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UMATILLA RIVER SUBBASIN FISH HABITAT IMPROVEMENT

ANNUAL REPORT 1994

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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) Flood damage assessment of project leases after the May 1994 flood, 2) reconstruction of 1.25 miles of high tensile steel fence, 3) inspection and routine maintenance of 14.8 miles of fence, 4) collection of approximately 6,600 cottonwood and willow cuttings for transplanting in spring of 1995, 5) establishment of three bioengineered habitat restoration demonstration projects, 6) Implementation of a streambank stabilization workshop (bioengineering techniques) for Umatilla Basin residents and resource agency personnel, 7) collection and summarization of physical and biological monitoring data, and 8) extensive interagency coordination.

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) (1) to partially mitigate for losses attributed to the installation and operation of the Federal Columbia River Power System. Historically, the Umatilla River basin 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 were observed as recently as 1963 (OGC 1963), and fall chinook in 1957 (Thompson and Haas 1960).

Annual runs of summer steelhead have averaged 2,067 adults during the past fifteen years with a low of 768 in 1981-82 and a high of 3,124 in 1986-87; counts for 1993-94 were 1,290 (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 a population of coho, however, documentation of the species 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) document fall chinook returning to the river since 1985, spring chinook since 1988 and coho since 1987 (Tables 2, 3 and 4).

Reasons for decline in Umatilla River anadromous fish populations 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 Umatilla 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 utilized by fish, and 4)

loss of instream and streamside cover (USFWS and NMFS 1982). Approximately 70% of the Umatilla Basin streams inventoried 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 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 was shifted from project implementation (new projects) to maintenance and evaluation of its existing projects. As a result, no new riparian leases with landowners have been procured.

In May of this year, the Birch Creek habitat projects were subjected to another out-of-bank flood event'. This is the second flood to afflict our projects since inception of the program in 1988 and is the third largest flood event recorded for this subbasin[2]. Ironically, this years event occurred almost on the same day as the May 1991 flood[3]. The largest event for this subbasin[4] took place in January of 1965.

Evaluation of the Birch Creek projects (post 1994 flood) illustrates the vital importance for restoring flood plain function and riparian habitat with vegetation (native trees, shrubs, and grasses). Project personnel found eroding streambanks most often developed on sites where trees and vegetation were deficient (pre-flood conditions) and/or immediately downstream from a reach where the stream had been manually constrained and/or had been treated with bank hardening components (ie. rip-rap). In evaluating the program projects we found a positive correlation between vegetative recovery and the

[1] Peak flow was 1400+ cfs. with a recurrence interval estimate of ten-years.
[2] Flow records have been kept by the Oregon Water Resources Department since 1928.
[3] Peak flow was 1800+ cfs. with a recurrence interval estimate of 25 years.
[4] Peak flow was 2200+ cfs. with a 50-year estimated recurrence interval.

deposition of soil. This equates to streambank building, noting several inches of new soil accumulation in areas where riparian plant species have been encouraged to re-establish.

In light of these findings the biologist for this program has opted to explore habitat restoration techniques that focus primarily on the re-establishment of riparian vegetation to address bank erosion problems. The application of bioengineering techniques appears to satisfy both habitat recovery (fish and wildlife needs) and streambank stabilization needs (of particular interest to landowners). Bioengineering, an aggressive vegetative approach to riparian restoration and bank stabilization, utilizes living plant material as the main structural component in streambank restoration projects. Bioengineering treatments, once established, tend to be self-repairing, which contrasts to bank hardening techniques such as rip-rap that often require maintenance. Although some rock is incorporated in bioengineering applications, the primary emphasis of each and every project is the use and re-establishment of lost key vegetative components.

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
1993-94	1,290

/1 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 /1	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
1994	263	8	271

/1 Adults are greater than 24 inches in length.

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

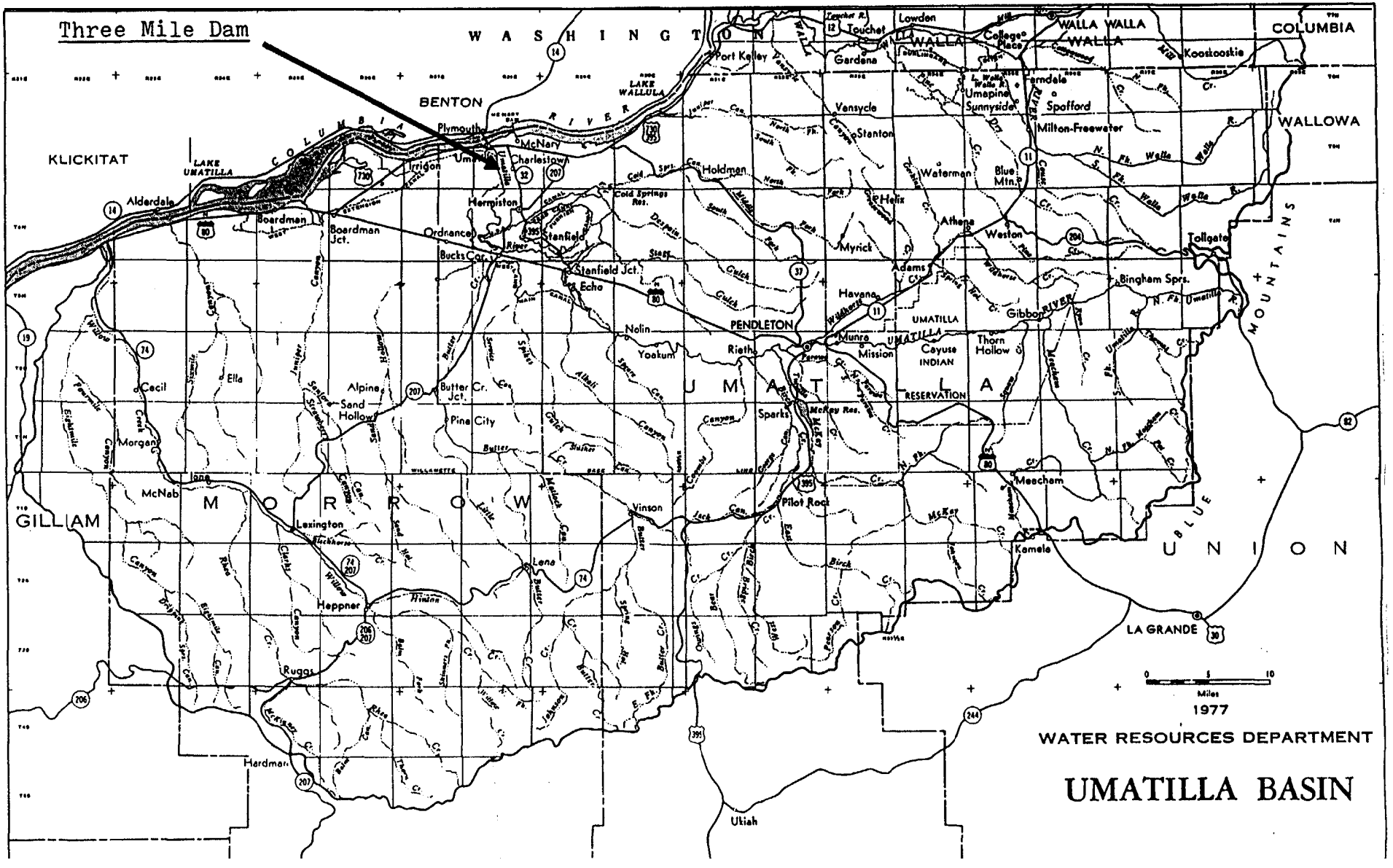

Figure A. Location of Three Mile Dam within the Umatilla subbasin.

TABLE 3. THREE MILE DAM, UMATILLA RIVER FALL CHINOOKCOUNTS

YEAR	ADULT /1	JACK /2	SUBJACK /3	TOTAL - 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
1994	687	237	368	1,292

/1 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	ADULT /1	JACK /2	TOTAL 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
1994	985	62	1,047

/1 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. The river and its tributaries flow in a northwesterly direction for approximately **115** miles. The confluence of the Umatilla with the Columbia River is located at river mile (RM) 289 near the town of Umatilla, Oregon (Figure B). 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 predominant 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 basin flood plains have led to dramatic changes in waterway characteristics since arrival of Euro-American pioneers to the area during the middle 1800's (Beschta 1994). Stream channelizing, conversion of bottomland deciduous forests to agricultural fields, diking of stream corridors to prevent out-of-bank flows, streambank hardening (rip-raping), and elimination of riparian vegetation have turned many basin streams into relatively straight/deeply incised channels. Loss of stream channel meander within valley floors help to accelerate runoff velocity and its impacts to the land. A combination of these alterations have caused excessive bedload deposits in the lower reaches of basin streams. From a water quality and fisheries perspective, streams in these conditions, tend to be the most non-productive for salmonids in terms of desirable habitat, water quality and aquatic resource diversity.

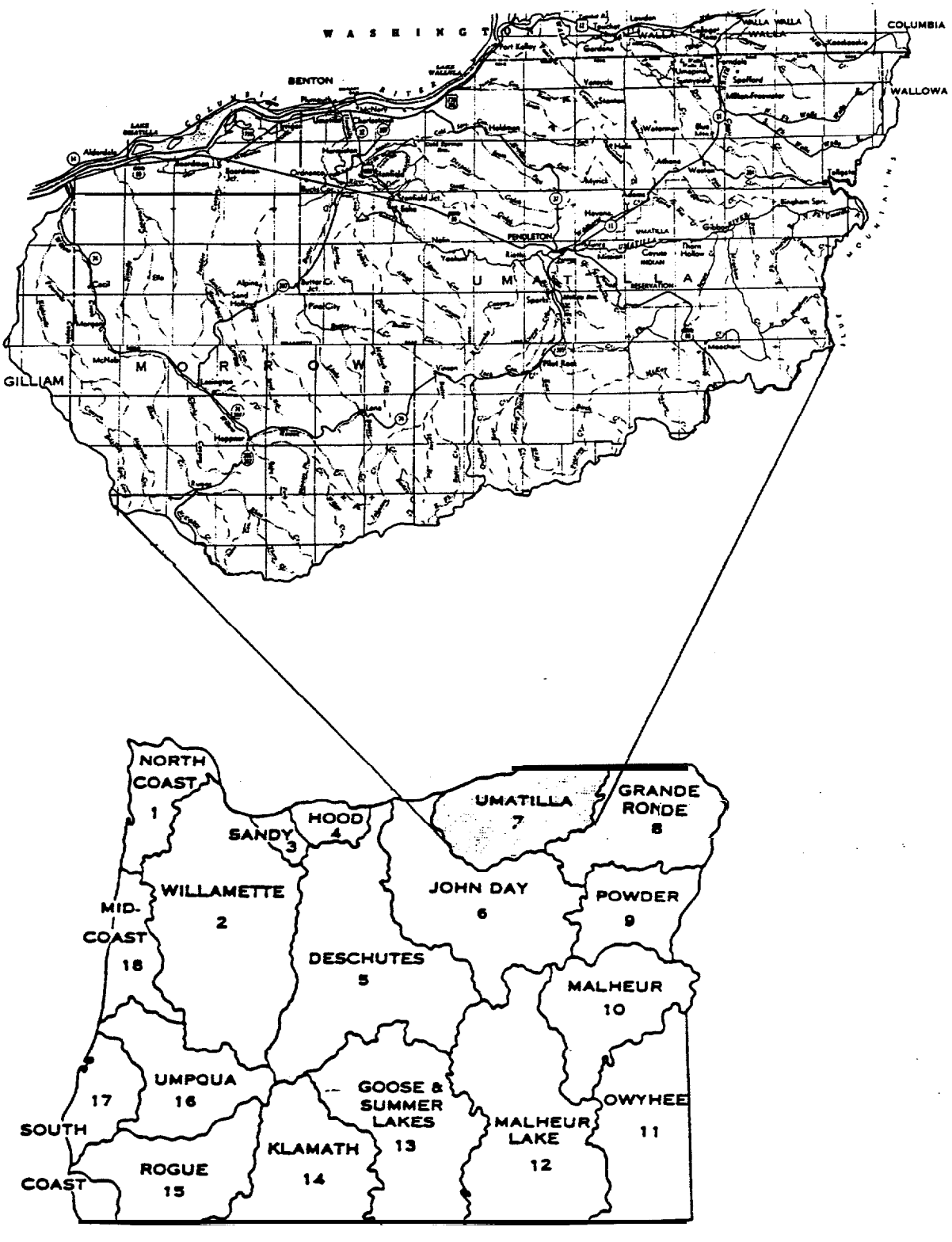

Figure B. Location of the Umatilla Basin within Oregon.

METHODS AND MATERIALS

The goal of the Umatilla Basin Fish Habitat Improvement Program is to apply habitat enhancement measures that will optimize natural production of salmon and summer steelhead smolts within the Umatilla River and its tributaries. 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 project implementation to project 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

Operations and Maintenance (O&M) entails maintaining project structures (ie. fences, livestock water developments, and stream habitat improvements) and any vegetative work (e.g. plantings, weed control, etc.) needed to ensure landowner needs are met and desired future conditions are achieved inside project leases. The O&M phase of the program will continue on each project site for the duration of each projects respective riparian lease inormally 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. Design and Layout

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 treatments, however, is determined by the biologist, with occasional input from other professionals.

b. Landowner Coordination

Landowner coordination is an integral part of maintenance on all projects. Access, field conditions, and work timing are all important considerations to reduce impacts to the land and on landowners' operations.

c. Development of Contracts

Considerable time is required to develop contracts for all major maintenance projects.

d. Obtaining Work Permits

Fill and removal permits must be obtained for all instream projects that involve removal or fill in a waterway. Permits are obtained from 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 and effort.

2. **Fencing**

Because of intensive livestock use around many project areas, fence inspection and maintenance are year-round activities. In addition to corridor fence maintenance, stream cross fences and/or watergap cross fences are also maintained to help keep livestock outside of the project boundaries. Regular inspections and subsequent maintenance ensures maximum riparian recovery inside projects.

3. **Instream**

Under current watershed conditions, annual inspection and maintenance of instream structures has become necessary. Repeated/prolonged highwater events and/or changes in channel morphology over time can cause a structure to fail. To ensure structural integrity and desirable project

results, appropriate maintenance activities may take place. Instream maintenance on our projects will be done an a case by case basis depending on impact of the structure failure on riparian recovery, streambank stability and/or- landowner needs.

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 occurring at an unacceptably low rate.

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 (July through September) has been identified as a limiting factor for water quality in the Umatilla Basin (ODEQ, 1994). Revegetating project lease areas helps provide additional stream shade, thereby helping to reduce summer water temperatures and increase winter 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) Administrative Rules. The acceptable range for water temperature in the Umatilla River Basin is $\leq$ 68°F (ODEQ Administrative Rules, 1993). Land and/or wateruse activities which cause streams to exceed state water quality standards are, by law, illegal.

During the spring and fall, areas disturbed while conducting maintenance activities are re-seeded with grasses and legumes and/or planted with trees 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 spot sprayed with herbicides or manually removed.

5. **Water Developments**

To help reduce livestock pressure around project fences and riparian habitats, offchannel livestock watering sites are developed away from riparian areas. These projects may involve tapping a spring, developing a well or pond, or diverting streamflow into a collection/holding device (e.g. livestock watering trough). These projects can become somewhat creative in the sense that alternative forms of energy must be tapped (where standard electricity sources are unavailable) to operate mechanically operated systems. These alternative energy sources include wind, solar, rainwater collection, and gravity feed systems.

6. **Miscellaneous**

These activities may include vehicle, ATV, and equipment maintenance and repair, project sign maintenance, and animal control.

Animal over-utilization of project leases can have a negative impact on project objectives. As riparian zones begin to re-establish, animals (wild and/or domestic) may increase their use of the site. Any use which causes the site to degrade or become static should be addressed (e.g. beavers dropping trees inside project areas where trees are deficient and rodents targeting grasses and shrubs). To address these type of problems the program consults with the district wildlife biologists and addresses the problem according to their recommendations. Wrapping tree trunks with wire to discourage site depravation by beavers or implementation of animal control measures are examples of strategies used.

Monitoring and Evaluation

This phase of the program usually begins the year following completion of implementation activities and continues for the duration of each projects respective riparian lease (usually 15 years). Monitoring and Evaluation (M&E) is essential to assess

the success of this program for restoring stream habitat. Typical (M&E) activities may include:

1. **Photopoint Monitoring and Picture Taking**

Standardized photographs are taken from selected sites prior to project implementation, and then re-taken annually 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 stream. These notebooks contain maps of all photopoint locations, instructions for where and how to take the photographs, and contain the accumulation of labeled slides and prints. To date, the Umatilla program has 56 active photopoint sites.

During 1994, prints were made of all of the original photopoint pictures established at the beginning of each projects. Prints were also made from selected photopoint pictures taken in 1994. The prints of the original photopoint pictures will help facilitate the alignment of the camera in the field during subsequent picture retakes. The prints made of the selected 1994 photographs accompanied with prints of the original pictures will help the program illustrate project progress to participating landowners, tour groups and assist in the long-term evaluation of the program (Appendix 3). The program's photopoint notebooks were updated with the new slides and prints.

Aerial photography/videography is another tool available for assessing stream channel and riparian vegetative change over time. The biologist spent time during 1994 exploring these new monitoring techniques and is considering them for future program use.

2. **Habitat Monitoring Transect Establishment and Data**

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

3. Thermograph Data Collection and Summarization

Thermographs have been installed within or adjacent to several project areas. These thermographs operate year round, collecting one temperature reading per hour, and are deployed for up to six month intervals (maximum data storage capacity of the thermograph). The program uses thermographs to detect temperature changes through analysis. Data is downloaded into a computer program after each deployment period and summarized. Results of the data help determine if project goals for improving stream temperature are being met.

Two temperature monitoring sites were added to the program during 1994. The new stations, located on West Birch Creek, will help us in our overall assessment of the Birch Creek Watershed.

During 1993/1994 the program deployed their thermographs at six locations on Birch Creek and two locations on Meacham Creek (Figure C). Birch Creek thermographs are placed in Westgate Canyon and on the Houser, McDanial, Straughan, Harvey, and Hwy. 395 bridge properties. Distance from the upper thermograph site on East Birch Creek to the lower thermograph site on mainstem Birch Creek is approximately 19.5 miles. The West Birch Creek Thermographs are located approximately 13 miles apart. Meacham Creek thermographs are deployed on the Louisiana Pacific property and are placed approximately 1 stream mile apart. Beginning in 1992, the program began operating thermographs on a year round schedule.

The biologist spent a significant amount of time during late winter learning the Grande Ronde Fish Habitat Program's Quatro Fro Thermograph Summarization Program. In comparison to other summarization programs used in the past, the Qpro program significantly improves speed and accuracy for summarization of temperature data.

In converting to the Qpro summarization program, the biologist learned there are occasional data recording errors produced by the thermographs that go undetected when using the former summarization programs. This discovery means all temperature data collected in previous years will need to be re-summarized using the Qpro program to see if corrections

are necessary. Re-visiting this data will also allow us to standardize our data (for all years) into a single format and thus make comparative analysis between sampling years possible. For this annual report the biologist had only enough time to summarize the 1993/1994 temperature data using the Qpro program. An effort will be made to re-summarize the previous years of temperature data in the future.

Monthly minimum and maximum air[1] and water temperatures were also plotted for some of the sampling stations monitored during 1993/1994 (Appendix 1, Figures 14-17). Due to a insufficient supply of thermographs, the program is limited to recording only stream temperatures at this time. In order for the program to accurately evaluate the effects of riparian habitat restoration and its relationship to stream temperature, air and water temperature should be recorded simultaneously at each of the monitoring sites.

Currently the NOAA data is the best information available for depicting air temperature conditions over our Lower Birch Creek thermograph sampling sites. Other thermograph sampling sites are located at substantially higher, and therefore cooler, elevations then the **NOAA** Pendleton airport site.

4. Biological and Physical Habitat 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 mans' activities on specific populations or ecosystems.

Biological surveys conducted by program personnel incorporate 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/species composition, and habitat preference(s) of the

[1] Using maximum and minimum monthly air temperature readings taken at the Pendleton Airport's National Oceanic and Atmospheric Administration (NOAA) weather station as a reference.

species sampled. Presently, data collected within project leases are for informational purposes only and are not statistically valid for answering questions regarding biomass or population gains from habitat projects-.

During 1994, project personnel sampled West Birch Creek using electrofishing techniques. The program electrofished an even proportion of slow (pool) and fast (glides, riffles, etc.) habitats for fish species composition information and to obtain a population estimate for the area encompassed by the reaches sampled. Sample sites were randomly selected from a stratified distribution of habitat types found throughout the range of stream miles surveyed.

In June of 1994, project personnel received training in conducting physical and biological surveys. Sampling methodology and habitat characteristic types used to conduct these types of surveys were developed by the ODFW Aquatic Inventories Program (ODF'W 1993). These methods were used to sample fish and their habitats on West Birch Creek (from the city of Pilot Rock Oregon to the headwaters located on Umatilla National Forest land) during the summer of 1994.

Data from physical habitat surveys provide 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).

6. Miscellaneous Field Activities

Miscellaneous monitoring and evaluation activities may include salmonid redd counts, evaluation of riparian vegetative recovery and/or planting success, and monitoring of logging activities when they occur adjacent to project areas.

Proposed instream work activities on lands that may effect project sites are also 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.

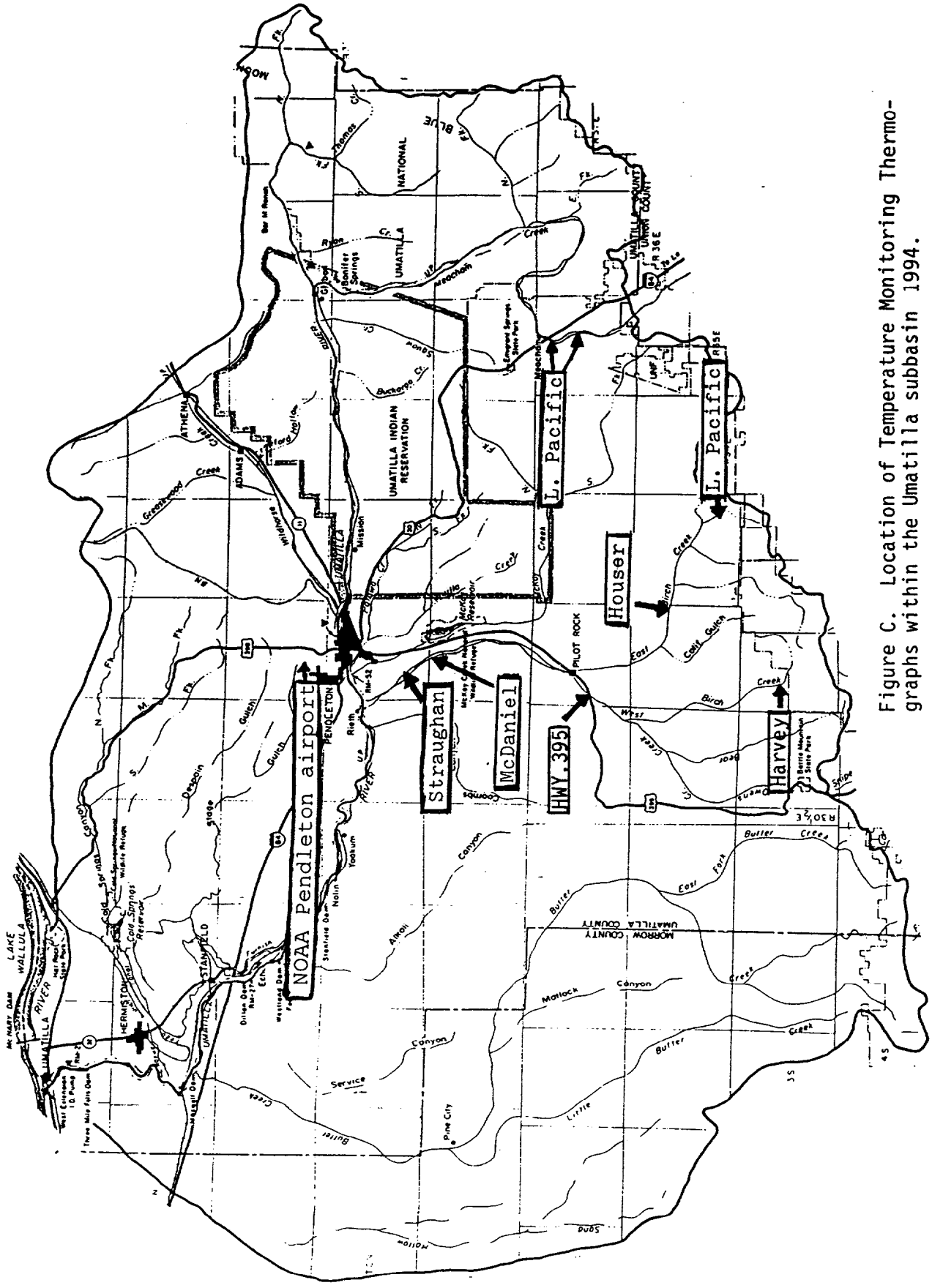

Figure C. Location of Temperature Monitoring Thermographs within the Umatilla subbasin 1994.

RESULTS AND DISCUSSION I. FIELD ACTIVITIES

All 1994 field work were associated with either O&M or M&E activities.

Operations and Maintenance

The Umatilla Basin experienced a relatively warm winter with a moderate snowpack. Rain on snow and localized cloudbursts in the Upper Umatilla Basin produced flashy flow conditions throughout the late winter/early spring. These conditions produced the third largest flood event in Birch Creek recorded history[2]. These spring flow conditions resulted in additional streambank erosion, bedload deposition, channel migration, riparian vegetation losses, and moderate damage to our fences, watergaps, and instream structures.

Ironically, minimal precipitation and hot temperatures throughout the summer/early fall negated groundwater recharge accrued from the wet spring and resulted in poor forage conditions during mid/late summer for livestock. Flows in all Umatilla basin streams were extremely low from mid July through late September. Consequently, livestock pressure on our fences and watergaps were unduly high with several incidents of trespass encountered inside the exclosures during this time period.

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 fence reconstruction work on 0.25 miles of Meacham Creek, 0.5 miles of Birch Creek, and 0.5 miles of East Birch Creek.

b. **Landowner Coordination.** A considerable amount of time was spent coordinating with landowners while developing plans for maintenance of projects.

[2] Records have been kept for this subbasin since 1928 by the Oregon Water Resources Department.

Private properties were reviewed (by landowner request) for streambank restoration needs by the district fish biologist, a United States Department of Agriculture Natural Resource Conservation Service (USDA NRCS) hydrologist, and the biologist. Our objectives were to assist landowners in evaluating their streambank erosion problems incurred by the May 1991 and 1994 floods, assist in the development of restoration plans, and discuss potential funding sources for projects that are compatible with stream habitat restoration needs. Properties inspected included program leases and private lands along the Lower Umatilla River, Birch and Pearson Creeks. Landowners were fairly receptive to habitat restoration needs and were willing to consider bank stabilization treatments that are compatible with these objectives.

A comprehensive fish and wildlife habitat improvement project was developed for the D. Lobato property on lower Birch Creek. This project will address a multitude of fish and wildlife habitat deficiencies and will serve as one of three sites planned for demonstrating bioengineering techniques. The biologist is working with Agua Tierra Environmental Consulting Inc. (ATEC) from Olympia Washington on developing the Lobato project and with Interfluve Inc. from Hood River Oregon on developing bioengineered maintenance treatments for three of the program leases on East Birch Creek. ODFW and the Lobato's will seek project sponsorship and funding from a variety of resources to implement the Lobato's project. The Lobato's project also seeks multi-agency cooperation to make this project a community based educational opportunity for those agencies, groups, and individuals who wish to participate.

The biologist also coordinated with landowners along Birch and Meacham Creeks regarding:

weed and beaver control activities inside lease areas.

review of timber harvest operations that occurred adjacent to our program leases.

weed control activities that were implemented adjacent to and outside of our program leases.

relocation and reconstruction of project fences that were destroyed by the 1994 flood and project maintenance activities conducted by the program that took place inside of the leases.

instream work activities that were conducted by landowners inside our leases.

and habitat restoration information was provided to landowners who requested it.

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

Property damage after the May 1994 flood event was a common topic of concern amongst our participating landowners. Some landowners remain skeptical about the programs ability to stabilize their stream corridors without reverting to traditional treatments such as rip-rapping and channelizing. None of the landowners however, requested to option out of their leases-.

The program leader and the biologist in conjunction with the ODFW engineering -division, developed a maintenance contract for bioengineering treatments on three of the East Birch Creek leases. The program hired Inter-fluve Inc.(a bioengineering consulting firm from Hood River Oregon) to assess two stream reaches (one on the Rugg & Falk leases and the other on the Houser lease). Inter-fluve Inc. will develop a bioengineered restoration plan for the two reaches and assist the program with implementation of the two projects during 1995. These sites will serve as demonstration areas for bioengineered habitat restoration and will provide an opportunity for program personnel to learn from experts. In addition, a third bioengineering contract, as discussed earlier, was developed with ATEC Inc. to address stream/riparian

issues on a non-program leased property owned by the D. Lobato family on lower Birch Creek.

d. Obtaining Work Permits. None of the maintenance work conducted by the program in 1994 required obtaining work permits through the Oregon Division of State Lands (ODSL), U.S. Army Corps of Engineers (USACOE), or the Umatilla County Planning Department.

Maintenance Work Preparation

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

Maintenance Work Implementation

Routine maintenance work was implemented on all program leases. These activities however, could not address large scale restoration needs to areas severely impacted by the May 1994 flood. Instead, these areas had to be assessed, prioritized based on budgetary limitations, and scheduled for treatment in 1995.

Fish habitat projects in the Umatilla program encompass 5.7 miles of Birch Creek, 2.8 miles of East Birch Creek, and 2.1 miles of Meacham Creek respectively (Table 5).

Fencing

Approximately 15 miles of project fencing was inspected and routine maintenance carried out. Of these 15 miles of fencing, approximately 1.25 miles had to be rebuilt. In areas where permanent corridor fencing was lost during the 1994 flood, temporary electric fencing was installed. Watergaps and stream crossing fences also had to be rebuilt. Several of these structures were replaced with electrical polywire; a very effective and inexpensive alternative for fence replacement after floods. Temporary fencing will have to be used at these sites until a long term solution for

streambank stabilization and fish habitat enhancement can be developed. This solution most likely will require negotiating a wider corridor with the landowners.

Project personnel discovered theft of approximately 35 (2"x6"x20') wood fence rails from the Meacham Creek project fences. Considerable time was spent replacing the missing rails and making other fence repairs.

Four of the programs battery powered electric fences were converted to solar powered units for the summer. The program will purchase more solar powered units in 1995 to help alleviate battery maintenance during the summer.

Dry weather conditions during late summer led to livestock overuse of pastures adjacent to our fences. Operators tended to leave their animals on these pastures for a much longer period than usual. During this period fence monitoring had to be increased appreciably, as the forage within the riparian exclosures became more enticing for the livestock. Several incidents of livestock trespass were encountered.

Thermographs

Thermographs were checked periodically throughout the year for maintenance needs and proper function. All RYAN Thermograph units were sent to the manufacturer in March for re-calibration and service. Hobo Thermograph units were substituted for the RYANS during their absence.

Instream

Instream structures were inspected along 8.6 miles of Mainstem and East Birch Creeks and 2.2 miles of Meacham Creek. Seven naturally fallen trees were cabled and anchored instream, two each on the Houser and Gambill leases, and three on the Straughan lease, to protect eroding streambanks and improve fish habitat diversity.

Revegetation

Weed control activities were conducted along six miles of Mainstem and East Birch Creeks. Treated properties included the F.E. Straughan, J. Straughan, Wheeler, McDaniel,

Rhinehart, Hoeft, Hemphill, Gambill, W. Weinke and Houser properties.

Plantings on project leases were not conducted during 1994. Deciduous tree cuttings were collected however, throughout the winter of 1994-95 for planting in the spring of 1995. Approximately 6,000 willow and 600 cottonwood cuttings were collected. Project personnel identified potential planting sites based on the need to improve bank stability and/or improve channel shading.

Water Development

Landowner cooperation with livestock management on the Y. Gambill property made installing the solar powered water development project unnecessary during 1994. Water right rules prohibited this project from being implemented in 1993. Changes in the regulations, however, appear favorable for implementing these type of projects in the future. If needed, the program will install this equipment on a suitable project site in 1995.

Miscellaneous Field Activities

Vehicle, ATV, and equipment maintenance and repairs were completed as necessary throughout the year. One of the programs two permanently assigned vehicles was returned to the Oregon State Motor Pool in Portland Oregon.

Approximately 60 old signs denoting riparian project areas as a cooperative effort between BPA, ODFW, and landowners were replaced with new signs denoting the same on all project lease sites.

TABLE 5. FISH HABITAT PROGRAM RIPARIAN PROJECTS WITHIN THE UMATILLA RIVER BASIN (OPERATIONS AND MAINTENANCE 1994).

BIRCH CREEK: Landowner	Year Imp.	Fence Miles	Acres Leased	Stream X-ings	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	Stream X-ings	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	Stream X-ings	Water Gaps	Stream Miles	Instream Structures
L. Pacific	89	0.90	15.4	4	3	0.65	
L. Pacific	91	0.50	23.5	4		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

Monitoring and Evaluation

1. Photopoint Monitoring and Picture Taking

Photopoints were re-marked with new tags to facilitate ease in relocating and identifying the sites in the field.

Photopoint pictures (35mm color slides) were taken during the month of September from 13 Meacham Creek and 43 Birch/East Birch Creek photopoint sites. This activity encompassed all program leases. Selected photopoint pictures depicting project progress are included in this report (Appendix 3).

2. Thermograph Data & Summarization

All hourly temperature data for 1993/1994 was summarized into weekly and monthly maximum, minimum and mean temperatures. This data was graphed using Harvard Graphics (Appendix 1, figures l-13).

During 1993/1994, specifically during the months of July through September, four of the six Birch Creek stations recorded mean weekly maximum temperatures that exceed state water quality standards for the Umatilla Basin. (Appendix 1, figures 1 & 2). Temperatures of this magnitude can have a negative effect on salmonids.

Water temperature has been identified as a key component in the selection of habitat utilized by juvenile salmon and steelhead (Meehan, 1991). Juvenile salmonids exhibit a tolerance threshold for minimum and maximum water temperatures. Lethal limits for chinook salmon have been reported as 26.2 °C and 0.8 °C respectively; and 23.9 °C and 0.0 °C respectively for steelhead. The preferred ranges are 12-14 °C for chinook, and 10-13 °C for steelhead.

Juvenile salmonids respond to unfavorable water temperatures by moving to thermal refuges. It is important to note that when temperatures approach each species tolerance threshold, a proportional reduction in the amount of total habitat available develops for that species. As temperatures in a stream increase, salmonids will begin to concentrate in smaller areas within suitable stream habitat. This

concentration may increase the competition for space, food, oxygen, and can make the fish more susceptible to disease and predation. Invasion of non-native fish species can also be expected. This, in turn, can increase predation on salmonids and further increase competition for the available habitat (Ebersole, et.al., 1994).

At this time the program has insufficient information to detect trends in water temperature changes directly related to our projects. Some of the physical and biological changes from upper to lower parts of the Birch and Meacham Creek watersheds can be explained by the natural continuum of ecological process within the stream system (Vannote et. all. 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 the 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. Influences such as the impacts of the 1991 and 1994 basin wide floods further complicate this endeavor. We predict air temperature will continue to have 'a major influence on water temperature in our project streams until positive vegetative changes develop within the riparian corridors. As long as project areas are maintained, riparian habitat should continue to improve.

3. Habitat Monitoring Transects

Most of the stream habitat monitoring transects on the F.E. Straughan Birch Creek property that were buried by the 1991 flood, were relocated and identified in 1993 and 1994. Data was not collected from this site, however the program will attempt to sample all transect locations due for monitoring in 1995.

4. Biological and Physical Habitat Monitoring

A 50 meter reach on Meacham Creek within the Louisiana Pacific lease was sampled during mid-summer 1994 for species composition information. This same area was sampled using the same sampling method and during the same time period as in 1992 and 1993 (Appendix 2, figure 18). In 1994 an

inverse in species composition was observed for this site.. Salmonids accounted for 66% of the total fish sampled in 1994 compared to 23% in 1993 and 18% in 1992. This observation may be attributed to improving habitat conditions, however high spring flows and cooler water temperatures during the transition period to low summer flow may have produced these results (ie. salmonids were dominating the reach at the time flow diminished). Subsequent mid-summer sampling should help detect if this is a positive trend shift towards our goal of improving salmonid habitat within this reach of Meacham Creek.

Project personnel assisted district staff with their annual spawning ground (redd) counts for summer run steelhead (Table 6). The steelhead surveys were conducted during the spring before flooding. Survey conditions were (unusually) optimal for this year's count. Typically, spring runoff causes excessive turbidity which prevents good visibility and high flows can wash out or cover up redds.

TABLE 6. 1994 SUMMER STEELHEAD REDD COUNTS FOR BIRCH CREEK

BIRCH CREEK SAMPLE REACH	REDDS PER MILE
East Birch Creek	8.7
West Gate Canyon	12.0
Pearson Creek	6.2
West Birch Creek	3.3

Private property owners along West Birch Creek were contacted for permission to conduct a comprehensive physical and biological survey of the stream and riparian habitat on their properties during 1994. The landowner contacts for this project helped inform more people in the basin about the ODFW/BPA program, answered questions and/or concerns about the survey, and provided an opportunity for us to discuss fish and fish habitat issues.

The comprehensive biological survey of West Birch Creek (approximately 20 miles) was facilitated in conjunction with the physical habitat survey of this same area during 1994.

A total of 80 habitat units were sampled (20 fast, 20 slow in each of two strata). Data summary and analysis of the survey work are being evaluated by the ODFW's Aquatic Inventories program. Results of this work were unavailable in time for this report.

Although results of this project are still under evaluation, it is noteworthy to mention the finding of an isolated trout population while conducting the survey. Project personnel encountered a set of two water falls, of which both may prevent the upstream passage of fish. Located inside a roadless area in the headwater reach of the watershed, the lower falls is approximately 3.5 meters in height and the upper falls is approximately 25 meters in height. Trout were found present above both falls, however species type and genetic origin have yet to be determined. Project personnel are working with district and departmental staff on generating a plan to answer these types of questions.

RESULTS AND DISCUSSION II. ADMINISTRATION

Administrative

Administrative activities during 1994 included preparation of reports and data summaries, budget preparation and purchasing, program development, personnel hiring and supervision, and contract administration.

Reports and Data Summaries

In compliance with our contract, annual and monthly progress reports for the Umatilla Fish Habitat program were prepared and submitted to BPA.

Information for the 1995-1996 Statement of Work and Budget was submitted to the Program Leader for contract preparation.

Project personnel wrote and submitted a habitat survey summary report (West Birch Creek) to the ODFW Aquatic Inventories Program. This report will assist the Aquatic Inventories staff in their analysis of the data our program collected this year.

Budgets/Purchasing

The biologist wrote and submitted two grant applications (GWEB and R&E) for one of three bioengineered habitat restoration demonstration projects proposed for next year.

Field supplies, office supplies, and project maintenance materials were purchased as needed throughout the contract period.

Program Development

The biologist and district staff spent considerable time reviewing bioengineering techniques and receiving input from bioengineering consultants on methods for solving streambank erosion problems. Program and district staff have determined that the Umatilla fish habitat projects can stand to benefit by applying the techniques to their O&M program. To initiate the process, several bioengineering consulting firms located throughout the Pacific Northwest were

contacted and invited to give presentations to the district. Two firms, Inter-Fluve Inc. from Hood River Oregon and ATEC (Agua Tierra Environmental Consulting Inc.) from Olympia Washington came to Pendleton during late summer to make presentations. After evaluating their work, the program has begun to establish three demonstration sites for applying the techniques (two projects to be funded by BPA and the other with outside program grant moneys). If the demonstration projects prove beneficial and cost effective, the program will probably apply the techniques to future projects.

The biologist worked cooperatively with the John Day District BLM and the local USDA-NRCS office on exploring the use of aerial photographs and videography to monitor project and subbasin wide habitat improvement progress. Technologies are available to convert aerial pictures to a computerized format and then evaluate habitat changes over time using subsequent photographs. These computer programs allow the user to numerically calculate percentage gains and losses resulting from physical habitat changes.

Project personnel attended workshops or seminars on: Bioengineering Techniques; BPA Streamkeeper Program; Oregon Chapter of the American Fisheries Society Annual Conference; ODFW Fish Biologist Workshop; Cispus Workshop for Training in Resource Management Communication Skills; ODFW North East Region Training Conference; AFS Managing Rangeland Ecosystems Symposium; ODFW Aquatic Inventory Survey/Sampling Techniques Training; ODFW Purchasing Procedures Workshop; Monthly Safety and Weekly Staff Meetings; and Holistic Resource Management Training.

Personnel

Mr. Michael Montgomery and Mr. Robert Marheine were hired in June as seasonal employees. Mike worked throughout the duration of the contract period, while Robert worked through the end of September. Seasonal employees spent about 60% of their time conducting physical and biological fish habitat surveys and the remainder of their time on project maintenance.

Position descriptions, work plans and performance evaluations were written for both seasonal employees.

Contract Administration

Noxious weed control and habitat log placement contracts were administered by project personnel during 1994.

INTERAGENCY COORDINATION/EDUCATION

Interagency Coordination

Meetings were attended to review/comment on:

-Status of fish stocks in NE Oregon.

-Changes in the Oregon Department of Forestry's (DOF)water Classification and Protection Rules as it pertains to timber harvest, stream temperature monitoring, and placement of large woody debris in riparian areas and wetlands.

-Changes in the Fill/Removal permit process for the Umatilla Basin that attempt to address habitat restoration and acceptable streambank restoration processes, using a stream reach approach concept.

The biologist worked with Umatilla County Weed Control on noxious weed control within the program's leased areas.

Stream Temperature data and summarization techniques were shared with the ODFW/BPA Grande Ronde Fish Habitat Improvement Program.

Three hazardous material spill incidents that were reported to the biologist were referred to the Department of Environmental Quality.

The biologist attended monthly meetings of the Umatilla and Walla Walla Basin Watershed Councils.

The biologist attended district meetings with the Oregon State Police and Department of Environment Quality to discuss environmental violations, policies and procedures.

The biologist worked cooperatively with the Confederated Tribes of the Umatilla Indian Reservation's fish habitat biologist to develop a Streambank Stabilization Workshop (Bioengineering Techniques) and various other activities throughout the year.

A list of BPA fencing specifications and a list of heavy equipment operators and fence contractors was compiled and sent to the Baker District of the Bureau of Land Management.

Landowner Contact reports were prepared and sent monthly to the program leader.

Project personnel coordinated with T. Murdock of the BPA Streamkeeper Training Program to help conduct a public training seminar in Pendleton.

The biologist coordinated with ODFW Aquatic inventory program staff to facilitate completion of the field work conducted by project personnel on the West Birch Creek Aquatic Inventory project.

Monthly meetings of the Blue Mountain Chapter of Trout Unlimited are attended on a regular basis to foster a cooperative working relationship on program habitat improvement projects.

Trout Unlimited habitat project funding sources were reviewed with the TU., program's Project Coordinator. The biologist will seek these funds for future habitat restoration opportunities.

A proposal was written and submitted to the Apprenticeship in Science and Engineering (ASE) summer youth program in an attempt to obtain a summer student employee to assist with program projects.

Education

The following educational activities were undertaken during 1994:

Information about the ecology, biology, and importance of beaver in stream ecosystems were compiled and sent out to various interests. Information also focused on how to prevent localized damage to riparian vegetation in areas of heavy beaver activity.

A bioengineering workshop was planned, developed, and presented to the public at the Pendleton Convention Center in February of 1995. The biologist coordinated with the

ODFW district fish biologist and the CTUIR fish habitat biologist to bring this event together. Approximately 280 people attended the day long workshop. Twelve Speakers gave presentations on various subjects such as: Hydrology, Permitting, Vegetative Materials, Planting Methods, Bioengineering Treatments/Case Histories, Project Planning, and how Bioengineering principles apply to habitat restoration efforts in the Umatilla Basin.

The Bioengineering Workshop received financial support from 13 sources to make this a free workshop for all who wished to attend. Contributions for the workshop paid for the production of about 350 workshop notebooks, catering services and food for the breaks, speakers per diem, convention center rental, and production of a professional quality education video of the event.

Poster session displays depicting the works of the Umatilla Fish Habitat Improvement Program were developed for the AFS biennial coho-chinook salmon workshop and the Pendleton Sportsmen Show.

Copies of our BPA Annual reports were provided to various interests upon request.

A one hour local radio show was conducted to discuss local watershed restoration issues.

A presentation on the ODFW/BPA Umatilla Sub-basin Fish Habitat Improvement Program was given to the Umatilla Basin Watershed Council.

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APPENDIX-1
THERMOGRAPH DATA

Figure 1. Mean Weekly Maximum Temperature for Birch Creek May 1, 1994 through October 31, 1994.

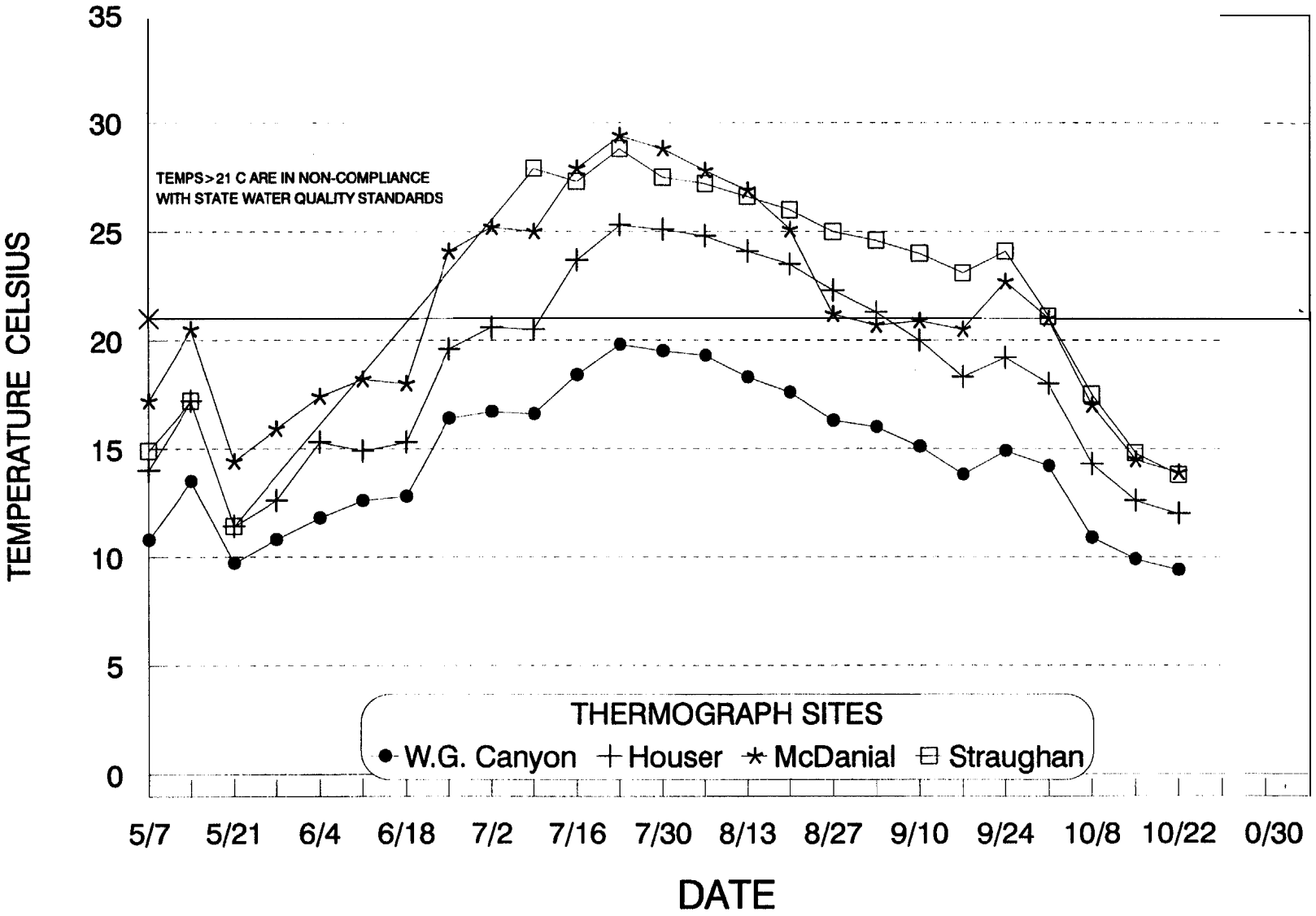


Figure 2. Mean Weekly Maximum Temperature for West Birch Creek May 1, 1994 through October 31, 1994.

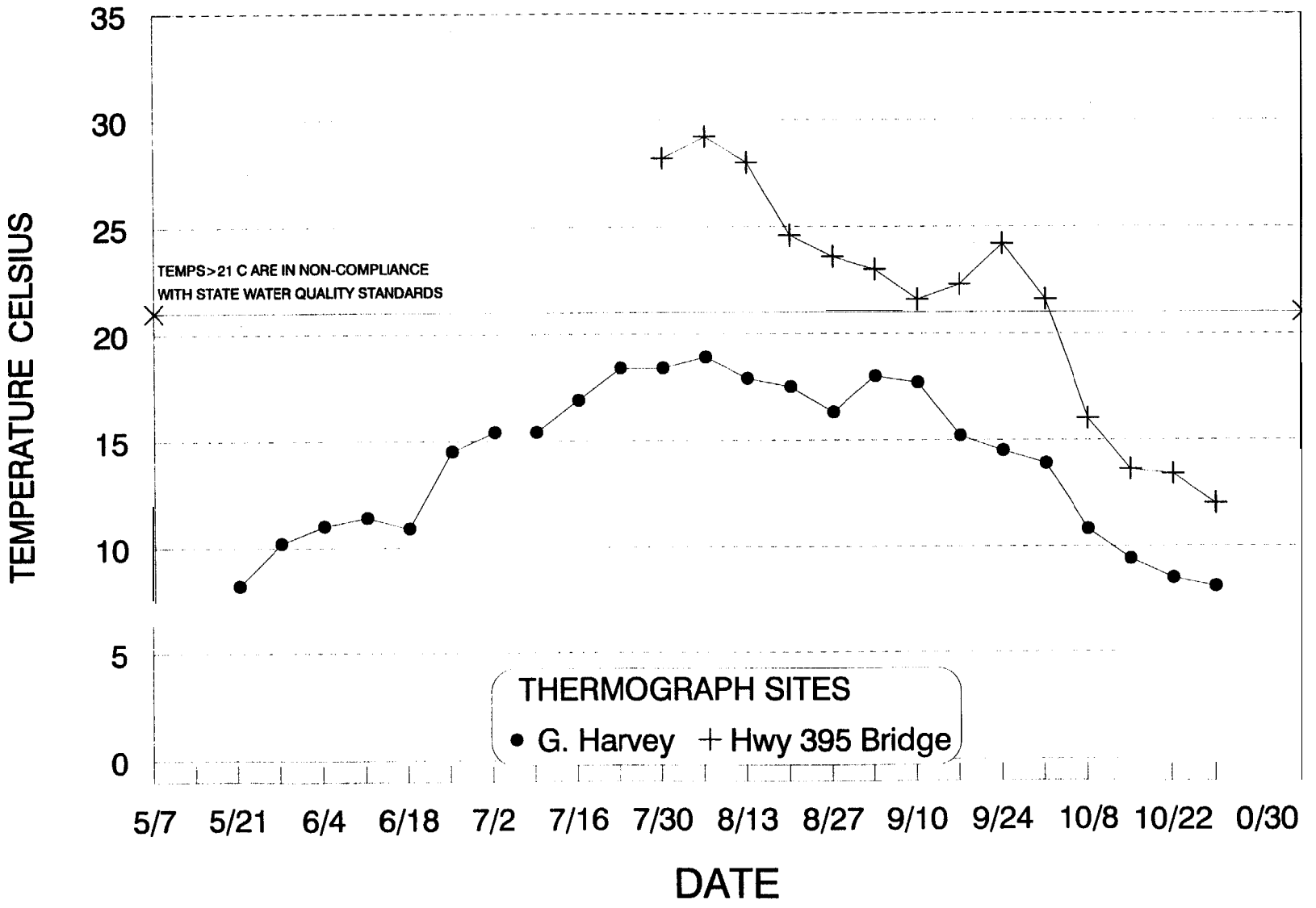
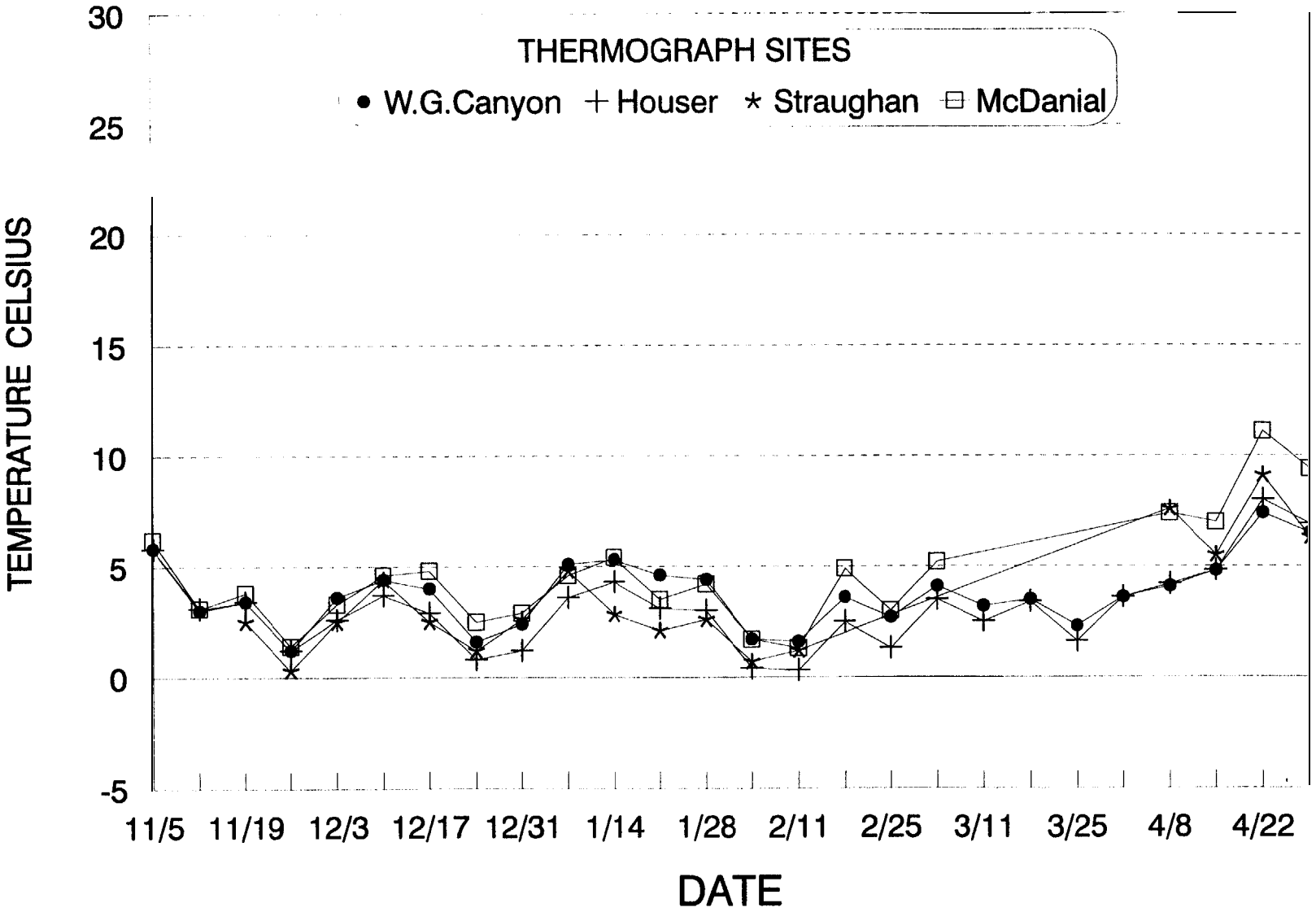
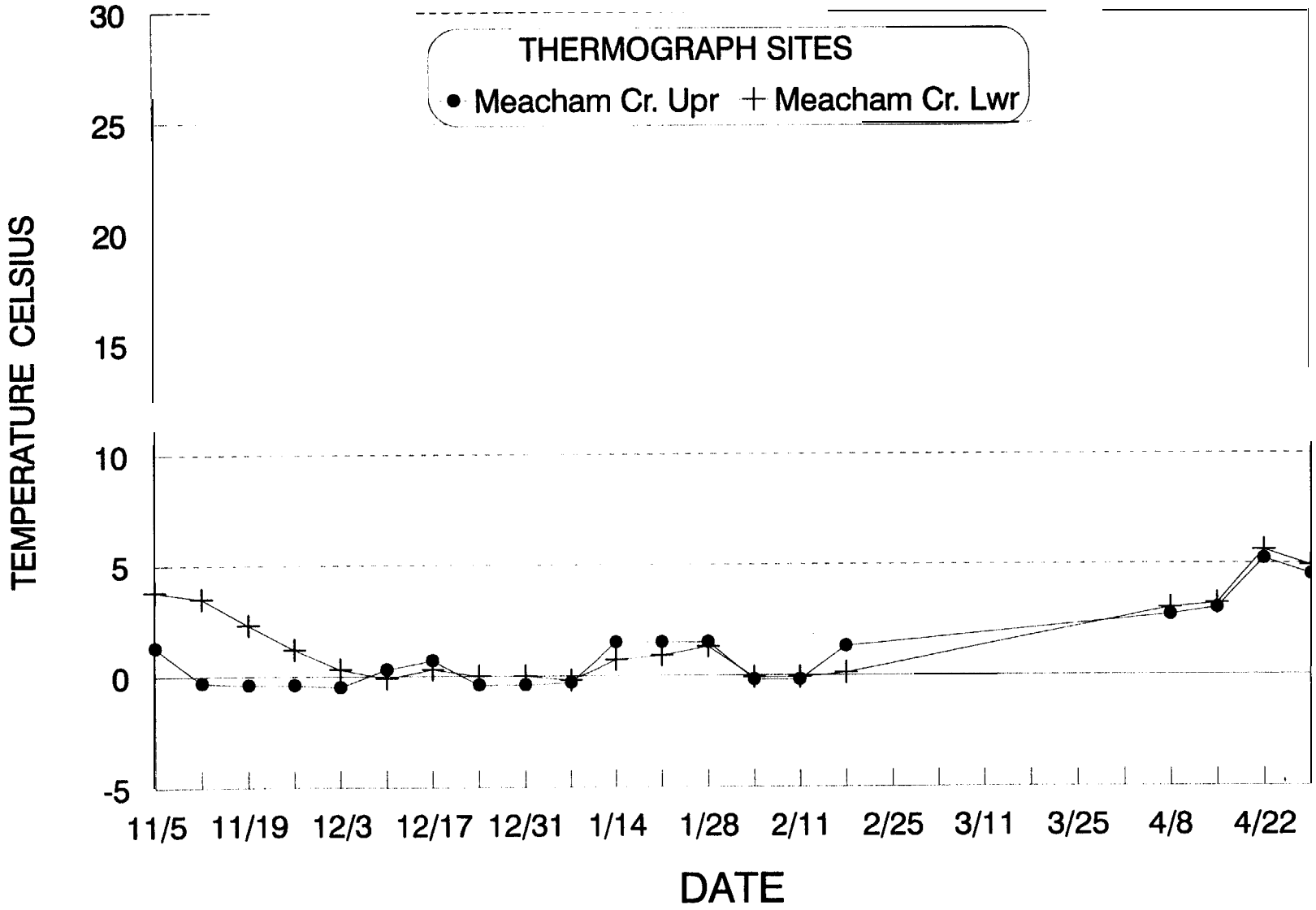


Figure 4. Mean Weekly Minimum Temperature for Birch Creek November 1, 1993 through April 30, 1994.



Note: Thermographs @ Straughan and McDanial sites removed for service on Feb. 14 and Mar. 4 respectively.

Figure 5. Mean Weekly Minimum Temperature for Meacham Creek November 1, 1993 through April 30, 1994.



Note: Both thermographs were removed for service in late February.

Figure 6. Monthly Min, Max, and Avg. Water Temperature for E. Birch Creek. (Westgate Canyon) Nov. 1993 - Oct. 1994

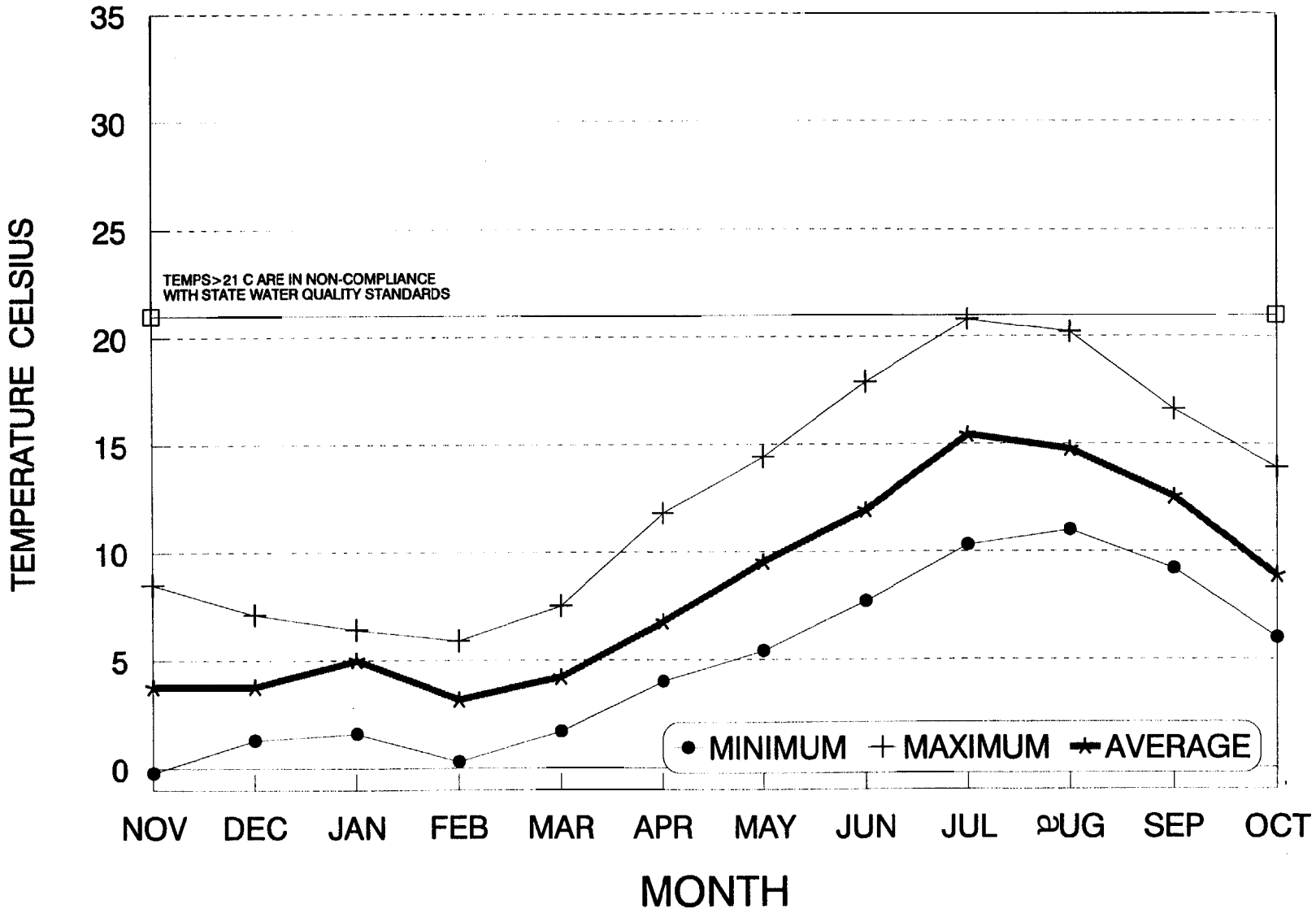


Figure 7. Monthly Min, Max, and Avg. Water Temperature for E. Birch Creek. (Houser Property) Nov. 1993 - Oct. 1994

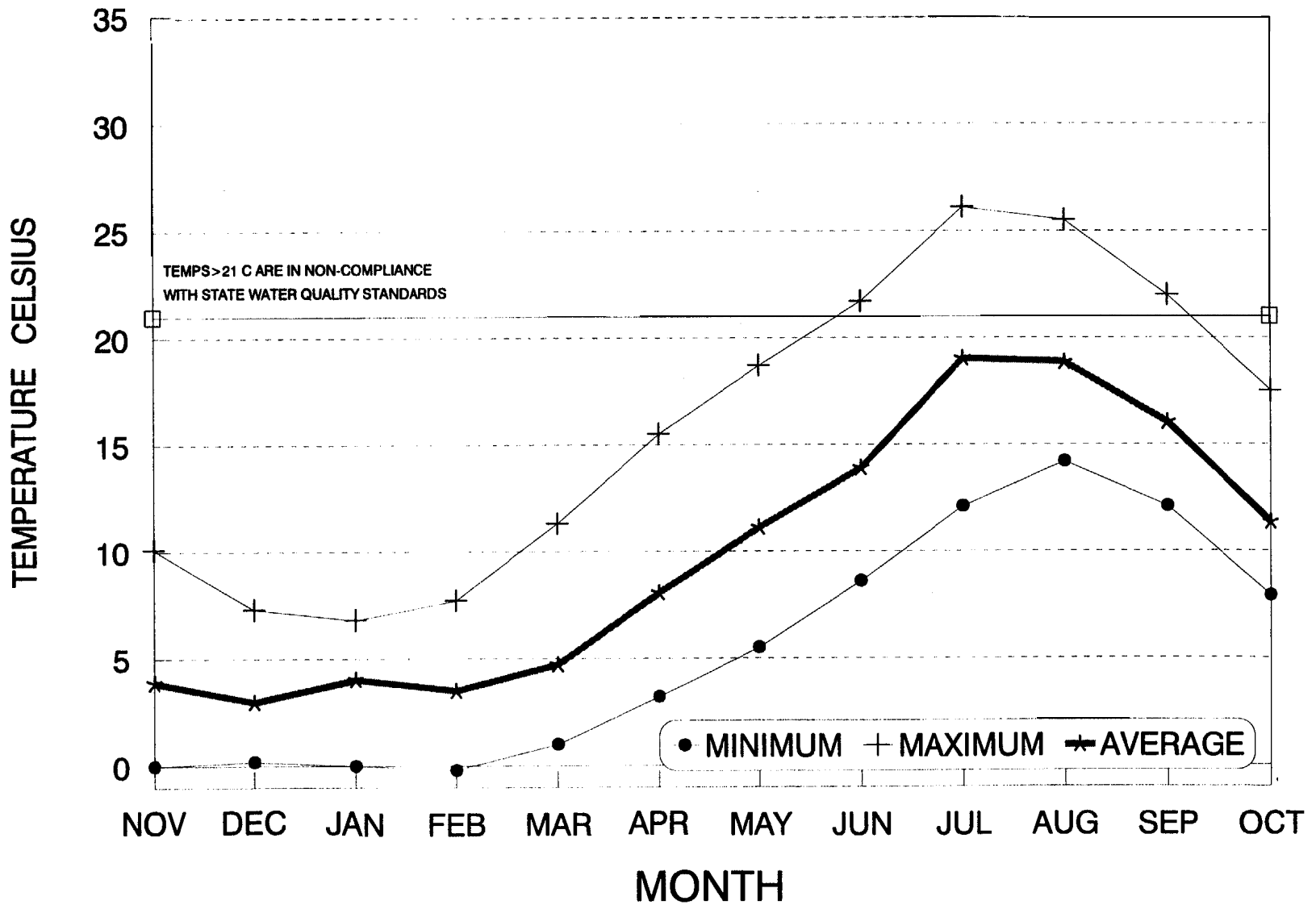


Figure 8. Monthly Min, Max, and Avg. Water Temperature for Birch Creek. (McDanial Property) Nov. 1993 - Oct. 1994

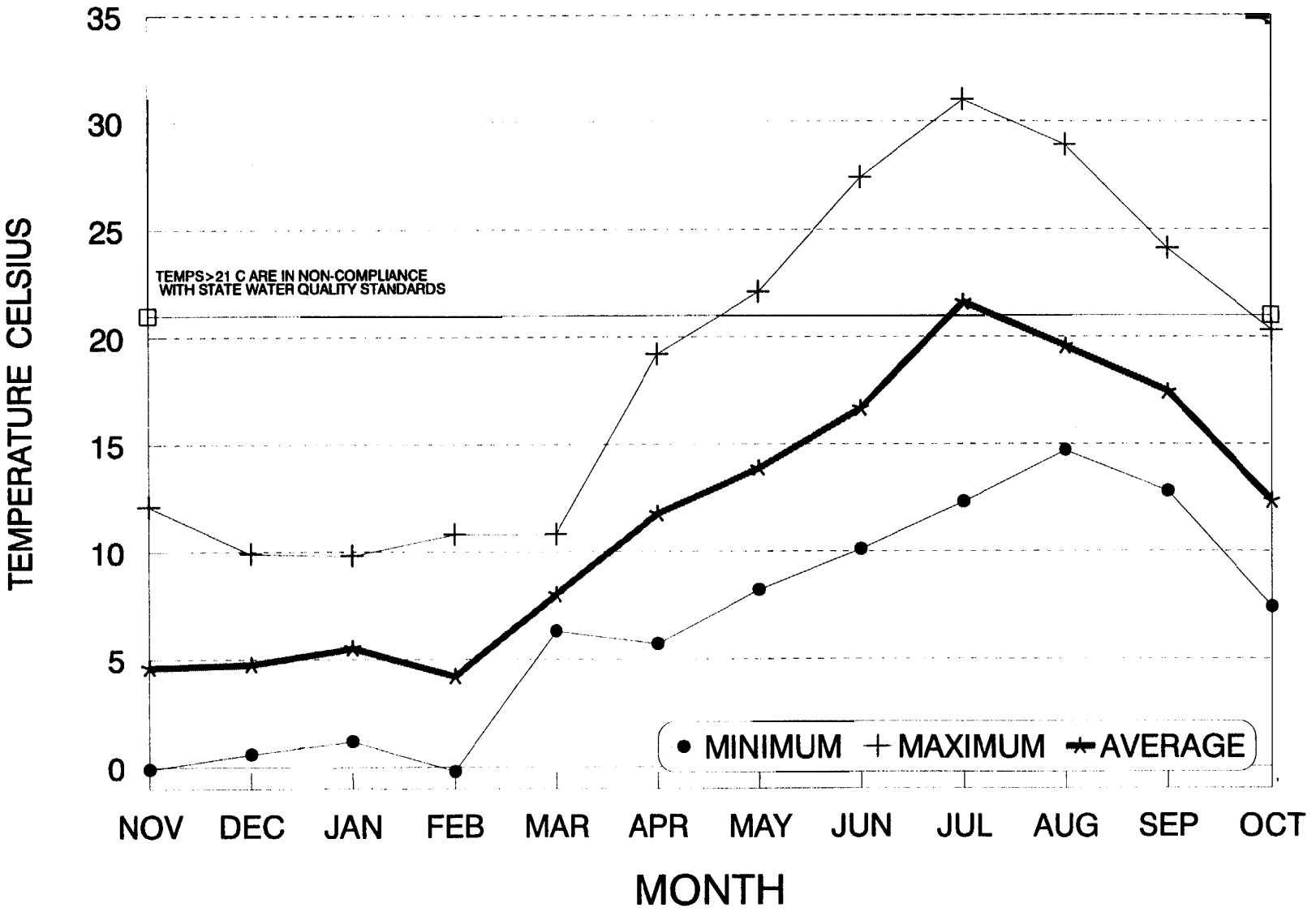
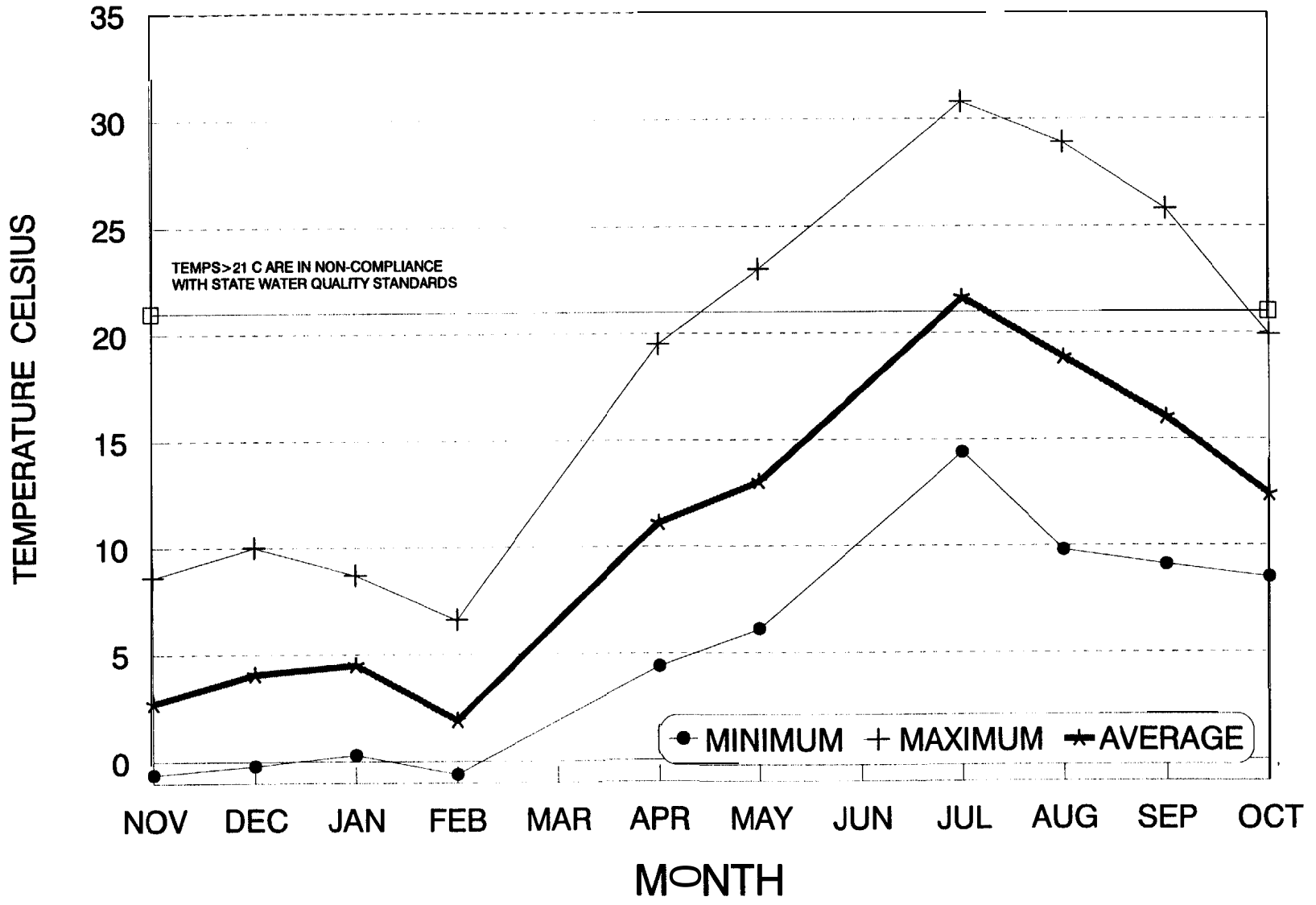


Figure 9. Monthly Min, Max, and Avg. Water Temperature for Birch Creek. (Straughan Property) Nov. 1993 - Oct. 1994



Note: No data for March and June, thermograph was down for service and repair.

Figure 10. Monthly Min, Max, and Avg. Water Temperature for W. Birch Creek. (G. Harvey Property) May 1994 - Oct. 1994

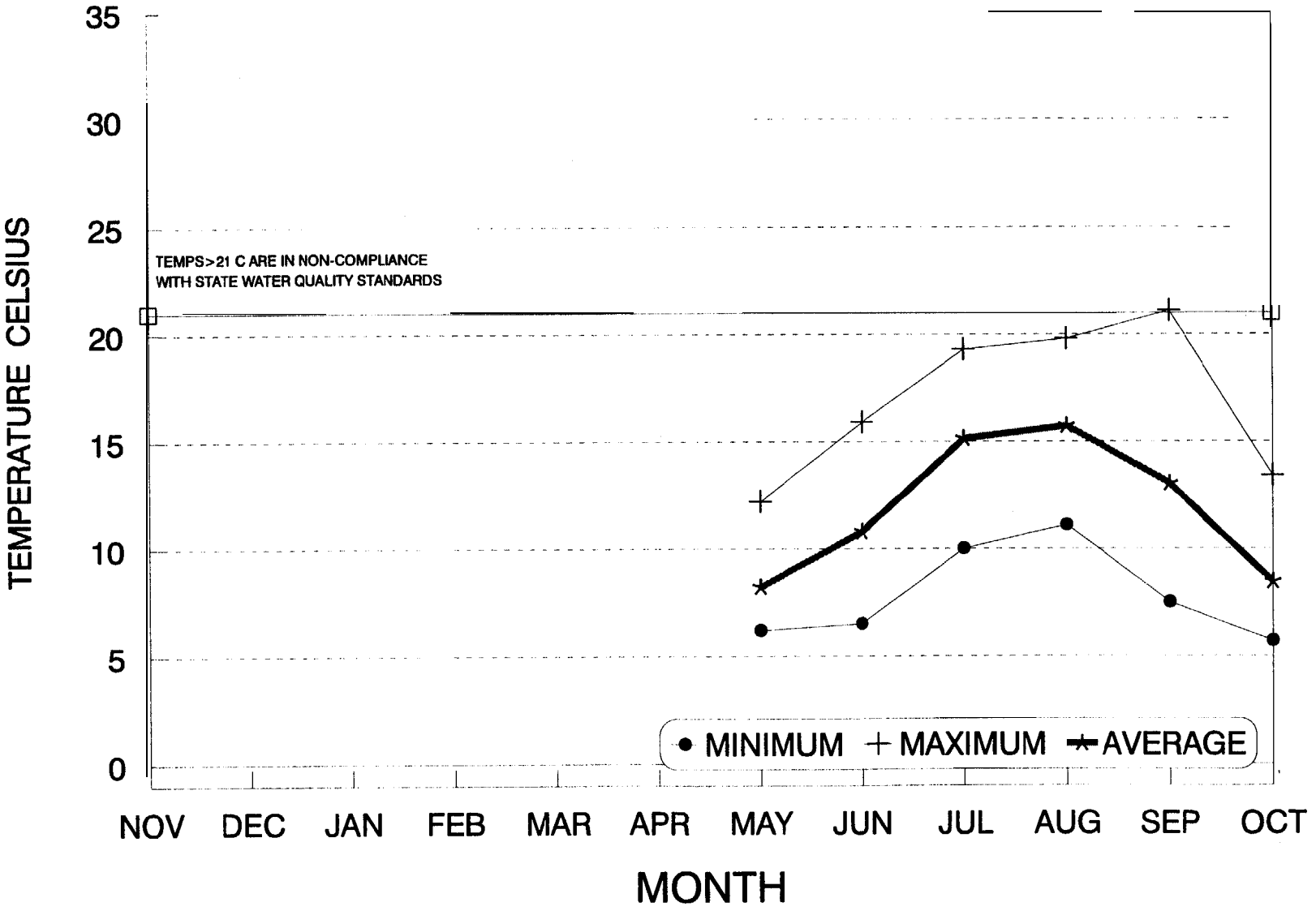


Figure 11. Monthly Min, Max, and Avg. Water Temperature for W. Birch Creek. (Hwy. 395 Bridge) Jul. 1994 - Oct. 1994

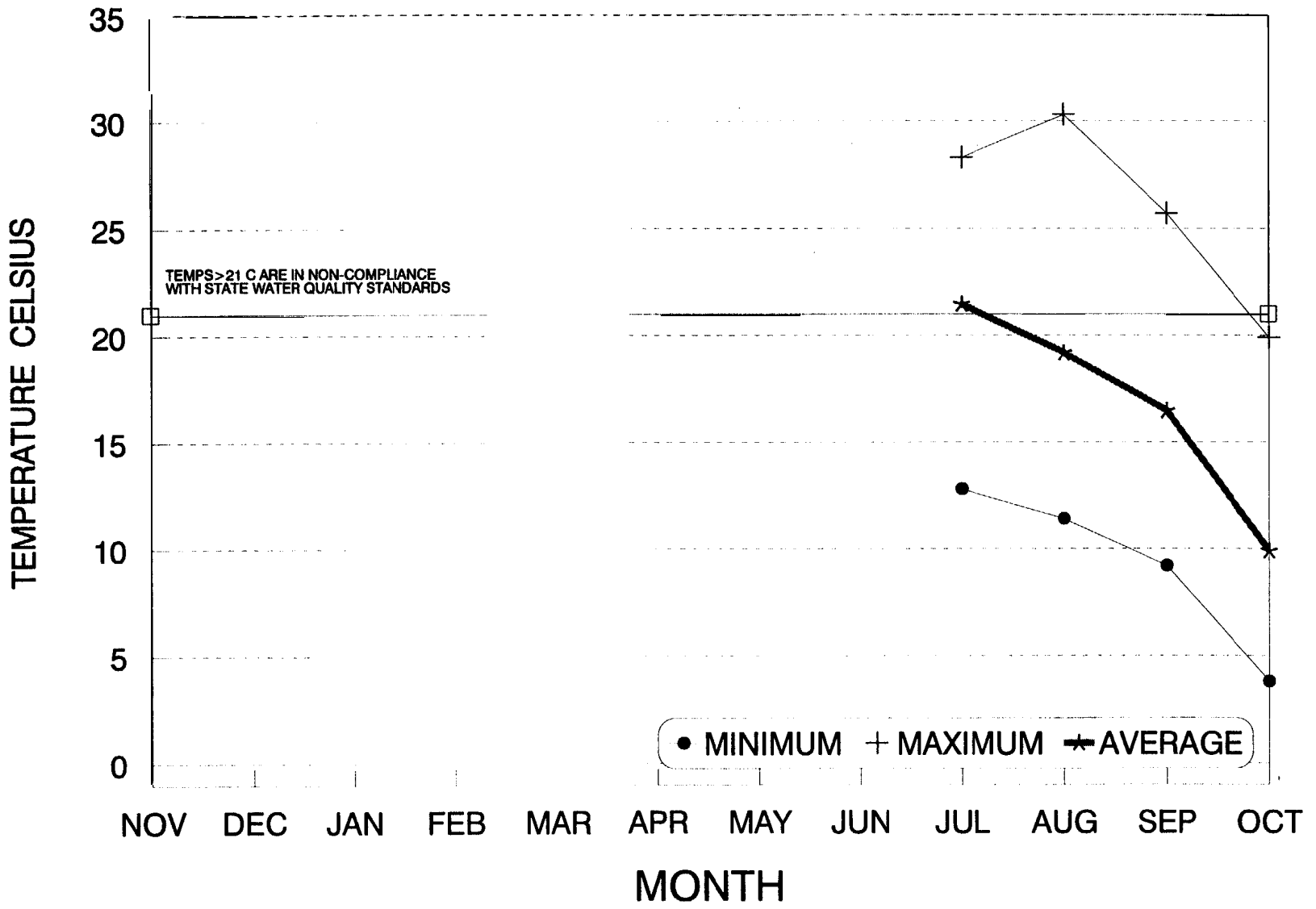
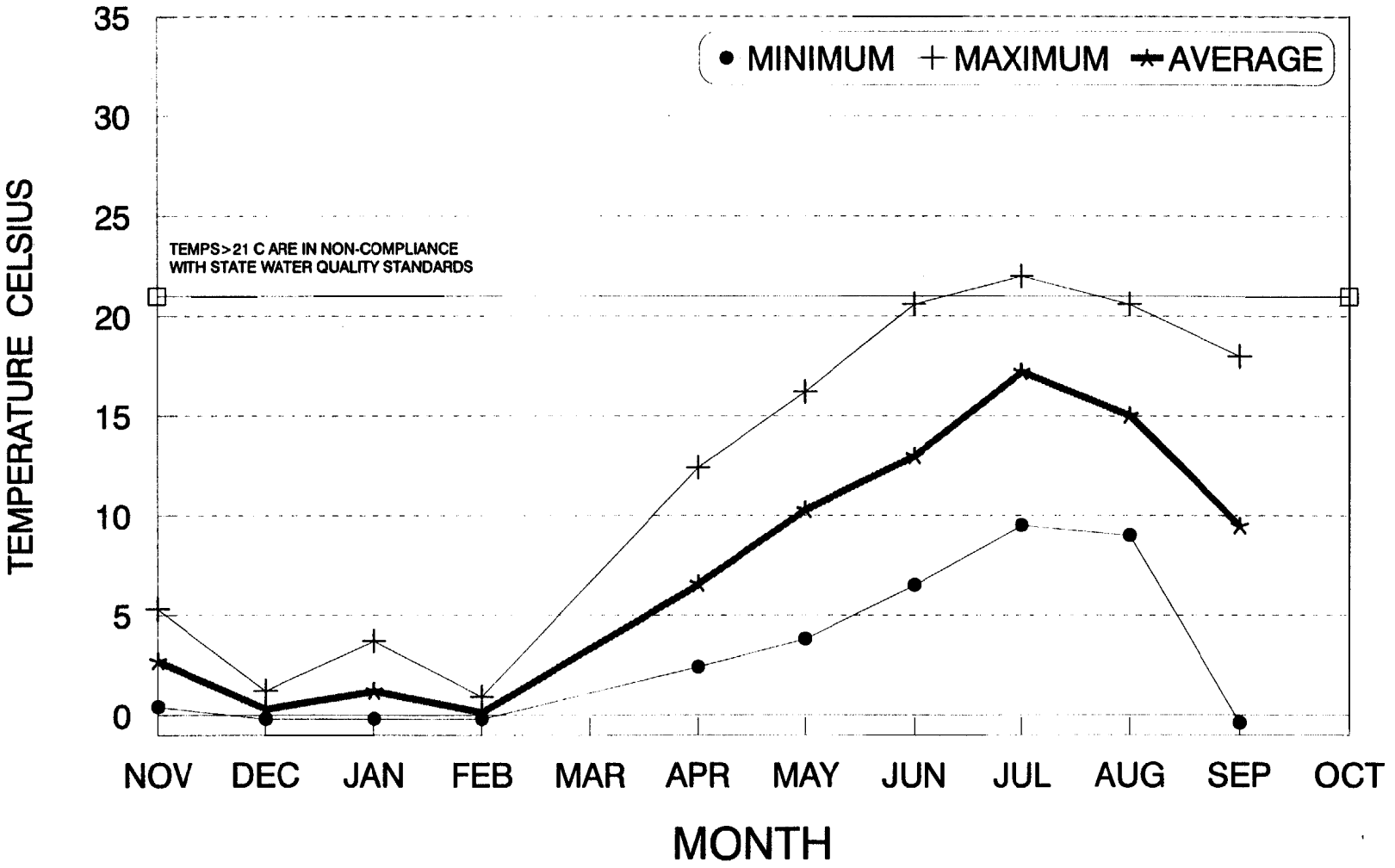
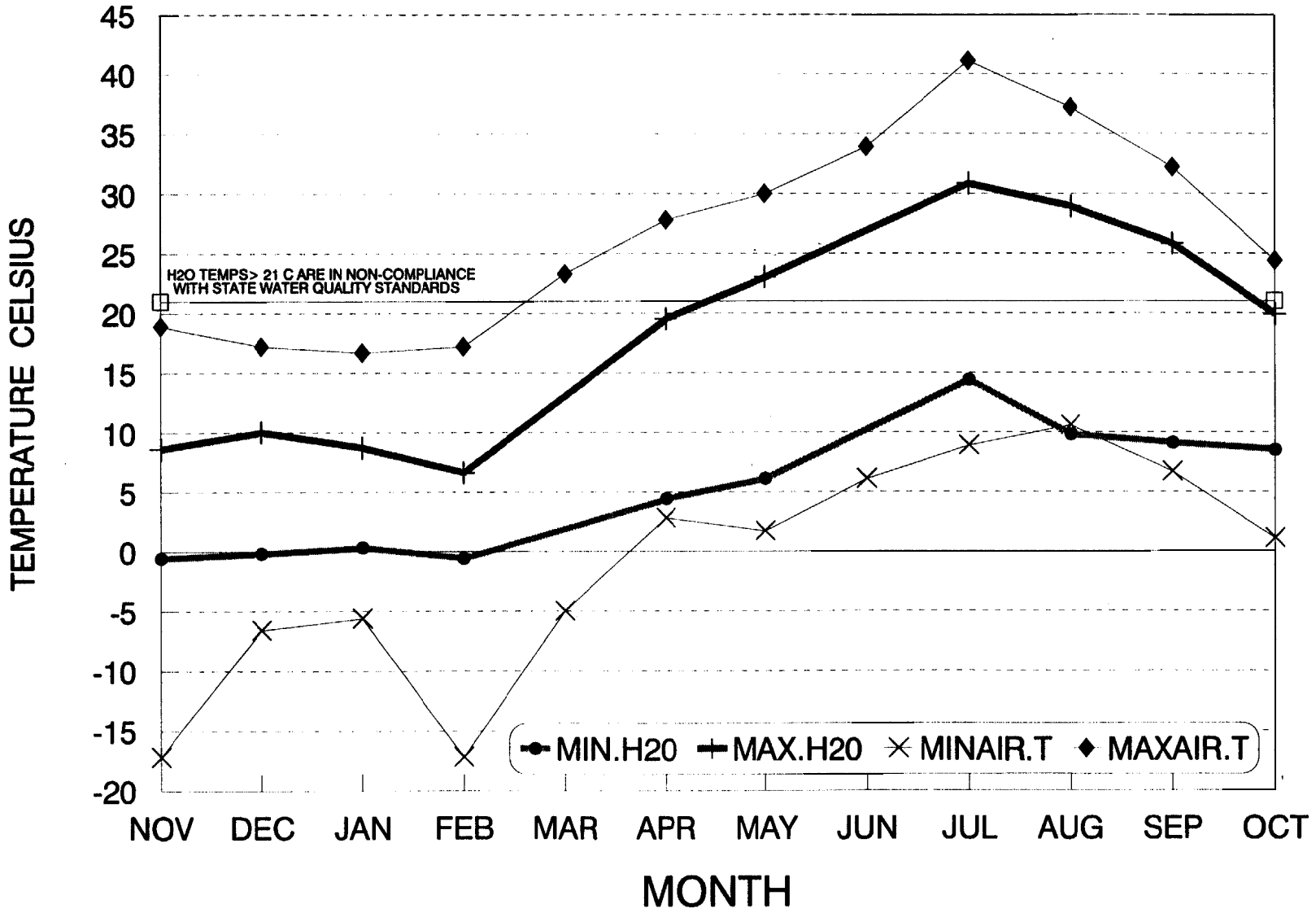


Figure 13. Monthly Min, Max, and Avg. Water Temperature for Lower Meacham Creek (LP Property) Nov. 1993 - Sept. 1994



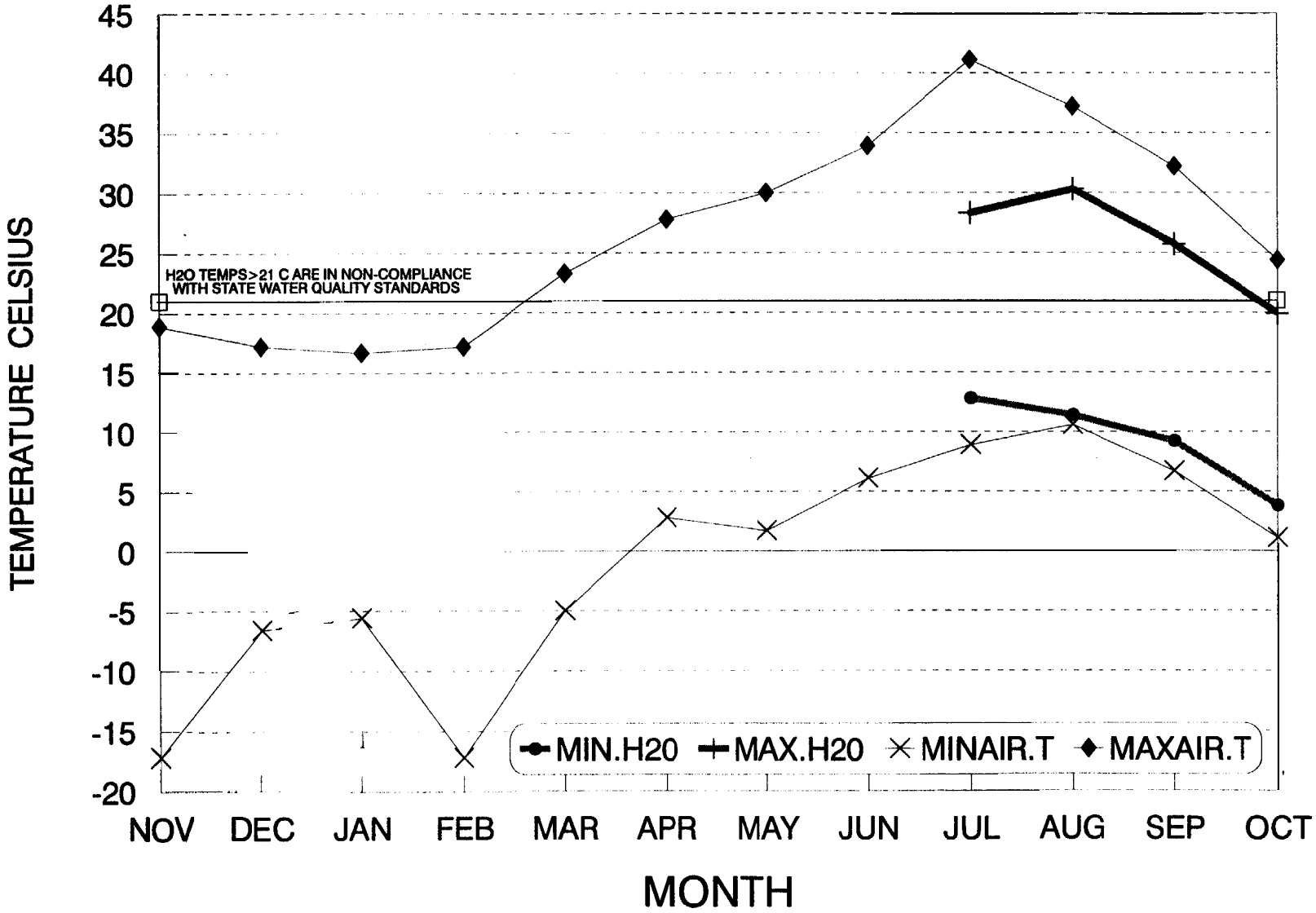
Note: Thermograph down for service during the month of March and no data for October (subsurface flow conditions).

Figure 16. Monthly Min./Max. Air and Water Temperature for Birch Creek (Straughan Property) Nov. 1993 - Oct. 1994



Note: Air temperature data from NOAA @ Pendleton Airport.

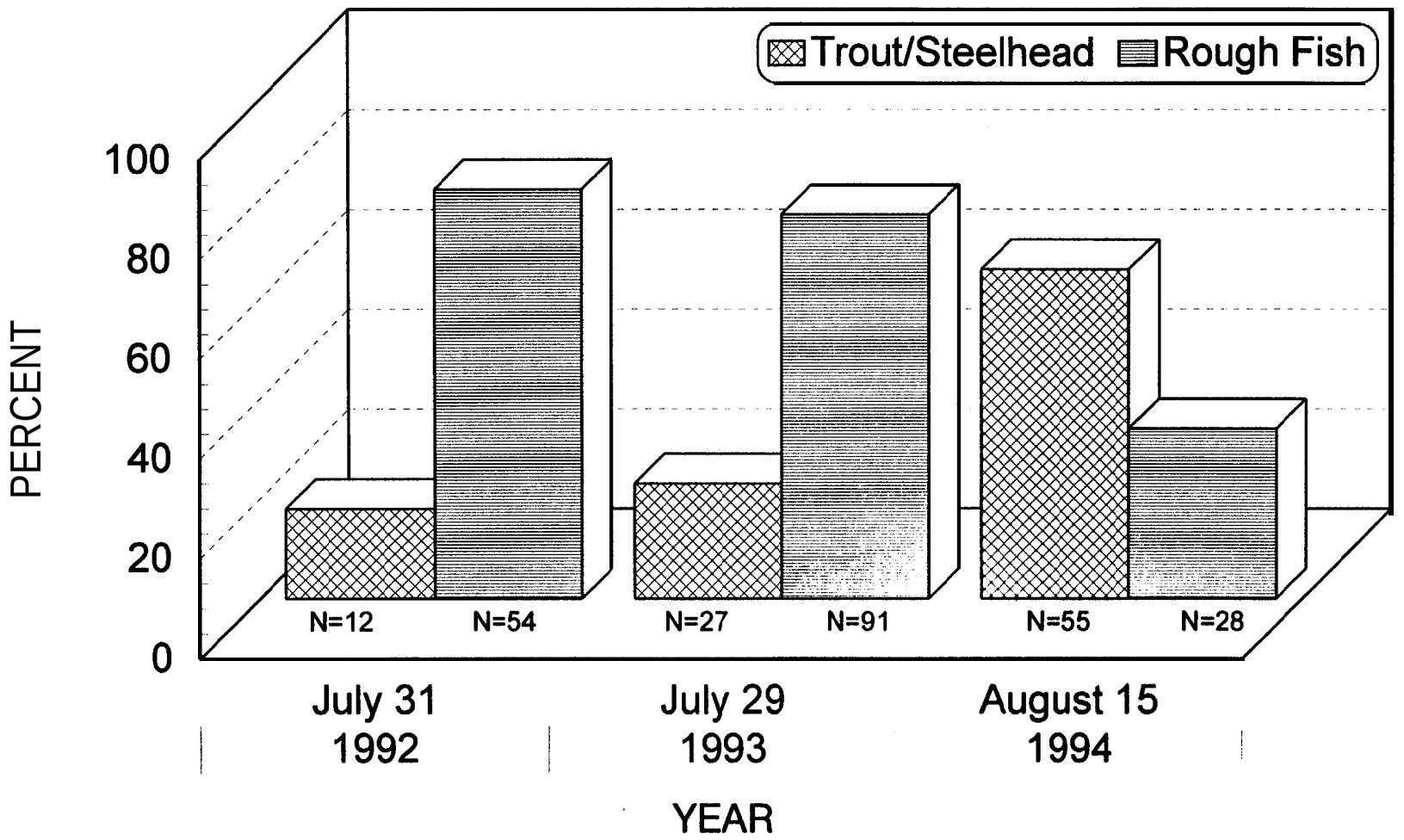
Figure 17. Monthly Min./Max. Air and Water Temperatures for W. Birch Creek (Hwy. 395 Bridge) Nov. 1993 - Oct. 1994



Note: Air temperature data from NOAA @ Pendleton Airport.

APPENDIX- 2
BIOLOGICAL SAMPLING DATA

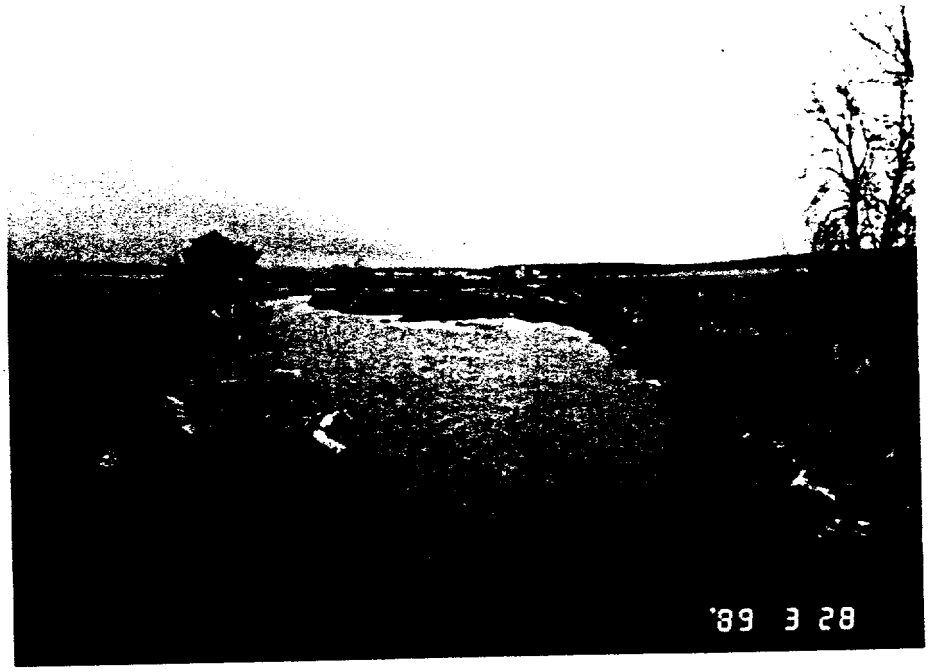
Figure 18. Fish Species Composition Within a 50 Meter Reach on Meacham Creek (L.P. Lease). Summers 1992-1994.



APPENDIX -3
Photographs

F. E. Straughn Property - 1990. First Fall photograph taken after project implementation.

F. E. Straughn Property - 1994. Fall photograph. Note riparian development on right and left banks.



C. Hemphil Property - 1989. March photograph taken just after project fence completion.

C. Hemphil Property - 1989. First fall photograph. Note absence of decidious tree component along the stream banks

C. Hemphil Property - 1994. May photograph taken during the flood about 2 hours before peak flow.

C. Hemphil Property - 1994. Fall photograph. Note riparian recovery as compared to the 1989 photographs.

EAST BIRCH CREEK
T. RUGG PROPERTY
Photopoint #2a

MARCH - 1990
First photograph of project taken just after fence completion.
NOTE: Bedload in channel as compared to the 1994 photograph of this site as shown below.

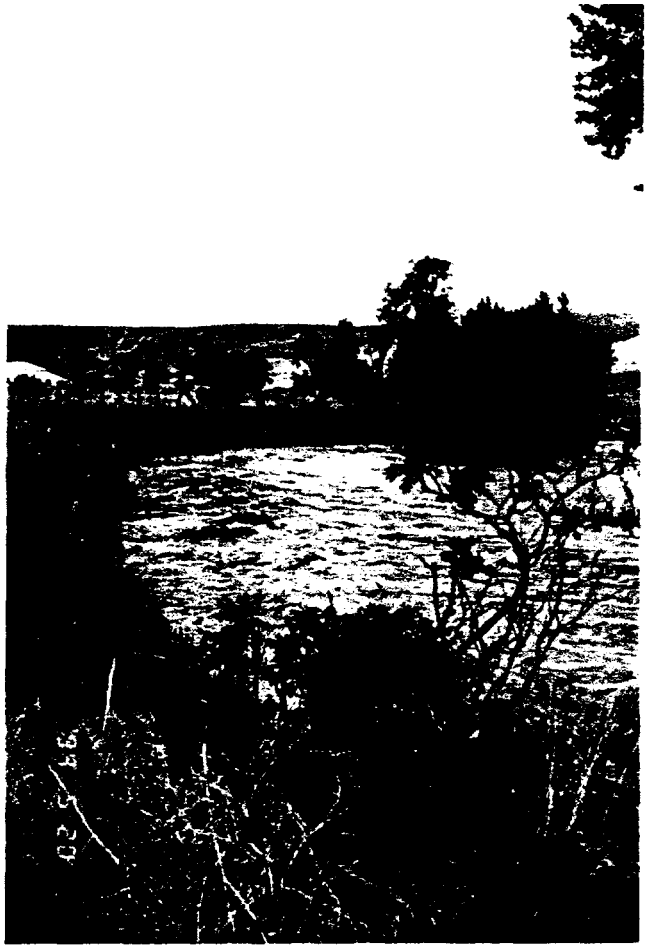
SEPTEMBER - 1990
First fall photograph, note juvenile cottonwood recruitment in foreground.

SEPBEMBER - 1994
Site after two flood events.
NOTE: Channelmigration, headcut/ erosion on right bank and channel down cutting. This site to be treated with Bio-engineering techniques in 1995 and will serve as one of three demonstrations sites for these practices.

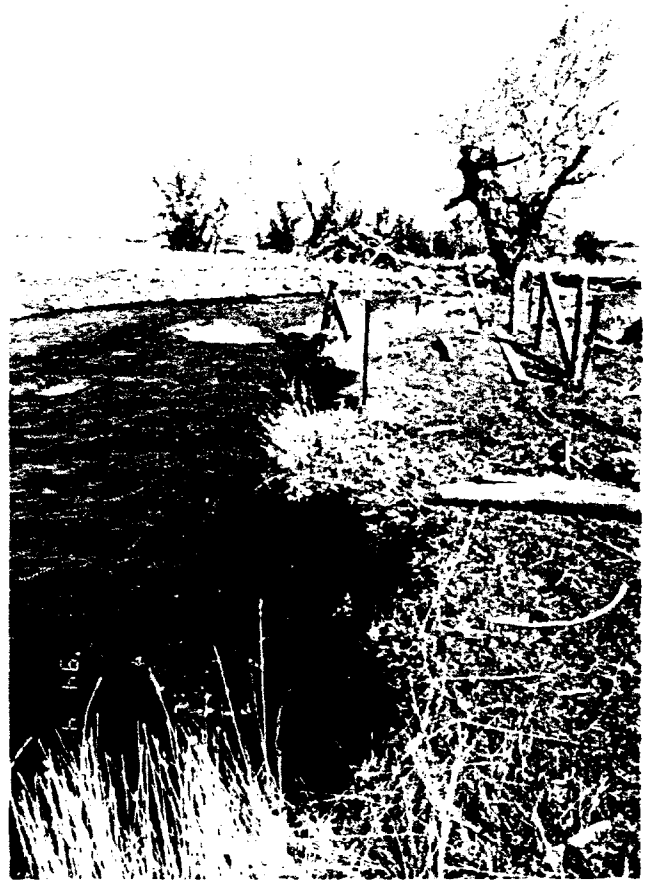
T. Rugg Property - 1994. Eroded streambank. Photo taken two days after peak flow hit during the May flood.

T. Rugg Property - 1994. Cut bank view of the above photo. Streambank to be restored in 1995 using Bio-engineering techniques.

BIRCH CREEK FLOOD PICTURES



McDaniel Property - 1994. Proposed site for tree planting on left bank during 1995. Photo taken same day of peak flow.



Gambill Property - 1994. Photo taken about 1 month before May flood event. Photo depicts fence lost to winter erosion and shows new program fence constructed on *right.*

Gambill Property - 1994. Photograph taken during peak flow conditions during the May flood. Site to be planted with willows and cottonwood in 1995.

Houser Property - 1990. Fall photograph taken the first year after project implementation.

Houser Property - 1994. Fall photograph. Note channel widening and meander development. Erosion concerns to be addressed in 1995 using bioengineering techniques.