

# Delta Water Quality Fingerprinting Using DSM2

Central Valley Drinking Water Policy  
Public Workshop  
October 3, 2006



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Delta Modeling Section  
California Department of Water Resources

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## Acknowledgements

Michael Mierzwa, Jamie Anderson, and Bob Suits

## References

<http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/annualreports.cfm>

- Chapter 14, 2002 Annual Report
- Chapter 9, 2004 Annual Report
- Chapter 3, 2005 Annual Report
- Chapter 6, 2005 Annual Report

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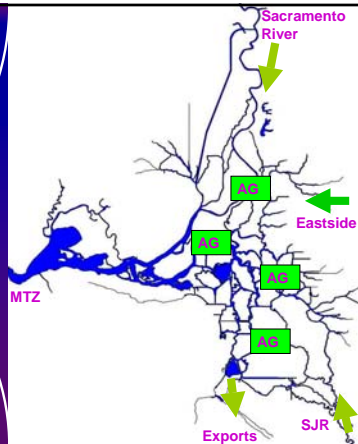
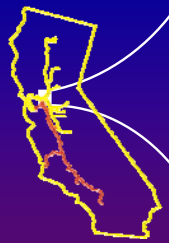
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The Delta Simulation Model (DSM):  
Sacramento-San Joaquin Delta



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## Fingerprint Basics

### Run DSM2-hydro

This module will provide Delta-wide flows, stage, and velocities.

### Run DSM2-qual

This module will estimate:

*Volumetric fingerprints* – fixed and equivalent boundary source concentrations

*Constituent fingerprints* – actual boundary source concentrations

All constituent sources are modeled independently.

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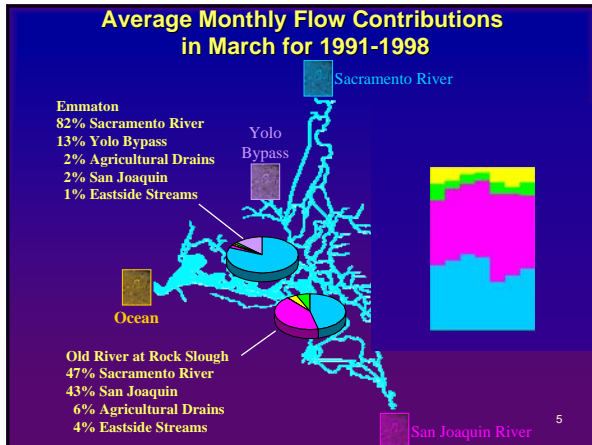
## Average Monthly Flow Contributions in March for 1991-1998

### Emmaton

- 82% Sacramento River
- 13% Yolo Bypass
- 2% Agricultural Drains
- 2% San Joaquin
- 1% Eastside Streams

### Ocean

- Old River at Rock Slough
- 47% Sacramento River
- 43% San Joaquin
- 6% Agricultural Drains
- 4% Eastside Streams



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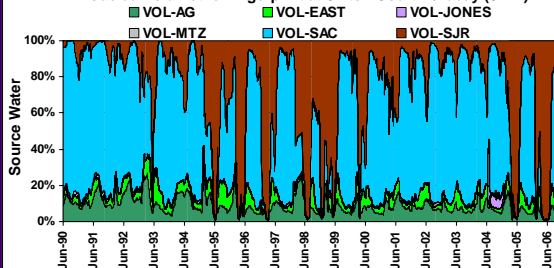
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## Historical C.C.F. Volumetric Fingerprint

### Modeled Volumetric Fingerprint at Clifton Court Forebay (SWP)



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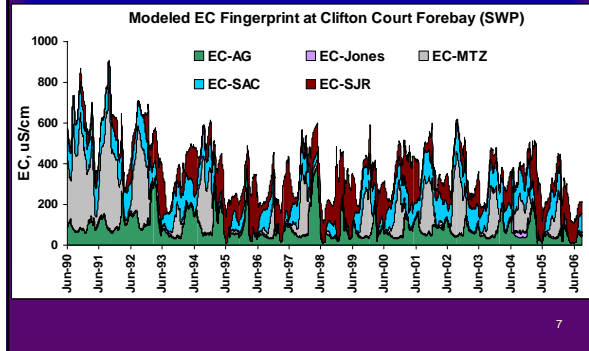
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### Historical C.C.F. Salinity Fingerprint




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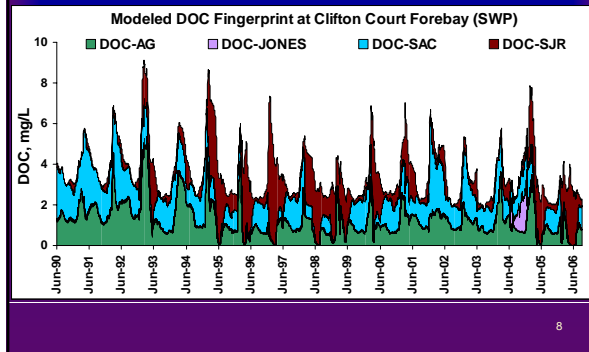
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### Historical C.C.F. DOC Fingerprint




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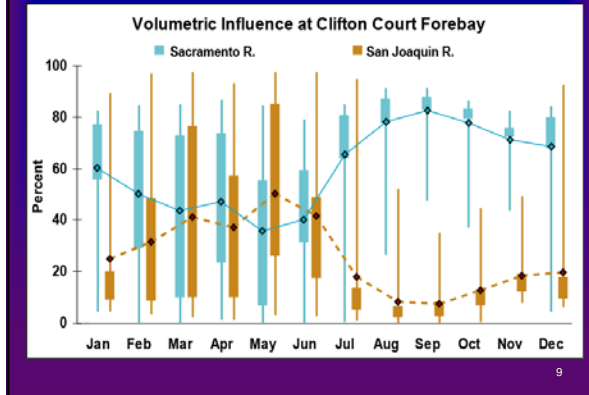
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### CCFB Source Water (avg. historical 1990-2006)




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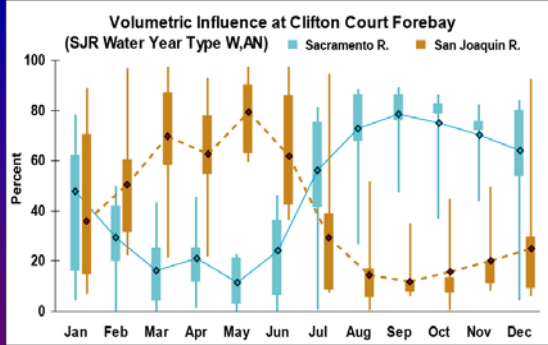
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**CCFB Source Water (WYT: W,AN), avg. historical 1990-2006**



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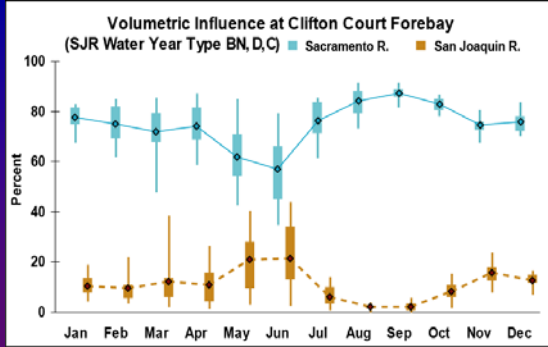
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**CCFB Source Water (WYT: BN,D,C), avg. historical 1990-2006**



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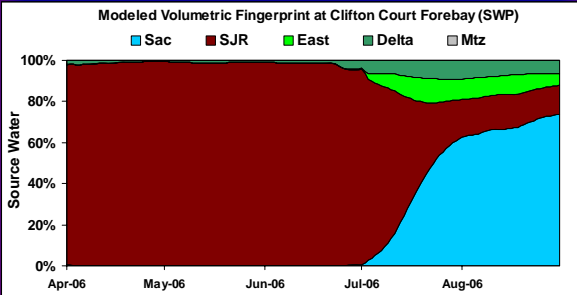
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**Recent Historical Volumetric Fingerprint For MWQI Program**



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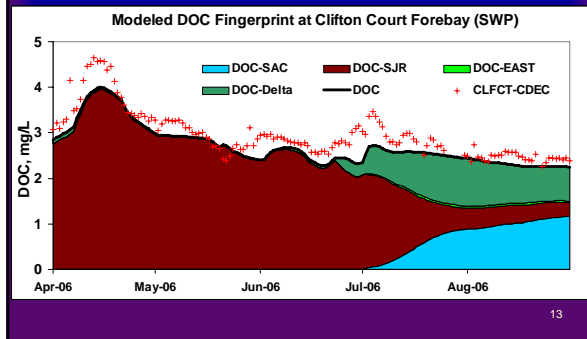
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### Recent Historical C.C.F. DOC Fingerprint For MWQI Program




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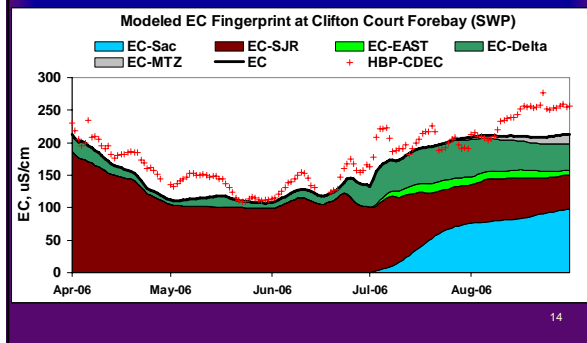
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### Recent Historical C.C.F. Salinity Fingerprint For MWQI Program




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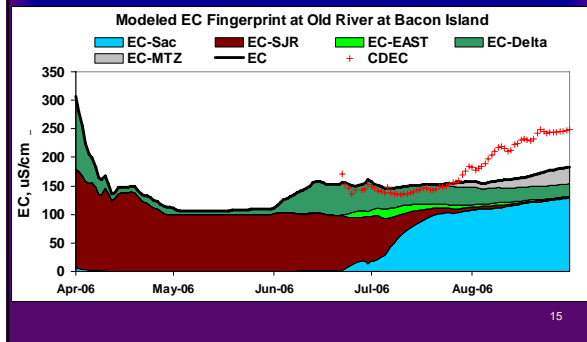
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### Recent Historical Old River at Bacon Island Salinity Fingerprint




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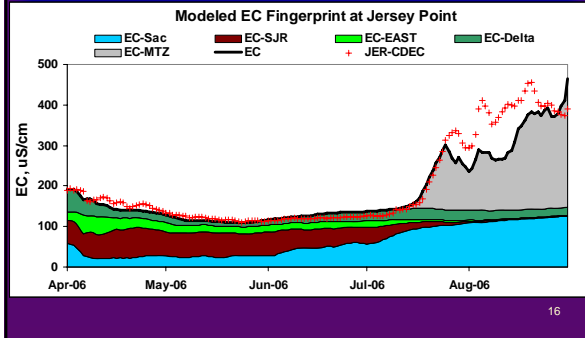
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## Recent Historical J.P. Salinity Fingerprint For MWQI Program




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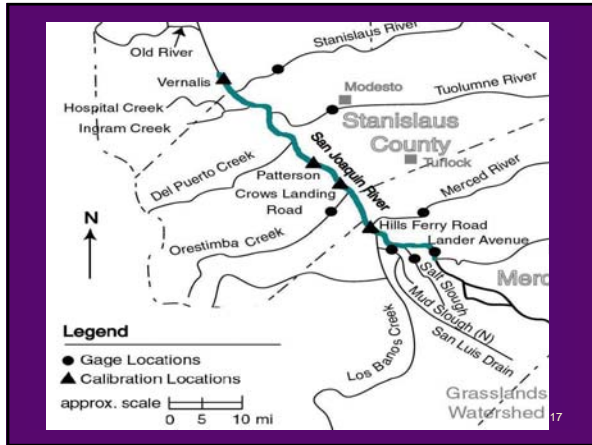
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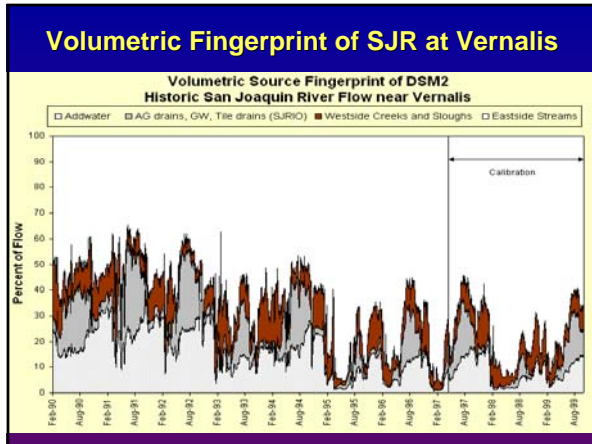
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## Volumetric Fingerprint of SJR at Vernalis




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### Future work

- **Validation methodology for fingerprints** has been explored by analyzing EC concentrations versus grab sample mineral data such as chloride, sulfate, bicarbonate, and bromide. (Paul Hutton, Ph.D., MWD) These anion concentrations have shown a strong relationship to Delta source waters.
- **Modeling more constituents** in DSM2 will provide data to further analyze source mixing and indicate actions needed to improve DSM2.

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### Fingerprint Conclusions

- **Extending the timeline :**
  - *The historical fingerprint is continually being updated (1991 to current).*
  - *We also will be modeling further back in time (perhaps to 1976).*
- **Useful information from fingerprints :**
  - *The current historical fingerprints can provide information such as relative source water to seasonal trends and water year type.*
  - *The data, however, is in need of further analysis.*

more...

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### ...Fingerprint Conclusions

- **Fingerprinting sources upstream :**
  - *Fingerprinting sources upstream of major boundary inflows may prove to be a valuable management tool.*
  - *still in development*
- **Further development :**
  - *fingerprint validation methodology*
  - *modeling of more constituents*
  - *The above combined with a future DSM2 recalibration process will lead to a more accurate depiction of source waters in the Sacramento-San Joaquin Delta.*

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*Delta Water Quality  
Fingerprinting Using DSM2*

Questions?



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