

Agricultural Water Use

In the California Water Plan Update

Statewide Water Analysis Network Workshop

Todd Hillaire

September 24, 2007

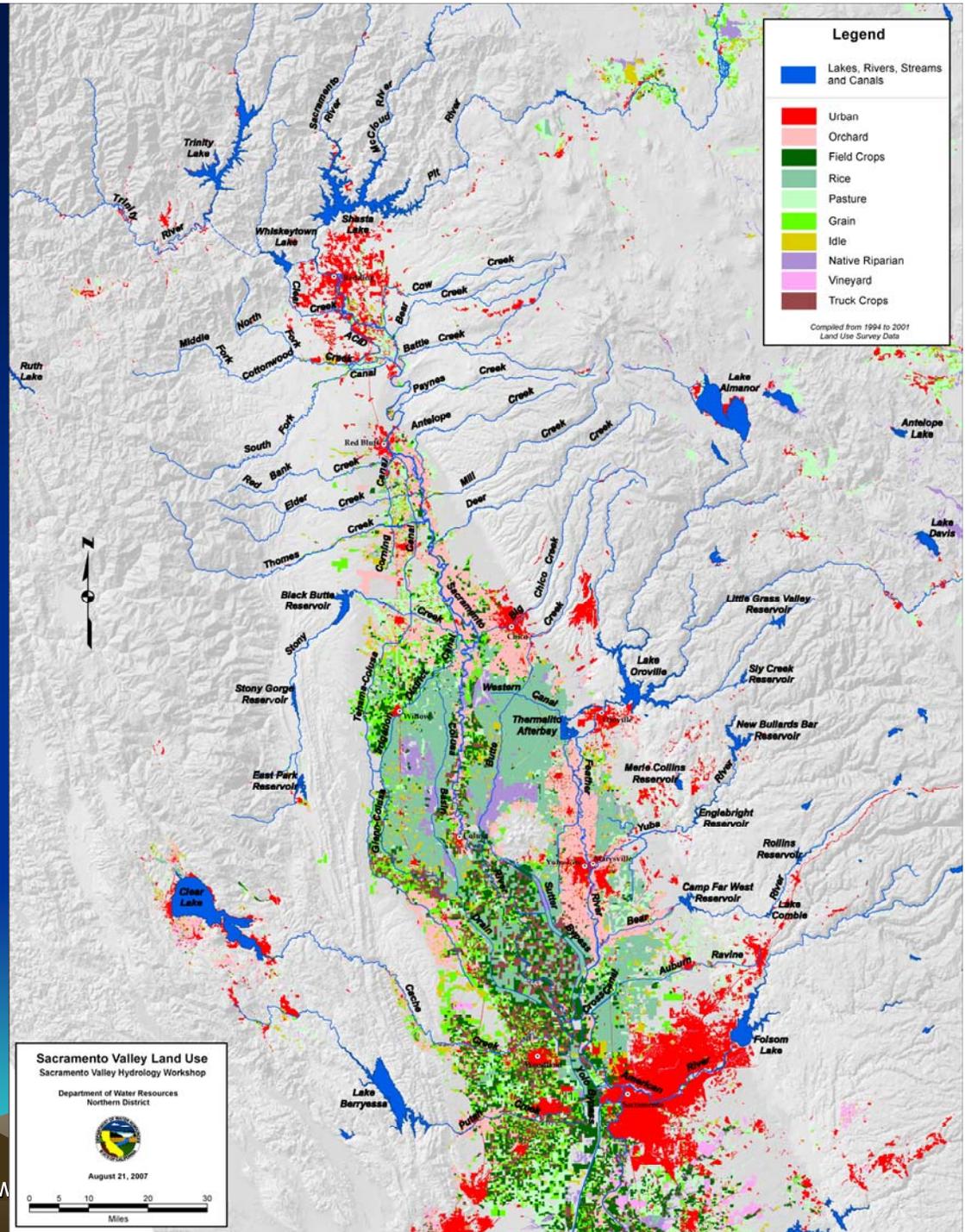


Overview

- Agricultural land use
- Water Portfolio Components
- Process map
- California Agricultural Water Use Model
- Water Plan activities
- Analytical tool development
- Parking lot issues
- Data needs
- Potential partnerships

Land Use

- Crop Type by Field
- Aggregated by DAU-County
- Determine Water Portfolio parameters



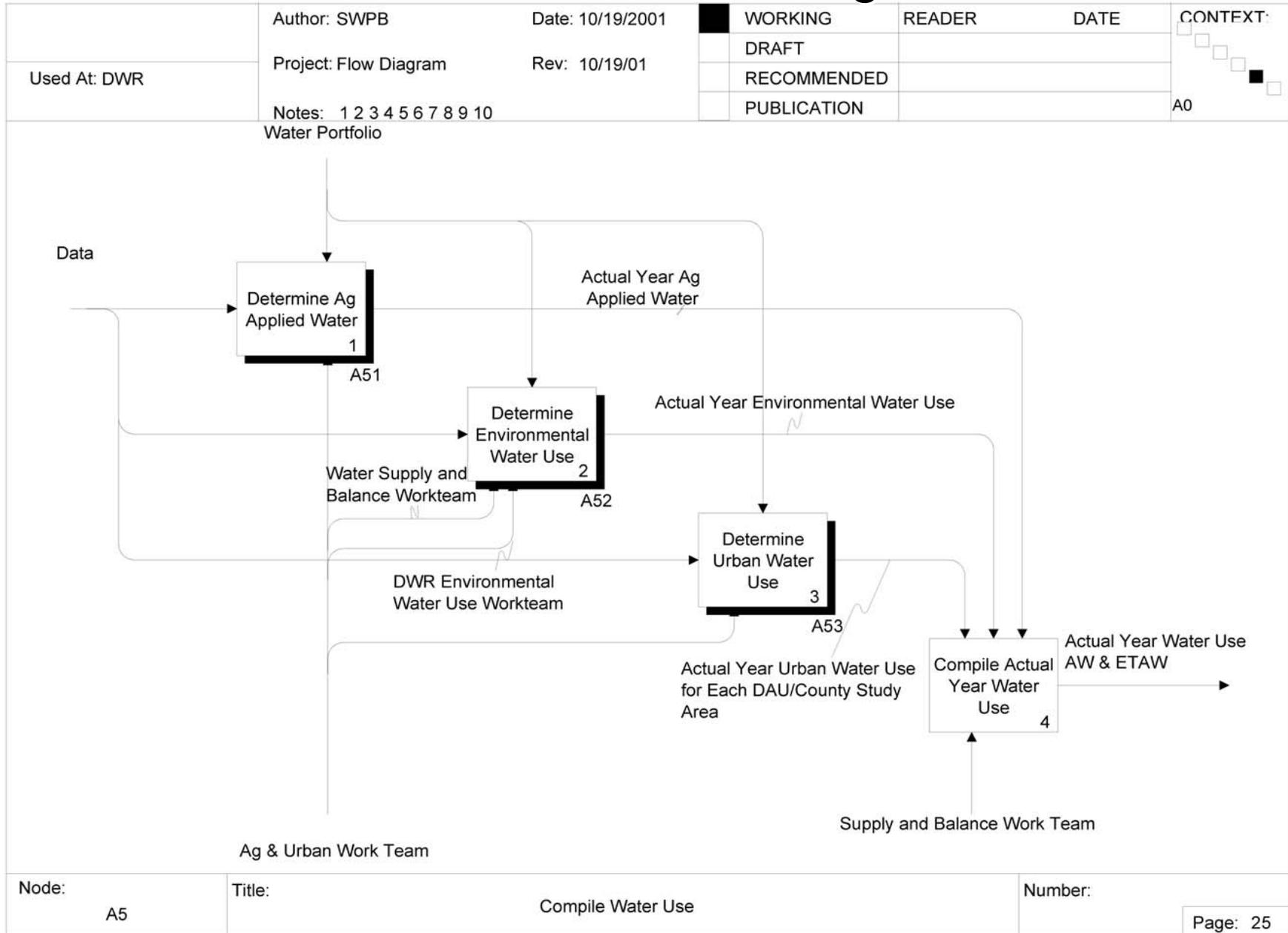
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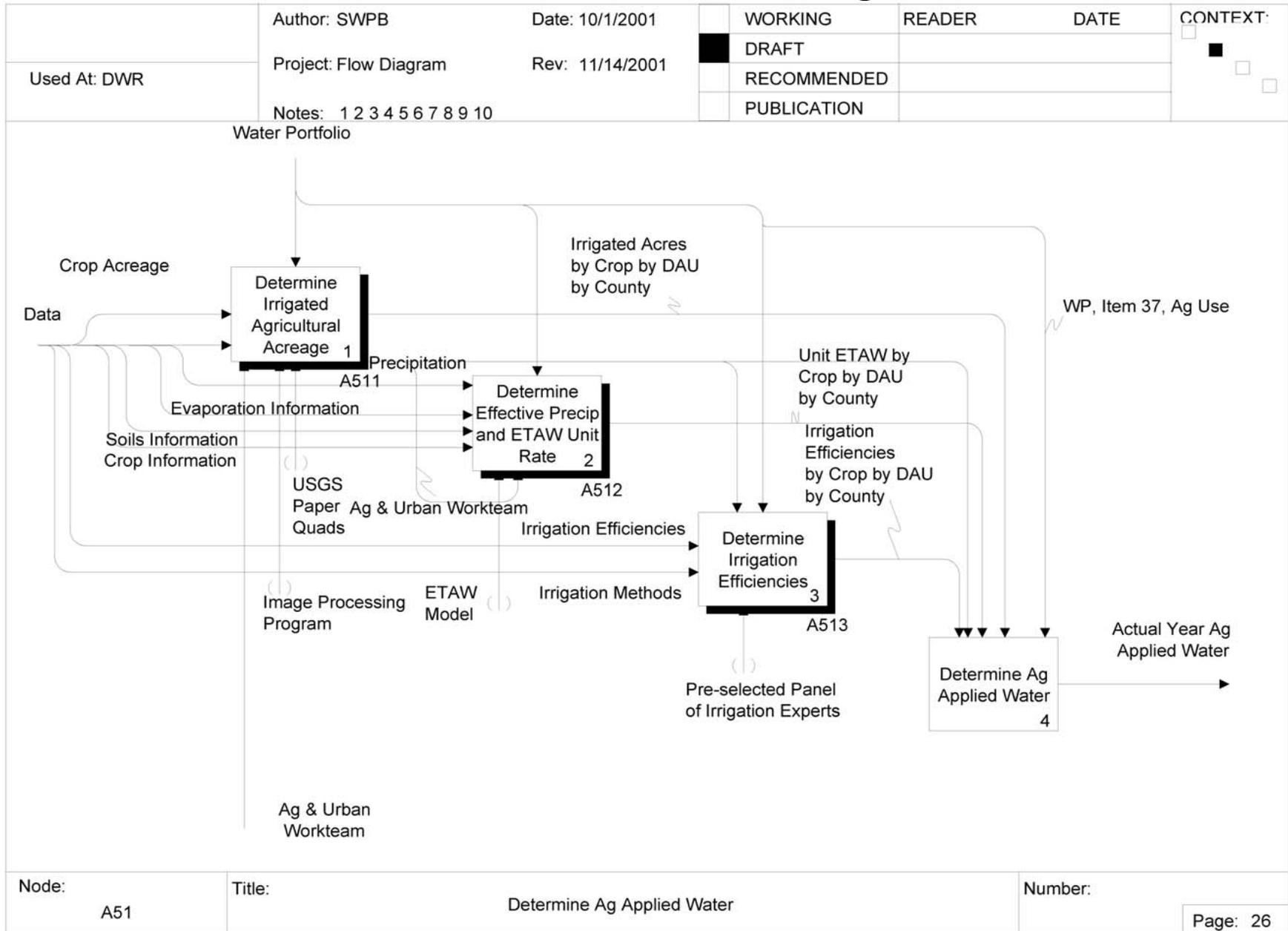
Components of Ag Water Use

- Evapotranspiration (ET)
- Evapotranspiration of Applied Water (ETAW)
- Effective Precipitation (EP)
- Applied Water
 - Total Water Use
 - Use by Water Source type (e.g., surface water, groundwater) if available

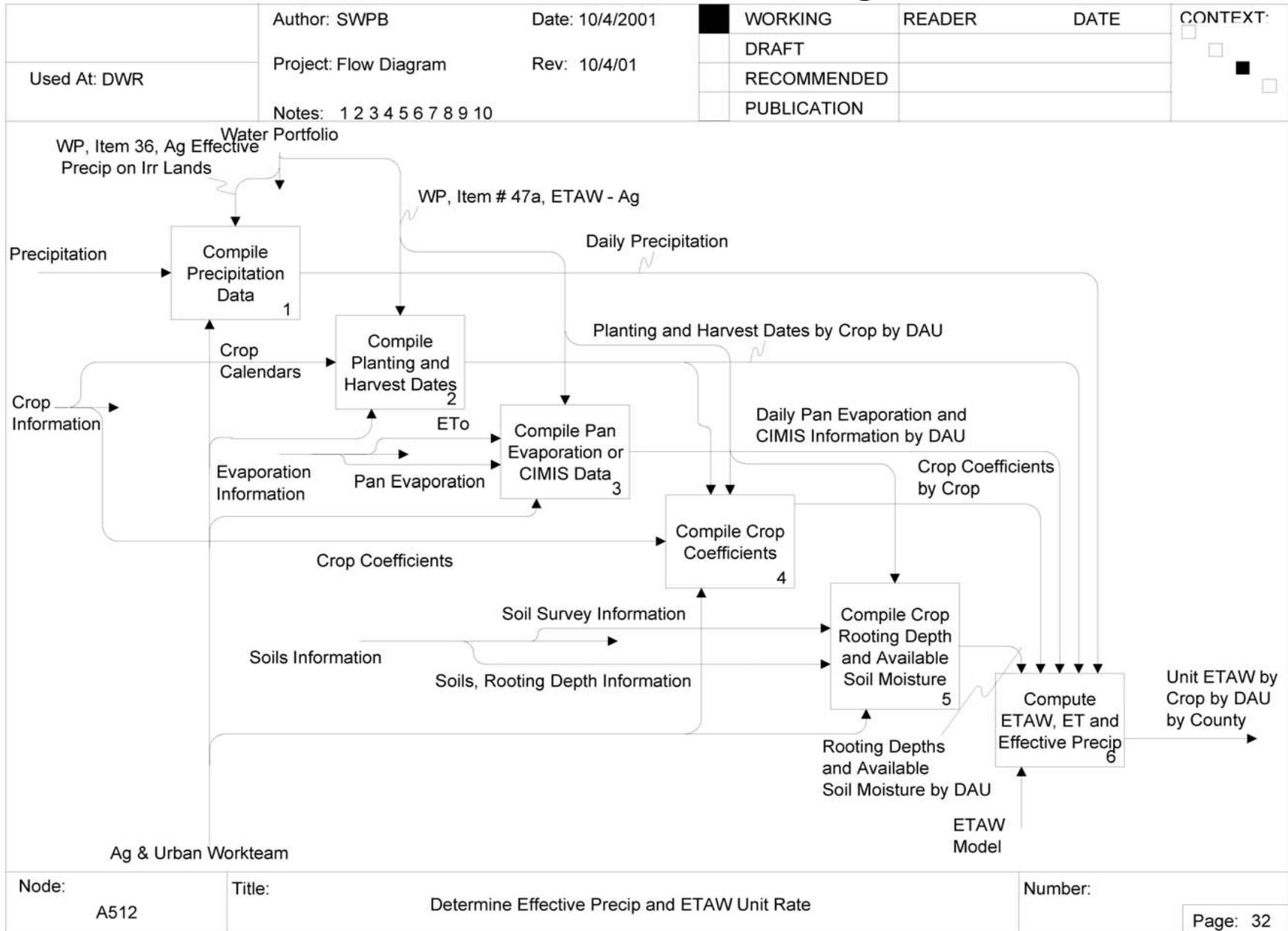
IDEF0 Process Diagram



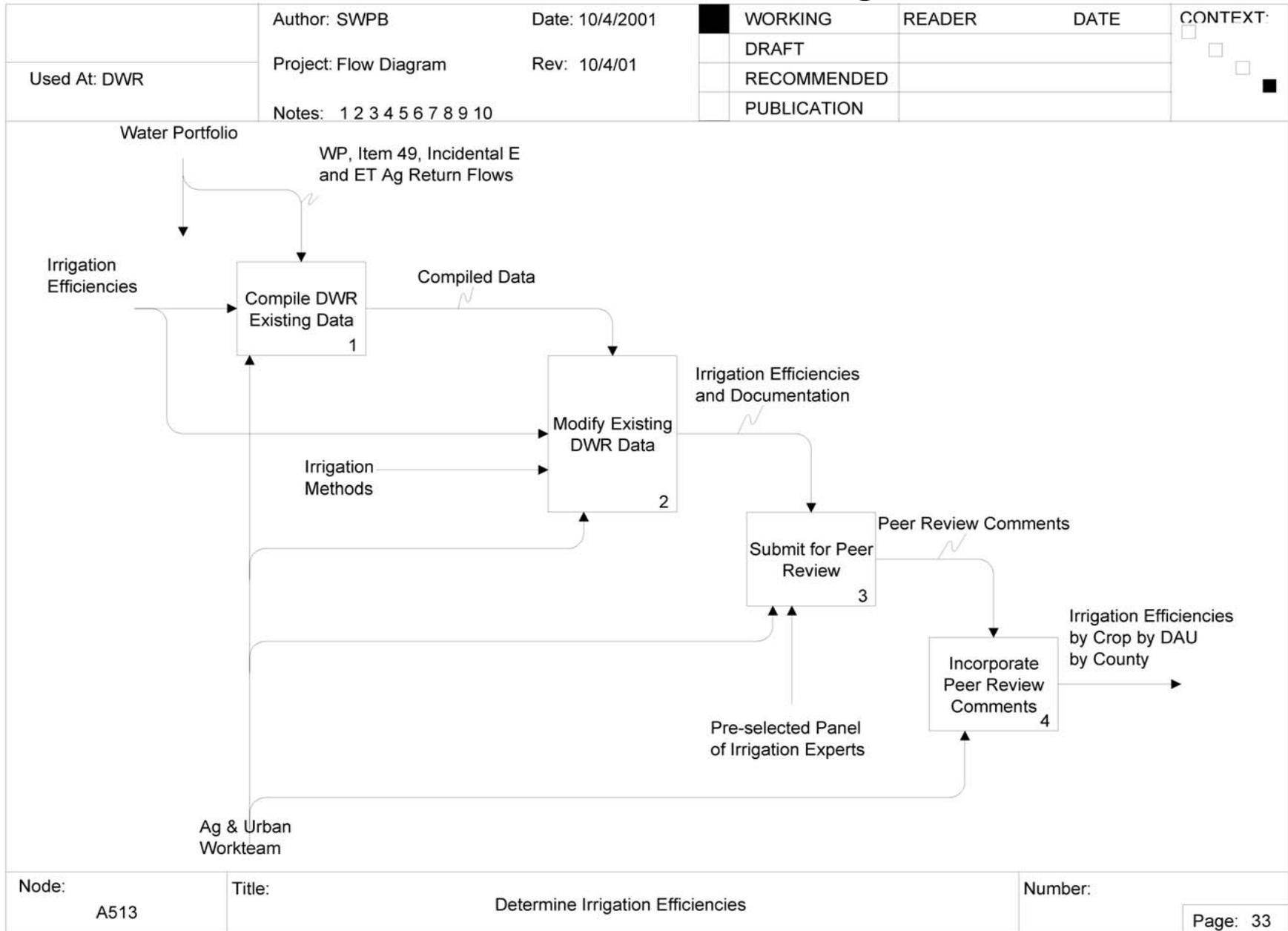
IDEF0 Process Diagram



IDEF0 Process Diagram



IDEF0 Process Diagram



Node:

A513

Title:

Determine Irrigation Efficiencies

Number:

California Agricultural Water Use Model

- Monthly time-step model using rootzone soil moisture storage methodology
- Daily precipitation/infiltration preprocessor
 - Uses SCS Method to estimate infiltration vs. runoff
- Rootzone storage defined by effective rooting and available soil moisture storage
 - Based on NRCS Soil Survey data
- Computes ET, EP, ETAW, and deep percolation from precipitation

California Agricultural Water Use Model

- Applied Water determined from farm data input
 - Application fractions
 - Estimated from Irrigation Method mapping
 - Cultural practices
 - Rice ponding
 - Leaching Requirements
 - Pre-irrigation
 - Frost protection
 - Other ET and non-ET cultural practices
- Compute consumed fraction or irrigation efficiency as $ETAW / AW$

California Agricultural Water Use Model

California Agricultural Water Use Model

-  Intput ...
-  Reports ...
-  Calculate ETAW ...
-  Calculate Ag Water Use ...
-  Maintenance ...
-  About this model
-  Exit



Model Input

Input

- DAU-Counties ...**
- Farm Data ...**
- Soil Data ...**
- Crop Data ...**
- Evaporation ...**
- Precipitation ...**
- Infiltration Curves ...**
- Infiltration override values ...**

Quality Assurance Checks...

Farm Data Input

Year Split Source?

DAU County

FARM DATA

Applied Water Input	Crop	Delete Crop	-----Area (Acres)-----				Note
			Surface	Mixed	Ground	Total	
<input type="checkbox"/>	Alfalfa	<input checked="" type="checkbox"/>	7,705	0	1,310	9,015	<input type="button" value="F"/>
<input type="checkbox"/>	Grain	<input checked="" type="checkbox"/>	21,334	0	1,079	22,413	<input type="button" value="F"/>
<input type="checkbox"/>	Meadow Pasture	<input checked="" type="checkbox"/>	3,376	0	0	3,376	<input type="button" value="F"/>
<input type="checkbox"/>	Meadow Pasture - X	<input checked="" type="checkbox"/>	1,810	0	0	1,810	<input type="button" value="F"/>
<input type="checkbox"/>	Onions & Garlic	<input checked="" type="checkbox"/>	1,608	0	227	1,835	<input type="button" value="F"/>
<input type="checkbox"/>	Other Field	<input checked="" type="checkbox"/>	316	0	164	480	<input type="button" value="F"/>
<input type="checkbox"/>	Other Truck	<input checked="" type="checkbox"/>	1,558	0	97	1,655	<input type="button" value="F"/>
<input type="checkbox"/>	Pasture	<input checked="" type="checkbox"/>	1,328	0	84	1,412	<input type="button" value="F"/>
<input type="checkbox"/>	Pasture - X	<input checked="" type="checkbox"/>	15	0	32	47	<input type="button" value="F"/>
<input type="checkbox"/>	Potatoes	<input checked="" type="checkbox"/>	5,186	0	194	5,380	<input type="button" value="F"/>
<input type="checkbox"/>	Sugar Beets	<input checked="" type="checkbox"/>	3,688	0	171	3,859	<input type="button" value="F"/>
<input type="button" value="Add New Crop..."/>			Total	47,924	0	3,358	51,282
			Double Crop	0	0	0	0
			Total Land Area	47,924	0	3,358	51,282

Notes: farm data note - 2000 1-modoc applies to all crops

Model Output

State of California, Department of Water Resources
Annual Ag Water Use by DAU County

9/17/2007

HQ Crops

2000 Water Year	Area (Acres x 1,000)			Unit	ETAW (Acre-feet x 1,000)			Consumed Fraction			Unit Applied Water (feet)			Applied Water (Acre-feet x 1,000)			Unit ET	ET (Acre-feet x 1,000)			Unit EP	EP (Acre-feet x 1,000)			
	SW	GW	Total		ETAW			SW	GW	Tot	SW	GW	Tot	SW	GW	Total		ET	SW	GW		Total	SW	GW	Total
					SW	GW	Total																		
167 - Butte																									
Alfalfa	0.0	0.1	0.1	3.0	0.0	0.2	0.2	0.00	0.79	0.79	0.0	3.8	3.8	0.0	0.3	0.3	3.7	0.0	0.3	0.3	0.8	0.0	0.1	0.1	
Almonds	0.3	1.8	2.1	2.3	0.7	4.2	4.9	0.76	0.80	0.79	3.1	2.9	3.0	0.9	5.3	6.1	3.2	0.9	5.8	6.7	0.9	0.2	1.6	1.8	
Cucurbits	0.2	0.0	0.2	0.9	0.2	0.0	0.2	0.68	0.00	0.68	1.3	0.0	1.3	0.2	0.0	0.2	1.2	0.2	0.0	0.2	0.4	0.1	0.0	0.1	
Grain	0.3	2.3	2.6	0.4	0.1	0.9	1.1	0.70	0.70	0.70	0.6	0.6	0.6	0.2	1.3	1.6	1.5	0.5	3.4	4.0	1.1	0.4	2.5	2.9	
Meadow Pasture	0.6	0.0	0.6	2.6	1.5	0.0	1.5	0.70	0.00	0.70	3.7	0.0	3.7	2.2	0.0	2.2	3.2	1.9	0.0	1.9	0.6	0.4	0.0	0.4	
Other Truck	0.0	0.3	0.3	1.5	0.0	0.4	0.4	0.00	0.78	0.78	0.0	1.9	1.9	0.0	0.5	0.5	1.8	0.0	0.5	0.5	0.3	0.0	0.1	0.1	
Pasture	0.0	0.3	0.3	3.2	0.0	1.0	1.0	0.00	0.70	0.70	0.0	4.5	4.5	0.0	1.5	1.5	3.8	0.0	1.3	1.3	0.7	0.0	0.2	0.2	
Rice	0.9	0.0	0.9	2.7	2.3	0.1	2.4	0.57	0.56	0.57	4.8	4.8	4.8	4.2	0.2	4.3	3.0	2.6	0.1	2.7	0.3	0.2	0.0	0.3	
Safflower	0.0	0.6	0.6	0.8	0.0	0.5	0.5	0.00	0.70	0.70	0.0	1.2	1.2	0.0	0.7	0.7	1.8	0.0	1.1	1.1	1.0	0.0	0.6	0.6	
Sugar Beets	0.6	0.0	0.6	2.2	1.2	0.0	1.2	0.68	0.00	0.68	3.2	0.0	3.2	1.8	0.0	1.8	2.9	1.7	0.0	1.7	0.8	0.4	0.0	0.4	
Sunflower	0.5	0.3	0.8	1.2	0.6	0.4	1.0	0.68	0.73	0.70	1.8	1.7	1.7	0.9	0.5	1.4	1.6	0.8	0.5	1.3	0.4	0.2	0.1	0.3	
Walnuts	0.4	1.4	1.7	2.4	0.9	3.3	4.1	0.75	0.78	0.77	3.2	3.0	3.1	1.1	4.2	5.3	3.0	1.1	4.2	5.3	0.7	0.2	0.9	1.1	
167 - Butte																									
Total	3.7	7.1	10.8	1.7	7.5	11.1	18.6	0.55	0.84	0.72	3.1	2.0	2.4	11.5	14.5	26.0	2.5	9.7	17.1	26.8	0.8	2.2	6.1	8.3	
	0.7	0.4	1.1	Double Crop Acreage																					
	3.0	6.7	9.7	Irrig. Land Area																					
2000																									
Total	3.7	7.1	10.8	1.7	7.5	11.1	18.6	0.55	0.84	0.72	3.1	2.0	2.4	11.5	14.5	26.0	2.5	9.7	17.1	26.8	0.8	2.2	6.1	8.3	
	0.7	0.4	1.1	Double Crop Acreage																					
	3.0	6.7	9.7	Irrig. Land Area																					

Water Plan Activities

- Deliverables
 - Irrigated Acreage
 - In some areas, by water source
 - Applied Water
 - In some areas, by water source
 - ETAW, ET, and EP
 - Consumed Fraction (Irrigation Efficiency)
- Update 2005 accomplishments
 - 1998, 2000, and 2001 water portfolio data
- Update 2009 planned activities
 - 1999, 2002, 2003, 2004, and 2005 water portfolio data

Analytical Tool Development

- Incorporate cultural practices of rice into Model
 - Rice Decomposition
 - Rice Duck Clubs
- Analyze smaller units than a DAU/County
 - Cover water districts, grouping of water service areas or unorganized areas, etc.

Update 2005 Parking Lot Issues

- Comprehensive analytical framework
- Gap analysis
- Additional annual water portfolio data
- QA/QC for Water Plan data
- Improved data transparency
- Climate change impacts

Data needs

- Increased accuracy in determining annual land use patterns
- Water source mapping by field
 - Identification of surface and ground water infrastructure
- Irrigation method data by field
- Measured on-farm/field applied water data
- Improved crop coefficient data for computing ET

Potential partnerships

- UC Cooperative Extension
- Department of Conservation
- County Agricultural Commissioners
- Water Districts/Agencies
- ???

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Questions?

