

**UMATILLA RIVER BASIN ANADROMOUS FISH HABITAT  
ENHANCEMENT PROJECT**

1992 Annual Report

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## **ABSTRACT**

The Umatilla habitat improvement program is funded under the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program measure 704 (d)(1)34.02, and targets the improvement of water quality and the restoration of riparian areas, holding, spawning and rearing habitats of steelhead, spring and fall Chinook and coho salmon. The Confederated Tribes of the Umatilla Indian Reservation are responsible for enhancing stream reaches within the Reservation boundaries as guided by an implementation plan developed cooperatively with the Oregon Department of Fish and Wildlife and the U.S.D.A. Forest Service, Umatilla National Forest.

Enhancements included the construction of nine boulder deflectors, two boulder weirs with pools, and 4 instream boulder placements. Instream cover was improved through the placement of 38 instream cover trees that were cabled to anchor boulders and four rootwads placed and anchored in pools. High tensile fence was constructed along 1.2 miles of stream bank to exclude livestock from riparian areas.

Scheduled maintenance and adjustment of existing instream and flood plain structures in Meacham Creek and the Umatilla River was conducted on 25 stream bank deflectors and two boulder weirs.

The efforts to restore and protect the riparian and fish habitats in the Umatilla Basin included a watershed approach to addressing causative factors to habitat degradation. This approach incorporated education on watershed issues and public involvement in restoration efforts. Volunteers from a local Boyscout Troop planted riparian hardwoods and local elementary school classes were given tours of the project areas as part of the education and public involvement efforts. Tribal staff coordinated with resource agencies and the Union Pacific Railroad in assessment of potential impacts of their proposed Blue Mountain Expansion Project.

Water quality monitoring continued for temperature and turbidity throughout the project area. Survey of channel cross sections and photo documentation of riparian recovery within the project areas provided additional baseline data.

## **ACKNOWLEDGMENTS**

This project was funded by the Bonneville Power Administration. The Confederated Tribes of the Umatilla Indian Reservation thank Jerry Bauer and other Bonneville Power Administration personnel for their assistance. Thanks also to Tim Bailey of the Oregon Department of Fish and Wildlife and John Sanchez and Ed Calame of the Umatilla National Forest for technical input and assistance.

We would like to acknowledge the cooperating landowners who supported our efforts and provided important background on properties in the project areas.

For their volunteer work on restoring the riparian communities of the Umatilla Indian Reservation, we thank Boy Scout Troop # 743. And for his assistance with riparian enhancements and documentation of restoration efforts we thank Derik Winn.

Thanks also to Tribal staff, whose cooperation and contributions are evident in this report. Special thanks to Ken Hall for contract inspection, to Gary James for support and guidance, and to Joe Richards for administration of this agreement.

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## INTRODUCTION

This report covers work accomplished by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) from May 1992 through April 1993 as part of the Umatilla Drainage Habitat Improvement Program. This Program is funded under the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program, Measure 704 (d)(1) 34.02, as partial mitigation for construction of hydroelectric dams and the subsequent losses of anadromous fish throughout the Columbia River system. The CTUIR as co-managers of the fisheries resources, was identified as the responsible agency for implementation of improvements on the Umatilla Indian Reservation.

The Umatilla River Drainage Anadromous Fish Habitat Improvement Implementation Plan (Implementation Plan), was developed by the Oregon Department of Fish and Wildlife (ODFW), U.S.D.A. Forest Service, Umatilla National Forest (USFS), and the CTUIR to guide enhancement activities in the basin from 1988 through 1992 (Reeve et al. 1988). Enhancement activities target improvement of water quality, and restoration of riparian areas and spawning and rearing habitat of steelhead (*Oncorhynchus mykiss*), spring and fall chinook salmon (*Oncorhynchus tshawytscha*), and coho salmon (*Oncorhynchus kisutch*). These species represent an important cultural and religious resource to the Indian Tribes and their protection is mandated by Treaty with the United States Government.

Enhancement strategies include riparian vegetation restoration and protection, habitat diversity improvement and channel development. Improvements are being implemented in conjunction with other anadromous fish restoration efforts in the Umatilla River Basin including passage improvements (ladders, screens, and flow enhancement) and hatchery supplementation. These efforts will help boost spawning escapement and natural production in the enhanced habitats throughout the Umatilla Basin. The efforts to restore and protect the riparian and fish habitats in the Umatilla Basin during the reporting period included a watershed approach to addressing causative factors to habitat degradation. This approach incorporated public involvement in restoration efforts and education on watershed issues.

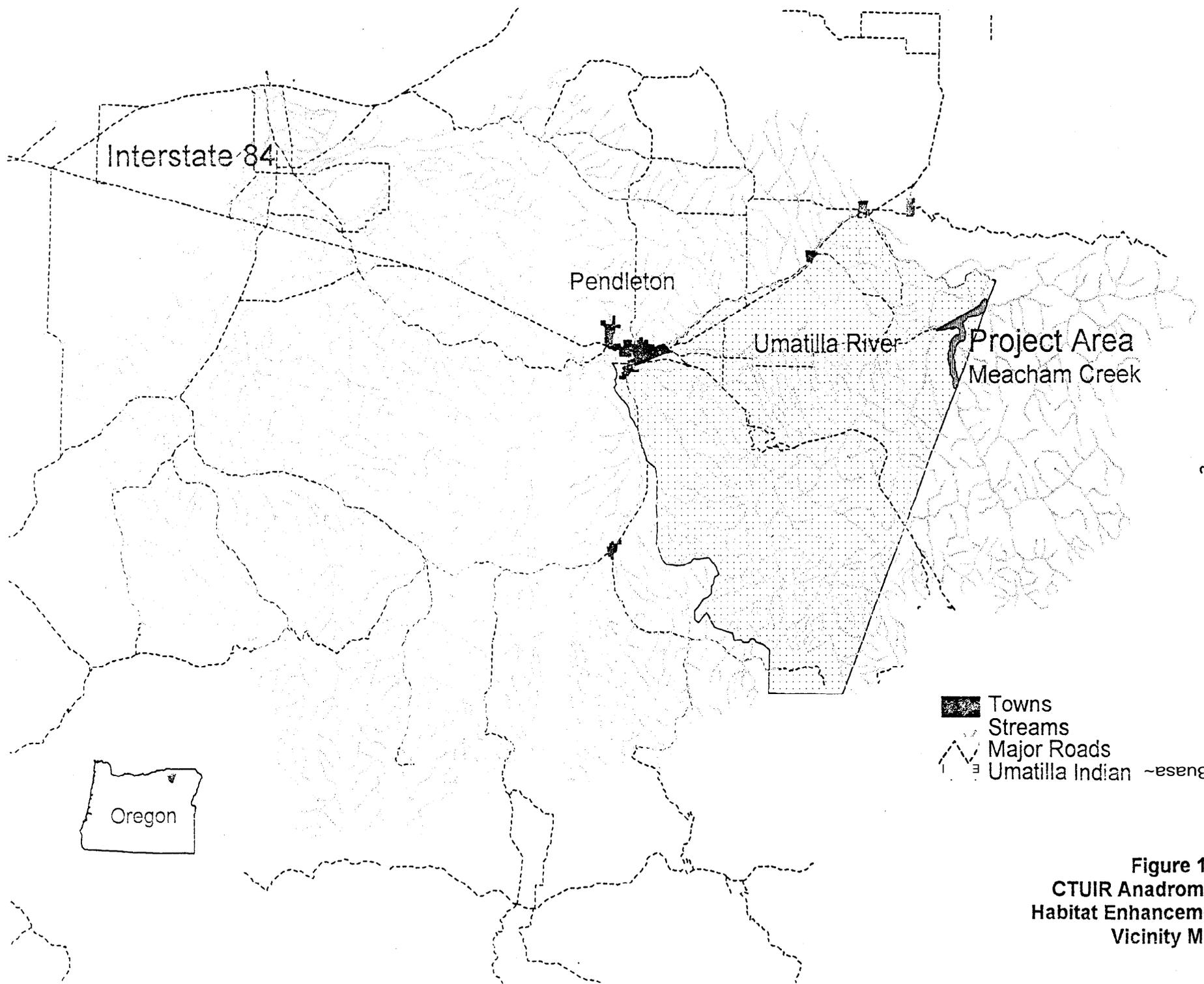
## DESCRIPTION OF PROJECT AREA

The Umatilla River is a tributary to the Columbia River at RM 289. It has a drainage basin of 308 sq. miles below the confluence of Meacham Creek (Figure 1). Meacham Creek is a major tributary to the Umatilla River, entering at river mile (RM) 79. It drains approximately 165 square miles and produces 145,000 acre-feet annually at RM 5 near the eastern boundary of the reservation. The principle aquifer is quaternary alluvium composed of unconsolidated sand and gravel, gravel, and some silt. Alluvium may reach a depth of up to 12 feet (Gonthier and Harris, 1975).

The project area includes the lower 4 miles of Meacham Creek, and the Umatilla River between RM 78.5 and 81.7. and the lower quarter mile section of Boston Canyon Creek. These reaches had been initially treated during previous project years were reentered for maintenance and continued enhancements.

Elevations in the project area range from 1,760 to 2,000 feet above sea level, giving the area an unusually long growing season. Stream gradients average less than 2 percent. Flooding in the project area usually occurs in late winter and spring as a result of a rain on snow event. The flood peaks tend to be high and the volumes large, but the duration of damaging stages seldom last more than a day or two (U.S. Army, Corps of Engineers, 1975).

The project lies in a big game winter grazing zone as outlined by the CTUIR Land Development Code (1983). The primary land use is livestock grazing, May to November. Timber harvest is permissible under a conditional use permit.



Interstate 84

Pendleton

Umatilla River

Project Area  
Meacham Creek

-  Towns
-  Streams
-  Major Roads
-  Umatilla Indian Reservation



Oregon

**Figure 1**  
**CTUIR Anadromous Fish**  
**Habitat Enhancement Project**  
**Vicinity Map**

## **METHODS AND MATERIALS**

### **Project Design and Layout:**

Tribal staff surveyed project areas for maintenance needs and continued enhancement opportunities. Structure designs and materials specifications were developed and materials and equipment needs were estimated.

Machine access and haul routes to structure sites and materials storage sites were identified and flagged.

### **Landowner Agreements:**

Existing agreements on Meacham Creek and the Umatilla River ensured access for maintenance and continued enhancements as needed.

### **Instream Permits:**

Permit applications were submitted to and permits granted from the Army Corps of Engineers for 404 Fill and Removal Permit and the CTUIR Department of Natural Resources for Tribal Stream Zone Alteration Permits.

### **Watershed Approach:**

The CTUIR at the direction of the Bonneville Power Administration and consistent with the direction of other tribes and resource agencies in the Columbia Basin is refocussing anadromous fish habitat restoration and enhancement efforts from the past instream structural approach to a more holistic watershed approach. This approach looks to address causative factors to degradation of fish and riparian habitats within a watershed context. An increased emphasis on public outreach and education will help ensure protection of existing restoration efforts and reduce future impacts.

The CTUIR coordinated an education tour of enhancement areas with local schools, provided job training opportunities for tribal youth programs, coordinated a riparian enhancement project with a local Boyscout troop, and coordinated with resource agencies to provided technical input and comment to a proposed Union Pacific Railroad double track expansion project in the Blue Mountains.

### **Subcontracts:**

The CTUIR prepared, advertised for bids and awarded contracts for various materials delivery and construction activities associated with the construction of instream and flood plain structures as follows:

#### **Equipment Rental For Instream Construction**

Sub-contract for rental of operated equipment for materials movement and instream construction and maintenance was awarded to Harney County Gypsum Co., of Burns Oregon.

#### **Fence Construction**

Sub-contract for construction of high tensile fence was awarded to Raymond Doherty of Pilot Rock Oregon for the construction of 1.2 miles of fencing on the Umatilla River and lower Meacham Creek.

#### **Materials (Boulders and Rip Rap)**

Rock for instream and flood plain structures was purchased at a delivered price from Humberts Excavating of Milton-Freewater Oregon.

### **Monitoring and Evaluation:**

#### **Stream Channel Cross Sections**

Stream channel cross sections were surveyed at 42 established monitoring sites throughout the project areas. Surveys were conducted by tribal staff using standard transit level, rod and measuring tape to monitor for changes in stream channel morphology resulting from riparian recovery, natural bedload movement and instream and floodplain structure function.

#### **Photo Documentation**

Photo documentation of riparian recovery and instream structure function over time was completed at all cross section locations and at selected pre-established permanent sites using 35mm slide film. Slides were cataloged in the CTUIR Photo record library.

## **Squaw Creek Biological Surveys**

Past spawning ground surveys have shown Squaw Creek to be a major producer of steelhead in the Upper Umatilla Basin. Baseline data on fish abundance and habitat conditions were collected in 1991. At that time, fall salmonid populations were estimated and length frequencies documented in Squaw Creek from the Umatilla River at the mouth upstream to Little Squaw creek using multiple pass electrofishing or Peterson mark-recapture. Follow up spring smolt trapping was scheduled using a rotary screen trap. However, unseasonably low water levels prevented trap deployment. Some data was obtained on length frequency for spring populations as part of the genetic risk assessment study being conducted by Carl Schreck at Oregon State University. As part of this study, tribal staff conducted multiple pass electrofishing of 15 randomly selected pools in the lower 3 miles of Squaw Creek to collect steelhead pre-smolts for genetic assessment. Fork length of all shocked steelhead was measured and length frequencies were plotted (Figure 2). Fish greater than 120mm were then placed in individual plastic wrappings and put on dry ice for shipping to Oregon State University for genetic analysis.

## **Water Quality Monitoring**

Temperature and sediment data was collected as an ongoing part of the program to provide a base line on water quality and to quantify the short and long term effects of restoration efforts. Water temperatures were recorded hourly using Ryan Temp-Mentor hydrothermographs deployed at various locations on Meacham, Squaw, Buckaroo, and Wildhorse Creeks and the Umatilla River (Appendix A).

Suspended sediments were monitored from May 1 through November 30, 1992 using ISCO sediment samplers on the Umatilla River at USGS gage station RM 81.7 (East Reservation Boundary), and RM 56 (West Reservation Boundary), and at the USGS Gage station on Meacham Creek at RM 2 (Appendix A). Samples were processed at the U.S. Forest Service Lab in Pendleton by USFS personnel. Total suspended sediments, JTU's, conductivity, and total dissolved solids were measured. The sampler at the East Boundary of the Reservation was removed prior to high flows to prevent possible damage or loss.

### **Riparian Enhancements:**

Riparian habitats were enhanced through the planting of local stock riparian hardwood cuttings and seeding of gravel bars and disturbed sites with grass seed/forb mix. A total of 300 lbs of seed mix was planted. This occurred primarily during spring and fall with limited seeding of haul roads during the summer months. Approximately 200 willow cuttings were prepared and planted during the spring and summer of 1992 months by tribal staff and Summer Youth Program employees as part of their job training and natural resource education program.

A cooperative project was developed with local Boy Scout Troop 743 to plant 100 2-4 foot tall rooted cottonwood trees, 125 rooted willows and additional willow cuttings along toe dikes, bank revetment structures and pool edges to improve stream bank stability and increase stream surface shade. This project was started during this reporting period in April of 1993 and will continue into the 1993 project year.

### **Riparian Exclosure Fence:**

Riparian areas on over one mile of the Umatilla River were protected through the construction of 1.2 miles of high tensile smooth wire fencing. High rock bluffs along one bank of the river made construction impractical and largely unnecessary.

Existing riparian exclosure fence on Meacham Creek and the Umatilla River was maintained and stream crossing fences that had been removed prior to high flows, were deployed prior to the grazing season. All exclosures were monitored weekly for cattle trespass and offending animals removed immediately.

### **Instream Construction:**

All instream activities were directed and inspected by tribal habitat staff. Petroleum absorbent booms were deployed downstream of all heavy equipment working in the stream zone to protect against spills of petroleum products from engine and hydraulic systems. Efforts included 105 hours of track mounted excavator time used to place 600,000 lbs of boulders in new and existing structures.

New construction including nine boulder deflectors, two boulder weirs with pools, 4 instream boulder placements, 38 instream cover trees placed and cabled to anchor boulders, and four rootwads anchored in pools.

Scheduled maintenance and adjustment of existing instream and flood plain structures in Meacham Creek and the Umatilla River was conducted on 25 stream bank deflectors and two boulder weirs.

## RESULTS AND DISCUSSION

### Habitat Enhancements:

Instream and flood plain habitat enhancements constructed in previous implementation years in the lower four miles of Meacham Creek and the Umatilla River. between RM 78.5 and 80, were maintained and modified to meet their original design functions. Where appropriate, additional structures were built. Enhancement of instream cover was emphasized with the placement of over 40 large organic debris placements. Long term stability of instream structures was increased though cabling structures together using the Hilti Fastening System. These efforts should ensure continued increases in stream channel stability and habitat capability for cold water anadromous fish.

Riparian area recovery was the focus of two public outreach and education efforts. These efforts are a reflection of the change in direction of the CTUIR's and BPA's approach to restoration and protection of anadromous fish habitat from the early instream stabilization and habitat restoration approach to a more holistic systems based approach that addressed the causative factors to habitat degradation.

The first of these public outreach projects was job training for tribal youth in the Summer Youth Program. A summer youth employee was funded by the Job Training Program to assist tribal staff with enhancement efforts in exchange for education in natural resource management techniques. The youth was trained in riparian plant identification and restoration techniques, photo documentation techniques and basic land survey methods.

The second outreach effort was with a local Boyscout troop. Students in both situations learned the importance of good land stewardship and developed a working knowledge of riparian restoration techniques. As a result of their assistance to tribal staff, riparian habitats were enhanced throughout the Meacham Creek and Umatilla River project areas with the planting of grass/forb seed mixes and riparian hardwood cuttings and rooted cottonwood and willow stock on protected sites within the riparian corridor fence. Sites disturbed by construction activities were seeded with grass/forb mix to minimize erosion.

These efforts will provide for increased stream bank stability and maintenance of lower water temperatures within and below the project areas. The exposure the participants received to resource restoration and protection issues may provide for long lasting and wide spread resource benefits throughout their lives.

The protected riparian corridor on the Umatilla River was expanded through the construction of 1.2 miles of high tensile smooth wire fencing to exclude livestock.

#### **Monitoring and Evaluation:**

Monitoring and evaluation of instream and riparian recovery continued throughout all project areas with photo-documentation of riparian recovery, survey of channel cross sections to measure the effects of treatments on stream channel morphology, and collection of water temperature, and suspended sediment data. While the effects of the enhancement efforts on water quality may not be detectable for years, the data collected will provide important base line information. A compilation of the data sets and, where continuity of data permitted, summary graphs were prepared (Appendix A.). The highest recorded temperatures occurred June 24th 1992 in Wildhorse Creek. This tributary to the Umatilla River has great potential for future riparian restoration and its high visibility along Highway 11 makes it a good choice for future demonstration projects. Meacham Creek and the Umatilla River both produced stream temperatures in excess of 750 F. in June with Meacham Creek exceeding 800 F. in August.

Suspended sediment loads as sampled from the Umatilla River at the west boundary of the Umatilla Indian Reservation peaked in February at over 250 tons per day. This peak corresponded to a daily average discharge rate of over 2000 Cubic Feet per Second. This sediment load was measured above Wildhorse Creek and would have been significantly increased due to its contribution of sediments.

### Squaw Creek Steelhead Length Frequency Survey:

Summary of the limited length frequency data collected during the genetic risk assessment sampling in June 1992 (Figure 2.) shows a greater frequency of 0+ age class than 1+. Length frequency data collected in October of the previous year (Figure 3.) showed a greater frequency of 1+ age class.

While the sampling strategies, magnitude of area searched and level of effort differed, the observed differences may reflect the effects of high predation on the 0+ age class during the lower flow periods later in the season, possibly from the 1+ age class steelhead. Further analysis of age class survival during low flow periods is needed to make more substantive conclusions. However, instream cover through out the Umatilla Basin should continue to be emphasized in enhancement efforts to help assure maximum survival of anadromous salmonids in early life stages.

FIGURE 2. SQUAW CREEK JUVENILE STEELHEAD LENGTH FREQUENCIES  
JUNE 25, 1992

## Squaw Creek Juvenile Steelhead June 25, 1992

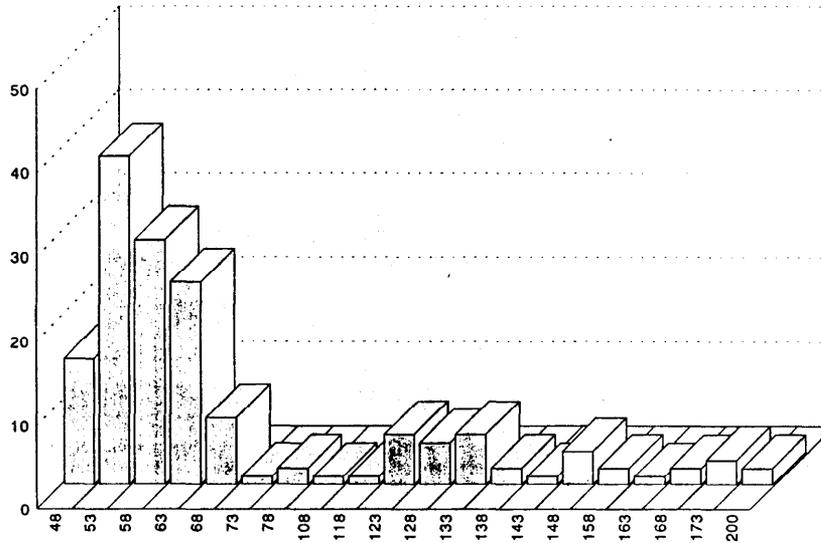
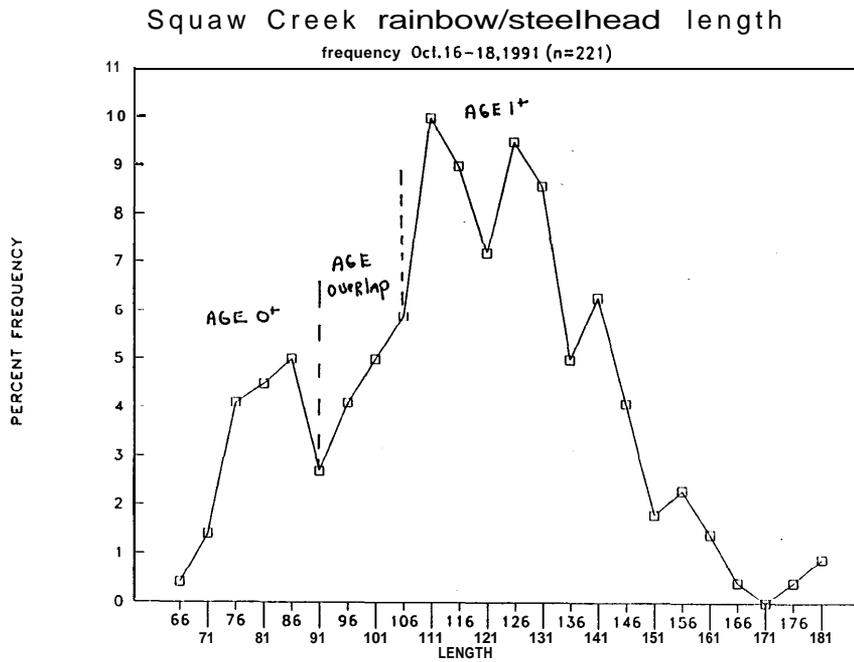


FIGURE 3. SQUAW CREEK RAINBOW/STEELHEAD LENGTH FREQUENCIES  
OCTOBER 16-18, 1991



### Out-Year Plannina:

Expansion of the watershed approach to resource protection and enhancement will be proposed for the 1993 project year. Increased public outreach and education is essential to preserve the progress made to date. Addressing the factors that continue to degrade the watershed and its associated anadromous fish habitat is needed to provide widespread and lasting success of restoration efforts.

Proposed double track expansion of the Union Pacific Railroad through the Blue Mountains poses a potential threat to the fisheries resources in Umatilla and Grand Ronde and Powder River Basins. CTUIR will continue to coordinate with the Union Pacific Railroad and the state and federal resource agencies to assure protection of the existing investments in the fisheries resources in Meacham Creek and the Umatilla River and to minimize operational impacts to the system as a whole.

The importance of natural processes in maintaining and restoring fish habitats should be emphasized over more costly artificial approaches. The use of beaver in restoring system function in areas where they are compatible with existing land use needs to be documented and presented to landowners in the Umatilla Basin.

CTUIR staff have documented the establishment of beaver in Meacham Creek above the project areas. Documentation of their effects on riparian flood plain habitat development and protection of this area should be of high priority for out years. Demonstration of roles of these natural processes in restoration of flood plain functions will be valuable in working with landowners throughout the tribal ceded lands.

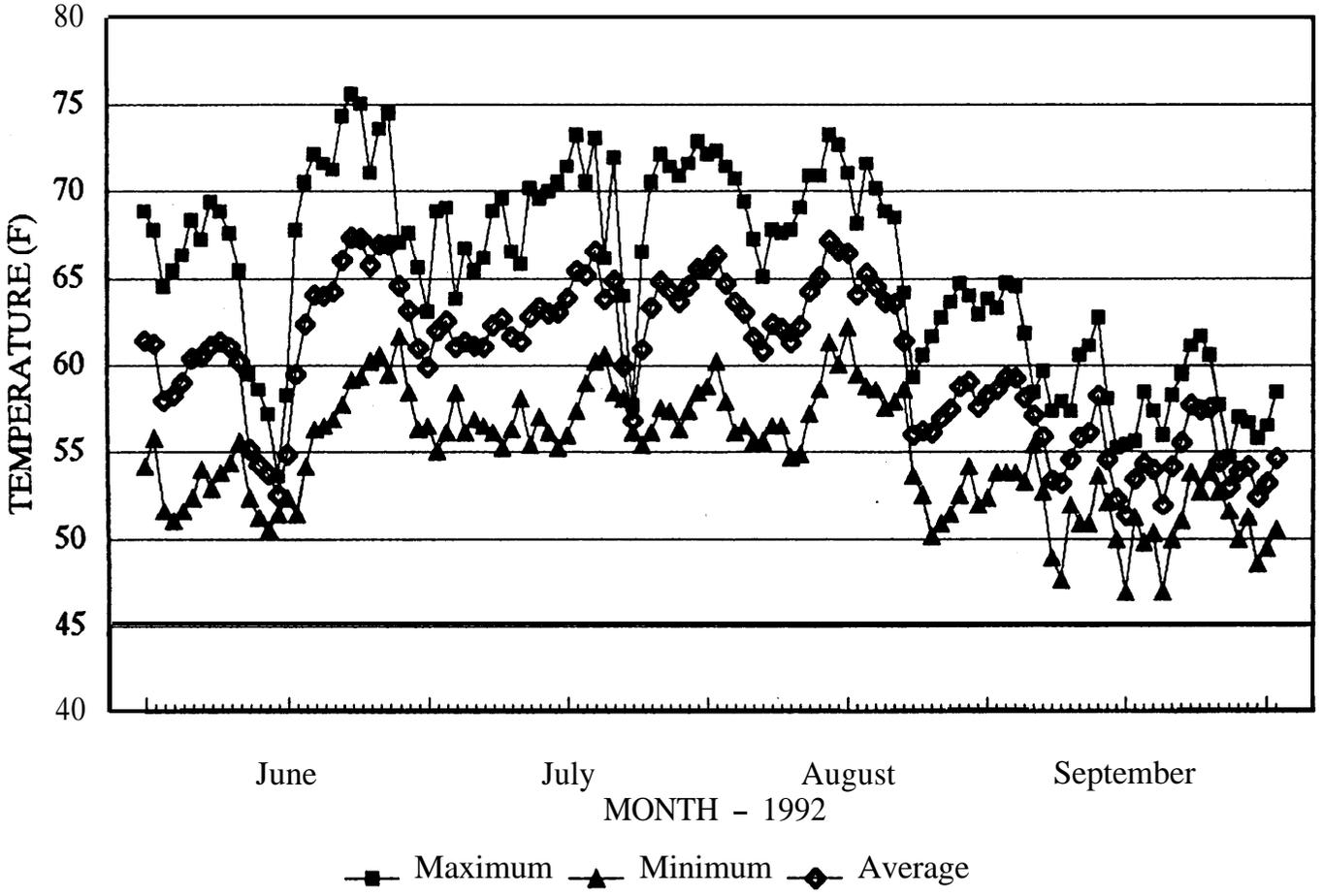
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- Gonthier, J.B. and D.D. Haris. 1977. Water Resources of the Umatilla Indian Reservation, Oregon. U.S. Geological Survey Water Resource Investigations 77-3 U.S. Dept. of Interior. Portland, Oregon 112 pages.
- Reeve, R., S. Williams, J. Neal and J. Sanchez. 1988. Umatilla River Drainage Anadromous Fish Habitat Improvement Implementation Plan. March 1988, Available from: Bonneville Power Administration, Portland, Oregon 53 pages.
- U.S. Army Corps of Engineers, Walla Walla District. 1975. Flood Plain Information, Umatilla River Cayuse-Gibbon, Oregon 22 pages.

Appendix A:  
Water Quality Data

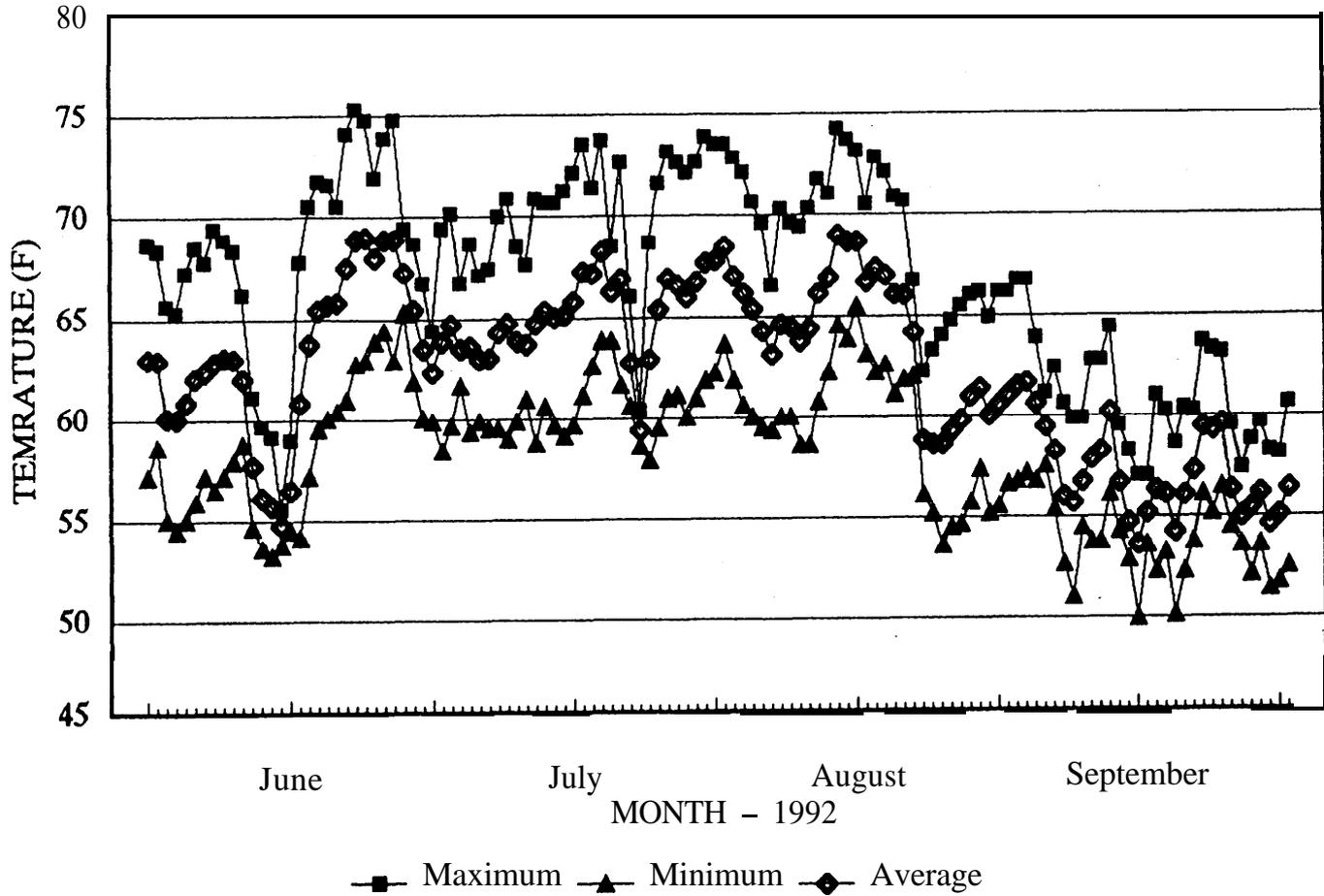
# UMATILLA RIVER

River Mile 81.7 (USGS Gage Station)



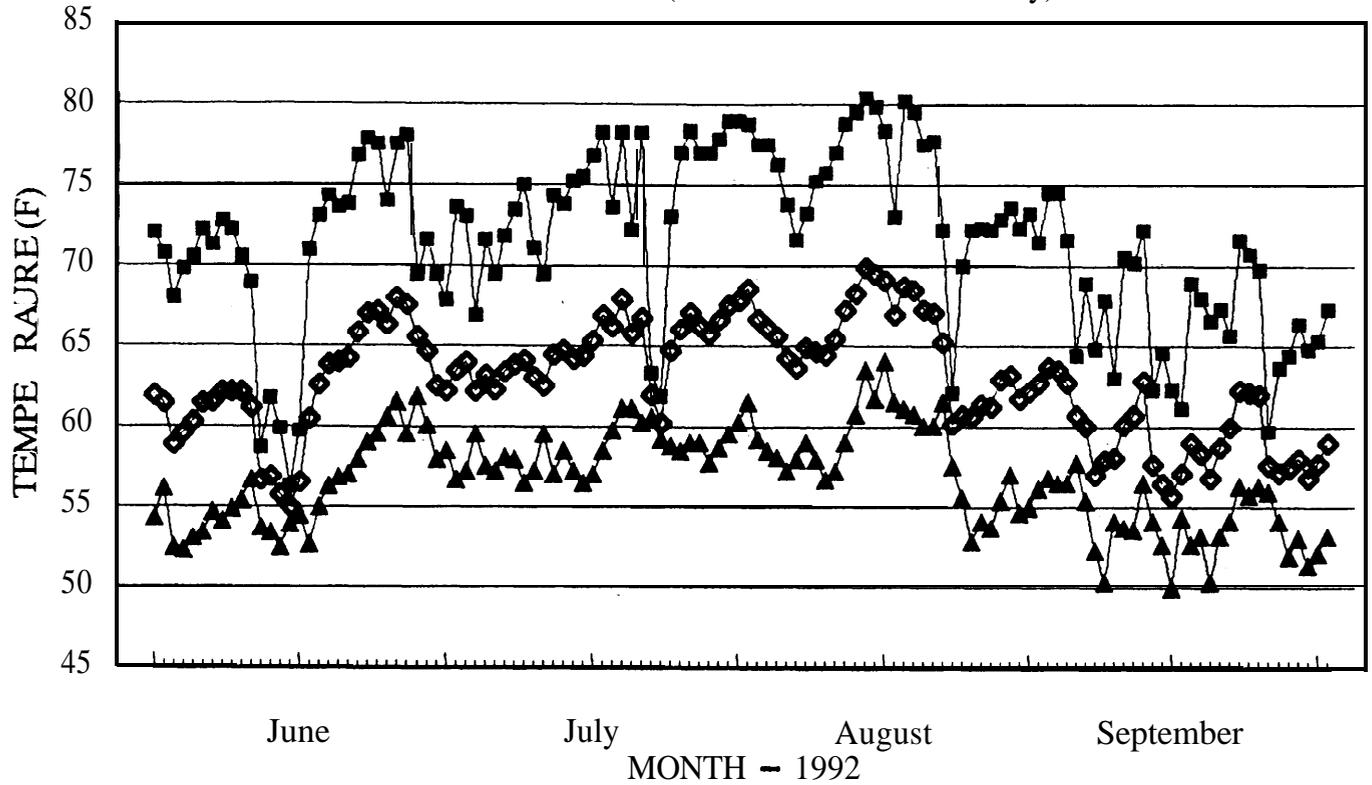
# UMATILLARIVER

River Mile 78.5 (Below Mouth of Meacham Creek)



# MEACHAM CREEK

River Mile 5.25 (East Reservation Boundary)



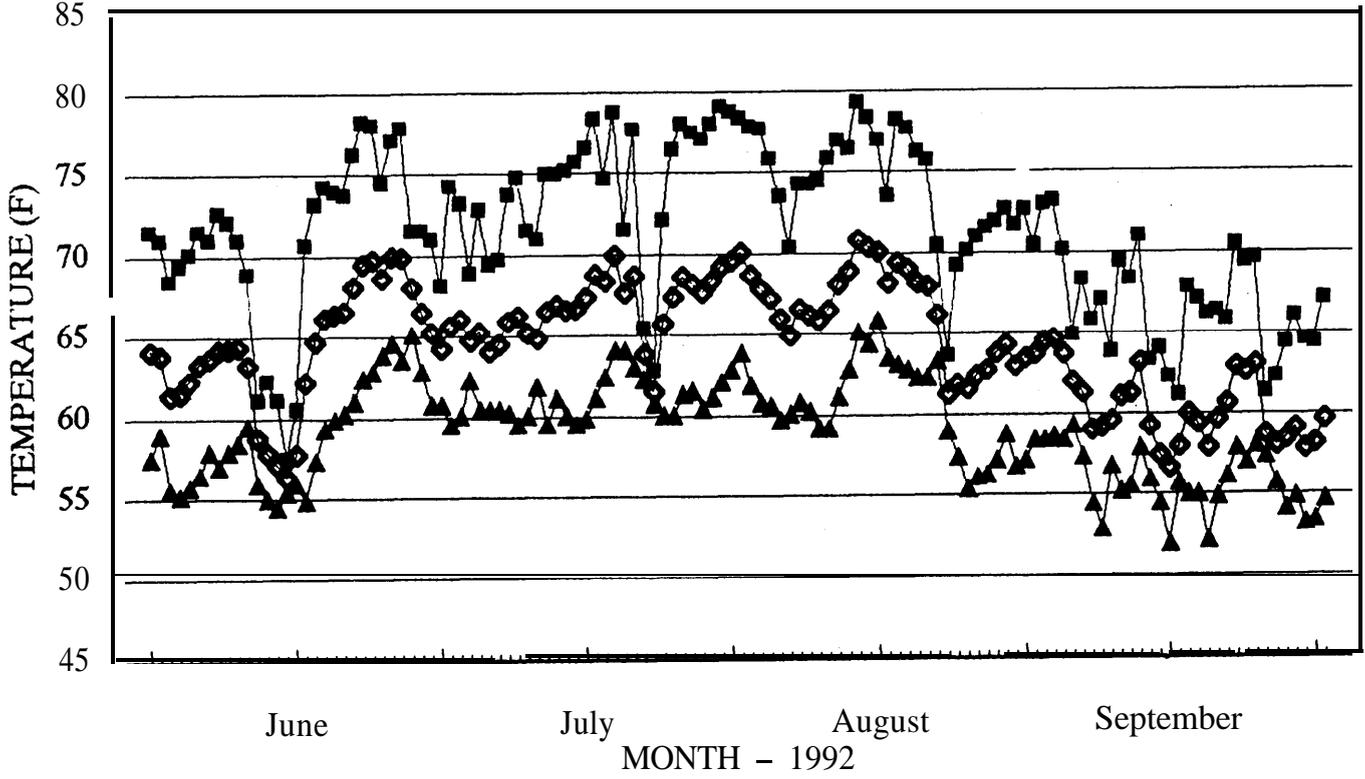
■ Maximum ▲ Minimum ◆ Average

File Name: TL903023.002

Graph File Name: MEACHRMS

# MEACHAM CREEK

River Mile 2 (USGS Gage Station)

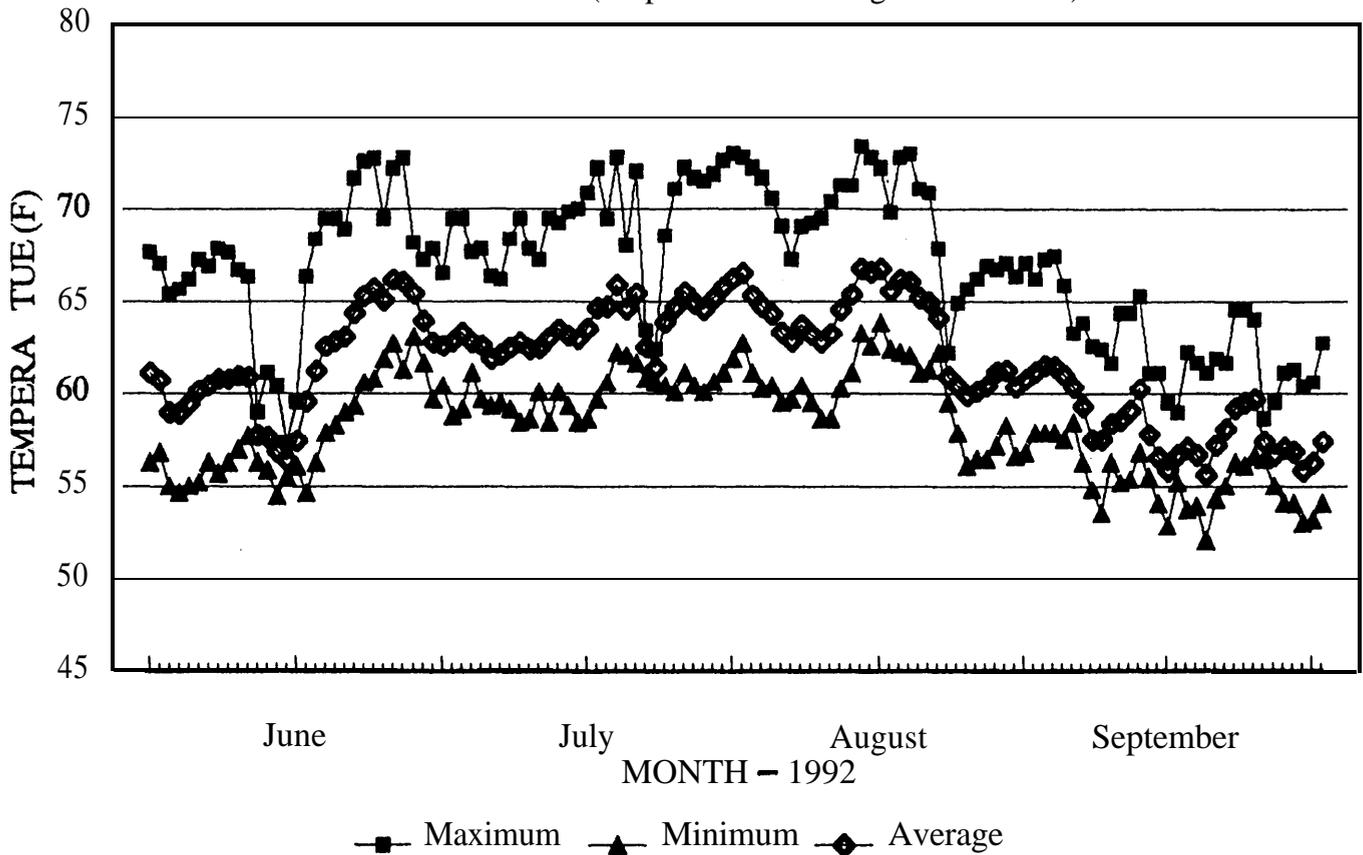


■ Maximum ▲ Minimum ◆ Average

File Name: TL900721.011  
Graph File Name: SUMMER

# SQUAW CREEK

River Mile 2 (Proposed USGS Gage Station Site)

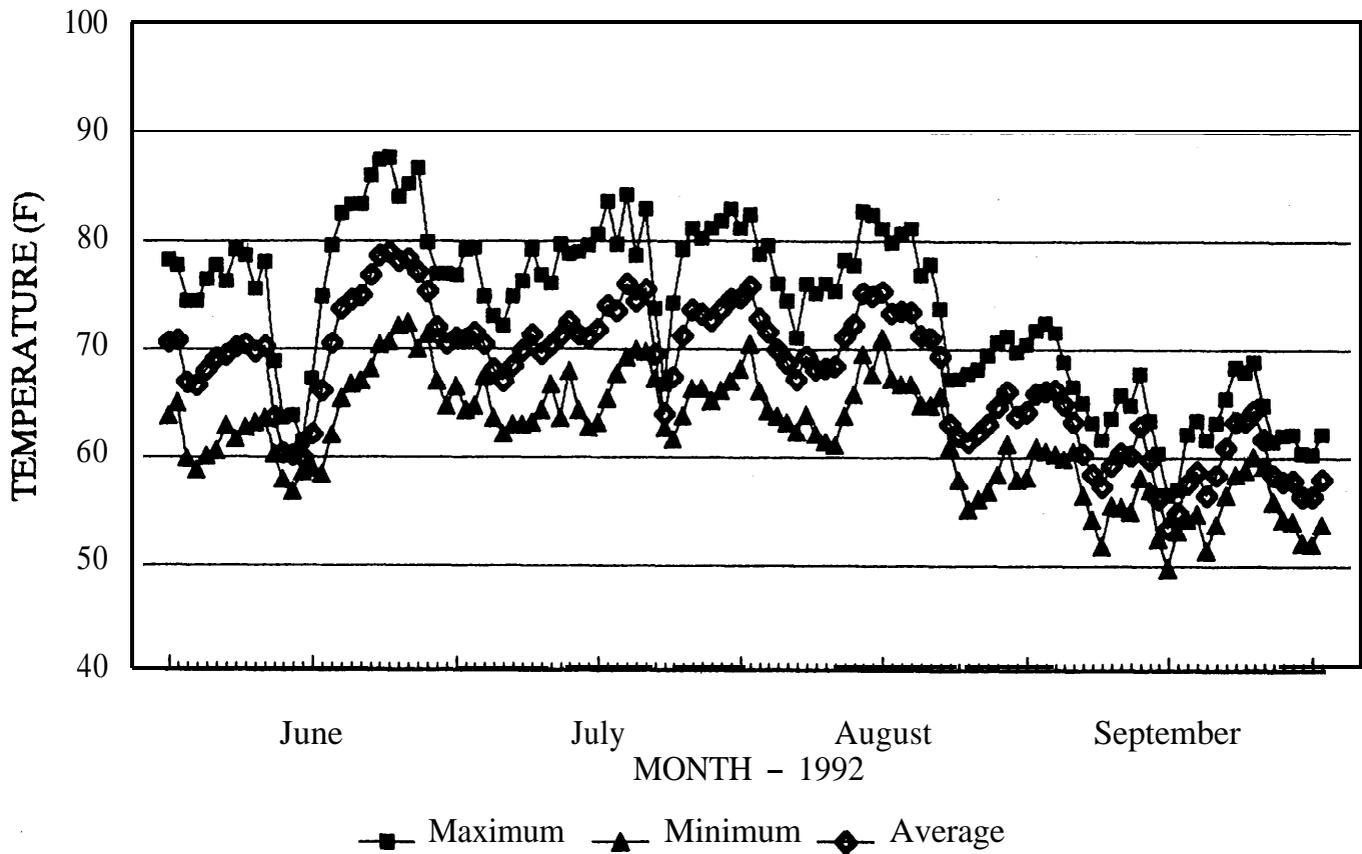


File Name: TL903021.002

Graph File Name: SQUAWRM2

# WILDHORSE CREEK

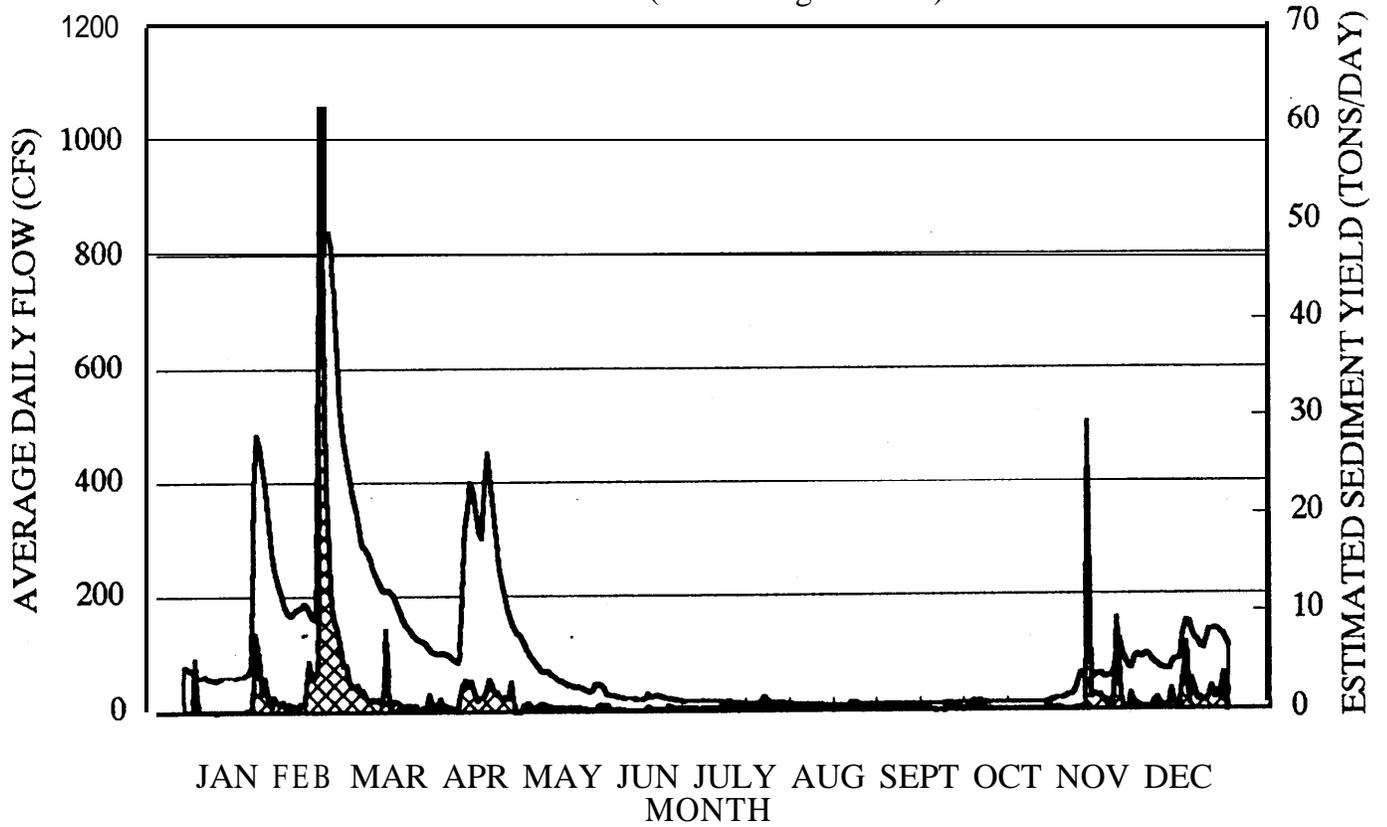
River Mile 26



File Name: TL902390.001

Graph File Name: WILDRM26

1992 MEACHAM CREEK SUSPENDED SEDIMENT DATA  
River Mile 2 (USGS Gage Station)



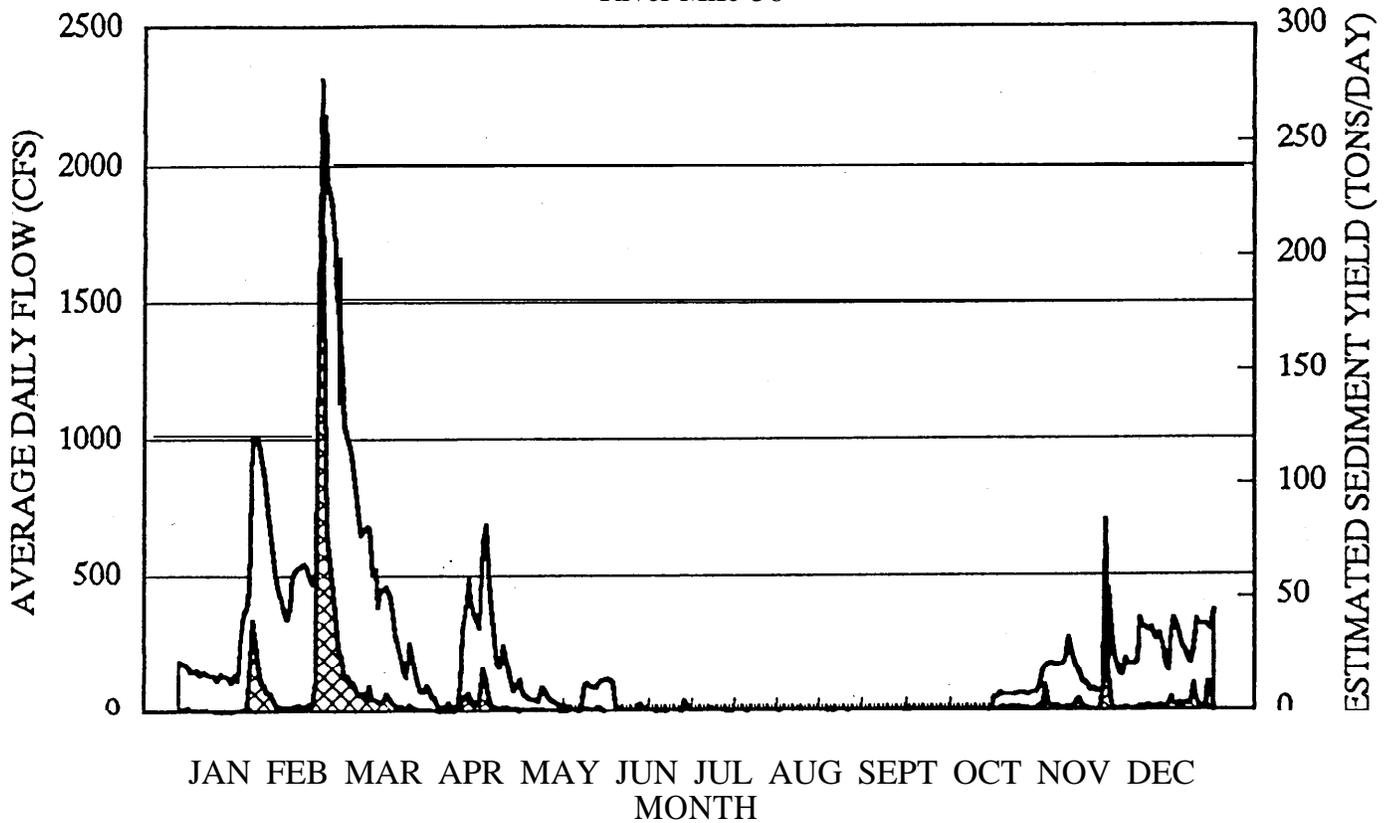
Flow (CFS)

Estimated Sediment Load (Tons/Day)

File Name: MEACHSED

Graph File Name: MEACHRM2'

1992 UMATILLA RIVER SUSPENDED SEDIMENT DATA  
River Mile 56



□ Flow (CFS)

▣ Estimated Sediment Load (Tons/Day)

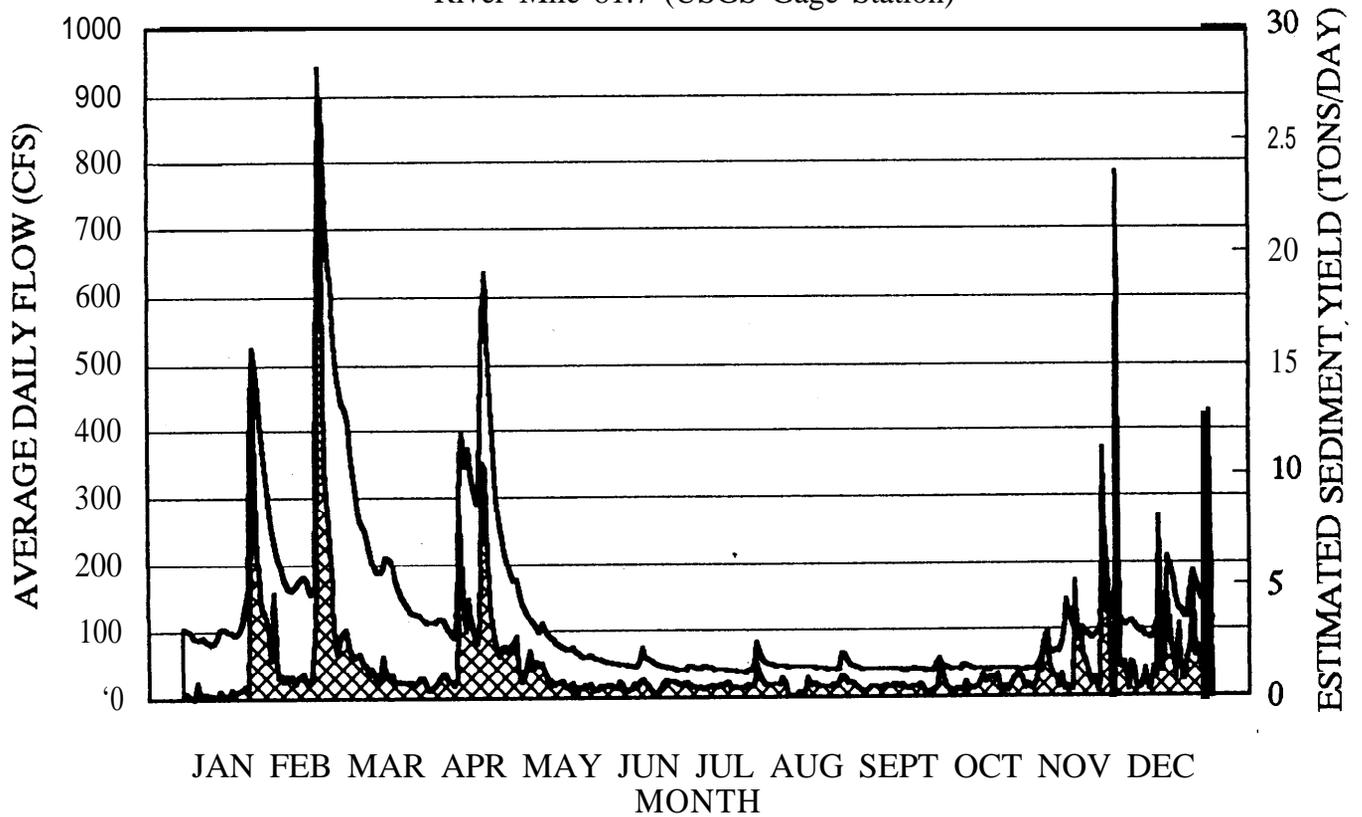
Sediment data not collected June 1 through June 19.

Sediment data collected above confluence of Wild Horse Creek Flow collected below confluence.

File Name: URM56SED

Graph File Name: UMSED56

1992 UMATILLA RIVER SUSPENDED SEDIMENT DATA  
River Mile 81.7 (USGS Gage Station)



□ Flow (CFS)

▣ Estimated Sediment Load (Tons/Day)

File Name: URM81SED

Graph File Name: UMASED81