



Using GIS in the Classroom





GIS Transforms Students into 21st Century Learners while Stimulating Teachers to Become Highly Qualified

Roger & Anita Palmer

GISetc

www.gisetc.com





Schools spend a good deal of money on technology.

- Projects attempted should justify this expense
- Not just better looking work but work that could only be possible without these tools
- Stakeholders should be proud of work you do

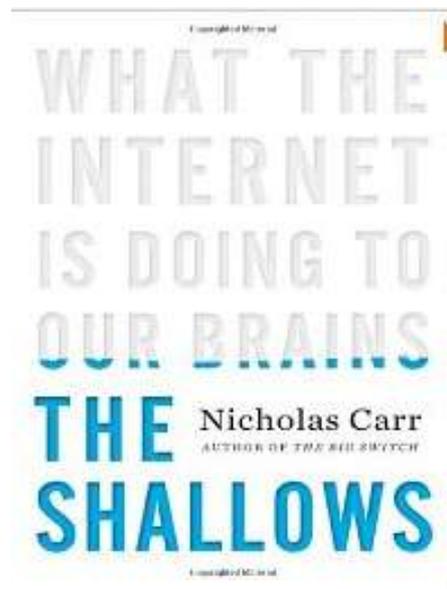


Students spend a lot of time online

- Kaiser Family Foundation recently reported that an average student spends 7 ½ hours online based on surveys of 2000 students from across the country
- Because of multitasking they actually stream over 10 hours of media daily
- Media browsing has a slight negative correlation to school performance and direct relation to risky behaviors



Some ask what impact technology use produces in us



"Raising the Bar" highly valued skills in business

- **Analyze and solve complex problems** 79%
- **Connect actions to ethical decisions** 75%
- **Collaborate with others in diverse group settings** 71%
- **Innovate and be creative** 70%
- **Implement developments in science and technology** 70%
- **Organize and evaluate info from multiple sources** 70%

Hart Research Associates study of 300 business owners hiring over 25 employees





What should technology assisted learning look like?

- Challenging
- Fun and inspiring
- Give progressive feedback that they are on track with finding patterns
- Invite discussion / collaboration
- Require data to test hypothesis
- Address problems students feel are real or important





How is GIS well suited for the challenges facing education?

- GIS is a critical thinking platform
- Critical thinking is a lifelong professional skill
- Makes quick sense of tedious amounts of data
- Listed as one of top 3 job growth areas
- Facilitates networks to people in the know



GIS effectively visualizes, analyzes, and models academic content

- Science – probeware, imagery, gps
- Math – tables, graphs, coordinates
- Language Arts – sense of place for literature/writing/lit critique
- Social Studies – demographics, politics, economics, culture, historical imagery
- Physical Education – hiking, biking, geocaching, photography, lifetime sports



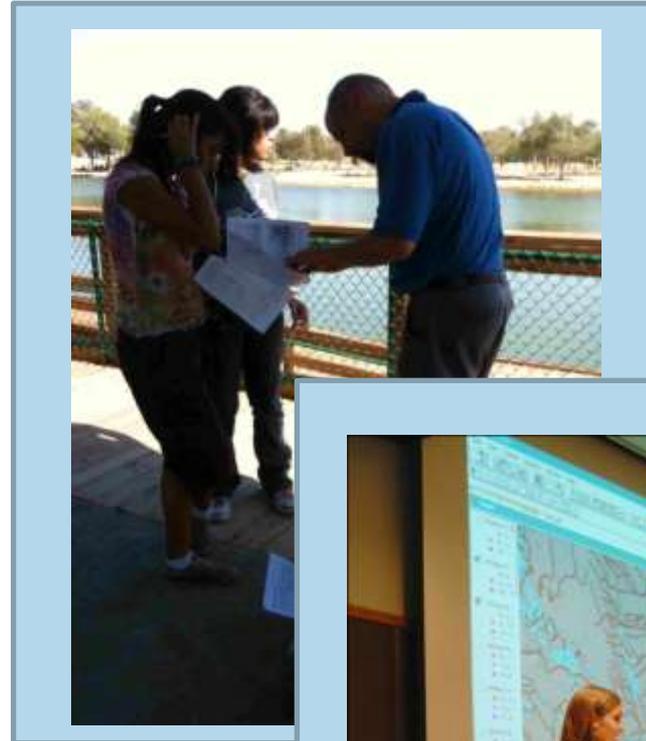
GIS sharpens student skills

- Multiple representations of data
- Pattern finding
- Simple to complex modeling
- Data manipulation
- Query and subset large datasets
- Analysis
- Prediction



GIS assesses student understanding

- Source of blackline master maps
- Real life problem solving
- Data based argumentation
- Solve Scenarios
- Create Data Mashups



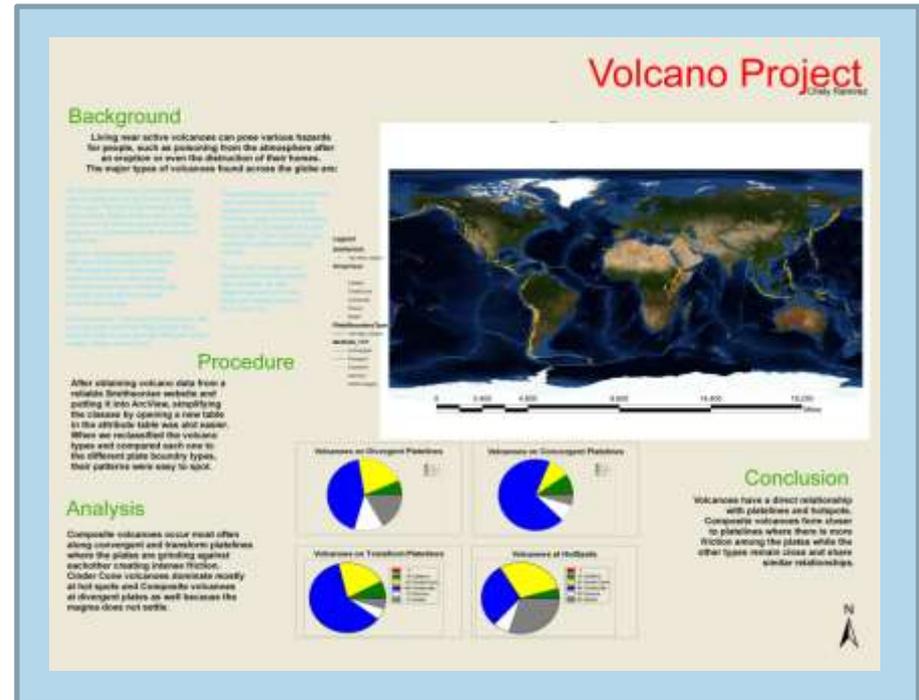
How Do You Assess Your Students...
Are they creating data based arguments?
Are they asking their own questions?
Do they recommend or set up their own experiments?

...



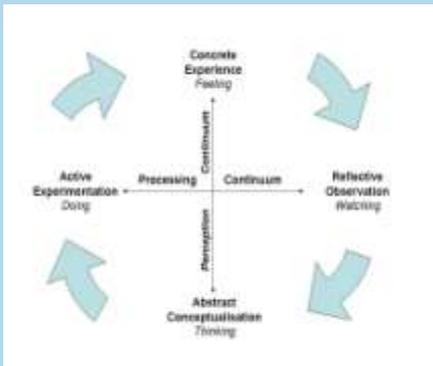
GIS helps students understand inquiry

- Hypothesize
- Experiment design
- Data gathering
- Analysis
- Check hypothesis
- Conclusion
- Graphic layout reports



GIS appeals to multiple learning styles

- Myers Briggs E/I N/P T/F P/J
- Visual, Auditory, Tactile
- Gardner's: Visual, Aural, Verbal, Kinesthetic, Mathematical, Social, Solitary, Natural
- Kolb: concrete-abstract, random-sequential
reflect observe-active experiment



GIS in PD helps make teachers highly effective

- Wholistic
- Interdisciplinary
- Engaging for teachers
- Creates new contexts for teachers specialty
- Way to see content differently
- Teach with primary source data



I am having an absolute blast teaching with this software.

Mike Monson
20 yrs experience
Center, ND

GIS has changed the way I will teach. It has made me excited about my subject in a much deeper way!
Tisha Giddes
5th yr teacher Killeen, TX

Academic Content Investigated

The screenshot shows a browser window displaying the USGS Earthquake Search website. The browser's address bar shows the URL <http://earthquake.usgs.gov/earthquakesearch/epic/>. The website header features the USGS logo with the tagline "science for a changing world" and navigation links for "USGS home", "Contact USGS", and "Search USGS". Below the header is a navigation bar for the "Earthquake Hazards Program" with tabs for "EARTHQUAKES", "HAZARDS", "LEARN", "PREPARE", "MONITORING", and "RESEARCH". The main content area is titled "Earthquake Search" and includes a graphic with the word "Earthquake" in red above a globe and a seismogram, and the word "Search" in red below it. A sidebar on the left lists various search options under "Past" and "Present". A "Select the Search Type" section offers "Global (Worldwide) Search" and "Rectangular Area Search". A "See also" section lists "Search Documentation", "The Data Base", and "Other Earthquake Searches".

Earthquake Search

USGS
science for a changing world

USGS home
Contact USGS
Search USGS

Earthquake Hazards Program

Home About Us Contact Us Search

EARTHQUAKES HAZARDS LEARN PREPARE MONITORING RESEARCH

Past

- Past 8-30 days
- Significant Earthquakes
- Earthquake Lists & Maps
- Search for an Earthquake

Present

- Real-time - CA/NV
- Real-time - USA
- Real-time - Worldwide
- About Earthquake Maps
- KML / RSS Feeds & Data
- Earthquake Notifications
- Seismogram Displays
- Earthquake Animations
- Did You Feel It?
- Shakeflaps
- PAGER

Earthquake Search

Earthquake Search

Select the Search Type

- [Global \(Worldwide\) Search](#)
- [Rectangular Area Search](#)

See also

- [Search Documentation](#)
- [The Data Base](#)
- [Other Earthquake Searches](#)



Grabbing Current Data



NEIC: Earthquake Search Results

Year	Month	Day	Time (hhmmss.mmm) UTC	Latitude	Longitude	Magnitude	Depth
2008	01	01	063227.96	40.29	72.99	5.6	6
2008	01	01	100851.24	-35.76	-103.69	5.0	10
2008	01	01	185459.01	-5.88	146.88	6.3	
2008	01	01	191305.11	-5.90	146.97	5.8	
2008	01	02	084229.20	-23.10	-70.44	5.0	
2008	01	02	114454.17	-23.67	-114.86	5.0	
2008	01	02	151856.40	-36.85	-94.25	5.2	
2008	01	02	200412.65	-6.99	125.23	5.0	5
2008	01	03	105817.28	-5.16	152.07	5.0	
2008	01	03	111548.51	-5.92	122.66	5.4	
2008	01	04	012631.20	-21.64	-68.63	5.3	1
2008	01	04	072918.30	-2.78	101.03	6.0	
2008	01	04	114637.82	51.92	-170.10	5.0	
2008	01	05	015645.46	14.13	-91.48	5.6	60
2008	01	05	060226.06	14.29	124.60	5.1	37

- Cut
- Copy**
- Paste
- Select All
- Print...
- Print Preview...

- Search for "Year,Month,Day,Time(hhmmss.m...)"
- More Search Types ▶
- Send To ▶
- Page Info ▶





Microsoft Excel - Book1

File Edit View Insert Format Tools Data Window Help



A1 = Year,Month,Day,Time(hh:mm:ss.mmm)

	A	B	C
1	Year,Month,Day,Time(hh:mm:ss.mmm)		
2	2008,01,01,063227.96, 40.29, 72		
3	2008,01,01,100851.24, -35.76, -10		
4	2008,01,01,185459.01, -5.88, 148		
5	2008,01,01,191305.11, -5.90, 148		
6	2008,01,02,084229.20, -23.10, -70		
7	2008,01,02,114454.17, -23.67, -11		
8	2008,01,02,151856.40, -36.85, -94		
9	2008,01,02,200412.65, -6.99, 125		
10	2008,01,03,105817.28, -5.16, 152		
11	2008,01,03,111548.51, -5.92, 122		
12	2008,01,04,012631.20, -21.64, -68		
13	2008,01,04,01101.03,6.0, 35		
14	2008,01,04,01170.10,5.0, 35		
15	2008,01,04,0108,-91.48,5.6, 66		
16	2008,01,05,060226.06, 14.29, 124.60,5.1, 37		

- Sort...
- Filter
- Form...
- Subtotals...
- Validation...
- Table...
- Text to Columns...**
- Consolidate...
- Group and Outline
- PivotTable and PivotChart Report...
- Get External Data
- Refresh Data

- Format Cells...
- Pick From List...
- Hyperlink...

	H	I	J
1	Latitude,Longitude,Magnitude,Depth		
2			
3	Depth		
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			



Stories aren't always spatially distributed

The screenshot displays a GIS application interface. At the top, a world map is overlaid with numerous small blue circular markers representing earthquake locations. A context menu is open over the map, listing options such as 'Sort Ascending', 'Sort Descending', 'Summarize...', 'Statistics...', 'Field Calculator...', 'Calculate Geometry...', 'Turn Field Off', 'Freeze/Unfreeze Column', 'Delete Field', and 'Properties...'. The 'Statistics...' option is highlighted. On the left, a 'Layers' panel shows the 'Quak9707' layer selected. Below the map, the 'Attributes of Quak9707' table is visible, containing 12 columns and 12 rows of data. The table columns are FID, Shape, OBJECTID, Year, Month, Day, Time, Latitude, Longitude, Magnitude, and Depth. The first row (FID 0) is selected. At the bottom, a status bar shows 'Record: 1', 'Show: All Selected', and 'Records (0 out of 199230 Selected)'. A small 'SchoolSite' logo is in the bottom-left corner.

FID	Shape	OBJECTID	Year	Month	Day	Time	Latitude	Longitude	Magnitude	Depth
0	Point	63414	1997	1	1	3020.33	13.03	-88.08	4.5	33
1	Point	63415	1997	1	1	14402.31	45.66	26.58	3.6	141
2	Point	63416	1997	1	1	23227.64	-15.36	-173.36	4.2	83
3	Point	63417	1997	1	1	24401.51	2.52	127.54	3.8	124
4	Point	63418	1997	1	1	33045.37	30.26	68.12	4.5	39
5	Point	63419	1997	1	1	35358.32	-33.29	-71.91	3.8	20
6	Point	63420	1997	1	1	43551.88	6.81	-72.89	5.3	163
7	Point	63421	1997	1	1	52801.03	-15.1	-75.63	4.5	33
8	Point	63422	1997	1	1	54922.27	34.35	-37.3	4.8	10
9	Point	63423	1997	1	1	71039.96	-15.66	-72.2	3.6	100
10	Point	63424	1997	1	1	75658.15	-4.43	140.03	3.4	33
11	Point	63425	1997	1	1	84846.42	-34.76	-179.52	4.3	33

The Stories in the Statistics

Layers

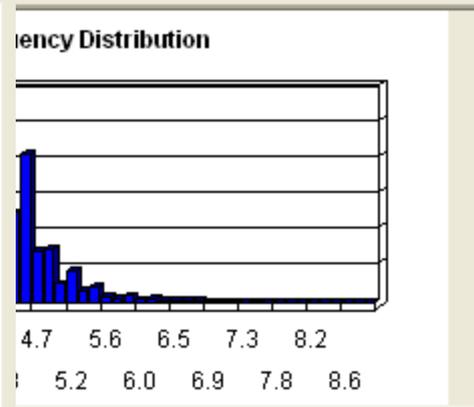
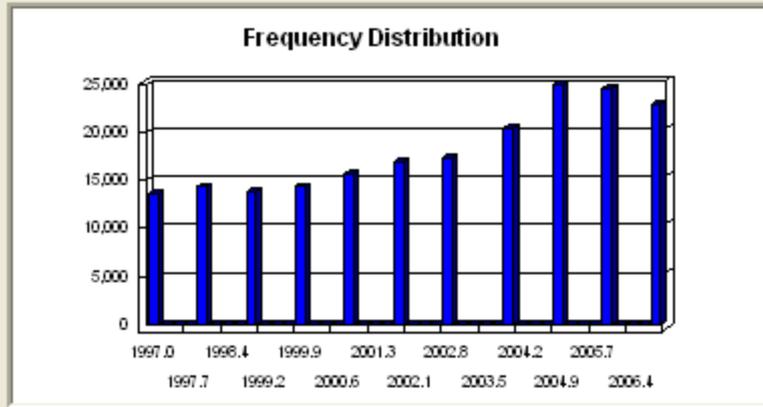
- Quak9707
- Country07
- GlobalBath.tif
- earth_wsi.sid



Field: Year

Statistics:

Count: 199230
 Minimum: 1997
 Maximum: 2007
 Sum: 398993420
 Mean: 2002.677408
 Standard Deviation: 3.143278



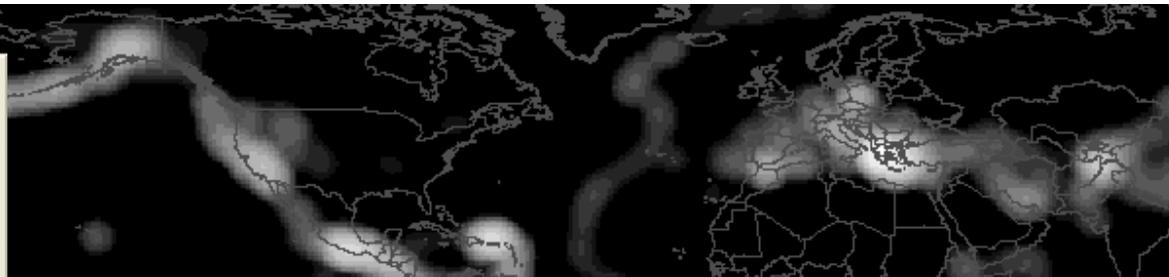
1	Point	63415	1997	1	1	14402.31	45.66	26.58	3.6	141
2	Point	63416	1997	1	1	23227.64	-15.36	-173.36	4.2	83
3	Point	63417	1997	1	1	24401.51	2.52	127.54	3.8	124
4	Point	63418	1997	1	1	33045.37	30.26	68.12	4.5	39
5	Point	63419	1997	1	1	35358.32	-33.29	-71.91	3.8	20
6	Point	63420	1997	1	1	43551.88	6.81	-72.89	5.3	163
7	Point	63421	1997	1	1	52801.03	-15.1	-75.63	4.5	33
8	Point	63422	1997	1	1	54922.27	34.35	-37.3	4.8	10
9	Point	63423	1997	1	1	71039.96	-15.66	-72.2	3.6	100
10	Point	63424	1997	1	1	75658.15	-4.43	140.03	3.4	33
11	Point	63425	1997	1	1	84846.42	-34.76	-179.52	4.3	33

Record: 1 | Show: All Selected | Records (0 out of 199230 Selected) | Options



Extrapolating data to analyze

- Country07
- eqdens9207
 - Copy
 - Remove
 - Open Attribute Table
 - Joins and Relates
 - Zoom To Layer
 - Zoom To Make Visible
 - Zoom To Raster Resolution
 - Visible Scale Range
 - Data
 - Save As Layer File...
 - Properties...



Layer Properties

General | Source | Extent | Display | Symbology | Fields | Joins & Relates

Show:
Classified
Stretched

Draw raster grouping values into classes Import...

Fields:
Value: <VALUE>
Normalization: <None>

Classification:
Geometrical Interval
Classes: 15 Classify...

Color Ramp: [Color Ramp]

Symbol	Range	Label
[Black]	0 - 1.072812103	0 - 1.072812103
[Dark Gray]	1.072812103 - 1.802459354	1.072812104 - 1.802459354
[Medium Gray]	1.802459354 - 2.875271458	1.802459355 - 2.875271458
[Light Gray]	2.875271458 - 4.452644371	2.875271459 - 4.452644371
[White]	4.452644371 - 6.771881169	4.452644372 - 6.771881169
[Light Gray]	6.771881169 - 10.18189239	6.77188117 - 10.18189239
[White]	10.18189239 - 15.19568679	10.1818924 - 15.19568679

Show class breaks using cell values Display NoData as [Dropdown]
 Use hillshade effect Z: 1

OK Cancel Apply



Earthquakes per degree over 10 years

The screenshot shows a GIS application interface. On the left is a layer list with the following items:

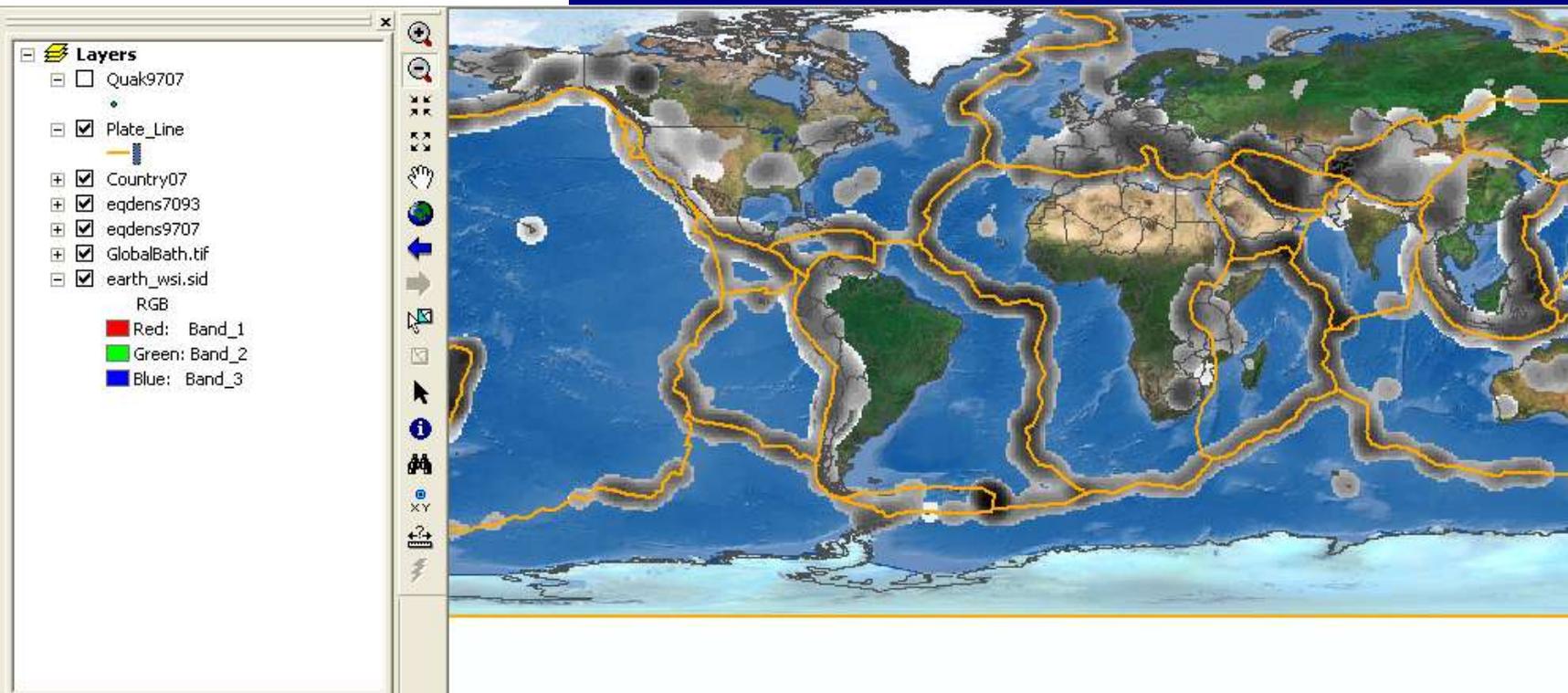
- Country07
- eqdens9707
 - <VALUE>
 - 0 - 1.072812103
 - 1.072812104 - 1.802459354
 - 1.802459355 - 2.875271458
 - 2.875271459 - 4.452644371
 - 4.452644372 - 6.771881169
 - 6.77188117 - 10.18189239
 - 10.1818924 - 15.19568679
 - 15.1956868 - 22.56754946
 - 22.56754947 - 33.40651787
 - 33.40651788 - 49.34322767
 - 49.34322768 - 72.77522876
 - 72.77522877 - 107.2276773
 - 107.2276774 - 157.8836673
 - 157.8836674 - 232.3639853
 - 232.3639854 - 341.8735962
- GlobalBath.tif
- earth_wsi.sid
 - RGB
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3

The 'Layer Properties' dialog box is open, showing the 'Classified' tab. The 'Draw raster grouping values into classes' section is active. The 'Fields' section shows 'Value: <VALUE>' and 'Normalization: <None>'. The 'Classification' section shows 'Geometrical Interval' and 'Classes: 15'. The 'Color Ramp' section shows a color ramp with a table of values:

Symbol	Range	Label
[White]	0 - 1.072812103	0 - 1.072812103
[Light Yellow]	1.072812103 - 1.802459354	1.072812104 - 1.802459354
[Light Green]	1.802459355 - 2.875271458	1.802459355 - 2.875271458
[Light Blue]	2.875271459 - 4.452644371	2.875271459 - 4.452644371
[Light Purple]	4.452644372 - 6.771881169	4.452644372 - 6.771881169
[Light Cyan]	6.77188117 - 10.18189239	6.77188117 - 10.18189239
[Light Magenta]	10.1818924 - 15.19568679	10.1818924 - 15.19568679
[Light Red]	15.1956868 - 22.56754946	15.1956868 - 22.56754946
[Light Orange]	22.56754947 - 33.40651787	22.56754947 - 33.40651787
[Light Yellow-Orange]	33.40651788 - 49.34322767	33.40651788 - 49.34322767
[Light Green-Orange]	49.34322768 - 72.77522876	49.34322768 - 72.77522876
[Light Yellow-Green]	72.77522877 - 107.2276773	72.77522877 - 107.2276773
[Light Green]	107.2276774 - 157.8836673	107.2276774 - 157.8836673
[Light Yellow-Green]	157.8836674 - 232.3639853	157.8836674 - 232.3639853
[Light Green]	232.3639854 - 341.8735962	232.3639854 - 341.8735962



Finding tectonic plates from Data



Grids help find changes from average activity

Who_Is_Next.mxd - ArcMap - ArcView

File Edit View Insert Selection Tools Window Help

Spatial Analyst Layer: eqdens04

Distance
Density...
Interpolate to Raster
Surface Analysis
Cell Statistics...
Neighborhood Statistics...
Zonal Statistics...
Reclassify...
Raster Calculator...
Convert
Options...

Raster Calculator

Layers:
10 yr avg Qk Density
2004 Qk Density
earth_wsi.sid
GlobalBath.tif

[2004 Qk Density] - [10 yr avg Qk Density]

About Building Expressions Evaluate Cancel >>

SchoolSite
July 6-8, 2011
10th
Annual
User Conference

Red Had Fewer Earthquakes in 2004 Blue Had More Earthquake Activity

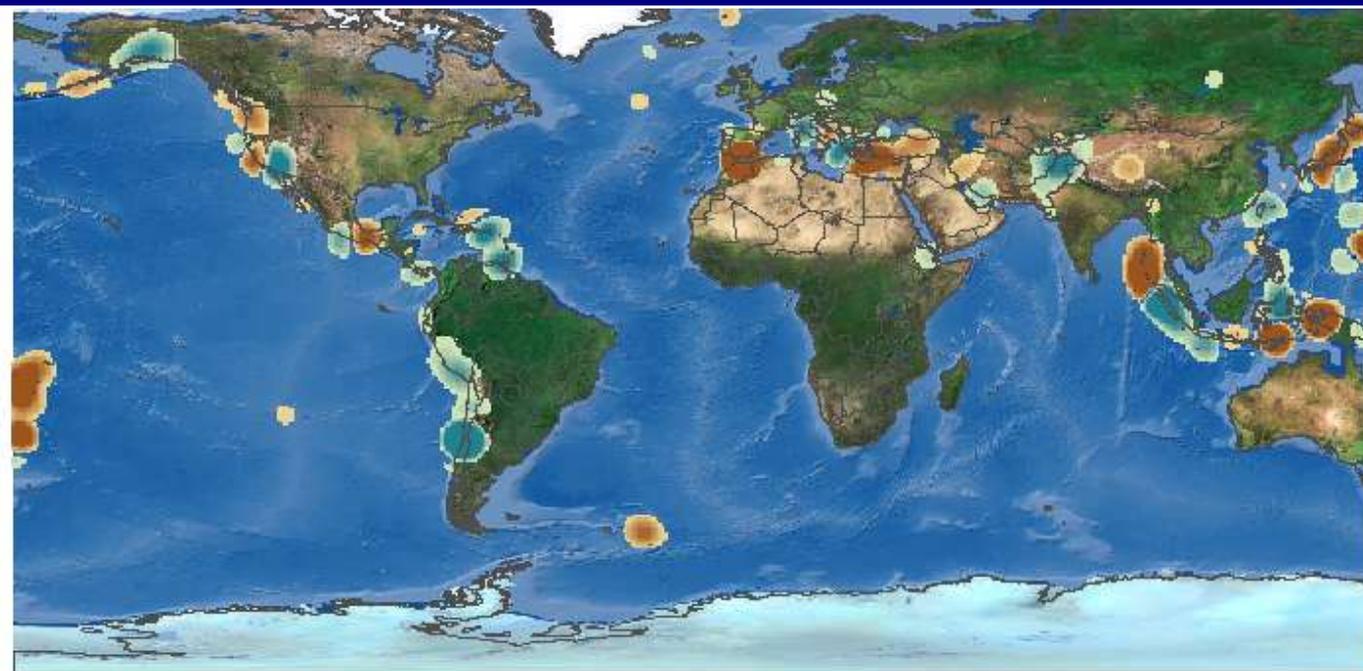
Legend for earthquake density in 2004:

<VALUE>

Dark Brown	-22 - -1.7
Brown	-1.6 - -1.5
Light Brown	-1.4 - -1.3
Orange	-1.2 - -1.1
Light Orange	-1 - -0.9
Yellow	-0.8 - -0.7
Light Yellow	-0.6 - -0.5
Light Green	-0.4 - -0.3
White	-0.2 - -0.1
White	0 - 0.1
Light Green	0.2 - 0.3
Green	0.4 - 0.5
Light Green	0.6 - 0.7
Green	0.8 - 0.9
Dark Green	1 - 1.1
Dark Green	1.2 - 1.3
Dark Green	1.4 - 1.5
Dark Green	1.6 - 1.7
Dark Green	1.8 - 9.7

Legend for layers:

- eqdens04
- eqdens05
- eqdens9707





Other Science Stories

- MRData Soil Chemistry to see evidence of natural history forces of continental formation
- Understand growing regions
- Illustrate irrigation issues in the arid west



USGS Mineral Resources On-Line Spatial Data

Mineral Resources On-Line Spatial Data

Interactive maps and downloadable data for regional and global Geology, Geochemistry, Geophysics, and Mineral Resources

Topical indexes of scientific data [\[Show descriptions\]](#)

[Geographic Area](#)
[Scientific Topics](#)

Mineral resource data [\[Show descriptions\]](#)

[Mineral Resources Data System \(MRDS\)](#)
[Alaska Resource Data File \(ARDF\)](#)





Mineral Resources On-Line Spatial Data

Mineral Resources > [Online Spatial Data](#)

National Geochemical Survey database

National-scale geochemical analysis of stream sediments and soils in the US, from existing data, reanalysis of existing samples, and new sampling. G

View:

Show in a web browser window:



Continental US



Alaska

Show in Google Earth or download KML:

- KMZ, compressed, 2.2M bytes

Show in your GIS using OGC WMS:

<http://mrddata.usgs.gov/cgi-bin/mapserv?map=ngs.map&request=GetCapabilities&service=WMS&version=1.1.1>

Download:

Download data for geographic areas you choose

Get the entire data set

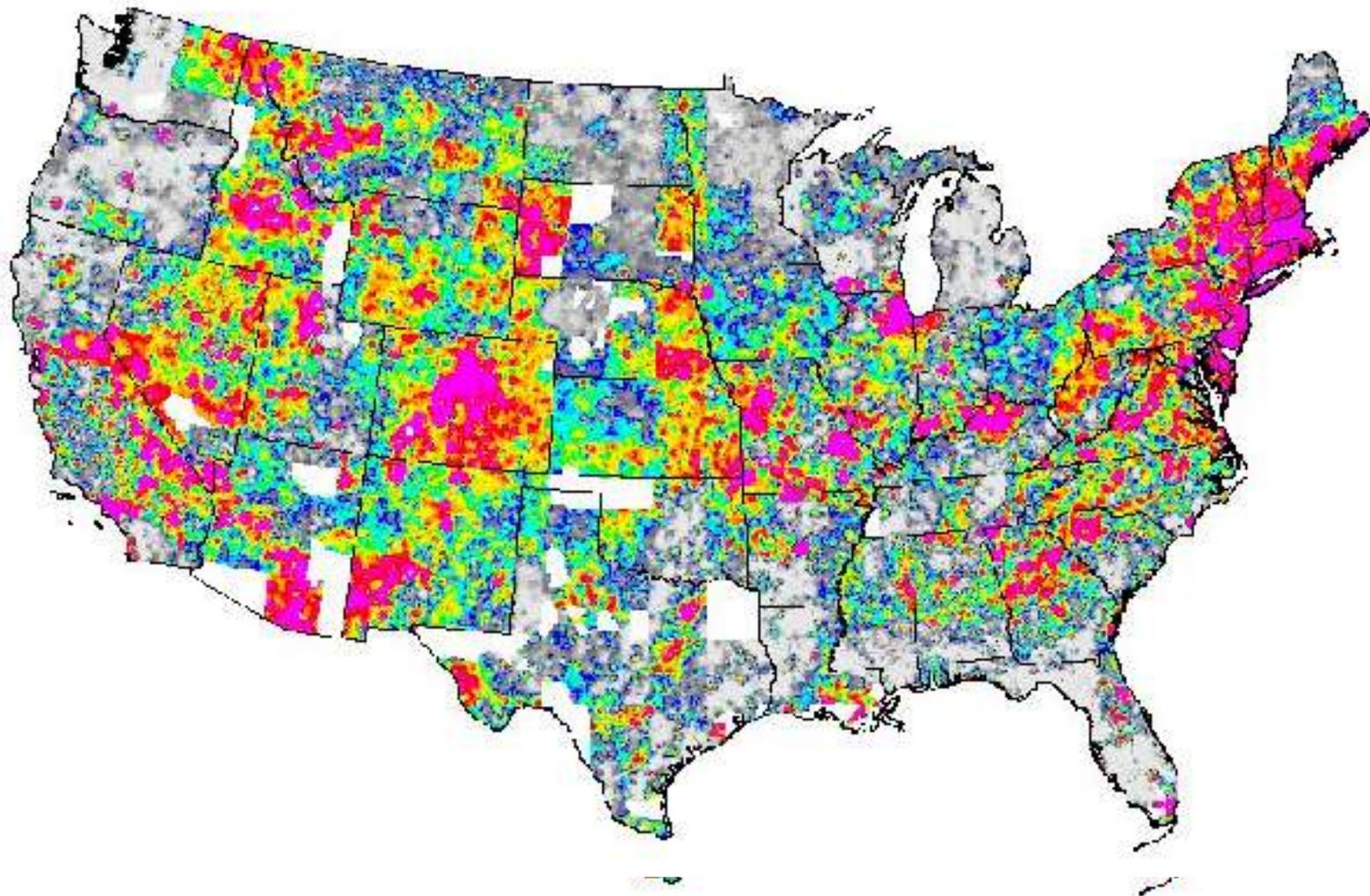
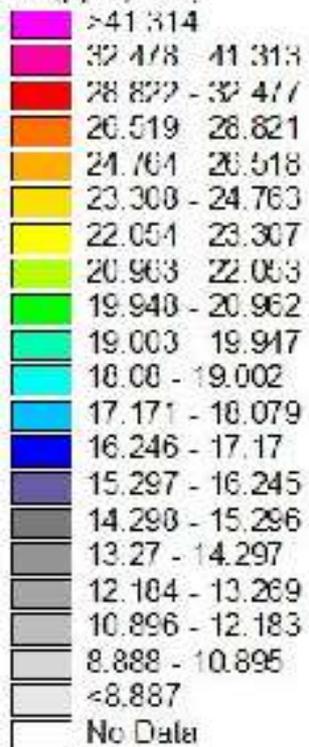
- Shapefile with a subset of 53 attributes: ICP40, As, Se, Hg (74,409 samples, 5.2MB .ZIP package)
- dBase file with all 287 attributes (77,212 records, 19.6MB .ZIP package)

Documentation:

[National Geochemical Survey - Full documentation](#)

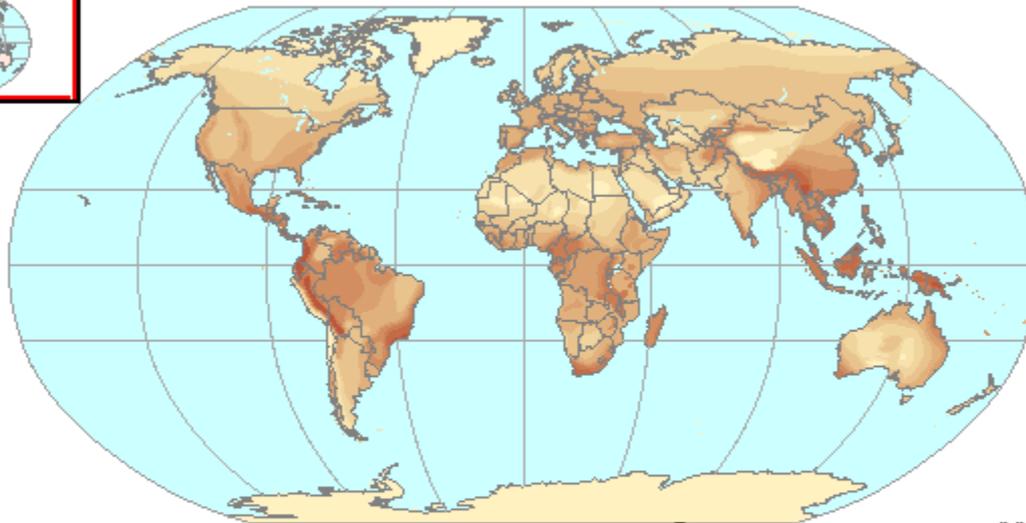


Pb (ppm, ICP)



Pairing these map sources to teach natural history and evolution

IMAPS World Atlas



© UNEP-WCMC 2007
Powered by UNEP.Net

Disclaimer

This map shows the species richness of vascular plants, plotted as a world density surface. It is based on some 1400 literature records from different geographic units, with richness values as mapped calculated on a standard area of 10,000 km² using a single species-area curve.

Source: Data and analysis © Wilhelm Barthlott (Botanic Institute and Botanic Gardens, University of Bonn). Reproduced by permission, with modification to colours. For further details see Barthlott and website <http://www.botanik.uni-bonn.de/system/biomaps.htm#worldmap>. (March 2002)

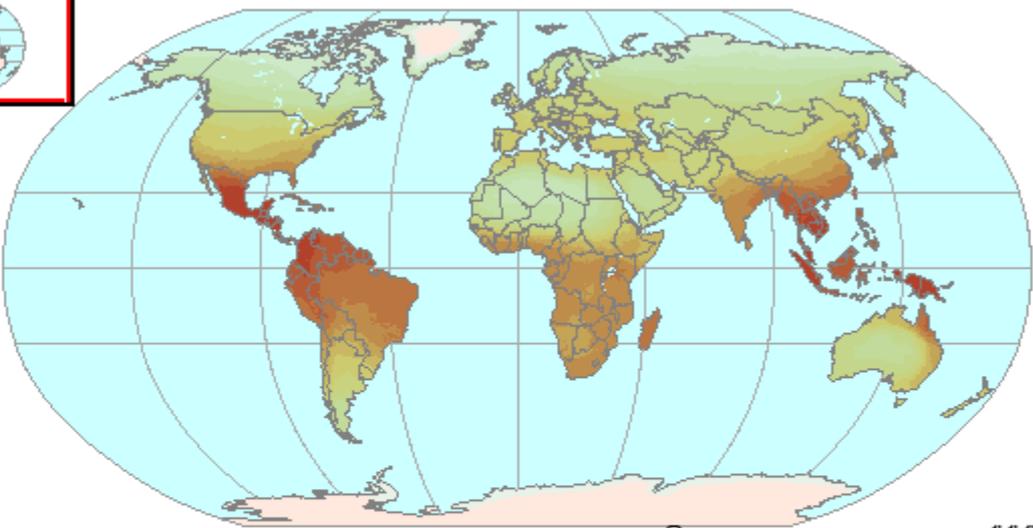
Barthlott, W. et al. 1999: Terminological and methodological aspects of the mapping and analysis of global biodiversity. *Acta Botanica Fennica* 162:103-110.

- Biodiversity through time
- Humans and biodiversity
- Terrestrial biodiversity
 - 5.1 Photosynthetic Activity
 - 5.2 Global Land Cover
 - 5.3 Vascular Plant Family Diversity
 - 5.4 Country Level Biodiversity
 - 5.5 Flowering Plant Family Diversity
 - 5.6 Vertebrate Diversity
 - 5.7 Current Forest Distribution
 - 5.8 Non-forest Terrestrial Ecosystems
 - 5.9 Potential Cloud Forest Distribution

Visible Active

- Internationally Protected Area (points)
- Critically Endangered Mammals
- Critically Endangered Birds
- Centres of Plant Diversity
- Bird Extinctions





- Biodiversity through time
- Humans and biodiversity
- Terrestrial biodiversity
 - 5.1 Photosynthetic Activity
 - 5.2 Global Land Cover
 - 5.3 Vascular Plant Family Diversity
 - 5.4 Country Level Biodiversity
 - 5.5 Flowering Plant Family Diversity
 - 5.6 Vertebrate Diversity
 - 5.7 Current Forest Distribution
 - 5.8 Non-forest Terrestrial Ecosystems
 - 5.9 Potential Cloud Forest Distribution

- Visible Active
- Internationally Protected Areas (points)
 - Critically Endangered Mammals
 - Critically Endangered Birds
 - Centres of Plant Diversity
 - Bird Extinctions

UNEP
WCMC
© UNEP-WCMC, 2007
Powered by UNEP.Net

Disclaimer

Flowering plant family diversity



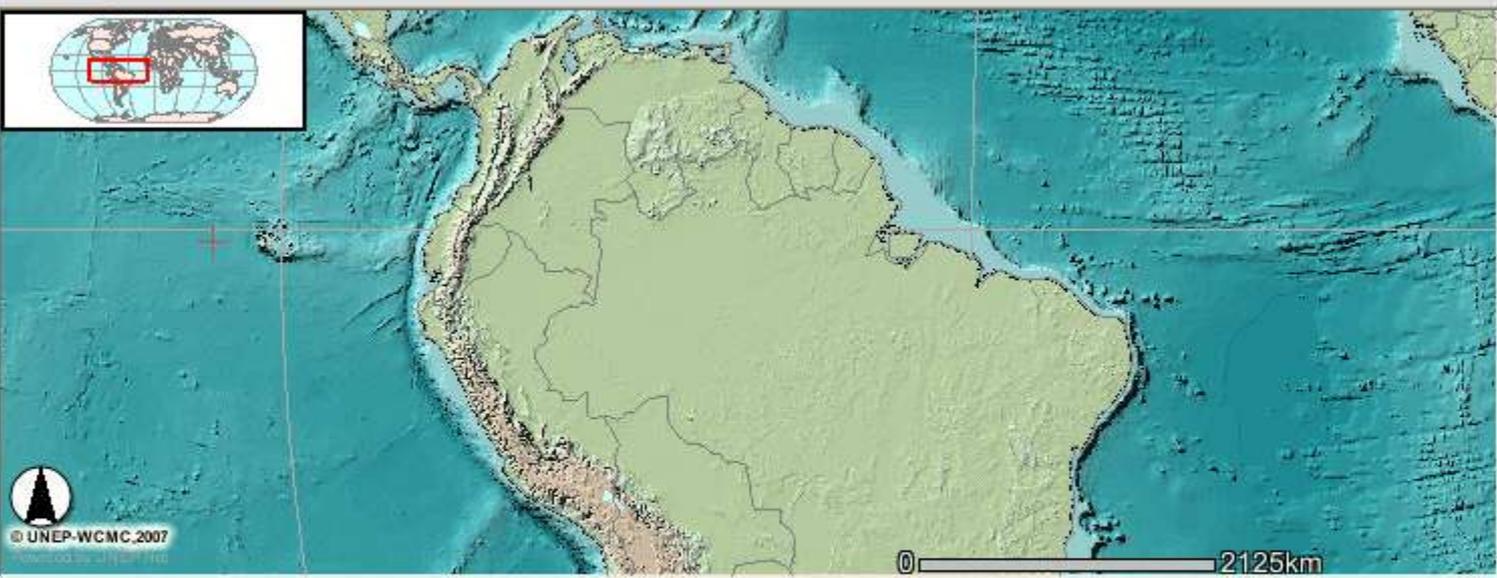
Global diversity of flowering plants represented as a density surface derived from distribution maps for 284 non-aquatic plant

Zoom In

Refresh Map

• **What makes south and central America such strong centers of speciation?**





- [The Biosphere](#)
- [1.1 Physical Geography](#)
- [1.2 Primary Production](#)
- [The diversity of organisms](#)
- [Biodiversity through time](#)
- [Humans and biodiversity](#)
- [Terrestrial biodiversity](#)
- [Marine biodiversity](#)
- [Freshwater biodiversity](#)
- [Responding to change](#)



© UNEP-WCMC, 2007

Disclaimer

Basic physical geography of the Earth

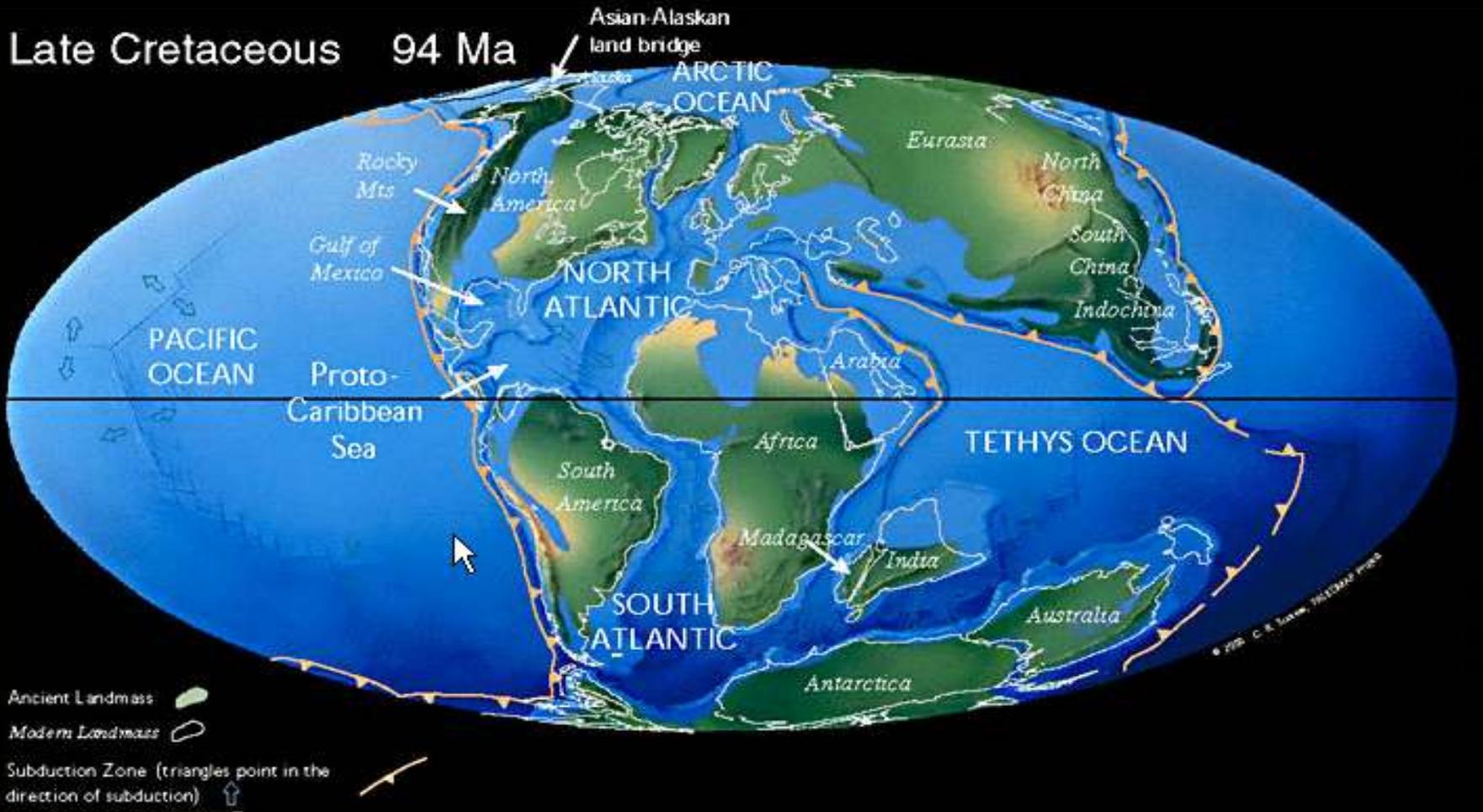
The relative areas occupied by dry land and by water, and the general distribution of areas of extreme height or depth.

- Visible Active
- Internationally Protected Areas (points)
 - Critically Endangered Mammals
 - Critically Endangered Birds
 - Centres of Plant Diversity
 - Bird Extinctions

The elevation uniformity makes it more sensitive to climate changes in recent glacial times forming pocket biomes isolated from each other. Isolated vascular plants have opportunities to evolve separately when wetter times rejoin the rainforest fragments.



Late Cretaceous 94 Ma



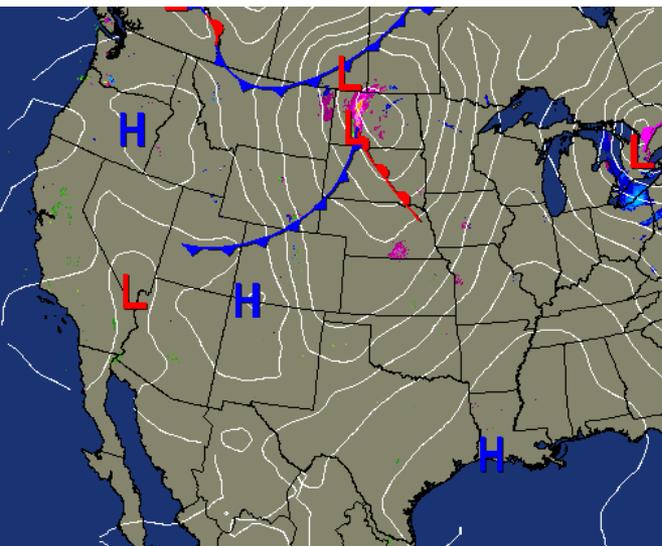
The central American isthmus arose slowly as island chains forming a competitive advantage for flowering plants able to migrate before other plants or predators.



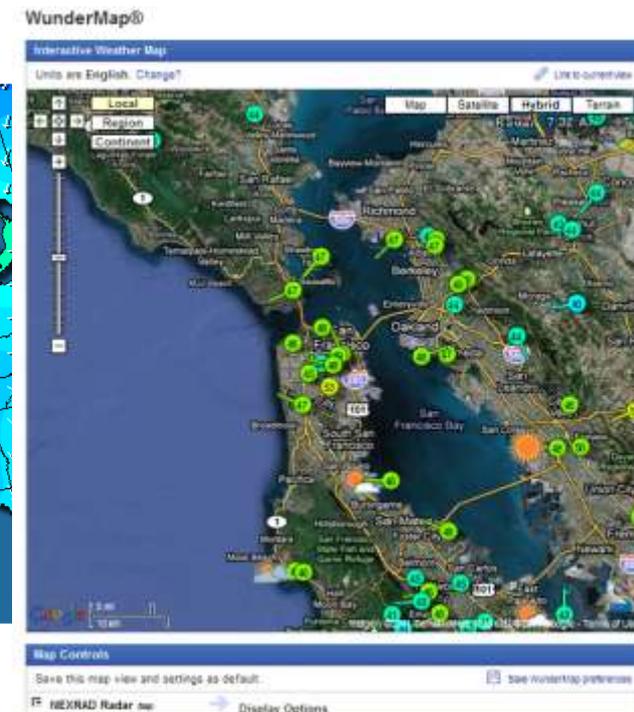
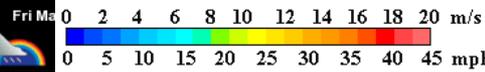
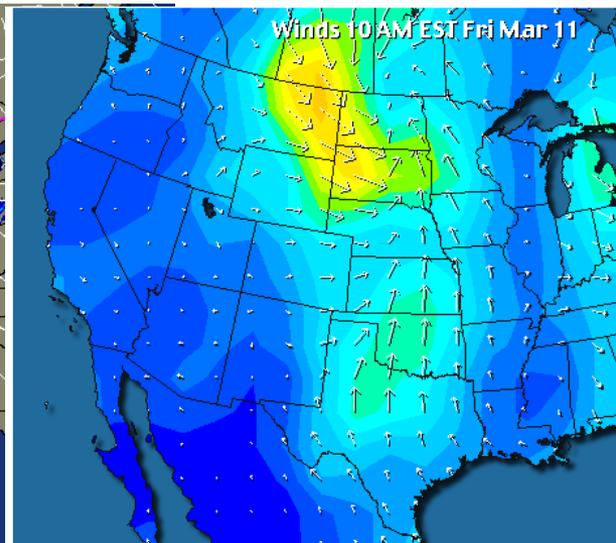
Weather Mapping

- Compare these to locally measured variables with probeware such as PASC0, Vernier, or Fourier

Weatherunderground.com



United States Current Fronts

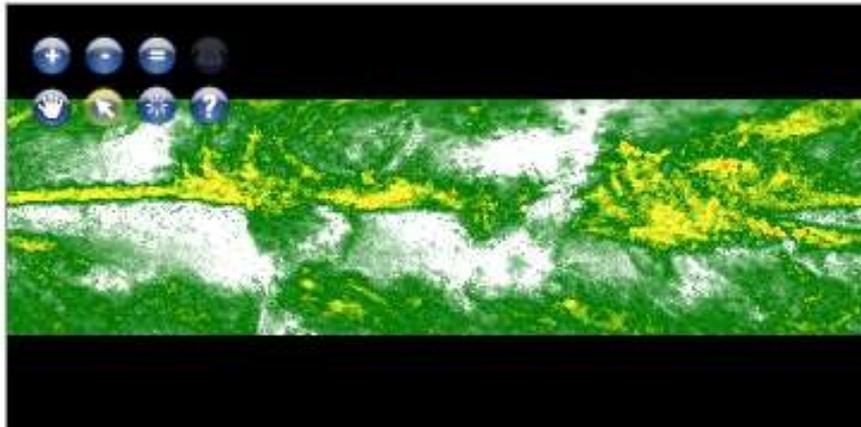


Climate



Home News WMS Help About NEO Subscribe

Tip: New dataset: Sea Surface Temperature 1981-2006 from AVHRR. See the 'Ocean' tab below.



Ocean Atmosphere Energy Land Life

Atmosphere Datasets

- Aerosol Optical Thickness
- Aerosol Particle Radius
- Carbon Monoxide
- Cirrus Reflectance
- Cloud Fraction
- Cloud Optical Thickness
- Cloud Particle Radius
- Cloud Water Content
- False Color
- Total Rainfall
- True Color
- Water Vapor

Search Parameters

Duration
day

Date Range
Start: [] [] []
End: [] [] []

Clear Form

Search NEO

Download Options

Full Color
JPEG

Get Image

Analysis Matching Datasets

Total Rainfall (1 day - TRMM)

Select

- Rainfall data from NASA Earth Observation



Grid Data can be added, Subtracted, Divided...

Untitled - ArcMap - ArcEditor

File Edit View Bookmarks Insert

1:154,525,761

Spatial Analyst Layer: AugRain05.TIF

- Layers
- AugRain05.TIF
- AugRain06.TIF
- AugRain07.TIF
- AugRain08.TIF
- AugRain09.TIF

Raster Calculator

Layers:

AugRain05.TIF
AugRain06.TIF
AugRain07.TIF
AugRain08.TIF
AugRain09.TIF

-	7	8	9	=	<>	And
/	4	5	6	>	>=	Or
-	1	2	3	<	<=	Xor
+	0	.	()		Not

$$\frac{([AugRain05.TIF] + [AugRain06.TIF] + [AugRain07.TIF] + [AugRain08.TIF] + [AugRain09.TIF])}{5}$$

About Building Expressions

Evaluate

Cancel

>>

Display Source Selection

Drawing Arial 10 B I U

-92.474 98.357 Decimal Degrees

5:18 AM
11/11/2010



Questions of drought or global warming can be addressed with certainty

Untitled - ArcMap - ArcE

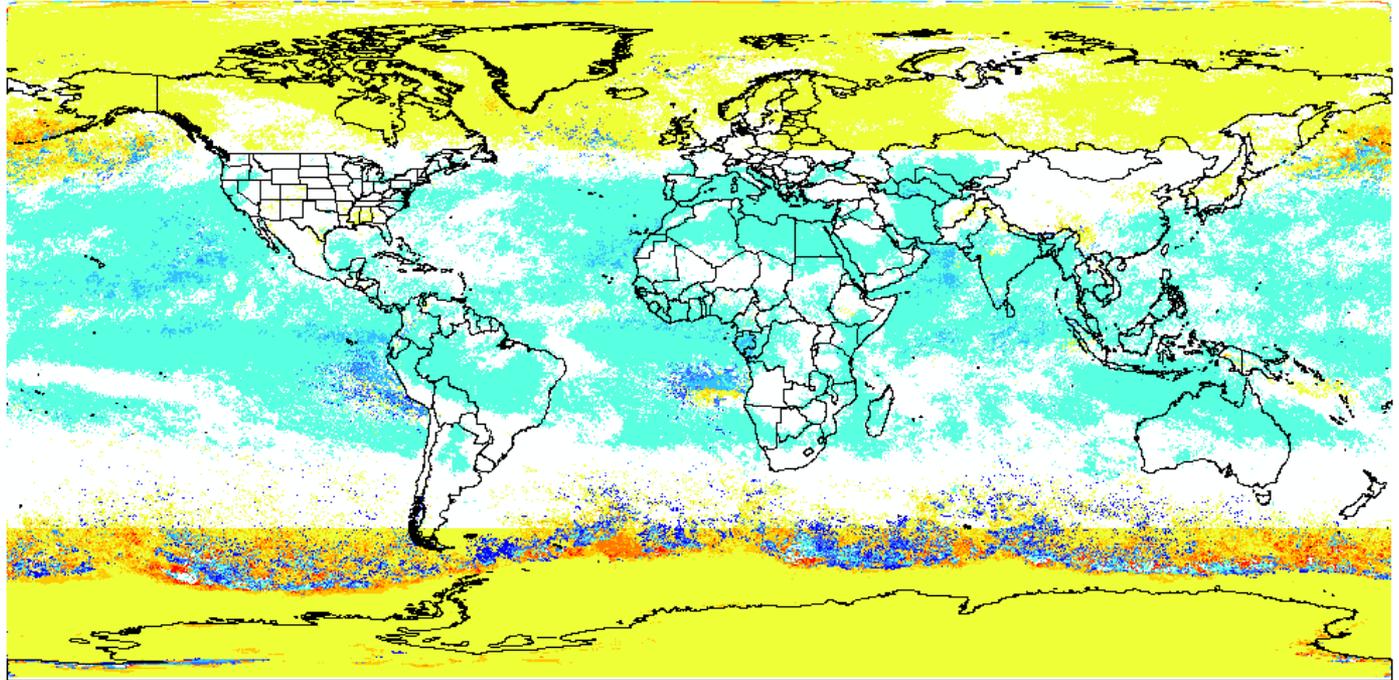
File Edit View Bookmarks

Print Copy Paste

Zoom In Zoom Out

Spatial Analyst Layer: AugRain05.TIF

- Layers**
- Countries2007
 - states
 - 2009 Rainfall Difference
 - VALUE
 - 204 - -161.6666667
 - 161.6666666 - -119.3333333
 - 119.3333332 - -77
 - 76.99999999 - -34.66666667
 - 34.66666666 - 7.666666667
 - 7.666666668 - 50
 - 50.00000001 - 92.33333333
 - 92.33333334 - 134.6666667
 - 134.6666668 - 177
 - 5 yr Avg Rainfall
 - AugRain05.TIF
 - AugRain06.TIF
 - AugRain07.TIF
 - AugRain08.TIF
 - AugRain09.TIF



Display Source Selection

Drawing

Arial

10

B

I

U

A

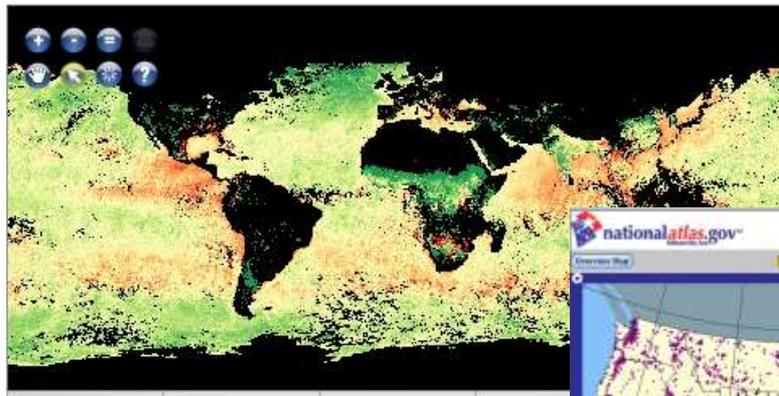
-128.875 16.73 Decimal Degrees

5:44 AM
11/11/2010



Air Quality Measures

- Weatherunderground, weather.com
- Dust measurements from NEO
- Toxic Release maps (national atlas)



Aerosol Particle Radius (1 month - Terra/MODIS)

February 1, 2011 00:00-March 1, 2011 00:00

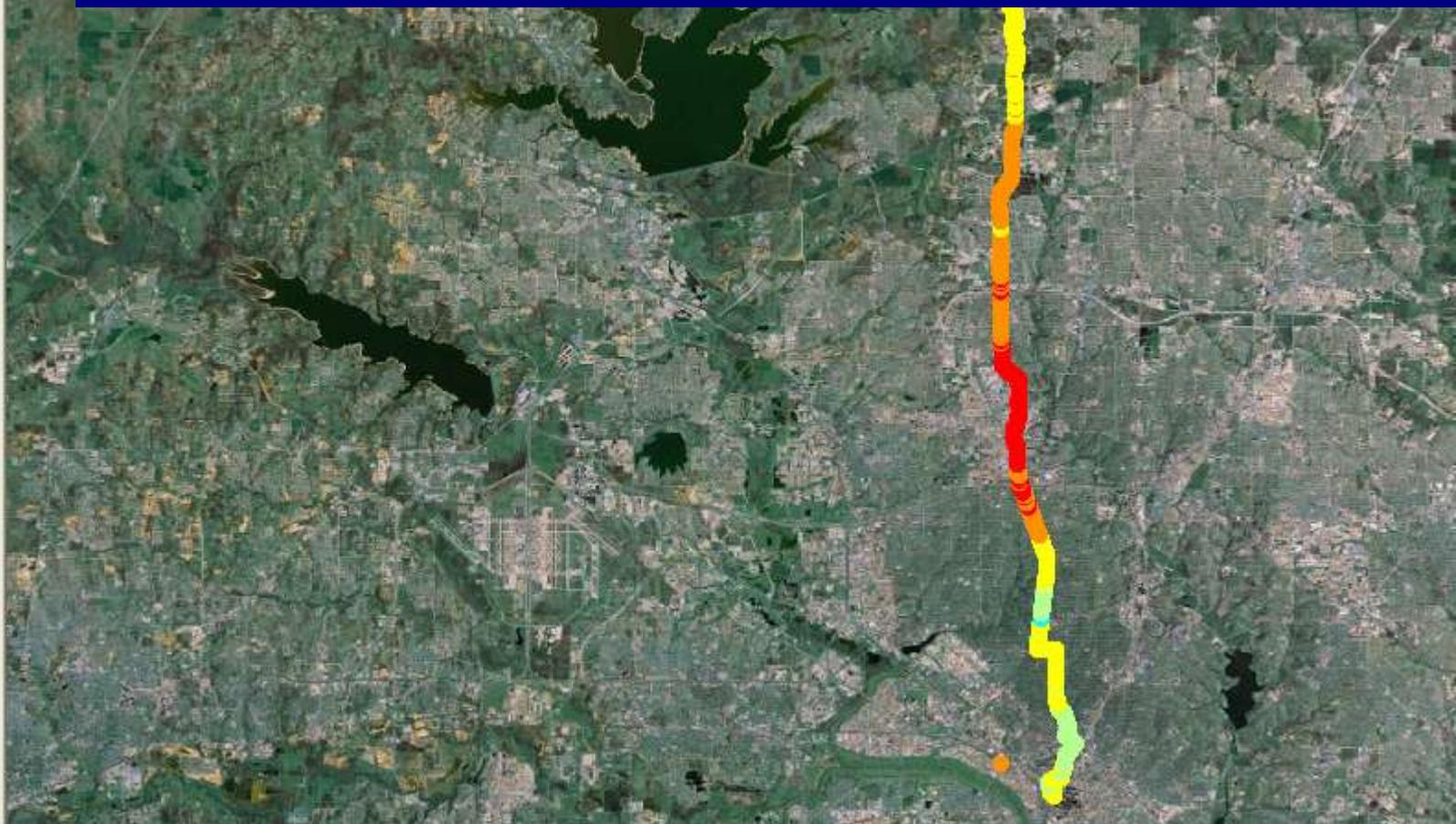
[About this dataset](#)



pH of Rain up Dallas' Central Highway

Layers

- AcidRainToFrisco E
- pH
 - 7.200000 - 7.40
 - 7.400001 - 7.70
 - 7.700001 - 8.00
 - 8.000001 - 8.30
 - 8.300001 - 8.70
 - 8.700001 - 9.00
 - 9.000001 - 9.60
- ESRI_Imagery_Wo

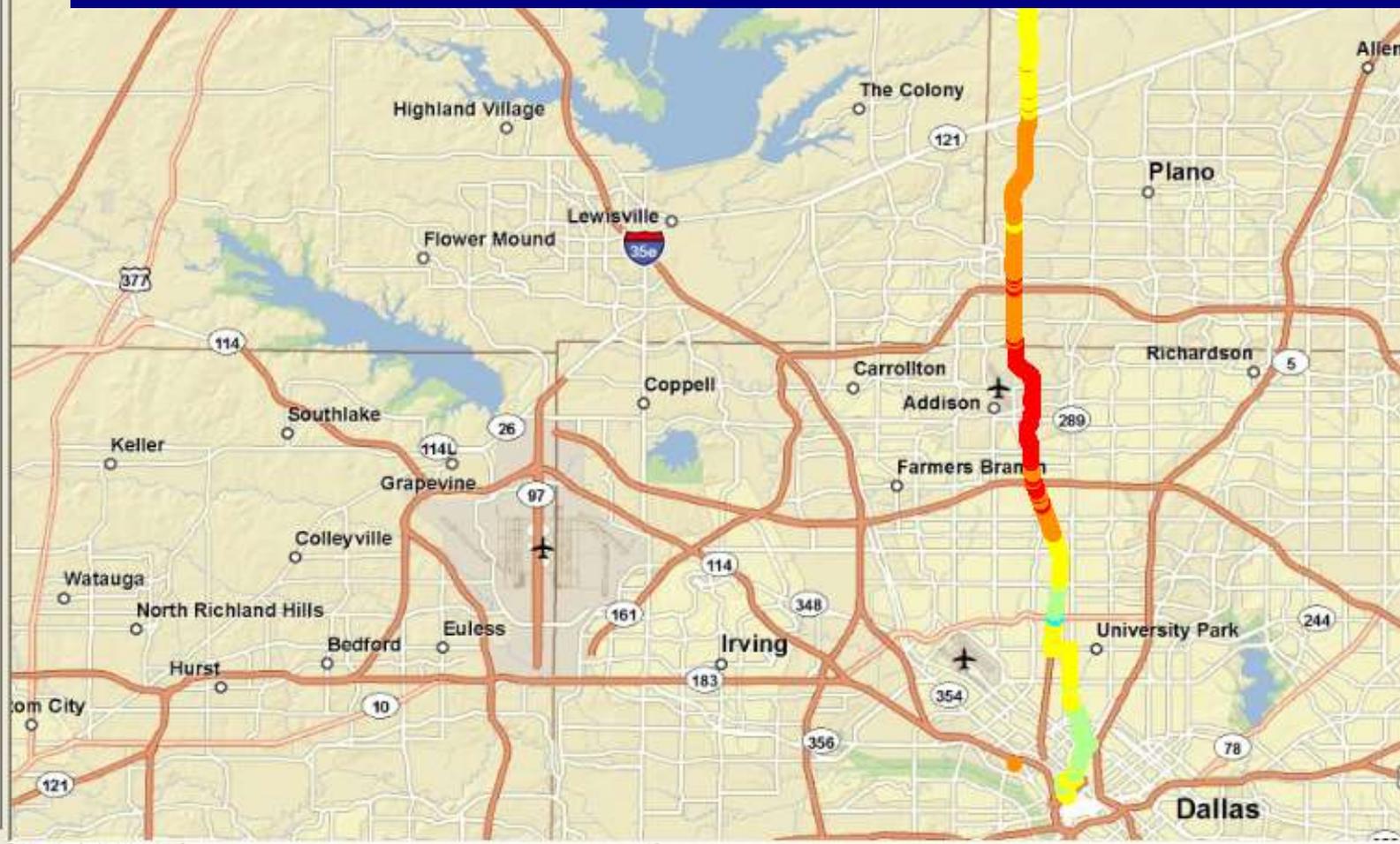


What Other Questions Come To Mind?

Layers

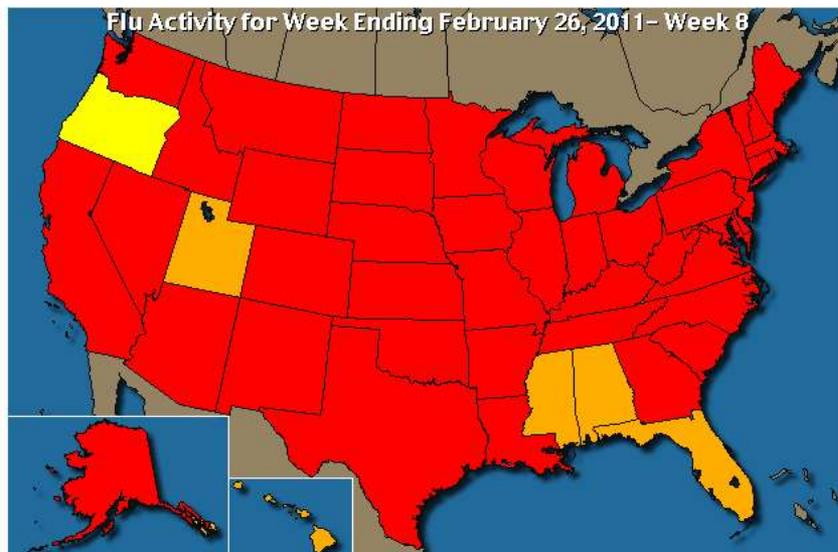
- AcidRainToFrisco E pH
 - 7.200000 - 7.40
 - 7.400001 - 7.70
 - 7.700001 - 8.00
 - 8.000001 - 8.30
 - 8.300001 - 8.70
 - 8.700001 - 9.00
 - 9.000001 - 9.60
- ESRI_StreetMap_W
- NGS_Topo_US_2D
- ESRI_Imagery_Wo

Display Source Selection



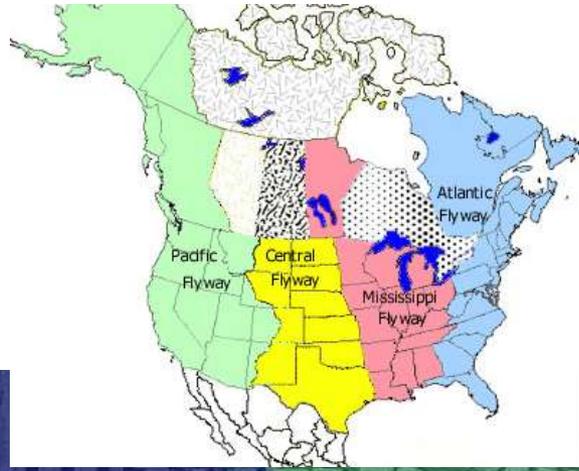
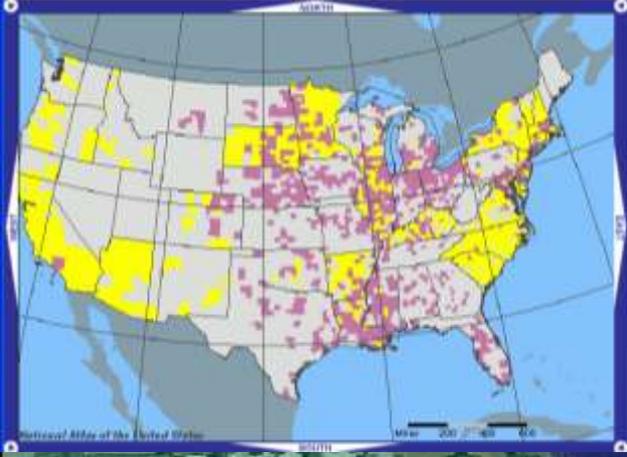
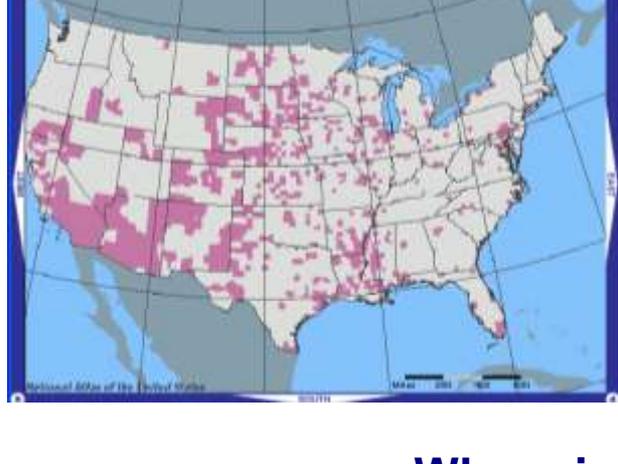
Epidemiology

- Weatherunderground
- National Atlas
- Google flu tracker



No Report Sporadic Regional
No Activity Local Widespread





Where is the origin of West Nile and what are possible vectors to transmit it?



Off World Online GIS

- PIGWAD enables students to investigate NASA's goal of reaching the Moon Mars and beyond.



USGS
science for a changing world

U.S.G.S. Planetary GIS Web Server - PIGWAD
Planetary Interactive G.I.S.-on-the-Web Analyzable Database

MSL OGC Global GIS Discussions Astrogeology



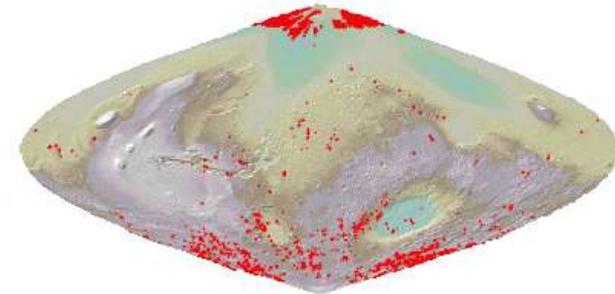
Home
PIGWAD Maps

- o Mars
- o The Moon
- o Venus
- o Callisto
- o Europa
- o Ganymede
- o Io

GIS Tutorials
Tools and Scripts
Downloads
Publications
Links

Mission Statement for PIGWAD

The objectives of this project are three-fold: (1) Produce a web-based, user-friendly interface aimed at the planetary research community that will support Geographic Information Systems (GIS) graphical, statistical, and spatial tools for analyses of planetary data, including the distribution of planetary GIS tutorials, tools, programs, and information; (2) Create planetary GIS databases consisting of peer-reviewed digital geologic maps, feature maps, topography, and remote-sensing data under the scientific oversight of the NASA Geologic Mapping Subcommittee (GEMS); and (3) Support and encourage the use of GIS in planetary research including geospatial open standards.



History

NASA's Planetary Geology and Geophysics Program, under the auspices of the Planetary Cartography and Geologic Mapping Working Group (PCGMWG), has chosen to support a planetary, Web-based GIS and planetary GIS support site that the entire science community may utilize. The USGS in Flagstaff will provide this service, given our expertise in both terrestrial and



Moon Missions: Where will we find water

File Tools Layer Graphics Imagery Help

Refresh



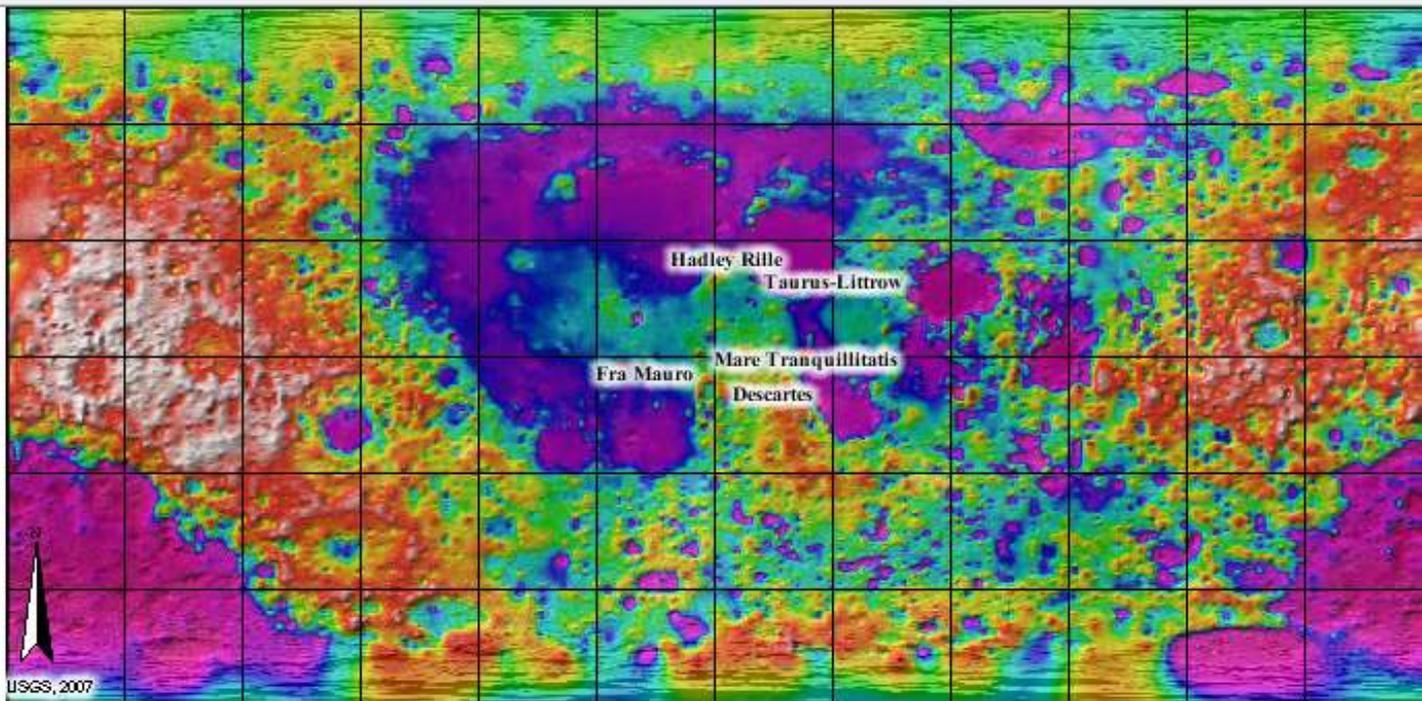
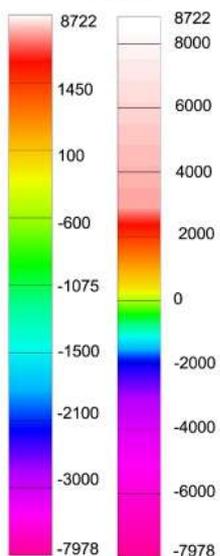
- L-1047
- L-1062
- L-1162

Topography (topogrd2)

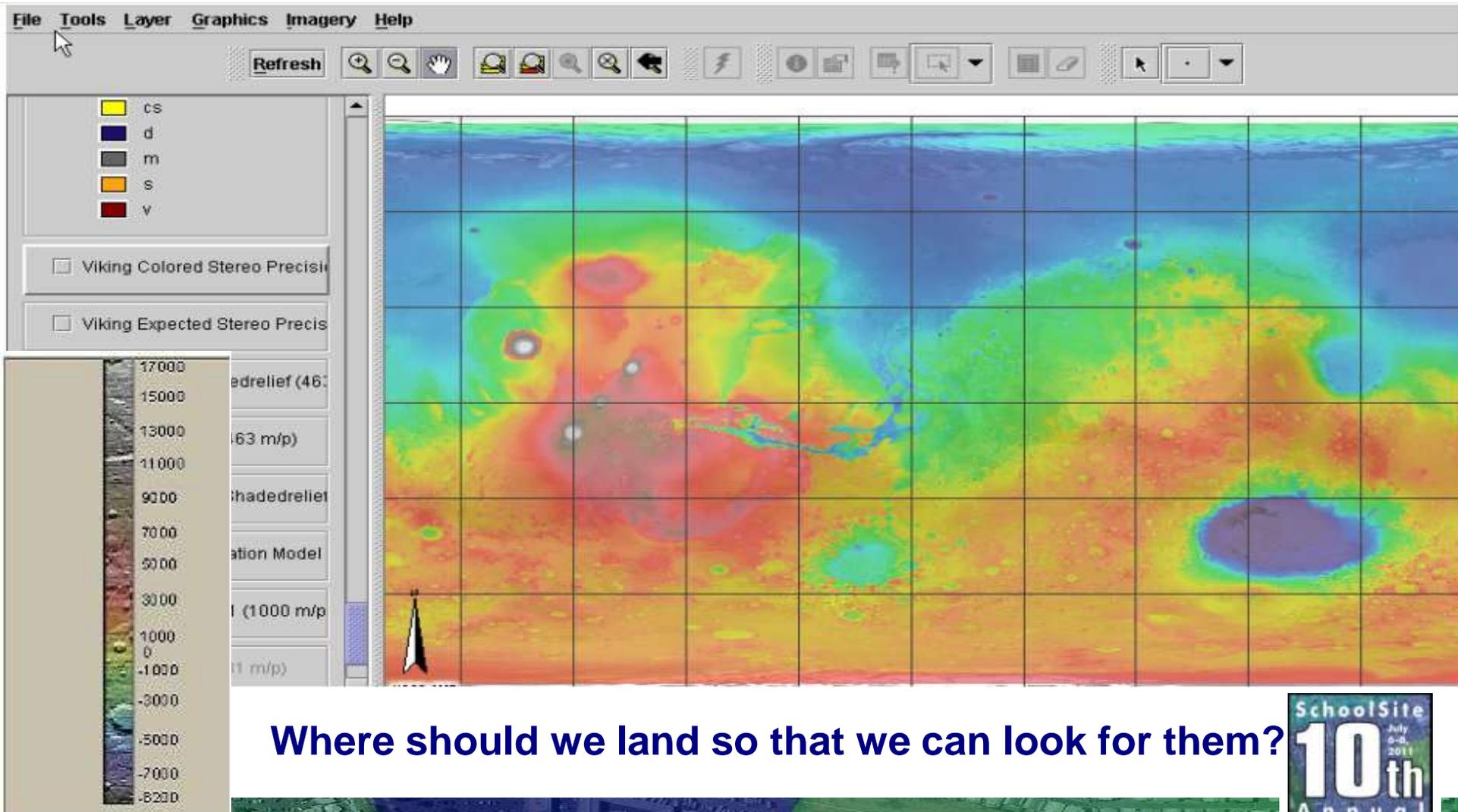
Free-air Gravity (fairgrd2)

Topography Color (Altimetry)

Topography



Mars: What resources are most important?



Where should we land so that we can look for them?

History is also well suited to maps



insight™

home
about
view the collection
directory
recent additions
purchase reproductions
news
help

David Rumsey Map Collection

CARTOGRAPHY ASSOCIATES

New! Try viewing the map collection with the new [LUNA 6.0 Browser](#)

Now over 100 new maps added to the Rumsey Historical Maps in [Google Earth](#) and to a new layer in [Google Maps](#). Read more about these collections.. New! September, 2008, **over 30 new maps in Google Earth, including the Wheeler Survey of the U.S. West, 1871-83.**



visit the collection in second life
The David Rumsey Historical Map Collection is now in Second Life. In this virtual world, you can experience maps like you never have before.

[Visit Rumsey Maps in Second Life](#) [Read Articles & View Media](#)

The collection has four viewers, choose a link below, or [try the new Directory](#)

Gis Maps
Gis Maps Guide. Don't Look Anymore. Find it Here.
dcmtext.com

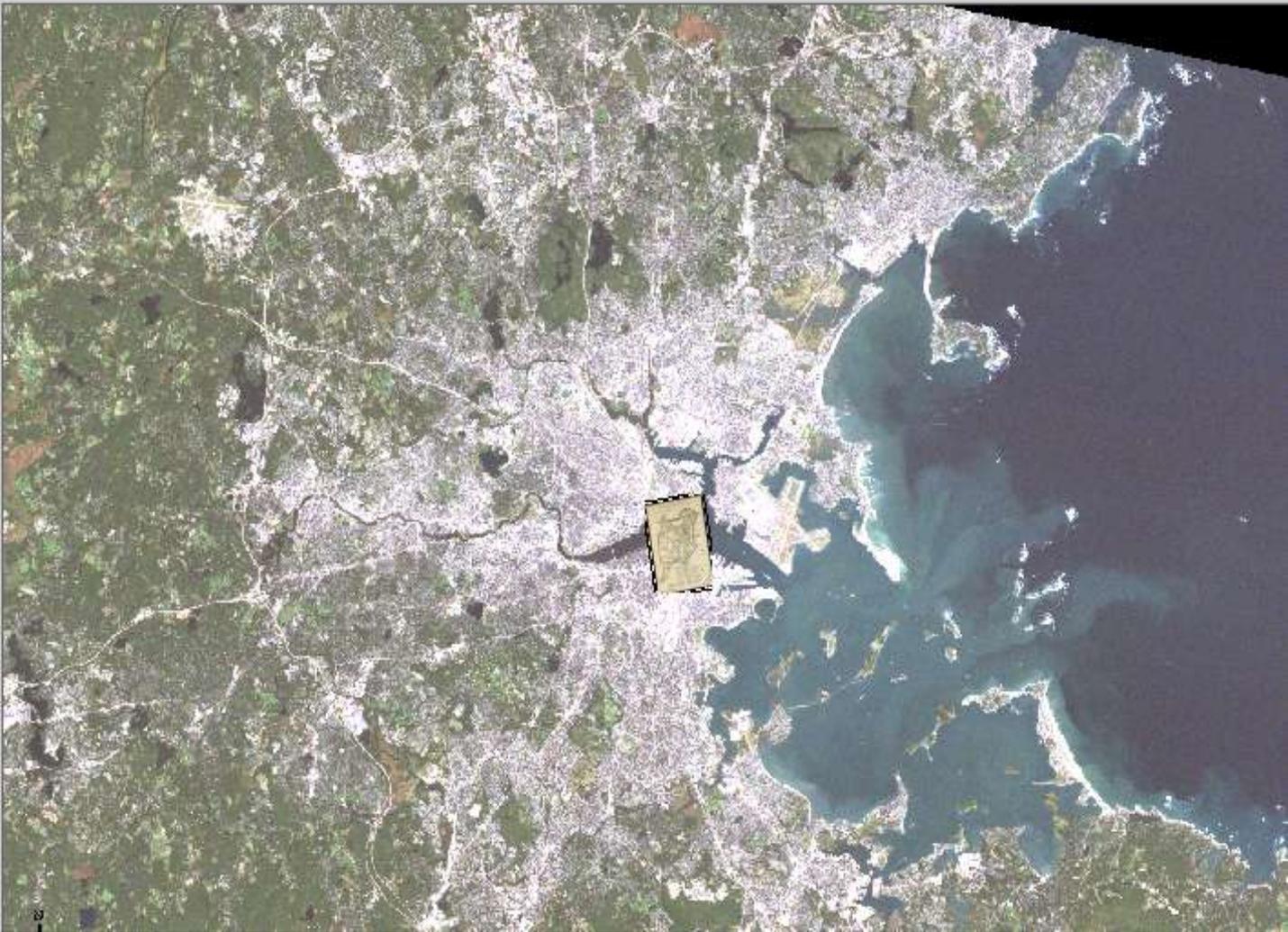
New LUNA Browser	- New! LUNA 6.0 Browser. Works in IE, Firefox, and Safari on all Windows and Mac systems. No download, use the link on the left to launch! Link to Insight 5.6 Browser
insight™ Java Client	- 5.6 Insight Java Client. An advanced viewer that requires one-time download from the link on the left. Use the same link for all future launches! Details
GIS <u>Browser</u>	- The GIS (Geographic Information System) Browser shows detailed overlays of maps and geospatial data.
Collections Ticker	- An alternative to structured searching. View clickable streaming thumbnails of the collection.

Webby Award winner in Technical Achievement



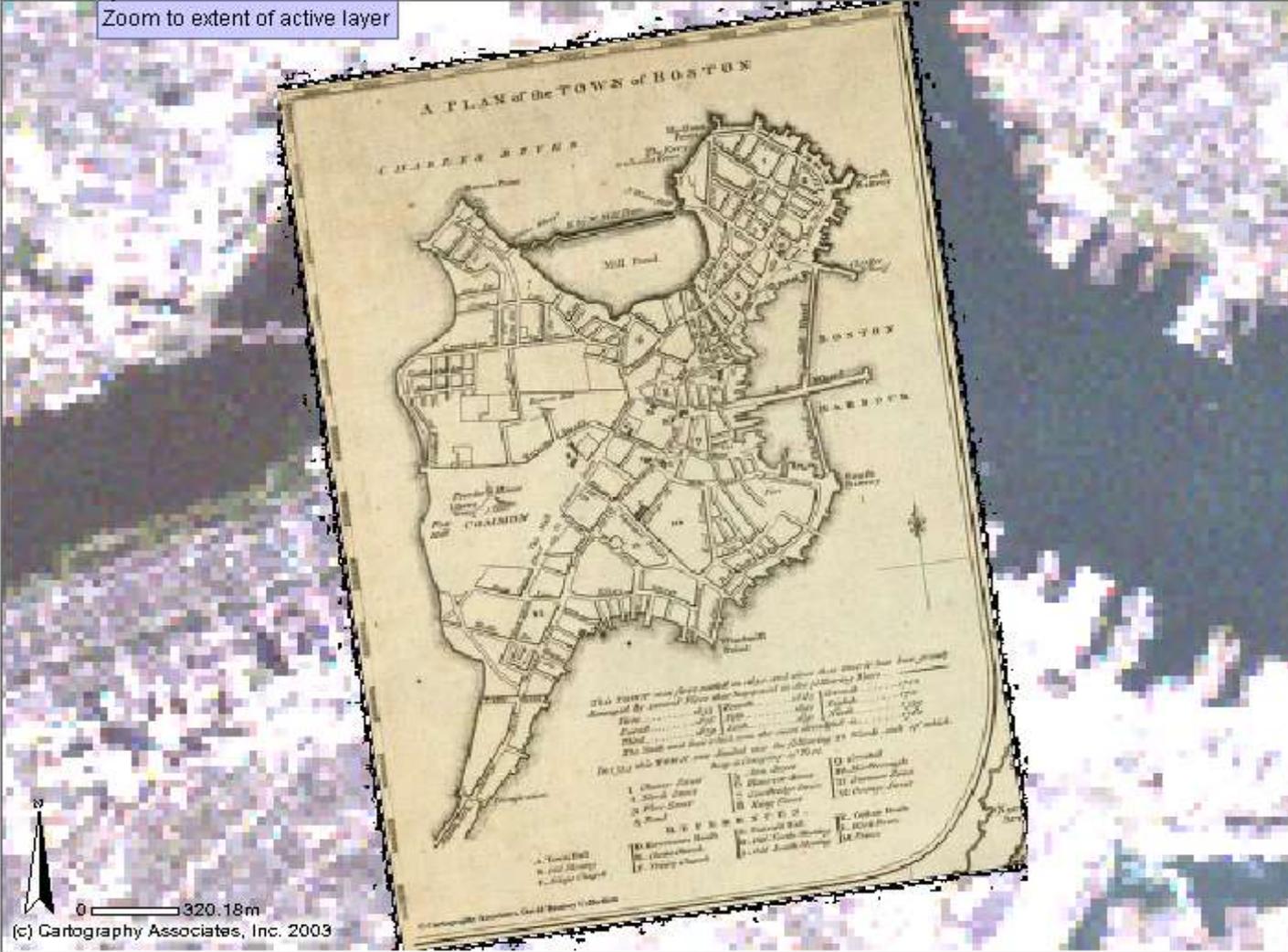


- Streets 
- MajorRoads 
- Lakes 
- Parks 
- State Boundary 
- Boston Inset, 1776 
- Boston, 1835
- Boston Inset, 1836



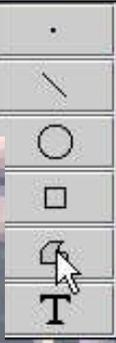
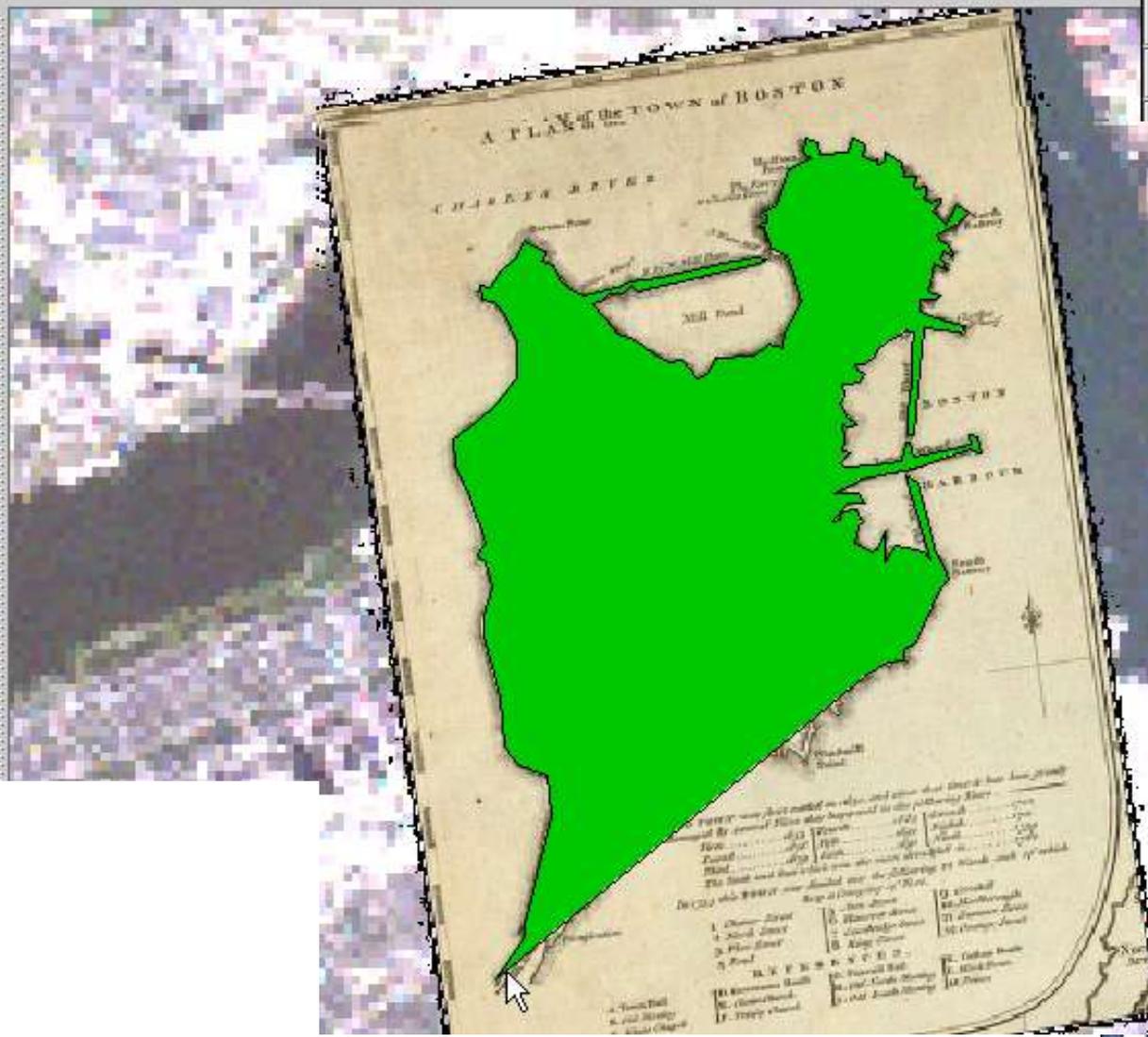


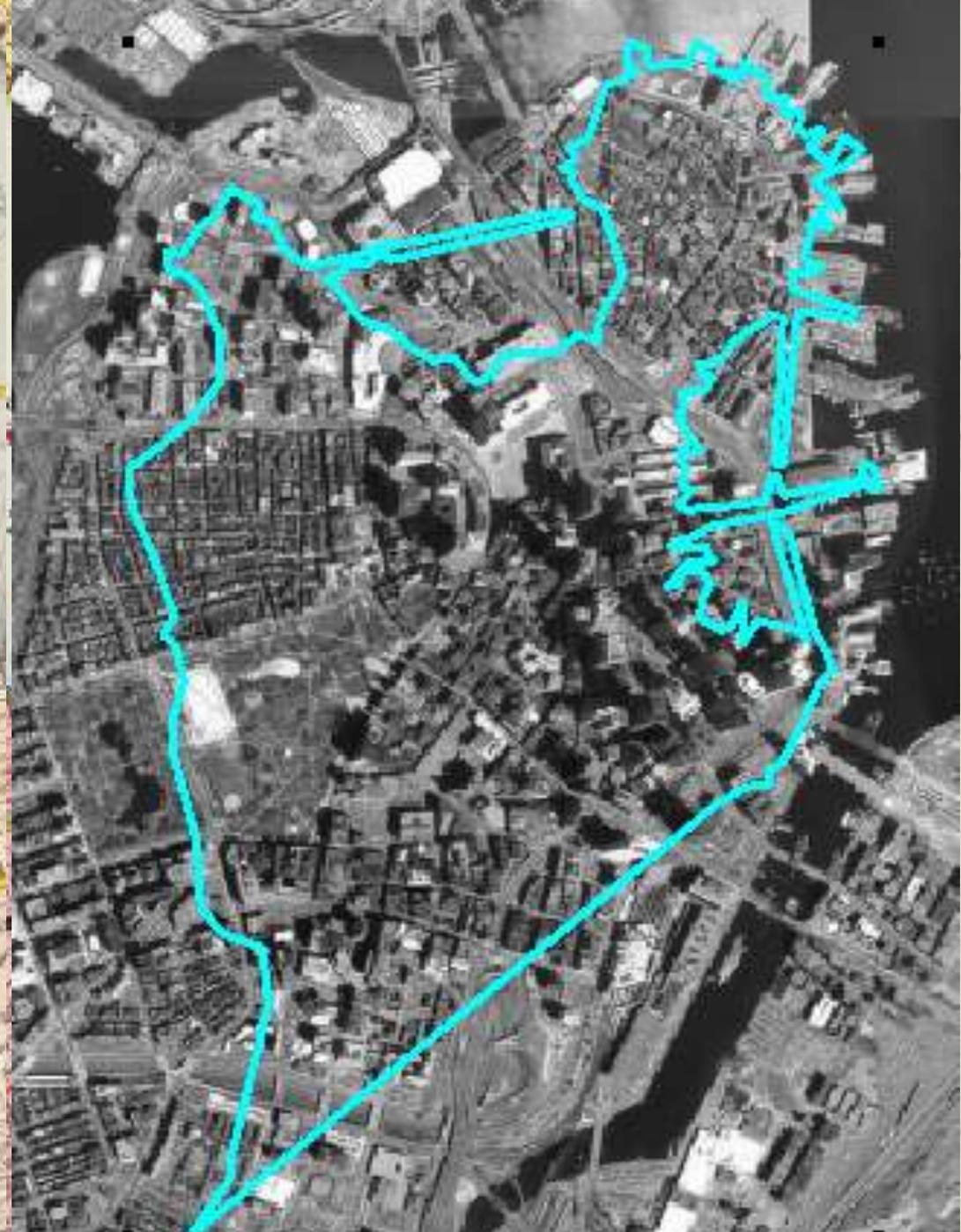
- Streets
- MajorRoads
- Lakes
- Parks
- State Boundary
- Boston Inset, 1776
- Boston, 1835
- Boston Inset, 1836
- Boston, 1841
- Boston, 1842





- Streets 
- MajorRoads 
- Lakes 
- Parks 
- State Boundary 
- Boston Inset, 1776 





**1835, 1846, 1852,
1874, 1897, and
current**





Historical Census Browser

What can you do on this site?

- **Examine state and county topics for individual census years.**
 - examine multiple topics within a census year
 - produce tables of data by state or county
 - sort data by selected categories
 - create ratios between any two data categories

Choose a census year to begin examining data:

1790	1800	1810	1820	1830	1840	1850	1860	1870
1880	1890	1900	1910	1920	1930	1940	1950	1960

- **Examine state and county topics over time.**
 - examine a topic across multiple census years

About the Historical Census Browser

The data and terminology presented in the Historical Census Browser are drawn directly from historical volumes of the U.S. Census of Population and Housing.

To Cite This Collection (APA Style)

(2004). Historical Census Browser. Retrieved [Date you accessed source], from the University of Virginia, Geospatial and Statistical Data Center:
<http://fisher.lib.virginia.edu/collections/stats/histcensus/index.html>.

<http://fisher.lib.virginia.edu/collections/stats/histcensus/>



Historical Census Browser

What can you do on this site?

- **Examine state and county topics for individual census years.**
 - examine multiple topics within a census year
 - produce tables of data by state or county
 - sort data by selected categories
 - create ratios between any two data categories

Choose a census year to begin examining data:

1790	1800	1810	1820	1830	1840	1850	1860	1870
1880	1890	1900	1910	1920	1930	1940	1950	1960

- **Examine state and county topics over time.**
 - examine a topic across multiple census years
 - produce tables of data by state or county

Choose a category to begin examining data:

General Population	Ethnicity/Race/Place of Birth
Education & Literacy	Agriculture
Economy/Manufacturing/Employment	Slave Population

- **Generate maps of selected data** Click on "Map It!" at the top of data columns to

About the Historical Census Browser

The data and terminology presented in the Historical Census Browser are drawn directly from historical volumes of the U.S. Census of Population and Housing.

To Cite This Collection (APA Style)

(2004). Historical Census Browser. Retrieved [Date you accessed source], from the University of Virginia, Geospatial and Statistical Data Center:
<http://fisher.lib.virginia.edu/collections/stats/histcensus/index.html>.





Census Data Over Time

Display data from:

1790 ▼ to: 1960 ▼

Select from the topics below in the category of Economy/Manufacturing/Employment:

- COST OF RAW MATERIALS IN MANUFACTURING (1860--1940) ▲
- MANUFACTURING ESTABLISHMENTS (1860--1940)
- PERSONS ENGAGED IN MANUFACTURING (1820--1880)
- TOTAL CAPITAL INVESTED IN MANUFACTURING (1840--1900)
- TOTAL WAGES PAID IN MANUFACTURING (1860--1940) ▼

Submit Query

Reset

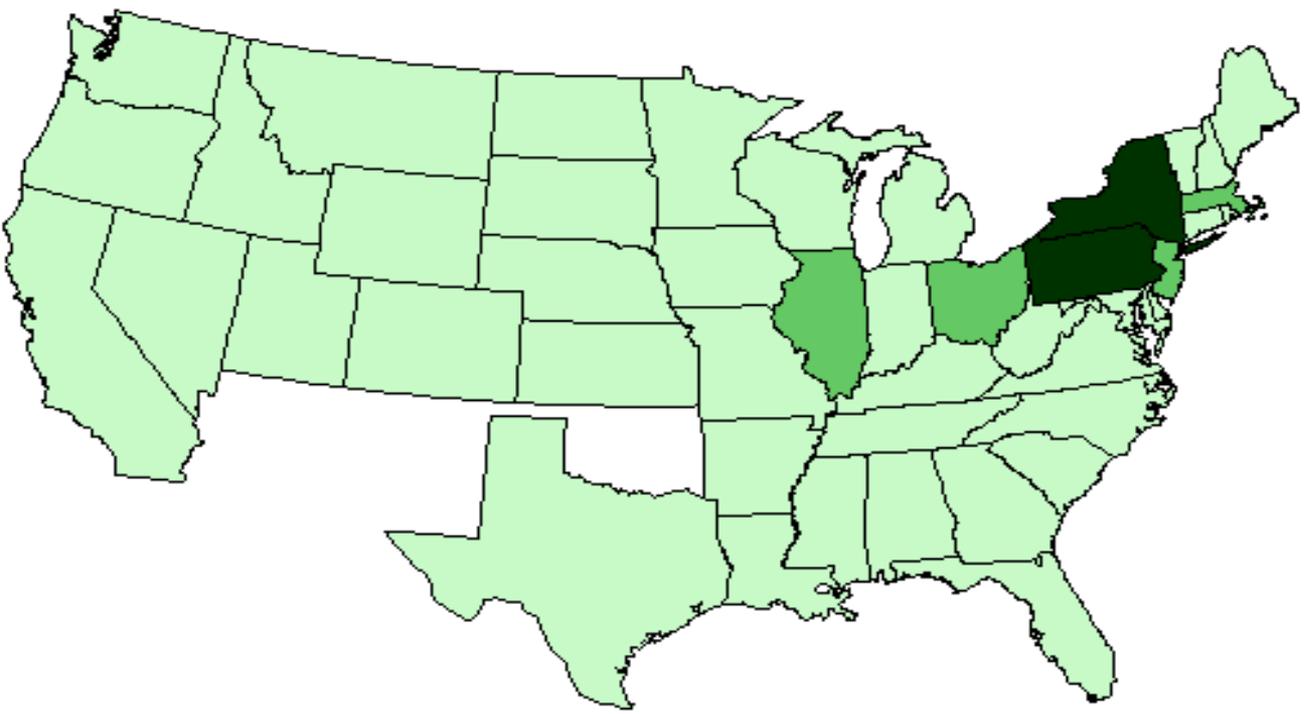
TOTAL CAPITAL INVESTED IN MANUFACTURING

State

To retrieve county-level data, select a state and click the submit button below

	1840 Map It!	1850 Map It!	1860 Map It!	1870 Map It!	1880 Map It!	1890 Map It!	1900 Map It!
<input type="checkbox"/> All States							
<input type="checkbox"/> Alabama	2,130,064	3,450,606	9,098,181	5,714,032	9,668,008	46,123	70,370
<input type="checkbox"/> Arkansas	424,467	324,065	1,316,610	1,782,913	2,953,130	14,971	35,961
<input type="checkbox"/> California	N/A	1,006,197	22,043,096	39,728,202	61,243,784	146,798	205,395
<input type="checkbox"/> Colorado	N/A	N/A	N/A	2,835,605	4,311,714	26,652	62,825
<input type="checkbox"/> Connecticut	13,669,139	23,890,408	45,590,430	95,281,278	120,480,275	227,004	314,697
<input type="checkbox"/> Delaware	1,589,215	2,978,945	5,452,887	10,839,093	15,655,822	33,695	41,203
<input type="checkbox"/> Florida	669,490	544,260	1,874,125	1,079,930	3,210,680	11,110	33,107
<input type="checkbox"/> Georgia	2,899,565	5,460,483	10,890,875	13,930,125	20,672,410	56,922	89,790
<input type="checkbox"/> Idaho	N/A	N/A	N/A	N/A	N/A	1,049	2,942
<input type="checkbox"/> Illinois	3,136,512	6,385,387	27,548,563	94,368,057	140,652,066	502,005	766,830
<input type="checkbox"/> Indiana	4,132,043	7,842,362	17,881,586	52,052,425	65,742,902	131,605	234,482
<input type="checkbox"/> Iowa	199,645	1,292,875	7,247,130	22,420,183	33,987,886	77,513	102,733
<input type="checkbox"/> Kansas	N/A	N/A	1,064,935	4,319,060	11,192,315	43,926	66,827
<input type="checkbox"/> Kentucky	5,945,259	12,350,740	20,256,579	29,277,809	45,813,039	79,812	104,071
<input type="checkbox"/> Louisiana	6,430,699	5,318,074	7,151,172	18,313,974	11,462,468	34,754	113,084
<input type="checkbox"/> Maine	7,105,620	14,700,452	22,044,020	39,796,190	49,988,171	80,420	122,919





Outlines **Layers** Labels

- Current US Cities
- Waterways
- Current US States
- Geology
- Image
- Data Layer

Data Label

Tools



Classification/Legend

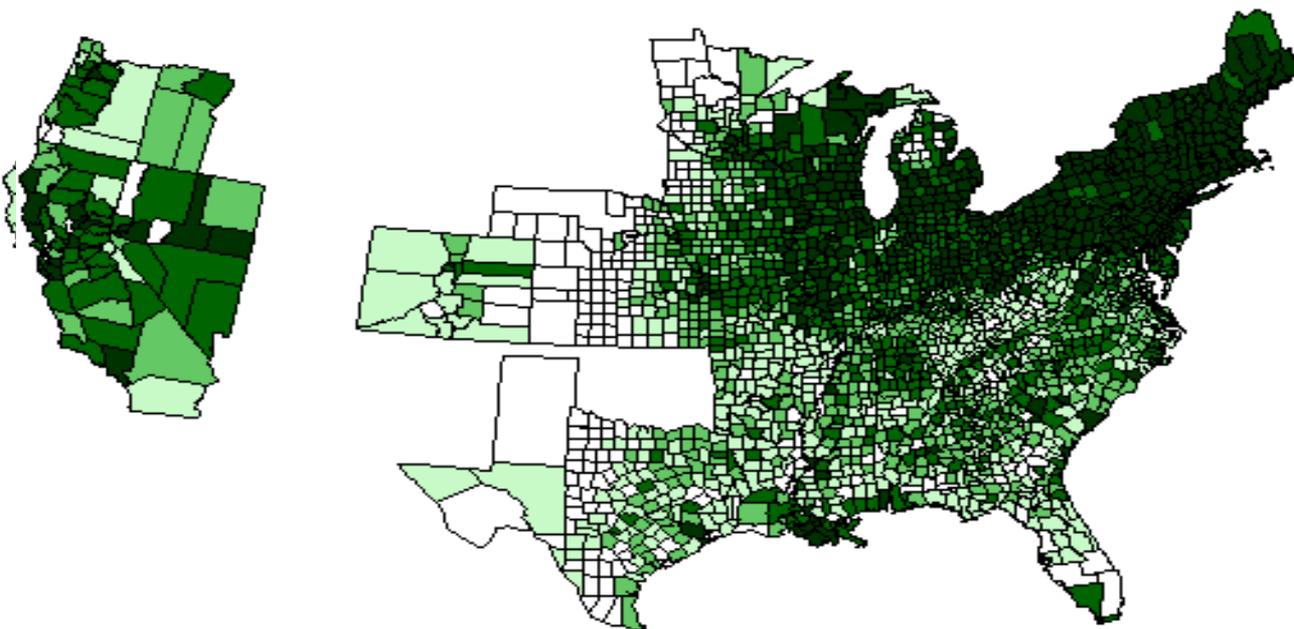
Open legend in new window.

- 1473 - 413907
- 413907 - 826341
- 826341 - 1238775
- 1238775 - 1651210
- Missing Data



UNITED STATES COUNTIES IN 1870: TOTAL CAPITAL INVESTED IN MANUFACTURING

The data and terminology presented in the Historical Census Browser are drawn directly from historical volumes of the U.S. Census of Population and Housing.



Outlines Layers Labels

- Current US Cities
- Waterways
- Current US States
- Historic US States
- Geology
- Image
- Data Layer

Data Label

[Refresh Map](#)

Tools



Classification/Legend

[Customize Values](#)

Open legend in new window.

- 150 - 30525
- 30550 - 102335
- 102621 - 437167
- 437213 - 174016674
- Missing Data





Consider online webmapping sites for what they offer:

- quick access to data
- growing database of varied topics
- visualization of large data sets easing interpretation
- chance for students to build evidence based understanding of the world.





Typical GIS Integration Pathways:

1.) Use curriculum:

**Our World Series,
GIS Tutorial,
Eyes in the Sky II**

www.esri.com/arclessons,

**STEM lessons at James Madison University,
Earth exploration tool book**



Spending on Education -VS- Happiest Countries (Happiness Index)



< COMPARE OTHER MAPS

CLOSE

**2.) Encourage Online Map Use to Start Discussions:
National Atlas, World Mapper, Nation Master,
State Mapper, Gap Minder, American Factfinder**



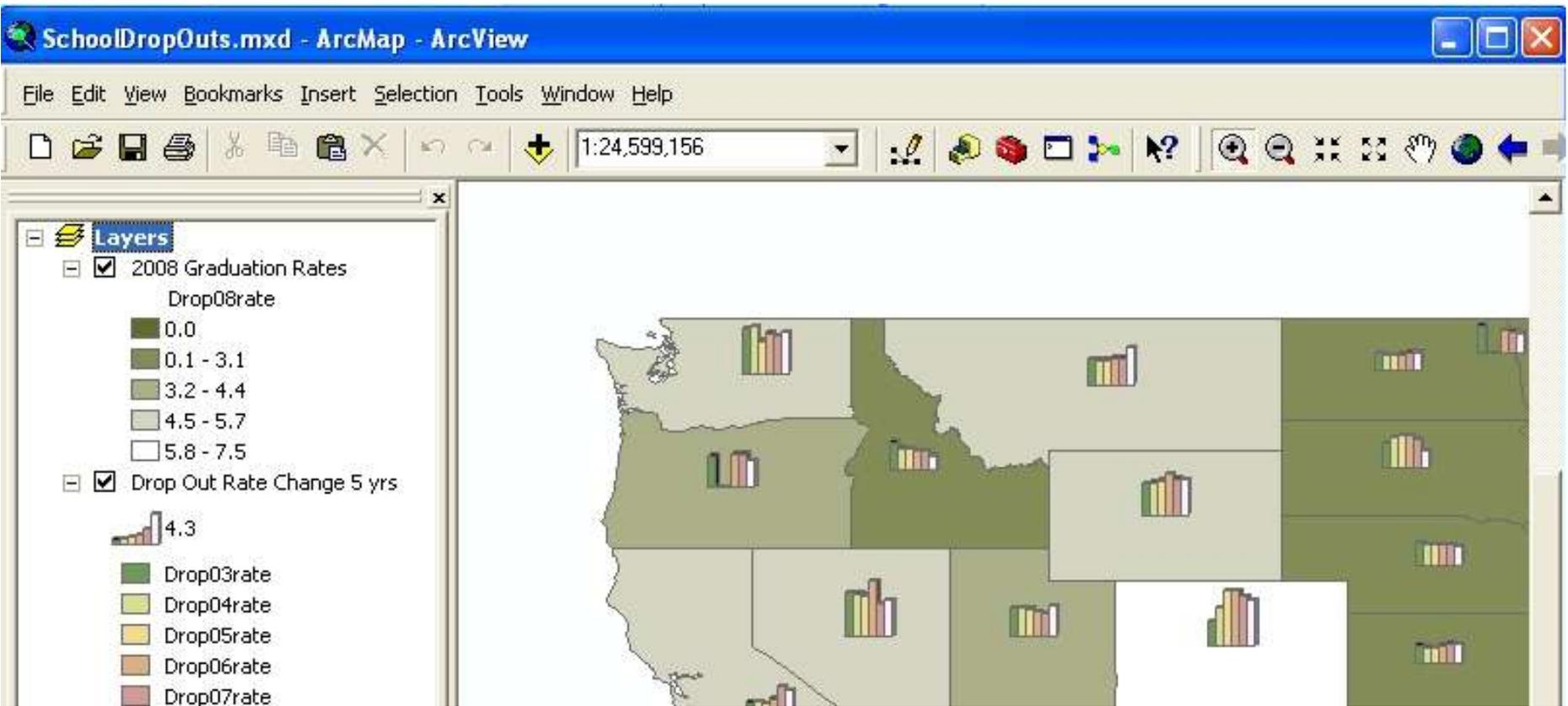


3.) Using GPS to add points to a streamed background map from ArcGIS online.



Finding your own data

4.) Join tables of data to existing geographies





Adding your own data

4b.) Digitizing your own data

- Trails, census data, businesses
- Geocoding addresses

4c.) Calculating new grids from Elevation or point concentrations

- Slope, aspect
- Reclassifying grids for simpler additions
- Doing grid calculations
- Creating Models



What Students Can Do with Even Little Time

The screenshot shows a GIS application window titled "Water.mxd". The interface includes a menu bar (File, Edit, View, Bookmarks, Insert, Selection, Tools, Window, Help), a toolbar with various icons, and a status bar displaying the coordinates "1:27,847".

The main map area displays a 3D terrain view of a river system. The river is highlighted in blue, and the surrounding terrain is green. The river is labeled "Red River of the North" and "turtle river". The map also shows a "studyarea" and "aquifers" (Glacial Drift Aquifers, Sandstone and carbonate, Sandstone aquifers). The "Red River Drainage Basin" and "NCentStates" are also visible.

The legend on the left side of the window is organized into two main sections:

- Water Quality**
 - studyarea
 - Red River of the North
 - turtle river
 - aquifers
 - ROCK_NAME
 - Glacial Drift Aquifers
 - Sandstone and carbonate
 - Sandstone aquifers
 - Red River Drainage Basin
 - NCentStates
- River Profile (Trout Habitat)**
 - BottomProfile
 - Logs
 - Sandbars
 - Rocks
 - Brush



Summer Field Science: 1 wk 8 hrs /day





⦿ While appropriate tools and clothes get you out into the field,



⦿ It's a challenge to bring the data and experiences back to the classroom





Nothing replaces observations & a note book!





Work in teams, divide labor and build a common table back in the classroom





⦿ Compare data for consistency, then quickly enter it into spread sheets and share it.





WatQual2.dbf - Microsoft Excel non-commercial use

Home Insert Page Layout Formulas Data Review View

Clipboard: Cut, Copy, Paste, Format Painter

Font: Calibri, 11, Bold, Italic, Underline, Text Color, Background Color

Paragraph: Bullets, Numbering, Indentation, Wrap Text

Styles: Merge & Center, Number, Conditional Formatting

R8	
A	
1	LATITUDE
2	48.086
3	48.024
4	48.005
5	47.936
6	47.993
7	

Save As

CommunityGeography > ComGEO_module4_Water

Search ComGEO_module4_Wa...

Organize New folder

Name	Date modified	Type
TroutHabitat	11/11/2010 12:51 PM	File folder
3Seasontable.txt	8/24/2006 8:49 AM	Text Document
4thSeasontable.txt	8/24/2006 9:18 AM	Text Document
MacroInvert.txt	5/10/2009 12:29 AM	Text Document

File name: WatQual2.txt

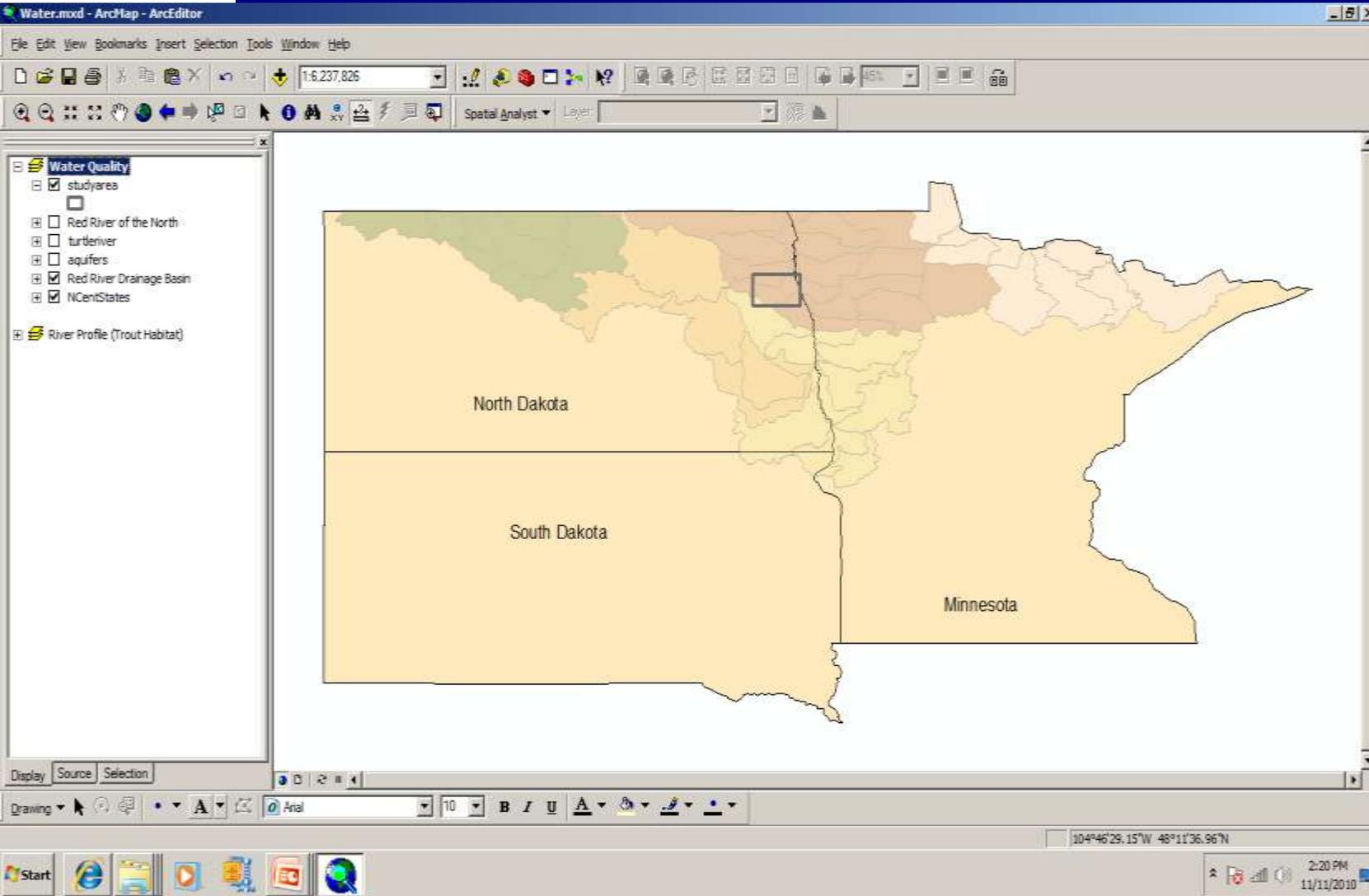
Save as type: Text (Tab delimited) (*.txt)

Authors: Participant Tags: Add a tag

Hide Folders Tools Save Cancel



Assemble a basemap to display your data



Adding data students gathered

The screenshot displays the ArcMap interface with the 'Add XY Data' dialog box open. The dialog box contains the following text and fields:

Add XY Data

A table containing X and Y coordinate data can be added to the map as a layer

Choose a table from the map or browse for another table:

3Seasontable_txt_4thSeasontable_txt

Specify the fields for the X and Y coordinates:

X Field: LONGITUDE

Field: LATITUDE

Coordinate System of Input Coordinates

Description: Unknown Coordinate System

Show Details Edit...

The 'Add' dialog box is also open, showing the file browser with the following files listed:

Look in: ComGEO_module4_Water

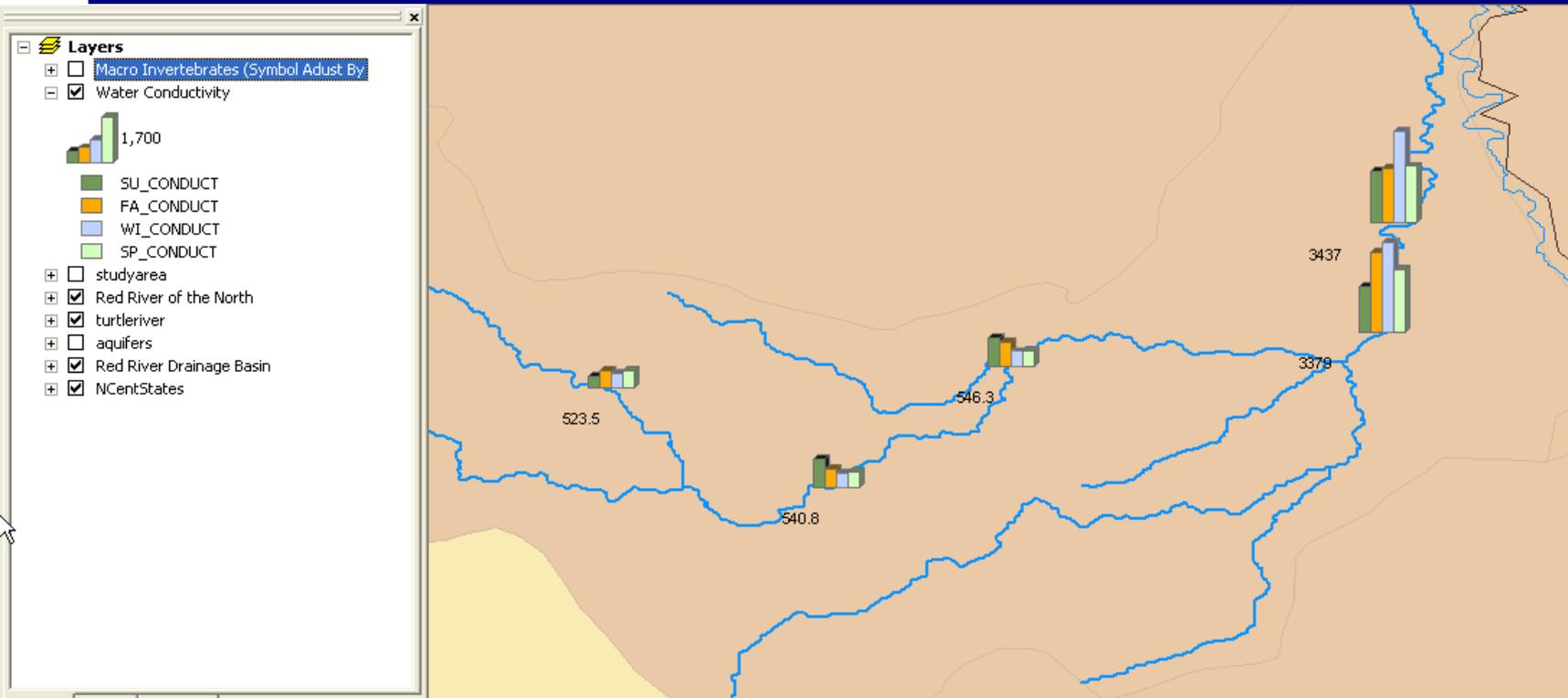
- TroutHabitat
- 3Seasontable.xls
- 3Seasontable.txt
- 4thSeasontable.xls
- 4thSeasontable.txt
- MacroInvert.txt

Name: [] Add

Show of type: Tables Cancel

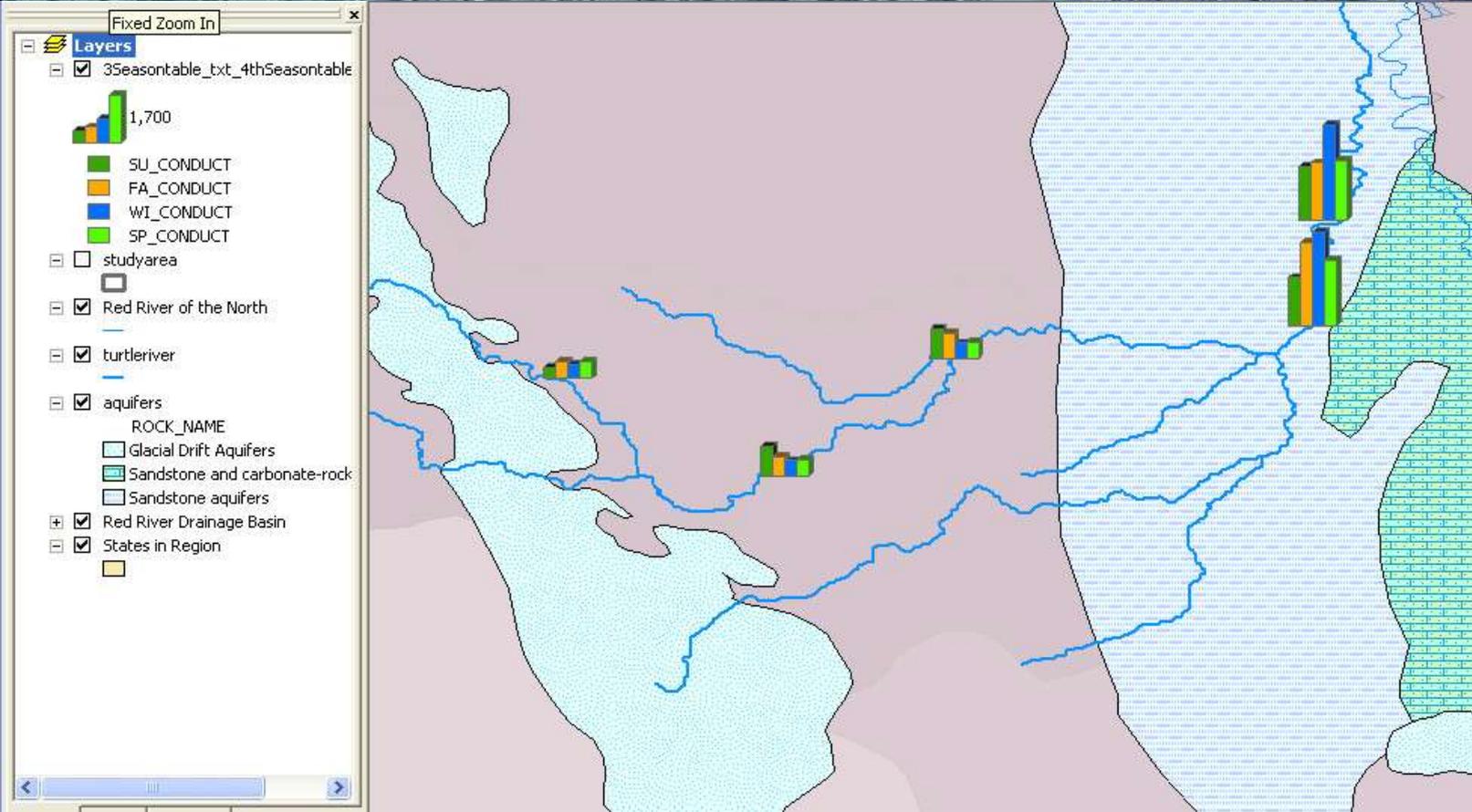


Choosing an appropriate representation



While many variables were collected. What questions does conductivity raise?





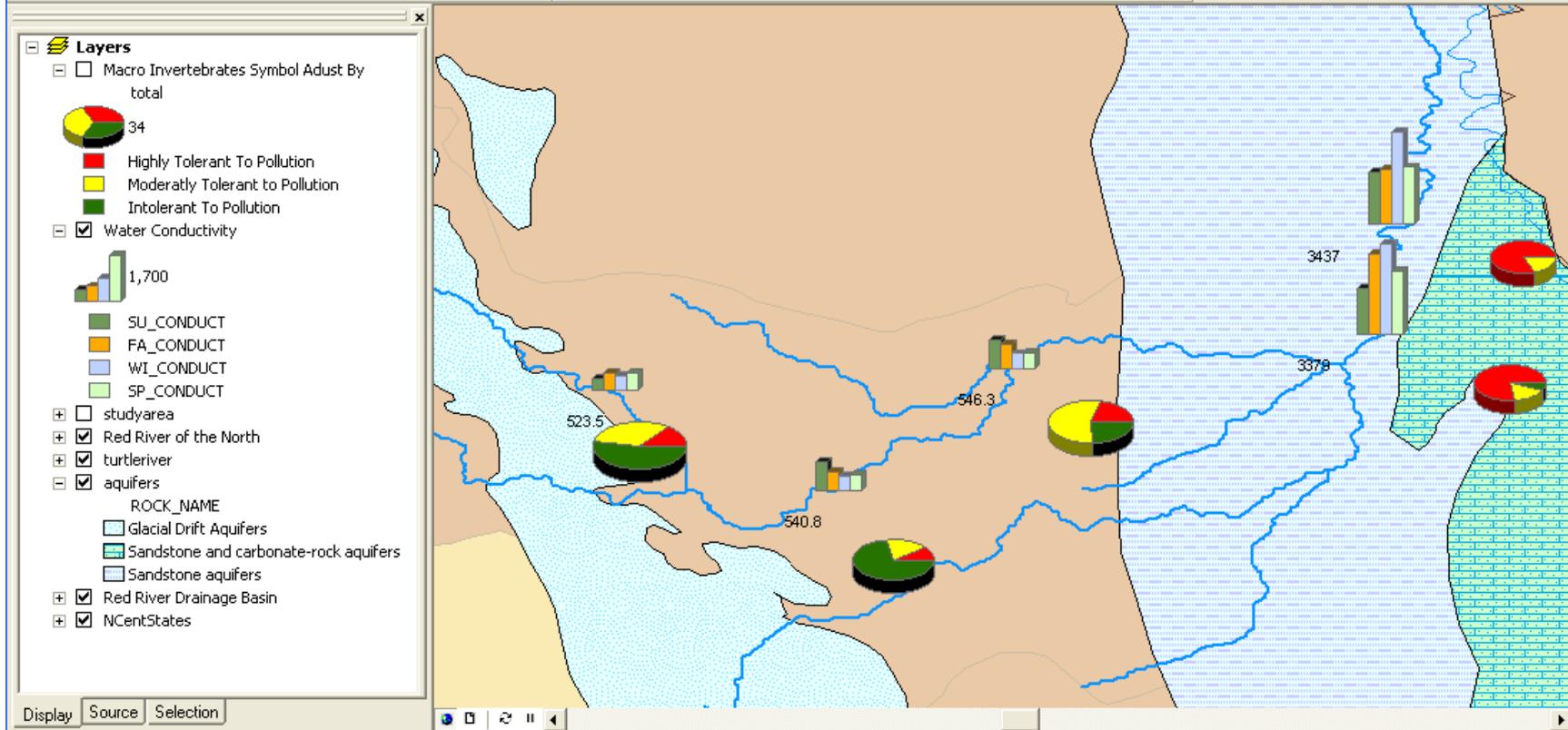
- The Blue-green areas are aquifers that feed these streams.
- How do they affect what can live in the river?



Student water quality projects



Water Quality Impacts What Lives in River



- **Students reported their results at interpretive talks at the park, in newspaper articles, in local tv news and at professional conferences!**



⦿ Even hand draw maps can be registered if marked with GPS



Finished Maps Help Draw Fishing Tourism

The screenshot shows a GIS application window with two main panels. The top panel, titled 'Layers', contains a list of map layers with checkboxes: 'studyarea', 'Red River of the N', 'turtleriver', 'aquifers', 'Red River Drainage', and 'NCentStates'. The bottom panel, titled 'River Profile (Trout)', contains a list of profile features with checkboxes: 'BottomProfile', 'Logs', 'Sandbars', 'Rocks', 'Brush', 'Holes', and 'GenDepth (incl)'. Below this is a legend for 'DEPTH' with color-coded boxes for ranges: 6-8, 9-11, 12-13, 14-16, 17-22, 23-27, 28-32, 33-37, 38-43, and 44-50. At the bottom of the window, there are tabs for 'Display', 'Source', and 'Selection'.



- Students followed up by surveying the river bottom profile to understand fish habitat preferences.

And Raise More Questions



- Students worked to find out species preferences for ponds, riffles and sheltering debris.

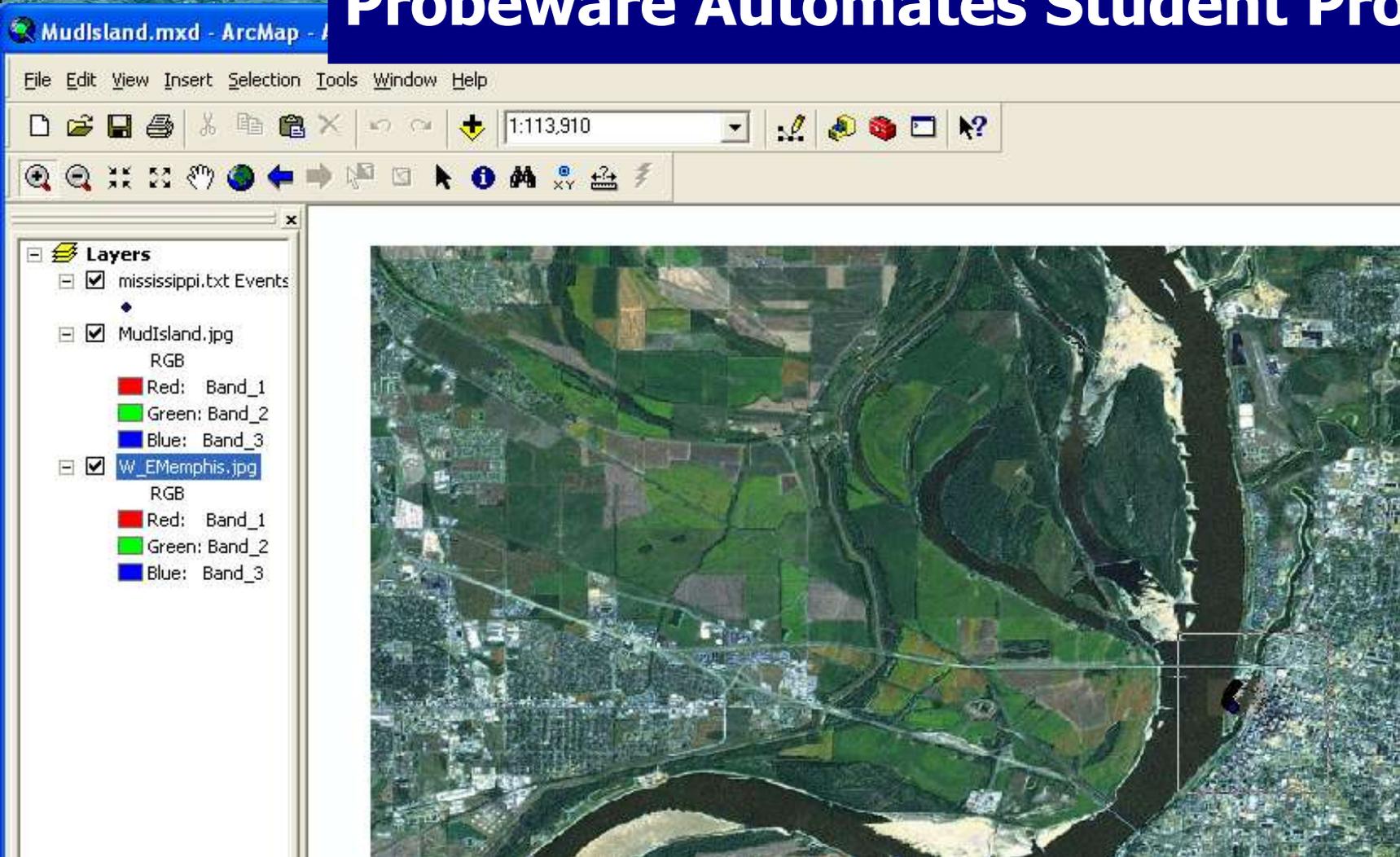




Students presented their work as part of the scientific community



Probeware Automates Student Projects





⦿ Probeware can tie GPS and environmental data together ready to be mapped!



UPPER MISSISSIPPI RIVER

➤ America's mightiest river begins as a newborn creek two steps wide and a few inches deep, flowing from Lake Itasca in northwest Minnesota. The source was discovered in 1832, 160 years after French explorers first canoed the Upper Mississippi.

Flowing north from Itasca, the stream makes a question mark shaped curve through forests and marshes before turning south through a steep-banked channel. Now a strong, young river, it drops quickly down the Falls of St. Anthony at Minneapolis, Minnesota and reaches maturity as it flows through spreading valleys bordered by high wooded bluffs and islands thick with cottonwoods.

Originally, the upper river was interrupted by rapids and falls, making boat traffic difficult. Efforts to stabilize the channel began in 1878, and today a modern dam and lock system has largely transformed the upper river into a series of slackwater lakes with heavy barge traffic moving north to the head of navigation at Minneapolis.

After being joined by the Missouri at St. Louis, the Mississippi is joined by the Ohio at Cairo, Illinois, and becomes the Lower Mississippi. Old Man River

MISSOURI RIVER

➤ The Missouri is a giant river compared to the Mississippi when they meet north of St. Louis, Missouri. Its 2,315-mile route drains one-third of the continent, over 500,000 square miles.

Lewis and Clark hoped the Missouri would be their "Northwest Passage" to the Pacific Ocean in 1804, and they followed it to its source on the eastern slope of the Rocky Mountains in south-west Montana.

The Missouri was once known as "Old Misery" for its dangerous channel, sudden floods, unpredictable islands and changing course. It was said, that a steamboat had to "climb a steep bank, cross a corn field, and corner a river that's tryin' to get away."

Since WWII, a growing dam system has begun to tame the Missouri, forming the upper river into a chain of lakes, with no locks for barge traffic. Sioux City, Iowa is the head of navigation.

The powerful river washes away 175 million tons of soil a year from the plains grasslands and wood country along its route. The muddy

Missouri's strength pins the Mississippi to its banks, and the brown and blue streams flow side-by-side for miles down river.

Field Research resources may be available from many sources, interpretive signs are just one example of good background material



MudIsland.mxd - ArcMap - ArcView

File Edit View Insert Selection Tools Window Help

1:4,941

Layers

- mississippi.txt: Events
 - Temperatur
 - 23.900000 - 24.5
 - 24.500001 - 25.1
 - 25.100001 - 25.7
 - 25.700001 - 26.7
 - 26.700001 - 28.2
- MudIsland.jpg
 - RGB
 - Red: Band_...
 - Green: Band_...
 - Blue: Band_...
- W_EMemphis.jpg
 - RGB
 - Red: Band_...
 - Green: Band_...
 - Blue: Band_...

Layer Properties

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

Show:

Draw quantities using color to show values. Import...

Fields:
Value: Temperatur

Classification:
Natural Breaks (Jenks)
Classes: 5 Classify...

Normalization: none

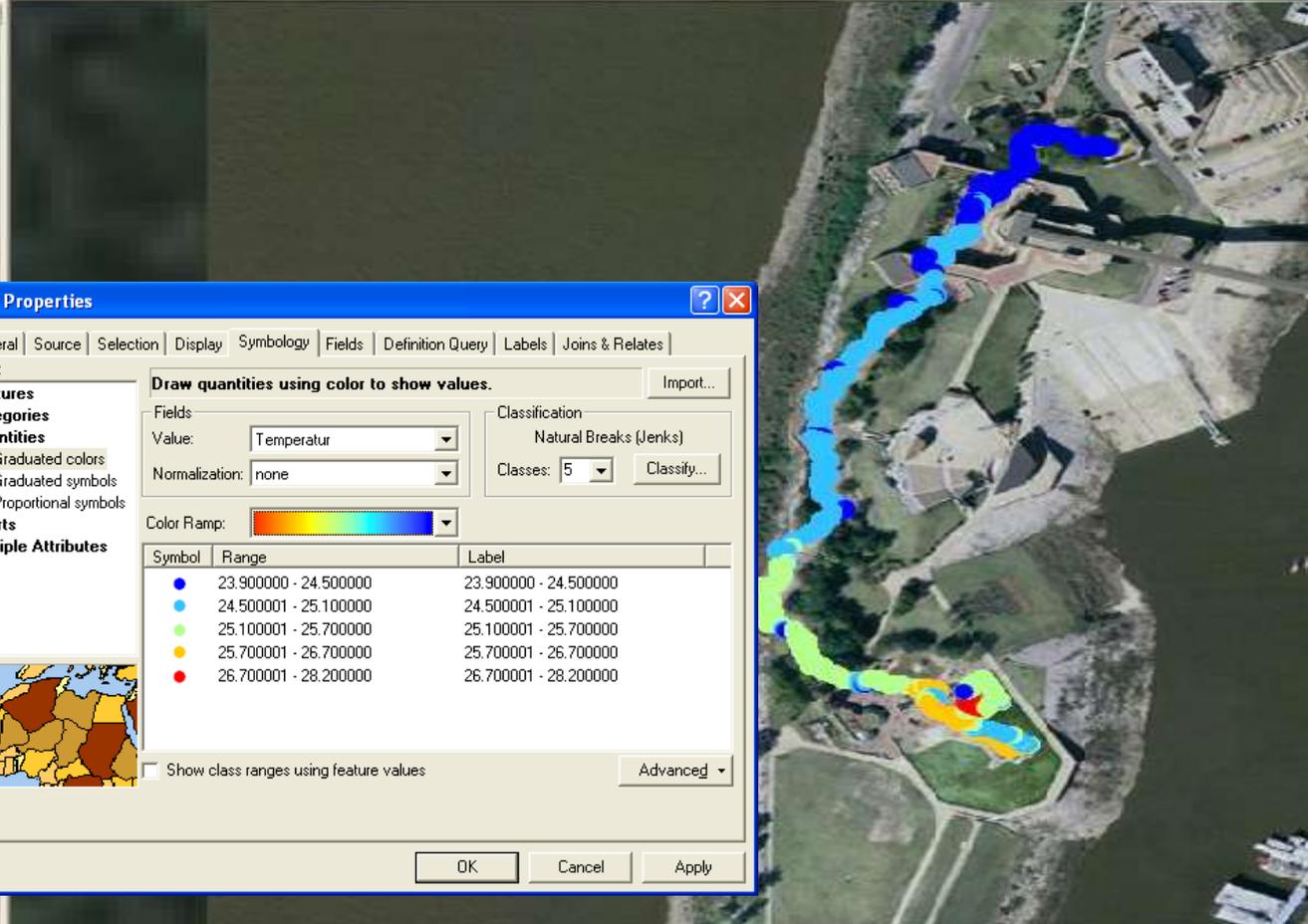
Color Ramp:

Symbol	Range	Label
	23.900000 - 24.500000	23.900000 - 24.500000
	24.500001 - 25.100000	24.500001 - 25.100000
	25.100001 - 25.700000	25.100001 - 25.700000
	25.700001 - 26.700000	25.700001 - 26.700000
	26.700001 - 28.200000	26.700001 - 28.200000

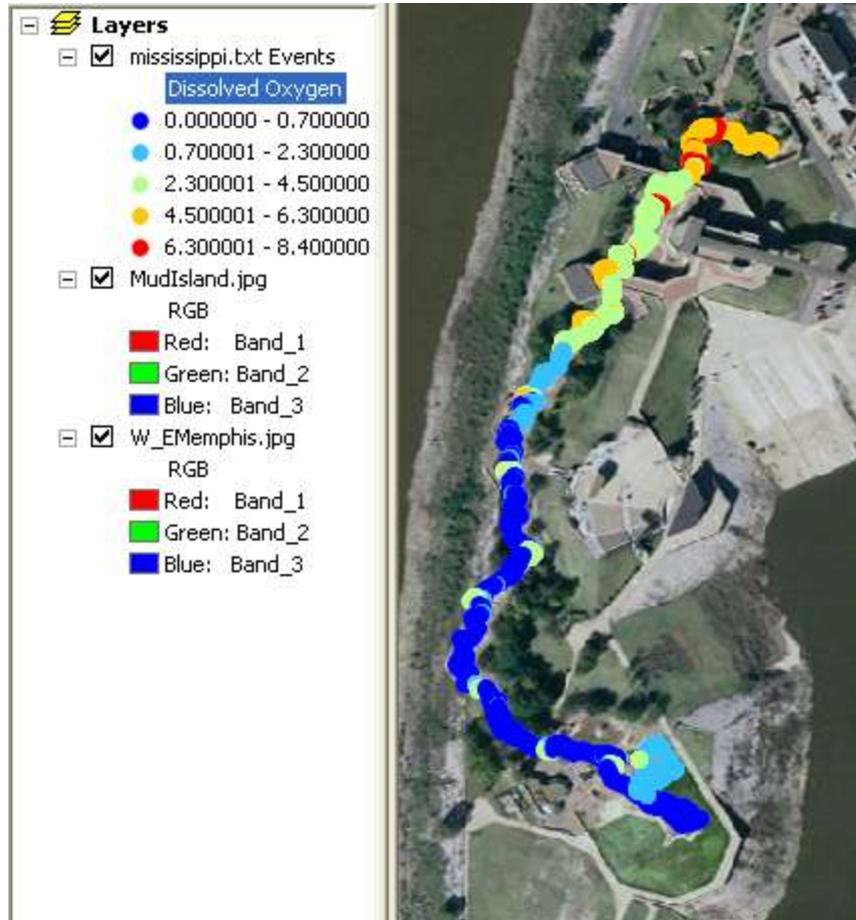
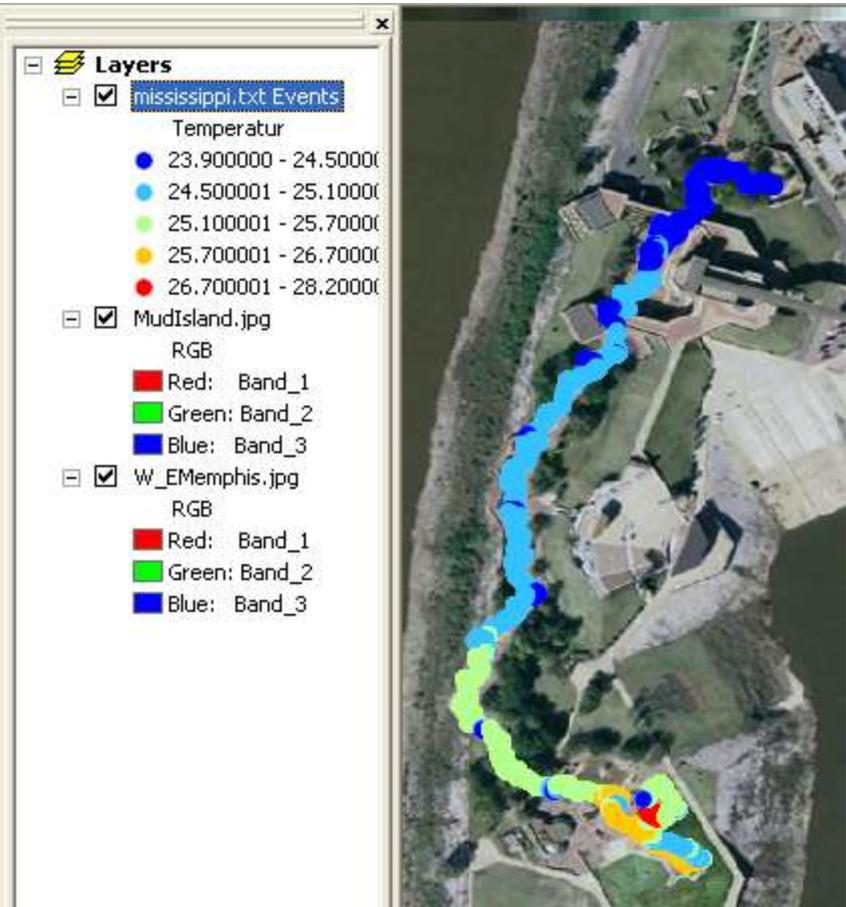
Show class ranges using feature values

Advanced

OK Cancel Apply



Comparing Variables to Quickly Show Relationships



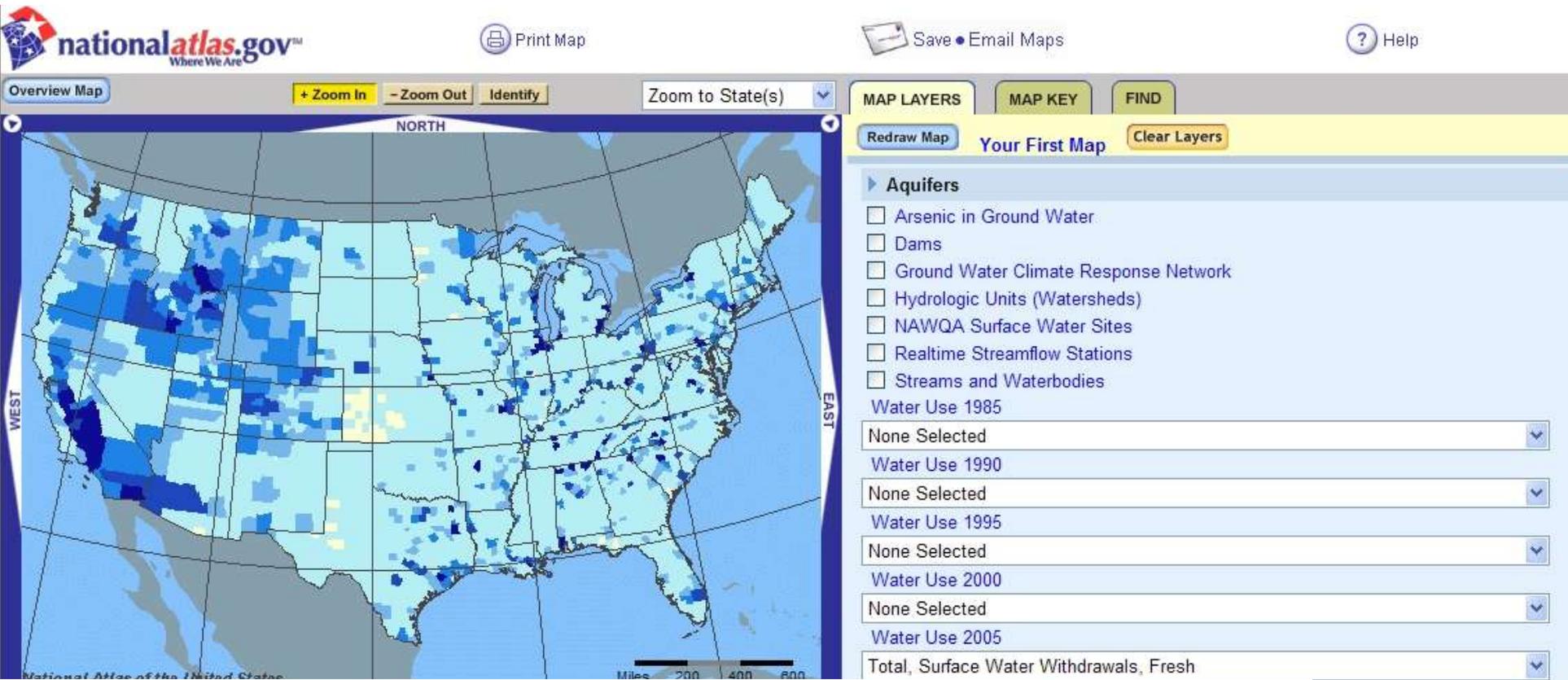
Temperature

vs

Dissolved Oxygen

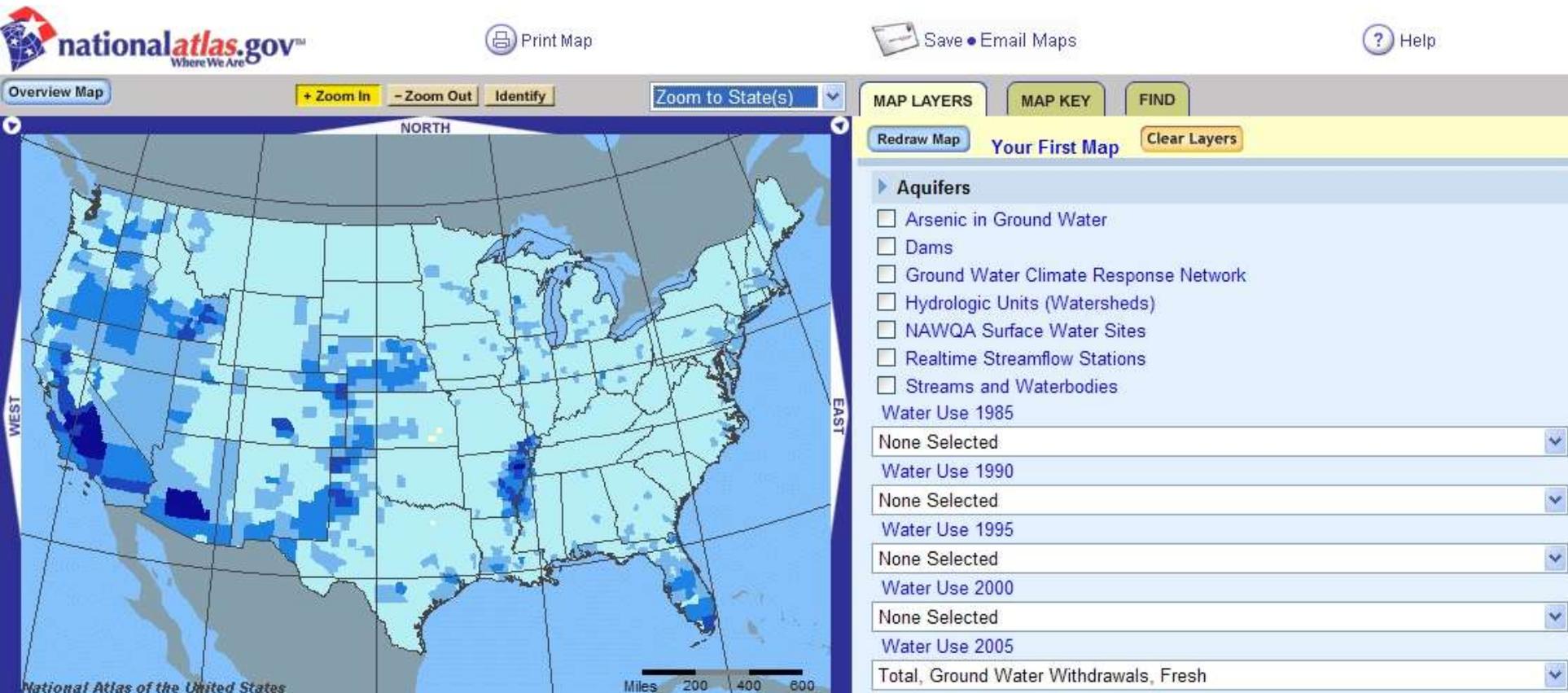


Who uses surface waters?



- Surface water withdrawal correlates with US cities implying industrial or personal consumption in the east. The west reflects increased surface water use for agriculture.

Even ground waters tell important stories



⦿ **Agricultural use of ground water has lowered aquifers in western plain states by up to 200 m!**



Students compare local values to real time networks

Real-time water quality

WaterQualityWatch -- Continuous Real-Time Water Quality of Surface Water in the United States

Real-Time Specific Conductance, in $\mu\text{S}/\text{cm}$

January 20, 2011 17:34ET

About USGS WaterQualityWatch

Current RTWQ Maps

Redisplay

State:

United States

Measurement:

Specific Conductance

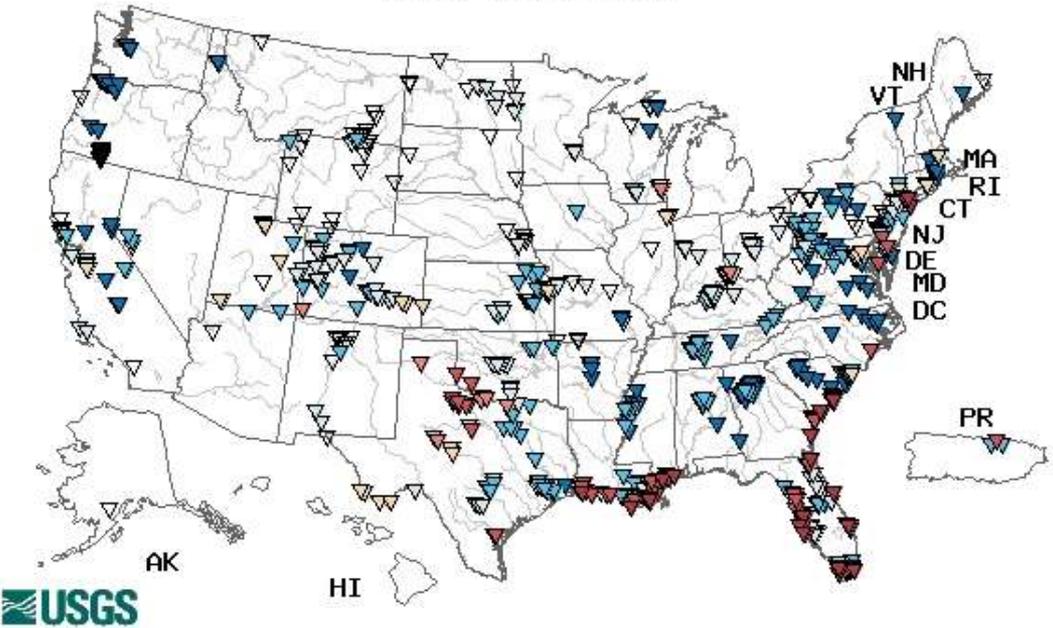
Animate Map

RTWQ Sites

Google Map of all USGS Real-Time Water Data

RTWQ FAQ

- What is the USGS?
- What is continuous RTWQ?
- How are sites selected?
- Why continuous and real time?
- How are these data used?
- What are these measurements?
- How are monitors maintained?
- What is a surrogate?



Explanation							
<250	250-749	750-2,240	2,250-4,990	5,000-9,990	10,000-35,000	>35,000	No Data

Temp Cond pH D.O. Turb Disch

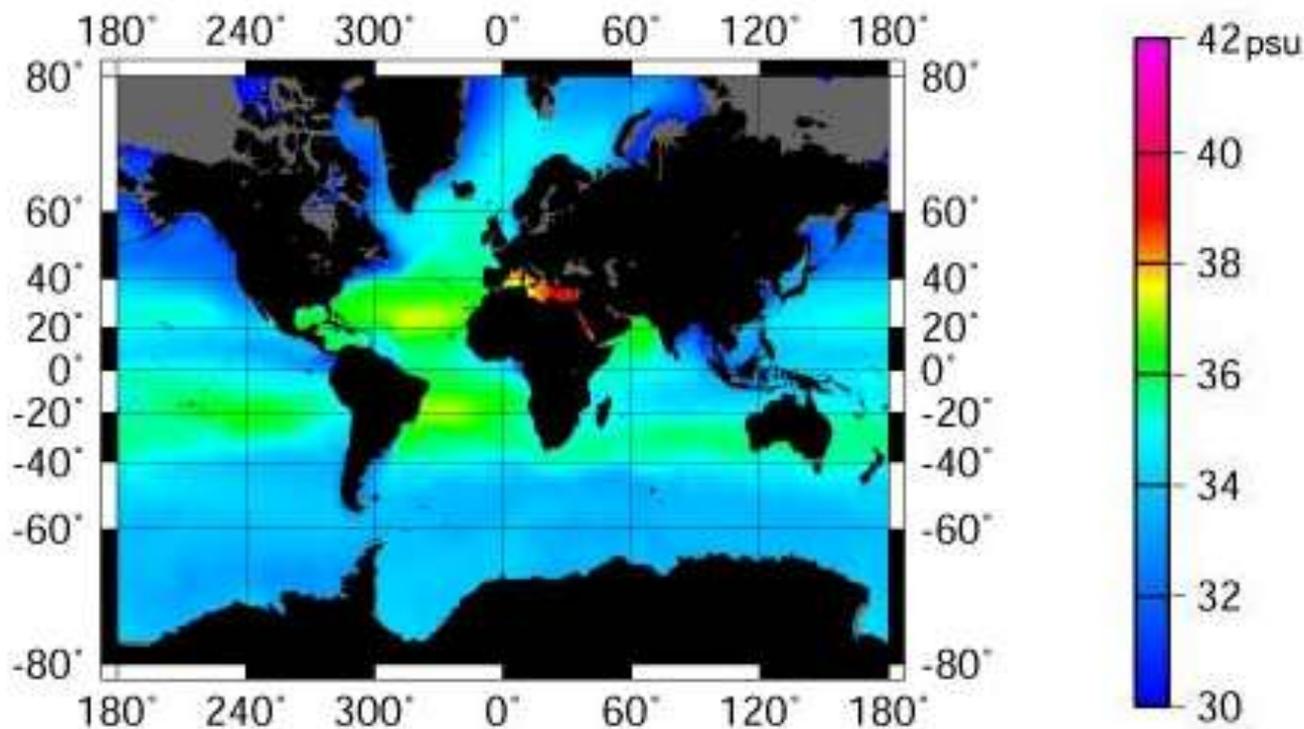


Where do these water pollutants end up?

Levitus Ocean Maps

Annual Salinity vs. Depth

Practical Salinity Unit



Depth (meters): 10

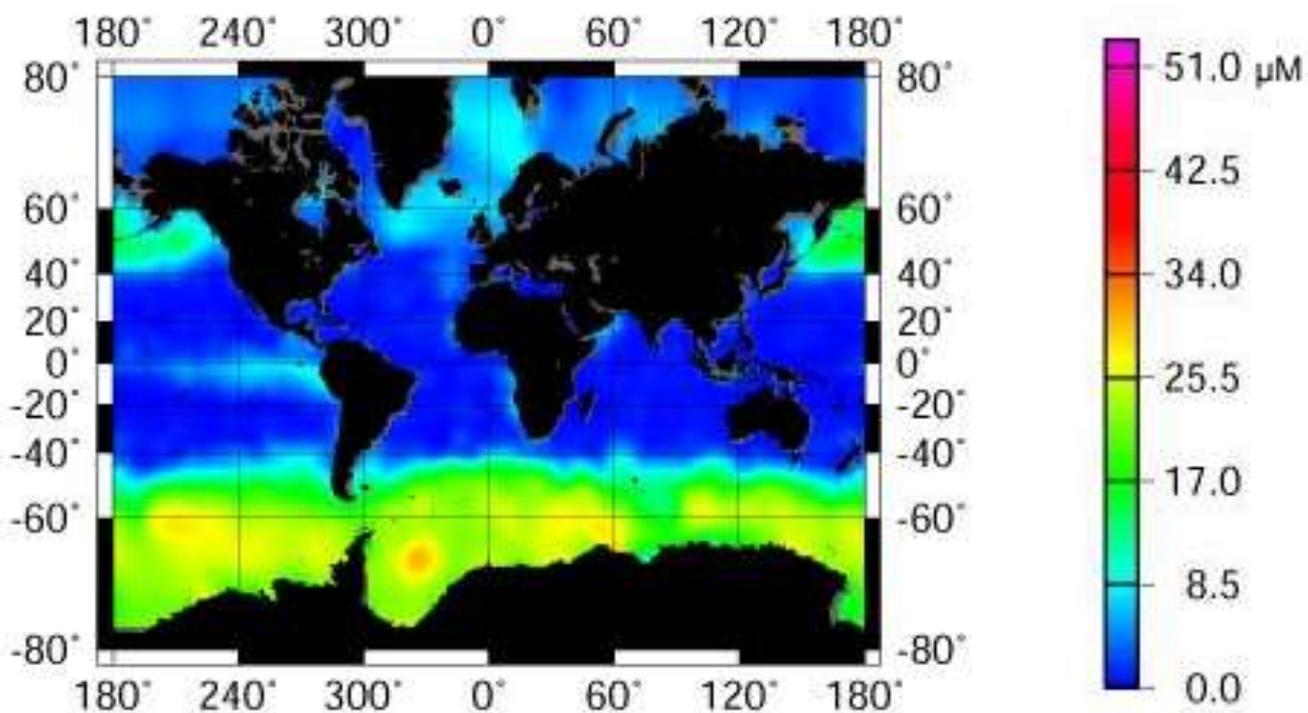


Where do these water pollutants end up?

Levitus Ocean Maps

Annual Nitrate vs. Depth

Micromolar (micromoles per liter)



Depth (meters): 20

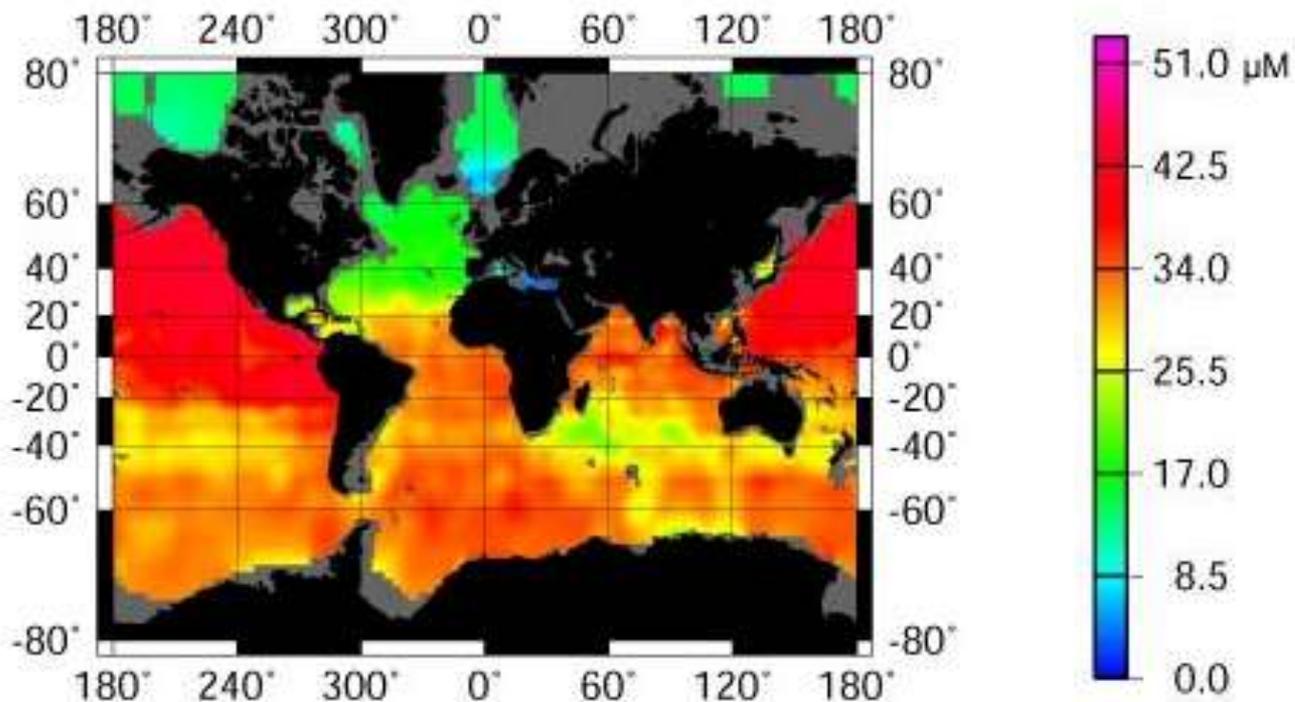


Where do these water pollutants end up?

Levitus Ocean Maps

Annual Nitrate vs. Depth

Micromolar (micromoles per liter)



Depth (meters): 1000

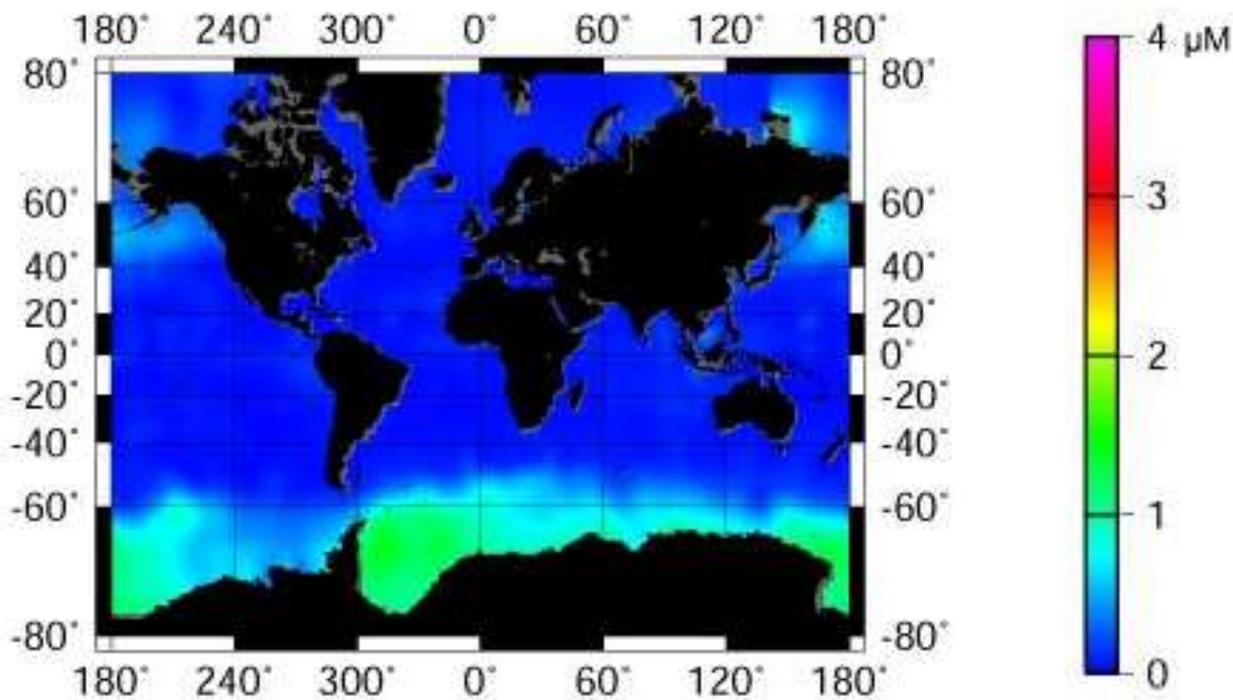


Where do these water pollutants end up?

Levitus Ocean Maps

Annual Phosphate vs. Depth

Micromolar (micromoles per liter)



Depth (meters): 20



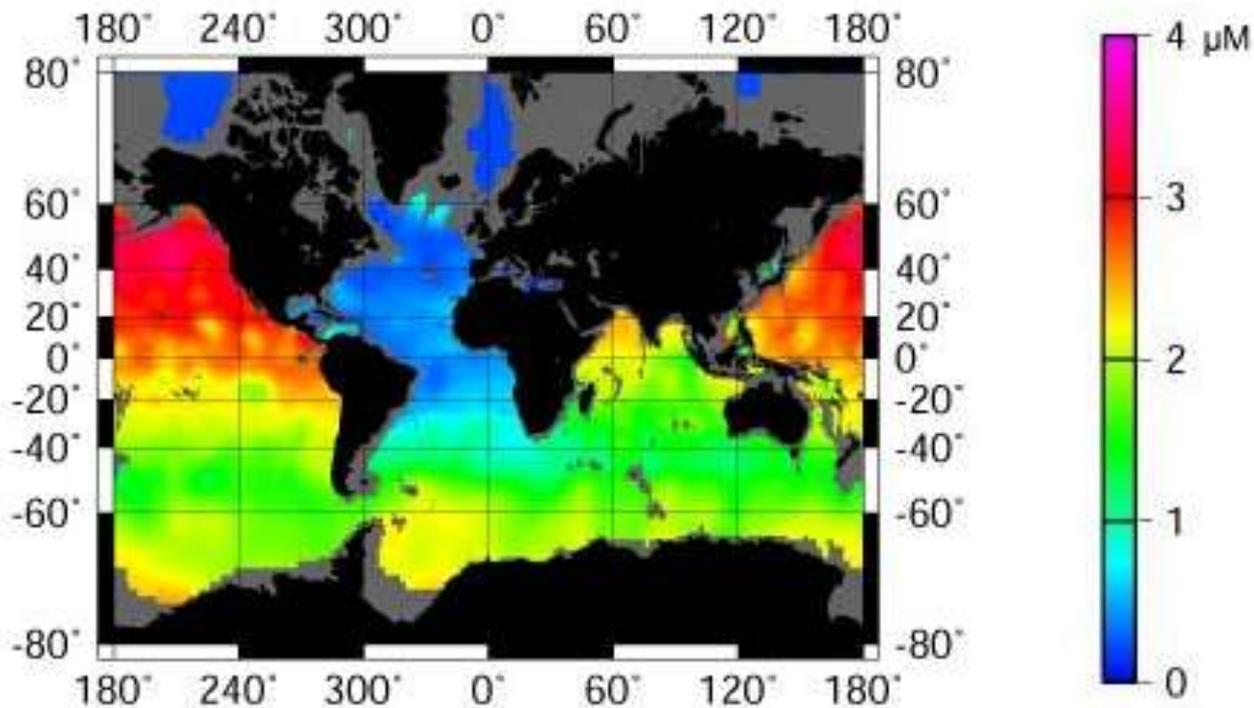
Where do these water pollutants end up?

Levitus Ocean Maps



Annual Phosphate vs. Depth

Micromolar (micromoles per liter)



Depth (meters): 2000





Encourage GIS use to leverage thinking back in your classrooms!

- Put current events in contexts
- Incorporate multimedia
- Collaborate
- Compare layers for insight into patterns
- Use data to support theories
- Find patterns visually... tell powerfull stories to engage students to think!



Your Part in Creating Capacity

- How you can influence course offerings at your district
 - Stand alone classes in CTE
 - Inserting GIS exercises into standard classes
 - Science, Social Studies, Mathematics, English language, ROTC, Physical Education
- Where to find help or expertise to do projects
 - Student interns from your school district
 - Community College program interns
 - Local business partnerships



Main Ideas

- GIS is Critical thinking
- GIS is analysis not just visualization
- GIS accesses data and impacts learning across the curriculum
- GIS engages students in local issues
- GIS is an important tool to inform good administrative decision making
- GIS is a 21st century skill with job potential
- GIS is a robust tool visualizing our growing world of information without becoming an overload
- GIS enables us to leverages work across the school district and beyond.



Thanks for Your Interest!

- GISetc consists of 25 years of teaching experience
- Other services from GISetc
 - Software and Curriculum sales
 - Professional Development
 - Geospatial Technology in Classroom Support
- For information:
 - Visit www.gisetc.com
 - Contact Anita Palmer – anita@gisetc.com
Roger Palmer – roger@gisetc.com

