Team members present: Bill Befort, Lee Frellich, Lawson Gerdes, Mike Hauser, George Host, Tim Jones, Jim Manolis, Tom Ziesler, Jim Manolis (Team Leader).

Other staff present: Chris Edgar (FRC, Spatial Analysis Project Manager), Daren Carlson (DNR, OMBS)

Submitted by Jim Manolis and Daren Carlson.

Meeting opened with introductions.

Overview of Project:

Several team members were new, so Jim Manolis gave a brief overview the project purpose and vision and updated staff progress to date:

Project Purpose

♦ The project aims to improve understanding of historical landscape patterns and possible future conditions as a guide for forest planning and management strategies.

♦ The project will work to determine the value and limitations of spatial pattern data in developing science-based management strategies and in evaluating the consequences of alternative decisions.

Purpose--Strategy Team Vision

♦ Improve the understanding of conditions and changes in landscapes through the depiction of past, current, and possible future landscape patterns

♦ Develop effective tools that assess those conditions and changes through an iterative process of implementing, testing, and interpreting

♦ Identify strengths and limitations in data, in the uses of spatial data, and in the interpretation of analyses

♦ This effort adds to and does not replace existing planning efforts nor does it address all concerns and issues related to the management of forest landscapes.

June 6, 2000 Technical Team Minutes:

Participants were asked to comment on the Draft Minutes from the 6-6-00 Technical Team meeting. No comments were made except for the previous comments by Lawson Gerdes regarding relevé plot location. Jim provided Lawson a modified version of her comments for her to review.

Strategy team meeting review:

Jim summarized the results of the June 16, 2000 strategy team meeting. Topics covered were:

1. Definitions – Strategy team provided some changes to the list of definitions and have been incorporated.

2. Geographic extent of analysis – During the June 6 PTT meeting, the PTT wanted the PST to define the geographic extent of analysis. PST responded that it depended on the question and they needed more information from the PTT before geographic extent could be determined.
3. Questions tables – PST wanted to keep the disturbance table separate from the vegetation table but stated that the PTT could reorganize questions for their use. However, the PTT should use the question table as a guide to their progress to ensure all questions are addressed.

4. Tasks for technical team: The Technical Team will meet in July and August to determine methods to answer the questions and provide a report to the PST for their next meeting on 9-8-00. For each question, the PTT will identify:

   Analysis tools

   Data Available
   - Problems with data

   Data Gaps
   - How to fill in the long run

   Benefits and costs of different analysis approaches

   Links to other projects

Other Updates:

Jim and Daren compiled a preliminary table of data sources and related projects. This table was handed to PTT members. Jim and Daren are also keeping a bibliography of spatial analysis literature—this will be made available to participants.

Native Plant Community Hierarchy definitions – DNR’s Natural Heritage Program has been working on definitions. Draft definitions will be distributed to the team.

Conceptual Model of Factors Driving Spatial Patterns of Forest Vegetation:

Modeling as a guide to integrated research.-- Jim handed out a one-page description of “Modeling as a Guide to Integrated Research” (by Tony Starfield, U of MN, and John Dwyer, US Forest Service). The handout emphasizes the utility of developing a conceptual model early in a collaborative research or assessment project. The process of developing the conceptual model serves a number of purposes: it forces participants to cooperate from the beginning and helps develop a whole system mind-set, it helps clarify objectives and questions asked, it helps identify key components and issues, pinpoints crucial data needs, and helps provide a shared understanding and common language for the scientists participating in the project.

Developing a conceptual model:-- Team members thought this approach would be helpful. Jim and Daren had developed a draft conceptual model of the interaction between the driving factors of spatial patterning of vegetation, and they presented it to the team. Participants provided several suggestions for changes and the updated model is below. (Main comments were that the landscape pattern of vegetation box should be larger and in the center of the diagram to emphasize that is the focus of the project), response of vegetation or vegetation growth needs to be included, and that there are other interactive arrows not represented.

Native Plant Community Class Mapping:

George Host presented preliminary map outputs from his Native Plant Community (NPC) class mapping efforts for the North Superior Uplands. The final output is a map of potential NPC vegetation and shows remarkable resolution. George is working on a write-up of methods and results and this will be available soon. The intent is to combine these maps with Lee Frelich’s RNV model to assess the range of natural variability of vegetative growth stages within NPC classes. The team will also explore the utility of calculating landscape metrics using the NPC maps.
Analysis Approaches:

Since the June technical team meeting, Jim and Daren developed a “Data sources over time” schematic. See below. Team members commented on the lack of data for earlier time periods. The table prompted a discussion over sources for future modeling which is detailed more below.

Participants brainstormed different approaches to analysis. It was agreed that two, possibly more, scales of analysis were needed for the change analysis.

Air photo sub-sampling:

A air photo sub-sampling scheme was discussed. Bill Befort said that the 1930’s air photos cover virtually the whole state and we are losing this resource as the photos are degenerating. He estimated that to scan (and rectify?) the entire state coverage of the (1930's only?) photos would cost $500,000. This does not include interpretation.

Participants agreed that interpreting a sub-sampling of air photos from the 1930’s, 1960’s and 1990’s, and comparing these to the extent possible with GLO line-note information was a viable change-analysis approach. The team discussed that using photos has advantages over satellite imagery because it does not duplicate the many current satellite projects, and can provide information on vertical stand structure which is limited when using satellite data. Also, the air photos go back and time further than satellite imagery.

The team discussed using case studies vs. a sub-sampling/extrapolation approach. It was noted that efforts could be limited in geographic extent to show how it works, and could possibly lead to further analysis from an LCMR or another grant. Extent of potential sub-samples was discussed. Townships would be a possibility, but might be too small to capture large disturbances. Other data sources may be needed to capture the largest disturbances (Heinselman’s data, Satellite data). LTA’s (Landscape Type Associations) might be another viable sampling unit.

There was some discussion about what landscape metrics should be used, but team members agreed that it’s too early in the process to make these decisions. Bill Befort asked whether studies have been conducted on how scale, resolution, and number of classes used can influence landscape metrics. He pointed out that just changing these variables would have a large influence on landscape metrics, which have nothing to do with what is actually on the ground. Tim Jones and others said a number of studies have been done and published in Landscape Ecology and other journals. These issues will have to be considered when selecting landscape metrics and interpreting results.

Staff will investigate costs for the Air Photo and GLO methodology, and write-up methods for discussion.

Future modeling efforts:

The team discussed that there are not enough resources to develop a new model and likely the best approach will be to modify an existing model. Potential models identified were HARVEST for short time frames and LANDIS for longer term. Tim Jones described his work of linking the LANDIS output to bird communities. Chris Edgar commented that these models are difficult to use for tactical decision-making. He thought a range of models should be considered including operations research/harvest scheduling models. Operations research models attempt to find a solution to meet a range of objectives, rather than simulate outcomes of different scenarios. The team agreed that a full range of models should be considered.

Lee Frelich discussed incorporating climate-change scenarios into modeling efforts. He pointed out that climate change models predict very different results on the distribution of forests in Minnesota depending on which model is used.

Strategy Team Question Table:

Team members decided to go over the question table to identify what was and was not feasible and covered parts of the disturbance, vegetation, and species tables before running out of time. Results are recorded in the question tables (a separate document, attached).

Of note was a discussion about the species component of the project. Team members felt that we had to manage expectations about the ability to model responses of individual species (given available funding). Chris Edgar stressed a concern about the usefulness of analysis and model results if they are not tied to species needs.

The team will meet again on August 16, 10-3:00 at the Cloquet Forestry Center to further discuss and refine methods.
Conceptual model of factors related to landscape patterns of forest vegetation

- Landform
- Hydrology
- Soils
- Climate

Vegetation Response
- species type
- growth rate

Landscape pattern of vegetation
- Patch size, shape, arrangement
- Patch composition

Species relationships
- Ecosystem Processes
  - primary productivity
    - including timber
- Hydrologic processes
  - aquatic systems

Resources--Benefits produced by landscape patterns:
  - Tourism,
  - Timber,
  - Wildlife,
  - Aesthetic Values etc.

Natural disturbance

Human Development

Management

Social and economic processes
- Ownership patterns
- Demographics
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**Data**

- Stand inventories - SNF
- Aerial photos - Cloquet Valley S.F. digitized

**Existing Projects & Potential Change Analyses**

- FIA/ bearing tree comparisons - Almendinger
- Air photo subsambling - partner with Guideline Monitoring Project?
- NALC/ Brown
- Pastor
- Wolter

**Technologies**

- Lidar
- Radar
- Hyper-spectral

**Remote Sensing**

- MODIS
- Integrated data /modeled maps; K-nearest neighbor approaches, NPC mapping
- FIA
- Landsat
- MSS
- TM
- AVHRR

**Digitized Data**

- GLO line notes
- Heinselman fire origins
- Bearing trees
- Marschner