Delta Mendota Canal Recirculation Feasibility Study

Client: Bureau of Reclamation

- Excess DMC flow diverted to SJR via Wasteways.
- Will the project bring flow, salinity, and DO in the Delta closer to compliance with the Basin Plan?
- Will the project incur less reliance on New Melones releases and result in increased water storage capacity?
- Model study and recirculation pilot study.

Baseline Existing conditions vs. Future No Action (FNA) conditions

Common Assumptions Version 8D

Existing Conditions	Future Conditions
Temporary Barriers	Temporary Barriers
Contra Costa Water District (CCWD) intakes at Rock Slough and Highway 4	All 3 CCWD CalSim outputs are used but Alternative Intake Project (AIP) flows are lumped at Highway 4
2005 LOD	2020 LOD
2005 Delta Island Consumptive Use (DICU)	2020 DICU
No SDIP (temporary barriers used)	No SDIP (temporary barriers used)
No Dredging	No Dredging
North of Delta operations ignored	North of Delta operations ignored

Detailed Model Assumptions:

- Model output is used from 1922 to 2003, after a spin-up year in 1921.
- DWR's astronomical tide is used for water level at Martinez, which accounts for spring-neap and seasonal variations in tidal elevation, as opposed to earlier DSM2 studies that used tides with only a semidiurnal variation.
- EC at Martinez is estimated using DWR's astronomical tide and total Delta outflow from CalSim II, assuming constant values for seawater salinity and freshwater salinity.
- Boundary flows and tides from CalSim II are divided into 14 periods per year (10 full months + 4 Vernalis Adaptive Management Plan periods).
- EC for the SJR: from CalSim II.
- EC for Delta Island return flows: DWR standard values (constant monthly values).
- EC for other flows: Sacramento, Calaveras rivers at 175 microSiemens per centimeter (µS/cm); Mokelumne and Cosumnes rivers (Eastside Streams), and Yolo Bypass at 150 µS/cm.
- South Delta barriers: Physical features and operation as temporary barriers for existing and future runs.
- Delta Cross Channel output: from CalSim II.
- CCWD diversions at Rock Slough, Los Vaqueros Intake, and (for future) AIP; note that the AIP export flows are added to the CCWD Old River Highway 4 pumping plant. Due to the South Delta geometry and export flows, DWR has indicated that any difference between pulling water from Old River rather than Victoria Canal should be negligible (DWR memo, February 5, 2008).

Future Recirculation Project Alternatives

A

Excess Federal Facilities Only

- Excess Jones PP
- No CVP/SWP impact

A1

Supplement Vernalis Compliance

- Supplemental to New Melones release

A2

Supplement Vernalis Compliance and Enhance New Melones Water Supply

- Prior to New Melones release

B

Excess Federal and State Facilities

- Excess Jones PP
- Excess Banks PP
- No CVP/SWP impact

B1

Supplemental Vernalis Compliance

- Supplemental to New Melones release

B2

Supplement Vernalis Compliance and Enhance New Melones Water Supply

- Prior to New Melones release

C

Federal and State Facilities
Limited Reduction of CVP Deliveries

- Excess Jones PP for Vernalis flow and water quality
- Excess Banks PP for Vernalis flow and quality
- CVP facilities then used for recirculation for Vernalis flow in priority to CVP SOD deliveries

Prior to
New Melones release

D

Federal and State Facilities
Recirculation Priority to CVP Deliveries

- Excess Jones PP and Banks PP used first for Vernalis flow and quality
- CVP facilities then used for recirculation for Vernalis flow and quality in priority to CVP SOD deliveries

Prior to
New Melones release

Simulation: Calsim II FNA
Calsim II Output used as Input for DSM2: FNA Delta boundary conditions including Vernalis flow and EC, Jones and Banks pumping rates, Delta outflow

↓

Simulation: DSM2 FNA
DSM2 Output used as Input for Calsim II: FNA EC in DMC

↓

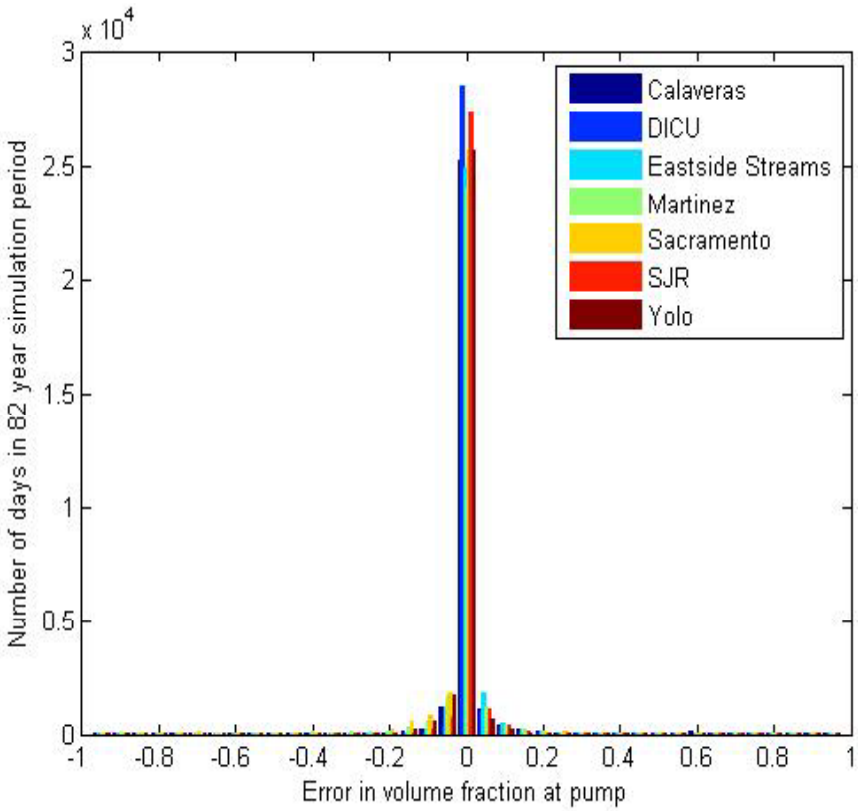
Simulation: Calsim II action alternative
Calsim II Output (Alternatives A2, B2, C, D) and post-processing spreadsheet tool output (Alternatives A1, B1) used as Input for DSM2: Action alternative Vernalis flow and EC, Jones and Banks pumping, Delta outflow

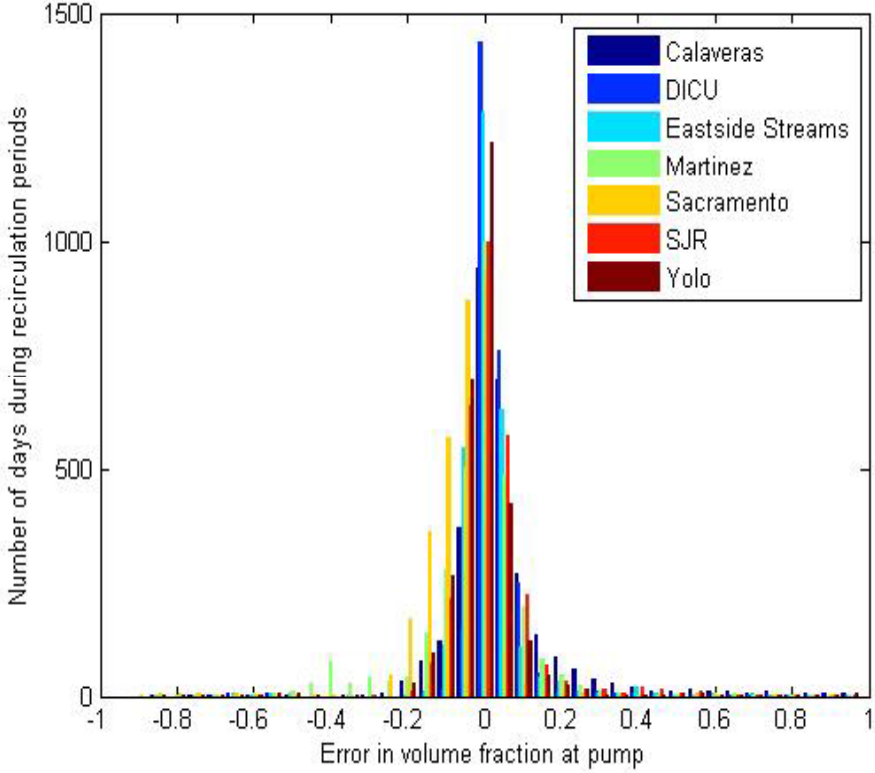
↓

Simulation: DSM2 action alternative
DSM2 Output: Action alternative flow, EC, source fraction at all locations inside the Delta

Error in performing only 2 iterations of CALSIM/DSM feedback: volume fraction at Tracy pumps

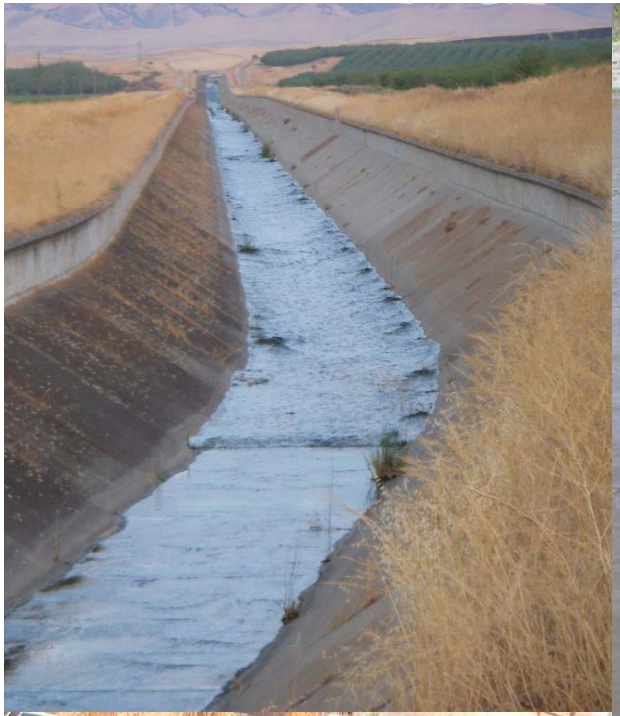
$$Error = \frac{V_{Alt.D} - V_{FNA}}{V_{FNA}}$$





DSM2 output

Station	Location	Output Parameters
RSAN072	SJR at Brandt Bridge	Flow, stage, EC, source fraction
ROLD059	Old River at Tracy Road	Flow, stage, EC
RSAN112	SJR at Vernalis	Flow, stage, EC
RMID041	Middle River at Mowry	Flow, stage, EC
RSAN007	SJR at Antioch	Flow, stage, EC, source fraction
RSAN037	SJR Mandeville Island	Flow, stage, EC, source fraction
RSAN087	SJR Mossdale	Flow, stage, EC, source fraction
ROLD024	Old River W. of Bacon Island	Flow, stage, EC, source fraction
ROLD034	Old River W. of Victoria Island	Flow, stage, EC, source fraction
midr_s_turn_cut	Middle River south of Turner Cut	Flow, stage, EC, source fraction
CHGLR009	Grant Line Canal at Tracy Road	Flow, stage, EC, source fraction
CHVTOOO	Victoria Canal	Flow, stage, EC
SLRCK005	Rock Slough CCWD intake	Flow, stage, EC
CLFCT	Clifton Court Forebay	Flow, stage, EC
chdmc006	Tracy Pumping Plant	Flow, stage, EC, source fraction
RSAN052	SJR at Ringe Pump	Flow, stage, EC, source fraction



Newman Wasteway Pilot study

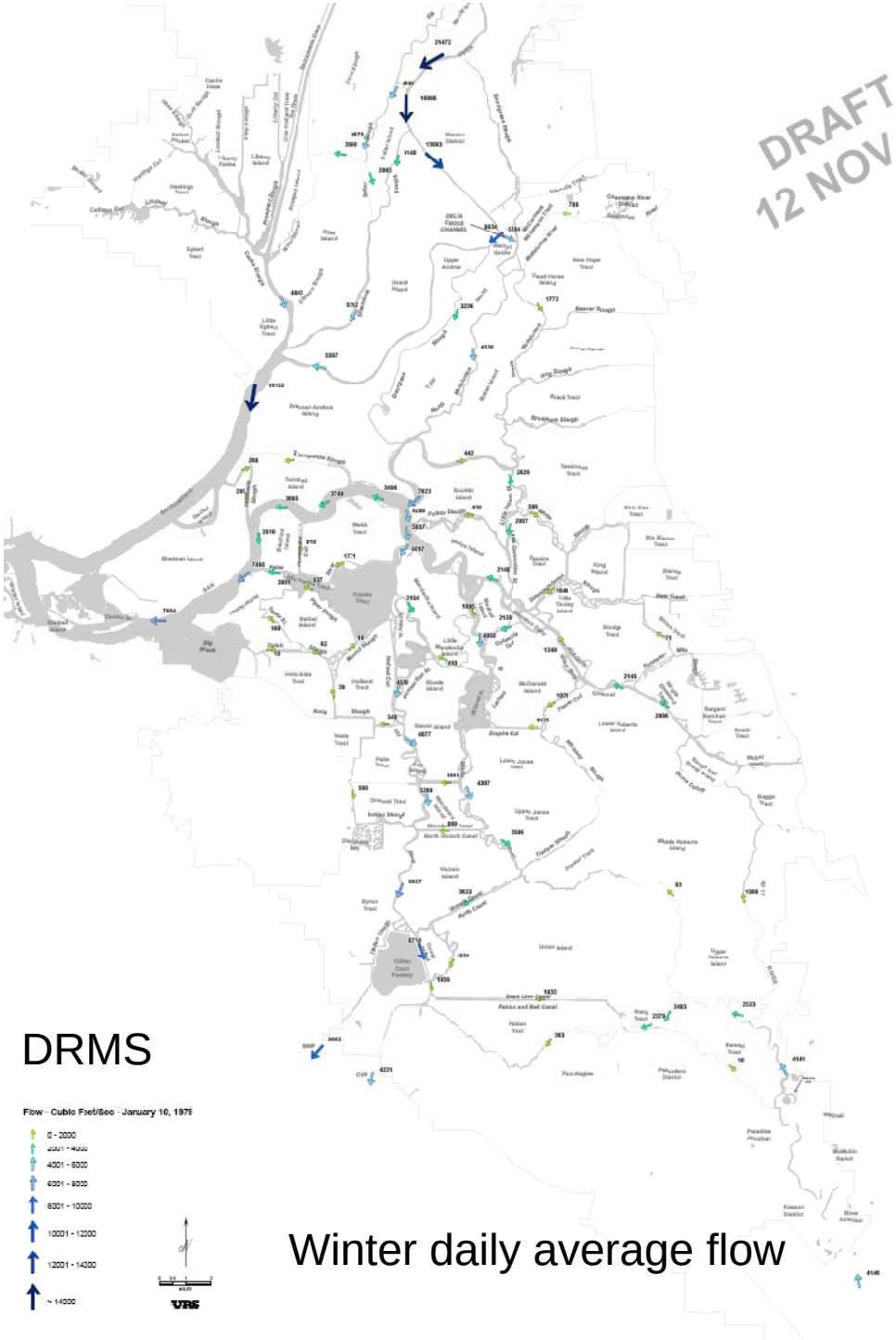
Flow, water quality, and turbidity monitoring

Subsided islands in the Delta and saltwater gulp

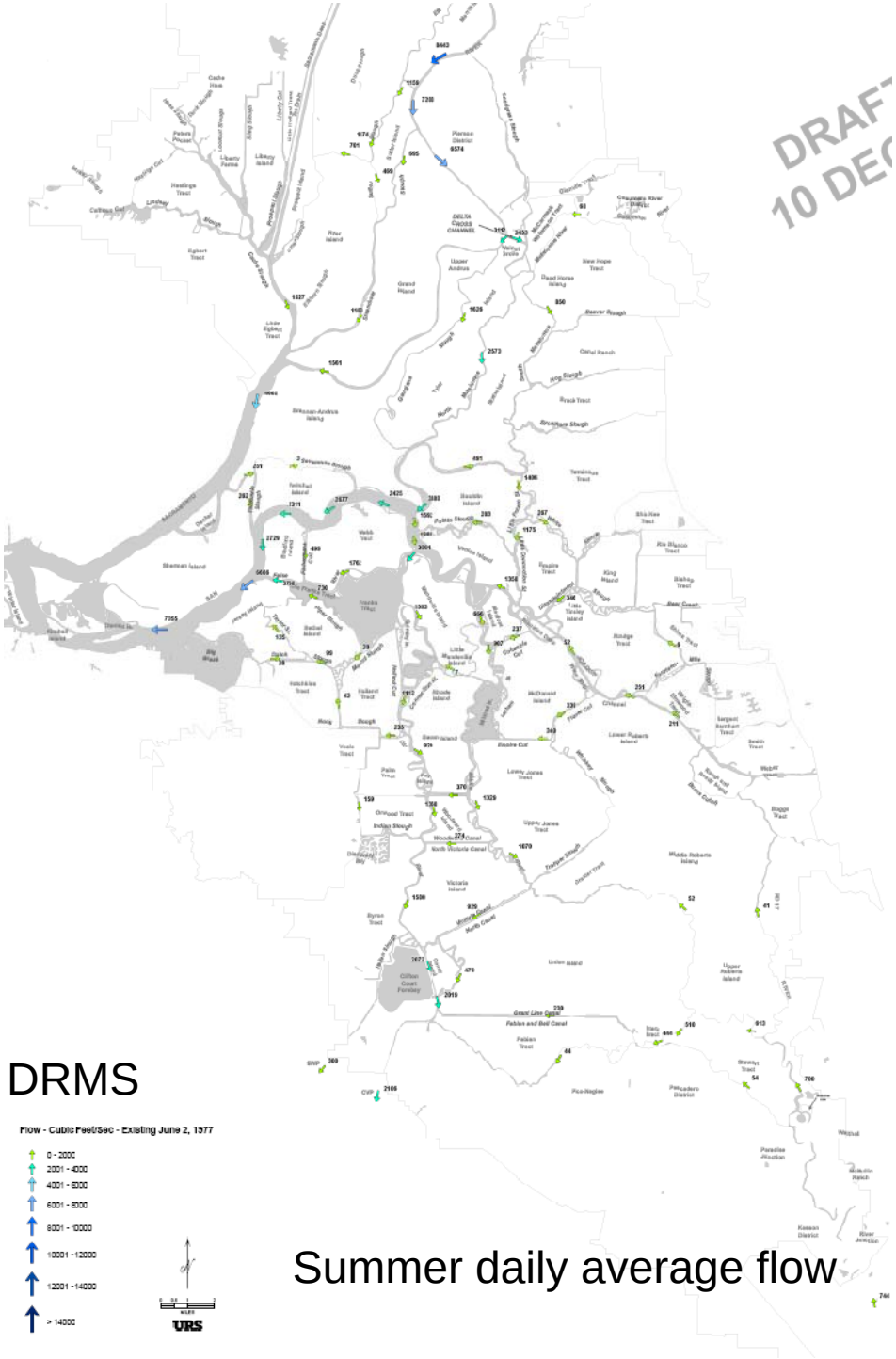
- Delta Island subsidence up to 20 ft. below sea level.
- Most levees not engineered, but built by farmers between 1850's to early 20th century.
- Franks' Tract, Mildred Island already flooded
- SWP, CVP pump from south Delta at Tracy.
- Major quake could cause failure of many levees simultaneously.
- Levee failure gulps in saltwater from the Bay.
- Saltwater shuts down SWP and CVP for up to 2 years.
- Evaluate alternatives to protect water supply.

2004 Jones Tract levee failure

California Aqueduct

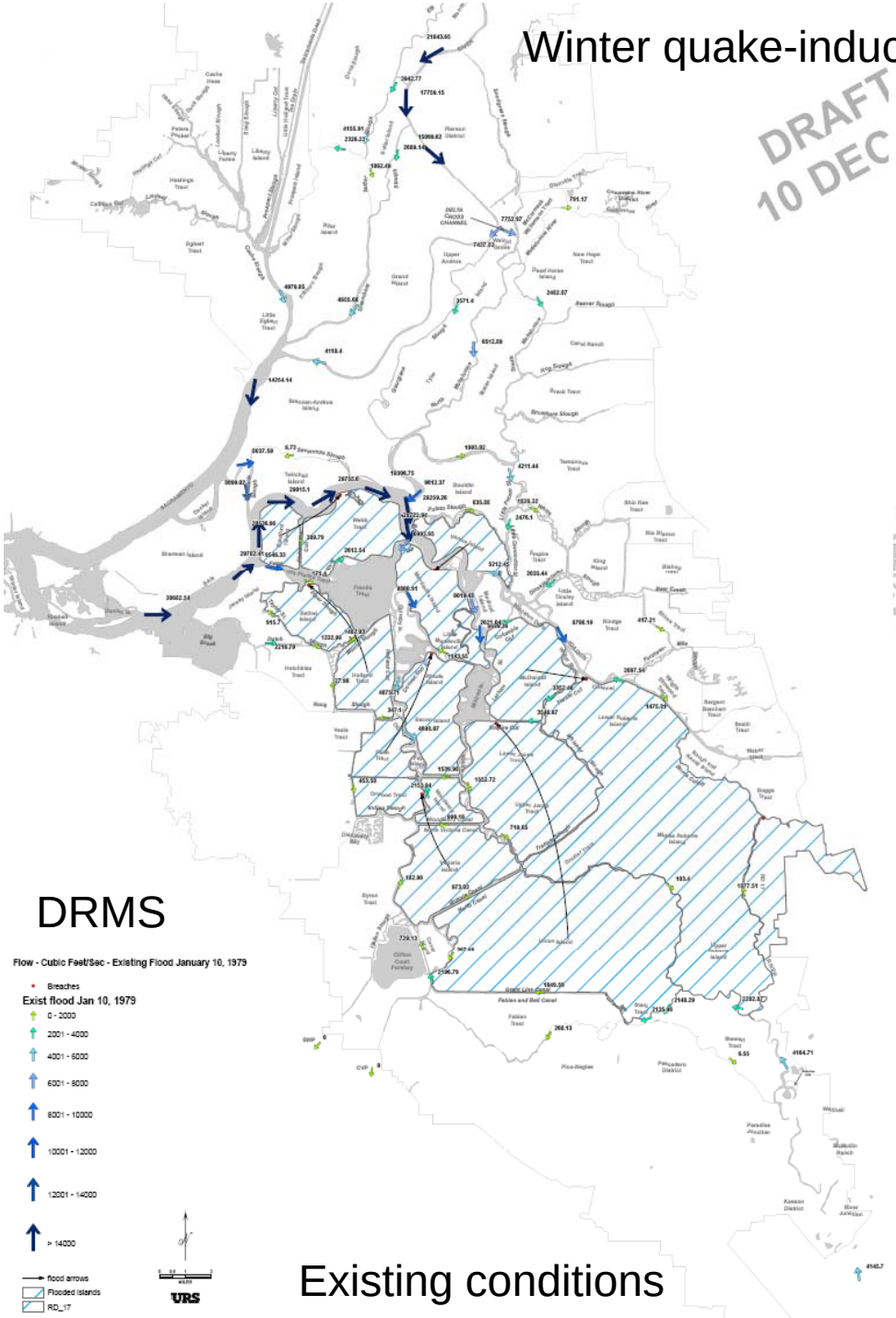


Winter daily average flow

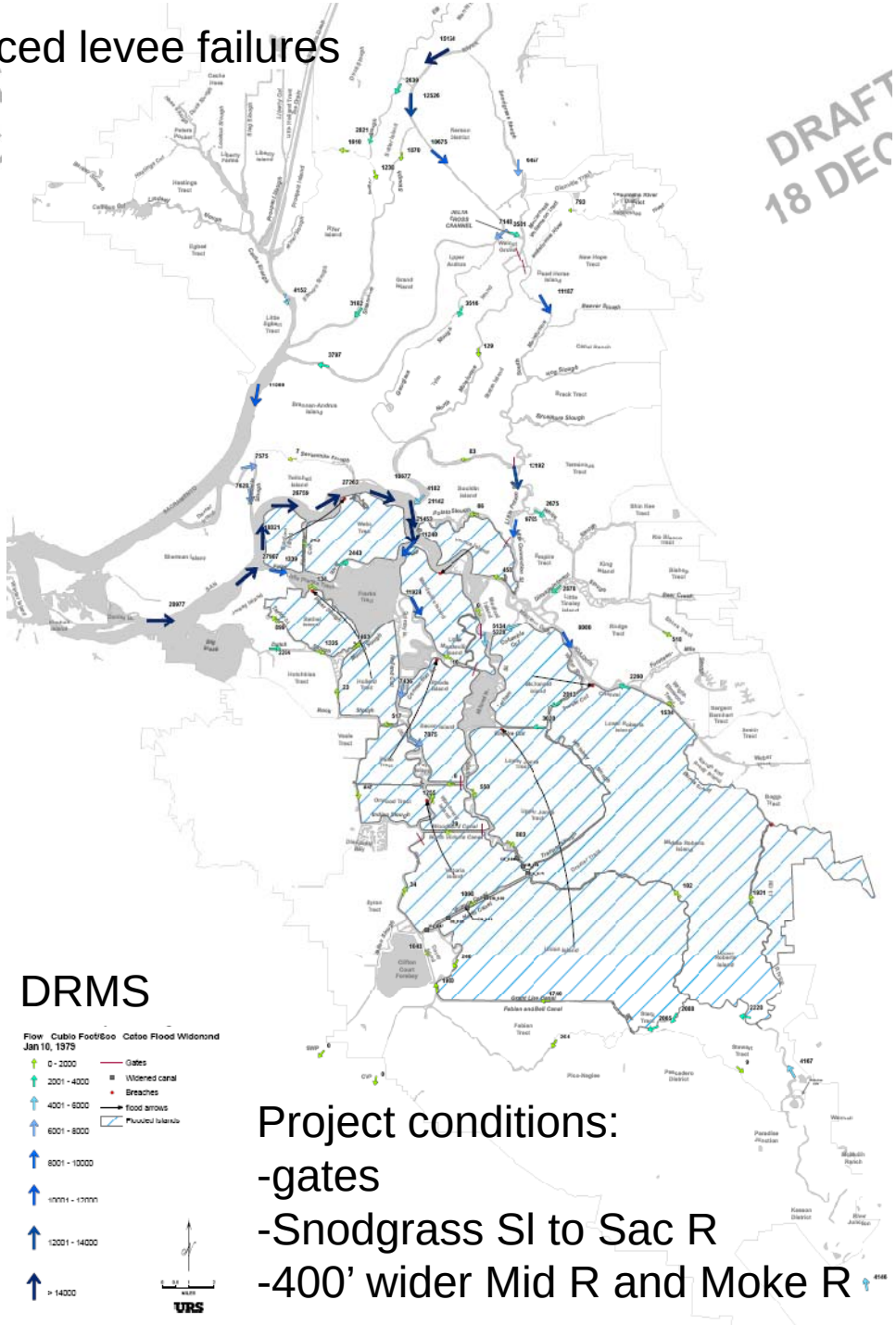


Summer daily average flow

Winter quake-induced levee failures



Existing conditions

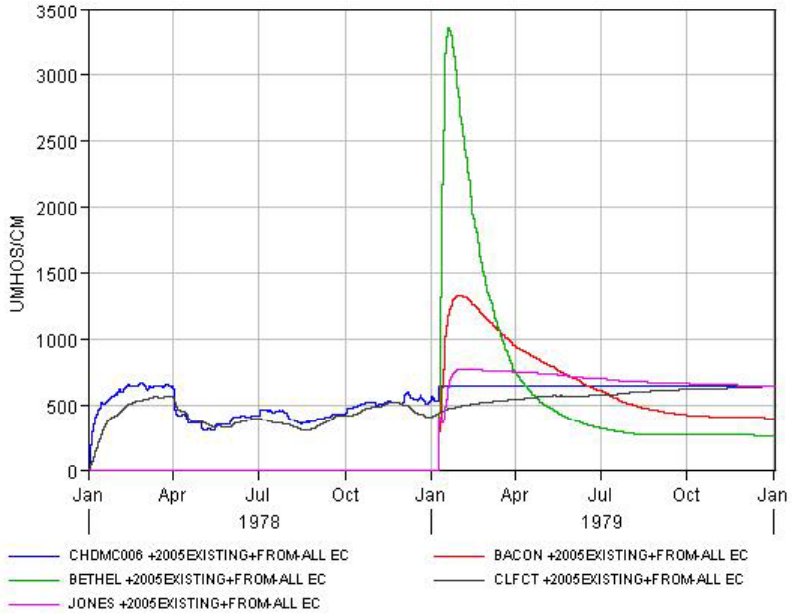


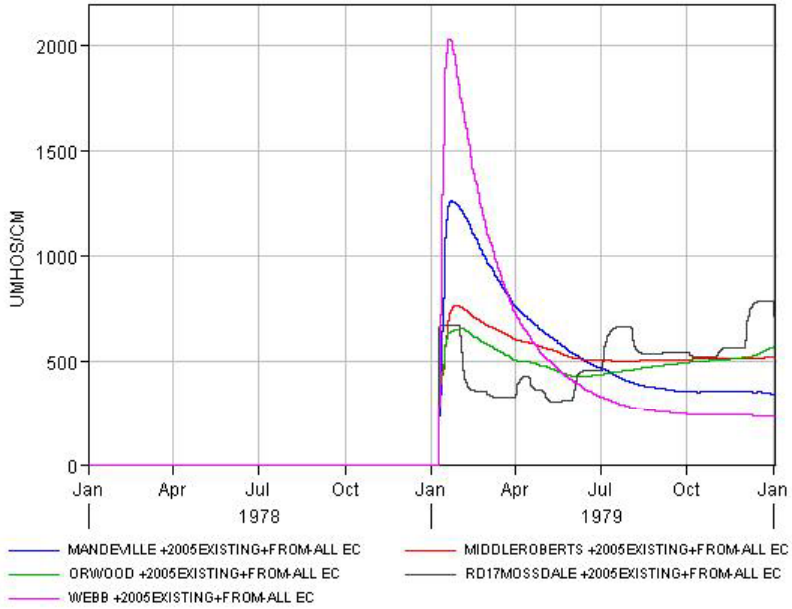
Project conditions:
-gates
-Snodgrass Sl to Sac R
-400’ wider Mid R and Moke R

Relative salinity of flooded islands – winter quake

Note: Martinez EC not adjusted

Existing conditions





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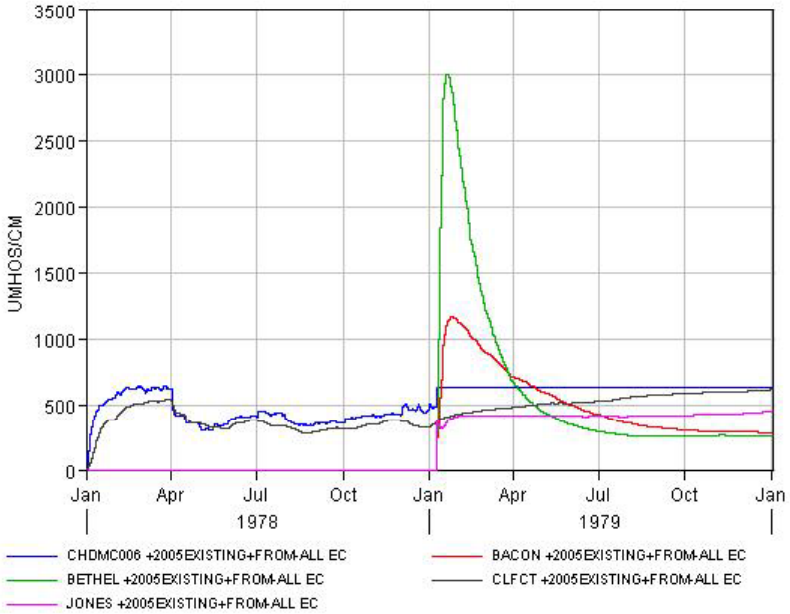

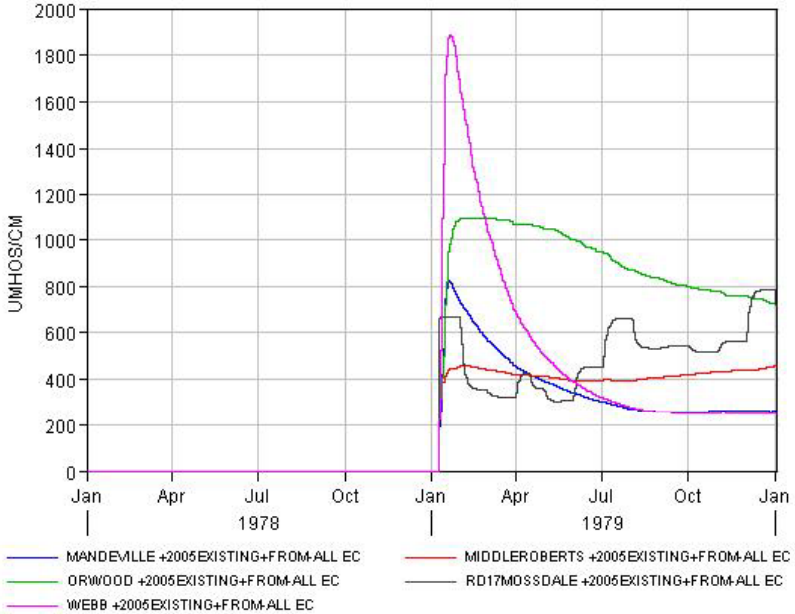

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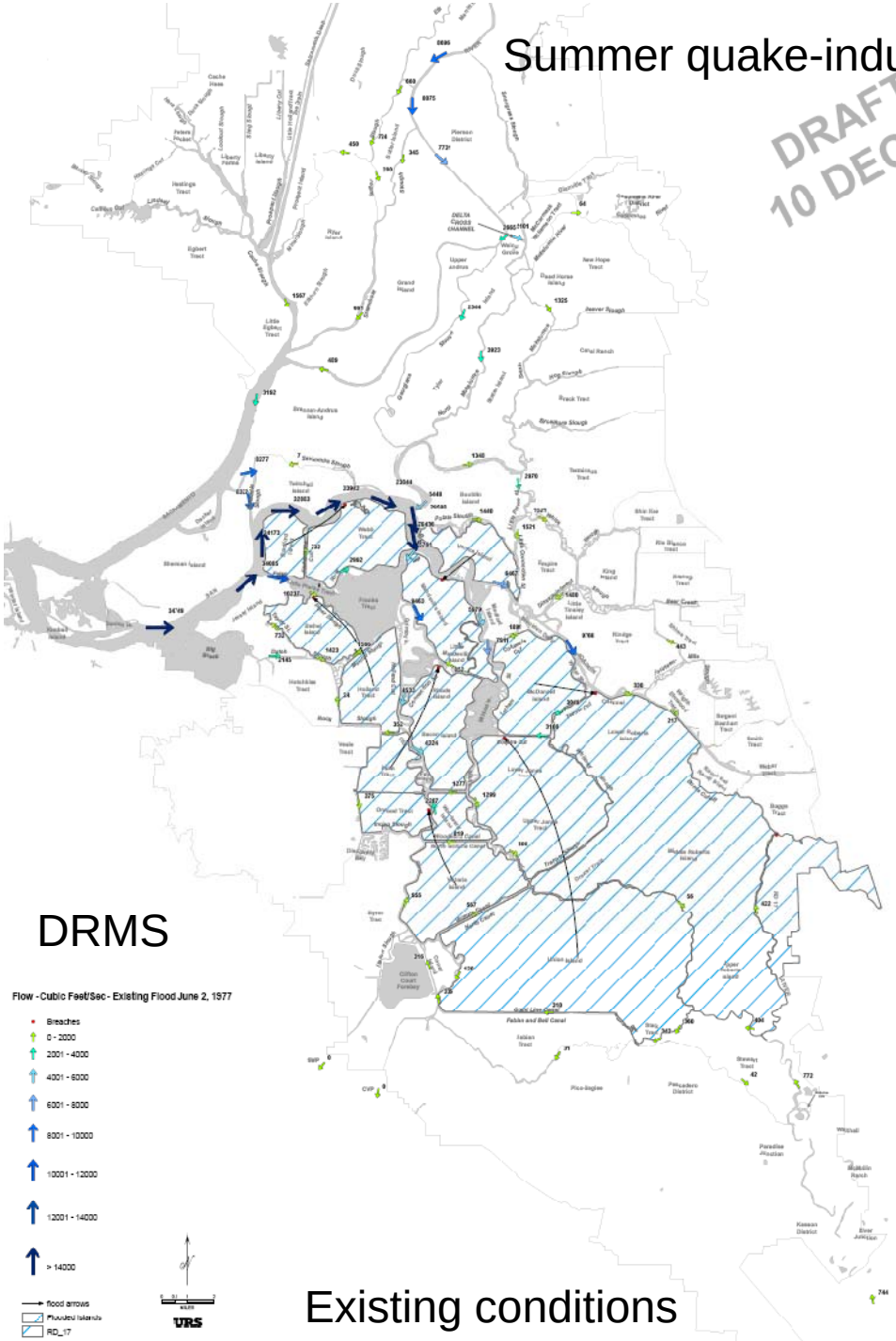

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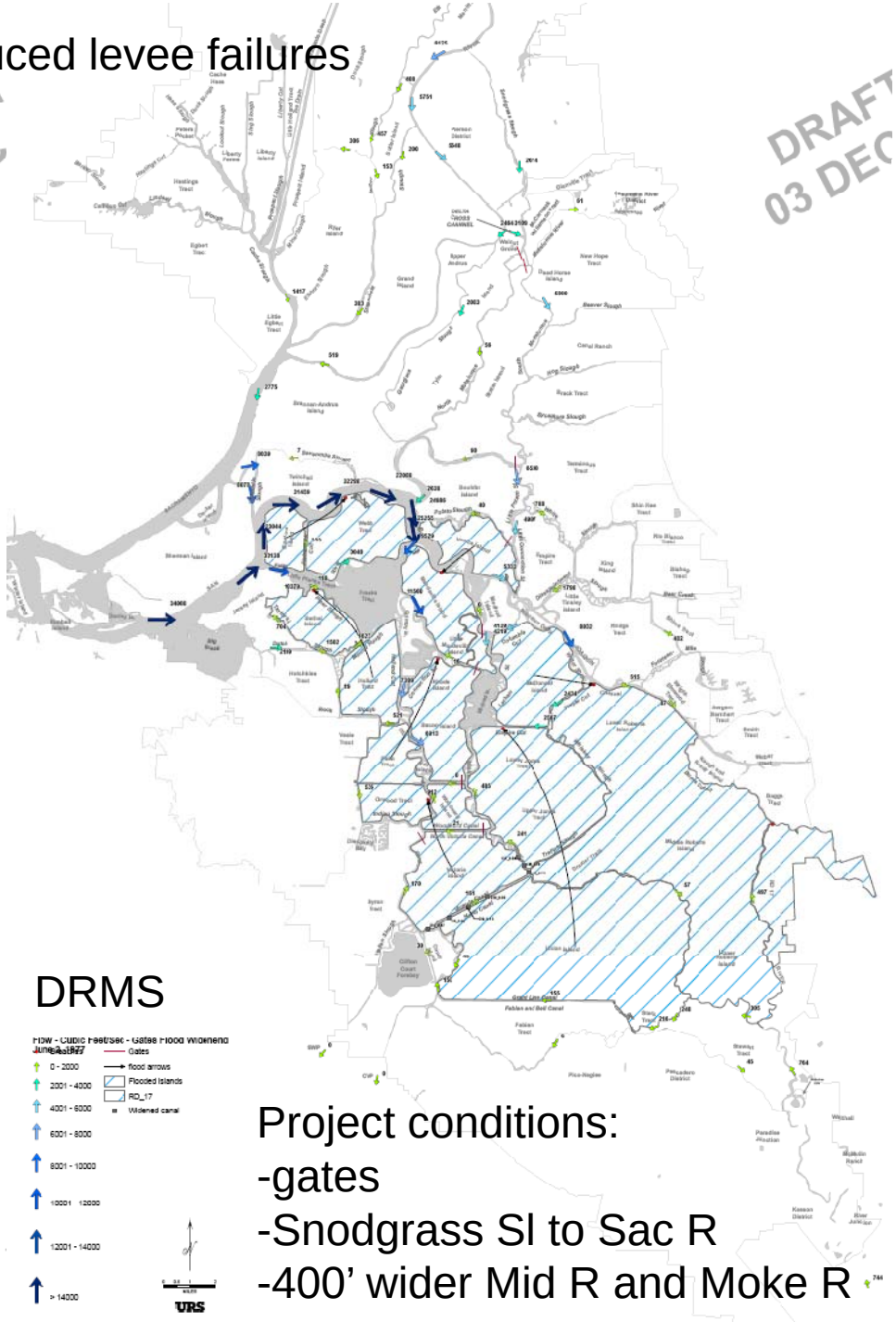

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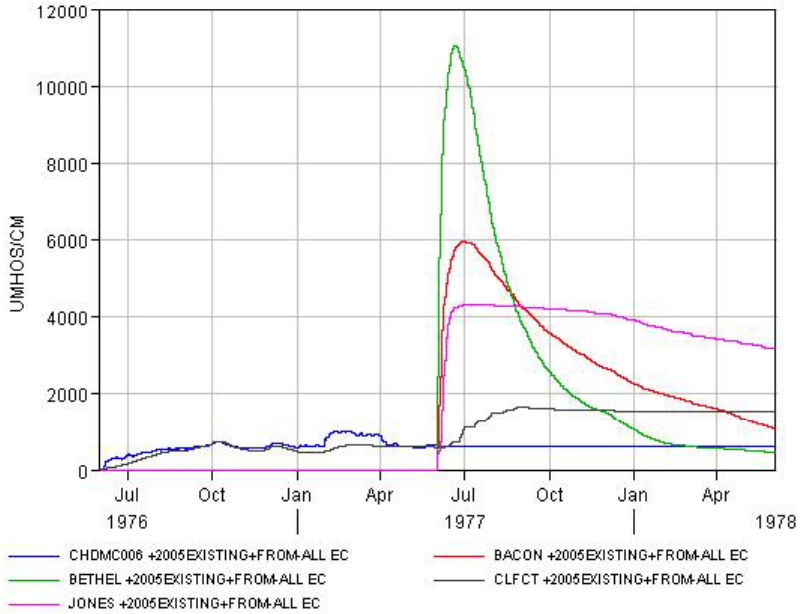

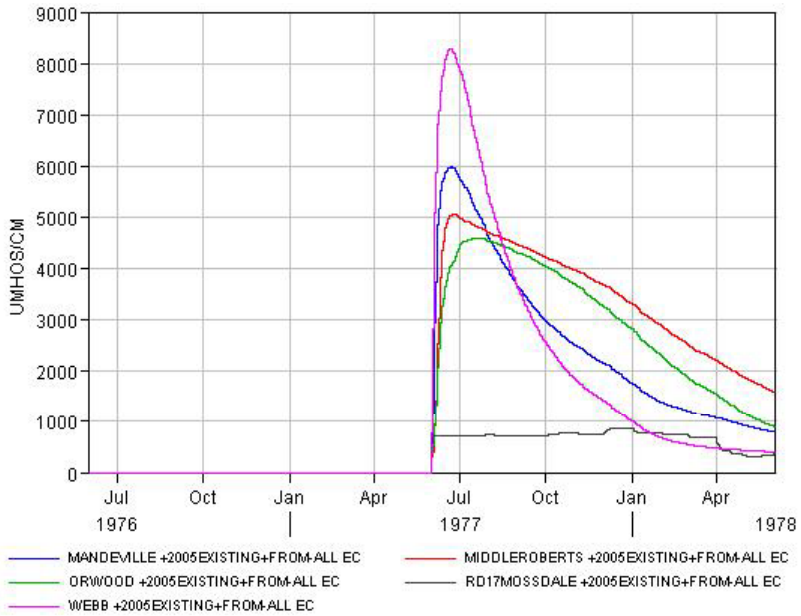
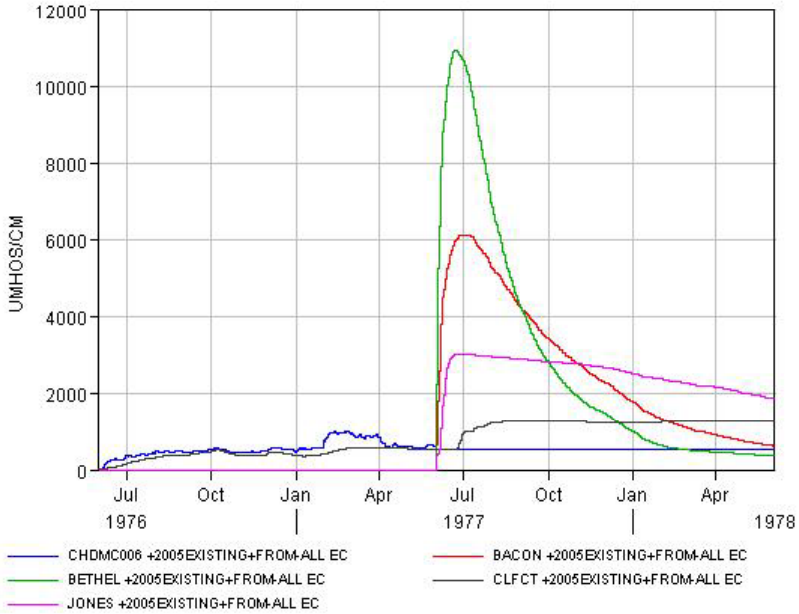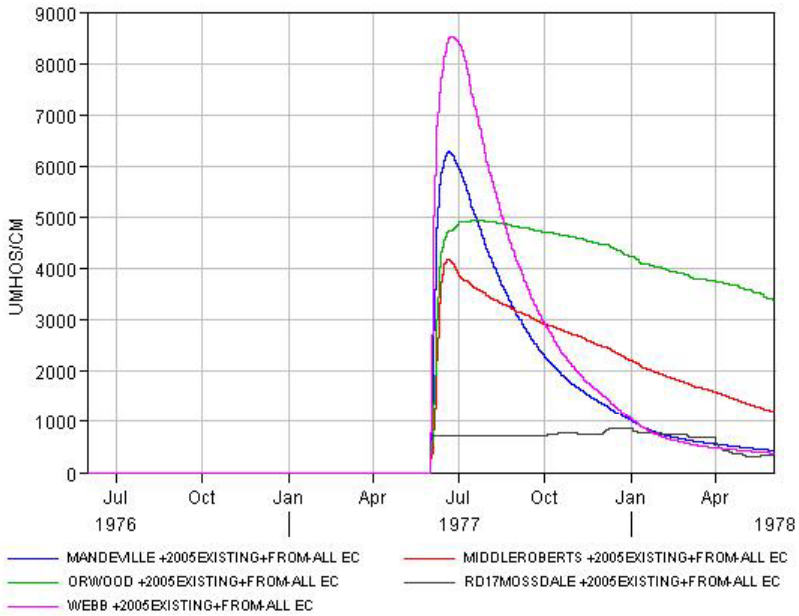
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