Wilderness Water Temperatures: A look at the Selway and Middle Fork Salmon

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With Help From:

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Background

- Prompted by ORW nominations
- Heightened sensitivity to water T
- Questions about whether criteria are achievable
- Curiosity about reference or natural background conditions

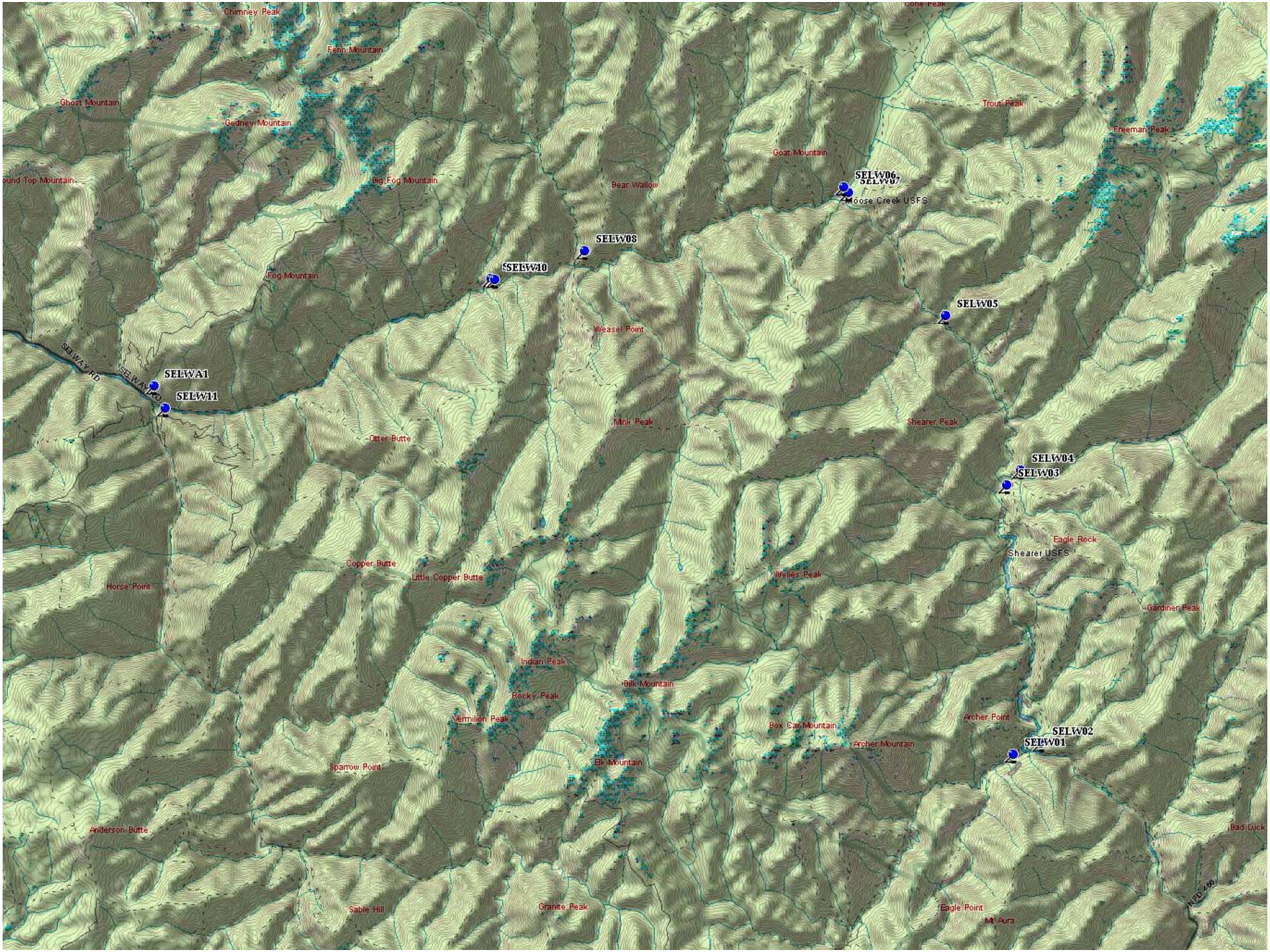
Objectives

- **Characterize current water quality** as a baseline for ORW
- **Document temperatures in pristine waters and compare to criteria**

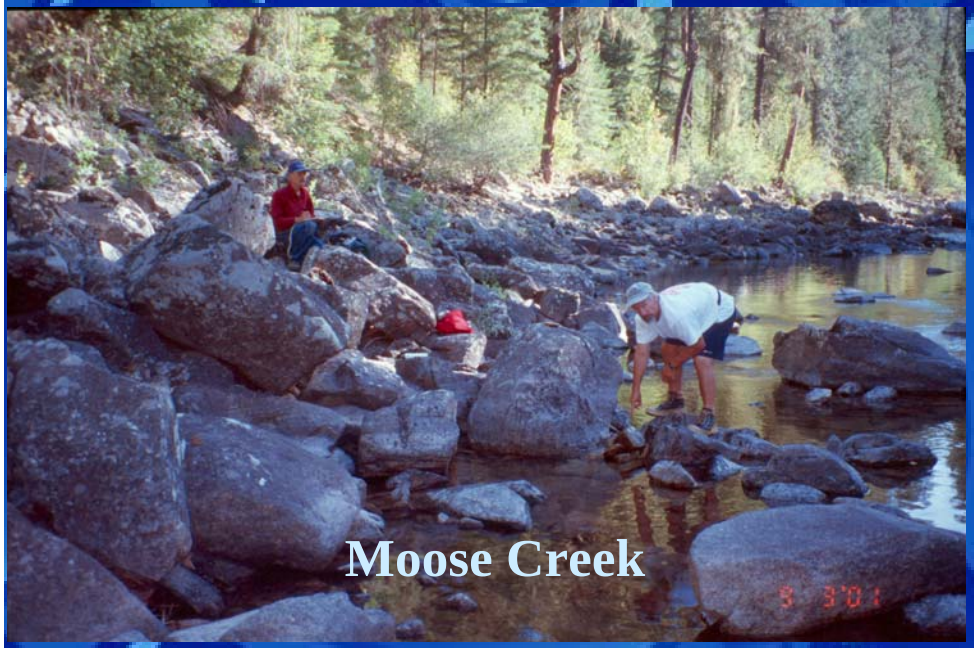
Methods

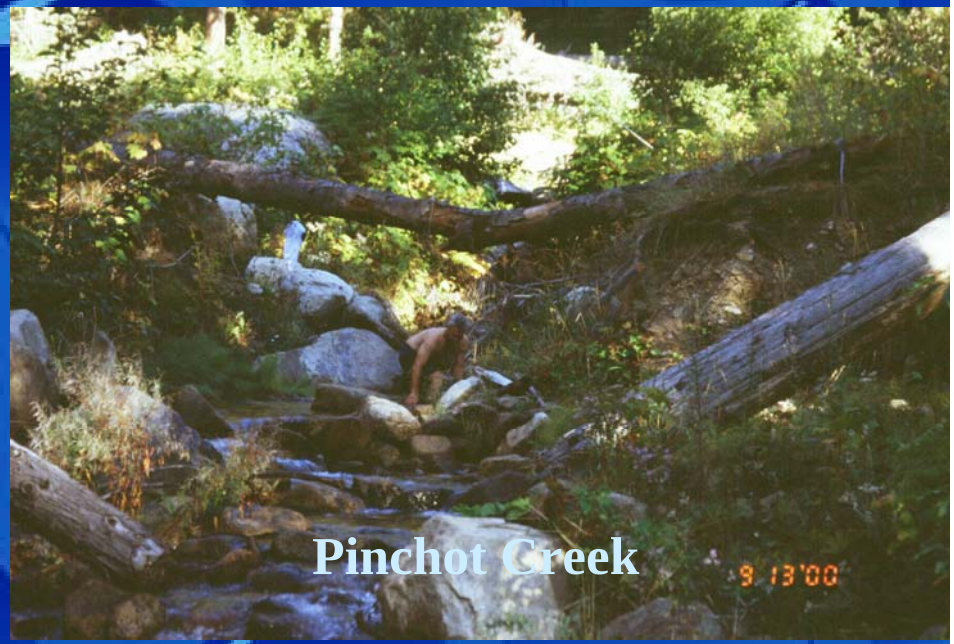
- Year long deployment
  - relocation
  - ice
  - high flows
- Recreational safety
- Protected by rocks
- Margins of flow in larger streams

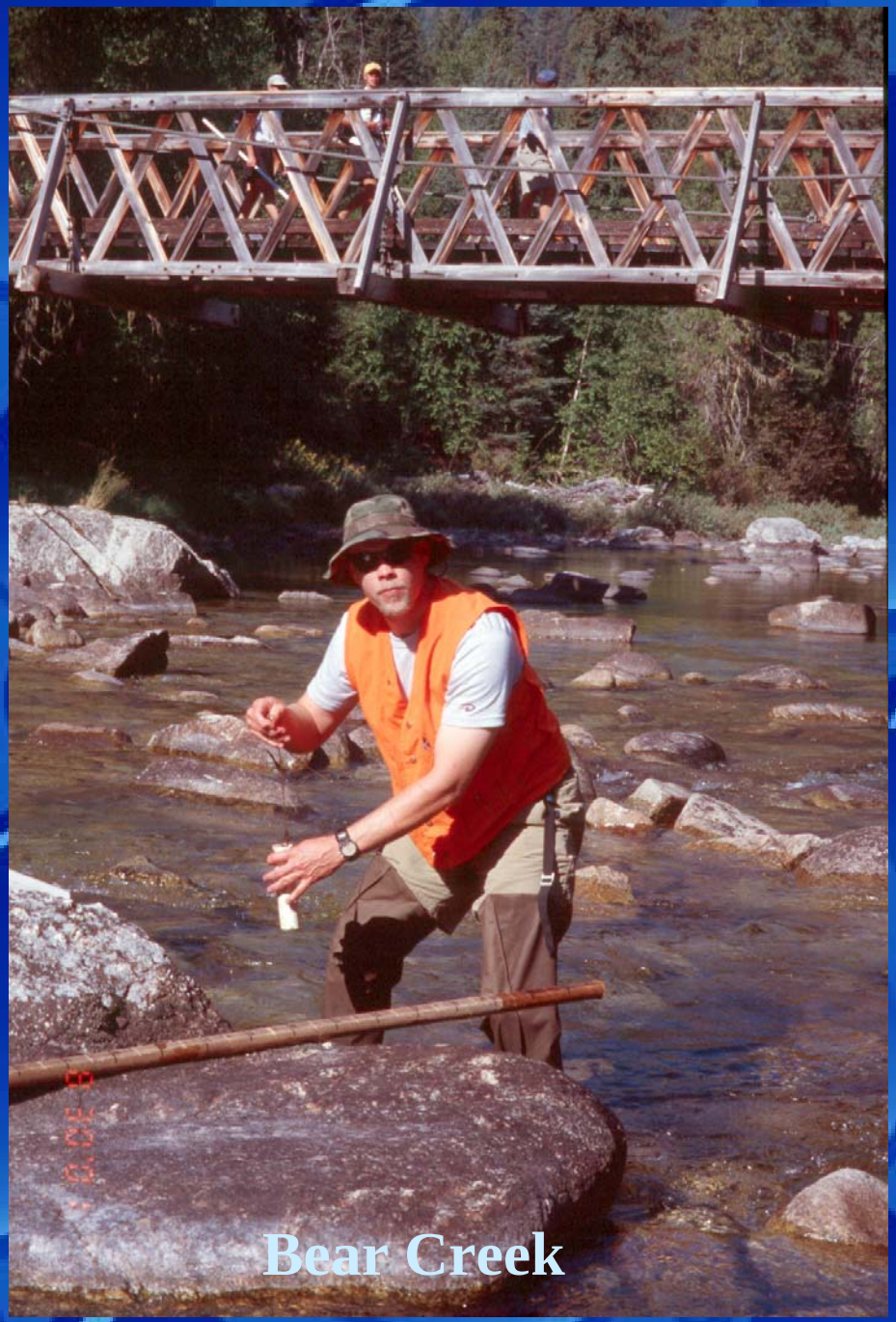
8 29'01


Chimney Peak
Fenn Mountain
Ghost Mountain
Gedney Mountain
Trout Peak
Freeman Peak
Goat Mountain
Big Fog Mountain
Bear Wallow
SELW06
SELW07
Moose Creek USFS
SELW08
SELW10
Fog Mountain
SELW05
Weasel Point
SELWAY RD
SELWA1
SELW11
Otter Butte
Mink Peak
Shearer Peak
SELW04
SELW03
Eagle Rock
Shearer USFS
Copper Butte
Little Copper Butte
Horse Point
Wylies Peak
Gardiner Peak
Indian Peak
Bilk Mountain
Rocky Peak
Vermilion Peak
Box Car Mountain
Archer Point
SELW02
SELW01
Archer Mountain
Elk Mountain
Sparrow Point
Anderson Butte
Bad Luck
Sable Hill
Granite Peak
Eagle Point
Mt Aura

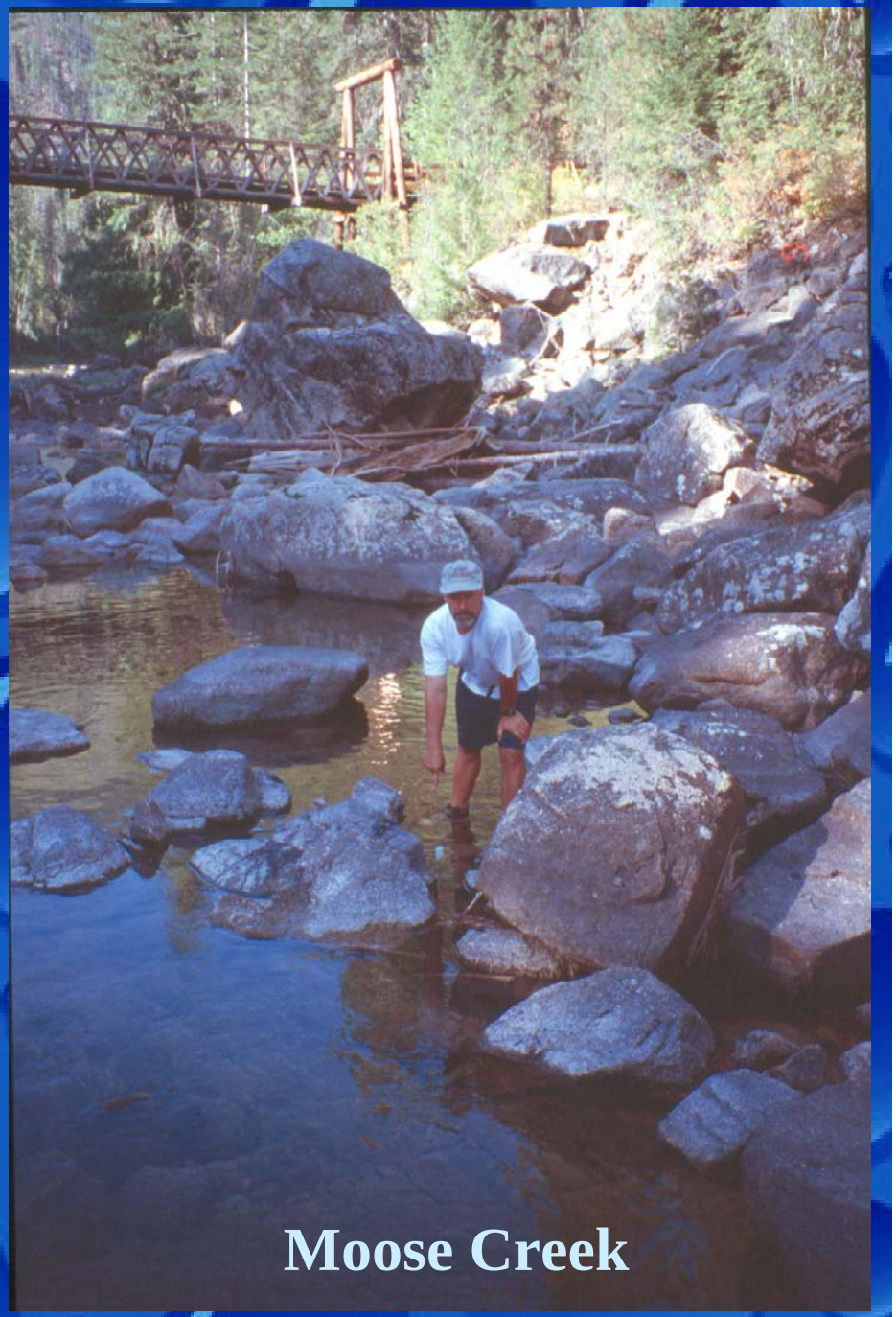
- A variety of stream sizes
  - Pinchot Cr., small 2nd order
  - Moose Cr., 5th order



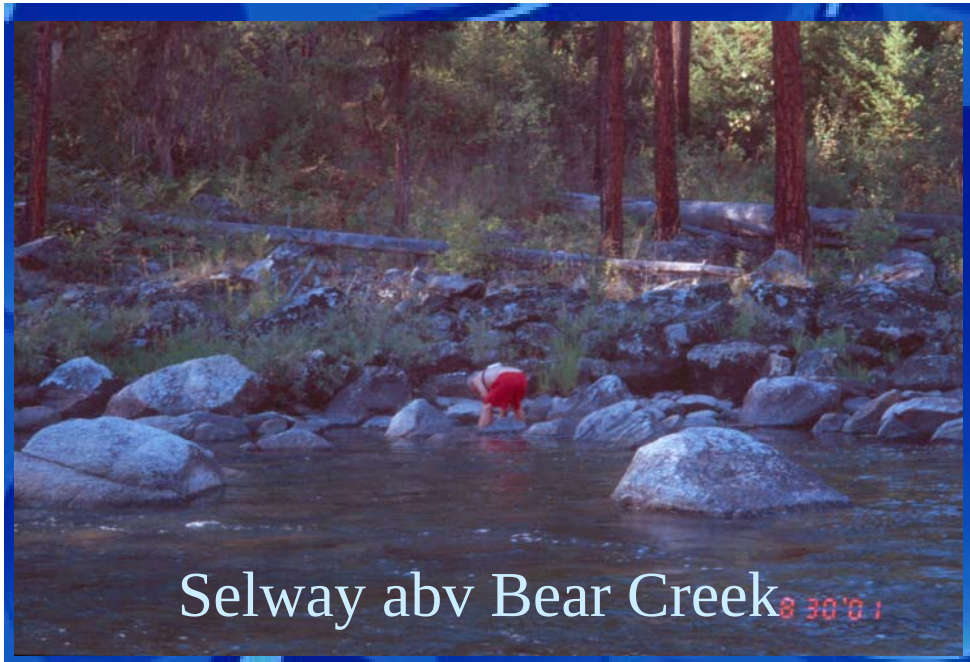




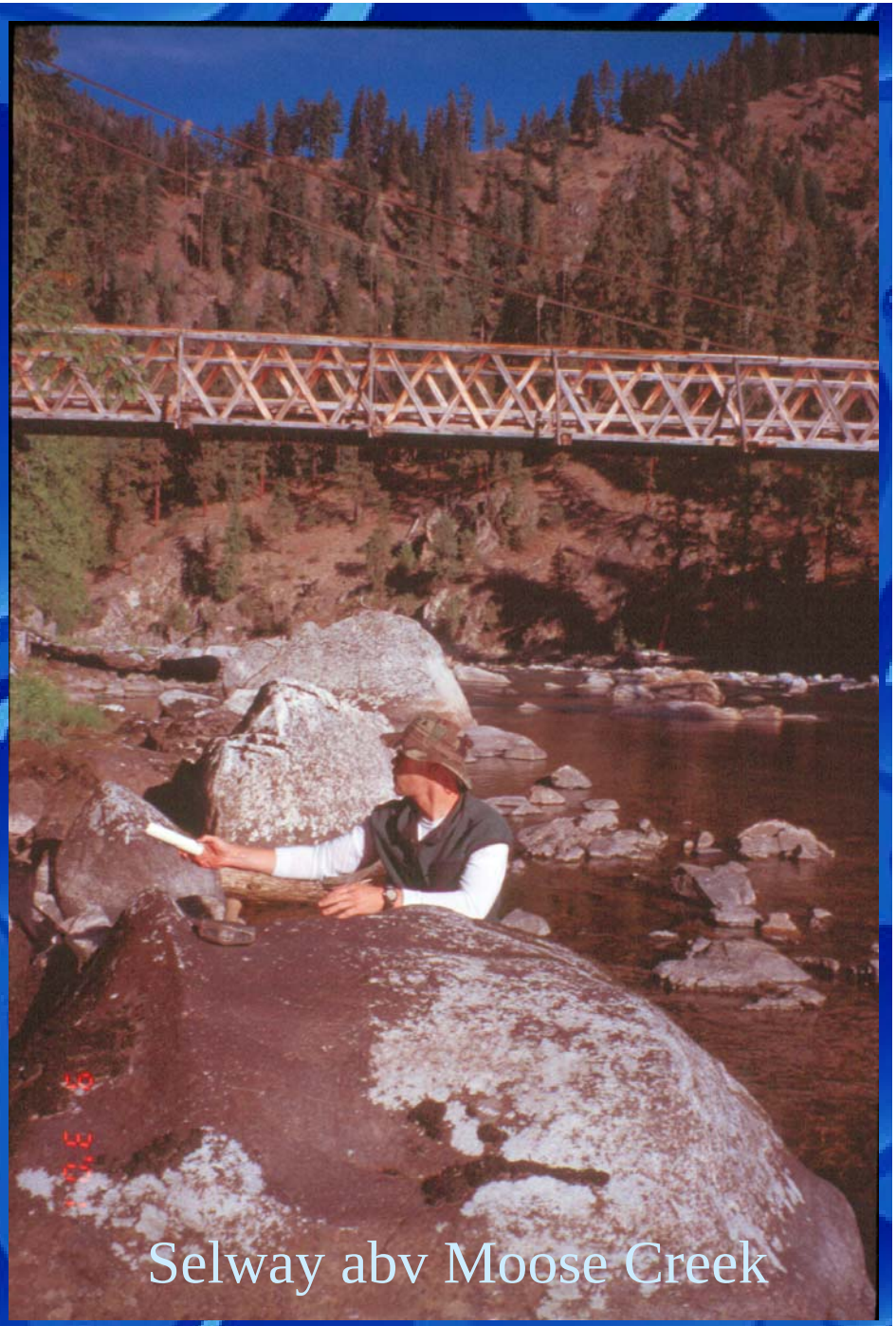
Bear Creek



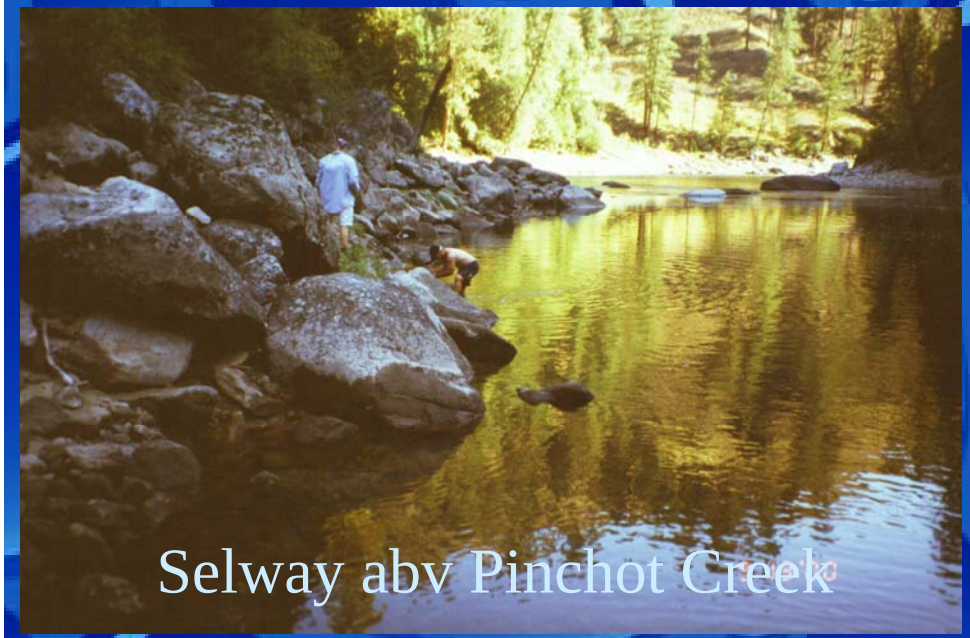
Moose Creek



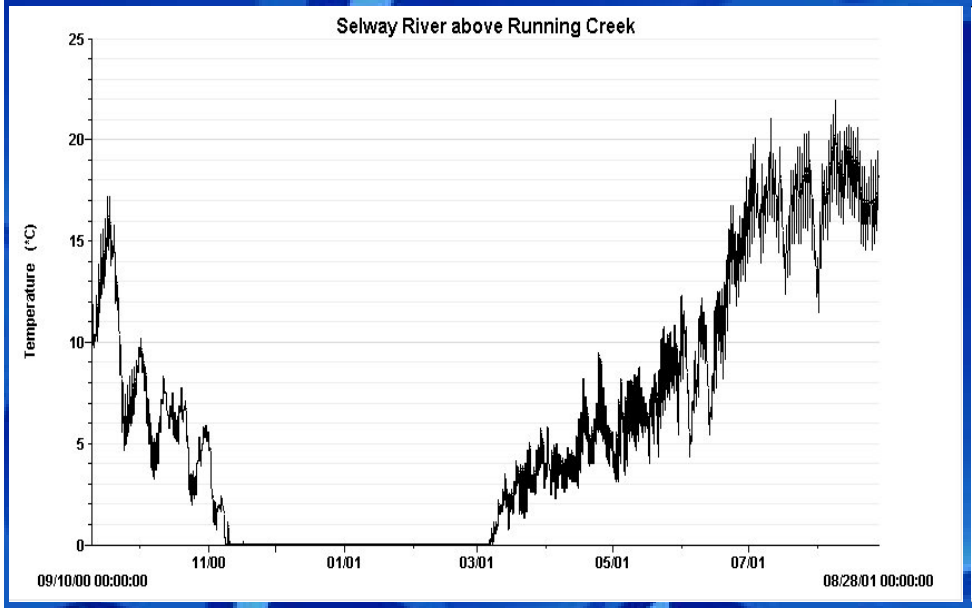
Selway abv Bear Creek

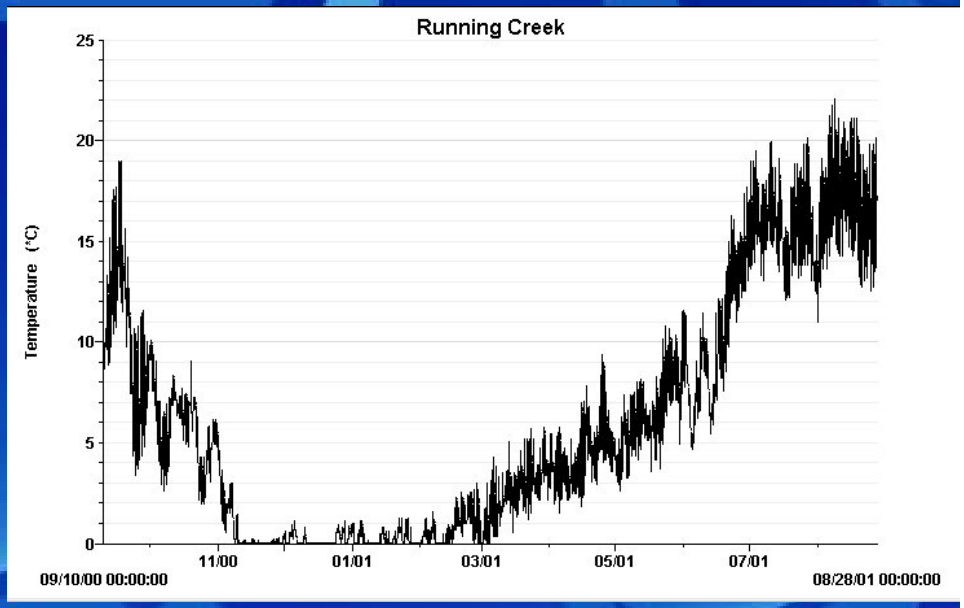


Selway abv Moose Creek



Selway abv Pinchot Creek


Selway River above Running Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/10/00 00:00:00
08/28/01 00:00:00


Running Creek
Temperature (°C)
25
20
15
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11/00
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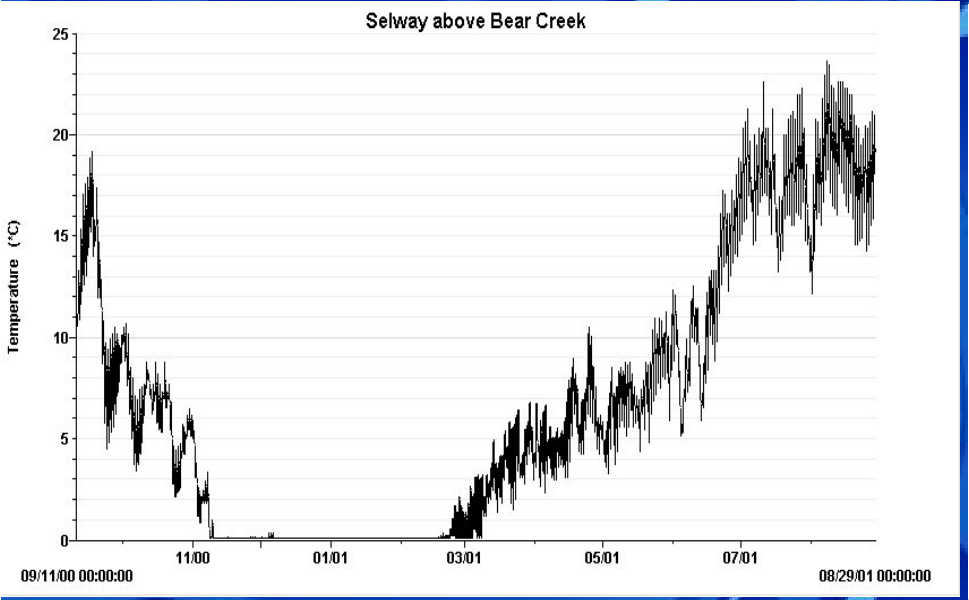
05/01
07/01
09/10/00 00:00:00
08/28/01 00:00:00


Selway above Bear Creek
Temperature (°C)
25
20
15
10
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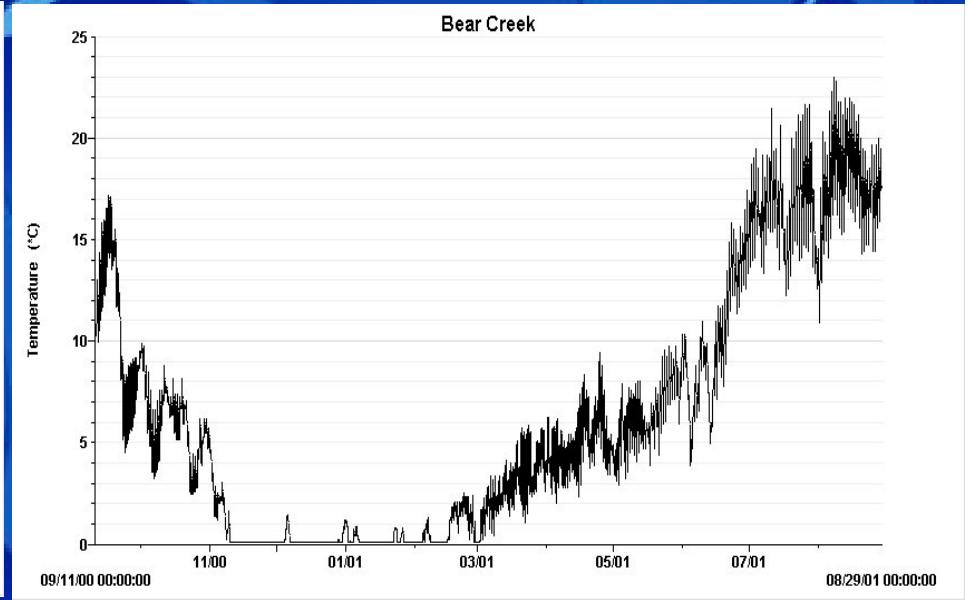
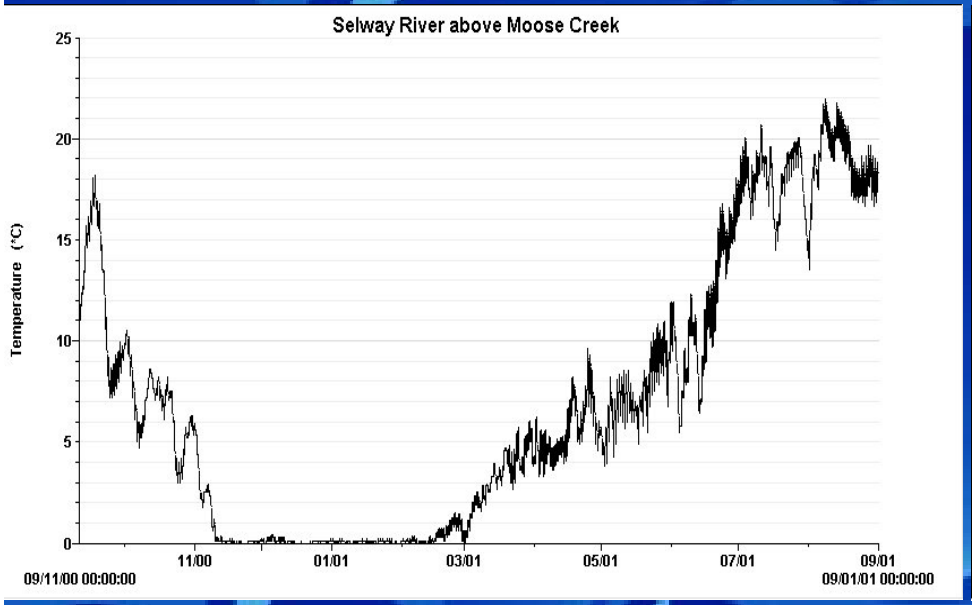
0
11/00
01/01
03/01
05/01
07/01
09/11/00 00:00:00
08/29/01 00:00:00


Bear Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/11/00 00:00:00
08/29/01 00:00:00


Selway River above Moose Creek
Temperature (°C)
25
20
15
10
5
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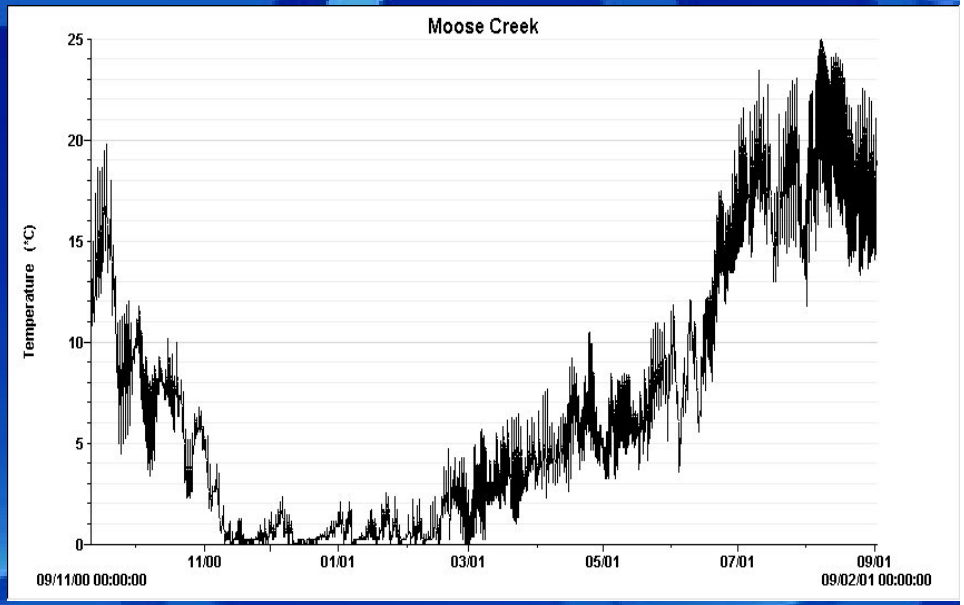
11/00
01/01
03/01
05/01
07/01
09/01
09/11/00 00:00:00
09/01/01 00:00:00


Moose Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
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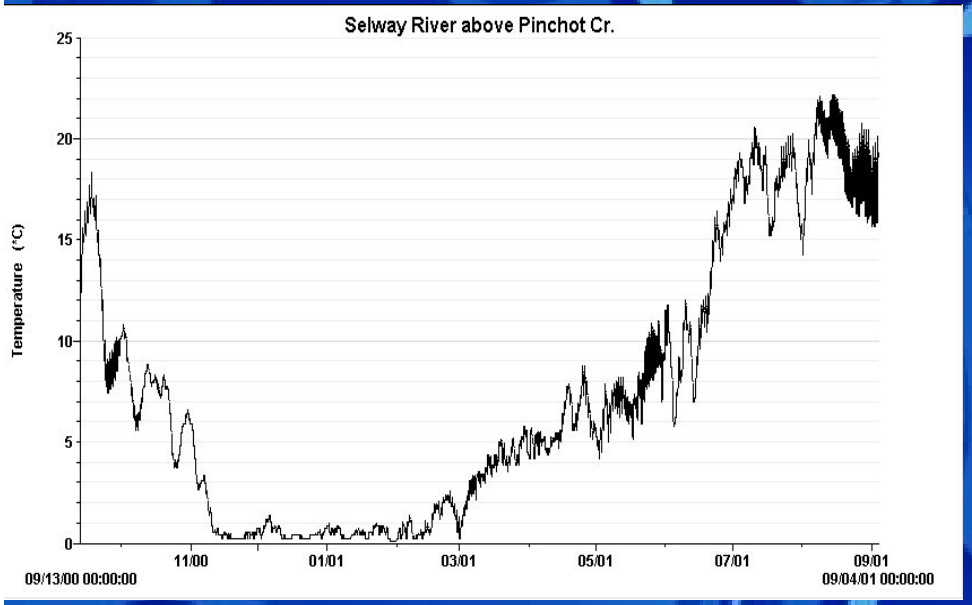
09/11/00 00:00:00
09/02/01 00:00:00


Selway River above Pinchot Cr.
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
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09/01
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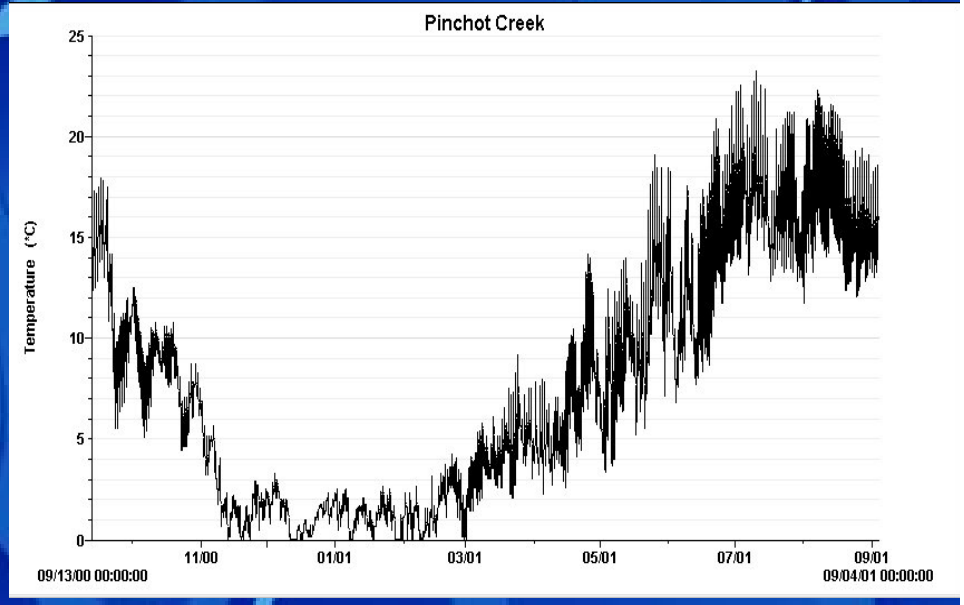
09/04/01 00:00:00


Pinchot Creek
Temperature (°C)
25
20
15
10
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0
11/00
01/01
03/01
05/01
07/01
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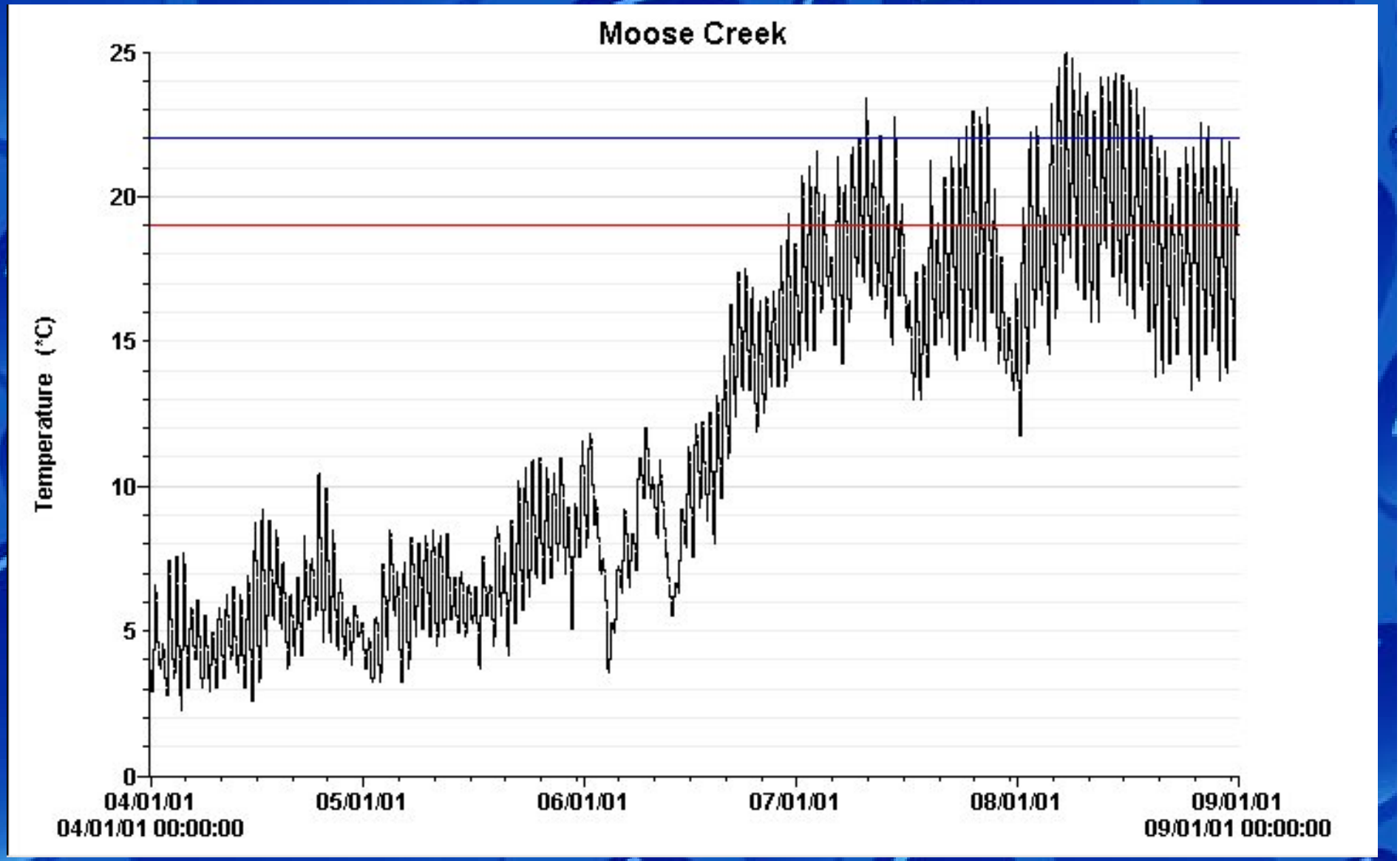
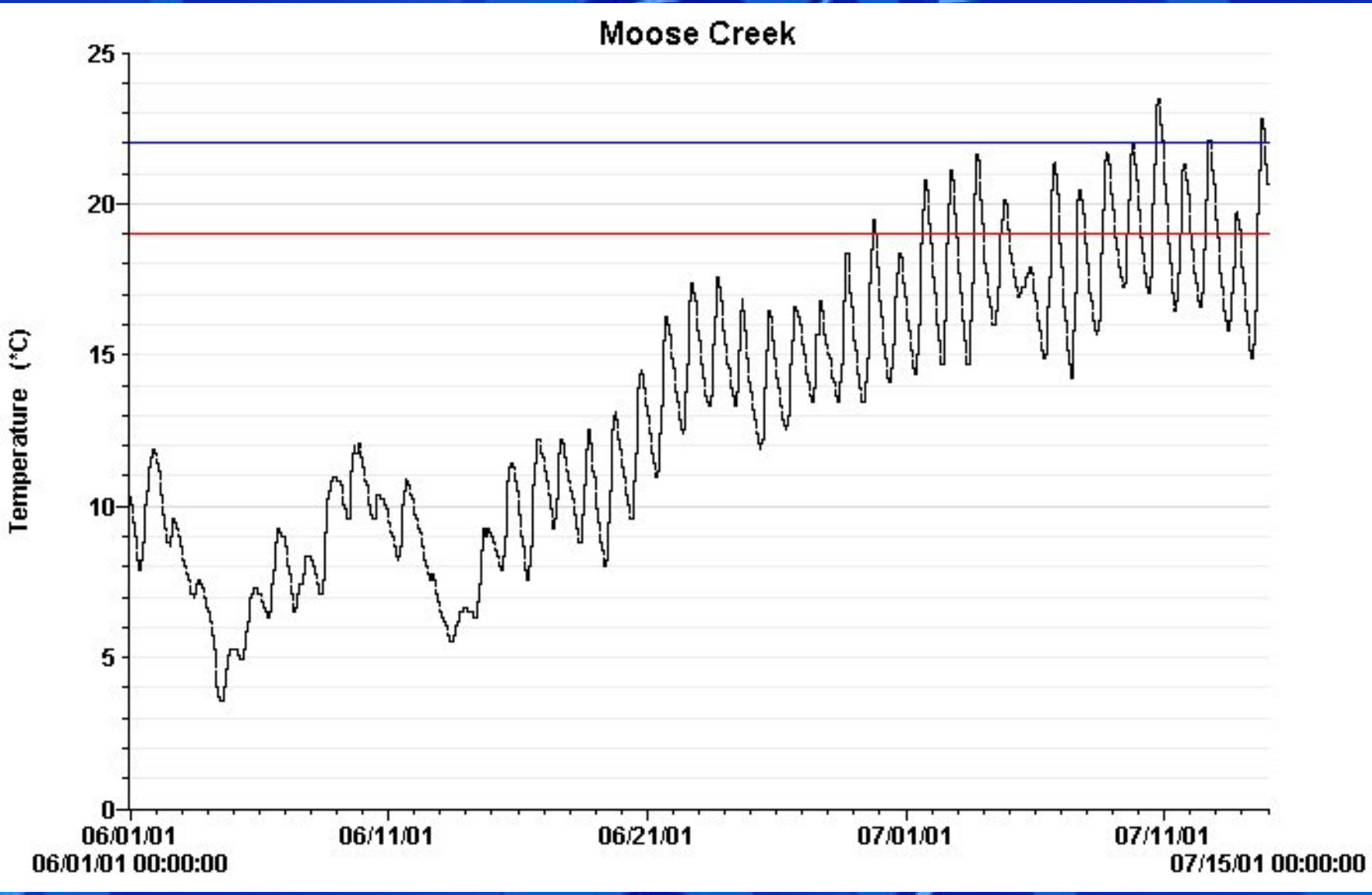
09/13/00 00:00:00
09/04/01 00:00:00


Moose Creek
Temperature (°C)
25
20
15
10
5
0
04/01/01
05/01/01
06/01/01
07/01/01
08/01/01
09/01/01
04/01/01 00:00:00
09/01/01 00:00:00


Moose Creek
Temperature (°C)
25
20
15
10
5
0
06/01/01
06/11/01
06/21/01
07/01/01
07/11/01
06/01/01 00:00:00
07/15/01 00:00:00

Selway 2000-2001 Water T Summary

Site	MDMT 22°C	MWMT 16°C	MDAT 19°C	MWAT 15°C	Date of ocurrence			
Running Cr.	**22.2**	**21.1**	18.6	**17.7**	A8	A12	A8	A13
Selway abv Running	22.0	**20.7**	**19.9**	**18.9**	A8	A12	A8	A13
Selway abv Bear	**23.7**	**22.8**	**21.0**	**20.1**	A7	A12	A8	A13
Bear Creek	**23.0**	**22.2**	**20.1**	**19.3**	A7	A12	A8	A13
Moose Creek	**25.0**	**24.2**	**21.2**	**20.4**	A7	A12	A8	A13
Selway abv Moose	22.0	**21.3**	**21.2**	**20.4**	A8	A13	A8	A13
Pinchot	**23.3**	**22.2**	19.0	**18.1**	A10	A14	A9	A14
Selway abv Pinchot	**22.2**	**21.7**	**21.3**	**20.7**	A15	A18	A8	A14
Max	25.0		21.3					
Min	22.0		18.6					
Moose Cr RAWS	61 days > 32.2°C, May 22nd/Sep 16th				A17	A17	A13	A16
Selway GS Air T	23 days > 32.2°C, June 21st/Aug 30th				A12	A17	A13	A17

Bolded values exceed respective criterion. Pink shaded cells are highs, turquoise shaded cells are lows.

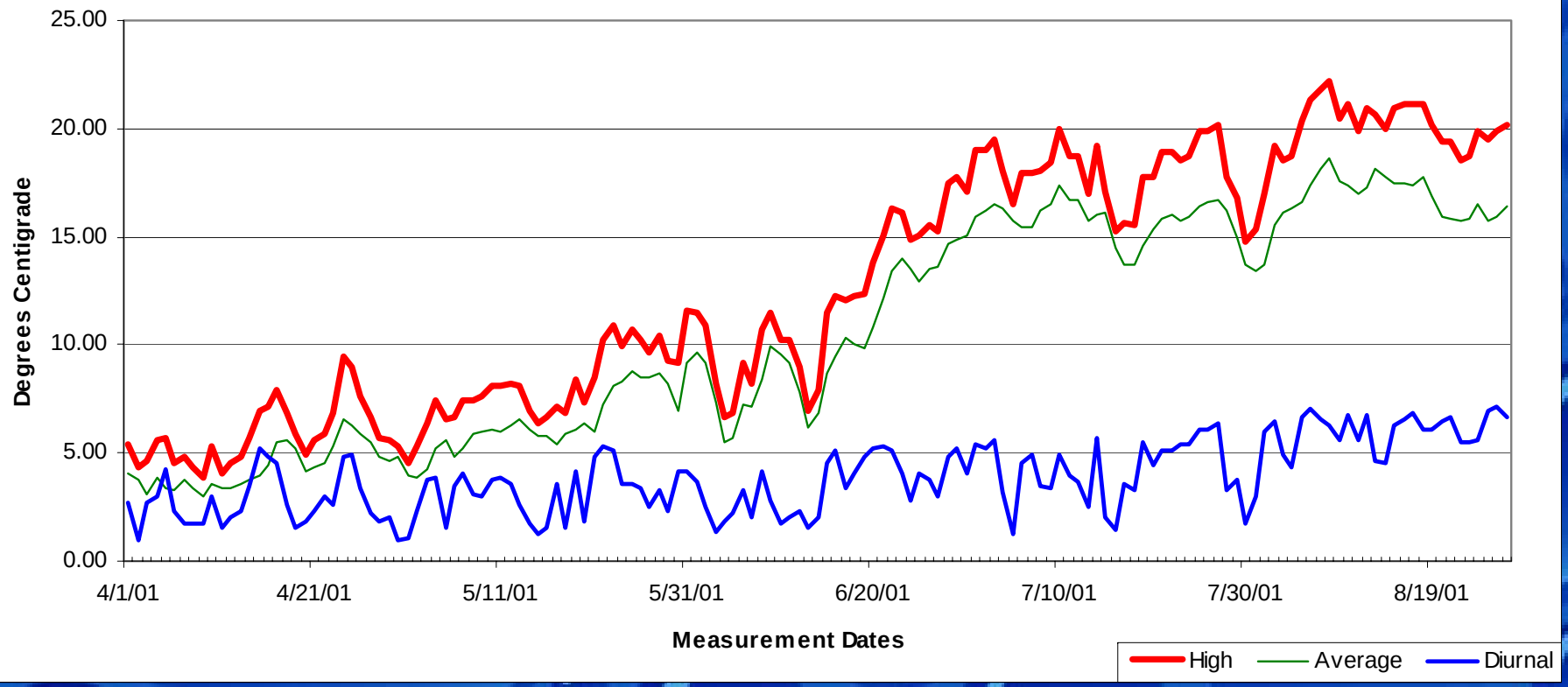
DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: Running Creek
Data Collection Site: near airstrip
Data Period: 4/1/01 - 8/27/01

MDMT = 22.2, 08 Aug
MWMT = 21.1, 12 Aug
MDAT = 18.6, 08 Aug
MWAT = 17.7, 13 Aug

HUC4 Number: 17060301
HUC4 Name: Upper Selway
North of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 877 M
Waterbody ID Number: 0

Daily Waterbody Temperatures



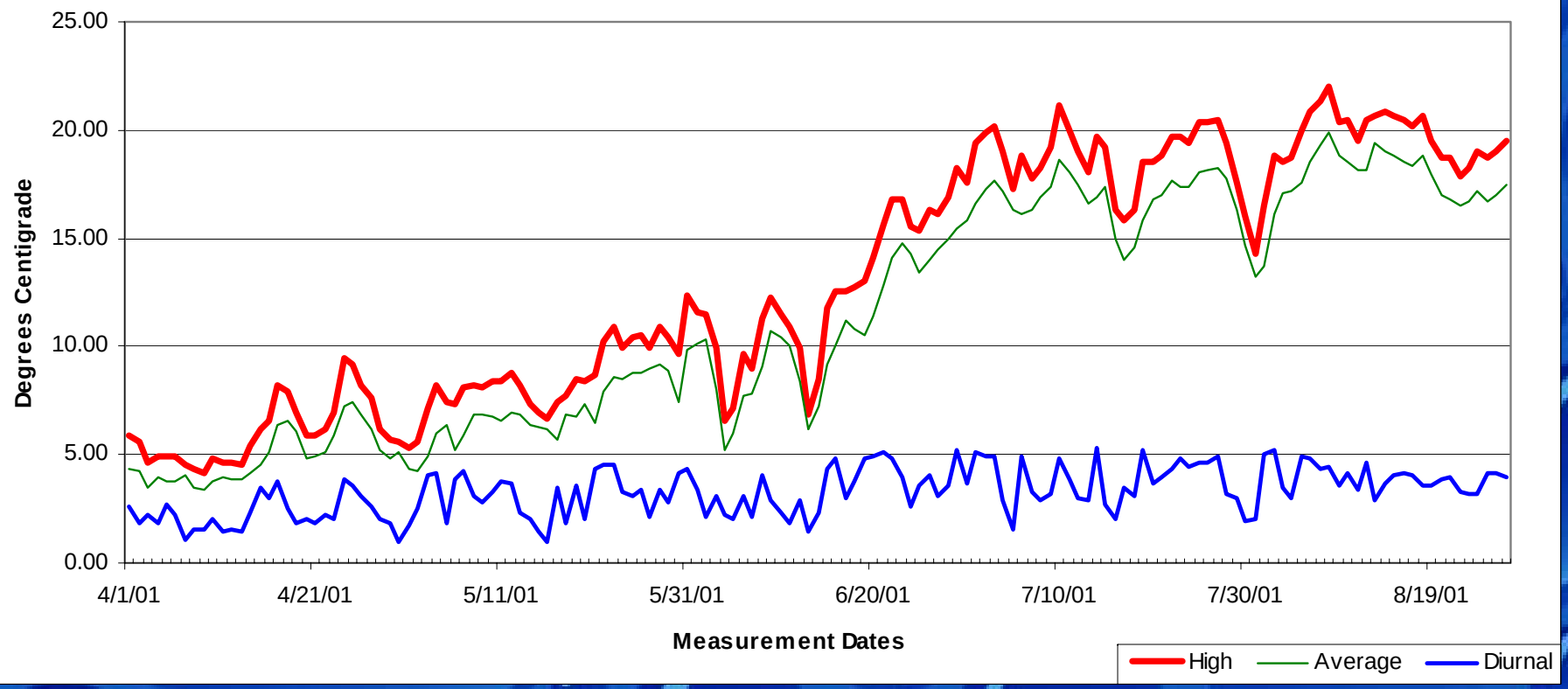
DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: Selway R. abv Running Cr
Data Collection Site: at pack bridge
Data Period: 4/1/01 - 8/27/01

MDMT = 22.0, 08 Aug
MWMT = 20.7, 12 Aug
MDAT = 19.9, 08 Aug
MWAT = 18.9, 13 Aug

HUC4 Number: 17060301
HUC4 Name: Upper Selway
North of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 849 M
Waterbody ID Number: 0

Daily Waterbody Temperatures

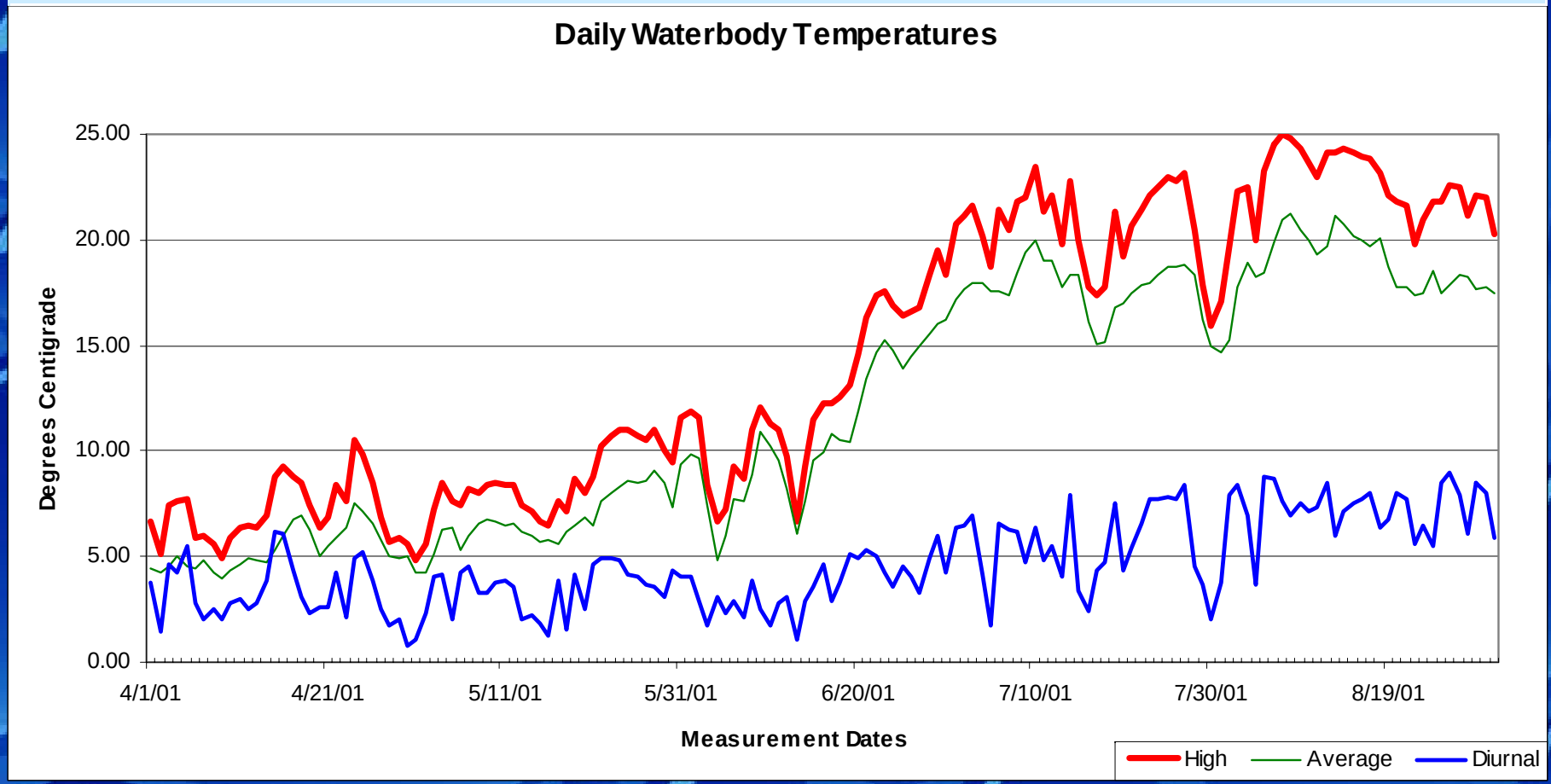


DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: Moose Creek
Data Collection Site: near mouth
Data Period: 4/1/01 - 8/31/01

MDMT = 25.0, 07 Aug
MWMT = 24.2, 12 Aug
MDAT = 21.2, 08 Aug
MWAT = 20.4, 13 Aug

HUC4 Number: 17060301
HUC4 Name: Upper Selway
North of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 680 M
Waterbody ID Number: 0



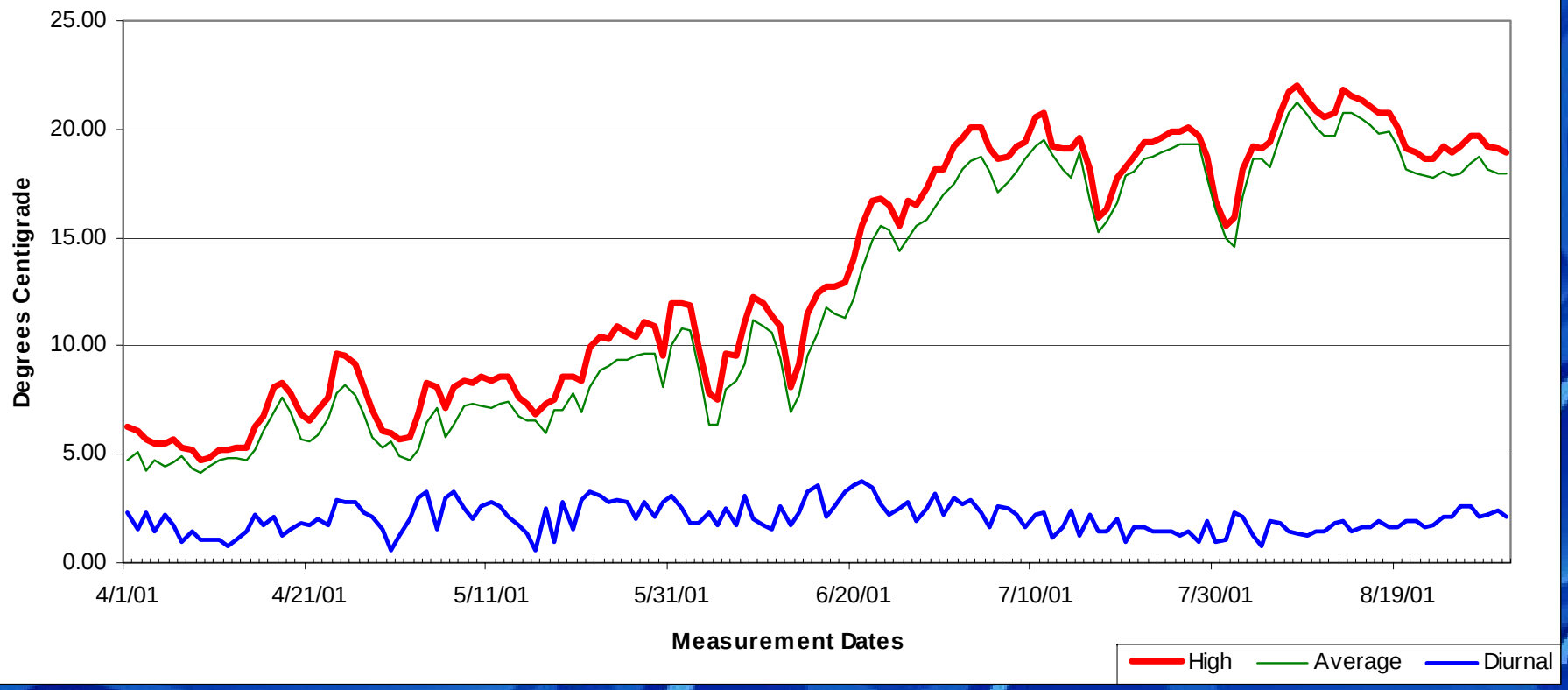
DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: Selway River abv Moose Cr
Data Collection Site: right bank, near airstrip
Data Period: 4/1/01 - 8/31/01

MDMT = 22.0, 08 Aug
MWMT = 21.3, 13 Aug
MDAT = 21.2, 08 Aug
MWAT = 20.4, 13 Aug

HUC4 Number: 17060301
HUC4 Name: Upper Selway
North of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 678 M
Waterbody ID Number: 0

Daily Waterbody Temperatures

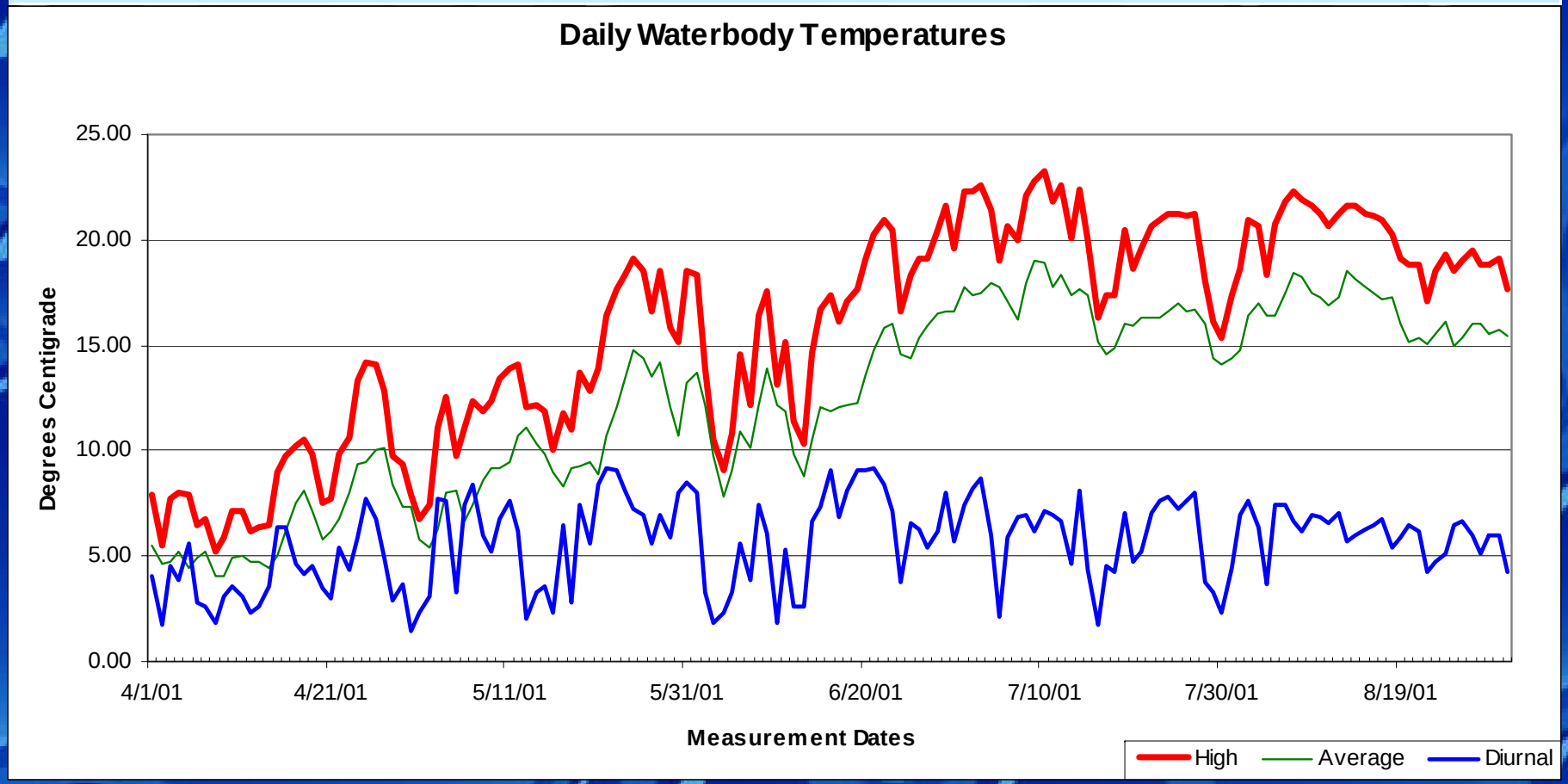


DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: Pinchot Creek
Data Collection Site: near mouth
Data Period: 4/1/01 - 8/31/01

MDMT = 23.3, 10 Jul
MWMT = 22.2, 14 Jul
MDAT = 19.0, 09 Jul
MWAT = 18.1, 14 Jul

HUC4 Number: 17060301
HUC4 Name: Upper Selway
North of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 582 M
Waterbody ID Number: 0



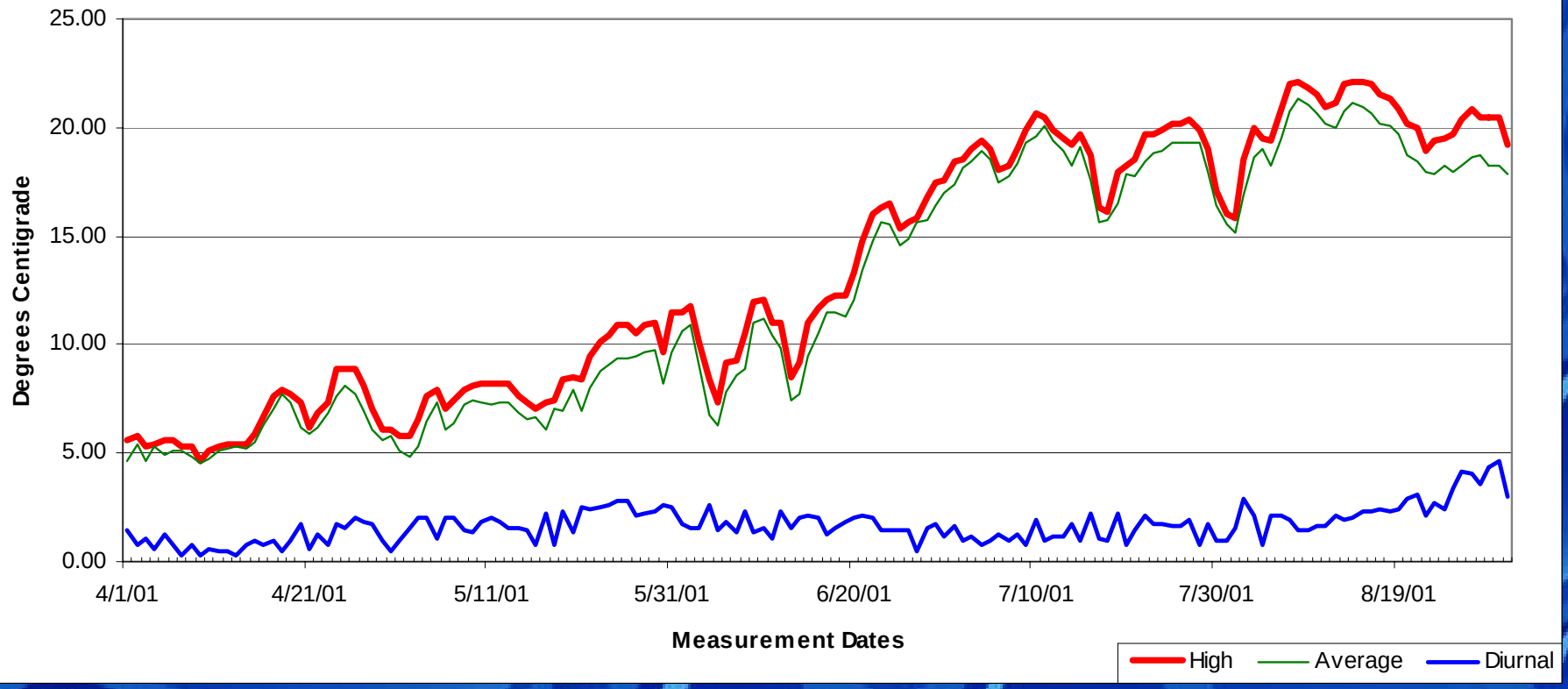
DEQ Summary of Temperature Data

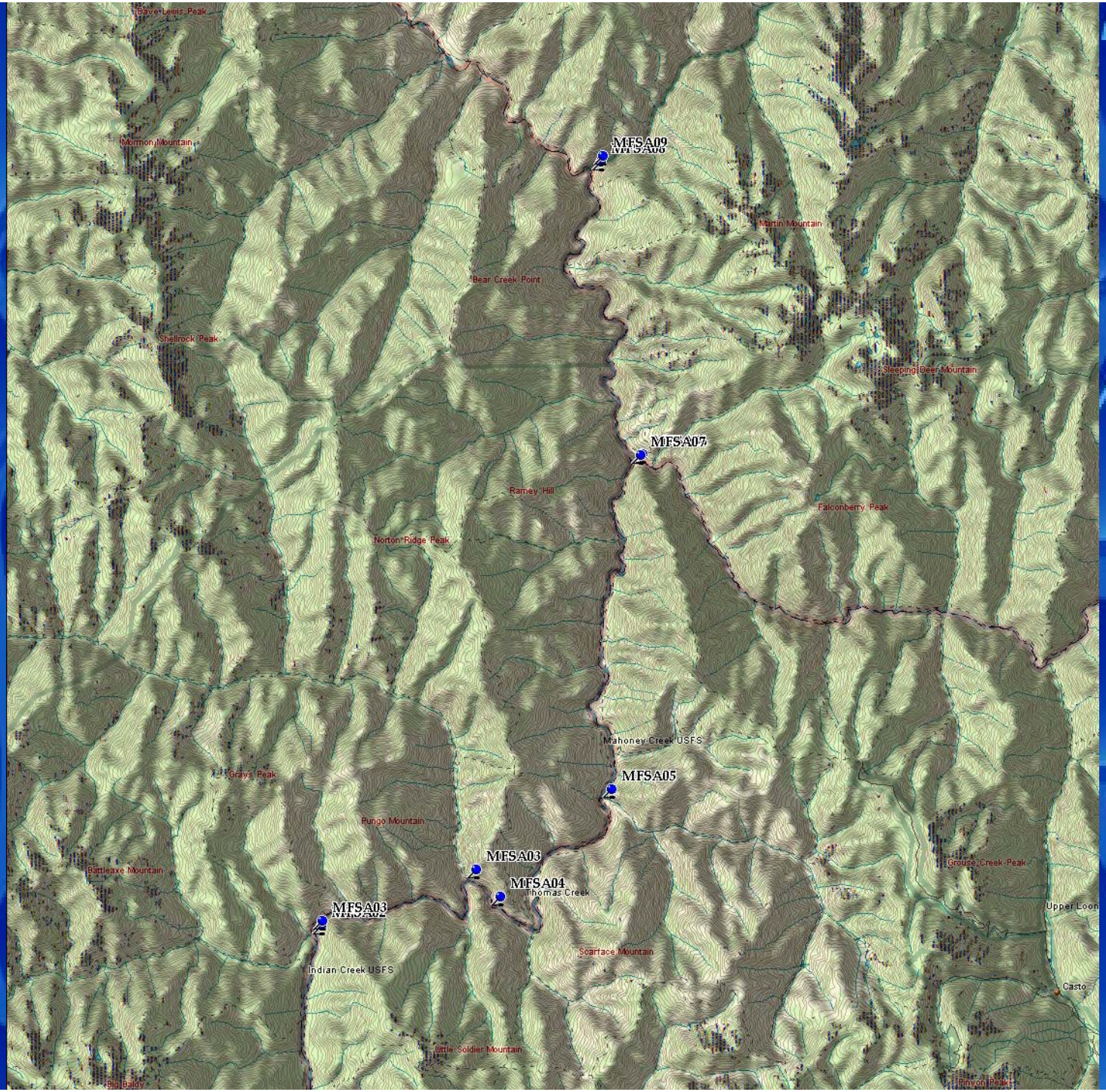
Data Source Name: DEQ
Water Body Name: Selway R abv Pinchot Cr
Data Collection Site: right bank
Data Period: 4/1/01 - 8/31/01

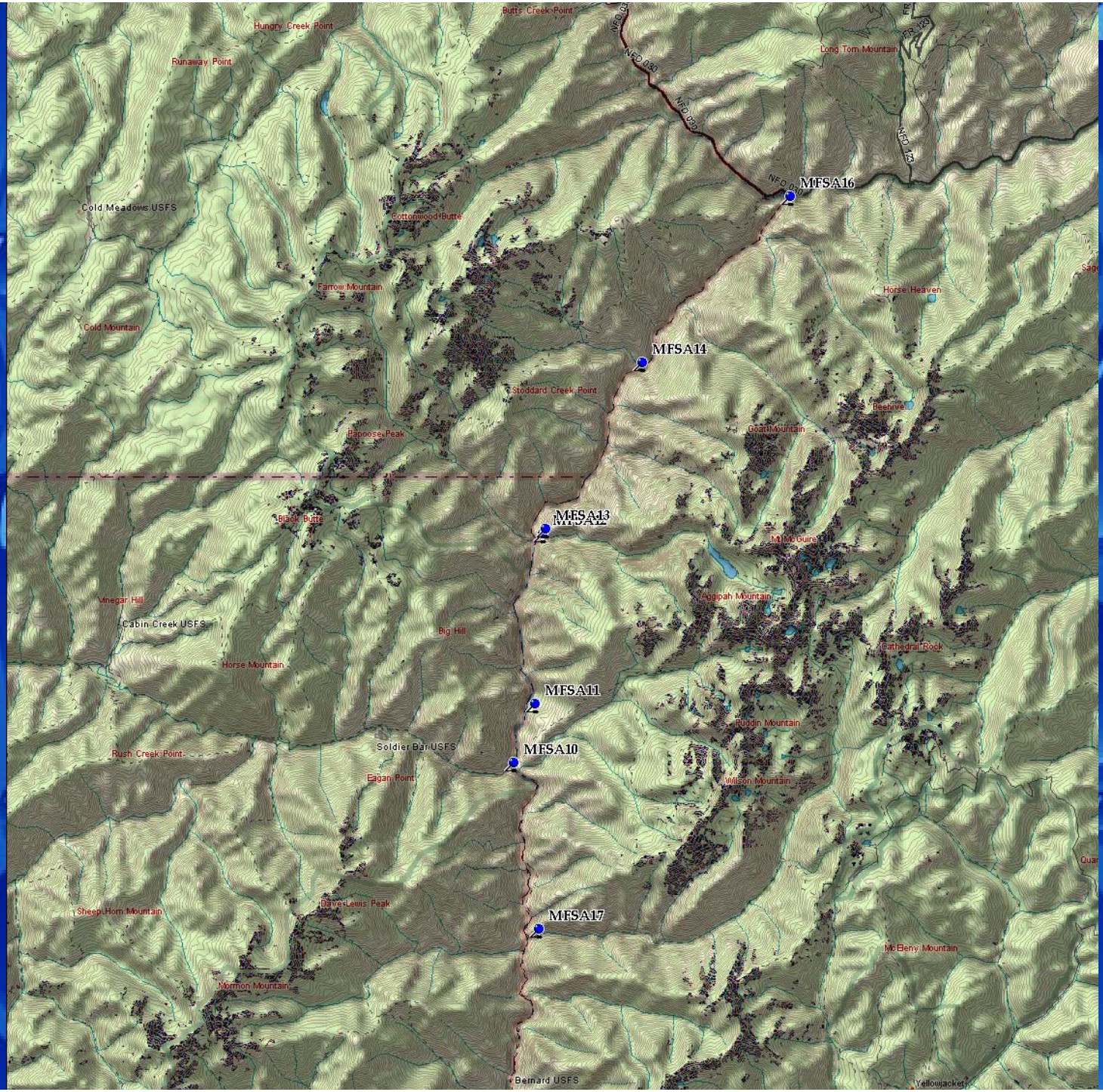
MDMT = 22.2, 15 Aug
MWMT = 21.7, 18 Aug
MDAT = 21.3, 08 Aug
MWAT = 20.7, 14 Aug

HUC4 Number: 17060301
HUC4 Name: Upper Selway
North of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 567 M
Waterbody ID Number: 0

Daily Waterbody Temperatures

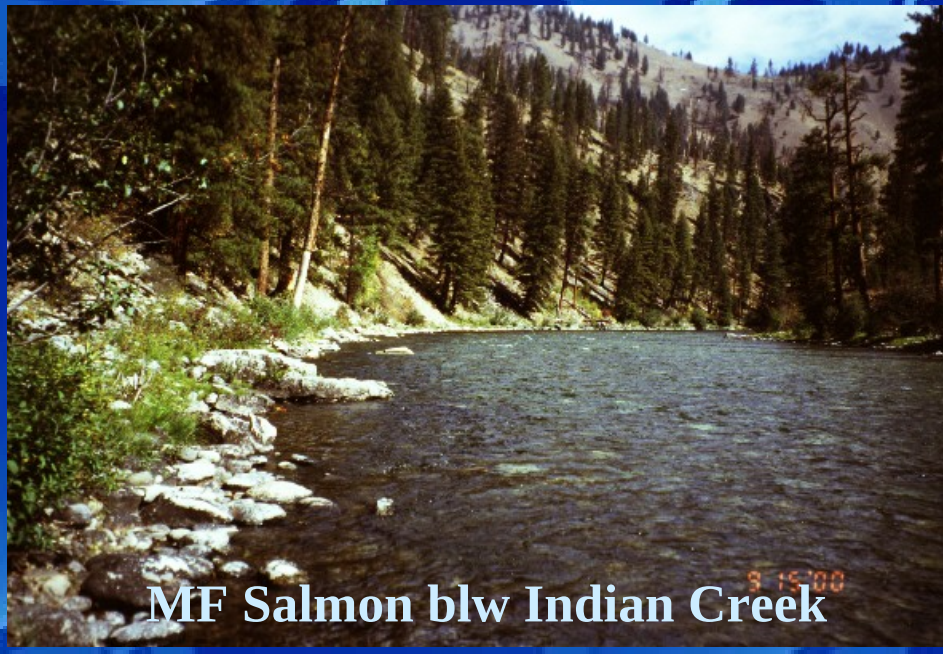



Dave Lewis Peak
Mormon Mountain
MFSA09
Martin Mountain
Bear Creek Point
Shellrock Peak
Sleeping Deer Mountain
MFSA07
Ramey Hill
Falconberry Peak
Norton Ridge Peak
Mahoney Creek USFS
Grays Peak
MFSA05
Pungo Mountain
MFSA03
Battleaxe Mountain
MFSA04
Thomas Creek
Grouse Creek Peak
MFSA03
Upper Loon
Scarface Mountain
Indian Creek USFS
Casto
Little Soldier Mountain
Big Baldy
Canyon Peak



Butts Creek Point
Hungry Creek Point
Runaway Point
Long Tom Mountain
NFD 080
NFD 099
NFD 123
MFSA16
Cold Meadows USFS
Cottonwood Butte
Farrow Mountain
Horse Heaven
Cold Mountain
MFSA14
Stoddard Creek Point
Beehive
Goat Mountain
Papoose Peak
Black Butte
MFSA13
Mt McGuire
Aggipah Mountain
Vinegar Hill
Cabin Creek USFS
Big Hill
Cathedral Rock
Horse Mountain
MFSA11
Puddin Mountain
Soldier Bar USFS
MFSA10
Rush Creek Point
Eagan Point
Wilson Mountain
Sheep Horn Mountain
Dave Lewis Peak
MFSA17
McElleny Mountain
Mormon Mountain
Bernard USFS
Yellowjacket

Indian Creek

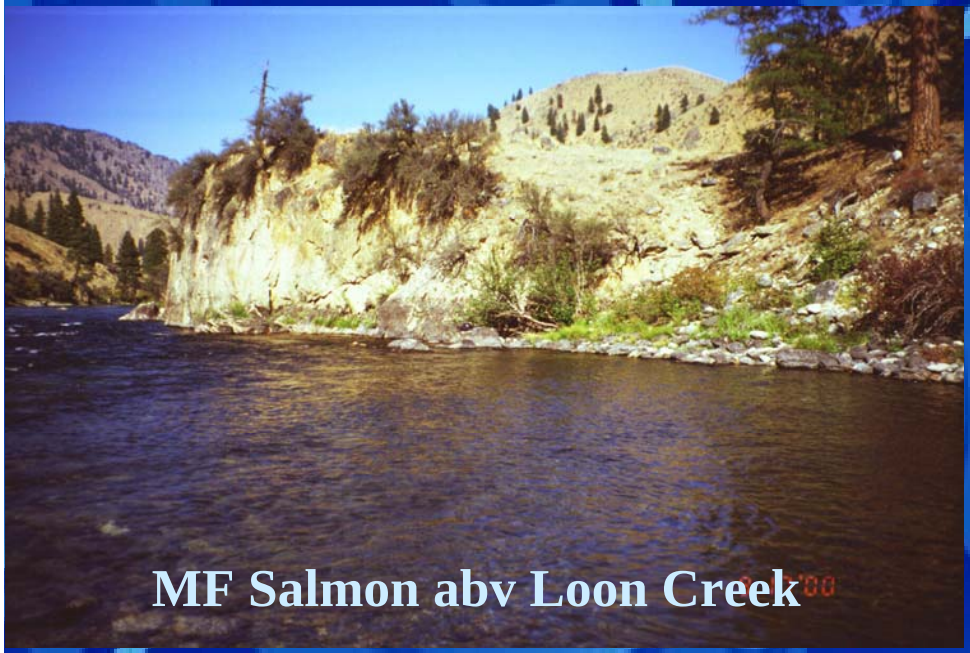

MF Salmon blw Indian Creek

MF Salmon abv
Sunflower Hot Spring

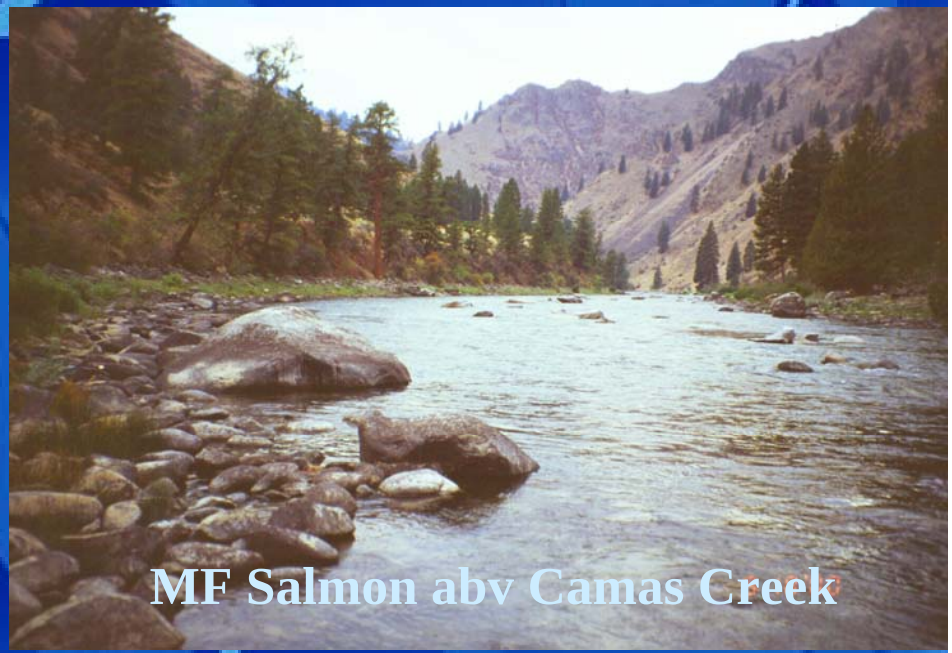
StowAway Installation

Little Loon Creek

Loon Creek



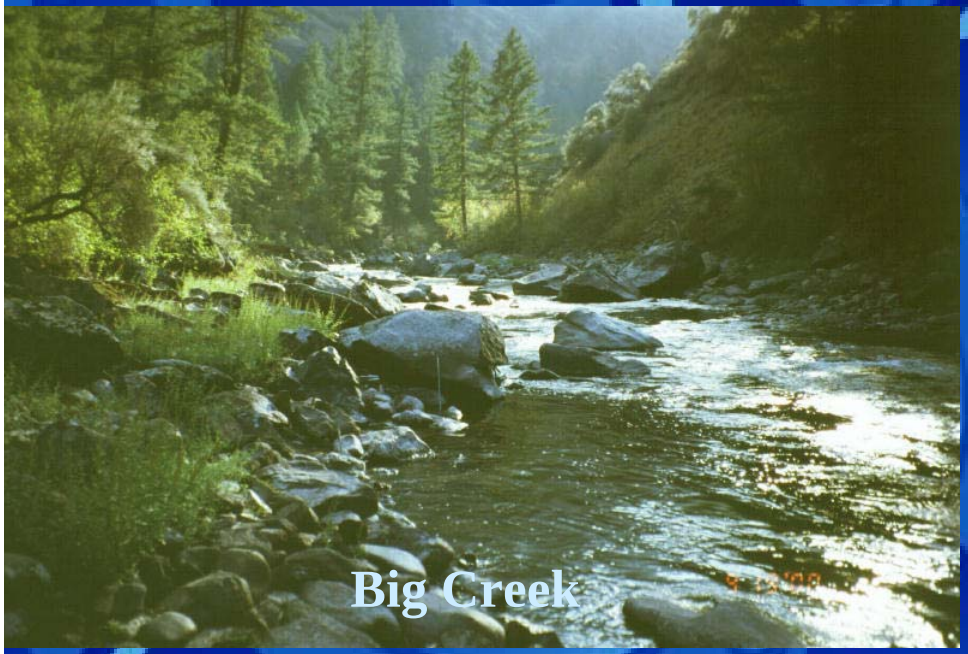
MF Salmon abv Loon Creek



MF Salmon abv Camas Creek

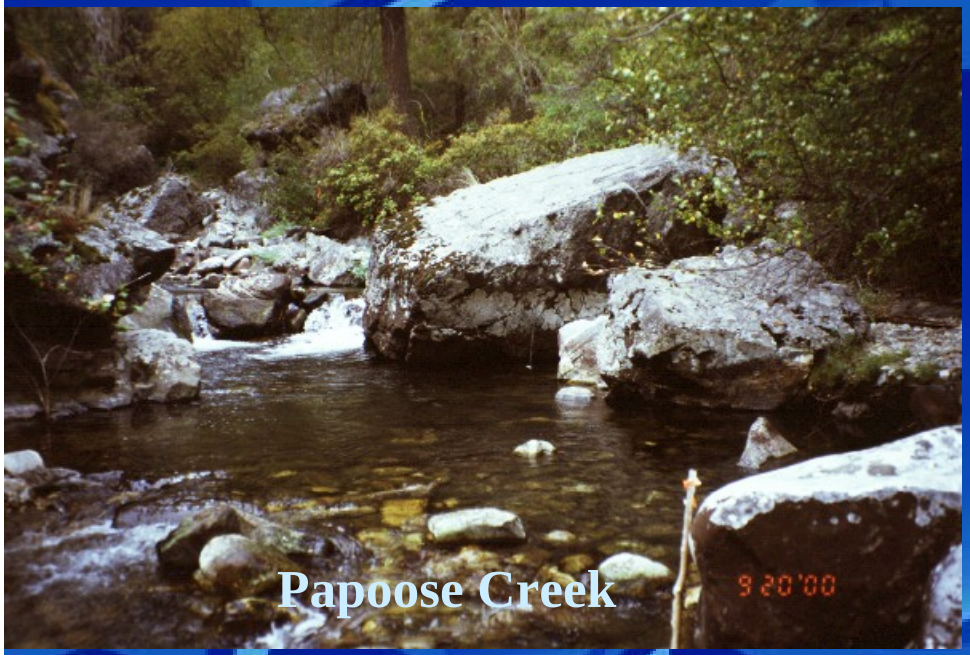
Camas Creek (close-up, base of alder)

Bernard Guard Station Air Temp Site

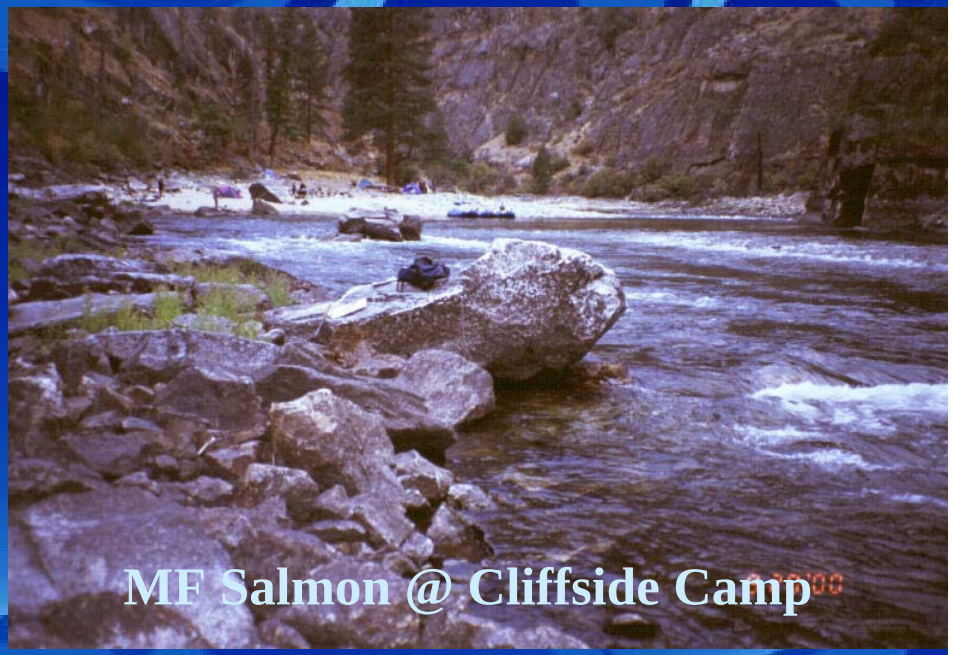


Big Creek

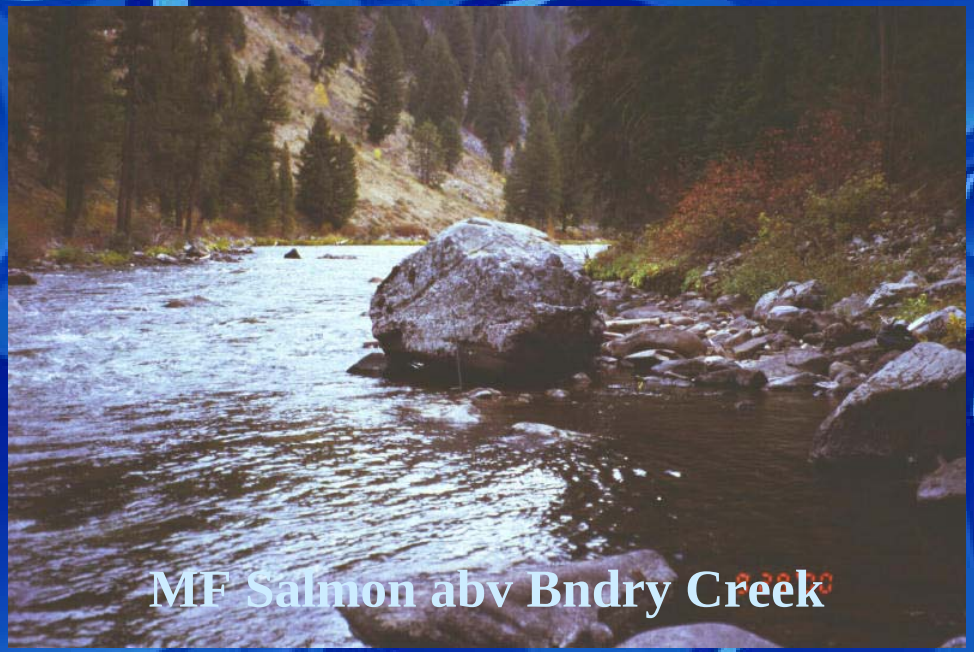
Ship Island Creek



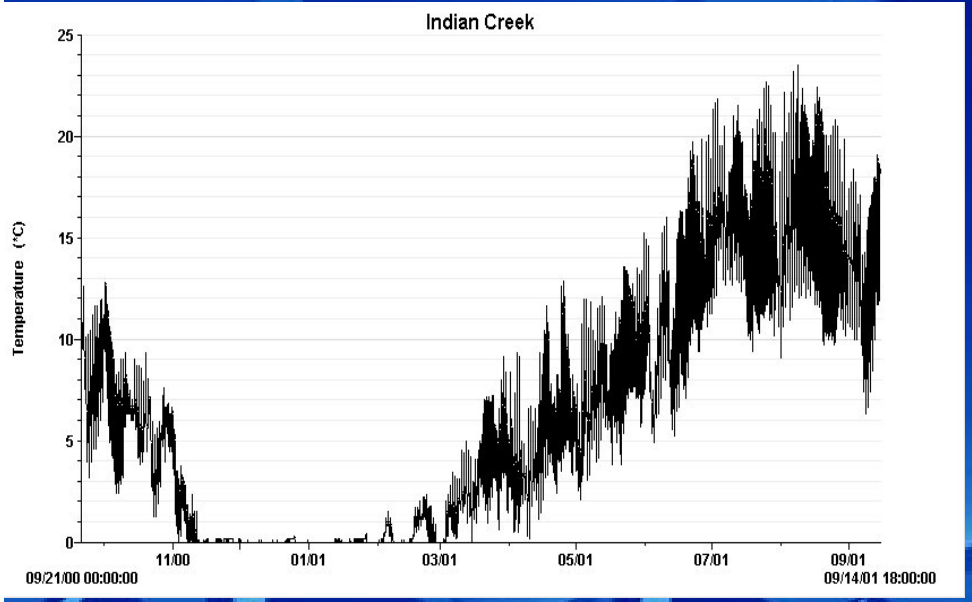
Papoose Creek



MF Salmon @ Cliffside Camp



MF Salmon abv Bndry Creek


Indian Creek
Temperature (°C)
25
20
15
10
5
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01/01
03/01
05/01
07/01
09/01
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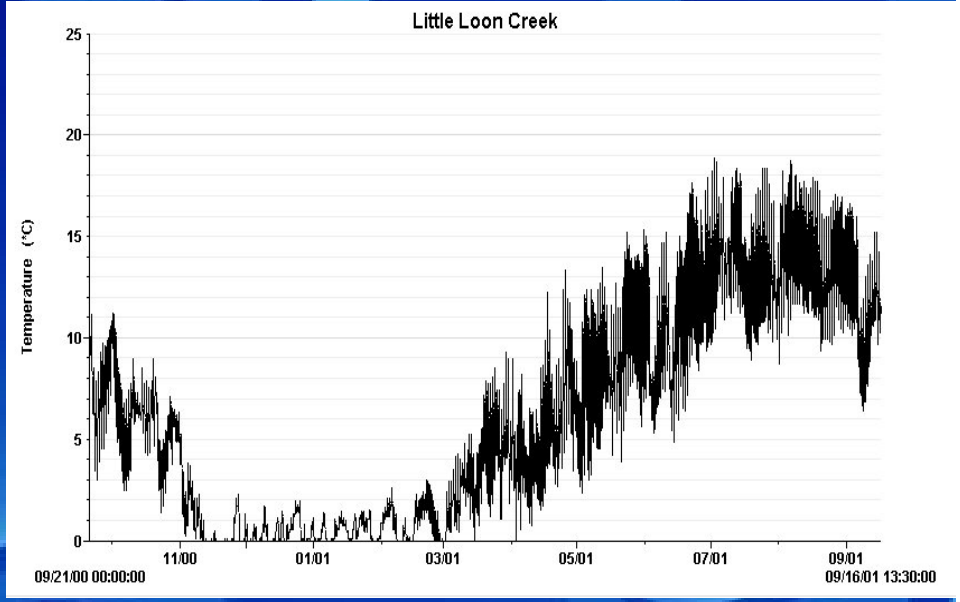
Little Loon Creek
Temperature (°C)
25
20
15
10
5
0
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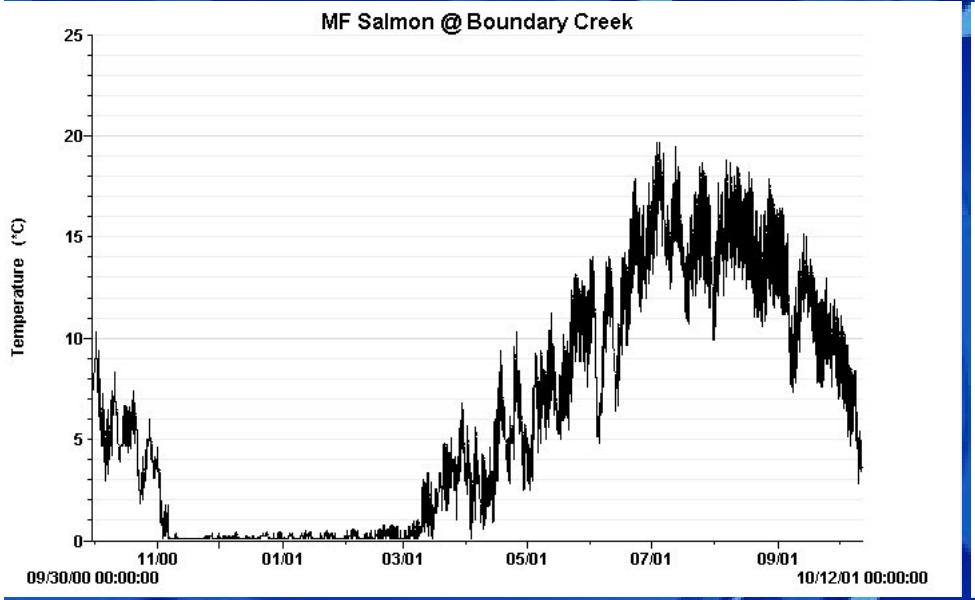
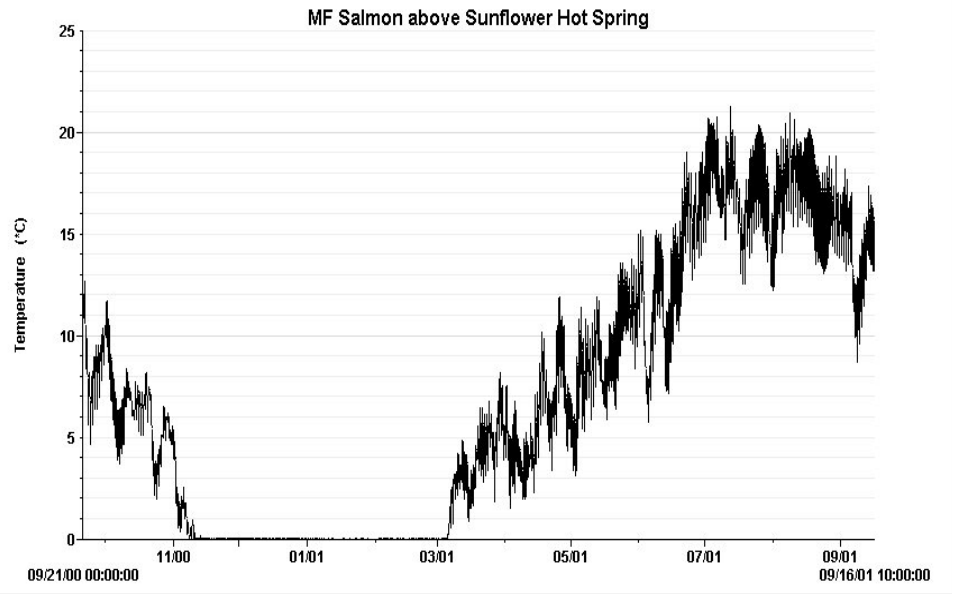
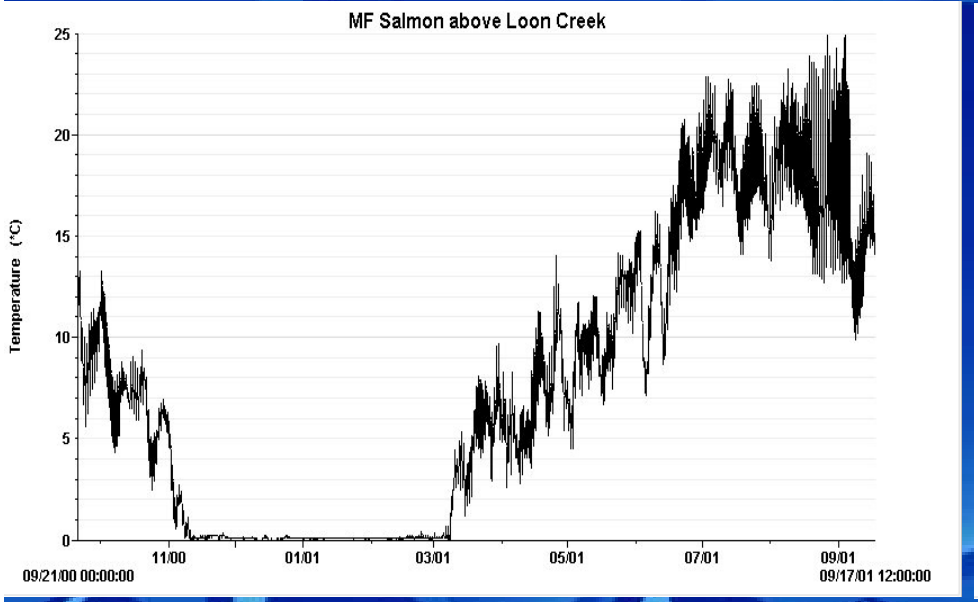
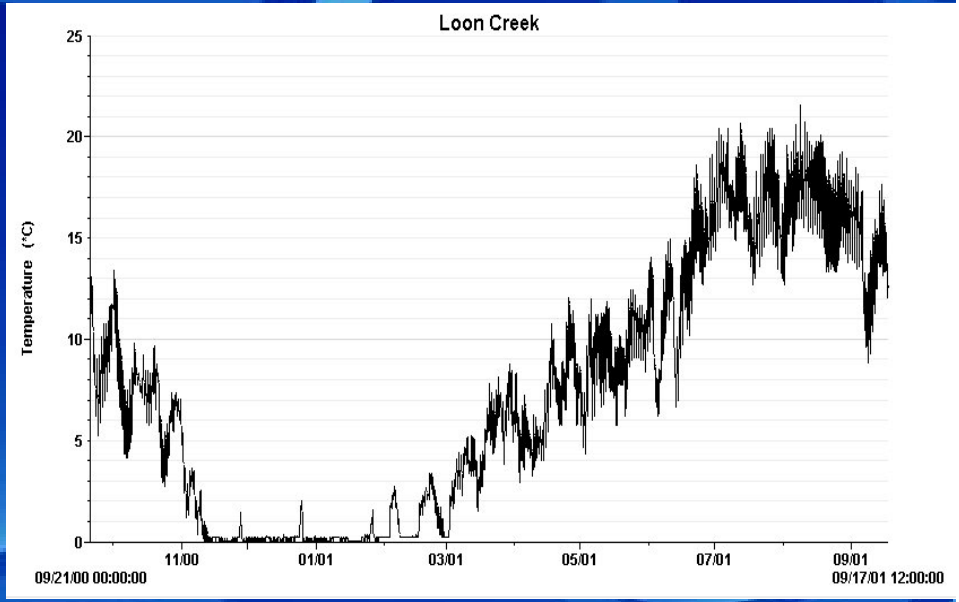
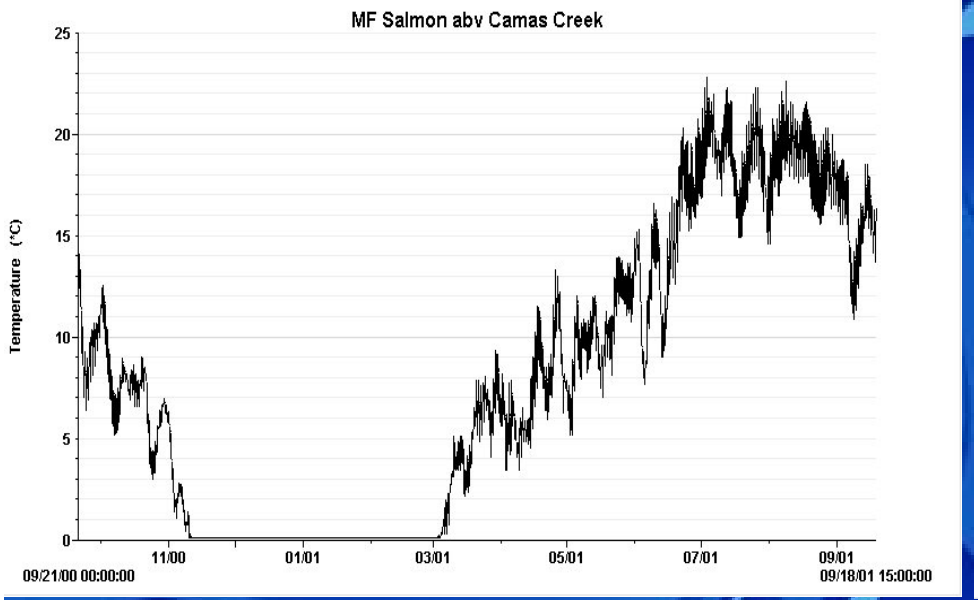
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/16/01 13:30:00

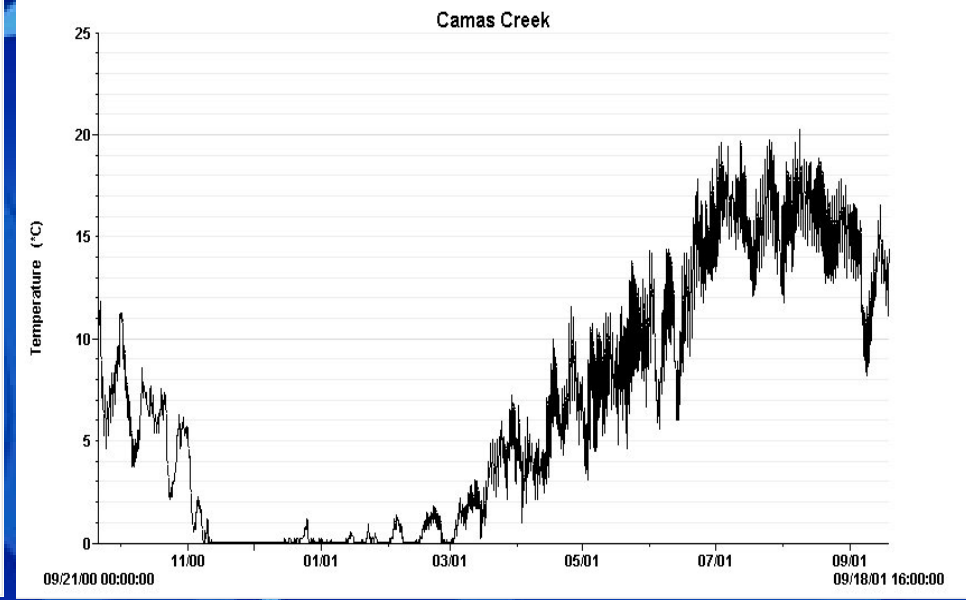

MF Salmon @ Boundary Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/01
09/30/00 00:00:00
10/12/01 00:00:00

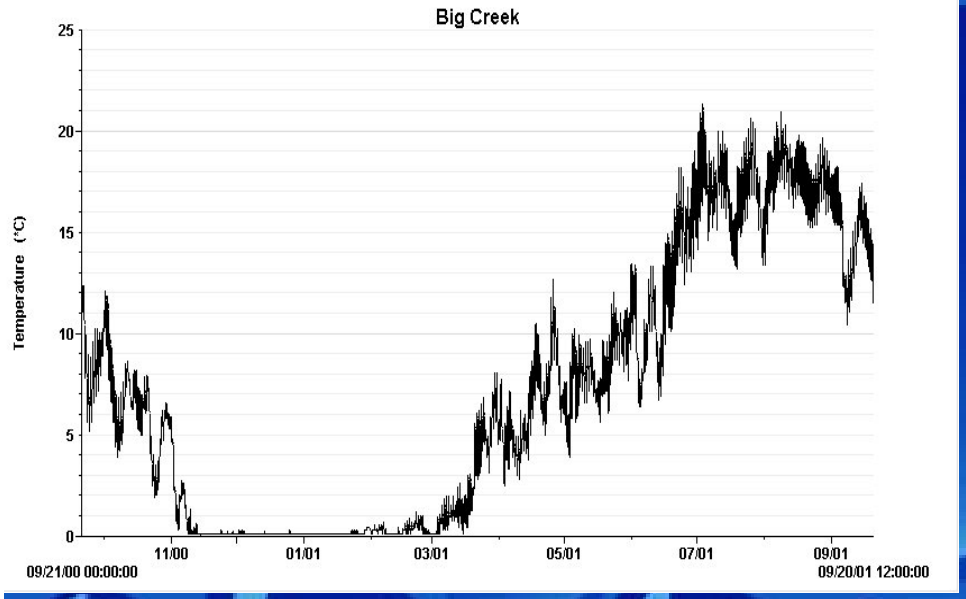

MF Salmon above Sunflower Hot Spring
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/16/01 10:00:00

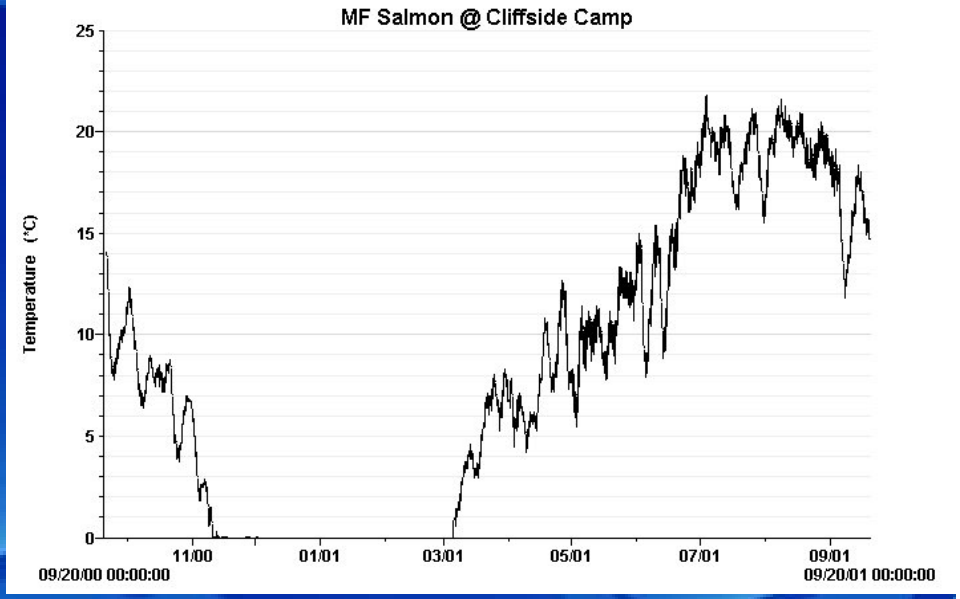

MF Salmon above Loon Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/17/01 12:00:00

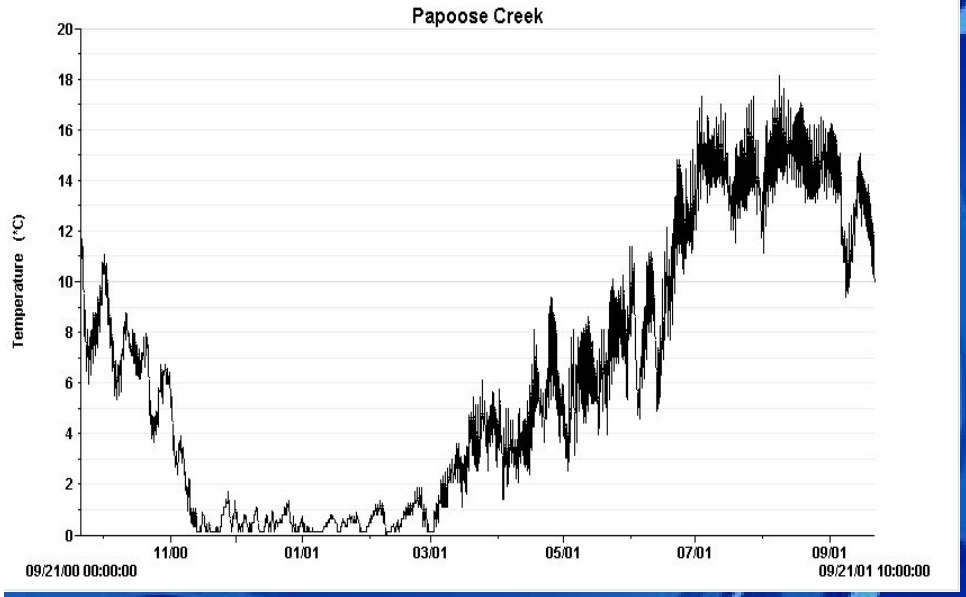

Loon Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/17/01 12:00:00

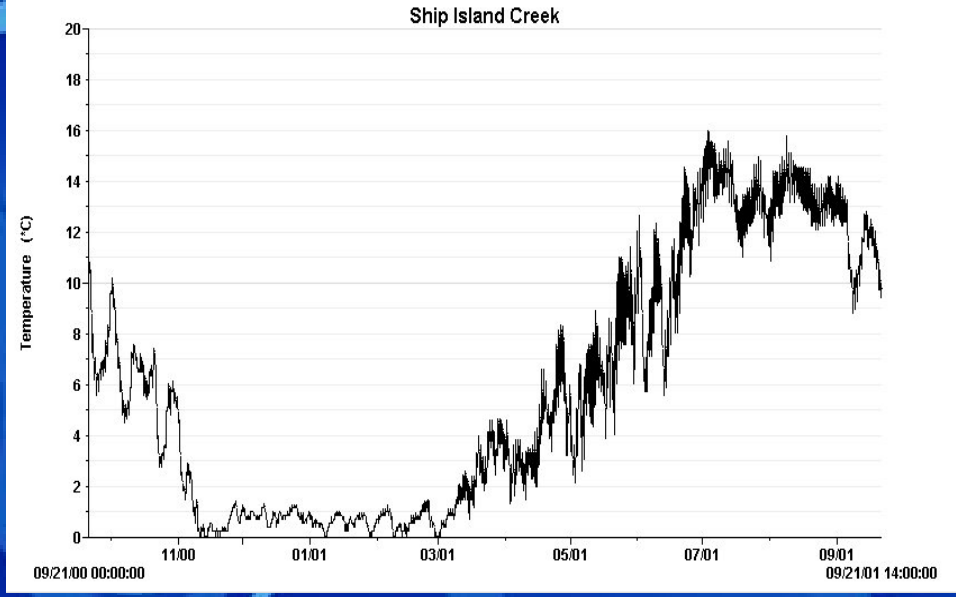

MF Salmon abv Camas Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/18/01 15:00:00


Camas Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/18/01 16:00:00


Big Creek
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/20/01 12:00:00


MF Salmon @ Cliffside Camp
Temperature (°C)
25
20
15
10
5
0
11/00
01/01
03/01
05/01
07/01
09/01
09/20/00 00:00:00
09/20/01 00:00:00


Papoose Creek
Temperature (°C)
20
18
16
14
12
10
8
6
4
2
0
11/00
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/21/01 10:00:00


Ship Island Creek
Temperature (°C)
20
18
16
14
12
10
8
6
4
2
0
11/00
01/01
03/01
05/01
07/01
09/01
09/21/00 00:00:00
09/21/01 14:00:00

MF Salmon 2000-2001 Water T Summary

Site	MDMT 22°C	MWMT 16°C	MDAT 19°C	MWAT 15°C	Date of ocurrence			
MF Salmon @ Bndry Cr.	19.7	**18.8**	17.7	**16.7**	J4	J7	J4	J7
Indian Creek	**23.6**	**22.1**	17.3	**16.5**	A8	A11	A8	A11
MF blw Indian Cr	**22.8**	**21.6**	17.3	**16.9**	A8	A11	A8	A12
MF abv Sunflower Hot Spr	21.3	**20.3**	19.0	**18.3**	J12	J7	J4	J7
Little Loon	18.9	**17.8**	15.1	14.4	J2	J27	J12	A12
Loon Creek	21.6	**20.3**	18.4	**18.0**	A8	A12	A8	A12
MF abv Loon Cr	**23.3**	**22.2**	**20.6**	**19.9**	A8	J6	J4	J7
MF abv Camas Cr	**22.8**	**21.8**	**20.7**	**20.1**	J3	J7	J5	J7
Camas Creek	20.3	**19.1**	17.7	**17.1**	A8	A11	A8	A13
Wilson Creek	17.6	**16.8**	15.4	15.0	A8	A11	A8	A12
Big Creek	21.3	**20.4**	**19.2**	**18.8**	J3	A11	A9	A12
Papoose Creek	18.2	**17.3**	16.0	**15.6**	A8	A12	A8	A13
Ship Island Creek	16.0	15.5	15.0	14.5	J3	J7	J5	J9
MF @ Cliffside	21.8	**21.1**	**20.9**	**20.5**	J4	A12	A8	A12
Max	23.6		20.9					
Min	16.0		15.0					
Indian Creek GS Air T	14 days > 32.2°C, June 21st / Aug 27th				A6	A12	J4	J7
Bernard GS Air T	23 days > 32.2°C, May 22nd / Sep 4th				A6	J5	J3	J7

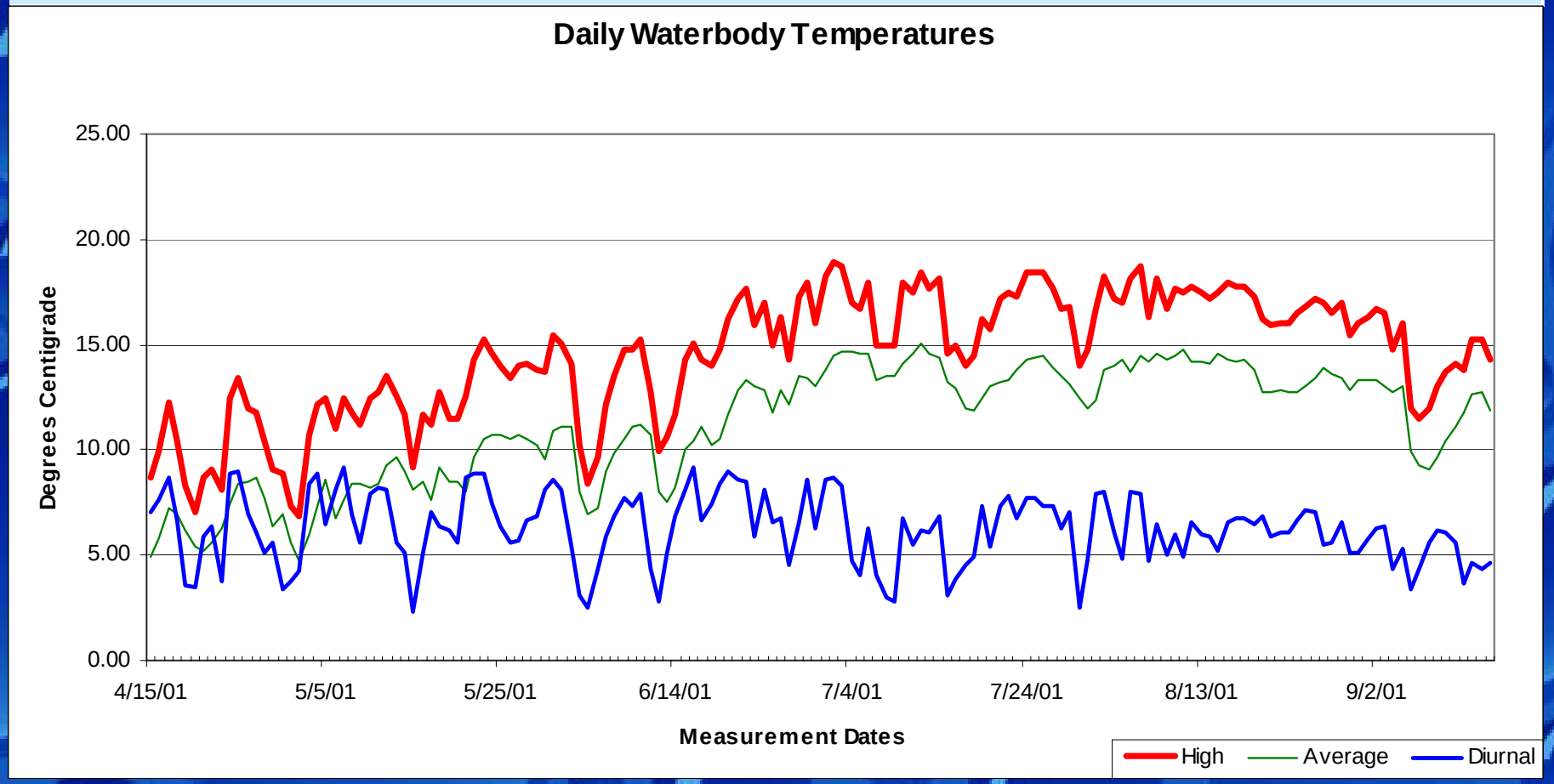
Bolded values exceed respective criterion. Pink shaded cells are highs, turquoise shaded cells are lows.

DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: Little Loon Creek
Data Collection Site: near mouth
Data Period: 4/15/01 - 9/15/01

MDMT = 18.9, 02 Jul
MWMT = 17.8, 27 Jul
MDAT = 15.1, 12 Jul
MWAT = 14.4, 12 Aug

HUC4 Number: 17060205
HUC4 Name: Upper Middle Fork Salmor
South of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 1294 M
Waterbody ID Number: 0

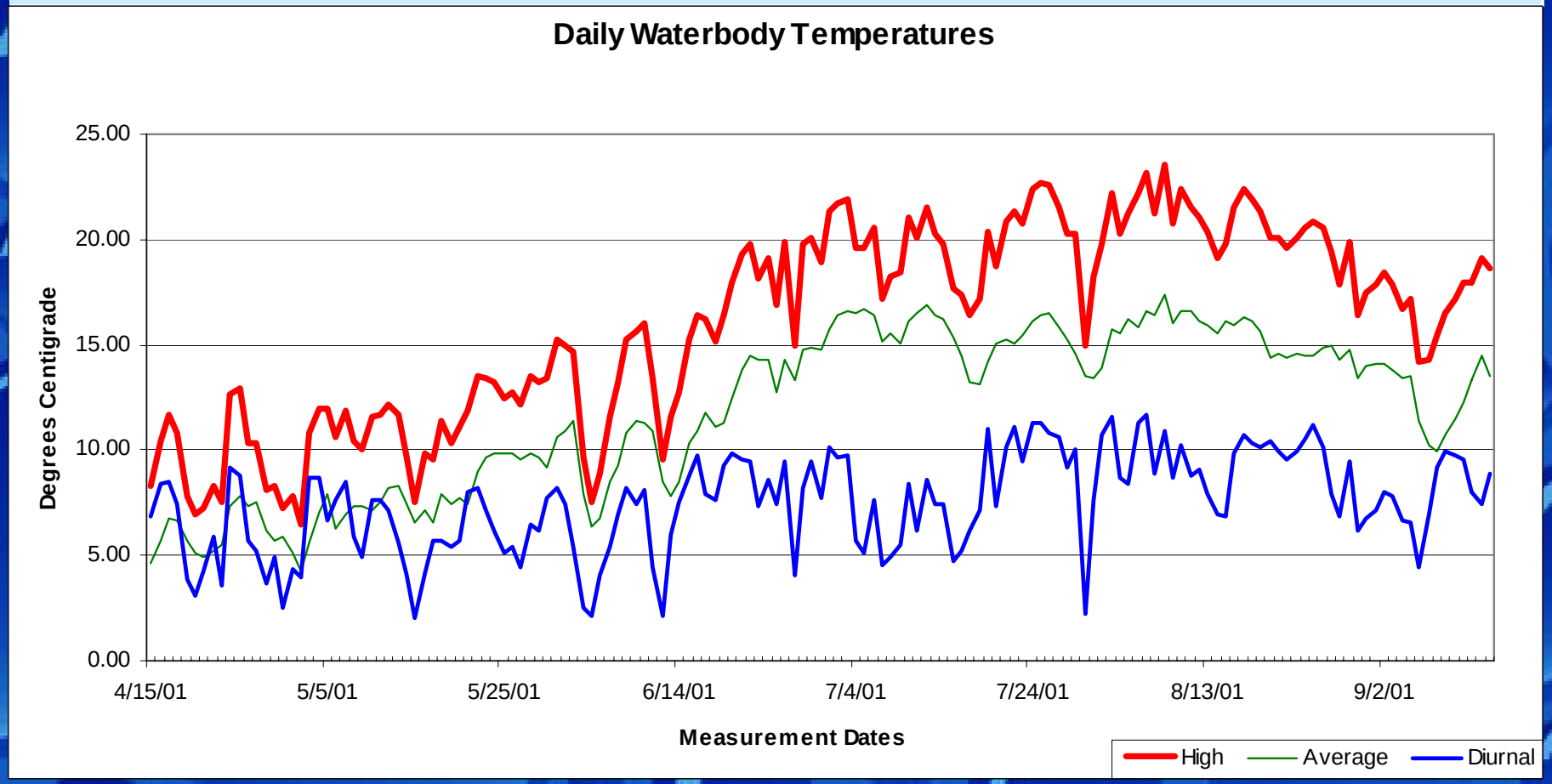


DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: Indian Creek
Data Collection Site: near mouth
Data Period: 4/15/01 - 9/14/01

MDMT = 23.6, 08 Aug
MWMT = 22.1, 11 Aug
MDAT = 17.3, 08 Aug
MWAT = 16.5, 12 Aug

HUC4 Number: 17060205
HUC4 Name: Upper Middle Fork Salmor
South of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 1403 M
Waterbody ID Number: 0



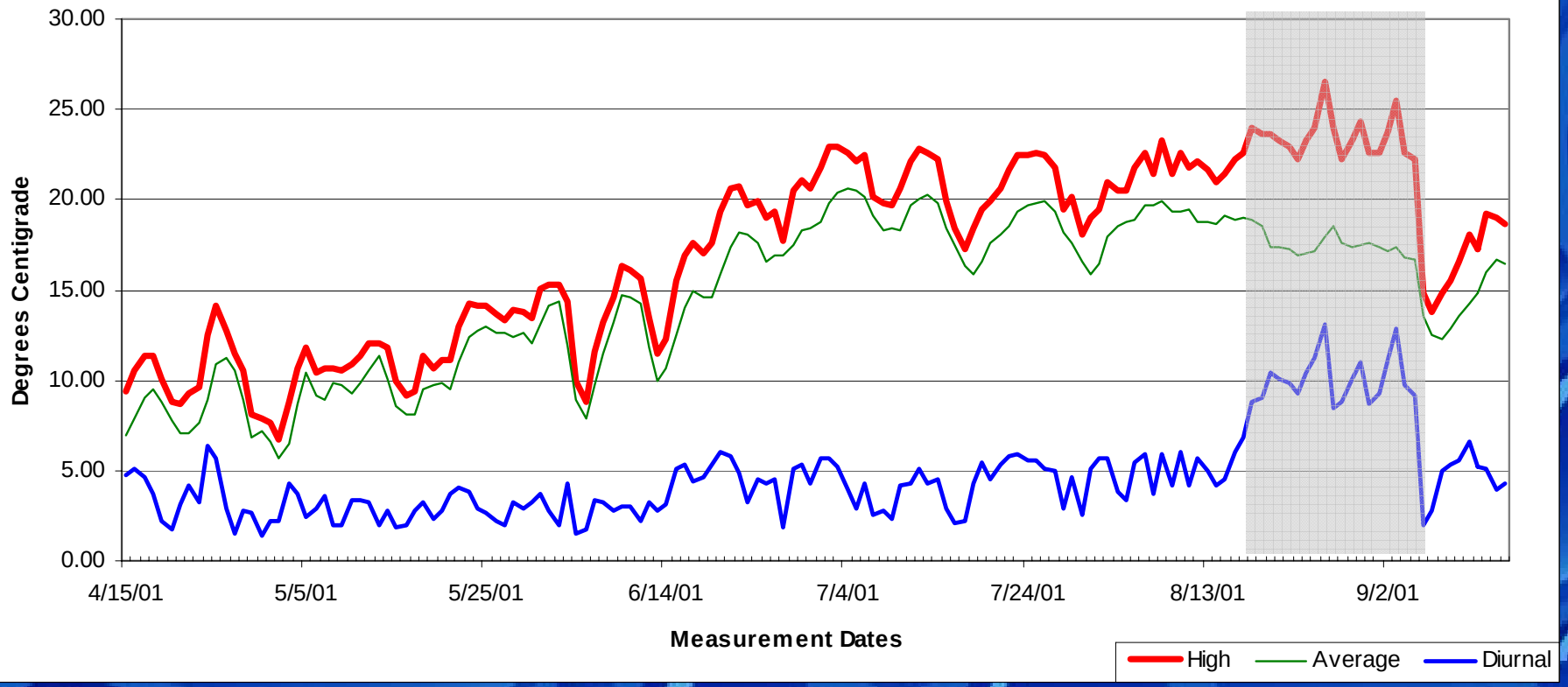
DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: MF Salmon abv Loon Creek
Data Collection Site: right bank
Data Period: 4/15/01 - 9/15/01

MDMT = 26.6, 26 Aug
MWMT = 24.0, 30 Aug
MDAT = 20.6, 04 Jul
MWAT = 19.9, 07 Jul

HUC4 Number: 17060206
HUC4 Name: Lower Middle Fork Salmo
South of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 1228 M
Waterbody ID Number: 0

Daily Waterbody Temperatures

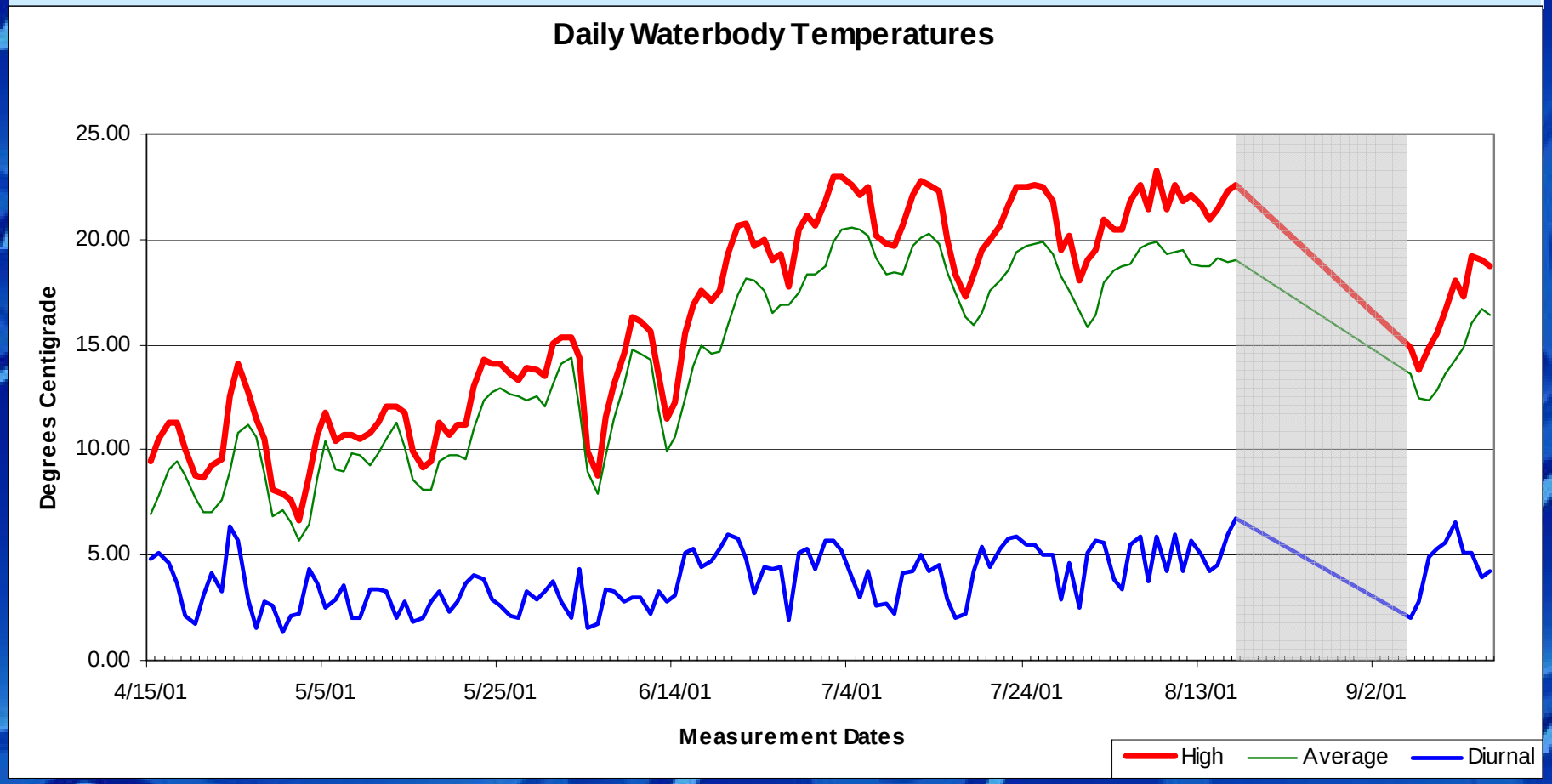


DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: MF Salmon abv Loon Cr
Data Collection Site: right bank
Data Period: 4/15/01 - 9/15/01

MDMT = 23.3, 08 Aug
MWMT = 22.2, 06 Jul
MDAT = 20.6, 04 Jul
MWAT = 19.9, 07 Jul

HUC4 Number: 17060206
HUC4 Name: Lower Middle Fork Salmo
South of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 1228 M
Waterbody ID Number: 0

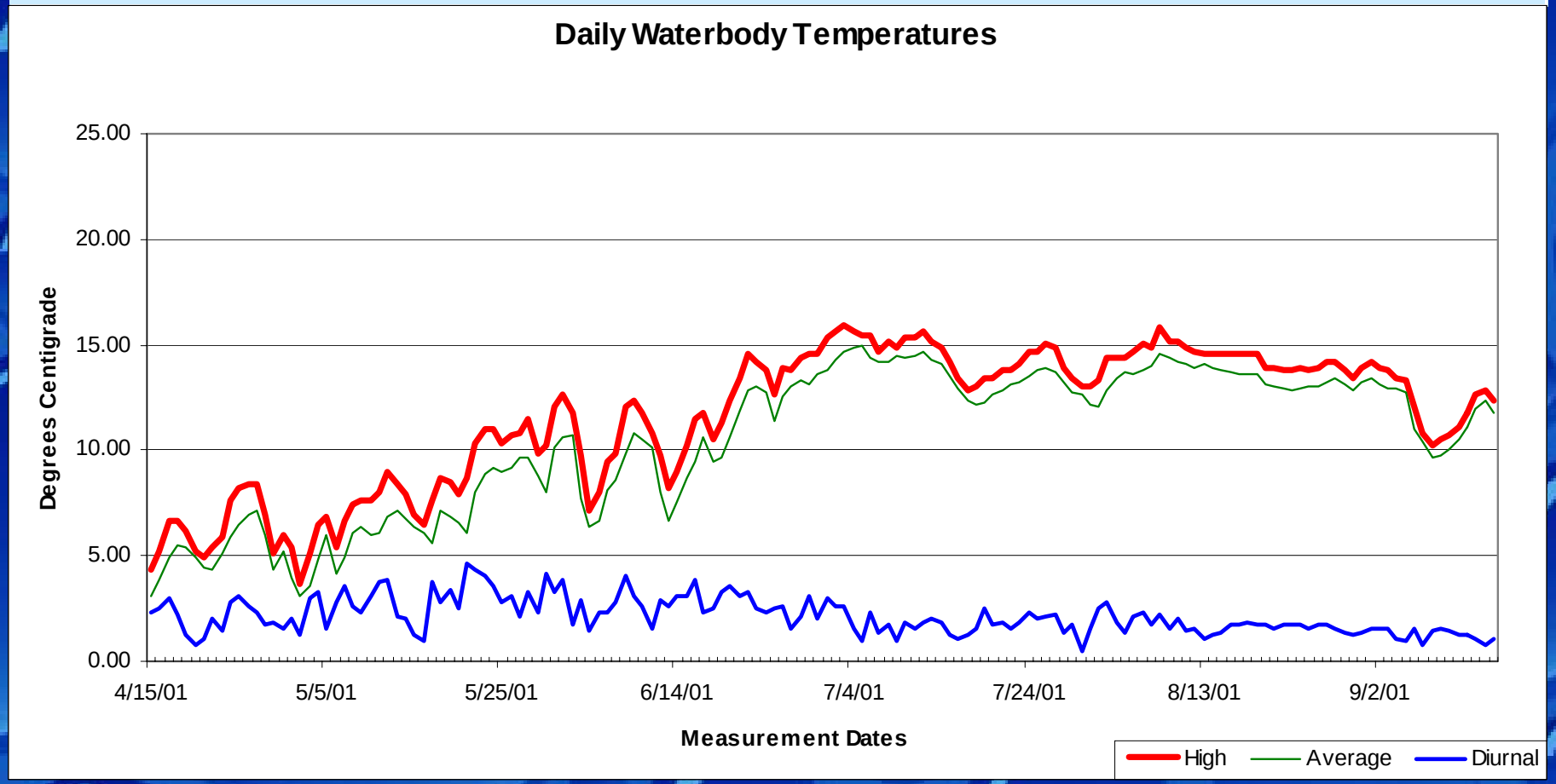


DEQ Summary of Temperature Data

Data Source Name: DEQ
Water Body Name: Ship Island Creek
Data Collection Site: near mouth
Data Period: 4/15/01 - 9/15/01

MDMT = 16.0, 03 Jul
MWMT = 15.5, 07 Jul
MDAT = 15.0, 05 Jul
MWAT = 14.5, 09 Jul

HUC4 Number: 17060206
HUC4 Name: Lower Middle Fork Salmo
South of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 1005 M
Waterbody ID Number: 0

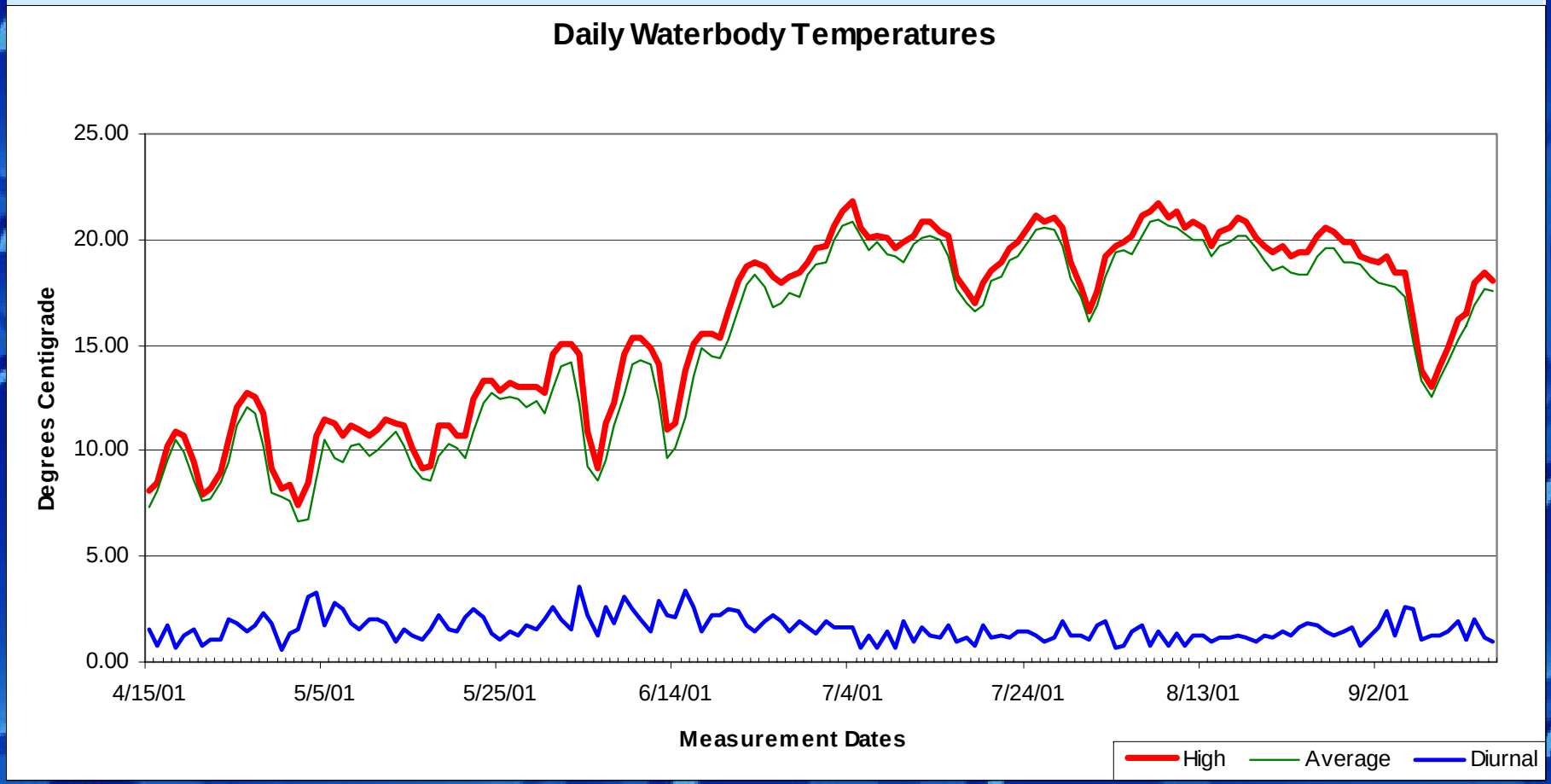


DEQ Summary of Temperature Data

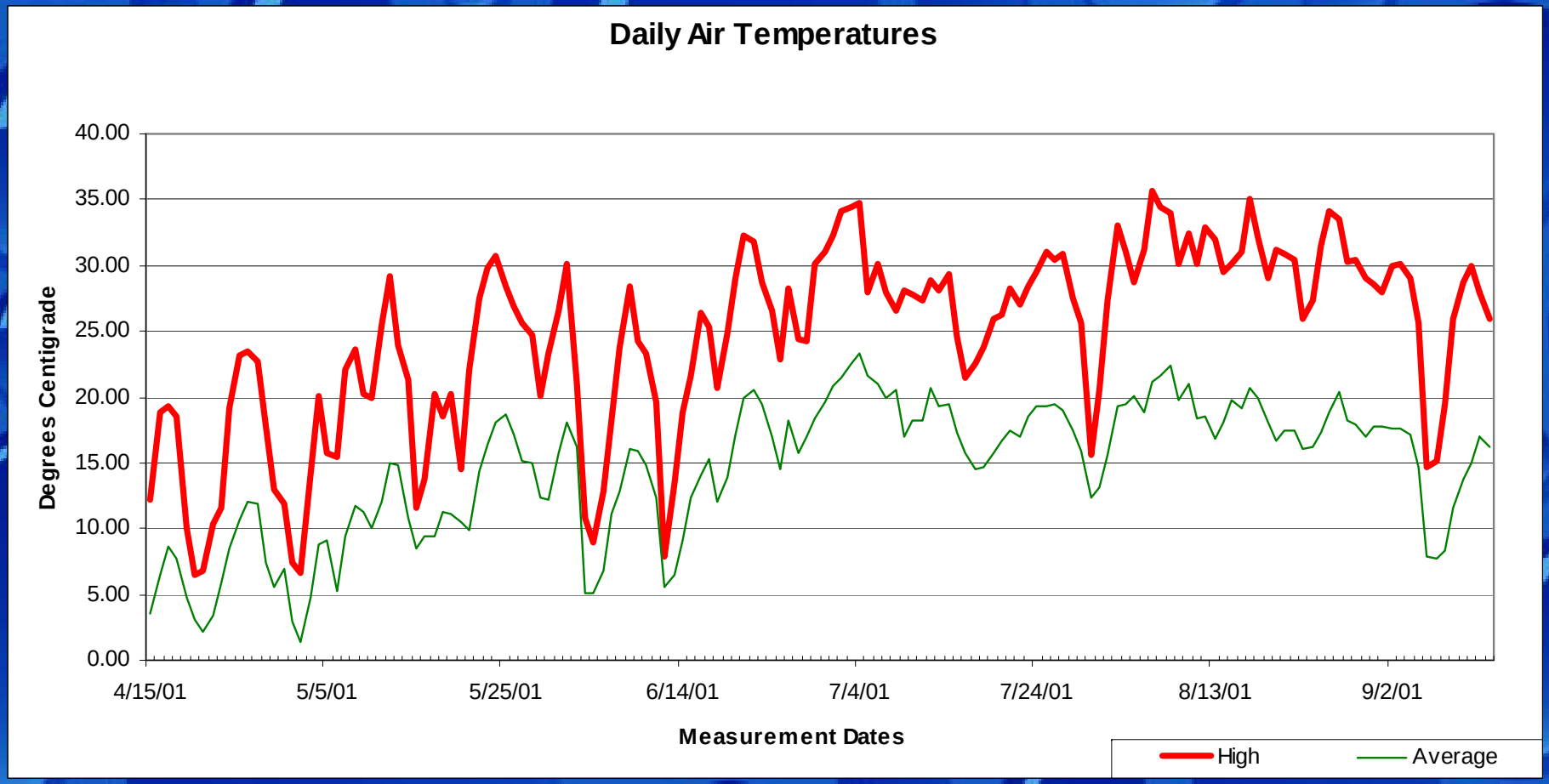
Data Source Name: DEQ
Water Body Name: MF Salmon @ Cliffside
Data Collection Site: right bank
Data Period: 4/15/01 - 9/15/01

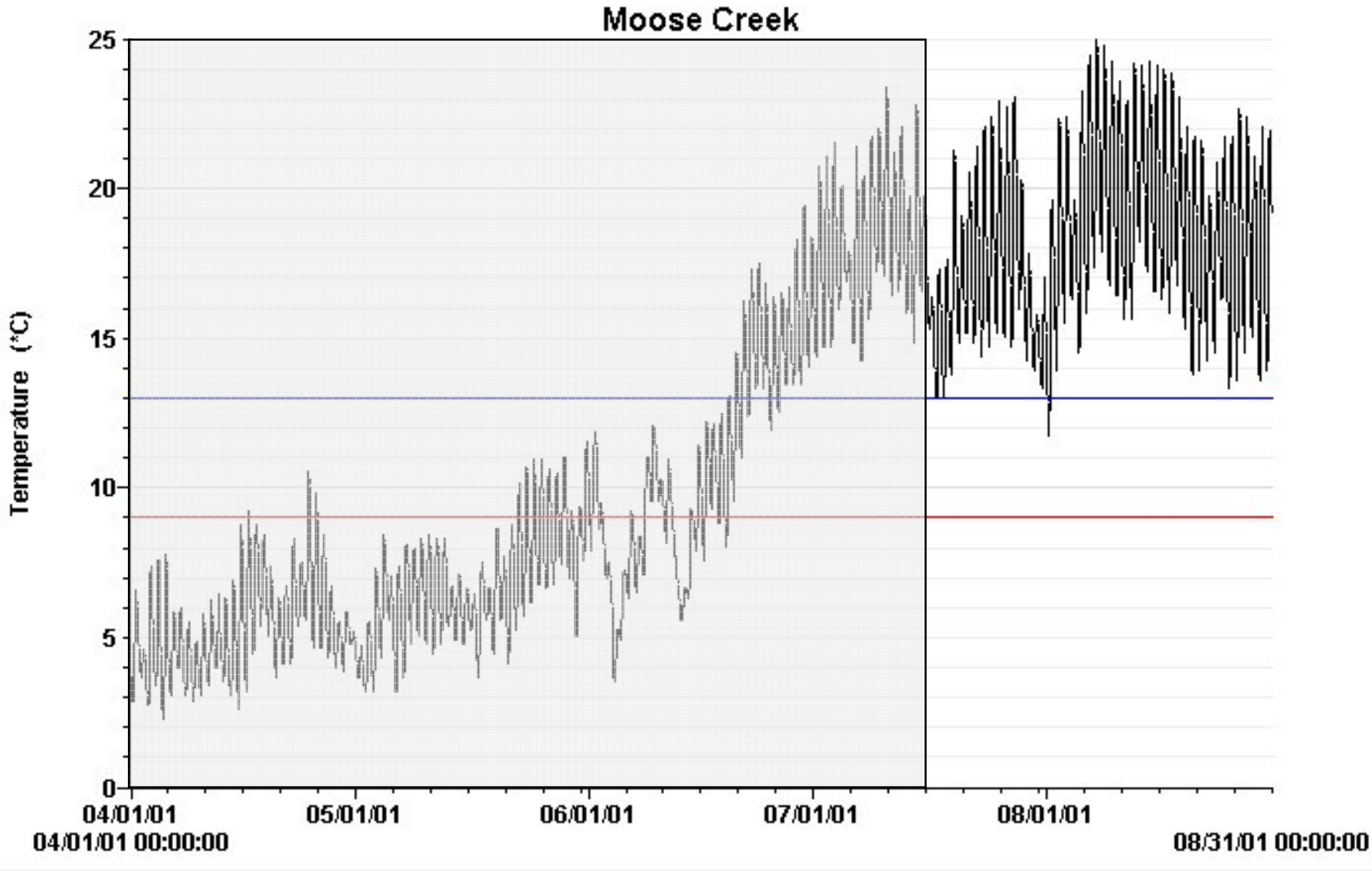
MDMT = 21.8, 04 Jul
MWMT = 21.1, 12 Aug
MDAT = 20.9, 08 Aug
MWAT = 20.5, 12 Aug

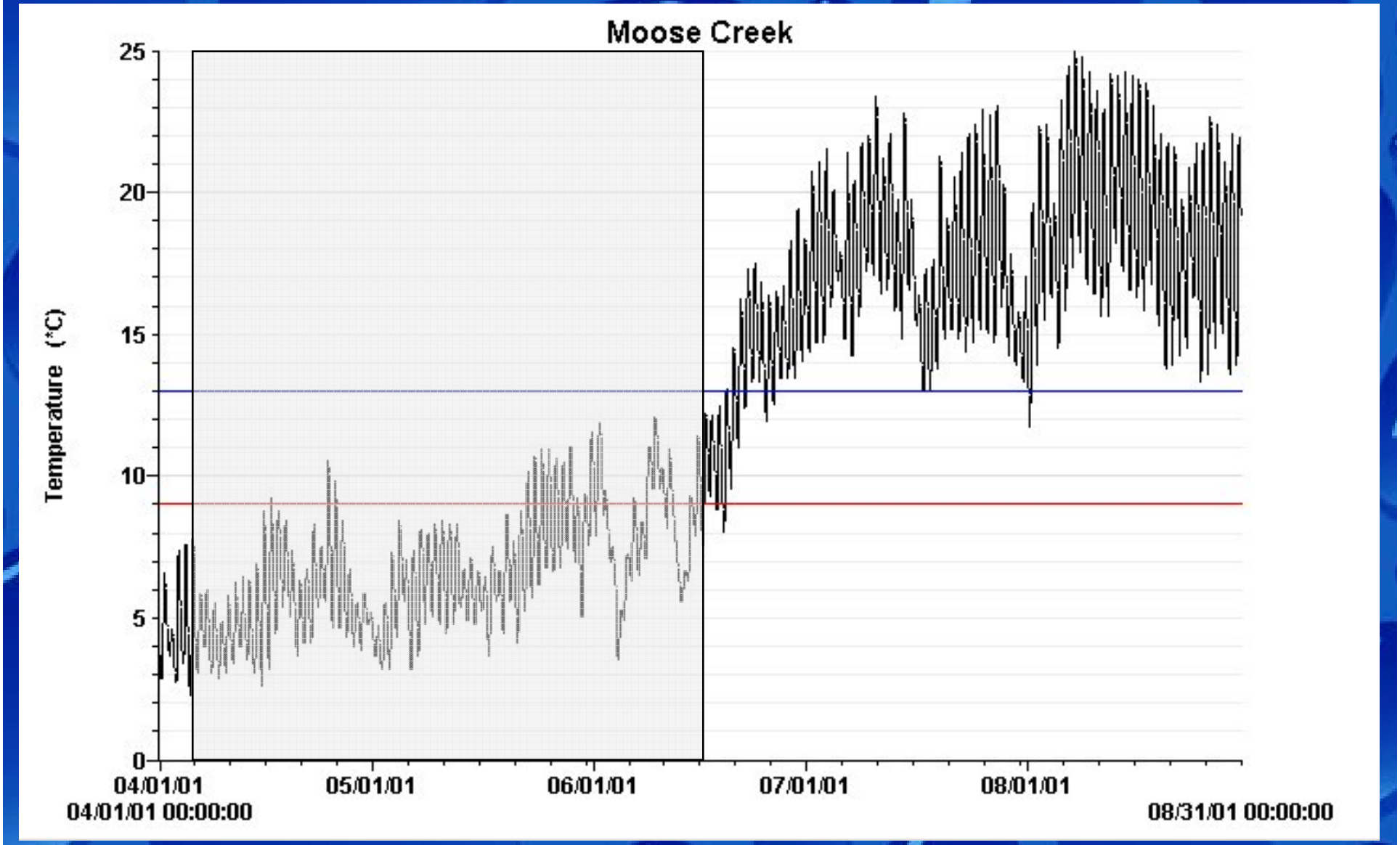
HUC4 Number: 17060206
HUC4 Name: Lower Middle Fork Salmo
South of the Salmon Clearwater Divide
Idaho Bull Trout Elevation: 965 M
Waterbody ID Number: 0

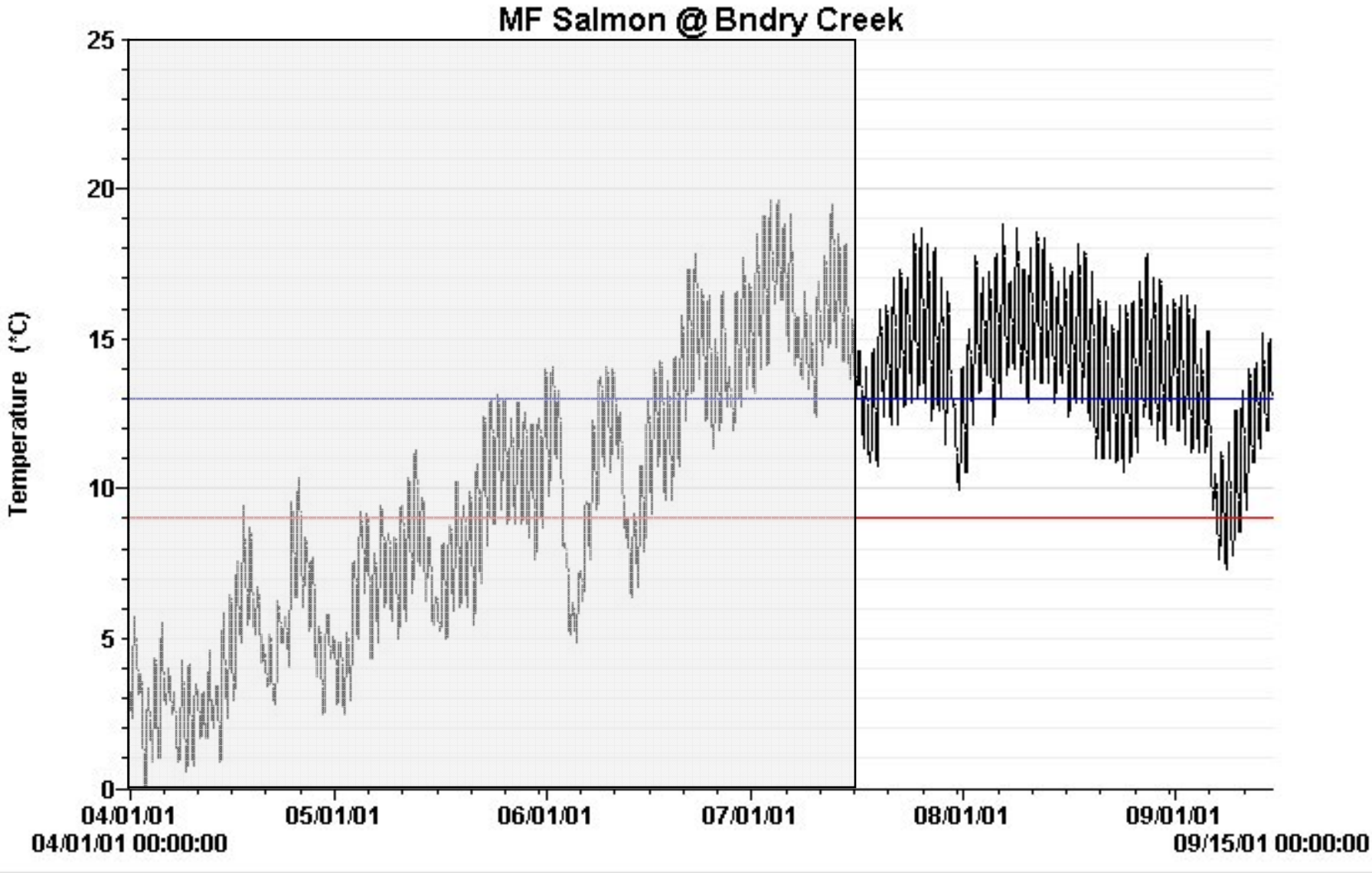


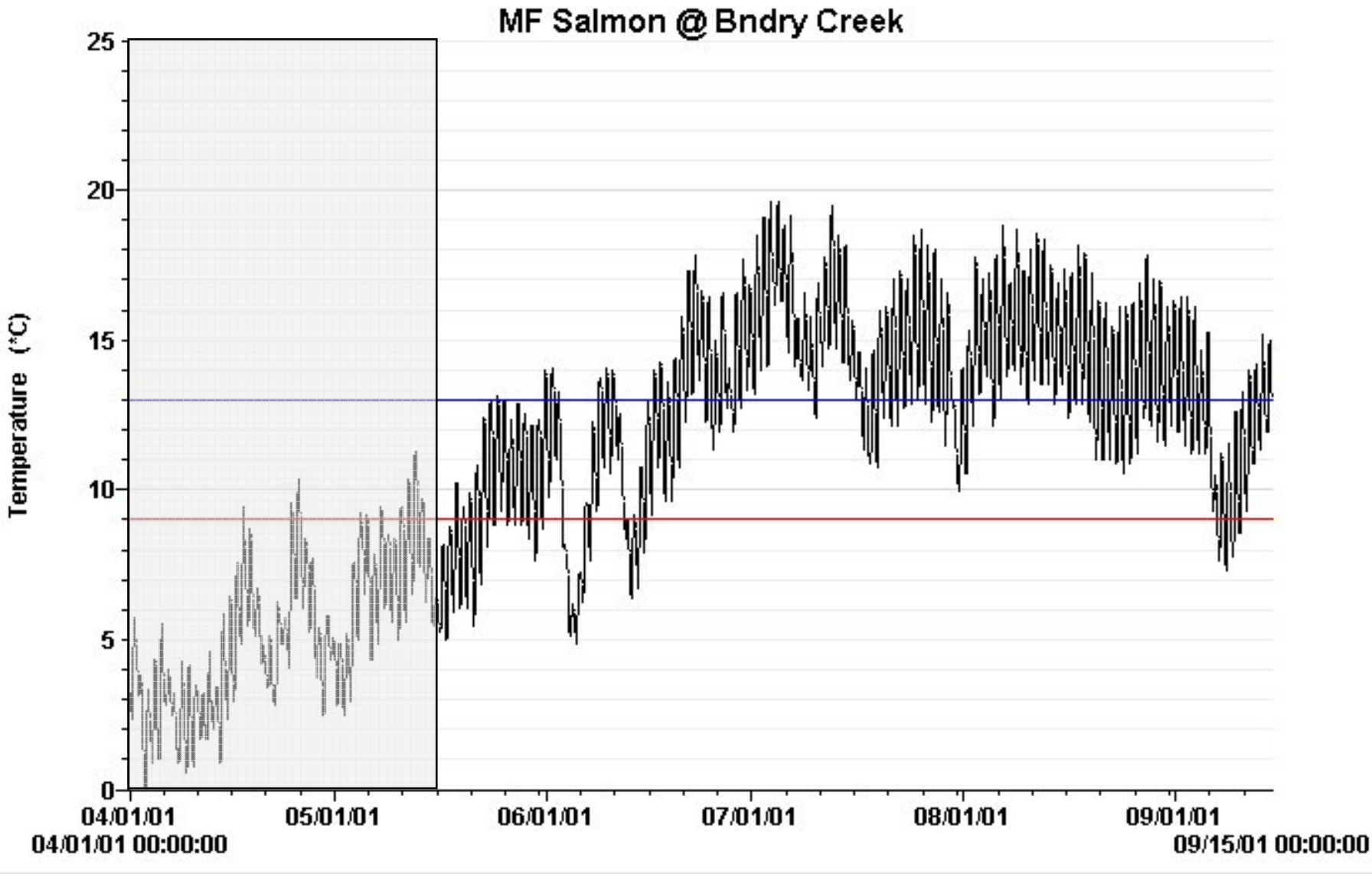
Indian Creek Guard Station Air Temperature




Moose Creek
Temperature (°C)
25
20
15
10
5
0
04/01/01
05/01/01
06/01/01
07/01/01
08/01/01
04/01/01 00:00:00
08/31/01 00:00:00


Moose Creek
Temperature (°C)
25
20
15
10
5
0
04/01/01
05/01/01
06/01/01
07/01/01
08/01/01
04/01/01 00:00:00
08/31/01 00:00:00


MF Salmon @ Bndry Creek
Temperature (°C)
25
20
15
10
5
0
04/01/01
05/01/01
06/01/01
07/01/01
08/01/01
09/01/01
04/01/01 00:00:00
09/15/01 00:00:00


MF Salmon @ Bndry Creek
Temperature (°C)
25
20
15
10
5
0
04/01/01
05/01/01
06/01/01
07/01/01
08/01/01
09/01/01
04/01/01 00:00:00
09/15/01 00:00:00

Concluding Observations

Smaller diurnal range in lower mainstems
- results in lower daily max but higher daily means

Rapid rise in T in mid June - end of snowmelt?

Selway tribs warmer than mainstem

MF Salmon generally cooler than Selway in heat of summer but warmer in spring

MF salmon tribs generally cooler than mainstem

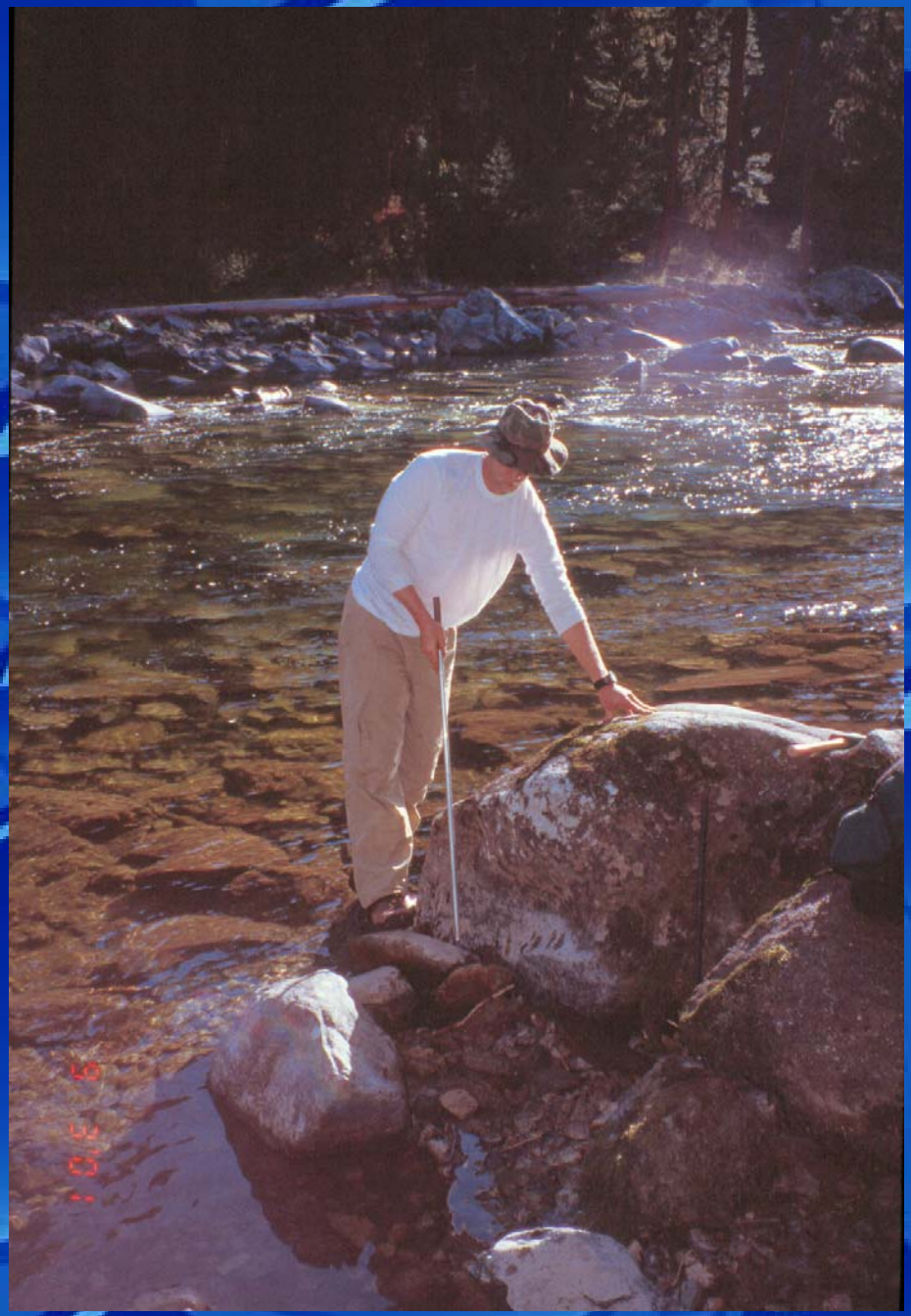
If wilderness streams can not meet criteria the criteria have little meaning

Recommendations

There is a need for more stream specific information on spawning times

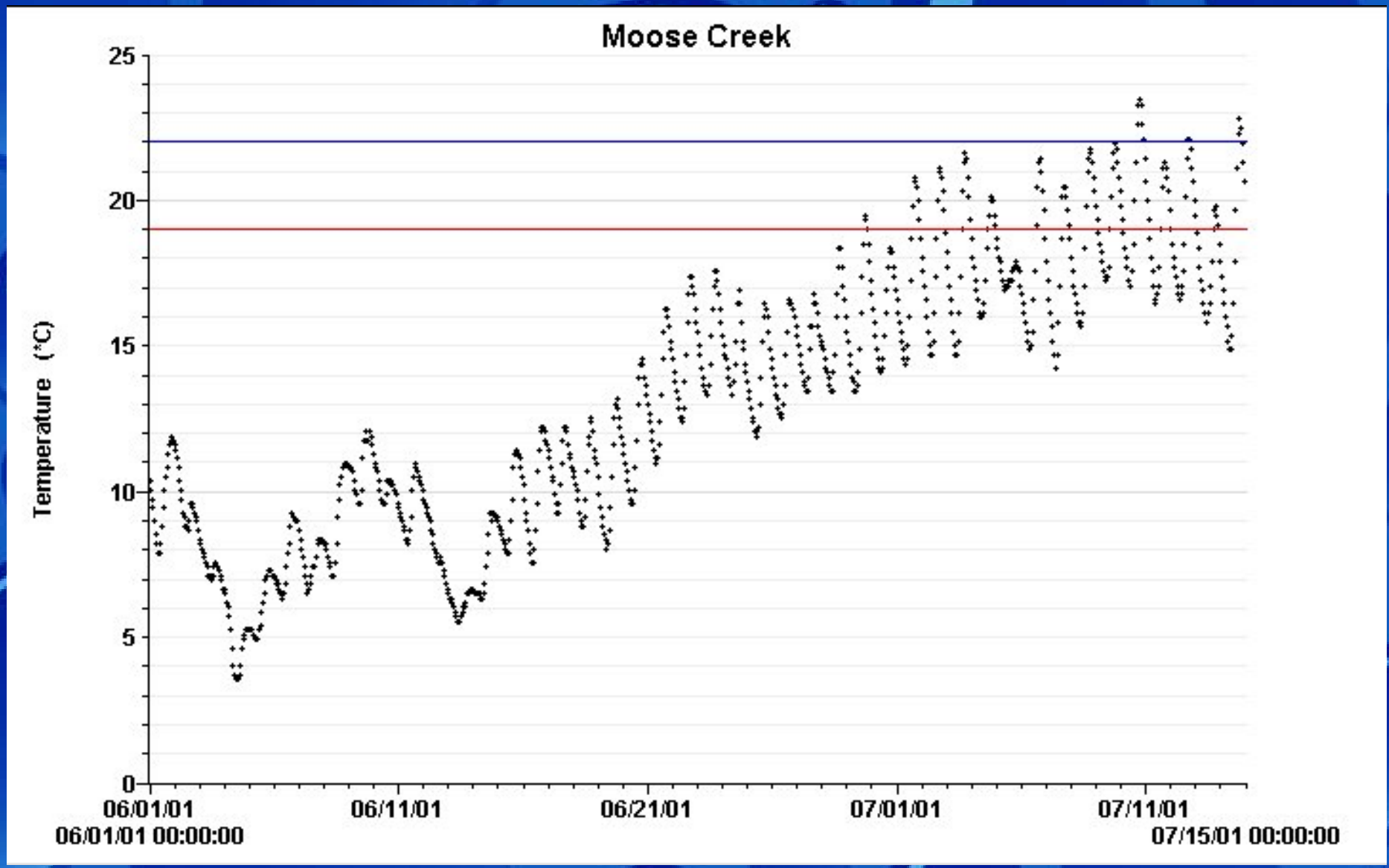
Criteria should take into account frequency and duration of temperature extremes, not just magnitude

Every time you look at water temperature records look at weather records as well, or water temp will be out of context



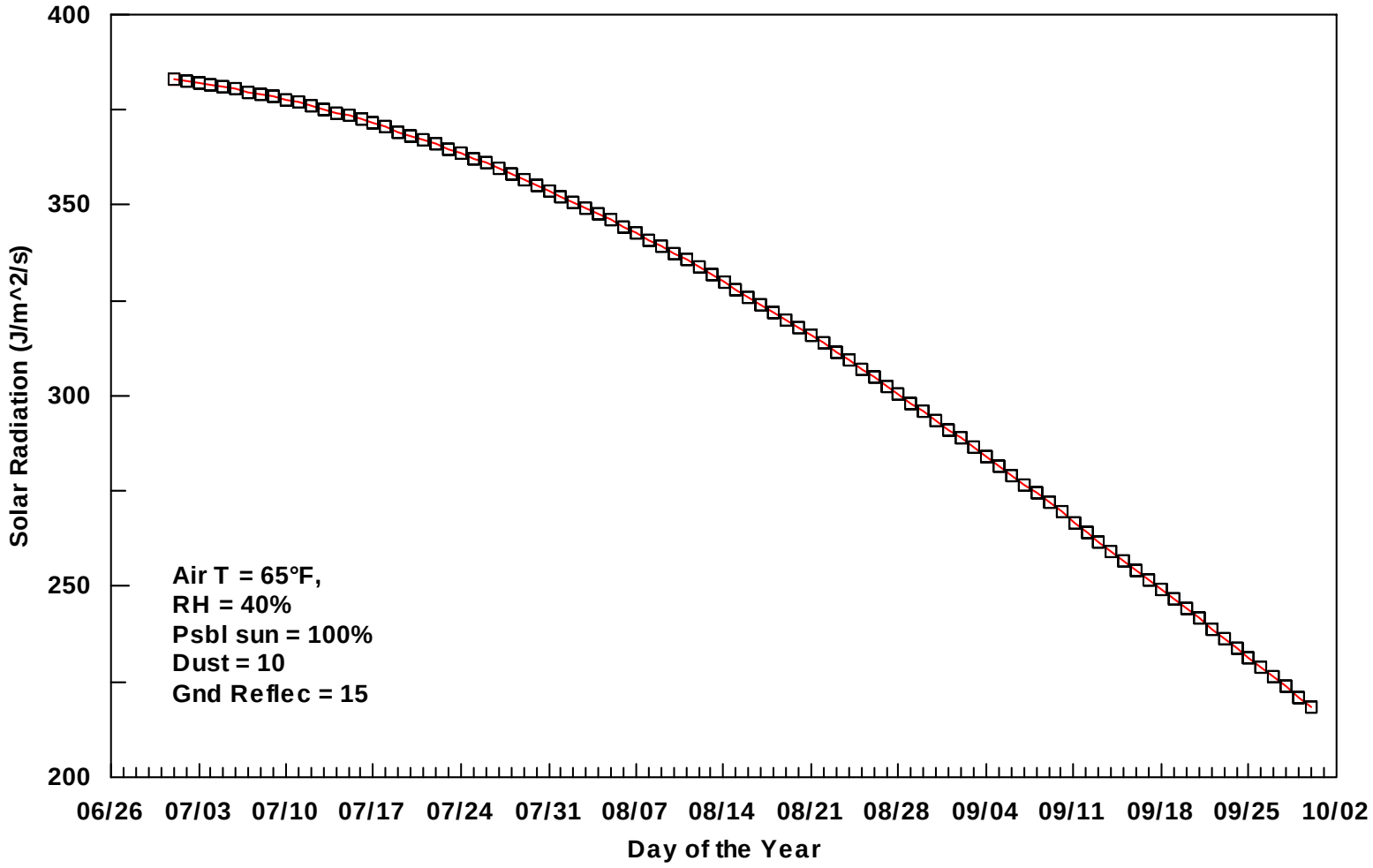
I will gladly swap data CDs

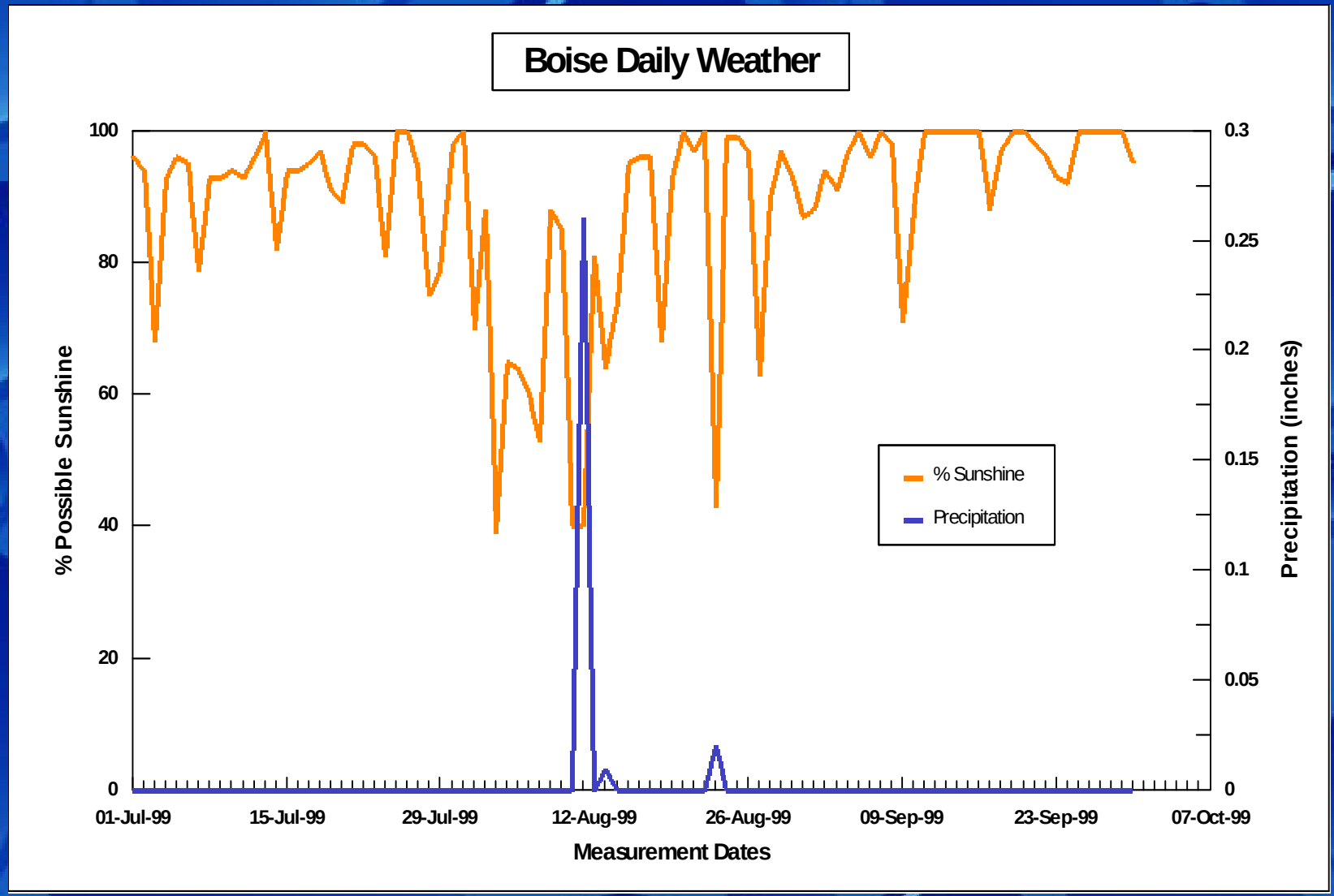
dessig@deq.state.id.us

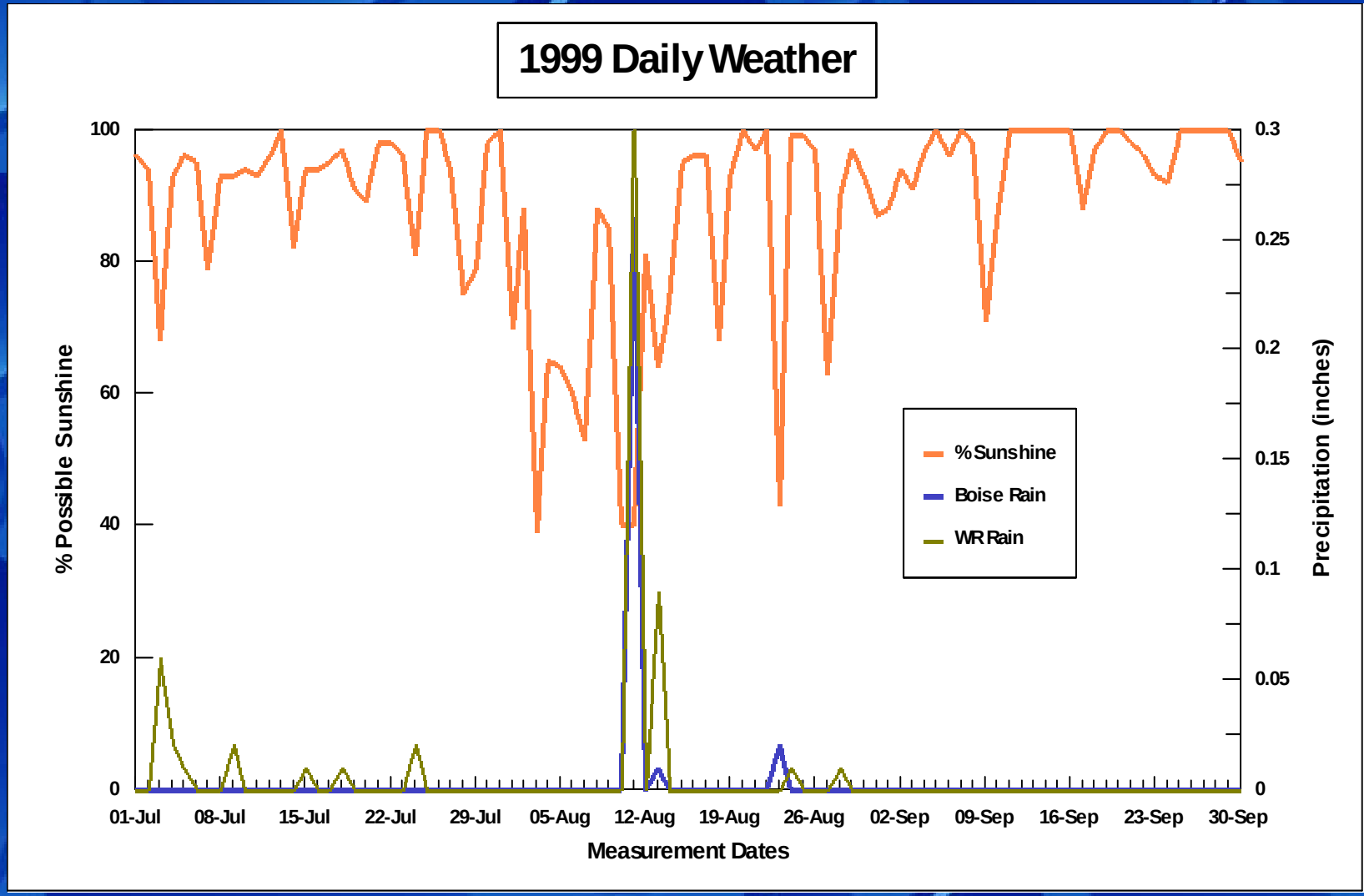

Moose Creek
Temperature (°C)
25
20
15
10
5
0
06/01/01
06/11/01
06/21/01
07/01/01
07/11/01
06/01/01 00:00:00
07/15/01 00:00:00

Contact:
Don A. Essig
IDEQ
208-373-0119
HOBO
9 28 '00

Mores Creek Clear Sky Solar Radiation




Boise Daily Weather
% Possible Sunshine
Precipitation (inches)
100
80
60
40
20
0
0.3
0.25
0.2
0.15
0.1
0.05
0
% Sunshine
Precipitation
01-Jul-99
15-Jul-99
29-Jul-99
12-Aug-99
26-Aug-99
09-Sep-99
23-Sep-99
07-Oct-99
Measurement Dates


1999 Daily Weather
% Possible Sunshine
Precipitation (inches)
100
80
60
40
20
0
0.3
0.25
0.2
0.15
0.1
0.05
0
01-Jul
08-Jul
15-Jul
22-Jul
29-Jul
05-Aug
12-Aug
19-Aug
26-Aug
02-Sep
09-Sep
16-Sep
23-Sep
30-Sep
Measurement Dates
% Sunshine
Boise Rain
WR Rain