Hydrologic Scenarios for 2013

Laura Condon, Levi Brekke, Subhrendu Gangopadhyay

Bureau of Reclamation, Denver

November 6, 2012

ESP Weighting Methodology

1. Match Each station with a climate Division

- Delineate upstream area
- Intersect basin delineations with climate divisions
- Choose the division that provides the largest precipitation volume

2. Determine tercile ranges for climate variables and designate year types

- For the selected climate division calculate tercile thresholds for the 1971-2000 climate normal period using January-March (JFM) seasonal values
- Designate year types using the tercile ranges and JFM seasonal values

3. Get forecast from CPC and reweight ESP traces

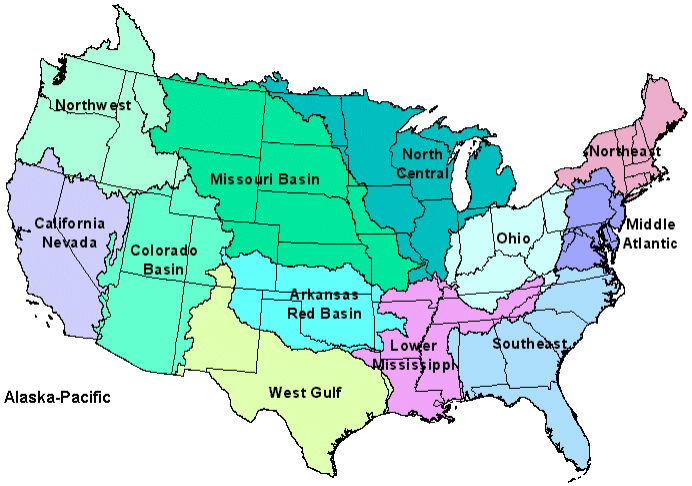
- Determine the likelihood of each year type based on the CPC forecast
- Reweight years according to the likelihoods derived from the CPC forecast

ESP Weighting Methodology

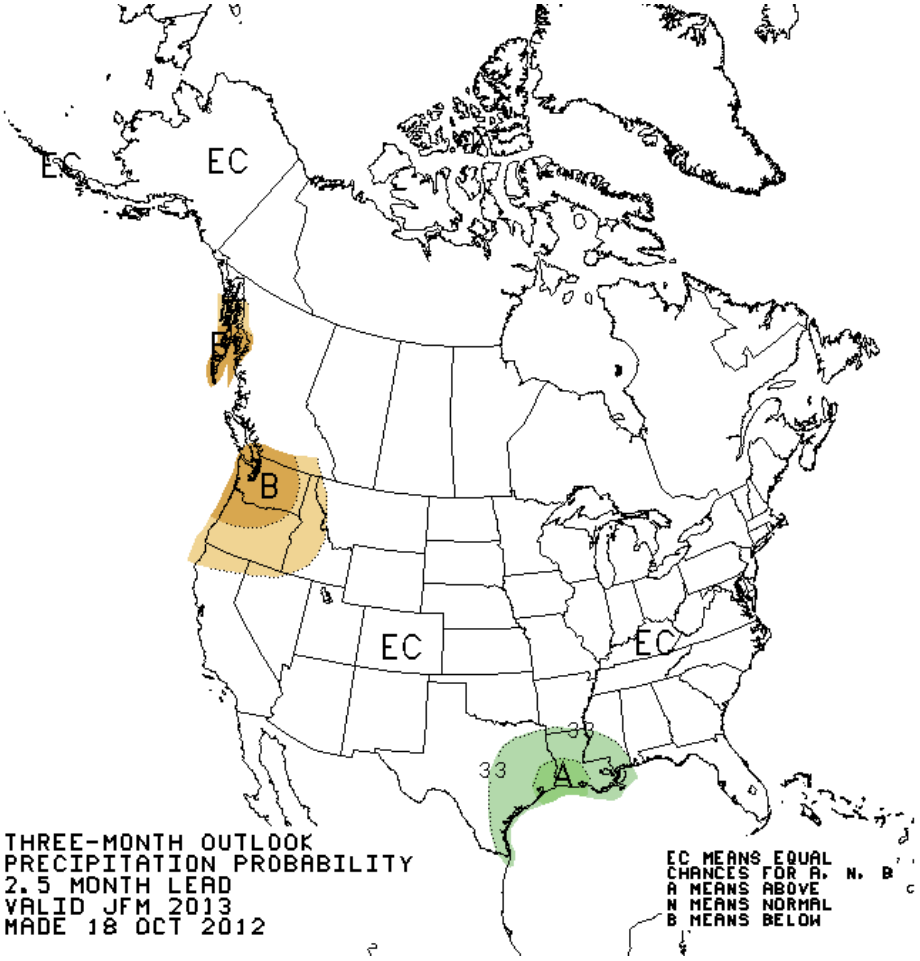
- **Un-weighted**
  - Original ESP traces with each year equally likely
- **Scenario 1**
  - Traces are weighted according to the temperature forecast
- **Scenario 2**
  - Traces are weighted according to joint probabilities of temperature and precipitation forecasts
- For each scenario we provide two datasets:
  - All ESP traces are reweighted
  - Only the traces from 1971-2000 (i.e. the climate normal period) are reweighted

Data

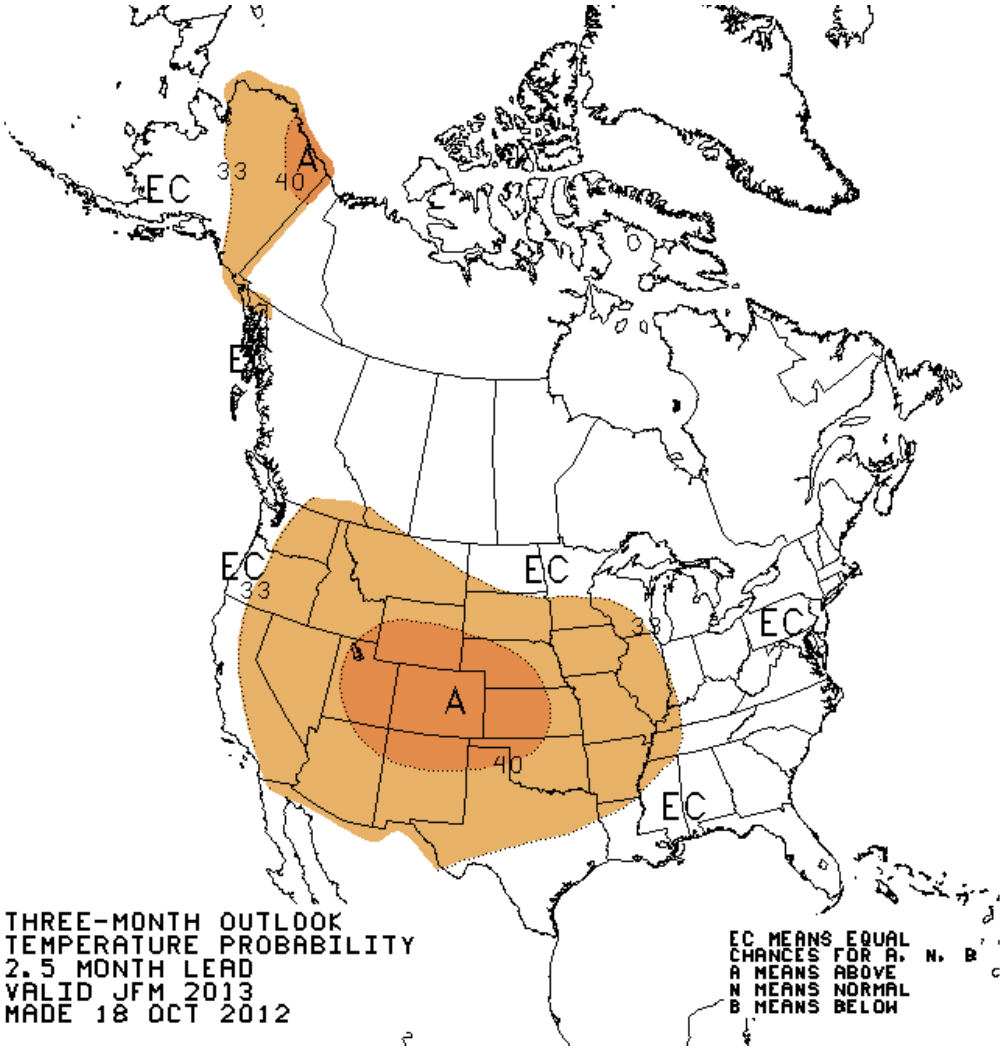
- ESP Traces provided by RFCs
- Climate division temperature and precipitation (from ncdc.noaa.gov)
- Climate Prediction Center Three month outlooks for January – March (CPC)



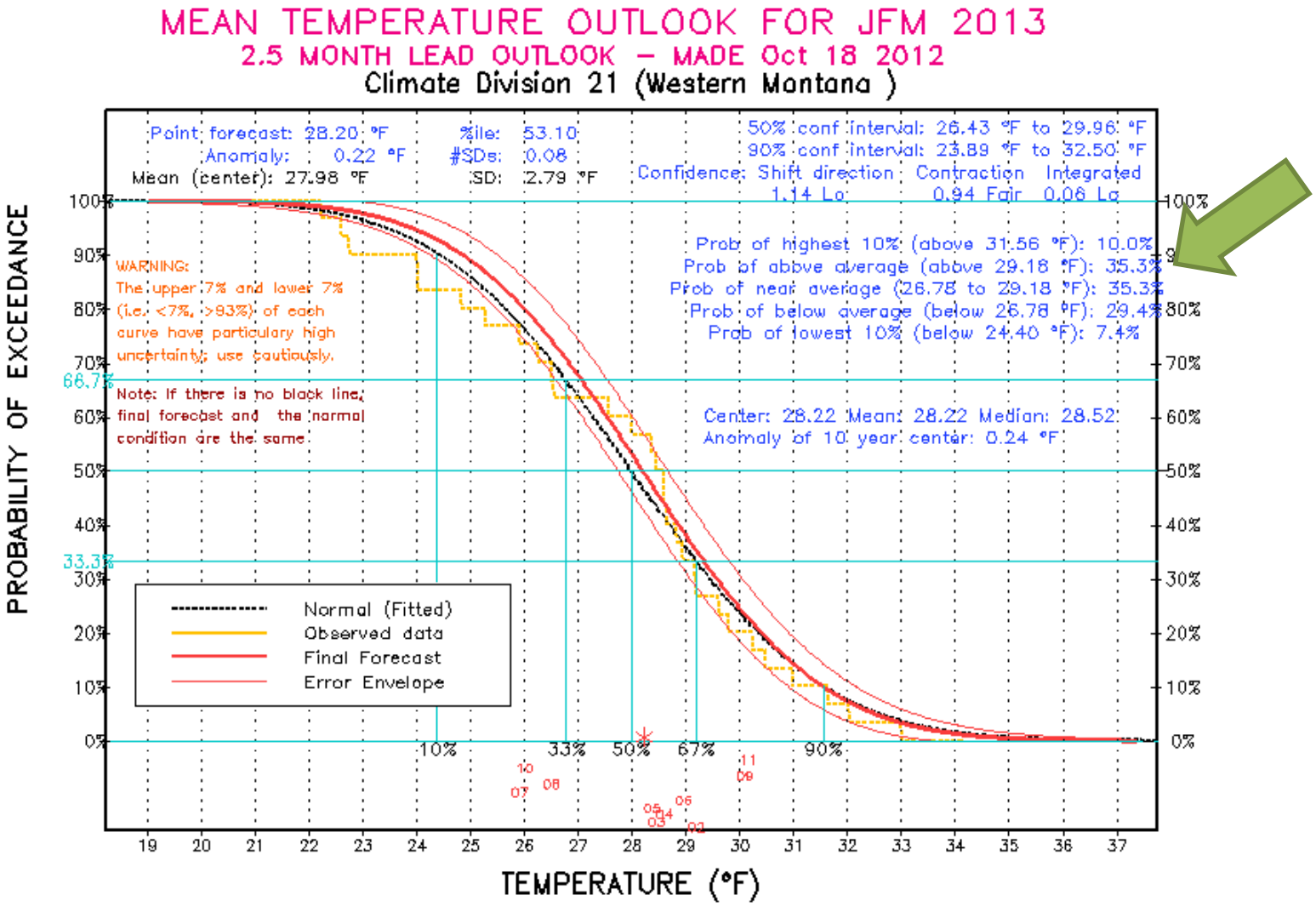
Jan-Mar National Precipitation Outlook



Jan – Mar National Temperature Outlook



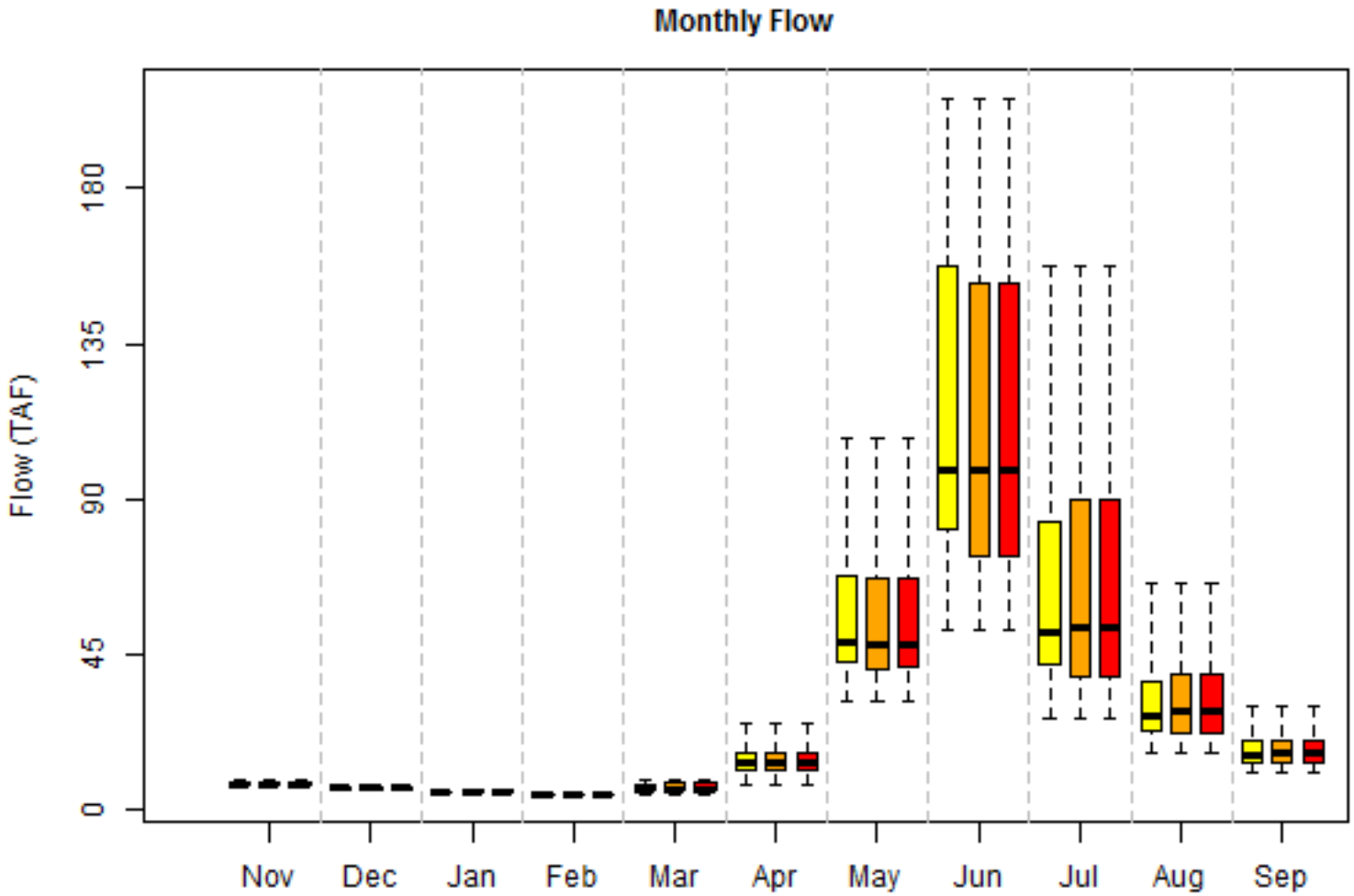
Example Climate Division Forecast



What do we expect

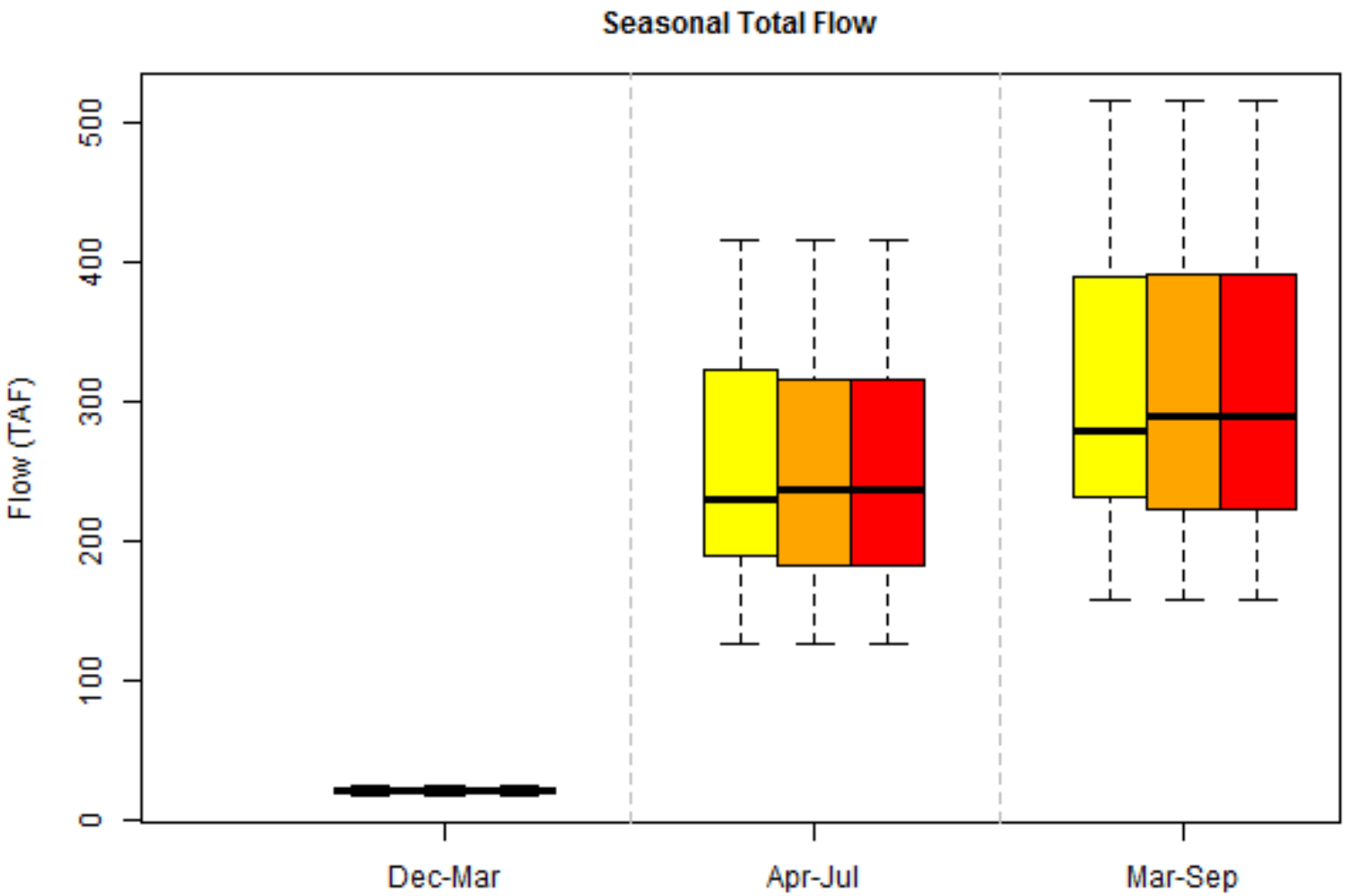
- Warmer winter months could lead to:
  - Increased precipitation falling as rain rather than snow
  - Earlier runoff
  - Increased flow early in the season
  - Decreased summer flows

CBRFC: Green Mountain Inflow



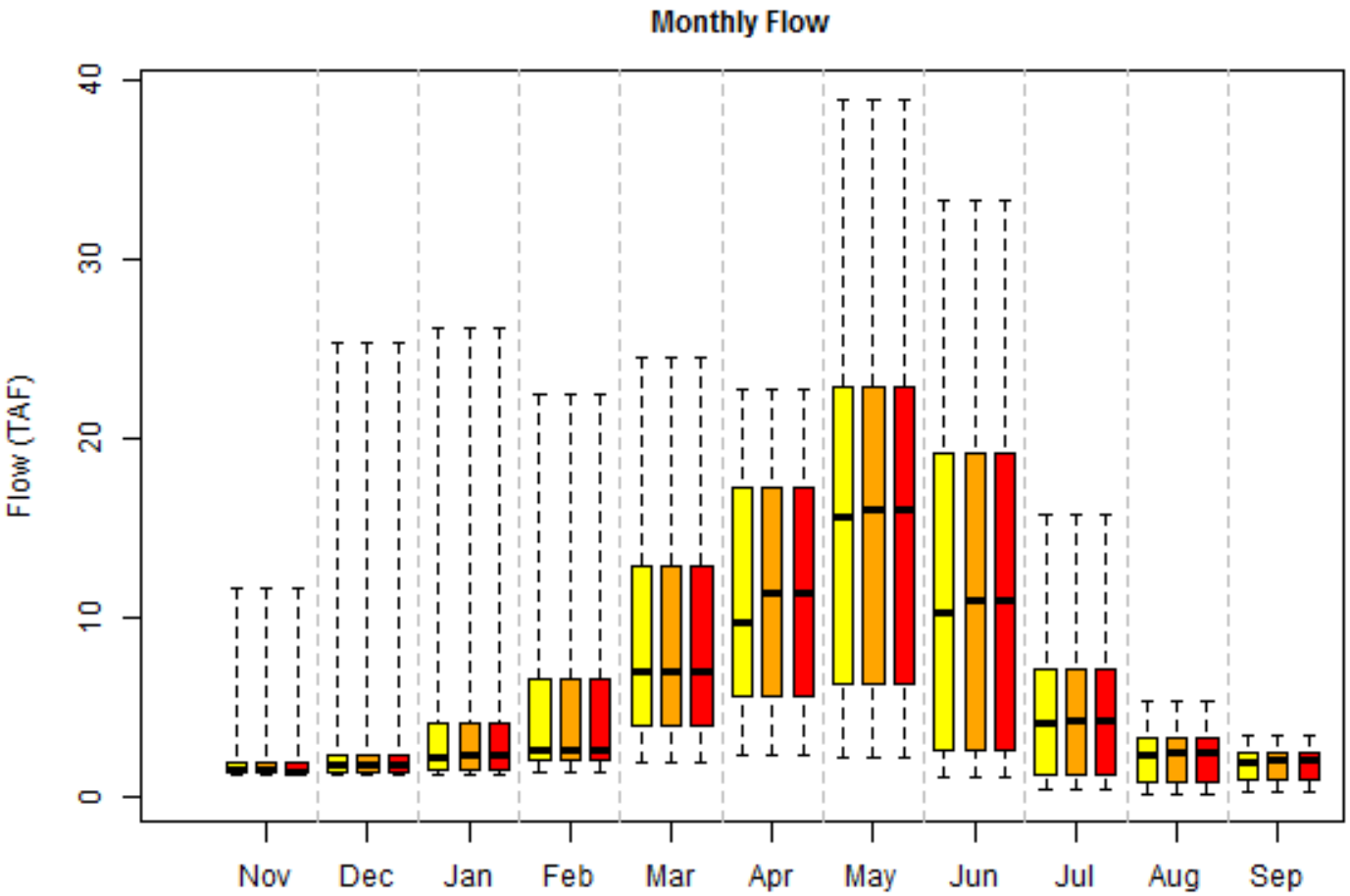
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

CBRFC: Green Mountain Inflow



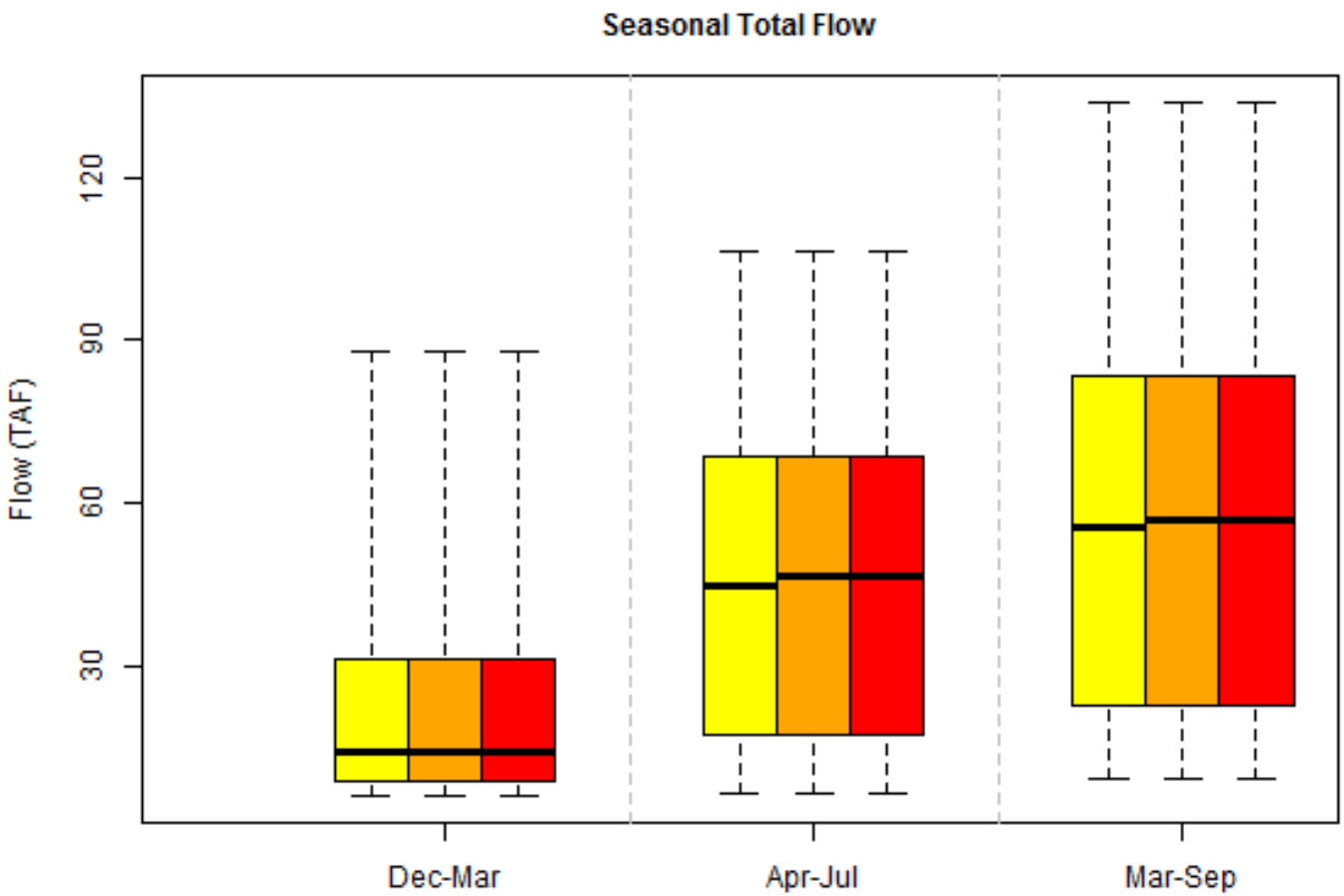
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

CNRFC: Truckee River at Farad Gage



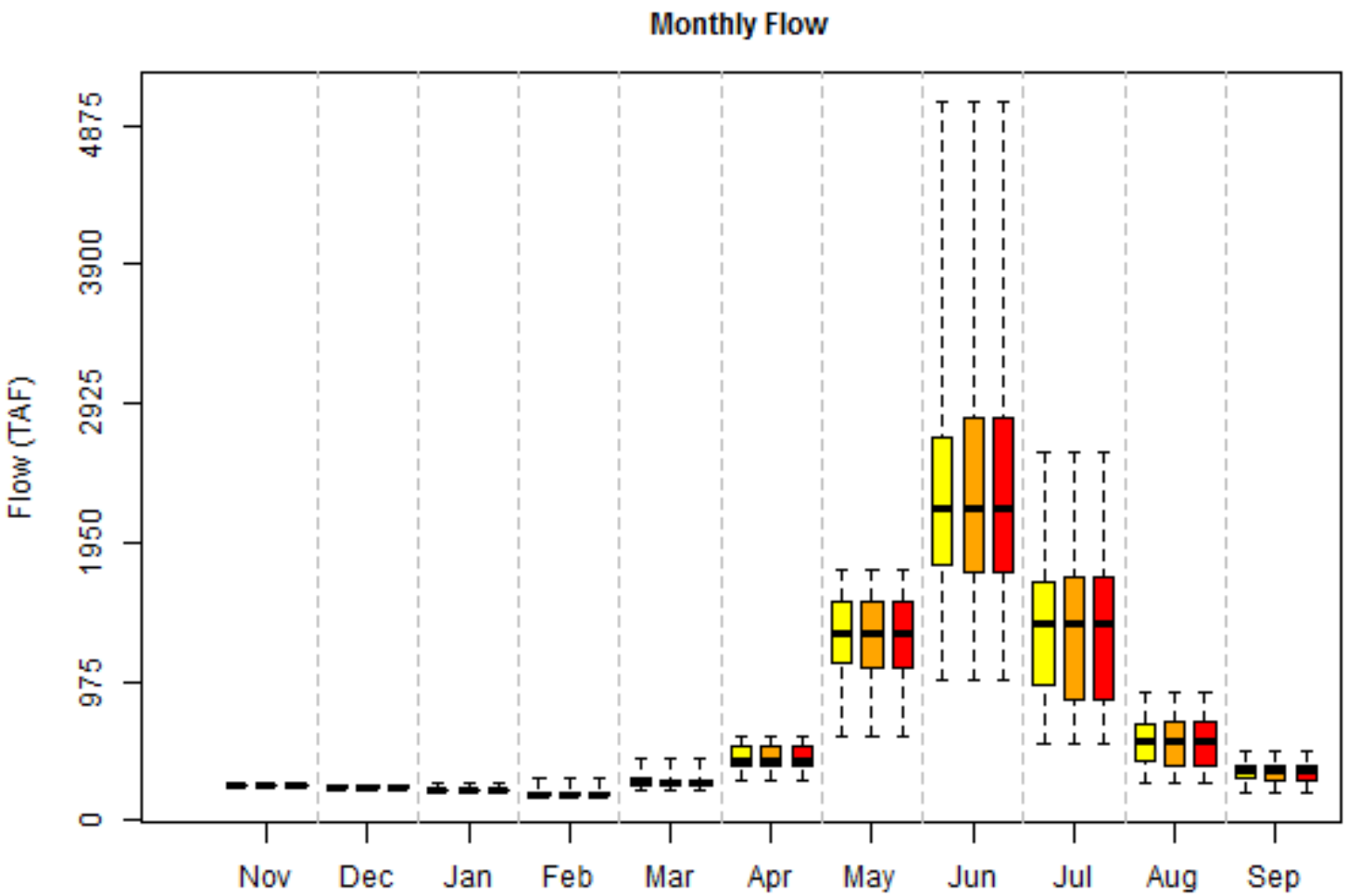
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

CNRFC: Truckee River at Farad Gage



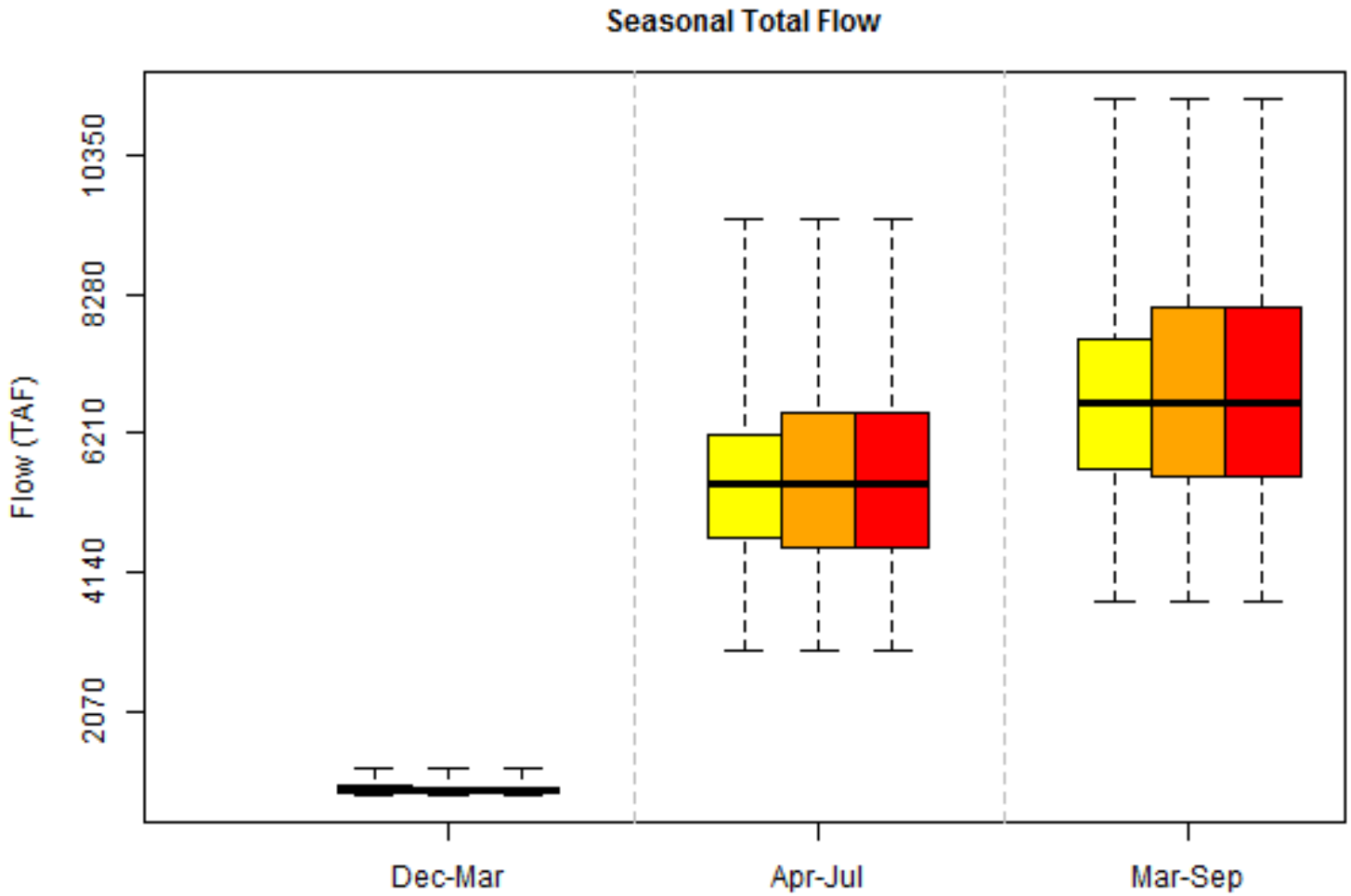
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

MBRFC: Yellowstone River near Sidney, Natural Flow



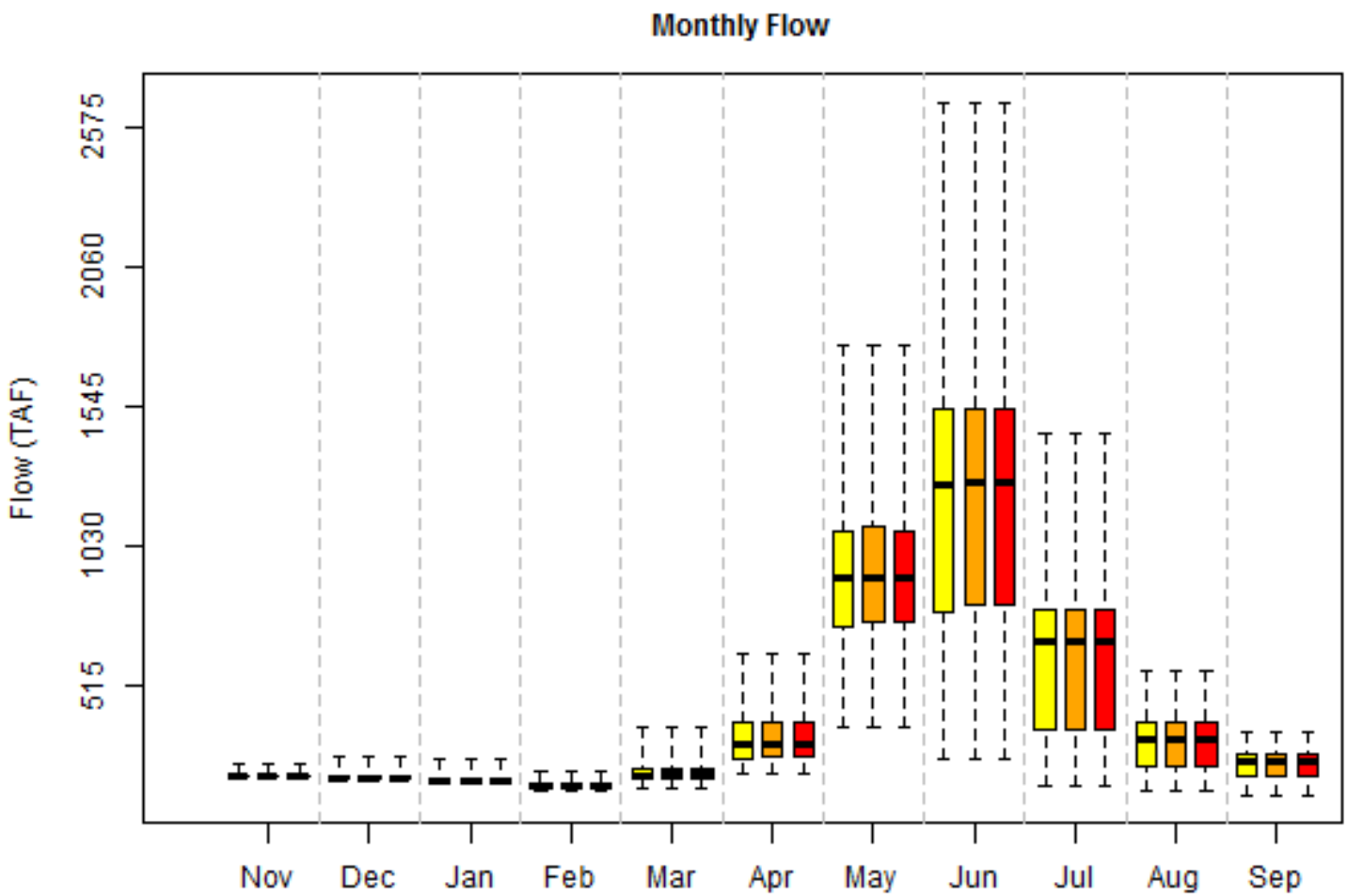
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

MBRFC: Yellowstone River near Sidney, Natural Flow



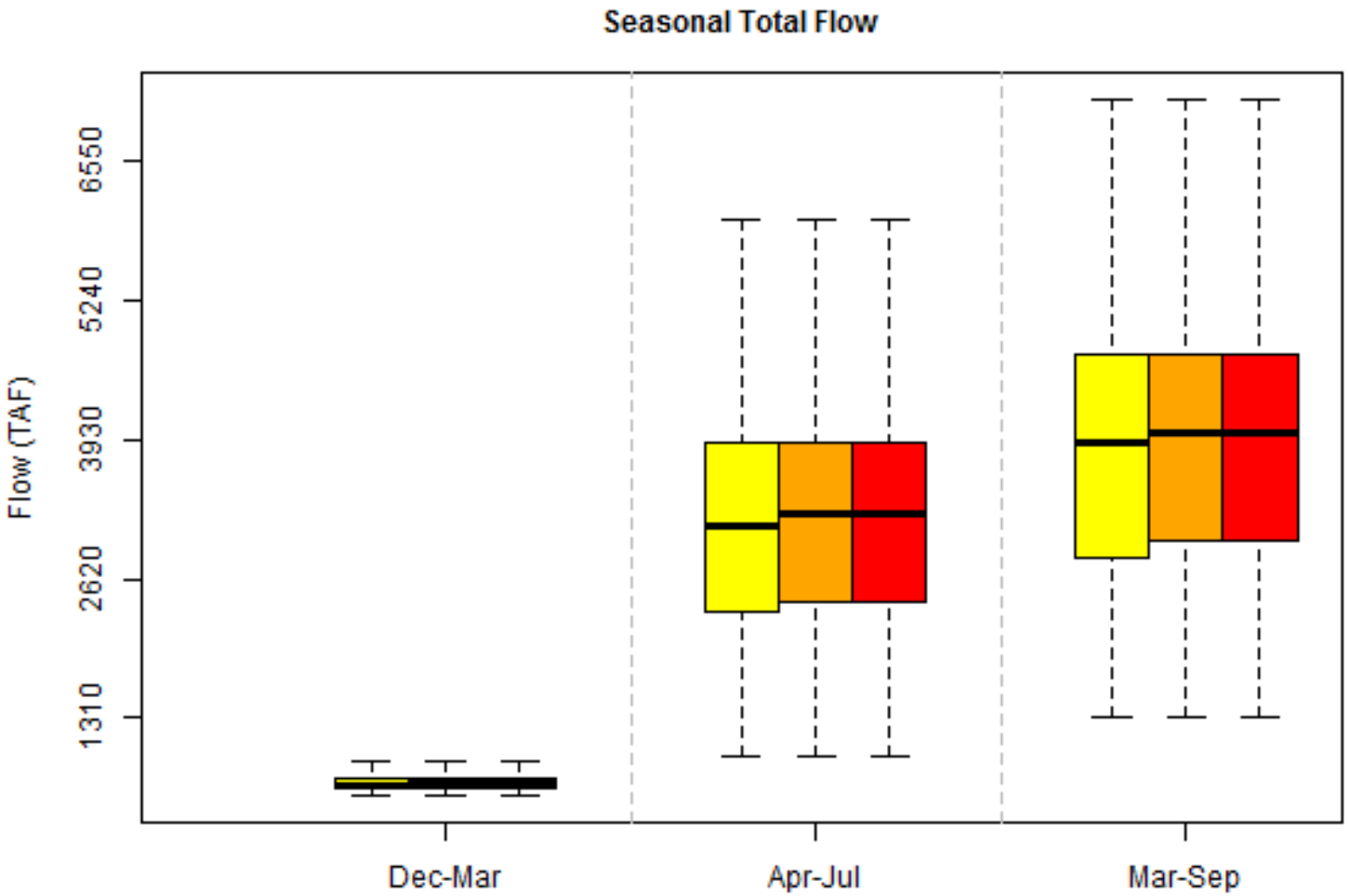
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

NWRFC: Snake River near Heisi



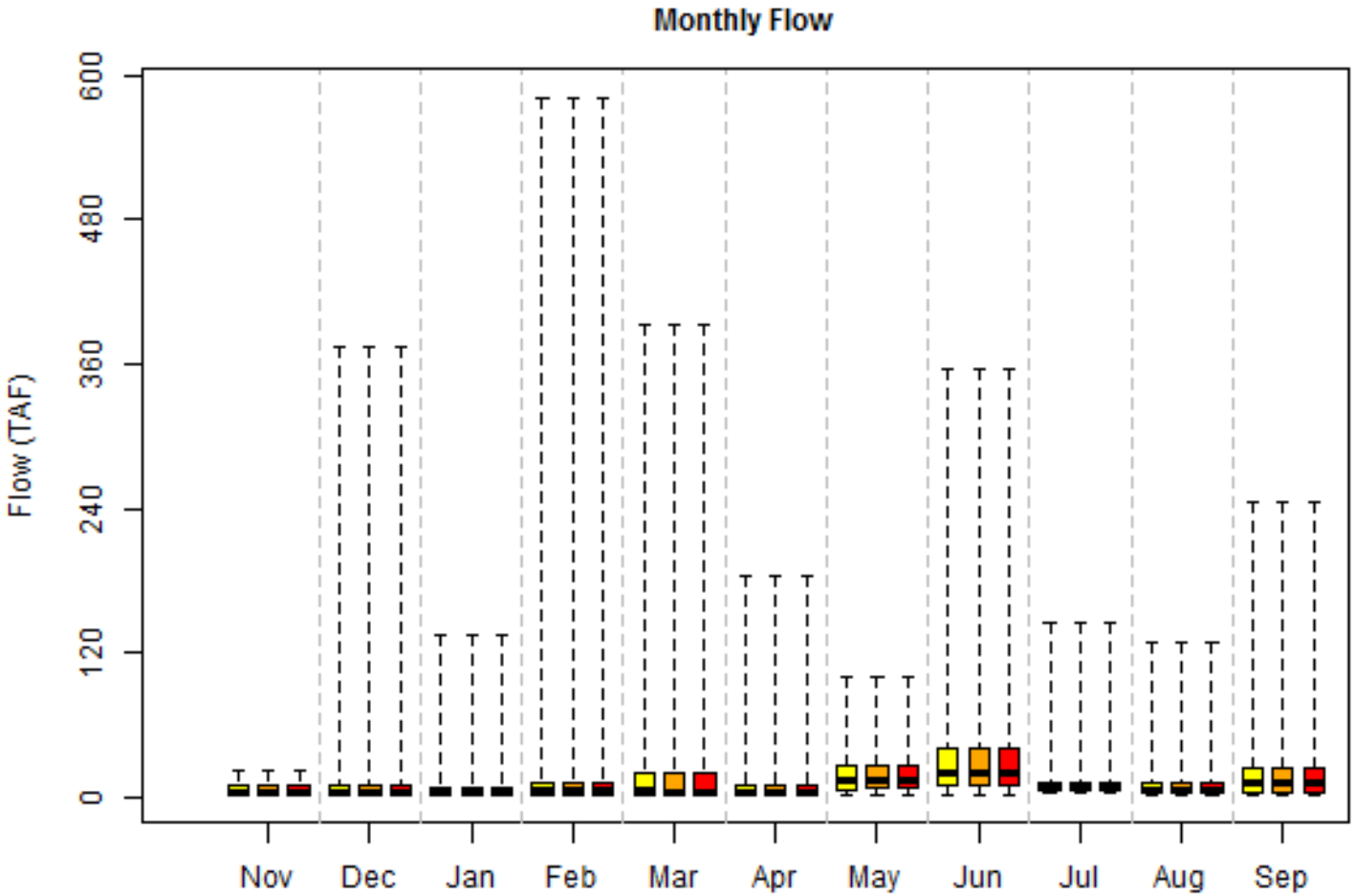
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

NWRFC: Snake River near Heisi



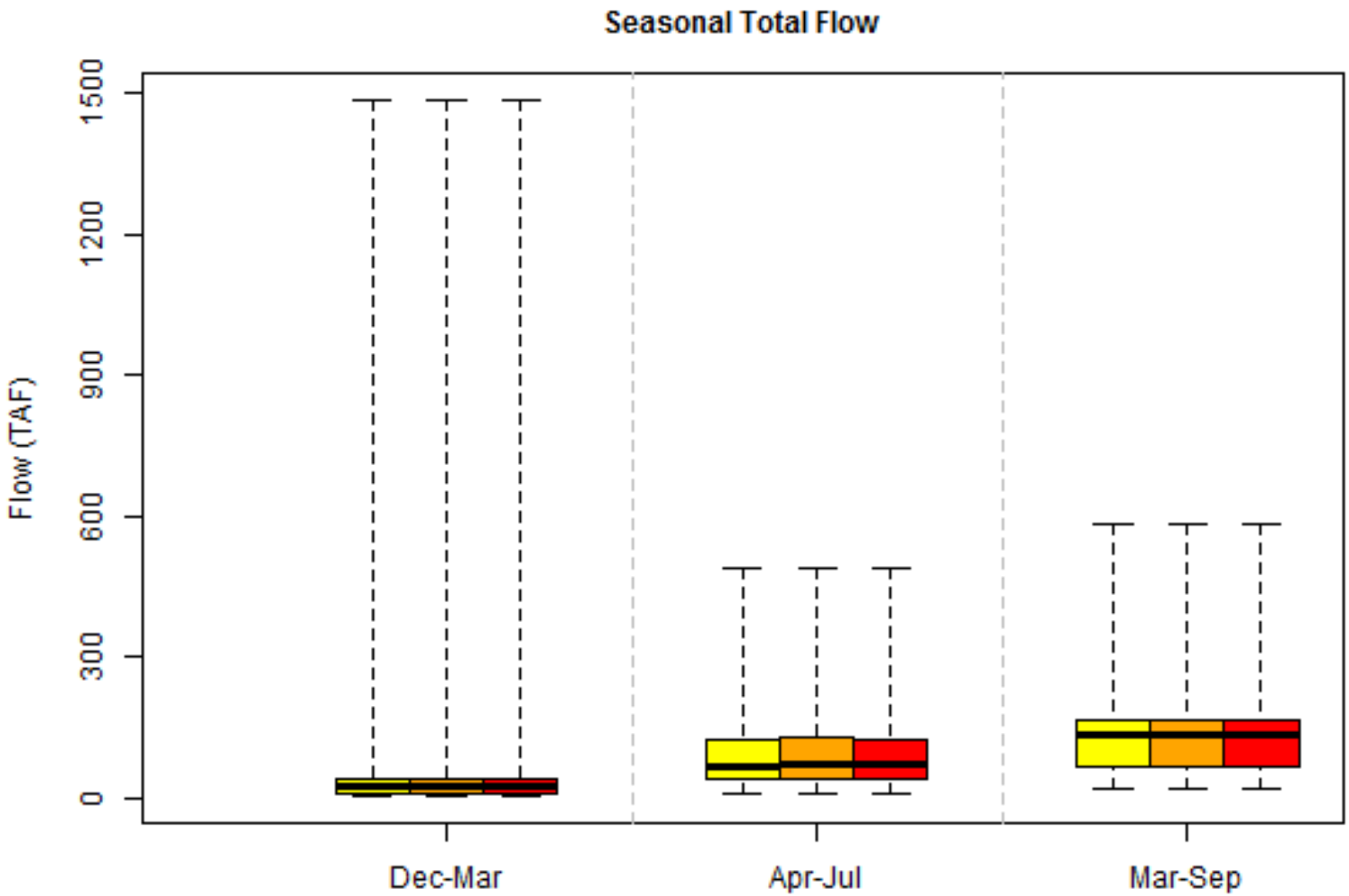
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

WGRFC: Colorado River at San Saba



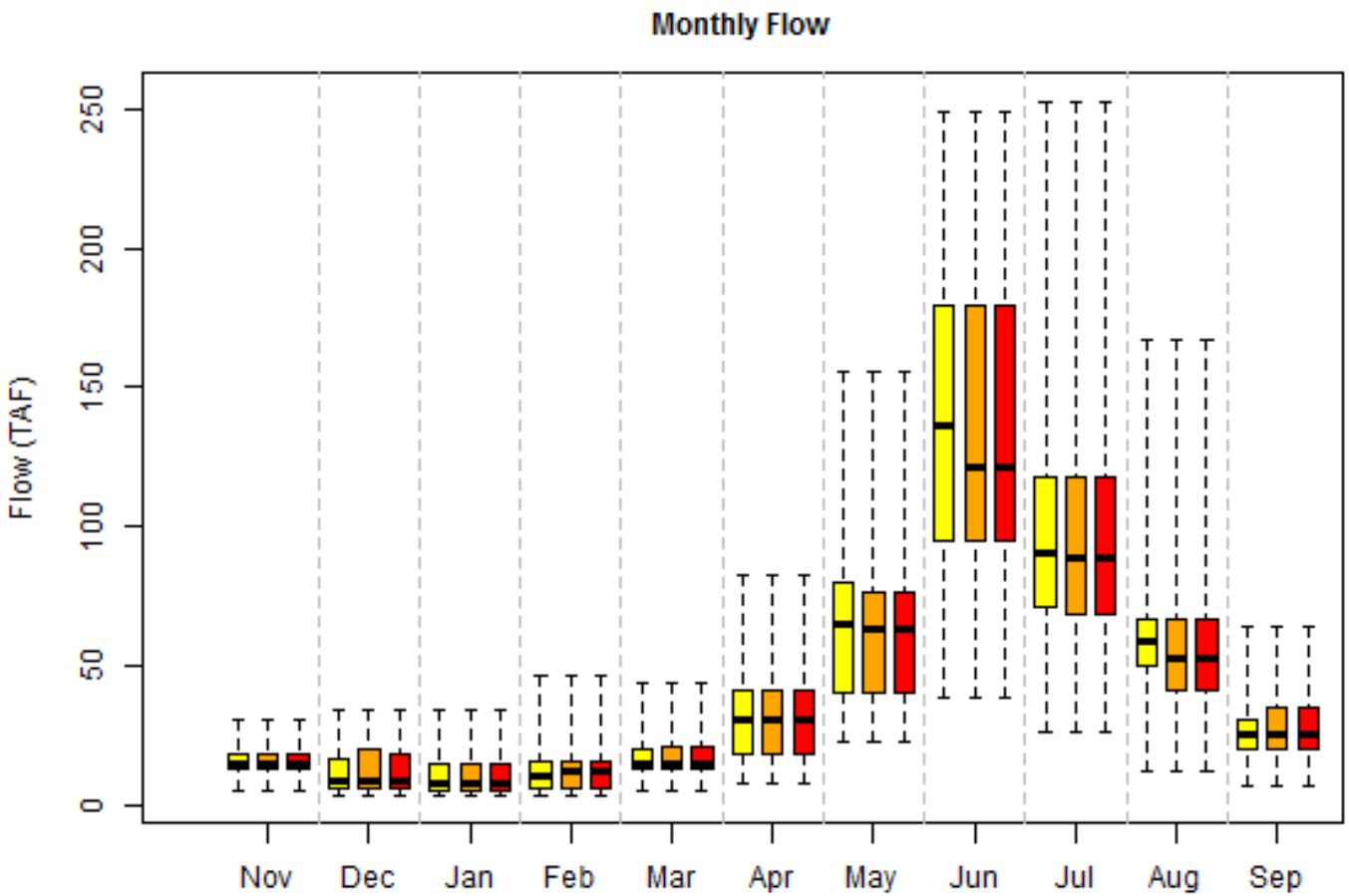
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

WGRFC: Colorado River at San Saba



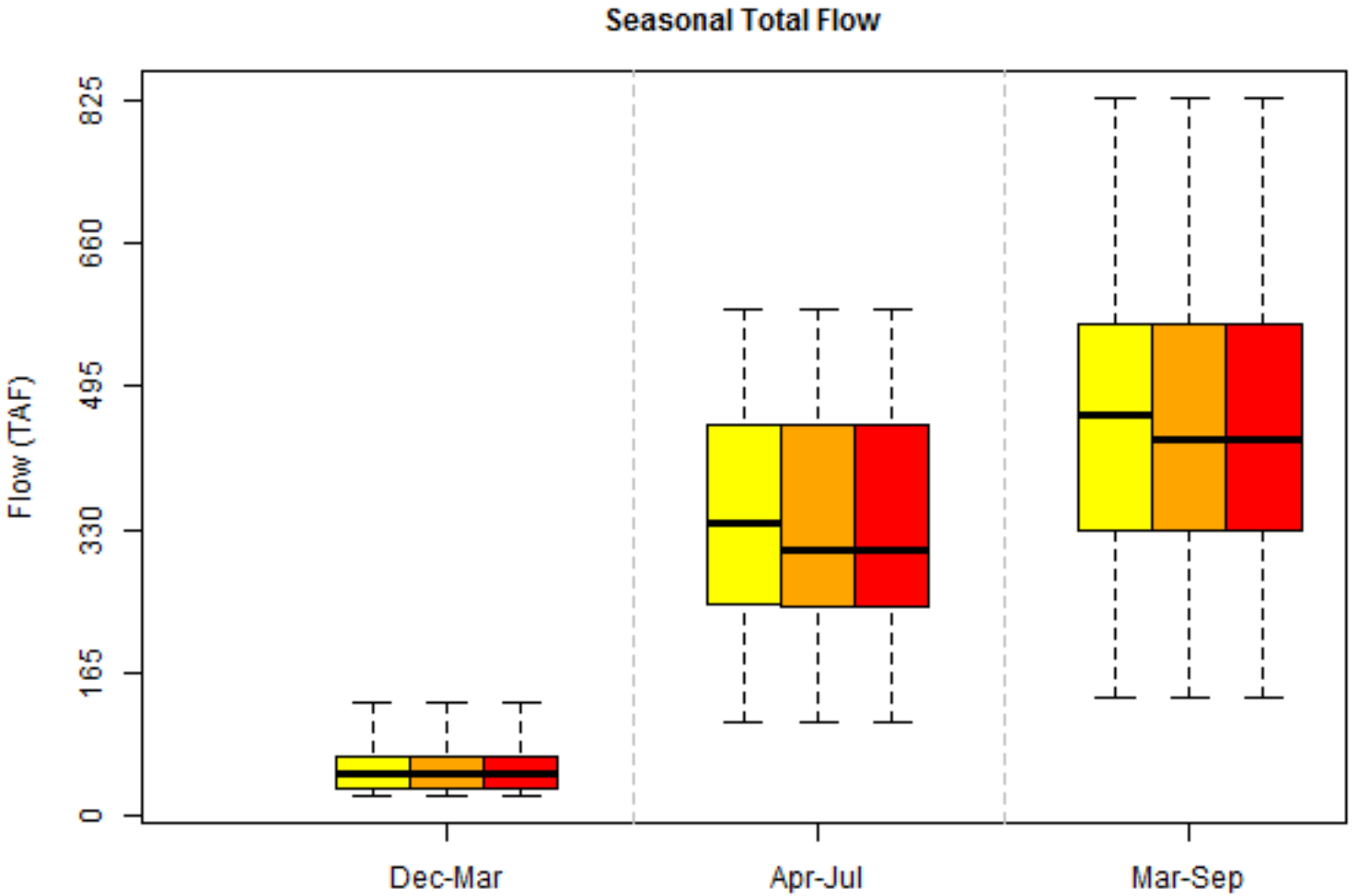
Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

ABRFC: Arkansas River at Pueblo Dam



Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

ABRFC: Arkansas River at Pueblo Dam



Yellow – Unweighted; **Orange** – Scenario 1 (only T); **Red** – Scenario 2 (T+P)

Hydrologic Scenarios for 2013

Laura Condon, Levi Brekke, Subhrendu Gangopadhyay

Bureau of Reclamation, Denver

November 6, 2012