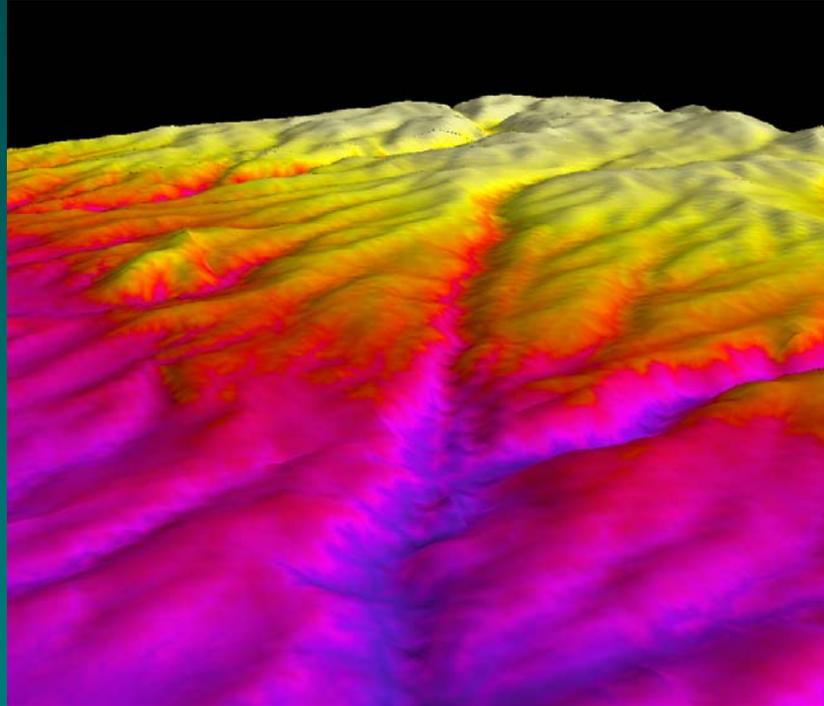


Using GIS in the LEA World

Introduction



Henning Schreiber
Calaveras County Environmental Health

Agenda

Our agenda is tentative and, depending on the number of questions, we might move slower or faster.

Part 1 – Introduction

- What is a Geographic Information System (GIS)
- Capturing Geographic Data
- Metadata

Part 2.1 – How to work the system

- Basics
- Information access and visualization

Part 2.2 – Using GIS Tools

- Basic Tools
- Geo-processing Tools
- Creating new Datasets/Layers

Part 2.3 – Extensions and external software

Part 3 – GIS Applications

Regarding Questions...

America needs



Your questions

When is the time to ask questions?

Whenever the question arises!

Introduction

- What is a Geographic Information System (GIS)
- The “Geographic” Component
- The “Information” Component
- The “System” That Combines Both Parts
- Creating A Basic Map In 20 Minutes

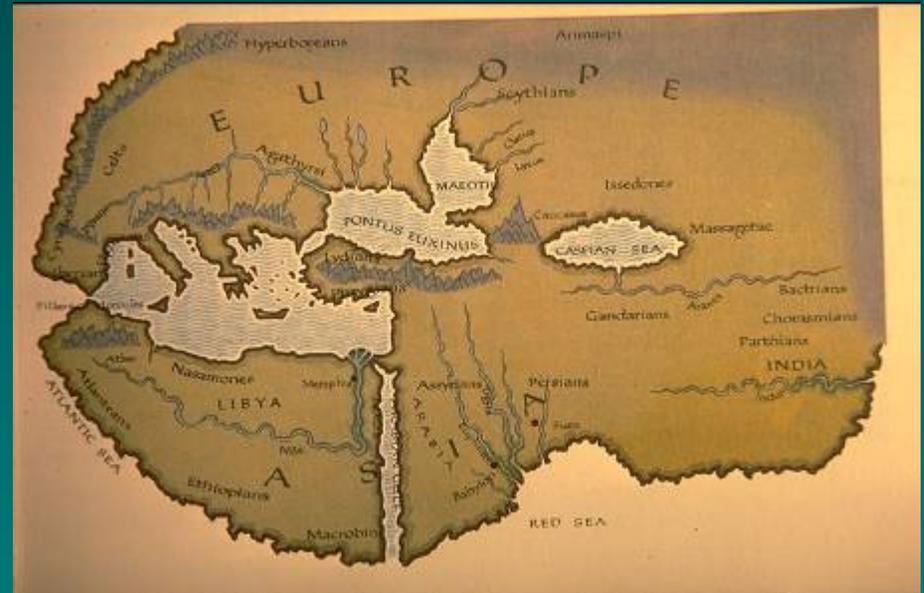
Introduction

The oldest way to describe a spatial context...

... is a map.



A parcel map from ancient Rome

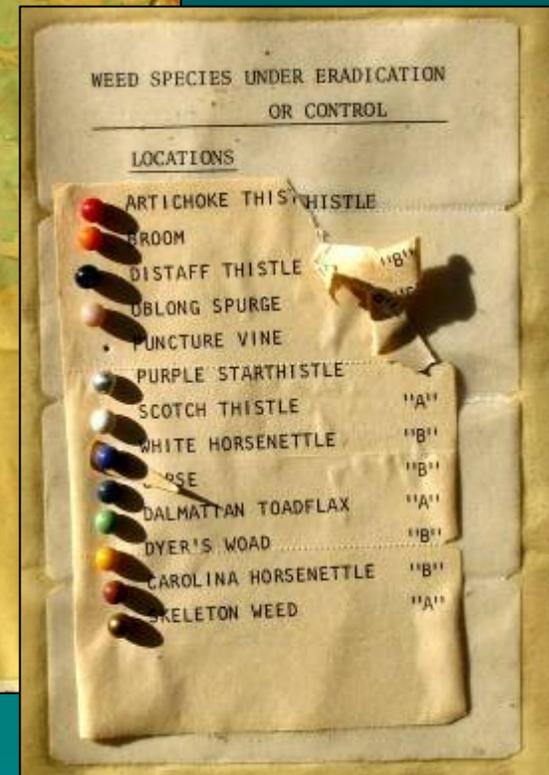


World map by Herodotus 450 BC

The early days of GIS

Using a map, a legend and color-coded pins...

... and
TIME !



What is a GIS?

Geographic



Information



System



Two red arrows point from the 'Geographic' and 'Information' ovals down to the 'System' oval, indicating that the combination of geographic data and information processing forms a system.

What is a GIS?

Geographic



Information



System



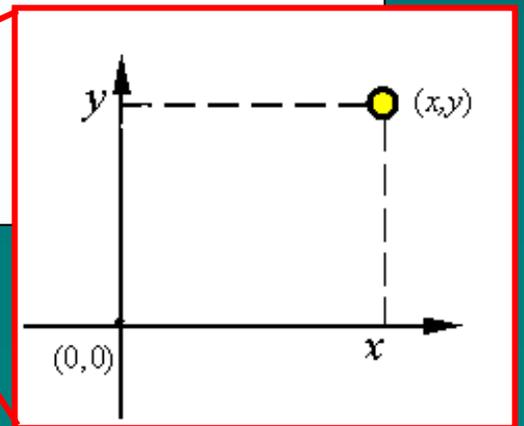
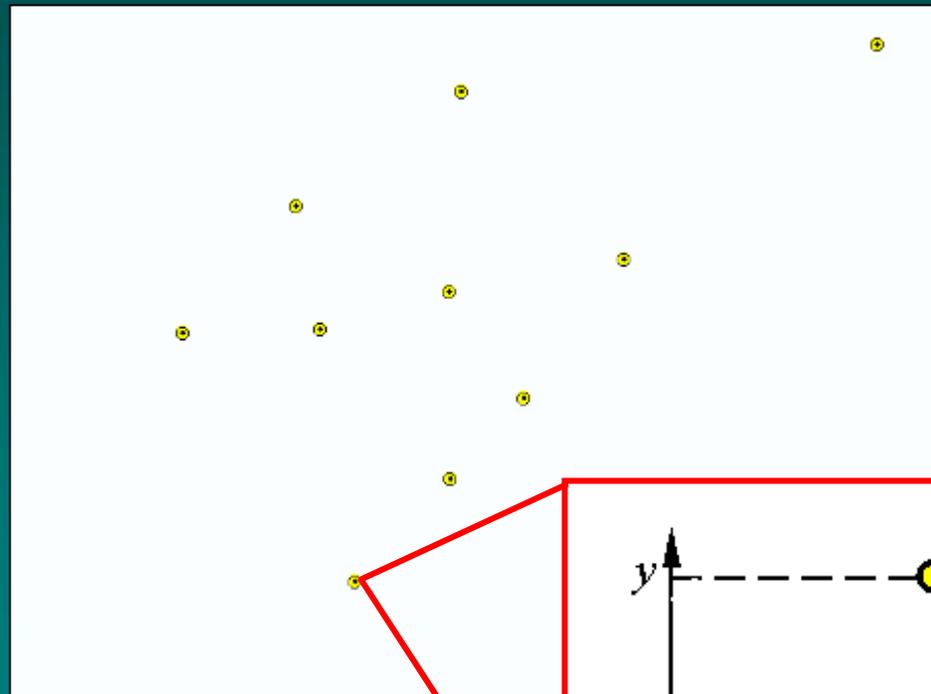
Two red arrows point from the 'Geographic' and 'Information' ovals down to the 'System' oval, indicating that the combination of geographic data and information processing forms a system.

The Geographic Component

There are four different types of geographic data that can be stored in a GIS.

Points

one x and y coordinate



The Geographic Component

There are four different types of geographic data that can be stored in a GIS.

Points

one x and y coordinate

Lines

straight line between two xy coordinates



The Geographic Component

There are four different types of geographic data that can be stored in a GIS.

Points

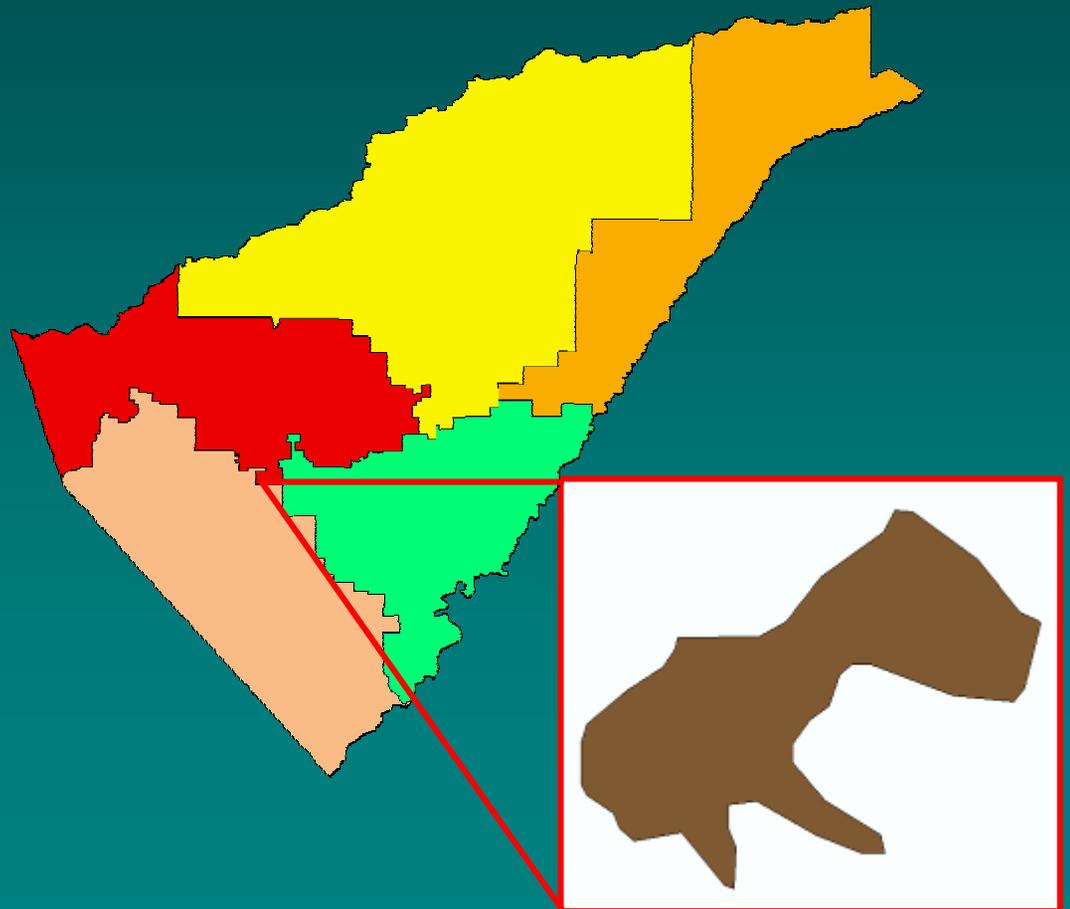
one x and y coordinate

Lines

straight line between two xy coordinates

Polygons

lines between many xy coordinates, line closes



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There are four different types of geographic data that can be stored in a GIS.

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one x and y coordinate

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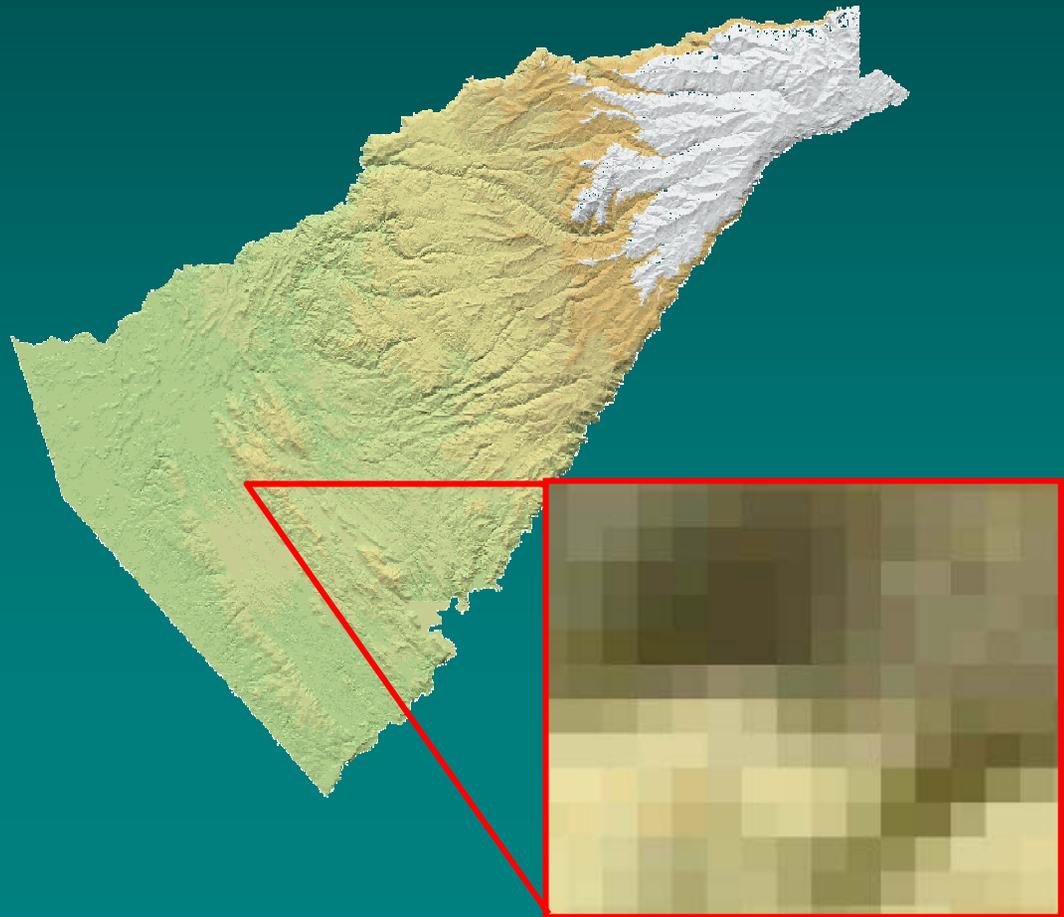
straight line between two xy coordinates

Polygons

lines between many xy coordinates, line closes

Raster

many xy coordinates in rows and columns



The Geographic Component

There are four different types of geographic data that can be stored in a GIS.

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one x and y coordinate

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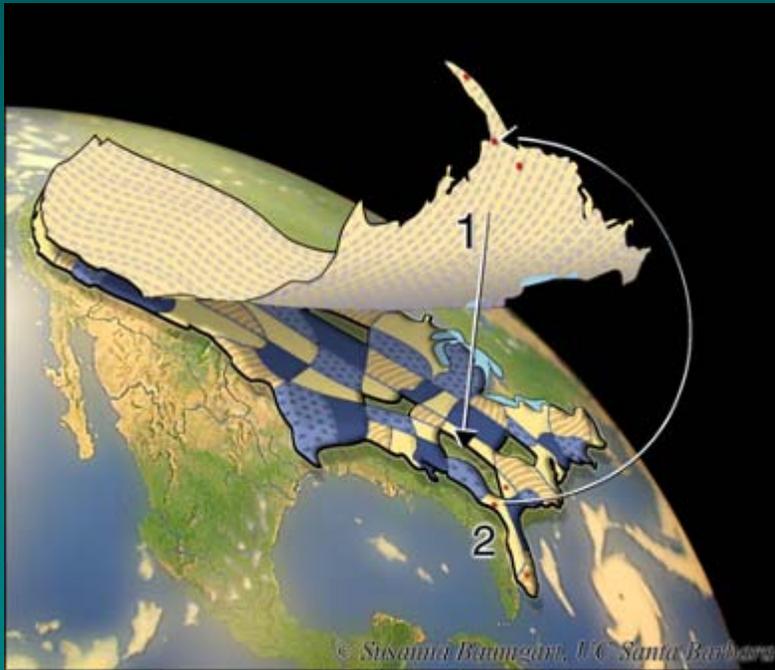
In the GIS world these types of geographic data are called Feature classes, and one point or line or polygon is a geographic feature.

Sometimes "shape file" or "layer" is used for describing a feature class

The Geographic Component

Projections – what is that?

“The Earth is a flat disk.” – Not really!

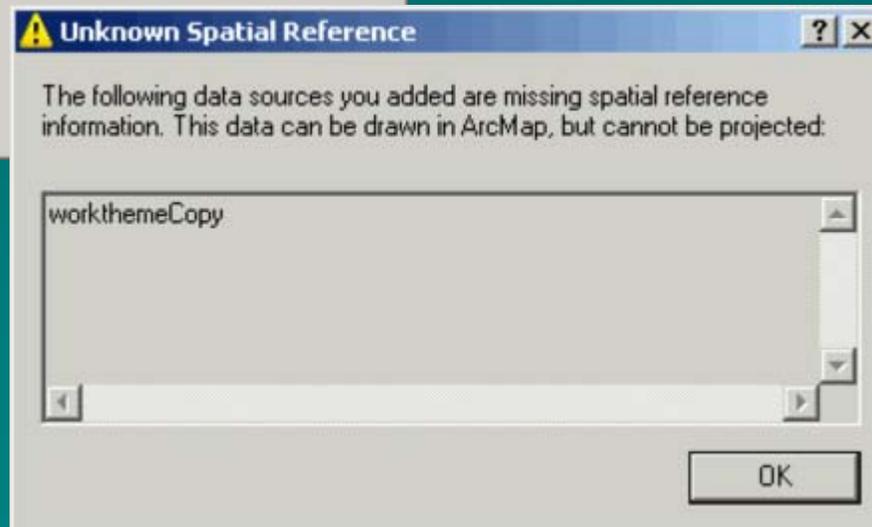
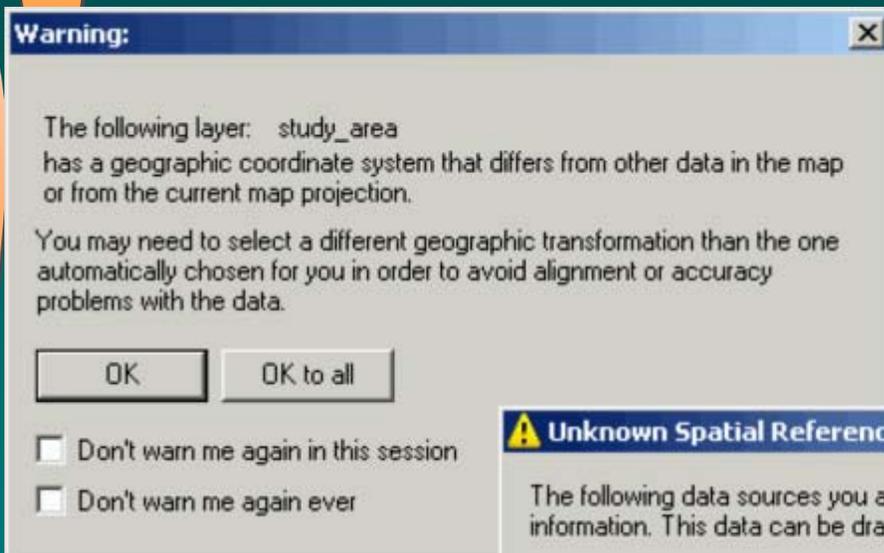


- How to get the skin of a ball onto a flat piece of paper?
- You have to stretch and bend it!
- And the Math behind it is the projection!

The Geographic Component

Projections – why bother?

- ArcGIS 8.x and 9.x converts on the fly, ArcView 3.x does not!



The Geographic Component

Projections – why bother?

“The earth is a globe.” – not really either!

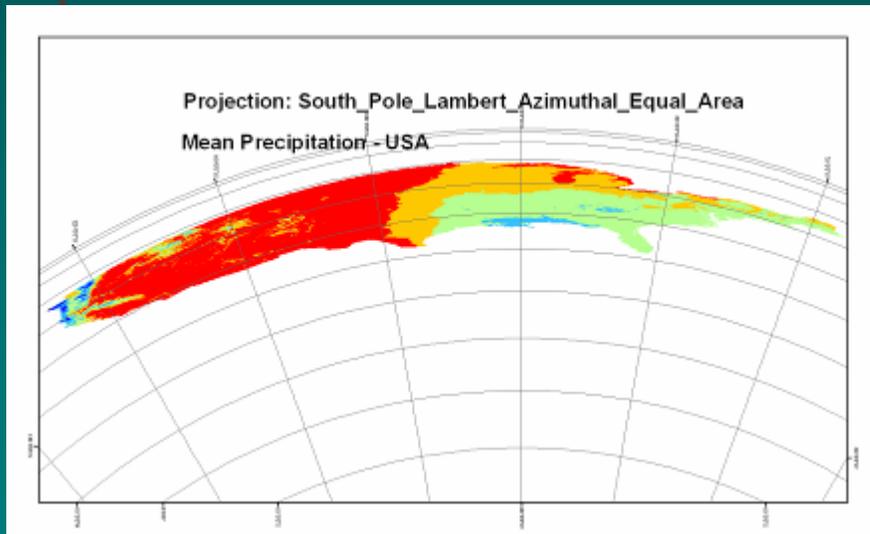


- ArcGIS 8.x and 9.x converts on the fly, ArcView 3.x does not!
- Projection conversions are approximate only.

The Geographic Component

Projections – why bother?

No projection can display true distances
and true areas and true bearings!



- ArcGIS 8.x and 9.x converts on the fly, ArcView 3.x does not!
- Projection conversions are approximate only.
- Projections define how the map looks like

The Geographic Component

Scale and Accuracy

What accuracy and
scale should I use?
It depends...



The accuracy determines
at what scale you can
present your data.

... on your project.

Don't display your
county data on a world
map.

Don't spend \$\$\$\$ on
sub-meter accuracy
when you only need a
business location.

Define your project, look
into the future, then
determine accuracy.

What is a GIS?

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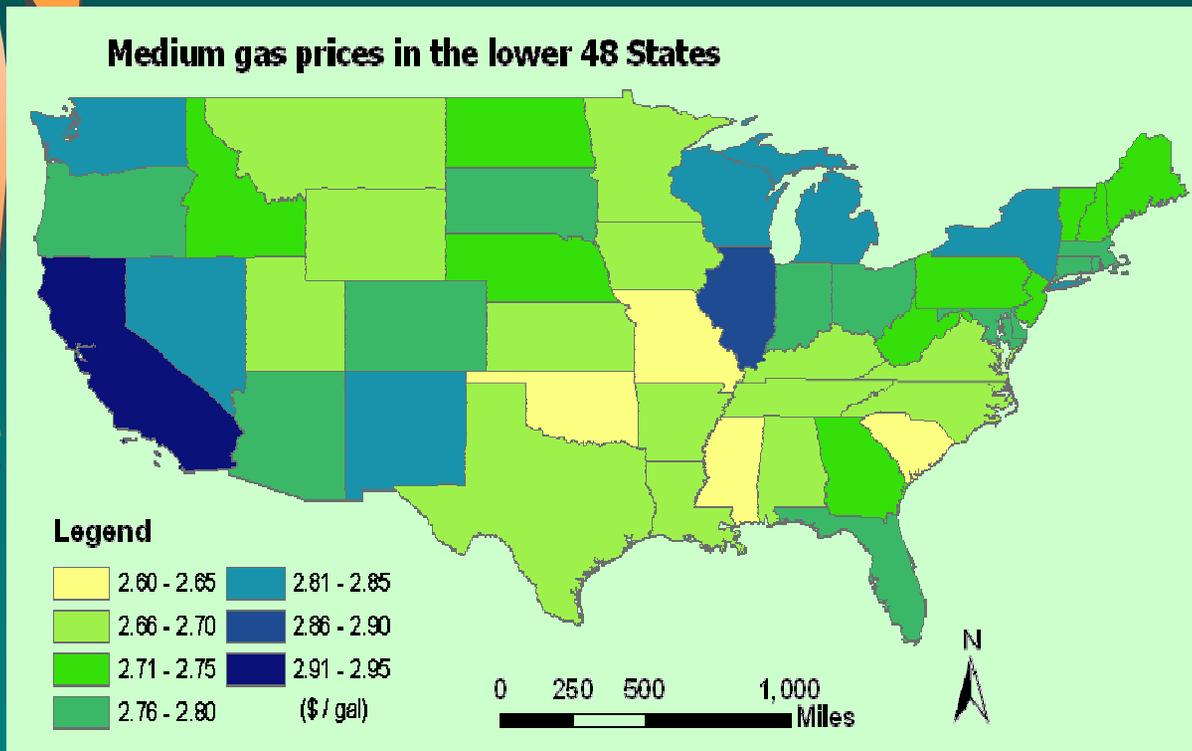
System



Two red arrows point from the 'Geographic' and 'Information' ovals down to the 'System' oval, indicating that the combination of geographic data and information processing forms a system.

The Information Component

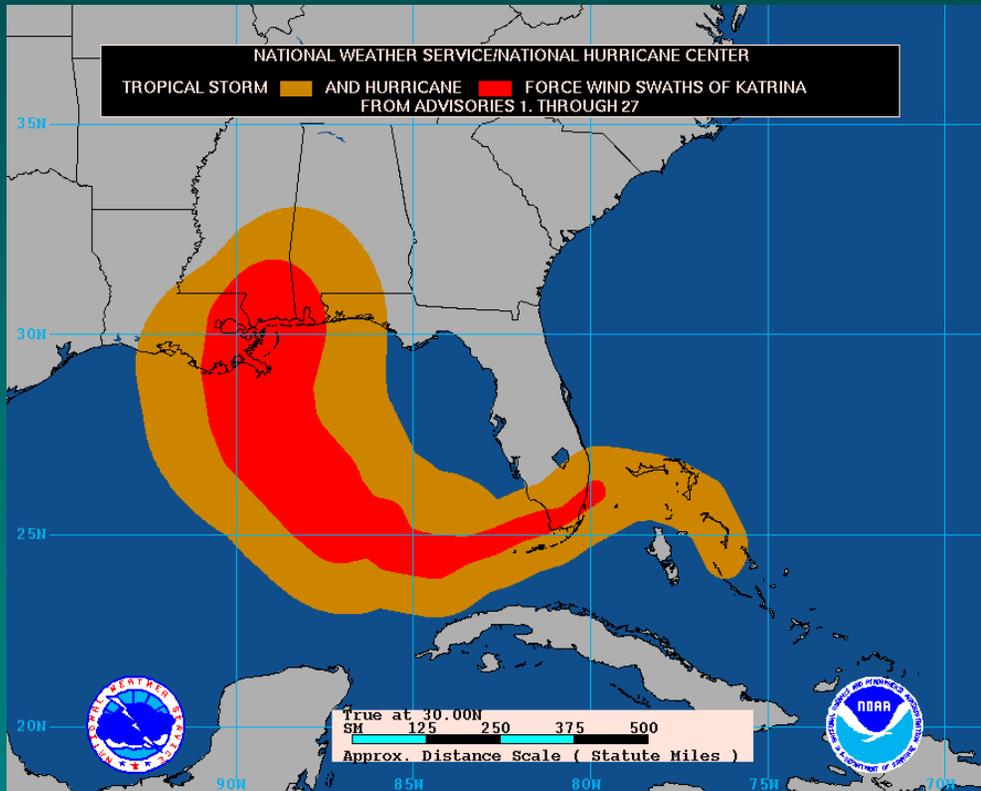
80% of all information has a spatial reference!



When we talk about gas prices...

The Information Component

80% of information has a spatial reference!

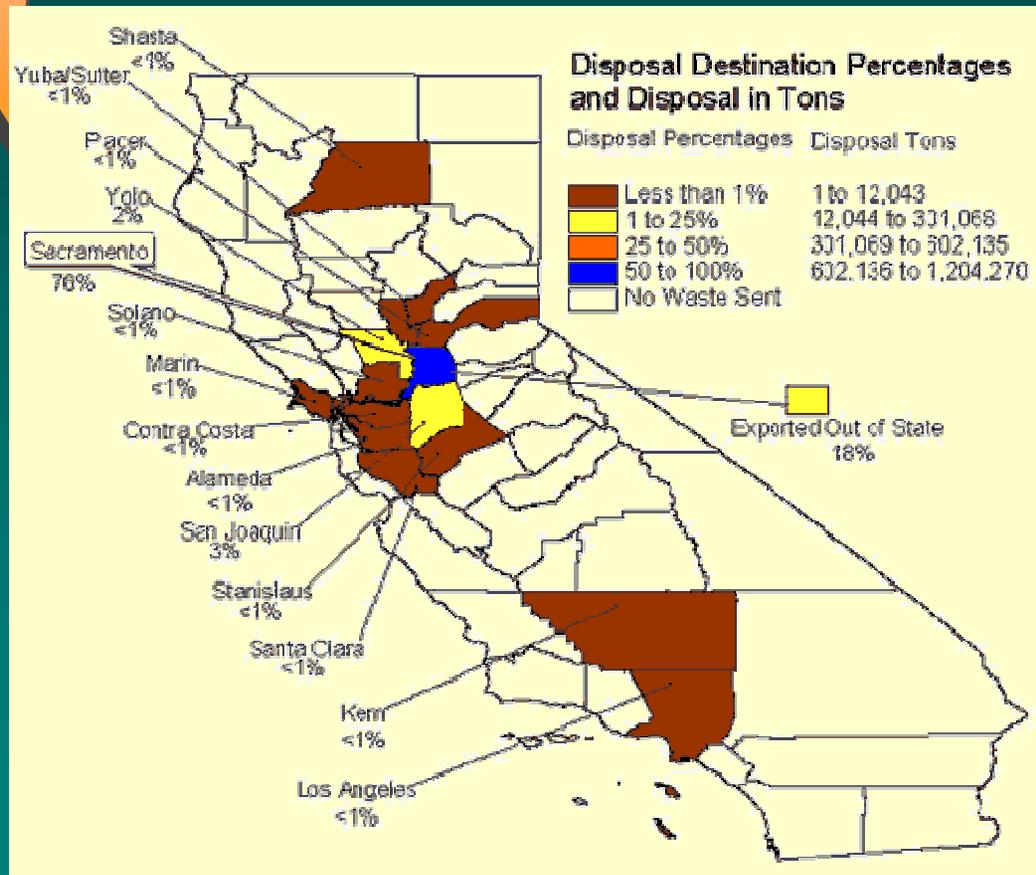


When we talk
about gas
prices...

When we talk
about weather...

The Information Component

80% of information has a spatial reference!



When we talk about gas prices...

When we talk about weather...

When we talk about solid waste...

The Information Component

“Attributes” – the information tied to spatial references.

Location:

Rock Creek Landfill



Attributes:

-  Name
-  Location
-  Class
-  Volume
-  Waste Type #1, #2, ...
-  # employees
-  # door knobs
- 

The Information Component

What kind of information do I need and what would be the appropriate feature class?

... again, it depends on scope and scale of the project

Regarding landfills:



If you want to show where they are or how to route trucks – a point feature class is sufficient.



If you need to show the landfill boundaries, calculate area, volume etc. – a polygon feature is appropriate, and a higher accuracy too.



If you want to delineate drainage lines – use a line feature class.

What is a GIS?

Geographic

Information

System



What is a GIS?

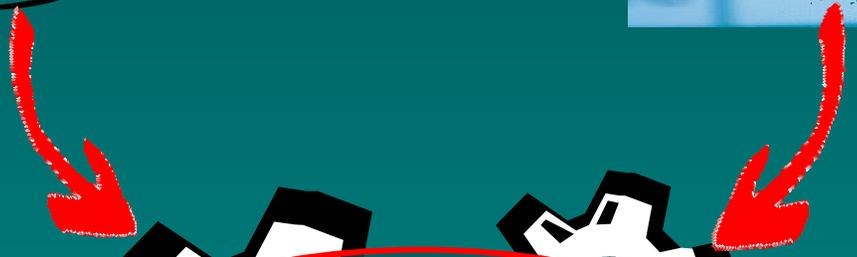
Geographic



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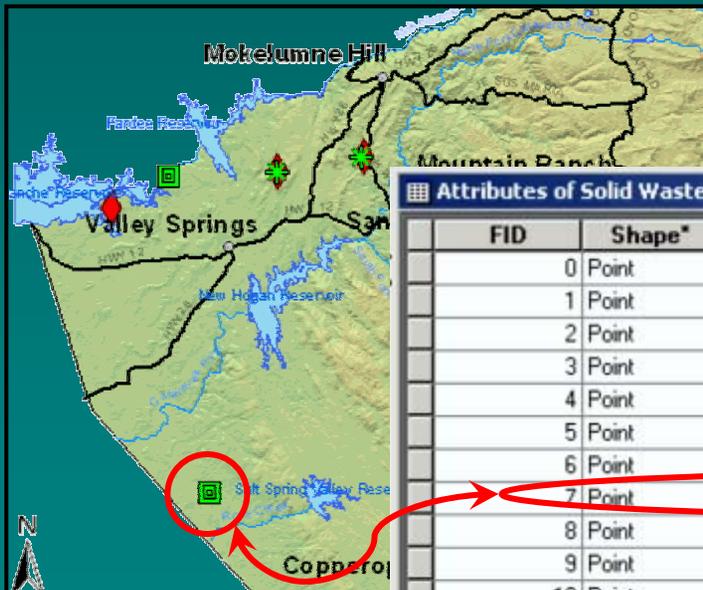


The System Component

GIS links **spatial information (location)** with **descriptive information (attributes)** and creates a **map (layer)**

Location:

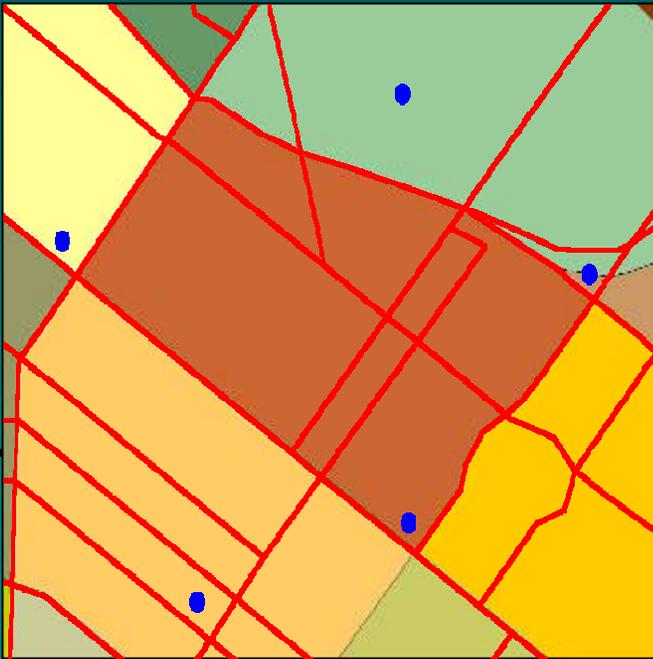
Attributes:



FID	Shape*	ID	LOCATION	APN	TYPE	LONG	LAT	CHARAC
0	Point	SW2001001	Wolfboro - Upper	02014001	BS	-120.09798	38.415	CS
1	Point	SW2001005	Wilseyville	10019018	BS	-120.52187	38.369	CS
2	Point	SW2001004	Paloma	16004034	BS	-120.78939	38.239	CS
3	Point	SW2001003	San Andreas	16009009	BS	-120.72011	38.250	CS
4	Point	SW2001002	Wolfboro - Lower	02014001	BS	-120.09229	38.411	CS
5	Point	SW2002007	CAM - Copper	64027002	BS	-120.54595	37.941	CS
6	Point	SW2002008	CAM - Copper	64027002	OT	-120.54471	37.938	PS
7	Point	SW2002006	Milton	50025015	LF	-120.84113	38.035	PS
8	Point	SW2002004	Wilseyville	50025015	TS	-120.52182	38.370	PS
9	Point	SW2002003	Paloma	10019018	TS	-120.78896	38.239	PS
10	Point	SW2002002	San Andreas	16009009	TS	-120.72055	38.249	PS
11	Point	SW2002001	Penn Mine	48002002	LF	-120.87635	38.236	PS
12	Point	SW2002005	Avery	30019023	TS	-120.36490	38.206	PS

The System Component

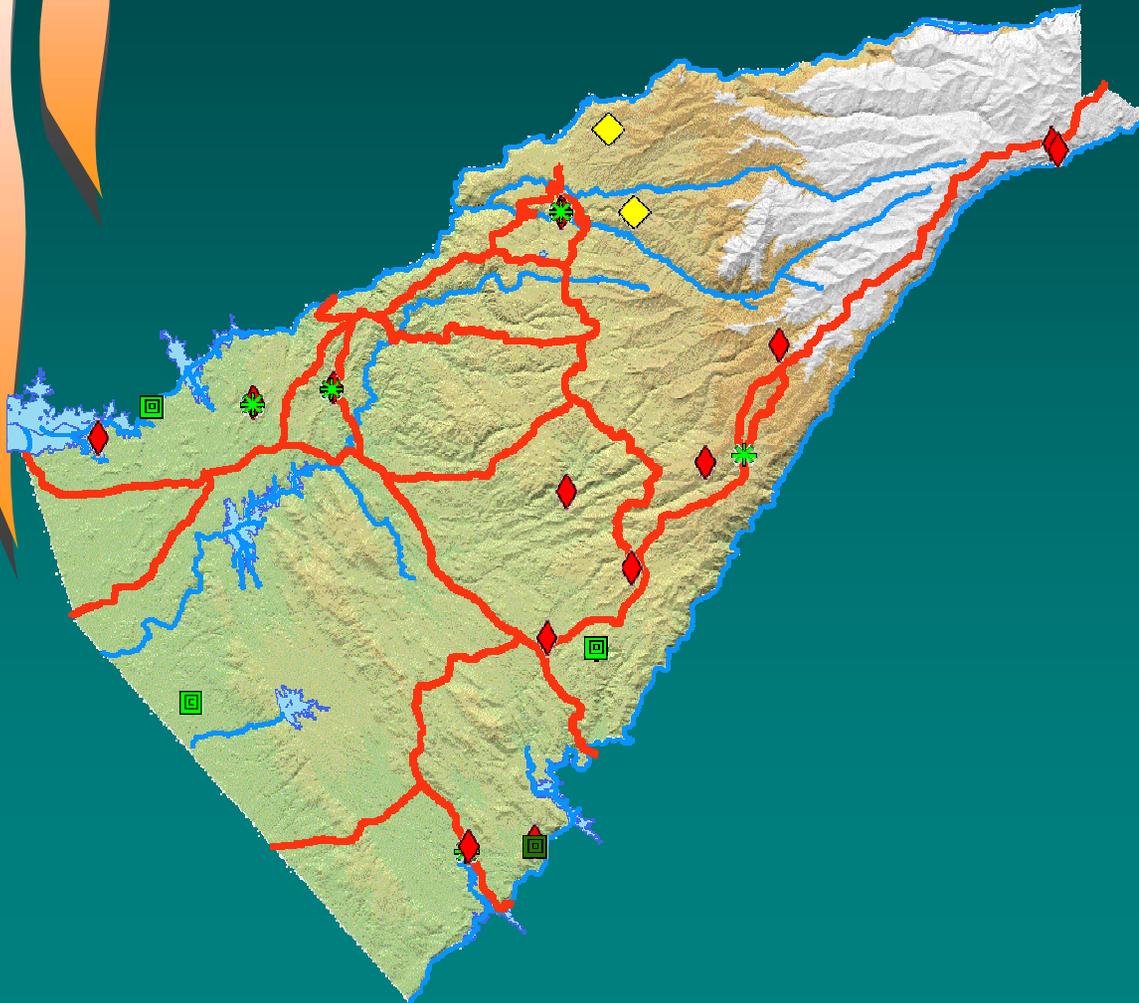
A map consists of several layers



- In GIS you can overlay these layers.
- For any point on these layers all information stored as attributes is available.
- With the selected layers GIS creates a map specific to each project.

The System Component

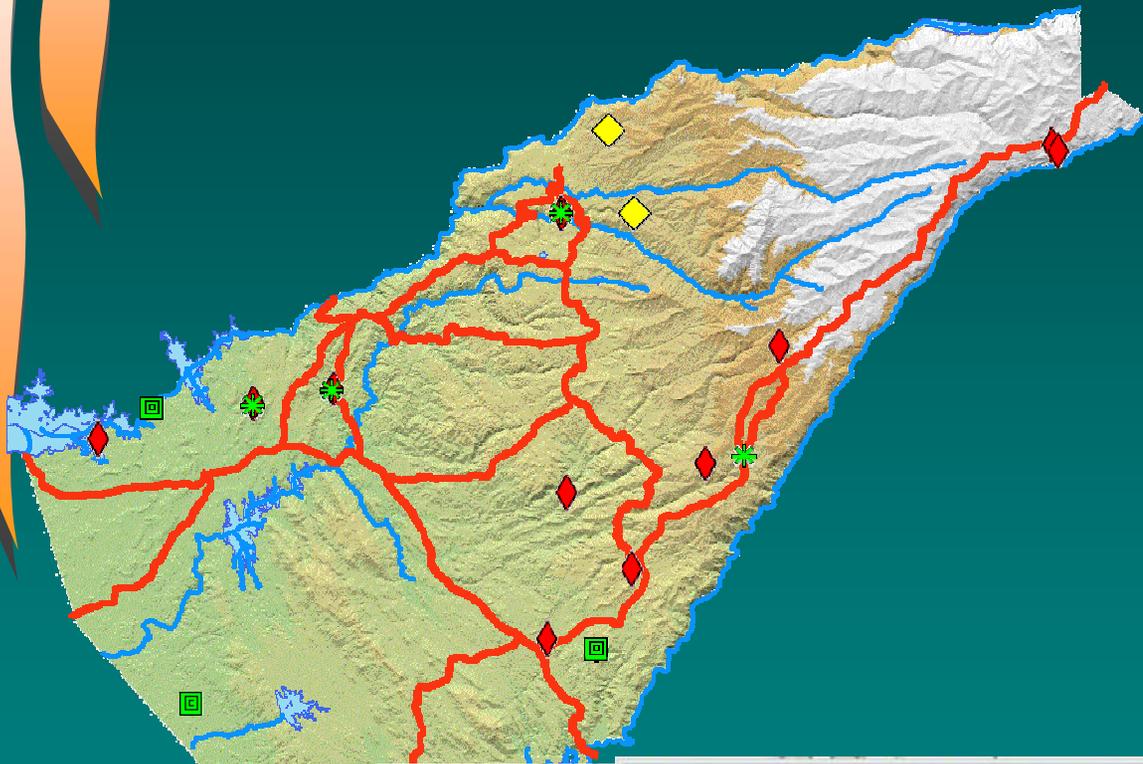
A map consists of several layers



- Solid Waste Sites
- Main Roads
- Main Rivers
- Main Lakes
- Image

The System Component

A map consists of several layers



- Solid Waste Sites
- Main Roads
- Main Rivers
- Main Lakes
- Image

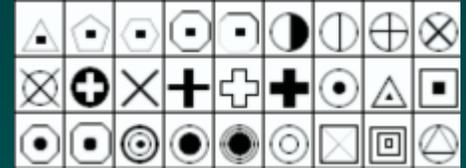
Attributes of La

FID	Shape*
13	Polygon
17	Polygon
16	Polygon
14	Polygon
8	Polygon

Attributes of Main Roads

FID	Shape*	ROADNAME	DIRECTION	SHOULDE	NUM_LANES	SUR_TYPE
0	Polyline	RIDGE RD	two_way	non_graded	2	Paved
1	Polyline	LAUREL ST	two_way	non_graded	2	Paved
2	Polyline	HWY26	two_way		2	Paved
3	Polyline	JESUS MARIA	two_way	non_graded	2	Paved
4	Polyline	HWY 49	two_way		2	Paved
5	Polyline	HWY 49	two_way		2	Paved

The System Component Information Visualization



Symbology

The tab
“Symbology” in the
Layer Properties
provide various
ways to symbolize
according to the
information
displayed.

Layer Properties

General | Source | Selection | Display | Symbology | Fields | Definition Query | Labels | Joins & Relates

Show:

Draw categories using unique values of one field. Import...

Value Field: TYPE

Color Ramp: [Color Ramp]

Symbol	Value	Label	Count
<input checked="" type="checkbox"/>	<all other values>	<all other values>	0
	<Heading>		26
<input type="checkbox"/>	BS	BS	13
<input type="checkbox"/>	CIA	CIA	1
<input type="checkbox"/>	ID	ID	2
<input type="checkbox"/>	LF	LF	3
<input type="checkbox"/>	OT	OT	1
<input type="checkbox"/>	TS	TS	6

Add All Values | Add Values... | Remove | Remove All | Advanced

OK | Cancel | Apply

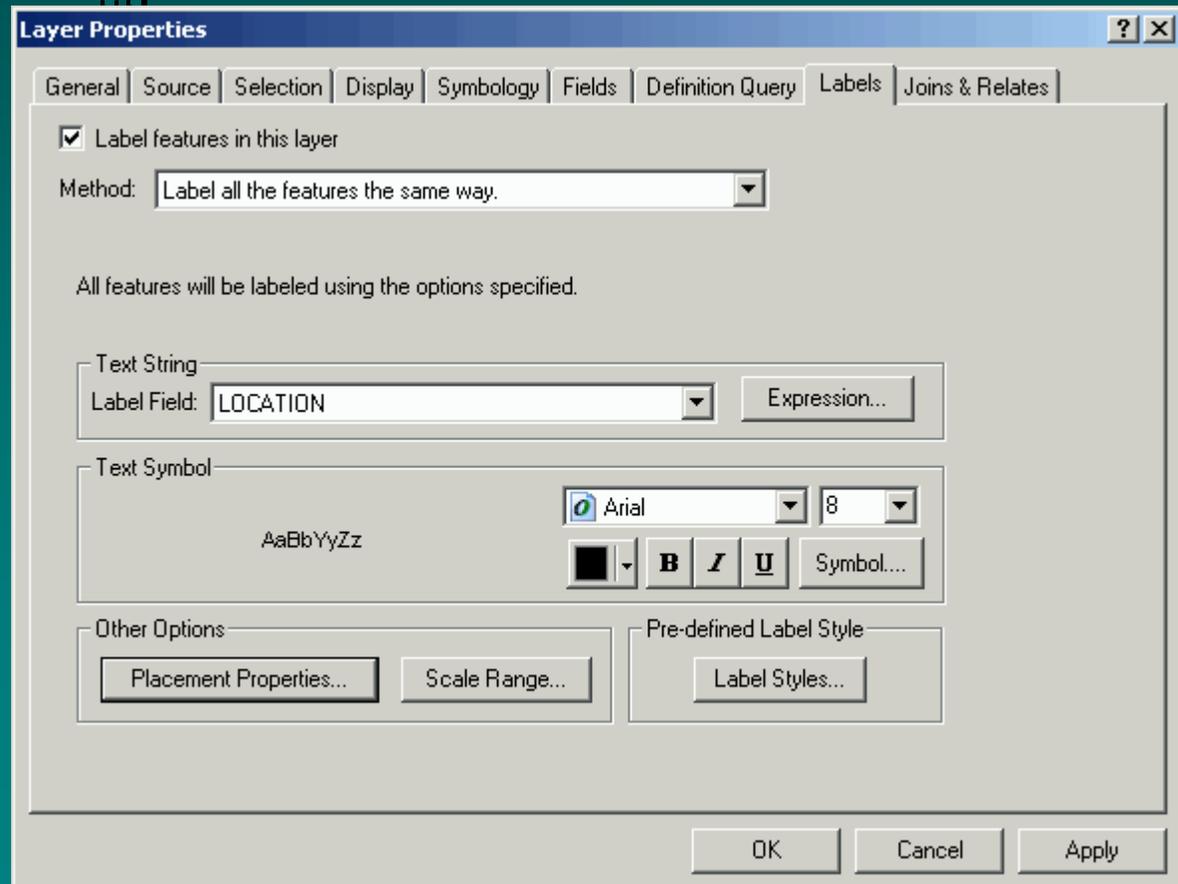
The System Component Information Visualization

Labeling



Select the “label”
tab under Layer
Properties

Labeling is one of
the more difficult
tasks while
creating a map.



File Edit View Insert Selection Tools Window Help

Spatial Adjustment [Icons] Drawing [Icons] [Font: Arial, Size: 10, Bold, Italic, Underline] [Color] [Line Style] [Symbol]

[Icons] Editor [Task: Create New Feature] [Target:]

3D Analyst Layer: [Icons] Layer: Solid Waste Sites

Layers

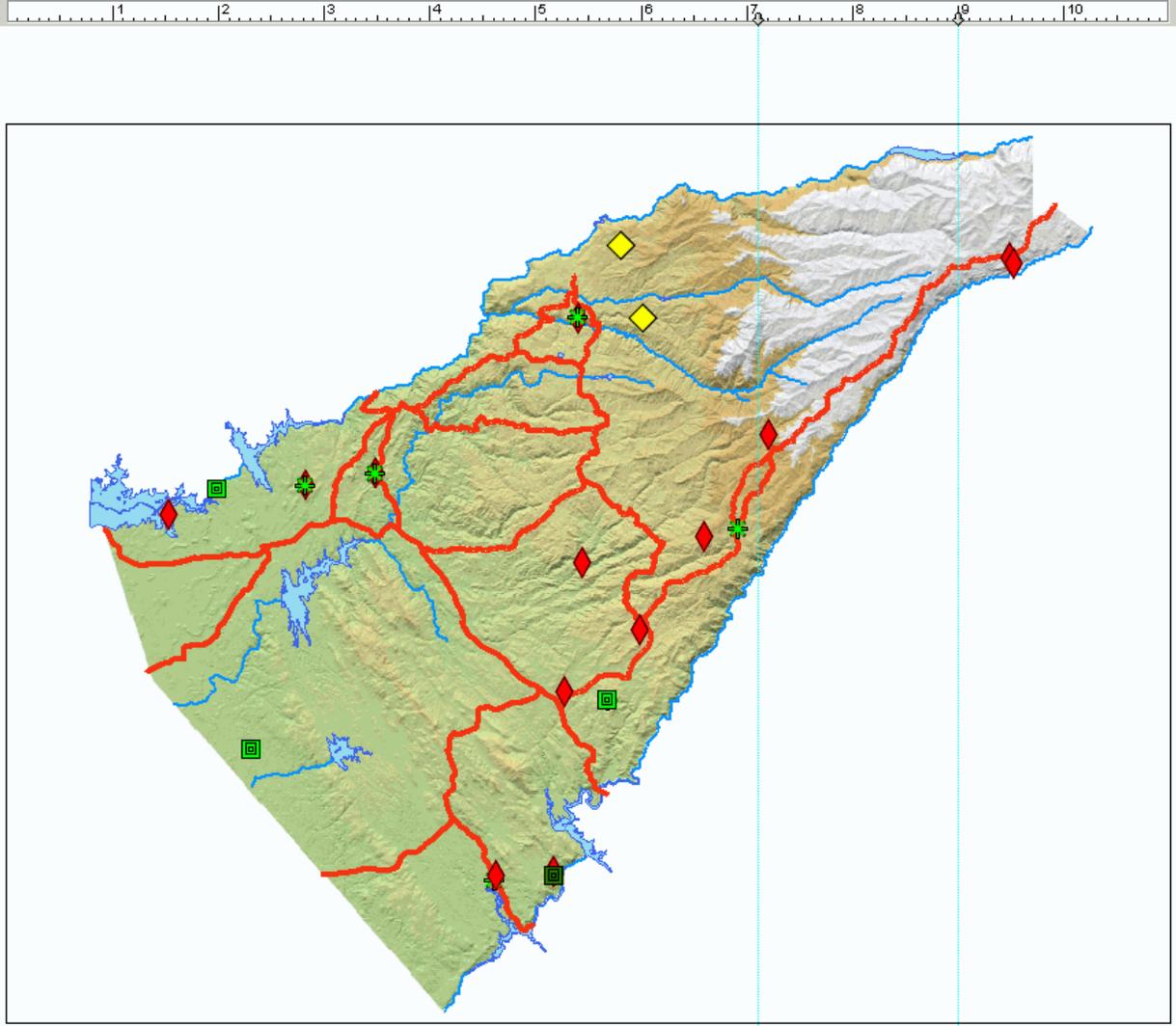
- Solid Waste Sites
 - TYPE
 - Burn Sites
 - Illegal Disposal Sites
 - Transfer Stations
 - Land Fill
 - CAM
- Main Roads
- Lakes
- Main Rivers
- CountyBnd
- calaveras.tif

Display Source Selection

ArcToolbox

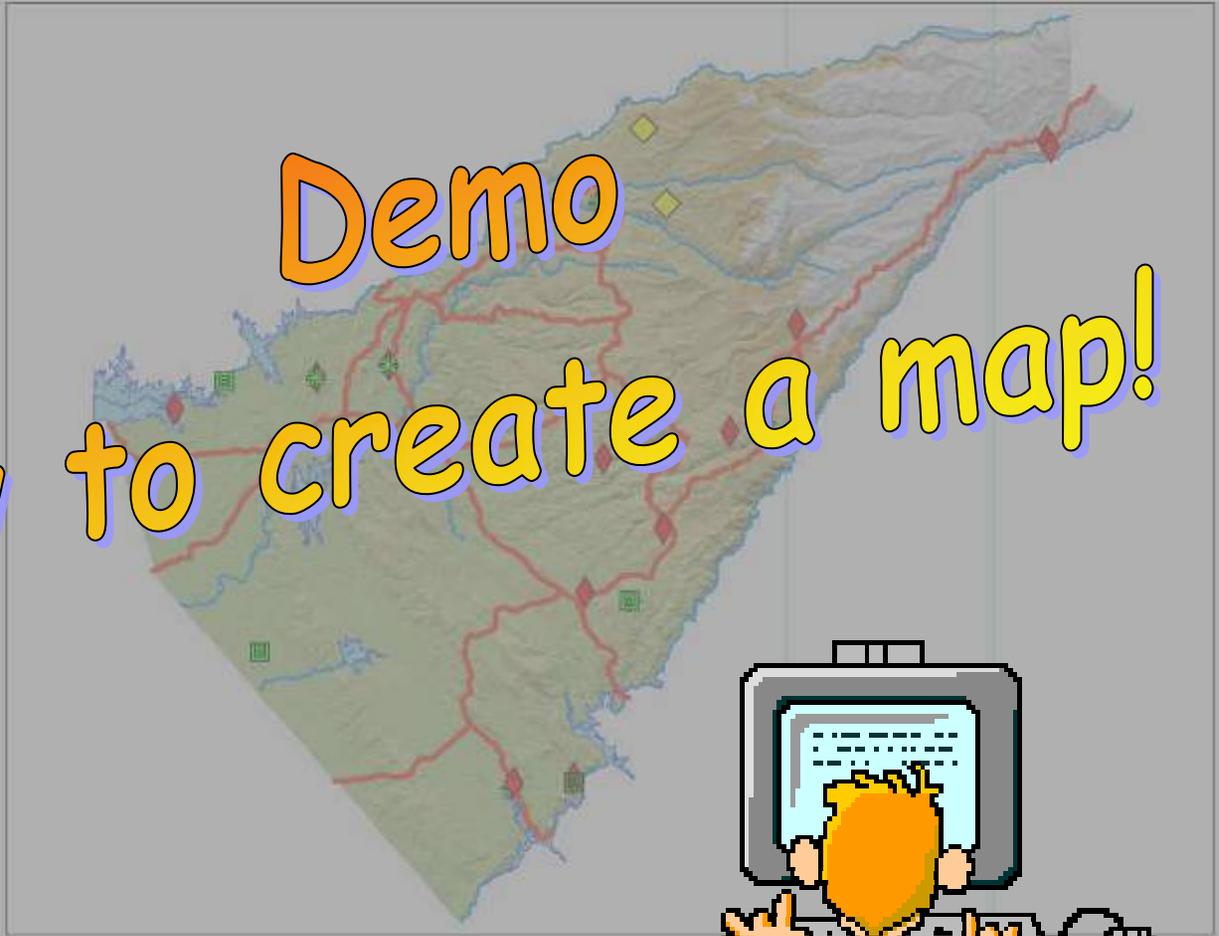
- 3D Analyst Tools
- Analysis Tools
- Cartography Tools
- Conversion Tools
- Data Interoperability Tools
- Data Management Tools
- Geocoding Tools
- Geostatistical Analyst Tools
- Linear Referencing Tools
- Network Analyst Tools
- Samples
- Spatial Analyst Tools
- Spatial Statistics Tools

Favorites Index Search



- Layers
- Solid Waste Sites
 - TREE
 - Burn Sites
 - Illegal Disposal Sites
 - Transfer Stations
 - Land Fill
 - CAM
 - Main Roads
 - Lakes
 - Main Rivers
 - CountyBnd
 - colorvers.tif

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 - Spatial Statistics Tools



Demo
How to create a map!

