GIS Resources for Longleaf Pine Ecosystem Restoration and Conservation  
Workshop held at Auburn University on November 9 and 10, 2010

Executive Summary

The Longleaf Alliance hosted a workshop to improve and develop the GIS resources needed to support longleaf pine ecosystem restoration and conservation across the historical range from Virginia to Texas. The workshop was held at the Auburn University School of Forestry and Wildlife Sciences on November 9 - 10, 2010. Fifty-five participants (NGOs, Federal Agencies, State Agencies, and 1 private contractor) attended the workshop with involvement by a larger number of partners through a pre-workshop data request.

Small workgroups tackled information needs at two scales. Site and landscape scale questions were discussed and recommendations were made for acquiring and managing information. Interests were expressed in organizing and using data at both scales and working to integrate data to better address questions and needs at the range-wide scale.

Meeting Objectives: Progress was made on each, understandably none were completely achieved---but additional the clarity developed at the workshop will allow substantive next steps:

- Agreement on what data are needed to answer the key questions about longleaf pine ecosystems (where is it; what condition is it in; how is it changing; and how is it being managed?)
- Agreement on data standards and principles for the use of these data (metadata, sharing, privacy, etc.)
- Agreement on the best sources for these data
- A better understanding of tools and approaches to coordinate, standardize, and integrate these data across various scales
- Agreement on how to store and manage these data
- An expanded and documented network of contacts and resources

Whole Group Discussion and Conclusions

Key Characteristics and Needs

- Longleaf pine spatial data need to be easily accessible
  - Needs to be a highly motivated process (i.e. data is needed for tracking, planning, etc.)
  - Data at the range-wide, landscape, and site scales are needed depending on the questions being asked
  - Spell out argument for data needs and uses
  - A centralized location is needed for some data
    - The centralized location must provide secure segregation or deletion of Privacy Act protected information or other statutorily required protection for private landowner information
    - There is interest in continuing the Longleaf Alliance effort to collect existing longleaf pine site/stand data and making it available
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- Existing longleaf pine site/stand level data could be housed by the Longleaf Alliance
  - Internal server
  - Web based with open access for all users
  - Open platform
  - Capture minimum attributes

Funding and Coordination

- Requests for funding and data requests need to come from an established group of partners
- Working Group could be designated pulling from workshop planners and participants
  - Funding requests could go to the Federal Agencies and other funders via the Federal Coordination Group – (Glen Gaines)
- Support is needed from
  - Lead agencies that oversee data:
    - Department of Defense
    - US Forest Service
    - US Fish and Wildlife Service
  - Southern Group of State Foresters
    - Management Chiefs
  - GIS Task Forces

Next Steps and Tasks:

- Develop a regional steering/advisory board
- Present a summary of this meeting at the next meetings of the Partners, Southern Group of State Foresters, SEFWA, etc.
- Longleaf Alliance will work on a proposal for continuing to collect site/stand level data and for creating an online system to display, distribute, and capture data
- Landscape planning group will meet and work on a proposal for landscape level work
Meeting Notes Summary and Main Points

Site Level Work Groups

- Define definitions for longleaf condition classes
- Create protocols for collecting data
  - More emphasis is needed on prescribed fire information
- Use minimums for site/stand level data developed at the workshop
  - Shape type
    - Point
      - Table with (X/Y) coordinates
    - Polygon
    - Raster
  - Minimum attributes
    - Forest type – need definition
      - Longleaf pine presence/absence
    - Area (acres)
    - Unique identifier
    - Ownership (private, public – list agency)
    - Metadata
      - Name and contact information (potentially add as attribute)
      - Attribute descriptions
      - General description of data
    - Original projection
    - Method used to collect
    - Data source
    - Sharable
    - Age of data
- Develop performance measures - to make attribute tables allow for progress reporting
- Review existing databases and online system
  - National Biological Information Infrastructure (NBII)/Environmental Protection Agency (EPA) Exchange for centralized node support
  - USFWS Partners Program Habitat Information Tracking System (habITS)
- Check out funding sources for Longleaf Alliance Project
  - Department of Defense (DoD)
  - EPA
  - DoD Legacy Resource Management Program/SERDP – Strategic Environmental Research and Development Program
- Check out needs for MOU or data use agreements
Landscape Work Groups

- Forest Inventory Analysis (FIA) Atlas – Chris Oswalt
  - Request emphasis on longleaf pine forest
  - Include forest stand and condition information
- Range-wide Decision Support Tool for Open Pine Habitat and bird conservation – Barry Grand is leading
- LANDFIRE – accuracy assessment – refresh/change detection
- Expedite Significant Geographic Landscapes - local implementation team mapping
  - Need teams and leaders identified
- Pursue funding focused on Significant Geographic Areas (SGAs)
  - US Forest Service
  - US Fish and Wildlife Service
  - Mississippi State
  - Texas A&M
  - Work at local level, implement range-wide
  - Longleaf Alliance (LLA) work with Southeast Regional Partnership for Planning and Sustainability (SERPPAS) to build support for grant applications
  - Communicate grant opportunities
- Need updated band use classification for Significant Geographic Areas (SGAs) – US Geologic Survey (USGS)
- US Fish and Wildlife Service needs to include species recovery data
- Provide more information to the group on the North Carolina Department of Environment and Natural Resources (NCDENR) protocol and other possible protocols/procedures before being able to endorse/agree
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Planning Committee List:

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Barry Grand</td>
<td>Auburn University, AL Cooperative Fish and Wildlife Research Unit</td>
</tr>
<tr>
<td>John Kush</td>
<td>Auburn University, Longleaf Pine Stand Dynamics Lab</td>
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<tr>
<td>John Gilbert</td>
<td>Auburn University, Longleaf Pine Stand Dynamics Lab</td>
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<tr>
<td>Will Allen</td>
<td>Conservation Fund</td>
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<tr>
<td>Jazmin Varela</td>
<td>Conservation Fund</td>
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<tr>
<td>Rob Sutter</td>
<td>Enduring Conservation Outcomes LLC</td>
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<tr>
<td>Dean Gjerstad</td>
<td>Longleaf Alliance, Inc. (LLA)</td>
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<td>EJ Williams</td>
<td>Longleaf Alliance, Inc. (LLA)</td>
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<td>Rhett Johnson</td>
<td>Longleaf Alliance, Inc. (LLA)</td>
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<tr>
<td>Roel Lopez</td>
<td>Texas A&amp;M University</td>
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<tr>
<td>Brad Barber</td>
<td>TX State Forest Service</td>
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<tr>
<td>Liz Kramer</td>
<td>University of Georgia, Natural Resources Spatial Analysis Lab</td>
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<tr>
<td>Randy Wilson</td>
<td>US Fish and Wildlife Service</td>
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<td>Paul Lang</td>
<td>US Fish and Wildlife Service</td>
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<td>Laurie Fenwood</td>
<td>US Fish and Wildlife Service</td>
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<td>David Meriwether</td>
<td>US Forest Service</td>
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<td>Eric Schmeckpeper</td>
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<td>Joel Harrison</td>
<td>US Forest Service</td>
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<td>Glen Gaines</td>
<td>US Forest Service</td>
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<td>Jim Fenwood</td>
<td>Facilitator</td>
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Participants List:

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<tr>
<td>Allen, Will</td>
<td>Conservation Fund</td>
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<tr>
<td>Bailey, Andrew</td>
<td>North Carolina Division of Forest Resources</td>
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<td>Bailey, Charles</td>
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<td>Balbach, Hal</td>
<td>US Army Engineer Research and Development Center</td>
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<td>Barbour, Michael</td>
<td>Nature Serve - AL Natural Heritage Program</td>
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<tr>
<td>Black, Mike</td>
<td>Northern Bobwhite Quail Initiative (NBCI)</td>
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<td>Bohn, Cindy</td>
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<td>Elledge, Jim</td>
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<td>George, Tracy</td>
<td>Alabama Wildlife &amp; Freshwater Fisheries</td>
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<td>Gilbert, John</td>
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<td>Army OREGA-S</td>
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<td>Williams, EJ</td>
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<td>US Fish and Wildlife Service</td>
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<td>Zellmer, Rick</td>
<td>Natural Resources and Conservation Service</td>
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Breakout Session Questions and Notes
*Notes were created by combining and reorganizing notes from each small workgroup for each breakout session. Expanded notes are available upon request.

Day One - Breakout Sessions
Breakout Session 1: What data are needed to answer key questions about longleaf pine ecosystems?

1. How will site/landscape scale data be used? Example topics include: business needs and processes of end-users such as assessing baseline conditions, prioritizing actions, and reporting to stakeholders. Additional landscape scale topics include understanding connectivity and potential conflicts with other land use types, where temporal information is as important as spatial information.

Site Group
- Baseline data
  - Summarize current condition assessments – multiple attributes, snapshot/trends
    - Preparing work plans (quarterly) for actual activities (i.e. Forest Management Plans)
    - Change detection – from current conditions
- Mitigation
- Restoration
- Prioritization
  - Partners
    - Where to work with private landowners to improve the habitat – look for landowners to work with – species conservation, conservation easements or acquisition
- Accountability – reaching program, agency goals
- Longleaf pine conditions (how data will be used?)
  - Production – regeneration, growth and yield.
  - Harvest
  - Threatened and Endangered (T/E) species status and other species
  - How much do we have? – Metrics - How many acres?
  - Prescriptions
  - Project planning
  - Accumulative analysis
  - Budget increase and justification
  - Funding increases and justification
  - Health
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- Presence of exotics (flora and fauna)
- What is the potential for areas of LLP restoration
- Site data is used to extrapolate beyond site area
- Progress tracking- success or failure
- Corridors or connections

- Work activities
  - Primary land objectives/uses
  - Past land management (i.e. site prep, prescribed fire)
  - Historical and planned activities
  - Prioritize who is eligible for cost shares/ selecting vendors
  - Provide datasets for future research planning
  - Future education
  - Data can be used for simulations or modeling
  - Partnership development (communication)

Landscape Group
- Meet range wide plan
  - Collection of baseline current vs potential longleaf pine
    - Current condition – understory, structure, composition, and function
      - Total acres (maintain/improve) vs potential acres (restore)
      - Public (Federal, State) acres vs private acres (industry, non-industrial private forest landowner (NIPF), non-government organization (NGO))
  - Set targets
    - i.e. 10% historic – ecosystem restoration and representation
    - Ecosystem function
      - Current extent – understory development
    - Prioritize strategic use of resources
      - Acquisition
        - Design large acquisitions with multiple parties
      - Cost-share
      - Building partnerships
      - Funding justification
      - Corridor development (connectivity between parcels)
      - Promotion to private landowners and decision makers
      - Education and information
      - Estimate how current acres support priority bird populations
      - Target management and restoration to meet bird goals
      - Objective criteria for decisions
      - Interpretation
        - Change over time – trend analysis
      - Conservation planning
      - Threatened and endangered, rare species reintroduction or actions
      - Modeling – distribution, etc.
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- Identify outside pressures i.e. climate change
- Disaster response
- Identify potential habitat
- Prioritizing work force
- Compatibility priorities
- Identifying “hot spots” for geospatial assistance – work with US Geological Survey (USGS) LIDAR for the nation
- Drill down spatially explicit plan from significant landscapes to site level (conservation planning within the 12 sites)
- Predicted range with climate change
- How do you quantify to remotely sense a map to determine condition/success?

2. What data are needed to answer key questions about longleaf pine ecosystems on the site/landscape scale? Example site scale topics include: listing types of datasets (points/polylines) and discussing attributes such as stand type, age, tree species association, density, burning history, wildlife species information, and understory information. Example landscape scale topics include: listing types of datasets, attribute classes, and approaches to assessing the condition patches and matrix forests.

Site Group
- Shape type
  - Point (X/Y) locations
  - Polygon for site/stand boundary
- Universal attributes
  - Overstory
    - Longleaf pine
      - Dominant
      - Presence/Absence
  - Midstory
    - Dominant type
      - Pine, hardwood, shrub
  - Understory
    - Dominant type
      - Grass/herbaceous, shrub, hardwood
      - Is longleaf pine regeneration present
    - Amount of duff, litter
  - Fire history or frequency
  - Potential longleaf pine sites
    - Soils information
    - Smote sensitive – screen
    - Current vegetation (management)
  - Ownership
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- Public – list agency – Federal, State
- Private – nonindustrial private landowners, industry
- Sensitive information screened and used for upward reporting
  - Acres – reporting needed
  - Unique identifier

Landscape Group
- Data need
  - Soil – surface geography – physical characteristics (resolution)
  - Condition of landscape
    - Location of existing longleaf pine
      - Access fragmentation
    - Ecosystem function
      - Condition
        - Mix of restored/enhanced/maintained
  - Multiple use
  - Management potential (fire, etc.)
  - Spatial relationships
  - Ownership
  - Integration
    - Definition of terms
    - MOUs/agreements – data sharing, funding
- Need to develop process to make the data dynamic
  - Continuous data for updating
  - Process for remote sensing to update at various scales
    - LANDSAT to tree (Mississippi process)
  - Consistent protocols across the range to access condition of the range
    - Ground floor vegetation to match up with current Forest Inventory Analysis (FIA) data (site/stand level)
  - The Nature Conservancy (TNC) - identify priorities and communicate to public and benefactors
  - Identify greatest resource needs
  - Fragmenting parcels for management and landuse
- Define the ecological parameters – What is the discussed end product?
  - If the goal is ecologically sustainable – what is needed?
  - What other disciplines are needed?
    - Planners
    - Landscape ecologists
    - Sociologists
- “Forest futures project” – dataset for next 50 years to determine landuse scenario with climate change – NFTA- Southern Research Station
- Do we have current data or methodology to characterize the extent of longleaf pine base condition?
  - Datasets can be used, but not appropriate/tested across the range
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- Data is there for cover/age
  - Analysis need
    - Presence/absences/potentially at range level
    - Site level
      - Ecological sustainability
      - Biologically relevant
    - Current use/growth projections (urban)
    - Knowledge of existing landscape level priority areas

- FIA data and analysis – FIA Forest Atlas
  - Research product – potentiality of pixels
  - Troy Wilson: Northern Research Station model – coarse level FIA data and downscaling FIA longleaf pine plots with similar pixels

3. What site/landscape scale datasets are available to address these uses and needs, and what datasets are needed? Examples site scale topics include: listing existing datasets and priorities for datasets needed. Example landscape scale topics include: listing types of datasets, attribute classes, and approaches to assessing the condition patches and matrix forests.

**Site Group**
- Existing Data:
  - Base layers
    - Soils
    - NAIP – National Agriculture Imagery Program, DRG-Digital Raster Graphs, and other imagery
    - DEMs –Digital Elevation Models
    - Topographic maps
  - Mining stand/site data we have
    - Public – longleaf pine dominance/presence/absence, understory
      - State and Federal Stand Information
        - Identify agency/organization
      - Private – longleaf pine dominance/presence/absence, understory – if in program
        - Created in the process of a forest management plan
          - Stewardship plans
  - Fire
    - Burn permits
      - Private?
      - Public should have records?
    - Other sources (footwork difficult)
      - Smoke management plans
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- Burn plans – in a standard format
- Will always be gaps
- Call and ask/evaluate and include
- Prioritization for tracking condition
  - Acres

- Collecting data
  - Observational Data- could be easily collected – use
  - For restoration use – raster over vector
  - Seed need – nursery – local seed source (adapt to climate change)
    - Longleaf pine seed source
    - Understory seed sources
  - Geneticists and seed source for each state
  - All in GIS database with minimum of latitude/longitude and/or polygons
  - Paper/digital maps
  - Data source and currency
  - Florida database is an example
  - Ownership and manager – filter out bulk for reporting purposes
  - Observe vs measure
  - Use public domain
  - Date
  - Threatened and Endangered Species
    - May not be best to require for private ownership.
    - Good to track on public lands

- Conditions
  - Burn History
  - Natural vs planted (establishment year)
  - Site condition (cutover vs oldfield/ag restore)
  - Site preparation – guides and treatments
  - Policy and program if applicable
  - Stocking – avoid harvest terms
  - Easy classification triangle – fire/size/ground cover component

- What is longleaf? (As far as what to include, does it all need to be longleaf pine?)
  - Build a range – low overstory vs fully forested
  - Scale/value for data
    - Simple, consistent, repeatable
    - Site type guidelines
    - Soil
  - Regional level information – use compatible data standards (possibly DoD)
  - Basal area
Species composition – continuum – list by dominant (mostly pubic) (T/E species?)
Classify – restore/improve/maintain

Goals
- Show change in acreage over time
- Identify native longleaf pine in state

General description of what is needed
- Map, easily observable
- Stocking/what is there

1. Longleaf pine
   - dominant
   - presence/absence
2. Understory
   - herbaceous/grassy/no hardwoods
   - hardwoods or shrubs/not grassy
3. Fire frequency
   - existing data – permits

Landscape Group
- Available:
  - Remotely sensed data from
    - LANDSAT TM Program
    - OCONOS
    - SPOT Image Corporation
    - USFS Rapid assessment
    - FIA assessment
    - DEM – elevation
    - Growth datasets
    - Parcel data
    - Only for identify longleaf pine in range

Need
- Protocol for identifying existing and potential longleaf
- Repeatability across range
  - Historic Range
    - Remove Unsuitable
    - For suitable
      - Inventory
        - Existing
Protocol for selecting landscape units
  - North Carolina Department of Environment and Natural Resources (NCDENR)
  - Evaluate by North Carolina and Texas/Louisiana Implementation Teams

Potential

NCDENR protocol provided as example (based on landscape guilds, landform, etc – identified ecosystem units that were for the most part longleaf ecosystem units; generally delineating a unit was good for analysis and evaluation

Expert opinion model: for local implementation teams – communicate what we know now

Need to move proposal for remote sensing pilot range-wide forward

Need to work on breaking barriers to sharing data
  - What kind of data
  - Identify barriers for threatened and endangered species information
  - Private landowner information
  - Funding
  - Communicating needs

What we ask for?
  - Design for the future
    - Landscape
    - Site
  - Inventory at site level and aggregate up to landscape

Day Two
Breakout Session 2: What are the key principles that should apply to the acquisition and management of GIS data?

1. What are the key or minimum standards that apply to the acquisition of site/landscape scale data? Example topics include: shape types (point or polygon), minimum attributes, precision/accuracy, ground truthing, and metadata.

Site and Landscape Groups

Minimums
  - Shape type
    - Point
      - Table with (X/Y) coordinates
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- Polygon
- Raster

- Attributes
  - Forest type – need definition
    - Longleaf pine presence/absence
  - Acres
    - Minimum size
      - Minimum mapping unit = 1> 100 acres
      - Polygon minimum = 2.5 acres
      - Minimum planning unit – NatureServe ecological system type
  - Unique identifier
  - Ownership (private, public –list agency)
  - Metadata
    - Name and contact information (potentially add as attribute)
    - Attribute descriptions
    - General description of data
  - Original projection
  - Method used to collect
    - Accuracy
      - Minimum sampling/inventory?
  - Data source
  - Sharable
  - Age of data

Nice to have:
- Stand Structure – triangle for Longleaf pine condition
  - Overstory species condition
    - Dominant
    - Codominant
    - Presence/absence of longleaf pine
    - Stand Age
    - Stand condition (old-field or cutover)
  - Understory
    - Dominant type
      - Grassy/herbaceous, shrub, hardwood
      - Is longleaf pine regeneration present
  - Fire – average return interval
    - Create scale 0,1,2 for years
  - Longleaf pine associated species
    - Ecological system classification (NatureServe)

- 5 year update schedule or as completed

Landscape Group
- Range-wide planning
  - County level collection of data
  - Protecting private landowner data
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- Best available rare species data incorporated
  - USFWS and Heritage Programs – county occurrence data
- DoD
  - Potential longleaf pine site outside of fence
- Need to know data at landcover level also
- Ownership type
  - Threatened and endangered species data most sensitive
- Differentiating well maintained longleaf pine sites
- Identify most critical attributes for base map – start general
- Three levels of data
  - Range
  - Local teams
  - Stand
  - Determine needs for each and aggregate up
- Objective data – importance of standardizing

2. What are key standards for managing site/landscape scale data? Example topics include: sharing data, showing data, privacy, security, updating, and linkages with other databases.

Site and Landscape Groups
- Review existing standards of those managing site data
  - Department of Defense (DoD)
  - National Biological Information Infrastructure (NBII)
  - Protected Areas Database (PAD)
- Privacy
  - Develop protocols for sharing/publishing of longleaf data
    - For database with longleaf pine
    - For other database with longleaf pine
  - For public database
    - Strip ownership information and source information if needed for private property
    - Share only stripped version
    - Web service
- Policy issues
  - Private w/o landowner
  - T/E species at quarter quad level
- Linkages
  - State supported databases
- Shapefile – data sharing format
- Need working groups - need to know more information
- Surveys for some data
- Full time data manager
3. What tools and approaches can be used to integrate data from the site and landscape scales?

Site Group
- Integration tools
- USFWS (Habitat Information Tracking System) habITS
- Environmental Protection Agency (EPA) Exchange Net
- EPA Southeastern Ecological Framework
- State ecological integrity
- Longleaf Alliance Database

Landscape Group
- Questions
  - Integration depends on the objectives and the data
  - What are the end products?
  - What do people want?
  - Identify users?
  - Who holds the data?
- Review Local Implementation Team data collection methods
  - Request leaders provide
- Remote sensing using North Carolina model to prioritize lcc to lead
- Development of simple survey for data collection
  - State forestry agencies
  - Private contractors
  - Extension network
  - Cost share programs
  - Build survey on system developed by John Gilbert
- Potential to use website to capture information like – Tree Farm, Champion Trees, etc.

Breakout Session 3: What is the best way to store and manage these data?

Site Scale Questions:
1. What is the best way to acquire, store, and manage site/landscape scale data? Example topics include: who would provide data, how should it be housed, who will manage it, and funding opportunities.

Site and Landscape Groups
- Centralized database is needed
  - With a unique system of identifying data
  - Standard attributes at “lowest”, useful level
    - Tabular data with (X/Y) coordinates
- Update annually
  - Develop schedule
  - Tracking progress
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- Request
  - Chain of command – list of contacts
  - Narrow request
  - Existing vs new

- Data sources - Facilitation is needed
  - GIS user groups
  - Federal
  - State
  - County
  - Municipalities
  - Department of Transportation
  - Department of Corrections
  - Provide names and references

- Housed - Each group will produce data they need, Longleaf Alliance will be consumer. What key elements will they need? Accuracy level; attributes: forest type, acres, identifier, ownership type; metadata (who, what, how, shareable)
  - Internal server
  - Web based tools
  - ESRI compatible mng
  - Open platform
  - Available to non-ESRI – like .kmz (GoogleEarth)
  - Longleaf Alliance or contract
  - Someone not FOIA/able – Freedom of Information Act

- Continue with Gilbert/Kush project with Longleaf Alliance
- Concentrate on prioritized objective attributes
  - Overstory – longleaf pine presence/absence
  - Understory – presence/absence
  - Keep it simple with a scale for each (0,1,2,3)
- Attributes sources identified allowing for drill down
  - Detailed county information available or not
  - Point of contact critical

- Requests needs to come from the group as a whole

- Management
  - Tract use
    - Registration
    - Level of access
  - Oversight
  - Regional steering committee/advising group
  - Protections
  - Consider copywriting
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- Funding
  - Funding – clear identification of deliverable
    - Grant versus America’s Longleaf Partner Contribution
  - EPA Exchange (Request For Proposals out now)
  - $100K
  - Network of nodes that load data
    - EPA does have a copy
  - Check with NBII for storage of data – Free – Is it FOIAable?
  - Nature Serve – “Data Dump”
    - Making relational databases
    - Will need funding?
  - USFWS Landscape Conservation Cooperatives (LCCs)
    - Serves conservation planning
- Longleaf Legacy/DoD Legacy Resource Management
  - Preproposals due in summer
  - Procedure for support letters/comments
- SERDP Proposals
  - Relate to climate change
  - Proposal for non-feds – January 5th
  - Proposals for Federal – March 1st
- Longleaf Alliance is a valued partner for their funding sources
  - Need existing longleaf acres for carbon sequestration accounting
  - Need existing longleaf for species/ecosystem
    - Modeling and vulnerability
  - Need existing longleaf pine for conservation for herps
    - Understanding understory/wetland interactions

2. Is there a need for a centralized information hub for site scale and/or landscape scale data?

Site Group
- Yes from all groups
- Yes, there is a need for a hub
- But not necessary for holding data
- For tracking “accomplishments”
  - Yes, we need a central database
  - Acres categorized by
    - Maintain
    - Recover/improve
    - Restore
  - Condition
    - Species management
    - See laundry list
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- Dollars spent
- Burning acres

Landscape Group
- Longleaf Recovery Plan Partners Contribute funding to Centralized Spatial Database
  - Landscape level planning and sources
  - Continue Longleaf Alliance/Auburn Project – Longleaf Alliance Request Funding
- Formal request for simple attributes (overstory, understory) to public and private leads - Include meeting overview
- Report

Landscape Breakout – Continuation of Day 1 presented at the end of Day 2

Who is the audience? Longleaf restoration community (not a particular group of decision makers or fund sources)

Implementing the Goals of the LLP Range-Wide Conservation Plan
- Need range-wide information using current technology (including image classification and FIA analysis)
  - Identify/fund a person to conduct periodic (every 1-3 years) satellite-based assessment of forest cover (4 classes: hdwd, pine, mixed, regen) vs. non-forest range-wide. Develop products to define existing and potential “LL” per needs of logic model (see below). Provide technical advice and support for local teams.
  - Explore feasibility of new approaches, perhaps at the local scale. Technical review committee selects most promising ones to test range-wide.
  - Need data to fill in between SGAs (FIA Atlas? NRCS?)
  - Threats analysis at range-wide scale to be delivered to local teams for further analysis
- Need protocol for conservation planning and actions within local implementation areas
  - Use proposed logic model for local group process
    - Start with “historic” range [actually need broader perspective that acknowledges potential effects of climate change]
    - Remove “unsuitable” lands/areas [criterion: can LL grow and thrive there and can active management be conducted?]?
    - Split suitable land into “existing” vs “potential”
    - Develop localized “threat map”
    - Use protocol for selecting landscape units that represent or could represent LL core habitat areas
    - Encourage local teams to identify opportunities for connectivity/corridors between LL core habitat areas

Identify minimum consistent (and important) data sets at three scales—range-wide, major landscapes, local
- Aggregate Range-wide
  - DEM
  - Soils (specifically?)
  - Productivity class
  - Human population and urban spread (SRS-Raleigh, universities)
• Major landscapes (SGAs)
  o Land uses, trends
  o Existing and potential threats (qualitative) Threat map
  o Corridor of least resistance (analysis product?)

• FIA probably has the only datasets that cut across all ownership boundaries for the entire range
• GAP and LANDFIRE appear inconsistent, of questionable quality in some states, and typically “dated”
• Some states (Mississippi, for ex.) have very good products that cover existing and potential vegetation that are updated frequently

• Producing this product and making it publically available, we then task independently driven and funded research to test, improve and modify this information by local level implementation groups. While maybe on the local level, the methodology resulting and the products may be suitable for testing range-wide. The group could reconvene and determine those processes which hold promise and push for range-wide implementation.
  o Passive Approach – Task Force will evaluate independent uses of product and facilitate range-wide application.
  o Active Approach – Acquire funding for multiple (3) graduate student projects with an explicit direction to develop range-wide applications while allowing for a diversity of approaches among individual projects.

• Public vs private land data range-wide

Meeting Notes and Summaries were compiled by John Gilbert and edited by the Planning Committee.

For any questions or comments contact:

John Gilbert
Research Associate III
Longleaf Pine Stand Dynamics Lab
School of Forestry and Wildlife Sciences
602 Duncan Drive
Auburn University, AL 36849-5418
334-329-0236 Lab
334-844-1084 Fax