Overview of Land Cover Uses and Concerns in FWS

Presenter: Karen Murphy
Regional Fire Ecologist
National Wildlife Refuge System
Anchorage, AK

Overview of Land Cover Uses and Concerns in FWS

A snapshot of the US Fish and Wildlife Service shows a diverse organization with a variety of missions and multiple approaches to gathering and using land cover data.

Overview of Land Cover Uses and Concerns in FWS

FWS Organization Chart

Directory/Deputy Directors

NATIONAL PROGRAMS (partial list):
- National Wildlife Refuge System
- Migratory Birds & State Programs
- Fisheries & Habitat Conservation
- Endangered Species
- International Affairs
- Law Enforcement
- External Affairs
- Budget, Planning, & Human Resources
- Business Management & Operations
- Information Resources and Technology Management (GIS)

Regional Director's; Regions 1-7

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Uses of Land Cover Data

Landscape level analysis:

• Multiple states for some critical habitat determinations for endangered species
• Large watersheds such as the Gulf of Maine to model habitat availability
• Large land management units such as some Alaskan Refuges or Wetland Management Districts

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Detailed local analysis:

• Refuge planning and management; habitat monitoring, fire plans, wildlife habitat models... the full range of land management activities
• Quality checks of National Wetlands Inventory data
• Endangered Species Critical Habitat determinations on smaller areas
• Habitat modeling across Joint Ventures to identify priority protection and restoration areas

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Detailed local analysis:

• Landcover classes are used to extrapolate evapotranspiration rates which are combined with hydrographic features to create water budget models.

• Water budget models are used to conserve, manage and protect water resources and water rights on National Wildlife Refuges.

• Fire behavior modeling for suppression activities or to prepare prescribed burns (if cross-walks with fuel models exist).

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Types of Land Cover Data in use in FWS

- National Land Cover Database (NLCD)
- GAP
- TNC Ecological Systems
- National Wetlands Inventory
- NVCS Derived Fine Scale Land Cover Classification
- Alaska Vegetation Classification System

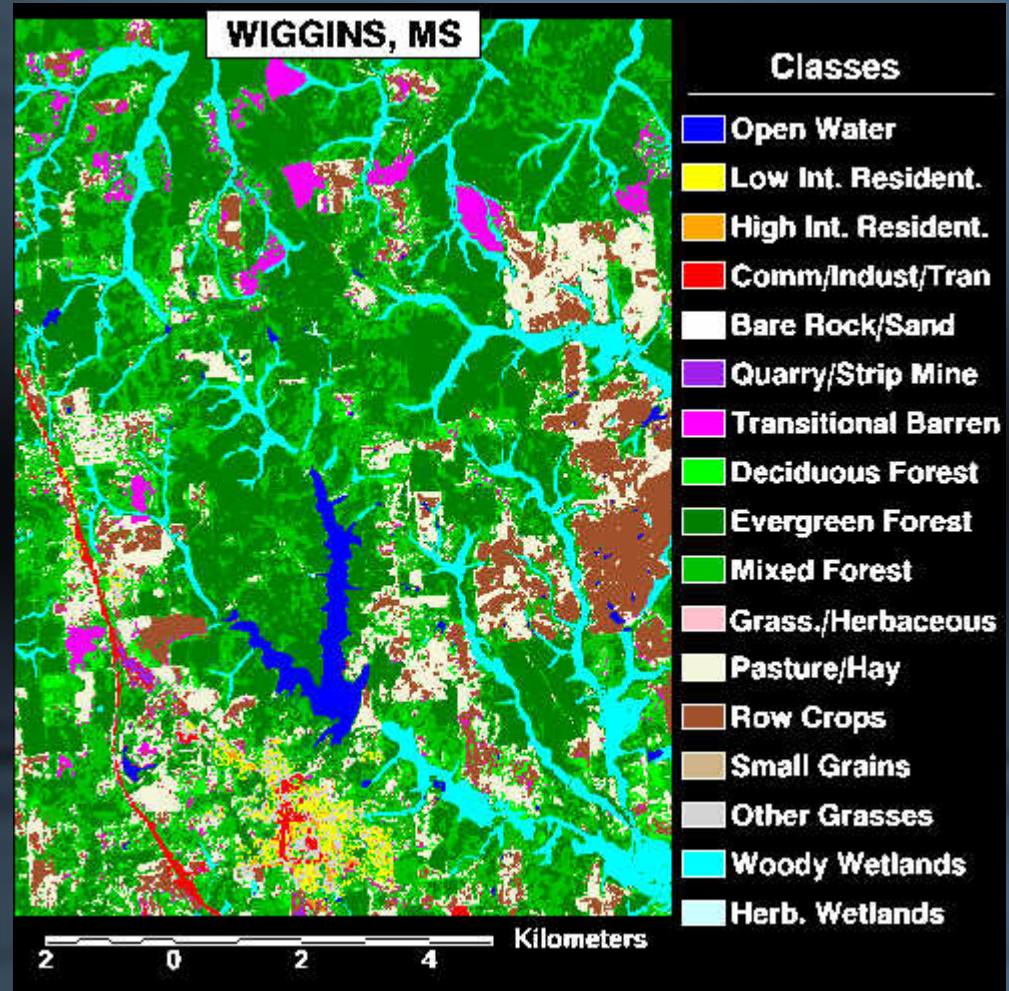# Overview of Land Cover Uses and Concerns in FWS

Types of Land Cover Data with floristic levels:

- National Land Cover Database (NLCD)
- **GAP**
- **TNC Ecological Systems**
- National Wetlands Inventory
- NVCS Derived Fine Scale Land Cover Classification –**Alliance Level**
- Alaska Vegetation Classification System – **Level IV**

NLCD of Wiggins Mississippi.

WIGGINS, MS

Classes

- Open Water
- Low Int. Resident.
- High Int. Resident.
- Comm/Indust/Tran
- Bare Rock/Sand
- Quarry/Strip Mine
- Transitional Barren
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Grass./Herbaceous
- Pasture/Hay
- Row Crops
- Small Grains
- Other Grasses
- Woody Wetlands
- Herb. Wetlands

Kilometers

2   0   2   4

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NLCD Data Application from the Lower Mississippi Valley Joint Venture Office
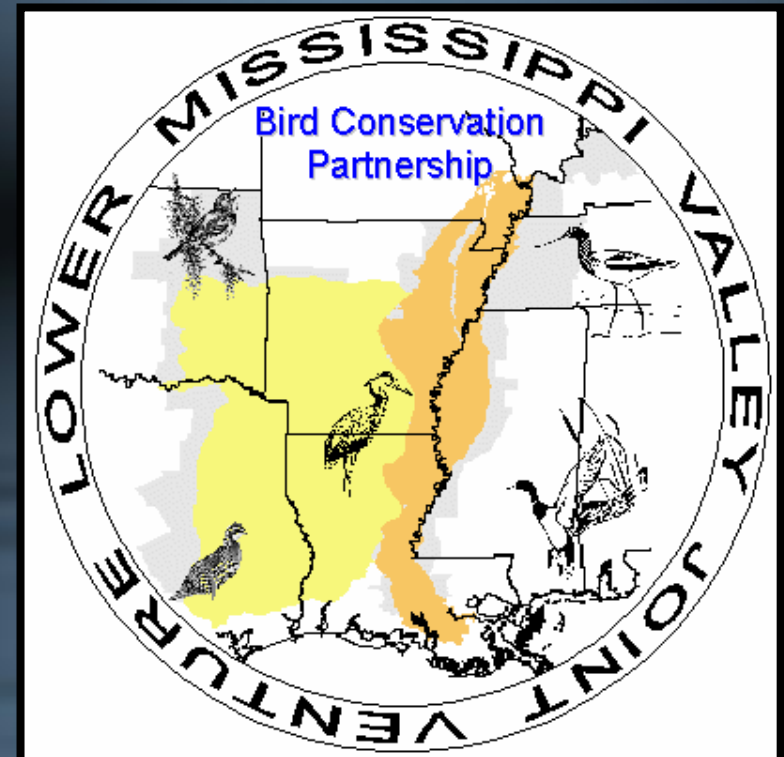
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Characterize Habitat Conditions

NLCD was used to locate areas of bottomland hardwood habitat capable of maintaining a source population of forest breeding birds

Forest Breeding Birds Associated with Forested Wetlands
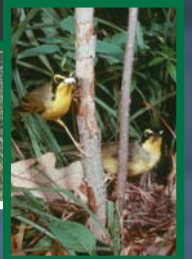
Overview of Land Cover Uses and Concerns in FWS

- Characterize Habitat Conditions

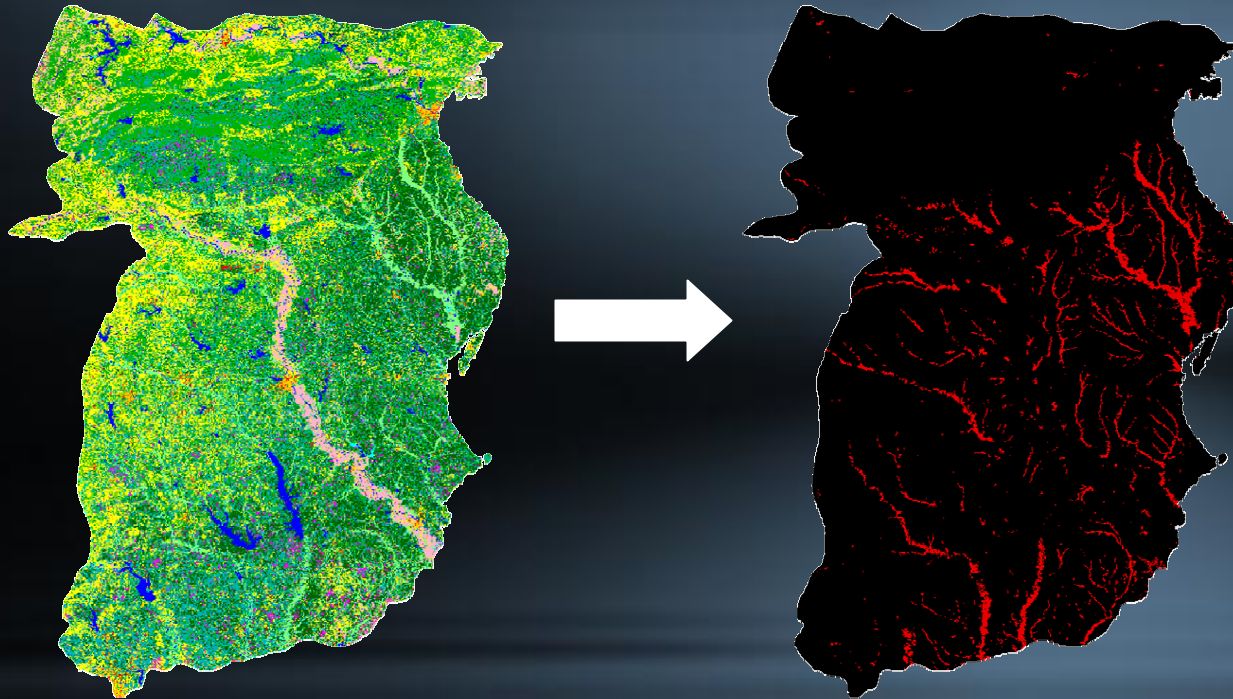- Quantify Ecological Alterations

- Develop Decision Support Models

Forest Breeding Birds Associated with Forested Wetlands

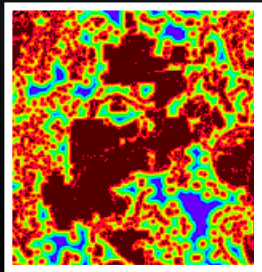# Overview of Land Cover Uses and Concerns in FWS

NLCD

Suitable Habitat

Characterizing habitat conditions allows one to determine the ability of the landscape to support a species of concern at prescribed levels
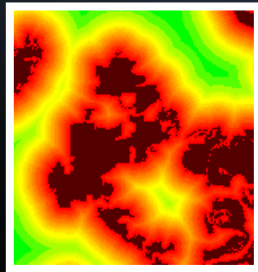
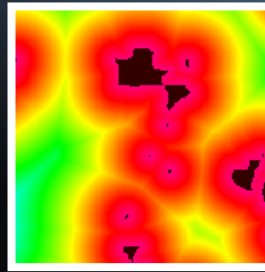# Overview of Land Cover Uses and Concerns in FWS

Example: Reforestation Decision Support Model =
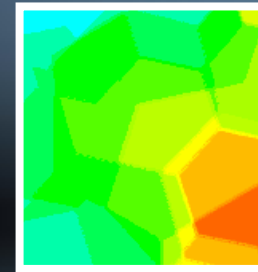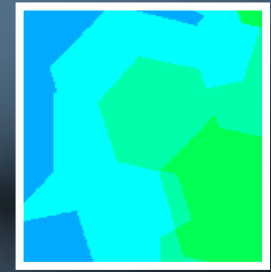Mean [(forest)+(2*patch)+(3*core)+(2*percent)+(area)]
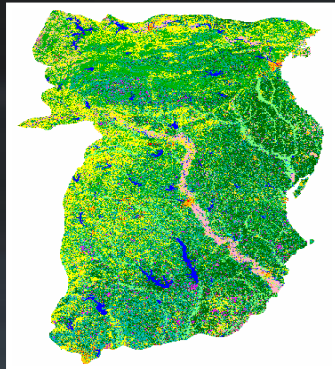
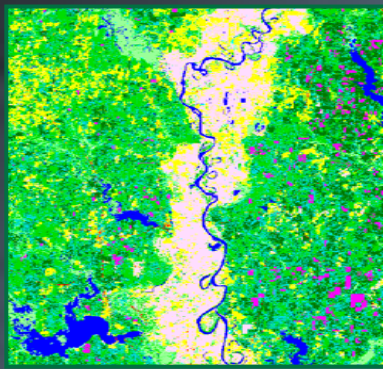Forest   Patch   Core   Percent   Area

West Gulf Coastal Plain   Red River Valley
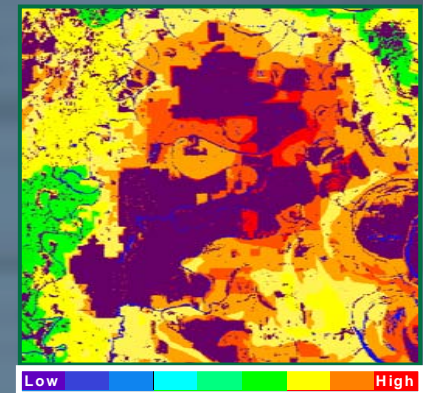
Low   High

Landcover data were used to identify caribou wintering habitat on Kanuti NWR.
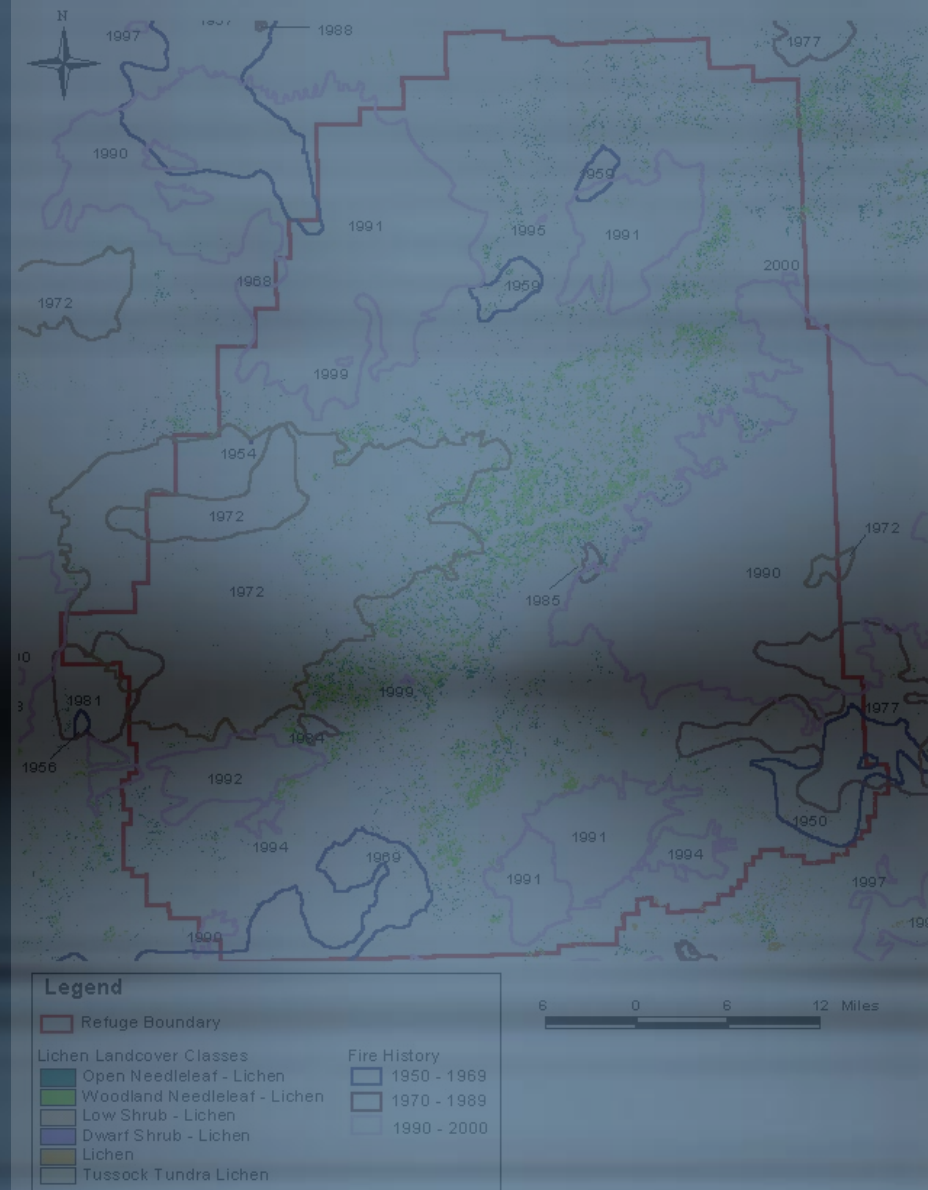
Figure 1. Distribution of lichen landcover classes relative to fire history 1950 - 2000, Kanuti National Wildlife Refuge, Alaska.

Legend

Refuge Boundary

Lichen Landcover Classes
Open Needleleaf - Lichen
Woodland Needleleaf - Lichen
Low Shrub - Lichen
Dwarf Shrub - Lichen
Lichen
Tussock Tundra Lichen

Fire History
1950 - 1969
1970 - 1989
1990 - 2000

3

Landcover classes included visible understory categories such as: "woodland needleleaf – lichen" or "dwarf shrub – lichen".

Similar projects to define moose habitat are hampered by shrub categories that don't separate shrub families (i.e. willow from alder).

This is a common challenge for biologist who want to use landcover maps for habitat modeling where species composition is more important than vegetative structure.

Other projects of interest:

- Southwestern region (R2) mapping NWR to alliance levels – reprocessing TM imagery for vegetation

- New MRLC field data collected to support both standard classes and finer floristic classifications in some places

- Crosswalks between landcover classes and "potential natural vegetation" groups used for Fire Regime Condition Class determinations

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Problems with existing Land Cover Data

Spatial:

•   To support management objectives, many refuges require higher resolution and more accurate land cover datasets.

• Field sites should be recorded with location data

•   Landscape level analysis can use 30 meter resolution data, but need finer classes than are often described.

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Problems with existing Land Cover Data

Chronological:

- Data (imagery & field) 5 years old or less is preferred
- NLCD 10 year update cycle is an improvement, but still not adequate in areas of rapid change
- Land cover data or the sources it is derived from are over 20 years old in many locations and digital data is not available for large areas of Alaska

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Problems with existing Land Cover Data

Thematic:

• There is a lack of consistency in data classification where it crosses political boundaries (e.g. where GAP crosses state lines). This needs to be corrected and is more an issue of coordination than additional data collection.

Problems with existing Land Cover Data

Thematic (cont'd):

• NVCS classifications (vegetation community classifications) are not complete across the country. Collecting this data can be prohibitively expensive for field stations; this process needs to be completed so that field offices can concentrate on collecting their own field data and not establishing baseline data standards.

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Problems with existing Land Cover Data

Thematic (cont'd):

• Issues with mapping alliances (NVCS) or TNC's ecological systems need to be resolved so that spectral signatures can be used to sort classes from satellite imagery.

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Problems with existing Land Cover Data

Thematic (cont'd):

• Different classifications are needed: fuels data for fire models, for example, is very different than habitat data for waterfowl nesting models.
The creation of good crosswalks between various types of land cover classifications such as NLCD or GAP data and fire fuels classifications could help the above issue and be done centrally

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Problems with existing Land Cover Data

Data collection and analysis:

- Accuracy standards are highly variable and accuracy assessments are often not rigorous.

- Need field data that incorporates more vegetation information (i.e. dominant species at ground, understory, mid-story and overstory) and canopy closure information provides more modeling capability

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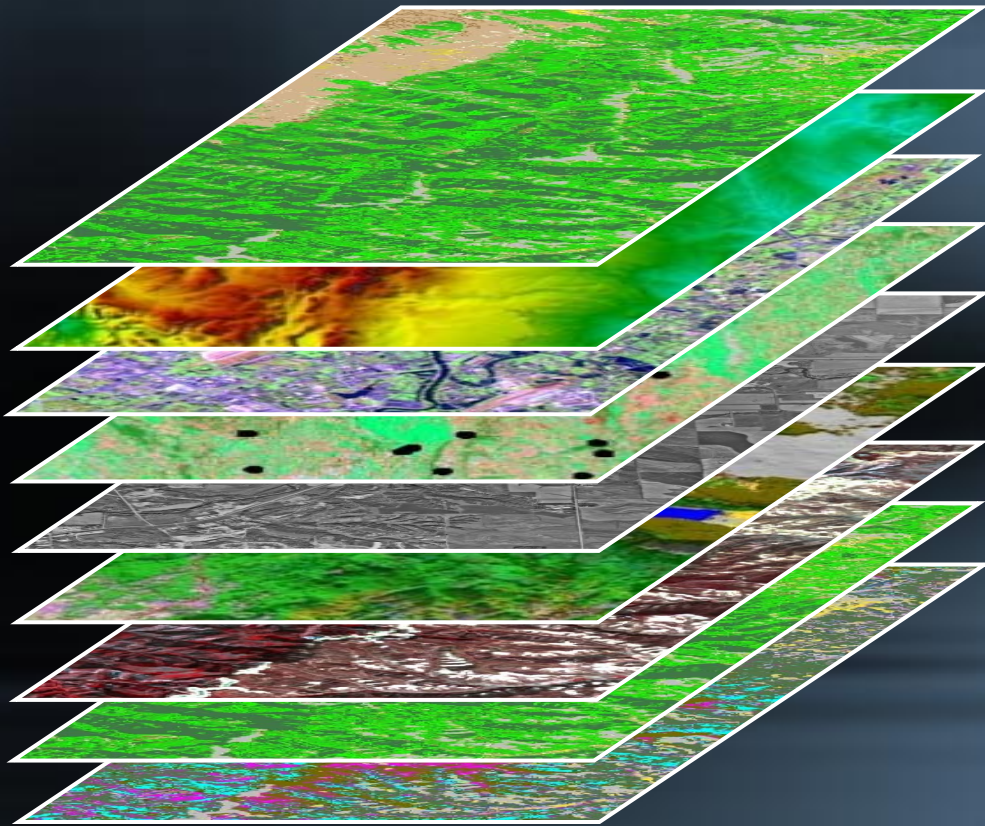**Problems with existing Land Cover Data**

Data collection and analysis (cont'd):

- Communication with field units often lacking when regional landcover mapping occurs

- Options to replace damaged landsat 7 imagery need to be pursued

How we collect data determines what can extract from the landcover data in the future.

- Biophysical/ ecological gradients
- Vegetation
- Fire fuels
- Habitat models
- Fire Regime Condition Class
- Field reference database
- Simulation models

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Summary of needs:

- More current and frequent source imagery
- Replacement for Landsat 7 imagery
- Higher resolution imagery and data, particularly for vegetation data sets
- Completion of NVCS vegetation classifications or TNC ecological systems across U.S.
- Resolve mapping issues at Alliance or Ecological Systems levels

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Summary of needs:

- Creation of standard crosswalks between land cover data sets for widely used applications
- Improve accuracy assessment standards
- Design field data collection to maximize its applicability to modeling.
- Design field data collection/sampling so that sampling to update landcover maps can focus on areas of greatest change
- Continue interagency dialogs and partnerships

Questions?

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FWS GIS Contact Information

National GIS Coordinator:
Deb Green
303-275-3574
deb_green@fws.gov

USFWS GIS homepage
http://www.fws.gov/data