Calculations of Potential Offsets from Westside Regional Drainage Plan (Sections B1, B2)

MAA Draft Compliance and Evaluation Plan

August 4, 2009
9:00 am – 11:30 am
Management Agency Agreement

• Requirement of the Basin Plan (Salinity and Boron TMDL for the Lower San Joaquin River)
• Executed in December 2008 by Regional Water Board and Reclamation
• Cooperative implementation, initially a 2 year monitoring, assessment and reporting program
• Contains several reporting agreements
• Contains a goal of 25 percent reduction and/or offset of salts transported to basin by CVP
• Refers to Reclamation Action Plan
Draft Compliance Evaluation and Monitoring Plan
Contents (2008 monthly data)

• Action Plan Elements
  – Status
  – Quantification of Potential Load Offsets

• DMC Supply Water Load
  – Methodology for Calculations

• Future Reclamation Actions
  – Status
  – Quantification of Potential Load Offsets

• Vernalis Water Quality

• Summary of Potential Offsets to DMC Loads

• Proposal for Continuing Public Participation
Draft Compliance Evaluation and Monitoring Plan

- First draft of Plan submitted on January 1, 2009
- Second draft submitted to Executive Director of Regional Board for approval on July 1, 2009
- Next draft will be submitted on January 1, 2010
- Final Compliance Evaluation and Monitoring Plan due to Regional Board by July 1, 2010
Potential Offsets from Westside Regional Drainage Plan

-Agenda-

- Background
- Data Sources
- Approach
- Potential Offset Calculation Methodology
- Grassland Bypass Project Performance
- Monthly Loads, 2000 - now
Potential Offsets from Westside Regional Drainage Plan -Background-

• Load allocations established for salts in Grassland Subarea (not currently in effect)
• Load allocation set to allow Consumptive Use increase in salts
• CVP water supply allowance granted to recipients of DMC water, 50% of water supply load (static numbers)
• In TMDL calculation, Grassland Subarea loads based on Mud and Salt Slough historic loads (pre-Grassland Bypass Project)
Potential Offsets from Westside Regional Drainage Plan

- Data Sources -

- Mud Slough near Gustine
  - USGS Station 11262900 (EC, discharge)

- Salt Slough at Hwy 165 near Stevinson
  - USGS Station 11261100 (EC, discharge)

- Grassland Bypass Project (for presentation only)
  - SFEI Data Reports (San Luis Drain Site B)
Potential Offsets from Westside Regional Drainage Plan
-Discharge Data-

Discharge, AF

Jun-97  Nov-98  Mar-00  Jul-01  Dec-02  Apr-04  Sep-05  Jan-07  Jun-08

USGS Mud Sl  USGS Salt Sl  SLD Site B
Potential Offsets from Westside Regional Drainage Plan
-Water Quality Data-

- USGS Mud SI
- USGS Salt SI
- SLD Site B

EC, µmhos/cm

Jun-97 Nov-98 Mar-00 Jul-01 Dec-02 Apr-04 Sep-05 Jan-07 Jun-08
Potential Offsets from Westside Regional Drainage Plan

-Approach-

- Grassland Bypass Project measures loads entering San Luis Drain
- Offsets should capture *reduced tons*
- Offsets should *not impair* a subarea's ability to comply with allocations
- Grassland subarea loads were examined to determine how they compare to allocations
Potential Offsets from Westside Regional Drainage Plan

- Approach -

<table>
<thead>
<tr>
<th>Subarea Allocation</th>
<th>Subarea Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMC Supply Water Credit: Table 4-19</td>
<td></td>
</tr>
<tr>
<td>Consumptive Use Allowance: Actual flow * trigger value</td>
<td></td>
</tr>
<tr>
<td>Subarea Base Load Allocation: Table 4-15</td>
<td></td>
</tr>
<tr>
<td>Actual Load: Actual flow * actual EC – Groundwater Accretions (Table 4-4)</td>
<td></td>
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<tr>
<td>Portion that offsets DMC Supply Water Load</td>
<td></td>
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<tr>
<td>Assimilative Capacity from Subarea: Allocation – Actual Load</td>
<td></td>
</tr>
</tbody>
</table>

RECLAMATION
Potential Offsets from Westside Regional Drainage Plan
-Calculation Methodology-

Loads from Grassland Bypass Project:

\[ L_{GBP} = Q \times C \times 0.74 \times 0.0013599 \]

Where:

- \( L_{GBP} \) = Daily load of salts from Grassland Bypass Project, tons
- \( Q \) = Daily flow from Grassland Bypass Project through San Luis Drain, acre feet
- \( C \) = Daily electrical conductivity in San Luis Drain at Station B, mS/cm
- 0.74 = Site-specific EC to TDS ratio (TMDL Vol. 1 pp 15)
- 0.0013599 = factor for converting units into tons
Potential Offsets from Westside Regional Drainage Plan
-Calculation Methodology-

Calculation of Grassland Subarea Actual Load:

\[ L = (0.68 \times Q_{Salt} \times C_{Salt} + 0.69 \times Q_{Mud} \times C_{Mud}) \times 0.0013599 \]

Where:

- \( L \) = Salt load from Grassland Subarea, tons
- \( Q \) = Monthly discharge from Salt Slough or Mud Slough, AF
- \( C \) = Monthly average salinity of Salt Slough or Mud Slough, EC, umhos/cm
- 0.68, 0.69 = Site-specific EC to TDS ratio (TMDL Vol. 1 pp 15)
- 0.0013599 = factor for converting units into tons
Potential Offsets from Westside Regional Drainage Plan
-Calculation Methodology-

Calculation of Grassland Subarea Base Load Allocation:
Base Load (Table 4-15 in TMDL, by mo, WY)
+ CVP Import Supply Water Credit (Table 4-19 in TMDL, by mo, WY)
+ Consumptive Use Allowance = 0.0013599 * 193 mg/L TDS * Flow, AF
- Subarea Groundwater Accretions, tons (Table 4-4 in TMDL, scaled to subarea’s miles of sloughs)
Potential Offsets from Westside Regional Drainage Plan -Calculation Methodology-

When a Real Time Management Program is implemented, the real time load allocation for Grassland subarea is:

0.37 * Real time Assimilative Capacity available at Vernalis
Grassland Bypass Performance

![Bar chart showing tons of salt over water years from 1986 to 2009. The chart indicates a decrease in tons of salt over time, with the lowest values expected in 2009.](chart)

Water Year

- 1986
- 1987
- 1988
- 1989
- 1990
- 1991
- 1992
- 1993
- 1994
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009 (est)

Tons of Salt

- 300,000
- 250,000
- 200,000
- 150,000
- 100,000
- 50,000
- 0

Grassland Bypass Project
Grassland Subarea Allocations
2005 (W)
Grassland Subarea Allocations 2007 (C)

- Real Time LA, tons
- Base LA, tons
- CVP Supply Water Credit, tons
- CUA, tons

<table>
<thead>
<tr>
<th>Month</th>
<th>Oct-06</th>
<th>Nov-06</th>
<th>Dec-06</th>
<th>Jan-07</th>
<th>Feb-07</th>
<th>Mar-07</th>
<th>Apr-07</th>
<th>VA MP-07</th>
<th>May-07</th>
<th>Jun-07</th>
<th>Jul-07</th>
<th>Aug-07</th>
<th>Sep-07</th>
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<tbody>
<tr>
<td>Oct-06</td>
<td>90,000</td>
<td>70,000</td>
<td>80,000</td>
<td>90,000</td>
<td>40,000</td>
<td>30,000</td>
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<td>40,000</td>
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</table>

Note: The chart shows the allocation of various types of materials over the months from Oct-06 to Sep-07.
Grassland Subarea Allocations 2008 (C)

- Real Time LA, tons
- Base LA, tons
- CVP Supply Water Credit, tons
- CUA, tons

Chart showing the allocation of salt in tons from October 2007 to September 2008.
Grassland Subarea Loading Profile 2001 (D)

- Remaining Portion
- Groundwater Portion?
- GBP Contribution

Salt, tons

- October 2000
- November 2000
- December 2000
- January 2001
- February 2001
- March 2001
- April 2001
- VAM P-01
- May 2001
- June 2001
- July 2001
- August 2001
- September 2001
Grassland Subarea Loading Profile 2002 (D)

- Remaining Portion
- Groundwater Portion?
- GBP Contribution

<table>
<thead>
<tr>
<th>Month</th>
<th>Remaining Portion</th>
<th>Groundwater Portion</th>
<th>GBP Contribution</th>
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</thead>
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<tr>
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<td>20,000</td>
<td>5,000</td>
<td>5,000</td>
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<td>Dec-01</td>
<td>20,000</td>
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<td>Jan-02</td>
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<td>Feb-02</td>
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<td>May-02</td>
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<td>Jun-02</td>
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<td>Jul-02</td>
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<td>Aug-02</td>
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<td>Sep-02</td>
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<tr>
<td>Month</td>
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<td>Groundwater Portion?</td>
<td>GBP Contribution</td>
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<td>Sep-06</td>
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</table>
Grassland Subarea Loading Profile 2008 (C)

Salt, tons

Oct-07 Nov-07 Dec-07 Jan-08 Feb-08 Mar-08 Apr-08 VAM P-08 May-08 Jun-08 Jul-08 Aug-08 Sep-08

- Remaining Portion
- Groundwater Portion?
- GBP Contribution
Grassland Subarea Potential Offsets 2000 (AN)

- Exceedances: Remaining Tons Below Allocation
- CVP Supply Water Credit portion

76%

Percentages are amount that DMC loads are offset by potential offsets.

Oct-99  Nov-99  Dec-99  Jan-00  Feb-00  Mar-00  Apr-00  VAM P-00  May-00  Jun-00  Jul-00  Aug-00  Sep-00

11% 51% 45% 61% 53%
Grassland Subarea Potential Offsets 2001 (D)

Exceedances
Remaining Tons Below Allocation
CVP Supply Water Credit portion

<table>
<thead>
<tr>
<th></th>
<th>Salt, tons</th>
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<tbody>
<tr>
<td>Oct-00</td>
<td>65%</td>
</tr>
<tr>
<td>Nov-00</td>
<td>46%</td>
</tr>
<tr>
<td>Dec-00</td>
<td>19%</td>
</tr>
<tr>
<td>Jan-01</td>
<td>44%</td>
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<tr>
<td>Feb-01</td>
<td>19%</td>
</tr>
<tr>
<td>Mar-01</td>
<td>28%</td>
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<tr>
<td>Apr-01</td>
<td>37%</td>
</tr>
<tr>
<td>VAM</td>
<td>28%</td>
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<tr>
<td>May-01</td>
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<td>Jun-01</td>
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<td>Aug-01</td>
<td>28%</td>
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<tr>
<td>Sep-01</td>
<td>22%</td>
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RECLAMATION
Grassland Subarea Potential Offsets 2002 (D)

- Exceedances
- Remaining Tons Below Allocation
- CVP Supply Water Credit portion

Oct-01 Nov-01 Dec-01 Jan-02 Feb-02 Mar-02 Apr-02 VAM P-02 May-02 Jun-02 Jul-02 Aug-02 Sep-02

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<th>Apr-02</th>
<th>VAM P-02</th>
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<tr>
<td>Exceedances</td>
<td>32%</td>
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<tr>
<td>Remaining Tons Below Allocation</td>
<td></td>
<td>16%</td>
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<tr>
<td>CVP Supply Water Credit portion</td>
<td></td>
<td></td>
<td>42%</td>
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<td></td>
<td></td>
<td>68%</td>
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<td>38%</td>
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Grassland Subarea Potential Offsets 2003 (BN)
Grassland Subarea Potential Offsets
2005 (W)

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<th>Jul-05</th>
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<tbody>
<tr>
<td>Salt, tons</td>
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<td></td>
<td></td>
<td>66%</td>
<td>91%</td>
<td>55%</td>
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<td>Dec-04</td>
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<td>Jan-05</td>
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<td>Feb-05</td>
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<td>66%</td>
<td>91%</td>
<td>55%</td>
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<td>Mar-05</td>
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<td>27%</td>
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<td>-10,000</td>
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<td>-50,000</td>
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<td>Apr-05</td>
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<td>30%</td>
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<td></td>
<td>-30,000</td>
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<td>May-05</td>
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<td></td>
<td></td>
<td>70%</td>
<td></td>
<td></td>
<td>-70,000</td>
<td></td>
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<tr>
<td>Jun-05</td>
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<td></td>
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<td>7%</td>
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<tr>
<td>Jul-05</td>
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<td>2%</td>
<td></td>
<td></td>
<td>-30,000</td>
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</tr>
</tbody>
</table>

- Exceedances
- Remaining Tons Below Allocation
- CVP Supply Water Credit portion
Grassland Subarea Potential Offsets
2006 (W)

- Exceedances
- Remaining Tons Below Allocation
- CVP Supply Water Credit portion

Oct-05 Nov-05 Dec-05 Jan-06 Feb-06 Mar-06 Apr-06 May-06 Jun-06 Jul-06 Aug-06 Sep-06

Salt, tons

-50,000 -30,000 -10,000 10,000 30,000 50,000 70,000

-10,000

50% 19% 100% 100% 38% 37% 30% 13% 23%
Grassland Subarea Potential Offsets 2008 (C)

- Exceedances
- Remaining Tons Below Allocation
- CVP Supply Water Credit portion

<table>
<thead>
<tr>
<th>Month</th>
<th>Oct-07</th>
<th>Nov-07</th>
<th>Dec-07</th>
<th>Jan-08</th>
<th>Feb-08</th>
<th>Mar-08</th>
<th>Apr-08</th>
<th>VAM P-08</th>
<th>May-08</th>
<th>Jun-08</th>
<th>Jul-08</th>
<th>Aug-08</th>
<th>Sep-08</th>
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</thead>
<tbody>
<tr>
<td>Salt, tons</td>
<td>70%</td>
<td>96%</td>
<td>74%</td>
<td>38%</td>
<td>35%</td>
<td>38%</td>
<td>49%</td>
<td>58%</td>
<td>53%</td>
<td>61%</td>
<td>47%</td>
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</table>

- 70% exceedances
- 96% remaining tons below allocation
- 74% CV supply water credit portion

Oct-07 to Sep-08
Grassland Subarea Potential Offsets 2009 (D)

- Exceedances: 30,000 tons
- Remaining Tons Below Allocation: 10,000 tons
- CVP Supply Water Credit portion: 78%

Oct-08: 65%
Nov-08: 78%
Dec-08: 100%
Jan-09: 15%
Feb-09: 3%
Meeting Schedule

July 28: CVP Delivered Load
Data Sources, Calculations

August 4: Westside Regional Drainage Plan
Subarea Load Calculations, Groundwater Load
CVP Water Supply Credit, Assimilative Capacity

August 17: Unquantified Subareas
Data Availability, Subarea load quantification

August 24: Eastside Tributary Dilution Flows
Subarea Load Calculations, Assimilative Capacity

TBD: Real-Time Management Program
Status of Efforts, Assimilative Capacity, Potential Uses

TBD: Offsets, Credits, Trading
Application of Potential Offsets, Credits to CVP-Delivered Loads
Contacts

Draft Plan is posted at:
http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/
central_valley_projects/vernalis_salt_boron/

Reclamation Contact:
Lisa Holm (lholm@usbr.gov)

Regional Water Board Contact:
Gail Cismowski (gcismowskii@waterboards.ca.gov)