

Public Preferences for Future Conditions in Disturbed and Undisturbed Northern Forest Sites

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Introduction

Although professional foresters share a reasonably precise and consistent language for describing forest conditions, this language is not always understood by the public. Therefore, verbal surveys alone are not sufficient for determining public preferences for future forest conditions. Orland and Ursavas (this volume) present one way for managers to communicate with the public about alternative forest management options and outcomes. Realistic and biologically accurate visualizations of future forest conditions can help translate complex biophysical data into meaningful information that concerned citizens can understand. *Such carefully created visualizations can aid manager-public communication in a number of contexts including informal “what-do-you-think-about-this” conversations, formal public meetings, research focus groups, and systematic surveys of public opinion.*

This paper describes findings from a survey of residents and visitors to the Boundary Waters Canoe Area Wilderness (BWCAW) and Gunflint Trail area in Minnesota. Participants expressed their preferences for forest management alternatives based on computer visualizations (pictures) of predicted outcomes over time. Because management actions influence forest conditions for decades, it is not sufficient to assess preferences between options at only one point in time. Rather, each management option is best represented as a series of forest conditions that change over years. For this survey, computer-generated visualizations of projected forest conditions showed alternative management options for the same site over an 80-year period. Respondents viewed two projected-outcome visualizations (treatment vs. no-treatment) for the same site and selected their preferred outcome from the pair. Each of the eight sites used in the study was typical of an important northern forest type in the BWCAW/Gunflint Trail study area that had been hit by a major blowdown on July 4, 1999. Five of the sites were severely affected by the blowdown (disturbed sites) and three were not significantly affected (undisturbed sites). Three treatment versus no-treatment pairs were created for one of the undisturbed sites, so there were 10 choice pairs in all. A quantitative rating-scale response format allowed precise measurement of preferences at each of five projected time-steps (2, 12, 22, 52, and 82 years after treatment), as well as overall preferences based on a review of the full 80-year progression of forest conditions.

Key Findings

For disturbed sites (where virtually all trees had been blown down), both visitors and residents generally preferred salvage-and-plant treatment scenarios over no-treatment (natural regeneration) alternatives. For undisturbed sites, both respondent groups consistently preferred no treatment over treatments (thin, or thin and plant). These preferences were consistent with frequently expressed opinions that forest managers should “fix broken sites,” but “leave unbroken sites alone.” This sentiment will come as no surprise to managers. Participants’ choices were guided only by visualizations of projected future forest conditions for actual sites without any indication of which visualizations represented active treatment or no treatment. Our findings therefore indicate there may be a substantial basis for this commonly expressed pattern of public preferences, a pattern based on how the resulting forest looks rather than on preconceptions about forest management.

The strength of respondent preferences for treatment versus no-treatment scenarios was different for different sites. This may be due to differences in the growth rates of the different tree species on each site, differences in soils, or other site-specific conditions affecting treatment response that were reflected in the visualizations. For both of the undisturbed jack pine sites, respondents slightly preferred thinning in the early years after treatment, but this preference dropped off in the later years. For disturbed jack pine sites, respondents had a relatively consistent but moderate preference for treatment conditions (i.e., planting of jack pines) over all time-steps. For disturbed aspen/birch/conifer sites, there was greater variability in respondents’ preferences for planting of red and white pines. In general, the thin and the thin-and-plant options were soundly rejected by all participant groups for the undisturbed aspen/birch/conifer site.

Relative to visitors, residents generally showed slightly higher preferences for the projected conditions associated with treatment options for disturbed sites. This finding is consistent with a general tendency for residents to respond more strongly than visitors to the observable differences in forest conditions.

Ratings for conditions far in the future (+52 and +82 years, when most respondents will be dead) factored more heavily into respondents’ overall preferences than ratings for the more immediate conditions (+2 and +12 years). This finding suggests that participants were applying a “negative discount rate,” which contradicts the usual economic assumption that long-term future benefits are less valuable to consumers than short-term benefits (i.e., a dollar tomorrow is worth less than a dollar today).

Detailed Findings

Some of the key findings from this study will be discussed in the next three sections. All of the results and comparisons discussed below proved significant and were substantially robust in the statistical analyses of project data.

Study Site Specifics

Each of the eight sites used in the study was selected to be typical of important northern forest types in the BWCAW/Gunflint Trail study area. Five of the sites were severely affected by the blowdown (disturbed sites) and three were not significantly affected (undisturbed sites). The biophysical conditions simulated in the visualizations were developed by professional foresters using computer models calibrated to the appropriate forest type and to the initial conditions at each site. For each site, two management scenarios were modeled and visualized. One scenario assumed minimal or no management action (no treatment) and the other assumed what foresters thought would be the most appropriate active management approach (treatment) for the site. For one of the sites (north poplar undisturbed) two different treatments were modeled and visualized (thin and thin-and-plant), although the same no-treatment option was used for each. One additional pair compared thin versus thin-and-plant for the north poplar site, bringing the total to 10 site/treatment pairs to be evaluated. Characteristics of the study sites and associated treatments are briefly described in table 1.

Table 1.—Brief description of study sites and treatments

Initial condition	Site name	Forest type	Treatment strategy
Undisturbed	Dumpster	Jack pine	Thin to reduce fire risk
	Rotten Jack Undisturbed	Jack pine	Thin to reduce fire risk
	North Poplar Thin		Thin to reduce fire risk
	North Poplar Thin Plant	Aspen/birch/conifer	Thin and plant red/white pine
Disturbed	Trapper	Aspen/birch/conifer	Plant red/white pine and control hardwoods
	Rudy Salvage	Aspen/birch/conifer	Plant red/white pine and control hardwoods
	Rotten Jack Salvage	Jack pine	Plant jack pine and control hardwoods
	Magnetic Lake	Aspen/birch/conifer	Plant red/white pine and control hardwoods
	Guard Station	Jack pine	Plant jack pine and control hardwoods

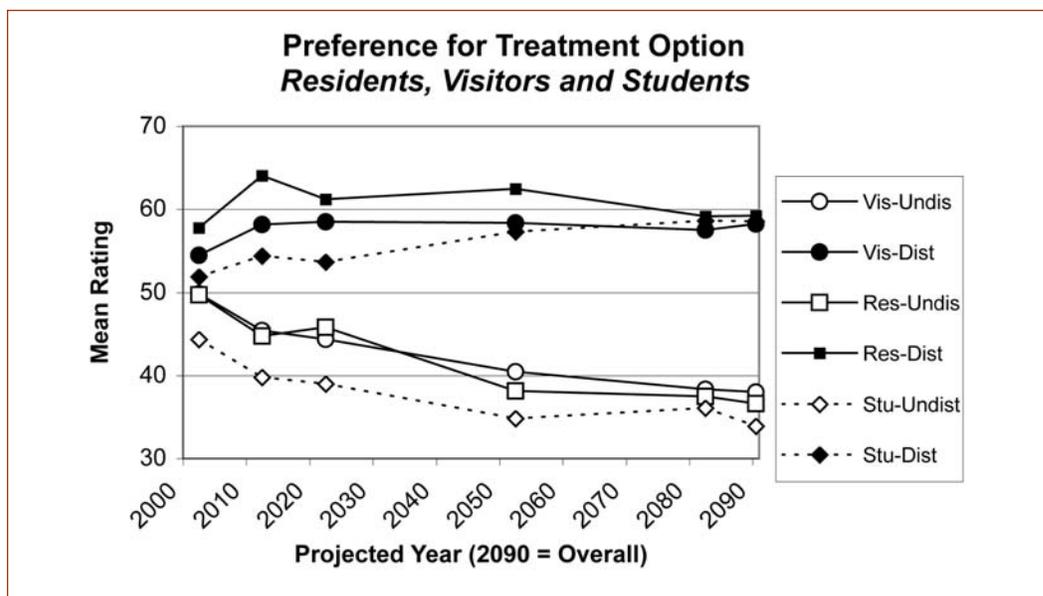
Three separate views of each site were shown in the visualizations to depict the variability in both initial conditions and post-treatment conditions (illustrated in Orland and Ursavas, this volume). Conditions for each site management alternative were projected for 2, 12, 22, 52, and 82 years into the future. The study described here focused on people’s preferences for the no-treatment option versus the treatment option at each forest site, but did not compare people’s preferences across different sites

Overall Preferences

Comparisons of residents’ and visitors’ preferences for treatments (versus no treatments) at disturbed versus undisturbed sites are of particular interest. Figure 1 shows average preference scores over the five time periods and overall scores for treatment options.

Residents and visitors generally preferred visualized forest conditions of treatment options for disturbed sites but preferred the no-treatment options for undisturbed sites. Both groups expressed the strongest preferences for treatment-scenario conditions at the disturbed sites in the first two time periods after treatment (years 12 and 22). For undisturbed sites, both groups had progressively decreasing preferences for treatment options (or increasing preferences for no-treatment options) over the 80-year simulation period.

Figure 1.—Residents, visitors, and students all preferred treatment options (planting) for disturbed sites, but preferred no-treatment options (versus thin or thin-and-plant treatments) for undisturbed sites



Note: Values below 50 indicate that no treatment is the preferred option.

Also shown in figure 1 are the mean preference ratings for a group of 60 college students from a southwestern university who participated over the Internet. Although these students were not directly familiar with the sites, or the forest type generally, their preference patterns are quite similar to those of residents and visitors, confirming that this basic pattern of preferences can be expected to be quite robust over a number of demographic and other participant variables. Such consistency across groups is commonly found for perceptual judgments based on landscape scenes.

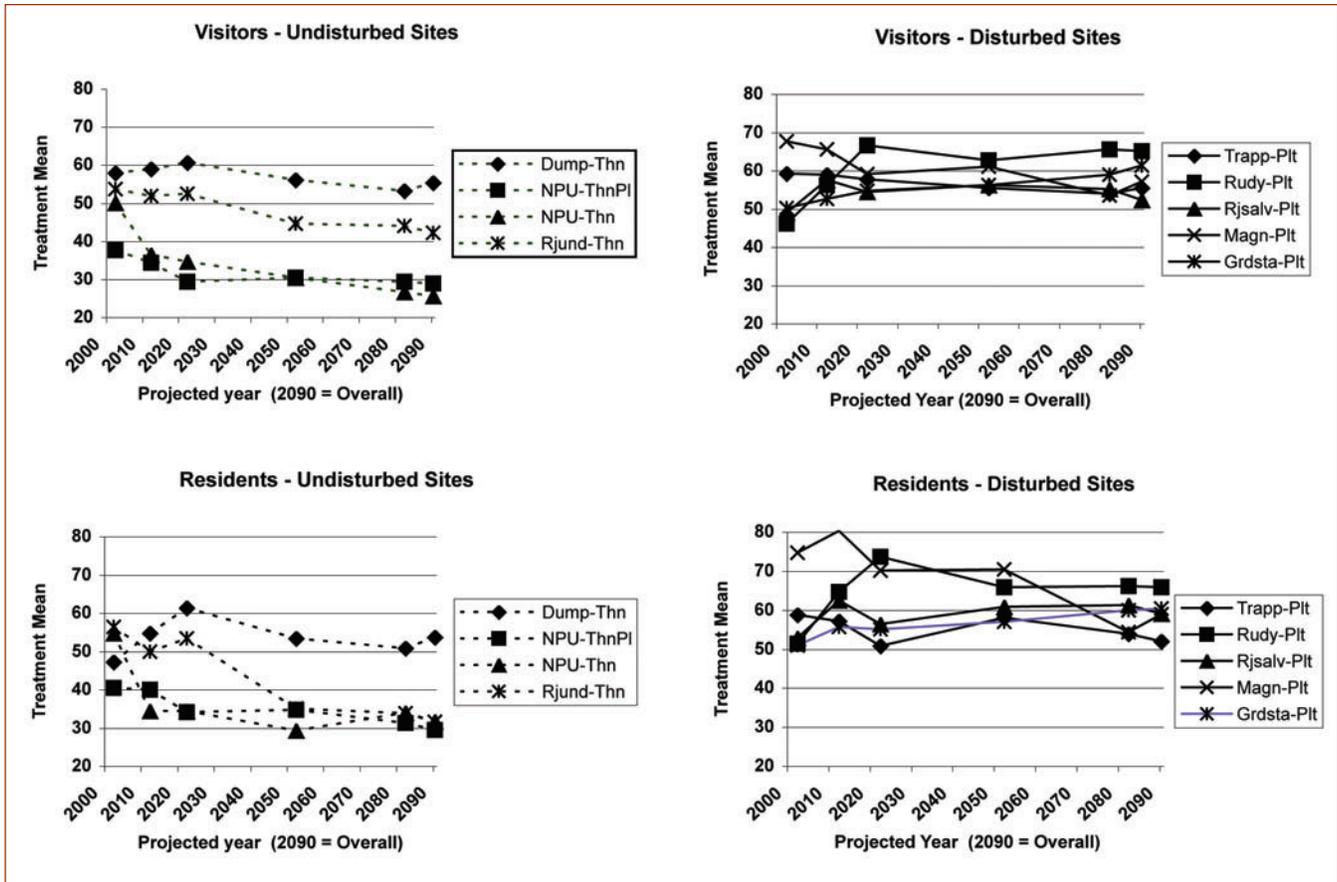
Figure 1 suggests that the overall preference judgments for all groups (graphed at year 2095) tended to most closely match respondents' judgments for the later time periods. This effect was confirmed by multiple regression analyses predicting overall ratings using the separate ratings for each of the five projection-years as independent variables. Ratings for conditions far in the future (52 and 82 years, when most respondents will be dead) weighed more heavily in predicting overall preferences than ratings for more immediate conditions (2 and 12 years). Economists generally assume that future benefits should be discounted; i.e., that a dollar tomorrow is worth less than a dollar today. In contrast, participants in this study gave substantial consideration to environmental conditions that would be achieved far in the future, a finding we are pursuing in ongoing research.

Site-Specific Results

The strength of respondent preferences for treatment versus no-treatment scenarios was different for different sites. This finding may be due to differences in the growth rates of the different tree species on each site, differences in soils, or other site-specific conditions affecting treatment response that were reflected in the visualizations. This finding was anticipated. In fact, the expectation of such differences helped guide the selection of forest sites for this study, and the projected treatments for different sites (including the intensity and timing of treatment stages) took the different initial site conditions into account. The relatively smooth and progressive changes in preferences over time for the disturbed versus undisturbed classes of sites shown earlier in figure 1 reflect the statistical effects of averaging. There is no reason to expect that any particular site would exhibit the exact same smooth and progressive pattern of preferences over the time period simulated.

The left panel of figure 2 shows that the thinning treatment for the Dumpster site (undisturbed jack pine) was generally slightly preferred by both visitors and residents. A similar thinning option for another jack pine site (Rotten Jack Undisturbed or Rjund) was slightly preferred by both groups for the first three time periods (+2, +12 and +22 years), but preferences shifted toward the no-treatment conditions in the later years (+52 and +82 years), especially for residents. The initial condition for both of these undisturbed sites was a rather dense uniform stand of moderate-size jack pines. Apparently the thinning treatments tended to improve attractiveness for the first few time-steps, but

Figure 2.—Preference patterns for visitors and residents over time for individual study sites within disturbed and undisturbed classes



Note: Values below 50 indicate that no treatment is the preferred option.

this perceived improvement failed to hold up as the forest grew in the later years, most dramatically so for the Rotten Jack site. Residents and visitors both preferred no treatment to either of the treatment options for North Poplar Undisturbed (NPU), with the treatment condition generally faring progressively worse over time periods. Based on the visualizations, none of the participant groups were favorably impressed with the effort to shift this stand from a mixed aspen/birch/conifer forest toward a red and white pine forest by thinning and then suppressing regeneration of hardwoods.

For disturbed sites, visitors and residents consistently preferred planting treatments over no treatment with natural regeneration (right panel of figure 2). Residents also generally showed slightly higher preferences than visitors for the projected conditions associated with treatment options, especially for the Magnetic and the Rudy sites. This is consistent with a general tendency for residents to be more sensitive than visitors to the changes in represented forest conditions. The Magnetic site also showed a

distinct pattern of stronger initial preferences for treatment that then declined progressively over time. In contrast, Rudy (another aspen/birch/conifer site) showed no difference in preferences for initial treatment versus no treatment, followed by an increase in preference for the treatment scenario by the +22-year time-step, where it leveled off. Respondents showed a relatively moderate but consistent preference for treatment conditions (versus no-treatment conditions) over all time-steps at both disturbed jack pine sites (Rotten Jack Salvage and Guard Station) and at the Trapper (aspen/birch/conifer) site.

Study Background

On July 4, 1999, the “Blowdown” profoundly changed hundreds of thousands of acres of northern forest. Among the heavily affected areas in the U.S. were public forests around the Boundary Waters Canoe Area Wilderness, including a narrow peninsula of private and public lands along the Gunflint Trail in northern Minnesota. The immediate effect of the blowdown was an immense tangle of uprooted and snapped-off trees that blocked roads, trails, and canoe routes over miles of the landscape. At the beginning of the study reported here (2000), some of the disturbed areas had already been salvaged and cleared, and some had recently been planted. In many places, however, there were still large areas of downed trees, all pointing in the same direction (“the wind went thataway”). These dramatic changes have continued to affect forest conditions and will for decades to come. The blowdown stimulated both public interest and forest management action. Forest managers and the public generally agreed that the “fuels” in blowdown areas had increased wildfire hazards and that affected areas should be restored to ecologically healthy, less hazardous conditions. There was considerably less agreement about exactly how this should be done and about what future conditions forest managers should strive to achieve. This latter concern was the focus of the study described here.

Participants

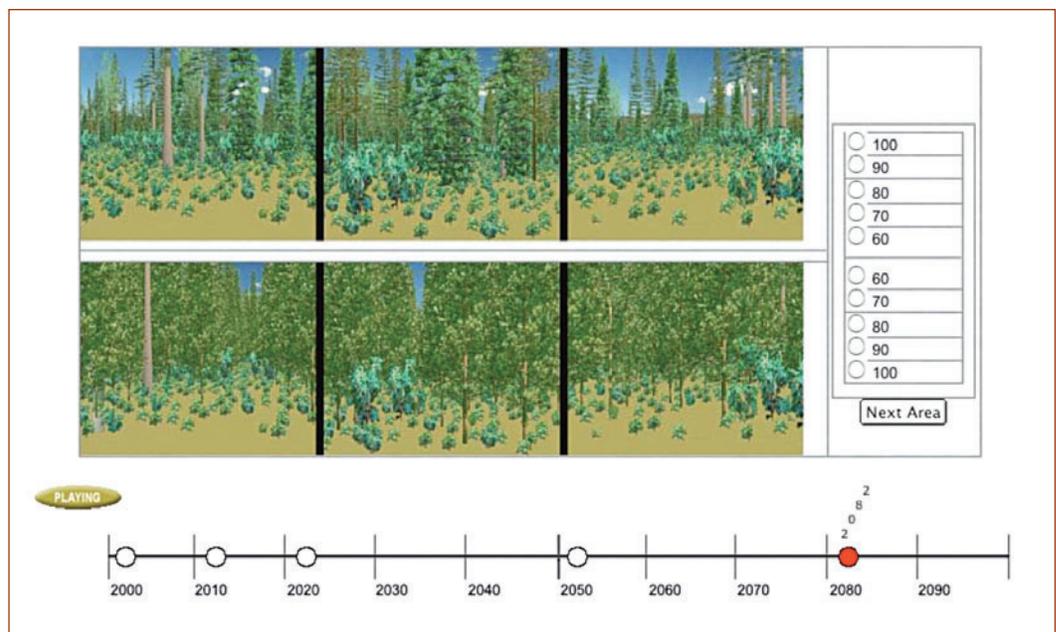
A total of 215 visitors and 85 residents agreed to participate in the visualization-comparison survey during the summer of 2003. Participants were intercepted at the Gunflint Ranger District Office (where most were on their way to or returning from a BWCAW trip), the Gunflint Trail Association Visitor Center, the Java Moose coffee shop (which had a mix of residents and visitors/tourists), and the town RV Park (which had medium- to long-term visitors) in Grand Marais, MN. In addition, respondents were recruited from various lodges, outfitters, and camping facilities along the Gunflint Trail. Although no claim of a formal “probability sample” can be made, responses to personal information questions confirmed that a very broad cross section of residents and visitors participated in the survey. The similarity of results obtained from a sample of university students further indicates that the general response patterns observed can safely be generalized over a considerable range of participants.

Procedures

Visualizations were presented for evaluation on individual laptop computers. Participants first read a brief background about the BWCAW-Gunflint Trail study area, the blowdown and its effects on the forest, and public forest managers' desire to know public preferences for future conditions in the area and for northern forests in general. A standard set of instructions described the procedures to be followed in the study. Each participant proceeded independently at his/her own pace to view and evaluate the treatment versus no-treatment pairs for each of the sites assigned and then to answer a few questions about themselves.

Evaluations for each site were preceded by digitized photographs showing initial conditions for the three selected scenes at the site. The two photo-simulated visualization options for each site were then presented one above the other on the computer screen, and participants indicated their preference between them by clicking on a scale presented at the right of the screen, as illustrated by figure 3. For each site, the treatment and no-treatment options were shown over the five time-step periods by visualizations of the same three views shown in the initial condition photos. The respondent had to choose one photo from each of the treatment/no-treatment pairs (there was no 50/50 response option) and indicate the strength of the preference for the chosen option by selecting a value from 60 (minimal

Figure 3.—Typical choice display screen showing treatment (upper) versus no-treatment (lower) options for a northern forest study site for year 2082



preference) to 100 (maximum preference) on the response scale. For each site, respondents first separately recorded choices/ratings for visualized treatment-versus-no-treatment pairs at each of the five projected time periods (2, 12, 22, 52, and 82 years). Then an animated slide show ran the treatment-versus-no-treatment visualizations for that site in sequence over the full 80-year projection (as indicated by figure 3). The participant viewed this slide show as often as desired and then recorded her/his overall evaluation using the choice/response scale.

Each participant evaluated a random selection of 7 of the 10 visualized site/treatment pairs. The order of pairs and the position of treatment/no-treatment options (top/bottom) were individually randomized for each participant. Choices/ratings were automatically entered into a database and transformed into a measure of the degree of preference for the treatment member of each pair. Scores could range from 0, minimum preference, to 100, maximum preference for the treatment option.

Acknowledgments

This study was part of a collaborative program of research undertaken with Brian Orland (Pennsylvania State University) and Joanne Vining (University of Illinois). Our work would not have been possible without the help and cooperation of a great many other people. We wish to thank in particular the Gunflint Trail Association and the Gunflint Ranger District for their generous cooperation and assistance with this project. Pam Jakes (USDA Forest Service Research, St. Paul), Sarah McCaffrey (USDA Forest Service Research, Evanston), Dan Gilmore (University of Minnesota), and Douglas Kastendick (USDA Forest Service Research, Grand Rapids) donated countless hours of professional service to this project, and Michael Meitner (University of British Columbia) generously assisted in the development of the computer systems we have used. Caroline and Carrie Daniel, Cenk Ursavas, and Mindy Merrick conducted most of the computer surveys. The North Central Research Station and the three cooperating universities provided essential financial support.

We are especially grateful to the owners of the Java Moose Coffee Shop and the many property owners' association members, lodge and outfitter employees, and visitors to the Gunflint Trail and Boundary Waters Canoe Area Wilderness for their cooperation and participation in this study.