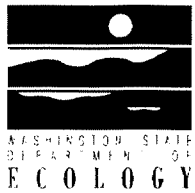

Evaluation of High Temperature in Rock Creek (Klickitat County)

Introduction

Rock Creek basin lies in central Klickitat County, south of the Yakima Indian Reservation and east of Highway 97. Much of the upper portion is privately owned forest. The lower portion lies within non-forested rangeland. Much of the stream channel lies within steeply incised canyons which has prevented direct impacts to much of the channel and riparian areas. While the riparian vegetation and stream banks are intact in most of the upper watershed, the stream channel and banks in the lower portion consist largely of cobble sized rocks (hence the name, Rock Creek). Violations of the state water quality criterion for temperature for Class A streams (18°C) were noted, prompting the listing of Rock Creek as an impaired waterbody. The Eastern Klickitat Conservation District and the Natural Resources Conservation Service deployed automatic temperature monitors at 10 sites within the Rock Creek basin during summer 1995 and has provided these data to the Department of Ecology for evaluation. In addition, a stream habitat evaluation was done at each monitoring site and provided to us.

The ten monitoring sites are listed in Table 1 and shown in Figure 1. The data presented in Figures 2-6 are daily maximum temperatures. Daily maximum temperature exceeded 18°C through late July and early August at the mouth of the Middle Fork and at the Quartz Creek site upstream (Figure 2). The three uppermost sites on the West Fork of Rock Creek (WF1-WF3) were similar in maximum temperature through early July but WF2 was much warmer in August and September (Figure 3). Of these three sites WF2 had the highest temperature, although all had excursions above 18°C. The decrease in stream temperature between WF2 and WF3 may be due to the influence of several small tributaries or due to shading. The temperature on the mainstem site immediately downstream of the confluence of the Middle Fork and West Fork parallels that of the tributaries but tends to be slightly higher. Temperature at the next mainstem site (RC2) was much higher than either RC1 or Harrison Creek, probably reflecting the more exposed, rocky creekbed between the two mainstem sites. Temperatures below RC2 were high, 20°C to >30°C, throughout the summer.

The stream survey included estimates of bottom substrate, water velocity, channel alteration, scouring/deposition, pool to riffle ratio, bank stability, streamside cover, channel configuration, and canopy coverage of the stream. The lower portion of the creek shows impacts from past grazing activity and episodic flood events, including lack of riparian cover and a shallow, braided stream channel.

by William Ehinger
February 1996

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Table 1. Temperature monitoring sites. Canopy cover estimates were provided by the E. Klickitat Conservation District, target values are from Washington Forest Practices Board's Standard Methodology for Conducting Watershed Analysis, Ver. 3.0

Site	Description	Elev (ft)	canopy cover (%) (estimate)	canopy cover (%) (target)
Quartz Creek	near the head of Quartz Creek	2600	30	60
MF1	mouth of Middle Fork Rock Creek	1570	50	90
WF1	near head of West Fork Rock Creek	3150	40	40
WF2	WF Rock Creek near Box Canyon Road	2500	30	70
WF3	WF Rock Creek above Middle Fork	1580	85	90
Harrison Creek	mouth of Harrison Creek	650	95	90
RC1	Rock Creek above Bickleton Hwy	1050	80	90
RC2	Rock Creek below Harrison Creek	625	30	90
RC3	Rock Creek near 93201 Bridge	550	35	90
RC4	mouth of Rock Creek	350	20	90

Conclusions

The temperature data show that maximum water temperature commonly exceeds the state water quality standard of 18°C for Class A streams throughout the basin. The stream habitat survey of stream substrate, riparian corridor, and canopy cover (and photographs of each site) indicated that most of Rock Creek shows little impact from current forestry or agricultural activities, however evidence of past grazing practices are evident. Water temperature, especially in the lower part of the basin, is affected by the exposed rocky substrate and lack of riparian cover. The temperatures observed in upper Rock Creek may be natural for a small creek in a hot, sunny summer climate. A small stream, such as Rock Creek, situated on a south facing slope is especially sensitive to overheating where riparian cover is low. Based on the stream surveys, four of the ten monitoring sites meet or were within 10% of the target canopy coverage goals for eastern Washington Class A streams (Standard Method for Conducting Watershed Analysis, pg. D-25). Overall, Rock Creek appears to be recovering.

It would be difficult and expensive to quantitatively estimate what portion of the observed high temperature is natural versus that due to anthropogenic influences. Current land management is probably adequate to protect this stream. However, we have several recommendations which would speed the recovery and perhaps prevent flood related damage in the future. We recommend that the Department of Ecology work through the Eastern Klickitat Conservation District to ensure that:

1) Funds are sought for rehabilitating Rock Creek. This may include establishing a single channel, where a braided channel exists, planting riparian vegetation, and other related activities. The goal of riparian vegetation planting would be to attain the target canopy coverage established by Washington State Department of Natural Resources for Class A streams in eastern Washington (Table 1).

2) Grazing and forestry practices are closely followed to protect riparian corridors and to maintain slope stability and water retention capacity of the uplands.

3) Forest roads in the upper watershed are properly stabilized to prevent damage to the creek due to road failure.

4) Progress in riparian plantings is documented.

5) Temperature monitoring and stream surveys are repeated to monitor the effects stream rehabilitation work on both canopy cover and water temperature.

Item number one could begin immediately with the instream work completed as funding permits, but should not to exceed 20 years. A Memorandum of Understanding is being developed between the Eastern Klickitat Conservation District and the Department of Ecology (Max Linden, CRO) in which the Conservation District will coordinate these activities among the members of the Watershed Committee and be responsible for reporting back to the Department of Ecology-Central Region Office

Figures

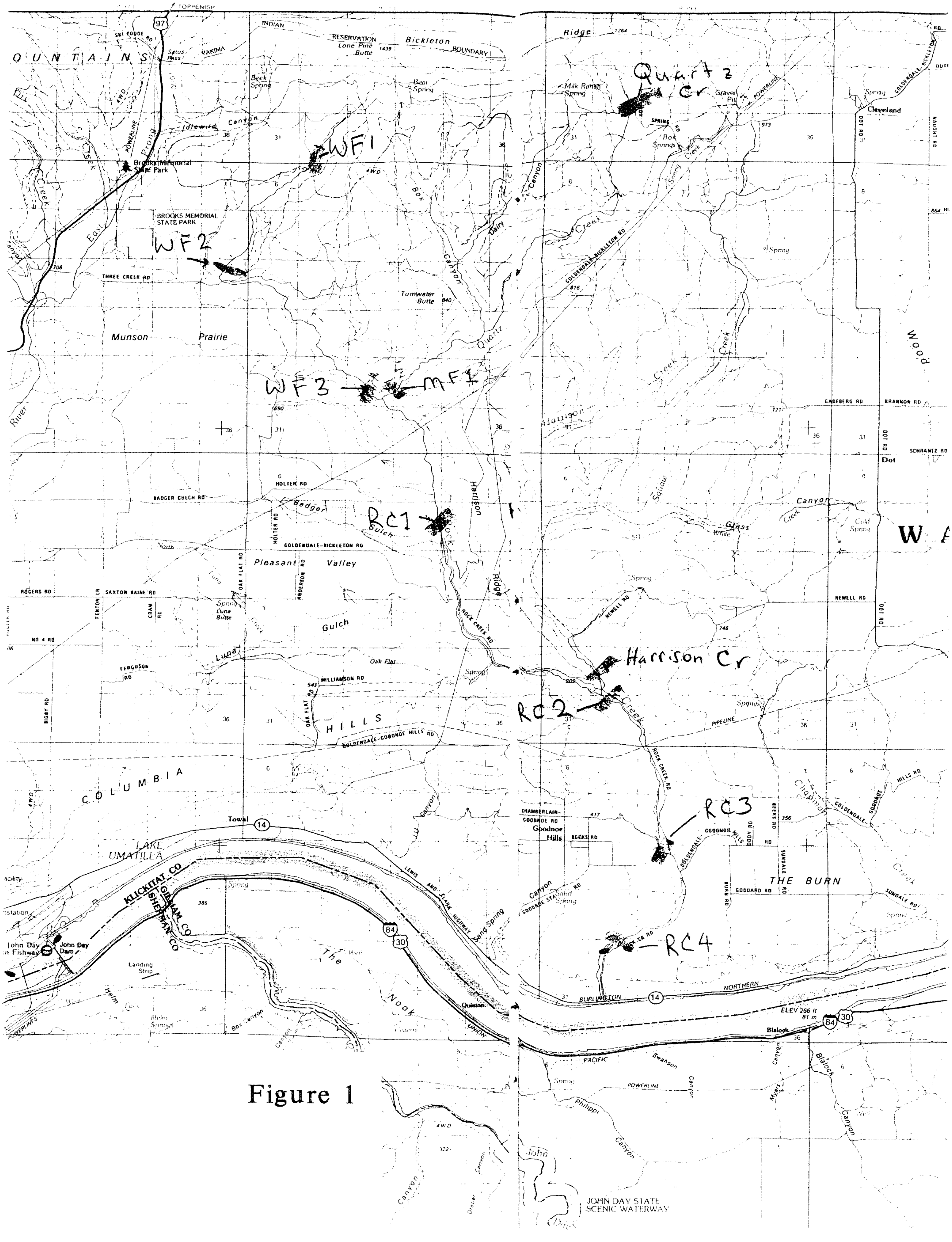
Quartz Cr
WF1
WF2
WF3
MF1
RC1
Harrison Cr
RC2
RC3
RC4
TOPPENISH
97
MOUNTAINS
INDIAN
RESERVATION
BOUNDARY
Bickleton
Lone Pine Butte
Ridge
Milk Ranch Spring
Gravel Pit
POWERLINE
Cleveland
Brooks Memorial State Park
BROOKS MEMORIAL STATE PARK
THREE CREEK RD
Tumwater Butte
Munson
Prairie
River
Wood
GOLDENDALE-BICKLETON RD
HOLTER RD
BADGER GULCH RD
Badger
Gulch
Pleasant
Valley
ROGERS RD
SAXTON BAINE RD
Luna Butte
Oak Flat
WILLIAMSON RD
HILLS
GOLDENDALE-GOODNOE HILLS RD
PIPELINE
ROCK CREEK RD
NEWELL RD
Glass
Canyon
DOT RD
Dot
GADEBERG RD
BRANNON RD
SCHRANTZ RD
COLUMBIA
Towal
14
LAKE UMATILLA
KLICKITAT CO
GILLIAM CO
SHERMAN CO
John Day Dam
LEWIS AND CLARK HIGHWAY
84
30
The Nook
CHAMBERLAIN-GOODNOE RD
Goodnoe Hills
BEEKS RD
GOLDENDALE-GOODNOE HILLS RD
THE BURN
SUNDALE RD
GODDARD RD
NORTHERN
BURLINGTON
ELEV 266 ft 81 m
Blalock
PACIFIC
Swanson
POWERLINE
Philippi
Canyon
JOHN DAY STATE SCENIC WATERWAY

Figure 1

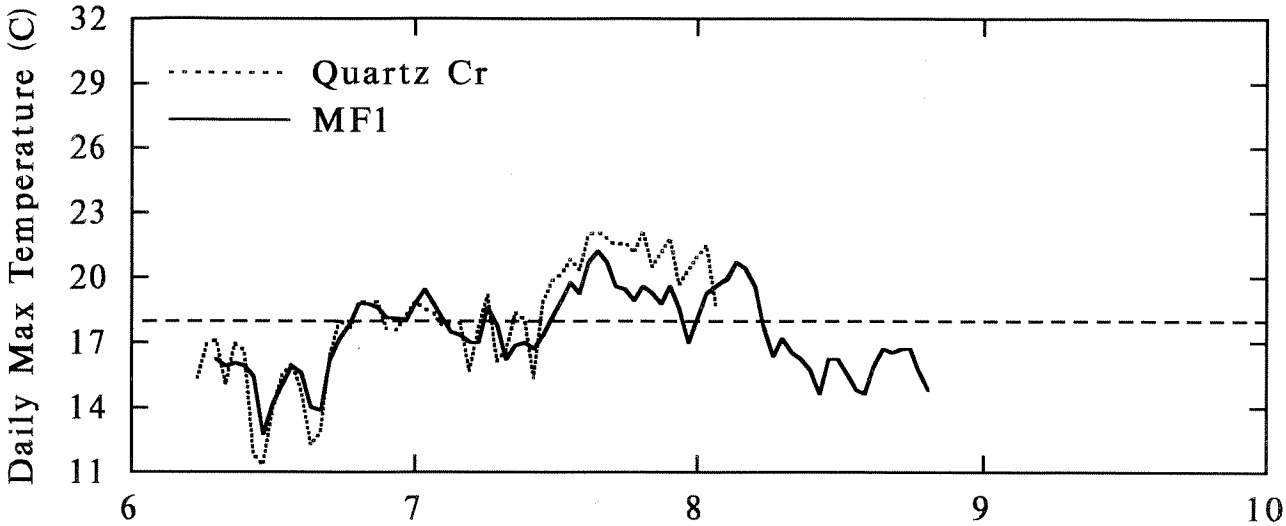

Figure 2

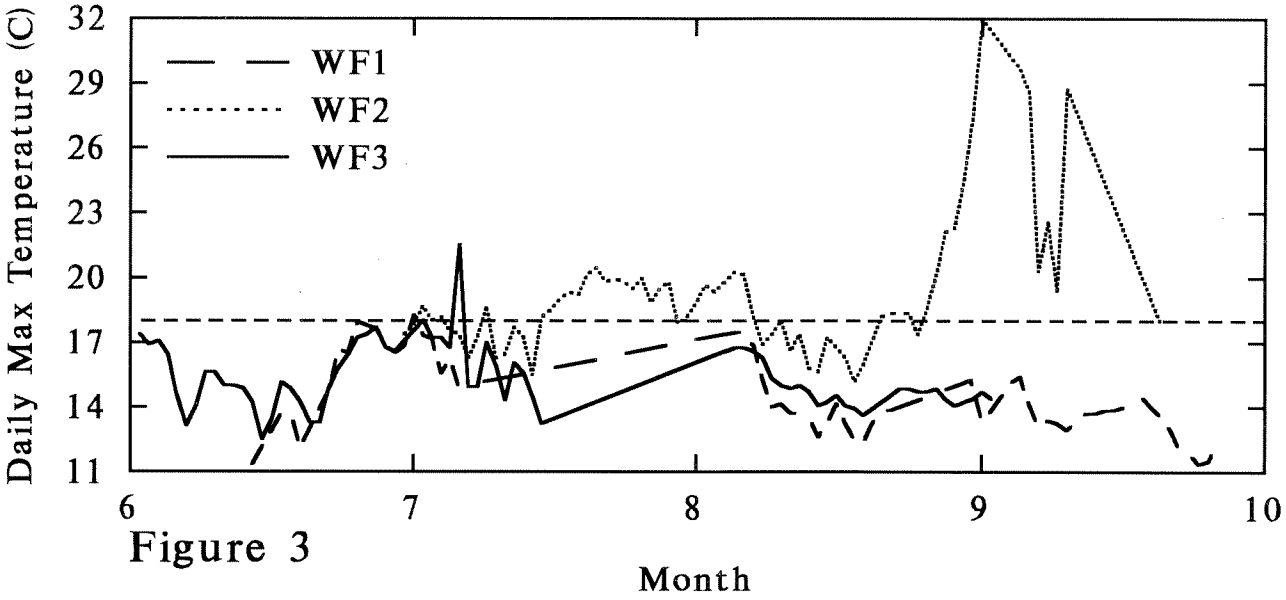

Figure 3

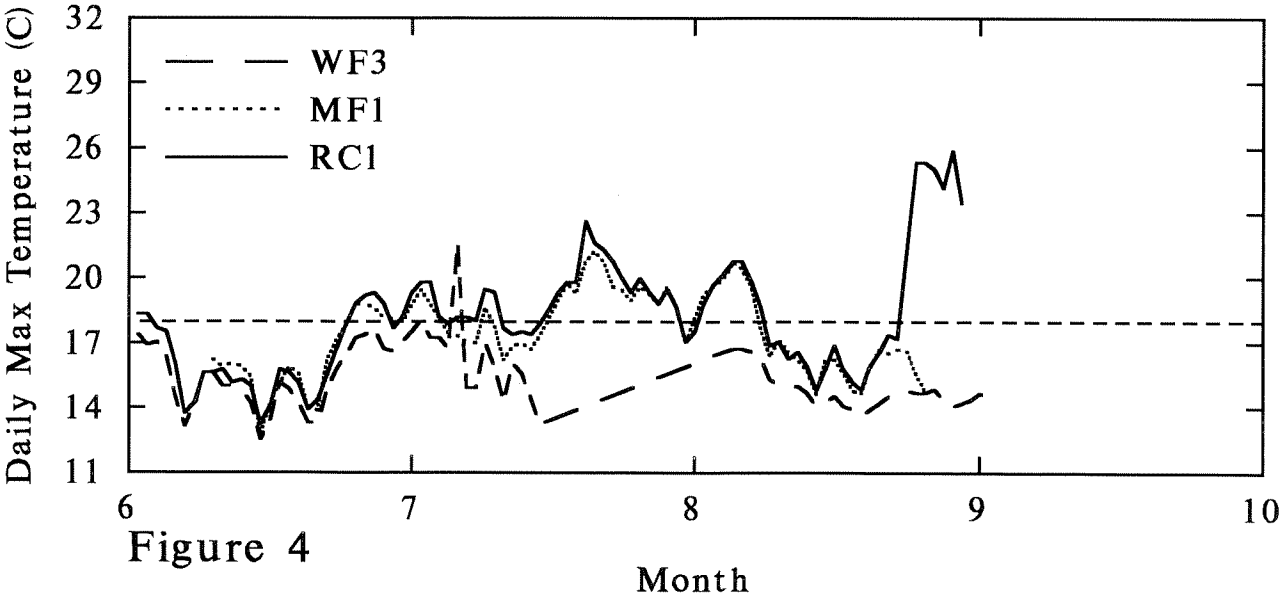

Figure 4

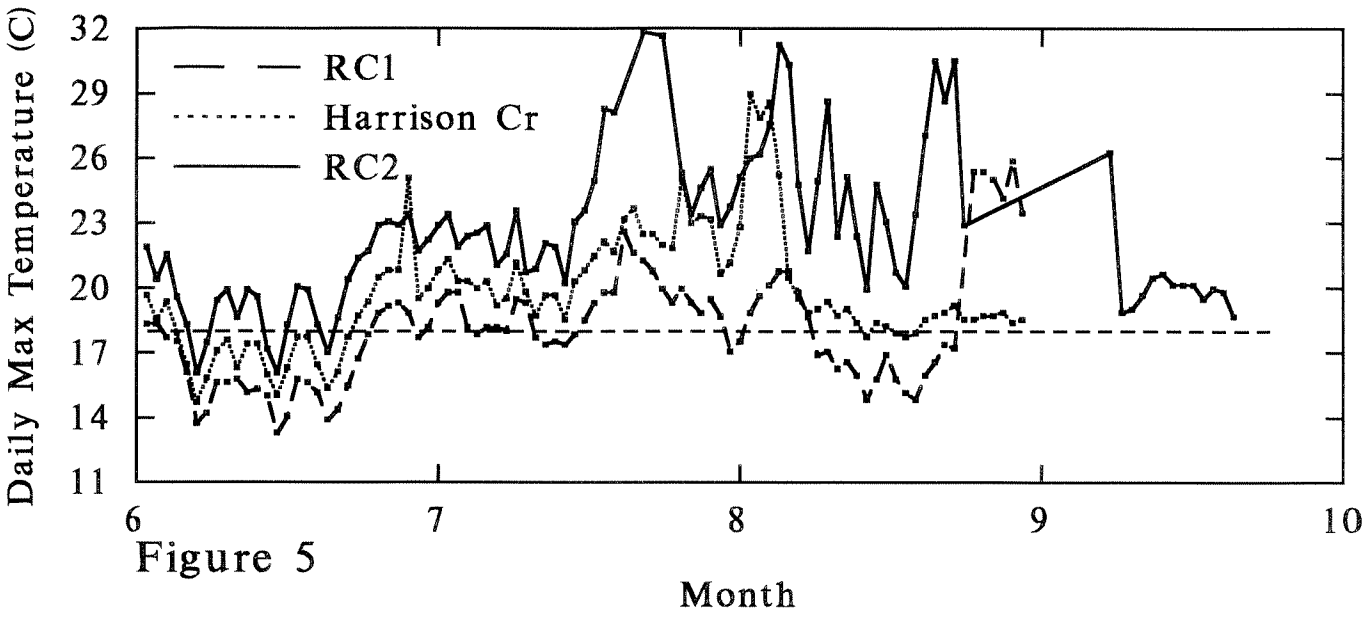

Figure 5

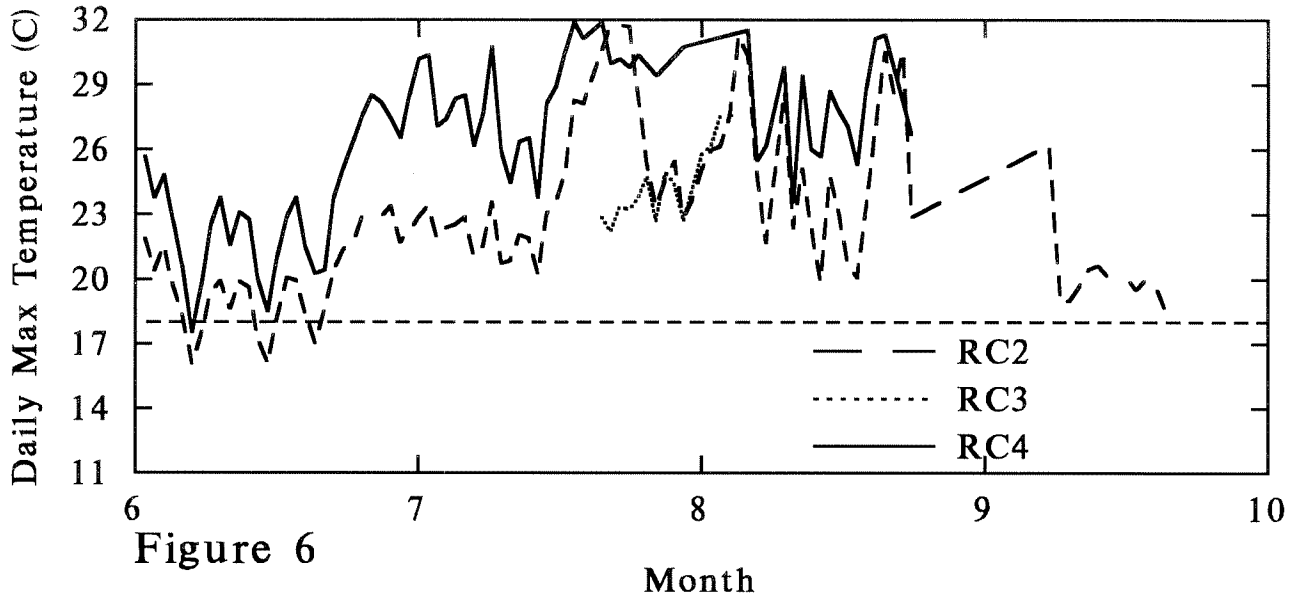

Figure 6