Potential Application of Real-Time Monitoring, Fingerprinting and Forecasting to the Flooded Islands Study

Robert J. DuVall
Municipal Water Quality Investigation Unit
California Department of Water Resources
7/21/2005

Outline

- Alternatives
- Questions/hypotheses
- Tools
- Example

West False River Gate Alternative

Alternative Features

1 operable gate

Common Features

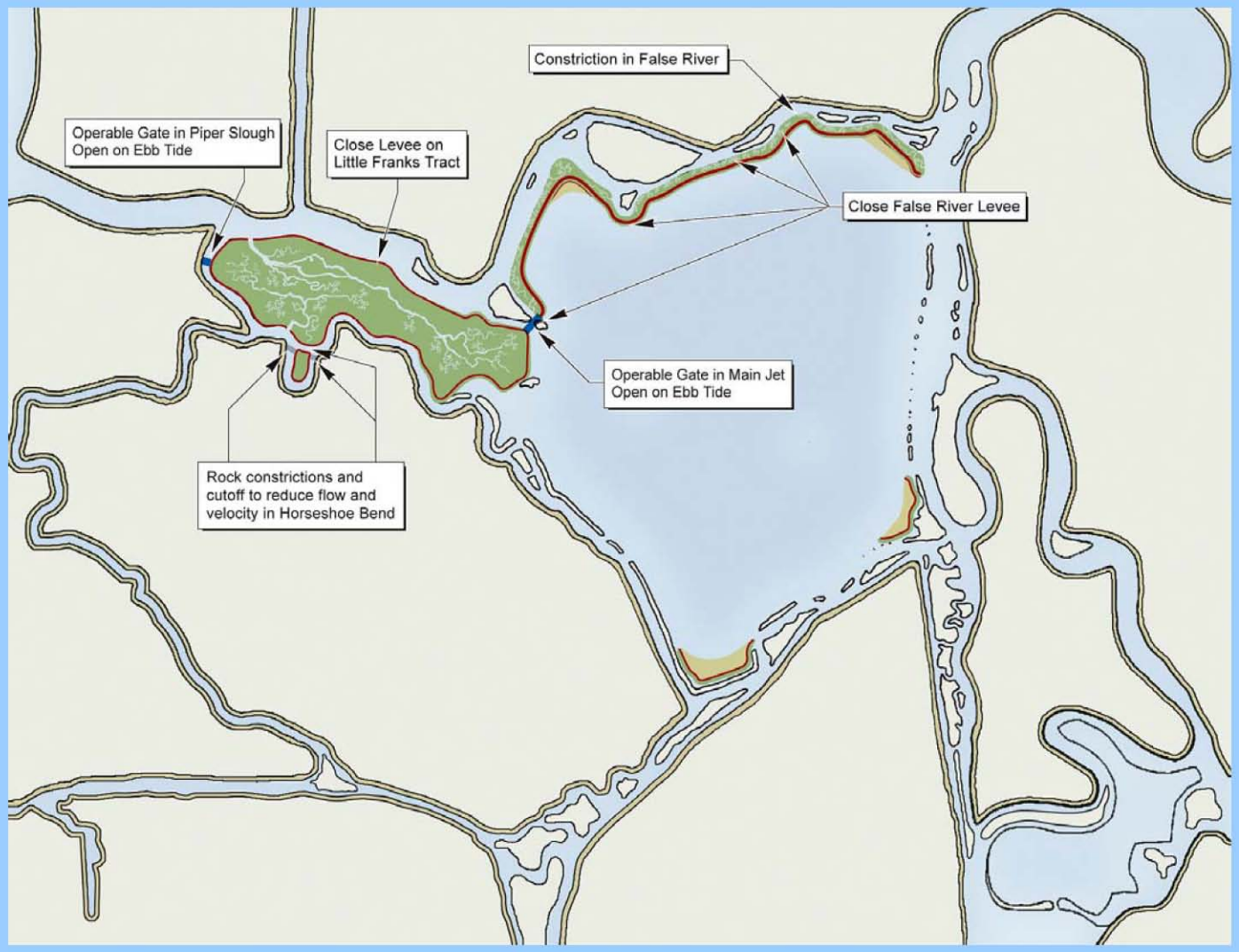
Little Franks Tract Marsh Restoration

4 Pocket Beaches

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Gates/Barriers
- Tidal Marsh
- Beaches

North Levee and Two Gates Alternative



Alternative Features

- 2 operable gates
- North Levee with Marsh
- False River Constriction

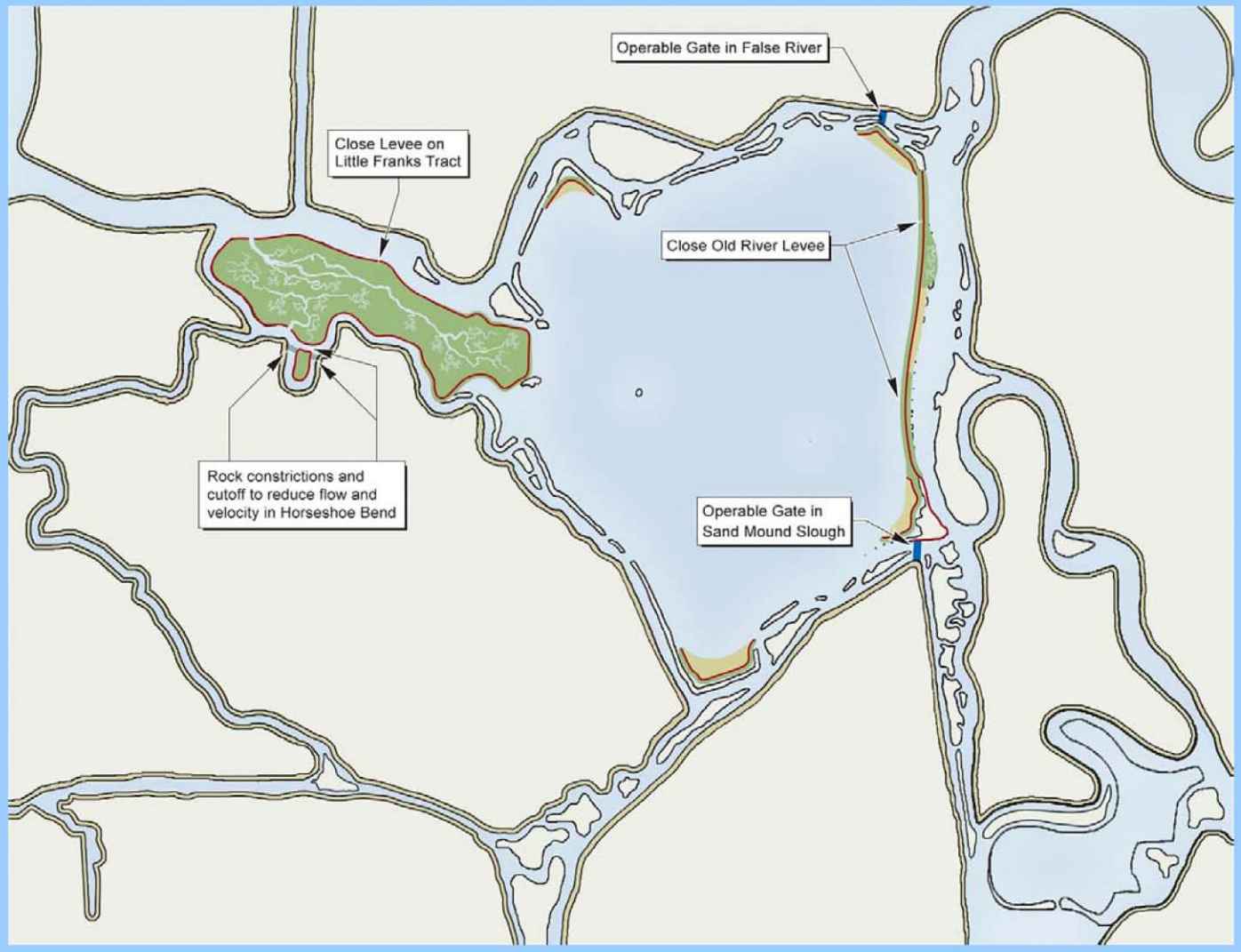
Common Features

- Little Franks Tract Marsh Restoration
- 4 Pocket Beaches
- 2 Constrictions on Piper Slough
- Horseshoe Bend Cutoff

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Gates/Barriers
- Tidal Marsh
- Beaches

East Levee and Two Gates Alternative



Alternative Features

- 2 operable gates
- East Levee with Marsh and Beach

Common Features

- Little Franks Tract Marsh Restoration
- 4 Pocket Beaches
- 2 Constrictions on Piper Slough
- Horseshoe Bend Cutoff

Legend

- Existing Levee
- Rock Dyke
- Rock Constrictions
- Gates/Barriers
- Tidal Marsh
- Beaches

Cox Alternative

Alternative Features

2 non operable gates/barriers

Common Features

Little Franks Tract Marsh Restoration

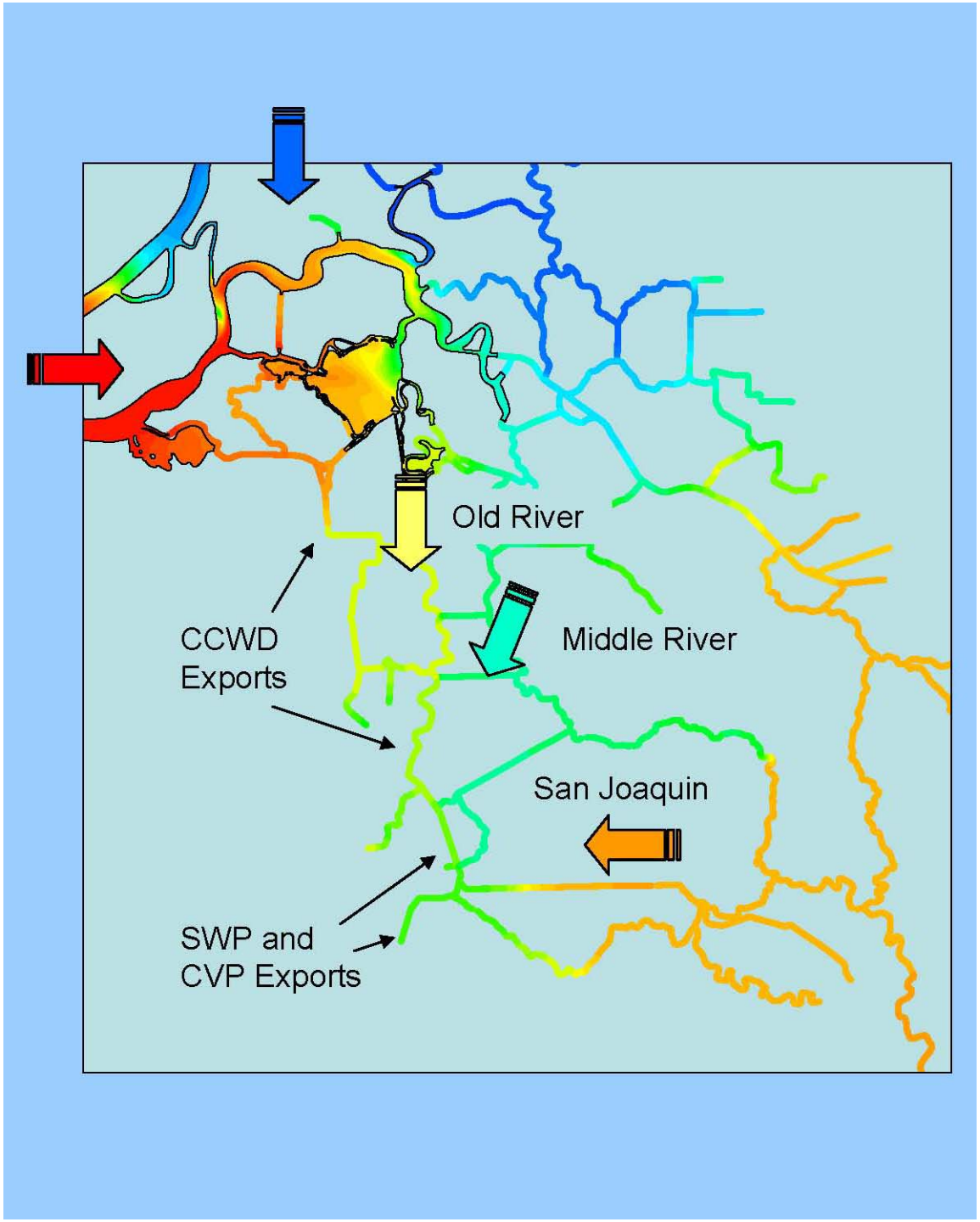
4 Pocket Beaches

Legend

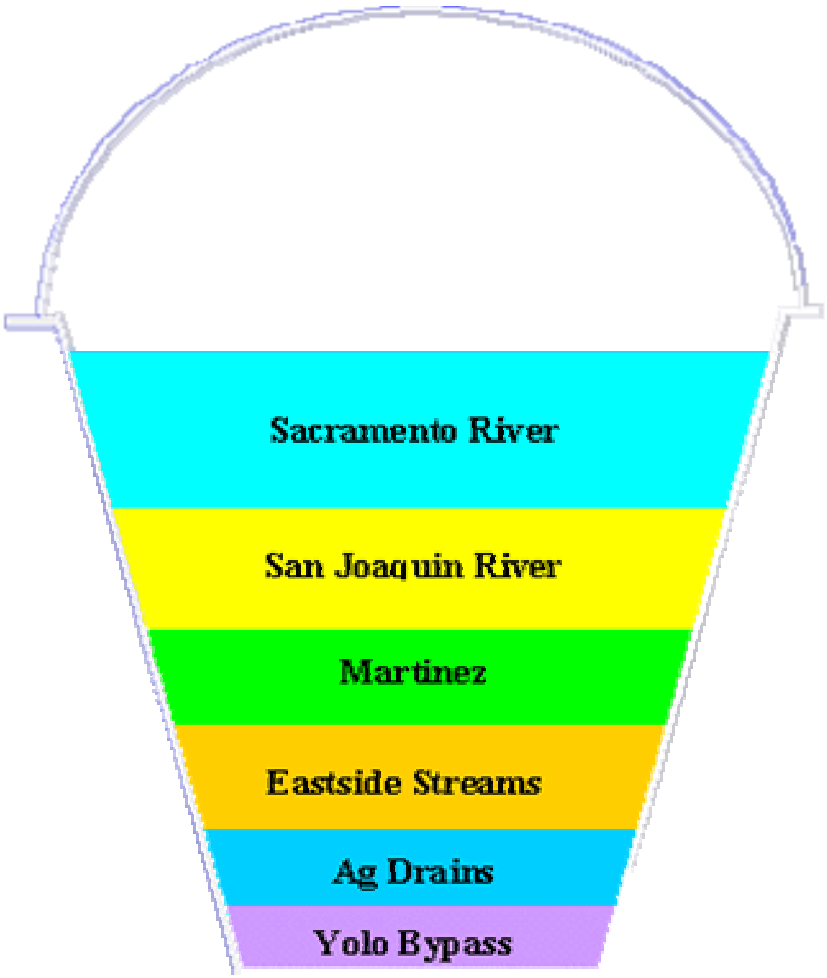
- Existing Levee
- Rock Dyke
- Rock Constrictions
- Gates/Barriers
- Tidal Marsh
- Beaches

Questions/hypotheses

Will these alternatives reduce Bay salt at the export locations and by how much?



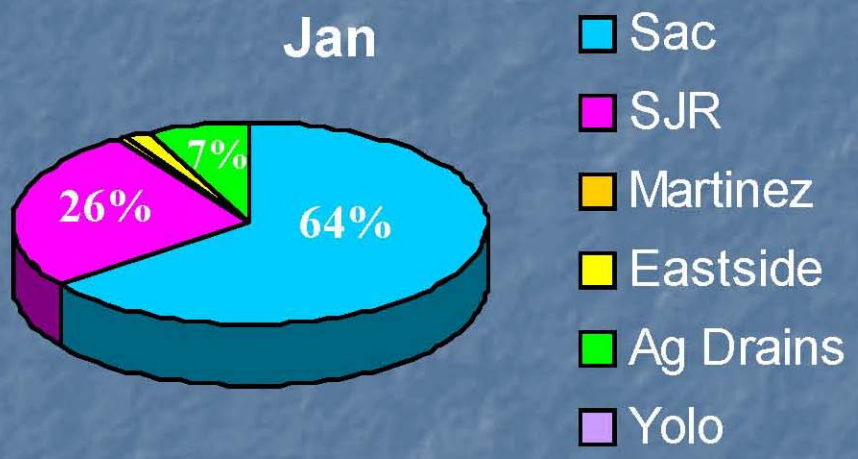
These questions/hypotheses can be tested with DSM2 source tracking/fingerprinting



Flow Contributions at Clifton Court

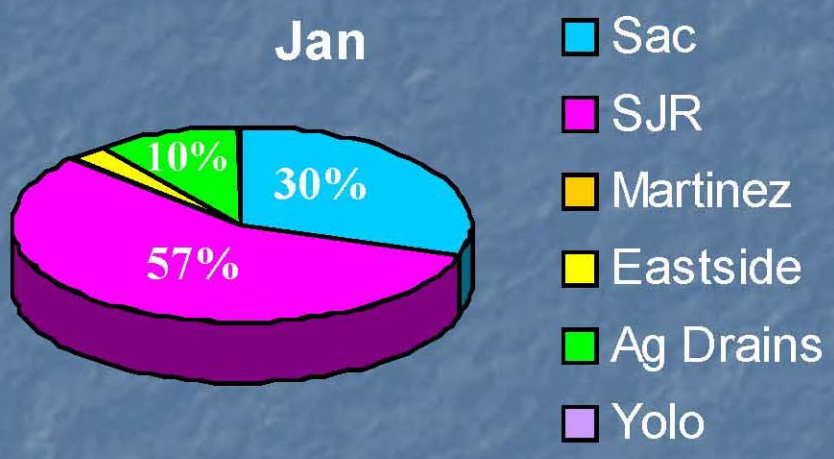
Alternative X

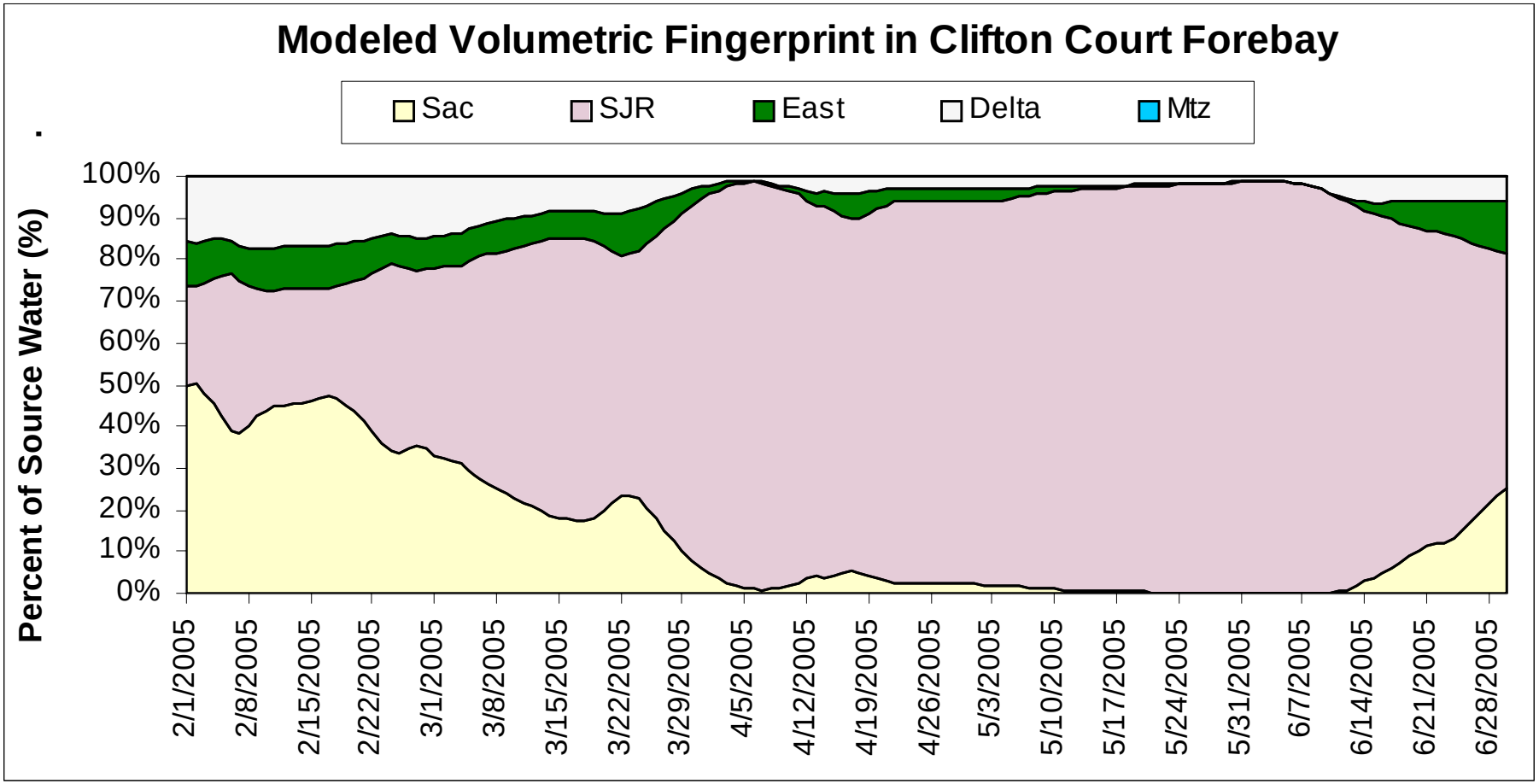
~~Critical Years~~

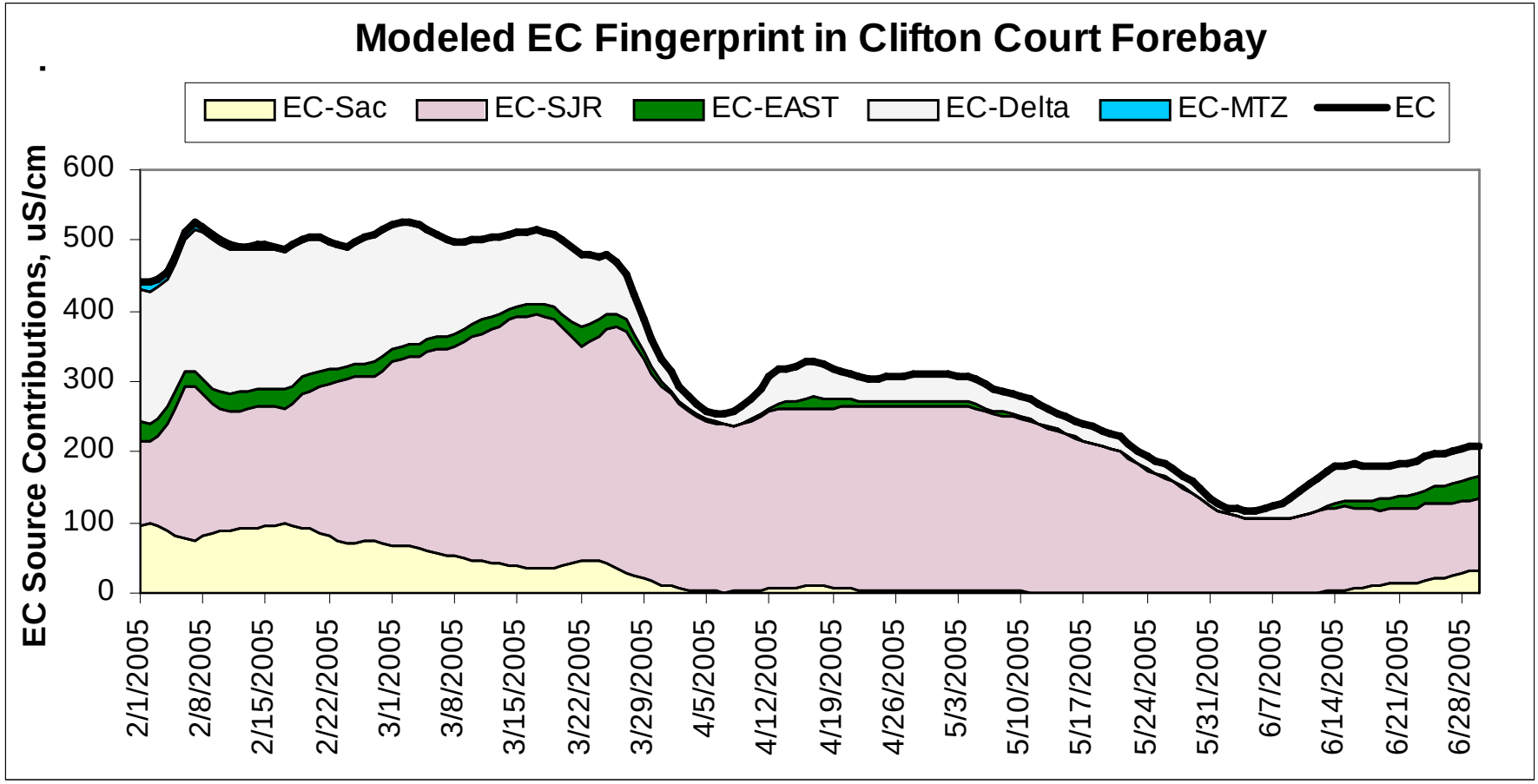


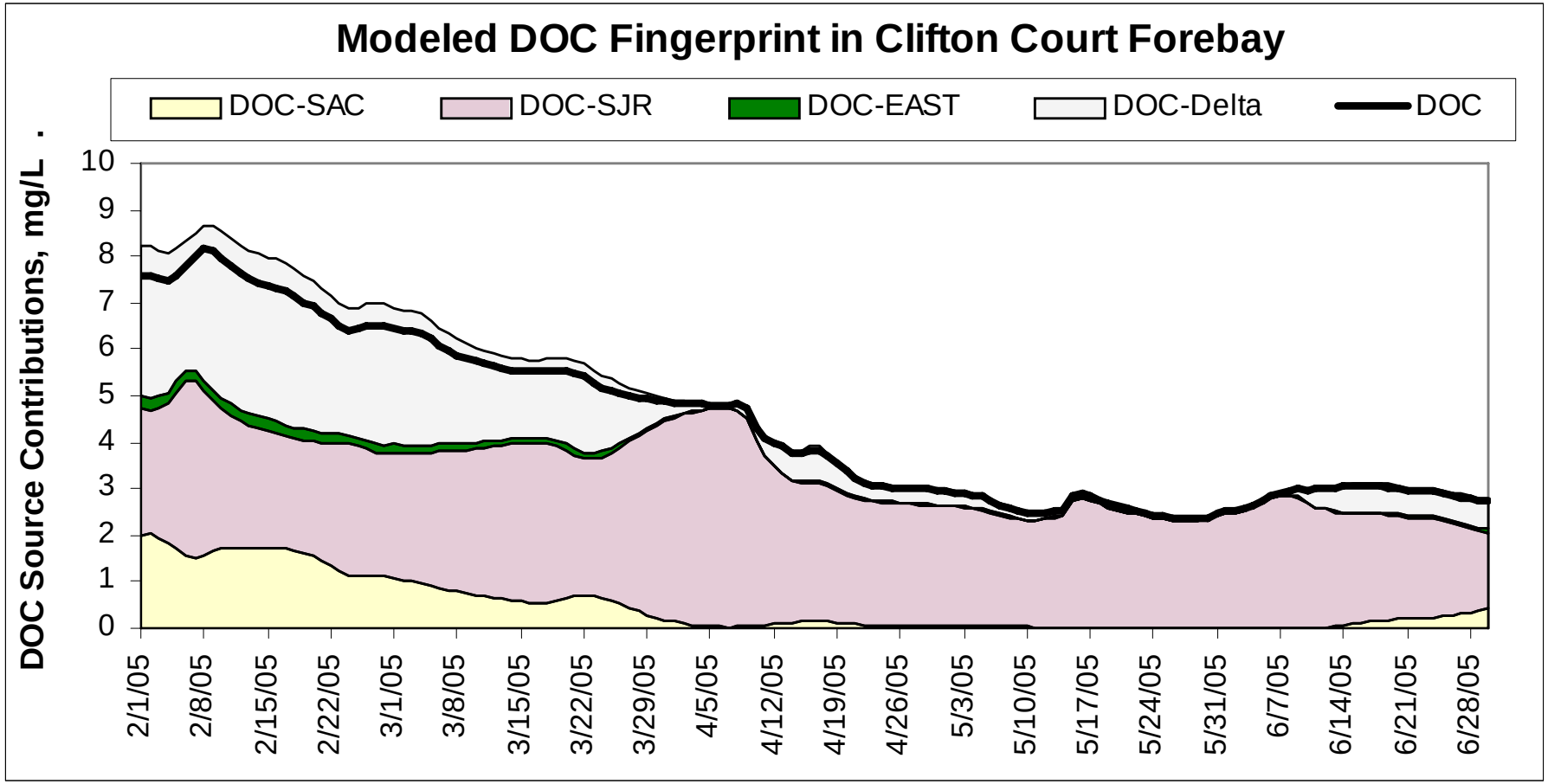
Base or Alternative Y

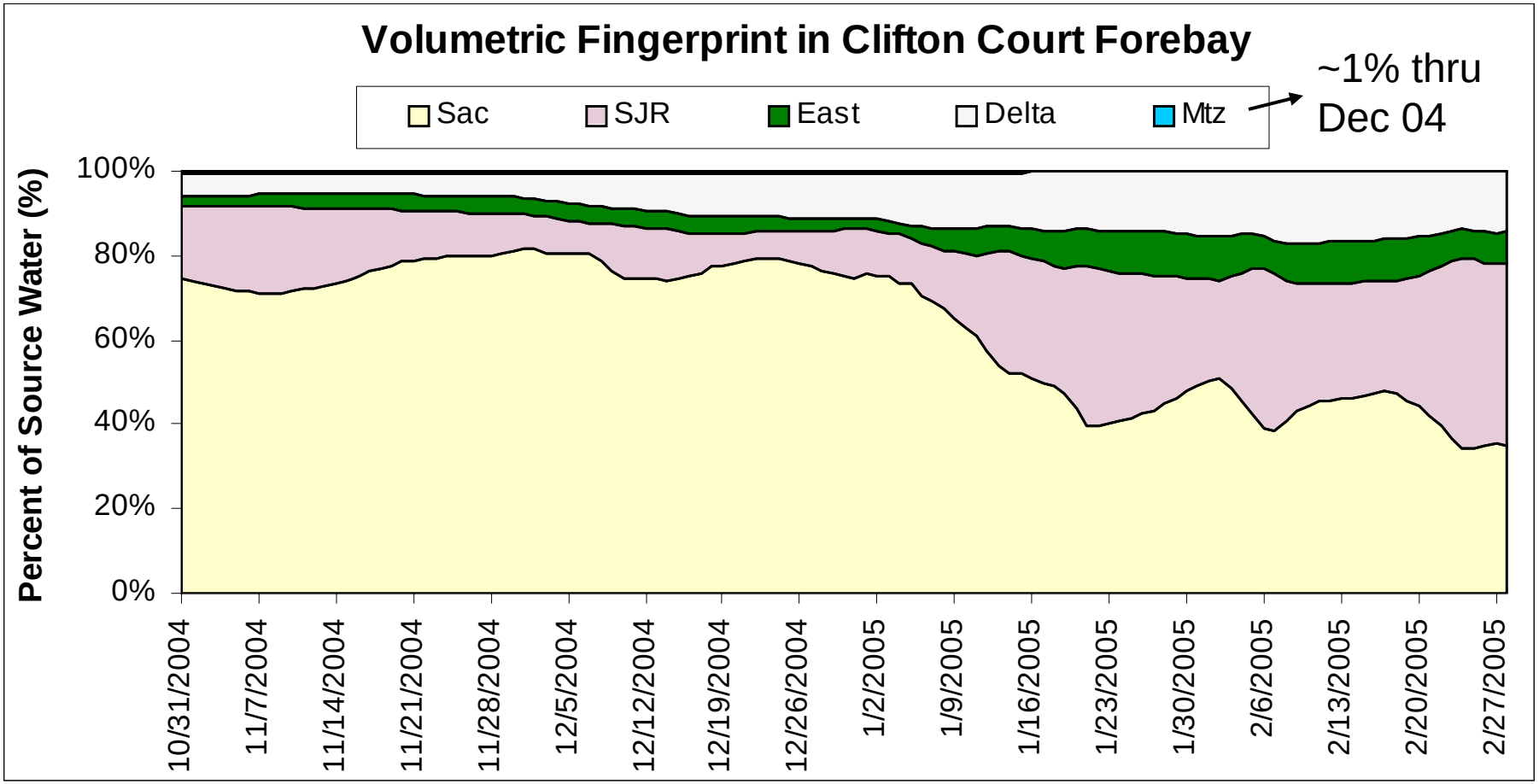
~~Wet Years~~

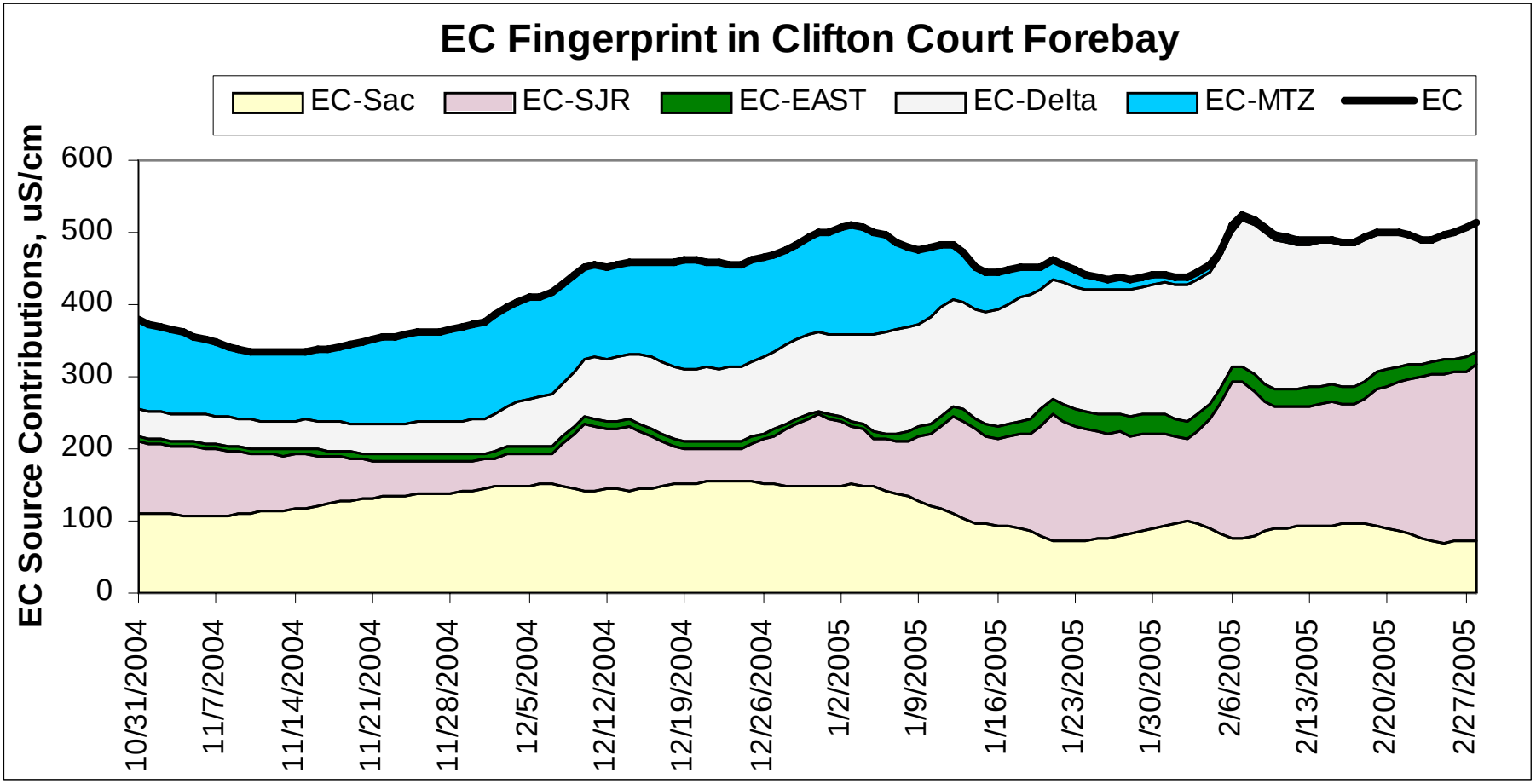


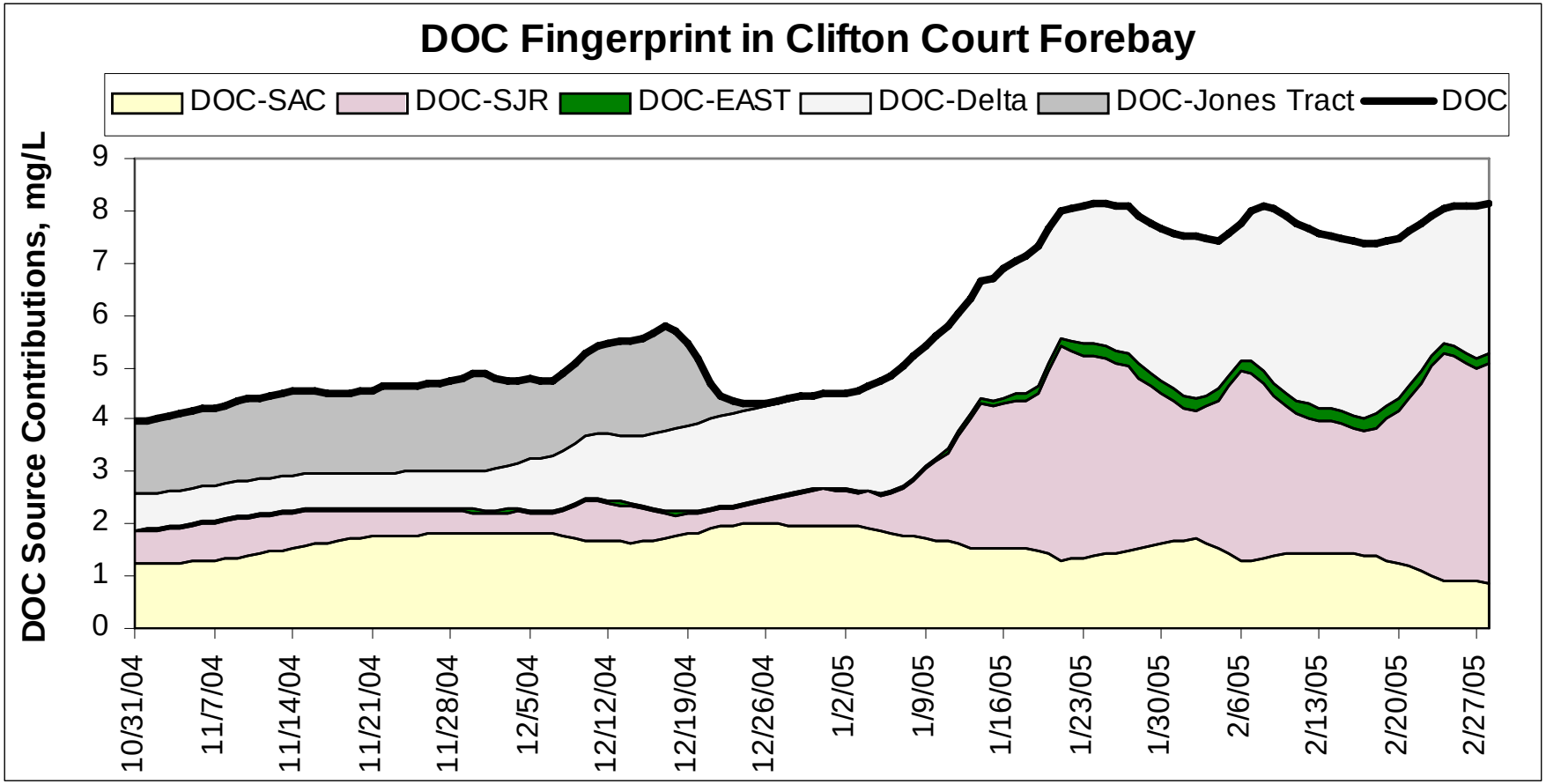

Modeled Volumetric Fingerprint in Clifton Court Forebay
Sac
SJR
East
Delta
Mtz
Percent of Source Water (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2/1/2005
2/8/2005
2/15/2005
2/22/2005
3/1/2005
3/8/2005
3/15/2005
3/22/2005
3/29/2005
4/5/2005
4/12/2005
4/19/2005
4/26/2005
5/3/2005
5/10/2005
5/17/2005
5/24/2005
5/31/2005
6/7/2005
6/14/2005
6/21/2005
6/28/2005


Modeled EC Fingerprint in Clifton Court Forebay
EC-Sac
EC-SJR
EC-EAST
EC-Delta
EC-MTZ
EC
EC Source Contributions, uS/cm
600
500
400
300
200
100
0
2/1/2005
2/8/2005
2/15/2005
2/22/2005
3/1/2005
3/8/2005
3/15/2005
3/22/2005
3/29/2005
4/5/2005
4/12/2005
4/19/2005
4/26/2005
5/3/2005
5/10/2005
5/17/2005
5/24/2005
5/31/2005
6/7/2005
6/14/2005
6/21/2005
6/28/2005


Modeled DOC Fingerprint in Clifton Court Forebay
DOC-SAC
DOC-SJR
DOC-EAST
DOC-Delta
DOC
DOC Source Contributions, mg/L
10
9
8
7
6
5
4
3
2
1
0
2/1/05
2/8/05
2/15/05
2/22/05
3/1/05
3/8/05
3/15/05
3/22/05
3/29/05
4/5/05
4/12/05
4/19/05
4/26/05
5/3/05
5/10/05
5/17/05
5/24/05
5/31/05
6/7/05
6/14/05
6/21/05
6/28/05

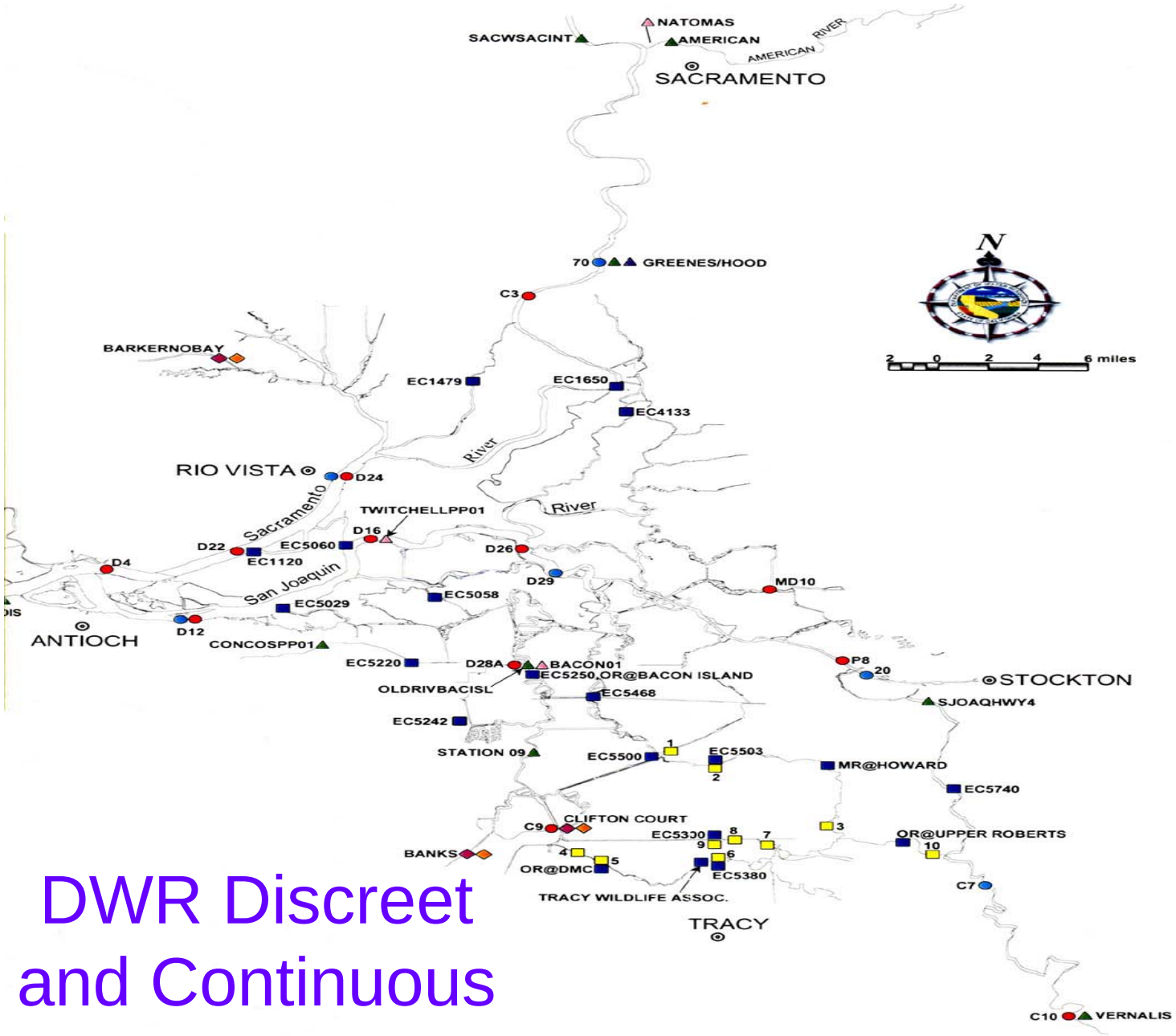

Volumetric Fingerprint in Clifton Court Forebay
Sac
SJR
East
Delta
Mtz
~1% thru Dec 04
Percent of Source Water (%)
100%
80%
60%
40%
20%
0%
10/31/2004
11/7/2004
11/14/2004
11/21/2004
11/28/2004
12/5/2004
12/12/2004
12/19/2004
12/26/2004
1/2/2005
1/9/2005
1/16/2005
1/23/2005
1/30/2005
2/6/2005
2/13/2005
2/20/2005
2/27/2005


EC Fingerprint in Clifton Court Forebay
EC-Sac
EC-SJR
EC-EAST
EC-Delta
EC-MTZ
EC
EC Source Contributions, uS/cm
600
500
400
300
200
100
0
10/31/2004
11/7/2004
11/14/2004
11/21/2004
11/28/2004
12/5/2004
12/12/2004
12/19/2004
12/26/2004
1/2/2005
1/9/2005
1/16/2005
1/23/2005
1/30/2005
2/6/2005
2/13/2005
2/20/2005
2/27/2005

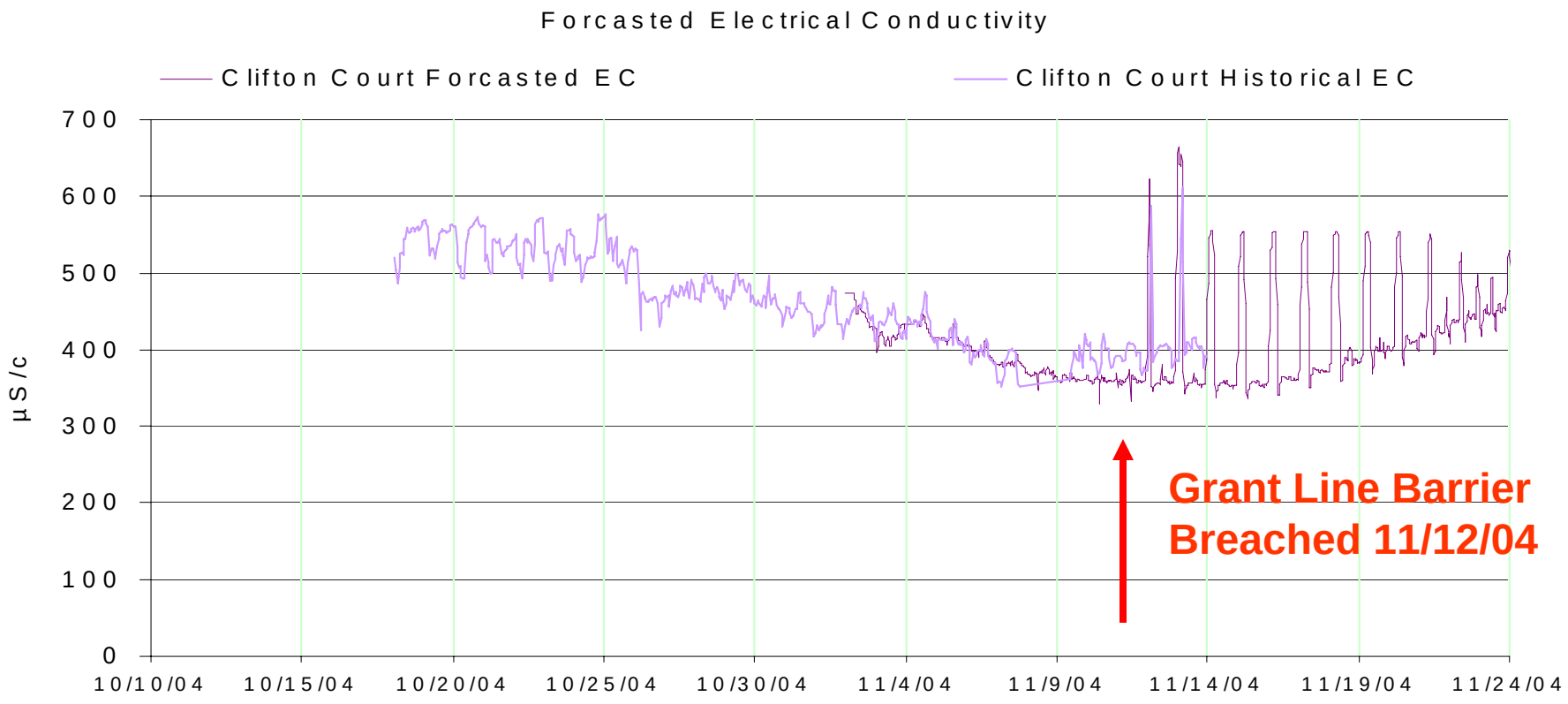

DOC Fingerprint in Clifton Court Forebay
DOC-SAC
DOC-SJR
DOC-EAST
DOC-Delta
DOC-Jones Tract
DOC
DOC Source Contributions, mg/L
0
1
2
3
4
5
6
7
8
9
10/31/04
11/7/04
11/14/04
11/21/04
11/28/04
12/5/04
12/12/04
12/19/04
12/26/04
1/2/05
1/9/05
1/16/05
1/23/05
1/30/05
2/6/05
2/13/05
2/20/05
2/27/05

Fingerprinting and Forecasting

- Real-time monitoring is necessary for fingerprinting and forecasting.
- Need to know boundary conditions and inputs to models like DSM2.
- Level of resolution must be consistent with questions/hypotheses.
- GIGO
- Models must be tested, validated.



DWR Discreet and Continuous Monitoring Sites


Forcasted Electrical Conductivity
Clifton Court Forcasted EC
Clifton Court Historical EC
µS/c
700
600
500
400
300
200
100
0
10/10/04
10/15/04
10/20/04
10/25/04
10/30/04
11/4/04
11/9/04
11/14/04
11/19/04
11/24/04
Grant Line Barrier
Breached 11/12/04