

Isolated Facility Capacity Sensitivity Analysis Update

BDCP Conveyance Workgroup
May 20, 2009

Update to Capacity Sensitivity Study

- Purpose of capacity sensitivity study is to evaluate changes in Delta exports and flow conditions under varying north Delta diversion (NDD) and conveyance sizes
- Scenarios presented on May 6, 2009 considered:
 - Capacities of 5, 10, and 15 kcfs
 - Dual conveyance
 - Historical hydroclimate and sea levels
 - Operational measures described in Dec 19, 2008 Overview document (and used in DRERIP evaluations)
- Update considers three additional conditions:
 1. **Increased South of Delta Storage or Demand**
 2. **Future Hydroclimate and Sea Levels under Climate Change**
 3. **Fully Isolated North Delta Diversion and Conveyance**

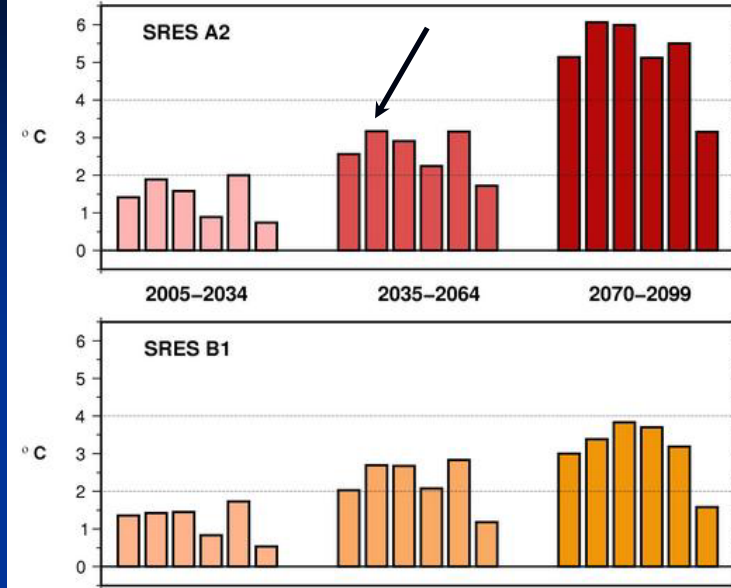
Scenarios with Increased SOD Storage or Demand

- Assumptions
 - SOD storage and demand limitations on diversions removed
 - Surrogate demand added to model of allow diversions to occur whenever supply was available and Hood bypass, OMR, Delta outflow, and other Delta requirements were satisfied
 - Demand added upstream of aqueduct conveyance limitations

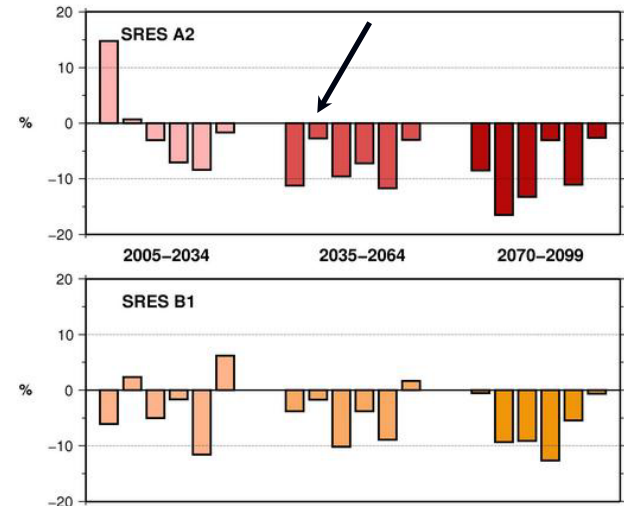
Scenarios with Climate Change Assumptions

- Climate Action Team selected scenarios (6 GCMs x 2 emission scenarios)
- Downscaling and hydrologic analysis performed for all major watersheds
- Historic inflows are “perturbed” to reflect climate change future (CALSIM II)
- Hydrologic indices and Sac Valley consumptive use updated
- Selected one scenario for this analysis:
 - SRES A2 (higher emission scenario)
 - GFDL CM2.1 general circulation model
 - Mid-century
 - Higher warming, but relatively modest changes to precipitation
- Sea level rise (1-2 ft) incorporated through new ANNs
- DWR methodologies applied

Jul–Aug–Sep temperature change from 1961–1990
Sacramento region
from 6 GCMs, A2 and B1 GHG emission scenarios

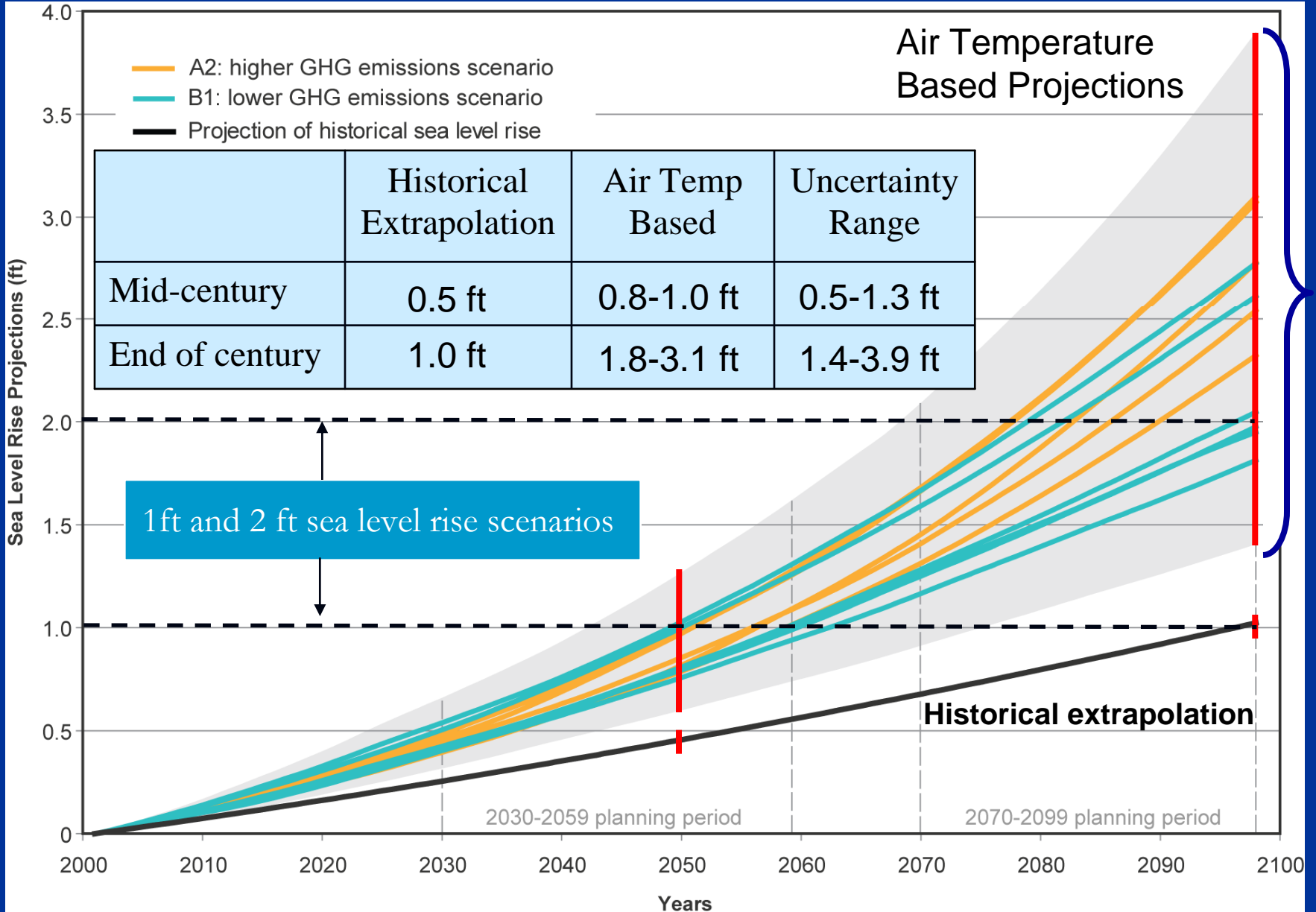


percent of 1961–1990 water year precip
Sacramento region
from 6 GCMs, A2 and B1 GHG emission scenarios



models are:
1: CNRM CM3 -- 2: GFDL CM2.1 -- 3: MIROC3.2 (med)
4: MPI ECHAM5 -- 5: NCAR CCSM3 -- 6: NCAR PCM1

Sea Level Rise Considerations

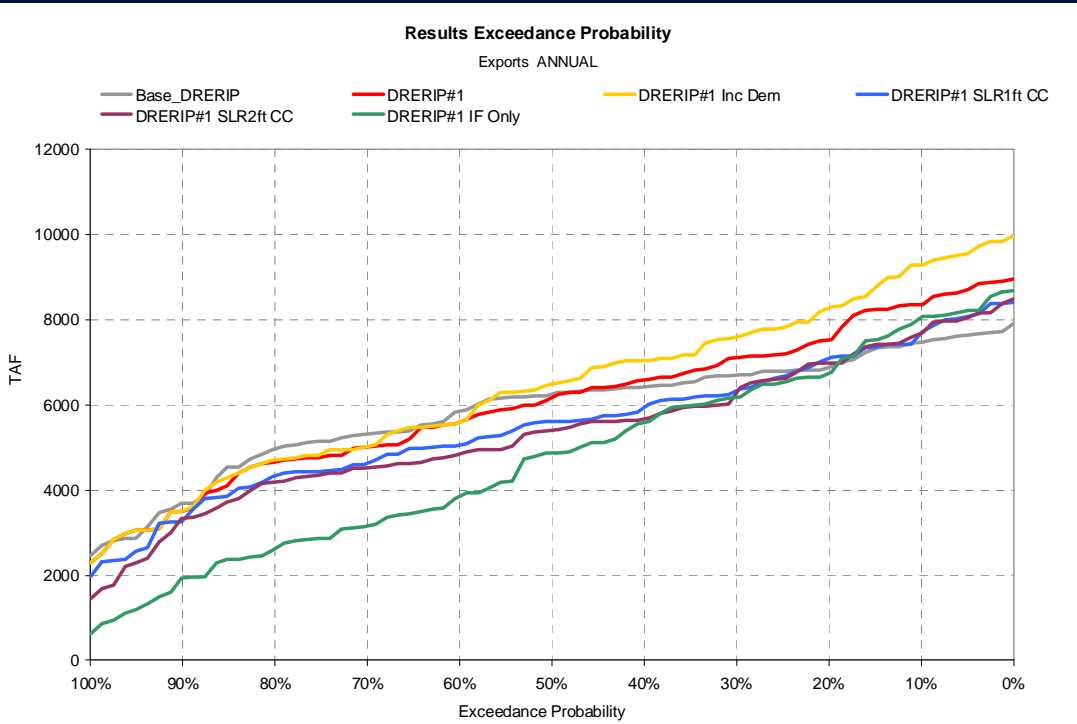


Scenarios with Fully-Isolated Conveyance

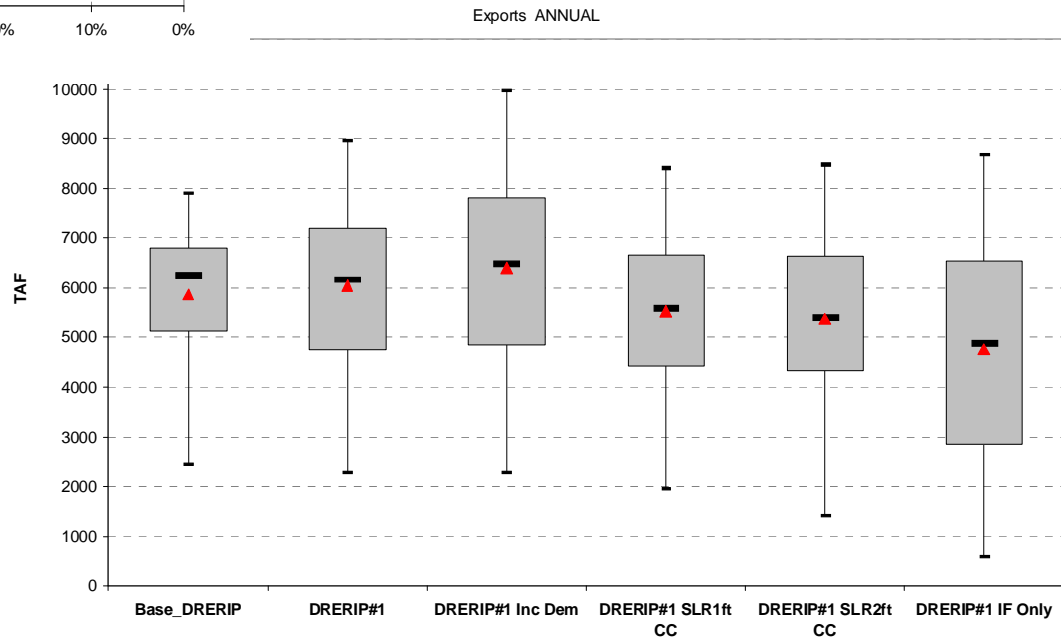
- Assumptions
 - No SWP or CVP south Delta diversion operation
 - In-Delta diversions remain
 - Salinity and X2 standards per D-1641

Annual Export Reliability Results

DRERIP#1 Assumptions



Single Month Box Plot Study Comparison
(th to 75th percentile range, whiskers=min and max, dash=median, triangle=mean)

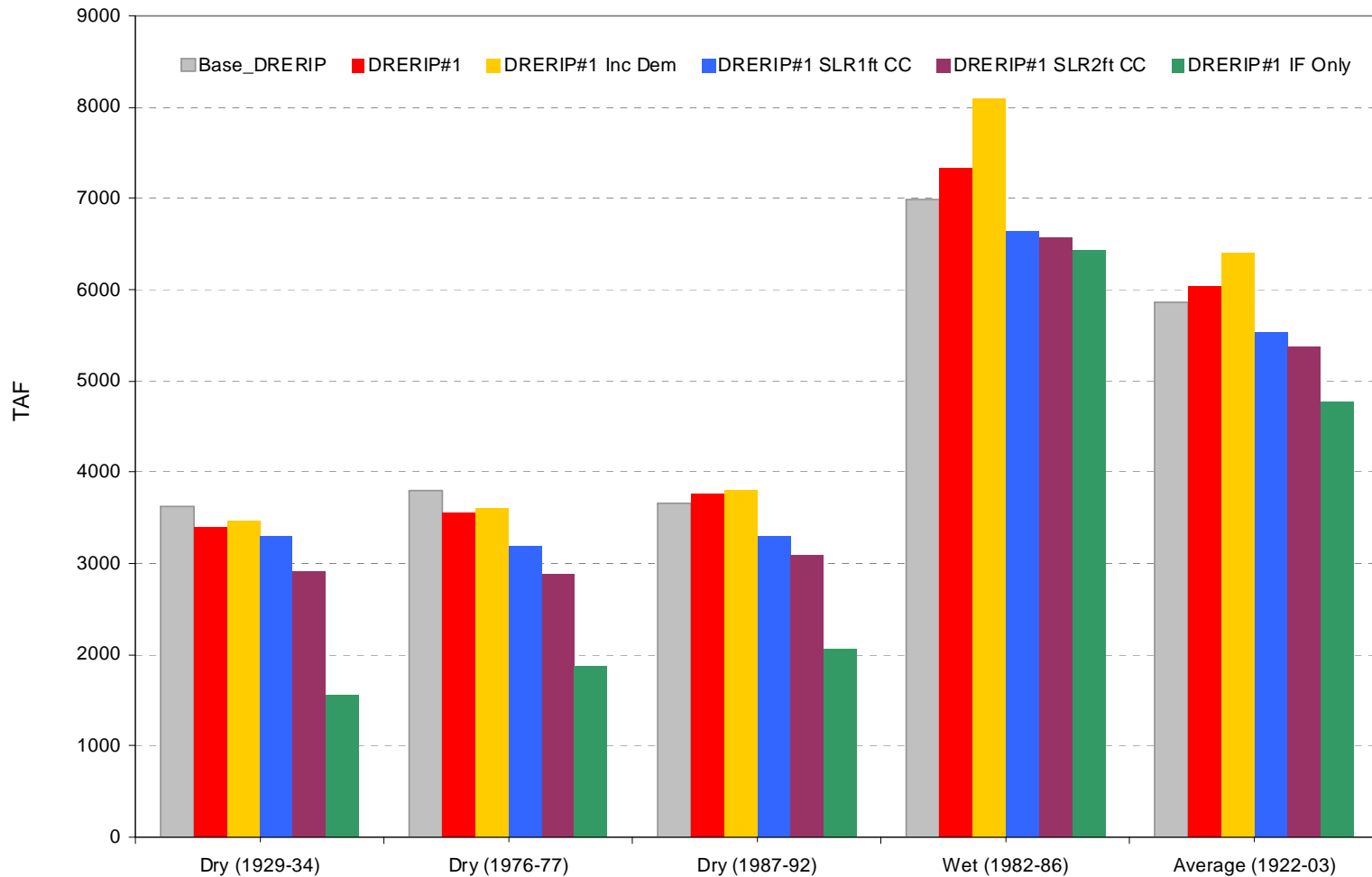


Average Exports for Selected Periods

DRERIP#1 Assumptions

Multi Study Comparison - Long Term Monthly Average Results

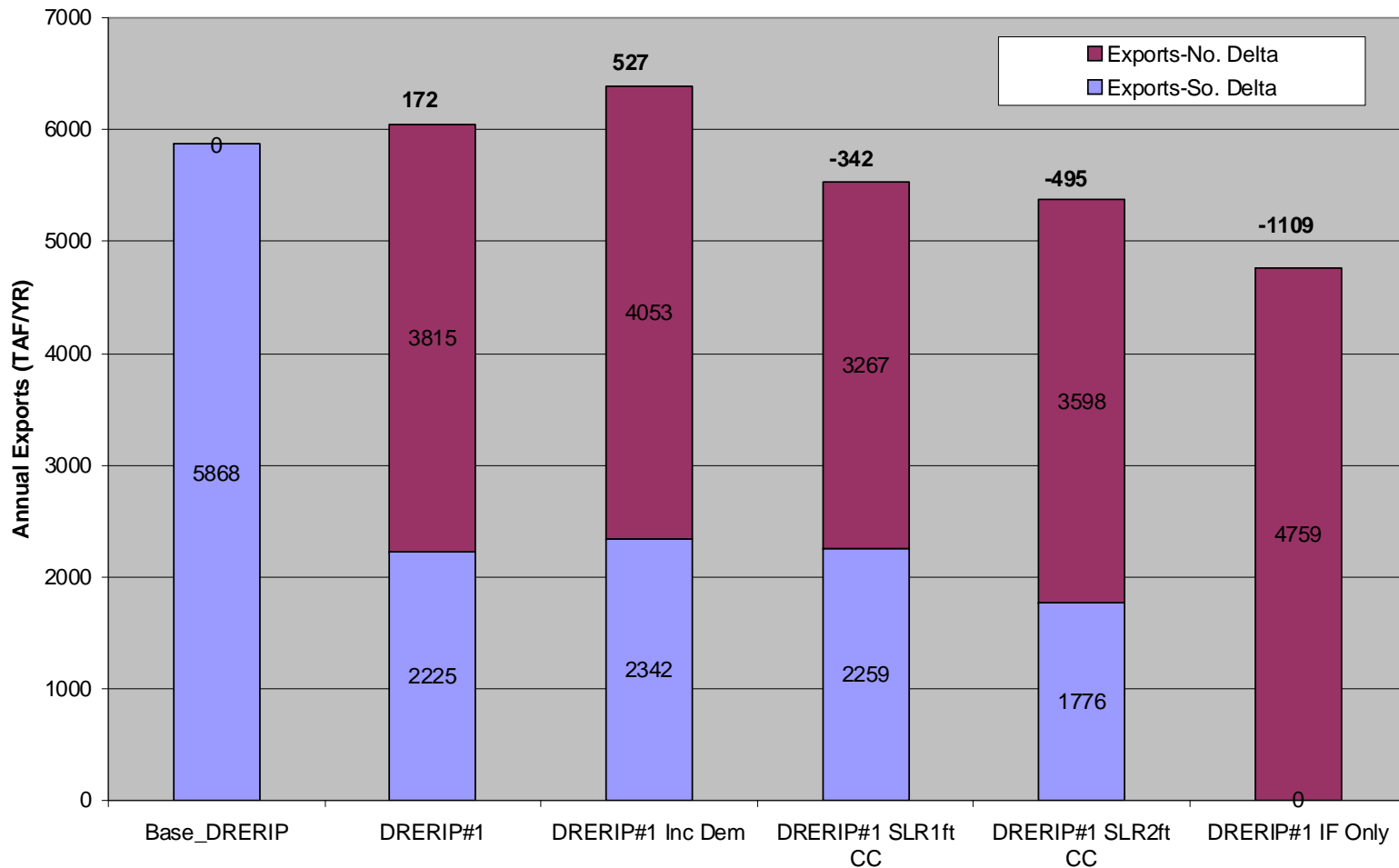
Exports



South vs North Delta Exports

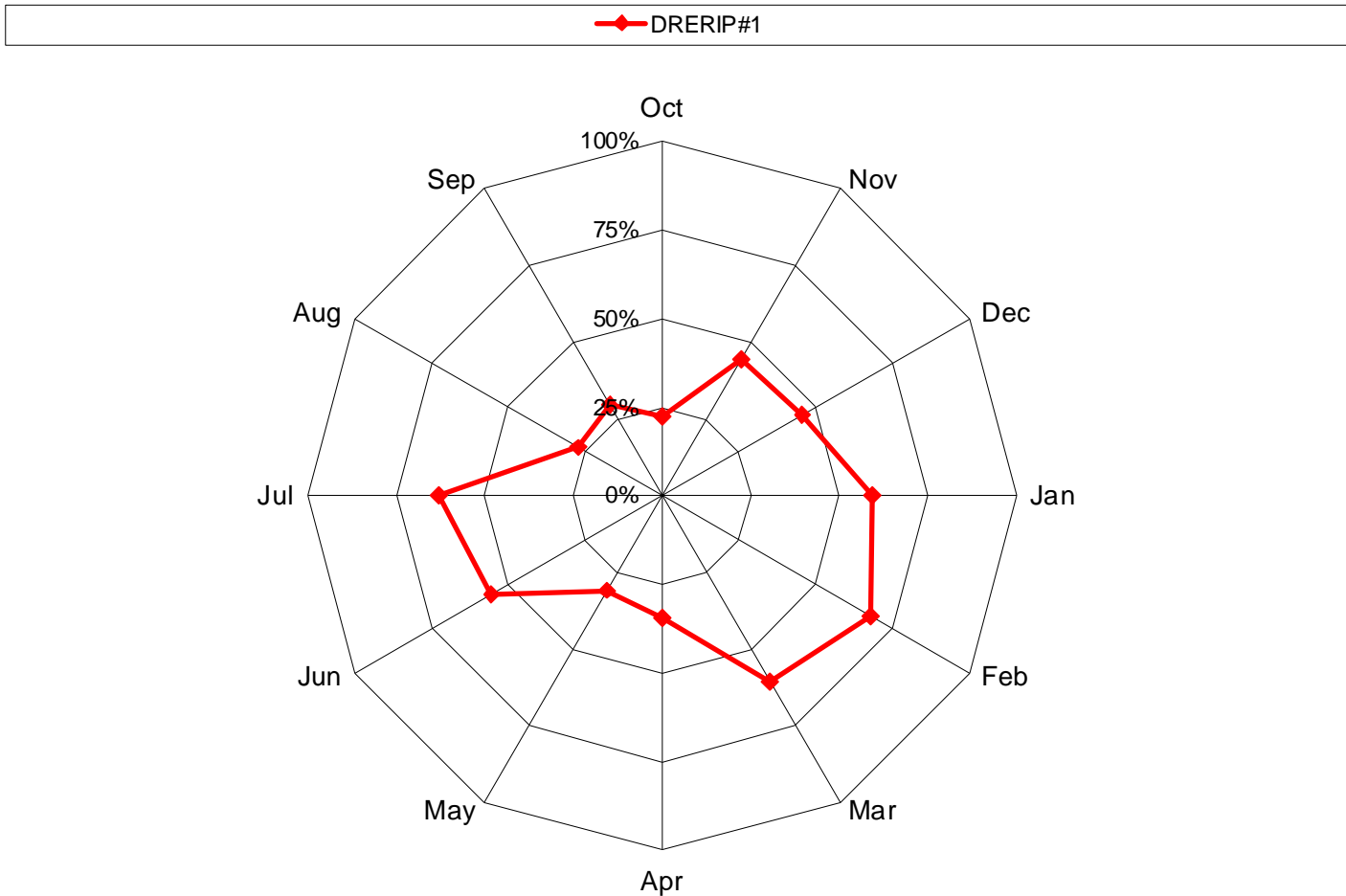
DRERIP#1 Assumptions

Long-Term Annual Distribution of SWP and CVP Delta Exports



Sample IF Usage Frequency Plot

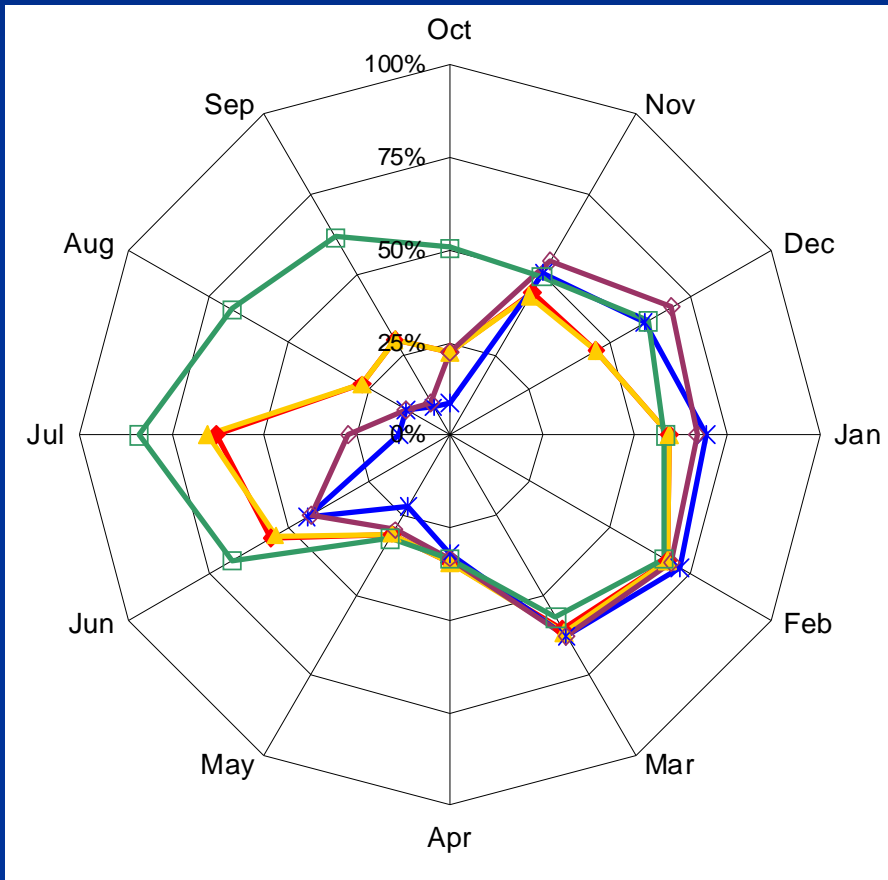
Frequency of Capacity Usage Greater Than 5,000 cfs



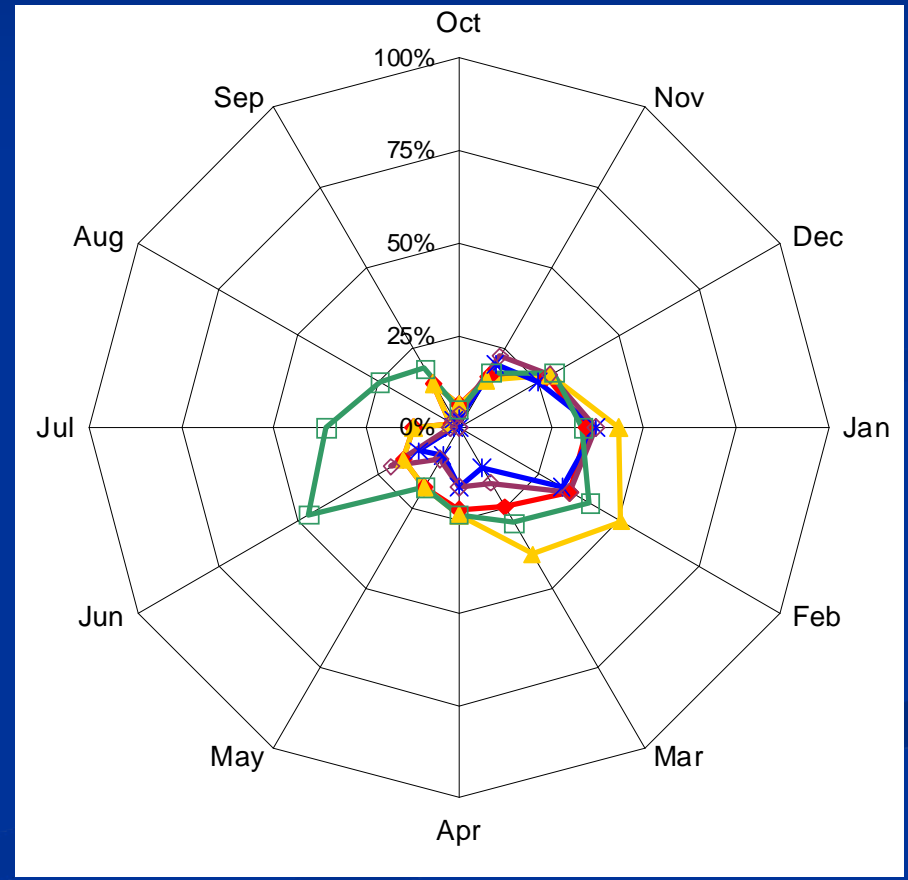
Frequency of Capacity Usage

DRERIP#1 Assumptions

Greater than 5,000 cfs

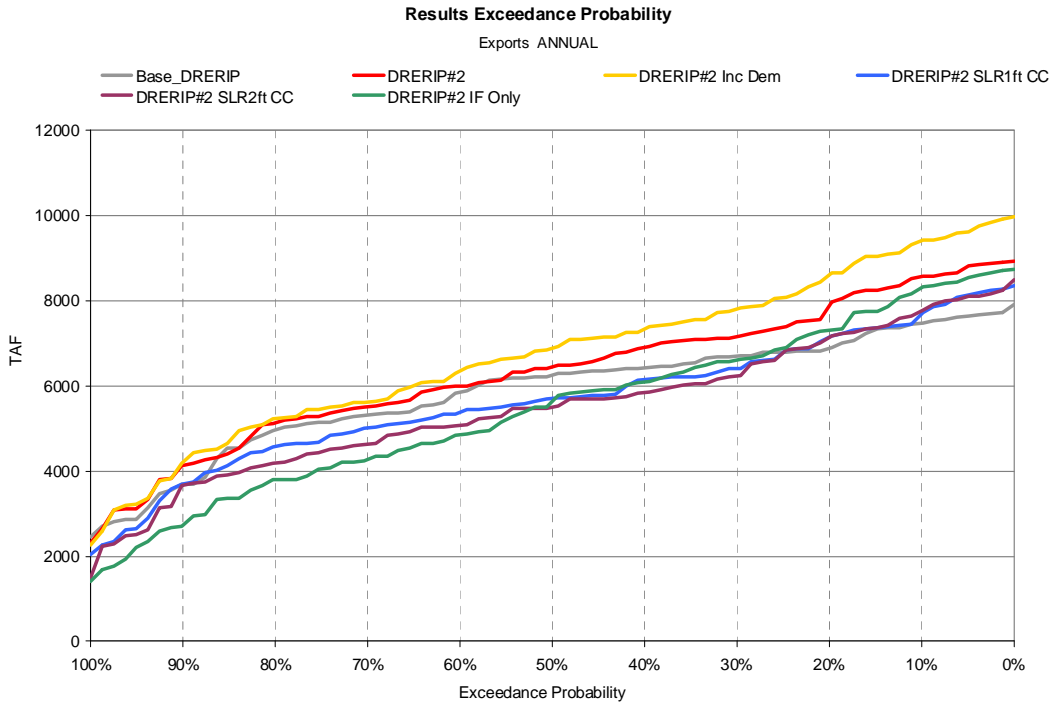


Greater than 10,000 cfs

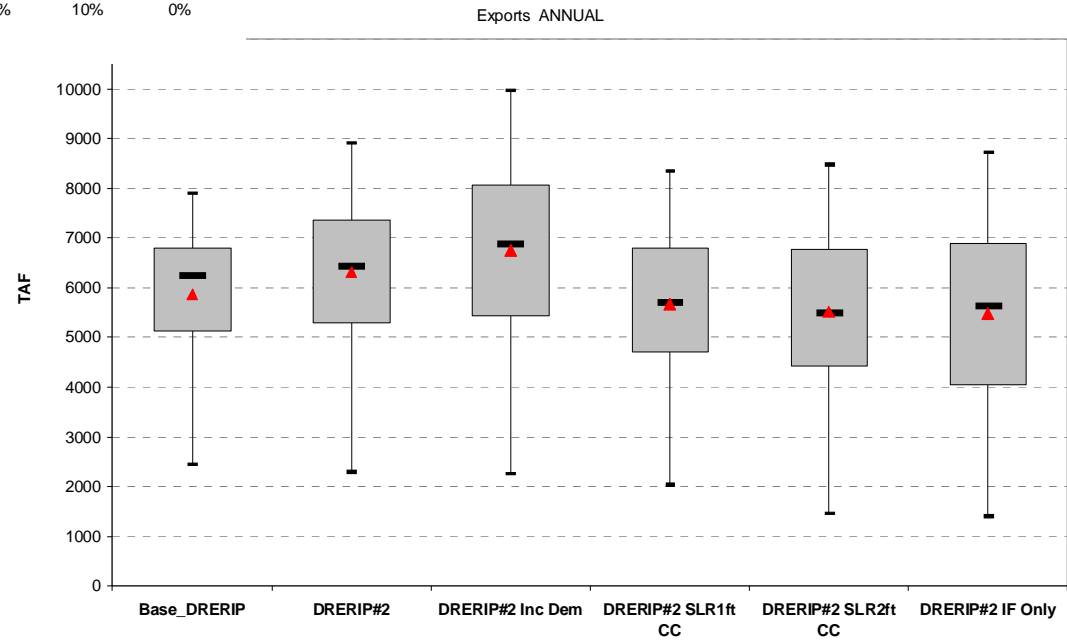


Annual Export Reliability Results

DRERIP#2 Assumptions



Single Month Box Plot Study Comparison
 5th to 75th percentile range, whiskers=min and max, dash=median, triangle=mean)

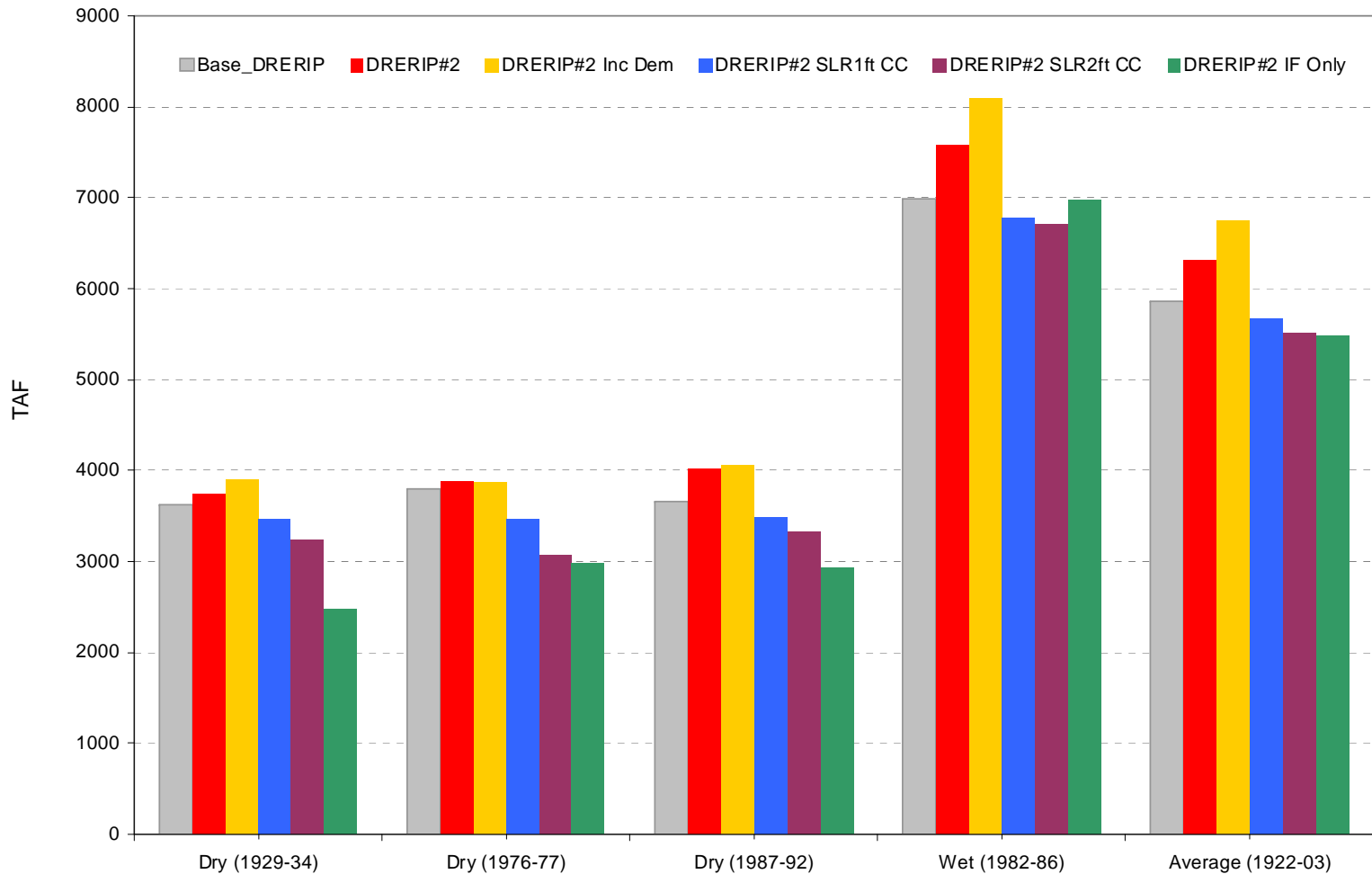


Average Exports for Selected Periods

DRERIP#2 Assumptions

Multi Study Comparison - Long Term Monthly Average Results

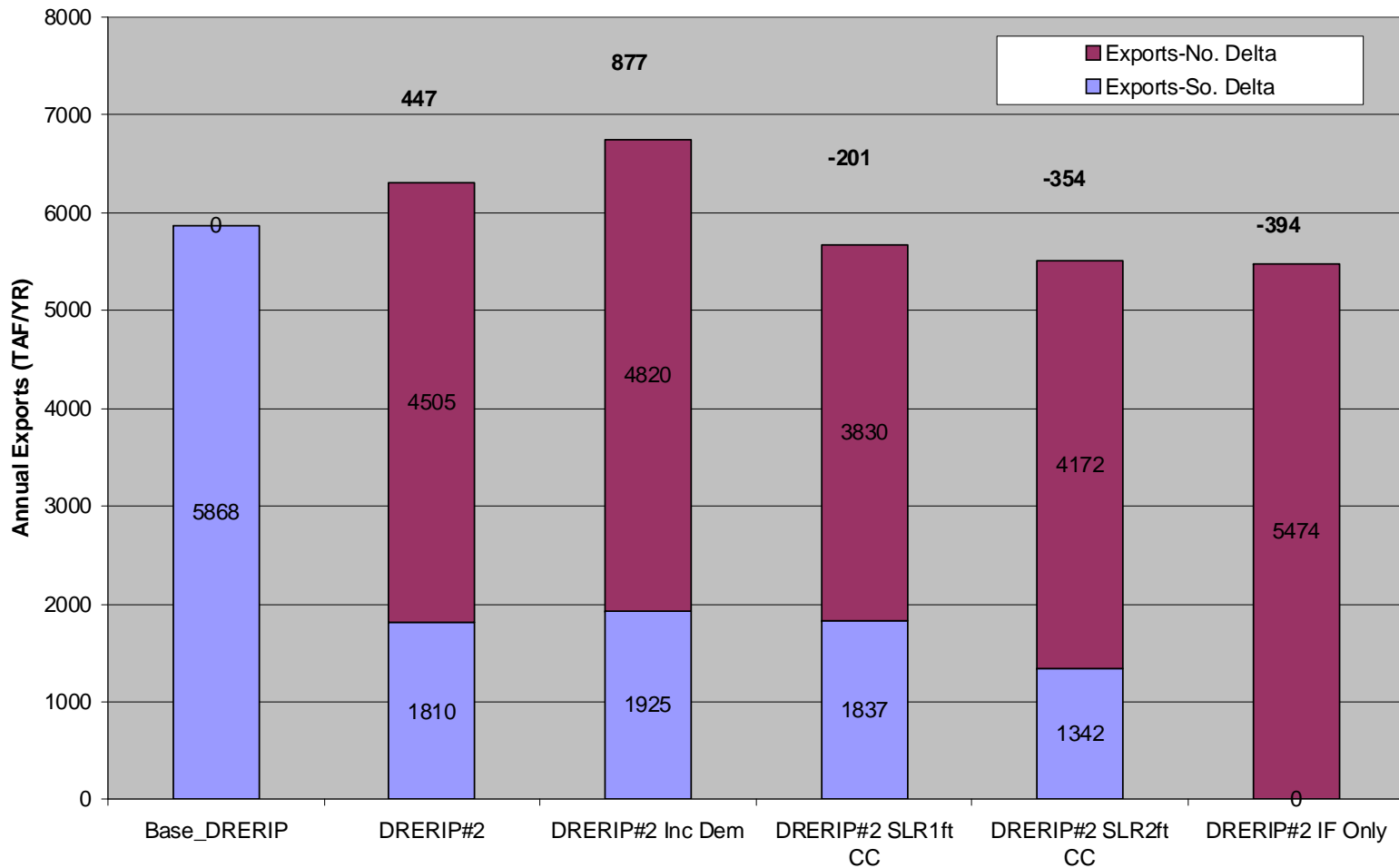
Exports



South vs North Delta Exports

DRERIP#2 Assumptions

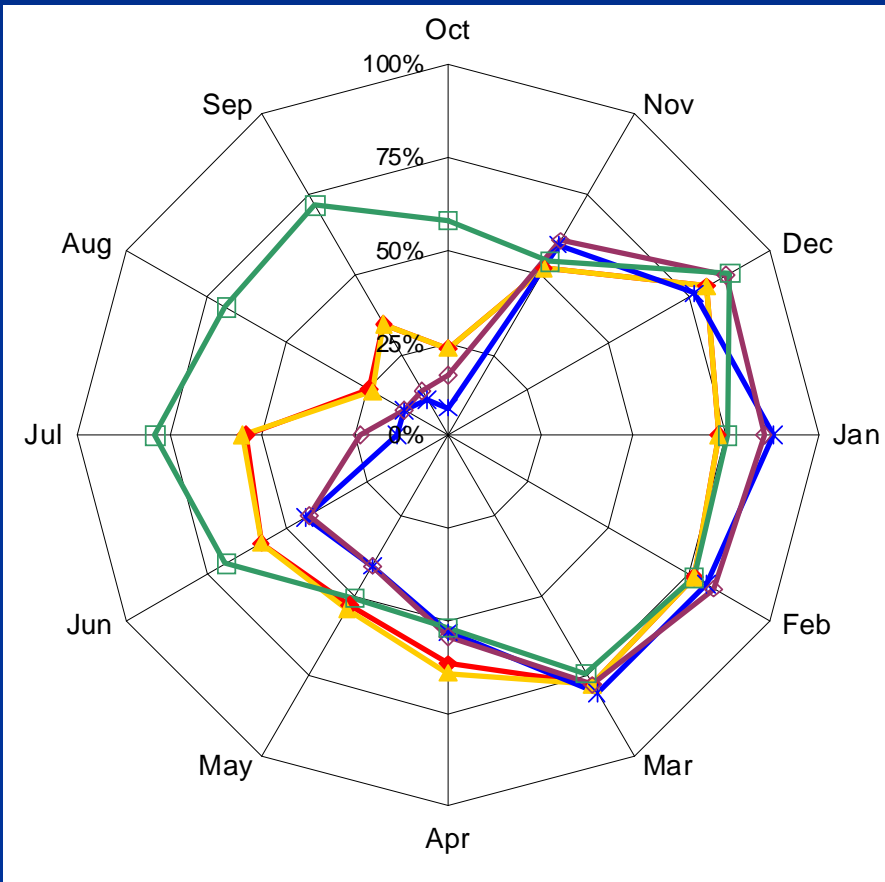
Long-Term Annual Distribution of SWP and CVP Delta Exports



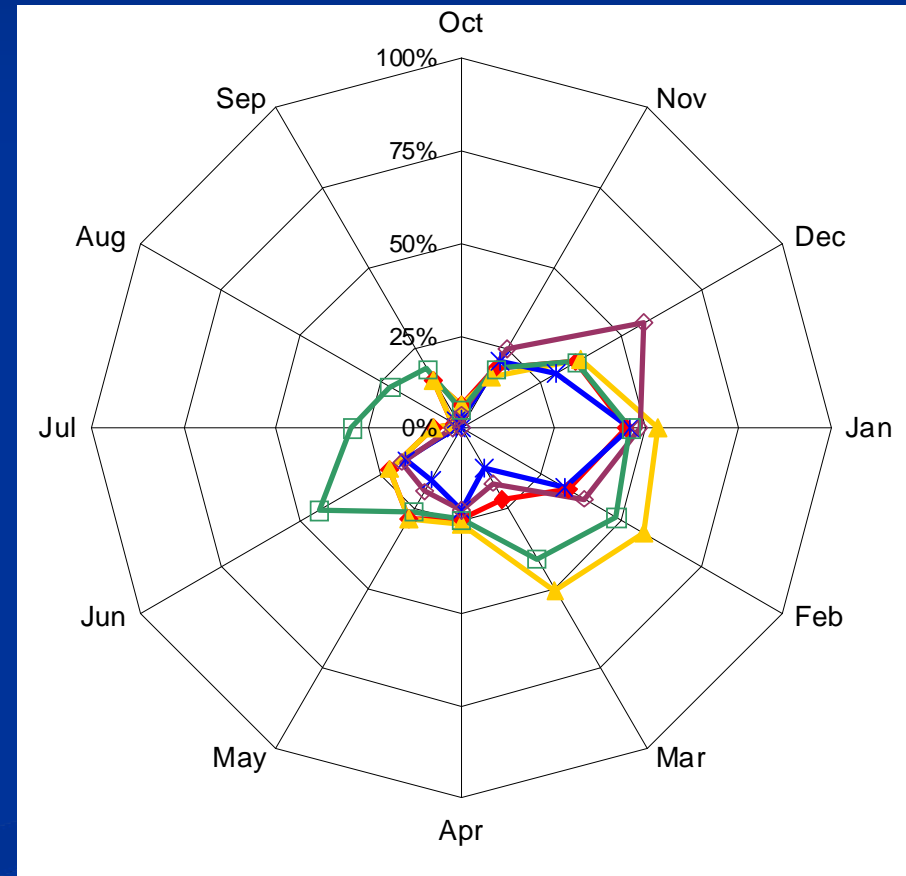
Frequency of Capacity Usage

DRERIP#2 Assumptions

Greater than 5,000 cfs



Greater than 10,000 cfs



DRERIP#1 DRERIP#1 Inc Dem DRERIP#1 SLR1ft CC DRERIP#1 SLR2ft CC DRERIP#1 IF Only

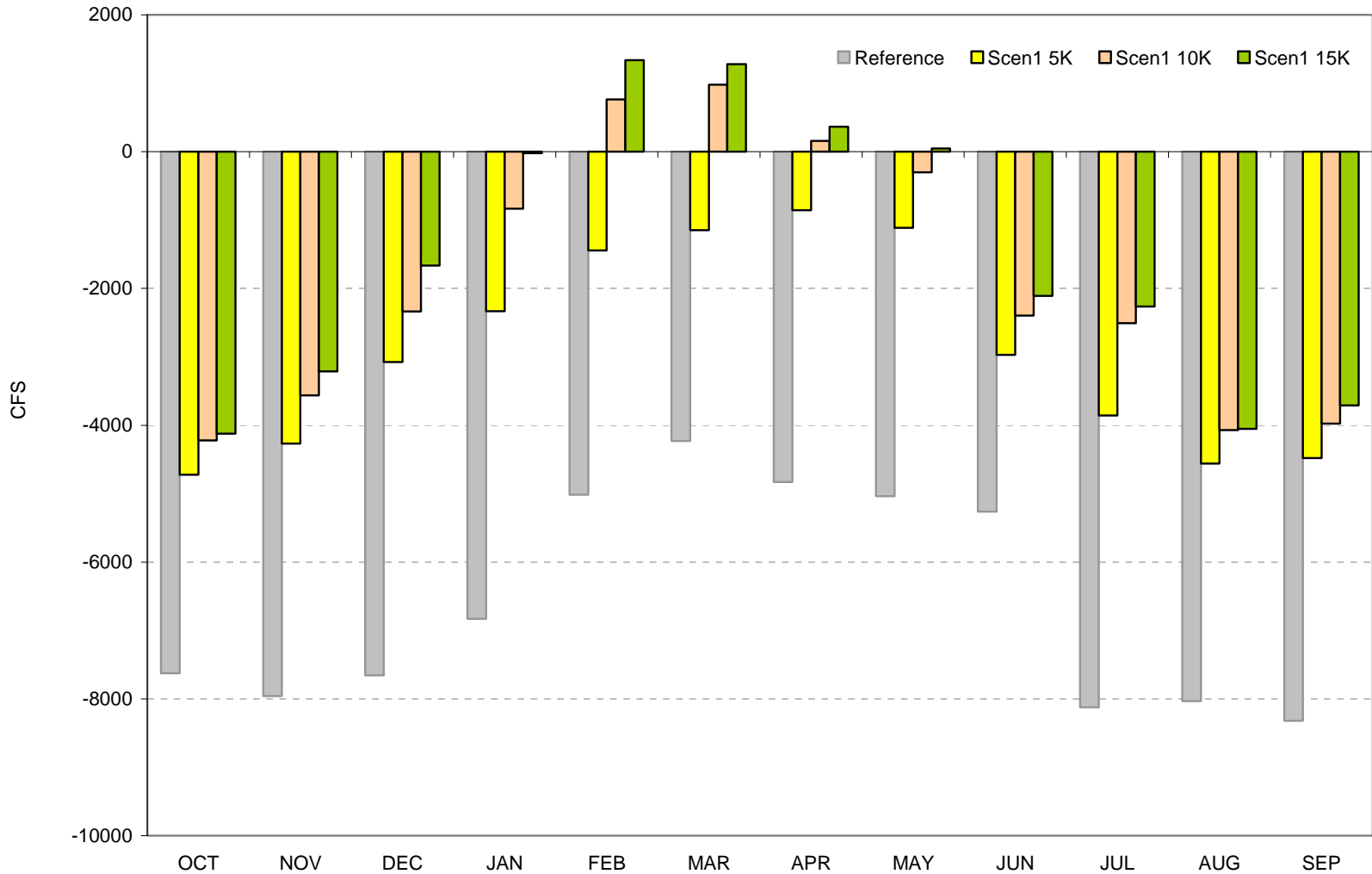
Delta Flow Results

- Combined Old and Middle River Flows
- Sacramento River Flows d/s Diversion
- Delta Outflows
- X2 Position

OMR Flows with Varying Capacities

Multi Study Comparison - Long Term Monthly Average Results

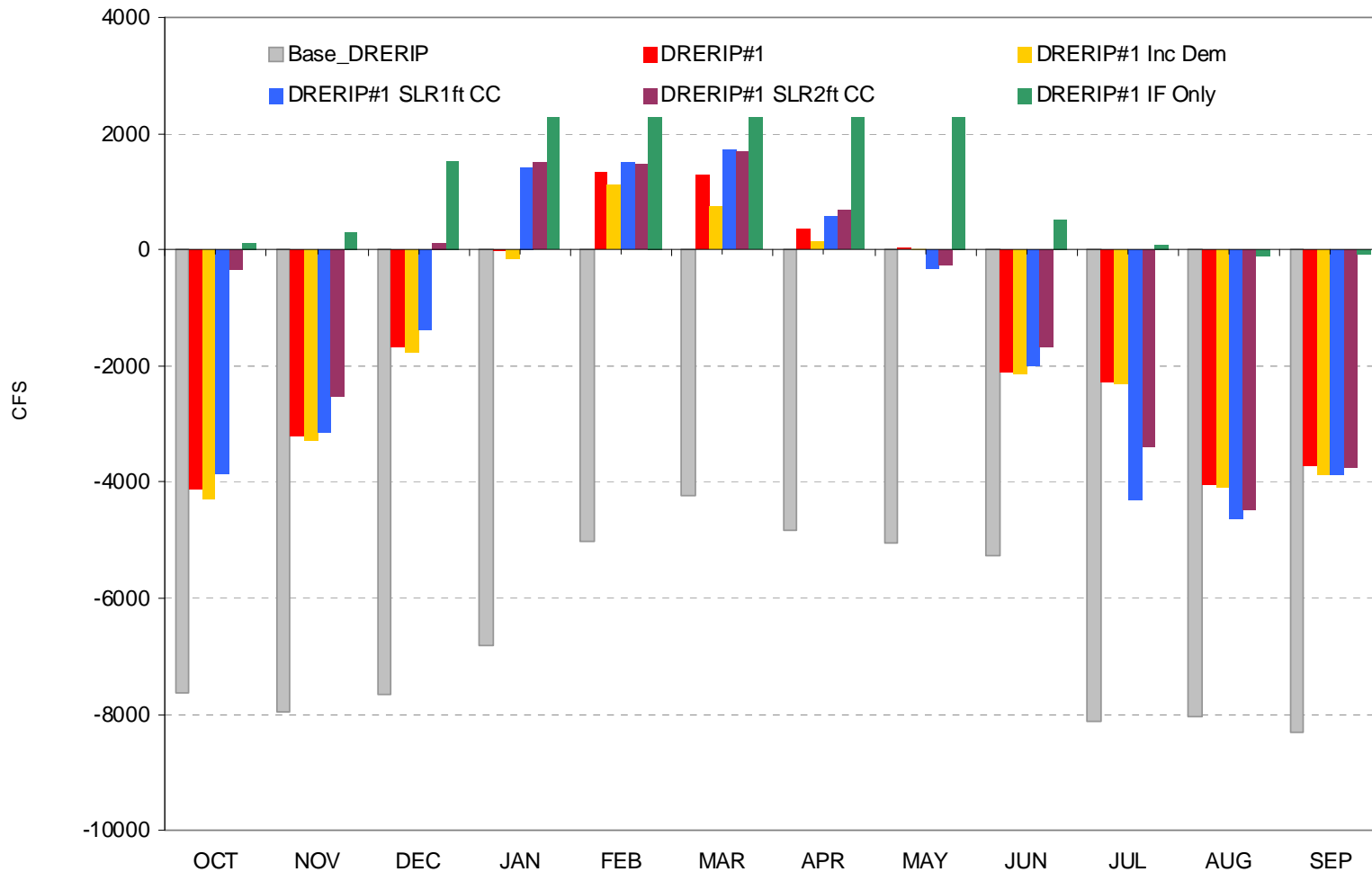
Old and Middle River combined flow (OMR)



OMR Flows under Varying Assumptions

Multi Study Comparison - Long Term Monthly Average Results

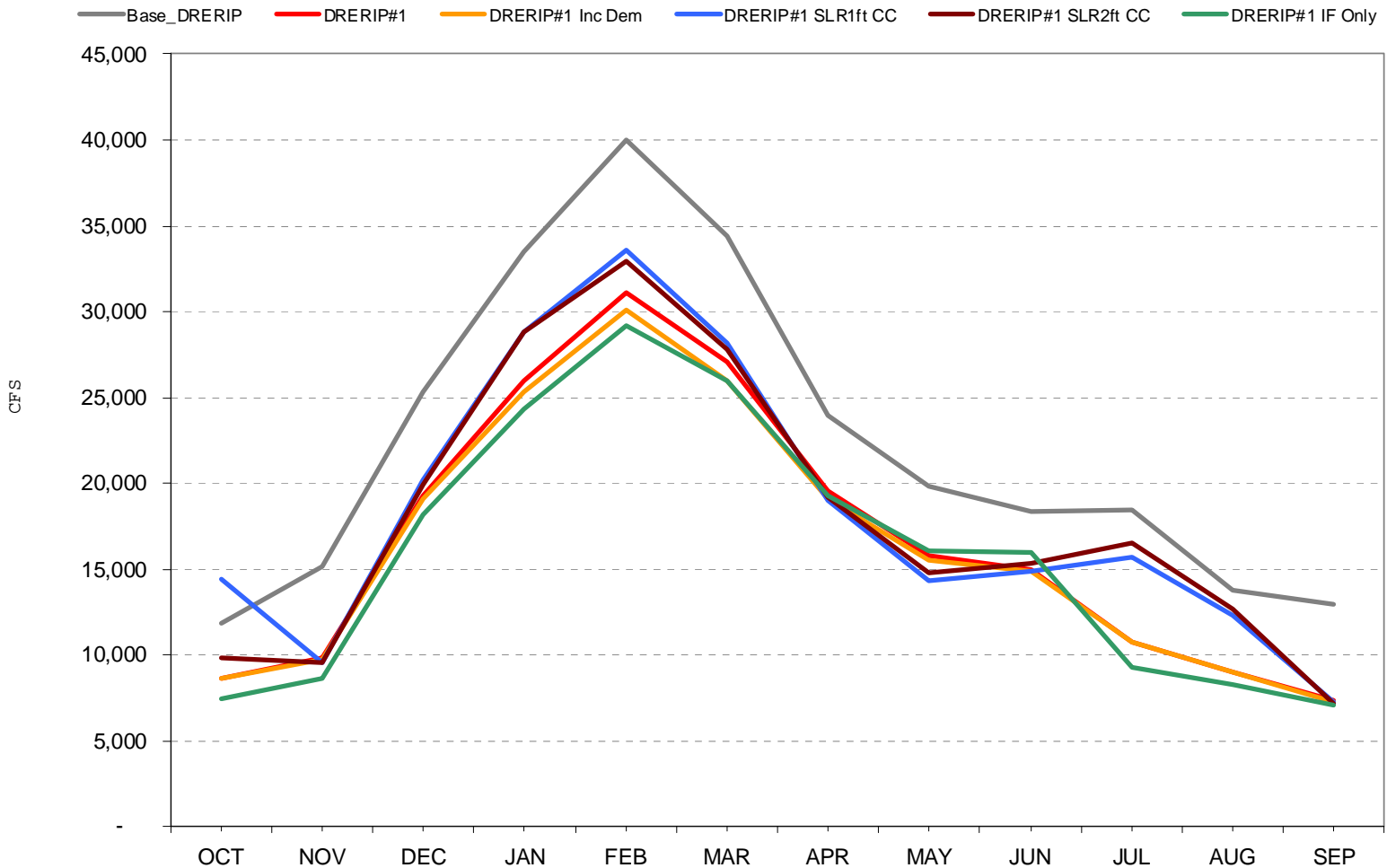
OMR



Sacramento River Flow Results

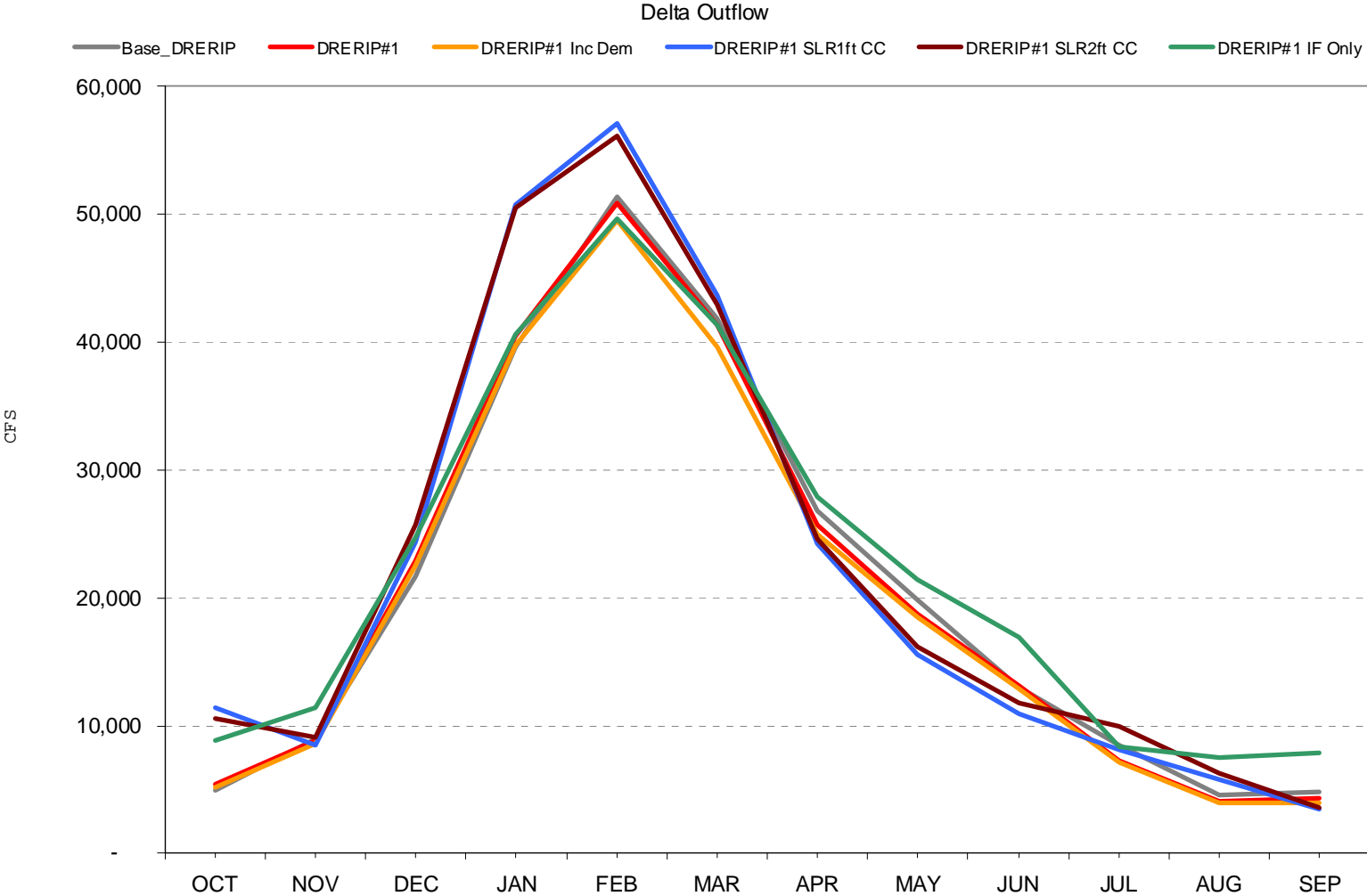
Multi Study Comparison - Long Term Monthly Average Results

Sac R ds Hood



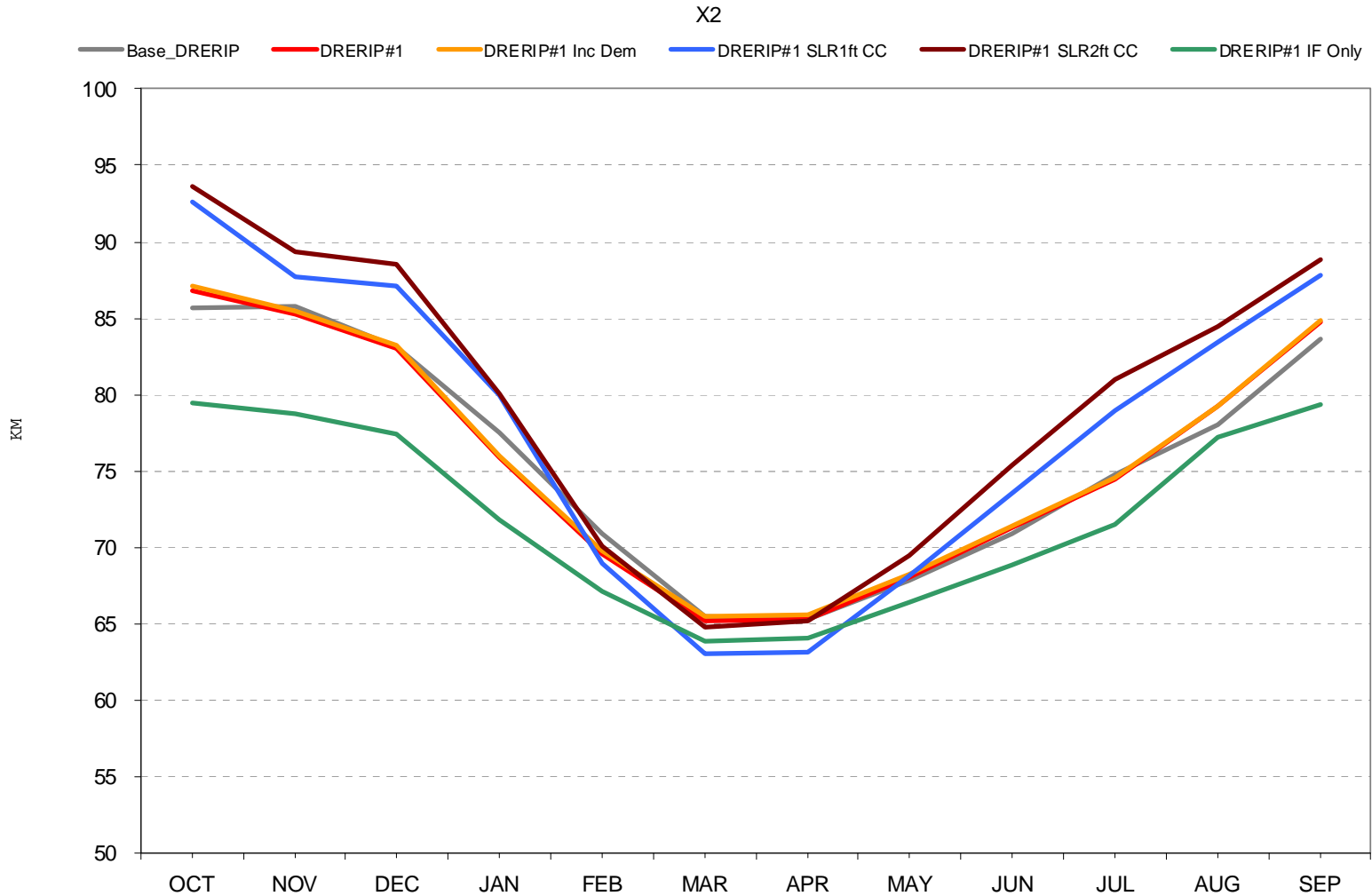
Delta Outflow Results

Multi Study Comparison - Long Term Monthly Average Results



X2 Results

Multi Study Comparison - Long Term Monthly Average Results



Summary

- 5 kcfs vs 10 kcfs:
 - Diversion and canal capacity of 10 kcfs provides significant benefit towards achieving water supply reliability and reducing reliance on south Delta flows
- 10 kcfs vs 15 kcfs:
 - provides greater operational flexibility to respond to fish needs,
 - provides means to maintain water supply under levee failure,
 - provides means to adapt to climate change futures,
 - provides capacity for peak/intermittent operations under daily and hourly timescales

Backup



Do Analysis Timescales Matter?

- Monthly vs Daily
- Daily vs Hourly

Background

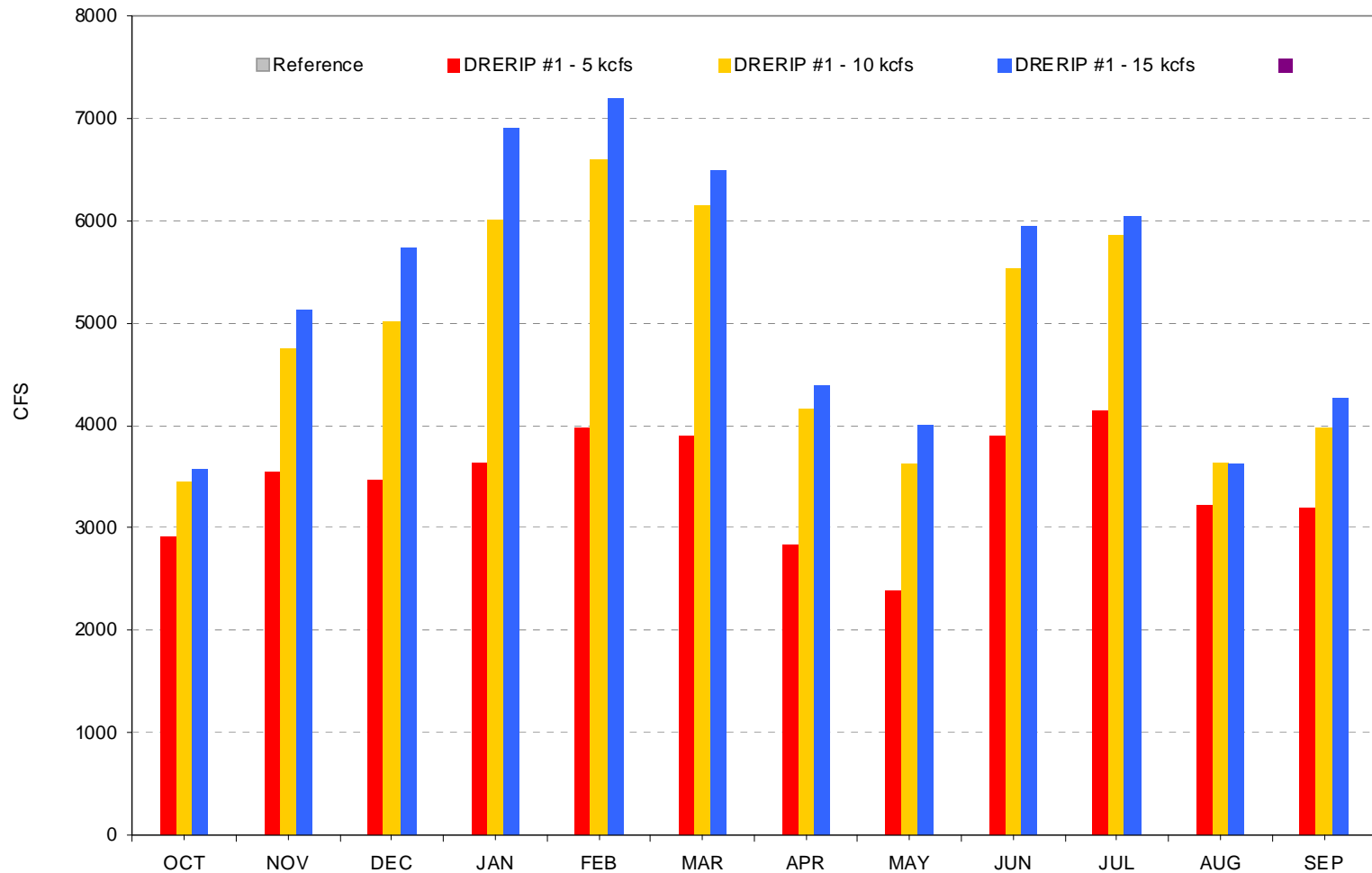
- Intakes and conveyance facilities in the north Delta proposed to shift primary point of diversion from south Delta in order to
 - reduce entrainment of pelagic species,
 - allow for broader Delta habitat restoration, and to
 - provide reliable water supplies for agricultural and urban users
- Analyses performed to date have assumed an intake and conveyance facility capacity of 15,000 cfs
- Capacity assumptions based on
 - previous modeling analyses,
 - desire to match existing Banks and Jones PP physical capacities (10,300 cfs and 4,600 cfs, respectively),
 - to allow for greater diversion of peak flows during relatively environmentally-benign times,
 - and permit intermittent daily operations that may require instantaneous diversion capacity greater than the daily or monthly averages



Seasonal Trend in Capacity Usage

Multi Study Comparison - Long Term Monthly Average Results

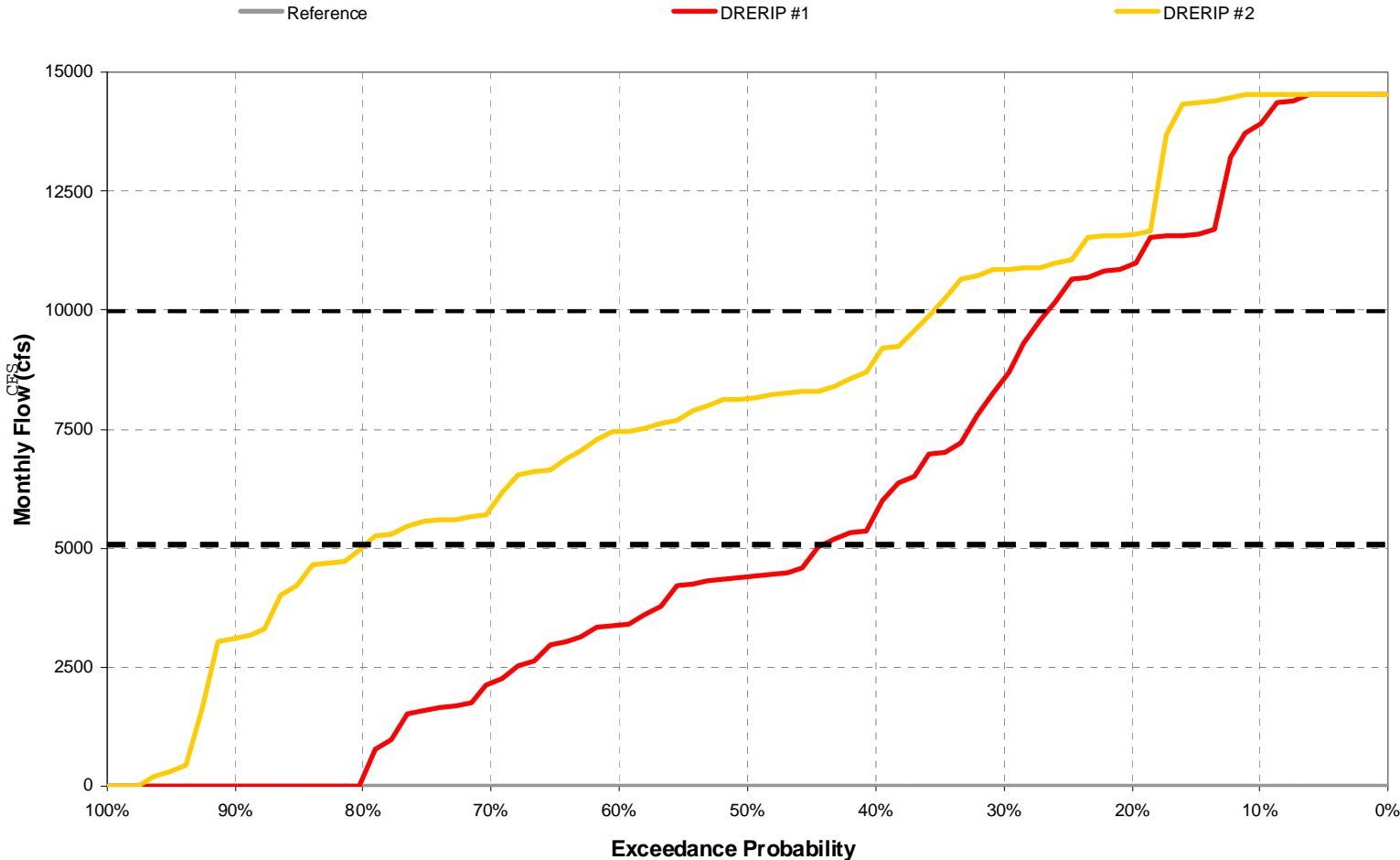
Total IF



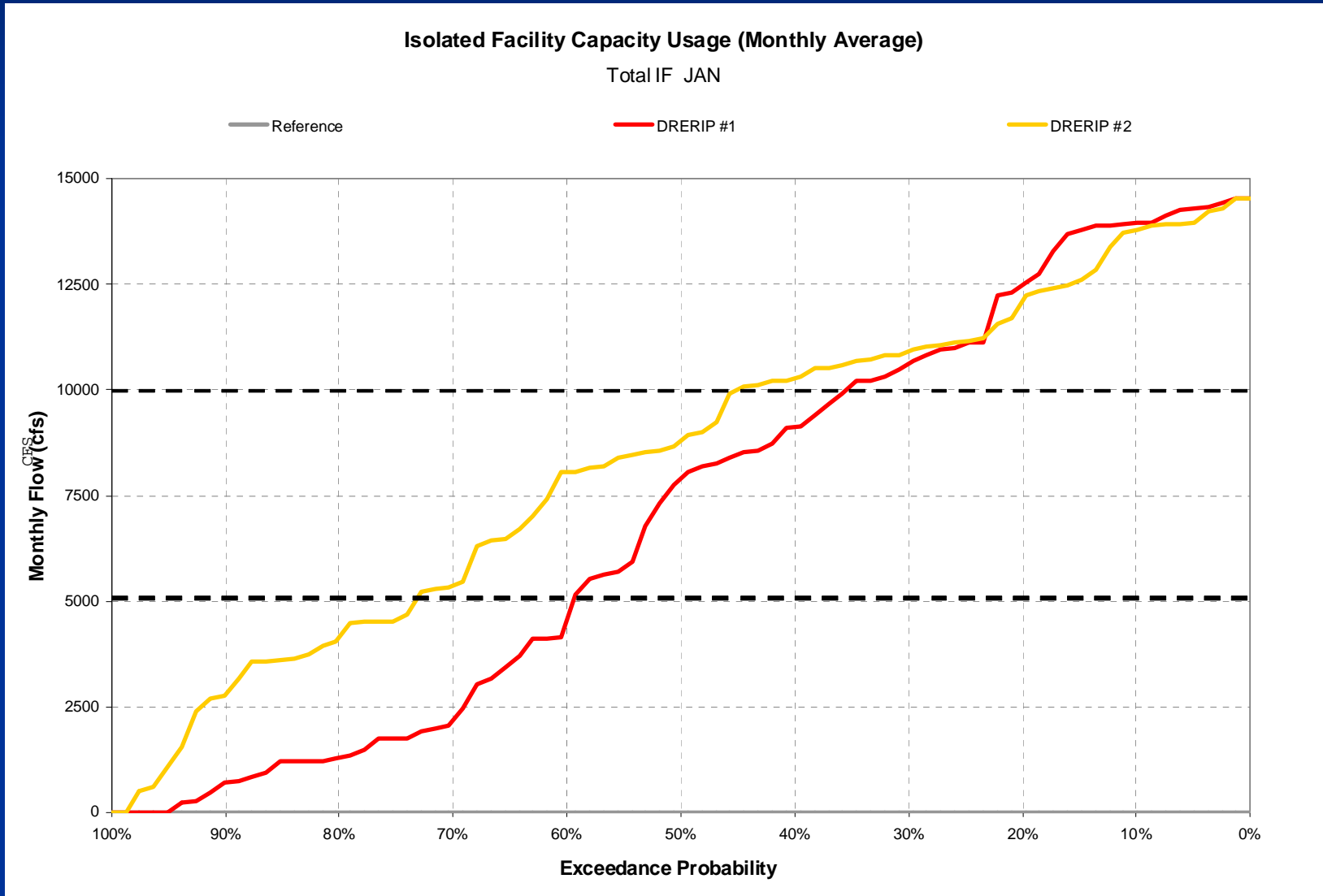
Results: IF Usage - December

Isolated Facility Capacity Usage (Monthly Average)

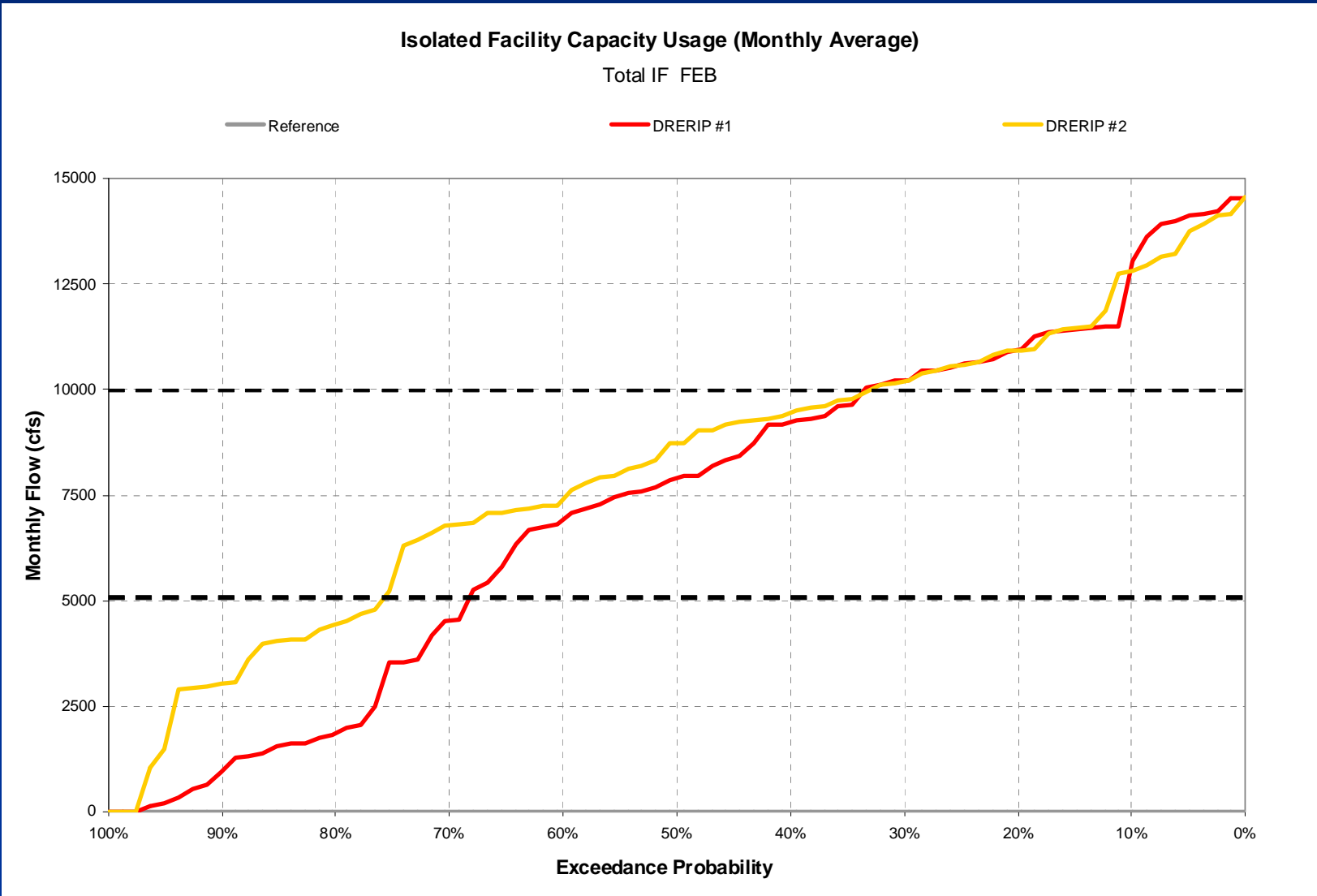
Total IF DEC



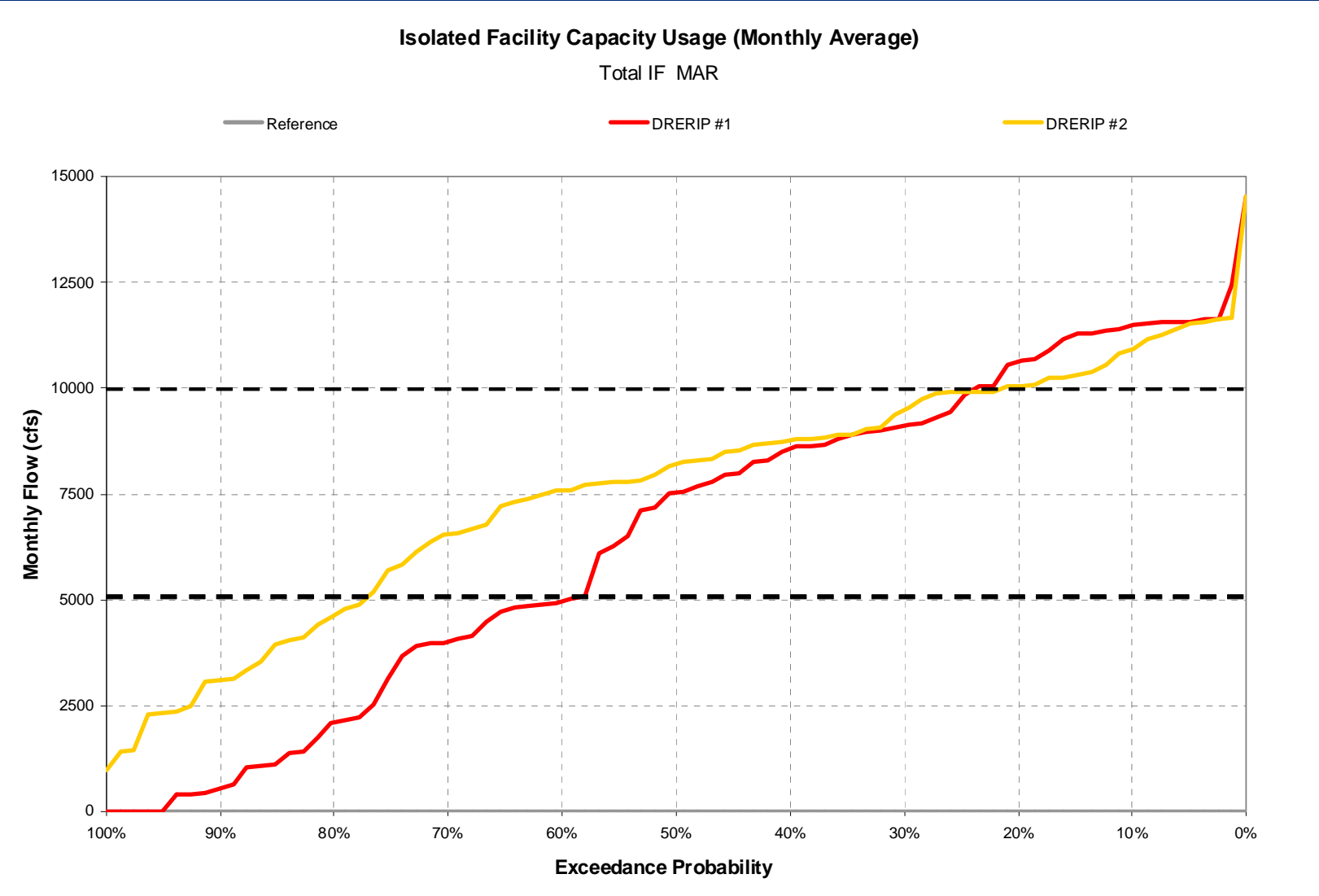
Results: IF Usage - January



Results: IF Usage - February



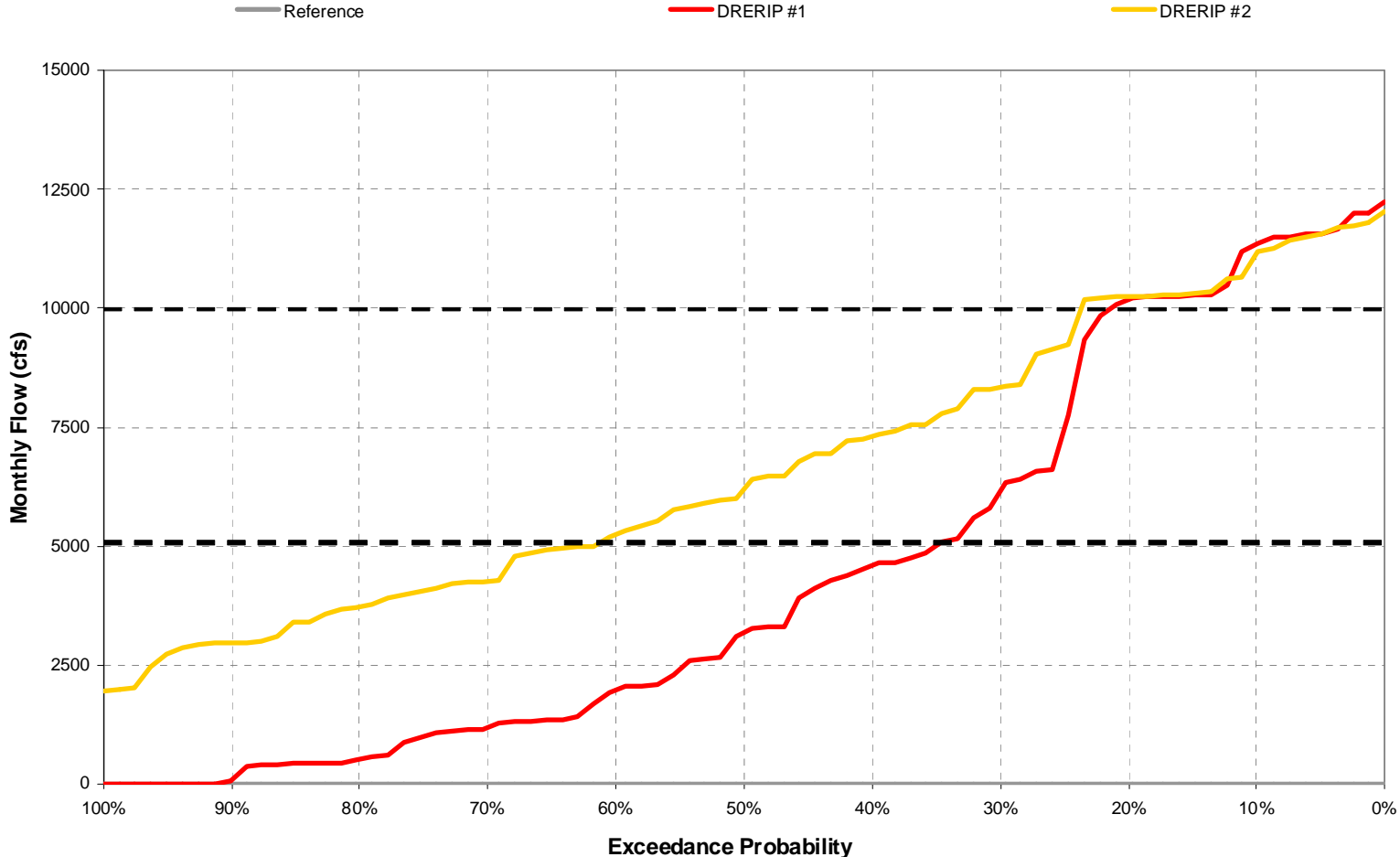
Results: IF Usage - March



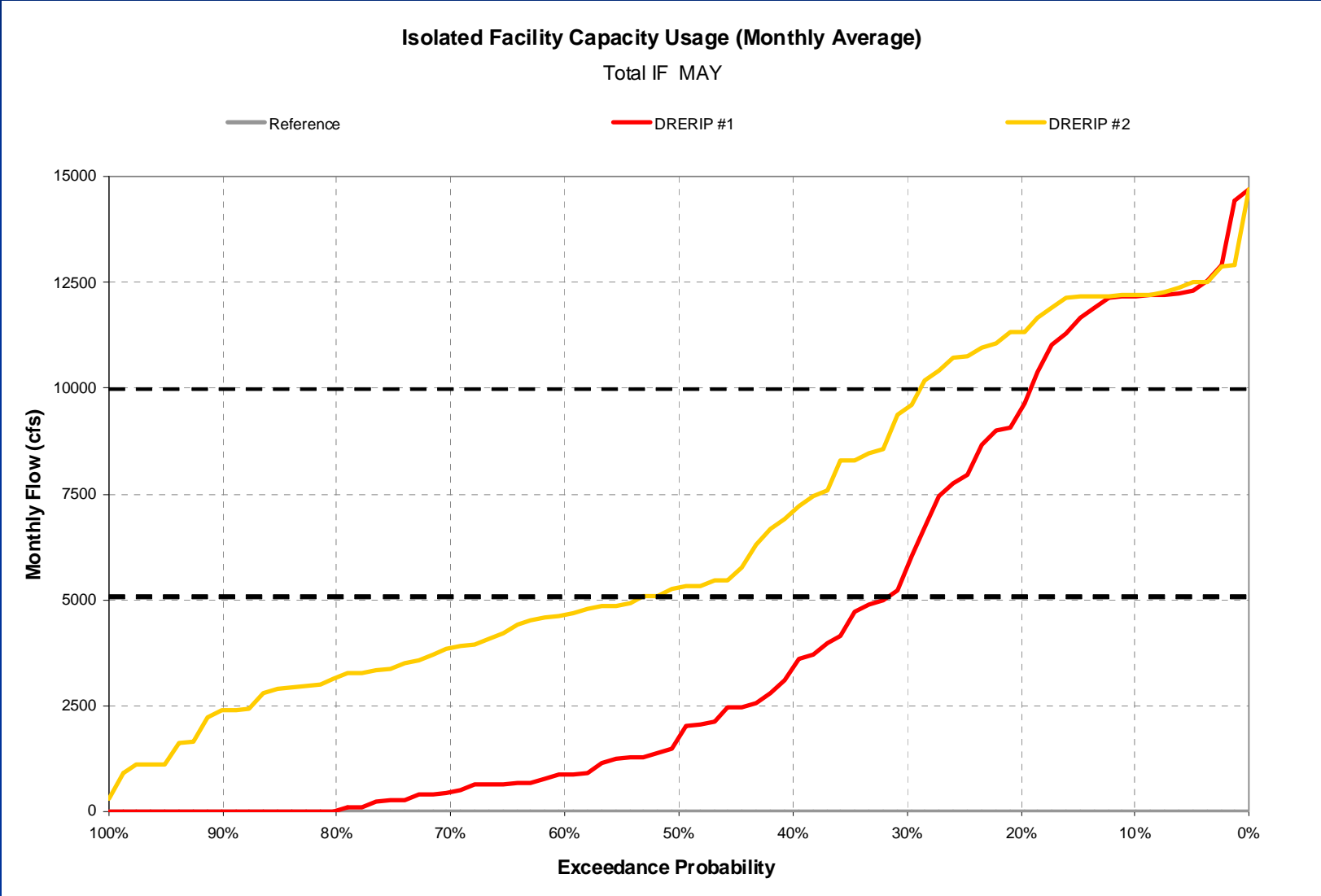
Results: IF Usage - April

Isolated Facility Capacity Usage (Monthly Average)

Total IF APR



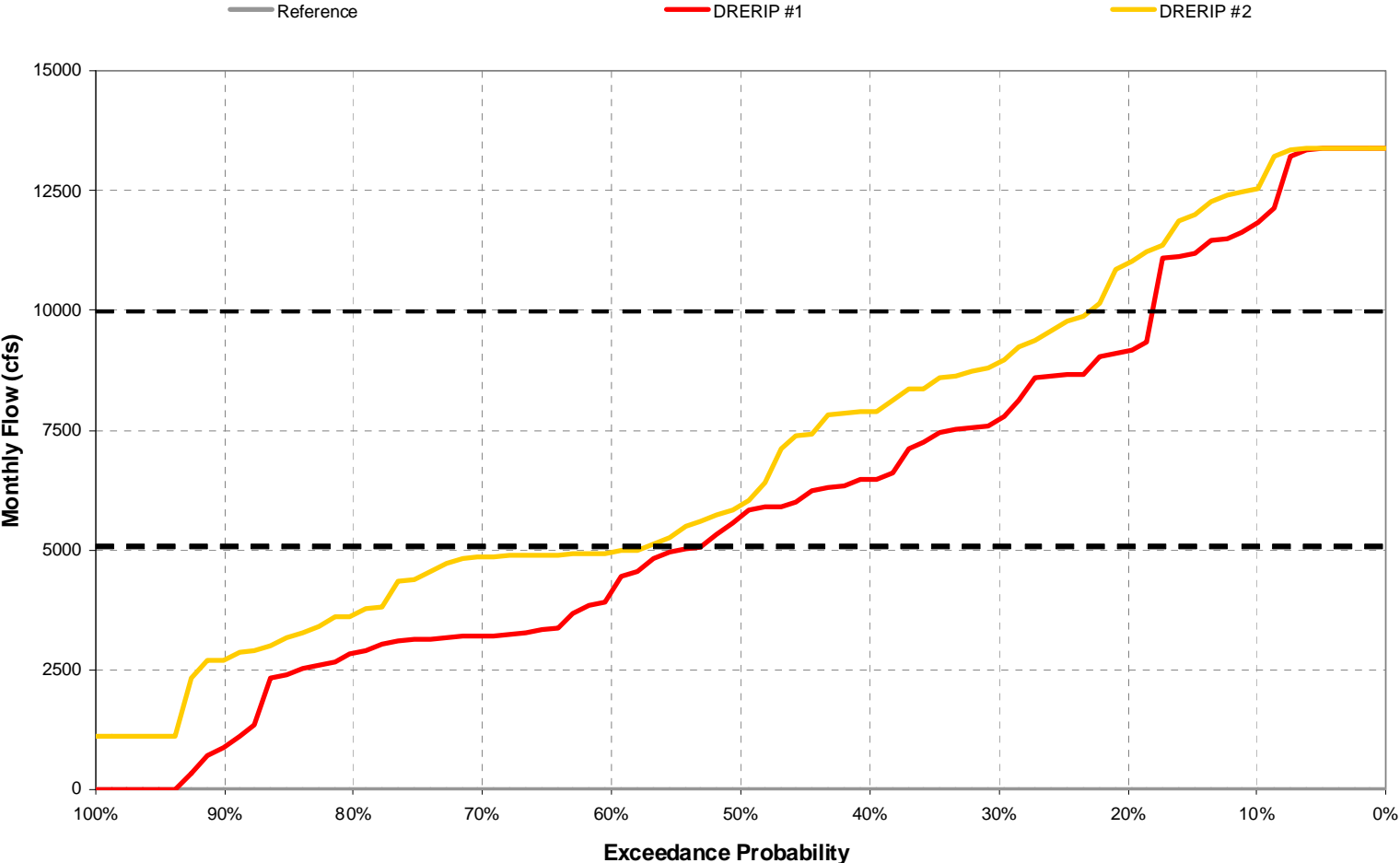
Results: IF Usage - May



Results: IF Usage - June

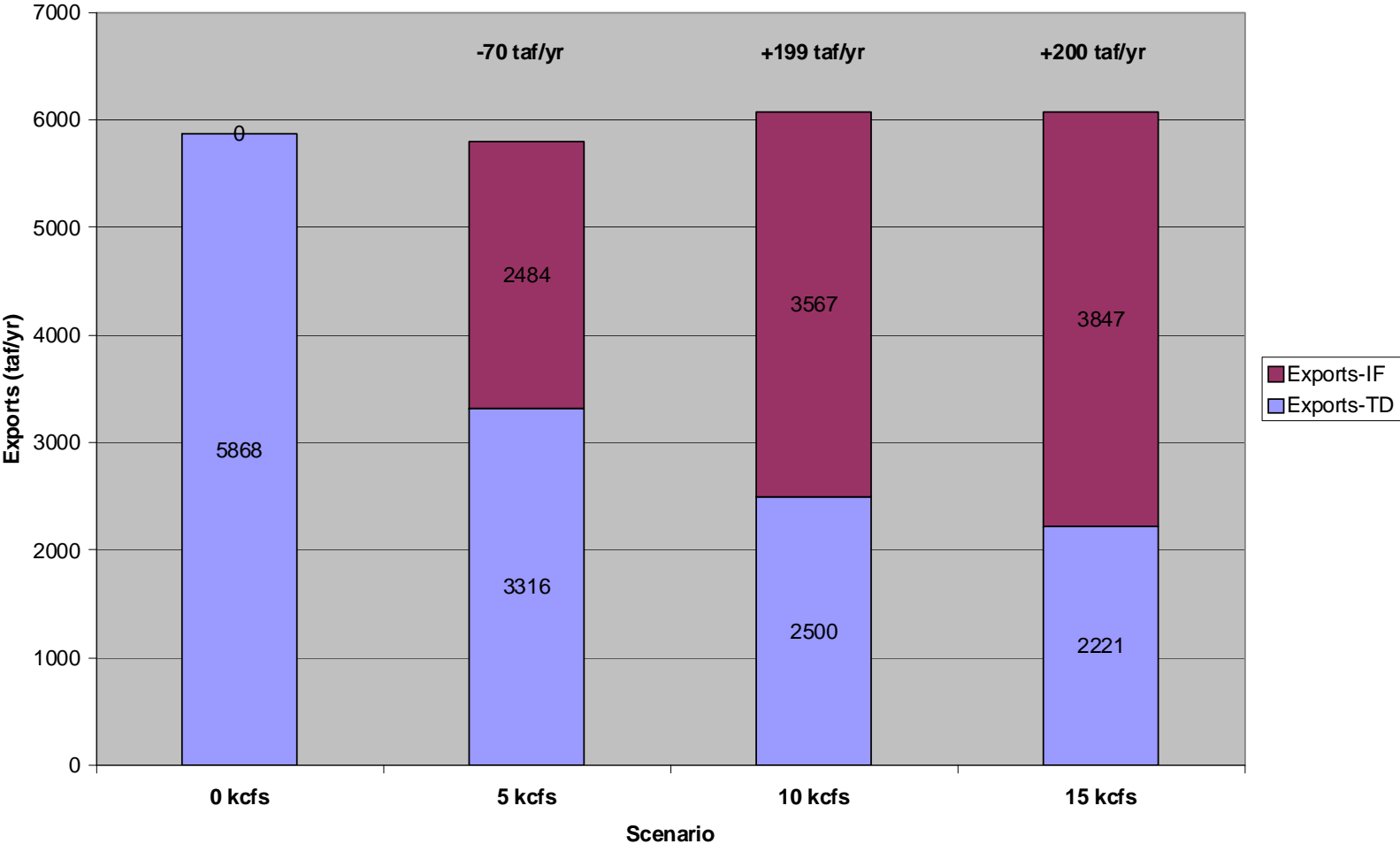
Isolated Facility Capacity Usage (Monthly Average)

Total IF JUN



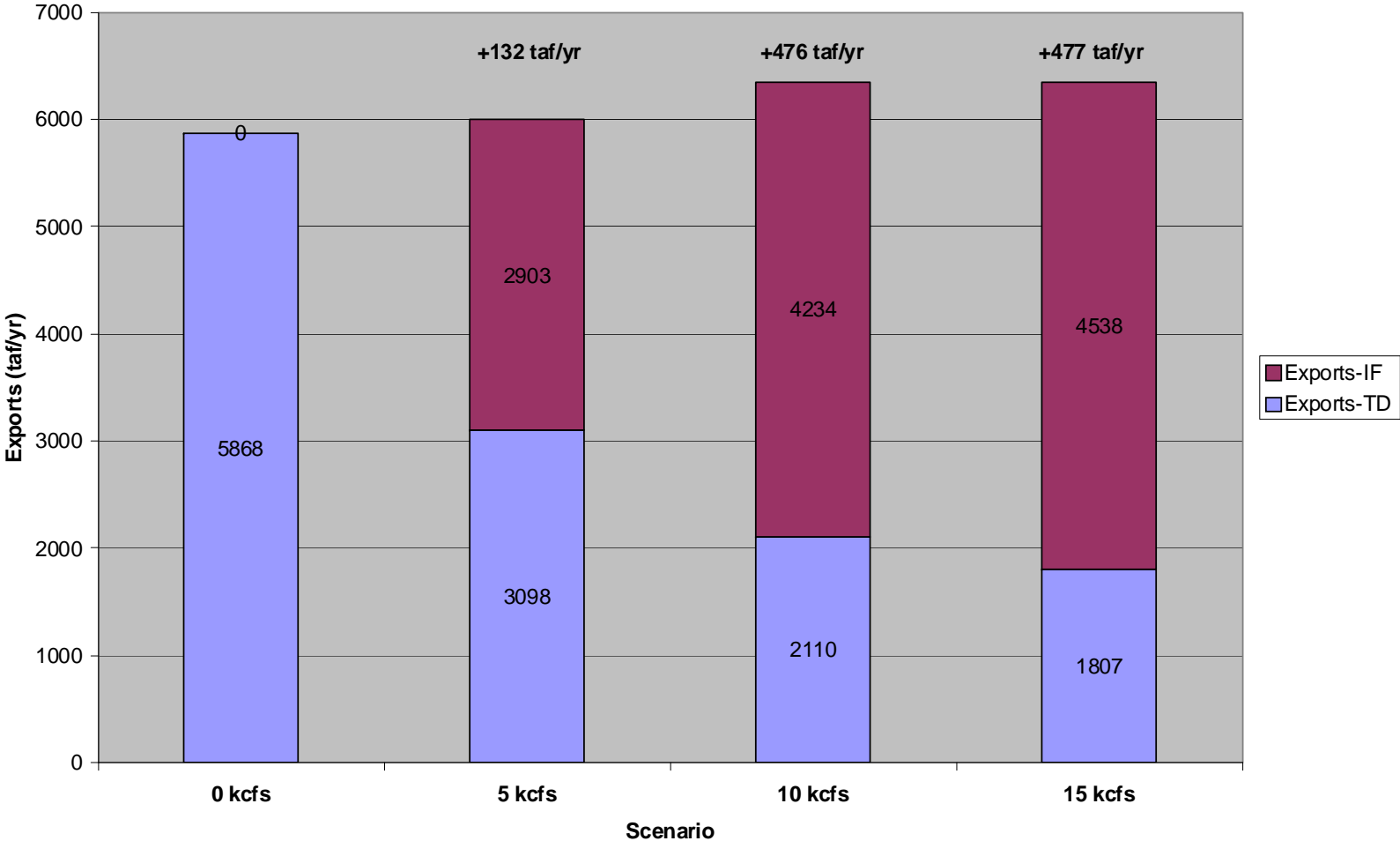
Avg Exports – DRERIP #1

Isolated Facility Studies - Export Comparison



Avg Exports – DREERIP #2

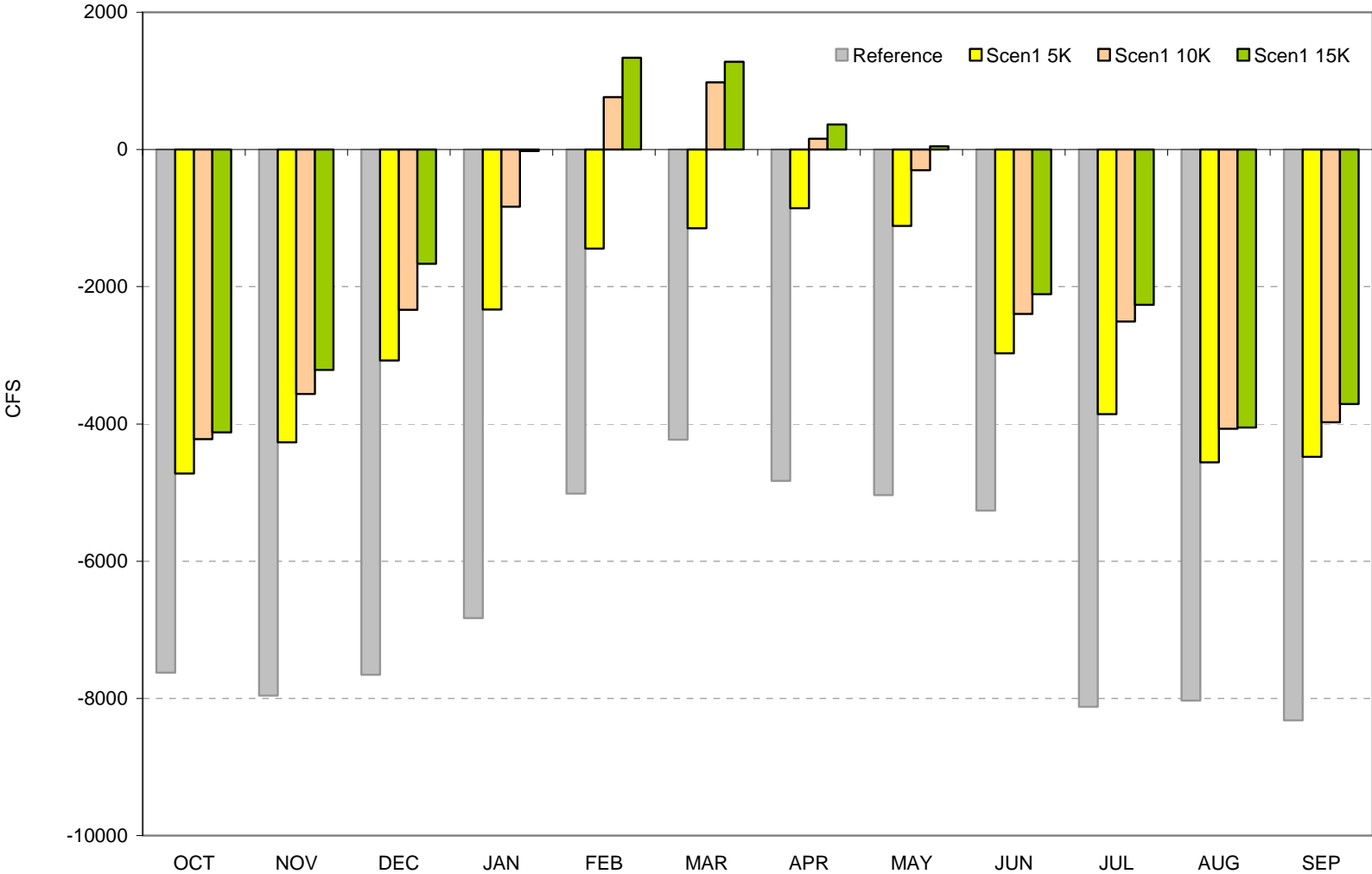
Isolated Facility Studies - Export Comparison



Results: OMR Flows

Multi Study Comparison - Long Term Monthly Average Results

Old and Middle River combined flow (OMR)



Results: Sac R Flows

Multi Study Comparison - Long Term Monthly Average Results

Sac R ds Hood

