Monitoring the Effects of NPCC Mainstem Amendments on Resident Fish in Montana

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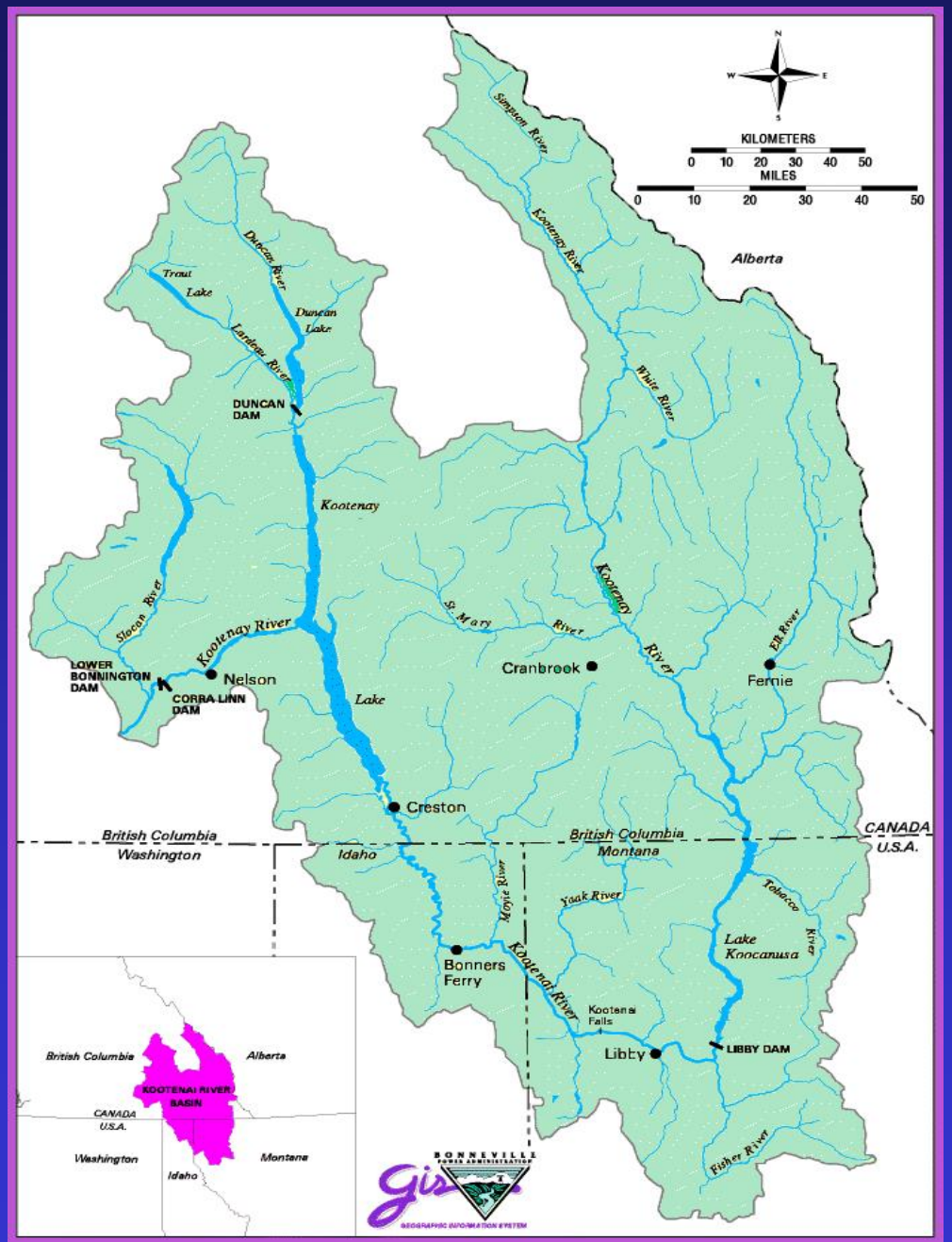
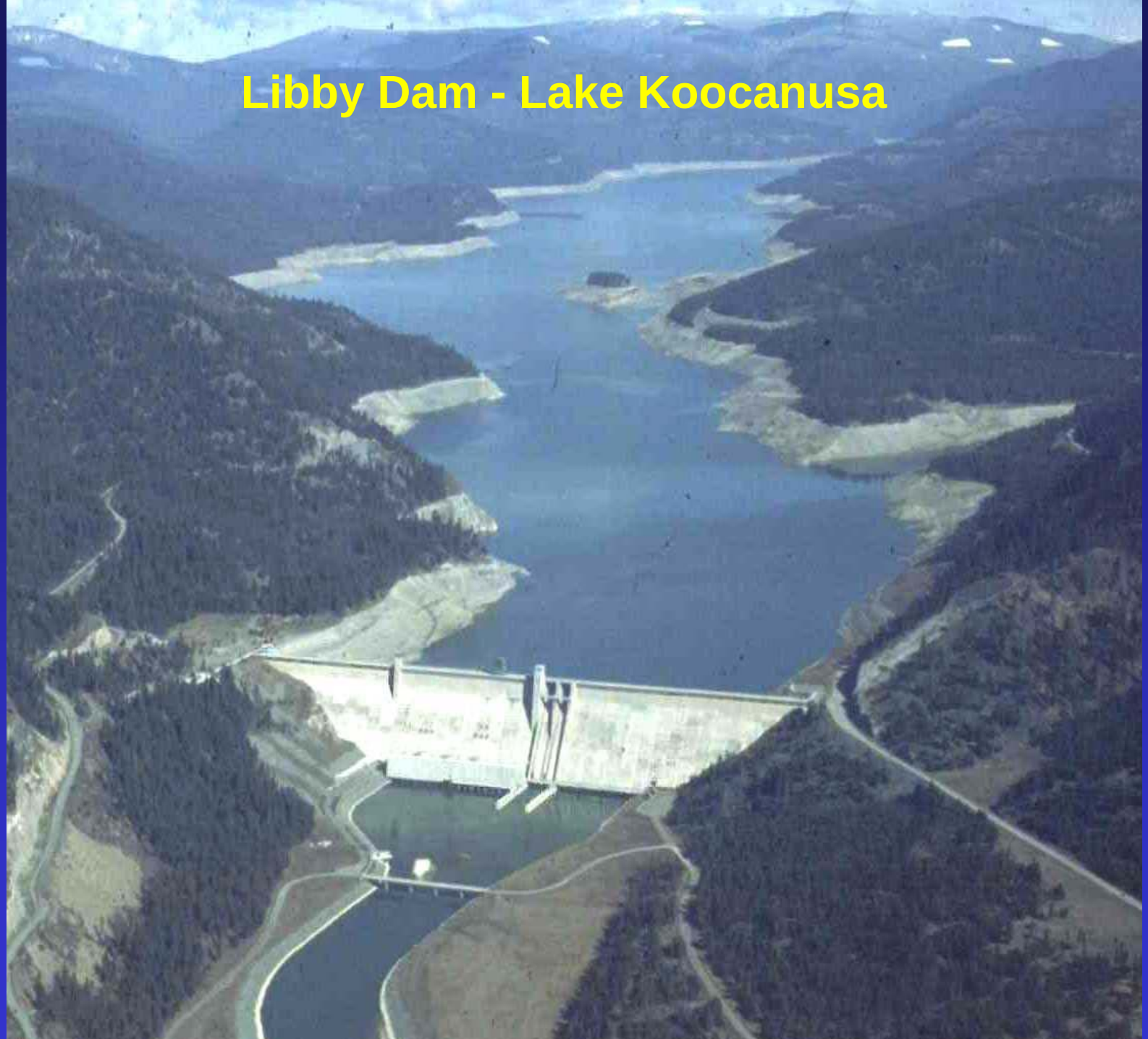
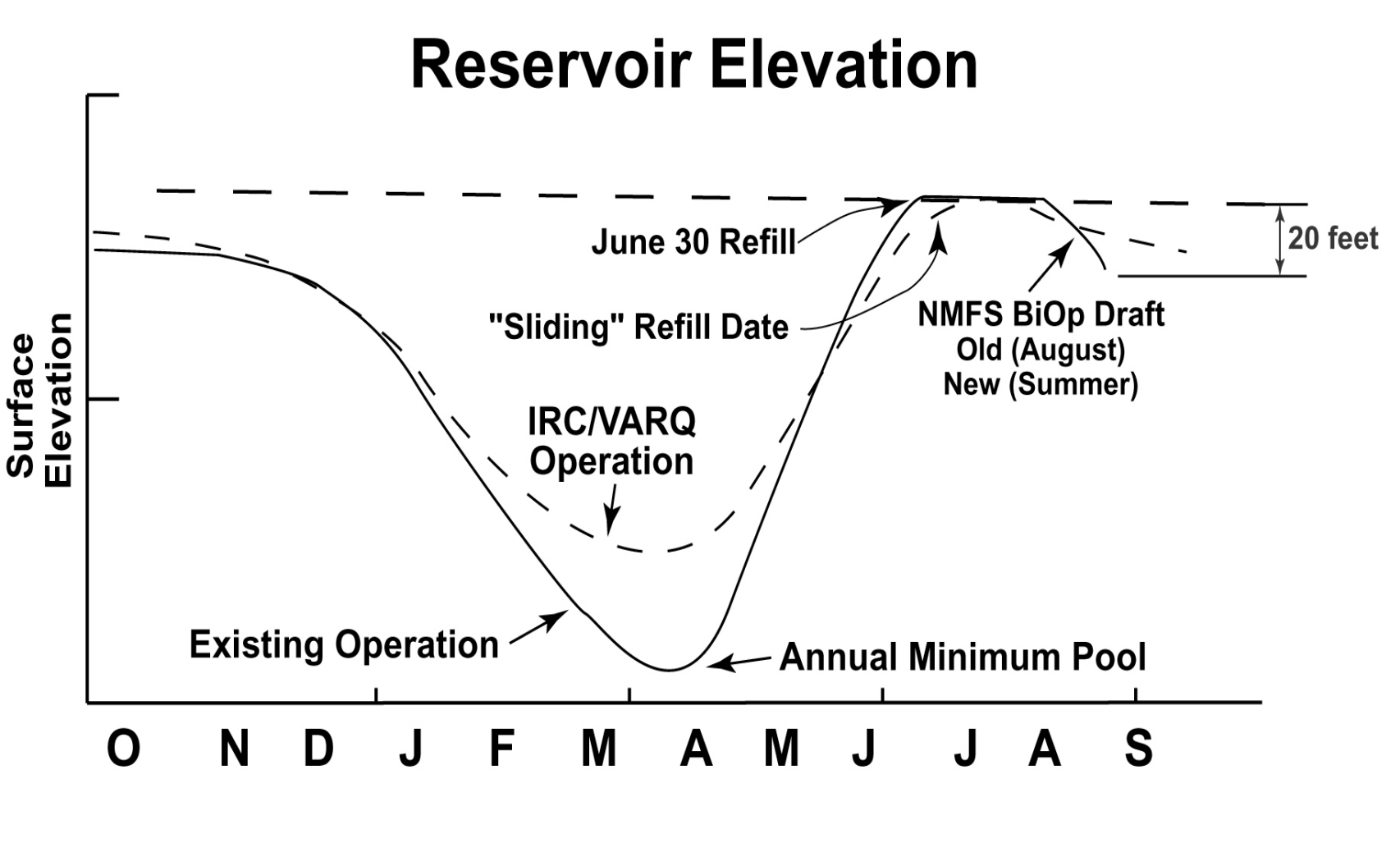
Kootenai Subbasin



Libby Dam - Lake Koocanusa



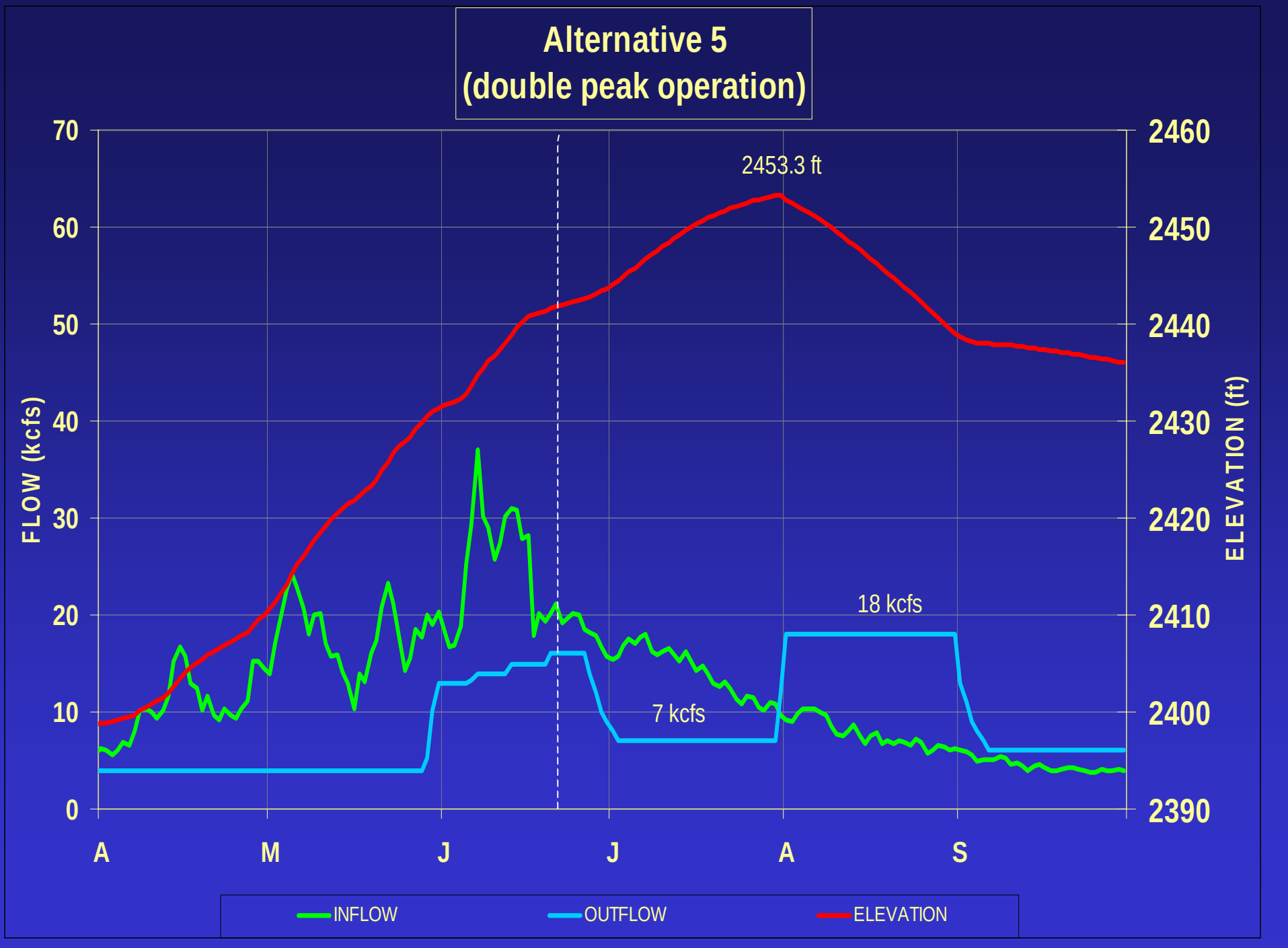

Reservoir Elevation
Surface Elevation
June 30 Refill
"Sliding" Refill Date
IRC/VARQ Operation
Existing Operation
Annual Minimum Pool
NMFS BiOp Draft
Old (August)
New (Summer)
20 feet
O
N
D
J
F
M
A
M
J
J
A
S

Alternative 1
(Flat flow at 12.5 kcfs through Aug 31)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
2446.4 ft
12.5 kcfs
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION

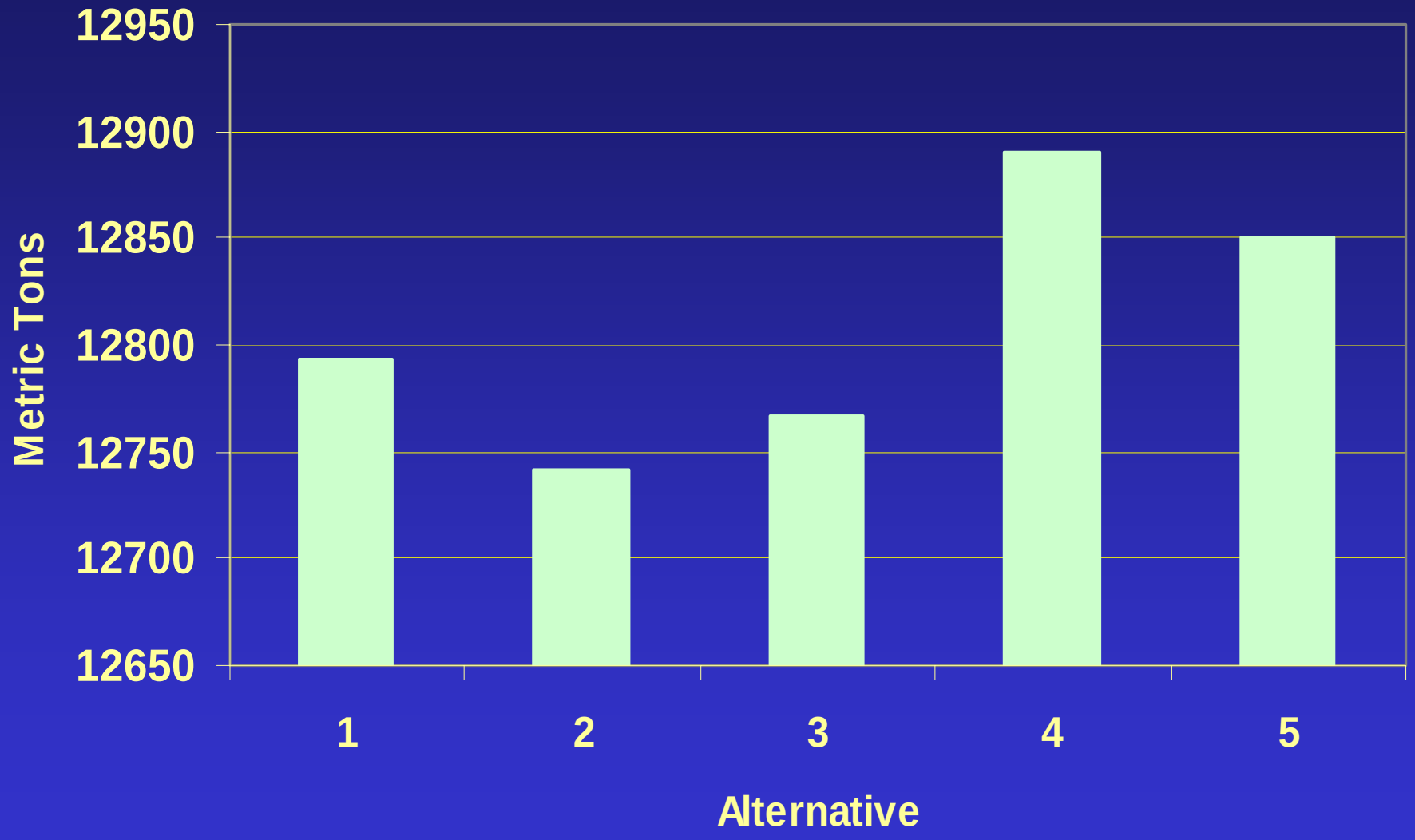
Alternative 2
(steady decreasing flows)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
A
M
J
J
A
S
2443.1 ft
16 kcfs
14 kcfs
12 kcfs
8 kcfs
7 kcfs
6 kcfs
INFLOW
OUTFLOW
ELEVATION

Alternative 3
(steady decreasing flows)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
A
M
J
J
A
S
2443.1 ft
16 kcfs
14 kcfs
12 kcfs
8 kcfs
7 kcfs
6 kcfs
INFLOW
OUTFLOW
ELEVATION

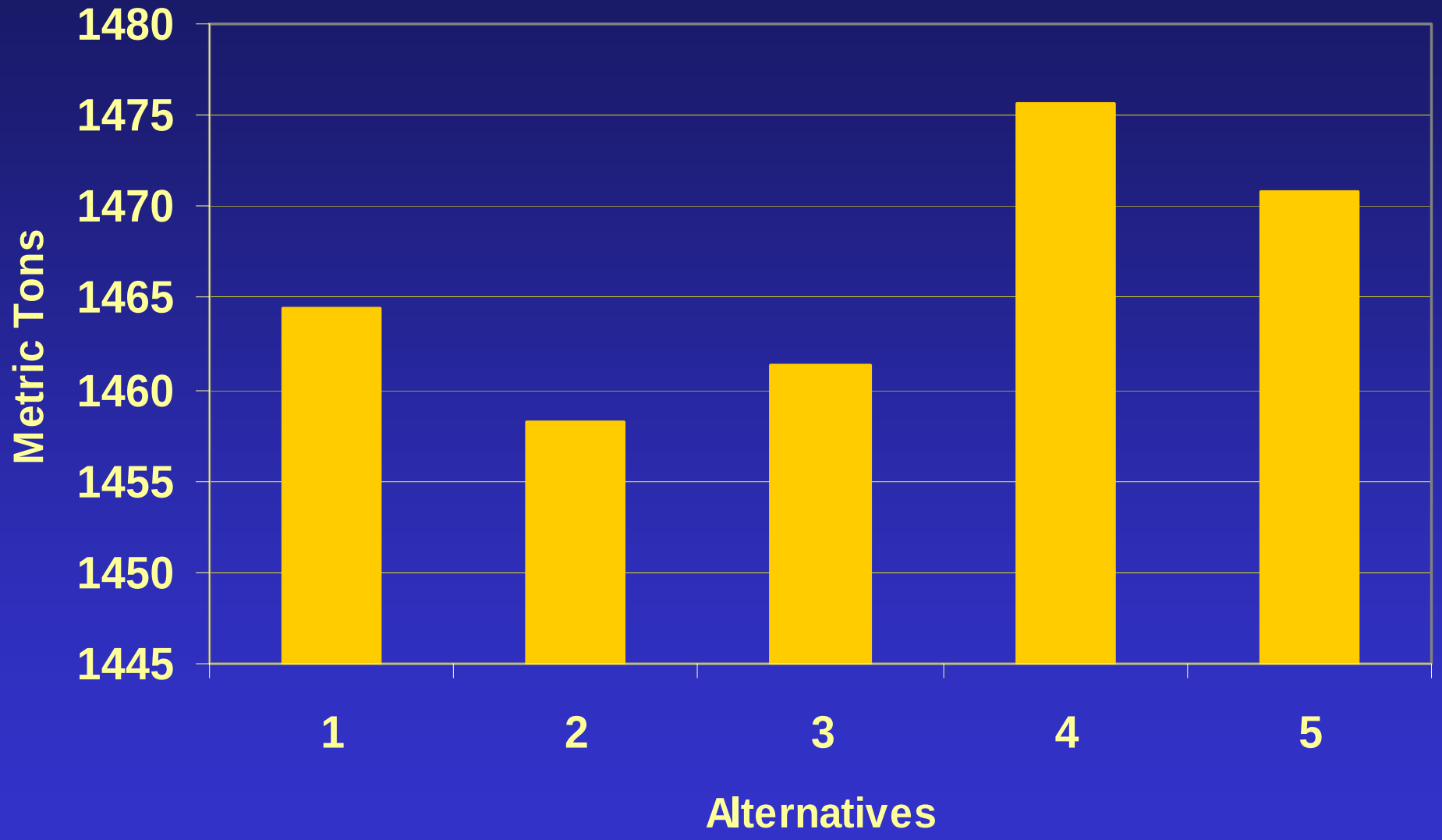
Alternative 4
(flat flow at 10 kcfs)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
2449.3 ft
10 kcfs
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION


Alternative 5
(double peak operation)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
2453.3 ft
18 kcfs
7 kcfs
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION

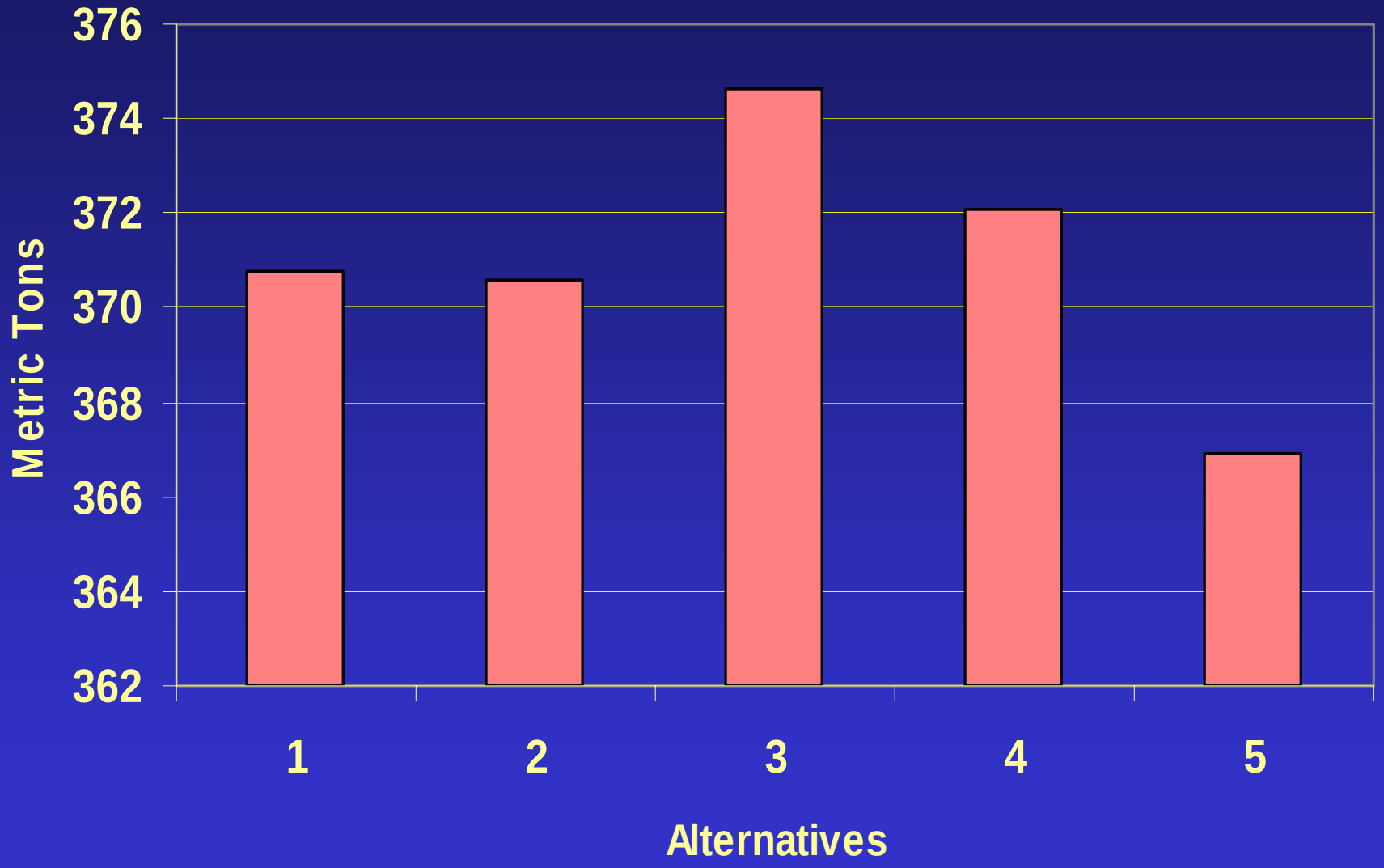
Primary Production Libby Reservoir



Zooplankton Production - Libby Reservoir

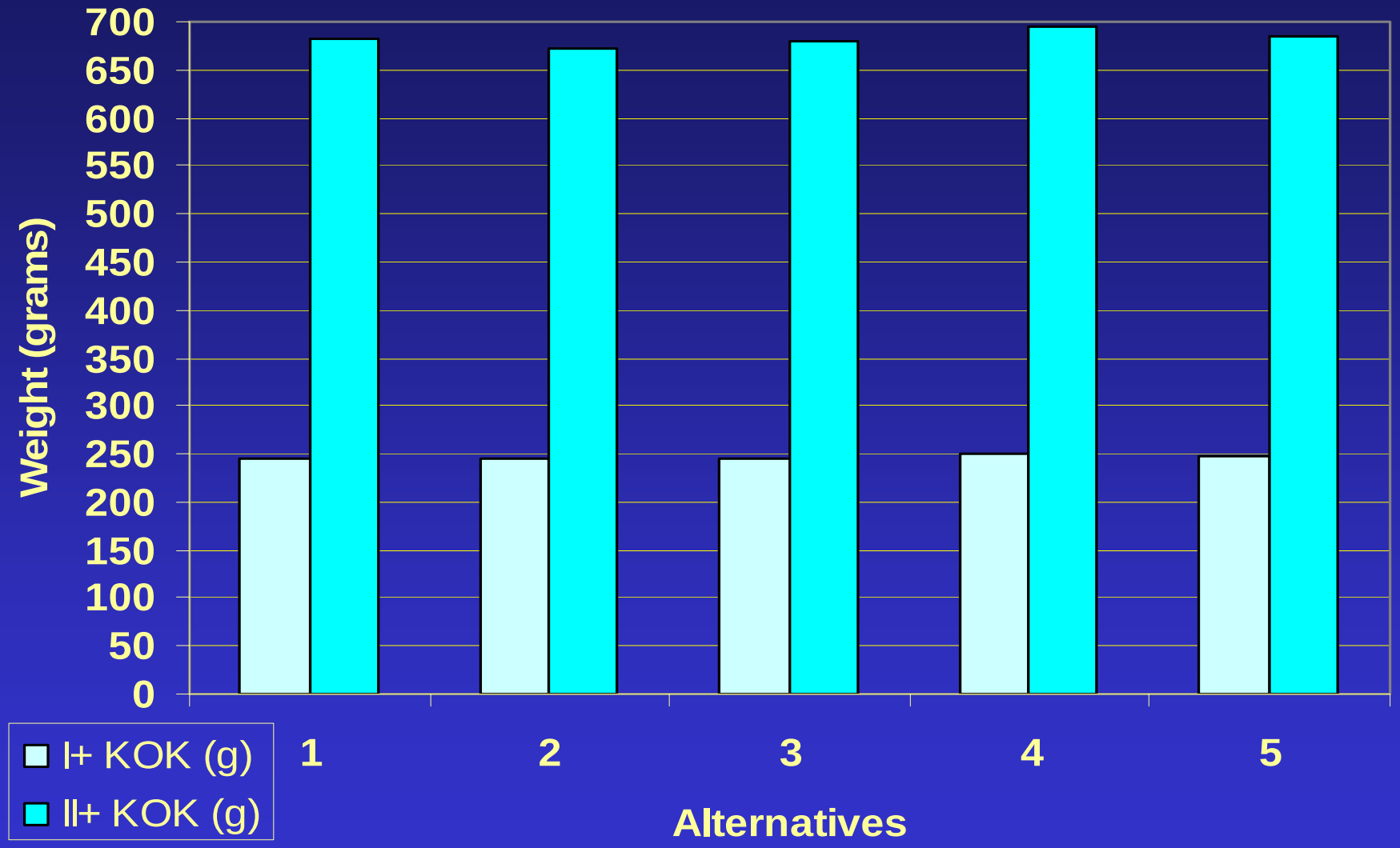


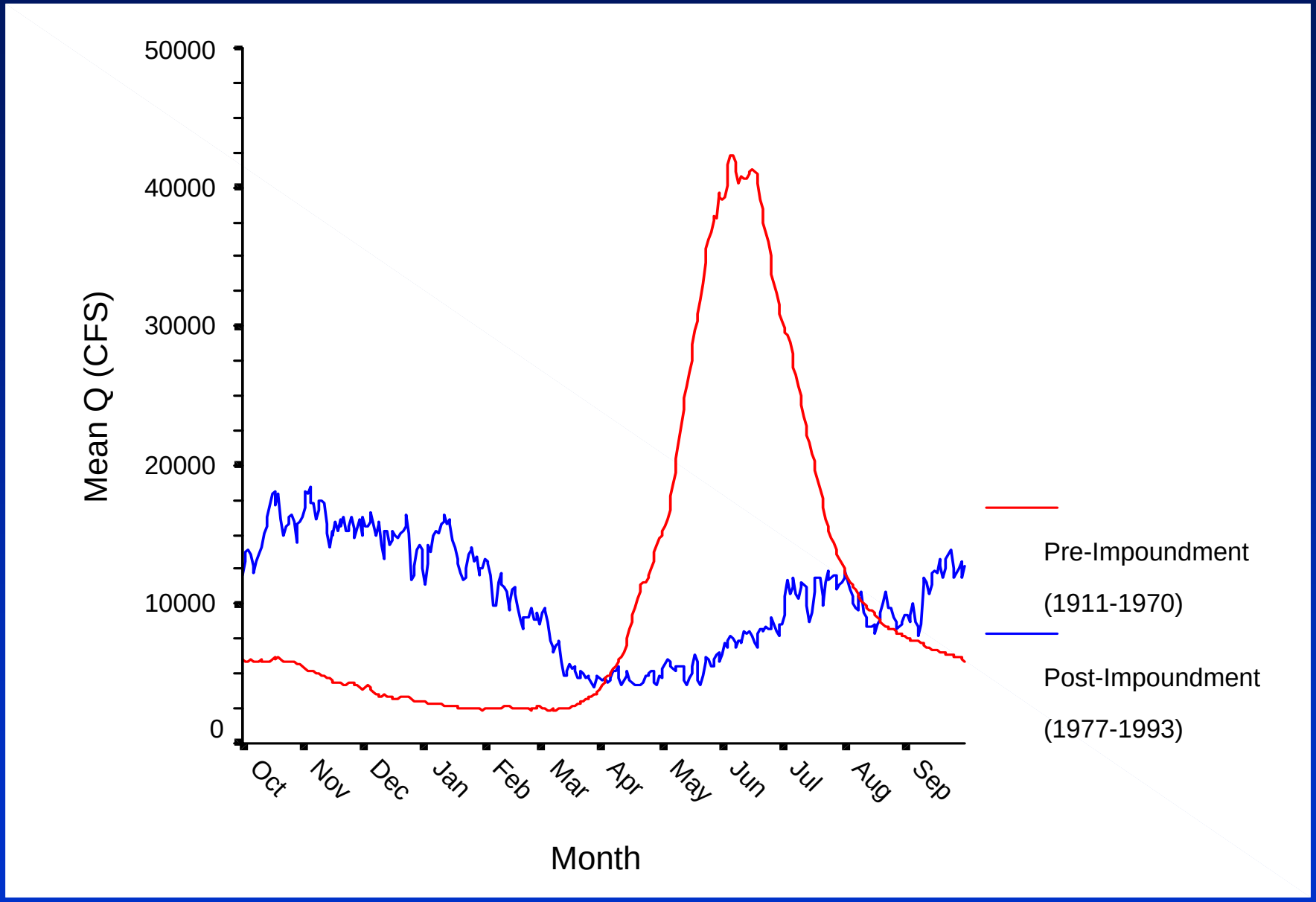
Benthic Production - Libby Reservoir



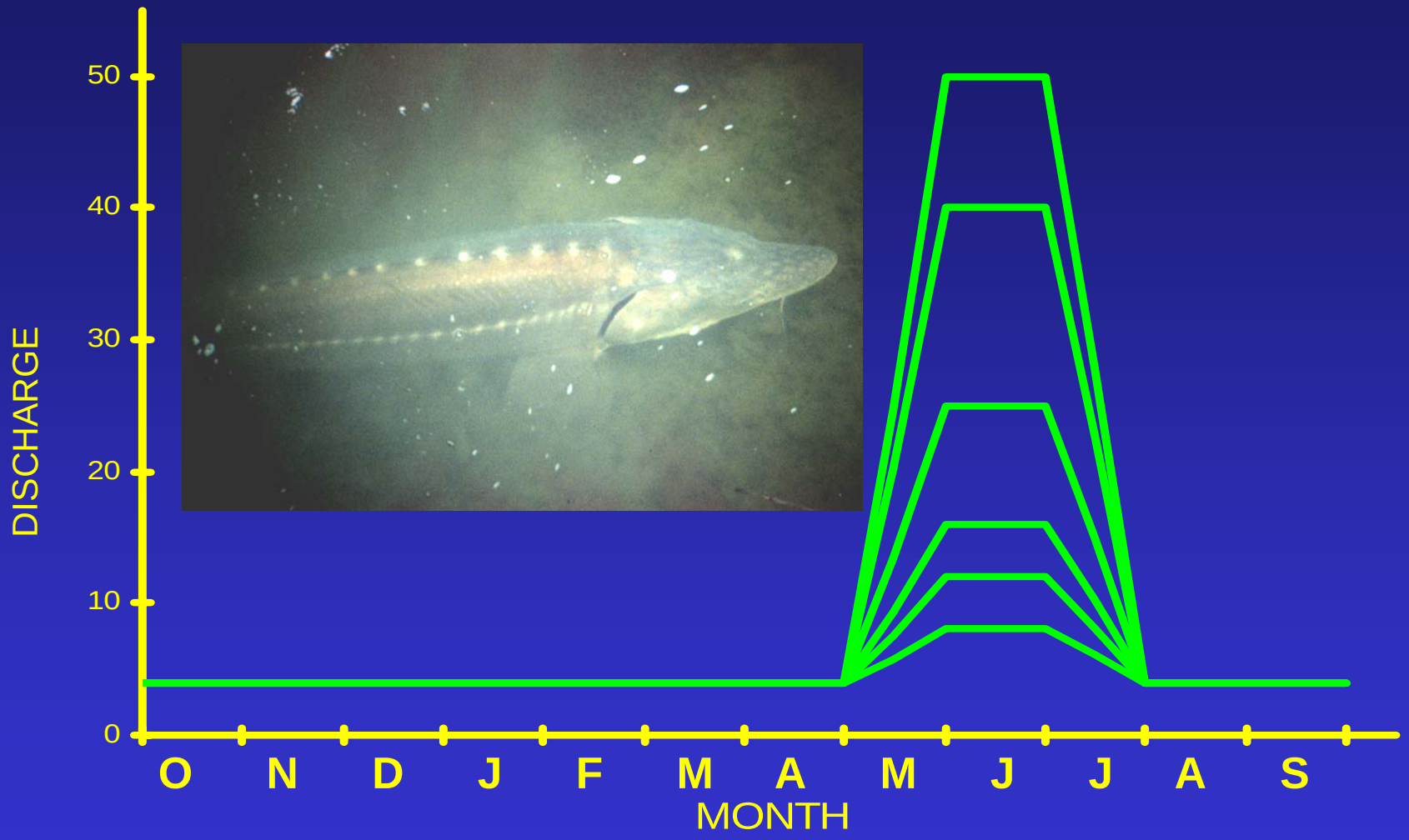
Alternative 3
(steady decreasing flows)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
A
M
J
J
A
S
2443.1 ft
16 kcfs
14 kcfs
12 kcfs
8 kcfs
7 kcfs
6 kcfs
INFLOW
OUTFLOW
ELEVATION

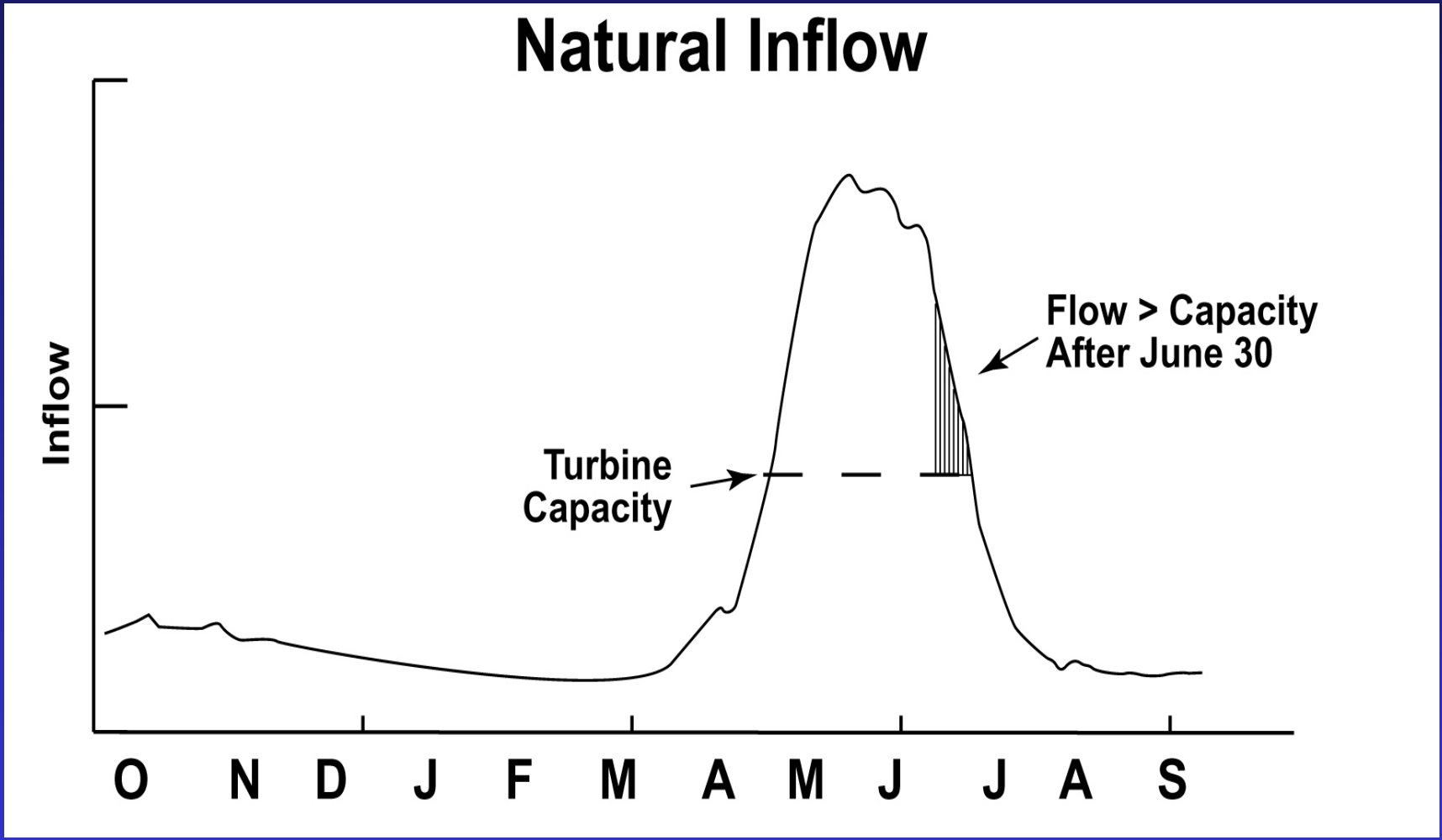
Kokanee Growth - Libby Reservoir

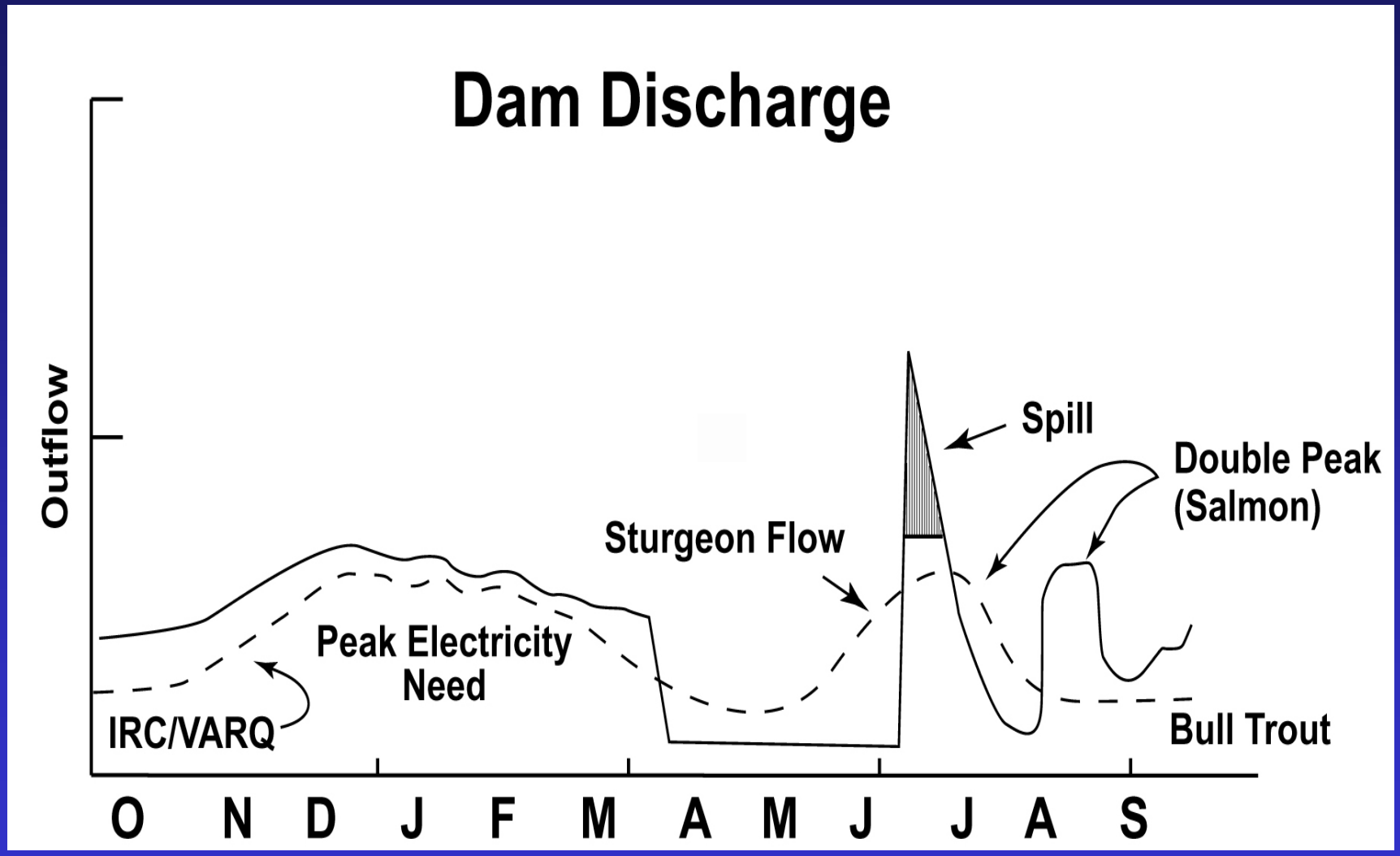


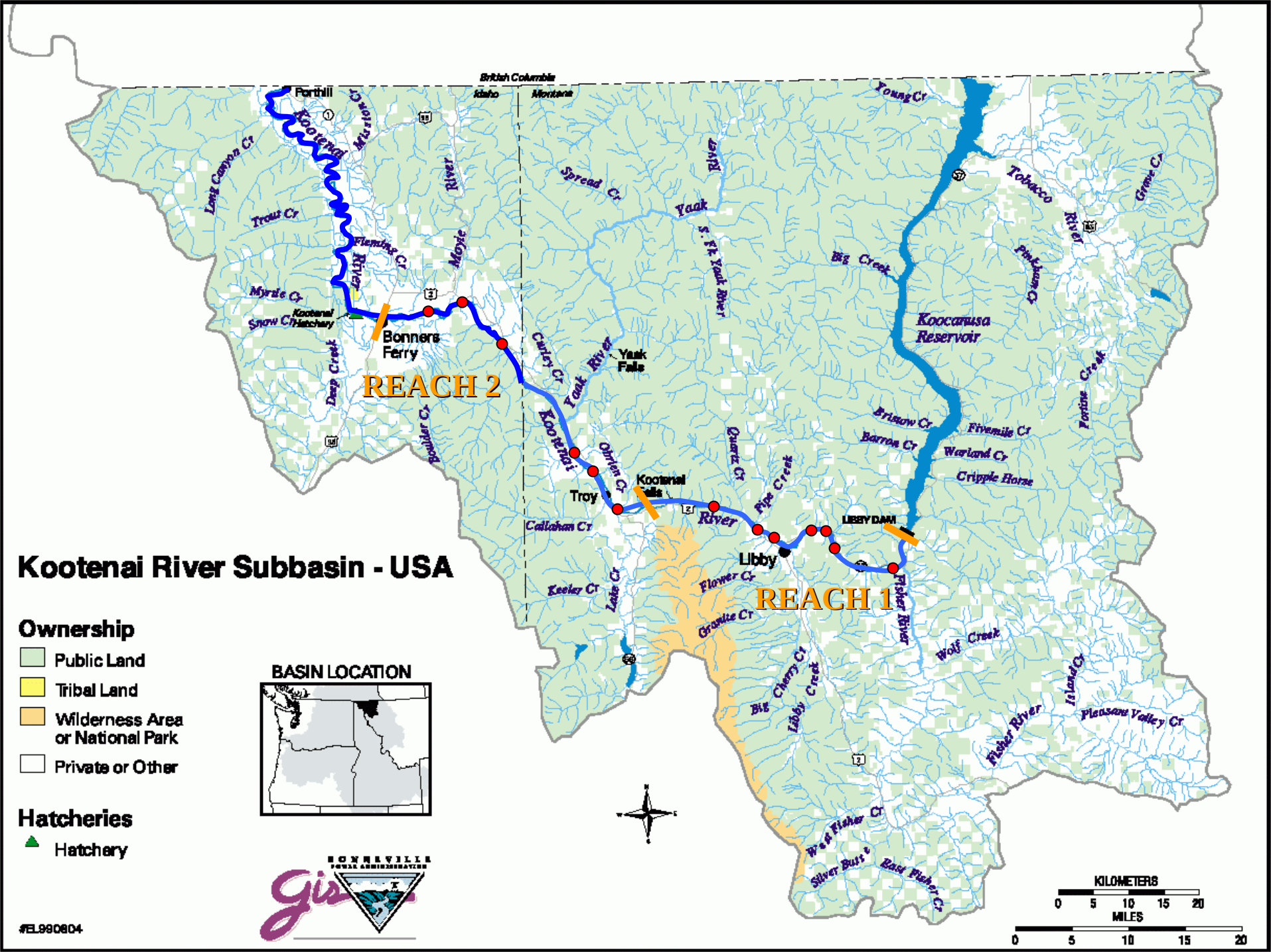

50000
40000
30000
20000
10000
0
Mean Q (CFS)
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Month
Pre-Impoundment
(1911-1970)
Post-Impoundment
(1977-1993)

White Sturgeon Tiered Flows

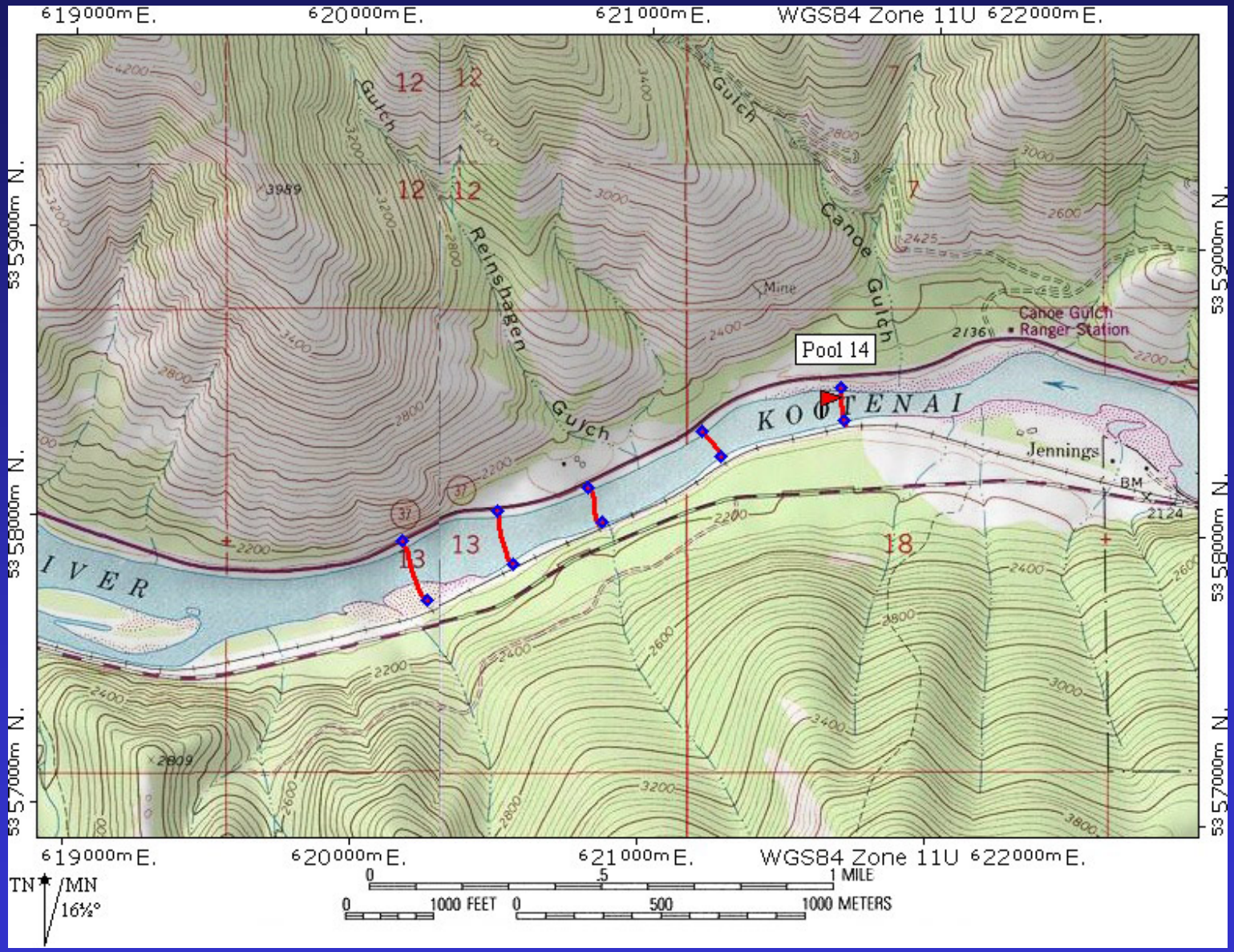



Natural Inflow
Inflow
Flow > Capacity
After June 30
Turbine
Capacity
O
N
D
J
F
M
A
M
J
J
A
S

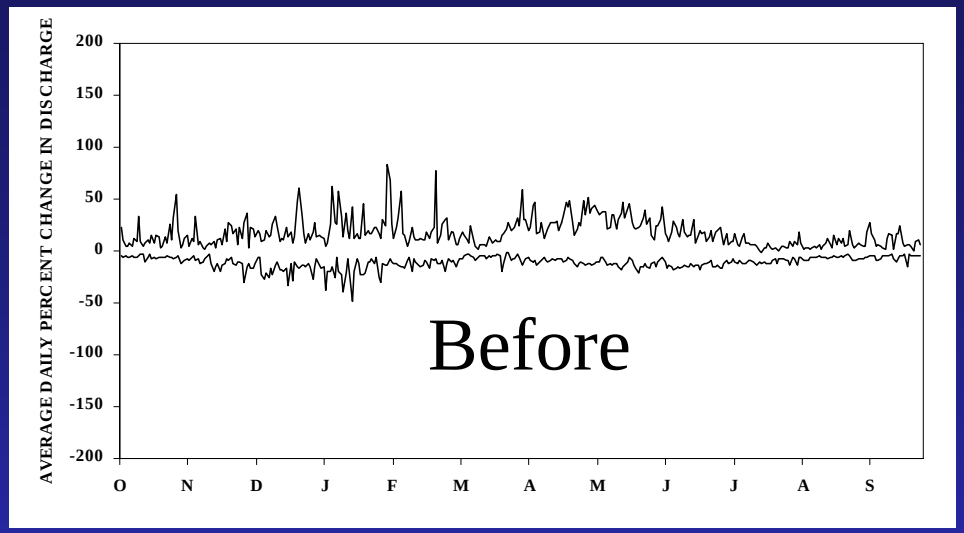

Dam Discharge
Outflow
Spill
Double Peak
(Salmon)
Sturgeon Flow
Peak Electricity
Need
IRC/VARQ
Bull Trout
O
N
D
J
F
M
A
M
J
J
A
S

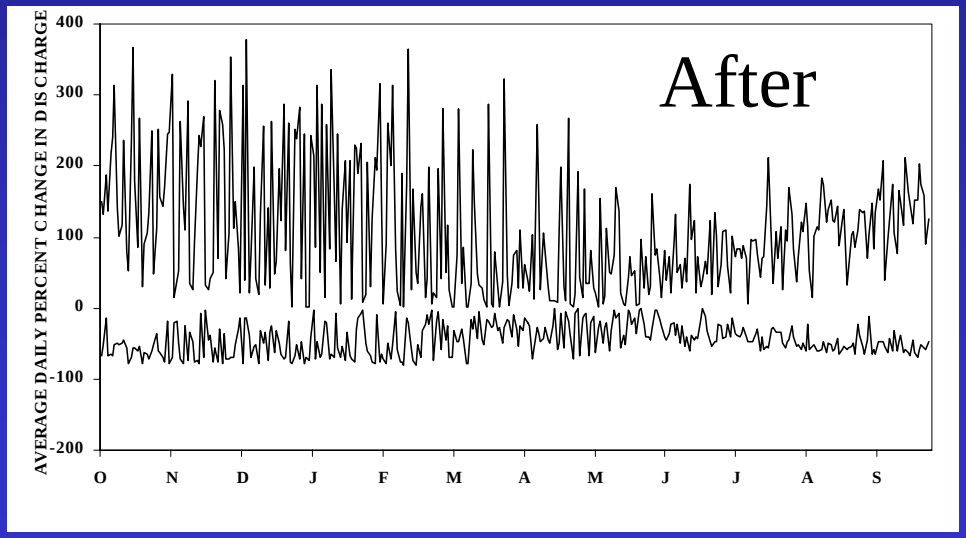

Kootenai River Subbasin - USA
Ownership
Public Land
Tribal Land
Wilderness Area or National Park
Private or Other
Hatcheries
Hatchery
BASIN LOCATION
REACH 2
REACH 1
Porthill
Bonners Ferry
Kootenai Hatchery
Yaak Falls
Troy
Kootenai Falls
Libby
LIBBY DAM
Koocanusa Reservoir
British Columbia
Idaho
Montana
Long Canyon Cr
Trout Cr
Myrtle Cr
Snow Cr
Deep Creek
Fleming Cr
Moyie River
Boulder Cr
Mission Cr
Spread Cr
Yaak River
S. Fk Yaak River
Curley Cr
Callahan Cr
Keeler Cr
Lake Cr
Quartz Cr
Pipe Creek
Flower Cr
Granite Cr
Big Cherry Cr
Libby Creek
Big Creek
Young Cr
Tobacco River
Grave Cr
Pinkham Cr
Fortine Creek
Brimow Cr
Barron Cr
Fivemile Cr
Warland Cr
Cripple Horse
Fisher River
Wolf Creek
Island Cr
Pleasant Valley Cr
West Fisher Cr
Silver Butte
East Fisher Cr
KILOMETERS
0 5 10 15 20
MILES
0 5 10 15 20
#EL990804

Pool 14: GPS-based transects



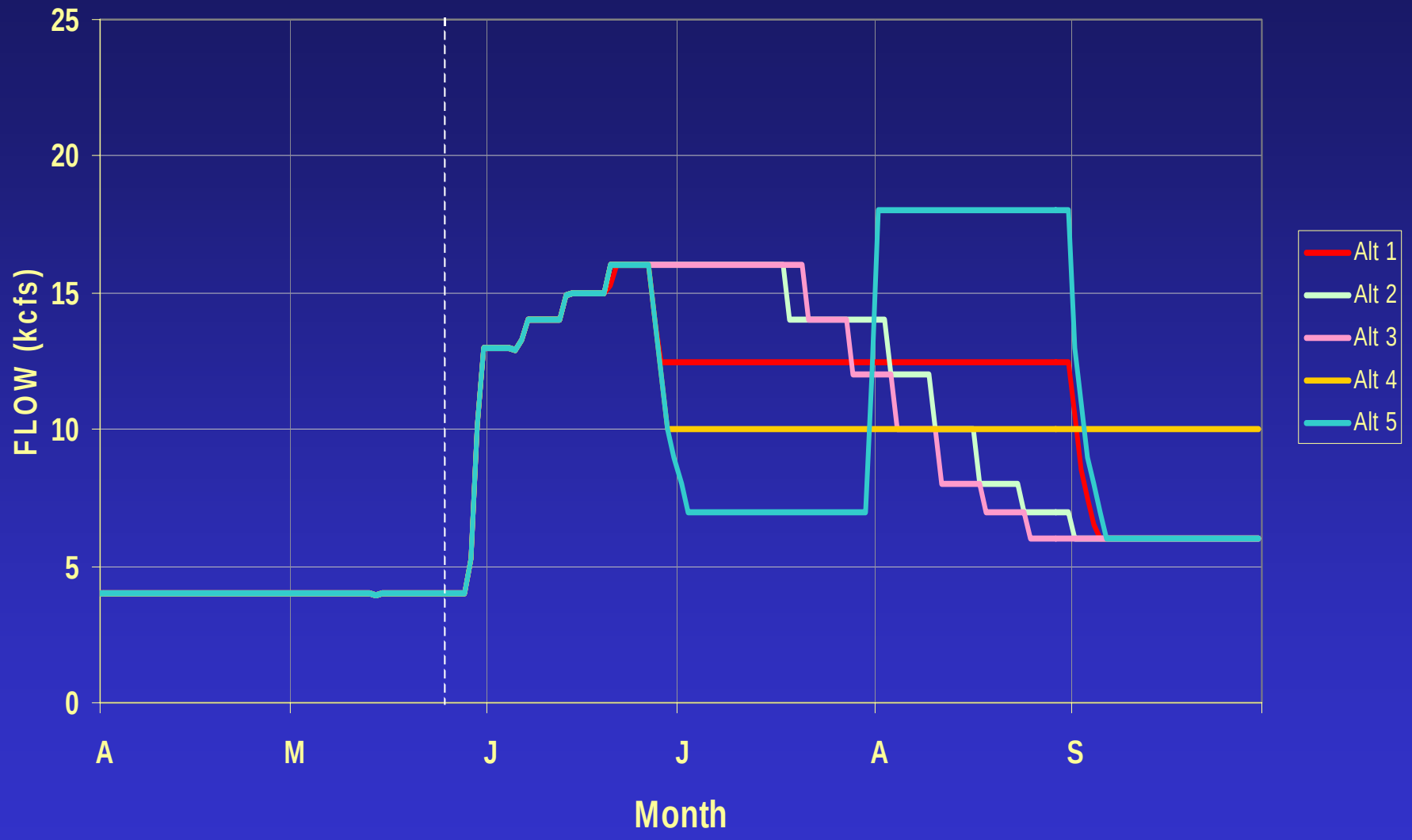
Daily Discharge Variability

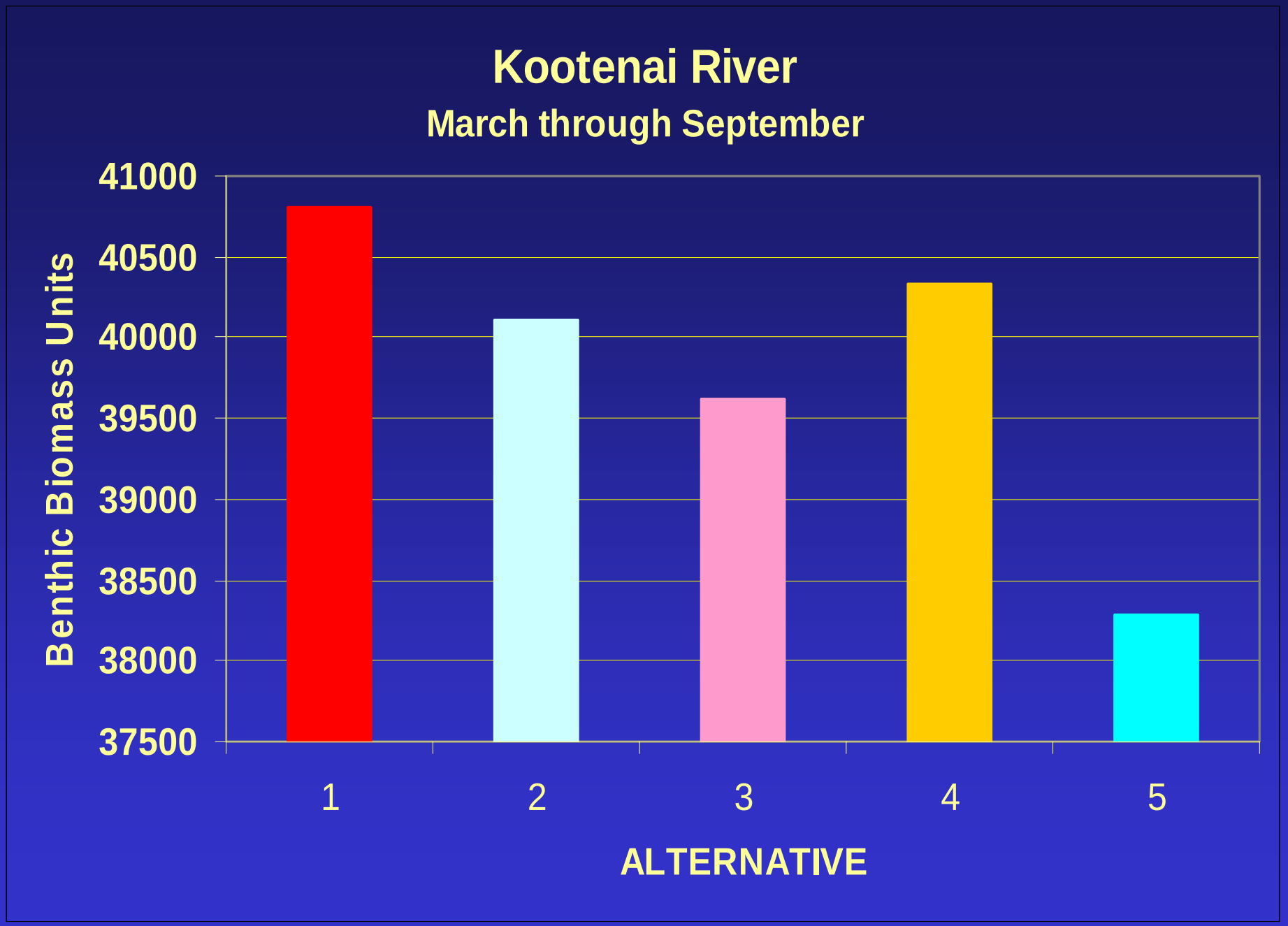


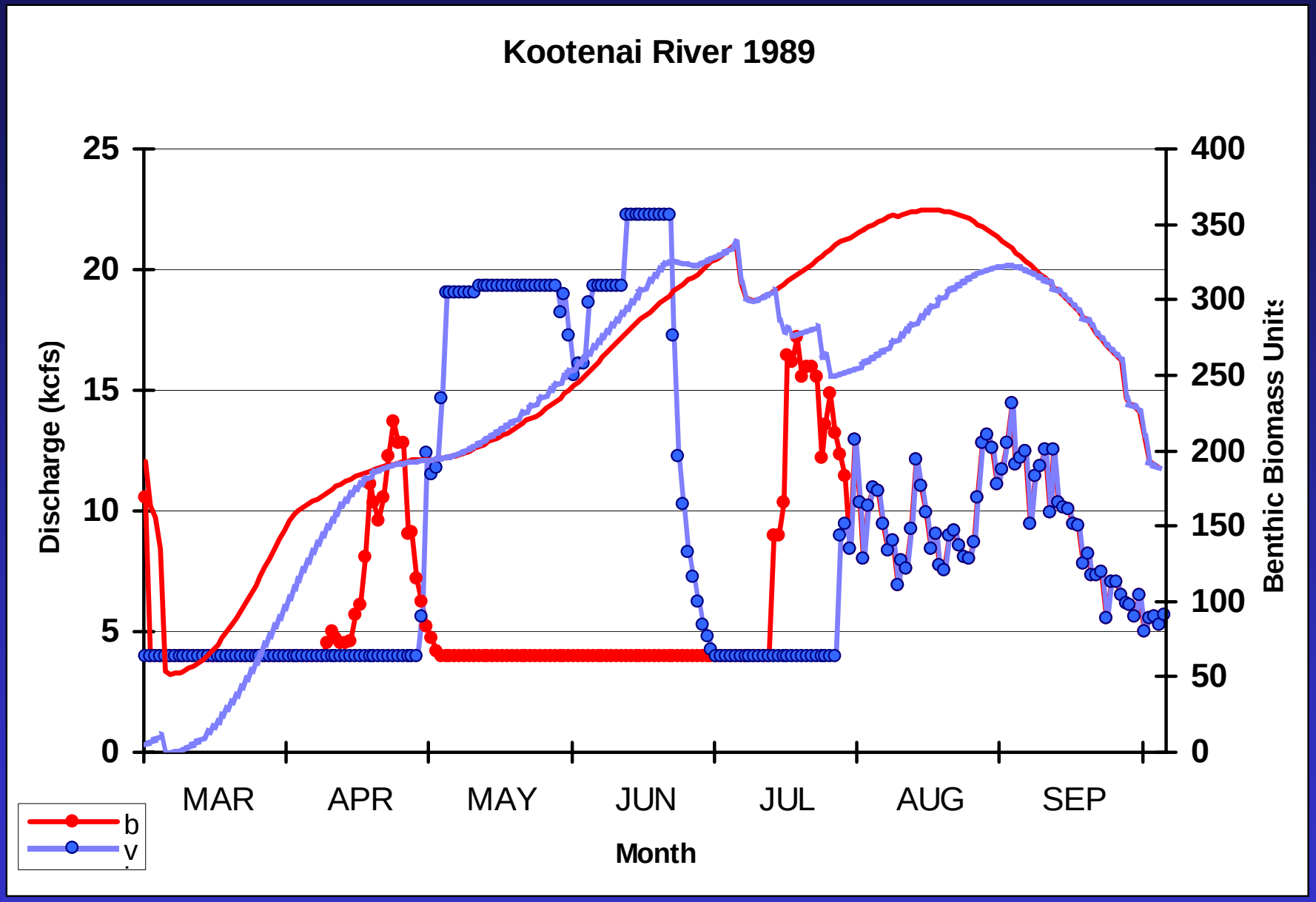


Rehabilitate primary and secondary productivity
Restore the quantity, seasonal pattern, and stability of stream flows and reservoir conditions

Discharge Alternatives




Kootenai River
March through September
Benthic Biomass Units
41000
40500
40000
39500
39000
38500
38000
37500
1
2
3
4
5
ALTERNATIVE


Kootenai River 1989
Discharge (kcfs)
Benthic Biomass Units
25
20
15
10
5
0
400
350
300
250
200
150
100
50
0
MAR
APR
MAY
JUN
JUL
AUG
SEP
Month
b
v

Bull Trout