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

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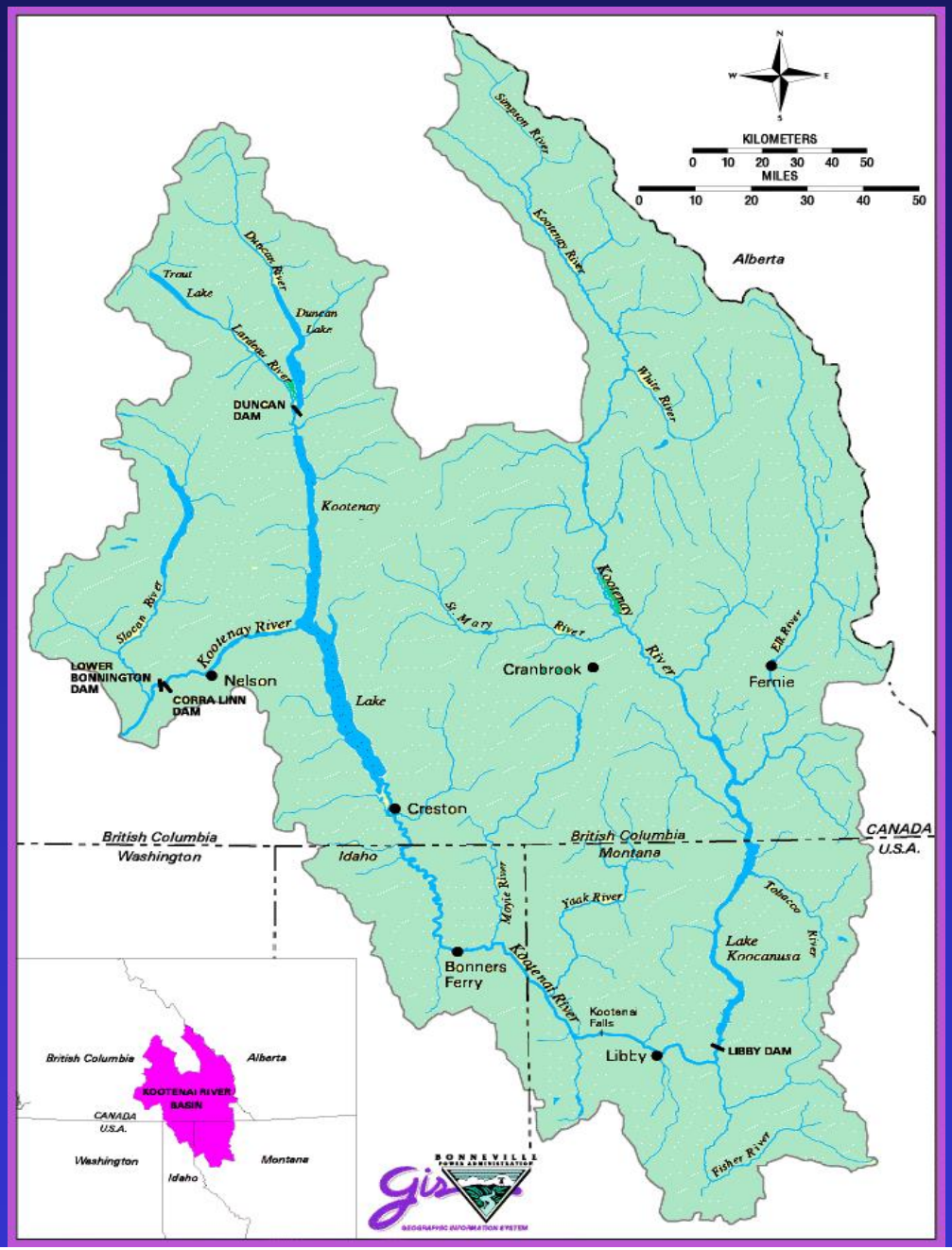
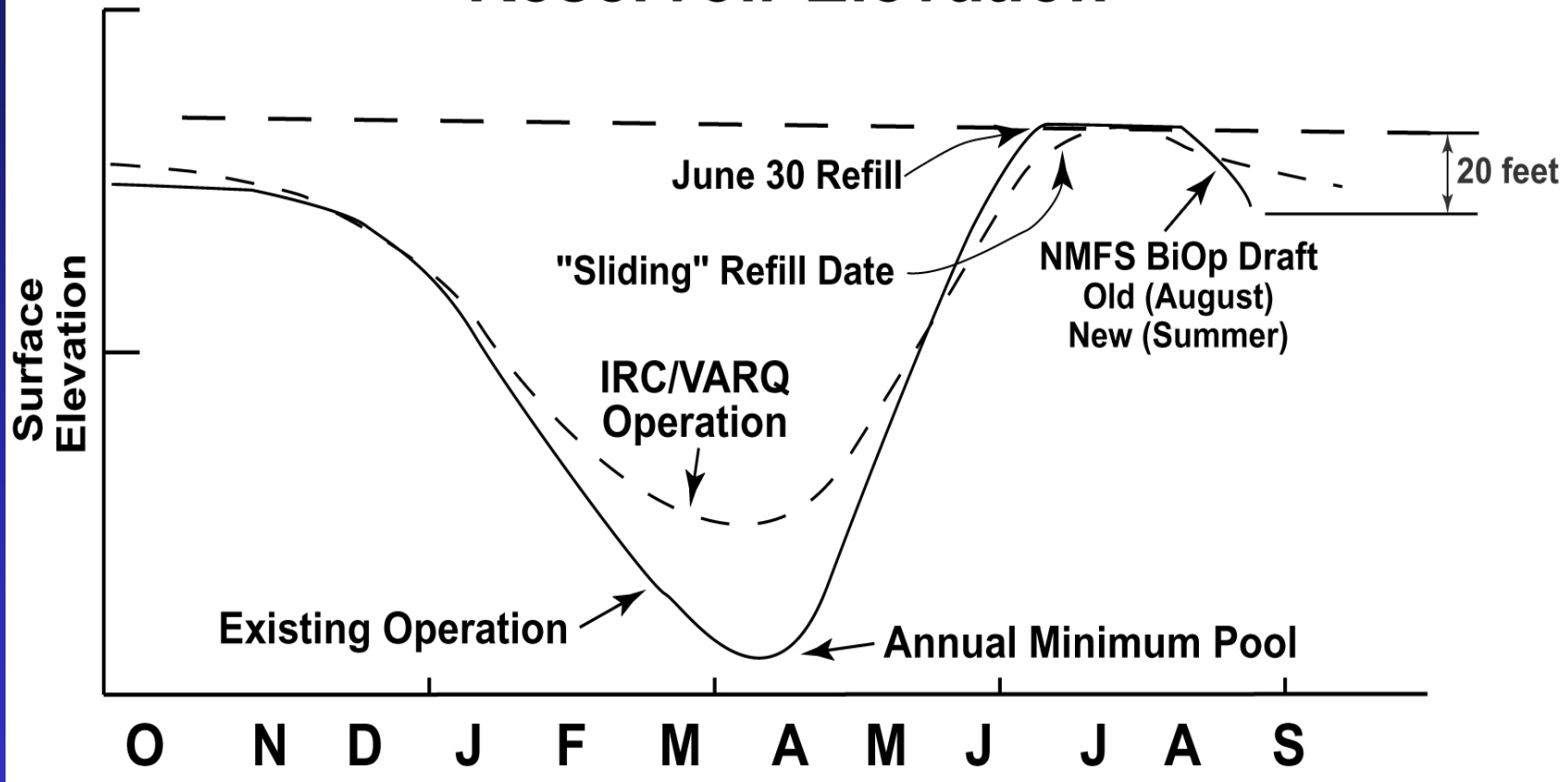
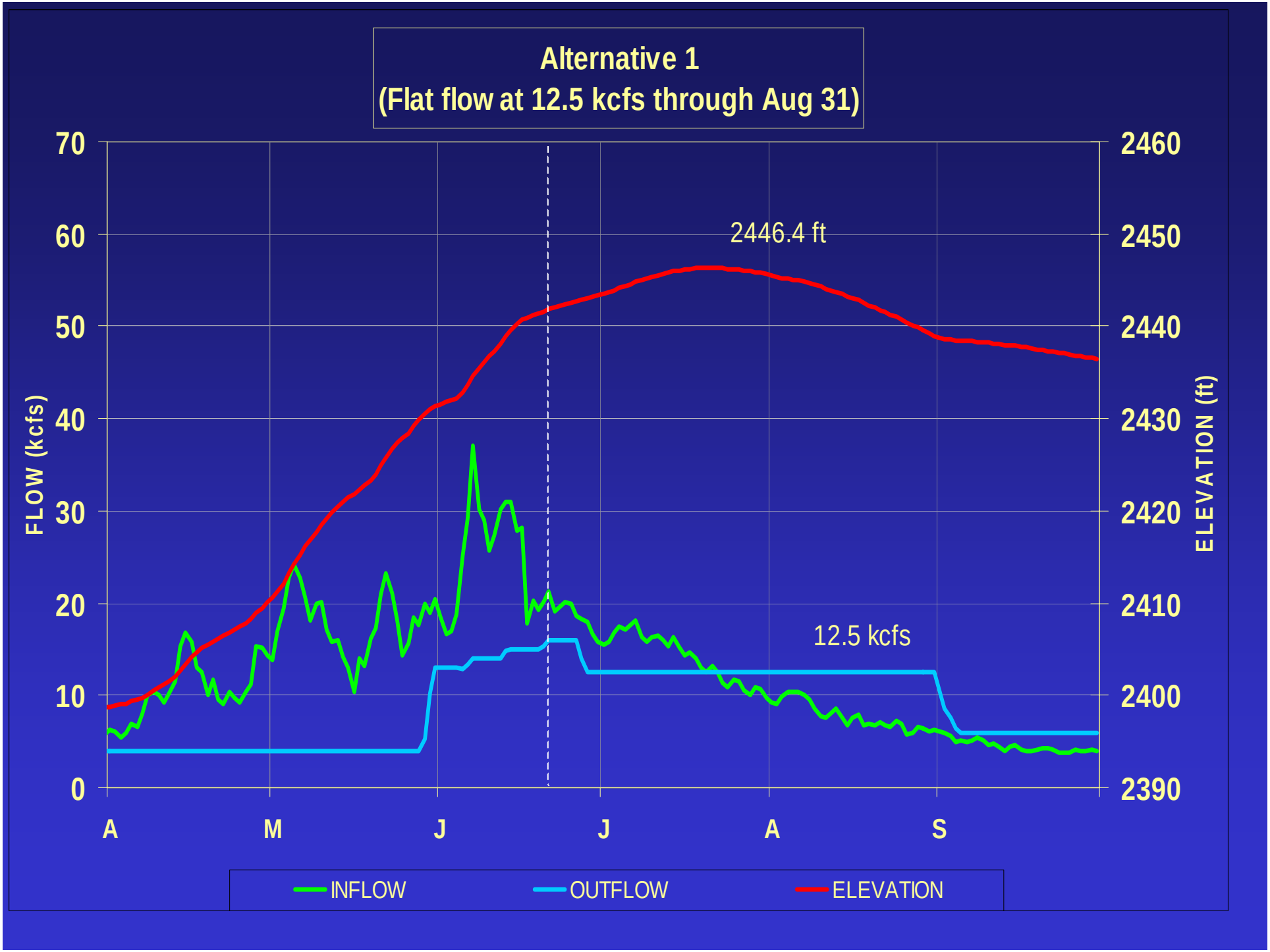
Kootenai Subbasin

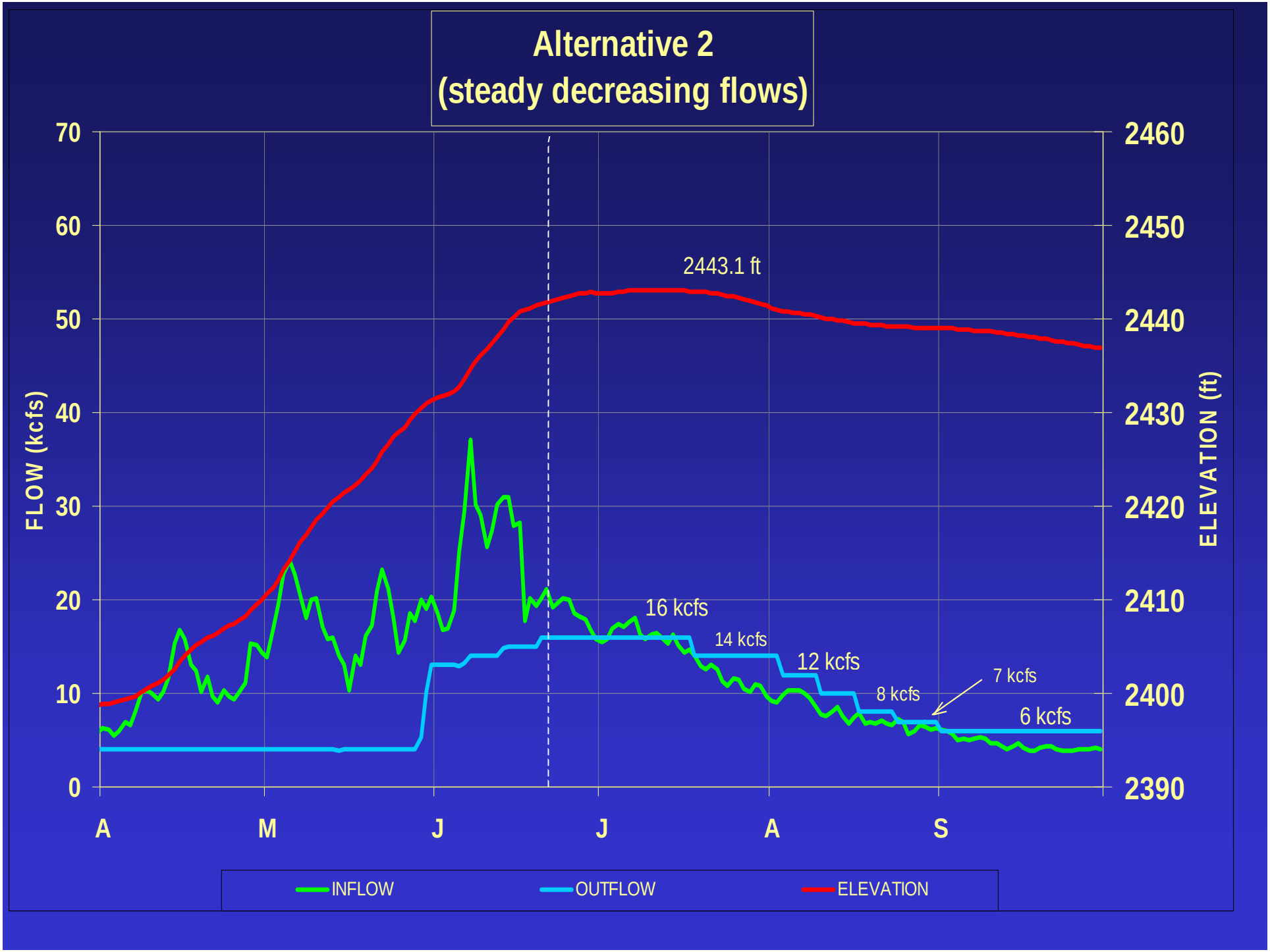


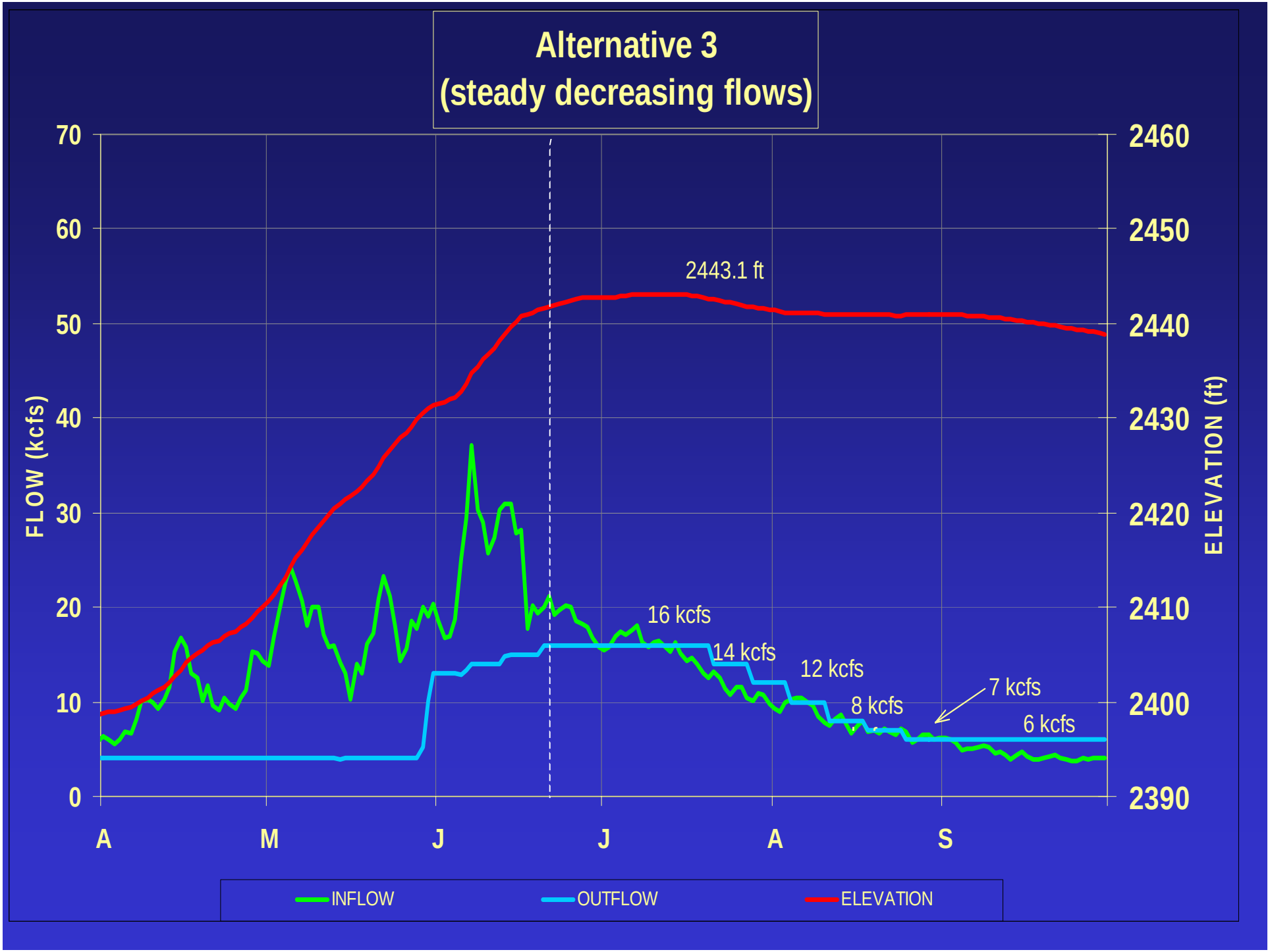
Libby Dam - Lake Koocanusa

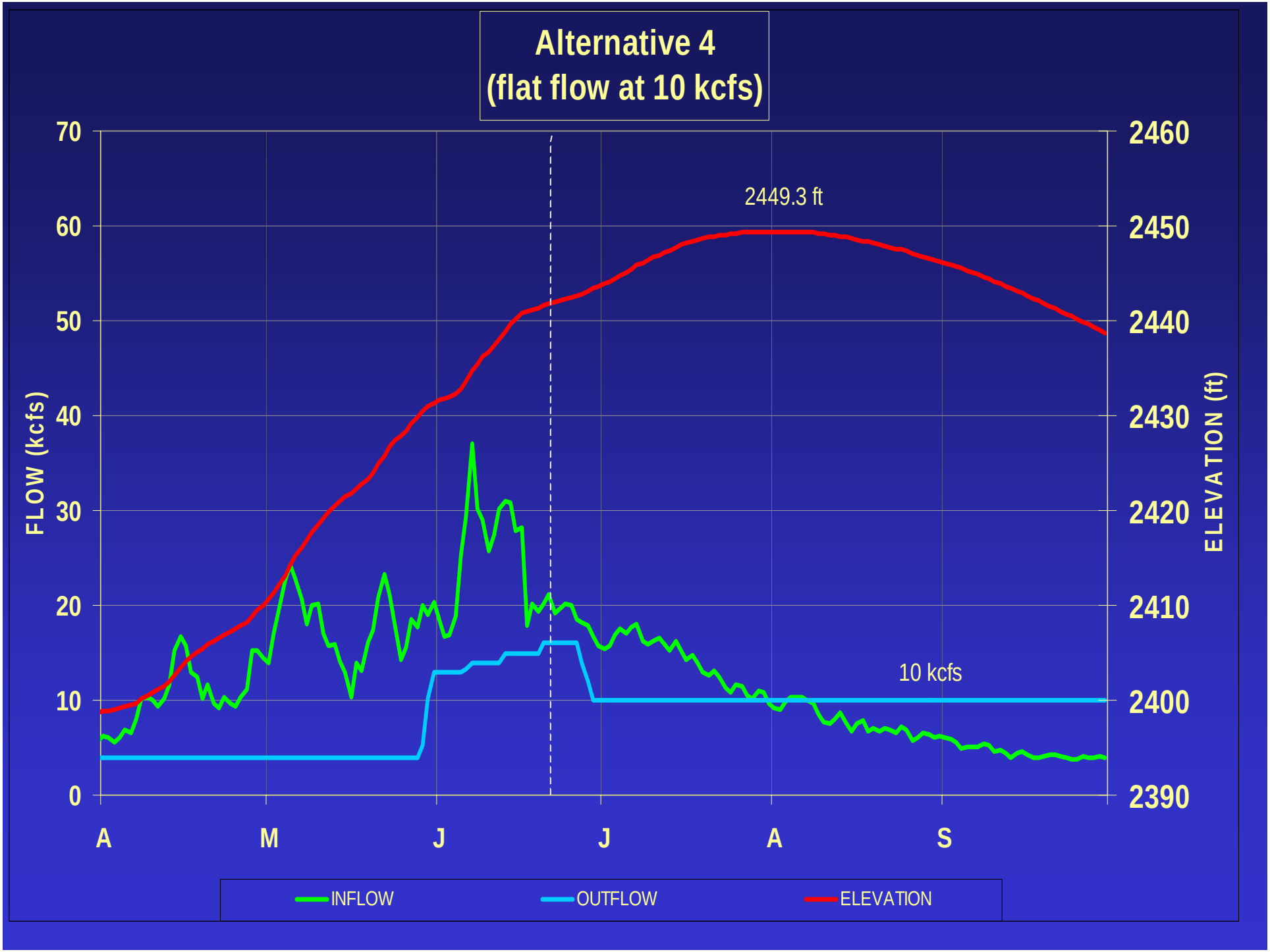
Reservoir Elevation

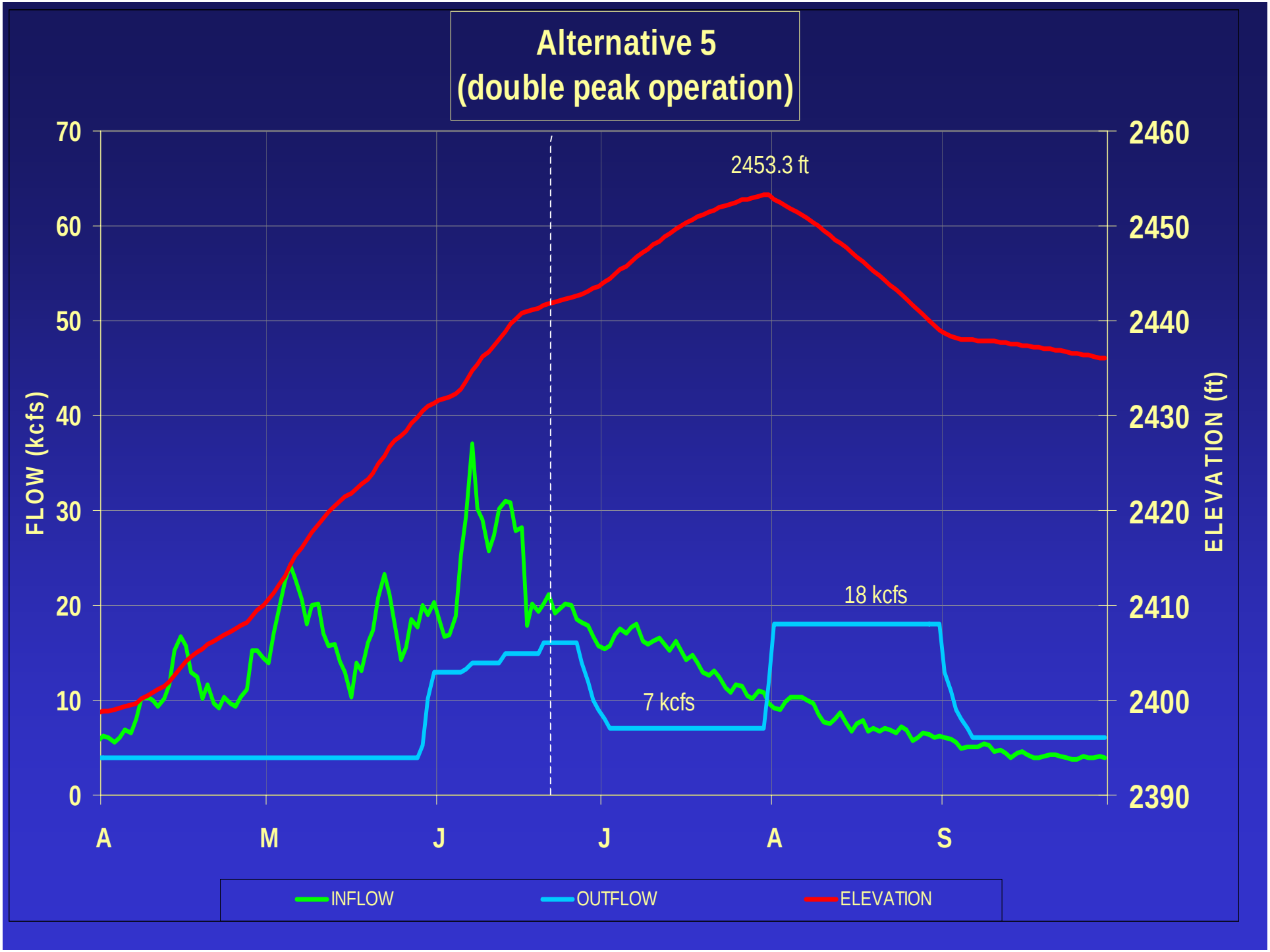


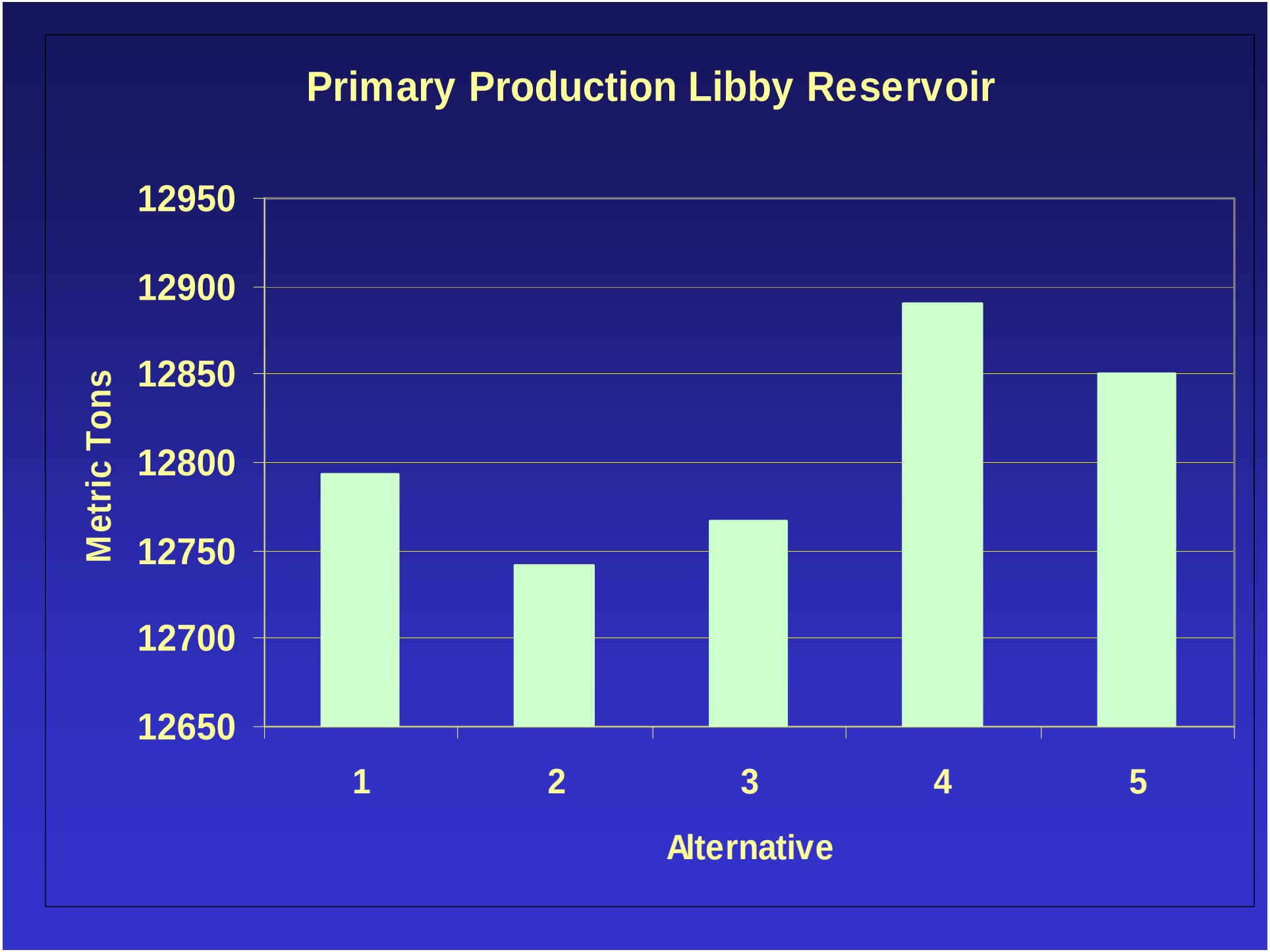

Alternative 1
(Flat flow at 12.5 kcfs through Aug 31)
70
60
50
40
30
20
10
0
FLOW (kcfs)
2460
2450
2440
2430
2420
2410
2400
2390
ELEVATION (ft)
2446.4 ft
12.5 kcfs
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION


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
2443.1 ft
16 kcfs
14 kcfs
12 kcfs
8 kcfs
7 kcfs
6 kcfs
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION

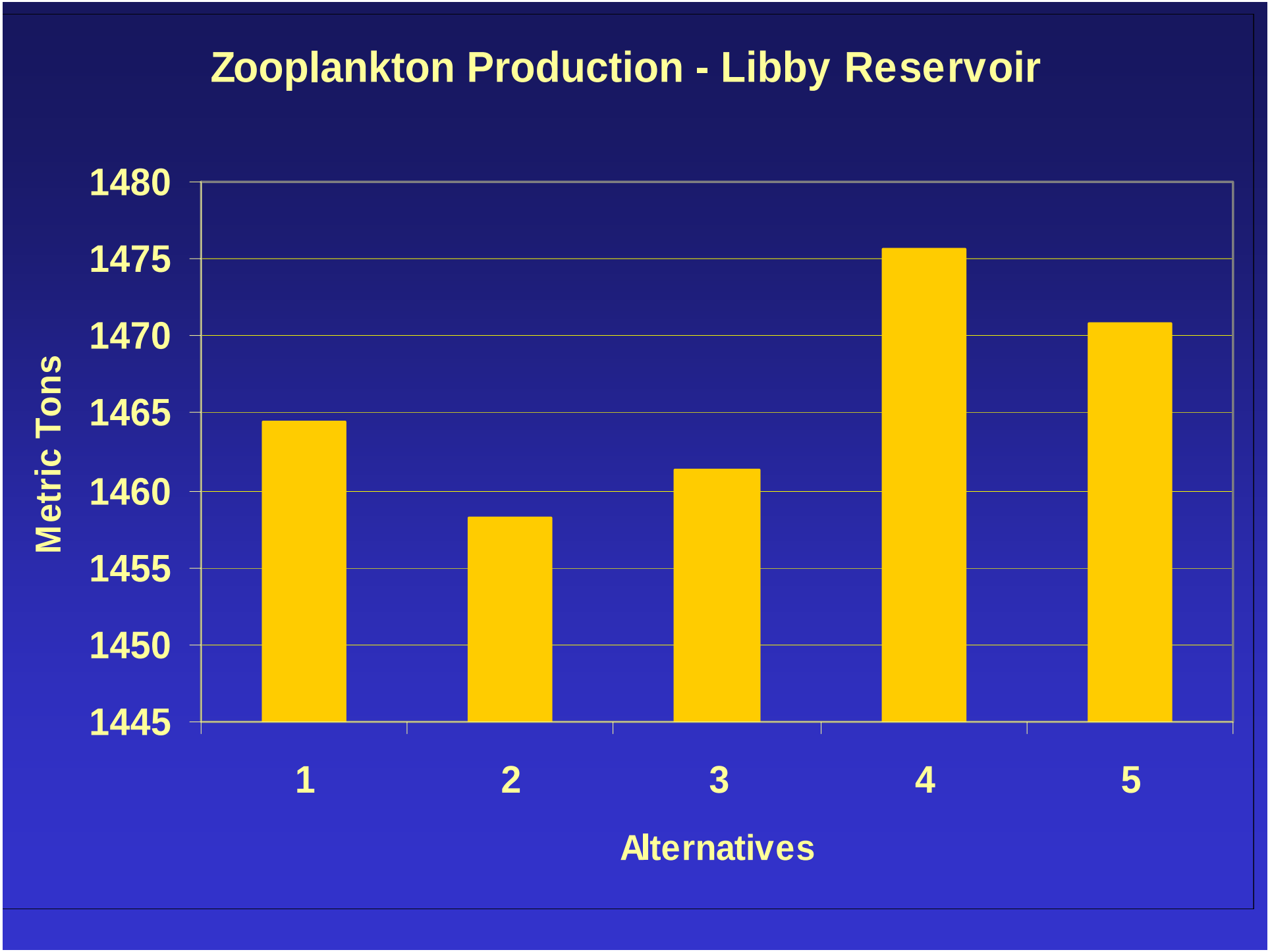

Alternative 3
(steady decreasing flows)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
2443.1 ft
16 kcfs
14 kcfs
12 kcfs
8 kcfs
7 kcfs
6 kcfs
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION

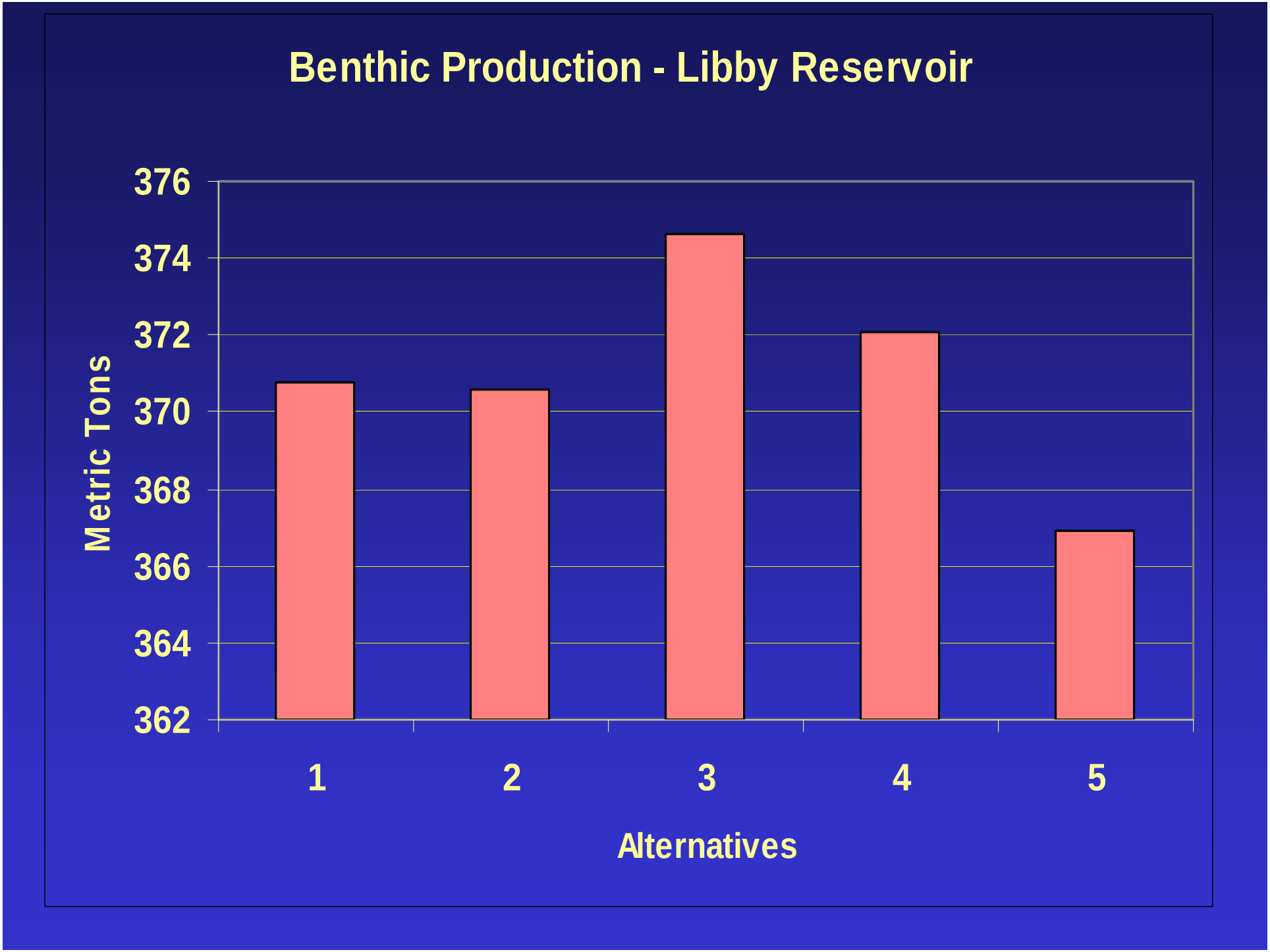

Alternative 4
(flat flow at 10 kcfs)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
2449.3 ft
10 kcfs
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION

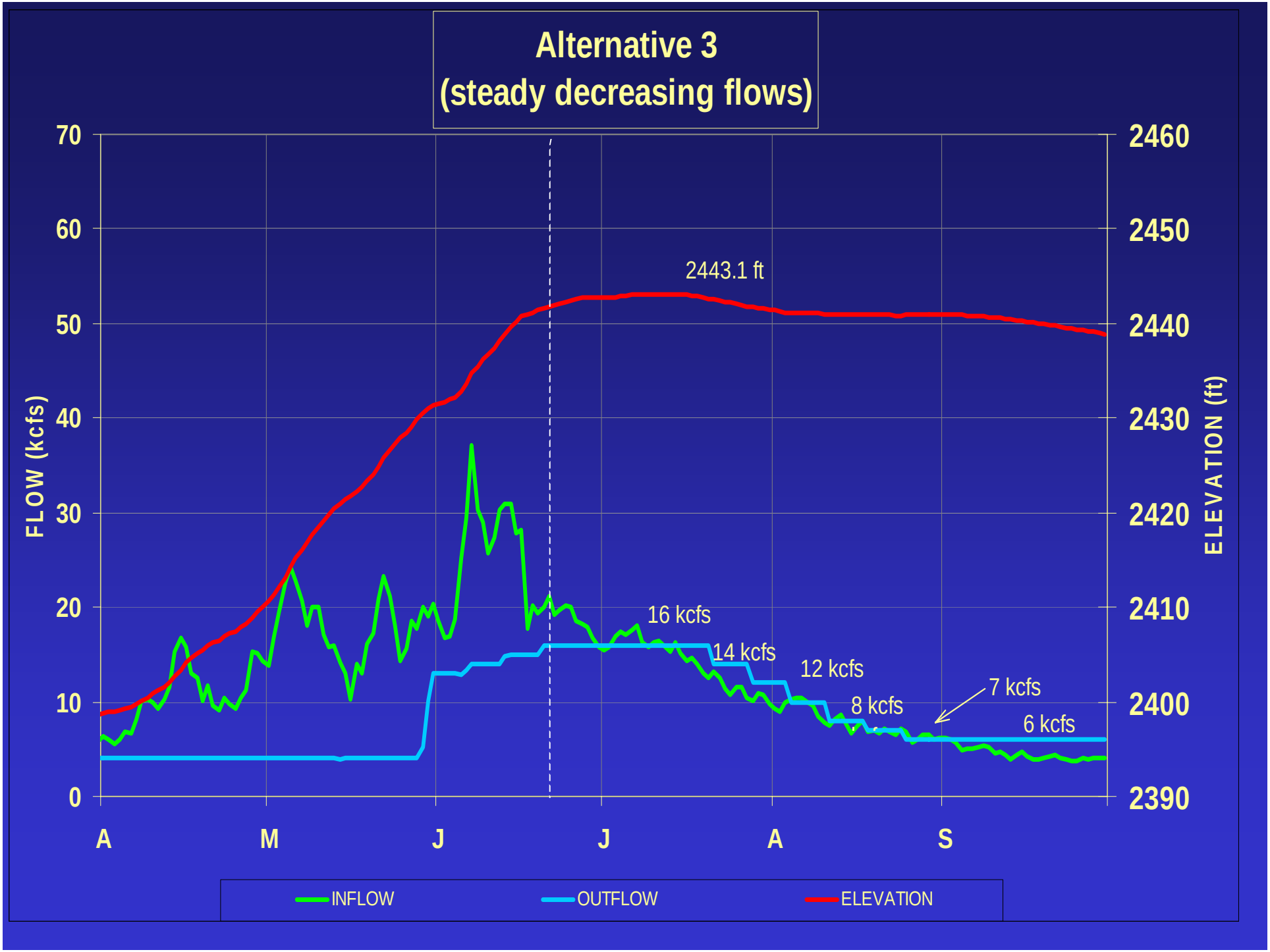

Alternative 5
(double peak operation)
2453.3 ft
18 kcfs
7 kcfs
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION

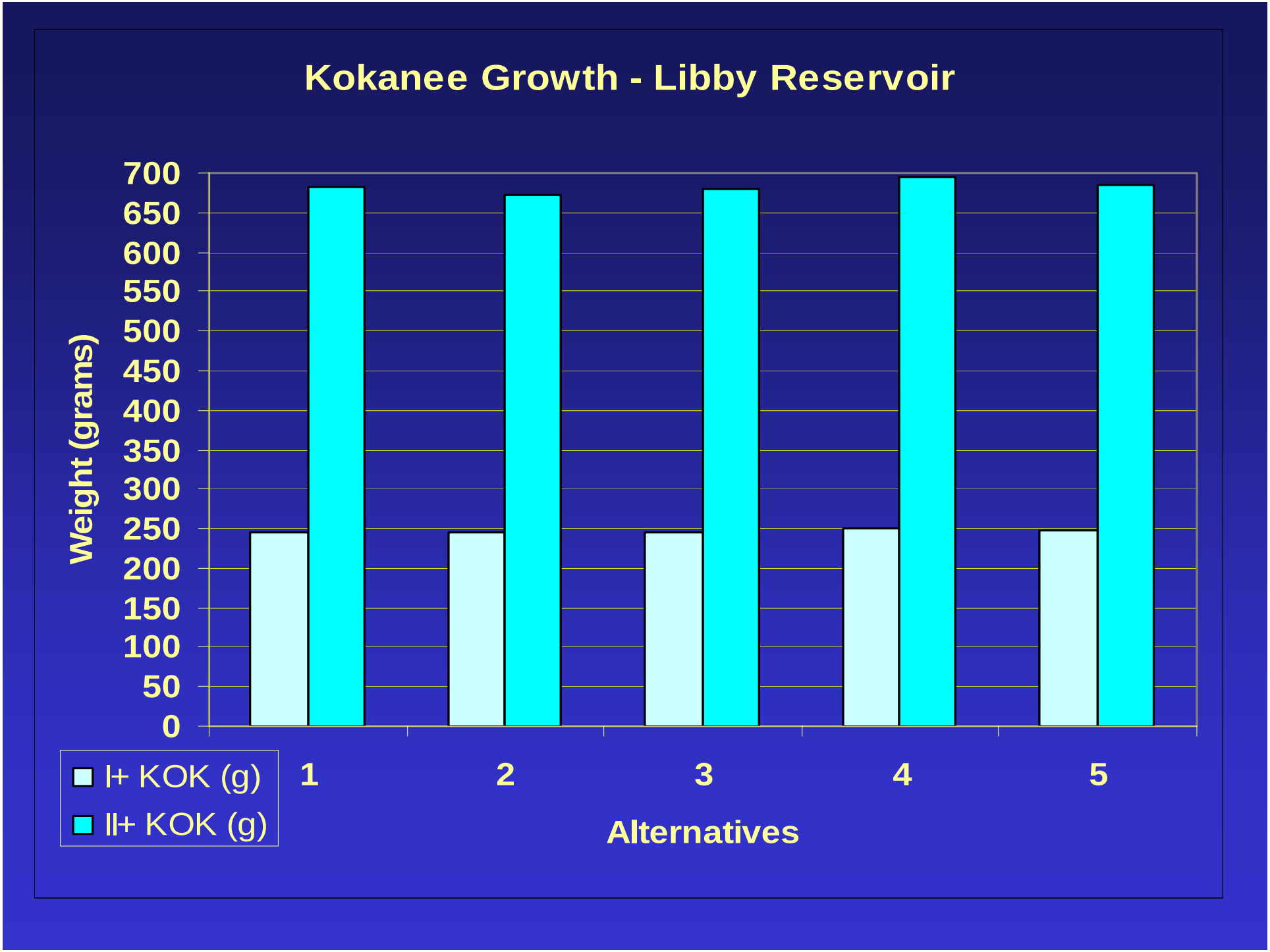

Primary Production Libby Reservoir
12950
12900
12850
12800
12750
12700
12650
Metric Tons
1
2
3
4
5
Alternative

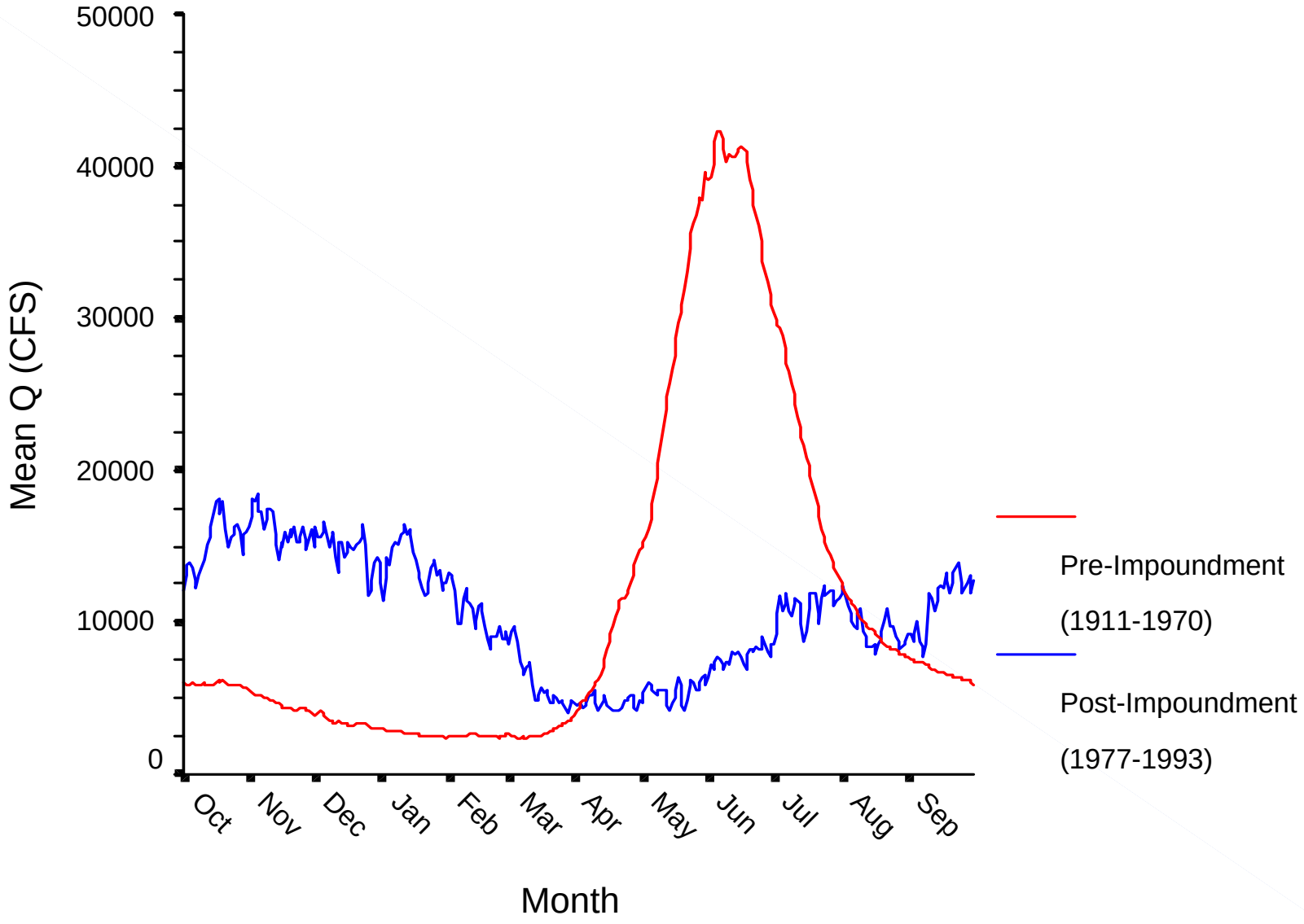
Zooplankton Production - Libby Reservoir



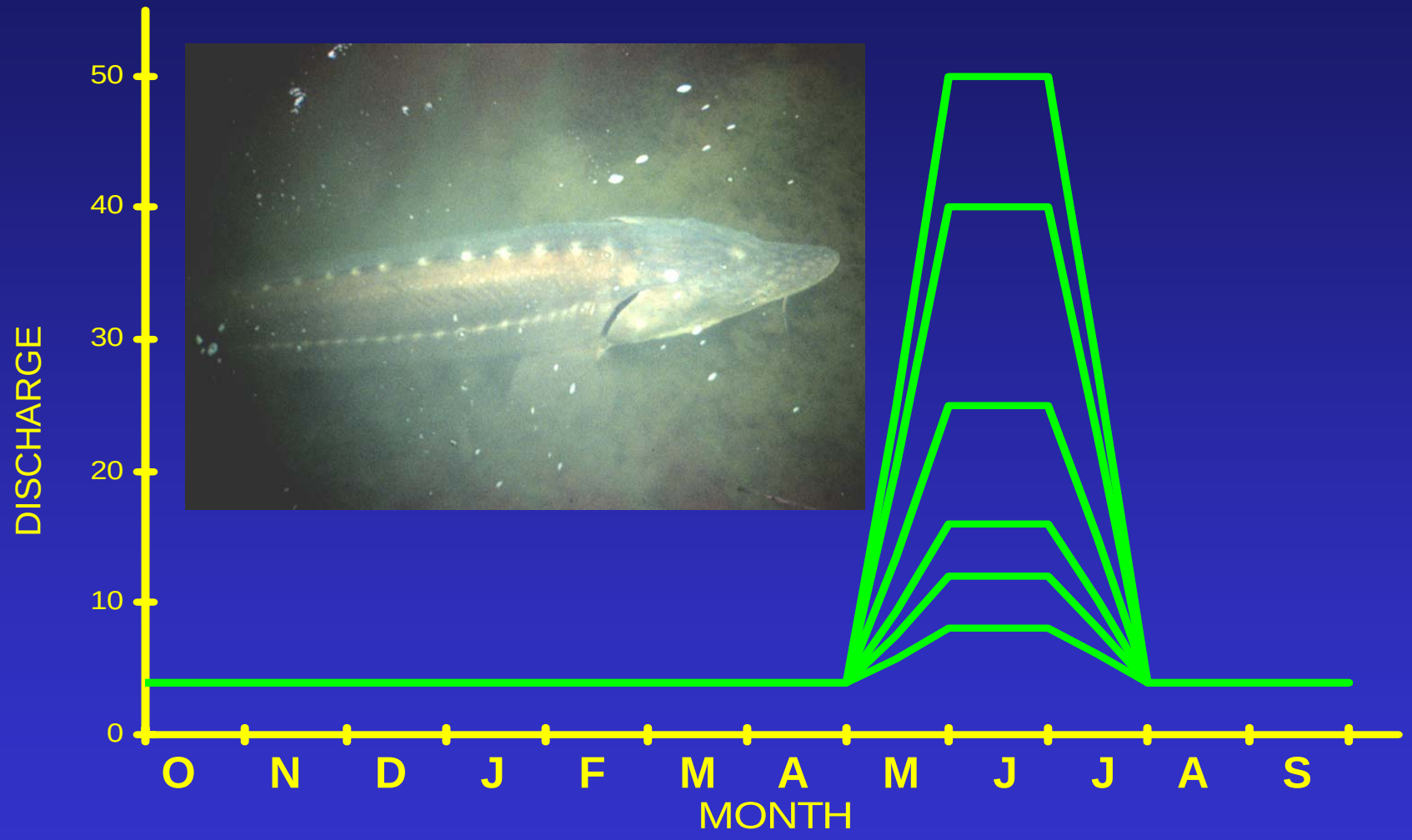

Benthic Production - Libby Reservoir
376
374
372
370
368
366
364
362
Metric Tons
1
2
3
4
5
Alternatives

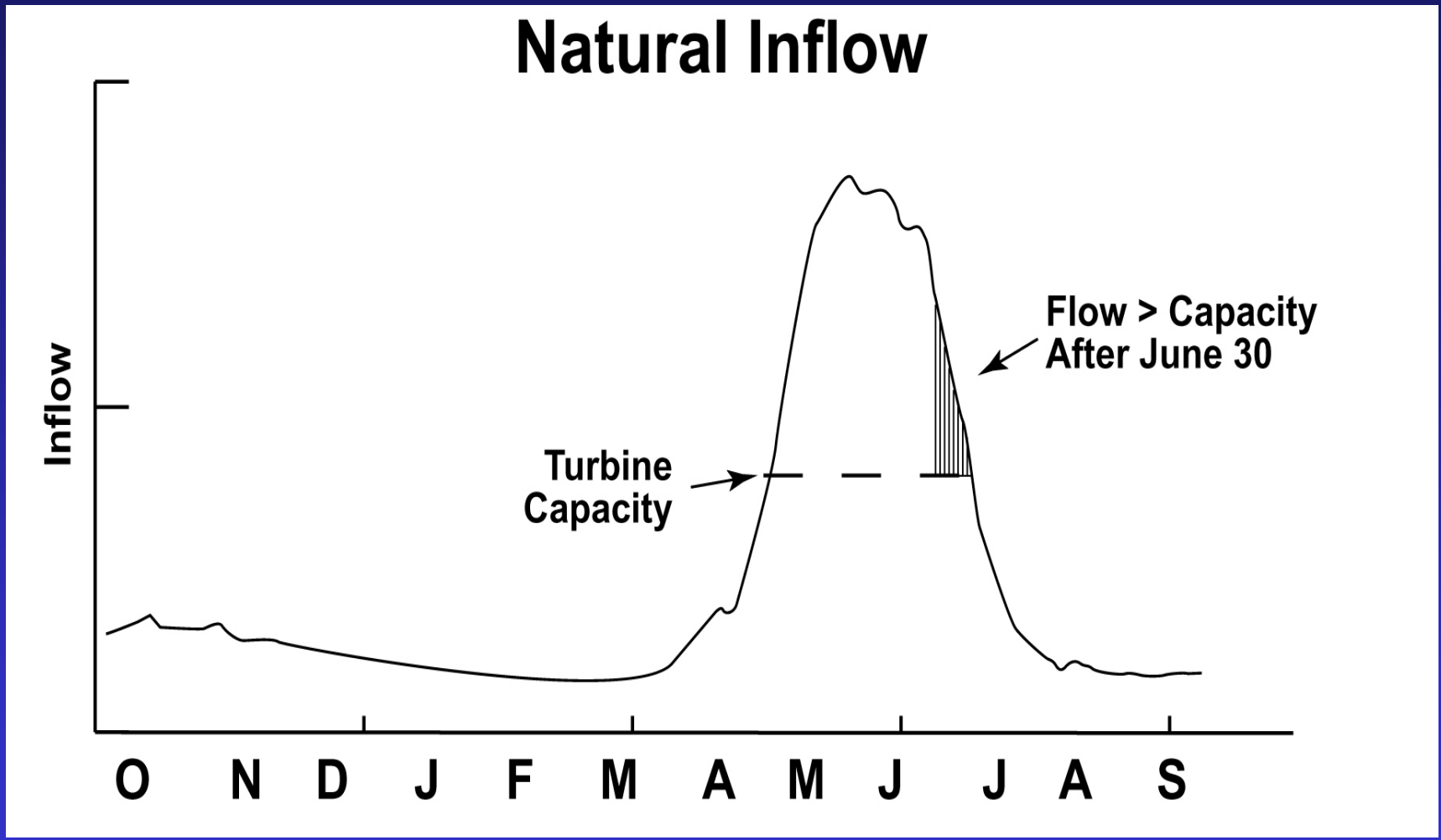

Alternative 3
(steady decreasing flows)
FLOW (kcfs)
ELEVATION (ft)
70
60
50
40
30
20
10
0
2460
2450
2440
2430
2420
2410
2400
2390
2443.1 ft
16 kcfs
14 kcfs
12 kcfs
8 kcfs
7 kcfs
6 kcfs
A
M
J
J
A
S
INFLOW
OUTFLOW
ELEVATION

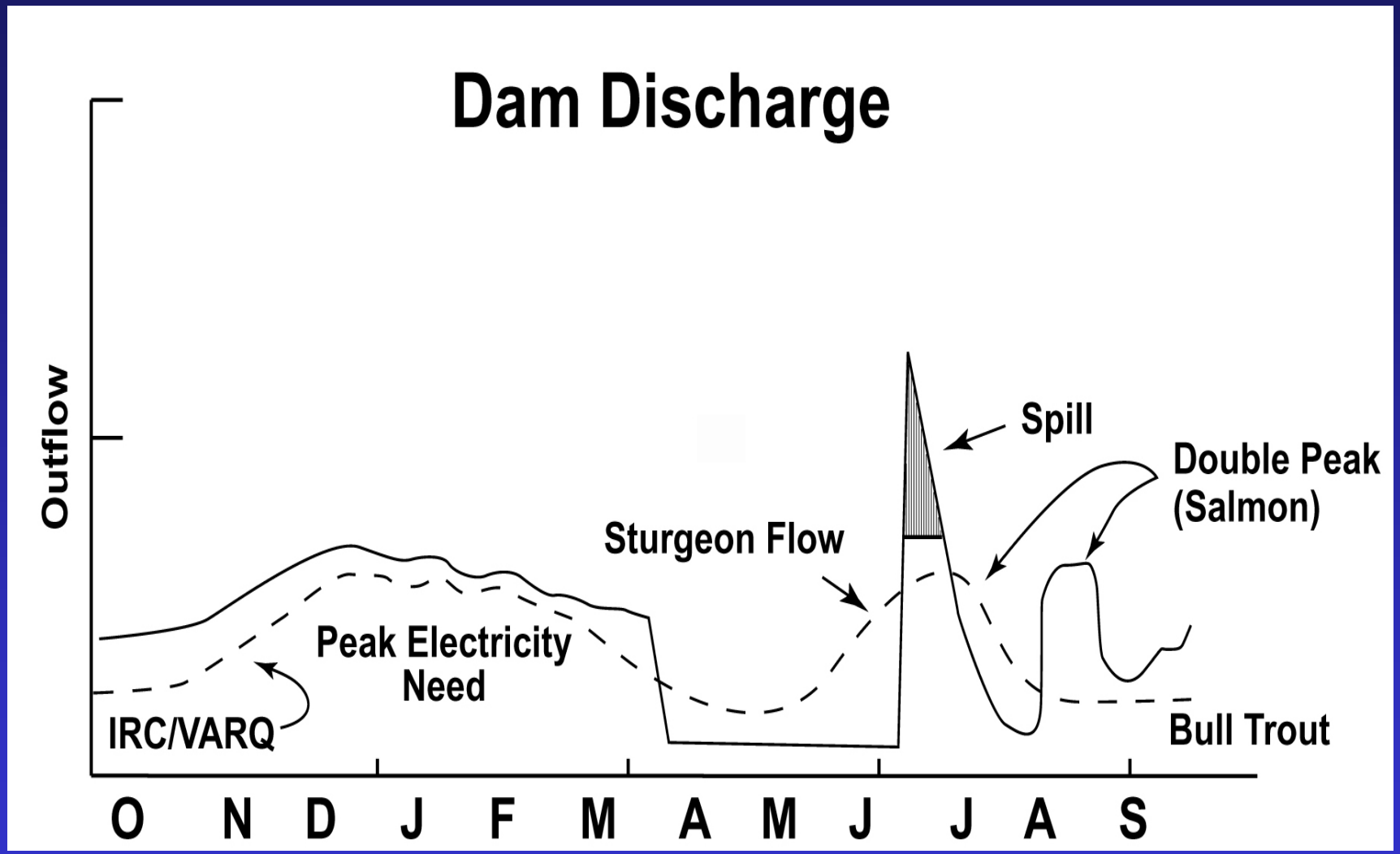

Kokanee Growth - Libby Reservoir
Weight (grams)
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
1
2
3
4
5
Alternatives
I+ KOK (g)
II+ KOK (g)

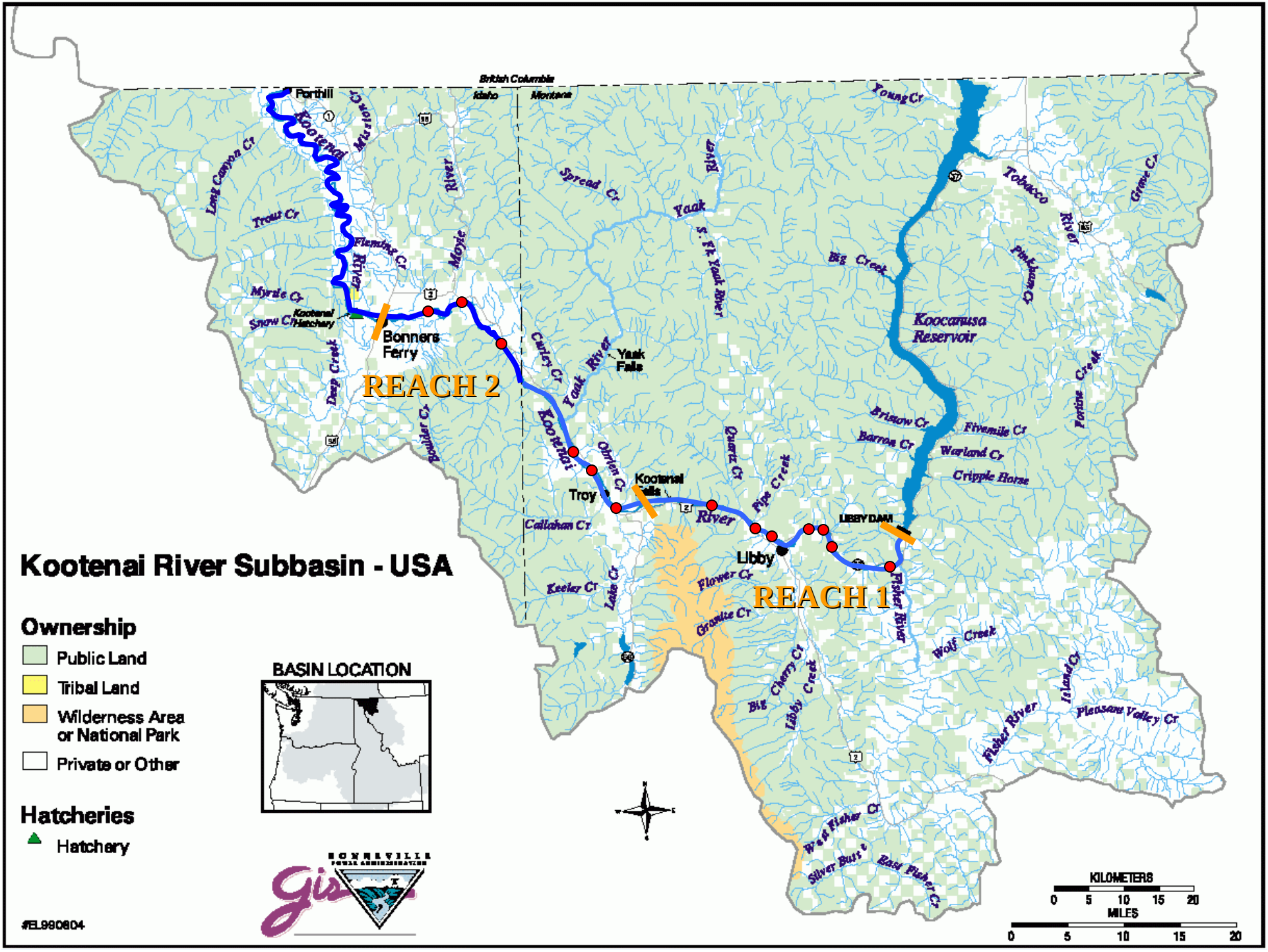

50000
40000
30000
20000
10000
0
Mean Q (CFS)
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Month
Pre-Impoundment
(1911-1970)
Post-Impoundment
(1977-1993)

White Sturgeon Tiered Flows

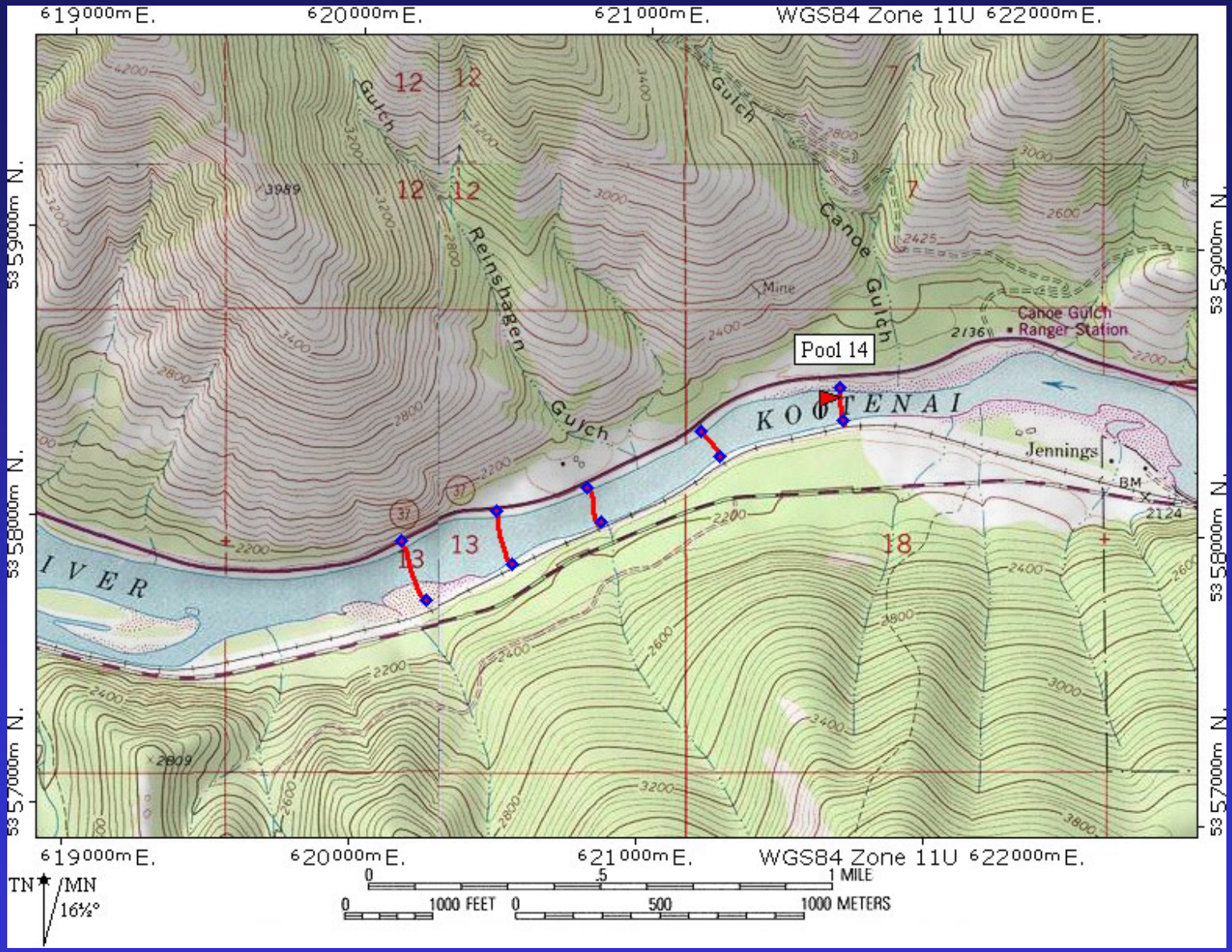



Natural Inflow
Inflow
Flow > Capacity
After June 30
Turbine
Capacity
O
N
D
J
F
M
A
M
J
J
A
S

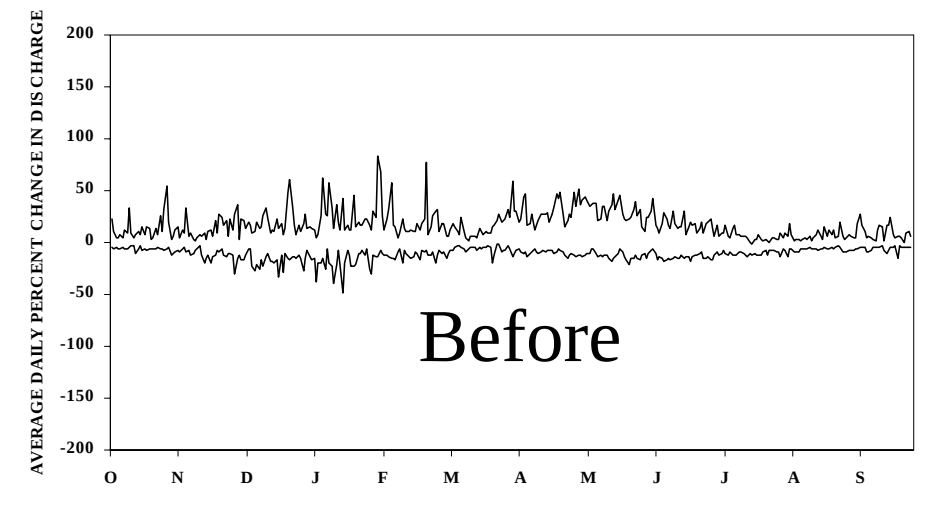

Dam Discharge
Outflow
Spill
Double Peak
(Salmon)
Sturgeon Flow
Peak Electricity
Need
IRC/VARQ
Bull Trout
O
N
D
J
F
M
A
M
J
J
A
S

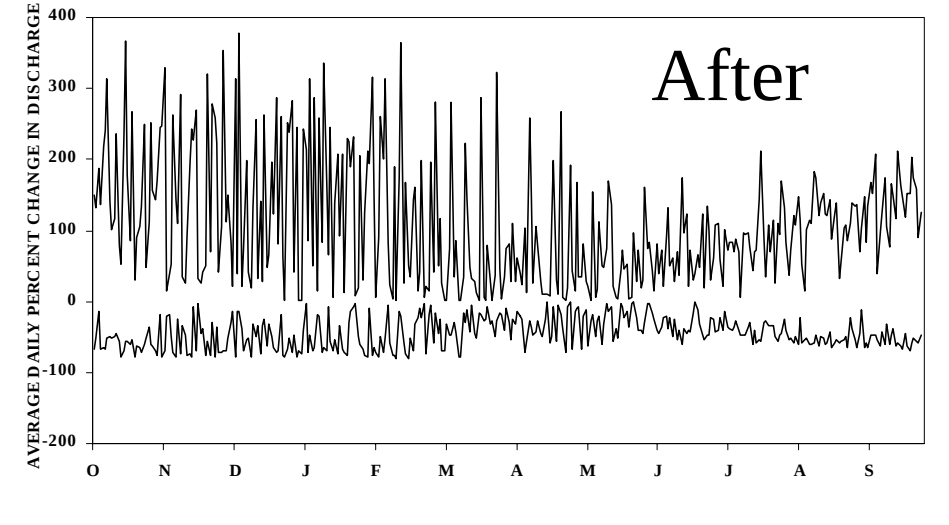

Kootenai River Subbasin - USA
Ownership
Public Land
Tribal Land
Wilderness Area or National Park
Private or Other
Hatcheries
Hatchery
BASIN LOCATION
REACH 2
REACH 1
Porthill
Bonners Ferry
Troy
Libby
Koocanusa Reservoir
LIBBY DAM
Yaak Falls
Kootenai Falls
Kootenai Hatchery
British Columbia
Idaho
Montana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

Pool 14: GPS-based transects



Daily Discharge Variability

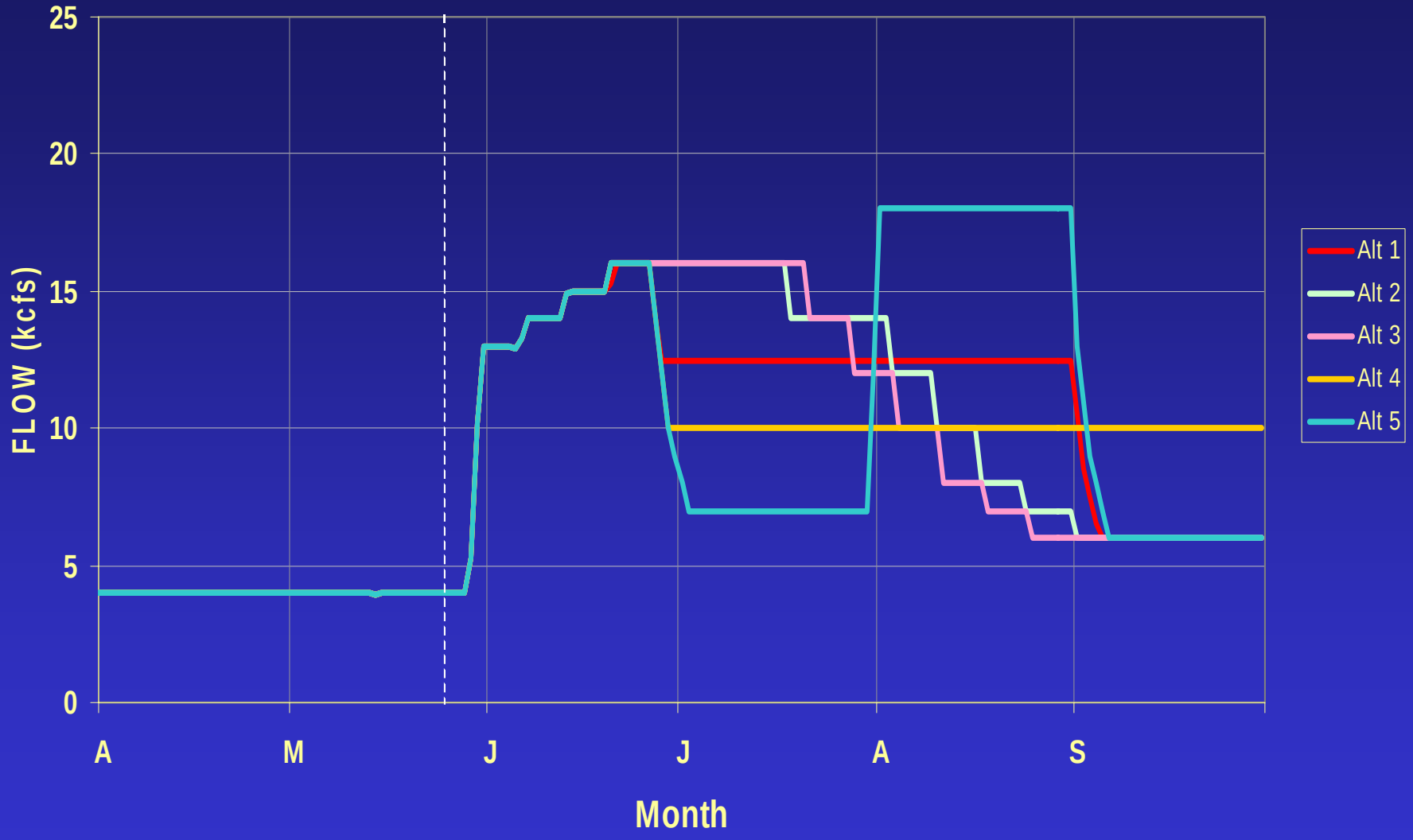


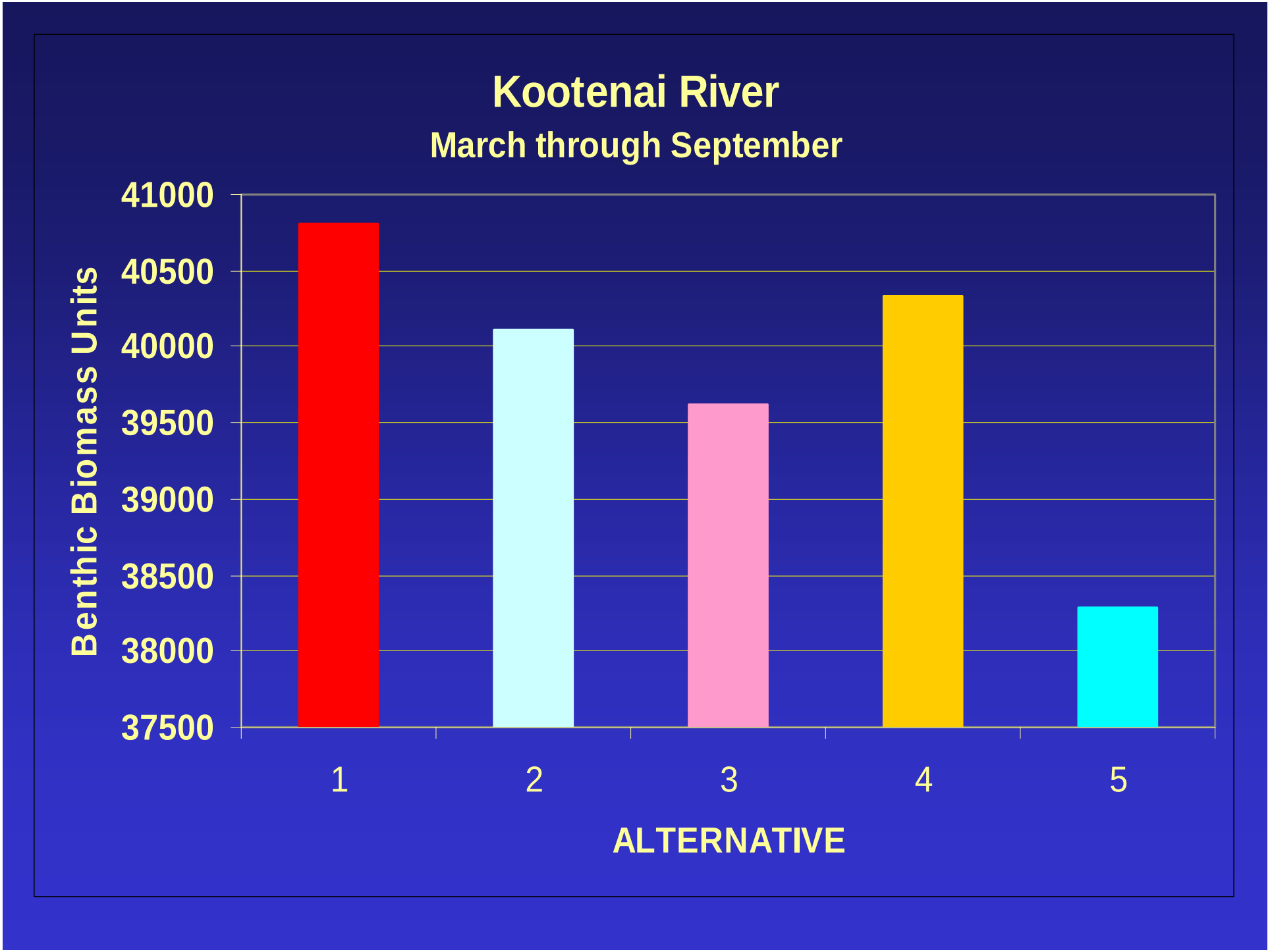


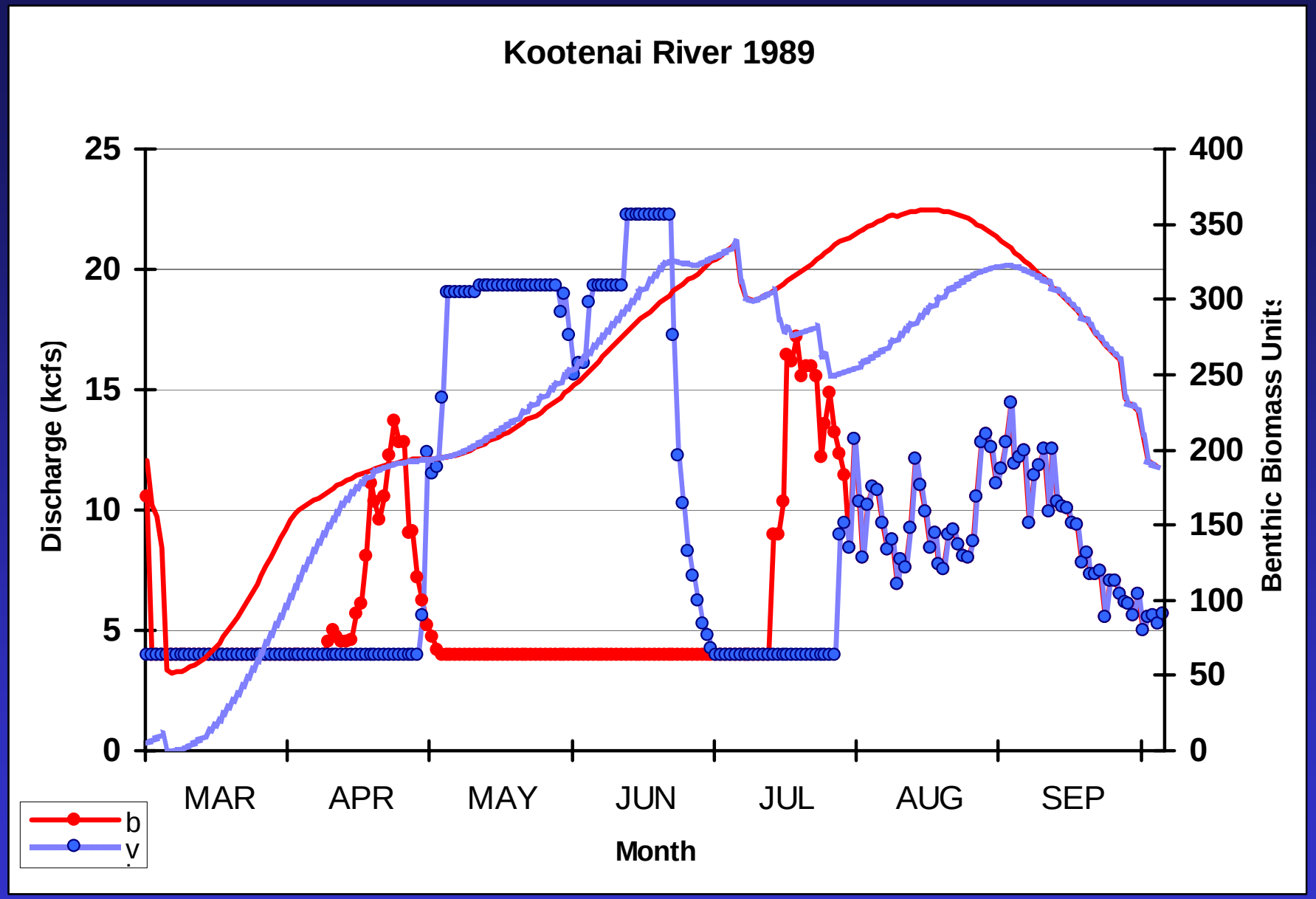
Rehabilitate primary and secondary productivity

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