UMATILLA RIVER SUBBASIN FISH HABITAT IMPROVEMENT PROJECT

ANNUAL REPORT 1993

Prepared by:

Timothy D. Bailey, District Fish Biologist
Troy S. Laws, Fish Habitat Biologist

Oregon Department of Fish and Wildlife
Pendleton, OR

Prepared for:

U. S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
P.O. Box 3621
Portland, OR 97283-362 1

Project Number 87- 100-02
Contract Number DE-AI79-87BP3 5769

MAY 1994

ABSTRACT

This annual report is in fulfillment of contract obligations with Bonneville Power Administration which is the funding source for the Oregon Department of Fish and Wildlife's Umatilla Basin Habitat Improvement Project.

Major activities undertaken during this report period included: 1) procurement of one access easement with a private landowner, 2) design, layout, and implementation of **3.36 miles** of instream structure maintenance 3) inspection and routine maintenance of 15.1 miles of fence 4) revegatation along 3.36 miles of stream, 5) collection and summarization of physical and biological monitoring data, 6) extensive interagency coordination, and 7) environmental education activities with local high school students.

TABLE OF CONTENTS

INTRODUCTION

The Northwest Power Planning Council's Fish and Wildlife Program (NPPC 1987) calls for the rehabilitation of steelhead and salmon populations in the Umatilla River (Section 703) (c) (I) to partially mitigate for losses due to the installation and operation of the Federal Columbia River Power System. Historically, the Umatilla supported large runs of spring and fall chinook salmon, which provided productive Indian and non-Indian fisheries. Although most chinook were eliminated from the Umatilla over 50 years ago, a few spring chinook salmon were observed as recently as 1963 (OGC 1963), and fall chinook as recently as 1957 (Thompson and Haas 1960).

Annual runs of summer steelhead have averaged 2,123 adults during the past fourteen years with a low of 768 in 1981-82 and a high of 3,124 in 1986-87; counts for 1992-93 were 1,913 (Table 1).

Until the mid-1900's, natural production of coho salmon was widespread throughout the Columbia Basin. In areas above Bonneville Dam, the species could be found in numerous subbasins of the mid- and upper Columbia regions (NPPC 1990). Historically, the Umatilla River is considered to have supported coho, however, documentation of the coho's presence, era of disappearance, and historical abundance is unknown.

The Oregon Department of Fish and Wildlife (ODFW) and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) are currently implementing a major salmon re-establishment program in the Umatilla Basin. Adult fish counts conducted at Three Mile Dam (Figure A) documented fall chinook returning to the river since 1985, spring chinook since 1988 and coho since 1987 (Tables 2, 3 and 4).

Reasons for the decline of anadromous fish in the Umatilla River include passage problems at Columbia and Umatilla River dams, water use practices within the basin, poor watershed health, and degradation of the quality and quantity of spawning and rearing habitat. Reduction in the amount of riparian habitat along the river and its tributaries contributes to poor stream conditions, which result in: 1) greater seasonal variation in flows and water temperatures, 2) unstable streambanks, 3) decreased production of food organisms used by fish, and 4) loss of instream and streamside cover (USFWS and NMFS 1982). Approximately 70% of the stream miles inventoried in the Umatilla River Basin in 1982 (295 miles) were identified as

needing riparian habitat rehabilitation (USFWS and NMFS 1982). Intermittent or non-existent summertime flows in sections of Meacham, Squaw, Wildhorse, and Birch creeks are due in part to extensive losses of riparian vegetation throughout the past century.

The Umatilla River Basin has three government agencies working on habitat improvement projects within their respective jurisdictions. The three agencies are: Confederated Tribes of the Umatilla Indian Reservation (CTUIR) on reservation lands; United States Department of Agriculture Forest Service (USFS) on Umatilla National Forest lands: and Oregon Department of Fish and Wildlife (ODFW) on private lands.

During 1993 the ODFW/BPA program emphasis for the Umatilla Basin shifted from project implementation to maintenance and evaluation. As a result, no new riparian leases were procured in 1993.

TABLE 1. THREE MILE DAM /1, UMATILLA RIVER SUMMER STEELHEAD COUNTS

YEAR /2	TOTAL ADULTS
1979-80	2,367
1980-81	1,298
1981-82	768
1982-83	1,264
1983-84	2,062
1984-85	3,436
1985-86	2,959
1986-87	3,124
1987-88	2,481
1988-89	2,476 /3
1989-90	1,694
1990-91	1,111
1991-92	2,769
1992-93	1,913

/l See Figure 1 for the location of Three Mile Dam within the Umatilla Basin.

/2 September 1 through June 30.

/3 Trap shut down for extreme cold weather from 2-2-89 to 2-24-89.

TABLE 2. THREE MILE DAM, UMATILLA RIVER SPRING CHINOOK COUNTS

YEAR			TOTAL
	ADULT /l	JACK /2	TOTAL
1988	13	0	13
1989	66	98	164
1990	2,158	32	2,190
1991	1,291	39	1,330
1992	462	4	466
1993	1,205	16	1,221

/l Adults are greater than 24 inches in length.

/2 Jacks are precocially mature fish less than 24 inches in length.

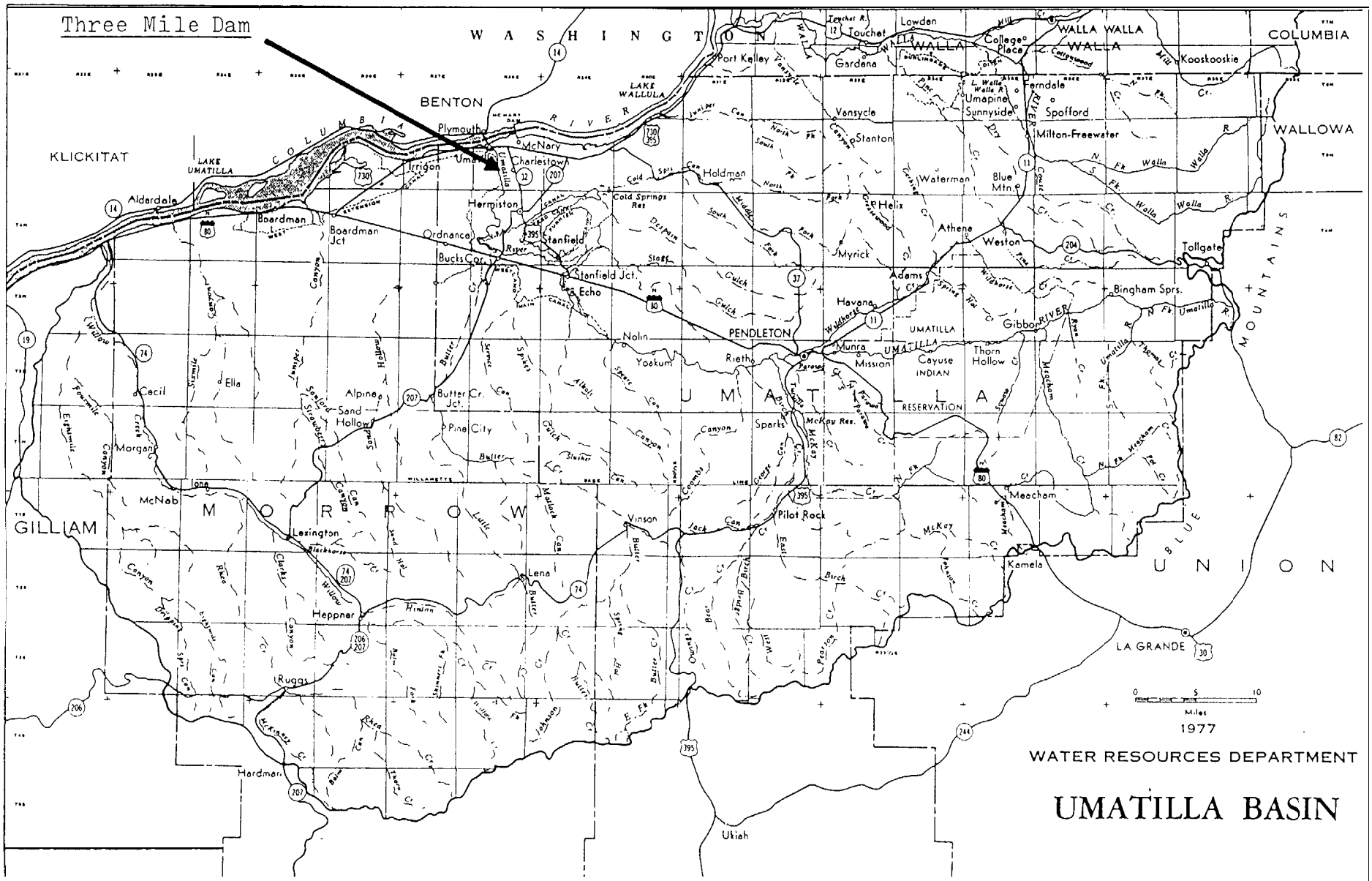


Figure A. Location of Three Mile Dam within the Umatilla subbasin.

TABLE 3. THREE MILE DAM, UMATILLA RIVER FALL CHINOOK COUNTS

YEAR	TOTAL			
	ADULT /1	JACK /2	SUBJACK /3	TOTAL
1985	6	79	0	85
1986	27	447 /4	0	474
1987	52	52	295	399
1988	94	176	1,283	1,553
1989	279	247	76	602
1990	333	107	621	1,061
1991	522	468	274	1,264
1992	239	64	0	303
1993	370	27	15	412

/l Adults are greater than 24 inches in length.

/2 Jacks are precocially mature fish between 18 and 24 inches in length.

/3 Subjacks are precocially mature fish less than 18 inches in length.

/4 A combination of jacks and subjacks.

TABLE 4. THREE MILE DAM, UMATILLA RIVER COHO COUNTS

YEAR	TOTAL		
	ADULT /l	JACK /2	TOTAL
1987	0	29	29
1988	742	610	1,352
1989	3,694	507	4,201
1990	409	511	920
1991	1,733	187	1,920
1992	340	173	513
1993	1,531	18	1,549

/l Adults are greater than 20 inches in length.

/2 Jacks are precocially mature fish less than 20 inches in length.

DESCRIPTION OF PROJECT AREAS

The Umatilla River, located in northeast Oregon, originates on the western slopes of the Blue Mountains east of the city of Pendleton (Figure B). The river and its tributaries flow in a northwesterly direction for approximately 115 miles. The rivers confluence with the Columbia is located at river mile (RM) 289 near the town of Umatilla, Oregon. The Umatilla River drainage encompasses approximately 2,545 square miles and as monitored at the city of Umatilla, Or. (RM 2), has an average annual runoff of about 336,000 acre-feet (OWRD, 1988). The actual total annual runoff is estimated to be much higher. Due to extensive water withdrawals within the basin, Oregon Water Resources Department (OWRD) estimates the total annual yield to be 515,000 acre-feet. In downstream order, beginning at the headwaters, major tributaries of the Umatilla River are: North and South Forks of the Umatilla River, Meacham, McKay, Birch, and Butter creeks.

Intensive agriculture (dry land farming, irrigated crops, and livestock grazing) is the dominant land use throughout the lower Umatilla Basin while timber harvest and livestock grazing are the predominant land uses in the upper basin. Intensive land uses within flood plains have led to dramatic changes in waterway characteristics since settlement of the basin in the 1800's. Stream channelizing (straightening), diking of flood plains, streambank rip-raping, and elimination of riparian vegetation have turned many basin streams into relatively straight and deeply incised channels. Loss of stream channel meander within the valley floors help to accelerate runoff velocity and its impacts to the land. From a water quality and fisheries perspective, streams in the forested areas of the basin are in better condition than sections of streams found in areas of intensive agriculture.

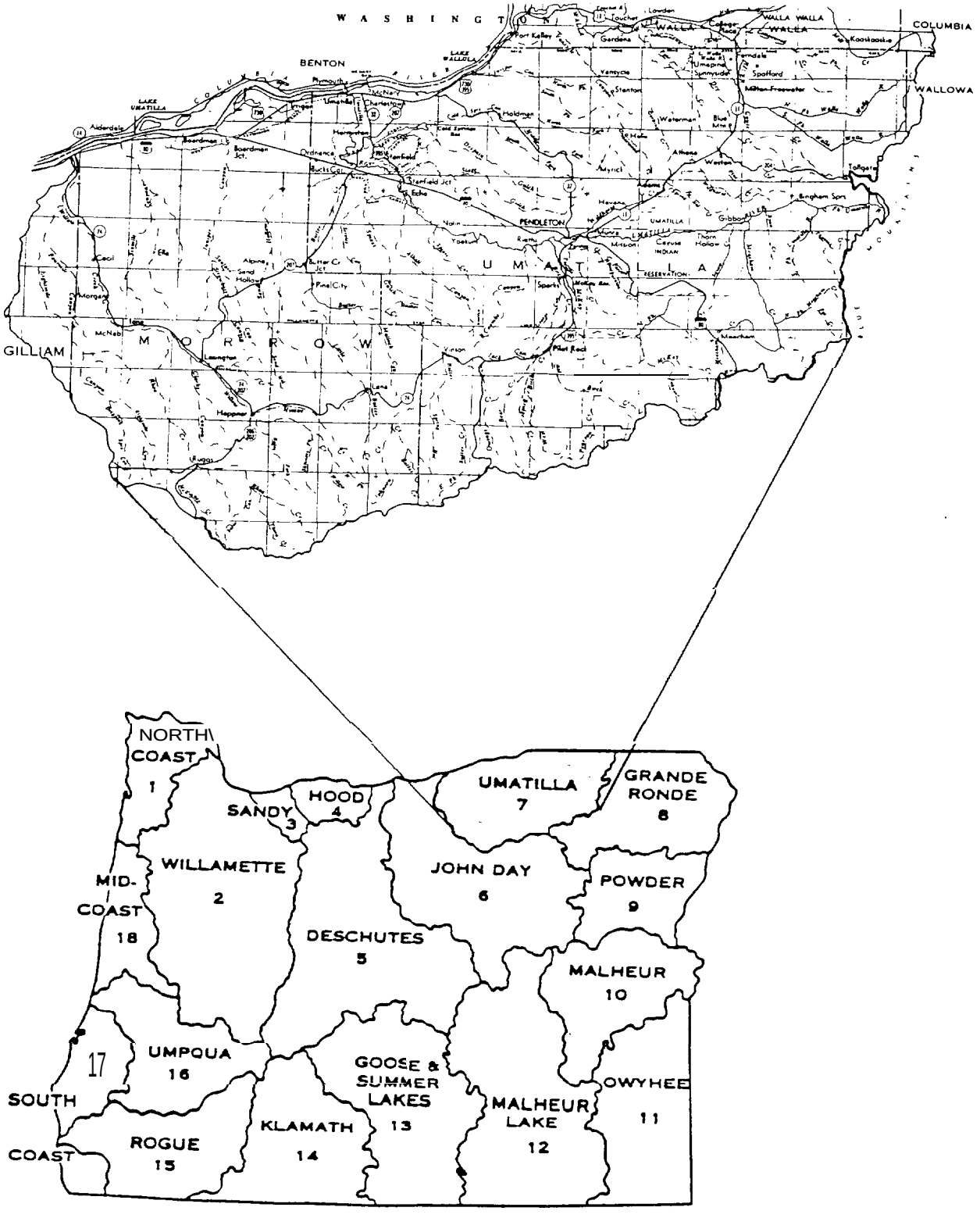


Figure B. Location of the Umatilla Basin within Oregon.

METHODS AND MATERIALS

The goal of the Umatilla Basin Fish Habitat Improvement Program is to optimize salmon and summer steelhead smolt production within the Umatilla River Basin using habitat enhancement measures. To accomplish this goal, work has progressed in four phases:

1. Implementation - Prework
2. Implementation - Onsite Developments
3. Operations and Maintenance
4. Monitoring and Evaluation

In 1993, program emphasis shifted from implementation to operation/maintenance (O&M) and monitoring/evaluation (M&E). Methods discussed herein, therefore, are only those associated with O&M and M&E activities.

Operations and Maintenance

O&M entails maintaining project structures (i.e. fences, water developments, and instream structures) and any vegetative work, (e.g. plantings, weed control, etc.) needed to ensure desirable results. The O&M phase of the program will continue on each project site for the duration of the respective riparian leases (usually 15 years). Typical O&M activities include:

1. Project Planning

Project planning includes design and layout of all maintenance work to be done on-site, landowner coordination, development of contracts and contract specifications, and obtaining necessary work permits.

a. Desian and Lavout

The layout of maintenance projects (fencing, instream structures, water developments, vegetative plantings, etc.) is usually accomplished in late winter or following spring runoff.

Design and layout of maintenance projects consists primarily of on-site development. Landowners are usually given the opportunity to review and comment on design and layout of projects. The actual quantity and design of structures, however, is determined by the biologist, with input from other professionals.

b. Landowner Coordination

Landowner coordination is an integral part Of maintenance on all projects. Access, ground conditions, and work implementation timing are all important considerations to reduce impacts on landowner's operations.

c. Development of Contracts

Contract documents are developed for all major maintenance projects. Considerable time is required to develop and collate written contract document components.

d. Obtainina Work Permits

Fill and removal permits must be obtained for all instream projects that involve removal or fill in a waterway. Permits must be obtained fro-m the Army Corps of Engineers, Oregon Division of State Lands, and the Umatilla County Planning Department. Development of permit applications, and correspondence with these agencies requires considerable time.

2. Fencing

Because of intensive use by livestock along many project areas, fence inspections and maintenance is a year-round activity. Adequate maintenance is mandatory to ensure riparian recovery is achieved inside project boundaries.

3. Instream

Repair of instream structures is often necessary. High-water events or changes in channel morphology can cause a structure to fail. To ensure structural integrity and desirable results, appropriate maintenance activities may take place:.

4. Revegetation

The goal of the Fish Habitat Program is to establish abundant riparian vegetation to reduce soil erosion and provide benefits to aquatic and terrestrial resources. Plantings are made when the biologist and/or other resource specialists determine that natural revegetation is not occurring rapidly enough,

Maximum shade attainable for most streams in project areas is about 80%. The objective of the program is to reach a minimum of 70% shade within 20 years of project implementation.

High summer water temperature is a major limiting factor for salmonid fish production in many Umatilla Basin streams. Revegetating project lease areas helps provide additional stream shade, thereby helping to reduce summer water temperatures.

Re-establishment of maximum stream shade attainable may help project streams achieve compliance standards for water quality as required by Oregon Department Of Environmental Quality (ODEQ) Adminstrative Rules. The acceptable range for water temperature in the Umatilla River Basin is $< 68^{\circ}F$ (ODEQ, 1993). Landuse and/or wateruse activities which cause streams to exceed water quality standards are illegal.

During the spring and fall, areas disturbed while conducting maintenance activities are seeded with grasses and legumes to stabilize soils and discourage weed growth. Since many projects are also within areas of intensive agriculture, noxious weed control is, at times, also necessary. Project areas are monitored throughout the spring and summer for noxious weed occurrence. When discovered, these weeds are either sprayed with herbicides or manually removed.

5. **Miscellaneous**

Animal over-utilization of project areas has a negative impact on project objectives. As riparian zones begin to reestablish, animals (wild and/or domestic) may increase their use of the site. Any use which causes the site to become degraded or static should be addressed (e.g. beavers dropping trees inside project areas where trees are deficient). To address this type of problem, program personnel may initiate measures to discourage animals from over using an area. Wrapping tree trunks with wire to discourage beaver damage is a viable solution. Other miscellaneous activities include maintenance and repair of project equipment.

Wonitorina and Evaluation

This phase of the program usually begins the year following completion of implementation and will continue for the duration of each projects respective riparian lease (usually 15 years). Typical (M&E) activities may include:

1. Photopoint Monitoring and Picture Taking

Standardized pictures are taken from selected photopoints prior to project implementation, and then during the fall each year thereafter. Over time these photopoints will provide visual record of habitat changes that occur. Also associated with photopoint monitoring is maintenance of a photopoint notebook for each project area. These notebooks contain maps of all photopoint locations, instructions on taking the photographs, and labeled slides and prints. To date, the Umatilla program has 56 active photopoint sites.

2. Habitat Monitoring Transect Establishment and Data

Within selected project areas permanent habitat monitoring transects have been established to measure channel morphology and vegetative response to habitat enhancement activities. These measurements are to be repeated at regular intervals (3-5 years) and these data compared to the original data as a means of quantitatively measuring environmental change through time.

3. Thermograph Data Collection and Summarization

Thermographs have been installed within or adjacent to several project areas (Appendix 1, Figure C). They are utilized year round, collect one temperature reading per hour, and are operated for six month intervals (maximum data storage capacity of the thermograph). The program uses thermographs to gather baseline data and detect changes in water temperatures. Data is downloaded into a computer program after each deployment period and summarized. Results of the data help determine if project goals are being met.

4. Biological Surveys

Biological surveys help resource managers assess the ecological roles and habitat requirements of fish and wildlife. Information on the habits and habitat requirements of species life history stages can be critical not only to effective management of fish and wildlife resources, but also to evaluation of the impacts of man's activities on specific populations or ecosystems.

Biological surveys conducted by the fish habitat program incorporate active fish capture techniques to gather baseline information on fish/fish populations residing in project streams. Data collected can provide insight to the presence/absence, abundance, distribution, season of use, age composition, species composition, and habitat preference(s) of the species sampled. Presently, data collected are for informational purposes only and are not statistically valid for answering questions regarding biomass or population gains from habitat projects.

5. Physical Habitat Surveys

Physical Habitat Surveys conducted on project streams are periodically initiated through the fish habitat program. Data collection methods and habitat parameters sampled were developed by the ODFW Aquatic Inventories Program (ODFW 1993). Data collected provides quantitative information on habitat conditions of stream reaches sampled and is considered valid for repetitive sampling purposes (surveys should be repeated every 3-5 years).

Associated with physical habitat surveys is the development of Habitat Performance Benchmarks for Eastside and North Eastern Oregon streams. Habitat Performance Benchmarks are a compilation of value ranges derived from variables sampled while conducting physical habitat surveys (Kim Jones, ODFW, personal communication). Habitat benchmarks provide resource managers a table of reference to use in their analysis of habitat survey data when comparative data for a reach sample is not available (Appendix 3, Table 6).

6. Miscellaneous Field Activities

Proposed instream work activities on non-project lands that may effect project areas are reviewed by the biologist (e.g. fill and removal permit applications). The biologist provides technical input on the projects design/re-design; additional recommendations for information not presented in the application; and, in some cases, support for rejecting an application as proposed due to negative impacts the project will have on fish and fish habitat.

RESULTS AND DISCUSSION I. FIELD ACTIVITIES

All 1993 field work were associated with either O&M or M&E activities.

Operations and Maintenance

Maintenance Work Planning

There are four stages included in planning: a) design and layout, b) landowner coordination, c) development of contracts and contract specifications, and d) obtaining work permits.

a. **Design and Layout.** Project design and layout was completed for instream maintenance activities on 2.23 miles of Birch Creek, and 1.13 miles of East Birch Creek.

b. **Landowner Coordination.** A considerable amount of time was spent coordinating with landowners when developing plans for maintenance of project structures.

The Technician coordinated with landowners along Birch Creek regarding weed control activities inside lease areas.

Yvonne Gambill was contacted regarding placing **a** stock watering trough on her property. The trough would be supplied with water from the creek by a solar powered water pump. This project would eliminate one water gap on the project.

Ben Weinke was contacted about planting of grasses and shrubs on his property.

Mac Levy of Cunningham Sheep contacted the Biologist regarding possible project implementation on their West Birch Creek property. He was instructed that BPA funds were no longer available for project implementation. The Biologist and Program Leader met on-site with Mr. Levy to discuss the possibility of supplying state funding for the project.

Restoration efforts on the William Weinke and J. Hatley properties were reviewed by the Biologist with J. Robinson of Wood Fiber Industries and J. Hatley respectively.

A fill and removal project proposal meeting was conducted on the Opal Rhinhart property to discuss instream work proposed for a site inside the program lease agreement. The Biologist, 0. Rhinhart and J. Sparks (landowners), and C. Hadley of (SCS) were in attendance.

Instream work issues were addressed with the McDaniels on their Birch Creek property.

Instream work activities proposed for the Roger Spaulding and Bill Joliff East Birch Creek properties were reviewed by the Biologist. Projects had the potential to affect program leases downstream.

A instream fill and removal activity planned for property owned by Bob Hoeft on West Birch Creek was reviewed by the Biologist.

c. **Development of Contracts.** A weed control contract was developed with the Umatilla County Weed Control Department for managing noxious weed problems within project areas.

Drafts of high tensile smooth wire and barbed wire fence specifications developed by the ODFW Engineering Department were reviewed, edited and returned.

d. Obtaining Work Permits. Project personnel coordinated with the Division of State Lands (DSL) and Army Corps of Engineers (ACOE) to secure 2 fill and removal permits for instream maintenance work.

Maintenance Work Preparation

All instream work sites were staked or otherwise identified with appropriate markings. Sites were prepared for work activity (e.g. riparian corridor fencing was temporarily removed, sensitive areas were marked for protection, and access routes to the work area were pre-approved by the landowner).

Maintenance Work Implementation

Instream construction/maintenance activities were completed on 2.23 miles of Birch Creek and 1.13 miles of East Birch Creek on the McDaniel, Rhinehart,

Gambill, and Houser properties. Five hundred fifty two cubic yards of rock was placed in the form of rip rap and jetties. In addition, 11 cottonwood trunks were placed instream to protect eroding streambanks and to improve fish habitat diversity. Following is a summary of O&M work completed:

McDaniel property

Three rock jetties and 75 linear ft. of rock rip rap were installed to protect actively eroding streambanks. Three naturally fallen cottonwood trees within project boundaries were used to construct a log deflector. This added complexity to instream habitat and prevented further streambank erosion.

Rhinhart property

One rock jetty and three rip rap structures damaged from previous years of high flow events, were repaired. Results of the work activity prevented further bank erosion.

Gambill property

Six rock jetties were repaired along eroding banks. One rock barb was constructed to direct flow away from an eroding streambank and prevent loss of a riparian corridor fence.

Houser property

One log deflector was constructed from naturally fallen cottonwood trees and one cottonwood tree was cabled instream to create habitat diversity.

B. Weinke, L. Hoeft, Y. Gambill, and W. Weinke properties

Cabling of instream structures installed in 1992 was completed this year. Maintenance structures installed in 1993 were also cabled. Cabling materials together (connecting strings or clusters of rocks using steel cable) increases the structures life span and efficiency.

Louisiana Pacific Mill property

An abandoned concrete irrigation diversion dam that was a partial barrier to fish migration was removed from Mainstem Birch Creek.

Fencing

Approximately 15 miles of project fencing was inspected and routine maintenance activities carried out (Table 5). Associated with fence maintenance were maintenance of 67 cross fences, 36 water gaps, and 10 electric fence systems.

Thermographs

Thermographs were checked periodically throughout the year. Thermographs on the Houser and McDaniel properties were moved short distances because of stream channel changes. A thermograph was deployed on the Straughan property on lower Mainstem Birch Creek. Addition of this site provided invaluable data for Lower Birch Creek when the thermograph located on the McDaniel property was found to have malfunctioned throughout the summer deployment period. The probe on the upper Meacham Creek thermograph was damaged by an animal (probe was chewed off) and had to be replaced midway through the summer deployment period.

Instream

Instream structures were inspected along 8.6 miles of Mainstem and East Birch Creeks and 2.2 miles of Meacham Creek. Structures found to need maintenance were identified and repair work was facilitated during the late summer low flow period.

TABLE 5. FISH HABITAT RIPARIAN PROJECTS WITHIN THE UMATILLA RIVER BASIN (OPERATIONS AND MAINTENANCE 1993).

BIRCH CREEK: Landowner	Year Imp.	Fence Miles	Acres Leased	Cross Fences	Water Gaps	Stream Miles	Instream Structures
F. Straughan	89	0.69	5.8	4	2	0.31	21
J. Straughan	90	0.84	17.2			1.00	3
McDaniel	89	1.75	20.3	9	4	0.90	42
Rhinhart	89		22.1			0.63	40
B. Weinke	90	0.50	5.8	3	2	0.50	4
Hoeft	90	0.50	21.0	2	1	1.00	1
Hemphil	89	0.38	10.0	1	1	0.25	
Gambill	90	1.25	12.9		3	0.70	21
W. Weinke	89	0.65	17.9	4	2	0.44	14
Totals:		6.56	133.0	23	15	5.73	146

E.BIRCH CREEK: Landowner	Year Imp.	Fence Miles	Acres Leased	Cross Fences	Water Gaps	Stream Miles	Instream Structures
Magic Mile	89	1.75	21.2	12	6	0.70	27
Rugg	89	0.45	10.4	3	1	0.31	
Houser	88	2.01	33.6	11	5	1.13	6
L. Pacific	89	1.25	11.4	6	2	0.70	
Totals:		5.46	76.6	32	14	2.84	33

MEACHAM CREEK: Landowner	Year Imp.	Fence Miles	Acres Leased	Cross Fences	Water Gaps	Stream Miles	Instream Structures
L. Pacific	89	0.90	15.4	4	1	0.65	
L. Pacific	91	0.50	23.5	4	3	0.60	32
F.R.Inc/Twomile	92	1.70	18.3	4	3	0.94	
Totals:		3.10	57.2	12	7	2.19	32
All Projects Total :		15.12	266.8	67	36	10.76	211

Reveaetation

Weed control activities were conducted along six miles of Mainstem and East Birch Creeks. Treated properties included the J. Straughan, Wheeler, McDaniel, Rhinhart, Hoeft, Hemphill, Gambill, W. Weinke and Houser properties.

All ground disturbed by instream maintenance activities, and areas generally lacking in ground covering vegetation inside project areas, were seeded with grasses and legumes. Two different seed mixtures were used depending on the site. The seed mixtures were: Mix 1 - 85% Paiute Orchardgrass, and 15% Birdsfoot Treefoil. Mix 2 - 35% Alcar Tall Wheatgrass, 35% Luna Pubescent Wheatgrass, 15% Dryland Alfalfa, and **15%** Yellow Blossom Sweet Clover.

Approximately 900 willow cuttings were collected from the Rhinhart and Straughan properties and planted on Mainstem Birch Creek projects sites. Seeding of grasses and legumes **was** done at various locations as well.

Water develoment

Water right needs were investigated by the biologist for the Gambill property water development project. Existing rules prohibited this project from being implemented in 1993, however, changes in the procedures for securing approval through the OWRD process appear favorable for implementing this project in 1994.

Monitoring and Evaluation

1. **Photopoint Picture Taking**

Photopoint pictures were taken from 13 Meacham and 37 Birch Creek photopoints. This activity encompassed all program leases except the J. Straughan property (6 photopoints). Photopoint notebooks were updated with the new information and duplicates of the pictures were made. Total number of active photopoints is 56.

2. Habitat Monitoring Transects and Data

Some of the habitat monitoring transects on the F.E. Straughan Birch Creek property that were buried by the 1991 flood, were relocated and identified. No data was collected from these sites.

The Biologist reviewed fish habitat transect data for the Grande Ronde and Umatilla programs. Considerable time was spent editing the data from all locations and re-entering lost portions of the data collected from McCoy Creek (Upper Grande Ronde) into the computer database. Data collected from Chesnimnus, Elk, Sheep, McCoy, East Birch, and Birch creeks in 1988 and 1989 is now edited and stored on computer diskette. Data collected from Birch and Meacham creeks in 1992 was entered into computer data files and summarized.

3. Thermograph Data Collection & Summarization

Thermographs were deployed at four locations on Birch Creek and two locations on Meacham Creek (Appendix 1, Figures C & l-5). Birch Creek thermographs are placed in Westgate Canyon and on the Houser, McDanial, and Struaghan properties. Distance from the upper thermograph site to the lower thermograph is approximately 19.5 miles. Meacham Creek thermographs are deployed on the Louisiana Pacific property and placed approximately 1 stream mile apart (Figures 6-9). Beginning in 1992, thermographs at all locations are operated year round.

1993 was a below normal year for air temperatures throughout the Umatilla Basin (National Oceanic and Atmospheric Administration [NOAA] published data, 1994). **Daily** temperature readings taken at the NOAA Pendleton airport office show 1993 as the second coldest year on record for the past 30 years. Compared to 1992, the 1993 water temperature data showed a reduction in monthly maximum and mean weekly maximum water temperatures for the spring/summer and fall/winter deployment periods (Appendix 1, Figures 10-12). Although improvements in project area riparian vegetation are occurring, air temperatures in 1993 probably had a greater influence on water temperatures.

Stream temperature data collected from Birch creek during the summer show an increase of nine to ten degrees Celsius from the upper to the lower thermograph sites (a distance of 19.5 river miles). A smaller temperature increase is evident during the winter, however, the difference between monthly minimum and maximum stream temperatures also increases from the upper to the lower site. These results are indicative of a lack of stream shading that increases downstream as evidenced by the stream habitat inventory conducted in 1988 (Williams et. al. 1989) and the stream habitat inventory conducted in 1993 **by** ODFW (ODFW Published

data, 1994). The downstream increase in stream temperature may correlate well with the downstream change in fish species composition found during 1992 & 1993 electrofishing surveys (Appendix 2).

Some of the physical and biological changes from upper to lower parts of the Birch Creek drainage can be explained by the natural continuum of ecological processes within the stream system (Vannote et. al. 1980). However, intensive land uses that occur throughout the drainage have drastically changed the riparian plant community which shapes both the physical and biological components of the stream (Cummins 1984). These uses are most pronounced in its lower reaches. Therefore, trends in these data are greatly influenced by land use practices that occur throughout the drainage. To what extent this occurs, however, cannot be quantified with the information available.

Thermograph temperature data collected from Meacham Creek indicates average maximum and minimum weekly stream temperatures are inconsistent from the upper to the lower sampling site (Appendix 1, Figures 6-9). The difference between monthly maximum and minimum stream temperature is also inconsistent between the two sites, varying from <1°C to 5°C. This difference is probably due to the location of the lower temperature probe as discussed in the **1992** annual report (Bailey, 1993). Although the lower probe is located in pool habitat, the biologist opted to leave it in the same location throughout 1993 (a better location for thermograph placement could not be found within project boundaries). Instead, a comparative test of the sampling site with a second thermograph was initiated. The second thermograph was placed in the upper water column above the original recorder. This was done to determine if thermal stratification within the water column is producing the results presented above.

For unknown reasons, data collected from the second thermograph did not offload onto the computer. Therefore, a comparison of surface vs. bottom temperatures at the lower site could not be evaluated. Water temperatures near the bottom of pools can be 2.8-5.6 degrees Celcius cooler than the surface water (Bilby 1984). This may account for the observed fluctuation rather than conditions relating to habitat quality over the one mile of stream between the thermographs. An effort will be made in 1994 to re-evaluate this observation.

Minimum and Maximum air and water temperatures were plotted for Meacham Creek, 1992 & 1993 (Appendix 1, Figures 13 and 14). Results showed a similar reduction in water temperatures between sample years comparable to the Birch Creek temperature data.

Currently there is insufficient data to detect trends in water temperature changes directly related to program habitat projects. Influences such as the impacts of the 1991 basin wide flood event and current land/water use practices above and near the sampling sites further complicate this endeavor. Air temperature will continue to be a major influence on water temperature until positive vegetative changes develop within riparian corridors. As long as project areas are maintained, riparian habitat will continue to improve.

4. **Biological Monitoring**

A 50 meter reach on Meacham Creek located inside the Louisiana Pacific lease was electrofished (using the pass removal technique) twice in 1993 for species composition information. This same area was sampled (using the same sampling technique) four times in 1992. Data provided insight of the species utilizing the habitat in the sample reach during the periods of time sampled (Appendix 2, Figure 15).

Spot check electrofishing surveys were conducted on Birch Creek Project leases within standardized sampling sites. Surveyors used the pass/removal technique to conduct the study. Conducted on a semi-monthly basis (August 1992 to July 1993), the study provided limited insight of the fish species present inside project lease areas during different seasons of the year. The study also showed salmonids comprising a higher proportion of the lower Birch Creek samples during the winter months as compared to the summer month data (Appendix 2, Figure 16).

A comprehensive biological survey of East Birch Creek (14 miles) was facilitated in conjunction with a physical habitat survey of the same area during 1993 (see Appendix 2, Figure D for location of the survey). Surveyors sampled an even proportion of slow (pool) and fast (glides, riffles, etc.) habitats for fish species composition data. Sites were randomly selected from a stratified distribution of habitat types throughout the range of stream miles surveyed. A total of 81 habitat units within two reaches were used.

Species composition estimates from the biological survey showed similar results to our spot check electrofishing surveys of project sites within Birch Creek (Appendix 2, Figures 16 [July data] and 17A-D). In both surveys, juvenile rainbow trout (all age classes) and cottids (sculpin) were found to be more abundant in the upper reaches of East Birch Creek than in the lower reaches, where rough fish species (dace and bridgelip suckers) dominated the habitat. Sculpin occupy similar habitat to salmonids, preferring cool water temperatures ($\leq$ 68°F) (Beschta et al. 1987). In essence, sculpin could be considered indicator species of water quality suitable for salmonids.

Segregation of species in the use of habitat has been observed when more than one species or age-group of fish were present in the same section of stream (Meehan and Bjornn 1991). Some investigators believe segregation is selective (an evolutionary adaptation), while others believe it results mainly from interactions between fish, the outcomes of which are determined by the size, aggressiveness, and capabilities (e.g., swimming performance) of the fish. It appears that changes in species composition in East Birch Creek may correlate well with the downstream increase in temperature illustrated by the East Birch Creek temperature data (Appendix 1, Figure 1).

5. Habitat Monitoring

Physical Habitat Surveys

Physical habitat surveys were conducted on 14 miles of East Birch and 2.4 miles of West Gate Canyon creeks (Appendix 3, Figure E). Surveyors measured aquatic and riparian habitat condition to quantitatively describe fish habitat. Data collected in 1993 is baseline information and a comparative analysis can not be made until the survey is repeated (3-5 years). However, the 1993 data was compared to Draft Habitat Benchmarks for North Eastern Oregon streams (Appendix 3, Tables 6 and 7). In comparison to the benchmark ranges, both streams would be classified as being poor in condition, showing deficiencies in wood debris, shade, and residual pool depth.

Subsequent surveys (every 3-5 years) may detect measurable changes in habitat condition. During 1994, the program plans to survey West Birch Creek (a tributary of Birch Creek with no program projects).

Data collected will be compared and contrasted to the 1993 East Birch Creek data to pit a stream with habitat restoration activities against a non-treated stream. A comparison of the two streams could demonstrate the benefits of habitat restoration work since both streams are similar in many respects and affected by the same types of land use practices.

RESULTS AND DISCUSSION II. ADMINISTRATION

Administrative

Reports and Data Summaries

In compliance with **our contract,** an annual and monthly progress reports were prepared and submitted to BPA. Data collected from 1993 biological inventories and habitat monitoring surveys were summarized. Results of the physical and biological data are included in this report.

Budgets/Purchasing

The budget and statement of work for FY 1994 was prepared and submitted to BPA.

Field supplies, office supplies, and project maintenance materials were purchased as needed throughout the contract period. Major purchase items included:

* Approximately 552 cubic yards of riprap stone and boulders for instream maintenance.

* A solar powered water pumping system to supply livestock water on the Gambill property.

* Hobo-Temp miniature thermographs for project site water temperature monitoring.

* Two Dry suit outfits for future physical and biological monitoring activities.

* **Miscellaneous vehicle tools** as needed.

* Fourteen 12 volt automotive batteries to power electric fences. These had to be replaced later during this contract period due to their failure to hold **a** charge. The batteries were under warranty and therefore were exchanged.

* Supplies for electric fencing and instream structure cabling.

* **A commercial grade (60 amp) 12 volt battery** charger system for recharging fence batteries.

Program Development

The district fish biologist and program leader oriented the new habitat biologist, Troy Laws, to parts of the district and most project sites.

The habitat biologist spent considerable time reviewing and receiving input from other program personnel on high tensile smooth wire fence specifications. The habitat biologist and program leader met with engineering staff to review these specifications and facilitate their completion.

Project personnel attended **a** training session on conducting physical and biological surveys as developed by the ODFW's Aquatic Inventories Program. These methods were used to sample fish and their habitats on East Birch and Westgate Canyon Creeks during 1993.

Personnel

Tim Bailey (the permanent fish habitat biologist) was promoted to the position of Umatilla District Fish Biologist, effective September 31, 1993. Troy Laws was subsequently hired on December 1, 1993 to replace Mr. Bailey.

Greg Rimbach (the permanent technician) transferred to a wildlife habitat position at Pendleton. Greg's position was eliminated due to downsizing of the BPA Habitat Program in the Umatilla Basin.

Two Seasonal EBA-l's were hired for a total of ten months to help with project maintenance, field surveys, and biological inventories.

Contract Administration

Project repair work and noxious weed control contracts were awarded as planned during this contract period.

Interagency Coordination

The habitat biologist attended a scoping meeting held by the CTUIR to discuss their plans to develop a Umatilla basin water quality database.

The habitat biologist attended a meeting with T. Shaw and C. Scheeler (CTUIR), J. Sanchez (USFS), and J. Germond (ODFW) to discuss CTUIR's 1993-94 habitat program.

Project personnel attended monthly Soil and Water Conservation District (SWCD) meetings and public scoping meetings organized by the SWCD.

The Biologist coordinated with the Division of State lands and Army Corps of Engineers on obtaining fill and removal permits for project work. Project personnel also helped landowners complete fill and removal permit applications for instream work on their properties.

Several meetings were attended with personnel from ODFW, CTUIR, CH2M Hill, COE, USFW, NMFS and UPRR to discuss Union Pacific's Blue Mountain Project.

The habitat biologist met with T. Shaw (CTUIR) to plot thermograph data from Meacham Creek.

The Biologist coordinated with T. Shaw (CTUIR) regarding the Tribes development of habitat improvement projects on Wildhorse Creek. Several on-site meetings with landowners and agencies were attended throughout 1993. A tour of potential small demonstration fencing project sites to implement on Wildhorse Creek was also attended.

A tour with the Department of Environmental Quality (DEQ) and several other agencies to discuss points of interest for a Total Maximum Daily Load (TMDL) study for the Umatilla River by DEQ was attended by the habitat biologist.

An interagency meeting was held with representatives of CTUIR **and USFS to coordinate thermograph deployments in** the basin.

Project personnel coordinated with Mary Corps of the Umatilla Co. Weed Control Dept. to tour Mainstem Birch

Creek project sites and develop a contract for weed control in these areas.

A meeting with D. Lieuallen (SWCD) was attended by the biologist to discuss ODFW concerns regarding appropriate use of Pine Creek restoration funds.

District monthly safety meetings and regional Staff meetings were attended by project personnel as required.

Project personnel participated in the ODFW Aquatic Inventory Training Seminar that was held in La Grande Or.

Education

The habitat biologist met with Bill Peal of Pendleton High School (PHS) to review a BPA project proposal for an environmental education program. The habitat biologist also coordinated with PHS on habitat enhancement activities planned for Wildhorse Creek.

A habitat improvement display was put up and **a** slide presentation given at the N.E. Oregon Sportsman Show.

The habitat biologist spent time with representatives from the Oregon Public Broadcasting television show, "Oregon Field Guide" to film and discuss environmental impacts of fill and removal activities. A site belonging to Wood Fiber Industries adjacent to one of our project sites on Birch Creek was used for the film segment.

REFERENCES

Bailey, T.D. and G.P. Rimbach. 1993. Umatilla River Subbasin Fish Habitat Improvement Project. 1992 Annual Report. U.S. Department of Energy Bonneville Power Administration Report. DOE/BP-35769-4 March 1993. 5op.

Beschta, Et.Al, 1987. Streamside Management: Forestry and Fishery Interactions. Institute of Forest Resources. University of Washington, 1987. 6:191-233.

Bilby, R.E. 1984. Removal of woody debris may affect stream channel stability. Journal of Forestry. 82(10):609-613.

Cummins, K.W., G.W. Minshall, J.R. Sedell, C.E. Cushing, and R.C. Petersen. 1984. Stream ecosystem theory. Verh. Internat. Verein. Limnol. 22:1818-1827.

Gregory, S.V., F.J. Swanson, W.A. McKee, and K.W. Cummins. 1991: An ecosystem perspective of riparian zones; focus of links between land and water. Bioscience 41:540-551.

Jones, K. Oregon Department Of Fish and Wildlife. Personal Communication. February 1994.

Meehan, W.R., and T.C. Bjornn. 1991. Influences of Forests and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Publication 19. 1991. 3:47-82.

National Oceanic and Atmospheric Administration 1992 and 1993, Local Climatololgical Data, Annual Summary with Comparative Data, Pendleton Oregon. 1992:8p, 1993 Preliminary Data:12p.

Northwest Power Planning Council. 1987. Columbia River Basin Fish and Wildlife Program. Portland, Oregon.

Northwest Power Planning Council. 1990. Integrated System Plan for Salmon and Steelhead Production in the Columbia River Basin. Columbia River Basin Fish and Wildlife Program. p117-121. Portland Oregon.

Oregon Department of Environmental Quality, Water Quality Division. January, 1993. Oregon Administrative Rules. Chapter 340, Division 41 - Department of Environmental Quality. 50-Div.41-54-Div.41.

Oregon Department of Fish and Wildlife. 1994. Aquatic Inventories Project, Physical Habitat Surveys, Fish Surveys, Umatilla Basin. Survey Summaries and Analysis for East Birch and Westgate Canyon Creeks.

Oregon Department of Fish and Wildlife, USDA Forest Service, and Confederated Tribes of the Umatilla Indian Reservation. 1988. Umatilla River Drainage Anadromous Fish Habitat Improvement Plan.

Oregon State Game Commission. 1963. The Fish and Wildlife Resources of the Umatilla Basin, Oregon, and their water use requirements. Report of the State Water Resources Board. Portland, Oregon.

Oregon Water Resources Department. 1988. Umatilla Basin Report. August 1988. 246p.

Thompson, R.N., and J.B. Haas. 1960. Environmental survey report pertaining to salmon and steelhead in certain rivers of eastern Oregon and the Willamette River and its tributaries. Part I. Survey report of eastern Oregon rivers. Fish Commission of Oregon, Fish Research Project, 14-17-001-178, Completion Report, Clackamas Oregon.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1982. Eastern Oregon Anadromous Fish Habitat Restoration Project. Umatilla River Basin Planning Aid Report. Portland, Oregon.

Vannote, R.L., G.W. Minshall, K.W. Cummins, J.R. Sedell, and C.E. Cushing. 1980. The river continuum concept. Can. J. Fish. Aquat. Sci. 37:130-137.

Williams, S.H., R.N. Reeve, and D.R. Haight. 1989. Umatilla basin fish habitat improvement project. Annual Report. Portland, OR: U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife. 31p.

APPENDIX - 1
THERMOGRAPH DATA

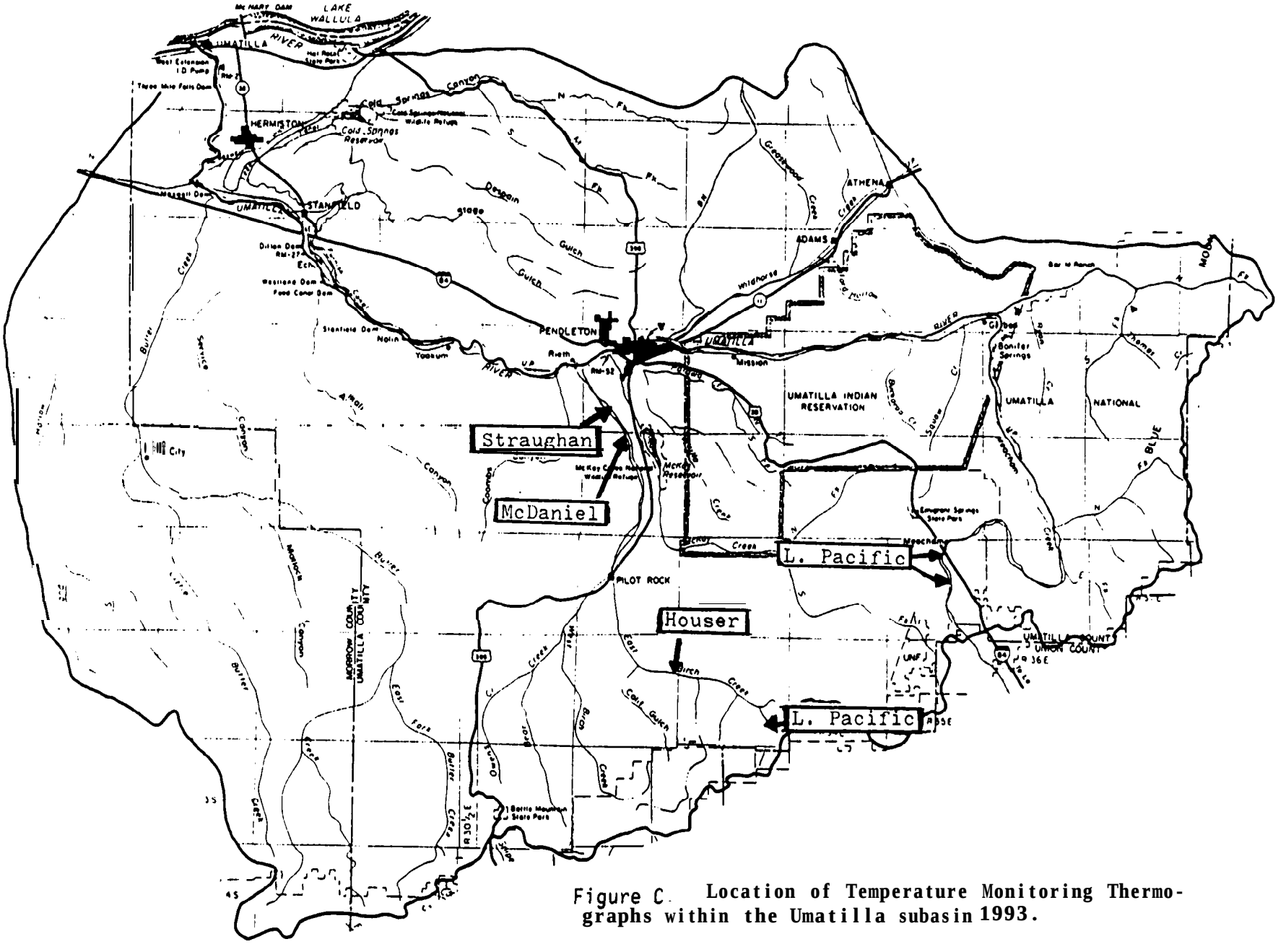
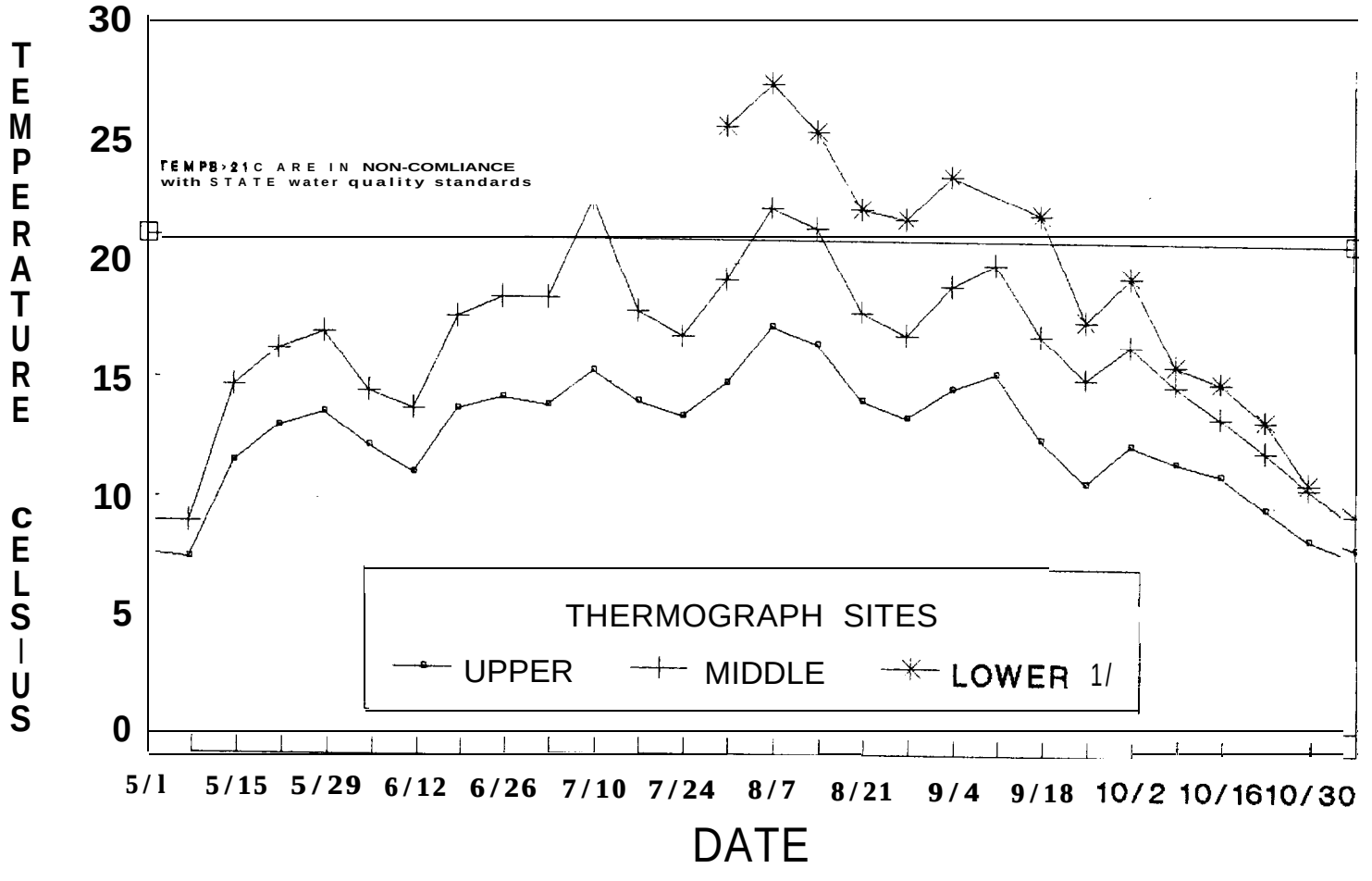


Figure C. Location of Temperature Monitoring Thermographs within the Umatilla subasin 1993.

Figure 1. Mean Weekly Maximum Temperatures for Birch Creek May 1 through October 30, 1993.



1/ Data For the Lower Site is From an Alternate location 1 Mi Downstream. Thermograph at Original Location Failed.

Figure 2. Mean Weekly Minimum Temperature for Birch Creek November 7, 1992 through April 30, 1993.

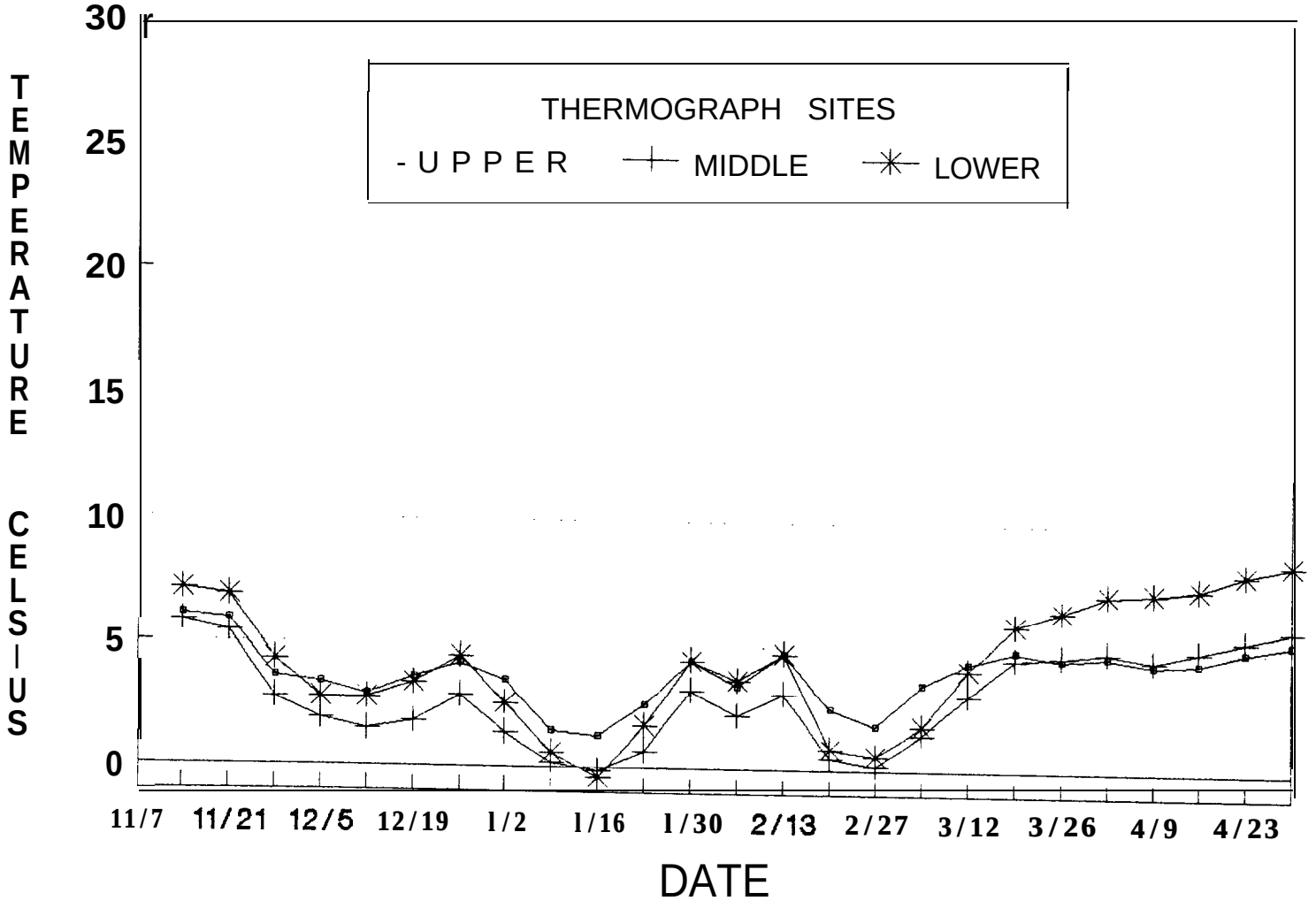


Figure 3. Monthly Minimum and Maximum Temperatures for Birch Creek. (Upper Thermograph Site) Nov. 1992 - Oct. 1993

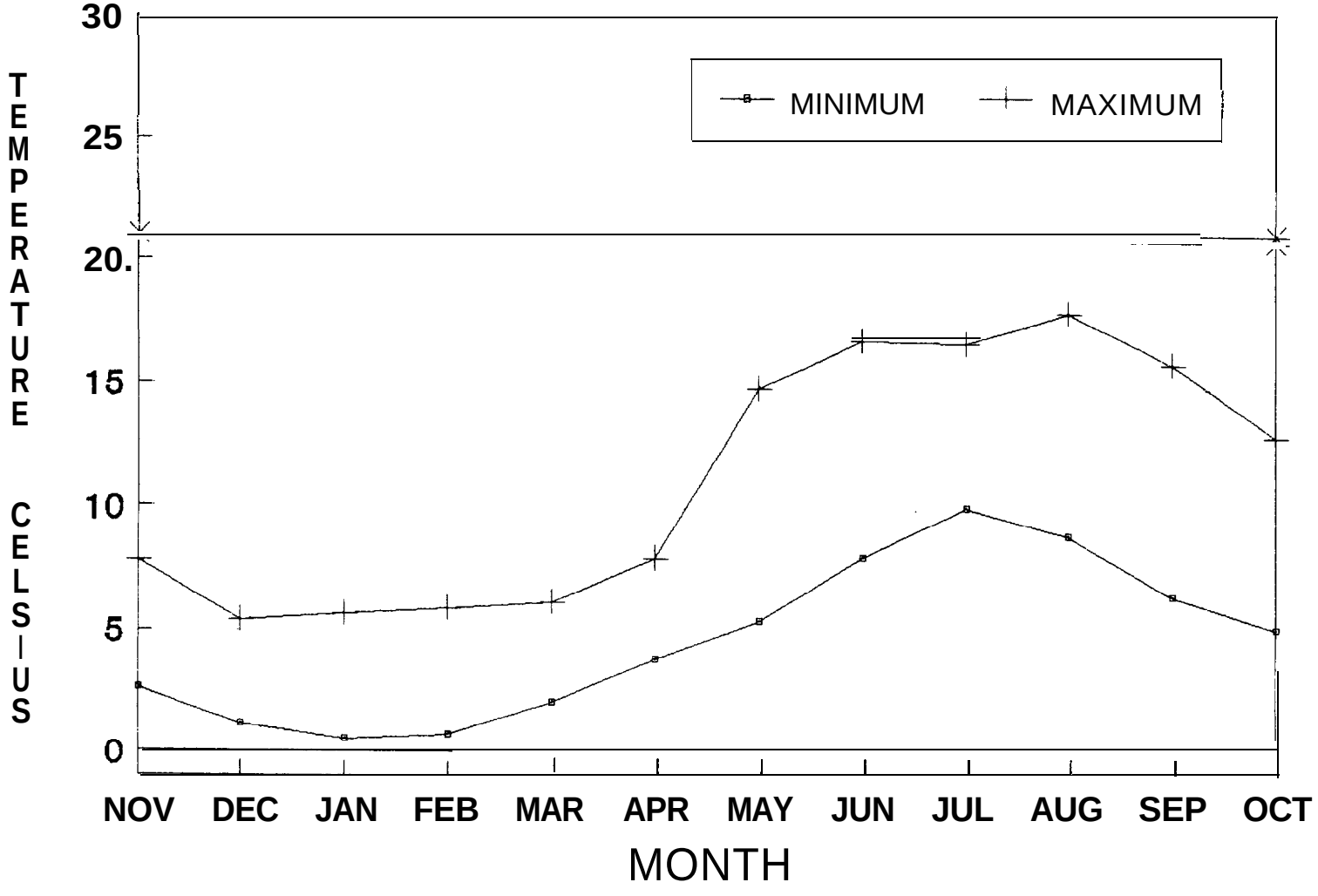


Figure 4. Monthly Minimum and Maximum Temperatures for Birch Creek. (Middle Thermograph Site) Nov. 1992 - Oct. 1993

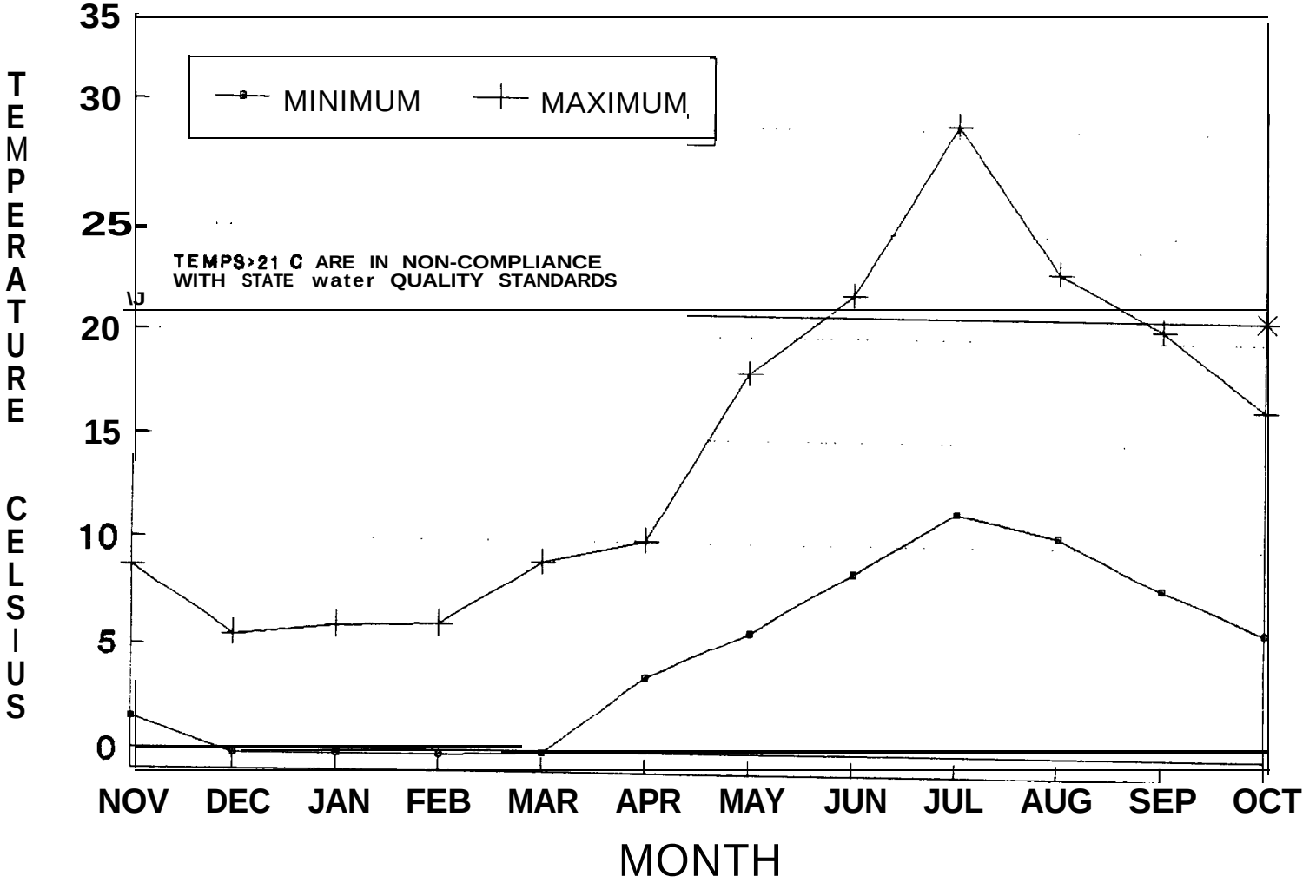
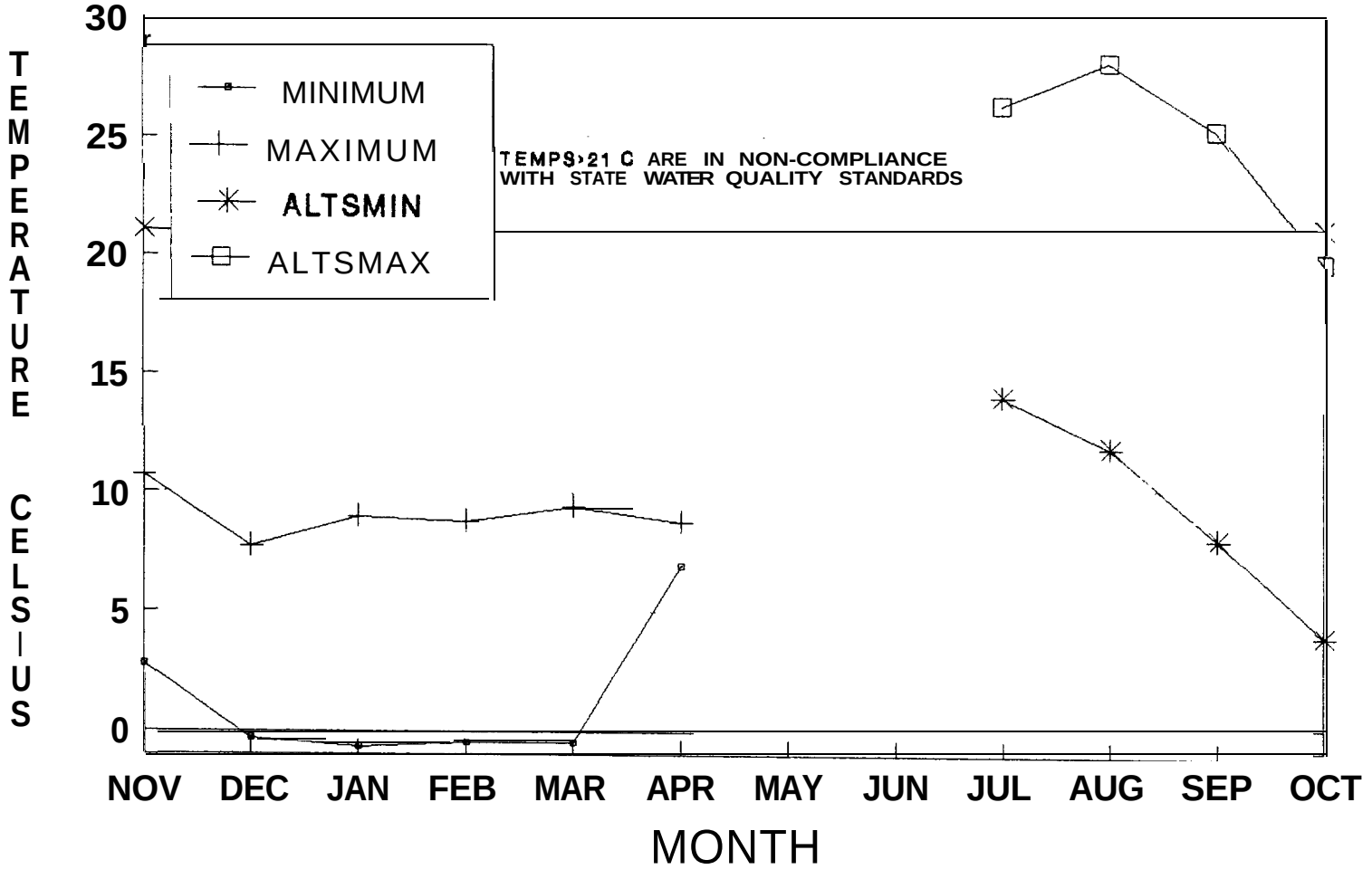
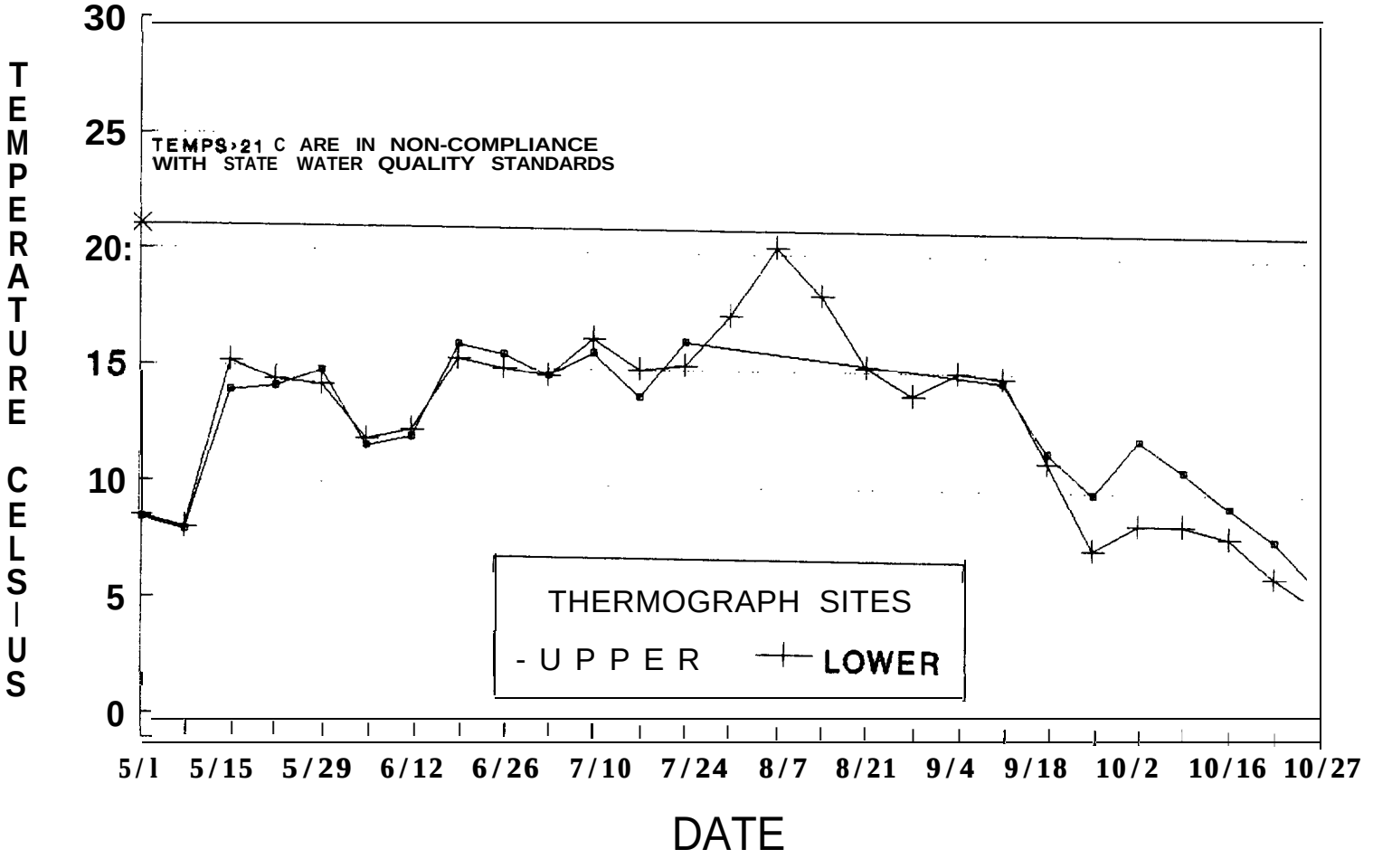


Figure 5. Monthly Minimum and Maximum Temperatures for Birch Creek. (Lower Thermograph Site) Nov. 1992 - Oct. 1993



DATA FOR JULY - OCTOBER IS FROM AN ALTERNATE LOCATION 1 Mi DOWNSTREAM. THERMOGRAPH AT ORIGINAL LOCATION FAILED.

Figure 6. Mean Weekly Maximum Temperatures for Meacham Creek. May 1 through October 27, 1993.



NO DATA FOR UPPER SITE, (7/21-9/7). THERMOGRAPH FAILED DUE TO DAMAGE BY AN ANIMAL.

Figure 7. Mean Weekly Minimum Temperatures for Meacham Creek. November 7, 1992 through April 23, 1993.

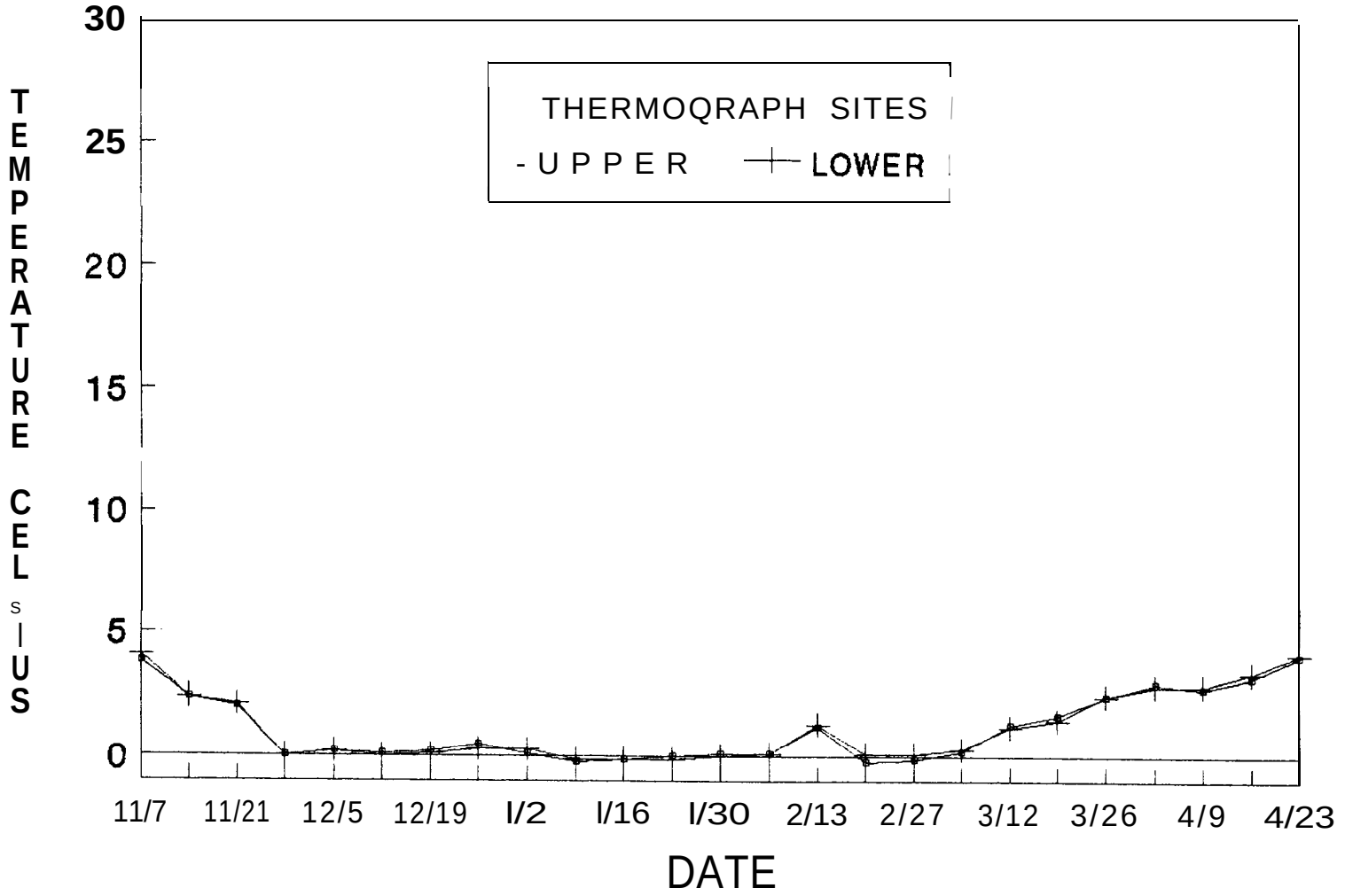
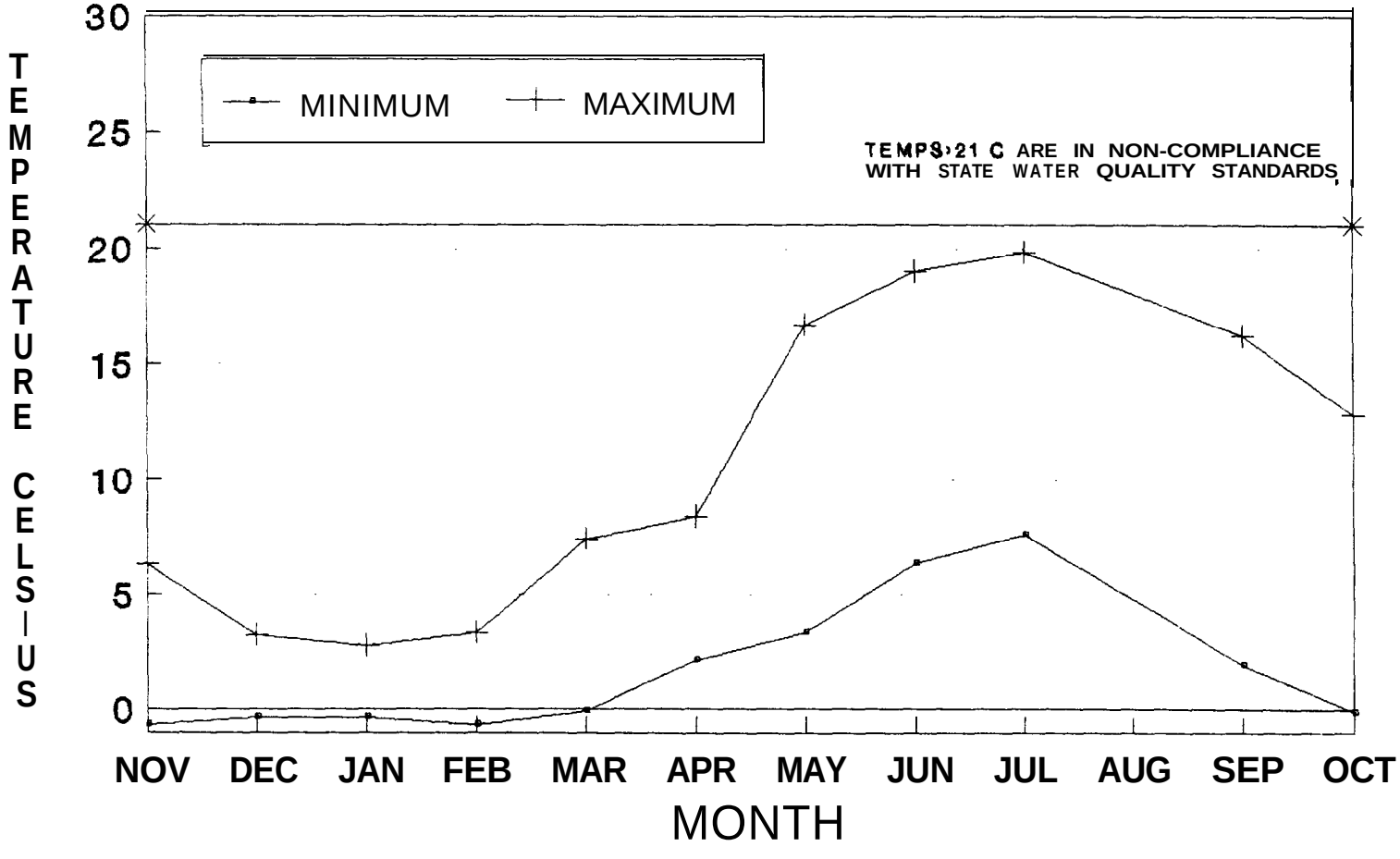


Figure 8. Monthly Minimum and Maximum Temperatures for Meacham Creek. (Upper Thermograph Site) Nov.1992 - Oct. 1993



THERMOGRAPH DID NOT REPORT DATA FOR JULY 20 THROUGH SEPTEMBER 8. UNIT WAS DAMAGED BY AN ANIMAL.

Figure 9. Monthly Minimum and Maximum Temperatures for Meacham Creek. (Lower Thermograph Site) Nov.1992 - Oct. 1993

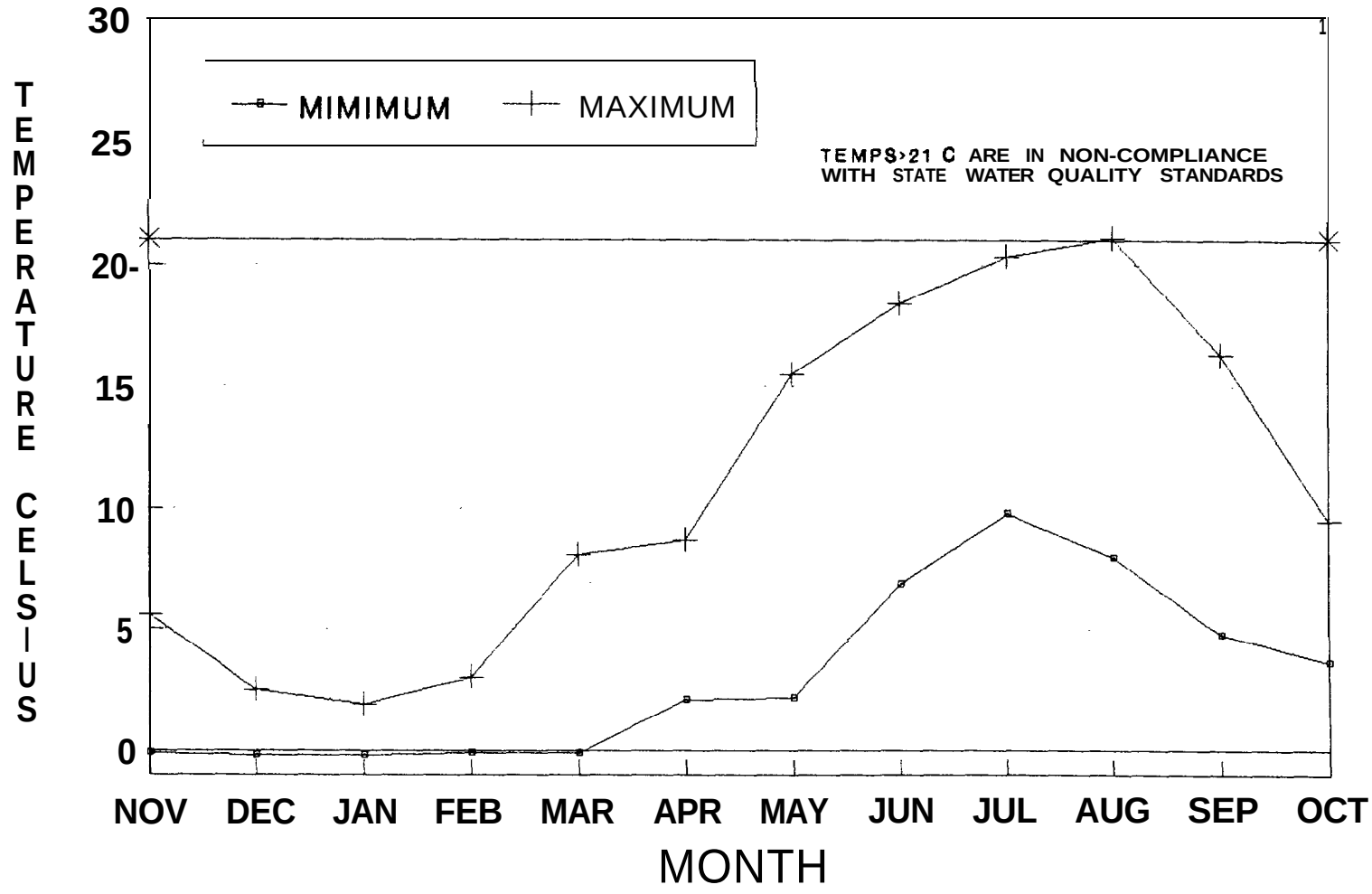


Figure 10. Monthly Minimum and Maximum Temperatures for Air and Water. Birch Creek (Upper Site), 1992 and 1993.

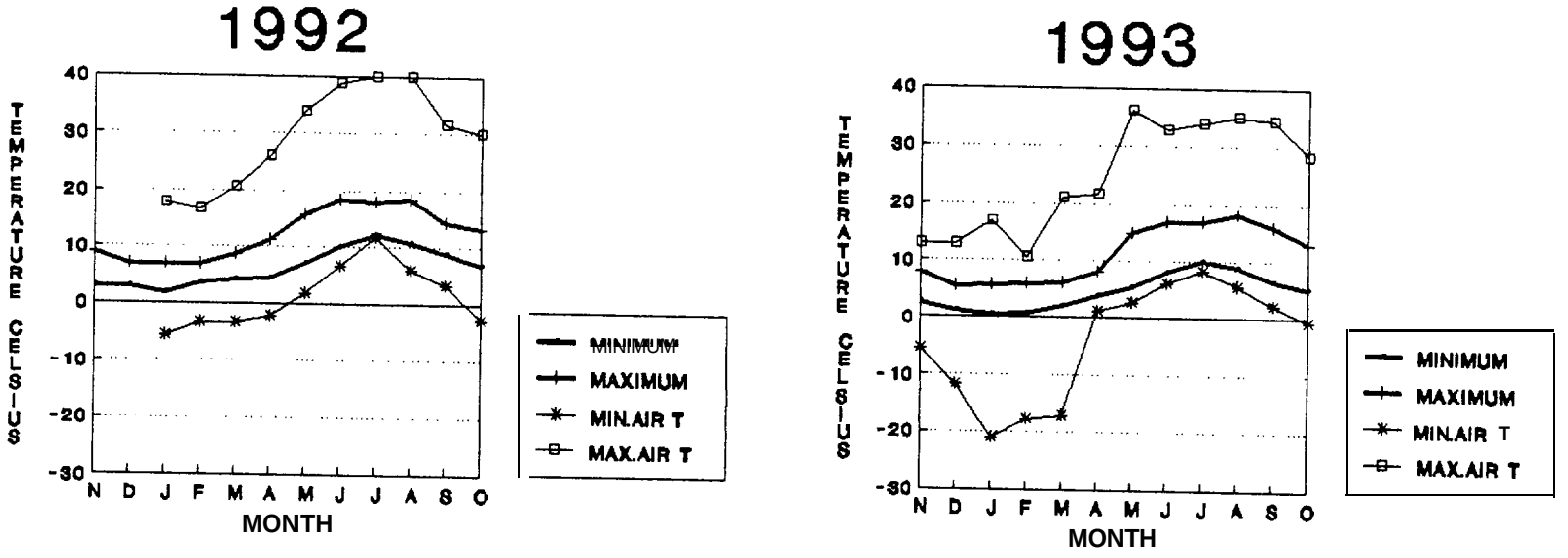


Figure 11. Monthly Minimum and Maximum Temperatures for Air and Water. Birch Creek (Middle Site), 1992 and 1993.

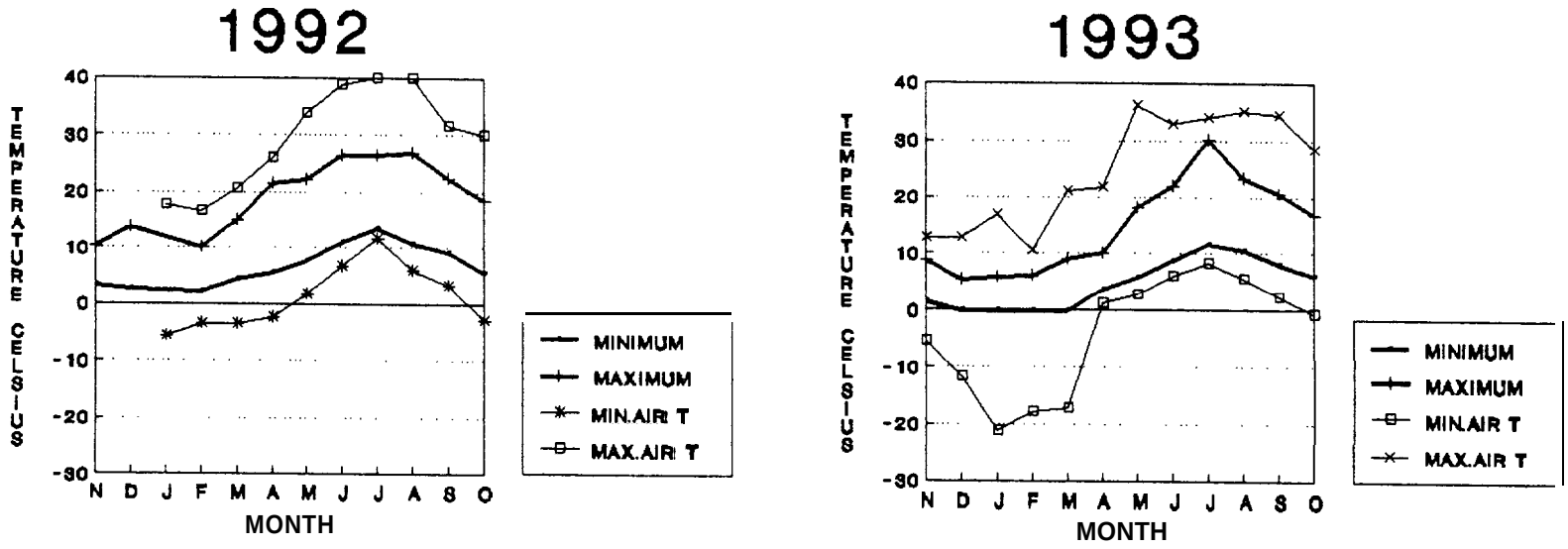


Figure 12. Monthly Minimum and Maximum Temperatures for Air and Water. Birch Creek (Lower Site), 1992 and 1993.

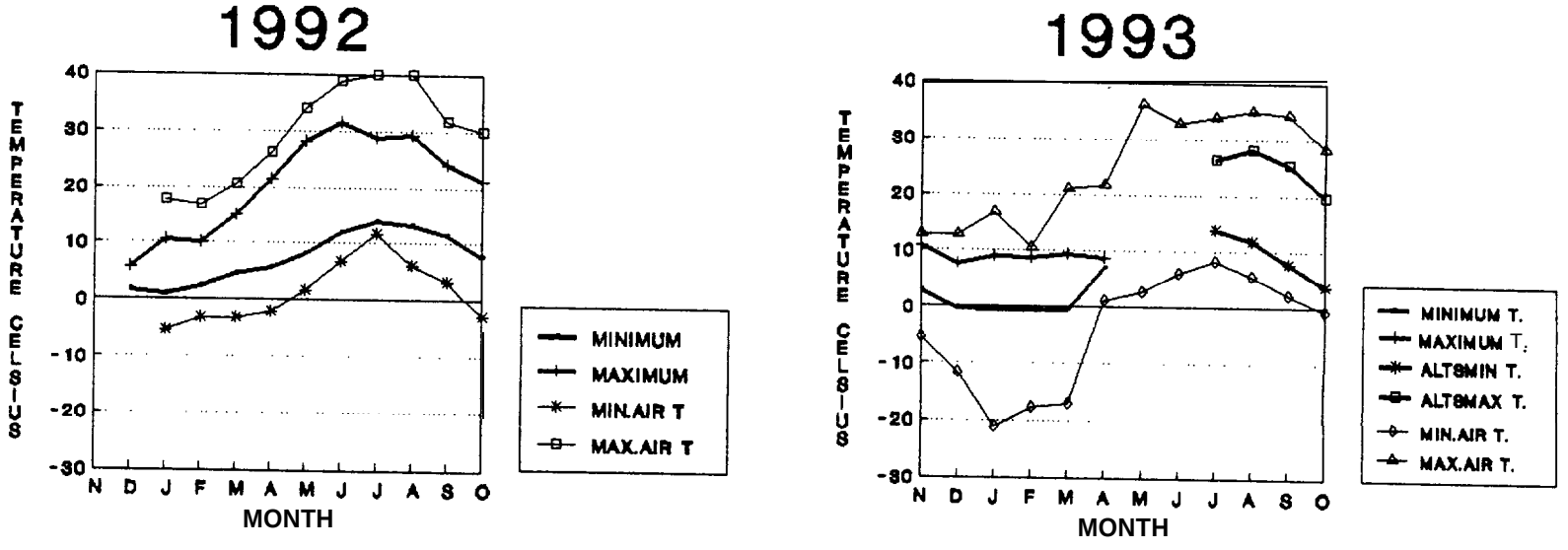


Figure 13. Monthly Minimum and Maximum Temperatures for Air and Water. Meacham Creek (Upper Site), 1992 and 1993

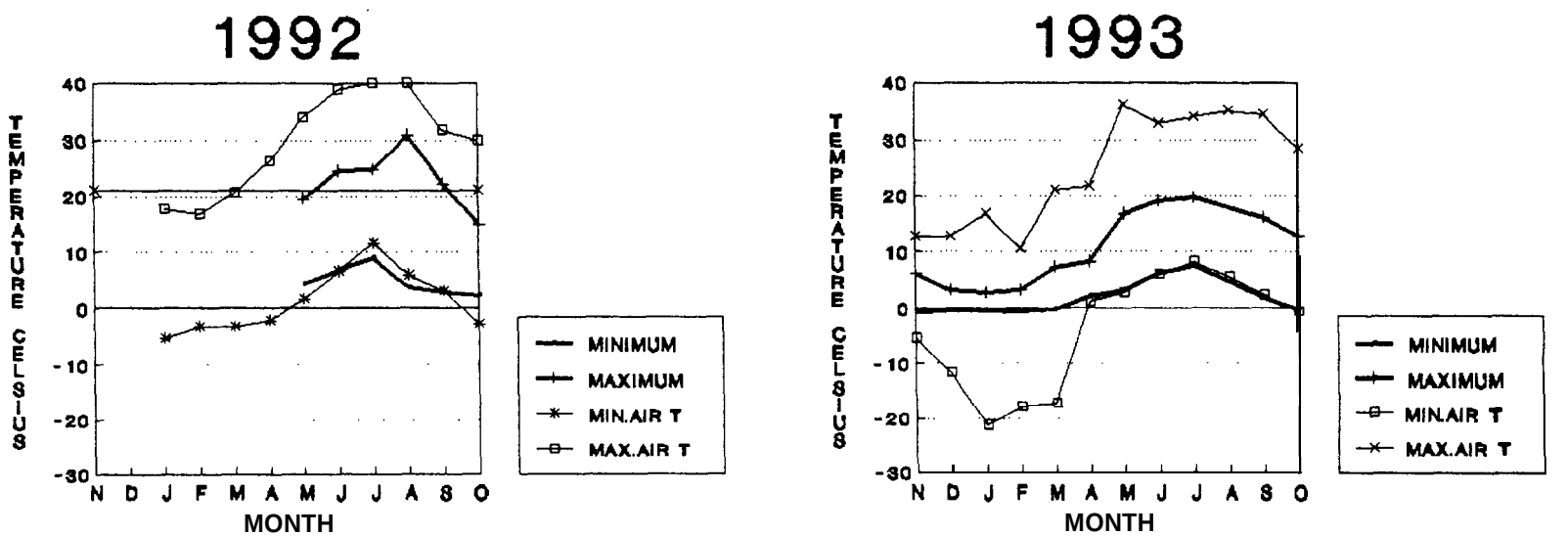
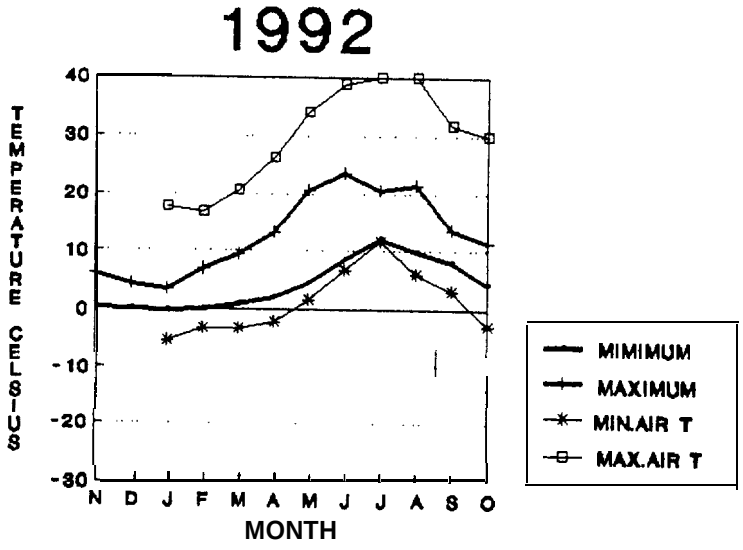
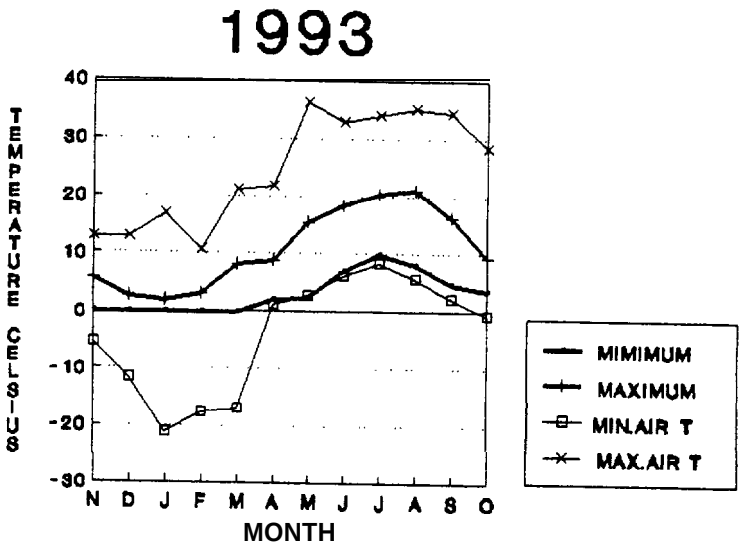


Figure 14. Monthly Minimum and Maximum Tempertures for Air and Water. Meacham Creek (Lower Site), 1992 and 1993.





APPENDIX – 2
BIOLOGICAL SAMPLING DATA

Figure 15. Fish Species Composition within a 50 meter Reach on Meacham Creek (L.P. Lease). July 1992 - July 1993.

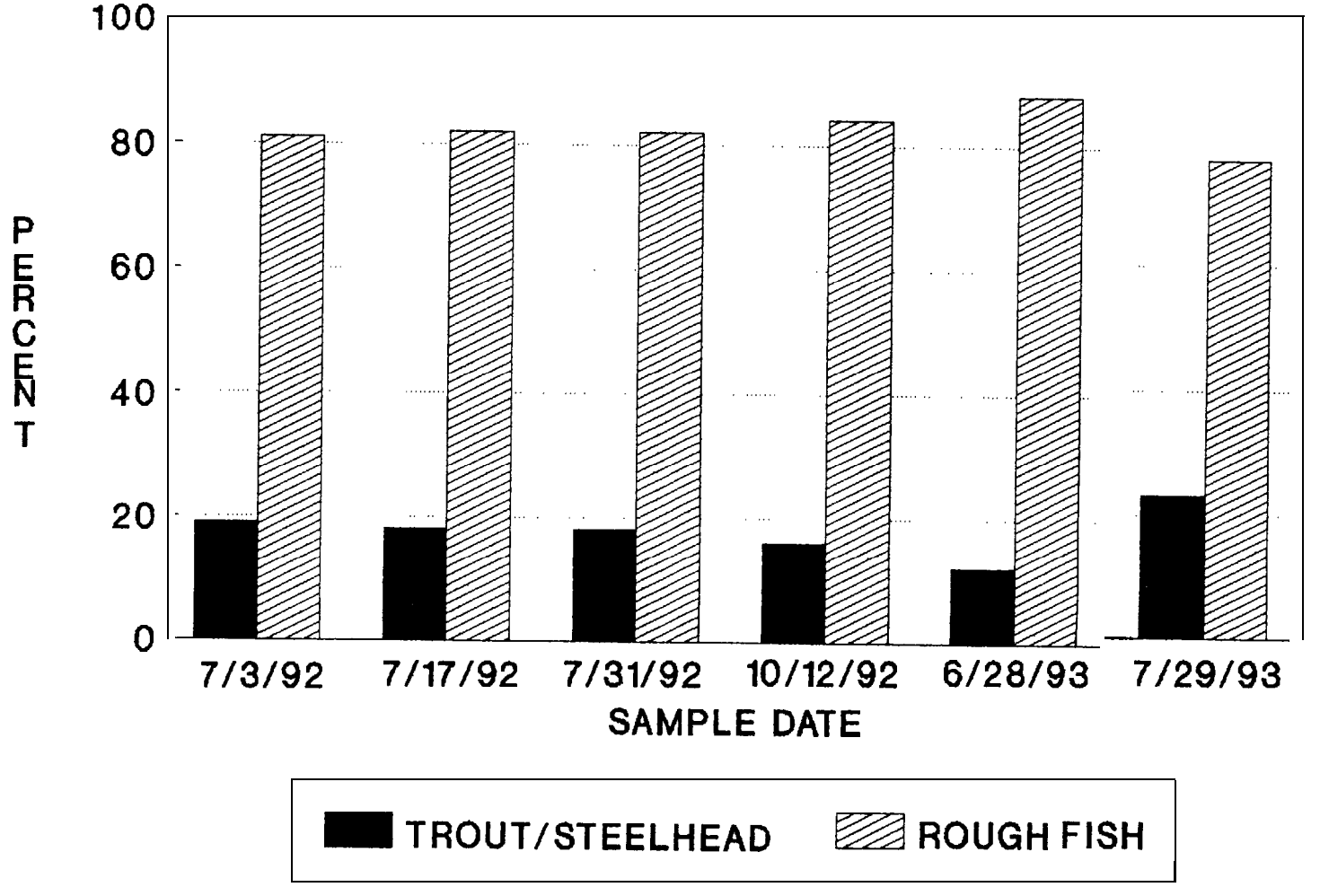
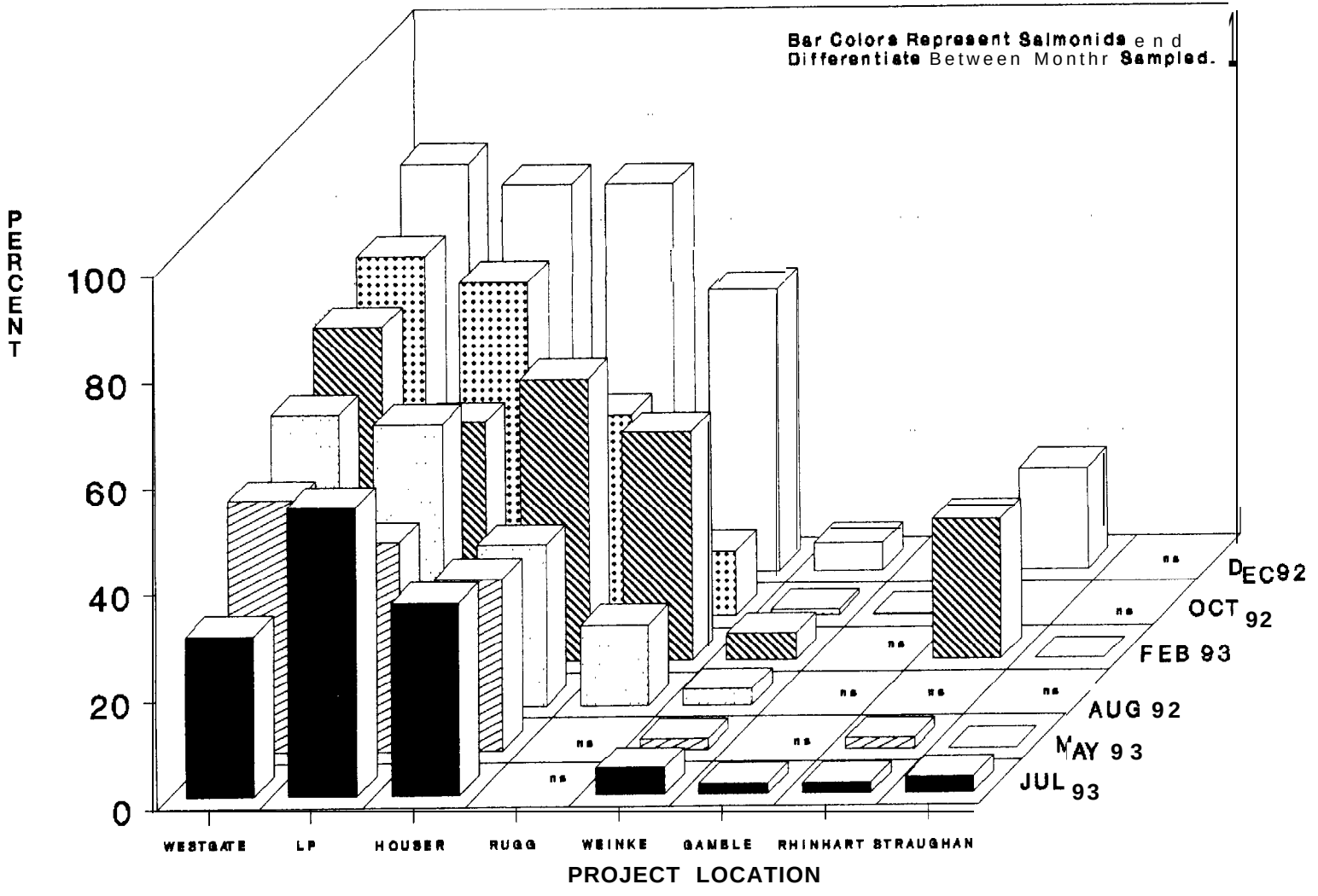


Figure 16. Fish Species Composition (% Salmonids) within standardized sample sites (Birch Creek). Aug 1992 - Jul 1993



(ns) denote8 site not sampled.

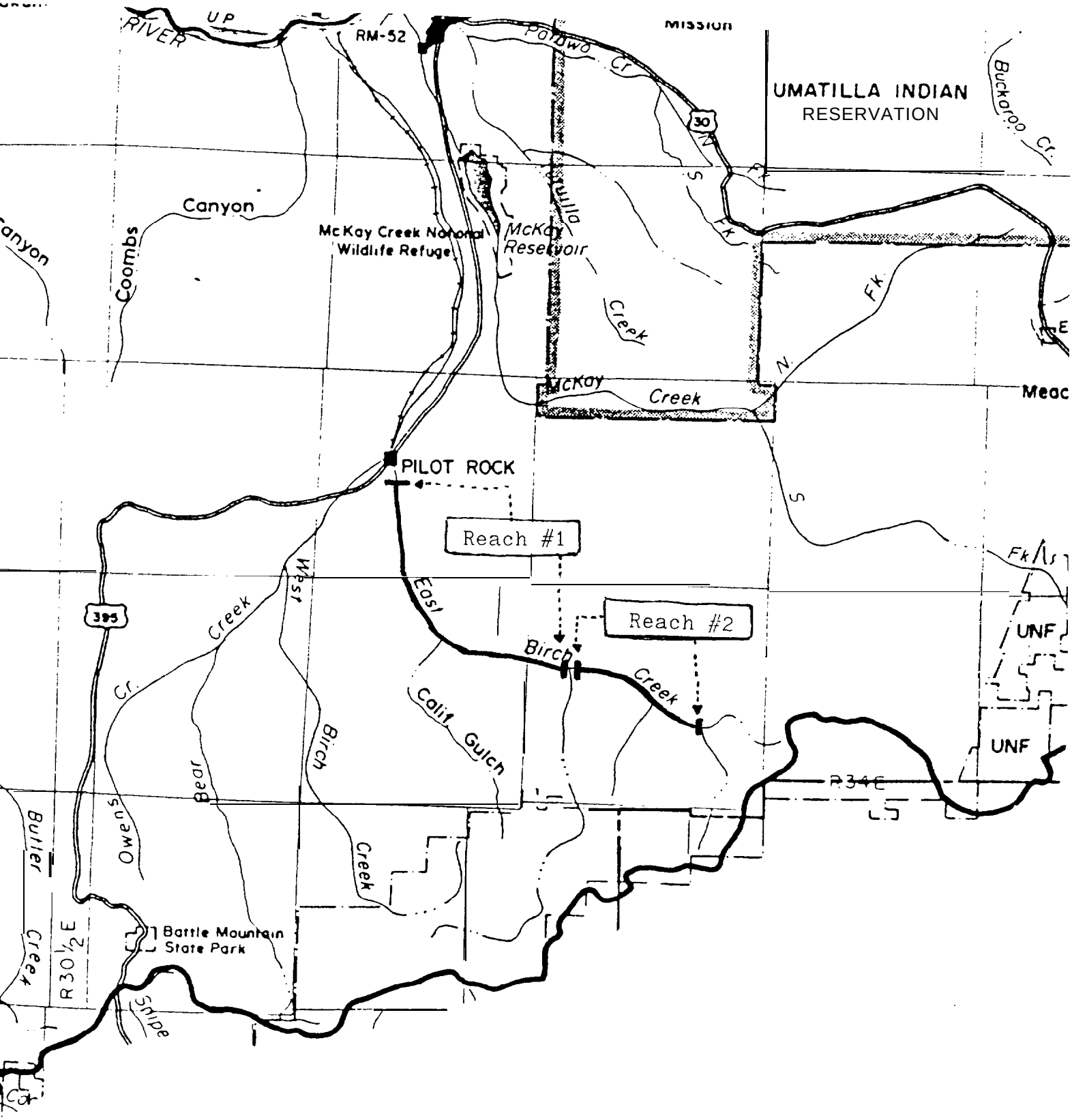
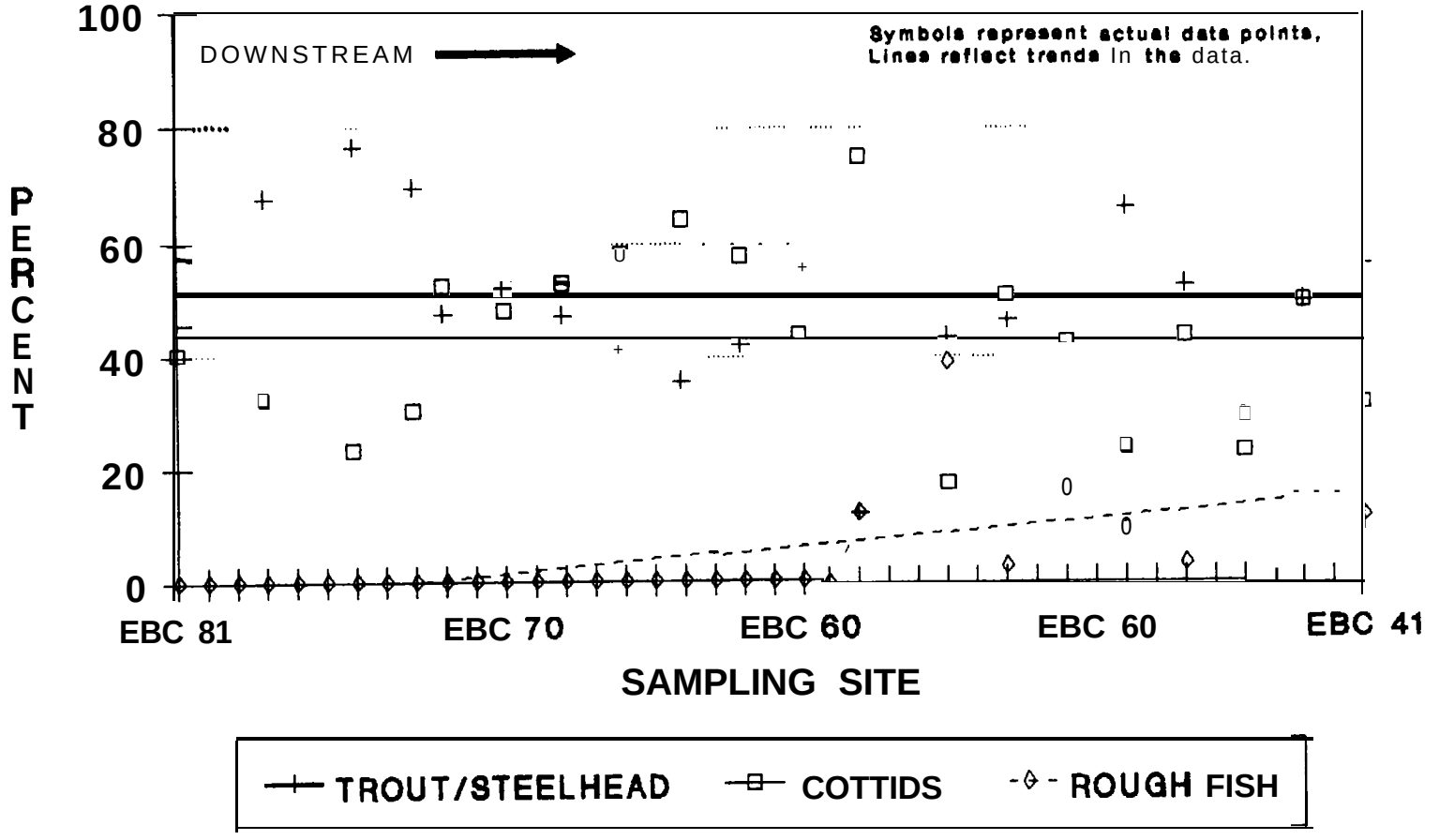


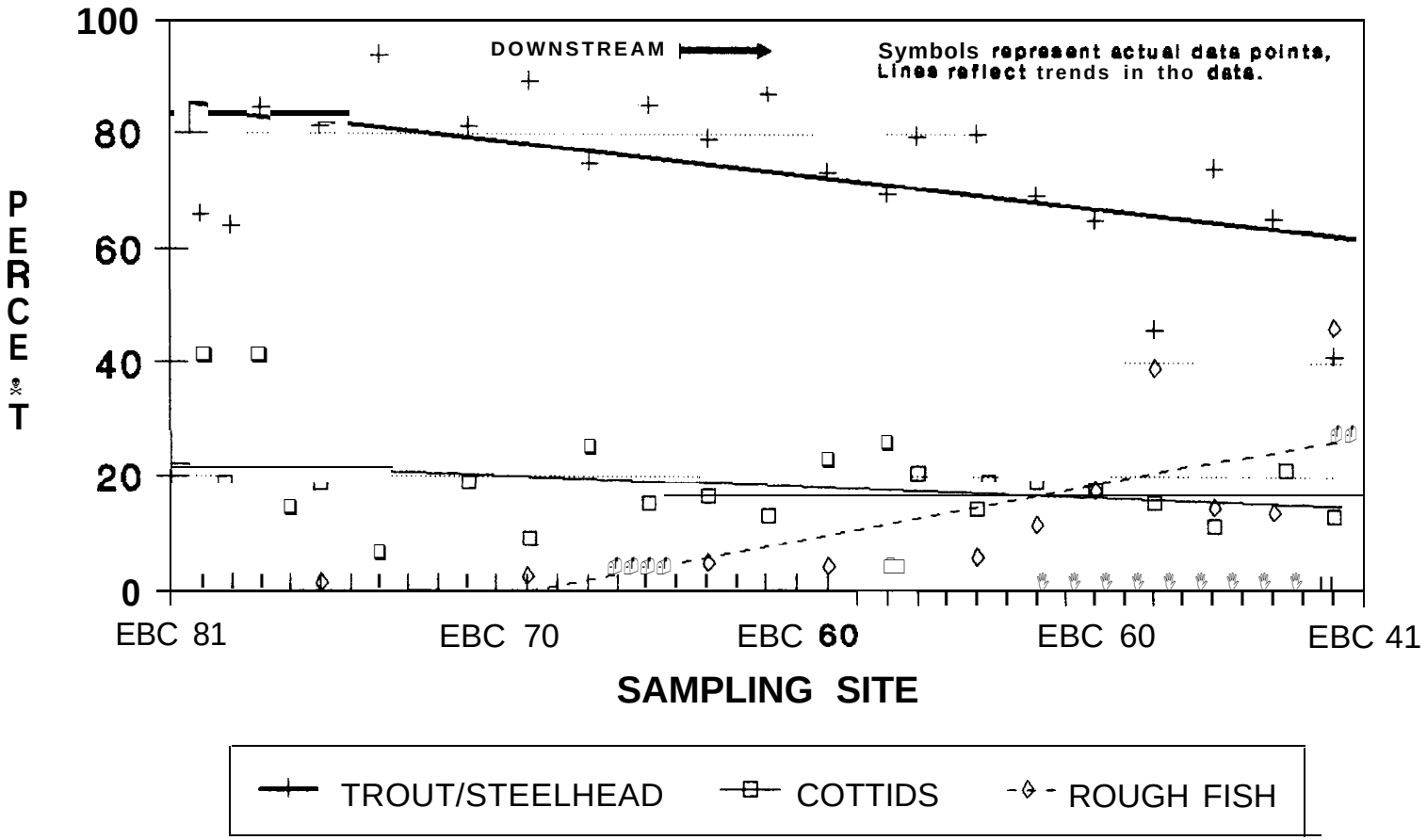
Figure D. Location of the Biological Stream Survey Sample Reaches within East Birch Creek 1993.

Figure 17A. Fish Species Composition (Downstream Trend of Change in Composition) within Fast Water sampling sites. East Birch Creek (Reach #2). Summer 1993.



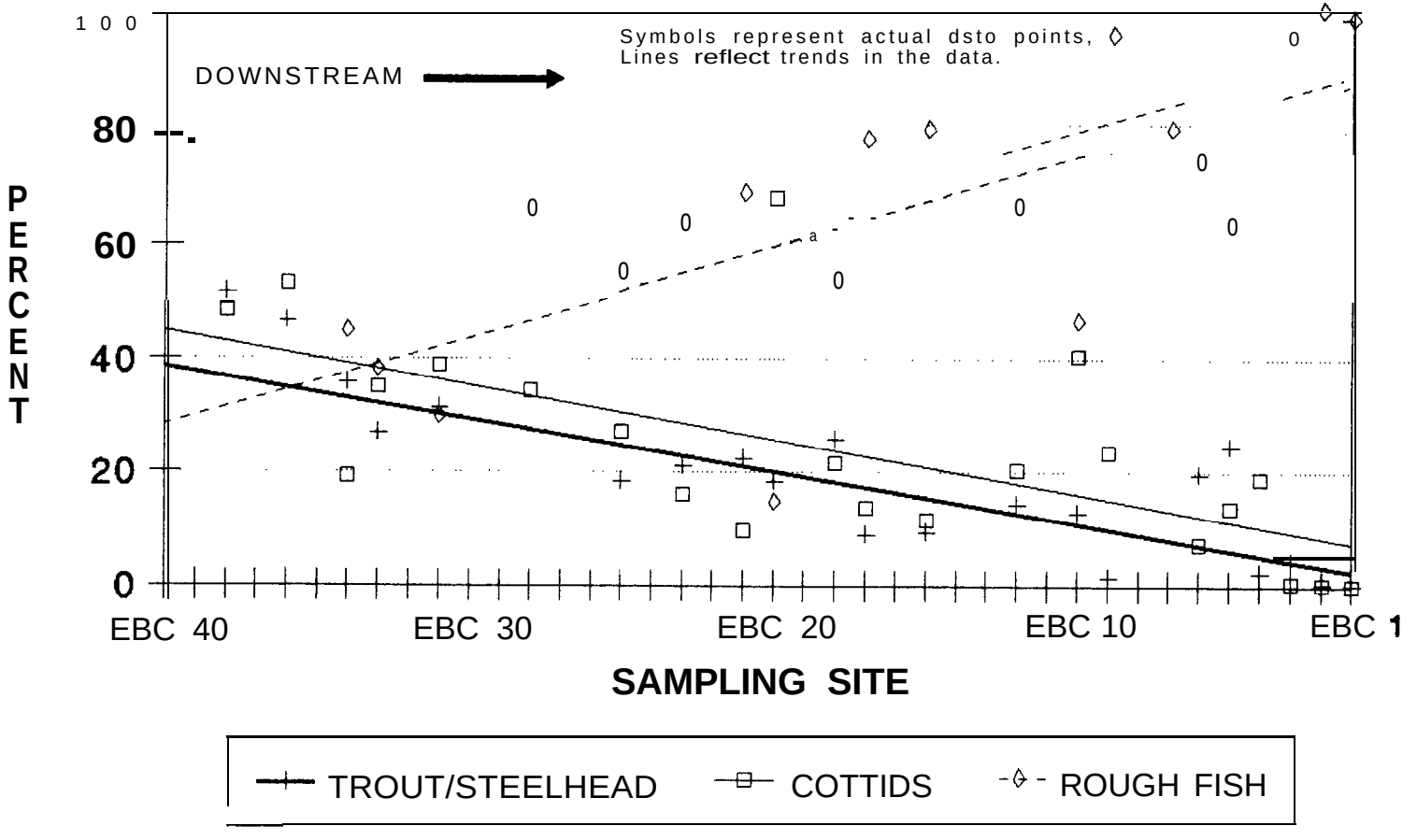
EBC 81 near mouth of West Gate Canyon
EBC 41 near mouth of Pearson Creek

Figure 17B. Fish Species Composition (Downstream Trend of Change in Composition) within Slow Water sampling sites. East Birch Creek (Reach #2). Summer 1993.



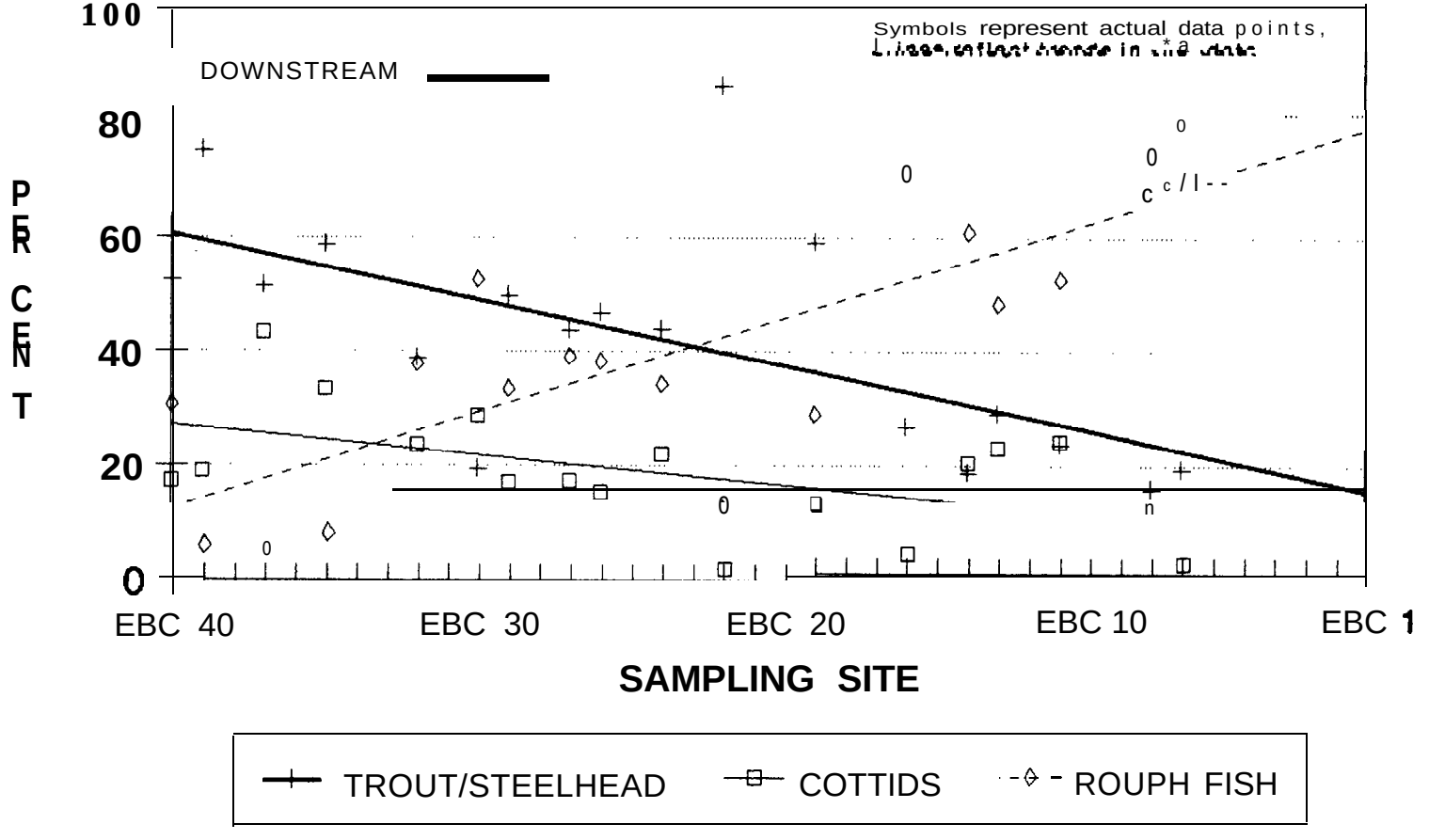
EBC 81 near mouth of West Gate Canyon
EBC 41 near mouth of Pearson Creek

Figure 17C. Fish Species Composition (Downstream Trend of Change in Compostion) within Fast Water sampling sites. East Birch Creek (Reach #I). Summer 1993



EBC 40 near mouth of Pearson Creek
EBC 1 near town of Pilot Rock

Figure 17D. Fish Species Composition (Downstream Trend of Change in Composition) within Slow Water sampling sites. East Birch Creek (Reach #I). Summer 1993.



EBC **40** near mouth of Pearson Creek
EBC 1 near town of Pilot Rock

APPENDIX - 3
PHYSICAL HABITAT DATA

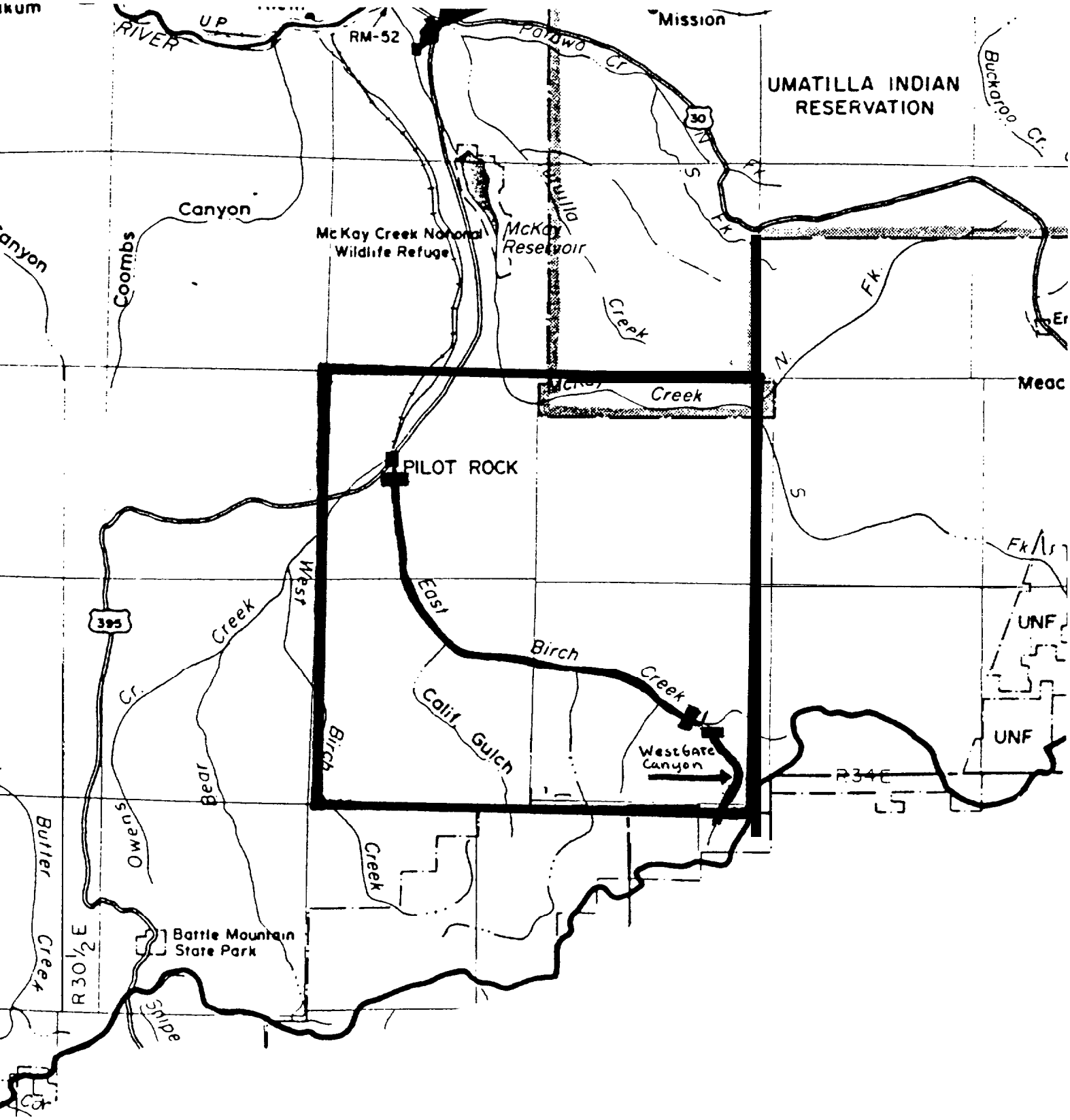


Figure **E.** Location of Physical and Biological Stream Surveys conducted within the Umatilla sub-basin in 1993 (East Birch and West Gate Canyon creeks).

ODFW: AQUATIC INVENTORY PROJECT

HABITAT BENCHMARKS (DRAFT 12/I 992)

POOLS	POOR	GOOD
POOL AREA (%I	<IO	>35
POOL FREQUENCY (Channel Widths)	>20	<8
RESIDUAL POOL DEPTH		
LOW GRADIENT-SMALL	co.2	>0.5
HIGH GRADIENT-LARGE	co.5	>I.O
RIFFLES		
WIDTH / DEPTH RATIO		
EASTSIDE	>30	c I 0
WESTSIDE	>30	c I 5
SILT-SAND-ORGANICS (% AREA)		
NORTHWEST/COLUMBIA	>25	C I 0
NORTHEAST	>20	<8
CENTRAL/SOUTHEAST	>25	c I 2
SOUTHWEST	>15	c 5
GRAVEL (% AREA)	c I 5	30-80
REACH AVERAGE		
SHADE (percent)		
STREAM WIDTH c 12 meters		
WESTSIDE	<70	>75
NORTHEAST	<60	>70
CENTRAL - SOUTHEAST	<40	>50
STREAM WIDTH > 12 meters		
WESTSIDE	c55	>60
NORTHEAST	<40	>60
CENTRAL - SOUTHEAST	<30	>40
LARGE WOODY DEBRIS	**POOR**	**GOOD**
PIECES / 100 m STREAM LENGTH	c I 0	>20
VOLUME / 100 m STREAM LENGTH	<20	>30

REFERENCE LWD VALUES FROM ODFW NORTHWEST AND COLUMBIA REGION STREAMS

STREAM SIZE (ACW)	PIECES / 1 OOm		VOLUME (m3) / IOOm	
	OG	SG	OG	SG
< 2 m	23.5	12.1	47.0	0.6
2 - 7 m	24.5	7.5	34.1	20.1
> 7 m	23.8	49.7	47.4	15.2

Table 6. Draft Habitat Benchmarks developed by the Aquatic Inventories Program (ODFW).

REACH SUMMARY: 1993 SUMMER HABITAT INVENTORIES.

STREAM	REACH	LENGTH (m)	GRADIENT	CHANNEL FORM	LAND USE*	OPEN SKY % of 180	BANK EROSION %	FINES IN RIFFLES %	GRAVEL IN RIFFLES %	LARGE BOULDERS #/l OOm
EAST BIRCH CREEK	1	4107	1.3	u s	AG	67.0	18.9	7.0	50.0	6.74
EAST BIRCH CREEK	2	16282	1.7	u s	AG/LG	45.0	13.3	0.0	51.0	5.98
EAST BIRCH CREEK	3	1198	3.0	CA	AG/LG	28.0	0.7	1.0	53.0	3.01
WESTGATE CANYON	1	1980	5.0	CA	LG/PT	40.0	9.9	5.0	53.0	10.05
WESTGATE CANYON	2	1972	9.0	CH	BK/TH	39.0	0.2	12.0	55.0	55.07

*Land USE CODES AG-AGRICULTURE. TH-TIMBER HARVEST, PT-PARTIAL CUT TIMBER. LG-LIGHT GRAZING, BK-BUG KILL

REACH SUMMARY: 1993 SUMMER HABITAT INVENTORIES.

STREAM	REACH	NUMBER POOLS	PERCENT POOLS	CHANNEL WIDTHS/ POOL	RESIDUAL POOL DEPTH	WOOD DEBRIS PIECES #/l OOm	WOOD DEBRIS VOLUME (m3)/1 OOm	RIPARIAN TREES TOTAL/l 000ft	RIPARIAN CONIFERS #>‘20in dbh /l OOOft	RIPARIAN CONIFERS #>35in dbh /l 000ft
EAST BIRCH CREEK	1	15	5.3	19.1	0.4	0.2	0.1	——	——	- - -
EAST BIRCH CREEK	2	196	10.1	7.3	0.5	1.7	2.1	1579	0	0
EAST BIRCH CREEK	3	24	467.0	6.2	0.4	2.9	10.4	384	37	0
WESTGATE CANYON	1	16	2.7	17.0	0.3	5.0	20.0	1170	18	0
WESTGATE CANYON	2	21	3.9	15.4	0.2	12.1	29.0	1676	61	0

Table 7. Reach Summary data from the Physical Habitat Surveys conducted on East Birch and West Gate Canyon Creeks during the summer of 1993.