the barbs rocks, and root wads placed within the scour pool all provide increased cover. Bank erosion is slowed or stopped resulting in less suspended sediment. Deposition along the downstream bankline provides tree planting opportunities leading to a complex riparian habitat community.

1998 Asotin Creek Habitat Projects

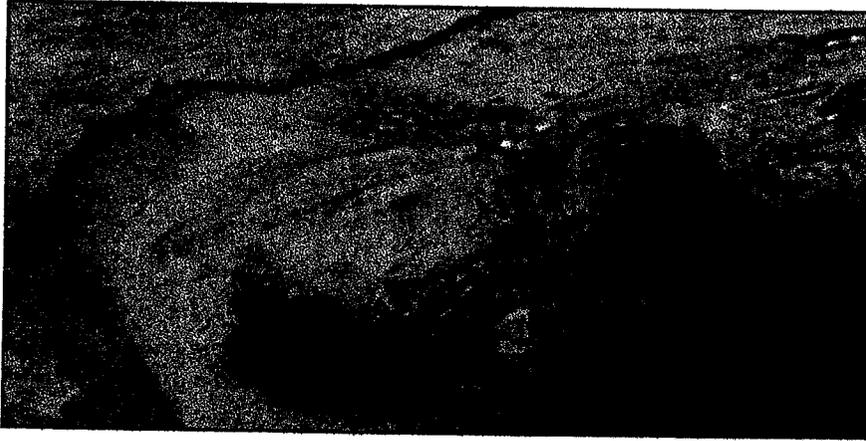


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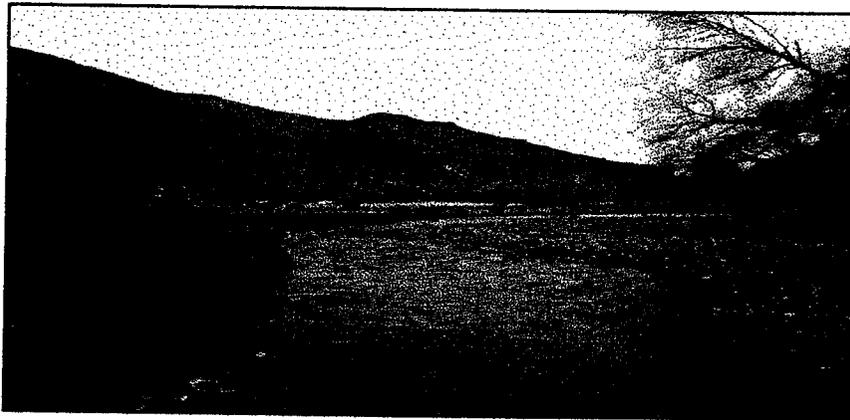
Scale 14.00
 Date: Jun 08 15:03 1998
 Scale: 1:31,250 (at center)
 1000 Feet
 1000 Meters

- Local Road
- Major Connector
- Trail
- Geographic Feature
- River/Canal
- Intermittent River

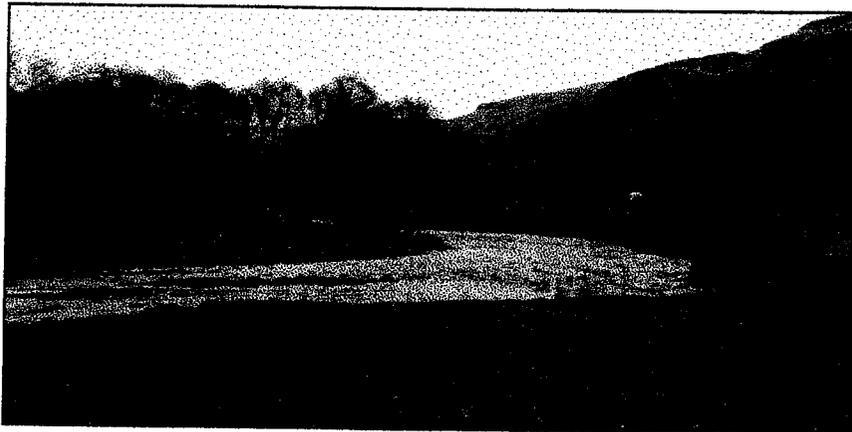
M. Koch #6 Habitat Restoration Project



Aerial photograph of site. Downstream view in first two pictures.



Upper section of project site. Install vortex rock weir, rock vanes and LWD placement on left bank.



Lower section of project site. Upstream view.

MARTY KOCH #6
 NE 1/4, SEC 3, T9N, R44E
 R.M. 12.6-12.8

LEGEND

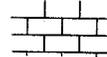
ROCK
 VANE



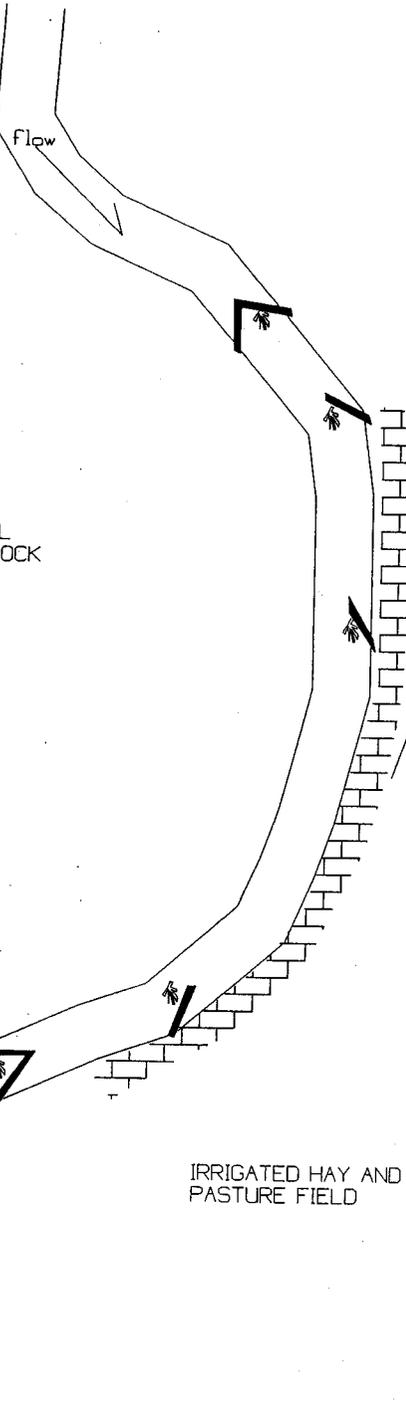
VORTEX
 ROCK
 WEIR



LARGE
 WOODY
 MATERIALS



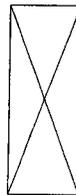
EACH VORTEX WEIR AND ROCK VANE
 WILL CONTAIN A MINIMUM OF ONE
 SUBMERGED ROOT WAD.



OLD STREAM CHANNEL
 NOW PLUGGED WITH ROCK
 AND WOOD DEBRIS.

LARGE WOODY MATERIALS
 WILL BE PLACED ALONG
 EROSION VERTICAL BANK
 TO MAINTAIN MEANDER BENDS.
 UPPER SITE 630 FEET

IRRIGATED HAY AND
 PASTURE FIELD



MARTY KOCH'S
 HOUSE

CONNECTS TO MARTY
 KOCH #7

DESIGNED	DATE
DRAWN	APPROVED BY
TRACED	TITLE
CHECKED	TITLE

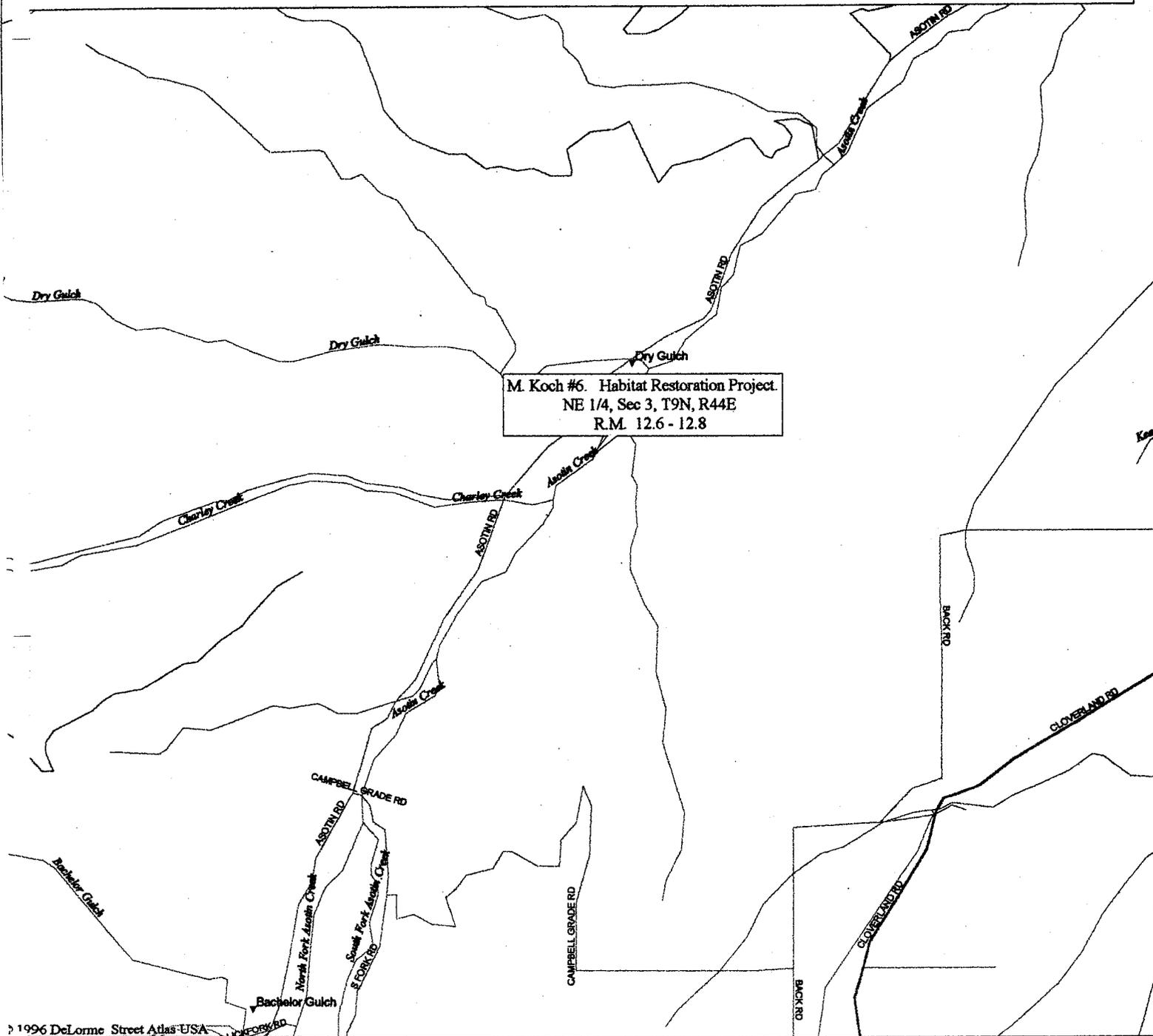
MARTY KOCH FISH HABITAT IMPROVEMENT
 PLAN VIEW
 ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

DRAWING NO.

SHEET OF

1998 Asotin Creek Habitat Projects



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 1000 Meters

- Local Road
- Major Connector
- Trail
- ▼ Geographic Feature
- River/Canal
- Intermittent River

CHARLEY CREEK #5
 R.M. 1-3
 SEC 3, T9N, R44E

ASOTIN CREEK ROAD

CATTLE GUARD COVERED
 CONCRETE BOX CULVERT

CHARLEY CREEK

Flow

LEGEND

ROCK VANE WITH ROOT WAD 

EACH ROCK VANE WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.

A DEBRIS JAM IN THIS AREA CAUSED THE BRAIDED CHANNELS TO DEVELOP.

CHARLEY CREEK SPLITS INTO MULTIPLE CHANNELS BECAUSE OF SEDIMENT DEPOSITION FROM PREVIOUS FLOODS. THE FAR RIGHT CHANNEL ON THIS DRAWING FLOWS THROUGH OPEN FIELD AND IS VERY SHALLOW. THE PLAN IS TO STACK LARGE WOODY MATERIALS ALONG THE BANKS TO FORCE THE WATER INTO ONE MAIN CHANNEL.

ROCK VANE

WOODY DEBRIS PLACEMENT

OPEN FIELD

HEAVILY WOODED

ROCK VANE

WOODY DEBRIS PLACEMENT

SELECTED CHANNEL

ASOTIN CREEK

DATE	_____
APPROVED BY:	_____
TITLE	_____
TITLE	_____

DATE	_____
DESIGNED	_____
DRAWN	_____
TRACED	_____
CHECKED	_____

CHARLEY CREEK FISH HABITAT IMPROVEMENT
 PLAN VIEW
 CHARLEY CREEK, ASOTIN COUNTY WA
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

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SHEET	_____ OF _____

1998 Asotin Creek Habitat Projects

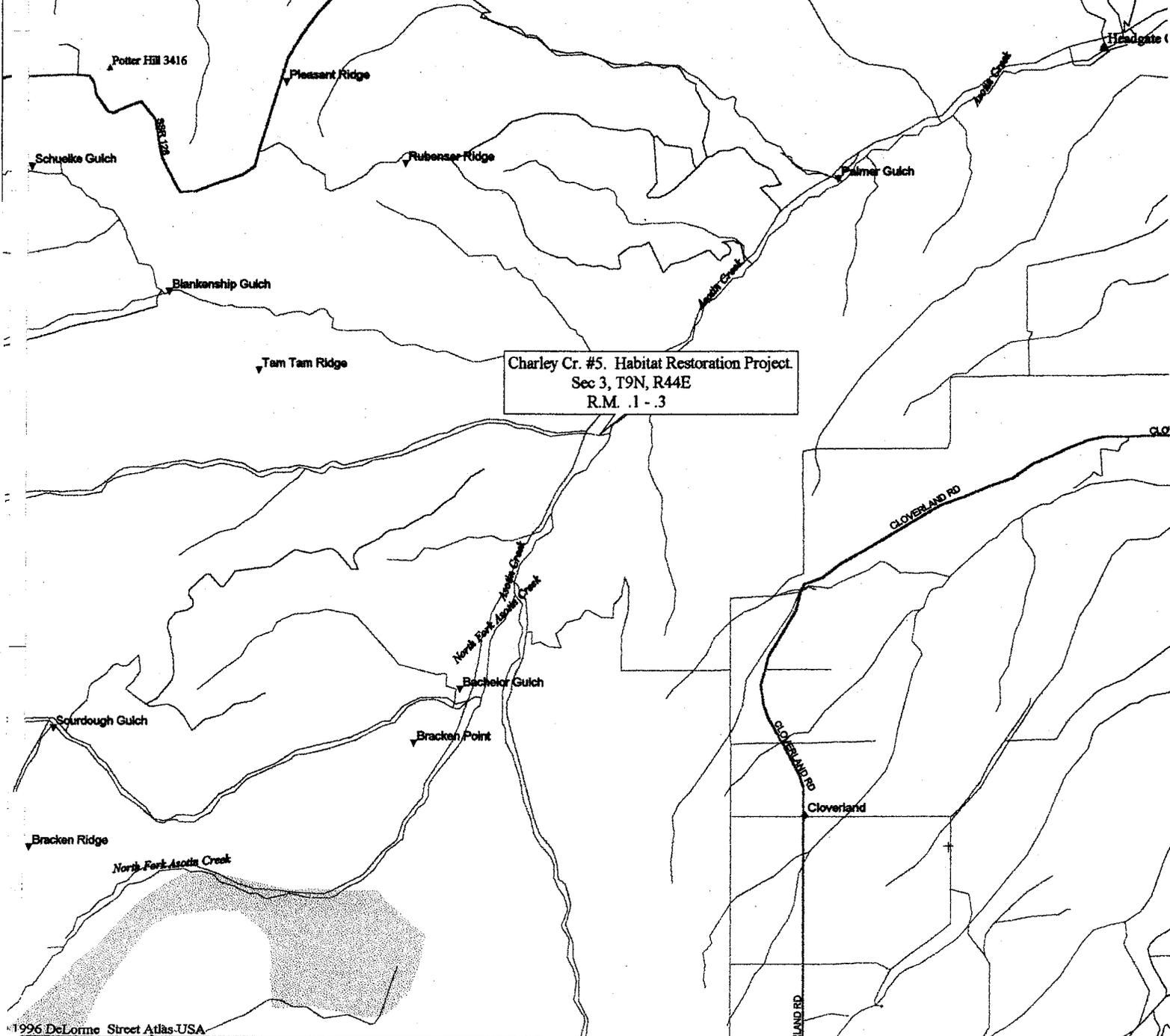
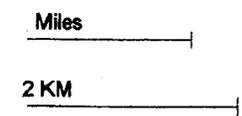


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 Printed on Jun 08 14:21 1998
 Scale 1:62,500 (at center)



- | | |
|---------------------|--------------------|
| Local Road | Locale |
| Major Connector | Cemetery |
| Primary State Route | Woodland |
| Trail | River/Canal |
| Summit | Intermittent River |
| Geographic Feature | |
| Park/Reservation | |

Charley Creek #4 Habitat Restoration Project



Project site is upstream of the county road on the right bank.
Structures to be installed: vortex rock weir, rock vanes and root wad revetment.



Upstream of bridge root wad revetment site on right bank.

CHARLEY CREEK #4
 SEC 3, T9N, R44E
 R.M. 05-07

LEGEND

ROCK VANE WITH ROOT WAD



VORTEX ROCK WEIR WITH ROOT WAD



LARGE WOODY DEBRIS



EACH VORTEX WEIR AND ROCK VANE WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.

VORTEX ROCK WEIR

SLOPE BANK TO 2:1 AND VEGETATE 20 FOOT LENGTH

VERTICLE BANK WITH GOOD ROOT MASS

BARE AREA SEED TO GRASS AND PLANT WOODY SPECIES 200 FEET LONG

ANIMAL ACCESS TO THE STREAM HAS BEEN LIMITED TO THE WATER GAP IN THIS STREAM SECTION.

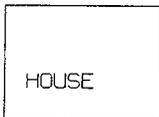
WATER GAP

ROCK VANE

ROOT WAD REVETMENT 180 FEET

40 FT

CHARLEY CREEK ROAD



ROCK TOE AND LOG WALL

ASOTIN CREEK ROAD

DRAWING NOT TO SCALE

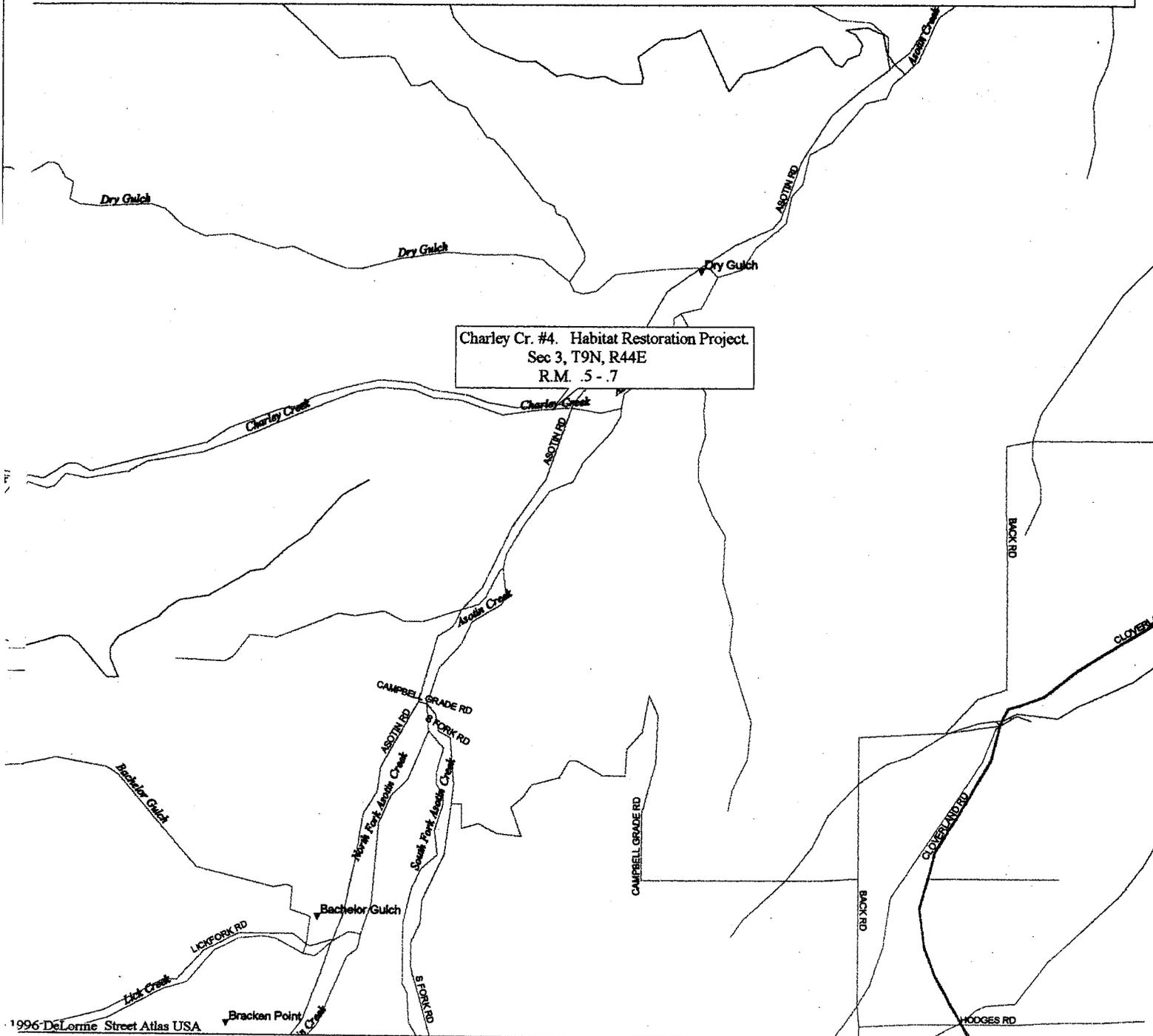
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DATE	DESIGNED	DRAWN	TRACED	CHECKED

CHARLEY CREEK FISH HABITAT IMPROVEMENT
 PLAN VIEW
 CHARLEY CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.
SHEET OF

1998 Asotin Creek Habitat Projects

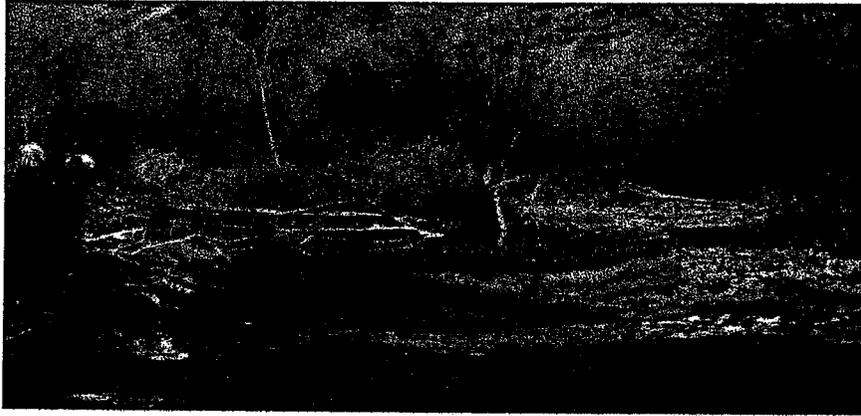


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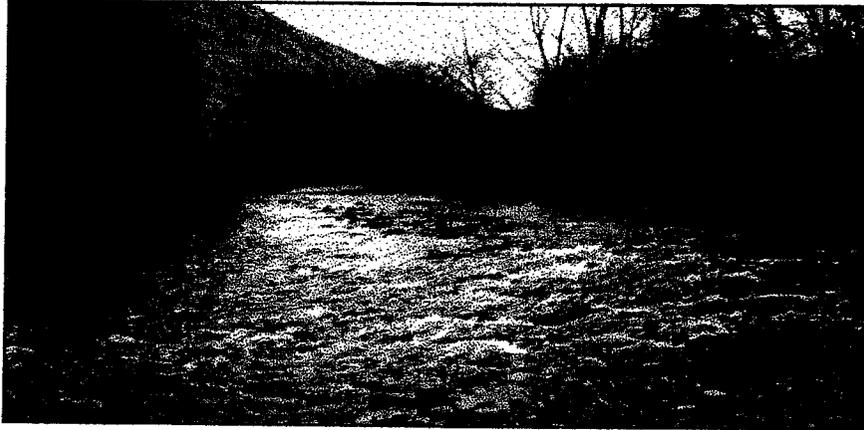
Fig 14.00
 on Jun 08 14:12 1998
 scale 1:31,250 (at center)
 1000 Feet
 1000 Meters

- Local Road
- Major Connector
- Trail
- Geographic Feature
- River/Canal
- Intermittent River

Koch #3 Habitat Restoration Project (Cont.)



Existing off-channel rearing on lower section, LWD will be placed for cover.



Just out from off-channel. Install structures to narrow, deepen and direct flow to basalt bluff.



Deepest pool, four feet, created by natural LWD, structures such as these will help install pools.

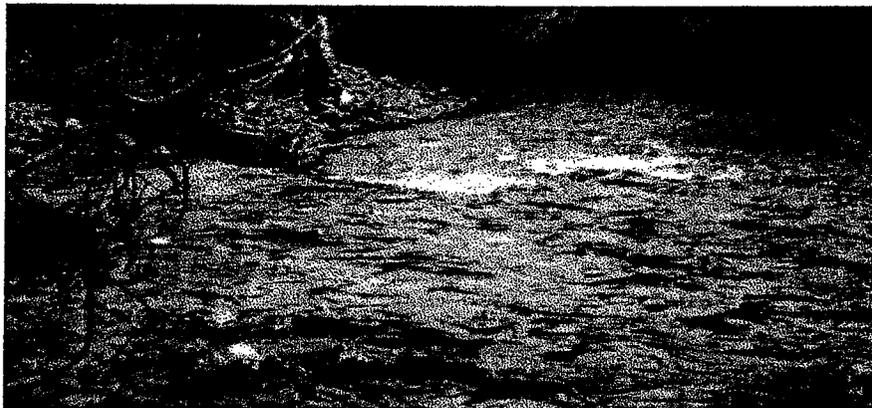
Koch #3 Habitat Restoration Project



Downstream view. Upper section, install vortex rock weir.

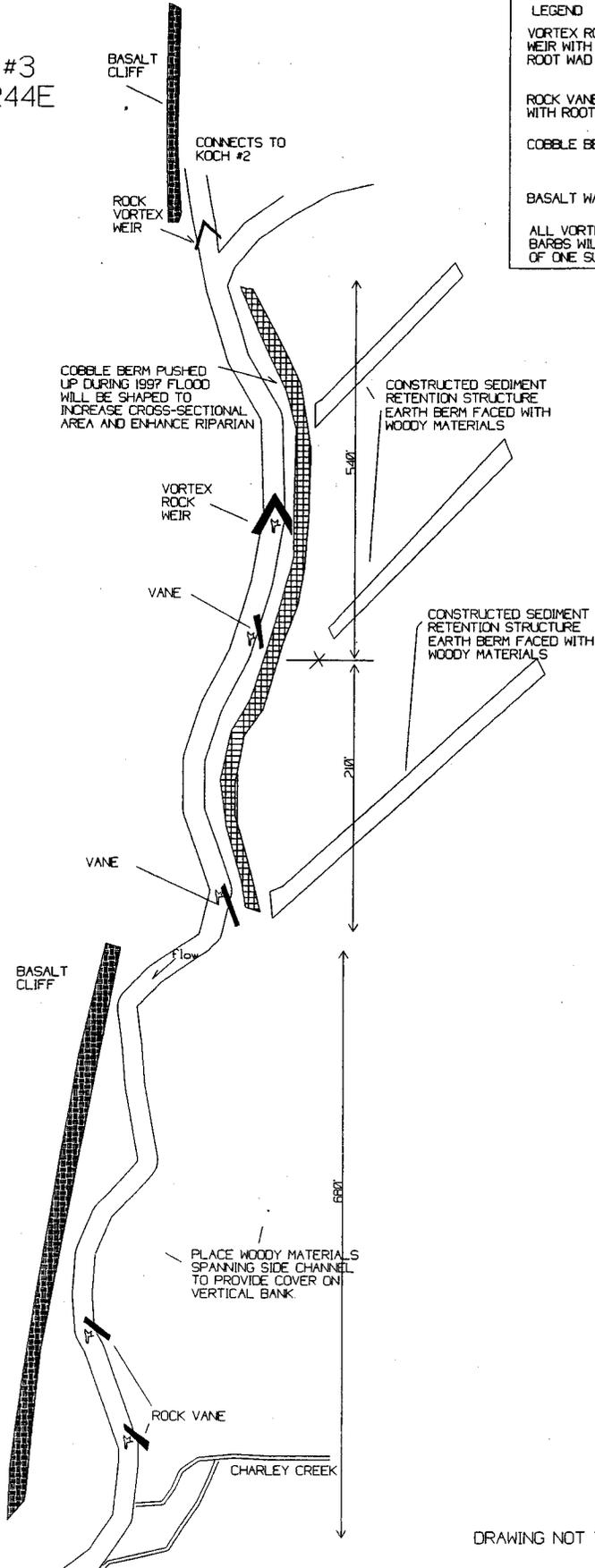


Upstream view. Remove dredged material. Install rock vanes and vortex rock weirs.



Downstream view. Structures will be installed on left bank to help deepen channel and direct flows against basalt bluff.

FRANK KOCH #3
 SEC 3, T9N, R44E
 R.M. 13.3-13.5



LEGEND
 VORTEX ROCK WEIR WITH ROOT WAD
 ROCK VANE WITH ROOT WAD
 COBBLE BERM
 BASALT WALL
 ALL VORTEX WEIRS, VANES, AND BARBS WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.

APPROVED BY:	DATE
TITLE	
TITLE	

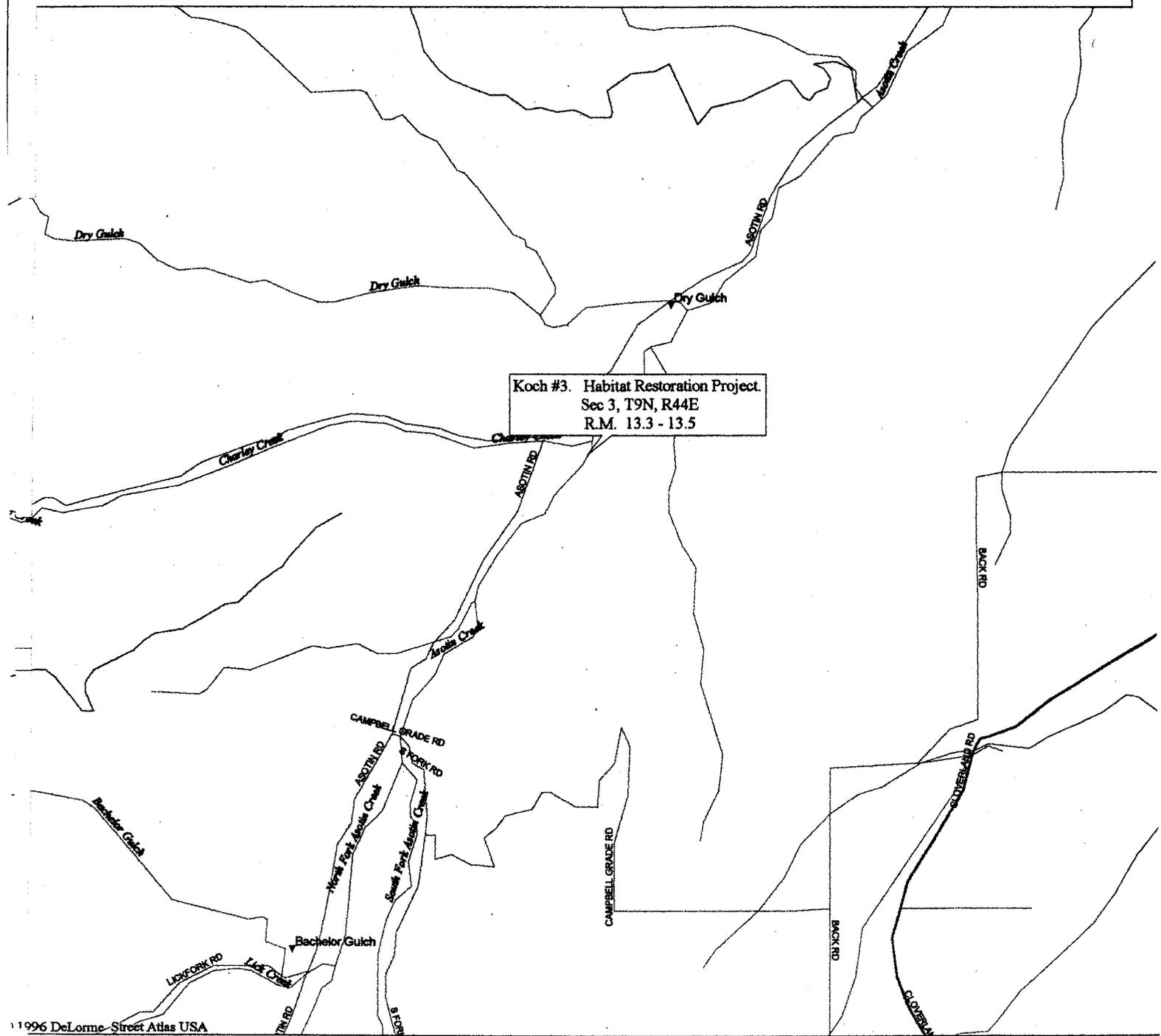
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FRANK KOCH FISH HABITAT IMPROVEMENT
 PLAN VIEW
 ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

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1998 Asotin Creek Habitat Projects



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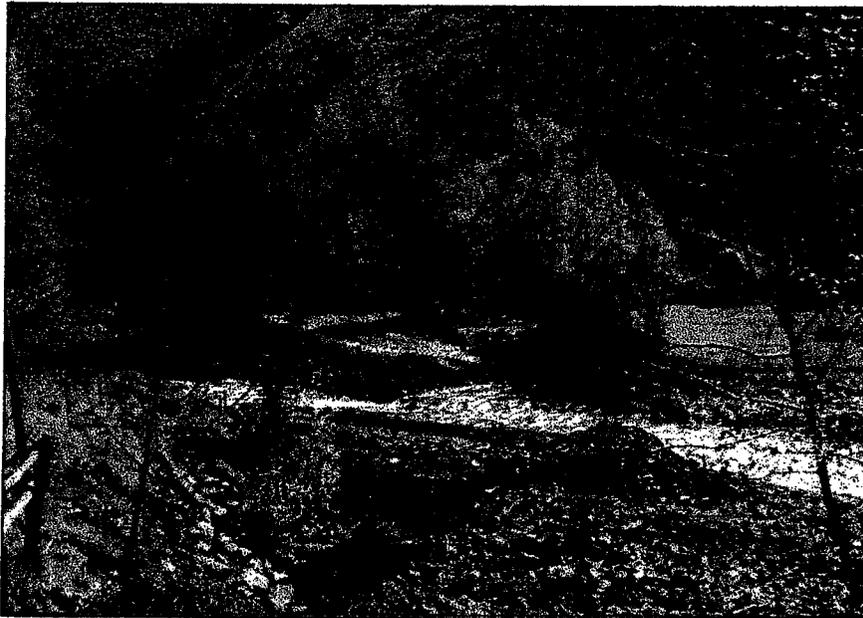
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 Scale 1:31,250 (at center)
 000 Feet
 1000 Meters

- Local Road
- Major Connector
- Trail
- ▼ Geographic Feature
- River/Canal
- Intermittent River

Koch #2 Channel Reconstruction Project



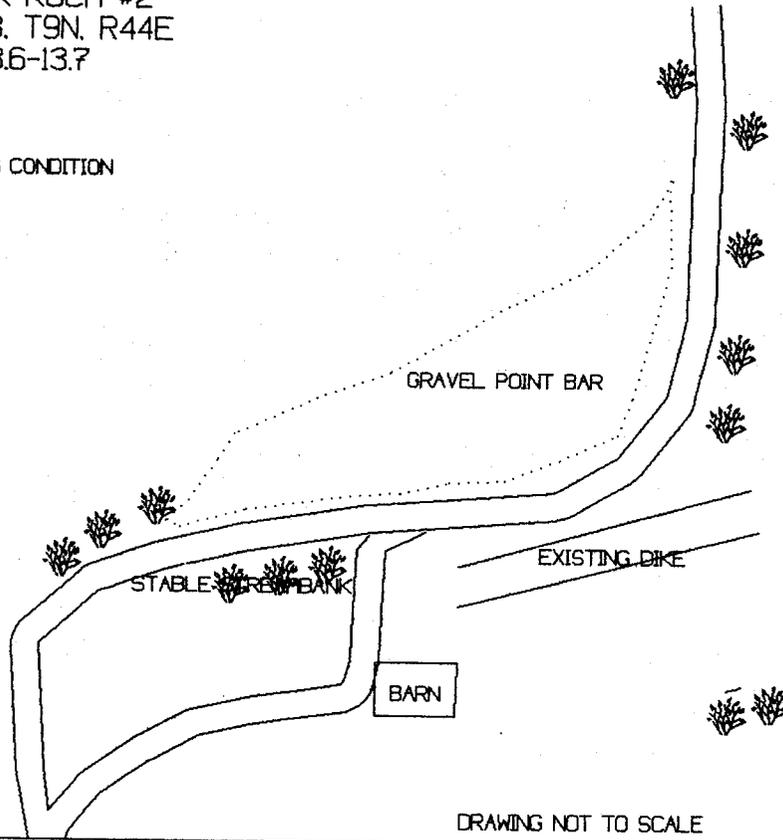
Downstream view. Install vortex rock weir. Remove cobble berm.
Landowner obtained permit to dredge after 1997 flood.



Lower section of site. Rootwad revetment.

FRANK KOCH #2
 SEC 3, T9N, R44E
 R.M. 13.6-13.7

EXISTING CONDITION



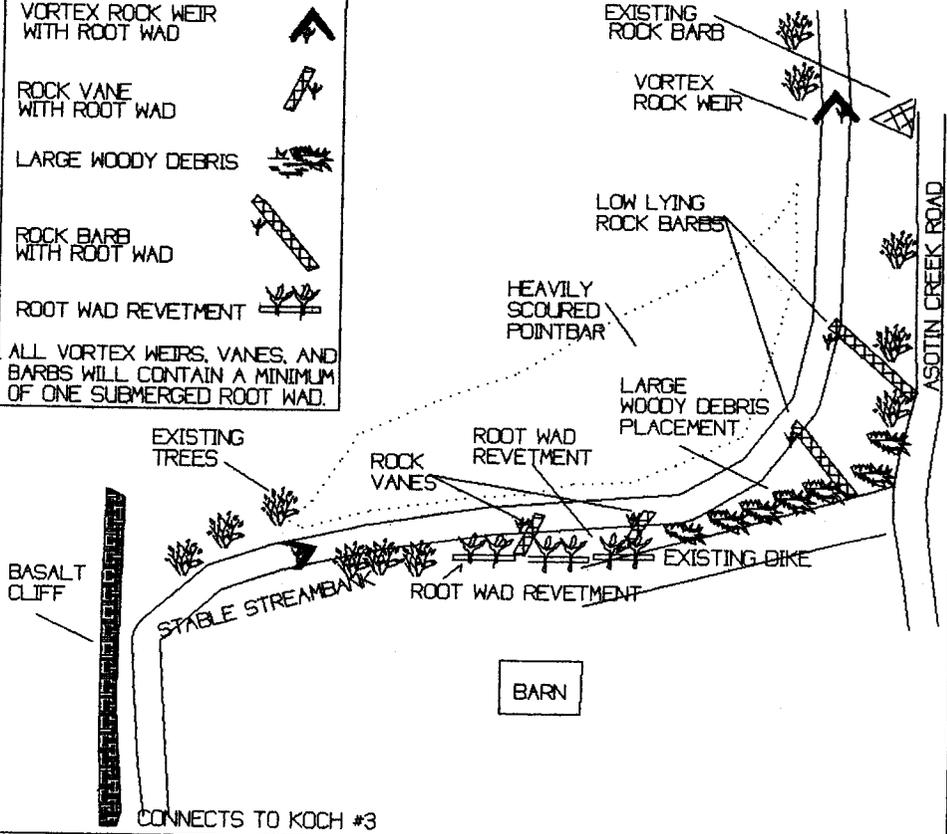
DRAWING NOT TO SCALE

LEGEND

- VORTEX ROCK WEIR WITH ROOT WAD
- ROCK VANE WITH ROOT WAD
- LARGE WOODY DEBRIS
- ROCK BARB WITH ROOT WAD
- ROOT WAD REVETMENT

ALL VORTEX WEIRS, VANES, AND BARBS WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.

PLANNED CONDITION



DRAWING NOT TO SCALE

DATE	APPROVED BY
	TITLE
	TITLE

DESIGNED	DATE
DRAWN	
TRACED	
CHECKED	

FRANK KOCH FISH HABITAT IMPROVEMENT

PLAN VIEW

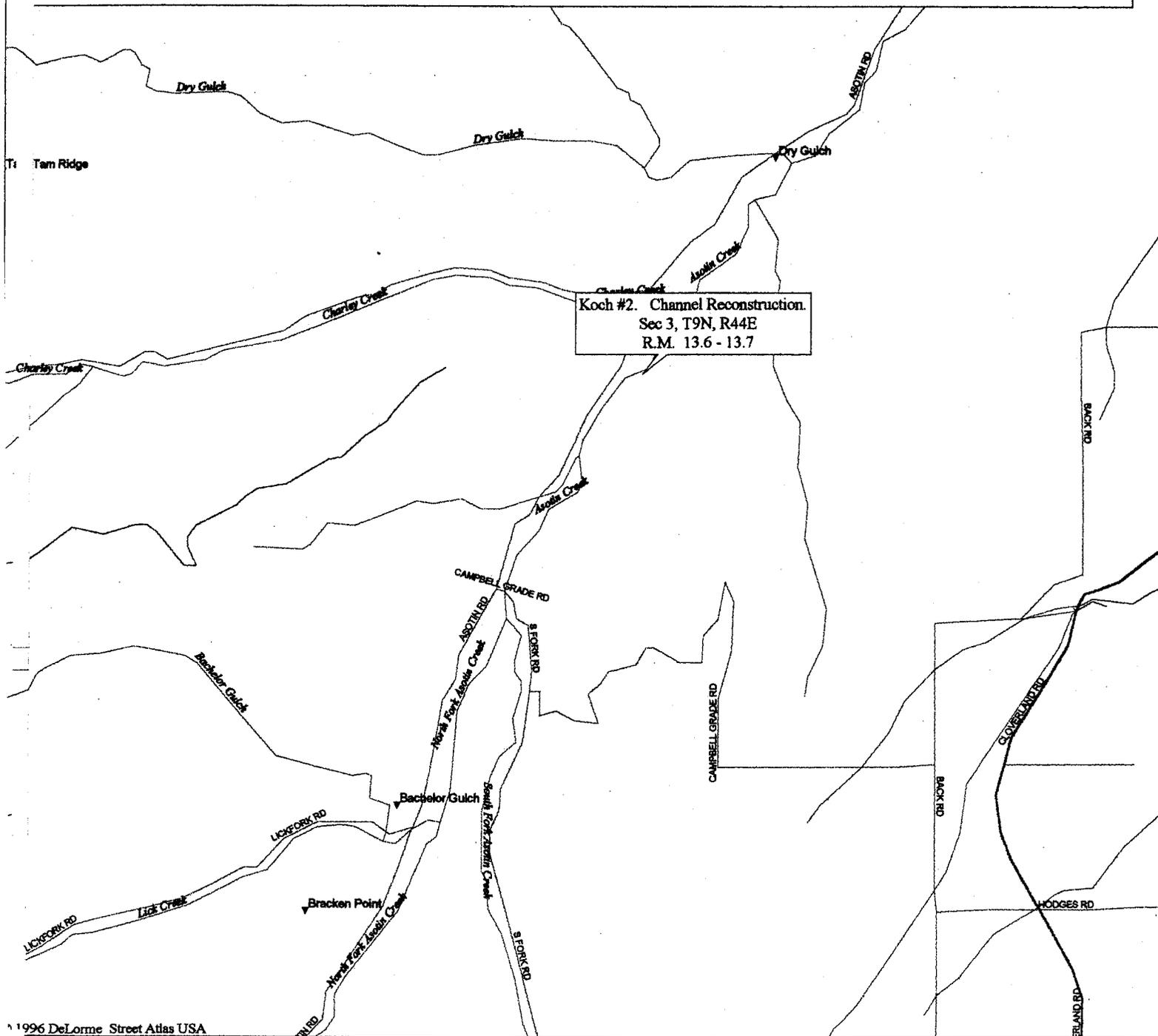
ASOTIN CREEK, ASOTIN COUNTY, WA.

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000 Feet

1000 Meters

- Local Road
- Major Connector
- Trail
- ▼ Geographic Feature
- River/Canal
- Intermittent River

Koch #1 Meander Reconstruction Project



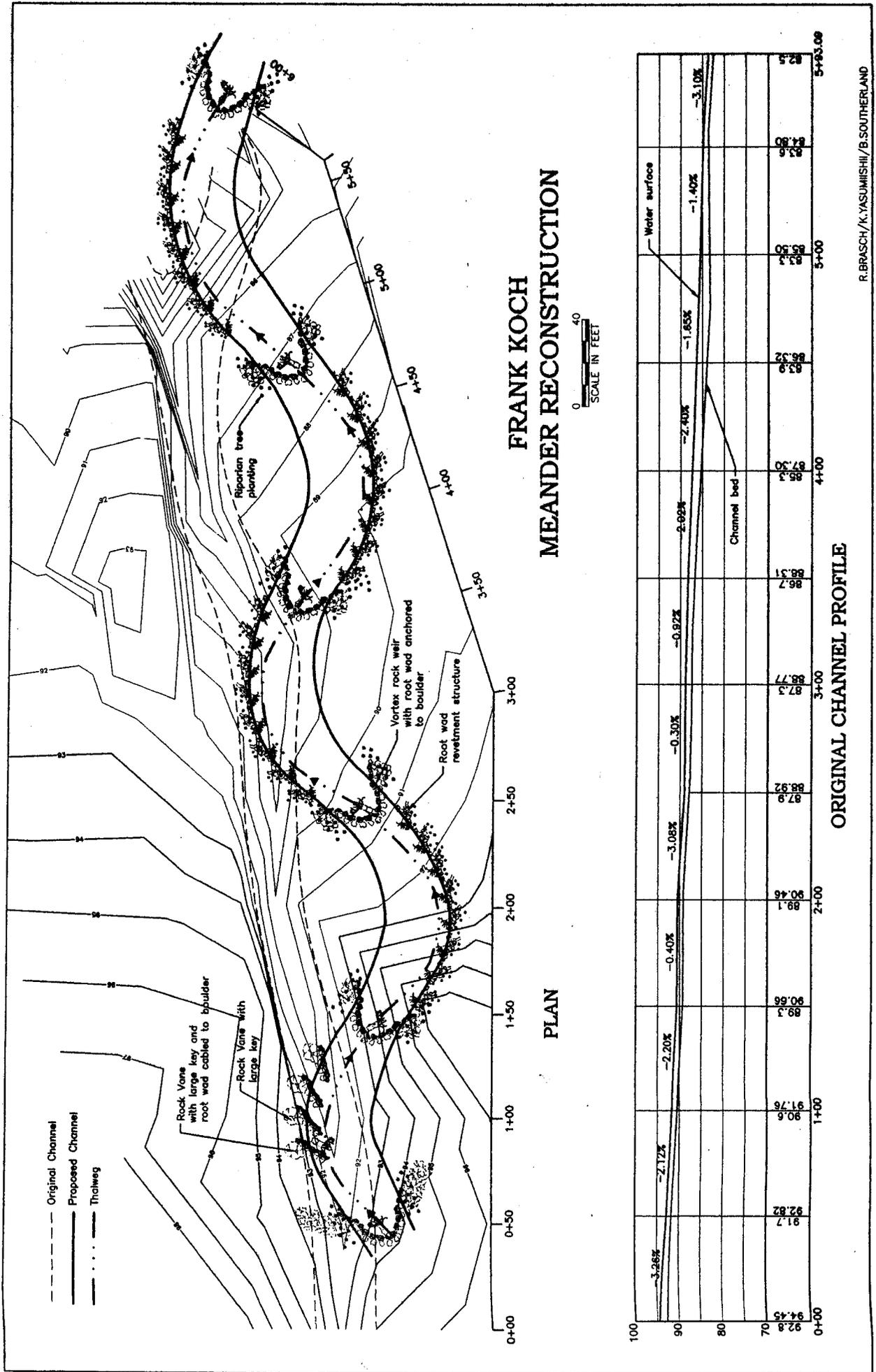
Aerial photograph of sites.



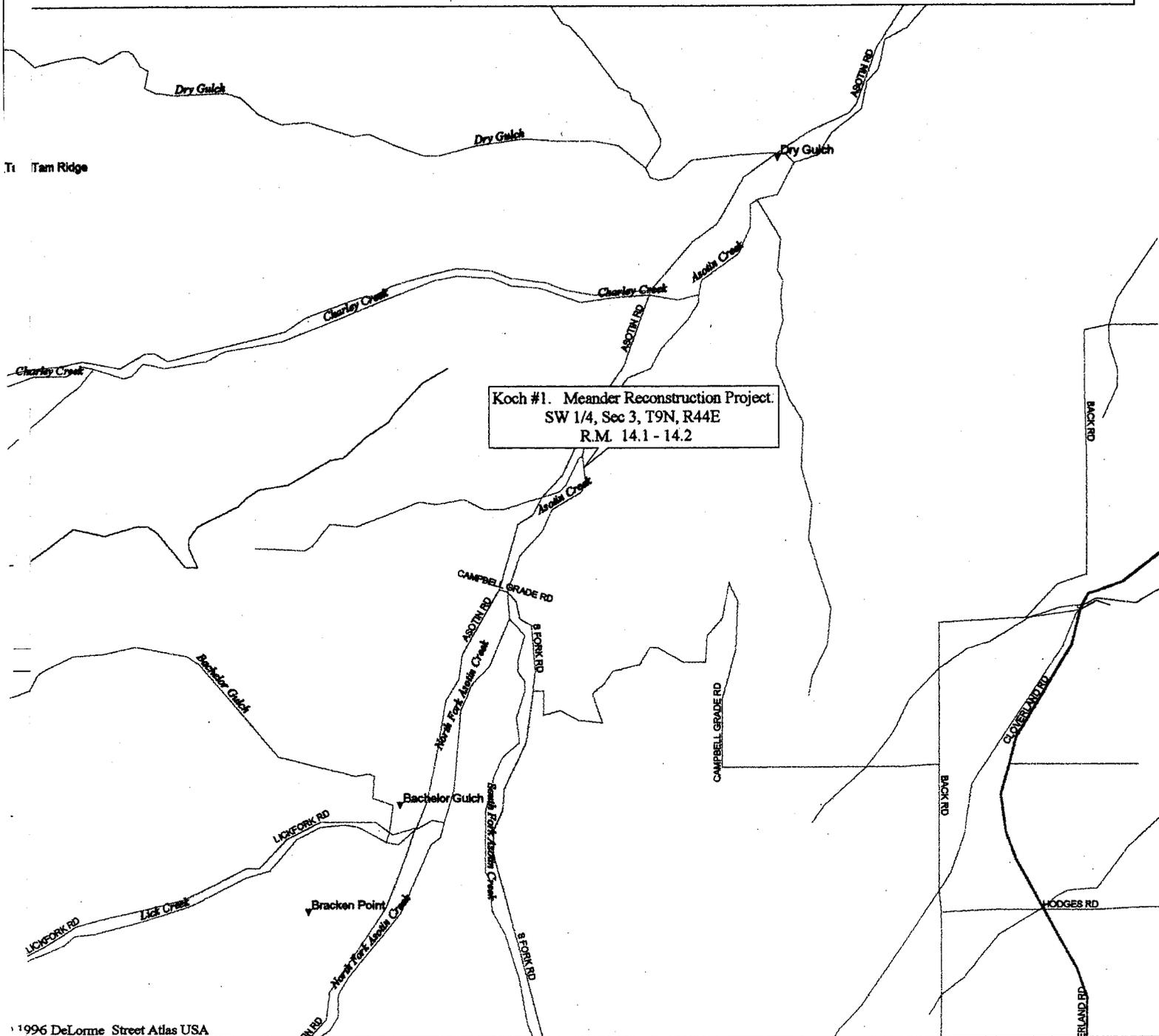
Meanders will begin on upper most root wads on right bank.



And the meanders will end at the bottom of this picture.



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Scale 1:31,250

Printed on Jun 08 14:57 1998

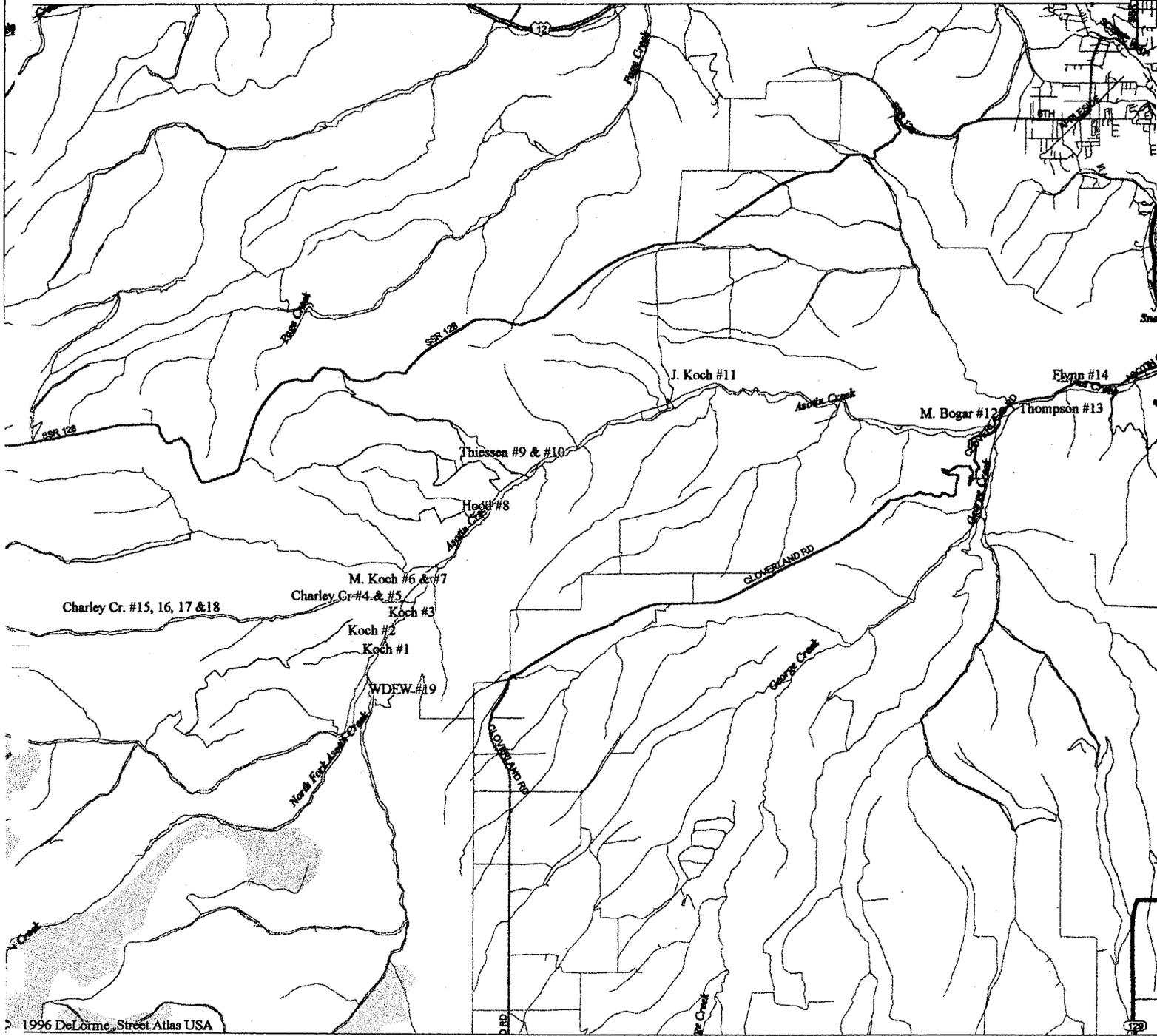
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000 Feet

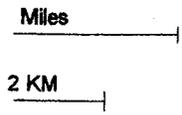
1000 Meters

-  Local Road
-  Major Connector
-  Trail
-  Geographic Feature
-  River/Canal
-  Intermittent River

1998 Asotin Creek Habitat Projects



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 Mon Jun 08 14:41 1998
 Scale 1:125,000 (at center)

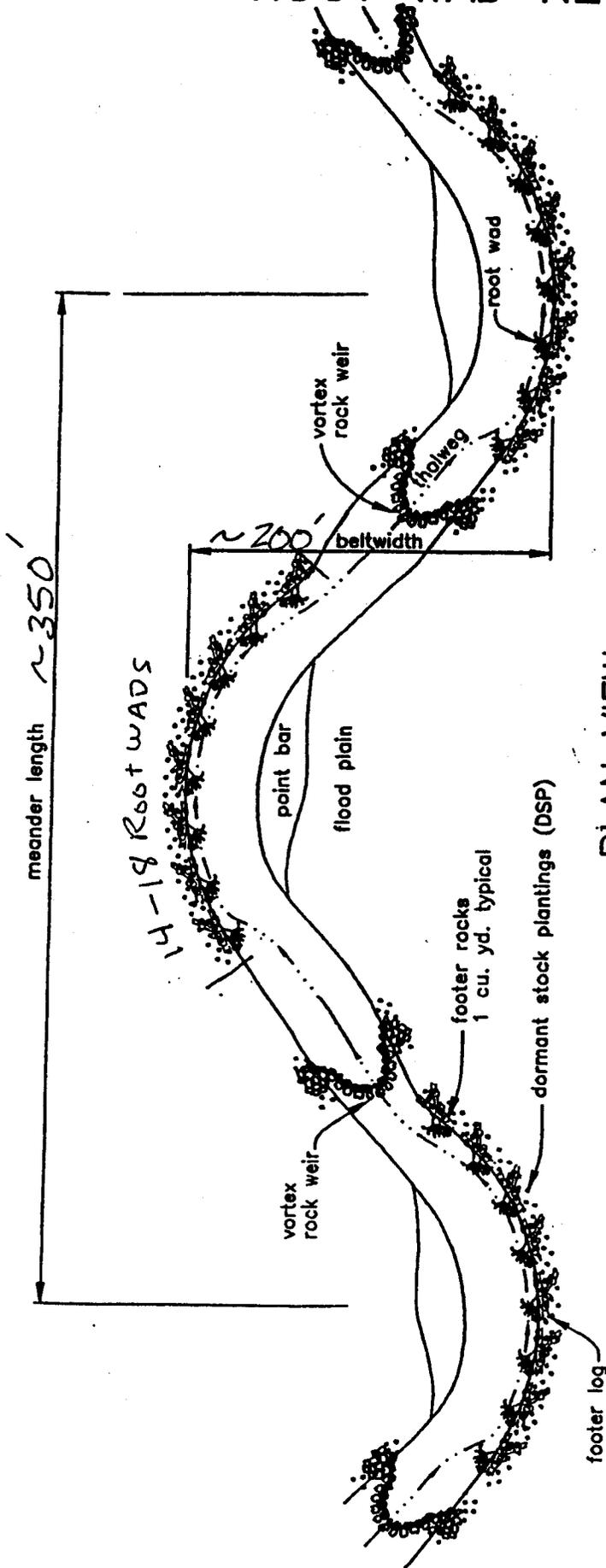


- | | |
|---------------------|--------------------|
| Local Road | Water |
| Major Connector | Woodland |
| State Route | River/Canal |
| Primary State Route | Intermittent River |
| Trail | |
| US Highway | |
| Land | |

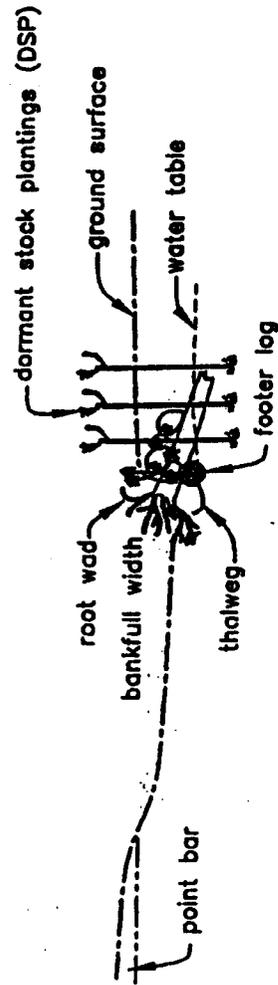
APPENDIX B

Location Maps and Plan Drawings

TYPICAL MEANDER RECONSTRUCTION AND ROOT WAD REVETMENTS



PLAN VIEW



TYPICAL CROSS SECTION

How Does Meander Reconstruction Affect Erosion or Sedimentation Rates?

A reconstructed meander built to bankfull size and dimension with all the physical features present like point bars, cross-overs and stable banks on meander curves; will transport bedload better than a braided or F channel. In a natural C4 system, bedload moves systematically from point bar allowing for less sediment buildup on center bars or other depositional features. The center bars in disturbed systems often affect the systematic movement of bedload causing more pressure on the streambanks while increasing width to depth ratios. The more obvious benefits meander reconstruction practices have on reducing erosion and sedimentation rates are regarding the re-establishment of willows, cottonwoods etc. A stable streambank needs to be present prior to revegetation. Meander reconstruction with root wad revetments includes a stable bank for young riparian species to establish.

How can Meander Reconstruction Affect Riparian Re-establishment?

Asotin Creek typically has many reaches that are entrenched or braided. By re-establishing a floodplain, via meander reconstruction, a seasonal water table becomes available for riparian species. One of the most common causes for willow re-establishment failures in arid and semi-arid climates, are due to lack of adequate water table available throughout the growing season.

W. Barry Southerland
WPT Stream Geomorphologist

Meander Reconstruction

How it relates to the *Asotin Creek Model Watershed Plan*?

Meander reconstruction can achieve several benefits that are unique to its approach in the Asotin Creek system: A.) In braided river systems (common to Asotin Creek) meander reconstruction allows for a single thread channel with a low width to depth ratio versus a wide and shallow channel. B.) Considerable more fish habitat is available in the reconstructed channel. In this deeper and narrower, yet longer and gentler gradient stream, you have all of the basic physical features of a natural system if you reconstruct back to the natural stable stream form (sometimes called the reference site). Some of these components are: pools in the near bank region, riffles in the cross-over part of the meander geometry, and reintroduction of a functional floodplain. C.) Just below riffles are gravel tailouts on these typical C4s common to Asotin Creek. These gravel tailouts, if they reappear on a consistent basis, are available for spawning. Vortex rock weirs are often used to mimic a crossover while providing grade stabilization and better gravel tailout below the scour pool. D.) When large woody debris is used as part of the revetment to mimic much of what was removed over the years, you add vital components such as bank stability and fish habitat cover. The bank stability characteristic of root wad revetments that becomes desirable is the soil matrix available in between the wads. This critical area allows for the re-established of native riparian species along the streambank. E.) Root wad revetments, when installed properly, will help maintain a thalweg (low-flow channel). The thalweg is a critical habitat component for fish during the hot summer months.

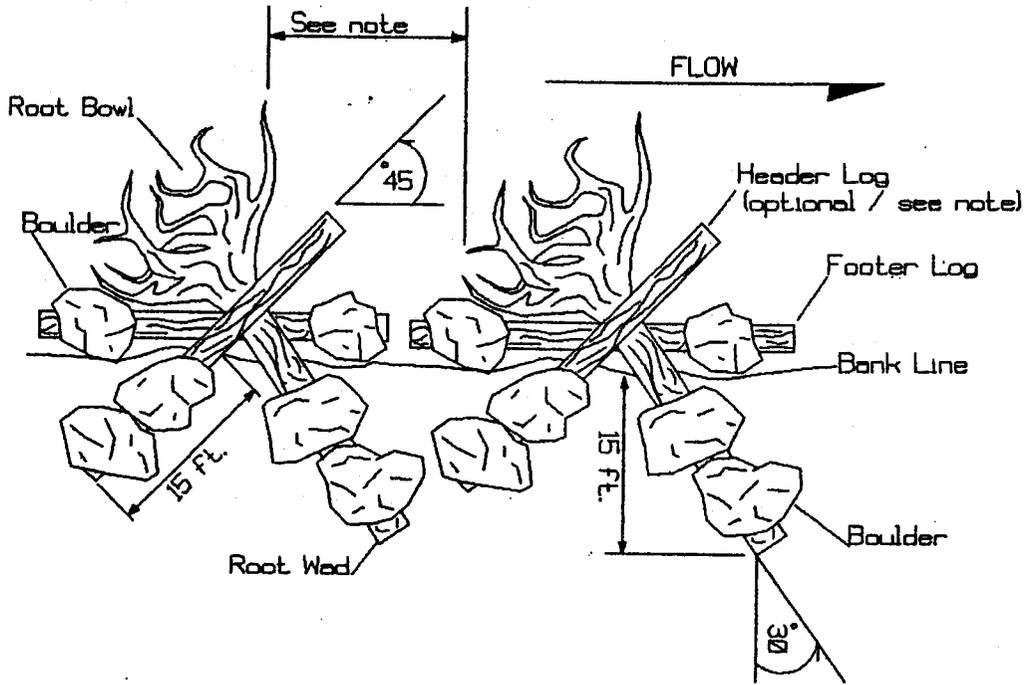
How does Meander Reconstruction Affect Water Temperature?

The lower the width to depth ratio of a C4 channel versus a higher width to depth ratio D4 or F4 stream, means less water is exposed to thermal inputs and more of the total channel is available for shading by streambank vegetation. The water temperature remains cooler in a low, width to depth ratio channel in a meander reconstruction style revetment.

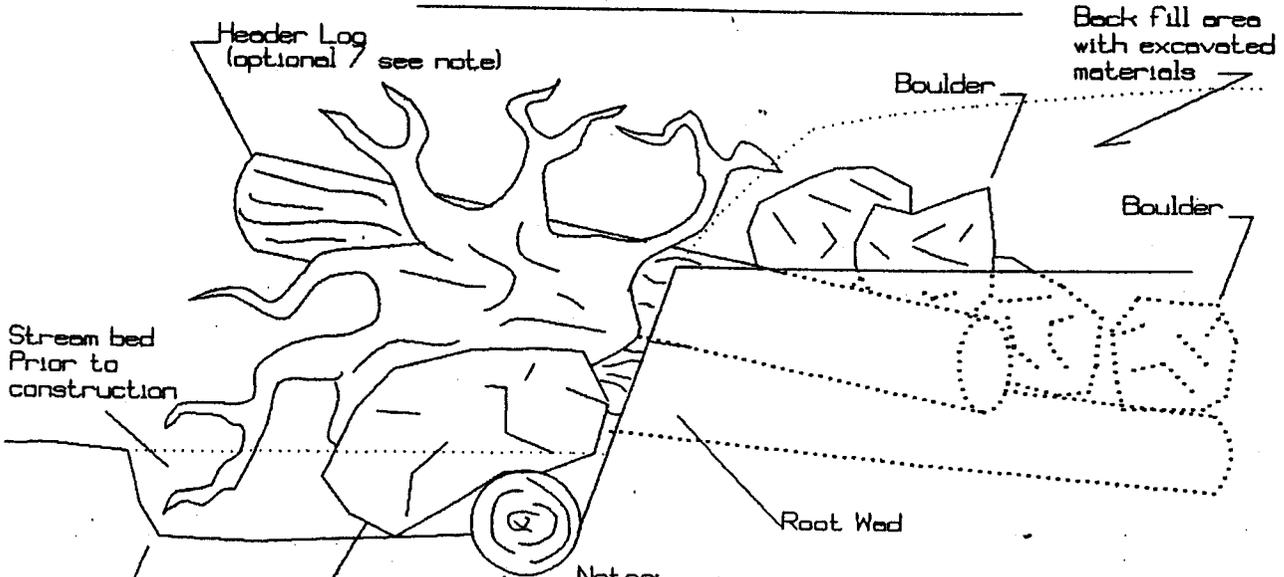
How Does Meander Reconstruction Increase Stability?

The root wad revetments, sometimes vanes, and vortex rock weirs are often seen as the more obvious stability components. However, meander reconstruction has the advantage, in some rural environments, of utilizing the old floodplain to disperse energy. This is a more desirable flow feature instead of maintaining concentrated flows in an entrenched or braided channel with extraordinary high velocities.

PLAN VIEW



TYPICAL X-SECTION



Notes:
 Minimum boulder diameter is 36 inches.
 Minimum amount is 9 boulders per root wad complex.
 Root Wads, header logs and footer logs are subject to NRCS approval prior to installation.
 Spacing between root wads (measured from the root bowl edge) will be 6 feet.
 Header log may be omitted with NRCS approval.

DATE	APPROVED BY	TITLE
7/97		

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RDS		
DRAWN		
RDS		

ROOT WAD DETAIL

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.	SHEET	OF

ROOT WAD REVETMENT

Description:

Revetments are typically used to reinforce a vertical bank on a riffle or meander stream section. Meander bends can also be reconstructed using revetments. The most visible parts of the revetment are the root wads extending from the bank into the stream flow and the header logs. Header logs may or may not be used depending on the application. Log stems with root wads attached are placed with the root portion out of the constructed bank and facing slightly up-stream. The log stem extends into the bank 10-15 feet and is secured with large boulders. The root wad is supported by the footer logs placed parallel to the stream. Optional header log stems cross the root wad logs and point down-stream.

Construction:

A trench is dug parallel to the stream flow and well below the existing streambed for the length of the project. A footer log is placed in this trench and secured with large boulders: the footer logs establish the new bankline. Root wads are placed on top of the footer log at approximately 10-15 foot spacing with the root mass pointing up-stream and the stem nearly perpendicular to the footer log with 10-15 feet into the constructed bank. The root mass extends 2-4 feet into the stream flow and approximately 1/2 of the root mass is below the water surface during flows experienced during construction periods. Header logs, if used, are then placed across the root wad stem and point down-stream: header logs may only be submerged during very high flows. Typically 6-10 cubic yards of very large boulders are placed on top of the stems to secure the root wad revetment in place. Rock may also be placed between the root wads to protect this area and also to act as small deflectors. Finally river cobbles or available soil materials are placed over the stems and rock anchors and graded to design specifications.

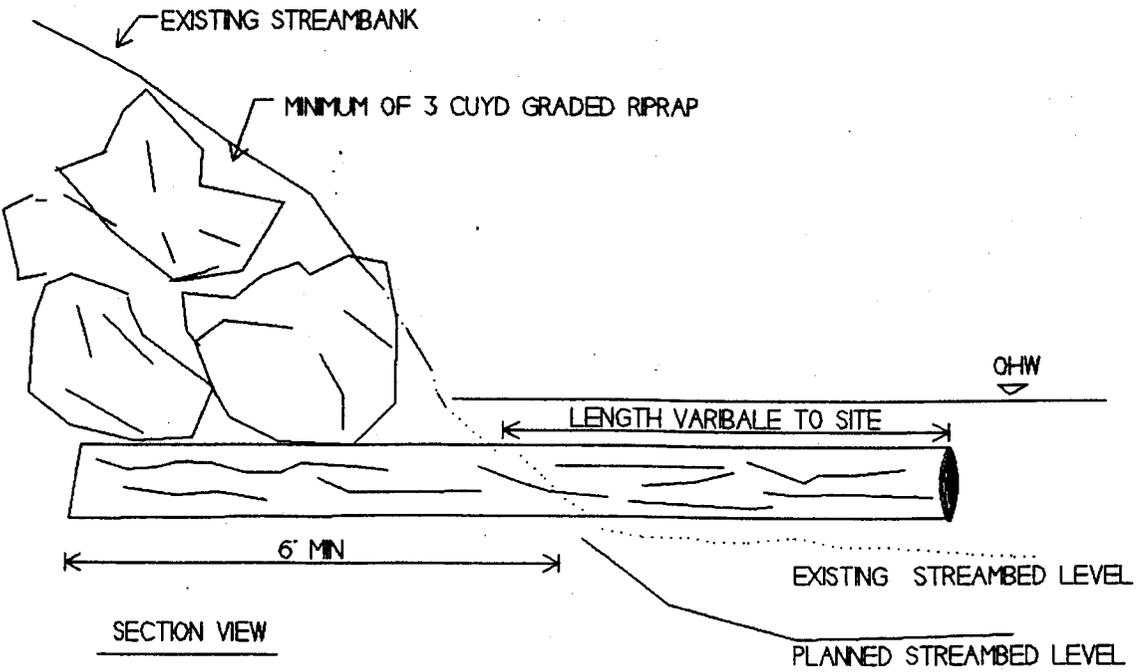
Hydraulic Action:

Root wads extending into the stream result in turbulent flows scouring pools and creating eddies. The combination of woody materials secured with large boulders has been successfully used in places that had highly erosive banks, piled river cobbles, or where no bankline existed.

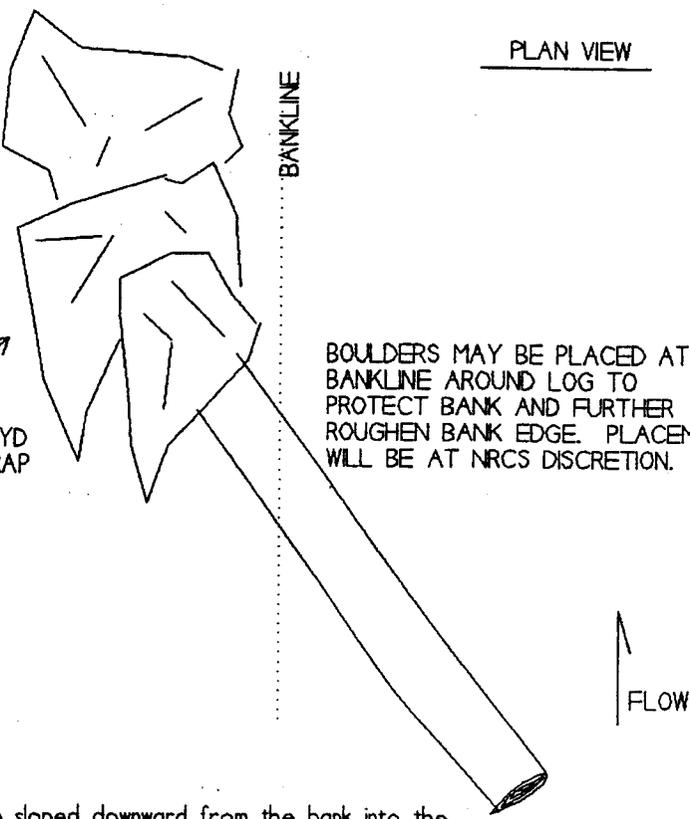
Benefits:

Root wads add complexity to the pools developed by structure installation or along "sterile" banklines. Root material provides interstitial spaces for complex cover as well as habitat for aquatic insects. Scour pools provide deep cover and cooler water holding areas. Root wad revetment allow the thalweg to be maintained at the near bank region without erosion and interrupting flows at the bankline providing increased cover.

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	TITLE	7/97	DRAWN
			RDS
	TITLE		TRACED
			CHIEF



SECTION VIEW



PLAN VIEW

NOTES:

- Log may be sloped downward from the bank into the stream flow at NRCS discretion.
- 3 cu.yd. of 36 inch graded riprap shall be placed on end of the log.
- Key log into bank a minimum of 6 feet.
- Key trench will be at the depth of the existing streambed and will be a minimum of 4 feet wide.
- Log barb location will be staked in the field by NRCS.

LOG BARB DETAIL

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO. _____

SHEET _____ OF _____

LOG BARB

Description:

This structure is a log, with or without a root wad, that is partially buried into the streambank and extends into the rivers current. The purpose of the log is to have the current scour a pool beneath the log as the water rushes under it or to create a pool and redirect the current away from the bank. Depending on the desired results, the log may be pointed up-stream or perpendicular to the bank. It might also be parallel to the water surface or may be at the water surface at the bank and angle slightly downward towards the end. The top of the log is placed a few inches to a foot below the water surface.

Construction:

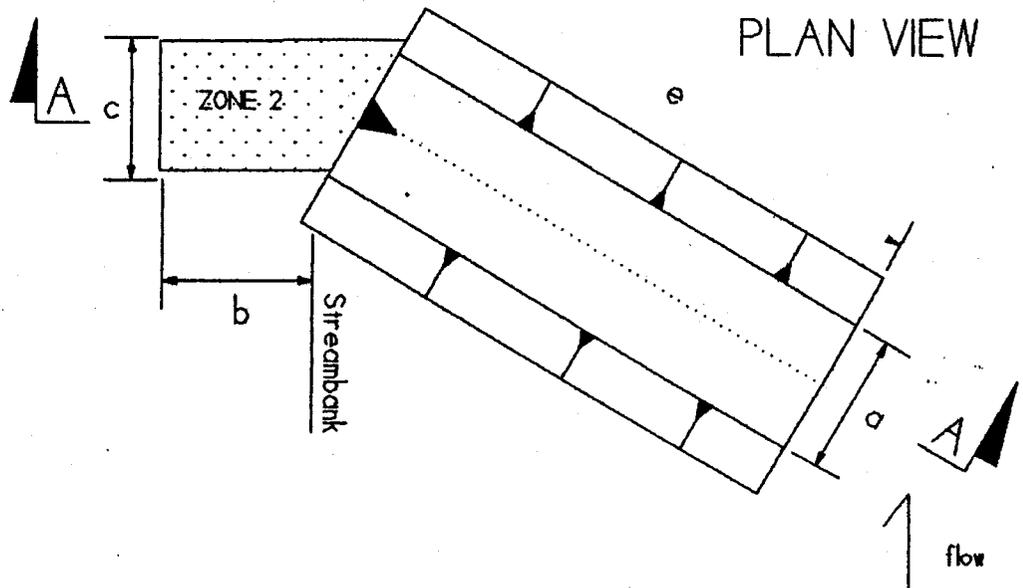
A trench is dug back into the bank 5 - 10 feet and below the depth of the existing stream bed. The log is laid into the trench, secured in place with large boulders, and the trench is back filled with the excavated materials. Depending on the log length, it may extend into the current five to 15 feet.

Hydraulic Action:

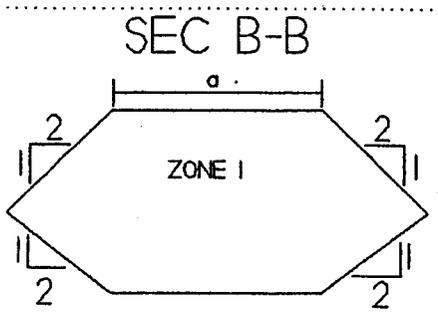
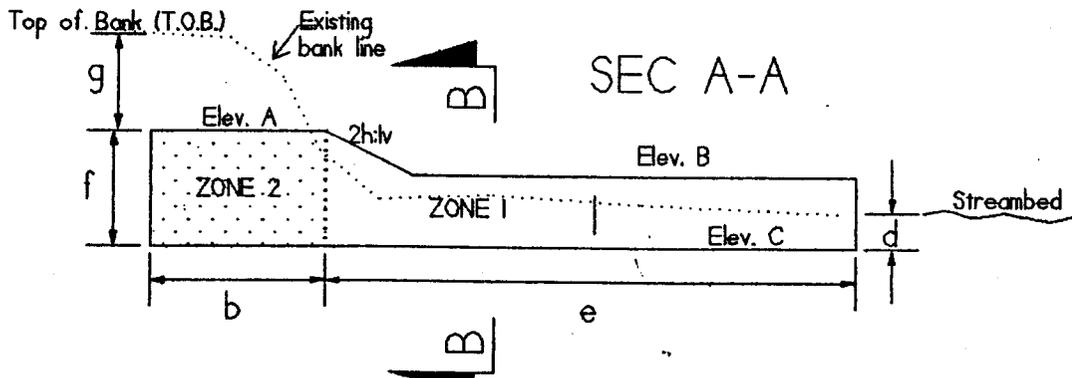
The current is forced over and under the log developing and maintaining a pool. If the log is angled up-stream the water current is redirected away from the bank. If a root wad is attached to the log the water flow is more disrupted and a eddy and pool are formed.

Benefits:

The scour pool and the log both provide cover for fish. This structure is a very low impact way of developing pools and breaking unruffled flows along a bank.



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DRAWN	RDS	DATE	7/97
TRACED			
CHECKED			
APPROVED BY		TITLE	
		TITLE	



ROCK GRADATION		
% Passing Dry wt. Basis	Zone 1	Zone 2
	Size Opening (inches)	Size Opening (inches)
100	48	36
60-80	36	24
20-40	24	15
15-25	18	8

STA	a	b	c	d	e	f	g	Elev. A	Elev. B	Elev. C	T.O.B.

* All dimensions in feet.

NOTES: STREAM BARBS WILL BE STAKED IN FIELD FOR LOCATION AND ANGLE UPSTREAM.
ROOT WAD WILL BE PLACED IN SCOUR POOL AS SHOW ON PLAN VIEW AND DETAIL DRAWINGS.

USDA NATURAL RESOURCES CONSERVATION SERVICE

BARB DETAIL

DRAWING NO. _____

SHEET _____ OF _____

Charley Creek #15 Habitat Restoration Project



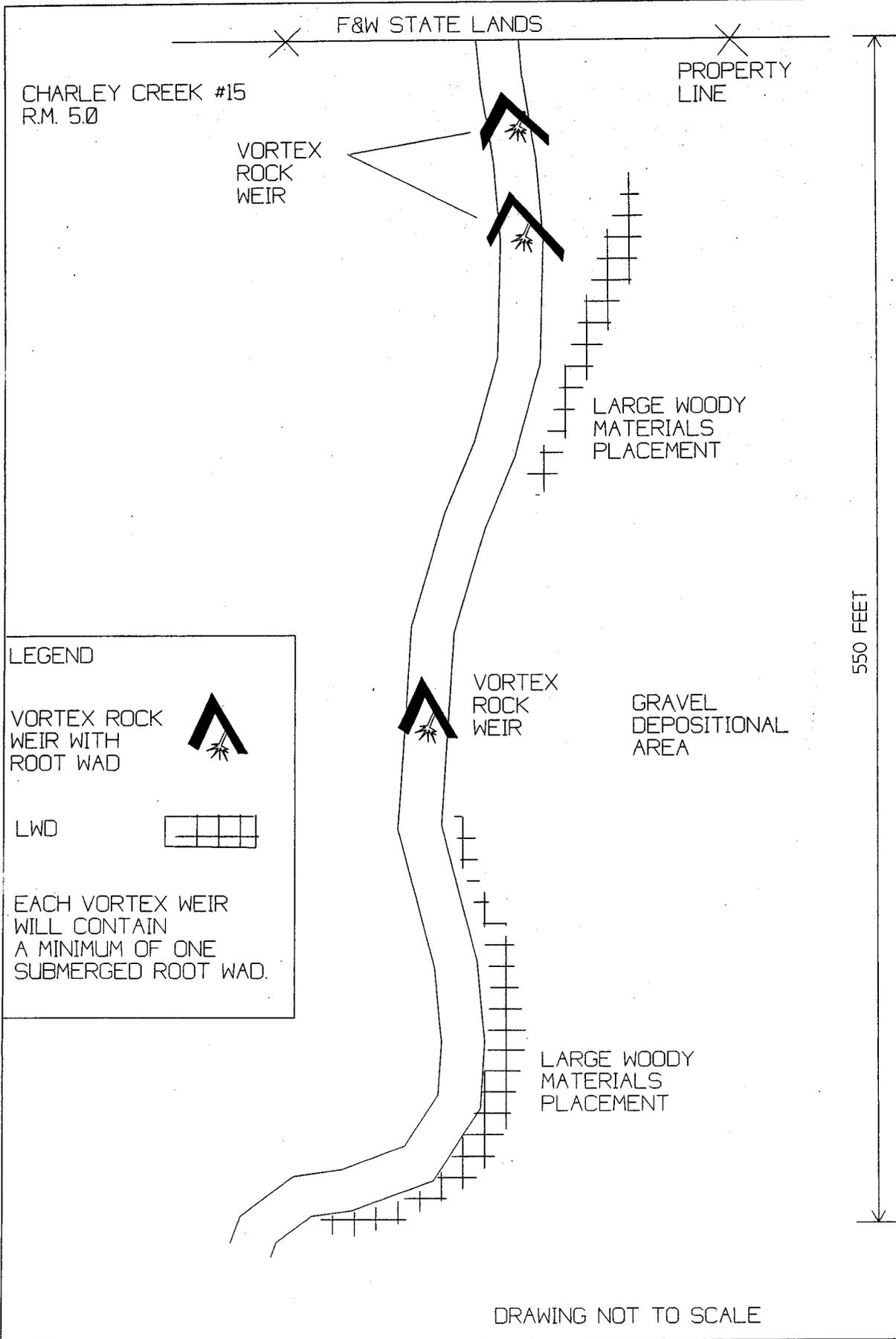
Upper section. Install rock vanes on right bank and vortex rock weirs.



Middle section. Anchor existing LWD and install structures.

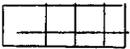


Lower section of site.



LEGEND

VORTEX ROCK WEIR WITH ROOT WAD 

LWD 

EACH VORTEX WEIR WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.

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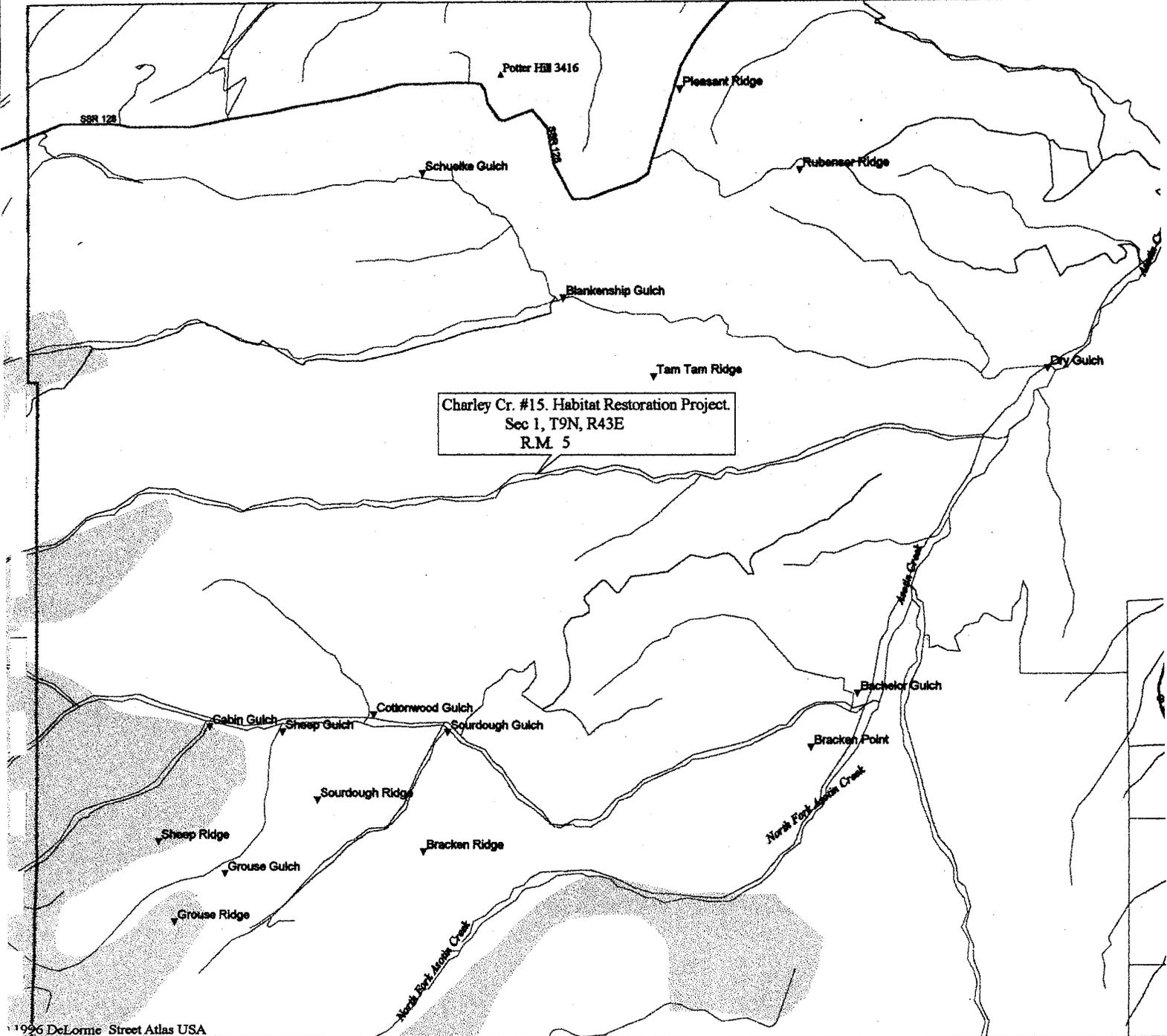
CHARLEY CREEK FISH HABITAT IMPROVEMENT
 PLAN VIEW
 CHARLEY CREEK, ASOTIN COUNTY WA
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO. _____

SHEET _____ OF _____

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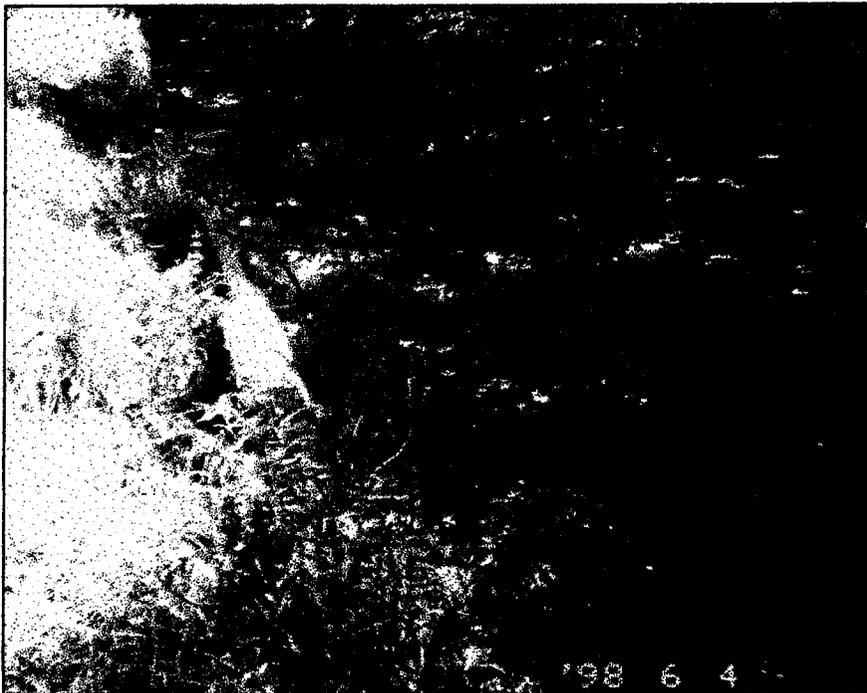
Miles
 2 KM

- Local Road
- Major Connector
- Trail
- Summit
- Geographic Feature
- County Boundary
- Woodland
- River/Canal
- Intermittent River

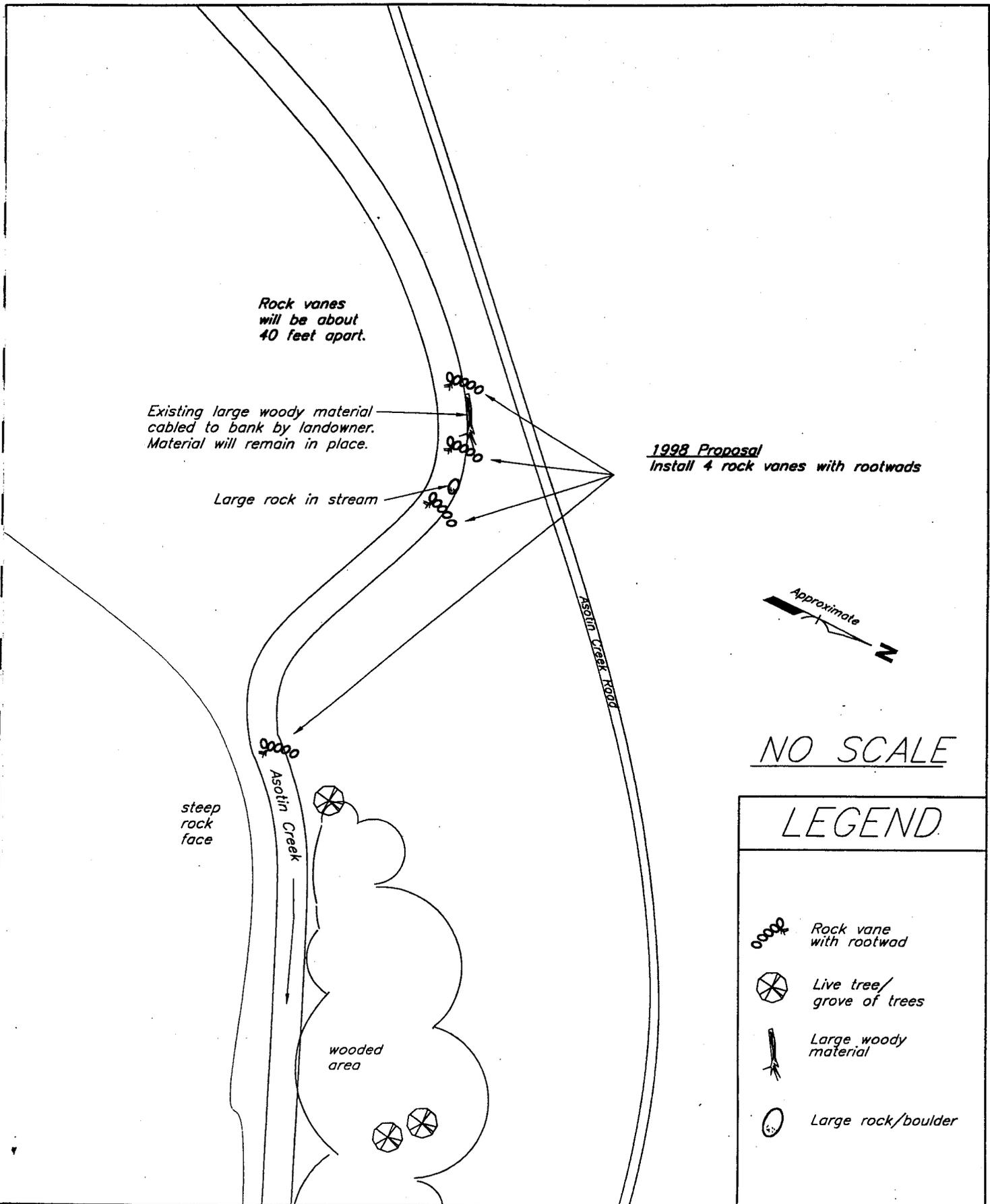
C. Flynn #14 Habitat Restoration Project



Upstream View. Rock vanes with root wads on left bank.



Downstream view. Cabled tree, rock vanes above and below the structure.



NO SCALE

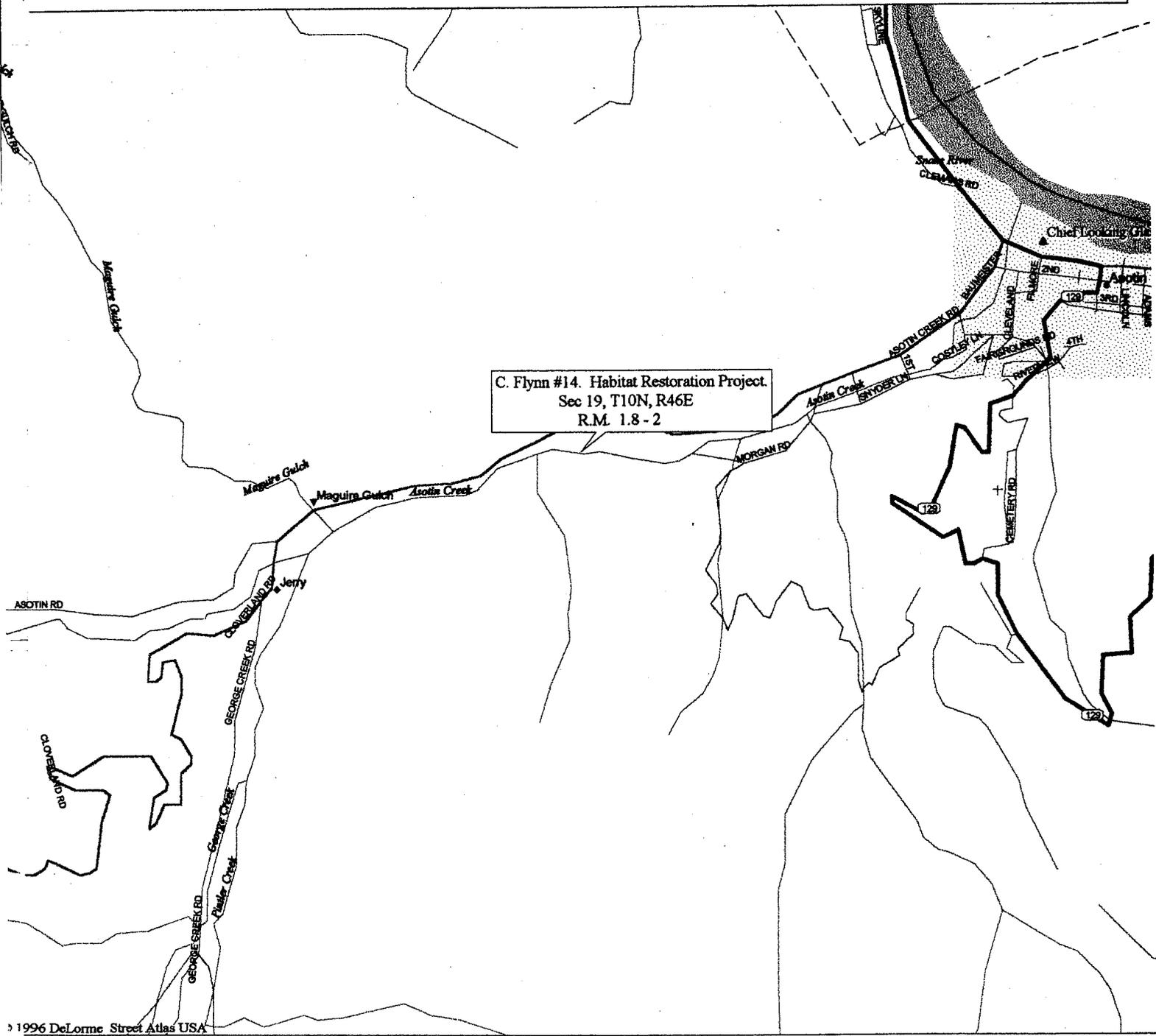
LEGEND	
	Rock vane with rootwad
	Live tree/grove of trees
	Large woody material
	Large rock/boulder

REFERENCE
 C. Flynn - # 14
 Asotin Creek 1998
 Proposed Work

NATURAL RESOURCES
 CONSERVATION SERVICE
 U.S. DEPARTMENT OF AGRICULTURE

CAD FILE NO. CFLYNN.DWG
 STANDARD DWG. NO.
 5
 DRAWN BY R. Lewis
 APPROVED BY _____
 DATE 6/98 SHEET 1 OF 1

1998 Asotin Creek Habitat Projects



C. Flynn #14. Habitat Restoration Project.
 Sec 19, T10N, R46E
 R.M. 1.8 - 2

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- | | | |
|-----------------------|---------------------|----------------------|
| — Local Road | ▲ Park/Reservation | — Intermittent River |
| — Major Connector | ◆ Locale | |
| — Primary State Route | + Cemetery | |
| — Trail | — State Boundary | |
| - - - Utility/Pipe | ▨ Population Center | |
| ● County Seat | ▨ Water | |
| ▼ Geographic Feature | — River/Canal | |

Thompson #13 Habitat Restoration Project (Cont.)



Upstream view. Install rock vanes with rootwads on right bank.



Downstream view. Install vortex rock weir off end of rip rap and rock vane on right bank by trees.

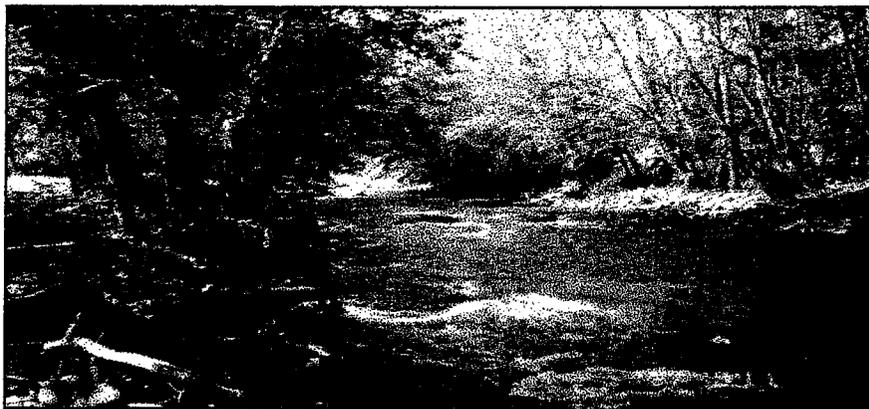
Thompson #13 Habitat Restoration Project



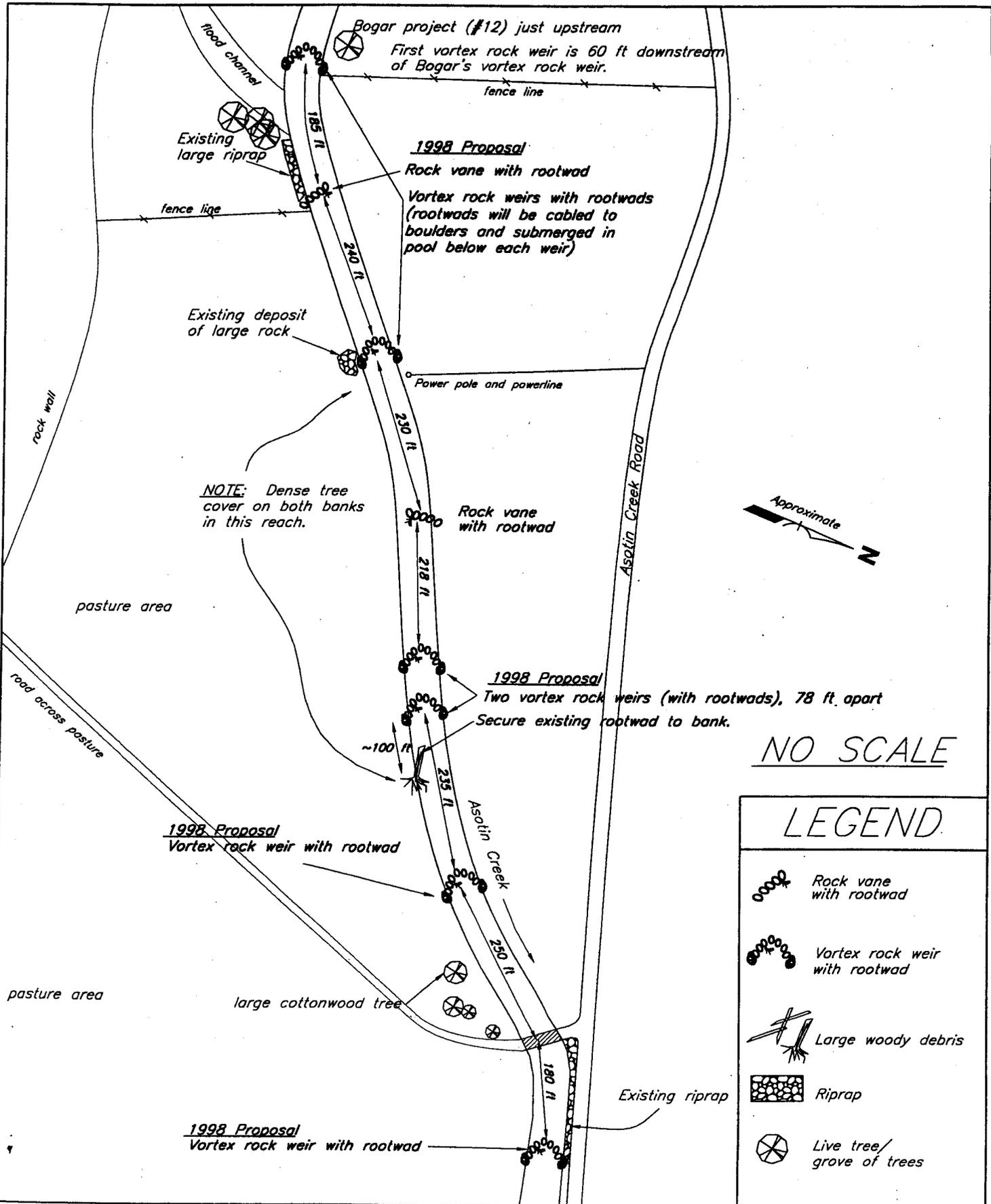
Downstream view. Vortex rock weir and rock vanes on right bank. Note cobble berms on right bank.



Upstream view. Install rock vanes on right bank.



Upstream view. Rock vanes on right bank and vortex rock weir.



NO SCALE

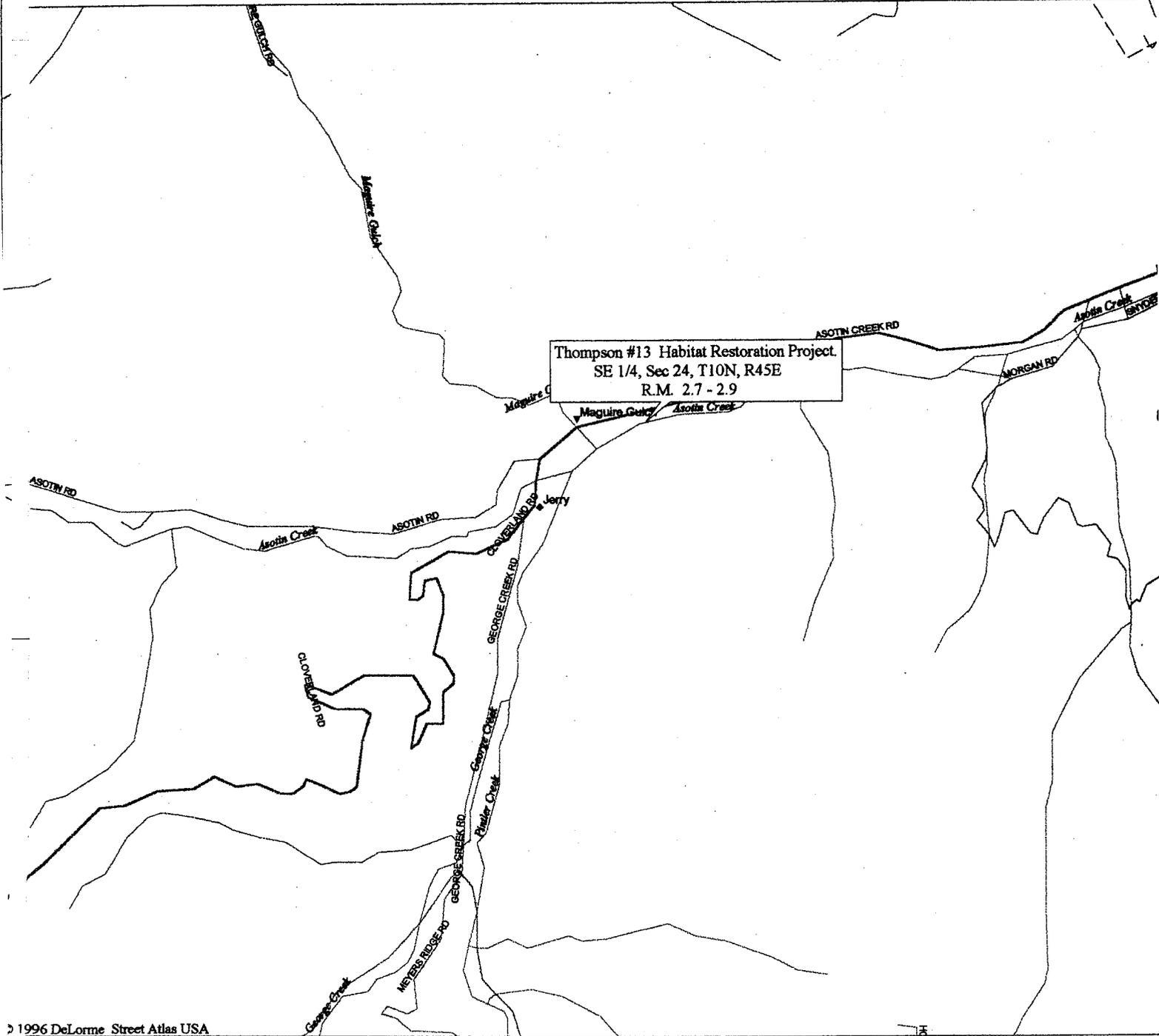
LEGEND	
	Rock vane with rootwad
	Vortex rock weir with rootwad
	Large woody debris
	Riprap
	Live tree/ grove of trees

REFERENCE
 Thompson - #13
 Asotin Creek 1998
 Proposed Work

NATURAL RESOURCES
 CONSERVATION SERVICE
 U.S. DEPARTMENT OF AGRICULTURE

CAD FILE NO. THOMPSON.DWG
 STANDARD DWG. NO.
 4
 DRAWN BY R. Lewis
 APPROVED BY _____
 DATE 6/98 SHEET 1 OF 1

1998 Asotin Creek Habitat Projects



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1000 Meters

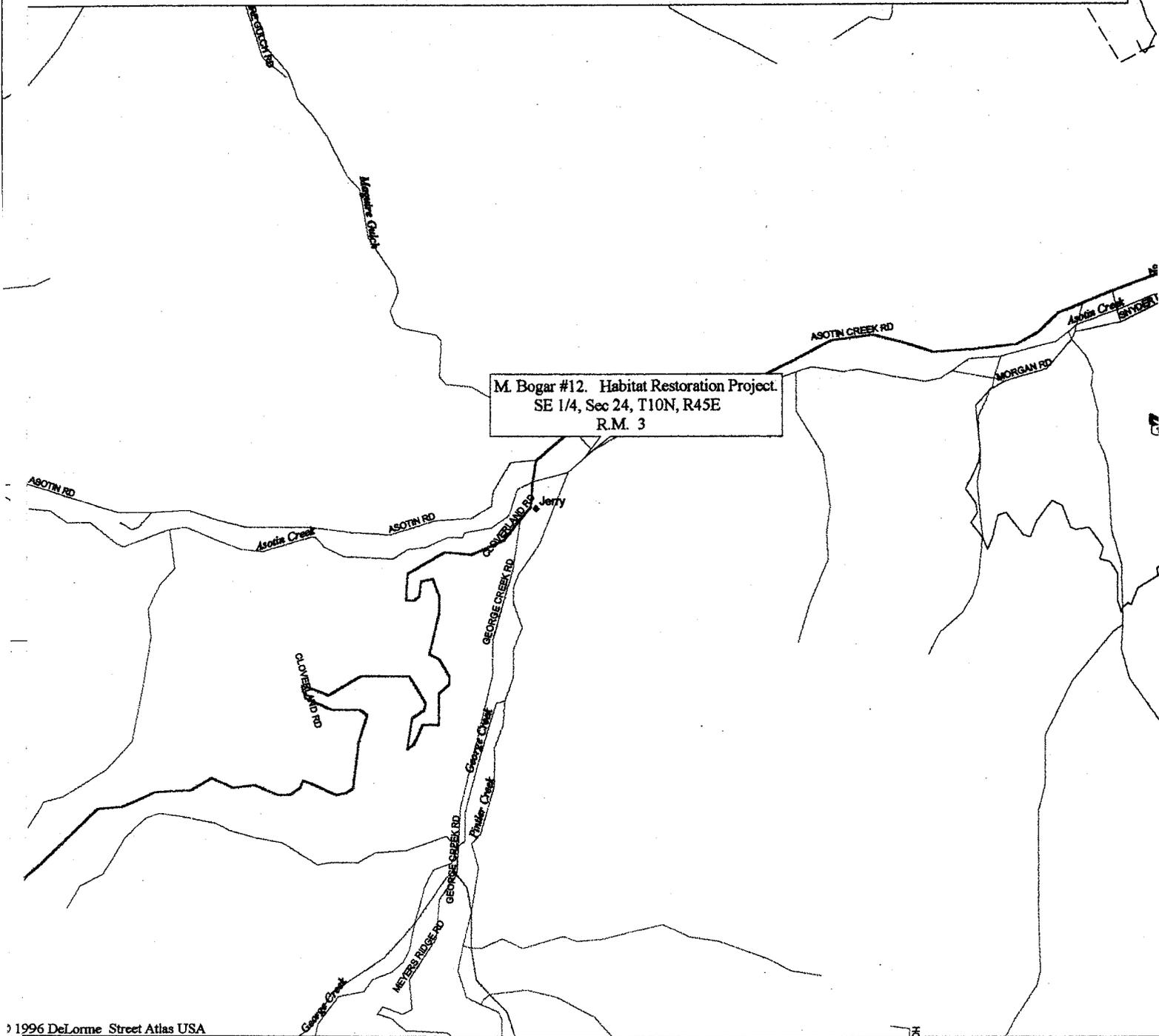
- | | | | |
|---|---------------------|---|--------------------|
|  | Local Road |  | Water |
|  | Major Connector |  | River/Canal |
|  | Primary State Route |  | Intermittent River |
|  | Trail |  | Geographic Feature |
|  | Utility/Pipe |  | Locale |

Bogar #12 Habitat Restoration Project



Upstream view. Install rock vane above upper riffle.
Middle of picture, install vortex rock weir.

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 1000 Feet
 1000 Meters

- | | |
|---------------------|--------------------|
| Local Road | Water |
| Major Connector | River/Canal |
| Primary State Route | Intermittent River |
| Trail | |
| Utility/Pipe | |
| Geographic Feature | |
| Locale | |

J. Koch #11 Habitat Restoration Project



Upstream view. Install vortex rock weir above fence.



Downstream view. Install rock vanes w/root wads on left bank.



Downstream view. Install vortex rock weir below riffle, remove cobble berms.

JIM KOCH #11
 SW 1/4, SEC 20, T10N, R44E
 R.M. 9.4-9.5

LEGEND

VORTEX ROCK WEIR WITH ROOT WAD



ROCK VANE WITH ROOT WAD



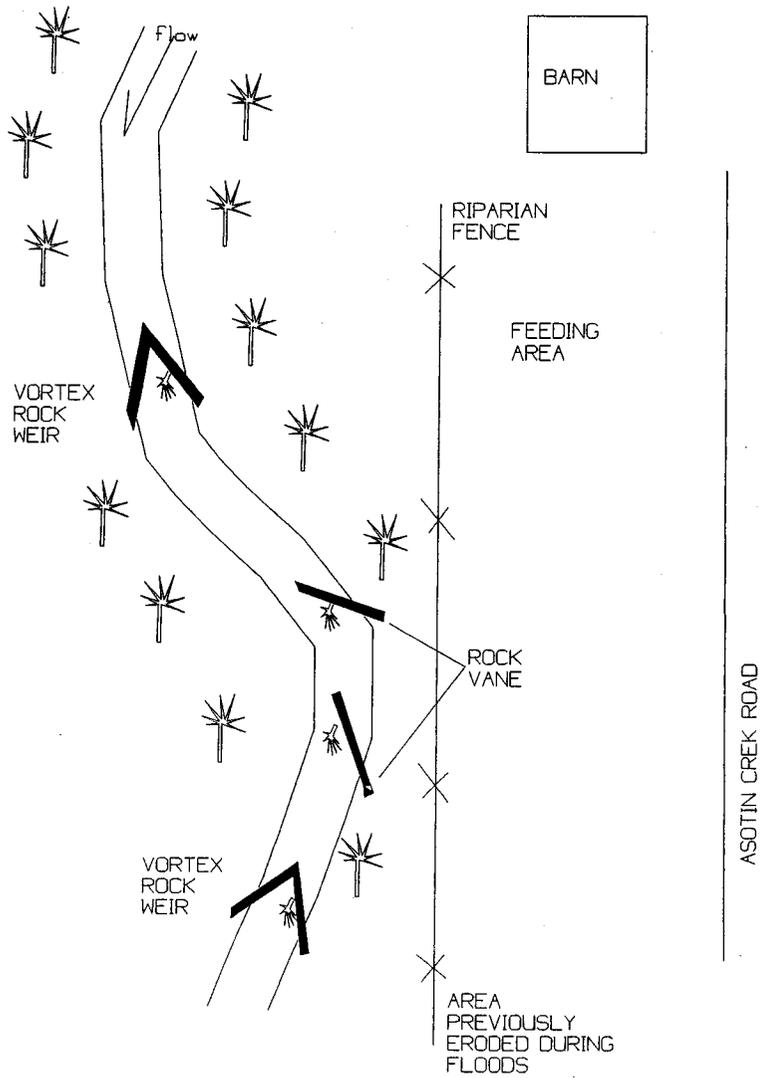
EXISTING RIPARIAN VEGETATION



EXISTING RIPARIAN FENCE



EACH VORTEX WEIR AND ROCK VANE WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.



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DATE	APPROVED BY	TITLE	TITLE

DATE	DESIGNED	DRAWN	TRACED	CHECKED

JIM KOCH FISH HABITAT IMPROVEMENT
 PLAN VIEW
 ASOTIN CREEK, ASOTIN COUNTY, WA.

USDA NATURAL RESOURCES CONSERVATION SERVICE

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Thiessen #10 Habitat Restoration Project (Cont.)



Downstream view. Exposed, raw, vertical streambank on right bank. LWD placement to reduce sedimentation and rock vanes to create pools.

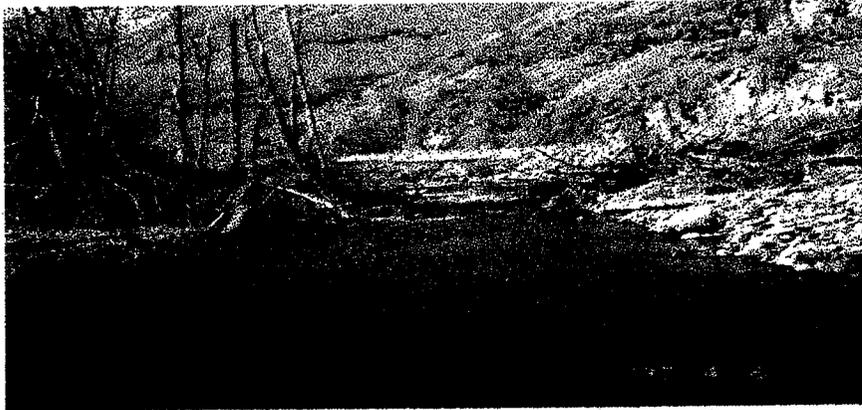


Upstream view at lower section of project.



Upstream view. Rock outcropping with natural pools for root wad placement.

Thiessen #10 Habitat Restoration Project



Upstream view. Install vortex rock weir.



Upstream view. Rootwads will be incorporated into structures.



Downstream view. Install rock vanes on right bank.
LWD placement along toe of streambank.

THIESSEN #10
 SW 1/4, SEC 26, T10N, R44E
 R.M. 10.8-10.9

LEGEND

ROCK VANE WITH ROOT WAD



VORTEX ROCK WEIR WITH ROOT WAD



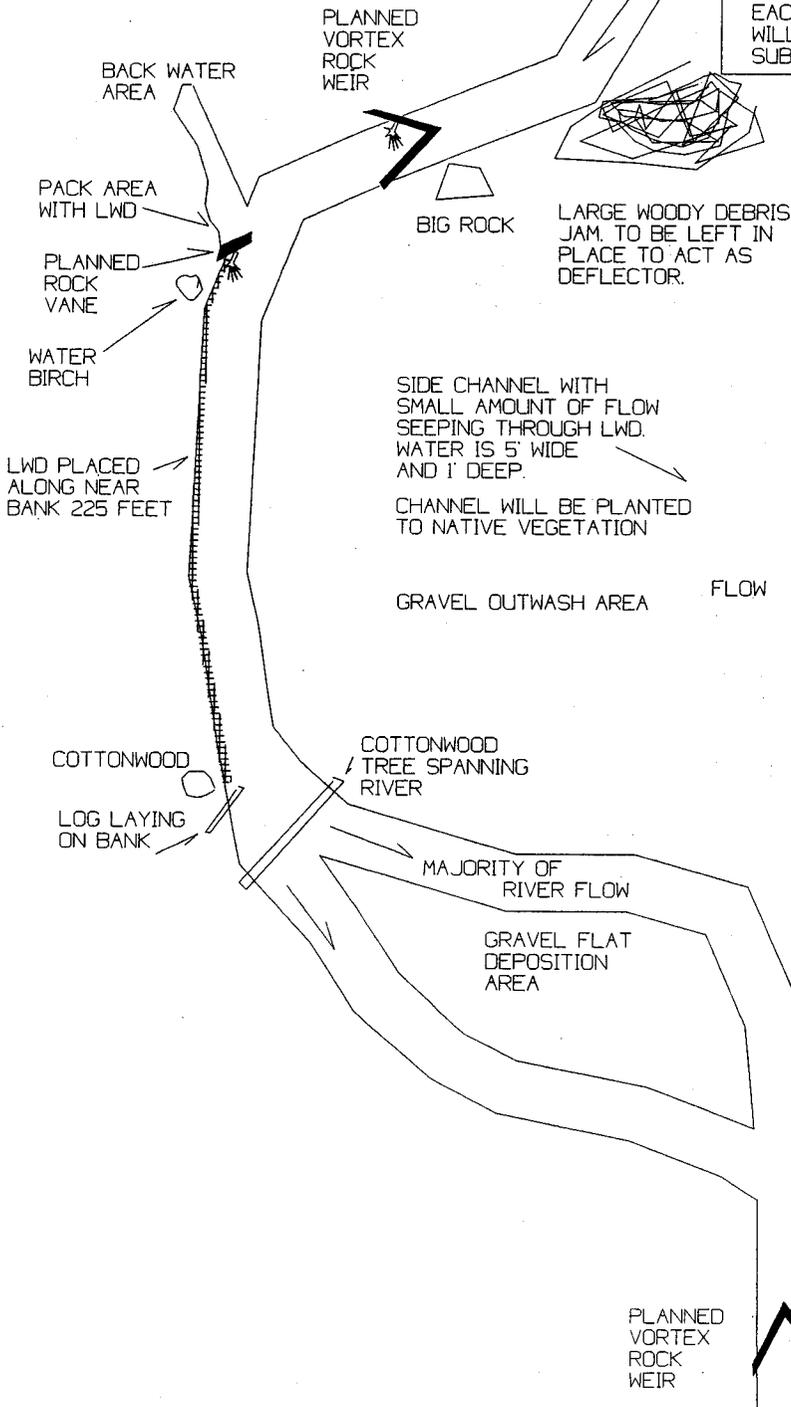
LARGE WOODY DEBRIS



EACH VORTEX WEIR AND ROCK VANE WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.

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TITLE	_____
TITLE	_____

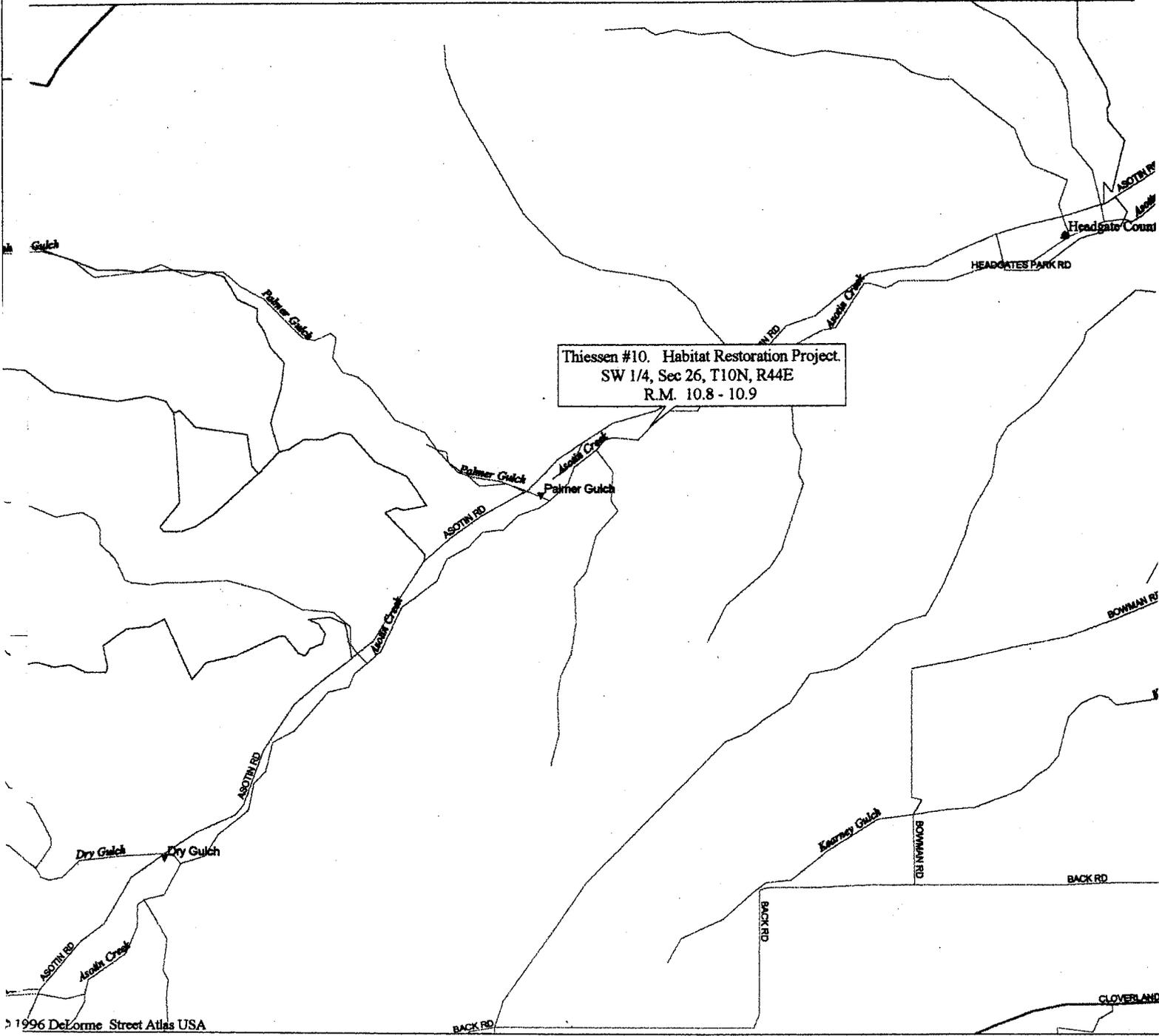
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THIESSEN FISH HABITAT IMPROVEMENT
 PLAN VIEW
 ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

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1998 Asotin Creek Habitat Projects



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- Local Road
- Major Connector
- Trail
- ▼ Geographic Feature
- ▲ Park/Reservation
- River/Canal
- Intermittent River

Thiessen #9 Habitat Restoration Project



Previous bank stabilization workshop site.
Lower section of project site, upstream view.
Remove debris jam on right bank and place on left bank.
Install vortex rock weir, LWD placement and two rock vanes on left bank.

THIESSEN #9
 NW 1/4, SEC 25, T10N, R44E
 R.M. 110

LEGEND

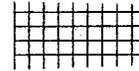
ROCK VANE WITH ROOT WAD



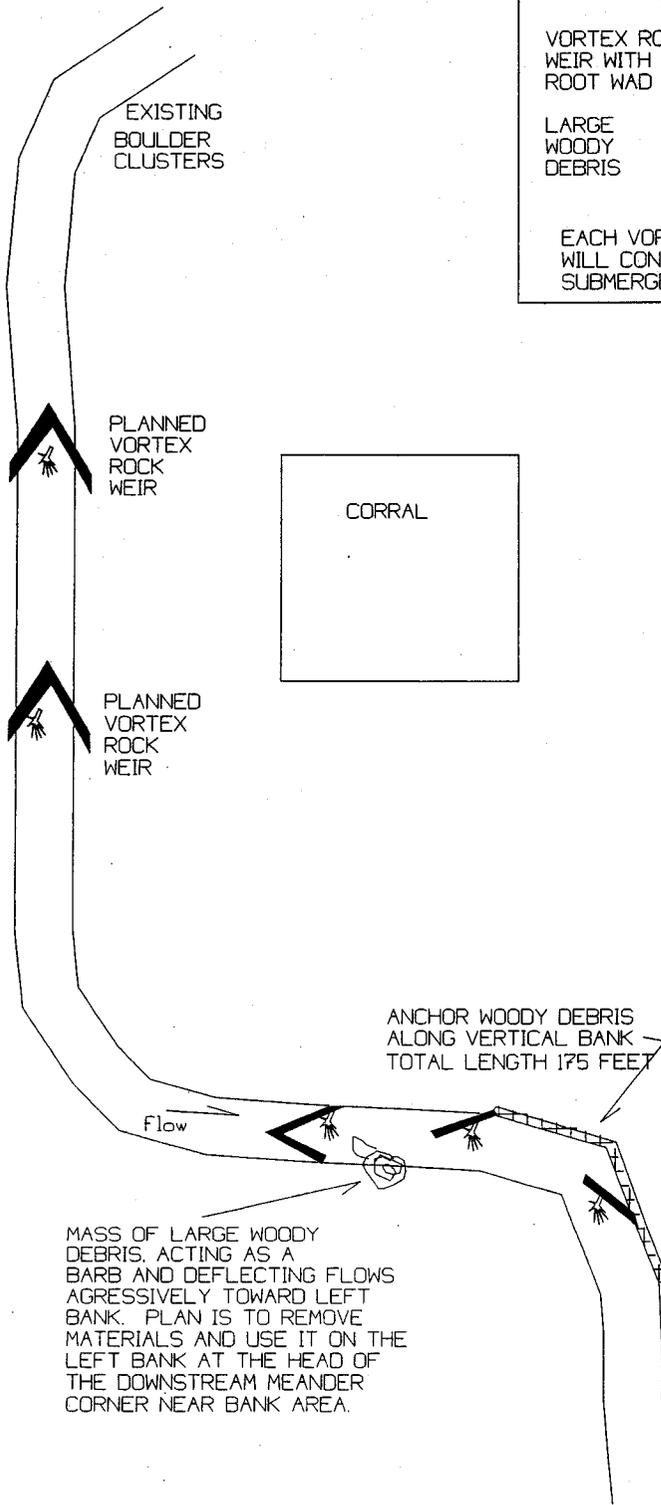
VORTEX ROCK WEIR WITH ROOT WAD



LARGE WOODY DEBRIS



EACH VORTEX WEIR AND ROCK VANE WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.



MASS OF LARGE WOODY DEBRIS, ACTING AS A BARB AND DEFLECTING FLOWS AGGRESSIVELY TOWARD LEFT BANK. PLAN IS TO REMOVE MATERIALS AND USE IT ON THE LEFT BANK AT THE HEAD OF THE DOWNSTREAM MEANDER CORNER NEAR BANK AREA.

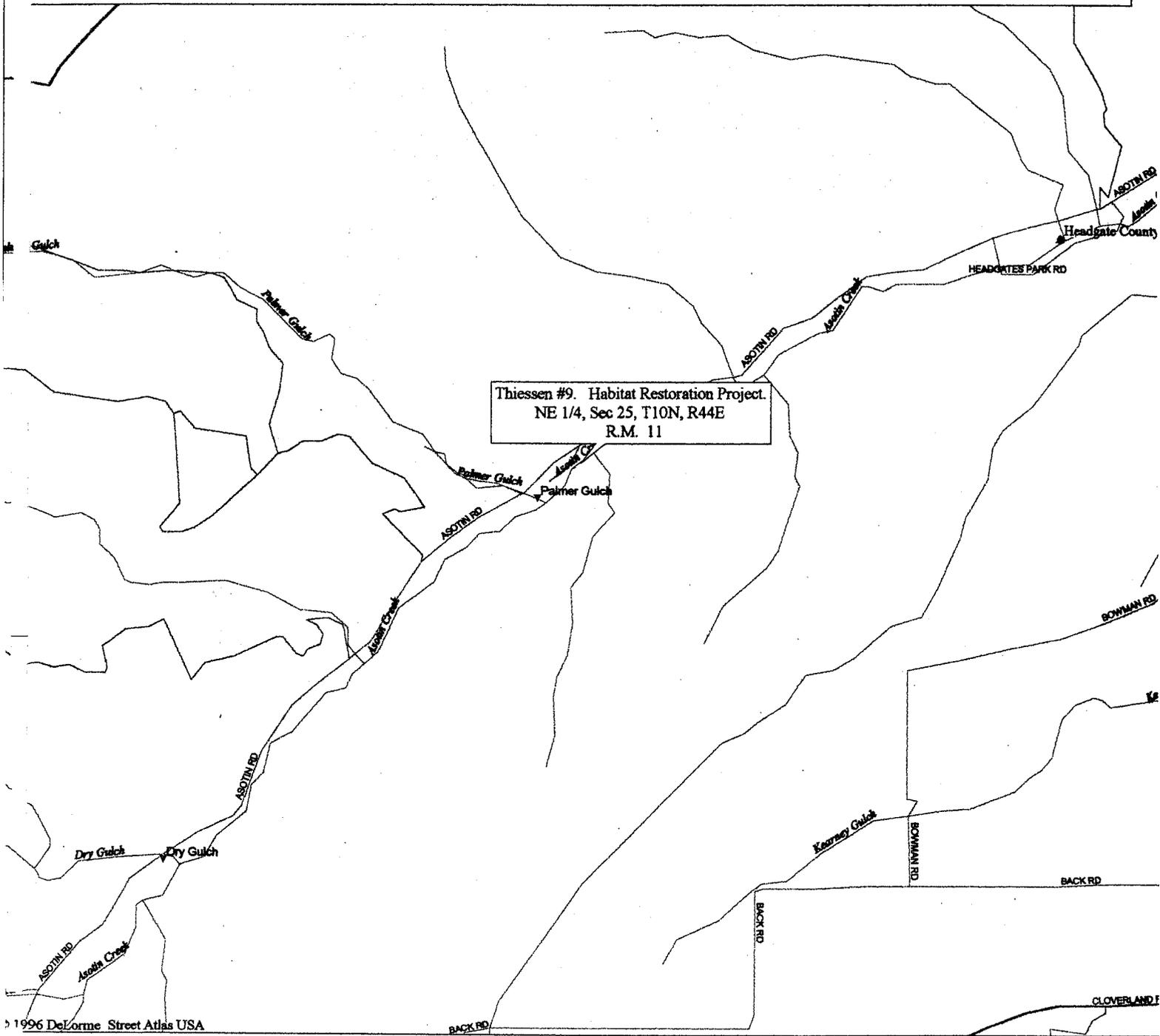
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THEISSEN FISH HABITAT IMPROVEMENT
 PROJECT LAYOUT
 ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

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1998 Asotin Creek Habitat Projects



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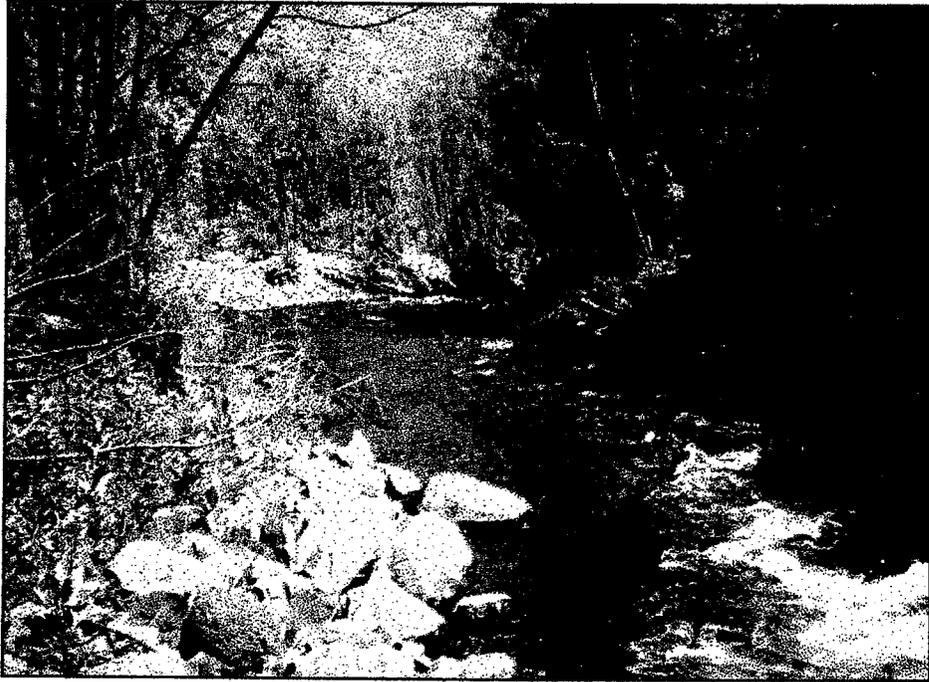
Scale 1:31,250 (at center)

000 Feet

1000 Meters

-  Local Road
-  Major Connector
-  Trail
-  Geographic Feature
-  Park/Reservation
-  River/Canal
-  Intermittent River

Hood #8 Habitat Restoration Project

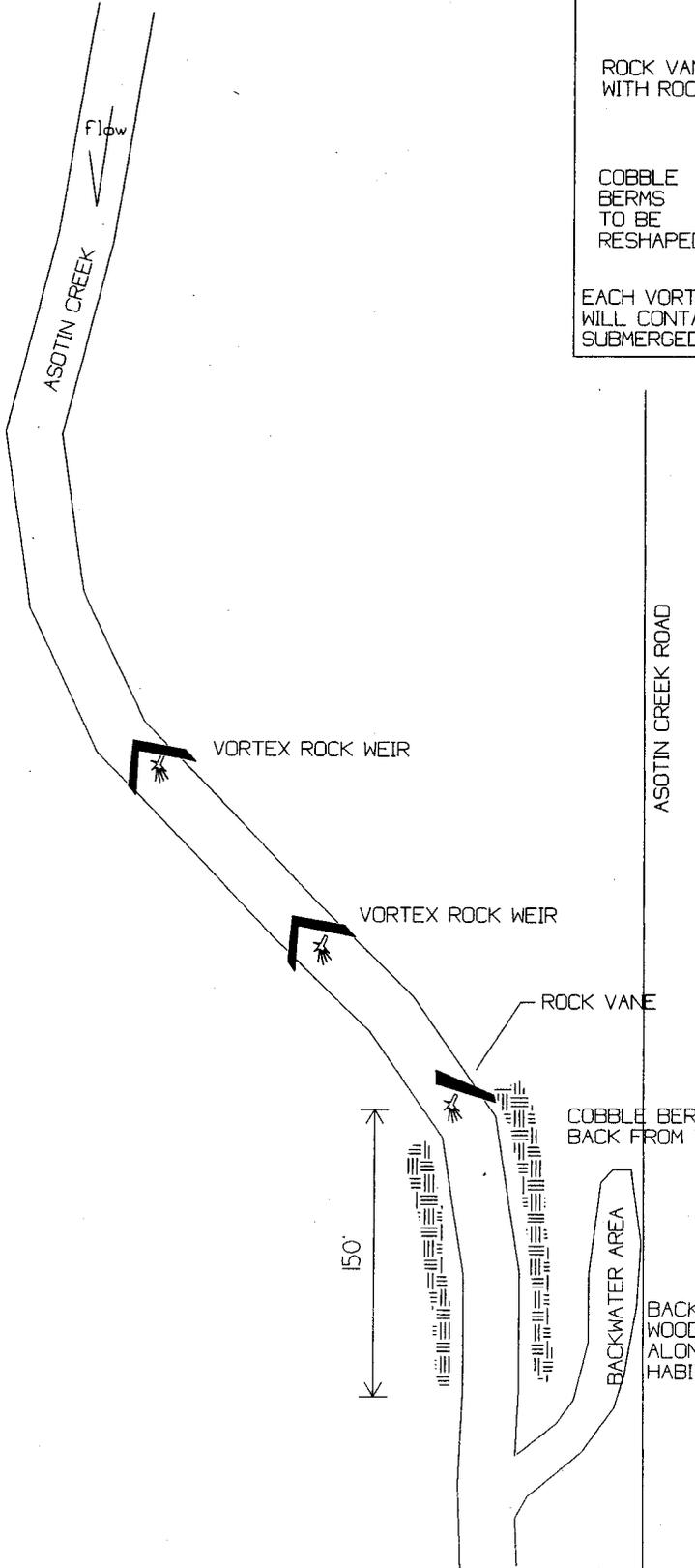


Downstream view. Install vortex rock weirs and rock vane with root wad.



Downstream view. Cobble berm pushed up by county during flood to fix road.

HOOD #8
 NE 1/4 SEC 35, T10N, R44E
 R.M. 120



LEGEND

VORTEX ROCK
 ROCKWEIR WITH
 ROOT WAD



ROCK VANE
 WITH ROOT WAD



COBBLE
 BERMS
 TO BE
 RESHAPED



EACH VORTEX WEIR AND ROCK VANE
 WILL CONTAIN A MINIMUM OF ONE
 SUBMERGED ROOT WAD.

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TRACED		TITLE	
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HOOD FISH HABITAT IMPROVEMENT
 PLAN VIEW
 ASOTIN CREEK, ASOTIN COUNTY, WA
 USDA NATURAL RESOURCES CONSERVATION SERVICE

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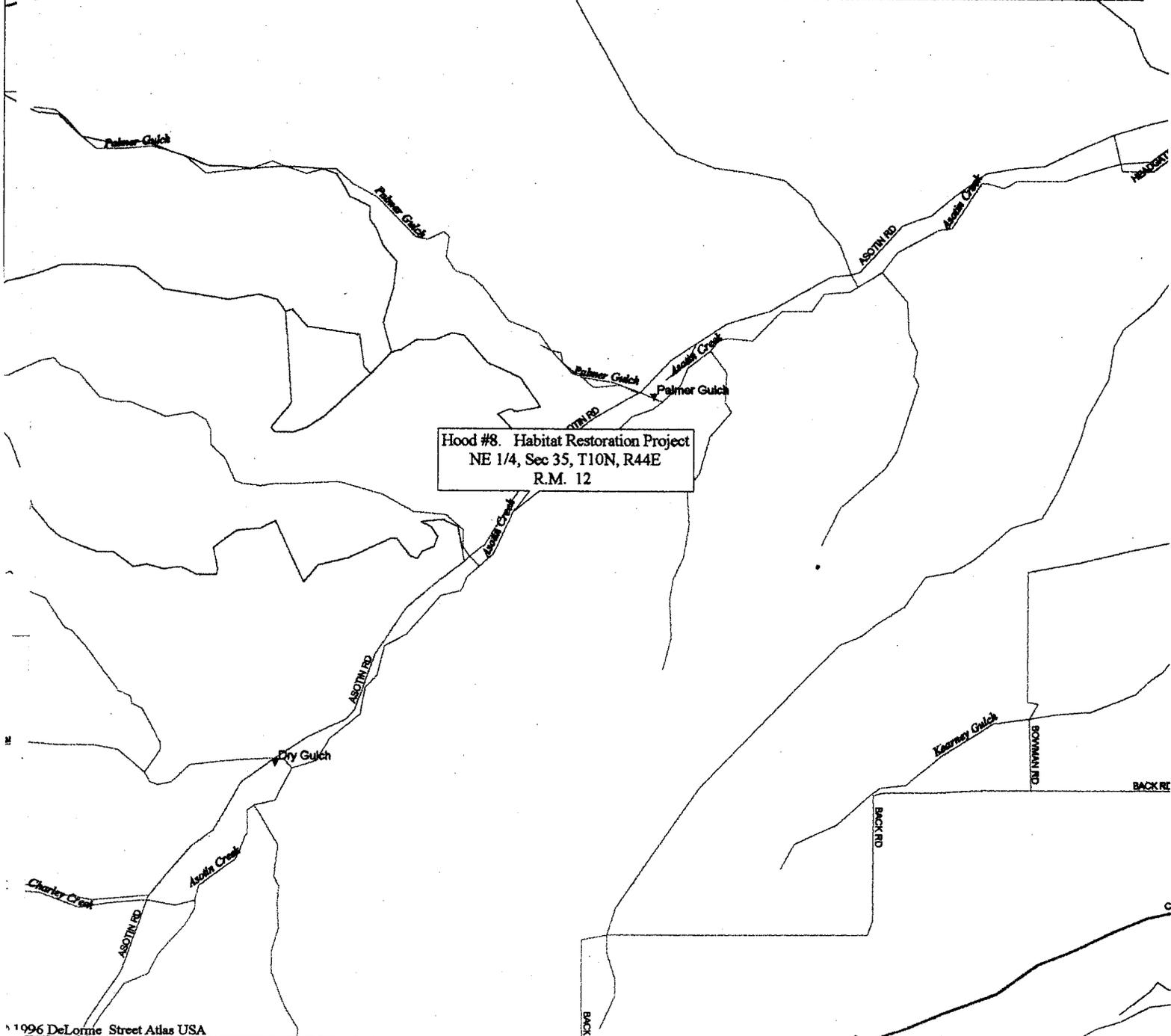
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SHEET OF

M. Koch #7 Habitat Restoration Project

No Pictures of Site!!!

1998 Asotin Creek Habitat Projects



Hood #8. Habitat Restoration Project
 NE 1/4, Sec 35, T10N, R44E
 R.M. 12

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 Scale 1:31,250 (at center)
 000 Feet
 1000 Meters

- Local Road
- Major Connector
- Trail
- ▼ Geographic Feature
- River/Canal
- Intermittent River

MARTY KOCH #7
 NE 1/4, SEC 3, T9N, R44E
 R.M. 12.3-12.4

LEGEND

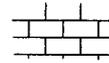
ROCK
 VANE



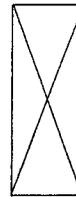
VORTEX
 ROCK
 WEIR



LARGE
 WOODY
 MATERIALS

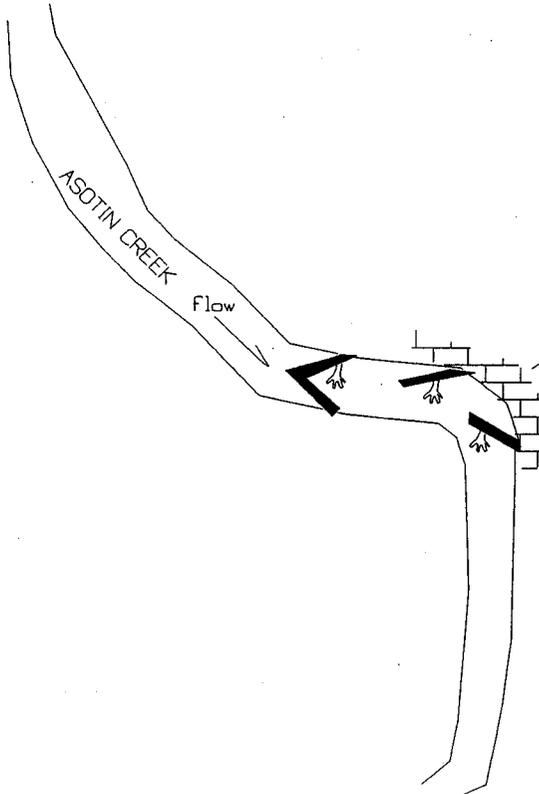


EACH VORTEX WEIR AND ROCK VANE
 WILL CONTAIN A MINIMUM OF ONE
 SUBMERGED ROOT WAD.

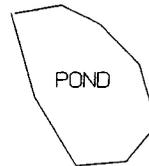


MARTY KOCH'S
 HOUSE

CONNECTS TO MARTY
 KOCH #6



LARGE WOODY MATERIALS
 PLACEMENT ON 150 FEET
 OF LEFT BANK



POND

ASOTIN CREEK ROAD

DATE	_____
APPROVED BY	_____
TITLE	_____
TITLE	_____

DESIGNED	_____	DATE	_____
DRAWN	_____		_____
TRACED	_____		_____
CHECKED	_____		_____

MARTY KOCH FISH HABITAT IMPROVEMENT
 PLAN VIEW
 ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

DRAWING NO.	_____
SHEET	OF _____

Fish Utilization

A selected number of sites will be evaluated by snorkeling, prior to project installation, within one month after project completion, and again the following year. The number and type of fish will be recorded and compared to find if the structures are attracting juvenile or adult salmonids. A stream reach near the project that has similar conditions and no practice installation, will also be snorkeled and used for comparison. Surveys will also be conducted to determine whether projects are creating suitable spawning habitat by counting the number of redds in a project area and an adjoining non-treatment stream reach.

Riparian Vegetation Enhancement

Permanent photo points will be established at selected areas to monitor vegetative growth where project sites coincide with animal exclusion and vegetative plantings. Photos will be taken from the center of the stream, if possible, to show bank vegetative growth and stream shading.

Asotin Creek Monitoring Plan

The Asotin Creek Monitoring Plan can be divided into four areas: 1) Water quality; 2) Stream physical characteristics; 3) Fish utilization; and 4) Riparian vegetation enhancement.

Water quality monitoring is being completed by Washington State University; in cooperation with the conservation district. Copies of the testing parameters and preliminary results are included in this appendix. The Asotin Conservation District and the Natural Resource Conservation Service in cooperation will complete the remaining elements with either Washington State Department of Fish and Wildlife or the Nez Perce Tribe.

Stream Physical Characteristics

One of each type of structure scheduled to be installed in 1998 will be selected for monitoring. A topographic survey will be completed at the project site prior to construction and after installation. Cross sections of the site, and a determined distance upstream and downstream, will be taken perpendicular to the stream flow on five-foot intervals to determine pre and post-construction conditions. Surveys will be completed a minimum of once per year for the contract period. The purpose of the survey is to, determine existing conditions and post-construction pool depth, pool area, and if structures maintain pool characteristics for a number of years.

A flow meter will be used to determine velocities at representative cross sections before and after construction. Depending on the intended fish benefits of the structure, velocities may be measured at tailout sections or pools to determine if velocities match those needed for spawning, rearing, or resting.

For stabilization projects bank erosion will be evaluated prior to construction and a annual soil loss determined. After construction yearly visits to the sites will be completed to determine effectiveness of the project.

At selected sites scour chains will be installed to determine streambed aggregation or degradation. Streambed samples will be taken and a sieve analysis gradation completed. The topographic survey described above will be used to find stream gradient and baneful width.

Recording temperature thermographs will be installed at selected pools of average depth, to determine if there is cold water holding areas created by practice installation. One thermograph will be placed at the deepest point in the pool, the second just below the water surface, and the third will be placed above the water to record air temperatures.

**Washington Department of Fish and Wildlife
Pre- and Post- Habitat Assessments On
1998 BPA Habitat Restoration Projects.**

I. Items to be accomplished by WDFW.

Monitor and Evaluation – WDFW will conduct pre- and post- construction habitat and fish utilization surveys. The Creek will be stratified into strata, 1.) North Fork, 2.) South Fork, 3.) Charley Creek, 4.) main Asotin Creek above Kearney Gulch, and 5.) main Asotin Creek below Kearney Gulch. Data collected will be reported by strata, where appropriate, and are included in the following:

1. Basic habitat measurements will be recorded pre- and post- project construction for all 1998 BPA Habitat Restoration Sites. Measurements will include: 1.) Pool number, 2.) Pool area, 3.) Maximum and average site depth, 4.) Pool quality, 5.) Mean pool depth, 6.) Quantitative and qualitative counts of woody debris, and 7.) Standard deviation of thalweg depth.
2. Representative 1998 Habitat Restoration Sites (stratified by area) will be snorkeled pre- construction. The density of juvenile salmonids will be documented for comparison with 1999-snorkel density information.
3. A summary of habitat and fish utilization surveys will be provided to the Asotin County Conservation District in hand and/or electronic form.

Monitoring and Evaluation at Koch #1 and Hood #8 will include:

1. Bank erosion pins for estimates of lateral migration.
2. Toe pins for vertical movement and measurement to the bank pins for estimate of streambank changes.
3. Scour chains to monitor incision.
4. Longitudinal profile referenced to two cross-sections (Profile ~ 1,000 ft.) for overall corridor changes.
5. Physical description of pools (width, depth & presence or absence of LWD).
6. Pebble counts in pool tailouts.
7. Photo plots – pictures before and after projects. Pictures of riparian development.
8. WDFW will conduct pre- and post-construction habitat and fish utilization surveys.

Remainder of the sites will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre- and post-construction habitat and fish utilization surveys.

II. Time of Completion of Contracted Services

- A. Habitat and fish utilization surveys will be completed between July 1st and Sept. 30th 1998.
- B. Data summaries will be completed by December 31st, 1998.

APPENDIX D

Monitoring Plan

Checklist for Documenting Environmental Baseline and Effects of Proposed Actions on Relevant Indicators

Main Stem of Asotin Creek Headgate Park to George Creek

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS ON THE ACTION		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality:						
Temperature		X			X	
Sediment		X			X	
Habitat Access:						
Physical Barriers	X				X	
Habitat Elements:						
Substrate		X			X	
Large Woody Debris			X		X	
Pool Frequency			X		X	
Pool Quality			X		X	
Off Channel Habitat			X		X	
Refugia			X		X	
Channel Dynamics:						
Width/Depth Ratio		X			X	
Streambank Condition		X			X	
Floodplain Connectivity			X		X	
Flow/Hydrology:						
Peak/Base Flows		X			X	
Drainage Network Increase		X			X	
Watershed Conditions:						
Road Density & Location		X			X	
Disturbance History		X			X	
Riparian Reserves			X		X	

Checklist for Documenting Environmental Baseline and Effects of Proposed Actions on Relevant Indicators

Main Stem of Asotin Creek George Creek to Snake River

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS ON THE ACTION		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality:						
Temperature			X		X	
Sediment			X		X	
Habitat Access:						
Physical Barriers	X				X	
Habitat Elements:						
Substrate		X			X	
Large Woody Debris			X		X	
Pool Frequency			X		X	
Pool Quality			X		X	
Off Channel Habitat			X		X	
Refugia			X		X	
Channel Dynamics:						
Width/Depth Ratio		X			X	
Streambank Condition		X			X	
Floodplain Connectivity			X		X	
Flow/Hydrology:						
Peak/Base Flows			X		X	
Drainage Network Increase			X		X	
Watershed Conditions:						
Road Density & Location		X			X	
Disturbance History		X			X	
Riparian Reserves			X		X	

Checklist for Documenting Environmental Baseline and Effects of Proposed Actions on Relevant Indicators

Main Stem of Asotin Creek North Fork to Headgate Park

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS ON THE ACTION		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality:						
Temperature			X		X	
Sediment		X			X	
Habitat Access:						
Physical Barriers	X				X	
Habitat Elements:						
Substrate		X			X	
Large Woody Debris			X		X	
Pool Frequency			X		X	
Pool Quality			X		X	
Off Channel Habitat		X			X	
Refugia			X		X	
Channel Dynamics:						
Width/Depth Ratio		X			X	
Streambank Condition		X			X	
Floodplain Connectivity		X			X	
Flow/Hydrology:						
Peak/Base Flows		X			X	
Drainage Network Increase		X			X	
Watershed Conditions:						
Road Density & Location		X			X	
Disturbance History		X			X	
Riparian Reserves			X		X	

Checklist for Documenting Environmental Baseline and Effects of Proposed Actions on Relevant Indicators

George Creek

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS ON THE ACTION		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality:						
Temperature		X			X	
Sediment		X			X	
Habitat Access:						
Physical Barriers	X				X	
Habitat Elements:						
Substrate		X			X	
Large Woody Debris		X			X	
Pool Frequency		X			X	
Pool Quality		X			X	
Off Channel Habitat		X			X	
Refugia		X			X	
Channel Dynamics:						
Width/Depth Ratio		X			X	
Streambank Condition		X			X	
Floodplain Connectivity		X			X	
Flow/Hydrology:						
Peak/Base Flows			X		X	
Drainage Network Increase			X		X	
Watershed Conditions:						
Road Density & Location			X		X	
Disturbance History			X		X	
Riparian Reserves			X		X	

Checklist for Documenting Environmental Baseline and Effects of Proposed Actions on Relevant Indicators

Charley Creek

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS ON THE ACTION		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality:						
Temperature		X			X	
Sediment		X			X	
Habitat Access:						
Physical Barriers	X				X	
Habitat Elements:						
Substrate	X				X	
Large Woody Debris			X		X	
Pool Frequency			X		X	
Pool Quality		X			X	
Off Channel Habitat			X		X	
Refugia			X		X	
Channel Dynamics:						
Width/Depth Ratio		X			X	
Streambank Condition		X			X	
Floodplain Connectivity		X			X	
Flow/Hydrology:						
Peak/Base Flows		X			X	
Drainage Network Increase		X			X	
Watershed Conditions:						
Road Density & Location		X			X	
Disturbance History		X			X	
Riparian Reserves			X		X	

Checklist for Documenting Environmental Baseline and Effects of Proposed Actions on Relevant Indicators

South Fork of Asotin Creek

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS ON THE ACTION		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality:						
Temperature			X		X	
Sediment		X			X	
Habitat Access:						
Physical Barriers	X				X	
Habitat Elements:						
Substrate	X				X	
Large Woody Debris			X		X	
Pool Frequency			X		X	
Pool Quality		X			X	
Off Channel Habitat			X		X	
Refugia			X		X	
Channel Dynamics:						
Width/Depth Ratio		X			X	
Streambank Condition		X			X	
Floodplain Connectivity		X			X	
Flow/Hydrology:						
Peak/Base Flows			X		X	
Drainage Network Increase		X			X	
Watershed Conditions:						
Road Density & Location		X			X	
Disturbance History		X			X	
Riparian Reserves			X		X	

Checklist for Documenting Environmental Baseline and Effects of Proposed Actions on Relevant Indicators

North Fork of Asotin Creek

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS ON THE ACTION		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality:						
Temperature		X			X	
Sediment	X				X	
Habitat Access:						
Physical Barriers	X				X	
Habitat Elements:						
Substrate	X				X	
Large Woody Debris		X			X	
Pool Frequency			X		X	
Pool Quality		X			X	
Off Channel Habitat		X			X	
Refugia		X			X	
Channel Dynamics:						
Width/Depth Ratio		X			X	
Streambank Condition		X			X	
Floodplain Connectivity		X			X	
Flow/Hydrology:						
Peak/Base Flows		X			X	
Drainage Network Increase		X			X	
Watershed Conditions:						
Road Density & Location	X				X	
Disturbance History	X				X	
Riparian Reserves		X			X	

PATHWAY	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
	Pool Quality	Pools > 1 meter deep (holding ponds) with good cover and cool water, minor reduction of pool volume by fine sediment	Few deeper pools (>1 meter) present or inadequate cover/temp, moderate reduction of pool volume by fine sediment	No deep pools (>1 meter) and inadequate cover/temp, major reduction of pool volume by fine sediment
	Off-channel Habitat	Backwaters with cover and low energy off-channel areas (ponds, oxbows)	Some backwaters and high energy side channels	Few or no backwaters, no off-channel ponds
	Refugia (important remnant habitat for sensitive aquatic species)	Habitat refugia exists and are adequately buffered (i.e., intact riparian reserves); existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations	Habitat refugia exists but are not adequately buffered; existing refugia are insufficient in size, number and connectivity to maintain viable populations or sub-populations	Adequate habitat refugia do not exist
Channel Condition & Dynamics:	Width/Depth Ratio	12-18 for stream types C (Rosgen)	18-24 for stream type C (Rosgen)	> 24 for stream type C (Rosgen)
	Streambank Condition	> 90% stable; i.e., on average less than 10% of banks are actively eroding	80-90% stable	<80% stable
	Floodplain Connectivity	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession	Reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas: wetland extent drastically reduced and riparian vegetation/succession altered significantly

1. Matrix of Pathways of Indicators

PATHWAY	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Water Quality:	Temperature	50-57° F	57-60° F (spawning) 57-64° F (migration & rearing)	> 60° F (spawning) > 64° F (migration & rearing)
	Sediment/Turbidity	<12% fines (<0.85mm) in gravel, turbidity low	12-20% turbidity moderate	>20% fines at surface or depth in spawning habitat, turbidity high
	Chemical Contamination/ Nutrients	Low levels of chemical contamination from agricultural, industrial or other sources, no excess nutrients, no CWA 303d designated reaches	Moderate levels of chemical contamination from agricultural, industrial and other sources, some excess nutrients, one CWA 303d designated reach	High levels of chemical contamination from agricultural, industrial and other sources, high levels of excess nutrients, more than one CWA 303d designated reach
Habitat Access:	Physical Barriers	Any human-made barriers present in watershed allow upstream and downstream fish passage at all flows	Any human-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	Any human-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows
Habitat Elements:	Substrate	Dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness <20%	Gravel and cobble is subdominant, or if dominant, embeddedness 20-30%	Bedrock, sand, silt or small gravel dominant, or if gravel and cobble dominant, embeddedness >30%
	Large Woody Debris (LWD)	>20 pieces/mile, >12" diameter >35 ft. length	Currently meets standards for properly functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard	Does not meet standards for properly functioning and lacks potential large woody debris recruitment
	Pool Frequency Channel #pools Width Mile 5 ft. 184 10 96 15 70 20 56 25 47 50 26 75 23 100 18	Meets pool frequency standards (left) and LWD recruitment standards for properly functioning habitat (above)	Meets pool frequency standards but LWD recruitment inadequate to maintain pools over time	Does not meet pool frequency standards

APPENDIX C

Pathway and Indicator Tables

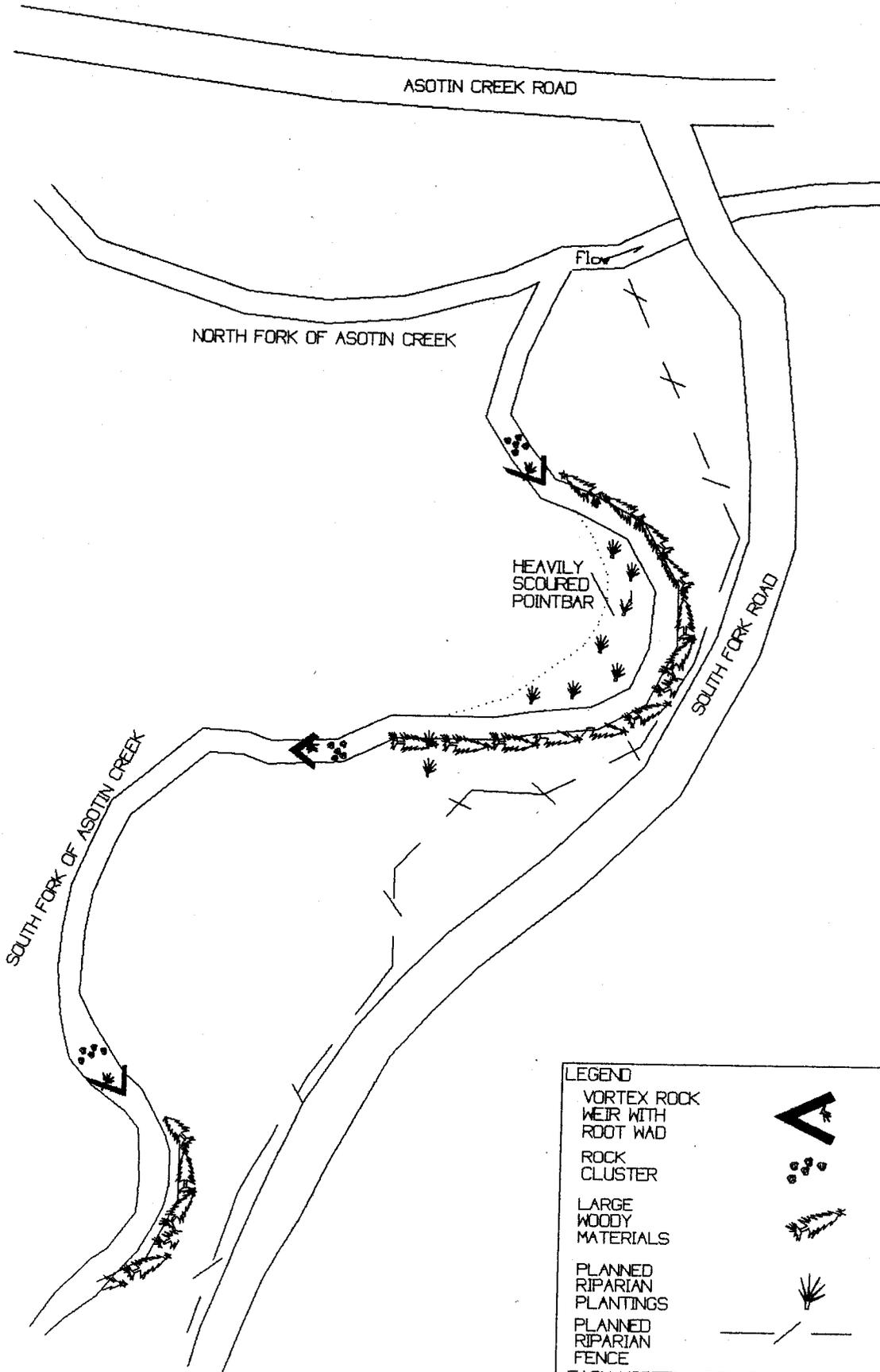
South Fork WDFW #19 Habitat Restoration Project



**South Fork of Asotin Creek above the
confluence of North Fork and Asotin Creek.**



**Right bank LWD debris cabling, vortex rock
weirs w/ boulder clusters in the tailout area.**



DRAWING NOT TO SCALE

LEGEND

- VORTEX ROCK WEIR WITH ROOT WAD
 - ROCK CLUSTER
 - LARGE WOODY MATERIALS
 - PLANNED RIPARIAN PLANTINGS
 - PLANNED RIPARIAN FENCE
- EACH VORTEX WEIR WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.

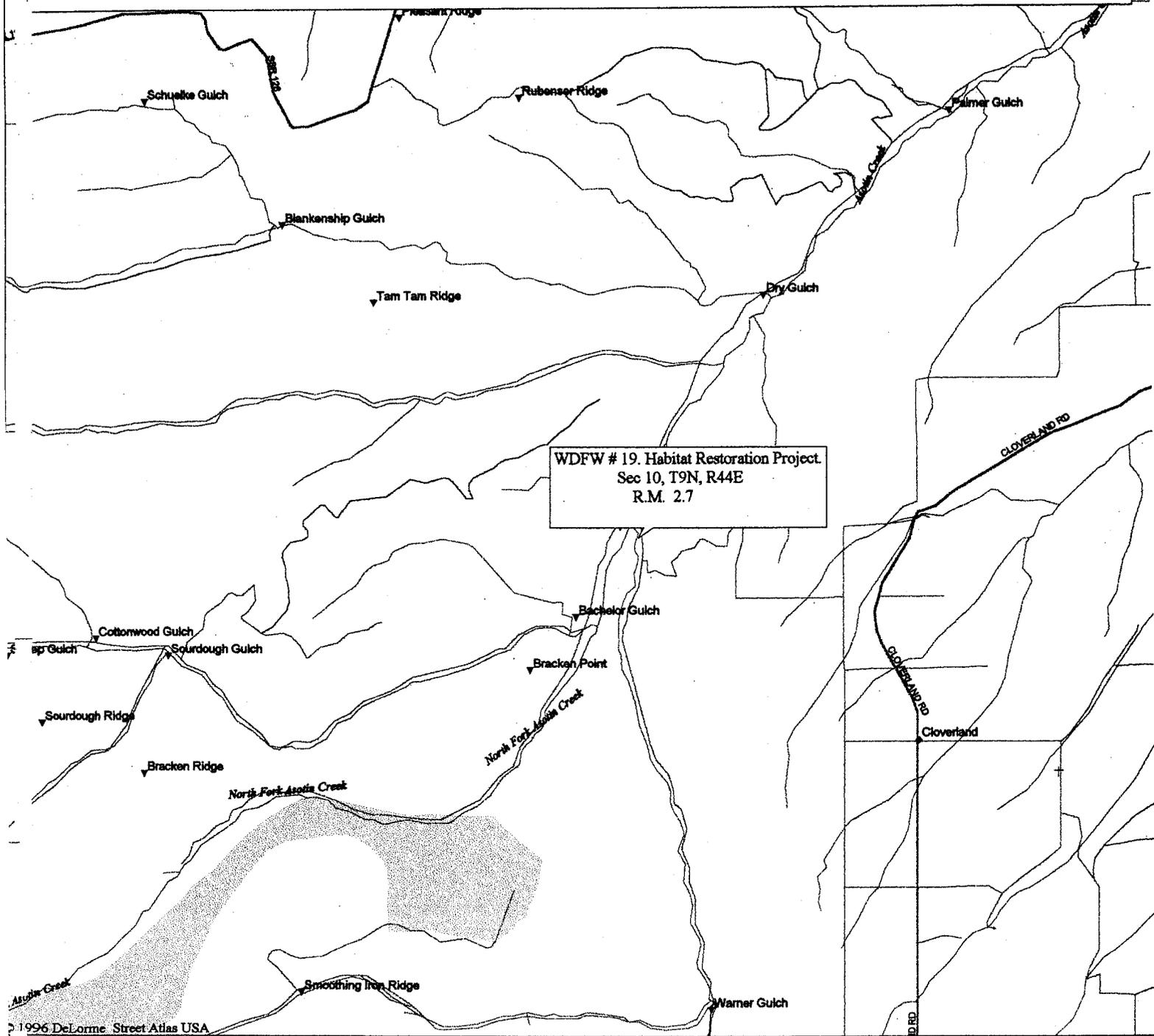


DESIGNED	DATE	APPROVED BY	DATE
DRAWN		TITLE	
TRACED		TITLE	
CHECKED		TITLE	

WDFW RIPARIAN RESTORATION AND INSTREAM HABITAT IMPROVEMENT
 PLAN VIEW
 SOUTH FORK OF ASOTIN CREEK, ASOTIN COUNTY, WA.
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO. _____
 SHEET 9

1998 Asotin Creek Habitat Projects



WDFW # 19. Habitat Restoration Project.
 Sec 10, T9N, R44E
 R.M. 2.7

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Fig 13.00
 Mon Jun 08 14:36 1998
 Scale 1:62,500 (at center)
 Miles
 2 KM

- | | |
|-----------------------|----------------------|
| — Local Road | + Cemetery |
| — Major Connector | ▨ Woodland |
| — Primary State Route | — River/Canal |
| — Trail | — Intermittent River |
| ▲ Summit | |
| ▼ Geographic Feature | |
| ◆ Locale | |

Charley Creek #18 Habitat Restoration Project



Downstream views. Install rock vanes on near right bank and far left bank.



Install vortex rock weirs on meander crossovers.

CHARLEY CREEK #18
R.M. 2.7

1200 FEET

THIS AREA WAS SEVERLY ERODED DURING THE FLOOD OF 1997. AREAS HAVE BEEN SCOURED OF TOP SOIL AND ARE NOW LARGE GRAVEL DEPOSITION AREAS ON THE POINT BAR REGIONS.

BOTH RIGHT AND LEFT STREAMBANK HAVE BEEN PLANTED TO NATIVE RIPARINA VEGETATION IN THE SPRING OF 1998.



LEGEND

VORTEX ROCK WEIR WITH ROOT WAD



ROCK VANE WITH ROOT WAD



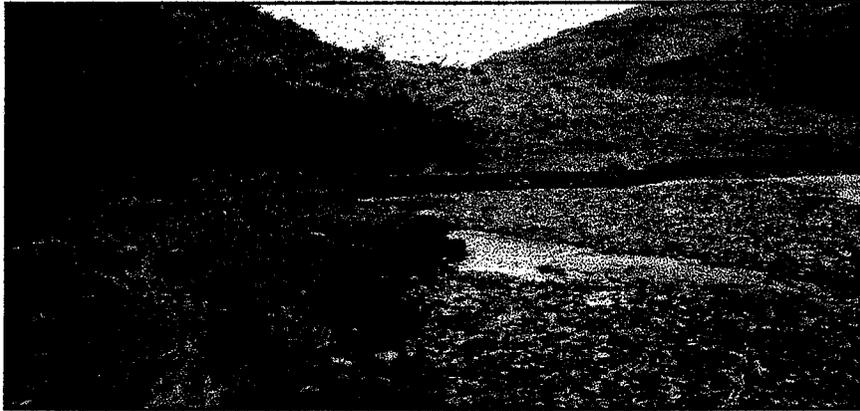
EACH VORTEX WEIR OR ROCK VANE WILL CONTAIN A MINIMUM OF ONE SUBMEGED ROOT WAD.

CHARLEY CREEK ROAD

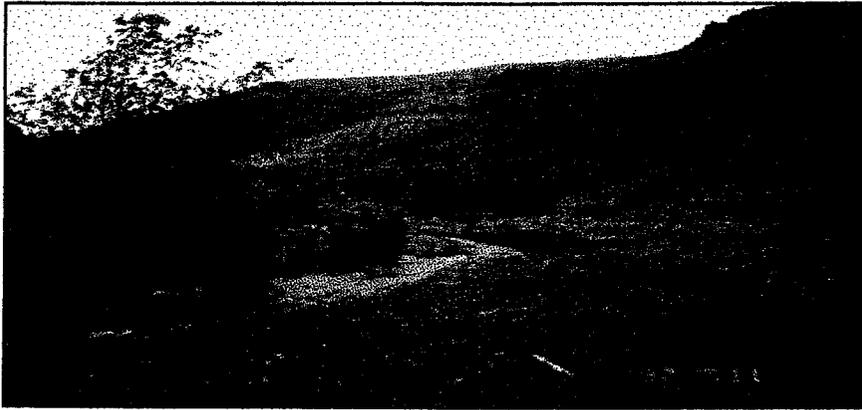
DRAWING NOT TO SCALE

DESIGNED	DATE	APPROVED BY	DATE
DRAWN		TITLE	
TRACED		TITLE	
CHECKED		TITLE	
CHARLEY CREEK FISH HABITAT IMPROVEMENT PLAN VIEW CHARLEY CREEK, ASOTIN COUNTY WA USDA NATURAL RESOURCES CONSERVATION SERVICE			
DRAWING NO.			
SHEET	OF		

Charley Creek #17 Habitat Restoration Project



Upstream view. Install rock vanes on right bank.



Upstream view. Install rock vanes on left bank.



Downstream view. Install rock vanes on left bank.

CHARLEY CREEK #17
R.M. 3.0

AREA HAS LIMITED EXISTING RIPARIAN VEGETATION. MOST VEGETATION WASHED OUT DURING THE FLOOD OF 1997. BOTH SIDES OF STREAM HAVE LARGE AREAS SCOURED OF TOP SOIL AND GRAVEL DEPOSITS.

BOTH BANKS OF STREAM WERE PLANTED WITH NATIVE RIPARIAN VEGETATION IN THE SPRING OF 1998.

LEGEND

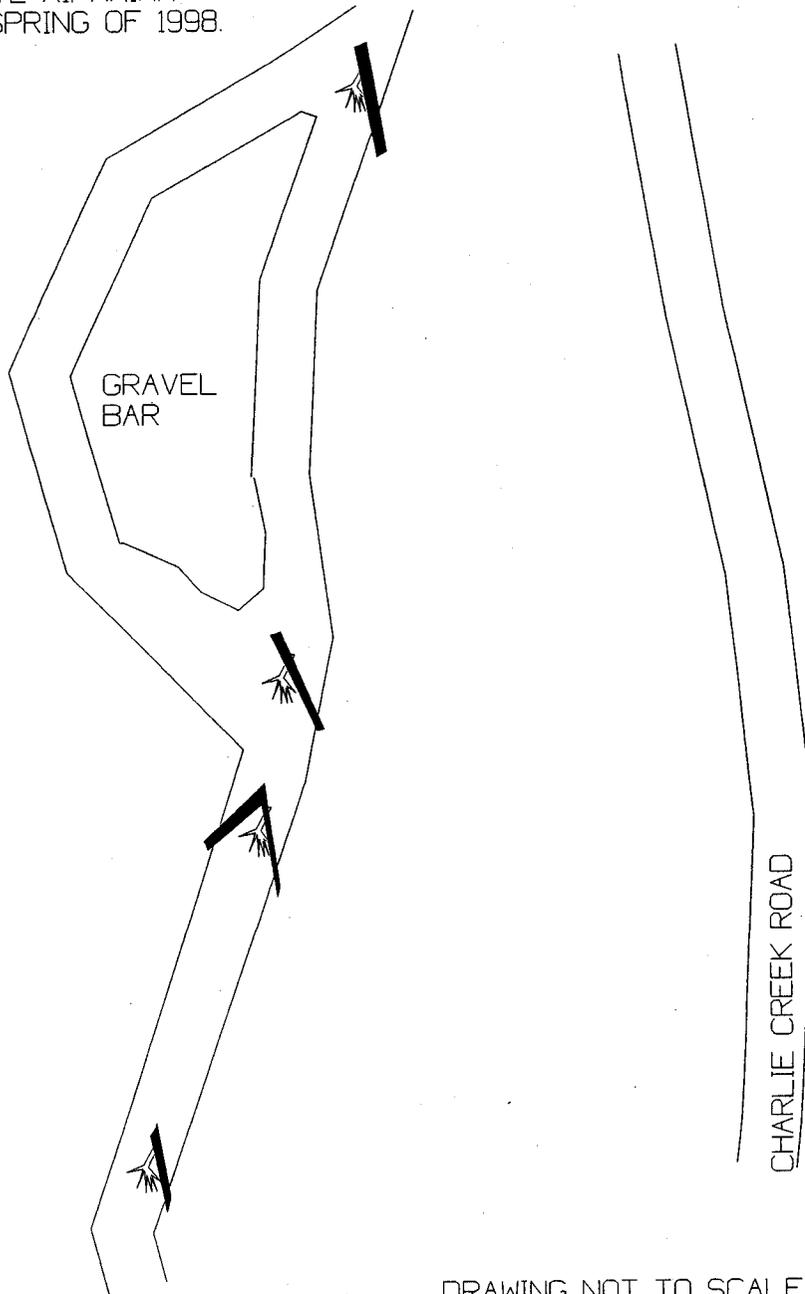
VORTEX ROCK WEIR WITH ROOT WAD



ROCK VANE WITH ROOT WAD



EACH VORTEX WEIR OR VANE WILL CONTAIN A MINIMUM OF ONE SUBMERGED ROOT WAD.



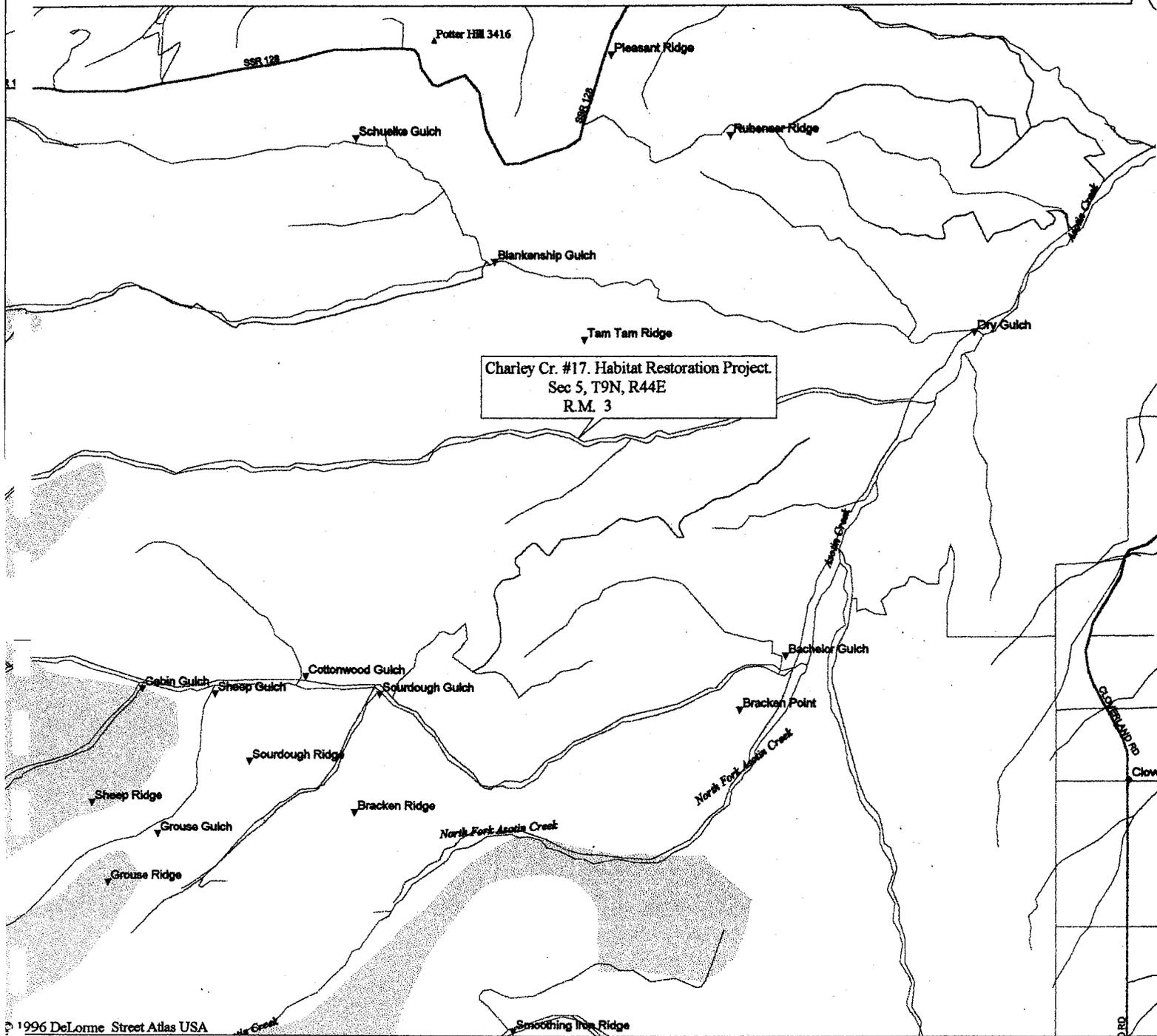
DESIGNED	DATE
DRAWN	APPROVED BY
TRACED	TITLE
CHECKED	TITLE

CHARLEY CREEK FISH HABITAT IMPROVEMENT
 PLAN VIEW CHARLEY CREEK SITE 3
 CHARLEY CREEK, ASOTIN COUNTY WA
 USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

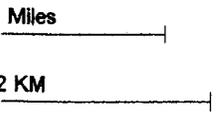
DRAWING NO.
SHEET OF

1998 Asotin Creek Habitat Projects



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Fig 13.00
 Mon Jun 08 14:29 1998
 Scale 1:62,500 (at center)



- | | | | |
|--|---------------------|--|--------------------|
| | Local Road | | Woodland |
| | Major Connector | | River/Canal |
| | Primary State Route | | Intermittent River |
| | Trail | | Summit |
| | Summit | | Geographic Feature |
| | Geographic Feature | | Locale |
| | Locale | | |

Charley Creek #16 Habitat Restoration Project



Downstream view. Site has been fenced and planted with trees.
Install rock vanes and vortex rock weirs to create pools.



Notice flood damage to area. Unstable and denude of vegetation.

CHARLIE CREEK #16
R.M. 4.5

LEGEND

VORTEX ROCK
WEIR WITH
ROOT WAD



ROCK VANE
WITH ROOT WAD

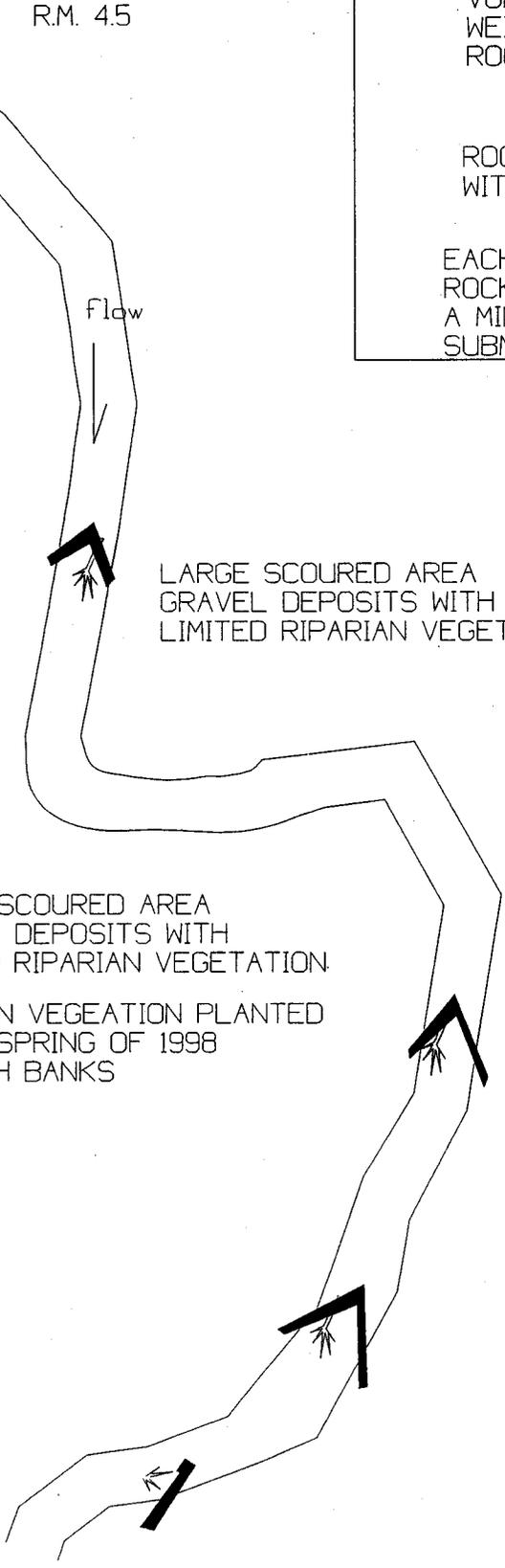


EACH VORTEX WEIR OR
ROCK VANE WILL CONTAIN
A MINIMUM OF ONE
SUBMERGED ROOT WAD.

DATE	_____
APPROVED BY	_____
TITLE	_____
TITLE	_____

DATE	_____
DESIGNED	_____
DRAWN	_____
TRACED	_____
CHECKED	_____

600'



LARGE SCOURED AREA
GRAVEL DEPOSITS WITH
LIMITED RIPARIAN VEGETATION

LARGE SCOURED AREA
GRAVEL DEPOSITS WITH
LIMITED RIPARIAN VEGETATION

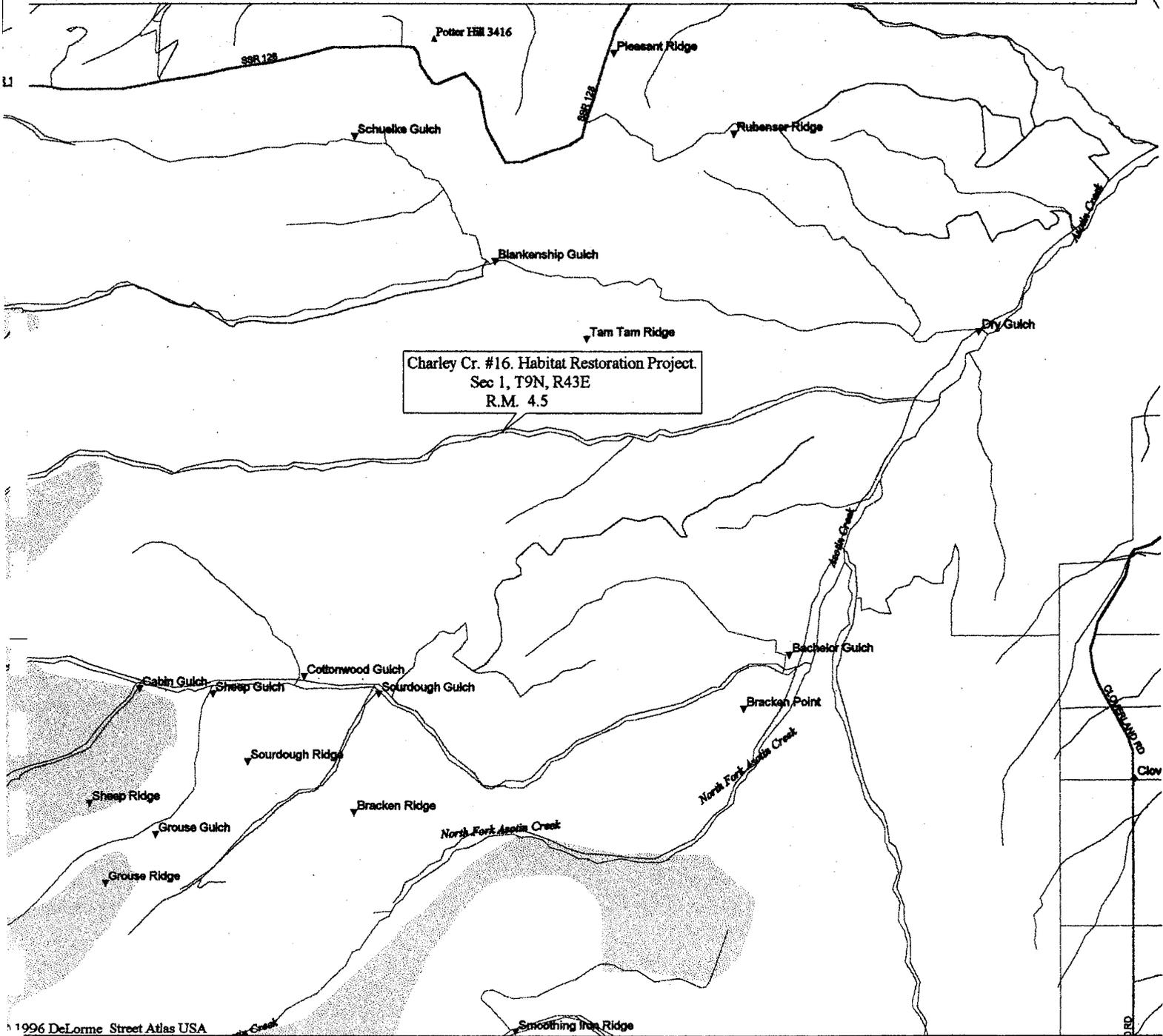
RIPARAIN VEGETATION PLANTED
IN THE SPRING OF 1998
ON BOTH BANKS

CHARLEY CREEK FISH HABITAT IMPROVEMENT
PLAN VIEW
CHARLEY CREEK, ASOTIN COUNTY WA
USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NOT TO SCALE

DRAWING NO.	_____
SHEET	_____ OF _____

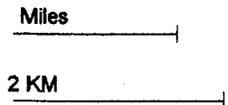
1998 Asotin Creek Habitat Projects



Charley Cr. #16. Habitat Restoration Project.
 Sec 1, T9N, R43E
 R.M. 4.5

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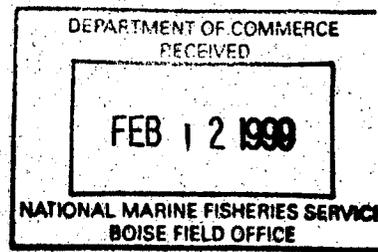
Fig 13.00
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 Scale 1:62,500 (at center)



- | | |
|---------------------|--------------------|
| Local Road | Woodland |
| Major Connector | River/Canal |
| Primary State Route | Intermittent River |
| Trail | |
| Summit | |
| Geographic Feature | |
| Locale | |

Copy Rick, Ed

**Fish Habitat Restoration Projects
Completed on Asotin Creek, WA**



BFO FILE COPY

Preliminary Project Report - January 1999



Cooperators:

**Bonneville Power Administration
Washington State Department of Fish & Wildlife
Washington State Conservation Commission
Natural Resource Conservation Service**

Fish Habitat Restoration Projects

Completed on Asotin Creek, WA 1998

Preliminary Project Report – 1999

Prepared for:

Asotin County Conservation District's Annual Meeting

by:

**Bradley J. Johnson
District Manager
Asotin County Conservation District
720 Sixth St., Suite B
Clarkston, WA 99403
brad-johnson@wa.nacdnet.org**

Acknowledgements

We express our appreciation to Mark Shaw of the Bonneville Power Administration and Representative Dave Mastin, Legislator for the 16th District, for funding recommendations. Jim Schroeder and Courtney Smith of the Clarkston NRCS Field Office and Cheryl Sonnen of the conservation district for their support and guidance. We also thank Rich Stauty, Jim Shawley, and Roberta Lewis from the Pomeroy NRCS Field Office, Larry Cooke, Barry Southerland and Larry Johnson from the State Office NRCS Stream Team, Glen Mendel and Steve Martin from Washington Department of Fish and Wildlife, and Rick Edwards of the National Marine Fisheries Service for their recommendations and cooperation in these projects.

A Special thanks to Potlatch Corporation, Corps of Engineers, and Cities of Lewiston and Clarkston for donating trees and root wads for projects. Also Hanley Nursery for donating 250 potted dogwood trees. Additionally the Asotin County Commissioners, Asotin County Road Department and participating landowners for input and cooperation.

Thanks to Latah Tree Farms and Heuett Construction for long hours and conservation of our natural resources during project construction.

Asotin Creek a fourth order tributary to the Snake River (Rm 145) which drains approximately 325 square miles of Asotin and Garfield Counties. The headwaters of Asotin Creek originate in the Blue Mountains and flow east into the Snake River at Asotin, Washington.

Asotin Creek has been given the distinction of a Genetic Sanctuary for steelhead under Washington Department of Fish and Wildlife's (WDFW) current resource plan (Glen Mendell personal conversation). Charley Creek, an upper tributary, has the highest densities of juvenile steelhead in southeastern Washington according to recent WDFW fisheries surveys (Glen Mendell). Historical records indicate that Asotin Creek once harbored strong runs (> 800 adults) of summer steelhead and moderate runs (> 100 adults) of spring chinook salmon. However, recent surveys indicate few adult chinook salmon spawn in Asotin Creek and spawner escapement for steelhead has declined to about 200 (ACMWP, 1995). A 1993 Forest Service survey documented the presence of bull trout in lower Asotin Creek, while the 1997 WDFW's Salmon and Steelhead Stock Inventory (SASSI) found them only in the North Fork and South Fork of Asotin Creek.

While some of the decline in numbers of anadromous salmonids can be attributed to downstream impacts (ocean conditions, harvests, predators, and dams), habitat quality and quantity in Asotin Creek is degraded. High summer stream temperatures, lack of quantity and quality resting and rearing pools containing large woody debris (LWD), and sediment deposition in spawning gravels were problems identified during the watershed analysis and are addressed in the *Asotin Creek Model Watershed Plan (Plan)*. Ongoing monitoring conducted by Washington State University (WSU), Washington Department of Fish and Wildlife (WDFW), Natural Resource Conservation Service (NRCS), and Northwest Management are monitoring chemical and physical attributes as well as temperature, in-stream and riparian habitat, and upland sediment reduction practices.

Asotin Creek Watershed Funding Amounts and Sources for the past three years:

Funding Sources	1996	1997	1998
WA State Conservation Commission	\$63,681.82	\$27,571.60	\$42,570.94
Bonneville Power Administration	\$109,267.64	\$157,357.56	\$206,399.33
US Forest Service	\$1,075.00	\$5,000.00	\$3,500.00
WA State HB 2496			\$53,676.40
Asotin County Road Department			\$3,500.00
Landowner Cash Match, Cost-Share	\$35,840.91	\$23,742.50	\$22,654.30
Totals	\$209,865.37	\$213,671.66	\$332,300.97
Habitat Restoration Projects			
New Projects	44	55	74
Operations and Maintenance Projects	0	61	9
# of Trees Planted	6,000	6,800	7,500
# of Pools Installed	78	66	139
Ft. of Habitat Restoration Installed	3,500 ft	2,775 ft	5,408 ft
Ft. of Riparian Fence Installed	1,300 ft	7,101 ft	16,959 ft
Alternative Water Development	2	2	2
Ft. of Terraces Installed	6,300 ft	20,000 ft	20,500 ft
# of Sediment Basins Installed	4	25	7
# of Sediment Basins Cleaned	0	61	9
Pasture/Hayland Planting Acres	100 ac	212 ac	187 ac
Direct Seeding Acres	0	0	850 ac

1998 Asotin Creek In-Stream Fish Habitat Restoration Projects

<i>Projects</i>	<i>Costs</i>	<i>In-Kind</i>	<i>Proj. Ft.</i>	<i>Structures and #'s of Pools</i>
Koch #1 *	\$31,745.10	\$5,340.00	780	vrw 6, rv 1 jrv 3, rwv 4, rw 24, 34
Koch #2	\$13,877.62	\$1,586.00	440	vrw 3, rv 2, rw 14, 50 ft 7
Koch #3	\$9,515.52	\$744.00	680	vrw 2, rv 9, rwv 2, rw 17, 50 ft, 13
Charley Cr #4	\$1,383.30	\$60.00	--	Delivered rock, but ran short
Charley Cr #5	\$3,805.34	\$200.00	80	80 ft of LWD Placement
M. Koch #6	\$13,077.36	\$2,120.00	355	vrw 2, jrv 3, rw 11 300 ft, 5
M. Koch #7	\$4,964.42	\$573.00	170	vrw 1, rv 2, rw 3, 75 ft, 3
Hood #8	\$4,613.63	\$542.00	220	vrw 1, rv 2, rwv 1, rw 4, 5
Thiessen #9	\$9,487.22	\$984.00	430	vrw 3, rv 2, rwv 9, rw 5, 150 ft, 14
Thiessen #10 *	\$14,903.22	\$2,700.00	350	vrw1, rv 2, rwv 5, rw 12, 200 ft, 8
J. Koch #11	\$4,915.54	\$1,212.00	173	vrw 2, rv 2, rw 3, 4
M. Bogar #12	\$3,081.45	\$312.00	210	vrw 2, rv 1, 3
Thompson #13	\$11,206.76	\$1,215.00	430	vrw 7, rv 2, 10
Flynn #14	\$3,995.41	\$582.00	160	rv 4, 4
Charley Cr #15	\$5,000.00	\$626.00	130	vrw 2, rv 3, 45 ft, 5
Charley Cr #16	\$6,676.23	\$676.00	170	vrw 3, rv 1, 4
Charley Cr #17	\$5,402.45	\$500.00	150	vlw 2, lv 1, 5
Charley Cr #18	\$7,176.23	\$840.00	140	vlw 2, lv 1, lw 2, 7
WDFW #19	\$17,564.12	\$2,250.00	340	vrw 4, rv 1, jrv 1, rw 7, 200 ft, 8
TOTALS	\$172,390.92	\$23,062.00	5,408 ft	139 Pools Installed

VRW -- Vortex Rock Weirs -- 39
 RV -- Rock Vanes -- 34
 JRV -- J-Hooked Rock Vanes -- 7
 RWV -- Root Wad Vanes -- 22
 RW -- Total Root Wads -- 76
 RW -- Root Wads Placed in Pools -- 22
 VLW -- Vortex Log Weirs -- 4
 LV -- Log Vanes -- 2

1,100 ft. of LWD Overhang
 5 Off-Channel Rearing Areas w/ LWD
 4 Off-Channel Depositional Areas

* Koch #1 and Thiessen #10 were funded using HB 2496
 Bonneville funding was used for the rest of the restoration projects
 In-Kind includes landowner time and NRCS & WDFW Personnel time

Koch #1 Meander Reconstruction Project



Project site prior to Construction



Meanders beginning to be formed



Koch Meander Reconstruction Project Completed

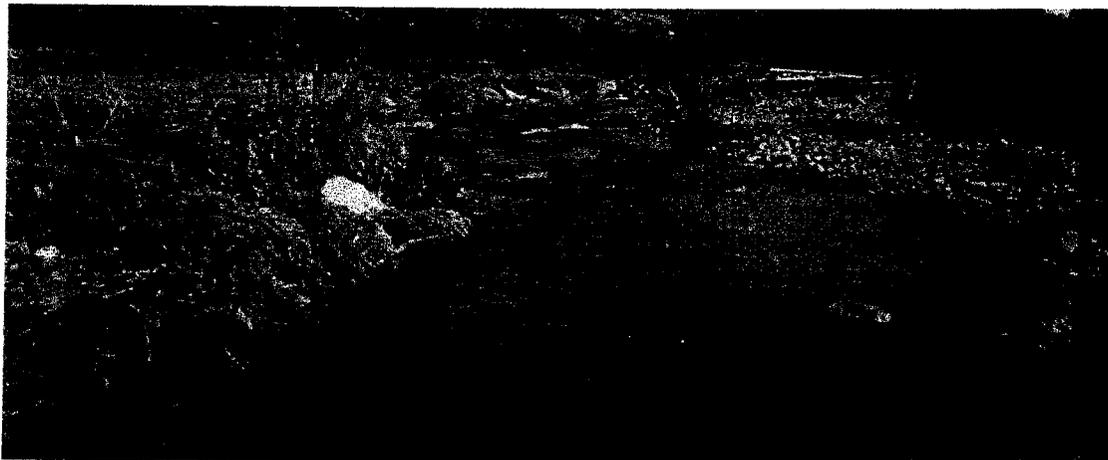
M. Koch #6 Habitat Restoration Project



Riffle run area with a pool at lower end of eroded streambank



Beginning to place root wad logs at the toe of streambank



Completed project with J-hooked rock vanes, logs with root wads and christmas trees

Cooperator	ft of fence	Total Cost	BPA Costs	Price per ft	Avg. Buffer
F. Koch	714	\$2,140.62	\$2,140.62	\$2.99	20 ft
J. Koch	845	\$3,571.85	\$3,498.85	\$4.14	63 ft
J. Holzmilller	1,700	\$1,972.90	\$1,972.90	\$1.16	25 ft
Charley Cr.	10,000	\$3,155.20	\$3,155.20	\$.31	20 ft
Lick Cr. #3	1,900	\$5,176.54	\$2,296.54	\$1.21	70 ft
F. Koch #2	1,800	\$3,018.03	\$3,018.03	\$1.68	40 ft
Totals	16,959 ft	\$19,035.14	\$16,082.14	\$1.92	40 ft

1998 Bonneville Riparian Fencing Projects on Asotin Creek



J. Koch Riparian Fencing Project



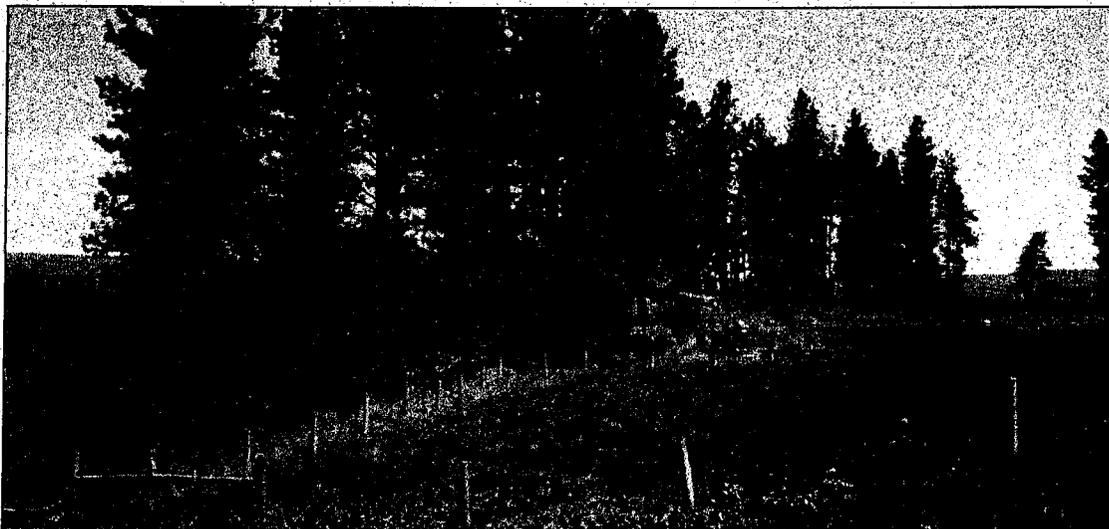
Completed J. Koch Riparian Fencing Project



J. Holzmilller Riparian Fencing Project on George Creek Headwaters



Temporary Fencing Installed by Landowner



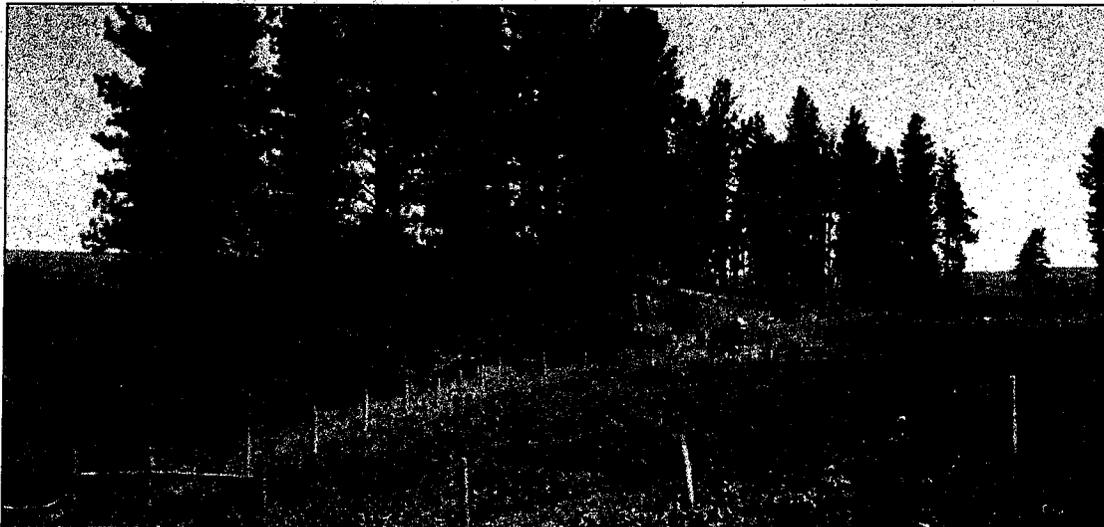
Completed Fencing Project with a 25 ft Buffer on Each Side of Stream



J. Holzmilller Riparian Fencing Project on George Creek Headwaters



Temporary Fencing Installed by Landowner



Completed Fencing Project with a 25 ft Buffer on Each Side of Stream

1998 BPA *Proposed* Project Reports

for Asotin Creek, WA

Habitat Restoration Projects

Prepared for:

**Bonneville Power Administration
Natural Resource Conservation Service
Washington State Conservation Commission
Washington Department of Fish and Wildlife
National Marine Fisheries Service**

by:

**Bradley J. Johnson
District Manager
Asotin County Conservation District
725 6th St., Suite 102
Clarkston, WA 99403**

**Asotin Creek
Model Watershed
Project Reports**

Project: Koch #1 Meander Reconstruction
Landowner: Frank Koch
Location: SW ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 14.1

Project: Koch #2 Channel Reconstruction
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 13.6

Project: Koch #3 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 13.3

Project: Charley Creek #4 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Charley Creek @ RM .5

Project: Charley Creek #5 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Charley Creek @ RM .1

Project: M. Koch # 6 Habitat Restoration Project
Landowner: Marty Koch
Location: NE ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 12.6

Project: M. Koch #7 Habitat Restoration Project
Landowner: Marty Koch
Location: NE ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 12.3

Project: Hood #8 Habitat Restoration Project
Landowner: Larry Hood
Location: NE ¼, Sec 35, T10N, R44E Mainstem Asotin Cr. @ RM 12

Project: Thiessen #9 Habitat Restoration Project
Landowner: Gene Thiessen
Location: NE ¼, Sec 25, T10N, R44E Mainstem Asotin Cr. @ RM 11

Project: Thiessen #10 Habitat Restoration Project
Landowner: Gene Thiessen
Location: SW ¼, Sec 26, T10N, R44E Mainstem Asotin Cr. @ RM 10.9

Project: J. Koch #11 Habitat Restoration Project
Landowner: Jim Koch
Location: SW ¼, Sec20, T10N, R44E Mainstem Asotin Cr. @ RM 9.4

Project: M. Bogar #12 Habitat Restoration Project
Landowner: Mark Bogar
Location: SE ¼, Sec 24, T10N, R45E Mainstem Asotin Cr. @ RM 3

Project: Thompson #13 Habitat Restoration Project
Landowner: Harold Thompson
Location: SE ¼, Sec 24, T10N, R45E Mainstem Asotin Cr. @ RM 2.7

Project: C. Flynn #14 Habitat Restoration Project
Landowner: Carl Flynn
Location: Sec 19, T10N, R46E Mainstem Asotin Creek @ RM 2

Project: Charley Cr. #15 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 1, T9N, R43E Charley Cr. Creek @ RM 5

Project: Charley Cr. #16 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 16, T9N, R44E Charley Creek @ RM 4.5

Project: Charley Cr. #17 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 5, T9N, R44E Charley Creek @ RM 3

Project: Charley Cr. #18 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 5, T9N, R44E Charley Creek @ RM 2.7

Project: South Fork Riparian Restoration and Instream Habitat Development
Landowner: Washington Department of Fish and Wildlife
Location: Sec 10, 15, and 22, T9N, R44E, South Fork Asotin Creek

Asotin Creek Model Watershed Project Reports

Project: Koch #1 Meander Reconstruction
Landowner: Frank Koch
Location: SW ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 14.1

Project Description:

The January 1st flood of 1997 caused extensive damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 600 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. Restoration efforts installed in 1997 were successful and it is clear that the landowner understands something else needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1, 1998 through May 31, 1999.

Site Description:

Geomorphic Meander Reconstruction: 750 ft reconstructed (presently 500 ft).
Root wad revetments – 320 ft
Vortex rock weirs - 6
Rock vanes – 4 on the left bank

Fish Habitat Improvements:

Vortex rock weirs – 6 large pools
Rock vanes – 4 large pools
LWD placement – 7 root wads placed into pools
Establishment of thalweg with LWD (root wad overhang)

Riparian Enhancement:

800 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

Treatment	Number	\$/Unit	Costs
<i>Meander Reconstruction</i>	<i>750 ft</i>	<i>\$ 35/ft</i>	<i>\$28,000</i>
Vortex Rock Weirs	6 ea	\$1,200	\$ 7,200
Rock Vanes	4 ea	\$ 800	\$ 3,200
Root Wad Revetment	27 ea	\$ 600	\$16,000
Riparian Plantings	800 ft	\$ 2/ft	<u>\$ 1,600</u>
			\$28,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Bank erosion pins for estimates of lateral migration.
2. Toe pins for vertical movement and measurement to the bank pins for estimate of streambank changes.
3. Scour chains to monitor incision.
4. Longitudinal profile referenced to two cross-sections (Profile ~ 1,000 ft.) for overall corridor changes.
5. Physical description of pools (width, depth & presence or absence of LWD).
6. Pebble counts in pool tailouts.
7. Photo plots – pictures before and after projects. Pictures of riparian development.
8. WDFW will conduct pre and post construction habitat and fish utilization surveys.
9. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines
Floodplain

XXX

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Koch #2 Channel Reconstruction
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 13.6

Project Description:

The January 1st flood of 1997 caused extensive damage to a pre-constructed dike and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 15, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

- Vortex rock weirs – 2
- Rock vanes – 2 on the left bank
- Rock barbs – 3 on the left bank
- LWD placements – 7 root wads placed into pools
- Root wad revetments – 150 ft on the left bank

Fish Habitat Improvements:

Vortex rock weirs –2 large pools
Rock Vanes – 2 large pools
Root wad revetment – 15 root wads in pools

Riparian Enhancement:

400 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

Treatment	Number	\$/Unit	Costs
Vortex Rock Weirs	2 ea	\$1,200	\$ 2,400
Rock Barbs	3 ea	\$1,000	\$ 3,000
Rock Vanes	2 ea	\$ 400	\$ 800
Root Wad Revetment	20 ea	\$ 500	\$10,000
Riparian Plantings	400 ft	\$ 2/ft	\$ 800
			\$17,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Koch #3 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 13.3

Project Description:

The January 1st flood of 1997 caused extensive damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weirs - 2

Rock vanes - 4 on the left bank

Off-channel depositional areas - 3 on floodplain on left bank

LWD placement - 80 ft on left bank of off-channel

Fish Habitat Improvements:

Vortex rock weirs – 2 large pools
Rock vanes – 4 large pools
Cable root wads into pools – 6
LWD placement into side channel – 80 ft

Riparian Enhancement:

800 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	2 ea	\$1,200	\$ 2,400
Rock Vanes	4 ea	\$ 700	\$ 2,800
Cabled Root Wads	6 ea	\$ 300	\$ 1,800
LWD Placement	80 ft	\$ 25/ft	\$ 2,000
Off-Channel Deposition Area	3 ea	\$ 800	\$ 2,400
Riparian Plantings	800 ft	\$ 2/ft	<u>\$ 1,600</u>
			\$13,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines
Floodplain

XXX

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Charley Creek #4 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Charley Creek @ RM .5

Project Description:

The January 1st flood of 1997 caused extensive damage to Charley Creek at this site. As a result, the stream is denuded of vegetation and one constant depth. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. 200 ft need to be treated to reduce lateral migration and potential incision. Charley Creek has the largest density of juvenile steelhead in S.E. Washington according to the Washington Department of Fish and Wildlife.

This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1st, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

- Vortex rock weir - 1
- Rock vanes - 2 on right bank
- Root wad revetments - 100 ft

Fish Habitat Improvements:

Vortex rock weirs – 1 large pool
Rock vanes – 2 large pools
LWD placement – 3 root wads placed into pools
Root wad revetment – 100 ft

Riparian Enhancement:

200 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	1 ea	\$1,200	\$ 1,200
Rock Vanes	2 ea	\$ 700	\$ 1,400
LWD	10 ea	\$ 800	\$ 8,000
Riparian Plantings	200 ft	\$ 2/ft	\$ 400
			\$11,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Charley Creek #5 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 3, T9N, R44E Charley Creek @ RM .1

Project Description:

The January 1st flood of 1997 caused the mouth of Charley Creek to become braided and the majority of the stream is running along the edge of an alfalfa field. It is potentially an adult passage barrier and needs to be put into two or three channels instead of the current conditions of 5 separate braided channels. Large woody debris will be used to help slow water velocities in the channels along the field edge and help maintain two existing channels through the riparian area. Two small rock vanes will be used to help maintain pools and velocities in the desired channel. Charley Creek has the largest density of juvenile steelhead in S.E. Washington according to the Washington Department of Fish and Wildlife.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Rock vanes – 2 one on left bank and one on right bank
LWD placement – 2 root wads placed into pools and also used to help reduce flow in undesirable channels

Fish Habitat Improvements:

Rock vanes – 2 large pools with root wads

Riparian Enhancement:

100 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Rock Vanes	2 ea	\$ 600	\$ 1,200
LWD	3 ea	\$ 600	\$ 1,800
Riparian Plantings	100 ft	\$ 2/ft	\$ 200
			\$ 3,200

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception, site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: M. Koch # 6 Habitat Restoration Project
Landowner: Marty Koch
Location: NE ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 12.6

Project Description:

The January 1st flood of 1997 caused extensive damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 200 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1st, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weirs - 2

Rock vanes - 3 on the left bank

LWD placement - 5 root wads placed into pools and 100 ft on left bank

Fish Habitat Improvements:

Vortex rock weirs – 2 large pools
Rock vanes – 3 large pools
LWD placement – 10 root wads in pools

Riparian Enhancement:

600 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	2 ea	\$1,200	\$ 2,400
Rock Vanes	3 ea	\$ 800	\$ 2,400
LWD	10 ea	\$ 600	\$ 6,000
Riparian Plantings	600 ft	\$ 2/ft	<u>\$ 1,200</u>
			\$12,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

	<u>Needed</u>	<u>Not Needed</u>
County		
Shorelines	XXX	
Floodplain		
State		
WA Dept. of Fish and Wildlife Hydraulic Permit	XXX	
Federal		
Army Corps of Engineers Section 404		

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: M. Koch #7 Habitat Restoration Project
Landowner: Marty Koch
Location: NE ¼, Sec 3, T9N, R44E Mainstem Asotin Creek @ RM 12.3

Project Description:

The January 1st flood of 1997 caused extensive damage a field and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 150 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weir - 1

Rock vanes - 2 on the left bank

Fish Habitat Improvements:

Vortex rock weirs – 1 large pool
Rock vanes – 2 large pools
LWD placement – 3 root wads placed into pools

Riparian Enhancement:

100 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	1 ea	\$1,200	\$ 1,200
Rock Vanes	2 ea	\$ 700	\$ 1,400
LWD	3 ea	\$ 600	\$ 1,800
Riparian Plantings	100 ft	\$ 2/ft	<u>\$ 200</u>
			\$ 4,600

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Hood #8 Habitat Restoration Project
Landowner: Larry Hood
Location: NE ¼, Sec 35, T10N, R44E Mainstem Asotin Cr. @ RM 12

Project Description:

The January 1st flood of 1997 caused extensive damage to pastureland, county road and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 200 ft need to be treated to reduce lateral migration and potential incision. The County Road Department rip rapped the road and the stream is currently 75 feet from the road. Cobble berms that were pushed up during construction are still intact and the pool forming structures need to be installed to help deepen the channel.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 15, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

- Vortex rock weirs - 2
- Rock vane - 1 on the left bank
- LWD placement - 3 root wads placed into pools

Fish Habitat Improvements:

Vortex rock weirs – 2 large pools
Rock vanes – 1 large pool
LWD placement – 3 root wads placed into pools

Riparian Enhancement:

100 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	2 ea	\$1,200	\$ 2,400
Rock Vanes	1 ea	\$ 800	\$ 800
LWD Placement	3 ea	\$ 300	\$ 900
Riparian Plantings	100 ft	\$ 2/ft	<u>\$ 200</u>
			\$ 4,300

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Bank erosion pins for estimates of lateral migration.
2. Toe pins for vertical movement and measurement to the bank pins for estimate of streambank changes.
3. Scour chains to monitor incision.
4. Longitudinal profile referenced to two cross-sections (Profile ~ 1,000 ft.) for overall corridor changes.
5. Physical description of pools (width, depth & presence or absence of LWD).
6. Pebble counts in pool tailouts.
7. Photo plots – pictures before and after projects. Pictures of riparian development.
8. WDFW will conduct pre and post construction habitat and fish utilization surveys.
9. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) maximum and average site depth, d.) pool quality, e.) mean pool depth, f.) quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines
Floodplain

XXX

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Thiessen #9 Habitat Restoration Project
Landowner: Gene Thiessen
Location: NE ¼, Sec 25, T10N, R44E Mainstem Asotin Cr. @ RM 11

Project Description:

The January 1st flood of 1997 caused extensive damage to pastureland, county road and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 300 ft need to be treated to reduce lateral migration and potential incision.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 15, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weirs - 3

Rock vanes – 2 on the left bank

LWD placement – 5 root wads placed into pools and 175 ft on the left bank

Fish Habitat Improvements:

Vortex rock weirs – 3 large pools
Rock vanes – 2 large pools
LWD placement – 5 root wads in pools

Riparian Enhancement:

100 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	3 ea	\$1,200	\$ 3,600
Rock Vanes	2 ea	\$ 800	\$ 1,600
LWD	5 ea	\$ 600	\$ 3,000
Riparian Plantings	100 ft	\$ 2/ft	<u>\$ 200</u>
			\$ 8,400

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Thiessen #10 Habitat Restoration Project
Landowner: Gene Thiessen
Location: SW ¼, Sec 26, T10N, R44E Mainstem Asotin Cr. @ RM 10.9

Project Description:

The January 1st flood of 1997 caused extensive damage to pastureland and the adjacent stream corridor at this site. As a result, the stream became braided and is presently denuded of riparian vegetation. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 400 ft need to be treated to reduce lateral migration and potential incision. This area currently has a ten foot high raw, vertical bank exposed bank on the right bank. The water velocities and depths are consistent throughout the site without any pools along the exposed bank.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

- Vortex rock weirs - 2
- Rock vanes - 3 on the right bank
- LWD placement - 200 ft on the right bank

Fish Habitat Improvements:

Vortex rock weirs – 2 large pools

Rock vanes – 3 large pools

LWD placement – 5 root wads placed into pools and 200 ft on the right bank

Riparian Enhancement:

600 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	2 ea	\$1,200	\$ 2,400
Rock Vanes	3 ea	\$ 800	\$ 2,400
LWD	15 ea	\$ 450	\$ 9,000
Riparian Plantings	600 ft	\$ 2/ft	<u>\$ 1,200</u>
			\$15,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: J. Koch #11 Habitat Restoration Project
Landowner: Jim Koch
Location: SW ¼, Sec20, T10N, R44E Mainstem Asotin Cr. @ RM 9.4

Project Description:

The January 1st flood of 1997 caused extensive damage to an over-winter feeding area and the adjacent stream corridor at this site. As a result, the stream channel is wide and shallow. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 600 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weirs - 2

Rock vanes - 2 on the left bank

LWD placement - 4 root wads placed into pools

Fish Habitat Improvements:

Vortex rock weirs – 2 large pools
Rock vanes – 2 large pools
LWD placement – 4 root wads placed into pools

Riparian Enhancement:

100 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

Treatment	Number	\$/Unit	Costs
Vortex Rock Weirs	2 ea	\$1,200	\$ 2,400
Rock Vanes	2 ea	\$ 700	\$ 1,400
LWD	4 ea	\$ 150	\$ 600
Riparian Plantings	100 ft	\$ 2/ft	\$ 200
			\$ 4,600

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Bank erosion pins for estimates of lateral migration.
2. Toe pins for vertical movement and measurement to the bank pins for estimate of streambank changes.
3. Scour chains to monitor incision.
4. Longitudinal profile referenced to two cross-sections (Profile ~ 1,000 ft.) for overall corridor changes.
5. Physical description of pools (width, depth & presence or absence of LWD).
6. Pebble counts in pool tailouts.
7. Photo plots – pictures before and after projects. Pictures of riparian development.
8. WDFW will conduct pre and post construction habitat and fish utilization surveys.
9. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines
Floodplain

XXX

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: M. Bogar #12 Habitat Restoration Project
Landowner: Mark Bogar
Location: SE ¼, Sec 24, T10N, R45E Mainstem Asotin Cr. @ RM 3

Project Description:

This site is on the mainstem of Asotin Creek directly below the mouth of George Creek. On the left bank the thalweg is directly below a four foot bank with limited amount of riparian vegetation. The velocities and depths at this site are constant and it was identified for pool forming structures that will also help reduce pressure to the left streambank. The landowner has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1st, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weir - 1
Rock vane - 1 on the left bank

Fish Habitat Improvements:

Vortex rock weir - 1 large pools
Rock vane - 1 large pools
LWD placement - 2 root wads placed into pools

Riparian Enhancement:

100 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	1 ea	\$1,200	\$ 1,200
Rock Vanes	1 ea	\$ 800	\$ 800
LWD Placement	2 ea	\$ 200	\$ 400
Riparian Plantings	100 ft	\$ 2/ft	<u>\$ 200</u>
			\$ 2,600

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Thompson #13 Habitat Restoration Project
Landowner: Harold Thompson
Location: SE ¼, Sec 24, T10N, R45E Mainstem Asotin Cr. @ RM 2.7

Project Description:

The January 1st flood of 1997 caused damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream channel is wide and shallow. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 200 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 15, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weirs - 6

Rock vanes – 2 First one on the right bank, downstream second one on the left bank

Fish Habitat Improvements:

Vortex rock weirs - 6
Rock vanes - 2 large pools
LWD placement - 8 root wads placed into pools

Riparian Enhancement:

500 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	6 ea	\$1,200	\$ 7,200
Rock Vanes	2 ea	\$ 800	\$ 1,600
LWD Placement	8 ea	\$ 100	\$ 800
Riparian Plantings	500 ft	\$ 2/ft	<u>\$ 1,000</u>
			\$10,600

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots - pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July - 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines
Floodplain

XXX

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: C. Flynn #14 Habitat Restoration Project
Landowner: Carl Flynn
Location: Sec 19, T10N, R46E Mainstem Asotin Creek @ RM 2

Project Description:

The January 1st flood of 1997 caused damage to an irrigated field and the adjacent stream corridor at this site. As a result, the stream channel is wide and shallow. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 200 ft need to be treated to reduce lateral migration and potential incision. This area is traditionally dozed by the landowner to keep the channel clear of debris and riparian vegetation. It is clear that he understands something needs to be accomplished and he has agreed to the following plans.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 15, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Rock vanes – 4 on the left bank

LWD placement – 4 root wads placed into pools

Fish Habitat Improvements:

Rock vanes – 4 large pools
LWD placement – 4 root wads placed into pools

Riparian Enhancement:

200 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Rock Vanes	4 ea	\$ 800	\$ 3,200
Root Wads	4 ea	\$ 100	\$ 400
Riparian Plantings	200 ft	\$ 2/ft	<u>\$ 400</u>
			\$ 4,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Charley Cr. #15 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 1, T9N, R43E Charley Cr. Creek @ RM 5

Project Description:

The January 1st flood of 1997 caused damage to native rangeland and the adjacent stream corridor at this site. As a result, the stream became braided. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 550 ft need to be treated to reduce lateral migration and potential incision.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1st, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weirs - 3

LWD placement – 10 root wads placed into pools

Fish Habitat Improvements:

Vortex rock weirs – 3 large pools
LWD placement – 10 root wads placed into pools

Riparian Enhancement:

550 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	3 ea	\$1,200	\$ 3,600
Root wads	10 ea	\$ 30	\$ 300
Riparian Plantings	550 ft	\$ 2/ft	<u>\$ 1,100</u>
			\$ 5,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

	<u>Needed</u>	<u>Not Needed</u>
County		
Shorelines	XXX	
Floodplain		
State		
WA Dept. of Fish and Wildlife Hydraulic Permit	XXX	
Federal		
Army Corps of Engineers Section 404		

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Charley Cr. #16 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 16, T9N, R44E Charley Creek @ RM 4.5

Project Description:

The January 1st flood of 1997 caused damage to native rangeland and the adjacent stream corridor at this site. As a result, the stream became braided. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 800 ft need to be treated to reduce lateral migration and potential incision.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weirs - 3

Rock vanes - 1 on the left bank

LWD placement - 4 root wads placed into pools

Fish Habitat Improvements:

Vortex rock weirs – 3 large pools
Rock vanes – 1 large pools
LWD placement – 4 root wads placed into pools

Riparian Enhancement:

800 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	3 ea	\$1,200	\$ 3,600
Rock Vanes	1 ea	\$ 600	\$ 600
Root Wads	4 ea	\$ 50	\$ 200
Riparian Plantings	800 ft	\$ 2/ft	<u>\$ 1,600</u>
			\$ 6,000

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines
Floodplain

XXX

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Charley Cr. #17 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 5, T9N, R44E Charley Creek @ RM 3

Project Description:

The January 1st flood of 1997 caused damage to native rangeland and the adjacent stream corridor at this site. As a result, the stream became braided. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 550 ft need to be treated to reduce lateral migration and potential incision.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 15, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weir - 1

Rock vanes - 3

LWD placement - 4 root wads placed into pools

Fish Habitat Improvements:

Vortex rock weirs – 1 large pools
Rock vanes – 3 large pools
LWD placement – 4 root wads placed into pools

Riparian Enhancement:

400 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weirs	1 ea	\$1,200	\$ 1,200
Rock Vanes	3 ea	\$ 600	\$ 1,800
Root Wads	5 ea	\$ 50	\$ 250
Riparian Plantings	400 ft	\$ 2/ft	\$ 800
			<u>\$ 4,050</u>

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines
Floodplain

XXX

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: Charley Cr. #18 Habitat Restoration Project
Landowner: Frank Koch
Location: Sec 5, T9N, R44E Charley Creek @ RM 2.7

Project Description:

The January 1st flood of 1997 caused damage to native rangeland and the adjacent stream corridor at this site. As a result, the stream became braided. The loss of meander geometry and topsoil has caused an unstable, high width to depth ratio (wide and shallow), stream corridor prone to lateral migration. While a single thread channel is beginning to form, its length and unstable bank condition are not conducive to the re-establishment of a low width to depth (deep and narrow) channel with well-established riparian trees. The first 550 ft need to be treated to reduce lateral migration and potential incision.

Objectives:

Restore in-stream fish habitat, re-establish meander geometry to bankfull discharge dimensions, enhance floodplains and pointbars relative to the riffle pool morphology that previously existed. Re-establish riparian vegetation and re-introduce large woody debris (LWD) to system. Objectives are consistent with those of the Asotin Creek Model Watershed Plan.

Timelines:

August 1st, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weir - 2

Rock vanes – 5 two on left bank and three on right bank

LWD placement – 7 root wads placed into pools

Fish Habitat Improvements:

Vortex rock weir – 2 large pool
Rock vanes – 5 large pools
LWD placement – 6 root wads placed into pools

Riparian Enhancement:

400 ft of large dormant stock bundles, willows and rooted material.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weir	2 ea	\$1,200	\$ 2,400
Rock Vanes	5 ea	\$ 600	\$ 3,000
Root Wads	6 ea	\$ 50	\$ 300
Riparian Plantings	400 ft	\$ 2/ft	<u>\$ 800</u>
			\$ 6,500

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines

XXX

Floodplain

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.

Asotin Creek Model Watershed Project Reports

Project: South Fork Riparian Restoration and Instream Habitat Development
Landowner: Washington Department of Fish and Wildlife
Location: Sec 10, 15, and 22, T9N, R44E, South Fork Asotin Creek

Project Description:

Historically intensive land use has occurred on these sections resulting in degraded stream channel stability, a loss of riparian vegetation and subsequently poor instream habitat. This reach of the south fork of Asotin Creek is a potentially significant producer of wild steelhead trout. To assist the reach achieve it's full potential, we propose to place large woody debris along the streambank to provide bank stability, instream habitat and promote revegetation. In addition to the placement of LWD, we propose the installation of rock weirs and boulder placements so that pool habitat is created in this degraded stream reach. The area will be isolated from grazing, camping and motorized vehicles with a fence. The riparian corridor will be revegetated next spring (March 1999) with conifers, dogwood, cottonwood and willow plantings during the dormant season.

Objectives:

Restore in-stream fish habitat, re-establish the riparian zone and protect the stream reach from further land use impacts

Timelines:

August 15, 1998 through May 31, 1999.

Site Description:

Geomorphic Reconstruction:

Vortex rock weir - 3

Boulder placements - 3 (each containing 3 to 5 three feet diameter boulders)

LWD placement – along 800 feet, not contiguous

Fish Habitat Improvements:

Vortex rock weir – 3 large pools, sorted spawning gravels at the tail outs
Boulder placements - multiple small pools and sorted spawning gravels
LWD placement – bank stability to facilitate revegetation and hiding cover

Riparian Enhancement:

1,500 lineal ft of conifers, dogwoods, cottonwoods and willows. Belt width varies, but will average at least 30 feet, totaling more than one acre of riparian restoration.

Cost Estimate:

<u>Treatment</u>	<u>Number</u>	<u>\$/Unit</u>	<u>Costs</u>
Vortex Rock Weir	3 ea	\$1,000	\$ 3,000
Boulder Placements	25 boulders	\$ 100	\$ 2,500
Large Woody Debris	15 trees	\$ 500	\$ 7,500
Riparian Plantings	1,500 ft	\$ 2/ft	<u>\$ 3,000</u>
			\$ 16,600

Operation and Maintenance:

Upon successful completion of the project, the operation and maintenance at the site will be taken over by the landowner for a period of ten years.

Monitoring and Evaluation:

Monitoring and Evaluation (M&E) will continue for a period of ten years and will include:

1. Photo plots – pictures before and after projects. Pictures of riparian development.
2. WDFW will conduct pre and post construction habitat and fish utilization surveys.
3. Basic habitat measurements will be recorded pre- and post-project installation for all 1998 habitat projects. Measurements will include: a.) pool number, b.) pool area, c.) Maximum and average site depth, d.) pool quality, e.) Mean pool depth, f.) Quantitative and qualitative counts of woody debris, and g.) standard deviation of thalweg depth.

Timeframes:

1. Habitat and fish utilization surveys will be completed between 1 July – 31 July 1998.
2. Data summaries and statistical analysis will be completed by 31 December 1998.

Cultural Resource Investigation:

No known cultural resources are listed on State Historical Preservation Officer's database for this location. If during site investigation or practice installation cultural resources are found, NRCS policy and procedures will be followed.

Threatened and Endangered Species:

Steelhead have been known to spawn throughout the mainstem of Asotin Creek, upstream of the mouth of George Creek. No steelhead or chinook spawning has been recorded on-site. Steelhead were recently listed as Threatened and Endangered, and chinook are already listed in the watershed.

If threatened and endangered species are found during planning or construction, NRCS standards and policies will be followed.

Permits:

Needed Not Needed

County

Shorelines
Floodplain

XXX

State

WA Dept. of Fish and Wildlife Hydraulic Permit

XXX

Federal

Army Corps of Engineers Section 404

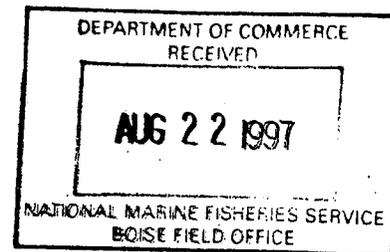
Consultation:

National Marine Fisheries has been involved since project conception; site review and practice selection. A biological assessment has been developed by the NRCS with draft reviewed by the NMFS. The biological assessment is attached for submission to NMFS with project reports.



Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

ENVIRONMENT, FISH AND WILDLIFE



AUG 13 1997

In reply refer to: EW-4

Mr. Ted Meyers
ATTN: Rick Edwards
National Marine Fisheries Service
1387 South Vinell Way, Suite 377
Boise, ID 83709

Enclosed for your review are the Biological Assessments of eight new project sites on Asotin Creek and its major tributaries, tributary to the Snake River, southeast Washington, Asotin Creek Model Watershed. These projects are part of the Northwest Power Planning Council's Fish and Wildlife Implementation Program for fiscal year 1997.

These Biological Assessments were completed by the Natural Resources Conservation Service, Spokane Washington office, in conjunction with their Blue Mountain field office, in cooperation with Rick Edwards, Boise field office, National Marine Fisheries Service, Boise, Idaho. It was determined that the proposed actions "**May affect, not likely to adversely affect**" the listed species of spring chinook or their critical habitat.

Due to this determination, we ask that you review and approve the implementation of the proposed projects as soon as possible. The work window for these instream projects on Asotin Creek is July 15 to September 30 for all project sites projects. All work window dates are coordinated with the Washington Department of Fish and Wildlife.

If you have any questions, please contact Mark Shaw at (503) 230-5239.

Thank you for your timely review of these projects.

Sincerely,

D. Robert Lohn
Director, Fish and Wildlife

Enclosure

BIOLOGICAL ASSESSMENT
ASOTIN CREEK MODEL WATERSHED
1997
STREAMBANK STABILIZATION
and
FISH HABITAT IMPROVEMENT
PROJECTS

Site 1 - Schlee

Site 2 - Koch

Site 3 - Blankinship #1

Site 4 - Blankinship #2

Site 5 - Hood

Site 6 - Thiessen #1

Site 7 - Thiessen #2

Site 8 - Headgate Park

Site 9 - Mullins

Site 10 - Hagenah #1

Site 11 - Hagenah #2

Site 12 - Hagenah #3

Submitted to: US DOC, National Marine Fish

Prepared by: Asotin County Conservation

US DOE, Bonneville Power Administra

and

USDA, Natural Resources Conservation S

August 1997

RICK EDWARD'S
COPY
SENT THRU BPA

INTRODUCTION:

The Asotin Creek watershed has been designated by the Northwest Power Planning Council as a "Model Watershed." This designation has resulted in the Asotin County Conservation District (ACCD) sponsoring a watershed approach for inventory and analysis in order to develop the *Asotin Creek Model Watershed Plan*. The Plan provides a framework for improving the overall health of the Asotin Creek watershed, with an emphasis on improving fish habitat for Snake River spring/summer chinook (herein, spring chinook) and fall chinook salmon. The conservation district has ensured that the model watershed planning process is being driven by a locally-based effort comprised of landowners, business people, user groups, civic organizations, recreationists, students, and other interested citizens.

The "locally driven" concept stresses a total watershed approach, calling for cooperation and coordination to sustain and increase the quantity and quality of habitat for native chinook and steelhead. The local approach is intended to give landowners a level of "certainty" that they are complying with applicable laws, such as the Endangered Species Act (ESA), so that they can avoid the economic disruption which could result from non-compliance with this and other environmental laws. Voluntary participation of private landowners with federal, state and local agencies and tribes is stressed as the best way to work on problems and develop solutions for watershed treatment that include improvement of fish habitat on private land. Including private lands with public lands as part of the watershed treatment is essential for a comprehensive recovery of the chinook salmon resource. Although the primary emphasis of the Plan is on chinook salmon, the involved parties realize that populations of other fish species, such as steelhead and bull trout (recently classified as "Proposed for Listing"), have declined and that implementation of this plan should also improve habitat quality for them.

During the summer of 1996, the Asotin County Conservation District received approval from the National Marine Fisheries Service (NMFS), and with funding from Bonneville Power Administration (BPA), completed ten demonstration projects which were done to protect property that was severely damaged in floods that occurred during the previous February and April. These projects were installed to stabilize eroding streambanks and to improve fish habitat, using various bio-engineering techniques, many of which had not been tried before in the Asotin Creek watershed. After these projects had been completed, but before the river had a chance to stabilize, it was hit by more flooding during the first week of January 1997. All of these floods have caused damage to property along the river.

The ACCD has again obtained funding from BPA and is currently seeking the proper permits to help 12 landowners (or managers) to protect and restore some of their badly-damaged lands along the creek and to correct damages that occurred at the 1996 demonstration sites. Each landowner (except for Asotin County, at Headgate Park) will contribute toward the cost of their project. The sites have been inspected, in the presence of the land manager, by members of the Technical Advisory Committee (TAC) and representatives from the Natural Resources Conservation Service (NRCS). The inspection team included fish habitat biologists, engineers, a

riparian specialist and a fluvial geomorphologist. Instream fish habitat components, similar to those used in the 1996 projects, will be included in every one of the 1997 projects. Woody vegetation, using "dormant stock plantings (DSP)," will be planted in spring 1998. In addition, experimental plantings will be made during summer 1997, using cuttings, bare root and containerized stock which was left over from the 1996 projects. The purposes for doing these projects are to:

- Demonstrate to the producers (private land managers) and the public that fish habitat can be incorporated into streambank stabilization projects and that instream fish habitat and riparian buffers can be compatible with agriculture practices,
- Evaluate the performance (both as bank protection and as fish habitat) and cost effectiveness of recommended practices,
- Obtain feedback from the producers and the public concerning the practices, and
- Use the information gathered to assist with full watershed implementation.

1. DESCRIPTION OF THE PROPOSED ACTIONS:

All of the following channel reconstruction projects will be designed to have the same bankfull width as was measured during the pre-flood conditions of the 1994 survey, using a combination of actual cross-sections and hydraulic geometry based on 32 years of flow gage readings taken at RM 5.3. Bank stabilization will be accomplished using rootwad revetments (**Appendix A**) and other bio-engineering techniques. These projects are listed in order, and by the landowner's name, beginning with the Schlee site at river mile (RM) 4 of the South Fork of Asotin Creek and proceeding downstream to the Hagenah sites on George Creek, a tributary that enters Asotin Creek at RM 4. Each of the following project descriptions include a legal description, approximate RM, and the streambank that is involved (e.g. left bank, looking downstream).

A. Individual Sites

Color photos of each of the following sites are located in **Appendix B**.

Site 1. Schlee

Landowner: Dan Schlee
Location: South Fork, Asotin Creek
NE ¼, Sec 34, T9N, R44E
RM 4
Left and Right Banks

Prior to 1995, this site, which is a winter-feeding area, had no riparian vegetation and the stream was completely accessible to cattle. It was chosen as a 1996 demonstration site to show conservation practices that improve water quality and riparian health and to demonstrate how these practices can work in conjunction with landowner objectives. The original project included riparian fencing and planting, as well as a "frost-free" water diversion for livestock. The recent floods tore out the fence, the watering system, and all

of the plantings. The roof gutters, installed in 1996 to direct storm runoff away from the feeding area, are still intact.

The main objectives for 1997 are to improve instream habitat and re-establish geomorphic stability and a riparian plant community. A 20 foot wide "water-gap" will be installed in the fencing to allow livestock access to water, rather than attempting to re-establish a water diversion.

The following structures will be used on this site: five rock barbs and one rock vane (half of a vortex rock weir) on the left bank; four rock barbs on the right bank; and two vortex rock weirs across the width of the channel. The vane is designed to redirect the thalweg to the center of the channel. A vortex rock weir will not function at this site because a basalt wall is along the right bank and will not allow the weir to be keyed into the bank. Large woody debris will be incorporated into all of the structures to add habitat complexity. A riparian fence will be rebuilt for animal exclusion along 1500 feet of the stream channel. The average width of the riparian area that is being fenced is 40 feet. The riparian area will be planted to native tree and shrub species in the spring of 1998.

Site 2. Koch

Landowner: Frank Koch
Location: Asotin Creek
SW ¼, Sec 3, T9N, R44E
RM 14.5
Left Bank

The flood which occurred on January 1 caused extensive damage to an irrigated field and a section of Asotin Creek adjacent to this field. The stream reach is now denuded of vegetation and is braided for approximately 1400 feet. Because of the unstable condition of the channel, minimal structures will be installed this year. The creek is now flowing approximately 100 feet from the edge of the field, but has the potential of cutting into the field again if the conditions change.

A rootwad revetment will be installed along 200 feet of the field edge. Structures to be installed in the creek channel include: one rock vane and two rock barbs on the left bank and one rock barb on the right bank. Large woody debris will be anchored in these structures and throughout the gravel outwash to enhance sedimentation and begin stabilization of the flood plain. Post-flood dredge spoils that have been piled along the stream corridor will be removed and used for fill behind the 200 feet of rootwad revetment in order to encourage a "single-thread" channel to become established. The entire riparian area will be planted to native tree and shrub species in the spring of 1998.

Site 3. Blankinship #1

Landowner: Doris Blankinship
Location: Asotin Creek, at confluence of Dry Gulch
SW ¼, Sec 35, T10N, R44E

RM 13.5
Left Bank

This site is a winter and spring livestock feeding and holding area. The creek in this section has high, raw, vertical, unstable banks and limited riparian vegetation. The stream thalweg is at the toe of the vertical bank, causing slumping and eroding activity. Water quality is also being degraded as a result of livestock access to the stream and surface runoff from the lot.

Four rock deflectors will be installed on the left bank to redirect the thalweg and reduce erosion. One rock vane will be installed on the left bank. Large woody debris will be incorporated into and between these structures. The bank will be shaped to a 1.5:1 slope and seeded to grass for temporary protection against winter and spring runoffs. Seedings will be held in place with erosion-control matting. The riparian area will be fenced; and native tree and shrub species will be planted in spring 1998.

Site 4. Blankinship #2

Landowner Doris Blankinship
Location Asotin Creek, at confluence of Dry Gulch
SW ¼, Sec 35, T10N, R44E
RM 13.5
Left Bank

This site is approximately 300 feet downstream of Site 3. During the January flood, high water accelerated erosion to this bank and removed 280 feet of pasture land, leaving high, raw, vertical, unstable banks and limited riparian vegetation. The creek is presently flowing 200 feet south of the project site, separated only by a large gravel island. High flows will cause the stream to erode more of the raw bank.

Four large rock deflectors, each with large woody debris, will be installed on the left bank to help reduce pressure during high flows. The bank will be reshaped to a 1.5:1 slope and seeded to grass. Erosion-control matting will be placed after construction in order to hold the seed and bankline in place. The riparian area will be fenced and native tree and shrub species will be planted in the spring of 1998.

Site 5. Hood

Landowner: Larry Hood
Location: Asotin Creek at confluence of Palmer Gulch
NE ¼, Sec 35, T10N, R44E
RM 12.5
Left Bank

This site is a winter feeding area that has a small (three feet wide) spring-fed channel that bisects the upper corral. Water quality in this channel (and in Asotin Creek, where it enters) is being degraded as a result of surface runoff from the lot and livestock access to

both channels. Prior to the recent flooding, this spring had perennial flow and supported juvenile steelhead rearing. It is proposed to construct a protected, off-channel rearing area which already has riparian cover. The lower 125 feet of this channel will be re-routed so that it enters Asotin Creek upstream of the corral. The newly-excavated off-channel rearing area will have one rock barb and four log weirs, with four random-boulder placements.

On the mainstem, three rock barbs and one vane will be installed on the left bank to redirect the thalweg into the basalt cliff, creating pools for resting and rearing. Large woody debris will be incorporated into the structures to add habitat complexity. Many segments of the project site have areas that were denuded during the January 1997 flood. The riparian plant community will be re-established along 600 feet of eroded bank to increase shade and filter nutrients. Approximately 800 feet of fencing will be installed to prevent direct animal access to this riparian-buffer. A 20 foot wide water gap will be constructed to allow livestock access to water. The water gap ramp generally has a 6:1 slope and is faced with 3 inch minus angular rock. The ramp's sideslopes will be 3:1 and will be seeded with grass for stabilization.

Site 6. Thiessen #1

Landowner: Gene Thiessen
Location: Asotin Creek
NE ¼, Sec 25, T10N, R44E
RM 11
Left Bank

The existing condition is an area along 200 feet of the left bank that was armored with large riprap as part of the 1996 work. This has constricted the channel and caused flows to have increased velocity, damaging the instream structures that had also been installed in 1996. The project will address stream capacity and instream habitat.

Stream capacity will be improved by removing approximately 1/3 of the existing riprap and using it for instream habitat. The majority of the rock to be removed is from the top edge of the rip-rapped bank. Two vortex rock weirs will be installed to help direct the thalweg to the middle of the stream and create pools. Large woody debris will be anchored in the pools to add habitat complexity. The area will be planted to native tree and shrub species in the spring of 1998.

Site 7. Thiessen #2

Landowner: Gene Thiessen
Location: Asotin Creek
NE ¼, Sec 25, T10N, R44E
RM 10.5
Left Bank

This section of the creek has approximately a 1.1% gradient which is considered high for a riffle/pool morphology. This section is low in habitat complexity. The site includes an upper area where flood waters scoured the floodplain, removing riparian vegetation and leaving a wide expanse of gravel. The lower area is much narrower and heavily wooded on both sides and is contained within a diked channel that constricts the flow and causes damage immediately upstream as a result of back-eddies. To allow better flow through this area, approximately 15 trees with an average diameter of 6-12 inches which are growing on the gravel point bar will be removed. This will be done in a manner that will not diminish the overall integrity of the riparian vegetation.

The 100 feet of eroded bankline will be planted with woody vegetation and protected against further erosion by installing one vortex rock weir, three rock barbs, and five rootwads. Large woody debris will be incorporated into the rock weir and barbs and between the barbs. The riparian area is already fenced and native tree and shrub species will be planted in the spring of 1998.

Site 8. Headgate Park

Landowner: Asotin County
Location: Asotin Creek
SE ¼, Sec 19, T10N, R45E
RM 10
Left and Right Banks

Headgate Park was used as a 1996 demonstration site for instream fish habitat improvements. Most of the habitat structures consisted of log barbs and anchored rootwads. The January flood damaged most of these structures, so maintenance and improvements are needed.

New habitat structures include five rock barbs with large woody debris for habitat complexity on the left bank, six vortex rock weirs, and two boulder-clusters, using cables and glue. Right bank structures include two rootwads cabled to the basalt wall. Several of the log barbs that washed out during the flood will be replaced, using a better anchoring system, such as a heavy rock deadman. The riparian area will be fenced and native tree and shrub species will be planted in the spring of 1998.

Site 9. Mullins

Landowner Emily Mullins
Location Asotin Creek
NE ¼, Sec 26, T10N, R45E
RM 8.5
Left Bank

During the January flood the creek migrated from its original channel along a basalt cliff and eroded into adjacent pasture land. The landowner is interested in protecting property and improving instream habitat. On the left bank, in the thalweg, structures include: one

small bend jam, four rock barbs, two vortex rock weirs, and six boulder placements. To help increase instream habitat complexity, large woody debris will be incorporated into these structures. The riparian area is already fenced and native tree and shrub species will be planted in the spring of 1998.

Site 10. Hagenah #1

Landowner: Casey Hagenah
Location: George Creek, upstream of confluence with Pintler Creek
NW ¼, Sec 36, T10N, R45E
RM 1.5
Right Bank

This site is located about 500 feet upstream of the barn. There is a natural rootwad that is already creating a pool and adding habitat complexity. More rootwads will be added to this mass and cabled to each other and to large boulders. The flood water back-eddied in this area, causing bank erosion. The new rootwads and boulders will also help protect this eroded bank.

Site 11. Hagenah #2

Landowner: Casey Hagenah
Location: George Creek, upstream of confluence with Pintler Creek
NW ¼, Sec 36, T10N, R45E
RM 1.5
Right Bank

This site is just downstream of site 10. It is in an area that has an average gradient of 1.1% and is low in habitat complexity. Two rock barbs will be installed to redirect the thalweg into the middle of the channel and scour two pools. Large woody debris will be incorporated to add habitat complexity and the area will be planted to native tree and shrub species in the spring of 1998.

Site 12. Hagenah #3

Landowner: Casey Hagenah
Location: George Creek, upstream of confluence with Pintler Creek
NW ¼, Sec 36, T10N, R45E
RM 1.5
Right Bank

This site is located approximately 200 yards downstream of site 11 and also has high velocity with an average gradient of 1.2%. Low habitat quality is also present. Planned

instream components include: one vortex rock weir to direct the thalweg to the center of the stream and two large rock barbs to re-direct the thalweg into the basalt wall and away from the eroding bank that has become unstable as a result of the effects of recent floods. Large woody debris will be incorporated into the structures to add habitat complexity. Native tree and shrub species will be planted inside the existing fence line in the spring of 1998.

B. Location Maps and Plan Drawings - see Appendix C

C. Relationship to Regional Planning Documents

The *Asotin Creek Model Watershed Plan* was developed to improve the health of the watershed as it relates in general to the creek itself, but specifically as it relates to Asotin Creek spring chinook salmon, which are part of the endangered Snake River chinook stocks. During the development of the Plan, numerous documents including the Northwest Forest Plan, PACFISH and the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP), were reviewed in order to determine the goals that would need to be met if the Plan were to be successful. Since these three documents dealt primarily with federal lands, and since the USFS, as a major land manager in the watershed and an active member of the Asotin Creek Technical Advisory Committee, was already implementing most of the measures that these documents advised, the Plan incorporated only those elements (such as pool frequency and size) that could be feasibly undertaken on private and state lands. The projects were compared individually to the elements in **Table 1 (Appendix D)** for a properly-functioning salmonid stream, as defined by NMFS and PACFISH. Each site was then rated for its environmental effects in **Table 2 (Appendix E)**.

It is important to note that the 1996 and 1997 floods caused significant changes to the river system. These changes were both negative and positive in regard to fish habitat. The damages to private land adjacent to the creek ranged from minor to very severe. The flood also caused some landowners to be more leery of using logs and stumps as instream fish habitat. NRCS opted to use the 1993 pre-flood geomorphic information (such as the bankfull width) as the standard for restoring the river condition.

The summary of effects in **Table 2** appear to show no major gains for chinook salmon, primarily because:

1. These limited projects are too small and are located too far downstream to address major habitat problems, such as sediments from upland erosion, elevated water temperatures, lack of refugia for juveniles, and little or no LWD recruitment;
2. The formulation used for entering results into the table does not give credit for minor short-term improvements that will eventually lead to major long-term improvements and, hopefully, an upgrade of the category; and
3. The term LWD, as used by NMFS and supported by fish habitat literature, is restricted to downed trees or parts of trees that are at least 35 feet long, with a minimum diameter of 12 inches. Most of the described projects do not include material this large and most of the wood

structure, such as the bole of the rootwad, is buried into the bank, rather than protruding into a deep pool, away from the bank. The rootwad revetments, however, though not meeting the definition of LWD, do provide some excellent cover and complexity for both juvenile and adult salmonids when they are placed in the thalweg of the channel, at the outside bend of the river.

The actual plans for each project site show improvements for fish habitat by means of riparian plantings, replacement of former rock-armored banklines with more fish-compatible bank protection in the form of stumps, logs and planted trees, and the installation of vortex rock weirs and barbs to form large pools. All of the weirs and rock deflectors/barbs will contain stumps and logs to add complexity and cover to each pool-forming structure.

II. DESCRIPTION OF THE SPECIES PRESENT:

A. Status

The Natural Resources Conservation Service (NRCS) requested a species listing from the National Marine Fisheries Service (NMFS) and US Fish and Wildlife Service (USFWS). NMFS indicated that Snake River spring/summer chinook salmon (*Oncorhynchus tshawytscha*) are known to be in the Asotin Creek watershed and are "listed" officially as *Threatened*, but with a proposal to be listed as *Endangered*. USFWS indicated that the bald eagle and the peregrine falcon may be in the Asotin Creek area and are "listed". Recently, both steelhead and bull trout, have been proposed for "listing". There are also 18 other animal species including the Pacific lamprey, as well as two plant species that are considered as *Candidate* species.

B. Life History

Asotin Creek: Spring/summer chinook were first documented in Asotin Creek in the 1930s by the former Bureau of Commercial Fisheries (now US Fish & Wildlife Service). In the mid 1950s, the US Army Corps of Engineers (COE) estimated an average of 18 adult chinook passed Headgate Dam

The first on-site chinook spawning surveys were conducted by the US Forest Service (USFS) in 1972 and 1973. Only the North Fork was surveyed. Since both of these surveys were on National Forest lands, they would have missed any spawning which might have occurred in the five miles of similar habitat downstream of the Forest boundary. Yearly surveys were then conducted by Washington Department of Fish and Wildlife (WDFW), beginning in 1984. The high count of 76 fish and 12 redds made in 1972 had steadily declined, so that by 1985 the count was 8 fish and 8 redds. No adult salmon have been found since the 1993 count of 2 fish and 2 adults. The Asotin Creek chinook counts follow the same trend in relative numbers as do historic redd counts in the Imnaha River since 1957. The Imnaha is only 48 miles upstream of Asotin Creek and located on the same side of the Snake River. There are no dams between the two streams. The 1972 count was the third highest in the Imnaha since the construction of The Dalles Dam. The 1973 count was the highest.

The limited data that has been collected for Asotin Creek chinook indicates that their life history is similar to that of the Tucannon River spring/summer chinook. The adults enter the Columbia River in early spring, swim upstream 145 miles and cross the Bonneville Dam by August 15. They continue for another 324 miles and cross seven more dams before reaching the mouth of Asotin creek. These fish must negotiate two more dams than the Tucannon fish.

Most adults probably enter the creek during high flows in May and June. Once in the stream, they move at varying speeds from pool to pool until they find a suitable holding area where they may stay from one week to over three months prior to spawning. The preferred holding areas are usually pools which have cover in the form of large woody debris (LWD) or undercut banks. They spawn in the North Fork, between late August and late September. Steelhead spawn and rear in the mainstem, South Fork and North Fork. Bull trout are known to exist in the upper reaches of the North Fork. Steelhead were trapped and counted at Headgate Dam, located 8 miles up the mainstem of Asotin Creek, from 1954 to 1961. Adult counts ranged from 408-1840. Recent returns range from 120 to 170. Spawning bull trout were recorded in the very headwaters of the North Fork of Asotin Creek in 1992.

III. DESCRIPTION OF THE ACTION AREA:

A. Environmental Baseline

Temperature: All of the project sites are in areas of poor temperature conditions for chinook, both for rearing and spawning. Water temperatures do not noticeably improve until about the North Fork (RM 15), although they approach the lethal limit (77⁰F) only in the South Fork and the very mouth of the creek. Data from the Asotin Creek Model Watershed Plan indicates that the stream is noticeably cooler than it was in 1984.

Dissolved Oxygen (DO): There is not much information regarding DO for the mainstem downstream of the USFS boundary. A study by WSU (Moore 1991) found that near the mouth of the creek, the DO was usually above the state standard of 8.0 mg/l during the hottest summer months and never went below 6.8 mg/l.

Turbidity: Frequently, Asotin Creek contains high amounts of suspended sediments. This usually occurs during spring runoff and during periods of heavy, long duration rains in late spring and intense thunderstorms in early summer. The sediment and turbidity increases dramatically downstream of the mouth of George Creek

Fecal Coliform: During the same 1991 (Moore) study the state standard of 100 colonies/100 ml was exceeded numerous times, downstream of the forks. The highest recorded value was 6000. Many of the sources for these high counts were winter feeding areas along the stream. Most of these sites have since been enclosed so that cattle do not have full access

General: All of the projects have several things in common. They are all on private land and most involve former gravel berms, some of which were reinforced with riprap faces. Many of these structures are 25-30 years old and were severely damaged during the recent floods. Prior to the floods, they all had narrow (5-50 ft) riparian buffers composed primarily of 25 year-old alders, with very few trees that would meet the criteria for LWD recruitment. At many sites, numerous standing trees along former banklines washed downstream, and many were removed during and after the flood fights.

Most of the instream LWD and stumps for these projects will be hauled to the site from various outside sources. The ACCD is securing large conifers for rootwad revetments and LWD, most of which will have large rootwads attached. Smaller rootwad material that is on site, may be utilized as components of rock structures and bank protection. Unfortunately, these are mostly small to medium- diameter deciduous trees which may not last as long as conifers when they are placed into the water.

IV. Effects of the Proposed Action on Proposed/Listed Species or Proposed/Designated Critical Habitat

A. Positive impacts: These projects will have several common components that will improve fish habitat, even though they may not be enough to raise the condition level of an indicator, as described in **Table 2**. Common components are:

Vortex rock weirs are designed to produce a thalweg and develop large pools at the downstream side of the weirs. Logs and/or large rootwads will be anchored into most of the pools that are formed to provide cover and to break up the flow. This will also create better spawning conditions by sorting the gravel and keeping it clean. These weirs also help stabilize the channel bottom. With a stable stream, less fine sediment will be deposited in the pools during low flows. Accumulations of fine sediment in pools reduce pool quality and residual pool volumes.

Rock barbs and deflectors will direct the flow away from the bank. This will help keep the banks stable. Bank instability can cause the loss of streamside vegetation and increased channel erosion. Erosion leads to increased levels of sediment in spawning gravels and in-filling of pools. Many of the barbs will have rootwads incorporated in them in order to create cover in the small-to-medium sized pools that normally form at the tip and downstream side of each barb.

Rootwad placement will add bio-diversity to the system, as well as fish and insect habitat by providing cover and creating small pools underneath and downstream of the rootwads.

All of the above pool-forming structures will also create complexity in the flow so that the existing streambed, which is made up of primarily cobbles, will develop pockets of sorted smaller gravels at the "tail-outs" of the pools. These conditions of flow velocity and rock grading create ideal spawning areas for chinook and steelhead.

Riparian plantings will be comprised of native woody vegetation. These plantings will provide bank stabilization, shade over the stream, food and cover for insects, and future LWD recruitment. Woody vegetation also provides habitat for wildlife and a more moderate micro-climate for both fish and wildlife. There have not been any discussions with land owners concerning the minimum width for the riparian areas, but literature surveys support a minimum of 50 feet. The width, and success, of the riparian area will ultimately depend on the availability of water and on the actions of the landowner or producer. For the above projects, planting along the river will follow very minimal specifications already established by NRCS in Practice Standard #322: Channel Vegetation.

Most of the project installations will result in long-term positive effects to the stream system and resulting fish habitat. Some short-term negative effects may occur during construction, such as increased sediment deposition and turbidity.

B. Determination of Effects: The following questions were reviewed and addressed as part of the decision-making process to make the Section 7 determination of effect:

Are there any proposed/listed anadromous salmonids and/or proposed or designated critical habitat in the watershed or downstream from the watershed?

Answer: **yes.**

Do the proposed actions have the potential to hinder attainment of relevant properly functioning indicators?

Answer: **no.**

Do the proposed actions have the potential to result in “take” of proposed/listed anadromous salmonids or destruction/adverse modification of proposed/designated critical habitat?

Answer: **no.**

Determination: **May Affect, Not Likely to Adversely Affect**

V. Mitigation Measures

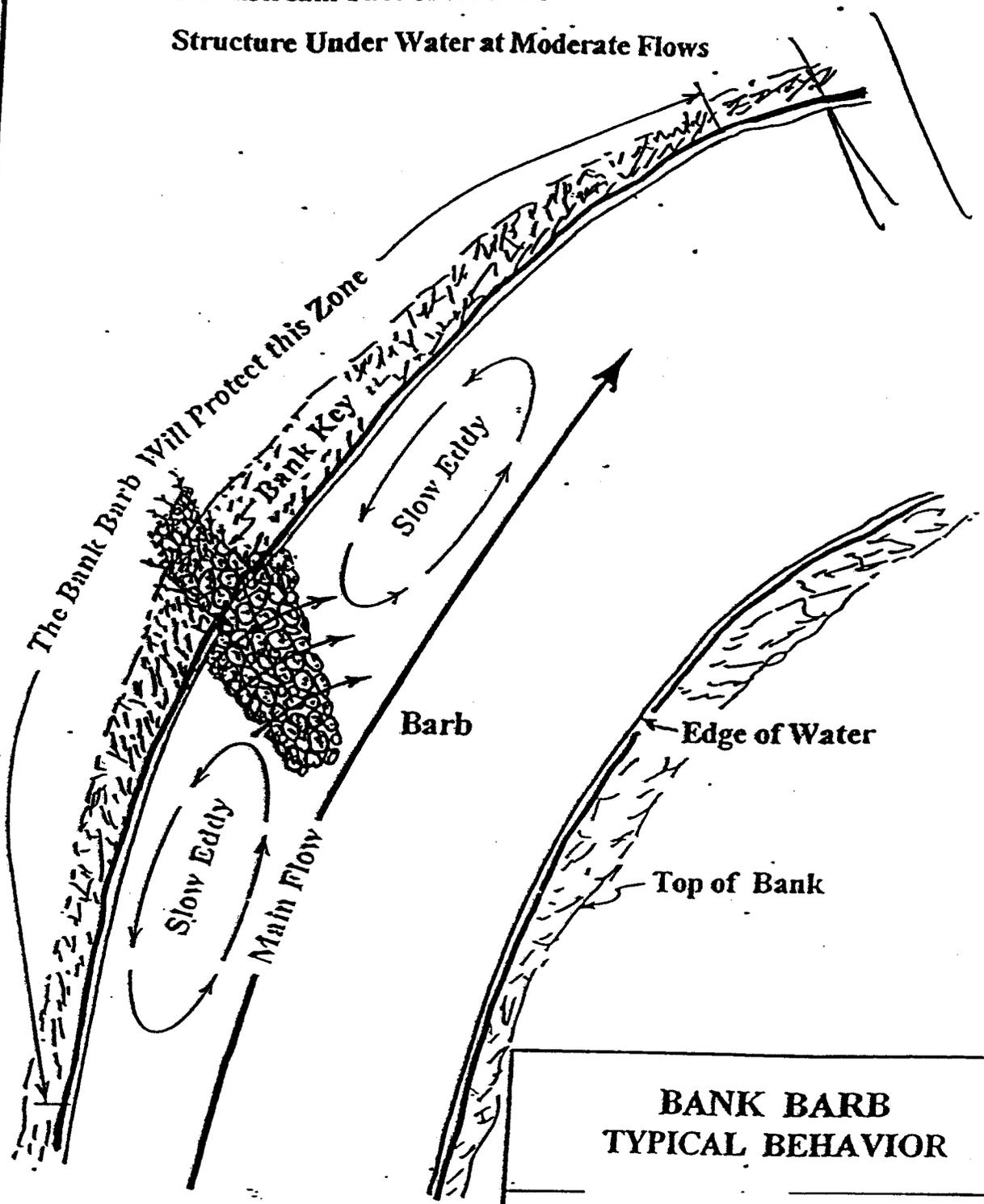
The goal of these projects is to make them part of a cumulative process, as described in the Asotin Creek Watershed Plan, that will lead to long term restoration of salmon habitat in Asotin Creek, as part of the recovery effort for the Snake River chinook populations. The long-term effects of the projects will help the goal to be reached. However, there may be some short-term negative effects that will have mitigation efforts designed for their reduction or elimination. The best mitigation is to perform the instream work only during those times of the year when the target fish species is least susceptible.

Work will only be performed during the “work window” established by WDFW. The window for working on instream projects in the *mainstem Asotin Creek and the South Fork* is from July 15 to September 30. If any condition changes during the window period and the WDFW habitat biologist recognizes that the project construction is causing adverse impacts to the listed species, the work will be shut down. Equipment such as track-hoes will be used for earth movement, individual rock placement and rootwad installation rather than bulldozers that would have to work in the stream in order to move rock. Rock used for each of the 12 sites will be clean angular basalt. Earth stockpiles will be placed away from the stream to avoid soil movement into surface waters during periods of heavy rains. During these runoff events, construction will cease in order to avoid siltation of the stream and undesirable soil compaction.

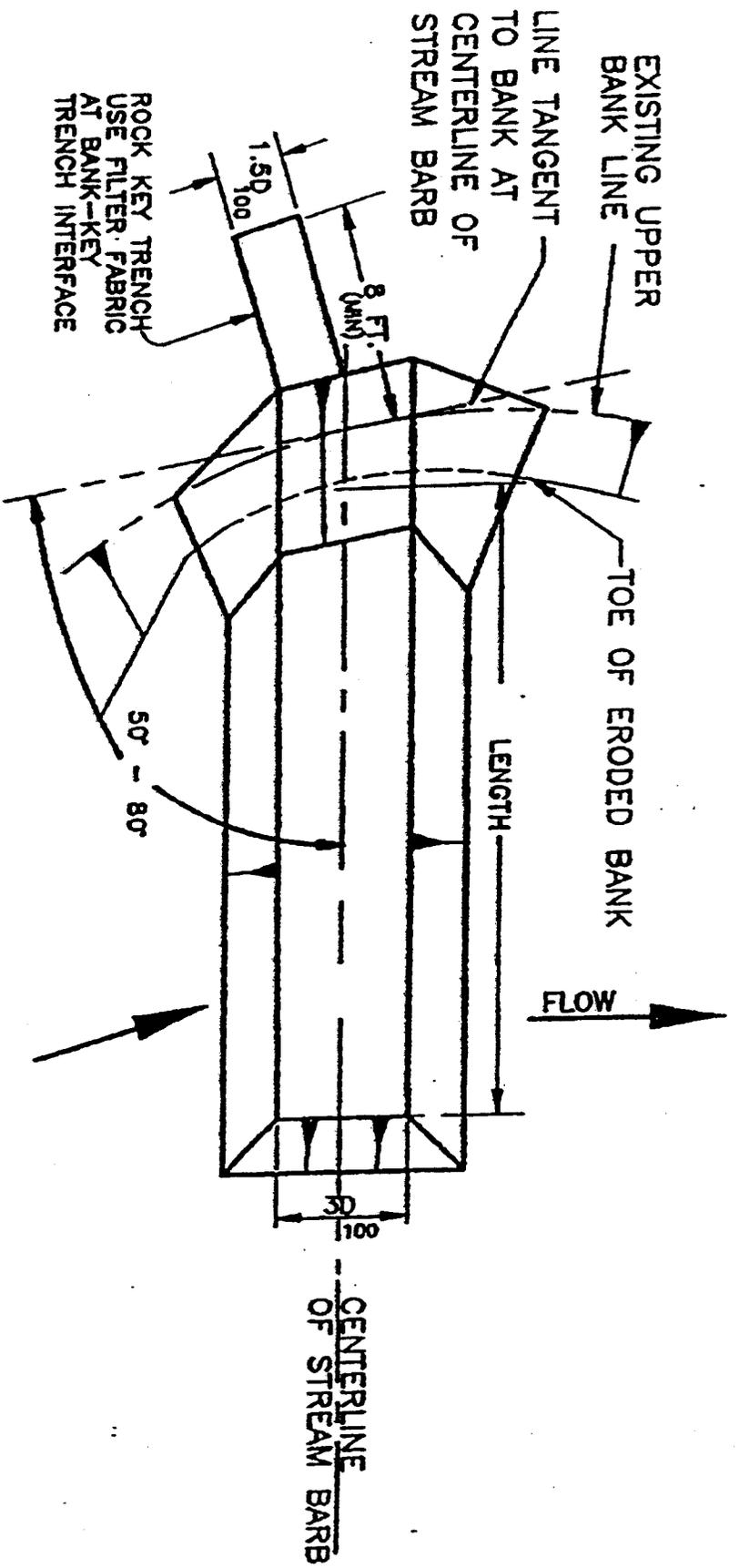
APPENDIX A

BIO - ENGINEERING AND INSTREAM STRUCTURES

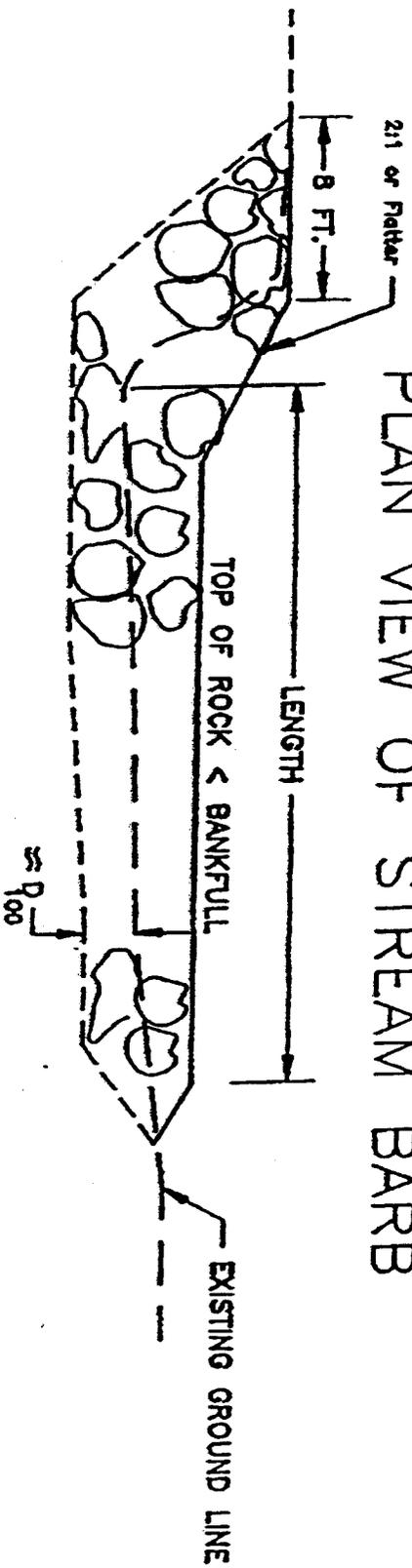
NOTE: Flow Is Directed Perpendicular to the
Downstream Face of the Barb
Structure Under Water at Moderate Flows



**BANK BARB
TYPICAL BEHAVIOR**



PLAN VIEW OF STREAM BARB



TYPICAL PROFILE CENTERLINE OF STREAM BARB



DIAGRAM 7 — ROOTWAD REVETMENT

ROOTWAD REVETMENTS ARE EFFECTIVE STREAMBANK PROTECTION WHEN RE-ESTABLISHING MEANDER PATHS OR PROTECTING DOWNSTREAM SCOUR AREAS INDUCED BY PROPOSED POOLS

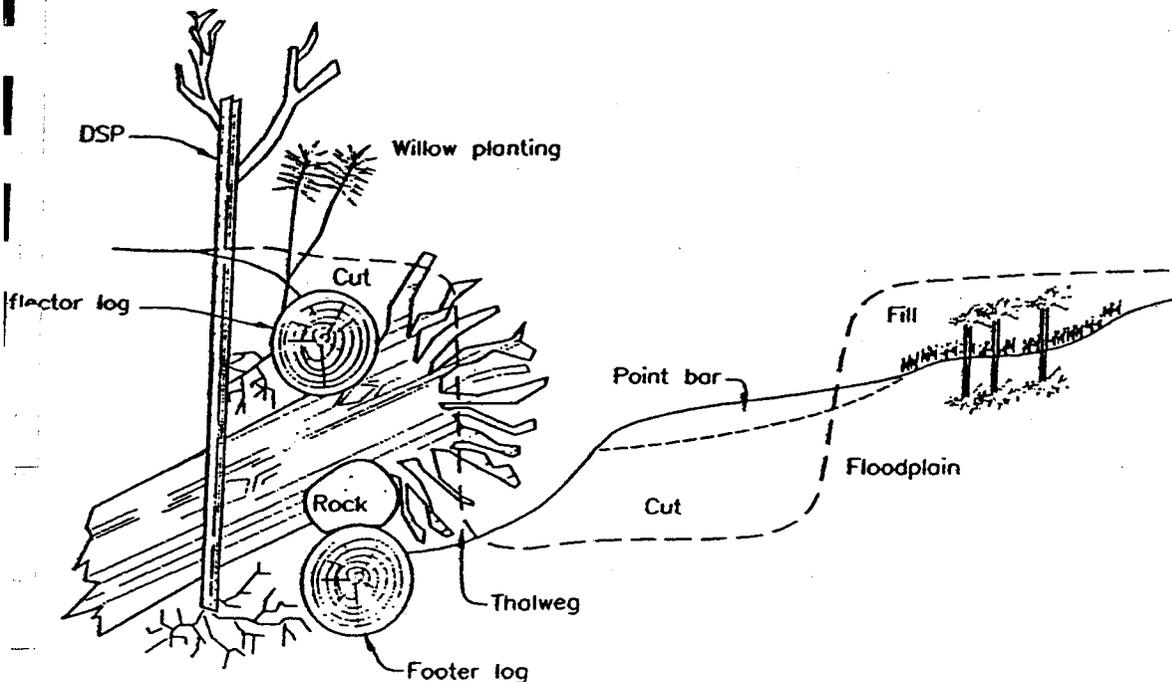
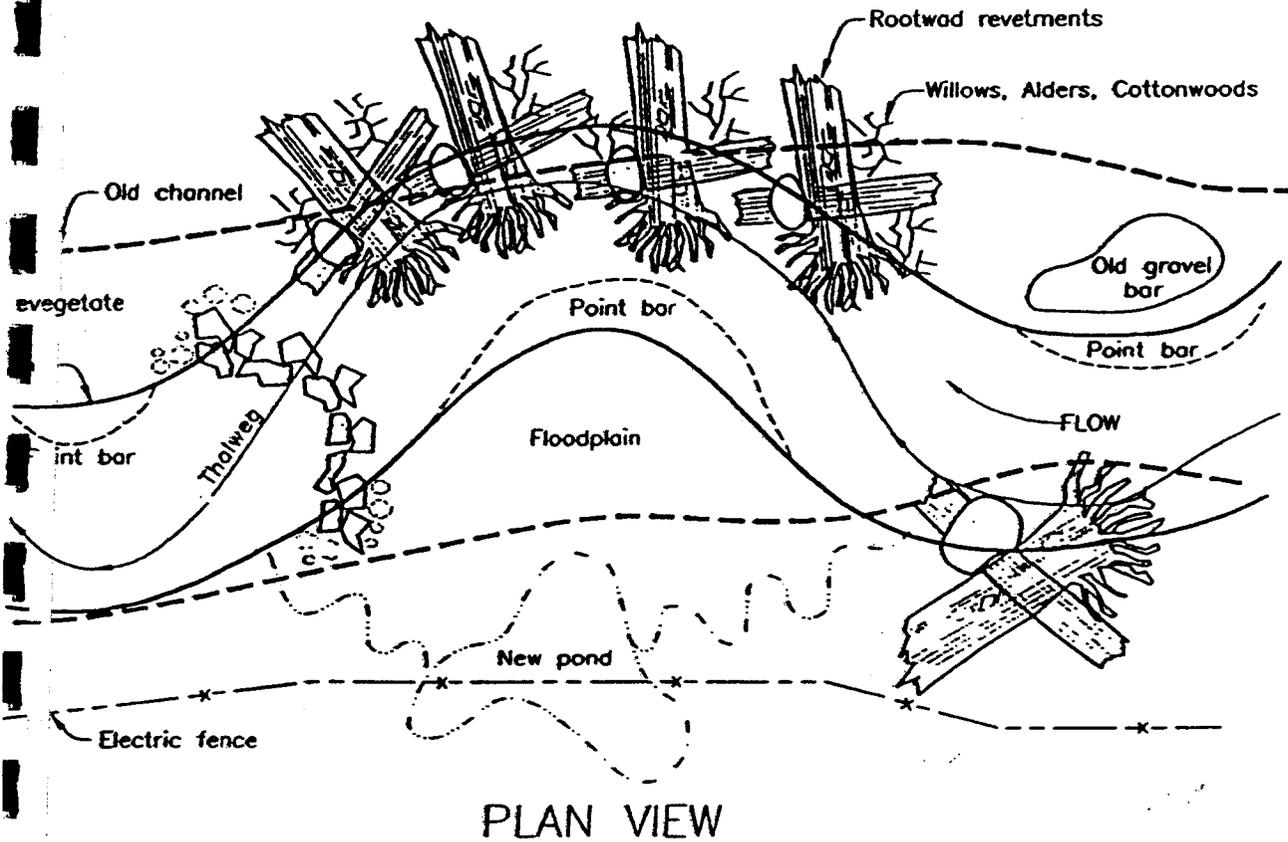
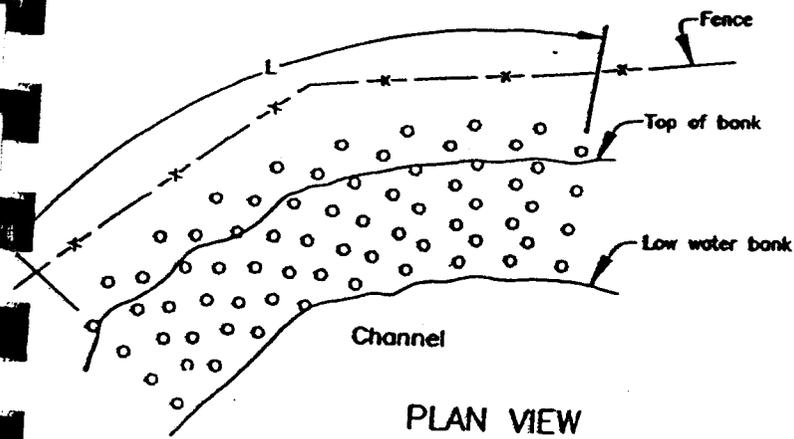


DIAGRAM 9 - DORMANT STOCK PLANTING

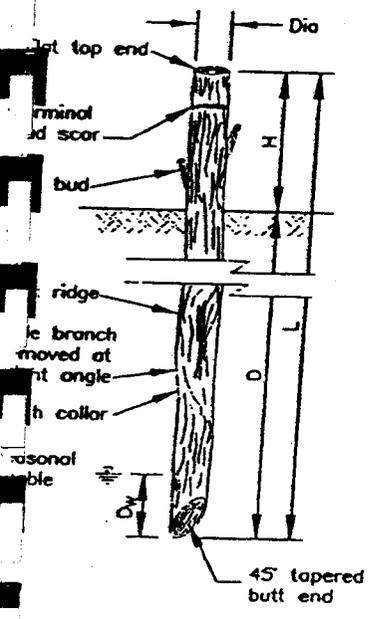
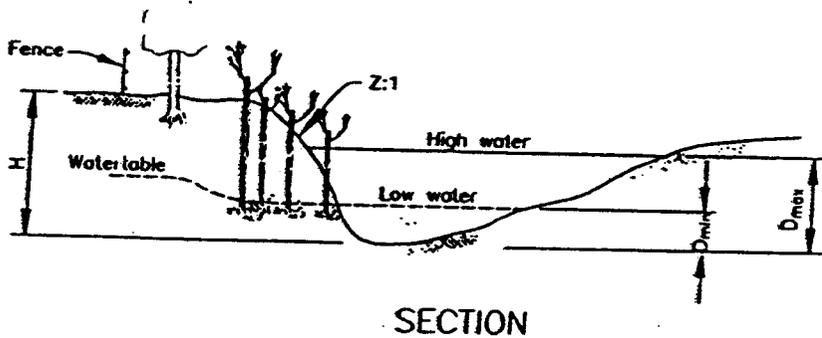


DIMENSIONS

Water Depth
 $D_{min} = \text{_____ ft.}$
 $D_{max} = \text{_____ ft.}$
 Bank
 $H = \text{_____ ft.}$
 $L = \text{_____ ft.}$
 $Z = \text{_____}$

PLANTINGS

Species _____
 Dia _____ in.
 Length _____ ft.
 Spacing
 _____ X _____ ft.
 No. of rows _____



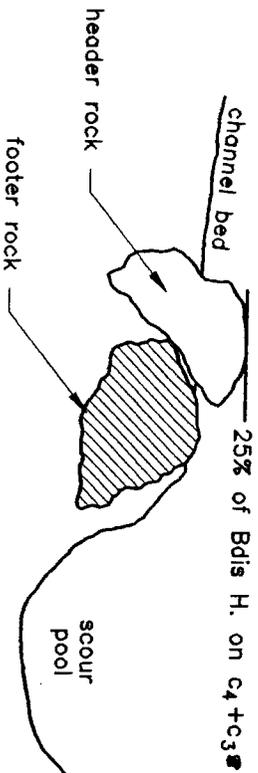
NOTES:

1. All lateral branches shall be trimmed to avoid damage.
2. A minimum of two lateral buds shall be above the planting depth.

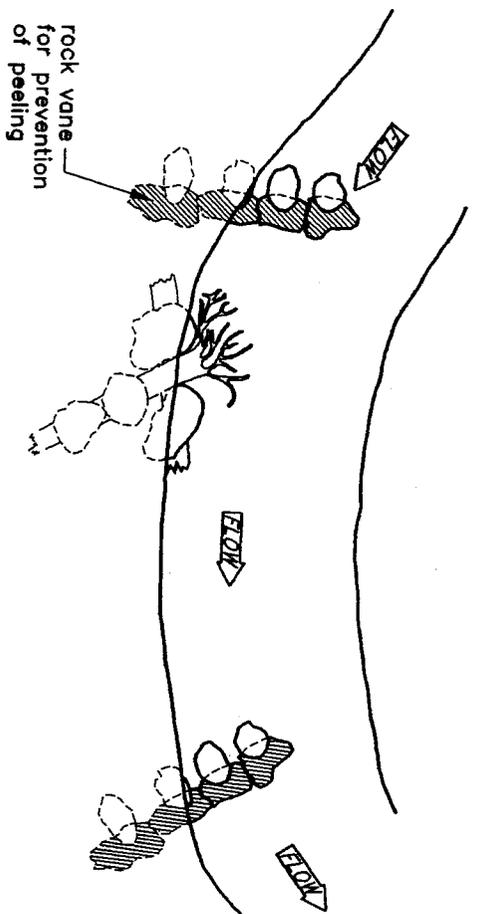
WOODY PLANT MATERIAL SPECIES

DIMENSIONS:
 $Dia. = \text{_____ inches}$
 $D = \text{_____ inches}$
 $H = \text{_____ inches}$
 $L = \text{_____ inches}$
 $D_w = \text{_____ inches}$

NOTE: DRAWING NOT TO SCALE

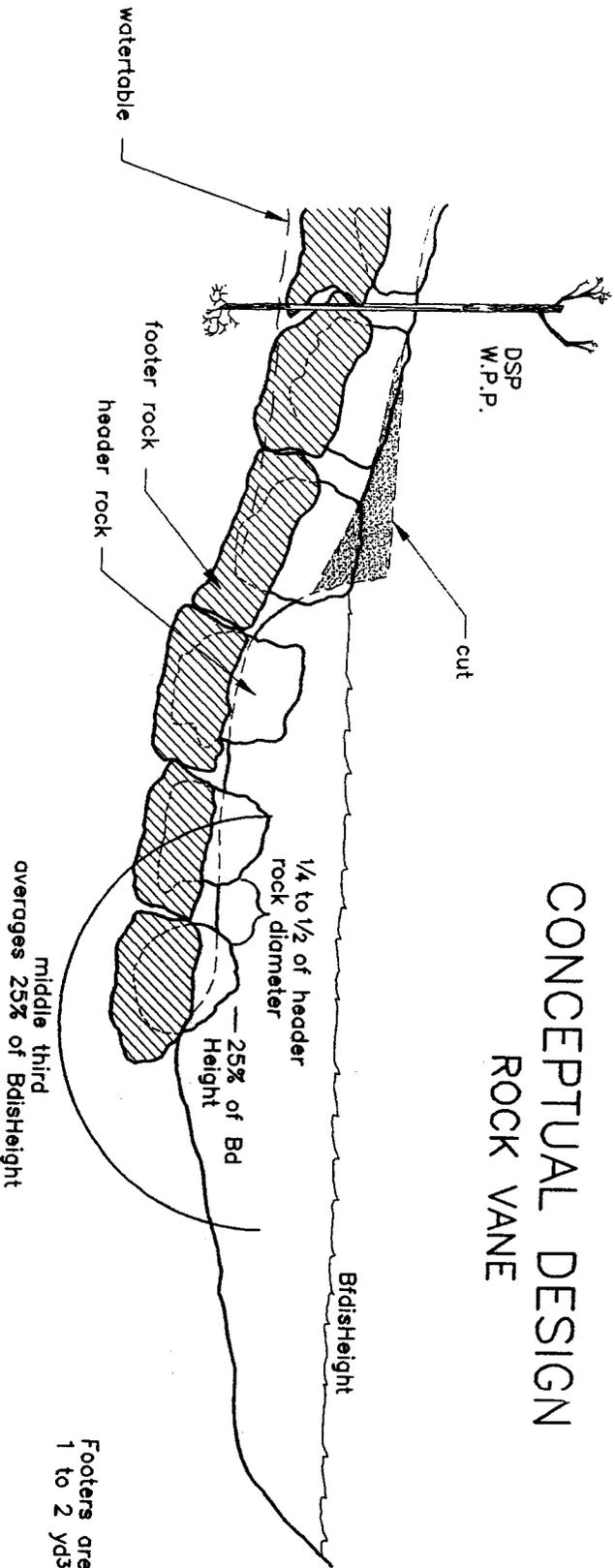


PROFILE VIEW
NOT TO SCALE



PLAN VIEW
NOT TO SCALE

CONCEPTUAL DESIGN ROCK VANE



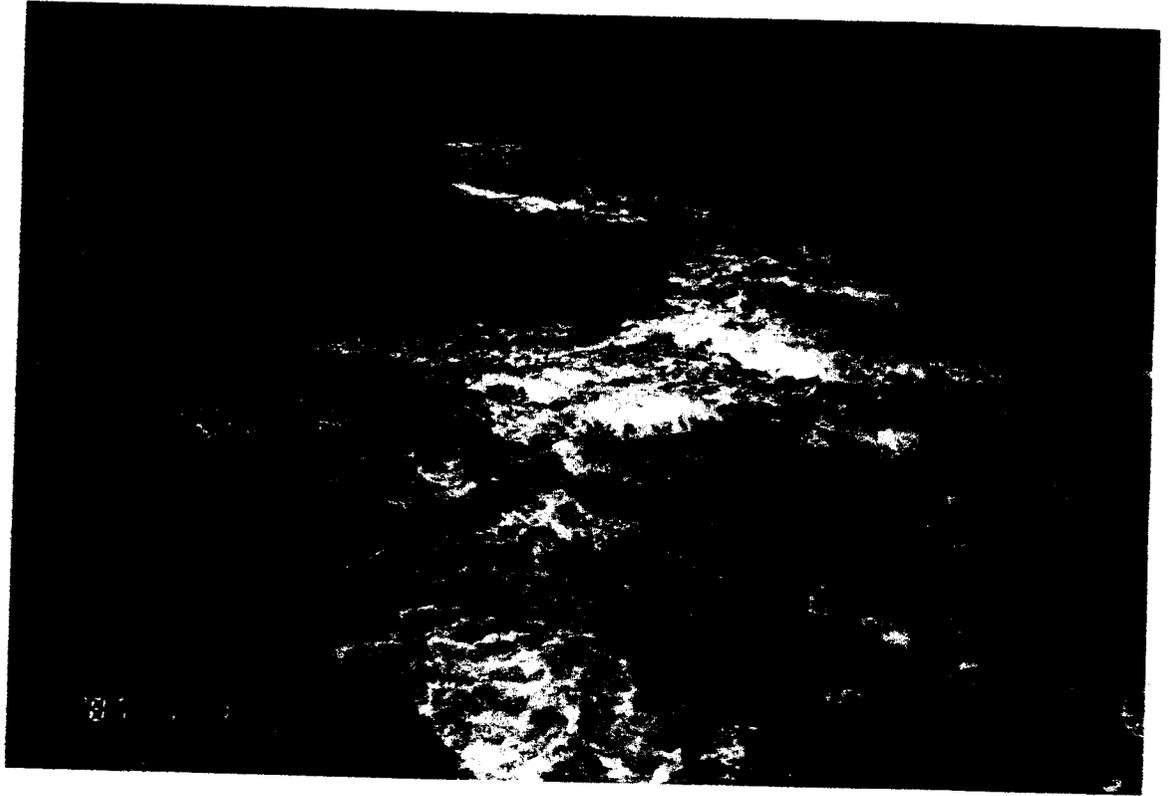
SECTION VIEW
(LOOKING UPSTREAM)
NOT TO SCALE

APPENDIX B

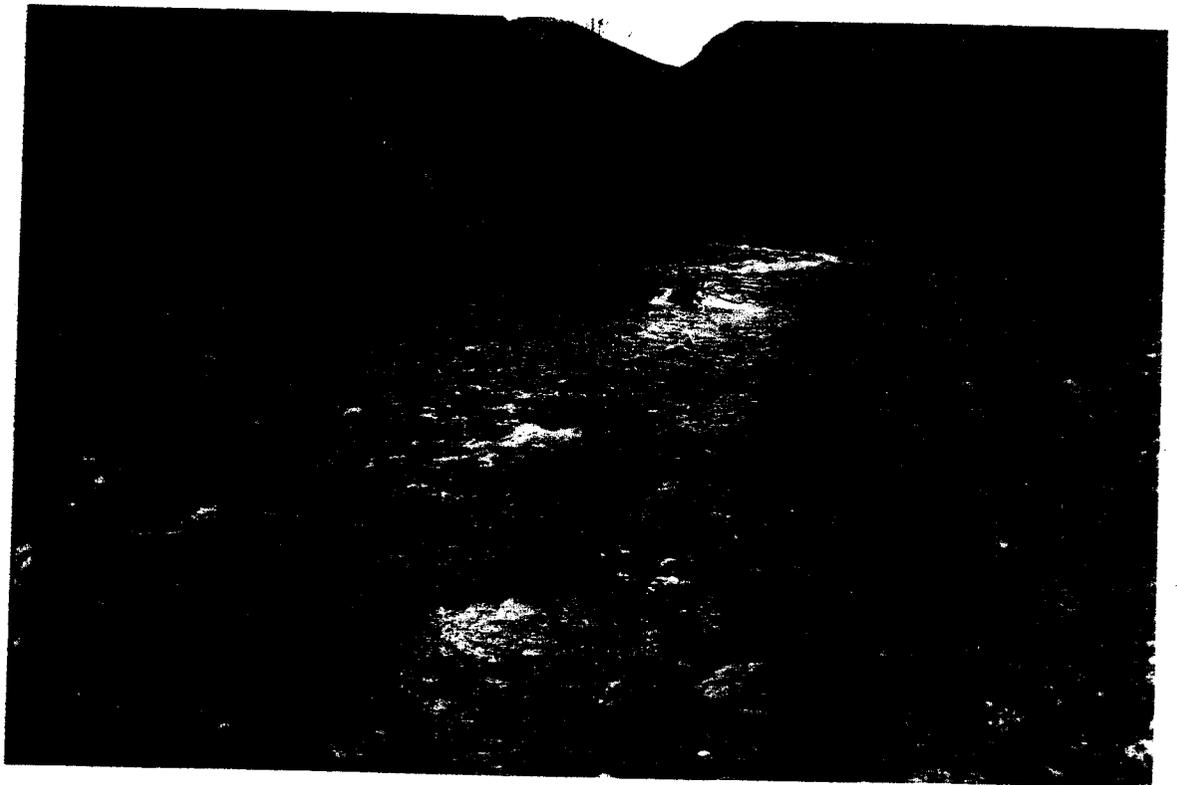
SITE PHOTOGRAPHS

Schlee Site #1

Upper

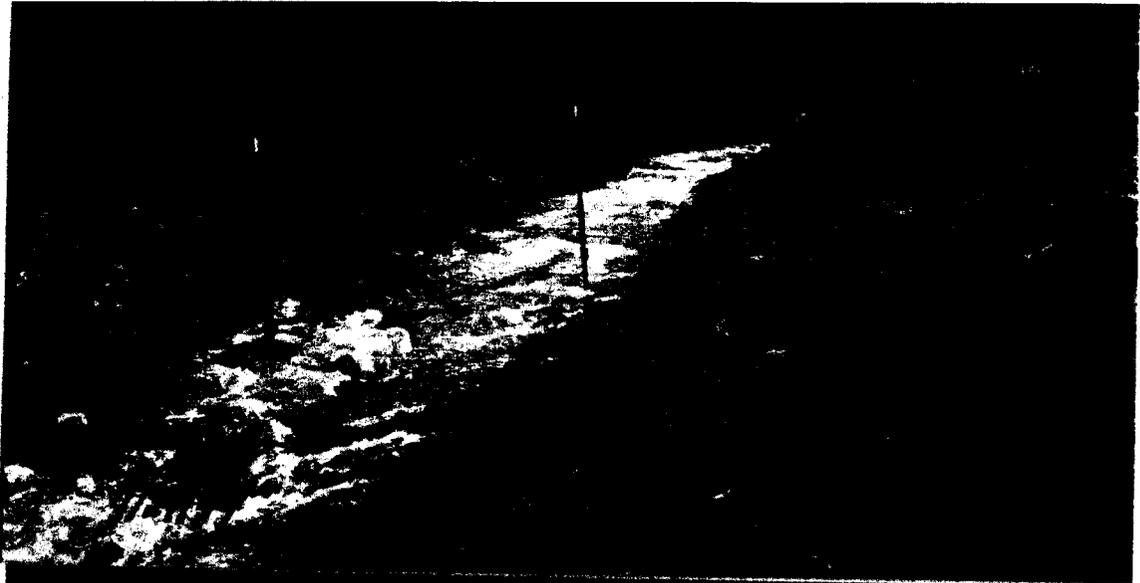


Middle Upper



Schlee Site #1

Middle



Middle Lower



2

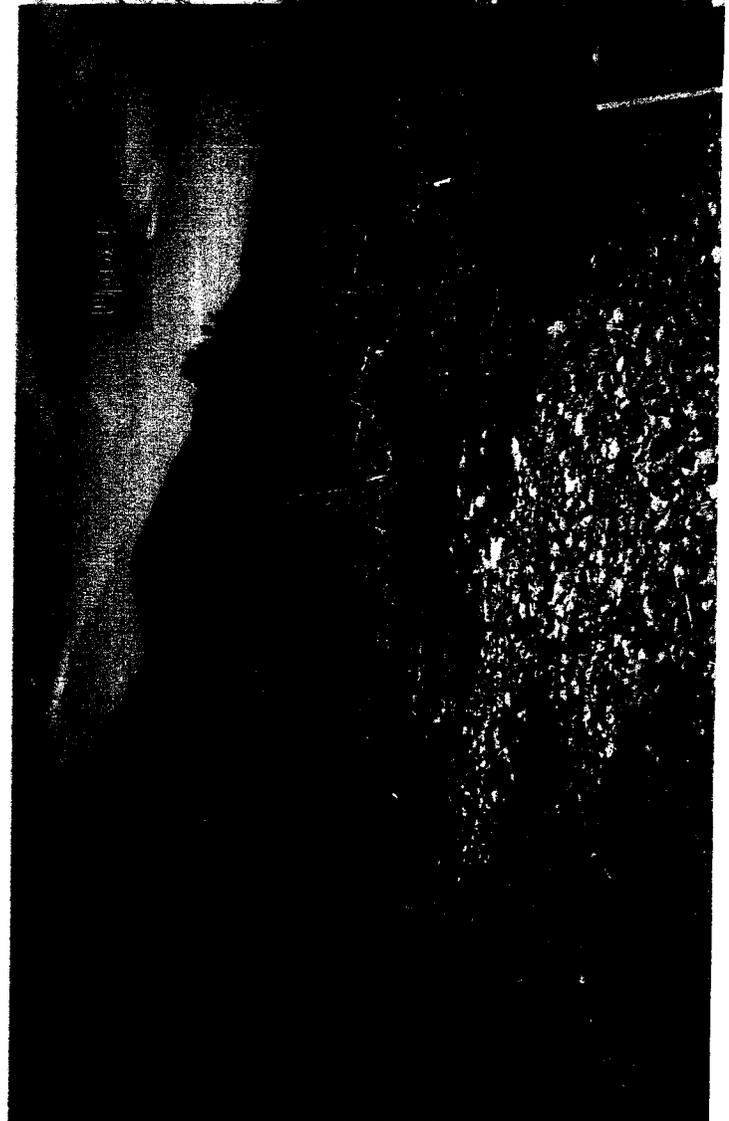
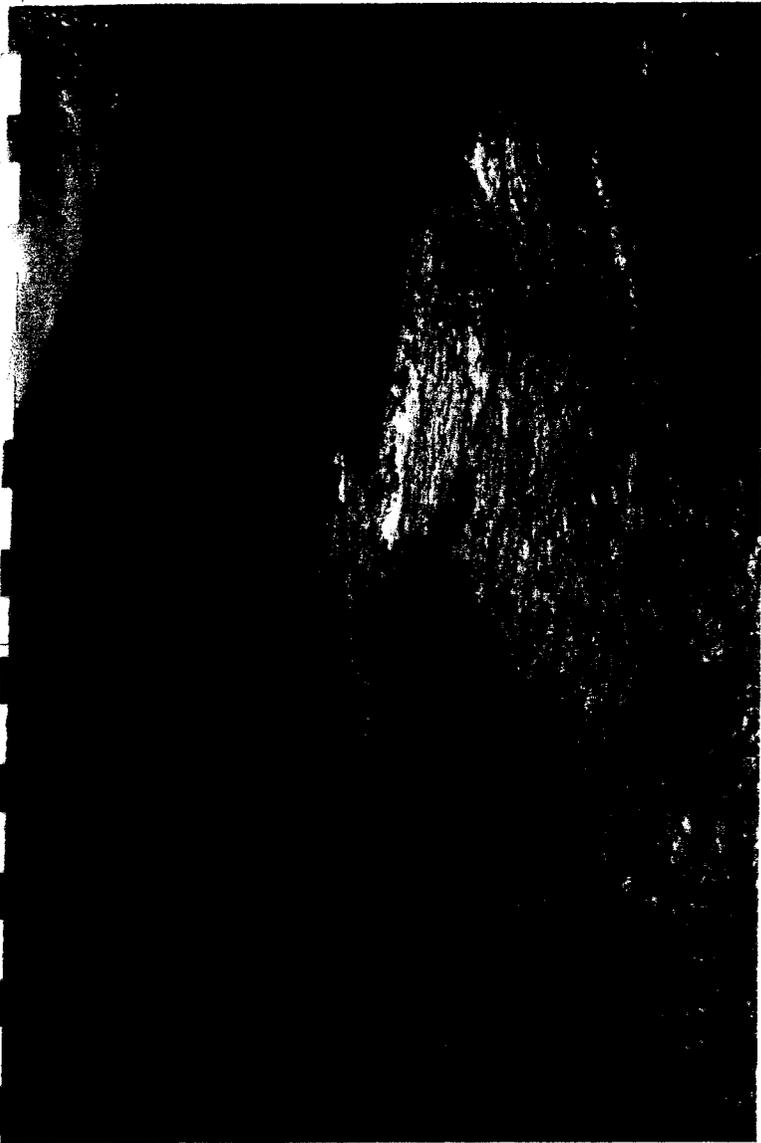
Lower



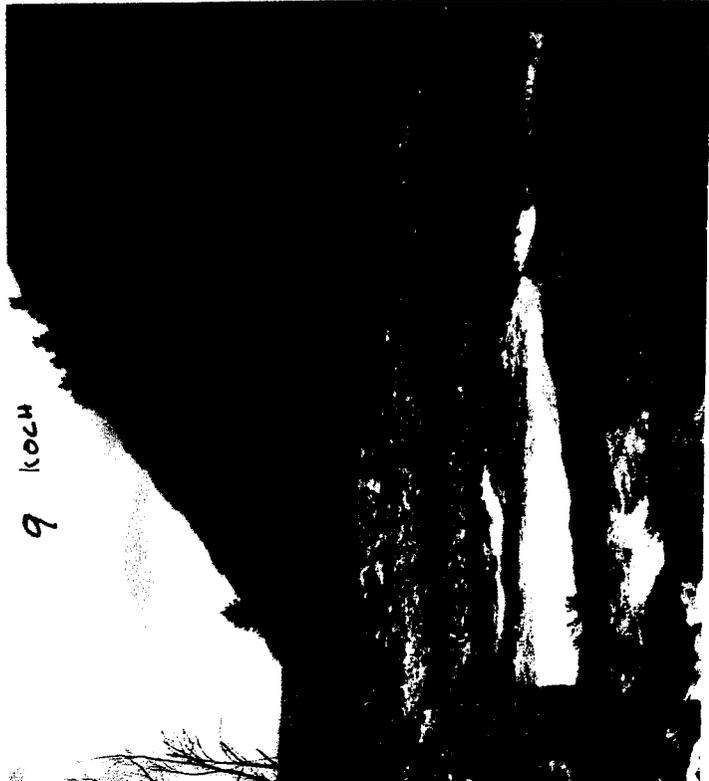
Koch Site #2

#17 Remove Post Flood

Dredged Material

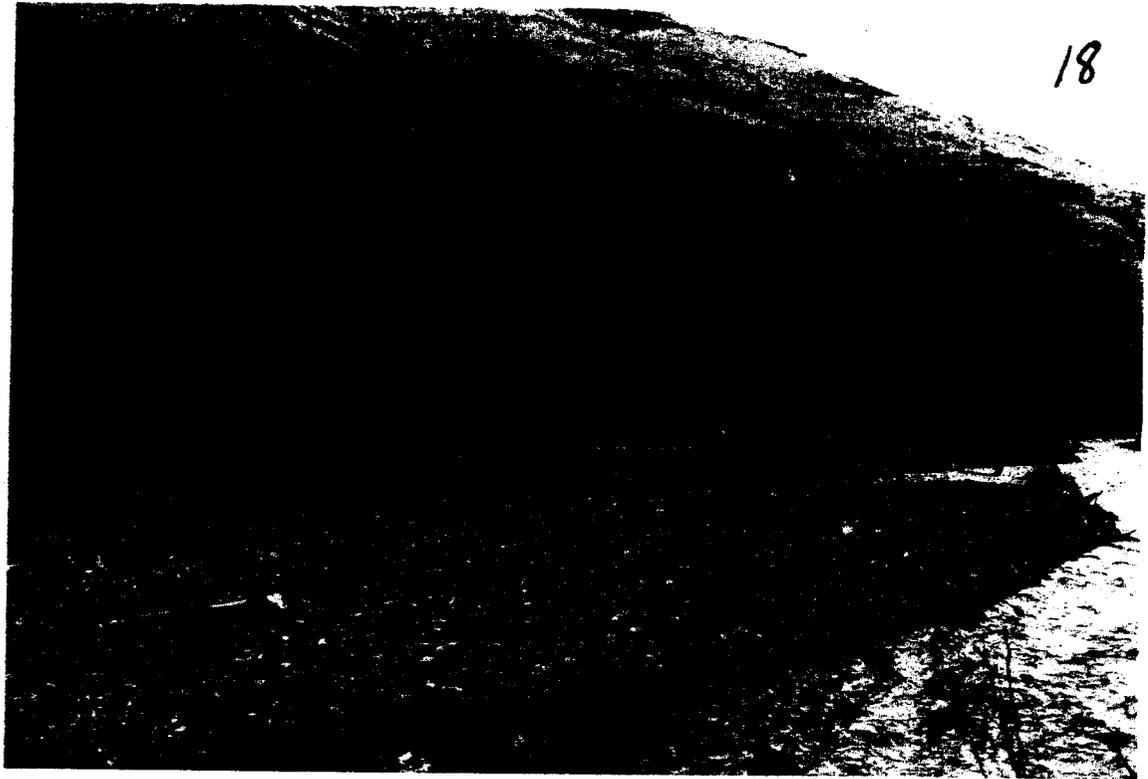


9 KOCH

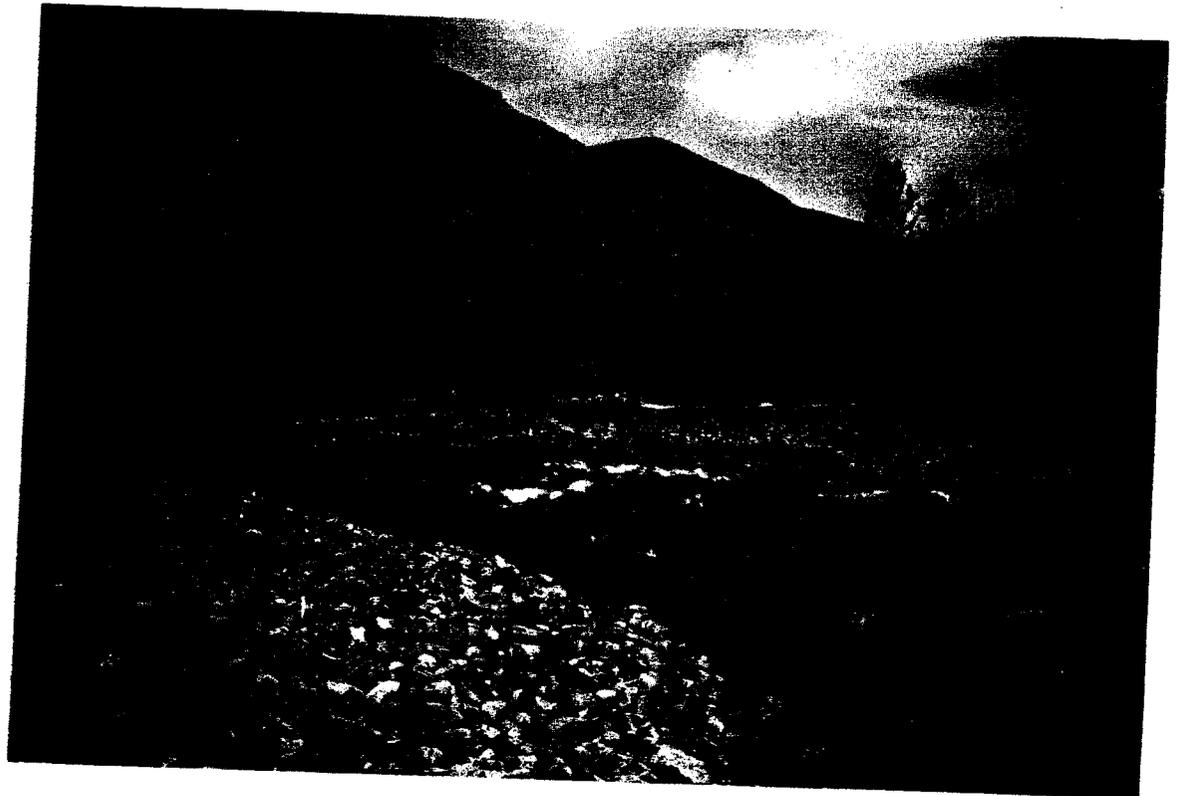


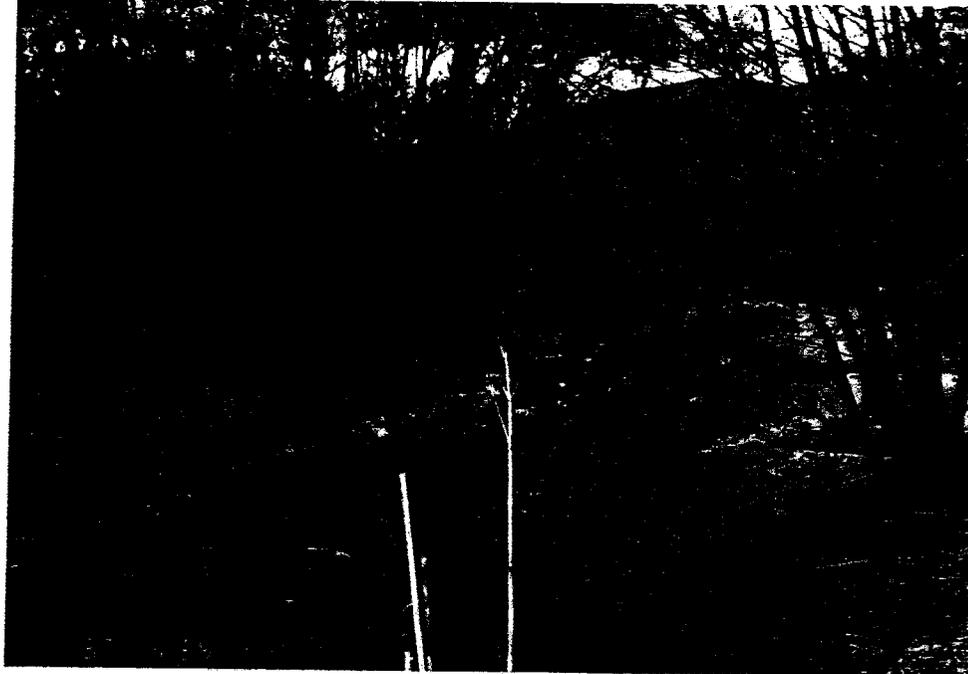
18

Middle



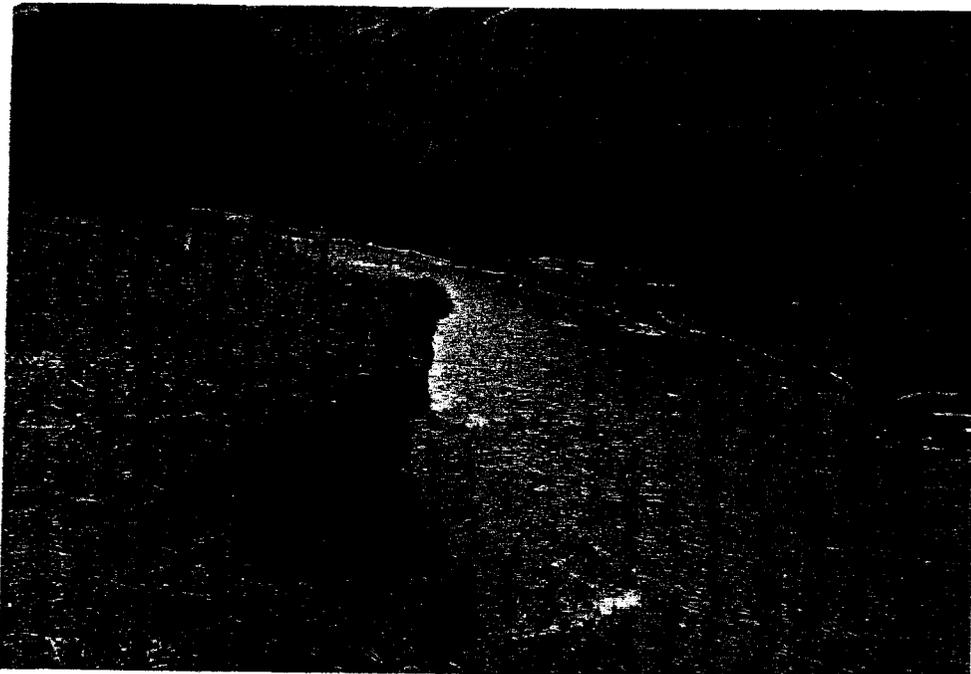
Lower



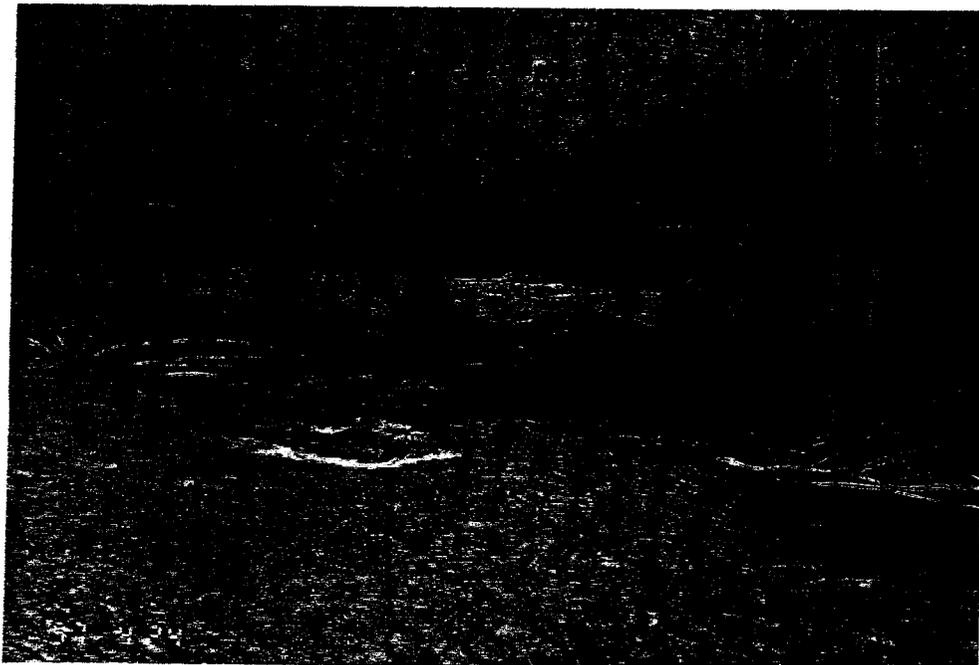


Blankinship Site #3

Upper



Middle



Across Stream

Blankinship Site #4



Upper, a view downstream

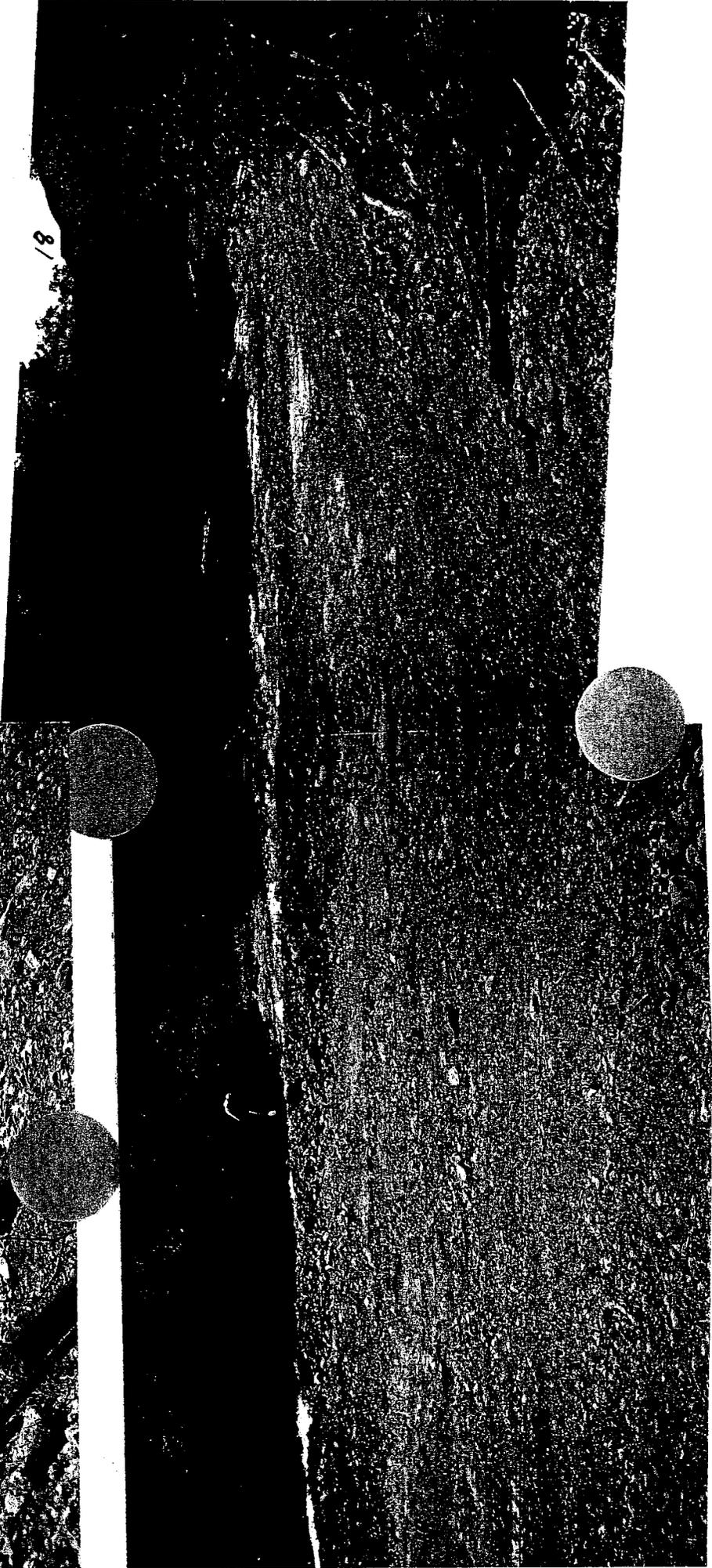
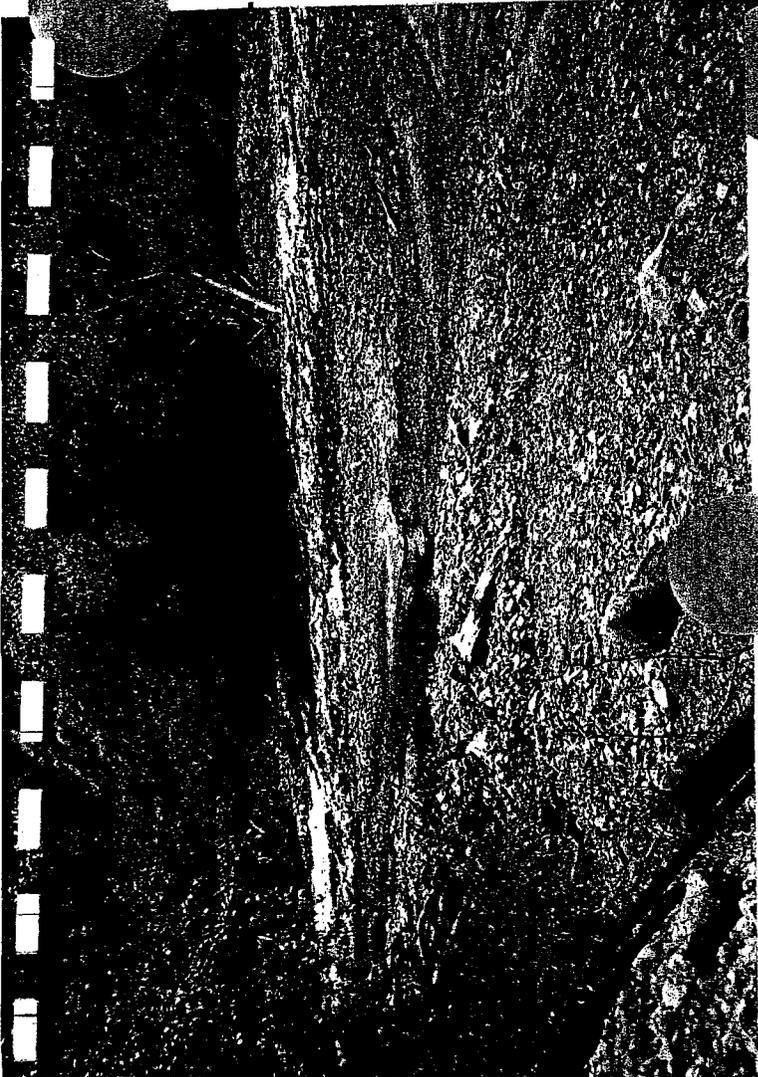


Middle, a view downstream



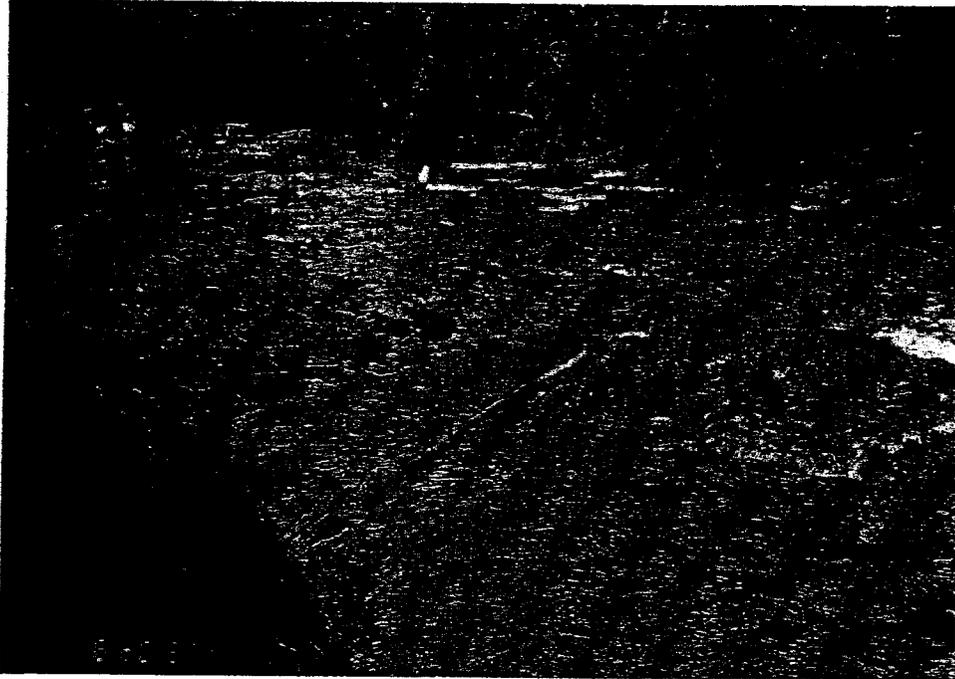
Middle, a view of left bank

-----> A view downstream



8

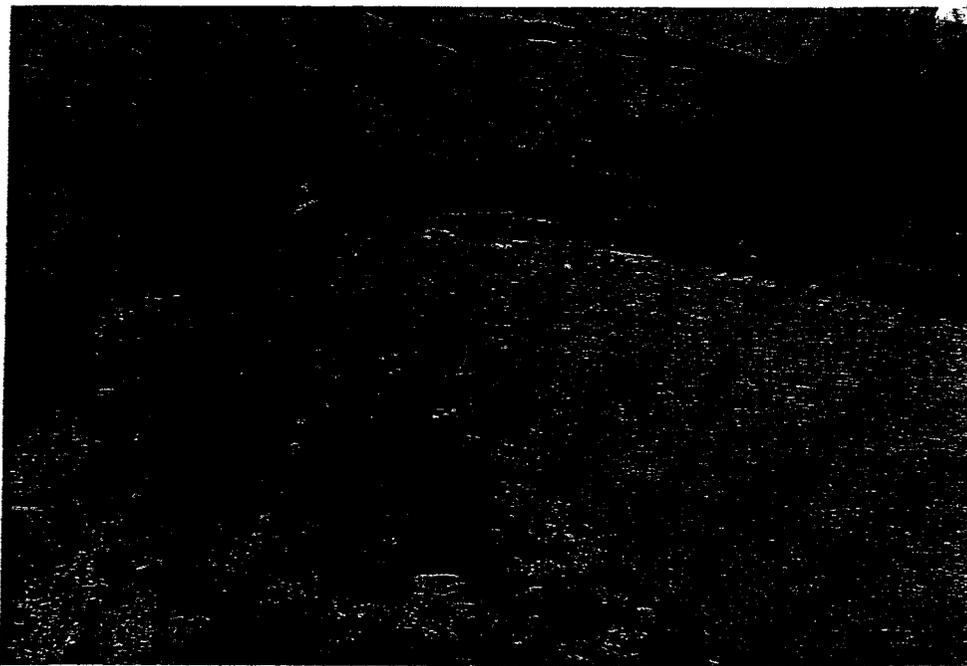
Headgate Park Site #8



Mullins Site #9



Upper



Lower

Hagenah Site #10



Hagenah Site #11

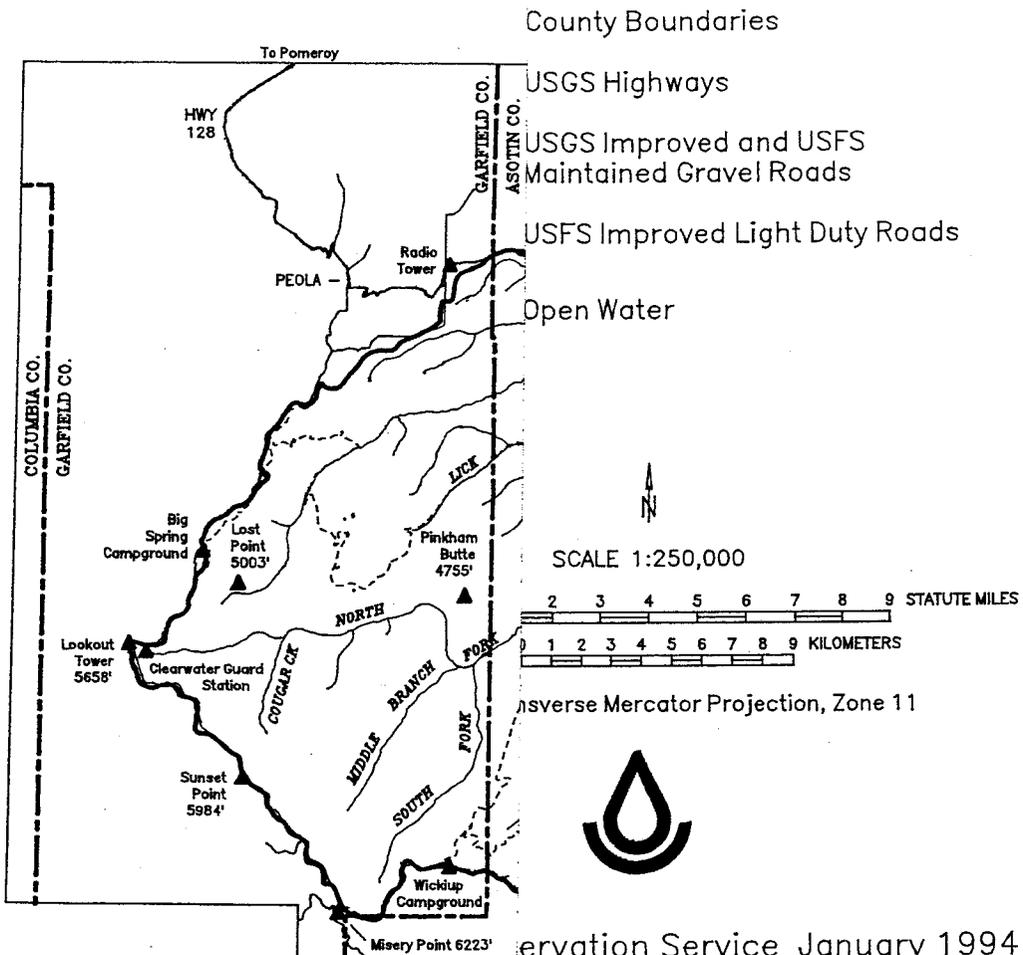


APPENDIX C

LOCATION MAPS
AND
PLAN DRAWINGS

ASOTIN CREEK MODEL WATERSHED BOUNDARY MAP

Asotin and Garfield Counties, Washington
Watershed Boundary
Streams and Rivers
County Boundaries



NOTE: This map is meant for general planning purposes rather than decisions on the use of specific tracts of land.

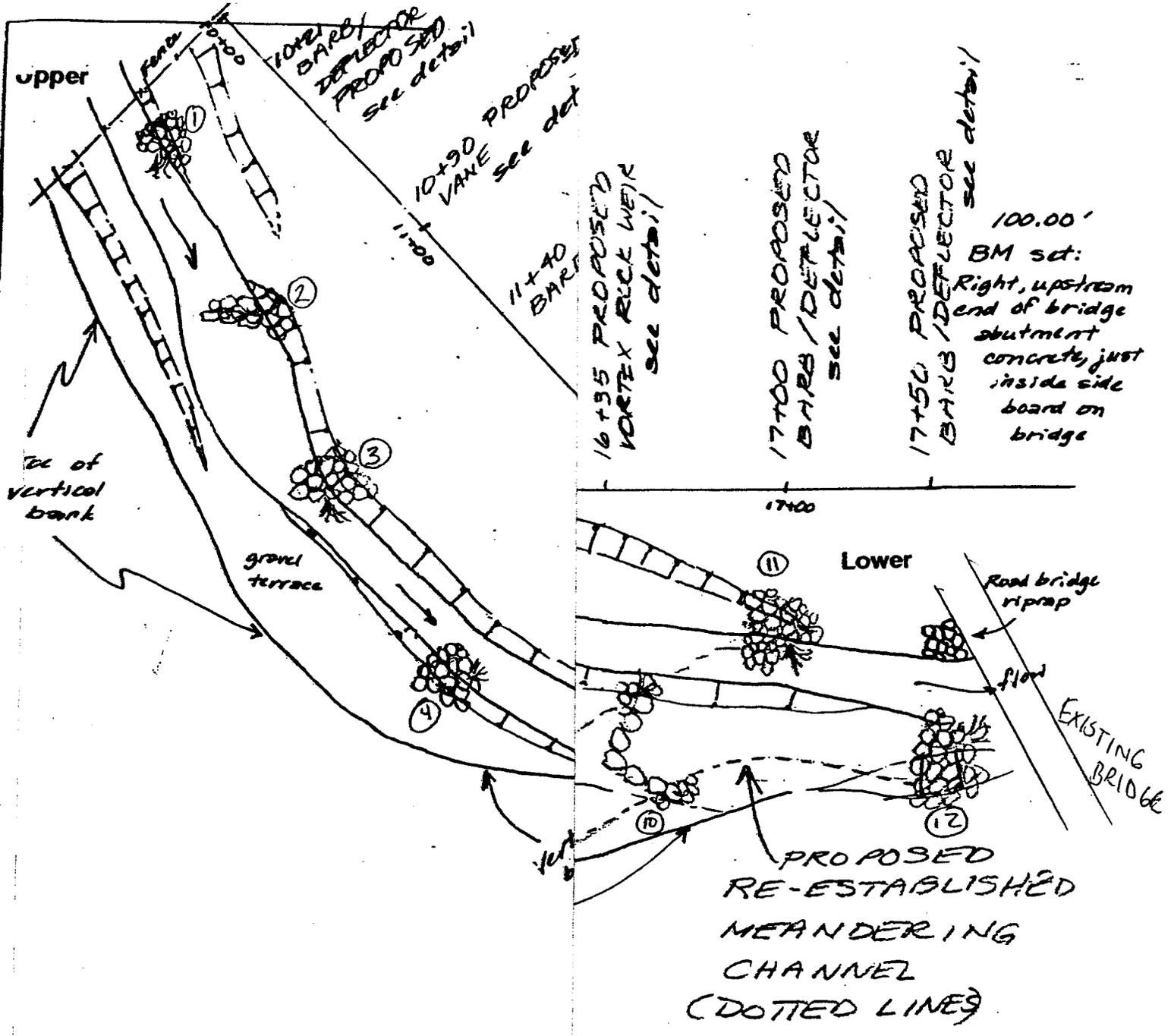
NOTE: The information shown on this map was compiled using SCS GRASS and FS MOSS GIS data layers.

Conservation Service January 1994
Spokane State Office, Spokane
in cooperation with the
County Conservation District

Using SCS GRASS4.0-MAPGEN Interface

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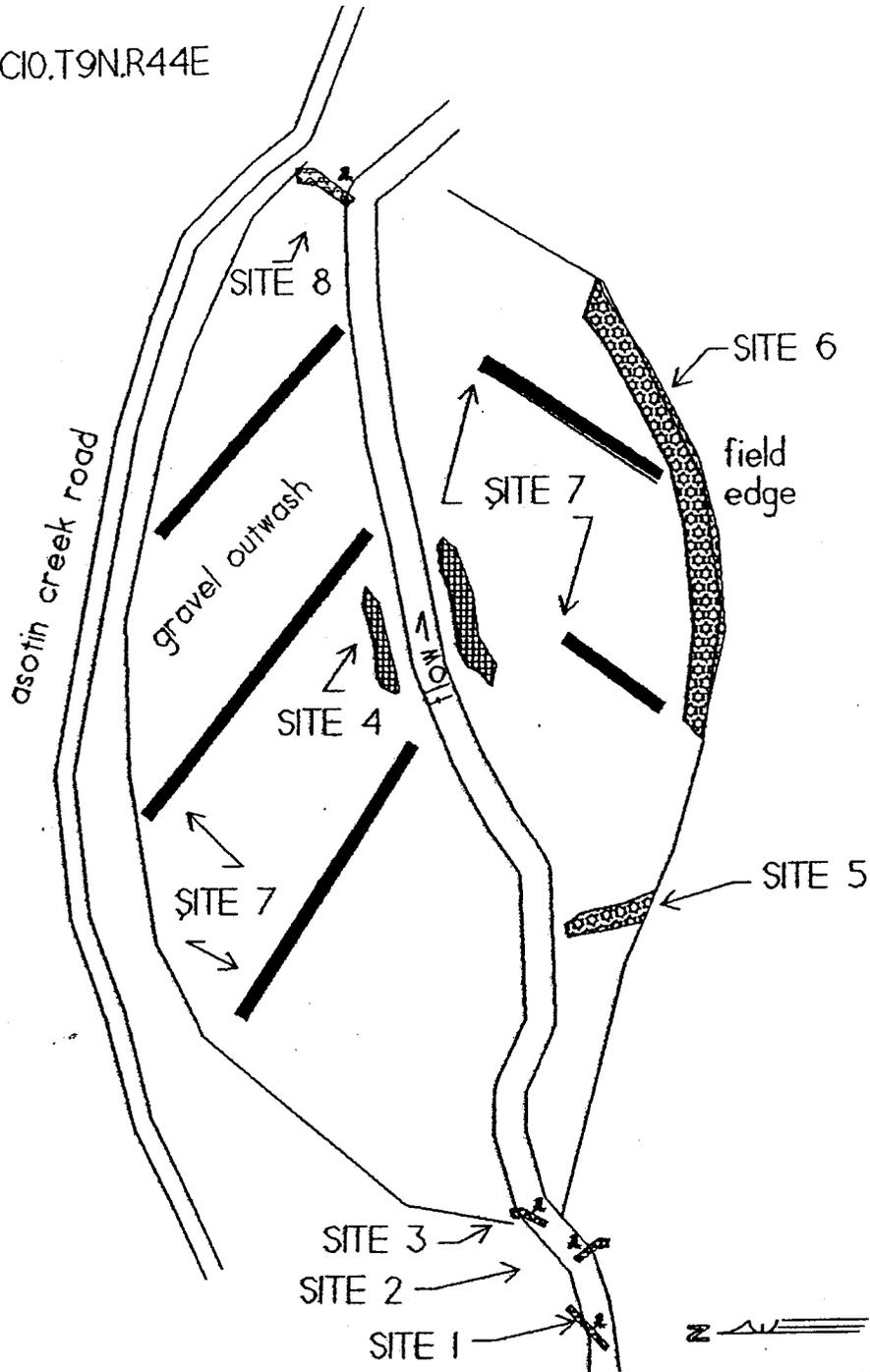
Schlee Site #1

SOUTH
 N. FORK ASOTIN CR.
 SCHLEE
 STREAMBANK PROTECTION,
 MEANDER RECONSTRUCTION
 ASOTIN CREEK WATERSHED

R. LUTS 4/97

LOCATION
NE1/4.NW1/4.SEC10.T9N.R44E

15+00

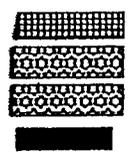


11+72

10+72

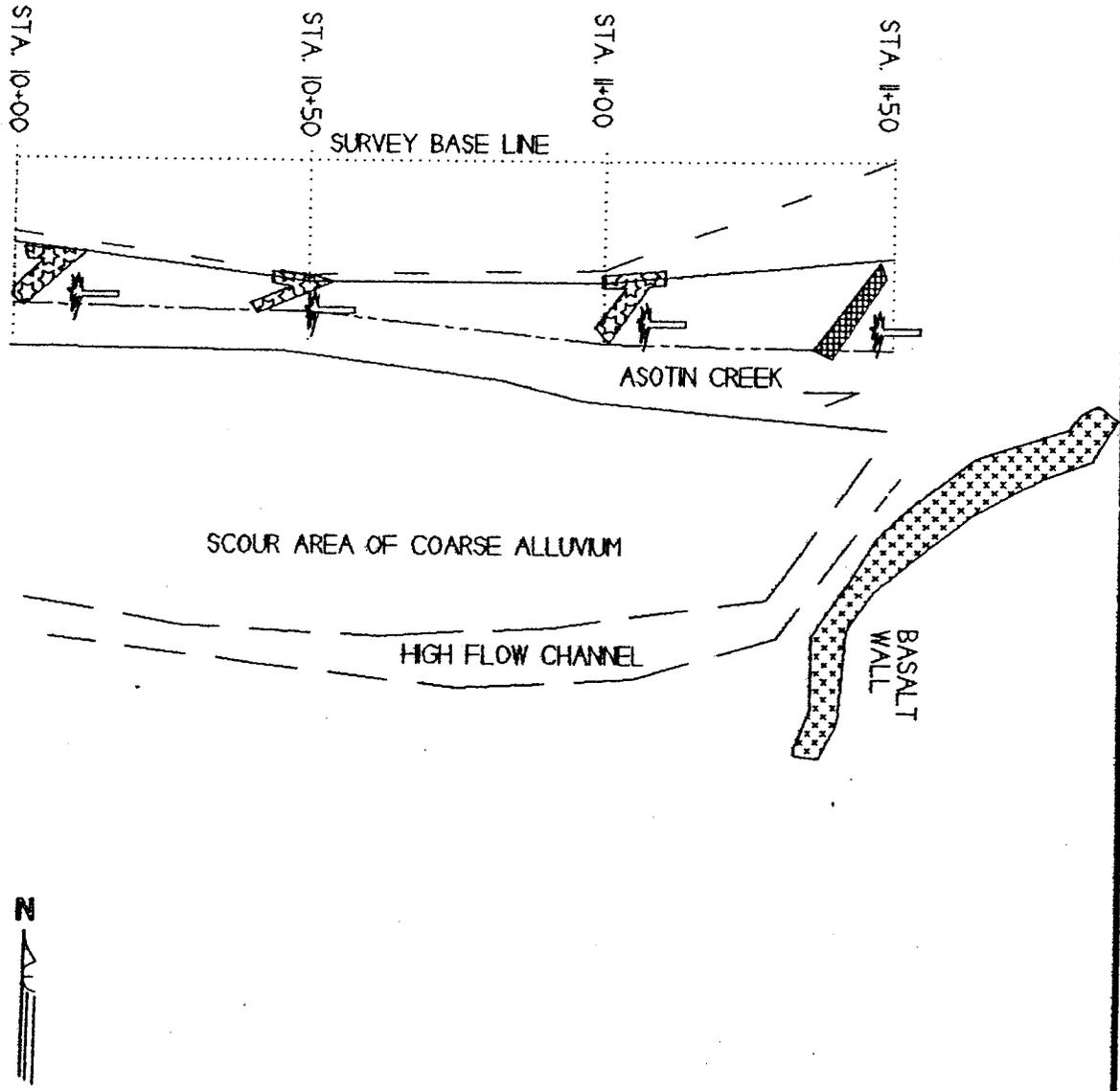
10+00

- LEGEND
- SITE 1 - ROCK VANE
 - SITE 2 - ROCK BARB
 - SITE 3 - ROCK BARB
 - SITE 4 - GRADING AND SHAPING
 - SITE 5 - ROOT WAD REVETMENT
 - SITE 6 - ROOT WAD REVETMENT
 - SITE 7 - LARGE WOODY DEBRIS
 - SITE 8 - ROCK BARB



DRAWING NOT TO SCALE

	PROJECT LAYOUT	DATE	DATE
	FRANK KOCH	9/77	DATE
	ASOTIN CREEK - ASOTIN COUNTY, WASHINGTON	9/77	DATE
	USDA NATURAL RESOURCES CONSERVATION SERVICE		DATE



LEGEND

TOP OF BANK ———

WATER EDGE ———

STREAM CENTER LINE - - - - -

ROCK BARB 

ROCK VANE 

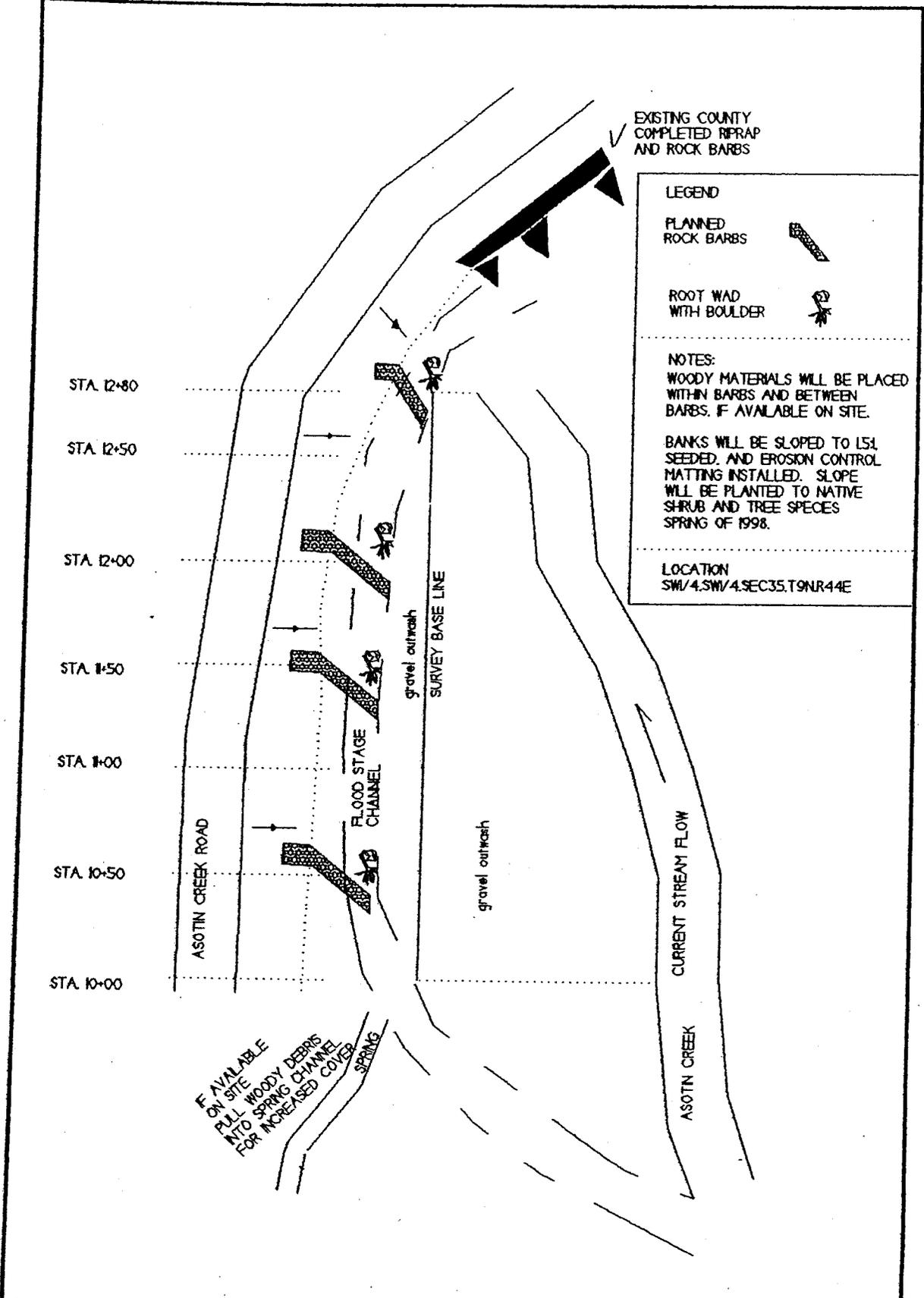
ROOT WAD/
BOULDER 

NOTE:
WOODY MATERIAL WILL BE PLACED WITHIN AND BETWEEN ROCK BARBS IF AVAILABLE ON SITE.

BANKS WILL BE SLOPED TO 1:1 SEDED, AND EROSION CONTROL MATTING INSTALLED. SLOPE WILL BE PLANTED TO NATIVE SHRUB AND TREE SPECIES SPRING OF 1998.

LOCATION
SW/4.SW/4.SEC35.T9N.R44E

PROJECT LAYOUT BLANKESHIP SITE I ASOTIN CREEK, ASOTIN COUNTY, WASHINGTON	DATE	7/97
	BY	RDS
U.S.D.A. NATURAL RESOURCES CONSERVATION SERVICE	SCALE	
	OTHER	



EXISTING COUNTY
COMPLETED RIPRAP
AND ROCK BARBS

LEGEND

PLANNED
ROCK BARBS



ROOT WAD
WITH BOULDER



NOTES:
WOODY MATERIALS WILL BE PLACED
WITHIN BARBS AND BETWEEN
BARBS, IF AVAILABLE ON SITE.

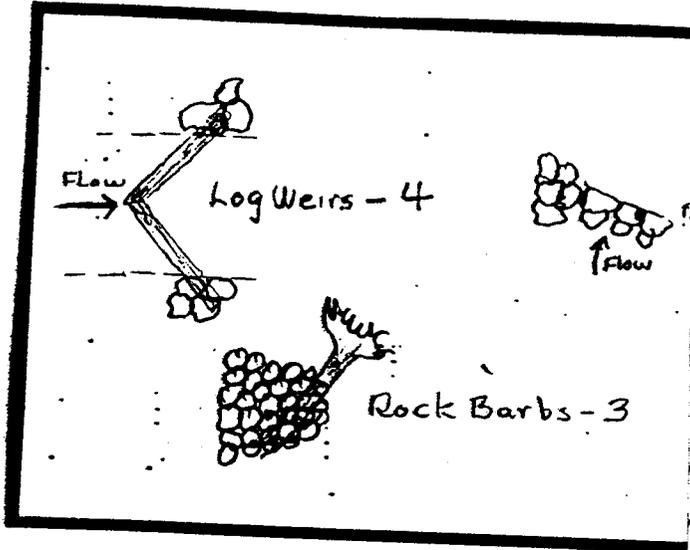
BANKS WILL BE SLOPED TO 1.5:1,
SEEDED, AND EROSION CONTROL
MATTING INSTALLED. SLOPE
WILL BE PLANTED TO NATIVE
SHRUB AND TREE SPECIES
SPRING OF 1998.

LOCATION
SW1/4, SW1/4, SEC35, T9N, R44E

RDS 7/97 RDS 7/97	PROJECT LAYOUT BLANKINSHIP - SITE 2 ASOTIN CREEK, ASOTIN COUNTY, WASHINGTON	PREPARED BY _____ DATE _____ CHECKED BY _____ DATE _____ DRAWN BY _____ DATE _____
	U.S.D.A. NATURAL RESOURCES CONSERVATION SERVICE	

Hood Site #5

LEGEND



Rock Barbs
Log Weirs
Rock Vau.

INSTALL ROCK DEFLECTOR ABOVE OLD CHANNEL INLET

PLACE EARTH FILL AND PROTECTIVE ROCK RIMM TO PLUG OLD CHANNEL INLET

EXCAVATE NEW CHANNEL FOR FISH HABITAT. INSTALL LOG WEIRS FOR FISH PASSAGE

PLAN VIEW
1" = 100'



ASOTIN CREEK
LARRY HOOD
ASOTIN CR WATERSHED

Original drawing
C. Smith

Drawing revisions:
R.L.L. 7/97

SHEET 1/1

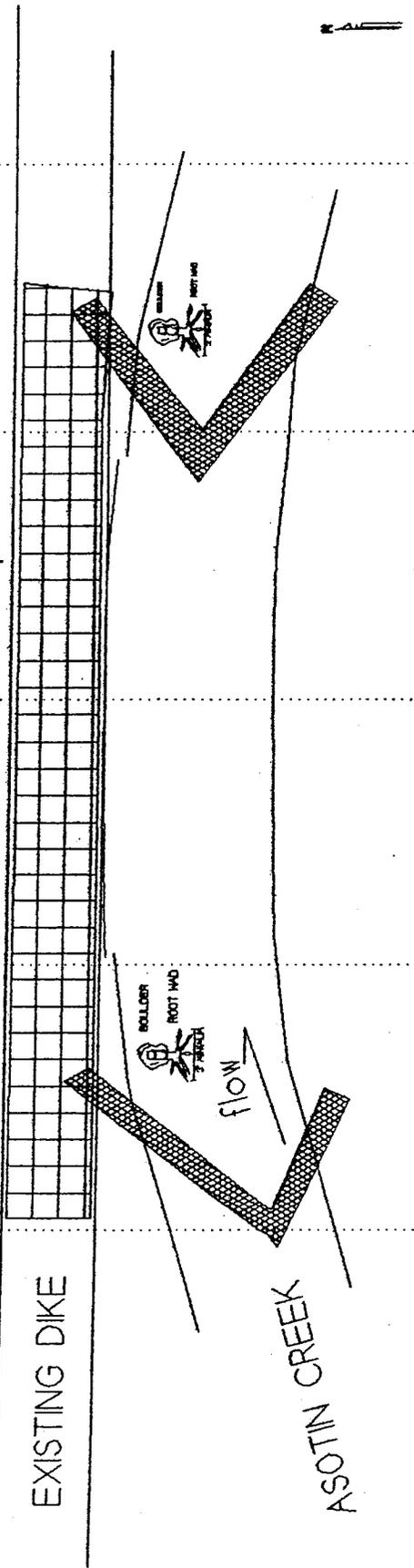
STA. 12+00

STA. 11+50

STA. 11+00

STA. 10+50

STA. 10+00



EXISTING DIKE

ASOTIN CREEK

Boulder
Root Wad

flow

LEGEND

ROOT WAD /
BOULDER

PLANNED
VORTEX ROCK
WEIR

EXISTING
ROCK RIPRAP

NOTES:
A ROOT WAD WILL BE PLACED
IN POOL BELOW VORTEX ROCK WEIR

EXISTING ROCK RIPRAP MATERIALS
ON UPPER BANKS WILL BE
DISPLACED TO PROVIDE AREAS
FOR TREE PLANTING IN THE
SPRING OF 1998.

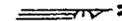
LOCATION
NW1/4, NE1/4
SEC25, T10N, R4E

PROJECT LAYOUT GENE THEISSEN SITE 1 ASOTIN CREEK, ASOTIN COUNTY, WASHINGTON		DESIGNED	DATE	APPROVED BY	DATE
USDA NATURAL RESOURCES CONSERVATION SERVICE		DRAWN	7/97	TITLE	
		TRACED		TITLE	
		CHECKED		TITLE	

DRAWING NO
PG25STLGC
SHEET 2 OF 3

PLANNED
VORTEX ROCK WEIR

SURVEY
BASELINE



PLANNED
ROCK BARB

STA. 10+00

ROOT WAD

TOP OF BANK

PLANNED
ROCK BARB

STA. 10+50

STA. 10+74

STA. 11+00

PLANNED
ROCK BARB

STA. 11+50

asotin creek

TOP OF EXISTING DIKE

STA. 12+00

gravel outwash

LEGEND

ROCK BARB



VORTEX ROCK WEIR



ROOT WAD / BOULDER



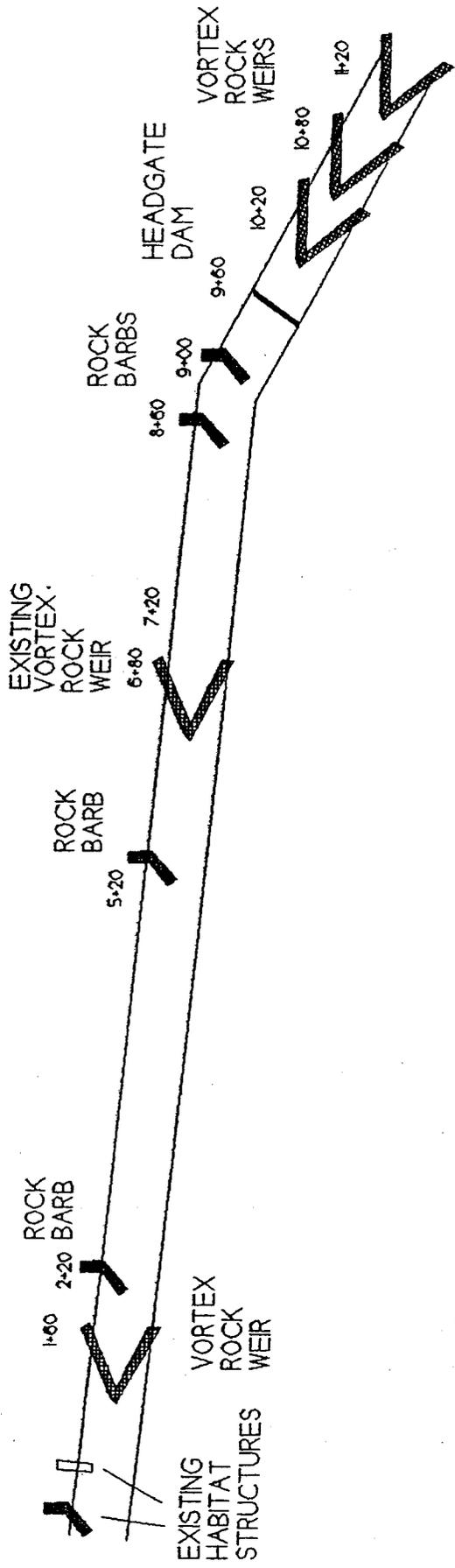
DATE	APPROVED BY
DATE	TITLE
DESIGNED	TITLE
DRAWN	7/97
ROD	
TRACED	
CHECKED	

PROJECT LAYOUT
GENE THEISSEN SITE 2
ASOTIN CREEK - ASOTIN COUNTY WASHINGTON

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.
PG25T2.600

SHEET 1 OF 1



STREAM WIDTH

- 1+60 45'
- 2+20 40'
- 5+20 38'
- 8+60 29'
- 9+00 49'
- 10+20 55'
- 10+80 30'
- 11+20 30'

DRAWING NTS

LEGEND

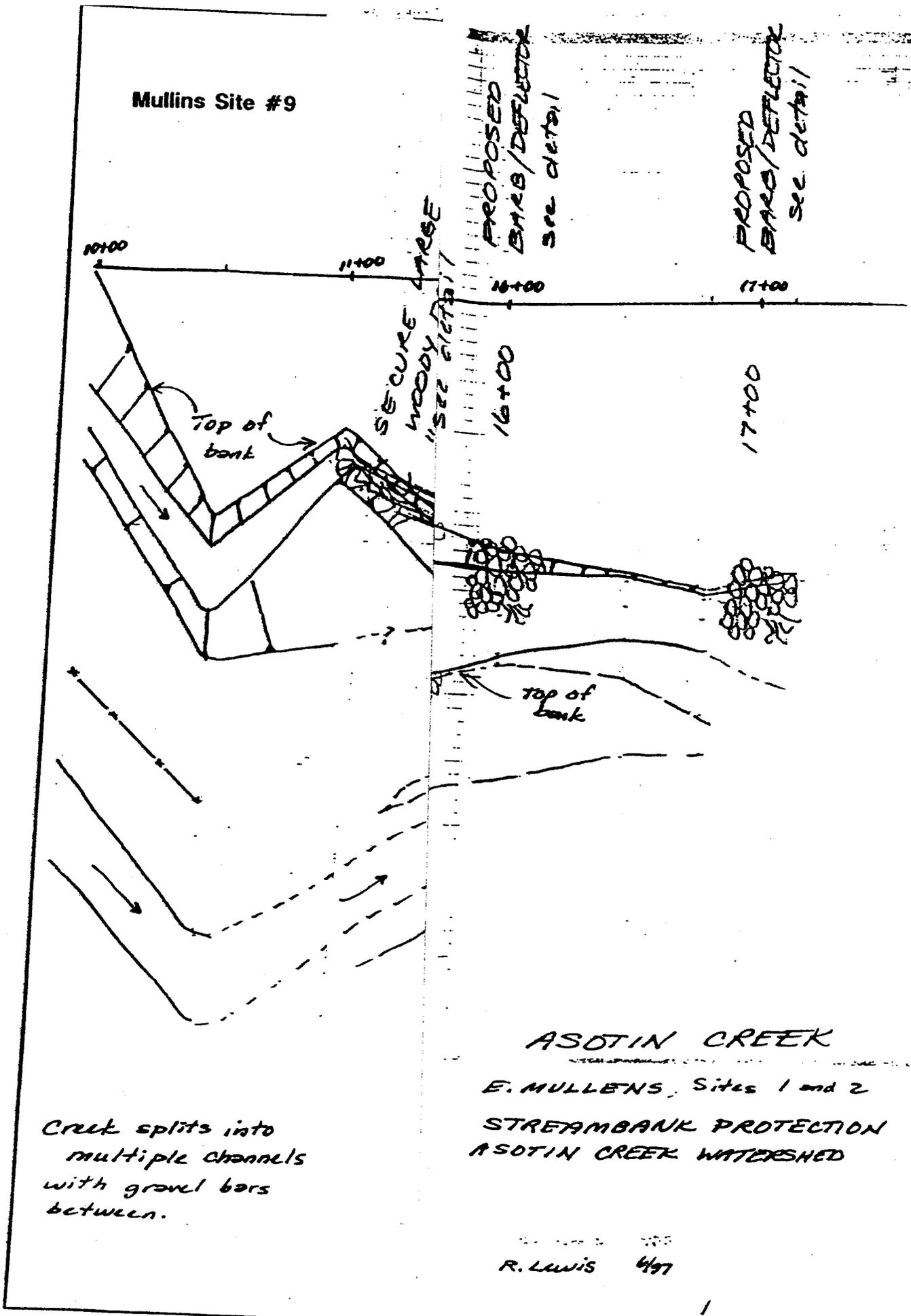
VORTEX ROCK WEIR

ROCK BARB

NOTES:
 ALL STRUCTURES PLANNED UNLESS SHOWN AS EXISTING.
 LARGE WOODY MATERIALS WILL BE INCORPORATED INTO ALL PLANNED STRUCTURES.

DRAWING NO.	PLAN VIEW		DESIGNER	RDS	DATE	DATE
	HEADGATE PARK		DRAWN	RDS	7/97	7/97
SHEET 2 OF 2	ASOTIN CREEK, ASOTIN COUNTY, WA		TRACED		APPROVED BY	
	USDA NATURAL RESOURCES CONSERVATION SERVICE		CHECKED		TITLE	

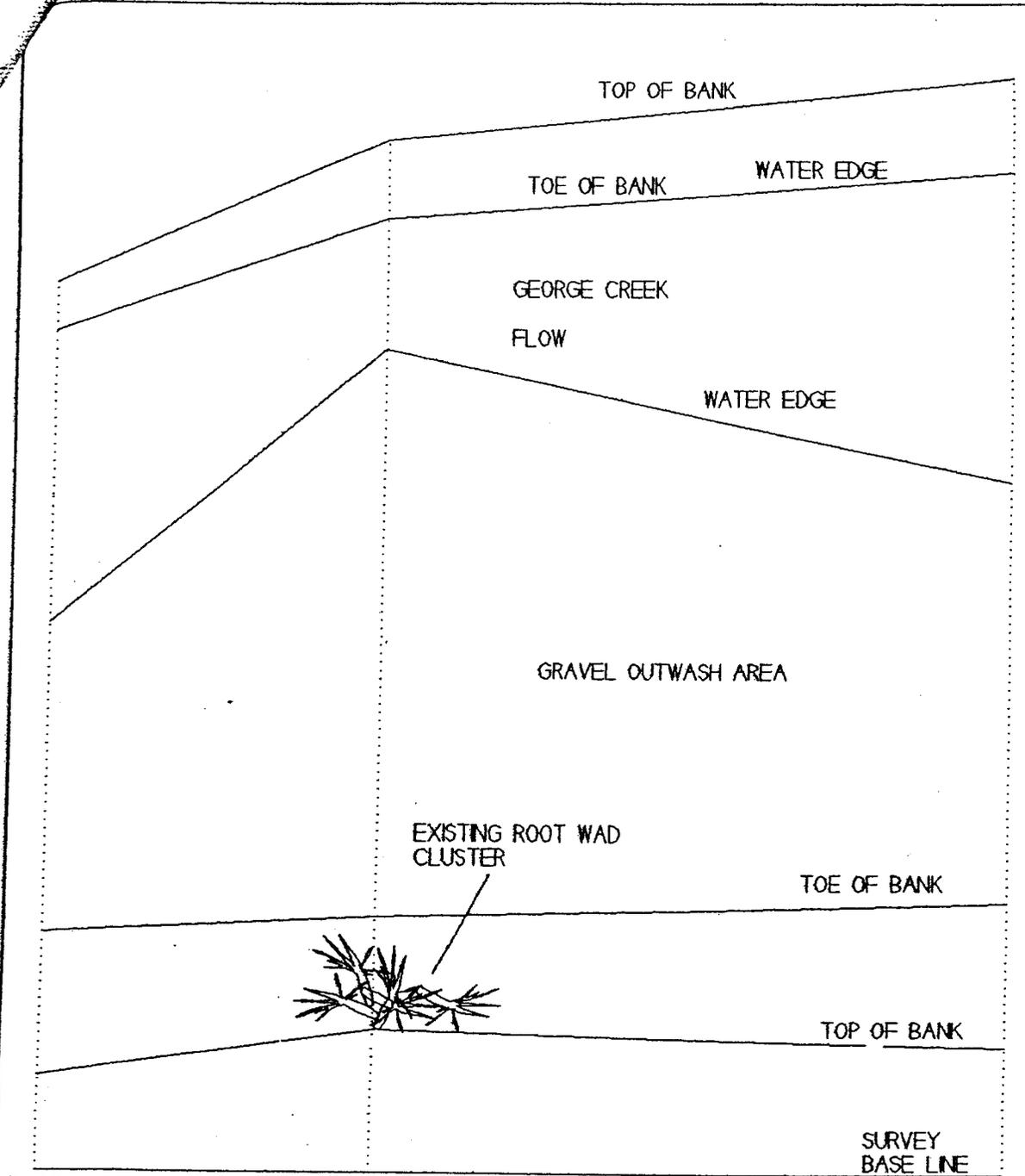
Mullins Site #9



Creek splits into multiple channels with gravel bars between.

ASOTIN CREEK
E. MULLENS, Sites 1 and 2
STREAMBANK PROTECTION
ASOTIN CREEK WATERSHED

R. Lewis 497



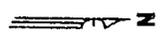
DESIGNED	RDS	DATE	7/97
DRAWN	RDS	APPROVED BY	
TRACED		TITLE	
CHECKED		TITLE	

DESIGNED	RDS	DATE	7/97
DRAWN	RDS	APPROVED BY	
TRACED		TITLE	
CHECKED		TITLE	

PLAN VIEW
 HAGENAH - - SITE 1
 ASOTIN CREEK, ASOTIN COUNTY, WA
 USDA NATURAL RESOURCES CONSERVATION SERVICE

NOTES:
 ADDITIONAL ROOT WADS AND BOULDERS
 WILL BE ADDED TO ENHANCE EXISTING
 ROOT WADS.

LEGEND
 EXISTING ROOT WAD COMPLEX



LEGEND



ROCK BARB

ROOT WAD



GEORGE CREEK

EDGE OF STREAM

TOP OF BANK

ROCK BARB

ROOT WAD

10+00

ROCK BARB

ROOT WAD

10+74



PLAN VIEW

HAGENAH

GEORGE CREEK, ASOTIN COUNTY, WA

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

SHEET 2 OF 6

DATE

7/97

DESIGNED

DRAWN RDS

TRACED

CHECKED

APPROVED BY

TITLE

TITLE

DATE

10+00 10+50 11+00 11+50 12+00 12+50

VORTEX ROCK
WEIR

GEORGE
CREEK

FLOW

GRAVEL
OUTWASH

ROOT
WAD
ROCK
BARB

ROOT
WAD

ROCK
BARB

SURVEY
BASE
LINE

TOP OF
BANK

TOP OF
DIKE

* TBM
40'
SOUTH BY
TREE

LEGEND

ROOT WAD

ROCK BARB

ROCK VORTEX WEIR

DATE

DATE

DESIGNED

DRAWN_RDS

TRACED

CHECKED

APPROVED BY

TITLE

PLAN VIEW
HAGENAH - - SITE 3
GEORGE CREEK, ASOTIN COUNTY, WA

USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.

SHEET 2 OF 2

APPENDIX D

TABLE 1 PATHWAYS AND INDICATORS

Table 1. Matrix of Pathways and Indicators

PATHWAY	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Water Quality:	Temperature	50-57° F	57-60° (spawning) 57-64° F (migration & rearing) 12-20% turbidity moderate	>60° F (spawning) >64° F (migration & rearing)
	Sediment/ Turbidity Chemical Contamination/ Nutrients	<12% fines (<0.85mm) in gravel, turbidity low low levels of chemical contamination from agricultural, industrial or other sources, no excess nutrients, no CWA 303d designated reaches	moderate levels of chemical contamination from agricultural, industrial and other sources, some excess nutrients, one CWA 303d designated reach	>20% fines at surface or depth in spawning habitat, turbidity high high levels of chemical contamination from agricultural, industrial and other sources, high levels of excess nutrients, more than one CWA 303d designated reach
Habitat Access:	Physical Barriers	any human-made barriers present in watershed allow upstream and down stream fish passage at all flows	any human-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	any human-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows
Habitat Elements:	Substrate	dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness <20%	gravel and cobble is subdominant, or if dominant, embeddedness 20-30%	bedrock, sand, silt or small gravel dominant, or if gravel and cobble dominant, embeddedness >30%
	Large Woody Debris (LWD)	>20 pieces/mile, >12" diameter >35 ft length	currently meets standards for properly functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard	does not meet standards for properly functioning and lacks potential large woody debris recruitment
	Pool Frequency channel width (ft) #pools 5 184 10 96 15 70 20 56 25 47 50 26 75 23 100 18	meets pool frequency standards (left) and LWD recruitment standards for properly functioning habitat (above)	meets pool frequency standards but LWD recruitment inadequate to maintain pools over time	does not meet pool frequency standards
	Pool Quality	pools >1 meter deep (holding pools) with good cover and cool water, minor reduction of pool volume by fine sediment	few deeper pools (>1 meter) present or inadequate cover/temp, moderate reduction of pool volume by fine sediment	no deep pools (>1 meter) and inadequate cover/temp, major reduction of pool volume by fine sediment

Table 1. (Cont.)

Habitat Elements (continued)	Off-channel Habita	backwaters with cover and low energy off-channel areas (ponds, oxbows)	some backwaters and high energy side channels	few or no backwaters, no off-channel ponds
Refugia (important remnant habitat for sensitive aquatic species)	habitat refugia exists and are adequately buffered (i.e. intact riparian reserves); existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations	habitat refugia exists but are not adequately buffered; existing refugia are insufficient in size, number and connectivity to maintain viable populations or sub-populations	adequate habitat refugia do not exist	
Channel Condition & Dynamics:	Width/Depth Ratio	12 - 18 for stream types C (Rosgen)	18 - 24 for stream type C (Rosgen)	>24 for stream type C (Rosgen)
	Streambank Condition	>90% stable; i.e., on average less than 10% of banks are actively eroding	80-90% stable	<80% stable
	Floodplain Connectivity	off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession	reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/ succession	severe reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent drastically reduced and riparian vegetation/ succession altered significantly
Flow/Hydrology:	Change in Peak/Base Flows	watershed hydrograph indicates peak flow, base flow and flow timing characteristics comparable to an undisturbed watershed of similar size, geology and geography	some evidence of altered peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography	pronounced changes in peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography
	Increase in Drainage Network	zero or minimum increases in drainage network density due to roads	moderate increases in drainage network density due to roads	significant increases in drainage network density due to roads
Watershed Conditions:	Road Density & Location	<2 mi/mi ² , no valley bottom roads	2-3 mi/mi ² , some valley bottom roads	>3/mi/mi ² , many valley bottom roads
	Disturbance History	<15% ECA (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian area; and for NWFP area ≥15% retention of LSOG in watershed	<15% ECA (entire watershed) but disturbance concentration in unstable or potentially unstable areas, and/or refugia, and/or riparian area; and for NWFP area ≥15% retention of LSOG in watershed	<15% ECA (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area; does not meet NWFP standard for LSOG retention
	Riparian Reserves	the riparian reserve system provides adequate shade, LWD recruitment, and habitat protection and connectivity in all sub-watersheds, and buffers or include known refugia for sensitive aquatic species (>80% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition >50%	moderate loss of connectivity or function (shade, LWD recruitment, etc.) of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (~70-80% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition 25-50% or better	riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (<70% intact), and/or for grazing impacts: percent similarity of riparian vegetation to the potential natural community/composition <25%

APPENDIX E

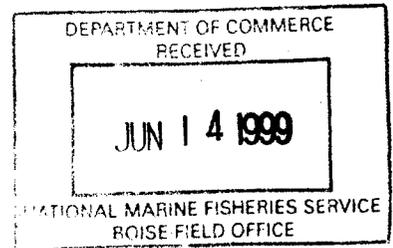
TABLE 2 SITE EFFECTS MATRIX

Table 2. Checklist for Documenting Environmental Baseline and Effects of Proposed Actions on Relevant Indicators

Sites 1 - 12

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Properly Functioning	At Risk	Not Properly Functioning	Restore	Maintain	Degrade
Water Quality						
Temperature			X		X	
Sediment		X			X	
Habitat Access						
Physical Barriers		X			X	
Habitat Elements						
Substrate	X				X	
Large Woody Debris			X		X	
Pool Frequency			X		X	
Pool Quality		X			X	
Off Channel Habitat			X		X	
Refugia		X			X	
Channel Dynamics						
Width/Depth Ratio		X			X	
Streambank Condition		X			X	
Floodplain Connectivity		X		X		
Flow/Hydrology						
Peak/Base Flows			X		X	
Drainage Network Increase		X			X	
Watershed Conditions						
Road Density & Location		X			X	
Disturbance History		X			X	
Riparian Reserves		X			X	

copy Rick
Ed



William Stelle, Jr., Regional Administrator
Rick Edwards, Staff Biologist
Northwest Region
7600 Sand Point Way, NE
Bin C15700, Building 1
Seattle, Washington 98115-0070

SFO FILE COPY

We are requesting "Incorporation by Reference" using previously submitted biological assessments, for the following projects.

Project 1	USFS
Project 2	Frank Koch
Project 3	Wayne Heistuman
Project 4	Wayne Heistuman
Project 5	Gene Theissen
Project 6	Leo Jungert
Project 7	Schlee Meander
Project 8	Koch Meander

The planned projects listed above involve similar impacts to the same species in the same geographic area; no new species have been listed or proposed and no new critical habitat has been designated for the action area; and there is no new relevant information to incorporate into last year's biological assessment.

Attached are the locations, descriptions, and project drawings for the 1999 Asotin Creek projects located in Asotin County, Washington. There have been no new fish species listed, or change in river conditions, and structures for 1999 are of the same type as 1998, therefore we have come to the same conclusion as 1998; a "may affect, but is not likely to adversely affect" determination for the Snake River steelhead and Snake River salmon. We are basing this conclusion on the BA's submitted to the NMFS over the last two years and the service's concurrence with our determinations. Mitigation and monitoring for 1999 will follow the same protocols outlined in the BA submitted to the service on June 9, 1998 and concurrence received July 29th, 1998. If no negative comments are received it will be assumed that the proposal is acceptable and construction will begin as planned. Construction of the projects will begin on or about July 15, 1999.

biological opinion issued after formal consultation if the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the early consultation. A written request for confirmation of the preliminary biological opinion should be submitted after the prospective applicant applies to the Federal agency for a permit or license but prior to the issuance of such permit or license. Within 45 days of receipt of the Federal agency's request, the Service shall either: (1) confirm that the preliminary biological opinion stands as a final biological opinion; or (2) if the findings noted above cannot be made, request that the Federal agency initiate formal consultation.

§402.12 Biological assessments.

(a) *Purpose.* A biological assessment shall evaluate the potential effects of the action on listed and proposed species and designated and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action and is used in determining whether formal consultation or a conference is necessary.

(b) *Preparation requirement.* (1) The procedures of this section are required for Federal actions that are "major construction activities"; provided that a contract for construction was not entered into or actual construction was not begun on or before November 10, 1978. Any person, including those who may wish to apply for an exemption from section 7(a)(2) of the Act, may prepare a biological assessment under the supervision of the Federal agency and in cooperation with the Service consistent with the procedures and requirements of this section. An exemption from the requirements of section 7(a)(2) is not permanent unless a biological assessment has been prepared.

(2) The biological assessment shall be completed before any contract for construction is entered into and before construction is begun.

(c) *Request for information.* The Federal agency or the designated non-Federal representative shall convey to the Director either (1) a written request for a list of any listed or proposed species or designated or proposed critical habitat that may be present in the action area; or (2) a written notification of the species and critical habitat that are being included in the biological assessment.

(d) *Director's response.* Within 30 days of receipt of the notification of, or the request for, a species list, the

Director shall either concur with or revise the list or, in those cases where no list has been provided, advise the Federal agency or the designated non-Federal representative in writing whether, based on the best scientific and commercial data available, any listed or proposed species or designated or proposed critical habitat may be present in the action area. In addition to listed and proposed species, the Director will provide a list of candidate species that may be present in the action area. Candidate species refers to any species being considered by the Service for listing as endangered or threatened species but not yet the subject of a proposed rule. Although candidate species have no legal status and are accorded no protection under the Act, their inclusion will alert the Federal agency of potential proposals or listings.

(1) If the Director advises that no listed species or critical habitat may be present, the Federal agency need not prepare a biological assessment and further consultation is not required. If only proposed species or proposed critical habitat may be present in the action area, then the Federal agency must confer with the Service if required under §402.10, but preparation of a biological assessment is not required unless the proposed listing and/or designation becomes final.

(2) If a listed species or critical habitat may be present in the action area, the Director will provide a species list or concur with the species list provided. The Director also will provide available information (or references thereto) regarding these species and critical habitat, and may recommend discretionary studies or surveys that may provide a better information base for the preparation of an assessment. Any recommendation for studies or surveys is not to be construed as the Service's opinion that the Federal agency has failed to satisfy the information standard of section 7(a)(2) of the Act.

(e) *Verification of current accuracy of species list.* If the Federal agency or the designated non-Federal representative does not begin preparation of the biological assessment within 90 days of receipt of (or concurrence with) the species list, the Federal agency or the designated non-Federal representative must verify (formally or informally) with the Service the current accuracy of the species list at the time the preparation of the assessment is begun.

(f) *Contents.* The contents of a biological assessment are at the discretion of the Federal agency and will depend on the nature of the Federal

action. The following may be considered for inclusion:

(1) The results of an on-site inspection of the area affected by the action to determine if listed or proposed species are present or occur seasonally.

(2) The views of recognized experts on the species at issue.

(3) A review of the literature and other information.

(4) An analysis of the effects of the action on the species and habitat, including consideration of cumulative effects, and the results of any related studies.

(5) An analysis of alternate actions considered by the Federal agency for the proposed action.

(g) *Incorporation by reference.* If a proposed action requiring the preparation of a biological assessment is identical, or very similar, to a previous action for which a biological assessment was prepared, the Federal agency may fulfill the biological assessment requirement for the proposed action by incorporating by reference the earlier biological assessment, plus any supporting data from other documents that are pertinent to the consultation, into a written certification that:

(1) The proposed action involves similar impacts to the same species in the same geographic area;

(2) No new species have been listed or proposed or no new critical habitat designated or proposed for the action area; and

(3) The biological assessment has been supplemented with any relevant changes in information.

(h) *Permit requirements.* If conducting a biological assessment will involve the taking of a listed species, a permit under section 10 of the Act (16 U.S.C. 1539) and Part 17 of this Title (with respect to species under the jurisdiction of the FWS) or Parts 220, 222, and 227 of this Title (with respect to species under the jurisdiction of the NMFS) is required.

(i) *Completion time.* The Federal agency or the designated non-Federal representative shall complete the biological assessment within 180 days after its initiation (receipt of or concurrence with the species list) unless a different period of time is agreed to by the Director and the Federal agency. If a permit or license applicant is involved, the 180-day period may not be extended unless the agency provides the applicant, before the close of the 180-day period, with a written statement setting forth the estimated length of the proposed extension and the reasons why such an extension is necessary.

(j) *Submission of biological assessment.* The Federal agency shall

PROJECT 1

Landowner: USFS (United States Forest Service)
Location: Sec 24, 25, 26, 32, 33, 34, & 35 T9N R43E
River Mile: 18.0 North Fork of Asotin Creek, WA

On USFS lands located in the North Fork of Asotin Creek, large woody materials and random boulder placements will be completed where stream access is available. The structure locations will be selected at the time of construction based on limited stream corridor disturbance and maximum fish benefit potential. An existing forest road will be used to access the area with equipment and materials. This project is a joint agreement between the USFS and the conservation district. The site will be revegetated in the spring of 2000.

PROJECT 2

Landowner: Frank Koch
Location: Sec 3, T9N, R44E
River Mile: 13.6 Mainstem Asotin Creek, WA

This site is located adjacent to the 1998 project site. Last year three rock vanes were placed on the left bank to shift velocities away from a vulnerable bank and to begin establishment of a stream meander. Because of a lack of large woody materials last year, the right bank was not addressed, it is now important to complete the stream restoration efforts as the stream re-establishes a meander pattern in response to last years in-stream structure placements. To complete the project in 1999, large woody materials will be placed on approximately 200 feet of the right bank to enhance fish habitat potential, establish a bankline for the development of a riparian vegetative corridor, and to maintain the limited existing riparian vegetation. An area approximately 200 feet wide and 400 feet long at this project site was re-vegetated this spring. Any disturbance of the plantings will be replanted in the spring of 2000.

PROJECT 3

Leasee: Wayne Heitstuman
Location: SW ¼, Sec 35, T10N, R44E
River Mile: 12.6 Mainstem Asotin Creek, WA

This project site is located above where Dry Gulch enters Asotin Creek and up-stream of pool forming structures installed in 1997. An area, approximately 75 feet long, on the left bank on an outside corner will have large woody materials placed in the stream parallel to the bankline and on the bank woven between existing trees. The purpose for this project is to enhance the fish habitat cover and to catch floating woody materials and suspended sediment there by creating a more fertile and complex riparian vegetative zone. The site will be revegetated in the spring of 2000.

PROJECT 4

Leasee: Wayne Heitstuman
Location: SW ¼, Sec 35, T10N, R44E
River Mile: 12.4 Mainstem Asotin Creek, WA

Located approximately a half mile downstream of Project 3, large woody materials will be placed on the near bank region of the right bank. Large woody materials will be placed in the stream parallel to the bankline and on the bank woven between existing trees. The purpose for this project is to enhance the fish habitat cover and to catch floating woody materials and suspended sediment there by creating a more fertile and complex riparian vegetative zone. The site will be revegetated in the spring of 2000.

PROJECT 5

Landowner: Gene Theissen
Location: NE ¼, Sec 25, T10N, R44E
River Mile: 10.5 Mainstem Asotin Creek, WA

Large woody materials will be placed on the alternating near bank regions, first on the right bank and then on the left. Each section to be treated is approximately 150 feet long. The purpose of this project is to enhance fish habitat cover, to protect the existing riparian vegetation, and to begin developing a bankline and more complex riparian area by accumulating floating woody debris and suspended sediment. Project site will be revegetated in the spring of 2000.

PROJECT 6

Landowner: Leo Jungert
Location: NW ¼, Sec 26, T10N, R45E
River Mile: 6.5 Mainstem Asotin Creek, WA

This project is located along Asotin Creek Road and is lower in the watershed in relation to the other proposed projects. The benefit to fish habitat is not as high, but this site has numerous abandoned cars that are either in the stream or on the verge of entering the stream. Asotin County Emergency Service has received a grant from DOE to remove the vehicles and in their permit from WDFW it states that something needs to be done to protect the streambank and improve fish habitat. It is identified that the removal of the vehicles will be done during low flow and the possibilities of streambank protection and fish habitat could go hand-in-hand with 4 J hooked rock vanes on the left bank. The structure's would reduce the width to depth ratio and provide pool habitat for migrating adults and rearing for juveniles. WDFW redd surveys indicate that this section of the Mainstem is being used by spawning steelhead. Project site will be revegetated in the spring of 2000.

PROJECT 7

Landowner: Dan Schlee
Location: NE ¼, Sec 34, T9N, R44E
River Mile: 4 South Fork of Asotin Creek, WA

Upon monitoring and assessment of the Schlee Meander Reconstruction Project (installed in September of 1997), two minor operation and maintenance items need to be addressed. Discharges, exceeding bankfull flows by at least six times, have passed through this site and it has maintained its pattern well.

The assessment indicates two channel characteristics that need to be addressed in 1999.

1. A headcut migrated 100 feet from offsite location. The bottom vortex weir of the Schlee Site held in place, in spite of a 24" headcut. O&M is needed and an additional vortex rock weir is needed approximately 30 feet below the original weir. The low set vortex rock weir would provide toe protection to the original weir, in addition to, providing more pool habitat and a step pool morphology.
2. The width:depth ratio should be lowered from 16 to 13 feet to help facilitate bedload movement at bankfull discharge.

There were no structural failures in spite of high flows. These Operation and Maintenance adjustments are minimal, but due to the investment made during initial project construction are needed to maintain project integrity. The goal is to eventually develop a self maintaining-stable stream type with high fish habitat values. Project site will be revegetated in the spring of 2000.

PROJECT 8

Landowner: Frank Koch

Location: SW ¼, Sec3, T9N, R44E

River Mile: 14.1 Mainstem Asotin Creek, WA

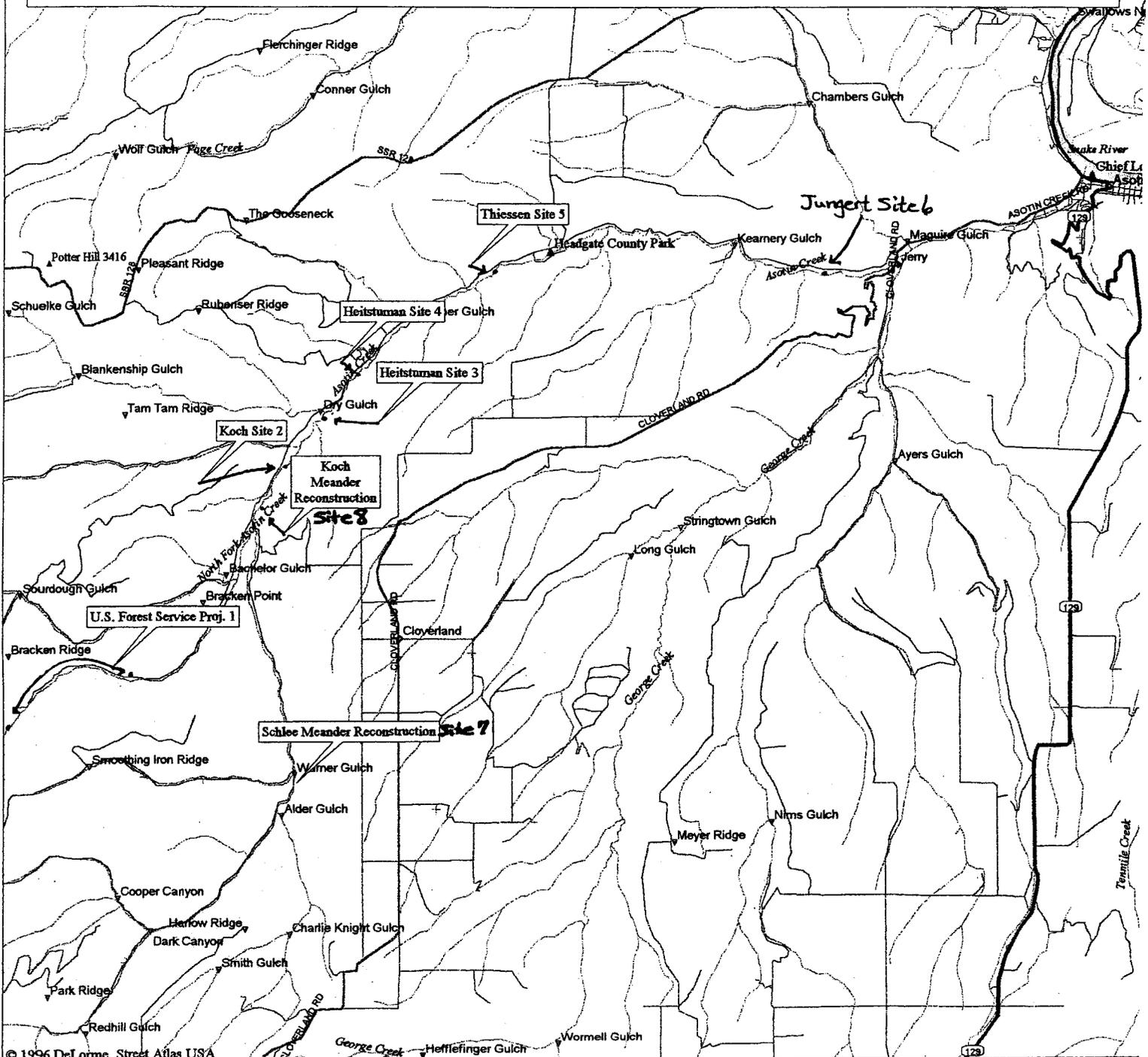
Upon monitoring and evaluation of Koch's Meander Reconstruction Project in May of 1999 (project completed in September of 1998), it was determined that the site survived flows 10 times the bankfull discharge, in spite of the initial lack of vegetation needed for root cohesion in the banks and reestablished floodplain. Some minor Operation and Maintenance and adjustments are needed.

The goal of these adjustments are to bring the current condition closer to a reference site condition (reference site condition would be defined as a natural site of the same stream type that maintains its dimensions, patterns, and profiles while being able to transport sediment, flows and detritus of the watershed) and support healthy riparian growth and root matrix.

The assessment indicated two minor O&M adjustments that are need to be addressed in 1999.

1. Lower the bankfull width:depth ratio from 17 to 12 feet. This will allow for adequate depth to achieve enough shear stress to more efficiently transport bedload and maintain a healthier thalweg.
2. Three additional J hook vanes at the end of the first three meander bends. These additions will help maintain a lower width to depth ratio while increasing the number of large pools for fish habitat. They would alternate from the left bank, to right bank, and left bank again to help maintain the meander pattern and reduce width to depth ratio.

1999 In-Stream Habitat Projects



© 1996 DeLorme Street Atlas USA

Mag 12.00
 Thu Jun 03 07:55 1999
 Scale 1:125,000 (at center)
 2 Miles
 2 KM

- | | |
|-----------------------|---------------------|
| — Local Road | ▲ Park/Reservation |
| — Major Connector | ◆ Locale |
| — Primary State Route | ☐ Cemetery |
| — Trail | --- County Boundary |
| — Utility/Pipe | — State Boundary |
| ● County Seat | ○ Population Center |
| ▲ Summit | Water |
| ▽ Geographic Feature | Woodland |

LEGEND

VORTEX ROCK WEIR WITH ROOT WAD



ROCK VANE WITH ROOT WAD



LARGE WOODY DEBRIS



ROCK BARB WITH ROOT WAD



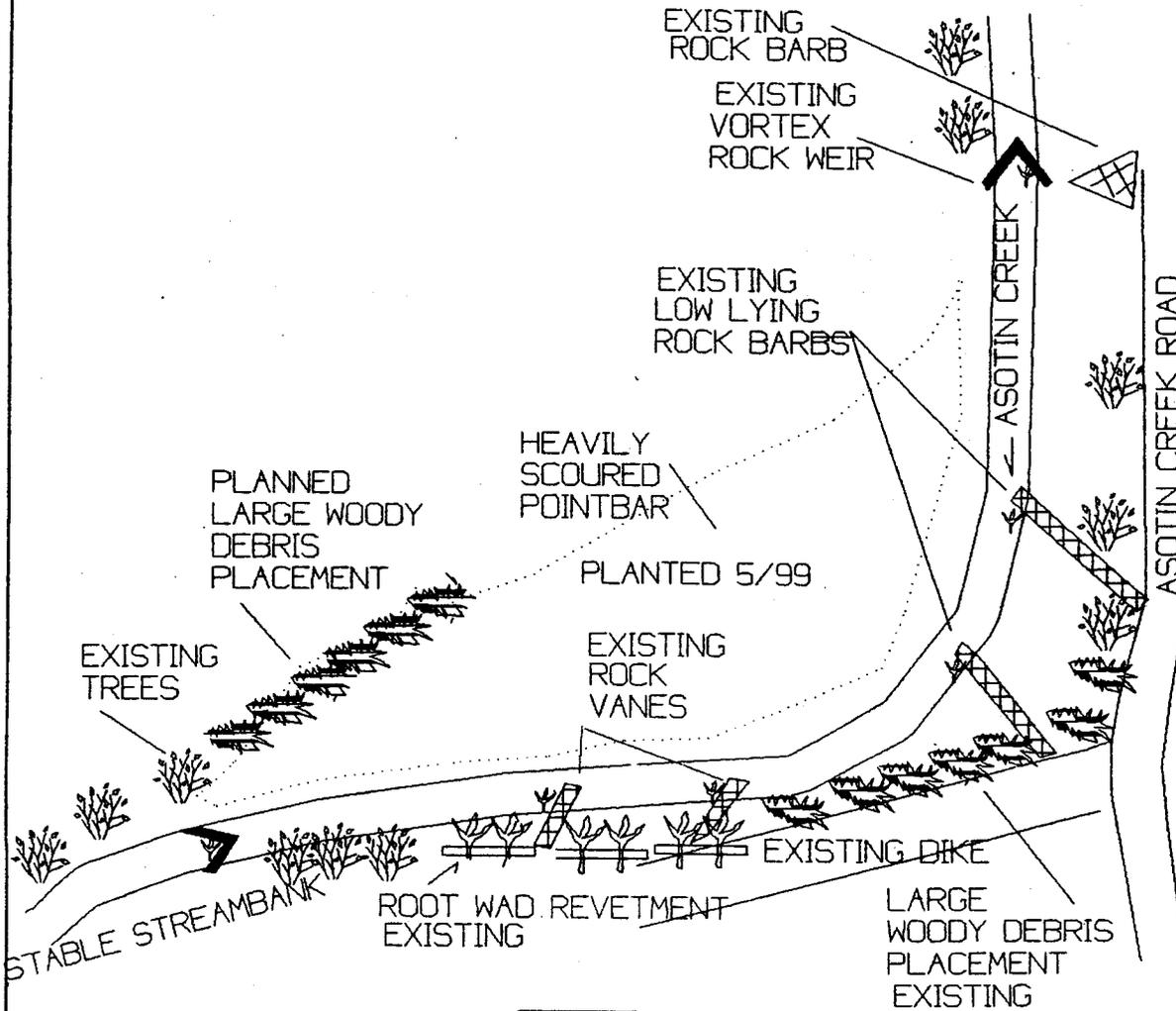
ROOT WAD REVETMENT



1999 PROJECT
LARGE WOODY DEBRIS PLACED ON RIGHT BANK APPROXIMATE LENGTH IS 200 FEET.

FRANK KOCH #2
SEC 3, T10N, R44E
R.M. 13.6

DESIGNED	DATE
DRAWN	APPROVED BY
TRACED	TITLE
CHECKED	TITLE



BARN

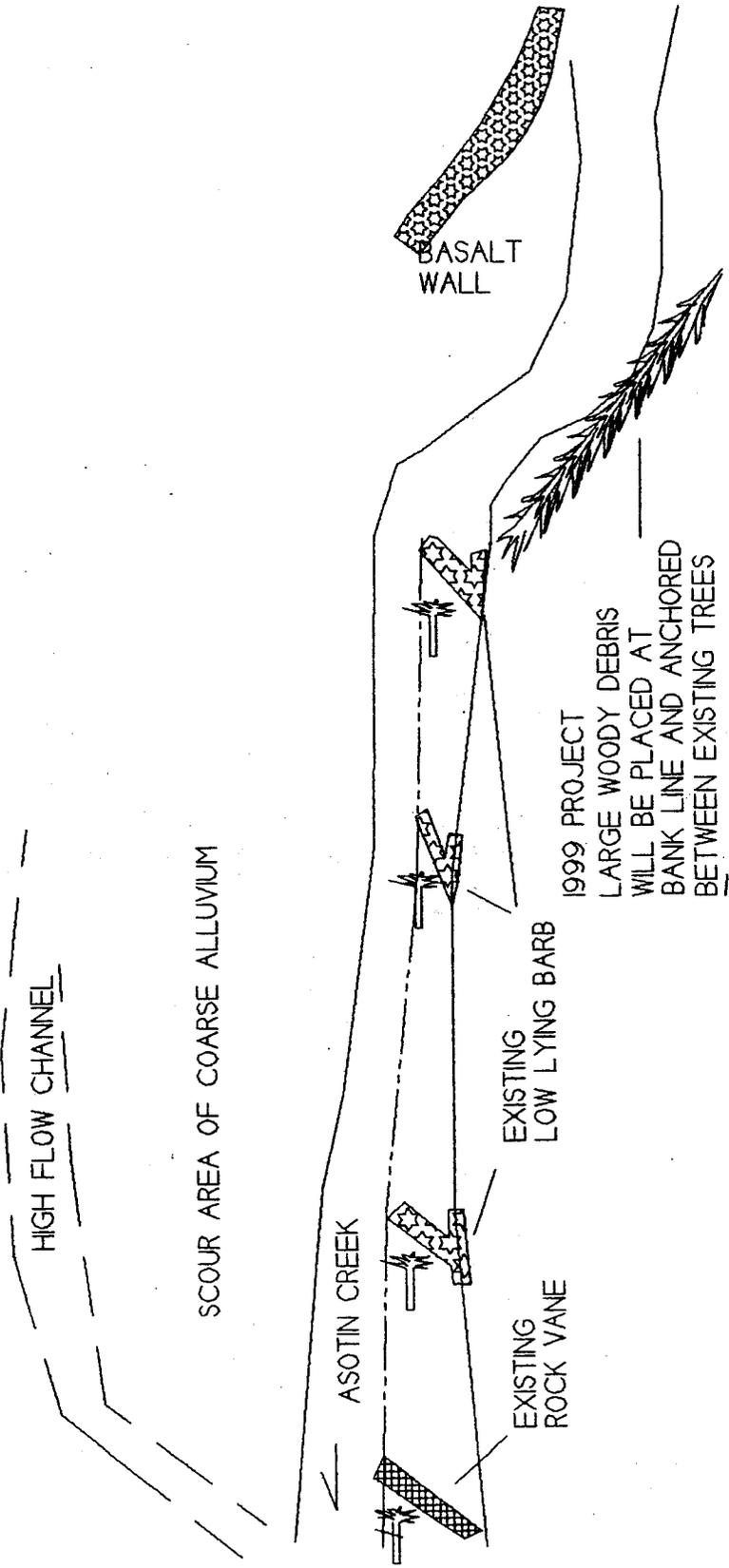
DRAWING NOT TO SCALE

PLAN VIEW
FRANK KOCH FISH HABITAT IMPROVEMENT
ASOTIN CREEK, ASOTIN COUNTY, WA.
USDA NATURAL RESOURCES CONSERVATION SERVICE

DRAWING NO.
SHEET OF

WAYNE HEITSTUMAN #3
 SW1/4, SW1/4, SEC 35, T10N, R44E
 R.M. 12.6

LEGEND	
WOODY DEBRIS	
WATER EDGE	
STREAM CENTER LINE	
ROCK BARB	
ROCK VANE	
ROOT WAD/ BOULDER	



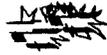
DRAWING NOT TO SCALE

PLAN VIEW WAYNE HEITSTUMAN SITE 1 FISH HABITAT IMPROVEMENT ASOTIN CREEK, ASOTIN COUNTY, WA.	DESIGNED: _____ DRAWN: _____ TRACED: _____ CHECKED: _____	DATE: _____ APPROVED BY: _____ TITLE: _____	DATE: _____ APPROVED BY: _____ TITLE: _____
	USDA NATURAL RESOURCES CONSERVATION SERVICE		

DRAWING NO. _____
 SHEET _____ OF _____

LEGEND

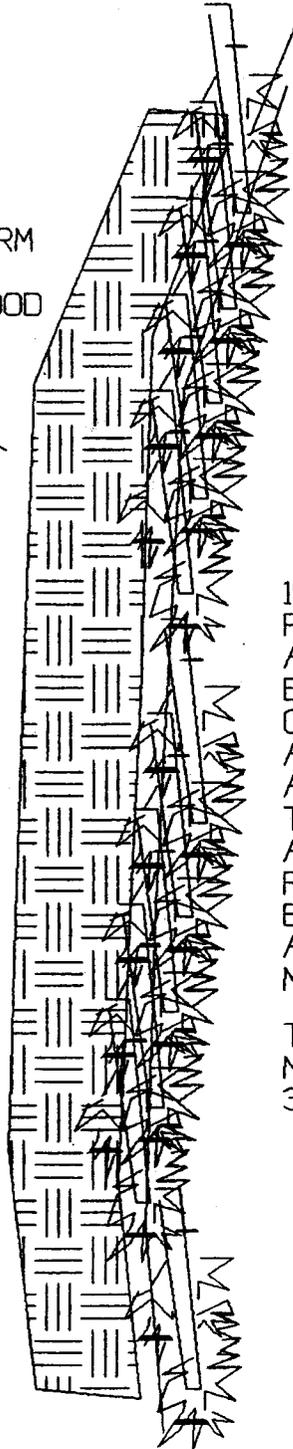
LARGE WOODY DEBRIS



WAYNE HEITSTUMAN #4
 SW 1/4 SEC 35 T10N R44E
 R.M. 12.4

GRAVEL BERM
 PUSHED UP
 DURING FLOOD
 OF 1997

ASOTIN
 CREEK



1999 PROJECT WILL BE TO PLACE LARGE WOODY DEBRIS ALONG THE RIGHT BANK AT THE BASE OF AND ON THE FACE OF GRAVEL BERM TO REDUCE VELOCITIES AT THE TOE OF THE SLOPE AND TO ADD FISH HABITAT COVER. THE WOODY MATERIALS WILL ALSO PROTECT EXISTING LIMITED RIPARIAN VEGETATION AND WILL BEGIN TO ESTABLISH A RIPARIAN AREA BY CAPTURING FLOATING MATERIALS AND SEDIMENT.

TOTAL LENGTH OF WOODY MATERIALS IS APPROXIMATELY 300 FEET.

DESIGNED	DATE	APPROVED BY	DATE
DRAWN		TITLE	
TRACED		TITLE	
CHECKED		TITLE	

PLAN VIEW
 WAYNE HEITSTUMAN SITE 2 FISH HABITAT IMPROVEMENT
 ASOTIN CREEK, ASOTIN COUNTY, WA.

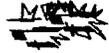
USDA NATURAL RESOURCES CONSERVATION SERVICE

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DRAWING NO.
 SHEET 9

LEGEND

LARGE WOODY DEBRIS



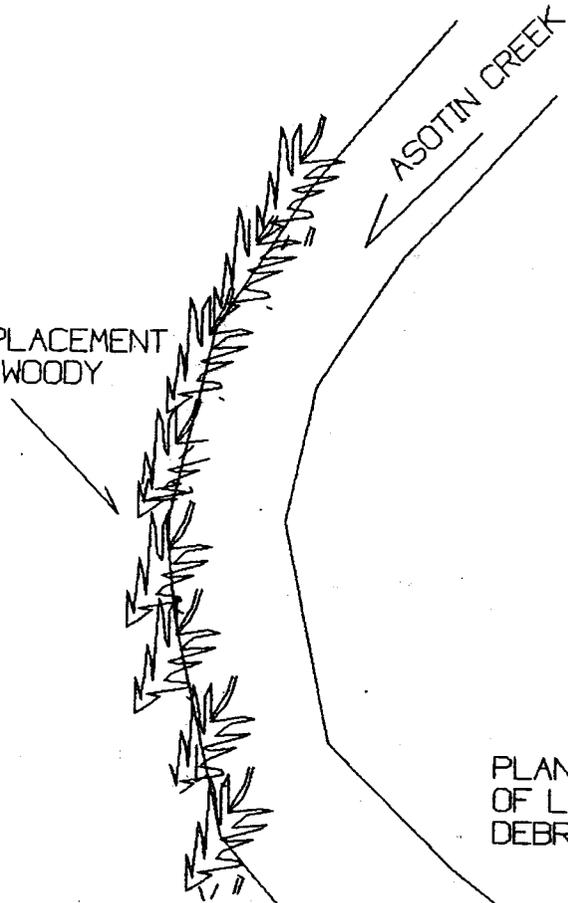
GENE THEISSEN #5

NE 1/4 SEC 25 T10N R44E
R.M. 10.5

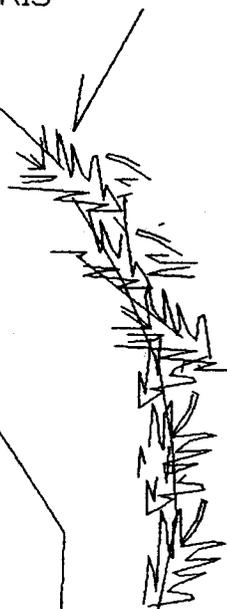
DATE	_____
APPROVED BY:	_____
TITLE	_____
TITLE	_____

DATE	_____
DESIGNED	_____
DRAWN	_____
TRACED	_____
CHECKED	_____

PLANNED PLACEMENT
OF LARGE WOODY
DEBRIS



PLANNED PLACEMENT
OF LARGE WOODY
DEBRIS



ASOTIN CREEK ROAD

1999 PROJECT WILL BE TO PLACE LARGE WOODY DEBRIS ALONG RIGHT AND LEFT BANKS AT THE BASE OF THE BANK AND ON THE BANK FACE TO REDUCE VELOCITIES. TO REDUCE EROSION AND ADD FISH HABITAT COVER. THE WOODY MATERIALS WILL ALSO PROTECT EXISTING LIMITED RIPARIAN VEGETATION AND WILL BEGIN TO ESTABLISH A RIPARIAN AREA BY CAPTURING FLOATING MATERIALS AND SEDIMENT.

TOTAL LENGTH OF WOODY MATERIALS IS APPROXIMATELY 300 FEET (150 ON EACH BANK).

PLAN VIEW

GENE THEISSEN FISH HABITAT IMPROVEMENT
ASOTIN CREEK, ASOTIN COUNTY, WA.

USDA NATURAL RESOURCES CONSERVATION SERVICE

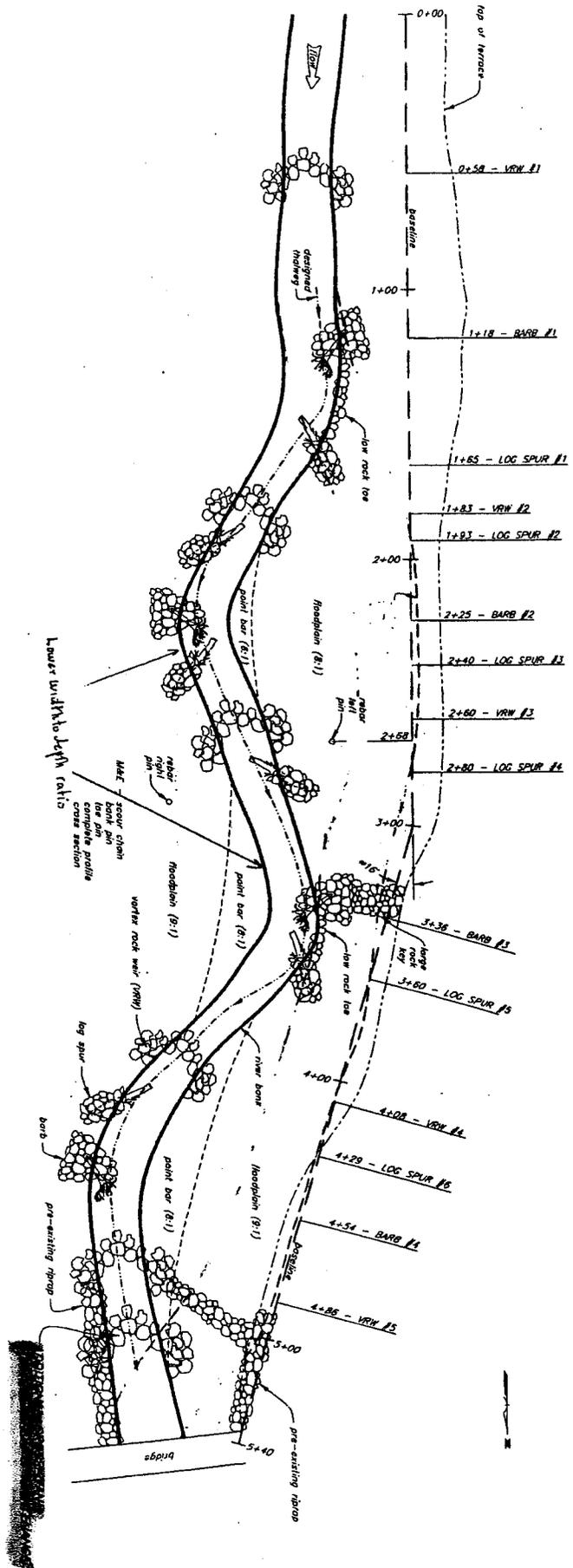
DRAWING NO. _____

SHEET _____ OF _____

DRAWING NOT TO SCALE

PLAN VIEW

1/2" = 10'



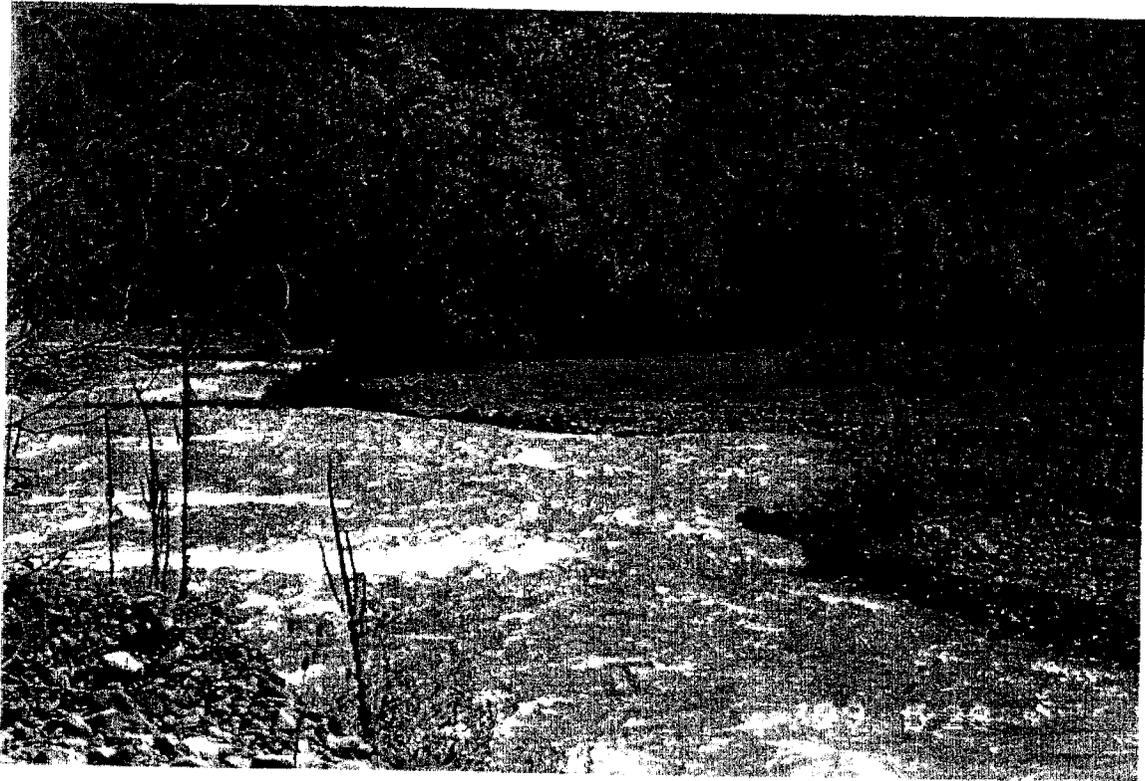
Dan Schlee #7

J-BAR RANCH - 1999 OPERATION & MAINTENANCE
 MEANDER RECONSTRUCTION
 SOUTH FORK ASOTIN CREEK
 ASOTIN CO., WASHINGTON

Designed	Betsy Southland	DATE	Approved
Drawn	Arnie Johnson		Title
Traced			
Checked			Title

SHEET NO. 02
 DTD FILE NO.
 DRAWING NO.

F. Koch #2



Rt bank. (Notice structures turning water
to right bank. LWD to help protect
eroding streambank.

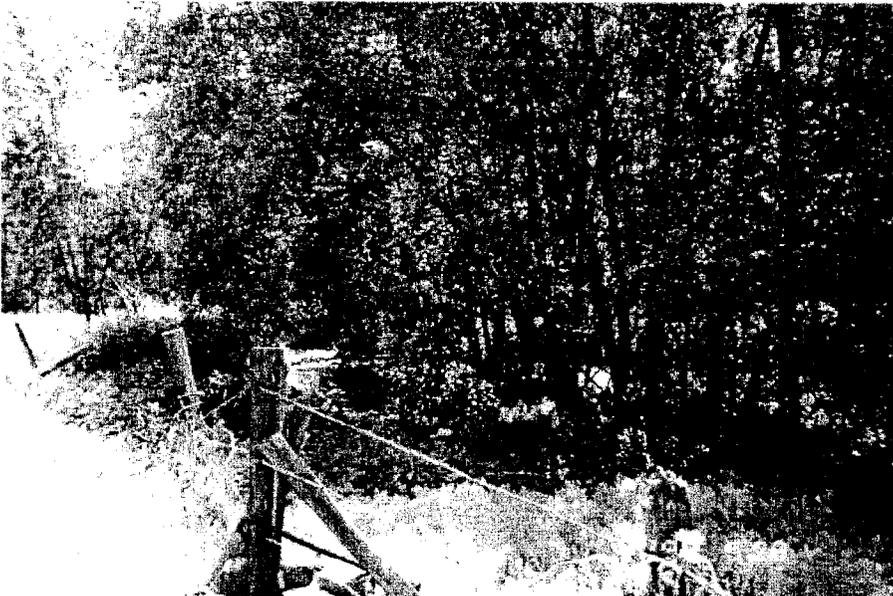
Holtsturnan Site #3



Looking upstream, left bank LWD placement.

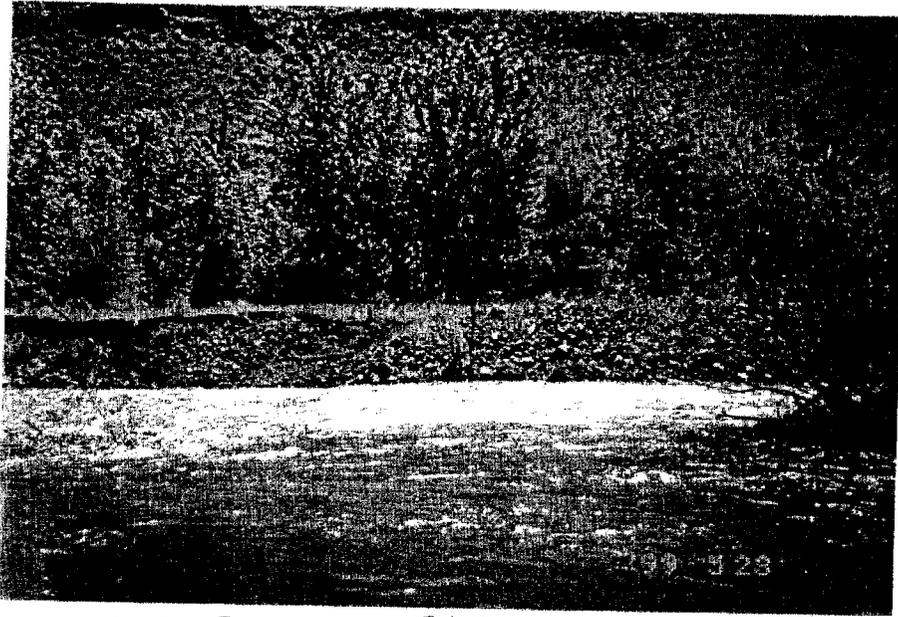


Place LWD on near bank (middle of pic).



Landowner concerned about losing more soil.

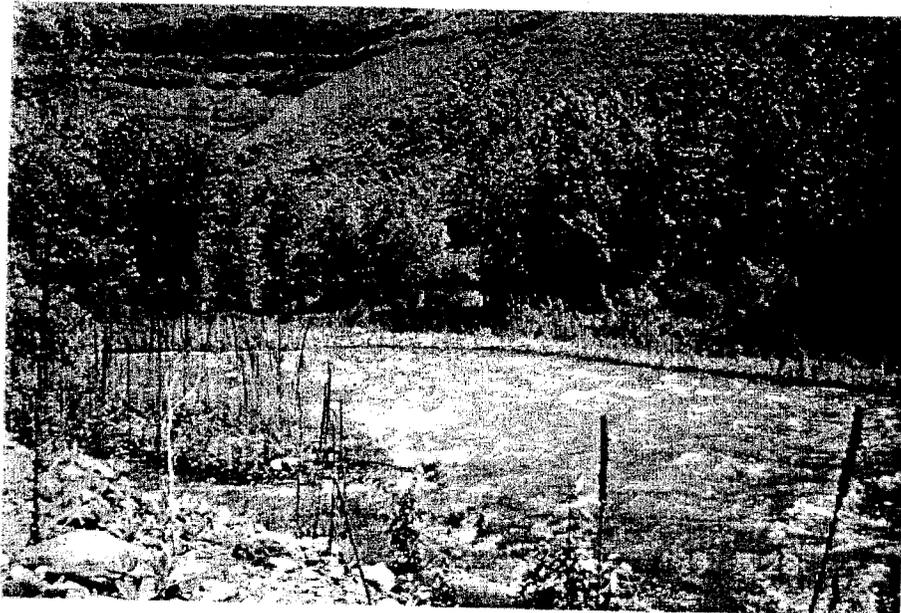
Heitstuman #4



Spoils from County Rd Dept. Work.



Middle Section. LWD Placement 300ft

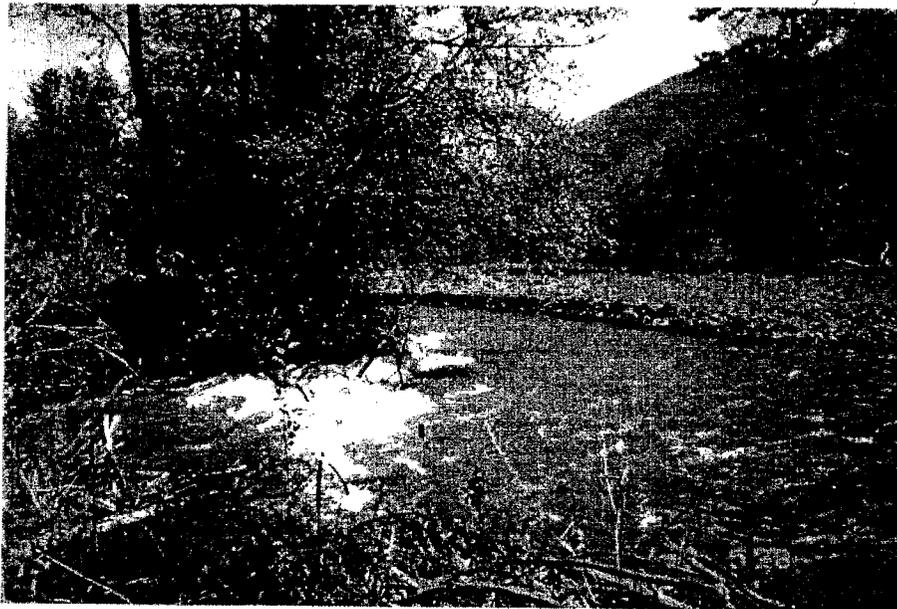


LWD will end @ trees to right of photo.

Thiessen Site #5



Looking upstream. Rt bank, LWD placement to stop pooling.



Middle Section



Lower Section looking upstream. LWD placement to catch material and prevent overbank flow.

Schlee Meander #7

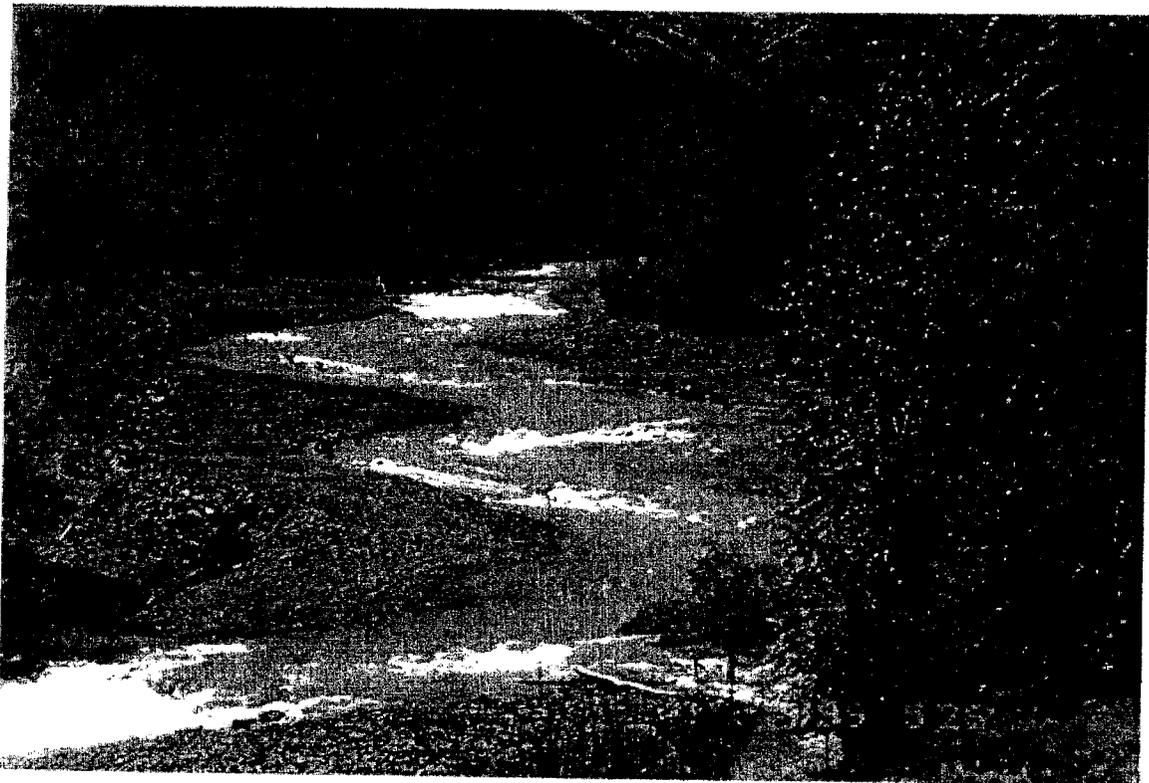


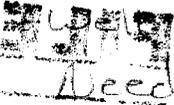
After Spring of 1998 planting.



Notice Headcut to bottom Vortex. Stopped at footers, but need additional Vortex 30 feet below to help stop headcut.

Koch Meander #8



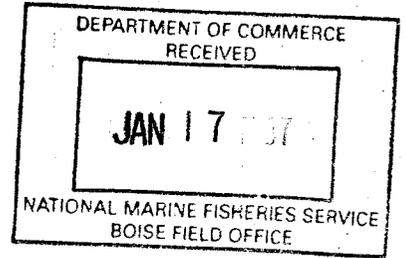
High water outside the root wad
revetments. No damage other than
some cobble buildup above the upper
two root wad revetments. Notice how
 the lower meander is functioning.
Need to use J Hooked Vanes to help
upper meanders.



Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Copy
Rec'd

BFO FILE COPY



JAN 13 1997

Ms. Elizabeth Garr
Chief, Habitat Section
National Marine Fisheries Service
525 NE Oregon Street, Suite 500
Portland, OR 97232

Dear Ms. Garr:

Enclosed for your review is the Asotin Creek Model Watershed Biological Assessment of fourteen proposed projects. The projects can be grouped into two categories of streambank stabilization and meander reconstruction. These projects are part of the Northwest Power Planning Council's Early Action Projects for the Columbia River Inter-Tribal Fish Commission and the Model Watersheds. Nick Iadanza of your office has been our point of contact for preliminary review of these projects.

This biological assessment was conducted using the draft version of "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale, Federal Version, National Marine Fisheries Service, November 16, 1995." It was determined that the proposed actions "**May affect, likely to adversely affect**" the listed species of spring chinook or their critical habitat. Due to this determination, we ask that you issue a take permit for the proposed activities and allow the projects to proceed as soon as possible. The normal beginning work window for instream projects in Asotin Creek varies from July 15 to August 15, depending on the location. The work window terminates on approximately October 15 to October 30. These dates are approximate and all work window dates are coordinated with the Washington Department of Fish and Wildlife. If possible, we ask that you make a determination on this set of projects by July 22, 1996.

If you have any questions please contact Mark Shaw at (503) 230-5239.

Thank you for your timely review of these projects.

Sincerely,

D. Robert Lohn
Director, Fish and Wildlife

Enclosure

cc:

Mr. Ted Meyers, National Marine Fisheries Service