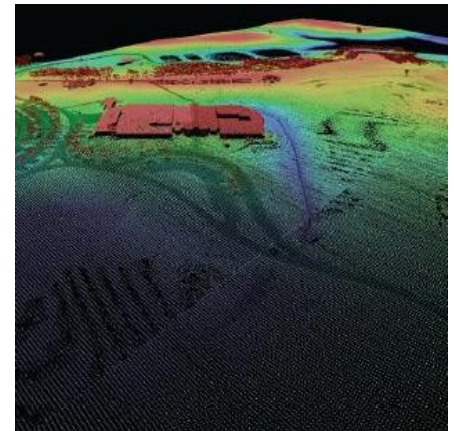
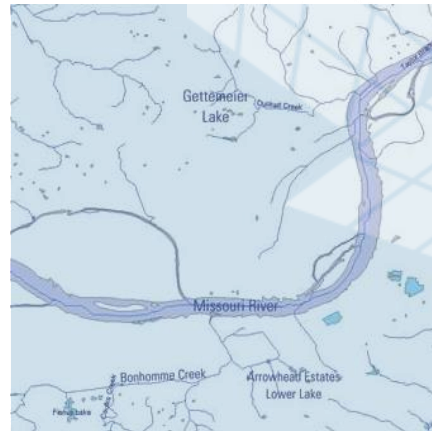
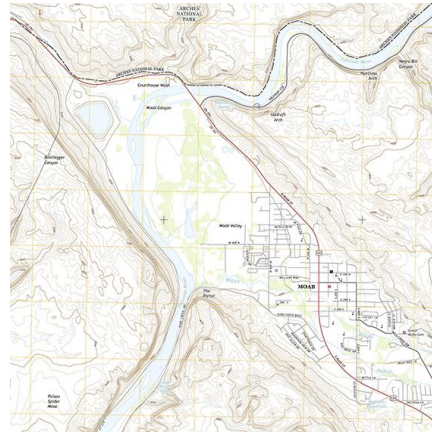




Natural Resources Management Underpinned by Geospatial Information

United States



Mike Tischler, Ph.D
Director, National Geospatial Program
U.S. Geological Survey
Email: mtischler@usgs.gov

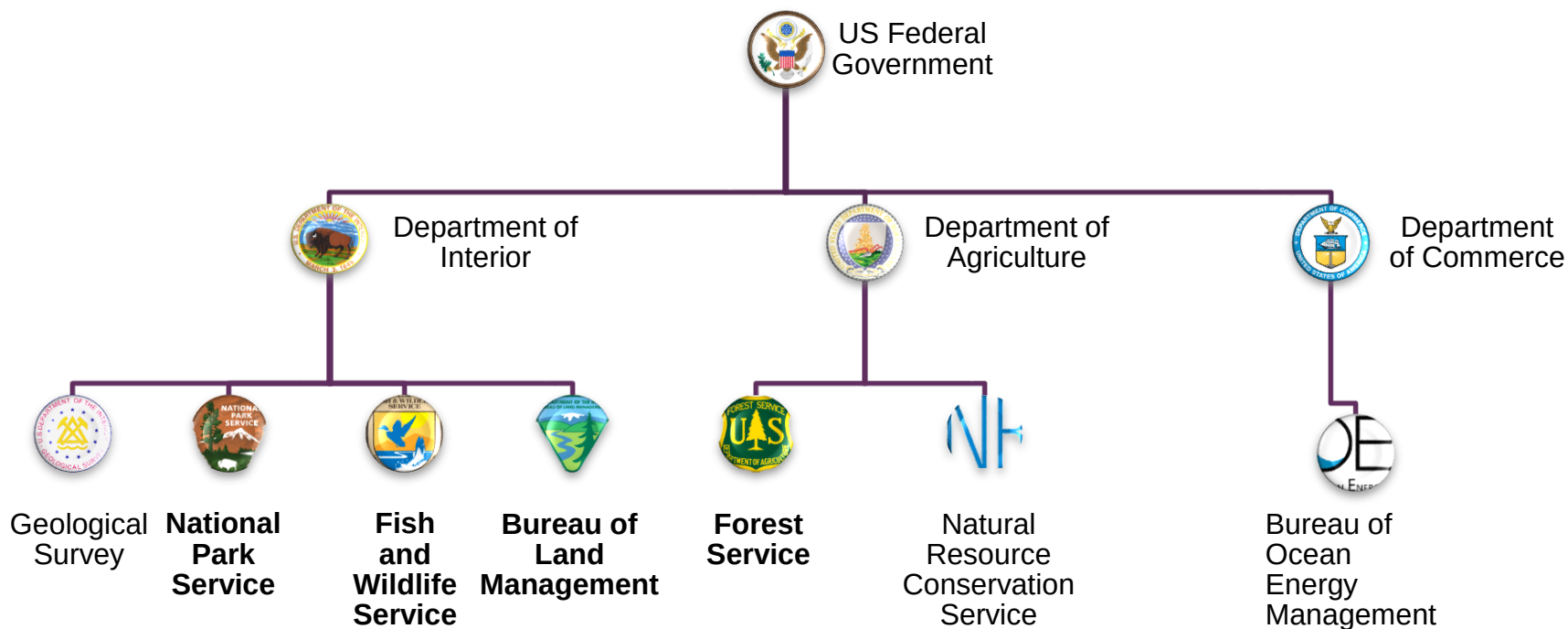
UN-World Geospatial Information Congress
November 2018

+

Natural Resource Management in the U.S.

2

Multi-agency approach



+ U.S. Geological Survey



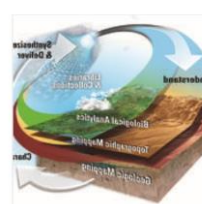
3

Mission

- Provides reliable scientific information to describe and understand the Earth to
 - Minimize loss of life and property from natural disasters
 - Manage water, biological, energy, and mineral resources
 - Enhance and protect our quality of life

Scope

- Collects, monitors, analyzes, and provides science about natural resource conditions, issues, and problems
- Carry out large-scale, multidisciplinary investigations and provide impartial scientific information



+ U.S. Geological Survey

3D Elevation Program (3DEP)

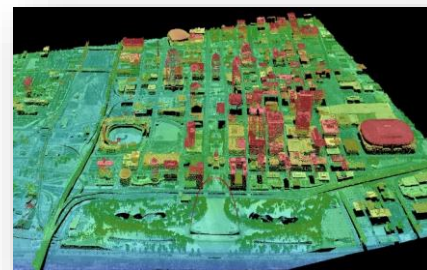
Documented Business Uses

Rank	Business Use	Annual Benefits	
		Conservative	Potential
1	Flood Risk Management	\$295M	\$502M
2	Infrastructure and Construction Management	\$206M	\$942M
3	Natural Resources Conservation	\$159M	\$335M
4	Agriculture and Precision Farming	\$122M	\$2,011M
5	Water Supply and Quality	\$85M	\$156M
6	Wildfire Management, Planning and Response	\$76M	\$159M
7	Geologic Resource Assessment and Hazard Mitigation	\$52M	\$1,067M
8	Forest Resources Management	\$44M	\$62M
9	River and Stream Resource Management	\$38M	\$87M
10	Aviation Navigation and Safety	\$35M	\$56M
:			
20	Land Navigation and Safety	\$0.2M	\$7,125M
Total for all Business Uses (1 – 27)		\$1.2B	\$13B

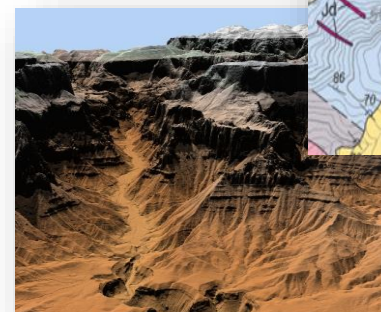


4

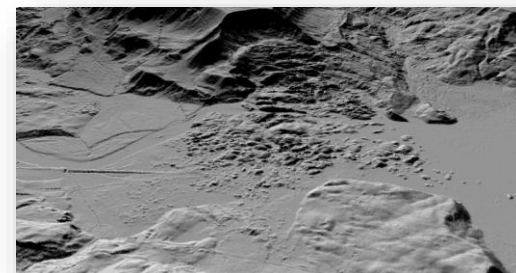
Flood Risk Management



Infrastructure



Critical Minerals



Landslides

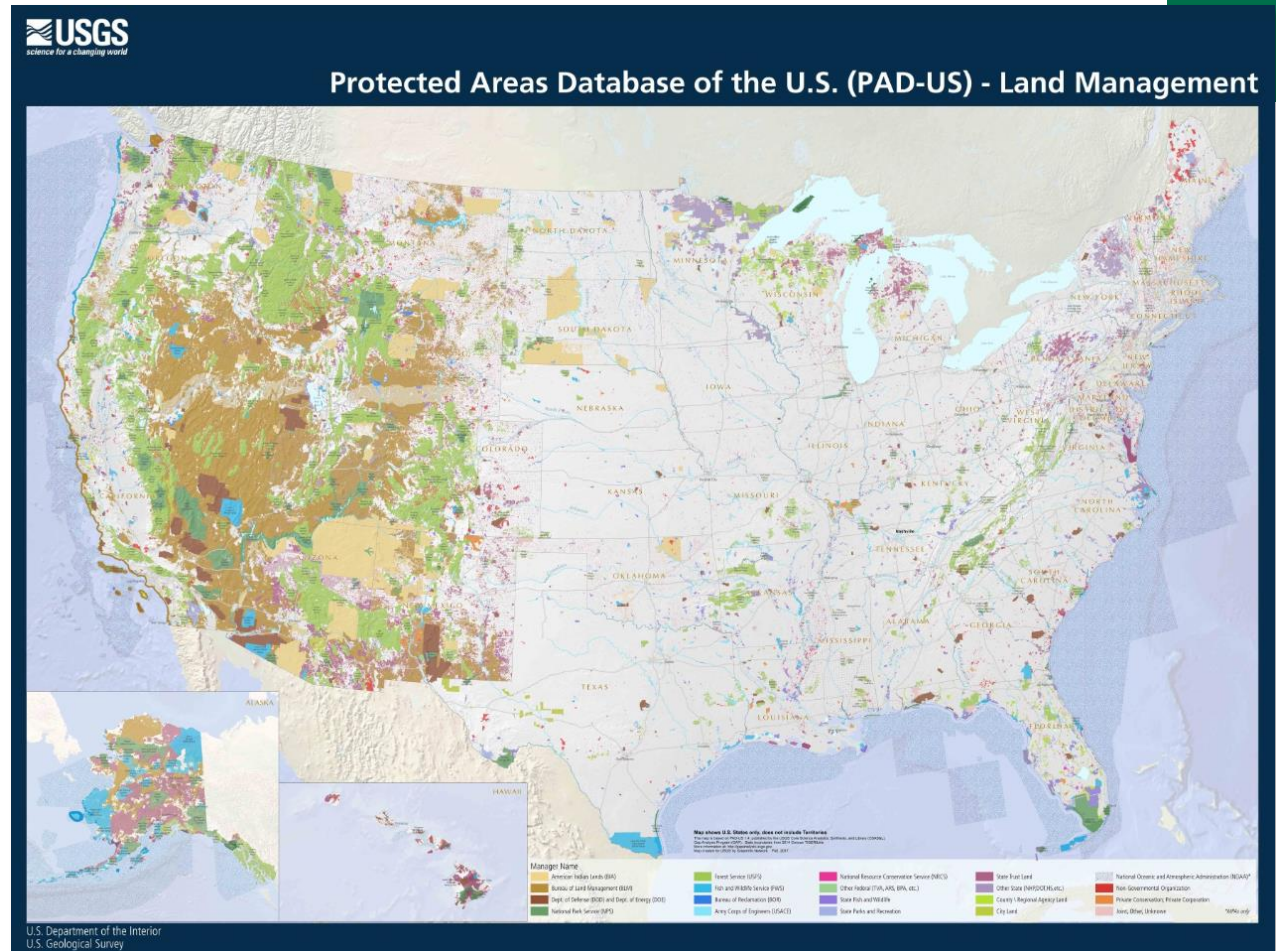
+ U.S. Geological Survey

Protected Areas Database of the United States (PAD-US)

Official inventory of public parks and other protected areas in all U.S. states and territories



5



The PAD-US Map Viewer displays a variety of map layers from Manager Name to Public Access

+ U.S. Geological Survey



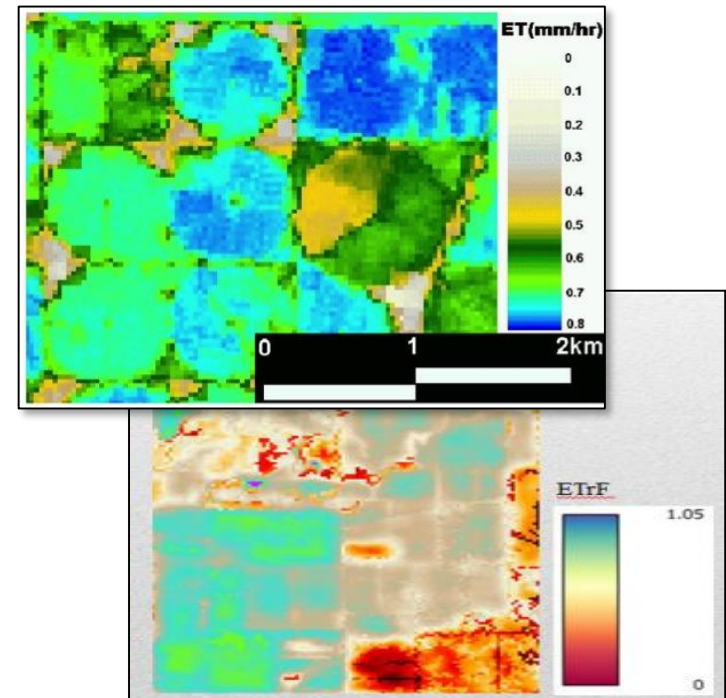
6

LANDSAT: Field-scale monitoring of water management in near-real time

In the western United States, government agencies and private parties use Landsat data to monitor water demand and consumption in near-real time to allow for more efficient use of limited water resources and adjudicate water rights:

“Evapotranspiration Maps derived from Landsat thermal imagery are used operationally by water managers to monitor and manage agricultural and urban water use, administer water rights, evaluate market transfers, negotiate and monitor interstate compacts, estimate water use by invasive species, and assess and monitor water and food security and sustainability. Landsat is the only operational satellite that combines thermal data with short-wave data at the spatial resolution needed to administer water use and water rights, which is often at the level of the individual agricultural field.”

-- Western States Water Council



Upper: Evapotranspiration from fields irrigated via center-pivot irrigation systems (Oakley Fan, Idaho, United States)

Lower: Evapotranspiration in vineyards (Lodi, California, United States)

+ National Park Service



7

Mission

- “...To conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”
(*NPS Organic Act, 1916*)

Scope

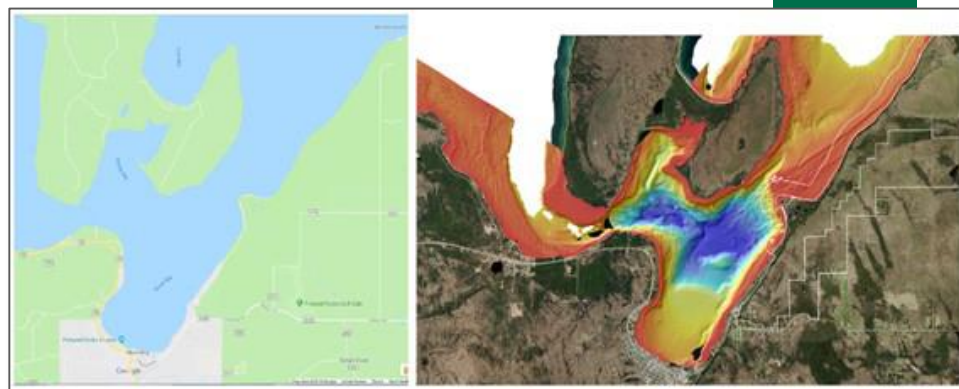
- Covers more than 85 million acres with 418 sites with at least 19 designations including 129 historical parks or sites, 88 national monuments, 60 national parks, 25 battlefields or military parks, 19 preserves, 18 recreation areas, 10 seashores, four parkways, four lakeshores, and two reserves





Adding Depth to Lakes

Most maps show the water as flat and blue, but there is much more below the surface. Collecting multi-beam sonar data along with lidar data helped map the lake bottom of all five national parks and lakeshores on Lakes Michigan and Superior.



Basic Google Map (left) and NPS/USACE Bathymetry Map (right) of Munising Bay, Pictured Rocks National Lakeshore, Michigan



U.S. Army Corps
of Engineers®

Results

- **Fisheries Management**
providing critical information about lake trout populations
- **Coastal Restoration**
revealing lake bottom features to plan future restoration projects such as Park headquarters
- **Mussels, Algae, and Botulism**
mapping dead zones to help avoid waterfowl deaths
- **Cultural Resources**
identifying unique stories such as ships running aground and dumping iron ore to free it

+ National Park Service

National Trails System

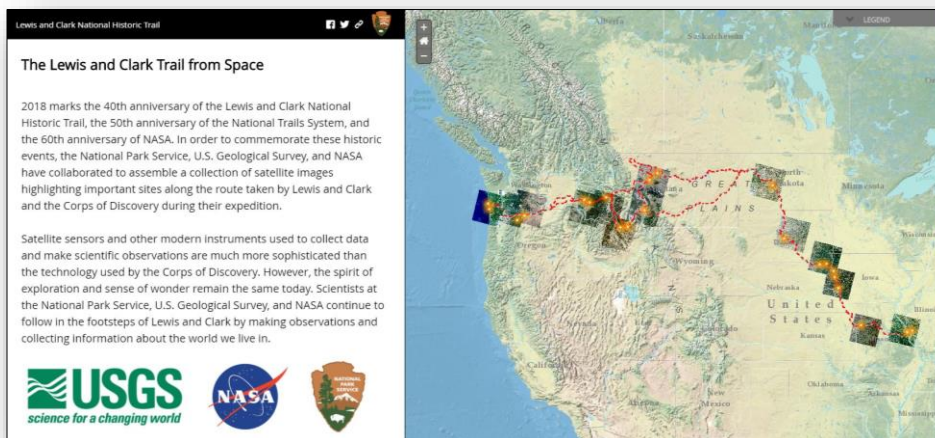
Using GIS through online interactive maps, story maps, and cartographic maps communicate the value of the national scenic, historic, and recreational trails that provide economic, historical, and environmental benefits for communities and natural resources across the country.



9



Garfield Peak Trail,
Crater Lake
National Park



The National Map
Your Source for Topographic Information

NPS, USGS, and NASA have assembled a collection of satellite images and topographic maps to highlight important sites along the Lewis and Clark National Historic Trail drawing parallels between scientific observations made then and information collected about Earth's resources and utilized now by NASA, USGS, and NPS scientists.

+ Fish and Wildlife Service



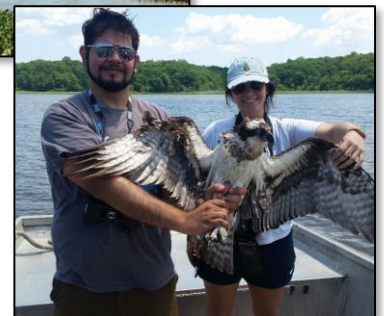
10

Mission

- Work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people

Scope

- Enforce federal wildlife laws
- Protect endangered species
- Manage migratory birds
- Restore nationally significant fisheries
- Conserve and restore wildlife habitat such as wetlands
- Help foreign governments with their international conservation efforts



+ Fish and Wildlife Service

Geospatial Applications



11

National Wetlands Inventory (NWI)



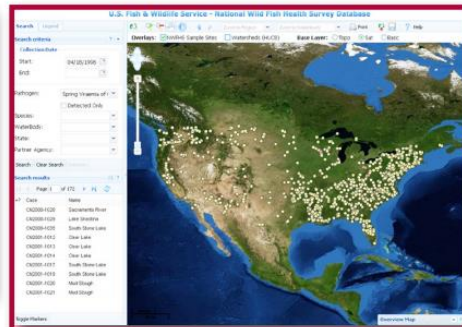
Provides information to the public on the extent and status of the Nation's wetlands

Critical Habitat Portal



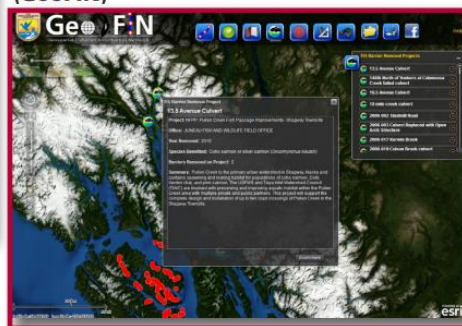
Serves information regarding Threatened and Endangered Species and Critical Habitat designation across the US

National Wild Fish Health Survey Database



Provides national fish health information to Service partners and the public

Geospatial Fisheries Information Network (GeoFIN)



The GeoFIN Mapper is an assemblage of data, showing an inventory of potential barriers to fish passage

Information, Planning and Conservation System (IPaC)



The IPaC system assists people in Planning their activities within the context of natural resource Conservation

Waterfowl Production Area



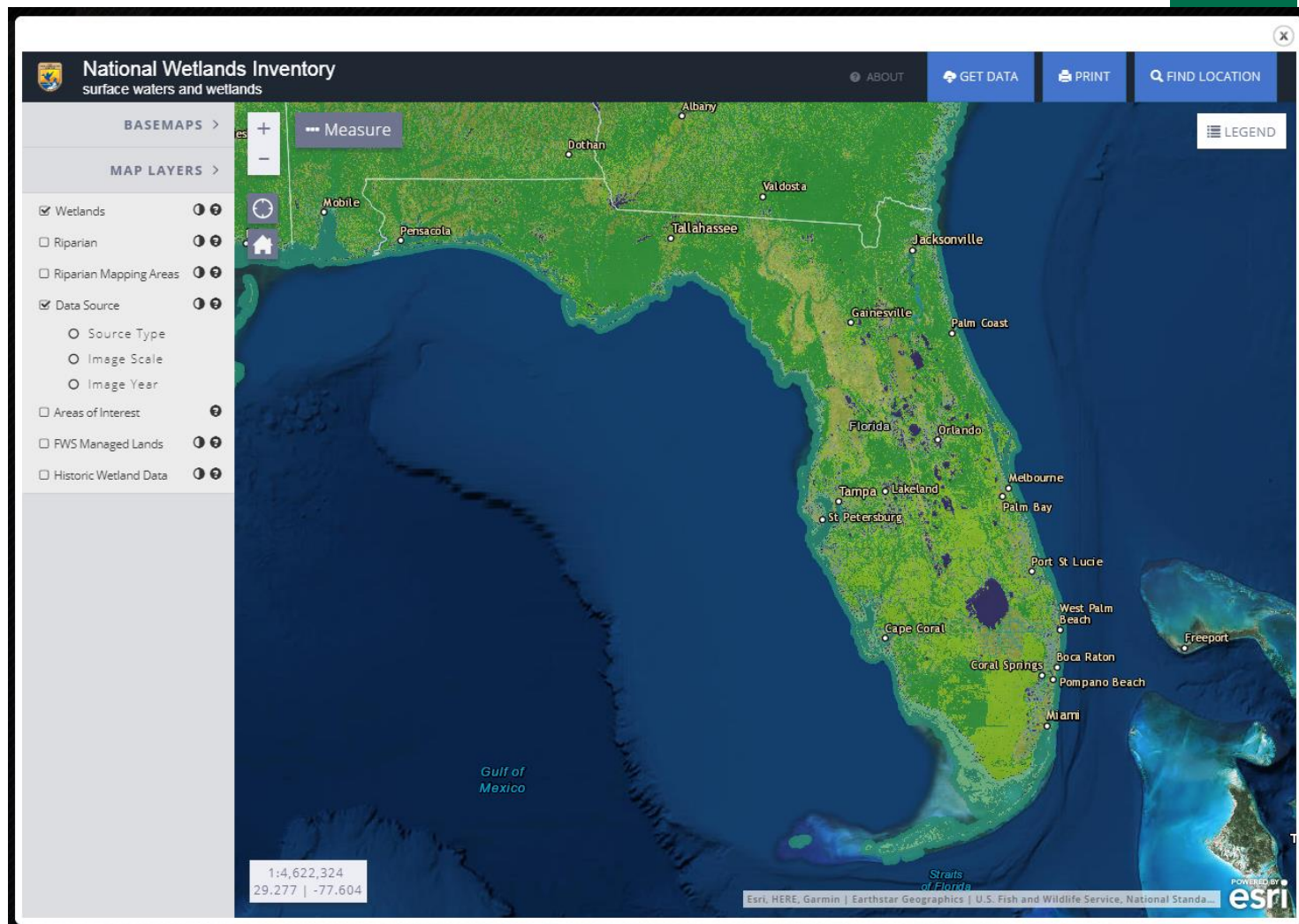
The Waterfowl Production Area Mapper presents a visualization of Waterfowl Production Areas in the Upper Midwest of the United States

+ Fish and Wildlife Service National Wetlands Inventory



12

Provides
information to
the public on
the extent and
status of the
Nation's
wetlands

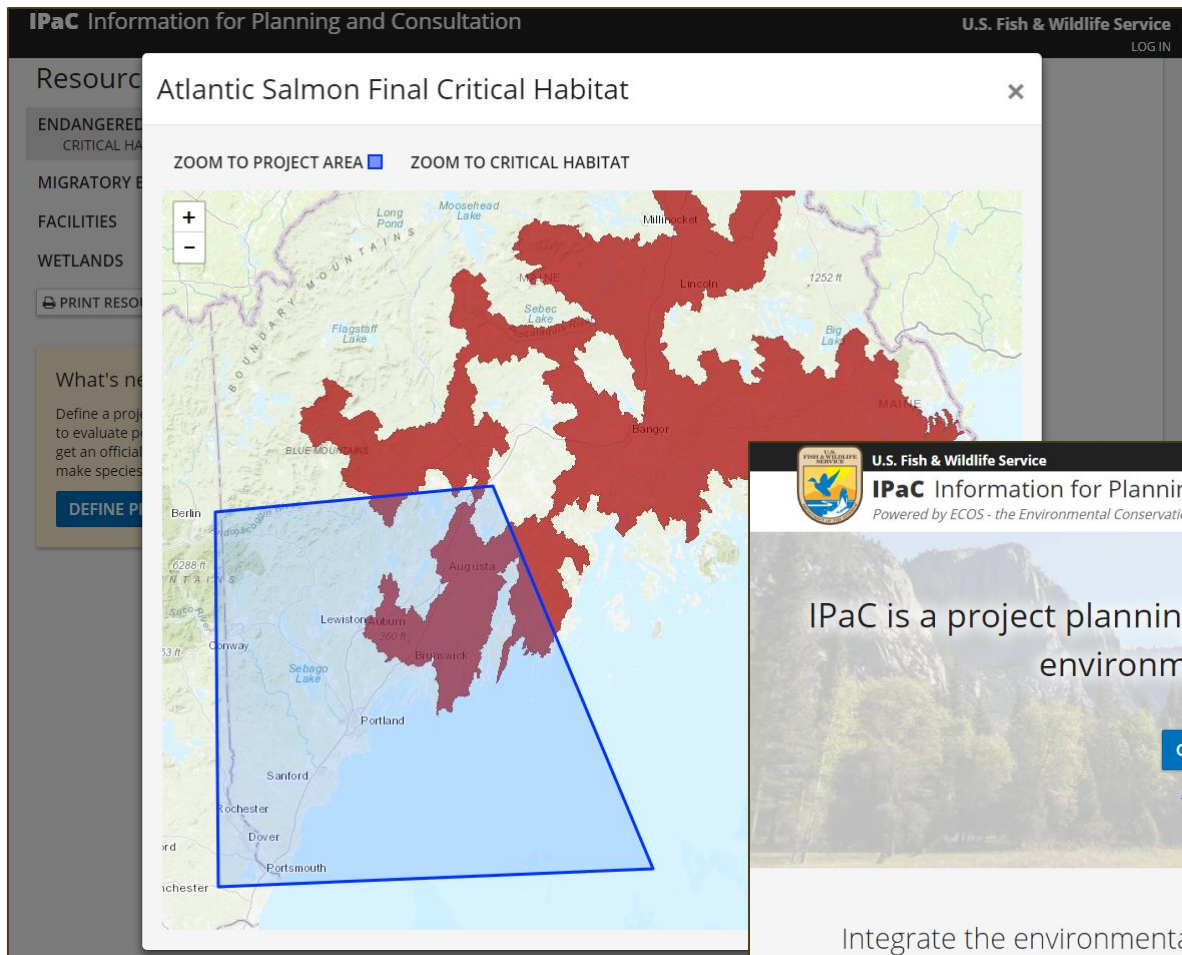


+ Fish and Wildlife Service

Information for Planning and Consultation



13



A tool to assist in determining how activities may impact sensitive natural resources and obtain suggestions for ways to address these impacts

Bureau of Land Management

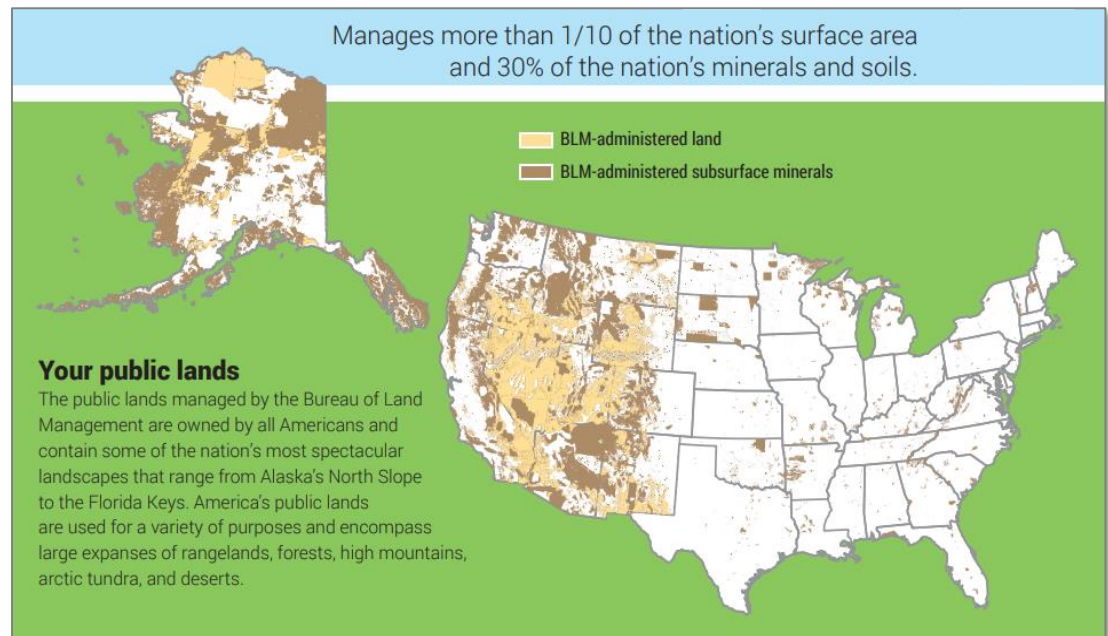


Mission

- To sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations

Mandate from Congress

- Energy development
- Livestock grazing
- Recreation
- Timber harvesting
- Ensuring natural, cultural, and historic resources are maintained



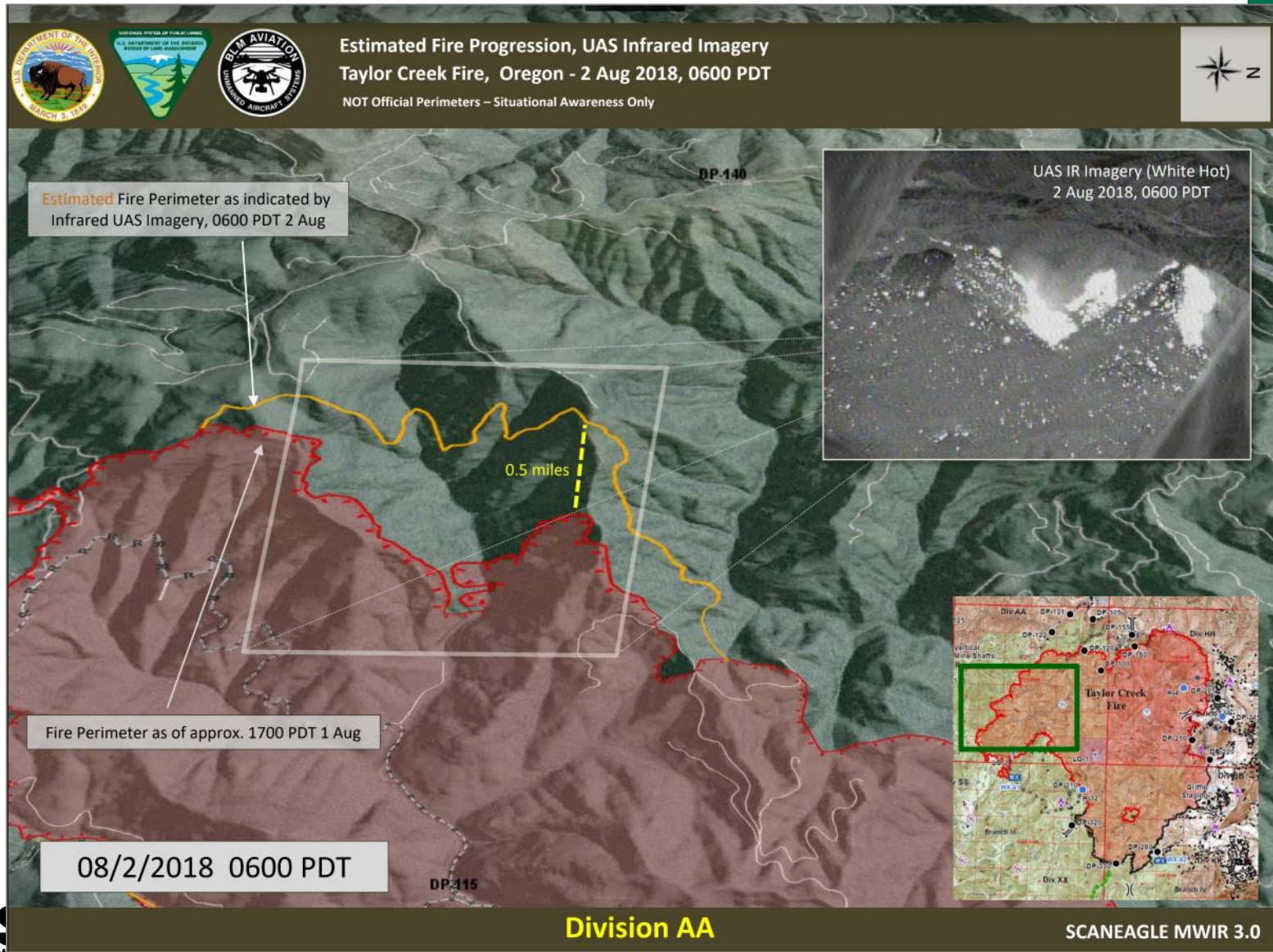
Application for Permit to Drill Example



+ Bureau of Land Management



16

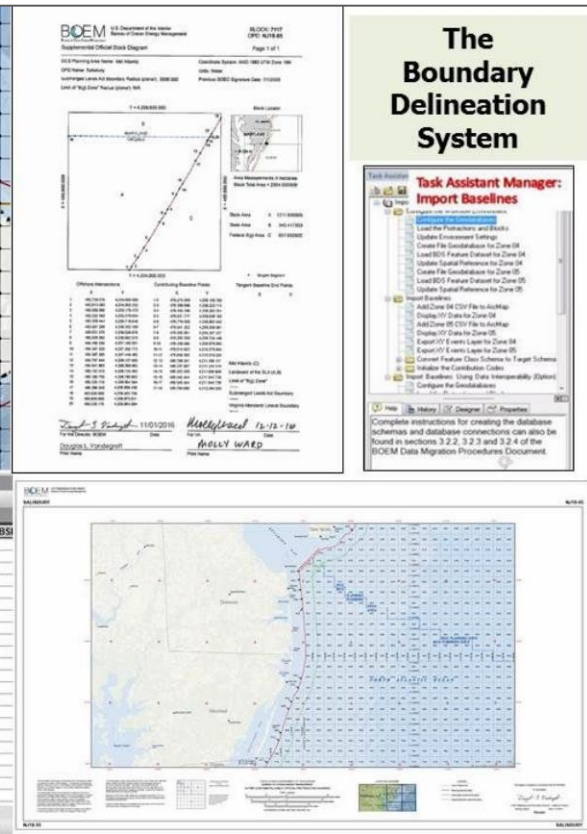
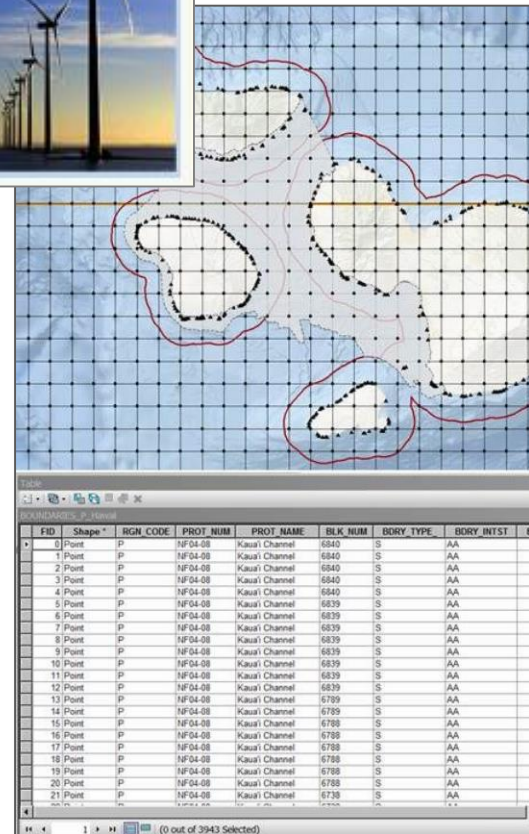


+ Bureau of Ocean Energy Management



MISSION

Responsible for overseeing the safe and environmentally responsible development of energy and mineral resources on the Outer Continental Shelf



Used by the BEOM's Office of Environmental Biology

+ Marine Cadastre

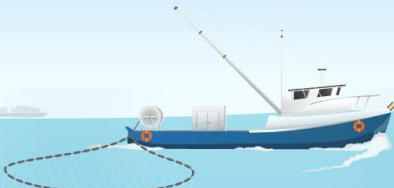
19

MarineCadastre.gov

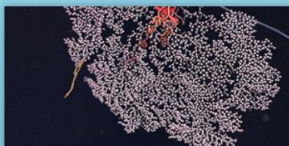
Data Ma

An Ocean of Information

A joint BOEM and NOAA initiative providing authoritative data to meet the needs of the offshore energy and marine planning communities.



Features



Deep Sea Corals



MarineCadastre.gov

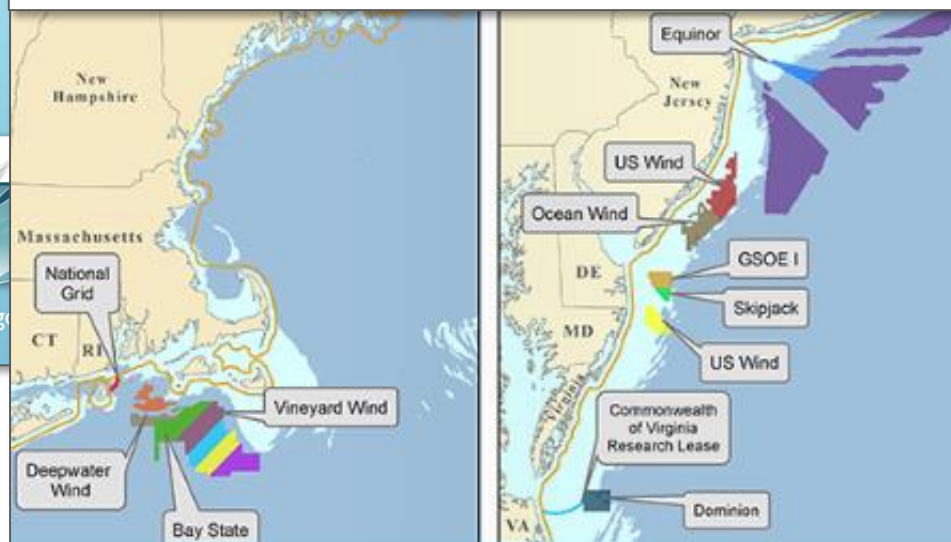
A Collaboration of

BOEM

BUREAU OF OCEAN ENERGY MANAGEMENT



Offshore Wind Development



+ U.S. Forest Service



20

Mission

- Sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations

Scope

- Achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people



Motto: Caring for the Land and Serving People

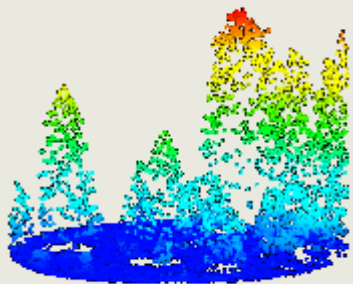
+ U.S. Forest Service



21

Forest Inventory Modeling

Collect Data



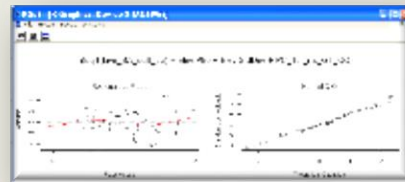
Lidar Plot Metrics



Field Plot Measurements



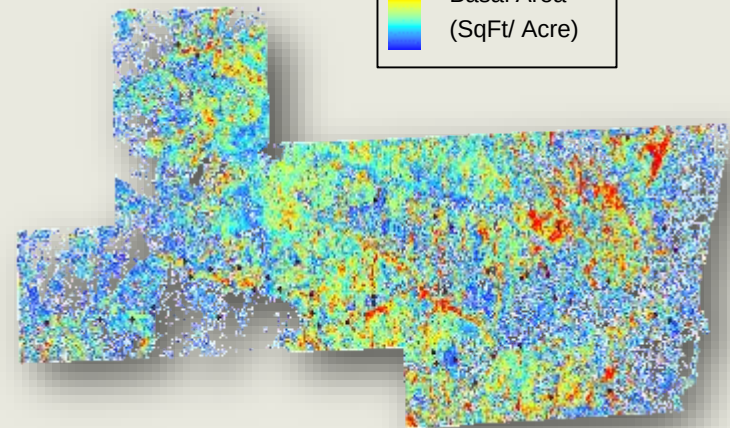
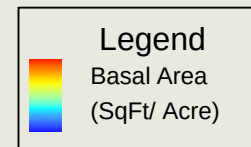
Explore Relationship



Build a statistical relationship between lidar plot metrics and field measurements



Build Forest Inventory Models



Predict forestry inventory parameters across the entire landscape using forest structure metrics and statistical relationship

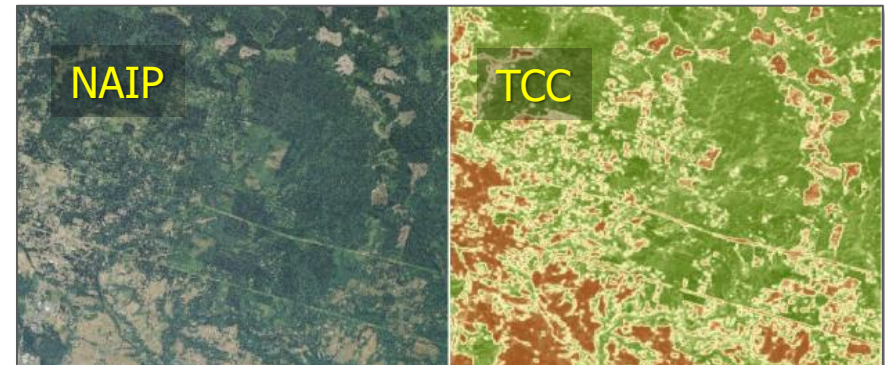
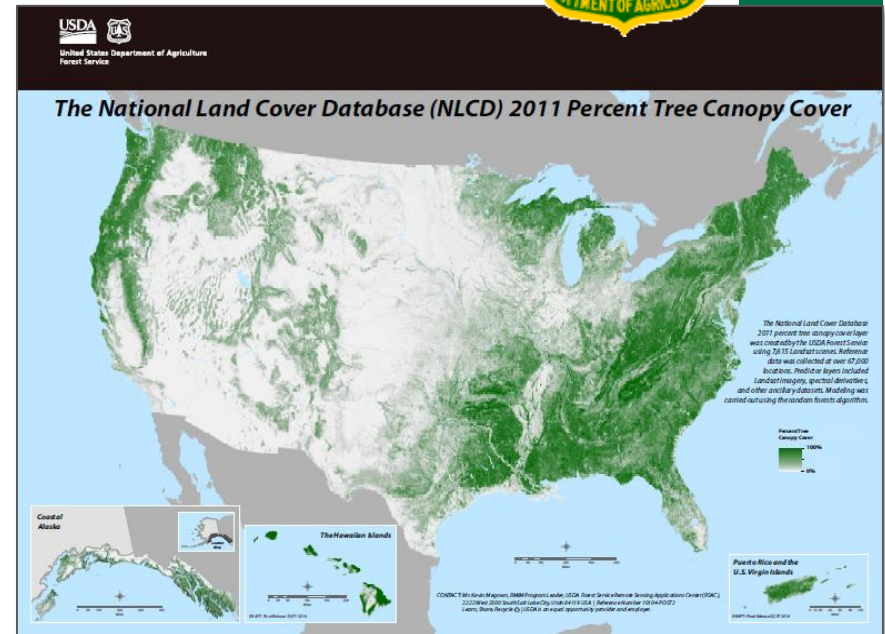
+ U.S. Forest Service

National Land Cover Dataset (NLCD) Tree Canopy Cover

- Tree canopy cover is an important spatial input
 - Fire behavior models
 - Insect and disease risk models
 - Forest fragmentation analyses
 - Wildlife habitat analyses



22



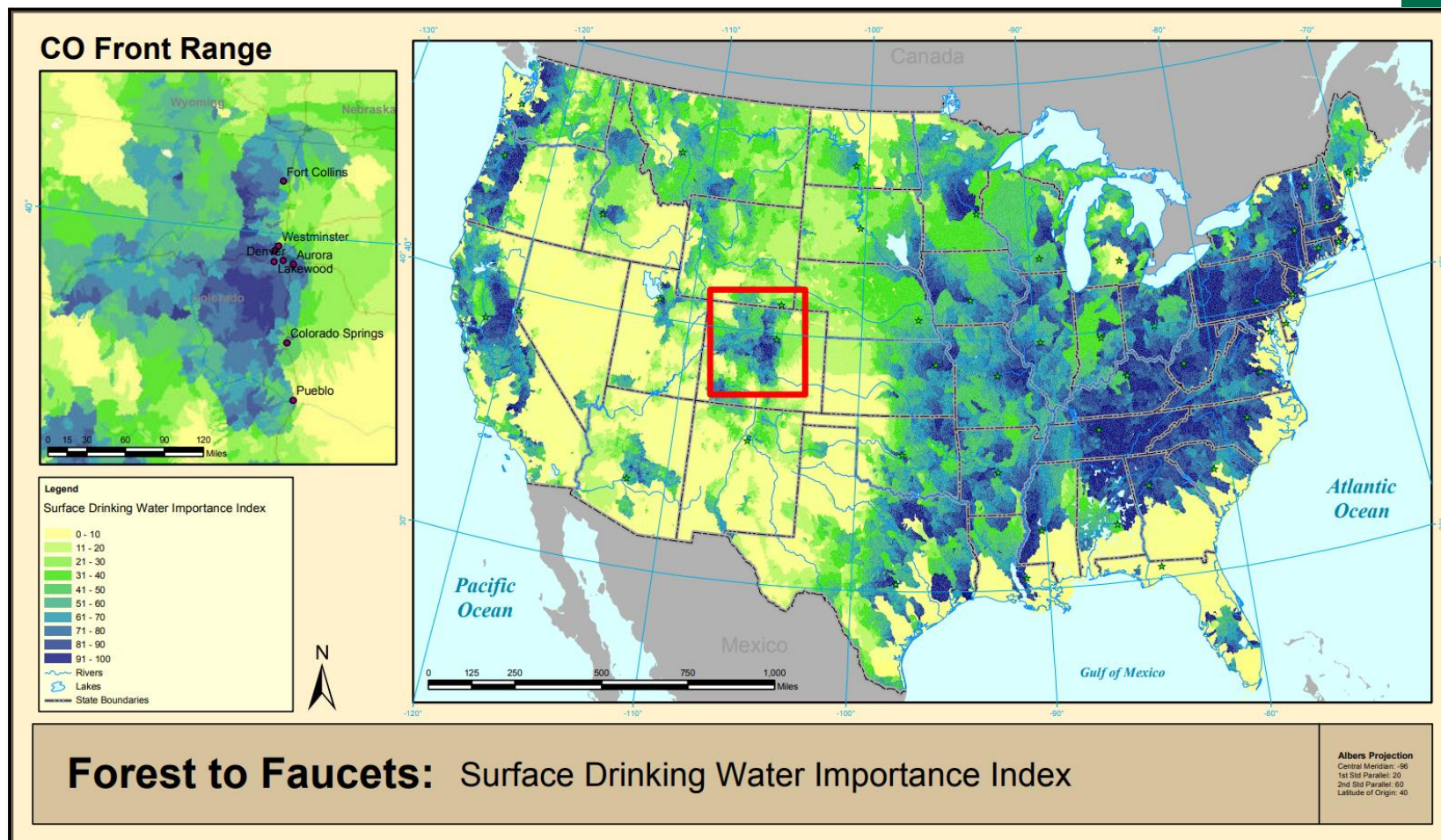
National Agricultural Imagery Program aerial photography as the input and the Tree Canopy Cover as the output example

+ U.S. Forest Service: Forests to Faucets



23

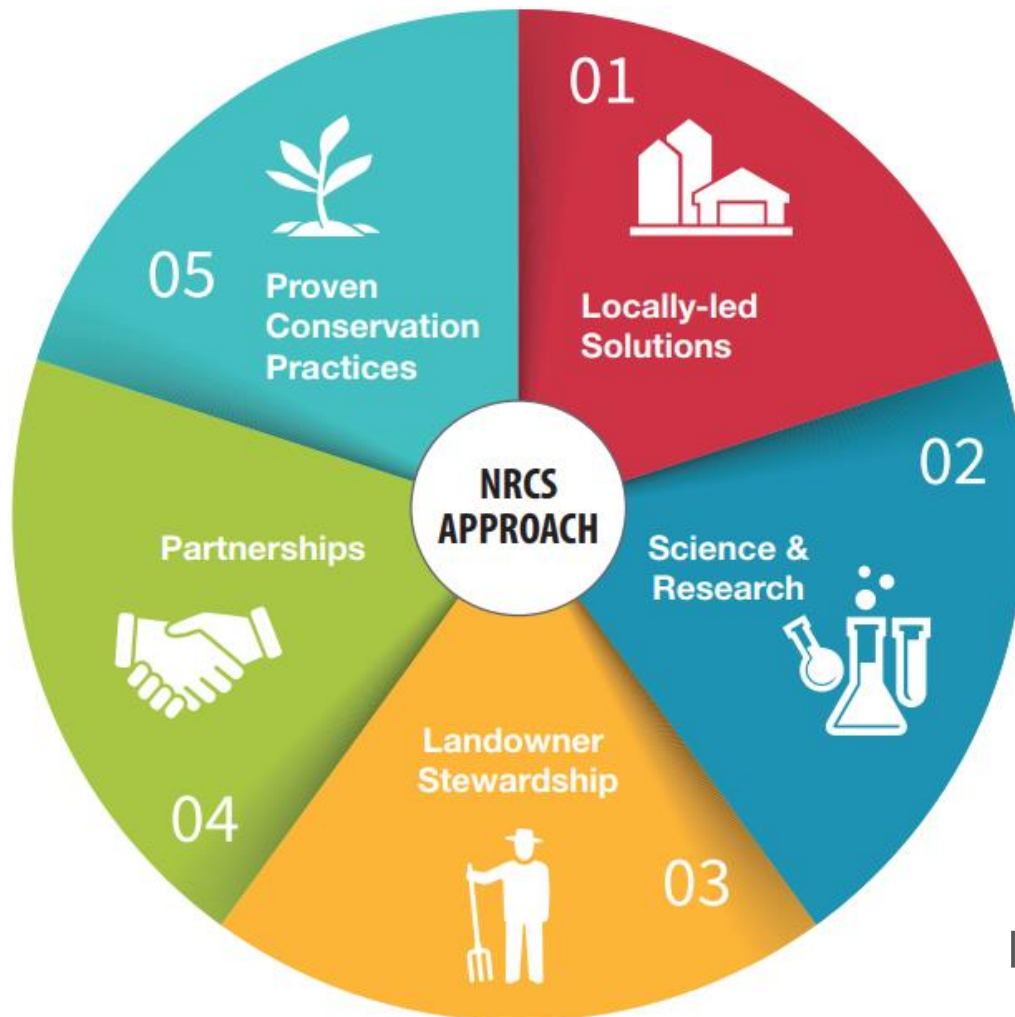
Modeling and mapping land areas most important to surface drinking water



+ Natural Resources Conservation Services



24



Provide resources to farmers and landowners to aid them with conservation

Ensuring productive lands in harmony with a healthy environment

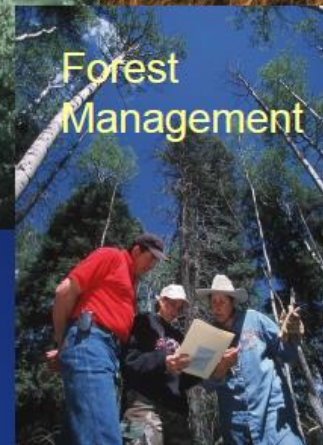
Helping People Help the Land

+ Natural Resources Conservation Services



25

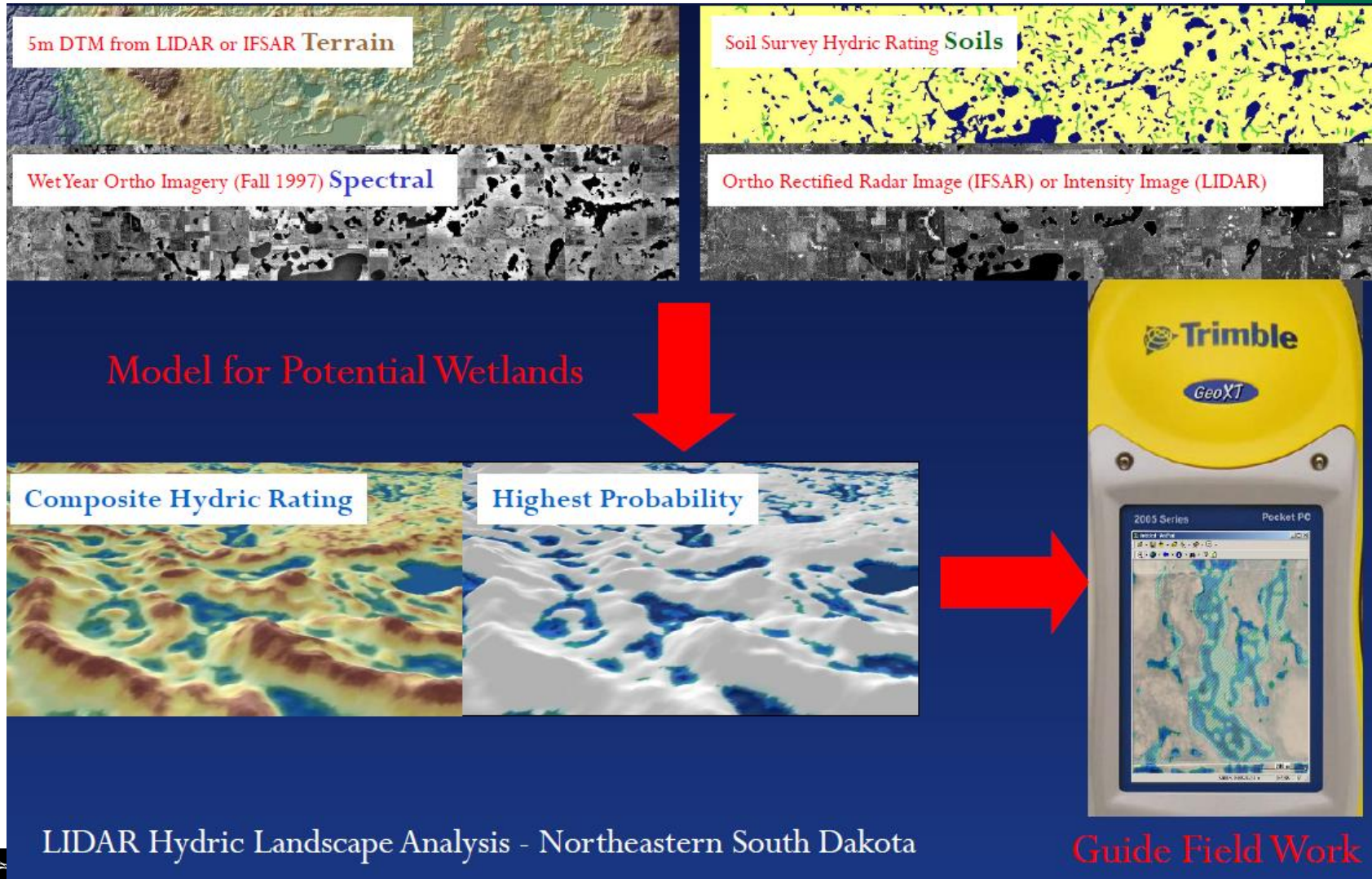
Many Resource Issues



+ Natural Resources Conservation Services



26

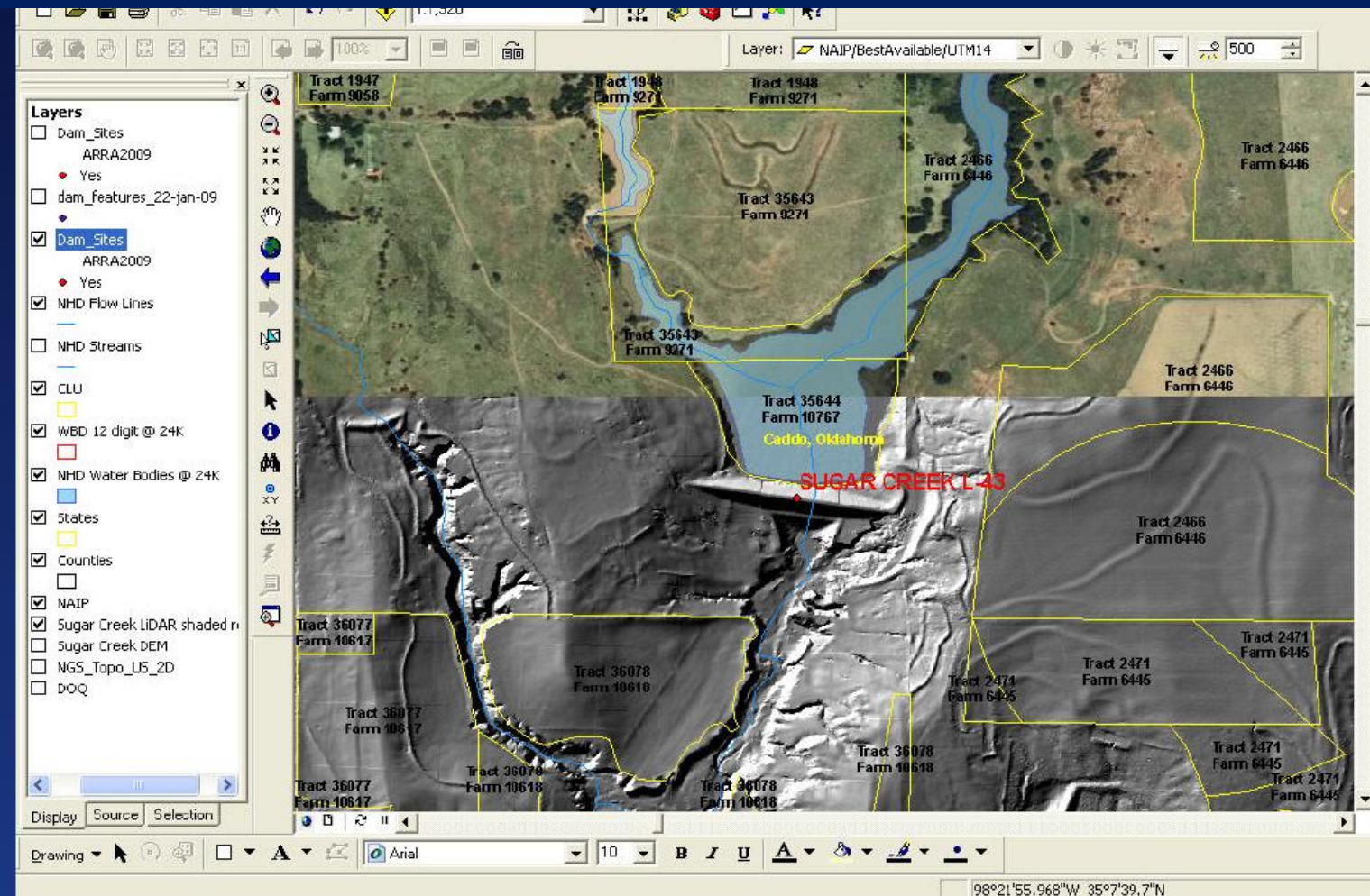


+ Natural Resources Conservation Services



27

NRCS Watershed Rehabilitation Program



+ LANDFIRE

Landscape Fire and Resource Management Planning Tools



28

- Shared program between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior
- Provides landscape scale geo-spatial products to support cross-boundary planning, management, and operations

LANDFIRE (LF)

The [LF Program](#) provides 20+ national geo-spatial layers (e.g. vegetation, fuel, disturbance, etc.), databases, and ecological models that are available to the public for the US and insular areas. [Learn how](#) LF is important to wildland fire management and supports more than fire.

LAND

- land cover/disturbance change
- endangered species monitoring
- climate-carbon-ecological modeling/research
- wildlife/habitat activities

FIRE

- fuel treatments
- fire suppression
- fire management planning
- active fire management

News

- Provisional MoD-FIS Fall 2018 Released
- DOI Seminar features LF
- LF awarded 'Environmental Dream Team' by DOI

Application

Highlighted Applications...
Learn about other ways LF is being used...

LF Partners **LF Tutorials** **Applications** **Postcards/Bulletins** **Data Alerts** **Notifications** **Frequently Asked Questions** **Contact Us** **Social Media** **Get Data**

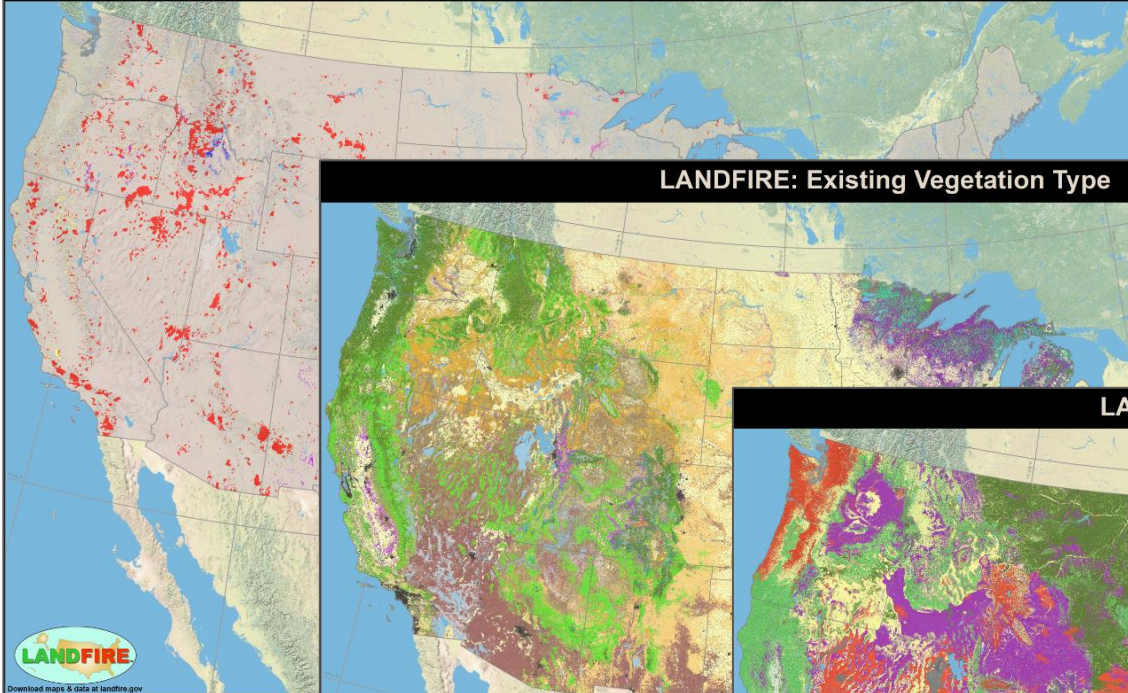
USDA: Accessibility / Privacy Policy / Important Notices / FOIA
DOI: Accessibility / Privacy Policy / Important Notices / FOIA

+ LANDFIRE

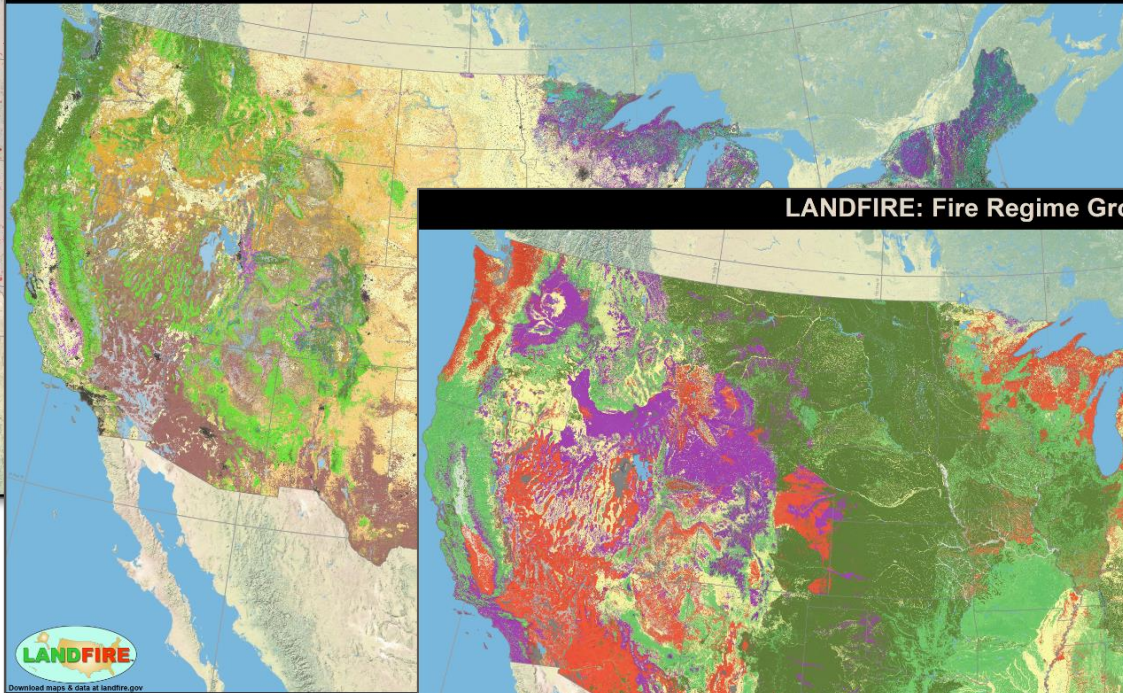


29

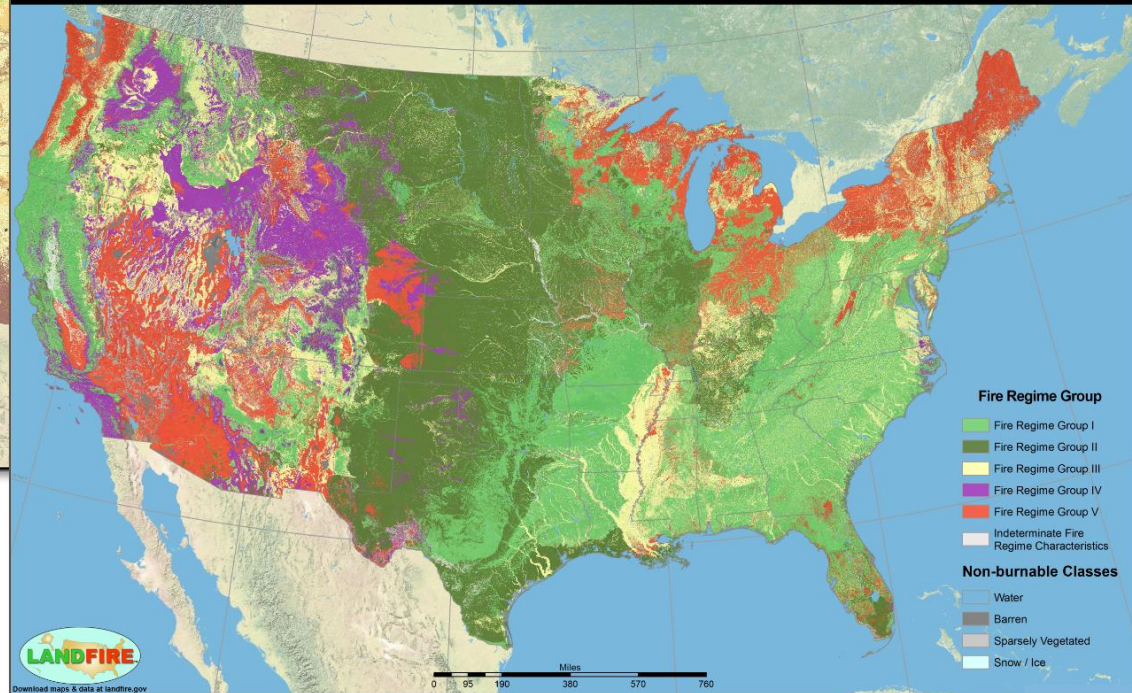
LANDFIRE: Vegetation Disturbances

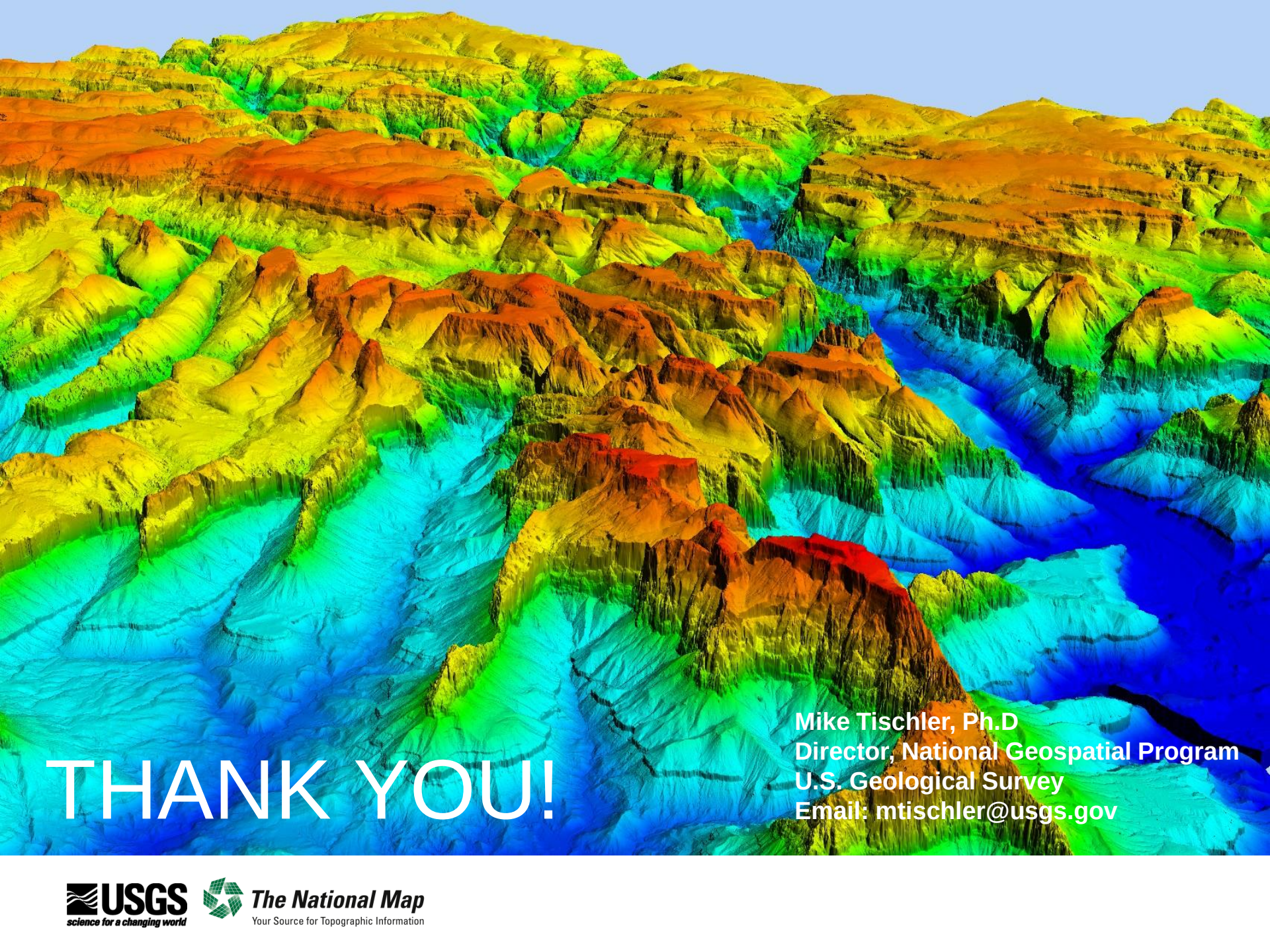


LANDFIRE: Existing Vegetation Type



LANDFIRE: Fire Regime Groups





THANK YOU!

Mike Tischler, Ph.D
Director, National Geospatial Program
U.S. Geological Survey
Email: mtischler@usgs.gov