A Database for Area Wide IPM

(integrated pest management)

in Berry Crops

Beth Robinson and Allegra Rainbow

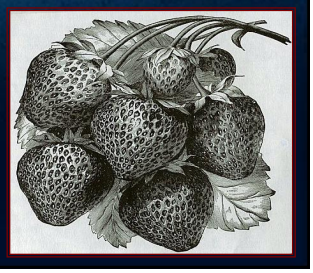
Berries in the PNW

Oregon:

- Third major producer of U.S. blueberries. (February 2000)
- Number one producer of U.S. blackberries, Boysenberries and Loganberries. (August 2002)
- Second in U.S. raspberry production. (August 2002)
- Third in U.S. strawberry production. (July 2002)
- Accounts for all of U.S. black raspberry market. (Sept. 7, 1999)
- Accounts for 26.1% of U.S. red raspberries. (Sept. 7, 1999)

Washington:

- Produces 59% of the raspberries grown in the U.S. (January 1999)
- Produces over 10% of raspberries grown worldwide. (January 1999)



Information from Western Region IPM Crop Profiles

IPM

- IPM: process that identifies and reduces risks from pests and pest management related strategies.
- Coordinates the use of pest biology, environmental information, and available technology to prevent unacceptable levels of pest damage by the most economical means, while posing the least possible risk to people, property, resources, and the environment.

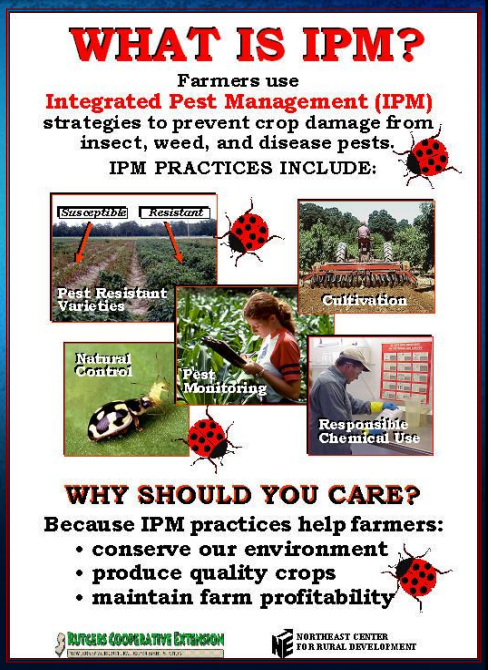


Photo source: www.pestmanagement.rutgers.edu/IPM/Vegetable/

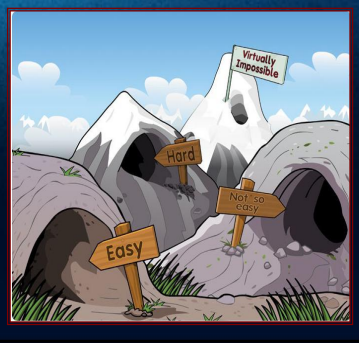
What are our GIS Needs?

- A geodatabase to join spatial information to external data
- Grower and processor location maps
- Regional area maps
- Scouting grid maps
- Insect and disease location maps

- Design a geodatabase that can easily produce and reproduce grower location maps and scouting grid maps
- Increase workflow by creating templates and annotation for displaying maps on two media types- paper and the Internet.
- Integrate information from an Access-based software program into the GIS.
- Establish a geodatabase application for displaying and analyzing insect and disease counts.

Difficulties

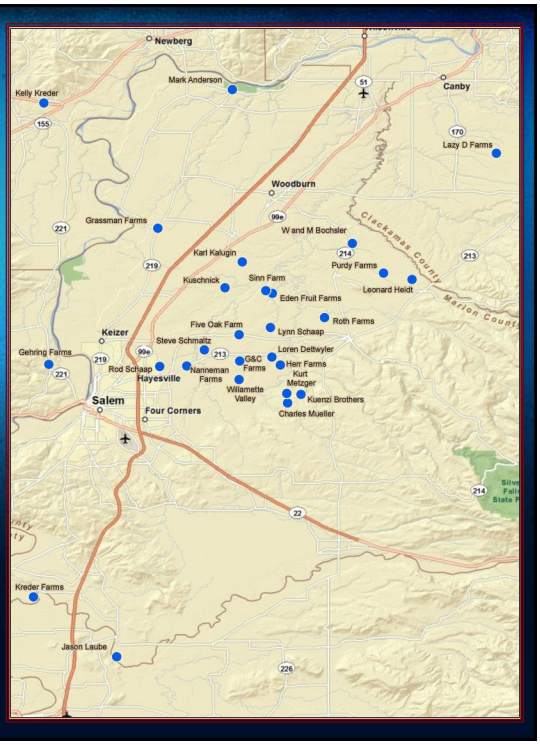
- Maps are easy- analysis is difficult
- Field data is in an external database
- Field data is based on grid locations, not GPS coordinates



Methods

(GIS Need: create processor and grower location maps)

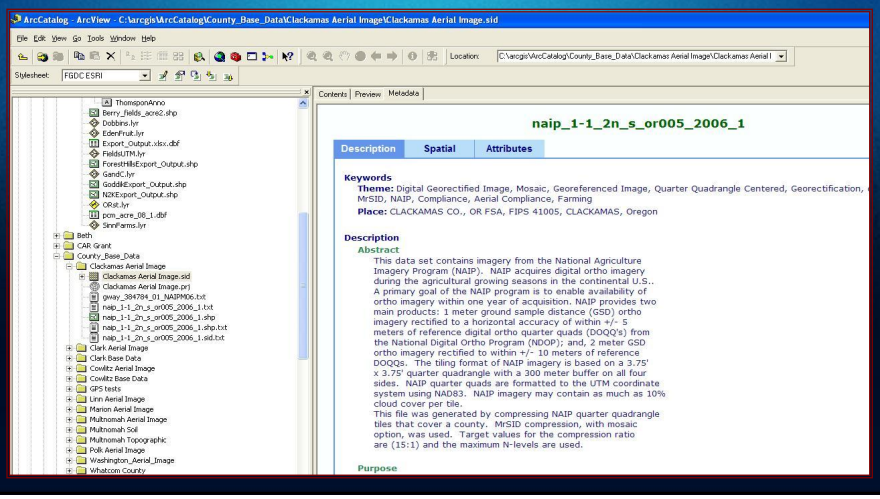
Geocode grower locations



Methods

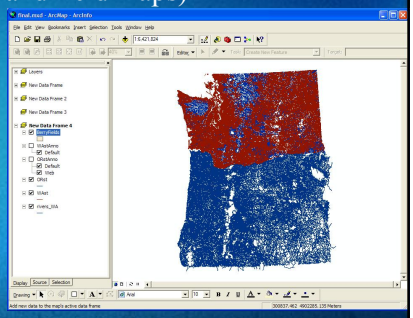
(base layers for field and regional maps)

- Clip base layers to OR and WA extent
- Imagery comes from NAIP



Methods

(to create scouting grid and field maps)



- **Create the fields featureclass**

Attributes of BerryFields

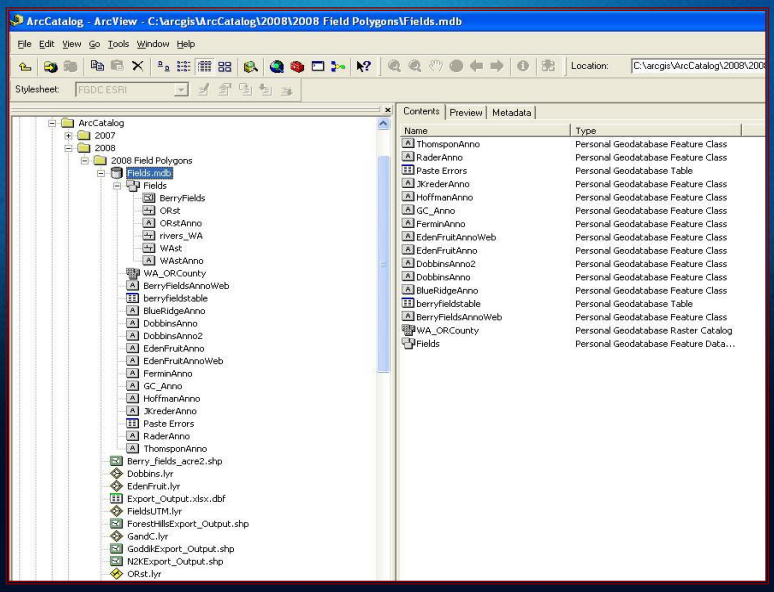
OBJECTID *	Shape *	Id	Name	Owner	org	Region	State	Group_
40	Polygon	84	Basargin	Basargin	Basargin			CAR
41	Polygon	83	Sharaverian	Sharaverian	Sharaverian			CAR
42	Polygon	88	Basargin	Basargin	Basargin			CAR
43	Polygon	89	Vasili Chernishov	Chernishov	Chernishov			CAR
44	Polygon	8	Cotton Joes	Cotton	Cotton		WA	CAR
45	Polygon	345	Orange Field	Brown	N2K Berry Farms		OR	OBPI
46	Polygon	346	Yellow Field	Brown	N2K Berry Farms		OR	OBPI
47	Polygon	346	Yellow Field	Brown	N2K Berry Farms		OR	OBPI
48	Polygon	343	Blackcaps	Brown	N2K Berry Farms		OR	OBPI
49	Polygon	342	Southside	Brown	N2K Berry Farms		OR	OBPI
50	Polygon	341	Northside	Brown	N2K Berry Farms		OR	OBPI
51	Polygon	162	Northside	Brown	N2K Berry Farms		OR	OBPI
52	Polygon	162	Northside	Brown	N2K Berry Farms		OR	OBPI
53	Polygon	341	Northside	Brown	N2K Berry Farms		OR	OBPI
54	Polygon	394	New Legacy field	Brown	N2K Berry Farm		OR	OBPI

Record: 5 Show: All Selected Records (0 out of 289 Selected) Options

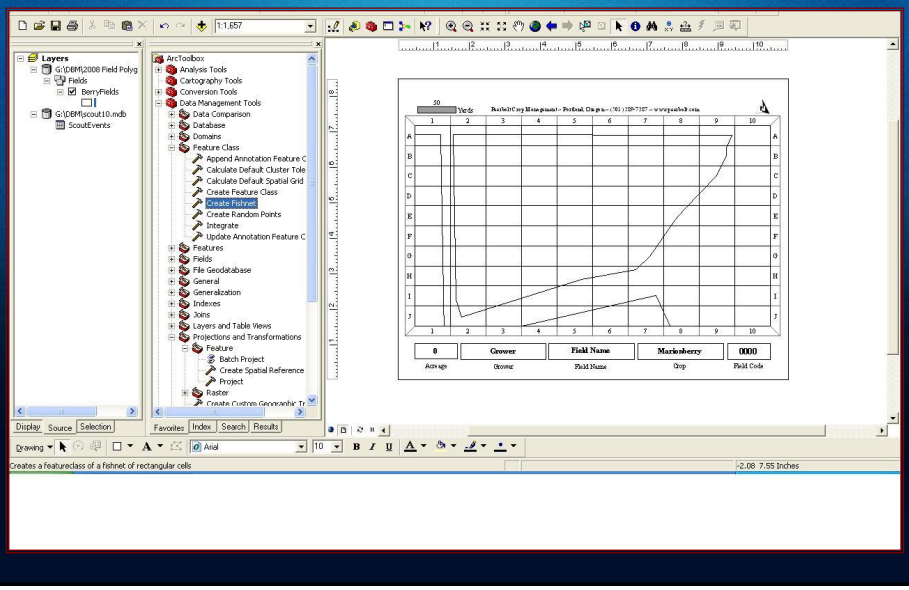
Field Map

Importance of the PCM code

Methods
(geodatabase structure)



Grid Map

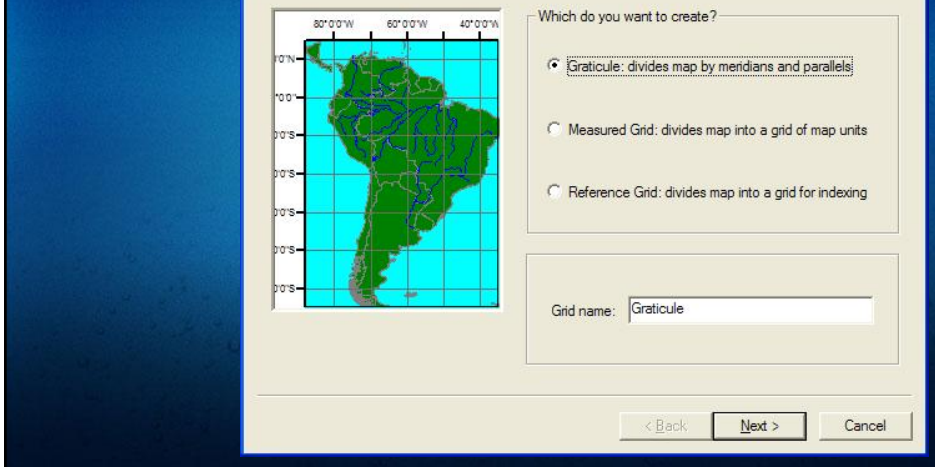


Scouting Grid Map

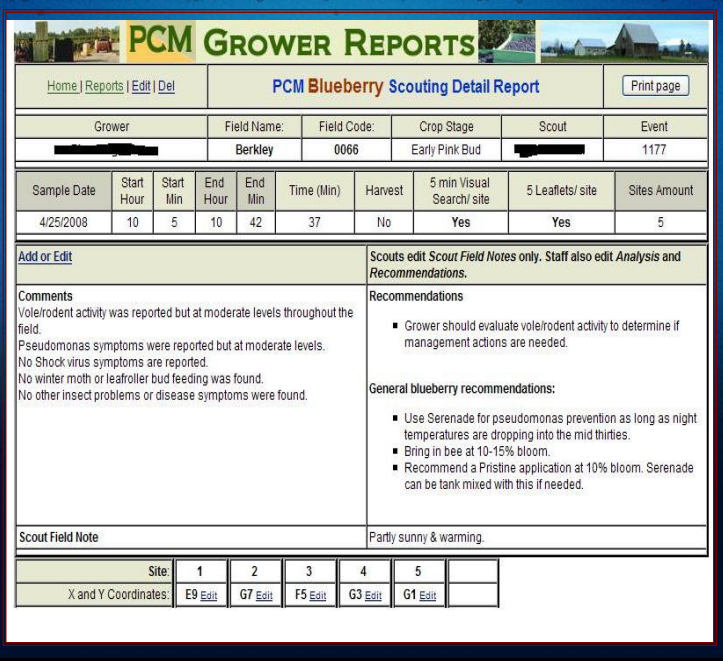
30 Yards

	1	2	3	4	5	6	7	8	9	10	
A											A
B											B
C											C
D											D
E											E
F											F
G											G
H											H
I											I
J											J
	1	2	3	4	5	6	7	8	9	10	

0	Grower	Field Name	Marionberry	0000
Acreage	Grower	Field Name	Crop	Field Code



Top of Scouting Report



PCM GROWER REPORTS

Home | Reports | Edit | Del

PCM Blueberry Scouting Detail Report

Print page

Grower	Field Name:	Field Code:	Crop Stage	Scout	Event
[redacted]	Berkley	0066	Early Pink Bud	[redacted]	1177

Sample Date	Start Hour	Start Min	End Hour	End Min	Time (Min)	Harvest	5 min Visual Search/ site	5 Leaflets/ site	Sites Amount
4/25/2008	10	5	10	42	37	No	Yes	Yes	5

Add or Edit

Scouts edit *Scout Field Notes* only. Staff also edit *Analysis* and *Recommendations.*

Comments

Vole/rodent activity was reported but at moderate levels throughout the field.
Pseudomonas symptoms were reported but at moderate levels.
No Shock virus symptoms are reported.
No winter moth or leafroller bud feeding was found.
No other insect problems or disease symptoms were found.

Recommendations

- Grower should evaluate vole/rodent activity to determine if management actions are needed.

General blueberry recommendations:

- Use Serenade for pseudomonas prevention as long as night temperatures are dropping into the mid thirties.
- Bring in bee at 10-15% bloom.
- Recommend a Pristine application at 10% bloom. Serenade can be tank mixed with this if needed.

Scout Field Note

Partly sunny & warming.

Site:	1	2	3	4	5	
X and Y Coordinates:	E9 Edit	G7 Edit	F5 Edit	G3 Edit	G1 Edit	

Scouting Report

Site:		1	2	3	4	5	
X and Y Coordinates:		E9 Edit	G7 Edit	F5 Edit	G3 Edit	G1 Edit	
5 min Visual Search		Count	Count	Count	Count	Count	Totals
Larvae	Winter Moth:	0	0	0	0	0	0
	Leafroller:	0	0	0	0	0	0
Beneficial	Green Lacewing:	0	0	0	0	0	0
	Lady Beetle:	0	0	0	0	0	0
	Minute Pirate Bug:	0	0	0	0	0	0
Insect Pest	Spiders:	0	0	0	0	0	0
	Box Elder Bugs:	0	0	0	0	0	0
	Lecanium Scale:	None	None	None	None	None	5
	Azeliea Bark Scale:	None	None	None	None	None	5
	Gall Midge Feeding:	None	None	None	None	None	5
	Weevil Notching:	None	None	None	None	None	5
Tip Blight:		None	None	None	None	None	5
Pseudomonas:		A few	A few	A few	A few	Several	11
Godronia Canker:		None	None	None	None	None	5
Mummyberry:		None	None	None	None	None	5
Fruit Rot:		None	None	None	None	None	5
Anthracnose:		None	None	None	None	None	5
Root Rot:		None	None	None	None	None	5
Chemical Burn:		None	None	None	None	None	5
Water Stress:		None	None	None	None	None	5
Vole & Rodent Activity:		A few	A few	A few	A few	A few	10
5 Minute Leaflets		Count	Count	Count	Count	Count	Totals
Aphids	Aphids Winged:	0	0	0	0	0	0
	Aphids Non Winged:	0	0	0	0	0	0
	Aphids Parasitized:	0	0	0	0	0	0

Site	Coord	Field Notes
1	E9 Edit	rabbits. one irrigation hose has been chewed through. nothing very notable here. good vigor. found a Mayfly
2	G7 Edit	some twigs with white tips. voles present
3	F5 Edit	one plant being chocked by grass. Not much to report here
4	G3 Edit	a few random dead buds.
5	G1 Edit	few rabbits here. Some shock (one bush). one bush with curling/wilted tips & dying buds. Pseudomonas affecting some buds.

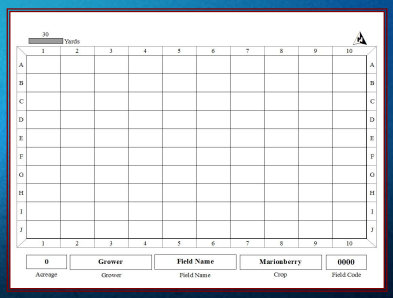
Orange Tortrix Application

Can we use our geodatabase structure to import and display orange tortrix counts from a single scouting event into the GIS?

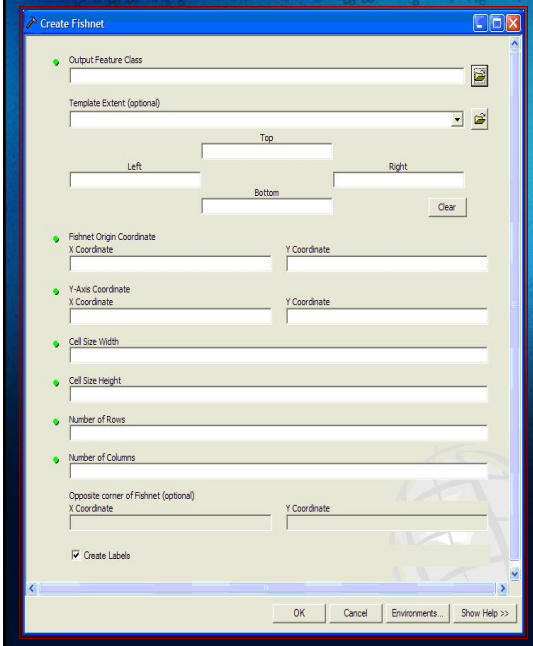
Application steps

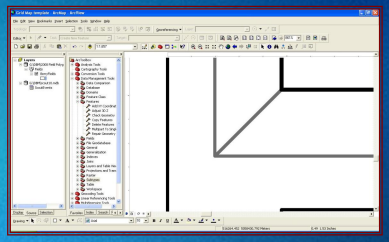
Create polygons from a grid

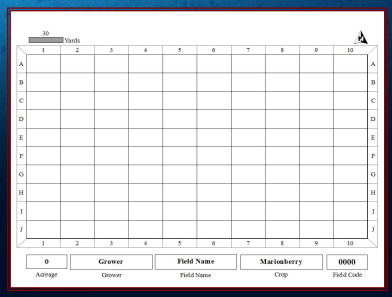
- Fishnet Tool
- Features to Polygon
- Join with external data
- Clip fields to polygons



Fishnet Tool

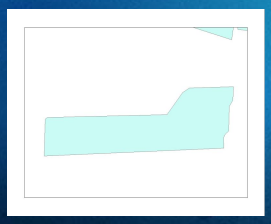




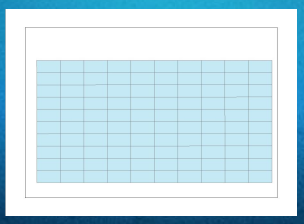


Features to Polygon

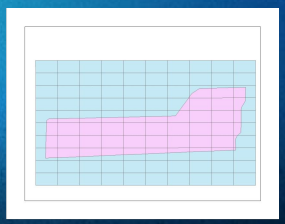
1

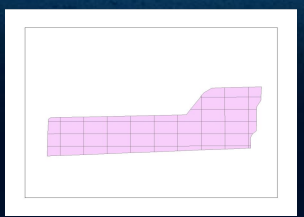


2

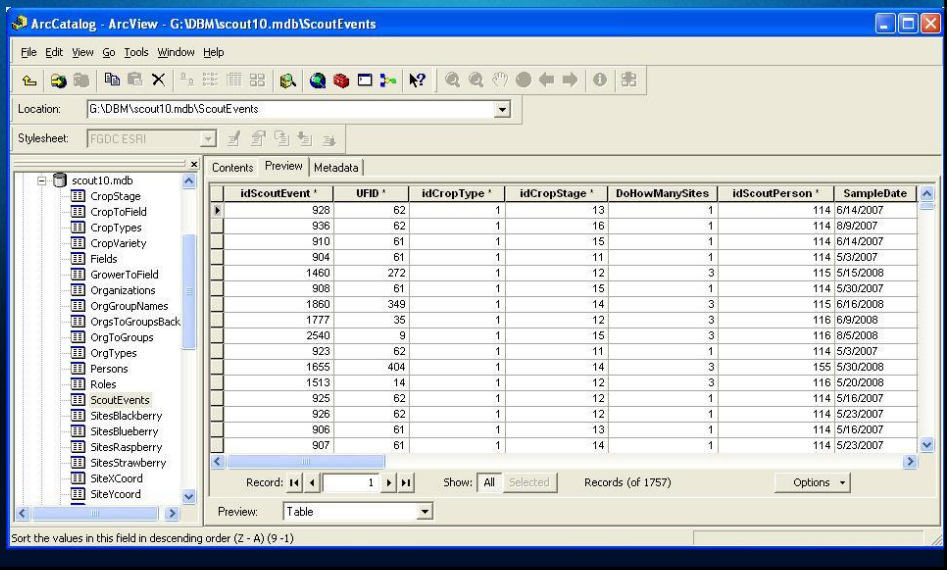


3

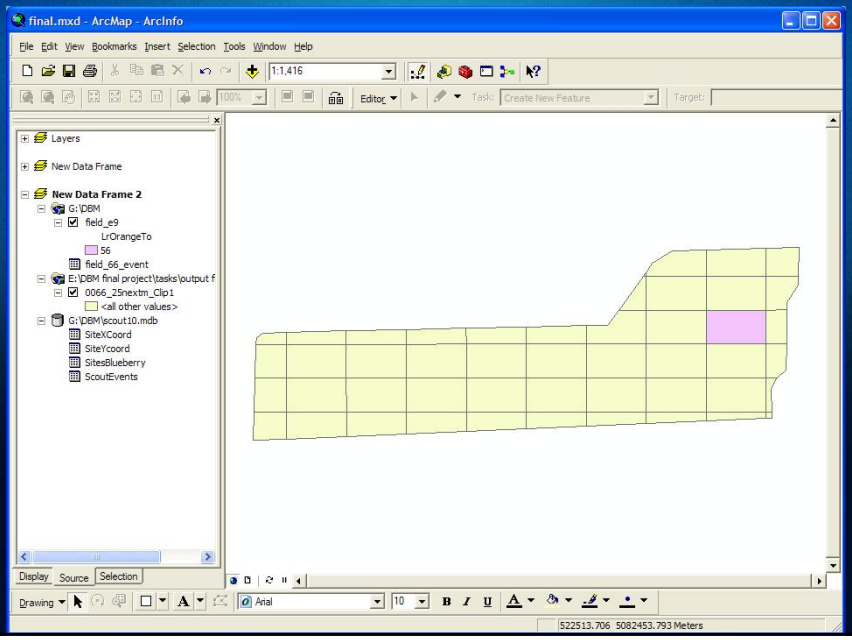




Stan database downloaded

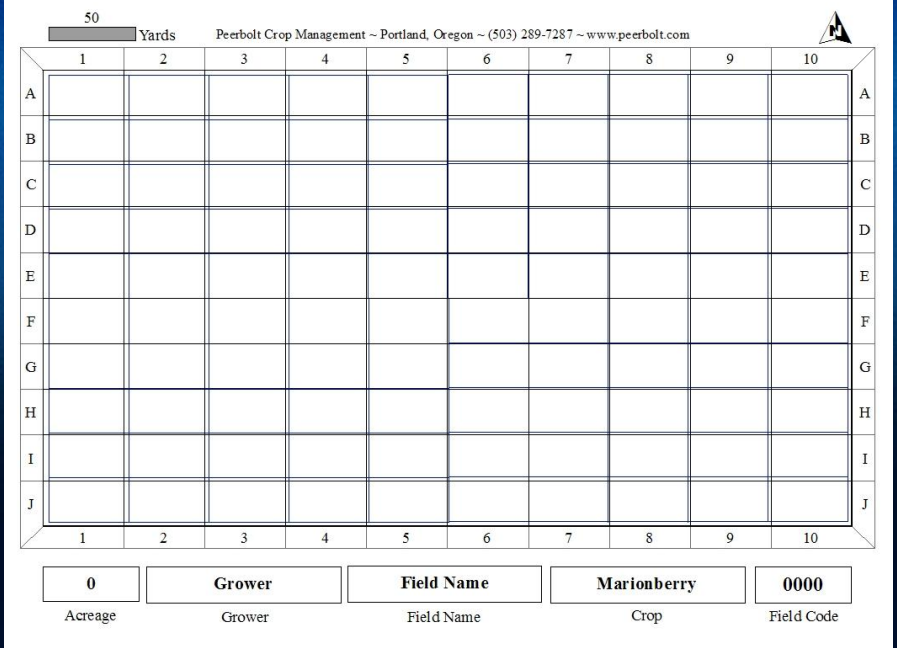


Join with external data



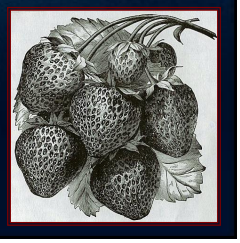
Errors and Obstacles

- The Stan database had to be downloaded.
- The fishnet tool inaccurate if not careful.
- The grid coordinates are sufficient for data collection, but not trend analysis.



Future applications

- Make insect and disease trends visible to decision makers via web based mapping
- Import GPS coordinates to the GIS desktop to link to the STAN in the future.
- One day, trend analysis ☺



Sources

Viers et al. 2005. Geodatabase Application for Invasive Plant Tracking and Coordinated Habitat Restoration. ESRI International User Conference, San Diego, California.

School of Education University of the West Indies, St. Augustine Tinidad. Report: Regional Training Workshop on GIS/GPS for Pest and Disease Monitoring and Detection.

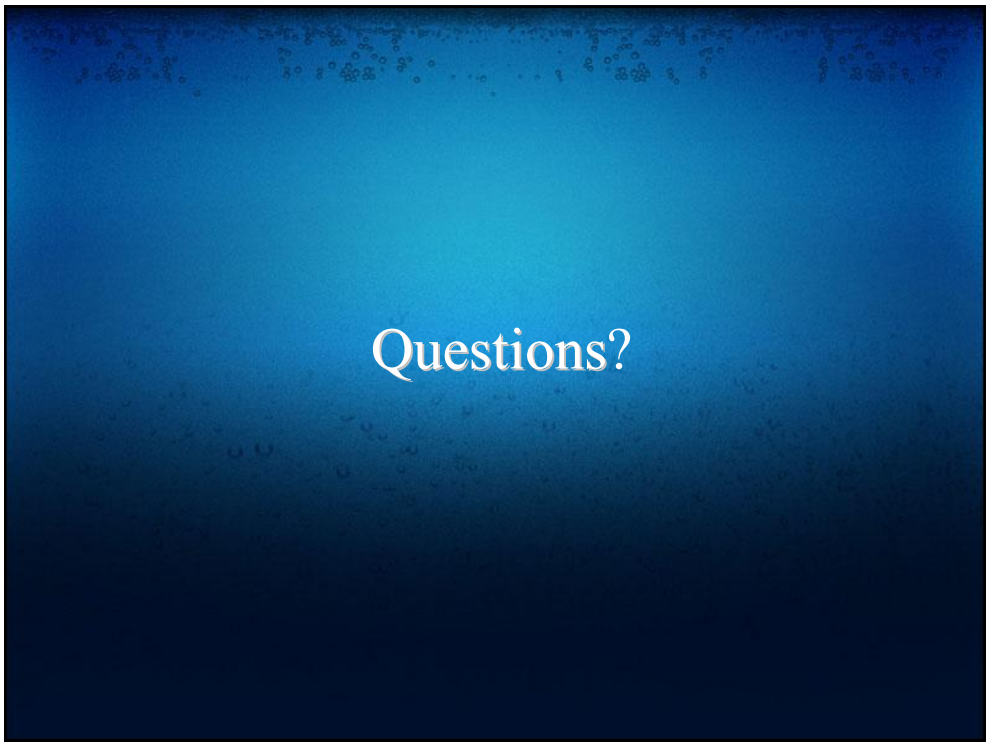
An ArcGIS Model for Agriculture. ESRI website.

Dr. Alessi, Samuel R. USDA ARS. System Engineering Case Study: A software-Driven Whole Farm Management Information System.

Goddard, Thomas et al. Potential for Integrated GIS-Agriculture Models for Precision Farming Systems

Arctur and Zeller. Designing Geodatabases- Case Studies in GIS Data Modeling; Redlands, CA: ESRI Press, 2004

Chang, Kang-tsung. Introduction to Geographic Information Systems. 4th ed. New York, NY: McGraw-Hill, 2008


Questions?