Drought Concerns of Alberta Environment's Flow Forecasting

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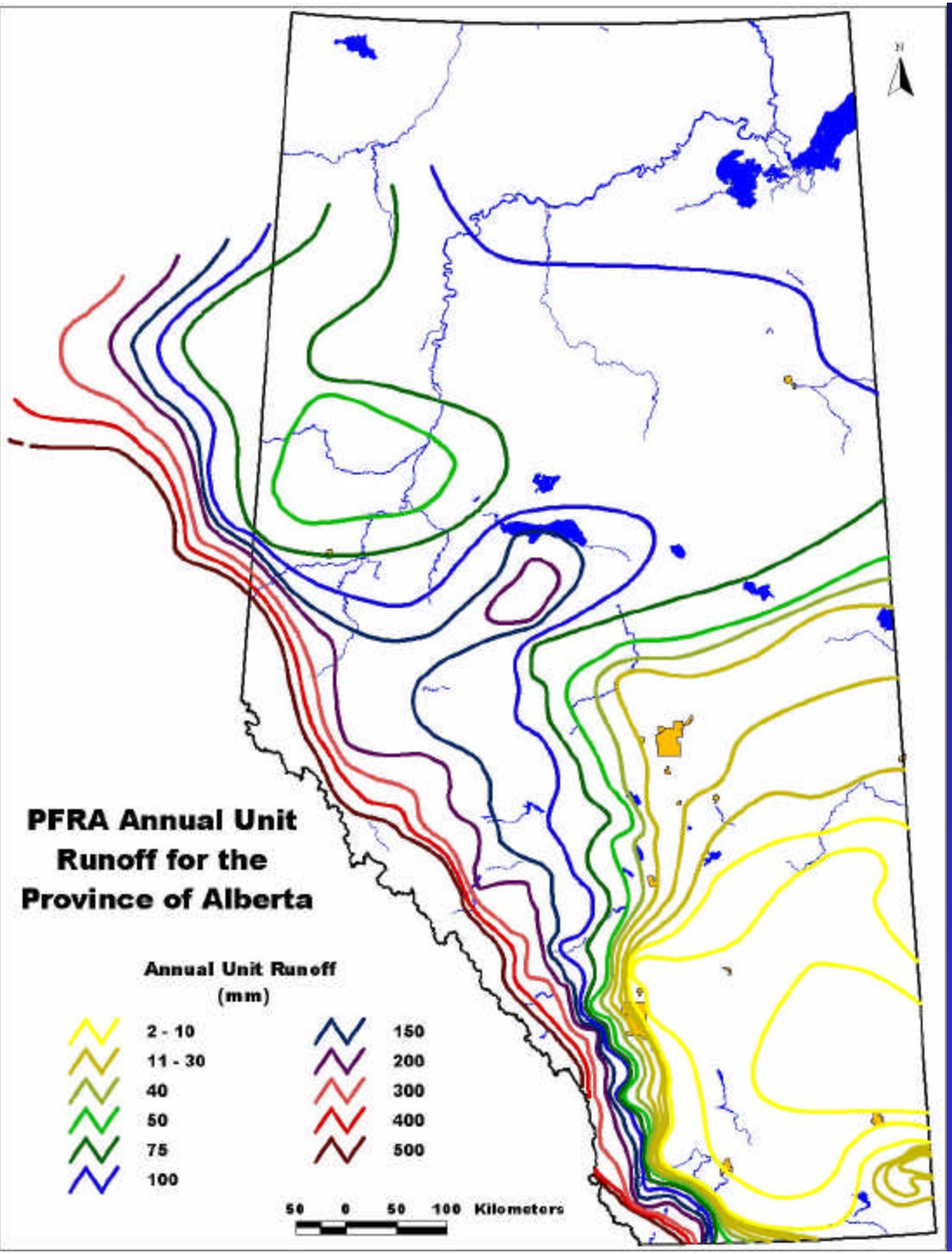
Alberta Environment

Alberta Environment

Roles

Alberta Government	Flow Forecasting
Public safety	Flood forecasts
Monitoring	Real-time data
Allocation of water	Natural flow forecasts
Managing Infrastructure	Inflow forecasts


PFRA Annual Unit Runoff for the Province of Alberta
Annual Unit Runoff (mm)
2 - 10
11 - 30
40
50
75
100
150
200
300
400
500
50 0 50 100 Kilometers

Water Supply Reservoirs

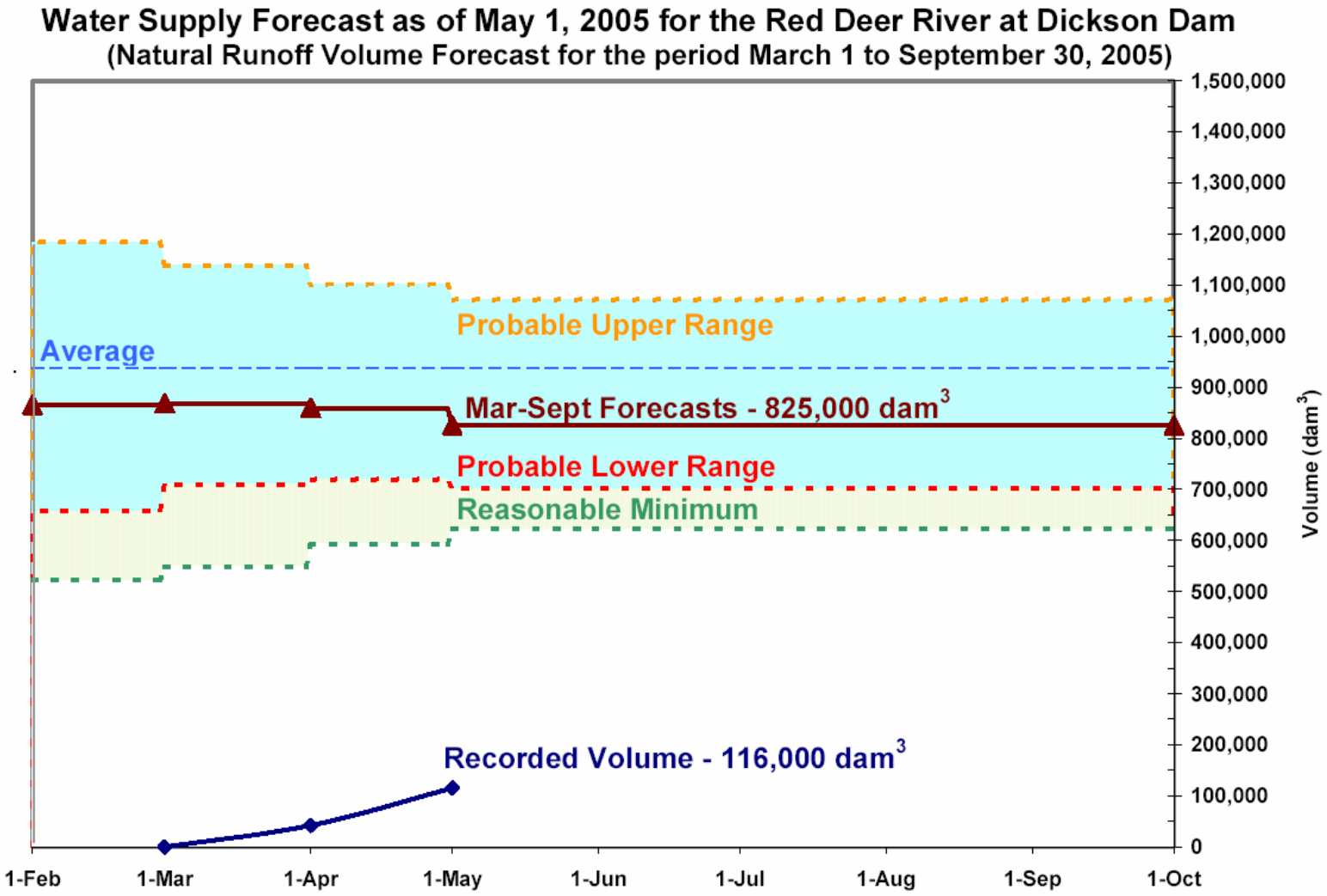
- Large amount of water infrastructure located in South Saskatchewan river basin
  - Reservoirs are located close to the mountains to supply water for irrigation and cities
- Reservoirs supply water to users during periods of high demand
  - Peak irrigation high demand occurs in the summer (June-August)
  - Peak supply occurs in May and June
- Reservoirs are multi-purpose structures, also used for flood reduction

1. Our concerns with drought forecasts

- Primarily concerned with droughts in mountains/foothills
- Interested in timing, persistence, anti-persistence

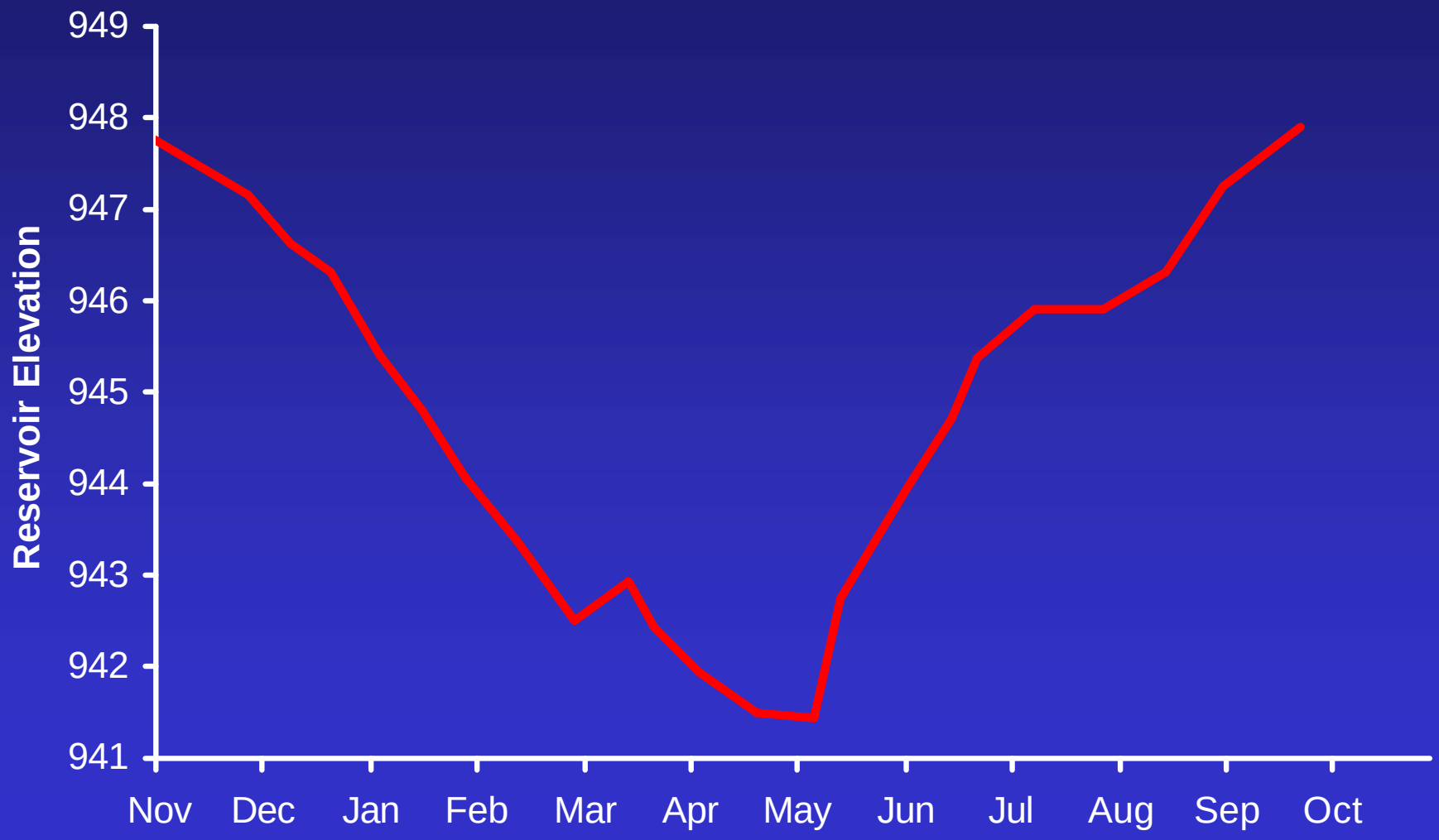
2. Drought-related activities:
Water Supply Forecasts

- Quantitative forecasts for major rivers based on:
  - Current conditions (snow, precipitation, soil moisture)
  - Future precipitation incorporated using measured frequency distributions for precipitation during forecast period (March to September runoff period)
- Forecasts provide irrigation operators with future runoff expectations to produce supply scenarios for farmers, communities and other stakeholders

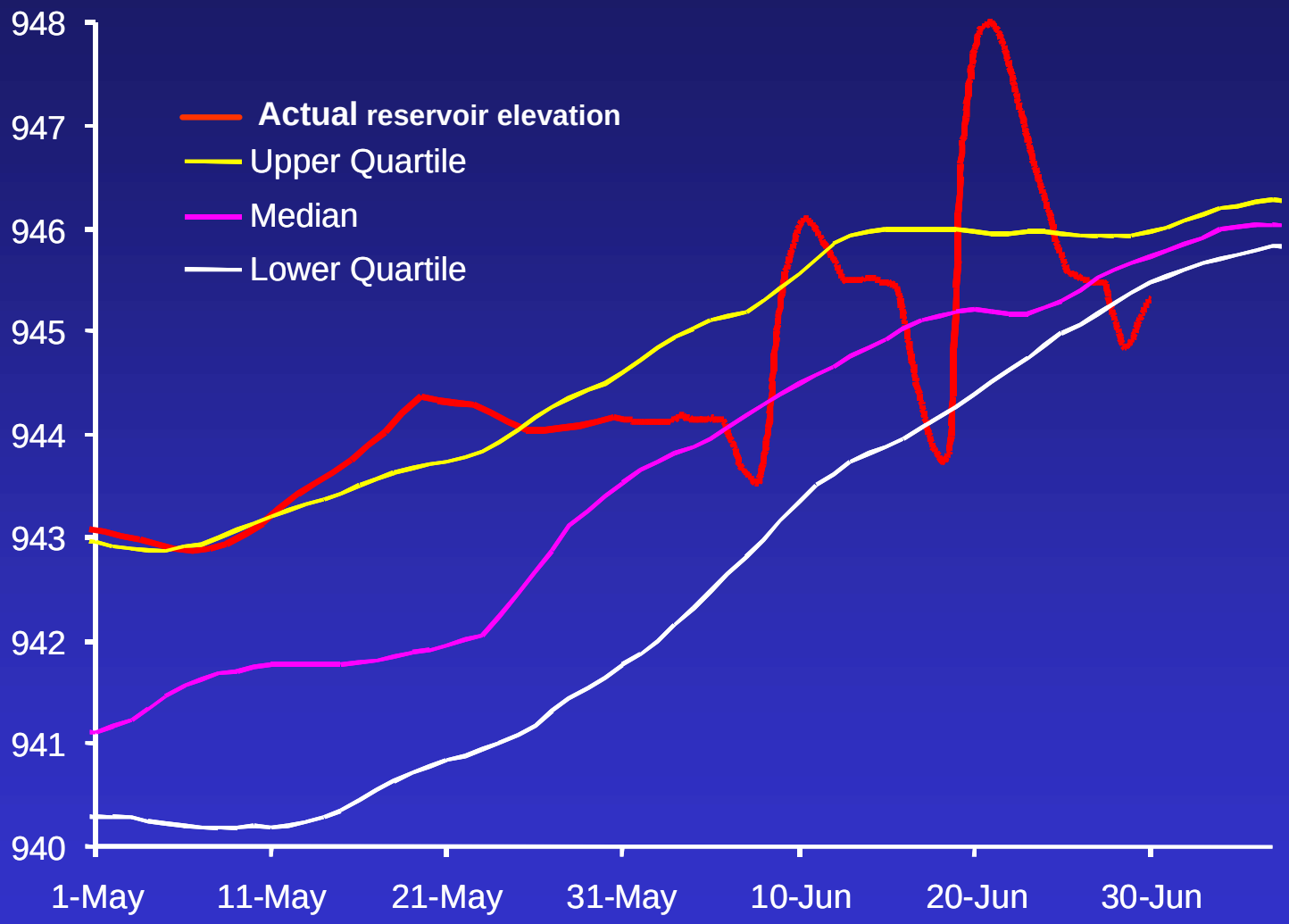

Water Supply Forecast as of May 1, 2005 for the Red Deer River at Dickson Dam
(Natural Runoff Volume Forecast for the period March 1 to September 30, 2005)
Probable Upper Range
Average
Mar-Sept Forecasts - 825,000 dam3
Probable Lower Range
Reasonable Minimum
Recorded Volume - 116,000 dam3
1,500,000
1,400,000
1,300,000
1,200,000
1,100,000
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Volume (dam3)
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct

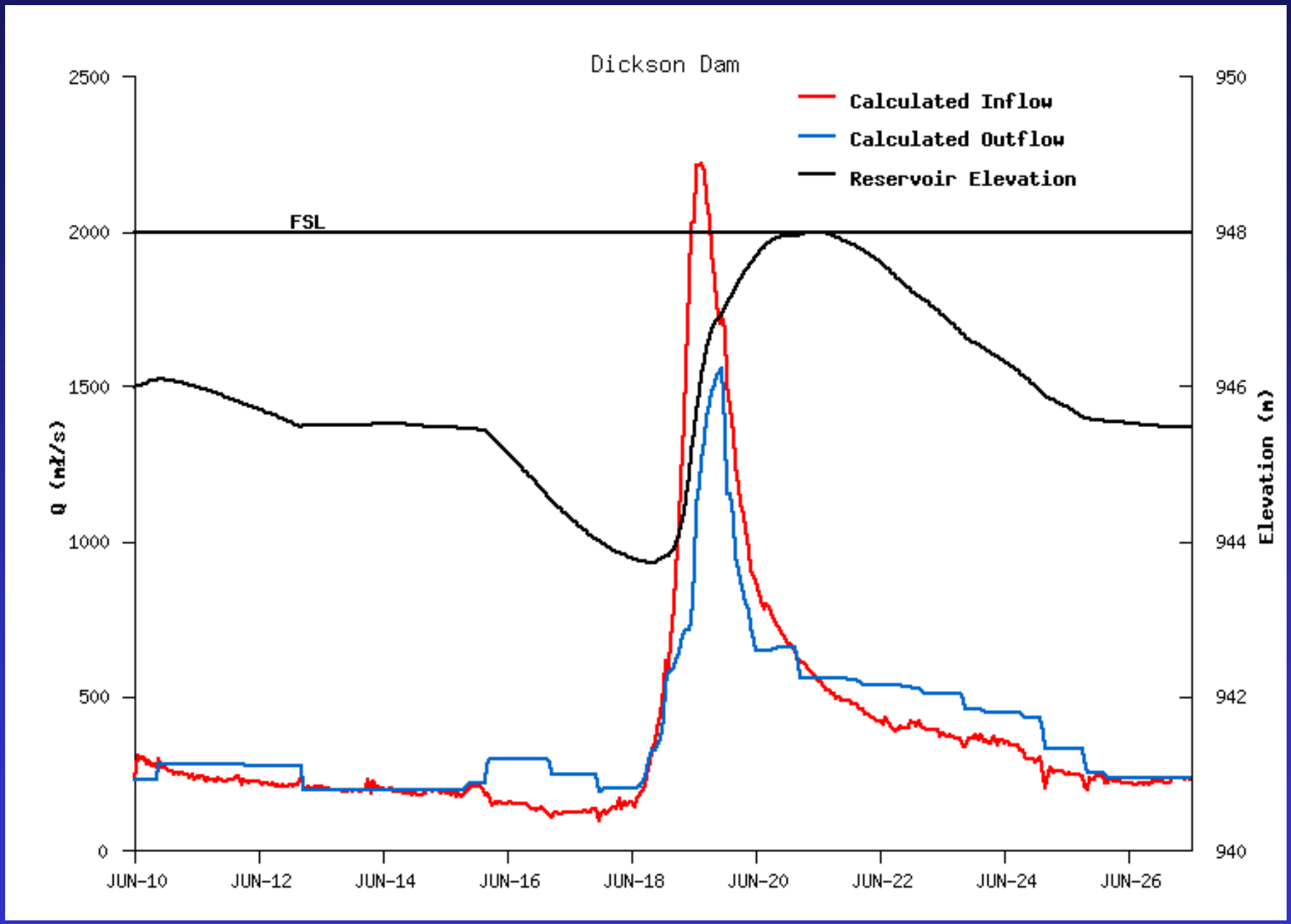
Dickson Dam

Typical Operations



Dickson Dam, 2005




Dickson Dam
Calculated Inflow
Calculated Outflow
Reservoir Elevation
FSL
Q (m3/s)
Elevation (m)
2500
2000
1500
1000
500
0
950
948
946
944
942
940
JUN-10
JUN-12
JUN-14
JUN-16
JUN-18
JUN-20
JUN-22
JUN-24
JUN-26

3. What can DRI accomplish?

- Improved long-range drought forecasts could:
  - Improve the accuracy of water supply forecasts
  - Improve current model capabilities in determining the timing of mountain snowmelt peak

Improved drought forecasts could:

- Improve Water Management planning by influencing the operation of reservoirs
- Example: Reservoirs are low due to dry spring and summer. Forecast is for a dry winter
- Releases from reservoir would be cut back to preserve water

Conclusions

- More accurate long-range drought forecasts could :
  - Improve the accuracy of Water Supply Forecasts, which would lead to
  - Improved Water Management operations
    - More efficient use of reservoir storage for drought or flood amelioration