

# Inflow-Outflow Method

## In the California Water Plan Update

Statewide Water Analysis Network Workshop

Todd Hillaire

September 24, 2007

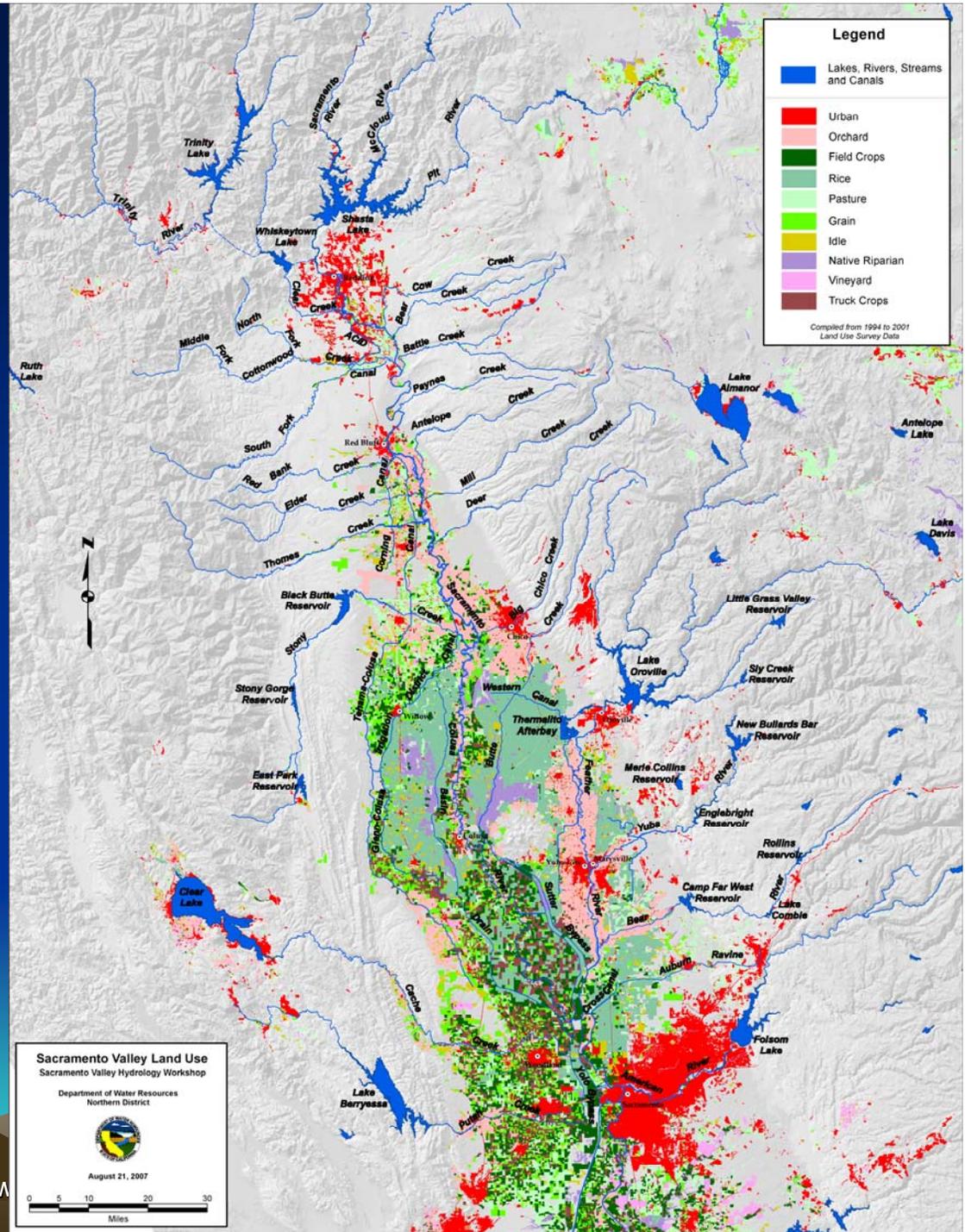


# Overview

- Supplies and Uses
- Water Portfolio Components
- Water Balance Process
- Inflow-Outflow Methodology
- Water Plan Coordination
- Inflow-Outflow Method Refinement
- Water Balance Scale
- Parking Lot Issues
- Water Plan Activities
- Data Needs
- Potential Partnerships

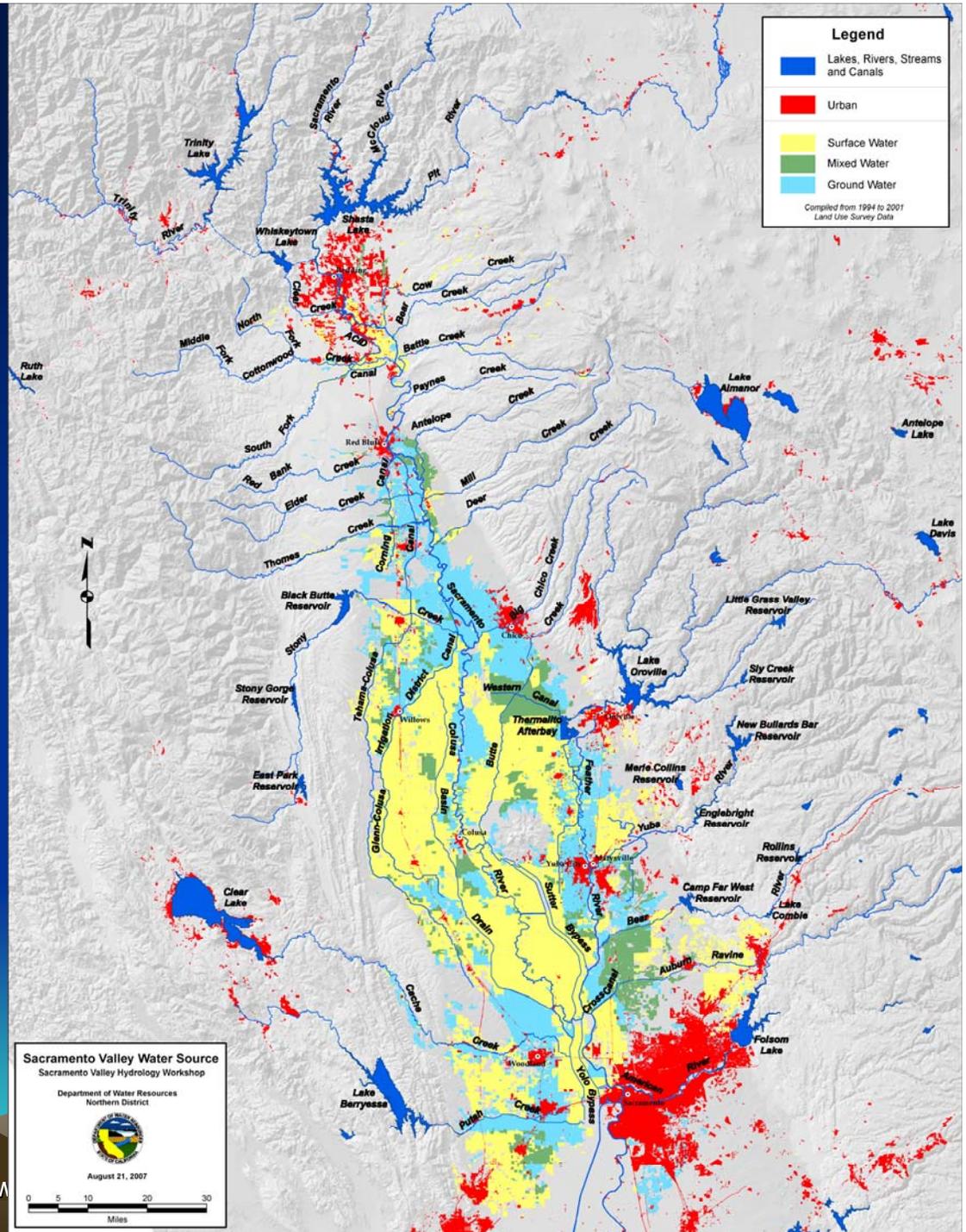
# Land Use

- Determine Water Portfolio uses for each sector
- Aggregate by DAU-County



# Water Source

- Source of supply by field
- Aggregate by DAU-County
- Determine water diversions or groundwater pumping



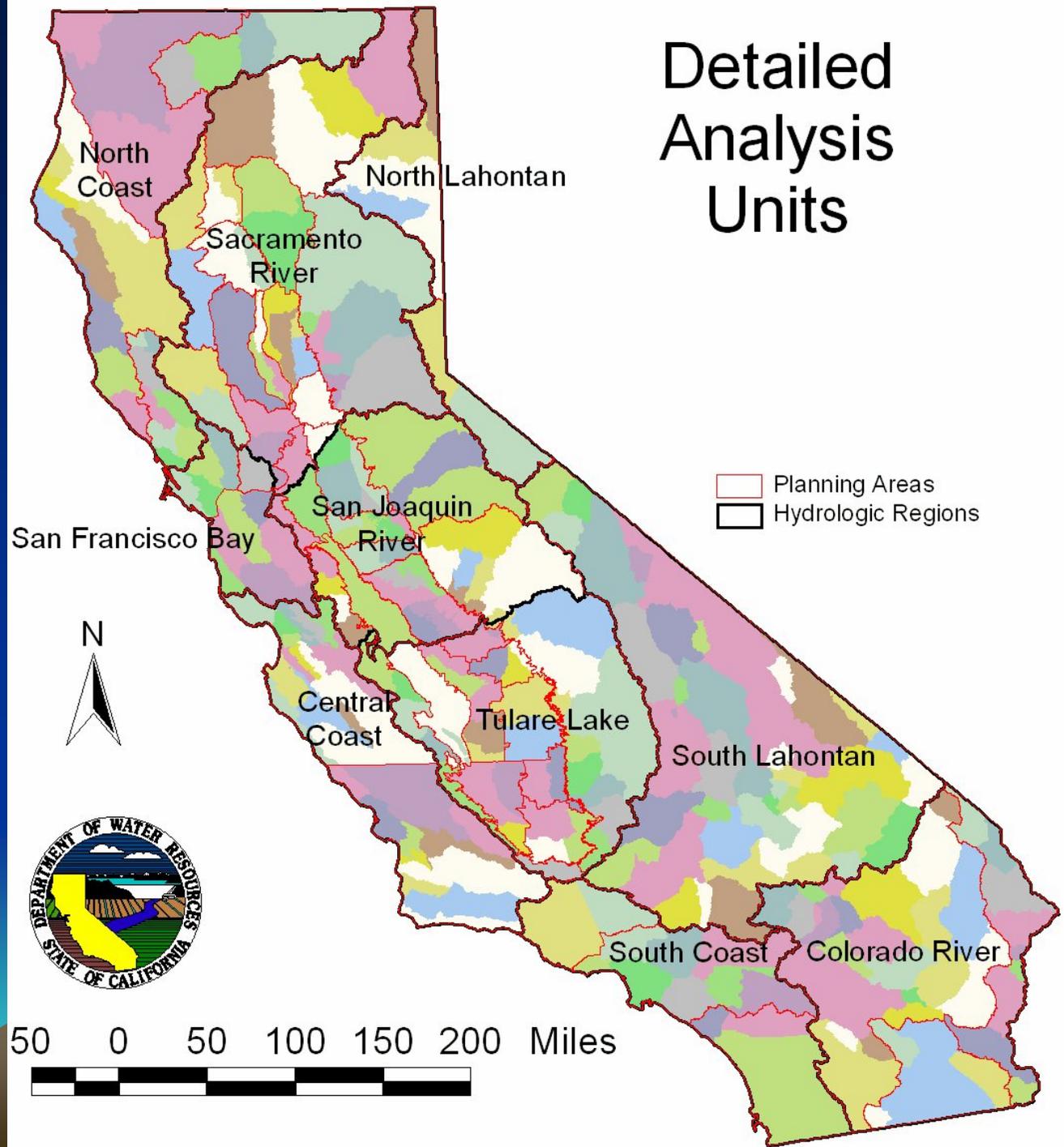
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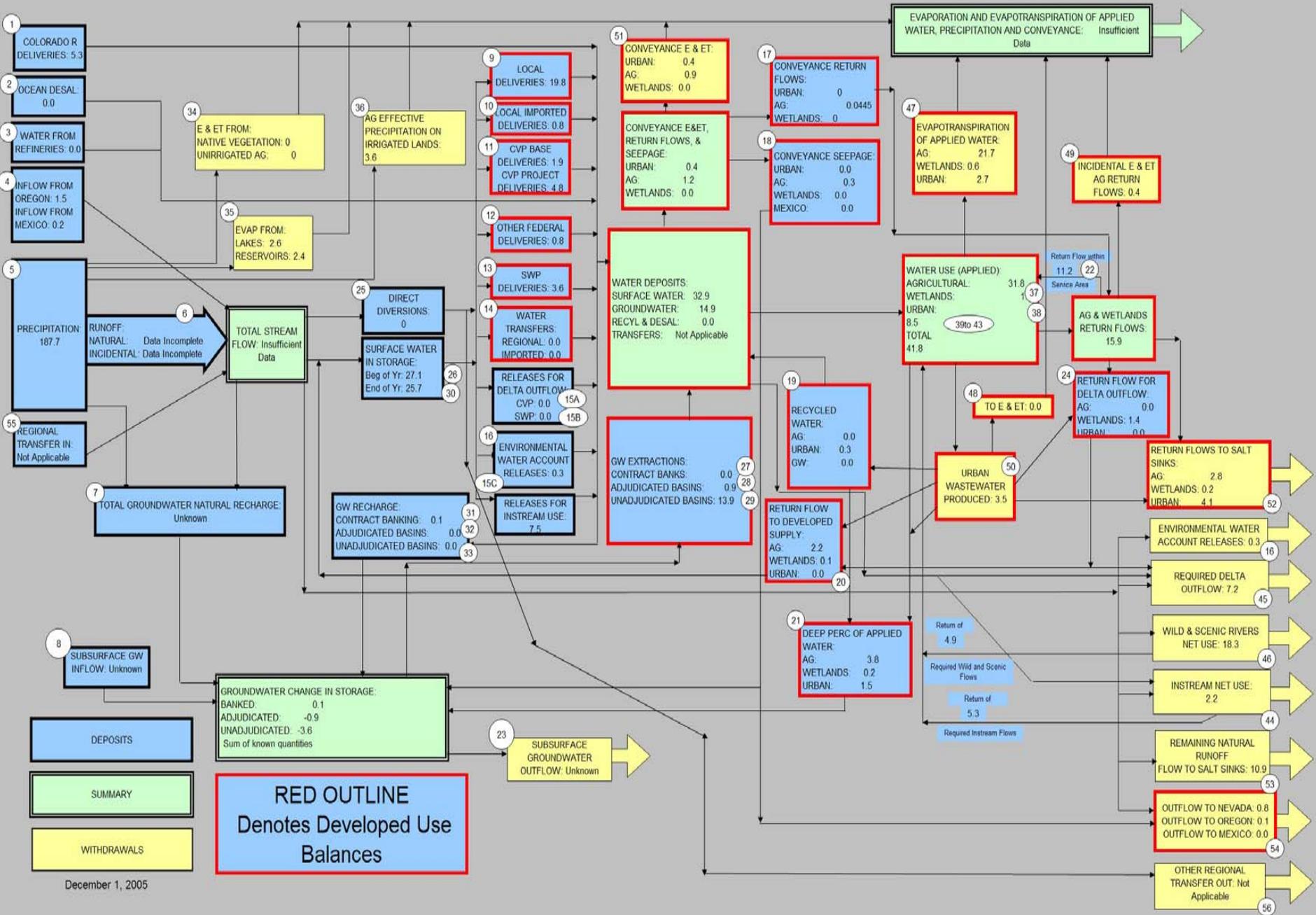
# Update 2009

- DAU-County water balances
  - County Totals
  - Watershed Totals
  - Regional Totals

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# STATEWIDE - 2000 FLOW DIAGRAM IN MILLION ACRE-FEET (MAF)



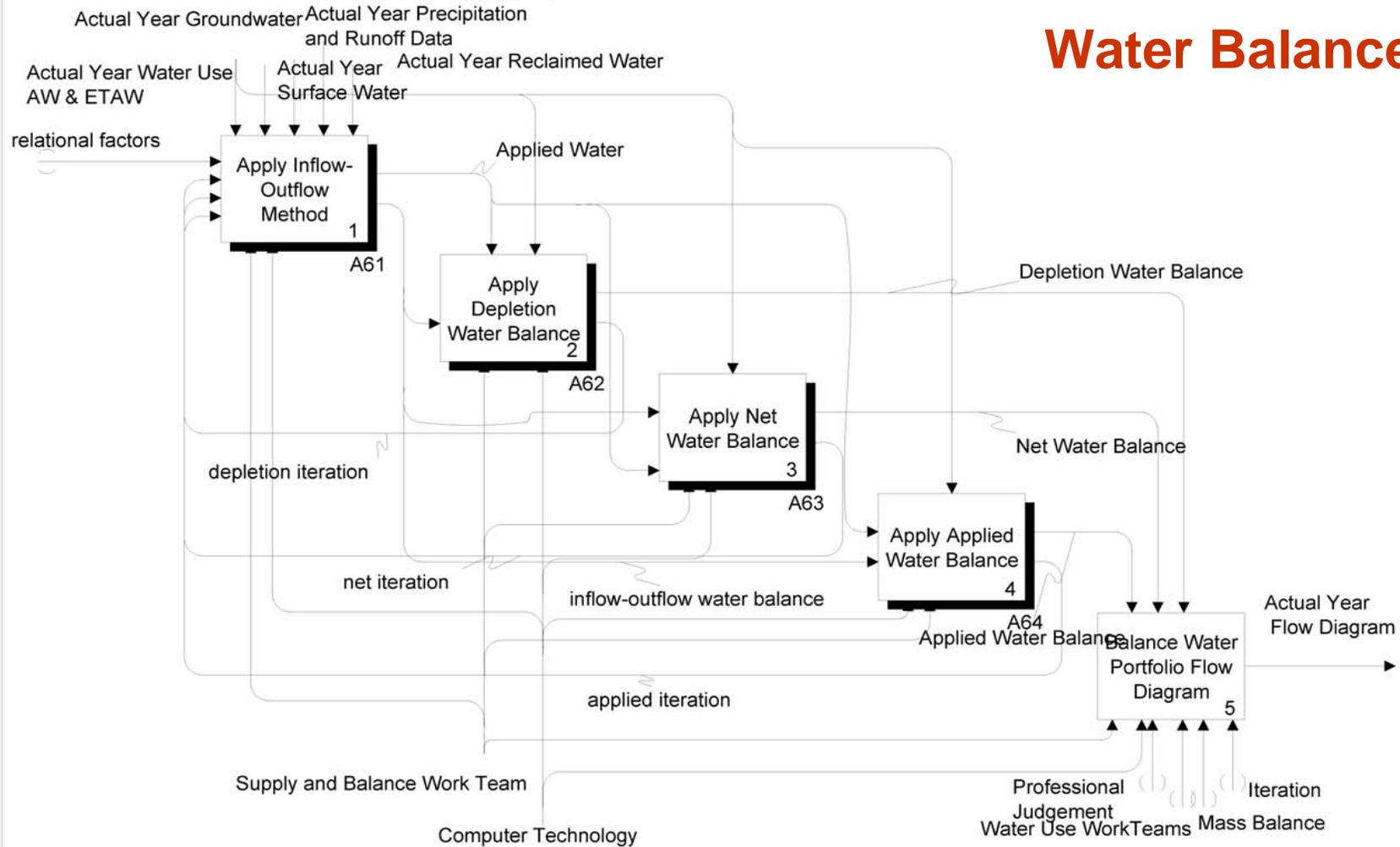
# Water Balance Process

- Mass balance (Water Flow Diagram) is difficult to apply
  - Limited data and staff resources to develop:
    - Rainfall-runoff and natural deep percolation recharge
    - Native vegetation ET
    - Stream accretion and depletion
    - Groundwater change in storage and lateral flow
- Apply Inflow-Outflow Method to developed uses
  - Limit analysis to surface and rootzone (boundary condition)
  - Develop applied water and consumptive use of applied water estimates
  - Determine the disposition of applied water
  - Use actual supply data or estimated diversions

# IDEF0 Process Diagram

Author: Tipton	Date: 10/19/2001	WORKING	READER	DATE	CONTEXT:
Project: Flow Diagram	Rev: 8/31/2007	DRAFT			□ □ □ □ □ □ □ □
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		PUBLICATION			

## Water Balances

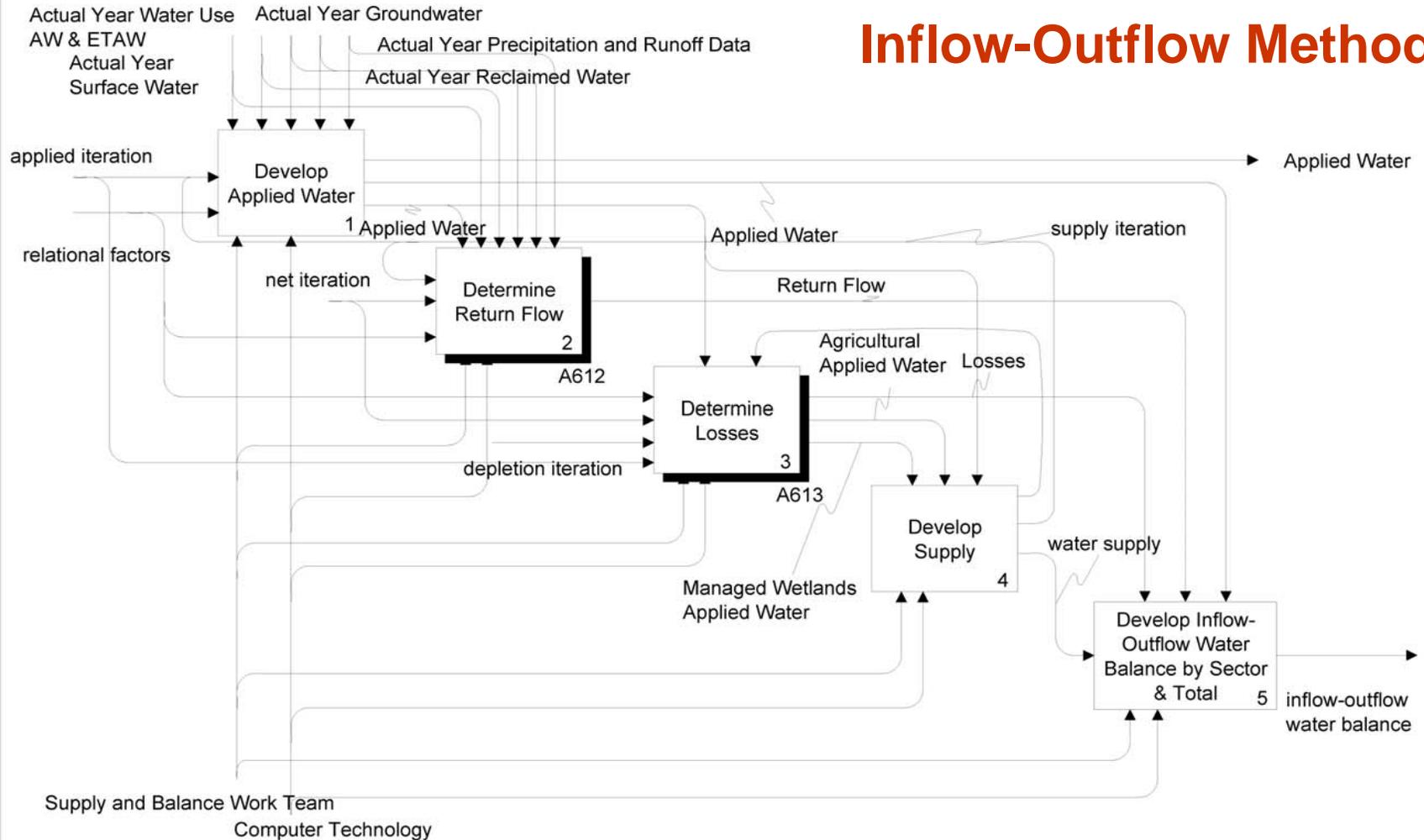


Node: A6	Title: Compile Flow Diagram	Number:
		Page: 46

# IDEF0 Process Diagram

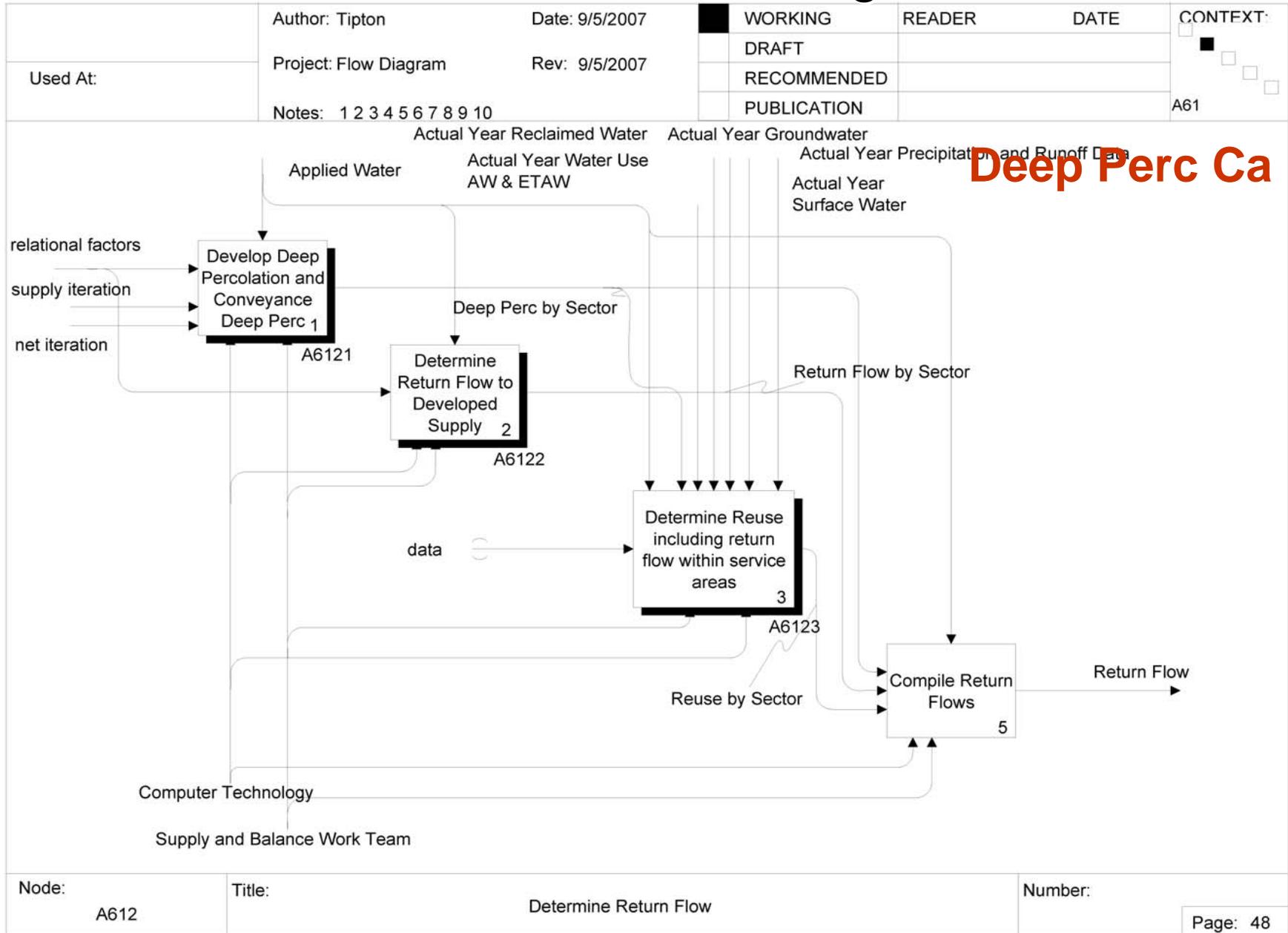
	Author: Tipton	Date: 8/31/2007	WORKING	READER	DATE	CONTEXT:
	Project: Flow Diagram	Rev: 8/31/2007	DRAFT			■ □ □ □ □ □ □ □
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## Inflow-Outflow Method



Node: A61	Title: Apply Inflow-Outflow Method	Number:	Page: 47
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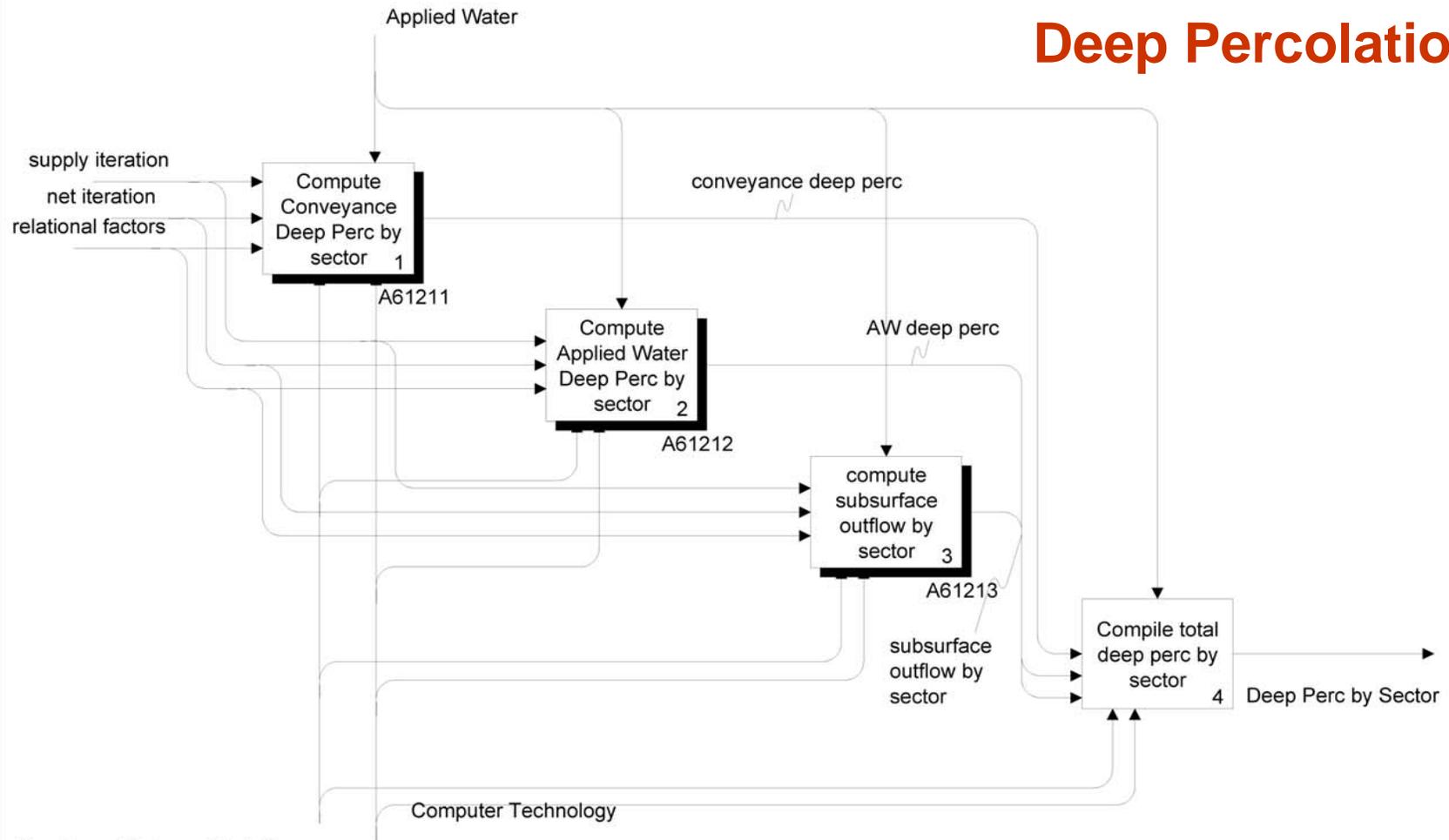
# IDEF0 Process Diagram



# IDEF0 Process Diagram

Used At:	Author: Tipton	Date: 9/11/2007	WORKING	READER	DATE	CONTEXT:
	Project: Flow Diagram	Rev: 9/11/2007	DRAFT			■ □ □ □
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			PUBLICATION			A612

## Deep Percolation

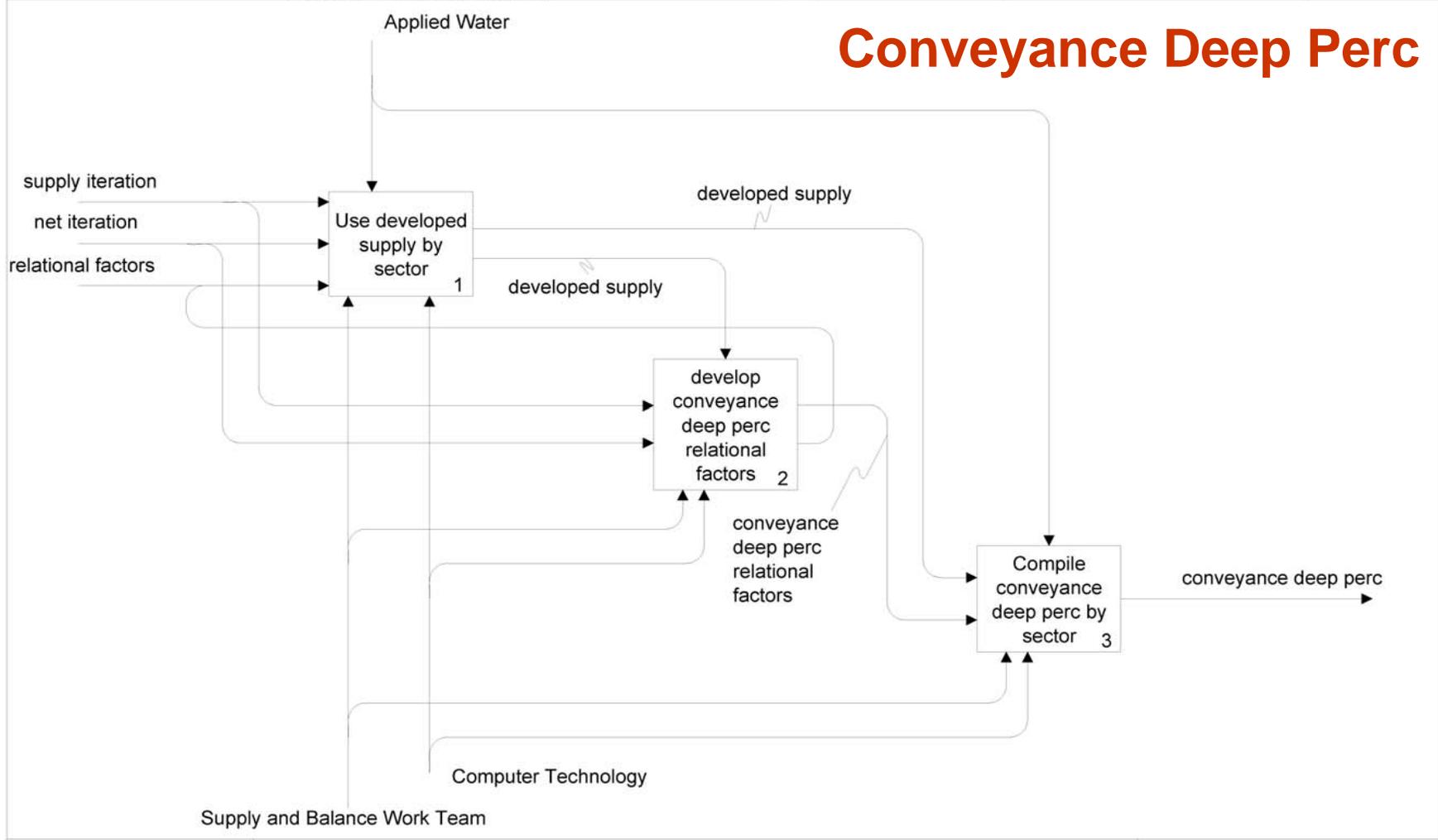


Supply and Balance Work Team

Node: A6121	Title: Develop Deep Percolation and Conveyance Deep Perc	Number:	Page: 49
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# IDEF0 Process Diagram

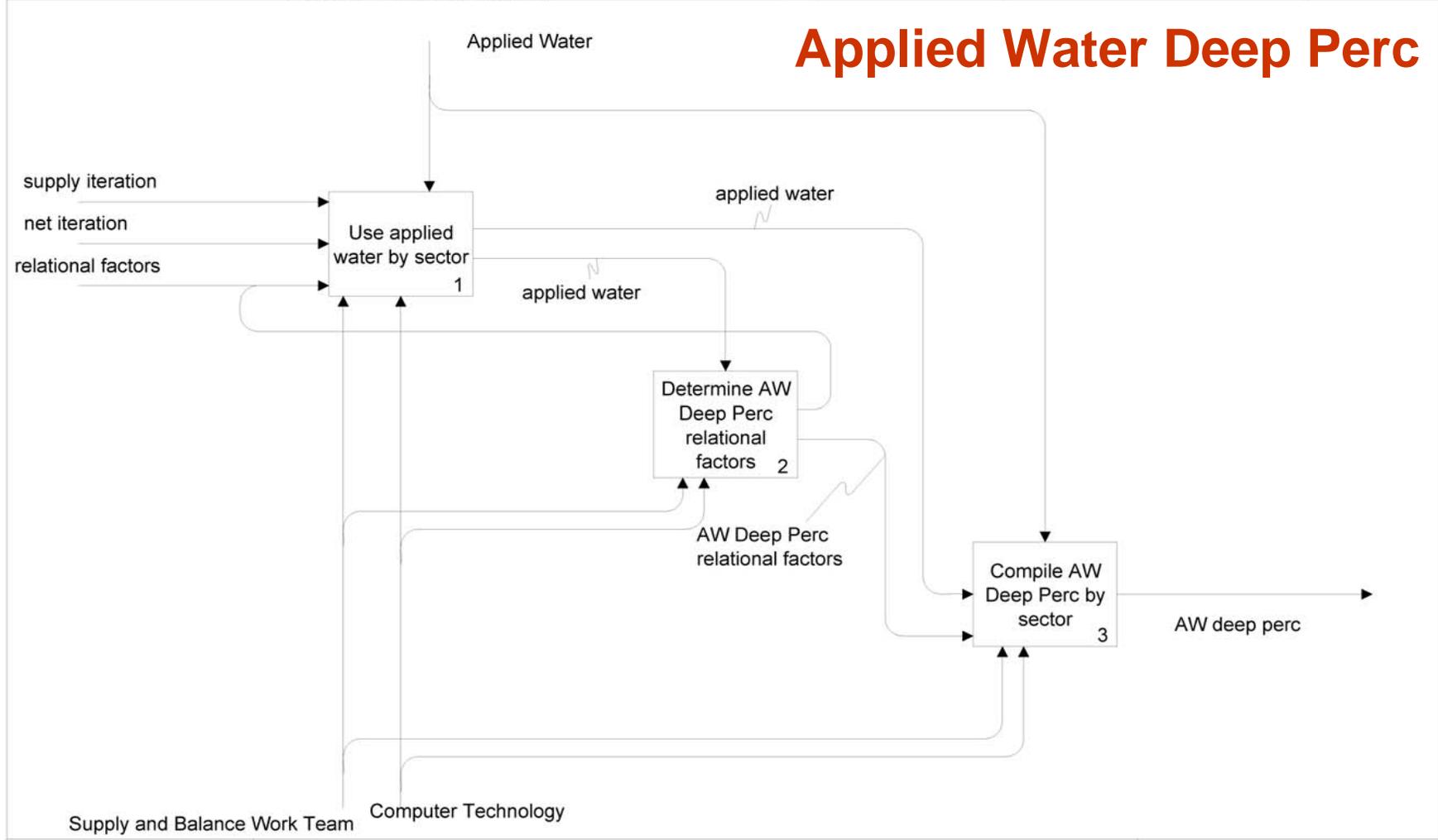
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	Project: Flow Diagram	Rev: 9/11/2007	<input type="checkbox"/> DRAFT			<input type="checkbox"/>
	Notes: 1 2 3 4 5 6 7 8 9 10		<input type="checkbox"/> RECOMMENDED			<input type="checkbox"/>
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Node: A61211	Title: Compute Conveyance Deep Perc by sector	Number:	Page: 50
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# IDEF0 Process Diagram

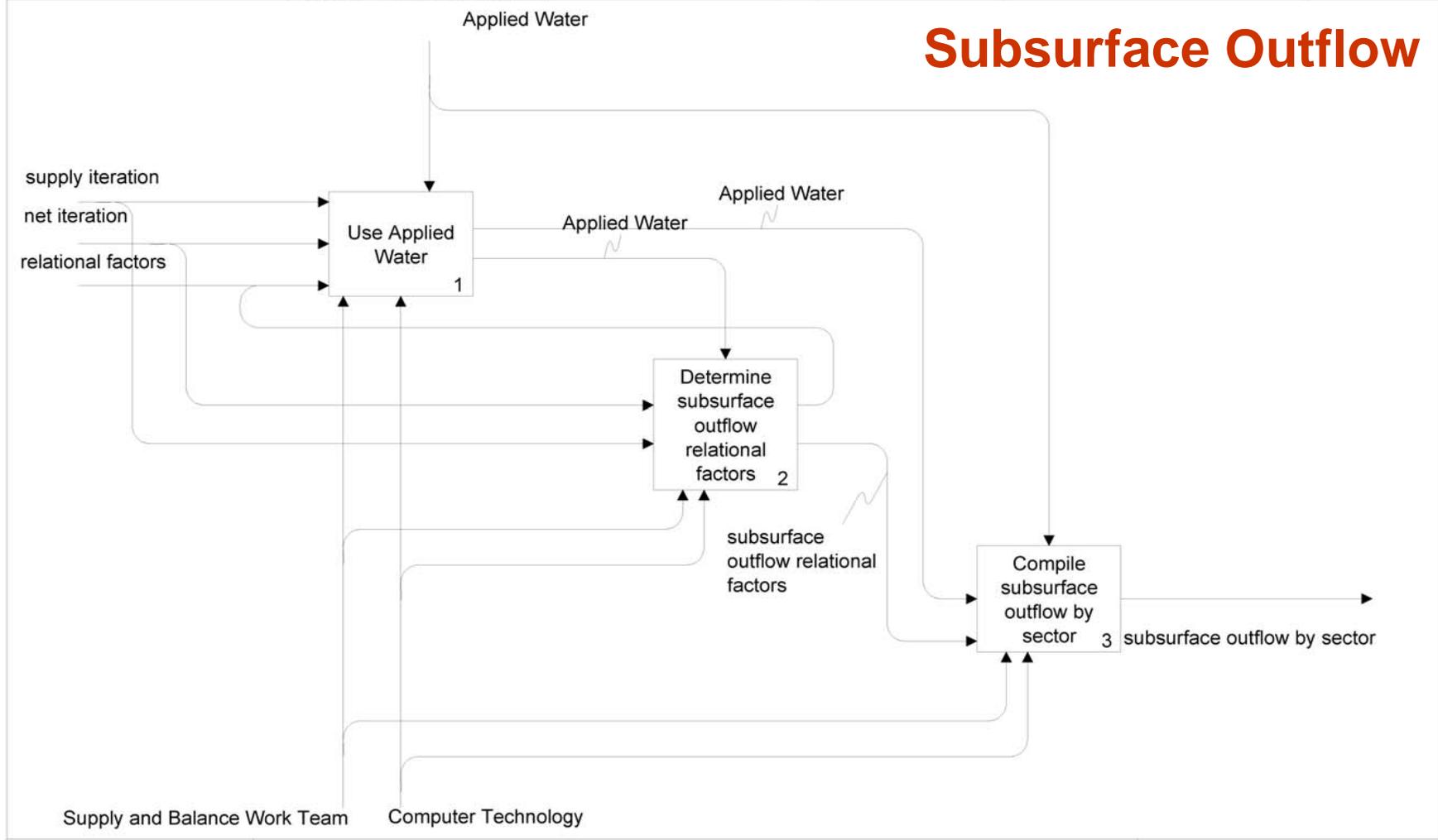
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Node: A61212	Title: Compute Applied Water Deep Perc by sector	Number:	Page: 51
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# IDEF0 Process Diagram

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	Notes: 1 2 3 4 5 6 7 8 9 10					A6121



Node: A61213	Title: compute subsurface outflow by sector	Number:	Page: 52
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# Inflow-Outflow Method Objectives

- Focus on Developed Use Balance
  - Describe developed uses and disposition of supplies
- Determine operational characteristics and relational factors
  - Relationship of supplies and applied water to conveyance seepage, deep percolation, consumptive uses, and outflow
- Refine applied water / deep percolation / runoff relationships
- Evaluate Consumed Fraction (Irrigation Efficiency) values
- Quantify and represent the reuse and movement of water between and within sectors of use
  - Important for rice and managed wetlands
- Estimate the movement of water between DAU/Counties
- Verify balance outflow

# Inflow-Outflow Method Process

- Determine actual year uses and supplies
  - Account for disposition of all uses, including conveyance, deep percolation, reuse, outflow, etc.
  - **First** - balance each sector of use
  - **Second** - balance all sectors together, accounting for the movement of water between sectors (reuse)
    - Urban WWTP discharge to drains and re-diverted for agricultural or managed wetland use
    - Agricultural return flows used by managed wetlands
    - Applied water, net water use, and depletion checks for estimating reuse, conveyance seepage, and deep percolation

# Process

- Supplies
- Drain Water
- Reuse
- Reuse between sectors
- Depletions
- Deep percolation
- Intentional GW recharge
- Outflow
- Change in surface storage

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Statewide Water

## Developed Water Use Balance Thousand Acre-Feet

Year: **1999** Scenario Type: **Actual Year**  
 Detailed Analysis Unit (DAU) No.: **163** DAU Name: **Willows-Arbuckle**  
 County No.: **06** County Name: **Colusa**

	Agriculture	Managed Wetland	Urban	Total
<b>U</b> Local Surface Water	3.0	0.0	0.0	3.0
<b>E</b> Local Import		0.0		0.0
Ground Water - Unadjudicated	78.8	7.7	2.6	89.1
<b>O</b> Ground Water - Adjudicated		0.0		0.0
<b>F</b> Ground Water - Banked		0.0		0.0
Colorado River		0.0		0.0
<b>W</b> State Water Project		0.0		0.0
<b>A</b> Central Valley Project - Base	419.1	26.6		445.7
<b>T</b> Central Valley Project - Project	141.5	48.2		189.7
<b>E</b> Other Federal		0.0		0.0
<b>R</b> Ocean Desalination		0.0		0.0
Water from Refineries		0.0		0.0
<b>S</b> Water Transfers		0.0		0.0
<b>U</b> Inter-basin Water Transfers		0.0		0.0
<b>P</b> <b>Sub-Total (Prime Supply)</b>	642.4	82.5	2.6	727.5
<b>P</b> <i>Inflow Drain Water</i>				
<b>L</b> From Other DAUs within County and PA	0.0	0.0		0.0
<b>Y</b> From Same DAU, out of County, within PA	80.6	7.5		88.1
Carry-over Storage from Previous Water Year	44.4	15.0		59.4
<b>Total Use of Water Supply</b>	767.4	105.0	2.6	875.0
<b>Reuse</b> <i>Not Included in Total Reuse of Supply</i>	88.4	23.5		
<b>R</b> Reuse - Wastewater Recycling <i>Not Included in Total Reuse of Supply</i>				
<b>E</b> Reuse - Desalination <i>Not Included in Total Reuse of Supply</i>				
<b>U</b> <i>Reuse Between Sectors</i>				
<b>S</b> Reuse of Agricultural Supply [Sector Balance Only]		0.0	0.0	
<b>E</b> Reuse of Managed Wetlands Supply [Sector Balance Only]	0.0		0.0	
<b>U</b> Reuse of Urban Supply [Sector Balance Only]	0.6	0.0		
<b>Total Reuse of Supply from Other Sectors</b>	0.6	0.0	0.0	
<b>ETAW</b>				
Evapotranspiration of Applied Water	454.1	40.1	1.2	495.4
Evaporation & Evapotranspiration of Applied Groundwater Recharge	0.0	0.0	0.0	0.0
Evaporation and Evapotranspiration of Wastewater			0.1	0.1
<b>D</b> <i>Other Consumptive Losses</i>				
<b>P</b> Conveyance System Evaporation & Evapotranspiration	2.8			2.8
<b>L</b> Conveyance System Evaporation & Evapotranspiration		0.0		0.0
<b>E</b> Conveyance System Evaporation & Evapotranspiration			0.0	0.0
<b>E</b> <i>Drainage Losses</i>				
<b>T</b> Riparian ET	9.6			9.6
<b>I</b> Riparian ET		0.0		0.0
<b>O</b> Riparian ET			0.0	0.0
<b>N</b> Miscellaneous Agricultural Evapotranspiration	6.6			6.6
Miscellaneous Managed Wetland Evapotranspiration		1.2		1.2
<b>Total Depletion</b>	473.1	41.3	1.3	515.7
<b>D</b> <i>Conveyance</i>				
<b>E</b> <i>Conveyance Seepage [not included in Balance]</i>	67.4			
<b>P</b> <i>Conveyance Seepage [not included in Balance]</i>		9.1		
<b>P</b> <i>Conveyance Seepage [not included in Balance]</i>			0.0	
<b>P</b> Conveyance Deep Percolation	22.6			22.6
<b>P</b> Conveyance Deep Percolation		0.0		0.0
<b>E</b> Conveyance Deep Percolation			0.0	0.0
<b>R</b> <i>Deep Percolation of Applied Water</i>				
<b>C</b> Deep Percolation of Applied Surface Water	8.3	0.1	0.0	8.4
Deep Percolation of Applied Groundwater	7.8	0.1	0.7	8.6
Deep Percolation of Groundwater Recharge	0.0	0.0	0.0	0.0
<b>Total Deep Percolation</b>	38.7	0.2	0.7	39.6
<b>Return Flows to Developed Supply</b>				
To Other DAUs within County within PA	13.0	4.7		17.7
To Same DAU, Out of County within PA	26.7	9.1		35.8
To Other DAU, Out of County within PA	0.0	0.0		0.0
Out of PA	129.1	45.9		175.0
Out of HR	0.0	0.0		0.0
<b>F</b> <i>Conveyance Return Flows to Developed Supply</i>				
<b>L</b> To Other DAUs within County within PA	2.8			2.8
<b>O</b> To Other DAUs within County within PA		0.4		0.4
<b>W</b> To Other DAUs within County within PA			0.0	0.0
<b>Outflow to Other Sector of Use within DAU/County</b>			0.6	
Outflow as Reuse to Agricultural Sector				
Outflow as Reuse to Managed Wetland Sector				
Outflow as Reuse Outflow to Urban Sector				
<b>Total Outflow</b>	196.8	63.5	0.6	260.3
<b>Change in Surface Storage (Drainage Carry-over to Next Water Year)</b>	59.4	0.0	0.0	59.4
<b>DAU/County Balance Condition: BALANCED</b>	0.0	0.0	0.0	0.0

**EXAMPLE**

# Inflow

- Supplies by sector of use
- Agricultural groundwater
  - Water source map for Sacramento Valley is the basis for the Land Use Method of groundwater pumping
  - Elsewhere, differentiate between surface and ground water use by field or regionally to refine estimates of land use based groundwater extraction

Developed Water Use Balance				
Thousand Acre-Feet				
Year:	2000	Scenario Type:	Actual Year	
Detailed Analysis Unit (DAU) No.:	163	DAU Name:	Willows-Arbuckle	
County No.:	06	County Name:	Colusa	
Planning Area (PA) No.:	0509	PA Name:	Central Basin East	
Hydrologic Region (HR) No.:	05	HR Name:	Sacramento River	

	Agriculture	Managed Wetland	Urban	Total
Local Surface Water	3.0	0.0	0.0	3.0
U Local Import		0.0		0.0
S Ground Water - Unadjudicated	73.7	7.6	4.7	86.0
E Ground Water - Adjudicated		0.0		0.0
Ground Water - Banked		0.0		0.0
O Colorado River		0.0		0.0
F State Water Project		0.0		0.0
Central Valley Project - Base	452.4	0.0		452.4
W Central Valley Project - Project	141.3	42.7		184.0
A Other Federal		0.0		0.0
T Ocean Desalination		0.0		0.0
E Water from Refineries		0.0		0.0
R Water Transfers		0.0		0.0
Inter-basin Water Transfers		0.0		0.0
<b>S Sub-Total (Prime Supply)</b>	<b>670.4</b>	<b>50.3</b>	<b>4.7</b>	<b>725.4</b>
<b>U Inflow Drain Water</b>				
P From Other DAUs within County and PA		0.0		0.0
P From Same DAU, out of County, within PA	196.0	43.1		239.1
L From Other DAU, out of County, within PA		0.0		0.0
Y Out of PA		0.0		0.0
Out of HR		0.0		0.0
Carry-over Storage from Previous Water Year		23.8		23.8
<b>Total Use of Water Supply</b>	<b>866.4</b>	<b>117.2</b>	<b>4.7</b>	<b>988.3</b>
Reuse	Not Included in Total Reuse of Supply			
R Reuse - Wastewater Recycling	21.7			
E Reuse - Desalination	Not Included in Total Reuse of Supply			
<b>U Reuse Between Sectors</b>				
S Reuse of Agricultural Supply [Sector Balance Only]		0.0	0.0	
E Reuse of Managed Wetlands Supply [Sector Balance Only]	0.0		0.0	
Reuse of Urban Supply [Sector Balance Only]	0.4	0.4		
<b>Total Reuse of Supply from Other Sectors</b>	<b>0.4</b>	<b>0.4</b>	<b>0.0</b>	

**Supplies by Use**

ETAW					
	Evapotranspiration of Applied Water	488.5	36.9	2.3	507.7
	Evaporation & Evapotranspiration of Applied Groundwater Recharge	0.0	0.0	0.0	0.0
D	Evaporation and Evapotranspiration of Wastewater			0.1	0.1
Other Consumptive Losses					
P	Conveyance System Evaporation & Evapotranspiration	3.2			3.2
L	Conveyance System Evaporation & Evapotranspiration		0.2		0.2
E	Conveyance System Evaporation & Evapotranspiration			0.0	0.0
Drainage Losses					
T	Riparian ET	9.0			9.0
I	Riparian ET		1.2		1.2
O	Riparian ET			0.0	0.0
N	Miscellaneous Agricultural Evapotranspiration	7.4			7.4
	Miscellaneous Managed Wetland Evapotranspiration		1.7		1.7
<b>Total Depletion</b>		<b>488.1</b>	<b>40.0</b>	<b>2.4</b>	<b>530.5</b>
Conveyance					
	Conveyance Seepage (not included in Balance)	77.2			
	Conveyance Seepage (not included in Balance)		6.2		
	Conveyance Seepage (not included in Balance)			0.2	
	Conveyance Deep Percolation	25.5			25.5
	Conveyance Deep Percolation		1.8		1.8
	Conveyance Deep Percolation			0.0	0.0
	Conveyance Deep Percolation to Salt Sink	0.0			0.0
	Conveyance Deep Percolation to Salt Sink		0.0		0.0
D	Conveyance Deep Percolation to Salt Sink			0.0	0.0
E	Conveyance Subsurface Outflow to OR	0.0			0.0
E	Conveyance Subsurface Outflow to OR		0.0		0.0
P	Conveyance Subsurface Outflow to OR			0.0	0.0
	Conveyance Subsurface Outflow to NV	0.0			0.0
P	Conveyance Subsurface Outflow to NV		0.0		0.0
E	Conveyance Subsurface Outflow to NV			0.0	0.0
R	Conveyance Subsurface Outflow to MX	0.0			0.0
C	Conveyance Subsurface Outflow to MX		0.0		0.0
O	Conveyance Subsurface Outflow to MX			0.0	0.0
L					
Deep Percolation of Applied Water					
T	Deep Percolation of Applied Surface Water	8.3	0.0	0.0	8.3
I	Deep Percolation of Applied Groundwater	10.3	0.0	1.5	11.8
O	Deep Percolation of Groundwater Recharge	0.0	0.0	0.0	0.0
N	Deep Percolation of Applied Surface Water to Salt Sink	0.0	0.0	0.0	0.0
	Deep Percolation of Applied Ground Water to Salt Sink	0.0	0.0	0.0	0.0
	Subsurface Outflow of Applied Surface Water to OR	0.0	0.0	0.0	0.0
	Subsurface Outflow of Applied Surface Water to NV	0.0	0.0	0.0	0.0
	Subsurface Outflow of Applied Surface Water to MX	0.0	0.0	0.0	0.0
	Subsurface Outflow of Applied Groundwater to OR	0.0	0.0	0.0	0.0
	Subsurface Outflow of Applied Groundwater to NV	0.0	0.0	0.0	0.0
	Subsurface Outflow of Applied Groundwater to MX	0.0	0.0	0.0	0.0
<b>Total Deep Percolation</b>		<b>44.1</b>	<b>1.8</b>	<b>1.5</b>	<b>47.4</b>

**Relational Adjustment Factors for Applied Water**

Ag	Wetland	Urban	
0.0000	0.0000	0.0000	Fraction of Total GW Recharge Applied Water by Sector

**Relational Factors - Conveyance Evaporation in Relation to Supply**

LSW	LJ	GW-U	GW-A	GW-B	CR	SWP	CVP-B	CVP-P	OFED	ODSL	REF	WT	IntWT	IDW	STOR	Rr	Rww	Rd	Ra	Rmw	Ru	
0.0040		0.0010					0.0040	0.0040						0.0040	0.0040							
0.0020		0.0010					0.0020	0.0020						0.0020	0.0020							

**Relational Factors - Miscellaneous Losses in Relation to Applied Water**

0.0105	Fraction of Ag Applied Surface Water	0.0150	Fraction of Ag - CP Applied Surface Water	0.0100	Fraction of Ag Applied Groundwater	0.0100	Fraction of Ag - CP Applied Groundwater
0.0110	Fraction of Managed Wetlands Applied Surface Water			0.0110	Fraction of Managed Wetlands Applied Groundwater		
0.0000	Fraction of Urban Applied Water						
0.0100	Fraction of Ag Applied Surface Water	0.0050	Fraction of Ag - CP Applied Surface Water	0.0050	Fraction of Ag Applied Groundwater	0.0050	Fraction of Ag - CP Applied Groundwater
0.0150	Fraction of Managed Wetlands Applied Surface Water			0.0150	Fraction of Managed Wetlands Applied Groundwater		

**Relational Factors - Conveyance Seepage and Deep Percolation in Relation to Supply**

LSW	LJ	GW-U	GW-A	GW-B	CR	SWP	CVP-B	CVP-P	OFED	ODSL	REF	WT	IntWT	IDW	STOR	Rr	Rww	Rd	Ra	Rmw	Ru	
0.1200		0.0500					0.1200	0.1200						0.0100	0.0100							
0.1200		0.0500					0.1200	0.1200						0.0100	0.0100							
0.1200		0.0500					0.1200	0.1200						0.0100	0.0100							

0.0300	0.0150					0.0350	0.0250							0.0250	0.0250							
0.0200	0.0150					0.0300	0.0200							0.0130	0.0100							

**Relational Factors ( ← )**

- On-field losses
- Deep Percolation
- Conveyance
- Outflow

# Depletions and Deep Percolation

**Relational Factors - Deep Percolation in Relation to Applied Water**

Ag	Ag - CP	MW	Urban		Urban
0.0110	0.0125	0.0100		Fraction of Applied Surface Water	
0.1400	0.1400	0.1400		Fraction of Applied Groundwater	1.0000
				Fraction of Applied Recharge Water	
				Fraction of Applied Surface Water	
				Fraction of Applied Groundwater	
				Fraction of Applied Surface Water	
				Fraction of Applied Surface Water	
				Fraction of Applied Surface Water	
				Fraction of Applied Groundwater	
				Fraction of Applied Groundwater	
				Fraction of Applied Groundwater	

# Relational Factor Example

- Conveyance consists of:
  - Conveyance Deep Percolation
  - Conveyance System Evaporation & Evapotranspiration
  - Conveyance Seepage
  - Conveyance Deep Percolation to Salt Sink
  - Conveyance Subsurface Outflow to OR, NV, or MX
  - Conveyance Return Flows to Develop Supply
    - To other DAU/Counties, Planning Areas, Hydrologic Regions
    - Conveyance Return Flows for Delta Outflow
  - Conveyance Return Flows to OR, NV, or MX

# Conveyance Deep Percolation (by Sector) =

$\sum$  [ Supply x Conveyance Deep Percolation Factor (DPC) ] (by supply type)

- = Local Surface Water x  $DPC_{LSW}$
- + Local Import x  $DPC_{LI}$
- + Groundwater (Unadjudicated) x  $DPC_{GW-U}$
- + Groundwater (Adjudicated) x  $DPC_{GW-A}$
- + Groundwater (Banked) x  $DPC_{GW-B}$
- + Colorado River x  $DPC_{CR}$
- + State Water Project x  $DPC_{SWP}$
- + Central Valley Project (Base) x  $DPC_{CVP-B}$
- + Central Valley Project (Project) x  $DPC_{CVP-P}$
- + Other Federal x  $DPC_{OFED}$
- + Ocean Desalinization x  $DPC_{ODSL}$
- + Water from Refineries x  $DPC_{REF}$
- + Water Transfers x  $DPC_{WT}$
- + Inter-Basin Water Transfers x  $DPC_{IntWT}$
- + Reuse x  $DPC_{Rr}$
- + Reuse (Wastewater Recycling) x  $DPC_{Rww}$
- + Reuse (Desalinization) x  $DPC_{Rd}$
- + Reuse of Agricultural Supply x  $DPC_{Ra}$
- + Reuse of Managed Wetland Supply x  $DPC_{Rmw}$
- + Reuse of Urban Supply x  $DPC_{Ru}$

## Example Calculation

# Outflow and Change in Surface Storage Components of Balance

Return Flows to Developed Supply			
To Other DAUs within County within PA	17.5	10.3	27.8
To Same DAU, Out of County within PA	31.5	20.7	52.2
To Other DAU, Out of County within PA			0.0
Out of PA	247.2	40.1	287.3
Out of HR			0.0
Return Flows for Delta Outflow			0.0
Return Flows to OR			0.0
Return Flows to NV			0.0
Return Flows to MX			0.0
Return Flows to Salt Sink			0.0
Conveyance Return Flows to Developed Supply			
To Other DAUs within County within PA	1.7		1.7
To Other DAUs within County within PA		1.2	1.2
To Other DAUs within County within PA			0.0
To Same DAU, Out of County within PA	4.3		4.3
To Same DAU, Out of County within PA		1.2	1.2
To Same DAU, Out of County within PA			0.0
To Other DAU, Out of County within PA	0.0		0.0
To Other DAU, Out of County within PA		0.0	0.0
To Other DAU, Out of County within PA			0.0
Out of PA	8.7		8.7
Out of PA		2.3	2.3
Out of PA			0.0
Out of HR	0.0		0.0
Out of HR		0.0	0.0
Out of HR			0.0
Conveyance Return Flows for Delta Outflow	0.0		0.0
Conveyance Return Flows for Delta Outflow		0.0	0.0
Conveyance Return Flows for Delta Outflow			0.0
Conveyance Return Flows to OR	0.0		0.0
Conveyance Return Flows to OR		0.0	0.0
Conveyance Return Flows to OR			0.0
Conveyance Return Flows to NV	0.0		0.0
Conveyance Return Flows to NV		0.0	0.0
Conveyance Return Flows to NV			0.0
Conveyance Return Flows to MX	0.0		0.0
Conveyance Return Flows to MX		0.0	0.0
Conveyance Return Flows to MX			0.0
Conveyance Return Flows to Salt Sink	0.0		0.0
Conveyance Return Flows to Salt Sink		0.0	0.0
Conveyance Return Flows to Salt Sink			0.0
Outflow to Other Sector of Use within DAU/County			
Outflow as Reuse to Agricultural Sector		0.4	
Outflow as Reuse to Managed Wetland Sector			0.4
Outflow as Reuse Outflow to Urban Sector			
<b>Total Outflow</b>	<b>310.9</b>	<b>75.8</b>	<b>386.7</b>
<b>Change in Surface Storage (Drainage Carry-over to Next Water Year)</b>	<b>23.8</b>	<b>0.0</b>	<b>23.8</b>
<b>DAU/County Balance Condition: UNBALANCED CONDITION - ERROR - CHECK!!!</b>	<b>-0.1</b>	<b>0.0</b>	<b>-0.1</b>

Relational Factors - Conveyance Return Flows in Relation to Supply

LSW	LI	GWU	GWA	GW-B	CR	SWP	CVP-B	CVP-P	OFED	ODSL	REF	WT	IntWT	IDW	STOR	Rr	Rww	Rd	Ra	Rmw	Ru
0.0020		0.0020					0.0020	0.0020							0.0020	0.0020					
0.0100		0.0100					0.0100	0.0100							0.0100	0.0100					
0.0050		0.0050					0.0050	0.0050							0.0050	0.0050					
0.0100		0.0100					0.0100	0.0100							0.0100	0.0100					
0.0100		0.0100					0.0100	0.0100							0.0100	0.0100					
0.0200		0.0200					0.0200	0.0200							0.0200	0.0200					

## Surface Storage by Use within Sectors

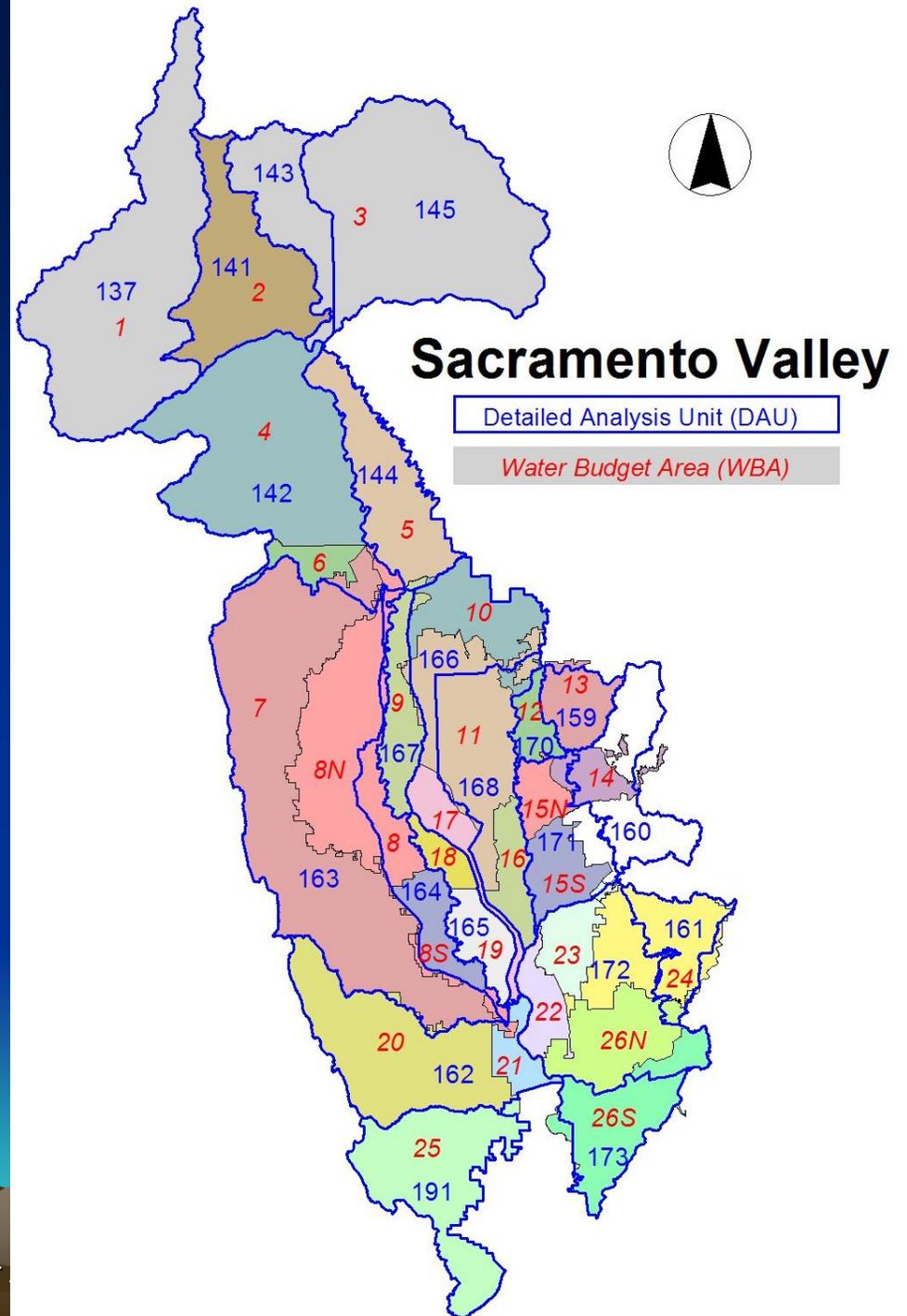
- Affected by rice and managed wetland ponding operations
- Results in monthly and water year carryover storage
- Affects return flow timing

Accounts for Outflow to other Sectors for Individual Sector Balance only. Supply reuse is not included in DAU/County Balance.

NOTE: The summation of the sector Balances may not equal the DAU/County balance due to reuse between sectors.

# Water Plan Coordination

- Coordinating Analysis Areas
  - Detailed Analysis Units (DAUs) for Water Plan
  - Water Budget Areas (WBAs) for CalSim
  - Analysis areas are subsets or combinations of one another



# Inflow-Outflow Method Refinement

- Outline data needs and coordinate with potential data partners
- Refine the process and representation of reuse
- Improve water routing linkages within and between DAU-County analysis areas
- Determine useful analysis areas
  - DAU-County?
  - Watershed?
  - Water district or water agency?
  - Groundwater basin?
  - How will the data fit with Integrated Regional Water Management Planning?

# Update 2005 Parking Lot Issues

- Comprehensive analytical framework
- Gap analysis
- Environmental water accounting
- Additional annual water portfolio data
- More local detail
- More groundwater information
- QA/QC for Water Plan data
- Improved data transparency
- Climate change impacts

# Water Plan Activities

- Deliverables
  - Water Supplies (Surface, ground, reuse, recycled, etc.)
  - Water Uses
  - Conveyance
  - Deep Percolation
  - Outflow
- Update 2005 accomplishments
  - 1998, 2000, and 2001 water portfolio data
- Update 2009 planned activities
  - 1999, 2002, 2003, 2004, and 2005 water portfolio data

# Examples of Data Needs

- Exchange of regional and local planning data
- WWTP data
- Water source mapping by field
  - Identification of surface and ground water infrastructure for improved estimates of supply
- Additional stream gaging
  - Diversions and system outflow
- Measured diversion data
- Conveyance loss data

# Potential partnerships/coordination

- Goal
  - Improve, coordinate, and promote Water Plan data exchange for regional planning and simulation models
- Partners
  - CalSim / IWFM coordination
  - Water Districts/Agencies?
  - Regional Planning Groups?
  - ???

# Inflow-Outflow Method

In the California Water Plan Update

**Questions?**

