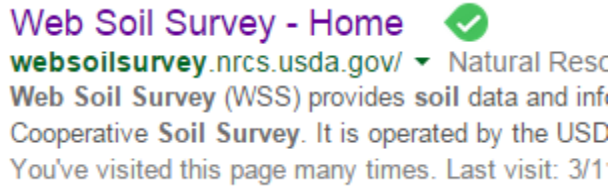
Discussion Topics

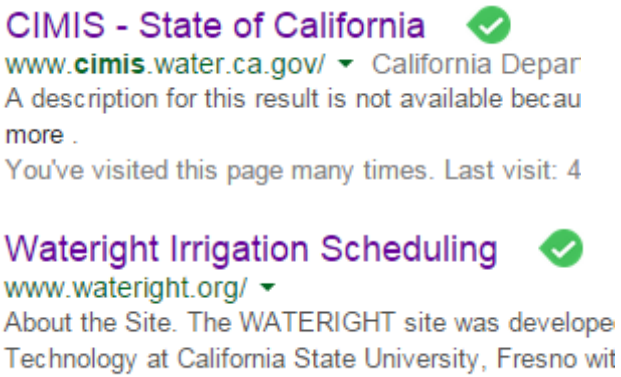
Soil Web Survey

- Define an AOI
- Retrieve soil information
  - Texture, EC, AWHC
- Generate a soil report



CIMIS

- Different uses for ET_o values
  - Irrigation scheduling
  - Water budget
- CIMIS-based resources
  - WaterRight
  - Water Destination Graph



Water Destination Graph

- NRCS Irrigation Visualizer

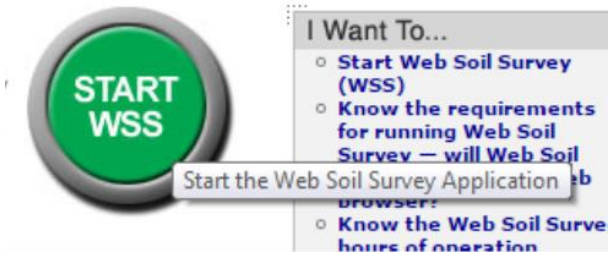
Discussion Topics

Soil Web Survey

- Define an AOI

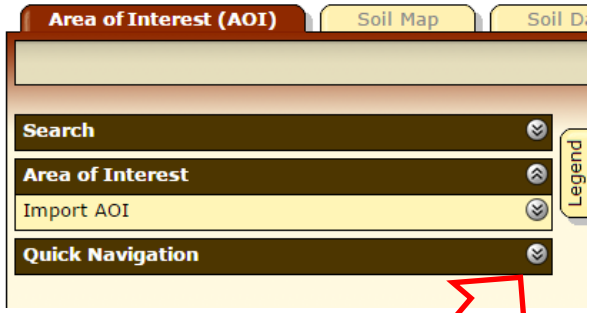
Step 1

Click - opens new tab



Step 2

Grey Font- inactive tab;
Single tier

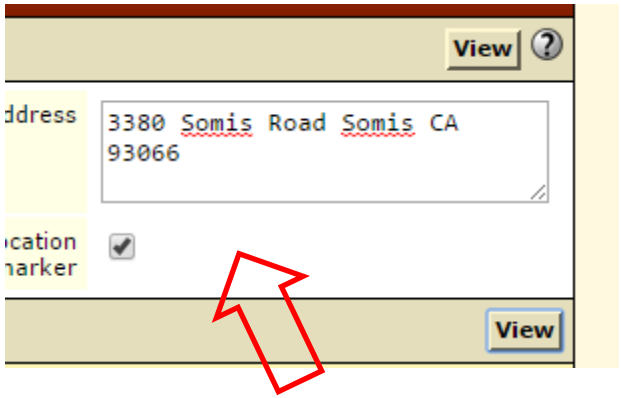


Expand/collapse menu

Soil Web Survey

- Define an AOI

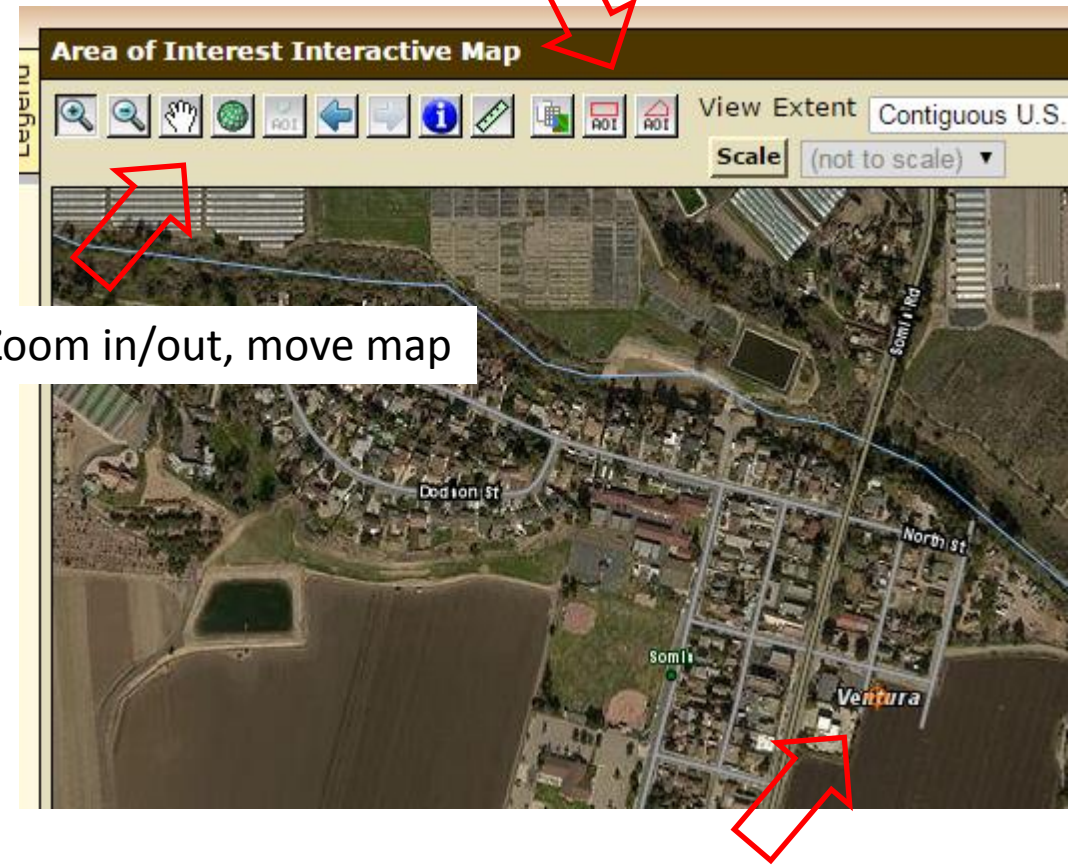
Step 3



Type in address & click view

Step 4

Rectangular or irregular shape AOI



Zoom in/out, move map

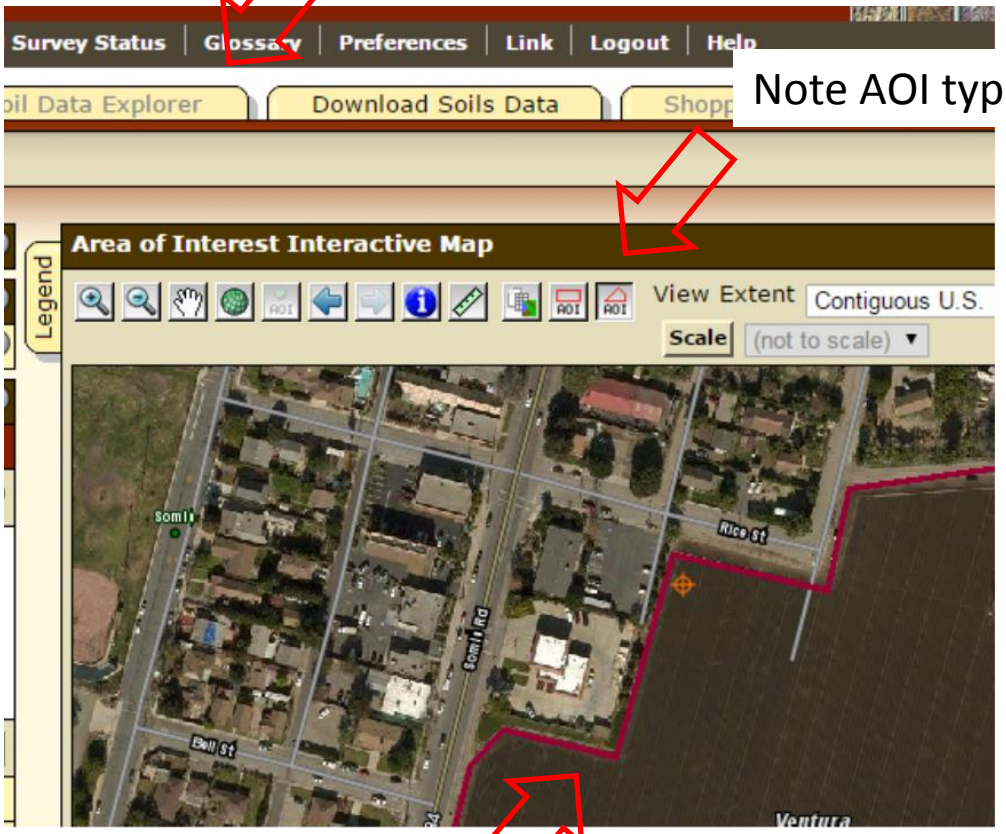
AOI marker

Soil Web Survey

- Define an AOI

Step 5

Tab still greyed out



Note AOI type selected

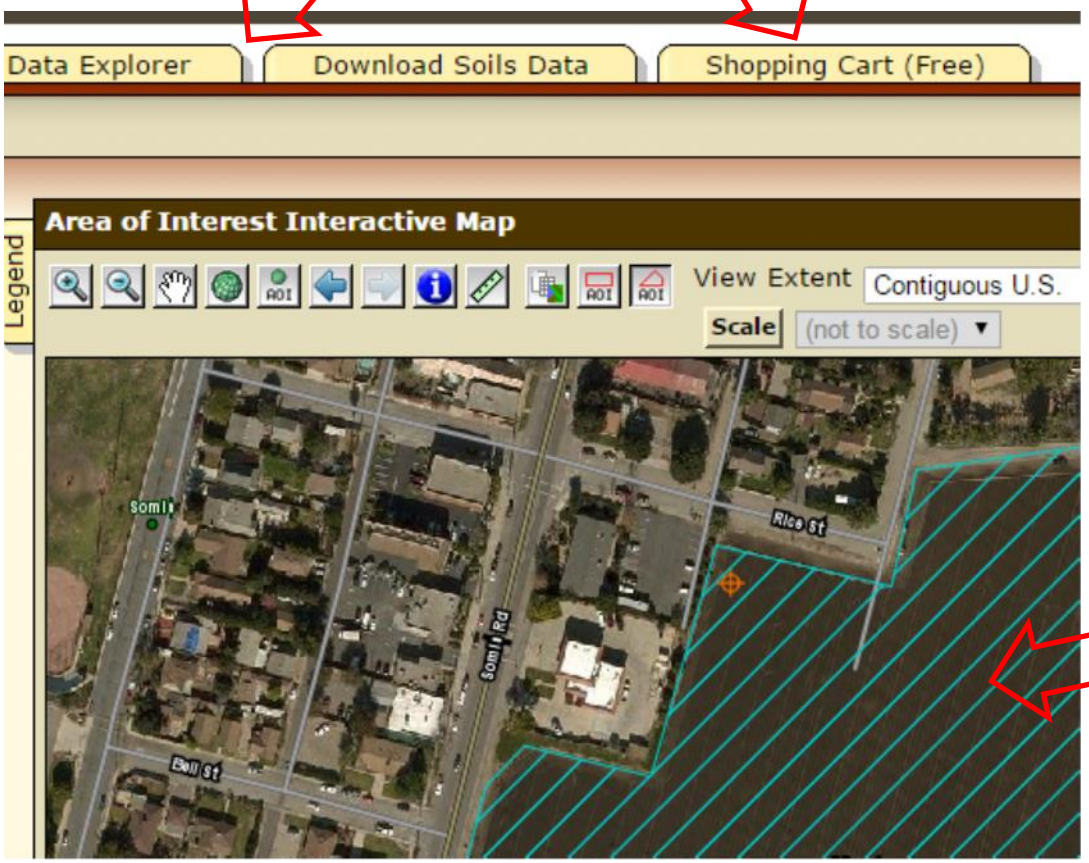
Edge of AOI boundary;
Single click sets point; double click closes polygon

Soil Web Survey

- Define an AOI

Step 6

Tabs now active



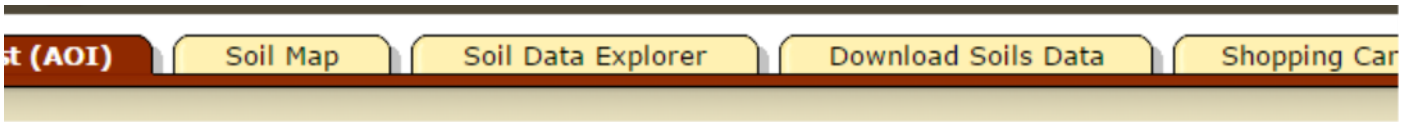
Once AOI is set, NRCS server loads data for area.

Soil Web Survey

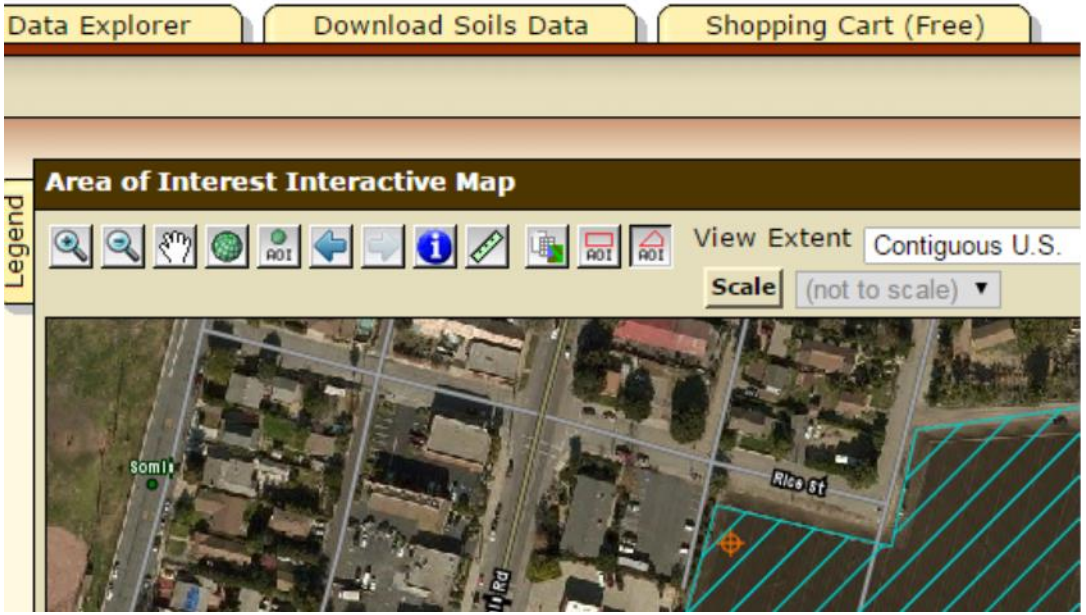
- Retrieve soil information
  - Texture, EC, AWHC

Variety of tabs now available;
Note single tier

Step 1



Click on tab

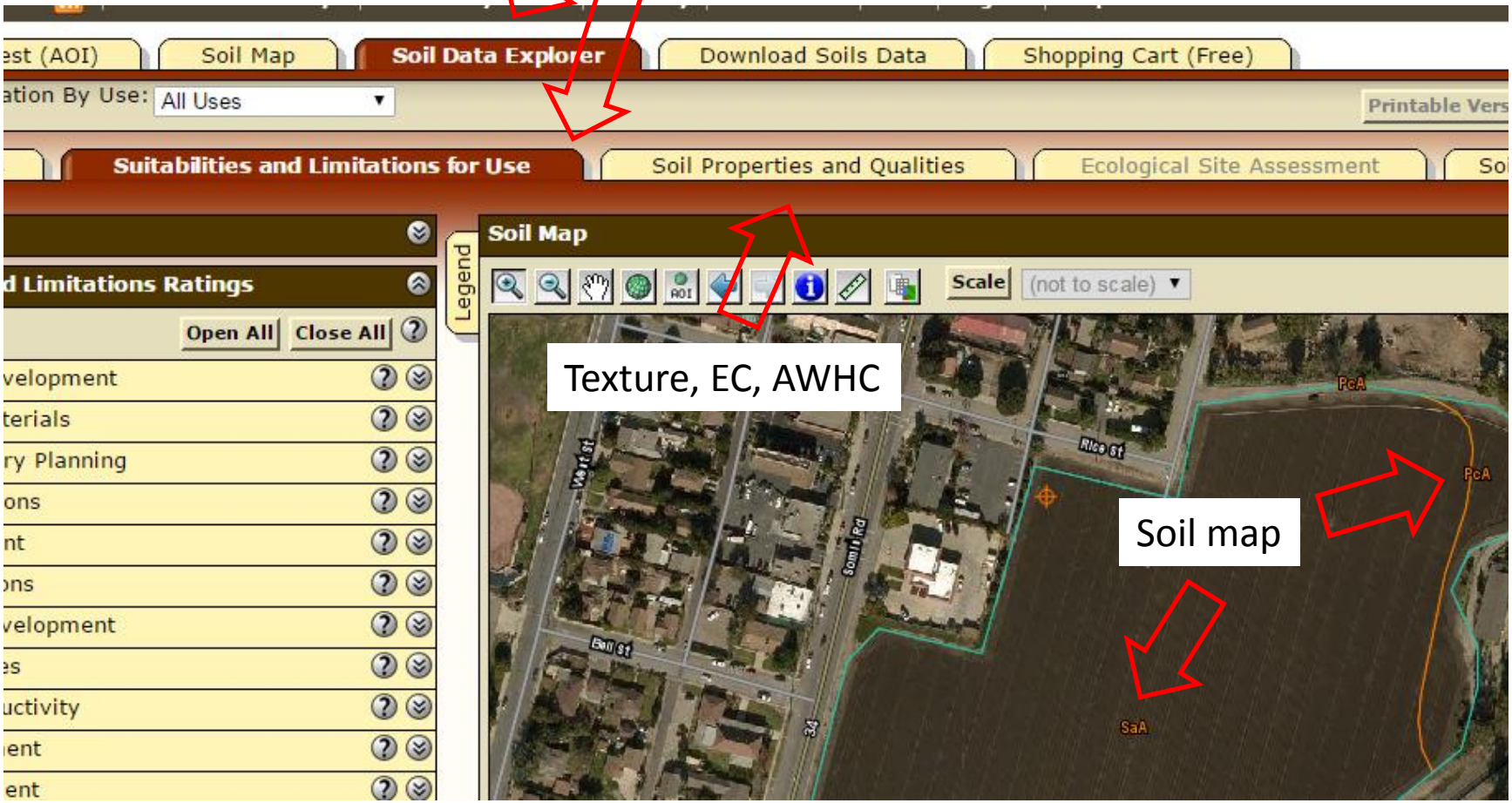


Soil Web Survey

- Retrieve soil information
  - Texture, EC, AWHC

Note that a second tier is available

Step 2

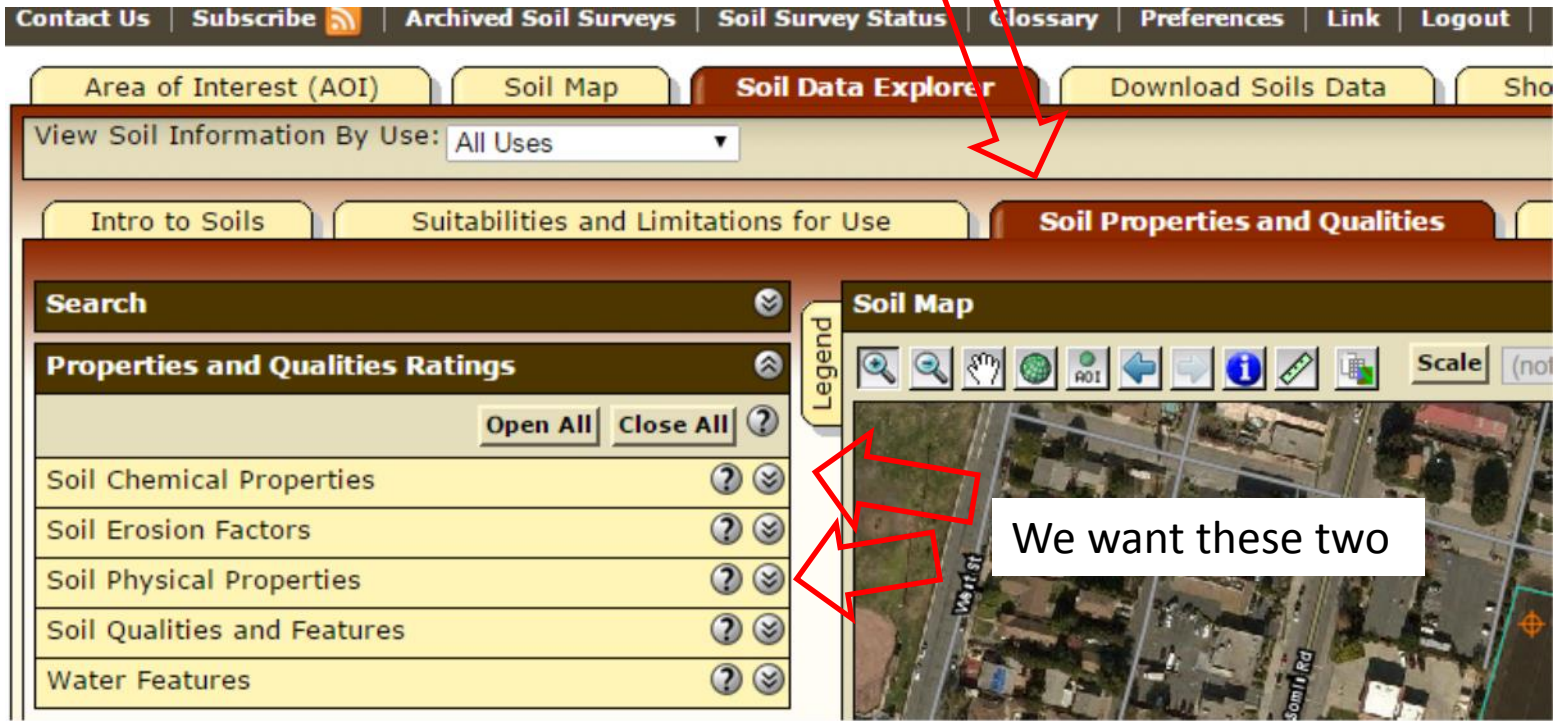


Soil Web Survey

- Retrieve soil information
  - Texture, EC, AWHC

We've switched to a new tab in the second tier; nothing has changed in the first tier

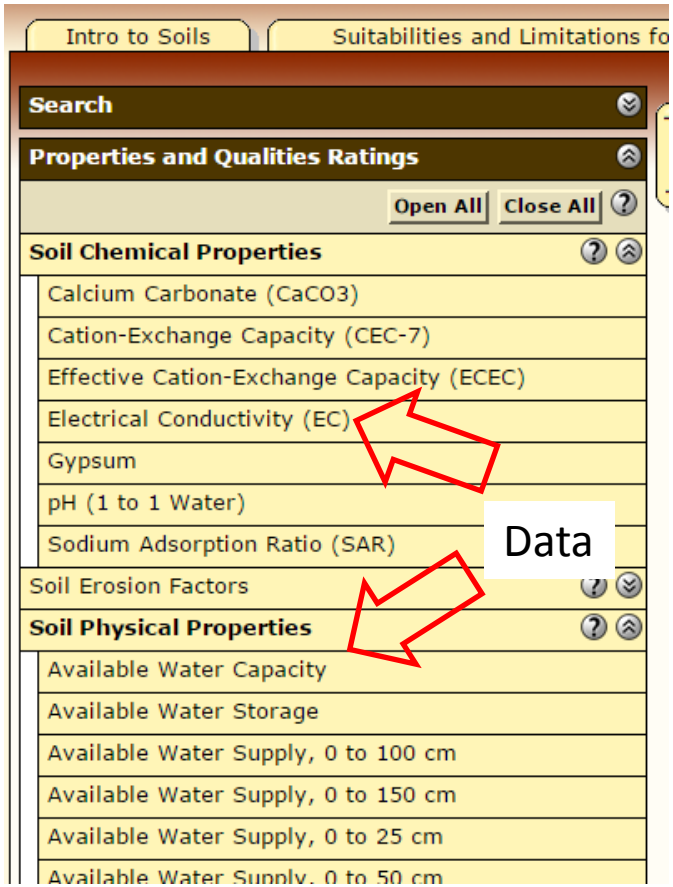
Step 3

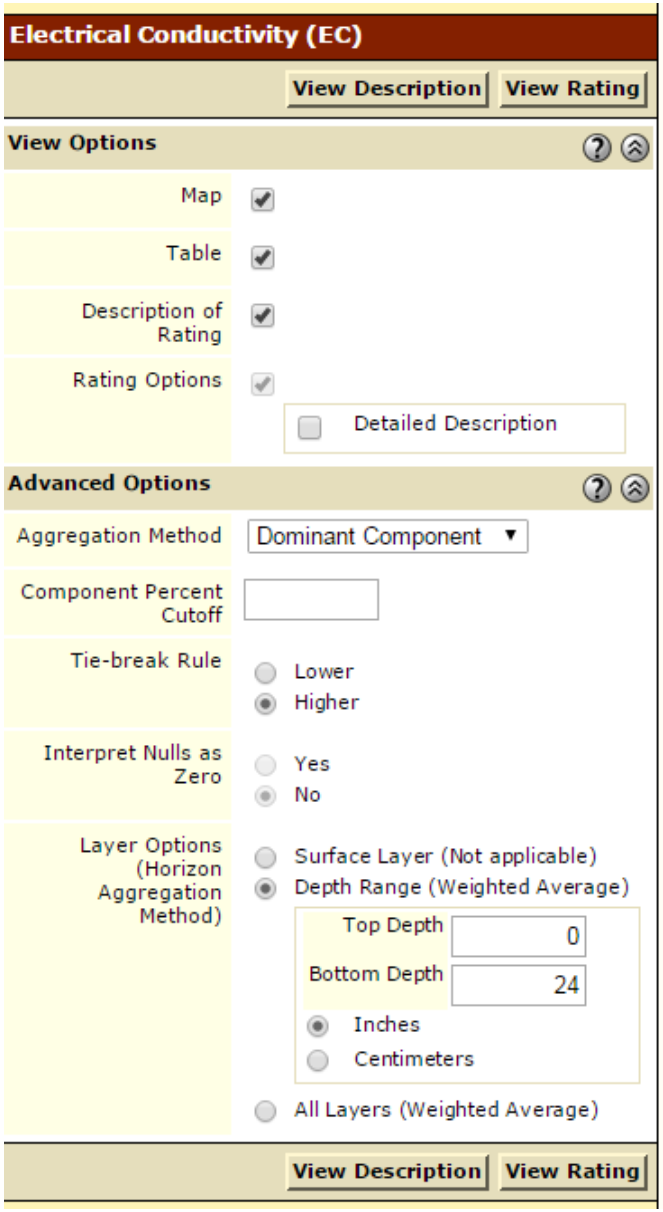


Soil Web Survey

- Retrieve soil information
  - Texture, EC, AWHC

Step 4





Click EC

Data Visuals

Cutoffs

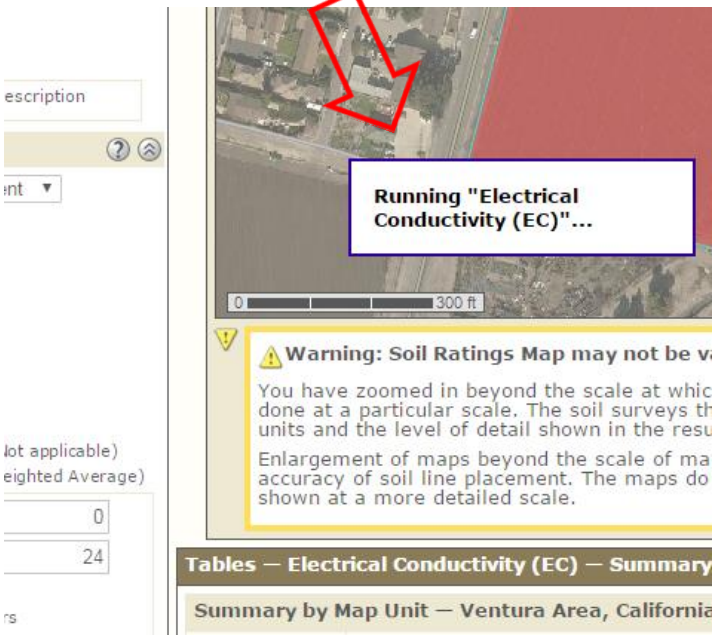
Get Data

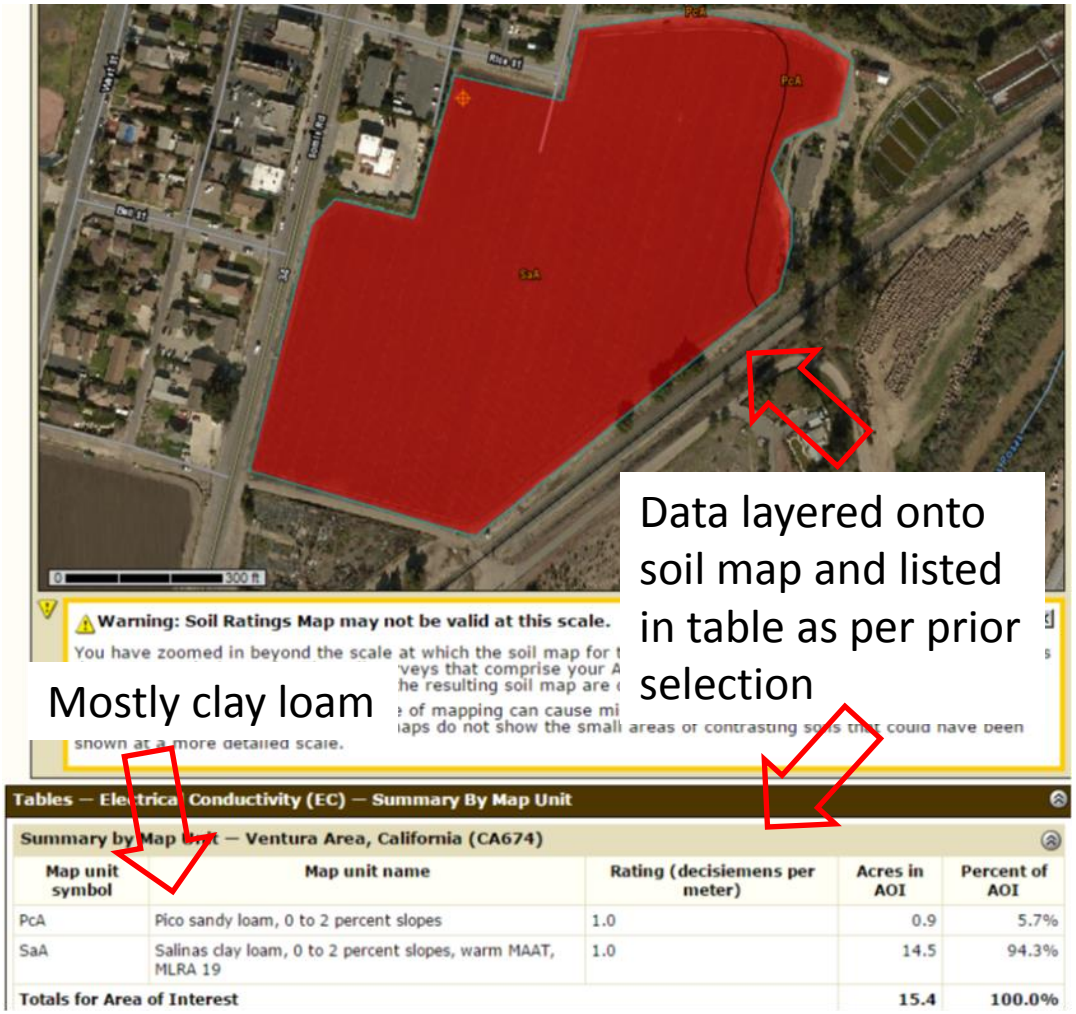
Soil Web Survey

- Retrieve soil information
  - Texture, EC, AWHC

Step 5

Processing request; note Greyed-out background





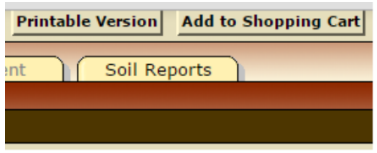
Mostly clay loam

Data layered onto soil map and listed in table as per prior selection

Tables — Electrical Conductivity (EC) — Summary By Map Unit

Summary by Map Unit — Ventura Area, California (CA674)

Map unit symbol	Map unit name	Rating (decisiemens per meter)	Acres in AOI	Percent of AOI
PcA	Pico sandy loam, 0 to 2 percent slopes	1.0	0.9	5.7%
SaA	Salinas clay loam, 0 to 2 percent slopes, warm MAAT, MLRA 19	1.0	14.5	94.3%
Totals for Area of Interest			15.4	100.0%

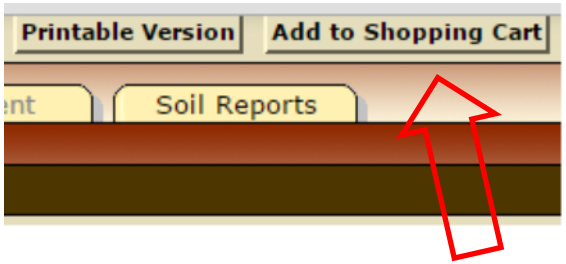


Look at top of page

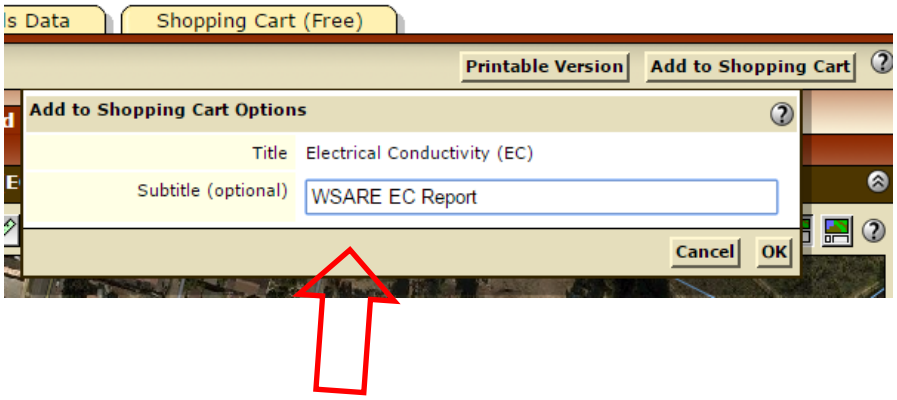
Soil Web Survey

- Retrieve soil information
  - Texture, EC, AWHC

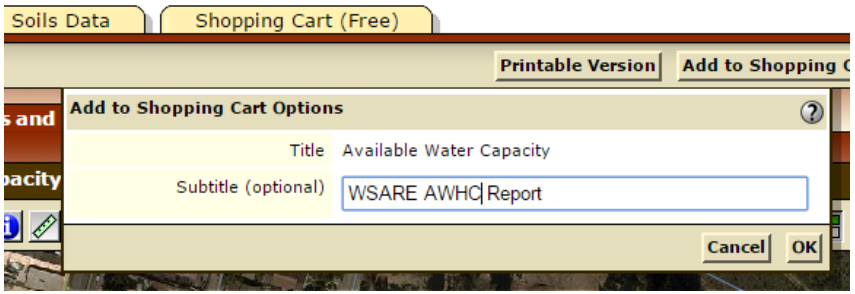
Step 6



Tells server what data set to queue



Can personalize it a bit



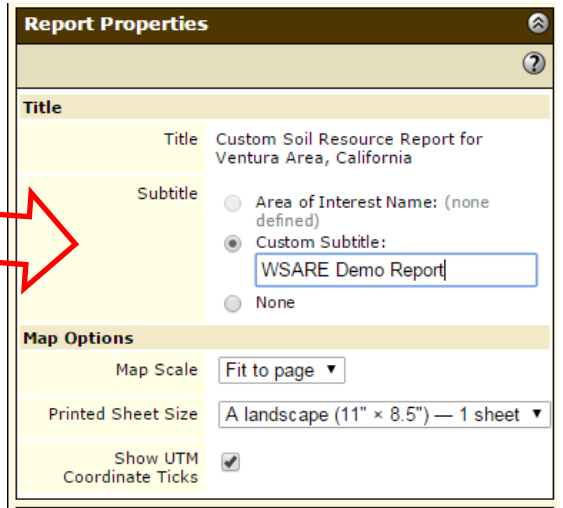
Soil Web Survey

- Generate a soil report

Step 1

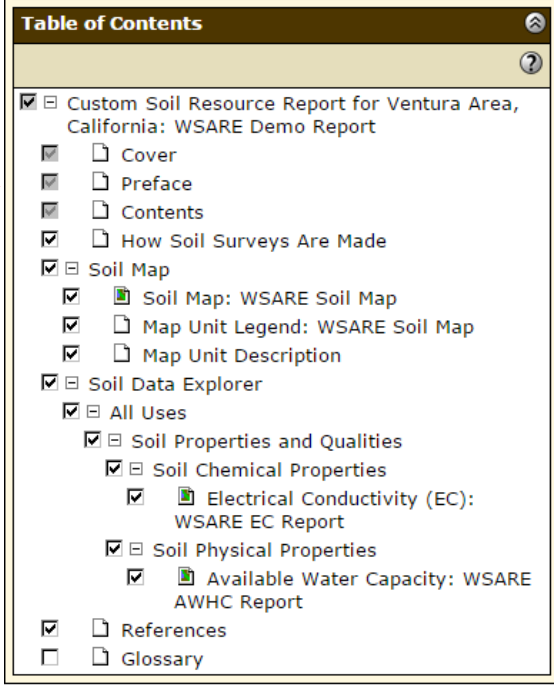
We're going here

Can add more personalized information



Can't remove greyed selections

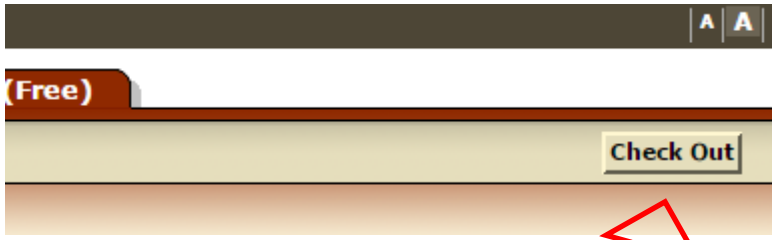
Our previous selections add automatically



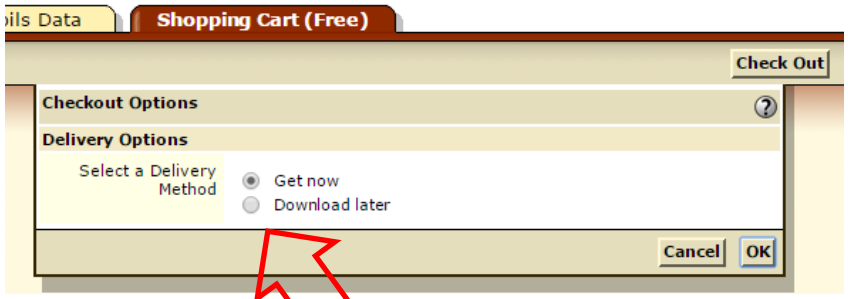
Soil Web Survey

- Generate a soil report

Step 2 +



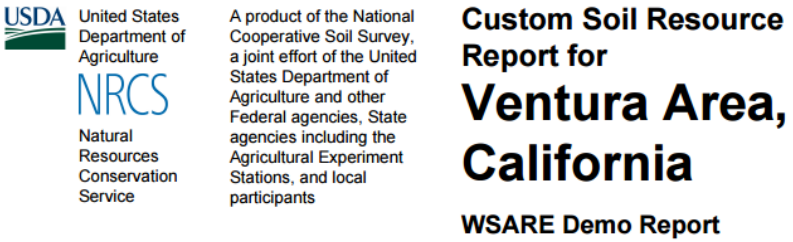
Top of page



Get now opens tab with pdf

pdf is being generated

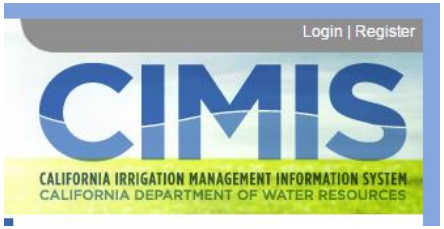
Here it is!



Discussion Topics

Soil Web Survey

CIMIS



Dispersed, so easy for growers to question relevance…

Monthly Average Refere

Zone	Jan	Feb	Mar	A
1	0.93	1.40	2.48	3
2	1.24	1.68	3.10	3
3	1.86	2.24	3.72	4
4	1.86	2.24	3.41	4
5	0.93	1.68	2.79	4
6	1.86	2.24	3.41	4
7	0.62	1.40	2.48	3
8	1.24	1.68	3.41	4
9	2.17	2.80	4.03	5
10	0.93	1.68	3.10	4
11	1.55	2.24	3.10	4
12	1.24	1.96	3.41	5
13	1.24	1.96	3.10	4
14	1.55	2.24	3.72	5
15	1.24	2.24	3.72	5
16	1.55	2.52	4.03	5
17	1.86	2.80	4.65	6
18	2.48	3.36	5.27	6

Variablity between stations
zone 1 and during winter m
ETo between estimation sit

Geographic zones… doesn't address microclimates, transitional areas…

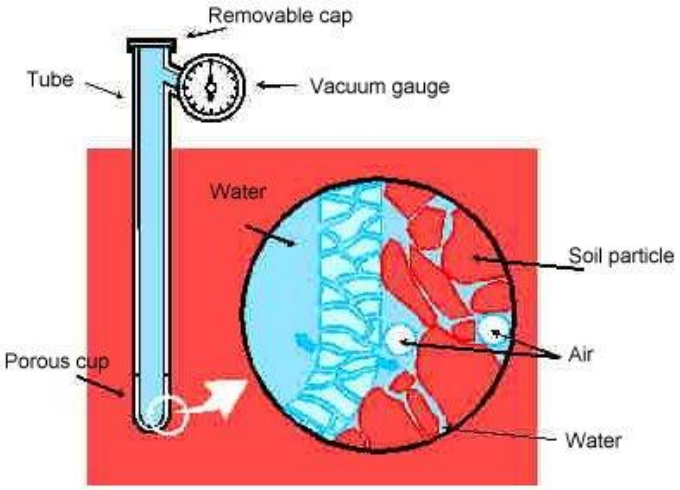
On-site instruments ideal but do the growers know how to use the data?

Discussion Topics

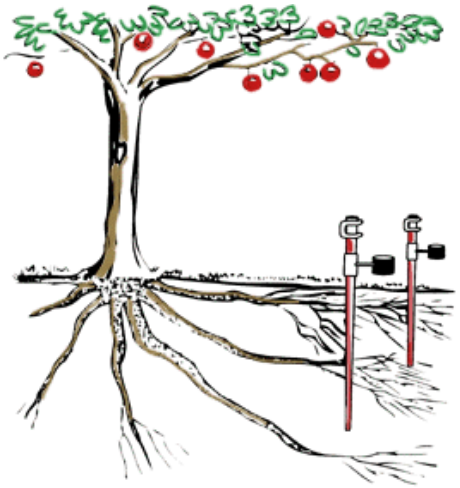
Soil Web Survey

CIMIS - GROUND TRUTH! Approach isn't simple or foolproof….

- Different uses for ET_o and system variability makes it complicated and tough to dial in….
  - Irrigation scheduling = sensitive to emission deviations and crop coefficients
  - Water budget = sensitive to placement and wetted area values
  - So to help mitigate disaster…take it Slooow and Ground Truth!



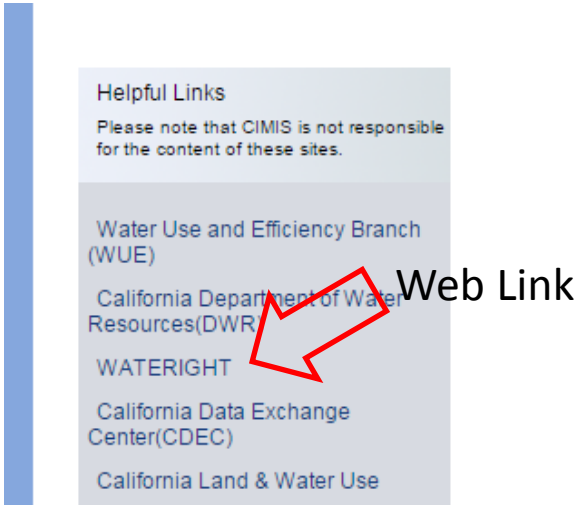
Soil sensors measure how "thirsty" soil is - this correlates with plant water stress.



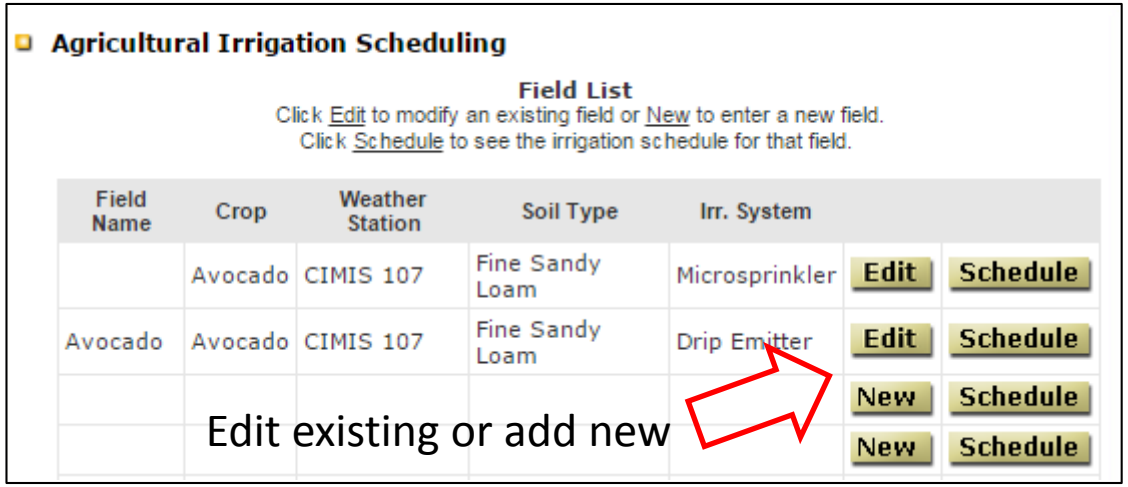
Sensors above & below the root zone help monitor soil moisture & limit plant water stress and leaching.

CIMIS

- CIMIS-based resources
  - WaterRight



Web Link

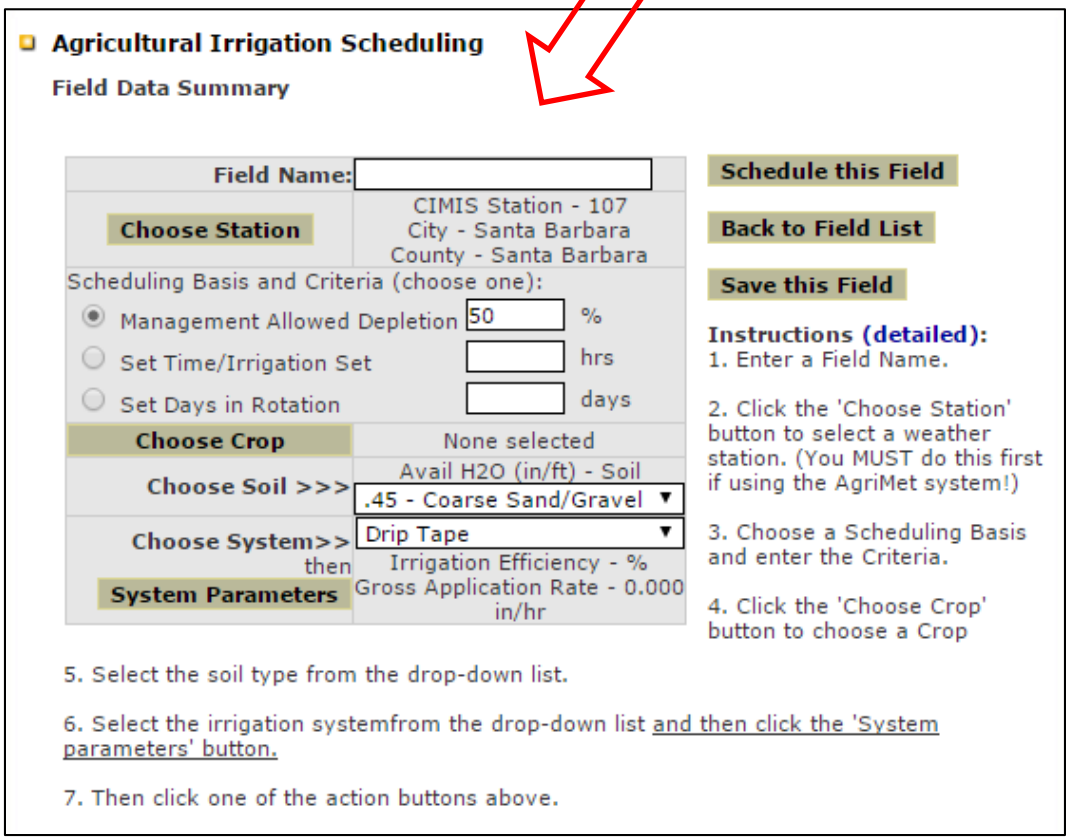


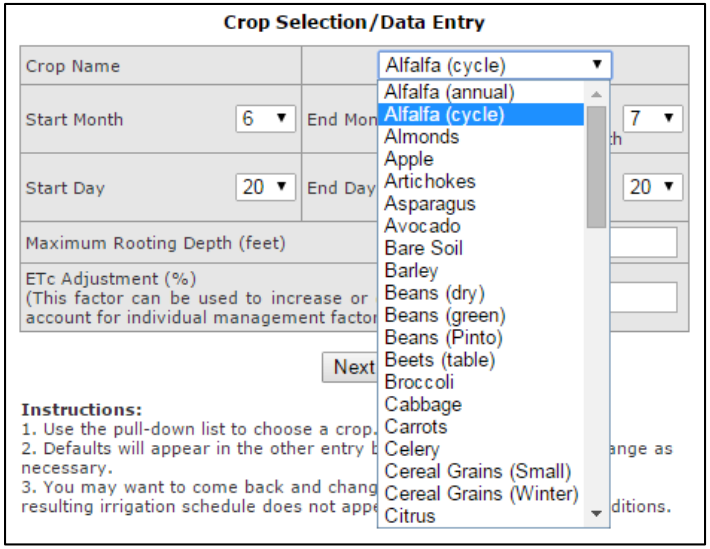
Edit existing or add new

CIMIS

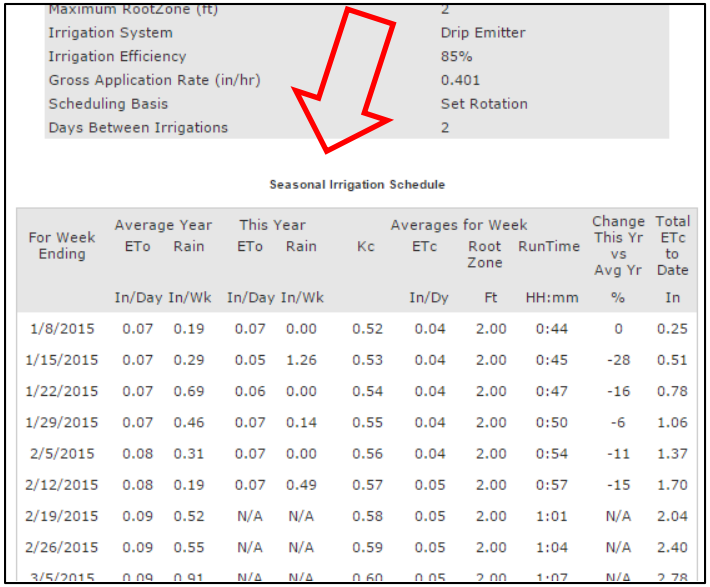
- CIMIS-based resources
  - WaterRight

Need to populate,
some are self generated





Output!



For Week Ending	Average Year ETo	Average Year Rain	This Year ETo	This Year Rain	Kc	Averages for Week ETc	Root Zone	RunTime	Change This Yr vs Avg Yr	Total ETc to Date
	In/Day	In/Wk	In/Day	In/Wk		In/Dy	Ft	HH:mm	%	In
1/8/2015	0.07	0.19	0.07	0.00	0.52	0.04	2.00	0:44	0	0.25
1/15/2015	0.07	0.29	0.05	1.26	0.53	0.04	2.00	0:45	-28	0.51
1/22/2015	0.07	0.69	0.06	0.00	0.54	0.04	2.00	0:47	-16	0.78
1/29/2015	0.07	0.46	0.07	0.14	0.55	0.04	2.00	0:50	-6	1.06
2/5/2015	0.08	0.31	0.07	0.00	0.56	0.04	2.00	0:54	-11	1.37
2/12/2015	0.08	0.19	0.07	0.49	0.57	0.05	2.00	0:57	-15	1.70
2/19/2015	0.09	0.52	N/A	N/A	0.58	0.05	2.00	1:01	N/A	2.04
2/26/2015	0.09	0.55	N/A	N/A	0.59	0.05	2.00	1:04	N/A	2.40
3/5/2015	0.09	0.91	N/A	N/A	0.60	0.05	2.00	1:07	N/A	2.78

Discussion Topics

Soil Web Survey

CIMIS

Water Destination Graph

- NRCS Irrigation Schedule Visualizer

Irrigation scheduling is based on concrete principles but just talking about those principles makes them abstract.

WDG may help put things into relative perspective….

ALL CREDIT TO MARK BARNETT ET AL. & NRCS

Water Destination Graph

- NRCS Irrigation Schedule Visualizer

Standard input field; edit yellow cells

Calculation Field

ET water loss (Grey)

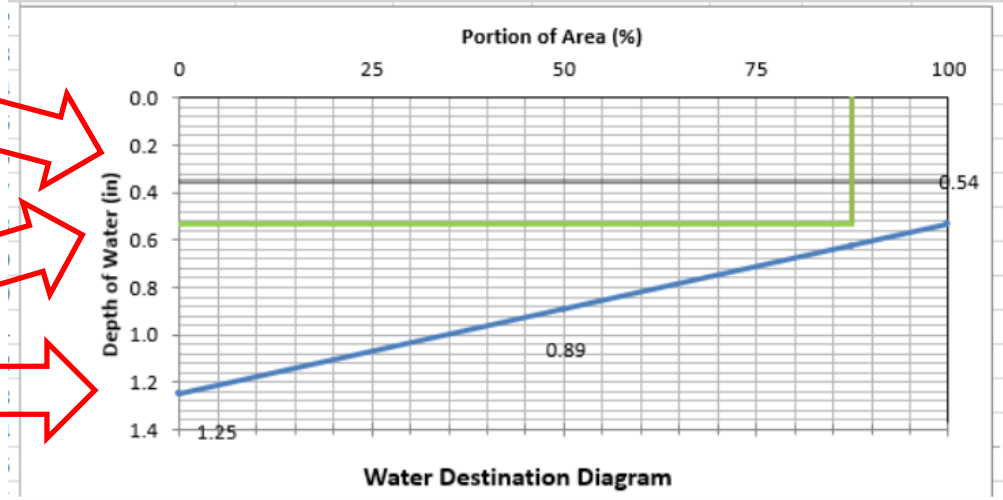
Applied water depth (Green)

Irrigation management curve (Blue)

Water Destination Diagram

Current Scheduling

Given:	**Crop Data:**		
	Crop =	Avocados	
	Peak ET =	0.05	in/day
	Scheduling:		
	Calculated DU =	0.7	
	Typical Set Time =	10	hrs
	Days Between Irrigation =	7	days
	Emitter Data :		
	Calculated Emitter Flow Rate =	12.5	gph
	Emitter per plant =	1	
	Field Spacing:		
	Plant spacing =	15	ft
	Row Spacing =	15	ft
Equations:	y =	Mx + b	
	Inches applied (in) =	96.3 x Flow Rate (gpm) x Set Time (hrs) / Row Spacing (ft) x Plant Spacing (ft)	
Solution:			
	Inches Applied =	0.892	inches
	Average of the Low Quarter =	0.624	inches
	SMD =	0.350	inches
	Slope, M =	-0.0071	
	b =	1.25	



Water Destination Graph

- NRCS Irrigation Schedule Visualizer

"In Your Dreams" scenario…

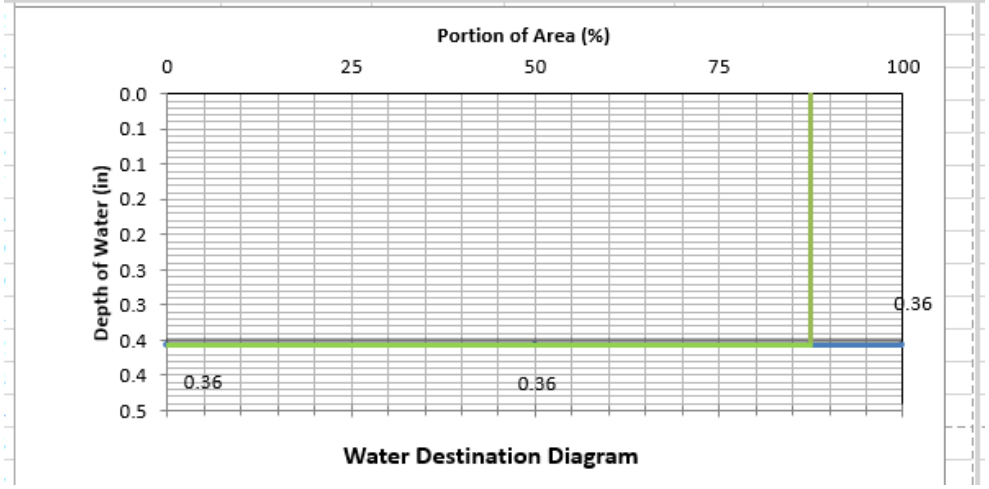
ET = applied water & perfect DU

All curves are now lined up; water budget is balanced

Water Destination Diagram

Current Scheduling

Given:	**Crop Data:**		
	Crop =	Avocados	
	Peak ET =	0.05	in/day
	Scheduling:		
	Calculated DU =	1	
	Typical Set Time =	4	hrs
	Days Between Irrigation =	7	days
	Emitter Data :		
	Calculated Emitter Flow Rate =	12.5	gph
	Emitter per plant =	1	
	Field Spacing:		
	Plant spacing =	15	ft
	Row Spacing =	15	ft
Equations:	y =	Mx + b	
	Inches applied (in) =	96.3 x Flow Rate (gpm) x Set Time (hrs) / Row Spacing (ft) x Plant Spacing (ft)	
Solution:			
	Inches Applied =	0.357	inches
	Average of the Low Quarter =	0.357	inches
	SMD =	0.350	inches
	Slope, M =	0.0000	
	b =	0.36	



Water Destination Graph

- NRCS Irrigation Schedule Visualizer

NOTE: There's been no "water" or "management" change; crop is now being under-irrigated

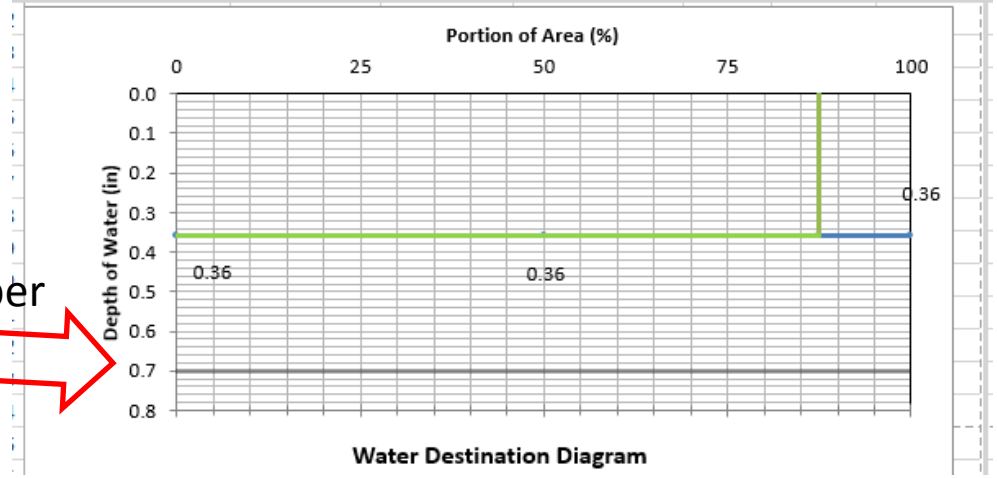
An ET increase…

Water Destination Diagram

Current Scheduling

Given:	**Crop Data:**		
	Crop =	Avocados	
	Peak ET =	0.1	in/day
	Scheduling:		
	Calculated DU =	1	
	Typical Set Time =	4	hrs
	Days Between Irrigation =	7	days
	Emitter Data :		
	Calculated Emitter Flow Rate =	12.5	gph
	Emitter per plant =	1	
	Field Spacing:		
	Plant spacing =	15	ft
	Row Spacing =	15	ft
Equations:	y =	Mx + b	
	Inches applied (in) =	96.3 x Flow Rate (gpm) x Set Time (hrs / Row Spacing (ft) x Plant Spacing (ft)	
Solution:			
	Inches Applied =	0.357	inches
	Average of the Low Quarter =	0.357	inches
	SMD =	0.700	inches
	Slope, M =	0.0000	
	b =	0.36	

… shows as deeper water loss



Water Destination Graph

- NRCS Irrigation Schedule Visualizer

What about a return to 0.05 ET but an increase in applied water?

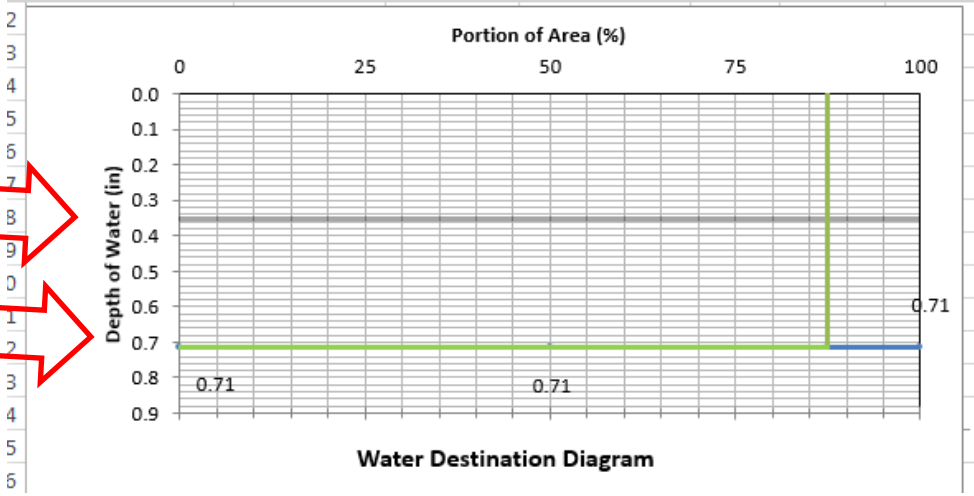
Depth of water loss is shallow…

… applied water depth is deeper.

Water Destination Diagram

Current Scheduling

Given:	**Crop Data:**		
	Crop =	Avocados	
	Peak ET =	0.05	in/day
	Scheduling:		
	Calculated DU =	1	
	Typical Set Time =	8	hrs
	Days Between Irrigation =	7	days
	Emitter Data :		
	Calculated Emitter Flow Rate =	12.5	gph
	Emitter per plant =	1	
	Field Spacing:		
	Plant spacing =	15	ft
	Row Spacing =	15	ft
Equations:	y =	Mx + b	
	Inches applied (in) =	96.3 x Flow Rate (gpm) x Set Time (hrs) / Row Spacing (ft) x Plant Spacing (ft)	
Solution:			
	Inches Applied =	0.713	inches
	Average of the Low Quarter =	0.713	inches
	SMD =	0.350	inches
	Slope, M =	0.0000	
	b =	0.71	



Water Destination Graph

- NRCS Irrigation Schedule Visualizer

What about a return to 0.05 ET and 4 hour set, but a poor DU?

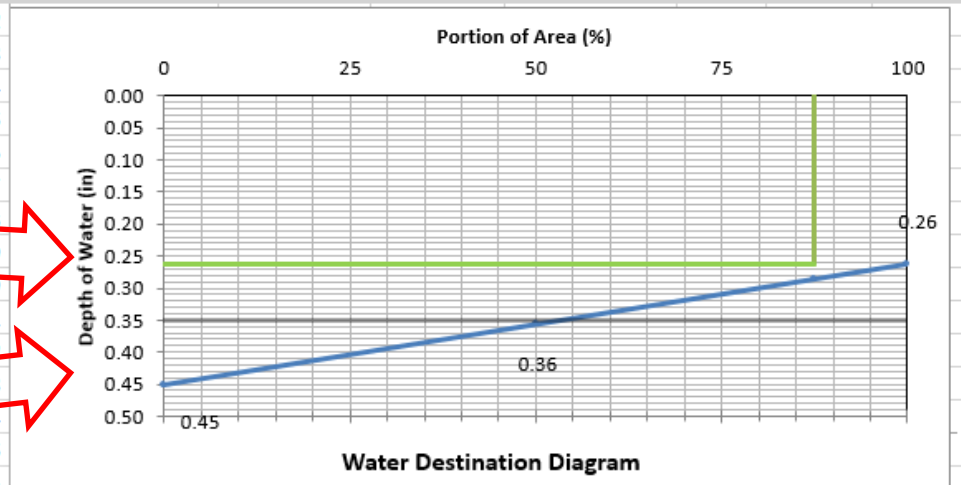
All low quarter trees under-irrigated

Only half of entire population getting adequate irrigation.

Water Destination Diagram

Current Scheduling

Given:	**Crop Data:**		
	Crop =	Avocados	
	Peak ET =	0.05	in/day
	Scheduling:		
	Calculated DU =	0.8	
	Typical Set Time =	4	hrs
	Days Between Irrigation =	7	days
	Emitter Data :		
	Calculated Emitter Flow Rate =	12.5	gph
	Emitter per plant =	1	
	Field Spacing:		
	Plant spacing =	15	ft
	Row Spacing =	15	ft
Equations:	y =	Mx + b	
	Inches applied (in) =	96.3 x Flow Rate (gpm) x Set Time (hrs / Row Spacing (ft) x Plant Spacing (ft)	
Solution:			
	Inches Applied =	0.357	inches
	Average of the Low Quarter =	0.285	inches
	SMD =	0.350	inches
	Slope, M =	-0.0019	
	b =	0.45	



Water Destination Graph

- NRCS Irrigation Schedule Visualizer

No worries…

- Correct the DU
- Adjust the set time

…and…

- GROUND TRUTH!

"Real-world" water use, in balance with a minimal amount of leaching.

Water Destination Diagram

Current Scheduling

Given:	**Crop Data:**		
	Crop =	Avocados	
	Peak ET =	0.05	in/day
	Scheduling:		
	Calculated DU =	0.9	
	Typical Set Time =	4.5	hrs
	Days Between Irrigation =	7	days
	Emitter Data :		
	Calculated Emitter Flow Rate =	12.5	gph
	Emitter per plant =	1	
	Field Spacing:		
	Plant spacing =	15	ft
	Row Spacing =	15	ft
Equations:	y =	Mx + b	
	Inches applied (in) =	96.3 x Flow Rate (gpm) x Set Time (hrs / Row Spacing (ft) x Plant Spacing (ft)	
Solution:			
	Inches Applied =	0.401	inches
	Average of the Low Quarter =	0.361	inches
	SMD =	0.350	inches
	Slope, M =	-0.0011	
	b =	0.45