

DRAFT Minutes from Spatial Analysis Project Technical Team Meeting
9/27/2000
Cloquet Forestry Center
10:00 AM to 3:00 PM

Team members present: Jim Rack (for Bill Befort), Lawson Gerdes, George Host, Tom Burk, Lee Frelich, Tom Zeissler, Dave Shadis, Jim Manolis (Team Leader).

Guests present: Jan Green (MNFRC), Mark White (NRRI), Chad Skally (MNFRC staff)

Staff present: Daren Carlson (DNR, OMBS)

Submitted by Jim Manolis and Daren Carlson.

Meeting opened with introductions. Jim Manolis proceeded to the agenda and the following headings follow the agenda format.

Timeline

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- George Host suggested that we first determine the finest level possible technically and then determine what is feasible financially.
- Members discussed the importance of finding good air photo interpreters and that interpreters need to be trained with good in house supervision.
- ***Members tentatively concluded that an Anderson “2.5” be used and is detailed as follows: Differentiate pine from spruce/fir and aspen/birch from other hardwoods. Develop rules, or adapt existing rules, to determine mixed categories. We didn’t get to this level of detail during the meeting, but proposed categories are: Urban developed, Agriculture, Grassland, Jack-pine, Red-white pine, Mixed coniferous, Aspen, mixed deciduous, mixed coniferous, water, lowland conifer, lowland hardwood, lowland shrub, other wetlands. If necessary we could lump some of these.***

Age classes/ structural classes

- All agreed that age should be differentiated, although this poses difficulties. Lee Frelich pointed out that the relationship between age-class and structural characteristics varies across sites and therefore we should focus on characterizing structure. Jan Green stressed the importance of distinguishing between 0-5 and 5-20 year age-classes as this distinction is important to birds.
- Most agreed that we follow process-based structural stages where we identify stand initiation, closed canopy stem exclusion, and understory reinitiation/ old growth.
- Jim Rack suggested that at least 3 structural classes should be identifiable from the photos and described them as:
 - a) Fine-textured even distribution of crown height and shape
 - b) Fine-textured with larger crowns becoming apparent
 - c) Coarsely textured as a result of uneven crown heights and shapes.
- Jan Green raised the concern about distinguishing between shrubs and young trees and, further, if we can distinguish between ericaceous and non-ericaceous shrubs.
- Several members expressed that much of the discussion is dependent on the defined MMU and discussion turned to that topic.

Minimum mapping unit (MMU)

- Most of the 1930’s photos are 1:15840 or 1:24000 scale, and a 10 acre MMU is more than feasible at these scales. The DNR’s CSA coverage has a MMU of 5 acres with 2 acre inclusions. Lee Frelich’s air photo study used 10 (ha?) moving windows.
- A MMU for the GLO line notes is less clear and involves using line transect theory to develop confidence limits of the small patches that were missed by the transects.
- Daren Carlson expressed concern that using a MMU of 10 acres could miss fundamental grain changes resulting from large patch dynamics to gap dynamics, or vice versa. Lee Frelich said these differences should be captured using mixed cover-class categories.
- ***Members agreed that 10 acres was a reasonable MMU and provides a compromise between resolution and extent.***

Spatial Metrics

The team considered a list of metrics that Jim had added to Appendix 3. Team members suggested adding largest patch, edge metrics, and core area metrics. Specific metrics will need to be discussed further as we get into analysis.

Sample unit size, number of samples, and statistical analysis

- Jim Manolis asked about rule of thumb to determine sample size vs. patch size. Tim Jones had suggested a rule at a previous meeting and we need to get the rule from him, and references he mentioned. Lee Frelich cited

Schugart's rule that reserves should be 50 times the mean patch size and Lee said that, while the rule was in reference to reserve design, the considerations are essentially the same as for this study.

- Jim Manolis stressed the need to assess the affect of sample unit size on spatial metrics, and get variance estimates to estimate statistical power. Effects are likely to vary across metrics.
- Lee Frelich suggested that more likely we will need to use non-parametric tests, such as Mann-Whitney or Kruskal-Wallis, and that we should base the power analysis on these types of tests.
- Tom Burk pointed out that the complexity of power analysis increases as the complexity of the statistical analysis increases. However, the team agreed that assessing power for simple tests would at least give us some idea of statistical power that might be obtained.
- ***The project will contract with George Host and Mark White to test different sample unit sizes and their effects on spatial metrics, and obtain variance estimates for power analyses. If possible, they will provide results from this work at the next meeting.***

Stratification

Jim Manolis reviewed reasons for stratification. Stratification increases precision of estimates of interest, given a fixed effort (without increasing sample size). Strata can also define groups to be compared.

So far, the team has considered stratifying based on geomorphology and ownership.

- Jim Manolis presented the relative proportions of geomorphology type in the Laurentian Mixed-Forest province and in the Northern Superior Uplands and Drift and Lake Plains Sections. Jim showed that fewer than half of the townships in the Laurentian Mixed-Forest province are dominated by a single geomorphic type. Several members stressed the potential importance of areas with mixed geomorphology and were concerned that stratification based on geomorphology may exclude these areas. Dave Shadis said that it is often the geomorphic transition zones in the Chippewa National forest area that have important spatial processes.
- Jan Green questioned the premise of using geomorphology for stratification. She said that, while geomorphology may determine the base grain, change in the landscape grain is mostly human derived and land ownership should be the stratification basis. George Host stressed that the geomorphology determines the extremes of heterogeneity imposed by the landscape and that ownership can be an up-front criterion, but not necessarily a strata.
- Tom Burk asked whether stratification was really necessary. He stated that stratification is used to efficiently estimate a population mean and it seems we are instead focusing on temporal change rather than trying to characterize the entire landscape.
- Dave Shadis observed that since 75% of the Laurentian Mixed forest province is composed of the top 4 geomorphology types, stratification may not buy us much efficiency over pure random selection.
- ***The team agreed that stratified-random selection was not necessary. Sample sites should be selected randomly, excluding large lakes and non-forested wetlands.***

Time periods

We further discussed the time-periods to consider, and whether we could drop down to 2 time periods to save funds.

The team agreed that we still need to look at three time periods, and 1930's, 1970's, and 1990's are the suggested time periods.

Spatial Analysis of Derived Data Sources

At the September 8 meeting, there was a suggestion to combine several budget topics into this one. The objective is to use a variety of analyses to measure spatial attributes of several data sources. Data sources include:

Interpreted aerial photos from the three time periods
Digitized GLO notes
Classified LANDSAT images
Range of Natural Variability type maps

The priority will be on the first two data sources. Team members agreed that more funds need to be allocated to this topic, \$45,000 minimum.

Future modeling

- Jan Green suggested we expand our list of candidate models and mentioned SNAP and NED models in addition to Landis and Harvest. Jim Manolis suggested that we consult with others and do a literature review to consider a whole range of models. Jim cited the following paper that reviews models and decision support systems:

Rauscher, M.H. 1999. Ecosystem management decision support for federal forests in the United States: A review. *For. Ecol. and Mgmt* 114: 173-197.

We will discuss the future modeling component in more detail at the next meeting.

Literature Reviews

Team members asked whether the “literature review” label best captures what is intended for this topic. We’re interested in a synthesis of information, not just a list of references. The team agreed to change the label to “white papers” to better reflect the intended purpose. At a minimum, we would look at the following topics:

- 1) Species related to spatial parameters
- 2) Models for future forest conditions
- 3) Models for animal species

Other topics of interest are:

Effects of spatial patterns on ecosystem processes such as insects and disease, hydrologic processes, and windthrow.

Budget

Jim presented a revised budget, based on suggestions from the joint Strategy Team/Technical Team meeting. The budget reduced the dollar amount in GLO note and literature review categories, and increased dollar amounts in future modeling, spatial analysis of derived data sources, and species modeling/interpretation topics. The technical team suggested further modifications:

- 1) Remove \$15,000 from the literature review topic, so that it is now at \$20,000.
- 2) Increase the Spatial analysis of derived data sources by \$7,500 to \$45,500.
- 3) Combine species-modeling and future-modeling topics, and increase from \$50,000 to \$57,500.

The team will meet again on October 13, 10:00 AM to 3:00 PM at the DNR Grand Rapids Resource Assessment Office to further discuss and refine methods and priorities.