

EXHIBIT 4-1
WRIA 35
Lower Snake Main Stem
Subbasin Map
 January 2005

ees Economic and Engineering Services, Inc.
 Bellevue Mount Vernon Olympia Portland Tri-Cities

LEGEND

USGS Gauging Stations	Ecology Gauging Stations
# Daily Streamflow	S Manual Stage Height
# Daily Streamflow, Real-time	S Telemetry
# Peakflow	— Major Roads
# Real-time	— Rivers and Streams
# Water Quality	— County Line
u WSU Monitoring Sites	— Lower Snake Main Stem
U Ecology Water Quality Stations	

Exhibit 4-2
Snake River near Anatone, Washington
Complete Record of Average Monthly Values (CFS): USGS 13334300
(9/1958 to Current)

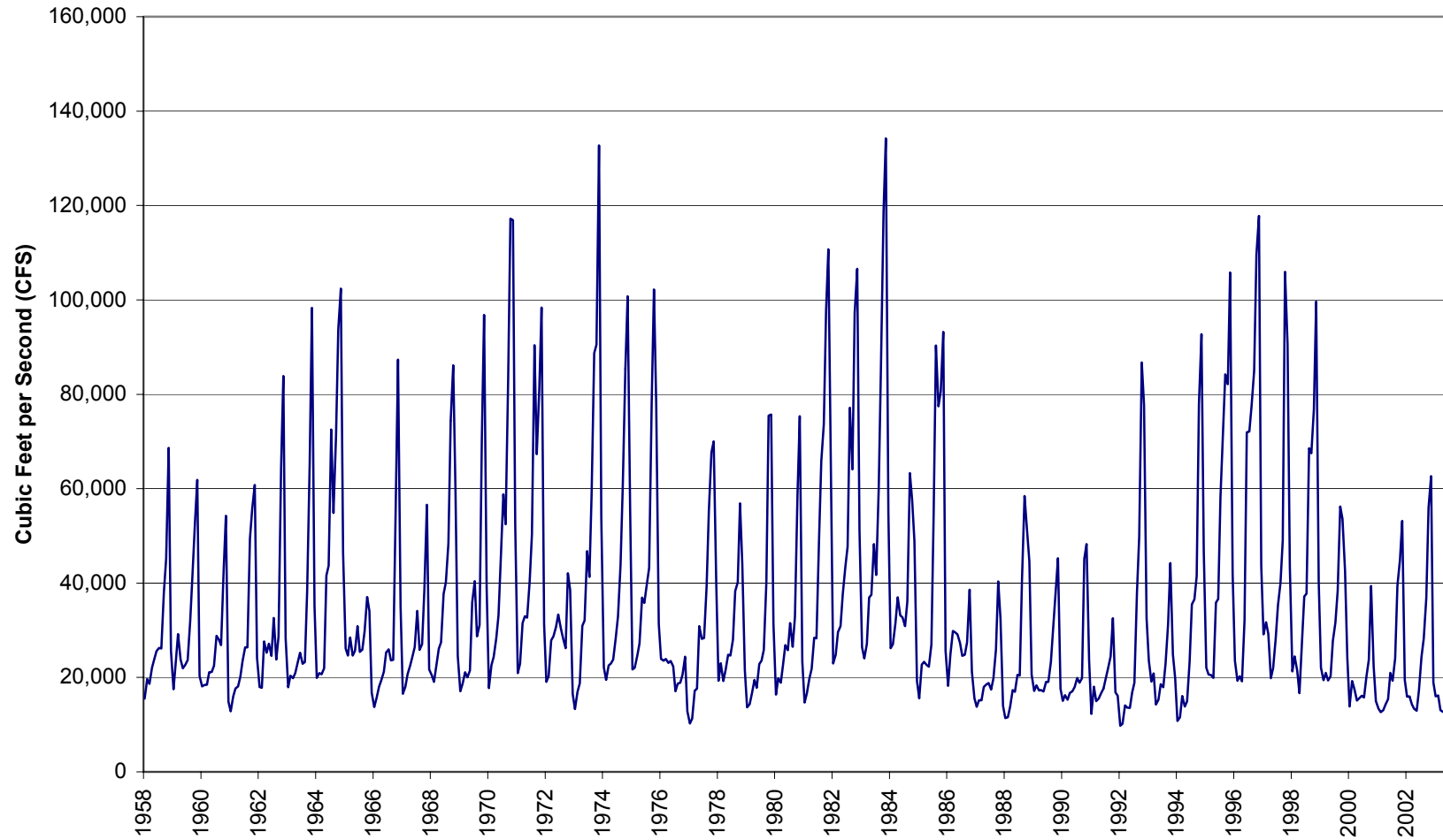


Exhibit 4-3
Snake River at Interstate Bridge
Complete Record of Values (CFS): Ecology Monitoring Site 35A150
(12/1990 to 1/1992; 3/1992 to 9/2001)

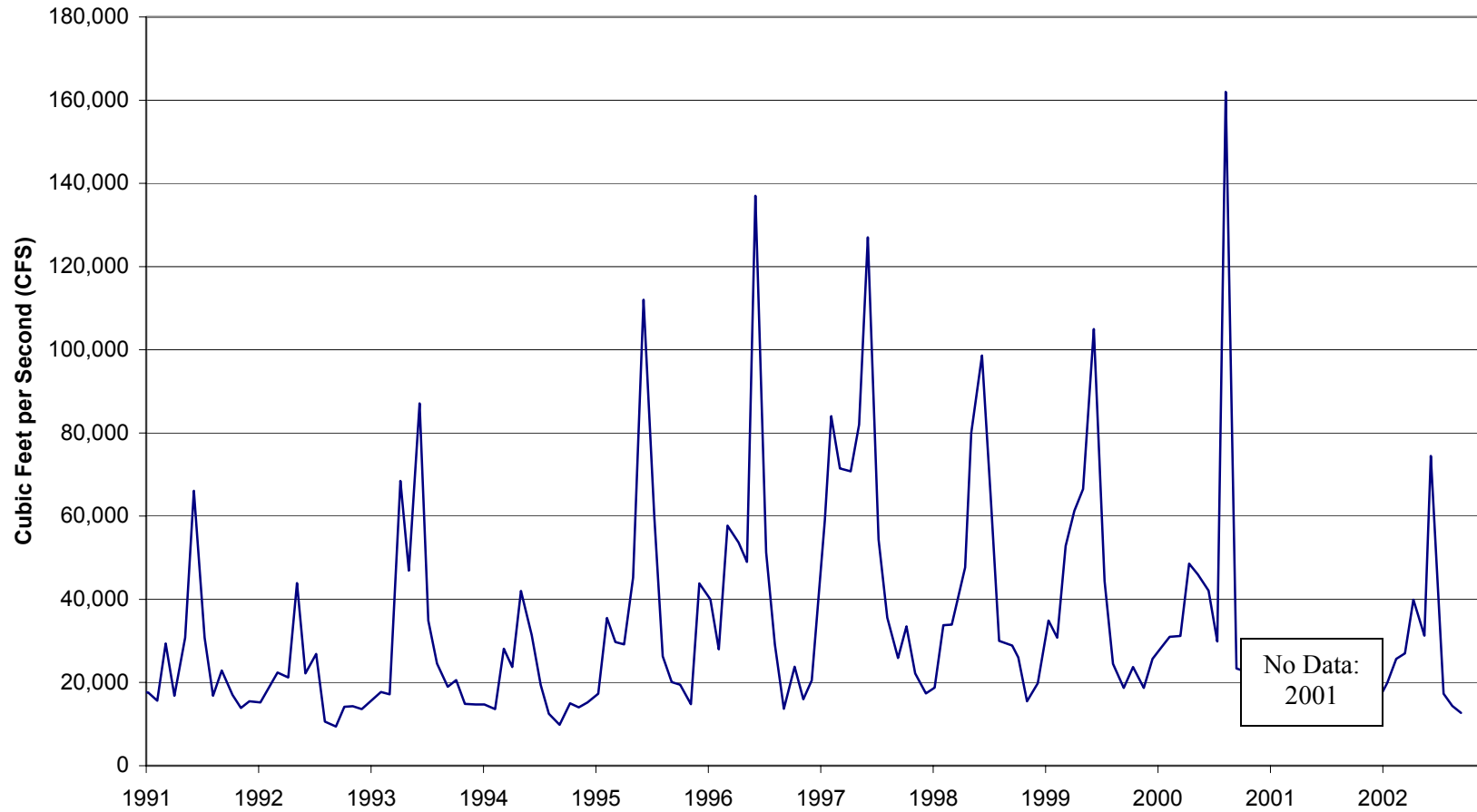


Exhibit 4-4
Snake River near Clarkston
Complete Record of Average Monthly Values (CFS): USGS Gage 13343500
(11/1915 to 10/1922; 8/1928 to 12/1972)

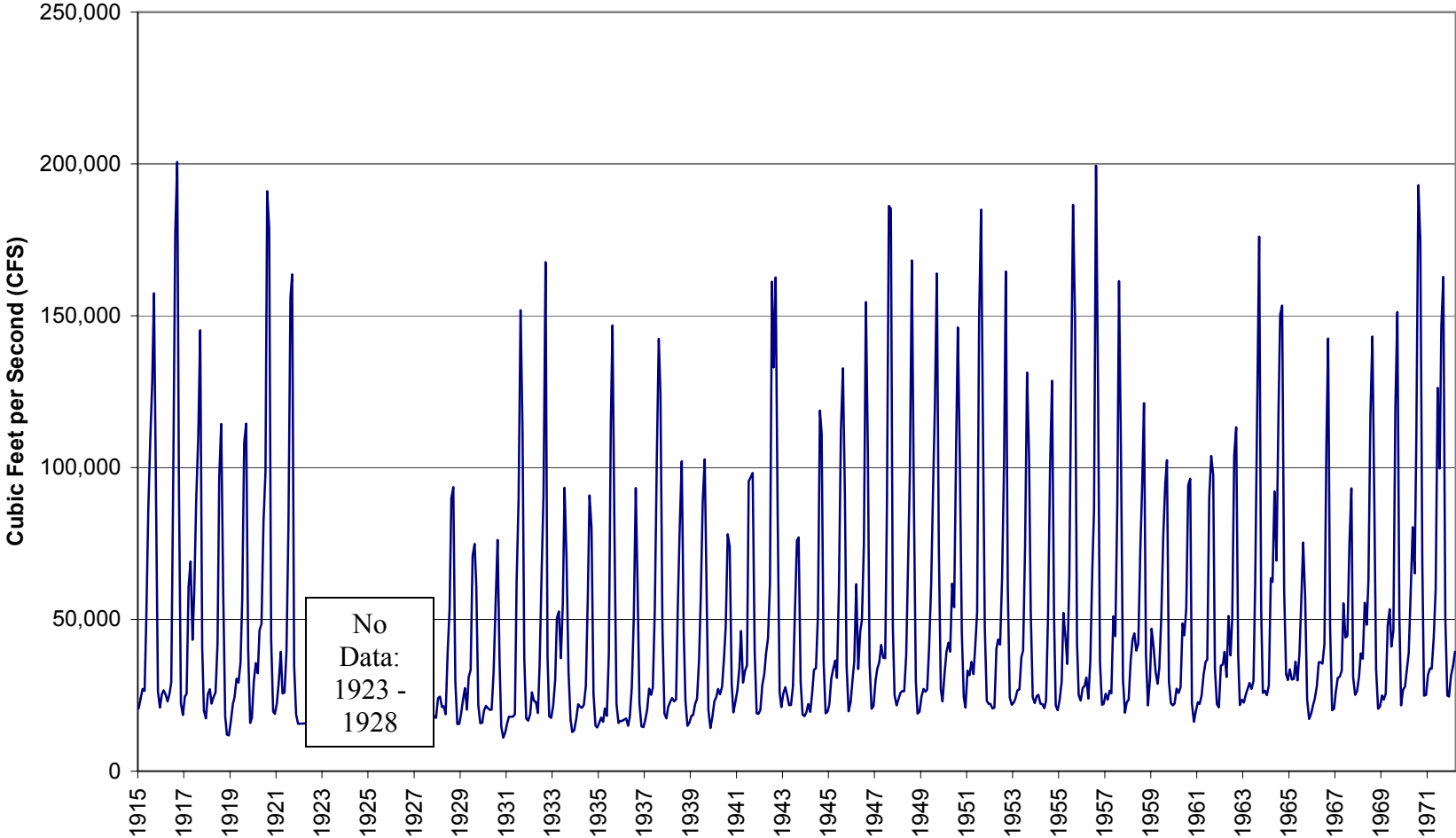


Exhibit 4-5
Snake River at Lower Granite Dam
Complete Record of Average Monthly Values (CFS)
USACE Reporting Site - River Mile 107.5 on the Snake River
(4/1975 to Current)

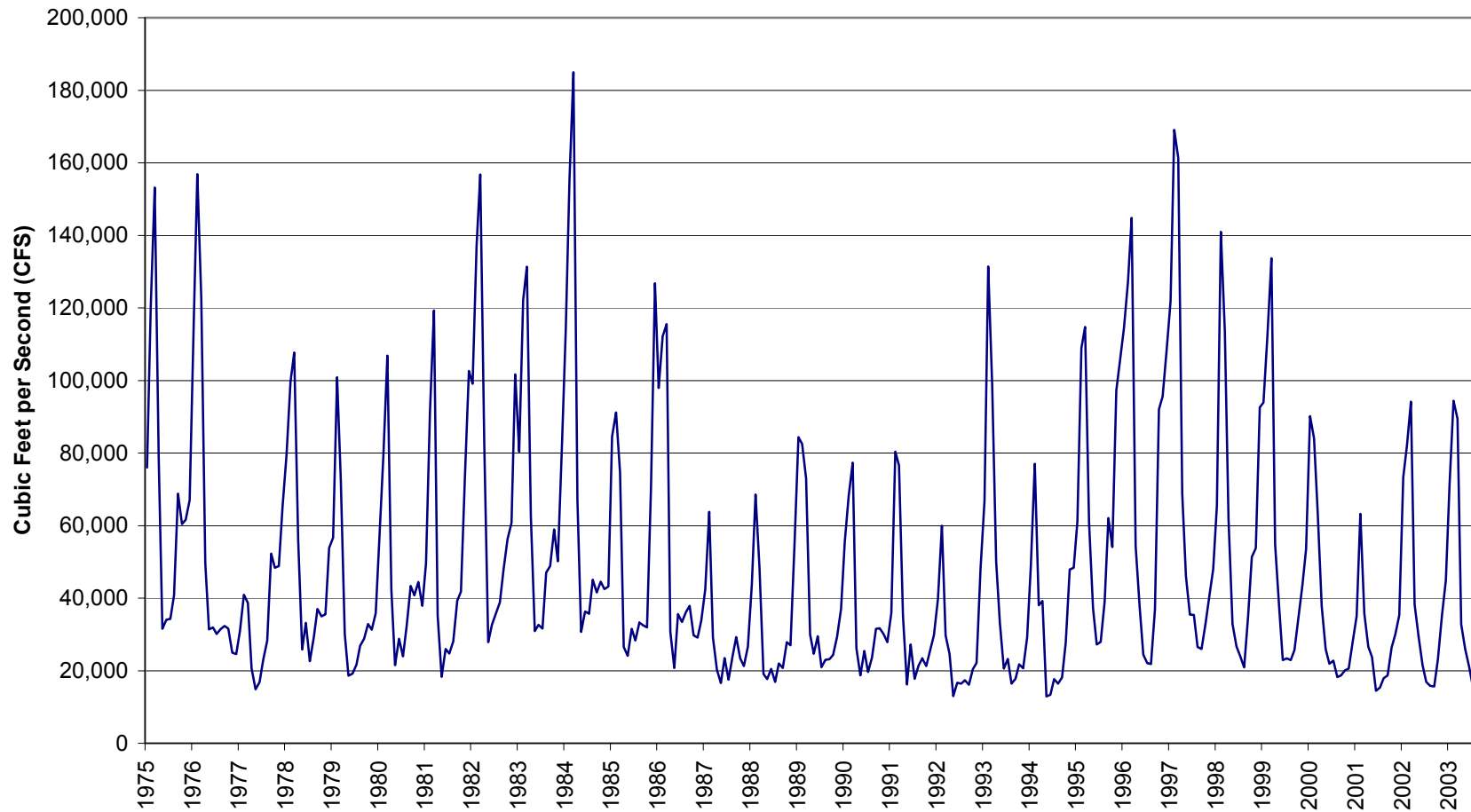


Exhibit 4-6
Snake River at Little Goose Dam
Complete Record of Average Monthly Values (CFS):
USACE Reporting Site - River Mile 70.3 on the Snake River
(3/1970 to Current)

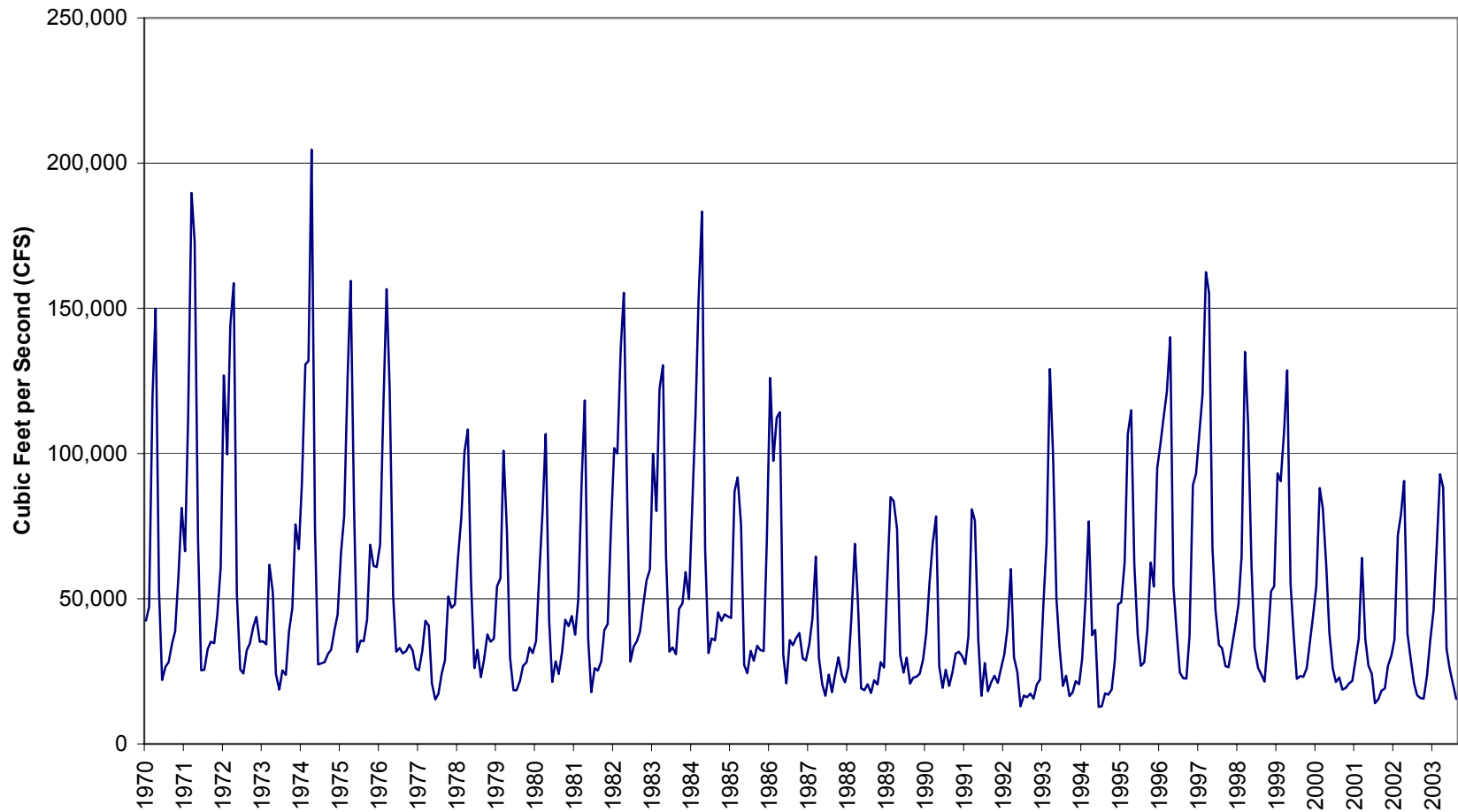


Exhibit 4-7
Meadow Creek near Central Ferry
Complete Record of Average Monthly Values (CFS): USGS Gage 13343800
(5/1963 to 9/1974)

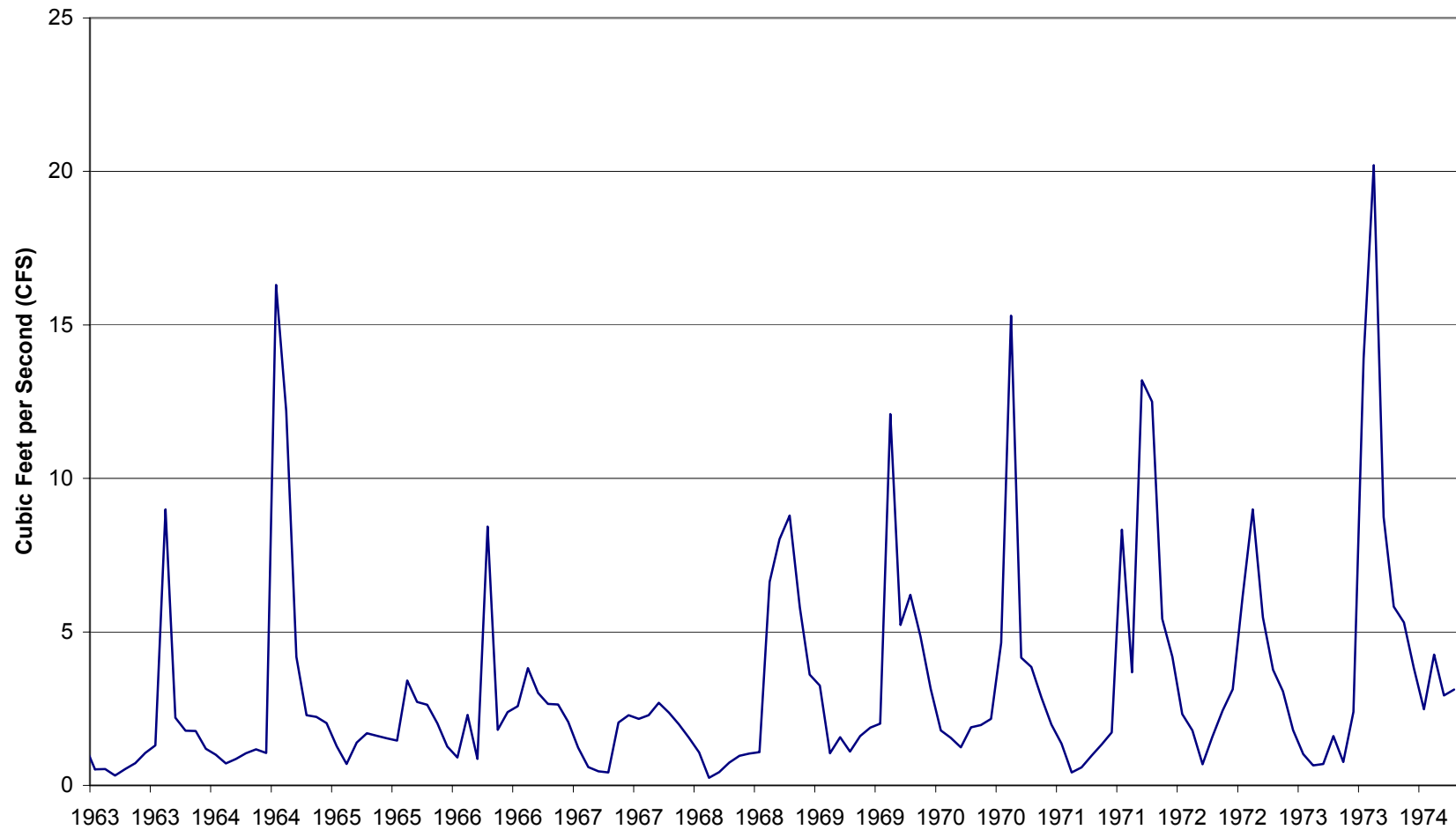


Exhibit 4-8
Snake River near Anatone, Washington
Average Monthly, 90% Exceedance, and 10% Exceedance Flows
Mean Annual Volume = 25,517,900 ac-ft/yr, USGS Gauge 13334300
(9/1958 to Current)

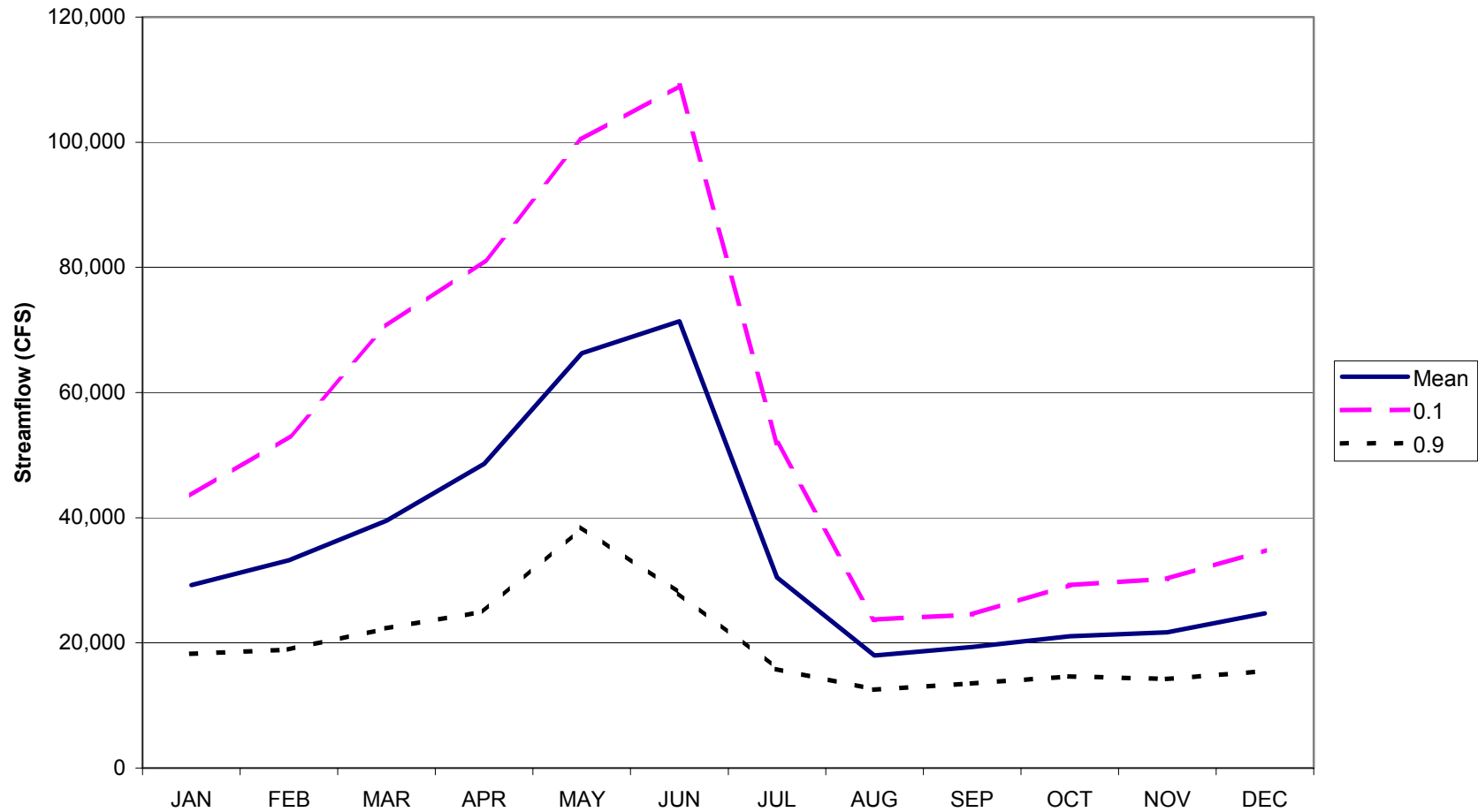


Exhibit 4-9
Snake River at Interstate Bridge
Average Monthly, 90% Exceedance, and 10% Exceedance Flows
Mean Annual Volume = 25,386,048 ac-ft, Ecology Monitoring Site 35A150
(12/1990 to 1/1992; 3/1992 to 9/2001)

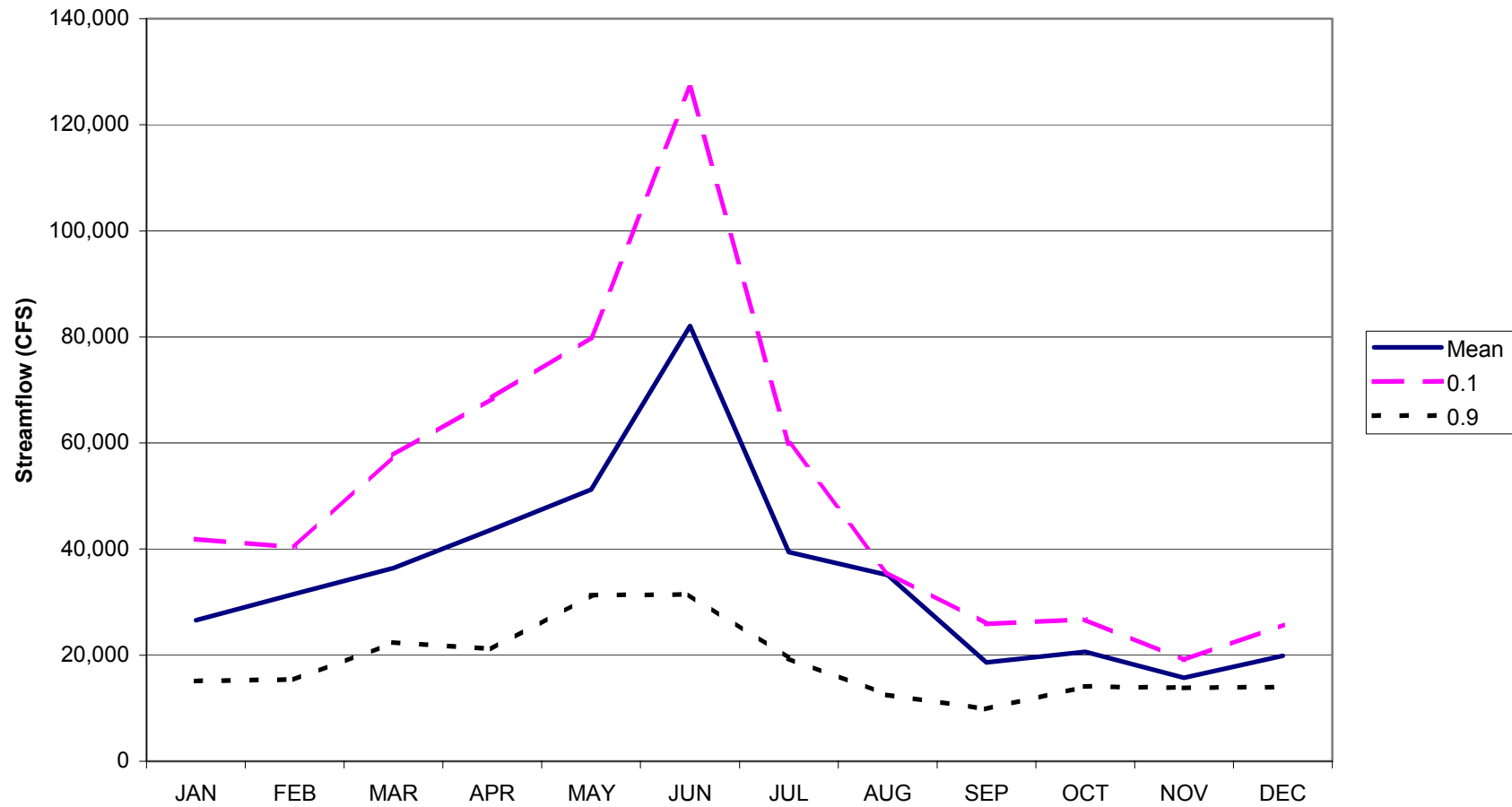


Exhibit 4-10
Snake River near Clarkston
Average Monthly, 90% Exceedance, and 10% Exceedance Flows
Mean Annual Volume = 36,429,975 ac-ft, USGS Gage 13343500
(11/1915 to 10/1922; 8/1928 to 12/1972)

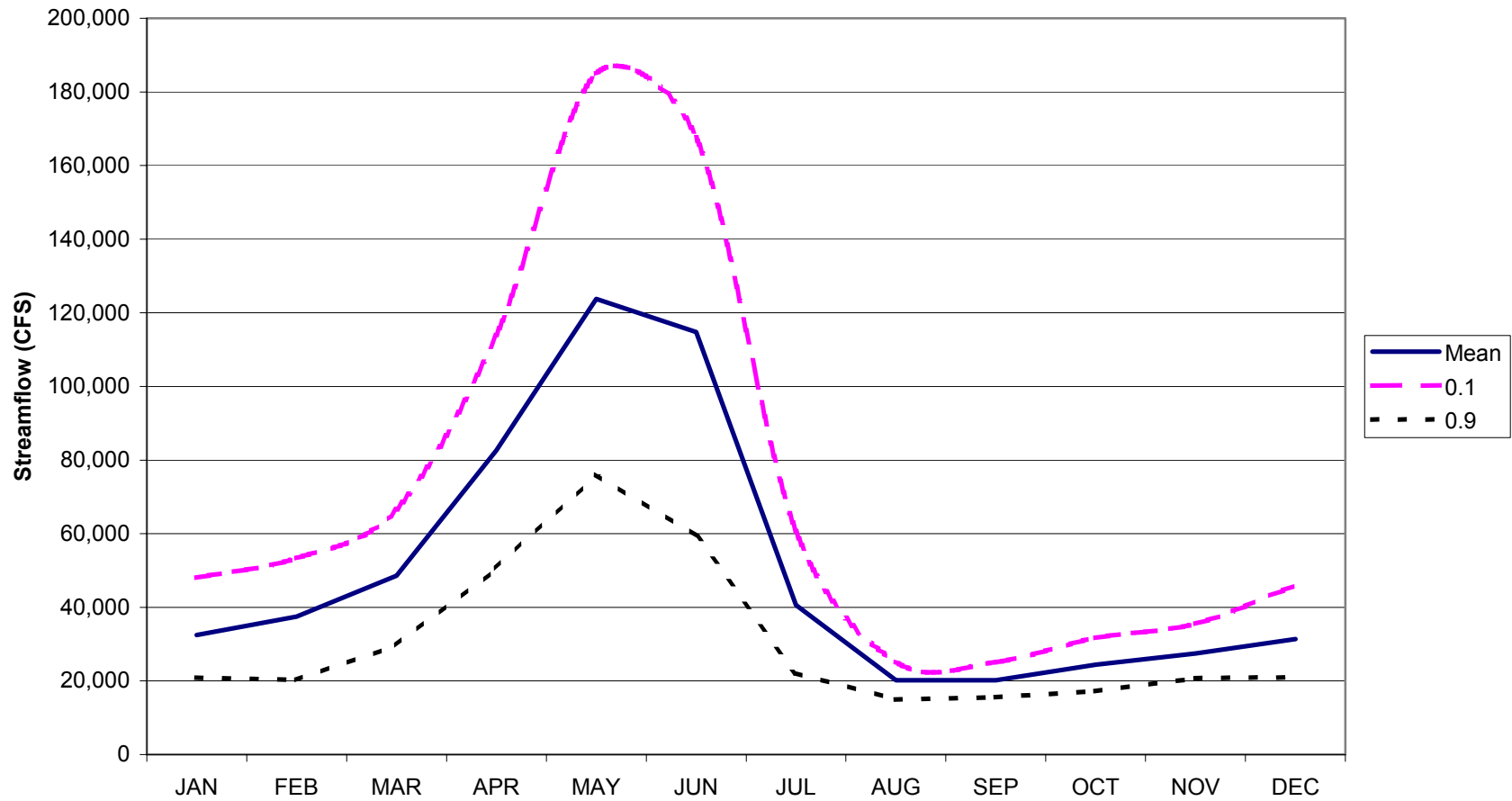


Exhibit 4-11
Snake River at Lower Granite Dam
Average Monthly, 90% Exceedance, and 10% Exceedance Flows
Mean Annual Volume = 35,778,164 ac-ft
USACE Reporting Site - River Mile 107.5 on the Snake River
(4/1975 to Current)

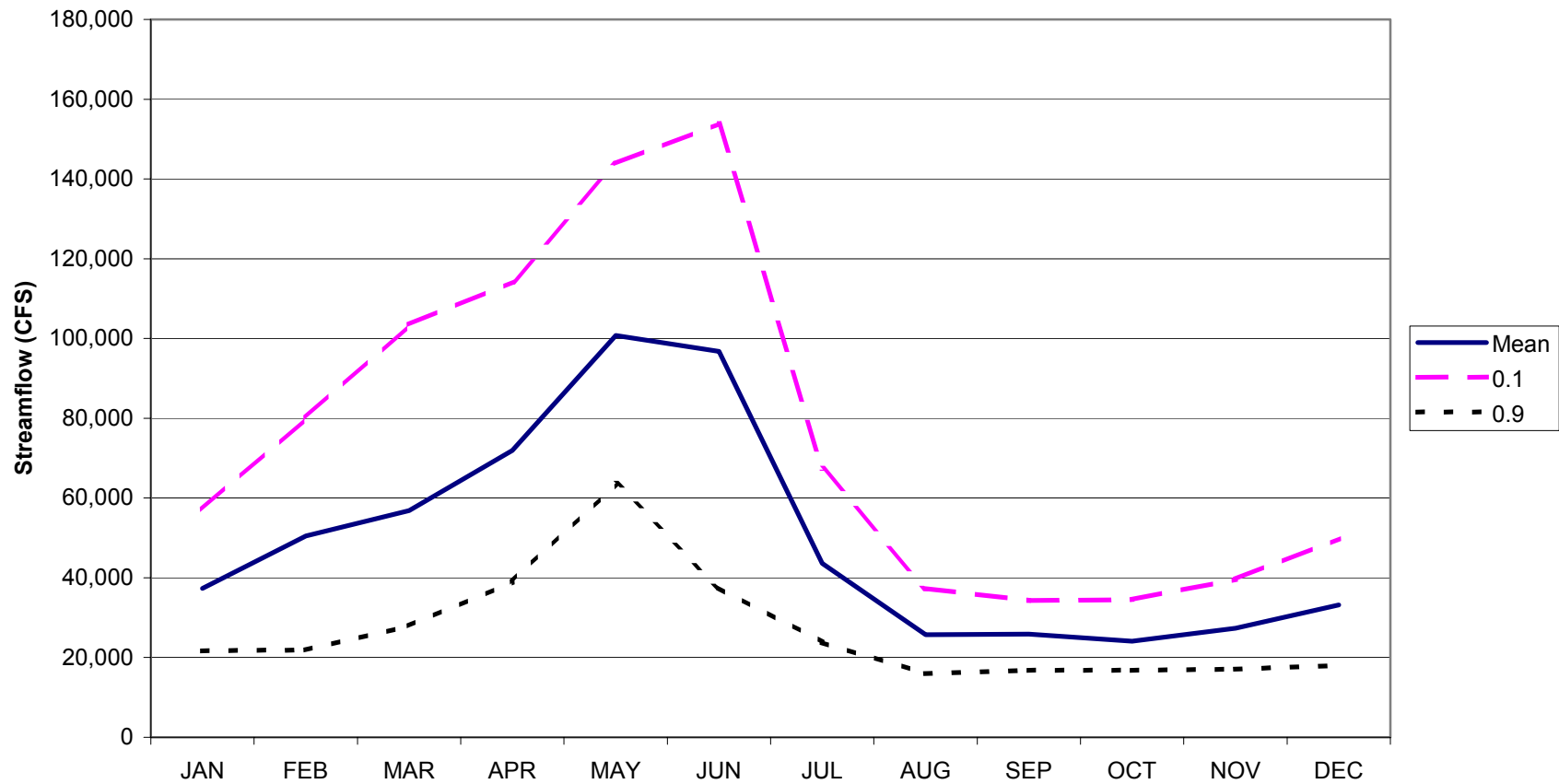


Exhibit 4-12
Snake River at Little Goose Dam
Average Monthly, 90% Exceedance, and 10% Exceedance Flows
Mean Annual Volume = 36,829,312 ac-ft
USACE Reporting Site - River Mile 70.3 on the Snake River
(3/1970 to Current)

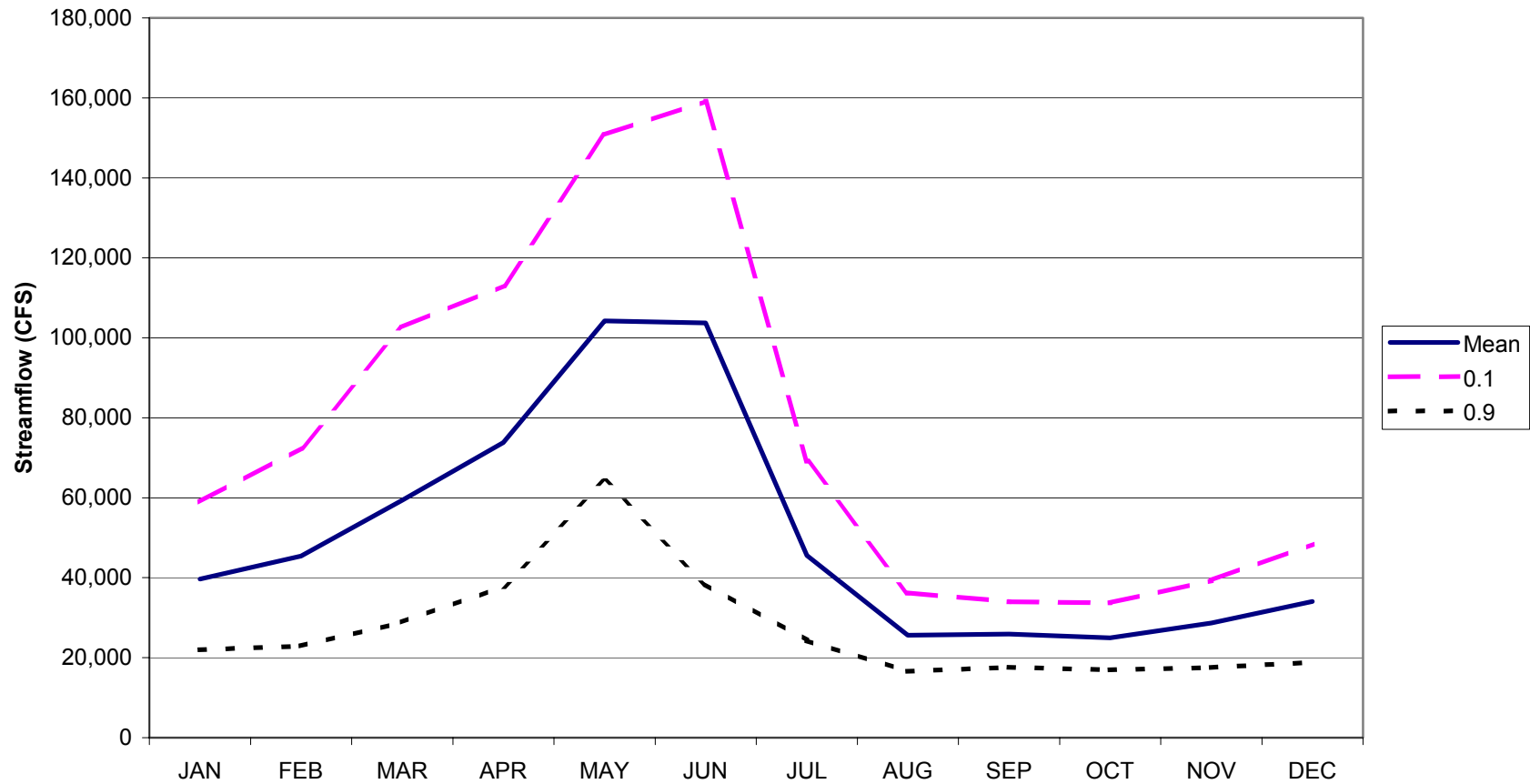
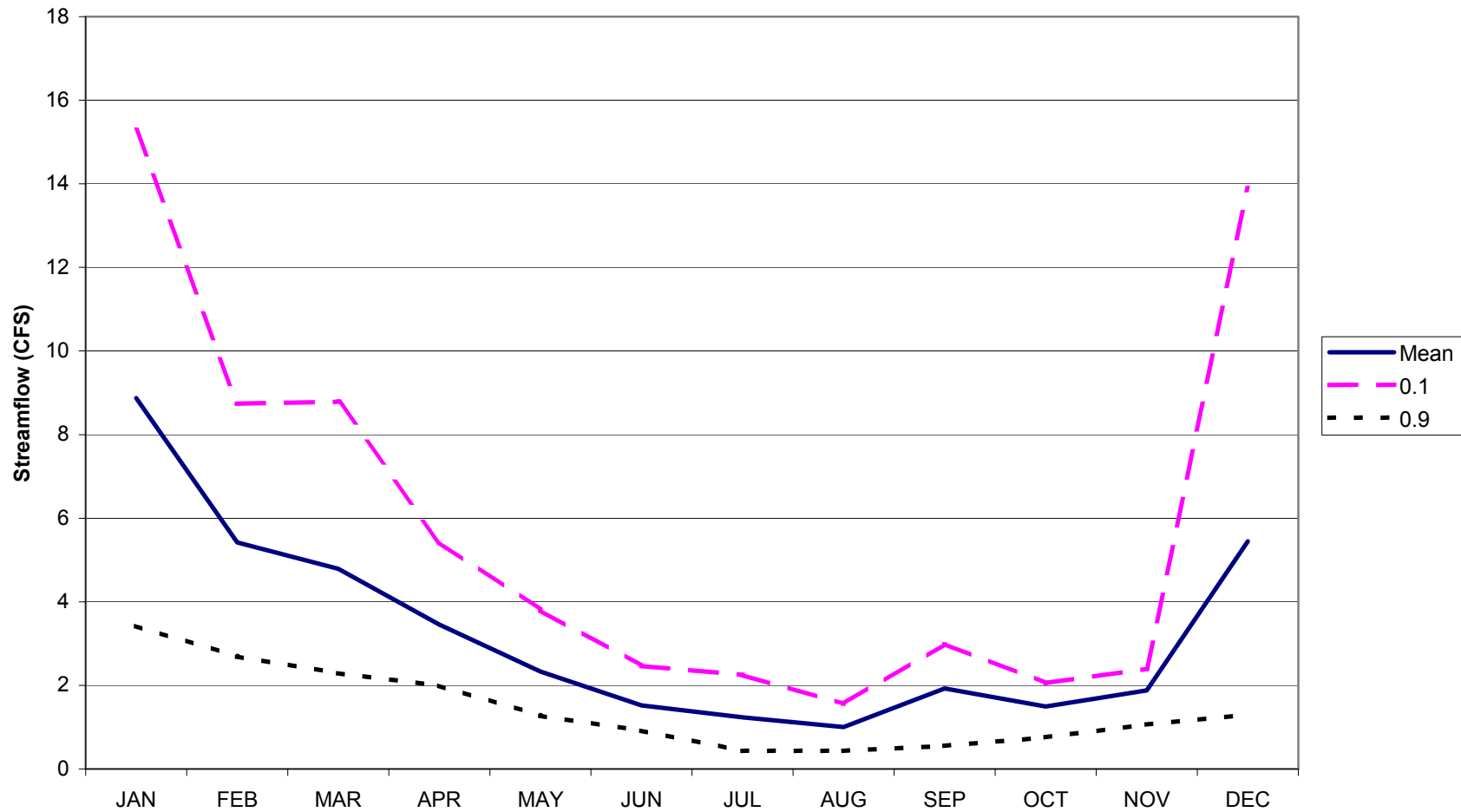


Exhibit 4-13
Meadow Creek near Central Ferry
Average Monthly, 90% Exceedance, and 10% Exceedance Flows
Mean Annual Volume = 2,372 ac-ft, USGS Gage 13343800
(5/1963 to 9/1974)



M:\ArcView\WRIA35_WQ\wq_stations.apr
04/27/2004

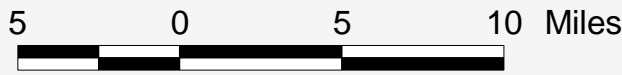
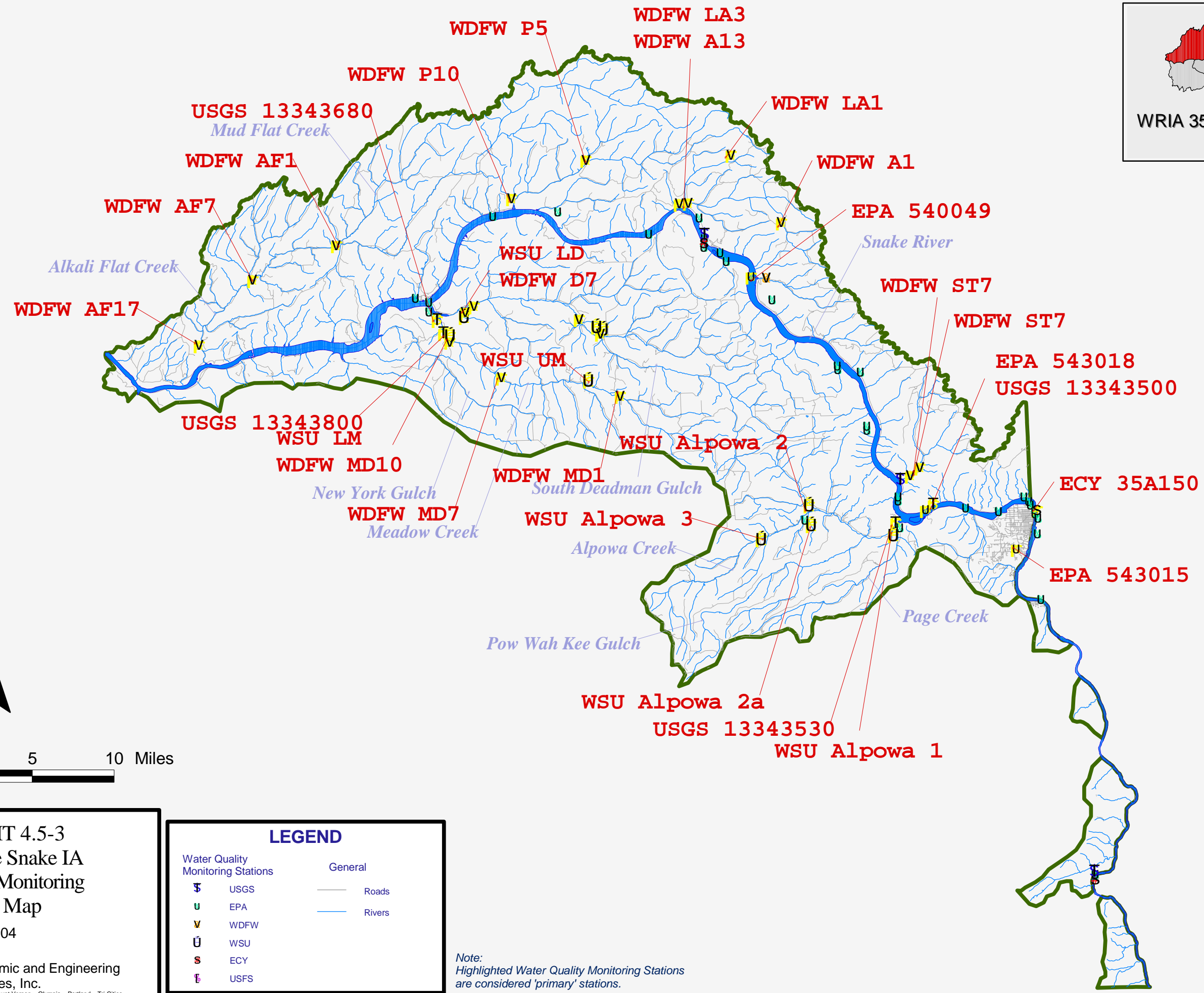
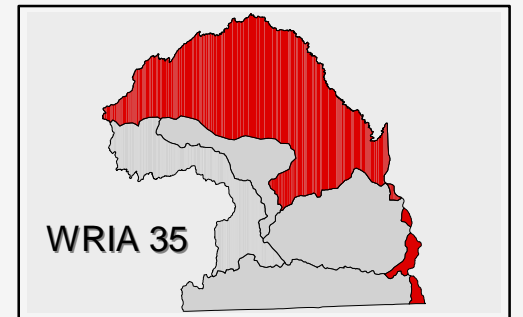


EXHIBIT 4.5-3
Middle Snake IA
Water Quality Monitoring
Location Map
April 2004



Water Quality Monitoring Stations		General	
⌘	USGS	—	Roads
u	EPA	—	Rivers
v	WDFW		
U	WSU		
S	ECY		
⌘	USFS		

Note:
Highlighted Water Quality Monitoring Stations
are considered 'primary' stations.

Exhibit 4-5.3

Water Quality Monitoring Stations in the Lower Snake River Mainstem Implementation Area

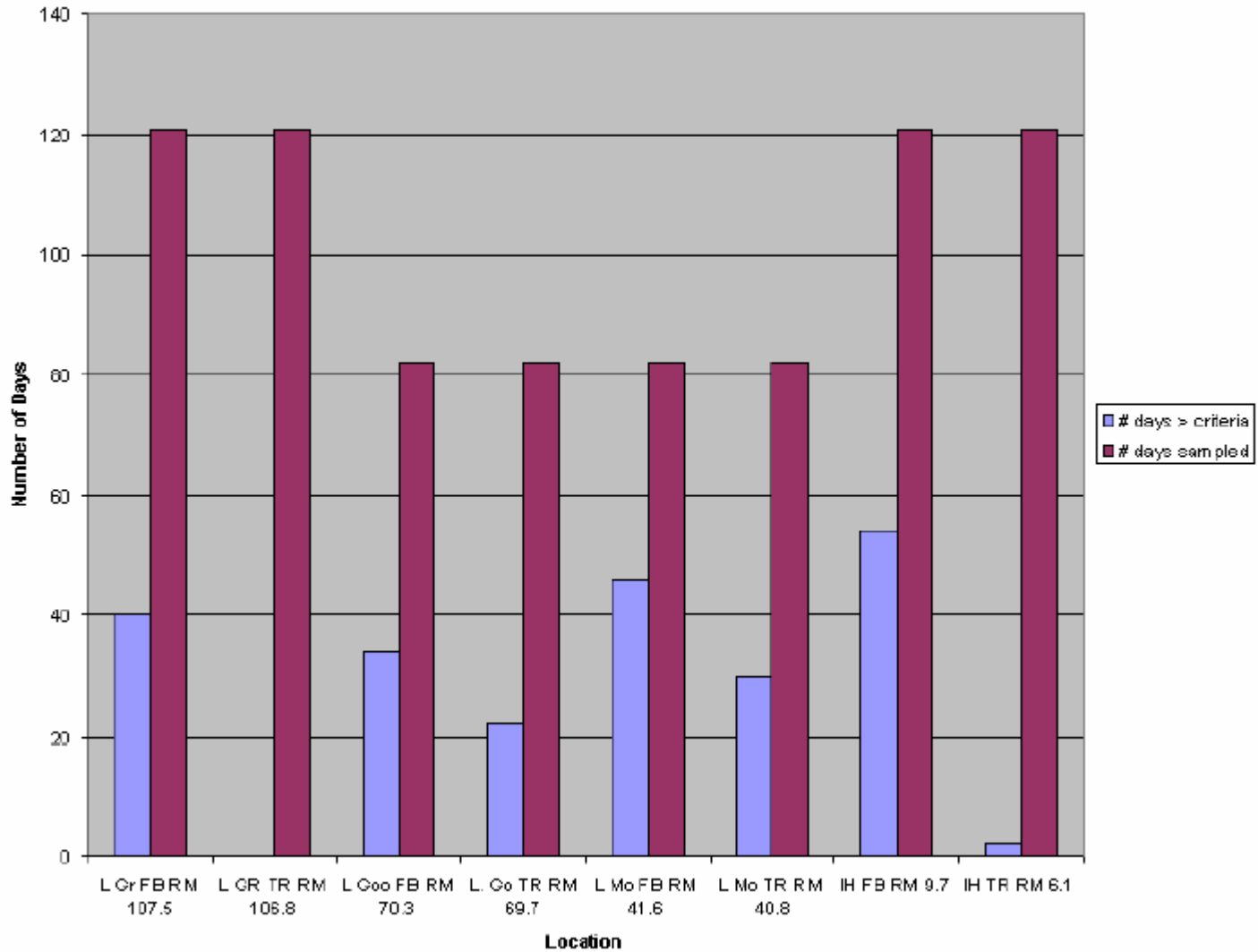
Exhibit 4-5.4
Map of USACE Dissolved Gas Monitoring Network



Source: USACE, 2004. USACE Northwestern Division – Water Quality Program webpage.

Exhibit 4-5.5

Water Temperature Exceedences in the Snake River in 2000 from July through October



Source: Preliminary Draft Columbia/Snake Mainstem Temperature TMDL, Appendix A – Problem Assessment for the Columbia/Snake River Temperature TMDL, Figure 3-10 (EPA 2001).

Exhibit 4-5.6

**Fecal Coliform Monitoring in Snake River at Interstate Bridge
Ecology 35A150: 1990 to 2003**

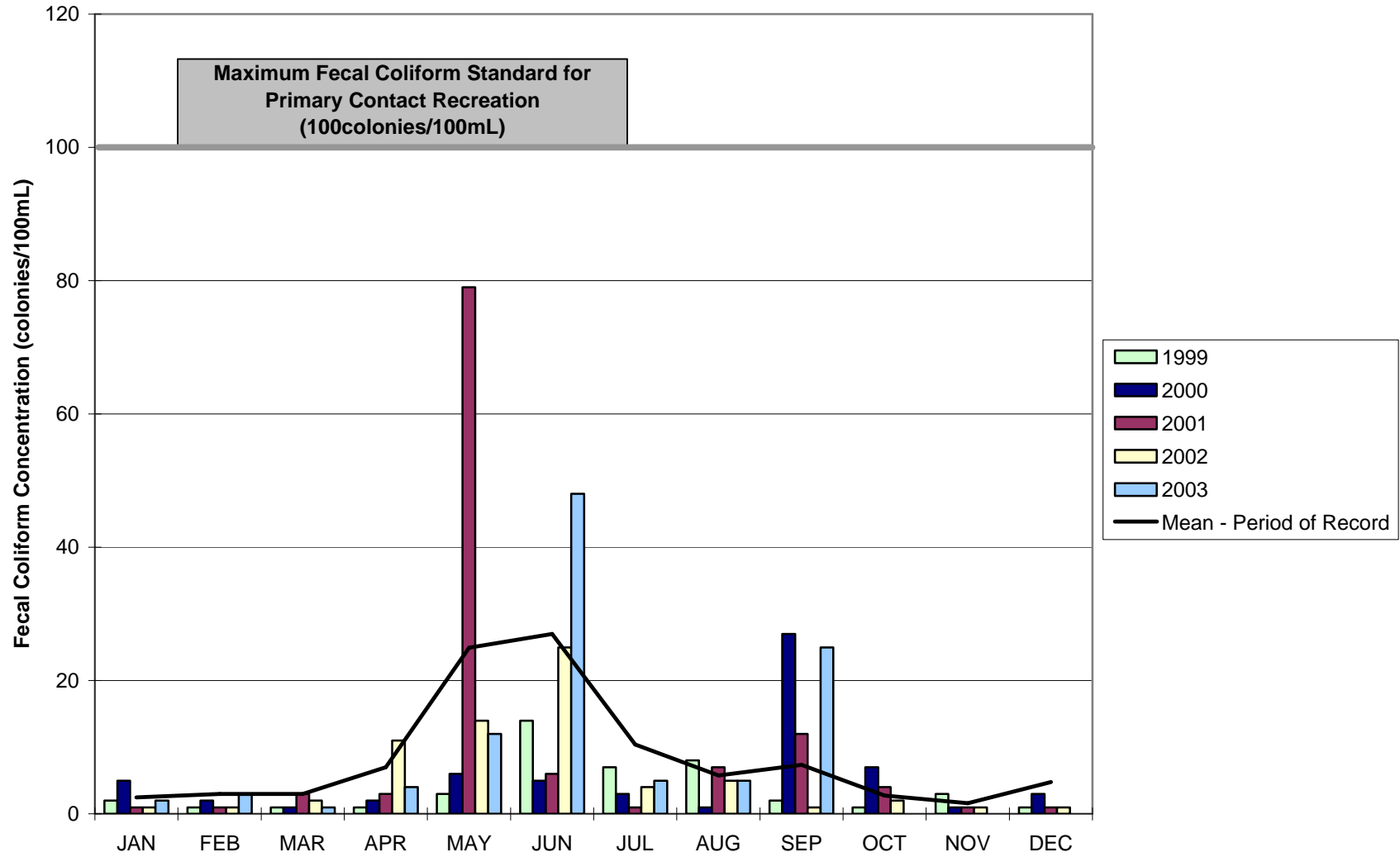


Exhibit 4-5.7

**pH Monitoring in Snake River at Interstate Bridge
Ecology 35A150: 1961 to 1969; and 1990 to 2003**

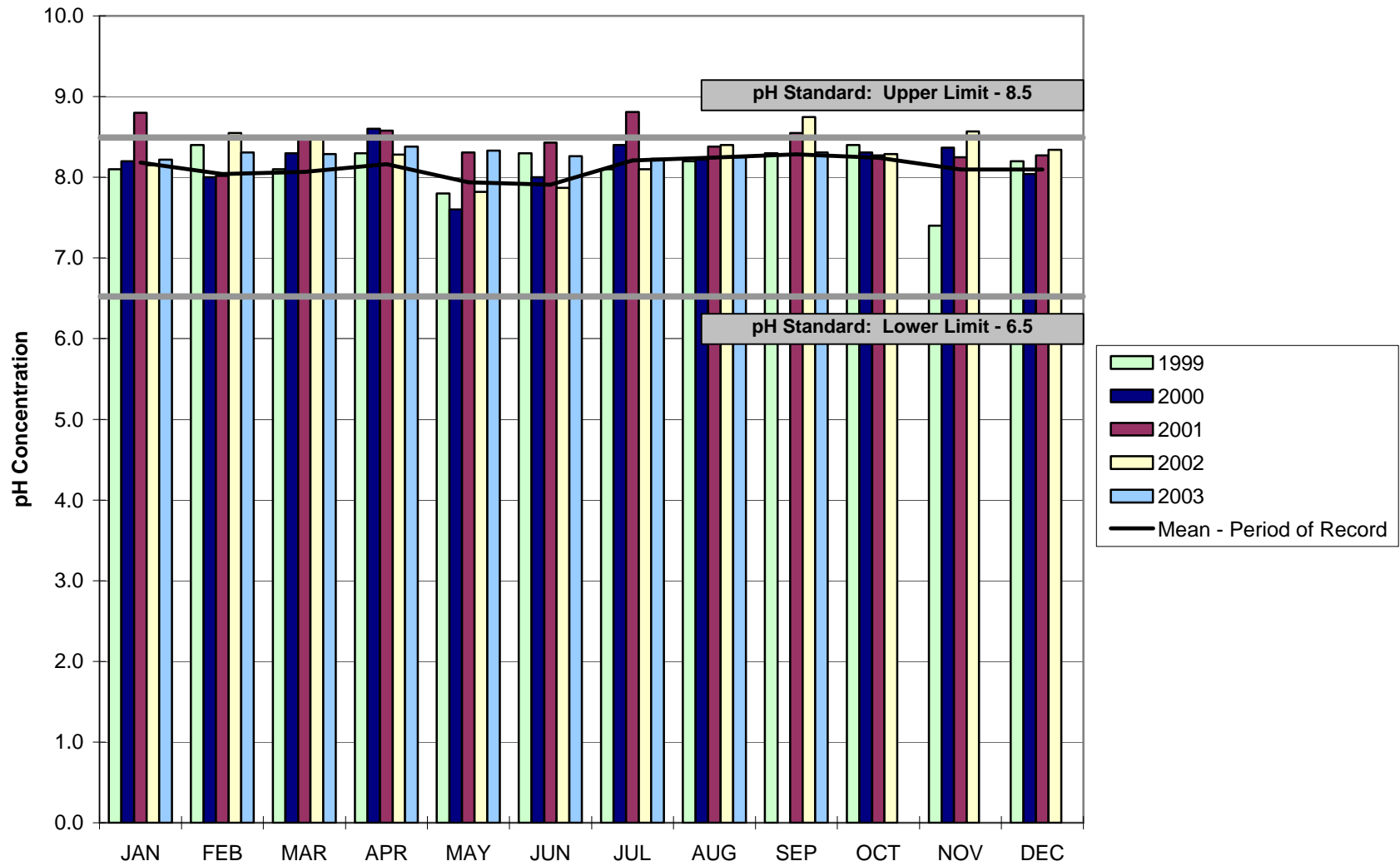


Exhibit 4-5.8

**Dissolved Oxygen Monitoring in Snake River at Interstate Bridge
Ecology 35A150: 1961 to 1969; 1990 to 2003**

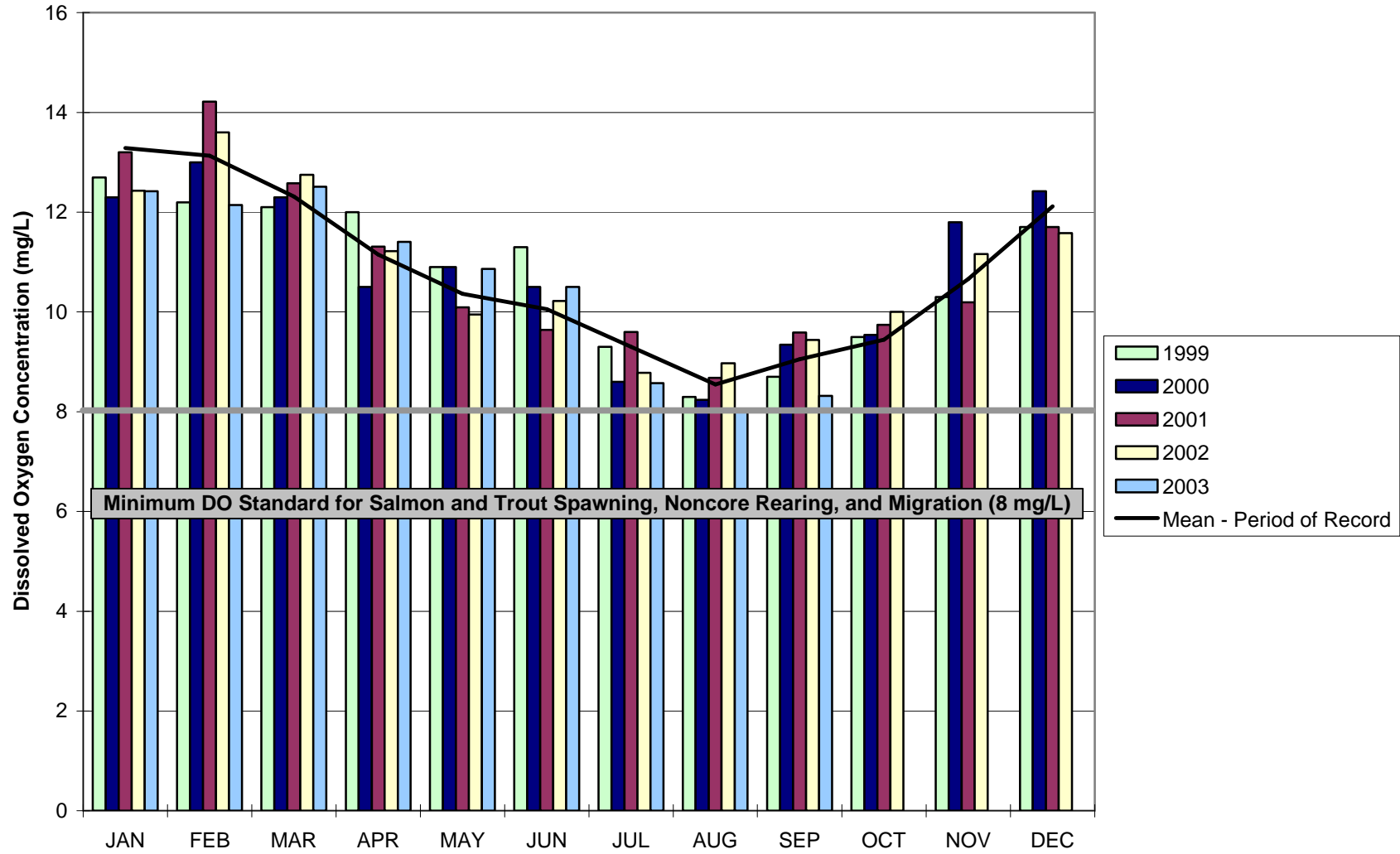


Exhibit 4-5.9

Mean Total Dissolved Gas Monitoring in Snake River from 2000 to 2003

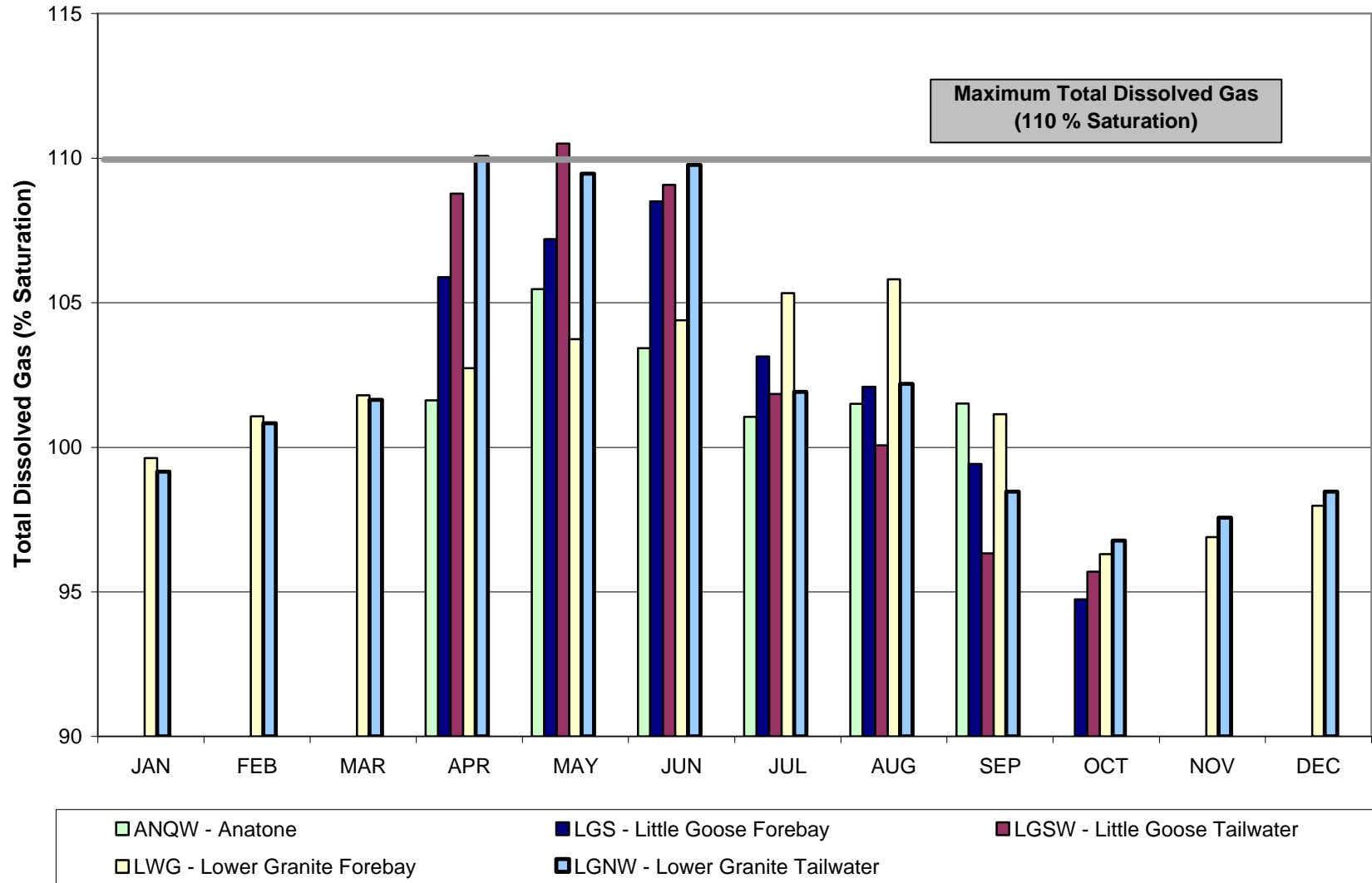


Exhibit 4-5.10

**Total Dissolved Gas Exceedences in the Snake River
between Anatone, WA and Lower Granite Dam
April - September 2000 to 2003**

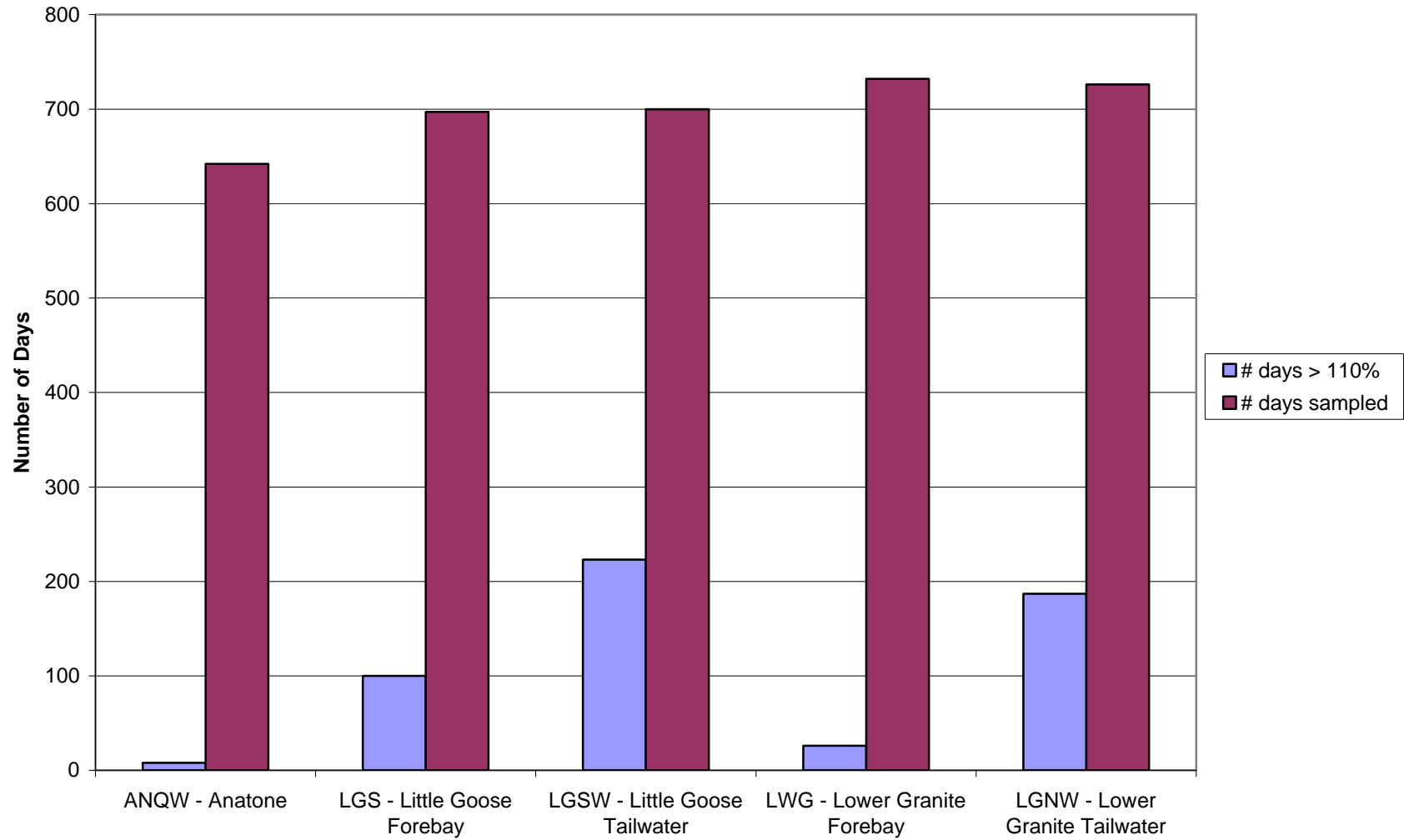


Exhibit 4-5.11

**Mean Monthly Turbidity Monitoring in the Snake River at Interstate Bridge
Ecology 35A150: 1990 to 2003**

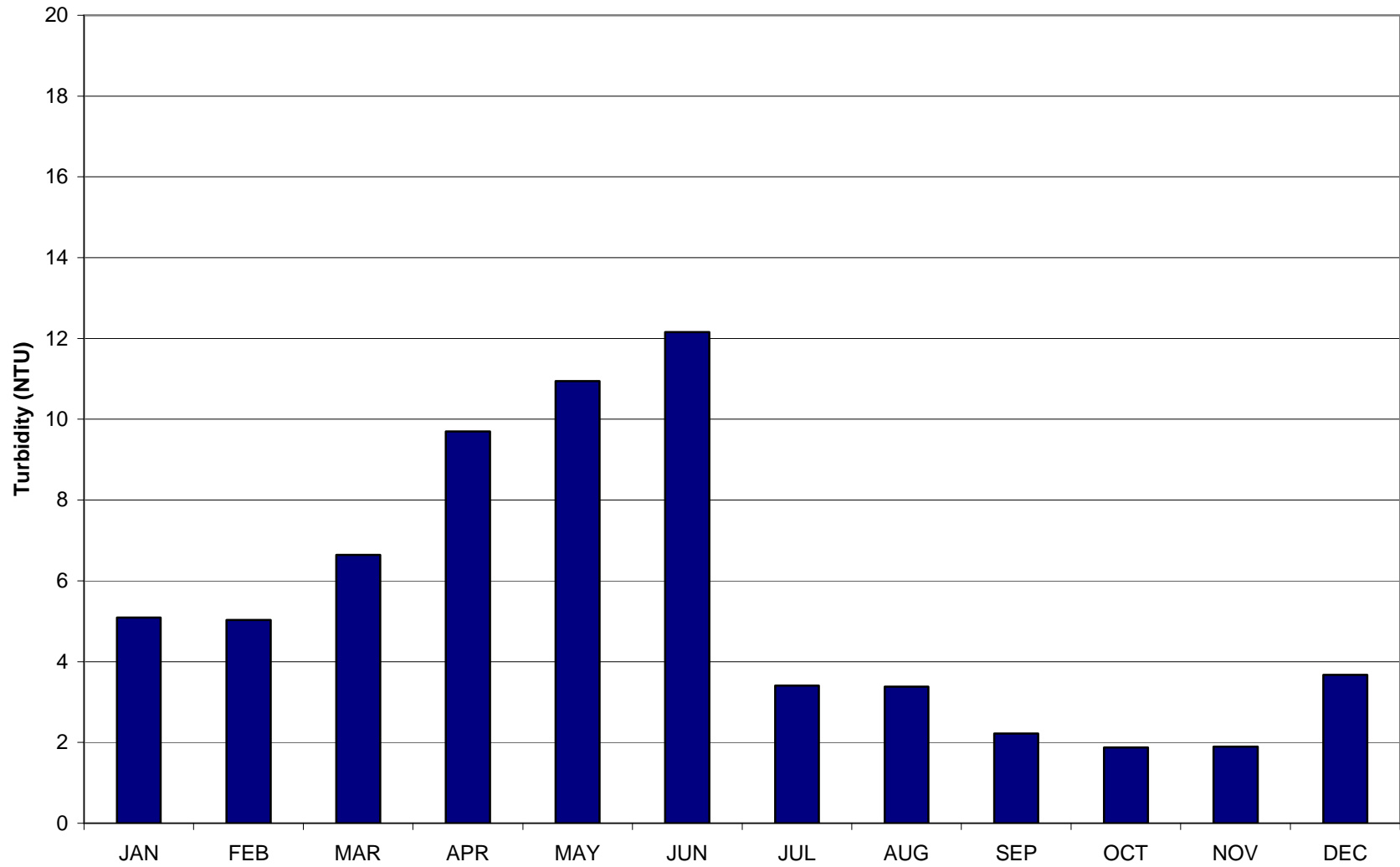


Exhibit 4-5.12

**Mean Monthly Total Suspended Solids Monitoring in Snake River at Interstate Bridge
Ecology 35A150: 1990 to 2003**

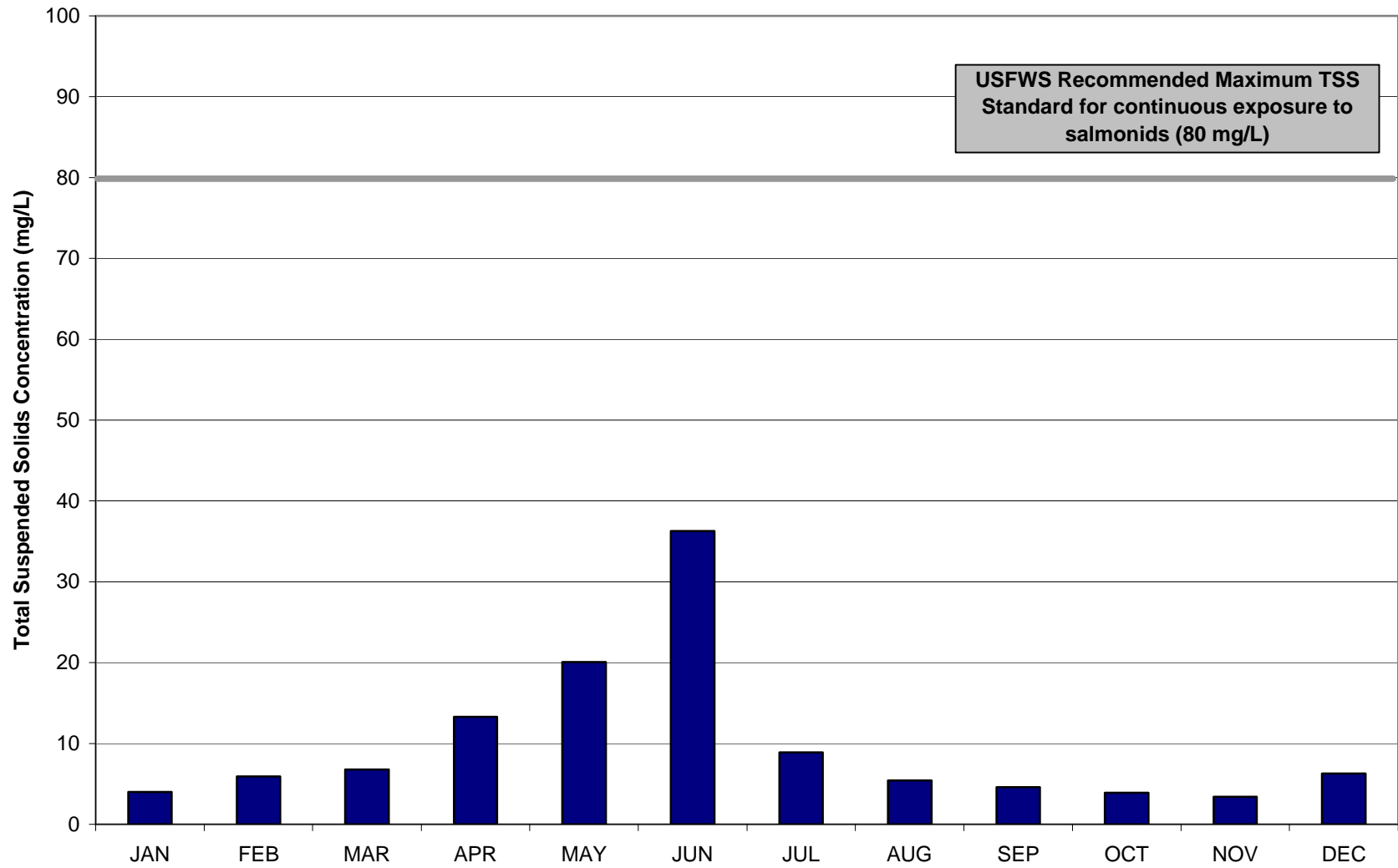


Exhibit 4-5.13

**Mean Monthly Temperature Monitoring in Alpowa Creek
WSU Alpowa 2 and 4: 2002
WSU Alpowa 1, 2a and 3: 2003**

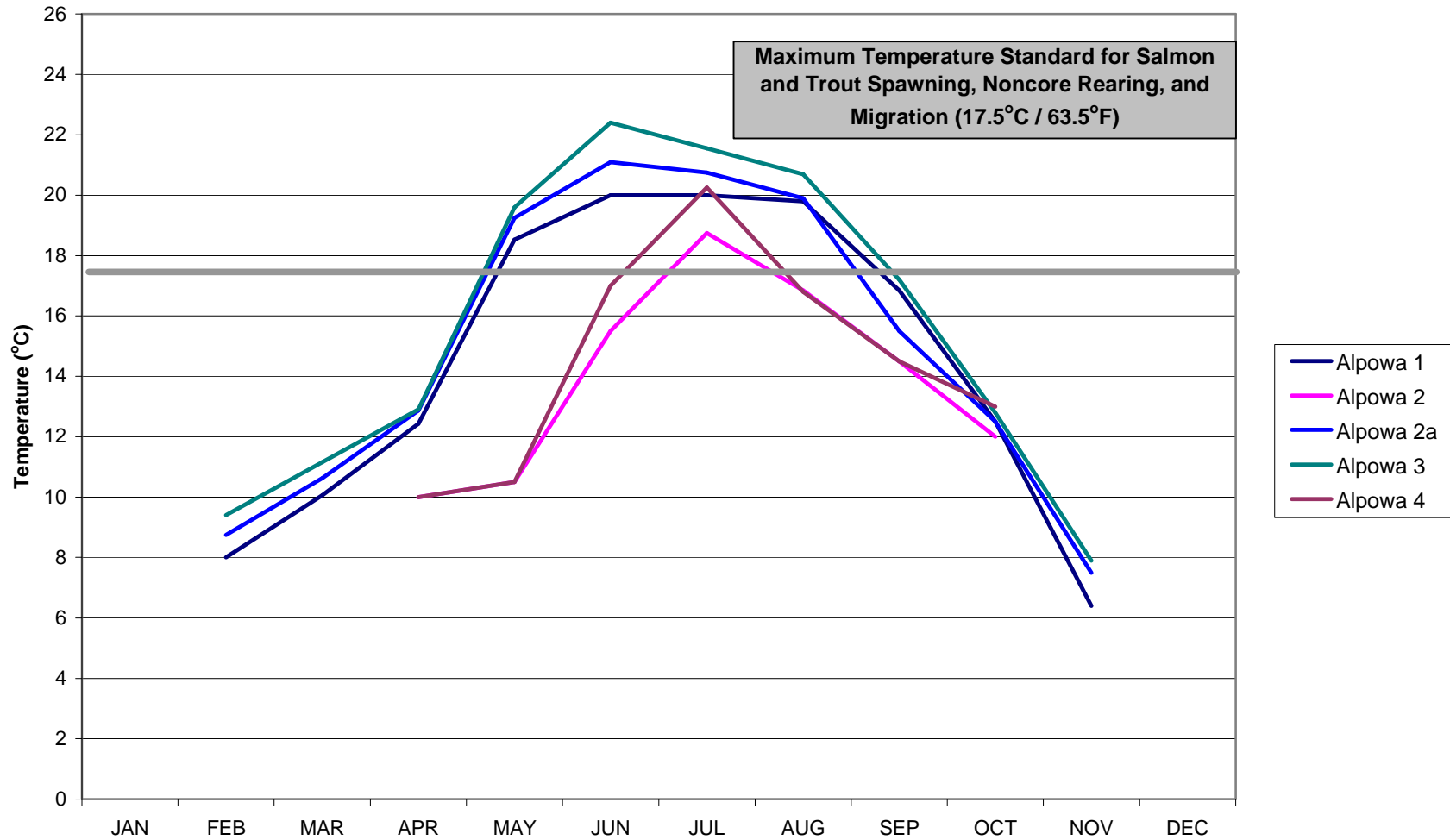


Exhibit 4-5.14

**Mean Monthly Fecal Coliform Monitoring in Alpowa Creek
WSU Alpowa 2 and 4: 2002
WSU Alpowa 1, 2a and 3: 2003**

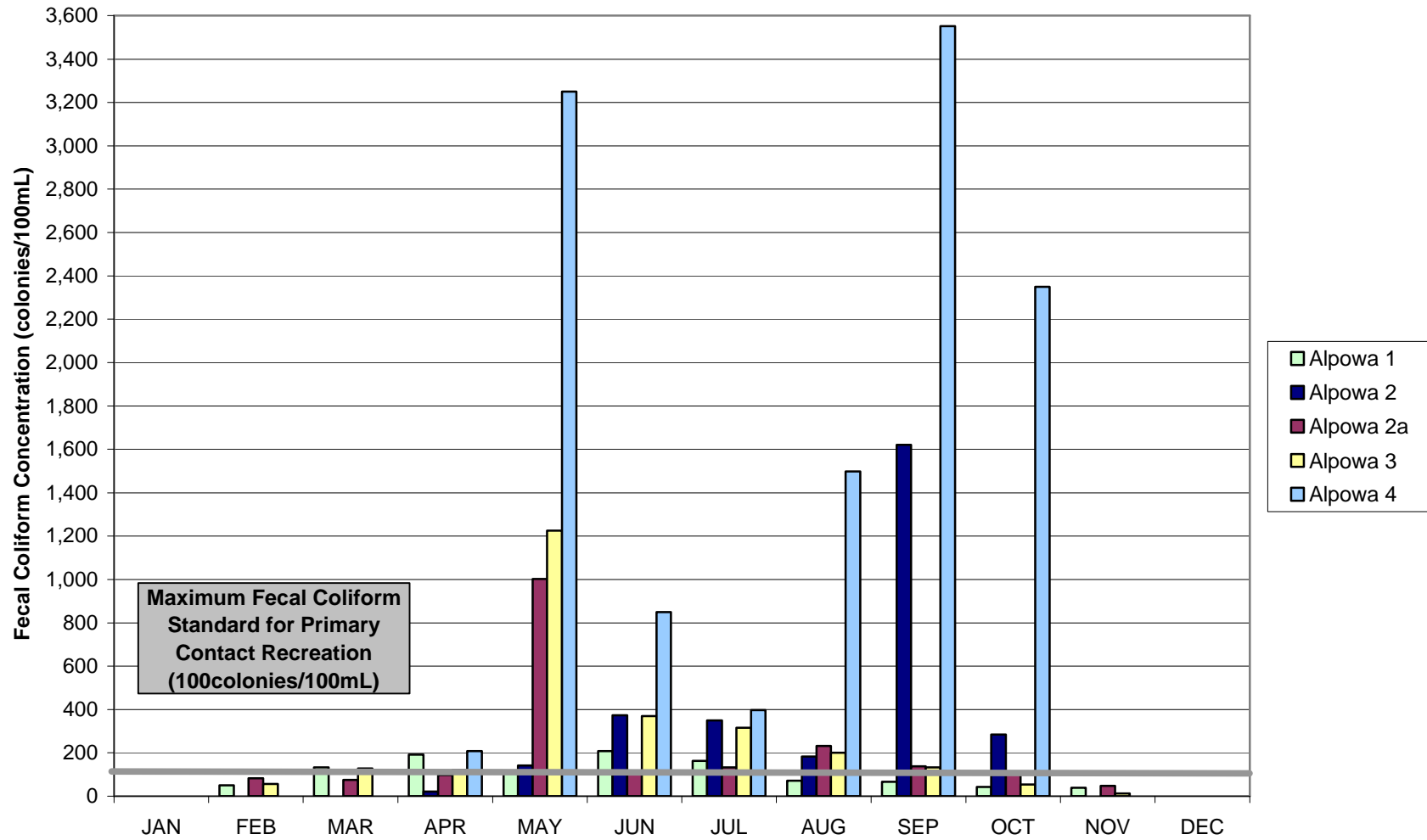


Exhibit 4-5.15

**Mean pH Monitoring in Alpowa Creek
WSU Alpowa 1, 2a and 3: 2003**

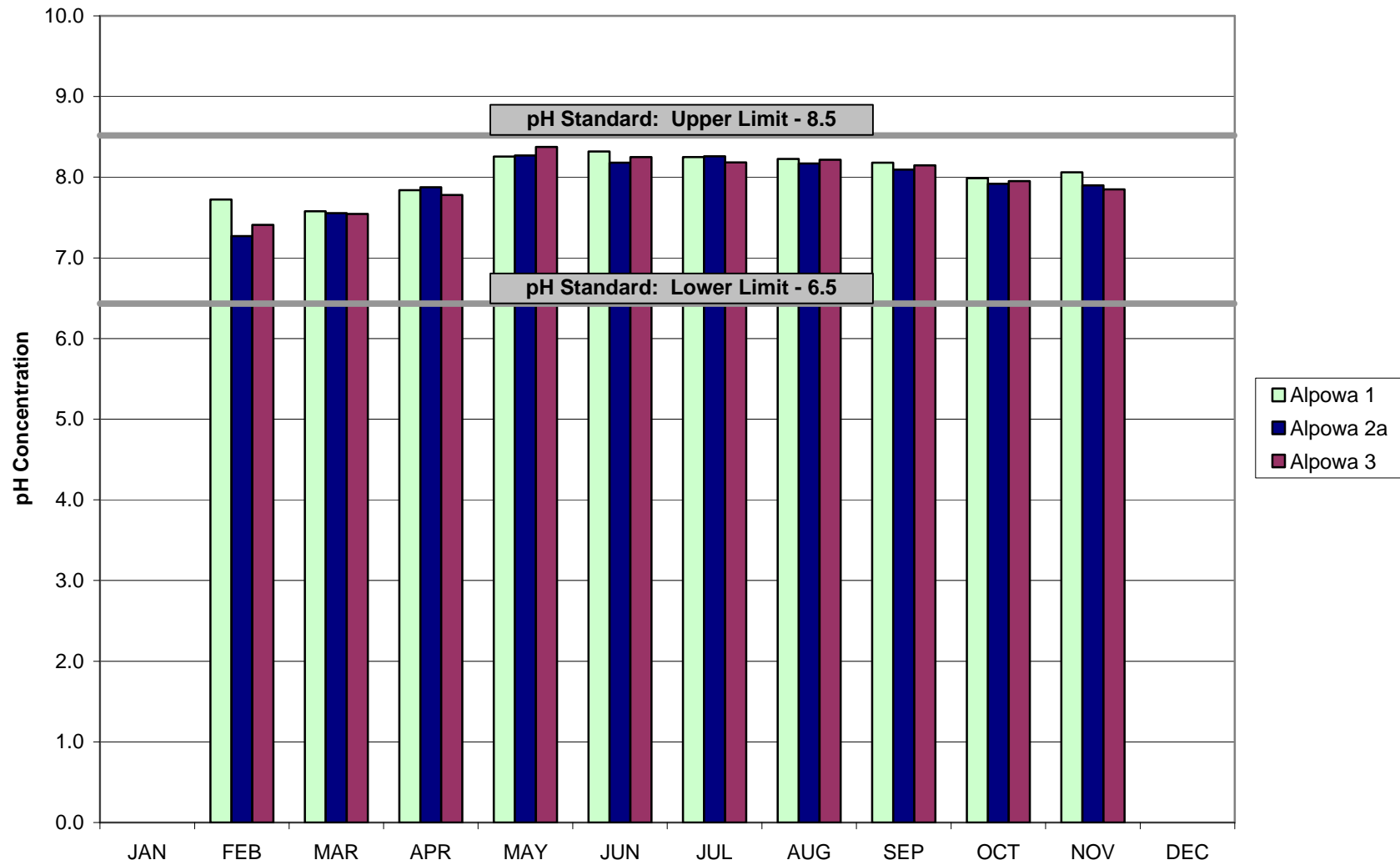


Exhibit 4-5.16

**Mean Dissolved Oxygen Monitoring in Alpowa Creek
WSU Alpowa 1, 2a and 3: 2003**

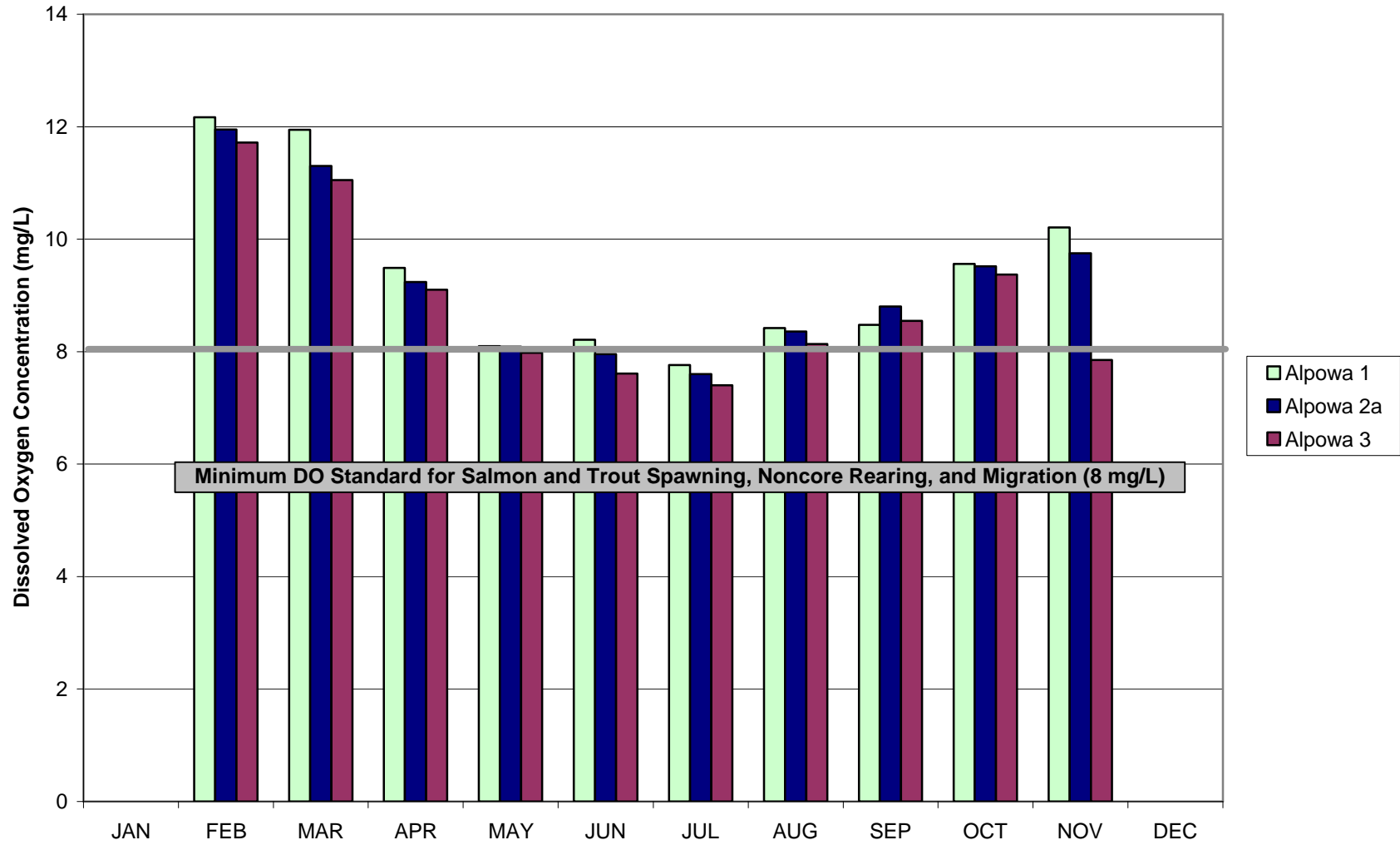


Exhibit 4-5.17

**Mean Total Suspended Solid Monitoring in Alpowa Creek
WSU Alpowa 2 and 4: 2002
WSU Alpowa 1, 2a and 3: 2003**

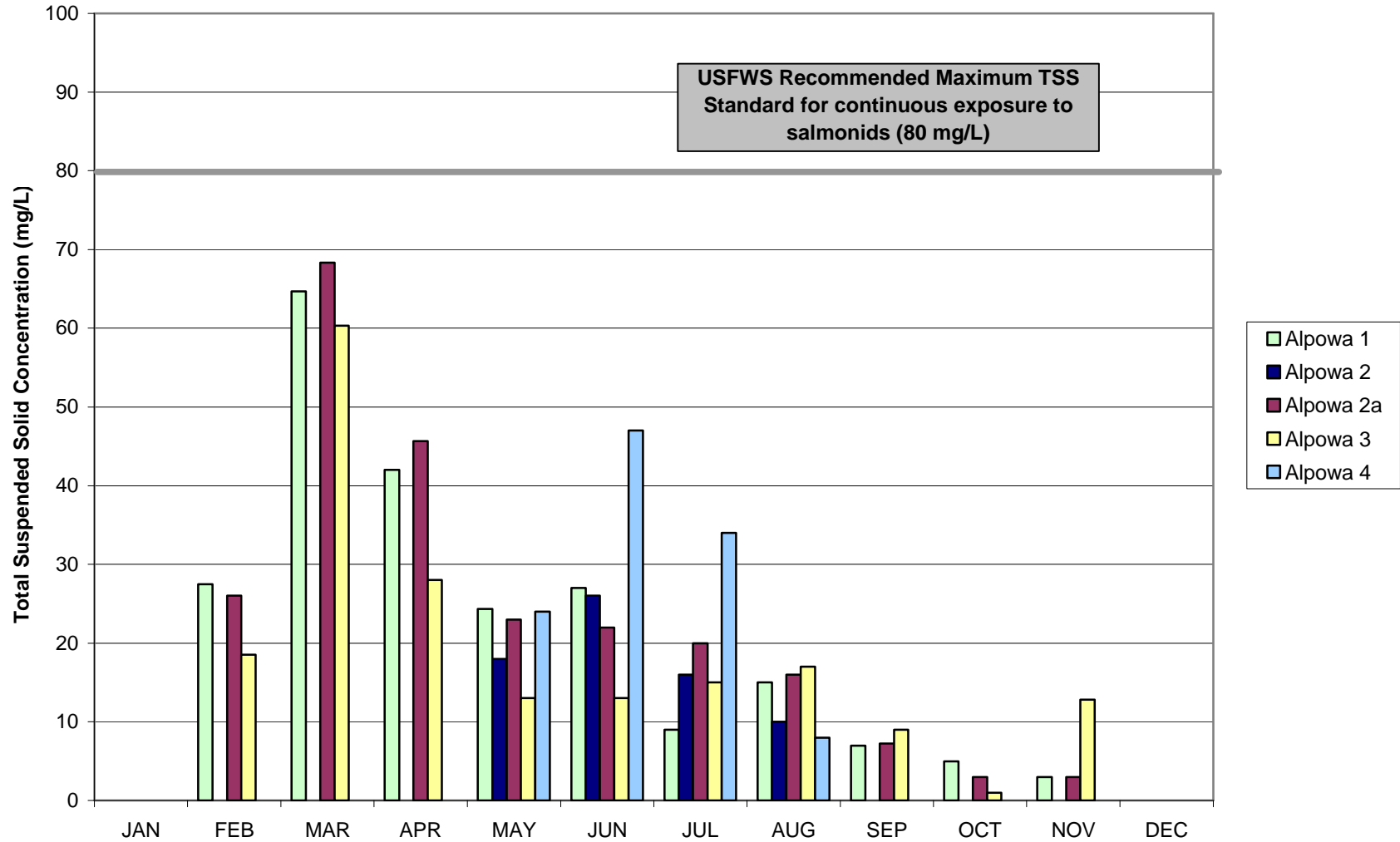
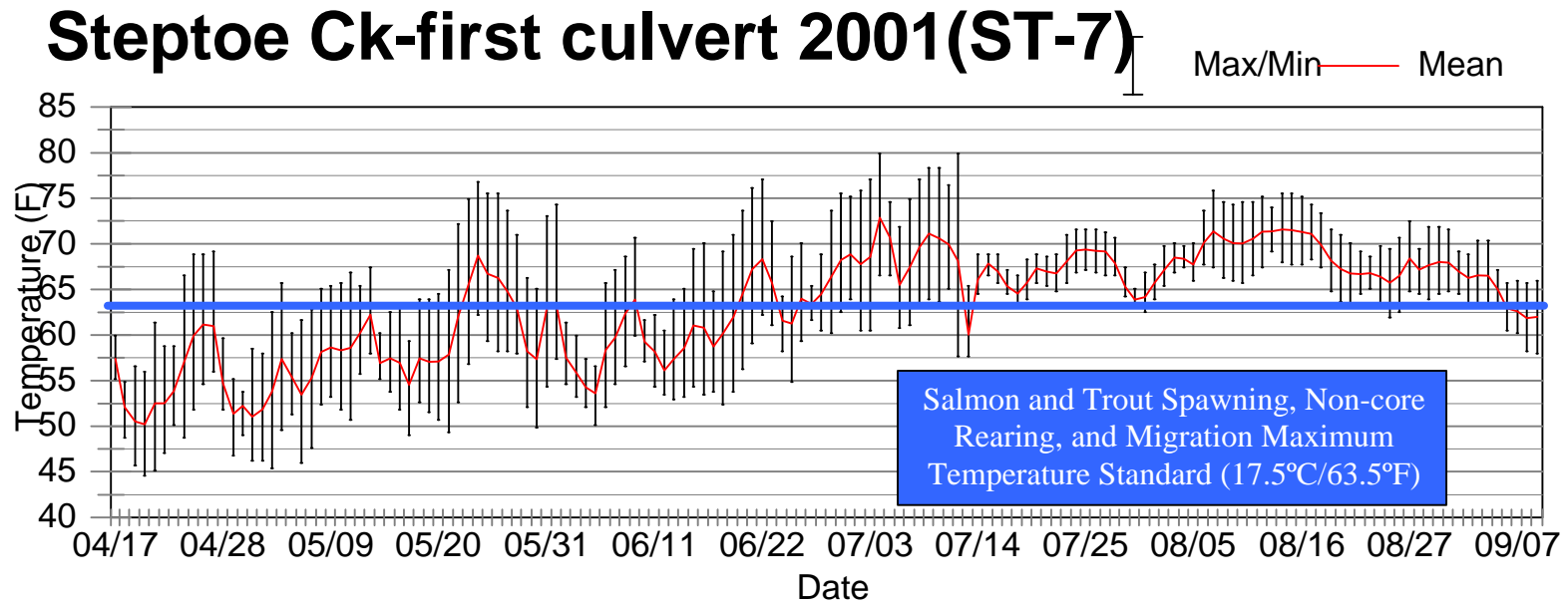


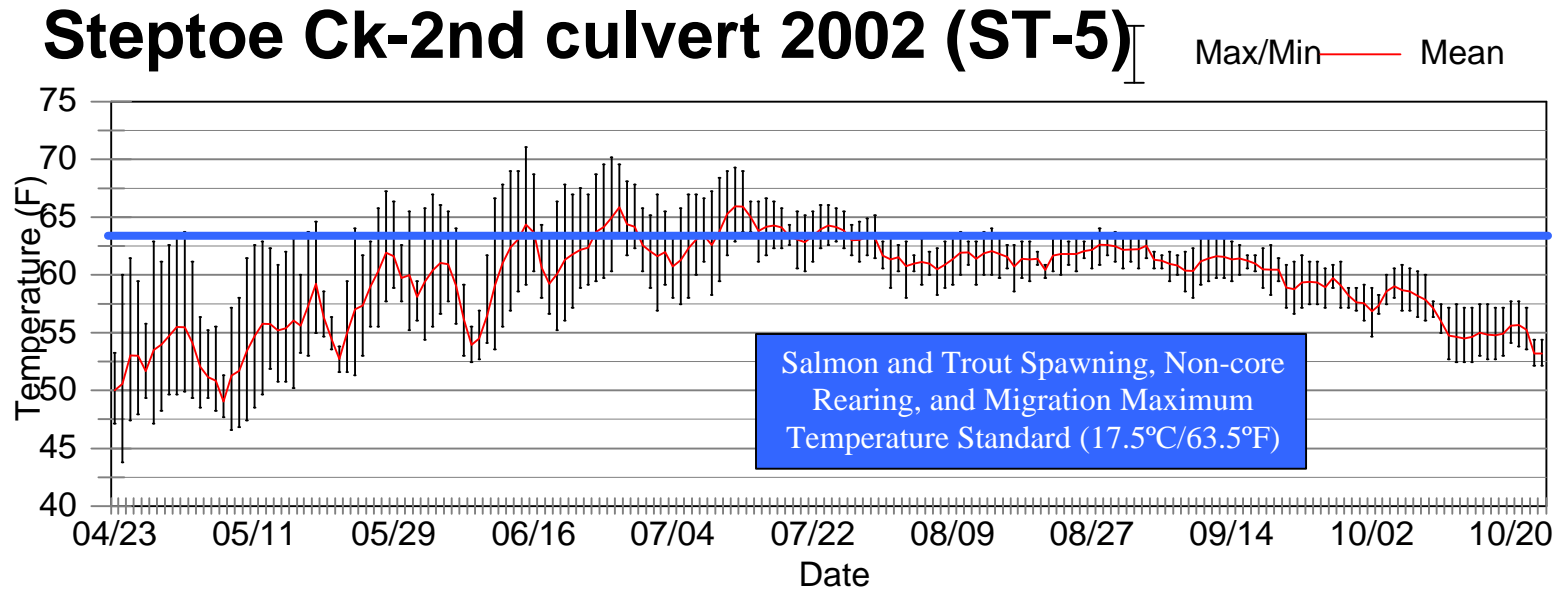
Exhibit 4-5.18

**2001 Water Temperature Monitoring in Steptoe Canyon at the first culvert near the mouth
WDFW Monitoring Station**



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.19
2002 Water Temperature Monitoring in Steptoe Canyon below the second culvert
WDFW Monitoring Station



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.20

**Mean Temperature Monitoring in Wawawai Canyon near the mouth
EPA 540049: 1958 to 1968, and 1971**

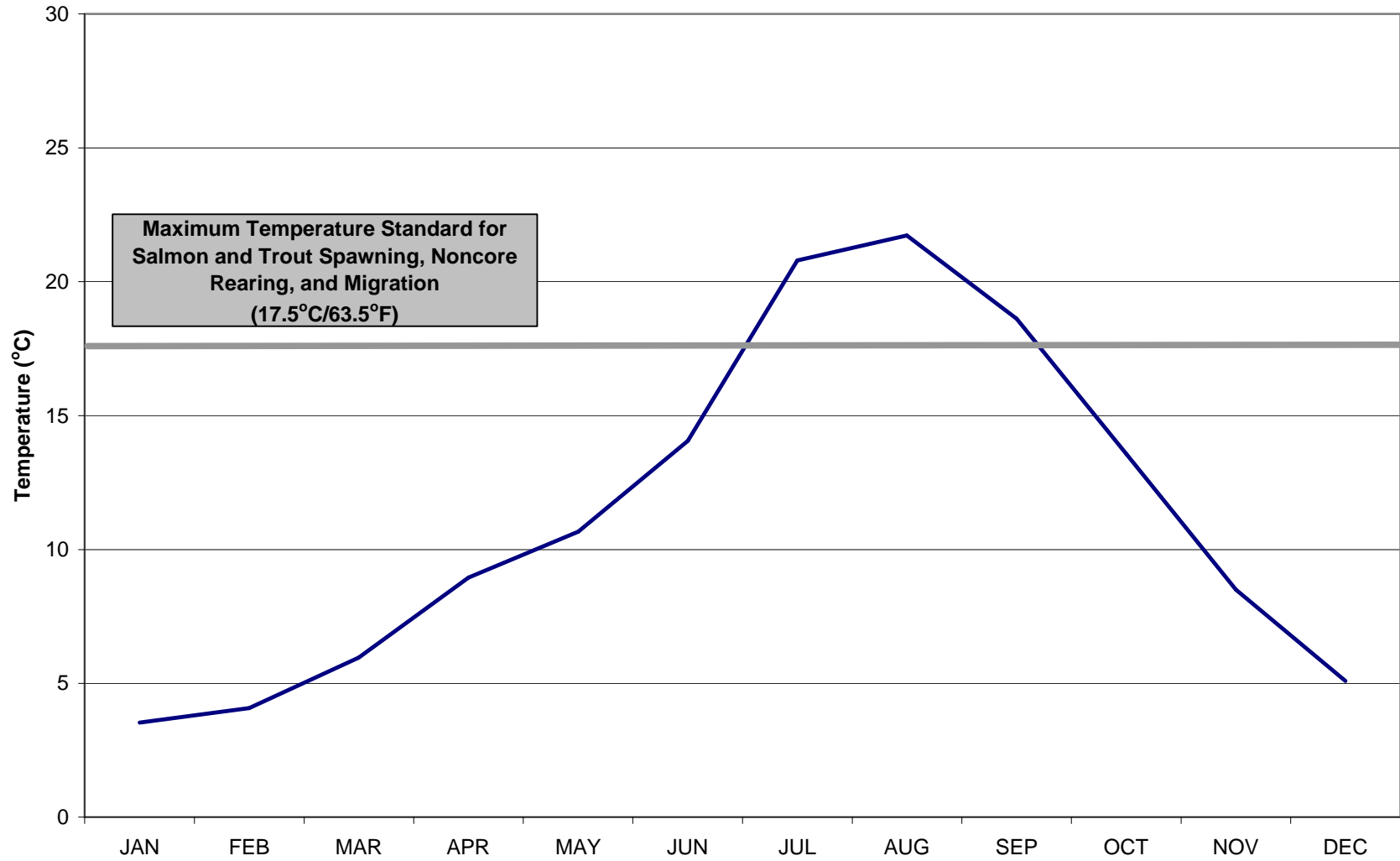
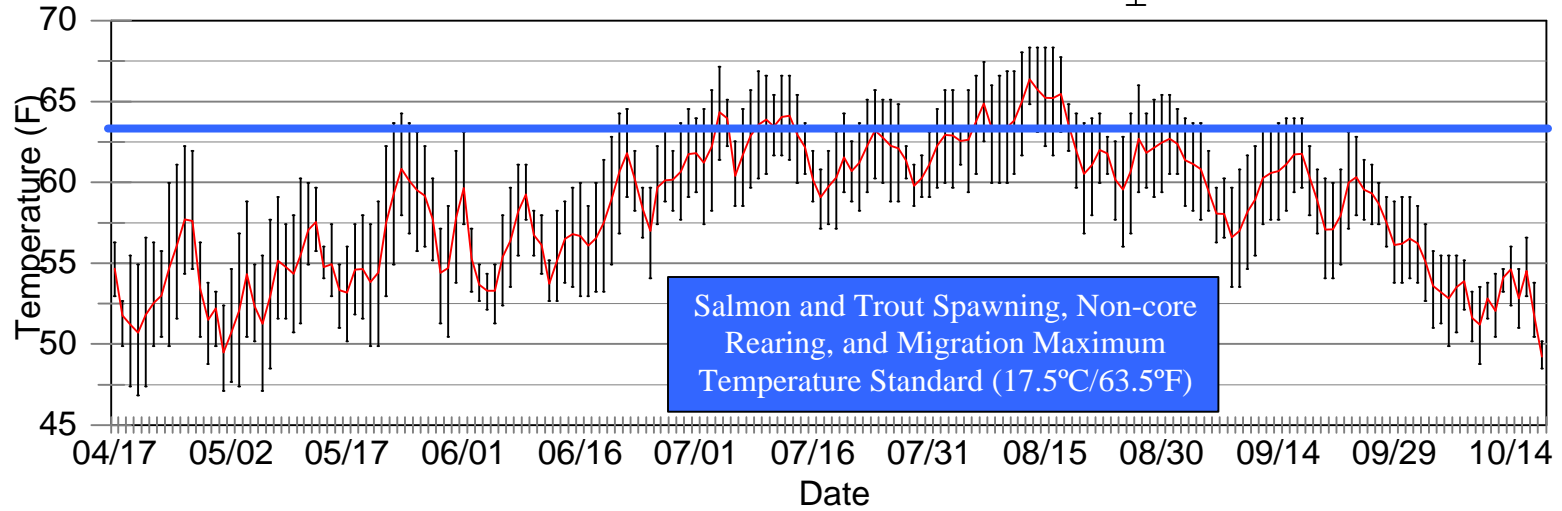


Exhibit 4-5.21

**2001 Water Temperature Monitoring in Wawawai Canyon at the first culvert near the mouth
WDFW Monitoring Station**

Wawawai Ck-first culvert 2001 (WA-6) Max/Min — Mean

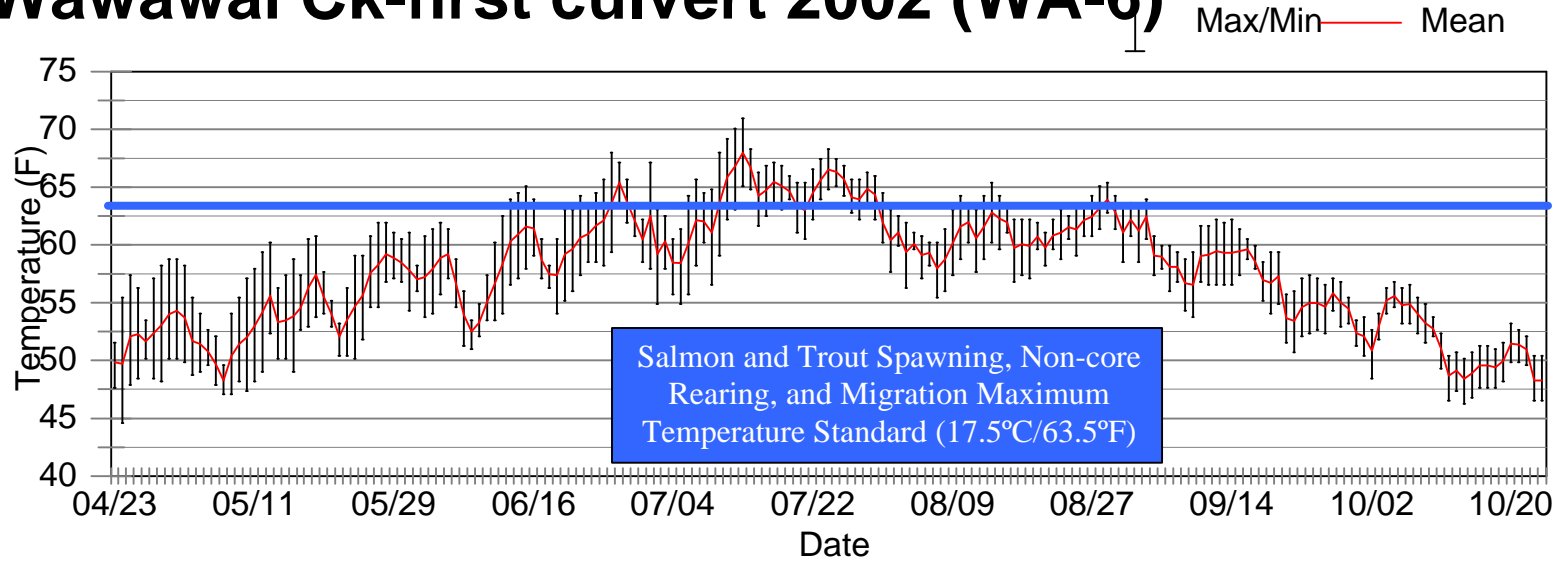


Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.22

**2002 Water Temperature Monitoring in Wawawai Canyon at the first culvert near the mouth
WDFW Monitoring Station**

Wawawai Ck-first culvert 2002 (WA-6)



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.23

**Mean pH Monitoring in Wawawai Canyon near the mouth
EPA 540049: 1958 to 1968, and 1971**

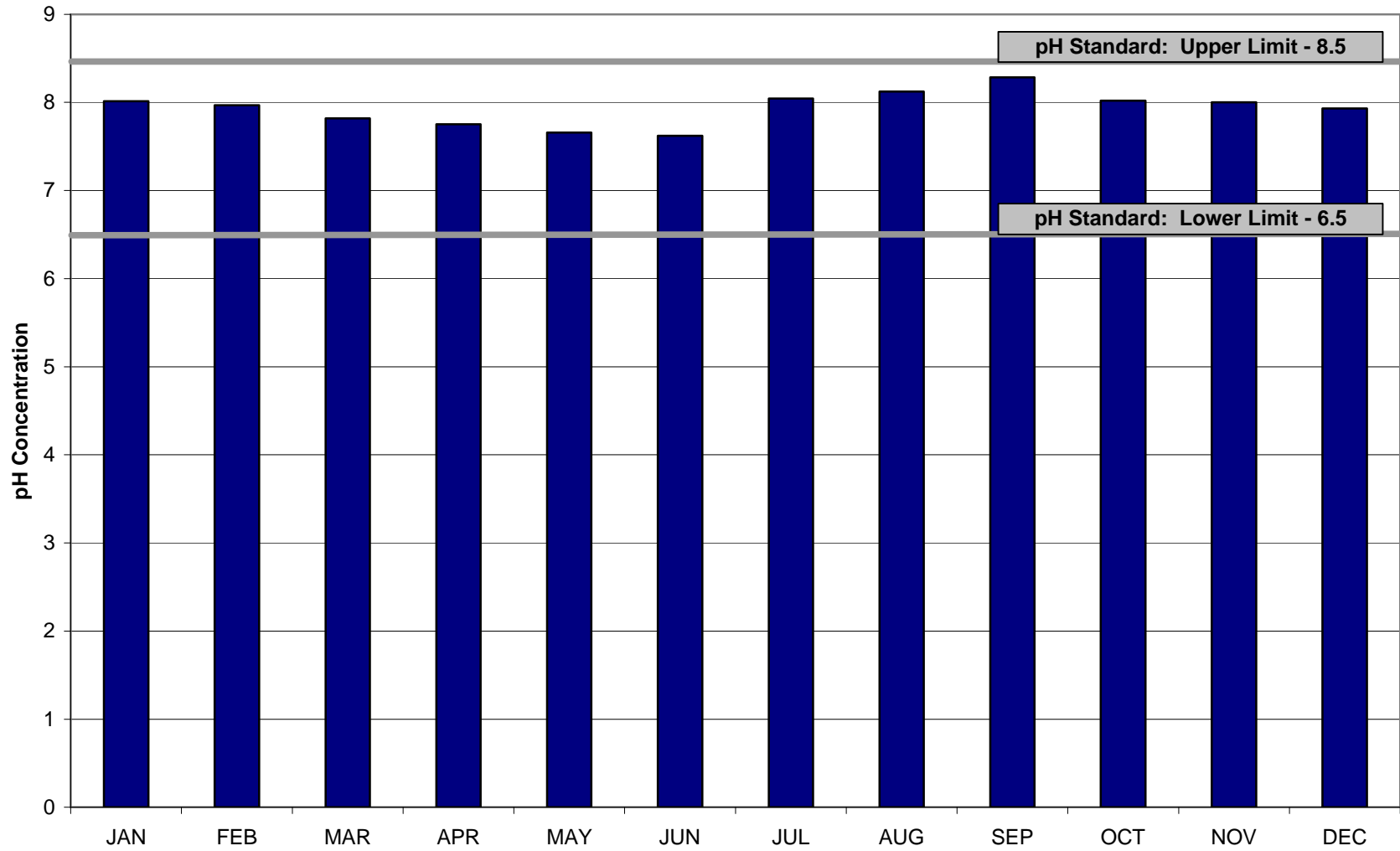


Exhibit 4-5.24

**Mean Dissolved Oxygen Monitoring in Wawawai Canyon near the mouth
EPA 540049: 1958 to 1968**

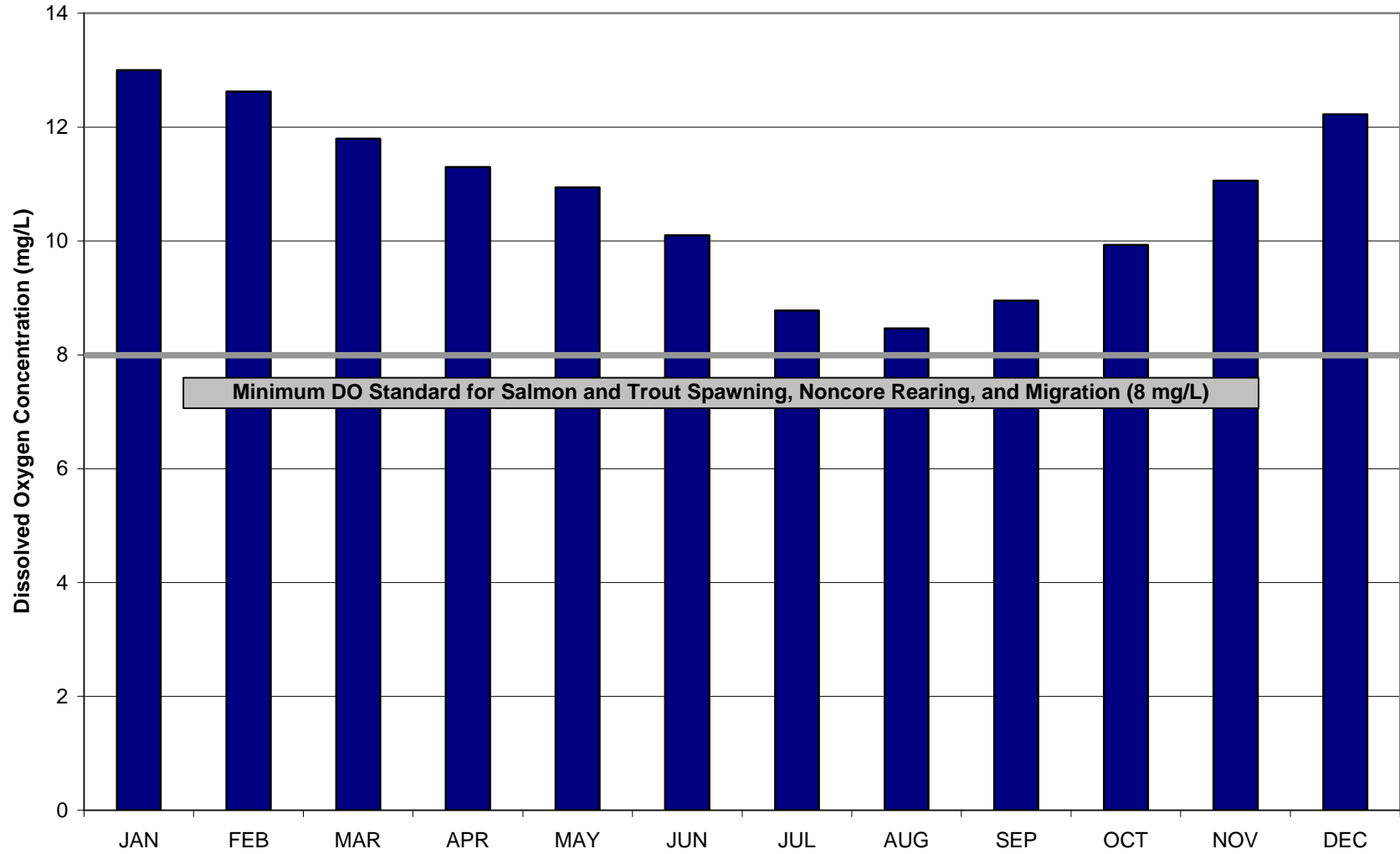
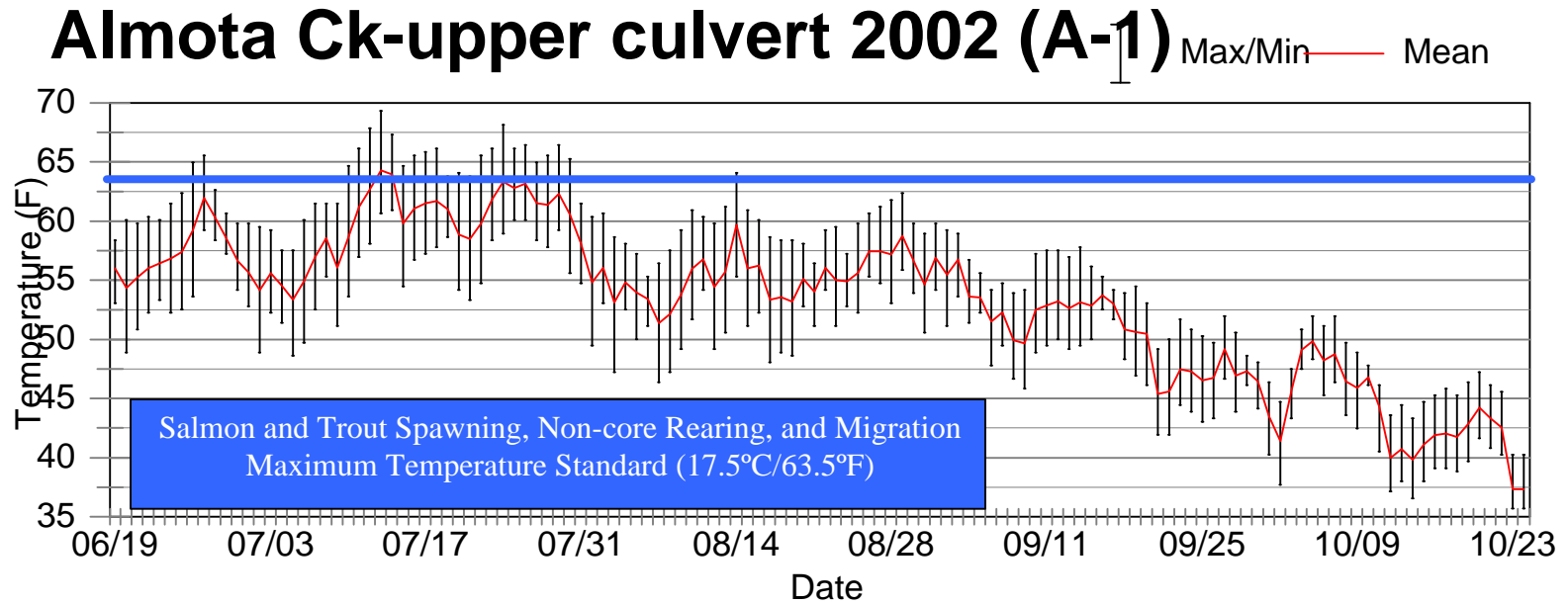


Exhibit 4-5.25

**2002 Water Temperature Monitoring in Almota Creek at the upper culvert on LaFollette Road
WDFW Monitoring Station**



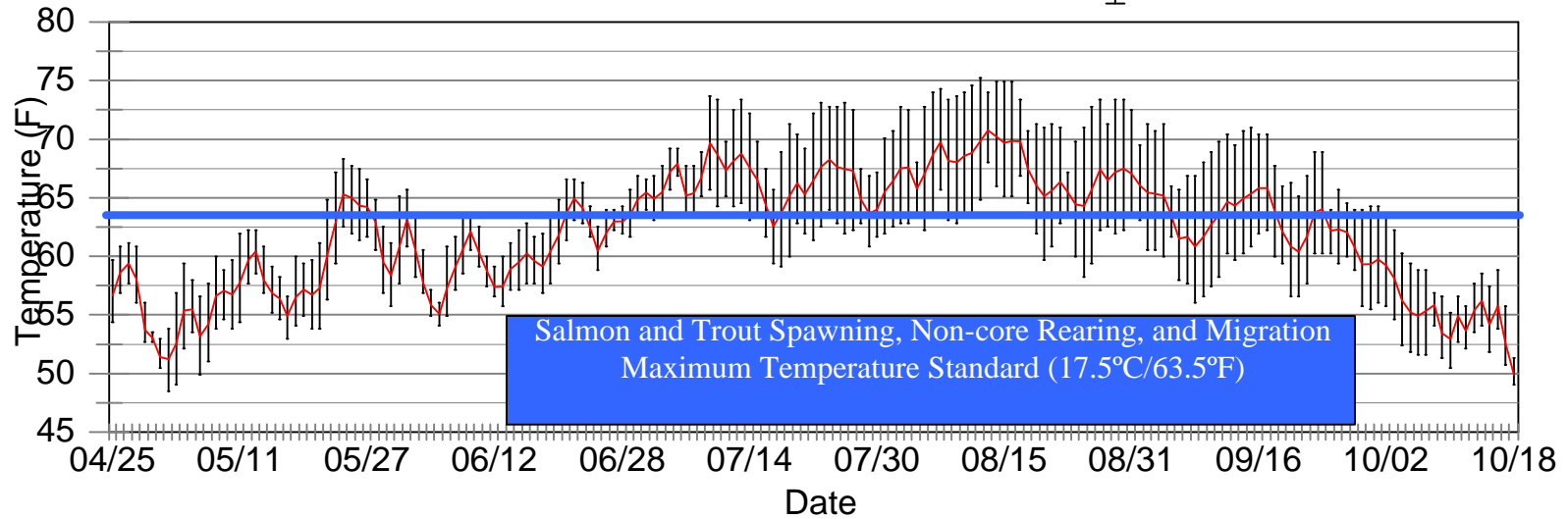
Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.26

**2001 Water Temperature Monitoring in Almota Creek above the culvert on Almota Road
WDFW Monitoring Station**

Almota Ck-above culvert 2001 (A-13)

Max/Min _____ Mean

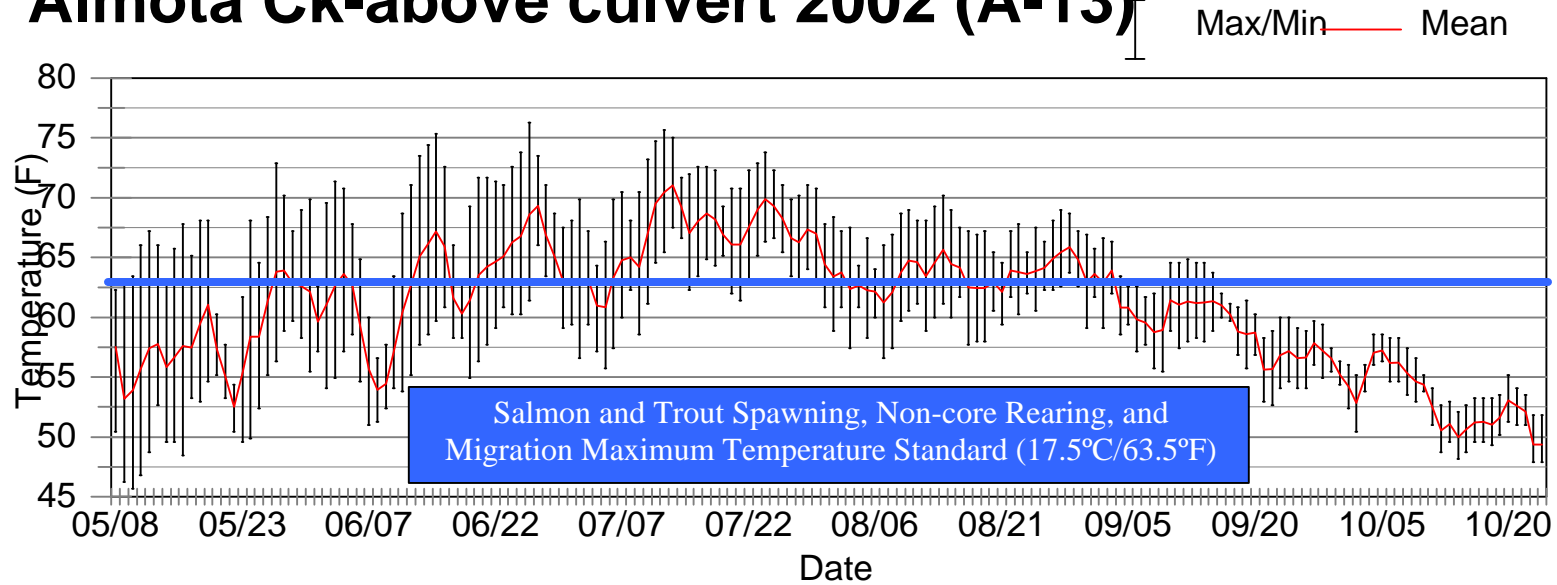


Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.27

**2002 Water Temperature Monitoring in Almota Creek above the culvert on Almota Road
WDFW Monitoring Station**

Almota Ck-above culvert 2002 (A-13)

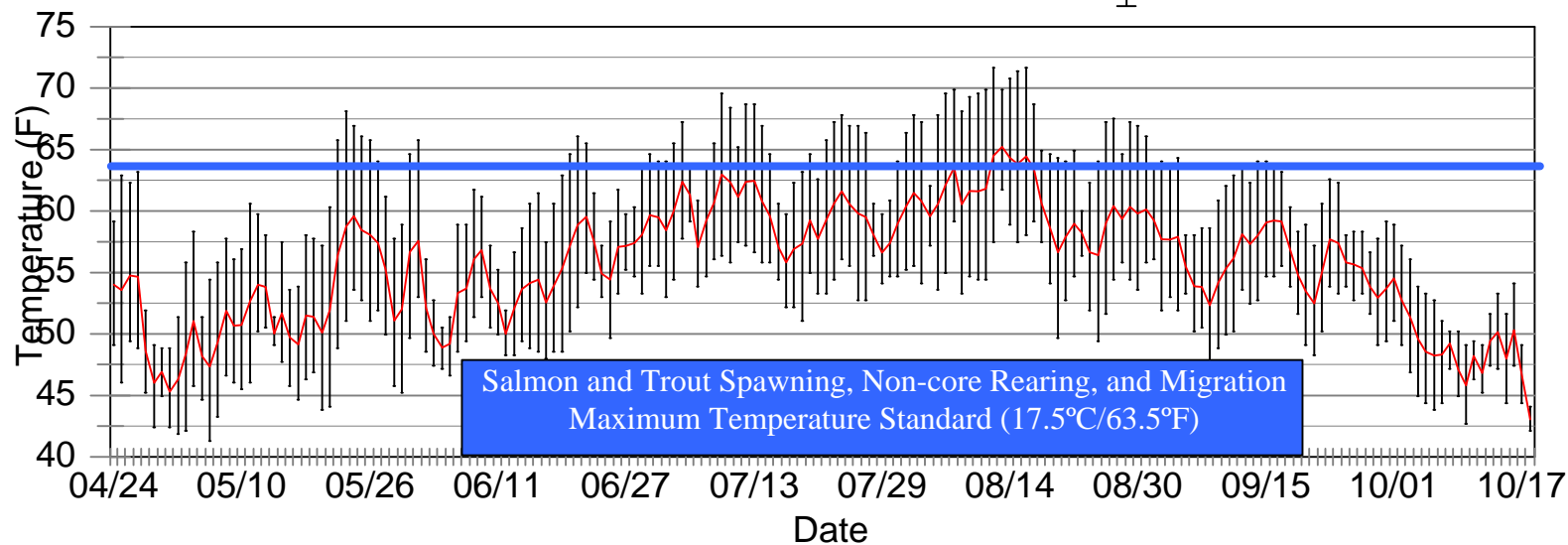


Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.28

**2001 Water Temperature Monitoring in Little Almota Creek at the culvert at Benedict Road
WDFW Monitoring Station**

L. Almota Ck-Benedict Rd 2001 (LA-1) Max/Min — Mean



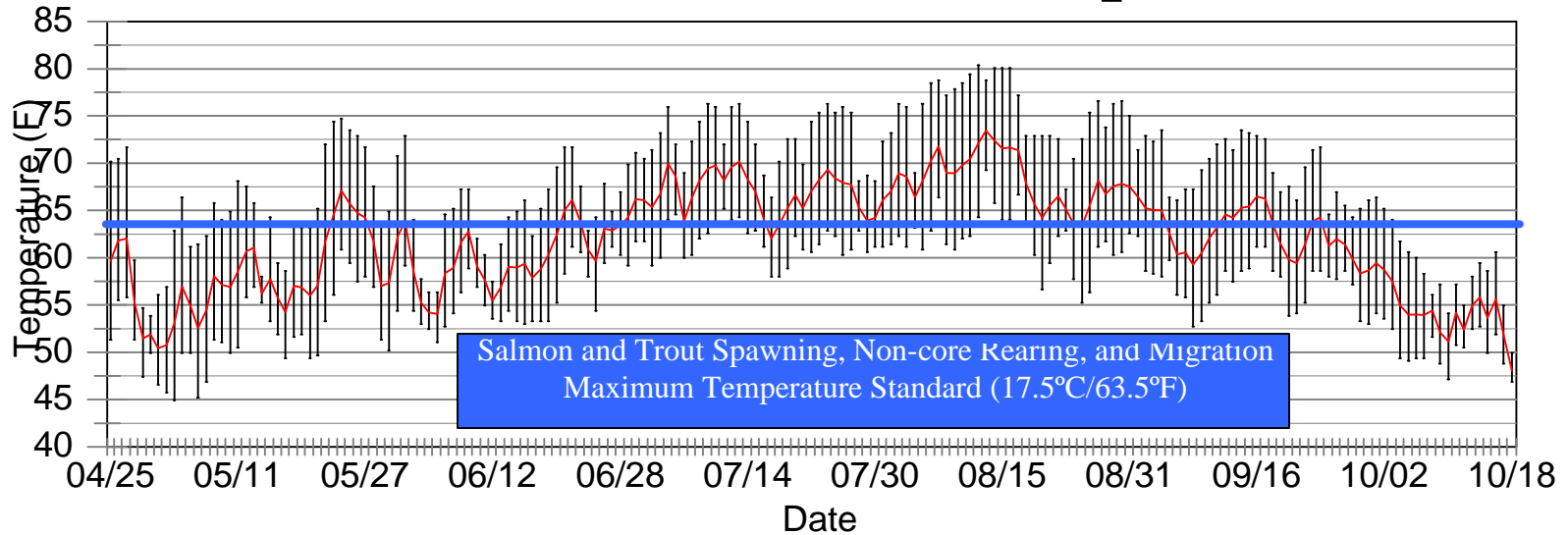
Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.29

**2001 Water Temperature Monitoring in Little Almota Creek above the first culvert near the mouth
WDFW Monitoring Station**

L. Almota Ck-lower culvert 2001 (LA-3)

Max/Min _____ Mean



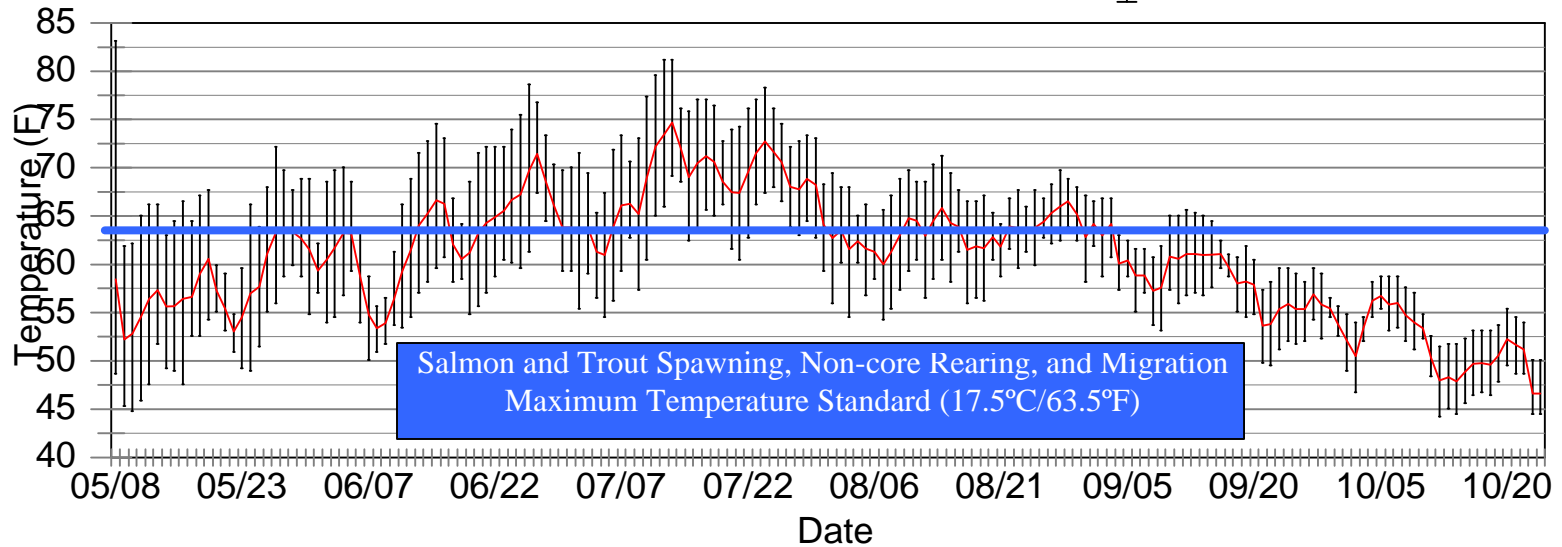
Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.30

**2002 Water Temperature Monitoring in Little Alмота Creek above the first culvert near the mouth
WDFW Monitoring Station**

L. Alмота Ck-lower culvert 2002 (LA-3)

Max/Min _____ Mean

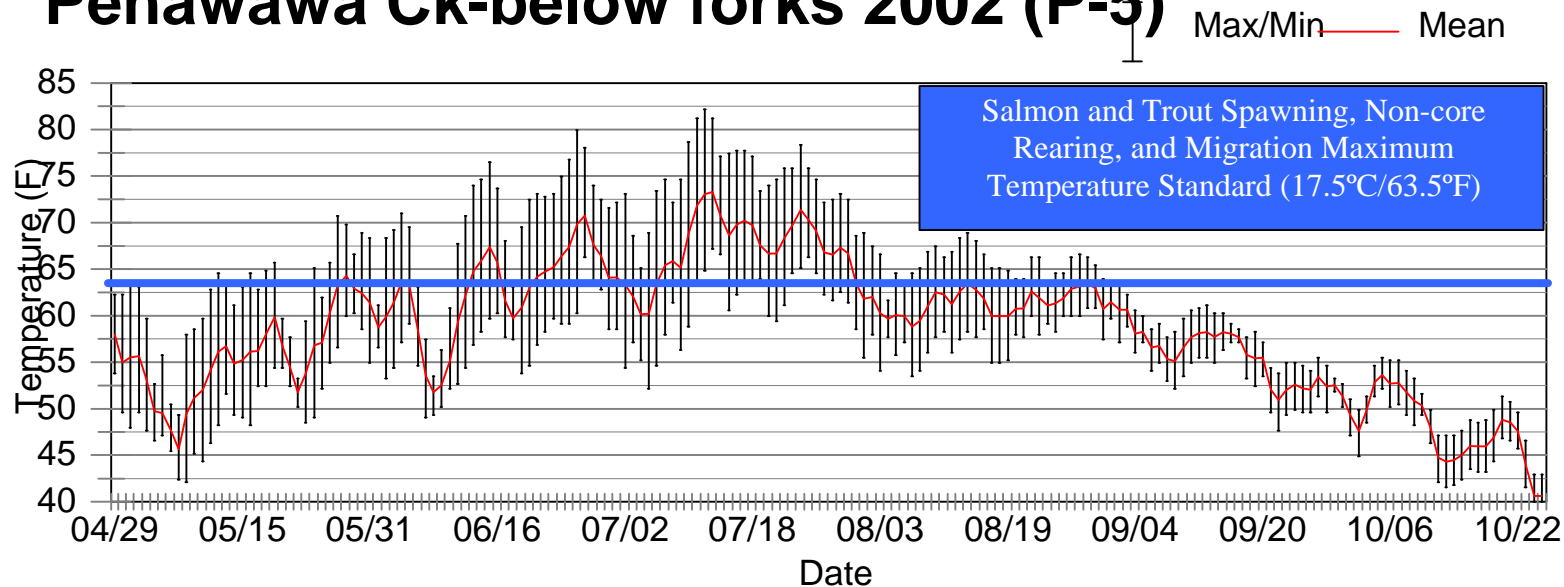


Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.31

**2002 Water Temperature Monitoring in Penawawa Creek below the forks at Getz-AE-Seaver Road Bridge
WDFW Monitoring Station**

Penawawa Ck-below forks 2002 (P-5)

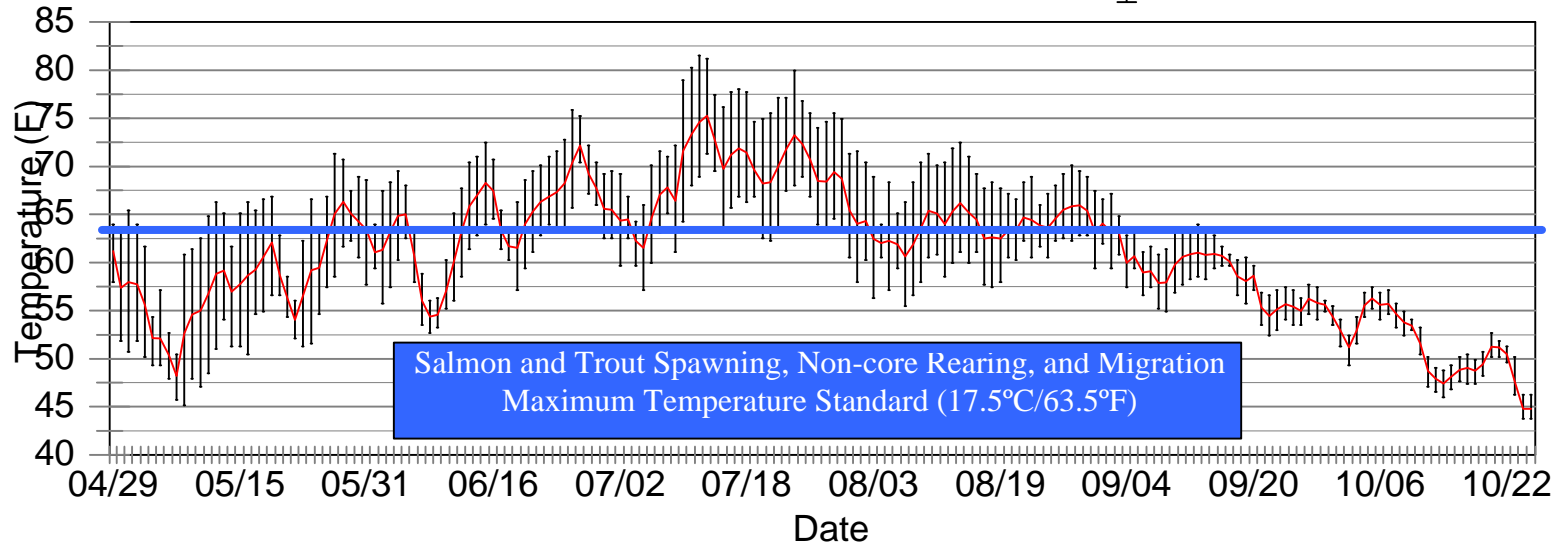


Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.32
2002 Water Temperature Monitoring in Penawawa Creek near the mouth
WDFW Monitoring Station

Penawawa Ck-above mouth 2002 (P-10)

Max/Min _____ Mean



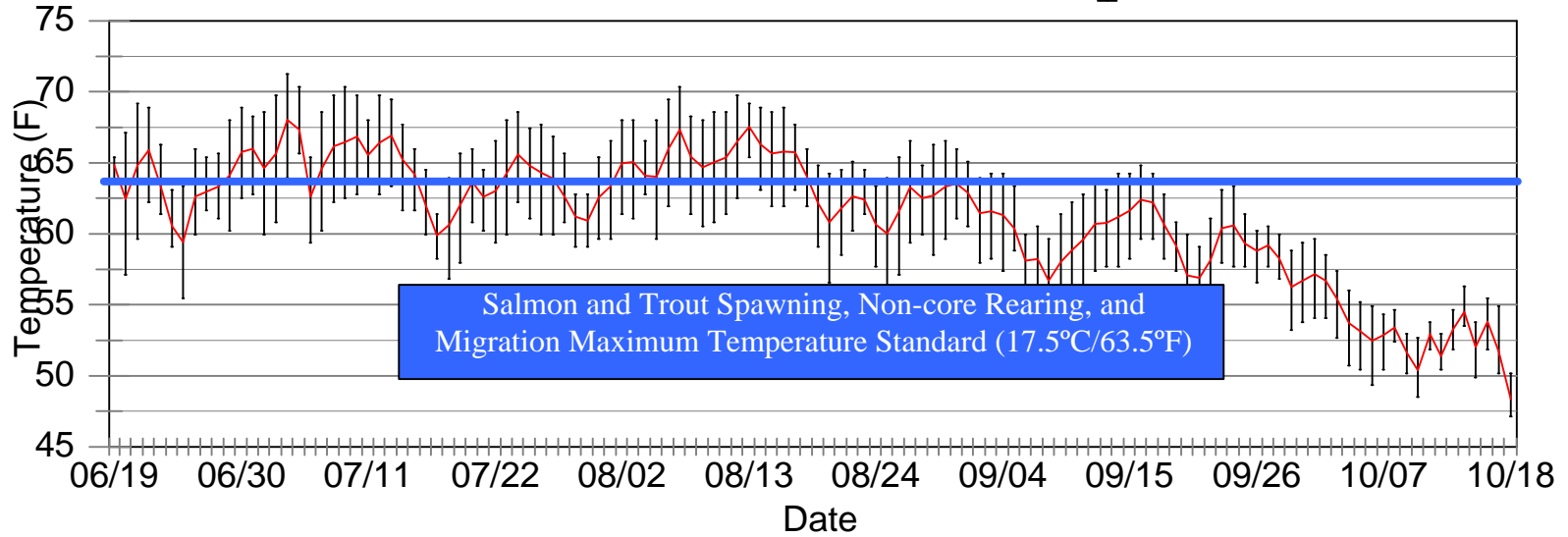
Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.33

**2001 Water Temperature Monitoring in Deadman Creek below first bridge on Lower Deadman Road
WDFW Monitoring Station**

Deadman Ck-below 1st bridge 2001 (D-1)

Max/Min _____ Mean

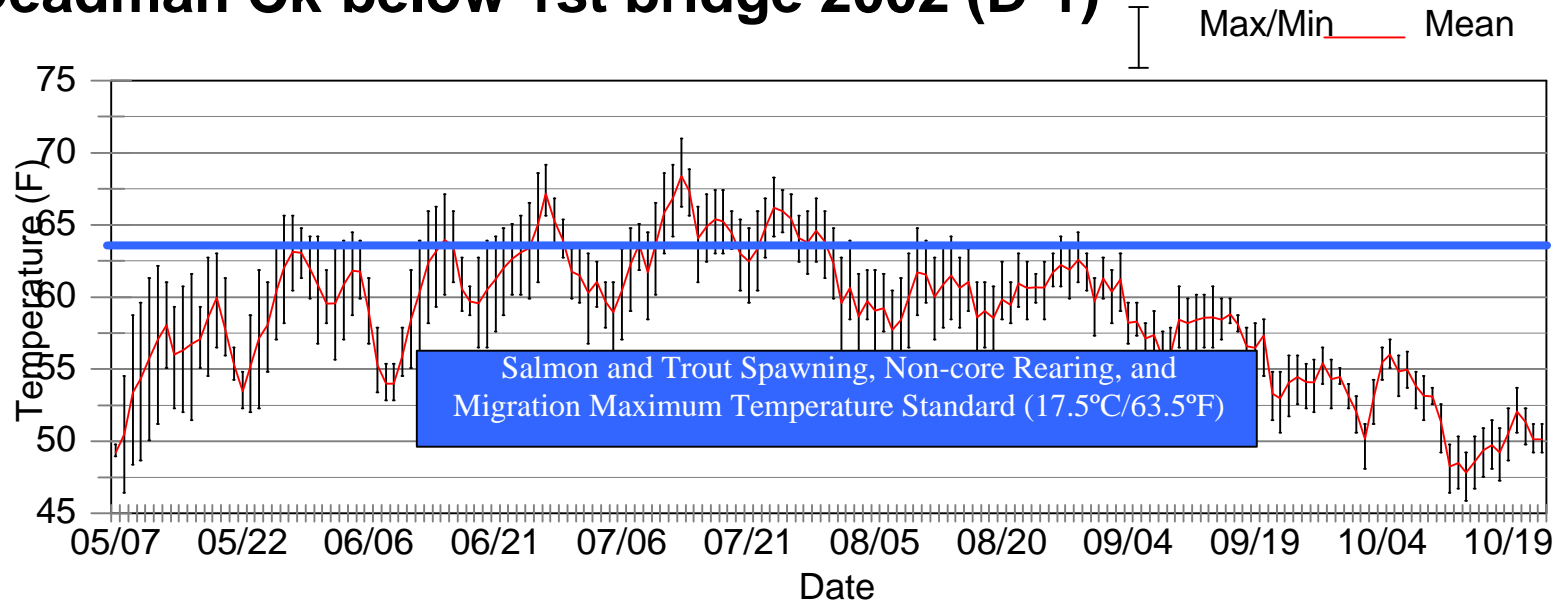


Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.34

**2002 Water Temperature Monitoring in Deadman Creek below first bridge on Lower Deadman Road
WDFW Monitoring Station**

Deadman Ck-below 1st bridge 2002 (D-1)



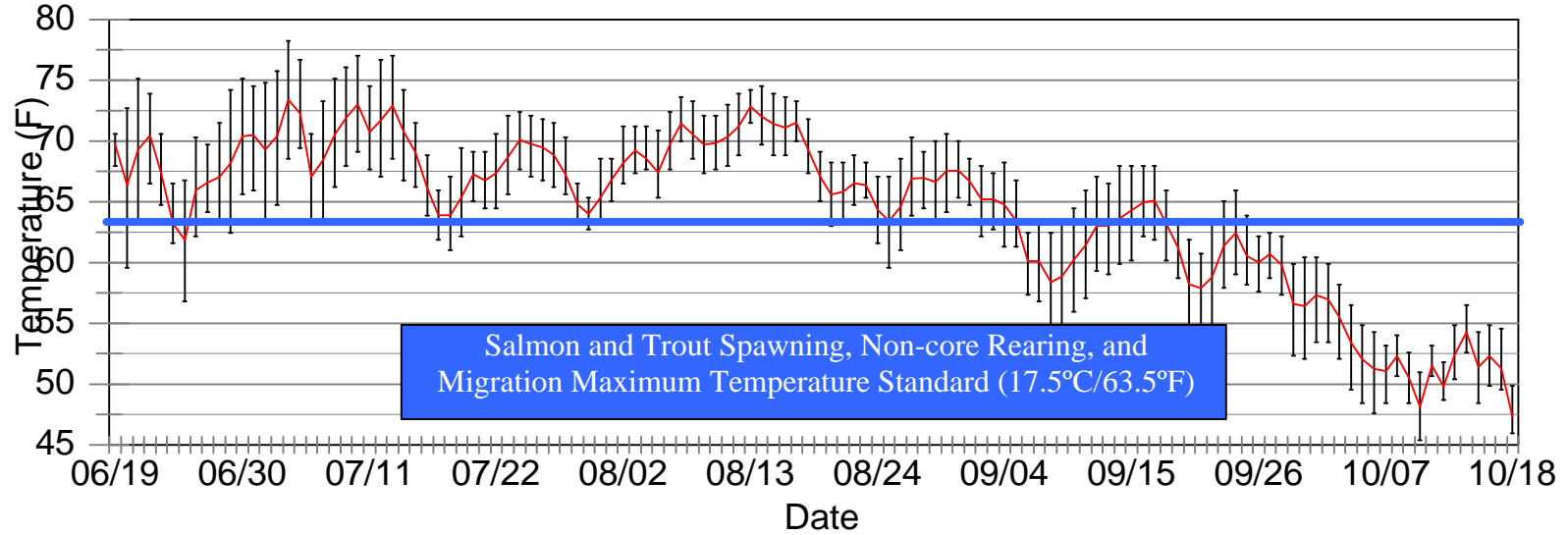
Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.35

**2001 Water Temperature Monitoring in Deadman Creek at stream ford, RM 1.4
WDFW Monitoring Station**

Deadman Ck-stream ford 2001 (D-5)

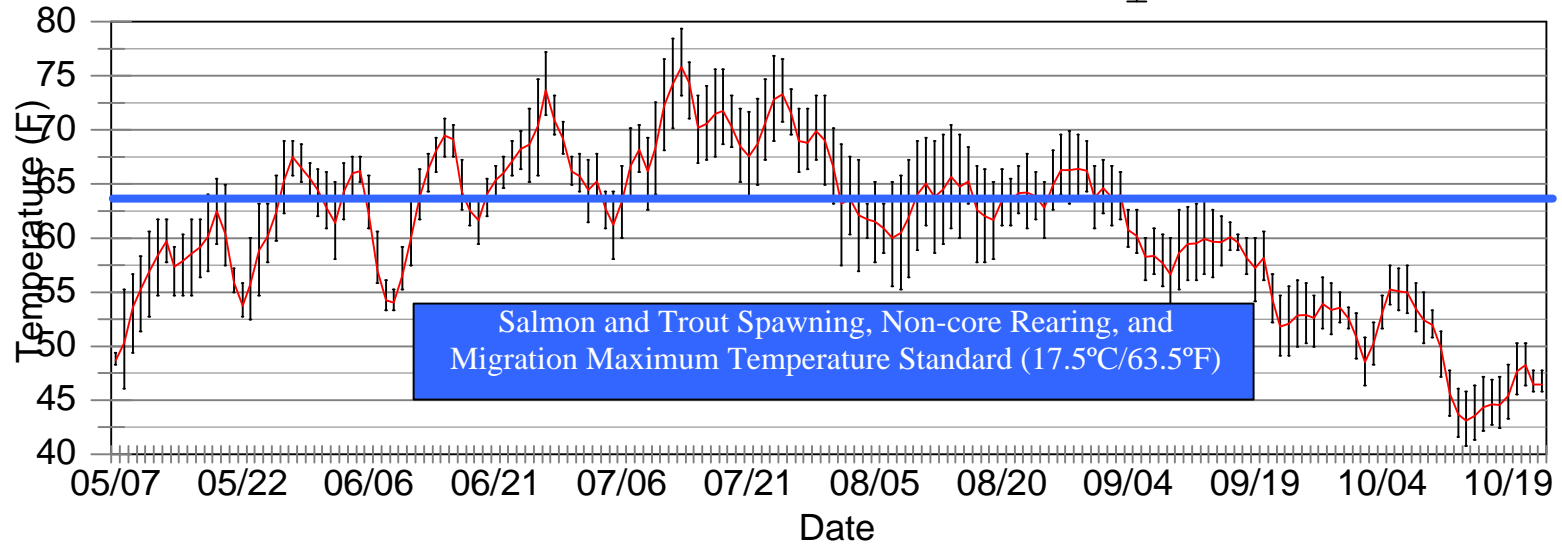
Max/Min  Mean 



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.36
2002 Water Temperature Monitoring in Deadman Creek at Willow Gulch Road Bridge
WDFW Monitoring Station

Deadman Ck-Willow Gulch Rd 2002 (D-7) | Max/Min  Mean



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.37

Mean Monthly Temperature Monitoring in Deadman Creek
WSU Lower Deadman: 2002 to 2003
WSU North Deadman and South Deadman: 2002
WSU Upper Deadman: 2003

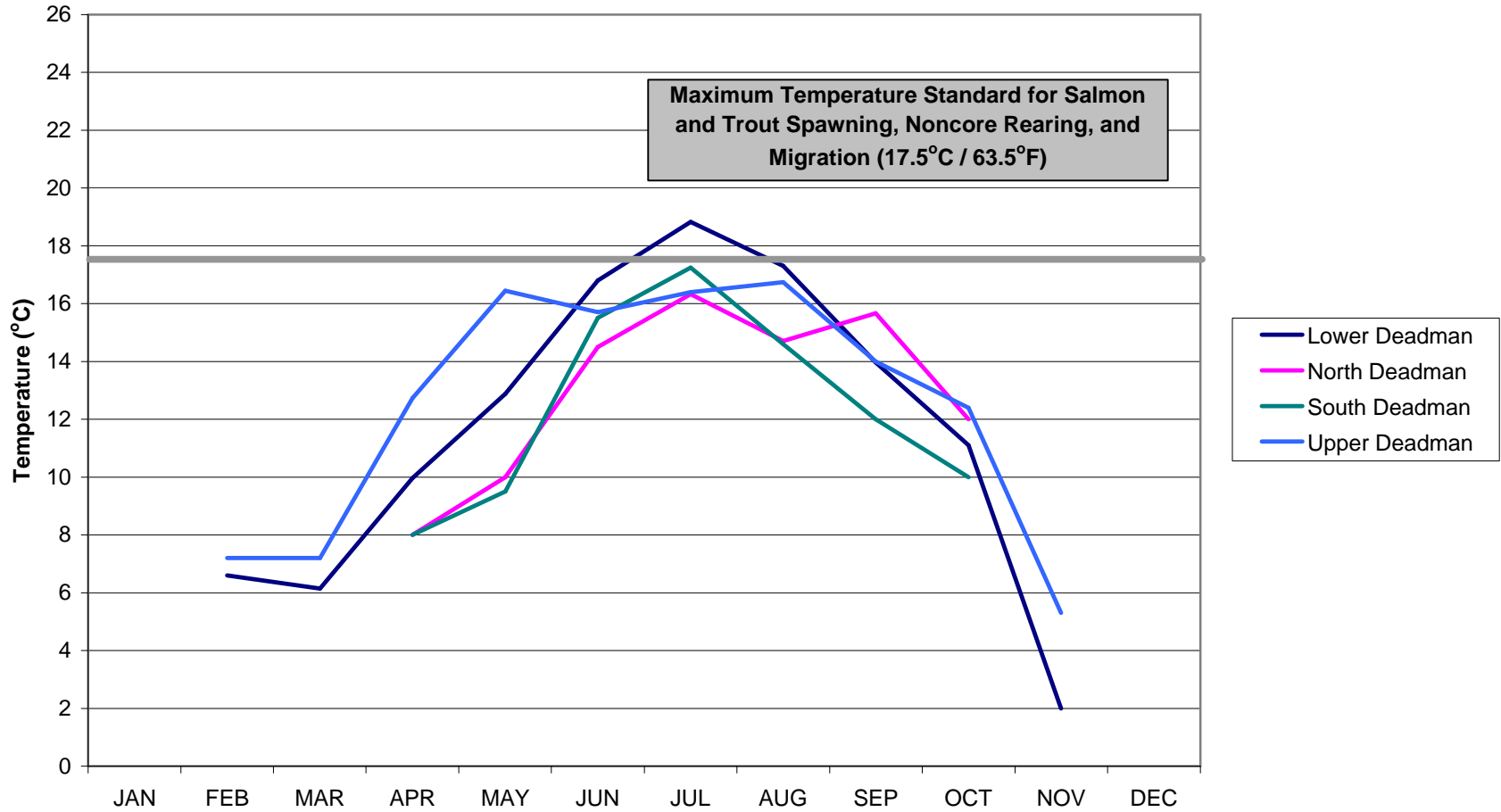


Exhibit 4-5.38

Mean Monthly Fecal Coliform Monitoring in Deadman Creek
WSU Lower Deadman: 2002 to 2003
WSU North Deadman and South Deadman: 2002
WSU Upper Deadman: 2003

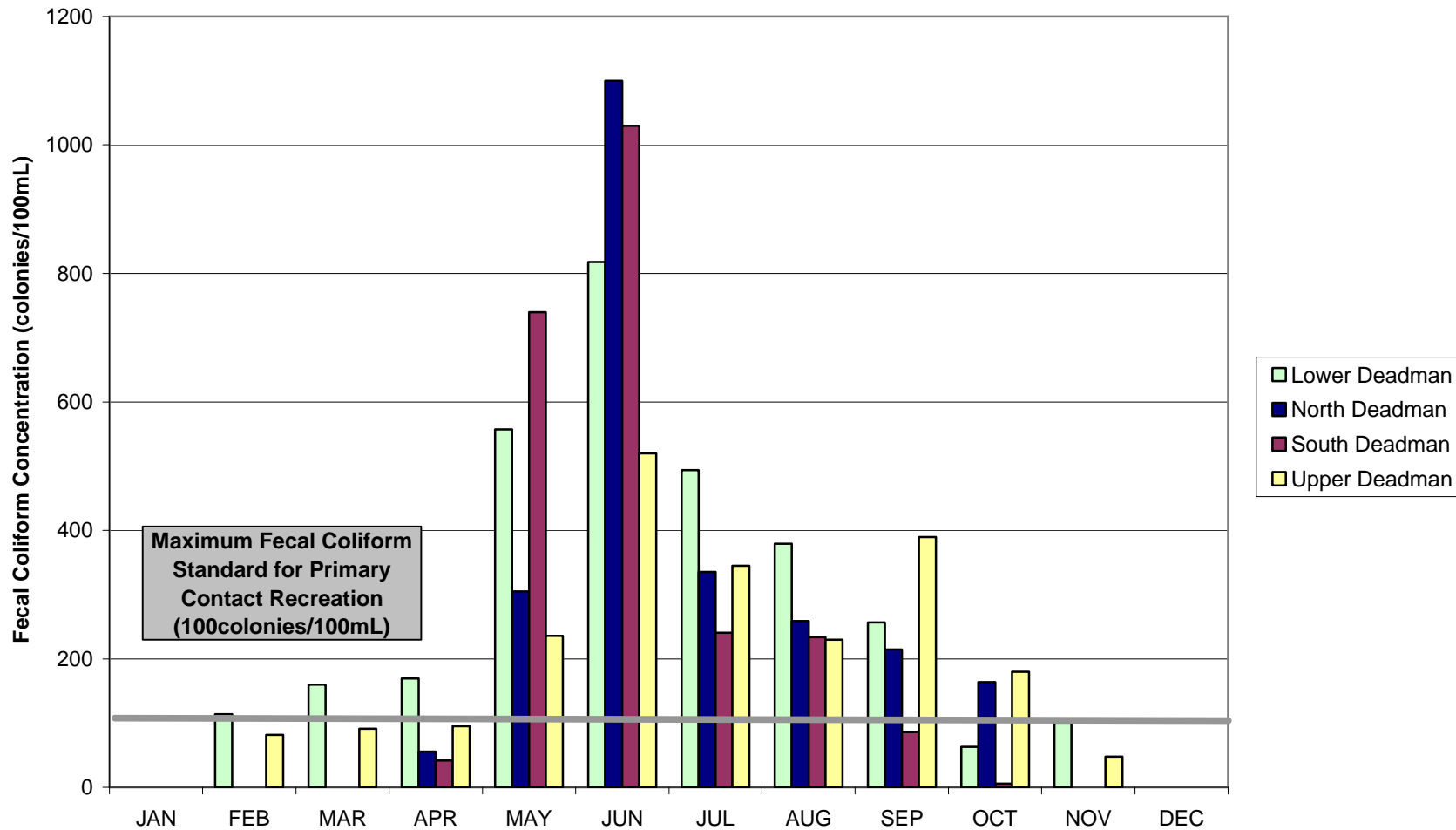


Exhibit 4-5.39

**Mean pH Monitoring in Deadman Creek
WSU Lower Deadman and Upper Deadman: 2003**

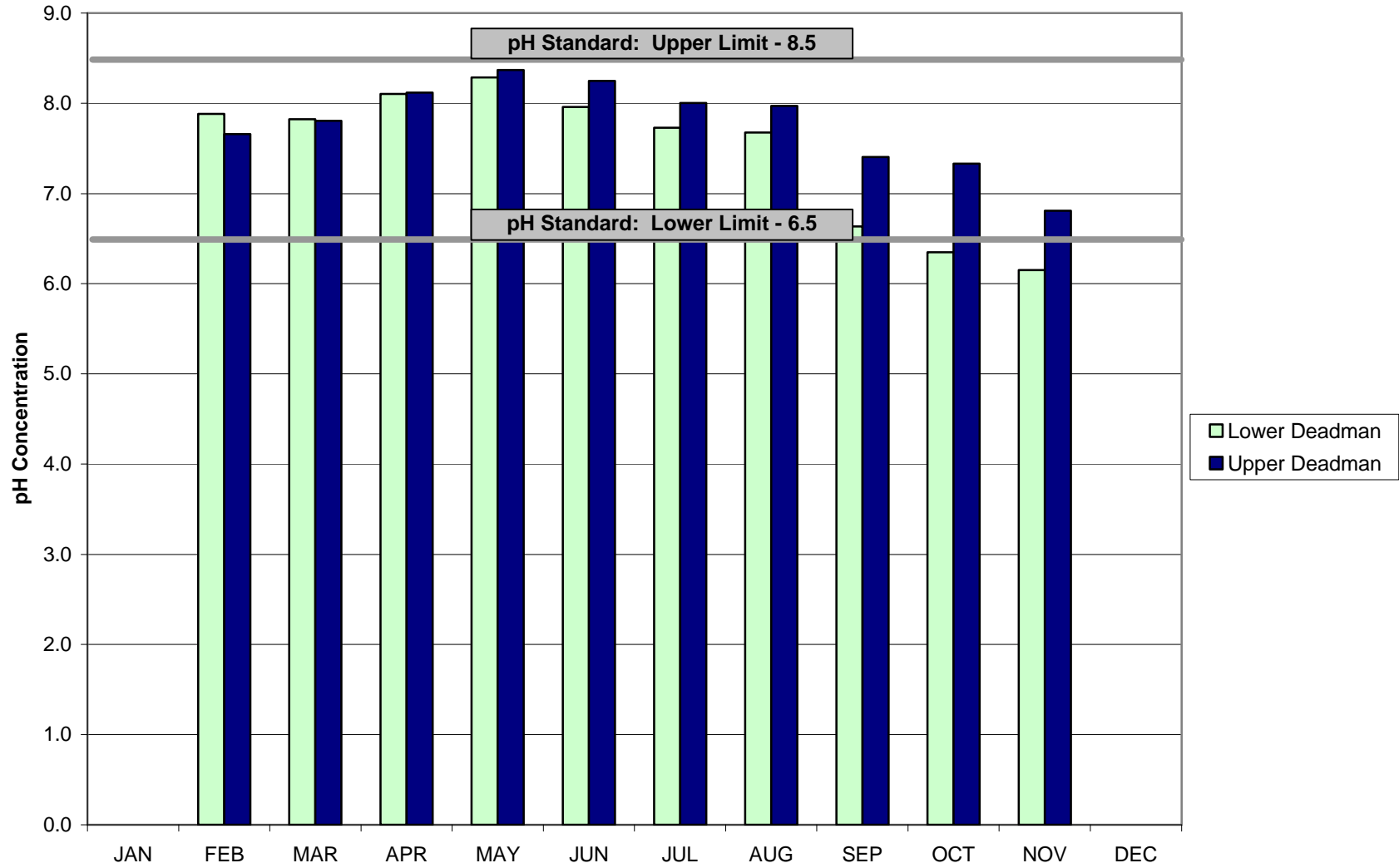


Exhibit 4-5.40

**Mean Dissolved Oxygen Monitoring in Deadman Creek
WSU Lower Deadman and Upper Deadman: 2003**

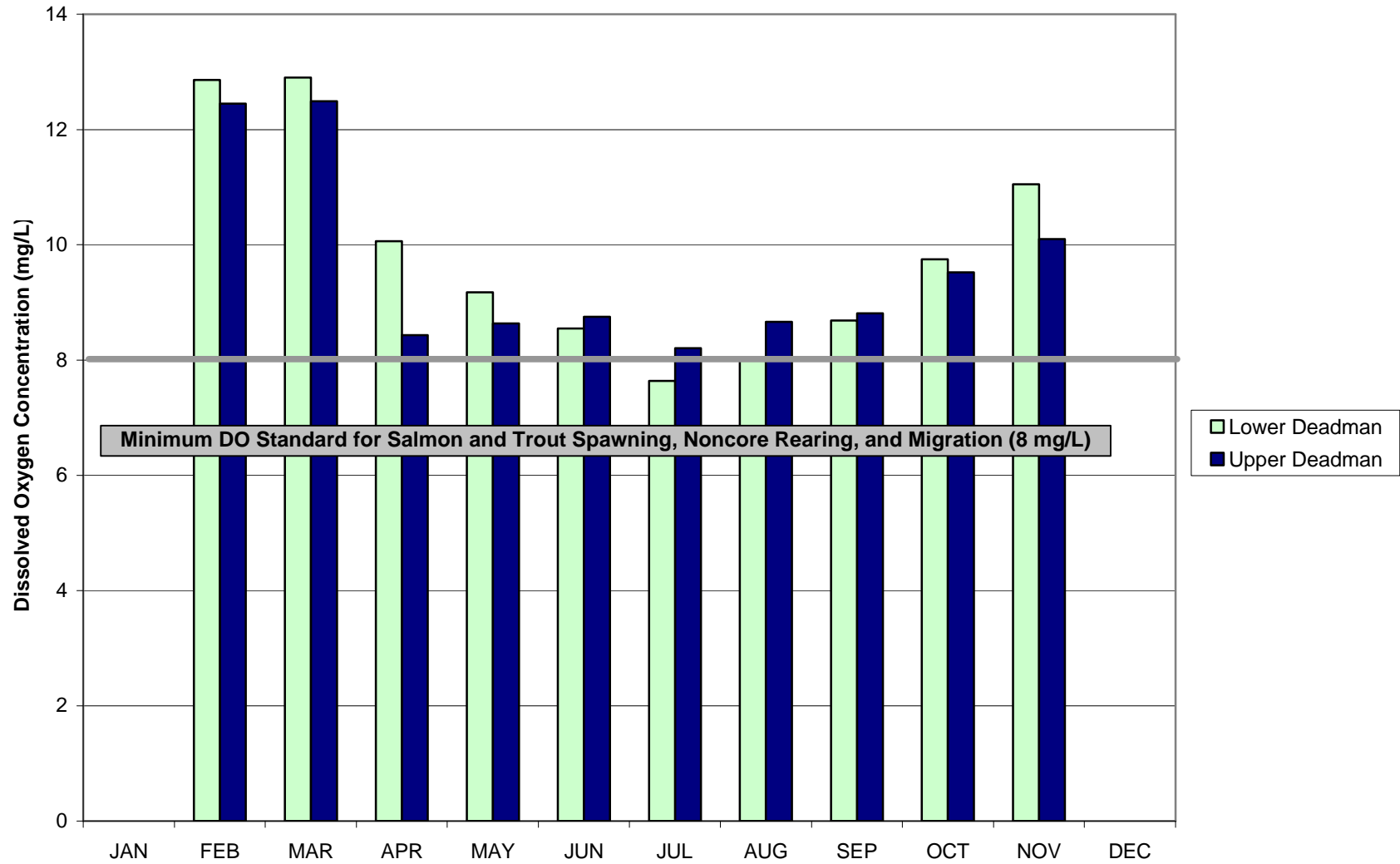


Exhibit 4-5.41

Mean Monthly Total Suspended Solid Monitoring in Deadman Creek
WSU Lower Deadman: 2002 to 2003
WSU North Deadman and South Deadman: 2002
WSU Upper Deadman: 2003

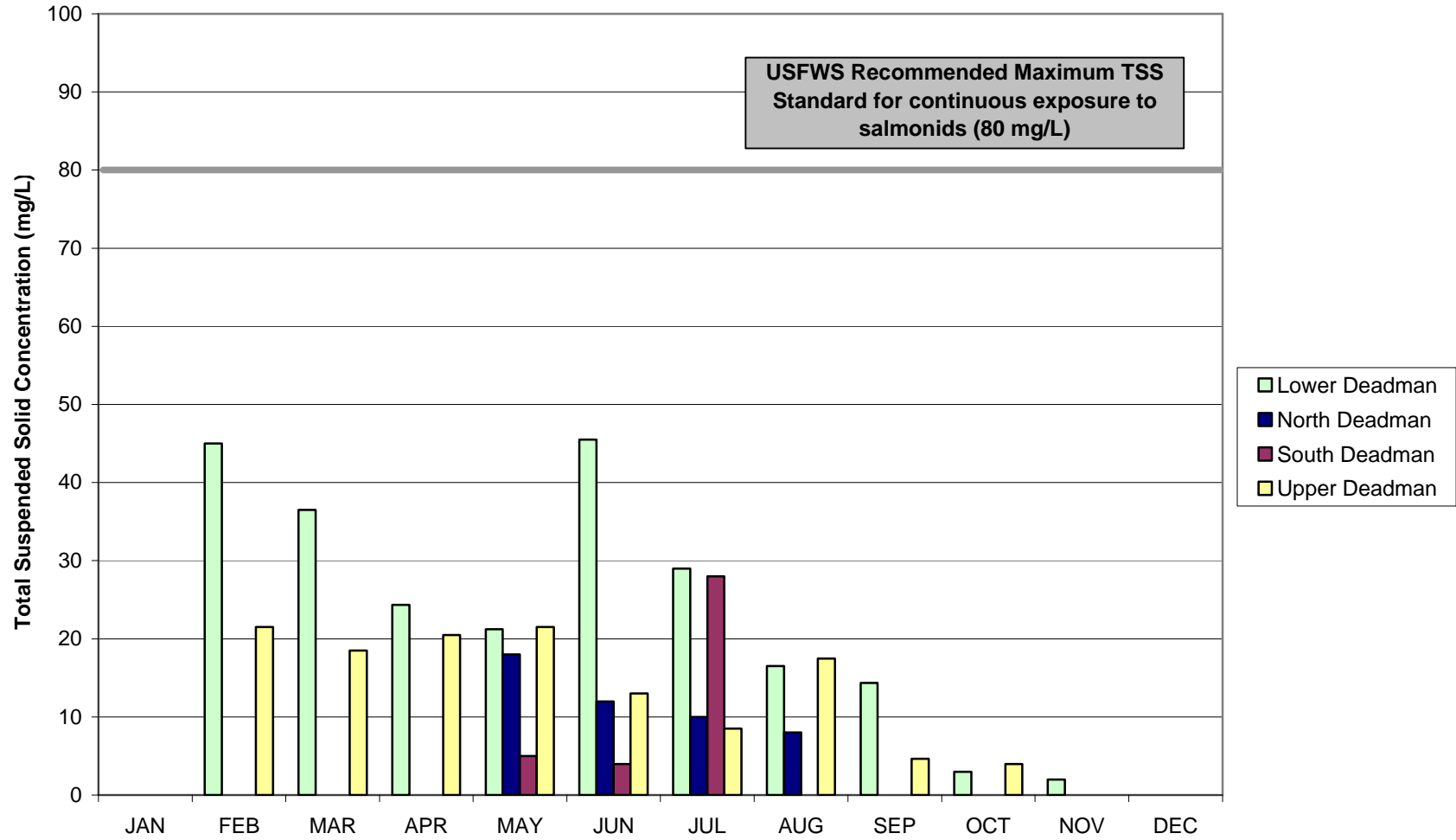
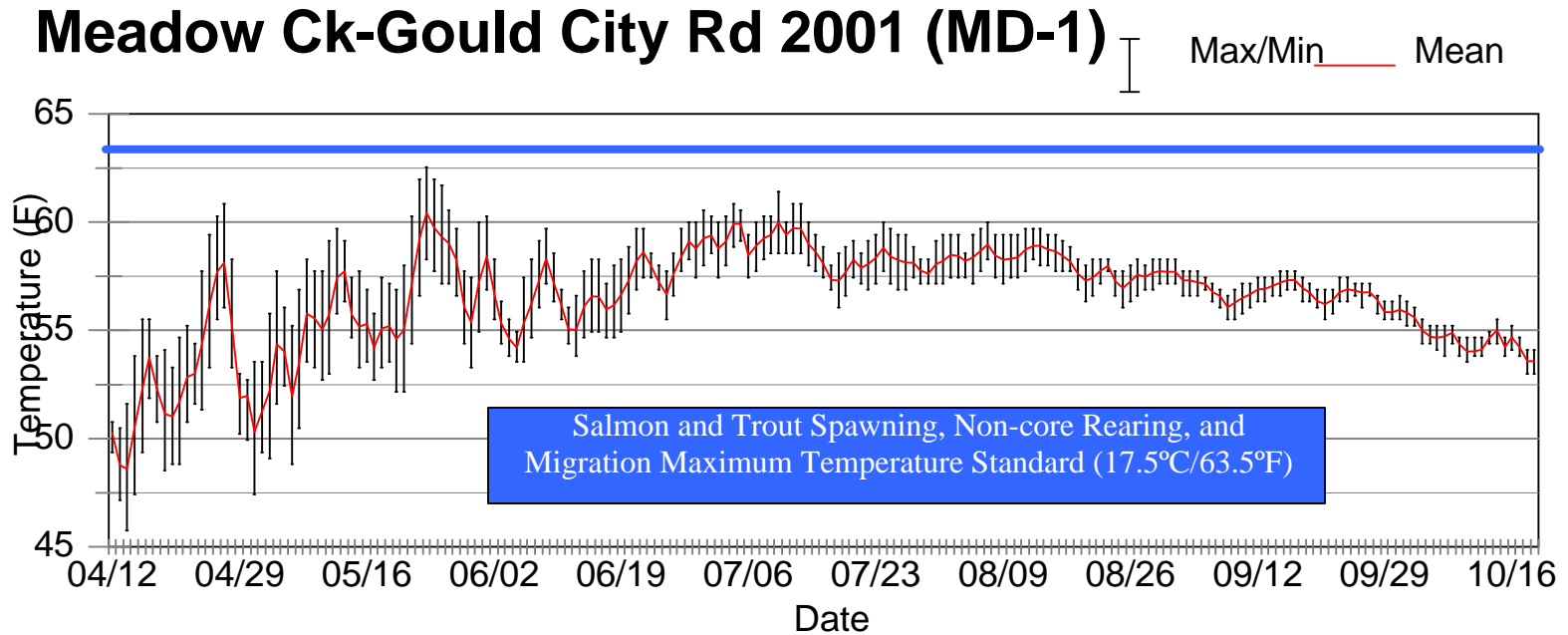
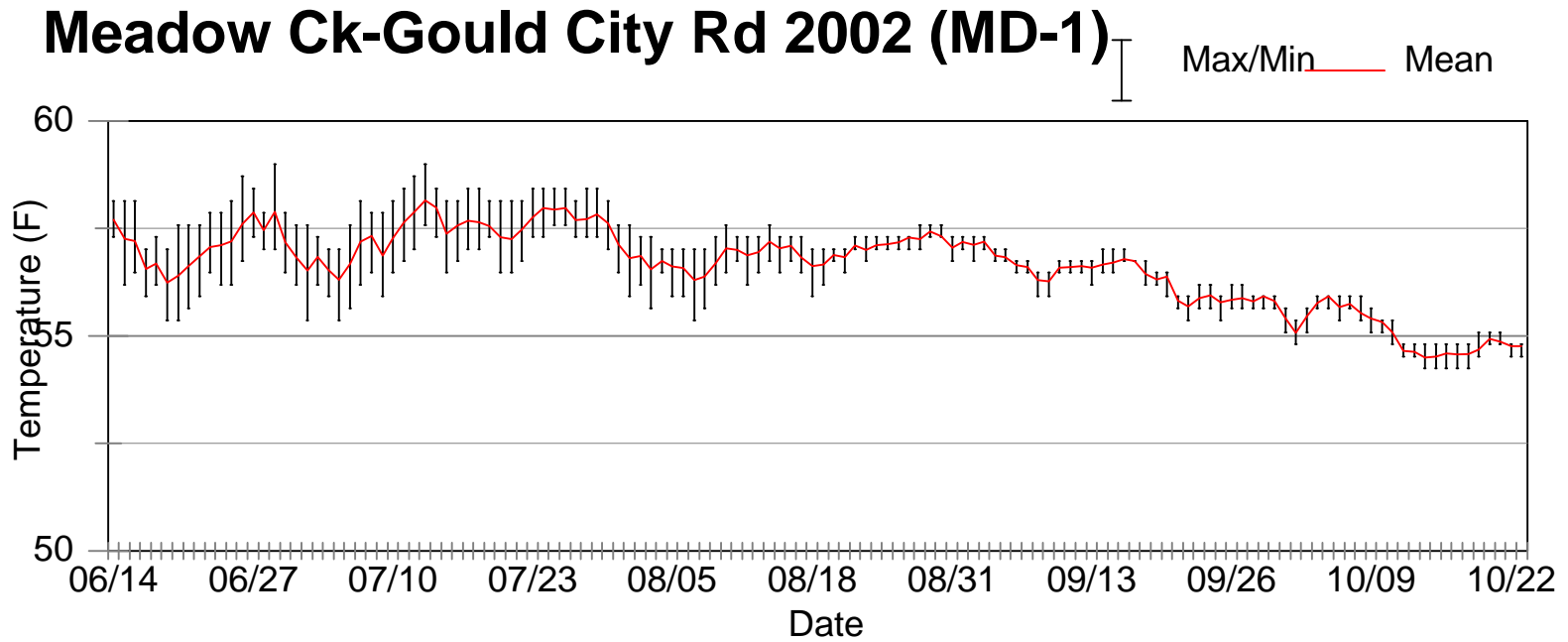


Exhibit 4-5.42
2001 Water Temperature Monitoring in Meadow Creek at Gould City Bridge
WDFW Monitoring Station



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.43
2002 Water Temperature Monitoring in Meadow Creek at Gould City Bridge
WDFW Monitoring Station



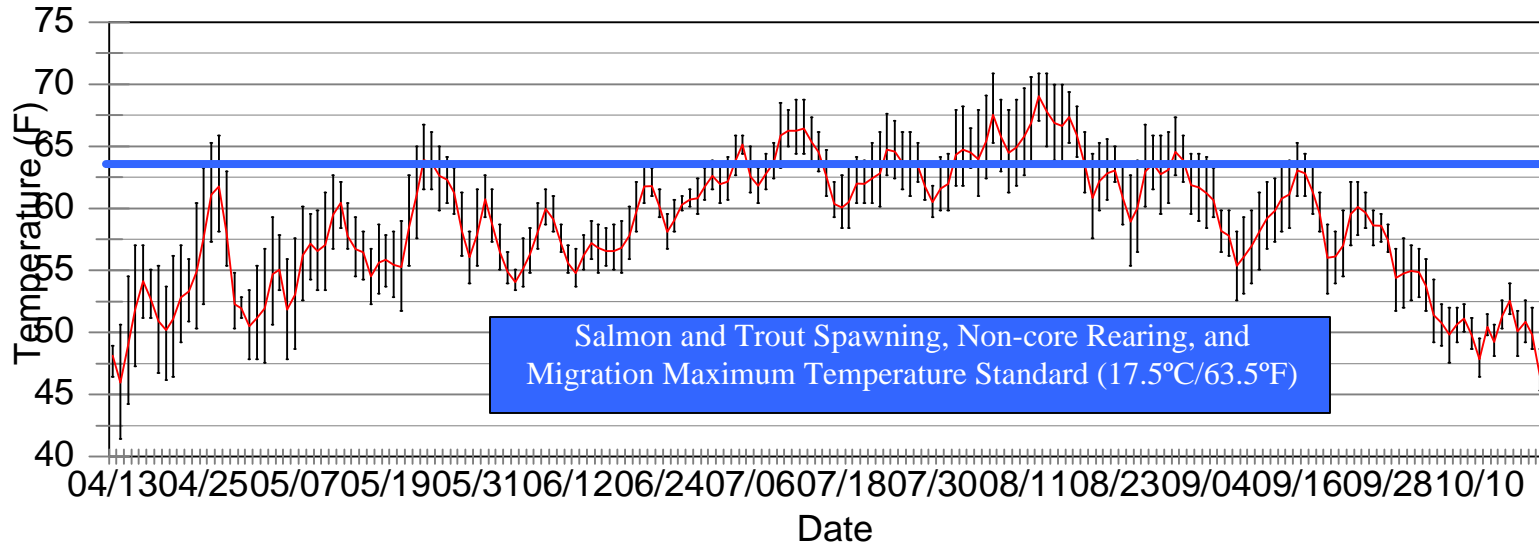
Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.44

**2001 Water Temperature Monitoring in Meadow Creek at Stream Ford, RM 5.6
WDFW Monitoring Station**

Meadow Ck-stream ford 2001 (MD-8)

Max/Min  Mean 

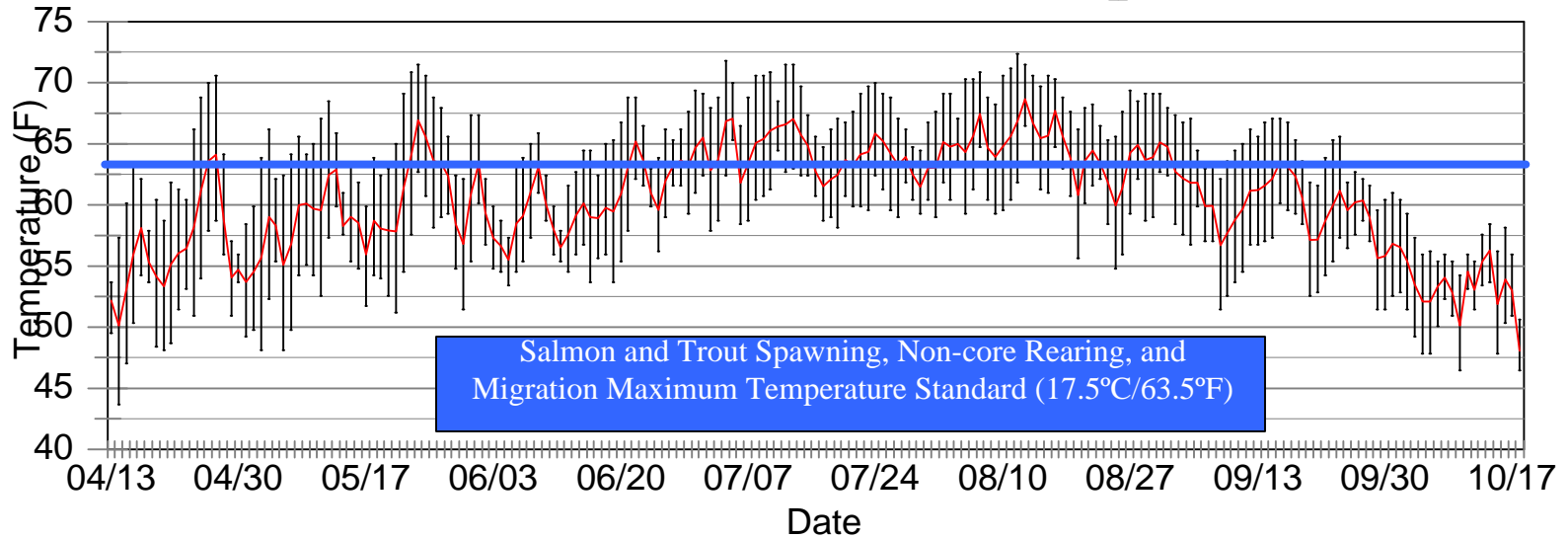


Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.45

**2001 Water Temperature Monitoring in Meadow Creek above farmhouse bridge, RM 0.4
WDFW Monitoring Station**

Meadow Ck-farmhouse brg. 2001 (MD-11) Max/Min _____ Mean



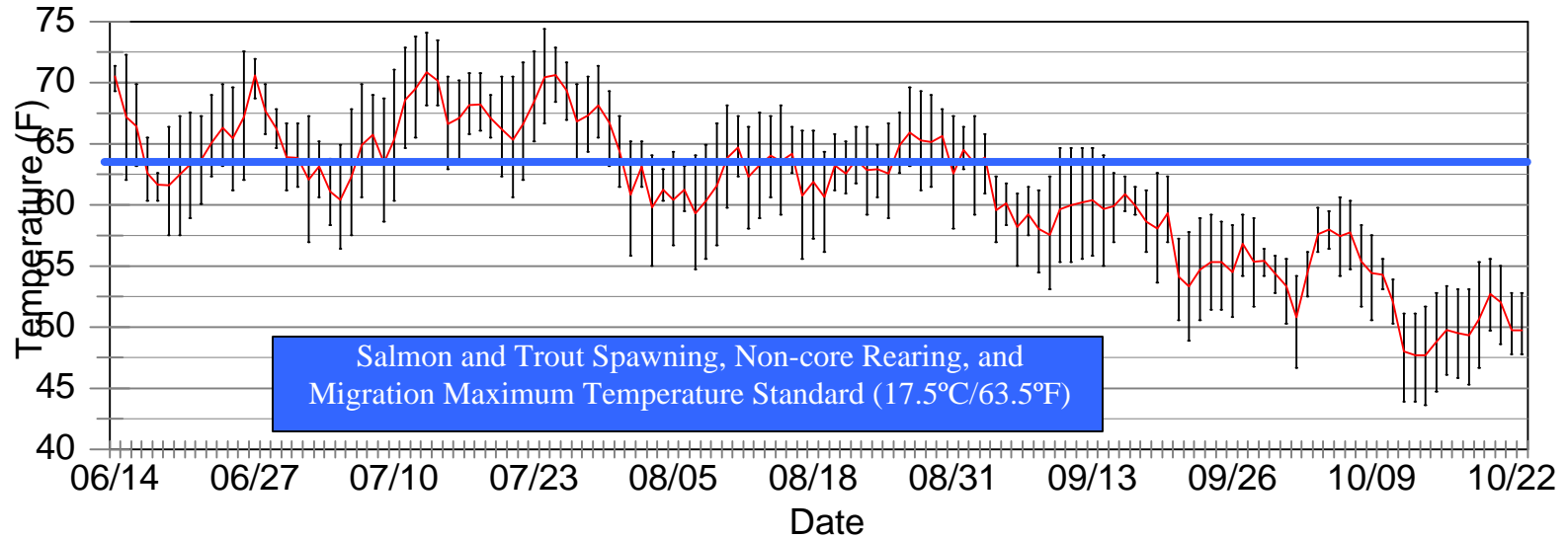
Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.46

**2002 Water Temperature Monitoring in Meadow Creek above farmhouse bridge, RM 0.4
WDFW Monitoring Station**

Meadow Ck-farmhouse brg. 2002 (MD-11)

Max/Min _____ Mean



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.47

**Mean Monthly Temperature Monitoring in Meadow Creek
WSU Lower Meadow and Upper Meadow: 2003**

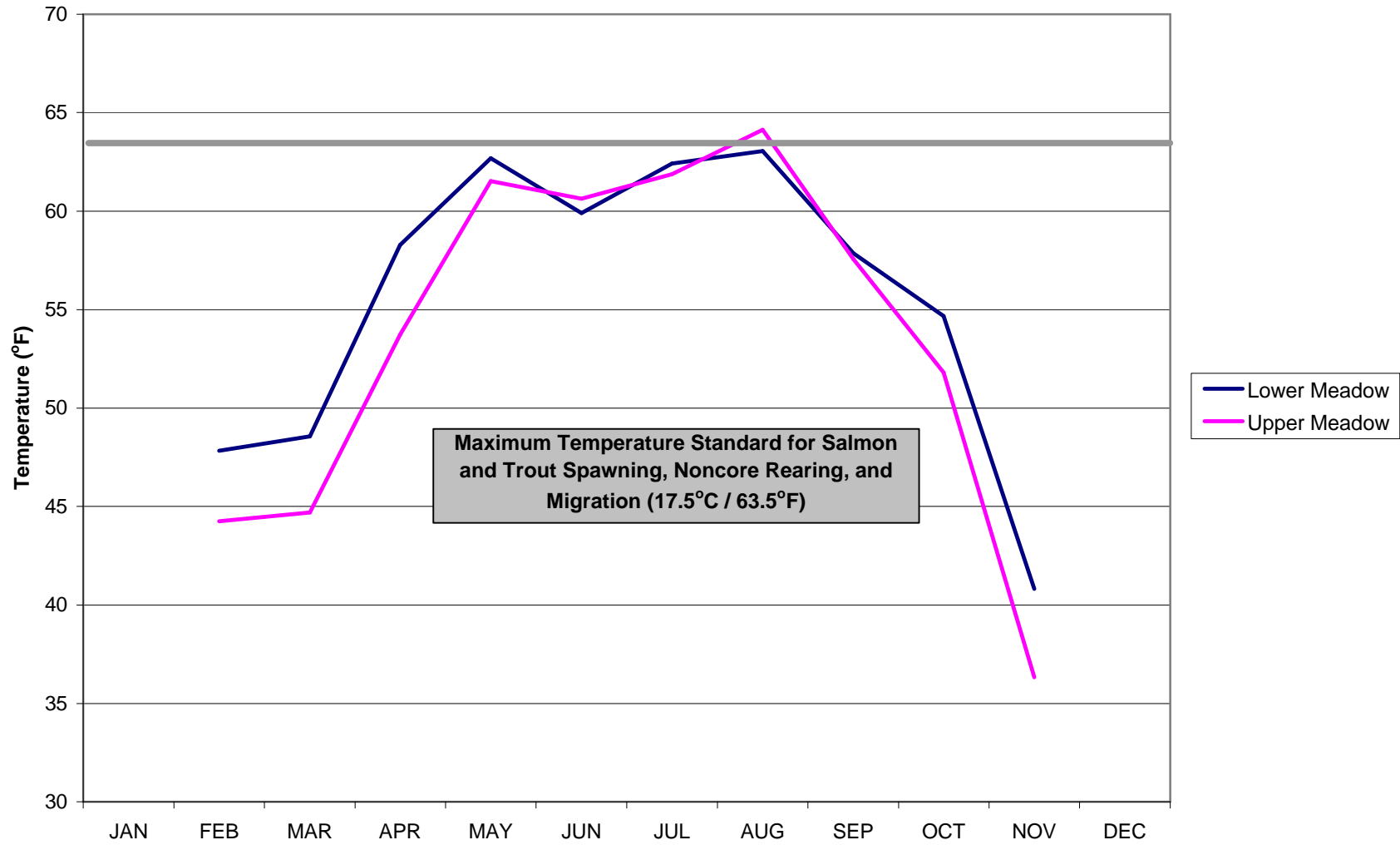


Exhibit 4-5.48

**Mean Fecal Coliform Monitoring in Meadow Creek
WSU Lower Meadow and Upper Meadow: 2003**

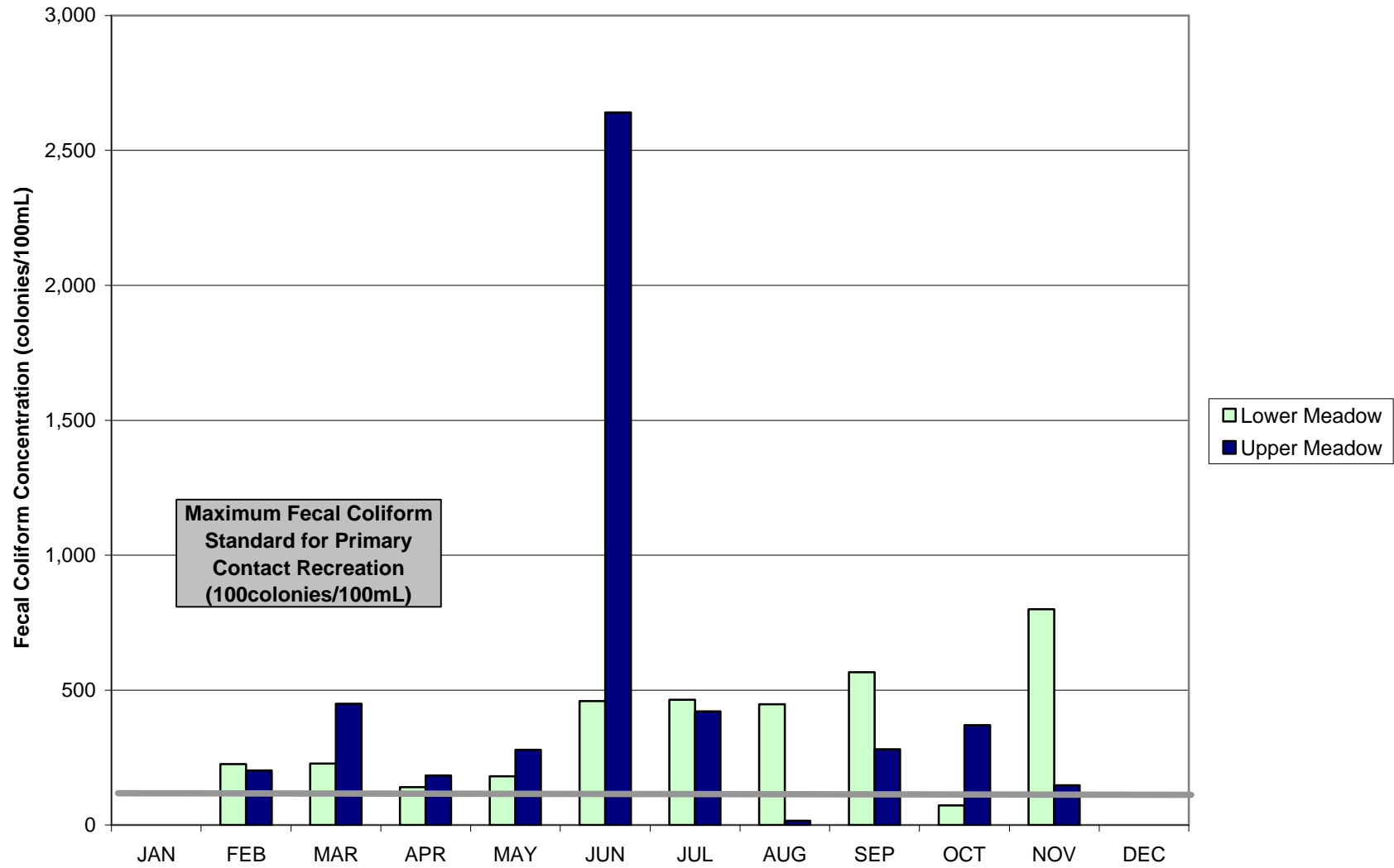


Exhibit 4-5.49

**Mean pH Monitoring in Meadow Creek
WSU Lower Meadow and Upper Meadow: 2003**

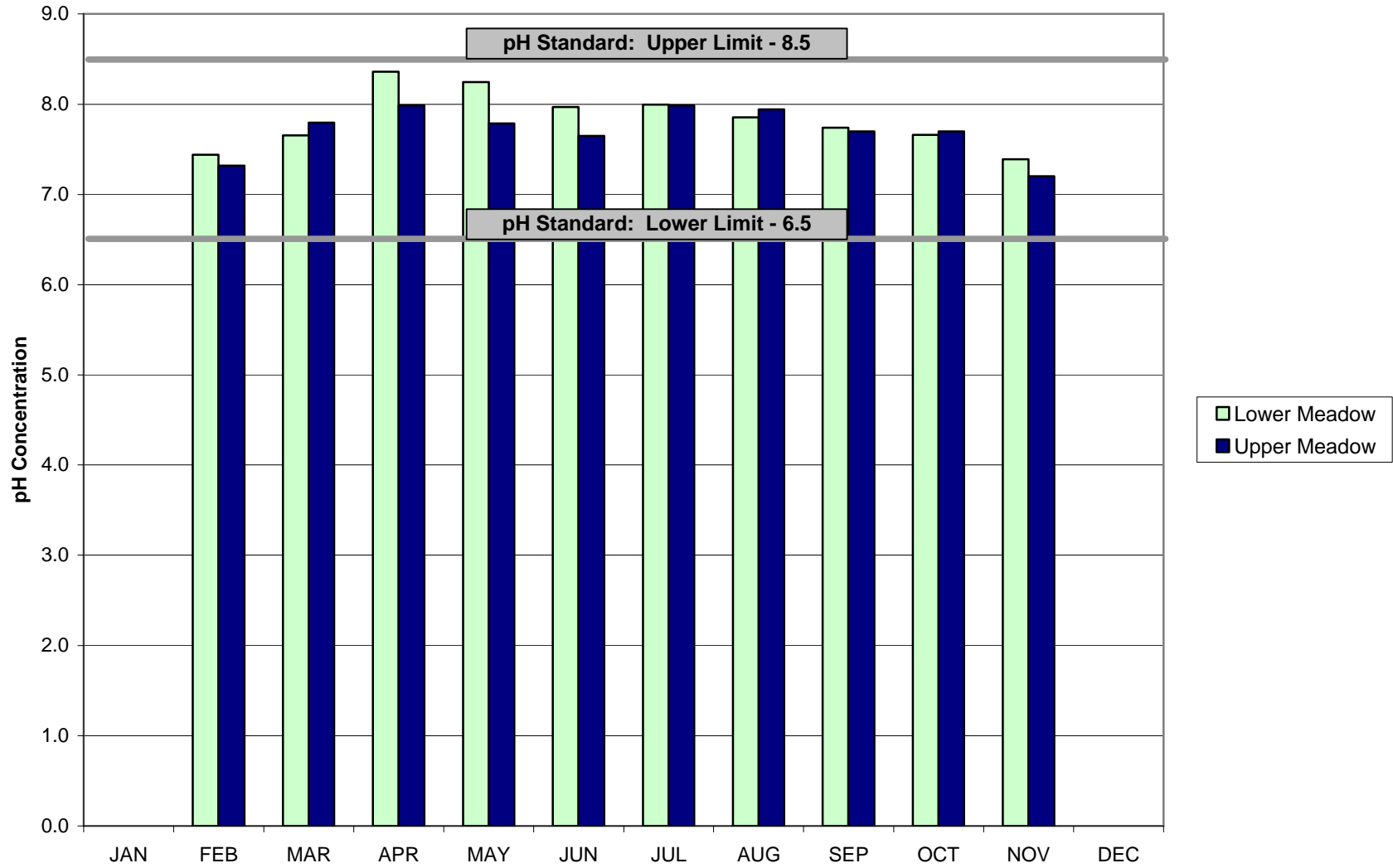


Exhibit 4-5.50

**Mean Dissolved Oxygen Monitoring in Meadow Creek
WSU Lower Meadow and Upper Meadow: 2003**

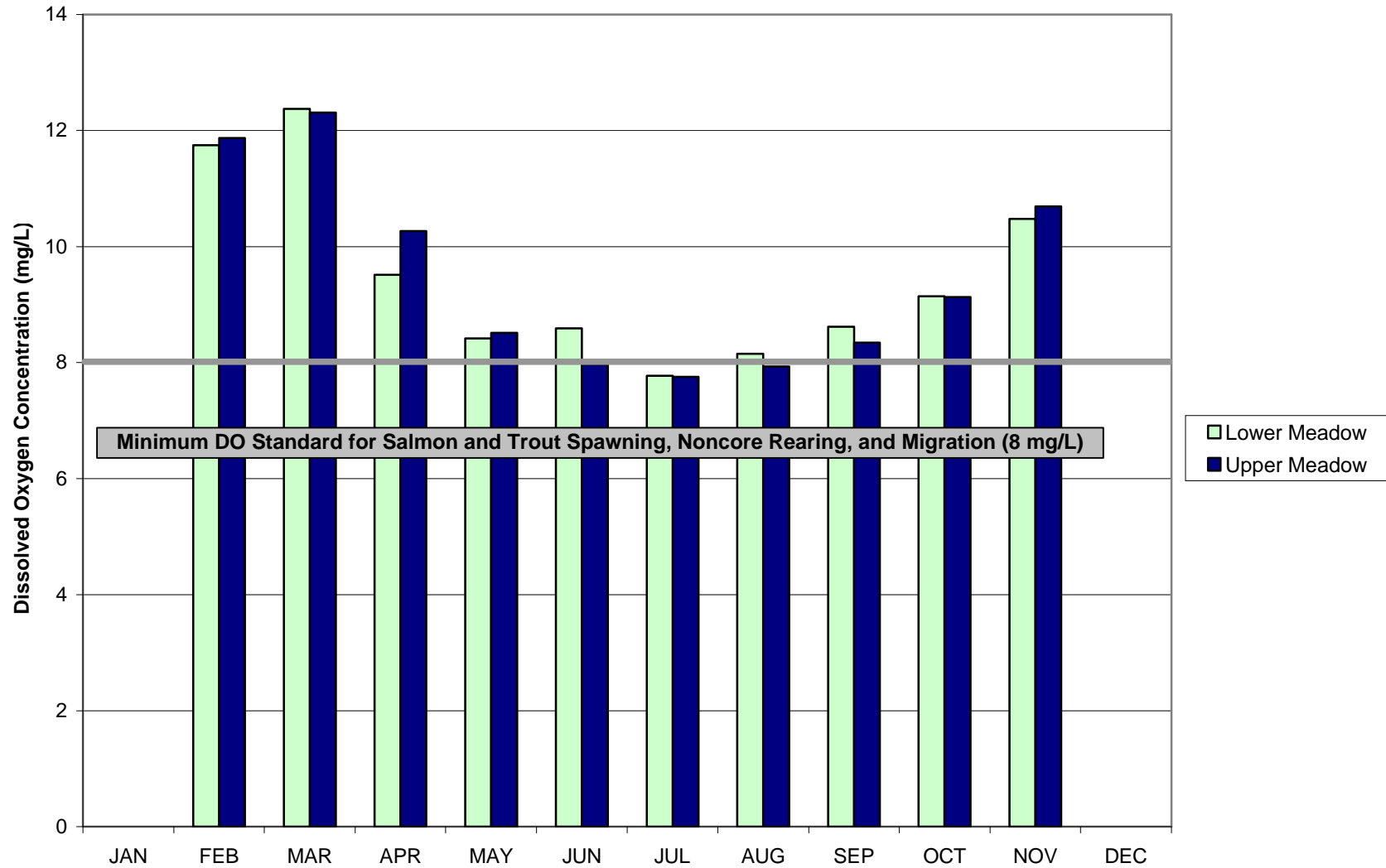


Exhibit 4-5.51

**Mean Monthly Total Suspended Solid Monitoring in Meadow Creek
WSU Lower Meadow and Upper Meadow: 2003**

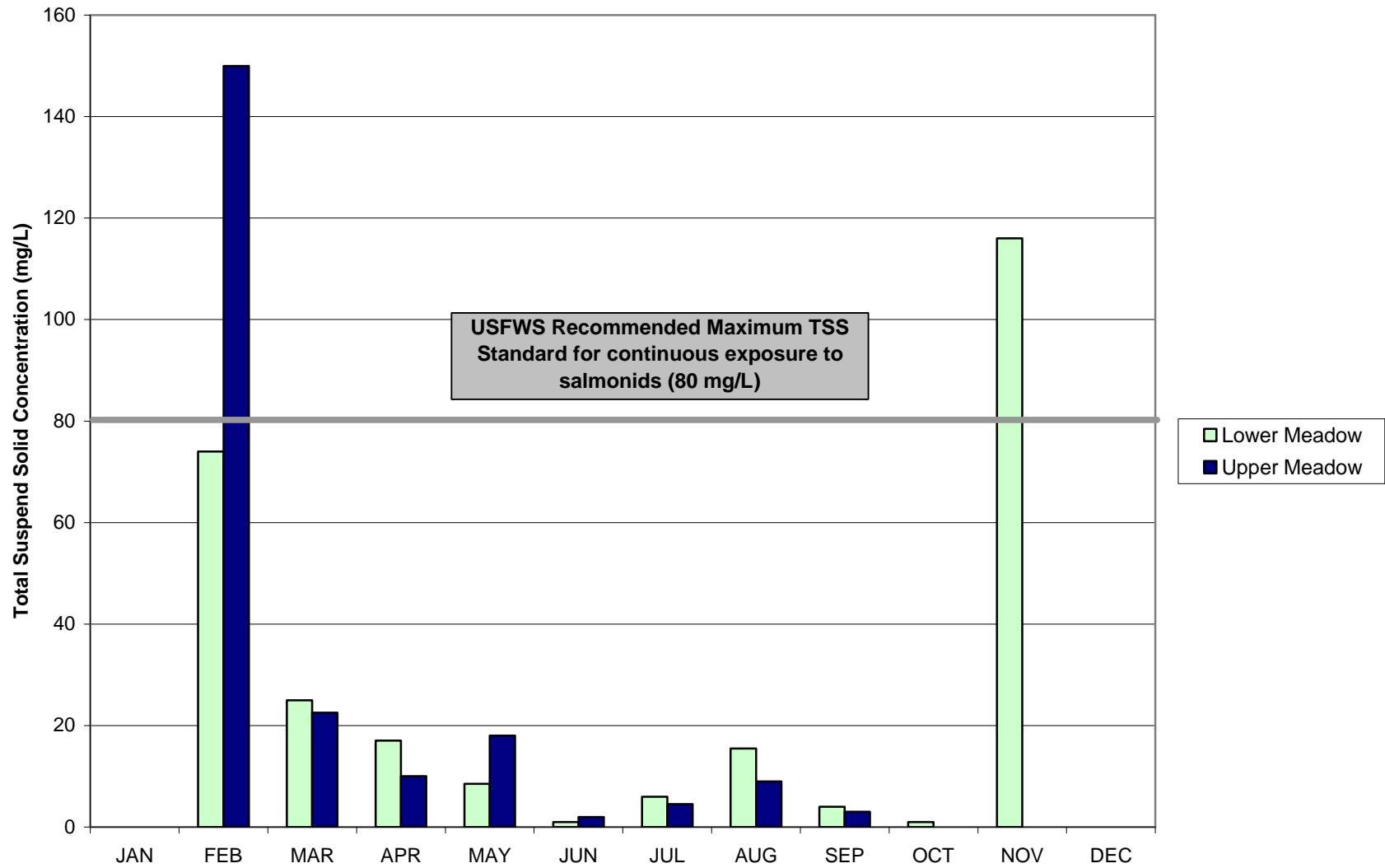
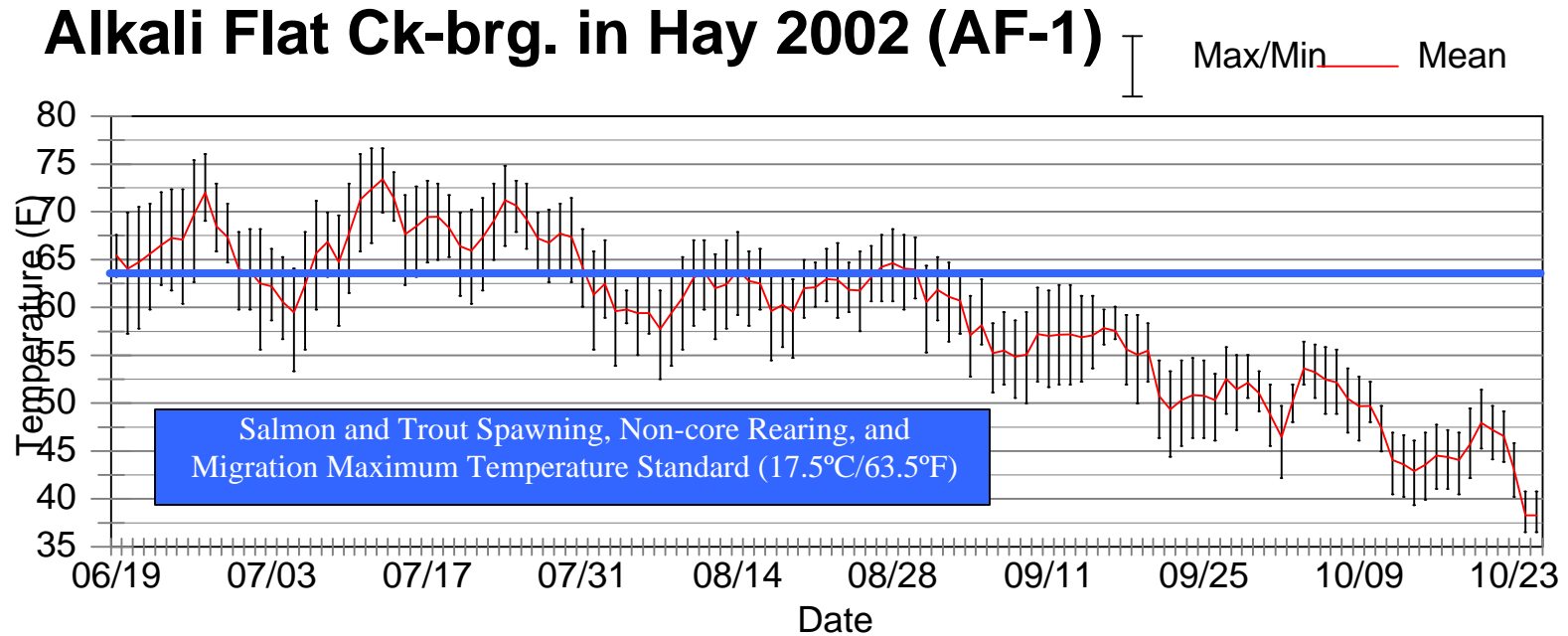


Exhibit 4-5.52
2002 Water Temperature Monitoring in Alkali Flat Creek below bridge in Hay, WA
WDFW Monitoring Station



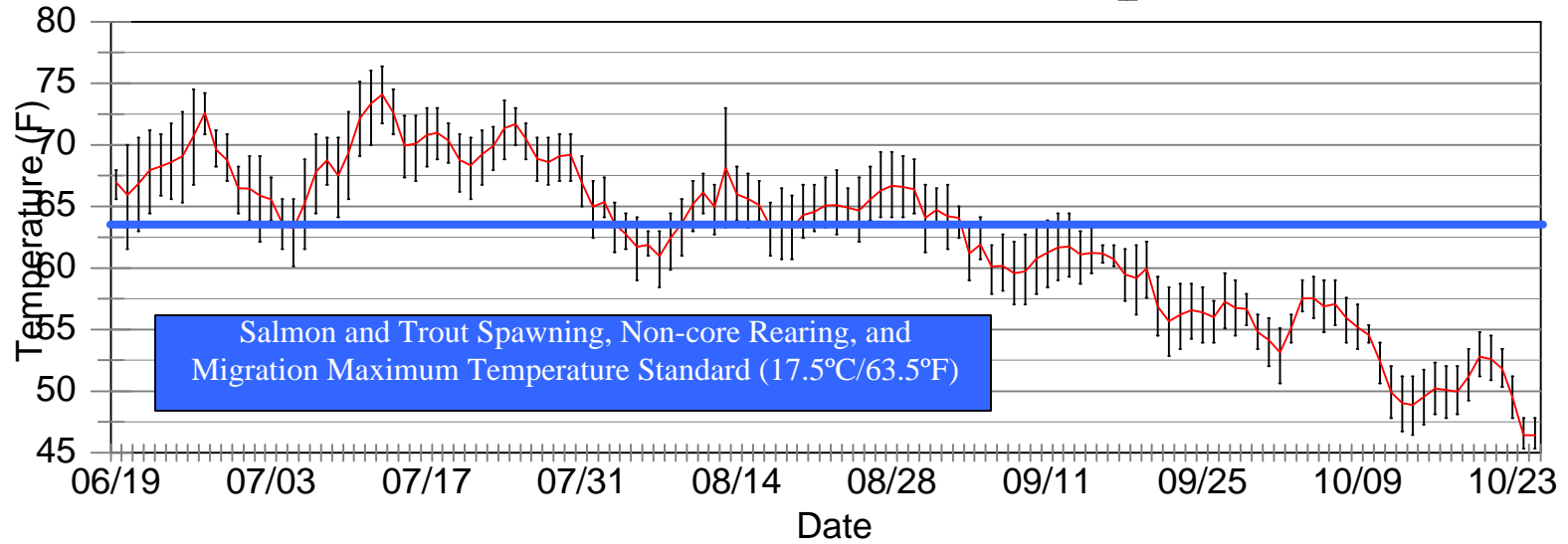
Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.53

**2002 Water Temperature Monitoring in Alkali Flat Creek at mouth of Rock Spring Gulch
WDFW Monitoring Station**

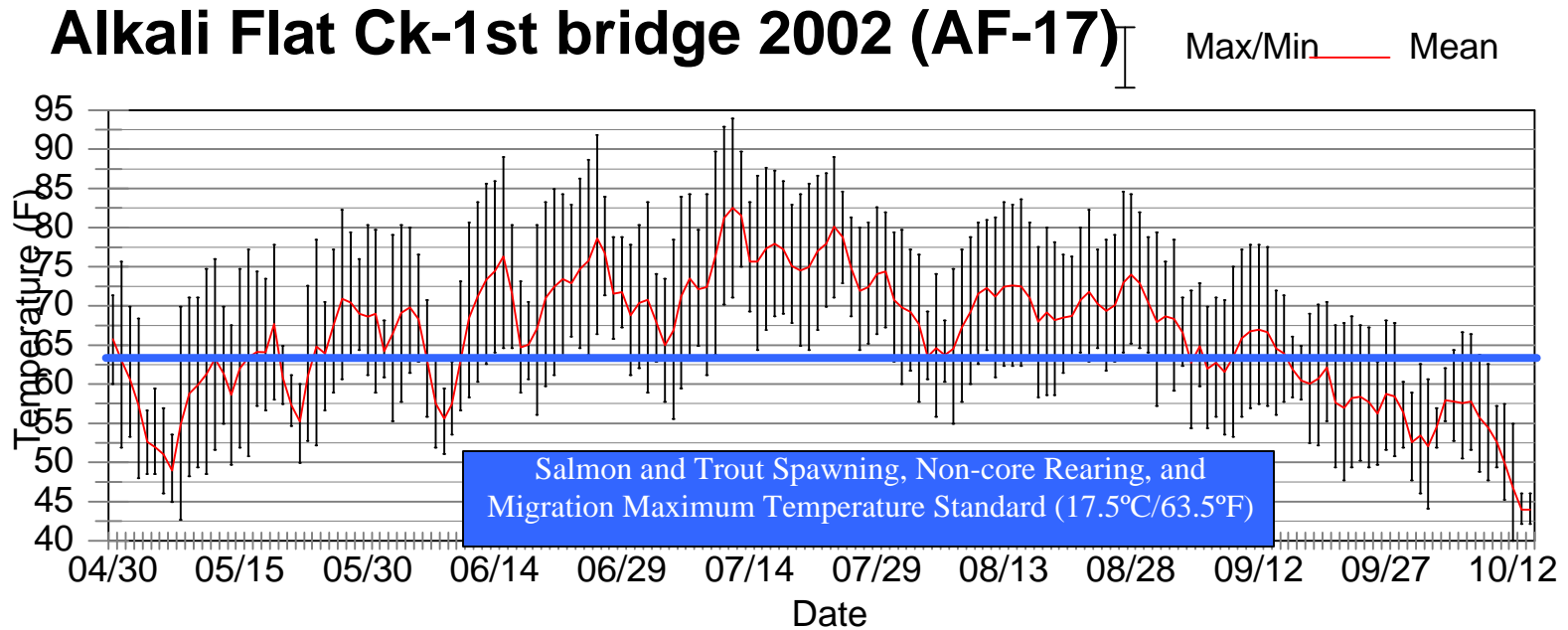
Alkali Flat Ck-Rock Spring 2002 (AF-7)

Max/Min  Mean 



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).

Exhibit 4-5.54
2002 Water Temperature Monitoring in Alkali Flat Creek below Long Hollow Road Bridge
WDFW Monitoring Station



Source: Brief Assessment of Salmonids and Stream Habitat Conditions in Snake River Tributaries of Asotin, Whitman and Garfield Counties in Washington, March 2001 – June 2003 – Final Report, Appendix C (Mendel et. al. 2004).