

On-line resources to make digital zone management maps

Pedro Andrade and John Heun



Farm Pro, Yuma AZ

Content in this presentation:

- I. Review of concepts, technology evaluation
- II. Examples of zone management using soil sensors and yield monitors in Arizona
- III. On-line options to delineate management zones

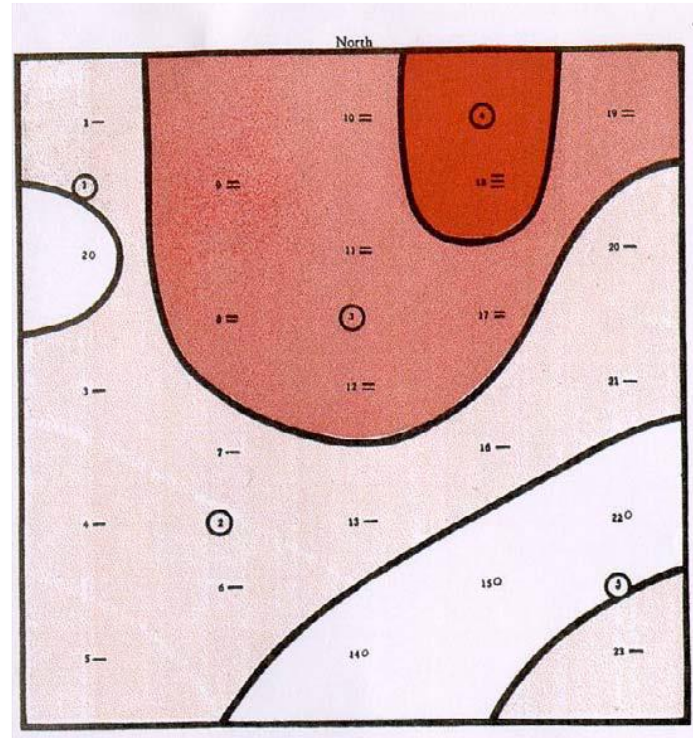
Points to analyze in this presentation:

- Factors limiting the adoption of zone management in AZ
- Machine operational side?
- Digital (computer) interface?
- Other?

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Theoretical concept of using multiple need-based rates of production inputs was conceived long ago



Map of grid soil samples tested for pH and suggested management zones for variable-rate lime application (Linsley and Bauer, 1929)

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Developments of spatial analysis and advances in digital technology made Zone Management one of the first developments of Precision Agriculture



“Farming by Soil Types”. First VRT project in the US

- Mid 1980’s in Minnesota
- Private Partnership:
 - Ag-Chem Equipment Co., Inc. and Soil Teq, Inc. Minnetonka, MN.

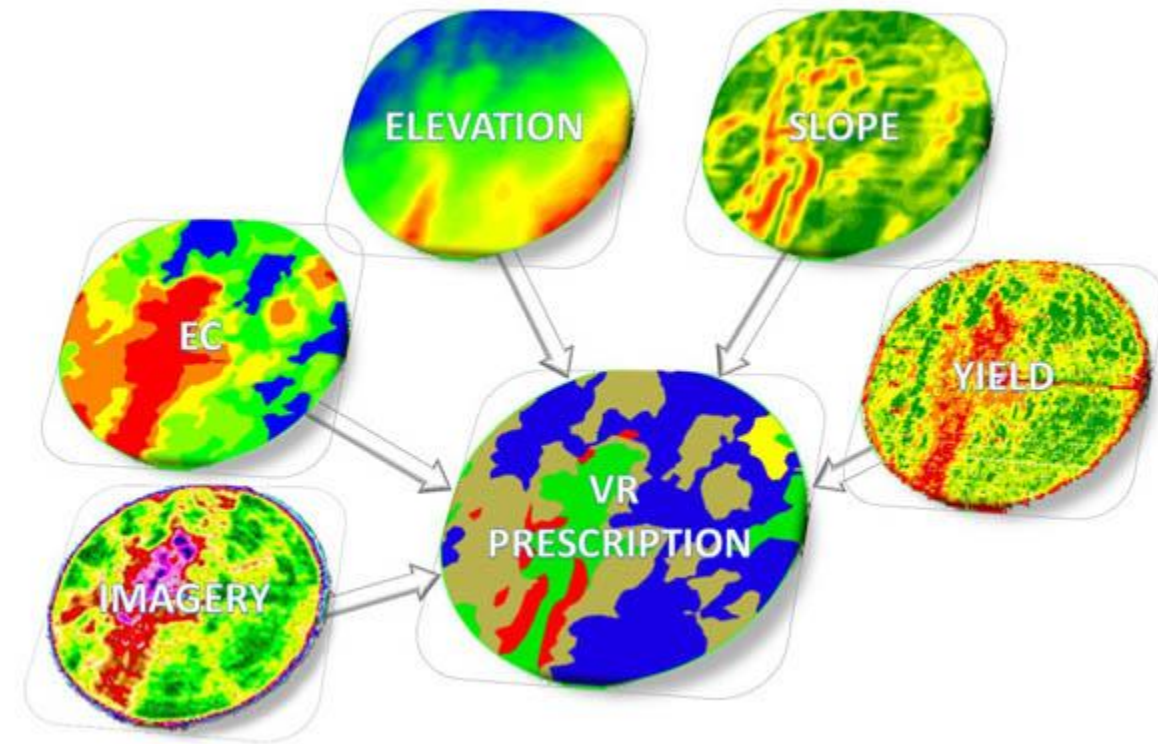
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“A zone is a group of like areas in a field that respond to inputs in much the same way. Divide a field into multiple similar areas and you have management zones for Precision Ag use.”

“Managing high yielding fields the same as low yielding fields doesn’t make sense. Likewise, the same thing can be said for areas within a field.”

“Most of us recognize areas within fields that respond differently to inputs such as fertilizer, seed, water, and pesticides. By grouping areas within a field that behave similarly more efficient application of inputs is guaranteed.”



<https://www.cropquest.com>

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Fertility Management



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Review of technical specs:

- High-flotation power unit
- GPS auto-steer
- 40 Acres/hour productivity (@ 12mph, 350 lb/A, 60ft boom)
- Rate control:
 - Hydraulic motors driven
 - Sensor-controlled rotational speed
 - 20-800 lb/A rate control
 - 4 L/R metering
 - Turning compensation
 - Raven controller compatible

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Precision Planting

- Variable seeding rate (PP Vset)
- Variable downward force (PP DeltaForce)
- Variable depth (PP SmartDepth)



Precision Spraying (Pest control)

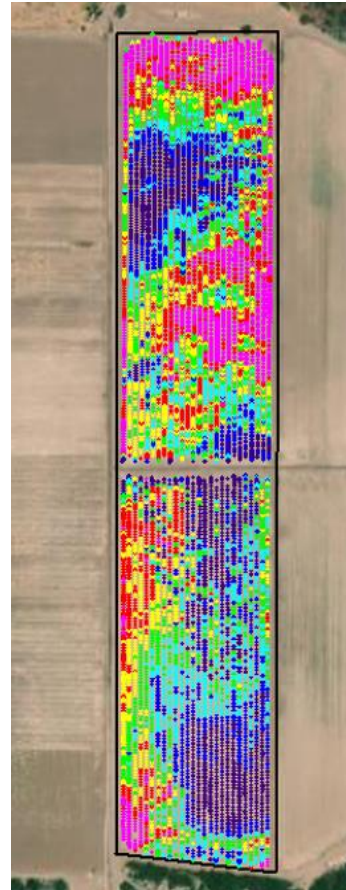
- Sensor-controlled spot spraying (WeedSeeker2, Weed-IT)
- PWM rate control

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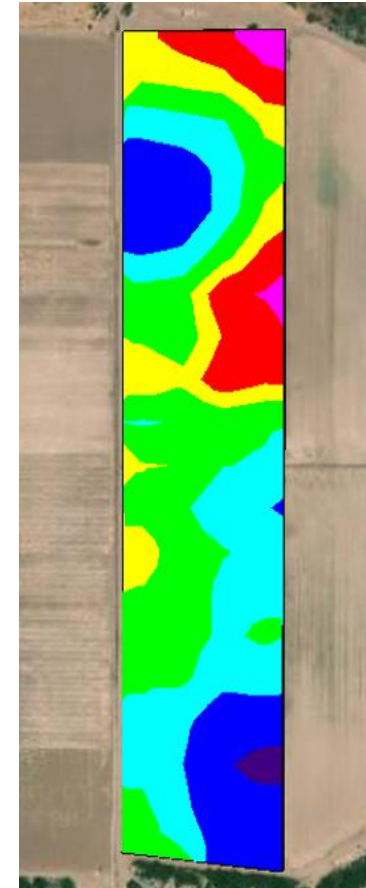
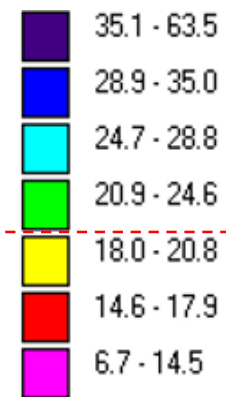
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Soil electrical conductivity survey. Safford AZ
Randy Norton, site-specific management of cotton Root-rot

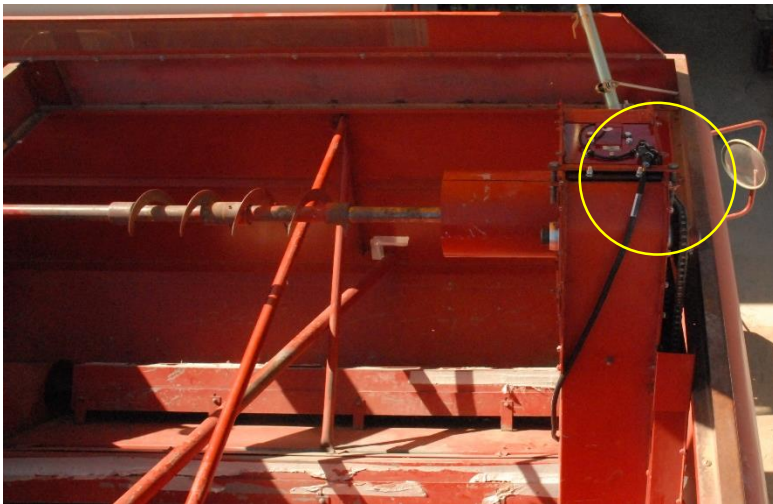


Soil Apparent Electrical Conductivity (mS/m)



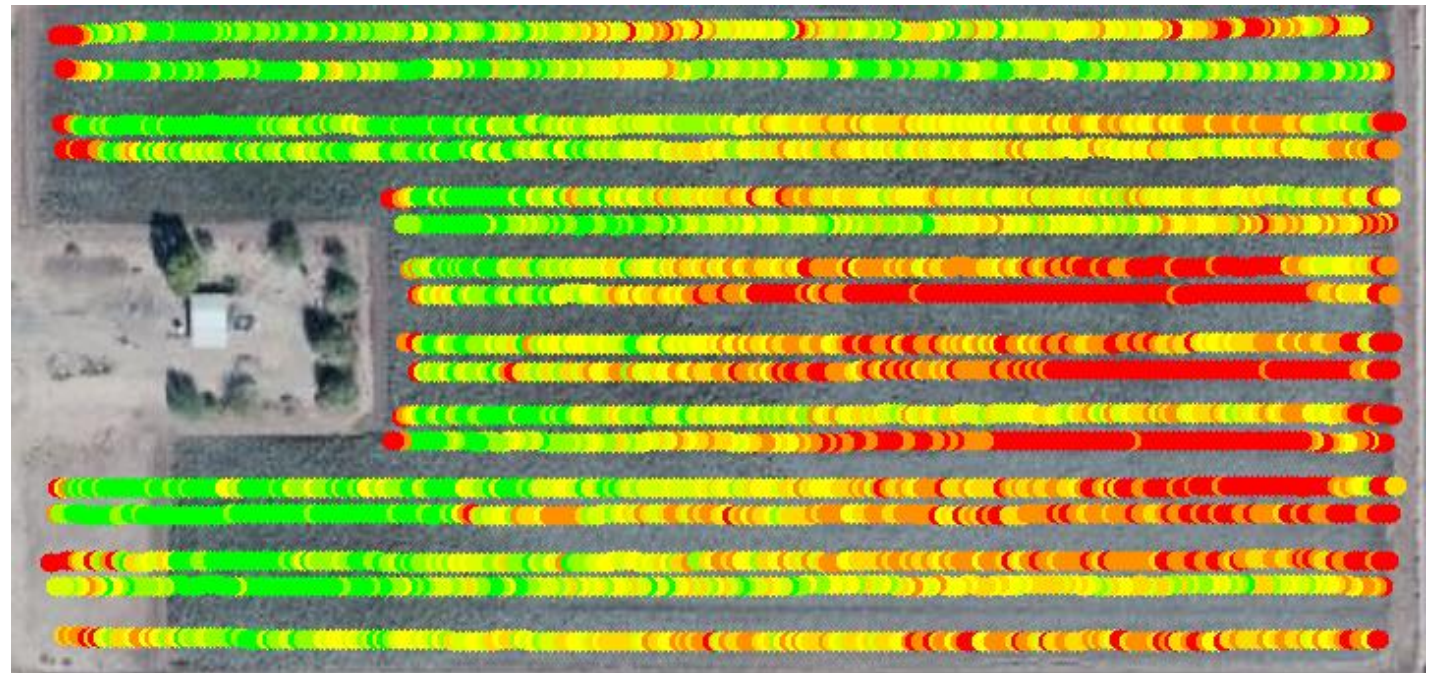
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Durum yield monitoring. Sacaton AZ

Pedro Andrade, John Heun. Site-specific management N fertilizer



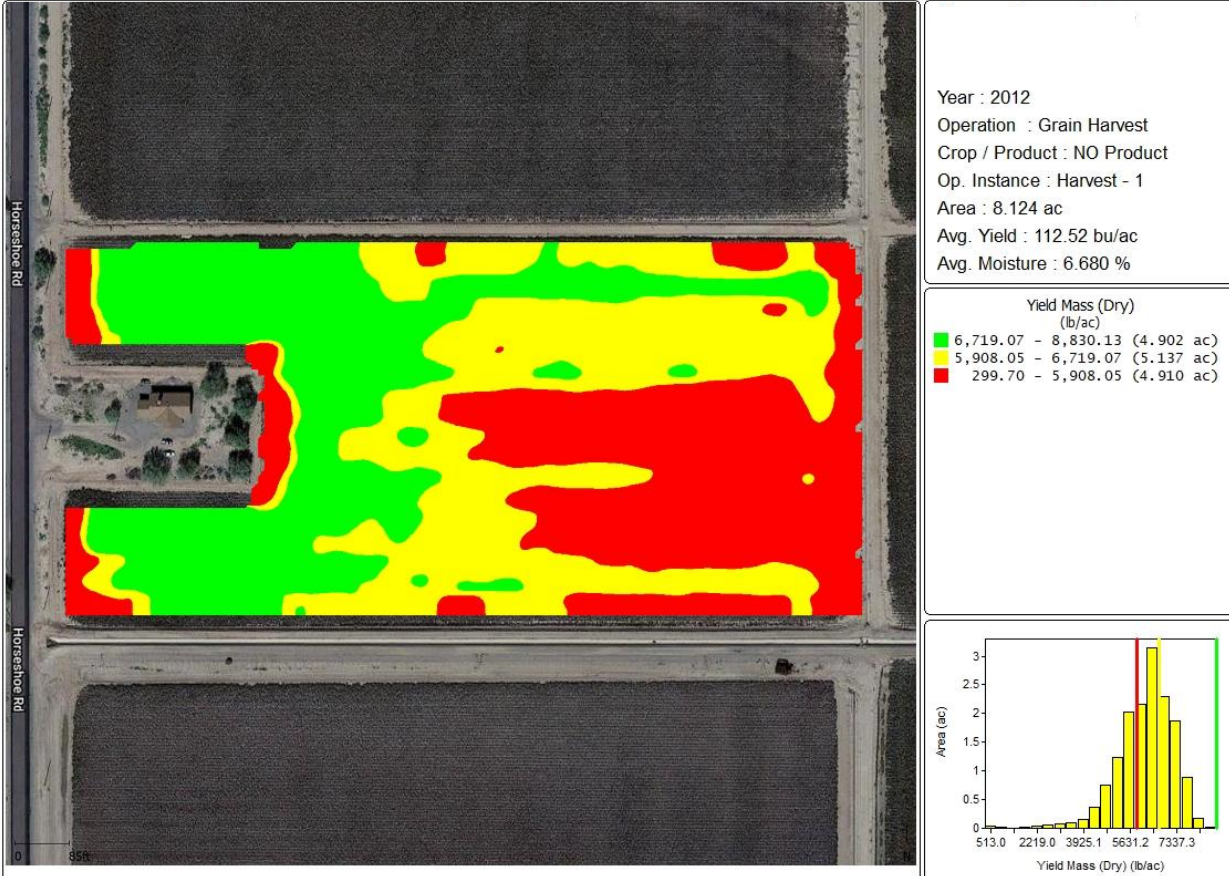
Yield Mass (Dry)
(lb/ac)

■	8,186.45 - 11,812.44 (0.67 ac)
■	7,758.61 - 8,186.45 (0.72 ac)
■	7,378.12 - 7,758.61 (0.73 ac)
■	7,034.31 - 7,378.12 (0.75 ac)
■	6,633.02 - 7,034.31 (0.76 ac)
■	6,079.48 - 6,633.02 (0.77 ac)
■	895.71 - 6,079.48 (0.72 ac)

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Grain Harvest 2012



Assign Legend Ranges

Select a Prescription rate value and a corresponding reference legend value from the list of values or the reference map. Click the ADD button to associate the two values in the Legend Assignment View.

Prescription Legend Values	Reference Layer Values and Map	Legend Assignment View
<ul style="list-style-type: none">25.00 gal(US)/ac28.00 gal(US)/ac31.00 gal(US)/ac	<ul style="list-style-type: none">4,000.0 - 5,596.9 lb/ac5,596.9 - 6,129.6 lb/ac6,129.6 - 7,727.8 lb/ac	<ul style="list-style-type: none">25.00 gal(US)/ac28.00 gal(US)/ac31.00 gal(US)/ac

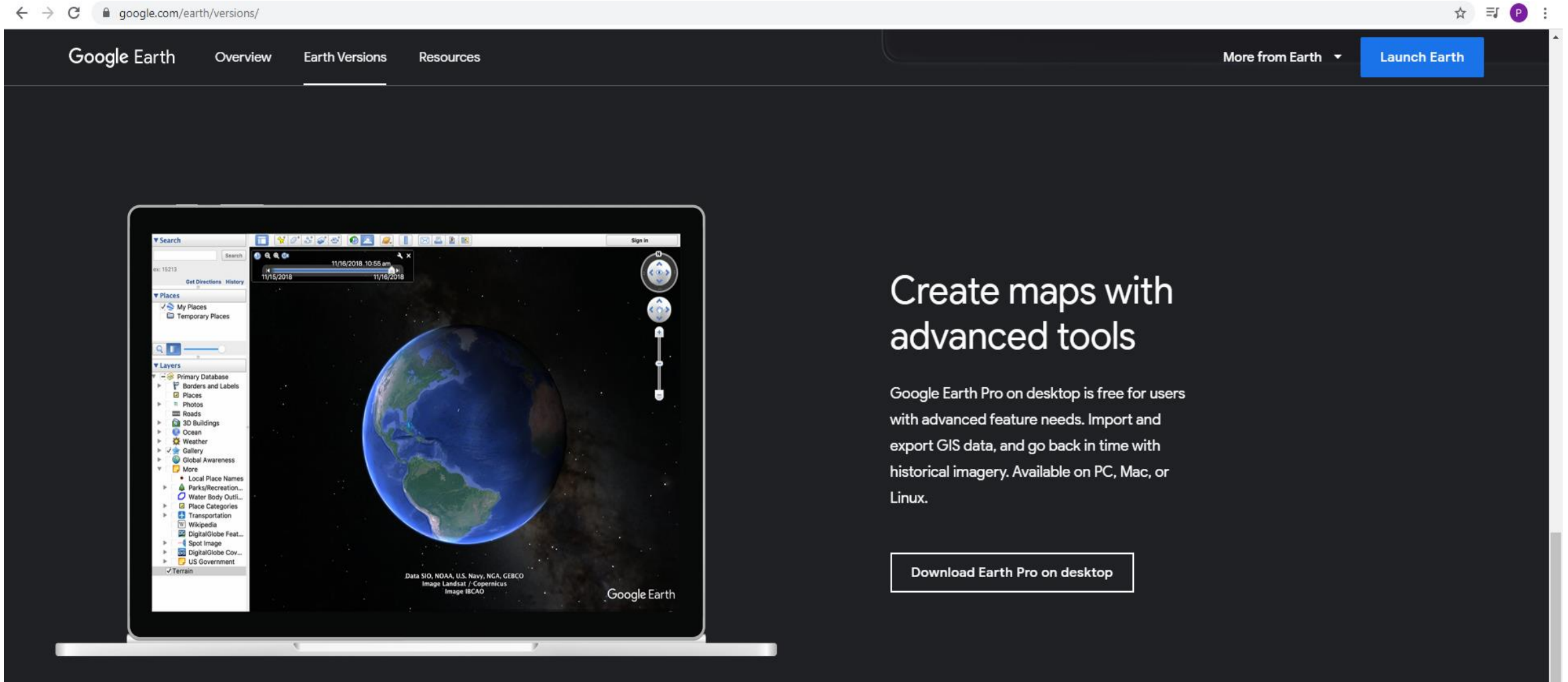
Buttons: Add >>, << Remove, << Remove All

Scale: 0 to 360ft. North arrow pointing up.

Buttons: < Back, Finish, Cancel, Help

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google.com/earth/versions/

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Google Earth Pro on desktop is free for users with advanced feature needs. Import and export GIS data, and go back in time with historical imagery. Available on PC, Mac, or Linux.

[Download Earth Pro on desktop](#)

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Google Earth imagery of field in Gila Bend AZ



8/1/2006



8/29/2014



11/15/2016

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The screenshot displays the USDA Web Soil Survey web application. The browser address bar shows the URL websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx. The page features a navigation menu with options like "Contact Us", "Subscribe", "Archived Soil Surveys", "Soil Survey Status", "Glossary", "Preferences", "Link", "Logout", and "Help". Below this is a secondary menu with "Area of Interest (AOI)", "Soil Map", "Soil Data Explorer", "Download Soils Data", and "Shopping Cart (Free)".

The main content area is titled "Area of Interest Interactive Map". It includes a search sidebar on the left with sections for "Area of Interest" (Import AOI), "Quick Navigation" (Address, State and County, Soil Survey Area, Latitude and Longitude or Current Location, PLSS, Bureau of Land Management, Department of Defense, Forest Service, National Park Service, Hydrologic Unit), and a "Legend" section. The map itself shows a satellite view of Arizona with county boundaries overlaid in red. Major cities and towns are labeled, and various soil survey areas are marked with green dots. The map interface includes standard navigation tools like a search icon, a hand icon for panning, and a "View Extent" dropdown set to "Contiguous U.S.". A scale indicator shows "(not to scale)".

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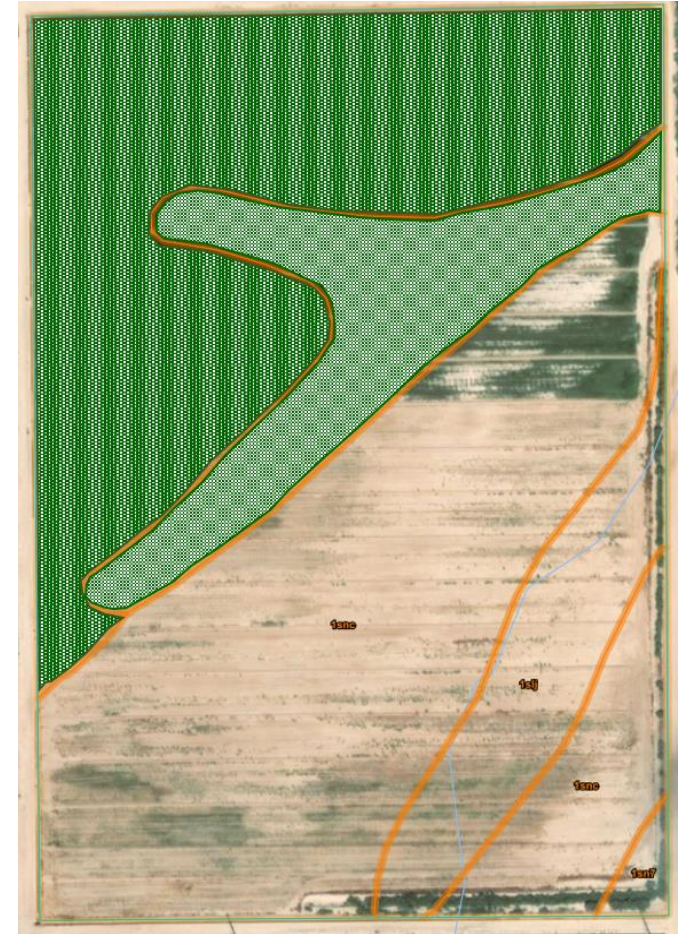
USDA-NRCS Web Soil Survey maps with imagery as background in Gila Bend AZ



User defined area of interest (AOI)



Contour lines and areas of soil units



Creating two management zones in the area with more fertile soil

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Limiting factors in the adoption of zone management in AZ

- Machine operational side?
- Digital (computer) interface?
- Economics (ROI)?
- Other?

Thanks for your attention!