

Spatial Analysis Questions and Definitions

Project Strategy Team

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The Project Strategy Team (PST) has the important task of setting the context for the project *Spatial Analysis of Forest Landscape Conditions*. This is to be accomplished through the identification of important questions related to the management of forest landscape conditions. These questions will guide the development of analysis tools and techniques, ensuring that products are in line with the needs of forest managers, policy makers, and interested citizens.

Identification of questions commenced in March 2000. The PST has been meeting monthly since then to work on the questions. This document represents the current thinking of the PST. This is a dynamic document that is changing with each meeting. The question identification phase of the project should be completed by late summer 2000.

Questions fall into one of several categories. First there are overarching questions that deal with project goals. Second, there are questions of a technical nature. Finally, there are questions that explicitly address an aspect of one or more of the following four areas: disturbance, vegetation, species, and land ownership/land use. The last set of questions are displayed in tables on the following pages.

Questions Related to Project Goals

1. To what degree do we integrate socio-economic conditions? For the most part, we will not, but there may be opportunities to integrate social and economic factors into modeling.
2. What are the roles and responsibilities of public and private landowners?
3. What are the implications of these tools and analyses (e.g. public – private, land use, property rights)?
4. Are the flora and fauna sustainable?
5. What are the cumulative effects of disturbances?
6. Where are the issues that extend beyond 1 province level being handled/considered?
7. Species list by taxonomic group ultimately ends up at the species level rather than guilds and groups
8. What and where are the most stable elements of the landscape?
9. Can't address all questions – answer those that we can
10. How resilient are the forests – historically and current?
11. What are the effects of past, current, and possible future practices?

General Technical Questions

1. How do we define the scale(s) that meets the maximum number of information needs we have at the landscape level?
2. The scale most appropriate for the analysis will depend on the particular question being addressed.
3. Assumption: We're Using vegetation as a surrogate for defining biodiversity, particularly species that we know little about or do not monitor (invertebrates, bryophytes, etc.).
4. Critical review of the DNR – ECS if we are to use that – goals at the province level?
5. Ability to cross scales – aggregate and cumulate
6. Species populations and habitat/coarse filter and fine filter
7. Can the level or intensity of management be developed or interpreted from this process; what are the implications for interpretation of results?

Definitions

Vegetation Communities

- Vegetation Communities consist of native plant communities (NPC's) and their vegetative growth stages (VGS's):

Native Plant Communities

- Native Plant Community Classes are the potential natural vegetation of a given site, generally defined by understory plant characteristics, soil conditions, and natural disturbance regimes. Also called habitat types or ecosystem types. These classes are stable over time, except for major geological, climatic, or land-use changes. The "containers" in which natural variation occurs.

Vegetative Growth Stages

- ♦ Vegetation composition and age/growth stage within a NPC class or type that exists at various points in time. These stages vary within and between NPC classes and change with succession, disturbance, and management.

Native Plant Community Classes exist in a classification hierarchy:

- ♦ Supersystems are the broadest level, such as forest vs. aquatic.
- ♦ Systems. Supersystems are divided into Systems, such as "Fire-dependent Forest Systems," "Mesic Hardwood Forest Systems," or "Rich Swamp Forest Systems."
- ♦ Classes. Systems are divided into Classes. For example, the Fire-Dependent Forest System is divided into Mesic-Mixed Forest, Dry-Mesic Conifer Forest, and Dry Pine-Oak Woodland Classes.
- ♦ Types. Classes are divided into Native Plant Community Types. Within the Mesic Mixed Forest Class, examples of types are Mesic Great Lakes Pine Forest, or Mesic -Upland White Cedar Forest.

Landscape Pattern

- Composition, size, shape, and arrangement of landscape elements. Elements can be:
 - Vegetation communities (NPC's or VGS's)
 - Landforms, soils, aquatic systems, etc.
 - Disturbances (natural, management)
 - Land use/cover

Disturbance

- ♦ Any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment.

Landscape and Patch

- Landscape: A heterogeneous land area composed of interacting sustainable forest resources that are defined by natural features and socially defined attributes (Minnesota Statutes 1999, 89A.01, subd. 9).
- Landscape mosaic: variable sets of user-defined patches which exhibit significant differences in terms of composition, structure or function.
- Patch: A spatially explicit area which is relatively homogeneous in terms of species composition and/or structure, and distinct from its surroundings

Disturbance Table

Questions	Pre-European	Pre-European to Current	Current	Possible Future	Technical Questions/Issues	Linkages
1. What is the landscape pattern of disturbances?	X	X	X	X	<p>What are the disturbances that we can consider and how do we ground truth? What is the smallest size element that we are going to consider? What are the conditions classes that assess forest health risk?</p> <p>Determine the rate of change between time periods.</p> <p>What were the type, size, intensity characteristics?</p>	
2. What are the rates of change in landscape patterns of disturbances?	X	X	X	X		
3. To what extent are disturbances influenced by patterns of ownership? What are the rates and patterns of change in ownership?		X	X	X		Ownership/ Land Use Q1
4. To what extent is landscape pattern of disturbance influenced by landform, topography, soils, lakes, etc?						
5. How are land use or disturbance patterns related to the extent of exotics?		X	X	X	DNR list of harmful exotics DNR analysis example	Ownership/ Land Use Q5

Vegetation Table

Questions	Pre-Europea n	Pre-Europe an to Current	Curren t	Possible Future	Technical Questions/Issues	Linkages
1. What is the landscape pattern of vegetation communities?	X	X	X	X	What are the cover types and age-classes? What is the useful cover type classification? What is the useful age-class classification? What are useful metrics and how will that be used to assess wildlife? How can modeling be used in determining pre-settlement and future landscape patterns? What is the minimum as well as full set of landscape descriptors that are helpful/useful in forest management? What is the smallest size element we are going to consider? Are we limited to 30m on a side pixels?	
2. What are the rates of change in landscape patterns of vegetation communities?	X	X	X	X	To what degree is the change irreversible?	
3. To what extent are vegetation communities connected, separated, and fragmented?		X	X	X	Is age-class a way to define fragmentation? Interruption of continuity. At multiple hierarchies	Species Q5
4. To what extent is landscape pattern of vegetation communities influenced by disturbance and/or landform?	X	X	X	X	Is the pre-settlement vegetation pattern a useful reference point for vegetation land potential?	
5. What are the rare vegetation communities and where are they?		X	X	X	Is it possible to identify the critical or key vegetation communities?	
6. How does change and variation in vegetative growth stage patterns link to disturbance?		X	X	X	Vegetation growth stages	Reciprocal of Q8
7. What is the landscape pattern of timber productivity levels in vegetation communities.			X	X	Productivity both potential/inherent and realized	
8. To what extent are physical conditions and vegetation communities influenced by disturbance patterns? (combine with question 6?)		X	X	X		Reciprocal of Q6

Species Table

Questions	Pre-Europea n	Pre-Europe an to Current	Current	Possible Future	Technical Questions/Issues	Linkages
1. What are the effects of change in landscape patterns on different wildlife species?	X	X	X	X	We don't know what is quality habitat for many species – probably can do for some plants, birds, and mammals	
2. Which species are potentially affected by landscape patterns of vegetation communities?		X	X	X	We don't know what is quality habitat for many species Generalist versus specialist Literature and expert review product. USFS population viability assessment	
3. What species are at or below thresholds for population viability because of changes in landscape patterns?		X	X	X	For those species where the threshold is known. Scale issue here.	
4. What are the distributions of mature conifers, large interior blocks of forest, other questions that relate back to species of risk?		X	X	X	Vegetation growth stages	
5. How does the configuration of vegetation communities relate to the dispersal abilities of species at risk/of concern?		X	X	X		
6. Is there a difference for species and their associated vegetation communities whether they are on the periphery or the center of their range?		X	X	X		
7. What are the vegetation community patterns that species are associated with?						Similar to Q2?
8. Are there thresholds for landscape change or connectivity that accelerate population declines toward a risk of endangerment or extinction; how do they differ for different species and vegetation communities?			X	X		

Land Ownership/Land Use Table

Questions	Pre-European	Pre-European to Current	Current	Possible Future	Technical Questions/Issues	Linkages
1. What are the effects of ownership on landscape pattern?						
1b. To what extent are disturbances influenced by patterns of ownership?		X	X	X		
2. What are the rates and patterns of change in ownership?		X	X	X		
3. What is the extent and landscape pattern of human alterations (roads, dams, power lines, mines, etc)?		X	X	X		
4. What are the impacts and cumulative impacts of land use on aquatic resources?		X	X		DNR list of exotics	Disturbance Q4
5. To what extent are land use and landscape patterns of disturbance related to exotics?			X	X		