



Deirdre Des Jardins  
145 Beel Dr  
Santa Cruz, CA 95060  
[ddj@cah2oresearch.com](mailto:ddj@cah2oresearch.com)

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State Water Resources Control Board  
1001 I Street  
Sacramento, California 95814

**via electronic mail**

Comments on the Draft Revised Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the Bay-Delta: San Joaquin River Flows And Southern Delta Water Quality

1. DWR and USBR have modelled exporting the increased South Delta flows. For the increased San Joaquin River flows to make a difference for migrating salmonids, the flows need to make it past the SWP and CVP pumps in the South Delta. The chart below is from preliminary modeling done for the Bay-Delta Conservation Plan parties and presented to the Bay-Delta Conservation Plan Steering Committee in 2010. The San Joaquin River sensitivity analyses was never published externally by DWR or USBR, so the only information available is from the 2010 presentation to the BDCP Steering Committee.<sup>1</sup>

Since fish are diverted roughly in proportion to flows, the increased exports by the South Delta pumps would mean that migrating fish would only derive 60%-80% of the benefit from the increased flows. The Board currently has definition of “Balanced Conditions”

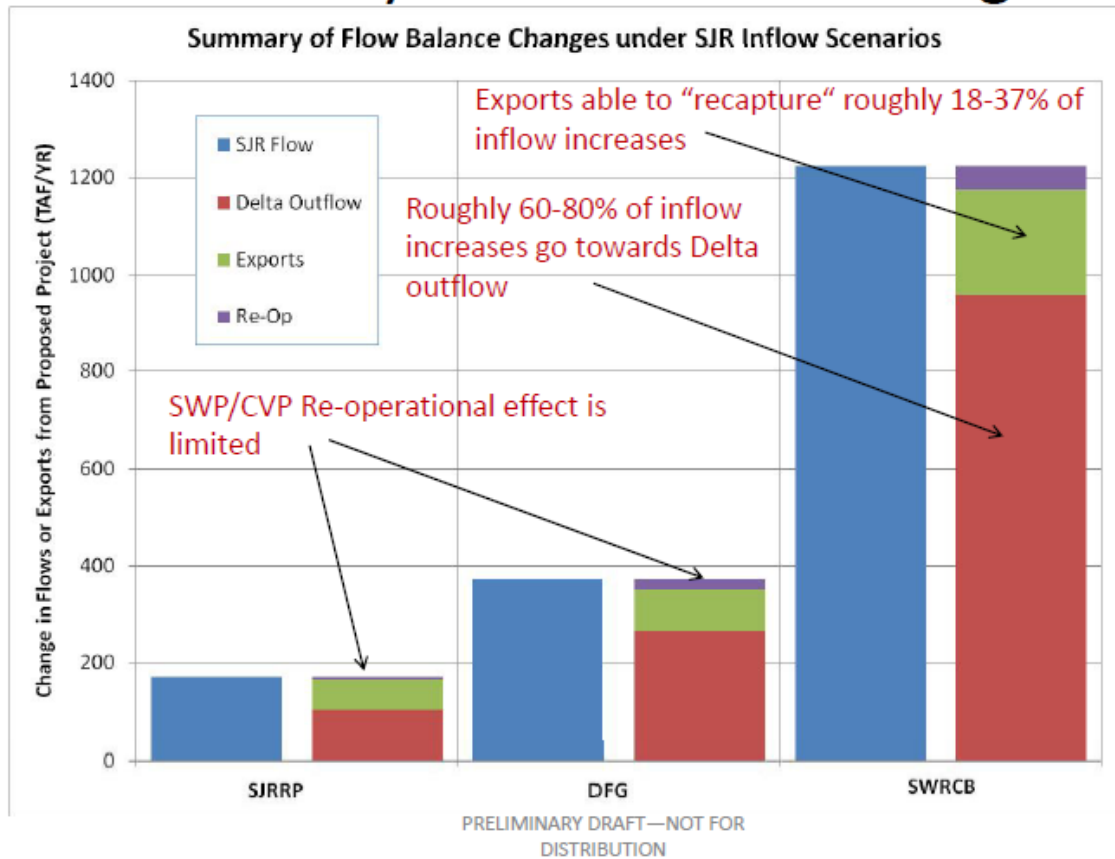
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<sup>1</sup> Evaluations of BDCP Operations Sensitivity to a Range of San Joaquin River Flows, presentation to BDCP Steering Committee, August 12, 2010. Obtained from BDCP Steering Committee archives at <http://baydeltaconservationplan.com>.

that are used when DWR and USBR are releasing water upstream for water quality purposes. There needs to be a similar definition of “Vernalis Balanced Conditions” when San Joaquin water rights holders are reducing diversions for water quality compliance at Vernalis and in the South Delta. The State Water Project and Central Valley Project will need to reduce diversions under such conditions so that stored water from the San Joaquin and Sacramento River diversions through the Delta Cross Channel are the primary sources of water. Under “Vernalis Balanced Conditions,” diversions should be limited to stored water released from New Melones when the Delta Cross Channel is closed.

This would have significant impacts on South Delta exports by the SWP and CVP; however, in implementing the water quality plan, the Board needs to consider the priority of water rights on the San Joaquin River.

## Summary of Delta Flow Changes



2. CALSIM II needs a peer review for the proposed application

**Validation of a computer model has been defined as** “the process of determining the degree to which a model and its associated data are an accurate representation of the real world from the perspective of the intended uses of the model.”<sup>2</sup> For uses in regulatory proceedings of the State Water Resources Control Board, Health and Safety Code Section 57004 provides for validation of models by peer review. According a 2011 resolution of the State Water Resources Control Board<sup>3</sup>,

State law (Health and Safety Code Section 57004, 115365, et al.) sets minimum requirements for external scientific peer review. Notably, Health and Safety Code Section 57004 requires all Cal/EPA boards, departments, or offices to submit for external scientific peer review the “scientific basis” and “scientific portions” of proposed rules, consistent with the statutory definition of these two terms. For rules subject to this requirement, the scientific findings, conclusions, and assumptions on which the scientific portions of the proposed rule are based and the supporting scientific data, studies, and other appropriate materials, must be submitted for peer review. The law further specifies that the agency, or a board, department, or office within the agency, must enter into an agreement with the National Academy of Sciences, the University of California, the California State University, or any similar scientific institution of higher learning to conduct external scientific peer review of the scientific basis for any rule proposed. (emphasis added.)

The full CALSIM II model has never had a technical peer review. There was a Strategic Review of CALSIM II in 2003, sponsored by the Bay-Delta Authority Science Program. The report, entitled , “A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California,” was published in December 2003.<sup>4</sup>

In the report, the 2003 Peer Review panel noted that the information provided for review “precluded a thorough technical analysis,” and stated that such a technical review should be carried out:

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<sup>2</sup> Department of Defense, Instruction 5000.61 on DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A). Based on standard practice.

<sup>3</sup> State Water Resources Control Board, Resolution No. 2011-0062, Authorizing the Executive Director or Designee, on Behalf of Cal/Epa and all other Agency Departments, Boards and Offices, to Enter into a Contract with the Regents of UC Berkeley for Mandated Scientific Peer Review and other Expert Review and Curriculum Review Services.

<sup>4</sup> Close et. al., “A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California,” obtained from the Davis-Woodland Hearing:

[http://www.waterboards.ca.gov/waterrights/water\\_issues/programs/hearings/daviswoodland/daviswoodland\\_cspa\\_es9.pdf](http://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/daviswoodland/daviswoodland_cspa_es9.pdf)

The information we received and the shortness of our meetings with modeling staff precluded a thorough technical analysis of CALSIM II. We believe such a technical review should be carried out. Only then will users of CALSIM II have some assurance as to the appropriateness of its assumptions and to the quality (accuracy) of its results. By necessity our review is more strategic. It offers some suggestions for establishing a more complete technical peer review, for managing the CALSIM II applications and for ensuring greater quality control over the model and its input data, and for increasing the quality of the model, the precision of its results, and their documentation. (p. 3)

The 2003 review panel also recommended:

To increase the public's confidence in the many components and features of CALSIM II, we suggest that these components of CALSIM be subjected to careful technical peer review by appropriate experts and stakeholders. (p. 2)

However, except for the San Joaquin River component of the model, a "careful technical peer review" appears never to have been done, and there have been continuing questions about the reliability of the model, particularly by stakeholders.

The January 2006 review of the San Joaquin River module, titled, "Review Panel Report San Joaquin River Valley CalSim II Model Review,"<sup>5</sup> obtained from [http://science.calwater.ca.gov/pdf/calsim/calsim\\_II\\_final\\_report\\_011206.pdf](http://science.calwater.ca.gov/pdf/calsim/calsim_II_final_report_011206.pdf) The 2006 Peer Review of the San Joaquin River component of the model noted some significant issues, and stated,

The panel does not in any way certify or endorse the model presented. On the other hand, we do not disapprove of or discourage its use by knowledgeable users. [...]

Users must take responsibility for model selection and application, and they must accept the responsibility for decisions that they make with information produced by the model. Relying on an external body to provide a blanket endorsement covering all possible applications is a dangerous practice. It tempts users to avoid accountability for their work. It tempts decisionmakers to place responsibility on general model reviews which are remote from a particular application. Further, it opens the door to intentional and unintentional abuse, negligence or complacency by model users and developers, or their managers who may shift responsibility to tools or some external general review panel for decisions made or actions recommended based on their use of a model. (p. 8, emphasis added.)

The 2006 Peer Review of the San Joaquin River component of the model also recommended documentation of model assumptions and error analyses. Under "Uncertainty in Model Results," the reviewers noted:

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<sup>5</sup> David Ford et. al., "Review Panel Report San Joaquin River Valley CalSim II Model Review," obtained from [http://science.calwater.ca.gov/pdf/calsim/calsim\\_II\\_final\\_report\\_011206.pdf](http://science.calwater.ca.gov/pdf/calsim/calsim_II_final_report_011206.pdf)

Currently no general guidance is available to indicate whether differences of 1 taf, 50 taf, 100 taf, or 500 taf are significant enough to rise above the level of error and noise inherent in the model. [p. 13],

and recommended

At a minimum, error analyses should be conducted, combining a sensitivity analysis of critical model results to some of the largest and least well supported model assumptions with an assessment of the likely range of error in these major model parameters and assumptions.

[p. 13.]

There has been no peer review of the error analyses conducted by the Department of Water Resources and the U.S. Bureau of Reclamation in the 2006 response. Such a review is essential to validate the model for its proposed use in the SED.

# Evaluation of BDCP Operations Sensitivity to a Range of San Joaquin River Flows

BDCP Steering Committee

August 12, 2010

# Separate Analyses

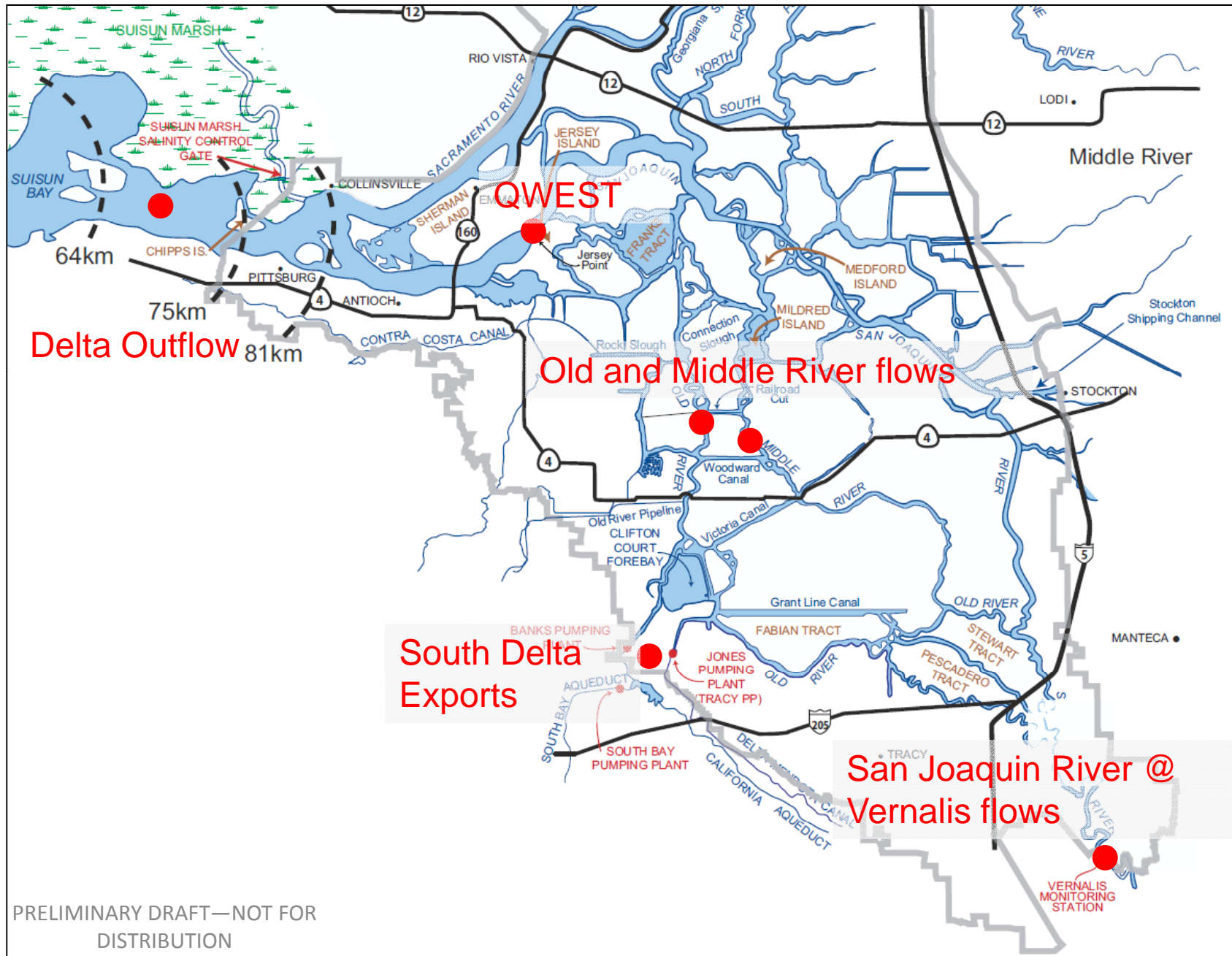
- Separate analyses designed to provide information to Steering Committee
- Separate Analyses (\* = completed)
  - \*North delta intake and conveyance sizing sensitivity analysis
  - \*North delta intake location sensitivity analysis
  - \*Delta levee failure and sea level rise
  - North delta alternative fish pathways analysis
  - **\*San Joaquin River inflow sensitivity**
  - Isolated Old River corridor analysis

# Objectives

- Understand the sensitivity of the draft BDCP operations and delta flows to uncertainty in future San Joaquin River flows
- Evaluate sensitivity in terms of:
  - San Joaquin River Vernalis flows
  - Old and Middle River flows
  - QWEST
  - Delta Exports
  - Delta Outflow
  - Delta Water Quality
- High level, preliminary analysis to provide information



# South Delta Locations Considered in the SJR Inflow Sensitivity



# Scenarios Considered in this Study

- 4 Scenarios Considered
  - Existing Requirements (D1641, VAMP, etc)
  - San Joaquin Restoration Program Flows
  - DFG Flow Targets (submitted to SWRCB, July 2010)
  - SWRCB Flow Targets (July 2010)
- Scenarios used to recognize risks/opportunities -- No judgment or likelihood of occurrence placed on scenarios
- All scenarios were implemented in the BDCP draft proposed operations (“proposed project”) at the Early Long-Term phase (~2025)

# Methodology & Assumptions

- CALSIM II studies for 82-years of hydrology performed for each scenario
- SJR Restoration Program flows implemented per approximate implementation
  - Includes re-operation of Friant and New Melones
- DFG and SWRCB flow targets implemented at Vernalis
  - Did not consider how water would be made available to meet the targets
- If target flows were lower than “Existing”, then “Existing” was maintained
- Partial month flow targets were weighted with base flows to arrive at monthly targets
- All simulations should be considered approximate

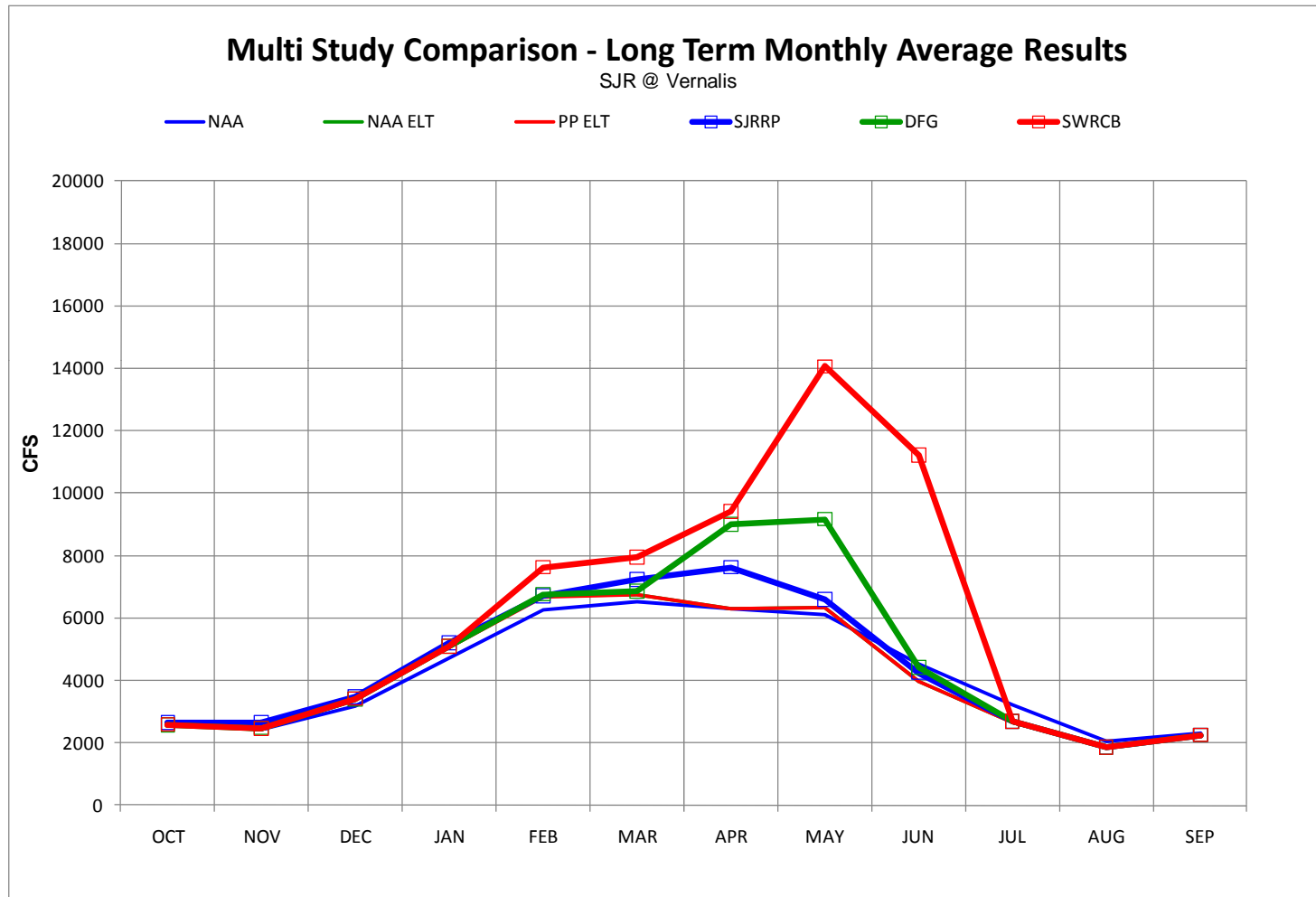
# What are the Range of Flows?

- SJRRP Friant releases in range of 1,500 – 4,000 cfs, March 15 – June 30
  - Duration and flows depend on year type
- DFG and SWRCB

Only these Spring flows were considered in this analysis

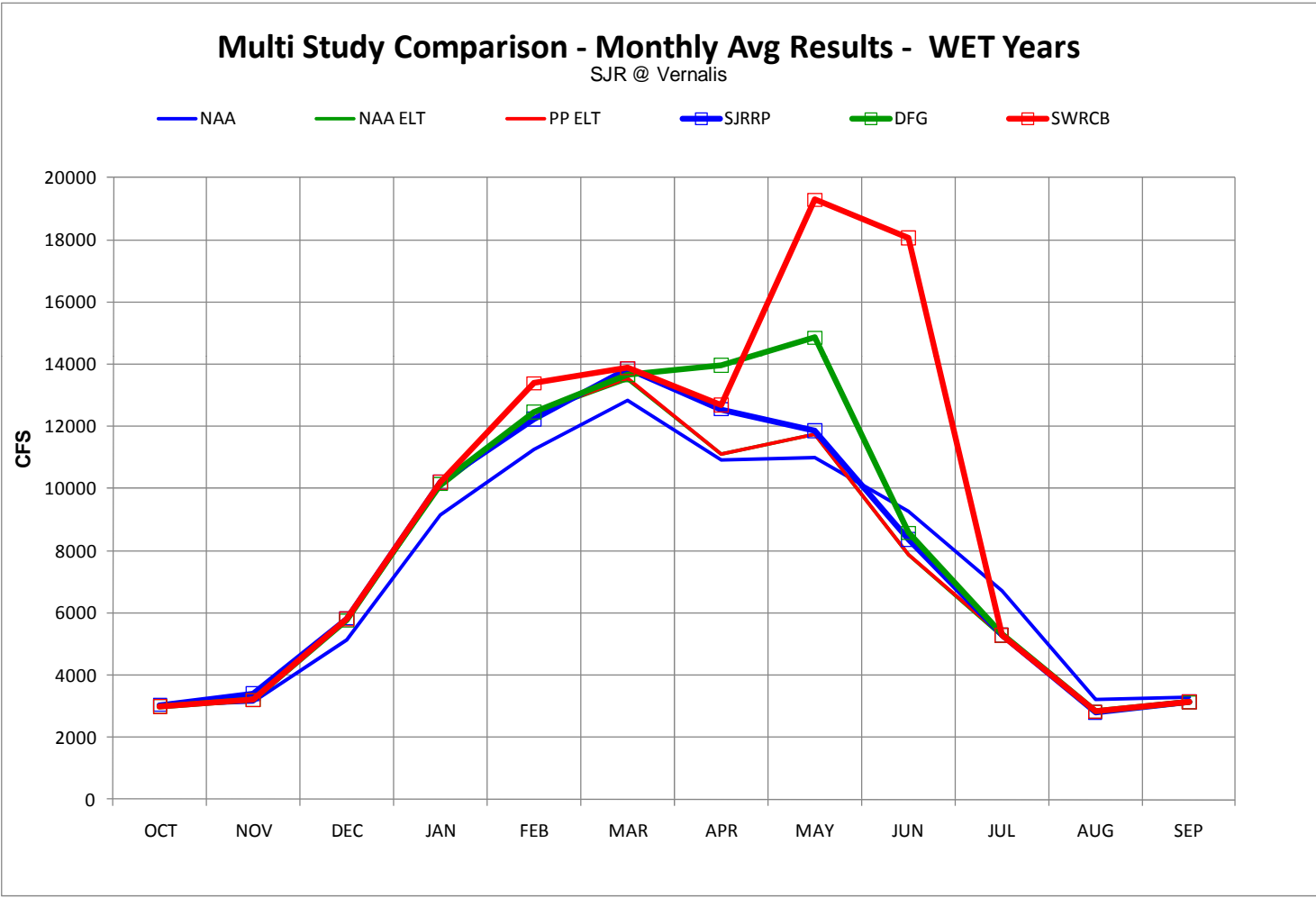
San Joaquin River														
Source	Period											WY Type	Criteria	
	O	N	D	J	F	M	A	M	J	J	A			S
CDFG													C	1,500 cfs base (3/15-6/15)
														5,500 cfs pulse (4/15-5/15), Total 7,000 cfs
													D	2,125 cfs base (3/15-6/15)
														4,875 cfs pulse (4/11-5/20), Total 7,000 cfs
													BN	2,258 cfs base (3/15-6/15)
														6,242 cfs pulse (4/6-5/25), Total 8,500 cfs
													AN	4,339 cfs base (3/15-6/15)
														5,661 cfs pulse (4/1-5/30), Total 10,000 cfs
SWRCB													W	6,315 cfs base (3/15-6/15)
														8,685 cfs pulse (3/27-6/4), Total 15,000 cfs
													All	1) Vernalis: 60 percent of 14-day average unimpaired flow
													All	2) Vernalis: 10 day minimum pulse of 3,600 cfs in late October (e.g., October 15 to 26)
													All	3) 2006 Bay-Delta Plan October pulse flow

# SJR Vernalis Flow Comparison (All Years)



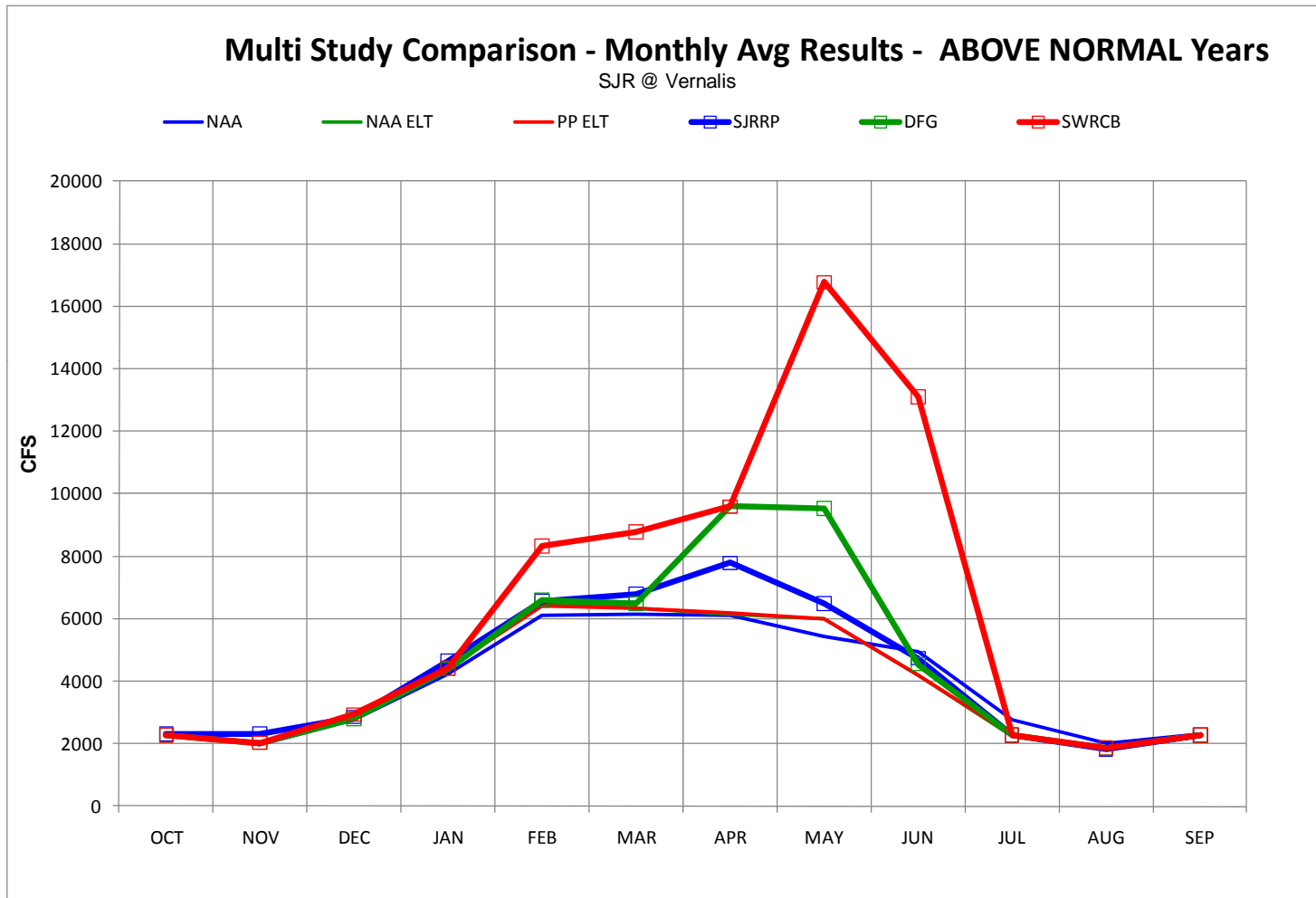
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# SJR Vernalis Flow Comparison (W Years)



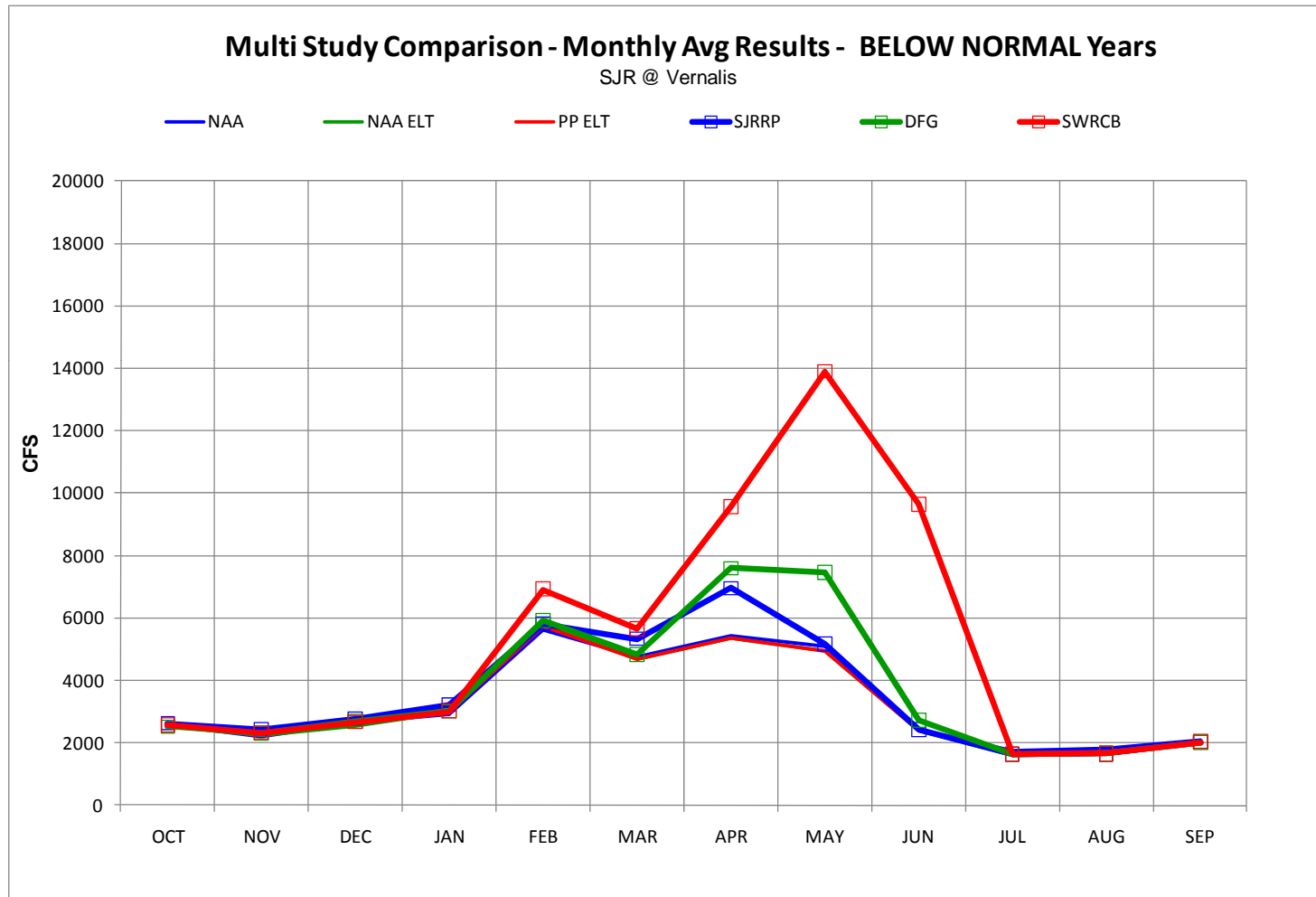
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# SJR Vernalis Flow Comparison (AN Years)



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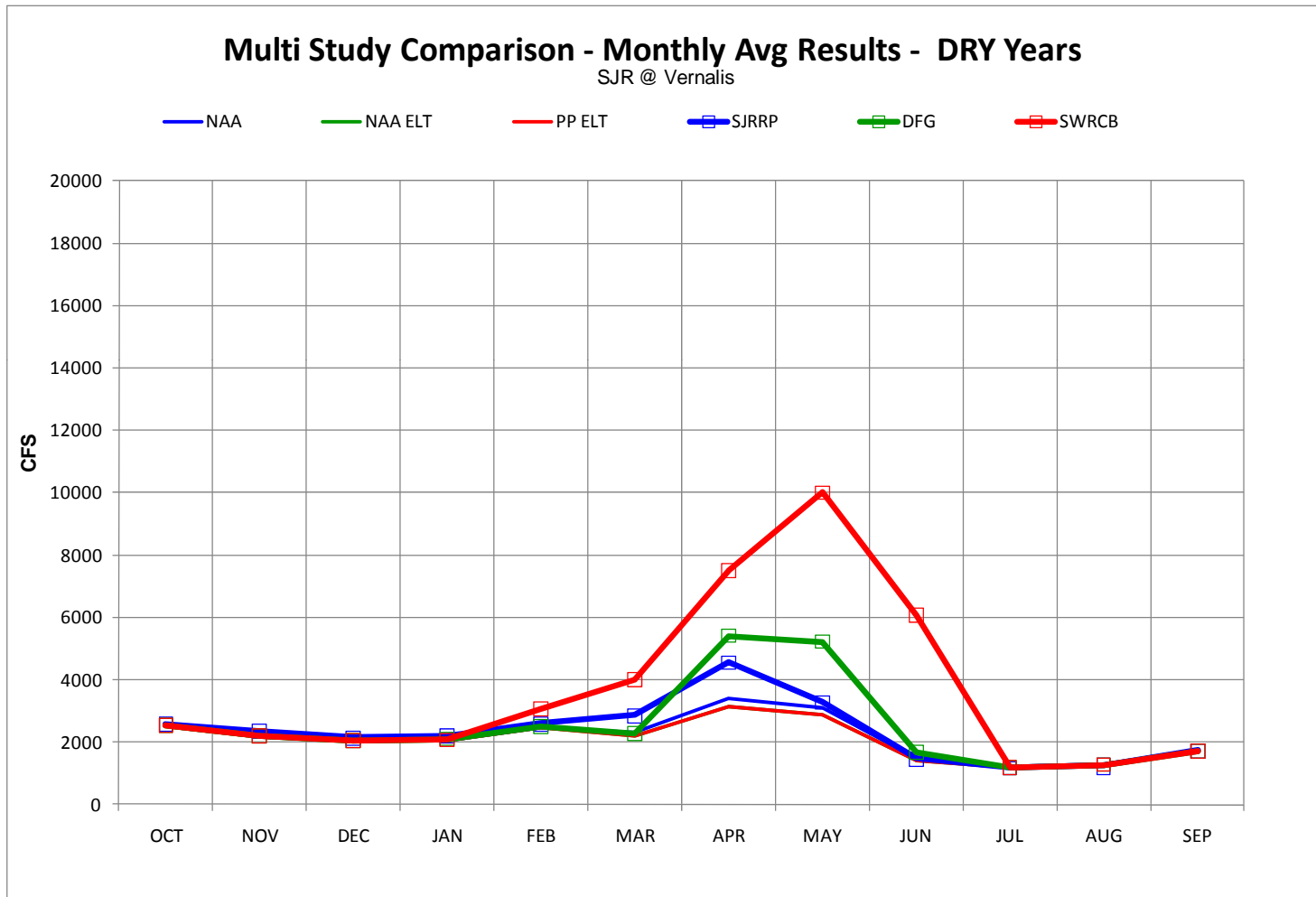
# SJR Vernalis Flow Comparison (BN Years)



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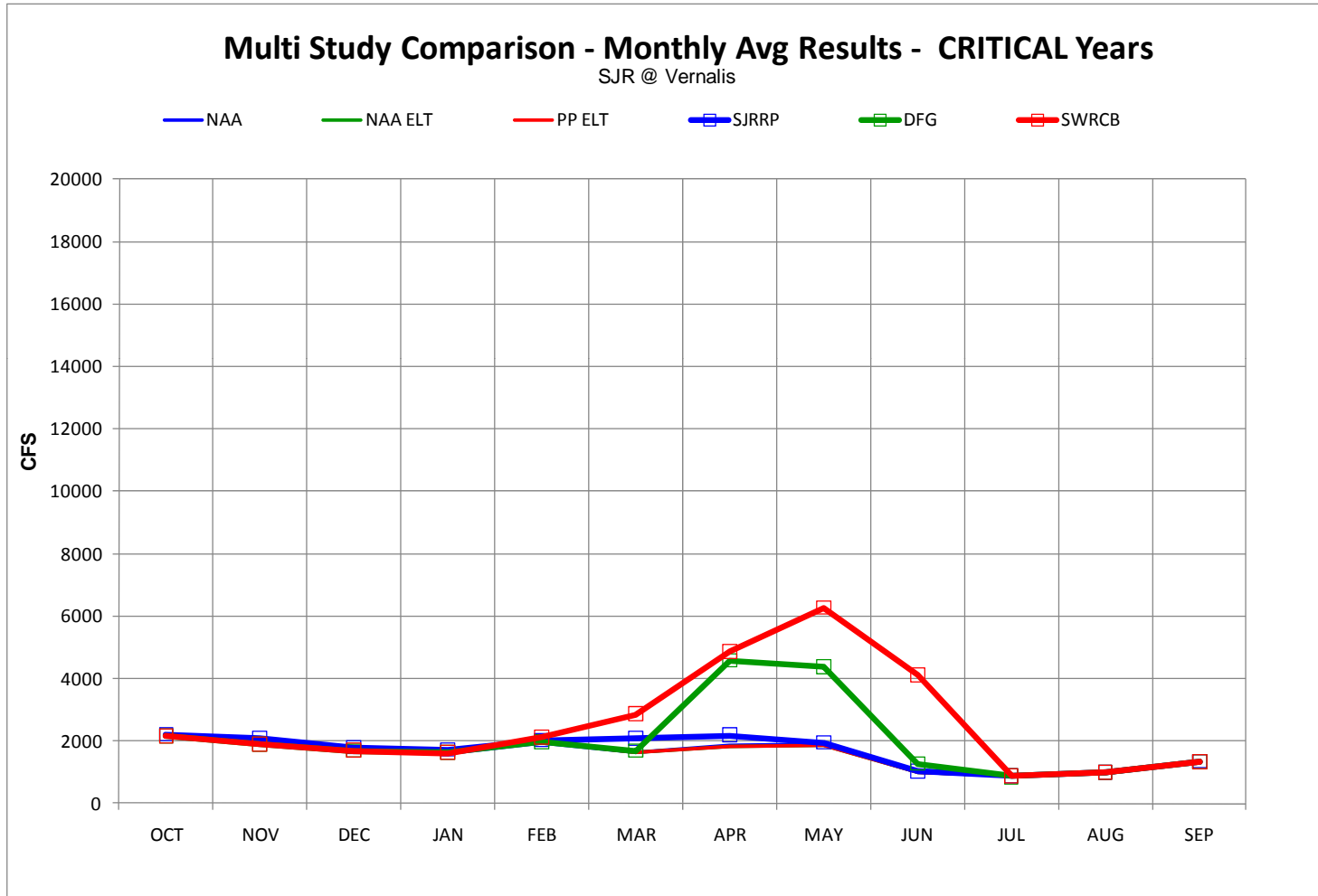


# SJR Vernalis Flow Comparison (D Years)



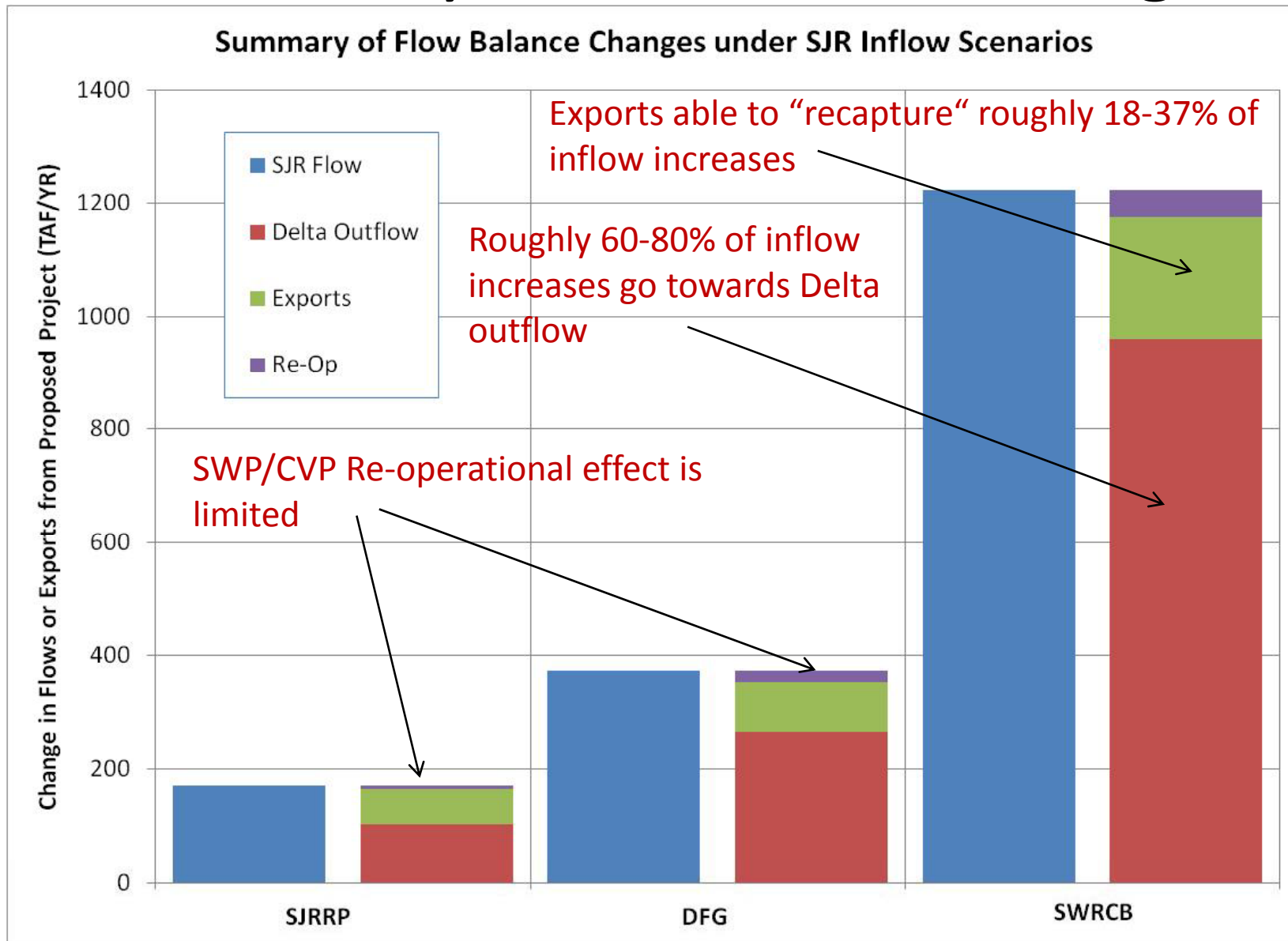
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# SJR Vernalis Flow Comparison (C Years)



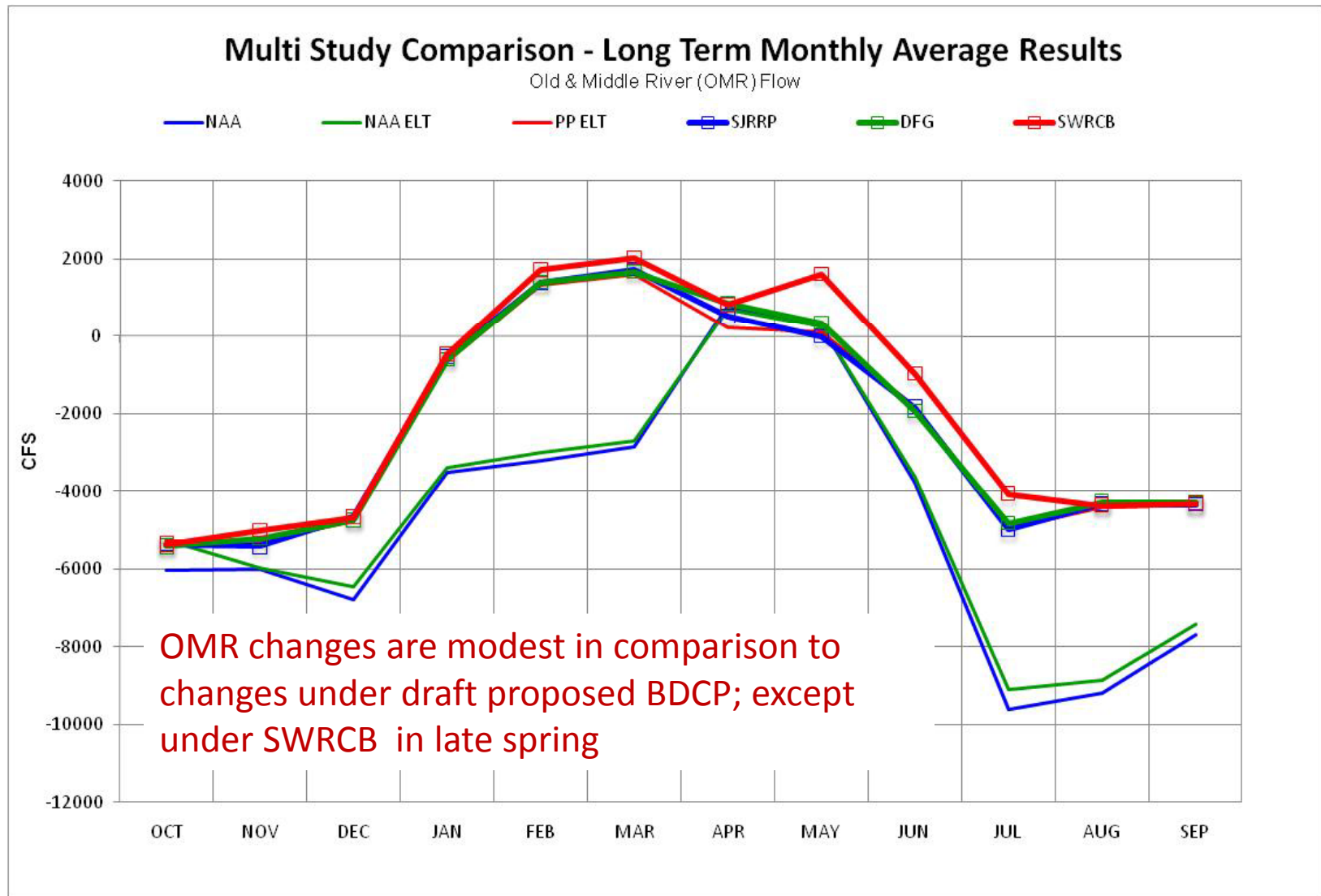
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# Summary of Delta Flow Changes



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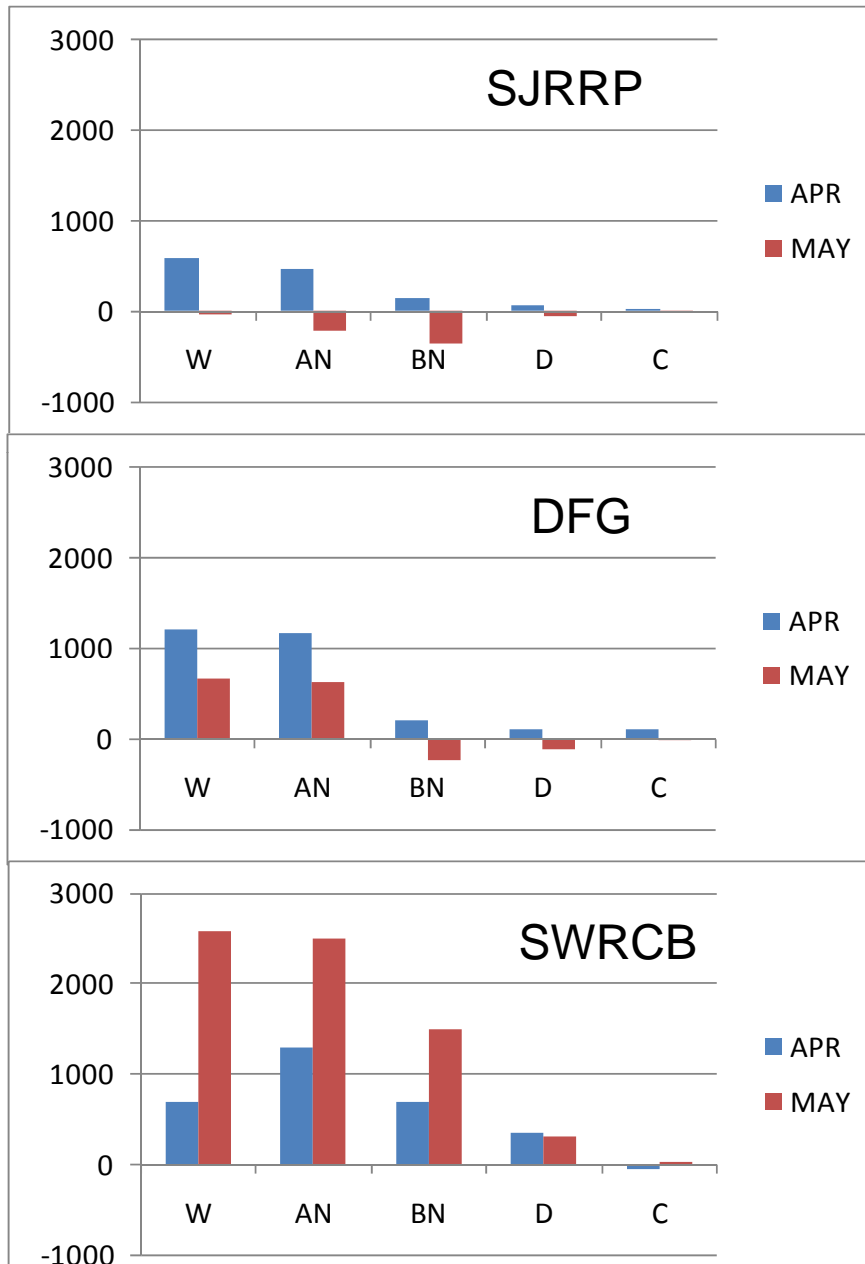
# Old and Middle River Flow Changes



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# Old and Middle River Flow Changes

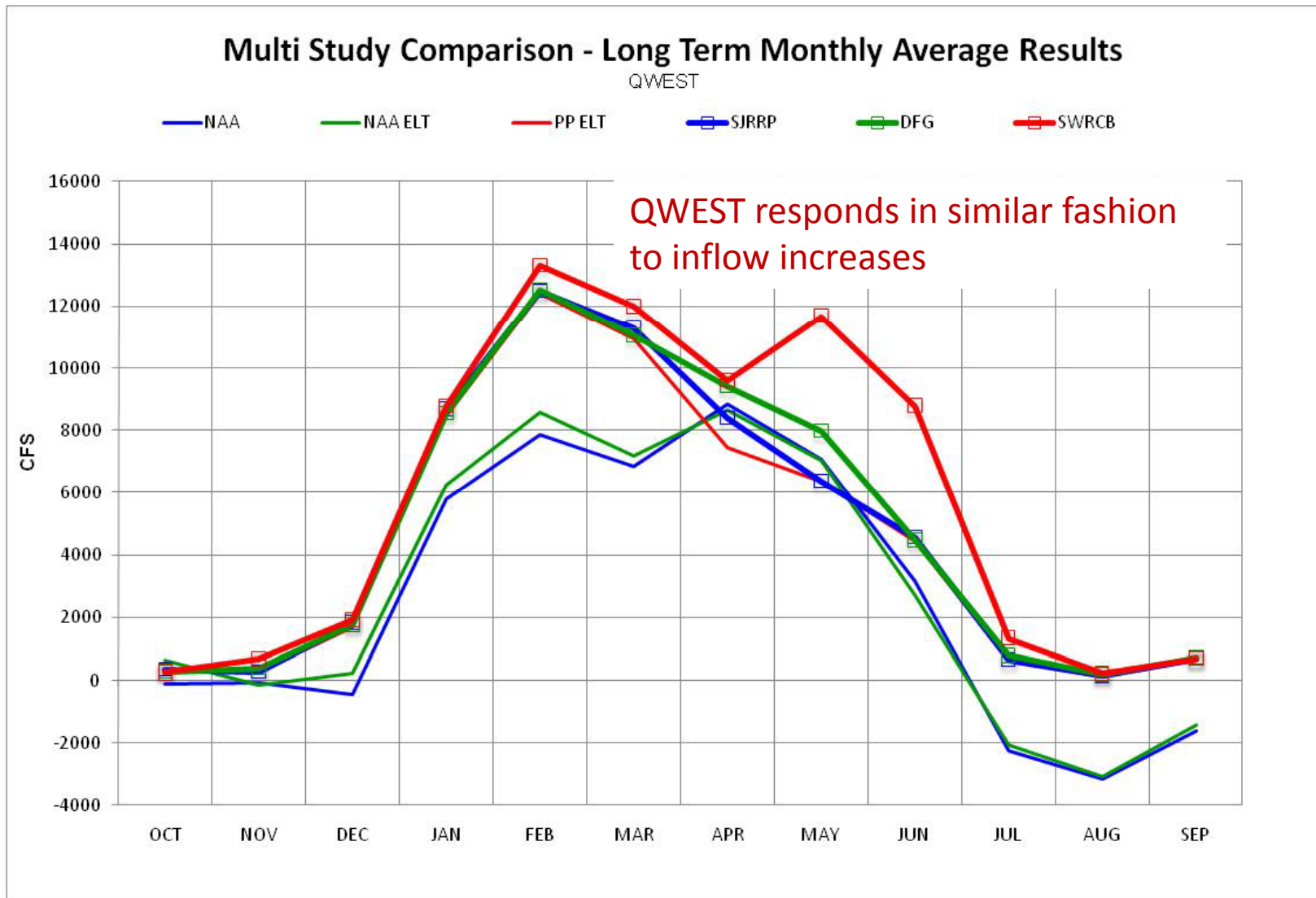
Change in April-May OMR Flows (cfs)  
Compared to Proposed Project



Little change in OMR during drier year types

Wetter year types experience larger OMR increases

# QWEST Flow Changes



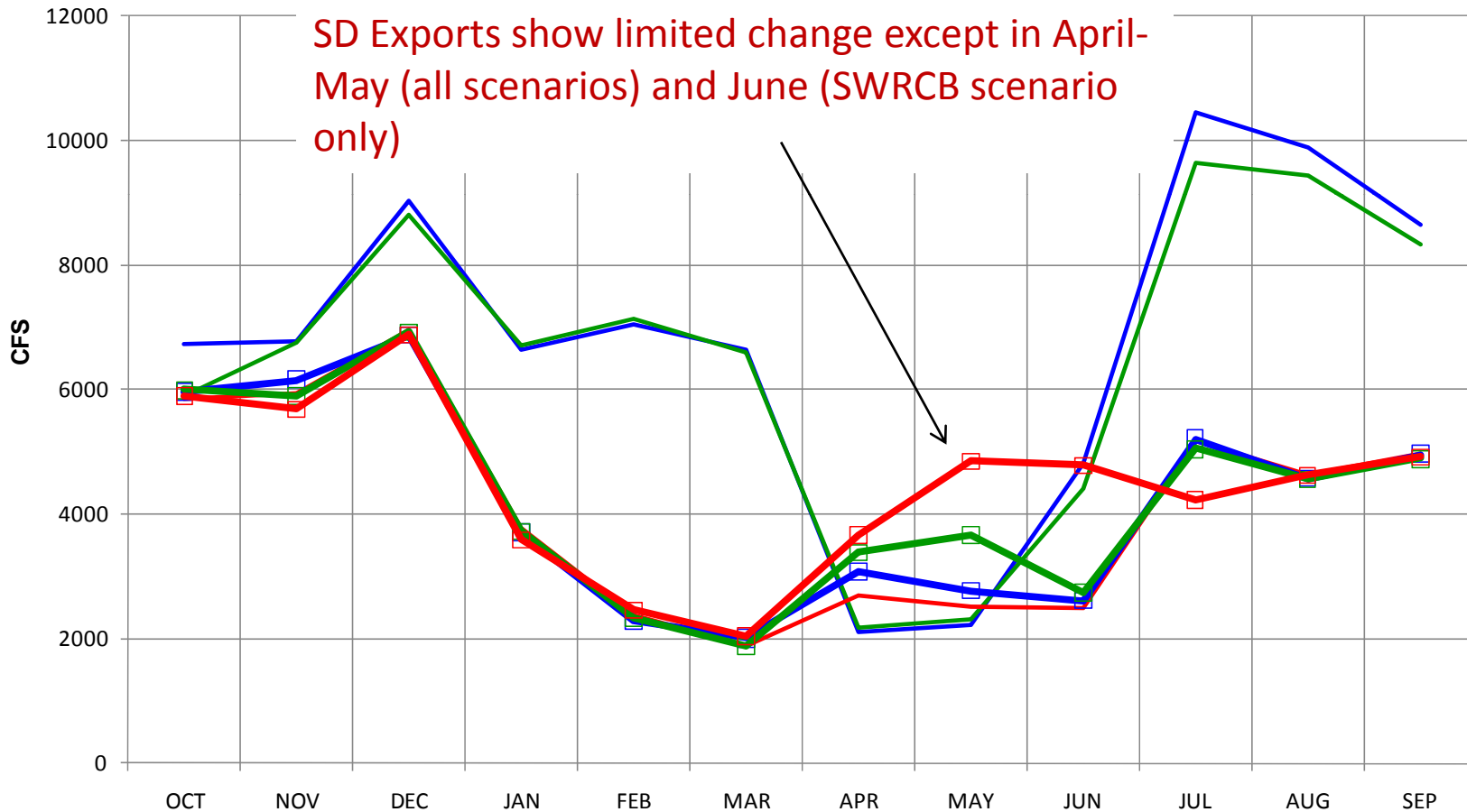
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# South Delta Export Changes

## Multi Study Comparison - Long Term Monthly Average Results

Total South Delta Exports

NAA NAA ELT PP ELT SJRRP DFG SWRCB



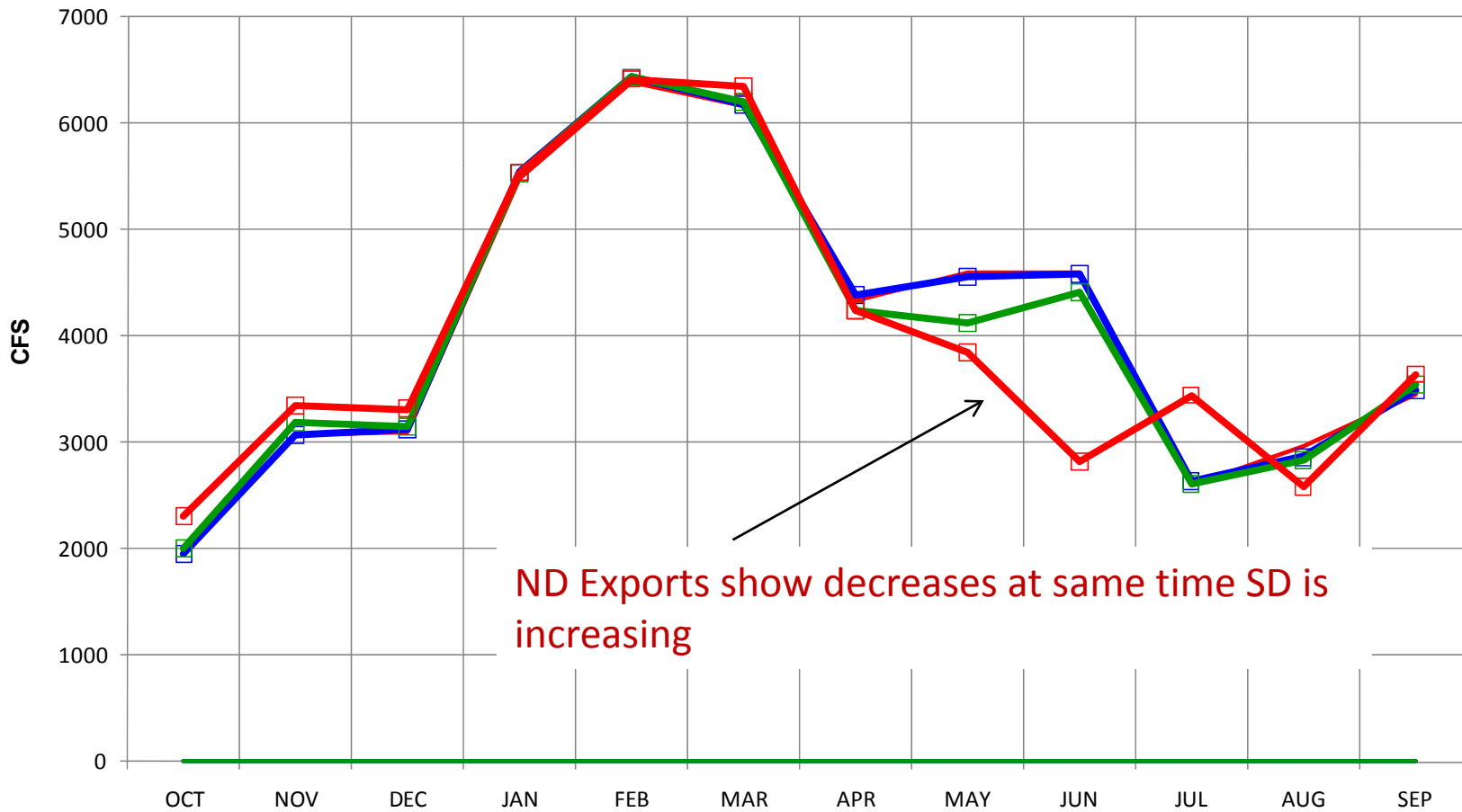
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# North Delta Export Changes

## Multi Study Comparison - Long Term Monthly Average Results

Total IF

NAA NAA ELT PP ELT SJRRP DFG SWRCB



ND Exports show decreases at same time SD is increasing

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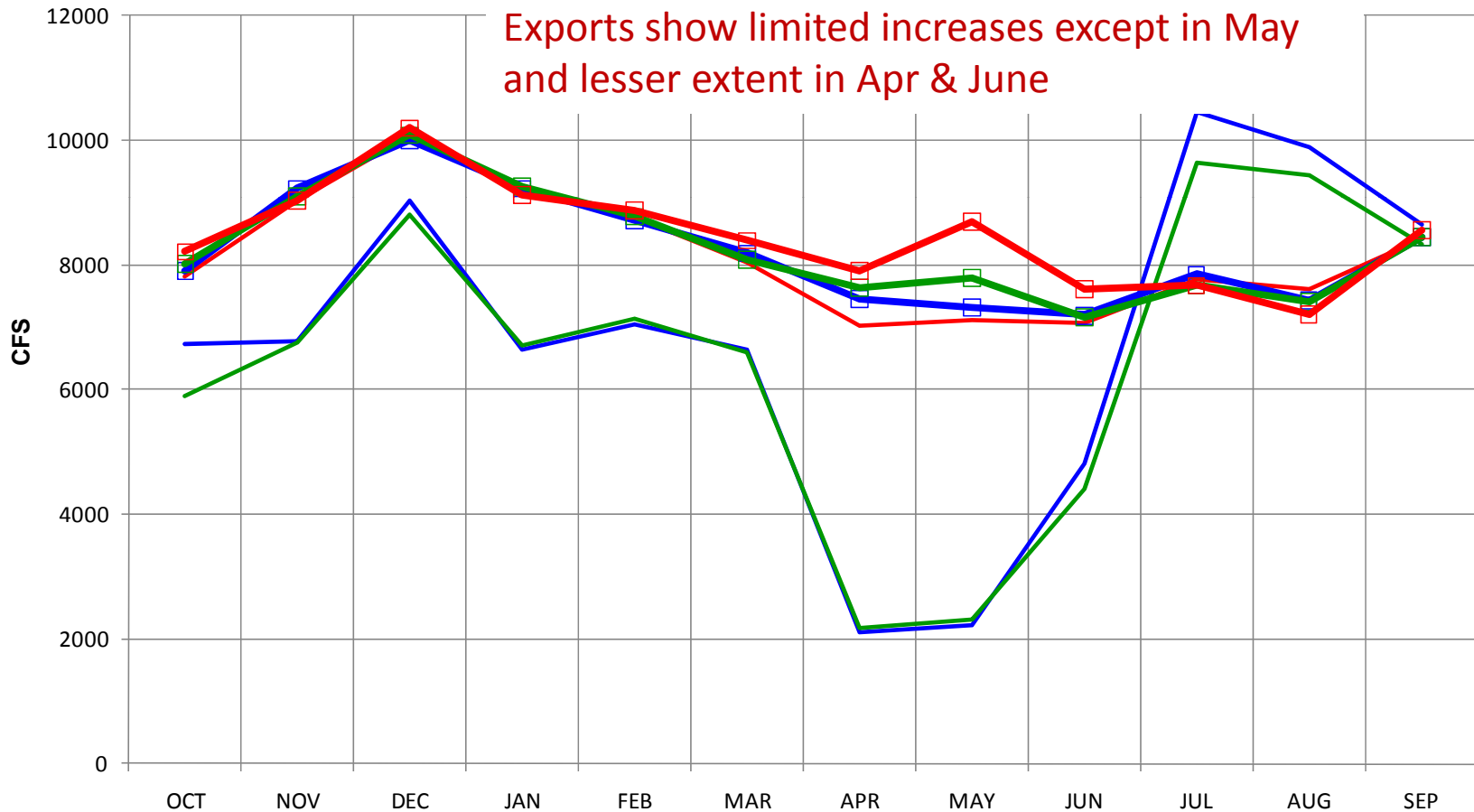


# Total SWP/CVP Delta Export Changes

## Multi Study Comparison - Long Term Monthly Average Results

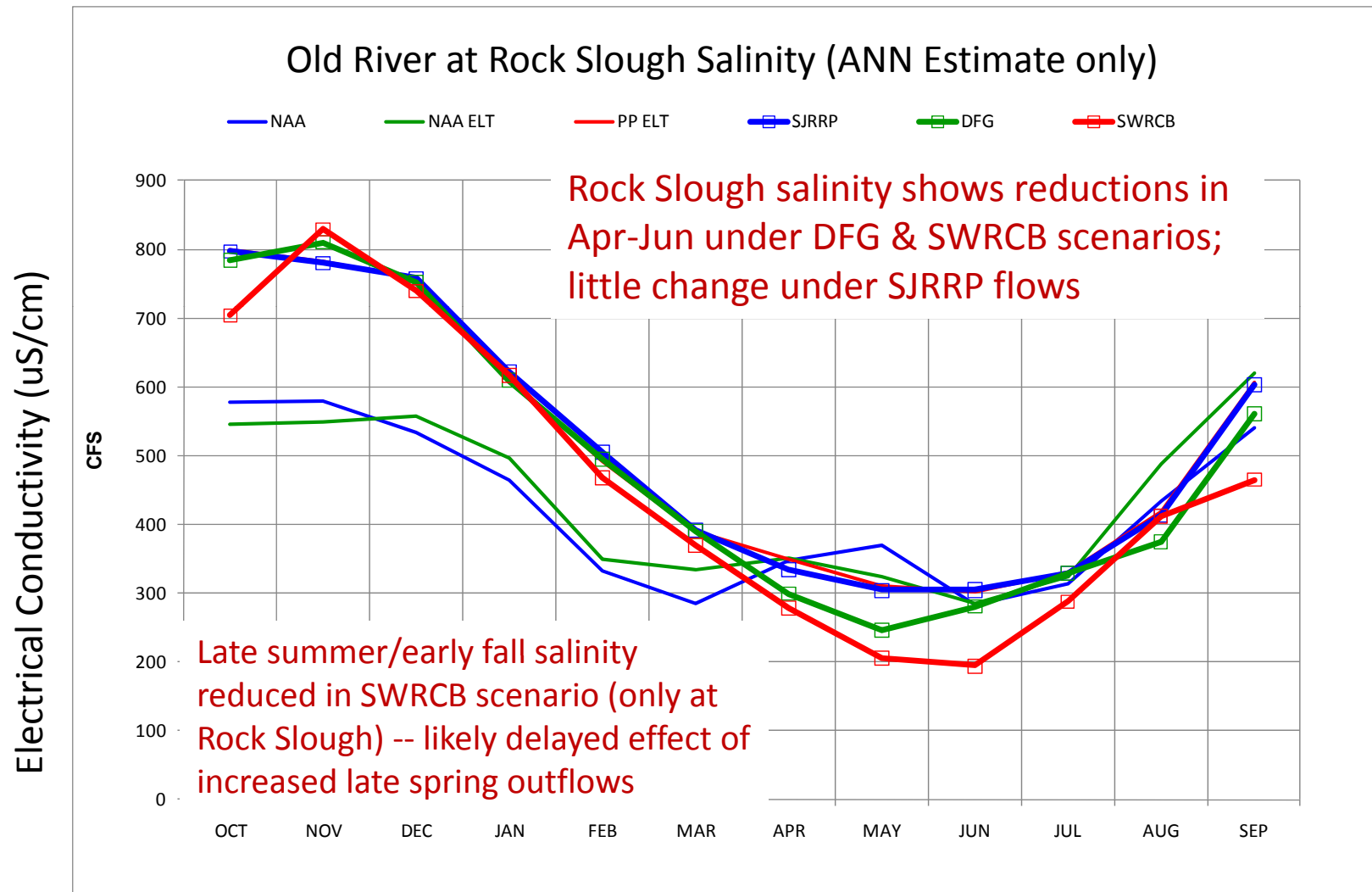
Delta Exports

NAA NAA ELT PP ELT SJRRP DFG SWRCB



PRELIMINARY DRAFT—NOT FOR DISTRIBUTION

# Seasonal Changes in Southern Delta Salinity



# Summary

- Scenarios suggest most inflow increases will go towards outflow (60-80%) and lesser extent toward exports (18-37%)
- SWP/CVP upstream re-operation is limited
- OMR and QWEST show increases largely during April-June; usually when the draft proposed BDCP flows are anticipated to be positive
- Modest changes in most Delta parameters with SJRPP
- SWRCB flows (tied to unimpaired) suggest shift in peaks toward May-Jun with corresponding effects to Delta flows
- Salinity effects are limited to the south Delta and April-Jun; except for SWRCB flows which show lingering effect through late summer
- No substantial risks to draft proposed BDCP operations noted from this analysis – trends are consistent with south delta flow trajectory of the draft proposed BDCP



# Department of Defense INSTRUCTION

NUMBER 5000.61

May 13, 2003

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USD(AT&L)

SUBJECT: DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A)

- References:
- (a) DoD Instruction 5000.61, "DoD Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A)," April 29, 1996 (hereby canceled)
  - (b) [DoD Directive 5000.59](#), "DoD Modeling and Simulation (M&S) Management," January 4, 1994
  - (c) [DoD 5025.1-M](#), "Department of Defense Directives System Procedures," March 5, 2003
  - (d) [DoD Directive 5141.2](#), "Director of Operational Test and Evaluation (DOT&E)," May 25, 2000
  - (e) through (p), see enclosure 1

## 1. REISSUANCE AND PURPOSE

This Instruction:

1.1. Reissues reference (a) to implement policy, assign responsibilities, and prescribe procedures under reference (b) for the verification, validation, and accreditation (VV&A) of DoD models and simulations and their associated data.

1.2. Authorizes publication of DoD 5000.61-G, "DoD Verification, Validation, and Accreditation Guide," consistent with DoD 5025.1-M (reference (c)).

## 2. APPLICABILITY AND SCOPE

This Instruction applies to:

2.1. The Office of the Secretary of Defense (OSD), the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities in the Department of Defense (hereafter referred to collectively as "the DoD Components").

2.2. All models and simulations developed, used, or managed by the DoD Components after the effective date of this Instruction.

2.3. Models and simulations used in support of Operational Test and Evaluation (OT&E), all of which are subject to guidance from the Director, OT&E, per DoD Directive 5141.2 (reference (d)).

### 3. DEFINITIONS

Terms used in this Instruction are defined in enclosure 2.

### 4. POLICY

It is DoD policy that:

4.1. Models and simulations used to support major DoD decision-making organizations and processes (such as the Defense Planning and Resources Board; the Joint Requirements Oversight Council; and the DoD Planning, Programming, and Budgeting System (references (e) through (g)) shall be accredited for that specific purpose by the DoD Component M&S Application Sponsor.

4.2. Each DoD Component shall be the final authority for validating representations of its own forces and capabilities in common-, general-, or Joint-use M&S applications and shall be responsive to the other DoD Components to ensure its forces and capabilities are appropriately represented.

4.3. Models and simulations used to support joint training and joint exercises shall be accredited for that specific purpose by the DoD Component M&S Application Sponsor.

4.4. Accreditation requirements of models and simulations used to support all other applications shall be determined at the DoD Component level.

4.5. The DoD Components shall establish VV&A policies and procedures for models and simulations they develop, use, or manage.

4.6. Each DoD Component shall comply with the responsibilities identified in section 5. and procedures identified in section 6.

## 5. RESPONSIBILITIES

5.1. The Under Secretary of Defense for Acquisition, Technology, and Logistics shall:

5.1.1. In coordination with the DoD Components, develop policies, plans, procedures, and DoD issuances for the effective implementation and management of VV&A of DoD M&S.

5.1.2. Through the Director, Defense Research and Engineering, as Chair of the DoD Executive Council for Modeling and Simulation (EXCIMS):

5.1.2.1. Encourage improved communication and coordination among and between organizations and agencies conducting DoD VV&A activities.

5.1.2.2. Identify and support investments in VV&A enabling technologies that have high-value return in fulfilling DoD requirements, or that fill gaps in DoD VV&A capabilities.

5.1.2.3. Promote joint and cooperative research, development, acquisition, and application of VV&A technologies and processes among the DoD Components.

5.1.2.4. Establish standards and guidelines to promote DoD VV&A procedural commonality and foster M&S interoperability.

5.1.2.5. Arbitrate differences in representation of forces and capabilities among the DoD Components to ensure standardization in common, general, or Joint-use M&S applications and federations of models and simulations.

5.1.3. Designate the Defense Modeling and Simulation Office as the "DoD VV&A focal point" and the central source of DoD VV&A information.

5.1.4. Comply with responsibilities specified in paragraph 5.3.

5.2. The Assistant Secretary of Defense for Command, Control, Communications, and Intelligence shall:

5.2.1. Through the Director, Defense Intelligence Agency:

5.2.1.1. As the DoD Modeling and Simulation Executive Agent (MSEA) for M&S representations of foreign forces, for other DoD Components' representations of foreign forces, and their systems shall:

5.2.1.1.1. Serve as the final validation authority (reference (b));

5.2.1.1.2. Resolve validation issues; and

5.2.1.1.3. Be responsive to that DoD Component to ensure that foreign forces and capabilities are appropriately represented (reference (b)).

5.2.1.2. As the DoD MSEA for M&S representations of U.S. National and Joint Intelligence processes, for other DoD Components' representations of U.S. National and Joint Intelligence processes shall:

5.2.1.2.1. Serve as the final validation authority (reference (b));

5.2.1.2.2. Resolve validation issues; and

5.2.1.2.3. Be responsive to that DoD Component to ensure that intelligence processes and capabilities are appropriately represented (reference (b)).

5.2.2. Comply with responsibilities specified in paragraph 5.3.

5.3. The Principal Staff Assistants (PSAs) and the Heads of the DoD Components shall:

5.3.1. Plan and provide resources, as needed, to carry out functional VV&A responsibilities according to DoD Component priorities.

5.3.2. Approve DoD VV&A policies and procedures, and DoD Publications.

5.3.3. Ensure non-DoD M&S applications they sponsor comply with established DoD VV&A policies and procedures.

5.3.4. Establish VV&A policies, procedures, and guidelines for M&S applications and their associated data. DoD Component VV&A policies and procedures shall address, as a minimum:

5.3.4.1. Use of existing or new models and simulations, including those that are federates or federations.

5.3.4.2. DoD Component-managed models and simulations used for joint-, general-, or common-use applications.

5.3.4.3. Models and simulations used by the DoD Components that are developed, used, or managed by non-DoD organizations, (i.e., contractors (including federally funded Research and Development Centers), industry, academia, and other Federal or non-Federal government organizations).

5.3.4.4. Designation, authorities, and responsibilities of:

5.3.4.4.1. M&S Proponent(s).

5.3.4.4.2. M&S Application Sponsor(s).

5.3.4.4.3. Verification, Validation, and Accreditation Agent(s).

5.3.4.4.4. DoD Component M&S VV&A focal point(s).

5.3.4.5. VV&A documentation and accessibility requirements, as outlined in enclosure 3.

5.3.4.6. Application-specific data verification and validation activities that are included as an integral part of M&S V&V, accreditation, and documentation activities.

5.3.5. Establish procedures holding the following accountable and responsible for the activities indicated:

5.3.5.1. M&S Proponents:

5.3.5.1.1. Verification and validation of their assigned M&S, as well as the documentation of those activities.

5.3.5.1.2. Coordinating validation activities with the DoD Component who serves as the final authority for the validations of representations within its purview.



5.3.5.1.3. Funding the V&V over the life cycle (e.g., development, upgrades, and maintenance) of their models and simulations.

5.3.5.1.4. For distributed modeling and simulation or federations of models or simulations (hereafter collectively referred to as "federations"):

5.3.5.1.4.1. The M&S Proponent roles and responsibilities pertaining to V&V for the overall federation shall be fulfilled by the DoD Component organization responsible for managing a federation and its associated data.

5.3.5.1.4.2. The responsibility for V&V of a federate and its associated data shall be retained by the M&S Proponent for each federate within a federation.

5.3.5.2. M&S Application Sponsors:

5.3.5.2.1. As the Accreditation Authority, accrediting M&S used for their specific application(s), as well as the documentation of those activities.

5.3.5.2.2. Funding the VV&A activities that support their application-specific accreditation decisions.

5.3.5.2.3. Consulting with the appropriate MSEA during VV&A plan development if the models and simulations will involve representations within the domain of the MSEA.

5.3.5.2.4. Accrediting the federation and its associated data for the specific purpose shall be the responsibility of the DoD Component serving as the M&S Application Sponsor of a federation.

5.3.5.3. Individual Data Producers:

5.3.5.3.1. The quality of their data or data products provided for M&S use.

5.3.5.3.2. Supplying data quality information, including data verification and validation reports for data or data products provided for M&S use.

5.3.6. Designate a "Component VV&A focal point" to interface with the DoD VV&A focal point for their VV&A policies, activities, and documentation.

5.3.7. Document and make accessible to the other DoD Components the results of their VV&A activities, including, but not limited to, information and data on their DoD Component VV&A policies and procedures, V&V results, and accreditation decisions.

5.3.8. When designated as a DoD MSEA:

5.3.8.1. Upon request, provide domain information and expertise in support of VV&A activities.

5.3.8.2. Make certain that data quality information is available and accessible to support the individual DoD Component's VV&A activities.

5.4. The Chairman of the Joint Chiefs of Staff shall:

5.4.1. Establish VV&A policies, procedures, and guidelines to satisfy the needs of joint activities reporting to the Chairman of the Joint Chiefs of Staff.

5.4.2. In coordination with the other DoD Components, establish procedures for the validation and accreditation of joint M&S and federations of models and simulations used for joint applications.

## 6. PROCEDURES

6.1. Verification and validation (V&V) shall be:

6.1.1. Incorporated into the development and life-cycle management processes of all M&S.

6.1.2. Required for all models and simulations in current use in the Department of Defense.

6.1.3. Commensurate with the relative importance, risk, and life-cycle management phase of the model, simulation, or federation to which they are applied.

6.2. The V&V of a federation shall include a determination that:

6.2.1. Federation elements can physically connect and exchange data.

6.2.2. Federates, when joined together, provide adequate, accurate, and consistent simulated representations that adhere to the principles of fair fight and address the mission objectives.

6.3. Data V&V is an integral part of the M&S VV&A process and shall:


6.3.1. Be addressed, to include programming of V&V resources, at the earliest stages of a new model or simulation development or the upgrade of an existing model or simulation.

6.3.2. Be documented as part of the VV&A documentation requirements, as specified in enclosure 3.

6.4. VV&A information shall be documented and, as a minimum, shall include the information specified in enclosure 3.

## 7. EFFECTIVE DATE

This Instruction is effective immediately.



**E. C. Aldridge, Jr.**  
**Under Secretary of Defense**  
**(Acquisition, Technology and Logistics)**

Enclosures - 3

- E1. References, continued
- E2. Definitions
- E3. VV&A Documentation Format and Accessibility Requirements

E1. ENCLOSURE 1

REFERENCES, continued

- (e) [DoD 5000.2-R](#), "Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information System (MAIS) Acquisition Programs," April 5, 2002
- (f) [DoD Directive 7045.14](#), "The Planning, Programming, and Budgeting System (PPBS)," May 22, 1984
- (g) Chairman of the Joint Chiefs of Staff Instruction 5123.01, "Charter of the Joint Requirements Oversight Council," March 8, 2001
- (h) [DoD 5000.59-M](#), "DoD Modeling and Simulation (M&S) Glossary," January 15, 1998
- (i) Title 10, United States Code
- (j) [DoD Directive 5111.1](#), "Under Secretary of Defense for Policy (USD(P)),  
December 8, 1999
- (k) [DoD Directive 5118.3](#), "Under Secretary of Defense (Comptroller)  
(USD(C))/Chief Financial Officer (CFO), Department Of Defense," January 6, 1997
- (l) [DoD Directive 5124.2](#), "Under Secretary of Defense for Personnel And Readiness  
(USD(P&R))," October 31, 1994
- (m) [DoD Directive 5134.1](#), "Under Secretary of Defense for Acquisition, Technology,  
and Logistics (USD(AT&L))," April 21, 2000
- (n) [DoD Directive 5137.1](#), "Assistant Secretary of Defense for Command, Control,  
Communications, and Intelligence (ASD(C3I))," February 12, 1992
- (o) [DoD 8320.1-M](#), "Data Administration Procedures," March 29, 1994
- (p) Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3500.02C, "Joint  
Training Master Plan 2002 for the Armed Forces of the United States," August 14,  
2000

## E2. ENCLOSURE 2

### DEFINITIONS

#### E2.1. GENERAL

Definitions used in this Instruction are divided into two sections: those terms established or continued in this DoD Instruction and terms adopted from other DoD issuances.

#### E2.2. TERMS ESTABLISHED OR CONTINUED

E2.2.1. Acceptability Criteria (Accreditation Criteria). A set of standards that a particular model, simulation, or federation must meet to be accredited for a specific purpose.

E2.2.2. Accreditation. The official certification that a model, simulation, or federation of models and simulations and its associated data are acceptable for use for a specific purpose (reference (b)).

E2.2.3. Accreditation Agent. The organization designated to conduct an accreditation assessment for an M&S application.

E2.2.4. Accreditation Authority. The organization or individual responsible to approve the use of a model, simulation, or federation of simulations for a particular application. (See Modeling and Simulation (M&S) Application Sponsor, definition E2.2.29.)

E2.2.5. Common-Use M&S. M&S applications, services, or materials provided by a DoD Component to two or more DoD Components (reference (b)).

E2.2.6. Data Verification and Validation (V&V). The process of verifying the internal consistency and correctness of data and validating that it represents real-world entities appropriate for its intended purpose or an expected range of purposes. The process has two perspectives: the producer and the user process.

E2.2.7. Distributed M&S. A set of models and/or simulations operating in a common synthetic environment over a network with two or more nodes.

E2.2.8. DoD Component Verification, Validation, Accreditation (VV&A) Focal Point. An organization, designated by each DoD Component, as its authoritative, single point of contact for information and data on, as a minimum, that DoD Component's VV&A policies and procedures, V&V results, and accreditation documentation. The DoD Component VV&A focal point shall be the designated point of contact to work with the DoD VV&A focal point on VV&A issues.

E2.2.9. DoD Executive Council for M&S (EXCIMS). An organization established by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) and responsible for providing advice and assistance on DoD M&S issues. The EXCIMS includes the DoD M&S Executive Council, the DoD M&S Working Group, and the supporting Sub-Working Groups and Task Forces that support them. Membership is determined by the USD(AT&L) (reference (b)).

E2.2.10. DoD Issuance. DoD Directives, Instructions, Publications, and their Changes (reference (c)).

E2.2.11. DoD M&S Executive Agent (MSEA). A DoD Component to whom the USD(AT&L) has assigned responsibility and delegated authority for the development and maintenance of a specific area of M&S application, including relevant standards and databases, used by or common to many models and simulations (reference (b)).

E2.2.12. DoD M&S Investment Plan. A DoD plan, published under the authority of the USD(AT&L) and with the coordination of the DoD Components, that establishes short-term (present to 6 years) and long-term (beyond 6 years) programs and funding for joint and common use M&S to achieve the specified goals and objectives outlined in the DoD M&S Master Plan (reference (b)).

E2.2.13. DoD M&S Master Plan. A DoD plan, published under the authority of the USD(AT&L) and with the coordination of the DoD Components, that establishes short-term (present to 6 years) and long-term (beyond 6 years) DoD goals and objectives for the application of M&S for joint and common use within the Department of Defense. It shall also include an assessment of current M&S capabilities, a status report on M&S efforts under development, and a road map that delineates the management, investment, and technical strategies required to achieve DoD M&S objectives (reference (b)).

E2.2.14. DoD M&S Resource Repository (MSRR)

E2.2.14.1. A geographically distributed and networked series of automated information systems that contain unclassified, classified, or both classified and unclassified data and information on M&S that is accessible by DoD-authorized users.

E2.2.14.2. A single DoD node, source, or site that contains M&S data and/or information that may or may not be part of the DoD MSRR network.

E2.2.15. DoD Publications. A DoD issuance that implements or supplements a DoD Directive and/or Instruction by providing uniform procedures for management or operational systems and disseminating administrative information. DoD Publications include: Catalogs, Directories, Guides, Handbooks, Indexes, Inventories, Lists, Manuals, Modules, Pamphlets, Plans, Regulations, and Standards that implement or supplement DoD Directives or Instructions (reference (c)).

E2.2.16. DoD VV&A Focal Point (VFP). A DoD organization designated as the authoritative, single point of contact for DoD and non-DoD activities on the data and information on DoD VV&A policies, procedures and practices, V&V results, and accreditation documentation.

E2.2.17. Domain. The physical or abstract space in which the entities and processes operate. The domain can be land, sea, air, space, undersea, a combination of any of the above, or an abstract domain, such as an n-dimensional mathematics space, or economic or psychological domains (reference (h)).

E2.2.18. Federate. An individual model or simulation that is part of a federation of models and simulations. Federates may be distributed.

E2.2.19. Federation of Models and Simulations. A system of interacting models and/or simulations, with supporting infrastructure, based on a common understanding of the objects portrayed in the system. (See Federate, definition E2.2.18.)

E2.2.20. Functional Activity. The primary subdivision of a functional area, made up of a collection of processes that can be managed together using policies and procedures not specifically applicable to other functional activities within the functional area.

E2.2.21. Functional Area. A functional area (e.g., personnel) is comprised of one or more functional activities (e.g., recruiting), each of which consists of one or more functional processes (e.g., interviews).

E2.2.22. Functional Process. A well-defined (or definable) set of logically related tasks and decisions within a functional activity that use resources to produce products or services.

E2.2.23. General-use M&S. Specific representations of the physical environment or environmental effects used by, or common to, many models and simulations; e.g., terrain, atmospheric, or hydrographic effects (reference (b)).

E2.2.24. Joint M&S. Abstract representations of joint and Service forces, capabilities, equipment, materiel, and services used in the joint environment by two, or more, Military Services (reference (b)).

E2.2.25. Military Departments. The Department of the Army, the Department of the Navy, and the Department of the Air Force, including their National Guard and Reserve components.

E2.2.26. Military Services. The Army, the Navy, the Air Force, and the Marine Corps.

E2.2.27. Model. A physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process (reference (b)).

E2.2.28. Modeling and Simulation (M&S). The use of models and simulations, either statically or over time, to develop data as a basis for making managerial or technical decisions. This includes, but is not limited to, emulators, prototypes, simulators, and stimulators.

E2.2.29. M&S Application Sponsor. The organization that accredits and uses the results or products from a specific application of a model or simulation.

E2.2.30. M&S Interoperability. The ability of a model or simulation to provide services to, and accept services from, other models and simulations, and to use the services so exchanged to enable these M&S to operate effectively together (reference (a)).

E2.2.31. M&S Proponent. The DoD Component organization that has primary responsibility to initiate development and life-cycle management of the reference version of one or more models and/or simulations.



E2.2.32. M&S VV&A Repository. A central library, catalog, registry, database, listing, or World Wide Web Internet site for VV&A data and information that may be part of DoD M&S Resource Repository.

E2.2.33. Office of the Secretary of Defense (OSD). Includes the immediate Offices of the Secretary and Deputy Secretary of Defense, the Under Secretaries of Defense, the Director of Defense Research and Engineering (DDR&E), the Assistant Secretaries of Defense (ASDs), the Director of Operational Test and Evaluation (DOT&E), the General Counsel of the Department of Defense (GC, DoD), the Inspector General of the Department of Defense (IG, DoD), the Assistants to the Secretary of Defense (ATSDs), the OSD Directors, or equivalents, who report directly to the Secretary or the Deputy Secretary of Defense, and such other staff offices as the Secretary of Defense establishes to assist in carrying out assigned responsibilities (reference (i)).

E2.2.34. Office of the Secretary of Defense (OSD) Components. The Undersecretaries of Defense and the Assistant Secretary of Defense (Command, Control, Communications, and Intelligence) and those Principal Staff Assistants and organizations over which they individually exercise authority, direction, control, or staff supervision as outlined in DoD Directives 5141.2, 5111.1, 5118.3, 5124.2, 5134.1, and 5137.1 (references (d) and (k) through (n)).

E2.2.35. Operational Test and Evaluation (OT&E). The field test, under realistic operational conditions, of any item (or key component) of weapons, equipment, or munitions for the purpose of determining the operational effectiveness and operational suitability of the weapons, equipment, or munitions for operational use, including combat, by typical military users, and the evaluation of the results of such test (reference (d)).

E2.2.36. Principal Staff Assistants. The Under Secretaries of Defense; the DDR&E, the ASDs; the Inspector General of the Department of Defense; the GC, DoD; the ATSDs; and the OSD Directors, or equivalents, who report directly to the Secretary or Deputy Secretary of Defense (reference (b)).

E2.2.37. Simulation. A method for implementing a model over time. Also, a technique for testing, analysis, or training in which real-world systems are used, or where real-world and conceptual systems are reproduced by a model (reference (b)).

E2.2.38. Simulation Conceptual Model. The developer's description of what the model or simulation will represent, the assumptions limiting those representations, and other capabilities needed to satisfy the user's requirements.

E2.2.39. Validation. The process of determining the degree to which a model and its associated data are an accurate representation of the real world from the perspective of the intended uses of the model (reference (b)).

E2.2.40. Validation Agent. The person or organization designated to perform validation of a model, simulation, or federation of models and/or simulations and the associated data.

E2.2.41. Verification. The process of determining that a model implementation and its associated data accurately represents the developer's conceptual description and specifications (reference (b)).

E2.2.42. Verification Agent. The person or organization designated to perform verification of a model, simulation, or federation of models and/or simulations and the associated data.

### E2.3. TERMS THIS INSTRUCTION ADOPTS

E2.3.1. From DoD 8320.1-M (reference (o)):

E2.3.1.1. Data. A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means.

E2.3.2. Data Quality. The correctness, timeliness, accuracy, completeness, relevance, and accessibility that make data appropriate for use.

E2.3.2. From Chairman of the Joint Chiefs of Staff Instruction 3500.02C (reference (p)):

E2.3.2.1. Exercise. A military maneuver or simulated wartime operation involving planning, preparation, and execution. It is carried out for the purpose of training and evaluation.

E2.3.2.2. Joint Exercise. A joint military maneuver, simulated wartime operation, or other Chairman of the Joint Chiefs of Staff/Combatant

Commander-designated event involving planning, preparation, execution, and evaluation. A joint exercise involves forces of two or more Military Departments interacting with a Combatant Commander or subordinate joint force commander; involves joint forces and/or joint staffs; and is conducted using joint doctrine or joint tactics, techniques, and procedures.

E2.3.2.3. Joint Training. Military training based on joint doctrine or joint tactics, techniques, and procedures to prepare joint forces and/or joint staffs to respond to strategic and operational requirements deemed necessary by the Combatant Commanders to execute their assigned missions. Joint training involves forces of two or more Military Departments.

E2.3.2.4. Multinational Exercises. Exercises that train and evaluate United States and other national forces or staffs to respond to requirements established by multinational force commanders to accomplish their assigned missions.

E2.3.2.5. Service Training. Military training based on Service policy and doctrine to prepare individuals and interoperable units. Service training includes basic, technical, operational, and interoperability training in response to operational requirements deemed necessary by the Combatant Commands to execute assigned missions.

### E3. ENCLOSURE 3

#### VERIFICATION, VALIDATION, AND ACCREDITATION (VV&A) DOCUMENTATION FORMAT AND ACCESSIBILITY REQUIREMENTS

##### E3.1. DOCUMENTATION REQUIREMENTS

As a minimum, document verification and validation information supporting accreditation decisions as well as accreditation results as follows:

###### E3.1.1. For verification:

E3.1.1.1. Identify the verification agent(s) involved in the verification.

E3.1.1.2. Describe the model or simulation version or release and identify the developing organization.

E3.1.1.3. List or reference the M&S requirements.

E3.1.1.4. List and/or describe the verification methodologies and activities.

E3.1.1.5. Summarize the verification results.

E3.1.1.6. Identify any M&S limitations.

###### E3.1.2. For validation:

E3.1.2.1. Identify the validation agent(s) performing the validation.

E3.1.2.2. Identify the model, simulation, or M&S federation version and/or release and its developing organization.

E3.1.2.3. Describe the Simulation Conceptual Model.

E3.1.2.4. List, describe, and/or identify the validation methodologies and activities used, including the methods for validation of data.

E3.1.2.5. Summarize validation results.

E3.1.2.6. Specify any identified M&S limitations.

E3.1.3. For accreditation: The M&S Application Sponsor shall document accreditation results, to include, at a minimum, the following:

E3.1.3.1. Identify the M&S Application Sponsor.

E3.1.3.2. Identify the accreditation agent organization, if different from the M&S Application Sponsor.

E3.1.3.3. Identify the model, simulation, or federation version and/or release and the developing organization.

E3.1.3.4. Identify the M&S Application Sponsor's intended purpose for the model, simulation, and/or federation to be accredited.

E3.1.3.5. List or describe the requirements to be addressed by the model, simulation, or M&S federation.

E3.1.3.6. Identify, assess, and/or catalog those aspects of the model, simulation, and/or federation that are essential and pertinent to an accreditation decision, as appropriate. For example:

E3.1.3.6.1. Assumptions.

E3.1.3.6.2. Scenarios.

E3.1.3.6.3. Representations of concepts, processes.

E3.1.3.6.4. Environmental representations (e.g., natural and/or human environment: climate, weather, terrain, geographic, political, economic, etc.).

E3.1.3.6.5. Representations of missions, organizations, systems (weapon systems, combat support systems, combat service support systems) and their capabilities.

E3.1.3.6.6. Doctrine, tactics, behaviors, and performance algorithms used by each represented force (blue, red, white).

E3.1.3.6.7. Other information and data, as needed.

E3.1.3.7. Describe the accreditation methodology, including V&V activities, that support accreditation; data verification and validation; risk assessments; and, acceptability criteria.

E3.1.3.8. Assess or evaluate the capabilities and limitations of the particular data, specific model, simulation, or federation as they affect the appropriateness for the intended purposes.

E3.1.3.9. State the M&S Application Sponsor's accreditation decision regarding the acceptability of the model, simulation, or federation for the intended purpose.

## **E3.2. M&S VV&A DOCUMENTATION ACCESSIBILITY REQUIREMENTS**

DoD M&S VV&A information and data should be readily accessible and available to DoD users. To meet this requirement, the DoD Components, to the extent that priorities and resources permit, shall:

E3.2.1. Establish a DoD Component M&S VV&A repository that identifies existing M&S VV&A documentation and ensures the timely addition of current, new, and future VV&A documentation.

E3.2.2. Establish procedures to allow DoD users to identify and access M&S VV&A documentation information and data.