NRCS NCGC Geospatial Data Support

State Soil Scientist Meeting
March 19, 2008

Sam Brown
Soil Geodatabases Team Leader

National Cartography & Geospatial Center

Fort Worth, Texas

NCGC Soil Survey Support

The NCGC Partnership with the Soil Survey Program includes providing:

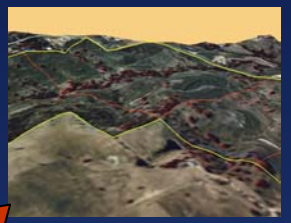
- **Geospatial Data**
- **Geospatial Technology**
- **Geospatial Services**

Elevation Data, Satellite Imagery, NAIP 2008, and NCGC Geospatial Web Map Service

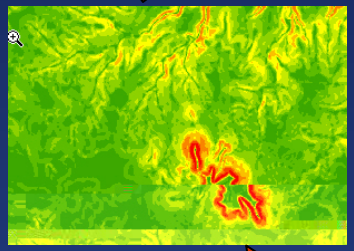
- NRCS supports a multi-resolution and sensor approach to creating elevation for the nation
- NRCS currently use Elevation Data from 30 and 10 meter NED, IFSAR 5 meter and LIDAR < 3 meter products
- NRCS need for standards, specifications and contract vehicles to purchase elevation products in FY2008 and beyond

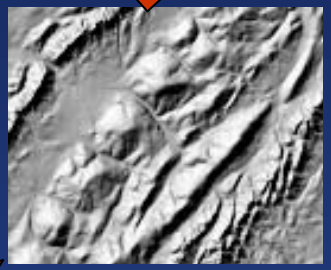
Terrain Modeling

What are our elevation requirements?



Analysis



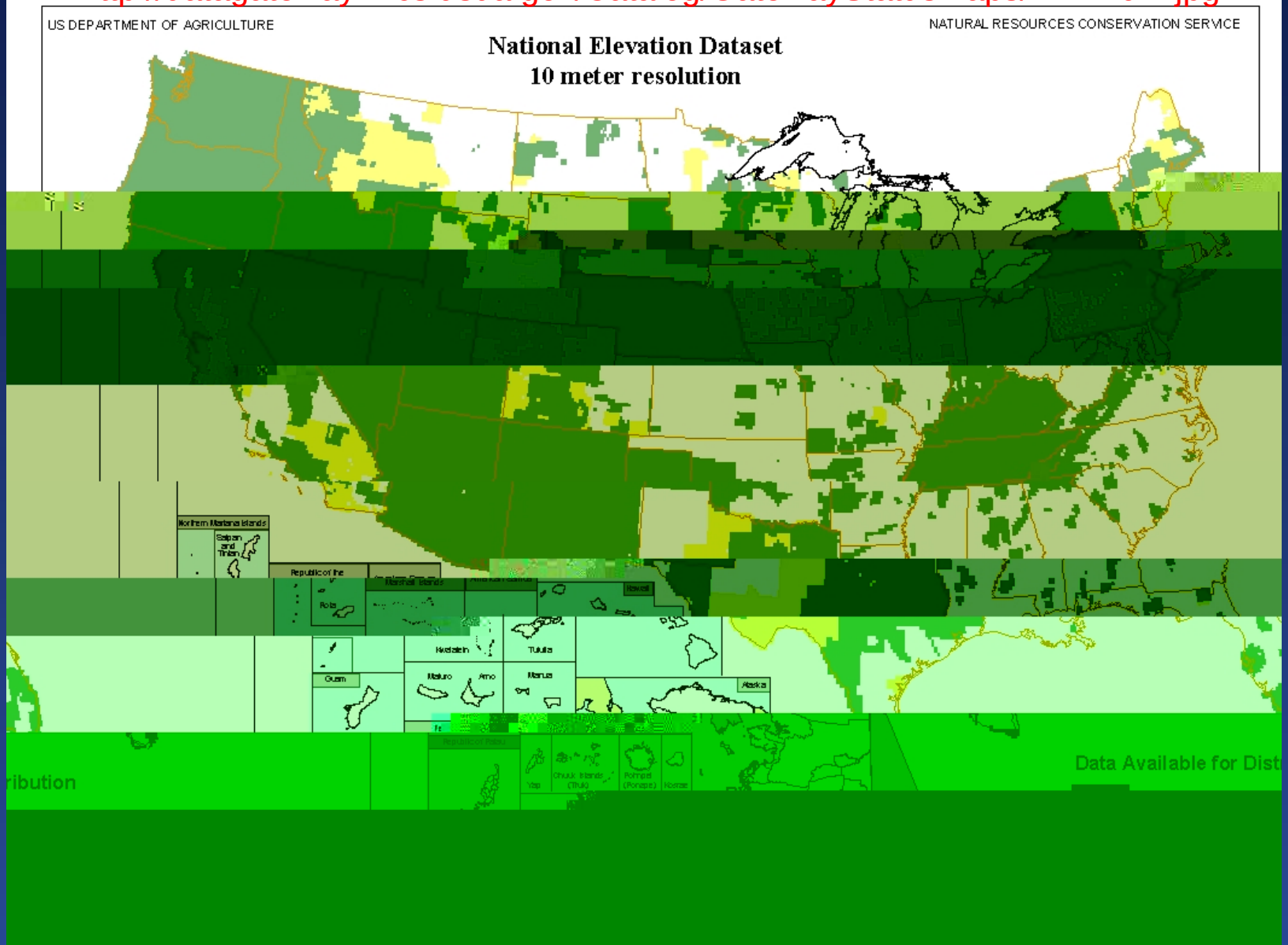


Visualization

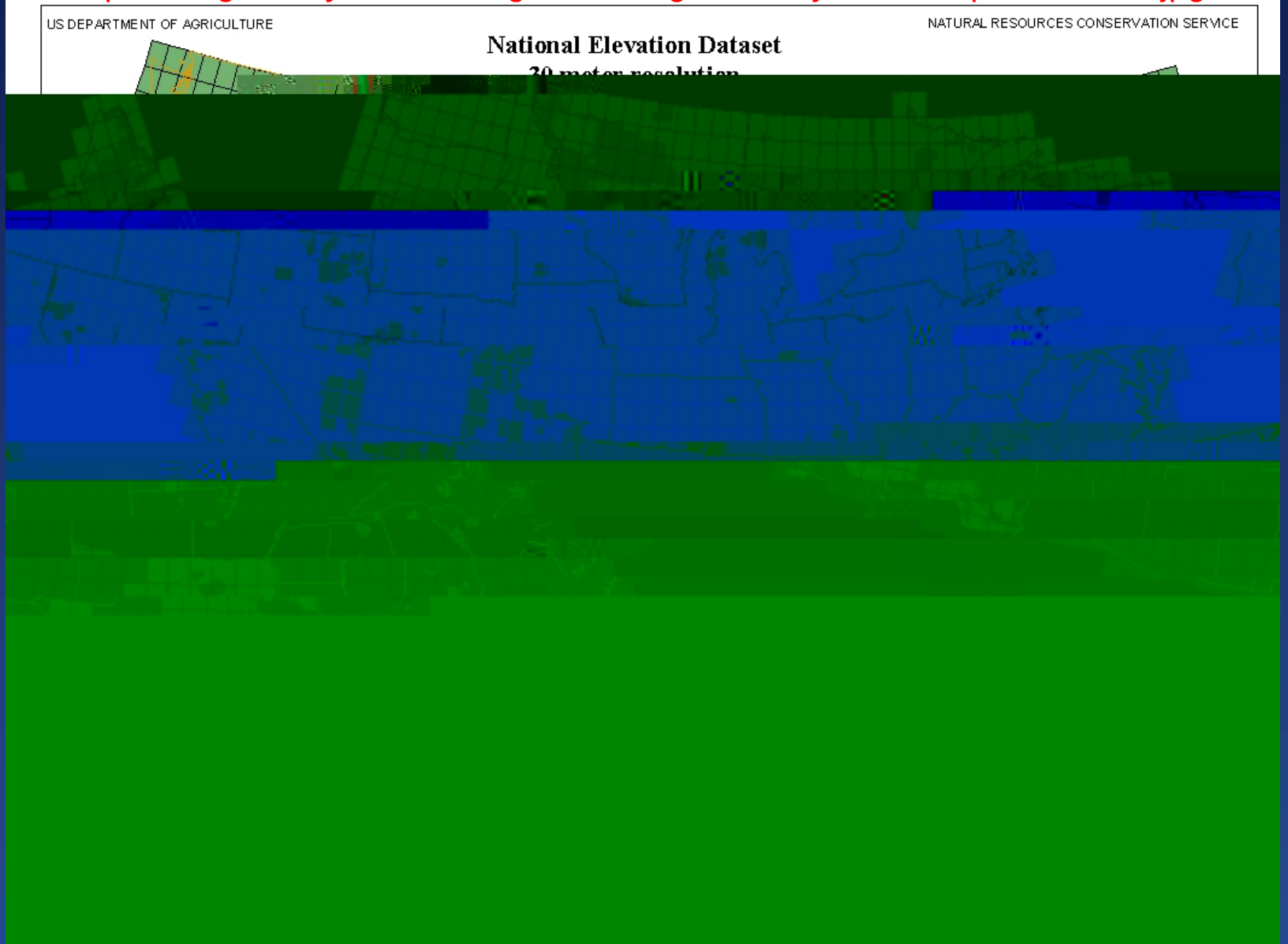
DEM

Reality

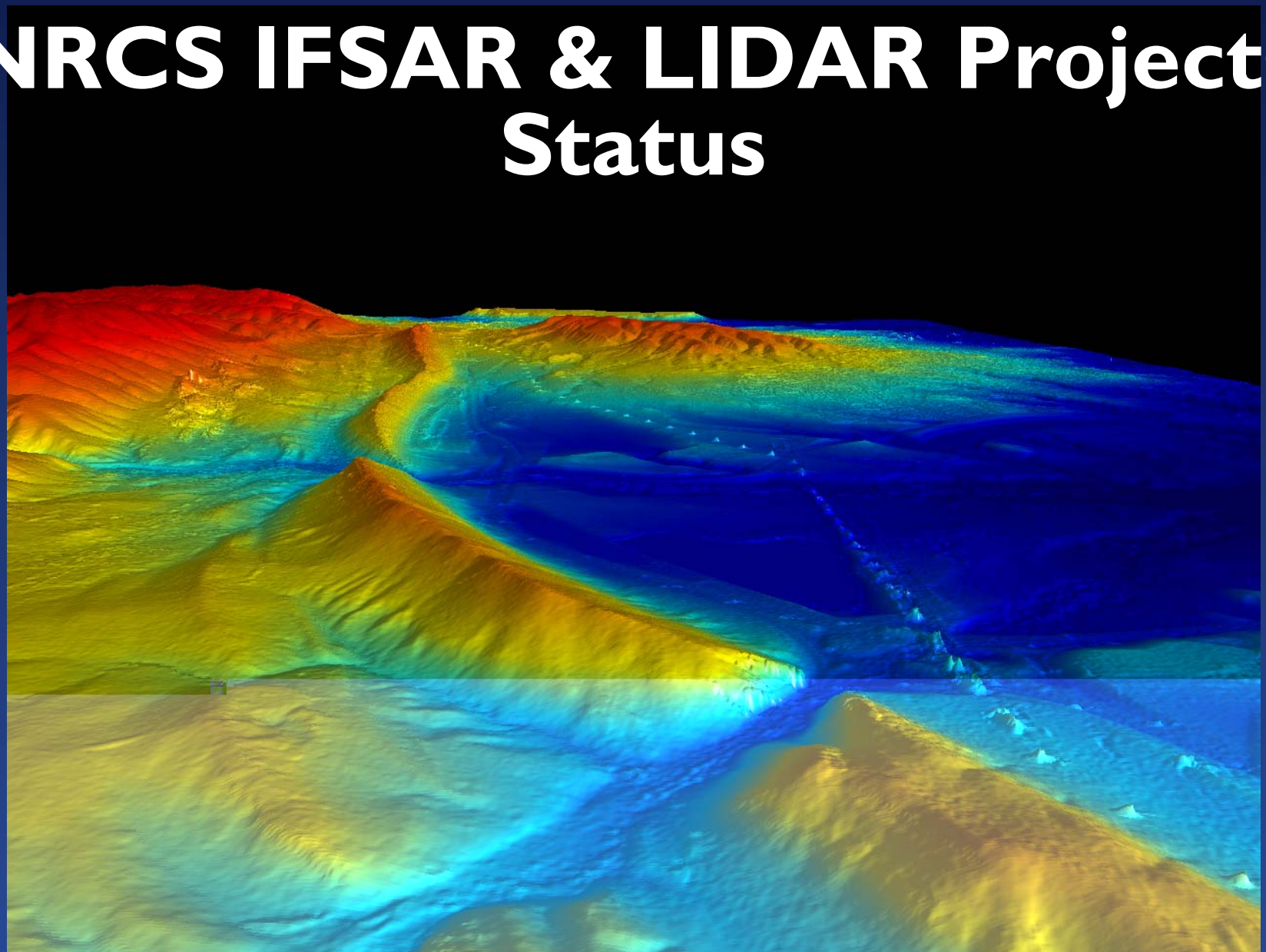
http://datagateway.nrcs.usda.gov/Catalog/GatewayStatusMaps/NED10M.jpg

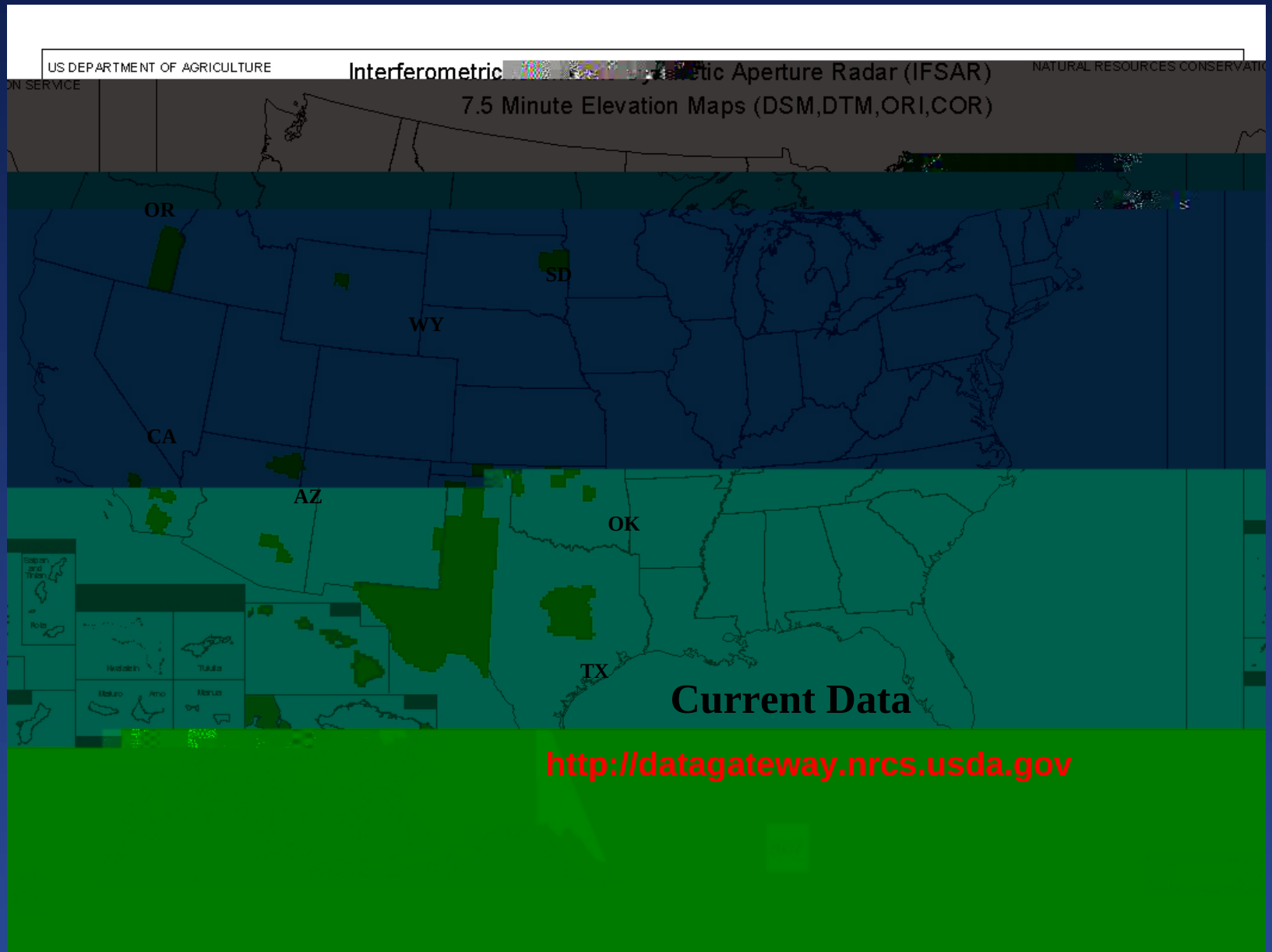


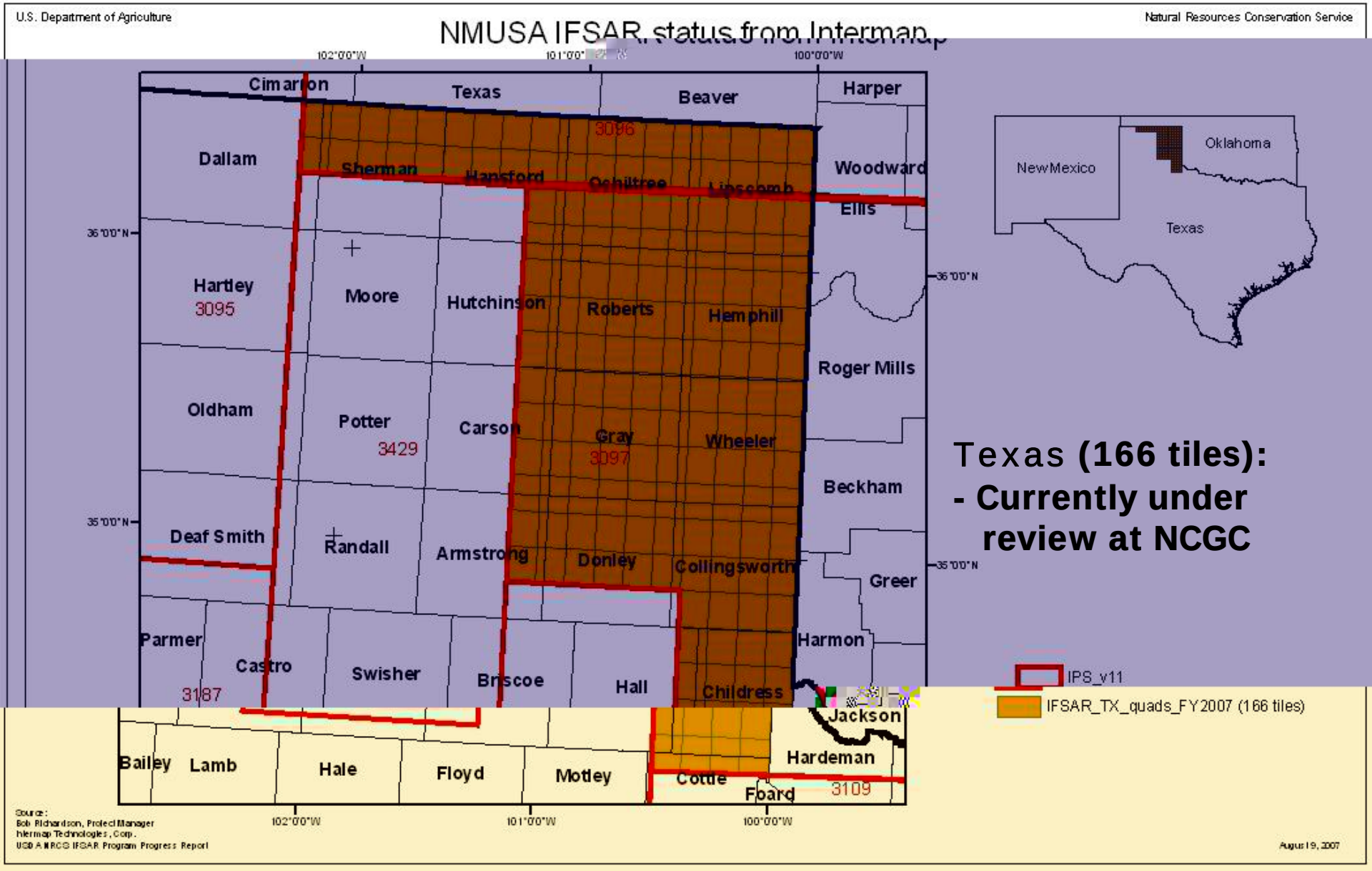
http://datagateway.nrcs.usda.gov/Catalog/GatewayStatusMaps/NED30M.jpg



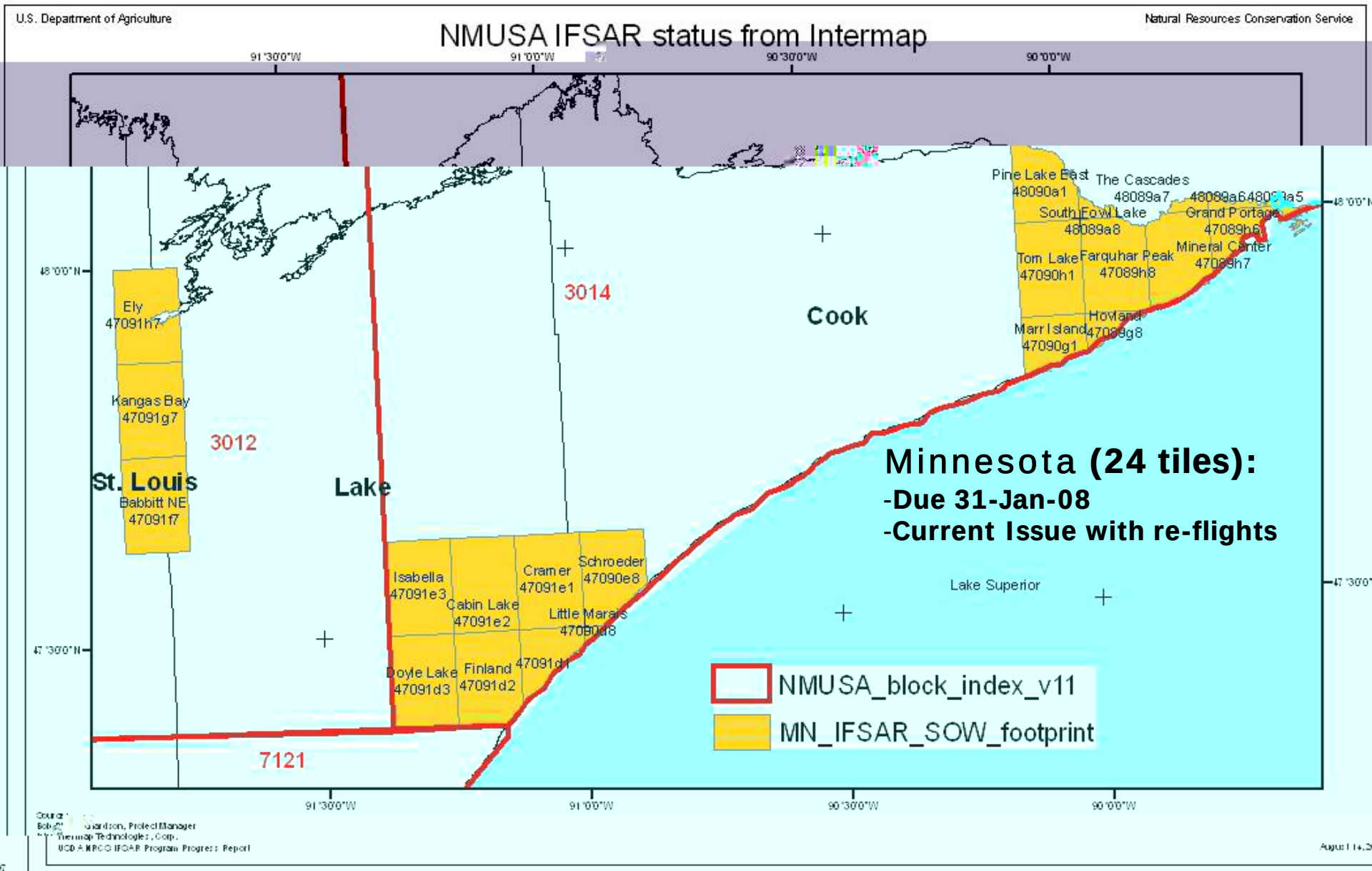
NRCS IFSAR & LIDAR Projects Status

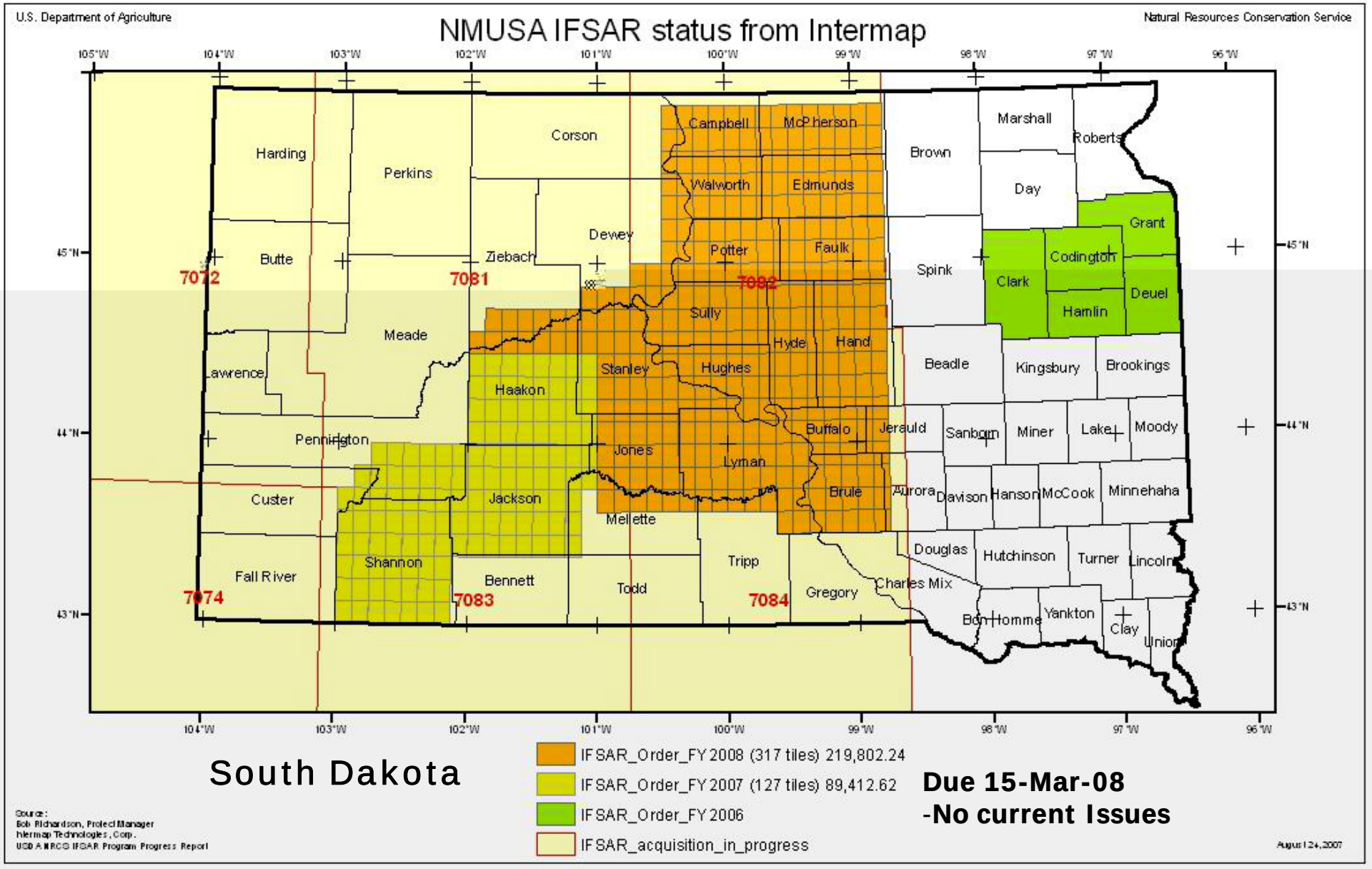


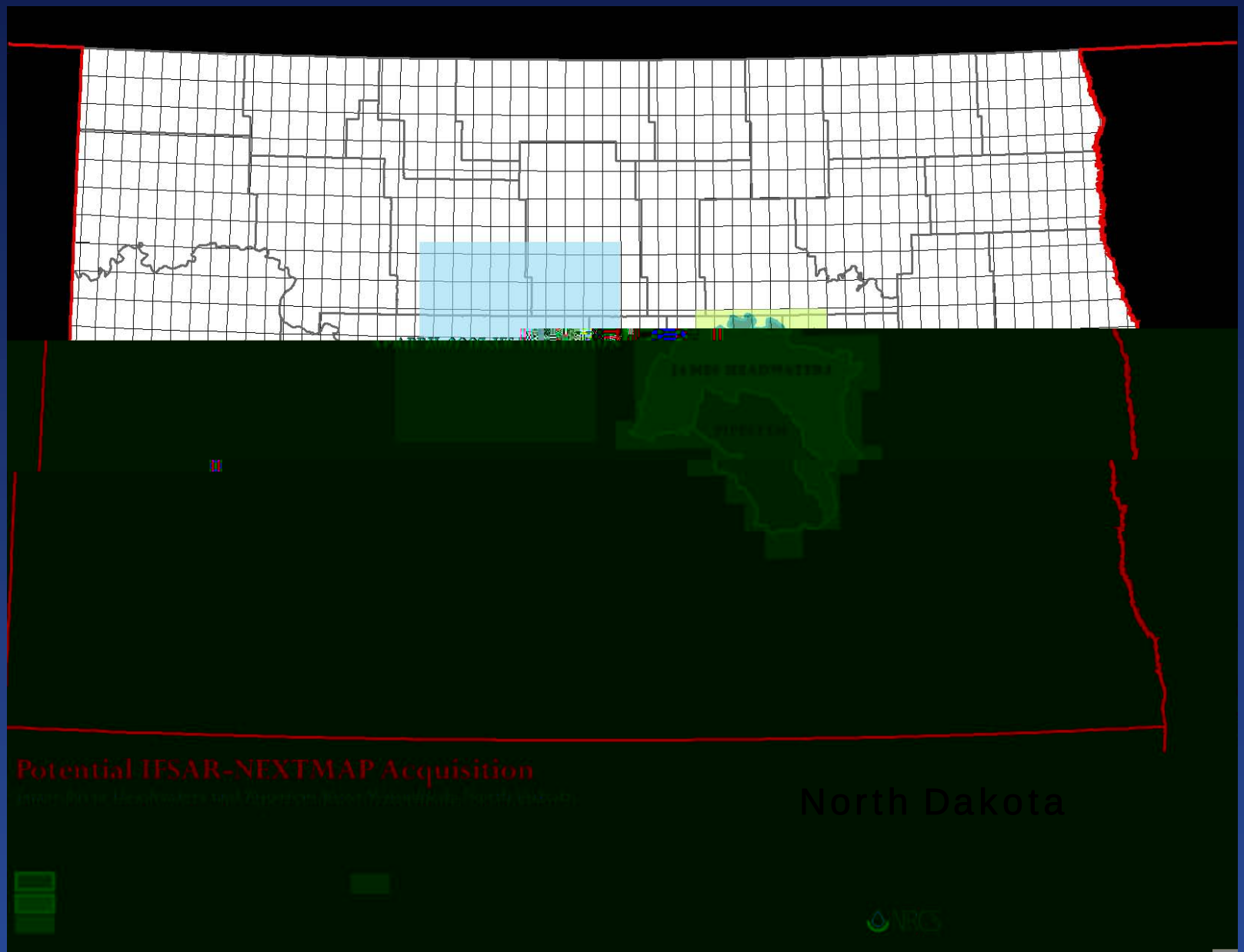

US DEPARTMENT OF AGRICULTURE
Interferometric
tic Aperture Radar (IFSAR)
NATURAL RESOURCES CONSERVATIO
7.5 Minute Elevation Maps (DSM,DTM,ORI,COR)
OR
SD
WY
CA
AZ
OK
TX
Current Data
http://datagateway.nrcs.usda.gov

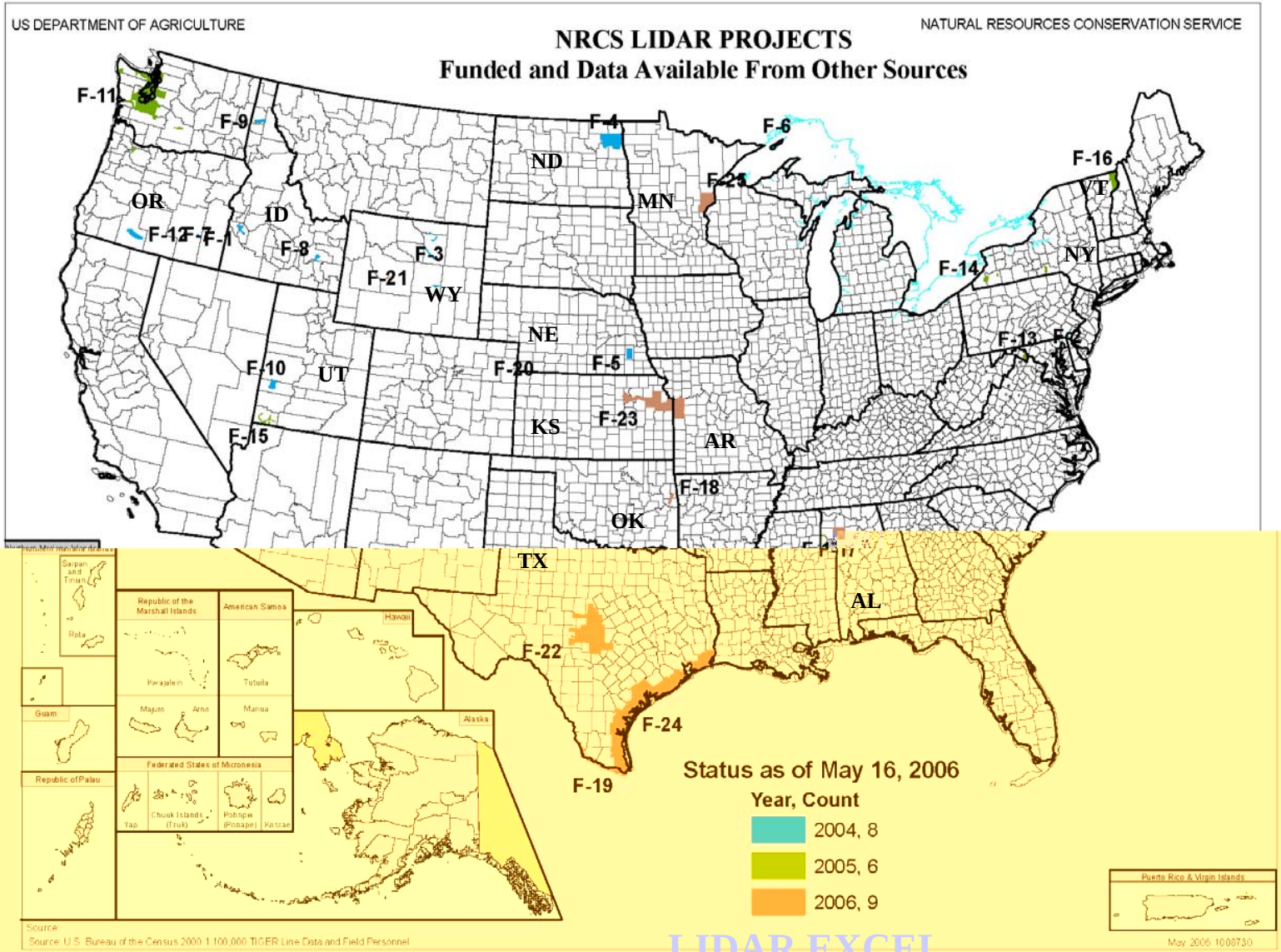


Texas (166 tiles):
- Currently under review at NCGC

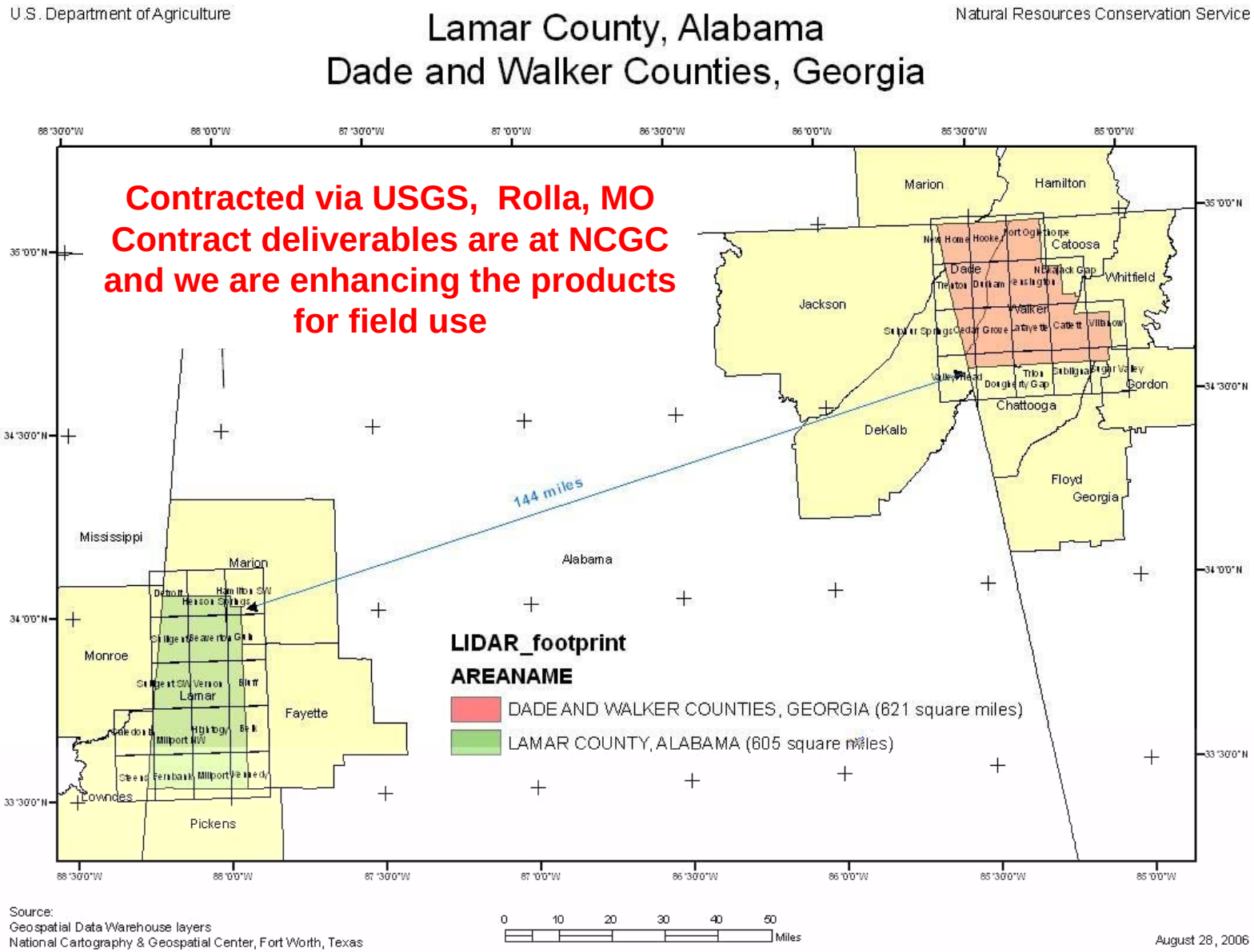

U.S. Department of Agriculture
NMUSA IFSAR status from Intermap
Natural Resources Conservation Service
91°30'0"W
91°0'0"W
90°30'0"W
90°0'0"W
48°0'0"N
47°30'0"N
Ely
47091h7
Kangas Bay
47091g7
3012
St. Louis
Babbitt NE
47091f7
Lake
3014
Cook
Pine Lake East
48090a1
The Cascades
48089a7
South Fowl Lake
48089a8
Grand Portage
47089h6
Tom Lake
47090h1
Farquhar Peak
47089h8
Mineral Center
47089h7
Marr Island
47090g1
Hovland
47089g8
Isabella
47091e3
Cramer
47091e1
Schroeder
47090e8
Cabin Lake
47091e2
Little Marais
47090d8
Doyle Lake
47091d3
Finland
47091d2
47091d1
Lake Superior
7121
NMUSA_block_index_v11
MN_IFSAR_SOW_footprint
Minnesota (24 tiles):
-Due 31-Jan-08
-Current Issue with re-flights


U.S. Department of Agriculture
NMUSA IFSAR status from Intermap
Natural Resources Conservation Service
105°W
104°W
103°W
102°W
101°W
100°W
99°W
98°W
97°W
96°W
45°N
44°N
43°N
Harding
Perkins
Corson
Campbell
McPherson
Marshall
Roberts
Brown
Day
Walworth
Edmunds
Grant
Dewey
Potter
Faulk
Spink
Codington
Clark
Deuel
Hamlin
Butte
Ziebach
7072
7081
7082
Sully
Hyde
Hand
Meade
Stanley
Hughes
Beadle
Kingsbury
Brookings
Lawrence
Haakon
Buffalo
Jerauld
Sanborn
Miner
Lake
Moody
Pennington
Jones
Lyman
Custer
Jackson
Brule
Aurora
Davison
Hanson
McCook
Minnehaha
Mellette
Douglas
Hutchinson
Turner
Lincoln
Shannon
Tripp
Fall River
Bennett
Todd
7074
7083
7084
Gregory
Charles Mix
Bon Homme
Yankton
Clay
Union
South Dakota
IFSAR_Order_FY2008 (317 tiles) 219,802.24
IFSAR_Order_FY2007 (127 tiles) 89,412.62
IFSAR_Order_FY2006
IFSAR_acquisition_in_progress
Due 15-Mar-08
-No current Issues
Source:
Bob Richardson, Project Manager
Intermap Technologies, Corp.
USDA NRCS IFSAR Program Progress Report
August 24, 2007

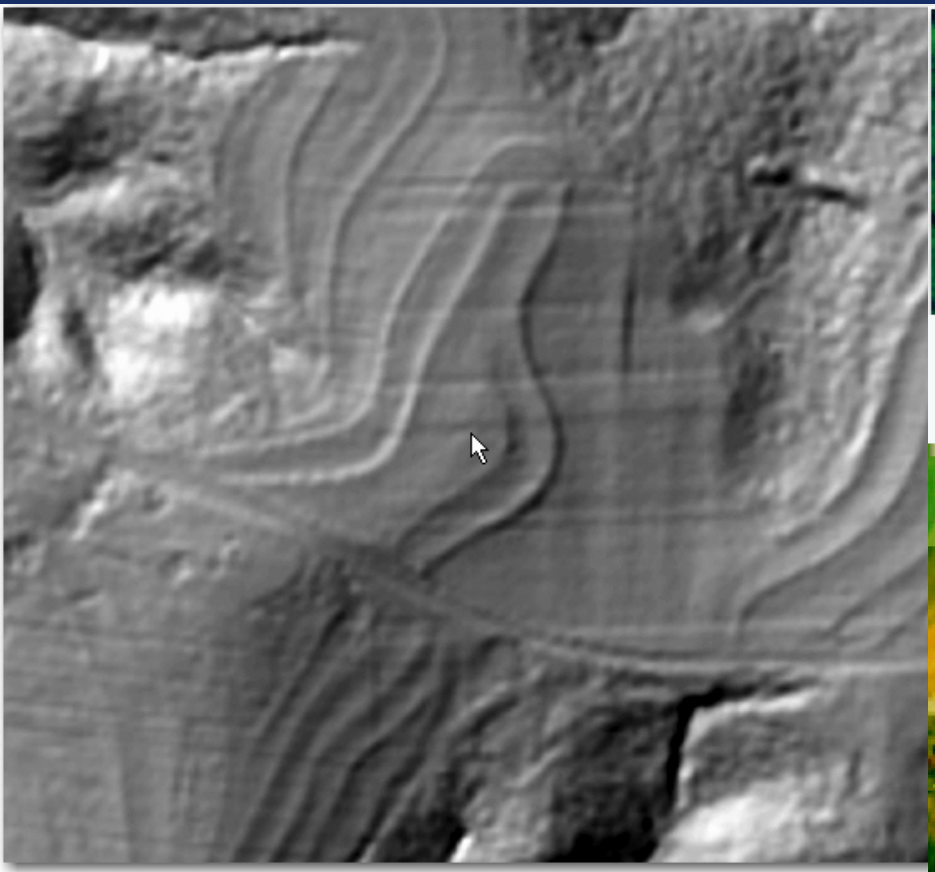

Potential IFSAR-NEXTMAP Acquisition
North Dakota

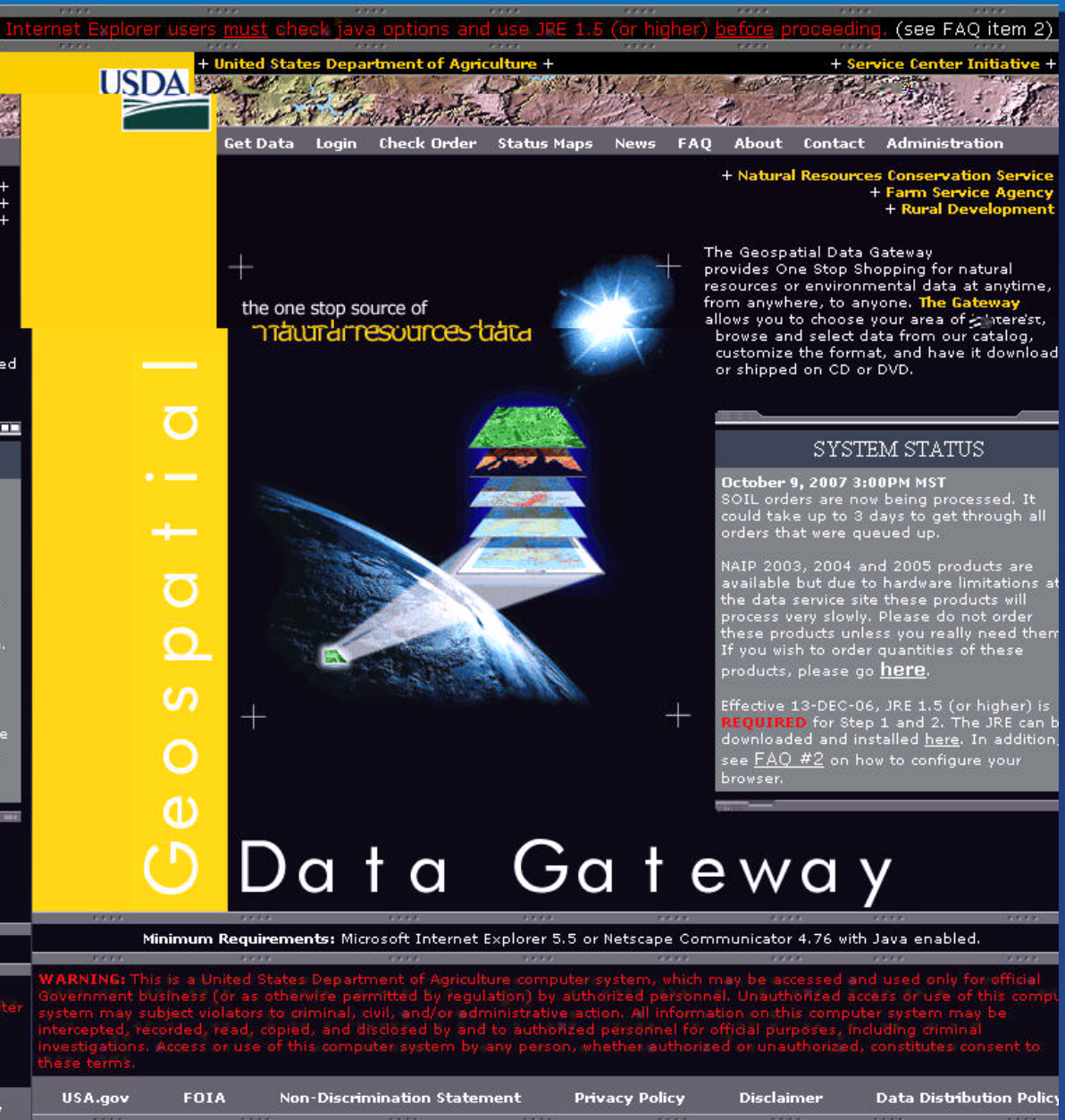

US DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NRCS LIDAR PROJECTS
Funded and Data Available From Other Sources
F-11
F-9
F-4
F-6
F-16
ND
MN
F-23
VT
OR
ID
F-12
F-7
F-1
F-8
F-3
F-21
WY
NY
F-14
NE
F-13
F-10
UT
F-20
F-5
F-15
KS
F-23
AR
F-18
OK
TX
AL
F-22
F-24
F-19
Status as of May 16, 2006
Year, Count
2004, 8
2005, 6
2006, 9
Republic of the Marshall Islands
American Samoa
Hawaii
Guam
Republic of Palau
Federated States of Micronesia
Alaska
Puerto Rico & Virgin Islands
Source: U.S. Bureau of the Census 2000 1:100,000 TIGER Line Data and Field Personnel
May 2006 1008730

LIDAR EXCEL


U.S. Department of Agriculture
Natural Resources Conservation Service
Lamar County, Alabama
Dade and Walker Counties, Georgia
Contracted via USGS, Rolla, MO
Contract deliverables are at NCGC
and we are enhancing the products
for field use
144 miles
Marion
Hamilton
Jackson
Dade
Walker
Whitfield
Catoosa
Chattooga
Gordon
DeKalb
Floyd
Georgia
Alabama
Mississippi
Monroe
Lamar
Fayette
Pickens
Lowndes
LIDAR_footprint
AREANAME
DADE AND WALKER COUNTIES, GEORGIA (621 square miles)
LAMAR COUNTY, ALABAMA (605 square miles)
Source:
Geospatial Data Warehouse layers
National Cartography & Geospatial Center, Fort Worth, Texas
0 10 20 30 40 50
Miles
August 28, 2006

United States Department of Agriculture
Natural Resources Conservation Service





NED 30m and 10m data available on the Gateway

IFSAR data (DTM & DSM) available to NRCS & FSA in geotiff format on the Gateway

LIDAR data is not available on the Gateway

Potential Gateway LIDAR projects are Sallisaw, OK & Essex, VT for inclusion into NED

Process Model developed by Dwain Daniels, SS uses ArcGIS server & NED 30 and 10 meter data.

Derivatives include:

Aspect

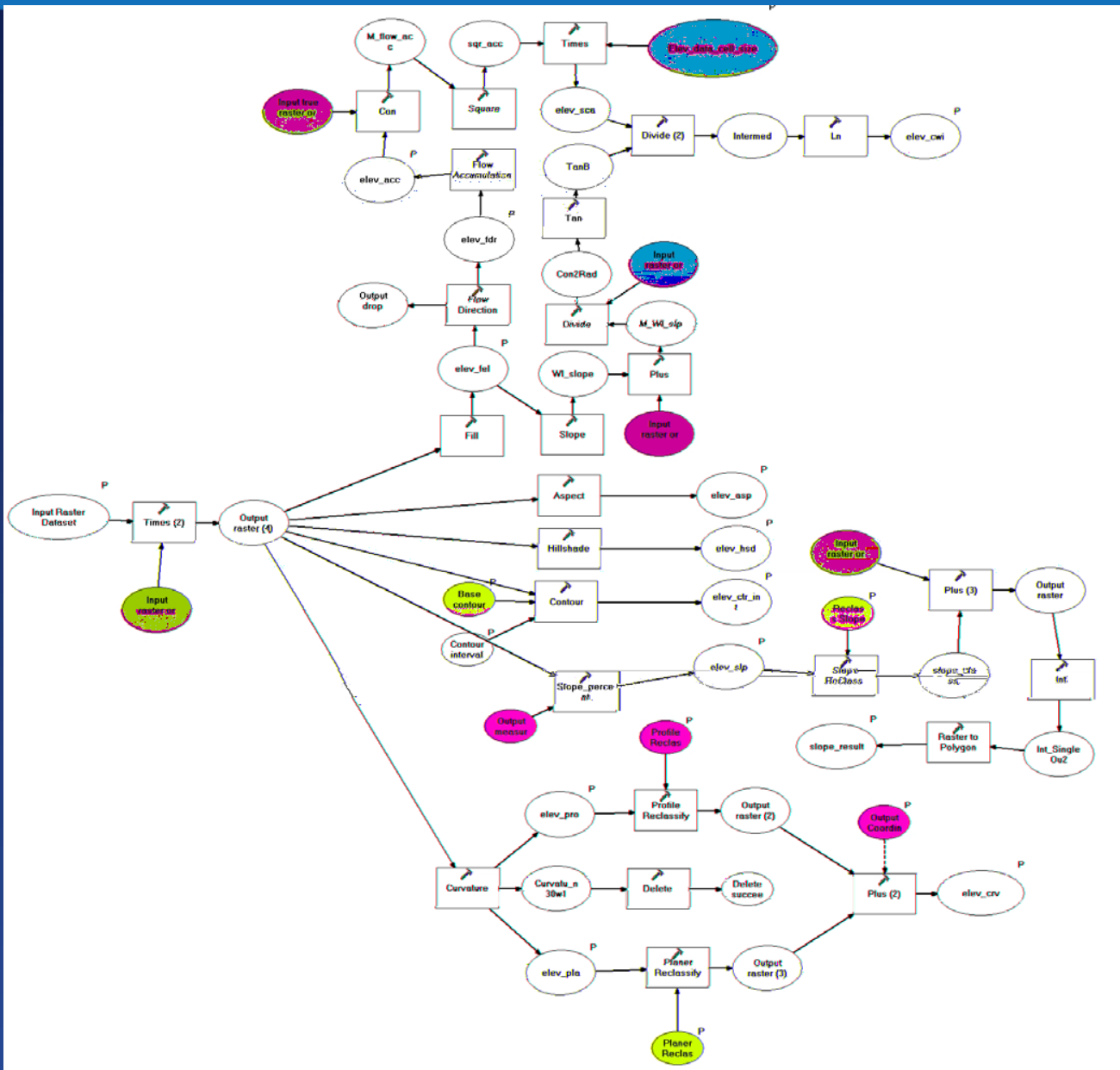
Contour lines

Curvature slope classes

Hillshade

Slope gradient

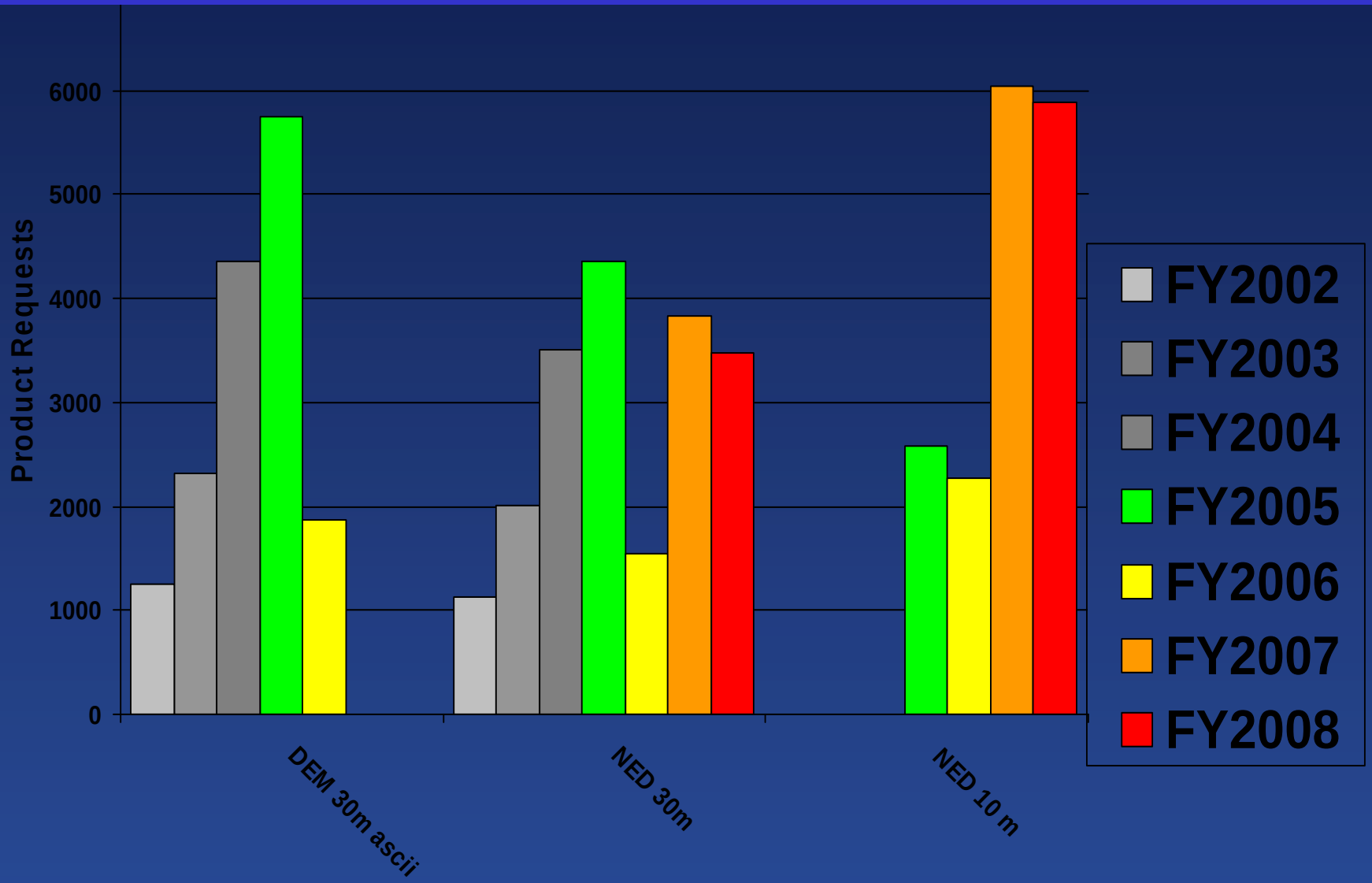
Wetness Index



ArcGIS Server Implementation for creating derivatives from **NED 30 and 10 meter data**.

NRCS plans to incorporate higher resolution grid data from **IFSAR (5 meter) and LIDAR (<5 meter)**

USGS Elevation data served via Gateway



Issues

- It is important for NRCS to have **true business requirements** before buying elevation data.
- We **need case studies from all business areas** to show how elevation can make business operations more efficient and effective.
- Elevation data is **not plug and play**. Processing, Procedures, Models, Derivatives, Analysis and Interpretation is needed. It is not an exact science. **Lots of R&D, trial & error**.

Elevation Future Directions

- Need to **identify the agency business requirements** for elevation for program areas as part of the NRCS GIS Strategy

USGS LiDAR Conference
Ruston, VA

- Center for LiDAR Information Coordination and Knowledge (CLICK)
- USGS LiDAR Conference, May 21-22nd 2008 at the USGS Headquarters in Reston, VA
- Potential dataset at state, federal, commercial and local agencies
- Partnership strategies
- Web page: http://lidar.cr.usgs.gov

For More Information

Contact

Steve Nechero at 817-509-3366
Email: Steven.Nechero@ftw.usda.gov

National Cartography & Geospatial Center

NCGC Home Page - http://www.ncgc.nrcs.usda.gov

NRCS Remote Sensing

Obtaining Satellite Imagery

USDA Satellite Imagery Archive

- The Foreign Agriculture Service **(FAS)**
  - **Repository and manager** of the USDA Satellite Imagery Archive
  - A **cost-sharing agreement** among the various subscribers including NRCS
  - **Imagery is for USDA use only**
  - **Partners can use imagery** if a cooperative agreement with NRCS is in place.
- The Archive contains **Limited SPOT**
- National georectified **Landsat, AWiFS, and AVHRR** (USGS)

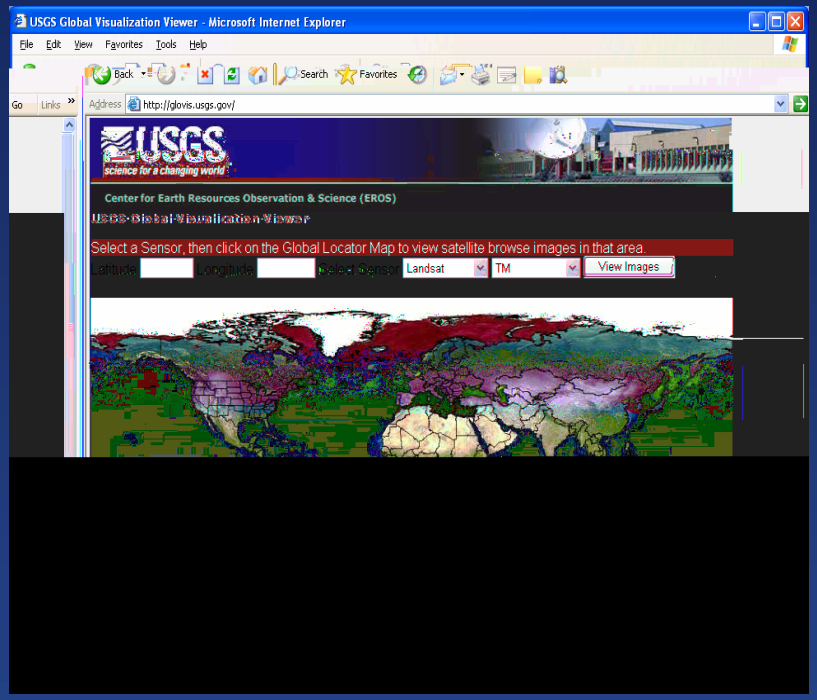
USGS-EROS Data Center (EDC) Best of the US

- National, cloud-free, **orthorectified, Landsat 7 imagery**.

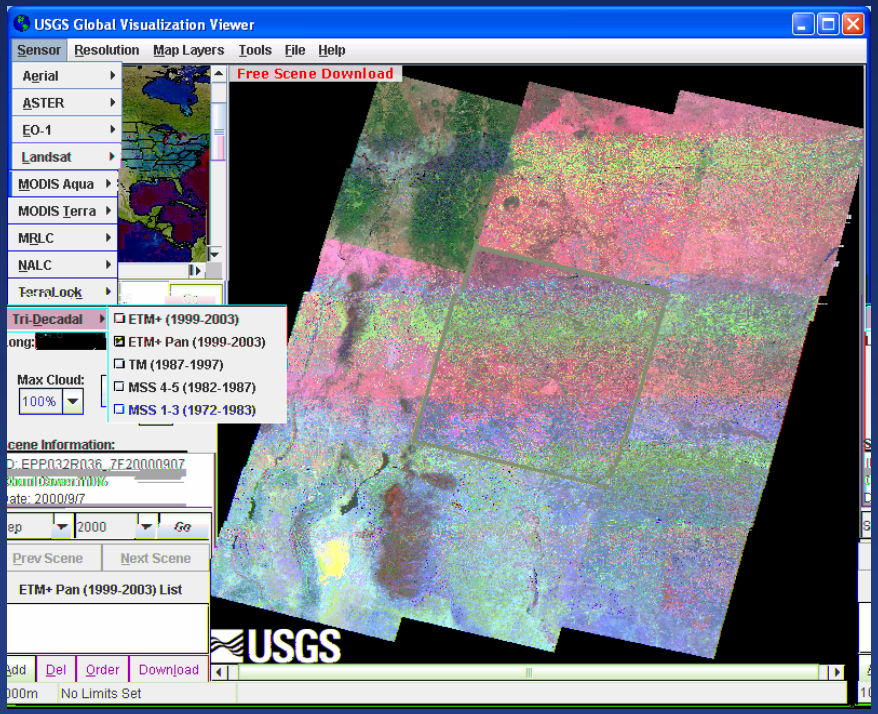
- Available for ftp download

Microsoft Excel Worksheet

USGS Global Visualization Viewer (GLOVIS) No Cost Data



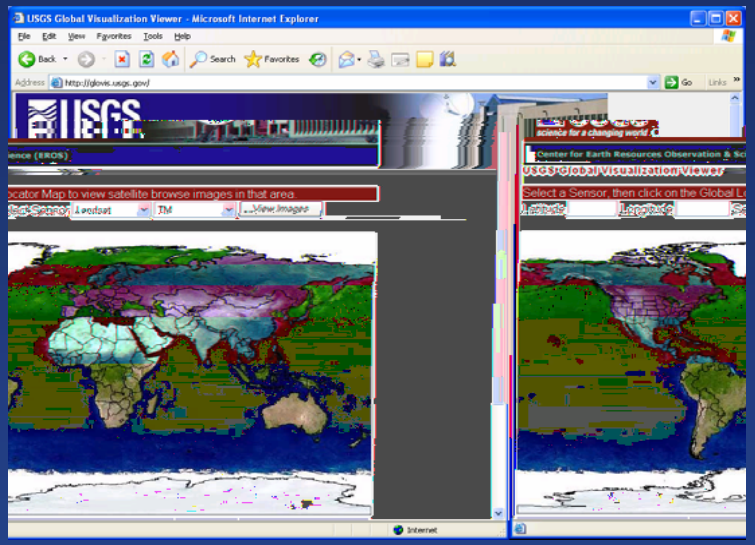
http://glovis.usgs.gov/



Tri-Decadal MSS and Landsat Free Downloads

USGS Global Visualization Viewer (GLOVIS)

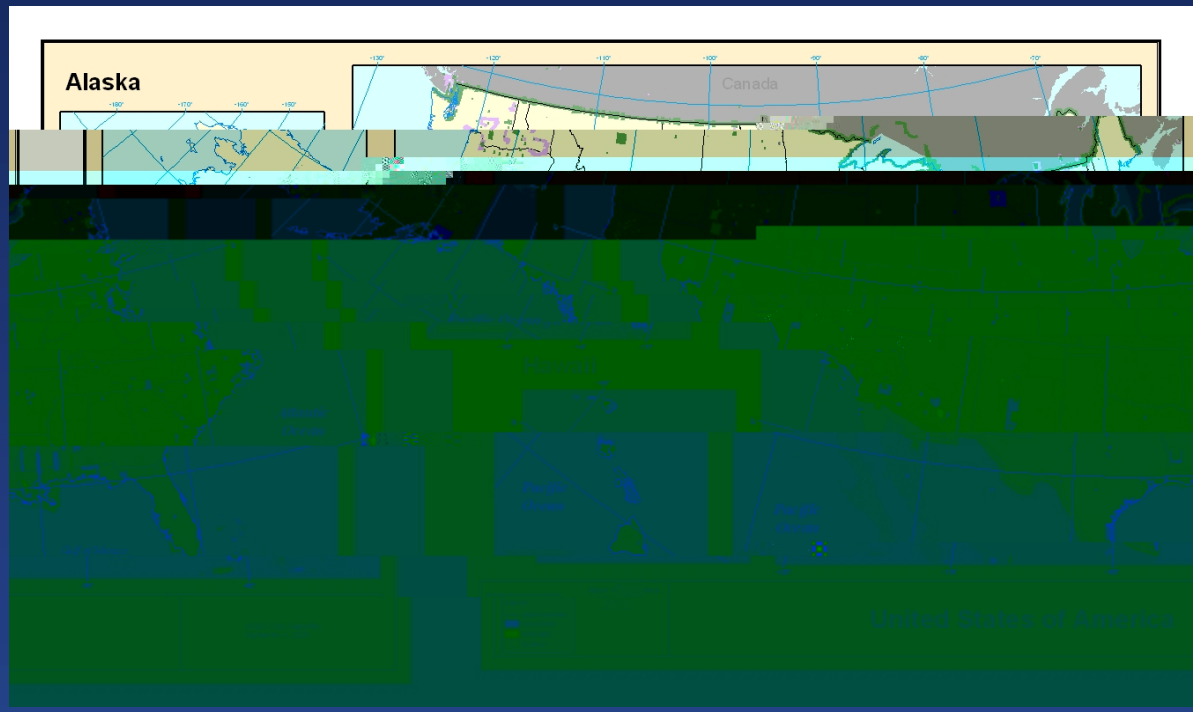
- Search and order tool for satellite data including
  - **ASTER**
  - **EO-1**
  - **Landsat**
  - **MODIS**



http://glovis.usgs.gov/

Commercial Satellite Imagery Library (CSIL)

- **Licensed Data shared** between Federal agencies.
- Shapefiles contain metadata for holdings of **IKONOS, OrbView and QuickBird**.
- Shapefiles are updated on a periodic basis.
- Data requests
  - Some ftp
  - Remainder via request to holding agency



CSIL US Coverage August 2006

http://edcftp.cr.usgs.gov/pub/metadata/satellite/ucdp/CSIL_Shapefiles

Satellite Vendors Under Contract with USDA Archive Imagery

- **Radarsat**
- **Earthsat**
- **Eurimage**
- **Geoeye**
- **Digital Globe**
- **SPOT**

- 2.8 – 60 m multispectral
- 0.6 – 10 m pan
- Costs below vendor catalog price
- **USDA-wide license**

Licensing Restrictions

- Almost all medium and high resolution satellite **imagery is copyrighted.**
- **Check the license agreement** before copying imagery or posting it on the web.
- There are **civil or criminal penalties** for violating copyright agreements.

http://edcsns17.cr.usgs.gov/EarthExplorer

Source	Primary Image Type	Cost	URL
USDA Contract	**Landsat** **Radar, Ikonos, QB, OV, SPOT**	$$ $$$ $$$	robert.tetrault@.usda.gov
NASA JPL	**New ASTER**	$	http://asterweb.jpl.nasa.gov/NewReq.asp
NASA JPL	ASTER Homepage		http://asterweb.jpl.nasa.gov
Global Land Cover Facility	**Landsat, MODIS, ASTER**	None	http://glcf.umiacs.umd.edu/index.shtml
AmericaView	**Landsat, MODIS, ASTER**	None	http://www.americaview.org/
Intermountain Region Digital Image Archive Ctr.	**Landsat, ASTER**	None	http://earth.gis.usu.edu
Land Processed Distributed Active Archive Center (LPDAAC)	**MODIS, ASTER**	None Or $	http://lpdaac.usgs.gov/datapool/datapool.asp

For Additional Information
Contact

Dorsey Plunk, at 817-509-3348

Email: dorsey.plunk@ftw.usda.gov

National Cartography & Geospatial Center

NCGC Home Page - http://www.ncgc.nrcs.usda.gov

NAIP 2008 Overview

Partnership Opportunities for USDA-NRCS

NAIP 2008 Program Enhancements

The NAIP Orthoimagery program added two options depending on available funding from Federal and State Partnerships for FY2008.

1) Four Band Orthoimagery Acquisition

-allows end users to view NAIP Orthoimagery in Natural Color or Color Infrared (CIR)

2) State Provided Ground Control Points

-State provided ground control points will increase accuracy of NAIP Orthoimagery

USDA-NRCS Partnership

- Starting with NAIP 2008, FSA will acquire one meter Orthoimagery only
- The two meter NAIP compliance product is discontinued
- NRCS contribution of $500,000 to NAIP 2008 will leverage a $16,700,000 Orthoimagery Base for NRCS

NAIP 2008 Specifications

• DOQQ Spatial Resolution	1 Meter
• DOQQ Spectral Bands	4 Band/CIR
• DOQQ Horizontal Accuracy	Absolute, 6M
• Flying Season	Early Leaf Emergence
• Coverage	Full State
• Refresh Cycle	3 to 5 Years

Arizona NAIP 2007 Four Band Test Pilot

Natural Color (Bands 1,2,3)

Color Infrared (Bands 2,3,4)

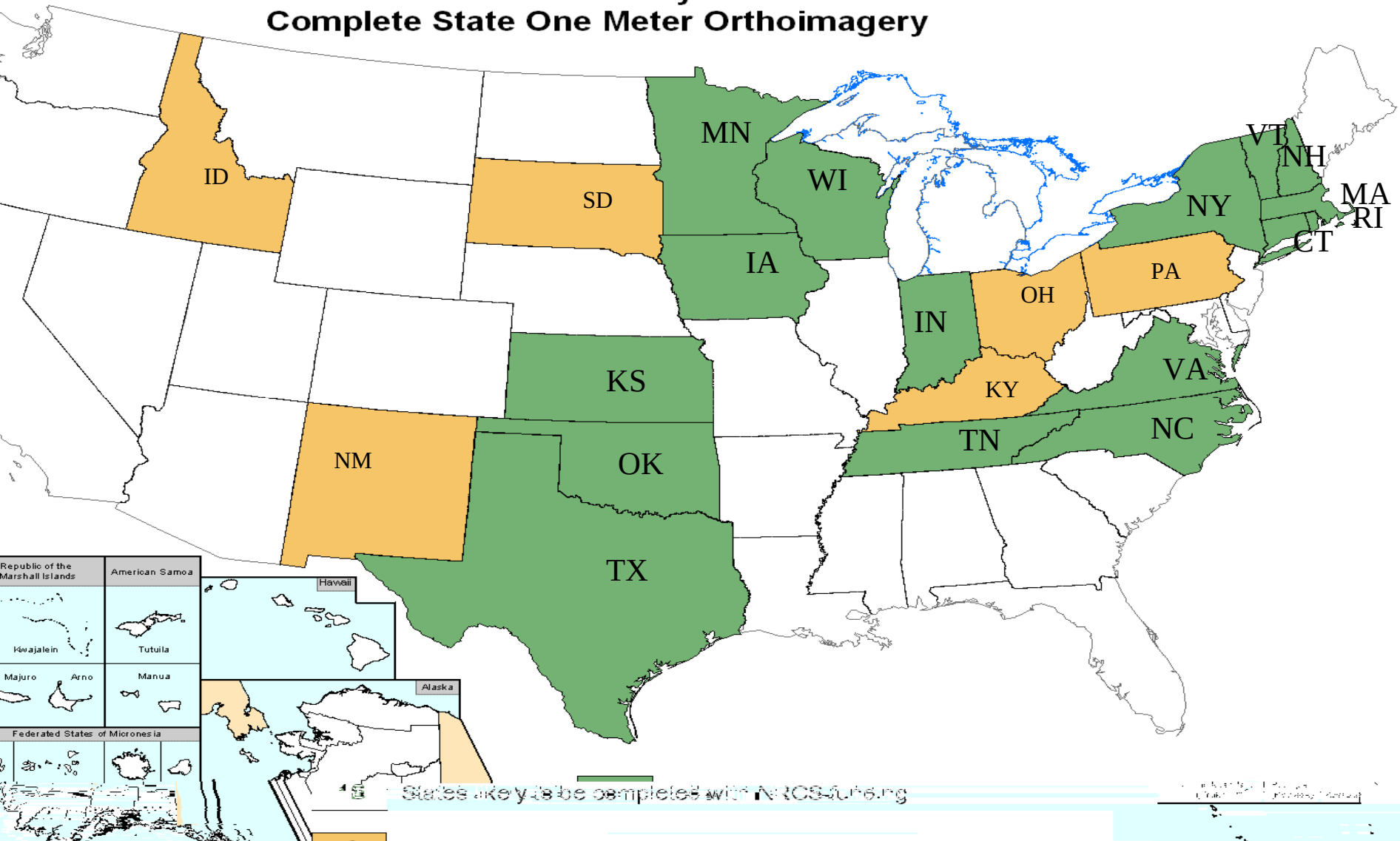
NAIP 2008 will include complete statewide acquisitions in Four Band (Natural Color and Color Infrared) for the following states.

1) Virginia
2) Connecticut
3) Texas
4) Indiana
5) Kansas
6) Minnesota
7) Rhode Island
8) Tennessee
9) Vermont

T OF AGRICULTURE

NATURAL RESOURCES CONSERVATION SERV

NAIP 2008 Priority States
Complete State One Meter Orthoimagery



NAIP 2008 Orthoimagery

State	Bands 3 or 4	Accuracy Control	DOQQ
CT	4	No	412
IN	4	Yes	2,692
ID	3	No	4,238
KS	4	No	5,902
MA	3	No	740
MN	4	Yes	6,762
NH	3	Yes	769
NY	3	No	3,879
NC	3	Yes	3,577
OK	3	No	4,815
RI	4	No	115
TN	4	No	3,001
TX	4	Yes	15,310
VT	4	Yes	813
VA	4	Yes	3,032
WI	3	No	4,503
	DOQQ Total		60,560

2008 NAIP Orthoimagery Notes

ID, OH, PA, KY, SD, NM are potential NAIP 2008 States with partnership funding and acquisition costs

-States = 16 Minimum with Full Statewide Coverage

- DOQQ 4 Band = 32,955

- DOQQ 3 Band = 27,605

- Accuracy Control = 7 States

NAIP 2008 Partnership Funding

Farm Service Agency
USDA – Forest Service
USDA – Natural Resources Conservation Service
USGS
State Governments

$ 16,700,000 **Value for NAIP 2008 with NRCS Contribution**

NAIP 2008 Summary

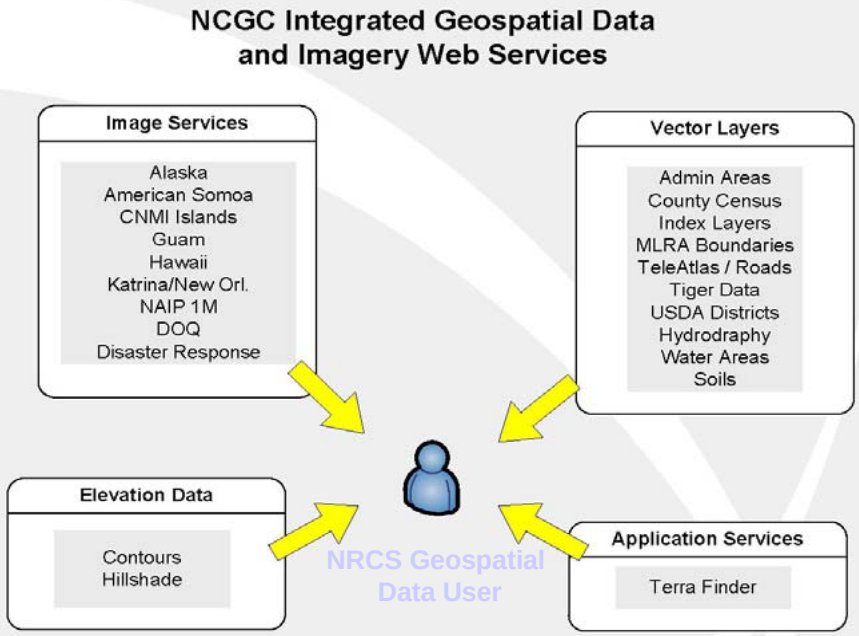
- NRCS LEVERAGING For NAIP 2008 INVESTMENT (16 states)
- SIGNIFICANT RETURN ON INVESTMENT ($16,700,000)
- NAIP ORTHOIMAGERY REFRESH CYCLE IS 3 YEARS (OPTIMUM) TO 5 YEARS
- CONSISTENT WITH SERVICE CENTER AGENCIES GIS STRATEGIC PLAN
- CONSISTENT WITH NRCS GEOSPATIAL STRATEGIC INVESTMENT

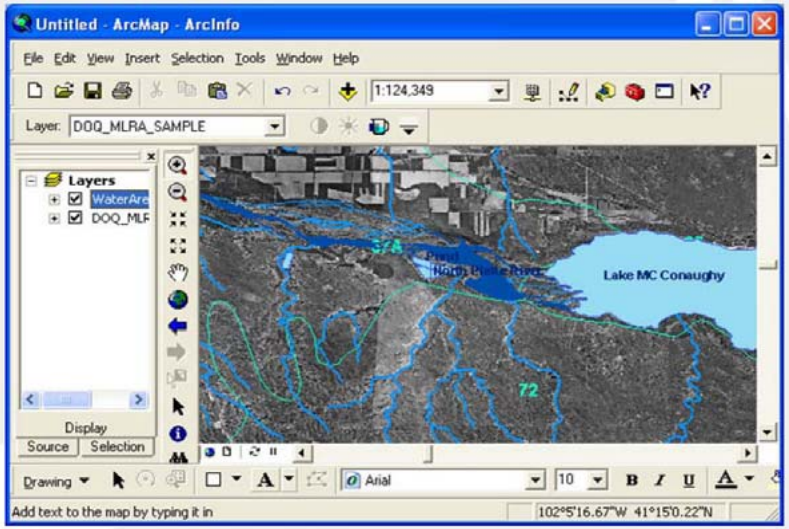
NCGC Geospatial WMS Soil Survey Support

NCGC Geospatial WMS

- Visualization & thin client analysis
- Authoritative datasets
- Centralized data
- Less data management
- For all NRCS program use
- MLRA SS business & project plan development

Geospatial Data Delivery



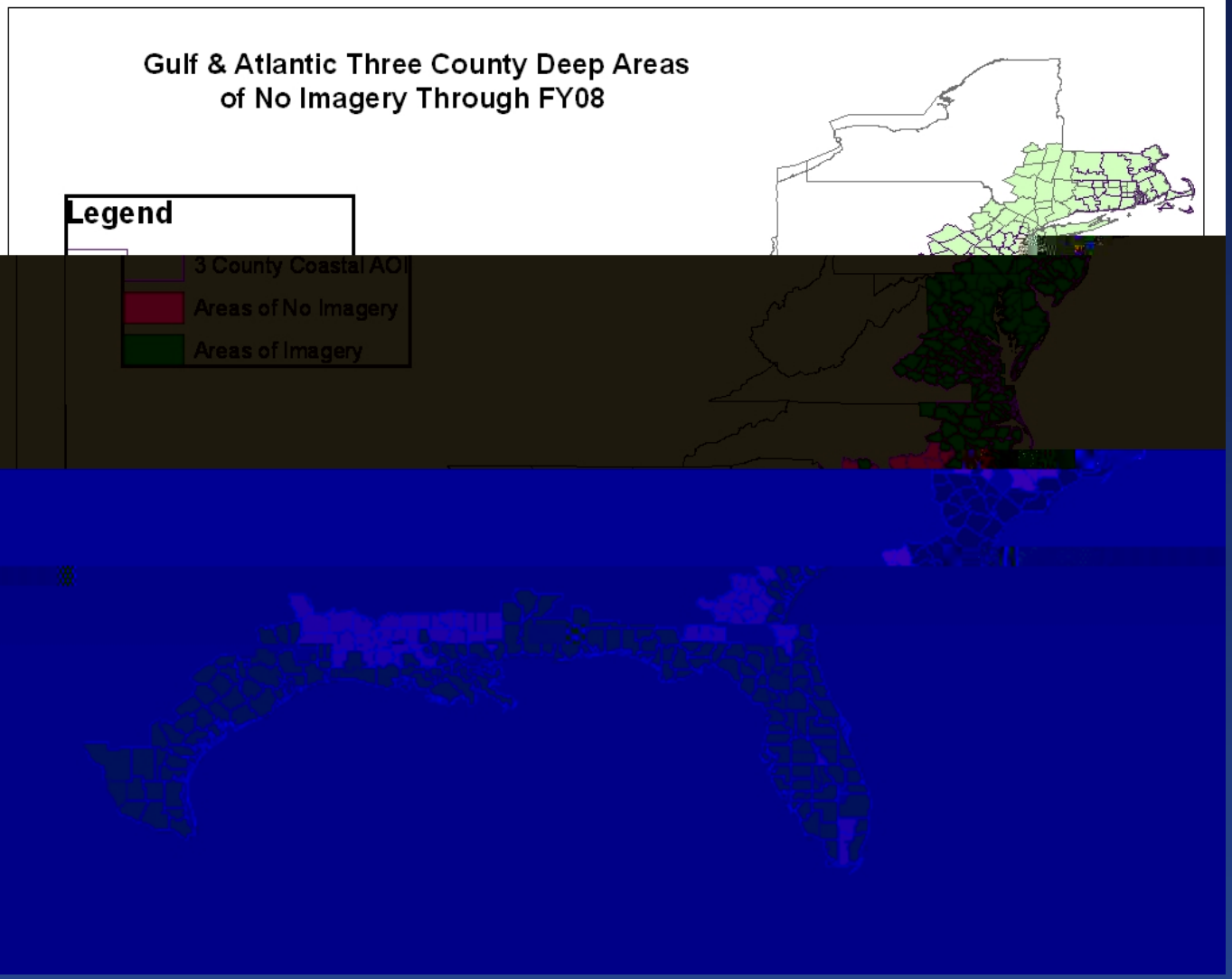


Web Map Services (WMS) can provide many Geospatial Data Layers (Raster and Vector) to NRCS Geospatial Data users for their **Business Applications** needs.

The NCGC is developing many WMS for use by NRCS Program and Scientific Functions such as…

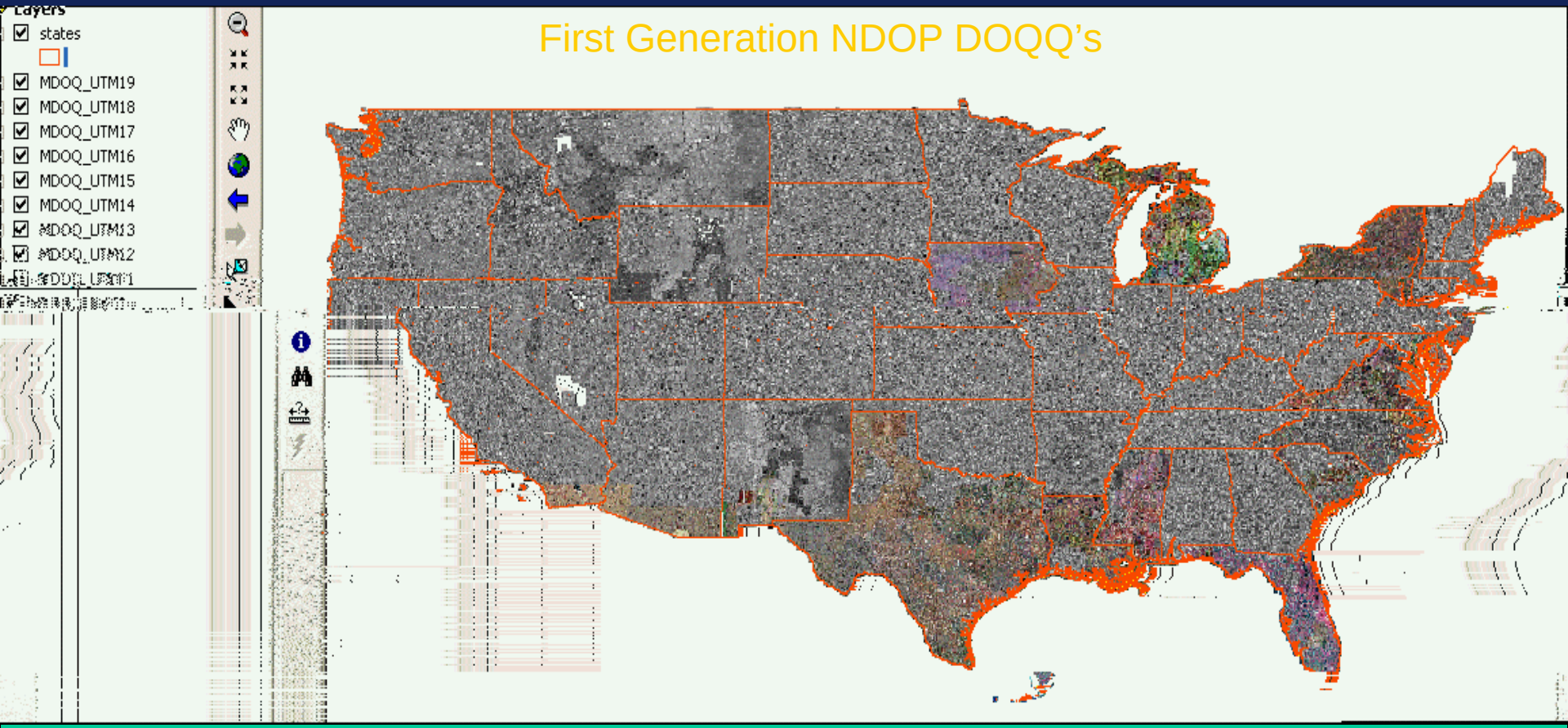
1) **Conservation Planning**
2) **Soil Survey**
3) **Natural Resource Inventory and Assessment**
4) **Engineering Application**
5) **Disaster Response**

Disaster Response Update



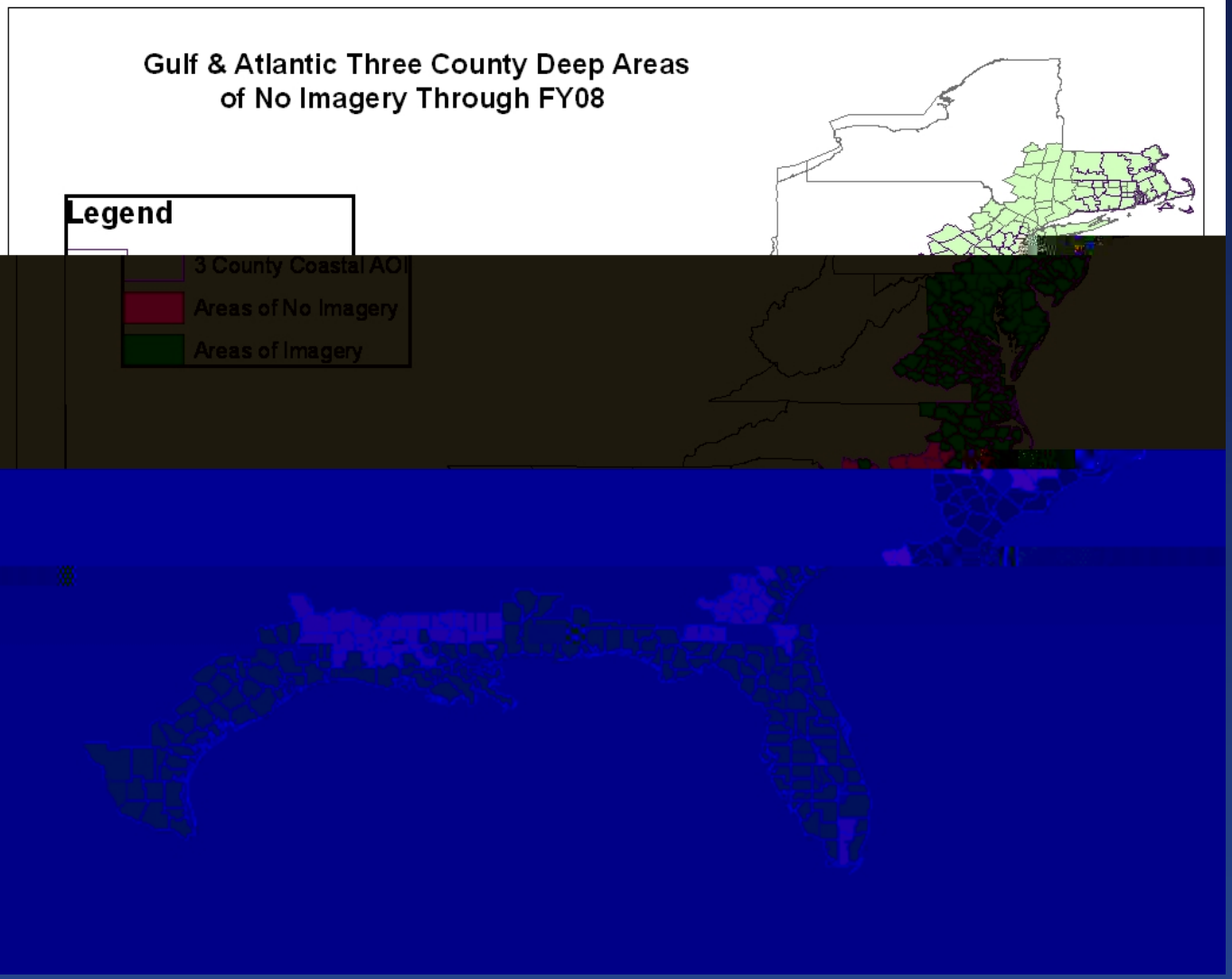
Geospatial Data Delivery

NCGC Developed Geospatial Web Map Service Examples



NCGC has created a Geospatial Web Map Service for all first generation DOQQ's

Disaster Response Update



ion Tools Window Help

1:24,910,041

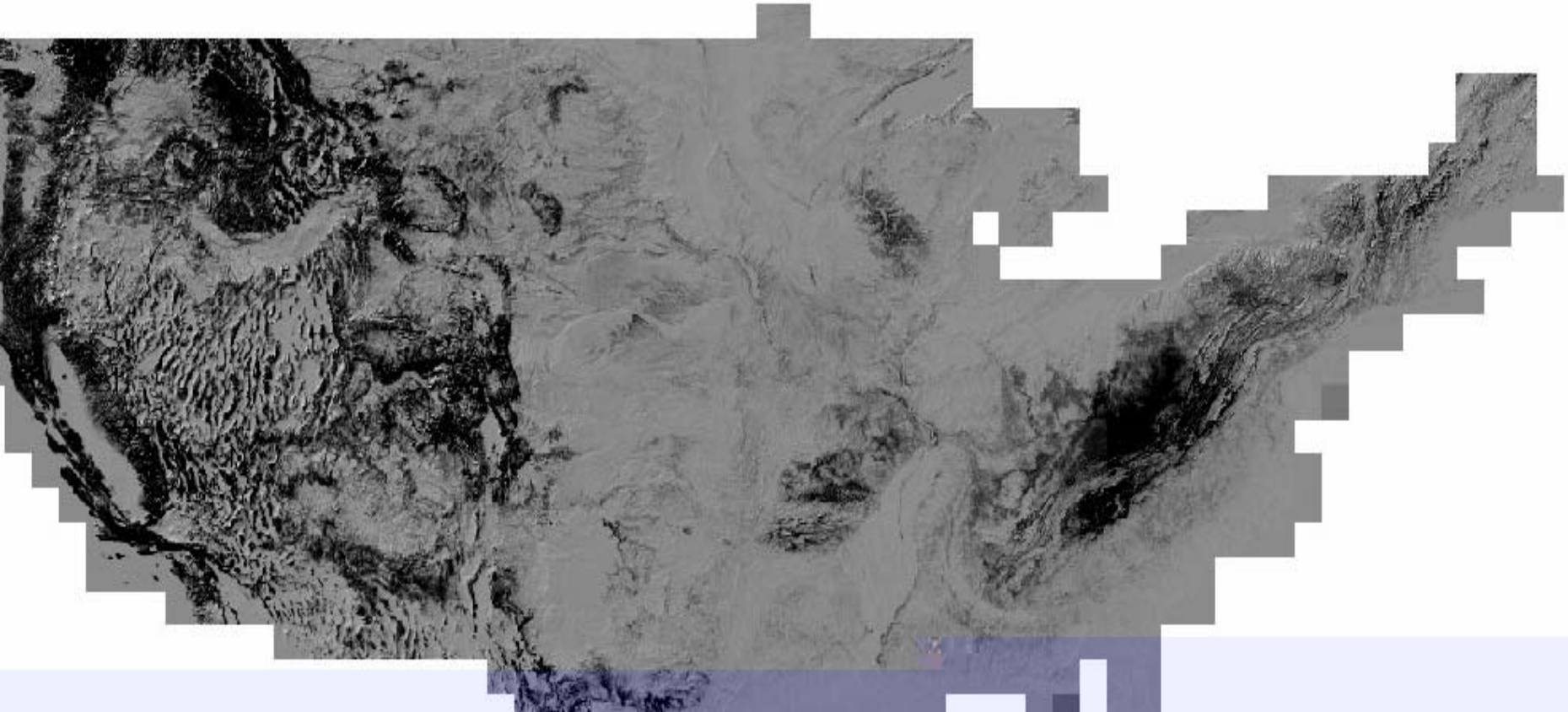
Create New Feature

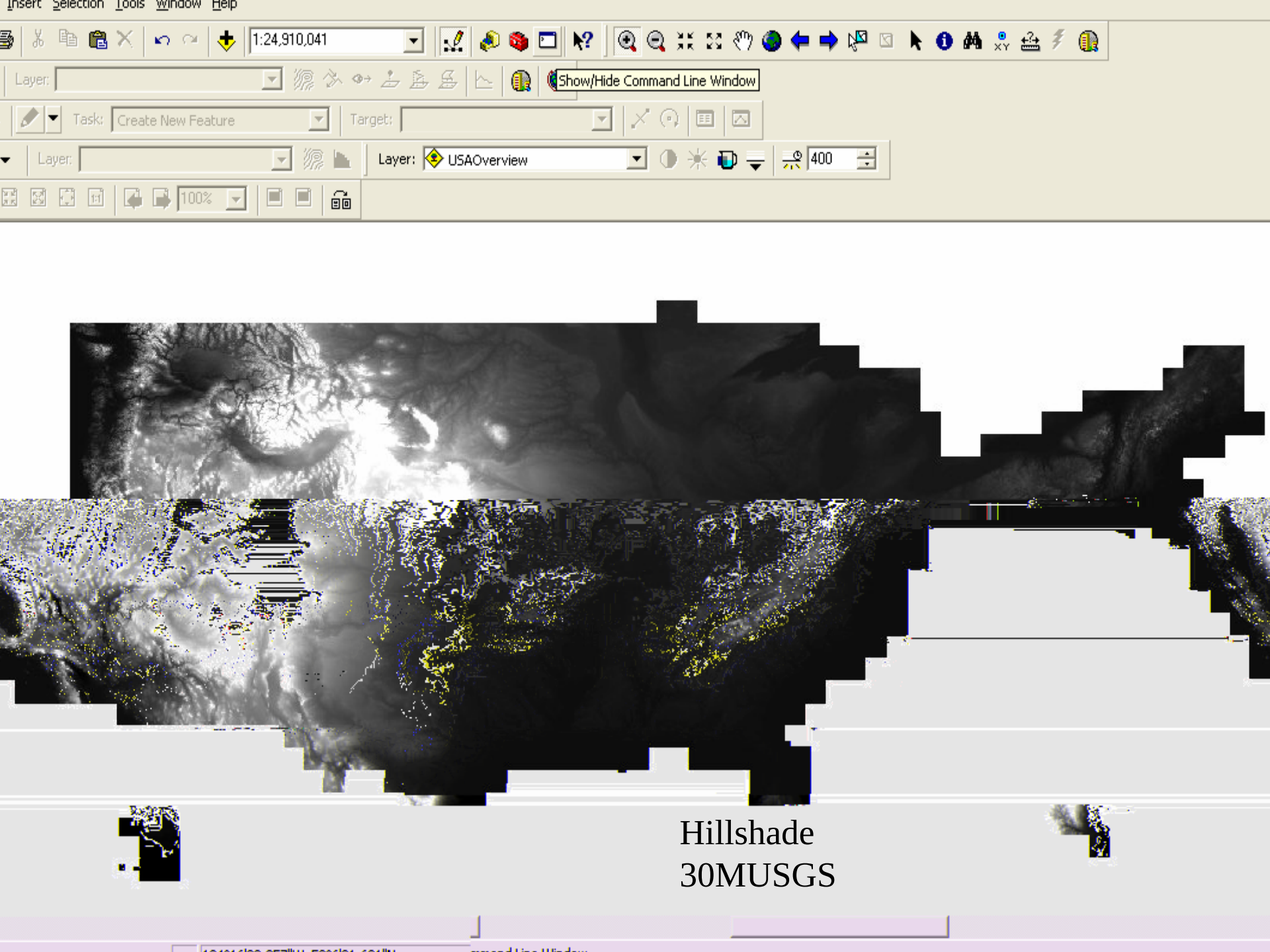
Target:

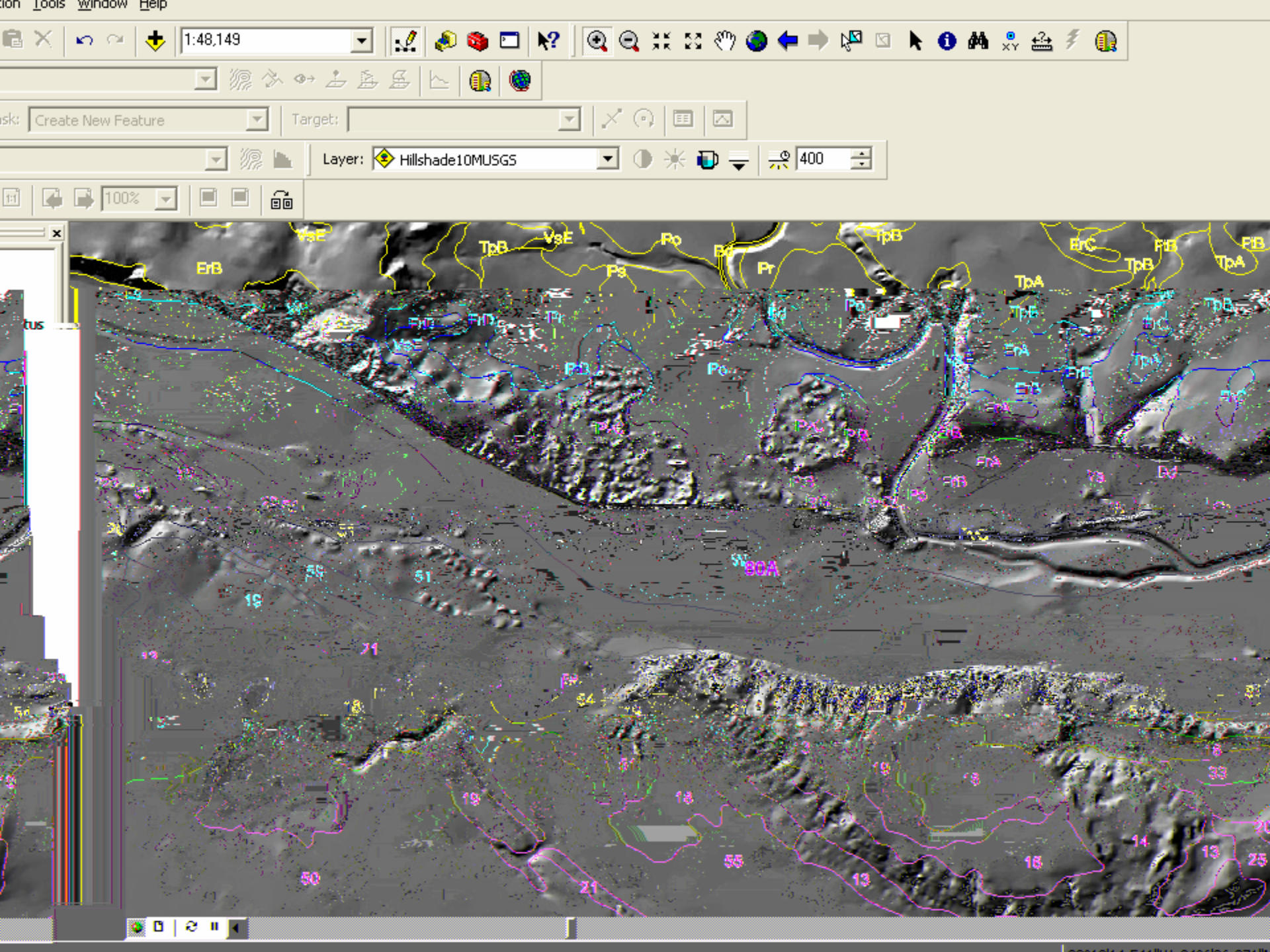
Layer: USAOverview

400

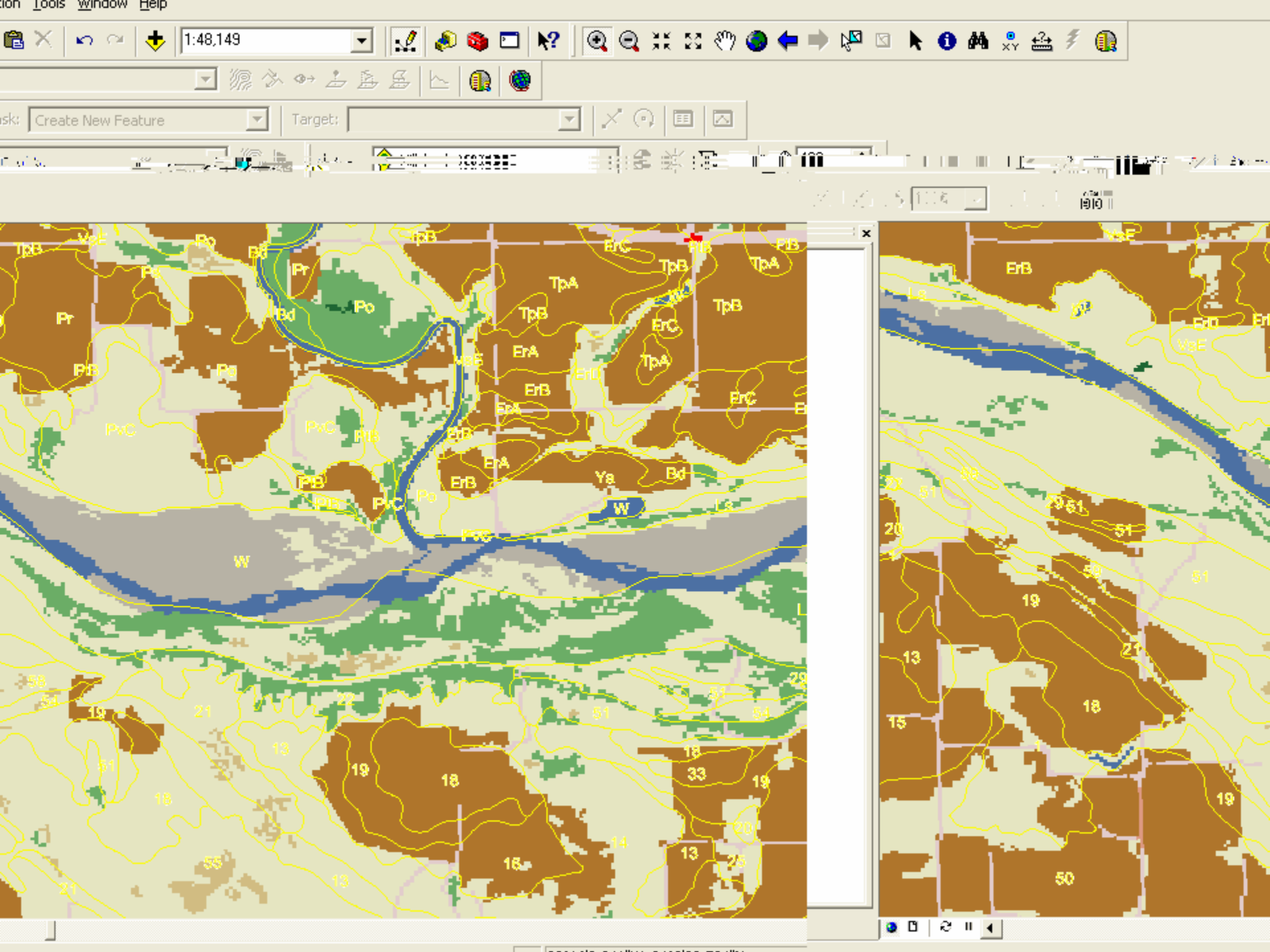
100%




Insert Selection Tools Window Help
1:24,910,041
Show/Hide Command Line Window
Layer:
Task: Create New Feature
Target:
Layer: USAOverview
400
100%
Hillshade
30MUSGS



Tools Window Help
1:48,149
Create New Feature
Target:
Layer: Hillshade10MUSGS
400
100%
ErB
VsE
TpB
Po
Ps
Pr
TpA
ErC
FtB



Tools Window Help
1:48,149
Create New Feature
Target:
TpB
VsE
Po
Bd
Pr
TpA
ErC
ErA
ErB
PtB
PvC
Ya
W
Ls
ErD
19
18
16
13
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33
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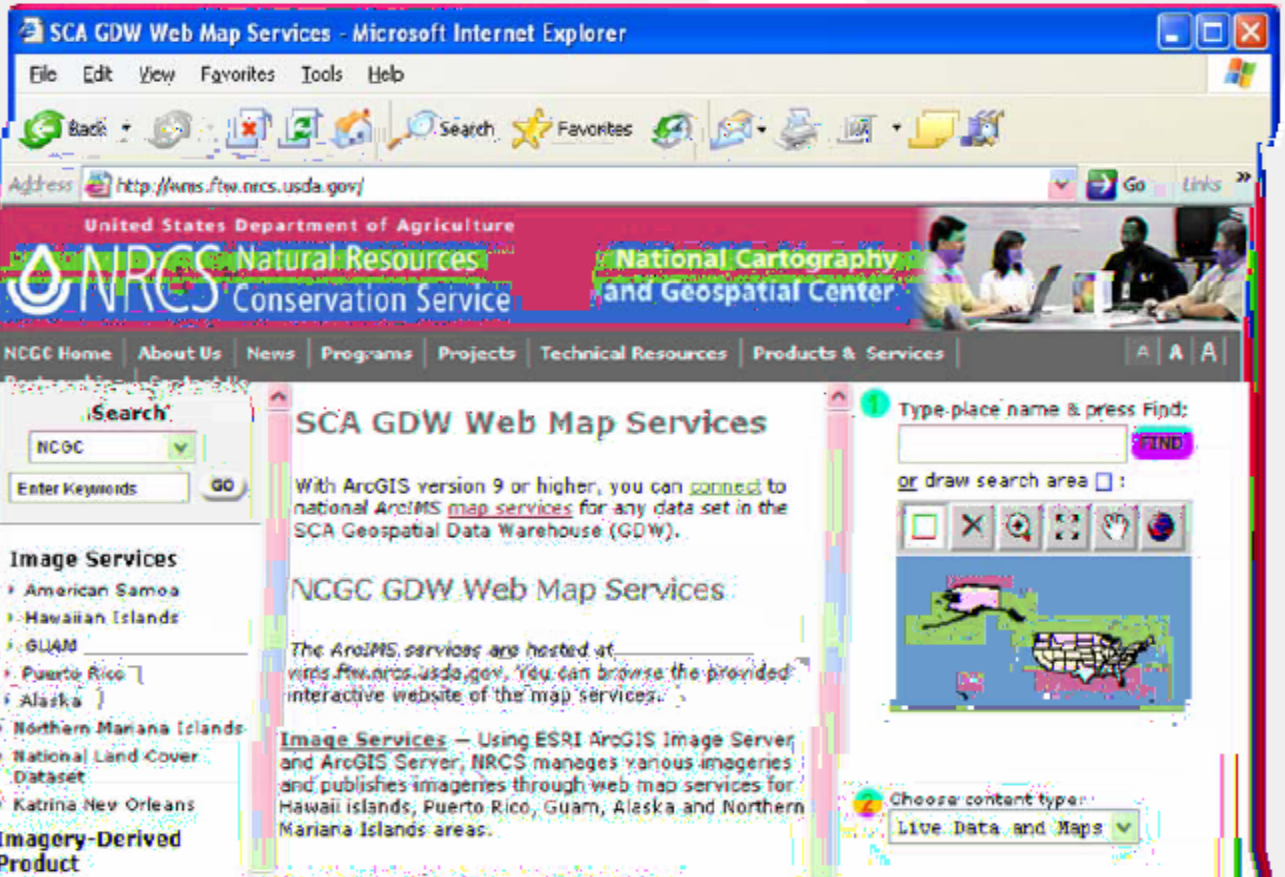
51
59
20
15

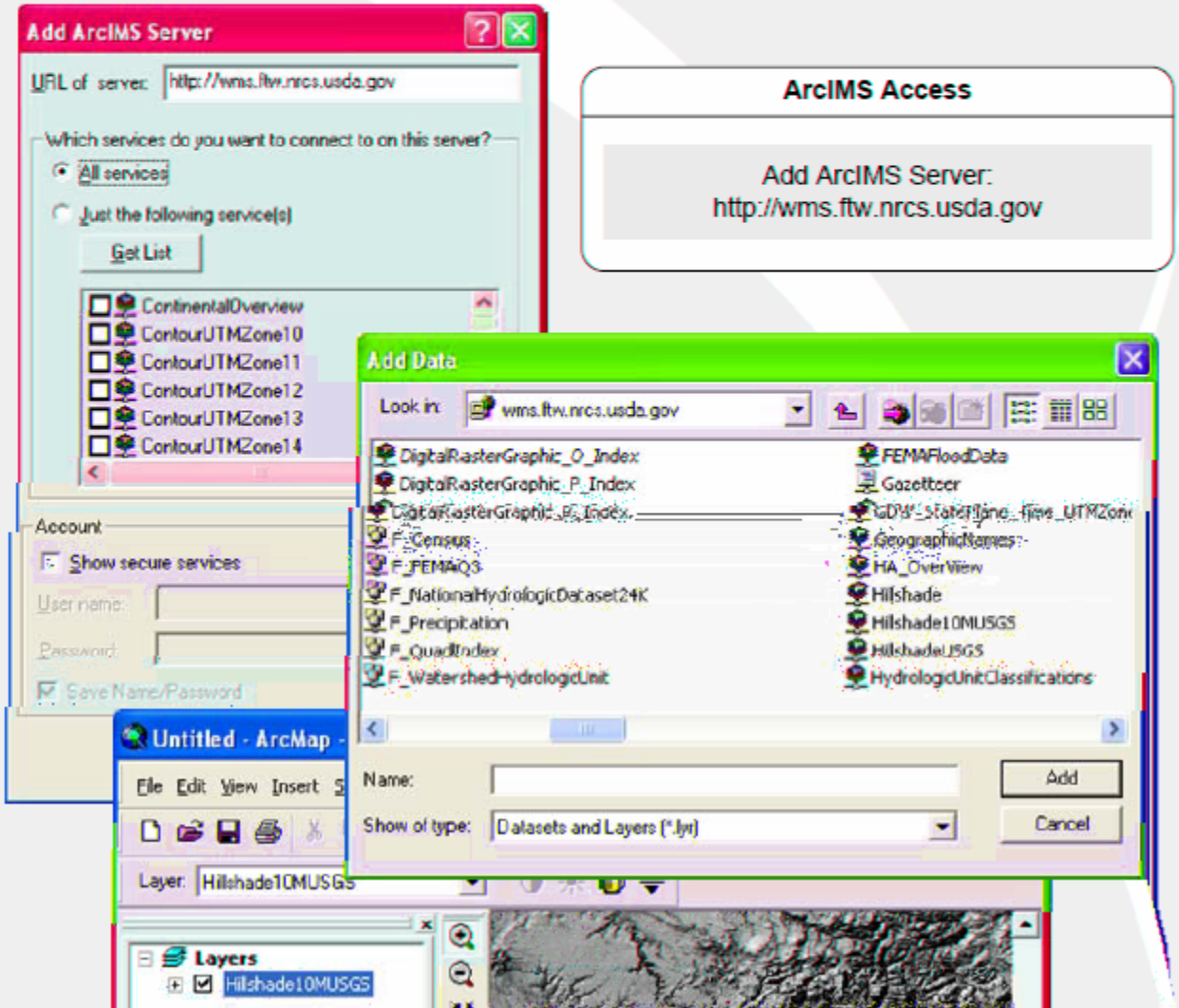
Accessing NCGC Geospatial Integrated Data Service Portal

Web Browser Access

Web Portal / Browser Access:
http://wms.ftw.nrcs.usda.gov



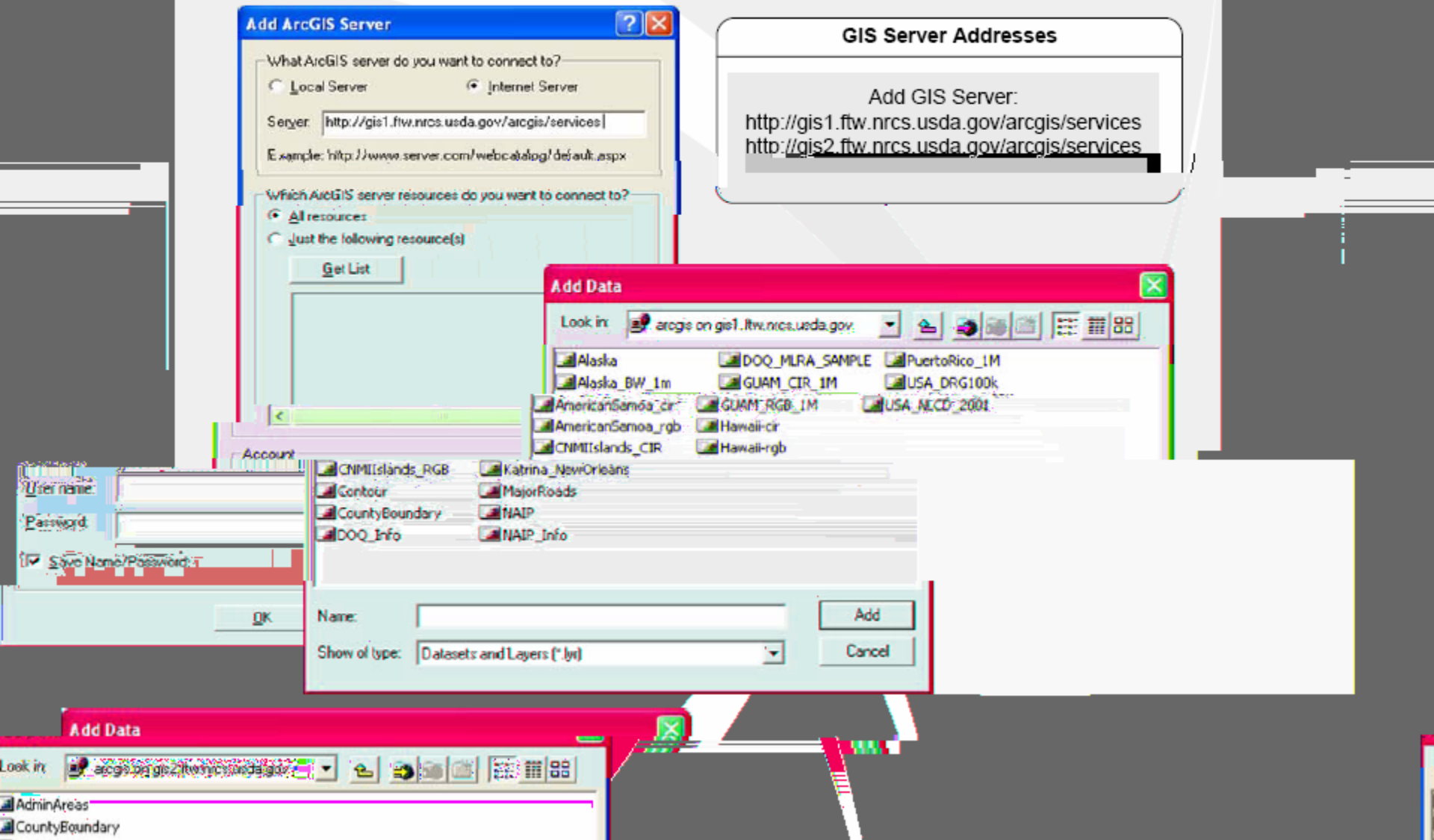
Accessing NCGC Integrated ArcIMS Data and Web Services



ArcIMS Access

Add ArcIMS Server:
http://wms.ftw.nrcs.usda.gov

Accessing Integrated NCGC GIS Server Data and Web Services



NCGC Soil Survey Support Summary

- Geospatial Data
- Geospatial Technology
- Geospatial Services

Thank You

National Cartography & Geospatial Center

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817-509-3401

NCGC Home Page - http://www.ncgc.nrcs.usda.gov