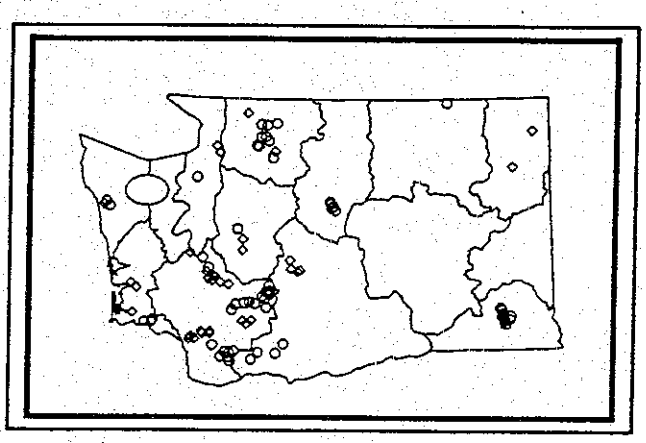
90-e75

TFW-WQ3-90-006

TIMBER/FISH/WILDLIFE

EVALUATION OF PREDICTION MODELS AND CHARACTERIZATION OF STREAM TEMPERATURE REGIMES IN WASHINGTON

DATA APPENDIX



OCTOBER 1990

TIMBER/FISH/WILDLIFE

EVALUATION OF PREDICTION MODELS AND CHARACTERIZATION OF STREAM TEMPERATURE REGIMES IN WASHINGTON

DATA APPENDIX

TEMPERATURE WORK GROUP

Kate Sullivan	Weyerhaeuser Company
John Tooley	Washington Department of Ecology
Kent Doughty	Nooksack Tribe
Jean Caldwell	Consultant
Pamela Knudsen	Washington Department of Fisheries

OCTOBER 1990

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INTRODUCTION

This document is the data appendix to the TIMBER/FISH/WILDLIFE Stream Temperature report titled **"EVALUATION OF PREDICTION MODELS AND CHARACTERIZATION OF STREAM TEMPERATURE REGIMES IN WASHINGTON"**. The data contained in this appendix were collected during the summer of 1988 at 92 sites within Washington State. This data-collection effort was made possible by the dedicated efforts of over 100 individuals representing 25 institutional cooperators. Table 1 is a partial list of these individuals.

This data appendix is organized into three units. Primary site data, secondary site data, and the data dictionary. A brief description of the differences between primary and secondary sites is given below. For a more complete description see Chapter 2 of the main report. Figure 1 shows generalized locations of the study sites.

Primary Site Data

The TFW Temperature Study included 33 primary sites. Primary sites were distinguished as having both continuously monitored water and air temperature. In addition, a field team visited each site and collected stream geometry, riparian shading, hydrology, and micro-climate information. Temperature model evaluations were performed at these primary sites.

Secondary Site Data

This study also included 59 secondary sites. These sites did not meet the criteria for model evaluation due to missing data components. Most secondary sites had only water temperature monitoring.

Data Dictionary

The model evaluation and regional stream temperature characterization required a broad array of parameters to describe geography, climate, hydrology, stream shading, and channel geometry. The data dictionary provides a description of key parameters used in this study.

Co-operator	Contact	Nature of Assistance
Boise Cascade	Candace Parr	Field Assistance
Colville Confederated Tribes	Jerry Marco	Operate Thermograph
Cowlitz County Conservation District	Sheldon Somers	Purchase & operate Thermograph
Longview Fiber Co.	Monte Martinson	Purchase & Operate Thermograph
Makah Tribe	Rick Klinge	Operate Thermograph
Muckleshoot Tribe	Larry Ratte	Operate Thermograph
Nooksack Tribe	Kent Doughty	Temperature Work Group, Provide & OperateThermograph
Northwest Indian Fisheries Commission	Dennis McDonald	Funding
Plum Creek Timber	Bruce Beckett	Funding
Puyallup Tribe	Mark Heckert	Operate Thermograph
Quileute Tribe	Mark Mobbs	Field Assistance
Quinault Tribe	Greg Watson	Operate Thermographs
Squaxin Island Tribe	Dave Shuett-Hames Michelle Stevie	Field Assistance
Landowner	Fran Moelman	Operate Thermograph
Tulalip Tribe	Kurt Nelson	Provide & Operate Thermograph, Field Assistance
Upper Columbia United Tribes	Eileen MacLanahan	Operate Thermographs
US Environmental Protection Agency		Funding
US Bureau of Indian Affairs	Dennis Olson	Data
USFS Colville National Forest	Bert Wasson	Data
USFS Gifford Pinchot National Forest	Deigh Bates	Data
USFS PNW Range & Experiment Station	Fred Everest	Provide Thermographs
USFS Umatilla National Forest	Ed Calame	Data
USFWS Fisheries Assistance Office	Phil Wampler	Provide Thermographs
USFWS Makah National Hatchery	Dan Sorenson	Data
USFWS Fisheries Research Res Center	Jack McIntyre	Data
USFWS Leavenworth National Hatchery	Jim Mullen Reg Reisenbichler	Data

Washington Dept of Ecology	John Tooley	Work Group, Project Coordinator
	David Roberts	Purchase Thermographs
	Jim Carrol	Field crew, Data reduction
	Anita Stohr	Computer Programming
	Elizabeth Lanzer	Equipment
	Brad Caldwell	Equipment
	Bob Johnson	Equipment
Washington Dept of Fisheries	Pamela Knudsen	Work group,
	Maggie Bell McKinnon	Field crew, Data reduction
	Bob Buggart	Operate Thermograph
Washington Dept of Natural Resources	Jim Ryan	Data
	Bob Bannon	Provide & Operate Thermographs
	Evan Pryor	Provide & Operate Thermographs
Washington Dept. of Wildlife	Thom Johnson	Provide & Operate Thermographs
	Steve Leider	Provide & Operate Thermograph
Washington Environmental Council	Cinnamon Zakar	Field Crew
	Roger Garrett	Operate Thermograph
Weyerhaeuser Company	Kate Sullivan	Work Group, Data management
	John Heffner	Technical & Field Assistance, Operate Thermographs
	Steve Anderson	Operate Thermograph
	Jim Booher	Operate Thermograph
Yakima Indian Nation	Joel Hubbel	Provide & operate Thermographs
	Dale Bambrick	Thermographs

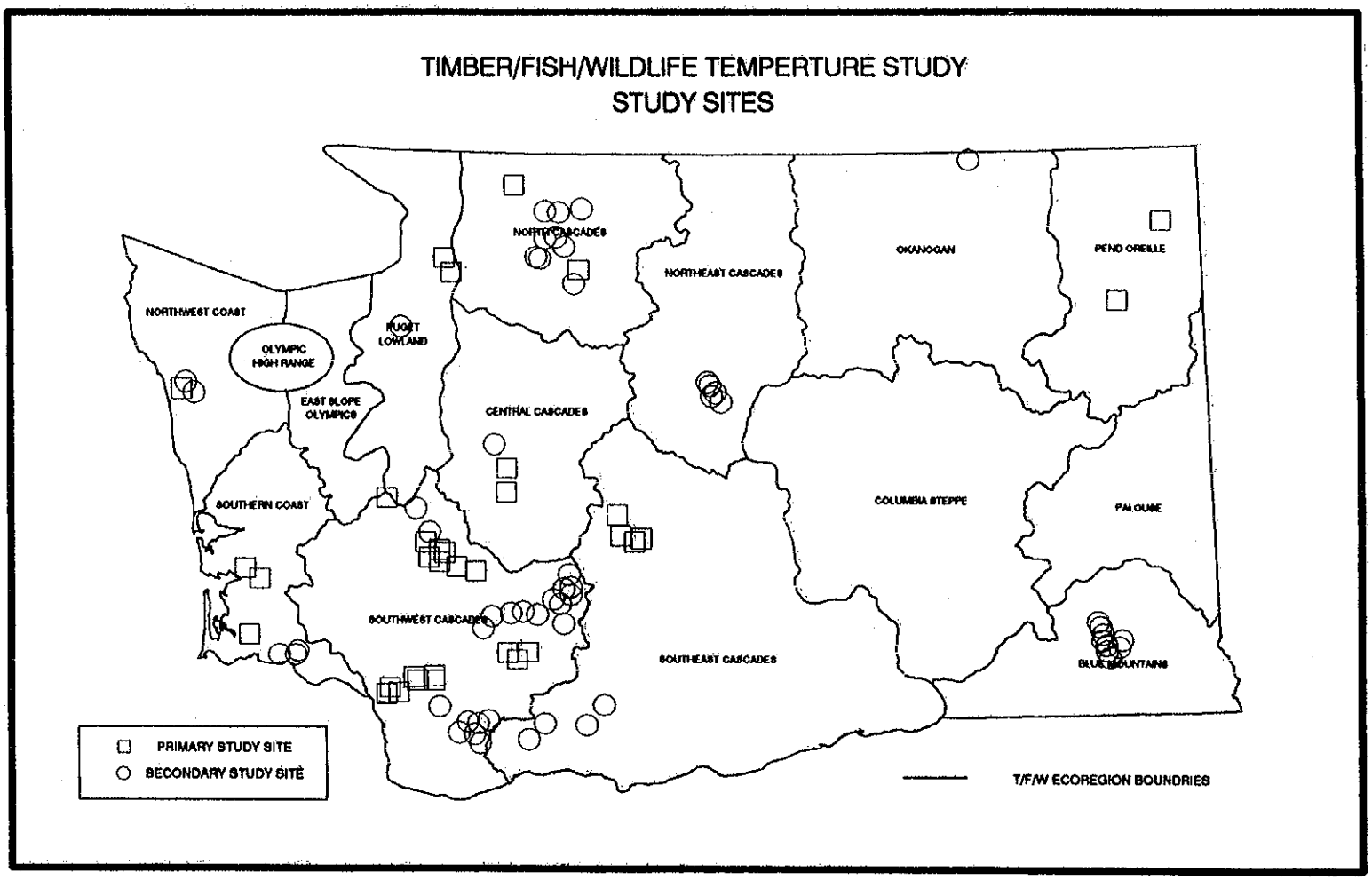
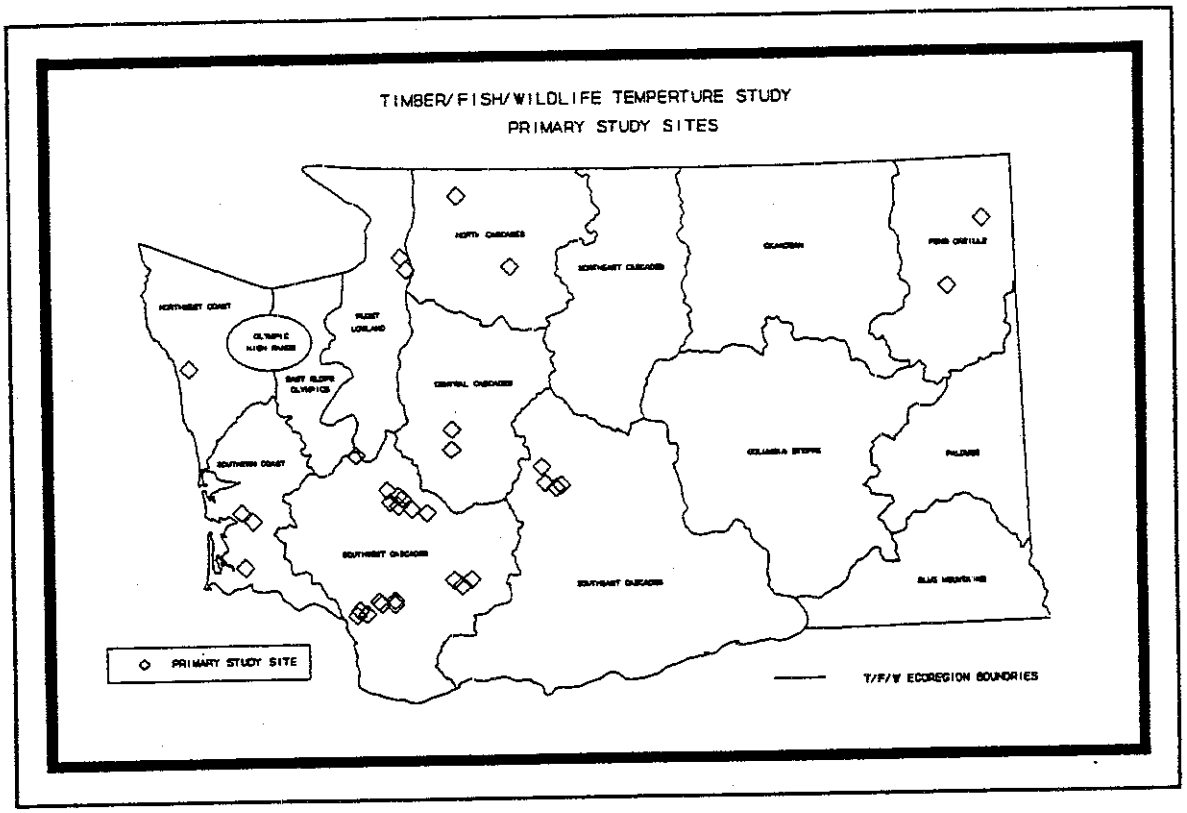
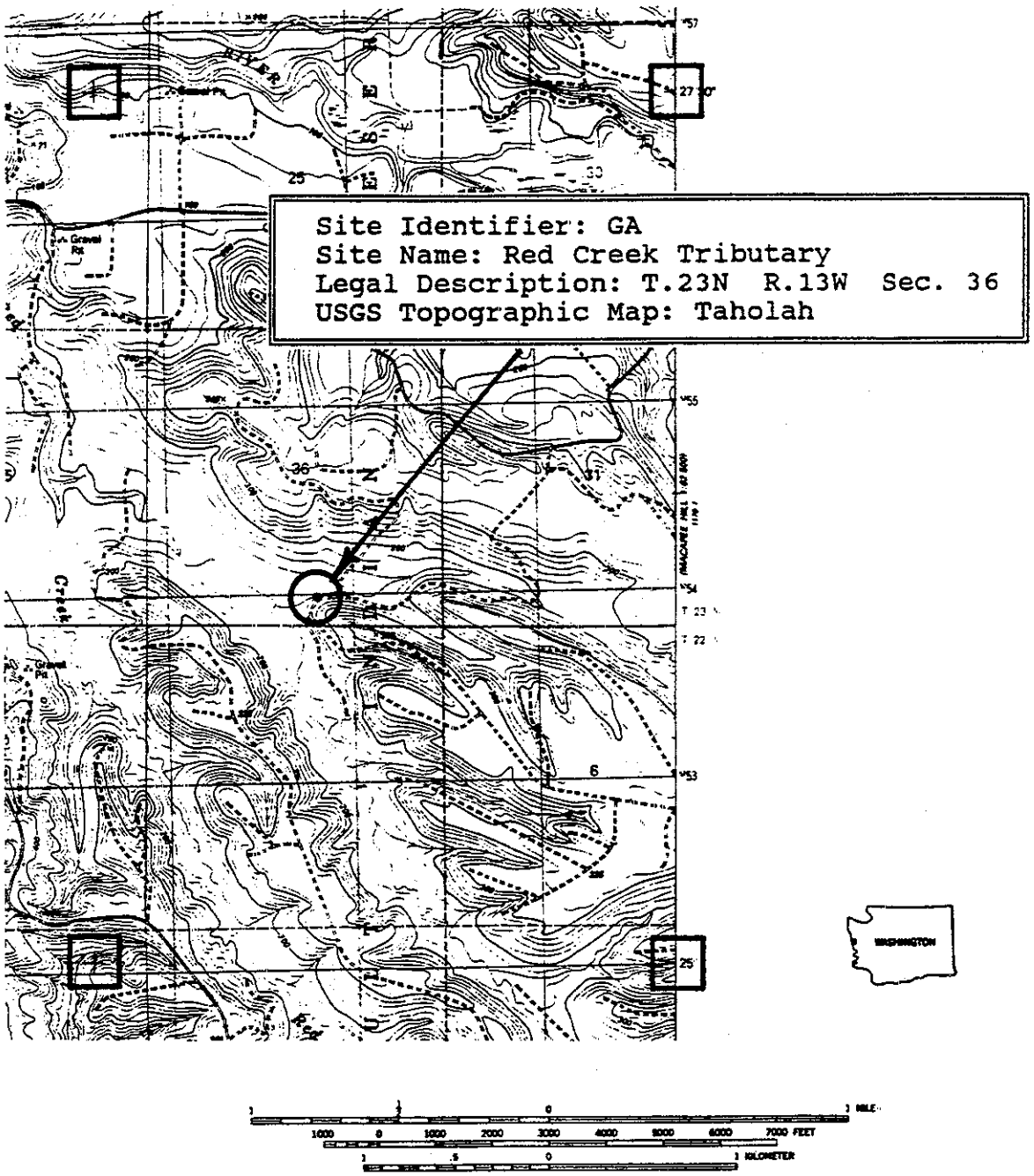


FIGURE 1. STUDY SITE LOCATIONS FOR THE 1988 T/F/W TEMPERATURE STUDY.

PRIMARY STUDY SITES



TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



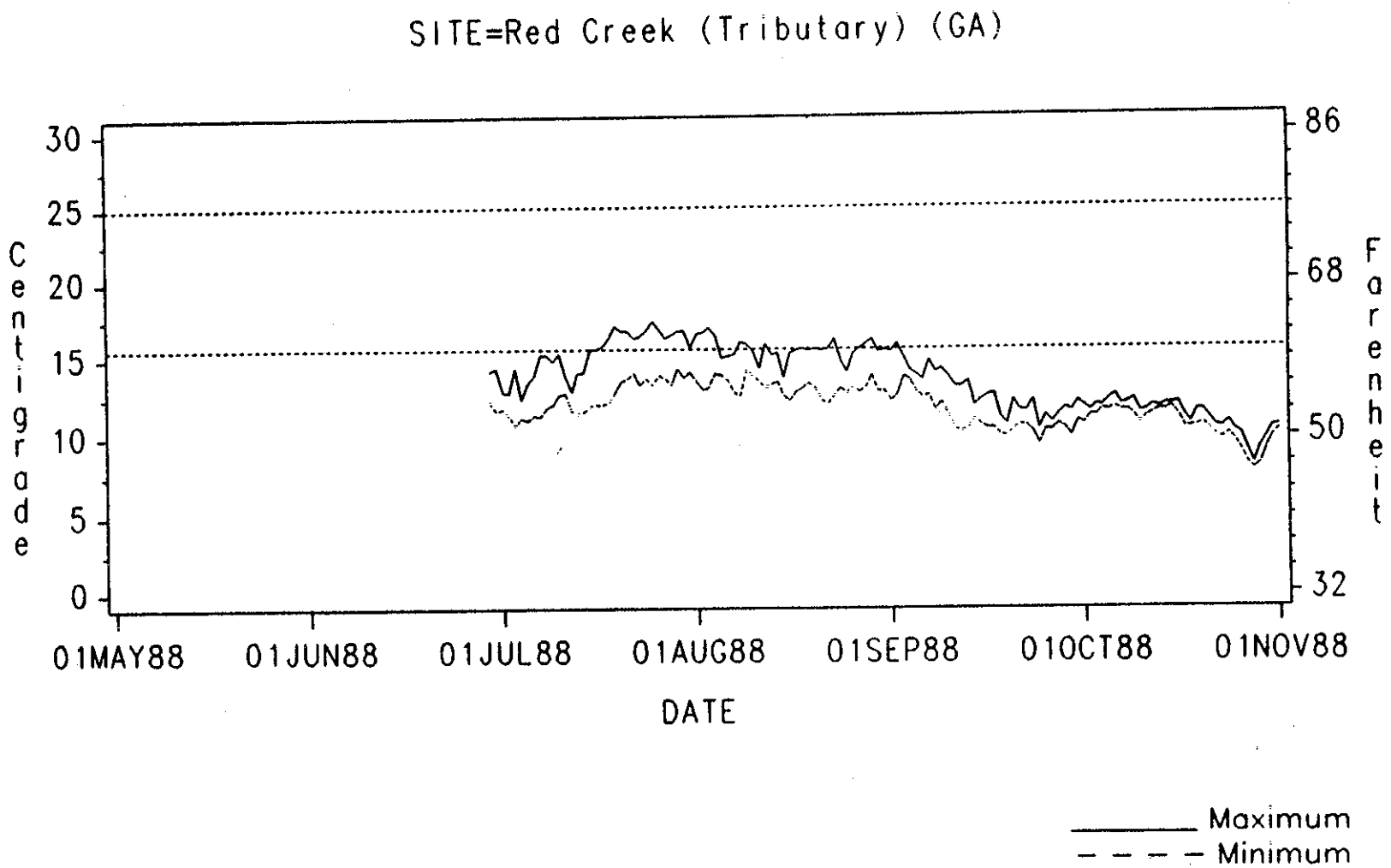
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	GA
Stream Name	SITENAMES	Red Creek Tributary
Cooperator	COOPERATOR	Quinault Nation
Cooperator/contact	COOPCONTACT	Greg Watson
Date of Site Visit	VISIT	09-19-88
County	COUNTY	Grays Harbor
Nearest town	NEARESTTOWN	Taholah
Township	TOWNSHIP	23N
Range	RANGE	13W
Section	SECTION	36
Site is Tributary To:	TRIBUTARYTO	Red Creek/Raft River
Water Resource Inventory Area	WRIA	21
WDF River Segment Identifier	WDFNUMBER	0340
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	Northwest Coast
Latitude Decimal Degrees (degrees)	LATDEC	47.434940
Longitude Decimal Degrees (degrees)	LONGDEC	124.275500
NOAA Local Climatological Data Station	NOAAINDEX	quillayute
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	terrace deposits
Geomorphic Stream Order	STREAMORDER	2
Thermograph Elevation (meters)	ELEVDSM	41
Elevation Top of Thermal Reach (meters)	ELEVUSM	48
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.1
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	258
Drainage Area Above Thermograph (hectares)	AREAHECT	556
Distance to Divide (meters)	DIVIDEMT	3956
Total Length of Perennial Streams (meters)	LENGTHMT	3956
Streamflow at Thermograph (cubic meters/second)	QDSM	0.066
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.066
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.000
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.016
Travel Time (meters/second)	TRAVELM	0.000
Average View To Sky (percent open) (percent)	VIEW1	82
Topographic Angle South (degrees)	TOPOSA	18
Topographic Angle Southeast (degrees)	TOPOSEA	11
Topographic Angle Southwest (degrees)	TOPOSWA	8
Average Forest Angle South (degrees)	FORSA	35
Average Forest Angle Southeast (degrees)	FORSEA	30
Average Forest Angle Southwest (degrees)	FORSWA	43
Percent Overhanging Brush (percent)	OVERBRUSH	13
Buffer Width Right Bank (meters)	BUFWIDRM	0.0
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	8
Vegetation Height West Bank (meters)	VEGHTWM	5
Percent Vegetative Density East (percent)	VEGDENE	6
Percent Vegetative Density West (percent)	VEGDENW	9
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.209
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	3.669
Percent of Channel Composed of Pools (percent)	PERCENPL	96
Average Pool Depth (meters)	DEPTHPM	0.390
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	37
Streambed Composition Sand (percent)	AVGSAND	17
Streambed Composition Gravel (percent)	AVGGRAVEL	47
Streambed Composition Cobble (percent)	AVGCOBBLE	0
Streambed Composition Boulder (percent)	AVGBOULDER	0
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	sand

*See data dictionary for detailed item description

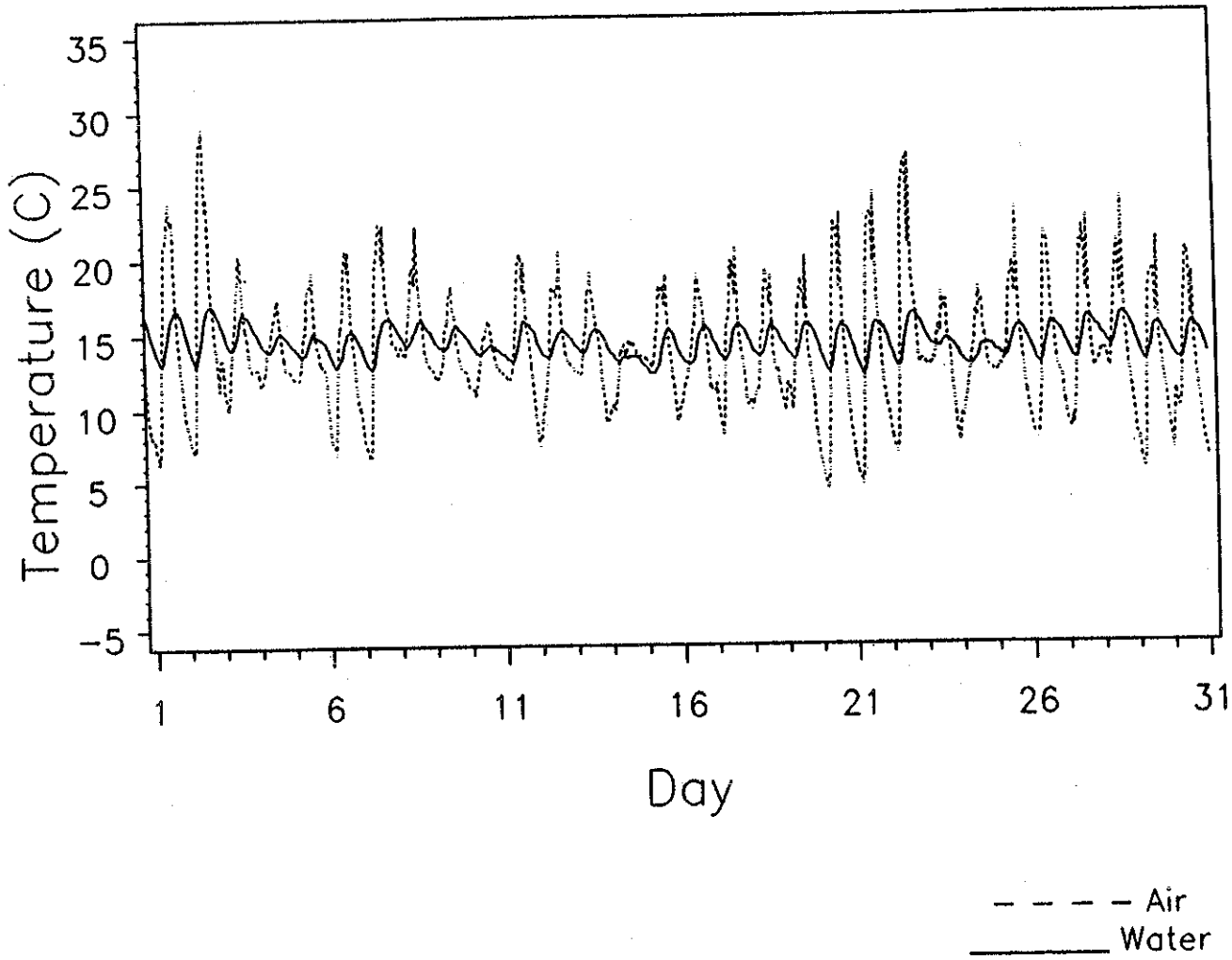
WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

RED CREEK (Tributary)

YEAR=1988 MONTH=AUGUST



TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

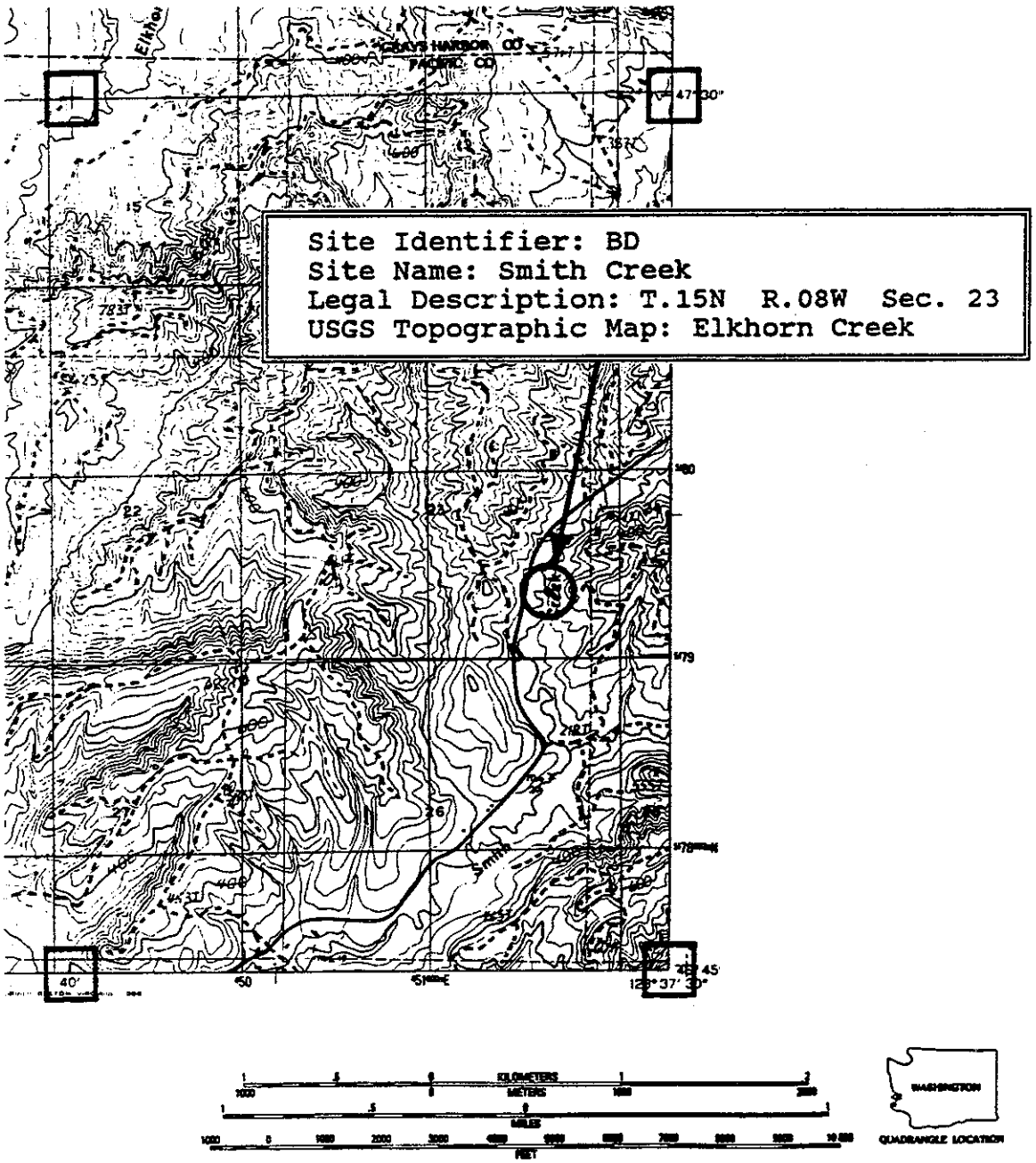
RED CREEK TRIBUTARY

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.7	15.1	20.6	16.6	7.2	13.5	13.4	3.1
02AUG	14.4	15.1	23.8	16.7	6.4	13.0	17.4	3.7
03AUG	16.7	15.3	28.9	17.0	7.2	13.1	21.7	3.9
04AUG	14.2	15.3	20.3	16.5	10.0	14.0	10.3	2.5
05AUG	13.8	14.5	17.4	15.0	11.6	13.9	5.8	1.1
06AUG	14.0	14.3	19.1	15.1	8.1	13.6	11.0	1.5
07AUG	12.8	14.1	20.6	15.2	6.9	12.8	13.7	2.4
08AUG	15.3	14.7	22.3	16.0	6.6	12.6	15.7	3.4
09AUG	15.4	15.0	22.1	15.9	12.1	14.2	10.0	1.7
10AUG	13.9	14.7	18.1	15.5	11.3	13.9	6.8	1.6
11AUG	13.2	13.9	15.9	14.3	10.8	13.5	5.1	0.8
12AUG	13.8	14.5	20.2	15.9	7.4	13.1	12.8	2.8
13AUG	14.2	14.3	20.5	15.2	8.5	13.3	12.0	1.9
14AUG	13.6	14.4	19.1	15.3	9.0	13.5	10.1	1.8
15AUG	13.1	13.2	14.5	13.7	9.8	12.6	4.7	1.1
16AUG	13.7	13.7	18.8	15.3	9.1	12.3	9.7	3.0
17AUG	13.9	14.1	18.8	15.5	10.3	12.8	8.5	2.7
18AUG	13.5	14.4	20.6	15.6	8.1	13.1	12.5	2.5
19AUG	13.5	14.3	19.1	15.5	9.7	13.4	9.4	2.1
20AUG	12.5	14.4	20.0	15.6	5.5	13.1	14.5	2.5
21AUG	12.3	14.0	22.8	15.5	4.2	12.3	18.6	3.2
22AUG	13.6	14.1	24.2	15.6	4.6	12.1	19.6	3.5
23AUG	16.1	14.7	26.8	16.2	6.8	12.6	20.0	3.6
24AUG	12.9	14.1	17.5	14.8	7.5	13.1	10.0	1.7
25AUG	13.5	13.5	17.8	14.1	9.2	12.7	8.6	1.4
26AUG	14.1	14.3	23.1	15.3	8.1	13.2	15.0	2.1
27AUG	13.3	14.4	21.4	15.6	7.8	12.8	13.6	2.8
28AUG	14.6	14.6	22.5	15.9	8.4	13.1	14.1	2.8
29AUG	14.3	15.0	23.8	16.2	7.5	13.9	16.3	2.3
30AUG	12.3	14.2	21.0	15.4	5.6	12.9	15.4	2.5
31AUG	12.5	14.2	20.3	15.5	6.0	12.9	14.3	2.6

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



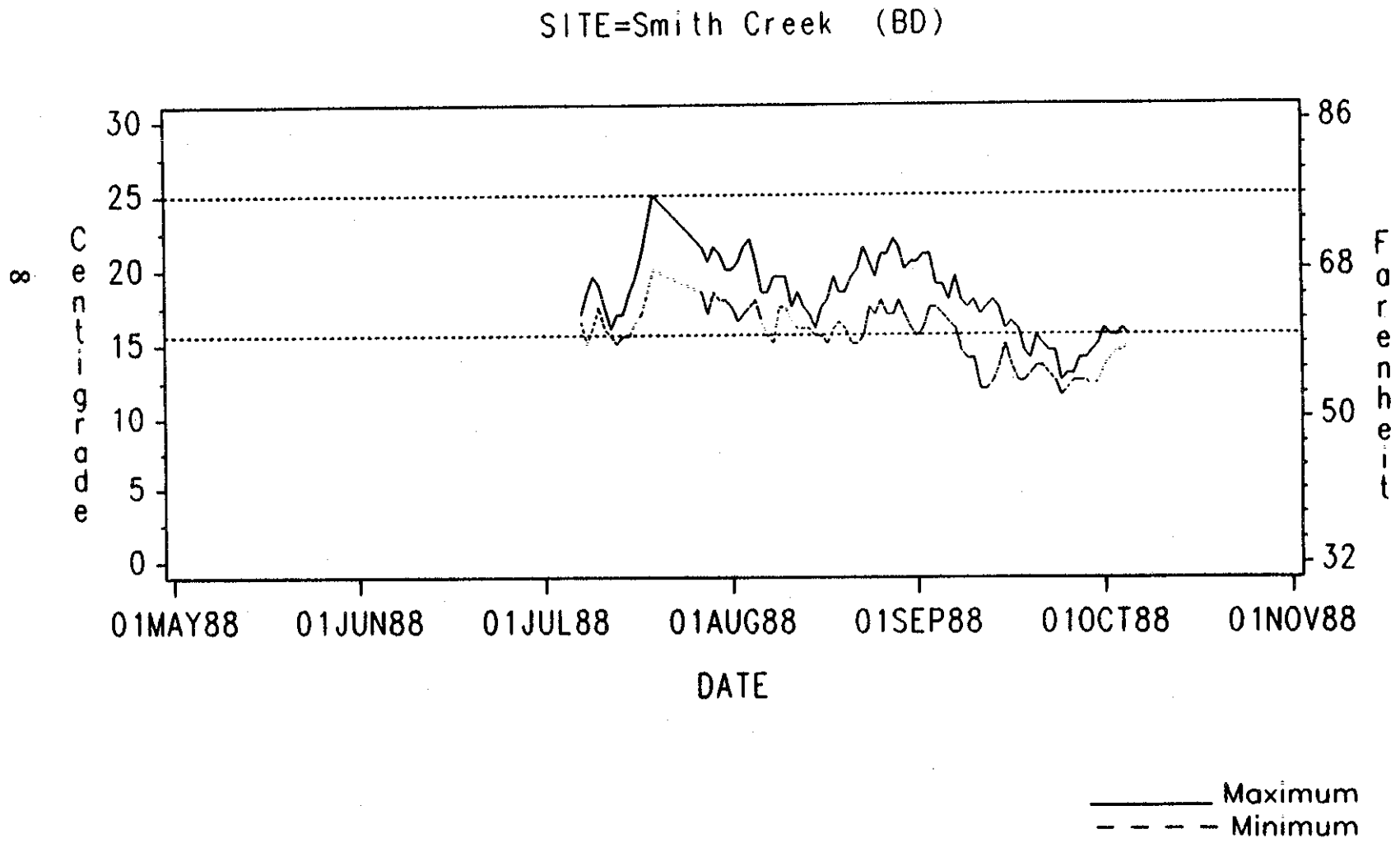
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

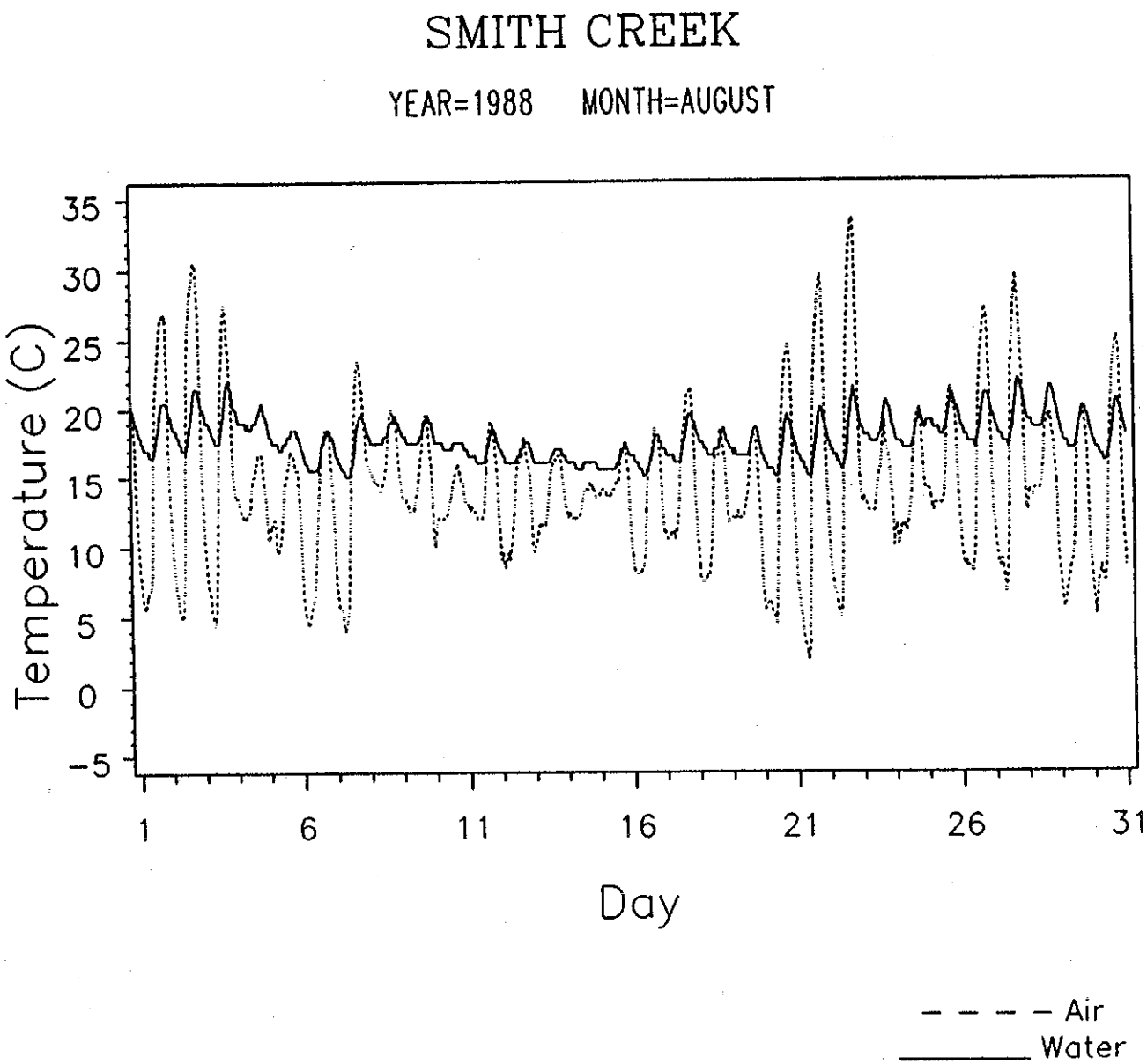
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	BD
Stream Name	SITENAMES	Smith Creek
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-20-88
County	COUNTY	Pacific
Nearest town	NEARESTTOWN	Raymond
Township	TOWNSHIP	15N
Range	RANGE	08W
Section	SECTION	23
Site is Tributary To:	TRIBUTARYTO	Willapa Bay
Water Resource Inventory Area	WRIA	24
WDF River Segment Identifier	WDFNUMBER	0035
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	Southern Coast
Latitude Decimal Degrees (degrees)	LATDEC	46.768050
Longitude Decimal Degrees (degrees)	LONGDEC	123.658300
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Miocene
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	marine sediment rock
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	67
Elevation Top of Thermal Reach (meters)	ELEVUSM	68
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.2
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	211
Drainage Area Above Thermograph (hectares)	AREAHECT	2264
Distance to Divide (meters)	DIVIDEMT	12812
Total Length of Perennial Streams (meters)	LENGTHMT	31340
Streamflow at Thermograph (cubic meters/second)	QDSM	0.101
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.094
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.006
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.003
Travel Time (meters/second)	TRAVELM	0.070
Average View To Sky (percent open) (percent)	VIEW1	93
Topographic Angle South (degrees)	TOPOSA	19
Topographic Angle Southeast (degrees)	TOPOSEA	23
Topographic Angle Southwest (degrees)	TOPOSWA	15
Average Forest Angle South (degrees)	FORSA	18
Average Forest Angle Southeast (degrees)	FORSEA	30
Average Forest Angle Southwest (degrees)	FORSWA	12
Percent Overhanging Brush (percent)	OVERBRUSH	1
Buffer Width Right Bank (meters)	BUFWIDRM	0.0
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	2
Vegetation Height West Bank (meters)	VEGHTWM	8
Percent Vegetative Density East (percent)	VEGDENE	1
Percent Vegetative Density West (percent)	VEGDENW	2
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.603
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	4.222
Percent of Channel Composed of Pools (percent)	PERCENPL	70
Average Pool Depth (meters)	DEPTHPM	0.650
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	50
Streambed Composition Sand (percent)	AVGSAND	50
Streambed Composition Gravel (percent)	AVGGRAVEL	0
Streambed Composition Cobble (percent)	AVGCOBBLE	0
Streambed Composition Boulder (percent)	AVGBOULDER	0
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	clay/silt

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


SMITH CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

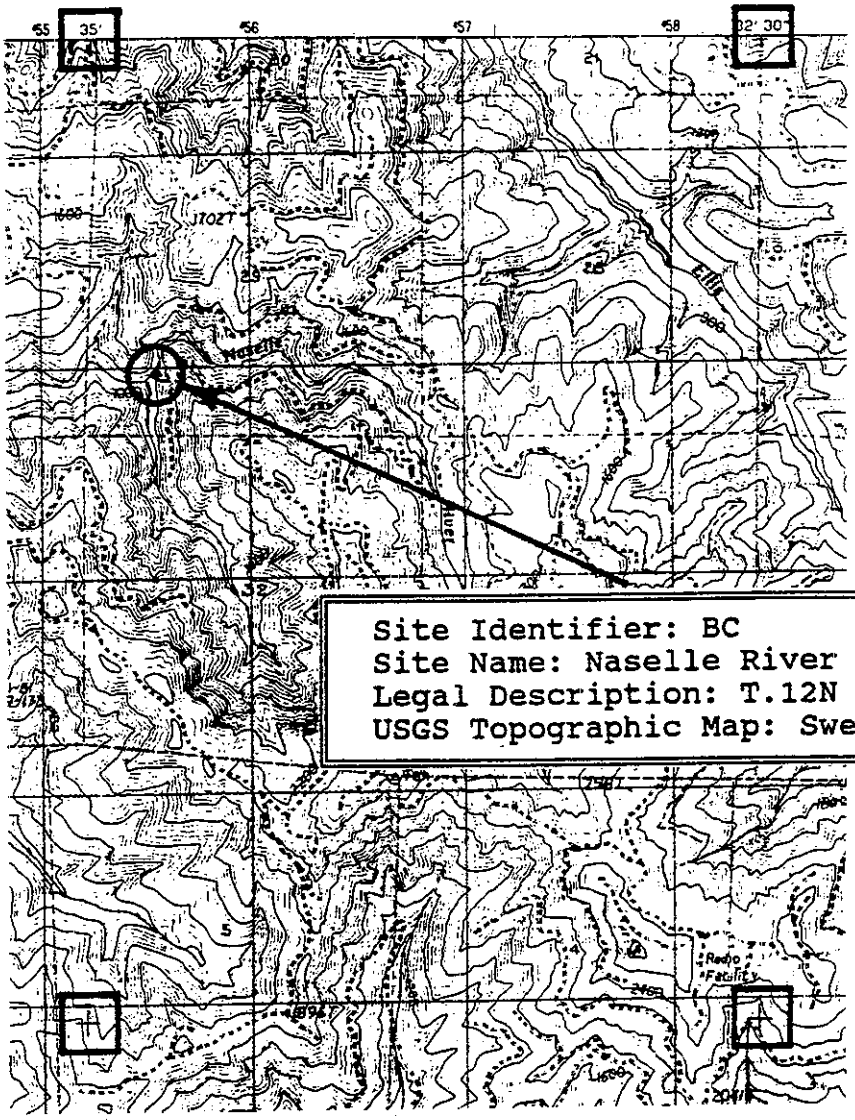
SMITH CREEK

Daily Temperatures in Degrees Celsius (C)

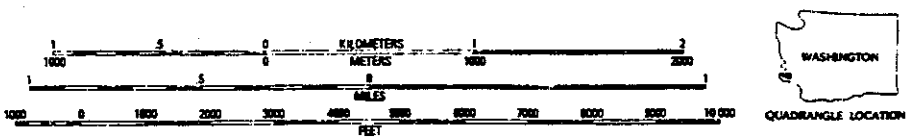
---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	14.5	18.2	20.5	20.0	7.5	17.5	13.0	2.5
02AUG	15.7	18.3	27.0	20.5	5.5	16.5	21.5	4.0
03AUG	17.1	19.0	30.5	21.5	5.0	17.0	25.5	4.5
04AUG	15.3	19.4	27.5	22.0	4.5	17.5	23.0	4.5
05AUG	13.6	19.1	17.0	20.5	10.5	18.0	6.5	2.5
06AUG	12.8	17.7	17.0	18.5	5.5	16.5	11.5	2.0
07AUG	11.5	16.7	18.5	18.5	4.5	15.5	14.0	3.0
08AUG	13.9	17.1	23.5	19.5	4.0	15.0	19.5	4.5
09AUG	16.1	18.2	20.0	19.5	13.5	17.5	6.5	2.0
10AUG	14.7	18.1	19.5	19.5	10.0	17.5	9.5	2.0
11AUG	13.4	17.2	16.0	17.5	11.5	16.5	4.5	1.0
12AUG	14.0	16.9	19.0	18.5	9.0	16.0	10.0	2.5
13AUG	13.0	16.6	18.0	17.5	8.5	16.0	9.5	1.5
14AUG	13.6	16.4	16.5	17.0	10.0	16.0	6.5	1.0
15AUG	13.1	15.8	14.5	16.0	12.0	15.5	2.5	0.5
16AUG	14.2	16.1	17.5	17.5	8.5	15.5	9.0	2.0
17AUG	12.8	16.4	18.5	18.0	8.0	15.0	10.5	3.0
18AUG	14.8	17.5	21.5	19.5	8.5	16.0	13.0	3.5
19AUG	12.5	17.2	18.5	18.5	7.5	16.5	11.0	2.0
20AUG	13.2	17.0	18.0	18.5	5.5	16.0	12.5	2.5
21AUG	13.3	16.8	24.5	19.5	4.5	15.0	20.0	4.5
22AUG	14.6	17.1	29.5	20.0	2.0	15.0	27.5	5.0
23AUG	17.4	17.9	33.5	21.5	5.0	15.5	28.5	6.0
24AUG	14.2	18.5	19.0	20.5	10.0	17.5	9.0	3.0
25AUG	14.4	18.0	20.0	19.5	10.0	17.0	10.0	2.5
26AUG	15.3	19.1	21.5	21.0	9.0	18.0	12.5	3.0
27AUG	16.0	18.8	27.0	21.0	8.0	17.0	19.0	4.0
28AUG	16.6	19.1	29.5	22.0	6.5	17.0	23.0	5.0
29AUG	14.9	19.5	19.5	21.5	7.0	18.0	12.5	3.5
30AUG	12.2	18.2	19.5	20.0	5.5	17.0	14.0	3.0
31AUG	14.0	17.9	25.0	20.5	5.0	16.0	20.0	4.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



Site Identifier: BC
Site Name: Naselle River
Legal Description: T.12N R.07W Sec. 29
USGS Topographic Map: Sweigiler Creek



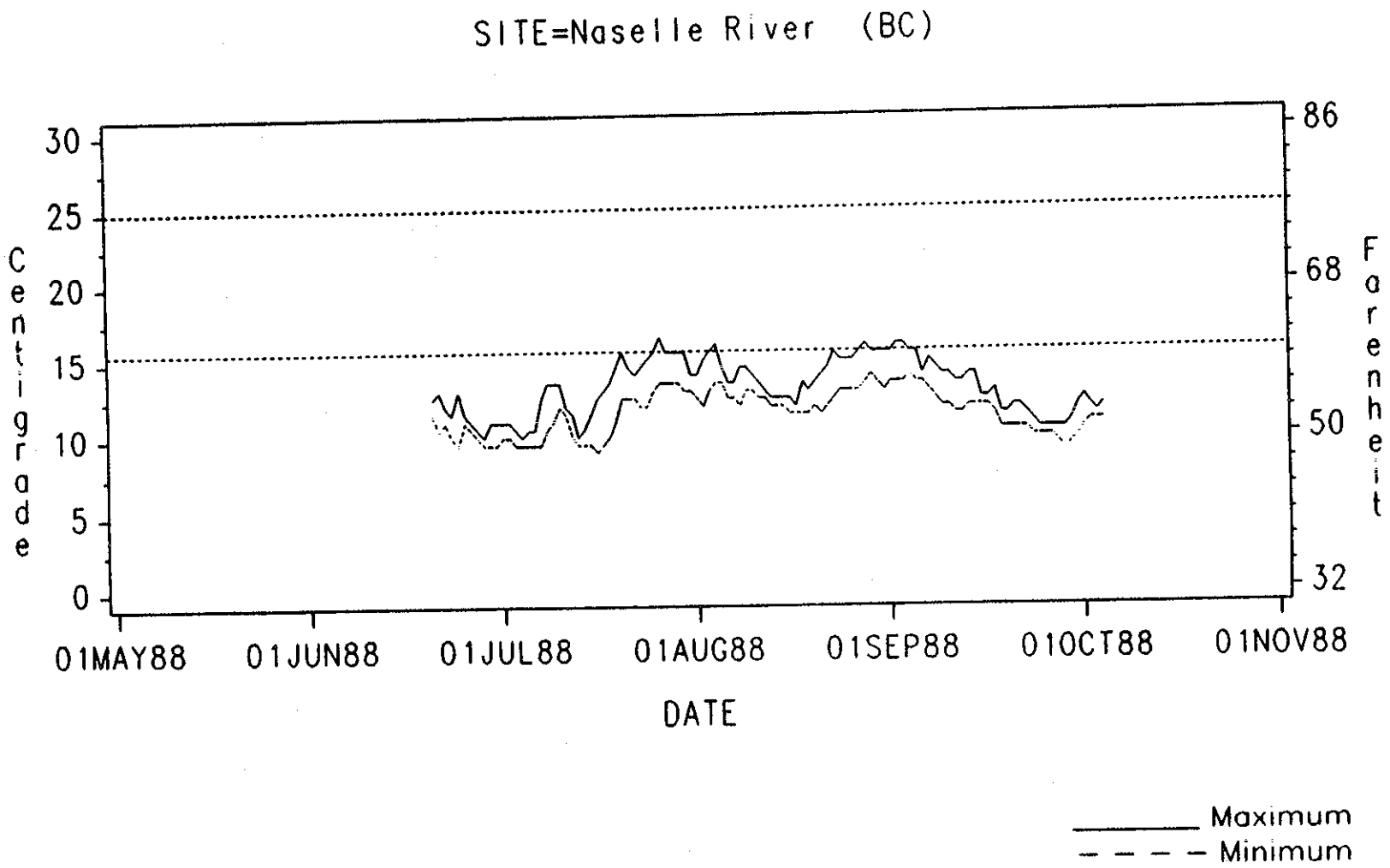
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

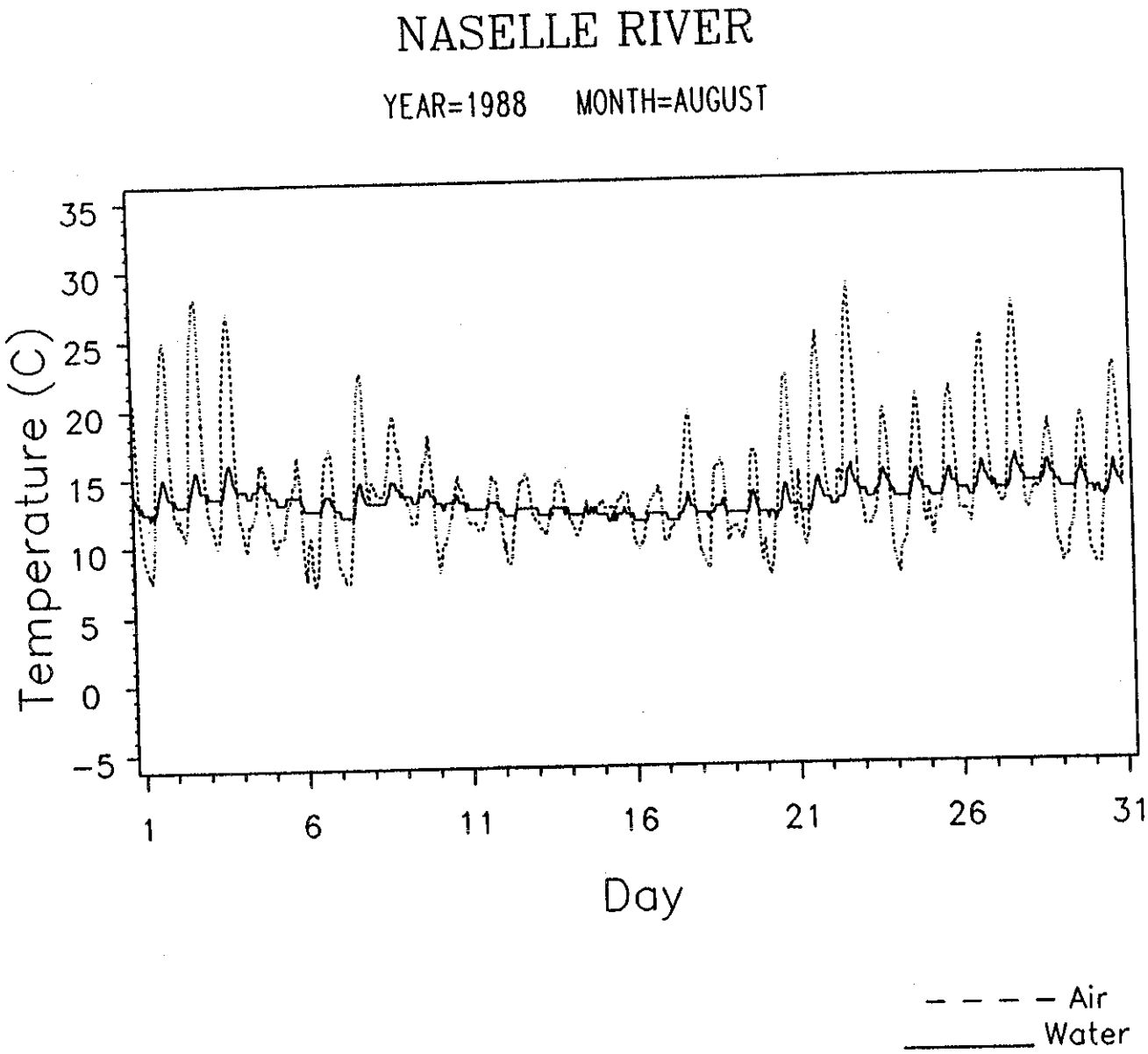
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	BC
Stream Name	SITENAMES	Naselle River
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	08-11-88
County	COUNTY	Pacific
Nearest town	NEARESTTOWN	Lebam
Township	TOWNSHIP	12N
Range	RANGE	07W
Section	SECTION	29
Site is Tributary To:	TRIBUTARYTO	Willapa Bay
Water Resource Inventory Area	WRIA	24
WDF River Segment Identifier	WDFNUMBER	0543
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	Southern Coast
Latitude Decimal Degrees (degrees)	LATDEC	46.485680
Longitude Decimal Degrees (degrees)	LONGDEC	123.579500
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	volcaniclastic
Geomorphic Stream Order	STREAMORDER	1
Thermograph Elevation (meters)	ELEVDSM	288
Elevation Top of Thermal Reach (meters)	ELEVUSM	310
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	3.6
Channel Gradient from Autolevel (percent)	GRADLEVEL	3.9
Channel Azimuth (degrees)	AZIMUTH1	267
Drainage Area Above Thermograph (hectares)	AREAHECT	310
Distance to Divide (meters)	DIVIDEMT	4071
Total Length of Perennial Streams (meters)	LENGTHMT	3724
Streamflow at Thermograph (cubic meters/second)	QDSM	0.020
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.027
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.009
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.005
Travel Time (meters/second)	TRAVELM	0.094
Average View To Sky (percent open) (percent)	VIEW1	59
Topographic Angle South (degrees)	TOPOSA	35
Topographic Angle Southeast (degrees)	TOPOSEA	36
Topographic Angle Southwest (degrees)	TOPOSWA	29
Average Forest Angle South (degrees)	FORSA	65
Average Forest Angle Southeast (degrees)	FORSEA	65
Average Forest Angle Southwest (degrees)	FORSWA	61
Percent Overhanging Brush (percent)	OVERBRUSH	28
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	9
Vegetation Height West Bank (meters)	VEGHTWM	9
Percent Vegetative Density East (percent)	VEGDENE	35
Percent Vegetative Density West (percent)	VEGDENW	28
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.180
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	2.419
Percent of Channel Composed of Pools (percent)	PERCENPL	75
Average Pool Depth (meters)	DEPTHPM	0.210
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	62
Streambed Composition Cobble (percent)	AVGCOBBLE	25
Streambed Composition Boulder (percent)	AVGBOULDER	13
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


NASELLE RIVER
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

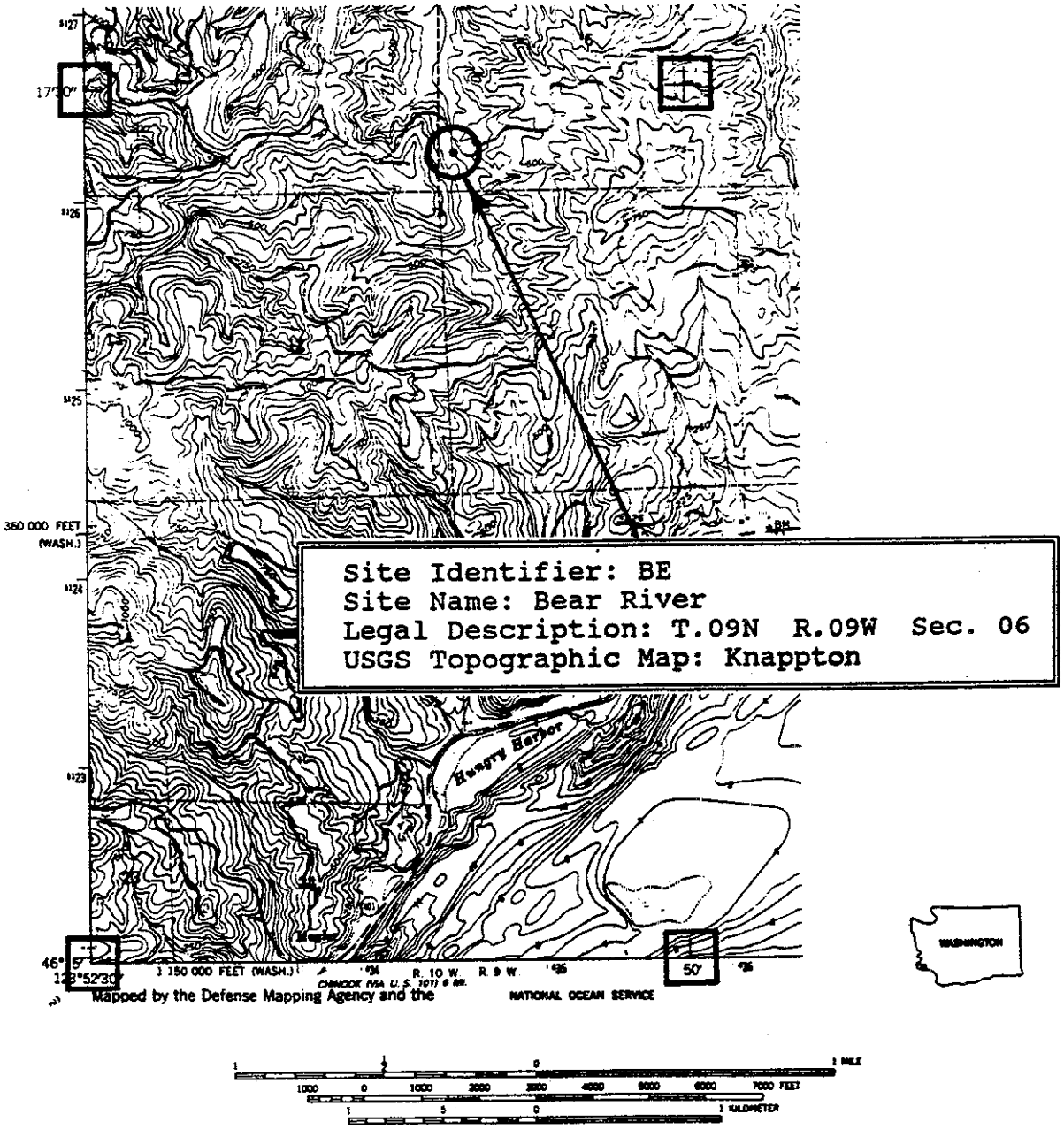
NASELLE RIVER

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.5	13.1	20.5	14.0	9.5	12.5	11.0	1.5
02AUG	15.2	13.2	25.0	15.0	7.5	12.0	17.5	3.0
03AUG	17.5	13.8	28.0	15.5	10.5	13.0	17.5	2.5
04AUG	16.7	14.2	27.0	16.0	10.0	13.5	17.0	2.5
05AUG	12.6	14.0	16.0	14.5	9.5	13.5	6.5	1.0
06AUG	12.0	13.3	16.5	13.5	7.5	12.5	9.0	1.0
07AUG	11.8	12.8	17.0	13.5	7.0	12.5	10.0	1.0
08AUG	13.6	12.8	22.5	14.5	7.0	12.0	15.5	2.5
09AUG	15.5	13.5	19.5	14.5	13.5	13.0	6.0	1.5
10AUG	13.7	13.5	18.0	14.0	9.0	13.0	9.0	1.0
11AUG	11.8	12.9	15.0	13.5	8.0	12.5	7.0	1.0
12AUG	12.4	12.6	15.0	13.0	10.0	12.5	5.0	0.5
13AUG	12.1	12.3	15.0	12.5	8.5	12.0	6.5	0.5
14AUG	12.4	12.3	14.5	12.5	10.5	12.0	4.0	0.5
15AUG	11.9	12.1	13.0	12.5	10.5	12.0	2.5	0.5
16AUG	12.6	11.9	13.5	12.5	10.0	11.5	3.5	1.0
17AUG	11.6	11.8	14.0	12.0	9.5	11.5	4.5	0.5
18AUG	13.6	12.1	19.5	13.5	10.0	11.5	9.5	2.0
19AUG	11.9	12.2	16.0	13.0	8.0	11.5	8.0	1.5
20AUG	12.1	12.3	16.5	13.5	8.5	12.0	8.0	1.5
21AUG	13.8	12.4	22.0	14.0	7.5	11.5	14.5	2.5
22AUG	16.4	12.9	25.0	14.5	9.5	12.0	15.5	2.5
23AUG	18.0	13.5	28.5	15.5	12.5	12.5	16.0	3.0
24AUG	13.4	13.7	19.5	15.0	8.5	13.0	11.0	2.0
25AUG	13.0	13.5	20.5	15.0	7.5	13.0	13.0	2.0
26AUG	14.6	13.6	21.0	15.0	10.0	13.0	11.0	2.0
27AUG	16.4	13.9	24.5	15.5	11.0	13.0	13.5	2.5
28AUG	17.4	14.3	27.0	16.0	12.0	13.5	15.0	2.5
29AUG	14.0	14.3	18.5	15.5	9.0	14.0	9.5	1.5
30AUG	12.3	13.9	19.0	15.5	8.0	13.5	11.0	2.0
31AUG	14.7	13.7	22.5	15.5	8.0	13.0	14.5	2.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



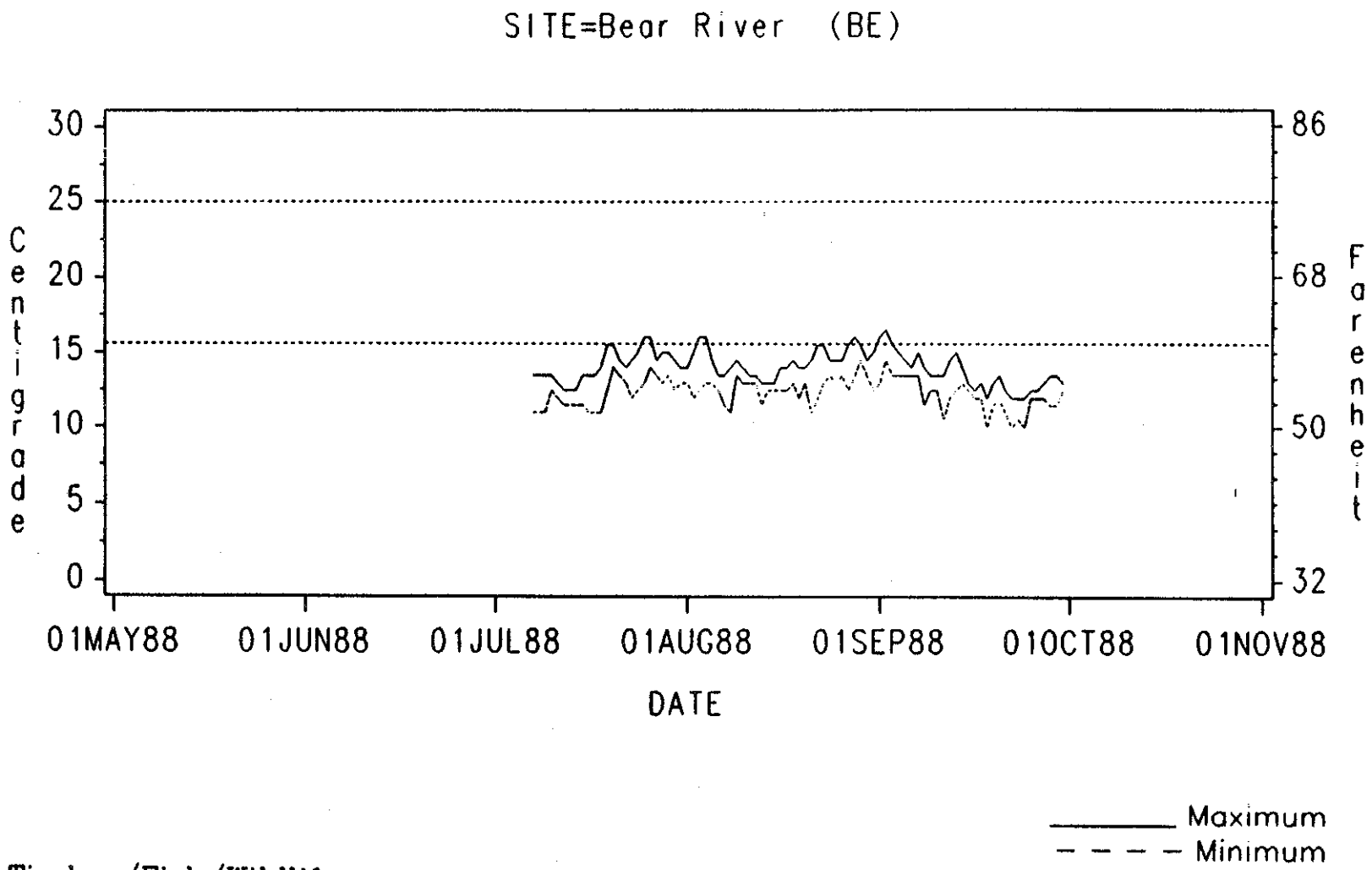
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

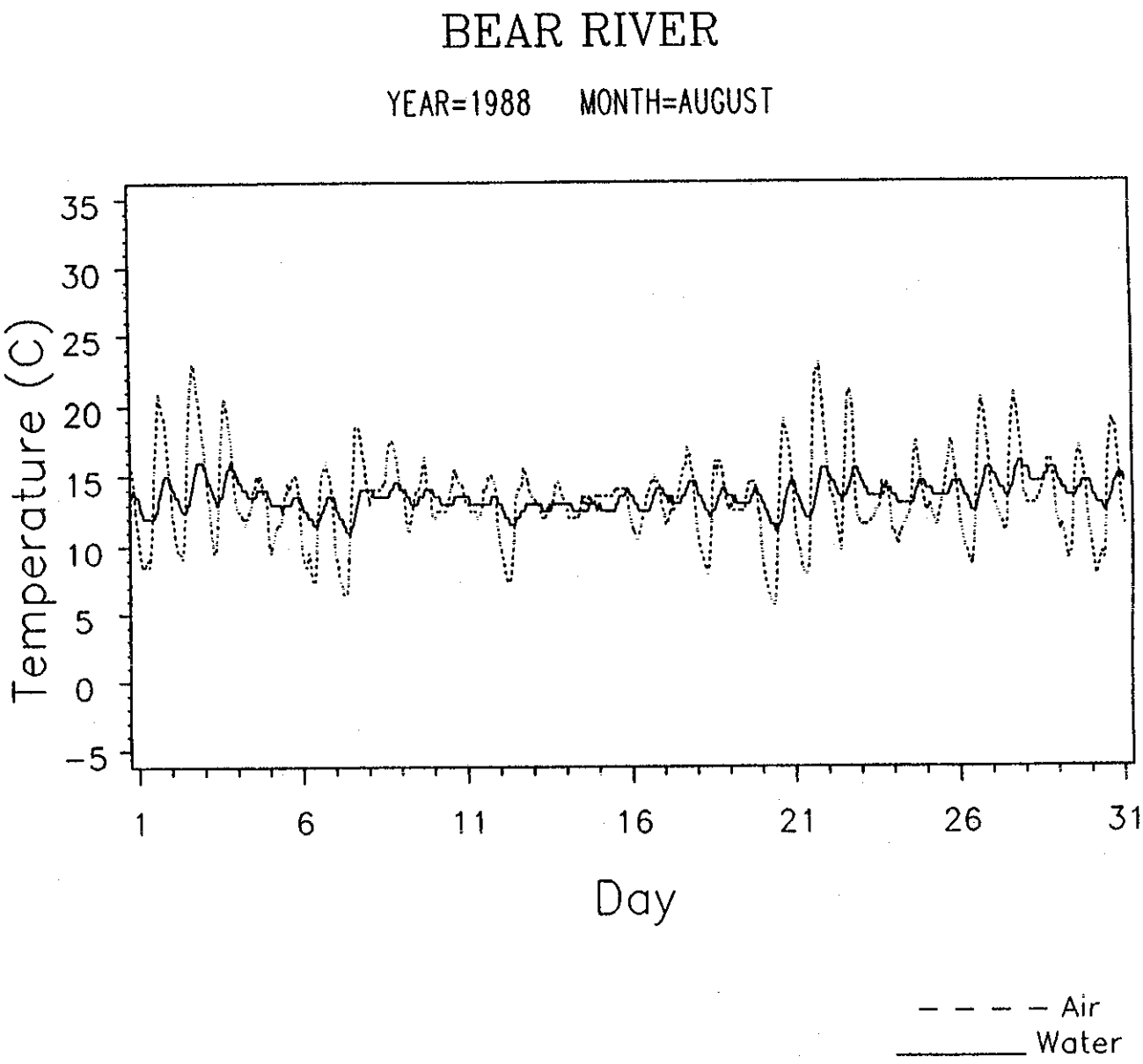
Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	BE
Stream Name	SITENAME$	Bear River
Cooperator	COOPERATOR	Longview Fibre
Cooperator/contact	COOPCONTACT	Monte Martinsen
Date of Site Visit	VISIT	08-10-88
County	COUNTY	Pacific
Nearest town	NEARESTTOWN	Knappton
Township	TOWNSHIP	09N
Range	RANGE	09W
Section	SECTION	06
Site is Tributary To:	TRIBUTARYTO	Willapa Bay
Water Resource Inventory Area	WRIA	24
WDF River Segment Identifier	WDFNUMBER	0689
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	South Coast
Latitude Decimal Degrees (degrees)	LATDEC	46.288850
Longitude Decimal Degrees (degrees)	LONGDEC	123.850900
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	marine sediment rock
Geomorphic Stream Order	STREAMORDER	1
Thermograph Elevation (meters)	ELEVDSM	92
Elevation Top of Thermal Reach (meters)	ELEVUSM	102
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.6
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.5
Channel Azimuth (degrees)	AZIMUTH1	352
Drainage Area Above Thermograph (hectares)	AREAHECT	336
Distance to Divide (meters)	DIVIDEMT	3541
Total Length of Perennial Streams (meters)	LENGTHMT	3541
Streamflow at Thermograph (cubic meters/second)	QDSM	0.027
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.028
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.010
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.007
Travel Time (meters/second)	TRAVELM	0.098
Average View To Sky (percent open) (percent)	VIEW1	19
Topographic Angle South (degrees)	TOPOSA	18
Topographic Angle Southeast (degrees)	TOPOSEA	20
Topographic Angle Southwest (degrees)	TOPOSWA	21
Average Forest Angle South (degrees)	FORSA	89
Average Forest Angle Southeast (degrees)	FORSEA	88
Average Forest Angle Southwest (degrees)	FORSWA	90
Percent Overhanging Brush (percent)	OVERBRUSH	80
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	55.7
Vegetation Height East Bank (meters)	VEGHTEM	17
Vegetation Height West Bank (meters)	VEGHTWM	15
Percent Vegetative Density East (percent)	VEGDENE	78
Percent Vegetative Density West (percent)	VEGDENW	79
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.188
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	2.452
Percent of Channel Composed of Pools (percent)	PERCENPL	86
Average Pool Depth (meters)	DEPTHPM	0.240
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	12
Streambed Composition Gravel (percent)	AVGGRAVEL	70
Streambed Composition Cobble (percent)	AVGCOBBLE	15
Streambed Composition Boulder (percent)	AVGBOULDER	0
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


BEAR RIVER
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

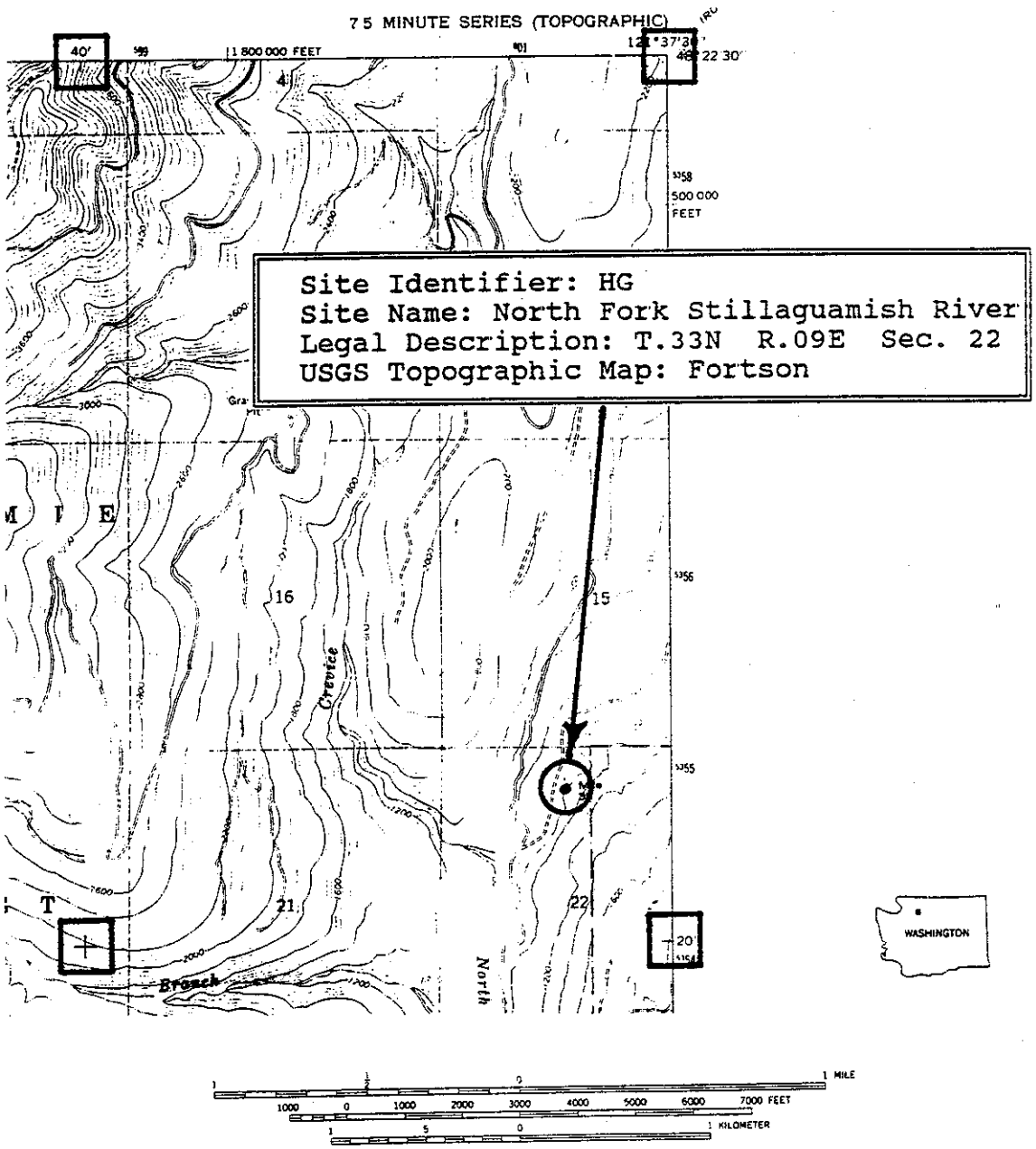
BEAR RIVER

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.3	13.2	16.0	14.0	9.5	13.0	6.5	1.0
02AUG	14.0	13.2	21.0	15.0	8.5	12.0	12.5	3.0
03AUG	15.9	14.1	23.0	16.0	9.0	12.5	14.0	3.5
04AUG	14.9	14.5	20.5	16.0	9.5	13.0	11.0	3.0
05AUG	13.0	13.8	15.0	14.5	9.5	13.0	5.5	1.5
06AUG	12.5	13.1	15.0	13.5	9.0	12.5	6.0	1.0
07AUG	11.6	12.5	16.0	13.5	7.5	11.5	8.5	2.0
08AUG	12.6	12.5	18.5	14.0	6.5	11.0	12.0	3.0
09AUG	15.1	13.8	17.5	14.5	13.0	13.5	4.5	1.0
10AUG	13.4	13.6	16.5	14.0	11.0	13.0	5.5	1.0
11AUG	13.5	13.3	15.5	13.5	12.0	13.0	3.5	0.5
12AUG	13.0	13.1	15.0	13.5	9.5	13.0	5.5	0.5
13AUG	11.9	12.3	15.5	13.0	7.5	11.5	8.0	1.5
14AUG	13.1	12.9	14.5	13.0	12.0	12.5	2.5	0.5
15AUG	12.8	12.7	13.5	13.0	12.0	12.5	1.5	0.5
16AUG	13.5	13.1	14.0	14.0	11.0	12.5	3.0	1.5
17AUG	12.9	13.1	15.0	14.0	10.5	12.5	4.5	1.5
18AUG	13.8	13.6	17.0	14.5	10.5	13.0	6.5	1.5
19AUG	12.4	13.1	16.0	14.0	8.0	12.0	8.0	2.0
20AUG	12.8	13.3	14.5	14.0	8.0	13.0	6.5	1.0
21AUG	11.9	12.7	19.0	14.5	5.5	11.0	13.5	3.5
22AUG	15.0	13.6	23.0	15.5	8.0	12.0	15.0	3.5
23AUG	14.3	14.3	21.0	15.5	9.5	13.0	11.5	2.5
24AUG	12.4	13.7	14.5	14.5	10.5	13.5	4.0	1.0
25AUG	13.2	13.5	17.5	14.5	10.0	13.0	7.5	1.5
26AUG	13.8	13.9	17.5	14.5	11.0	13.5	6.5	1.0
27AUG	14.0	13.9	20.5	15.5	8.5	12.5	12.0	3.0
28AUG	15.0	14.7	21.0	16.0	11.0	13.5	10.0	2.5
29AUG	13.9	14.9	16.5	15.5	11.0	14.5	5.5	1.0
30AUG	12.7	14.0	17.0	14.5	9.0	13.5	8.0	1.0
31AUG	13.1	13.7	19.0	15.0	8.0	12.5	11.0	2.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



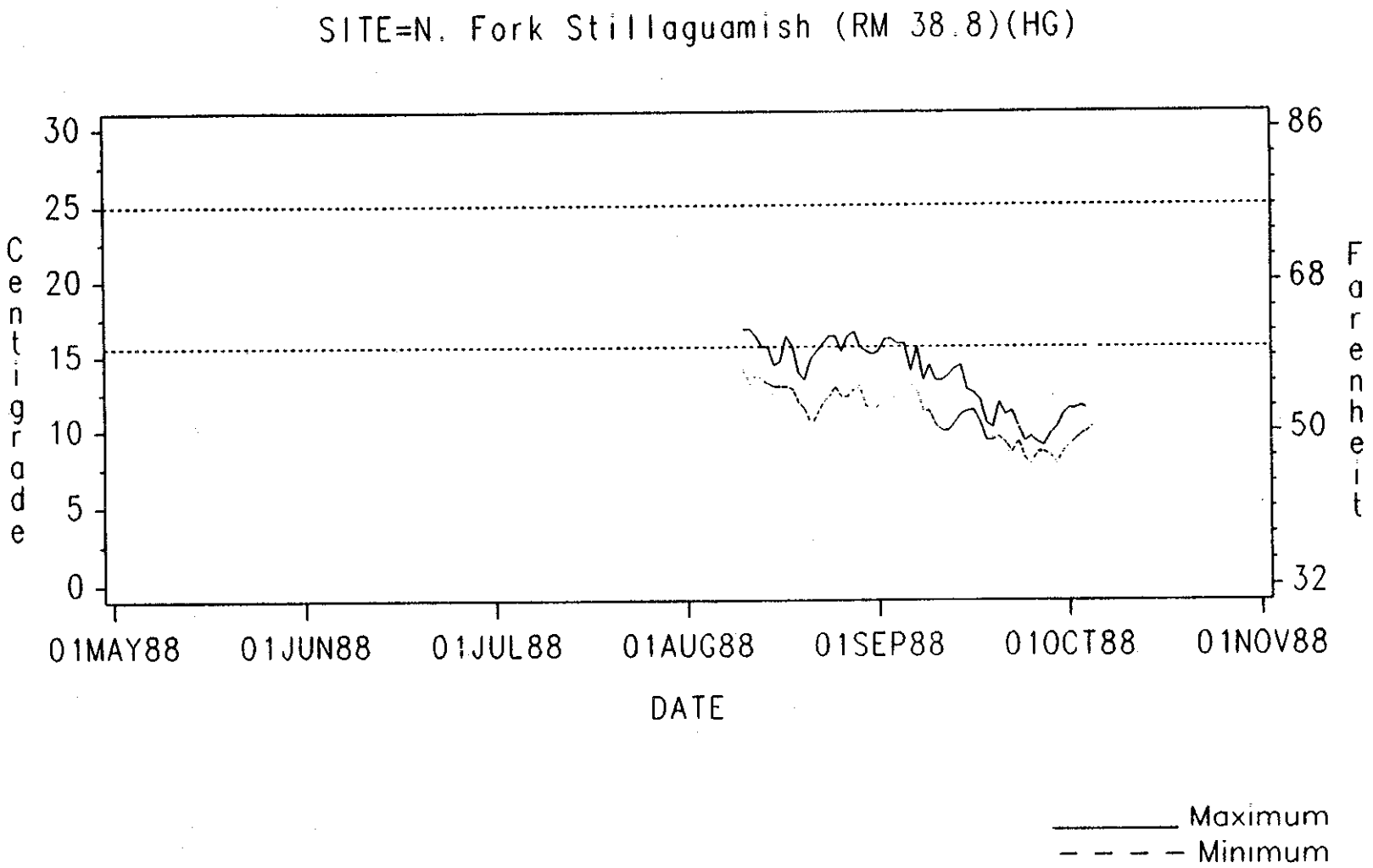
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	HG
Stream Name	SITENAME$	N Fk. Stillaguamish
Cooperator	COOPERATOR	Tulalip Tribes
Cooperator/contact	COOPCONTACT	Kurt Nelson
Date of Site Visit	VISIT	08-31-88
County	COUNTY	Skagit
Nearest town	NEARESTTOWN	Darrington
Township	TOWNSHIP	33N
Range	RANGE	09E
Section	SECTION	22
Site is Tributary To:	TRIBUTARYTO	Stillaguamish River
Water Resource Inventory Area	WRIA	05
WDF River Segment Identifier	WDFNUMBER	0135
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	North Cascades
Latitude Decimal Degrees (degrees)	LATDEC	48.340280
Longitude Decimal Degrees (degrees)	LONGDEC	121.632300
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	pre-Jurassic
Geologic Lithology of Basin	GEOLITHO	L.Grade Metamorphic
General Rock Type of Basin	GEOROCK	phyllite
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	275
Elevation Top of Thermal Reach (meters)	ELEVUSM	280
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.8
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.0
Channel Azimuth (degrees)	AZIMUTH1	204
Drainage Area Above Thermograph (hectares)	AREAHECT	7515
Distance to Divide (meters)	DIVIDEMT	20525
Total Length of Perennial Streams (meters)	LENGTHMT	74182
Streamflow at Thermograph (cubic meters/second)	QDSM	0.268
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.202
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.067
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.004
Travel Time (meters/second)	TRAVELM	0.241
Average View To Sky (percent open) (percent)	VIEW1	72
Topographic Angle South (degrees)	TOPOSA	26
Topographic Angle Southeast (degrees)	TOPOSEA	27
Topographic Angle Southwest (degrees)	TOPOSWA	15
Average Forest Angle South (degrees)	FORSA	52
Average Forest Angle Southeast (degrees)	FORSEA	56
Average Forest Angle Southwest (degrees)	FORSWA	40
Percent Overhanging Brush (percent)	OVERBRUSH	9
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	12
Vegetation Height West Bank (meters)	VEGHTWM	11
Percent Vegetative Density East (percent)	VEGDENE	17
Percent Vegetative Density West (percent)	VEGDENW	24
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.402
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	8.152
Percent of Channel Composed of Pools (percent)	PERCENPL	82
Average Pool Depth (meters)	DEPTHPM	0.540
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	65
Streambed Composition Cobble (percent)	AVGCOBBLE	20
Streambed Composition Boulder (percent)	AVGBOULDER	15
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

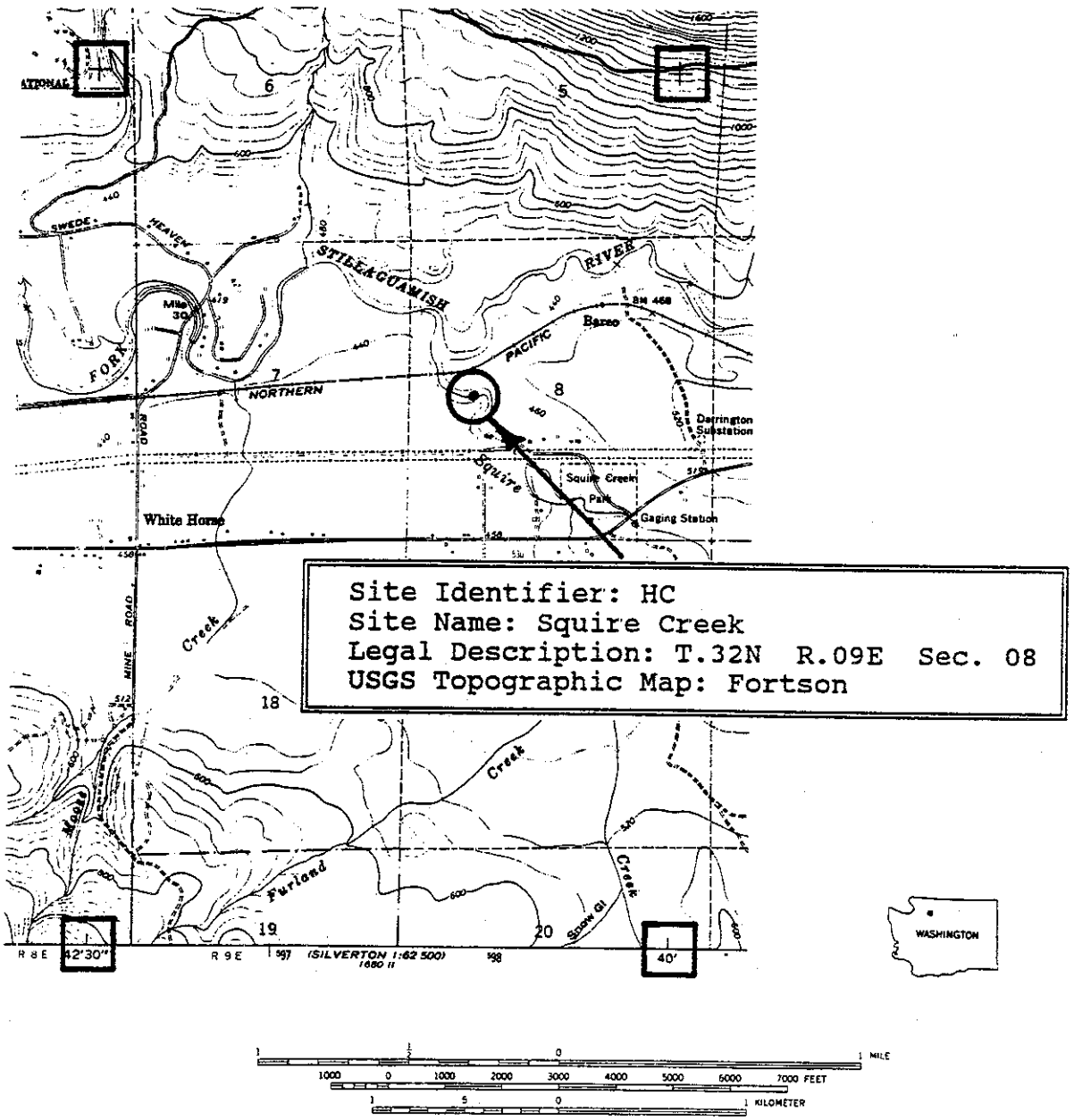
N. FORK STILLAGUAMISH AT RM 38.8

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
10AUG	17.3	15.5	21.3	16.8	11.7	14.1	9.6	2.7
11AUG	15.6	14.7	22.2	16.8	11.1	13.2	11.1	3.6
12AUG	15.6	14.8	20.2	16.3	13.7	13.7	6.5	2.6
13AUG	14.6	14.4	18.6	15.6	11.7	13.4	6.9	2.2
14AUG	13.4	14.1	18.1	15.6	10.8	13.2	7.3	2.4
15AUG	13.3	13.6	16.1	14.4	11.3	13.0	4.8	1.4
16AUG	13.4	13.7	16.1	14.6	11.9	13.0	4.2	1.6
17AUG	13.4	14.2	18.1	16.3	11.9	13.0	6.2	3.3
18AUG	12.7	13.7	17.3	15.6	9.0	12.8	8.3	2.8
19AUG	11.6	12.9	16.8	13.9	7.6	11.9	9.2	2.0
20AUG	10.2	12.3	15.3	13.4	6.1	11.5	9.2	1.9
21AUG	10.6	12.4	18.6	14.8	4.1	10.4	14.5	4.4
22AUG	12.7	13.0	20.8	15.3	6.3	11.1	14.5	4.2
23AUG	14.7	13.7	24.4	15.8	8.2	11.9	16.2	3.9
24AUG	15.6	14.2	23.8	16.3	9.6	12.3	14.2	4.0
25AUG	14.7	14.4	22.6	16.3	10.0	13.0	12.6	3.3
26AUG	13.6	13.8	19.9	15.3	8.0	12.3	11.9	3.0
27AUG	15.0	14.1	22.8	16.3	9.4	12.3	13.4	4.0
28AUG	15.9	14.6	24.7	16.6	10.0	12.8	14.7	3.8
29AUG	13.4	14.0	17.6	15.6	10.2	13.0	7.4	2.6
30AUG	11.4	13.3	19.4	15.3	5.9	11.7	13.5	3.6
31AUG	11.7	13.1	20.2	15.1	5.4	11.3	14.8	3.8

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



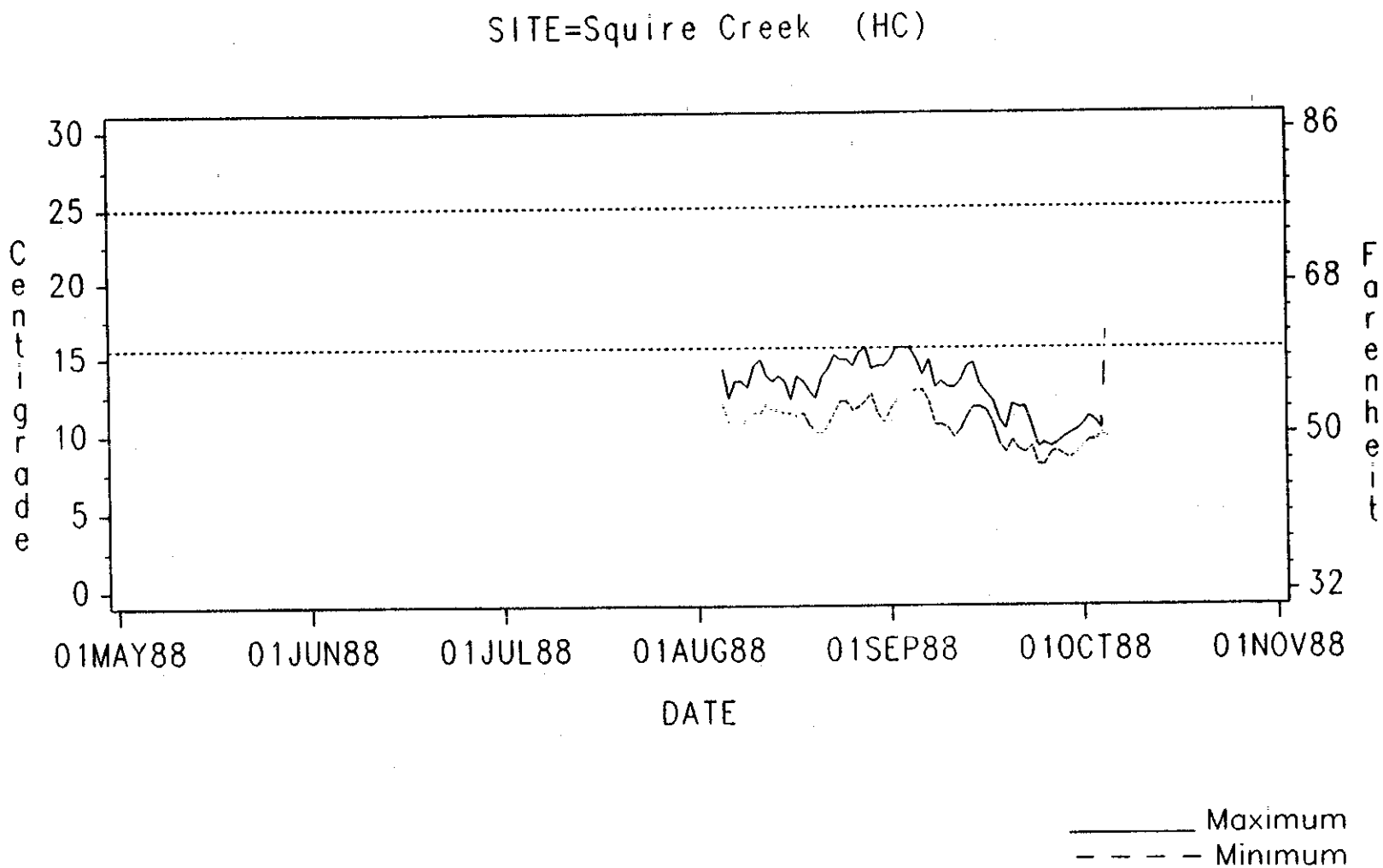
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	HC
Stream Name	SITENAMES	Squire Creek
Cooperator	COOPERATOR	Tulalip Tribes
Cooperator/contact	COOPCONTACT	Kurt Nelson
Date of Site Visit	VISIT	08-31-88
County	COUNTY	Snohomish
Nearest town	NEARESTTOWN	Darrington
Township	TOWNSHIP	32N
Range	RANGE	09E
Section	SECTION	08
Site is Tributary To:	TRIBUTARYTO	N.Fk Stillaguamish
Water Resource Inventory Area	WRIA	05
WDF River Segment Identifier	WDFNUMBER	0260
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	North Cascades
Latitude Decimal Degrees (degrees)	LATDEC	48.276240
Longitude Decimal Degrees (degrees)	LONGDEC	121.693100
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	pre-Tertiary
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite/basalt
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	130
Elevation Top of Thermal Reach (meters)	ELEVUSM	133
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.5
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.4
Channel Azimuth (degrees)	AZIMUTH1	325
Drainage Area Above Thermograph (hectares)	AREAHECT	6611
Distance to Divide (meters)	DIVIDEMT	18034
Total Length of Perennial Streams (meters)	LENGTHMT	34608
Streamflow at Thermograph (cubic meters/second)	QDSM	0.772
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.791
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.020
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.022
Travel Time (meters/second)	TRAVELM	0.241
Average View To Sky (percent open) (percent)	VIEW1	87
Topographic Angle South (degrees)	TOPOSA	9
Topographic Angle Southeast (degrees)	TOPOSEA	6
Topographic Angle Southwest (degrees)	TOPOSWA	8
Average Forest Angle South (degrees)	FORSA	24
Average Forest Angle Southeast (degrees)	FORSEA	14
Average Forest Angle Southwest (degrees)	FORSWA	22
Percent Overhanging Brush (percent)	OVERBRUSH	4
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	10
Vegetation Height West Bank (meters)	VEGHTWM	7
Percent Vegetative Density East (percent)	VEGDENE	13
Percent Vegetative Density West (percent)	VEGDENW	1
Volume-weighted Stream Depth (m) (meters)	DEPTHVWI	0.524
Volume-weighted Stream Width (m) (meters)	WIDTHVWI	10.646
Percent of Channel Composed of Pools (percent)	PERCENPI	82
Average Pool Depth (meters)	DEPTHPM	0.600
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	40
Streambed Composition Cobble (percent)	AVGCOBBLE	50
Streambed Composition Boulder (percent)	AVGBOULDER	10
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

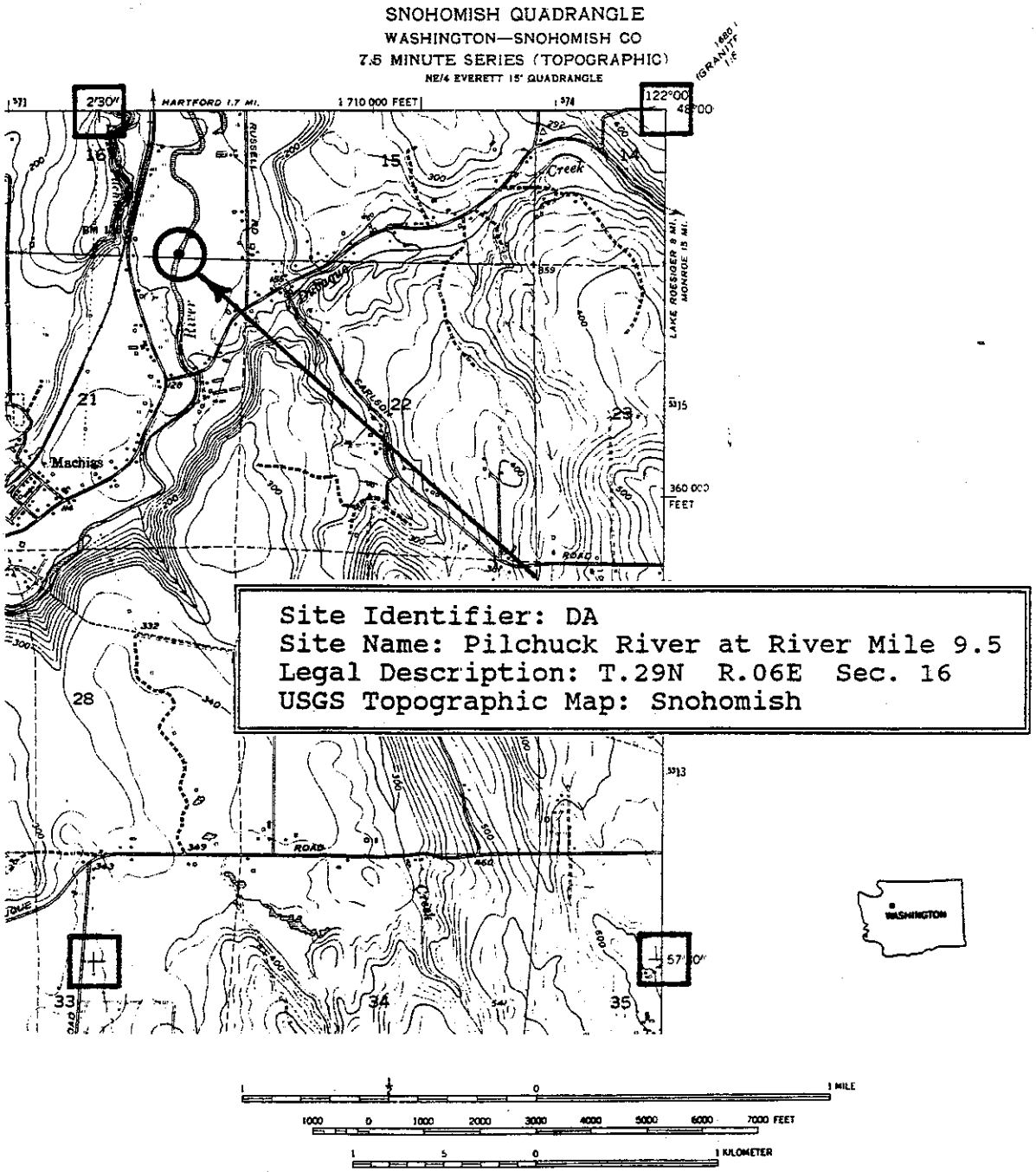
SQUIRE CR.

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
05AUG	14.8	13.1	17.8	14.2	11.6	11.9	6.2	2.3
06AUG	12.3	11.5	15.1	12.3	10.5	10.8	4.6	1.5
07AUG	13.8	11.8	19.7	13.4	9.2	10.6	10.5	2.8
08AUG	14.4	11.9	20.5	13.4	8.4	10.4	12.1	3.0
09AUG	14.7	11.9	18.8	13.0	10.4	11.1	8.4	1.9
10AUG	15.8	12.6	20.2	14.4	12.1	11.3	8.1	3.1
11AUG	15.8	12.9	20.8	14.8	10.6	11.3	10.2	3.5
12AUG	15.5	12.7	19.4	13.7	13.0	11.9	6.4	1.8
13AUG	14.7	12.4	17.6	13.4	12.3	11.5	5.3	1.9
14AUG	14.4	12.4	18.1	13.7	11.9	11.5	6.2	2.2
15AUG	13.4	12.3	16.3	13.4	10.6	11.3	5.7	2.1
16AUG	13.8	11.7	16.8	12.2	12.3	11.3	4.5	0.9
17AUG	13.8	12.1	17.8	13.7	12.3	11.1	5.5	2.6
18AUG	13.7	12.2	18.1	13.4	10.4	11.3	7.7	2.1
19AUG	12.9	11.7	17.6	12.8	8.8	10.6	8.8	2.2
20AUG	11.4	11.3	16.6	12.3	6.5	10.2	10.1	2.1
21AUG	12.8	11.8	20.5	13.7	6.1	10.0	14.4	3.7
22AUG	15.6	12.4	24.1	14.2	9.4	10.6	14.7	3.6
23AUG	18.0	13.1	27.1	15.1	11.1	11.3	16.0	3.8
24AUG	17.4	13.5	23.4	14.8	12.1	12.1	11.3	2.7
25AUG	15.4	13.5	20.5	14.8	10.4	12.1	10.1	2.7
26AUG	14.7	13.0	20.8	14.4	8.6	11.5	12.2	2.9
27AUG	16.8	13.5	25.1	15.3	10.6	11.7	14.5	3.6
28AUG	18.0	13.9	26.8	15.6	11.3	12.1	15.5	3.5
29AUG	14.3	13.2	17.3	14.2	11.3	12.6	6.0	1.6
30AUG	12.8	12.7	19.4	14.4	6.1	11.3	13.3	3.1
31AUG	13.6	12.7	22.2	14.4	6.5	10.8	15.7	3.6

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



Site Identifier: DA
Site Name: Pilchuck River at River Mile 9.5
Legal Description: T.29N R.06E Sec. 16
USGS Topographic Map: Snohomish

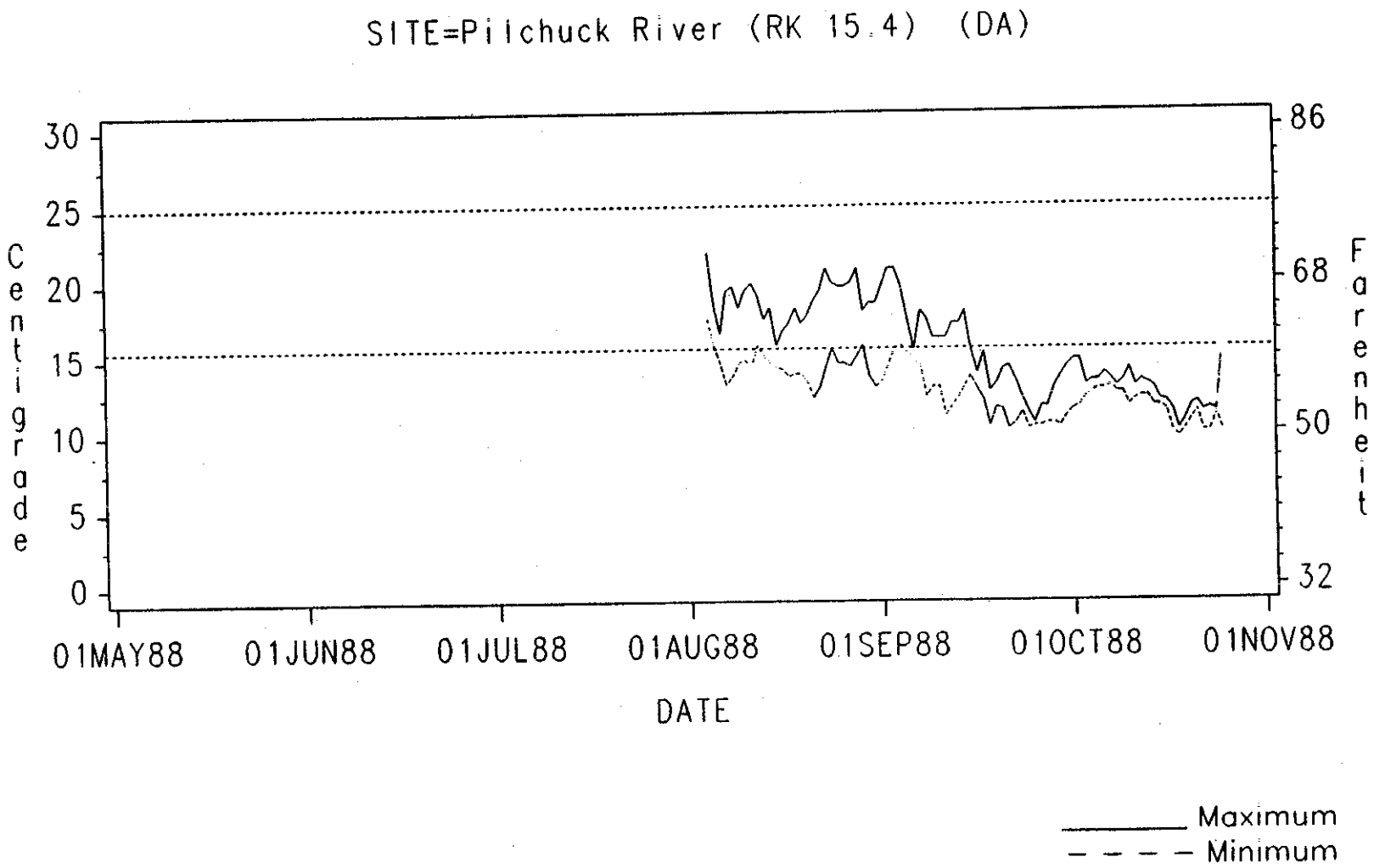
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	DA
Stream Name	SITENAME$	Pilchuck River RM 9.5
Cooperator	COOPERATOR	Tulalip Tribes
Cooperator/contact	COOPCONTACT	Kurt Nelson
Date of Site Visit	VISIT	10-13-88
County	COUNTY	Snohomish
Nearest town	NEARESTTOWN	Machias
Township	TOWNSHIP	29N
Range	RANGE	06E
Section	SECTION	16
Site is Tributary To:	TRIBUTARYTO	Puget Sound
Water Resource Inventory Area	WRIA	07
WDF River Segment Identifier	WDFNUMBER	0125
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	Puget Lowland
Latitude Decimal Degrees (degrees)	LATDEC	47.993030
Longitude Decimal Degrees (degrees)	LONGDEC	122.006100
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	young glacial till
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	38
Elevation Top of Thermal Reach (meters)	ELEVUSM	41
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.5
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	177
Drainage Area Above Thermograph (hectares)	AREAHECT	18459
Distance to Divide (meters)	DIVIDEMT	52144
Total Length of Perennial Streams (meters)	LENGTHMT	0
Streamflow at Thermograph (cubic meters/second)	QDSM	1.783
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	1.861
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.078
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.008
Travel Time (meters/second)	TRAVELM	0.341
Average View To Sky (percent open) (percent)	VIEW1	95
Topographic Angle South (degrees)	TOPOSA	5
Topographic Angle Southeast (degrees)	TOPOSEA	7
Topographic Angle Southwest (degrees)	TOPOSWA	12
Average Forest Angle South (degrees)	FORSA	21
Average Forest Angle Southeast (degrees)	FORSEA	33
Average Forest Angle Southwest (degrees)	FORSWA	38
Percent Overhanging Brush (percent)	OVERBRUSH	2
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	13.7
Vegetation Height East Bank (meters)	VEGHTEM	20
Vegetation Height West Bank (meters)	VEGHTWM	19
Percent Vegetative Density East (percent)	VEGDENE	35
Percent Vegetative Density West (percent)	VEGDENW	40
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.503
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	11.365
Percent of Channel Composed of Pools (percent)	PERCENPL	50
Average Pool Depth (meters)	DEPTHPM	0.760
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	33
Streambed Composition Gravel (percent)	AVGGRAVEL	55
Streambed Composition Cobble (percent)	AVGCOBBLE	13
Streambed Composition Boulder (percent)	AVGBOULDER	0
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

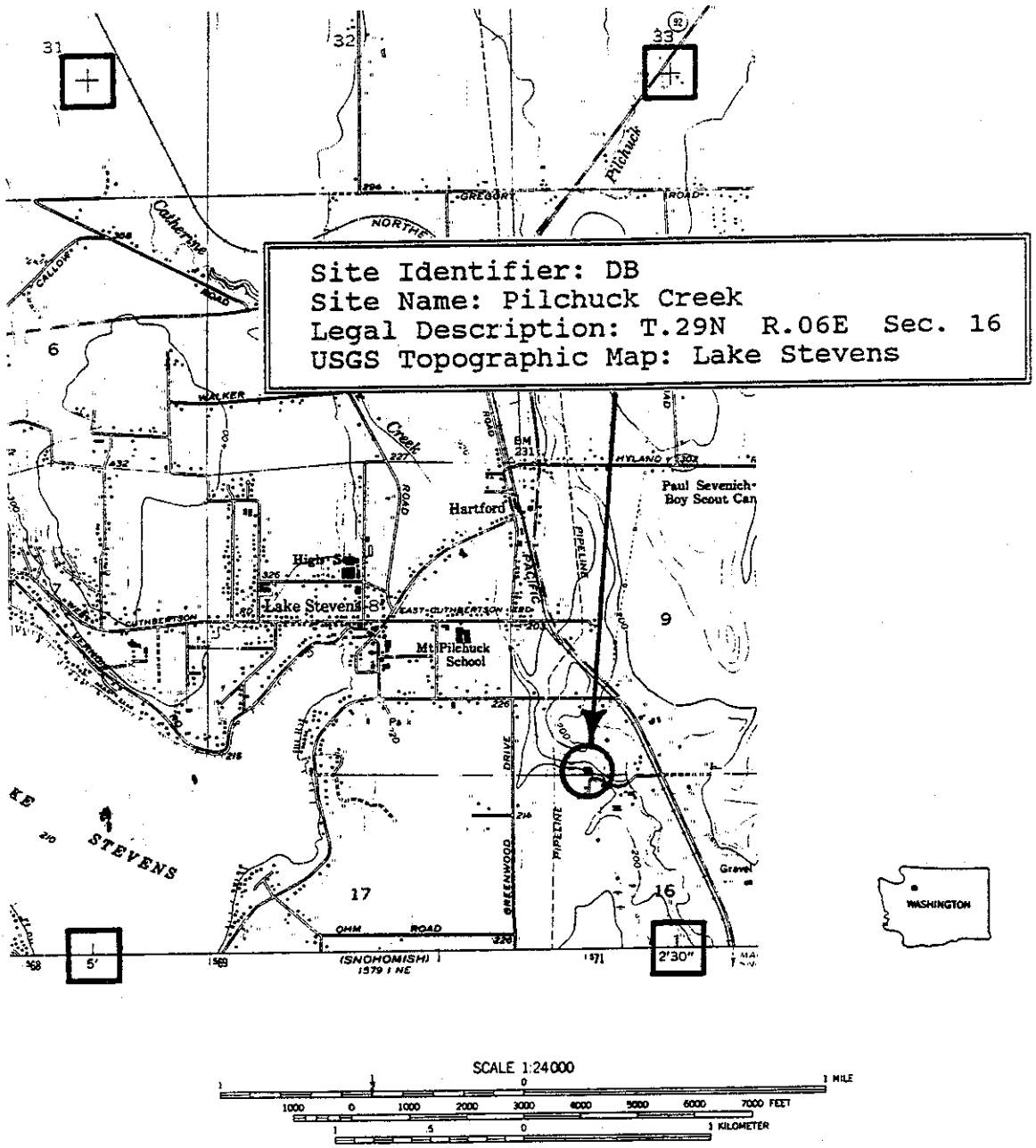
PILCHUK RIVER R.M. 9.5

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
04AUG	22.5	20.5	28.6	21.9	15.1	17.6	13.5	4.3
05AUG	14.7	17.0	17.6	18.6	11.9	15.8	5.7	2.8
06AUG	13.8	15.5	17.1	16.6	11.1	14.6	6.0	2.0
07AUG	14.4	15.8	22.8	19.4	8.4	13.2	14.4	6.2
08AUG	15.4	16.5	23.2	19.7	8.8	13.7	14.4	6.0
09AUG	15.8	16.4	22.2	18.3	10.8	14.6	11.4	3.7
10AUG	15.9	16.6	23.4	19.4	12.1	14.8	11.3	4.6
11AUG	15.4	16.9	23.4	19.9	9.2	14.4	14.2	5.5
12AUG	15.8	17.0	21.9	19.1	12.6	15.8	9.3	3.3
13AUG	15.1	16.3	19.1	17.6	12.6	15.1	6.5	2.5
14AUG	15.2	16.0	21.9	18.3	11.9	14.6	10.0	3.7
15AUG	14.2	14.9	17.3	15.8	11.9	14.4	5.4	1.4
16AUG	15.1	15.3	17.1	16.8	13.9	14.2	3.2	2.6
17AUG	14.4	15.4	17.3	17.3	13.0	13.7	4.3	3.6
18AUG	14.7	16.0	22.2	18.3	11.7	13.9	10.5	4.4
19AUG	13.8	15.6	19.7	17.3	9.6	13.9	10.1	3.4
20AUG	13.7	15.3	20.8	17.8	10.0	13.4	10.8	4.4
21AUG	13.6	15.4	25.1	18.8	6.5	12.3	18.6	6.5
22AUG	15.6	16.1	26.8	19.4	7.2	13.0	19.6	6.4
23AUG	18.0	17.3	29.7	20.8	10.0	14.4	19.7	6.4
24AUG	17.5	17.6	27.1	19.9	11.5	15.6	15.6	4.3
25AUG	15.4	17.1	24.4	19.7	9.8	14.6	14.6	5.1
26AUG	14.9	16.8	22.8	19.7	9.4	14.6	13.4	5.1
27AUG	16.4	17.0	26.1	19.9	9.8	14.4	16.3	5.5
28AUG	17.8	17.8	29.3	20.8	10.4	15.1	18.9	5.7
29AUG	14.4	16.7	17.6	18.1	11.9	15.8	5.7	2.3
30AUG	13.6	16.1	24.4	18.6	7.8	13.7	16.6	4.9
31AUG	13.9	15.8	25.1	18.6	6.1	13.0	19.0	5.6

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



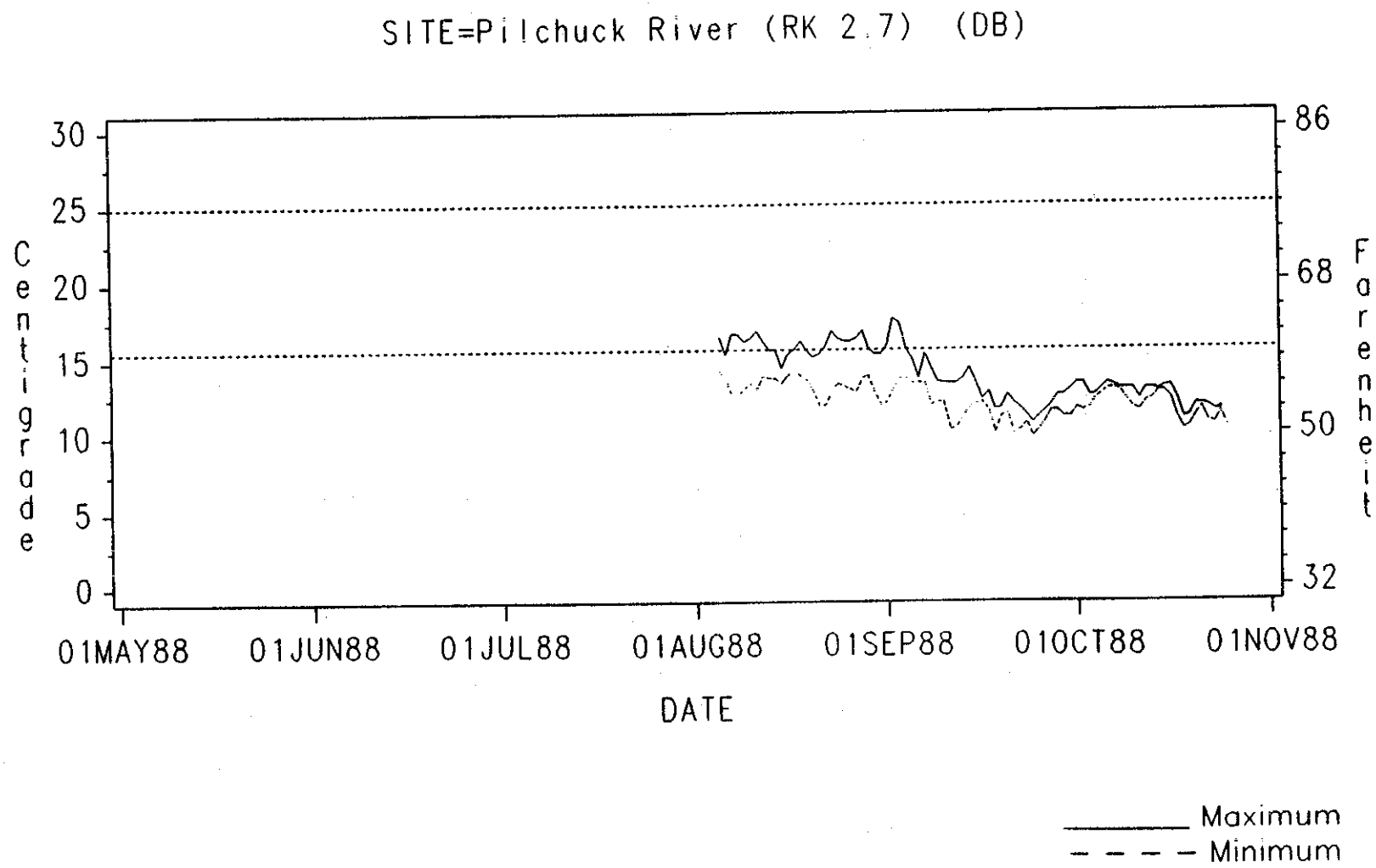
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

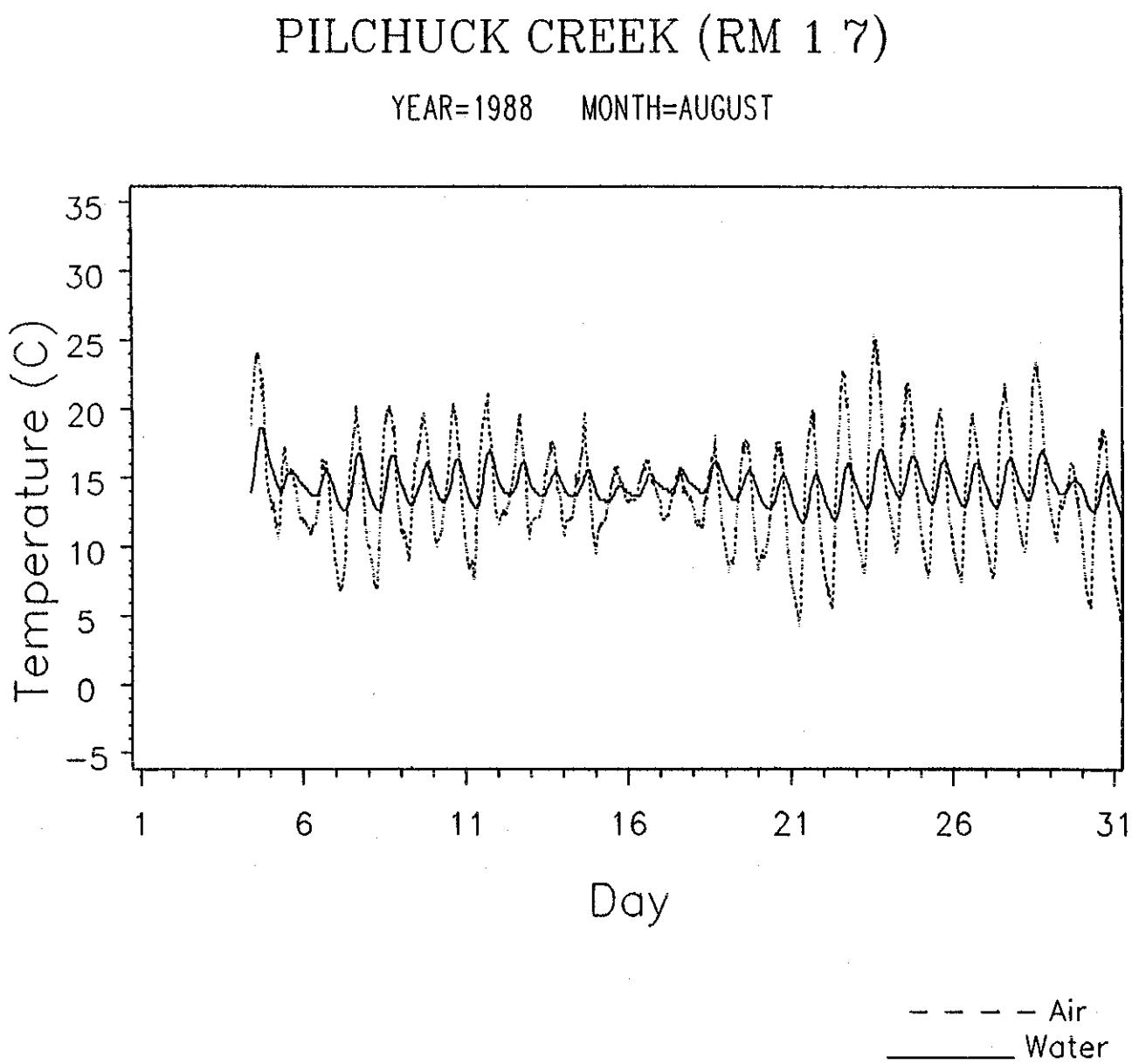
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	DB
Stream Name	SITENAMES	Little Pilchuck Ck.
Cooperator	COOPERATOR	Tulalip Tribes
Cooperator/contact	COOPCONTACT	Kurt Nelson
Date of Site Visit	VISIT	09-26-88
County	COUNTY	Snohomish
Nearest town	NEARESTTOWN	Machias
Township	TOWNSHIP	29N
Range	RANGE	06E
Section	SECTION	16
Site is Tributary To:	TRIBUTARYTO	Pilchuck River
Water Resource Inventory Area	WRIA	07
WDF River Segment Identifier	WDFNUMBER	0146
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	Puget Lowland
Latitude Decimal Degrees (degrees)	LATDEC	48.008290
Longitude Decimal Degrees (degrees)	LONGDEC	122.079500
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	alluvium
Geomorphic Stream Order	STREAMORDER	2
Thermograph Elevation (meters)	ELEVDSM	49
Elevation Top of Thermal Reach (meters)	ELEVUSM	55
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.0
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.4
Channel Azimuth (degrees)	AZIMUTH1	164
Drainage Area Above Thermograph (hectares)	AREAHECT	4442
Distance to Divide (meters)	DIVIDEMT	16464
Total Length of Perennial Streams (meters)	LENGTHMT	38693
Streamflow at Thermograph (cubic meters/second)	QDSM	0.104
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.114
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.010
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.003
Travel Time (meters/second)	TRAVELM	0.186
Average View To Sky (percent open) (percent)	VIEW1	37
Topographic Angle South (degrees)	TOPOSA	7
Topographic Angle Southeast (degrees)	TOPOSEA	8
Topographic Angle Southwest (degrees)	TOPOSWA	10
Average Forest Angle South (degrees)	FORSA	61
Average Forest Angle Southeast (degrees)	FORSEA	70
Average Forest Angle Southwest (degrees)	FORSWA	83
Percent Overhanging Brush (percent)	OVERBRUSH	63
Buffer Width Right Bank (meters)	BUFWIDRM	7.6
Buffer Width Left Bank (meters)	BUFWIDLM	9.1
Vegetation Height East Bank (meters)	VEGHTEM	9
Vegetation Height West Bank (meters)	VEGHTWM	9
Percent Vegetative Density East (percent)	VEGDENE	71
Percent Vegetative Density West (percent)	VEGDENW	55
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.211
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	3.493
Percent of Channel Composed of Pools (percent)	PERCENPL	78
Average Pool Depth (meters)	DEPTHPM	0.260
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	17
Streambed Composition Gravel (percent)	AVGGRAVEL	77
Streambed Composition Cobble (percent)	AVGCOBBLE	7
Streambed Composition Boulder (percent)	AVGBOULDER	0
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


PILCHUCK CREEK (RM 1 7)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
−5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

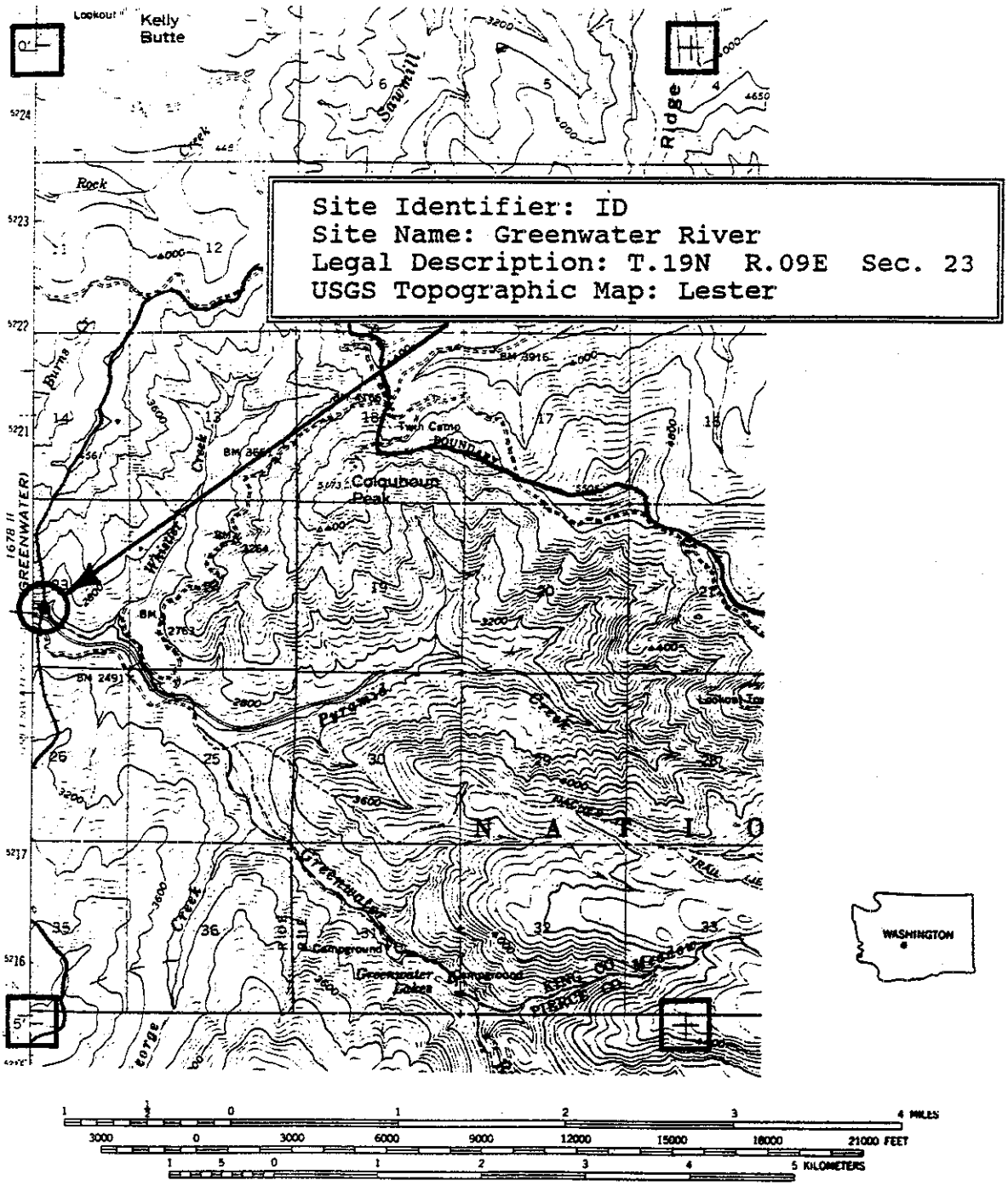
PILCHUCK CR. (R.M. 1.7)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
04AUG	20.2	17.0	24.1	18.6	13.7	13.9	10.4	4.7
05AUG	13.9	15.0	17.1	16.4	10.8	14.2	6.3	2.2
06AUG	12.8	14.4	16.3	15.3	8.9	13.7	7.4	1.6
07AUG	13.1	14.4	20.2	16.6	7.2	12.6	13.0	4.0
08AUG	14.0	14.4	20.2	16.6	7.1	12.6	13.1	4.0
09AUG	14.5	14.4	19.4	16.1	9.0	13.0	10.4	3.1
10AUG	14.4	14.6	20.5	16.3	10.2	13.4	10.3	2.9
11AUG	14.0	14.7	21.1	16.8	7.6	13.0	13.5	3.8
12AUG	14.6	14.7	19.7	16.1	10.4	13.9	9.3	2.2
13AUG	14.1	14.5	17.6	15.6	10.8	13.7	6.8	1.9
14AUG	13.9	14.4	19.7	15.6	10.0	13.7	9.7	1.9
15AUG	13.3	13.8	15.6	14.4	9.6	13.4	6.0	1.0
16AUG	14.5	14.4	16.3	15.3	13.4	13.9	2.9	1.4
17AUG	13.6	14.7	15.8	15.6	11.9	14.2	3.9	1.4
18AUG	13.5	14.8	18.1	16.1	10.1	13.9	8.0	2.2
19AUG	12.8	14.5	17.8	15.6	8.2	13.7	9.6	1.9
20AUG	12.5	13.9	17.6	15.1	8.4	13.0	9.2	2.1
21AUG	12.0	13.4	19.9	15.3	4.3	11.9	15.6	3.4
22AUG	13.9	13.8	22.8	15.8	5.7	11.9	17.1	3.9
23AUG	16.2	14.8	25.4	16.8	8.0	12.8	17.4	4.0
24AUG	15.5	15.0	21.7	16.3	9.6	13.4	12.1	2.9
25AUG	13.7	14.7	20.2	16.1	8.0	13.2	12.2	2.9
26AUG	13.3	14.5	19.4	16.1	7.4	13.0	12.0	3.1
27AUG	14.6	14.5	21.9	16.3	7.8	12.8	14.1	3.5
28AUG	16.1	15.1	23.4	16.8	9.8	13.7	13.6	3.1
29AUG	13.3	14.5	15.8	15.7	10.6	13.9	5.2	1.8
30AUG	12.1	13.9	18.6	15.3	5.9	12.8	12.7	2.5
31AUG	12.3	13.5	19.9	15.3	4.3	11.9	15.6	3.4

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



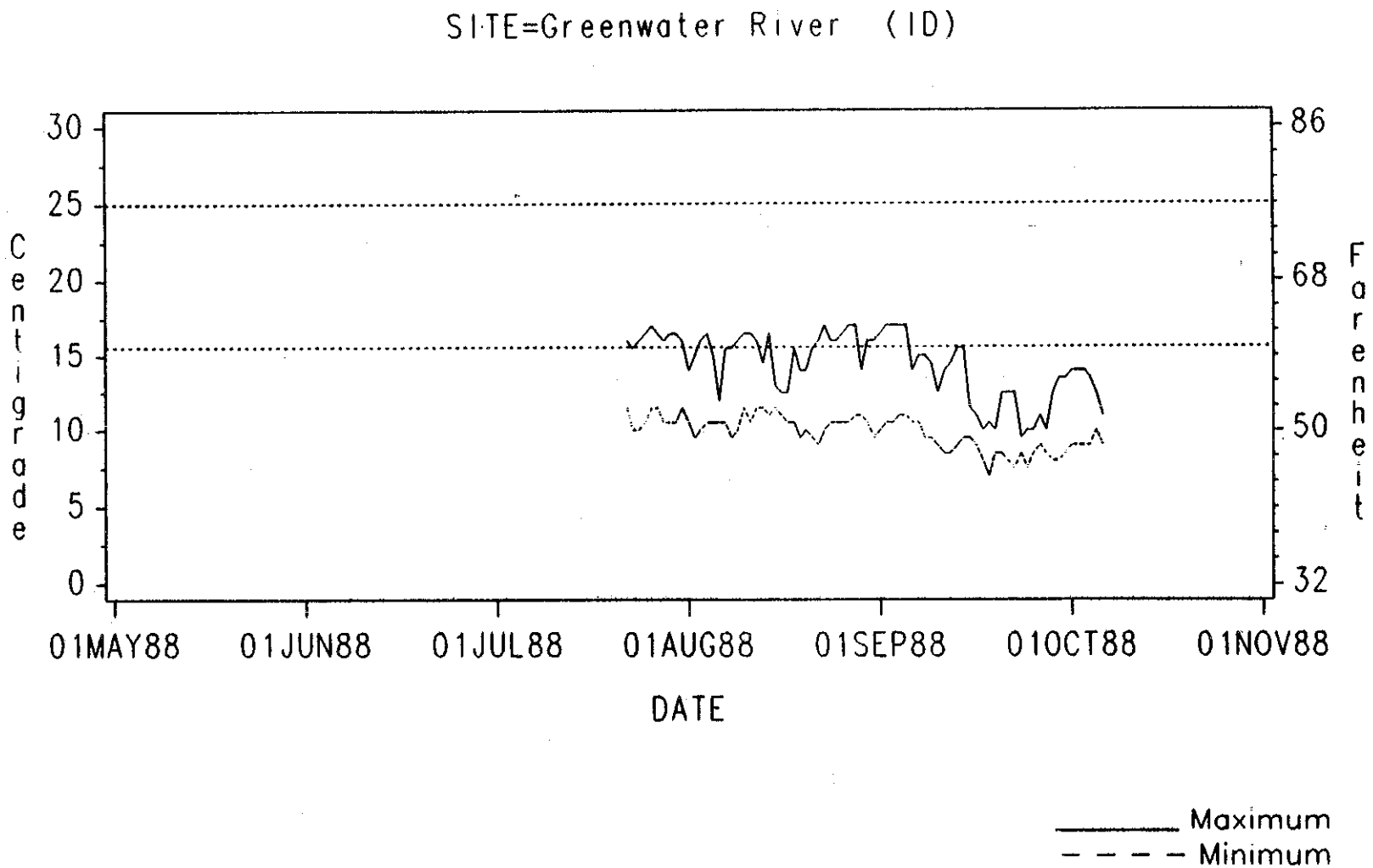
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

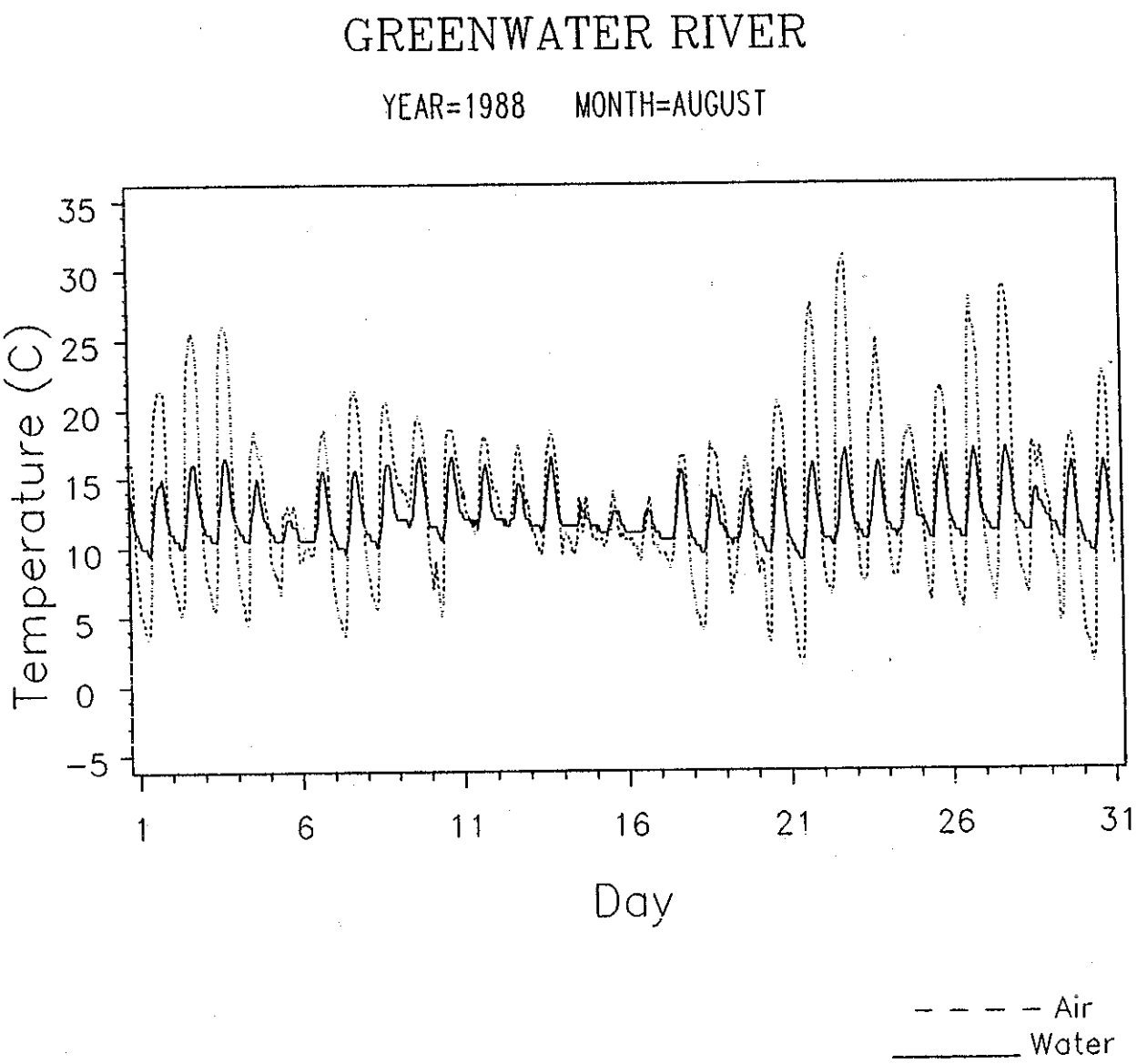
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	ID
Stream Name	SITENAMES	Greenwater River
Cooperator	COOPERATOR	Muckleshoot Tribe
Cooperator/contact	COOPCONTACT	Martin Fox
Date of Site Visit	VISIT	09-08-88
County	COUNTY	King/Pierce
Nearest town	NEARESTTOWN	Greenwater
Township	TOWNSHIP	19N
Range	RANGE	10E
Section	SECTION	23
Site is Tributary To:	TRIBUTARYTO	White River
Water Resource Inventory Area	WRIA	10
WDF River Segment Identifier	WDFNUMBER	0122
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	Central Cascades
Latitude Decimal Degrees (degrees)	LATDEC	47.118670
Longitude Decimal Degrees (degrees)	LONGDEC	121.498200
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	8
Geologic Age of Basin Geology	GEOAGE	Miocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	705
Elevation Top of Thermal Reach (meters)	ELEVUSM	716
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.8
Channel Gradient from Autolevel (percent)	GRADLEVEL	2.1
Channel Azimuth (degrees)	AZIMUTH1	297
Drainage Area Above Thermograph (hectares)	AREAHECT	11998
Distance to Divide (meters)	DIVIDEMT	20958
Total Length of Perennial Streams (meters)	LENGTHMT	64384
Streamflow at Thermograph (cubic meters/second)	QDSM	0.767
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.739
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.028
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.012
Travel Time (meters/second)	TRAVELM	0.579
Average View To Sky (percent open) (percent)	VIEW1	95
Topographic Angle South (degrees)	TOPOSA	19
Topographic Angle Southeast (degrees)	TOPOSEA	22
Topographic Angle Southwest (degrees)	TOPOSWA	14
Average Forest Angle South (degrees)	FORSA	32
Average Forest Angle Southeast (degrees)	FORSEA	30
Average Forest Angle Southwest (degrees)	FORSWA	29
Percent Overhanging Brush (percent)	OVERBRUSH	7
Buffer Width Right Bank (meters)	BUFWIDRM	4.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	6
Vegetation Height West Bank (meters)	VEGHTWM	6
Percent Vegetative Density East (percent)	VEGDENE	11
Percent Vegetative Density West (percent)	VEGDENW	1
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.254
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	5.198
Percent of Channel Composed of Pools (percent)	PERCENPL	35
Average Pool Depth (meters)	DEPTHPM	0.380
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	25
Streambed Composition Cobble (percent)	AVGCOBBLE	47
Streambed Composition Boulder (percent)	AVGBOULDER	28
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


GREENWATER RIVER
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

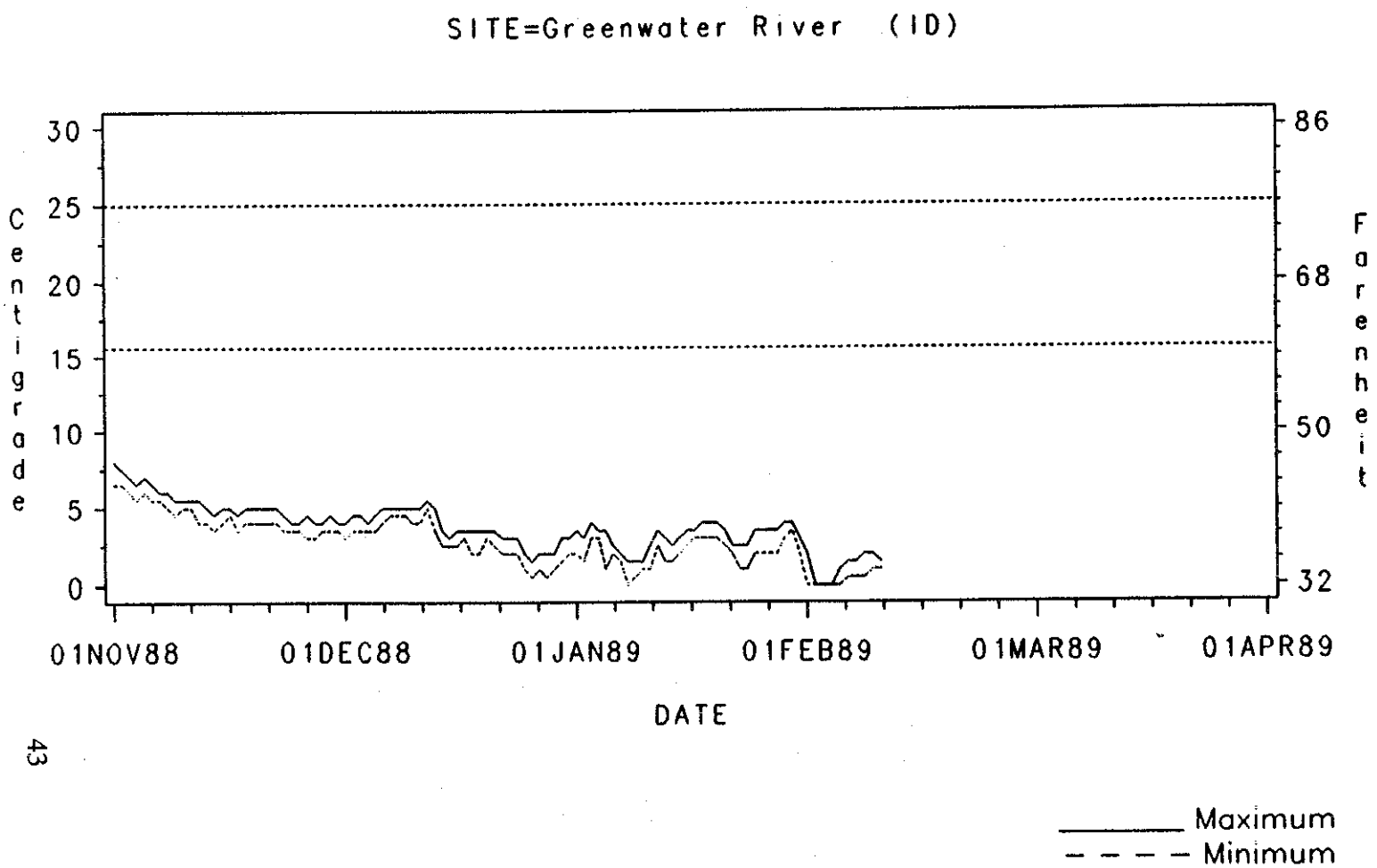
GREENWATER RIVER

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	11.2	11.8	16.5	14.0	6.0	10.5	10.5	3.5
02AUG	12.5	11.8	21.5	15.0	3.5	9.5	18.0	5.5
03AUG	14.9	12.4	25.5	16.0	5.0	10.0	20.5	6.0
04AUG	15.3	12.7	26.0	16.5	5.5	10.5	20.5	6.0
05AUG	12.0	12.1	18.5	15.0	4.5	10.5	14.0	4.5
06AUG	10.3	11.1	13.0	12.0	6.5	10.5	6.5	1.5
07AUG	12.6	12.0	18.5	15.5	6.5	10.5	12.0	5.0
08AUG	12.5	11.9	21.5	15.5	3.5	9.5	18.0	6.0
09AUG	13.6	12.5	20.5	16.0	5.5	10.0	15.0	6.0
10AUG	15.2	13.2	19.5	16.5	8.0	11.5	11.5	5.0
11AUG	12.9	12.9	18.5	16.5	5.0	10.5	13.5	6.0
12AUG	14.1	12.9	18.0	16.0	11.0	11.5	7.0	4.5
13AUG	13.7	12.5	17.5	14.5	11.5	11.5	6.0	3.0
14AUG	13.2	12.8	18.5	16.5	9.5	11.0	9.0	5.5
15AUG	11.2	11.8	13.5	13.0	9.5	11.5	4.0	1.5
16AUG	11.2	11.5	14.0	12.5	10.0	11.0	4.0	1.5
17AUG	10.6	11.4	13.5	12.5	9.0	10.5	4.5	2.0
18AUG	11.5	12.0	16.5	15.5	6.5	10.5	10.0	5.0
19AUG	11.1	11.3	17.5	14.0	4.0	9.5	13.5	4.5
20AUG	11.4	11.5	16.5	14.0	6.5	10.0	10.0	4.0
21AUG	12.0	11.7	20.5	15.5	3.0	9.5	17.5	6.0
22AUG	13.6	11.7	27.5	16.0	1.5	9.0	26.0	7.0
23AUG	17.7	12.6	31.0	17.0	6.5	10.0	24.5	7.0
24AUG	15.2	12.5	25.0	16.0	7.5	10.5	17.5	5.5
25AUG	13.4	12.6	18.5	16.0	7.5	10.5	11.0	5.5
26AUG	13.8	12.9	21.5	16.5	6.0	10.5	15.5	6.0
27AUG	15.1	12.9	28.0	17.0	5.5	10.5	22.5	6.5
28AUG	16.1	13.1	29.0	17.0	6.0	11.0	23.0	6.0
29AUG	12.5	12.2	17.5	14.0	6.5	11.0	11.0	3.0
30AUG	11.5	12.4	18.0	16.0	4.5	10.5	13.5	5.5
31AUG	11.1	11.9	22.5	16.0	1.5	9.5	21.0	6.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

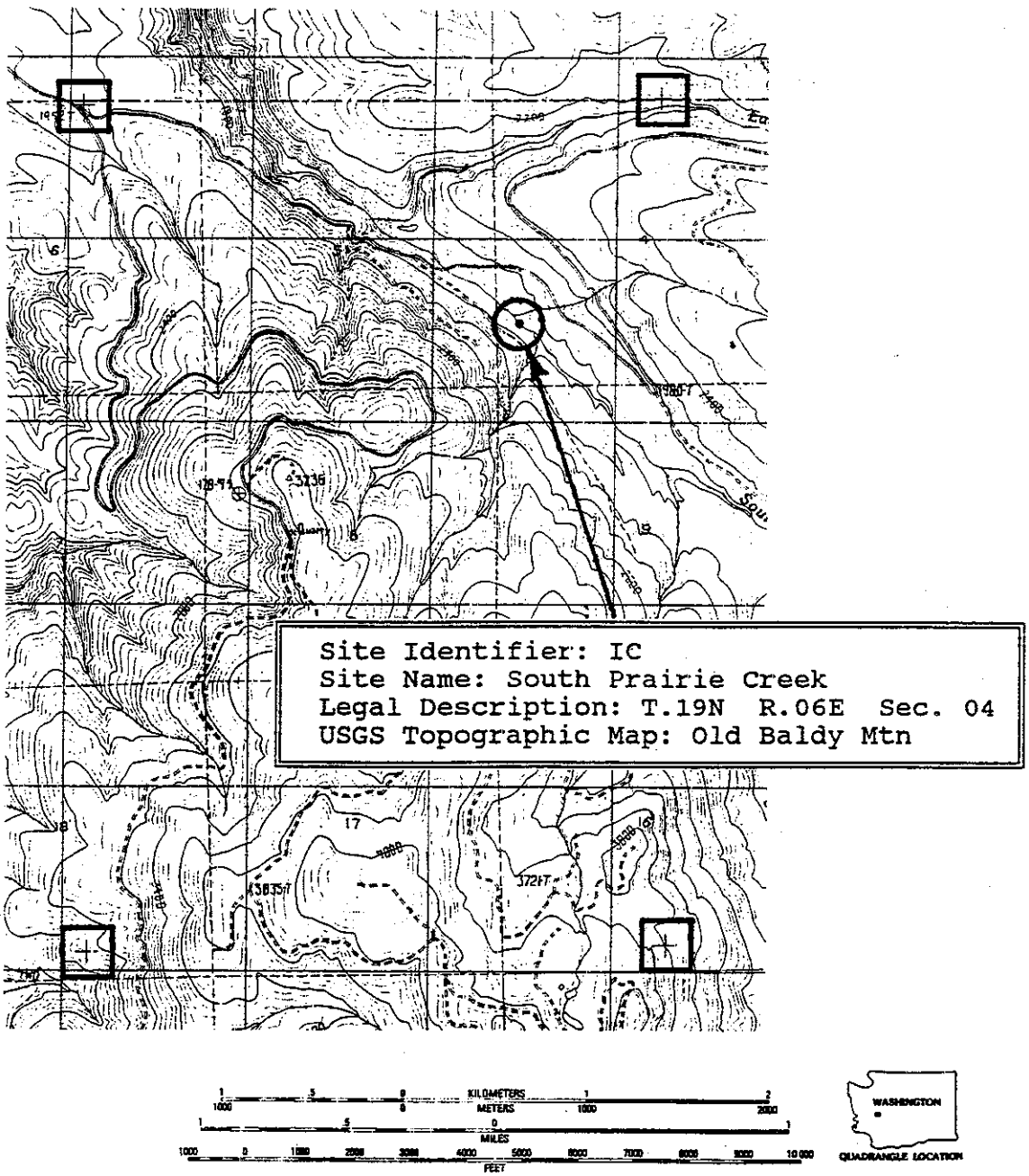
Greenwater River (ID)

Daily Temperatures in Degrees Celsius (C)

YEAR=1989 MONTH=JANUARY

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	0.7	2.9	1.5	3.5	0.5	2.0	1.0	1.5
02JAN	0.9	2.6	2.0	3.0	0.5	1.5	1.5	1.5
03JAN	2.5	3.3	5.5	4.0	1.0	3.0	4.5	1.0
04JAN	1.4	3.3	3.0	3.5	0.5	3.0	2.5	0.5
05JAN	0.3	2.6	1.0	3.5	-0.5	1.0	1.5	2.5
06JAN	-0.5	2.1	0.0	2.5	-1.5	2.0	1.5	0.5
07JAN	-2.1	1.8	-1.0	2.0	-4.0	1.5	3.0	0.5
08JAN	-0.6	1.0	1.0	1.5	-3.0	0.0	4.0	1.5
09JAN	1.0	1.1	1.0	1.5	1.0	0.5	0.0	1.0
10JAN	0.8	1.4	1.0	1.5	0.5	1.0	0.5	0.5
11JAN	1.1	1.9	1.5	2.5	1.0	1.0	0.5	1.5
12JAN	1.4	2.6	2.0	3.5	1.0	2.5	1.0	1.0
13JAN	0.9	2.1	1.5	3.0	0.0	1.5	1.5	1.5
14JAN	0.3	1.8	1.0	2.5	-0.5	1.5	1.5	1.0
15JAN	1.5	2.3	2.5	3.0	0.5	2.0	2.0	1.0
16JAN	2.7	2.8	4.0	3.5	1.5	2.5	2.5	1.0
17JAN	2.1	3.1	3.0	3.5	1.5	3.0	1.5	0.5
18JAN	2.5	3.5	4.0	4.0	1.5	3.0	2.5	1.0
19JAN	1.4	3.3	3.5	4.0	-0.5	3.0	4.0	1.0
20JAN	1.8	3.3	5.5	4.0	0.0	3.0	5.5	1.0
21JAN	0.8	3.1	1.5	3.5	-2.0	2.5	3.5	1.0
22JAN	-1.1	2.4	-0.5	2.5	-2.5	2.0	2.0	0.5
23JAN	-4.2	1.4	-0.5	2.5	-8.0	1.0	7.5	1.5
24JAN	-1.1	1.9	0.5	2.5	-3.0	1.0	3.5	1.5
25JAN	0.1	2.6	2.0	3.5	-2.5	2.0	4.5	1.5
26JAN	-0.6	2.4	3.0	3.5	-4.0	2.0	7.0	1.5
27JAN	1.2	2.7	2.5	3.5	0.0	2.0	2.5	1.5
28JAN	0.5	2.7	3.5	3.5	-1.5	2.0	5.0	1.5
29JAN	3.1	3.4	7.5	4.0	1.0	3.0	6.5	1.0
30JAN	3.9	3.7	7.0	4.0	1.5	3.5	5.5	0.5
31JAN	-1.6	2.4	1.0	3.0	-2.5	2.0	3.5	1.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP

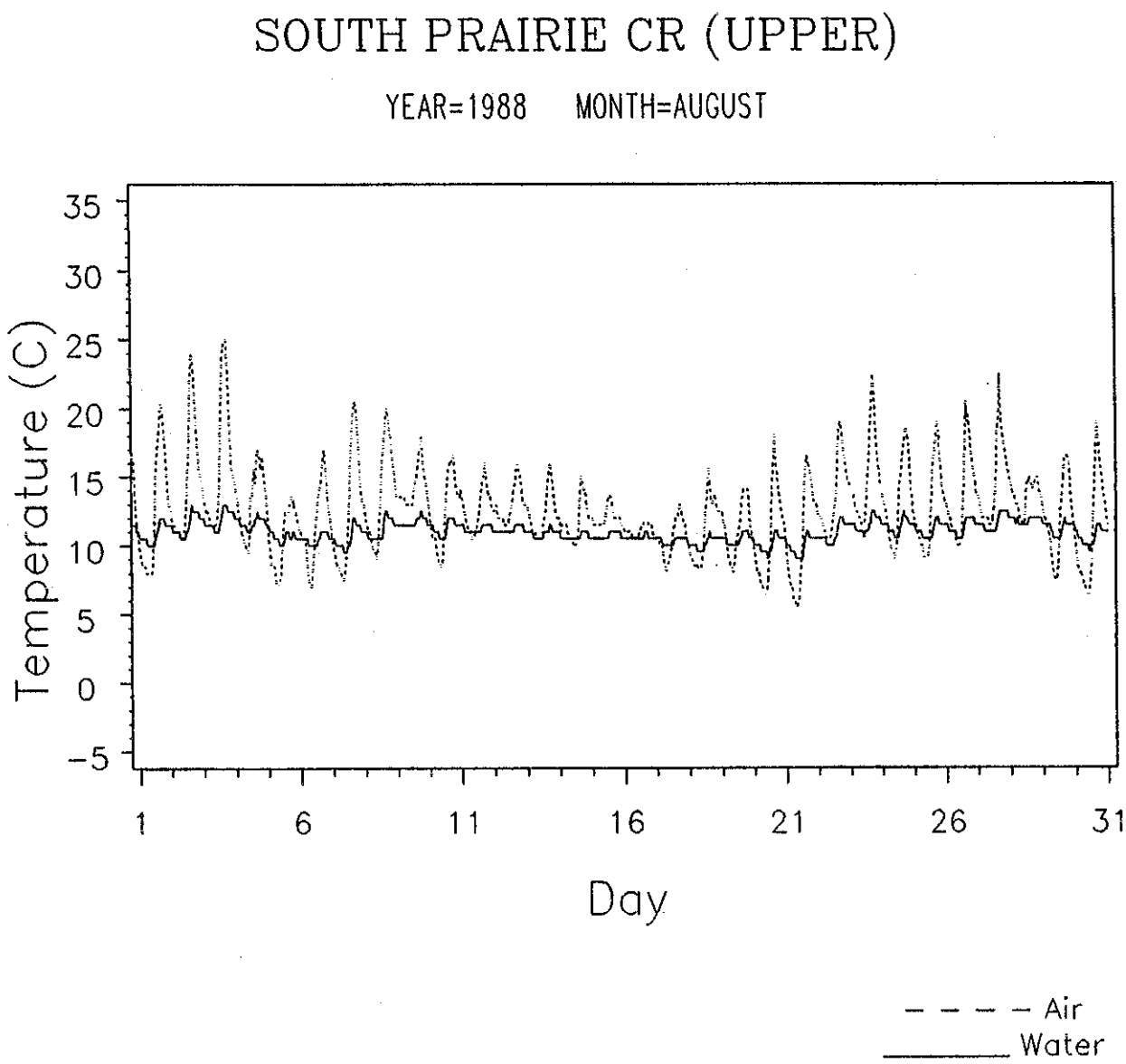


TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

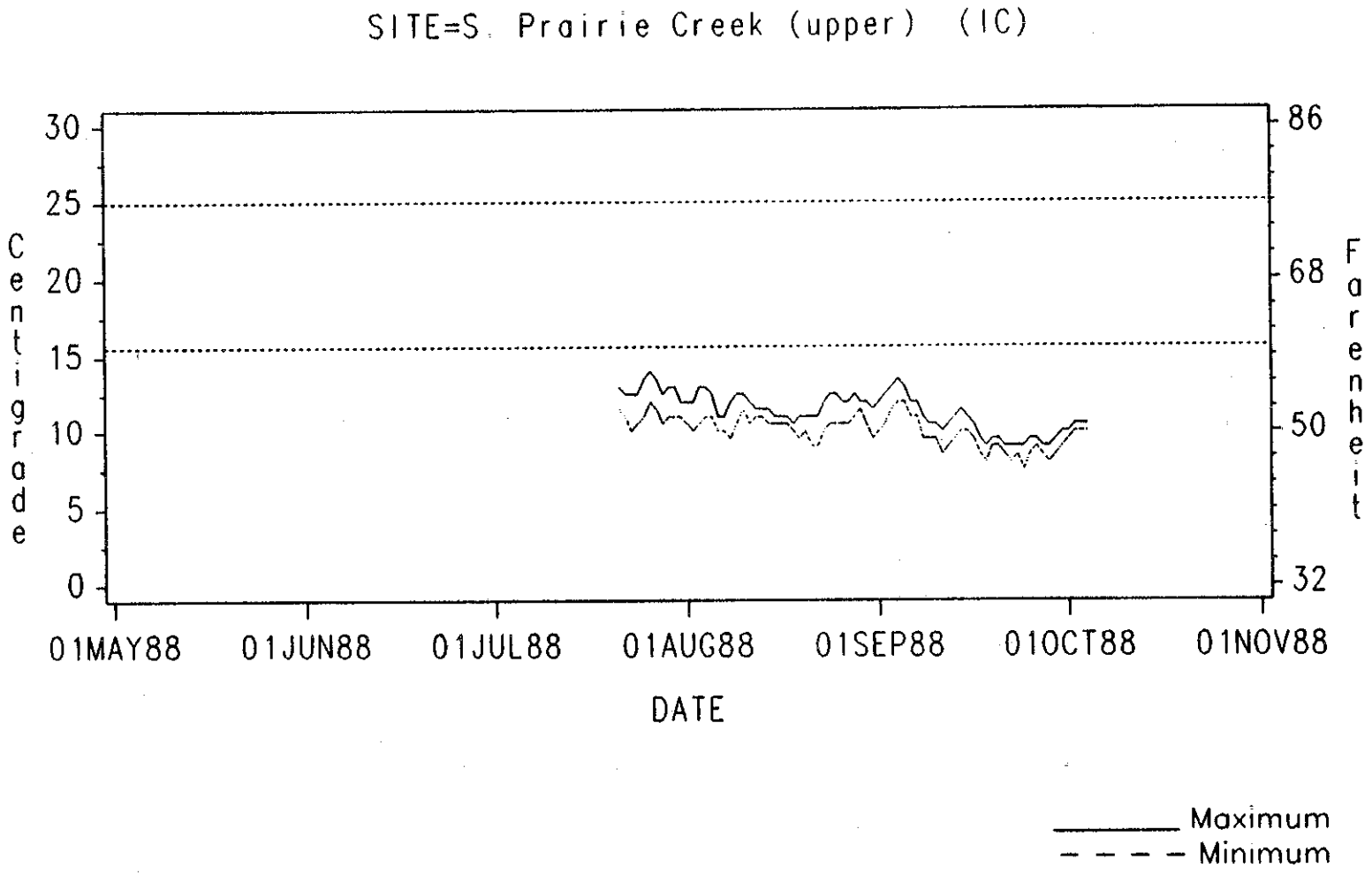
THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	IC
Stream Name	SITENAMES	South Prairie Creek
Cooperator	COOPERATOR	Puyallup Tribe
Cooperator/contact	COOPCONTACT	Mark Heckert
Date of Site Visit	VISIT	09-07-88
County	COUNTY	Pierce
Nearest town	NEARESTTOWN	Wilkeson
Township	TOWNSHIP	19E
Range	RANGE	06E
Section	SECTION	04
Site is Tributary To:	TRIBUTARYTO	Carbon River
Water Resource Inventory Area	WRIA	10
WDF River Segment Identifier	WDFNUMBER	0429
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	Central Cascades
Latitude Decimal Degrees (degrees)	LATDEC	47.072560
Longitude Decimal Degrees (degrees)	LONGDEC	121.927000
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Miocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	527
Elevation Top of Thermal Reach (meters)	ELEVUSM	544
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.8
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	314
Drainage Area Above Thermograph (hectares)	AREAHECT	2926
Distance to Divide (meters)	DIVIDEMT	7693
Total Length of Perennial Streams (meters)	LENGTHMT	22569
Streamflow at Thermograph (cubic meters/second)	QDSM	0.205
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.205
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.000
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.009
Travel Time (meters/second)	TRAVELM	0.235
Average View To Sky (percent open) (percent)	VIEW1	43
Topographic Angle South (degrees)	TOPOSA	30
Topographic Angle Southeast (degrees)	TOPOSEA	29
Topographic Angle Southwest (degrees)	TOPOSWA	25
Average Forest Angle South (degrees)	FORSA	70
Average Forest Angle Southeast (degrees)	FORSEA	48
Average Forest Angle Southwest (degrees)	FORSWA	65
Percent Overhanging Brush (percent)	OVERBRUSH	46
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	22
Vegetation Height West Bank (meters)	VEGHTWM	28
Percent Vegetative Density East (percent)	VEGDENE	78
Percent Vegetative Density West (percent)	VEGDENW	79
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.263
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	4.328
Percent of Channel Composed of Pools (percent)	PERCENPL	45
Average Pool Depth (meters)	DEPTHPM	0.280
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	8
Streambed Composition Cobble (percent)	AVGCOBBLE	28
Streambed Composition Boulder (percent)	AVGBOULDER	63
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description


SOUTH PRAIRIE CR (UPPER)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

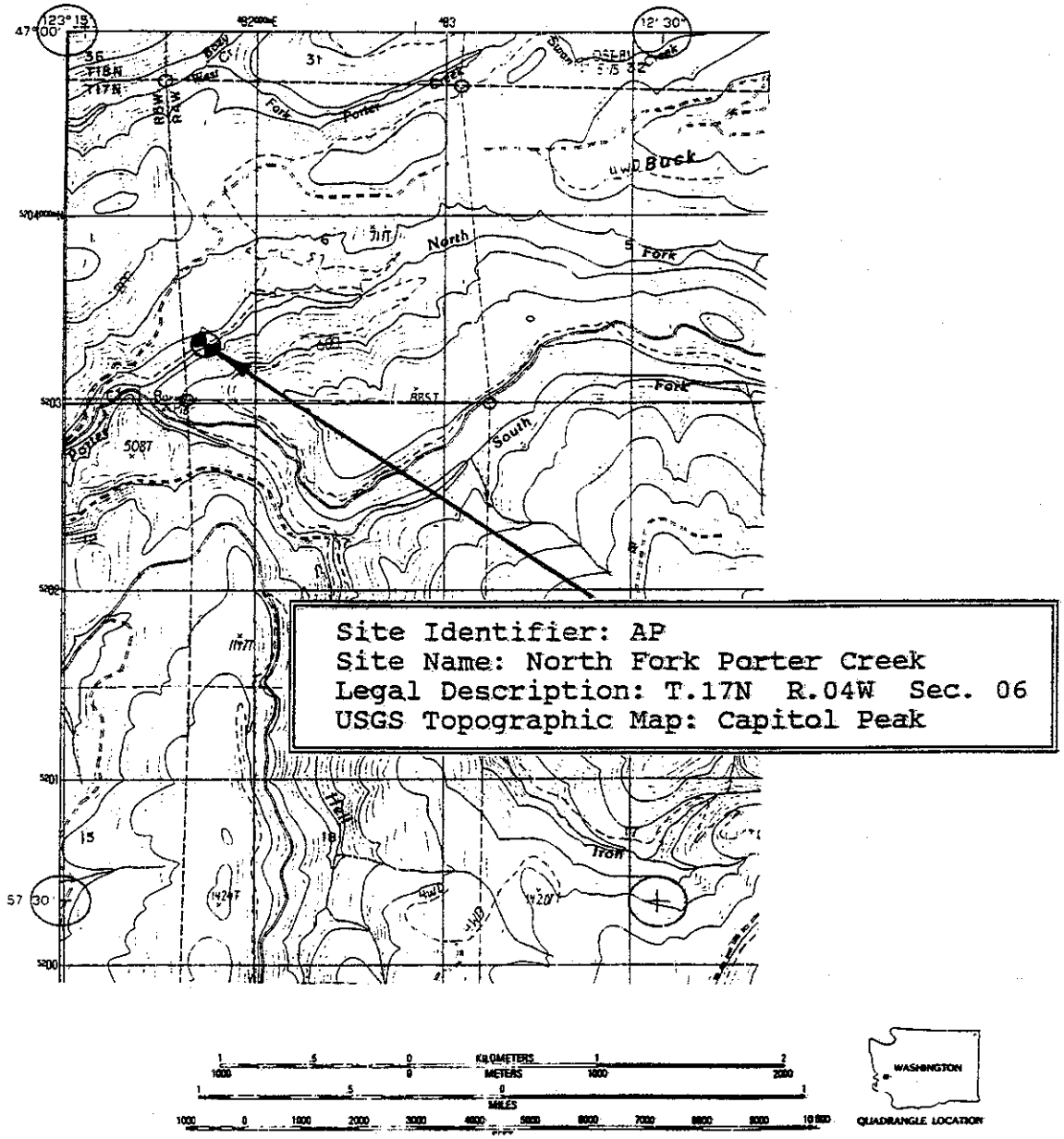
SOUTH PRAIRIE CR.--UPPER SITE

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	12.1	11.0	17.0	12.0	9.0	10.5	8.0	1.5
02AUG	12.8	10.9	20.5	12.0	8.0	10.0	12.5	2.0
03AUG	14.9	11.6	24.0	13.0	10.5	10.5	13.5	2.5
04AUG	16.1	11.9	25.0	13.0	11.5	11.0	13.5	2.0
05AUG	13.0	11.6	17.0	12.5	9.5	11.0	7.5	1.5
06AUG	10.6	10.6	13.5	11.0	7.0	10.0	6.5	1.0
07AUG	11.5	10.5	17.0	11.0	7.0	10.0	10.0	1.0
08AUG	12.7	10.6	20.5	12.0	7.5	9.5	13.0	2.5
09AUG	13.9	11.2	20.0	12.5	9.0	10.5	11.0	2.0
10AUG	14.2	11.7	18.0	12.5	11.0	11.5	7.0	1.0
11AUG	12.6	11.3	16.5	12.0	8.5	10.5	8.0	1.5
12AUG	12.6	11.2	16.0	11.5	10.5	11.0	5.5	0.5
13AUG	13.1	11.1	16.0	11.5	11.5	11.0	4.5	0.5
14AUG	12.3	10.9	16.0	11.5	10.5	10.5	5.5	1.0
15AUG	11.8	10.6	15.0	11.0	10.0	10.5	5.0	0.5
16AUG	12.0	10.7	13.5	11.0	11.0	10.5	2.5	0.5
17AUG	11.1	10.6	12.0	11.0	10.5	10.5	1.5	0.5
18AUG	10.5	10.3	13.0	10.5	8.0	10.0	5.0	0.5
19AUG	11.3	10.2	15.5	11.0	8.0	9.5	7.5	1.5
20AUG	10.9	10.4	14.0	11.0	8.0	10.0	6.0	1.0
21AUG	10.6	10.1	18.0	11.0	6.5	9.0	11.5	2.0
22AUG	10.7	9.9	16.5	11.0	5.5	9.0	11.0	2.0
23AUG	13.7	10.9	19.0	12.0	10.5	10.0	8.5	2.0
24AUG	14.9	11.5	22.5	12.5	11.5	10.5	11.0	2.0
25AUG	13.2	11.3	18.5	12.5	9.0	10.5	9.5	2.0
26AUG	12.9	11.1	19.0	12.0	9.0	10.5	10.0	1.5
27AUG	13.6	11.3	20.5	12.0	10.0	10.5	10.5	1.5
28AUG	14.7	11.7	22.5	12.5	11.5	11.0	11.0	1.5
29AUG	13.4	11.8	15.0	12.0	11.5	11.5	3.5	0.5
30AUG	11.8	11.2	16.5	12.0	7.5	10.5	9.0	1.5
31AUG	11.2	10.6	19.0	11.5	6.5	9.5	12.5	2.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



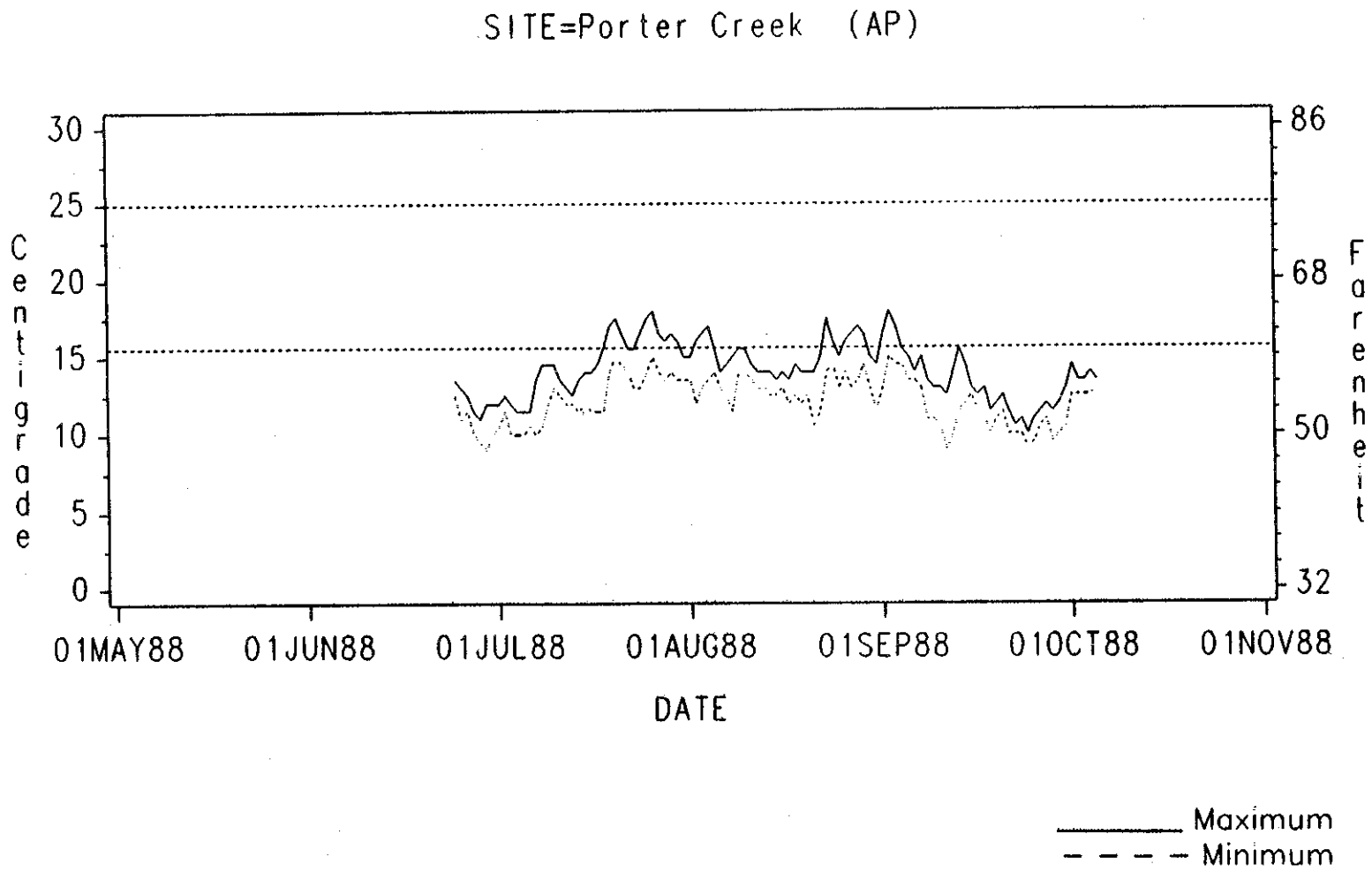
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

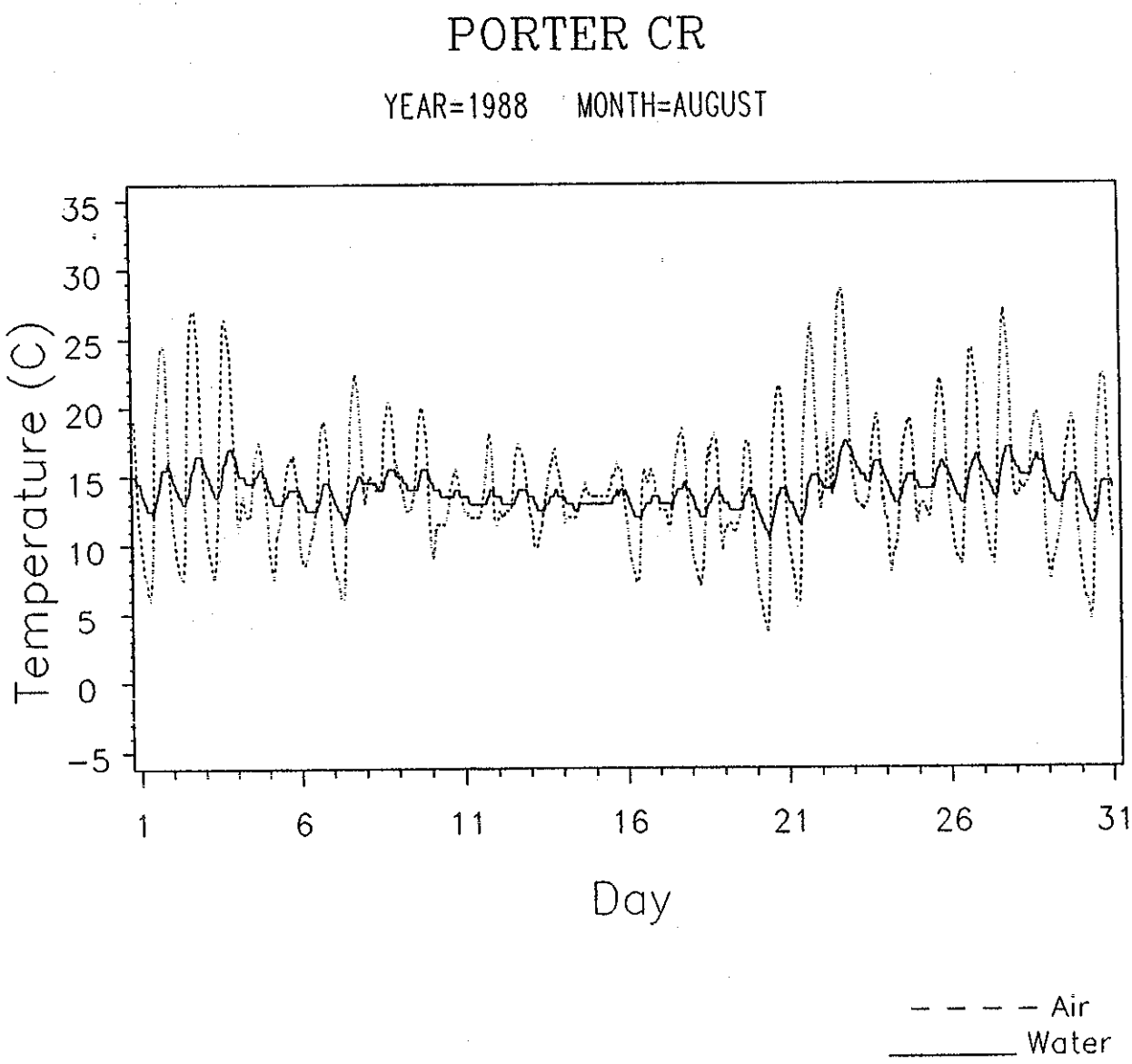
Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	AP
Stream Name	SITENAME$	North Fork Porter Cr
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-21-88
County	COUNTY	Grays Harbor
Nearest town	NEARESTTOWN	Porter
Township	TOWNSHIP	17N
Range	RANGE	04W
Section	SECTION	06
Site is Tributary To:	TRIBUTARYTO	Chehalis River
Water Resource Inventory Area	WRIA	22
WDF River Segment Identifier	WDFNUMBER	0543
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.984880
Longitude Decimal Degrees (degrees)	LONGDEC	123.239700
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	basalt
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	109
Elevation Top of Thermal Reach (meters)	ELEVUSM	118
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.5
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.9
Channel Azimuth (degrees)	AZIMUTH1	242
Drainage Area Above Thermograph (hectares)	AREAHECT	2493
Distance to Divide (meters)	DIVIDEMT	13182
Total Length of Perennial Streams (meters)	LENGTHMT	19276
Streamflow at Thermograph (cubic meters/second)	QDSM	0.133
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.140
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.007
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.007
Travel Time (meters/second)	TRAVELM	0.079
Average View To Sky (percent open) (percent)	VIEW1	12
Topographic Angle South (degrees)	TOPOSA	20
Topographic Angle Southeast (degrees)	TOPOSEA	19
Topographic Angle Southwest (degrees)	TOPOSWA	19
Average Forest Angle South (degrees)	FORSA	90
Average Forest Angle Southeast (degrees)	FORSEA	90
Average Forest Angle Southwest (degrees)	FORSWA	90
Percent Overhanging Brush (percent)	OVERBRUSH	87
Buffer Width Right Bank (meters)	BUFWIDRM	21.3
Buffer Width Left Bank (meters)	BUFWIDLM	18.3
Vegetation Height East Bank (meters)	VEGHTEM	19
Vegetation Height West Bank (meters)	VEGHTWM	18
Percent Vegetative Density East (percent)	VEGDENE	87
Percent Vegetative Density West (percent)	VEGDENW	91
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.233
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	3.453
Percent of Channel Composed of Pools (percent)	PERCENPL	39
Average Pool Depth (meters)	DEPTHPM	0.300
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	33
Streambed Composition Cobble (percent)	AVGCOBBLE	28
Streambed Composition Boulder (percent)	AVGBOULDER	38
Streambed Composition Bedrock (percent)	AVGBEDROCK	5
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


PORTER CR
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

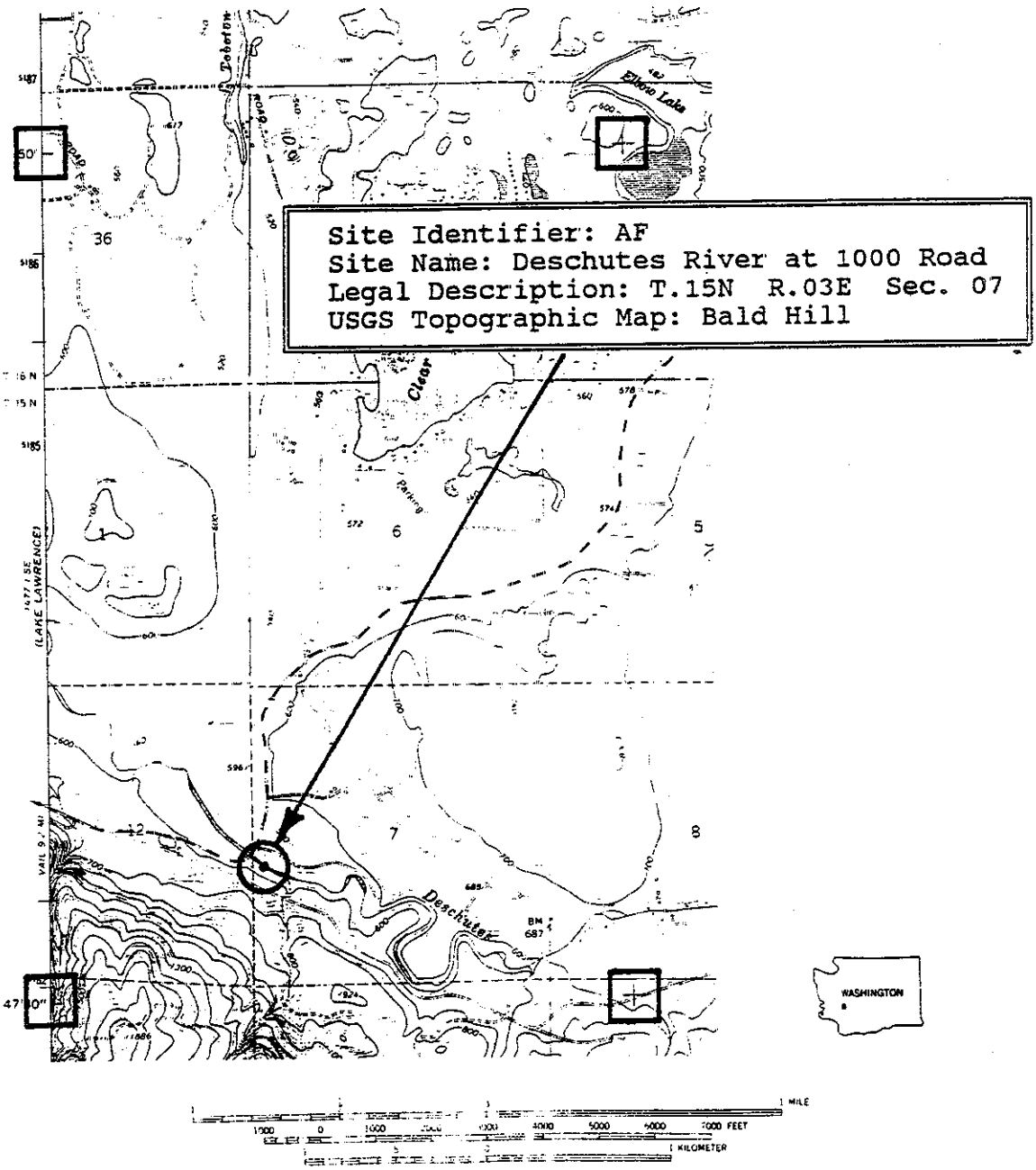
PORTER CR.

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	14.4	14.1	19.0	15.0	9.5	13.5	9.5	1.5
02AUG	15.0	14.0	24.5	16.0	6.0	12.0	18.5	4.0
03AUG	16.7	14.8	27.0	16.5	7.5	13.0	19.5	3.5
04AUG	16.4	15.3	26.5	17.0	7.5	13.5	19.0	3.5
05AUG	13.9	14.8	17.5	15.5	9.0	14.0	8.5	1.5
06AUG	12.6	13.5	16.5	14.0	7.5	13.0	9.0	1.0
07AUG	13.0	13.3	19.0	14.5	8.5	12.5	10.5	2.0
08AUG	13.9	13.4	22.5	15.0	6.0	11.5	16.5	3.5
09AUG	16.3	14.7	20.5	15.5	13.5	14.0	7.0	1.5
10AUG	14.9	14.7	20.0	15.5	9.0	14.0	11.0	1.5
11AUG	12.7	13.7	15.5	14.5	9.0	13.5	6.5	1.0
12AUG	13.4	13.3	18.0	14.0	11.5	13.0	6.5	1.0
13AUG	14.1	13.4	17.5	14.0	12.0	13.0	5.5	1.0
14AUG	13.4	13.2	17.0	14.0	9.5	12.5	7.5	1.5
15AUG	12.9	12.9	14.5	13.5	11.5	12.5	3.0	1.0
16AUG	14.0	13.3	16.0	14.0	10.5	13.0	5.5	1.0
17AUG	12.0	12.8	15.5	13.5	7.0	12.0	8.5	1.5
18AUG	14.2	13.5	18.5	14.5	9.5	12.5	9.0	2.0
19AUG	12.4	13.0	18.0	14.0	7.0	12.0	11.0	2.0
20AUG	12.8	13.0	17.5	14.0	7.5	12.5	10.0	1.5
21AUG	12.4	12.5	21.5	14.0	3.5	10.5	18.0	3.5
22AUG	15.3	13.5	26.0	15.0	5.5	11.5	20.5	3.5
23AUG	20.1	15.5	28.5	17.5	13.5	14.0	15.0	3.5
24AUG	14.8	15.3	19.5	16.0	12.0	14.5	7.5	1.5
25AUG	13.7	14.1	19.0	15.0	8.0	13.0	11.0	2.0
26AUG	15.8	14.7	22.0	16.0	11.5	14.0	10.5	2.0
27AUG	15.6	14.7	24.5	16.5	8.5	13.0	16.0	3.5
28AUG	16.6	15.2	27.0	17.0	8.5	13.5	18.5	3.5
29AUG	15.3	15.4	19.5	16.5	8.0	14.5	11.5	2.0
30AUG	13.1	14.0	19.5	15.0	7.5	13.0	12.0	2.0
31AUG	12.9	13.2	22.5	14.5	4.5	11.5	18.0	3.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



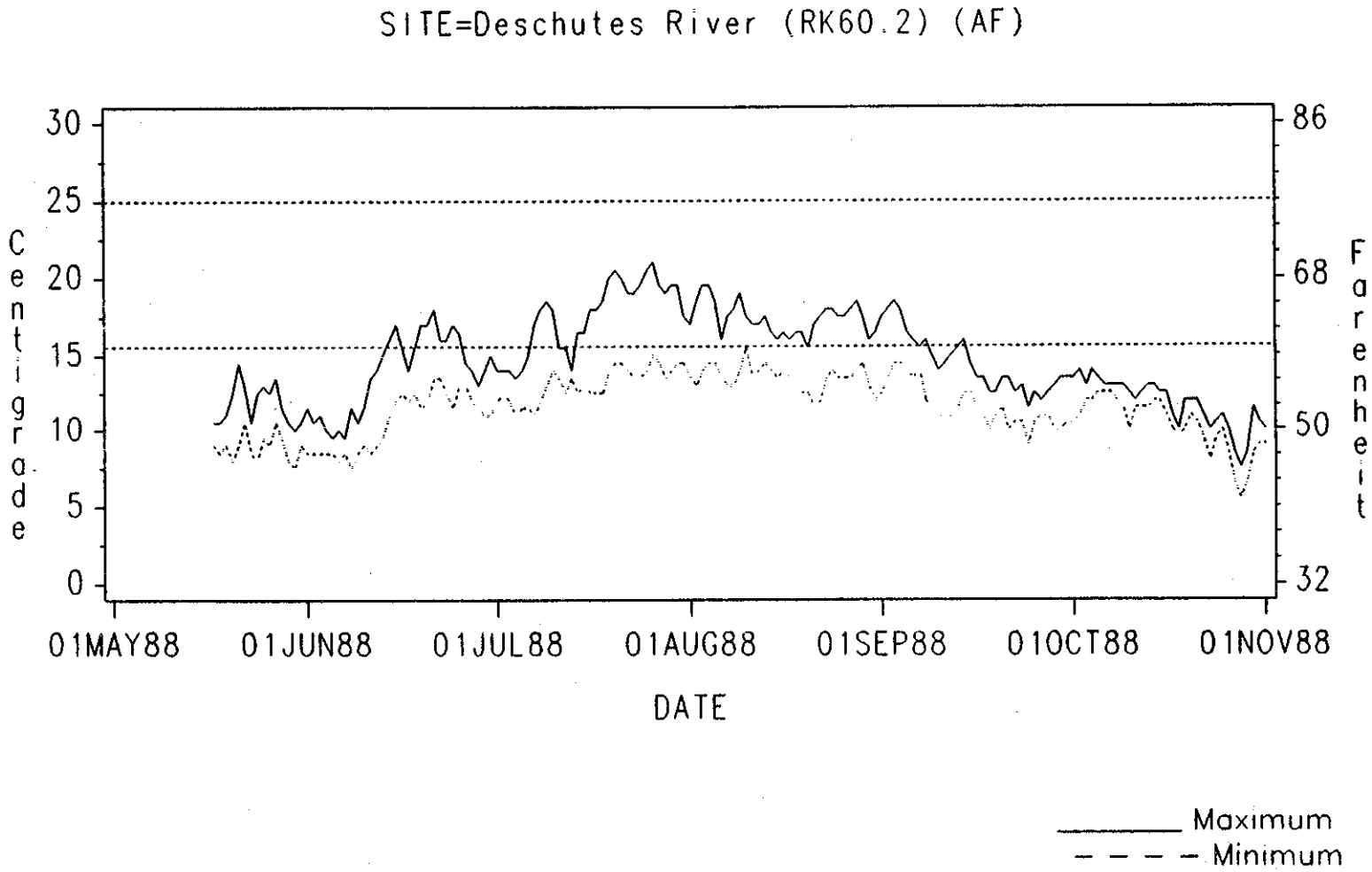
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

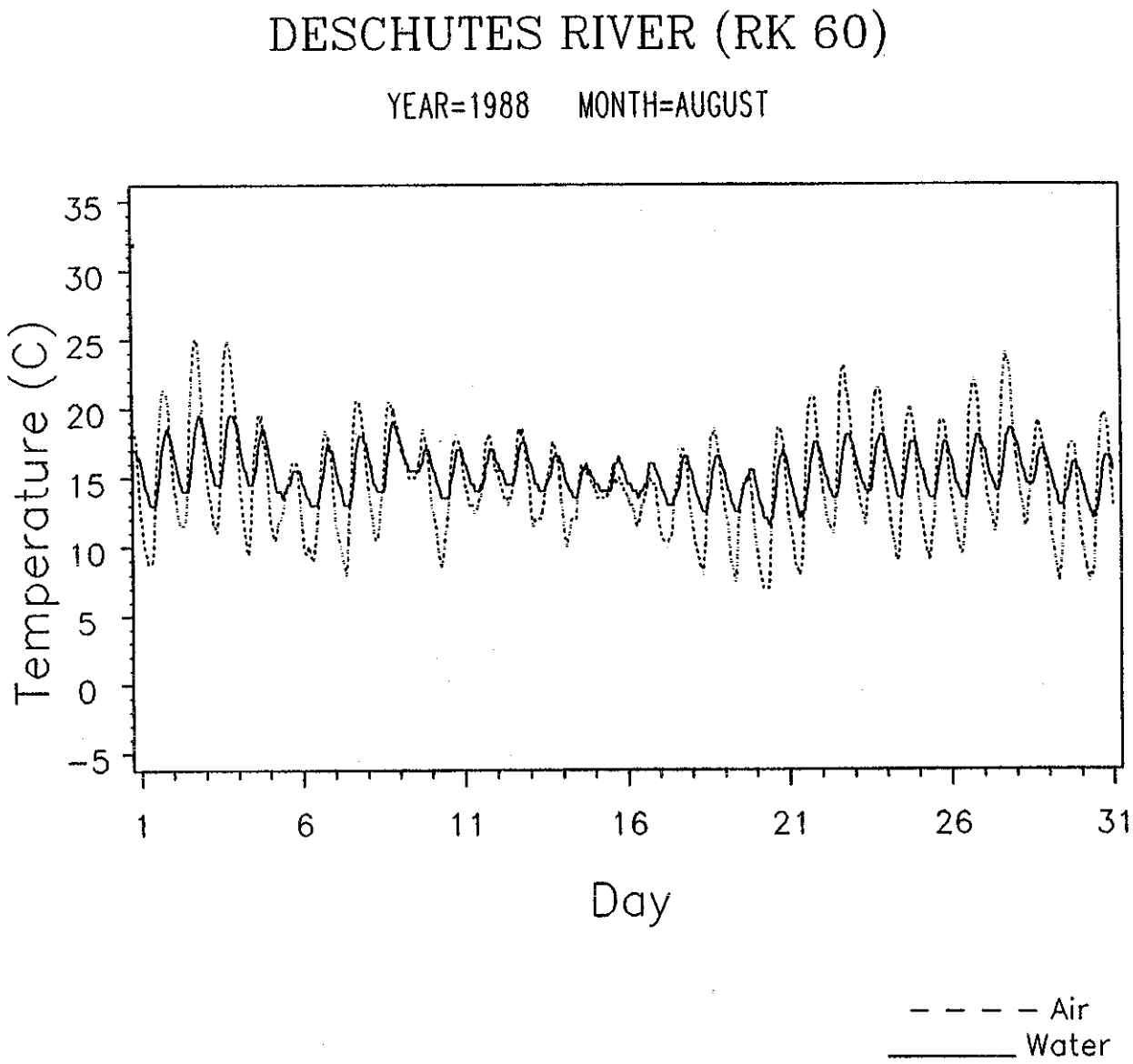
Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	AF
Stream Name	SITENAME$	Deschutes @ 1000 Road
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-19-88
County	COUNTY	Thurston
Nearest town	NEAREST TOWN	Rainier
Township	TOWNSHIP	15N
Range	RANGE	03E
Section	SECTION	07
Site is Tributary To:	TRIBUTARYTO	Puget Sound
Water Resource Inventory Area	WRIA	13
WDF River Segment Identifier	WDFNUMBER	0028
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.797990
Longitude Decimal Degrees (degrees)	LONGDEC	122.485400
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	168
Elevation Top of Thermal Reach (meters)	ELEVUSM	171
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.5
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.2
Channel Azimuth (degrees)	AZIMUTH1	271
Drainage Area Above Thermograph (hectares)	AREAHECT	14477
Distance to Divide (meters)	DIVIDEMT	26488
Total Length of Perennial Streams (meters)	LENGTHMT	109439
Streamflow at Thermograph (cubic meters/second)	QDSM	1.143
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	1.035
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.065
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.010
Travel Time (meters/second)	TRAVELM	0.329
Average View To Sky (percent open) (percent)	VIEW1	67
Topographic Angle South (degrees)	TOPOSA	23
Topographic Angle Southeast (degrees)	TOPOSEA	19
Topographic Angle Southwest (degrees)	TOPOSWA	25
Average Forest Angle South (degrees)	FORSA	50
Average Forest Angle Southeast (degrees)	FORSEA	37
Average Forest Angle Southwest (degrees)	FORSWA	52
Percent Overhanging Brush (percent)	OVERBRUSH	7
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	15
Vegetation Height West Bank (meters)	VEGHTWM	18
Percent Vegetative Density East (percent)	VEGDENE	31
Percent Vegetative Density West (percent)	VEGDENW	38
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.290
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	12.574
Percent of Channel Composed of Pools (percent)	PERCENPL	0
Average Pool Depth (meters)	DEPTHPM	0.000
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	23
Streambed Composition Cobble (percent)	AVGCOBBLE	40
Streambed Composition Boulder (percent)	AVGBOULDER	38
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


DESCHUTES RIVER (RK 60)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

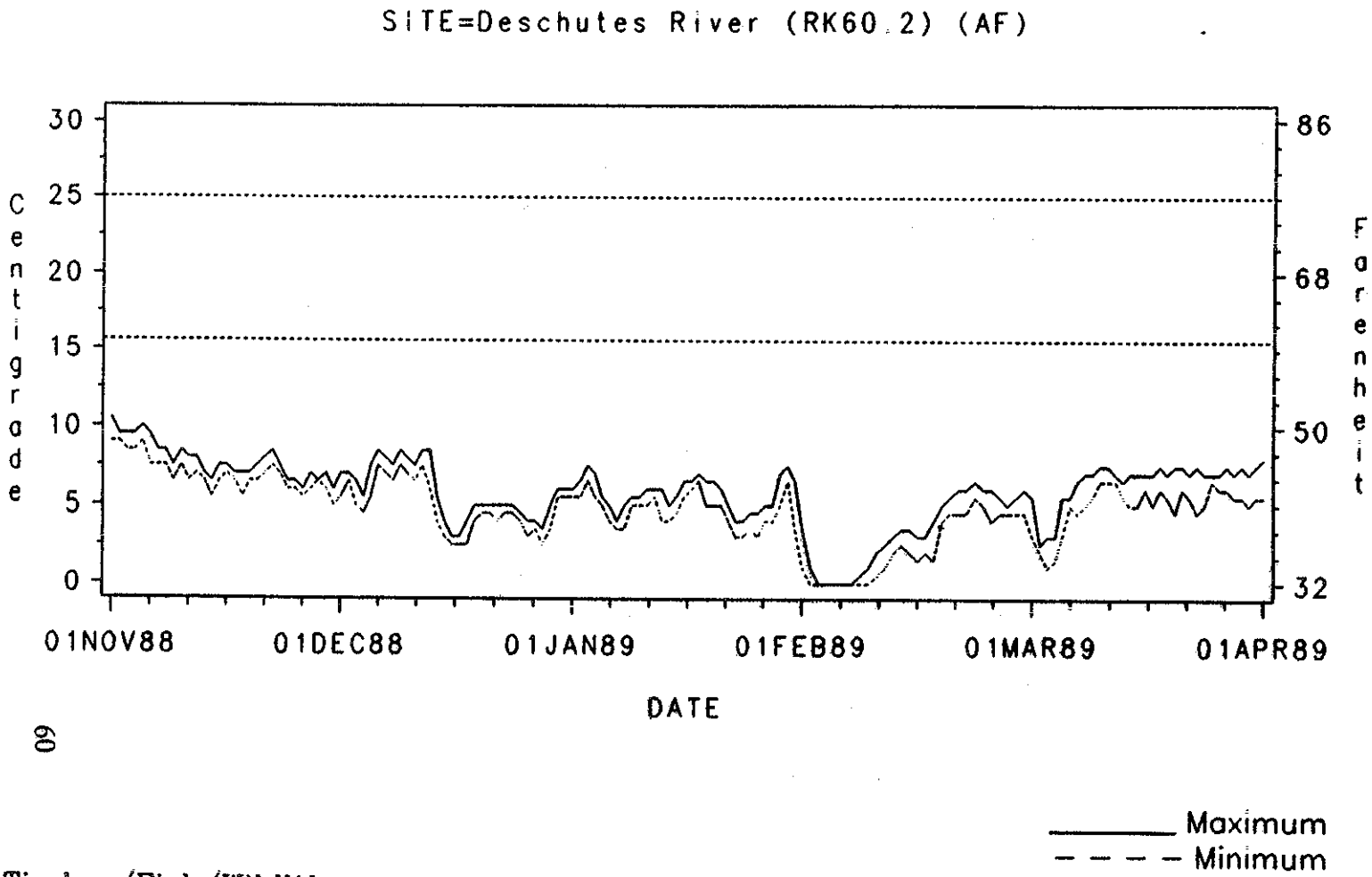
DESCHUTES RIVER AT WEYCO 1000 RD

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	14.0	15.1	18.5	17.0	10.0	13.5	8.5	3.5
02AUG	14.9	15.5	21.5	18.5	8.5	13.0	13.0	5.5
03AUG	17.4	16.5	25.0	19.5	11.5	14.0	13.5	5.5
04AUG	17.8	16.9	25.0	19.5	11.0	14.5	14.0	5.0
05AUG	14.7	16.4	19.5	18.5	9.5	14.5	10.0	4.0
06AUG	13.3	14.7	16.0	16.0	10.0	13.5	6.0	2.5
07AUG	13.3	14.8	18.5	17.5	9.0	13.0	9.5	4.5
08AUG	14.6	15.4	20.5	18.0	8.0	13.0	12.5	5.0
09AUG	15.8	16.1	20.5	19.0	10.5	14.0	10.0	5.0
10AUG	15.9	16.1	18.5	17.5	12.5	15.5	6.0	2.0
11AUG	13.6	15.1	18.0	17.0	8.5	13.5	9.5	3.5
12AUG	14.9	15.4	18.0	17.0	12.5	14.0	5.5	3.0
13AUG	15.4	15.8	18.5	17.5	12.5	14.5	6.0	3.0
14AUG	14.1	15.2	17.5	16.5	11.5	14.0	6.0	2.5
15AUG	13.5	14.7	16.0	16.0	10.0	13.5	6.0	2.5
16AUG	14.2	14.9	16.0	16.5	13.5	14.0	2.5	2.5
17AUG	13.2	14.7	15.5	16.0	11.0	13.5	4.5	2.5
18AUG	13.2	14.5	17.0	16.5	10.0	13.0	7.0	3.5
19AUG	13.3	14.4	18.5	16.5	8.0	12.5	10.5	4.0
20AUG	11.8	14.1	15.0	15.5	7.5	12.5	7.5	3.0
21AUG	12.5	14.0	18.5	17.0	7.0	11.5	11.5	5.5
22AUG	14.4	14.7	21.0	17.5	8.0	12.0	13.0	5.5
23AUG	16.5	15.7	23.0	18.0	11.0	13.5	12.0	4.5
24AUG	16.3	15.9	21.5	18.0	11.5	14.0	10.0	4.0
25AUG	14.6	15.6	20.0	17.5	9.0	13.5	11.0	4.0
26AUG	14.0	15.3	19.0	17.5	9.0	13.5	10.0	4.0
27AUG	15.6	15.6	22.0	18.0	9.5	13.5	12.5	4.5
28AUG	17.1	16.2	24.0	18.5	11.0	14.0	13.0	4.5
29AUG	15.3	15.8	19.0	17.5	11.5	14.5	7.5	3.0
30AUG	12.8	14.6	17.5	16.0	7.5	13.0	10.0	3.0
31AUG	13.4	14.4	19.5	16.5	7.5	12.0	12.0	4.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

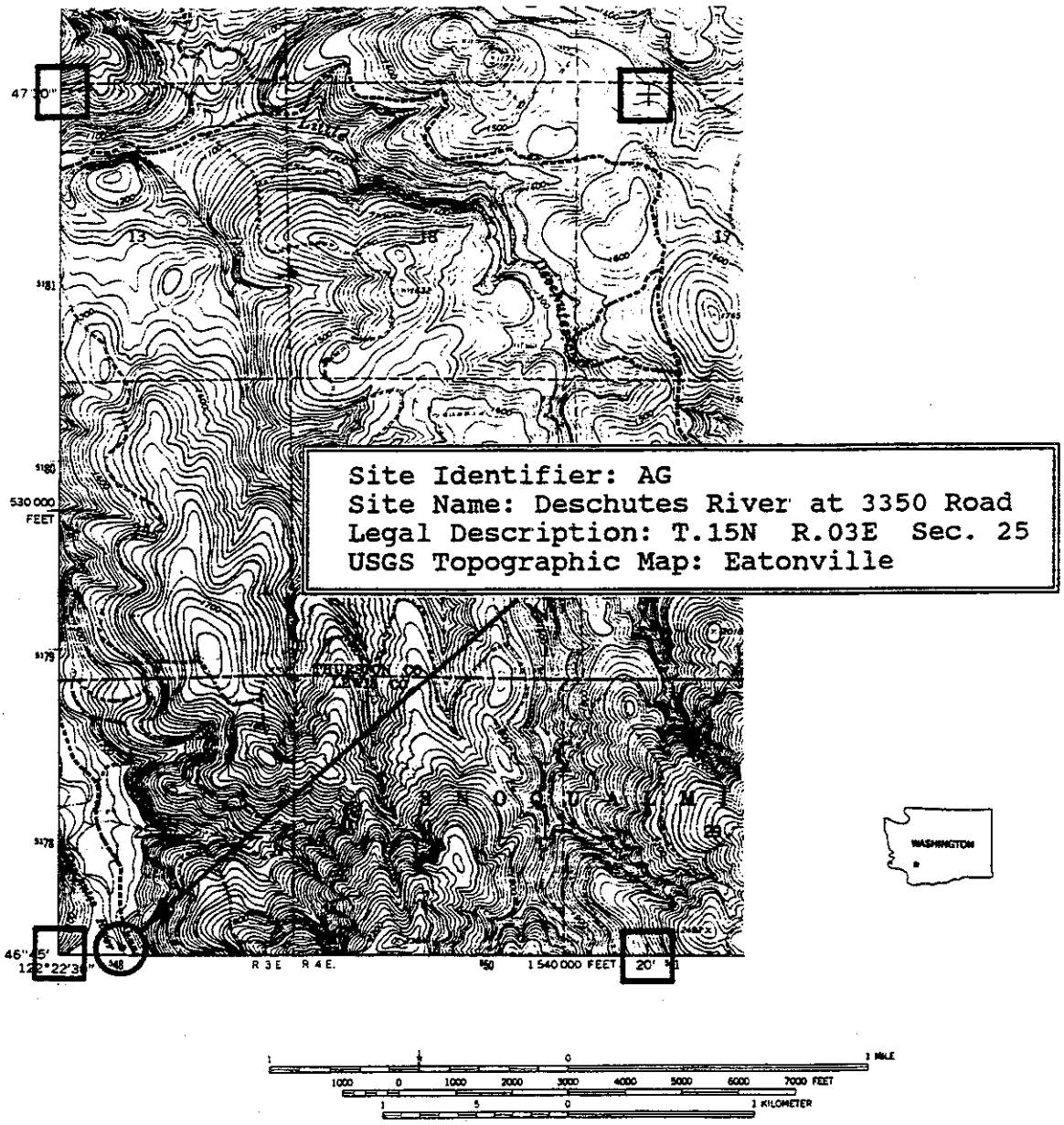
Deschutes River (RK60.2) (AF)

Daily Temperatures in Degrees Celsius (C)

YEAR=1989 MONTH=JANUARY

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	3.5	5.7	5.0	6.0	1.0	5.5	4.0	0.5
02JAN	5.8	6.1	7.0	6.5	4.0	5.5	3.0	1.0
03JAN	9.0	7.0	10.5	7.5	7.0	6.5	3.5	1.0
04JAN	4.7	6.4	7.0	7.0	3.0	5.5	4.0	1.5
05JAN	2.3	5.4	3.5	5.5	0.5	5.0	3.0	0.5
06JAN	0.9	4.7	2.5	5.0	-0.5	4.0	3.0	1.0
07JAN	-0.8	3.8	-0.5	4.0	-2.0	3.5	1.5	0.5
08JAN	2.6	4.0	6.0	5.0	-0.5	3.5	6.5	1.5
09JAN	4.8	5.2	6.5	5.5	3.5	5.0	3.0	0.5
10JAN	3.2	5.1	4.5	5.5	1.5	5.0	3.0	0.5
11JAN	4.5	5.3	6.5	6.0	2.0	5.0	4.5	1.0
12JAN	5.4	5.7	7.5	6.0	4.0	5.5	3.5	0.5
13JAN	2.3	5.0	4.5	6.0	0.0	4.0	4.5	2.0
14JAN	1.5	4.3	3.5	5.0	0.0	4.0	3.5	1.0
15JAN	4.7	5.0	5.5	5.5	3.5	4.5	2.0	1.0
16JAN	6.5	6.0	7.5	6.5	5.5	5.5	2.0	1.0
17JAN	5.7	6.3	7.0	6.5	4.5	6.0	2.5	0.5
18JAN	7.2	6.7	8.5	7.0	5.0	6.5	3.5	0.5
19JAN	2.1	5.7	5.0	6.5	0.0	5.0	5.0	1.5
20JAN	3.0	5.6	6.0	6.5	0.0	5.0	6.0	1.5
21JAN	3.5	5.9	5.0	6.0	1.0	5.0	4.0	1.0
22JAN	0.4	4.6	2.0	5.0	-1.5	4.0	3.5	1.0
23JAN	-1.7	3.3	0.0	4.0	-3.0	3.0	3.0	1.0
24JAN	-0.1	3.5	2.5	4.0	-2.0	3.0	4.5	1.0
25JAN	0.6	4.0	3.0	4.5	-0.5	3.5	3.5	1.0
26JAN	1.0	3.6	5.5	4.5	-2.0	3.0	7.5	1.5
27JAN	2.9	4.4	5.5	5.0	0.5	4.0	5.0	1.0
28JAN	2.9	4.5	6.0	5.0	-0.5	4.0	6.5	1.0
29JAN	7.4	5.9	11.5	7.0	4.0	5.0	7.5	2.0
30JAN	8.4	7.1	10.0	7.5	4.5	6.5	5.5	1.0
31JAN	0.6	4.7	3.5	6.5	-0.5	3.5	4.0	3.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



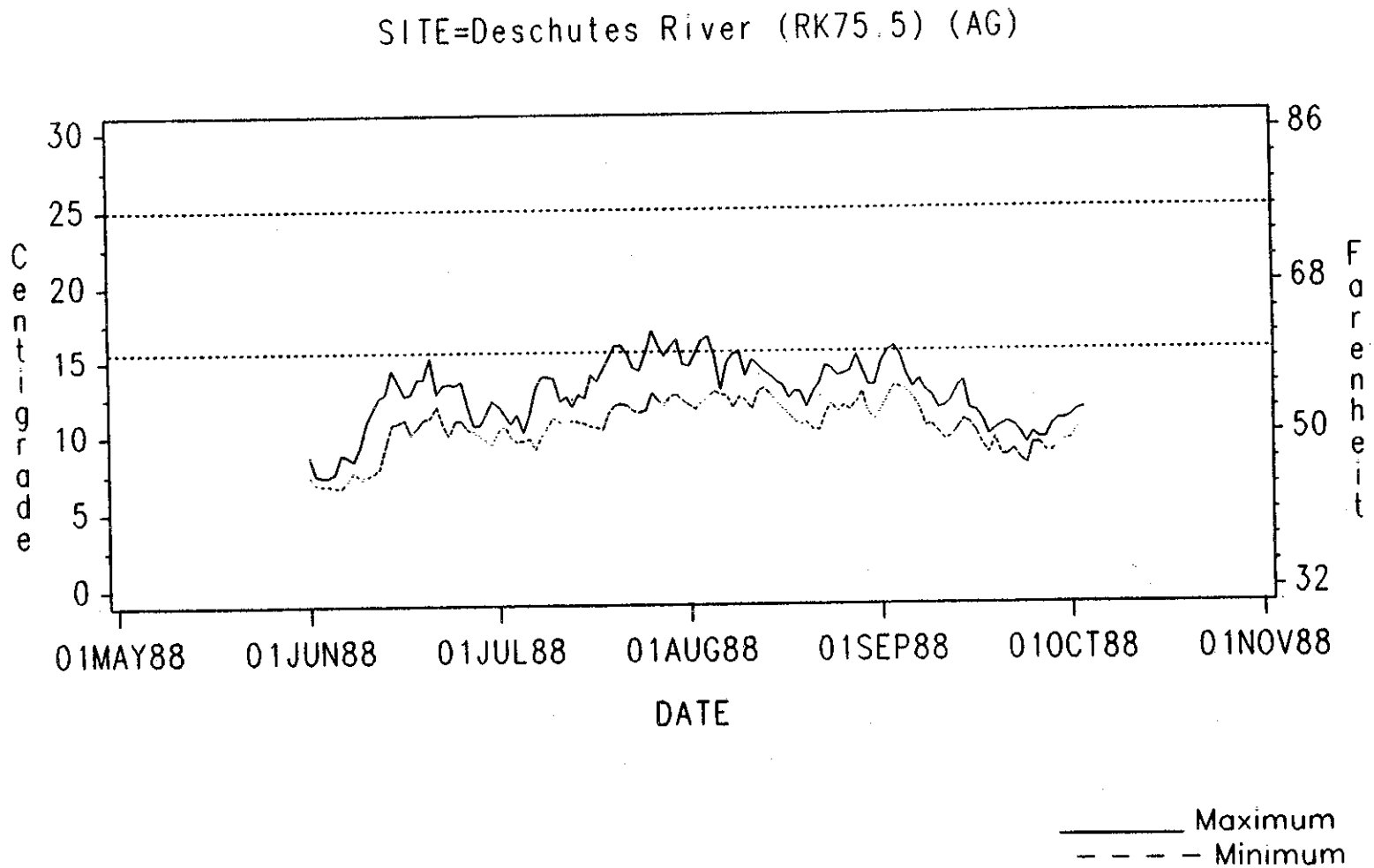
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

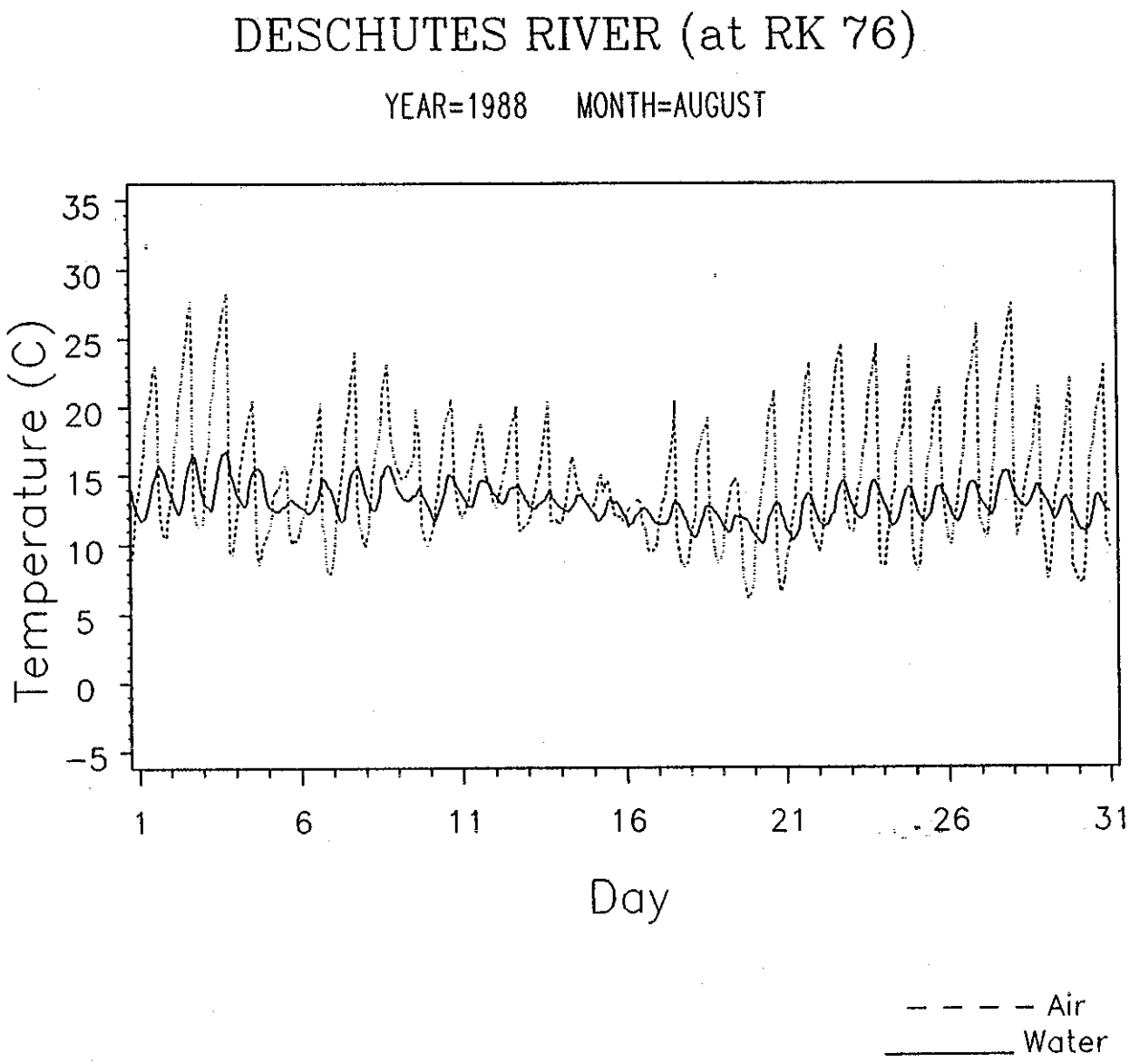
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AG
Stream Name	SITENAMES	Deschutes @ 3350 Road
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-18-88
County	COUNTY	Lewis
Nearest town	NEARESTTOWN	Eatonville
Township	TOWNSHIP	15N
Range	RANGE	03E
Section	SECTION	25
Site is Tributary To:	TRIBUTARYTO	Puget Sound
Water Resource Inventory Area	WRIA	13
WDF River Segment Identifier	WDFNUMBER	0028
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.749960
Longitude Decimal Degrees (degrees)	LONGDEC	122.370300
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	342
Elevation Top of Thermal Reach (meters)	ELEVUSM	359
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.8
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.2
Channel Azimuth (degrees)	AZIMUTH1	357
Drainage Area Above Thermograph (hectares)	AREAHECT	3261
Distance to Divide (meters)	DIVIDEMT	9807
Total Length of Perennial Streams (meters)	LENGTHMT	29275
Streamflow at Thermograph (cubic meters/second)	QDSM	0.485
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.554
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.080
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.017
Travel Time (meters/second)	TRAVELM	0.198
Average View To Sky (percent open) (percent)	VIEW1	70
Topographic Angle South (degrees)	TOPOSA	16
Topographic Angle Southeast (degrees)	TOPOSEA	15
Topographic Angle Southwest (degrees)	TOPOSWA	21
Average Forest Angle South (degrees)	FORSA	56
Average Forest Angle Southeast (degrees)	FORSEA	50
Average Forest Angle Southwest (degrees)	FORSWA	70
Percent Overhanging Brush (percent)	OVERBRUSH	11
Buffer Width Right Bank (meters)	BUFWIDRM	22.1
Buffer Width Left Bank (meters)	BUFWIDLM	17.5
Vegetation Height East Bank (meters)	VEGHTEM	13
Vegetation Height West Bank (meters)	VEGHTWM	22
Percent Vegetative Density East (percent)	VEGDENE	25
Percent Vegetative Density West (percent)	VEGDENW	53
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.342
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	6.773
Percent of Channel Composed of Pools (percent)	PERCENPL	28
Average Pool Depth (meters)	DEPTHPM	0.610
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	8
Streambed Composition Cobble (percent)	AVGCOBBLE	38
Streambed Composition Boulder (percent)	AVGBOULDER	55
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


DESCHUTES RIVER (at RK 76)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
−5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

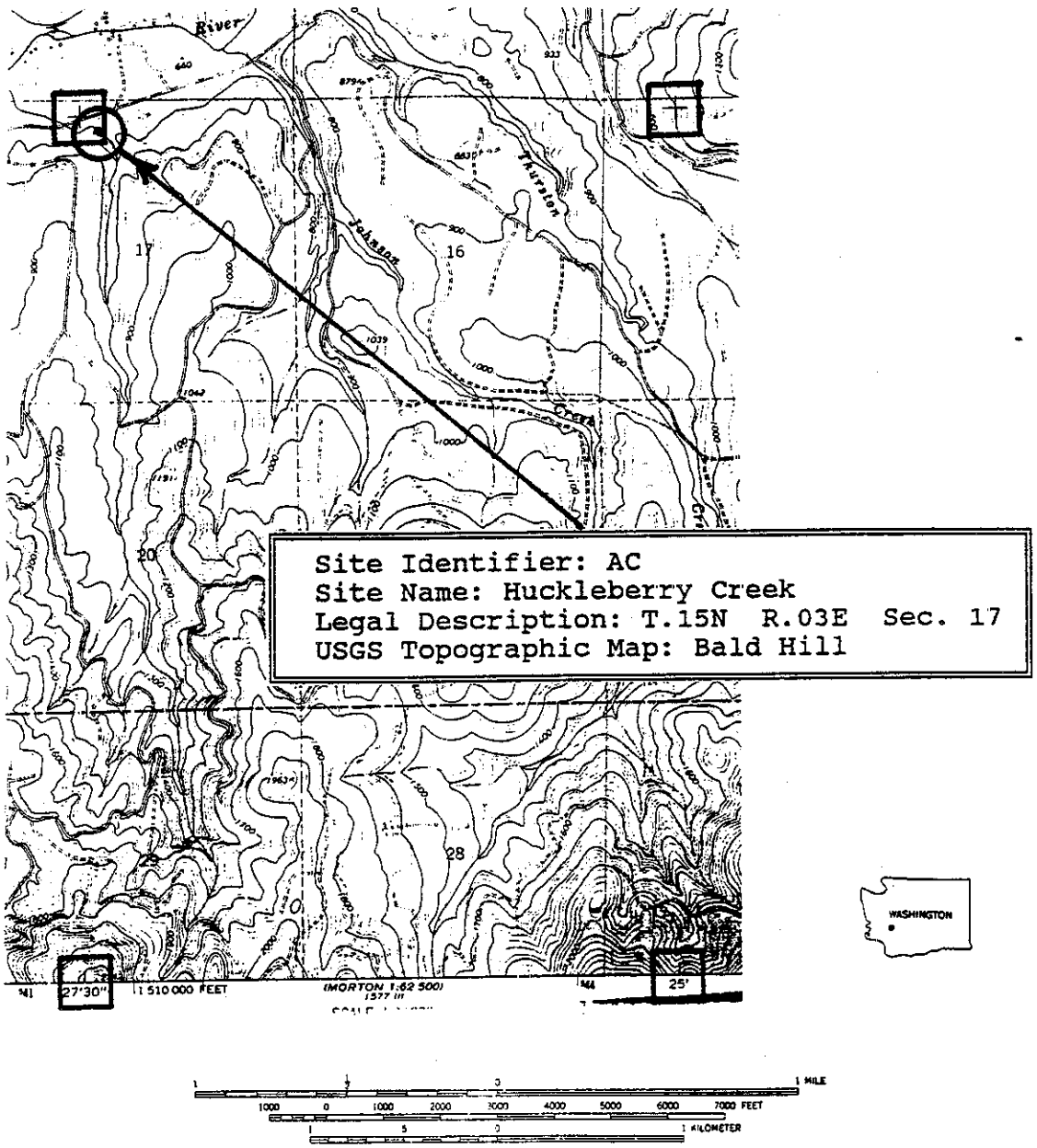
DESCHUTES RIVER (RK 76)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.7	13.3	20.6	14.6	9.0	12.0	11.6	2.6
02AUG	16.2	13.9	23.1	15.5	10.7	11.7	12.4	3.8
03AUG	18.2	14.3	27.7	16.3	11.3	12.2	16.4	4.1
04AUG	19.6	14.6	28.3	16.6	9.2	12.5	19.1	4.1
05AUG	14.2	14.1	20.5	15.3	8.6	12.9	11.9	2.4
06AUG	12.7	12.8	15.7	13.0	10.3	12.7	5.4	0.3
07AUG	13.2	13.5	20.3	14.8	8.1	12.6	12.2	2.2
08AUG	15.4	13.7	24.1	15.4	9.7	11.8	14.4	3.6
09AUG	17.3	14.1	23.2	15.5	10.5	12.5	12.7	3.0
10AUG	14.3	13.4	19.8	13.9	10.0	12.3	9.8	1.6
11AUG	15.3	13.6	20.5	15.0	10.8	11.7	9.7	3.3
12AUG	15.1	13.8	18.9	14.6	12.1	12.9	6.8	1.7
13AUG	14.7	13.7	20.0	14.2	11.0	13.1	9.0	1.1
14AUG	14.2	13.1	20.5	13.9	11.6	12.6	8.9	1.3
15AUG	13.8	12.9	16.3	13.5	11.6	12.2	4.7	1.4
16AUG	13.2	12.5	15.1	13.3	12.0	11.7	3.1	1.6
17AUG	11.5	11.9	13.2	12.4	9.6	11.3	3.6	1.1
18AUG	12.4	12.0	20.4	12.9	8.5	10.9	11.9	2.0
19AUG	13.4	11.8	19.3	12.8	8.8	10.6	10.5	2.2
20AUG	10.6	11.4	14.5	11.8	6.2	10.8	8.3	1.0
21AUG	13.2	11.6	21.1	12.8	6.6	10.3	14.5	2.5
22AUG	14.7	11.9	23.2	13.4	9.1	10.3	14.1	3.1
23AUG	16.5	12.8	24.6	14.6	9.5	11.3	15.1	3.3
24AUG	16.0	13.1	24.6	14.4	8.2	12.1	16.4	2.3
25AUG	14.7	12.7	23.7	13.9	8.1	11.4	15.6	2.5
26AUG	14.6	12.9	21.3	14.0	8.1	11.9	13.2	2.1
27AUG	17.3	13.0	25.9	14.2	10.2	11.6	15.7	2.6
28AUG	19.0	13.7	27.5	15.3	10.5	12.1	17.0	3.2
29AUG	14.4	13.4	21.7	14.3	7.9	12.8	13.8	1.5
30AUG	13.1	12.5	22.1	13.3	7.3	11.4	14.8	1.9
31AUG	14.4	12.1	23.0	13.3	7.3	11.0	15.7	2.3

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



Site Identifier: AC
Site Name: Huckleberry Creek
Legal Description: T.15N R.03E Sec. 17
USGS Topographic Map: Bald Hill

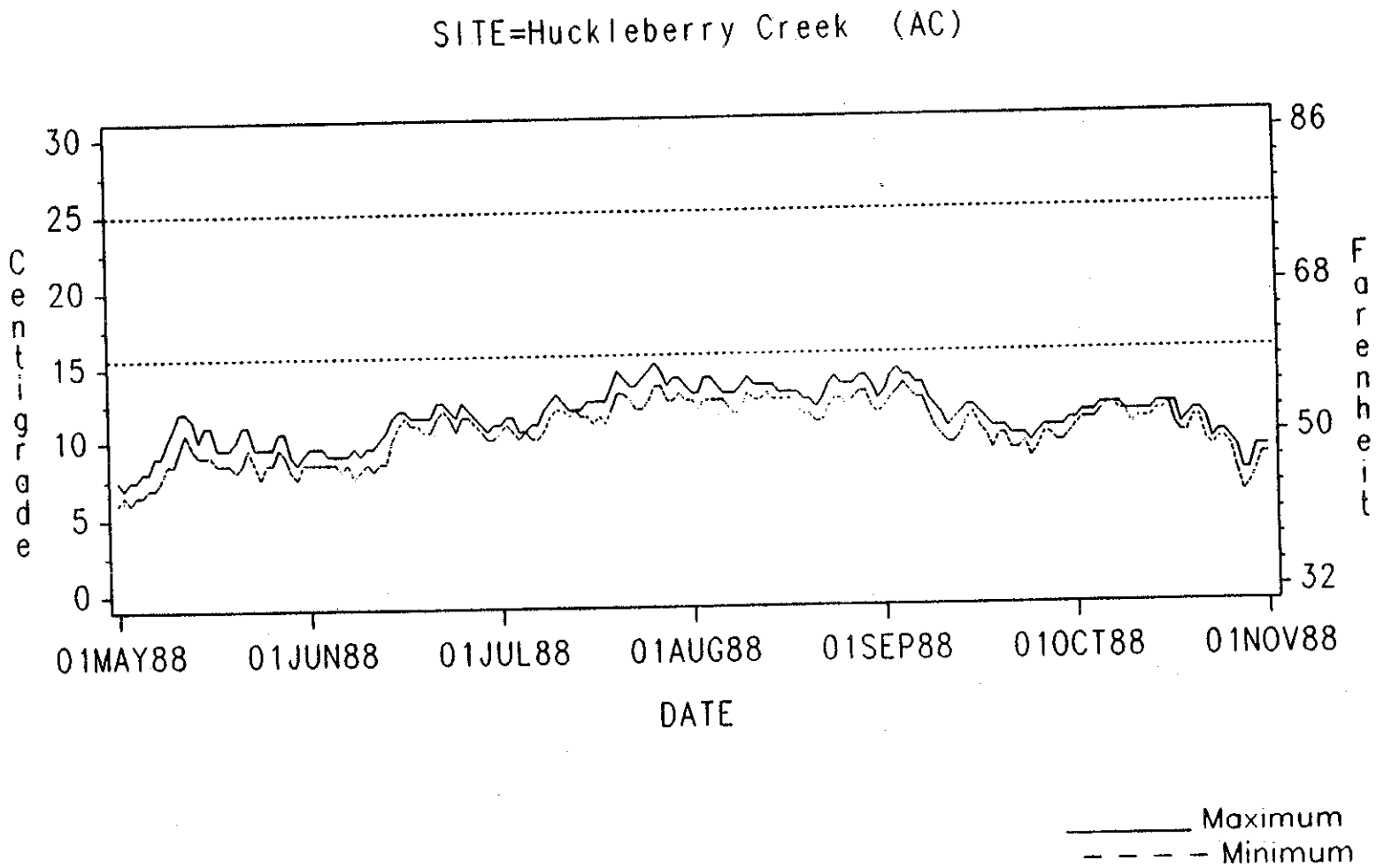
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

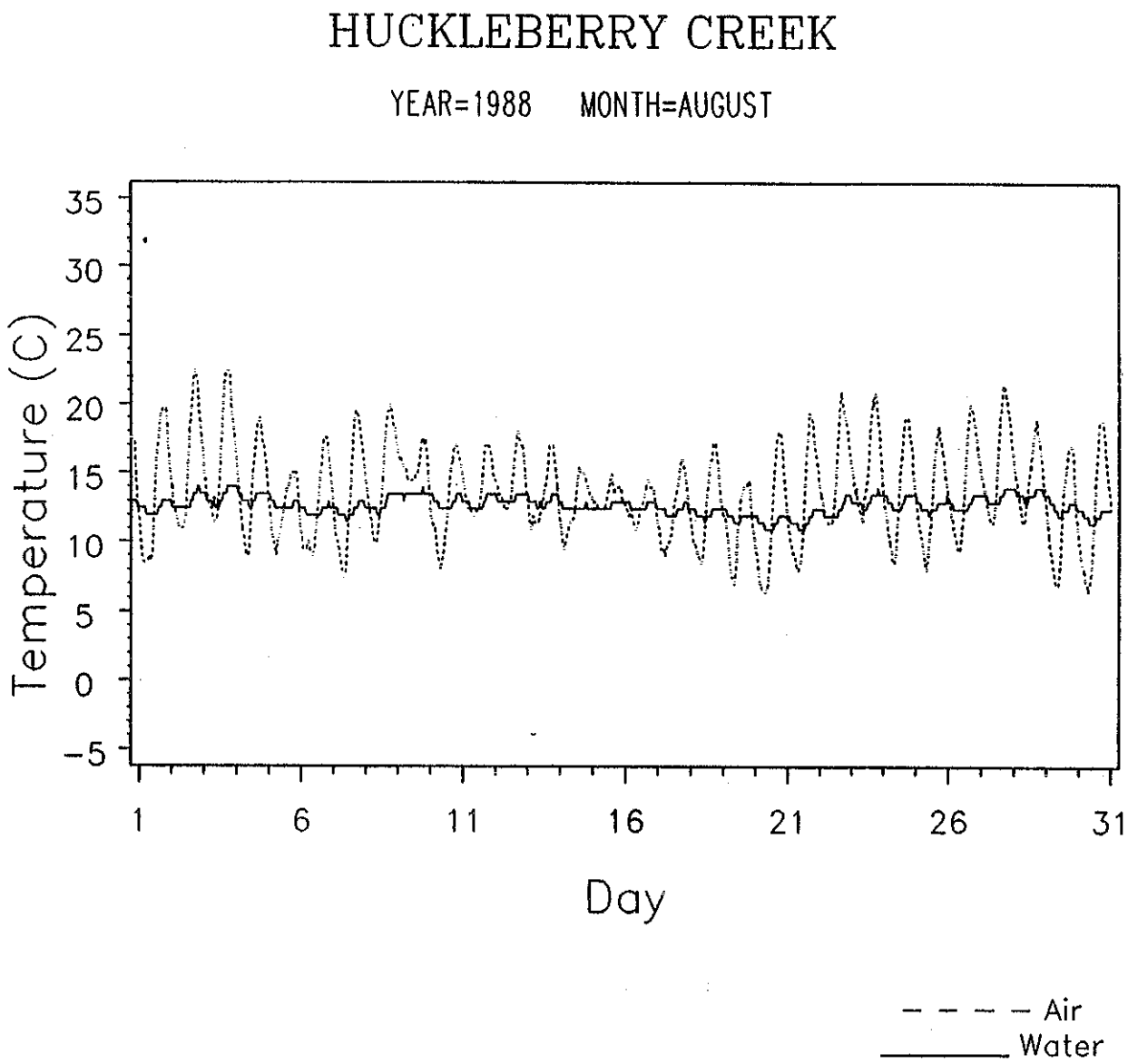
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AC
Stream Name	SITENAMES	Huckleberry Creek
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-07-88
County	COUNTY	Thurston
Nearest town	NEARESTTOWN	Rainier
Township	TOWNSHIP	15N
Range	RANGE	03E
Section	SECTION	17
Site is Tributary To:	TRIBUTARYTO	Deschutes
Water Resource Inventory Area	WRIA	13
WDF River Segment Identifier	WDFNUMBER	0086
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.791280
Longitude Decimal Degrees (degrees)	LONGDEC	122.457700
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	2
Thermograph Elevation (meters)	ELEVDSM	197
Elevation Top of Thermal Reach (meters)	ELEVUSM	228
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	5.1
Channel Gradient from Autolevel (percent)	GRADLEVEL	3.4
Channel Azimuth (degrees)	AZIMUTH1	348
Drainage Area Above Thermograph (hectares)	AREAHECT	534
Distance to Divide (meters)	DIVIDEMT	5779
Total Length of Perennial Streams (meters)	LENGTHMT	4986
Streamflow at Thermograph (cubic meters/second)	QDSM	0.031
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.030
Water-Budget Groundwater Determination (cubic meters/second)	GWDETERI	0.001
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.006
Travel Time (meters/second)	TRAVELM	0.073
Average View To Sky (percent open) (percent)	VIEW1	17
Topographic Angle South (degrees)	TOPOSA	18
Topographic Angle Southeast (degrees)	TOPOSEA	26
Topographic Angle Southwest (degrees)	TOPOSWA	26
Average Forest Angle South (degrees)	FORSA	90
Average Forest Angle Southeast (degrees)	FORSEA	88
Average Forest Angle Southwest (degrees)	FORSWA	90
Percent Overhanging Brush (percent)	OVERBRUSH	93
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	17
Vegetation Height West Bank (meters)	VEGHTWM	17
Percent Vegetative Density East (percent)	VEGDENE	86
Percent Vegetative Density West (percent)	VEGDENW	85
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.125
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	2.213
Percent of Channel Composed of Pools (percent)	PERCENPL	49
Average Pool Depth (meters)	DEPTHPM	0.180
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	70
Streambed Composition Cobble (percent)	AVGCOBBLE	30
Streambed Composition Boulder (percent)	AVGBOULDER	0
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


HUCKLEBERRY CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
−5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

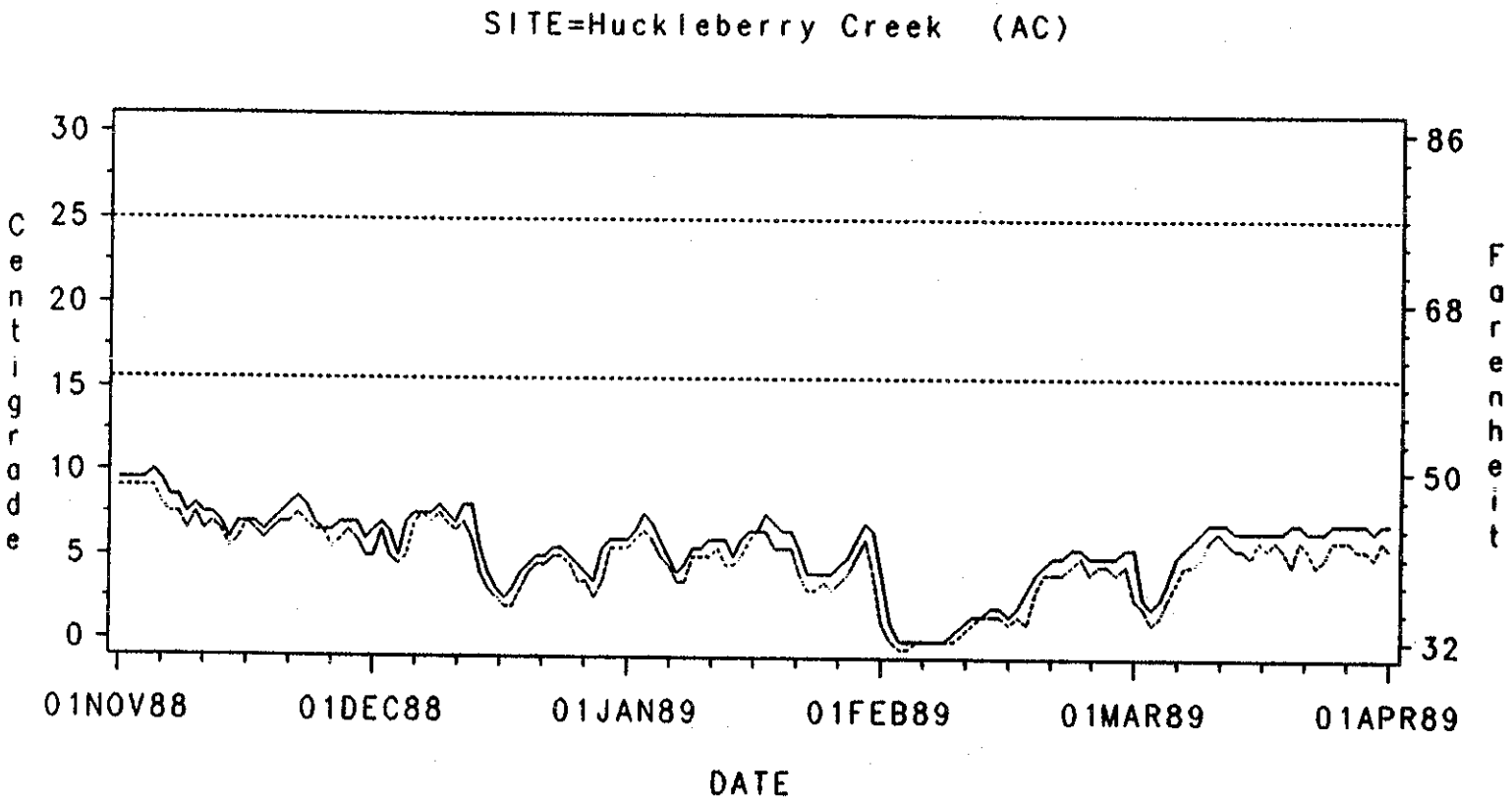
HUCKLEBERRY CREEK

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.3	12.7	17.5	13.0	10.0	12.5	7.5	0.5
02AUG	13.8	12.5	20.0	13.0	8.5	12.0	11.5	1.0
03AUG	15.8	13.0	22.5	14.0	11.0	12.5	11.5	1.5
04AUG	16.4	13.3	22.5	14.0	11.5	12.5	11.0	1.5
05AUG	14.0	13.2	19.0	13.5	9.0	12.5	10.0	1.0
06AUG	12.3	12.6	15.0	13.0	9.0	12.5	6.0	0.5
07AUG	12.8	12.3	17.5	13.0	9.0	12.0	8.5	1.0
08AUG	13.5	12.3	19.5	13.0	7.5	11.5	12.0	1.5
09AUG	15.0	12.9	20.0	13.5	10.0	12.0	10.0	1.5
10AUG	15.2	13.5	17.5	14.0	11.5	13.0	6.0	1.0
11AUG	12.8	12.9	17.0	13.5	8.0	12.5	9.0	1.0
12AUG	14.1	13.0	17.0	13.5	12.0	12.5	5.0	1.0
13AUG	14.6	13.2	18.0	13.5	12.0	13.0	6.0	0.5
14AUG	13.5	13.0	17.0	13.5	11.0	12.5	6.0	1.0
15AUG	12.8	12.5	15.5	13.0	9.5	12.5	6.0	0.5
16AUG	13.3	12.7	15.0	13.0	12.5	12.5	2.5	0.5
17AUG	12.6	12.7	14.5	13.0	11.0	12.5	3.5	0.5
18AUG	12.3	12.4	16.0	13.0	9.0	12.0	7.0	1.0
19AUG	12.6	12.2	17.5	12.5	8.5	11.5	9.0	1.0
20AUG	11.1	11.9	14.5	12.5	7.0	11.5	7.5	1.0
21AUG	11.6	11.5	18.0	12.0	6.5	11.0	11.5	1.0
22AUG	13.2	11.7	19.5	12.5	8.0	11.0	11.5	1.5
23AUG	15.4	12.6	21.0	13.5	11.5	12.0	9.5	1.5
24AUG	15.7	13.2	21.0	14.0	11.5	12.5	9.5	1.5
25AUG	13.8	13.1	19.0	13.5	8.5	12.5	10.5	1.0
26AUG	13.3	12.8	18.5	13.5	8.0	12.0	10.5	1.5
27AUG	14.6	12.9	20.0	13.5	9.5	12.5	10.5	1.0
28AUG	16.1	13.5	21.5	14.0	11.5	13.0	10.0	1.0
29AUG	14.8	13.6	19.0	14.0	11.5	13.0	7.5	1.0
30AUG	11.9	12.7	17.0	13.5	7.0	12.0	10.0	1.5
31AUG	12.5	12.1	19.0	12.5	6.5	11.5	12.5	1.0

WATER TEMPERATURE



Maximum
Minimum

Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

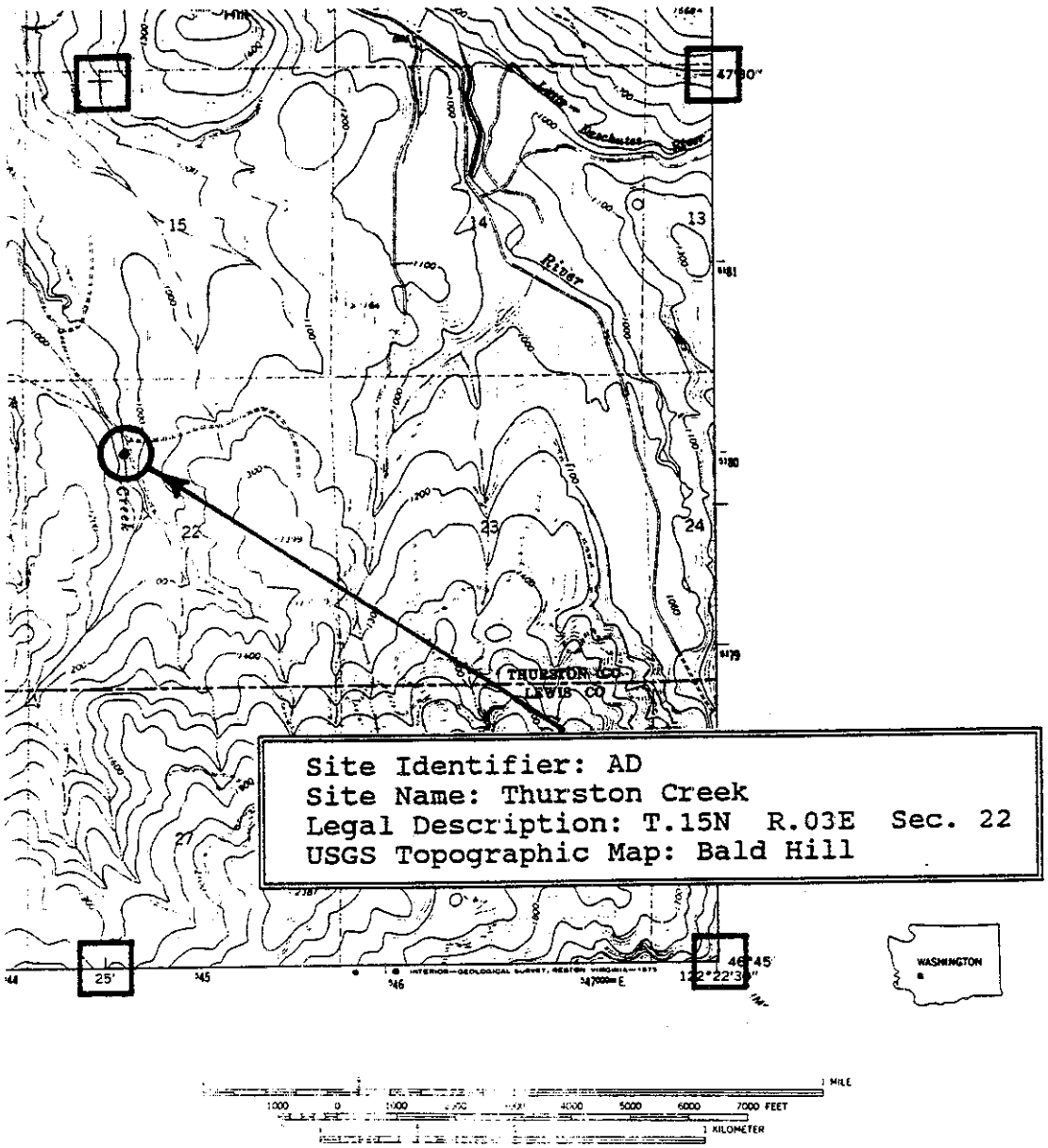
Huckleberry Creek (AC)

Daily Temperatures in Degrees Celsius (C)

YEAR=1989 MONTH=JANUARY

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	3.0	5.8	5.0	6.0	0.5	5.5	4.5	0.5
02JAN	5.3	6.2	7.0	6.5	3.5	6.0	3.5	0.5
03JAN	8.7	7.0	10.5	7.5	7.0	6.5	3.5	1.0
04JAN	4.1	6.6	6.5	7.0	2.0	6.0	4.5	1.0
05JAN	1.7	5.5	3.0	6.0	0.0	5.0	3.0	1.0
06JAN	0.3	4.8	2.0	5.0	-1.0	4.5	3.0	0.5
07JAN	-1.1	3.9	-0.5	4.0	-2.0	3.5	1.5	0.5
08JAN	1.5	3.8	5.5	4.5	-1.0	3.5	6.5	1.0
09JAN	4.2	5.3	5.5	5.5	3.0	5.0	2.5	0.5
10JAN	2.5	5.3	4.0	5.5	1.0	5.0	3.0	0.5
11JAN	3.3	5.5	6.0	6.0	0.5	5.0	5.5	1.0
12JAN	5.1	5.9	7.5	6.0	3.0	5.5	4.5	0.5
13JAN	1.5	5.3	4.0	6.0	-0.5	4.5	4.5	1.5
14JAN	0.8	4.7	3.0	5.0	-0.5	4.5	3.5	0.5
15JAN	4.3	5.4	5.5	6.0	2.5	5.0	3.0	1.0
16JAN	6.4	6.3	7.5	6.5	5.5	6.0	2.0	0.5
17JAN	5.2	6.5	6.5	6.5	4.0	6.5	2.5	0.0
18JAN	6.7	7.0	8.5	7.5	4.0	6.5	4.5	1.0
19JAN	1.8	6.0	5.0	7.0	-0.5	5.5	5.5	1.5
20JAN	2.8	5.9	6.0	6.5	-0.5	5.5	6.5	1.0
21JAN	3.1	6.0	4.5	6.5	0.0	5.5	4.5	1.0
22JAN	-0.2	4.8	1.5	5.5	-2.0	4.0	3.5	1.5
23JAN	-2.3	3.5	-0.5	4.0	-3.5	3.0	3.0	1.0
24JAN	-0.9	3.4	0.5	4.0	-3.0	3.0	3.5	1.0
25JAN	0.1	3.6	1.5	4.0	-1.0	3.5	2.5	0.5
26JAN	0.3	3.4	4.0	4.0	-2.0	3.0	6.0	1.0
27JAN	2.3	4.2	5.0	4.5	-0.5	3.5	5.5	1.0
28JAN	2.6	4.3	5.5	5.0	0.0	4.0	5.5	1.0
29JAN	6.8	5.5	11.5	6.0	4.0	5.0	7.5	1.0
30JAN	7.6	6.5	9.5	7.0	4.0	6.0	5.5	1.0
31JAN	-0.1	4.8	3.0	6.5	-1.5	4.0	4.5	2.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



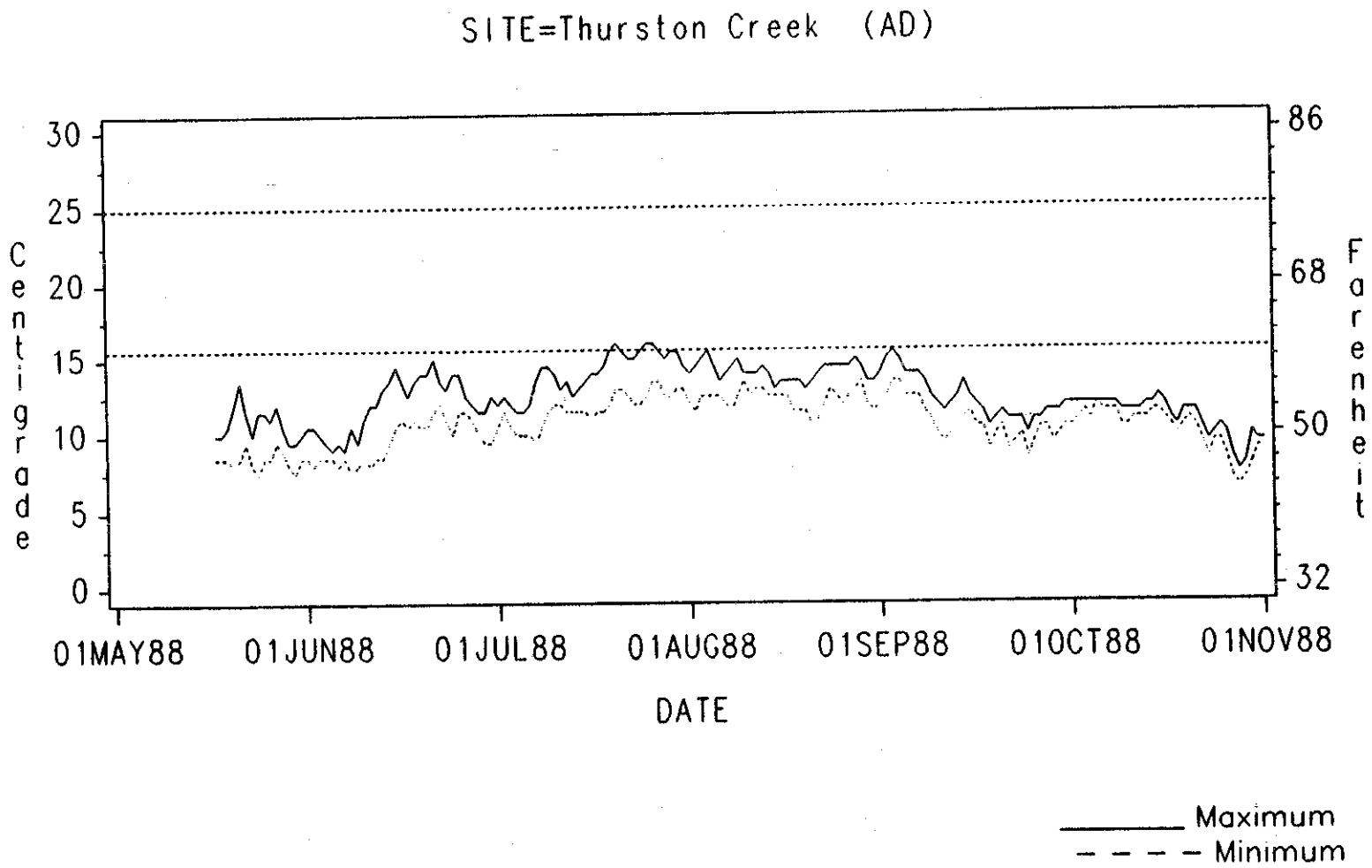
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

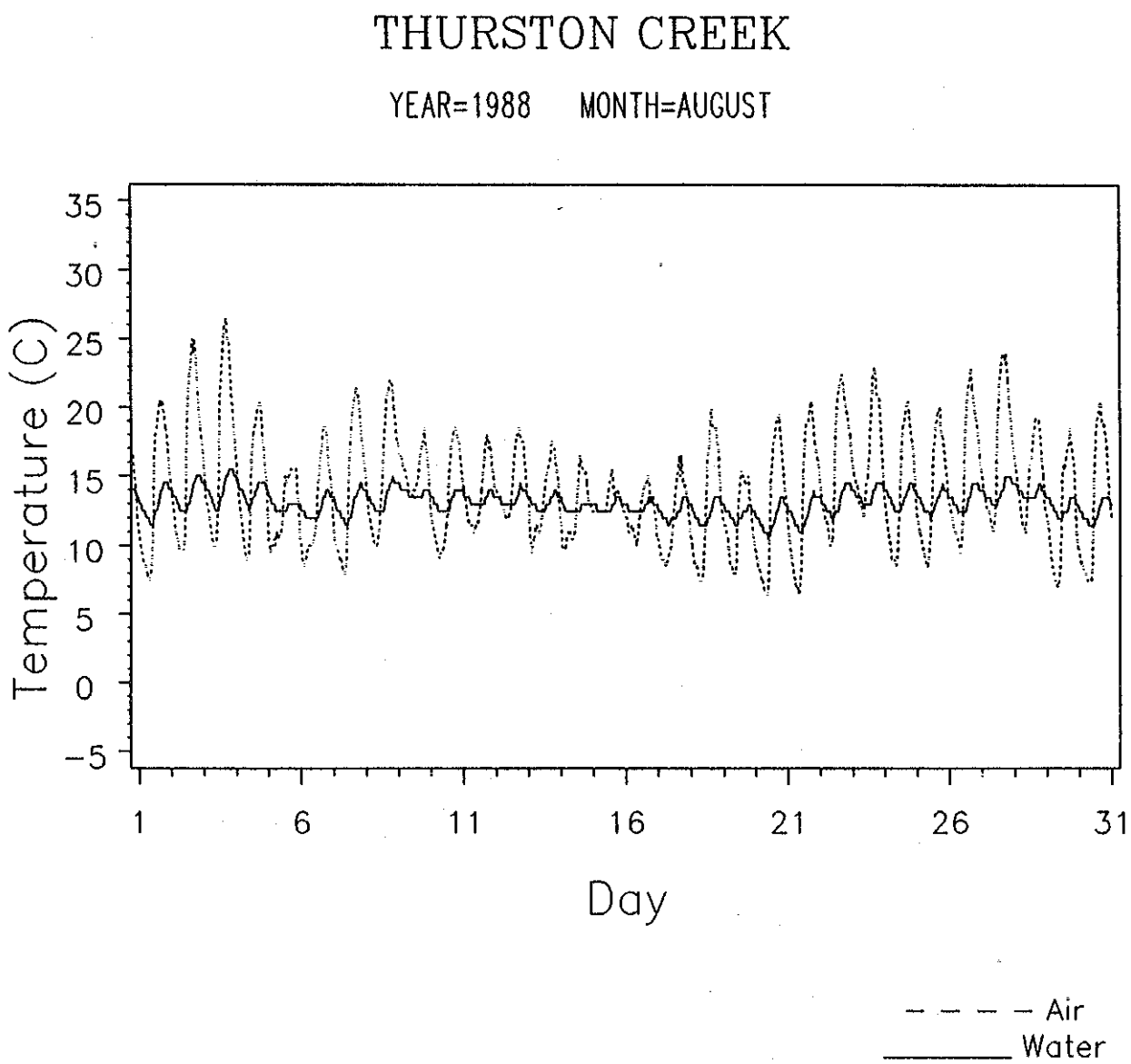
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AD
Stream Name	SITENAMES	Thurston Creek
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-14-88
County	COUNTY	Thurston
Nearest town	NEARESTTOWN	Rainier
Township	TOWNSHIP	15N
Range	RANGE	03E
Section	SECTION	22
Site is Tributary To:	TRIBUTARYTO	Deschutes
Water Resource Inventory Area	WRIA	13
WDF River Segment Identifier	WDFNUMBER	0095
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.773890
Longitude Decimal Degrees (degrees)	LONGDEC	122.415100
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	2
Thermograph Elevation (meters)	ELEVDSM	292
Elevation Top of Thermal Reach (meters)	ELEVUSM	313
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	3.4
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.8
Channel Azimuth (degrees)	AZIMUTH1	4
Drainage Area Above Thermograph (hectares)	AREAHECT	909
Distance to Divide (meters)	DIVIDEMT	5216
Total Length of Perennial Streams (meters)	LENGTHMT	4173
Streamflow at Thermograph (cubic meters/second)	QDSM	0.123
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.089
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.034
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.030
Travel Time (meters/second)	TRAVELM	0.146
Average View To Sky (percent open) (percent)	VIEW1	40
Topographic Angle South (degrees)	TOPOSA	14
Topographic Angle Southeast (degrees)	TOPOSEA	13
Topographic Angle Southwest (degrees)	TOPOSWA	20
Average Forest Angle South (degrees)	FORSA	69
Average Forest Angle Southeast (degrees)	FORSEA	66
Average Forest Angle Southwest (degrees)	FORSWA	73
Percent Overhanging Brush (percent)	OVERBRUSH	59
Buffer Width Right Bank (meters)	BUFWIDRM	24.4
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	17
Vegetation Height West Bank (meters)	VEGHTWM	18
Percent Vegetative Density East (percent)	VEGDENE	53
Percent Vegetative Density West (percent)	VEGDENW	60
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.223
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	2.963
Percent of Channel Composed of Pools (percent)	PERCENPL	51
Average Pool Depth (meters)	DEPTHPM	0.330
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	27
Streambed Composition Cobble (percent)	AVGCOBBLE	67
Streambed Composition Boulder (percent)	AVGBOULDER	7
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


THURSTON CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

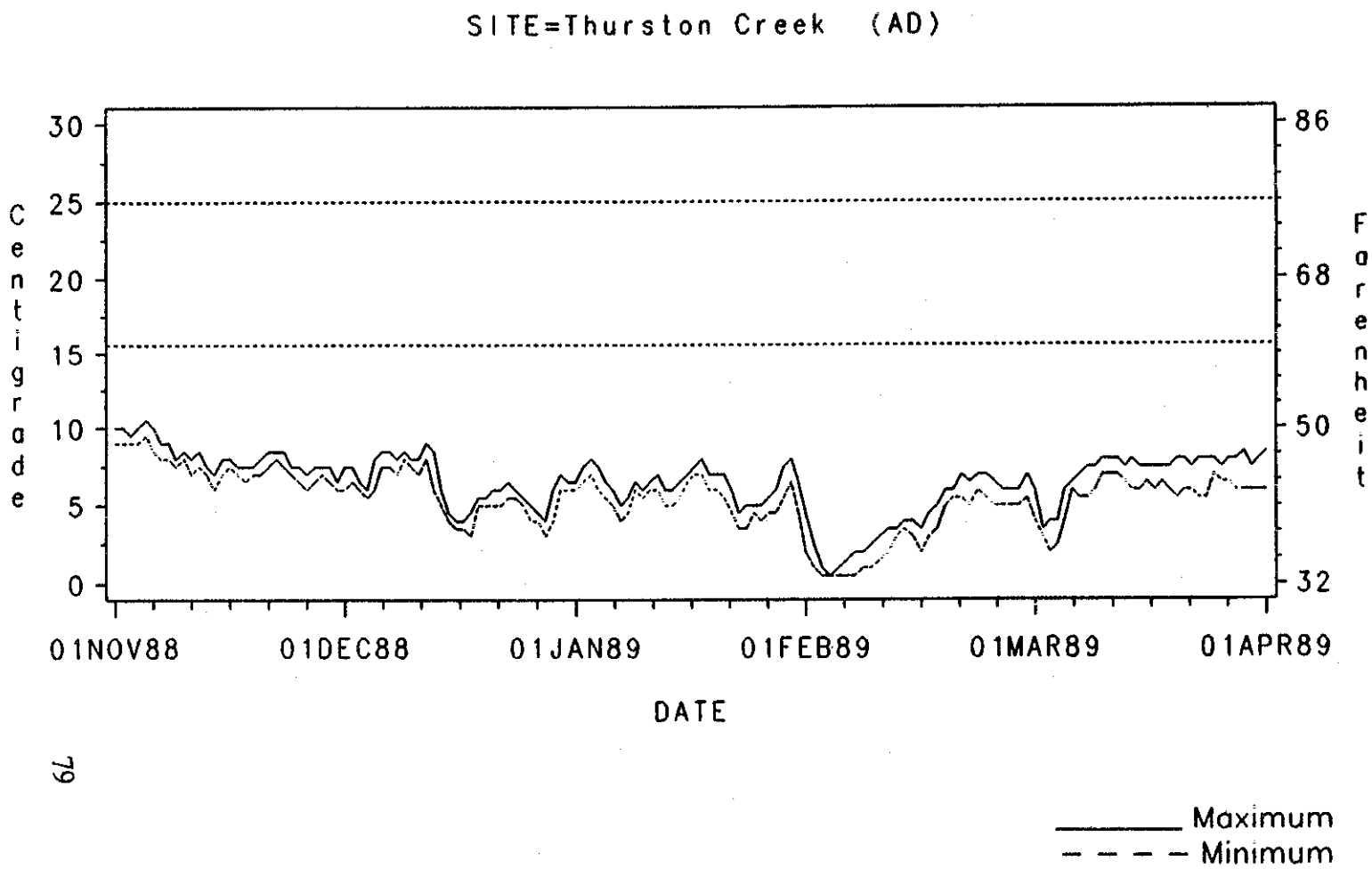
THURSTON CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	12.1	12.8	18.0	14.0	7.0	12.0	11.0	2.0
02AUG	14.1	13.0	20.5	14.5	7.5	11.5	13.0	3.0
03AUG	16.6	13.7	25.0	15.0	9.5	12.5	15.5	2.5
04AUG	17.5	14.1	26.5	15.5	10.0	12.5	16.5	3.0
05AUG	14.4	13.8	20.5	14.5	9.0	12.5	11.5	2.0
06AUG	12.6	12.8	15.5	13.5	9.0	12.5	6.5	1.0
07AUG	13.1	12.8	18.5	14.0	8.5	12.0	10.0	2.0
08AUG	14.5	12.9	21.5	14.5	8.0	11.5	13.5	3.0
09AUG	15.9	13.5	22.0	15.0	10.0	12.5	12.0	2.5
10AUG	15.1	13.7	18.5	14.0	11.5	13.5	7.0	0.5
11AUG	13.6	13.2	18.5	14.0	9.0	12.5	9.5	1.5
12AUG	13.9	13.4	18.0	14.0	11.0	13.0	7.0	1.0
13AUG	14.6	13.4	18.5	14.5	11.0	13.0	7.5	1.5
14AUG	13.4	13.1	17.5	14.0	9.5	12.5	8.0	1.5
15AUG	12.7	12.8	16.5	13.0	9.5	12.5	7.0	0.5
16AUG	13.2	12.9	15.5	13.5	12.0	12.5	3.5	1.0
17AUG	12.3	12.8	15.0	13.5	10.0	12.5	5.0	1.0
18AUG	12.0	12.5	16.5	13.5	8.5	11.5	8.0	2.0
19AUG	13.1	12.4	20.0	13.5	7.5	11.5	12.5	2.0
20AUG	11.6	12.3	15.5	13.0	8.0	11.5	7.5	1.5
21AUG	12.6	12.1	19.5	13.5	6.5	10.5	13.0	3.0
22AUG	13.7	12.4	20.5	14.0	6.5	11.0	14.0	3.0
23AUG	16.3	13.3	22.5	14.5	10.0	12.0	12.5	2.5
24AUG	16.6	13.7	23.0	14.5	12.0	13.0	11.0	1.5
25AUG	14.1	13.4	20.5	14.5	8.5	12.5	12.0	2.0
26AUG	14.0	13.2	20.0	14.5	8.5	12.0	11.5	2.5
27AUG	15.9	13.4	23.0	14.5	9.5	12.5	13.5	2.0
28AUG	17.3	13.9	24.0	15.0	11.0	13.0	13.0	2.0
29AUG	15.0	13.8	19.5	14.5	11.0	13.5	8.5	1.0
30AUG	12.3	12.8	18.5	13.5	7.0	12.0	11.5	1.5
31AUG	13.3	12.5	20.5	13.5	7.5	11.5	13.0	2.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

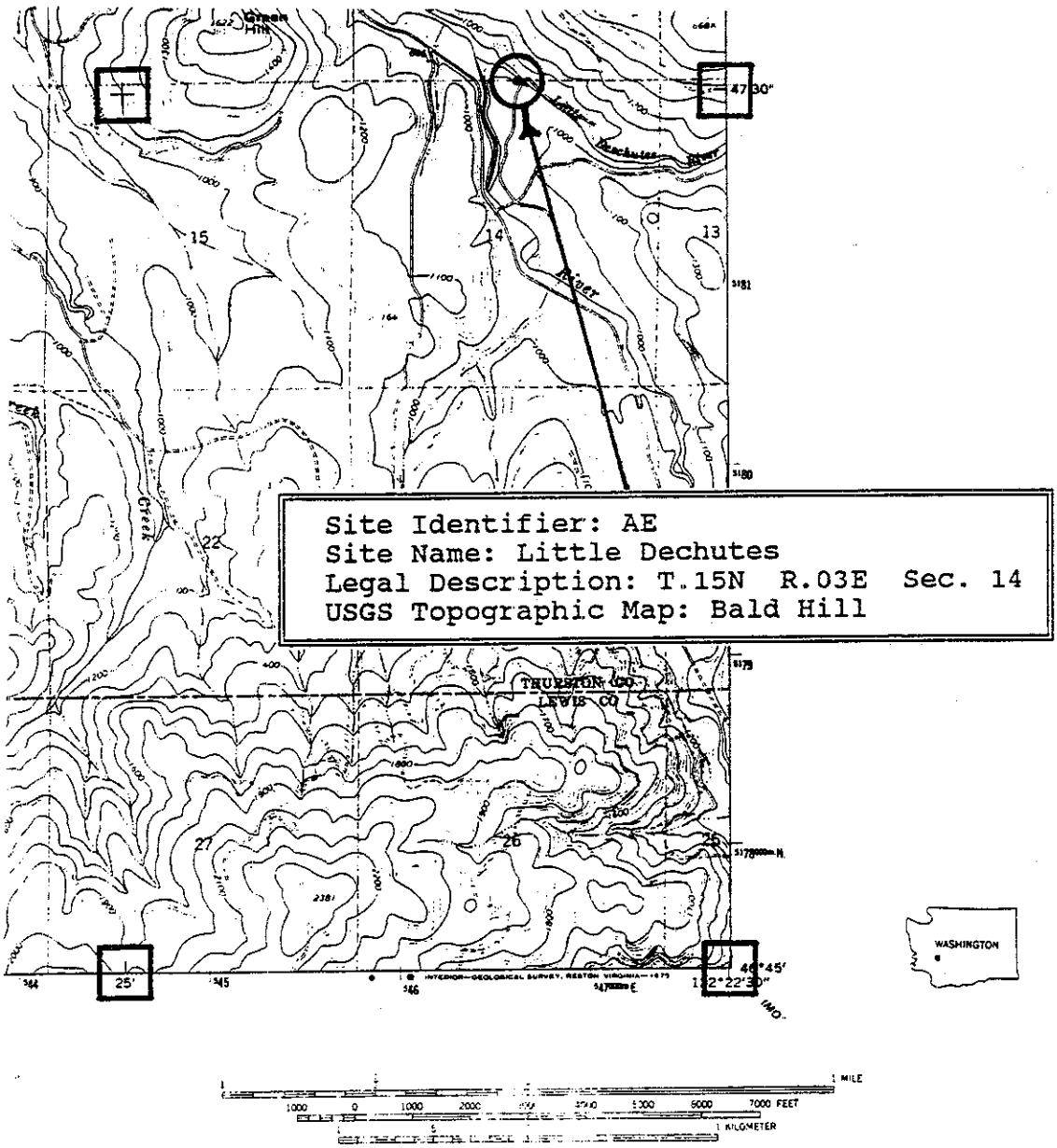
Thurston Creek (AD)

Daily Temperatures in Degrees Celsius (C)

YEAR=1989 MONTH=JANUARY

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	3.0	6.3	5.0	6.5	0.0	6.0	5.0	0.5
02JAN	5.1	6.8	7.5	7.5	3.5	6.5	4.0	1.0
03JAN	8.6	7.4	11.0	8.0	6.0	7.0	5.0	1.0
04JAN	3.4	6.9	6.0	7.5	1.5	6.0	4.5	1.5
05JAN	1.3	6.0	3.5	6.5	-0.5	5.5	4.0	1.0
06JAN	-0.2	5.4	2.5	6.0	-1.5	5.0	4.0	1.0
07JAN	-1.6	4.7	-0.5	5.0	-3.0	4.0	2.5	1.0
08JAN	1.9	5.0	6.0	5.5	-1.5	4.5	7.5	1.0
09JAN	4.1	6.0	6.5	6.5	3.0	6.0	3.5	0.5
10JAN	2.2	5.9	4.0	6.0	0.0	5.5	4.0	0.5
11JAN	3.6	6.1	6.0	6.5	1.5	6.0	4.5	0.5
12JAN	5.4	6.2	8.0	7.0	3.0	6.0	5.0	1.0
13JAN	1.0	5.6	3.5	6.0	-1.0	5.0	4.5	1.0
14JAN	0.1	5.3	2.5	6.0	-1.5	5.0	4.0	1.0
15JAN	3.9	6.0	6.0	6.5	2.0	5.5	4.0	1.0
16JAN	6.3	6.9	7.5	7.0	5.0	6.5	2.5	0.5
17JAN	5.0	7.1	7.0	7.5	3.5	7.0	3.5	0.5
18JAN	6.5	7.5	8.5	8.0	3.0	7.0	5.5	1.0
19JAN	1.8	6.3	5.5	7.0	-0.5	6.0	6.0	1.0
20JAN	3.2	6.4	6.5	7.0	0.0	6.0	6.5	1.0
21JAN	2.4	6.4	4.5	7.0	-1.0	5.5	5.5	1.5
22JAN	-0.5	5.3	2.0	6.0	-3.0	4.5	5.0	1.5
23JAN	-2.7	4.1	0.0	4.5	-5.0	3.5	5.0	1.0
24JAN	-0.8	4.4	1.0	5.0	-3.5	3.5	4.5	1.5
25JAN	0.2	4.6	3.0	5.0	-1.5	4.5	4.5	0.5
26JAN	0.8	4.4	5.5	5.0	-2.0	4.0	7.5	1.0
27JAN	1.8	5.0	5.5	5.5	-1.0	4.5	6.5	1.0
28JAN	2.6	5.1	6.0	6.0	-1.0	4.5	7.0	1.5
29JAN	6.9	6.4	11.5	7.5	3.5	5.5	8.0	2.0
30JAN	7.5	7.3	10.0	8.0	3.5	6.5	6.5	1.5
31JAN	-0.6	5.3	2.0	6.5	-2.0	4.5	4.0	2.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



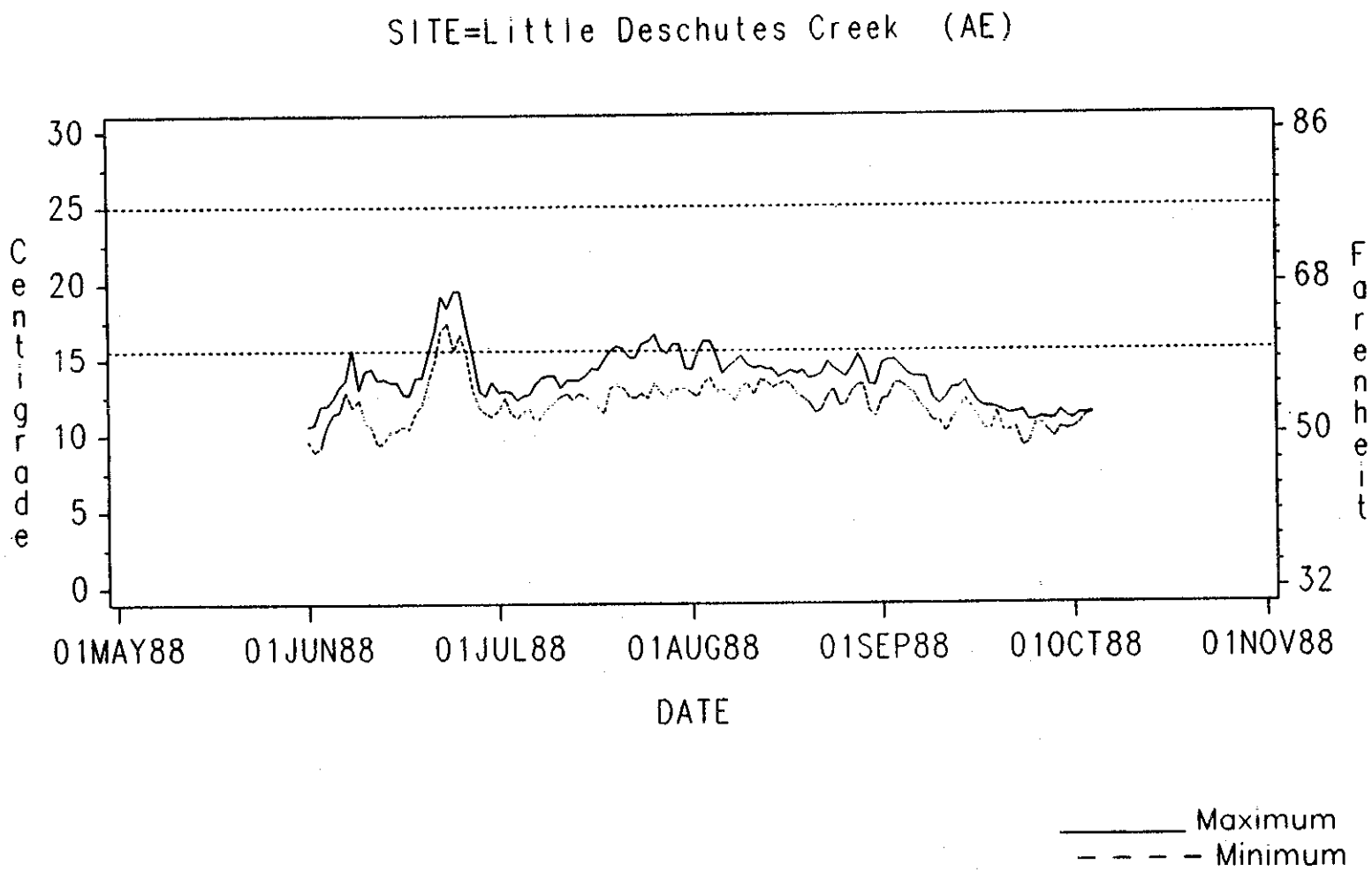
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	AE
Stream Name	SITENAME$	Little Dechutes
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-13-88
County	COUNTY	Thurston
Nearest town	NEARESTTOWN	Eatonville
Township	TOWNSHIP	15N
Range	RANGE	03E
Section	SECTION	14
Site is Tributary To:	TRIBUTARYTO	Deschutes
Water Resource Inventory Area	WRIA	13
WDF River Segment Identifier	WDFNUMBER	0110
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.792460
Longitude Decimal Degrees (degrees)	LONGDEC	122.389000
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	269
Elevation Top of Thermal Reach (meters)	ELEVUSM	279
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.6
Channel Gradient from Autolevel (percent)	GRADLEVEL	4.1
Channel Azimuth (degrees)	AZIMUTH1	315
Drainage Area Above Thermograph (hectares)	AREAHECT	2012
Distance to Divide (meters)	DIVIDEMT	9449
Total Length of Perennial Streams (meters)	LENGTHMT	16590
Streamflow at Thermograph (cubic meters/second)	QDSM	0.072
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.076
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.003
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.004
Travel Time (meters/second)	TRAVELM	0.101
Average View To Sky (percent open) (percent)	VIEW1	31
Topographic Angle South (degrees)	TOPOSA	20
Topographic Angle Southeast (degrees)	TOPOSEA	22
Topographic Angle Southwest (degrees)	TOPOSWA	19
Average Forest Angle South (degrees)	FORSA	76
Average Forest Angle Southeast (degrees)	FORSEA	78
Average Forest Angle Southwest (degrees)	FORSWA	72
Percent Overhanging Brush (percent)	OVERBRUSH	75
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	11
Vegetation Height West Bank (meters)	VEGHTWM	11
Percent Vegetative Density East (percent)	VEGDENE	69
Percent Vegetative Density West (percent)	VEGDENW	75
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.228
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	2.433
Percent of Channel Composed of Pools (percent)	PERCENPL	58
Average Pool Depth (meters)	DEPTHPM	0.290
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	5
Streambed Composition Gravel (percent)	AVGGRAVEL	15
Streambed Composition Cobble (percent)	AVGCOBBLE	20
Streambed Composition Boulder (percent)	AVGBOULDER	60
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description

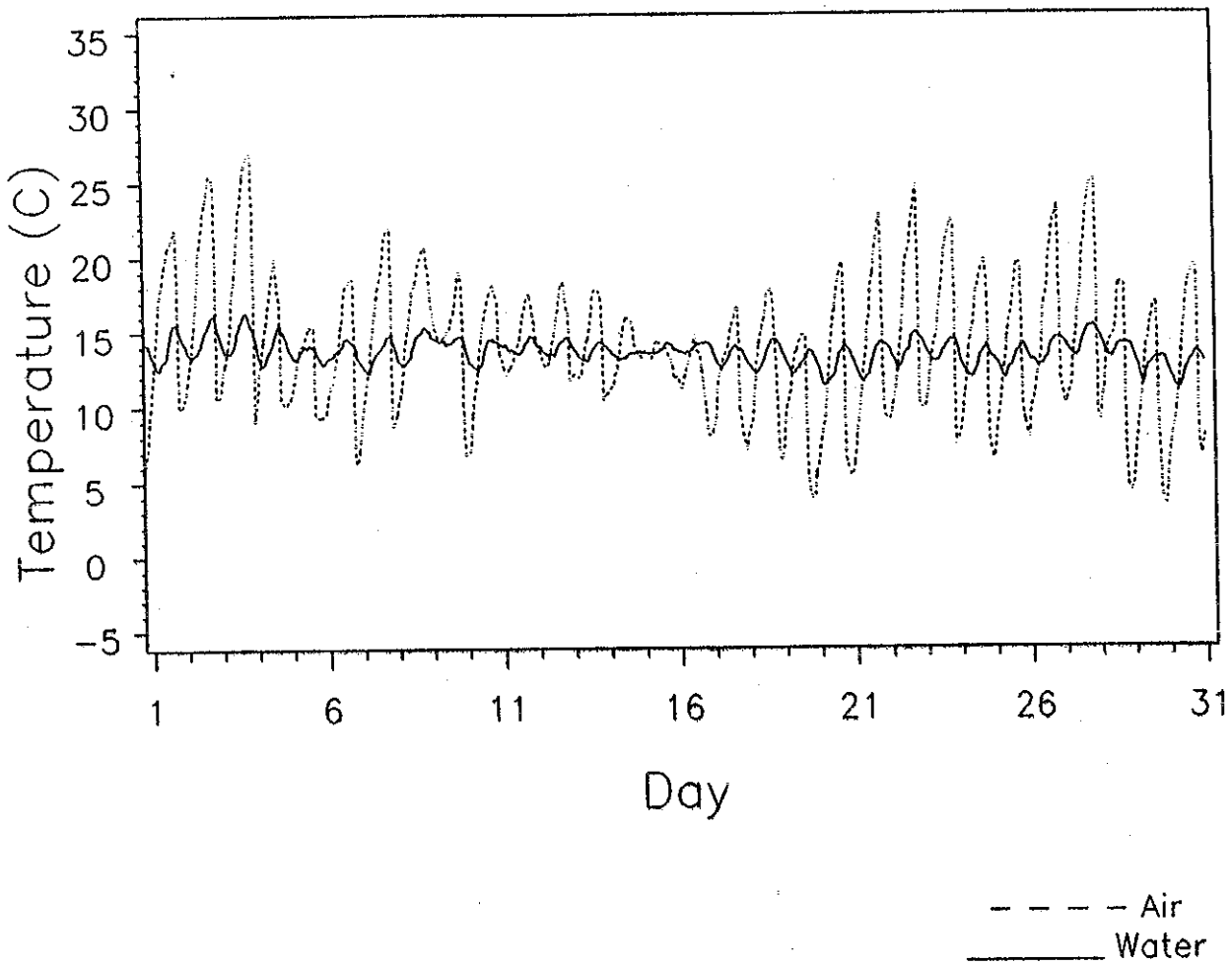
WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

LITTLE DESCHUTES CREEK

YEAR=1988 MONTH=AUGUST



TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

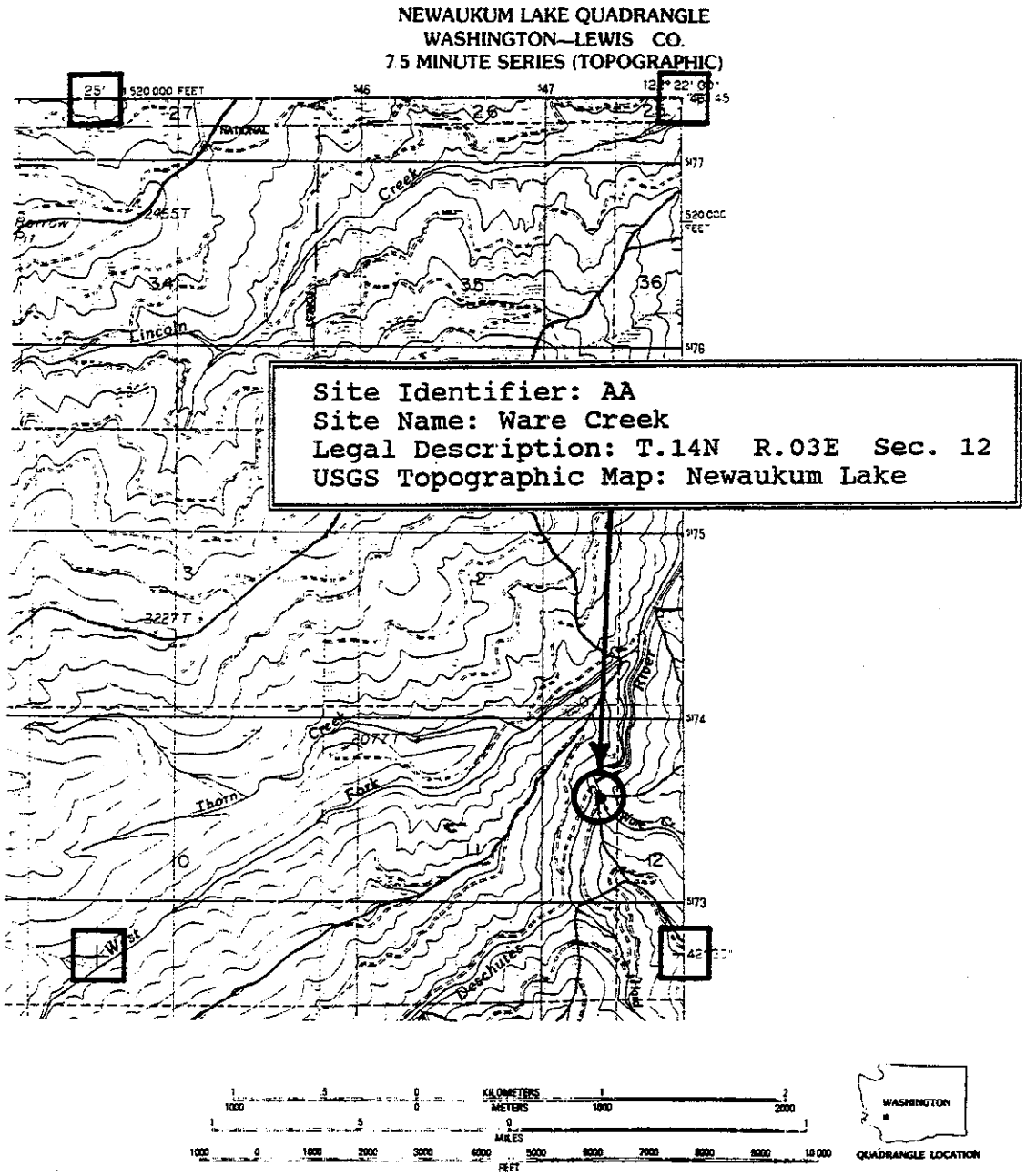
LITTLE DESCHUTES CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	12.1	13.6	18.3	14.3	6.2	12.7	12.1	1.6
02AUG	16.3	14.0	21.9	15.5	10.1	12.5	11.8	3.0
03AUG	18.4	14.6	25.5	16.2	10.6	13.4	14.9	2.8
04AUG	19.6	14.8	26.9	16.2	9.0	13.7	17.9	2.5
05AUG	14.2	14.1	19.9	15.2	10.4	12.8	9.5	2.4
06AUG	12.4	13.5	15.7	14.0	9.5	13.0	6.2	1.0
07AUG	13.1	13.8	18.5	14.5	6.2	12.7	12.3	1.8
08AUG	15.6	13.6	22.0	14.8	8.6	12.2	13.4	2.6
09AUG	16.7	14.2	20.6	15.2	10.1	13.1	10.5	2.1
10AUG	14.7	14.4	18.9	14.6	6.8	13.4	12.1	1.2
11AUG	14.0	13.6	18.2	14.4	6.9	12.6	11.3	1.8
12AUG	14.6	14.0	17.4	14.5	12.3	13.6	5.1	0.9
13AUG	14.7	13.9	18.3	14.3	11.8	13.5	6.5	0.8
14AUG	14.1	13.7	17.7	14.3	10.3	13.1	7.4	1.2
15AUG	13.7	13.5	15.6	13.8	11.0	13.3	4.6	0.5
16AUG	13.2	13.7	14.2	14.0	11.5	13.5	2.7	0.5
17AUG	11.6	13.9	14.7	14.2	8.0	13.3	6.7	0.9
18AUG	12.1	13.3	16.7	14.0	7.1	12.6	9.6	1.4
19AUG	12.8	13.3	17.5	14.2	6.4	12.4	11.1	1.8
20AUG	9.8	12.9	14.7	13.7	4.1	12.1	10.6	1.6
21AUG	11.8	12.7	19.5	13.8	5.4	11.4	14.1	2.4
22AUG	14.2	13.0	22.9	14.0	6.8	11.6	16.1	2.4
23AUG	15.8	13.8	24.7	14.8	9.5	12.5	15.2	2.3
24AUG	15.6	13.6	22.3	14.4	7.4	13.0	14.9	1.4
25AUG	13.8	13.0	19.8	14.1	6.5	11.9	13.3	2.2
26AUG	13.3	13.0	19.6	13.8	7.8	12.0	11.8	1.8
27AUG	15.8	13.6	23.4	14.4	9.9	12.8	13.5	1.6
28AUG	17.5	14.4	25.0	15.3	9.0	13.3	16.0	2.0
29AUG	12.3	13.8	18.1	14.6	4.5	13.3	13.6	1.3
30AUG	10.2	12.7	16.8	13.3	3.4	11.5	13.4	1.8
31AUG	13.0	12.4	19.1	13.3	6.7	11.2	12.4	2.1

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY SITE MAP



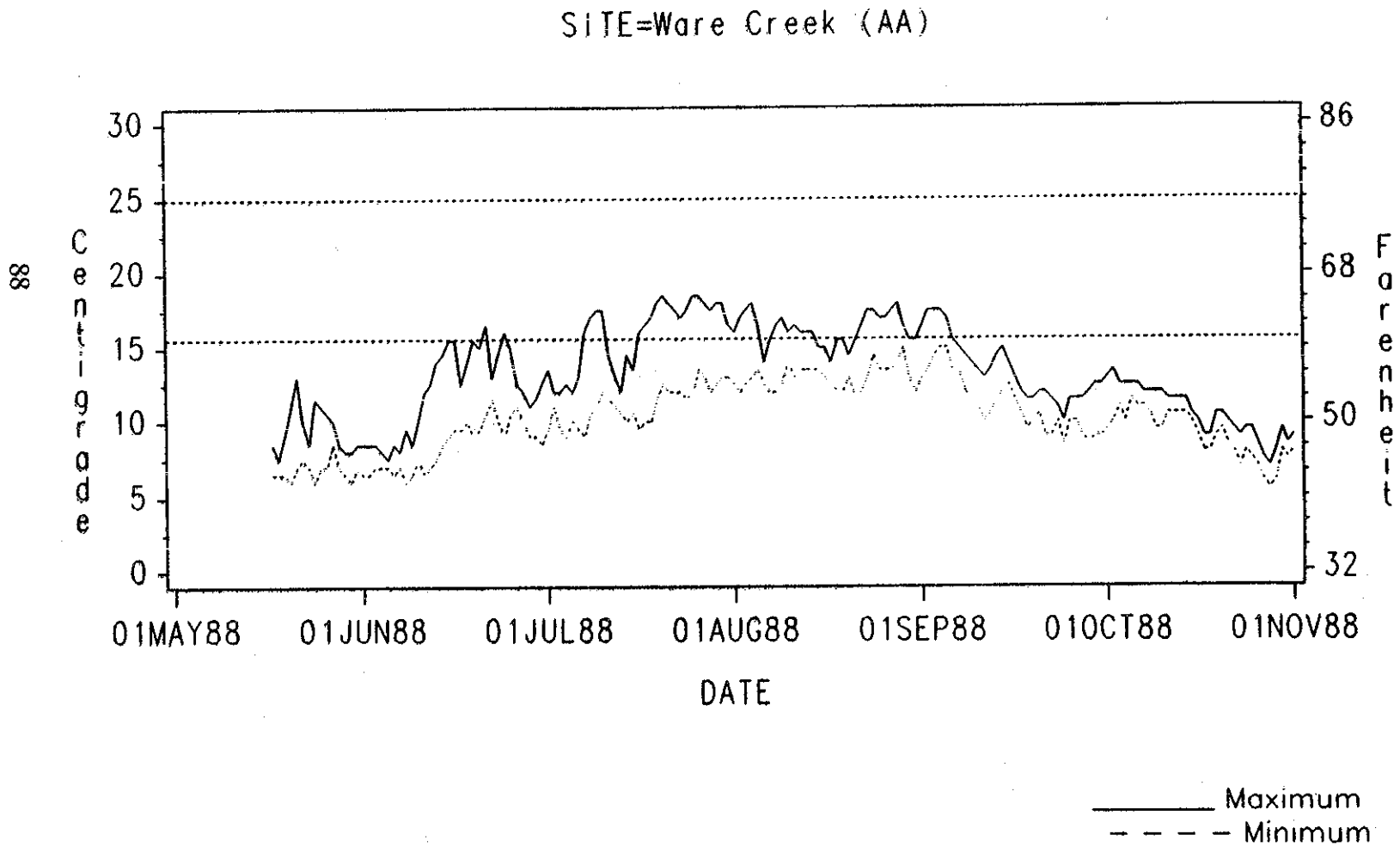
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

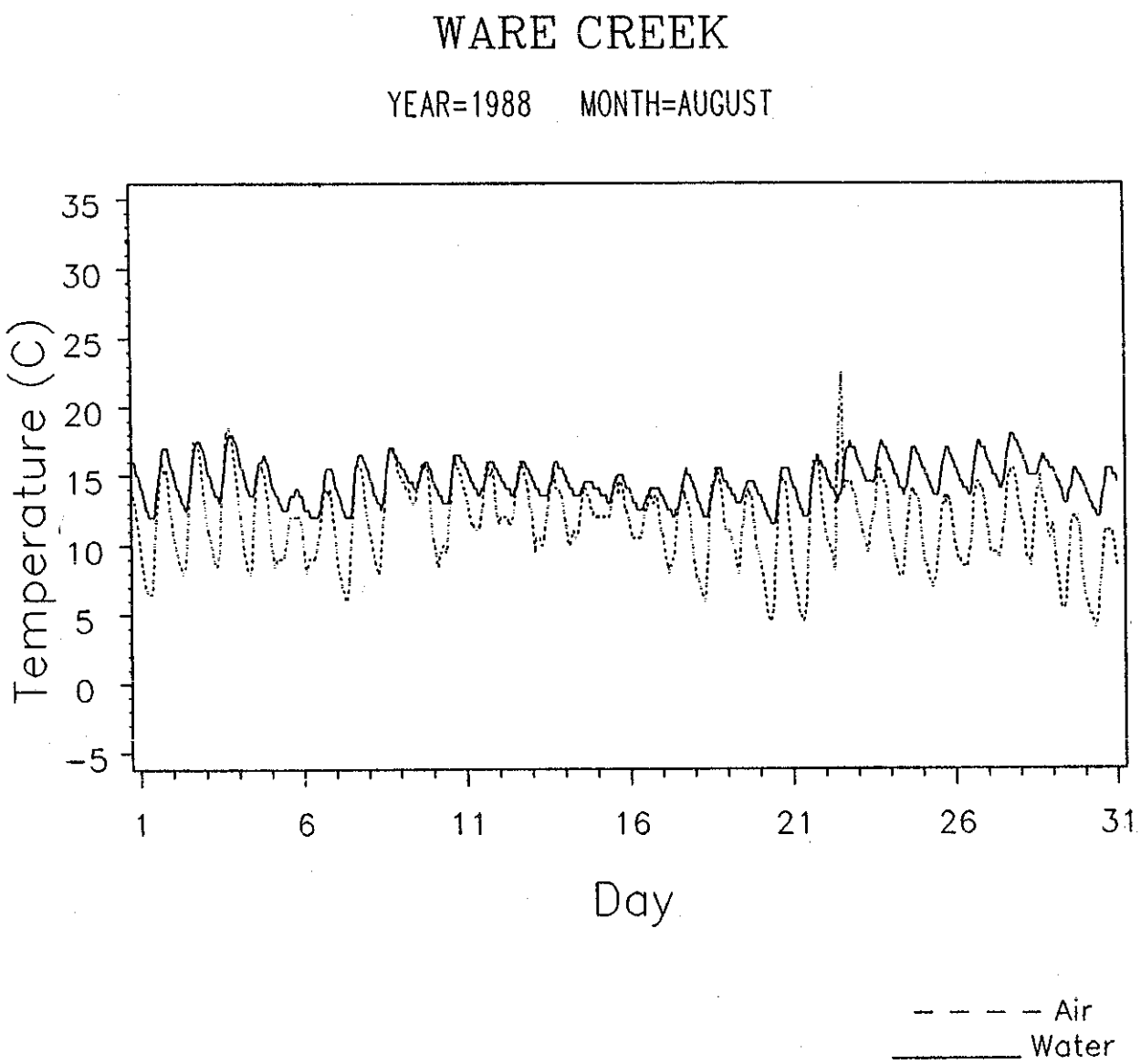
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AA
Stream Name	SITENAMES	Ware Creek
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-11-88
County	COUNTY	Lewis
Nearest town	NEARESTTOWN	Carlson
Township	TOWNSHIP	14N
Range	RANGE	03E
Section	SECTION	12
Site is Tributary To:	TRIBUTARYTO	Deschutes River
Water Resource Inventory Area	WRIA	13
WDF River Segment Identifier	WDFNUMBER	0128
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.715960
Longitude Decimal Degrees (degrees)	LONGDEC	122.411100
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	1
Thermograph Elevation (meters)	ELEVDSM	436
Elevation Top of Thermal Reach (meters)	ELEVUSM	487
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	8.4
Channel Gradient from Autolevel (percent)	GRADLEVEL	8.9
Channel Azimuth (degrees)	AZIMUTH1	303
Drainage Area Above Thermograph (hectares)	AREAHECT	288
Distance to Divide (meters)	DIVIDEMT	3002
Total Length of Perennial Streams (meters)	LENGTHMT	1915
Streamflow at Thermograph (cubic meters/second)	QDSM	0.030
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.017
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.010
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.016
Travel Time (meters/second)	TRAVELM	0.070
Average View To Sky (percent open) (percent)	VIEW1	93
Topographic Angle South (degrees)	TOPOSA	28
Topographic Angle Southeast (degrees)	TOPOSEA	26
Topographic Angle Southwest (degrees)	TOPOSWA	24
Average Forest Angle South (degrees)	FORSA	33
Average Forest Angle Southeast (degrees)	FORSEA	29
Average Forest Angle Southwest (degrees)	FORSWA	31
Percent Overhanging Brush (percent)	OVERBRUSH	7
Buffer Width Right Bank (meters)	BUFWIDRM	0.0
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	12
Vegetation Height West Bank (meters)	VEGHTWM	10
Percent Vegetative Density East (percent)	VEGDENE	0
Percent Vegetative Density West (percent)	VEGDENW	4
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.165
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	1.652
Percent of Channel Composed of Pools (percent)	PERCENPL	46
Average Pool Depth (meters)	DEPTHPM	0.210
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	5
Streambed Composition Cobble (percent)	AVGCOBBLE	15
Streambed Composition Boulder (percent)	AVGBOULDER	80
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


WARE CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

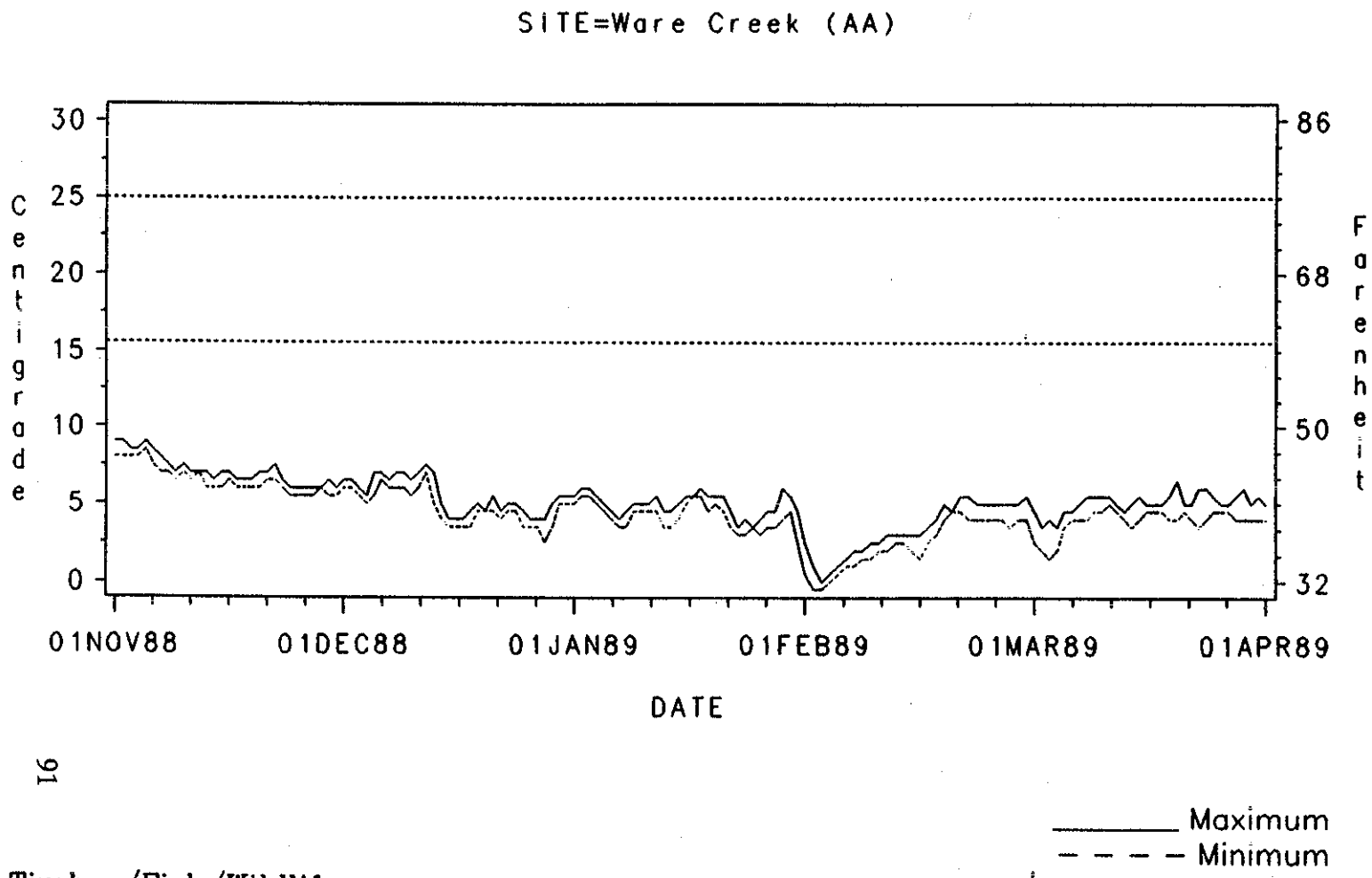
WARE CREEK (tributary to Deschutes River)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	11.0	14.1	14.5	16.0	8.0	12.5	6.5	3.5
02AUG	11.0	14.4	16.5	17.0	6.5	12.0	10.0	5.0
03AUG	12.6	15.1	17.5	17.5	8.0	12.5	9.5	5.0
04AUG	13.4	15.6	18.5	18.0	8.5	13.0	10.0	5.0
05AUG	11.9	15.0	16.0	16.5	8.0	13.5	8.0	3.0
06AUG	10.4	13.3	12.0	14.0	8.5	12.5	3.5	1.5
07AUG	11.0	13.5	14.0	15.5	8.0	12.0	6.0	3.5
08AUG	11.0	14.2	16.0	16.5	6.0	12.0	10.0	4.5
09AUG	12.9	14.9	17.0	17.0	8.0	12.5	9.0	4.5
10AUG	13.9	15.0	16.0	16.0	10.0	14.0	6.0	2.0
11AUG	12.4	14.7	16.5	16.5	8.5	13.0	8.0	3.5
12AUG	13.0	14.8	16.0	16.0	11.0	13.5	5.0	2.5
13AUG	13.3	14.7	16.0	16.0	11.0	13.5	5.0	2.5
14AUG	12.3	14.6	15.5	16.0	9.5	13.5	6.0	2.5
15AUG	12.0	14.1	14.0	15.0	10.0	13.5	4.0	1.5
16AUG	12.9	14.0	15.0	15.0	11.0	13.0	4.0	2.0
17AUG	11.9	13.4	14.0	14.0	10.5	12.5	3.5	1.5
18AUG	10.9	13.5	14.5	15.5	8.0	12.0	6.5	3.5
19AUG	10.9	13.7	15.5	15.5	6.0	12.0	9.5	3.5
20AUG	10.9	13.8	14.0	14.5	8.0	13.0	6.0	1.5
21AUG	9.6	13.6	15.0	15.5	4.5	11.5	10.5	4.0
22AUG	10.4	14.1	16.5	16.5	4.5	12.0	12.0	4.5
23AUG	13.7	15.3	22.5	17.5	8.0	13.0	14.5	4.5
24AUG	12.4	15.7	15.5	17.5	9.5	14.5	6.0	3.0
25AUG	10.8	15.4	14.0	17.0	7.5	13.5	6.5	3.5
26AUG	10.3	15.2	13.5	17.0	7.0	13.5	6.5	3.5
27AUG	11.3	15.5	14.5	17.5	8.5	13.5	6.0	4.0
28AUG	12.1	16.1	15.5	18.0	9.0	14.0	6.5	4.0
29AUG	11.6	15.6	15.0	16.5	8.5	15.0	6.5	1.5
30AUG	8.9	14.4	12.0	15.5	5.5	13.0	6.5	2.5
31AUG	7.9	13.8	11.0	15.5	4.0	12.0	7.0	3.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

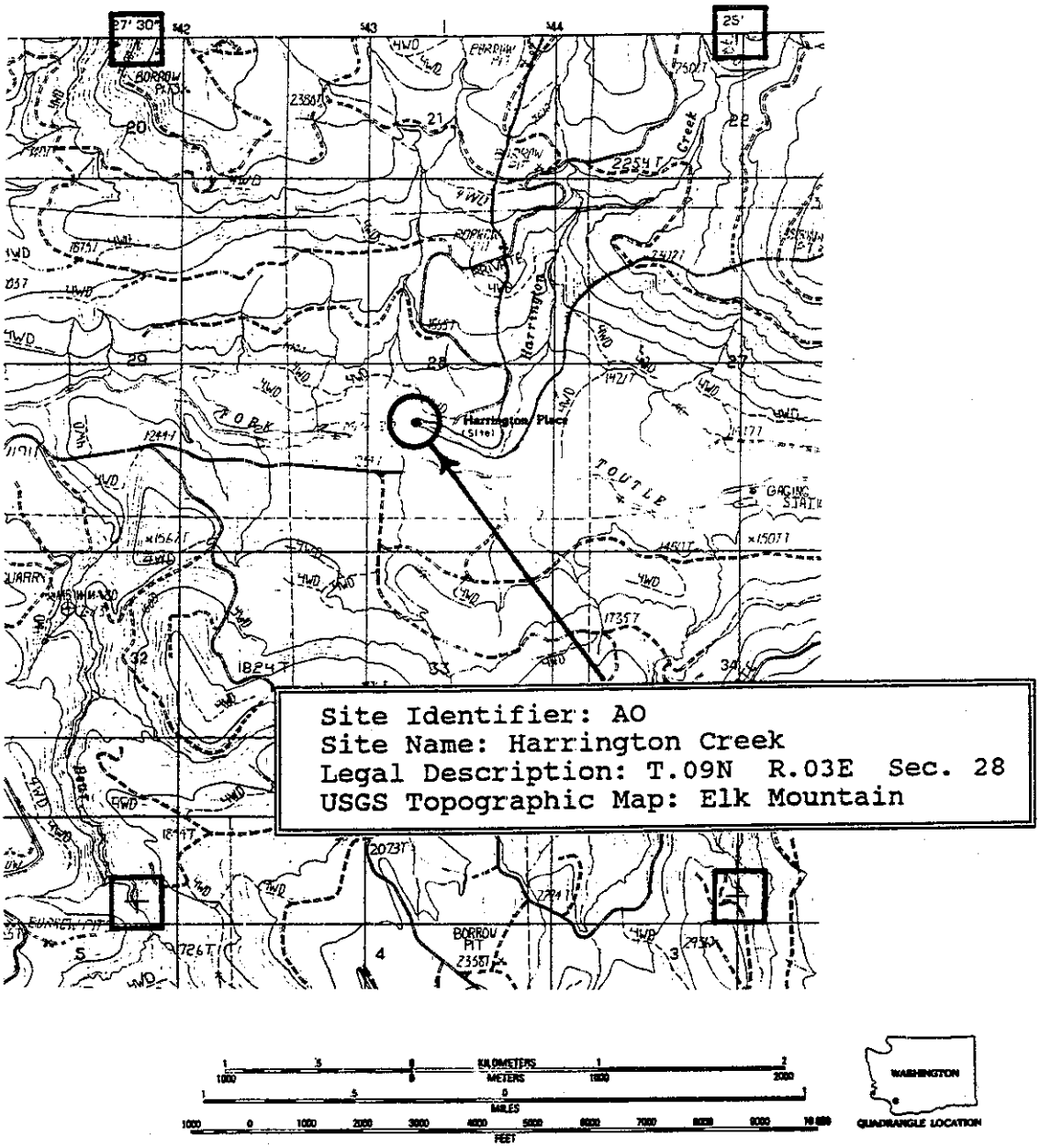
Ware Creek (AA)

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1989 MONTH=JANUARY ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	1.3	5.4	2.5	5.5	-0.5	5.0	3.0	0.5
02JAN	3.4	5.6	5.0	6.0	2.0	5.5	3.0	0.5
03JAN	6.5	5.8	8.0	6.0	5.5	5.5	2.5	0.5
04JAN	2.2	5.3	5.5	5.5	0.0	5.0	5.5	0.5
05JAN	-0.1	4.6	1.0	5.0	-1.0	4.5	2.0	0.5
06JAN	-1.4	4.3	-0.5	4.5	-2.5	4.0	2.0	0.5
07JAN	-3.3	3.6	-2.0	4.0	-5.0	3.5	3.0	0.5
08JAN	0.4	3.9	3.5	4.5	-2.0	3.5	5.5	1.0
09JAN	2.4	4.7	4.0	5.0	1.0	4.5	3.0	0.5
10JAN	0.7	4.6	2.0	5.0	-0.5	4.5	2.5	0.5
11JAN	2.1	4.8	3.5	5.0	0.5	4.5	3.0	0.5
12JAN	3.5	5.0	6.0	5.5	1.5	4.5	4.5	1.0
13JAN	-0.4	4.1	1.5	4.5	-2.0	3.5	3.5	1.0
14JAN	-1.1	4.1	0.0	4.5	-2.0	3.5	2.0	1.0
15JAN	1.0	4.5	3.0	5.0	-0.5	4.0	3.5	1.0
16JAN	4.1	5.2	5.0	5.5	3.0	5.0	2.0	0.5
17JAN	3.6	5.5	5.0	5.5	2.5	5.5	2.5	0.0
18JAN	5.3	5.6	7.5	6.0	2.5	5.5	5.0	0.5
19JAN	-0.2	4.9	2.0	5.5	-2.0	4.5	4.0	1.0
20JAN	2.5	5.3	7.0	5.5	-1.0	5.0	8.0	0.5
21JAN	1.2	4.9	3.5	5.5	-2.0	4.5	5.5	1.0
22JAN	-2.5	3.9	-0.5	4.5	-6.0	3.5	5.5	1.0
23JAN	-5.6	3.2	-2.0	3.5	-7.5	3.0	5.5	0.5
24JAN	-1.6	3.5	0.0	4.0	-5.0	3.0	5.0	1.0
25JAN	-2.1	3.5	-0.5	3.5	-3.5	3.5	3.0	0.0
26JAN	-1.9	3.5	1.5	4.0	-4.0	3.0	5.5	1.0
27JAN	-0.1	3.9	2.5	4.5	-2.5	3.5	5.0	1.0
28JAN	0.5	4.0	4.5	4.5	-2.0	3.5	6.5	1.0
29JAN	6.2	5.1	9.5	6.0	3.5	4.0	6.0	2.0
30JAN	5.8	5.3	7.0	5.5	2.0	4.5	5.0	1.0
31JAN	-1.5	3.2	1.0	4.5	-3.5	2.5	4.5	2.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



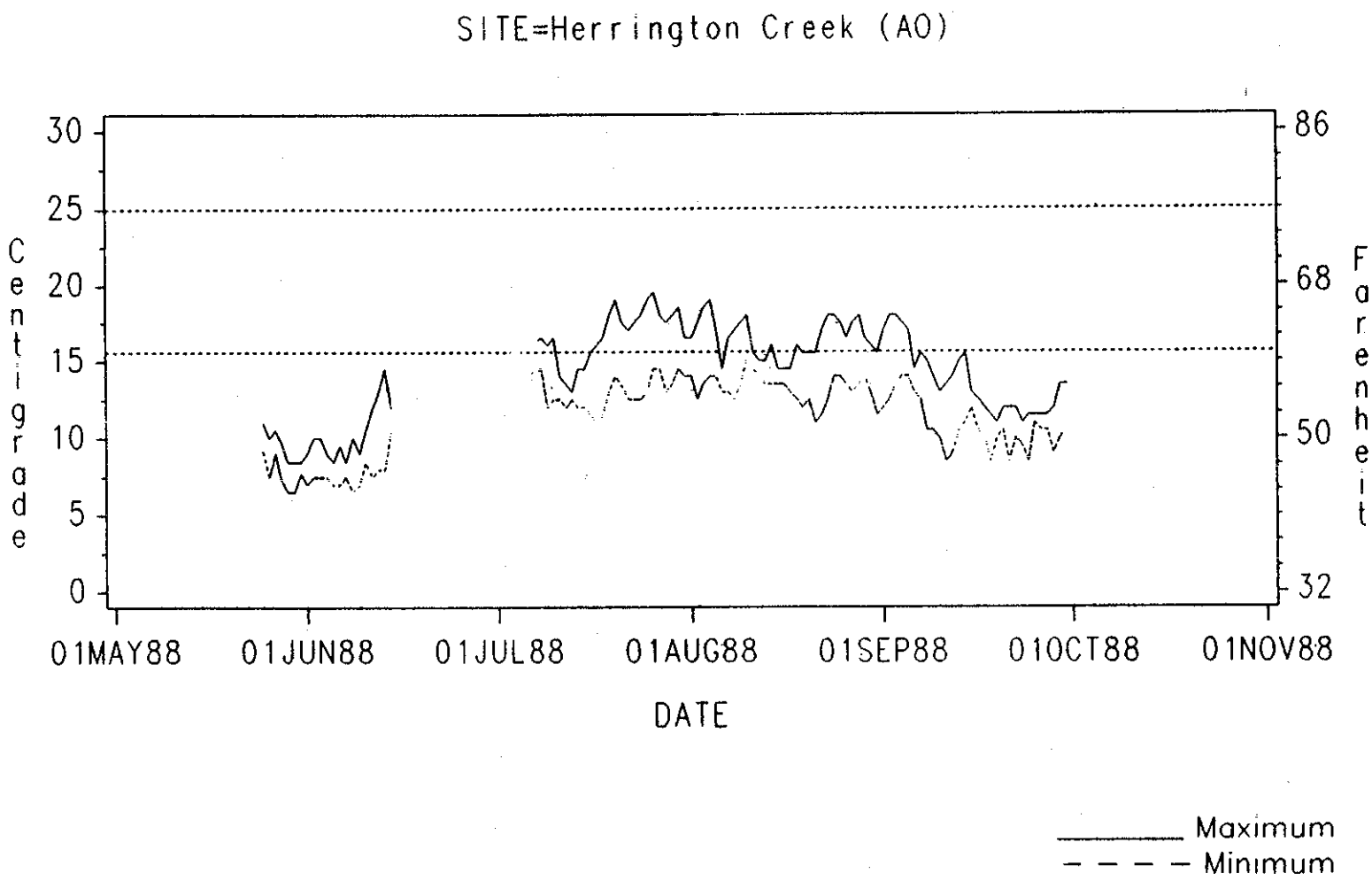
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	AO
Stream Name	SITENAME$	Harrington Creek
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	08-03-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Toutle
Township	TOWNSHIP	09N
Range	RANGE	03E
Section	SECTION	28
Site is Tributary To:	TRIBUTARYTO	S. Fk. Toutle
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0294
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.231340
Longitude Decimal Degrees (degrees)	LONGDEC	122.436100
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	lahars
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	375
Elevation Top of Thermal Reach (meters)	ELEVUSM	387
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.0
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.5
Channel Azimuth (degrees)	AZIMUTH1	276
Drainage Area Above Thermograph (hectares)	AREAHECT	822
Distance to Divide (meters)	DIVIDEMT	6286
Total Length of Perennial Streams (meters)	LENGTHMT	15886
Streamflow at Thermograph (cubic meters/second)	QDSM	0.072
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.075
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.004
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.004
Travel Time (meters/second)	TRAVELM	0.216
Average View To Sky (percent open) (percent)	VIEW1	64
Topographic Angle South (degrees)	TOPOSA	10
Topographic Angle Southeast (degrees)	TOPOSEA	11
Topographic Angle Southwest (degrees)	TOPOSWA	9
Average Forest Angle South (degrees)	FORSA	34
Average Forest Angle Southeast (degrees)	FORSEA	31
Average Forest Angle Southwest (degrees)	FORSWA	35
Percent Overhanging Brush (percent)	OVERBRUSH	23
Buffer Width Right Bank (meters)	BUFWIDRM	0.0
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	5
Vegetation Height West Bank (meters)	VEGHTWM	5
Percent Vegetative Density East (percent)	VEGDENE	6
Percent Vegetative Density West (percent)	VEGDENW	18
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.190
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	2.401
Percent of Channel Composed of Pools (percent)	PERCENPL	43
Average Pool Depth (meters)	DEPTHPM	0.250
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	7
Streambed Composition Gravel (percent)	AVGGRAVEL	45
Streambed Composition Cobble (percent)	AVGCOBBLE	30
Streambed Composition Boulder (percent)	AVGBOULDER	18
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

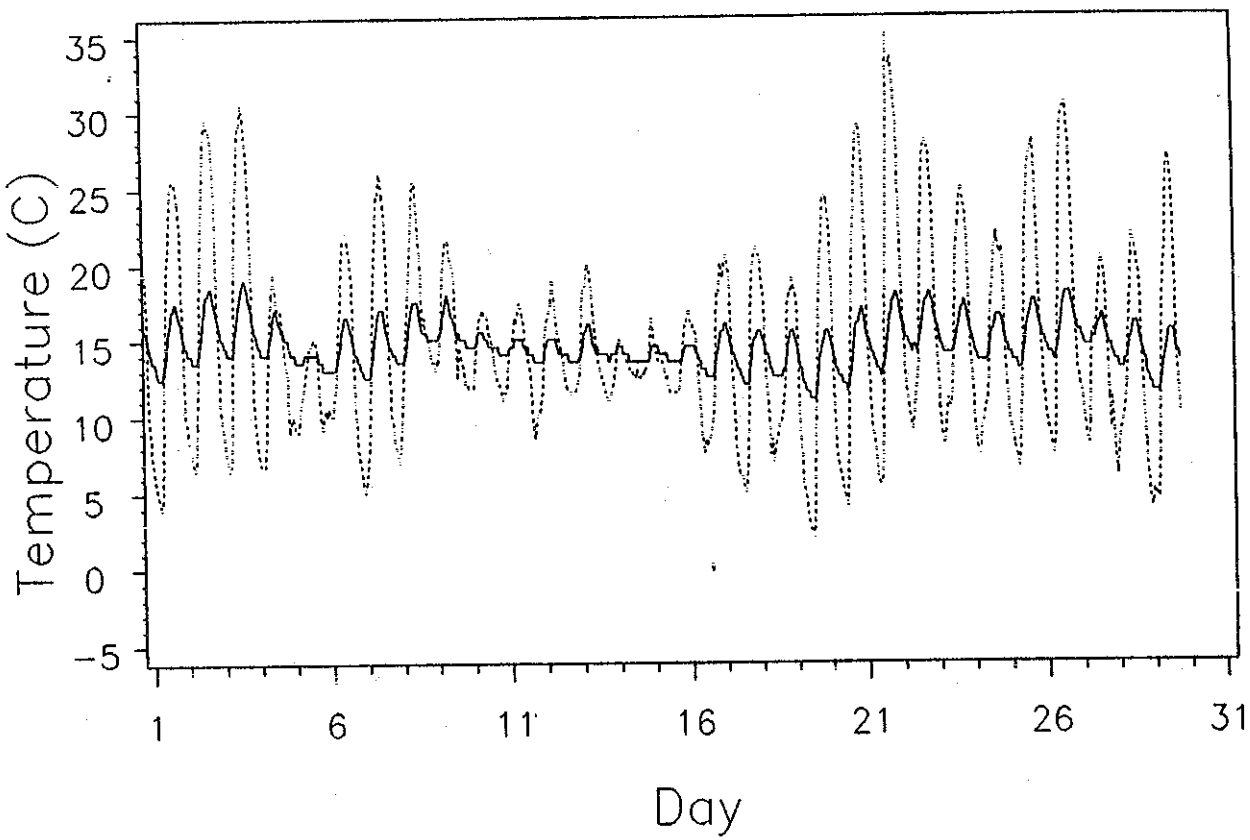
WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

HERRINGTON CREEK

YEAR=1988 MONTH=AUGUST



- - - - Air
_____ Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

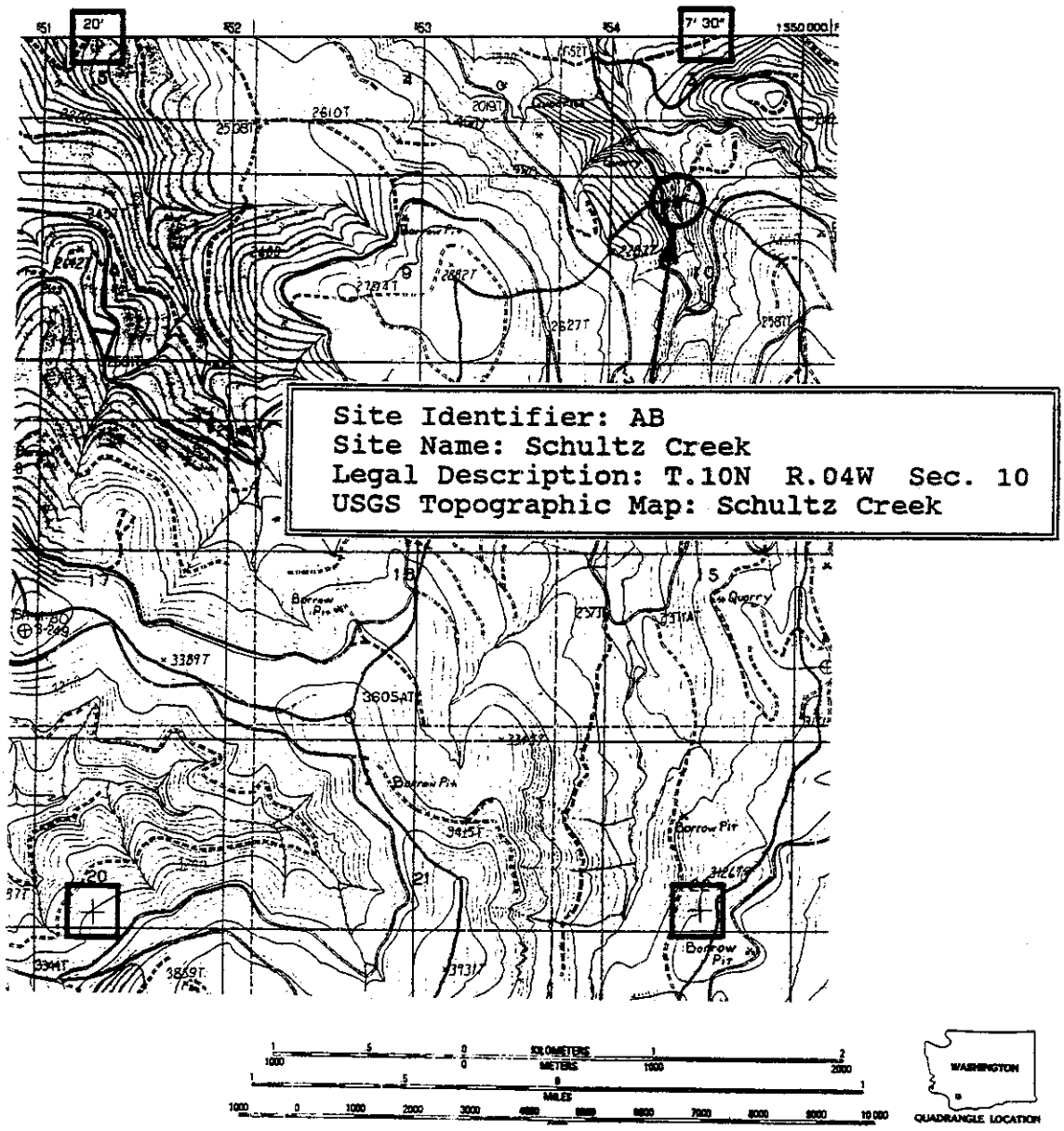
HERRINGTON CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.7	14.9	20.0	16.5	7.5	14.0	12.5	2.5
02AUG	14.8	14.7	25.5	17.5	4.0	12.5	21.5	5.0
03AUG	17.6	15.7	29.5	18.5	6.5	13.5	23.0	5.0
04AUG	18.1	16.1	30.5	19.0	6.5	14.0	24.0	5.0
05AUG	12.9	15.2	19.5	17.0	6.5	14.0	13.0	3.0
06AUG	11.6	13.8	15.0	14.5	9.0	13.0	6.0	1.5
07AUG	14.6	14.3	22.0	16.5	8.5	13.0	13.5	3.5
08AUG	14.8	14.5	26.0	17.0	5.0	12.5	21.0	4.5
09AUG	15.8	15.3	25.5	17.5	7.0	13.5	18.5	4.0
10AUG	16.5	15.9	21.5	18.0	12.5	15.0	9.0	3.0
11AUG	14.2	14.9	17.0	15.5	11.5	14.5	5.5	1.0
12AUG	14.1	14.4	17.5	15.0	11.0	14.0	6.5	1.0
13AUG	13.7	14.2	19.0	15.0	8.5	13.5	10.5	1.5
14AUG	14.7	14.4	20.0	16.0	11.5	13.5	8.5	2.5
15AUG	12.9	14.0	15.0	14.5	11.0	13.5	4.0	1.0
16AUG	13.4	13.9	16.5	14.5	12.0	13.5	4.5	1.0
17AUG	13.4	13.9	17.0	14.5	8.5	13.0	8.5	1.5
18AUG	13.6	13.9	20.5	16.0	7.5	12.5	13.0	3.5
19AUG	12.8	13.7	21.0	15.5	5.0	12.0	16.0	3.5
20AUG	12.0	13.5	19.0	15.5	5.5	12.5	13.5	3.0
21AUG	12.7	13.1	24.5	15.5	2.0	11.0	22.5	4.5
22AUG	15.7	14.1	29.0	17.0	4.0	11.5	25.0	5.5
23AUG	18.8	15.2	36.5	18.0	5.5	12.5	31.0	5.5
24AUG	17.6	15.8	28.0	18.0	9.0	14.0	19.0	4.0
25AUG	15.9	15.2	25.0	17.5	8.0	14.0	17.0	3.5
26AUG	14.2	14.7	22.0	16.5	7.5	13.5	14.5	3.0
27AUG	16.5	15.1	28.0	17.5	6.5	13.0	21.5	4.5
28AUG	18.2	15.7	30.5	18.0	7.5	13.5	23.0	4.5
29AUG	13.7	15.2	20.5	16.5	8.0	14.0	12.5	2.5
30AUG	13.2	14.2	22.0	16.0	6.0	13.0	16.0	3.0
31AUG	13.7	13.3	27.0	15.5	4.0	11.5	23.0	4.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



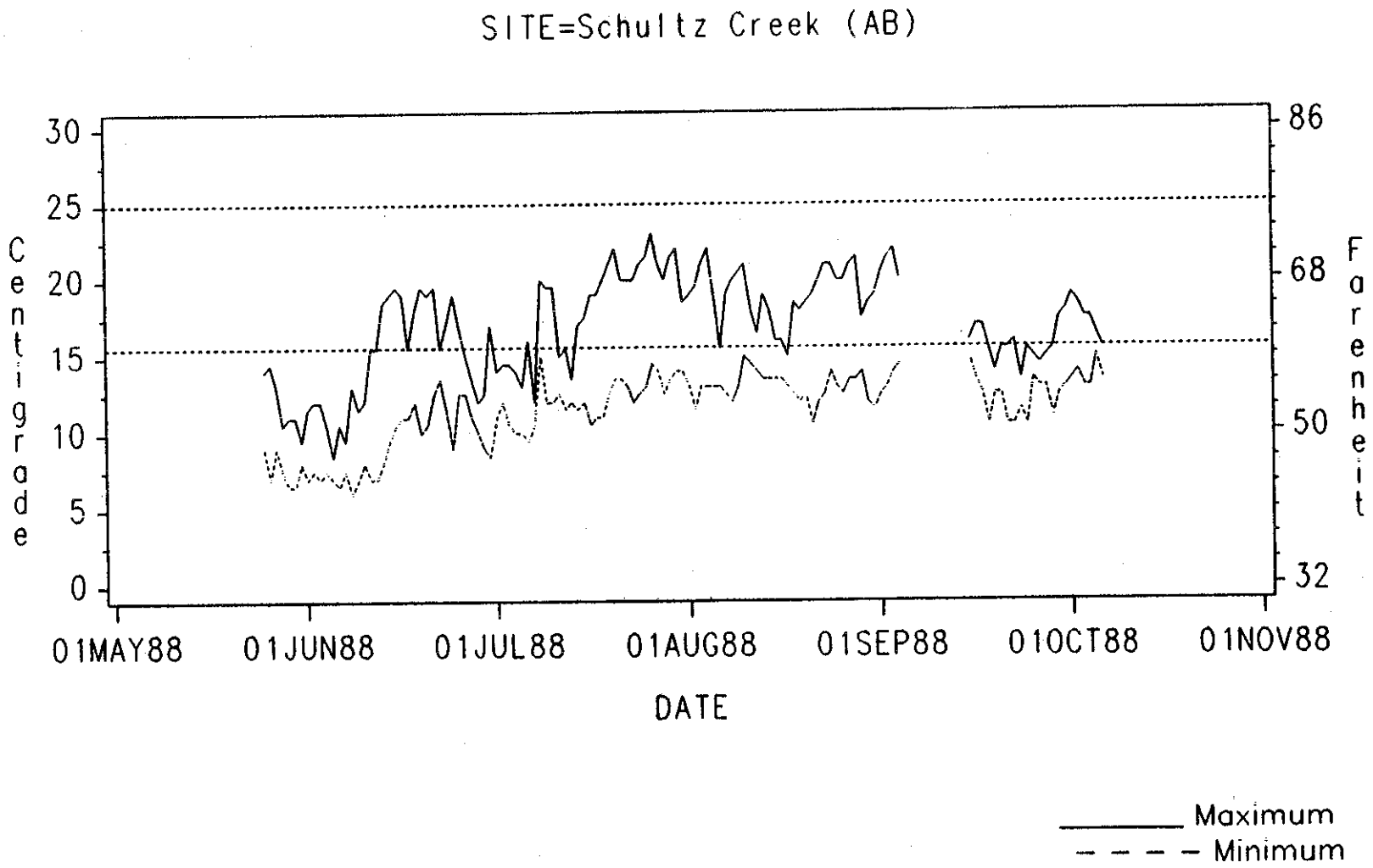
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

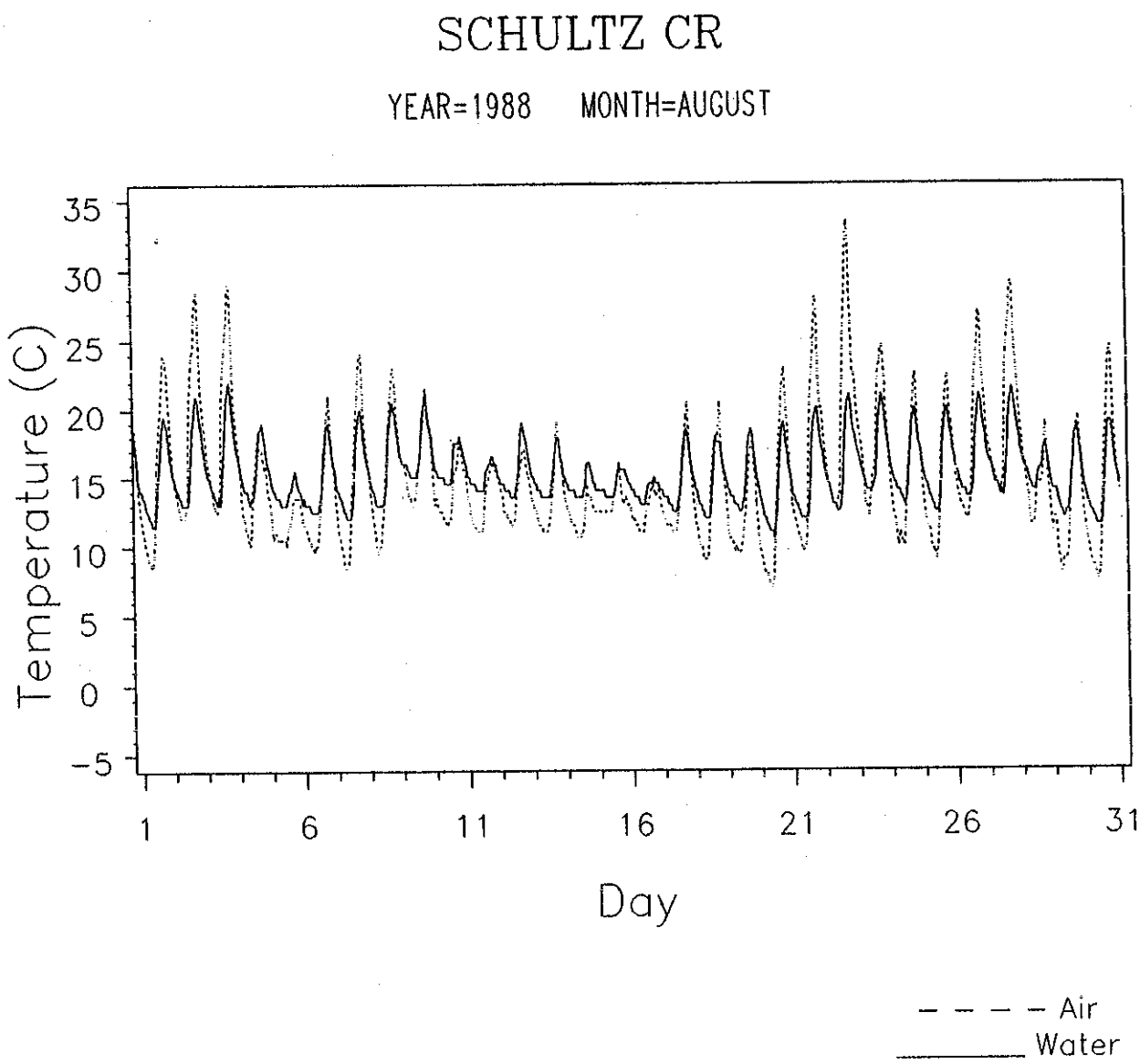
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AB
Stream Name	SITENAMES	Schultz Creek
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	07-28-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Morton
Township	TOWNSHIP	10N
Range	RANGE	04E
Section	SECTION	10
Site is Tributary To:	TRIBUTARYTO	Green River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0359
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.367020
Longitude Decimal Degrees (degrees)	LONGDEC	122.293200
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	tuff
Geomorphic Stream Order	STREAMORDER	2
Thermograph Elevation (meters)	ELEVDSM	540
Elevation Top of Thermal Reach (meters)	ELEVUSM	587
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	7.7
Channel Gradient from Autolevel (percent)	GRADLEVEL	5.5
Channel Azimuth (degrees)	AZIMUTH1	344
Drainage Area Above Thermograph (hectares)	AREAHECT	956
Distance to Divide (meters)	DIVIDEMT	7253
Total Length of Perennial Streams (meters)	LENGTHMT	15223
Streamflow at Thermograph (cubic meters/second)	QDSM	0.038
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.043
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.005
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.002
Travel Time (meters/second)	TRAVELM	0.128
Average View To Sky (percent open) (percent)	VIEW1	94
Topographic Angle South (degrees)	TOPOSA	15
Topographic Angle Southeast (degrees)	TOPOSEA	17
Topographic Angle Southwest (degrees)	TOPOSWA	26
Average Forest Angle South (degrees)	FORSA	13
Average Forest Angle Southeast (degrees)	FORSEA	17
Average Forest Angle Southwest (degrees)	FORSWA	30
Percent Overhanging Brush (percent)	OVERBRUSH	1
Buffer Width Right Bank (meters)	BUFWIDRM	0.0
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	3
Vegetation Height West Bank (meters)	VEGHTWM	2
Percent Vegetative Density East (percent)	VEGDENE	0
Percent Vegetative Density West (percent)	VEGDENW	0
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.293
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	2.085
Percent of Channel Composed of Pools (percent)	PERCENPL	74
Average Pool Depth (meters)	DEPTHPM	0.370
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	3
Streambed Composition Cobble (percent)	AVGCOBBLE	15
Streambed Composition Boulder (percent)	AVGBOULDER	50
Streambed Composition Bedrock (percent)	AVGBEDROCK	32
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


SCHULTZ CR
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

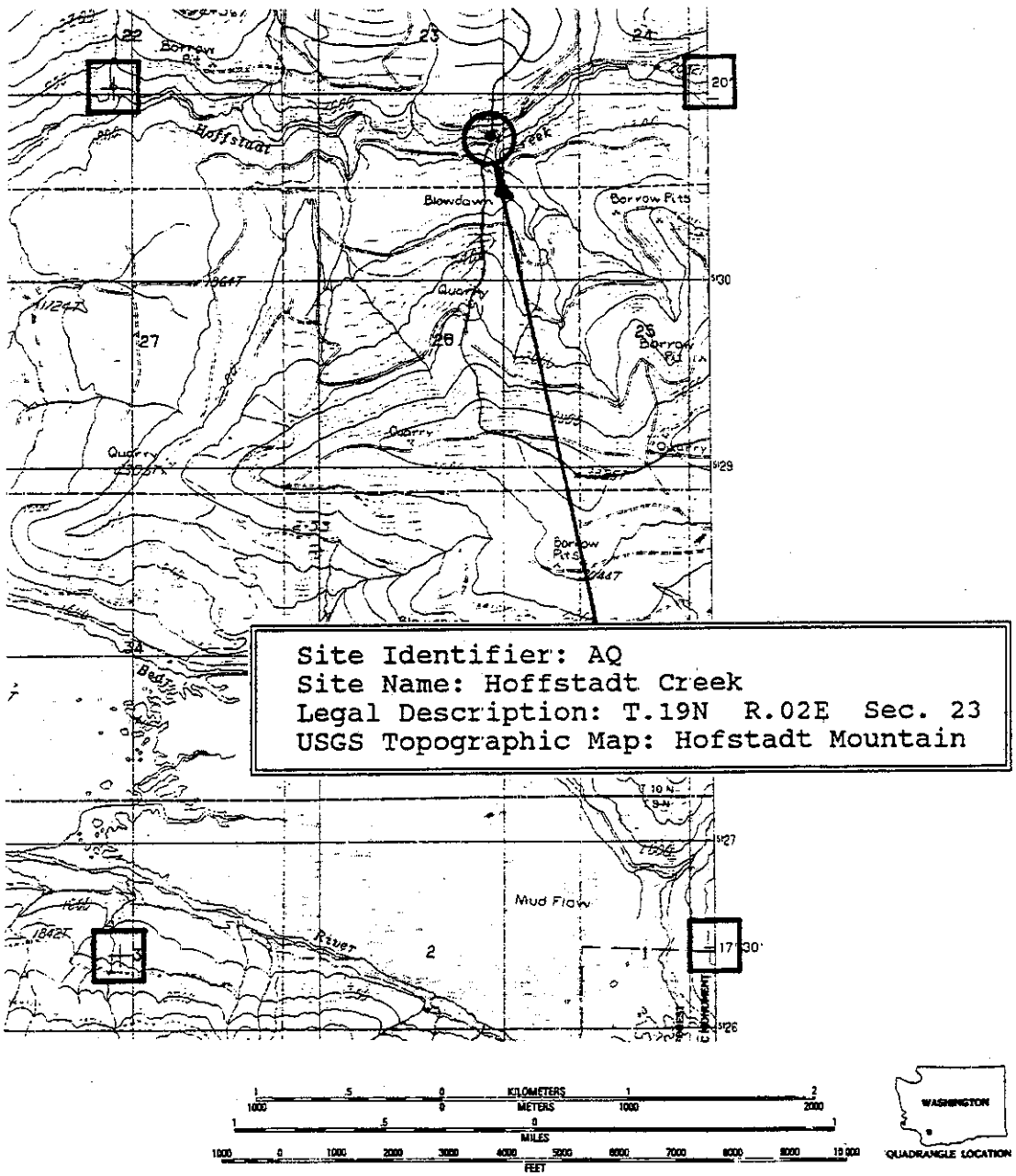
SCHULTZ CREEK

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.2	14.9	19.0	19.0	9.0	13.0	10.0	6.0
02AUG	15.5	14.9	24.0	19.5	8.5	11.5	15.5	8.0
03AUG	18.6	16.1	28.5	21.0	12.0	13.0	16.5	8.0
04AUG	19.0	16.5	29.0	22.0	12.5	13.0	16.5	9.0
05AUG	13.8	15.4	18.0	19.0	10.0	13.0	8.0	6.0
06AUG	11.7	13.8	13.5	15.5	10.0	13.0	3.5	2.5
07AUG	13.6	14.8	21.0	19.0	9.5	12.5	11.5	6.5
08AUG	15.1	15.2	24.0	20.0	8.5	12.0	15.5	8.0
09AUG	15.6	15.9	23.0	20.5	9.5	13.0	13.5	7.5
10AUG	15.9	16.9	21.5	21.0	13.0	15.0	8.5	6.0
11AUG	14.0	15.8	18.0	18.0	11.5	14.5	6.5	3.5
12AUG	13.4	15.0	16.0	16.5	11.0	14.0	5.0	2.5
13AUG	13.8	15.4	17.0	19.0	11.5	13.5	5.5	5.5
14AUG	13.5	14.9	19.0	18.0	11.0	13.5	8.0	4.5
15AUG	12.1	14.3	14.5	16.0	10.5	13.5	4.0	2.5
16AUG	13.3	14.4	15.5	16.0	12.0	13.5	3.5	2.5
17AUG	12.6	13.9	14.5	15.0	11.0	13.0	3.5	2.0
18AUG	13.8	14.7	20.5	18.5	11.0	12.5	9.5	6.0
19AUG	13.4	14.5	20.5	18.0	9.0	12.0	11.5	6.0
20AUG	12.1	14.6	17.5	18.5	9.0	12.5	8.5	6.0
21AUG	13.5	14.0	23.0	19.0	7.0	10.5	16.0	8.5
22AUG	16.9	15.1	28.0	20.0	9.5	12.0	18.5	8.0
23AUG	20.2	16.0	33.5	21.0	13.0	12.5	20.5	8.5
24AUG	17.4	16.5	24.5	21.0	12.0	14.0	12.5	7.0
25AUG	14.9	15.7	22.5	20.0	10.0	13.0	12.5	7.0
26AUG	14.9	15.6	22.5	20.0	9.0	12.5	13.5	7.5
27AUG	17.9	16.3	27.0	21.0	12.0	13.5	15.0	7.5
28AUG	20.0	16.8	29.0	21.5	13.5	13.5	15.5	8.0
29AUG	14.1	15.3	19.0	17.5	11.0	14.0	8.0	3.5
30AUG	12.7	14.6	19.5	18.5	8.0	12.0	11.5	6.5
31AUG	14.4	14.5	24.5	19.0	7.5	11.5	17.0	7.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



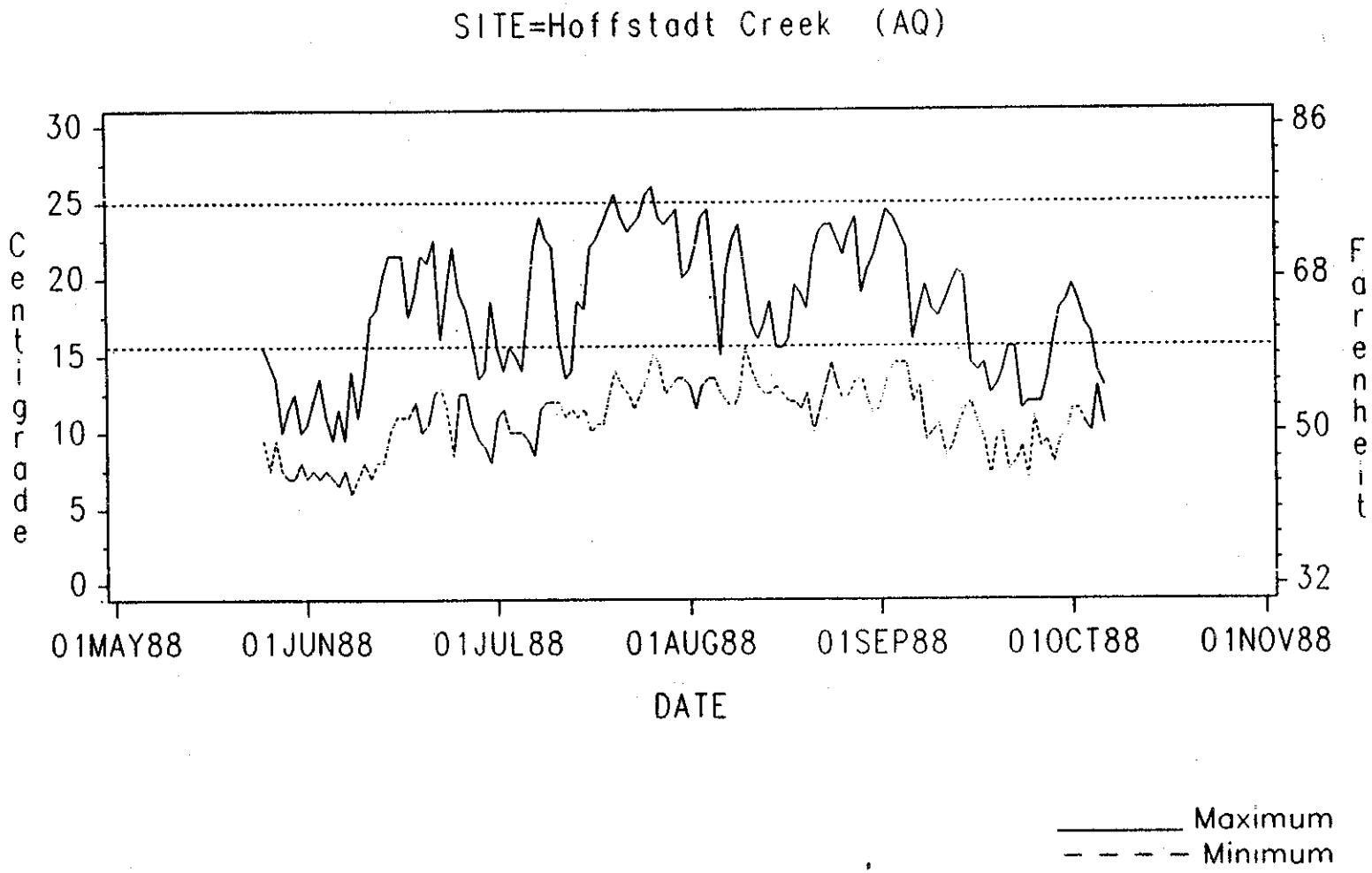
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

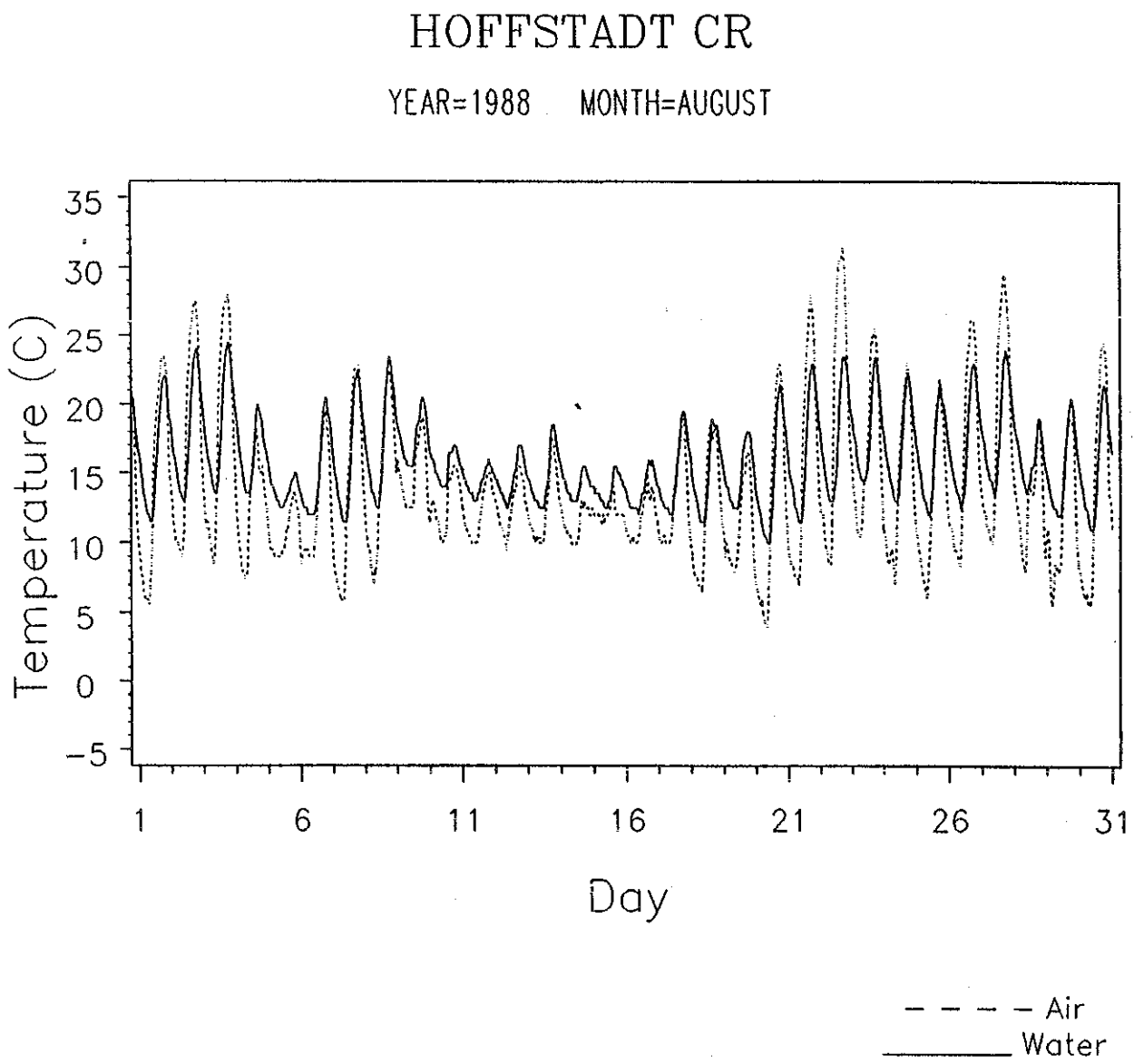
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AQ
Stream Name	SITENAMES	Hoffstadt Creek
Cooperator	COOPERATOR	WEYCO
Cooperator/contact	COOPCONTACT	John Heffner
Date of Site Visit	VISIT	08-08-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Toutle
Township	TOWNSHIP	10N
Range	RANGE	03E
Section	SECTION	23
Site is Tributary To:	TRIBUTARYTO	N. Fk. Toutle River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0396
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.330810
Longitude Decimal Degrees (degrees)	LONGDEC	122.394900
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	tuff
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	587
Elevation Top of Thermal Reach (meters)	ELEVUSM	600
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.1
Channel Gradient from Autolevel (percent)	GRADLEVEL	2.0
Channel Azimuth (degrees)	AZIMUTH1	237
Drainage Area Above Thermograph (hectares)	AREAHECT	2564
Distance to Divide (meters)	DIVIDEMT	7331
Total Length of Perennial Streams (meters)	LENGTHMT	41764
Streamflow at Thermograph (cubic meters/second)	QDSM	0.101
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.117
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.027
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.002
Travel Time (meters/second)	TRAVELM	0.171
Average View To Sky (percent open) (percent)	VIEW1	100
Topographic Angle South (degrees)	TOPOSA	20
Topographic Angle Southeast (degrees)	TOPOSEA	19
Topographic Angle Southwest (degrees)	TOPOSWA	14
Average Forest Angle South (degrees)	FORSA	13
Average Forest Angle Southeast (degrees)	FORSEA	13
Average Forest Angle Southwest (degrees)	FORSWA	13
Percent Overhanging Brush (percent)	OVERBRUSH	0
Buffer Width Right Bank (meters)	BUFWIDRM	0.6
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	5
Vegetation Height West Bank (meters)	VEGHTWM	4
Percent Vegetative Density East (percent)	VEGDENE	0
Percent Vegetative Density West (percent)	VEGDENW	0
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.230
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	4.539
Percent of Channel Composed of Pools (percent)	PERCENPL	54
Average Pool Depth (meters)	DEPTHPM	0.320
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	5
Streambed Composition Cobble (percent)	AVGCOBBLE	32
Streambed Composition Boulder (percent)	AVGBOULDER	30
Streambed Composition Bedrock (percent)	AVGBEDROCK	33
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


HOFFSTADT CR
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

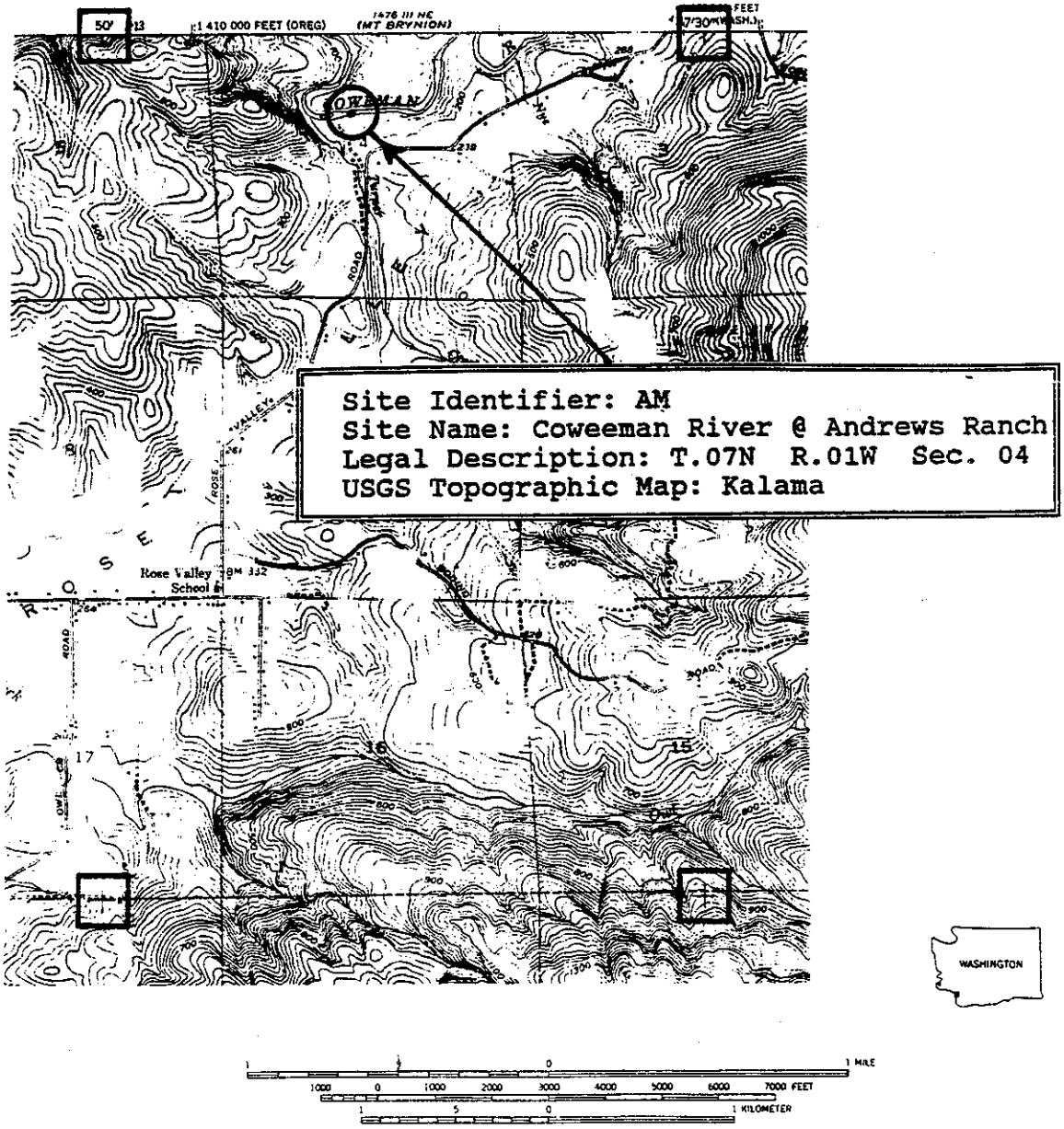
HOFFSTADT CR.

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	12.4	15.9	18.5	20.5	7.5	13.0	11.0	7.5
02AUG	14.7	16.4	23.5	22.0	5.5	11.5	18.0	10.5
03AUG	17.7	18.0	27.5	24.0	9.0	13.0	18.5	11.0
04AUG	18.1	18.5	28.0	24.5	8.5	13.5	19.5	11.0
05AUG	12.5	16.3	18.5	20.0	7.5	13.5	11.0	6.5
06AUG	10.6	13.6	13.5	15.0	8.5	12.5	5.0	2.5
07AUG	12.7	15.3	19.5	20.5	8.0	12.0	11.5	8.5
08AUG	14.1	16.3	23.0	22.5	5.5	11.5	17.5	11.0
09AUG	14.9	17.3	22.5	23.5	7.0	12.5	15.5	11.0
10AUG	14.6	17.4	19.0	20.5	11.5	15.5	7.5	5.0
11AUG	12.9	15.4	15.5	17.0	10.0	14.0	5.5	3.0
12AUG	12.2	14.3	15.0	16.0	10.0	13.0	5.0	3.0
13AUG	12.6	14.6	15.5	17.0	9.5	12.5	6.0	4.5
14AUG	12.6	14.8	17.5	18.5	10.0	12.5	7.5	6.0
15AUG	11.4	14.1	13.0	15.5	9.5	13.0	3.5	2.5
16AUG	12.1	13.8	14.0	15.5	10.5	12.5	3.5	3.0
17AUG	11.8	13.8	15.0	16.0	10.0	12.0	5.0	4.0
18AUG	13.1	15.1	19.0	19.5	9.0	12.0	10.0	7.5
19AUG	12.6	15.0	18.5	19.0	6.5	11.5	12.0	7.5
20AUG	11.1	14.8	16.5	18.0	6.5	12.5	10.0	5.5
21AUG	12.8	14.9	23.0	21.5	4.0	10.0	19.0	11.5
22AUG	16.2	16.6	28.0	23.0	7.0	11.5	21.0	11.5
23AUG	19.5	17.7	31.5	23.5	8.5	13.0	23.0	10.5
24AUG	16.8	18.1	25.5	23.5	10.5	14.5	15.0	9.0
25AUG	14.4	17.1	23.0	22.5	7.0	13.0	16.0	9.5
26AUG	13.3	16.4	22.0	21.5	6.0	12.0	16.0	9.5
27AUG	16.7	17.3	26.5	23.0	8.0	12.5	18.5	10.5
28AUG	18.6	18.2	29.5	24.0	10.0	13.5	19.5	10.5
29AUG	12.9	16.0	19.0	19.0	8.0	13.5	11.0	5.5
30AUG	12.1	15.4	19.0	20.5	5.5	12.0	13.5	8.5
31AUG	14.0	15.6	24.5	21.5	5.5	11.0	19.0	10.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



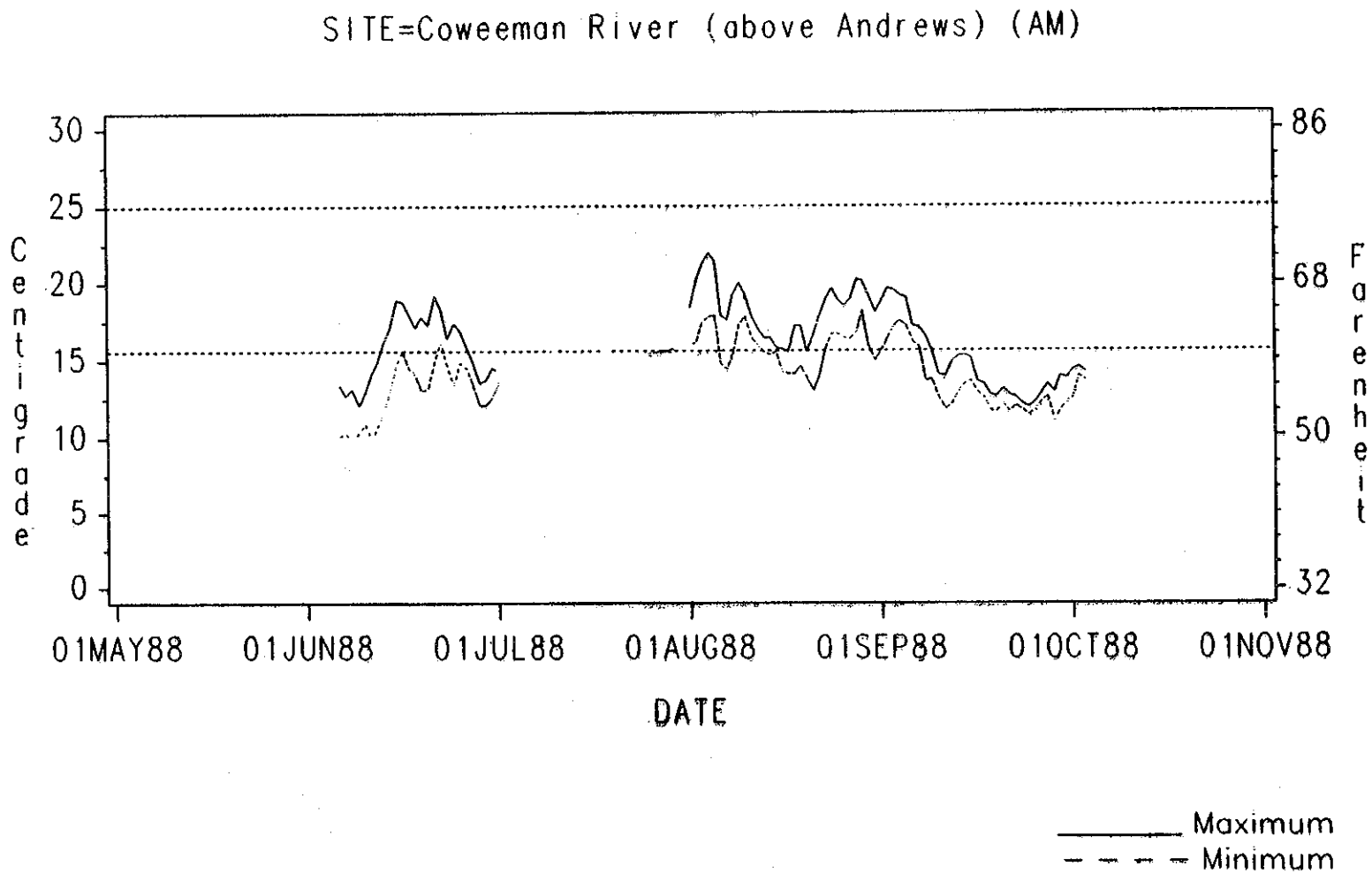
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

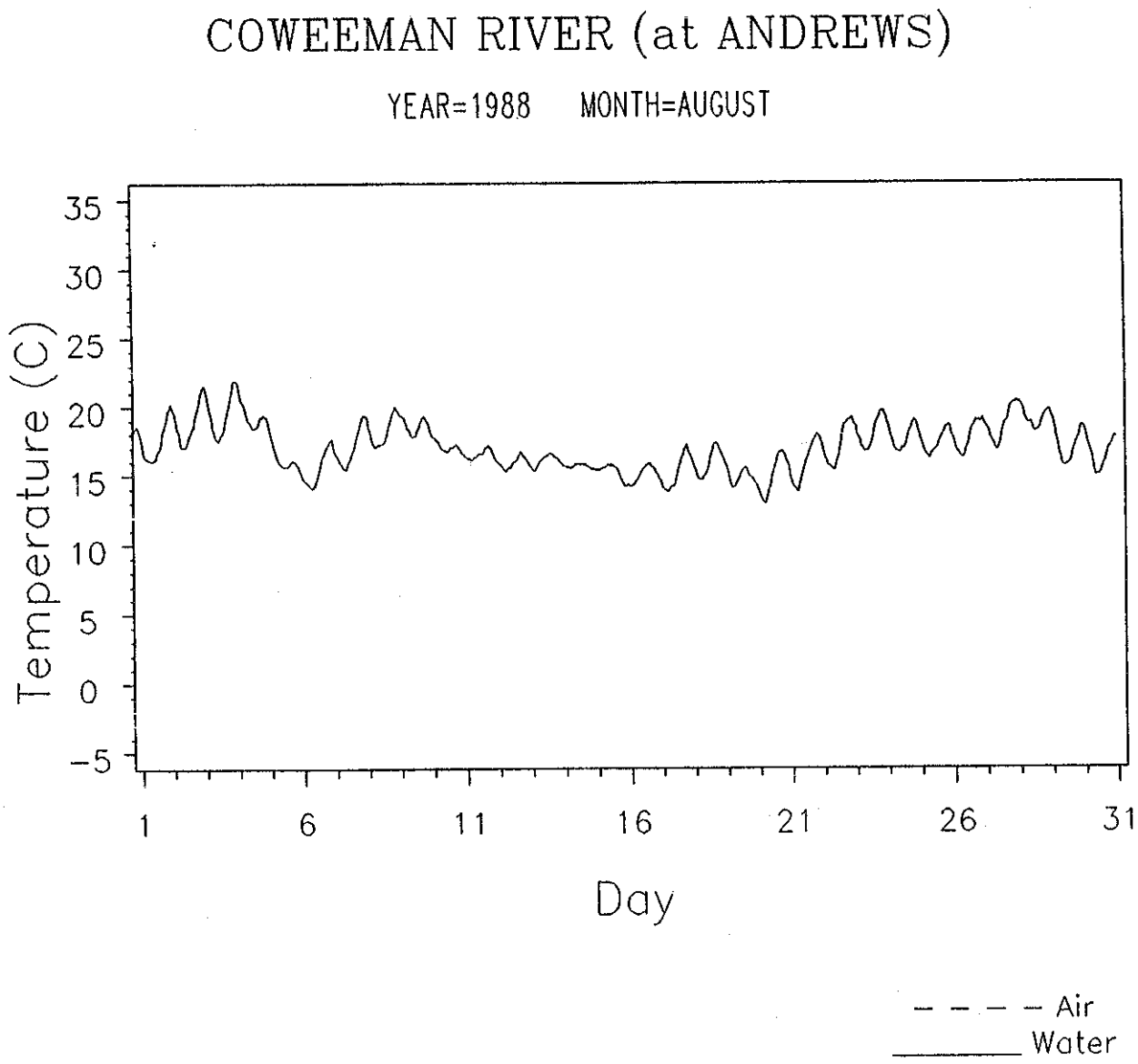
Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	AM
Stream Name	SITENAME$	Coweeman @ Andrws
Cooperator	COOPERATOR	Cowlitz Con.Dis., DNR
Cooperator/contact	COOPCONTACT	Somers, Pryor Marlowe
Date of Site Visit	VISIT	08-01-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Vision Acres
Township	TOWNSHIP	07N
Range	RANGE	01W
Section	SECTION	04
Site is Tributary To:	TRIBUTARYTO	Cowlitz River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0003
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.121140
Longitude Decimal Degrees (degrees)	LONGDEC	122.8161 ,0
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene-Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	5
Thermograph Elevation (meters)	ELEVDSM	27
Elevation Top of Thermal Reach (meters)	ELEVUSM	30
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.5
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	247
Drainage Area Above Thermograph (hectares)	AREAHECT	29345
Distance to Divide (meters)	DIVIDEMT	43789
Total Length of Perennial Streams (meters)	LENGTHMT	308956
Streamflow at Thermograph (cubic meters/second)	QDSM	1.572
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	1.713
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.142
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.005
Travel Time (meters/second)	TRAVELM	0.180
Average View To Sky (percent open) (percent)	VIEW1	72
Topographic Angle South (degrees)	TOPOSA	20
Topographic Angle Southeast (degrees)	TOPOSEA	17
Topographic Angle Southwest (degrees)	TOPOSWA	24
Average Forest Angle South (degrees)	FORSA	52
Average Forest Angle Southeast (degrees)	FORSEA	42
Average Forest Angle Southwest (degrees)	FORSWA	54
Percent Overhanging Brush (percent)	OVERBRUSH	15
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	17
Vegetation Height West Bank (meters)	VEGHTWM	19
Percent Vegetative Density East (percent)	VEGDENE	13
Percent Vegetative Density West (percent)	VEGDENW	24
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.542
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	18.673
Percent of Channel Composed of Pools (percent)	PERCENPL	42
Average Pool Depth (meters)	DEPTHPM	1.000
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	25
Streambed Composition Cobble (percent)	AVGCOBBLE	35
Streambed Composition Boulder (percent)	AVGBOULDER	40
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


COWEEMAN RIVER (at ANDREWS)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
−5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

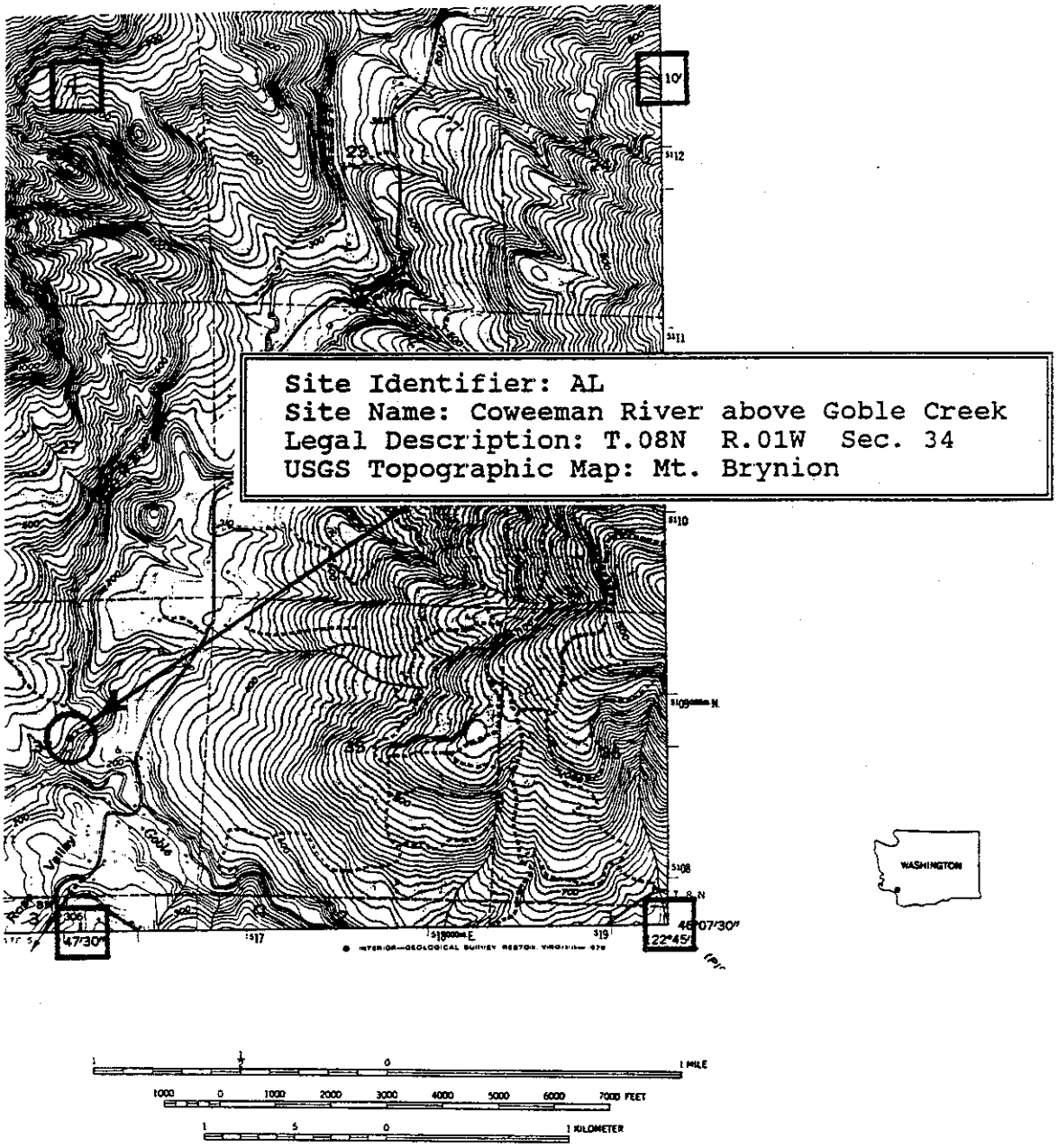
COWEEMAN RIVER (at Andrews)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.8	16.9	22.5	18.4	6.5	15.9	16.0	2.5
02AUG	16.4	17.5	28.0	20.2	7.0	16.2	21.0	4.0
03AUG	18.7	18.9	32.0	21.2	8.5	17.4	23.5	3.8
04AUG	18.8	19.6	32.0	21.9	8.5	17.8	23.5	4.1
05AUG	15.0	19.2	20.5	21.4	11.0	17.9	9.5	3.5
06AUG	12.4	16.0	17.0	17.9	6.5	14.7	10.5	3.2
07AUG	14.0	15.7	23.5	17.6	6.5	14.4	17.0	3.2
08AUG	15.8	17.1	28.0	19.3	6.0	15.4	22.0	3.9
09AUG	17.4	18.3	26.5	20.0	10.5	17.3	16.0	2.7
10AUG	17.2	18.5	23.5	19.2	13.5	17.8	10.0	1.4
11AUG	15.3	17.0	18.5	17.8	13.0	16.4	5.5	1.4
12AUG	15.7	16.5	20.0	17.0	12.0	15.9	8.0	1.1
13AUG	14.3	15.9	19.5	16.4	9.5	15.5	10.0	0.9
14AUG	15.7	16.0	20.5	16.4	13.0	15.3	7.5	1.1
15AUG	14.8	15.6	17.0	15.8	13.0	15.5	4.0	0.3
16AUG	14.5	15.2	16.0	15.7	13.0	14.2	3.0	1.5
17AUG	14.2	15.0	18.0	15.5	9.5	14.1	8.5	1.4
18AUG	14.5	15.4	23.0	17.2	8.5	14.1	14.5	3.1
19AUG	13.9	15.9	23.0	17.2	7.0	14.6	16.0	2.6
20AUG	12.8	14.8	20.0	15.5	8.5	13.8	11.5	1.7
21AUG	14.2	15.1	26.5	16.6	4.5	13.0	22.0	3.6
22AUG	16.8	16.1	31.0	17.9	6.5	14.0	24.5	3.9
23AUG	18.4	17.3	33.5	18.9	8.0	15.7	25.5	3.2
24AUG	17.1	18.1	27.5	19.6	11.0	16.7	16.5	2.9
25AUG	15.5	17.7	26.0	18.9	8.5	16.7	17.5	2.2
26AUG	16.0	17.4	24.0	18.5	11.0	16.4	13.0	2.1
27AUG	17.4	17.8	30.0	18.9	8.5	16.3	21.5	2.6
28AUG	19.2	18.6	32.5	20.2	10.0	16.8	22.5	3.4
29AUG	16.8	19.1	23.5	20.1	9.5	18.2	14.0	1.9
30AUG	14.5	17.2	23.5	19.2	7.0	15.9	16.5	3.3
31AUG	15.3	16.4	27.5	18.1	6.0	14.9	21.5	3.2

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



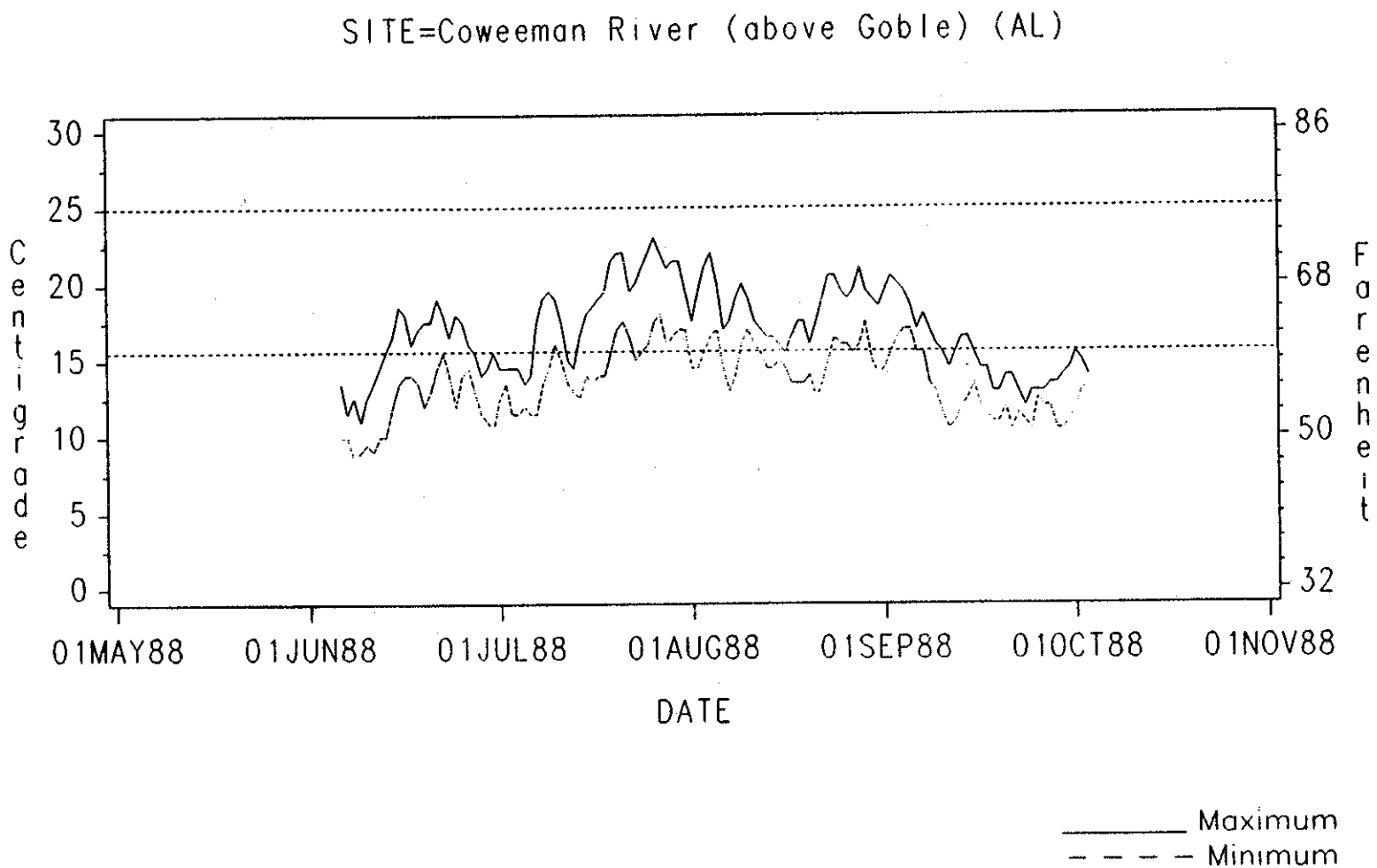
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

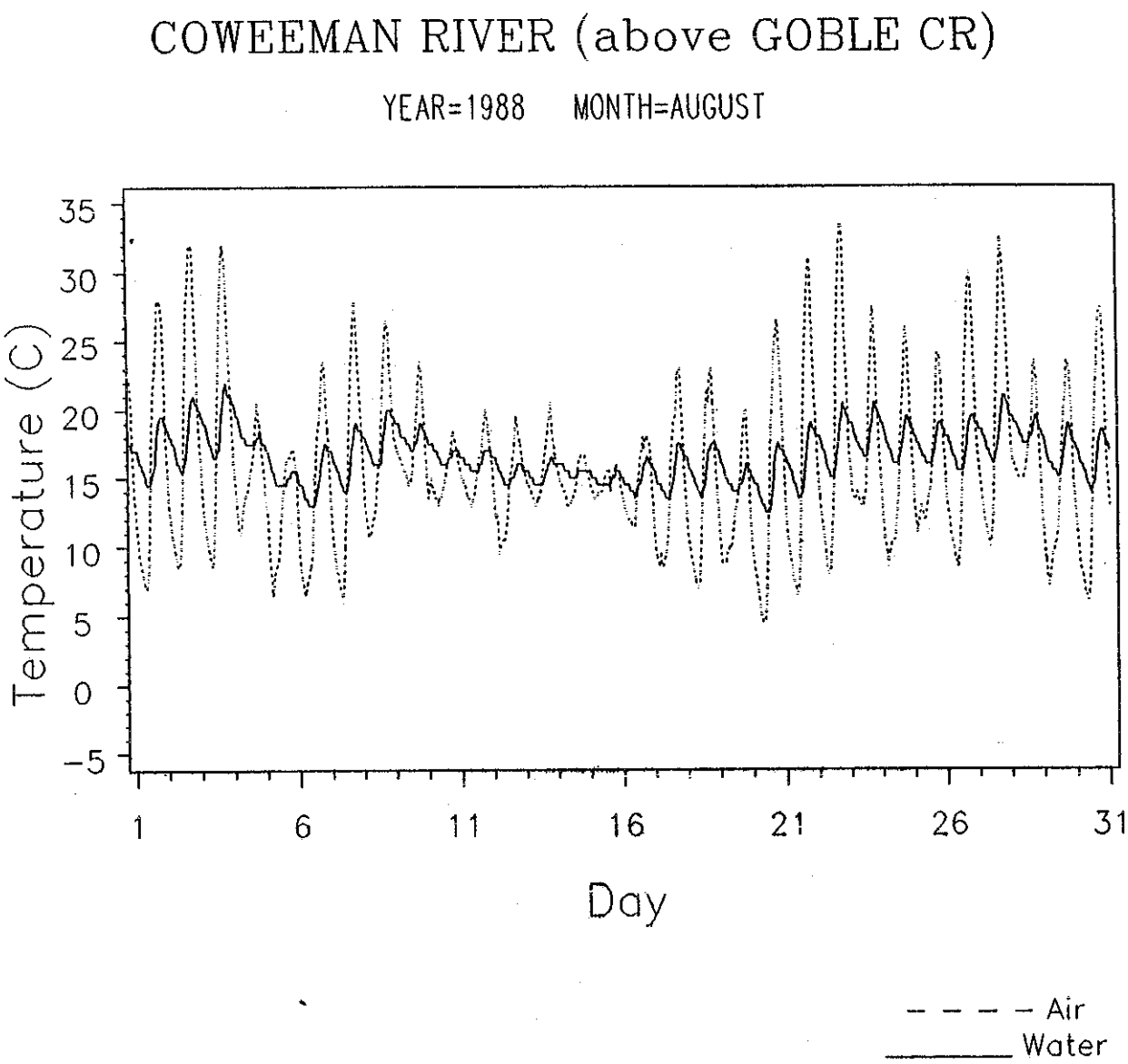
Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	AL
Stream Name	SITENAME$	Coweeman ab Goble
Cooperator	COOPERATOR	Cowlitz Con.Dis., DNR
Cooperator/contact	COOPCONTACT	Somers, Pryor,Marlowe
Date of Site Visit	VISIT	08-01-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Vision Acres
Township	TOWNSHIP	08N
Range	RANGE	01W
Section	SECTION	34
Site is Tributary To:	TRIBUTARYTO	Cowlitz River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0003
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.134540
Longitude Decimal Degrees (degrees)	LONGDEC	122.791500
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene-Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	5
Thermograph Elevation (meters)	ELEVDSM	43
Elevation Top of Thermal Reach (meters)	ELEVUSM	47
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.7
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.0
Channel Azimuth (degrees)	AZIMUTH1	183
Drainage Area Above Thermograph (hectares)	AREAHECT	21714
Distance to Divide (meters)	DIVIDEMT	40683
Total Length of Perennial Streams (meters)	LENGTHMT	222826
Streamflow at Thermograph (cubic meters/second)	QDSM	1.633
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	1.391
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.240
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.007
Travel Time (meters/second)	TRAVELM	0.280
Average View To Sky (percent open) (percent)	VIEW1	78
Topographic Angle South (degrees)	TOPOSA	21
Topographic Angle Southeast (degrees)	TOPOSEA	18
Topographic Angle Southwest (degrees)	TOPOSWA	19
Average Forest Angle South (degrees)	FORSA	39
Average Forest Angle Southeast (degrees)	FORSEA	47
Average Forest Angle Southwest (degrees)	FORSWA	44
Percent Overhanging Brush (percent)	OVERBRUSH	7
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	21
Vegetation Height West Bank (meters)	VEGHTWM	17
Percent Vegetative Density East (percent)	VEGDENE	9
Percent Vegetative Density West (percent)	VEGDENW	1
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.587
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	15.196
Percent of Channel Composed of Pools (percent)	PERCENPL	69
Average Pool Depth (meters)	DEPTHPM	0.920
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	5
Streambed Composition Cobble (percent)	AVGCOBBLE	20
Streambed Composition Boulder (percent)	AVGBOULDER	25
Streambed Composition Bedrock (percent)	AVGBEDROCK	50
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


COWEEMAN RIVER (above GOBLE CR)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
−5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

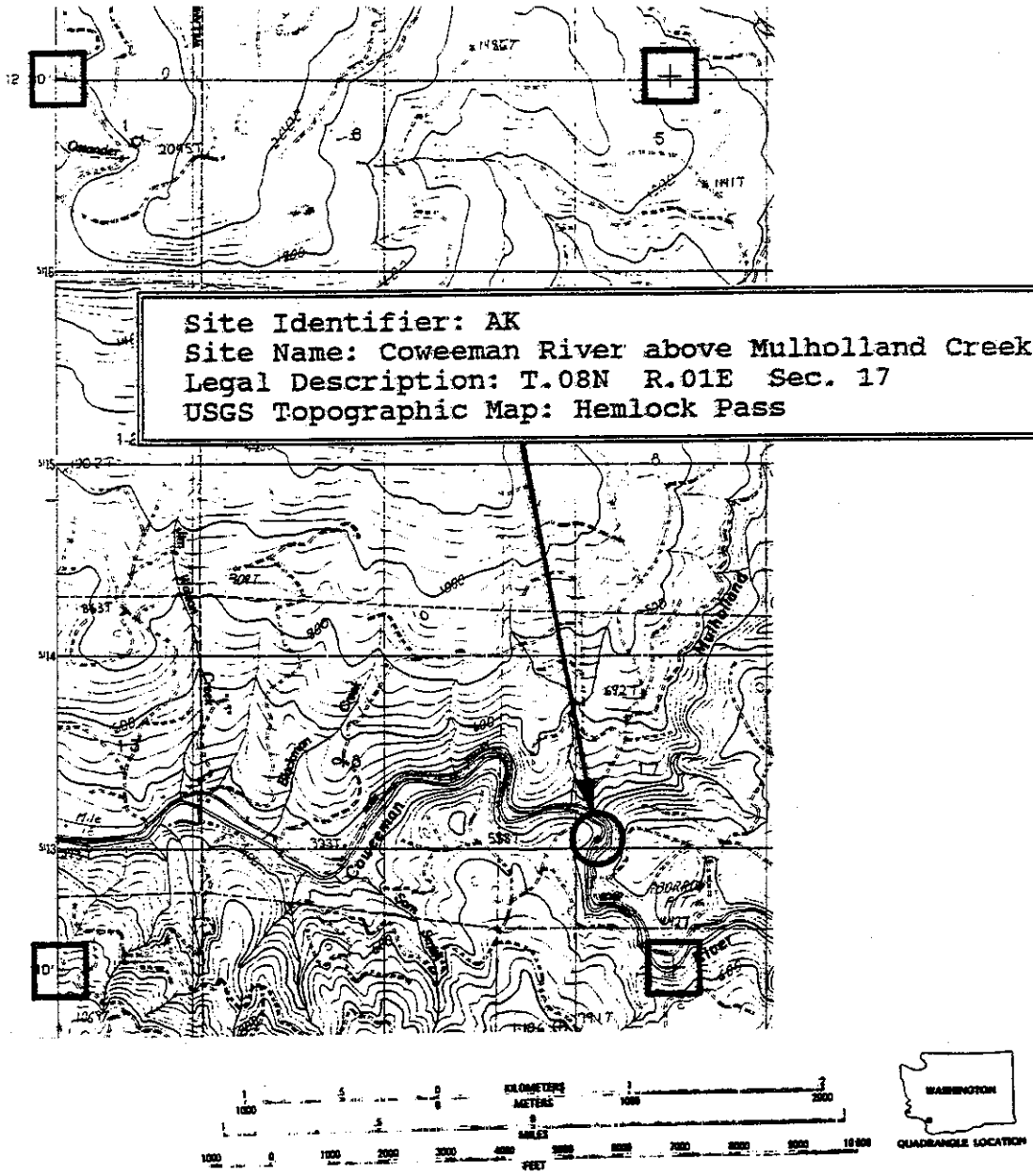
COWEEMAN RIVER (ABOVE GOBLE CR.)

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.8	16.0	22.5	17.5	6.5	14.5	16.0	3.0
02AUG	16.4	16.9	28.0	19.5	7.0	14.5	21.0	5.0
03AUG	18.7	18.1	32.0	21.0	8.5	15.5	23.5	5.5
04AUG	18.8	19.0	32.0	22.0	8.5	16.5	23.5	5.5
05AUG	15.0	18.0	20.5	20.0	11.0	17.0	9.5	3.0
06AUG	12.4	15.1	17.0	17.0	6.5	14.5	10.5	2.5
07AUG	14.0	15.0	23.5	17.5	6.5	13.0	17.0	4.5
08AUG	15.8	16.4	28.0	19.0	6.0	14.0	22.0	5.0
09AUG	17.4	17.8	26.5	20.0	10.5	16.0	16.0	4.0
10AUG	17.2	18.0	23.5	19.0	13.5	17.0	10.0	2.0
11AUG	15.3	16.6	18.5	17.5	13.0	16.0	5.5	1.5
12AUG	15.7	16.2	20.0	17.0	12.0	15.5	8.0	1.5
13AUG	14.3	15.3	19.5	16.5	9.5	14.5	10.0	2.0
14AUG	15.7	15.3	20.5	16.5	13.0	14.5	7.5	2.0
15AUG	14.8	15.4	17.0	16.0	13.0	15.0	4.0	1.0
16AUG	14.5	14.8	16.0	15.5	13.0	14.5	3.0	1.0
17AUG	14.2	15.0	18.0	16.5	9.5	13.5	8.5	3.0
18AUG	14.5	15.3	23.0	17.5	8.5	13.5	14.5	4.0
19AUG	13.9	15.7	23.0	17.5	7.0	13.5	16.0	4.0
20AUG	12.8	14.9	20.0	16.0	8.5	14.0	11.5	2.0
21AUG	14.2	14.8	26.5	17.5	4.5	12.5	22.0	5.0
22AUG	16.8	16.2	31.0	19.0	6.5	13.5	24.5	5.5
23AUG	18.4	17.5	33.5	20.5	8.0	15.0	25.5	5.5
24AUG	17.1	18.3	27.5	20.5	11.0	16.5	16.5	4.0
25AUG	15.5	17.6	26.0	19.5	8.5	16.0	17.5	3.5
26AUG	16.0	17.4	24.0	19.0	11.0	16.0	13.0	3.0
27AUG	17.4	17.4	30.0	19.5	8.5	15.5	21.5	4.0
28AUG	19.2	18.4	32.5	21.0	10.0	16.0	22.5	5.0
29AUG	16.8	18.4	23.5	19.5	9.5	17.5	14.0	2.0
30AUG	14.5	16.7	23.5	19.0	7.0	15.0	16.5	4.0
31AUG	15.3	16.2	27.5	18.5	6.0	14.0	21.5	4.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



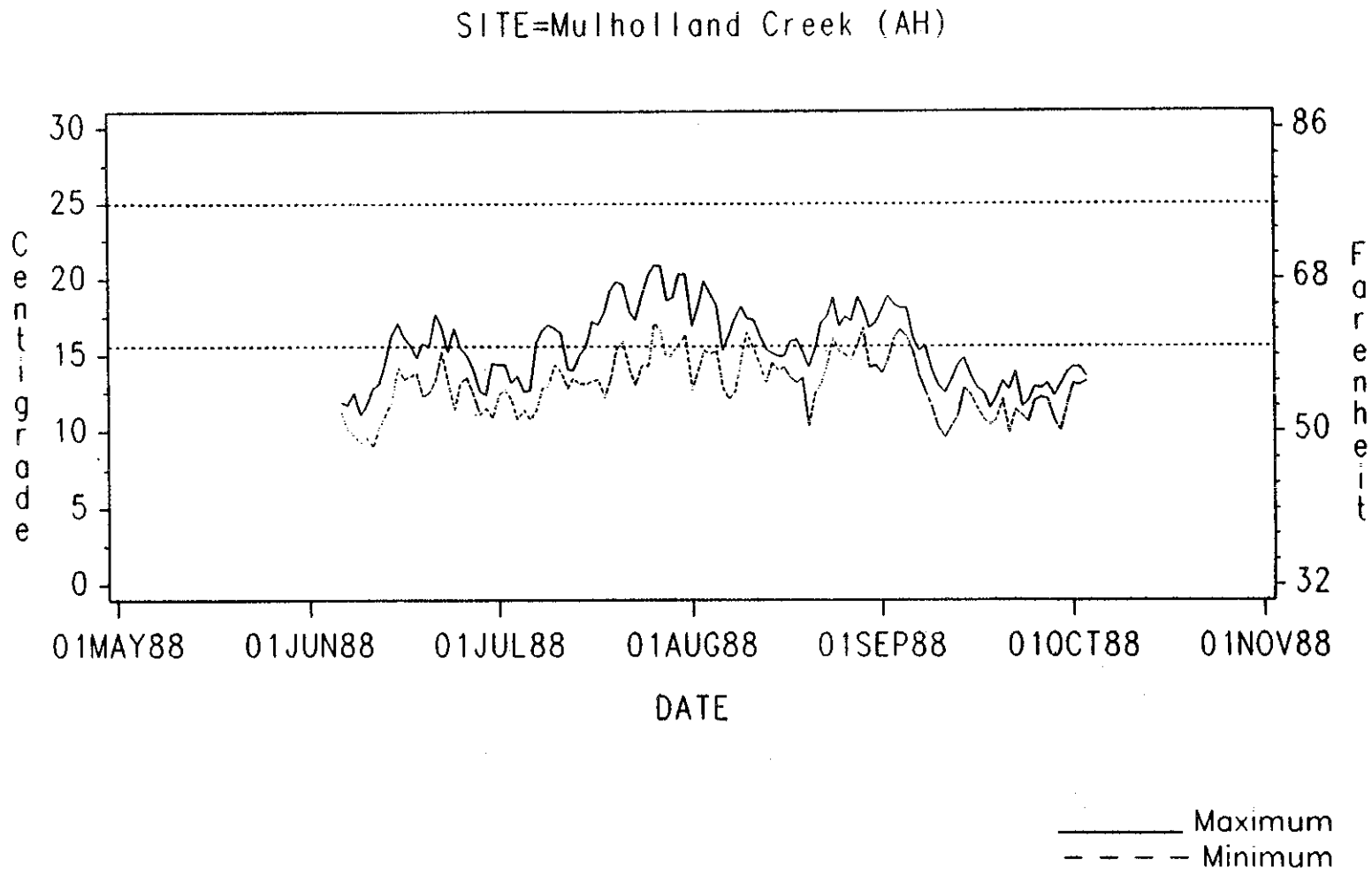
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

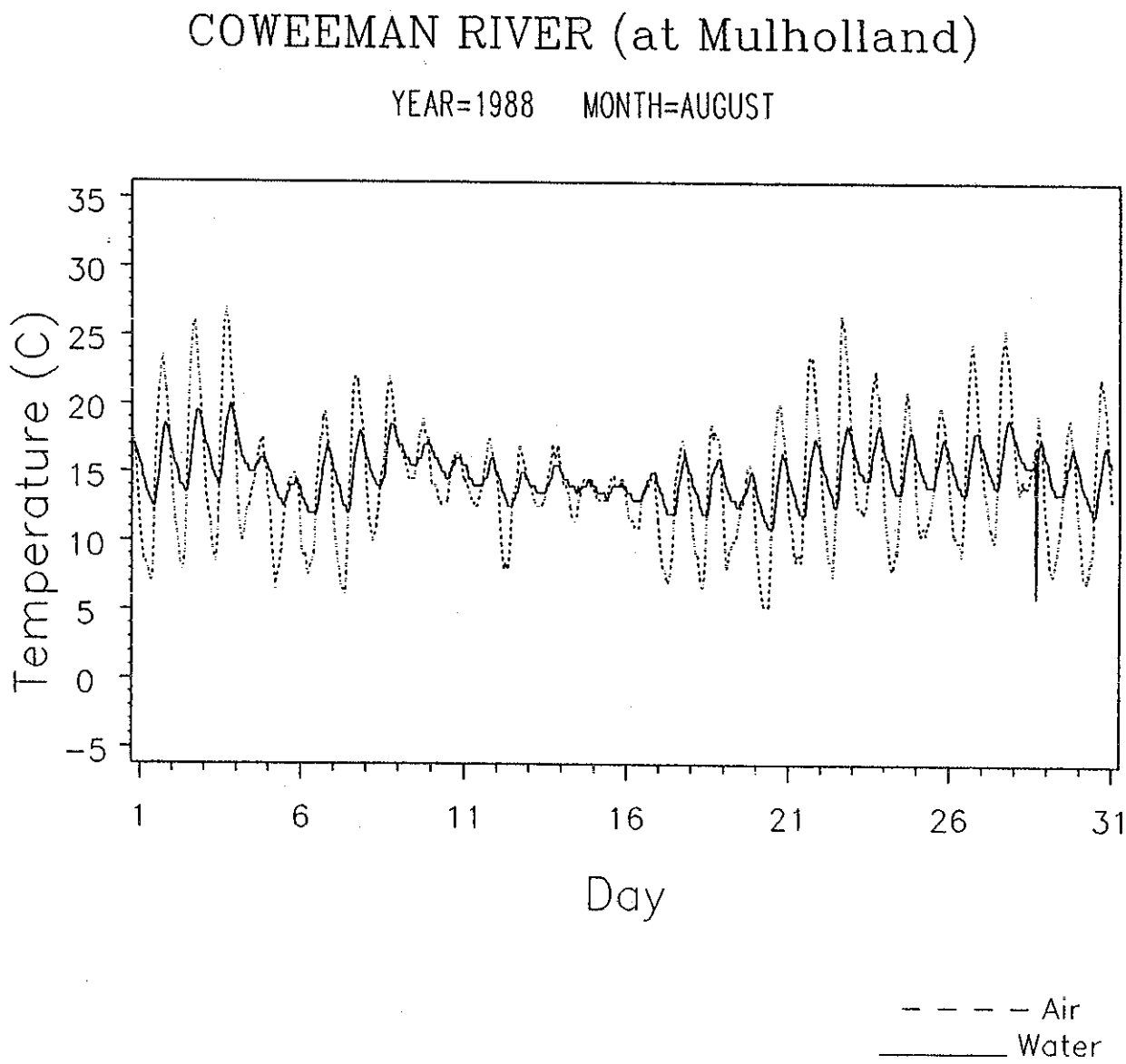
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AK
Stream Name	SITENAMES	Coweeman ab Mul. Cr.
Cooperator	COOPERATOR	Cowlitz Con.Dis. DNR
Cooperator/contact	COOPCONTACT	Somers, Pryor,Marlowe
Date of Site Visit	VISIT	08-02-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Ostrander
Township	TOWNSHIP	08N
Range	RANGE	01E
Section	SECTION	17
Site is Tributary To:	TRIBUTARYTO	Cowlitz River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0003
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.171710
Longitude Decimal Degrees (degrees)	LONGDEC	122.714200
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene-Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	115
Elevation Top of Thermal Reach (meters)	ELEVUSM	122
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.1
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.7
Channel Azimuth (degrees)	AZIMUTH1	317
Drainage Area Above Thermograph (hectares)	AREAHECT	12887
Distance to Divide (meters)	DIVIDEMT	29118
Total Length of Perennial Streams (meters)	LENGTHMT	135871
Streamflow at Thermograph (cubic meters/second)	QDSM	1.117
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	1.030
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.087
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.008
Travel Time (meters/second)	TRAVELM	0.253
Average View To Sky (percent open) (percent)	VIEW1	51
Topographic Angle South (degrees)	TOPOSA	18
Topographic Angle Southeast (degrees)	TOPOSEA	21
Topographic Angle Southwest (degrees)	TOPOSWA	33
Average Forest Angle South (degrees)	FORSA	49
Average Forest Angle Southeast (degrees)	FORSEA	57
Average Forest Angle Southwest (degrees)	FORSWA	71
Percent Overhanging Brush (percent)	OVERBRUSH	22
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	20
Vegetation Height West Bank (meters)	VEGHTWM	19
Percent Vegetative Density East (percent)	VEGDENE	43
Percent Vegetative Density West (percent)	VEGDENW	40
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.441
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	11.811
Percent of Channel Composed of Pools (percent)	PERCENPL	47
Average Pool Depth (meters)	DEPTHPM	0.610
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	30
Streambed Composition Cobble (percent)	AVGCOBBLE	30
Streambed Composition Boulder (percent)	AVGBOULDER	40
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


COWEEMAN RIVER (at Mulholland)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

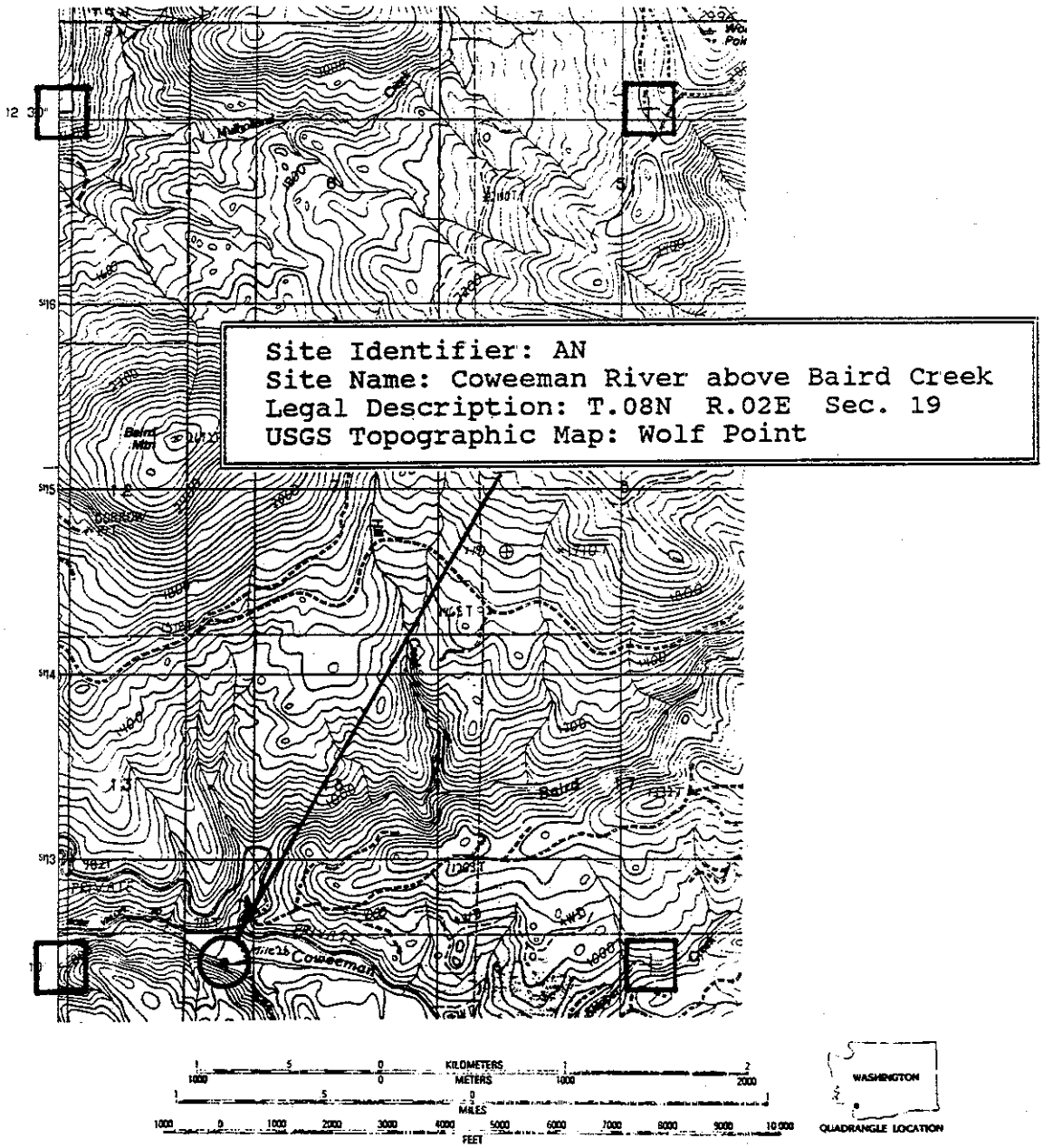
COWEEMAN RIVER (ABOVE MULHOLLAND CR.)

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	12.3	14.6	19.0	17.0	6.0	12.5	13.0	4.5
02AUG	14.8	15.2	23.5	18.5	7.0	12.5	16.5	6.0
03AUG	16.6	16.2	26.0	19.5	8.0	13.5	18.0	6.0
04AUG	17.1	16.9	27.0	20.0	8.5	14.0	18.5	6.0
05AUG	13.8	15.7	17.5	17.5	10.0	15.0	7.5	2.5
06AUG	11.5	13.6	15.0	15.0	6.5	12.5	8.5	2.5
07AUG	13.2	13.9	19.5	17.0	7.5	12.0	12.0	5.0
08AUG	14.1	14.8	22.0	18.0	6.0	12.0	16.0	6.0
09AUG	15.8	16.0	22.0	18.5	10.0	14.0	12.0	4.5
10AUG	16.1	16.3	19.0	17.5	14.0	15.5	5.0	2.0
11AUG	14.4	15.5	16.5	16.5	12.5	14.5	4.0	2.0
12AUG	14.6	14.7	17.5	16.0	12.5	14.0	5.0	2.0
13AUG	12.7	13.7	17.0	15.0	8.0	12.5	9.0	2.5
14AUG	14.4	14.3	17.0	15.5	12.5	13.5	4.5	2.0
15AUG	13.4	14.1	14.5	14.5	11.5	13.5	3.0	1.0
16AUG	13.7	13.7	15.0	14.5	12.0	13.0	3.0	1.5
17AUG	12.6	13.8	14.5	15.0	9.5	13.0	5.0	2.0
18AUG	12.2	13.7	17.5	16.5	7.0	12.0	10.5	4.5
19AUG	12.7	13.9	18.5	16.0	6.5	12.0	12.0	4.0
20AUG	11.7	13.6	15.5	15.0	8.0	12.5	7.5	2.5
21AUG	12.4	13.3	20.0	16.5	5.0	11.0	15.0	5.5
22AUG	15.5	14.5	23.5	17.5	8.5	12.0	15.0	5.5
23AUG	16.3	15.5	26.5	18.5	7.5	12.5	19.0	6.0
24AUG	15.9	16.1	22.5	18.5	11.0	14.5	11.5	4.0
25AUG	13.9	15.5	21.0	18.0	8.0	13.5	13.0	4.5
26AUG	14.3	15.4	20.0	17.5	10.5	14.0	9.5	3.5
27AUG	15.9	15.6	24.5	18.0	9.0	13.5	15.5	4.5
28AUG	17.1	16.3	25.5	19.0	10.0	14.0	15.5	5.0
29AUG	14.8	15.8	19.5	17.5	10.0	6.0	9.5	11.5
30AUG	12.8	14.8	19.0	17.0	7.5	13.5	11.5	3.5
31AUG	14.0	14.3	22.0	17.0	7.0	12.0	15.0	5.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



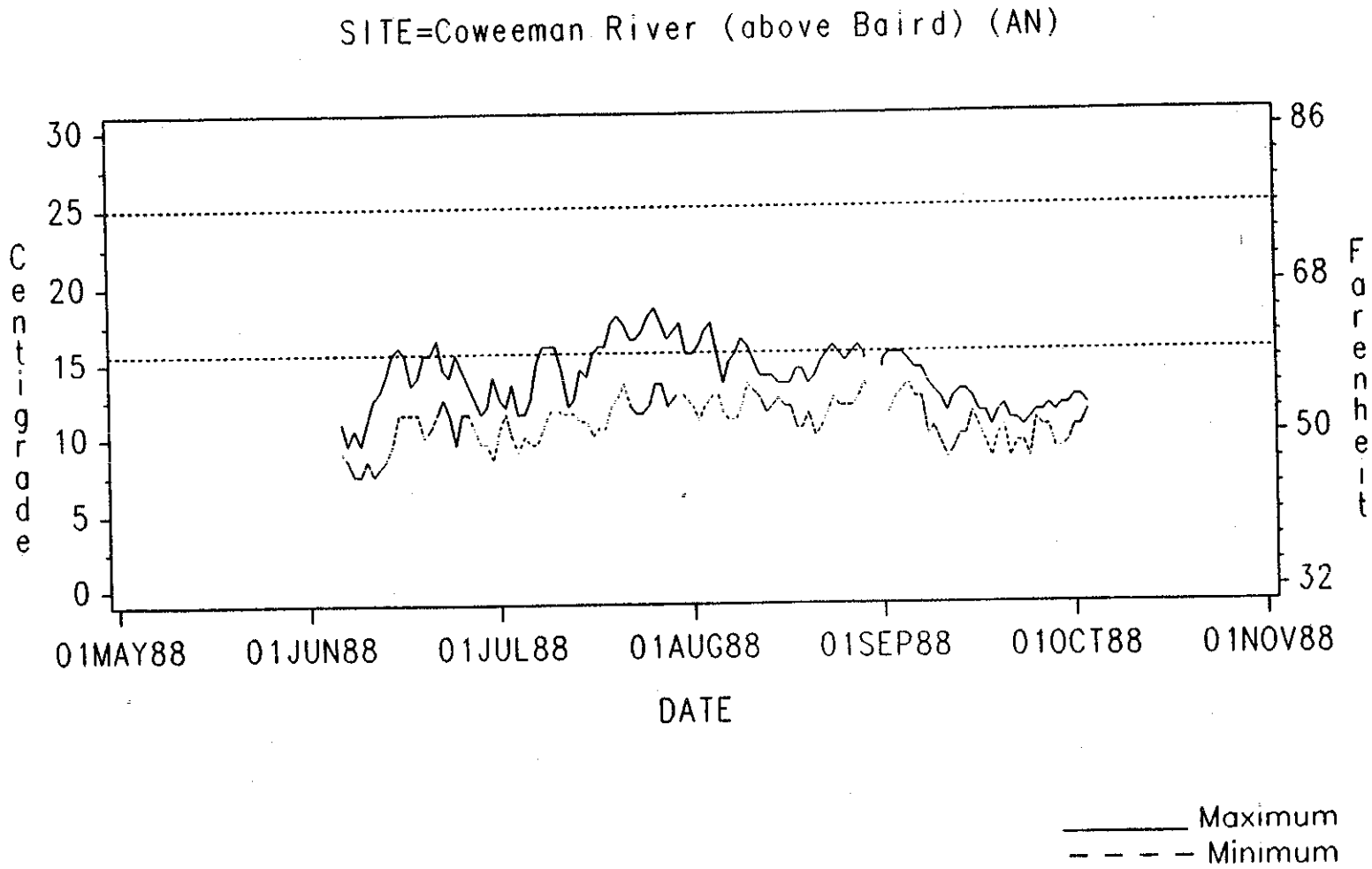
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

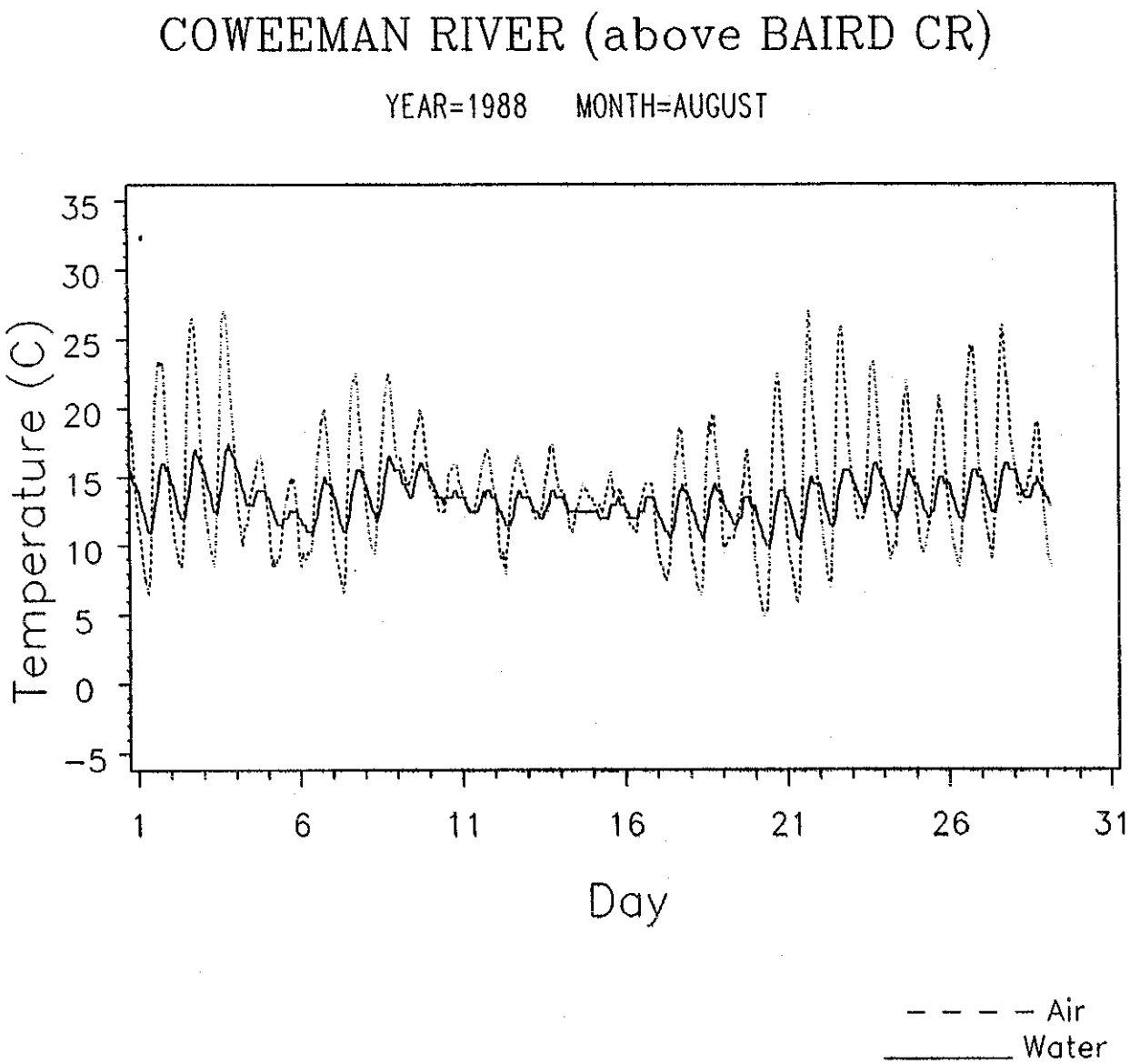
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AN
Stream Name	SITENAMES	Coweeman ab Baird
Cooperator	COOPERATOR	Cowlitz Con Dis., DNR
Cooperator/contact	COOPCONTACT	Somers, Pryor,Marlowe
Date of Site Visit	VISIT	08-02-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Ostrander
Township	TOWNSHIP	08N
Range	RANGE	02E
Section	SECTION	19
Site is Tributary To:	TRIBUTARYTO	Cowlitz River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0003
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.166670
Longitude Decimal Degrees (degrees)	LONGDEC	122.614500
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene-Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	209
Elevation Top of Thermal Reach (meters)	ELEVUSM	216
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.1
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.5
Channel Azimuth (degrees)	AZIMUTH1	273
Drainage Area Above Thermograph (hectares)	AREAHECT	7488
Distance to Divide (meters)	DIVIDEMT	17363
Total Length of Perennial Streams (meters)	LENGTHMT	88043
Streamflow at Thermograph (cubic meters/second)	QDSM	0.778
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.509
Water-Budget Groundwater Determination (cubic meters/second)	GWDETERI	0.193
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.009
Travel Time (meters/second)	TRAVELM	0.399
Average View To Sky (percent open) (percent)	VIEW1	59
Topographic Angle South (degrees)	TOPOSA	19
Topographic Angle Southeast (degrees)	TOPOSEA	14
Topographic Angle Southwest (degrees)	TOPOSWA	21
Average Forest Angle South (degrees)	FORSA	67
Average Forest Angle Southeast (degrees)	FORSEA	54
Average Forest Angle Southwest (degrees)	FORSWA	67
Percent Overhanging Brush (percent)	OVERBRUSH	32
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	10
Vegetation Height West Bank (meters)	VEGHTWM	14
Percent Vegetative Density East (percent)	VEGDENE	22
Percent Vegetative Density West (percent)	VEGDENW	27
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.349
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	9.626
Percent of Channel Composed of Pools (percent)	PERCENPL	56
Average Pool Depth (meters)	DEPTHPM	0.550
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	15
Streambed Composition Cobble (percent)	AVGCOBBLE	35
Streambed Composition Boulder (percent)	AVGBOULDER	50
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


COWEEMAN RIVER (above BAIRD CR)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
−5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

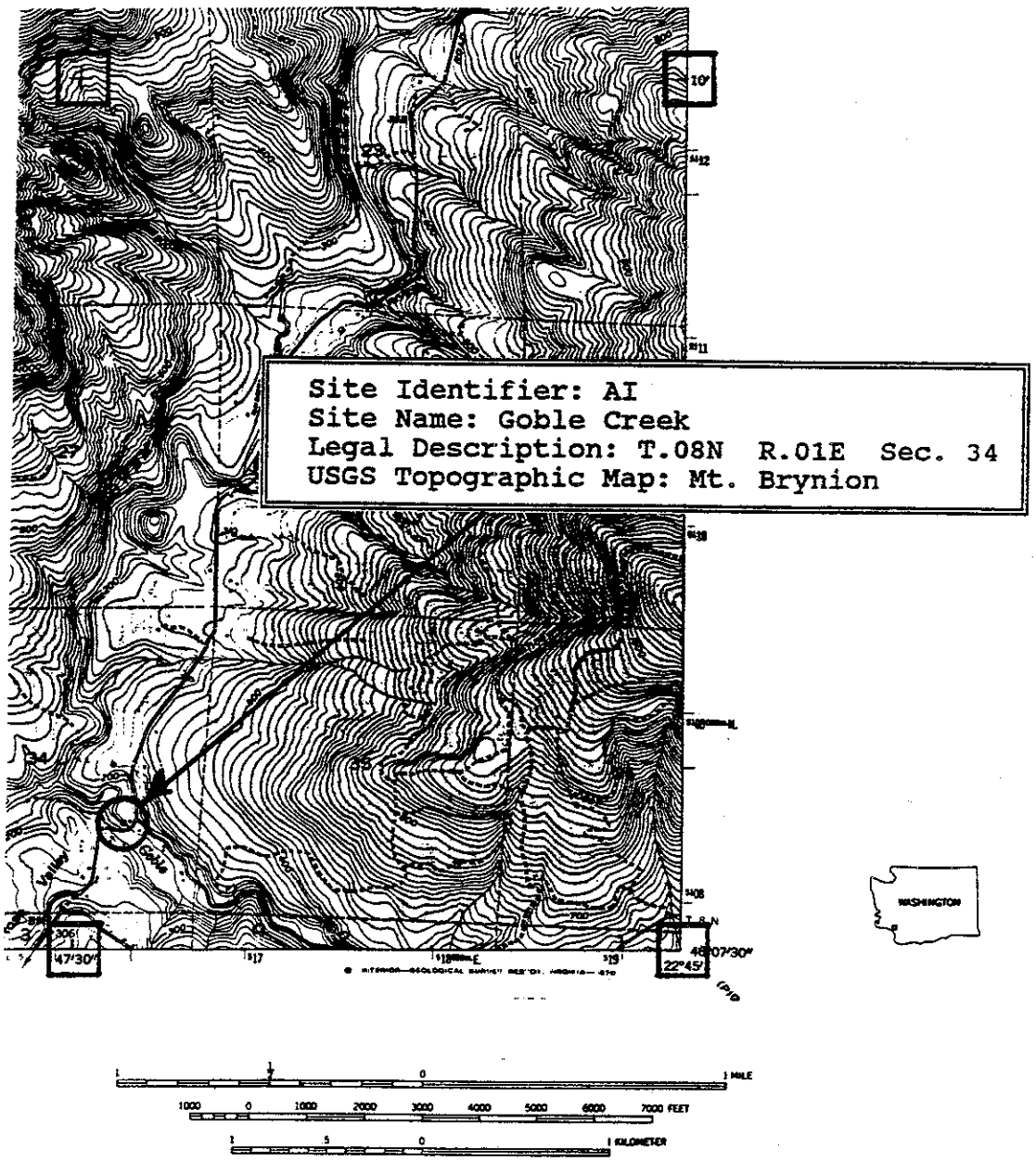
COWEEMAN RIVER (ABOVE BAIRD CR.)

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.6	13.5	19.5	15.5	9.5	12.0	10.0	3.5
02AUG	15.1	13.6	23.5	16.0	6.5	11.0	17.0	5.0
03AUG	16.7	14.4	26.5	17.0	8.5	12.0	18.0	5.0
04AUG	17.1	14.9	27.0	17.5	8.5	12.5	18.5	5.0
05AUG	13.5	13.8	16.5	15.5	10.0	13.0	6.5	2.5
06AUG	11.4	12.2	15.0	13.5	8.5	11.5	6.5	2.0
07AUG	13.7	12.7	20.0	15.0	8.5	11.0	11.5	4.0
08AUG	14.4	13.4	22.5	15.5	6.5	11.0	16.0	4.5
09AUG	15.8	14.2	22.5	16.5	9.5	12.0	13.0	4.5
10AUG	16.5	14.9	20.0	16.0	14.0	13.5	6.0	2.5
11AUG	14.2	13.7	16.0	15.0	12.5	13.0	3.5	2.0
12AUG	14.4	13.2	17.0	14.0	12.5	12.5	4.5	1.5
13AUG	12.9	12.7	16.5	14.0	8.0	11.5	8.5	2.5
14AUG	14.2	13.0	17.5	14.0	12.0	12.0	5.5	2.0
15AUG	13.1	12.6	14.5	13.5	11.0	12.5	3.5	1.0
16AUG	13.6	12.6	15.5	13.5	12.5	12.0	3.0	1.5
17AUG	12.6	12.7	14.5	13.5	9.5	12.0	5.0	1.5
18AUG	12.4	12.4	18.5	14.5	7.5	10.5	11.0	4.0
19AUG	12.7	12.6	19.5	14.5	6.5	10.5	13.0	4.0
20AUG	12.2	12.6	17.0	13.5	8.5	11.5	8.5	2.0
21AUG	12.7	12.1	22.5	14.0	5.0	10.0	17.5	4.0
22AUG	14.6	12.9	27.0	15.0	6.0	10.5	21.0	4.5
23AUG	15.8	13.7	26.0	15.5	7.0	11.5	19.0	4.0
24AUG	16.3	14.4	23.5	16.0	12.0	12.5	11.5	3.5
25AUG	14.8	13.8	22.0	15.5	9.0	12.0	13.0	3.5
26AUG	14.3	13.6	21.0	15.0	9.5	12.0	11.5	3.0
27AUG	15.8	13.8	24.5	15.5	8.5	12.0	16.0	3.5
28AUG	16.9	14.4	26.0	16.0	9.0	12.5	17.0	3.5
29AUG	15.0	14.2	19.0	15.5	10.0	13.5	9.0	2.0
30AUG	8.9	13.2	10.0	13.5	8.5	13.0	1.5	0.5
31AUG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



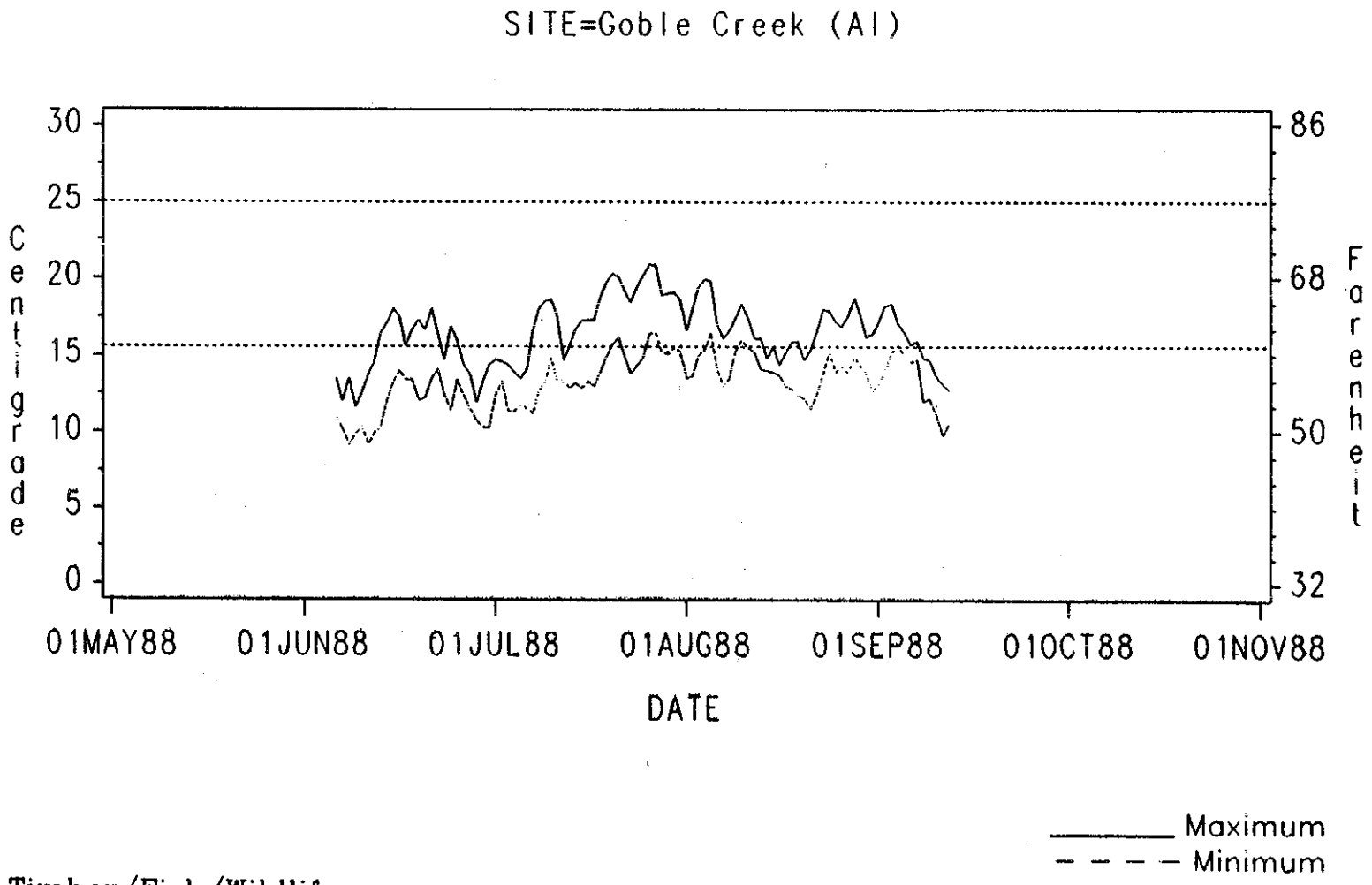
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

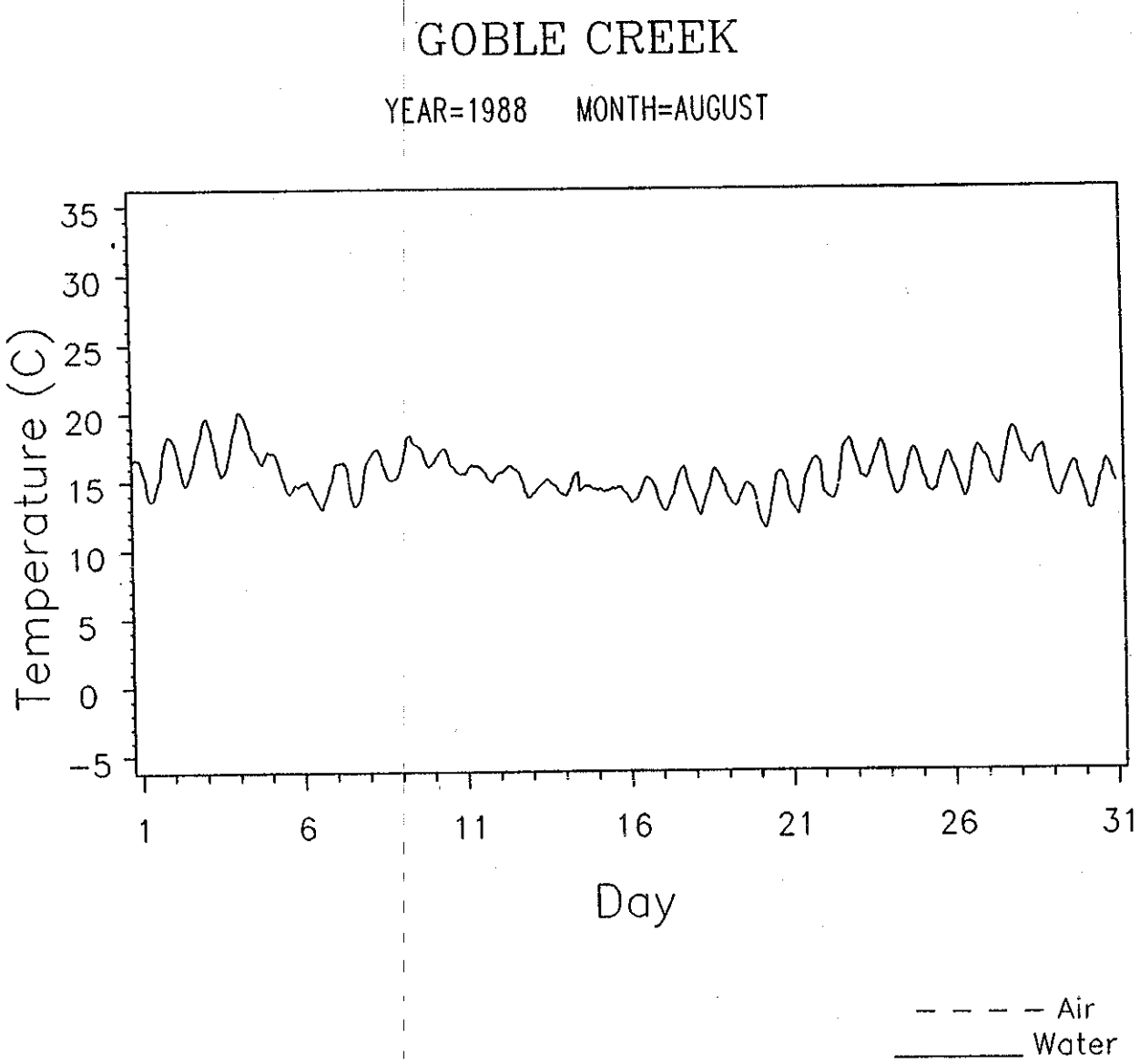
Item Name	Data Item*	Value
I/F/W Site Identifier	SITES	AI
Stream Name	SITENAMES	Goble Creek
Cooperator	COOPERATOR	Cowlitz Con.Dis., DNR
Cooperator/contact	COOPCONTACT	Somers, Pryor,Marlowe
Date of Site Visit	VISIT	07-26-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Kelso
Township	TOWNSHIP	08N
Range	RANGE	01E
Section	SECTION	34
Site is Tributary To:	TRIBUTARYTO	Coweeman River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0003
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.130940
Longitude Decimal Degrees (degrees)	LONGDEC	122.787900
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene-Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	48
Elevation Top of Thermal Reach (meters)	ELEVUSM	57
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.5
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.9
Channel Azimuth (degrees)	AZIMUTH1	316
Drainage Area Above Thermograph (hectares)	AREAHECT	6547
Distance to Divide (meters)	DIVIDEMT	12885
Total Length of Perennial Streams (meters)	LENGTHMT	76374
Streamflow at Thermograph (cubic meters/second)	QDSM	0.268
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.267
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.001
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.004
Travel Time (meters/second)	TRAVELM	0.274
Average View To Sky (percent open) (percent)	VIEW1	40
Topographic Angle South (degrees)	TOPOSA	18
Topographic Angle Southeast (degrees)	TOPOSEA	16
Topographic Angle Southwest (degrees)	TOPOSWA	19
Average Forest Angle South (degrees)	FORSA	81
Average Forest Angle Southeast (degrees)	FORSEA	80
Average Forest Angle Southwest (degrees)	FORSWA	73
Percent Overhanging Brush (percent)	OVERBRUSH	43
Buffer Width Right Bank (meters)	BUFWIDRM	11.1
Buffer Width Left Bank (meters)	BUFWIDLM	18.3
Vegetation Height East Bank (meters)	VEGHTEM	16
Vegetation Height West Bank (meters)	VEGHTWM	15
Percent Vegetative Density East (percent)	VEGDENE	53
Percent Vegetative Density West (percent)	VEGDENW	58
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.300
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	4.935
Percent of Channel Composed of Pools (percent)	PERCENPL	40
Average Pool Depth (meters)	DEPTHPM	0.430
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	15
Streambed Composition Cobble (percent)	AVGCOBBLE	57
Streambed Composition Boulder (percent)	AVGBOULDER	28
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


GOBLE CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

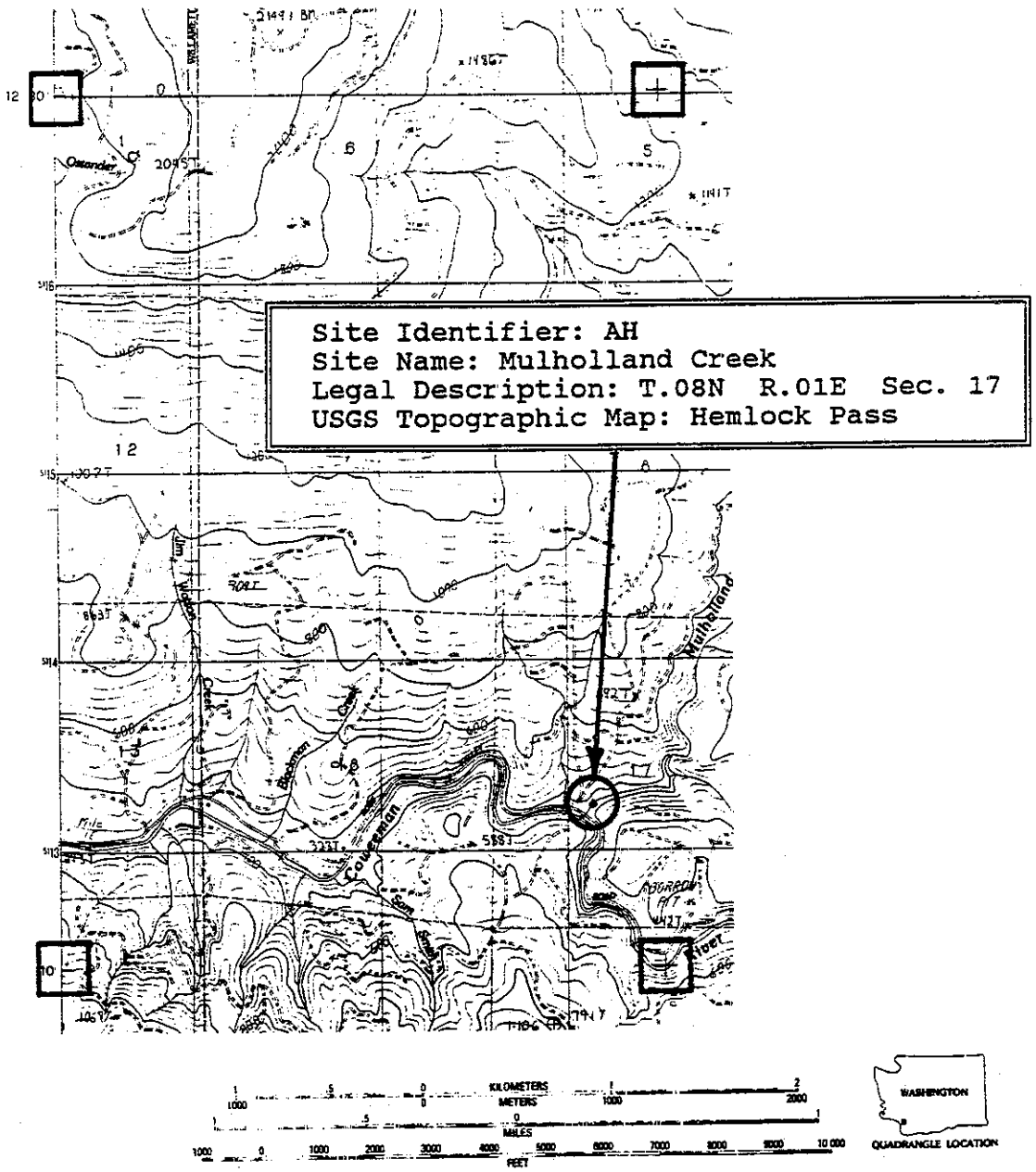
GOBLE CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.8	15.1	22.5	16.6	6.5	13.5	16.0	3.1
02AUG	16.4	15.8	28.0	18.1	7.0	13.7	21.0	4.4
03AUG	18.7	16.9	32.0	19.4	8.5	15.0	23.5	4.4
04AUG	18.8	17.5	32.0	19.9	8.5	15.4	23.5	4.5
05AUG	15.0	17.9	20.5	19.8	11.0	16.5	9.5	3.3
06AUG	12.4	15.3	17.0	17.1	6.5	14.2	10.5	2.9
07AUG	14.0	14.3	23.5	16.1	6.5	13.0	17.0	3.1
08AUG	15.8	15.1	28.0	16.6	6.0	13.5	22.0	3.1
09AUG	17.4	16.2	26.5	17.4	10.5	15.3	16.0	2.1
10AUG	17.2	17.2	23.5	18.3	13.5	16.0	10.0	2.3
11AUG	15.3	16.4	18.5	17.4	13.0	15.5	5.5	1.9
12AUG	15.7	15.7	20.0	16.1	12.0	15.2	8.0	0.9
13AUG	14.3	15.4	19.5	16.1	9.5	14.1	10.0	2.0
14AUG	15.7	14.5	20.5	14.8	13.0	14.0	7.5	0.8
15AUG	14.8	14.6	17.0	15.6	13.0	13.9	4.0	1.7
16AUG	14.5	14.2	16.0	14.4	13.0	13.7	3.0	0.7
17AUG	14.2	14.3	18.0	15.2	9.5	13.0	8.5	2.2
18AUG	14.5	14.3	23.0	15.9	8.5	12.8	14.5	3.1
19AUG	13.9	14.3	23.0	15.9	7.0	12.4	16.0	3.5
20AUG	12.8	13.8	20.0	14.7	8.5	12.2	11.5	2.5
21AUG	14.2	13.7	26.5	15.4	4.5	11.5	22.0	3.9
22AUG	16.8	14.8	31.0	16.6	6.5	12.5	24.5	4.1
23AUG	18.4	15.7	33.5	18.0	8.0	13.8	25.5	4.2
24AUG	17.1	16.3	27.5	17.9	11.0	15.3	16.5	2.6
25AUG	15.5	15.6	26.0	17.2	8.5	13.9	17.5	3.3
26AUG	16.0	15.5	24.0	16.9	11.0	14.3	13.0	2.6
27AUG	17.4	15.8	30.0	17.5	8.5	13.9	21.5	3.6
28AUG	19.2	16.6	32.5	18.7	10.0	14.9	22.5	3.8
29AUG	16.8	16.6	23.5	17.7	9.5	14.4	14.0	3.3
30AUG	14.5	14.9	23.5	16.2	7.0	13.8	16.5	2.4
31AUG	15.3	14.6	27.5	16.4	6.0	12.7	21.5	3.7

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP

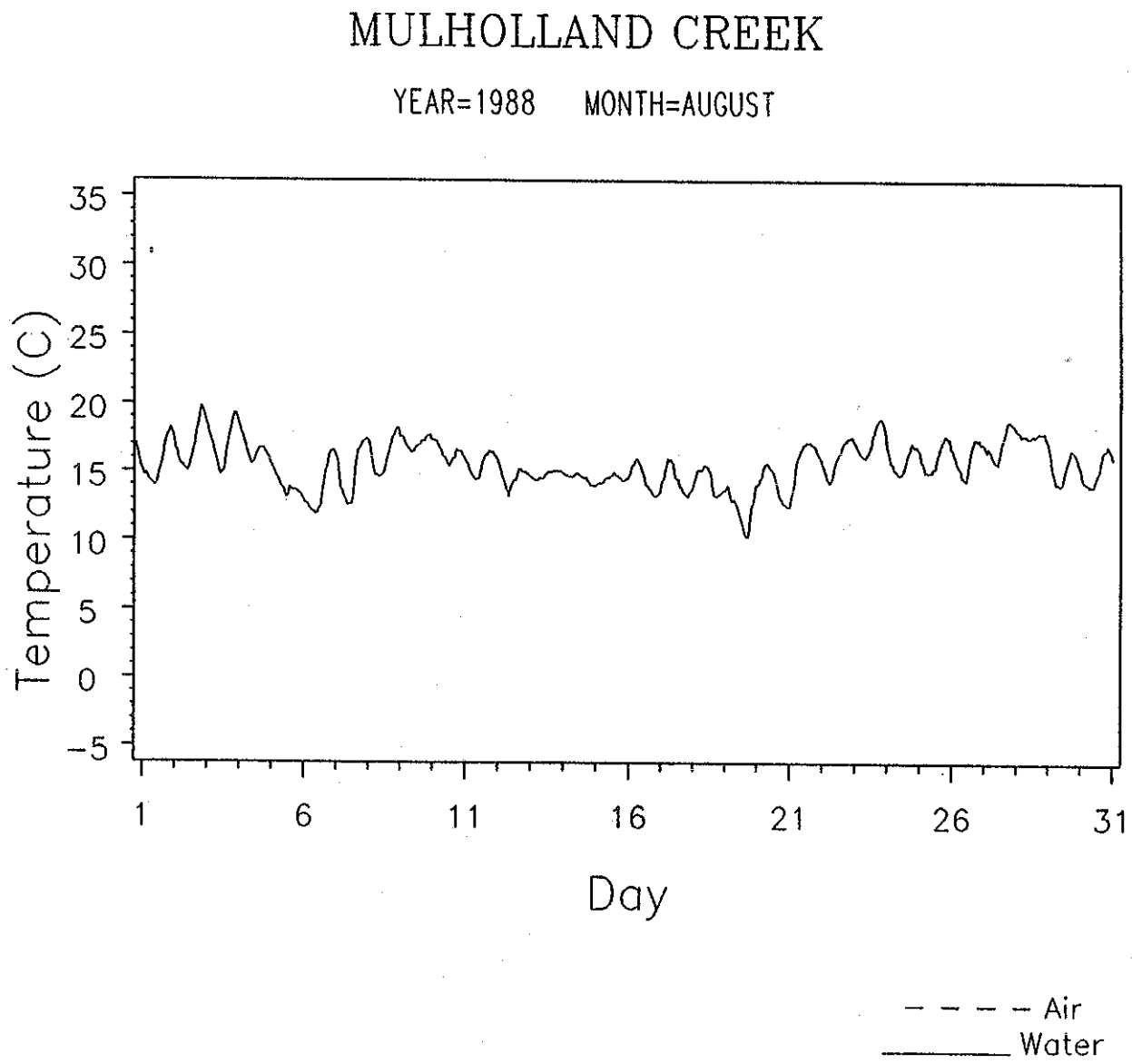


TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

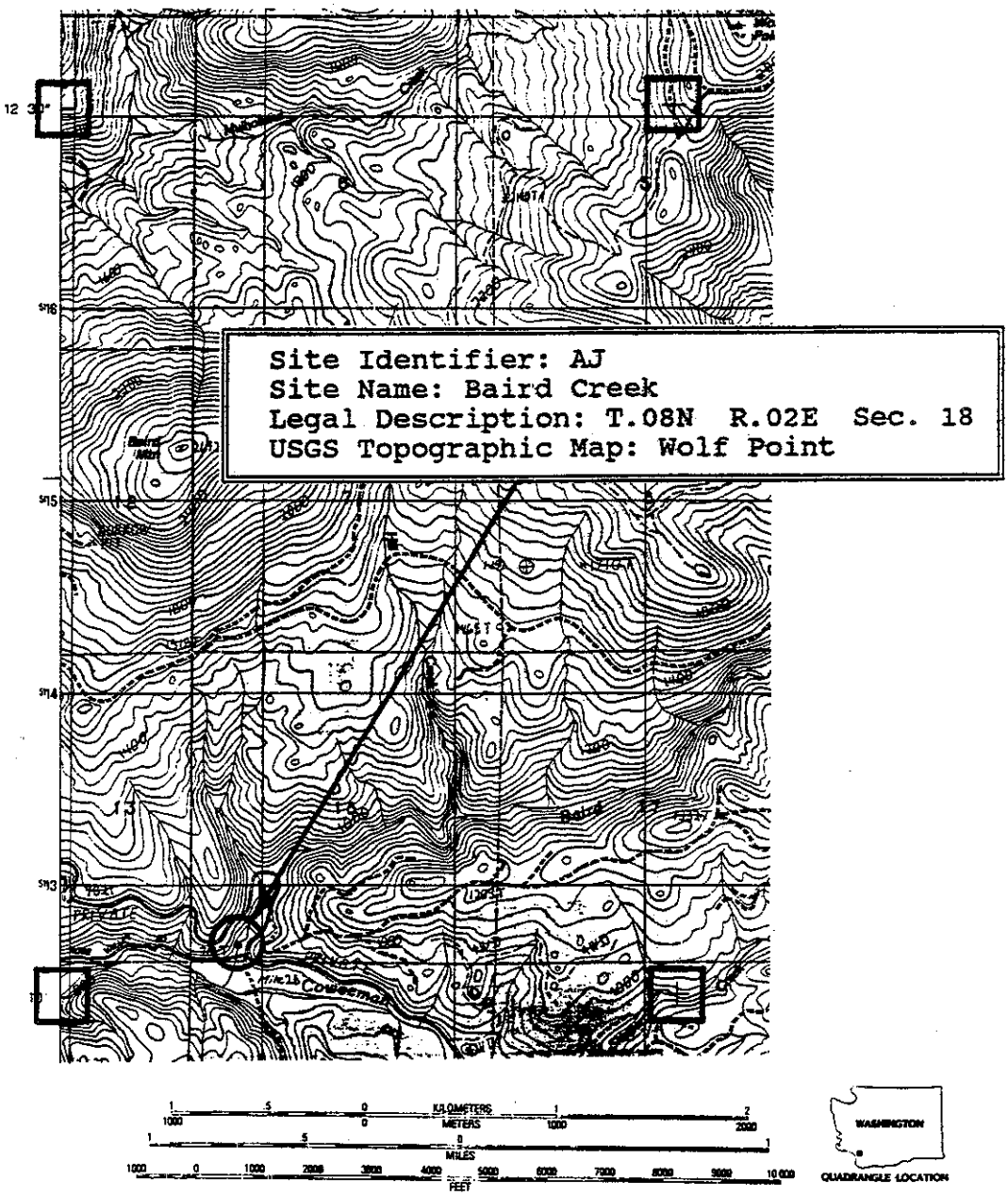
THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
I/F/W Site Identifier	SITES	AH
Stream Name	SITENAME$	Mulholland Creek
Cooperator	COOPERATOR	Cowlitz Con Dis., DNR
Cooperator/contact	COOPCONTACT	Somers, Pryor,Marlowe
Date of Site Visit	VISIT	07-27-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Ostrander
Township	TOWNSHIP	08N
Range	RANGE	01E
Section	SECTION	17
Site is Tributary To:	TRIBUTARYTO	Coweeman River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0084
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.173800
Longitude Decimal Degrees (degrees)	LONGDEC	122.713500
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene-Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	111
Elevation Top of Thermal Reach (meters)	ELEVUSM	121
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.6
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.5
Channel Azimuth (degrees)	AZIMUTH1	231
Drainage Area Above Thermograph (hectares)	AREAHECT	4646
Distance to Divide (meters)	DIVIDEMT	13658
Total Length of Perennial Streams (meters)	LENGTHMT	44721
Streamflow at Thermograph (cubic meters/second)	QDSM	0.162
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.201
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.041
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.004
Travel Time (meters/second)	TRAVELM	0.162
Average View To Sky (percent open) (percent)	VIEW1	39
Topographic Angle South (degrees)	TOPOSA	21
Topographic Angle Southeast (degrees)	TOPOSEA	18
Topographic Angle Southwest (degrees)	TOPOSWA	21
Average Forest Angle South (degrees)	FORSA	71
Average Forest Angle Southeast (degrees)	FORSEA	76
Average Forest Angle Southwest (degrees)	FORSWA	72
Percent Overhanging Brush (percent)	OVERBRUSH	46
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	22.9
Vegetation Height East Bank (meters)	VEGHTEM	12
Vegetation Height West Bank (meters)	VEGHTWM	13
Percent Vegetative Density East (percent)	VEGDENE	38
Percent Vegetative Density West (percent)	VEGDENW	49
Volume-weighted Stream Depth (m) (meters)	DEPTHVWI	0.296
Volume-weighted Stream Width (m) (meters)	WIDTHVWI	5.492
Percent of Channel Composed of Pools (percent)	PERCENPI	80
Average Pool Depth (meters)	DEPTHPM	0.340
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	3
Streambed Composition Cobble (percent)	AVGCOBBLE	13
Streambed Composition Boulder (percent)	AVGBOULDER	83
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description


MULHOLLAND CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



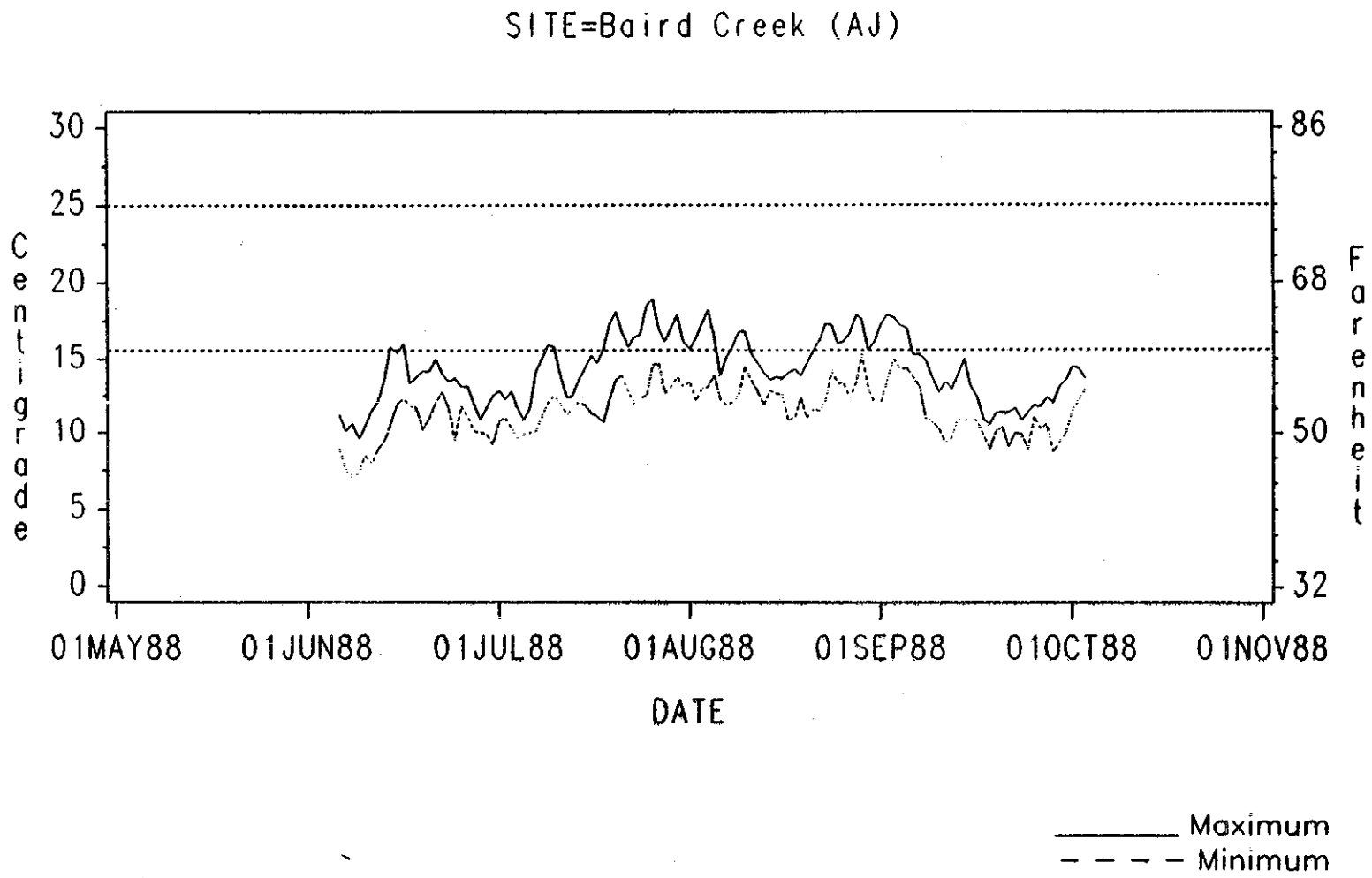
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

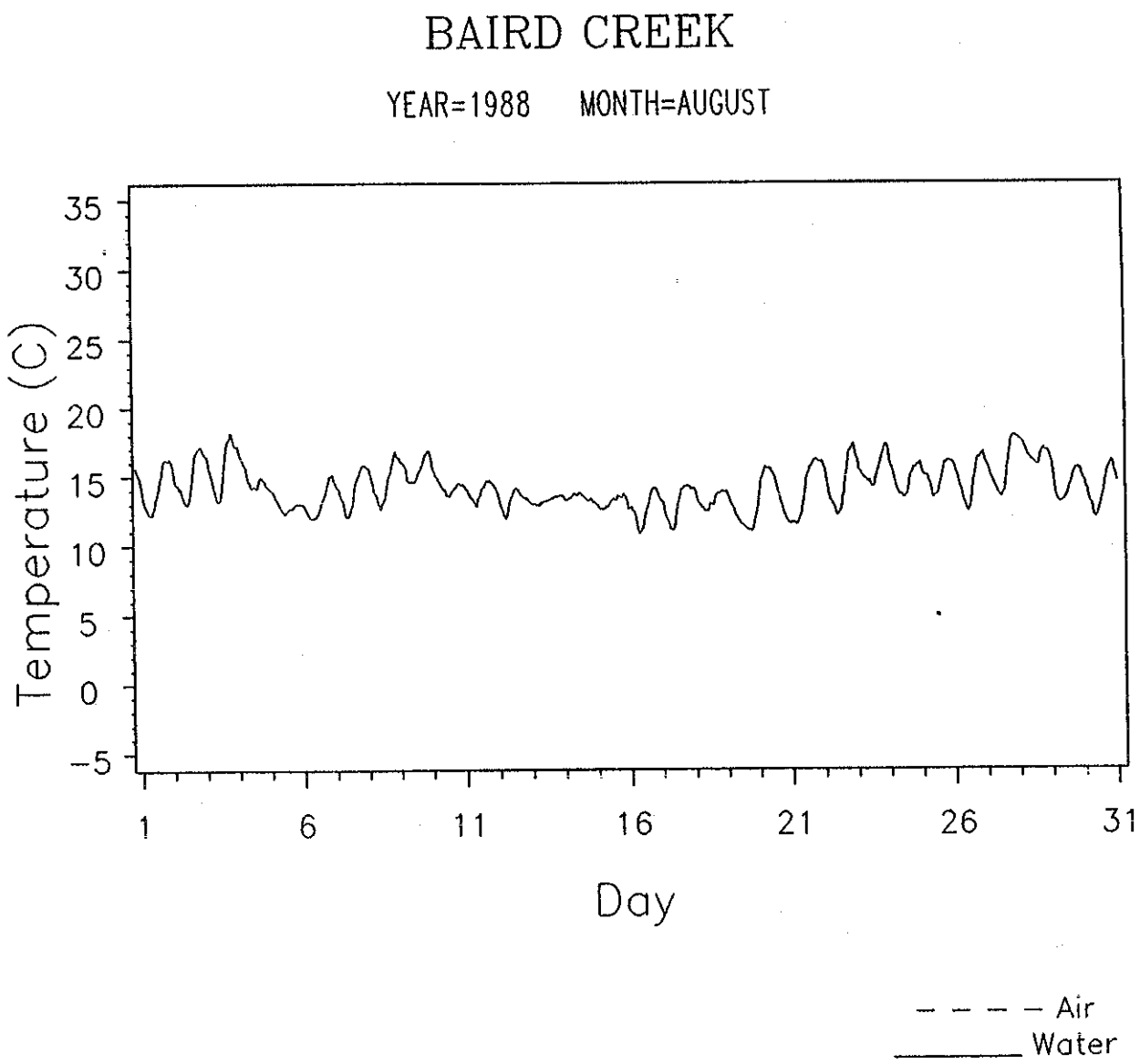
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	AJ
Stream Name	SITENAMES	Baird Creek
Cooperator	COOPERATOR	Cowlitz Con,Dis., DNR
Cooperator/contact	COOPCONTACT	Somers, Pryor,Marlowe
Date of Site Visit	VISIT	07-25-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Toutle
Township	TOWNSHIP	08N
Range	RANGE	02E
Section	SECTION	18
Site is Tributary To:	TRIBUTARYTO	Coweeman River
Water Resource Inventory Area	WRIA	26
WDF River Segment Identifier	WDFNUMBER	0101
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.168800
Longitude Decimal Degrees (degrees)	LONGDEC	122.613200
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Oligocene-Eocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	216
Elevation Top of Thermal Reach (meters)	ELEVUSM	240
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	3.9
Channel Gradient from Autolevel (percent)	GRADLEVEL	3.2
Channel Azimuth (degrees)	AZIMUTH1	211
Drainage Area Above Thermograph (hectares)	AREAHECT	2239
Distance to Divide (meters)	DIVIDEMT	7925
Total Length of Perennial Streams (meters)	LENGTHMT	16049
Streamflow at Thermograph (cubic meters/second)	QDSM	0.278
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.213
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.033
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.017
Travel Time (meters/second)	TRAVELM	0.122
Average View To Sky (percent open) (percent)	VIEW1	40
Topographic Angle South (degrees)	TOPOSA	20
Topographic Angle Southeast (degrees)	TOPOSEA	21
Topographic Angle Southwest (degrees)	TOPOSWA	27
Average Forest Angle South (degrees)	FORSA	56
Average Forest Angle Southeast (degrees)	FORSEA	63
Average Forest Angle Southwest (degrees)	FORSWA	63
Percent Overhanging Brush (percent)	OVERBRUSH	35
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	15
Vegetation Height West Bank (meters)	VEGHTWM	15
Percent Vegetative Density East (percent)	VEGDENE	47
Percent Vegetative Density West (percent)	VEGDENW	40
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.282
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	4.330
Percent of Channel Composed of Pools (percent)	PERCENPL	57
Average Pool Depth (meters)	DEPTHPM	0.420
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	5
Streambed Composition Cobble (percent)	AVGCOBBLE	37
Streambed Composition Boulder (percent)	AVGBOULDER	60
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	boulder

*See data dictionary item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


BAIRD CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

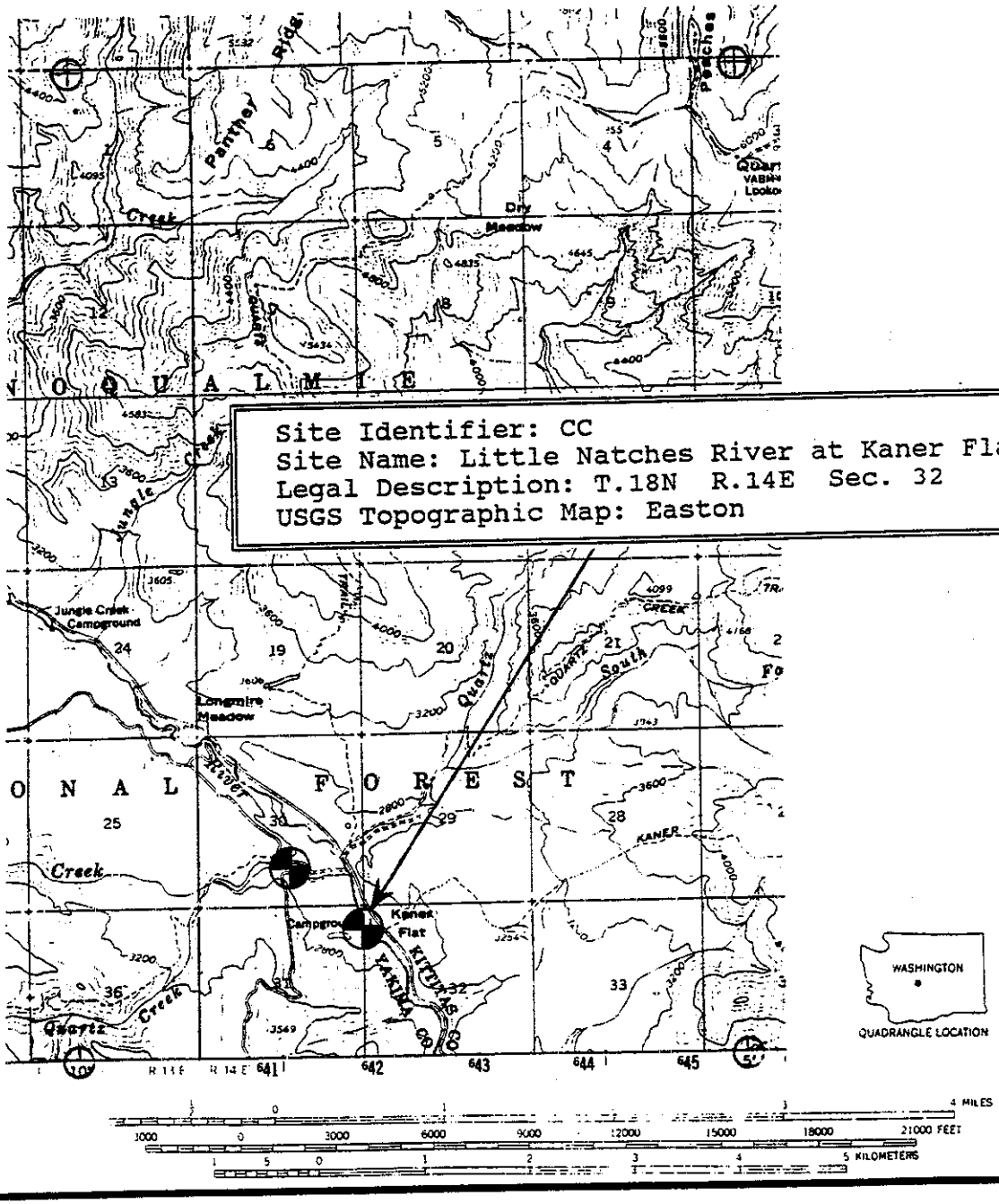
BAIRD CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.6	14.4	19.5	15.7	9.5	13.5	10.0	2.2
02AUG	15.1	14.3	23.5	16.3	6.5	12.2	17.0	4.1
03AUG	16.7	15.1	26.5	17.2	8.5	13.0	18.0	4.2
04AUG	17.1	15.8	27.0	18.2	8.5	13.2	18.5	5.0
05AUG	13.5	14.8	16.5	16.5	10.0	13.9	6.5	2.6
06AUG	11.4	12.9	15.0	13.9	8.5	12.3	6.5	1.6
07AUG	13.7	13.3	20.0	15.1	8.5	11.9	11.5	3.2
08AUG	14.4	14.1	22.5	15.8	6.5	12.1	16.0	3.7
09AUG	15.8	14.7	22.5	16.8	9.5	12.6	13.0	4.2
10AUG	16.6	15.6	20.0	16.8	14.0	14.5	6.0	2.3
11AUG	14.2	14.2	16.0	15.3	12.5	13.5	3.5	1.8
12AUG	14.4	13.9	17.0	14.7	12.5	12.8	4.5	1.9
13AUG	12.9	13.2	16.5	14.1	8.0	11.9	8.5	2.2
14AUG	14.2	13.3	17.5	13.6	12.0	12.9	5.5	0.7
15AUG	13.1	13.4	14.5	13.8	11.0	12.7	3.5	1.1
16AUG	13.6	13.1	15.5	13.7	12.5	12.6	3.0	1.1
17AUG	12.6	12.7	14.5	14.1	9.5	10.8	5.0	3.3
18AUG	12.4	13.0	18.5	14.3	7.5	11.1	11.0	3.2
19AUG	12.7	13.2	19.5	13.9	6.5	12.4	13.0	1.5
20AUG	12.3	12.0	17.0	14.7	8.5	11.0	8.5	3.7
21AUG	12.7	13.8	22.5	15.6	5.0	11.6	17.5	4.0
22AUG	14.6	14.4	27.0	16.2	6.0	11.5	21.0	4.7
23AUG	15.8	14.5	26.0	17.3	7.0	12.2	19.0	5.1
24AUG	16.3	15.5	23.5	17.2	12.0	14.2	11.5	3.0
25AUG	14.8	14.7	22.0	16.0	9.0	13.4	13.0	2.6
26AUG	14.3	15.0	21.0	16.1	9.5	13.4	11.5	2.7
27AUG	15.8	14.8	24.5	16.7	8.5	12.4	16.0	4.3
28AUG	16.9	15.6	26.0	17.9	9.0	13.5	17.0	4.4
29AUG	15.0	16.5	19.0	17.6	10.0	15.3	9.0	2.3
30AUG	8.9	14.3	10.0	15.6	8.5	13.1	1.5	2.5
31AUG	.	14.0	.	16.1	.	12.0	.	4.1

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP

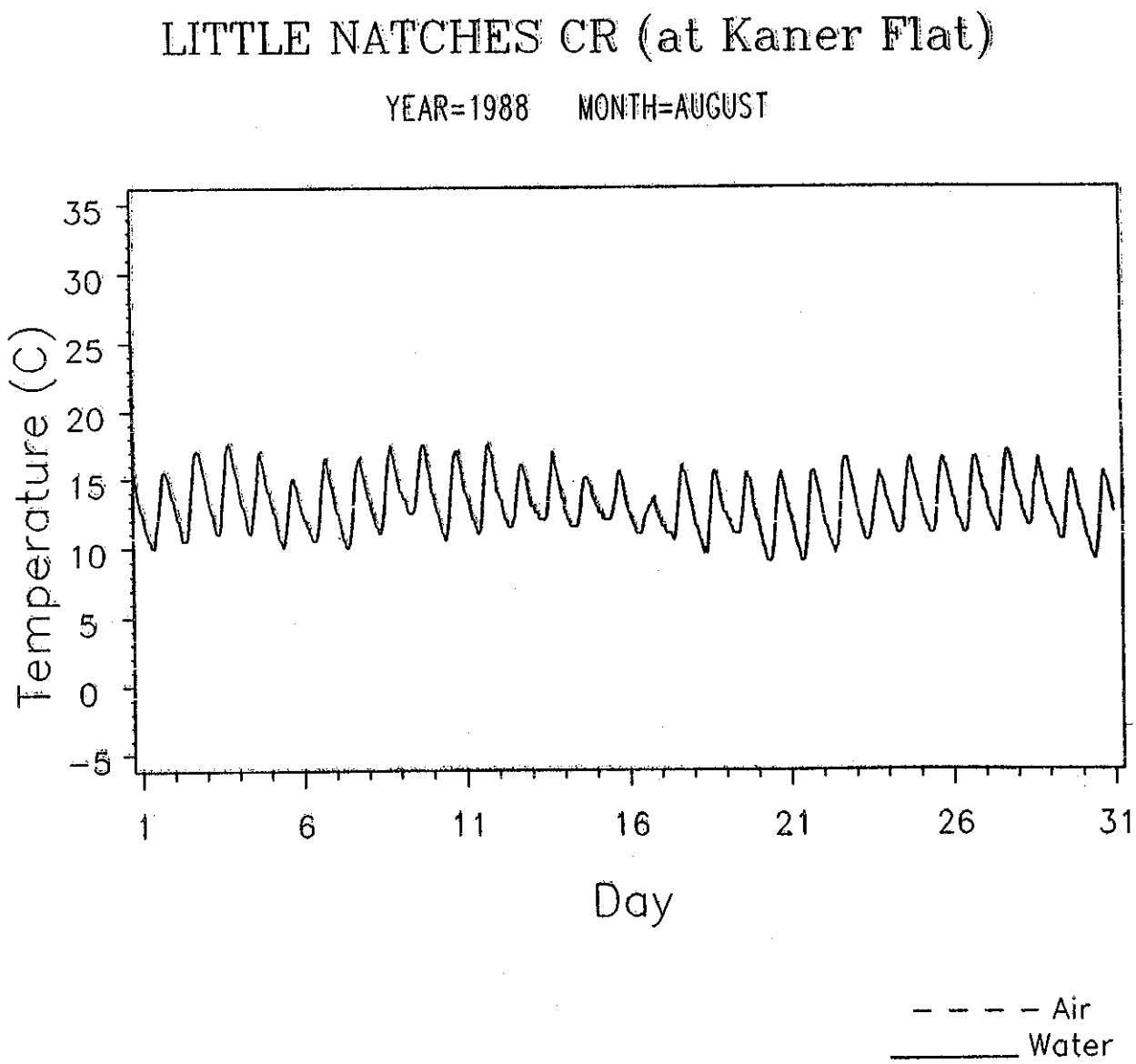


TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

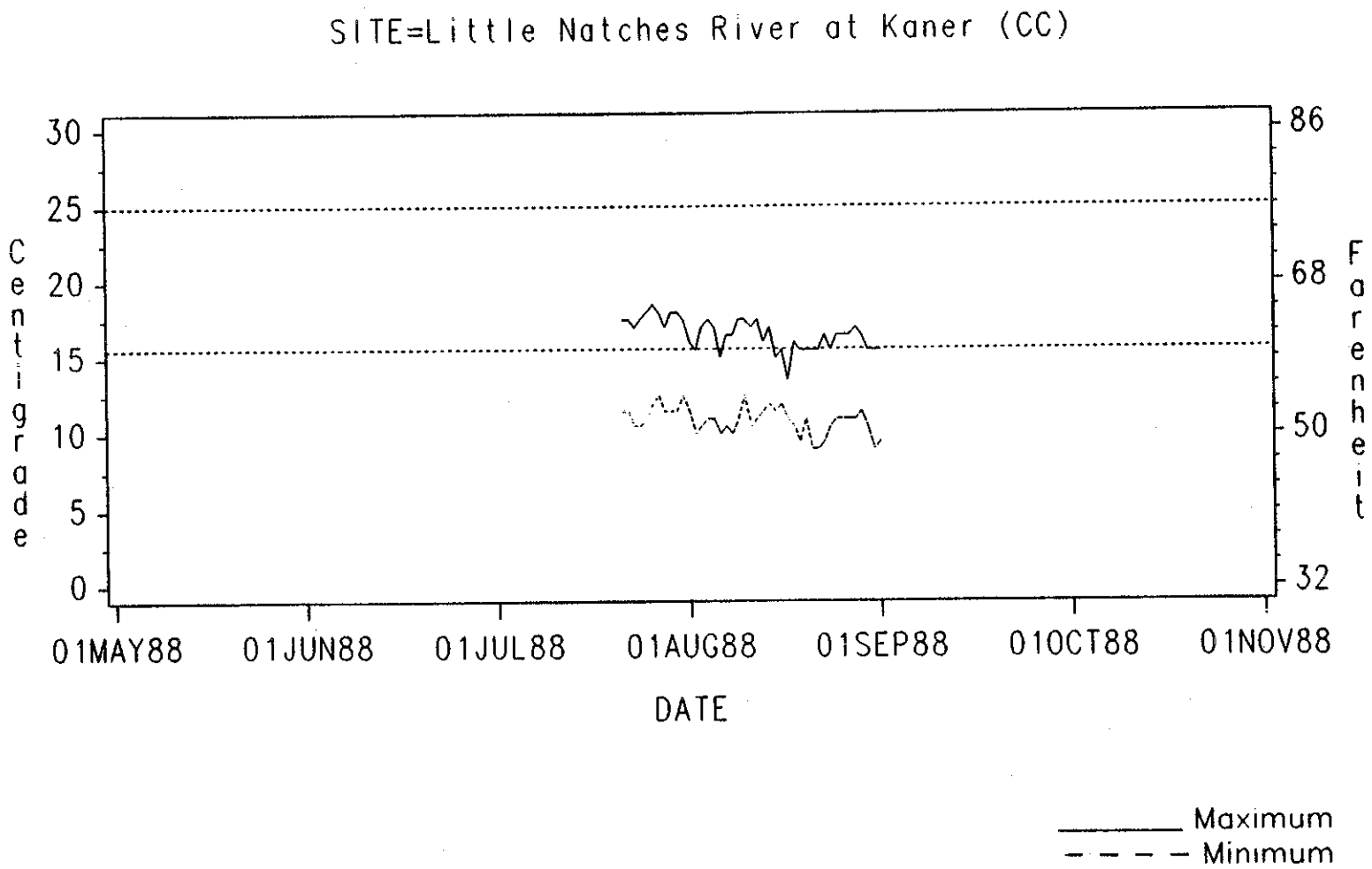
THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	CC
Stream Name	SITENAMES	Little Natches River
Cooperator	COOPERATOR	Yakima Indian Nation
Cooperator/contact	COOPCONTACT	Dale Bambrick
Date of Site Visit	VISIT	08-17-88
County	COUNTY	Yakima
Nearest town	NEARESTTOWN	American River
Township	TOWNSHIP	18N
Range	RANGE	14E
Section	SECTION	32
Site is Tributary To:	TRIBUTARYTO	American River
Water Resource Inventory Area	WRIA	38
WDF River Segment Identifier	WDFNUMBER	0852
DNR Water Type	DNRWATERTYPE	1+
T/F/W Ecoregion	ECOREGION	Southeast Cascades
Latitude Decimal Degrees (degrees)	LATDEC	47.009310
Longitude Decimal Degrees (degrees)	LONGDEC	121.129800
NOAA Local Climatological Data Station	NOAAINDEX	yakima/stampedepass
Mean Annual Air Temperature (degrees C)	ANNUALAIRC	8
Geologic Age of Basin Geology	GEOAGE	Miocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	5
Thermograph Elevation (meters)	ELEVDSM	813
Elevation Top of Thermal Reach (meters)	ELEVUSM	819
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.0
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.0
Channel Azimuth (degrees)	AZIMUTH1	158
Drainage Area Above Thermograph (hectares)	AREAHECT	36834
Distance to Divide (meters)	DIVIDEMT	29979
Total Length of Perennial Streams (meters)	LENGTHMT	220406
Streamflow at Thermograph (cubic meters/second)	QDSM	1.316
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	1.388
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.071
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.006
Travel Time (meters/second)	TRAVELM	0.564
Average View To Sky (percent open) (percent)	VIEW1	81
Topographic Angle South (degrees)	TOPOSA	13
Topographic Angle Southeast (degrees)	TOPOSEA	8
Topographic Angle Southwest (degrees)	TOPOSWA	16
Average Forest Angle South (degrees)	FORSA	34
Average Forest Angle Southeast (degrees)	FORSEA	30
Average Forest Angle Southwest (degrees)	FORSWA	47
Percent Overhanging Brush (percent)	OVERBRUSH	1
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	24
Vegetation Height West Bank (meters)	VEGHTWM	24
Percent Vegetative Density East (percent)	VEGDENE	7
Percent Vegetative Density West (percent)	VEGDENW	1
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.368
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	10.385
Percent of Channel Composed of Pools (percent)	PERCENPL	32
Average Pool Depth (meters)	DEPTHPM	0.640
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	30
Streambed Composition Cobble (percent)	AVGCOBBLE	40
Streambed Composition Boulder (percent)	AVGBOULDER	30
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description


LITTLE NATCHES CR (at Kaner Flat)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

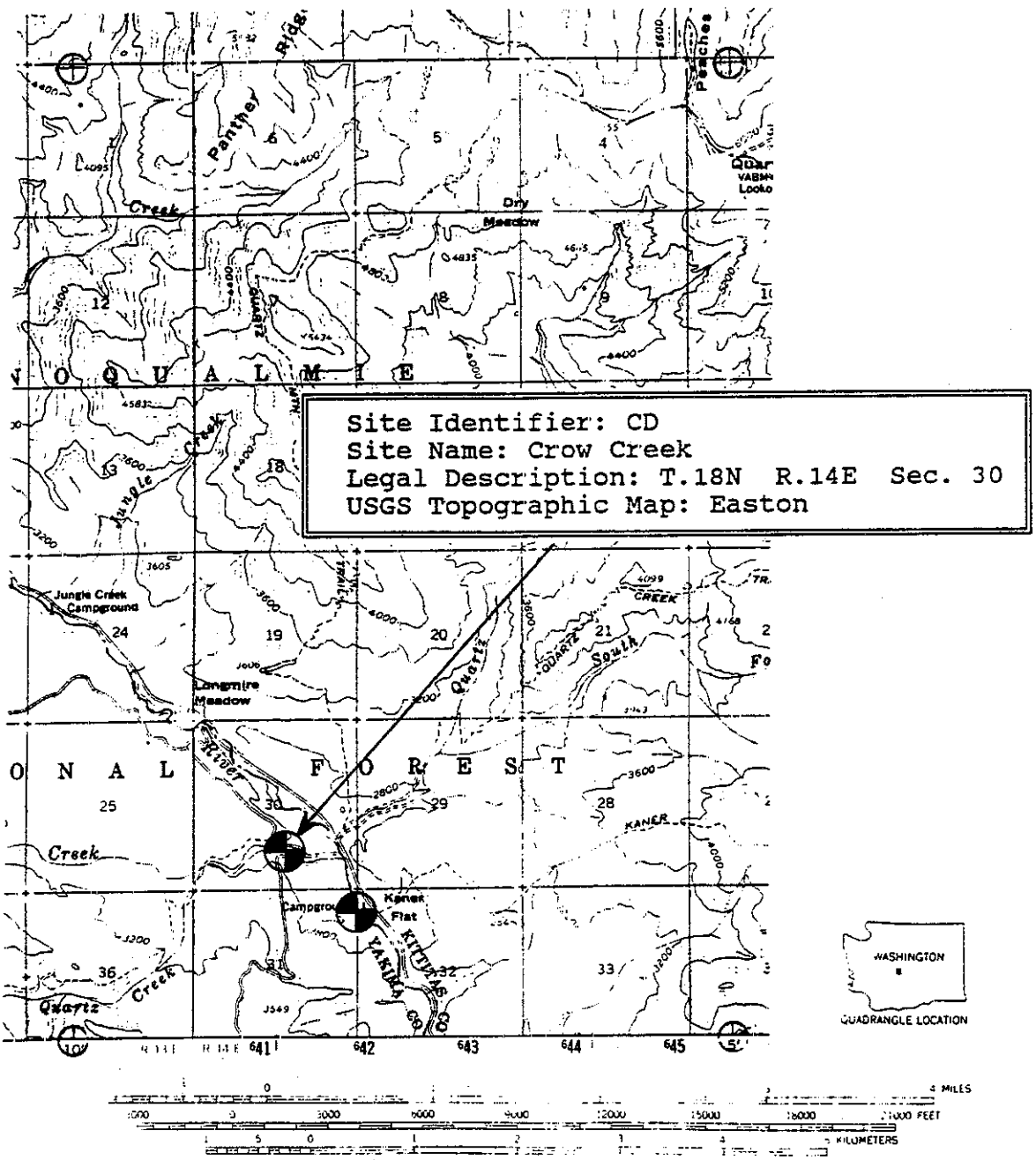
LITTLE NATCHES RIVER (At Kamer Flat)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	13.3	.	16.0	.	11.5	.	4.5
02AUG	.	12.7	.	15.5	.	10.0	.	5.5
03AUG	.	13.7	.	17.0	.	10.5	.	6.5
04AUG	.	14.2	.	17.5	.	11.0	.	6.5
05AUG	.	13.7	.	17.0	.	11.0	.	6.0
06AUG	.	12.5	.	15.0	.	10.0	.	5.0
07AUG	.	13.0	.	16.5	.	10.5	.	6.0
08AUG	.	13.1	.	16.5	.	10.0	.	6.5
09AUG	.	13.9	.	17.5	.	11.0	.	6.5
10AUG	.	14.5	.	17.5	.	12.5	.	5.0
11AUG	.	13.7	.	17.0	.	10.5	.	6.5
12AUG	.	14.0	.	17.5	.	11.0	.	6.5
13AUG	.	13.5	.	16.0	.	11.5	.	4.5
14AUG	.	13.7	.	17.0	.	12.0	.	5.0
15AUG	.	13.1	.	15.0	.	11.5	.	3.5
16AUG	.	13.2	.	15.5	.	12.0	.	3.5
17AUG	.	12.1	.	13.5	.	11.0	.	2.5
18AUG	.	12.8	.	16.0	.	10.5	.	5.5
19AUG	.	12.3	.	15.5	.	9.5	.	6.0
20AUG	.	12.6	.	15.5	.	11.0	.	4.5
21AUG	.	11.8	.	15.5	.	9.0	.	6.5
22AUG	.	12.1	.	15.5	.	9.0	.	6.5
23AUG	.	12.9	.	16.5	.	9.5	.	7.0
24AUG	.	12.8	.	15.5	.	10.5	.	5.0
25AUG	.	13.4	.	16.5	.	11.0	.	5.5
26AUG	.	13.5	.	16.5	.	11.0	.	5.5
27AUG	.	13.6	.	16.5	.	11.0	.	5.5
28AUG	.	13.9	.	17.0	.	11.0	.	6.0
29AUG	.	13.6	.	16.5	.	11.5	.	5.0
30AUG	.	12.8	.	15.5	.	10.5	.	5.0
31AUG	.	12.0	.	15.5	.	9.0	.	6.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



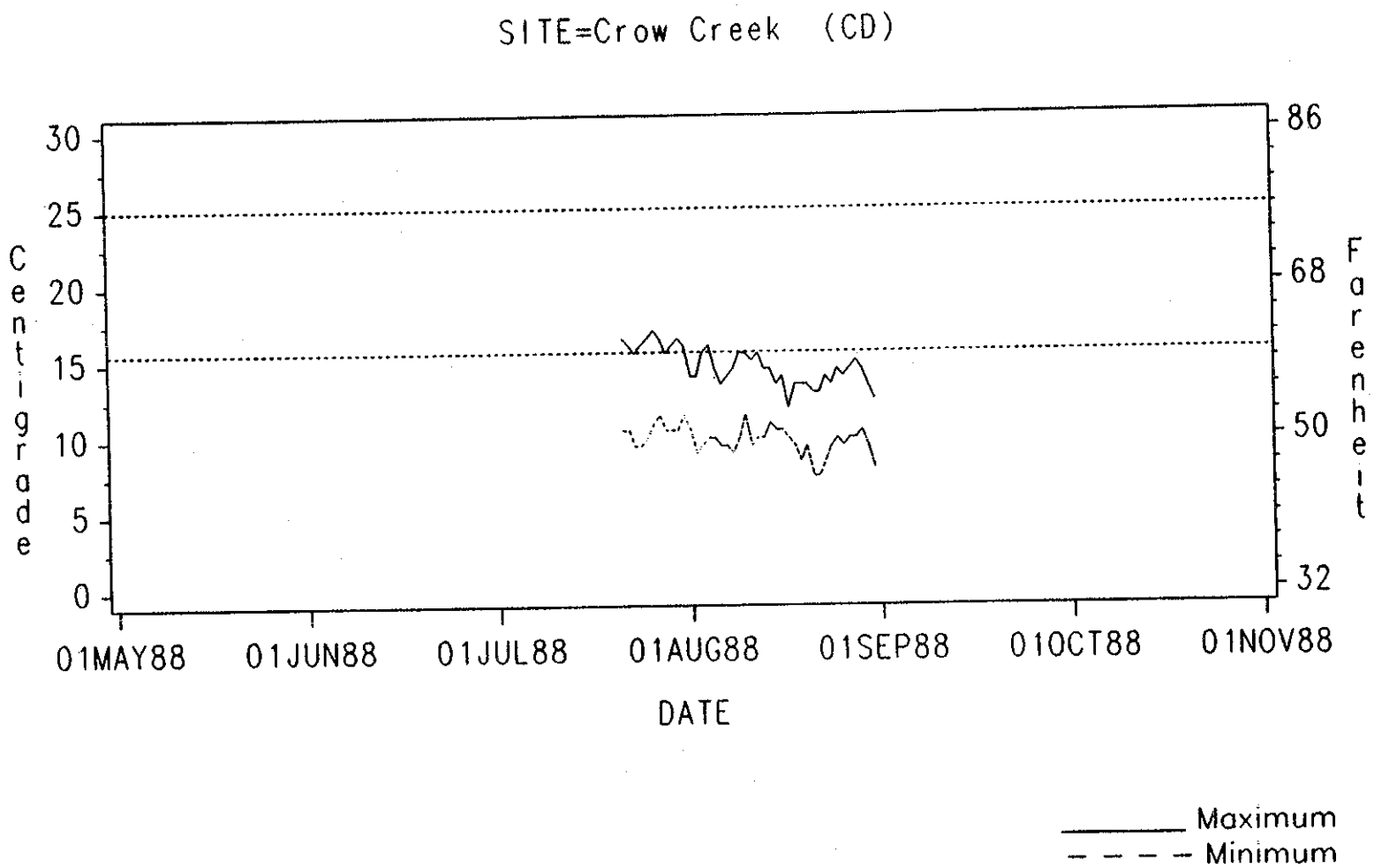
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

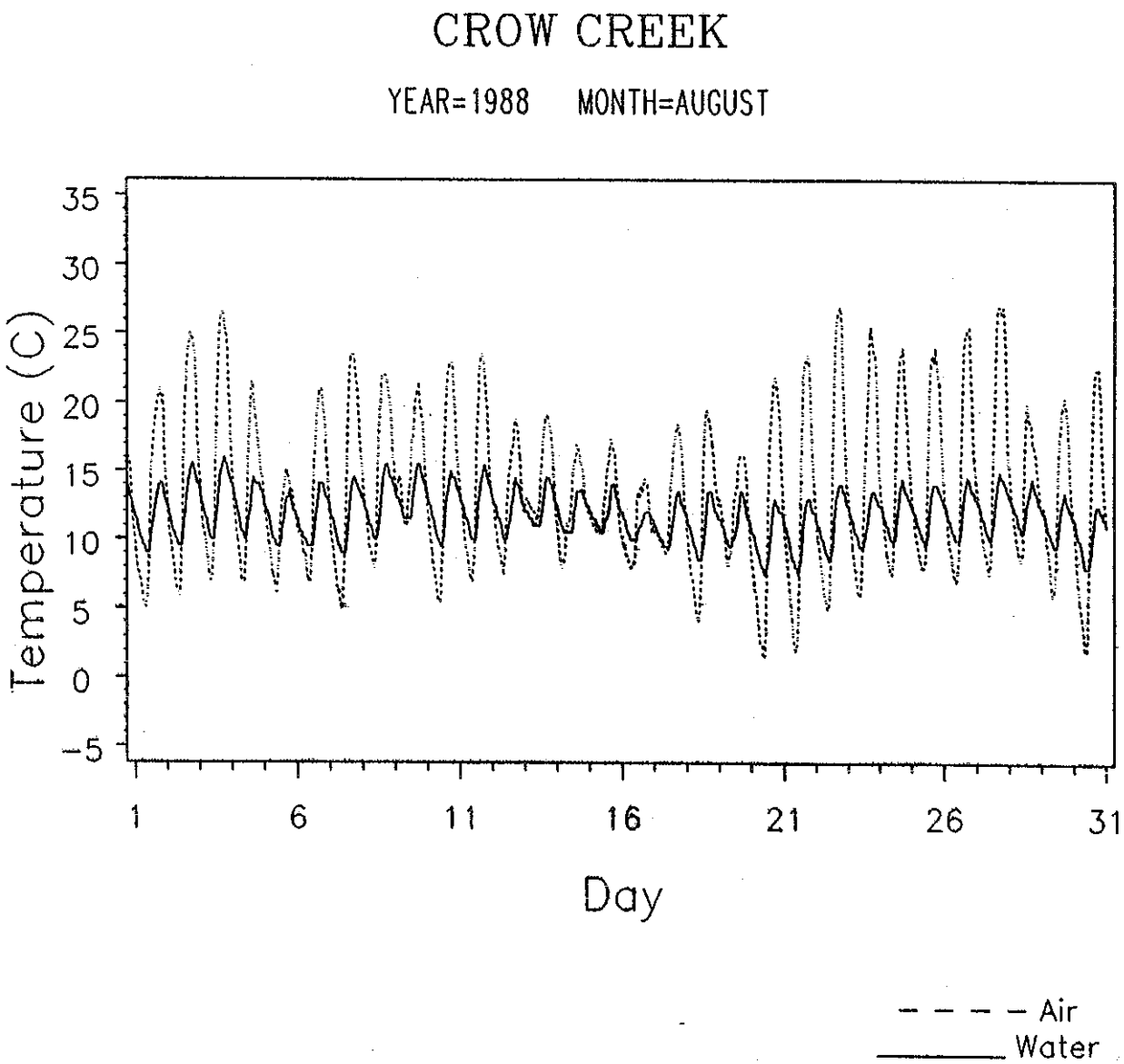
Item Name	Data Item*	Value
I/F/W Site Identifier	SITES	CD
Stream Name	SITENAMES	Crow Creek
Cooperator	COOPERATOR	Yakima Indian Nation
Cooperator/contact	COOPCONTACT	Dale Bambrick
Date of Site Visit	VISIT	08-15-88
County	COUNTY	Yakima
Nearest town	NEARESTTOWN	American River
Township	TOWNSHIP	18N
Range	RANGE	14E
Section	SECTION	30
Site is Tributary To:	TRIBUTARYTO	Little Natches
Water Resource Inventory Area	WRIA	38
WDF River Segment Identifier	WDFNUMBER	0858
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	Southeast Cascades
Latitude Decimal Degrees (degrees)	LATDEC	47.016250
Longitude Decimal Degrees (degrees)	LONGDEC	121.139200
NOAA Local Climatological Data Station	NOAAINDEX	yakima/stampedepass
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	8
Geologic Age of Basin Geology	GEOAGE	Miocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	827
Elevation Top of Thermal Reach (meters)	ELEVUSM	844
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.8
Channel Gradient from Autolevel (percent)	GRADLEVEL	2.5
Channel Azimuth (degrees)	AZIMUTH1	69
Drainage Area Above Thermograph (hectares)	AREAHECT	10387
Distance to Divide (meters)	DIVIDEMT	27780
Total Length of Perennial Streams (meters)	LENGTHMT	72829
Streamflow at Thermograph (cubic meters/second)	QDSM	0.603
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.601
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.002
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.008
Travel Time (meters/second)	TRAVELM	0.421
Average View To Sky (percent open) (percent)	VIEW1	71
Topographic Angle South (degrees)	TOPOSA	18
Topographic Angle Southeast (degrees)	TOPOSEA	14
Topographic Angle Southwest (degrees)	TOPOSWA	17
Average Forest Angle South (degrees)	FORSA	51
Average Forest Angle Southeast (degrees)	FORSEA	47
Average Forest Angle Southwest (degrees)	FORSWA	51
Percent Overhanging Brush (percent)	OVERBRUSH	5
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	15
Vegetation Height West Bank (meters)	VEGHTWM	12
Percent Vegetative Density East (percent)	VEGDENE	13
Percent Vegetative Density West (percent)	VEGDENW	15
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.341
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	5.838
Percent of Channel Composed of Pools (percent)	PERCENPL	58
Average Pool Depth (meters)	DEPTHPM	0.470
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	10
Streambed Composition Cobble (percent)	AVGCOBBLE	50
Streambed Composition Boulder (percent)	AVGBOULDER	40
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


CROW CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

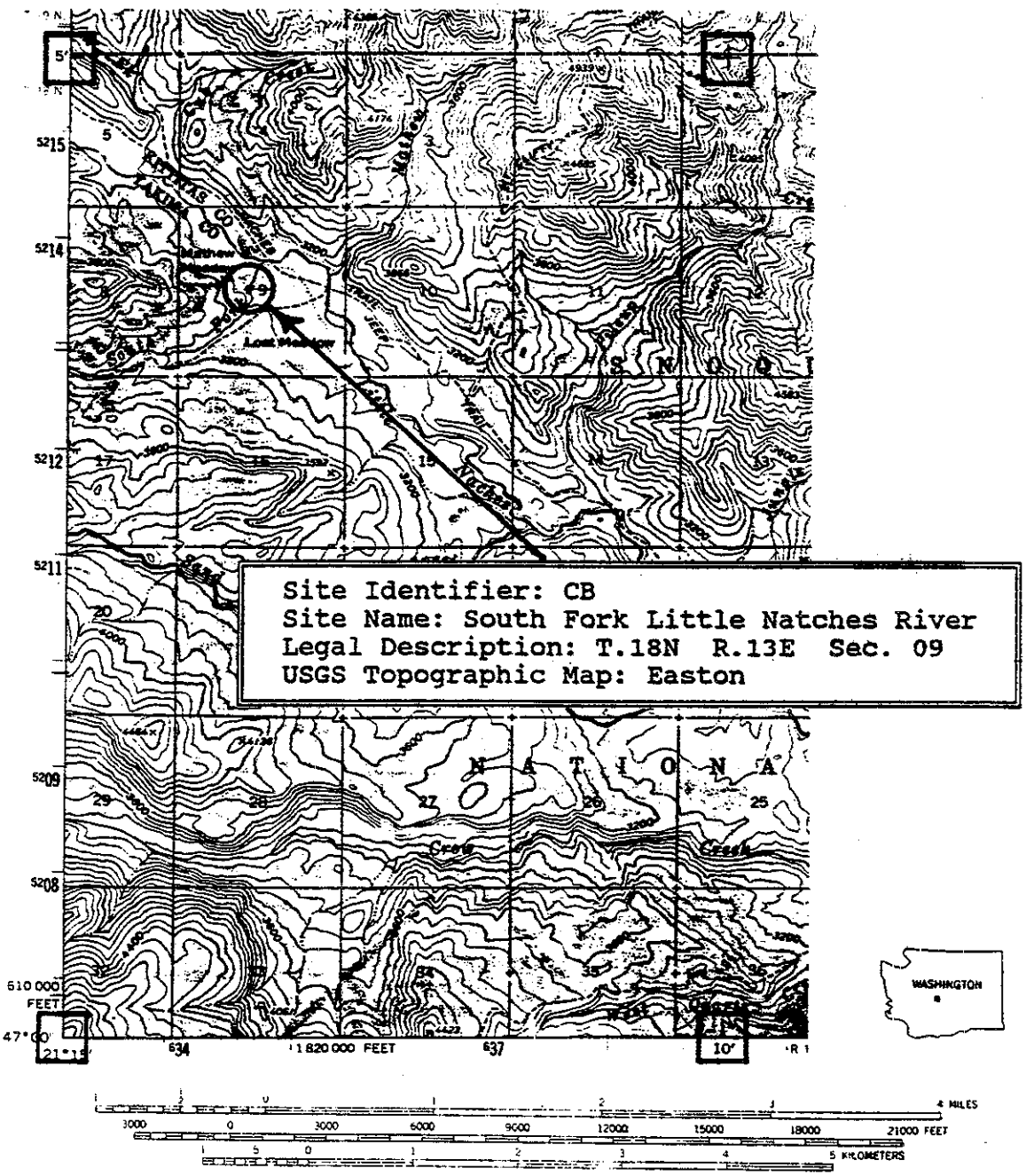
CROW CREEK--Tributary to Little Natches River

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	12.4	12.1	16.0	14.0	8.5	10.5	7.5	3.5
02AUG	13.0	11.4	21.0	14.0	5.0	9.0	16.0	5.0
03AUG	15.3	12.3	25.0	15.5	6.0	9.5	19.0	6.0
04AUG	16.4	12.9	26.5	16.0	7.0	10.0	19.5	6.0
05AUG	13.7	12.4	21.5	14.5	7.0	10.0	14.5	4.5
06AUG	11.0	11.3	15.0	13.5	6.0	9.5	9.0	4.0
07AUG	13.6	11.5	21.0	14.0	7.0	9.5	14.0	4.5
08AUG	14.1	11.7	23.5	14.5	5.0	9.0	18.5	5.5
09AUG	15.3	12.7	22.0	15.5	8.0	10.0	14.0	5.5
10AUG	15.5	13.2	21.5	15.5	11.0	11.5	10.5	4.0
11AUG	14.0	12.3	23.0	15.0	5.5	9.5	17.5	5.5
12AUG	14.7	12.5	23.5	15.5	7.0	10.0	16.5	5.5
13AUG	13.1	12.1	19.0	14.5	7.5	10.0	11.5	4.5
14AUG	14.4	12.4	19.0	14.5	10.0	11.0	9.0	3.5
15AUG	12.5	11.9	17.0	13.5	8.0	10.5	9.0	3.0
16AUG	12.8	11.9	17.5	14.0	9.5	10.5	8.0	3.5
17AUG	11.1	11.0	14.5	12.0	8.0	10.0	6.5	2.0
18AUG	12.9	11.2	18.5	13.5	9.0	9.5	9.5	4.0
19AUG	12.0	10.9	19.5	13.5	4.0	8.5	15.5	5.0
20AUG	12.1	11.1	16.5	13.5	7.5	9.5	9.0	4.0
21AUG	11.5	10.2	22.0	13.0	1.5	7.5	20.5	5.5
22AUG	12.4	10.5	23.5	13.0	2.0	7.5	21.5	5.5
23AUG	14.7	11.4	27.0	14.0	5.0	8.5	22.0	5.5
24AUG	14.8	11.5	25.5	13.5	6.0	9.5	19.5	4.0
25AUG	14.9	12.0	24.0	14.5	7.5	10.0	16.5	4.5
26AUG	15.2	12.0	24.0	14.0	8.0	9.5	16.0	4.5
27AUG	15.2	12.1	25.5	14.5	7.0	10.0	18.5	4.5
28AUG	16.7	12.5	27.0	15.0	7.5	10.0	19.5	5.0
29AUG	13.8	12.4	20.0	14.5	8.5	10.5	11.5	4.0
30AUG	13.0	11.4	20.5	13.5	6.0	9.5	14.5	4.0
31AUG	11.8	10.3	22.5	12.5	2.0	8.0	20.5	4.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



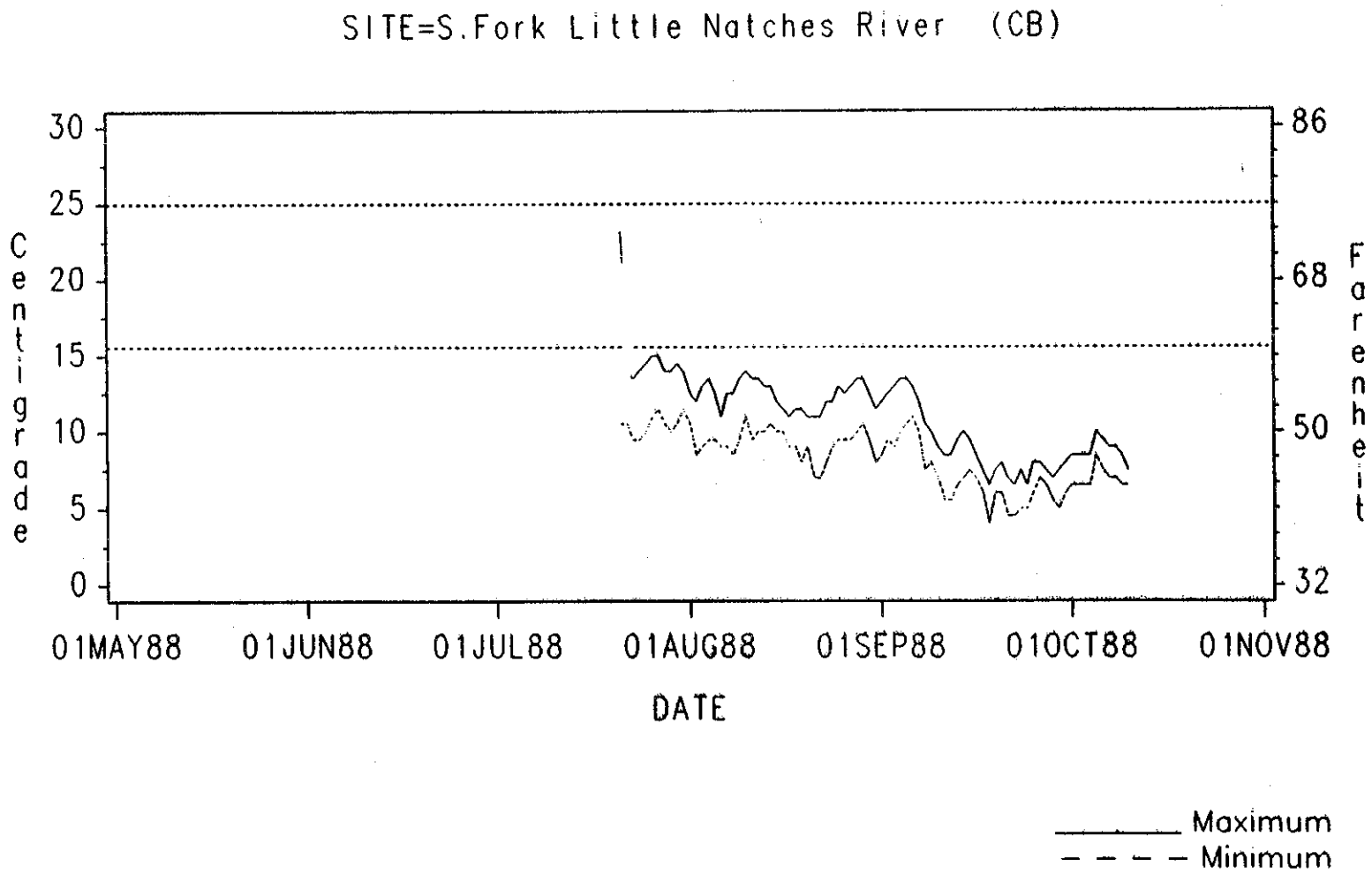
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

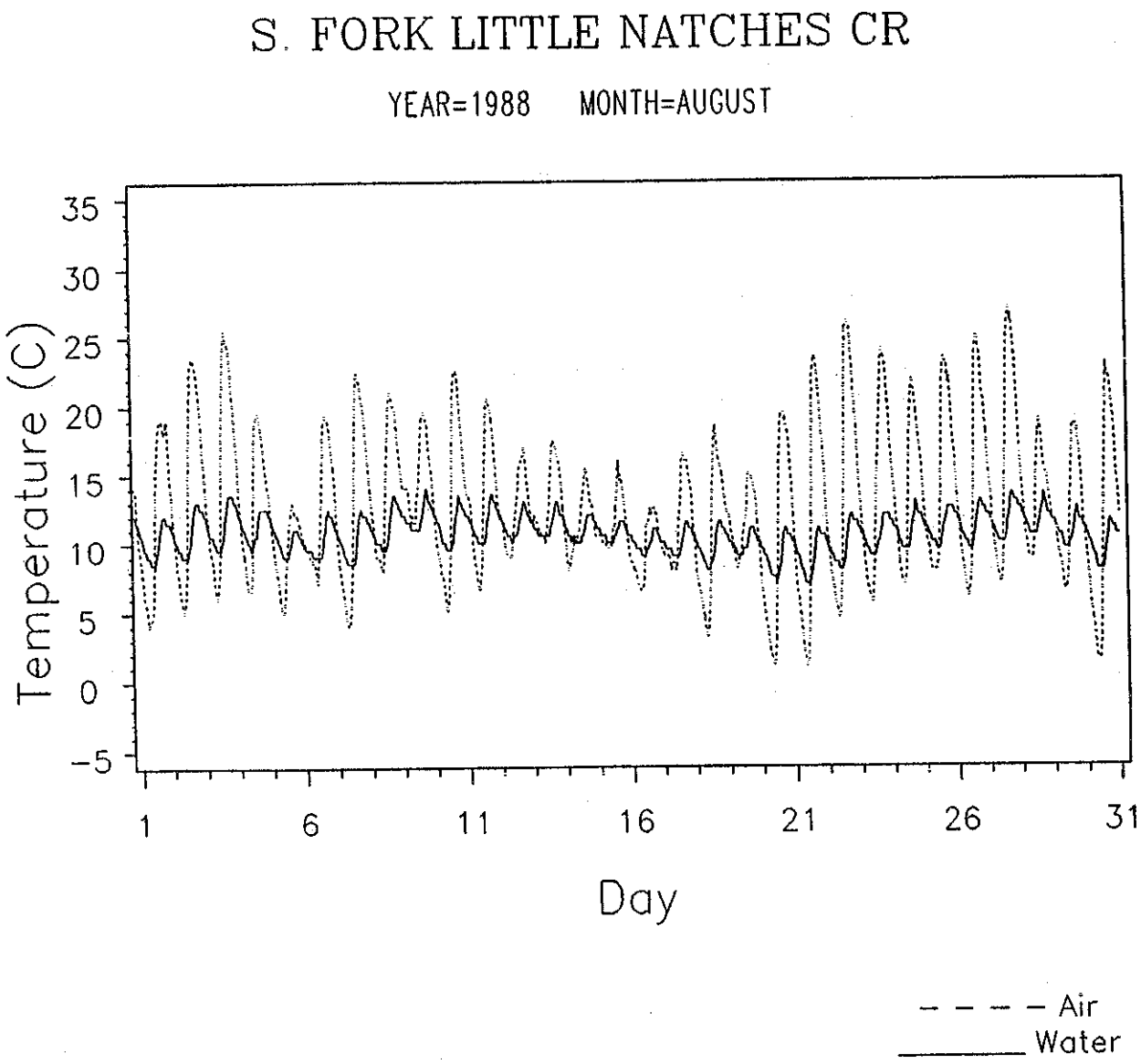
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	CB
Stream Name	SITENAMES	S. Fk. Little Natches
Cooperator	COOPERATOR	Yakima Indian Nation
Cooperator/contact	COOPCONTACT	Dale Bambrick
Date of Site Visit	VISIT	08-16-88
County	COUNTY	Yakima
Nearest town	NEARESTTOWN	American River
Township	TOWNSHIP	18N
Range	RANGE	13E
Section	SECTION	09
Site is Tributary To:	TRIBUTARYTO	Little Natches
Water Resource Inventory Area	WRIA	38
WDF River Segment Identifier	WDFNUMBER	0947
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	Southeast Cascades
Latitude Decimal Degrees (degrees)	LATDEC	47.062640
Longitude Decimal Degrees (degrees)	LONGDEC	121.181100
NOAA Local Climatological Data Station	NOAAINDEX	yakima/stampedepass
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	8
Geologic Age of Basin Geology	GEOAGE	Miocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	949
Elevation Top of Thermal Reach (meters)	ELEVUSM	963
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.3
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.6
Channel Azimuth (degrees)	AZIMUTH1	44
Drainage Area Above Thermograph (hectares)	AREAHECT	3910
Distance to Divide (meters)	DIVIDEMT	16176
Total Length of Perennial Streams (meters)	LENGTHMT	24484
Streamflow at Thermograph (cubic meters/second)	QDSM	0 165
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.190
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.025
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.007
Travel Time (meters/second)	TRAVELM	0 338
Average View To Sky (percent open) (percent)	VIEW1	44
Topographic Angle South (degrees)	TOPOSA	14
Topographic Angle Southeast (degrees)	TOPOSEA	12
Topographic Angle Southwest (degrees)	TOPOSWA	14
Average Forest Angle South (degrees)	FORSA	64
Average Forest Angle Southeast (degrees)	FORSEA	61
Average Forest Angle Southwest (degrees)	FORSWA	64
Percent Overhanging Brush (percent)	OVERBRUSH	6
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	21
Vegetation Height West Bank (meters)	VEGHTWM	22
Percent Vegetative Density East (percent)	VEGDENE	23
Percent Vegetative Density West (percent)	VEGDENW	27
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.258
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	3.565
Percent of Channel Composed of Pools (percent)	PERCENPL	57
Average Pool Depth (meters)	DEPTHPM	0 400
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	5
Streambed Composition Gravel (percent)	AVGGRAVEL	35
Streambed Composition Cobble (percent)	AVGCOBBLE	55
Streambed Composition Boulder (percent)	AVGBOULDER	5
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


S. FORK LITTLE NATCHES CR
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

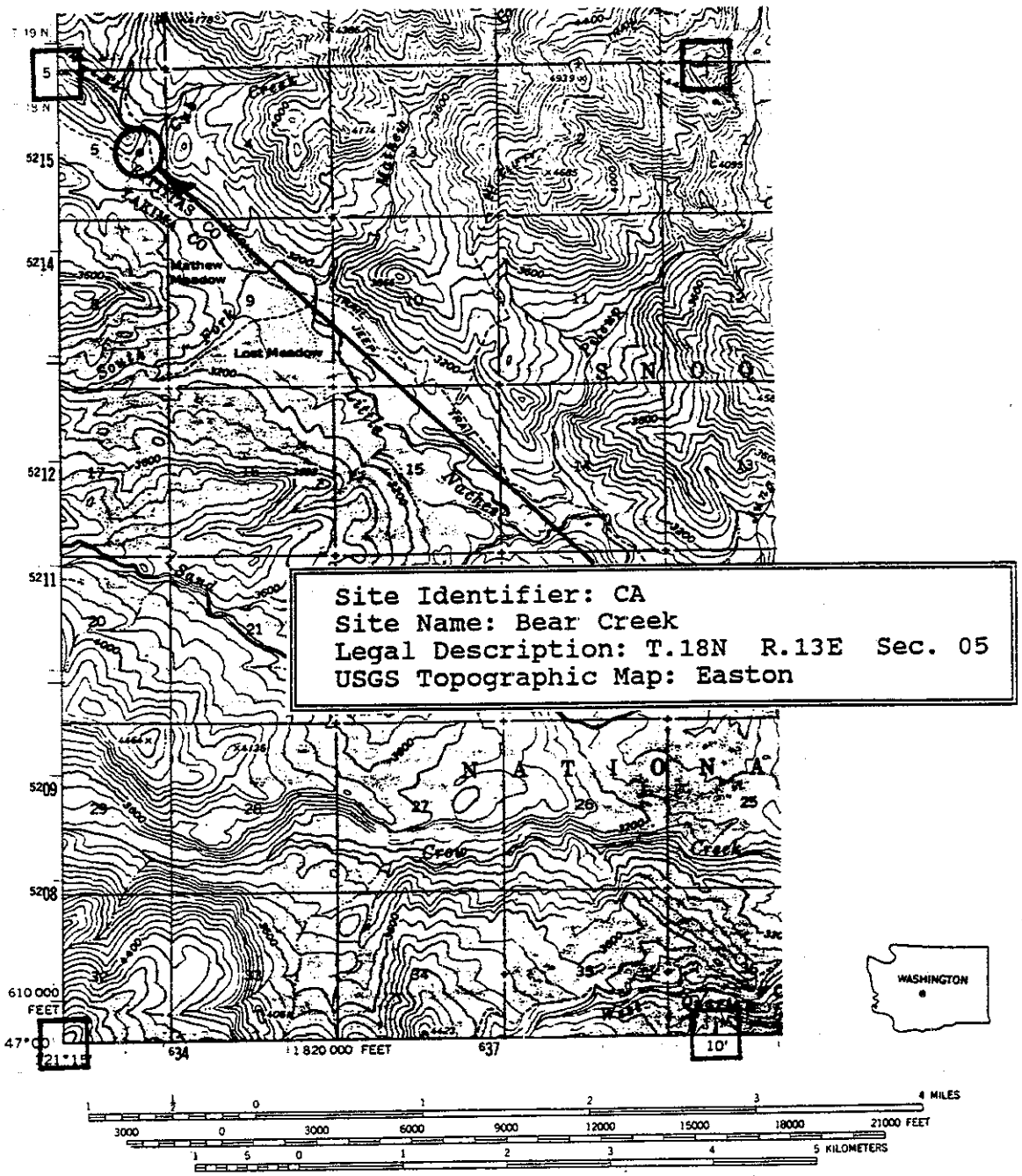
S. FORK LITTLE NATCHES RIVER

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	11.1	11.2	14.0	12.5	8.0	10.5	6.0	2.0
02AUG	12.1	10.2	19.0	12.0	4.0	8.5	15.0	3.5
03AUG	14.3	10.8	23.5	13.0	5.0	9.0	18.5	4.0
04AUG	15.5	11.4	25.5	13.5	6.0	9.5	19.5	4.0
05AUG	12.8	11.3	19.5	12.5	6.5	9.5	13.0	3.0
06AUG	9.5	10.1	13.0	11.0	5.0	9.0	8.0	2.0
07AUG	12.7	10.3	19.5	12.5	7.0	9.0	12.5	3.5
08AUG	13.0	10.2	22.5	12.5	4.0	8.5	18.5	4.0
09AUG	14.4	11.2	21.0	13.5	8.0	9.5	13.0	4.0
10AUG	14.7	11.9	19.5	14.0	9.5	11.0	10.0	3.0
11AUG	13.4	11.2	22.5	13.5	5.0	9.5	17.5	4.0
12AUG	13.4	11.5	20.5	13.5	6.5	10.0	14.0	3.5
13AUG	12.4	11.3	17.0	13.0	9.0	10.0	8.0	3.0
14AUG	12.9	11.3	17.5	13.0	8.5	10.5	9.0	2.5
15AUG	11.5	10.9	15.5	12.0	8.0	10.0	7.5	2.0
16AUG	11.2	10.6	16.0	11.5	8.5	10.0	7.5	1.5
17AUG	9.7	9.9	12.5	11.0	6.5	9.0	6.0	2.0
18AUG	11.4	10.0	16.5	11.5	7.5	9.0	9.0	2.5
19AUG	10.8	9.7	18.5	11.5	3.0	8.0	15.5	3.5
20AUG	11.0	9.8	15.0	11.0	6.0	9.0	9.0	2.0
21AUG	10.3	9.0	19.5	11.0	1.0	7.0	18.5	4.0
22AUG	11.7	9.0	23.5	11.0	1.0	7.0	22.5	4.0
23AUG	14.4	9.9	26.0	12.0	4.5	8.0	21.5	4.0
24AUG	14.4	10.4	24.0	12.0	5.5	9.0	18.5	3.0
25AUG	13.8	10.9	22.0	13.0	7.0	9.5	15.0	3.5
26AUG	14.8	11.1	23.5	12.5	8.0	9.5	15.5	3.0
27AUG	14.9	11.2	25.0	13.0	6.0	9.5	19.0	3.5
28AUG	16.4	11.5	27.0	13.5	7.0	10.0	20.0	3.5
29AUG	13.0	11.6	19.0	13.5	8.5	10.5	10.5	3.0
30AUG	12.1	10.7	18.5	12.5	6.5	9.5	12.0	3.0
31AUG	11.6	9.7	23.0	11.5	1.5	8.0	21.5	3.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



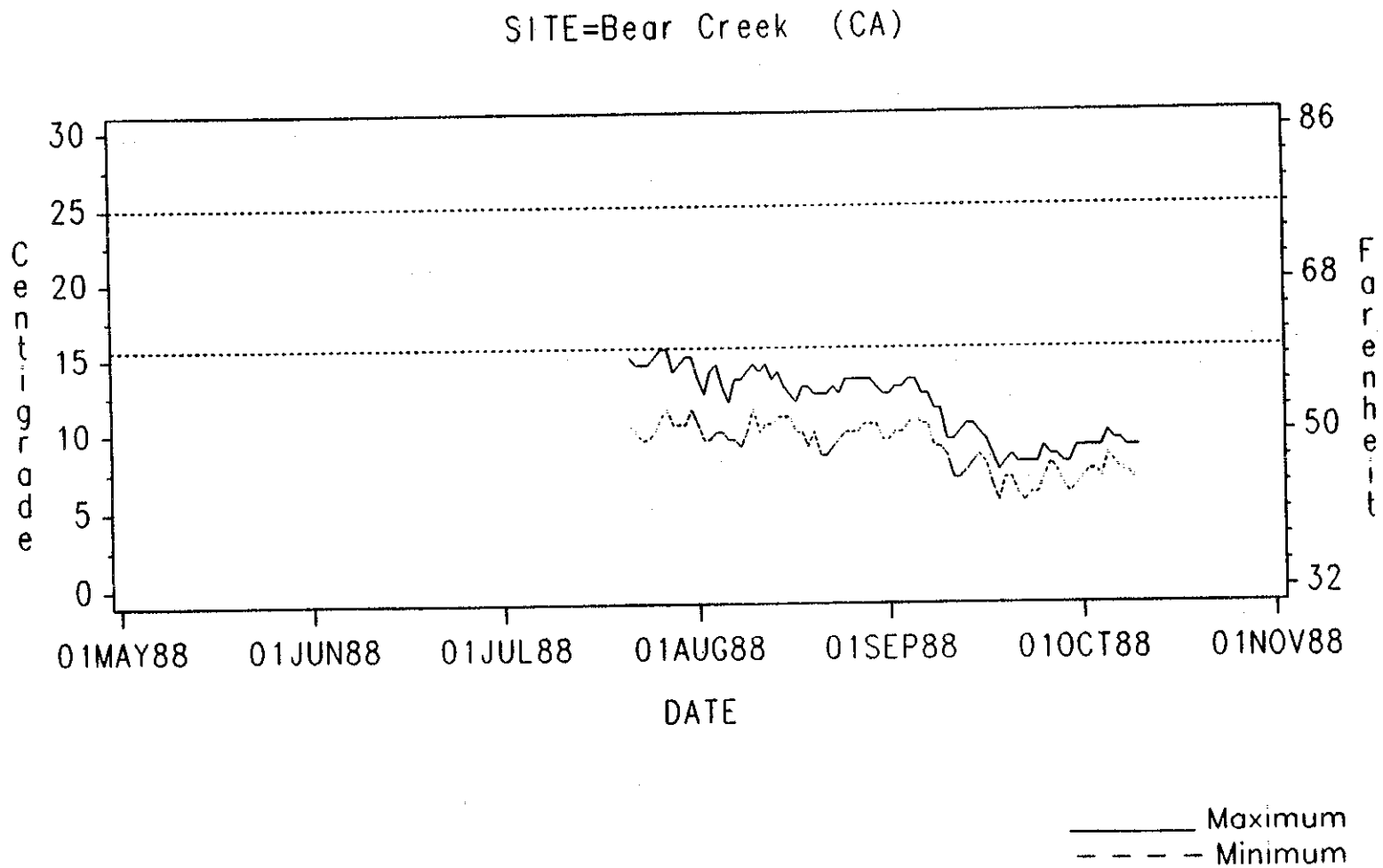
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

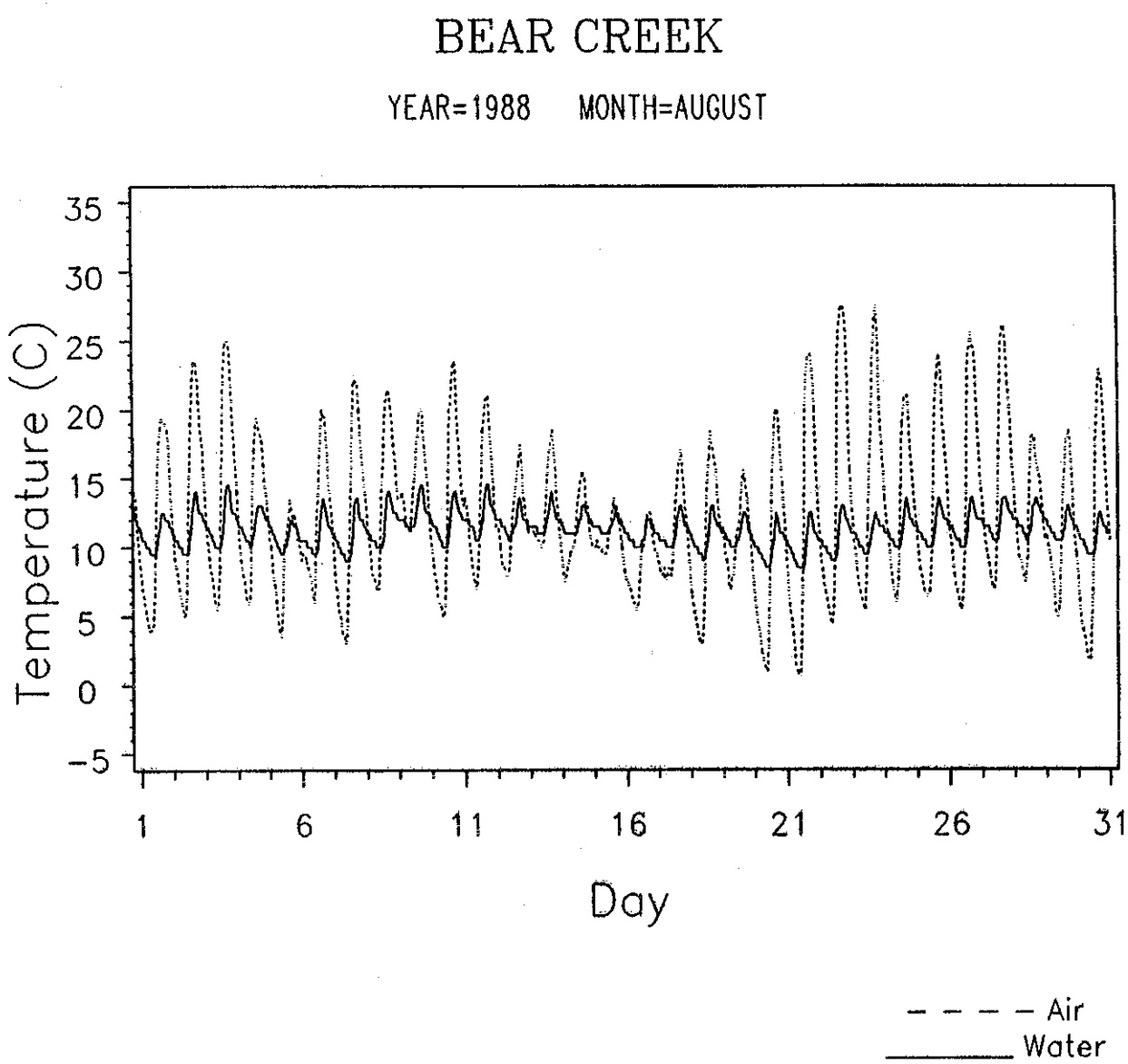
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	CA
Stream Name	SITENAMES	Bear Creek
Cooperator	COOPERATOR	Yakima Indian Nation
Cooperator/contact	COOPCONTACT	Dale Bambrick
Date of Site Visit	VISIT	08-16-88
County	COUNTY	Yakima
Nearest town	NEAREST TOWN	American River
Township	TOWNSHIP	18N
Range	RANGE	13E
Section	SECTION	05
Site is Tributary To:	TRIBUTARYTO	Little Natches
Water Resource Inventory Area	WRIA	38
WDF River Segment Identifier	WDFNUMBER	0948
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	Southeast Cascades
Latitude Decimal Degrees (degrees)	LATDEC	47.076850
Longitude Decimal Degrees (degrees)	LONGDEC	121.239900
NOAA Local Climatological Data Station	NOAAINDEX	yakima/stampedepass
Mean Annual Air Temperature (degrees C)	ANNUALAIRC	8
Geologic Age of Basin Geology	GEOAGE	Oligocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	volcaniclastic
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	956
Elevation Top of Thermal Reach (meters)	ELEVUSM	967
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.8
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.0
Channel Azimuth (degrees)	AZIMUTH1	154
Drainage Area Above Thermograph (hectares)	AREAHECT	3230
Distance to Divide (meters)	DIVIDEMT	7886
Total Length of Perennial Streams (meters)	LENGTHMT	19541
Streamflow at Thermograph (cubic meters/second)	QDSM	0.066
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.076
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.010
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.003
Travel Time (meters/second)	TRAVELM	0.101
Average View To Sky (percent open) (percent)	VIEW1	63
Topographic Angle South (degrees)	TOPOSA	19
Topographic Angle Southeast (degrees)	TOPOSEA	15
Topographic Angle Southwest (degrees)	TOPOSWA	25
Average Forest Angle South (degrees)	FORSA	49
Average Forest Angle Southeast (degrees)	FORSEA	54
Average Forest Angle Southwest (degrees)	FORSWA	58
Percent Overhanging Brush (percent)	OVERBRUSH	10
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	16
Vegetation Height West Bank (meters)	VEGHTWM	13
Percent Vegetative Density East (percent)	VEGDENE	21
Percent Vegetative Density West (percent)	VEGDENW	8
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.243
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	3.228
Percent of Channel Composed of Pools (percent)	PERCENPL	84
Average Pool Depth (meters)	DEPTHPM	0.340
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	3
Streambed Composition Gravel (percent)	AVGGRAVEL	50
Streambed Composition Cobble (percent)	AVGCOBBLE	40
Streambed Composition Boulder (percent)	AVGBOULDER	7
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


BEAR CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

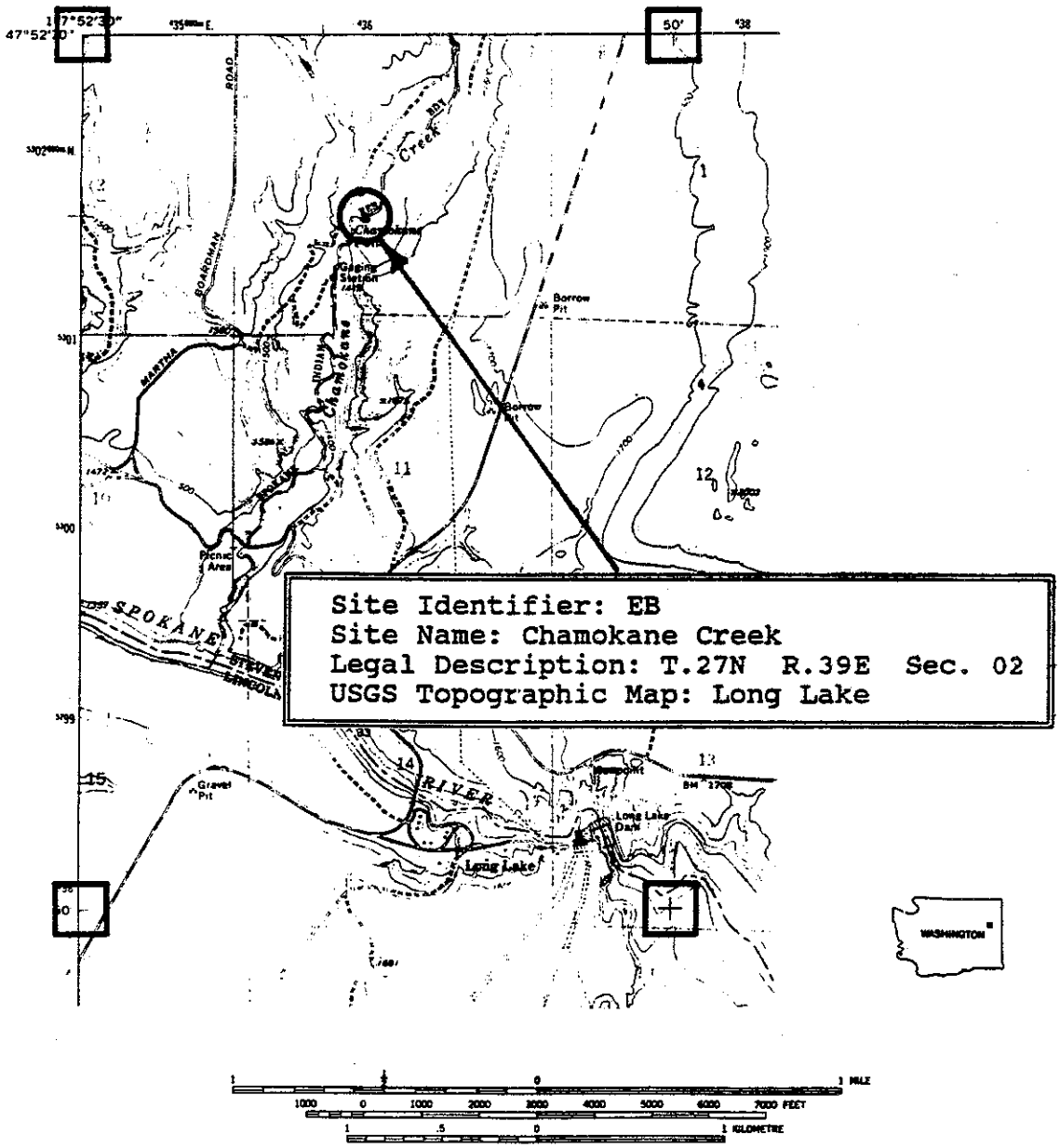
BEAR CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	11.0	11.7	15.5	13.5	7.0	10.5	8.5	3.0
02AUG	11.6	10.8	19.5	12.5	4.0	9.5	15.5	3.0
03AUG	13.8	11.3	23.5	14.0	5.0	9.5	18.5	4.5
04AUG	14.7	11.8	25.0	14.5	5.5	10.0	19.5	4.5
05AUG	12.4	11.6	19.5	13.0	6.0	10.0	13.5	3.0
06AUG	9.2	10.7	13.5	12.0	3.5	9.5	10.0	2.5
07AUG	12.2	10.9	20.0	13.5	6.0	9.5	14.0	4.0
08AUG	12.2	10.8	22.5	13.5	3.0	9.0	19.5	4.5
09AUG	13.9	11.6	21.5	14.0	7.0	10.0	14.5	4.0
10AUG	14.5	12.4	20.0	14.5	9.0	11.5	11.0	3.0
11AUG	13.2	11.7	23.5	14.0	5.0	10.0	18.5	4.0
12AUG	13.5	12.2	21.0	14.5	7.0	10.5	14.0	4.0
13AUG	11.9	11.8	17.5	13.5	8.0	10.5	9.5	3.0
14AUG	12.7	11.9	18.5	14.0	8.0	11.0	10.5	3.0
15AUG	11.4	11.7	15.5	13.0	7.5	11.0	8.0	2.0
16AUG	10.5	11.5	13.5	12.5	7.5	11.0	6.0	1.5
17AUG	9.0	10.8	12.5	12.0	5.5	10.0	7.0	2.0
18AUG	10.8	11.1	17.0	13.0	6.5	10.0	10.5	3.0
19AUG	10.3	10.8	18.5	13.0	3.0	9.0	15.5	4.0
20AUG	10.4	10.8	15.5	12.5	5.5	10.0	10.0	2.5
21AUG	9.7	10.1	20.0	12.5	1.0	8.5	19.0	4.0
22AUG	11.6	10.1	24.0	12.5	0.5	8.5	23.5	4.0
23AUG	14.8	10.7	27.5	13.0	4.5	9.0	23.0	4.0
24AUG	14.6	10.8	27.5	12.5	5.5	9.5	22.0	3.0
25AUG	13.1	11.2	21.0	13.5	6.0	10.0	15.0	3.5
26AUG	13.7	11.3	24.0	13.5	6.5	10.0	17.5	3.5
27AUG	14.5	11.5	25.5	13.5	5.5	10.0	20.0	3.5
28AUG	15.4	11.9	26.0	13.5	7.0	10.5	19.0	3.0
29AUG	12.4	11.9	18.0	13.5	7.5	10.5	10.5	3.0
30AUG	11.1	11.4	18.5	13.0	5.0	10.5	13.5	2.5
31AUG	11.1	10.7	23.0	12.5	1.5	9.5	21.5	3.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



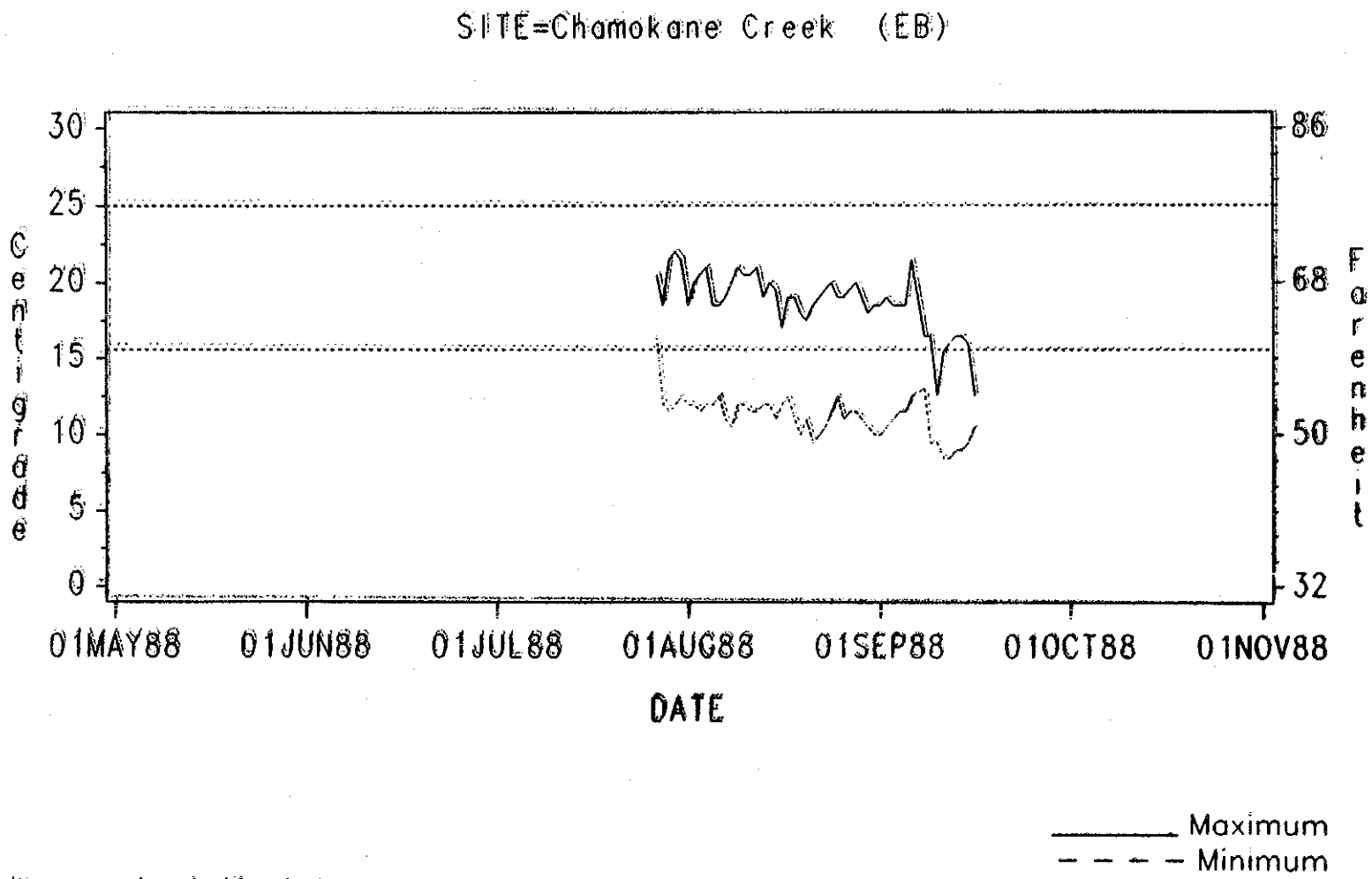
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

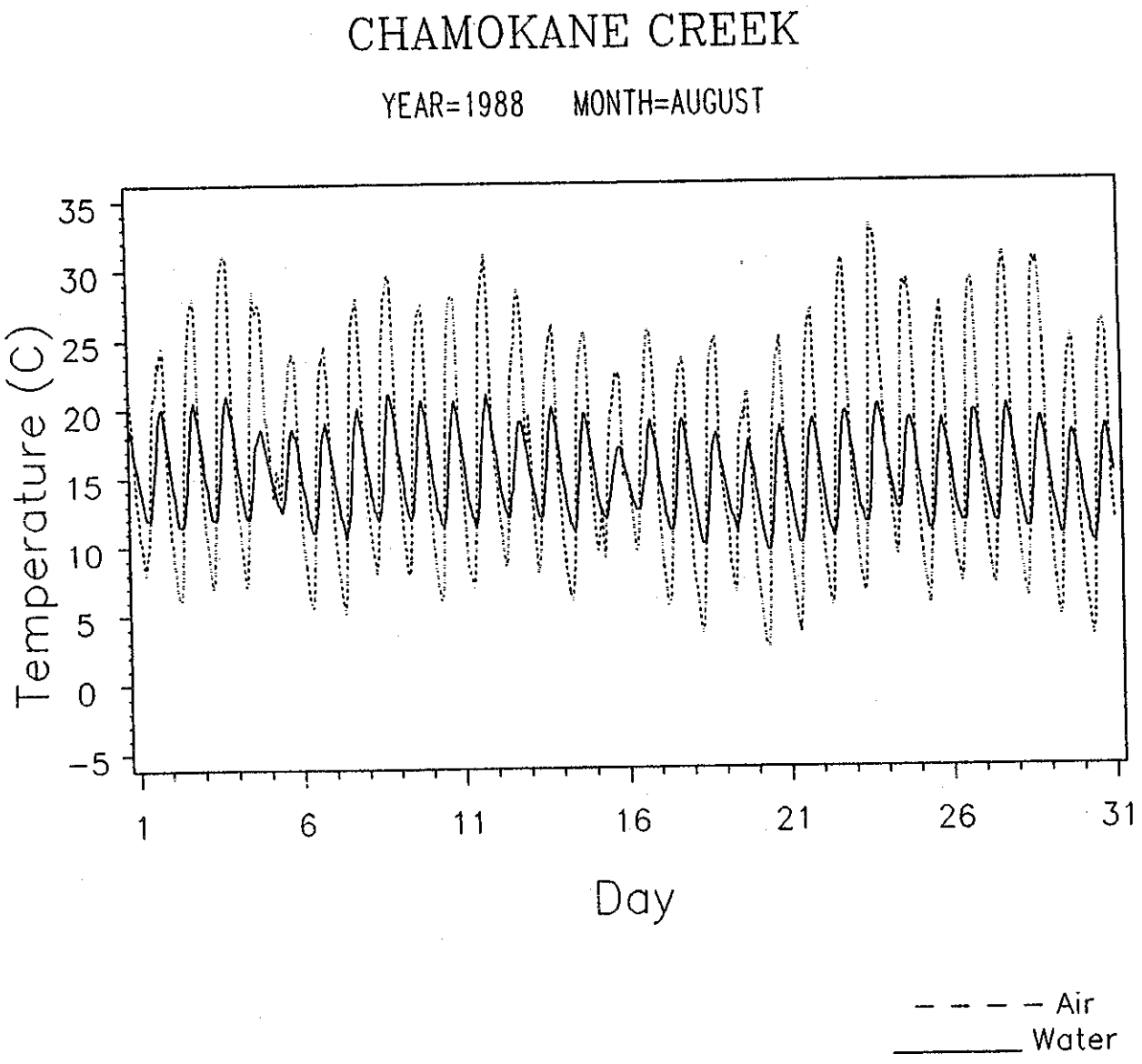
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	EB
Stream Name	SITENAMES	Chamokane Creek
Cooperator	COOPERATOR	U. Columbia Un.Tribes
Cooperator/contact	COOPCONTACT	Dale Chess
Date of Site Visit	VISIT	09-14-88
County	COUNTY	Stevens
Nearest town	NEAREST TOWN	Ford
Township	TOWNSHIP	27N
Range	RANGE	39E
Section	SECTION	02
Site is Tributary To:	TRIBUTARYTO	Spokane River
Water Resource Inventory Area	WRIA	54
WDF River Segment Identifier	WDFNUMBER	0250
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	Pend Oreille
Latitude Decimal Degrees (degrees)	LATDEC	47.866540
Longitude Decimal Degrees (degrees)	LONGDEC	117.854000
NOAA Local Climatological Data Station	NOAAINDEX	spokane
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	8
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	glaciolacustrine
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	446
Elevation Top of Thermal Reach (meters)	ELEVUSM	452
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.0
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.8
Channel Azimuth (degrees)	AZIMUTH1	216
Drainage Area Above Thermograph (hectares)	AREAHECT	46361
Distance to Divide (meters)	DIVIDEMT	57775
Total Length of Perennial Streams (meters)	LENGTHMT	0
Streamflow at Thermograph (cubic meters/second)	QDSM	0.717
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.679
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.038
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.002
Travel Time (meters/second)	TRAVELM	0.488
Average View To Sky (percent open) (percent)	VIEW1	93
Topographic Angle South (degrees)	TOPOSA	4
Topographic Angle Southeast (degrees)	TOPOSEA	7
Topographic Angle Southwest (degrees)	TOPOSWA	5
Average Forest Angle South (degrees)	FORSA	33
Average Forest Angle Southeast (degrees)	FORSEA	39
Average Forest Angle Southwest (degrees)	FORSWA	37
Percent Overhanging Brush (percent)	OVERBRUSH	6
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	6
Vegetation Height West Bank (meters)	VEGHTWM	5
Percent Vegetative Density East (percent)	VEGDENE	1
Percent Vegetative Density West (percent)	VEGDENW	7
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.278
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	6.260
Percent of Channel Composed of Pools (percent)	PERCENPL	37
Average Pool Depth (meters)	DEPTHPM	0.470
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	10
Streambed Composition Gravel (percent)	AVGGRAVEL	50
Streambed Composition Cobble (percent)	AVGCOBBLE	38
Streambed Composition Boulder (percent)	AVGBOULDER	3
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


CHAMOKANE CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
−5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

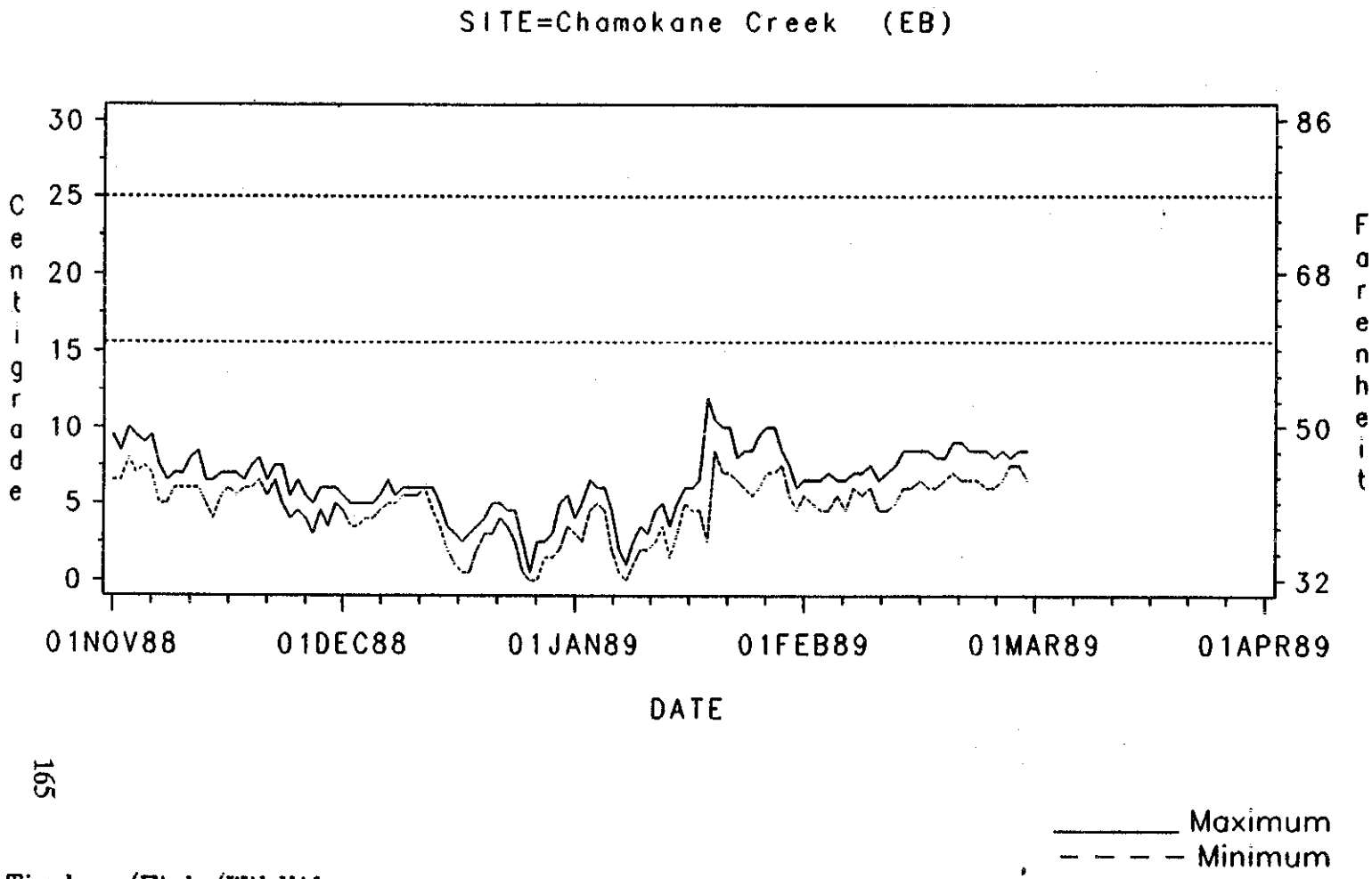
CHAMOKANE CR.

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	16.0	15.3	21.5	18.5	8.0	12.0	13.5	6.5
02AUG	16.1	15.5	24.5	20.0	8.0	12.0	16.5	8.0
03AUG	16.6	15.5	28.0	20.5	6.0	11.5	22.0	9.0
04AUG	19.0	16.1	31.0	21.0	7.0	12.0	24.0	9.0
05AUG	18.4	15.4	28.5	18.5	7.0	12.0	21.5	6.5
06AUG	17.7	15.3	24.0	18.5	10.5	12.5	13.5	6.0
07AUG	14.7	14.7	24.5	19.0	5.5	11.0	19.0	8.0
08AUG	16.5	15.1	28.0	20.0	5.0	10.5	23.0	9.5
09AUG	18.9	16.1	29.5	21.0	8.0	12.0	21.5	9.0
10AUG	17.4	16.0	27.5	20.5	8.0	12.0	19.5	8.5
11AUG	16.9	15.6	28.0	20.5	6.0	11.5	22.0	9.0
12AUG	18.2	15.8	31.0	21.0	7.0	11.5	24.0	9.5
13AUG	18.5	15.4	28.5	19.0	8.5	12.0	20.0	7.0
14AUG	17.1	15.6	26.0	20.0	8.0	12.0	18.0	8.0
15AUG	15.4	15.0	25.5	19.5	6.0	11.0	19.5	8.5
16AUG	15.9	14.4	22.5	17.0	9.0	12.0	13.5	5.0
17AUG	17.3	15.1	25.5	19.0	9.5	12.5	16.0	6.5
18AUG	14.2	14.6	23.5	19.0	5.5	11.0	18.0	8.0
19AUG	14.4	13.8	25.0	18.0	3.5	10.0	21.5	8.0
20AUG	13.6	13.9	21.0	17.5	6.5	11.0	14.5	6.5
21AUG	13.2	13.6	25.0	18.5	2.5	9.5	22.5	9.0
22AUG	15.0	14.2	27.0	19.0	3.5	10.0	23.5	9.0
23AUG	17.0	14.8	30.5	19.5	5.5	10.5	25.0	9.0
24AUG	19.0	15.5	33.0	20.0	6.5	11.5	26.5	8.5
25AUG	19.1	15.6	29.0	19.0	9.0	12.5	20.0	6.5
26AUG	16.0	14.7	27.5	19.0	5.5	11.0	22.0	8.0
27AUG	17.3	15.1	29.0	19.5	7.0	11.5	22.0	8.0
28AUG	17.8	15.3	31.0	20.0	7.0	11.5	24.0	8.5
29AUG	18.2	14.9	30.5	19.0	6.0	11.0	24.5	8.0
30AUG	14.4	14.2	25.0	18.0	4.5	10.5	20.5	7.5
31AUG	14.3	13.8	26.0	18.5	3.0	10.0	23.0	8.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

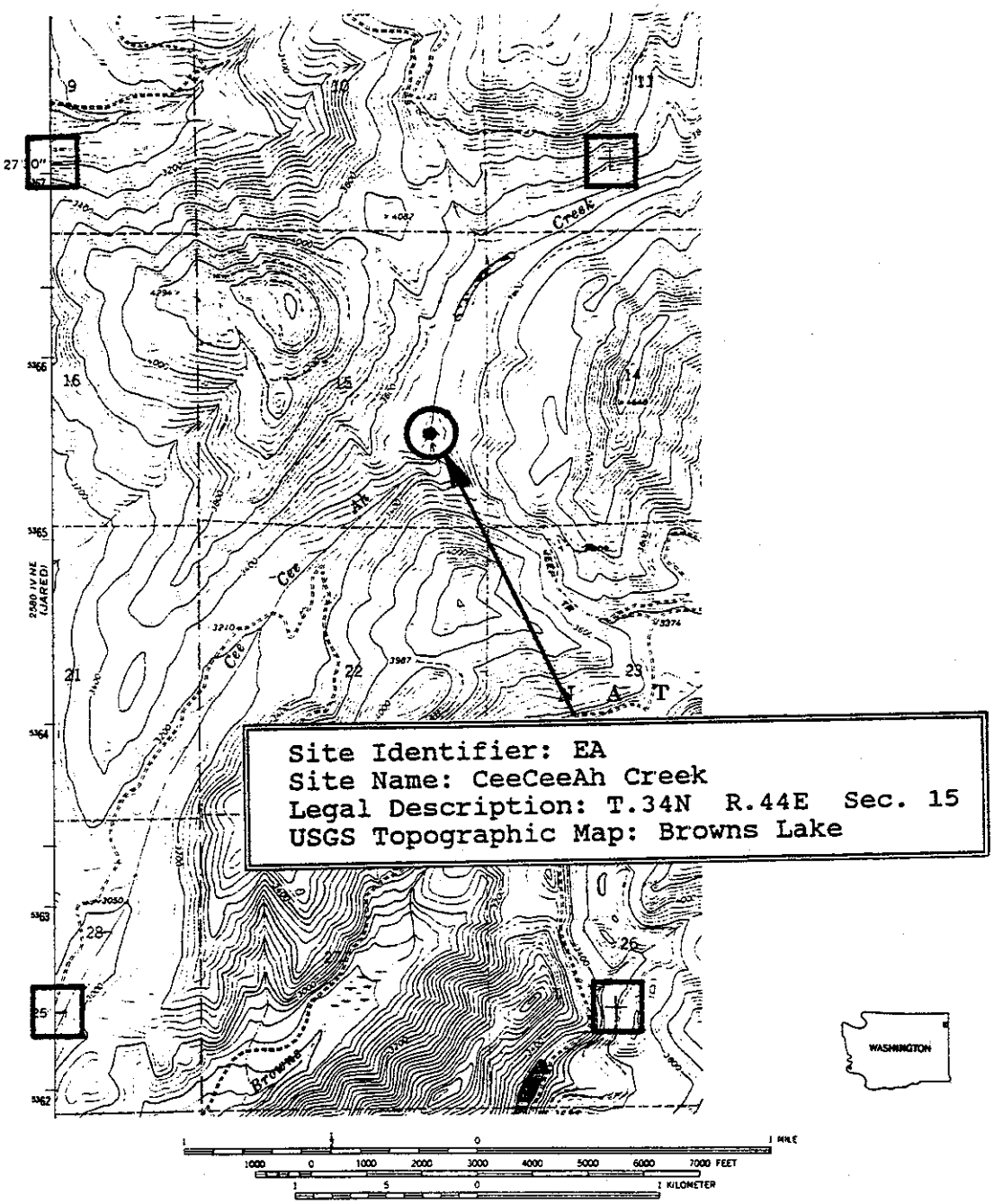
Chamokane Cr (EB)

Daily Temperatures in Degrees Celsius (C)

YEAR=1989 MONTH=JANUARY

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	-2.5	3.3	0.0	4.0	-4.5	3.0	4.5	1.0
02JAN	0.4	3.9	2.0	5.0	-1.5	2.5	3.5	2.5
03JAN	4.1	5.5	8.0	6.5	1.0	4.5	7.0	2.0
04JAN	2.6	5.4	4.0	6.0	1.0	5.0	3.0	1.0
05JAN	1.0	5.0	2.5	6.0	-1.5	4.5	4.0	1.5
06JAN	-4.9	3.5	-1.5	4.5	-8.5	2.0	7.0	2.5
07JAN	-9.5	1.3	-5.5	2.0	-1.4	0.5	8.5	1.5
08JAN	-8.5	0.6	-6.0	1.0	-1.4	0.0	8.0	1.0
09JAN	-4.7	2.0	-3.0	2.5	-6.5	1.0	3.5	1.5
10JAN	-4.9	2.6	-2.0	3.5	-9.5	2.0	7.5	1.5
11JAN	-5.6	2.4	-4.5	3.0	-8.0	2.0	3.5	1.0
12JAN	-2.4	3.3	1.0	4.5	-5.0	2.5	6.0	2.0
13JAN	0.5	4.0	3.5	5.0	-2.0	3.5	5.5	1.5
14JAN	-2.9	2.8	0.5	3.5	-9.0	1.5	9.5	2.0
15JAN	1.9	4.1	5.0	5.0	-1.0	3.0	6.0	2.0
16JAN	5.1	5.3	7.5	6.0	1.5	5.0	6.0	1.0
17JAN	3.4	5.0	6.5	6.0	0.0	4.5	6.5	1.5
18JAN	3.3	5.4	10.0	6.5	-2.5	4.5	12.5	2.0
19JAN	6.0	7.2	23.0	12.0	-6.0	2.5	29.0	9.5
20JAN	10.0	9.4	18.0	10.5	2.5	8.5	15.5	2.0
21JAN	9.5	8.4	19.5	10.0	0.5	7.0	19.0	3.0
22JAN	10.1	8.3	19.5	10.0	3.0	7.0	16.5	3.0
23JAN	5.4	7.2	8.5	8.0	1.5	6.5	7.0	1.5
24JAN	6.9	7.0	17.0	8.5	0.0	6.0	17.0	2.5
25JAN	8.7	7.0	20.0	8.5	-0.5	5.5	20.5	3.0
26JAN	12.2	7.8	24.5	9.5	3.5	6.0	21.0	3.5
27JAN	12.6	8.3	24.5	10.0	4.0	7.0	20.5	3.0
28JAN	11.9	8.3	21.5	10.0	4.0	7.0	17.5	3.0
29JAN	8.9	7.8	12.0	8.5	5.5	7.5	6.5	1.0
30JAN	2.3	6.5	4.0	7.5	-1.0	5.5	5.0	2.0
31JAN	2.4	5.5	6.0	6.0	-2.5	4.5	8.5	1.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



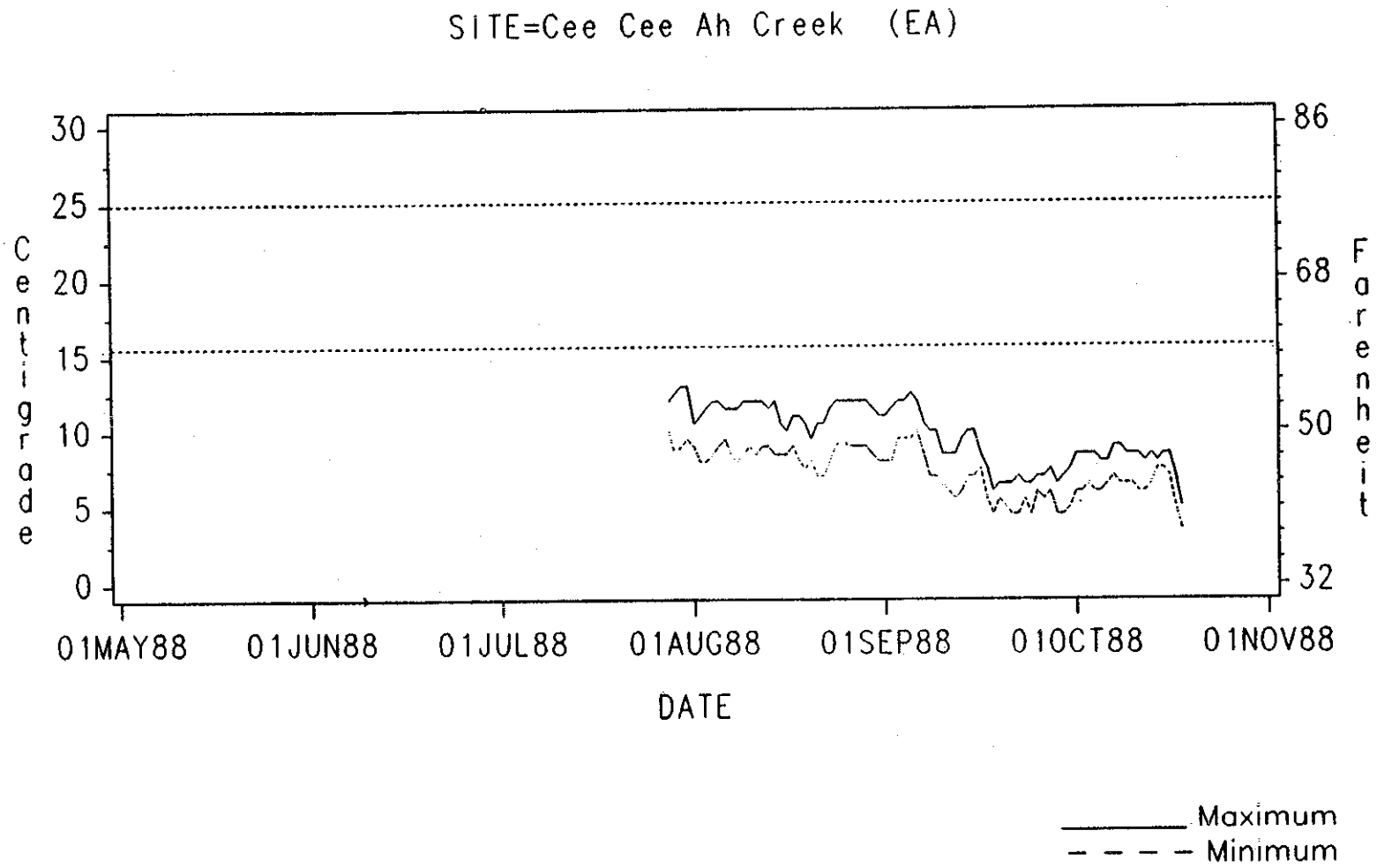
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	EA
Stream Name	SITENAMES	Cee Cee Ah Creek
Cooperator	COOPERATOR	U. Columbia Un.Tribes
Cooperator/contact	COOPCONTACT	Dale Chess
Date of Site Visit	VISIT	09-13-88
County	COUNTY	Pend Oreille
Nearest town	NEARESTTOWN	Cusick
Township	TOWNSHIP	34N
Range	RANGE	44E
Section	SECTION	15
Site is Tributary To:	TRIBUTARYTO	Pend Oreille River
Water Resource Inventory Area	WRIA	62
WDF River Segment Identifier	WDFNUMBER	0608
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	Pend Oreille
Latitude Decimal Degrees (degrees)	LATDEC	48.444480
Longitude Decimal Degrees (degrees)	LONGDEC	117.221800
NOAA Local Climatological Data Station	NOAAINDEX	spokane
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	8
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	glacial drift
Geomorphic Stream Order	STREAMORDER	1
Thermograph Elevation (meters)	ELEVDSM	1048
Elevation Top of Thermal Reach (meters)	ELEVUSM	1065
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.8
Channel Gradient from Autolevel (percent)	GRADLEVEL	5.1
Channel Azimuth (degrees)	AZIMUTH1	190
Drainage Area Above Thermograph (hectares)	AREAHECT	1174
Distance to Divide (meters)	DIVIDEMT	6096
Total Length of Perennial Streams (meters)	LENGTHMT	6096
Streamflow at Thermograph (cubic meters/second)	QDSM	0.027
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.024
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.003
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.005
Travel Time (meters/second)	TRAVELM	0.110
Average View To Sky (percent open) (percent)	VIEW1	70
Topographic Angle South (degrees)	TOPOSA	10
Topographic Angle Southeast (degrees)	TOPOSEA	14
Topographic Angle Southwest (degrees)	TOPOSWA	19
Average Forest Angle South (degrees)	FORSA	49
Average Forest Angle Southeast (degrees)	FORSEA	69
Average Forest Angle Southwest (degrees)	FORSWA	64
Percent Overhanging Brush (percent)	OVERBRUSH	43
Buffer Width Right Bank (meters)	BUFWIDRM	1.8
Buffer Width Left Bank (meters)	BUFWIDLM	7.6
Vegetation Height East Bank (meters)	VEGHTEM	5
Vegetation Height West Bank (meters)	VEGHTWM	4
Percent Vegetative Density East (percent)	VEGDENE	37
Percent Vegetative Density West (percent)	VEGDENW	63
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.143
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	1.762
Percent of Channel Composed of Pools (percent)	PERCENPL	77
Average Pool Depth (meters)	DEPTHPM	0.190
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	10
Streambed Composition Sand (percent)	AVGSAND	2
Streambed Composition Gravel (percent)	AVGGRAVEL	70
Streambed Composition Cobble (percent)	AVGCOBBLE	12
Streambed Composition Boulder (percent)	AVGBOULDER	7
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

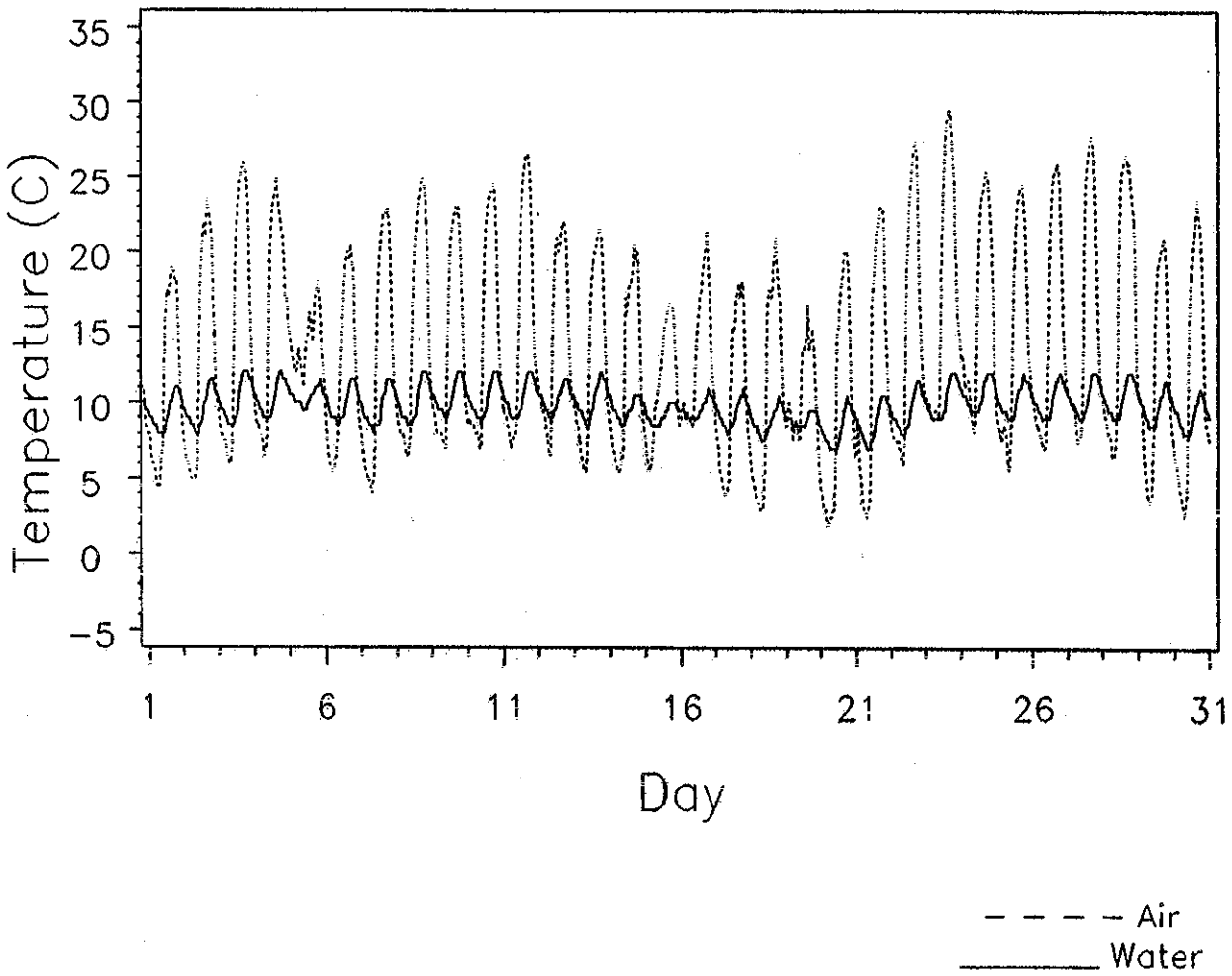
WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

CEE CEE AH CREEK

YEAR=1988 MONTH=AUGUST



TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

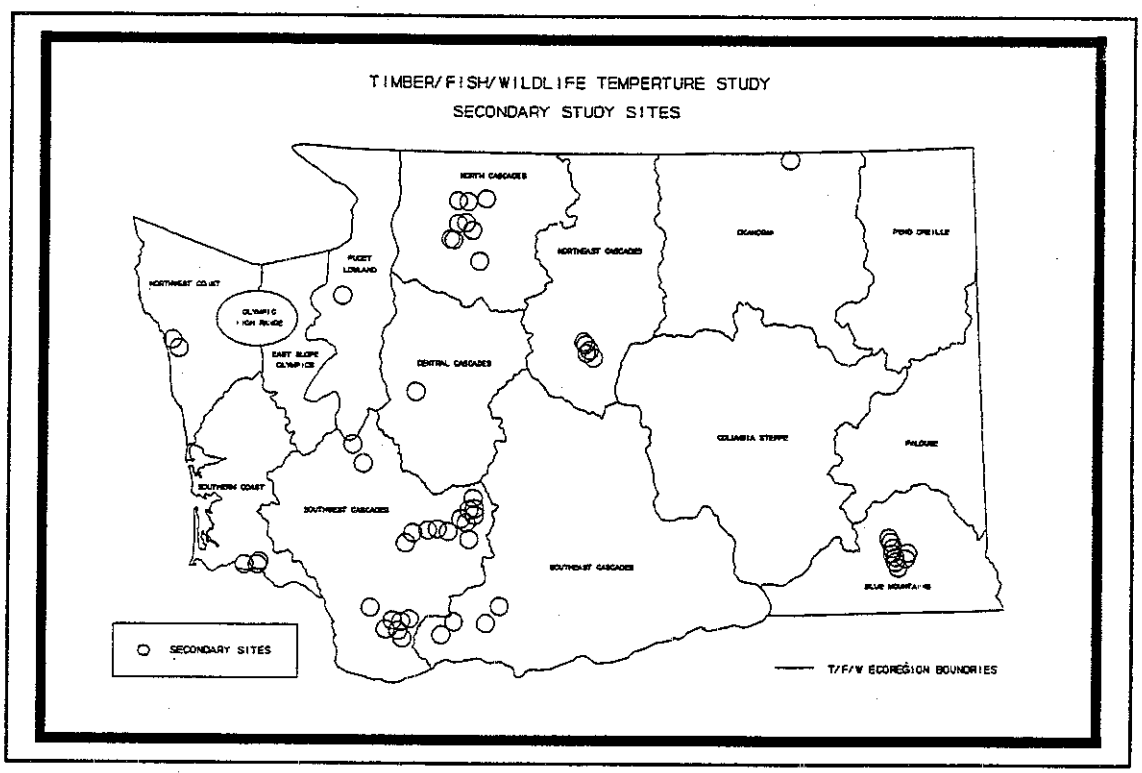
CEE CEE AH CR.

Daily Temperatures in Degrees Celsius (C)

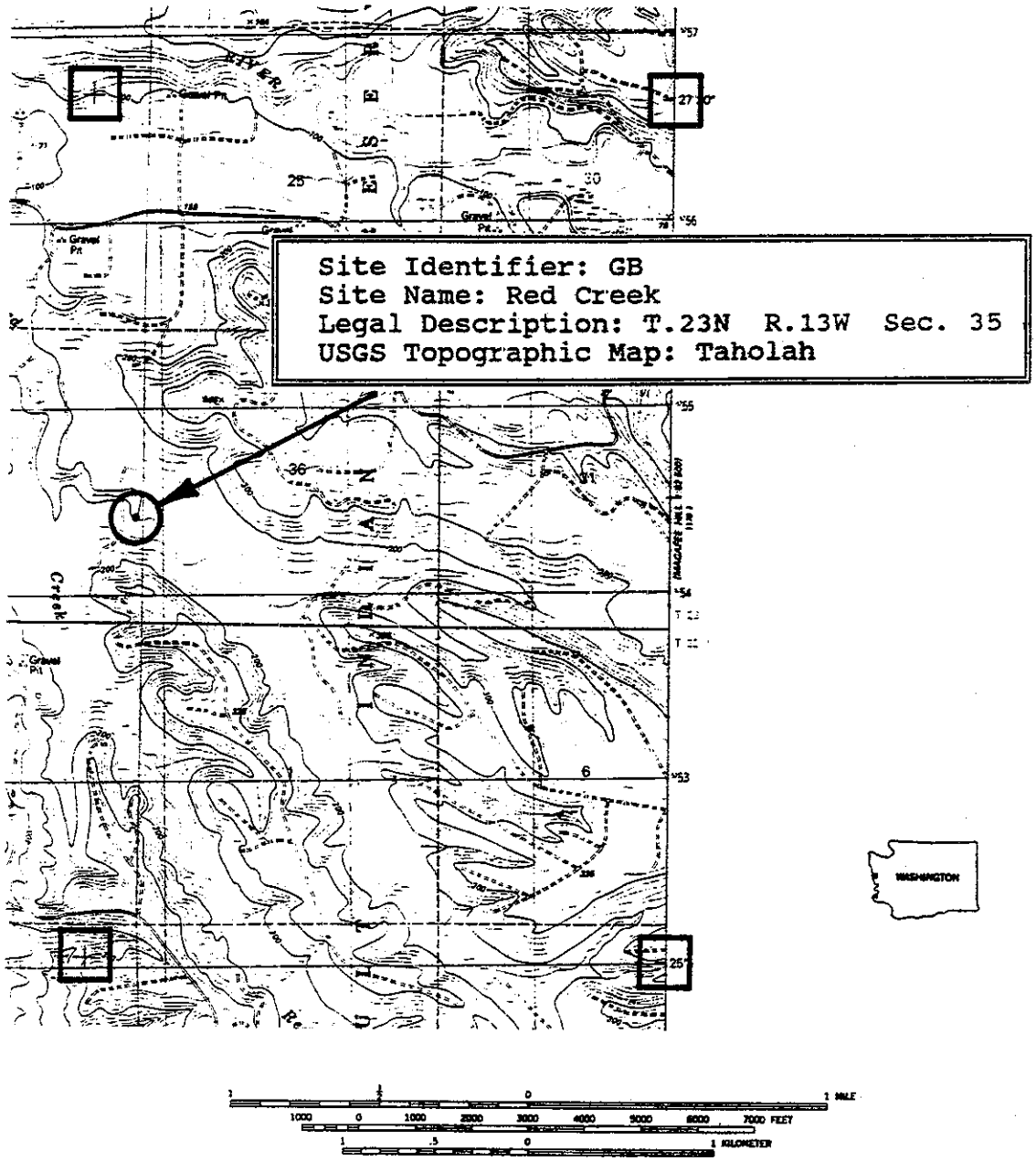
YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	9.7	.	10.5	.	9.0	.	1.5
02AUG	.	9.3	.	11.0	.	8.0	.	3.0
03AUG	.	9.6	.	11.5	.	8.0	.	3.5
04AUG	.	10.1	.	12.0	.	8.5	.	3.5
05AUG	.	10.3	.	12.0	.	9.0	.	3.0
06AUG	.	10.3	.	11.5	.	9.5	.	2.0
07AUG	.	9.9	.	11.5	.	8.5	.	3.0
08AUG	.	9.7	.	11.5	.	8.0	.	3.5
09AUG	15.0	10.1	25.0	12.0	6.5	8.5	18.5	3.5
10AUG	14.0	10.4	23.0	12.0	7.0	9.0	16.0	3.0
11AUG	14.6	10.2	24.5	12.0	7.0	8.5	17.5	3.5
12AUG	15.9	10.3	26.5	12.0	7.0	9.0	19.5	3.0
13AUG	14.2	10.2	22.0	11.5	6.5	9.0	15.5	2.5
14AUG	13.1	10.1	21.5	12.0	5.5	8.5	16.0	3.5
15AUG	11.9	9.5	20.5	10.5	5.5	8.5	15.0	2.0
16AUG	11.5	9.2	16.5	10.0	5.5	8.5	11.0	1.5
17AUG	13.3	9.6	21.5	11.0	7.5	9.0	14.0	2.0
18AUG	10.3	9.3	18.0	11.0	4.0	8.0	14.0	3.0
19AUG	11.0	8.8	21.0	10.5	3.0	7.5	18.0	3.0
20AUG	10.4	8.9	16.5	9.5	3.5	8.0	13.0	1.5
21AUG	10.1	8.4	20.0	10.5	2.0	7.0	18.0	3.5
22AUG	12.0	8.8	23.0	10.5	2.5	7.0	20.5	3.5
23AUG	15.0	9.5	27.5	11.5	6.0	8.0	21.5	3.5
24AUG	17.4	10.3	29.5	12.0	9.0	9.0	20.5	3.0
25AUG	16.2	10.6	25.5	12.0	8.0	9.5	17.5	2.5
26AUG	14.2	10.2	24.5	12.0	5.5	9.0	19.0	3.0
27AUG	15.2	10.3	26.0	12.0	7.0	9.0	19.0	3.0
28AUG	16.1	10.4	28.0	12.0	7.5	9.0	20.5	3.0
29AUG	16.3	10.4	26.5	12.0	6.5	9.0	20.0	3.0
30AUG	11.7	9.8	21.0	11.5	3.5	8.5	17.5	3.0
31AUG	11.6	9.2	23.5	11.0	2.5	8.0	21.0	3.0

SECONDARY STUDY SITES



TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



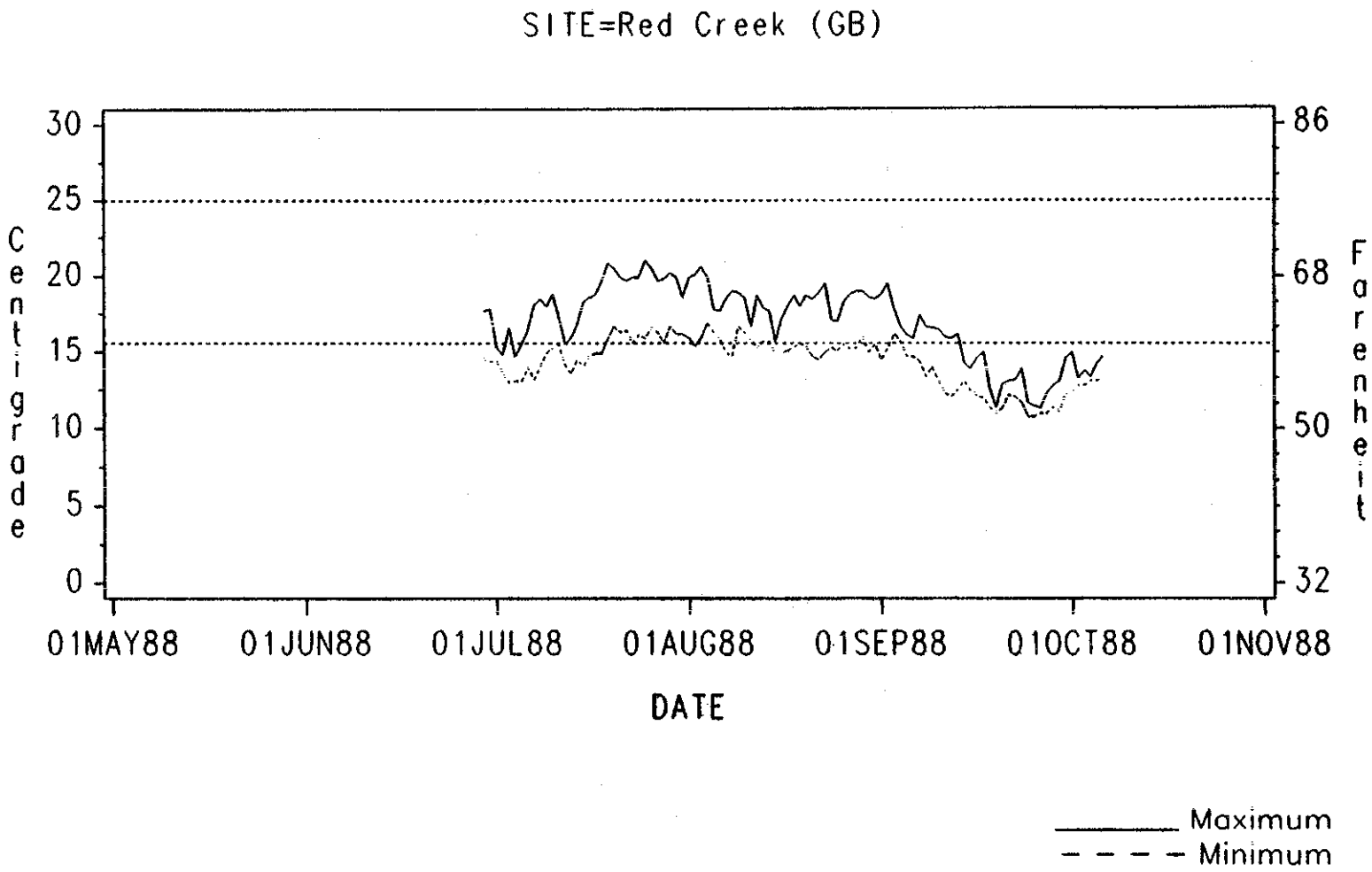
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

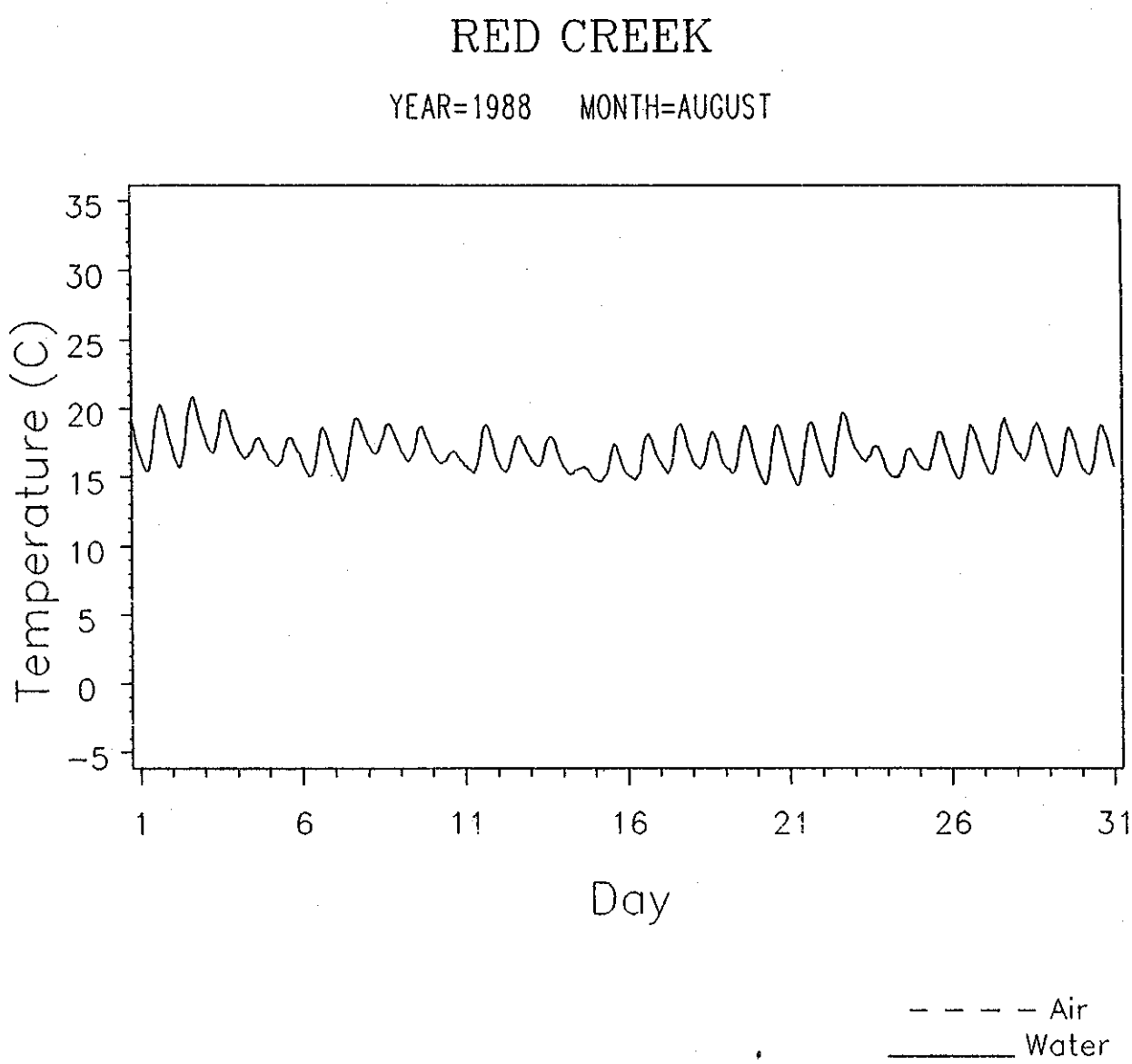
Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	GB
Stream Name	SITENAME$	Red Creek
Cooperator	COOPERATOR	Quinault Nation
Cooperator/contact	COOPCONTACT	Greg Watson
Date of Site Visit	VISIT	09-20-88
County	COUNTY	Grays Harbor
Nearest town	NEARESTTOWN	Taholah
Township	TOWNSHIP	23N
Range	RANGE	13W
Section	SECTION	35
Site is Tributary To:	TRIBUTARYTO	Raft River
Water Resource Inventory Area	WRIA	21
WDF River Segment Identifier	WDFNUMBER	0339
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	Northwest Coast
Latitude Decimal Degrees (degrees)	LATDEC	47.439260
Longitude Decimal Degrees (degrees)	LONGDEC	124.288400
NOAA Local Climatological Data Station	NOAAINDEX	quillayute
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	terrace deposits
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	61
Elevation Top of Thermal Reach (meters)	ELEVUSM	68
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.1
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	300
Drainage Area Above Thermograph (hectares)	AREAHECT	948
Distance to Divide (meters)	DIVIDEMT	7640
Total Length of Perennial Streams (meters)	LENGTHMT	18740
Streamflow at Thermograph (cubic meters/second)	QDSM	0.678
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.678
Water-Budget Groundwater Determination (cubic meters/second)	GWDETERI	0.000
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.036
Travel Time (meters/second)	TRAVELM	0.145
Average View To Sky (percent open) (percent)	VIEW1	15
Topographic Angle South (degrees)	TOPOSA	15
Topographic Angle Southeast (degrees)	TOPOSEA	13
Topographic Angle Southwest (degrees)	TOPOSWA	12
Average Forest Angle South (degrees)	FORSA	75
Average Forest Angle Southeast (degrees)	FORSEA	64
Average Forest Angle Southwest (degrees)	FORSWA	73
Percent Overhanging Brush (percent)	OVERBRUSH	60
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	35
Vegetation Height West Bank (meters)	VEGHTWM	32
Percent Vegetative Density East (percent)	VEGDENE	83
Percent Vegetative Density West (percent)	VEGDENW	70
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.495
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	5.630
Percent of Channel Composed of Pools (percent)	PERCENPL	83
Average Pool Depth (meters)	DEPTHPM	0.520
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	0
Streambed Composition Cobble (percent)	AVGCOBBLE	0
Streambed Composition Boulder (percent)	AVGBOULDER	0
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


RED CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

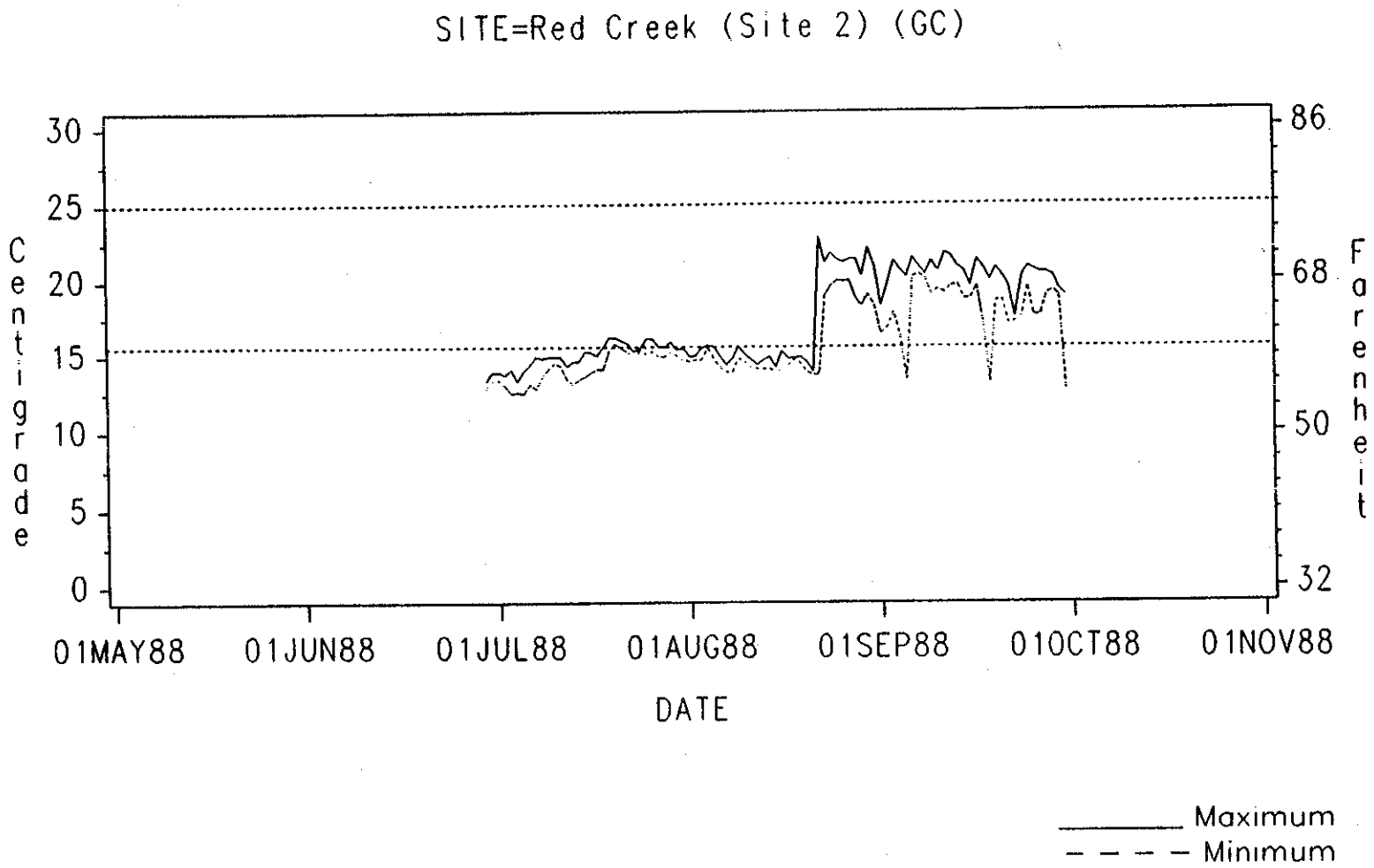
RED CREEK

Daily Temperatures in Degrees Celsius (C)

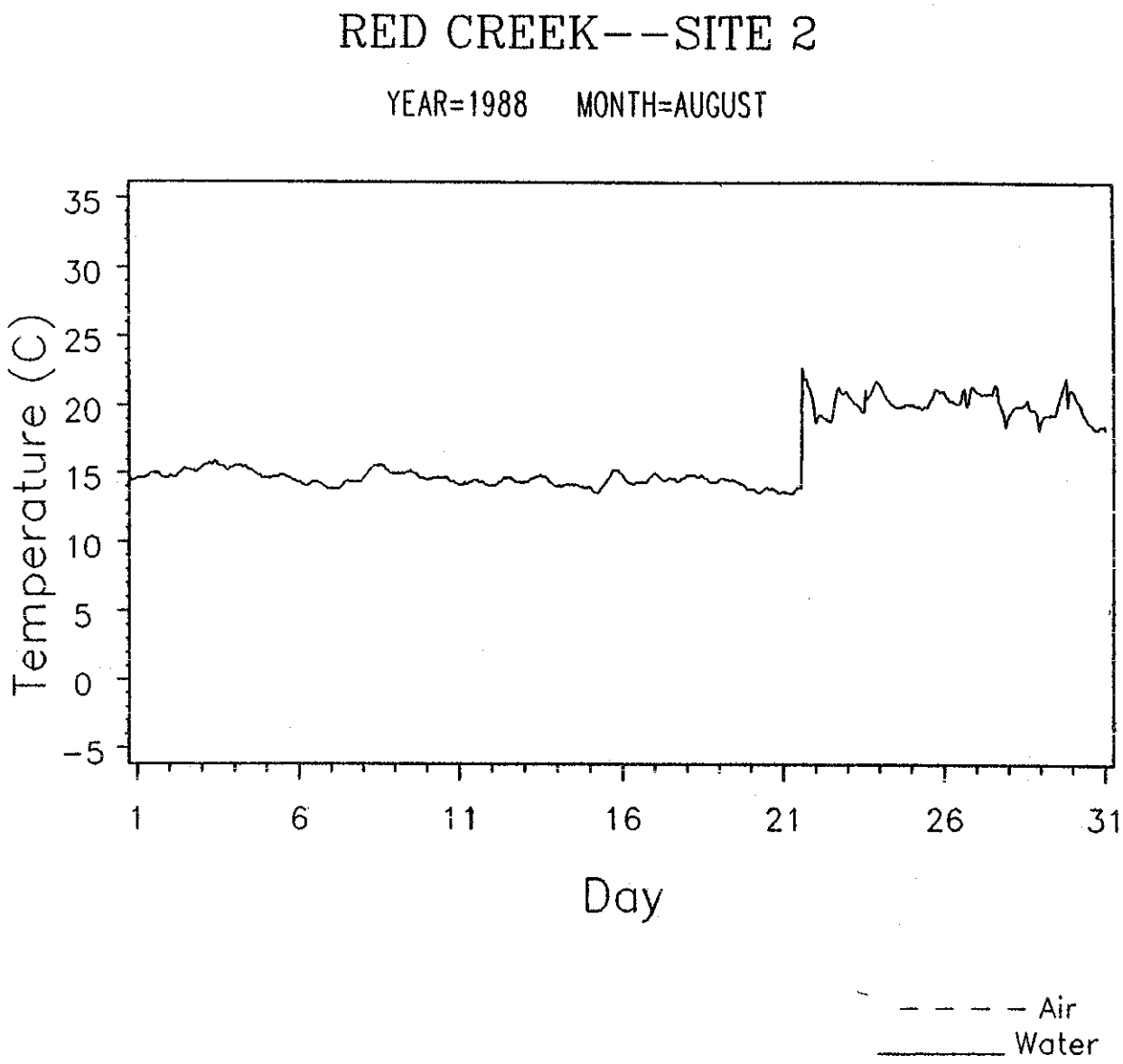
---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	17.6	.	19.9	.	15.9	.	4.0
02AUG	.	17.8	.	20.1	.	15.4	.	4.7
03AUG	.	18.3	.	20.6	.	15.9	.	4.7
04AUG	.	18.2	.	19.9	.	16.9	.	3.0
05AUG	.	17.0	.	17.8	.	16.3	.	1.5
06AUG	.	16.7	.	17.7	.	15.9	.	1.8
07AUG	.	16.7	.	18.5	.	15.0	.	3.5
08AUG	.	17.1	.	19.0	.	14.7	.	4.3
09AUG	.	17.7	.	18.9	.	16.7	.	2.2
10AUG	.	17.3	.	18.6	.	16.3	.	2.3
11AUG	.	16.4	.	16.7	.	15.8	.	0.9
12AUG	.	16.9	.	18.7	.	15.3	.	3.4
13AUG	.	16.7	.	17.9	.	15.7	.	2.2
14AUG	.	16.7	.	17.7	.	15.7	.	2.0
15AUG	.	15.4	.	15.7	.	14.9	.	0.8
16AUG	.	15.8	.	17.1	.	14.9	.	2.2
17AUG	.	16.4	.	18.0	.	15.1	.	2.9
18AUG	.	16.9	.	18.7	.	15.3	.	3.4
19AUG	.	16.7	.	18.0	.	15.6	.	2.4
20AUG	.	16.8	.	18.7	.	15.4	.	3.3
21AUG	.	16.5	.	18.5	.	14.7	.	3.8
22AUG	.	16.7	.	18.9	.	14.5	.	4.4
23AUG	.	17.4	.	19.5	.	15.0	.	4.5
24AUG	.	16.5	.	17.1	.	15.3	.	1.8
25AUG	.	16.0	.	17.0	.	15.1	.	1.9
26AUG	.	16.7	.	18.3	.	15.5	.	2.8
27AUG	.	16.8	.	18.8	.	15.2	.	3.6
28AUG	.	17.2	.	19.0	.	15.3	.	3.7
29AUG	.	17.4	.	19.0	.	16.0	.	3.0
30AUG	.	16.7	.	18.6	.	15.0	.	3.6
31AUG	.	16.8	.	18.5	.	15.5	.	3.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


RED CREEK--SITE 2
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

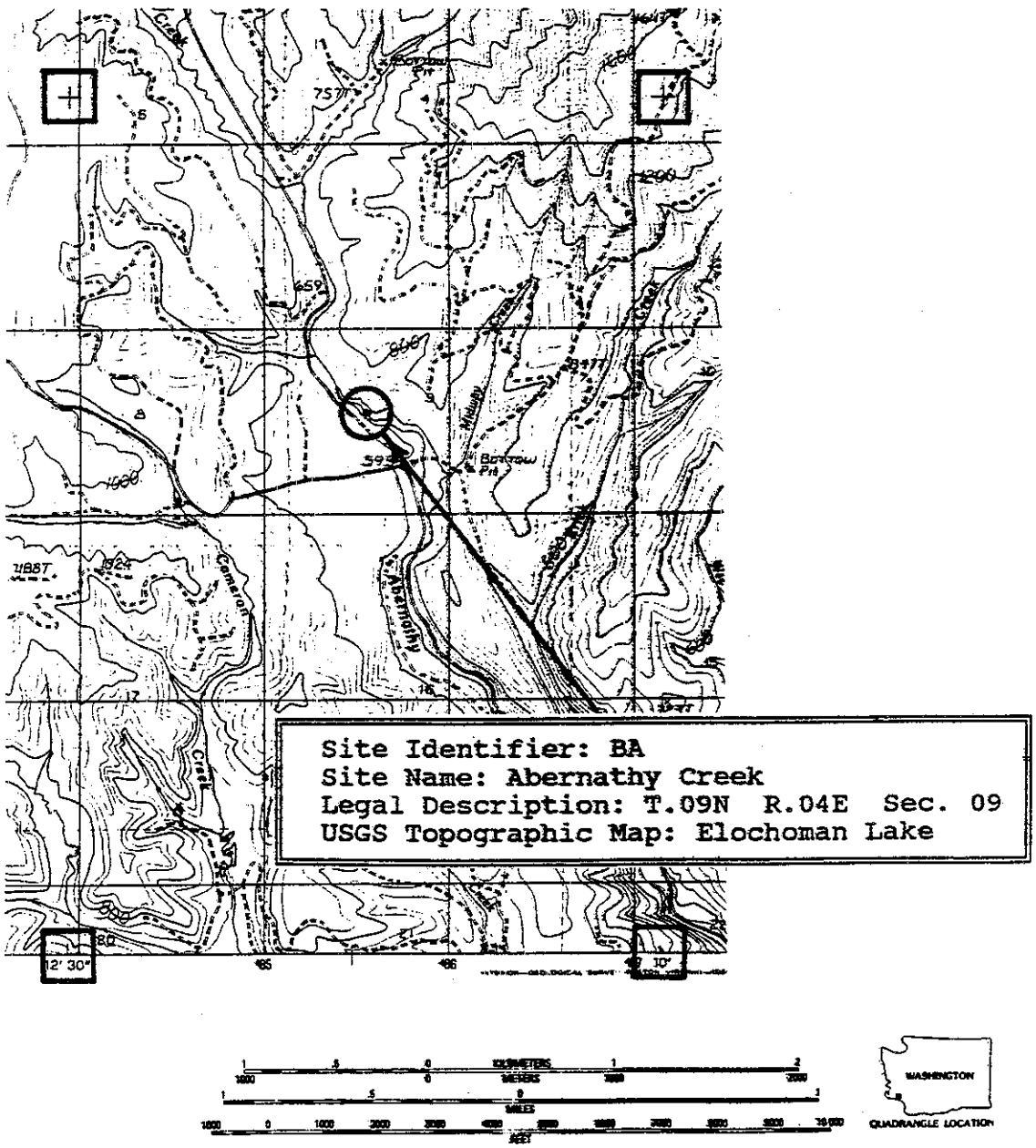
RED CREEK (SITE 2)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	14.8	.	14.9	.	14.6	.	0.3
02AUG	.	14.8	.	15.0	.	14.7	.	0.3
03AUG	.	15.1	.	15.5	.	14.7	.	0.8
04AUG	.	15.6	.	15.7	.	15.5	.	0.2
05AUG	.	15.2	.	15.6	.	14.7	.	0.9
06AUG	.	14.7	.	14.9	.	14.2	.	0.6
07AUG	.	14.2	.	14.4	.	13.9	.	0.5
08AUG	.	14.3	.	14.8	.	13.9	.	0.9
09AUG	.	15.3	.	15.6	.	14.8	.	0.8
10AUG	.	14.9	.	15.1	.	14.6	.	0.5
11AUG	.	14.5	.	14.7	.	14.2	.	0.5
12AUG	.	14.3	.	14.4	.	14.1	.	0.3
13AUG	.	14.5	.	14.7	.	14.1	.	0.6
14AUG	.	14.6	.	14.9	.	14.1	.	0.8
15AUG	.	14.1	.	14.2	.	13.9	.	0.3
16AUG	.	14.5	.	15.3	.	13.9	.	1.4
17AUG	.	14.5	.	14.8	.	14.3	.	0.5
18AUG	.	14.7	.	14.8	.	14.7	.	0.1
19AUG	.	14.7	.	14.9	.	14.5	.	0.4
20AUG	.	14.3	.	14.6	.	13.9	.	0.7
21AUG	.	13.8	.	13.9	.	13.7	.	0.2
22AUG	.	17.3	.	22.8	.	13.7	.	9.1
23AUG	.	20.0	.	21.2	.	19.0	.	2.2
24AUG	.	20.7	.	21.8	.	19.6	.	2.2
25AUG	.	20.3	.	21.4	.	20.0	.	1.4
26AUG	.	20.5	.	21.2	.	19.9	.	1.3
27AUG	.	20.7	.	21.4	.	20.0	.	1.4
28AUG	.	20.4	.	21.4	.	18.8	.	2.6
29AUG	.	19.7	.	20.3	.	18.3	.	2.0
30AUG	.	20.2	.	22.1	.	19.1	.	3.0
31AUG	.	19.1	.	20.9	.	18.3	.	2.6

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



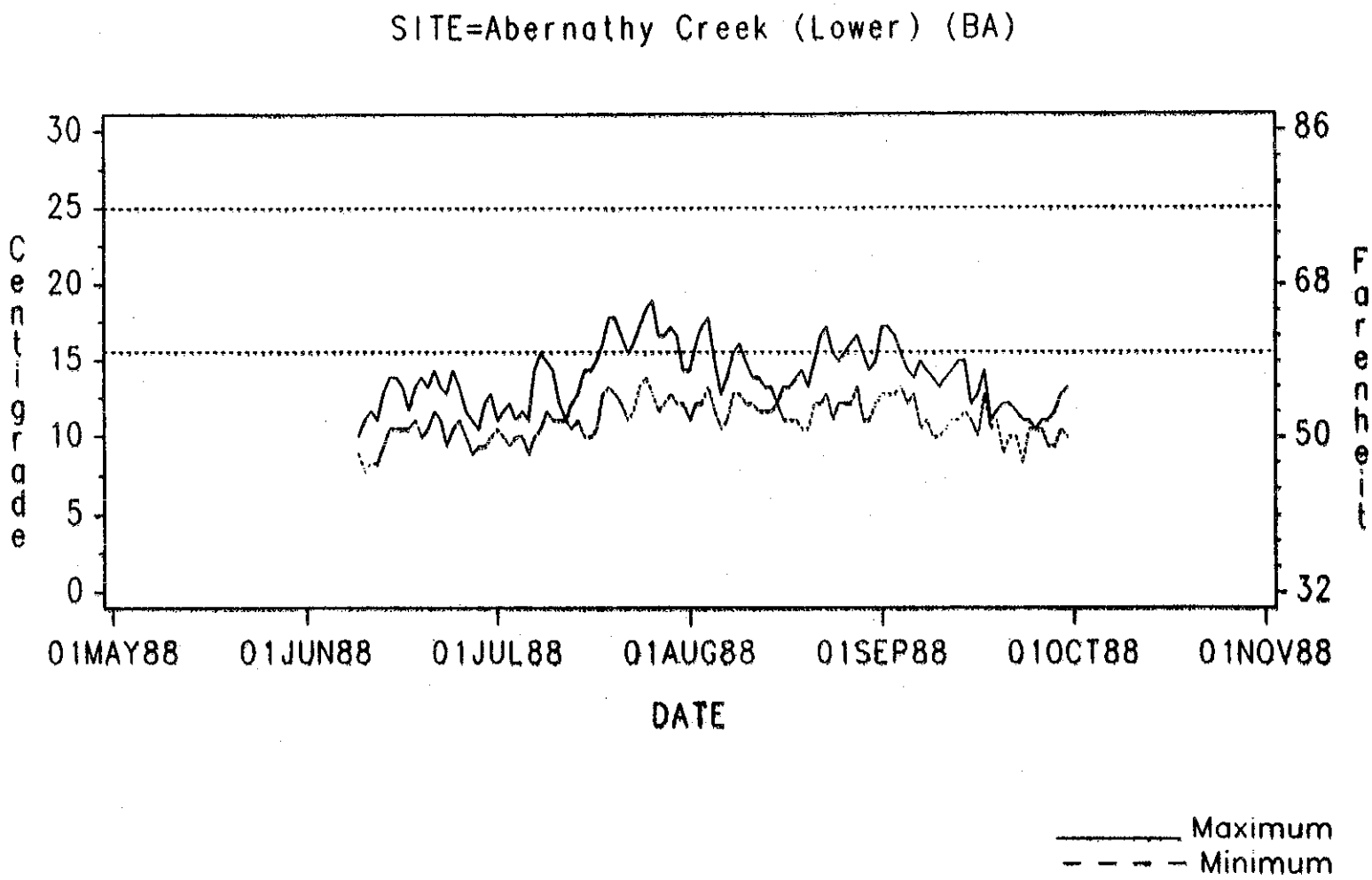
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	BA
Stream Name	SITENAMES	Abernathy Creek
Cooperator	COOPERATOR	WEYCO, ?
Cooperator/contact	COOPCONTACT	J.Booher. B Carpenter
Date of Site Visit	VISIT	08-09-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Oak Point
Township	TOWNSHIP	09N
Range	RANGE	04W
Section	SECTION	09
Site is Tributary To:	TRIBUTARYTO	Columbia River
Water Resource Inventory Area	WRIA	25
WDF River Segment Identifier	WDFNUMBER	0297
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	SW Washington
Latitude Decimal Degrees (degrees)	LATDEC	46.276240
Longitude Decimal Degrees (degrees)	LONGDEC	123.187200
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Miocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	basalt
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	178
Elevation Top of Thermal Reach (meters)	ELEVUSM	190
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.0
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.6
Channel Azimuth (degrees)	AZIMUTH1	146
Drainage Area Above Thermograph (hectares)	AREAHECT	2258
Distance to Divide (meters)	DIVIDEMT	7434
Total Length of Perennial Streams (meters)	LENGTHMT	27813
Streamflow at Thermograph (cubic meters/second)	QDSM	0.195
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.196
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.014
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.007
Travel Time (meters/second)	TRAVELM	0.305
Average View To Sky (percent open) (percent)	VIEW1	33
Topographic Angle South (degrees)	TOPOSA	20
Topographic Angle Southeast (degrees)	TOPOSEA	19
Topographic Angle Southwest (degrees)	TOPOSWA	23
Average Forest Angle South (degrees)	FORSA	70
Average Forest Angle Southeast (degrees)	FORSEA	70
Average Forest Angle Southwest (degrees)	FORSWA	75
Percent Overhanging Brush (percent)	OVERBRUSH	61
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	35.1
Vegetation Height East Bank (meters)	VEGHTEM	11
Vegetation Height West Bank (meters)	VEGHTWM	15
Percent Vegetative Density East (percent)	VEGDENE	56
Percent Vegetative Density West (percent)	VEGDENW	69
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.266
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	5.130
Percent of Channel Composed of Pools (percent)	PERCENPL	44
Average Pool Depth (meters)	DEPTHPM	0.350
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	43
Streambed Composition Cobble (percent)	AVGCOBBLE	27
Streambed Composition Boulder (percent)	AVGBOULDER	30
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

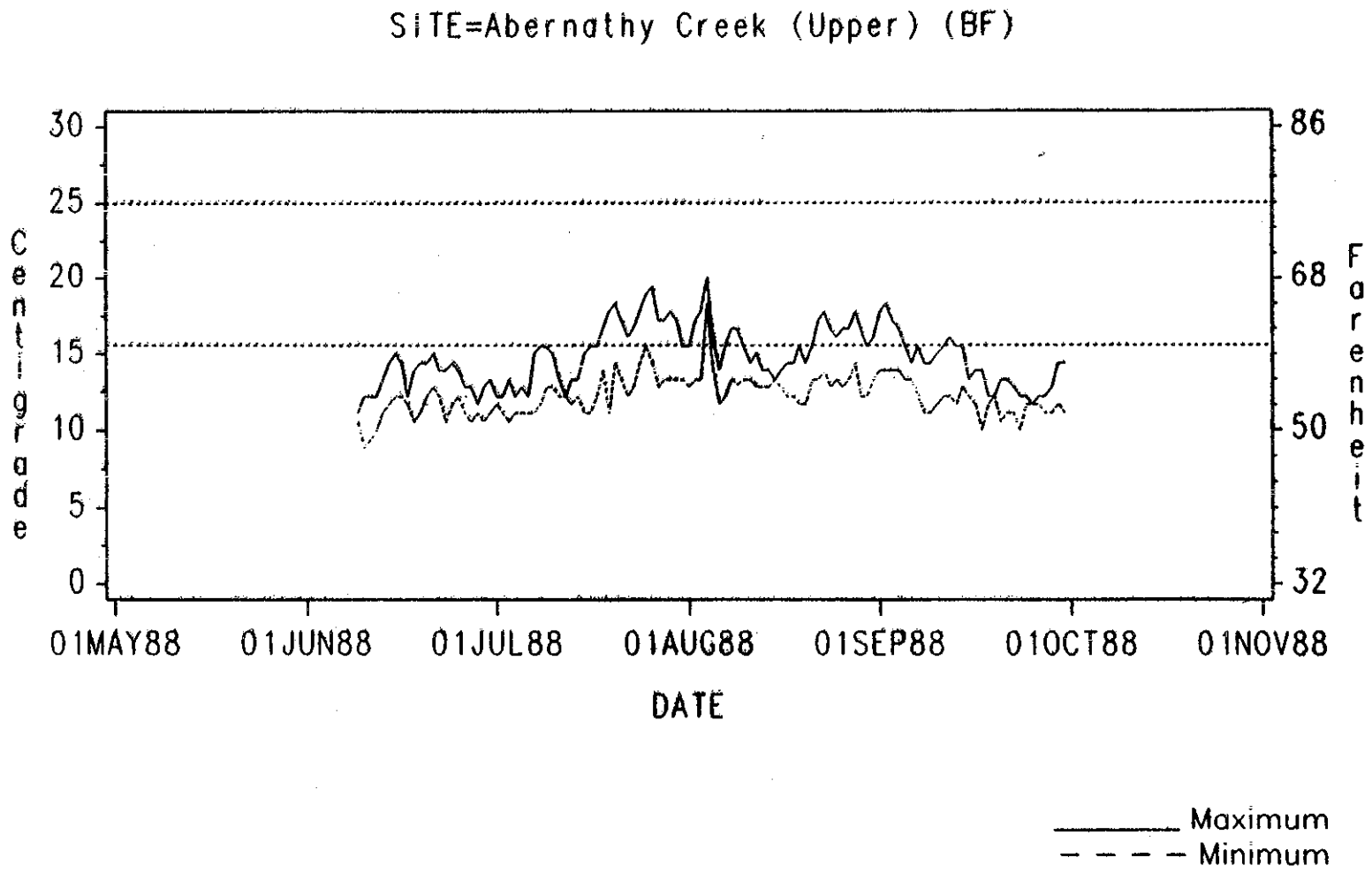
ABERNATHY CREEK (LOWER)

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	12.8	14.4	11.1	3.3
02AUG	14.2	16.1	12.2	3.9
03AUG	14.7	17.2	12.2	5.0
04AUG	15.5	17.8	13.3	4.4
05AUG	13.3	15.0	11.7	3.3
06AUG	11.7	12.8	10.5	2.2
07AUG	12.5	13.9	11.1	2.8
08AUG	14.2	15.5	12.8	2.8
09AUG	14.4	16.1	12.8	3.3
10AUG	13.6	15.0	12.2	2.8
11AUG	13.0	13.9	12.2	1.7
12AUG	12.8	13.9	11.7	2.2
13AUG	12.5	13.3	11.7	1.7
14AUG	12.5	13.3	11.7	1.7
15AUG	12.2	12.2	12.2	0.0
16AUG	12.2	13.3	11.1	2.2
17AUG	12.2	13.3	11.1	2.2
18AUG	12.5	13.9	11.1	2.8
19AUG	12.5	14.4	10.5	3.9
20AUG	11.9	13.3	10.5	2.8
21AUG	13.6	15.0	12.2	2.8
22AUG	14.4	16.7	12.2	4.4
23AUG	15.0	17.2	12.8	4.4
24AUG	13.3	15.5	11.1	4.4
25AUG	13.6	15.0	12.2	2.8
26AUG	13.9	15.5	12.2	3.3
27AUG	14.2	16.1	12.2	3.9
28AUG	15.0	16.7	13.3	3.3
29AUG	13.3	15.5	11.1	4.4
30AUG	12.8	14.4	11.1	3.3
31AUG	13.6	15.0	12.2	2.8

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

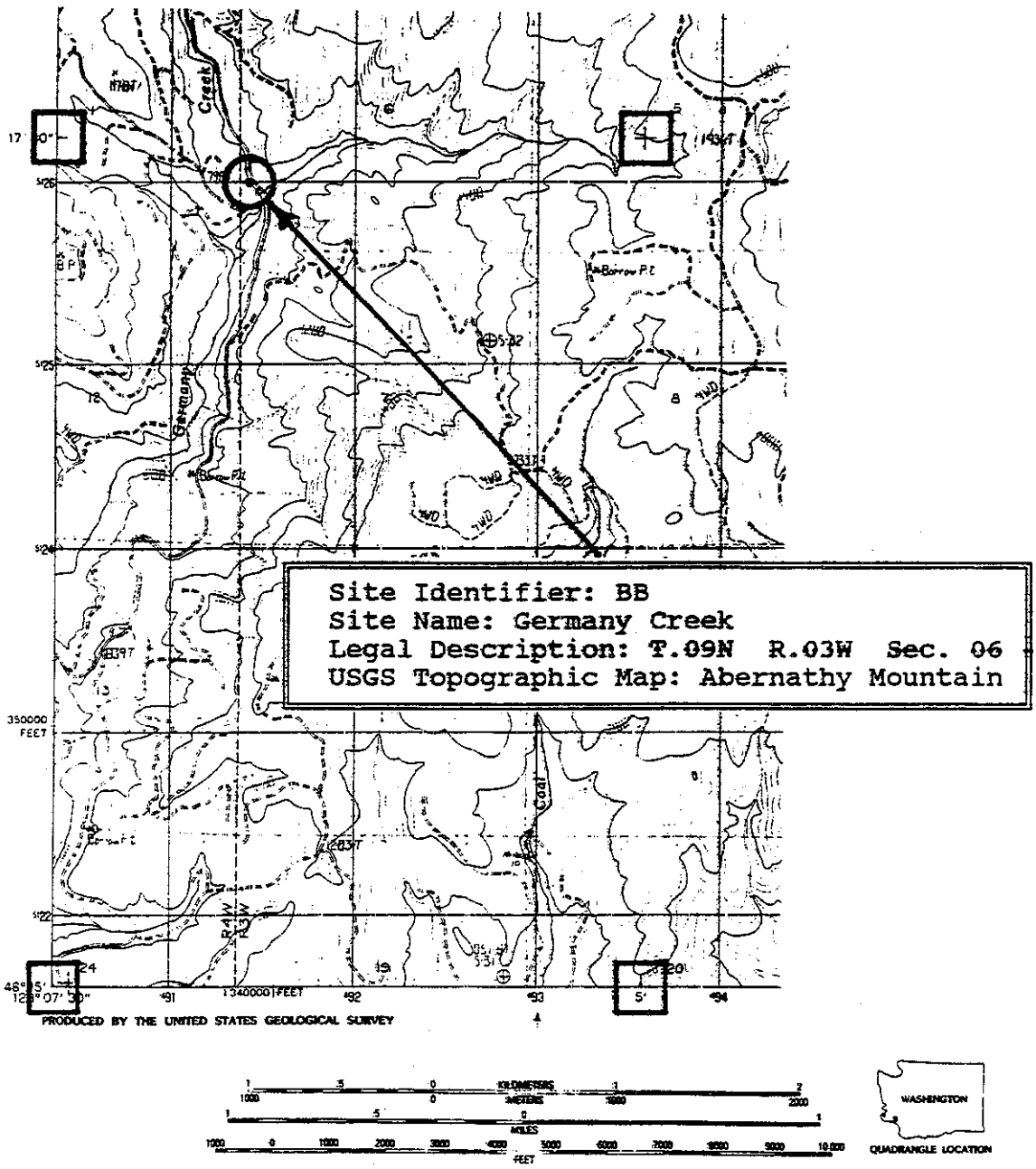
ABERNATHY CREEK (UPPER)

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	14.2	15.5	12.8	2.8
02AUG	15.3	17.2	13.3	3.9
03AUG	15.5	17.8	13.3	4.4
04AUG	19.1	20.0	18.3	1.7
05AUG	15.0	16.1	13.9	2.2
06AUG	12.8	13.9	11.7	2.2
07AUG	13.9	15.5	12.2	3.3
08AUG	15.0	16.7	13.3	3.3
09AUG	15.1	16.7	13.0	3.7
10AUG	14.4	15.5	13.3	2.2
11AUG	13.9	14.4	13.3	1.1
12AUG	13.9	15.0	12.8	2.2
13AUG	13.3	13.9	12.8	1.1
14AUG	13.3	13.9	12.8	1.1
15AUG	13.3	13.3	13.3	0.0
16AUG	13.3	13.9	12.8	1.1
17AUG	13.3	14.4	12.2	2.2
18AUG	13.3	14.4	12.2	2.2
19AUG	13.6	15.5	11.7	3.9
20AUG	13.0	14.4	11.7	2.8
21AUG	14.4	15.5	13.3	2.2
22AUG	15.3	17.2	13.3	3.9
23AUG	15.8	17.8	13.9	3.9
24AUG	14.7	16.7	12.8	3.9
25AUG	14.7	16.1	13.3	2.8
26AUG	14.7	16.7	12.8	3.9
27AUG	15.0	16.7	13.3	3.3
28AUG	16.1	17.8	14.4	3.3
29AUG	14.4	16.7	12.2	4.4
30AUG	13.9	15.5	12.2	3.3
31AUG	14.7	16.1	13.3	2.8

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



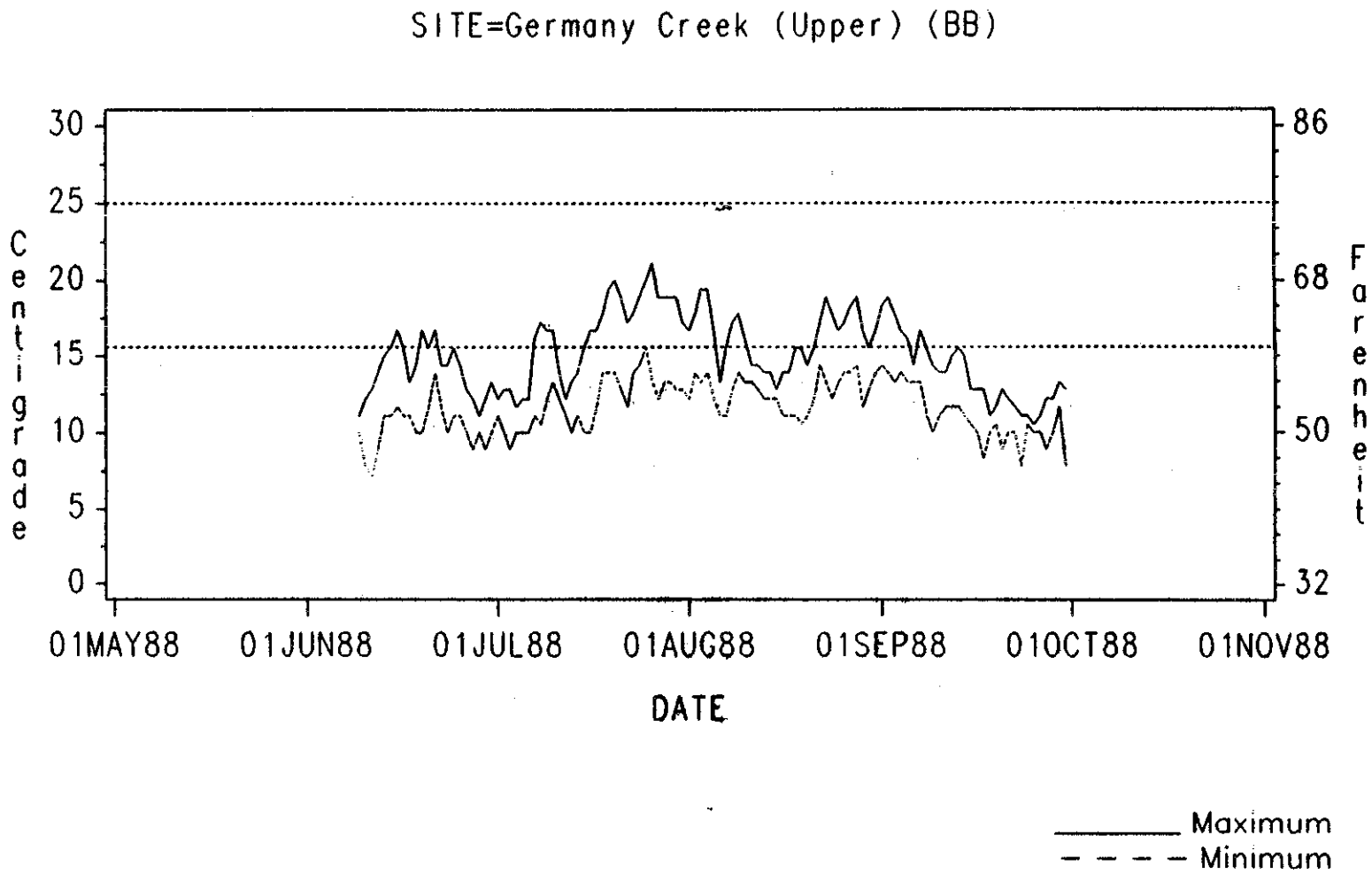
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	BB
Stream Name	SITENAMES	Germany Creek
Cooperator	COOPERATOR	WEC, International P
Cooperator/contact	COOPCONTACT	Roger Garrett, ?
Date of Site Visit	VISIT	08-09-88
County	COUNTY	Cowlitz
Nearest town	NEARESTTOWN	Stella
Township	TOWNSHIP	09N
Range	RANGE	03W
Section	SECTION	06
Site is Tributary To:	TRIBUTARYTO	Columbia River
Water Resource Inventory Area	WRIA	25
WDF River Segment Identifier	WDFNUMBER	0313
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	Southern Coast
Latitude Decimal Degrees (degrees)	LATDEC	46.289480
Longitude Decimal Degrees (degrees)	LONGDEC	123.110900
NOAA Local Climatological Data Station	NOAAINDEX	olympia
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	11
Geologic Age of Basin Geology	GEOAGE	Eocene
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	nearshore sediment
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	184.
Elevation Top of Thermal Reach (meters)	ELEVUSM	195
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.8
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.7
Channel Azimuth (degrees)	AZIMUTH1	160
Drainage Area Above Thermograph (hectares)	AREAHECT	2494
Distance to Divide (meters)	DIVIDEMT	7868
Total Length of Perennial Streams (meters)	LENGTHMT	21976
Streamflow at Thermograph (cubic meters/second)	QDSM	0.093
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.123
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.030
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.004
Travel Time (meters/second)	TRAVELM	0.146
Average View To Sky (percent open) (percent)	VIEW1	38
Topographic Angle South (degrees)	TOPOSA	15
Topographic Angle Southeast (degrees)	TOPOSEA	19
Topographic Angle Southwest (degrees)	TOPOSWA	20
Average Forest Angle South (degrees)	FORSA	79
Average Forest Angle Southeast (degrees)	FORSEA	84
Average Forest Angle Southwest (degrees)	FORSWA	81
Percent Overhanging Brush (percent)	OVERBRUSH	41
Buffer Width Right Bank (meters)	BUFWIDRM	19.1
Buffer Width Left Bank (meters)	BUFWIDLM	13.7
Vegetation Height East Bank (meters)	VEGHTEM	23
Vegetation Height West Bank (meters)	VEGHTWM	19
Percent Vegetative Density East (percent)	VEGDENE	45
Percent Vegetative Density West (percent)	VEGDENW	53
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.324
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	4.600
Percent of Channel Composed of Pools (percent)	PERCENPL	78
Average Pool Depth (meters)	DEPTHPM	0.410
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	28
Streambed Composition Cobble (percent)	AVGCOBBLE	40
Streambed Composition Boulder (percent)	AVGBOULDER	32
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

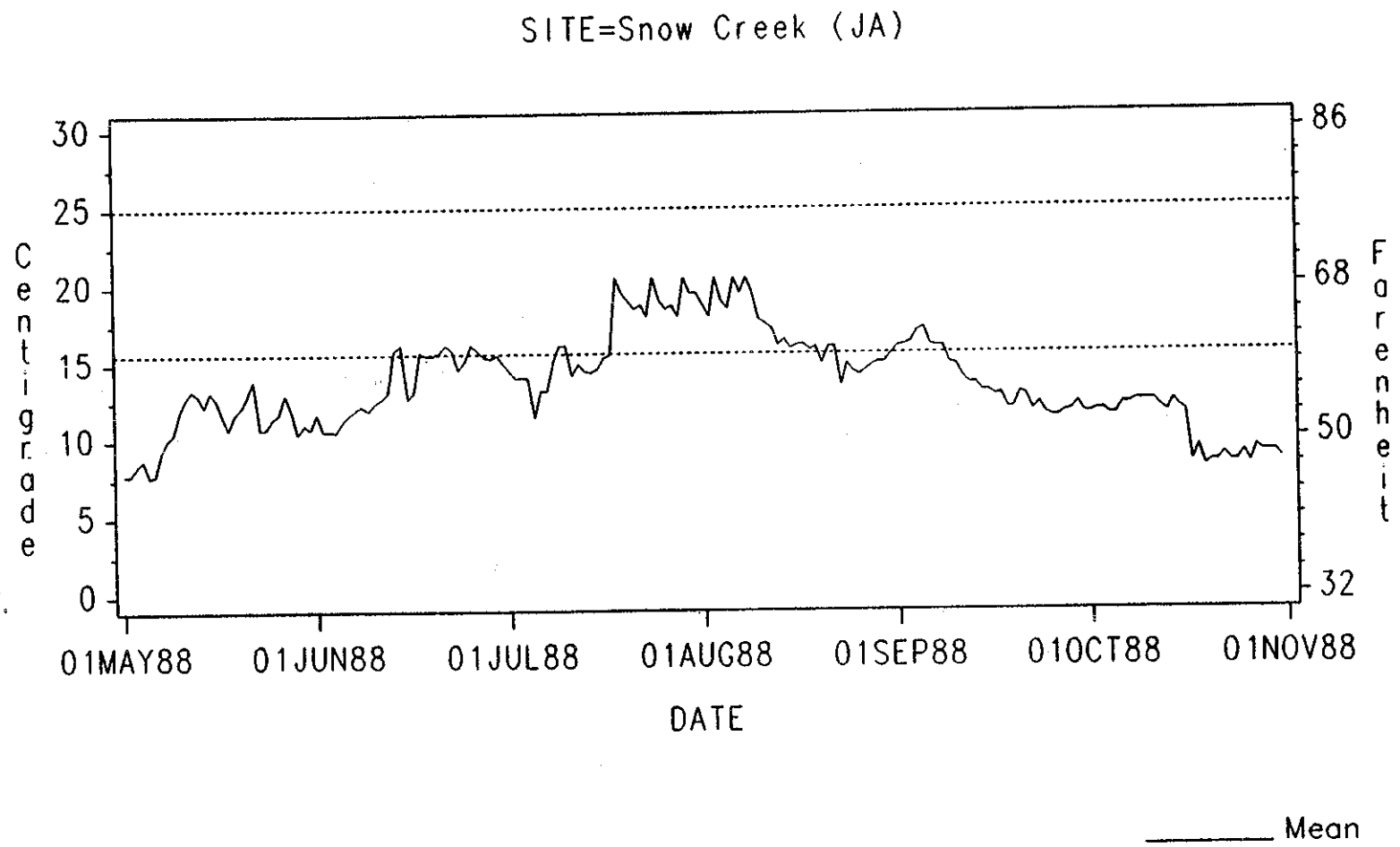
*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

SNOW CR.

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	18.7	.	.	.	.	.	.
02AUG	.	18.0	.	.	.	.	.	.
03AUG	.	20.5	.	.	.	.	.	.
04AUG	.	19.0	.	.	.	.	.	.
05AUG	.	18.5	.	.	.	.	.	.
06AUG	.	20.5	.	.	.	.	.	.
07AUG	.	19.5	.	.	.	.	.	.
08AUG	.	20.5	.	.	.	.	.	.
09AUG	.	19.5	.	.	.	.	.	.
10AUG	.	17.8	.	.	.	.	.	.
11AUG	.	17.5	.	.	.	.	.	.
12AUG	.	17.2	.	.	.	.	.	.
13AUG	.	16.1	.	.	.	.	.	.
14AUG	.	16.5	.	.	.	.	.	.
15AUG	.	15.9	.	.	.	.	.	.
16AUG	.	16.1	.	.	.	.	.	.
17AUG	.	16.2	.	.	.	.	.	.
18AUG	.	15.8	.	.	.	.	.	.
19AUG	.	16.0	.	.	.	.	.	.
20AUG	.	14.9	.	.	.	.	.	.
21AUG	.	16.0	.	.	.	.	.	.
22AUG	.	16.0	.	.	.	.	.	.
23AUG	.	13.5	.	.	.	.	.	.
24AUG	.	14.9	.	.	.	.	.	.
25AUG	.	14.4	.	.	.	.	.	.
26AUG	.	14.2	.	.	.	.	.	.
27AUG	.	14.5	.	.	.	.	.	.
28AUG	.	14.8	.	.	.	.	.	.
29AUG	.	15.0	.	.	.	.	.	.
30AUG	.	15.0	.	.	.	.	.	.
31AUG	.	15.6	.	.	.	.	.	.

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

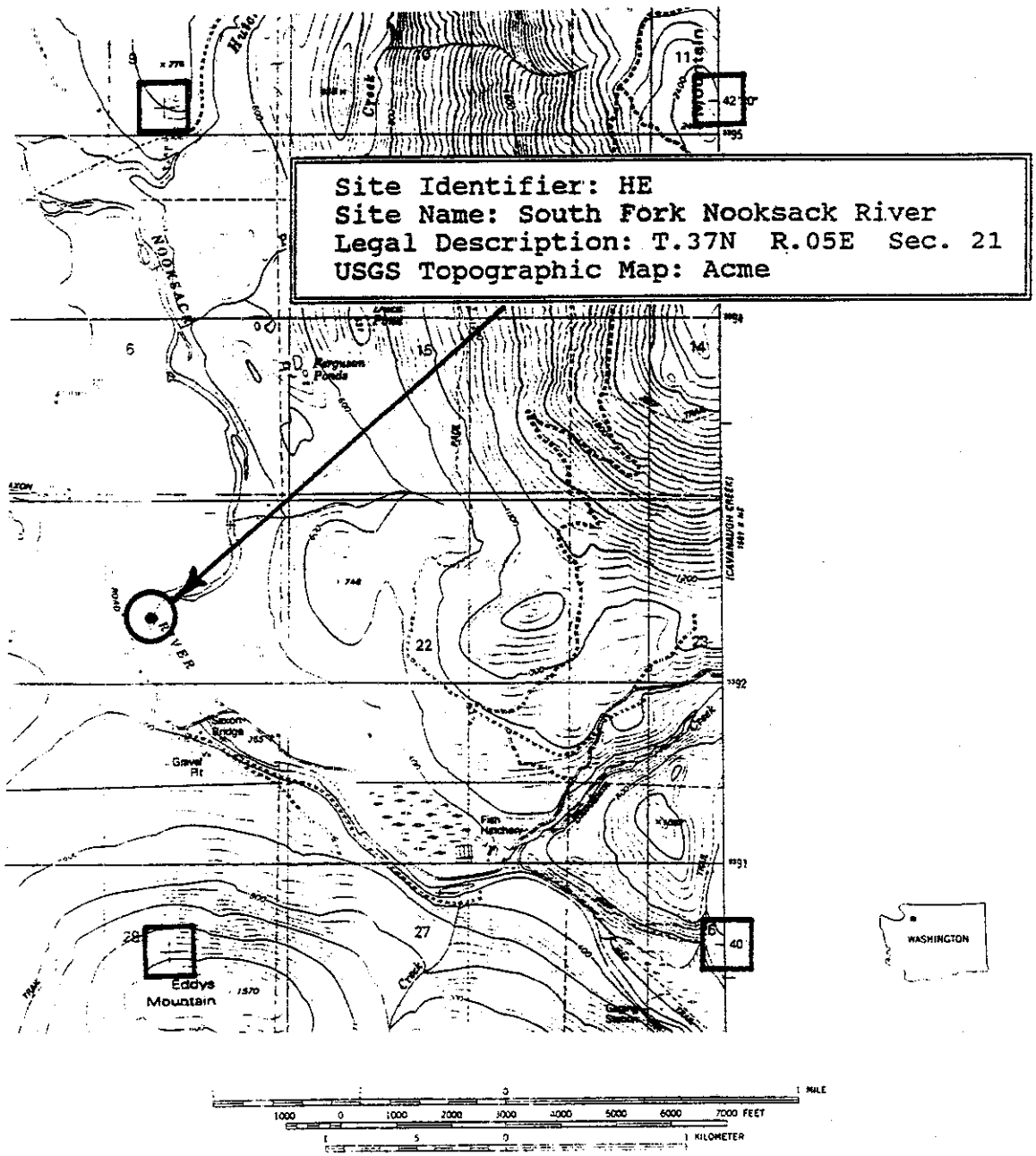
SNOW CR.

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=JANUARY

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	.	2.1	.	.	.	.	.	.
02JAN	.	2.1	.	.	.	.	.	.
03JAN	.	2.4	.	.	.	.	.	.
04JAN	.	1.4	.	.	.	.	.	.
05JAN	.	2.2	.	.	.	.	.	.
06JAN	.	1.5	.	.	.	.	.	.
07JAN	.	2.0	.	.	.	.	.	.
08JAN	.	2.0	.	.	.	.	.	.
09JAN	.	3.1	.	.	.	.	.	.
10JAN	.	3.0	.	.	.	.	.	.
11JAN	.	2.3	.	.	.	.	.	.
12JAN	.	2.5	.	.	.	.	.	.
13JAN	.	3.6	.	.	.	.	.	.
14JAN	.	5.5	.	.	.	.	.	.
15JAN	.	4.7	.	.	.	.	.	.
16JAN	.	4.1	.	.	.	.	.	.
17JAN	.	3.4	.	.	.	.	.	.
18JAN	.	3.2	.	.	.	.	.	.
19JAN	.	2.2	.	.	.	.	.	.
20JAN	.	2.8	.	.	.	.	.	.
21JAN	.	3.1	.	.	.	.	.	.
22JAN	.	3.3	.	.	.	.	.	.
23JAN	.	3.2	.	.	.	.	.	.
24JAN	.	2.6	.	.	.	.	.	.
25JAN	.	2.6	.	.	.	.	.	.
26JAN	.	3.2	.	.	.	.	.	.
27JAN	.	4.1	.	.	.	.	.	.
28JAN	.	5.4	.	.	.	.	.	.
29JAN	.	5.3	.	.	.	.	.	.
30JAN	.	5.0	.	.	.	.	.	.
31JAN	.	3.2	.	.	.	.	.	.

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



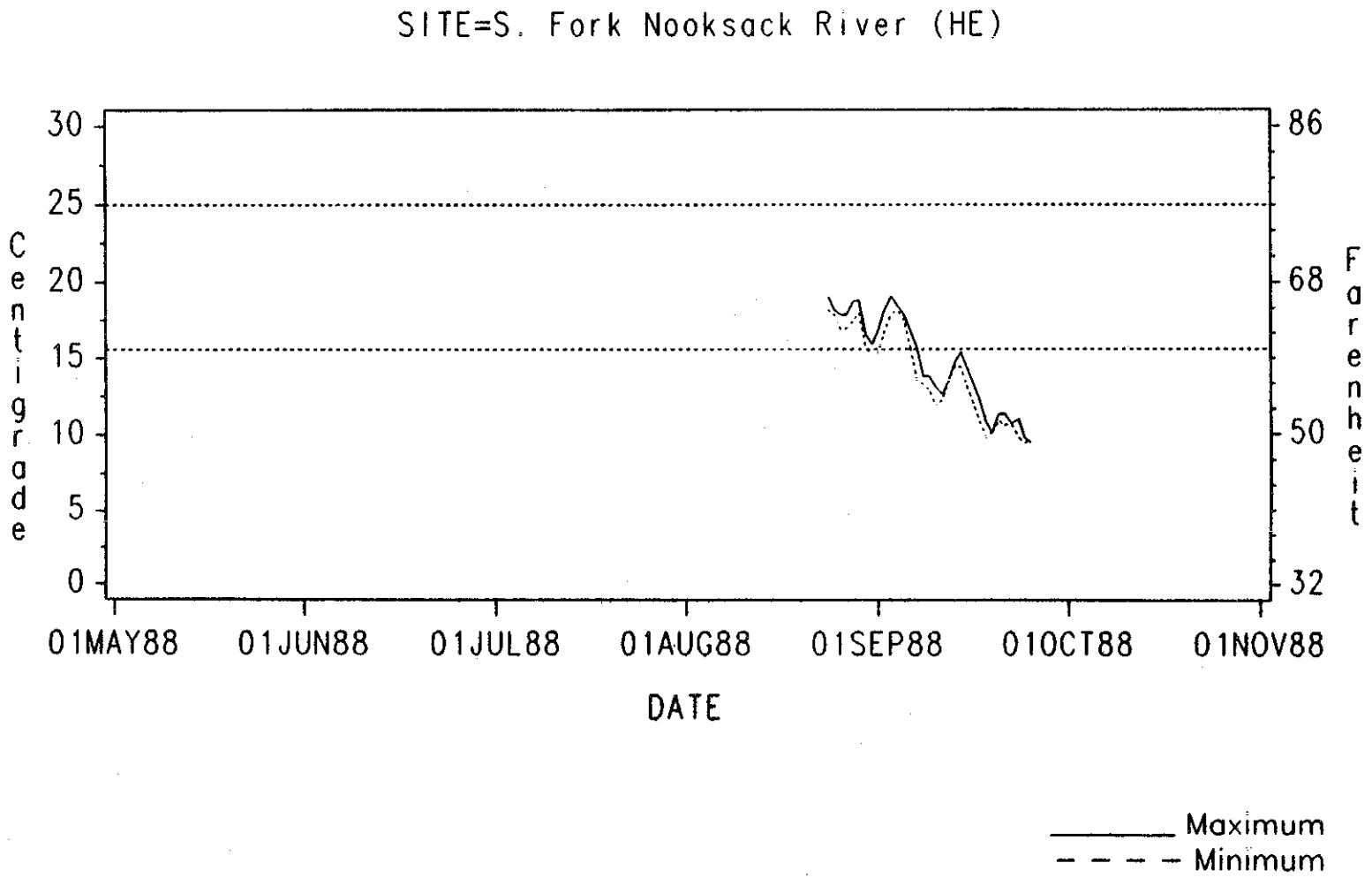
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	HE
Stream Name	SITENAMES	South Fork Nooksack
Cooperator	COOPERATOR	Nooksack Tribe
Cooperator/contact	COOPCONTACT	Kent Doughty
Date of Site Visit	VISIT	08-30-88
County	COUNTY	Watcom
Nearest town	NEARESTTOWN	Saxon
Township	TOWNSHIP	37N
Range	RANGE	05E
Section	SECTION	21
Site is Tributary To:	TRIBUTARYTO	Nooksack River
Water Resource Inventory Area	WRIA	01
WDF River Segment Identifier	WDFNUMBER	0246
DNR Water Type	DNRWATERTYPE	1+
T/F/W Ecoregion	ECOREGION	Puget Lowlands
Latitude Decimal Degrees (degrees)	LATDEC	48.683060
Longitude Decimal Degrees (degrees)	LONGDEC	122.206600
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	pre-Jurassic
Geologic Lithology of Basin	GEOLITHO	L.Grade Metamorphic
General Rock Type of Basin	GEOROCK	phyllite
Geomorphic Stream Order	STREAMORDER	5
Thermograph Elevation (meters)	ELEVDSM	105
Elevation Top of Thermal Reach (meters)	ELEVUSM	106
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.2
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.1
Channel Azimuth (degrees)	AZIMUTH1	331
Drainage Area Above Thermograph (hectares)	AREAHECT	26677
Distance to Divide (meters)	DIVIDEMT	41521
Total Length of Perennial Streams (meters)	LENGTHMT	0
Streamflow at Thermograph (cubic meters/second)	QDSM	3.941
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	4.021
Water-Budget Groundwater Determination (cubic meters/second)	GWDETERT	-0.080
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.014
Travel Time (meters/second)	TRAVELM	0.354
Average View To Sky (percent open) (percent)	VIEW1	97
Topographic Angle South (degrees)	TOPOSA	14
Topographic Angle Southeast (degrees)	TOPOSEA	7
Topographic Angle Southwest (degrees)	TOPOSWA	11
Average Forest Angle South (degrees)	FORSA	24
Average Forest Angle Southeast (degrees)	FORSEA	18
Average Forest Angle Southwest (degrees)	FORSWA	37
Percent Overhanging Brush (percent)	OVERBRUSH	4
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	10
Vegetation Height West Bank (meters)	VEGHTWM	12
Percent Vegetative Density East (percent)	VEGDENE	0
Percent Vegetative Density West (percent)	VEGDENW	3
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.386
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	22.843
Percent of Channel Composed of Pools (percent)	PERCENPL	0
Average Pool Depth (meters)	DEPTHPM	0.000
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	33
Streambed Composition Gravel (percent)	AVGGRAVEL	23
Streambed Composition Cobble (percent)	AVGCOBBLE	37
Streambed Composition Boulder (percent)	AVGBOULDER	7
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

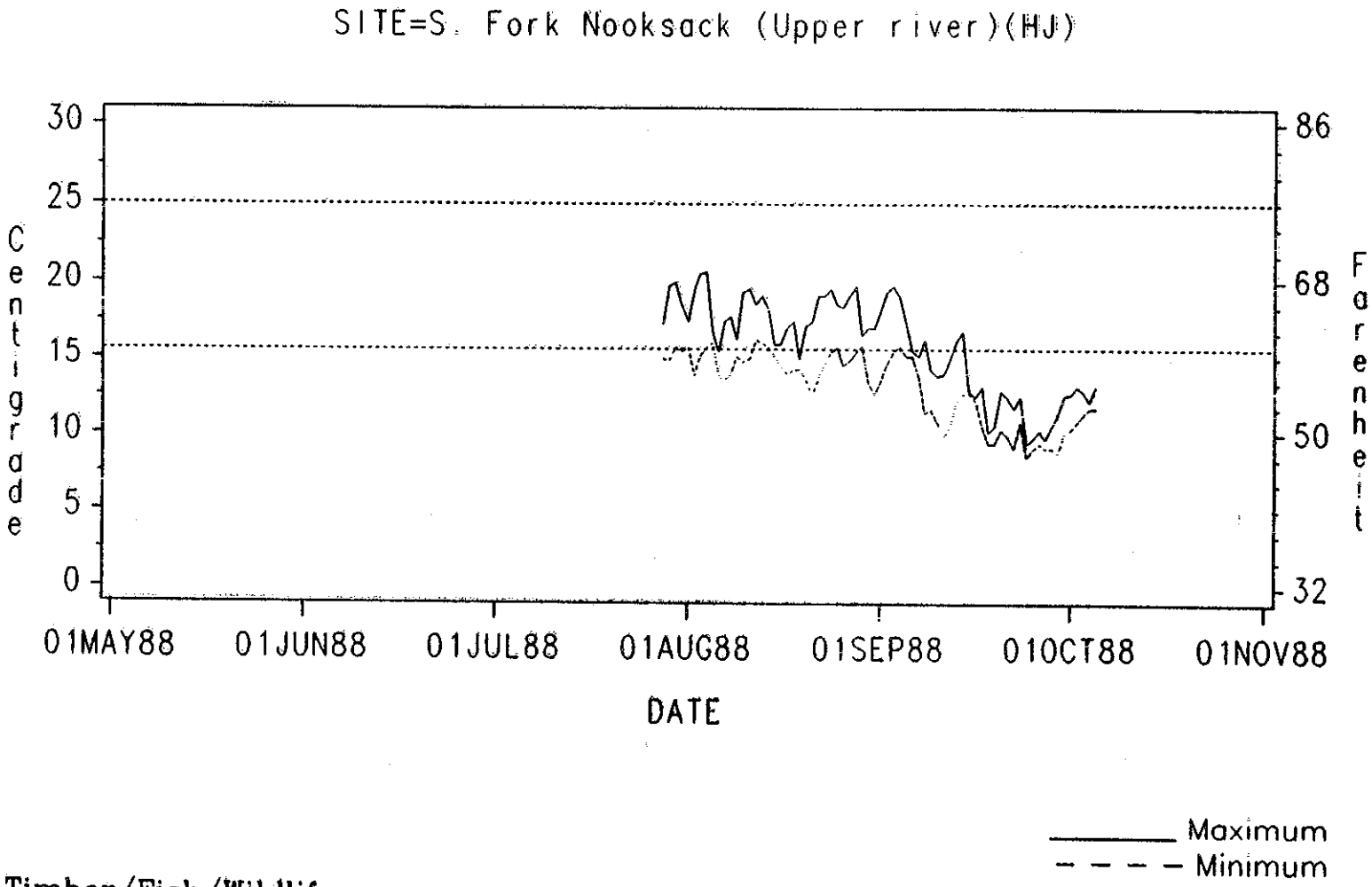
S. FORK NOOKSACK RIVER

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
24AUG	.	18.7	.	19.1	.	18.2	.	0.9
25AUG	.	18.0	.	18.2	.	17.9	.	0.3
26AUG	.	17.4	.	17.9	.	16.9	.	0.9
27AUG	.	17.4	.	17.9	.	17.0	.	0.8
28AUG	.	18.2	.	18.8	.	17.5	.	1.2
29AUG	.	18.4	.	18.8	.	18.0	.	0.8
30AUG	.	16.2	.	16.6	.	15.8	.	0.8
31AUG	.	15.5	.	15.9	.	15.1	.	0.9

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

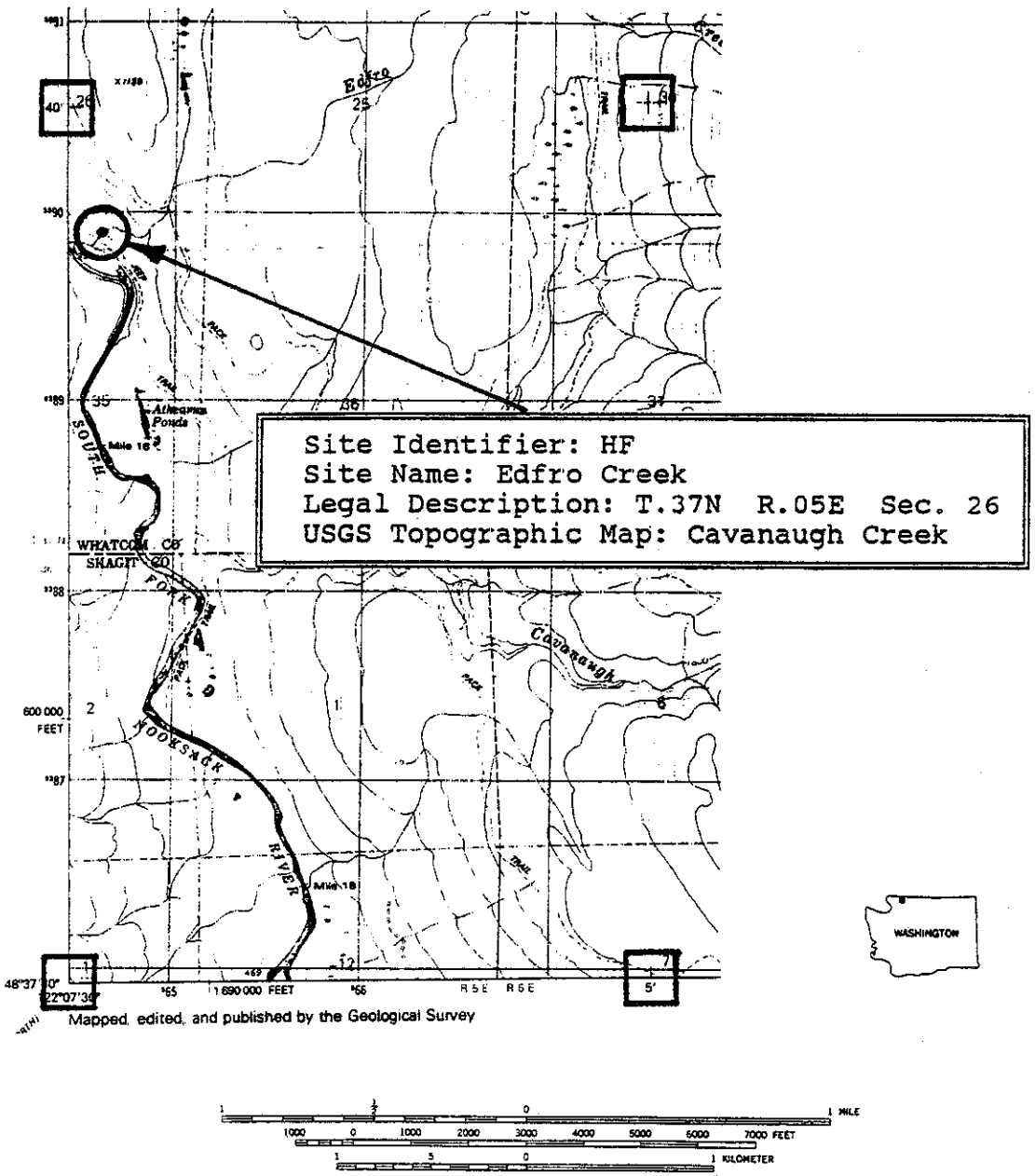
SOUTH FORK NOOKSACK RIVER (near upper end of river)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	16.5	.	17.4	.	15.7	.	1.7
02AUG	.	16.6	.	19.4	.	13.8	.	5.7
03AUG	.	17.8	.	20.5	.	15.1	.	5.4
04AUG	.	18.1	.	20.6	.	15.7	.	5.0
05AUG	.	16.4	.	16.8	.	16.0	.	0.8
06AUG	.	14.6	.	15.4	.	13.8	.	1.6
07AUG	.	15.5	.	17.4	.	13.5	.	3.8
08AUG	.	15.8	.	17.7	.	13.9	.	3.7
09AUG	.	15.7	.	16.2	.	15.1	.	1.1
10AUG	.	17.0	.	19.3	.	14.7	.	4.6
11AUG	.	17.2	.	19.5	.	14.9	.	4.6
12AUG	.	17.4	.	18.5	.	16.2	.	2.3
13AUG	.	17.5	.	19.1	.	16.0	.	3.1
14AUG	.	16.9	.	18.2	.	15.7	.	2.6
15AUG	.	15.5	.	15.9	.	15.1	.	0.8
16AUG	.	15.2	.	15.9	.	14.5	.	1.4
17AUG	.	15.5	.	17.0	.	13.9	.	3.0
18AUG	.	15.8	.	17.4	.	14.2	.	3.1
19AUG	.	14.5	.	14.9	.	14.2	.	0.6
20AUG	.	15.4	.	17.1	.	13.6	.	3.5
21AUG	.	14.9	.	17.4	.	12.5	.	4.9
22AUG	.	16.4	.	19.1	.	13.7	.	5.4
23AUG	.	.	.	19.1	.	.	.	.
24AUG	.	17.4	.	19.5	.	15.4	.	4.1
25AUG	.	17.1	.	18.5	.	15.7	.	2.8
26AUG	.	16.4	.	18.3	.	14.5	.	3.8
27AUG	.	16.9	.	19.1	.	14.8	.	4.3
28AUG	.	17.5	.	19.7	.	15.4	.	4.3
29AUG	.	16.2	.	16.5	.	15.8	.	0.7
30AUG	.	15.2	.	17.0	.	13.4	.	3.6
31AUG	.	14.8	.	17.0	.	12.6	.	4.4

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



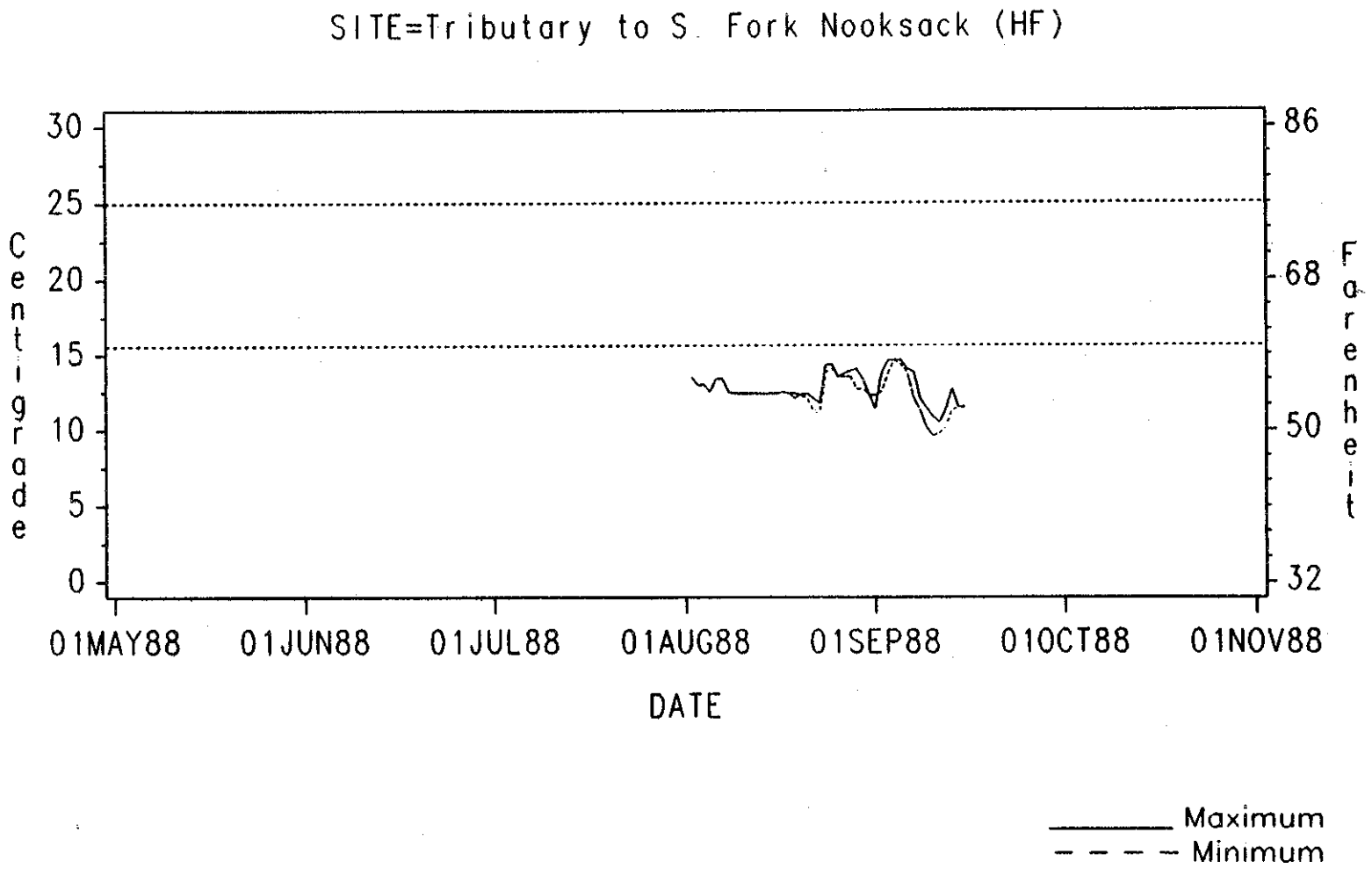
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITE$	HF
Stream Name	SITENAME$	Edfro Creek
Cooperator	COOPERATOR	Nooksack Tribe
Cooperator/contact	COOPCONTACT	Kent Doughty
Date of Site Visit	VISIT	08-30-88
County	COUNTY	Watcom
Nearest town	NEARESTTOWN	Saxon
Township	TOWNSHIP	37N
Range	RANGE	05E
Section	SECTION	26
Site is Tributary To:	TRIBUTARYTO	South Fork Nooksack
Water Resource Inventory Area	WRIA	01
WDF River Segment Identifier	WDFNUMBER	0283
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	Puget Lowlands
Latitude Decimal Degrees (degrees)	LATDEC	48.660330
Longitude Decimal Degrees (degrees)	LONGDEC	122.123000
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	pre-Jurassic
Geologic Lithology of Basin	GEOLITHO	L.Grade Metamorphic
General Rock Type of Basin	GEOROCK	phyllite
Geomorphic Stream Order	STREAMORDER	2
Thermograph Elevation (meters)	ELEVDSM	122
Elevation Top of Thermal Reach (meters)	ELEVUSM	262
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	23.0
Channel Gradient from Autolevel (percent)	GRADLEVEL	2.2
Channel Azimuth (degrees)	AZIMUTH1	237
Drainage Area Above Thermograph (hectares)	AREAHECI	718
Distance to Divide (meters)	DIVIDEMT	6503
Total Length of Perennial Streams (meters)	LENGTHMT	7441
Streamflow at Thermograph (cubic meters/second)	QDSM	0.005
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.009
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.005
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.001
Travel Time (meters/second)	TRAVELM	0.082
Average View To Sky (percent open) (percent)	VIEW1	19
Topographic Angle South (degrees)	TOPOSA	23
Topographic Angle Southeast (degrees)	TOPOSEA	28
Topographic Angle Southwest (degrees)	TOPOSWA	29
Average Forest Angle South (degrees)	FORSA	81
Average Forest Angle Southeast (degrees)	FORSEA	81
Average Forest Angle Southwest (degrees)	FORSWA	77
Percent Overhanging Brush (percent)	OVERBRUSH	77
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	18
Vegetation Height West Bank (meters)	VEGHTWM	17
Percent Vegetative Density East (percent)	VEGDENE	38
Percent Vegetative Density West (percent)	VEGDENW	32
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.116
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	1.736
Percent of Channel Composed of Pools (percent)	PERCENPL	70
Average Pool Depth (meters)	DEPTHPM	0.170
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	3
Streambed Composition Gravel (percent)	AVGGRAVEL	30
Streambed Composition Cobble (percent)	AVGCOBBLE	18
Streambed Composition Boulder (percent)	AVGBOULDER	33
Streambed Composition Bedrock (percent)	AVGBEDROCK	15
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

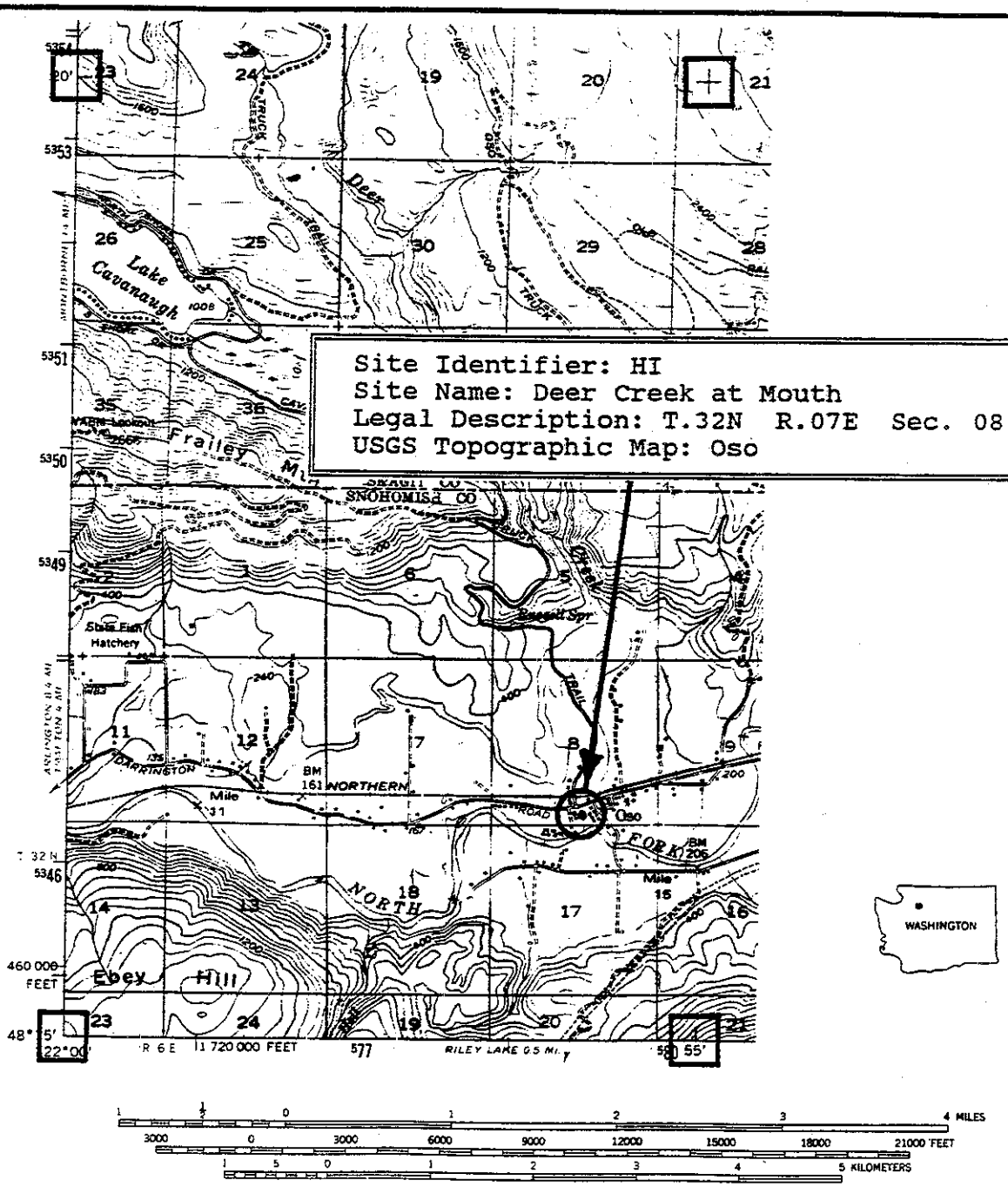
TRIBUTARY TO SOUTH FORK NOOKSACK RIVER

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
02AUG	.	13.5	.	13.5	.	13.5	.	0.0
03AUG	.	13.0	.	13.0	.	13.0	.	0.0
04AUG	.	13.0	.	13.0	.	13.0	.	0.0
05AUG	.	12.5	.	12.5	.	12.5	.	0.0
06AUG	.	13.4	.	13.4	.	13.4	.	0.0
07AUG	.	13.4	.	13.4	.	13.4	.	0.0
08AUG	.	12.5	.	12.5	.	12.5	.	0.0
09AUG	.	12.4	.	12.4	.	12.4	.	0.0
10AUG	.	12.4	.	12.4	.	12.4	.	0.0
11AUG	.	12.4	.	12.4	.	12.4	.	0.0
12AUG	.	12.4	.	12.4	.	12.4	.	0.0
13AUG	.	12.4	.	12.4	.	12.4	.	0.0
14AUG	.	12.4	.	12.4	.	12.4	.	0.0
15AUG	.	12.4	.	12.4	.	12.4	.	0.0
16AUG	.	12.4	.	12.4	.	12.4	.	0.0
17AUG	.	12.5	.	12.5	.	12.5	.	0.0
18AUG	.	12.4	.	12.4	.	12.4	.	0.0
19AUG	.	12.3	.	12.4	.	12.1	.	0.3
20AUG	.	12.3	.	12.3	.	12.3	.	0.0
21AUG	.	12.3	.	12.4	.	12.1	.	0.3
22AUG	.	11.6	.	12.1	.	11.2	.	0.9
23AUG	.	11.5	.	11.8	.	11.2	.	0.6
24AUG	.	14.0	.	14.3	.	13.8	.	0.5
25AUG	.	14.1	.	14.3	.	14.0	.	0.3
26AUG	.	13.5	.	13.5	.	13.5	.	0.0
27AUG	.	13.6	.	13.7	.	13.5	.	0.1
28AUG	.	13.7	.	13.9	.	13.5	.	0.4
29AUG	.	13.3	.	14.0	.	12.7	.	1.3
30AUG	.	13.0	.	13.4	.	12.7	.	0.6
31AUG	.	12.3	.	12.3	.	12.3	.	0.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



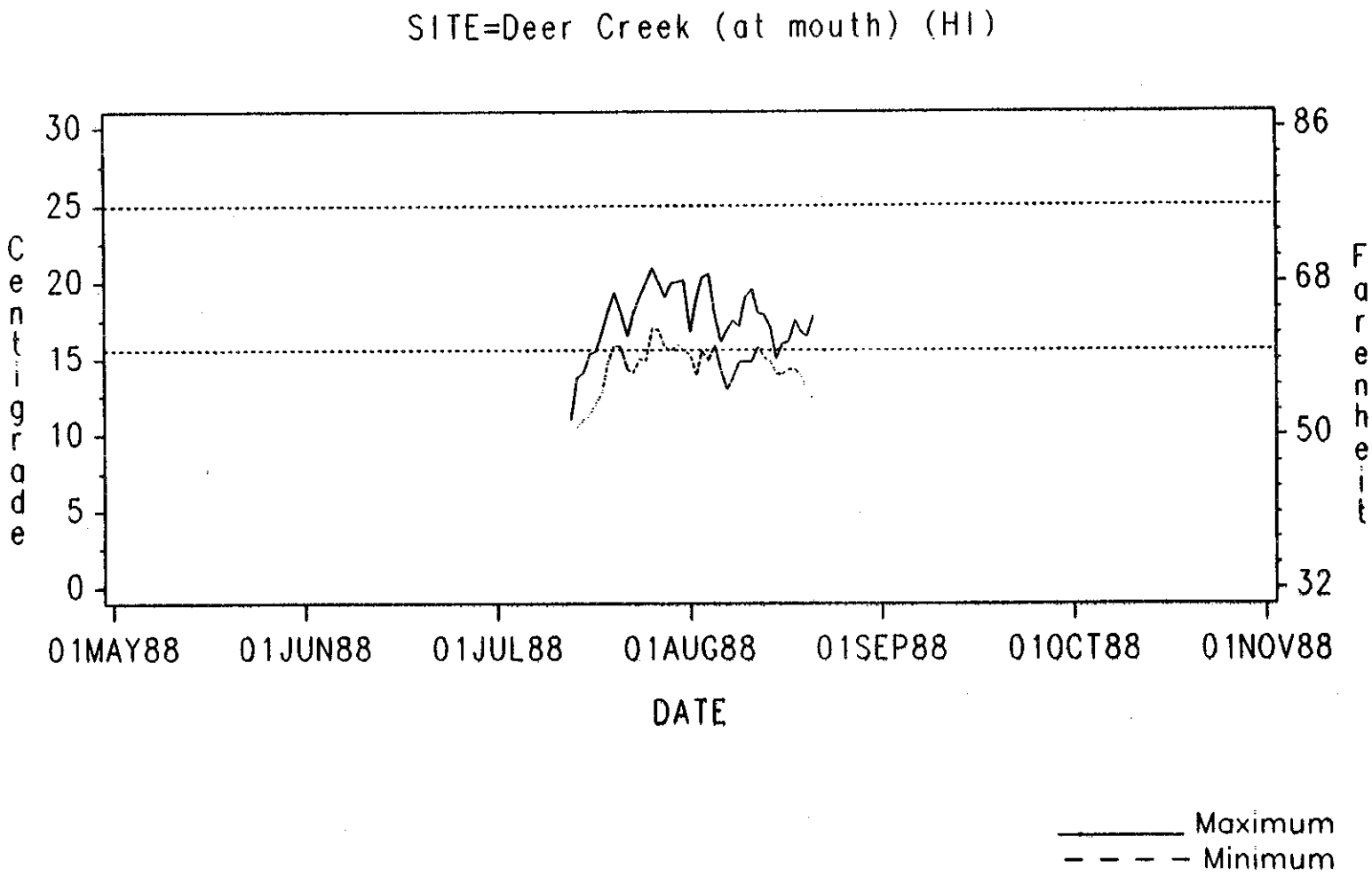
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	HI
Stream Name	SITENAMES	Deer Creek at Mouth
Cooperator	COOPERATOR	Tulalip Tribes
Cooperator/contact	COOPCONTACT	Kurt Nelson
Date of Site Visit	VISIT	08-22-88
County	COUNTY	Snohomish
Nearest town	NEARESTTOWN	Oso
Township	TOWNSHIP	32N
Range	RANGE	07E
Section	SECTION	08
Site is Tributary To:	TRIBUTARYTO	N.Fk Stillaguamish
Water Resource Inventory Area	WRIA	05
WDF River Segment Identifier	WDFNUMBER	0173
DNR Water Type	DNRWATERTYPE	1
T/F/W Ecoregion	ECOREGION	North Cascades
Latitude Decimal Degrees (degrees)	LATDEC	48.271210
Longitude Decimal Degrees (degrees)	LONGDEC	121.932300
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	alluvium
Geomorphic Stream Order	STREAMORDER	4
Thermograph Elevation (meters)	ELEVDSM	58
Elevation Top of Thermal Reach (meters)	ELEVUSM	62
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	0.7
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.8
Channel Azimuth (degrees)	AZIMUTH1	211
Drainage Area Above Thermograph (hectares)	AREAHECT	17499
Distance to Divide (meters)	DIVIDEMT	38488
Total Length of Perennial Streams (meters)	LENGTHMT	136624
Streamflow at Thermograph (cubic meters/second)	QDSM	1.365
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	1.250
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.114
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.010
Travel Time (meters/second)	TRAVELM	0.329
Average View To Sky (percent open) (percent)	VIEW1	89
Topographic Angle South (degrees)	TOPOSA	10
Topographic Angle Southeast (degrees)	TOPOSEA	9
Topographic Angle Southwest (degrees)	TOPOSWA	7
Average Forest Angle South (degrees)	FORSA	32
Average Forest Angle Southeast (degrees)	FORSEA	26
Average Forest Angle Southwest (degrees)	FORSWA	28
Percent Overhanging Brush (percent)	OVERBRUSH	5
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	45.7
Vegetation Height East Bank (meters)	VEGHTEM	39
Vegetation Height West Bank (meters)	VEGHTWM	29
Percent Vegetative Density East (percent)	VEGDENE	0
Percent Vegetative Density West (percent)	VEGDENW	5
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.368
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	10.090
Percent of Channel Composed of Pools (percent)	PERCENPL	41
Average Pool Depth (meters)	DEPTHPM	0.530
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	15
Streambed Composition Gravel (percent)	AVGGRAVEL	25
Streambed Composition Cobble (percent)	AVGCOBBLE	35
Streambed Composition Boulder (percent)	AVGBOULDER	25
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

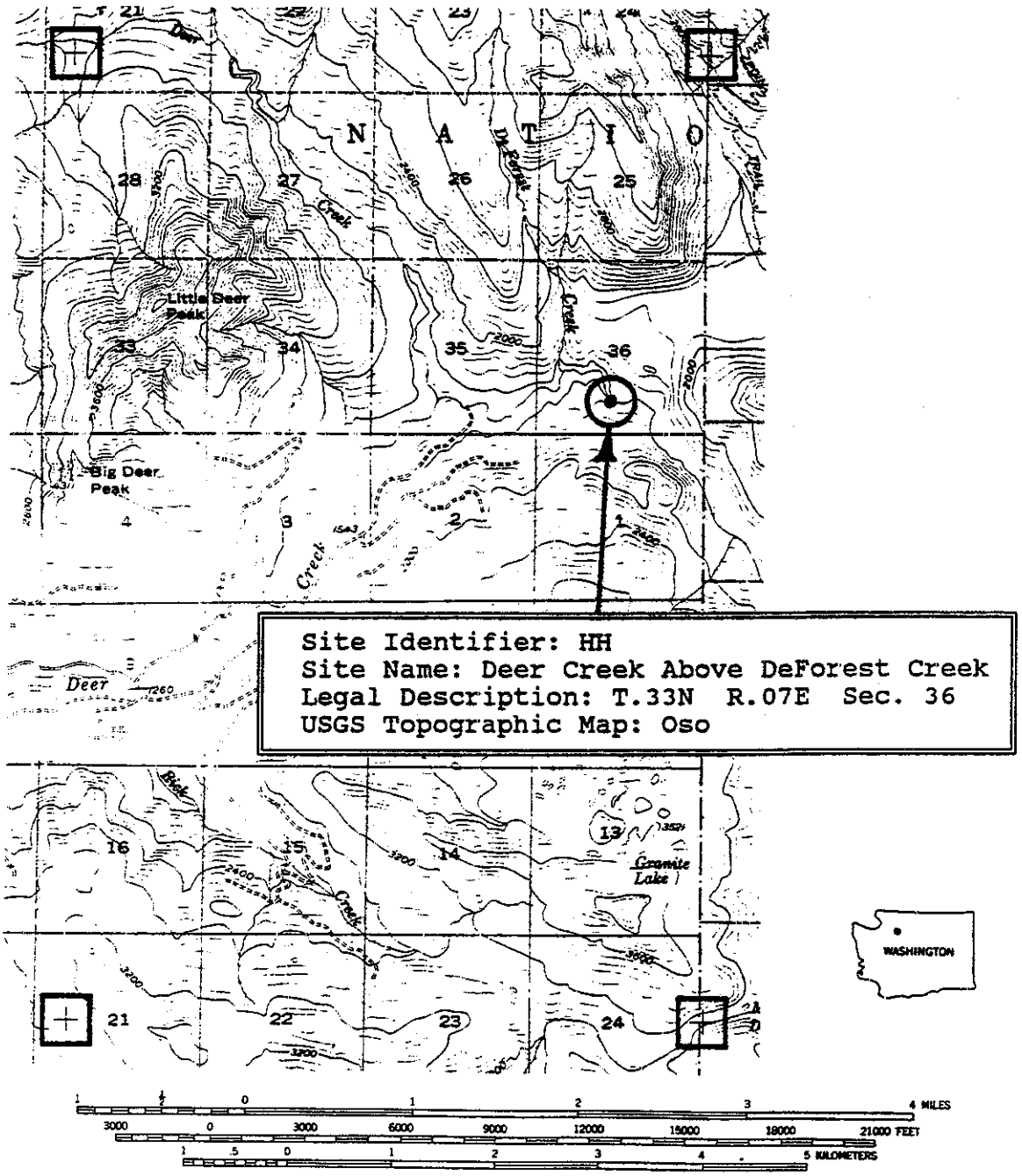
DEER CR. (AT THE MOUTH)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	16.0	.	16.8	.	15.3	.	1.5
02AUG	.	16.4	.	18.9	.	13.9	.	5.0
03AUG	.	17.9	.	20.3	.	15.5	.	4.8
04AUG	.	17.7	.	20.5	.	14.9	.	5.6
05AUG	.	16.9	.	17.9	.	15.9	.	2.0
06AUG	.	15.2	.	16.1	.	14.3	.	1.9
07AUG	.	15.0	.	16.9	.	13.0	.	3.9
08AUG	.	15.6	.	17.5	.	13.8	.	3.8
09AUG	.	16.0	.	17.1	.	14.8	.	2.3
10AUG	.	16.9	.	19.0	.	14.8	.	4.2
11AUG	.	17.1	.	19.5	.	14.8	.	4.8
12AUG	.	16.9	.	18.0	.	15.8	.	2.3
13AUG	.	16.5	.	17.9	.	15.1	.	2.8
14AUG	.	15.9	.	17.1	.	14.8	.	2.4
15AUG	.	14.5	.	15.0	.	14.0	.	0.9
16AUG	.	15.0	.	16.0	.	14.0	.	1.9
17AUG	.	15.2	.	16.1	.	14.3	.	1.9
18AUG	.	15.9	.	17.5	.	14.3	.	3.3
19AUG	.	15.3	.	16.8	.	13.9	.	2.9
20AUG	.	14.8	.	16.5	.	13.0	.	3.5
21AUG	.	15.0	.	17.8	.	12.3	.	5.5

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



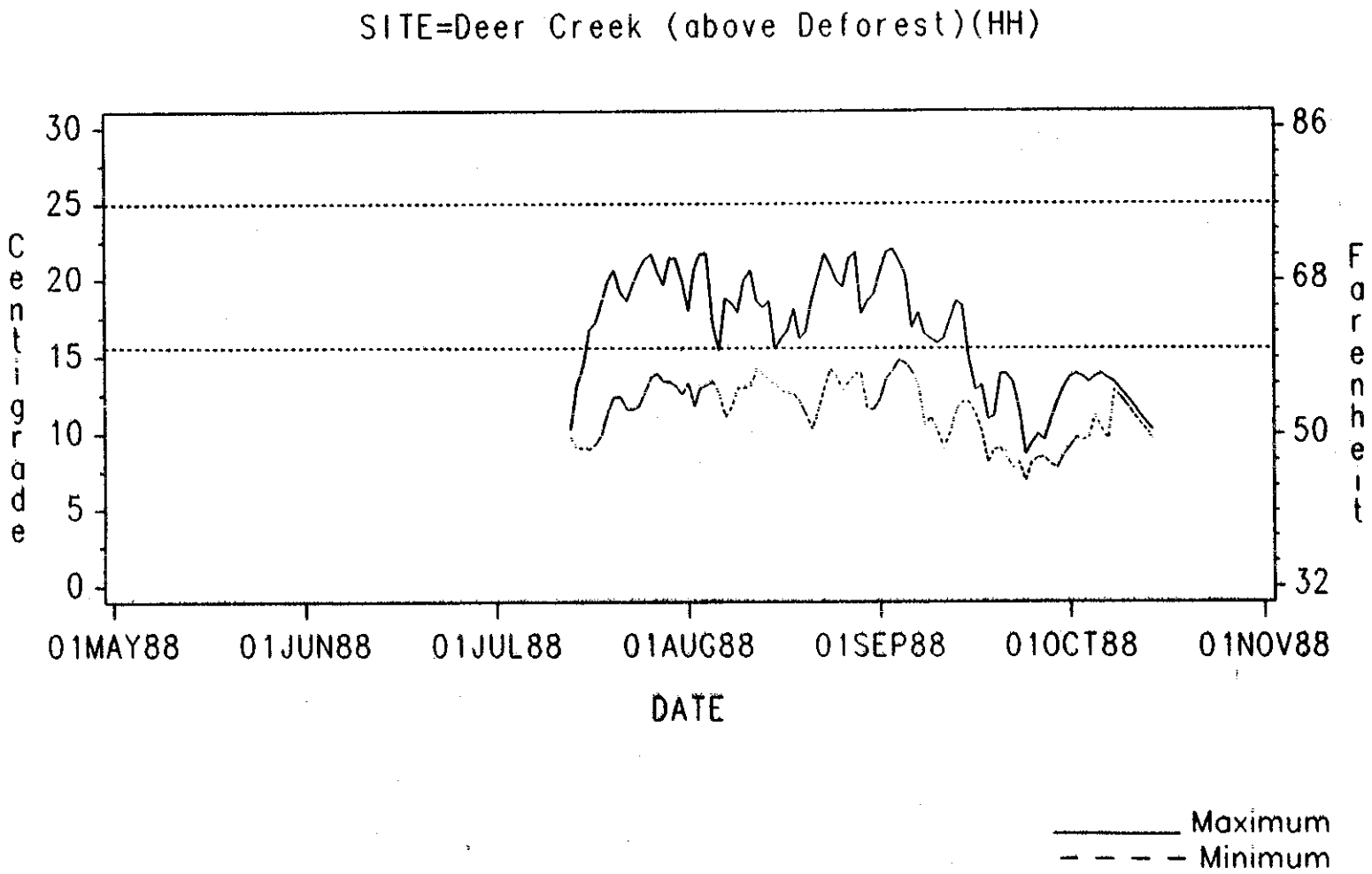
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	HH
Stream Name	SITENAMES	Deer Creek ab DeForest
Cooperator	COOPERATOR	Tulalip Tribes
Cooperator/contact	COOPCONTACT	Kurt Nelson
Date of Site Visit	VISIT	08-23-88
County	COUNTY	Skagit
Nearest town	NEARESTTOWN	Oso
Township	TOWNSHIP	33N
Range	RANGE	07E
Section	SECTION	36
Site is Tributary To:	TRIBUTARYTO	N.Fk Stillaguamish
Water Resource Inventory Area	WRIA	05
WDF River Segment Identifier	WDFNUMBER	0173
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	North Cascades
Latitude Decimal Degrees (degrees)	LATDEC	48.387830
Longitude Decimal Degrees (degrees)	LONGDEC	121.845800
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	glacial drift
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	487
Elevation Top of Thermal Reach (meters)	ELEVUSM	496
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	1.5
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	299
Drainage Area Above Thermograph (hectares)	AREAHECT	5932
Distance to Divide (meters)	DIVIDEMT	13980
Total Length of Perennial Streams (meters)	LENGTHMT	44467
Streamflow at Thermograph (cubic meters/second)	QDSM	0.265
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.265
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.000
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.006
Travel Time (meters/second)	TRAVELM	0.183
Average View To Sky (percent open) (percent)	VIEW1	76
Topographic Angle South (degrees)	TOPOSA	19
Topographic Angle Southeast (degrees)	TOPOSEA	16
Topographic Angle Southwest (degrees)	TOPOSWA	21
Average Forest Angle South (degrees)	FORSA	27
Average Forest Angle Southeast (degrees)	FORSEA	28
Average Forest Angle Southwest (degrees)	FORSWA	34
Percent Overhanging Brush (percent)	OVERBRUSH	6
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	22
Vegetation Height West Bank (meters)	VEGHTWM	21
Percent Vegetative Density East (percent)	VEGDENE	17
Percent Vegetative Density West (percent)	VEGDENW	0
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.389
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	7.290
Percent of Channel Composed of Pools (percent)	PERCENPL	66
Average Pool Depth (meters)	DEPTHPM	0.580
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	10
Streambed Composition Cobble (percent)	AVGCOBBLE	20
Streambed Composition Boulder (percent)	AVGBOULDER	70
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

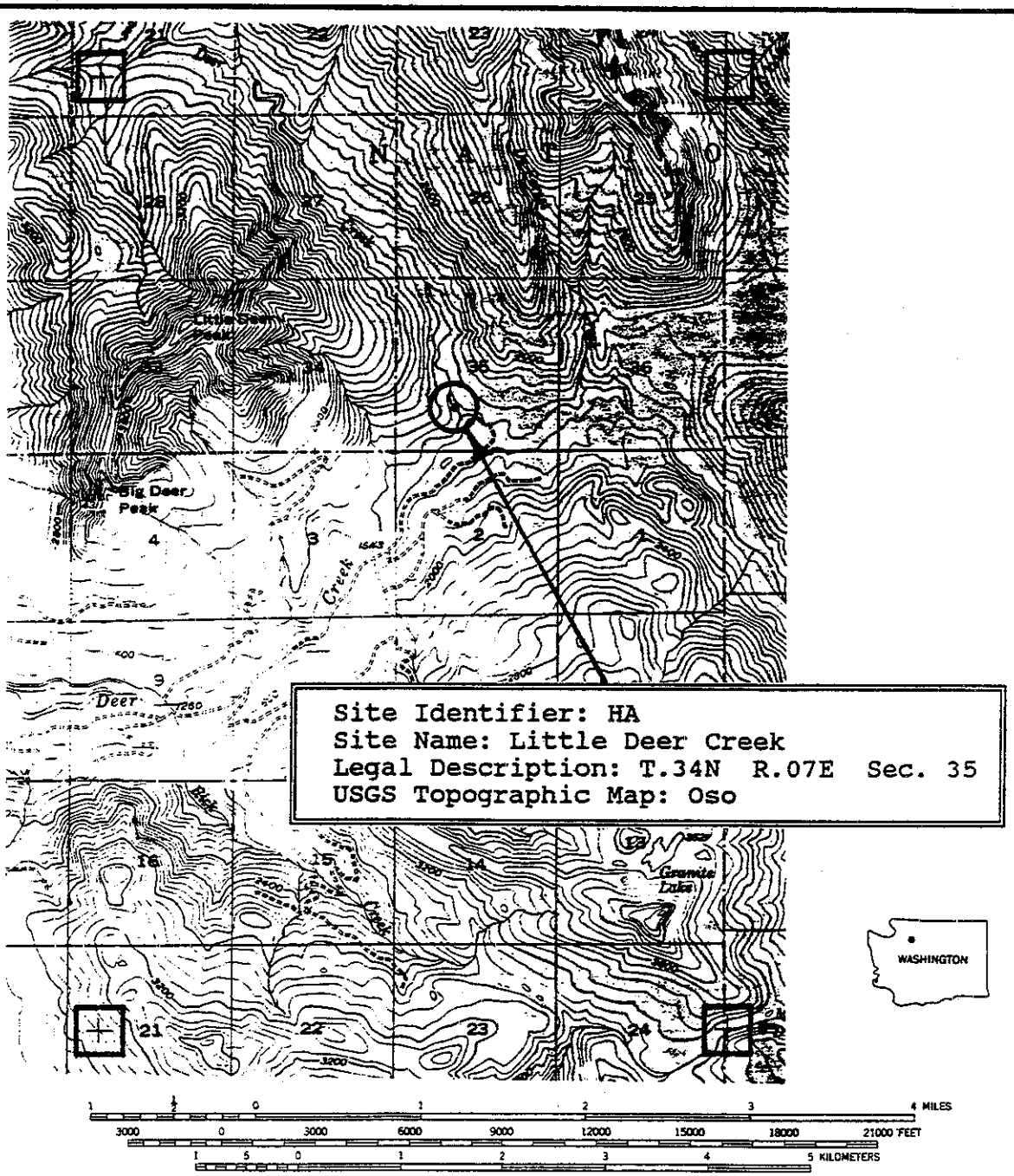
DEER CR. (AT R.M. 14)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	14.8	.	16.5	.	13.1	.	3.4
02AUG	.	15.8	.	19.9	.	11.8	.	8.2
03AUG	.	16.3	.	19.8	.	12.9	.	6.9
04AUG	.	16.5	.	19.9	.	13.1	.	6.8
05AUG	.	14.4	.	15.5	.	13.3	.	2.3
06AUG	.	13.4	.	14.5	.	12.3	.	2.3
07AUG	.	13.9	.	16.5	.	11.3	.	5.3
08AUG	.	14.3	.	16.9	.	11.8	.	5.1
09AUG	.	14.4	.	15.8	.	13.0	.	2.8
10AUG	.	15.5	.	18.1	.	12.9	.	5.2
11AUG	.	15.7	.	18.5	.	12.9	.	5.6
12AUG	.	15.5	.	17.0	.	14.0	.	3.0
13AUG	.	15.5	.	16.1	.	14.9	.	1.2
14AUG	.	14.8	.	16.3	.	13.3	.	3.0
15AUG	.	13.6	.	14.1	.	13.0	.	1.1
16AUG	.	14.1	.	15.3	.	12.9	.	2.4
17AUG	.	13.9	.	15.1	.	12.8	.	2.4
18AUG	.	14.4	.	16.0	.	12.8	.	3.3
19AUG	.	14.0	.	15.0	.	13.0	.	2.0
20AUG	.	12.6	.	14.0	.	11.3	.	2.8
21AUG	.	13.6	.	16.8	.	10.5	.	6.3
22AUG	.	14.8	.	18.0	.	11.5	.	6.5
23AUG	.	16.3	.	19.9	.	12.8	.	7.2
24AUG	.	16.1	.	18.5	.	13.8	.	4.8
25AUG	.	16.2	.	18.9	.	13.5	.	5.4
26AUG	.	15.6	.	18.5	.	12.8	.	5.8
27AUG	.	16.6	.	20.0	.	13.1	.	6.9
28AUG	.	17.1	.	20.5	.	13.8	.	6.8
29AUG	.	14.5	.	15.3	.	13.8	.	1.5
30AUG	.	14.7	.	17.9	.	11.5	.	6.4
31AUG	.	14.6	.	18.0	.	11.1	.	6.9

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



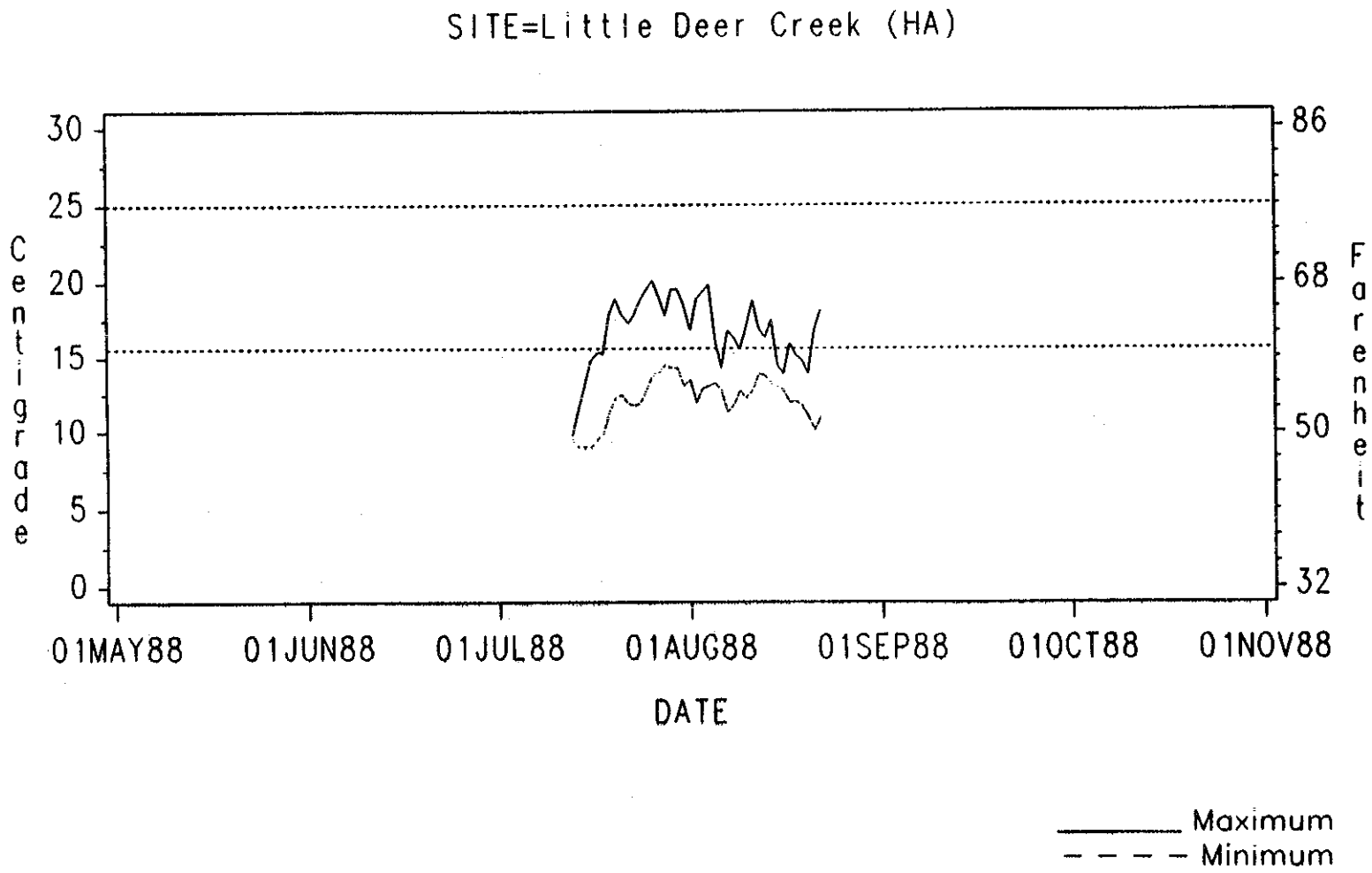
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	HA
Stream Name	SITENAMES	Little Deer Creek
Cooperator	COOPERATOR	Tulalip Tribes
Cooperator/contact	COOPCONTACT	Kurt Nelson
Date of Site Visit	VISIT	08-23-88
County	COUNTY	Skagit
Nearest town	NEARESTTOWN	Oso
Township	TOWNSHIP	34N
Range	RANGE	07E
Section	SECTION	35
Site is Tributary To:	TRIBUTARYTO	Deer Creek
Water Resource Inventory Area	WRIA	05
WDF River Segment Identifier	WDFNUMBER	0187
DNR Water Type	DNRWATERTYPE	2
T/F/W Ecoregion	ECOREGION	North Cascades
Latitude Decimal Degrees (degrees)	LATDEC	48.388930
Longitude Decimal Degrees (degrees)	LONGDEC	121.869600
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Quaternary
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	glacial drift
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	463
Elevation Top of Thermal Reach (meters)	ELEVUSM	475
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	2.0
Channel Gradient from Autolevel (percent)	GRADLEVEL	1.9
Channel Azimuth (degrees)	AZIMUTH1	173
Drainage Area Above Thermograph (hectares)	AREAHECT	3071
Distance to Divide (meters)	DIVIDEMT	10579
Total Length of Perennial Streams (meters)	LENGTHMT	24734
Streamflow at Thermograph (cubic meters/second)	QDSM	0.225
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.217
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.007
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.009
Travel Time (meters/second)	TRAVELM	0.247
Average View To Sky (percent open) (percent)	VIEW1	77
Topographic Angle South (degrees)	TOPOSA	10
Topographic Angle Southeast (degrees)	TOPOSEA	12
Topographic Angle Southwest (degrees)	TOPOSWA	10
Average Forest Angle South (degrees)	FORSA	29
Average Forest Angle Southeast (degrees)	FORSEA	38
Average Forest Angle Southwest (degrees)	FORSWA	41
Percent Overhanging Brush (percent)	OVERBRUSH	8
Buffer Width Right Bank (meters)	BUFWIDRM	25.9
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	17
Vegetation Height West Bank (meters)	VEGHTWM	16
Percent Vegetative Density East (percent)	VEGDENE	9
Percent Vegetative Density West (percent)	VEGDENW	13
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.409
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	6.175
Percent of Channel Composed of Pools (percent)	PERCENPL	72
Average Pool Depth (meters)	DEPTHPM	0.670
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	17
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	18
Streambed Composition Cobble (percent)	AVGCOBBLE	27
Streambed Composition Boulder (percent)	AVGBOULDER	35
Streambed Composition Bedrock (percent)	AVGBEDROCK	3
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

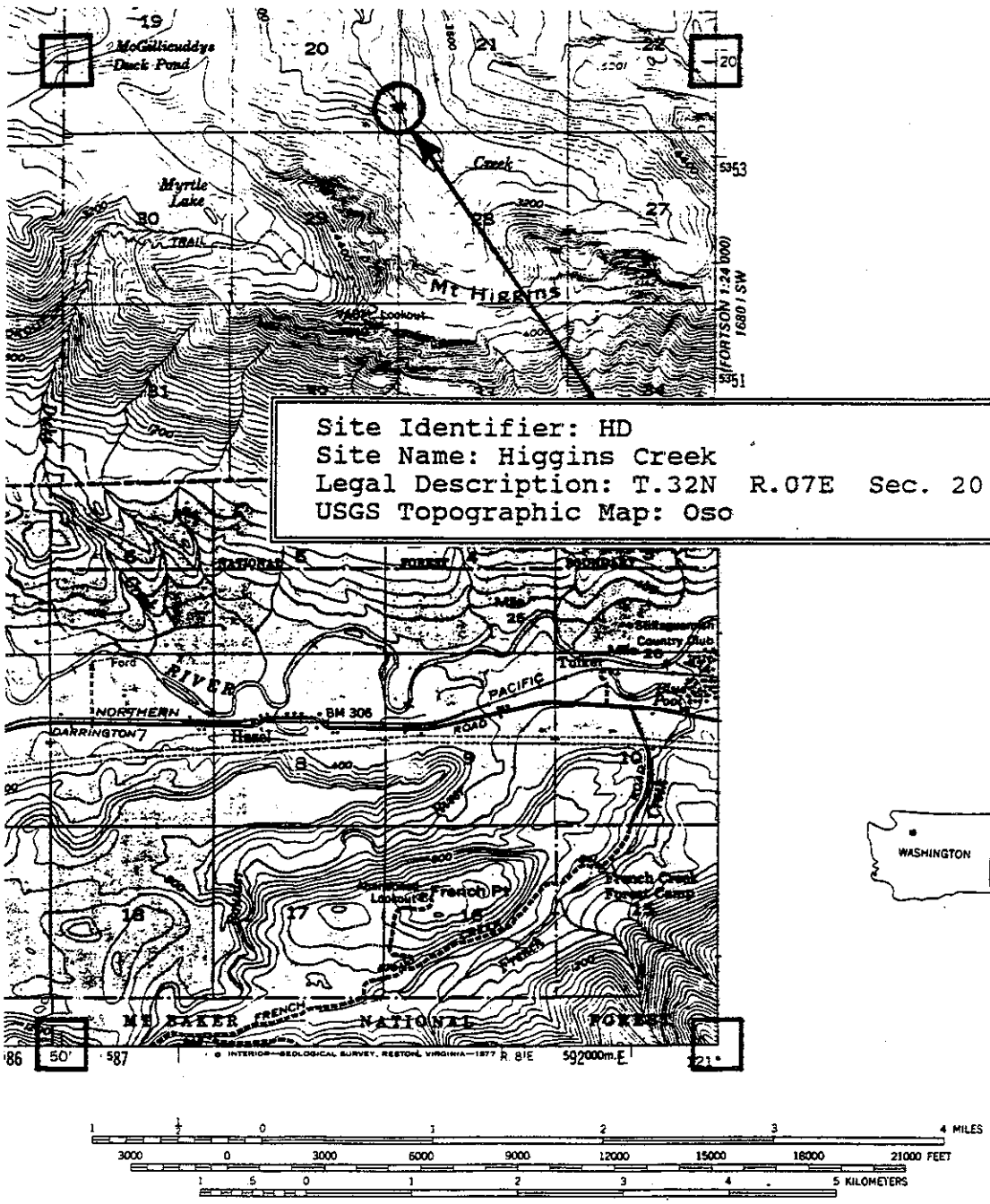
LITTLE DEER CR.

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	15.1	.	16.8	.	13.5	.	3.3
02AUG	.	15.5	.	18.9	.	12.0	.	6.9
03AUG	.	16.1	.	19.3	.	12.9	.	6.4
04AUG	.	16.4	.	19.8	.	13.1	.	6.7
05AUG	.	14.7	.	16.1	.	13.3	.	2.9
06AUG	.	13.5	.	14.3	.	12.8	.	1.5
07AUG	.	14.0	.	16.8	.	11.3	.	5.5
08AUG	.	14.0	.	16.3	.	11.8	.	4.5
09AUG	.	14.1	.	15.5	.	12.8	.	2.8
10AUG	.	14.6	.	17.0	.	12.3	.	4.8
11AUG	.	15.8	.	18.8	.	12.8	.	6.0
12AUG	.	15.4	.	16.9	.	13.9	.	3.0
13AUG	.	15.0	.	16.3	.	13.8	.	2.5
14AUG	.	15.4	.	17.5	.	13.3	.	4.3
15AUG	.	13.8	.	14.5	.	13.1	.	1.4
16AUG	.	13.3	.	13.9	.	12.8	.	1.1
17AUG	.	14.0	.	15.9	.	12.0	.	3.9
18AUG	.	13.6	.	15.1	.	12.1	.	3.0
19AUG	.	13.3	.	14.8	.	11.8	.	3.0
20AUG	.	12.5	.	13.9	.	11.1	.	2.8
21AUG	.	13.5	.	16.9	.	10.1	.	6.8
22AUG	.	14.6	.	18.1	.	11.0	.	7.1

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



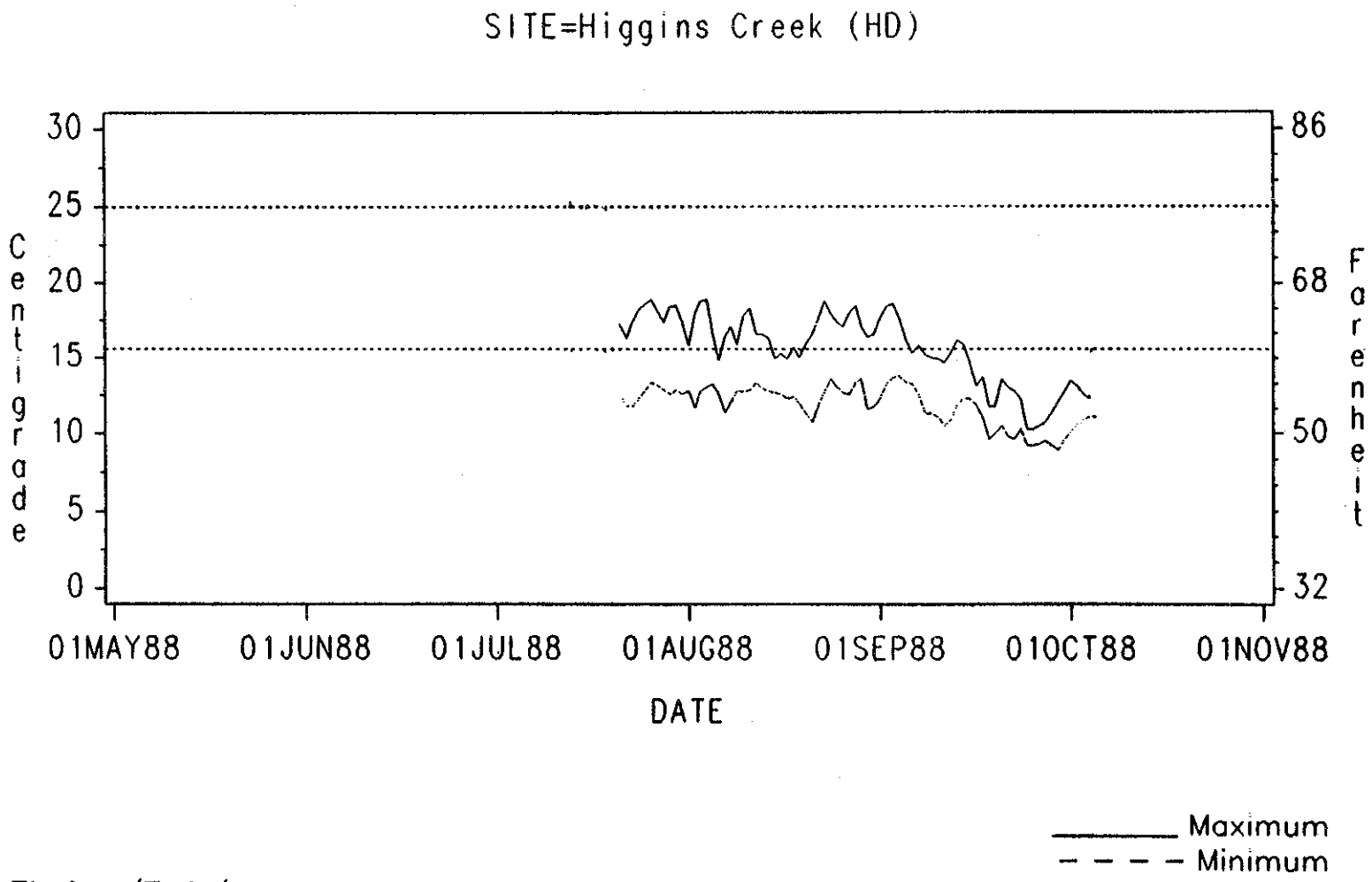
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	HD
Stream Name	SITENAMES	Higgins Creek
Cooperator	COOPERATOR	Tulalip Tribes
Cooperator/contact	COOPCONTACT	Kurt Nelson
Date of Site Visit	VISIT	08-24-88
County	COUNTY	Skagit
Nearest town	NEARESTTOWN	Oso
Township	TOWNSHIP	32N
Range	RANGE	07E
Section	SECTION	20
Site is Tributary To:	TRIBUTARYTO	Deer Creek
Water Resource Inventory Area	WRIA	05
WDF River Segment Identifier	WDFNUMBER	0199
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	North Cascades
Latitude Decimal Degrees (degrees)	LATDEC	48.329080
Longitude Decimal Degrees (degrees)	LONGDEC	121.789700
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Cretaceous
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	nonmarine sediments
Geomorphic Stream Order	STREAMORDER	1
Thermograph Elevation (meters)	ELEVDSM	792
Elevation Top of Thermal Reach (meters)	ELEVUSM	845
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	8.7
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	316
Drainage Area Above Thermograph (hectares)	AREAHECT	723
Distance to Divide (meters)	DIVIDEMT	3870
Total Length of Perennial Streams (meters)	LENGTHMT	3437
Streamflow at Thermograph (cubic meters/second)	QDSM	0.035
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.027
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	-0.016
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.010
Travel Time (meters/second)	TRAVELM	0.098
Average View To Sky (percent open) (percent)	VIEW1	51
Topographic Angle South (degrees)	TOPOSA	20
Topographic Angle Southeast (degrees)	TOPOSEA	23
Topographic Angle Southwest (degrees)	TOPOSWA	28
Average Forest Angle South (degrees)	FORSA	56
Average Forest Angle Southeast (degrees)	FORSEA	62
Average Forest Angle Southwest (degrees)	FORSWA	71
Percent Overhanging Brush (percent)	OVERBRUSH	12
Buffer Width Right Bank (meters)	BUFWIDRM	10.7
Buffer Width Left Bank (meters)	BUFWIDLM	100.0
Vegetation Height East Bank (meters)	VEGHTEM	14
Vegetation Height West Bank (meters)	VEGHTWM	34
Percent Vegetative Density East (percent)	VEGDENE	20
Percent Vegetative Density West (percent)	VEGDENW	23
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.361
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	3.303
Percent of Channel Composed of Pools (percent)	PERCENPL	92
Average Pool Depth (meters)	DEPTHPM	0.430
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	8
Streambed Composition Cobble (percent)	AVGCOBBLE	12
Streambed Composition Boulder (percent)	AVGBOULDER	40
Streambed Composition Bedrock (percent)	AVGBEDROCK	40
Streambed Median Particle Size	D50	boulder

*See data dictionary for detailed item description

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

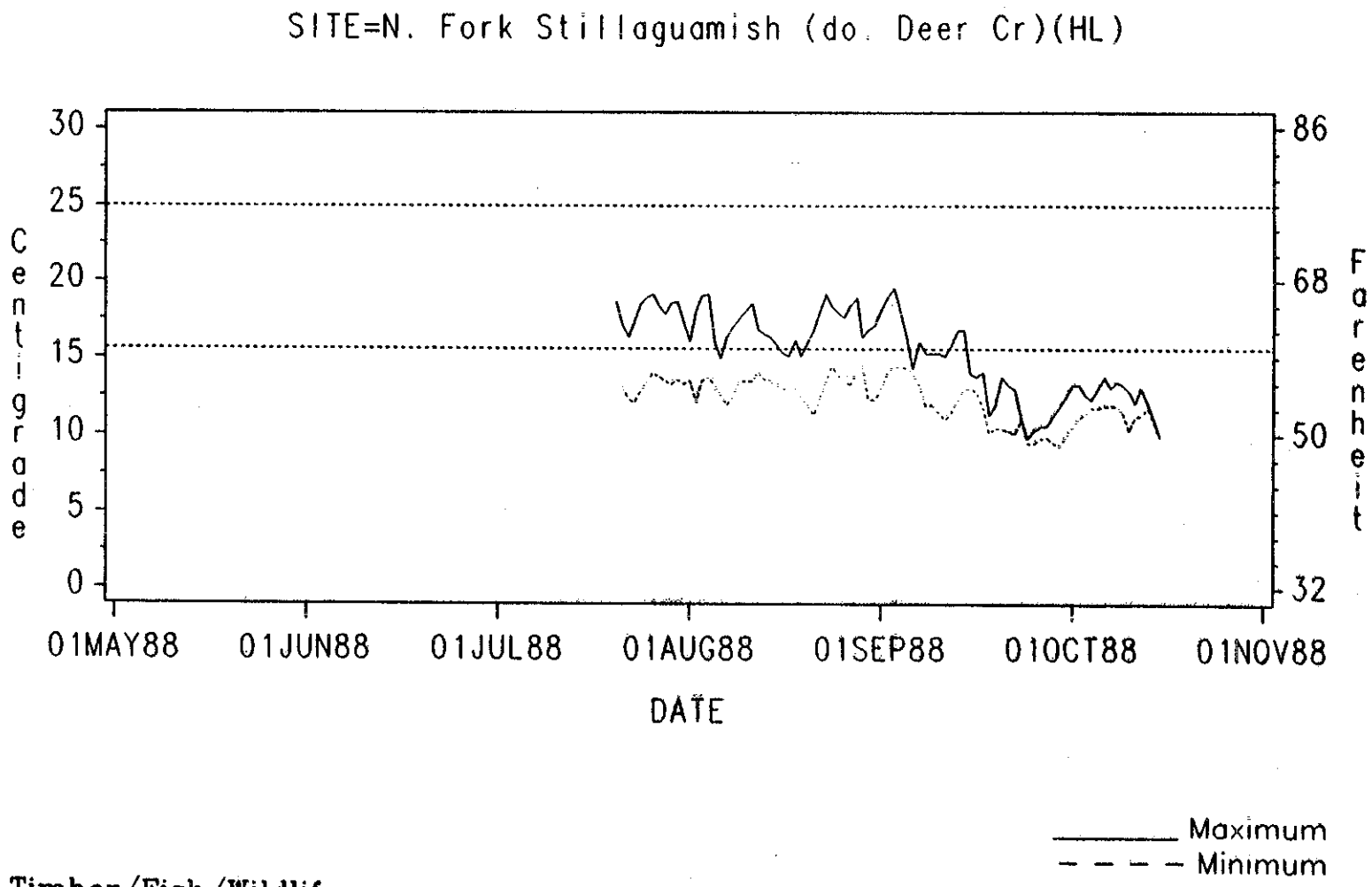
HIGGINS CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

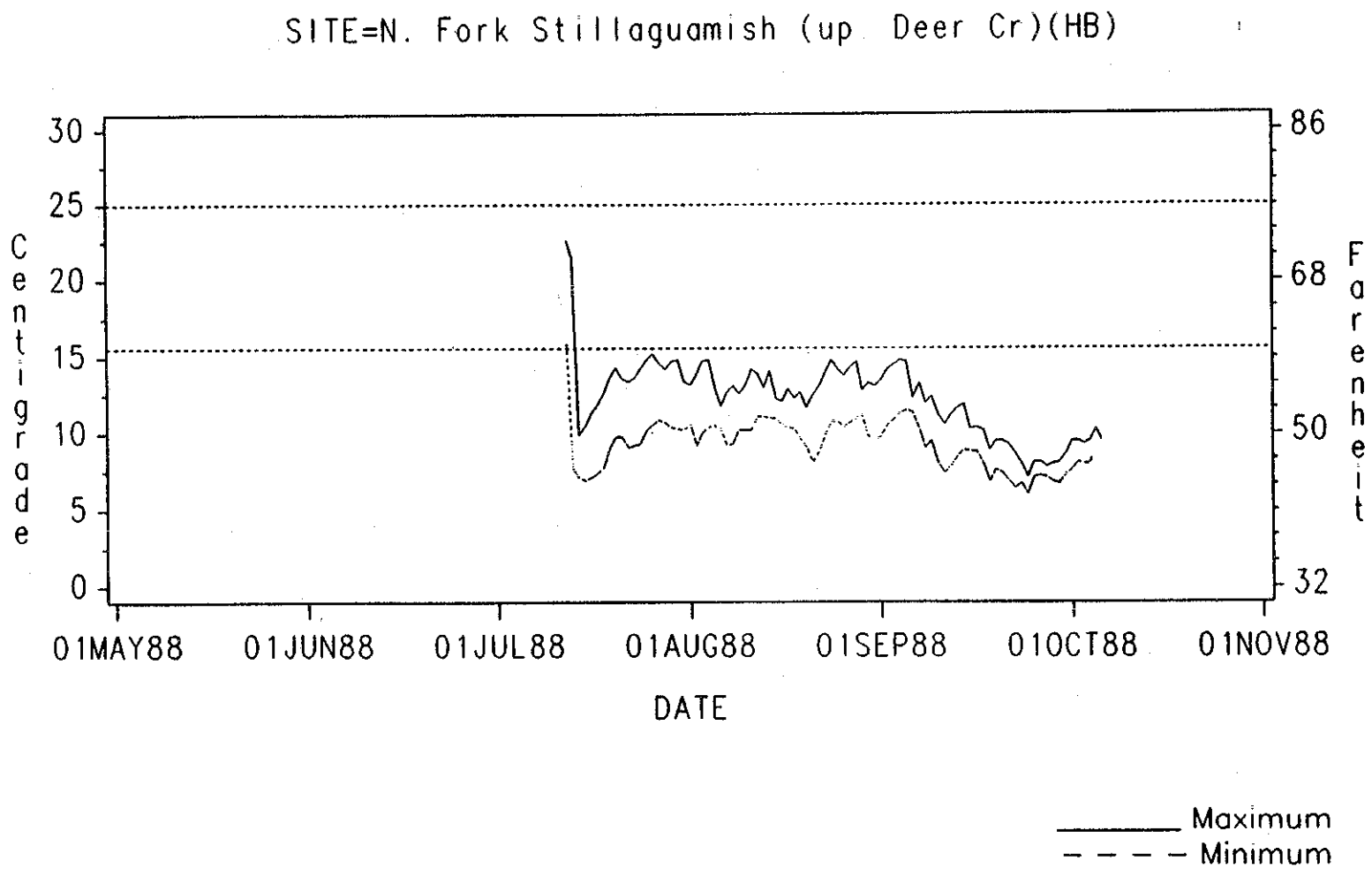
DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	14.3	.	15.8	.	12.8	.	3.0
02AUG	.	14.7	.	18.0	.	11.7	.	6.3
03AUG	.	15.8	.	18.8	.	12.8	.	6.0
04AUG	.	16.0	.	18.9	.	13.1	.	5.8
05AUG	.	14.8	.	16.6	.	13.3	.	3.3
06AUG	.	13.6	.	14.8	.	12.6	.	2.2
07AUG	.	13.8	.	16.4	.	11.4	.	5.0
08AUG	.	14.6	.	17.1	.	12.1	.	5.0
09AUG	.	14.3	.	15.9	.	12.8	.	3.1
10AUG	.	15.1	.	17.8	.	12.8	.	5.0
11AUG	.	15.6	.	18.3	.	12.9	.	5.4
12AUG	.	15.1	.	16.6	.	13.4	.	3.2
13AUG	.	14.7	.	16.6	.	13.0	.	3.6
14AUG	.	14.5	.	16.3	.	12.8	.	3.5
15AUG	.	13.8	.	14.9	.	12.7	.	2.2
16AUG	.	13.8	.	15.3	.	12.6	.	2.7
17AUG	.	13.6	.	14.9	.	12.3	.	2.6
18AUG	.	14.0	.	15.7	.	12.4	.	3.3
19AUG	.	13.6	.	15.0	.	12.0	.	3.0
20AUG	.	13.3	.	15.9	.	11.3	.	4.6
21AUG	.	13.7	.	16.6	.	10.8	.	5.8
22AUG	.	14.9	.	17.7	.	11.9	.	5.8
23AUG	.	15.8	.	18.8	.	12.8	.	6.0
24AUG	.	16.0	.	18.0	.	13.6	.	4.4
25AUG	.	15.4	.	17.4	.	13.1	.	4.3
26AUG	.	15.1	.	17.1	.	12.7	.	4.4
27AUG	.	15.4	.	18.0	.	12.6	.	5.4
28AUG	.	16.0	.	18.5	.	13.4	.	5.1
29AUG	.	14.9	.	17.1	.	13.6	.	3.5
30AUG	.	14.0	.	16.4	.	11.6	.	4.8
31AUG	.	14.3	.	16.6	.	11.8	.	4.8

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

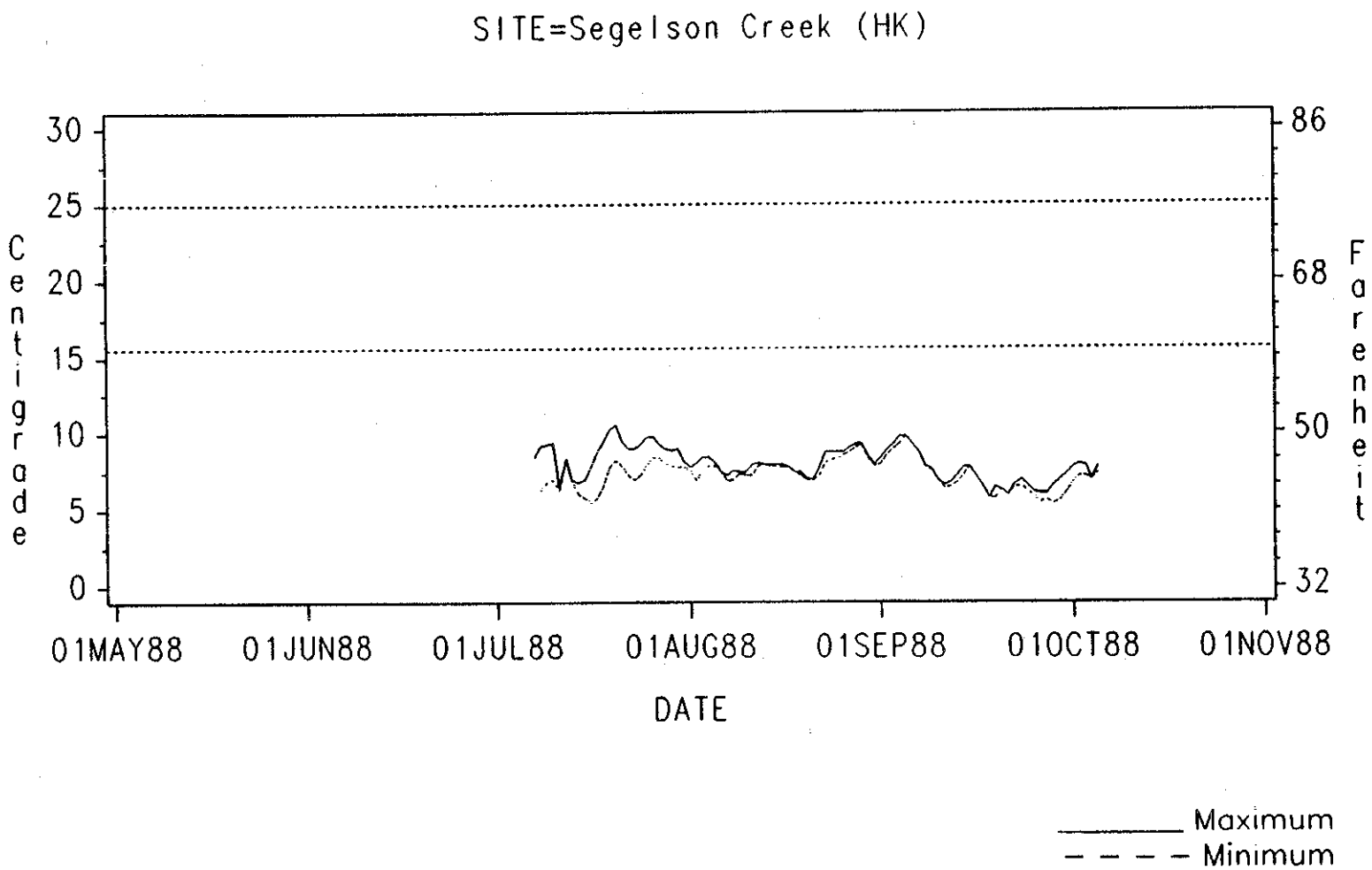
N. FORK STILLAGUAMISH RIVER (RM 14.4)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	11.5	.	13.2	.	10.6	.	2.6
02AUG	.	11.5	.	13.9	.	9.2	.	4.7
03AUG	.	12.2	.	14.7	.	10.0	.	4.7
04AUG	.	12.5	.	14.8	.	10.4	.	4.4
05AUG	.	11.8	.	13.0	.	10.5	.	2.5
06AUG	.	10.9	.	11.8	.	10.3	.	1.5
07AUG	.	10.7	.	12.7	.	9.2	.	3.5
08AUG	.	11.2	.	13.1	.	9.3	.	3.8
09AUG	.	11.2	.	12.6	.	10.2	.	2.4
10AUG	.	11.4	.	13.1	.	10.2	.	2.9
11AUG	.	11.9	.	14.2	.	10.2	.	4.0
12AUG	.	12.1	.	13.9	.	11.1	.	2.8
13AUG	.	12.0	.	13.0	.	11.1	.	1.9
14AUG	.	12.1	.	14.1	.	11.0	.	3.1
15AUG	.	11.5	.	12.3	.	11.0	.	1.3
16AUG	.	11.3	.	12.1	.	10.6	.	1.5
17AUG	.	11.3	.	12.9	.	10.4	.	2.5
18AUG	.	11.1	.	12.3	.	10.3	.	2.0
19AUG	.	10.8	.	12.7	.	9.7	.	3.0
20AUG	.	10.3	.	11.7	.	9.1	.	2.6
21AUG	.	10.3	.	12.5	.	8.1	.	4.4
22AUG	.	11.0	.	13.1	.	8.8	.	4.3
23AUG	.	11.8	.	14.0	.	9.9	.	4.1
24AUG	.	12.5	.	14.8	.	10.8	.	4.0
25AUG	.	12.3	.	14.2	.	10.8	.	3.4
26AUG	.	12.0	.	13.8	.	10.4	.	3.4
27AUG	.	12.4	.	14.3	.	10.7	.	3.6
28AUG	.	12.7	.	14.7	.	11.0	.	3.7
29AUG	.	12.0	.	12.8	.	11.2	.	1.6
30AUG	.	11.3	.	13.3	.	9.8	.	3.5
31AUG	.	11.1	.	13.1	.	9.5	.	3.6

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

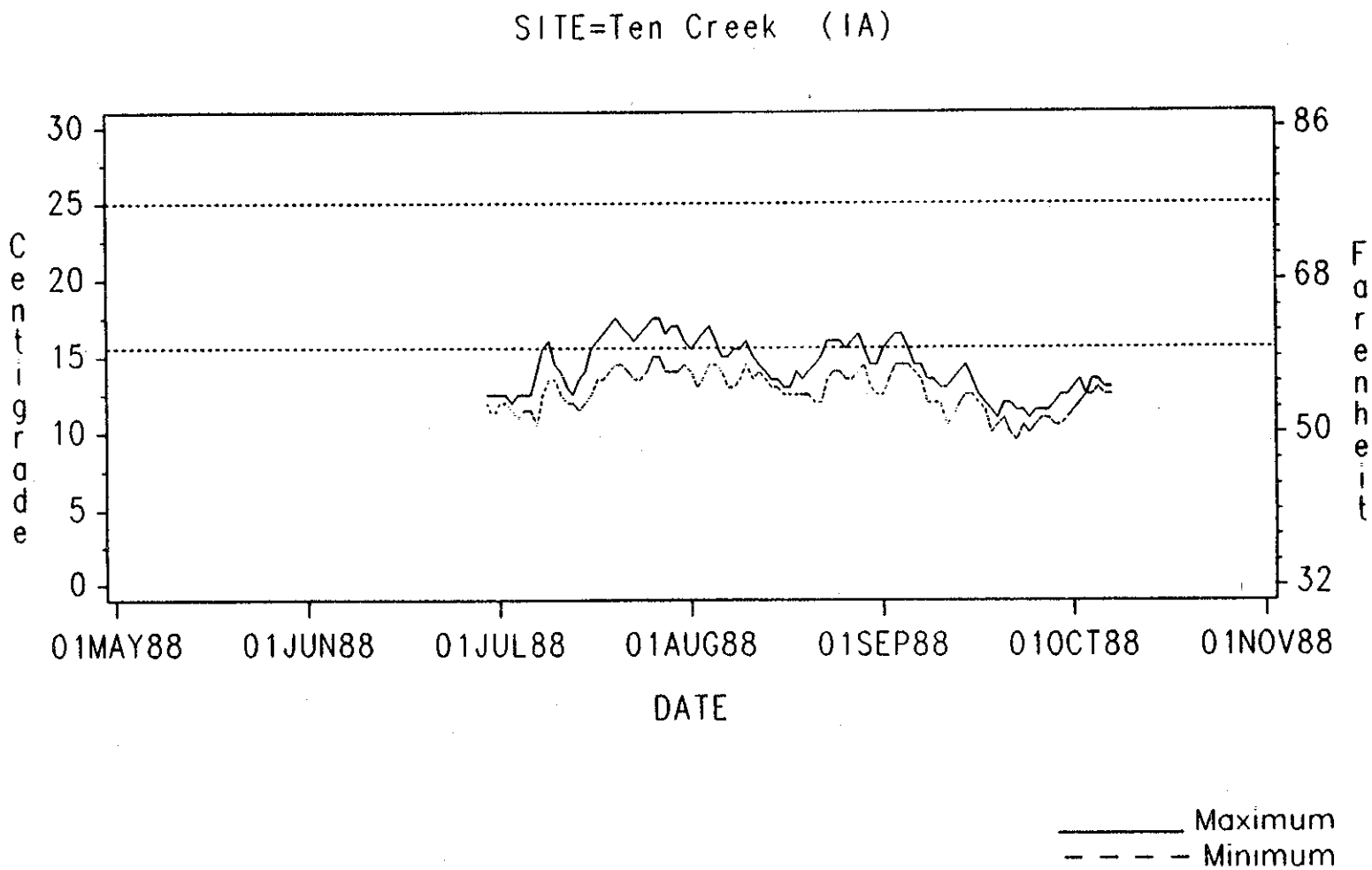
SEGELSON CR. (near Segelson pass)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	7.7	.	7.8	.	7.6	.	0.2
02AUG	.	7.5	.	8.1	.	6.9	.	1.2
03AUG	.	8.1	.	8.5	.	7.6	.	0.9
04AUG	.	8.2	.	8.5	.	7.9	.	0.6
05AUG	.	8.0	.	8.1	.	7.9	.	0.2
06AUG	.	7.5	.	7.5	.	7.5	.	0.0
07AUG	.	7.1	.	7.3	.	6.9	.	0.3
08AUG	.	7.3	.	7.6	.	7.0	.	0.6
09AUG	.	7.5	.	7.5	.	7.4	.	0.1
10AUG	.	7.4	.	7.5	.	7.3	.	0.3
11AUG	.	7.6	.	8.0	.	7.3	.	0.8
12AUG	.	8.0	.	8.1	.	7.9	.	0.2
13AUG	.	8.0	.	8.0	.	8.0	.	0.0
14AUG	.	8.0	.	8.0	.	7.9	.	0.1
15AUG	.	.	.	.	.	.	.	.
16AUG	.	7.9	.	8.0	.	7.8	.	0.3
17AUG	.	7.8	.	7.8	.	7.8	.	0.0
18AUG	.	7.5	.	7.5	.	7.5	.	0.0
19AUG	.	7.4	.	7.5	.	7.3	.	0.3
20AUG	.	7.1	.	7.1	.	7.0	.	0.1
21AUG	.	7.0	.	7.0	.	6.9	.	0.1
22AUG	.	7.5	.	7.8	.	7.3	.	0.5
23AUG	.	8.4	.	8.8	.	8.1	.	0.6
24AUG	.	.	.	.	.	.	.	.
25AUG	.	.	.	.	.	.	.	.
26AUG	.	8.7	.	8.8	.	8.6	.	0.2
27AUG	.	9.0	.	9.1	.	8.8	.	0.3
28AUG	.	9.2	.	9.3	.	9.1	.	0.2
29AUG	.	9.3	.	9.3	.	9.3	.	0.0
30AUG	.	8.5	.	8.6	.	8.4	.	0.2
31AUG	.	8.0	.	8.0	.	7.9	.	0.1

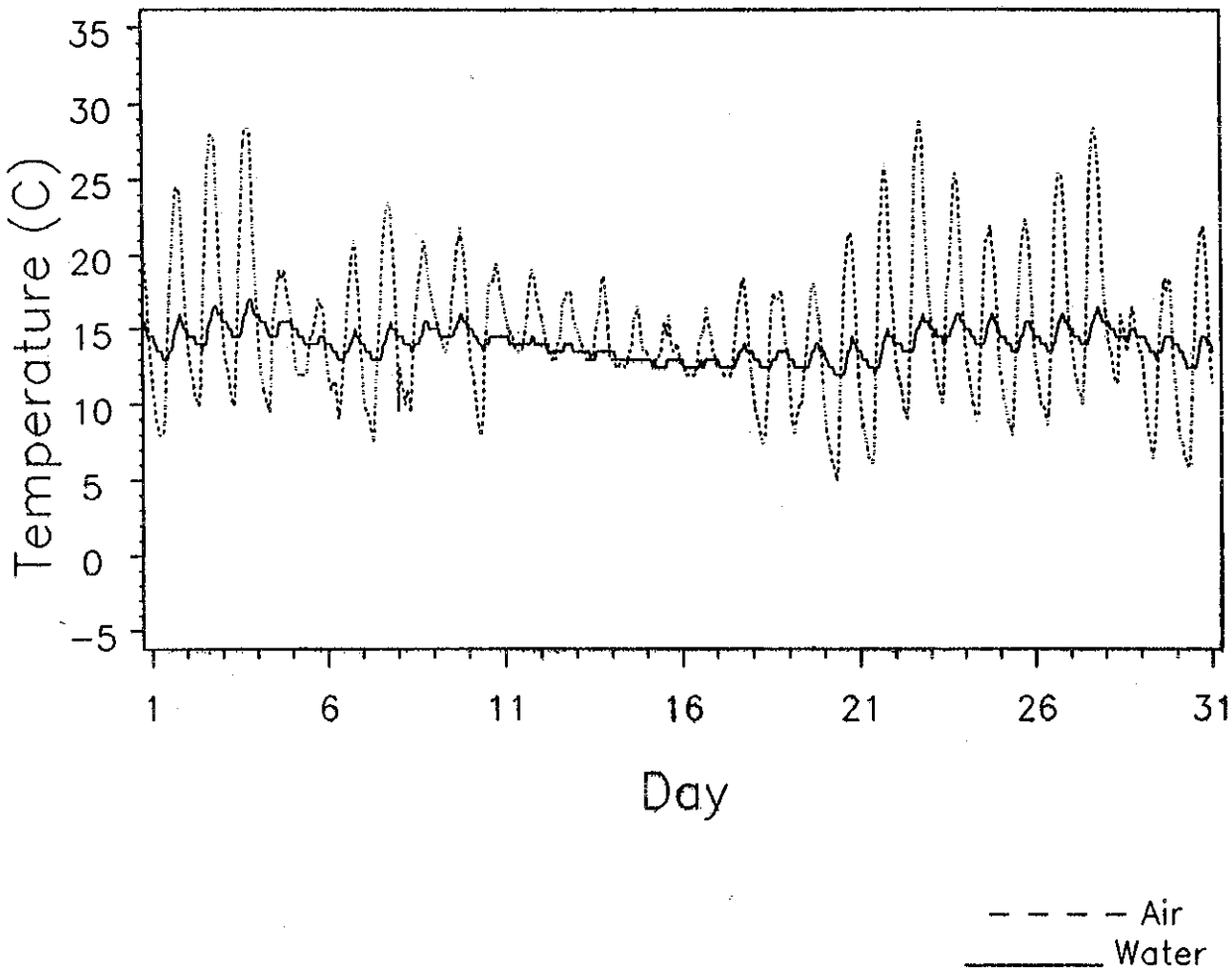
WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TEN CREEK

YEAR=1988 MONTH=AUGUST



TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

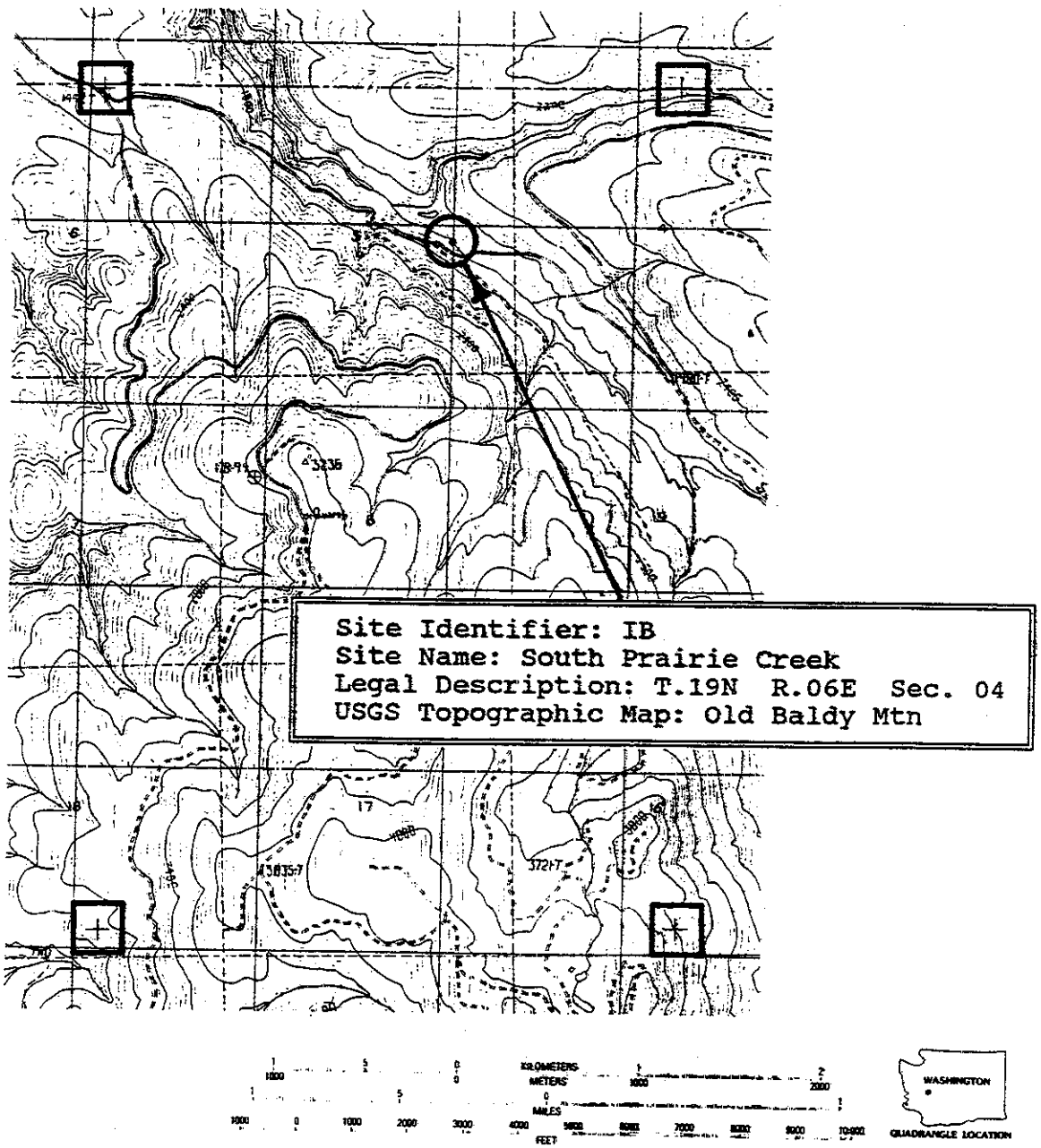
TEN CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	14.3	14.6	19.5	15.5	10.5	14.0	9.0	1.5
02AUG	15.7	14.2	24.5	16.0	8.0	13.0	16.5	3.0
03AUG	18.3	15.0	28.0	16.5	10.0	13.5	18.0	3.0
04AUG	18.7	15.6	28.5	17.0	10.0	14.5	18.5	2.5
05AUG	14.9	15.2	19.0	16.0	9.5	14.5	9.5	1.5
06AUG	13.8	14.3	17.0	15.0	11.5	14.0	5.5	1.0
07AUG	14.4	13.8	21.0	15.0	9.0	13.0	12.0	2.0
08AUG	15.3	13.9	23.5	15.5	7.5	13.0	16.0	2.5
09AUG	15.4	14.5	21.0	15.5	9.5	13.5	11.5	2.0
10AUG	16.8	15.0	22.0	16.0	12.5	14.5	9.5	1.5
11AUG	14.6	14.3	19.5	15.0	8.0	13.5	11.5	1.5
12AUG	15.6	14.1	19.0	14.5	13.5	14.0	5.5	0.5
13AUG	15.2	13.7	17.5	14.0	13.0	13.5	4.5	0.5
14AUG	14.7	13.4	18.5	13.5	13.0	13.0	5.5	0.5
15AUG	13.8	13.0	16.5	13.5	12.5	13.0	4.0	0.5
16AUG	13.7	12.8	16.0	13.0	12.5	12.5	3.5	0.5
17AUG	13.4	12.7	16.5	13.0	12.0	12.5	4.5	0.5
18AUG	14.0	13.0	18.5	14.0	10.0	12.5	8.5	1.5
19AUG	13.0	13.0	17.5	13.5	7.5	12.5	10.0	1.0
20AUG	12.8	13.0	18.0	14.0	8.0	12.5	10.0	1.5
21AUG	12.8	12.9	21.5	14.5	5.0	12.0	16.5	2.5
22AUG	14.9	13.4	26.0	15.0	6.0	12.0	20.0	3.0
23AUG	18.0	14.5	29.0	16.0	9.0	13.5	20.0	2.5
24AUG	17.0	15.0	25.5	16.0	10.0	14.0	15.5	2.0
25AUG	15.1	14.8	22.0	16.0	9.0	14.0	13.0	2.0
26AUG	14.8	14.4	22.5	15.5	8.0	13.5	14.5	2.0
27AUG	16.6	14.6	25.5	16.0	8.5	13.5	17.0	2.5
28AUG	18.4	15.0	28.5	16.5	10.0	14.0	18.5	2.5
29AUG	14.1	14.7	16.5	15.5	11.5	14.5	5.0	1.0
30AUG	12.7	14.0	18.5	14.5	6.5	13.0	12.0	1.5
31AUG	13.3	13.4	22.0	14.5	6.0	12.5	16.0	2.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY
SITE MAP



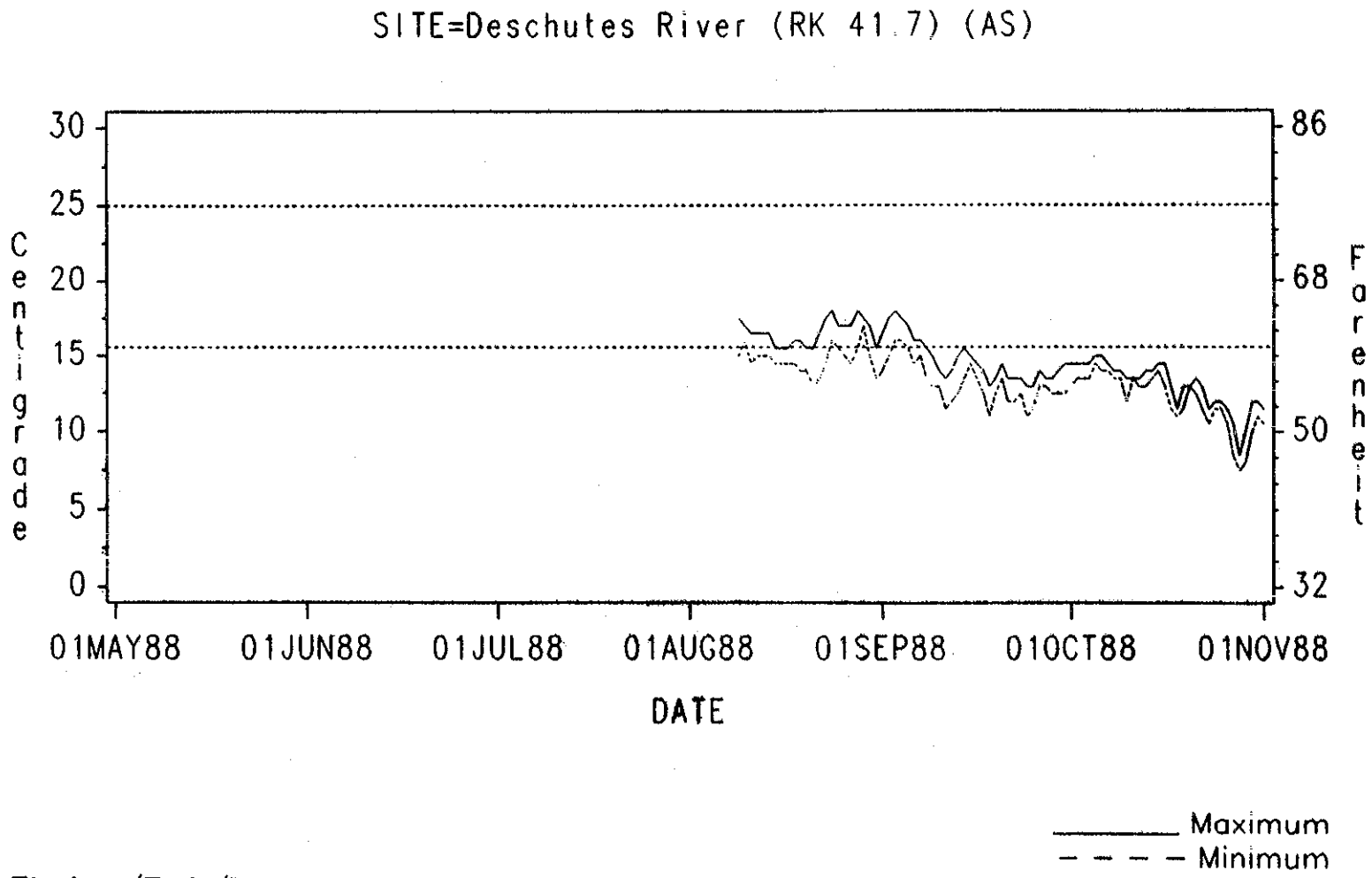
TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

THERMOGRAPH SITE DATA SUMMARY

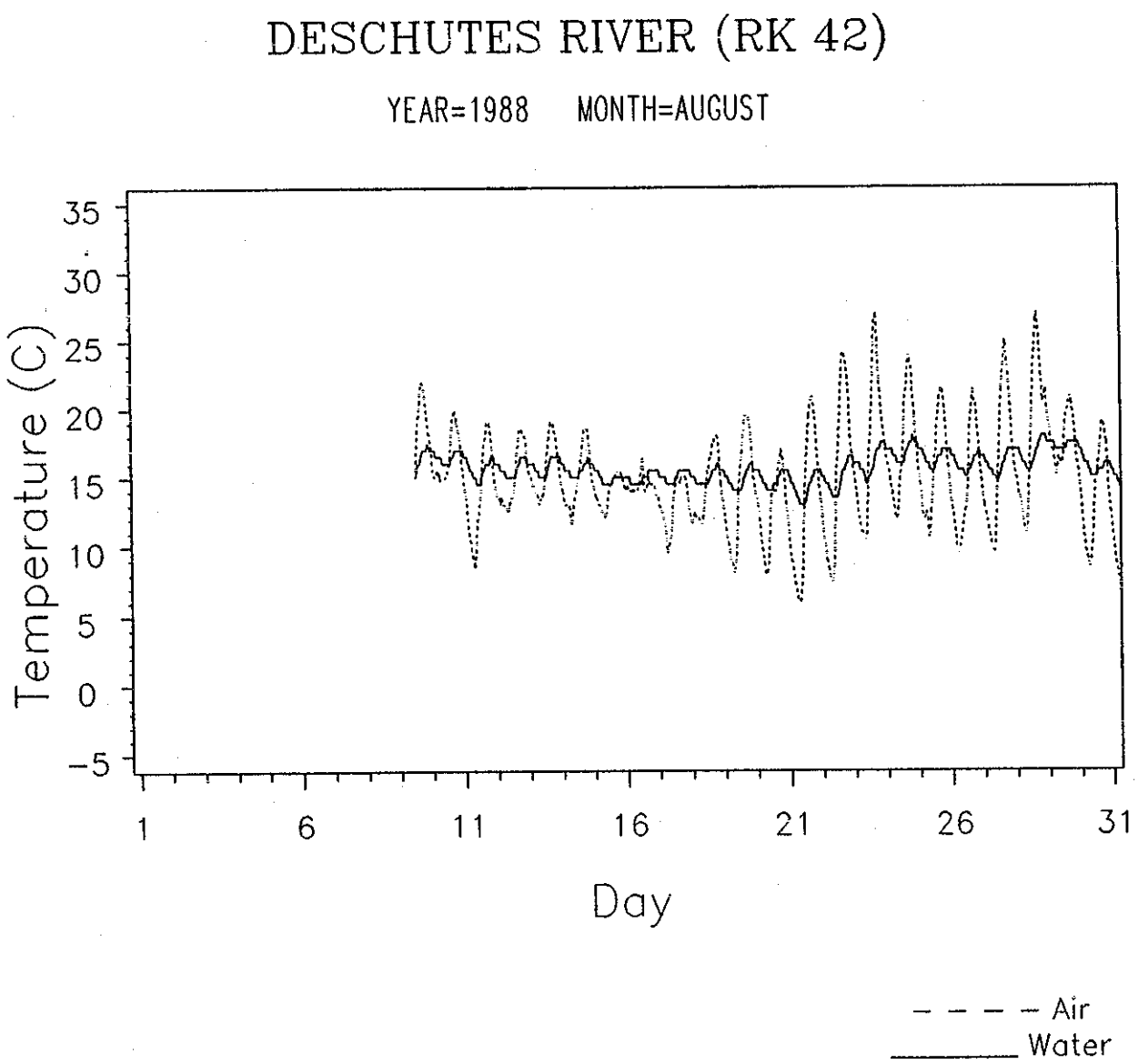
Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	IB
Stream Name	SITENAMES	South Prairie Creek
Cooperator	COOPERATOR	Puyallup Tribe
Cooperator/contact	COOPCONTACT	Mark Heckert
Date of Site Visit	VISIT	09-06-88
County	COUNTY	Pierce
Nearest town	NEARESTTOWN	Wilkeson
Township	TOWNSHIP	19E
Range	RANGE	06E
Section	SECTION	04
Site is Tributary To:	TRIBUTARYTO	Carbon River
Water Resource Inventory Area	WRIA	10
WDF River Segment Identifier	WDFNUMBER	0429
DNR Water Type	DNRWATERTYPE	3
T/F/W Ecoregion	ECOREGION	Central Cascades
Latitude Decimal Degrees (degrees)	LATDEC	47.075470
Longitude Decimal Degrees (degrees)	LONGDEC	121.932700
NOAA Local Climatological Data Station	NOAAINDEX	seattle
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	10
Geologic Age of Basin Geology	GEOAGE	Miocene
Geologic Lithology of Basin	GEOLITHO	Volcanic
General Rock Type of Basin	GEOROCK	andesite flows
Geomorphic Stream Order	STREAMORDER	3
Thermograph Elevation (meters)	ELEVDSM	510
Elevation Top of Thermal Reach (meters)	ELEVUSM	529
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	3.1
Channel Gradient from Autolevel (percent)	GRADLEVEL	2.5
Channel Azimuth (degrees)	AZIMUTH1	309
Drainage Area Above Thermograph (hectares)	AREAHECT	3088
Distance to Divide (meters)	DIVIDEMT	8234
Total Length of Perennial Streams (meters)	LENGTHMT	24997
Streamflow at Thermograph (cubic meters/second)	QDSM	0.204
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.204
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.000
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.008
Travel Time (meters/second)	TRAVELM	0.235
Average View To Sky (percent open) (percent)	VIEW1	92
Topographic Angle South (degrees)	TOPOSA	22
Topographic Angle Southeast (degrees)	TOPOSEA	14
Topographic Angle Southwest (degrees)	TOPOSWA	26
Average Forest Angle South (degrees)	FORSA	35
Average Forest Angle Southeast (degrees)	FORSEA	30
Average Forest Angle Southwest (degrees)	FORSWA	34
Percent Overhanging Brush (percent)	OVERBRUSH	9
Buffer Width Right Bank (meters)	BUFWIDRM	6.1
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	7
Vegetation Height West Bank (meters)	VEGHTWM	4
Percent Vegetative Density East (percent)	VEGDENE	14
Percent Vegetative Density West (percent)	VEGDENW	2
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.320
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	4.154
Percent of Channel Composed of Pools (percent)	PERCENPL	63
Average Pool Depth (meters)	DEPTHPM	0.360
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	0
Streambed Composition Sand (percent)	AVGSAND	0
Streambed Composition Gravel (percent)	AVGGRAVEL	22
Streambed Composition Cobble (percent)	AVGCOBBLE	28
Streambed Composition Boulder (percent)	AVGBOULDER	45
Streambed Composition Bedrock (percent)	AVGBEDROCK	5
Streambed Median Particle Size	D50	cobble

*See data dictionary for detailed item description

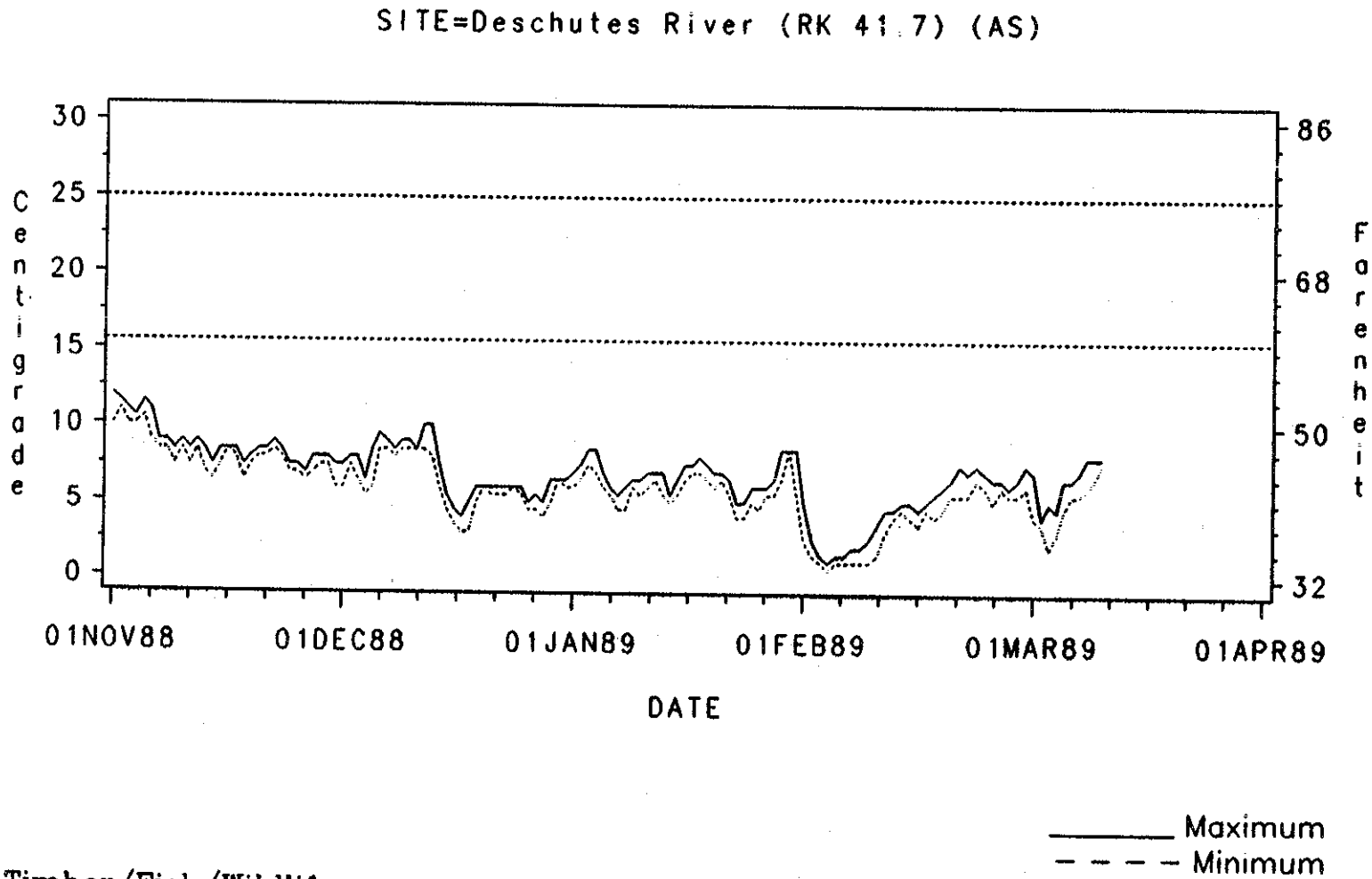
WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


DESCHUTES RIVER (RK 42)
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

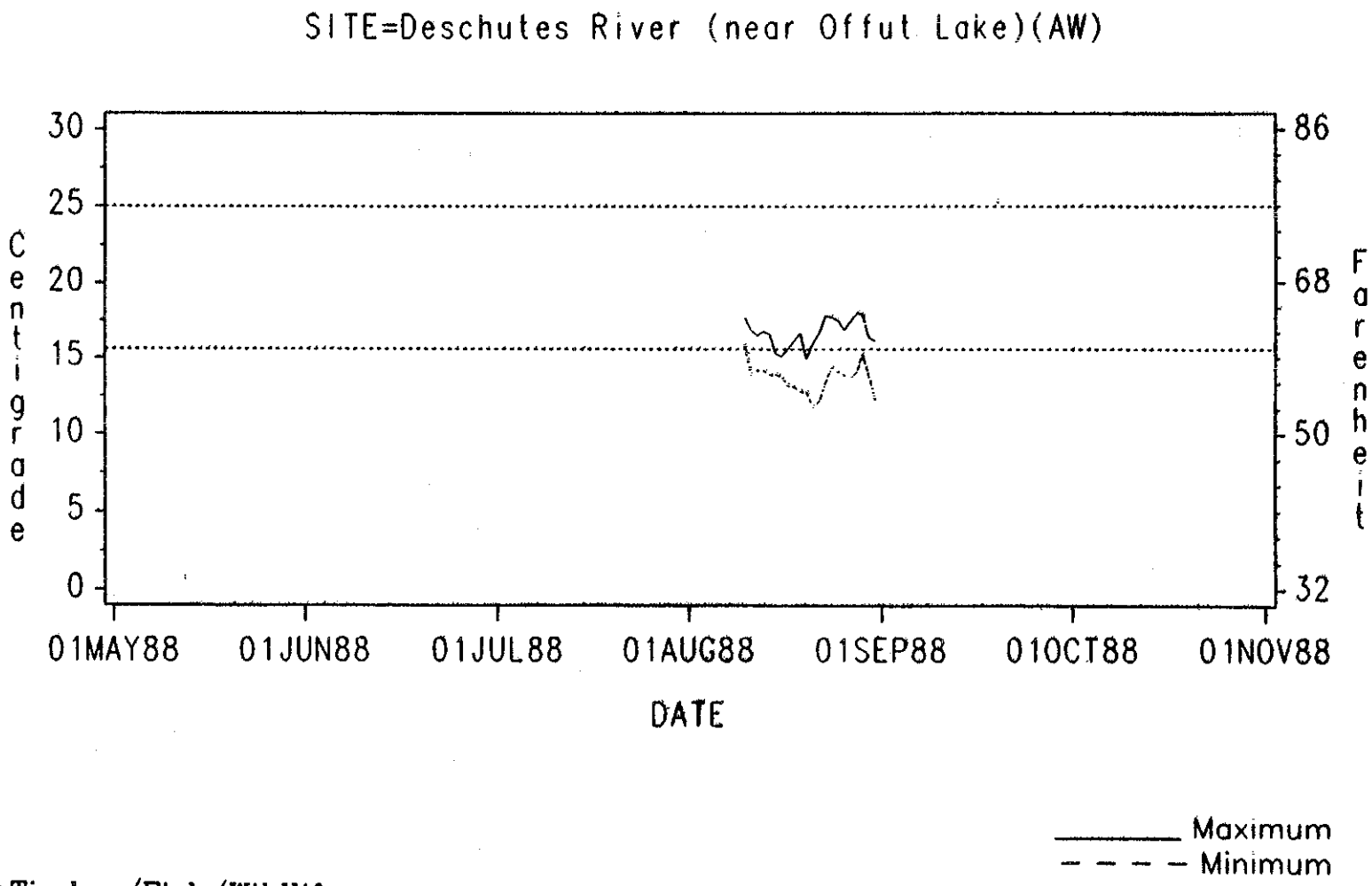
Deschutes River (RK41.7) (AS)

Daily Temperatures in Degrees Celsius (C)

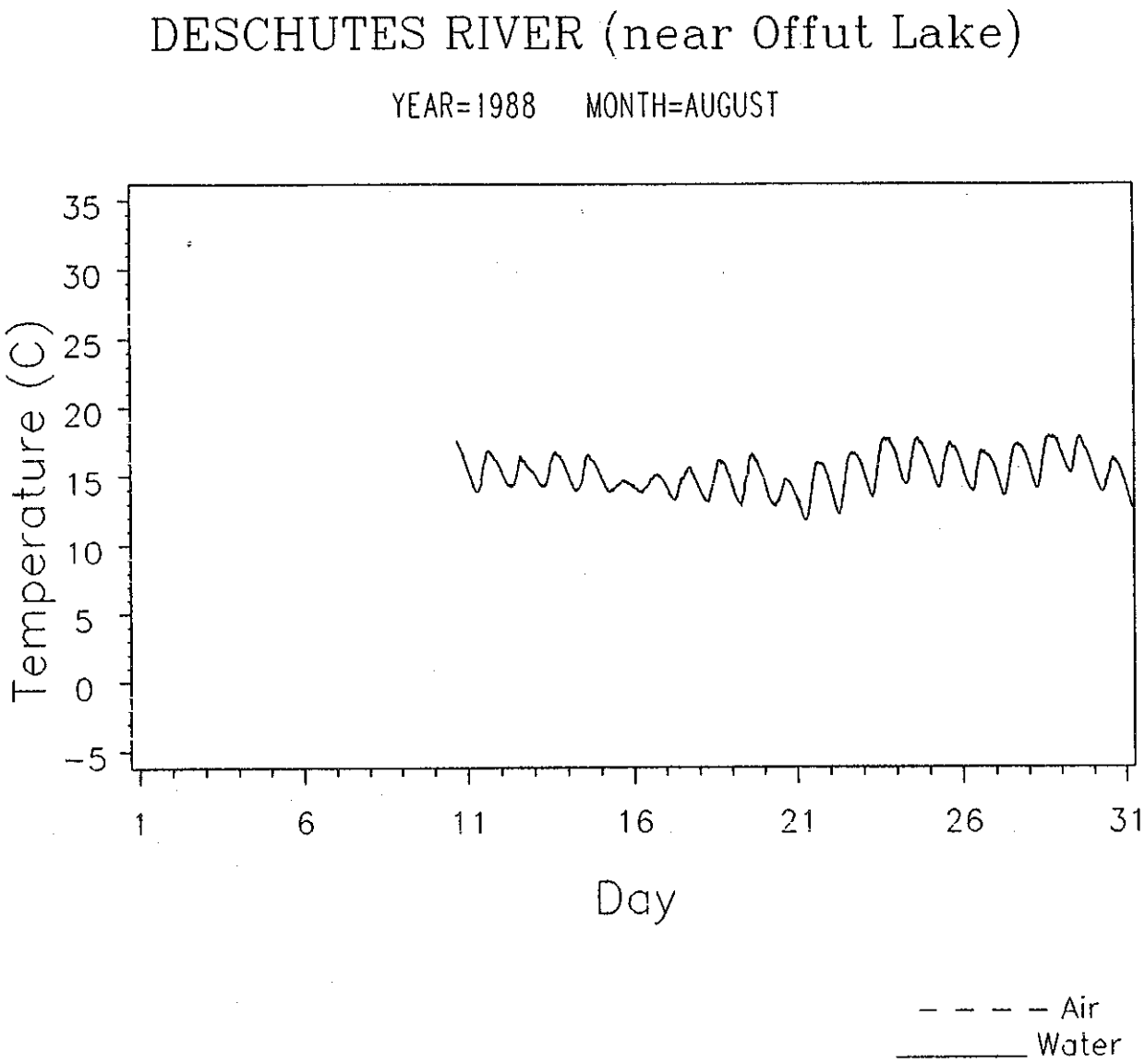
YEAR=1989 MONTH=JANUARY

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	4.5	6.3	6.0	7.0	2.5	6.0	3.5	1.0
02JAN	6.4	7.0	8.0	7.5	4.5	6.5	3.5	1.0
03JAN	9.1	8.0	10.5	8.5	7.0	7.5	3.5	1.0
04JAN	4.7	7.8	7.0	8.5	3.0	7.0	4.0	1.5
05JAN	2.8	6.5	4.0	7.0	1.5	6.0	2.5	1.0
06JAN	1.7	5.8	3.0	6.0	0.5	5.5	2.5	0.5
07JAN	-0.4	5.0	1.5	5.5	-1.5	4.5	3.0	1.0
08JAN	2.8	5.0	7.0	6.0	-1.0	4.5	8.0	1.5
09JAN	5.2	6.3	7.0	6.5	3.5	6.0	3.5	0.5
10JAN	3.8	6.0	5.5	6.5	2.5	5.5	3.0	1.0
11JAN	5.2	6.2	7.0	7.0	3.5	6.0	3.5	1.0
12JAN	6.3	6.8	7.5	7.0	5.0	6.5	2.5	0.5
13JAN	2.1	6.2	4.5	7.0	0.5	5.5	4.0	1.5
14JAN	2.1	5.2	4.0	5.5	1.0	5.0	3.0	0.5
15JAN	5.2	5.9	7.0	6.5	4.0	5.5	3.0	1.0
16JAN	7.2	7.0	8.0	7.5	6.5	6.5	1.5	1.0
17JAN	6.3	7.3	7.5	7.5	5.5	7.0	2.0	0.5
18JAN	7.0	7.7	8.5	8.0	3.5	7.0	5.0	1.0
19JAN	2.0	6.7	5.5	7.5	0.0	6.5	5.5	1.0
20JAN	4.0	6.3	7.0	7.0	0.0	6.0	7.0	1.0
21JAN	4.1	6.9	6.5	7.0	0.0	6.5	6.5	0.5
22JAN	0.9	5.9	3.0	6.5	-2.0	5.5	5.0	1.0
23JAN	-2.3	4.5	1.0	5.0	-4.5	4.0	5.5	1.0
24JAN	0.0	4.6	3.0	5.0	-2.5	4.0	5.5	1.0
25JAN	1.0	5.2	5.5	6.0	-1.5	5.0	7.0	1.0
26JAN	1.5	5.0	8.0	6.0	-3.0	4.5	11.0	1.5
27JAN	4.2	5.8	6.0	6.0	2.0	5.5	4.0	0.5
28JAN	3.5	6.0	7.5	6.5	0.0	5.5	7.5	1.0
29JAN	9.0	7.3	12.0	8.5	5.5	6.5	6.5	2.0
30JAN	9.1	8.5	11.0	8.5	4.0	8.5	7.0	0.0
31JAN	0.9	6.7	3.5	8.5	-0.5	5.5	4.0	3.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

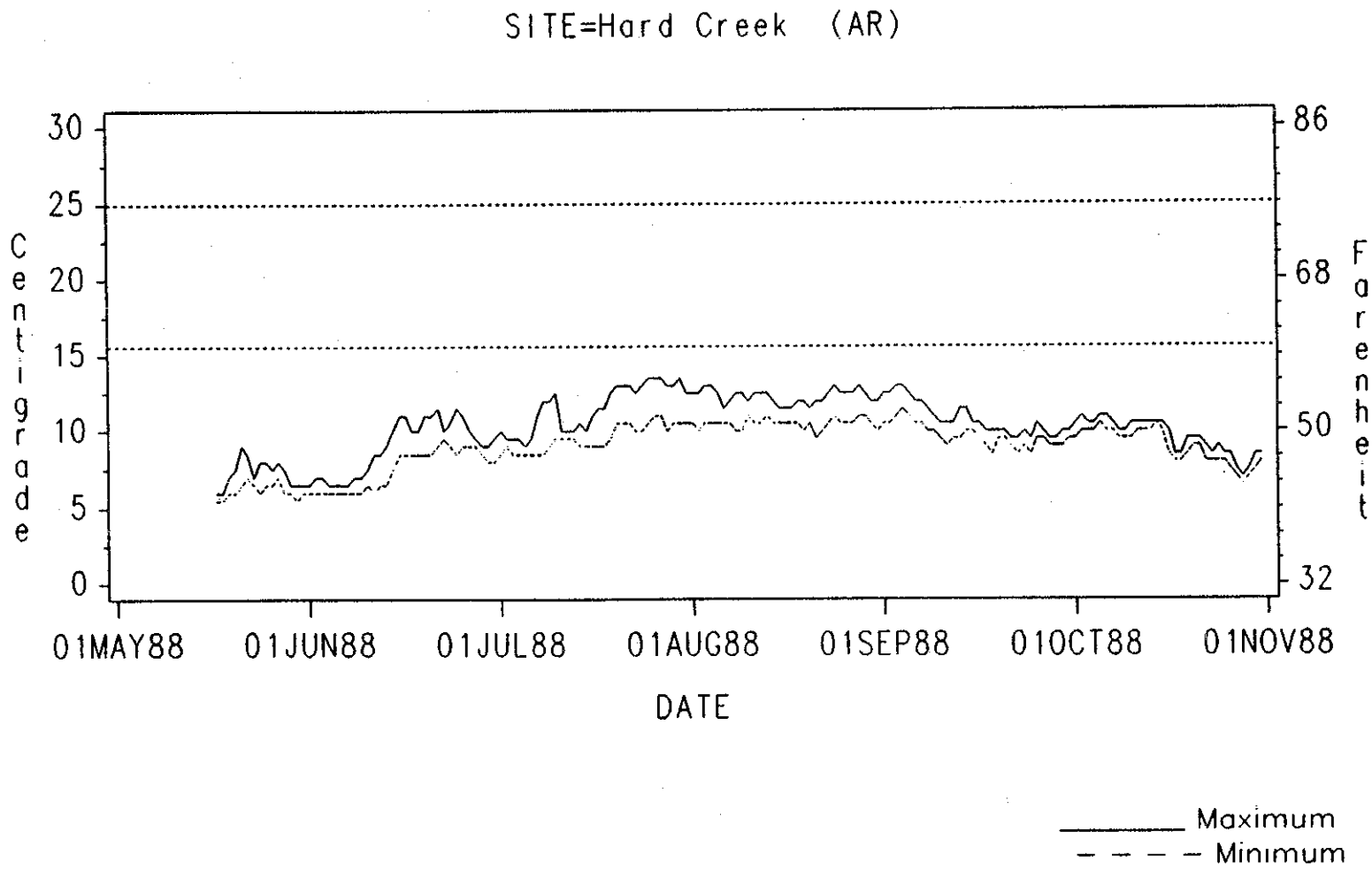
DESCHUTES RIVER (near Offut Lake

Daily Temperatures in Degrees Celsius (C)

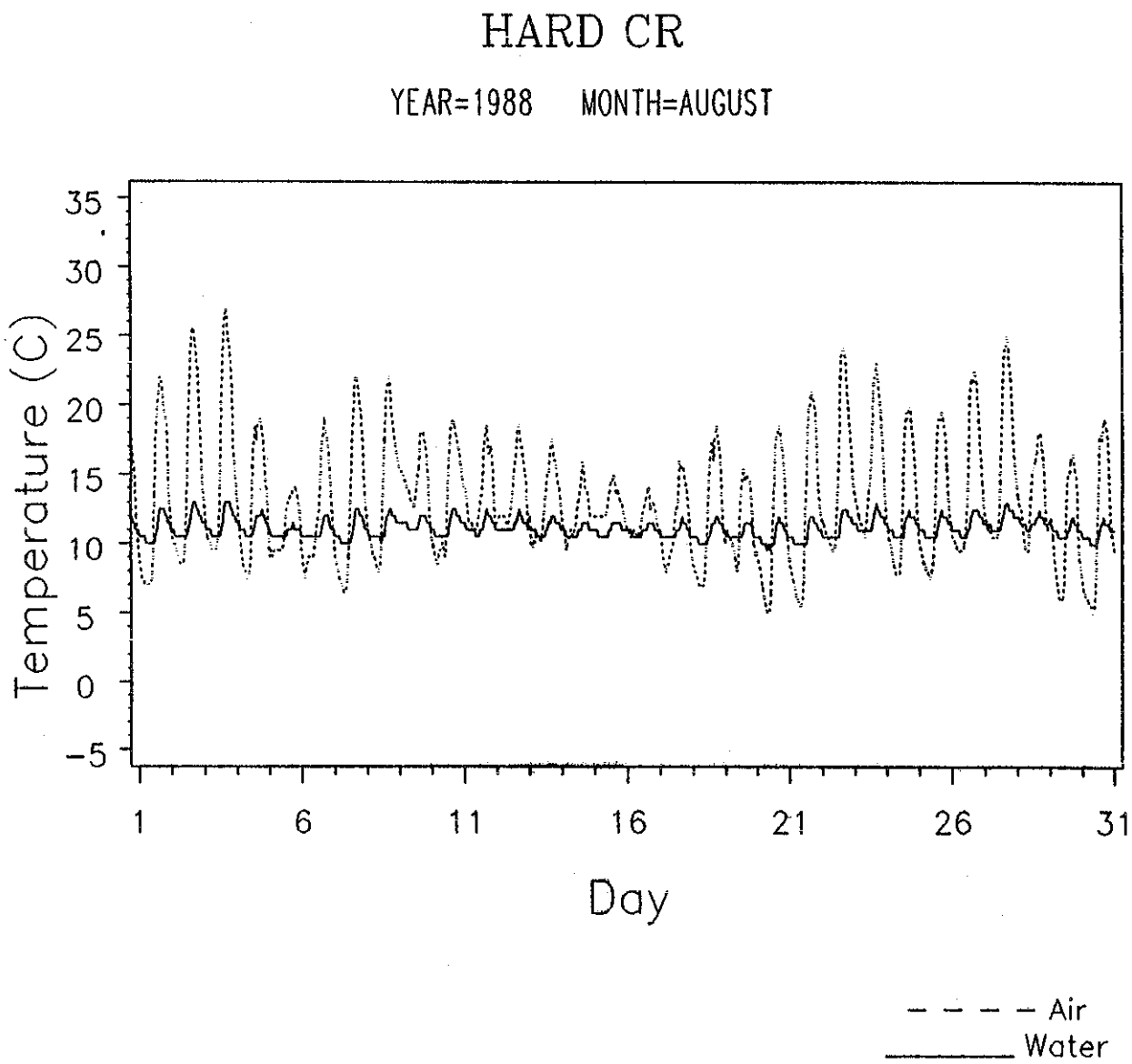
---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
10AUG	16.7	17.7	15.9	1.8
11AUG	15.5	16.9	13.9	3.0
12AUG	15.2	16.5	14.2	2.3
13AUG	15.5	16.8	14.2	2.6
14AUG	15.2	16.6	13.9	2.7
15AUG	14.4	15.3	13.9	1.4
16AUG	14.5	15.1	13.8	1.3
17AUG	14.5	15.6	13.2	2.4
18AUG	14.7	16.2	13.1	3.1
19AUG	14.8	16.7	12.8	3.9
20AUG	13.9	14.9	12.8	2.1
21AUG	14.1	16.0	11.8	4.2
22AUG	14.8	16.7	12.2	4.5
23AUG	15.9	17.8	13.4	4.4
24AUG	16.2	17.7	14.4	3.3
25AUG	16.0	17.5	14.1	3.4
26AUG	15.6	16.9	13.9	3.0
27AUG	15.8	17.4	13.6	3.8
28AUG	16.4	18.0	14.1	3.9
29AUG	16.6	17.9	15.3	2.6
30AUG	15.1	16.4	13.9	2.5
31AUG	14.5	16.1	12.3	3.8

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


HARD CR
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

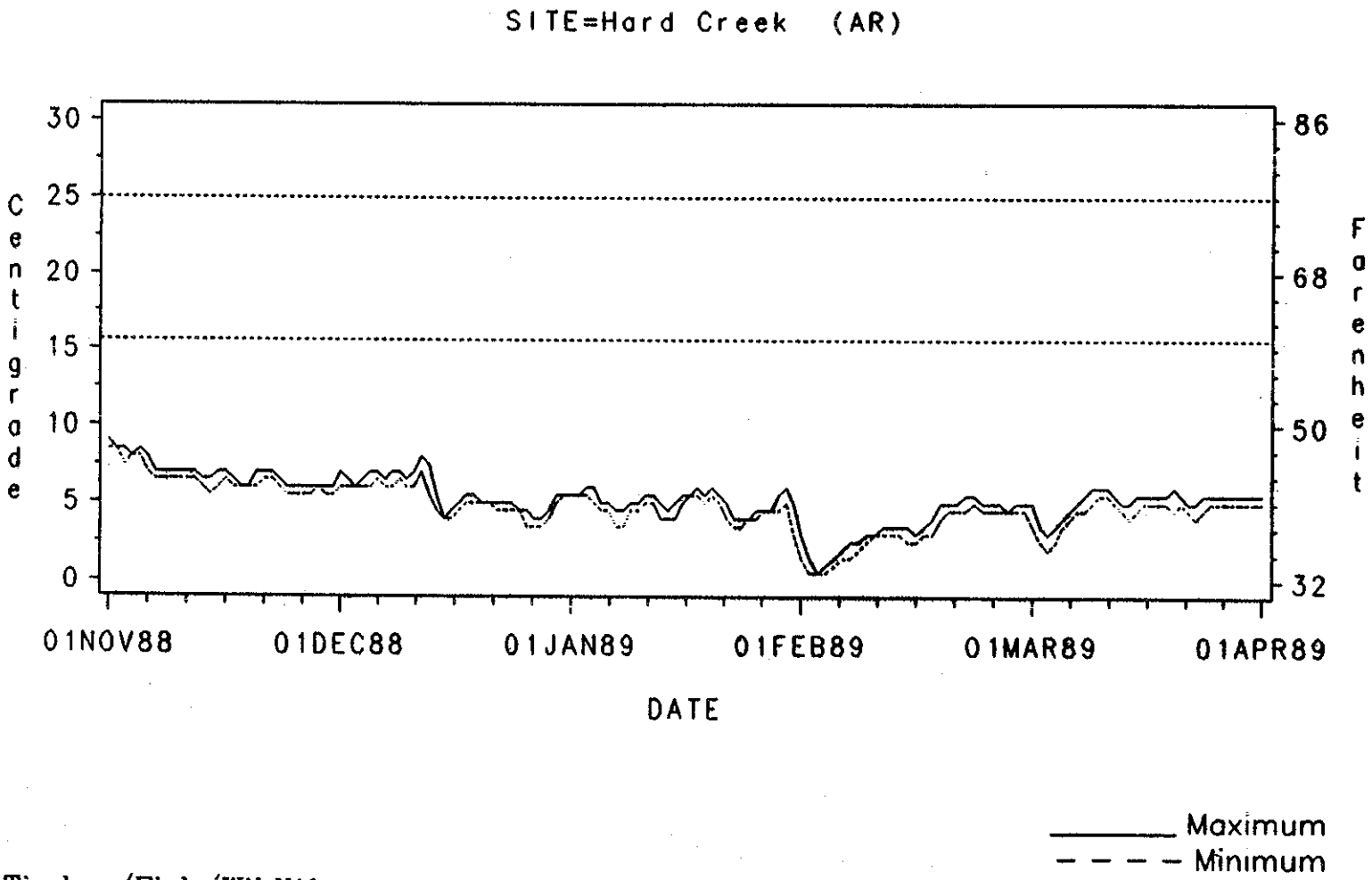
HARD CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	12.2	11.0	18.5	12.5	8.0	10.5	10.5	2.0
02AUG	13.3	11.0	22.0	12.5	7.0	10.0	15.0	2.5
03AUG	15.5	11.4	25.5	13.0	8.5	10.5	17.0	2.5
04AUG	16.2	11.5	27.0	13.0	9.5	10.5	17.5	2.5
05AUG	12.9	11.2	19.0	12.5	7.5	10.5	11.5	2.0
06AUG	11.2	10.7	14.0	11.5	8.0	10.5	6.0	1.0
07AUG	12.3	10.9	19.0	12.0	7.5	10.5	11.5	1.5
08AUG	13.2	10.9	22.0	12.5	6.5	10.0	15.5	2.5
09AUG	14.4	11.2	22.0	12.5	8.0	10.0	14.0	2.5
10AUG	14.3	11.4	18.0	12.0	9.5	11.0	8.5	1.0
11AUG	13.6	11.3	19.0	12.5	8.5	10.5	10.5	2.0
12AUG	13.6	11.2	18.5	12.5	11.0	10.5	7.5	2.0
13AUG	13.9	11.3	18.5	12.5	10.0	11.0	8.5	1.5
14AUG	13.1	11.1	17.5	12.0	9.5	10.5	8.0	1.5
15AUG	12.2	10.9	16.0	11.5	9.5	10.5	6.5	1.0
16AUG	12.8	11.0	15.0	11.5	11.0	10.5	4.0	1.0
17AUG	11.8	10.9	14.0	11.5	10.5	10.5	3.5	1.0
18AUG	11.4	10.8	16.0	12.0	8.0	10.5	8.0	1.5
19AUG	12.1	10.8	18.5	12.0	7.0	10.0	11.5	2.0
20AUG	11.4	10.8	15.5	11.5	8.0	10.5	7.5	1.0
21AUG	11.0	10.6	18.5	12.0	5.0	9.5	13.5	2.5
22AUG	12.4	10.7	21.0	12.0	5.5	10.0	15.5	2.0
23AUG	15.3	11.3	24.0	12.5	9.5	10.5	14.5	2.0
24AUG	15.3	11.5	23.0	13.0	10.5	11.0	12.5	2.0
25AUG	13.0	11.2	20.0	12.5	7.5	10.5	12.5	2.0
26AUG	12.7	11.2	19.5	12.5	7.5	10.5	12.0	2.0
27AUG	14.8	11.4	22.5	12.5	9.5	10.5	13.0	2.0
28AUG	16.0	11.8	25.0	13.0	10.5	11.0	14.5	2.0
29AUG	13.4	11.6	18.0	12.5	9.5	11.0	8.5	1.5
30AUG	10.7	11.0	16.5	12.0	6.0	10.5	10.5	1.5
31AUG	11.2	10.8	19.0	12.0	5.0	10.0	14.0	2.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

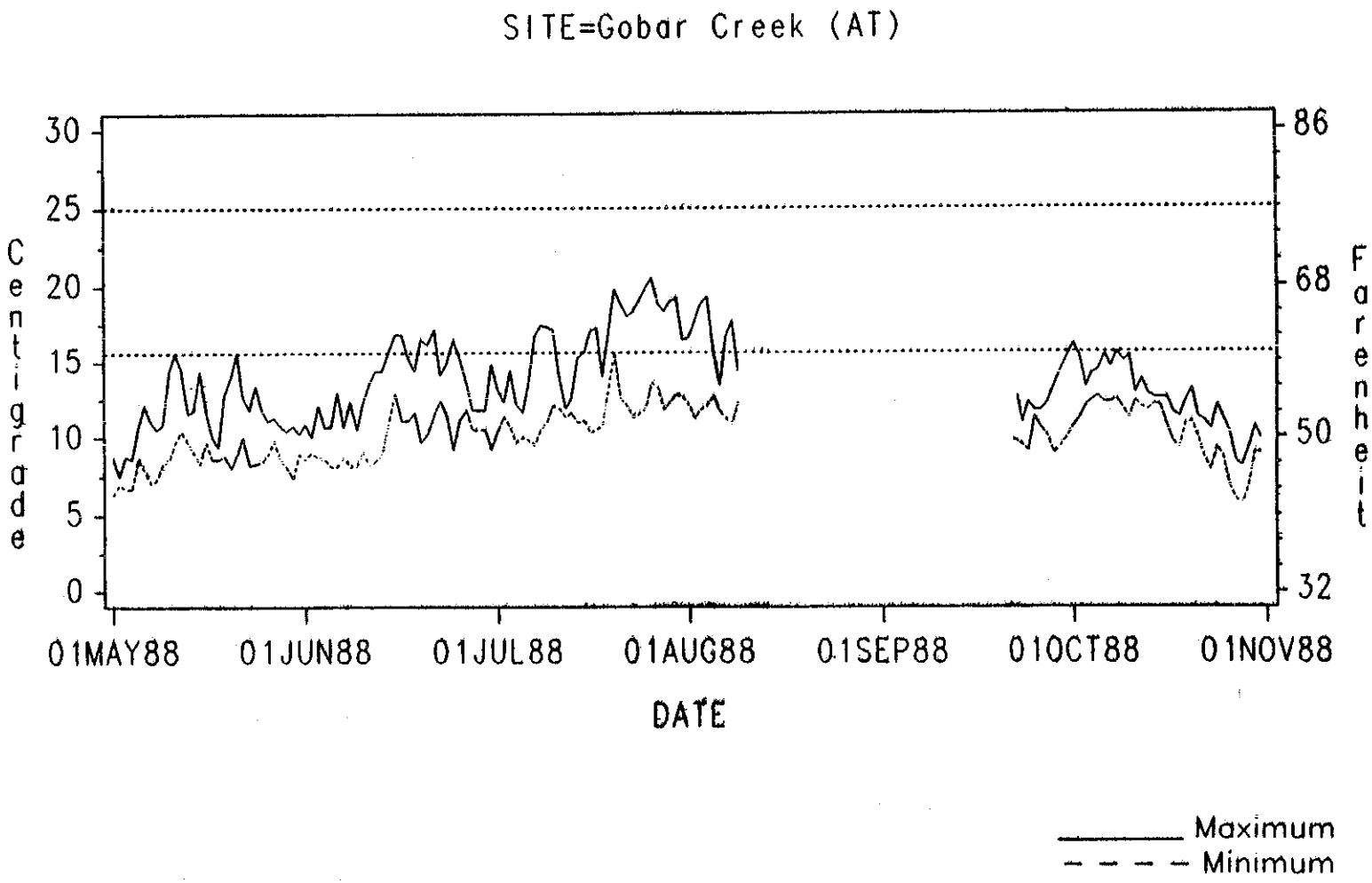
Hard Creek (AR)

Daily Temperatures in Degrees Celsius (C)

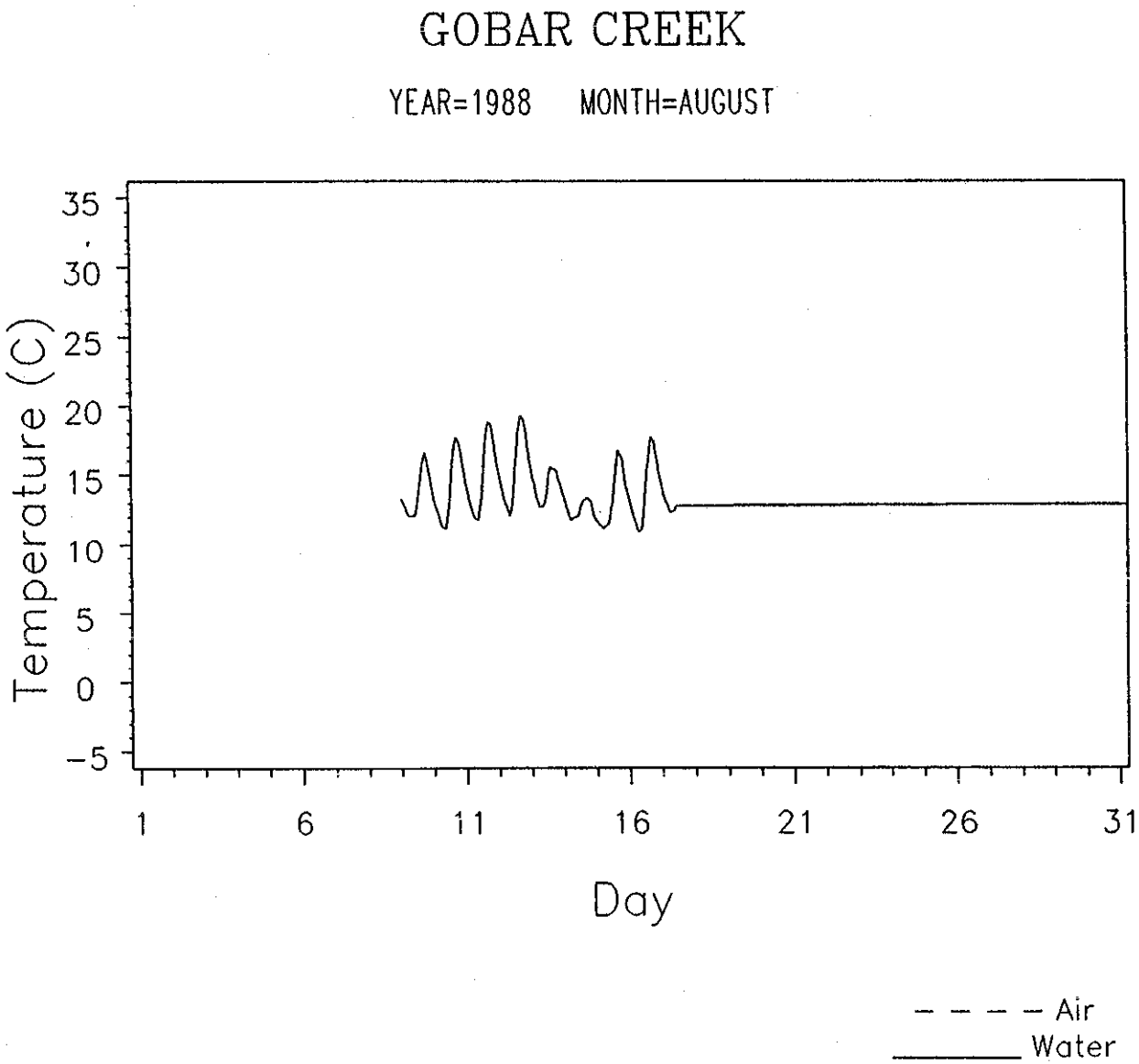
YEAR=1989 MONTH=JANUARY

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01JAN	1.9	5.5	3.5	5.5	0.5	5.5	3.0	0.0
02JAN	3.6	5.5	6.0	5.5	2.5	5.5	3.5	0.0
03JAN	6.2	5.9	7.5	6.0	5.5	5.5	2.0	0.5
04JAN	2.7	5.3	5.5	6.0	0.5	5.0	5.0	1.0
05JAN	0.5	5.0	1.5	5.0	0.0	4.5	1.5	0.5
06JAN	-0.5	4.5	0.5	5.0	-1.5	4.5	2.0	0.5
07JAN	-2.1	3.9	-1.0	4.5	-3.5	3.5	2.5	1.0
08JAN	0.5	4.1	4.0	4.5	-1.5	3.5	5.5	1.0
09JAN	2.2	4.9	3.5	5.0	1.5	4.5	2.0	0.5
10JAN	1.4	5.0	3.0	5.0	0.0	4.5	3.0	0.5
11JAN	2.6	5.0	4.0	5.5	1.5	5.0	2.5	0.5
12JAN	3.8	5.3	5.5	5.5	2.0	5.0	3.5	0.5
13JAN	0.4	4.6	2.0	5.0	-1.0	4.0	3.0	1.0
14JAN	-0.1	4.2	1.0	4.5	-1.0	4.0	2.0	0.5
15JAN	0.8	4.6	2.5	5.0	0.0	4.0	2.5	1.0
16JAN	4.2	5.3	6.0	5.5	2.5	5.0	3.5	0.5
17JAN	3.9	5.5	5.0	5.5	3.0	5.5	2.0	0.0
18JAN	5.0	5.9	6.0	6.0	3.5	5.5	2.5	0.5
19JAN	1.4	5.4	3.0	5.5	-0.5	5.0	3.5	0.5
20JAN	3.3	5.6	6.0	6.0	1.0	5.5	5.0	0.5
21JAN	1.9	5.3	4.0	5.5	-0.5	5.0	4.5	0.5
22JAN	-0.9	4.4	0.0	5.0	-3.5	4.0	3.5	1.0
23JAN	-3.5	3.5	-1.5	4.0	-5.0	3.5	3.5	0.5
24JAN	-0.8	3.8	0.5	4.0	-3.5	3.5	4.0	0.5
25JAN	-0.7	4.0	0.0	4.0	-1.5	4.0	1.5	0.0
26JAN	-0.5	4.3	1.5	4.5	-2.0	4.0	3.5	0.5
27JAN	0.7	4.5	2.0	4.5	-0.5	4.5	2.5	0.0
28JAN	0.9	4.5	3.0	4.5	-0.5	4.5	3.5	0.0
29JAN	5.7	5.1	8.5	5.5	2.0	4.5	6.5	1.0
30JAN	6.1	5.5	7.5	6.0	3.0	5.0	4.5	1.0
31JAN	-0.7	3.6	2.0	5.0	-2.0	3.0	4.0	2.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study


GOBAR CREEK
YEAR=1988 MONTH=AUGUST
Temperature (C)
35
30
25
20
15
10
5
0
-5
1
6
11
16
21
26
31
Day
Air
Water

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

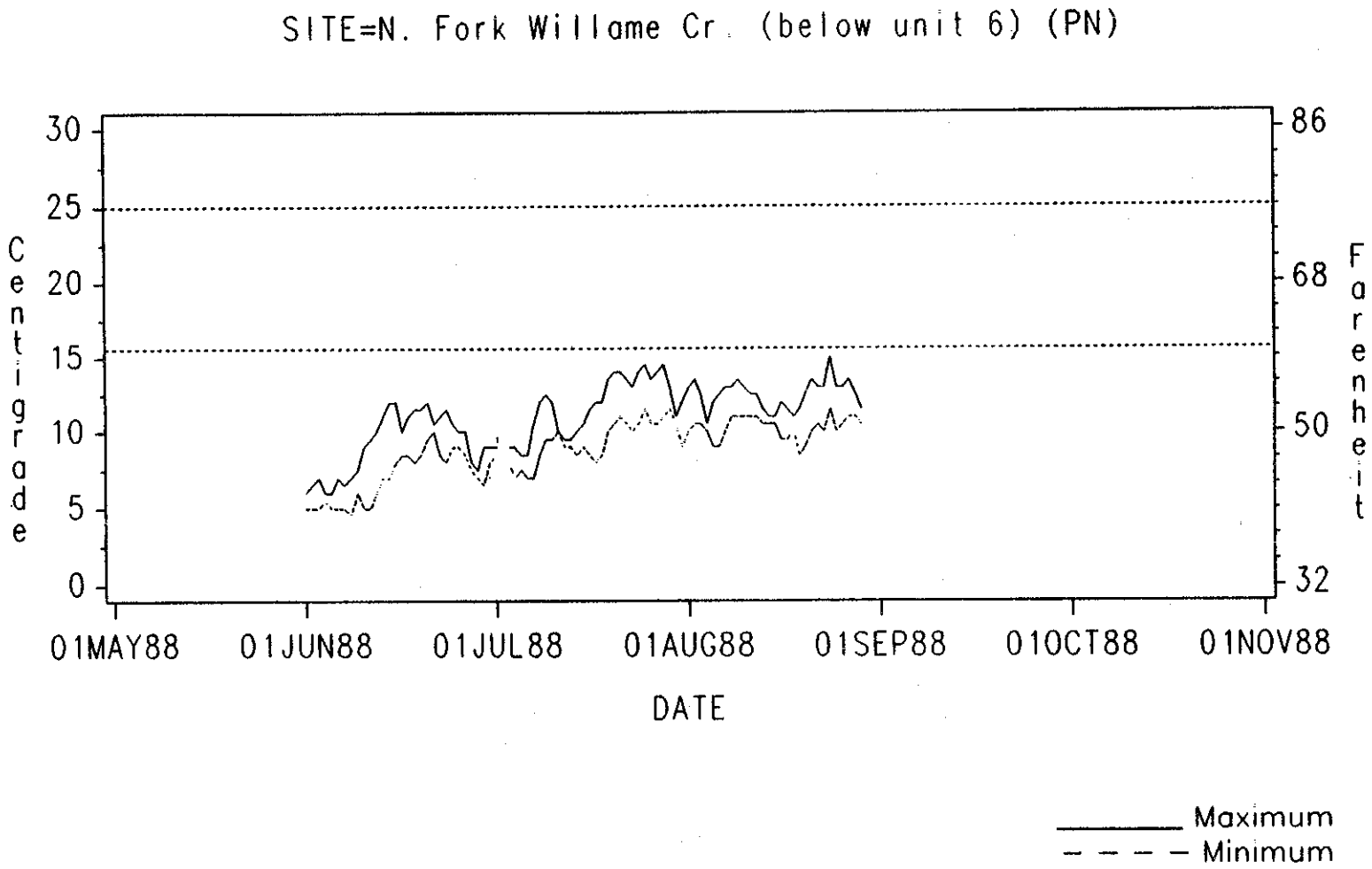
GOBAR CREEK

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	13.7	.	16.6	.	12.1	.	4.5
02AUG	.	14.1	.	17.7	.	11.2	.	6.5
03AUG	.	15.0	.	18.8	.	11.8	.	7.0
04AUG	.	15.5	.	19.3	.	12.1	.	7.2
05AUG	.	14.2	.	15.5	.	12.7	.	2.8
06AUG	.	12.6	.	13.4	.	11.7	.	1.7
07AUG	.	13.4	.	16.7	.	11.2	.	5.5
08AUG	.	14.0	.	17.7	.	10.9	.	6.8
09AUG	.	12.8	.	14.1	.	12.3	.	1.8
10AUG	.	.	.	.	.	.	.	.
11AUG	.	.	.	.	.	.	.	.
12AUG	.	.	.	.	.	.	.	.
13AUG	.	.	.	.	.	.	.	.
14AUG	.	.	.	.	.	.	.	.
15AUG	.	.	.	.	.	.	.	.
16AUG	.	.	.	.	.	.	.	.
17AUG	.	.	.	.	.	.	.	.
18AUG	.	.	.	.	.	.	.	.
19AUG	.	.	.	.	.	.	.	.
20AUG	.	.	.	.	.	.	.	.
21AUG	.	.	.	.	.	.	.	.
22AUG	.	.	.	.	.	.	.	.
23AUG	.	.	.	.	.	.	.	.
24AUG	.	.	.	.	.	.	.	.
25AUG	.	.	.	.	.	.	.	.
26AUG	.	.	.	.	.	.	.	.
27AUG	.	.	.	.	.	.	.	.
28AUG	.	.	.	.	.	.	.	.
29AUG	.	.	.	.	.	.	.	.
30AUG	.	.	.	.	.	.	.	.
31AUG	.	.	.	.	.	.	.	.

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

N. FORK WILLAME CREEK (BELOW UNIT 6)
Gifford Pinchot National Forest

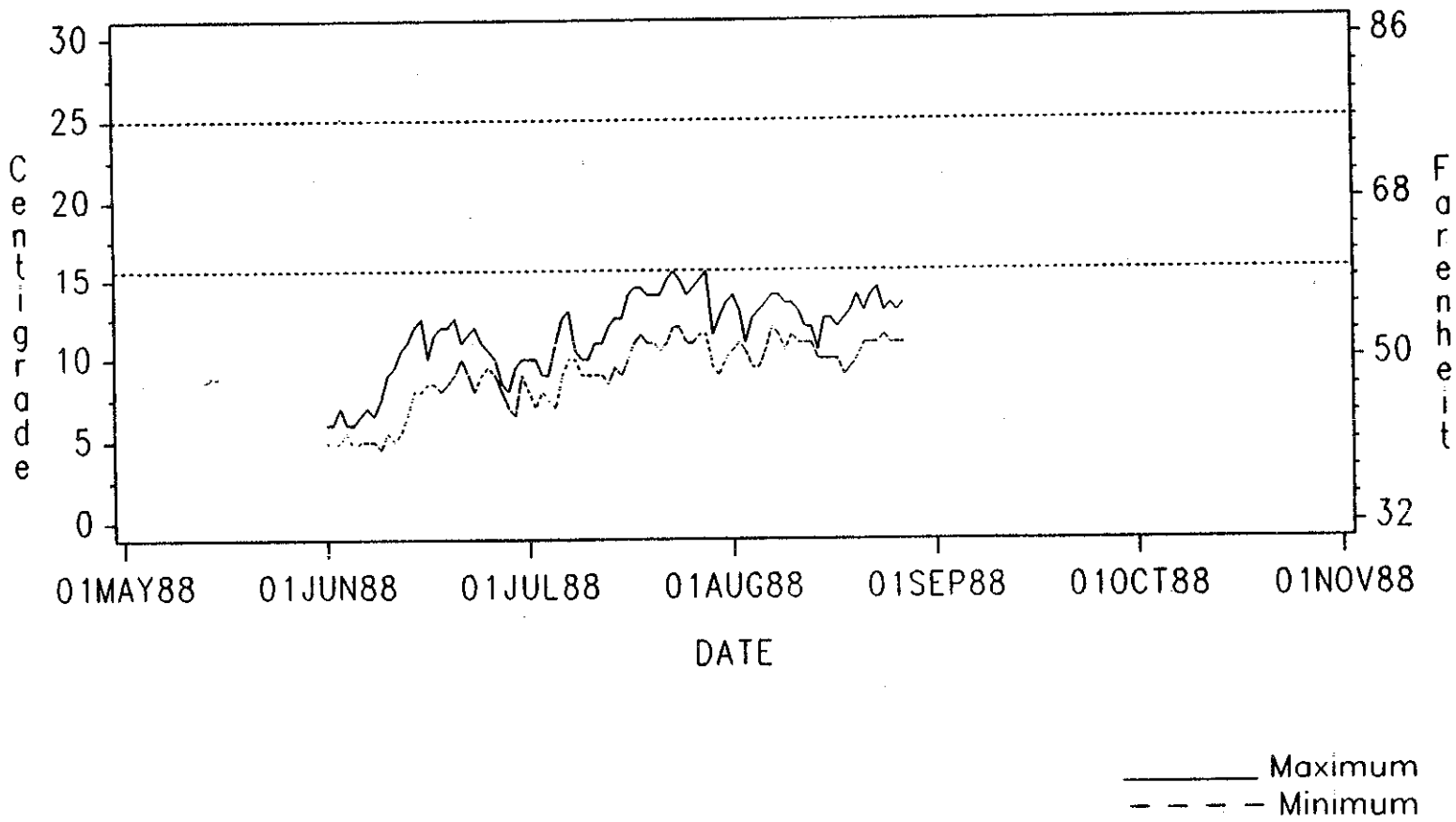
Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	11.5	13.0	10.0	3.0
02AUG	12.0	13.5	10.5	3.0
03AUG	11.5	12.5	10.5	2.0
04AUG	10.3	10.5	10.0	0.5
05AUG	10.5	12.0	9.0	3.0
06AUG	10.8	12.5	9.0	3.5
07AUG	11.5	13.0	10.0	3.0
08AUG	12.0	13.0	11.0	2.0
09AUG	12.3	13.5	11.0	2.5
10AUG	12.0	13.0	11.0	2.0
11AUG	11.8	12.5	11.0	1.5
12AUG	11.8	12.5	11.0	1.5
13AUG	11.0	11.5	10.5	1.0
14AUG	10.8	11.0	10.5	0.5
15AUG	10.8	11.0	10.5	0.5
16AUG	10.8	12.0	9.5	2.5
17AUG	10.5	11.5	9.5	2.0
18AUG	10.5	11.0	10.0	1.0
19AUG	10.0	11.5	8.5	3.0
20AUG	10.8	12.5	9.0	3.5
21AUG	11.8	13.5	10.0	3.5
22AUG	11.8	13.0	10.5	2.5
23AUG	11.5	13.0	10.0	3.0
24AUG	13.3	15.0	11.5	3.5
25AUG	11.5	13.0	10.0	3.0
26AUG	11.8	13.0	10.5	2.5
27AUG	12.3	13.5	11.0	2.5
28AUG	11.8	12.5	11.0	1.5
29AUG	11.0	11.5	10.5	1.0

WATER TEMPERATURE

SITE=N. Fork Willame Cr. (at 4700 rd) (PO)



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

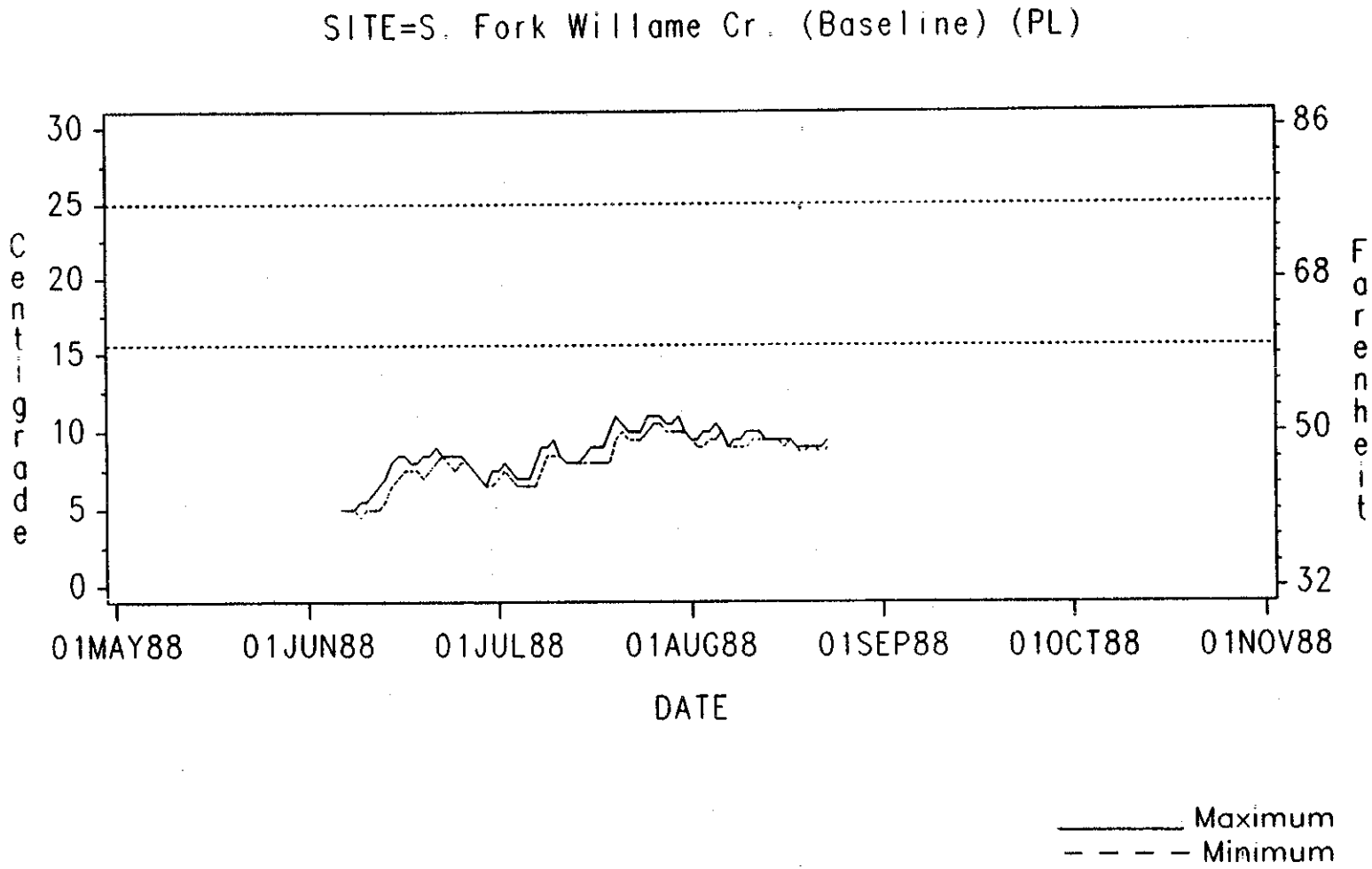
N. FORK WILLAME CREEK (AT ROAD 4700)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	12.3	14.0	10.5	3.5
02AUG	12.0	13.0	11.0	2.0
03AUG	10.8	11.0	10.5	0.5
04AUG	11.0	12.5	9.5	3.0
05AUG	11.3	13.0	9.5	3.5
06AUG	12.0	13.5	10.5	3.0
07AUG	13.0	14.0	12.0	2.0
08AUG	12.8	14.0	11.5	2.5
09AUG	12.0	13.5	10.5	3.0
10AUG	12.5	13.5	11.5	2.0
11AUG	12.0	13.0	11.0	2.0
12AUG	11.5	12.0	11.0	1.0
13AUG	11.5	12.0	11.0	1.0
14AUG	10.3	10.5	10.0	0.5
15AUG	11.3	12.5	10.0	2.5
16AUG	11.3	12.5	10.0	2.5
17AUG	11.0	12.0	10.0	2.0
18AUG	10.8	12.5	9.0	3.5
19AUG	11.3	13.0	9.5	3.5
20AUG	12.0	14.0	10.0	4.0
21AUG	12.0	13.0	11.0	2.0
22AUG	12.5	14.0	11.0	3.0
23AUG	12.8	14.5	11.0	3.5
24AUG	12.3	13.0	11.5	1.5
25AUG	12.3	13.5	11.0	2.5
26AUG	12.0	13.0	11.0	2.0
27AUG	12.3	13.5	11.0	2.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

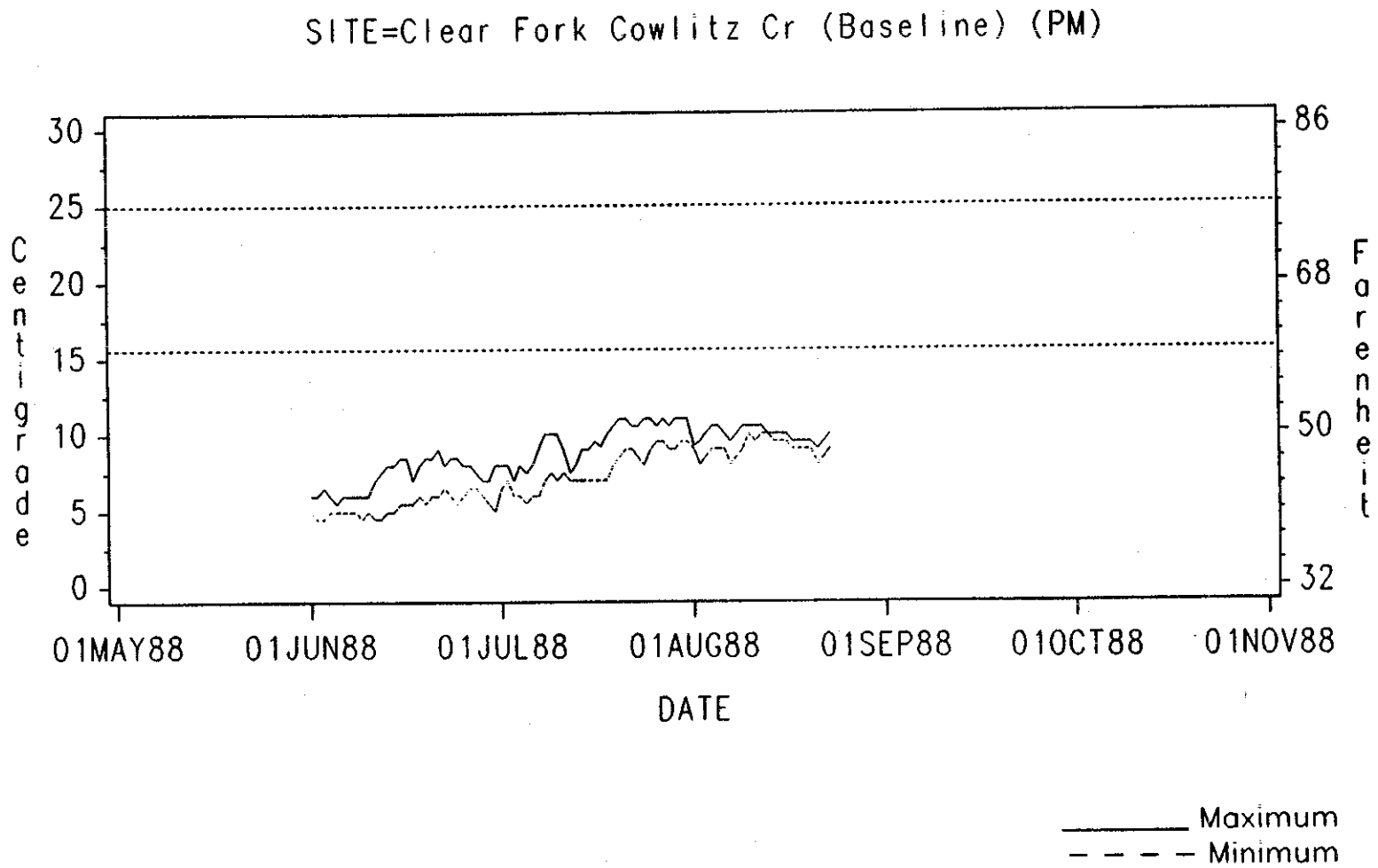
S. FORK WILLAME CREEK (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	9.5	9.5	9.5	0.0
02AUG	9.3	9.5	9.0	0.5
03AUG	9.5	10.0	9.0	1.0
04AUG	9.8	10.0	9.5	0.5
05AUG	10.0	10.5	9.5	1.0
06AUG	10.0	10.0	10.0	0.0
07AUG	9.0	9.0	9.0	0.0
08AUG	9.3	9.5	9.0	0.5
09AUG	9.3	9.5	9.0	0.5
10AUG	9.5	10.0	9.0	1.0
11AUG	9.8	10.0	9.5	0.5
12AUG	9.8	10.0	9.5	0.5
13AUG	9.5	9.5	9.5	0.0
14AUG	9.5	9.5	9.5	0.0
15AUG	9.5	9.5	9.5	0.0
16AUG	9.3	9.5	9.0	0.5
17AUG	9.5	9.5	9.5	0.0
18AUG	9.0	9.0	9.0	0.0
19AUG	8.8	9.0	8.5	0.5
20AUG	9.0	9.0	9.0	0.0
21AUG	9.0	9.0	9.0	0.0
22AUG	8.8	9.0	8.5	0.5
23AUG	9.3	9.5	9.0	0.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

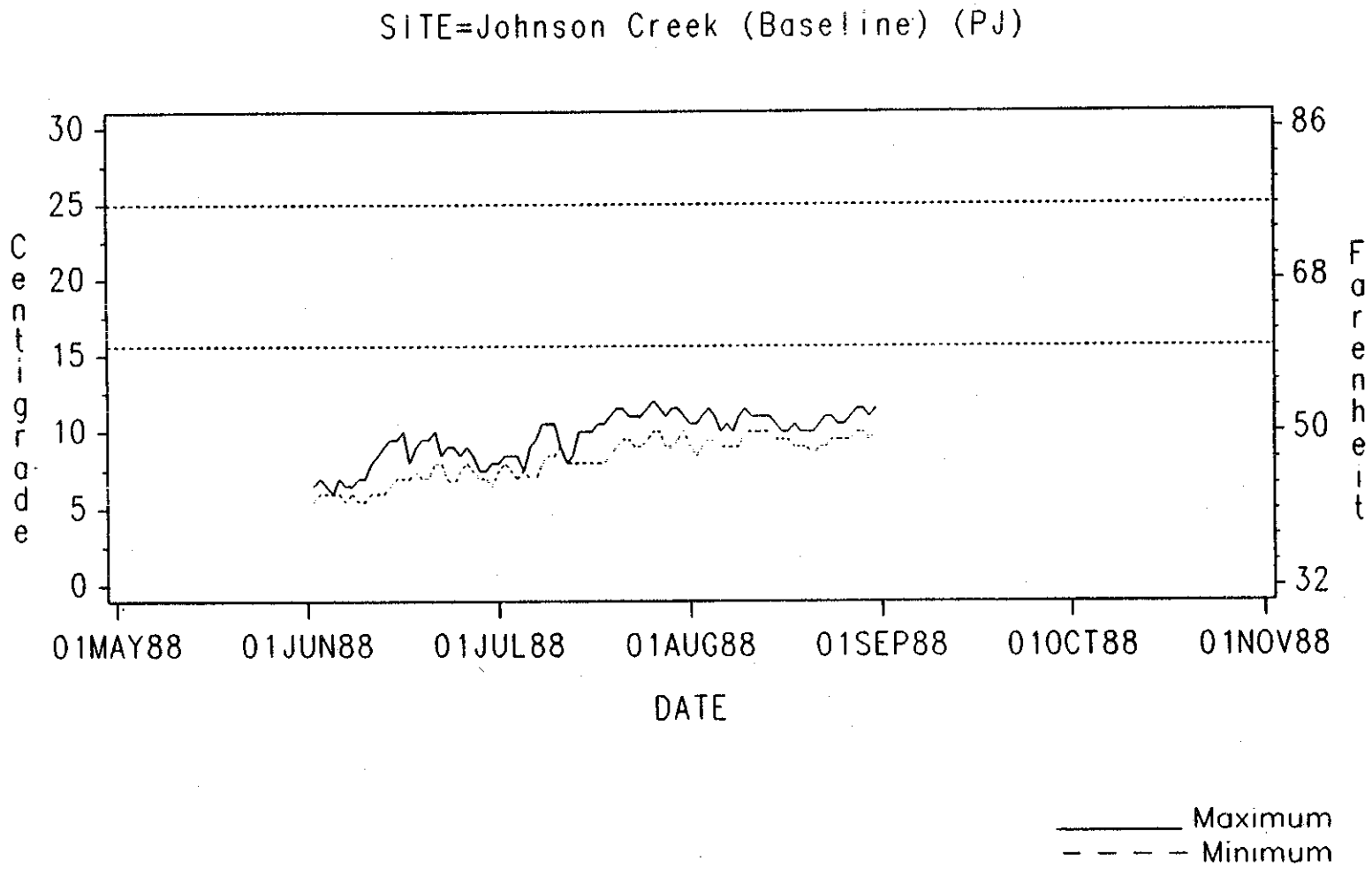
CLEAR FORK COWLITZ RIVER (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	9.1	9.2	9.0	0.2
02AUG	8.8	9.5	8.0	1.5
03AUG	9.3	10.0	8.5	1.5
04AUG	9.8	10.5	9.0	1.5
05AUG	9.8	10.5	9.0	1.5
06AUG	9.5	10.0	9.0	1.0
07AUG	8.8	9.5	8.0	1.5
08AUG	9.3	10.0	8.5	1.5
09AUG	9.8	10.5	9.0	1.5
10AUG	10.3	10.5	10.0	0.5
11AUG	10.0	10.5	9.5	1.0
12AUG	10.3	10.5	10.0	0.5
13AUG	10.0	10.0	10.0	0.0
14AUG	9.8	10.0	9.5	0.5
15AUG	9.8	10.0	9.5	0.5
16AUG	9.8	10.0	9.5	0.5
17AUG	9.3	9.5	9.0	0.5
18AUG	9.3	9.5	9.0	0.5
19AUG	9.3	9.5	9.0	0.5
20AUG	9.3	9.5	9.0	0.5
21AUG	8.5	9.0	8.0	1.0
22AUG	9.0	9.5	8.5	1.0
23AUG	9.5	10.0	9.0	1.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

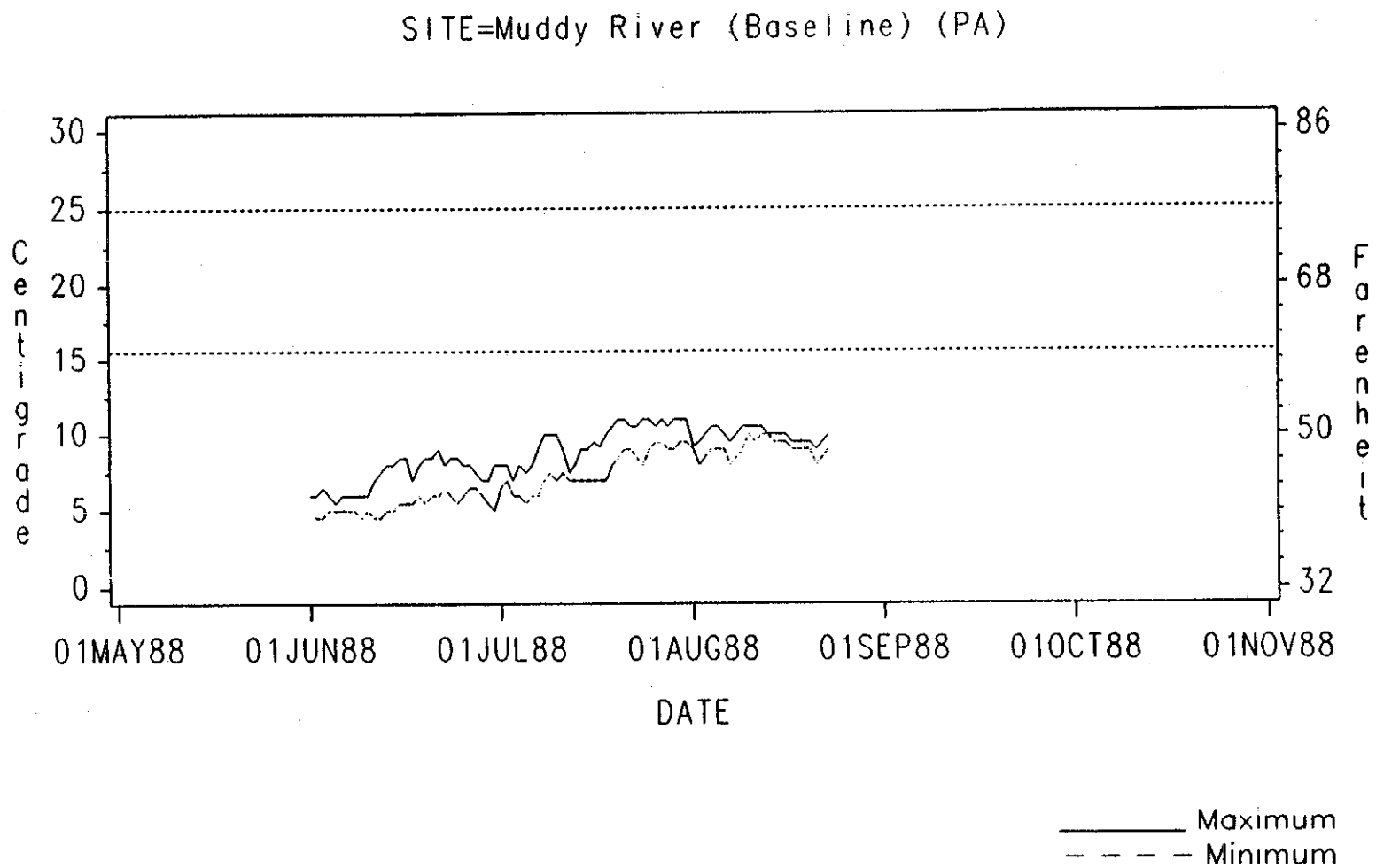
JOHNSON CREEK (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	9.8	10.5	9.0	1.5
02AUG	9.5	10.5	8.5	2.0
03AUG	10.0	11.0	9.0	2.0
04AUG	10.5	11.5	9.5	2.0
05AUG	10.3	11.0	9.5	1.5
06AUG	9.5	10.0	9.0	1.0
07AUG	9.8	10.5	9.0	1.5
08AUG	9.5	10.0	9.0	1.0
09AUG	10.0	11.0	9.0	2.0
10AUG	10.8	11.5	10.0	1.5
11AUG	10.5	11.0	10.0	1.0
12AUG	10.5	11.0	10.0	1.0
13AUG	10.5	11.0	10.0	1.0
14AUG	10.5	11.0	10.0	1.0
15AUG	10.0	10.5	9.5	1.0
16AUG	9.8	10.0	9.5	0.5
17AUG	9.8	10.0	9.5	0.5
18AUG	9.8	10.5	9.0	1.5
19AUG	9.5	10.0	9.0	1.0
20AUG	9.5	10.0	9.0	1.0
21AUG	9.3	10.0	8.5	1.5
22AUG	9.8	10.5	9.0	1.5
23AUG	10.0	11.0	9.0	2.0
24AUG	10.3	11.0	9.5	1.5
25AUG	10.0	10.5	9.5	1.0
26AUG	10.0	10.5	9.5	1.0
27AUG	10.3	11.0	9.5	1.5
28AUG	10.8	11.5	10.0	1.5
29AUG	10.8	11.5	10.0	1.5
30AUG	10.3	11.0	9.5	1.5
31AUG	10.8	11.5	10.0	1.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

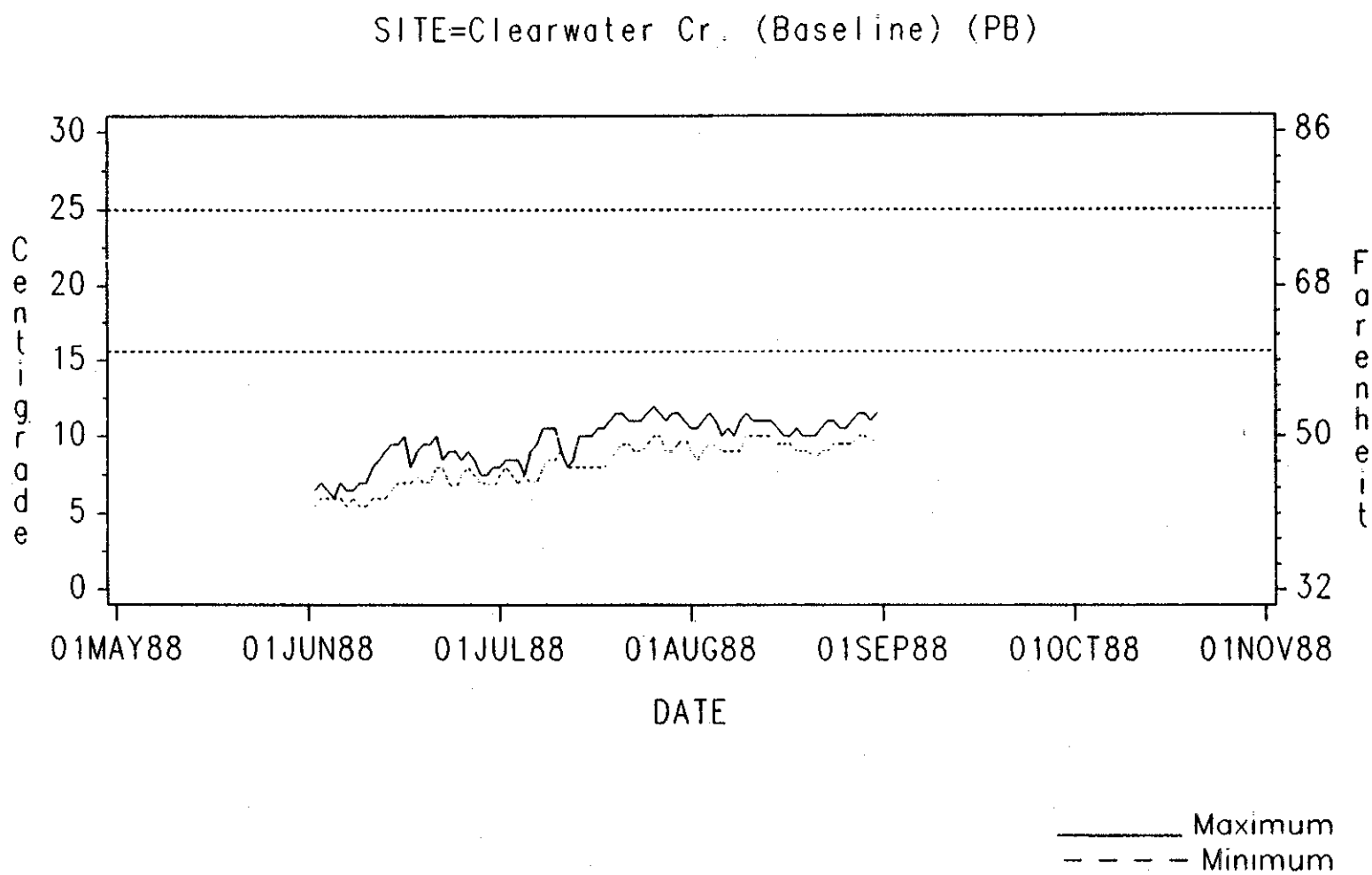
MUDDY RIVER
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	9.1	9.2	9.0	0.2
02AUG	8.8	9.5	8.0	1.5
03AUG	9.3	10.0	8.5	1.5
04AUG	9.8	10.5	9.0	1.5
05AUG	9.8	10.5	9.0	1.5
06AUG	9.5	10.0	9.0	1.0
07AUG	8.8	9.5	8.0	1.5
08AUG	9.3	10.0	8.5	1.5
09AUG	9.8	10.5	9.0	1.5
10AUG	10.3	10.5	10.0	0.5
11AUG	10.0	10.5	9.5	1.0
12AUG	10.3	10.5	10.0	0.5
13AUG	10.0	10.0	10.0	0.0
14AUG	9.8	10.0	9.5	0.5
15AUG	9.8	10.0	9.5	0.5
16AUG	9.8	10.0	9.5	0.5
17AUG	9.3	9.5	9.0	0.5
18AUG	9.3	9.5	9.0	0.5
19AUG	9.3	9.5	9.0	0.5
20AUG	9.3	9.5	9.0	0.5
21AUG	8.5	9.0	8.0	1.0
22AUG	9.0	9.5	8.5	1.0
23AUG	9.5	10.0	9.0	1.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

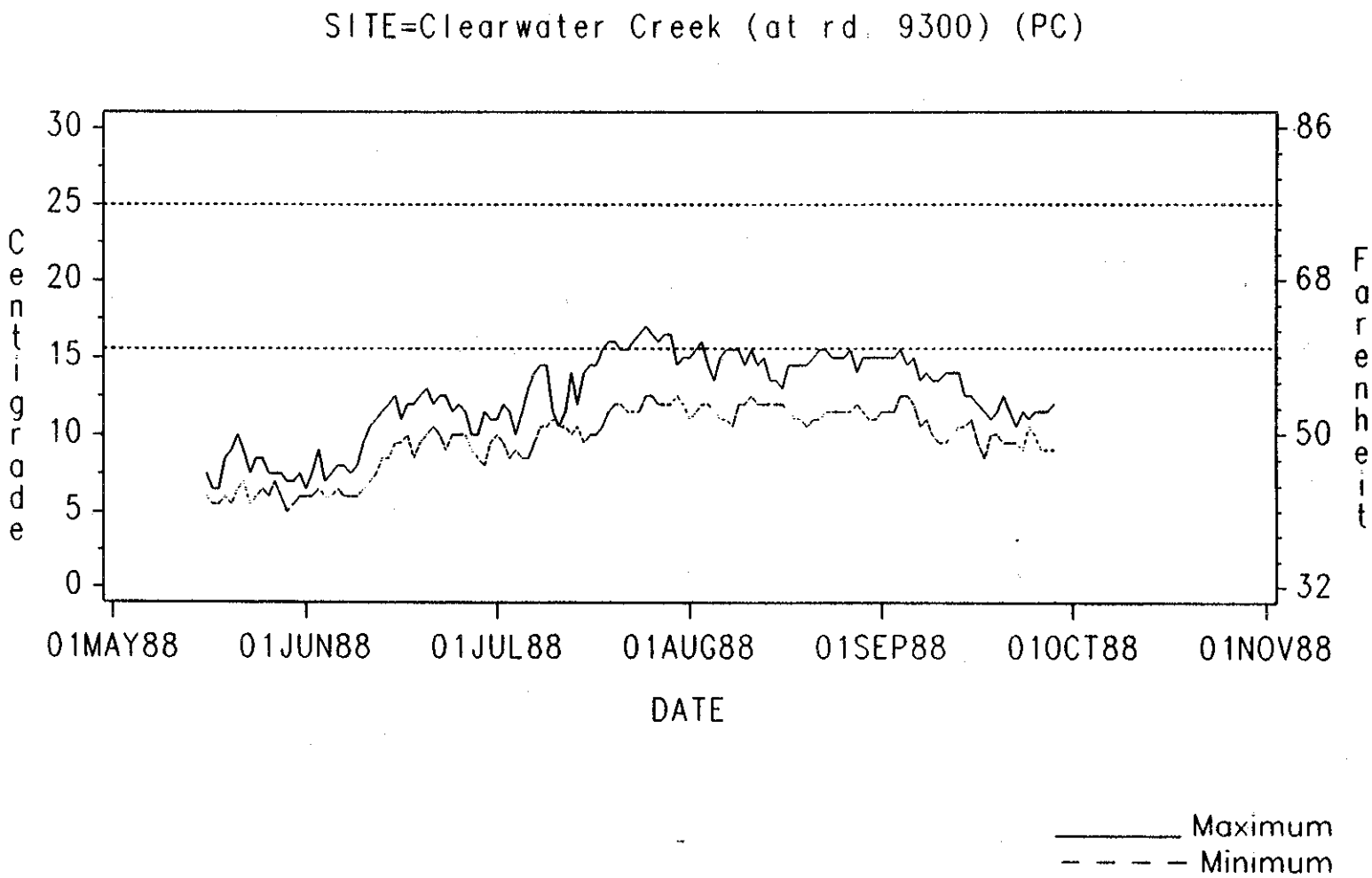
CLEARWATER CREEK (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	9.8	10.5	9.0	1.5
02AUG	9.5	10.5	8.5	2.0
03AUG	10.0	11.0	9.0	2.0
04AUG	10.5	11.5	9.5	2.0
05AUG	10.3	11.0	9.5	1.5
06AUG	9.5	10.0	9.0	1.0
07AUG	9.8	10.5	9.0	1.5
08AUG	9.5	10.0	9.0	1.0
09AUG	10.0	11.0	9.0	2.0
10AUG	10.8	11.5	10.0	1.5
11AUG	10.5	11.0	10.0	1.0
12AUG	10.5	11.0	10.0	1.0
13AUG	10.5	11.0	10.0	1.0
14AUG	10.5	11.0	10.0	1.0
15AUG	10.0	10.5	9.5	1.0
16AUG	9.8	10.0	9.5	0.5
17AUG	9.8	10.0	9.5	0.5
18AUG	9.8	10.5	9.0	1.5
19AUG	9.5	10.0	9.0	1.0
20AUG	9.5	10.0	9.0	1.0
21AUG	9.3	10.0	8.5	1.5
22AUG	9.8	10.5	9.0	1.5
23AUG	10.0	11.0	9.0	2.0
24AUG	10.3	11.0	9.5	1.5
25AUG	10.0	10.5	9.5	1.0
26AUG	10.0	10.5	9.5	1.0
27AUG	10.3	11.0	9.5	1.5
28AUG	10.8	11.5	10.0	1.5
29AUG	10.8	11.5	10.0	1.5
30AUG	10.3	11.0	9.5	1.5
31AUG	10.8	11.5	10.0	1.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

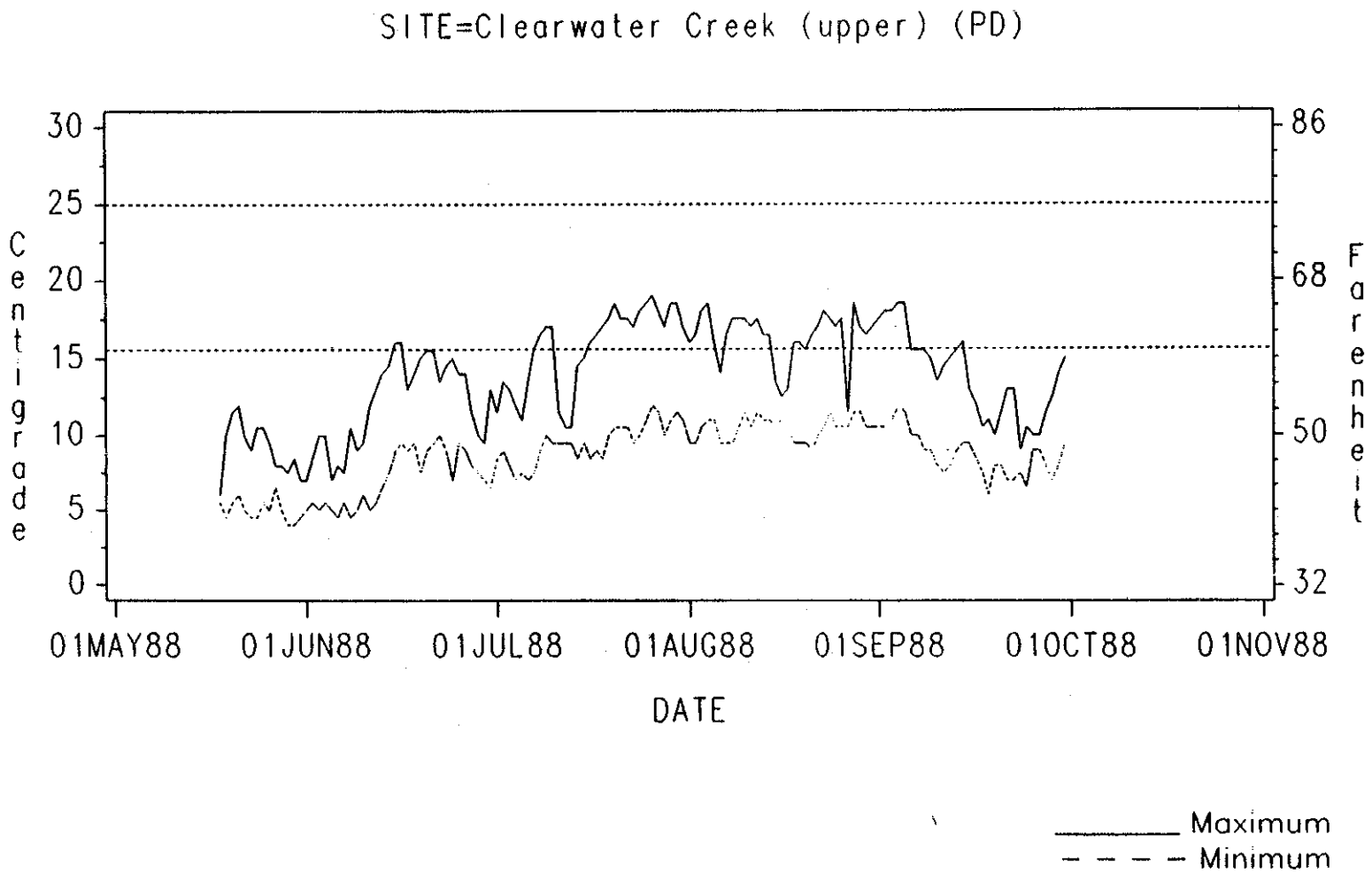
CLEAR CR. AT RD. 9300
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	13.0	15.0	11.0	4.0
02AUG	13.5	15.5	11.5	4.0
03AUG	14.0	16.0	12.0	4.0
04AUG	13.3	14.5	12.0	2.5
05AUG	12.5	13.5	11.5	2.0
06AUG	13.0	15.0	11.0	4.0
07AUG	13.3	15.5	11.0	4.5
08AUG	13.0	15.5	10.5	5.0
09AUG	13.8	15.5	12.0	3.5
10AUG	13.3	14.5	12.0	2.5
11AUG	14.0	15.5	12.5	3.0
12AUG	13.3	14.5	12.0	2.5
13AUG	13.5	15.0	12.0	3.0
14AUG	12.8	13.5	12.0	1.5
15AUG	12.8	13.5	12.0	1.5
16AUG	12.5	13.0	12.0	1.0
17AUG	13.0	14.5	11.5	3.0
18AUG	12.8	14.5	11.0	3.5
19AUG	12.8	14.5	11.0	3.5
20AUG	12.5	14.5	10.5	4.0
21AUG	13.0	15.0	11.0	4.0
22AUG	13.3	15.5	11.0	4.5
23AUG	13.5	15.5	11.5	4.0
24AUG	13.3	15.0	11.5	3.5
25AUG	13.3	15.0	11.5	3.5
26AUG	13.3	15.0	11.5	3.5
27AUG	13.5	15.5	11.5	4.0
28AUG	13.0	14.0	12.0	2.0
29AUG	13.3	15.0	11.5	3.5
30AUG	13.0	15.0	11.0	4.0
31AUG	13.0	15.0	11.0	4.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

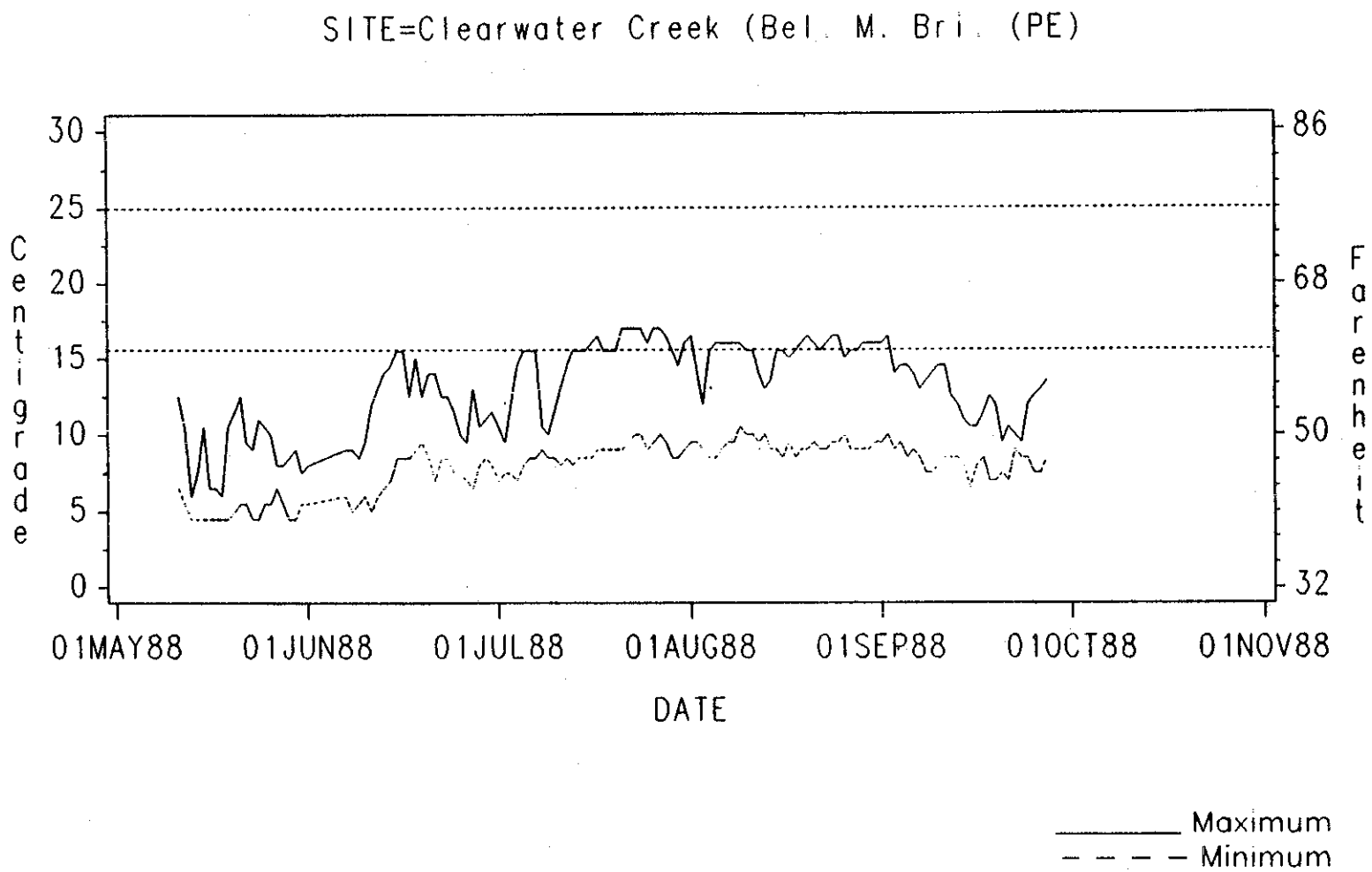
UPPER CLEARWATER CR. (ABOVE BRIDGE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	12.8	16.0	9.5	6.5
02AUG	13.0	16.5	9.5	7.0
03AUG	14.3	18.0	10.5	7.5
04AUG	14.8	18.5	11.0	7.5
05AUG	13.5	16.0	11.0	5.0
06AUG	11.8	14.0	9.5	4.5
07AUG	13.0	16.5	9.5	7.0
08AUG	13.5	17.5	9.5	8.0
09AUG	14.0	17.5	10.5	7.0
10AUG	14.5	17.5	11.5	6.0
11AUG	13.8	17.0	10.5	6.5
12AUG	14.5	17.5	11.5	6.0
13AUG	13.8	16.5	11.0	5.5
14AUG	13.8	16.5	11.0	5.5
15AUG	12.0	13.5	10.5	3.0
16AUG	11.8	12.5	11.0	1.5
17AUG	11.8	13.0	10.5	2.5
18AUG	12.8	16.0	9.5	6.5
19AUG	12.8	16.0	9.5	6.5
20AUG	12.5	15.5	9.5	6.0
21AUG	12.8	16.5	9.0	7.5
22AUG	13.5	17.0	10.0	7.0
23AUG	14.3	18.0	10.5	7.5
24AUG	14.5	17.5	11.5	6.0
25AUG	13.8	17.0	10.5	6.5
26AUG	14.0	17.5	10.5	7.0
27AUG	11.0	11.5	10.5	1.0
28AUG	15.0	18.5	11.5	7.0
29AUG	14.3	17.0	11.5	5.5
30AUG	13.5	16.5	10.5	6.0
31AUG	13.8	17.0	10.5	6.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

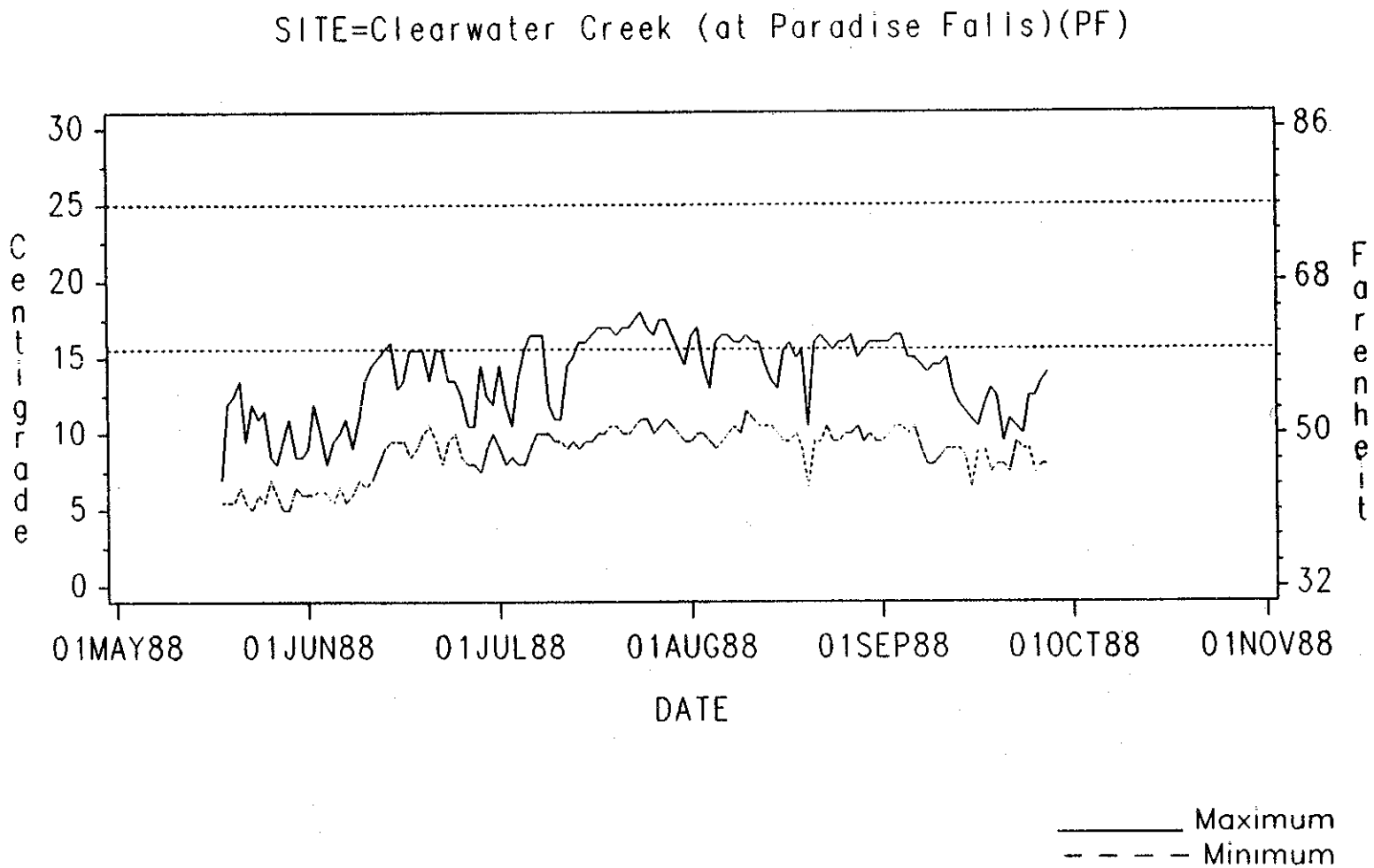
CLEARWATER CREEK (BELOW MIDDLE BRIDGE--G.P FOREST)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	11.3	13.0	19.5	16.5	3.0	9.5	16.5	7.0
02AUG	17.0	11.8	25.5	14.0	8.5	9.5	17.0	4.5
03AUG	18.0	10.5	29.5	12.0	6.5	9.0	23.0	3.0
04AUG	19.0	12.0	30.5	15.5	7.5	8.5	23.0	7.0
05AUG	15.3	12.3	24.0	16.0	6.5	8.5	17.5	7.5
06AUG	9.8	12.5	15.0	16.0	4.5	9.0	10.5	7.0
07AUG	13.8	12.8	23.0	16.0	4.5	9.5	18.5	6.5
08AUG	15.5	12.8	27.0	16.0	4.0	9.5	23.0	6.5
09AUG	16.5	13.3	26.0	16.0	7.0	10.5	19.0	5.5
10AUG	15.8	12.8	24.0	15.5	7.5	10.0	16.5	5.5
11AUG	13.5	12.8	20.5	15.5	6.5	10.0	14.0	5.5
12AUG	17.0	11.8	22.5	14.0	11.5	9.5	11.0	4.5
13AUG	14.8	11.5	22.0	13.0	7.5	10.0	14.5	3.0
14AUG	15.3	11.3	22.5	13.5	8.0	9.0	14.5	4.5
15AUG	11.8	12.3	17.5	15.5	6.0	9.0	11.5	6.5
16AUG	12.8	12.0	15.5	15.5	10.0	8.5	5.5	7.0
17AUG	13.3	12.3	17.5	15.0	9.0	9.5	8.5	5.5
18AUG	14.3	12.0	22.5	15.5	6.0	8.5	16.5	7.0
19AUG	13.5	12.5	23.0	16.0	4.0	9.0	19.0	7.0
20AUG	12.5	12.8	20.5	16.5	4.5	9.0	16.0	7.5
21AUG	14.5	12.8	26.0	16.0	3.0	9.5	23.0	6.5
22AUG	18.3	12.3	31.0	15.5	5.5	9.0	25.5	6.5
23AUG	20.0	12.5	34.5	16.0	5.5	9.0	29.0	7.0
24AUG	17.8	13.0	28.5	16.5	7.0	9.5	21.5	7.0
25AUG	14.5	13.0	24.5	16.5	4.5	9.5	20.0	7.0
26AUG	16.0	12.5	27.5	15.0	4.5	10.0	23.0	5.0
27AUG	19.3	12.3	32.0	15.5	6.5	9.0	25.5	6.5
28AUG	20.8	12.3	33.5	15.5	8.0	9.0	25.5	6.5
29AUG	15.8	12.5	23.0	16.0	8.5	9.0	14.5	7.0
30AUG	13.0	12.5	23.0	16.0	3.0	9.0	20.0	7.0
31AUG	18.3	12.8	29.5	16.0	7.0	9.5	22.5	6.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

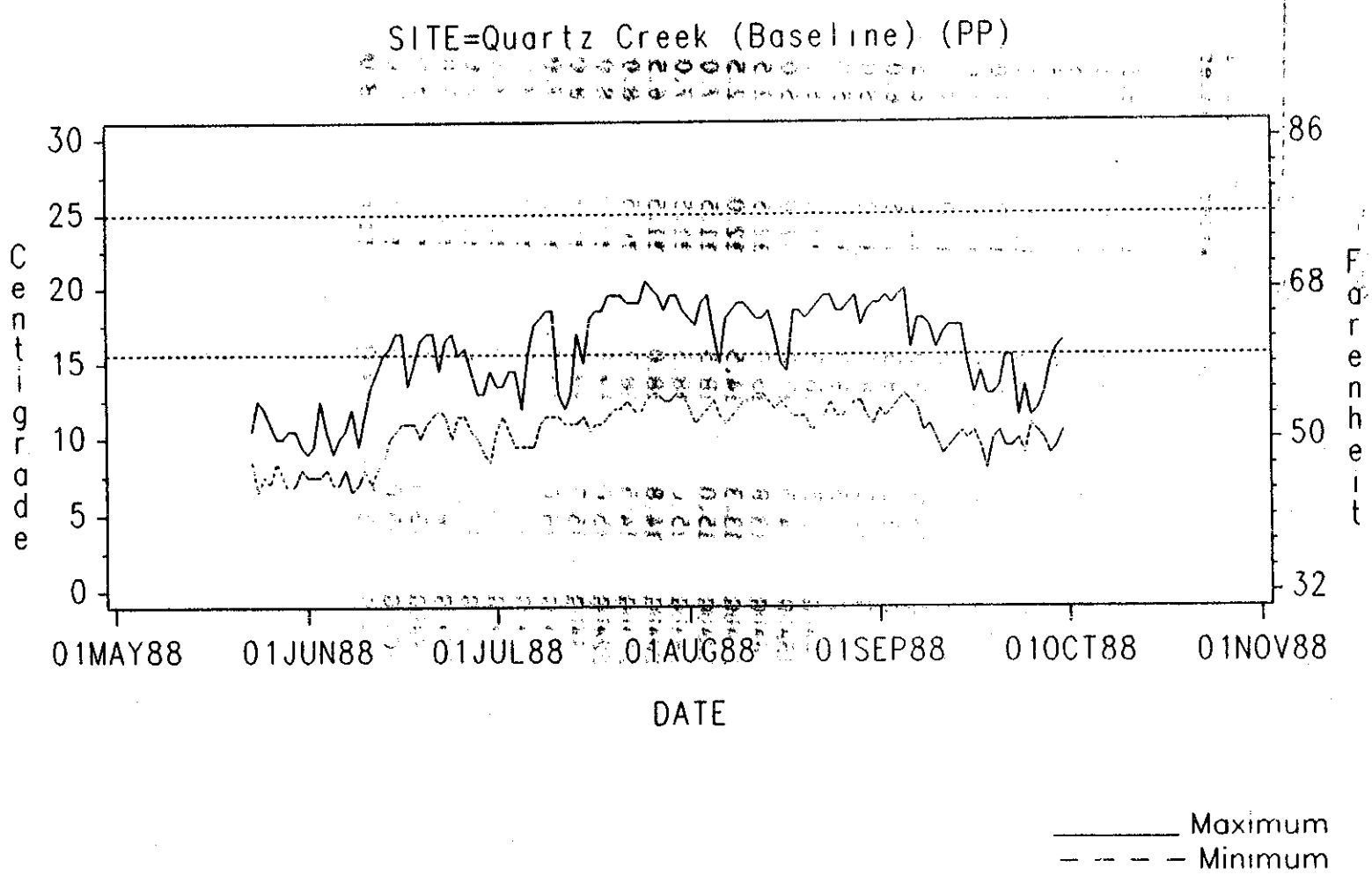
CLEARWATER CR. (at PARADISE FALLS)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	13.0	16.5	9.5	7.0
02AUG	13.5	17.0	10.0	7.0
03AUG	12.3	14.5	10.0	4.5
04AUG	11.3	13.0	9.5	3.5
05AUG	12.5	16.0	9.0	7.0
06AUG	13.0	16.5	9.5	7.0
07AUG	13.3	16.5	10.0	6.5
08AUG	13.3	16.0	10.5	5.5
09AUG	13.0	16.0	10.0	6.0
10AUG	14.0	16.5	11.5	5.0
11AUG	13.5	16.0	11.0	5.0
12AUG	13.3	16.0	10.5	5.5
13AUG	12.5	14.5	10.5	4.0
14AUG	12.0	13.5	10.5	3.0
15AUG	11.5	13.0	10.0	3.0
16AUG	12.5	15.5	9.5	6.0
17AUG	12.8	16.0	9.5	6.5
18AUG	12.5	15.0	10.0	5.0
19AUG	12.3	15.5	9.0	6.5
20AUG	8.5	10.5	6.5	4.0
21AUG	12.8	16.0	9.5	6.5
22AUG	13.0	16.5	9.5	7.0
23AUG	13.3	16.0	10.5	5.5
24AUG	12.5	15.5	9.5	6.0
25AUG	12.8	16.0	9.5	6.5
26AUG	13.0	16.0	10.0	6.0
27AUG	13.3	16.5	10.0	6.5
28AUG	12.8	15.0	10.5	4.5
29AUG	12.5	15.5	9.5	6.0
30AUG	13.0	16.0	10.0	6.0
31AUG	12.8	16.0	9.5	6.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

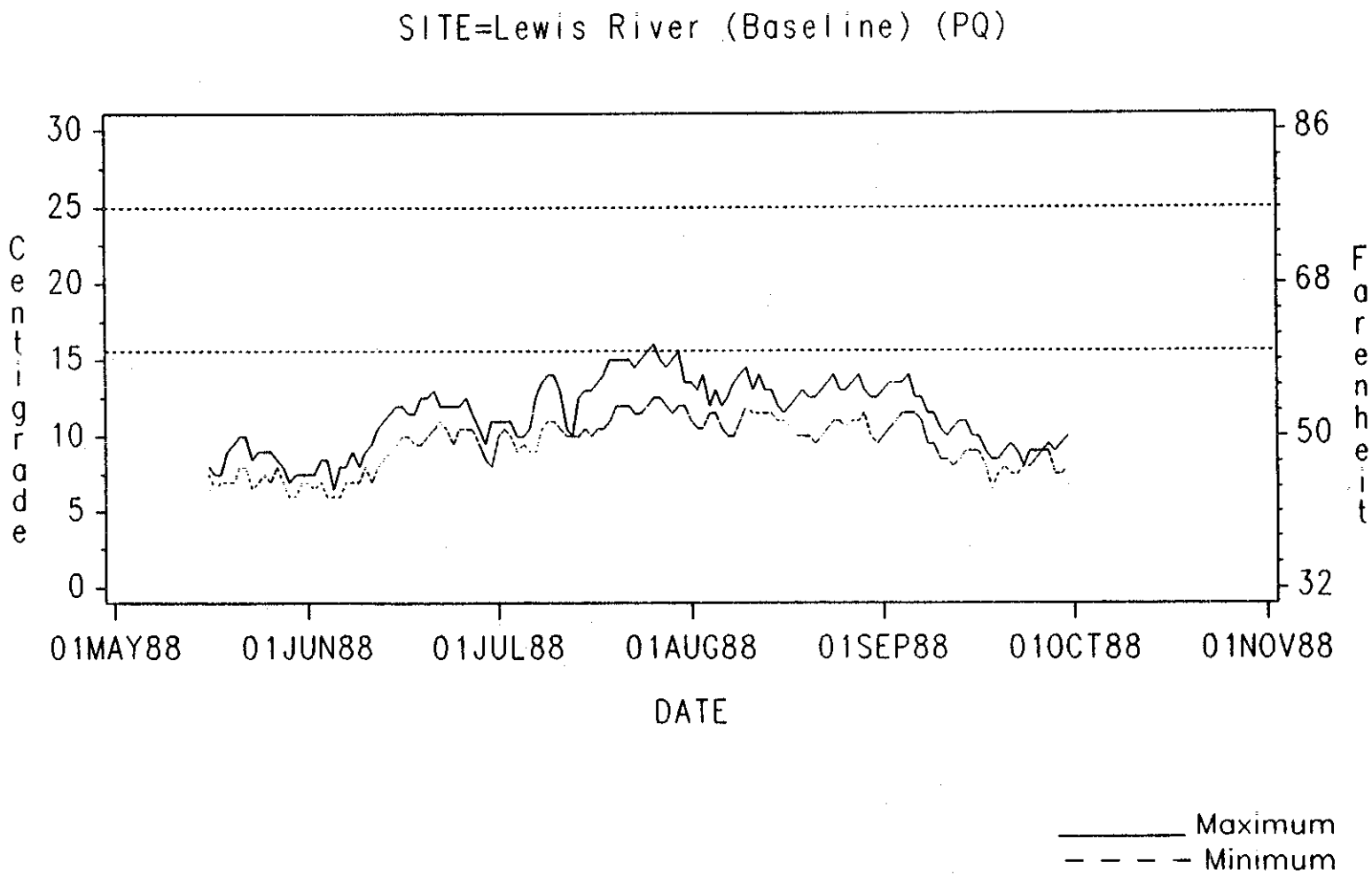
QUARTZ CREEK (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	15.0	18.0	12.0	6.0
02AUG	14.3	17.5	11.0	6.5
03AUG	15.3	19.0	11.5	7.5
04AUG	15.8	19.5	12.0	7.5
05AUG	14.8	17.0	12.5	4.5
06AUG	13.3	15.0	11.5	3.5
07AUG	14.5	18.0	11.0	7.0
08AUG	15.0	18.5	11.5	7.0
09AUG	15.5	19.0	12.0	7.0
10AUG	15.8	19.0	12.5	6.5
11AUG	15.5	18.5	12.5	6.0
12AUG	15.5	18.0	13.0	5.0
13AUG	15.5	18.0	13.0	5.0
14AUG	15.5	18.5	12.5	6.0
15AUG	14.5	17.0	12.0	5.0
16AUG	13.8	15.0	12.5	2.5
17AUG	13.3	14.5	12.0	2.5
18AUG	15.0	18.5	11.5	7.0
19AUG	15.0	18.5	11.5	7.0
20AUG	14.8	18.0	11.5	6.5
21AUG	14.5	18.5	10.5	8.0
22AUG	15.0	19.0	11.0	8.0
23AUG	15.5	19.5	11.5	8.0
24AUG	16.0	19.5	12.5	7.0
25AUG	15.0	18.5	11.5	7.0
26AUG	15.0	18.5	11.5	7.0
27AUG	15.5	19.0	12.0	7.0
28AUG	16.0	19.5	12.5	7.0
29AUG	15.0	17.5	12.5	5.0
30AUG	15.0	18.5	11.5	7.0
31AUG	15.0	19.0	11.0	8.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

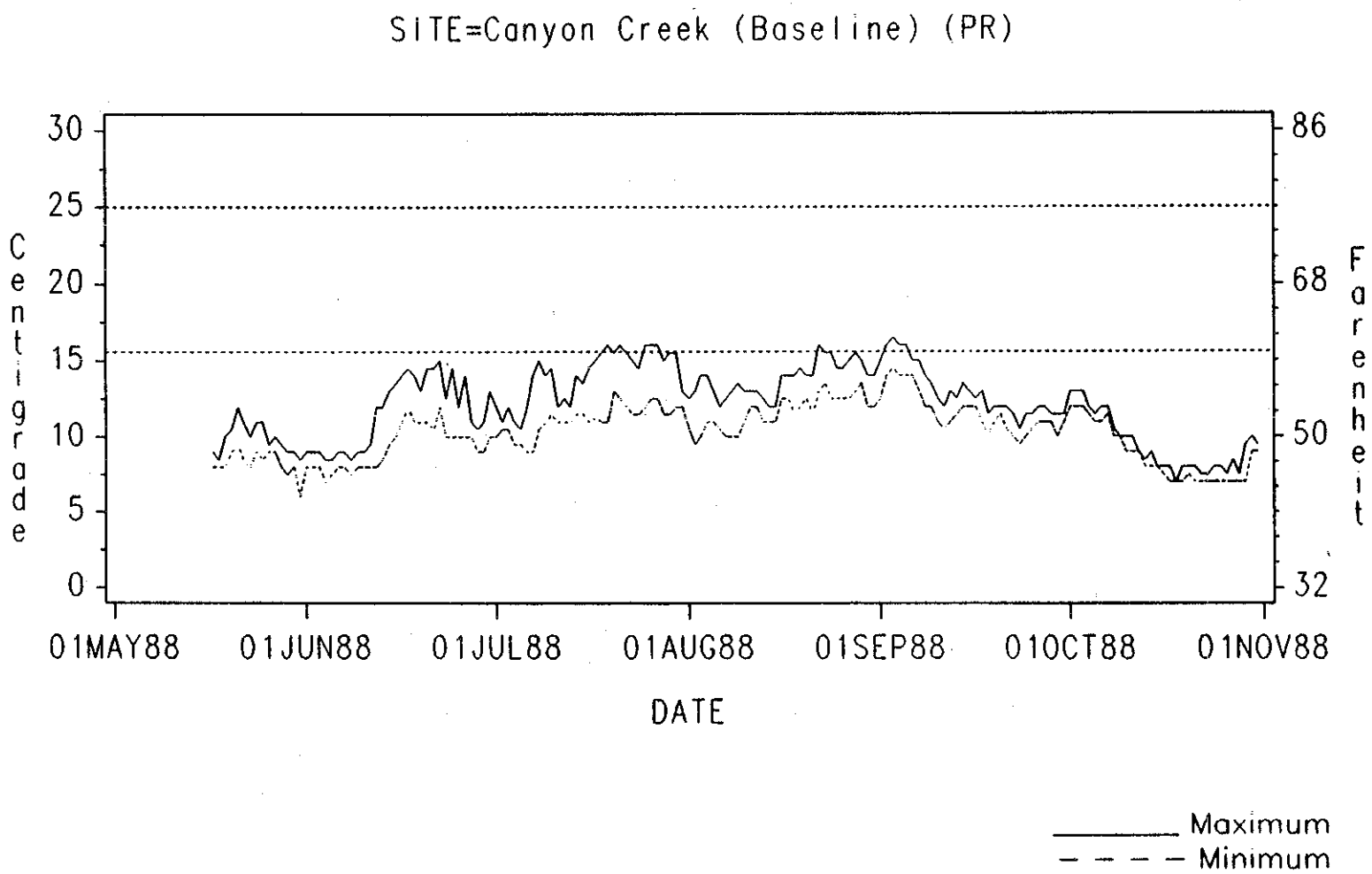
LEWIS RIVER (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	12.3	13.5	11.0	2.5
02AUG	11.8	13.0	10.5	2.5
03AUG	12.3	14.0	10.5	3.5
04AUG	11.8	12.0	11.5	0.5
05AUG	12.3	13.0	11.5	1.5
06AUG	11.3	12.0	10.5	1.5
07AUG	11.3	12.5	10.0	2.5
08AUG	11.8	13.5	10.0	3.5
09AUG	12.5	14.0	11.0	3.0
10AUG	13.3	14.5	12.0	2.5
11AUG	12.3	13.0	11.5	1.5
12AUG	12.8	14.0	11.5	2.5
13AUG	12.3	13.0	11.5	1.5
14AUG	12.3	13.0	11.5	1.5
15AUG	11.5	12.0	11.0	1.0
16AUG	11.3	11.5	11.0	0.5
17AUG	11.3	12.0	10.5	1.5
18AUG	11.3	12.5	10.0	2.5
19AUG	11.5	13.0	10.0	3.0
20AUG	11.3	12.5	10.0	2.5
21AUG	11.0	12.5	9.5	3.0
22AUG	11.5	13.0	10.0	3.0
23AUG	12.0	13.5	10.5	3.0
24AUG	12.5	14.0	11.0	3.0
25AUG	12.0	13.0	11.0	2.0
26AUG	11.8	13.0	10.5	2.5
27AUG	12.3	13.5	11.0	2.5
28AUG	12.5	14.0	11.0	3.0
29AUG	12.3	13.0	11.5	1.5
30AUG	11.3	12.5	10.0	2.5
31AUG	11.0	12.5	9.5	3.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

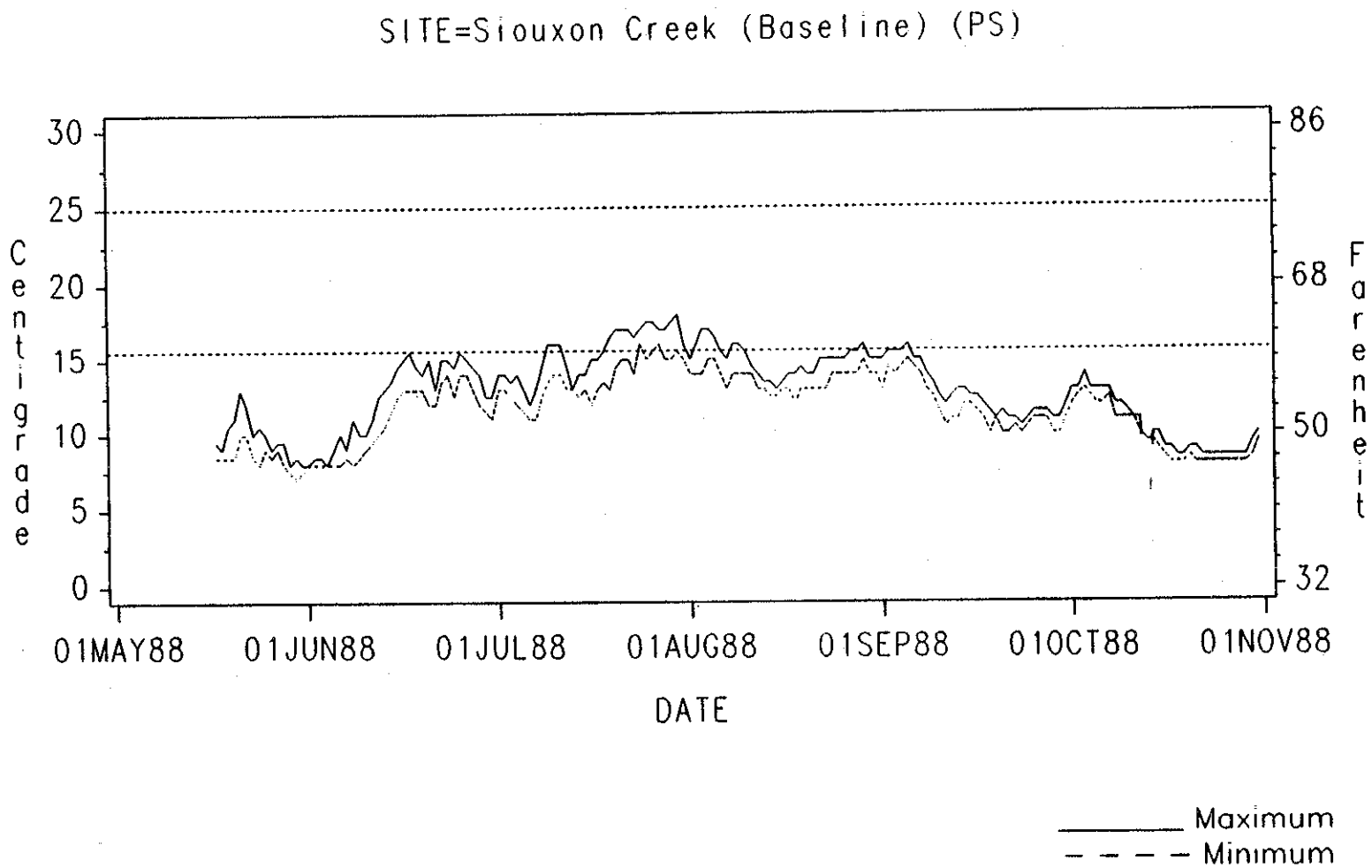
CANYON CREEK (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	11.5	12.5	10.5	2.0
02AUG	11.3	13.0	9.5	3.5
03AUG	12.0	14.0	10.0	4.0
04AUG	12.5	14.0	11.0	3.0
05AUG	12.0	13.0	11.0	2.0
06AUG	11.3	12.0	10.5	1.5
07AUG	11.3	12.5	10.0	2.5
08AUG	11.5	13.0	10.0	3.0
09AUG	11.8	13.5	10.0	3.5
10AUG	12.0	13.0	11.0	2.0
11AUG	12.5	13.0	12.0	1.0
12AUG	12.5	13.0	12.0	1.0
13AUG	11.8	12.5	11.0	1.5
14AUG	11.5	12.0	11.0	1.0
15AUG	11.5	12.0	11.0	1.0
16AUG	13.3	14.0	12.5	1.5
17AUG	13.3	14.0	12.5	1.5
18AUG	12.8	14.0	11.5	2.5
19AUG	13.3	14.5	12.0	2.5
20AUG	13.3	14.0	12.5	1.5
21AUG	12.8	14.0	11.5	2.5
22AUG	14.5	16.0	13.0	3.0
23AUG	14.5	15.5	13.5	2.0
24AUG	14.0	15.5	12.5	3.0
25AUG	13.5	14.5	12.5	2.0
26AUG	13.5	14.5	12.5	2.0
27AUG	13.8	15.0	12.5	2.5
28AUG	14.3	15.5	13.0	2.5
29AUG	14.3	15.0	13.5	1.5
30AUG	13.0	14.0	12.0	2.0
31AUG	13.0	14.0	12.0	2.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

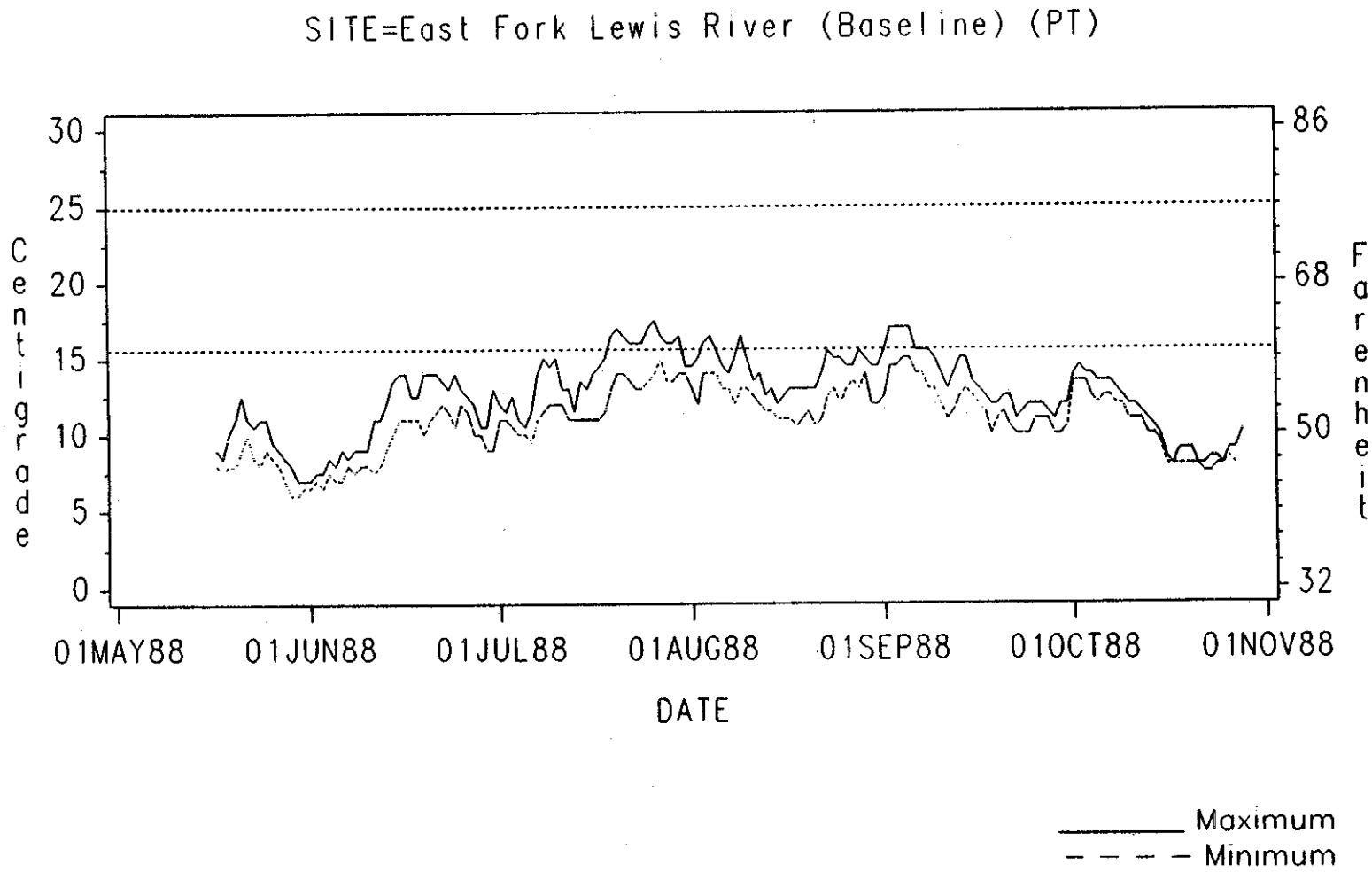
SIOUXON CREEK (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	14.5	15.0	14.0	1.0
02AUG	15.0	16.0	14.0	2.0
03AUG	15.5	17.0	14.0	3.0
04AUG	16.0	17.0	15.0	2.0
05AUG	15.8	16.5	15.0	1.5
06AUG	14.8	15.5	14.0	1.5
07AUG	14.0	15.0	13.0	2.0
08AUG	15.0	16.0	14.0	2.0
09AUG	15.0	16.0	14.0	2.0
10AUG	14.8	15.5	14.0	1.5
11AUG	14.3	14.5	14.0	0.5
12AUG	13.5	14.0	13.0	1.0
13AUG	13.3	13.5	13.0	0.5
14AUG	13.0	13.5	12.5	1.0
15AUG	12.8	13.0	12.5	0.5
16AUG	13.3	13.5	13.0	0.5
17AUG	13.5	14.0	13.0	1.0
18AUG	13.0	14.0	12.0	2.0
19AUG	13.8	14.5	13.0	1.5
20AUG	13.5	14.0	13.0	1.0
21AUG	13.5	14.0	13.0	1.0
22AUG	14.0	15.0	13.0	2.0
23AUG	14.0	15.0	13.0	2.0
24AUG	14.5	15.0	14.0	1.0
25AUG	14.5	15.0	14.0	1.0
26AUG	14.5	15.0	14.0	1.0
27AUG	14.8	15.5	14.0	1.5
28AUG	14.8	15.5	14.0	1.5
29AUG	15.5	16.0	15.0	1.0
30AUG	14.5	15.0	14.0	1.0
31AUG	14.5	15.0	14.0	1.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

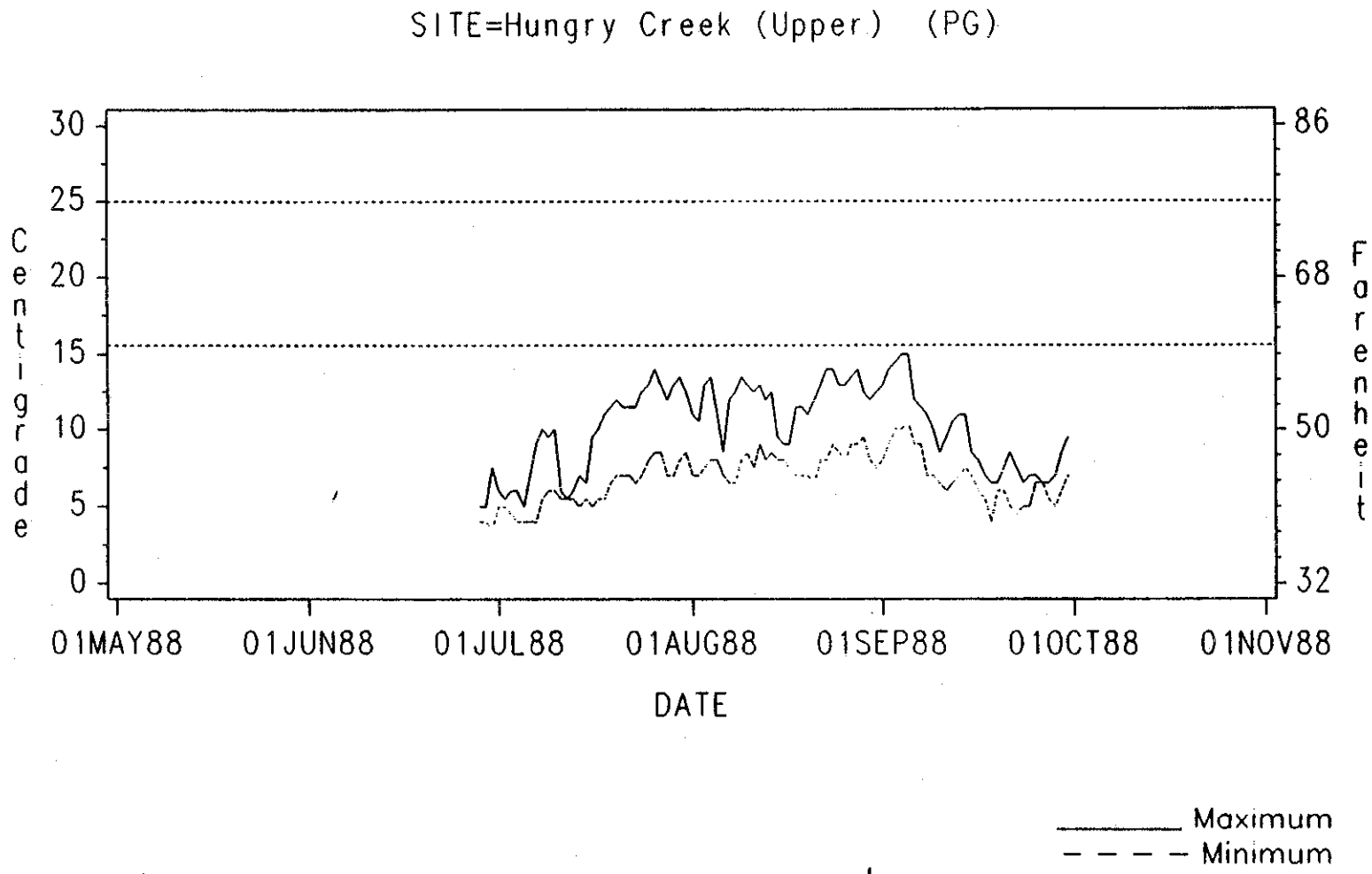
E. FORK LEWIS RIVER (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	13.8	14.5	13.0	1.5
02AUG	13.5	15.0	12.0	3.0
03AUG	15.0	16.0	14.0	2.0
04AUG	15.3	16.5	14.0	2.5
05AUG	14.8	15.5	14.0	1.5
06AUG	13.8	14.5	13.0	1.5
07AUG	13.5	14.0	13.0	1.0
08AUG	13.5	15.0	12.0	3.0
09AUG	14.8	16.5	13.0	3.5
10AUG	14.0	15.0	13.0	2.0
11AUG	13.0	13.5	12.5	1.0
12AUG	13.0	14.0	12.0	2.0
13AUG	12.0	12.5	11.5	1.0
14AUG	12.3	13.0	11.5	1.5
15AUG	11.5	12.0	11.0	1.0
16AUG	11.8	12.5	11.0	1.5
17AUG	12.0	13.0	11.0	2.0
18AUG	11.8	13.0	10.5	2.5
19AUG	12.0	13.0	11.0	2.0
20AUG	12.3	13.0	11.5	1.5
21AUG	11.8	13.0	10.5	2.5
22AUG	12.5	14.0	11.0	3.0
23AUG	14.0	15.5	12.5	3.0
24AUG	14.0	15.0	13.0	2.0
25AUG	13.5	15.0	12.0	3.0
26AUG	13.8	14.5	13.0	1.5
27AUG	14.0	14.5	13.5	1.0
28AUG	14.3	15.5	13.0	2.5
29AUG	14.5	15.0	14.0	1.0
30AUG	13.3	14.5	12.0	2.5
31AUG	13.3	14.5	12.0	2.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

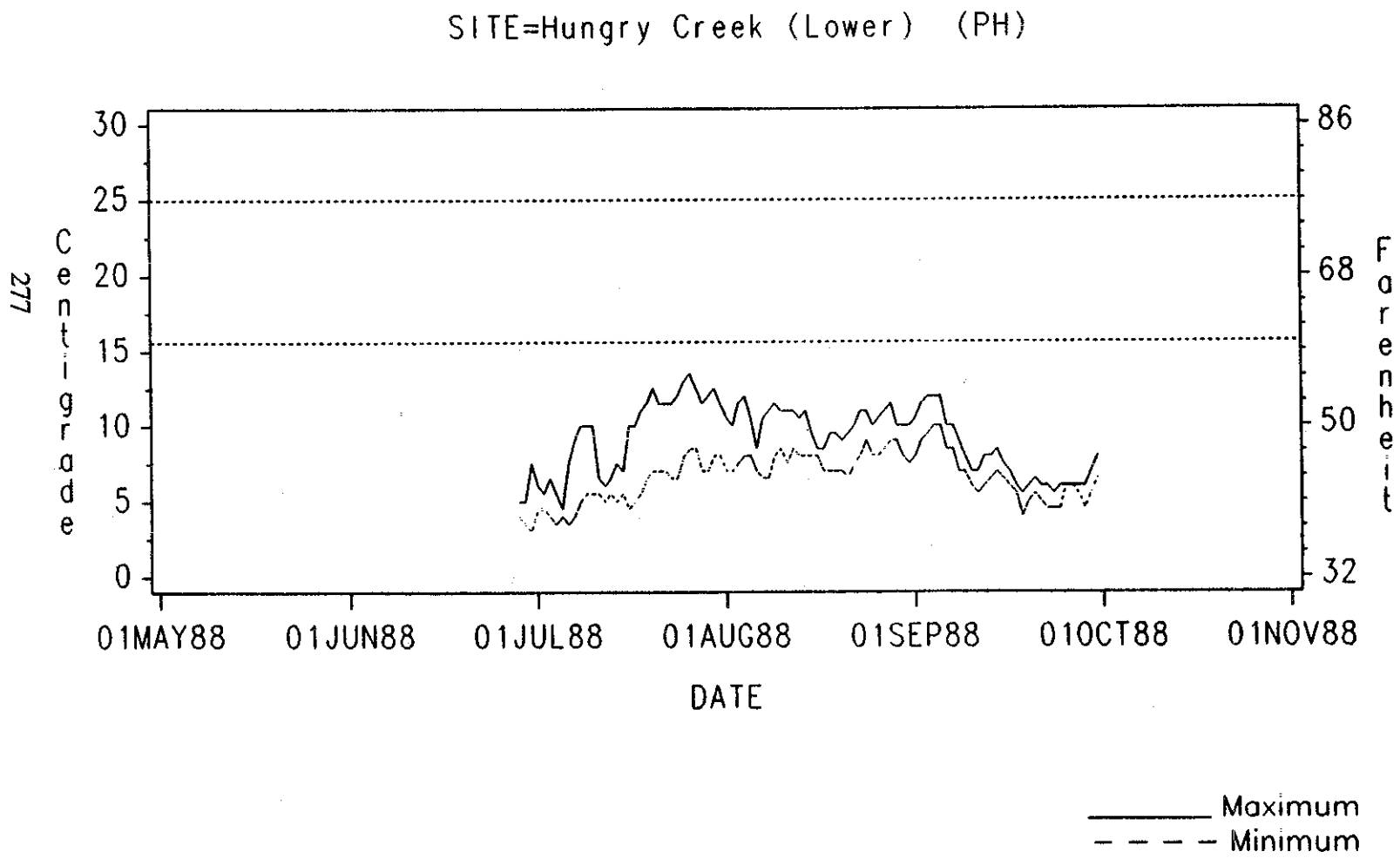
HUNGRY CREEK (UPPER STATION)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	9.0	11.0	7.0	4.0
02AUG	8.8	10.5	7.0	3.5
03AUG	10.3	13.0	7.5	5.5
04AUG	10.8	13.5	8.0	5.5
05AUG	9.5	11.0	8.0	3.0
06AUG	7.8	8.5	7.0	1.5
07AUG	9.3	12.0	6.5	5.5
08AUG	9.5	12.5	6.5	6.0
09AUG	10.8	13.5	8.0	5.5
10AUG	10.8	13.0	8.5	4.5
11AUG	10.0	12.5	7.5	5.0
12AUG	11.0	13.0	9.0	4.0
13AUG	10.0	12.0	8.0	4.0
14AUG	10.5	12.5	8.5	4.0
15AUG	8.8	9.5	8.0	1.5
16AUG	8.5	9.0	8.0	1.0
17AUG	8.3	9.0	7.5	1.5
18AUG	9.3	11.5	7.0	4.5
19AUG	9.3	11.5	7.0	4.5
20AUG	9.0	11.0	7.0	4.0
21AUG	9.3	12.0	6.5	5.5
22AUG	10.5	13.0	8.0	5.0
23AUG	11.0	14.0	8.0	6.0
24AUG	11.5	14.0	9.0	5.0
25AUG	10.8	13.0	8.5	4.5
26AUG	10.5	13.0	8.0	5.0
27AUG	11.3	13.5	9.0	4.5
28AUG	11.5	14.0	9.0	5.0
29AUG	11.0	12.5	9.5	3.0
30AUG	10.0	12.0	8.0	4.0
31AUG	10.0	12.5	7.5	5.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

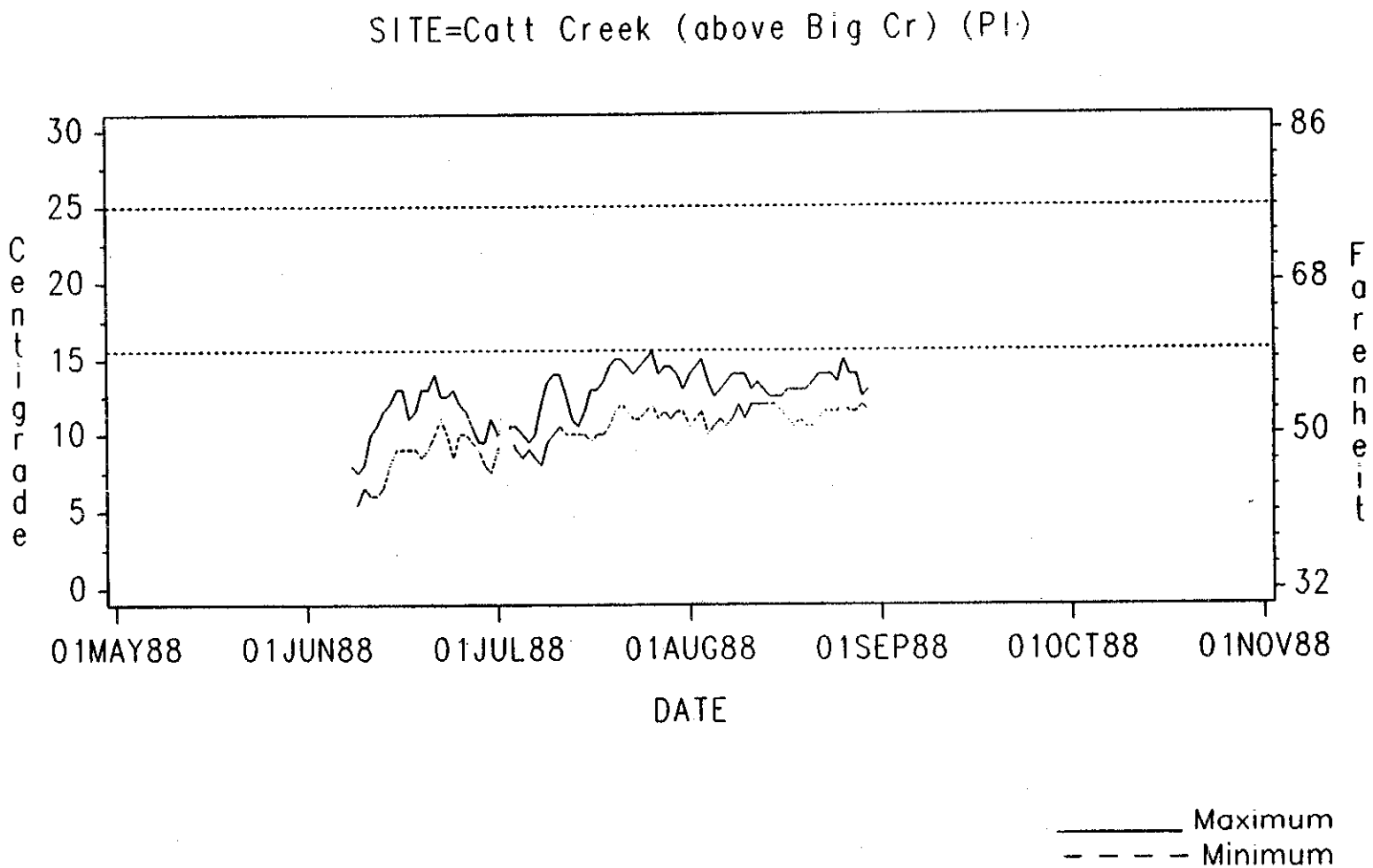
HUNGRY CREEK (LOWER STATION)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	8.8	10.5	7.0	3.5
02AUG	8.5	10.0	7.0	3.0
03AUG	9.5	11.5	7.5	4.0
04AUG	10.0	12.0	8.0	4.0
05AUG	9.3	10.5	8.0	2.5
06AUG	7.8	8.5	7.0	1.5
07AUG	8.5	10.5	6.5	4.0
08AUG	8.8	11.0	6.5	4.5
09AUG	9.8	11.5	8.0	3.5
10AUG	9.8	11.0	8.5	2.5
11AUG	9.3	11.0	7.5	3.5
12AUG	9.8	11.0	8.5	2.5
13AUG	9.3	10.5	8.0	2.5
14AUG	9.5	11.0	8.0	3.0
15AUG	8.8	9.5	8.0	1.5
16AUG	8.3	8.5	8.0	0.5
17AUG	7.8	8.5	7.0	1.5
18AUG	8.3	9.5	7.0	2.5
19AUG	8.3	9.5	7.0	2.5
20AUG	8.0	9.0	7.0	2.0
21AUG	8.0	9.5	6.5	3.0
22AUG	8.8	10.0	7.5	2.5
23AUG	9.5	11.0	8.0	3.0
24AUG	10.0	11.0	9.0	2.0
25AUG	9.0	10.0	8.0	2.0
26AUG	9.3	10.5	8.0	2.5
27AUG	9.8	11.0	8.5	2.5
28AUG	10.3	11.5	9.0	2.5
29AUG	9.5	10.0	9.0	1.0
30AUG	9.0	10.0	8.0	2.0
31AUG	8.8	10.0	7.5	2.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

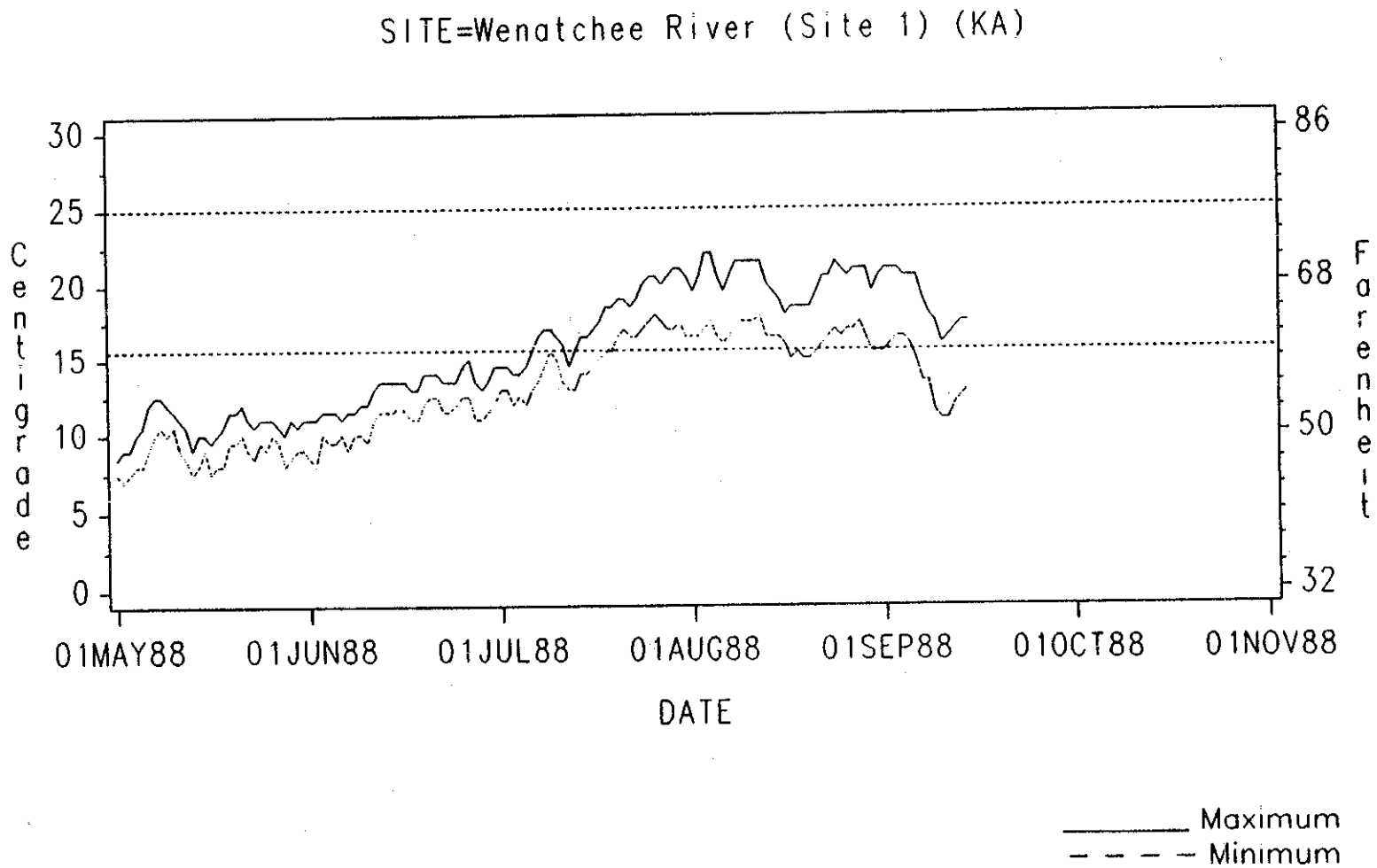
CATT CREEK (ABOVE BIG CREEK)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

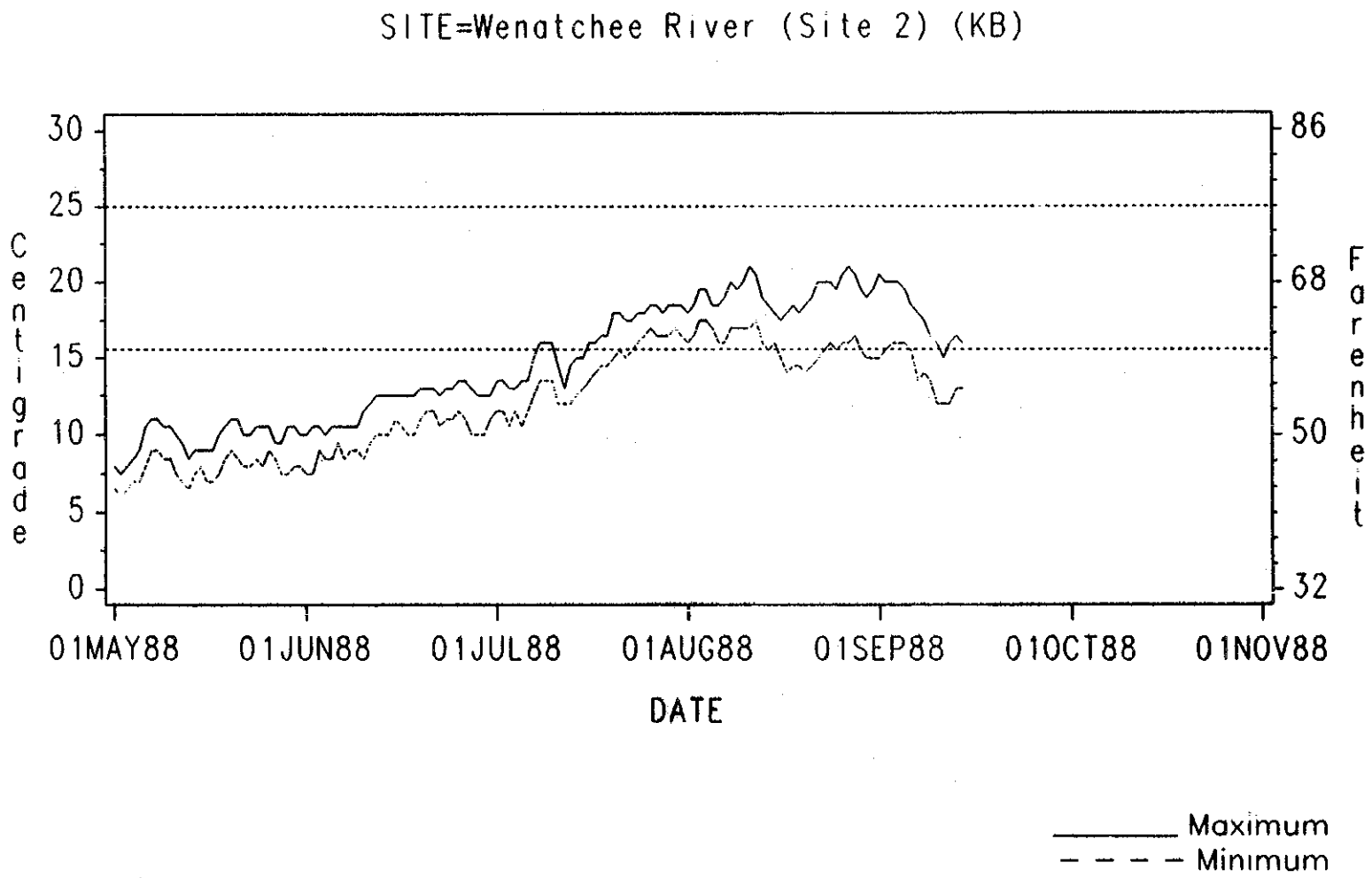
DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	12.3	14.0	10.5	3.5
02AUG	12.8	14.5	11.0	3.5
03AUG	13.3	15.0	11.5	3.5
04AUG	11.8	13.5	10.0	3.5
05AUG	11.5	12.5	10.5	2.0
06AUG	12.0	13.0	11.0	2.0
07AUG	12.0	13.5	10.5	3.0
08AUG	12.5	14.0	11.0	3.0
09AUG	13.0	14.0	12.0	2.0
10AUG	12.5	14.0	11.0	3.0
11AUG	12.5	13.0	12.0	1.0
12AUG	12.8	13.5	12.0	1.5
13AUG	12.5	13.0	12.0	1.0
14AUG	12.3	12.5	12.0	0.5
15AUG	12.3	12.5	12.0	0.5
16AUG	12.0	12.5	11.5	1.0
17AUG	12.0	13.0	11.0	2.0
18AUG	11.8	13.0	10.5	2.5
19AUG	12.0	13.0	11.0	2.0
20AUG	11.8	13.0	10.5	2.5
21AUG	12.0	13.5	10.5	3.0
22AUG	12.5	14.0	11.0	3.0
23AUG	12.8	14.0	11.5	2.5
24AUG	12.8	14.0	11.5	2.5
25AUG	12.5	13.5	11.5	2.0
26AUG	13.5	15.0	12.0	3.0
27AUG	12.8	14.0	11.5	2.5
28AUG	12.8	14.0	11.5	2.5
29AUG	12.3	12.5	12.0	0.5
30AUG	12.3	13.0	11.5	1.5

WATER TEMPERATURE



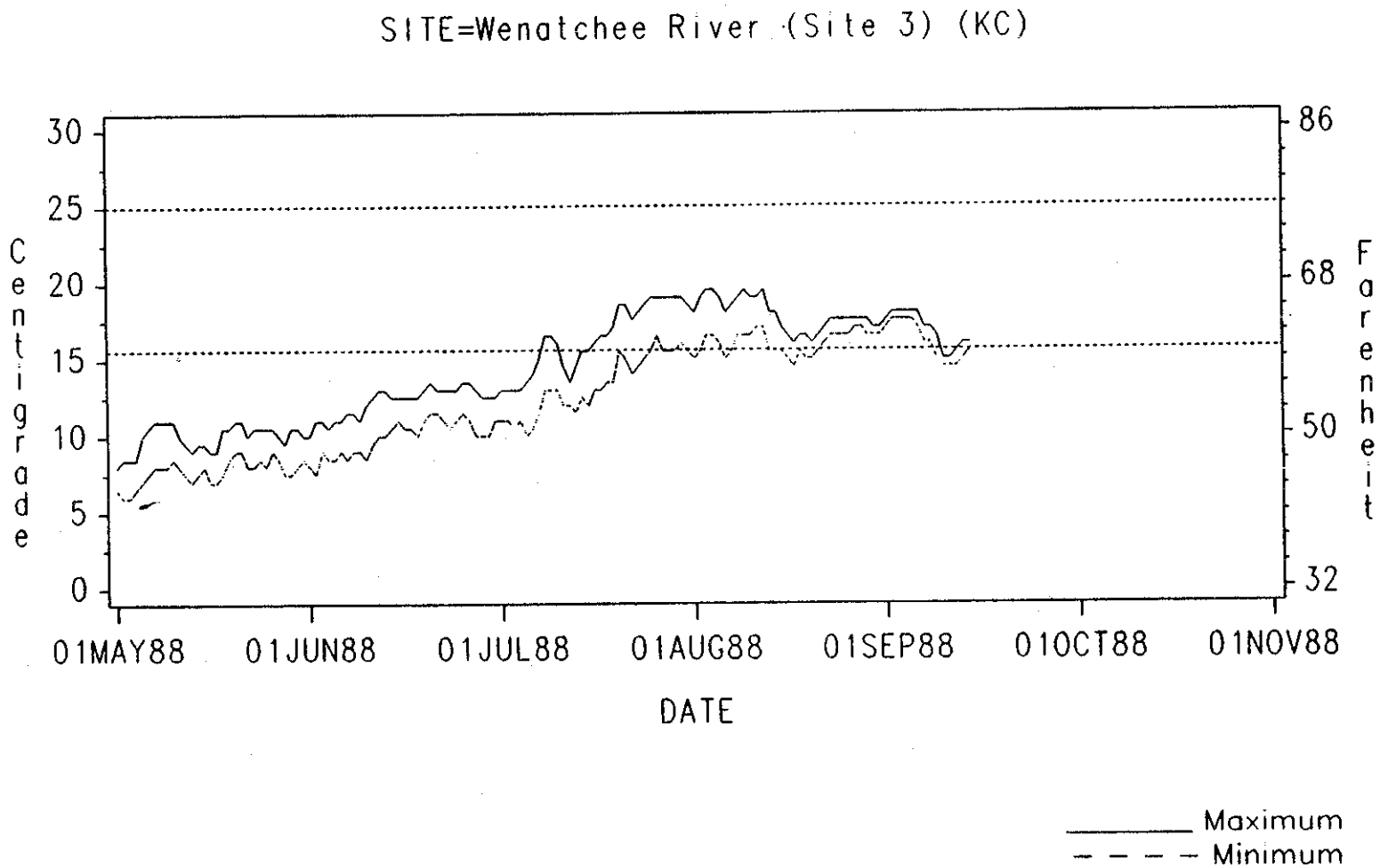
Timber/Fish/Wildlife
1988 Temperature Study

WATER TEMPERATURE



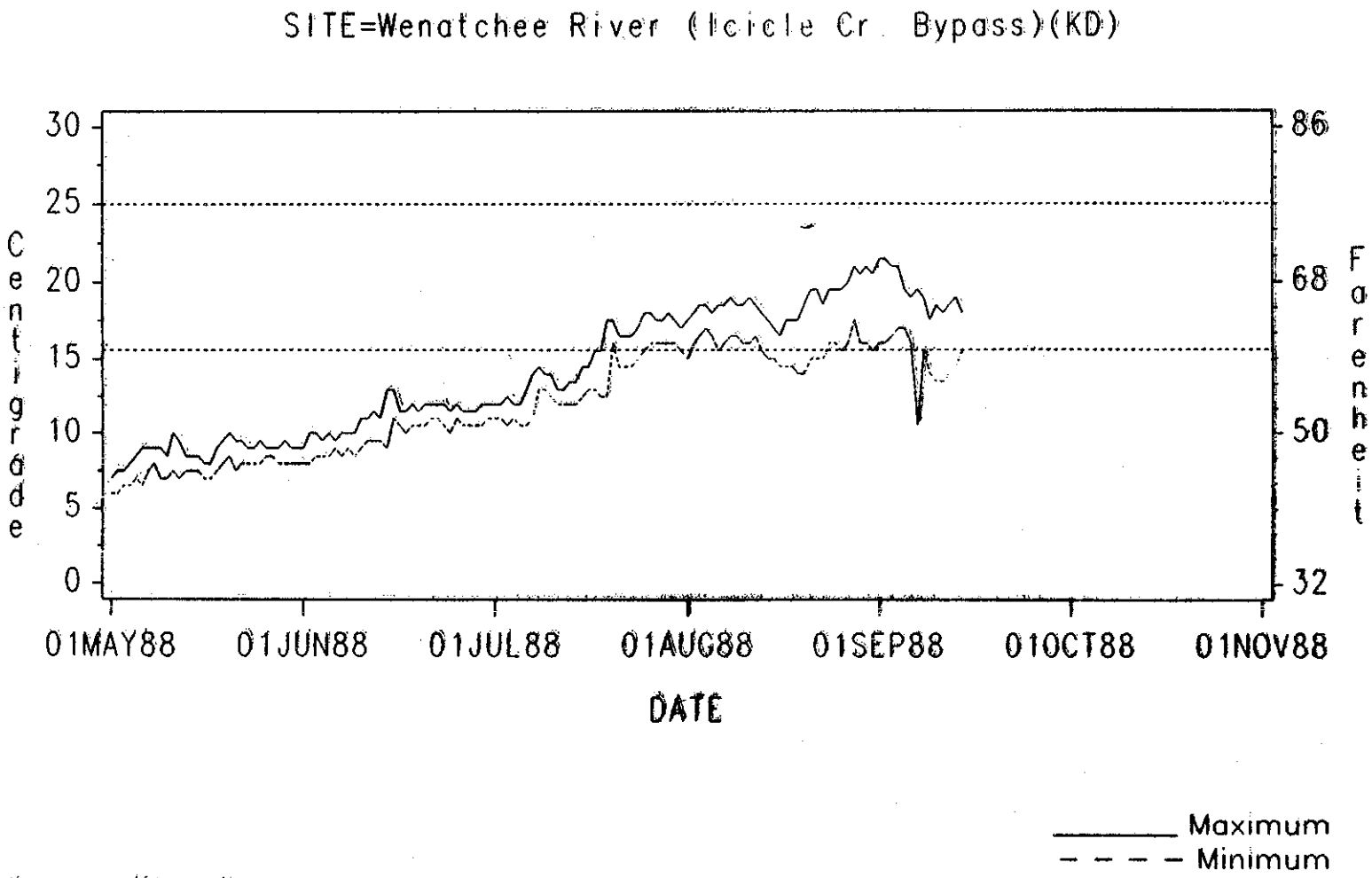
Timber/Fish/Wildlife
1988 Temperature Study

WATER TEMPERATURE



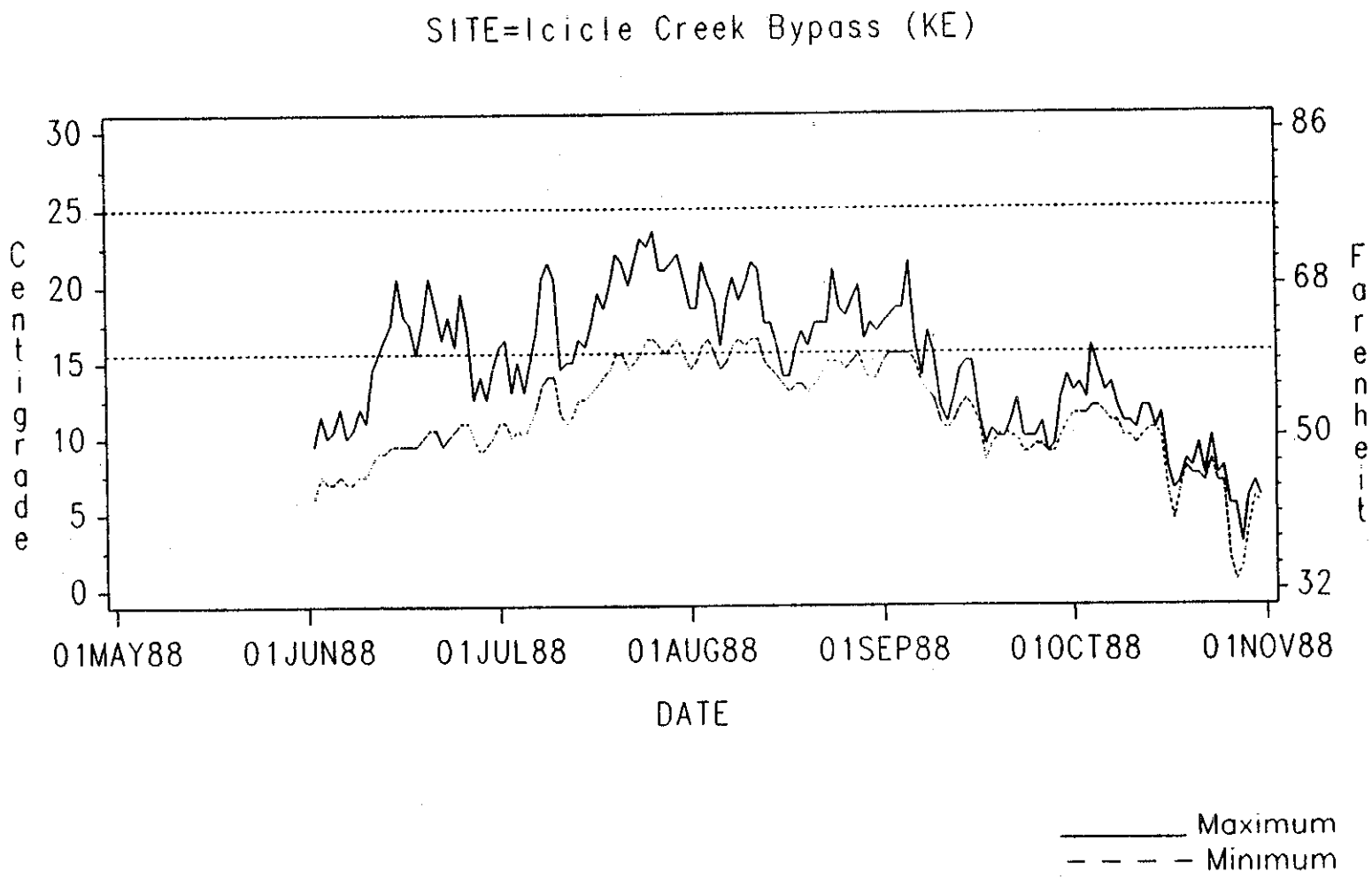
Timber/Fish/Wildlife
1988 Temperature Study

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

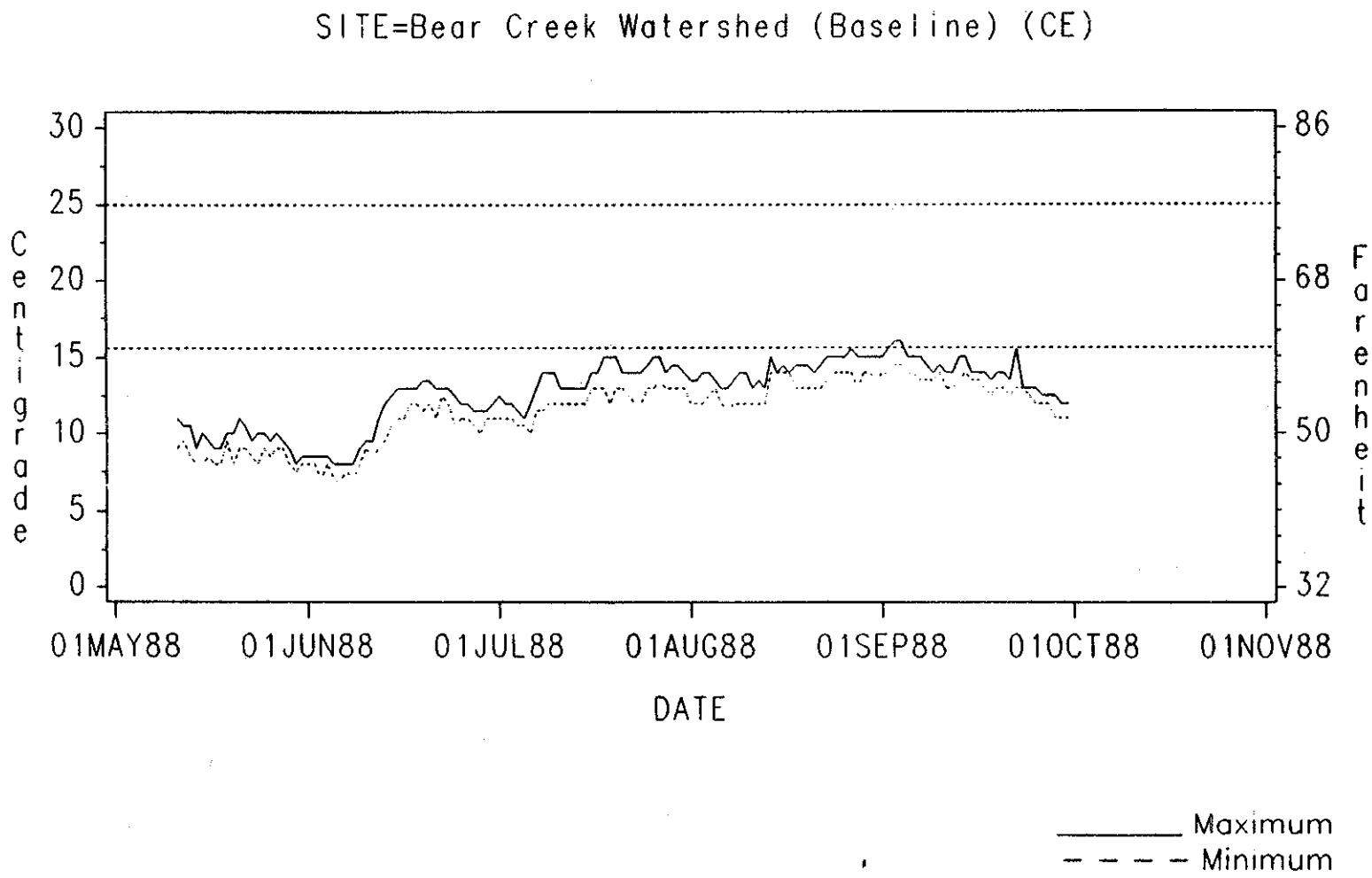
ICICLE CREEK BYPASS (WENATCHEE NATIONAL FOREST)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	20.3	16.5	28.0	18.5	12.5	14.5	15.5	4.0
02AUG	22.5	16.8	31.5	18.5	13.5	15.0	18.0	3.5
03AUG	24.5	18.8	35.0	21.5	14.0	16.0	21.0	5.5
04AUG	23.3	18.3	32.0	20.0	14.5	16.5	17.5	3.5
05AUG	20.8	17.3	28.0	19.0	13.5	15.5	14.5	3.5
06AUG	21.0	15.3	29.5	16.0	12.5	14.5	17.0	1.5
07AUG	22.8	17.0	32.5	19.0	13.0	15.0	19.5	4.0
08AUG	23.3	18.3	32.5	20.5	14.0	16.0	18.5	4.5
09AUG	23.0	17.8	31.5	19.0	14.5	16.5	17.0	2.5
10AUG	23.3	18.0	32.5	20.0	14.0	16.0	18.5	4.0
11AUG	24.3	19.0	33.5	21.5	15.0	16.5	18.5	5.0
12AUG	22.5	18.8	30.5	21.0	14.5	16.5	16.0	4.5
13AUG	20.8	16.3	28.5	17.5	13.0	15.0	15.5	2.5
14AUG	19.8	16.0	27.0	17.5	12.5	14.5	14.5	3.0
15AUG	18.3	15.0	23.5	16.0	13.0	14.0	10.5	2.0
16AUG	17.0	13.8	21.5	14.0	12.5	13.5	9.0	0.5
17AUG	19.8	13.5	28.5	14.0	11.0	13.0	17.5	1.0
18AUG	20.5	14.8	29.5	16.0	11.5	13.5	18.0	2.5
19AUG	19.5	15.3	27.5	17.0	11.5	13.5	16.0	3.5
20AUG	20.5	14.5	30.5	16.0	10.5	13.0	20.0	3.0
21AUG	22.3	15.5	33.5	17.5	11.0	13.5	22.5	4.0
22AUG	24.0	15.8	36.0	17.5	12.0	14.0	24.0	3.5
23AUG	21.5	16.3	30.5	17.5	12.5	15.0	18.0	2.5
24AUG	23.5	18.0	33.5	21.0	13.5	15.0	20.0	6.0
25AUG	22.3	16.8	32.0	18.5	12.5	15.0	19.5	3.5
26AUG	23.5	16.3	34.5	18.0	12.5	14.5	22.0	3.5
27AUG	24.5	17.0	35.5	19.0	13.5	15.0	22.0	4.0
28AUG	24.3	17.8	35.0	20.0	13.5	15.5	21.5	4.5
29AUG	21.0	15.5	30.0	16.5	12.0	14.5	18.0	2.0
30AUG	22.0	15.5	32.5	17.5	11.5	13.5	21.0	4.0
31AUG	23.5	15.5	34.5	17.0	12.5	14.0	22.0	3.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

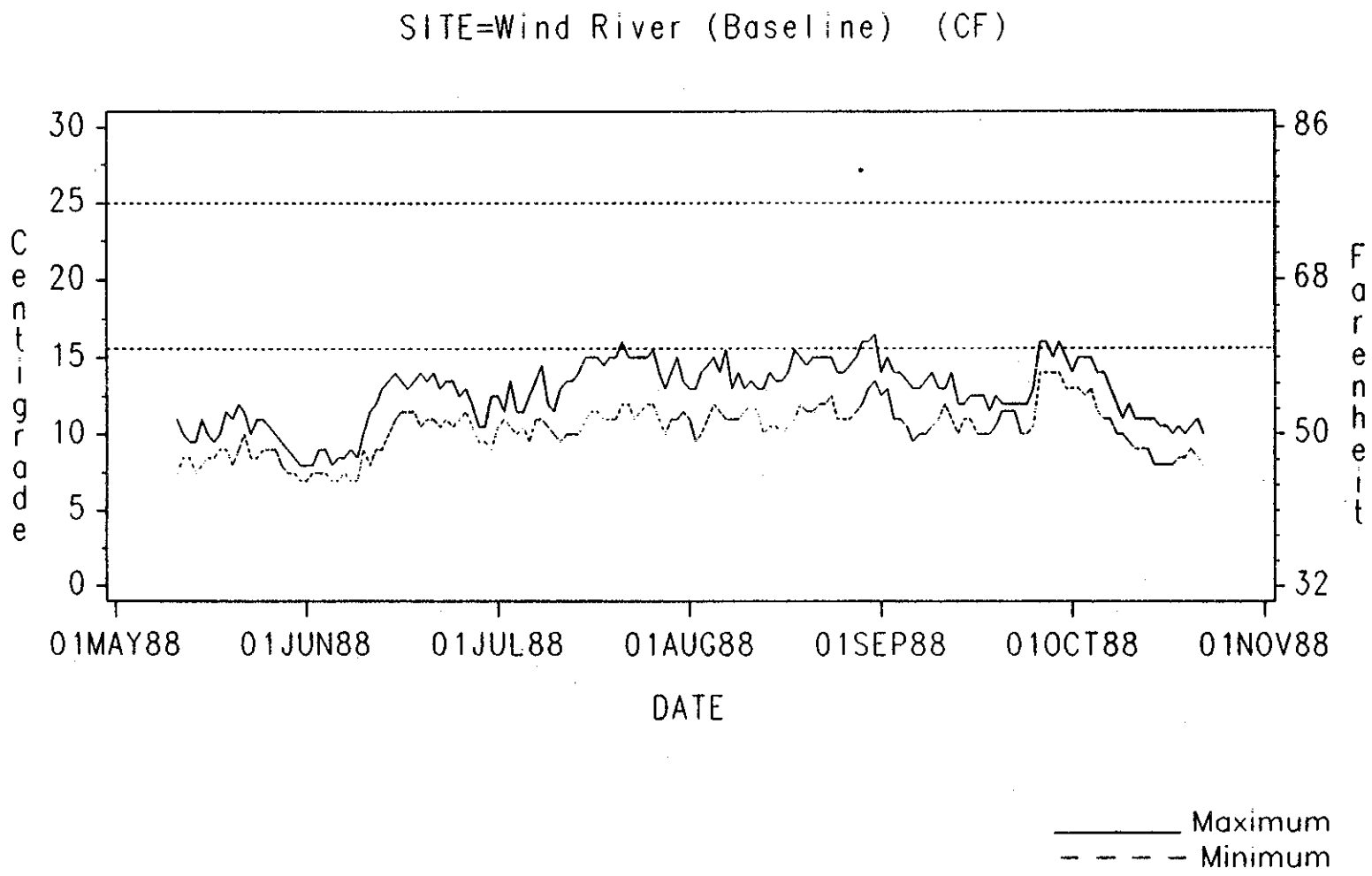
BEAR CREEK WATERSHED (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	12.8	13.5	12.0	1.5
02AUG	12.8	13.5	12.0	1.5
03AUG	13.0	14.0	12.0	2.0
04AUG	13.3	14.0	12.5	1.5
05AUG	13.3	13.5	13.0	0.5
06AUG	12.5	13.0	12.0	1.0
07AUG	12.3	13.0	11.5	1.5
08AUG	12.8	13.5	12.0	1.5
09AUG	13.0	14.0	12.0	2.0
10AUG	13.0	14.0	12.0	2.0
11AUG	12.5	13.0	12.0	1.0
12AUG	12.8	13.5	12.0	1.5
13AUG	12.5	13.0	12.0	1.0
14AUG	14.5	15.0	14.0	1.0
15AUG	14.0	14.0	14.0	0.0
16AUG	14.3	14.5	14.0	0.5
17AUG	14.0	14.0	14.0	0.0
18AUG	13.8	14.5	13.0	1.5
19AUG	13.8	14.5	13.0	1.5
20AUG	13.8	14.5	13.0	1.5
21AUG	13.5	14.0	13.0	1.0
22AUG	13.8	14.5	13.0	1.5
23AUG	14.3	15.0	13.5	1.5
24AUG	14.5	15.0	14.0	1.0
25AUG	14.5	15.0	14.0	1.0
26AUG	14.5	15.0	14.0	1.0
27AUG	14.8	15.5	14.0	1.5
28AUG	14.0	15.0	13.0	2.0
29AUG	14.5	15.0	14.0	1.0
30AUG	14.5	15.0	14.0	1.0
31AUG	14.3	15.0	13.5	1.5

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

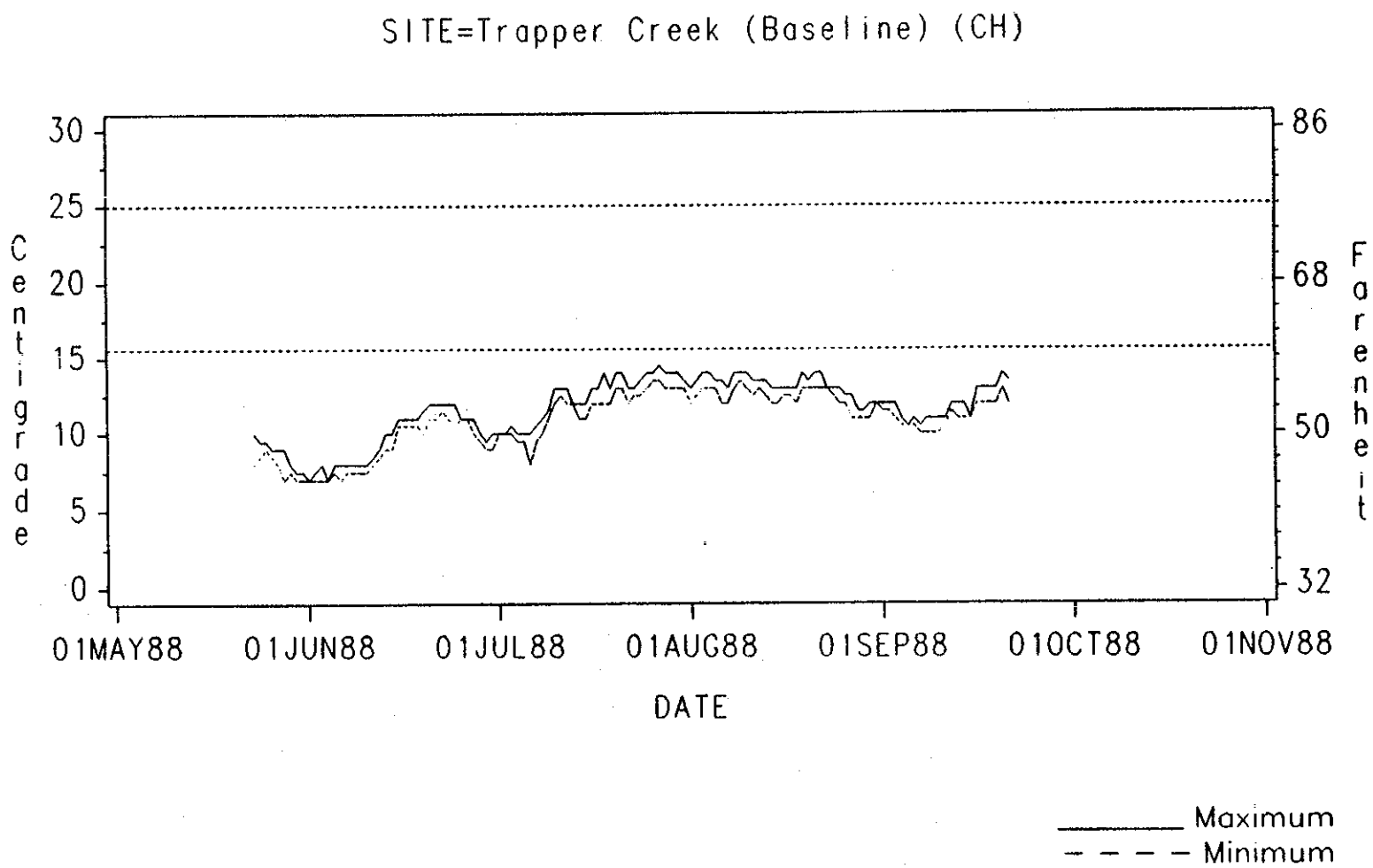
WIND RIVER (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	12.0	13.0	11.0	2.0
02AUG	11.3	13.0	9.5	3.5
03AUG	12.0	14.0	10.0	4.0
04AUG	12.8	14.5	11.0	3.5
05AUG	13.5	15.0	12.0	3.0
06AUG	12.8	14.0	11.5	2.5
07AUG	13.3	15.5	11.0	4.5
08AUG	12.0	13.0	11.0	2.0
09AUG	12.5	14.0	11.0	3.0
10AUG	12.3	13.0	11.5	1.5
11AUG	12.8	13.5	12.0	1.5
12AUG	12.3	13.0	11.5	1.5
13AUG	11.5	13.0	10.0	3.0
14AUG	12.3	14.0	10.5	3.5
15AUG	12.0	13.5	10.5	3.0
16AUG	11.8	13.5	10.0	3.5
17AUG	12.3	14.0	10.5	3.5
18AUG	13.3	15.5	11.0	4.5
19AUG	13.5	15.0	12.0	3.0
20AUG	13.0	14.5	11.5	3.0
21AUG	13.3	15.0	11.5	3.5
22AUG	13.5	15.0	12.0	3.0
23AUG	13.5	15.0	12.0	3.0
24AUG	13.8	15.0	12.5	2.5
25AUG	12.5	14.0	11.0	3.0
26AUG	12.5	14.0	11.0	3.0
27AUG	12.8	14.5	11.0	3.5
28AUG	13.3	15.0	11.5	3.5
29AUG	14.0	16.0	12.0	4.0
30AUG	14.5	16.0	13.0	3.0
31AUG	15.0	16.5	13.5	3.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

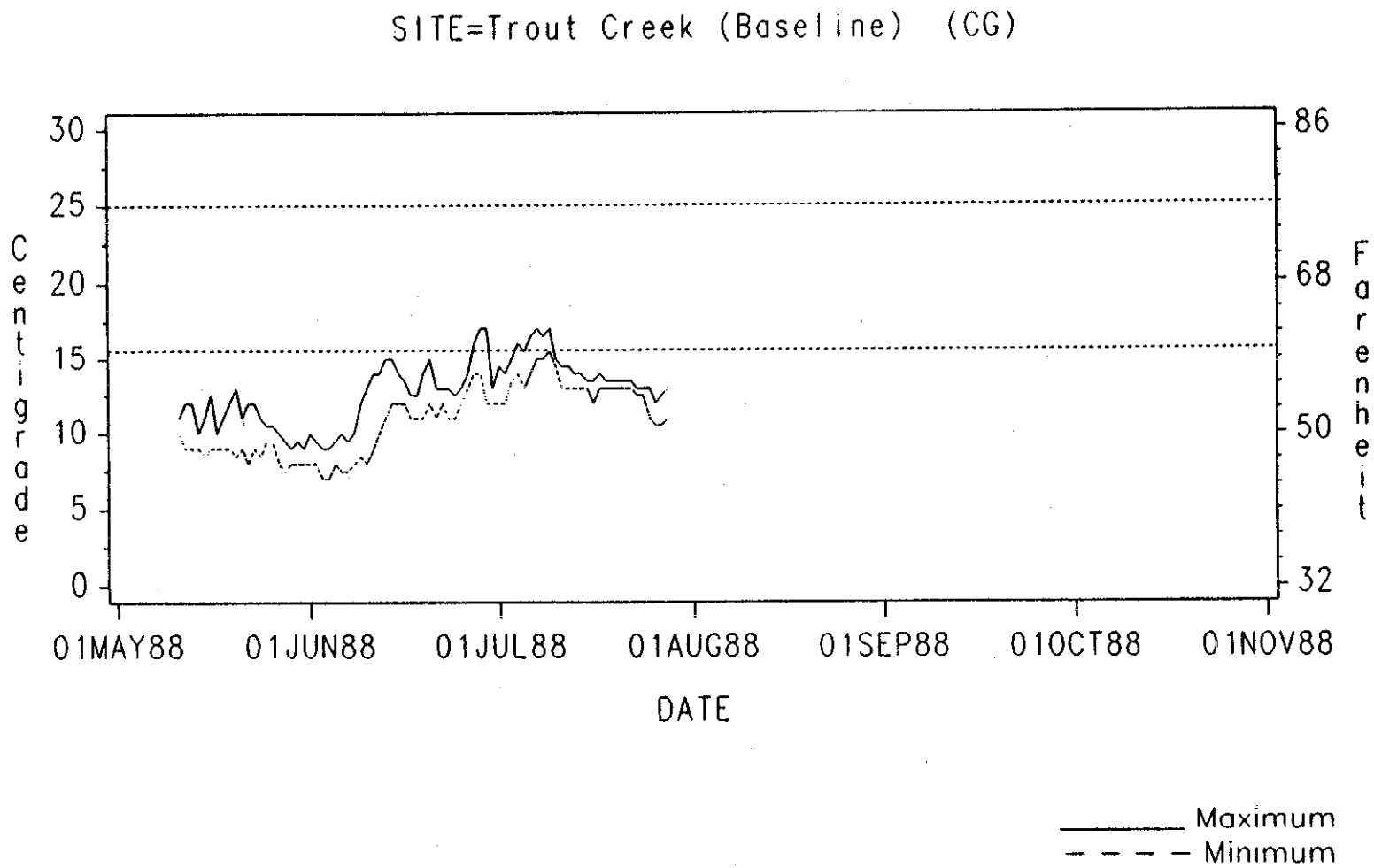
TRAPPER CREEK (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	12.5	13.0	12.0	1.0
02AUG	13.0	13.5	12.5	1.0
03AUG	13.5	14.0	13.0	1.0
04AUG	13.5	14.0	13.0	1.0
05AUG	13.3	13.5	13.0	0.5
06AUG	12.8	13.5	12.0	1.5
07AUG	12.5	13.0	12.0	1.0
08AUG	13.5	14.0	13.0	1.0
09AUG	13.8	14.0	13.5	0.5
10AUG	13.5	14.0	13.0	1.0
11AUG	13.0	13.5	12.5	1.0
12AUG	13.3	13.5	13.0	0.5
13AUG	13.0	13.5	12.5	1.0
14AUG	12.5	13.0	12.0	1.0
15AUG	12.5	13.0	12.0	1.0
16AUG	12.8	13.0	12.5	0.5
17AUG	12.8	13.0	12.5	0.5
18AUG	12.5	13.0	12.0	1.0
19AUG	13.5	14.0	13.0	1.0
20AUG	13.3	13.5	13.0	0.5
21AUG	13.5	14.0	13.0	1.0
22AUG	13.5	14.0	13.0	1.0
23AUG	13.0	13.0	13.0	0.0
24AUG	12.8	13.0	12.5	0.5
25AUG	12.5	13.0	12.0	1.0
26AUG	12.3	12.5	12.0	0.5
27AUG	11.8	12.5	11.0	1.5
28AUG	11.3	11.5	11.0	0.5
29AUG	11.3	11.5	11.0	0.5
30AUG	11.5	12.0	11.0	1.0
31AUG	12.0	12.0	12.0	0.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

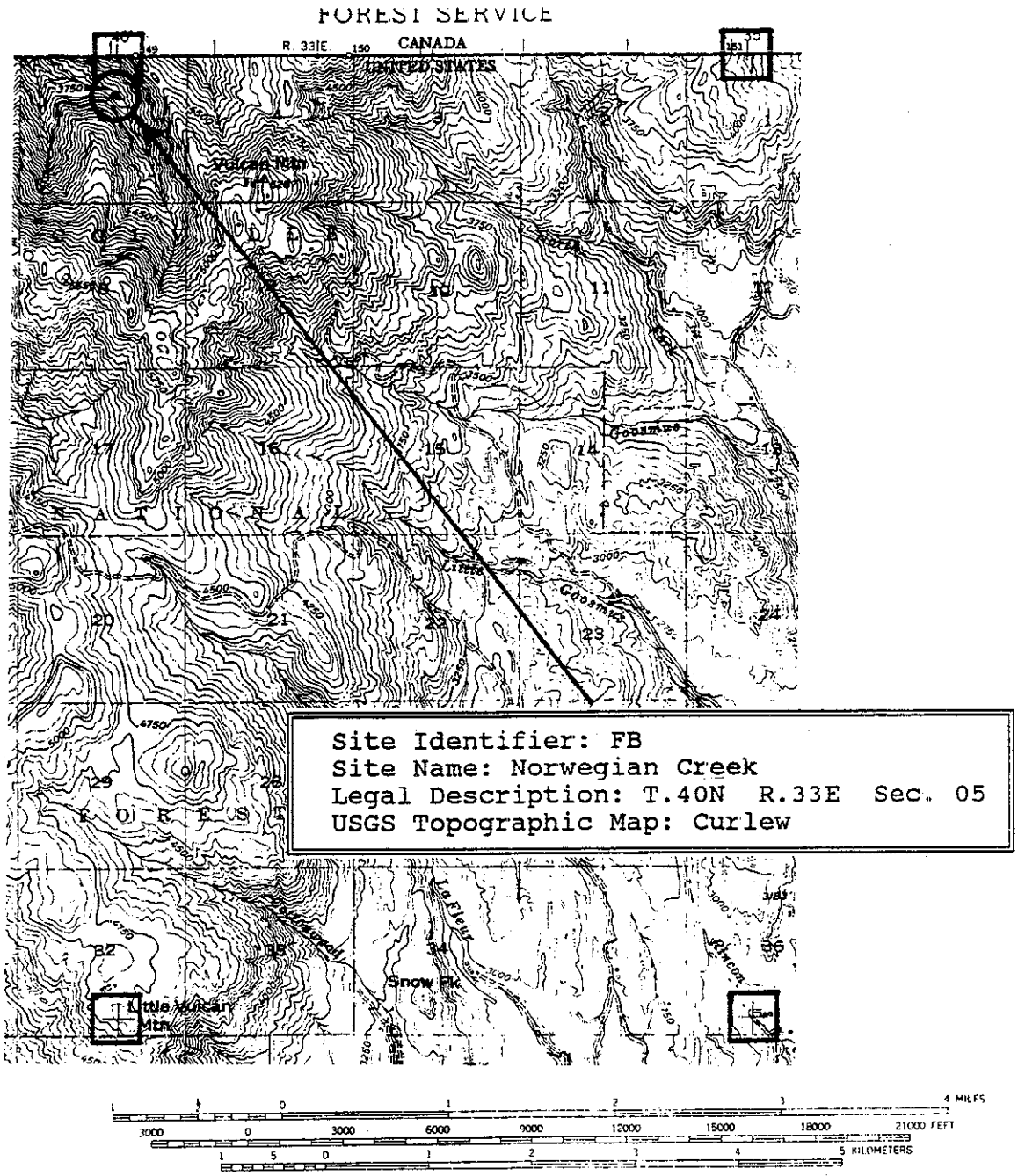
TROUT CREEK (BASELINE)
Gifford Pinchot National Forest

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=JULY ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01JUL	13.3	14.5	12.0	2.5
02JUL	13.0	14.0	12.0	2.0
03JUL	14.3	15.0	13.5	1.5
04JUL	15.0	16.0	14.0	2.0
05JUL	14.3	15.5	13.0	2.5
06JUL	15.3	16.5	14.0	2.5
07JUL	16.0	17.0	15.0	2.0
08JUL	15.8	16.5	15.0	1.5
09JUL	16.3	17.0	15.5	1.5
10JUL	14.8	15.0	14.5	0.5
11JUL	13.8	14.5	13.0	1.5
12JUL	13.8	14.5	13.0	1.5
13JUL	13.5	14.0	13.0	1.0
14JUL	13.5	14.0	13.0	1.0
15JUL	13.3	13.5	13.0	0.5
16JUL	12.8	13.5	12.0	1.5
17JUL	13.5	14.0	13.0	1.0
18JUL	13.3	13.5	13.0	0.5
19JUL	13.3	13.5	13.0	0.5
20JUL	13.3	13.5	13.0	0.5
21JUL	13.3	13.5	13.0	0.5
22JUL	13.3	13.5	13.0	0.5
23JUL	12.8	13.0	12.5	0.5
24JUL	12.8	13.0	12.5	0.5
25JUL	12.0	13.0	11.0	2.0
26JUL	11.3	12.0	10.5	1.5
27JUL	11.5	12.5	10.5	2.0
28JUL	12.0	13.0	11.0	2.0

TIMBER/FISH/WILDLIFE TEMPERATURE STUDY SITE MAP



TIMBER/FISH/WILDLIFE TEMPERATURE STUDY

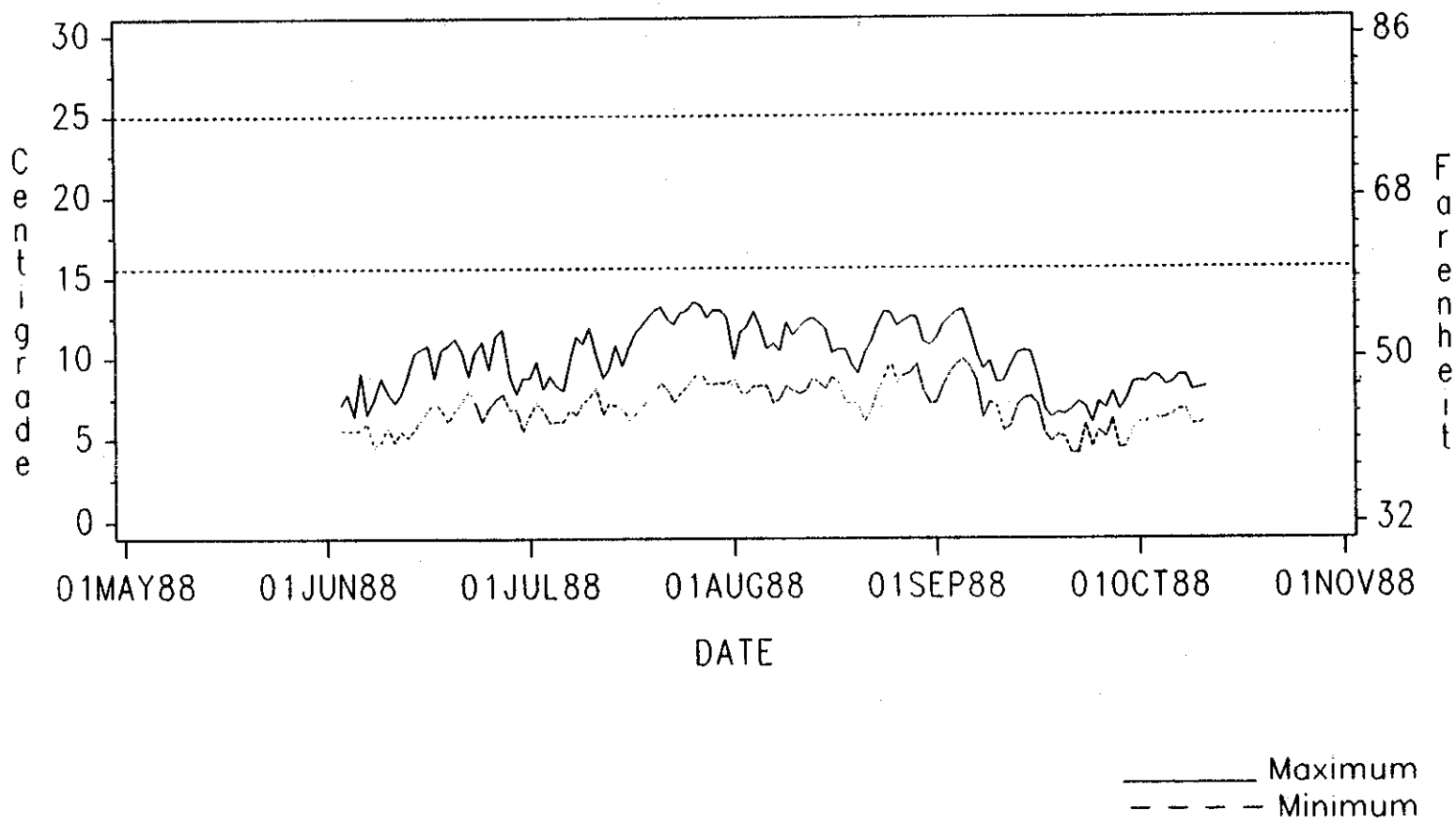
THERMOGRAPH SITE DATA SUMMARY

Item Name	Data Item*	Value
T/F/W Site Identifier	SITES	FB
Stream Name	SITENAMES	Norwegian Creek
Cooperator	COOPERATOR	USFS Colville NF
Cooperator/contact	COOPCONTACT	Burt Wasson
Date of Site Visit	VISIT	10-12-88
County	COUNTY	Ferry
Nearest town	NEARESTTOWN	Curlew
Township	TOWNSHIP	40N
Range	RANGE	33E
Section	SECTION	05
Site is Tributary To:	TRIBUTARYTO	Kettle River
Water Resource Inventory Area	WRIA	60
WDF River Segment Identifier	WDFNUMBER	
DNR Water Type	DNRWATERTYPE	4
T/F/W Ecoregion	ECOREGION	Colville
Latitude Decimal Degrees (degrees)	LATDEC	48.996810
Longitude Decimal Degrees (degrees)	LONGDEC	118.666900
NOAA Local Climatological Data Station	NOAAINDEX	spokane
Mean Annual Air Temperature (degrees C.)	ANNUALAIRC	7
Geologic Age of Basin Geology	GEOAGE	Upper Paleozoic
Geologic Lithology of Basin	GEOLITHO	Sedimentary
General Rock Type of Basin	GEOROCK	mostly graywacke
Geomorphic Stream Order	STREAMORDER	1
Thermograph Elevation (meters)	ELEVDSM	1154
Elevation Top of Thermal Reach (meters)	ELEVUSM	1219
Stream Gradient From Topographic Maps (percent)	TOPOGRAD	10.7
Channel Gradient from Autolevel (percent)	GRADLEVEL	0.0
Channel Azimuth (degrees)	AZIMUTH1	334
Drainage Area Above Thermograph (hectares)	AREAHECT	230
Distance to Divide (meters)	DIVIDEMT	2408
Total Length of Perennial Streams (meters)	LENGTHMT	1969
Streamflow at Thermograph (cubic meters/second)	QDSM	0.002
Streamflow Top of Thermal Reach (cubic meters/second)	QUSM	0.002
Water-Budget Groundwater Determination (cubic meters/second)	GWDETER1	0.000
Regional Groundwater Inflow (cubic meters/sec/km)	CMS/KM	0.001
Travel Time (meters/second)	TRAVELM	0.039
Average View To Sky (percent open) (percent)	VIEW1	55
Topographic Angle South (degrees)	TOPOSA	27
Topographic Angle Southeast (degrees)	TOPOSEA	28
Topographic Angle Southwest (degrees)	TOPOSWA	13
Average Forest Angle South (degrees)	FORSA	43
Average Forest Angle Southeast (degrees)	FORSEA	43
Average Forest Angle Southwest (degrees)	FORSWA	41
Percent Overhanging Brush (percent)	OVERBRUSH	33
Buffer Width Right Bank (meters)	BUFWIDRM	100.0
Buffer Width Left Bank (meters)	BUFWIDLM	0.0
Vegetation Height East Bank (meters)	VEGHTEM	39
Vegetation Height West Bank (meters)	VEGHTWM	12
Percent Vegetative Density East (percent)	VEGDENE	60
Percent Vegetative Density West (percent)	VEGDENW	60
Volume-weighted Stream Depth (m) (meters)	DEPTHVWT	0.073
Volume-weighted Stream Width (m) (meters)	WIDTHVWT	0.623
Percent of Channel Composed of Pools (percent)	PERCENPL	0
Average Pool Depth (meters)	DEPTHPM	0.000
Streambed Composition Clay & Silt (percent)	AVGCLAY/SILT	15
Streambed Composition Sand (percent)	AVGSAND	20
Streambed Composition Gravel (percent)	AVGGRAVEL	35
Streambed Composition Cobble (percent)	AVGCOBBLE	17
Streambed Composition Boulder (percent)	AVGBOULDER	13
Streambed Composition Bedrock (percent)	AVGBEDROCK	0
Streambed Median Particle Size	D50	gravel

*See data dictionary for detailed item description

WATER TEMPERATURE

SITE=Norwegian Creek (FB)



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

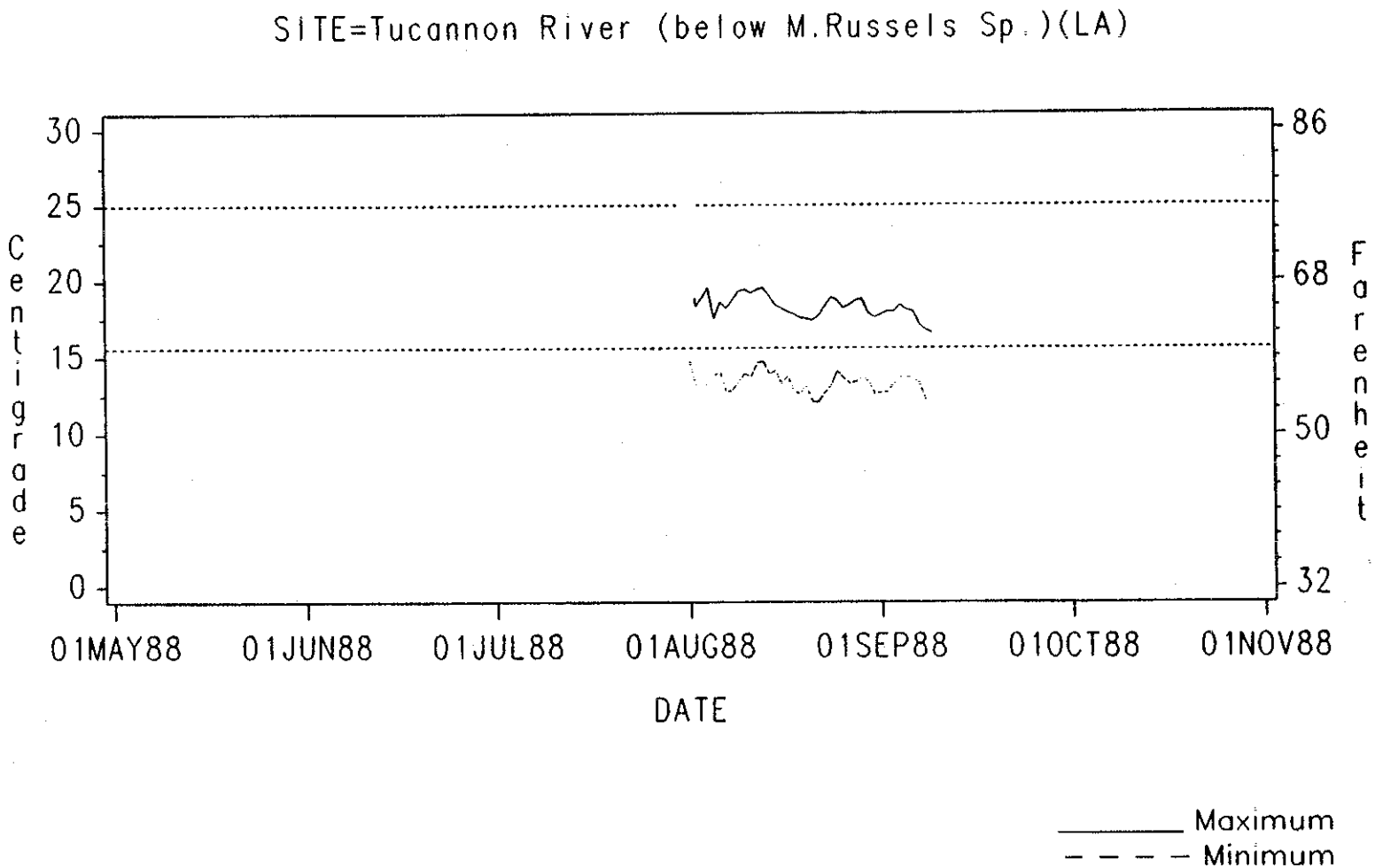
NORWEGIAN CR.

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	13.3	9.3	20.0	9.9	6.5	8.8	13.5	1.1
02AUG	12.2	9.8	18.3	11.6	6.1	7.9	12.2	3.7
03AUG	13.6	9.8	21.5	11.9	5.8	7.8	15.8	4.1
04AUG	16.4	10.6	24.5	12.9	8.3	8.3	16.3	4.6
05AUG	16.2	10.1	24.8	11.9	7.5	8.3	17.3	3.6
06AUG	11.0	9.4	14.9	10.5	7.0	8.3	7.9	2.3
07AUG	11.3	9.1	17.8	10.9	4.9	7.2	12.9	3.7
08AUG	11.8	9.0	17.8	10.4	5.9	7.5	11.9	2.9
09AUG	14.9	10.2	21.3	12.2	8.5	8.3	12.8	4.0
10AUG	12.2	9.7	18.8	11.4	5.5	8.0	13.3	3.4
11AUG	12.7	9.8	20.1	11.9	5.3	7.8	14.9	4.1
12AUG	14.6	10.1	23.0	12.3	6.3	8.0	16.8	4.3
13AUG	17.0	10.7	25.3	12.5	8.8	8.8	16.5	3.7
14AUG	14.7	10.4	21.8	12.2	7.5	8.5	14.3	3.7
15AUG	13.5	10.0	21.3	11.8	5.8	8.1	15.5	3.7
16AUG	10.1	9.5	12.8	10.3	7.4	8.8	5.4	1.5
17AUG	9.6	9.5	12.6	10.5	6.5	8.5	6.1	2.0
18AUG	8.4	8.9	13.1	10.5	3.8	7.3	9.4	3.3
19AUG	9.3	8.4	14.5	9.6	4.0	7.3	10.5	2.4
20AUG	6.4	8.1	9.9	9.0	2.9	7.1	7.0	1.9
21AUG	8.2	8.2	14.3	10.3	2.1	6.1	12.2	4.2
22AUG	10.6	8.9	17.2	11.0	3.9	6.8	13.3	4.2
23AUG	13.7	10.1	21.1	12.1	6.2	8.0	14.9	4.1
24AUG	16.4	10.9	24.5	12.9	8.2	8.8	16.3	4.1
25AUG	17.6	11.3	23.5	12.8	11.8	9.8	11.8	2.9
26AUG	12.7	10.3	18.8	12.0	6.5	8.5	12.3	3.5
27AUG	13.9	10.6	20.0	12.3	7.8	8.9	12.3	3.4
28AUG	15.8	10.9	23.0	12.6	8.5	9.1	14.5	3.5
29AUG	18.0	11.1	24.5	12.5	11.5	9.6	13.0	2.9
30AUG	9.8	9.5	15.0	11.0	4.5	8.0	10.5	3.0
31AUG	10.4	9.0	16.8	10.8	4.0	7.2	12.8	3.6

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

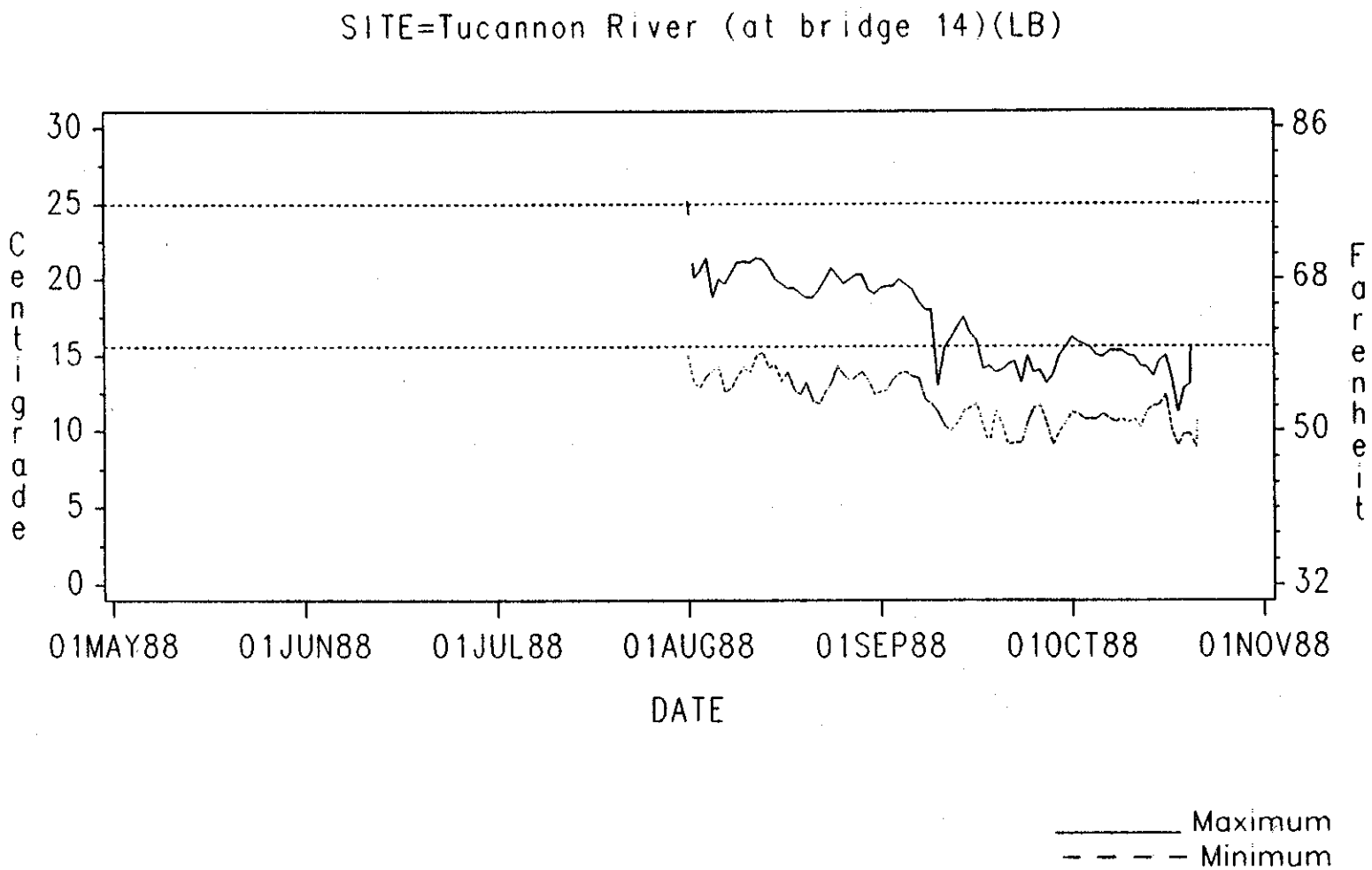
TUCANNON RIVER (below M.Russels Spring

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	18.7	25.7	14.7	11.0
02AUG	15.4	18.3	13.2	5.1
03AUG	15.5	18.8	12.9	5.9
04AUG	16.1	19.5	13.4	6.1
05AUG	15.7	17.5	13.8	3.7
06AUG	15.8	18.6	14.0	4.6
07AUG	15.1	18.2	12.7	5.5
08AUG	15.5	18.7	12.9	5.8
09AUG	16.1	19.3	13.4	5.9
10AUG	16.3	19.4	13.9	5.5
11AUG	16.2	19.2	13.7	5.5
12AUG	16.8	19.4	14.6	4.8
13AUG	16.7	19.5	14.7	4.8
14AUG	16.1	19.0	13.9	5.1
15AUG	15.8	18.4	14.1	4.3
16AUG	15.5	18.2	13.3	4.9
17AUG	15.5	18.0	13.7	4.3
18AUG	15.0	17.8	12.8	5.0
19AUG	14.8	17.6	12.6	5.0
20AUG	14.8	17.5	13.2	4.3
21AUG	14.4	17.4	12.1	5.3
22AUG	14.5	17.7	12.1	5.6
23AUG	15.1	18.3	12.7	5.6
24AUG	15.7	18.9	13.2	5.7
25AUG	16.0	18.7	14.1	4.6
26AUG	15.5	18.2	13.6	4.6
27AUG	15.4	18.4	13.3	5.1
28AUG	15.7	18.7	13.4	5.3
29AUG	15.9	18.8	13.7	5.1
30AUG	15.3	17.9	13.4	4.5
31AUG	14.7	17.6	12.6	5.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

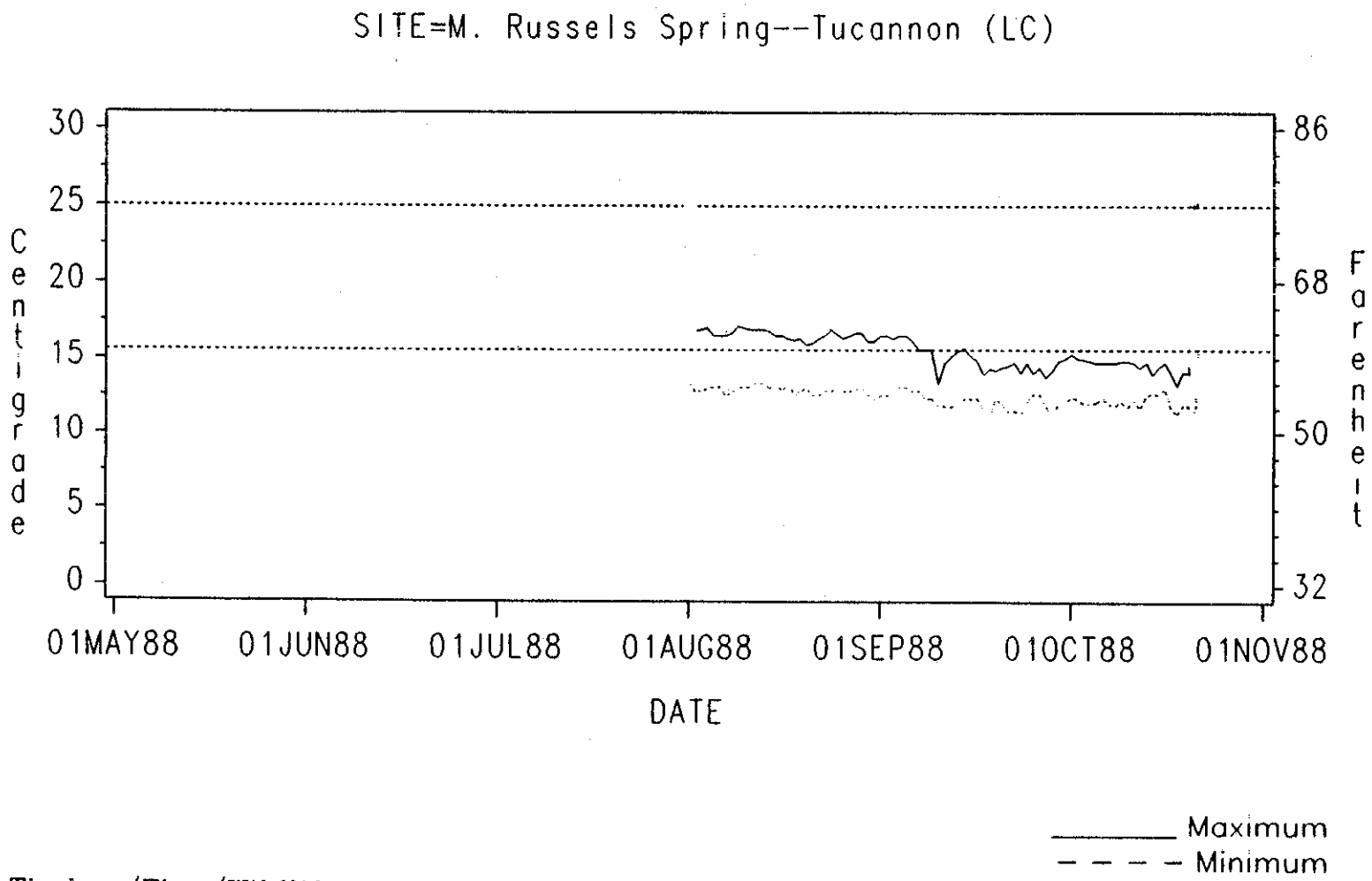
TUCANNON RIVER (at bridge 14)

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	19.0	25.2	15.0	10.2
02AUG	16.0	20.1	13.2	6.9
03AUG	16.1	20.5	12.9	7.6
04AUG	16.9	21.4	13.6	7.8
05AUG	16.3	18.8	14.0	4.8
06AUG	16.4	20.0	14.2	5.8
07AUG	15.6	19.7	12.6	7.1
08AUG	16.1	20.4	12.8	7.6
09AUG	16.8	21.1	13.6	7.5
10AUG	17.1	21.2	14.2	7.0
11AUG	17.0	21.1	13.9	7.2
12AUG	17.7	21.4	15.0	6.4
13AUG	17.5	21.3	15.2	6.1
14AUG	16.9	20.8	14.2	6.6
15AUG	16.5	20.0	14.4	5.6
16AUG	16.0	19.7	13.3	6.4
17AUG	16.1	19.4	13.9	5.5
18AUG	15.6	19.4	12.7	6.7
19AUG	15.3	19.1	12.4	6.7
20AUG	15.3	18.8	13.2	5.6
21AUG	14.8	18.8	12.0	6.8
22AUG	15.0	19.3	11.8	7.5
23AUG	15.7	20.0	12.6	7.4
24AUG	16.4	20.7	13.2	7.5
25AUG	16.7	20.2	14.3	5.9
26AUG	16.2	19.7	13.7	6.0
27AUG	16.1	20.0	13.3	6.7
28AUG	16.4	20.3	13.6	6.7
29AUG	16.6	20.3	13.9	6.4
30AUG	15.9	19.3	13.4	5.9
31AUG	15.2	19.0	12.4	6.6

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

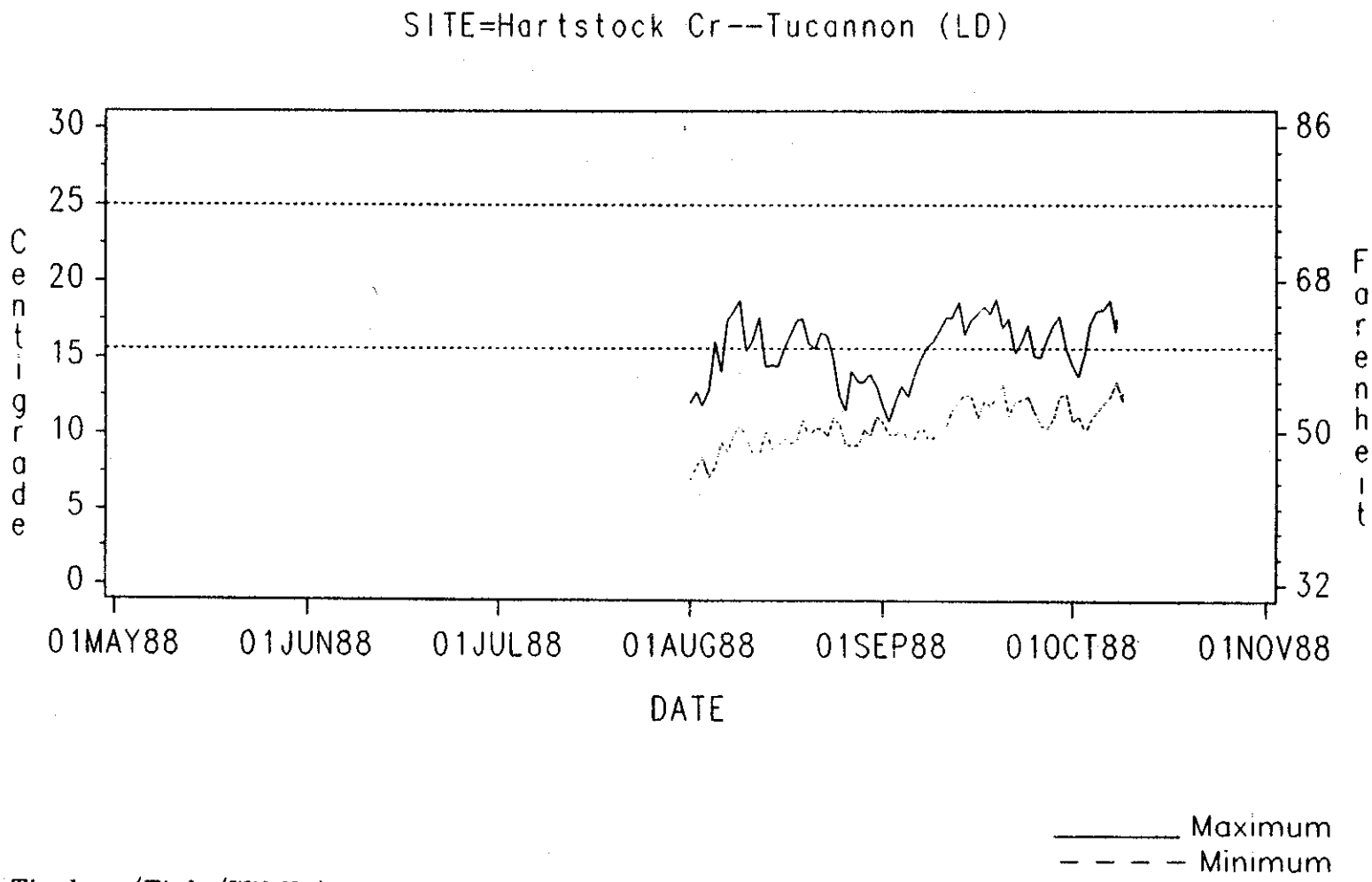
M. RUSSELS SPRING--Tucannon

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	17.7	25.7	13.4	12.3
02AUG	14.5	16.8	12.7	4.1
03AUG	14.5	16.9	12.8	4.1
04AUG	14.8	17.0	13.0	4.0
05AUG	14.4	16.5	13.1	3.4
06AUG	14.5	16.5	13.1	3.4
07AUG	14.3	16.5	12.4	4.1
08AUG	14.5	16.7	12.8	3.9
09AUG	14.8	17.1	13.0	4.1
10AUG	14.9	17.0	13.1	3.9
11AUG	14.8	16.9	13.1	3.8
12AUG	15.0	16.9	13.4	3.5
13AUG	14.8	16.9	13.4	3.5
14AUG	14.6	16.8	13.0	3.8
15AUG	14.5	16.5	13.4	3.1
16AUG	14.5	16.5	12.8	3.7
17AUG	14.5	16.3	13.3	3.0
18AUG	14.2	16.2	12.6	3.6
19AUG	14.2	16.3	12.8	3.5
20AUG	14.2	15.9	13.0	2.9
21AUG	14.0	16.0	12.5	3.5
22AUG	14.2	16.3	12.6	3.7
23AUG	14.5	16.5	12.8	3.7
24AUG	14.6	16.9	12.8	4.1
25AUG	14.6	16.6	13.1	3.5
26AUG	14.3	16.3	12.8	3.5
27AUG	14.3	16.5	12.8	3.7
28AUG	14.5	16.7	13.0	3.7
29AUG	14.6	16.7	13.0	3.7
30AUG	14.0	16.1	12.6	3.5
31AUG	13.9	16.1	12.3	3.8

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

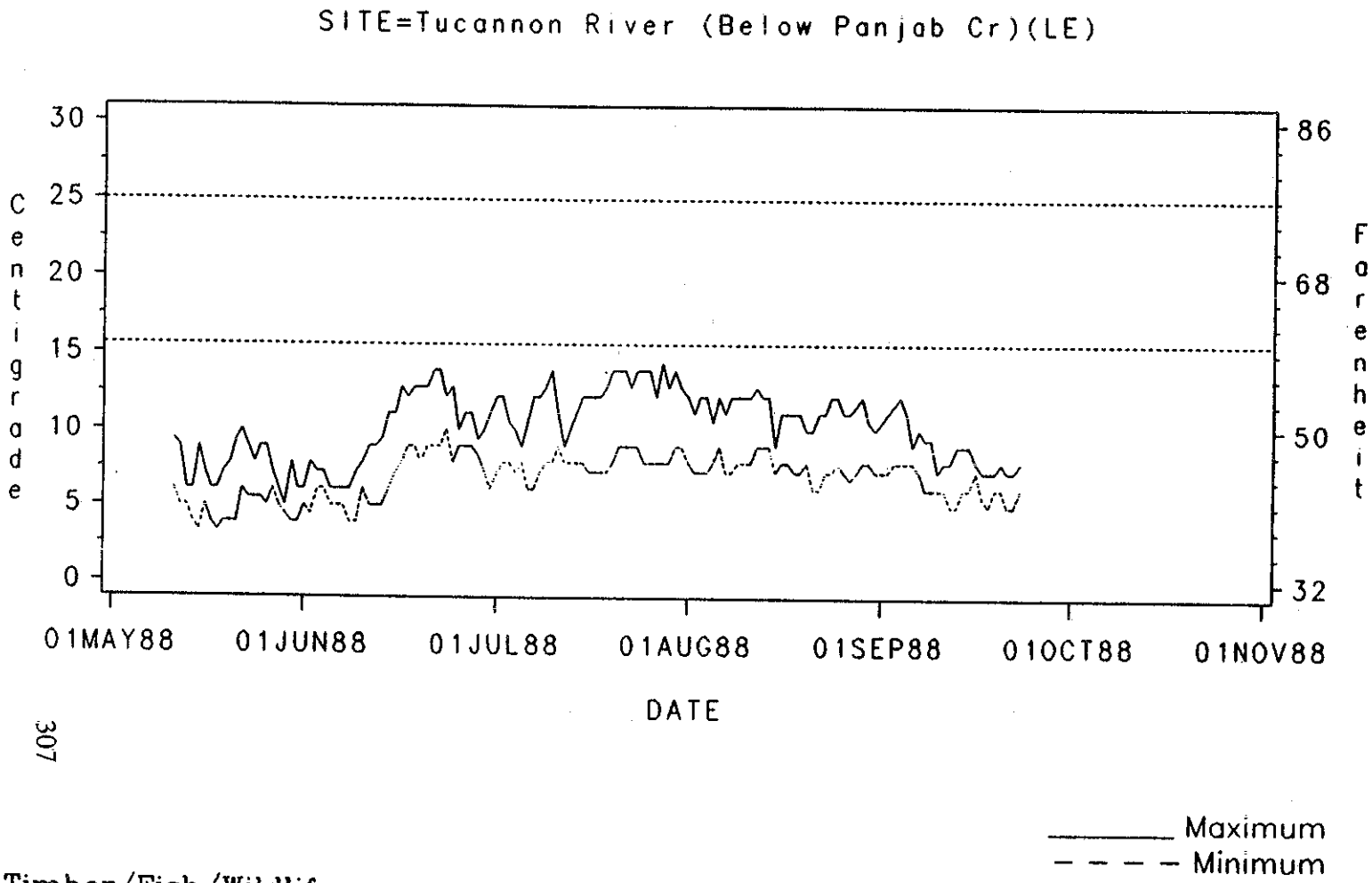
HARTSTOCK CR--Tucannon

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Water	Maximum Water	Minimum Water	Range Water
01AUG	9.5	12.0	7.0	5.0
02AUG	10.0	12.7	7.8	4.9
03AUG	9.7	11.8	8.4	3.4
04AUG	9.8	12.8	7.1	5.7
05AUG	11.2	16.0	7.8	8.2
06AUG	11.3	14.0	9.4	4.6
07AUG	12.3	17.4	8.8	8.6
08AUG	13.1	18.0	9.9	8.1
09AUG	13.7	18.7	10.5	8.2
10AUG	11.7	15.4	9.7	5.7
11AUG	11.5	16.1	8.6	7.5
12AUG	12.5	17.6	8.6	9.0
13AUG	11.8	14.4	10.1	4.3
14AUG	11.3	14.5	9.0	5.5
15AUG	11.3	14.4	9.2	5.2
16AUG	12.0	15.6	9.6	6.0
17AUG	12.4	16.4	9.3	7.1
18AUG	13.1	17.4	9.6	7.8
19AUG	13.7	17.5	10.9	6.6
20AUG	12.6	15.9	9.8	6.1
21AUG	12.3	15.6	10.3	5.3
22AUG	13.0	16.6	10.3	6.3
23AUG	12.8	16.4	9.8	6.6
24AUG	12.7	14.9	11.0	3.9
25AUG	11.2	12.4	10.6	1.8
26AUG	10.2	11.5	9.2	2.3
27AUG	11.3	14.1	9.2	4.9
28AUG	11.2	13.4	9.2	4.2
29AUG	11.4	13.4	10.2	3.2
30AUG	11.6	13.9	9.8	4.1
31AUG	12.1	13.1	11.1	2.0

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

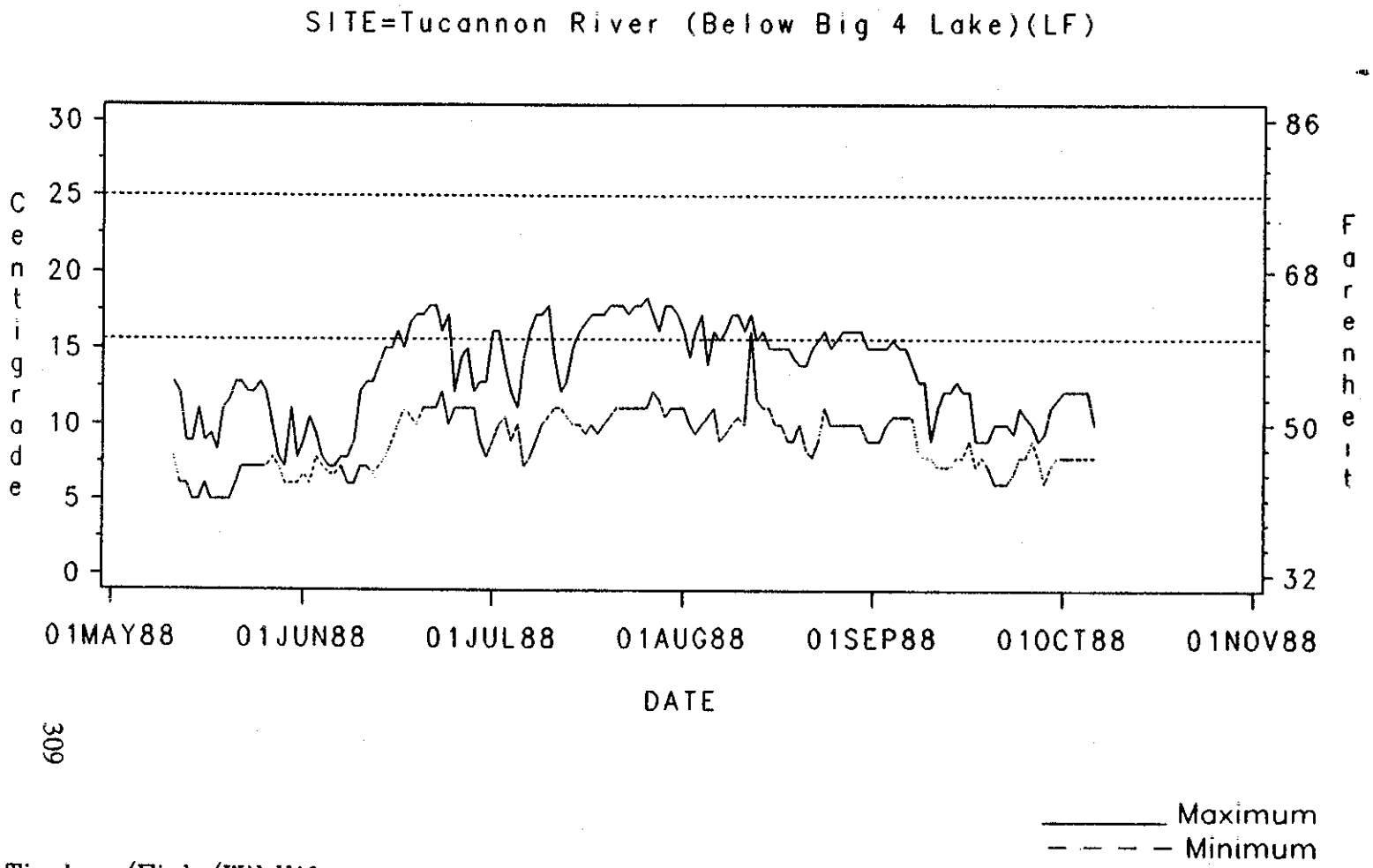
Tucannon River (Below Panjab Cr)(LE)

Daily Temperatures in Degrees Celsius (C)

---------- YEAR=1988 MONTH=AUGUST ----------

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	10.0	.	12.2	.	7.8	.	4.4
02AUG	.	9.2	.	11.1	.	7.2	.	3.9
03AUG	.	9.7	.	12.2	.	7.2	.	5.0
04AUG	.	9.7	.	12.2	.	7.2	.	5.0
05AUG	.	9.2	.	10.5	.	7.8	.	2.8
06AUG	.	10.5	.	12.2	.	8.9	.	3.3
07AUG	.	9.2	.	11.1	.	7.2	.	3.9
08AUG	.	9.7	.	12.2	.	7.2	.	5.0
09AUG	.	10.0	.	12.2	.	7.8	.	4.4
10AUG	.	10.0	.	12.2	.	7.8	.	4.4
11AUG	.	10.0	.	12.2	.	7.8	.	4.4
12AUG	.	10.8	.	12.8	.	8.9	.	3.9
13AUG	.	10.5	.	12.2	.	8.9	.	3.3
14AUG	.	10.5	.	12.2	.	8.9	.	3.3
15AUG	.	8.0	.	8.9	.	7.2	.	1.7
16AUG	.	9.4	.	11.1	.	7.8	.	3.3
17AUG	.	9.4	.	11.1	.	7.8	.	3.3
18AUG	.	9.2	.	11.1	.	7.2	.	3.9
19AUG	.	9.2	.	11.1	.	7.2	.	3.9
20AUG	.	8.9	.	10.0	.	7.8	.	2.2
21AUG	.	8.0	.	10.0	.	6.1	.	3.9
22AUG	.	8.6	.	11.1	.	6.1	.	5.0
23AUG	.	9.2	.	11.1	.	7.2	.	3.9
24AUG	.	9.7	.	12.2	.	7.2	.	5.0
25AUG	.	10.0	.	12.2	.	7.8	.	4.4
26AUG	.	9.2	.	11.1	.	7.2	.	3.9
27AUG	.	8.9	.	11.1	.	6.7	.	4.4
28AUG	.	9.4	.	11.7	.	7.2	.	4.4
29AUG	.	10.0	.	12.2	.	7.8	.	4.4
30AUG	.	9.2	.	10.5	.	7.8	.	2.8
31AUG	.	8.6	.	10.0	.	7.2	.	2.8

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

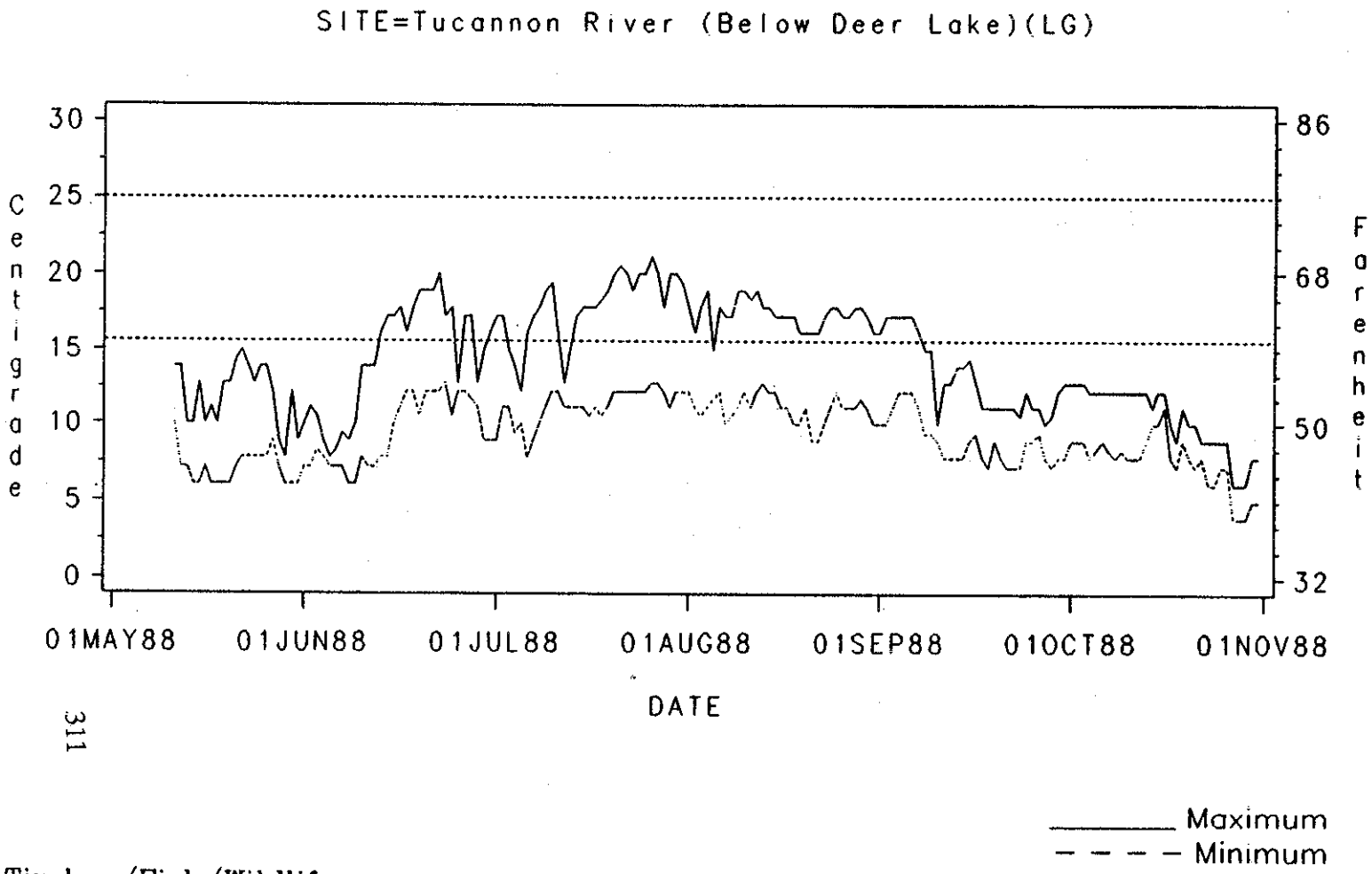
Tucannon River (Below Big 4 Lake)(LF)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	13.6	.	16.1	.	11.1	.	5.0
02AUG	.	12.2	.	14.4	.	10.0	.	4.4
03AUG	.	12.8	.	16.1	.	9.4	.	6.7
04AUG	.	13.6	.	17.2	.	10.0	.	7.2
05AUG	.	12.2	.	13.9	.	10.5	.	3.3
06AUG	.	13.6	.	16.1	.	11.1	.	5.0
07AUG	.	12.2	.	15.5	.	8.9	.	6.7
08AUG	.	12.8	.	16.1	.	9.4	.	6.7
09AUG	.	13.6	.	17.2	.	10.0	.	7.2
10AUG	.	13.9	.	17.2	.	10.5	.	6.7
11AUG	.	13.0	.	16.1	.	10.0	.	6.1
12AUG	.	16.7	.	17.2	.	16.1	.	1.1
13AUG	.	13.6	.	15.5	.	11.7	.	3.9
14AUG	.	13.6	.	16.1	.	11.1	.	5.0
15AUG	.	13.0	.	15.0	.	11.1	.	3.9
16AUG	.	12.5	.	15.0	.	10.0	.	5.0
17AUG	.	12.5	.	15.0	.	10.0	.	5.0
18AUG	.	11.9	.	15.0	.	8.9	.	6.1
19AUG	.	11.7	.	14.4	.	8.9	.	5.6
20AUG	.	11.9	.	13.9	.	10.0	.	3.9
21AUG	.	11.1	.	13.9	.	8.3	.	5.5
22AUG	.	11.4	.	15.0	.	7.8	.	7.2
23AUG	.	12.2	.	15.5	.	8.9	.	6.7
24AUG	.	13.6	.	16.1	.	11.1	.	5.0
25AUG	.	12.5	.	15.0	.	10.0	.	5.0
26AUG	.	12.8	.	15.5	.	10.0	.	5.5
27AUG	.	13.0	.	16.1	.	10.0	.	6.1
28AUG	.	13.0	.	16.1	.	10.0	.	6.1
29AUG	.	13.0	.	16.1	.	10.0	.	6.1
30AUG	.	13.0	.	16.1	.	10.0	.	6.1
31AUG	.	11.9	.	15.0	.	8.9	.	6.1

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

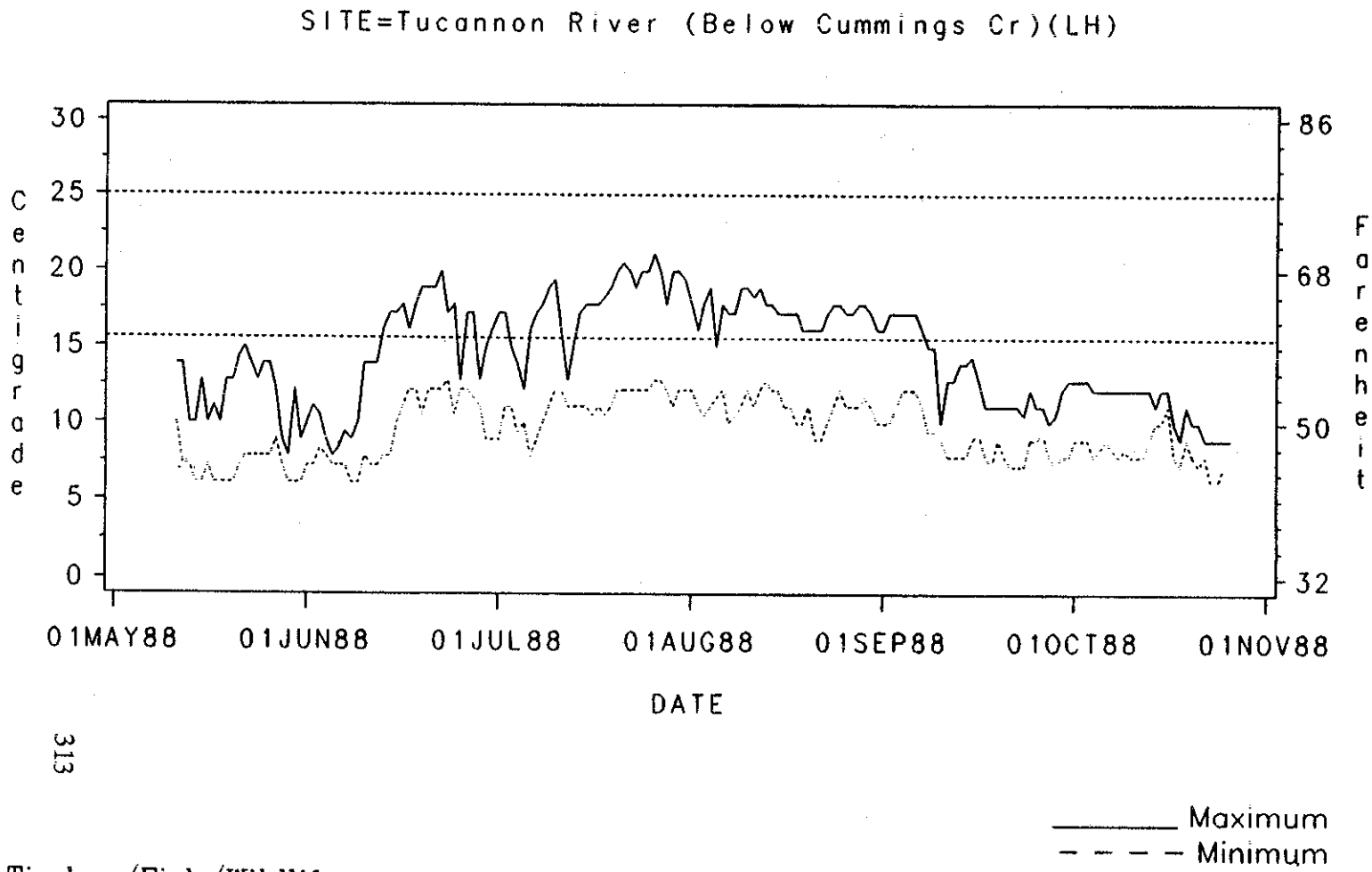
Tucannon River (Below Deer Lake)(LG)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	15.0	.	17.8	.	12.2	.	5.5
02AUG	.	13.6	.	16.1	.	11.1	.	5.0
03AUG	.	14.2	.	17.8	.	10.5	.	7.2
04AUG	.	15.0	.	18.9	.	11.1	.	7.8
05AUG	.	13.3	.	15.0	.	11.7	.	3.3
06AUG	.	15.0	.	17.8	.	12.2	.	5.5
07AUG	.	13.6	.	17.2	.	10.0	.	7.2
08AUG	.	13.9	.	17.2	.	10.5	.	6.7
09AUG	.	15.0	.	18.9	.	11.1	.	7.8
10AUG	.	15.5	.	18.9	.	12.2	.	6.7
11AUG	.	14.7	.	18.3	.	11.1	.	7.2
12AUG	.	15.5	.	18.9	.	12.2	.	6.7
13AUG	.	15.3	.	17.8	.	12.8	.	5.0
14AUG	.	15.0	.	17.8	.	12.2	.	5.5
15AUG	.	14.7	.	17.2	.	12.2	.	5.0
16AUG	.	14.2	.	17.2	.	11.1	.	6.1
17AUG	.	14.2	.	17.2	.	11.1	.	6.1
18AUG	.	13.6	.	17.2	.	10.0	.	7.2
19AUG	.	13.0	.	16.1	.	10.0	.	6.1
20AUG	.	13.6	.	16.1	.	11.1	.	5.0
21AUG	.	12.5	.	16.1	.	8.9	.	7.2
22AUG	.	12.5	.	16.1	.	8.9	.	7.2
23AUG	.	13.6	.	17.2	.	10.0	.	7.2
24AUG	.	14.4	.	17.8	.	11.1	.	6.7
25AUG	.	15.0	.	17.8	.	12.2	.	5.5
26AUG	.	14.2	.	17.2	.	11.1	.	6.1
27AUG	.	14.2	.	17.2	.	11.1	.	6.1
28AUG	.	14.4	.	17.8	.	11.1	.	6.7
29AUG	.	14.7	.	17.8	.	11.7	.	6.1
30AUG	.	14.2	.	17.2	.	11.1	.	6.1
31AUG	.	13.0	.	16.1	.	10.0	.	6.1

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

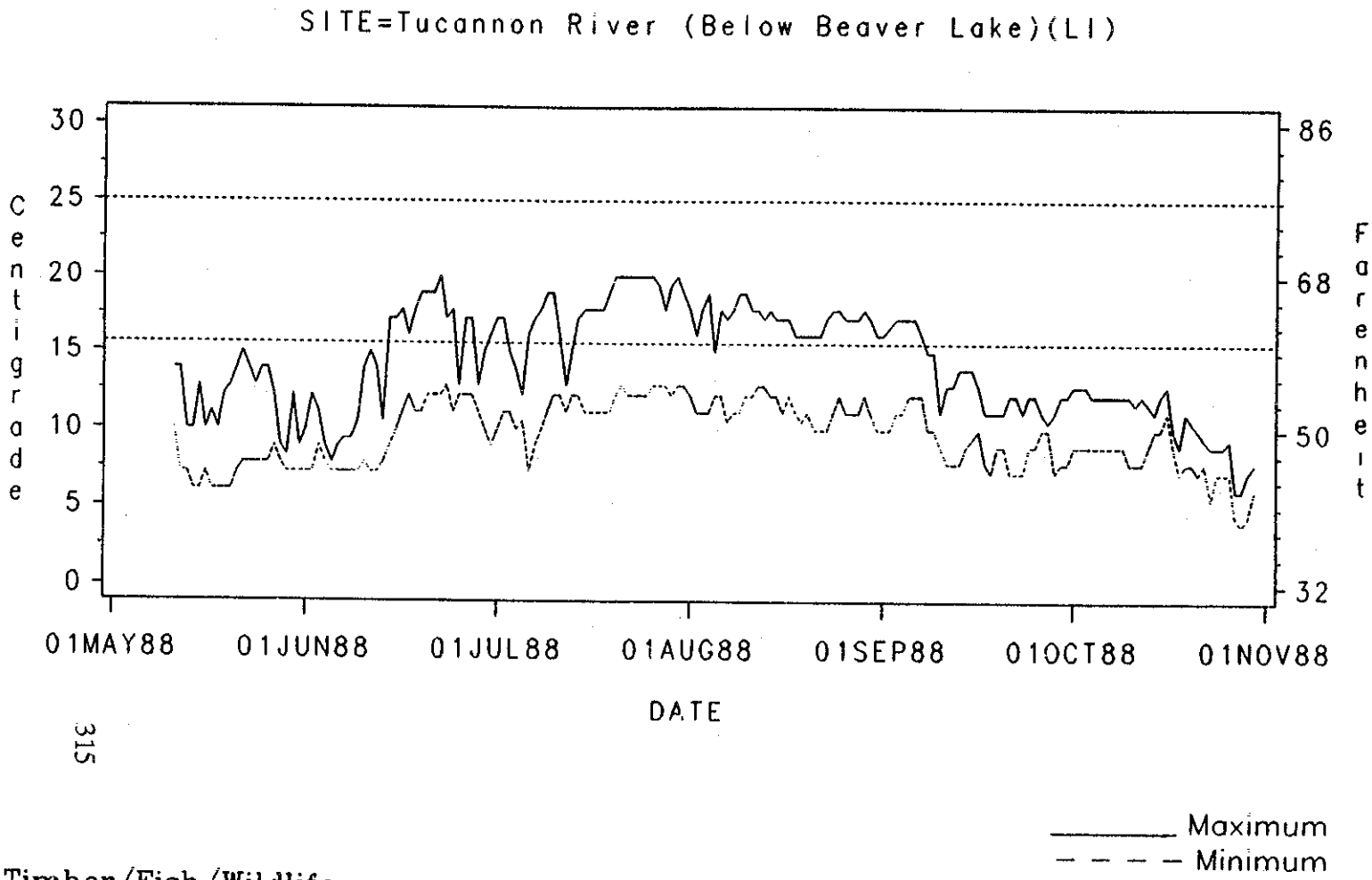
Tucannon River (Below Cummings Cr)(LH)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	15.0	.	17.8	.	12.2	.	5.5
02AUG	.	13.6	.	16.1	.	11.1	.	5.0
03AUG	.	14.2	.	17.8	.	10.5	.	7.2
04AUG	.	15.0	.	18.9	.	11.1	.	7.8
05AUG	.	13.3	.	15.0	.	11.7	.	3.3
06AUG	.	15.0	.	17.8	.	12.2	.	5.5
07AUG	.	13.6	.	17.2	.	10.0	.	7.2
08AUG	.	13.9	.	17.2	.	10.5	.	6.7
09AUG	.	15.0	.	18.9	.	11.1	.	7.8
10AUG	.	15.5	.	18.9	.	12.2	.	6.7
11AUG	.	14.7	.	18.3	.	11.1	.	7.2
12AUG	.	15.5	.	18.9	.	12.2	.	6.7
13AUG	.	15.3	.	17.8	.	12.8	.	5.0
14AUG	.	15.0	.	17.8	.	12.2	.	5.5
15AUG	.	14.7	.	17.2	.	12.2	.	5.0
16AUG	.	14.2	.	17.2	.	11.1	.	6.1
17AUG	.	14.2	.	17.2	.	11.1	.	6.1
18AUG	.	13.6	.	17.2	.	10.0	.	7.2
19AUG	.	13.0	.	16.1	.	10.0	.	6.1
20AUG	.	13.6	.	16.1	.	11.1	.	5.0
21AUG	.	12.5	.	16.1	.	8.9	.	7.2
22AUG	.	12.5	.	16.1	.	8.9	.	7.2
23AUG	.	13.6	.	17.2	.	10.0	.	7.2
24AUG	.	14.4	.	17.8	.	11.1	.	6.7
25AUG	.	15.0	.	17.8	.	12.2	.	5.5
26AUG	.	14.2	.	17.2	.	11.1	.	6.1
27AUG	.	14.2	.	17.2	.	11.1	.	6.1
28AUG	.	14.4	.	17.8	.	11.1	.	6.7
29AUG	.	14.7	.	17.8	.	11.7	.	6.1
30AUG	.	14.2	.	17.2	.	11.1	.	6.1
31AUG	.	13.0	.	16.1	.	10.0	.	6.1

WATER TEMPERATURE



Timber/Fish/Wildlife
1988 Temperature Study

TIMBER/FISH/WILDLIFE 1988 TEMPERATURE STUDY

Tucannon River (Below Beaver Lake)(LI)

Daily Temperatures in Degrees Celsius (C)

YEAR=1988 MONTH=AUGUST

DATE	Mean Air	Mean Water	Maximum Air	Maximum Water	Minimum Air	Minimum Water	Range Air	Range Water
01AUG	.	15.0	.	17.8	.	12.2	.	5.5
02AUG	.	13.6	.	16.1	.	11.1	.	5.0
03AUG	.	14.4	.	17.8	.	11.1	.	6.7
04AUG	.	15.0	.	18.9	.	11.1	.	7.8
05AUG	.	13.6	.	15.0	.	12.2	.	2.8
06AUG	.	15.0	.	17.8	.	12.2	.	5.5
07AUG	.	13.9	.	17.2	.	10.5	.	6.7
08AUG	.	14.4	.	17.8	.	11.1	.	6.7
09AUG	.	15.0	.	18.9	.	11.1	.	7.8
10AUG	.	15.5	.	18.9	.	12.2	.	6.7
11AUG	.	15.0	.	17.8	.	12.2	.	5.5
12AUG	.	15.3	.	17.8	.	12.8	.	5.0
13AUG	.	15.0	.	17.2	.	12.8	.	4.4
14AUG	.	15.0	.	17.8	.	12.2	.	5.5
15AUG	.	14.7	.	17.2	.	12.2	.	5.0
16AUG	.	14.2	.	17.2	.	11.1	.	6.1
17AUG	.	14.7	.	17.2	.	12.2	.	5.0
18AUG	.	13.6	.	16.1	.	11.1	.	5.0
19AUG	.	13.3	.	16.1	.	10.5	.	5.5
20AUG	.	13.6	.	16.1	.	11.1	.	5.0
21AUG	.	13.0	.	16.1	.	10.0	.	6.1
22AUG	.	13.0	.	16.1	.	10.0	.	6.1
23AUG	.	13.6	.	17.2	.	10.0	.	7.2
24AUG	.	14.4	.	17.8	.	11.1	.	6.7
25AUG	.	15.0	.	17.8	.	12.2	.	5.5
26AUG	.	14.2	.	17.2	.	11.1	.	6.1
27AUG	.	14.2	.	17.2	.	11.1	.	6.1
28AUG	.	14.2	.	17.2	.	11.1	.	6.1
29AUG	.	15.0	.	17.8	.	12.2	.	5.5
30AUG	.	14.2	.	17.2	.	11.1	.	6.1
31AUG	.	13.0	.	16.1	.	10.0	.	6.1

DATA DICTIONARY

DATA ITEM: AIR

SHORT DESCRIPTION: hourly air temperature degree Celsius
LONG DESCRIPTION: hourly air temperature values measured by thermograph, converted to degree Celsius, and quality assured with field observations
GENERAL USE: model testing, site characterization
MODEL USE: TEMPEST, TEMP86
UNITS OF MEASURE: degree Celsius
COMPUTATION FORM: (degree F - 32) * 0.55555
TYPE: numeric
FORMAT: 5.1
CODE DESCRIPTION: 999 = missing value
RANGE OF VALUES: -30.0 to 50.0
DATA SOURCE: thermograph
RESPONSIBILITY: WeyCo, Ecology
EXAMPLE: 10.5

DATA ITEM: AIRMAX

SHORT DESCRIPTION: maximum daily air temperature
LONG DESCRIPTION: maximum daily air temperature measured with recording thermograph, and generally calculated from hourly values
GENERAL USE: model testing, site characterization, temperature regimes
MODEL USE: IFIM, IFIM-SNTEMP
UNITS OF MEASURE: degree Celsius
COMPUTATION FORM: (degree F - 32) * 0.55555
TYPE: numeric
FORMAT: 5.1
CODE DESCRIPTION: 999 = missing value
RANGE OF VALUES: -1.0 to 50 0
DATA SOURCE: thermograph
RESPONSIBILITY: WeyCo, Ecology
EXAMPLE: 10.5

DATA ITEM: AIRMEAN

SHORT DESCRIPTION: mean daily air temperature in degree Celsius
LONG DESCRIPTION: mean daily air temperature measured with recording thermograph, and generally calculated from hourly values
GENERAL USE: model testing, site characterization, temperature regimes
MODEL USE: IFIM, IFIM-SNTEMP
UNITS OF MEASURE: degree Celsius
COMPUTATION FORM: (degree F - 32) * 0.55555
TYPE: numeric
FORMAT: 5.1
CODE DESCRIPTION: 999 = missing value
RANGE OF VALUES: -1.0 to 50.0
DATA SOURCE: thermograph
RESPONSIBILITY: WeyCo, Ecology
EXAMPLE: 10.5

DATA ITEM:	AIRMIN
SHORT DESCRIPTION:	minimum daily air temperature in degree Celsius
LONG DESCRIPTION:	minimum daily air temperature measured with recording thermograph, and generally calculated from hourly values
GENERAL USE:	model testing, site characterization, temperature regimes
MODEL USE:	IFIM, IFIM-SNTEMP
UNITS OF MEASURE:	degree Celsius
COMPUTATION FORM:	(degree F - 32) * 0.55555
TYPE:	numeric
FORMAT:	5.1
CODE DESCRIPTION:	999 = missing value
RANGE OF VALUES:	-1.0 to 50.0
DATA SOURCE:	thermograph
RESPONSIBILITY	WeyCo, Ecology
EXAMPLE:	10.5

DATA ITEM:	AIRRANGE
SHORT DESCRIPTION:	daily air temperature range in degree Celsius
LONG DESCRIPTION:	range of observed air temperature values measured over a day at recording thermograph, and generally calculated from hourly values
GENERAL USE:	model testing, site characterization, temperature regimes
MODEL USE:	none
UNITS OF MEASURE:	degree Celsius
COMPUTATION FORM:	(degree F - 32) * 0.55555
TYPE:	numeric
FORMAT:	5.1
CODE DESCRIPTION:	none
RANGE OF VALUES:	-1.0 to 50.0
DATA SOURCE:	thermograph
RESPONSIBILITY	WeyCo, Ecology
EXAMPLE:	10.5

DATA ITEM:	ANNUALAIRC
SHORT DESCRIPTION:	annual mean air temperature for site
LONG DESCRIPTION:	mean annual air temperature determined from USGS temperature report "*GENERALIZATION OF STREAM-TEMPERATURE DATA IN WASHINGTON*"
GENERAL USE:	model parameter determinations
MODEL USE:	all
UNITS OF MEASURE:	degrees Celsius
COMPUTATION FORM:	none
TYPE:	numeric
FORMAT:	4.1
CODE DESCRIPTION:	none
RANGE OF VALUES:	6.0 to 13.0
DATA SOURCE:	obtained from USGS isothermal map/mean annual air temperature figure 5, p. B11; "*GENERALIZATION OF STREAM-TEMPERATURE DATA IN WASHINGTON*" by M. R. Collings, 1973; USGS WSP-2029-B
RESPONSIBILITY	Ecology
EXAMPLE:	11.0

DATA ITEM: AREAHECT

SHORT DESCRIPTION: drainage area of basin above site, in hectares
LONG DESCRIPTION: drainage basin area above thermograph or streamflow site
GENERAL USE: site characterization, groundwater inflow, streamflow database
MODEL USE: none
UNITS OF MEASURE: hectares
COMPUTATION FORM: area (mi^2) * 258.99881
TYPE: numeric
FORMAT: 7.0
CODE DESCRIPTION: none
RANGE OF VALUES:
DATA SOURCE: digitized USGS map data; see digitize archives
RESPONSIBILITY Ecology
EXAMPLE: 120.

DATA ITEM: AVGBEDROCK

SHORT DESCRIPTION: average percent streambed composed of bedrock
LONG DESCRIPTION: average of bedrock composition within temperature reach; calculated by averaging the bedrock composition percentages measured in the field
GENERAL USE: channel characterization
MODEL USE: none
UNITS OF MEASURE: percentage
COMPUTATION FORM: average of channel A, channel B, channel C, etc
TYPE: numeric
FORMAT: I3
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 100
DATA SOURCE: calculated on SUBSTR8f.DB
RESPONSIBILITY Ecology
EXAMPLE:

DATA ITEM: AVGBOULDER

SHORT DESCRIPTION: average percent streambed composed of boulder
LONG DESCRIPTION: average of boulder composition within temperature reach; calculated by averaging the boulder composition percentages measured in the field
GENERAL USE: channel characterization
MODEL USE: none
UNITS OF MEASURE: percentage
COMPUTATION FORM: average of channel A, channel B, channel C, etc
TYPE: numeric
FORMAT: I3
CODE DESCRIPTION:
RANGE OF VALUES: 0 to 100
DATA SOURCE: calculated on SUBSTR8f.DB
RESPONSIBILITY Ecology
EXAMPLE:

DATA ITEM: AVGCLAY/SILT

SHORT DESCRIPTION: average percent streambed composed of clay/silt
LONG DESCRIPTION: average of clay/silt composition within temperature reach; calculated by averaging the clay/silt composition percentages measured in the field
GENERAL USE: channel characterization
MODEL USE: none
UNITS OF MEASURE: percentage
COMPUTATION FORM: average of channel A, channel B, channel C, etc
TYPE: numeric
FORMAT: I3
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 100
DATA SOURCE: calculated on SUBSTR8f.DB
RESPONSIBILITY Ecology
EXAMPLE: 50

DATA ITEM: AVGCOBBLE

SHORT DESCRIPTION: average percent streambed composed of cobble
LONG DESCRIPTION: average of cobble composition within temperature reach; calculated by averaging the cobble composition percentages measured in the field
GENERAL USE: channel characterization
MODEL USE: none
UNITS OF MEASURE: percentage
COMPUTATION FORM: average of channel A, channel B, channel C, etc
TYPE: numeric
FORMAT: I3
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 100
DATA SOURCE: calculated on SUBSTR8f.DB
RESPONSIBILITY Ecology
EXAMPLE: 50

DATA ITEM: AVGGRAVEL

SHORT DESCRIPTION: average percent streambed composed of gravel
LONG DESCRIPTION: average of gravel composition within temperature reach; calculated by averaging the gravel composition percentages measured in the field
GENERAL USE: channel characterization
MODEL USE: none
UNITS OF MEASURE: percentage
COMPUTATION FORM: average of channel A, channel B, channel C, etc
TYPE: numeric
FORMAT: I3
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 100
DATA SOURCE: calculated on SUBSTR8f.DB
RESPONSIBILITY Ecology
EXAMPLE: 50

DATA ITEM: AVGSAND

SHORT DESCRIPTION: average percent streambed composed of sand
LONG DESCRIPTION: average of sand composition within temperature reach; calculated by averaging the sand composition percentages measured in the field
GENERAL USE: channel characterization
MODEL USE: none
UNITS OF MEASURE: percentage
COMPUTATION FORM: average of channel A, channel B, channel C, etc
TYPE: numeric
FORMAT: I3
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 100
DATA SOURCE: calculated on SUBSTR8f.DB
RESPONSIBILITY Ecology
EXAMPLE: 50

DATA ITEM: AZIMUTH1

SHORT DESCRIPTION: channel azimuth measured from north
LONG DESCRIPTION: channel azimuth or orientation facing downstream and measured from North in a counterclockwise direction
GENERAL USE: shade computations
MODEL USE: TEMP86
UNITS OF MEASURE: degrees from North
COMPUTATION FORM: computed with digitizer program REACHALT.BAS
TYPE: numeric
FORMAT: 3.0
CODE DESCRIPTION: none
RANGE OF VALUES: 0-359
DATA SOURCE: USGS 1:24000 or 1:62500 topographic map
RESPONSIBILITY WDF or Ecology
EXAMPLE: 180

DATA ITEM: BUFWIDLM

SHORT DESCRIPTION: width of stream-shading buffer along left bank
LONG DESCRIPTION: width of stream-shading buffer strip along left streambank
GENERAL USE: model testing
MODEL USE: TEMP86
UNITS OF MEASURE: meters
COMPUTATION FORM: [bufferwidthklb]*.3048
TYPE: numeric
FORMAT: 6.2
CODE DESCRIPTION: 999 = very wide buffer
RANGE OF VALUES: 0.00 to 999.99
DATA SOURCE: riparian survey
RESPONSIBILITY Ecology
EXAMPLE: 10.22

DATA ITEM:	BUFWIDRM
SHORT DESCRIPTION:	width of stream-shading buffer along right bank
LONG DESCRIPTION:	width of stream-shading buffer strip along right bank(facing downstream) in meters
GENERAL USE:	model testing
MODEL USE:	TEMP86
UNITS OF MEASURE:	meters
COMPUTATION FORM:	[bufferwidthrb]*.3048
TYPE:	numeric
FORMAT:	6.2
CODE DESCRIPTION:	999 =very wide buffer
RANGE OF VALUES:	0.00 to 999.99
DATA SOURCE:	riparian survey
RESPONSIBILITY	Ecology
EXAMPLE:	10.22

DATA ITEM:	CMS/KM
SHORT DESCRIPTION:	regional groundwater inflow measured in CMS/KM
LONG DESCRIPTION:	regional groundwater inflow based on regional low flow measurements.
GENERAL USE:	model testing, site characterization
MODEL USE:	TEMPEST, TEMP86, IFIM
UNITS OF MEASURE:	cms/km flow per unit length of stream
COMPUTATION FORM:	streamflow at point divided by total stream length of watershed above point of measurement
TYPE:	numeric
FORMAT:	9.7
CODE DESCRIPTION:	none
RANGE OF VALUES:	0.0001 to 99.9999
DATA SOURCE:	Q2.wk1 spreadsheet files
RESPONSIBILITY	WeyCo
EXAMPLE:	0.01

DATA ITEM:	COOPCONTACT
SHORT DESCRIPTION:	person associated with running thermograph site
LONG DESCRIPTION:	person running thermograph, and/or local contact for site nomination for temperature study
GENERAL USE:	reporting
MODEL USE:	none
UNITS OF MEASURE:	none
COMPUTATION FORM:	none
TYPE:	character
FORMAT:	a30
CODE DESCRIPTION:	none
RANGE OF VALUES:	
DATA SOURCE:	Ecology, WeyCo, road show
RESPONSIBILITY	WDF
EXAMPLE:	John Heffner

DATA ITEM: COOPERATOR

SHORT DESCRIPTION: agency/entity cooperating at thermograph site
LONG DESCRIPTION: agency/entity cooperating on the temperature study either by running thermograph, nominating sites, or providing data
GENERAL USE: reporting
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: a30
CODE DESCRIPTION: none
RANGE OF VALUES:
DATA SOURCE: Ecology, WeyCo, road show
RESPONSIBILITY WDF
EXAMPLE: WeyCo

DATA ITEM: COUNTY

SHORT DESCRIPTION: name of county where site is located
LONG DESCRIPTION:
GENERAL USE: site location
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM:
TYPE: character
FORMAT: 12
CODE DESCRIPTION: none
RANGE OF VALUES: Mason to Pend Oreille
DATA SOURCE: USGS maps
RESPONSIBILITY Ecology
EXAMPLE: Thurston

DATA ITEM: D50

SHORT DESCRIPTION: substrate size classification containing 50th percentile
LONG DESCRIPTION: substrate size classification in which the 50th percentile fell into when adding percentages from the smallest to largest size classifications
GENERAL USE: channel characterization
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: summation from smallest category(avg clay/silt) to largest(avg bedrock) and flagging the category in which 50 percent falls in
TYPE: character
FORMAT: A9
CODE DESCRIPTION: none
RANGE OF VALUES:
DATA SOURCE: calculated on SUBSTR8f DB
RESPONSIBILITY Ecology
EXAMPLE: sand

DATA ITEM:	DEPTHPM
SHORT DESCRIPTION:	volume weighted average depth of pools in temperature reach
LONG DESCRIPTION:	volume weighted average pool depth determined from channel unit survey
GENERAL USE:	model testing
MODEL USE:	TEMP86
UNITS OF MEASURE:	meters
COMPUTATION FORM:	volumeunonlypools/surfareaonlypools
TYPE:	numeric
FORMAT:	5.2
CODE DESCRIPTION:	none
RANGE OF VALUES:	0.00 to 99.99
DATA SOURCE:	calculated on HI.WS
RESPONSIBILITY	Ecology
EXAMPLE:	0.99

DATA ITEM:	DEPTHVWT
SHORT DESCRIPTION:	volume-weighted average stream depth
LONG DESCRIPTION:	depth computed by weighing depth by channel unit volume
GENERAL USE:	model testing, site characterization
MODEL USE:	TEMPEST
UNITS OF MEASURE:	meters
COMPUTATION FORM:	svolume/ssurfare for each site; where svolume is a summation of all channel unit volumes and ssurfare is a summation of all channel unit surface areas for each site
TYPE:	numeric
FORMAT:	4.2
CODE DESCRIPTION:	none
RANGE OF VALUES:	0.00 to 9.99
DATA SOURCE:	calculated on HI.WS
RESPONSIBILITY	Ecology
EXAMPLE:	0.19

DATA ITEM:	DNRWATERTYPE
SHORT DESCRIPTION:	DNR water type
LONG DESCRIPTION:	official water type as determined from Washington Department of Natural Resources 1 inch=2000 ft. or 1 inch=1000 ft. Water Type Map
GENERAL USE:	statistics
MODEL USE:	none
UNITS OF MEASURE:	water type
COMPUTATION FORM:	none
TYPE:	character
FORMAT:	1
CODE DESCRIPTION:	1=type 1, 2=type 2, etc 9=untyped
RANGE OF VALUES:	1-5
DATA SOURCE:	DNR 1 inch=2000 ft. or 1 inch=1000 ft. water type maps
RESPONSIBILITY	Ecology
EXAMPLE:	1

DATA ITEM: ECOREGION

SHORT DESCRIPTION: TFW Ecoregion
LONG DESCRIPTION: TFW Ecoregion as proposed by the TFW Ambient Monitoring Steering Committee
GENERAL USE: site characterization,data analysis
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: 12
CODE DESCRIPTION: none
RANGE OF VALUES:
DATA SOURCE: TFW Ambient Monitoring Workplan
RESPONSIBILITY TFW Ambient Monitoring/Ecology
EXAMPLE: SW Washington

DATA ITEM: ELEVDSM

SHORT DESCRIPTION: downstream elevation in meters
LONG DESCRIPTION: elevation at the TFW thermograph location (which is the downstream limit of the study reach) as determined from USGS 1:24000 or 1:62500 topographic maps
GENERAL USE: channel gradient, site elevation
MODEL USE: SSTEMP, TEMP86
UNITS OF MEASURE: meters of elevation above mean sea
COMPUTATION FORM: elevds*.3048
TYPE: numeric
FORMAT: 4.0
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 9999
DATA SOURCE: USGS 1:24000 or 1:62500 topographic map; conversion calculated on DIGITIZE.WS
RESPONSIBILITY WDF or Ecology
EXAMPLE: 9999

DATA ITEM: ELEVUSM

SHORT DESCRIPTION: upstream elevation in meters
LONG DESCRIPTION: channel elevation at the upstream boundary of the TFW temperature study reach as determined from a USGS 1:24000 or 1:62500 topographic map
GENERAL USE: model testing
MODEL USE: SSTEMP
UNITS OF MEASURE: meters
COMPUTATION FORM: elevus*.3048
TYPE: numeric
FORMAT: 4.0
CODE DESCRIPTION:
RANGE OF VALUES: 0-9999
DATA SOURCE: USGS 1:24000 or 1:62500 topographic map
RESPONSIBILITY WDF or Ecology
EXAMPLE: 11

DATA ITEM: FORSA

SHORT DESCRIPTION: average of FORS readings for site
LONG DESCRIPTION: the angle formed between the horizontal water line and the line from the center of the stream to the top of the vegetative cover in the indicated direction
GENERAL USE: model testing
MODEL USE: TEMP86
UNITS OF MEASURE: degrees
COMPUTATION FORM: average of fors riparian transect readings by site
TYPE: numeric
FORMAT: I2
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 90
DATA SOURCE: calculated by SYSTAT; saved onto TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 30

DATA ITEM: FORSEA

SHORT DESCRIPTION: average of forte readings for site
LONG DESCRIPTION: the angle formed between the horizontal water line and the line from the center of the stream to the top of the vegetative cover in the indicated direction
GENERAL USE: model testing
MODEL USE: TEMP86
UNITS OF MEASURE: degrees
COMPUTATION FORM: average of forte riparian transect readings by site
TYPE: numeric
FORMAT: I2
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 90
DATA SOURCE: calculated by SYSTAT; saved onto TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 30

DATA ITEM: FORSWA

SHORT DESCRIPTION: average of FORSW readings for site
LONG DESCRIPTION: the angle formed between the horizontal water line and the line from the center of the stream to the top of the vegetative cover in the indicated direction
GENERAL USE: model testing
MODEL USE: TEMP86
UNITS OF MEASURE: degrees
COMPUTATION FORM: average of forsw riparian transect readings by site
TYPE: numeric
FORMAT: I2
CODE DESCRIPTION: none
RANGE OF VALUES: 0 to 90
DATA SOURCE: calculated by SYSTAT; saved onto TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 30

DATA ITEM: GEOAGE

SHORT DESCRIPTION: geologic age of the dominant geology in basin
LONG DESCRIPTION: site locations were located on DNR state geologic maps and the dominant geology determined
GENERAL USE: site characterization; groundwater inflow
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: a15
CODE DESCRIPTION: geologic ages written out: Quaternary,Eocene,etc
RANGE OF VALUES:
DATA SOURCE: Washington State DNR state geologic maps
RESPONSIBILITY Ecology
EXAMPLE: Oligocene

DATA ITEM: GEOLITHO

SHORT DESCRIPTION: geologic lithology type of dominant geology in basin
LONG DESCRIPTION: site locations were located on DNR state geologic maps and the dominant geology determined
GENERAL USE: site characterization; groundwater inflow
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: a15
CODE DESCRIPTION: lithology written out: sedimentary, low-grade metamorphic, volcanic, intrusive, high-grade metamorphic
RANGE OF VALUES:
DATA SOURCE: Washington State DNR state geologic maps
RESPONSIBILITY Ecology
EXAMPLE: volcanic

DATA ITEM: GEOROCK

SHORT DESCRIPTION: geologic rock type of dominant geology in basin
LONG DESCRIPTION: site locations were located on DNR state geologic maps and the dominant geology determined
GENERAL USE: site characterization; groundwater inflow
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: a15
CODE DESCRIPTION: rock type written out: andesite flows, outwash sand, etc
RANGE OF VALUES: none
DATA SOURCE: Washington State DNR state geologic maps
RESPONSIBILITY Ecology
EXAMPLE: Saddle Mountain basalt

DATA ITEM: GRADLEVEL

SHORT DESCRIPTION: channel slope determined by autolevel survey
LONG DESCRIPTION: channel slope as determined by surveying the stream channel for a distance of 25 channel widths upstream of the thermograph
GENERAL USE: model testing, site characterization
MODEL USE: TEMP86
UNITS OF MEASURE: percent
COMPUTATION FORM: none
TYPE: numeric
FORMAT: 5.2
CODE DESCRIPTION: none
RANGE OF VALUES: 0.00 to 99.99
DATA SOURCE: field notes
RESPONSIBILITY Ecology
EXAMPLE: 3.78

DATA ITEM: GWDETER1

SHORT DESCRIPTION: groundwater inflow determined from water budget
LONG DESCRIPTION: groundwater inflow determined from water budget values measured in the field.
GENERAL USE: model testing
MODEL USE:
UNITS OF MEASURE: feet^3/second
COMPUTATION FORM: GWdeter1 = [streamflow ds]-[streamflow us]-[surface inflo]
TYPE: numeric
FORMAT: 6.3
CODE DESCRIPTION: none
RANGE OF VALUES: 0.000 to 99.999
DATA SOURCE: field survey
RESPONSIBILITY Ecology
EXAMPLE: 0.005

DATA ITEM: LATDEC

SHORT DESCRIPTION: latitude of site in decimal degrees
LONG DESCRIPTION: latitude of site measured in decimal degrees rather than degrees, minutes, seconds
GENERAL USE: location
MODEL USE: none
UNITS OF MEASURE: degrees of latitude
COMPUTATION FORM: latitude decimal = degrees latitude + minutes latitude/60 + seconds of latitude/3600
TYPE: numeric
FORMAT: 6.4
CODE DESCRIPTION: none
RANGE OF VALUES: 45.5-49.0
DATA SOURCE: USGS 1:24000 or 1:62500 topographic maps
RESPONSIBILITY Ecology
EXAMPLE: 45.4999

DATA ITEM: LENGTHMT

SHORT DESCRIPTION: total length of perennial streams above site in meters
LONG DESCRIPTION: total length of perennial streams in basin above site determined from digitizing from USGS 7.5 minute topo-maps
GENERAL USE: site characterization; groundwater relation
MODEL USE: none
UNITS OF MEASURE: meters
COMPUTATION FORM: lengthmi * 1609.344
TYPE: numeric
FORMAT: 6.0
CODE DESCRIPTION: none
RANGE OF VALUES:
DATA SOURCE: digitized from USGS 7.5 minute maps
RESPONSIBILITY Ecology
EXAMPLE: 1915

DATA ITEM: LONGDEC

SHORT DESCRIPTION: longitude of site in decimal degrees of longitude
LONG DESCRIPTION: longitude of site in decimal degrees of longitude
GENERAL USE: location
MODEL USE: none
UNITS OF MEASURE: degrees of longitude
COMPUTATION FORM: longitude decimal=degrees of longitude+minutes of longitude/60+seconds of longitude/3600
TYPE: numeric
FORMAT: 7.4
CODE DESCRIPTION: none
RANGE OF VALUES: 117.0000-124.7500
DATA SOURCE: USGS 1:24000 or 1:62500 topographic map
RESPONSIBILITY Ecology
EXAMPLE: 124.7499

DATA ITEM: NEARESTTOWN

SHORT DESCRIPTION: nearest town
LONG DESCRIPTION: nearest town shown on USGS 1:500000 State of Washington map
GENERAL USE: site location
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: a20
CODE DESCRIPTION: none
RANGE OF VALUES:
DATA SOURCE: USGS Map State of Washington Scale 1:500000 revised 1982
RESPONSIBILITY Ecology
EXAMPLE: Seattle

DATA ITEM: NOAAINDEX

SHORT DESCRIPTION: NOAA LCD weather index station used for site
LONG DESCRIPTION: NOAA Local Climatological Data weather index station used for model testing and site characterization
GENERAL USE: model testing, site characterization
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: A13
CODE DESCRIPTION:
RANGE OF VALUES: none
DATA SOURCE: proximity to NOAA station
RESPONSIBILITY Ecology
EXAMPLE: Olympia

DATA ITEM: OVERBRUSH

SHORT DESCRIPTION: percent of stream shaded by overhanging brush calculated with SYSTAT by site
LONG DESCRIPTION: percent of the stream shaded directly by overhanging brush; a segment perpendicular to the streamflow was divided into quarters from the wetted perimeters; in each quarter a qualitative assessment was made of the percentage of overhanging vegetation over the quarter and recorded; average of the four quarter readings provided overhanging brush estimate; SYSTAT was used to average estimates by site
GENERAL USE: model testing
MODEL USE: TEMP86
UNITS OF MEASURE: percent
COMPUTATION FORM: average of percent overhanging readings by site using SYSTAT
TYPE: numeric
FORMAT: 6.2
CODE DESCRIPTION: none
RANGE OF VALUES: 0.00 to 100.00
DATA SOURCE: calculated with SYSTAT; saved on TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 5.00

DATA ITEM: PERCENPL

SHORT DESCRIPTION: volume weighted percentage of channel composed of pools
LONG DESCRIPTION: percentage of channel composed of various types of pools determined by volume weighing the channel units.
GENERAL USE: model testing, site characterization
MODEL USE: TEMP86
UNITS OF MEASURE: percent
COMPUTATION FORM: (volumeunonlypools/svolume)*100; sum unit volume of channel comprised of only pools divided by sum unit volume of entire channel multiplied by 100
TYPE: numeric
FORMAT: I3
CODE DESCRIPTION:
RANGE OF VALUES: 0 to 100
DATA SOURCE: calculated on HI.WS
RESPONSIBILITY Ecology
EXAMPLE: 10

DATA ITEM: QDSM

SHORT DESCRIPTION: measured streamflow at thermograph site converted to cubic meters per second
LONG DESCRIPTION: measured streamflow at thermograph site
GENERAL USE: model testing
MODEL USE: SSTEMP
UNITS OF MEASURE: cubic meters per second
COMPUTATION FORM: [streamflow us]*0.02832
TYPE: numeric
FORMAT: 7.4
CODE DESCRIPTION: none
RANGE OF VALUES: 0.0000 to 99.9999
DATA SOURCE: calculated on CHECK.WS; streamflow field notes
RESPONSIBILITY Ecology
EXAMPLE: 0.0011

DATA ITEM: QUSM

SHORT DESCRIPTION: streamflow entering TFW temperature study reach converted to cms
LONG DESCRIPTION: conversion of measured upstream flow converted to cms for use in SSTEMP
GENERAL USE: model testing
MODEL USE: SSTEMP
UNITS OF MEASURE: cubic meters per second
COMPUTATION FORM: [streamflow us]*0.02832
TYPE: numeric
FORMAT: 7.4
CODE DESCRIPTION: none
RANGE OF VALUES: 0.0000 to 99.9999
DATA SOURCE: calculated on CHECK.WS; conversion from field notes
RESPONSIBILITY Ecology
EXAMPLE: 0.0012

DATA ITEM: RANGE

SHORT DESCRIPTION: range of legal description
LONG DESCRIPTION: public land survey range of legal description
GENERAL USE: location
MODEL USE: none
UNITS OF MEASURE:
COMPUTATION FORM: none
TYPE: character
FORMAT: a3
CODE DESCRIPTION: none
RANGE OF VALUES: 16W-45E
DATA SOURCE: USGS 1:24000 or 1:62500 topographic maps
RESPONSIBILITY Ecology
EXAMPLE: 16W

DATA ITEM:	SECTION
SHORT DESCRIPTION:	legal section containing thermograph site
LONG DESCRIPTION:	public land survey legal section where thermograph is located
GENERAL USE:	locational
MODEL USE:	none
UNITS OF MEASURE:	
COMPUTATION FORM:	none
TYPE:	character
FORMAT:	a2
CODE DESCRIPTION:	none
RANGE OF VALUES:	1-36
DATA SOURCE:	field maps
RESPONSIBILITY	Ecology
EXAMPLE:	36

DATA ITEM:	SITENAME$
SHORT DESCRIPTION:	stream name where thermograph is located
LONG DESCRIPTION:	name of stream or river where field parameters were measured.
GENERAL USE:	general description
MODEL USE:	all
UNITS OF MEASURE:	none
COMPUTATION FORM:	none
TYPE:	character
FORMAT:	a37
CODE DESCRIPTION:	none
RANGE OF VALUES:	
DATA SOURCE:	field form
RESPONSIBILITY	Ecology
EXAMPLE:	Huckleberry Creek

DATA ITEM:	SITE$
SHORT DESCRIPTION:	unique TFW temperature study site identification
LONG DESCRIPTION:	unique id for sites where field crew measured shade, channel, and hydrologic parameters. These sites are initially the high priority sites where air and water temperature are measured concurrently
GENERAL USE:	to link relational databases
MODEL USE:	site characterization
UNITS OF MEASURE:	none
COMPUTATION FORM:	none
TYPE:	character
FORMAT:	2
CODE DESCRIPTION:	
RANGE OF VALUES:	000 to 999
DATA SOURCE:	Ecology
RESPONSIBILITY	Ecology
EXAMPLE:	001

DATA ITEM: STREAMORDER

SHORT DESCRIPTION: geomorphic stream order at thermograph site
LONG DESCRIPTION: stream order of site evaluated from the blue lines of 1:24000(if available) or 1:62500 USGS topographic maps
GENERAL USE: site characterization
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: A1
CODE DESCRIPTION: 1 = first order stream, 2 = second order stream, etc
RANGE OF VALUES: 1 to 5
DATA SOURCE: stream delineations from USGS 1:24000 and 1:62500 topographic maps
RESPONSIBILITY Ecology
EXAMPLE: 2

DATA ITEM: TOPOGRAD

SHORT DESCRIPTION: channel gradient from topographic maps
LONG DESCRIPTION: channel gradient as determined from USGS 1:24000 or 1:62500 topographic maps
GENERAL USE: site characterization
MODEL USE: none
UNITS OF MEASURE: percent
COMPUTATION FORM: upstream elevation-downstream elevation/reach length
TYPE: numeric
FORMAT: 5.2
CODE DESCRIPTION: none
RANGE OF VALUES: 0.00 to 99.99
DATA SOURCE: USGS maps & REACHALT.BAS digitizer program
RESPONSIBILITY Ecology or WDF
EXAMPLE: 8.4

DATA ITEM: TOPOSA

SHORT DESCRIPTION: topographic shade angle to the south
LONG DESCRIPTION: the topography S angle is formed from a line connecting a point at the center of the stream to a point on the topographic feature producing the shade
GENERAL USE: model testing
MODEL USE: TEMP86
UNITS OF MEASURE: degrees
COMPUTATION FORM:
TYPE: numeric
FORMAT: 5.2
CODE DESCRIPTION: average of site values
RANGE OF VALUES: 0.00 to 89.99
DATA SOURCE: riparian survey
RESPONSIBILITY Ecology
EXAMPLE: 12.55

DATA ITEM:	TOPOSEA
SHORT DESCRIPTION:	topographic shade angle in SE direction
LONG DESCRIPTION:	the topography SE angle is formed from a line connecting a point at the center of the stream to a point on the topographic feature producing the shade
GENERAL USE:	model testing
MODEL USE:	TEMP86
UNITS OF MEASURE:	degrees
COMPUTATION FORM:	average of site values
TYPE:	numeric
FORMAT:	5.2
CODE DESCRIPTION:	average of site values
RANGE OF VALUES:	0.00 to 89.99
DATA SOURCE:	riparian survey
RESPONSIBILITY	Ecology
EXAMPLE:	25.55

DATA ITEM:	TOPOSWA
SHORT DESCRIPTION:	topographic shade angle in Southwest direction
LONG DESCRIPTION:	the topography angle Southwest is formed from a line connecting a point at the center of the stream to a point on the topographic shade feature in the Southwest direction
GENERAL USE:	model testing
MODEL USE:	TEMP86
UNITS OF MEASURE:	degrees
COMPUTATION FORM:	average of site values
TYPE:	numeric
FORMAT:	I2
CODE DESCRIPTION:	none
RANGE OF VALUES:	0 to 90
DATA SOURCE:	field notes from riparian transect survey
RESPONSIBILITY	Ecology
EXAMPLE:	26

DATA ITEM:	TOWNSHIP
SHORT DESCRIPTION:	township of legal description
LONG DESCRIPTION:	public land survey township legal description
GENERAL USE:	location
MODEL USE:	none
UNITS OF MEASURE:	township
COMPUTATION FORM:	none
TYPE:	character
FORMAT:	a3
CODE DESCRIPTION:	none
RANGE OF VALUES:	1N-40N
DATA SOURCE:	USGS 1:;24000 or 1:62500 topographic maps
RESPONSIBILITY	Ecology
EXAMPLE:	1N

DATA ITEM: TRAVELM

SHORT DESCRIPTION: travel time meters/sec
LONG DESCRIPTION: conversion of traveltime ds to meters/second
GENERAL USE: model testing, site characterization
MODEL USE: TEMP86
UNITS OF MEASURE: meters/second
COMPUTATION FORM: [travelds]* .3048
TYPE: numeric
FORMAT: 6.3
CODE DESCRIPTION: none
RANGE OF VALUES: 0.000 to 99.999
DATA SOURCE: calculated on CHECK.WS; field note * conversion
RESPONSIBILITY Ecology
EXAMPLE: 0.305

DATA ITEM: TRIBUTARYTO

SHORT DESCRIPTION: major water body downstream of site
LONG DESCRIPTION:
GENERAL USE: locational
MODEL USE: none
UNITS OF MEASURE: none
COMPUTATION FORM: none
TYPE: character
FORMAT: a35
CODE DESCRIPTION: none
RANGE OF VALUES:
DATA SOURCE: USGS maps
RESPONSIBILITY Ecology
EXAMPLE: Puget Sound

DATA ITEM: VEGDENE

SHORT DESCRIPTION: shading density of vegetation East side
LONG DESCRIPTION: average screening factor of the shade producing strata of vegetation along the stream
GENERAL USE: model testing
MODEL USE: SRSHD
UNITS OF MEASURE: percent
COMPUTATION FORM:
TYPE: numeric
FORMAT: 6.2
CODE DESCRIPTION: 999 = no vegetation
RANGE OF VALUES: 0.00 to 100.00
DATA SOURCE: calculated on TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 50.00

DATA ITEM: VEGDENW

SHORT DESCRIPTION: shading density of vegetation along West side for SRSHD
LONG DESCRIPTION: average screening factor of the shade producing strata of vegetation along the West side of the stream
GENERAL USE: model testing
MODEL USE: SRSHD
UNITS OF MEASURE: percent
COMPUTATION FORM: average of site values
TYPE: numeric
FORMAT: 6.2
CODE DESCRIPTION: 999 = no vegetation
RANGE OF VALUES: 0.00 to 100.00
DATA SOURCE: calculated on TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 50.00

DATA ITEM: VEGHTEM

SHORT DESCRIPTION: height of vegetation on East side
LONG DESCRIPTION: average height of the shade producing strata on the East side of the TFW temperature study reach
GENERAL USE: model testing
MODEL USE: SRSHD
UNITS OF MEASURE: meters
COMPUTATION FORM: average of site values
TYPE: numeric
FORMAT: 5.2
CODE DESCRIPTION: 999 = no vegetation
RANGE OF VALUES: 0.00 to 99.99
DATA SOURCE: calculated in TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 50.00

DATA ITEM: VEGHTWM

SHORT DESCRIPTION: height of vegetation on West side
LONG DESCRIPTION: average height of shade producing vegetation on the West side of the stream
GENERAL USE: model testing
MODEL USE: SRSHD
UNITS OF MEASURE: meters
COMPUTATION FORM: [] * .3048
TYPE: numeric
FORMAT: 5.2
CODE DESCRIPTION: 999 = no vegetation
RANGE OF VALUES: 0.00 to 99.99
DATA SOURCE: calculated in TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 50.00

DATA ITEM: VIEW1

SHORT DESCRIPTION: average view to the sky determined by densitometer
LONG DESCRIPTION: average view to the sky as determined by taking the simple average of 4 densitometer reading (upstream, left, right, downstream) at each riparian transect and averaging for all values along the TFW temperature study reach
GENERAL USE: model testing, site characterization
MODEL USE: TEMPEST
UNITS OF MEASURE: percent
COMPUTATION FORM: (view1 + view2 + view3 + view4)/4
TYPE: numeric
FORMAT: 4.0
CODE DESCRIPTION: none
RANGE OF VALUES: 0. to 100
DATA SOURCE: calculated by SYSTAT; saved on TEMP1.WS
RESPONSIBILITY Ecology
EXAMPLE: 0.5

DATA ITEM: VISIT

SHORT DESCRIPTION: date of site characterization
LONG DESCRIPTION: date of field crew visit to measure channel units, riparian, and hydrology at the TFW temperature study sites
GENERAL USE: site characterization
MODEL USE: none
UNITS OF MEASURE: time
COMPUTATION FORM:
TYPE: date
FORMAT: mm-dd-yy
CODE DESCRIPTION: none
RANGE OF VALUES: 01-01-88 to 12-31-88
DATA SOURCE: field notes
RESPONSIBILITY Ecology
EXAMPLE: 07-11-88

DATA ITEM: WATER

SHORT DESCRIPTION: hourly water temperature degree Celsius
LONG DESCRIPTION: hourly water temperature values measured by thermographs, converted to degree Celsius, and quality assured with field observations
GENERAL USE: model testing, site characterization
MODEL USE: TEMPEST, TEMP86
UNITS OF MEASURE: degree Celsius
COMPUTATION FORM: (degree F - 32) * 0.55555
TYPE: numeric
FORMAT: 5.1
CODE DESCRIPTION: 999 = missing value
RANGE OF VALUES: -1.0 to 50.0
DATA SOURCE: thermographs
RESPONSIBILITY WeyCo, Ecology
EXAMPLE: 10.5

DATA ITEM: WATMAX

SHORT DESCRIPTION: maximum daily water temperature in degree Celsius
LONG DESCRIPTION: maximum daily water temperature values measured over a day at recording thermographs, and generally calculated from hourly values
GENERAL USE: model testing, site characterization, temperature regimes
MODEL USE: Brown, TEMP86
UNITS OF MEASURE: degree Celsius
COMPUTATION FORM: (degree F - 32) * 0.55555
TYPE: numeric
FORMAT: 5.1
CODE DESCRIPTION: none
RANGE OF VALUES: -1.0 to 50.0
DATA SOURCE: thermographs
RESPONSIBILITY WeyCo, Ecology
EXAMPLE: 10.5

DATA ITEM: WATMEAN

SHORT DESCRIPTION: mean daily water temperature in degree Celsius
LONG DESCRIPTION: mean daily water temperature values measured over a day at recording thermographs, and generally calculated from hourly values
GENERAL USE: model testing, site characterization, temperature regimes
MODEL USE: IFIM
UNITS OF MEASURE: degree Celsius
COMPUTATION FORM: (degree F - 32) * 0.55555
TYPE: numeric
FORMAT: 5.1
CODE DESCRIPTION: none
RANGE OF VALUES: -1.0 to 50.0
DATA SOURCE: thermographs
RESPONSIBILITY WeyCo, Ecology
EXAMPLE: 10.5

DATA ITEM: WATMIN

SHORT DESCRIPTION: minimum daily water temperature in degree Celsius
LONG DESCRIPTION: minimum daily water temperature values measured over a day at recording thermographs, and generally calculated from hourly values
GENERAL USE: model testing, site characterization, temperature regimes
MODEL USE: TEMP86
UNITS OF MEASURE: degree Celsius
COMPUTATION FORM: (degree F - 32) * 0.55555
TYPE: numeric
FORMAT: 5.1
CODE DESCRIPTION: none
RANGE OF VALUES: -1.0 to 50.0
DATA SOURCE: thermographs
RESPONSIBILITY WeyCo, Ecology
EXAMPLE: 10.5

DATA ITEM: WATRANGE

SHORT DESCRIPTION: daily water temperature range in degree Celsius
LONG DESCRIPTION: range of observed water temperature values measured over a day at recording thermographs, and generally calculated from hourly values
GENERAL USE: model testing, site characterization, temperature regimes
MODEL USE: none
UNITS OF MEASURE: degree Celsius
COMPUTATION FORM: (degree F - 32) * 0.55555
TYPE: numeric
FORMAT: 5.1
CODE DESCRIPTION: none
RANGE OF VALUES: -1.0 to 50.0
DATA SOURCE: thermographs
RESPONSIBILITY WeyCo, Ecology
EXAMPLE: 10.5

DATA ITEM: WDFNUMBER

SHORT DESCRIPTION: Wa. Dept. of Fisheries stream number
LONG DESCRIPTION: The 4-digit stream number obtained from the Wa. Dept. of Fisheries publication *'A CATALOG OF WASHINGTON STREAMS AND SALMON UTILIZATION'*.
GENERAL USE: location
MODEL USE: none
UNITS OF MEASURE:
COMPUTATION FORM: none
TYPE: character
FORMAT: 4
CODE DESCRIPTION:
RANGE OF VALUES: 0000-9999
DATA SOURCE: WDF publications: A CATALOG OF WASHINGTON STREAMS AND SALMON UTILIZATION' vol 1,2,&3 for western Washington, and Dept. of Ecology reference maps for Eastern Washington
RESPONSIBILITY Ecology
EXAMPLE: 0112

DATA ITEM: WIDTHNP

SHORT DESCRIPTION: channel width excluding pools and boulders
LONG DESCRIPTION: channel width computed from channel units other than pools and boulders
GENERAL USE: model testing
MODEL USE: TEMP86
UNITS OF MEASURE: meters
COMPUTATION FORM: (volumeumnopools)/(lenxdunnopools)
TYPE: numeric
FORMAT: 6.2
CODE DESCRIPTION: none
RANGE OF VALUES: 0.00 to 999.99
DATA SOURCE: calculated in HI.WS
RESPONSIBILITY Ecology
EXAMPLE: 3.33

DATA ITEM:	WIDTHVWT
SHORT DESCRIPTION:	volume weighted width
LONG DESCRIPTION:	the weighted average width of TFW temperature study reach computed by weighing the width by channel volume.
GENERAL USE:	site characterization
MODEL USE:	SSTEMP, SNTEMP
UNITS OF MEASURE:	meters
COMPUTATION FORM:	sum(channel unit width*channel width*channel depth*channel length)/sum (channel length*channel width) svolume/slenxdun
TYPE:	numeric
FORMAT:	6.2
CODE DESCRIPTION:	none
RANGE OF VALUES:	0.00 to 999.99
DATA SOURCE:	calculated on HI.WS
RESPONSIBILITY	Ecology
EXAMPLE:	6.63

DATA ITEM:	WRIA
SHORT DESCRIPTION:	Water Resource Inventory Area
LONG DESCRIPTION:	Water Resource Inventory Areas as shown on WRIA maps produced by the Wa. Depts of Fisheries and Ecology.
GENERAL USE:	site location
MODEL USE:	none
UNITS OF MEASURE:	none
COMPUTATION FORM:	none
TYPE:	character
FORMAT:	2
CODE DESCRIPTION:	code describes Water Resource Inventory Area watershed
RANGE OF VALUES:	01-62
DATA SOURCE:	Water Resource Inventory Areas map 1:1000000 produced by Wa. Dept of Ecology
RESPONSIBILITY	Ecology
EXAMPLE:	01