

COST COMPARISON OF RIGHT-OF-WAY TREATMENT METHODS¹

by Dennis E. Holewinski and Paul A. Johnston

Abstract. Progress to date of a 3-year impact study of cost comparison of right-of-way (ROW) treatment methods is reported. Conducted by Asplundh Environmental Services (AES) for the Empire State Electric Energy Research Corporation (ESEERCO), objectives attained thus far include site selection and pretreatment baseline data collection describing in detail conditions on 125 treatment units located on 18 ROWs in New York State, and applications of seven standard ROW treatment methods (five herbicidal and two mechanical), with three replications of each. Pretreatment data cover density/height of vegetation (analysis of variance); composition of capable (tall growing) species (by species — area curve); abundance and sociability of non-target desirable species; mesic habitat; soils evaluation (compaction, dry bulk density, humus type, and erosion); visual effects (computer analyzed); ROW edge study (identifying ecotones); wildlife habitat evaluation of selected species; and statistical relationships of various factors at the 95 percent significance level. All data were made available in (1) analyzed and clarified field forms, (2) punched cards, (3) permanent electronic data base. Cost data of applying treatments were tabulated and treatment quality evaluated. The final report (c. 1983) will give complete cost comparison of ROW treatment methods, their environmental impacts, and initial treatment effectiveness.

Recognizing that the best solutions to right-of-way (ROW) management problems vary from one region of the nation to another because of differences in climate, topography, soils, vegetation, wildlife, land uses, and social values, Empire State Electric Energy Research Corporation (ESEERCO) began a research program into ROW management in New York State. The program's goals of increasing safety, economy and environmental compatibility of electric energy in New York are being attained through an open-end series of projects. The first project (1973) established the state-of-the-art in ROW management techniques through a literature search and consultations with nationally recognized experts in the field. The second project examined the "record in the field" in New York and was conducted by Asplundh Environmental Services (AES) on 22 representative ROWs (Fig. 1). ESEERCO's third project conducted by AES is an

intensive cost comparison of ROW management techniques and associated environmental effects. The study meets the three requirements of a complete study of environmental impact (Green, 1979), including a baseline study, an impact study, and biological monitoring. Controls are included to detect any changes not related to the impact.

Methods

Objectives obtained in the first 2 years of the AES 3-year study include: site selection, pretreatment baseline data collection and analysis, and application of seven standard ROW treatment methods (five herbicidal and two mechanical) on six density/height classes of tall-growing (capable) species combinations, replications of each, for a total of 12 treatment units, consisting of a 1,760-foot length of an entire ROW segment. Another portion of the study evaluates four additional special treatment methods performed on areas of one acre each, replicated three times.

Pretreatment. Pretreatment baseline data collection covers: existing conditions on study ROWs and their treatment units; density/height classes found; similarity of capable species found throughout New York; desirable non-target plant communities found; boundaries of pretreatment edge; soil compaction conditions; visual conditions; wildlife habitat evaluation for selected species; conditions on study ROWs to be treated with girdling and herbicide injection treatment methods; statistical relationships of various factors at the 95 percent significance level; and cost data and treatment quality for all treatment methods applied.

Site selection. Selection of study ROWs was critical because the cost of applying a treatment

¹Presented at the annual conference of the International Society of Arboriculture in Louisville, Kentucky in August 1982.

method is directly related to accessibility to the ROW and the density and height of tall-growing (capable) species. Eighteen of the 50 candidate ROWs submitted by ESEERCO qualified as study ROWs. A study ROW contained at least three of New York State's five prevalent capable species: white ash, red maple, red oak, black cherry, and quaking aspen. Height and density were divided into six classes. Study ROWs and at least 2.3 miles of mesic habitat (moist but well-drained sites) and traversed a Northern Hardwoods forest type or one of its variants found in New York. Each ROW had a documented treatment history and was reasonably accessible. Study ROWs were divided into seven treatment units (1,760 feet long) aggregating 126 treatment units on 18 ROWs.

Capable species. Trees capable of growing to over 20 feet endanger safe and reliable energy transmission and are responsible for most maintenance problems in New York State. A prime

goal of the study is comparing the costs of treatment of capable species. A species-area curve determined the optimum plot size for vegetation sampling in each density class. The density and height of capable species were evaluated by the analysis of variance. Forty-six capable species were found on study ROWs throughout the state. Sorensen's Quotient of Similarity was used to calculate the similarity of species composition.

Desirable non-target species. Over 550 plant species were identified on study ROWs. Desirable nontarget species were evaluated by abundance and sociability data. Herbaceous cover generally increased with decreasing tree and shrub cover. Total herbaceous cover was high on ROWs and low in adjoining woods (due in part to forest competition reducing light infiltration).

ROW edge. ROW edges were studied to identify the boundaries of the ecotone (transition area between two or more biotic communities). Data were collected by the line transect technique.

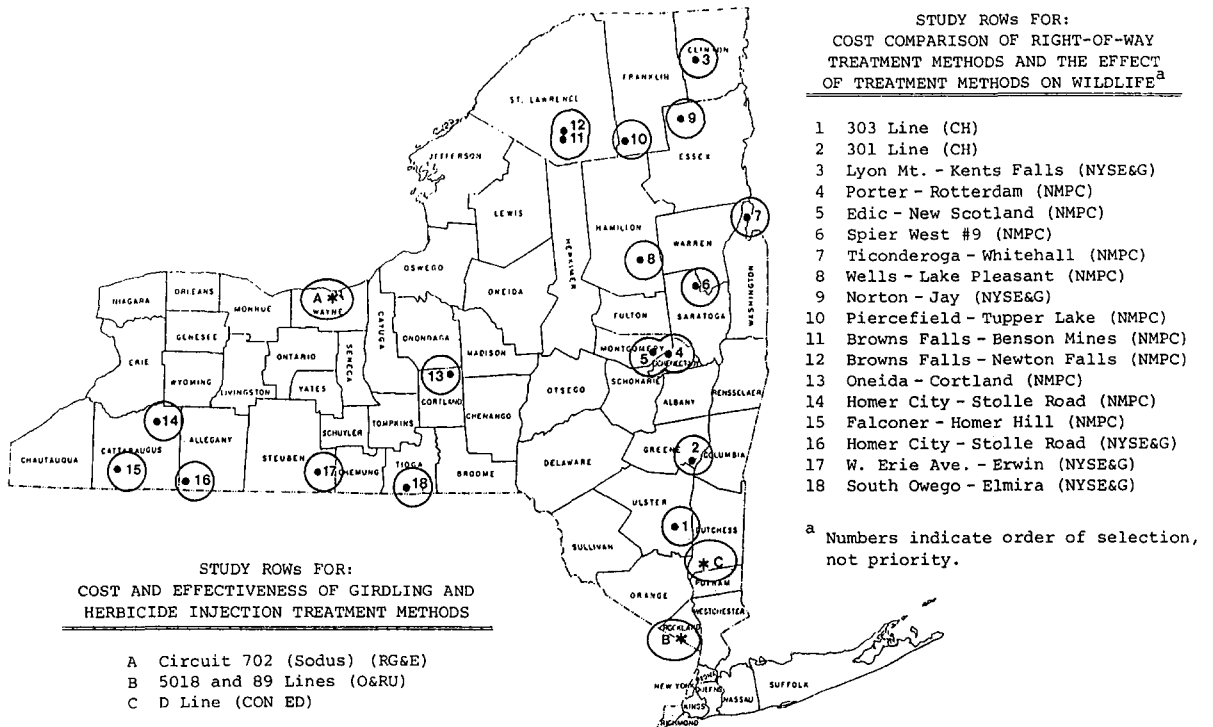


Figure 1.

Data indicated a definite edge effect. The influence of the forest edge extends into the ROW area and affects vegetation composition. Also apparent is the influence of ROW clearing on composition and density of understory vegetation in immediately adjoining woods.

Surface soil properties were evaluated on ROWs and off-ROW sites for bulk density, penetrometer resistance, and thickness of surface organic layers at the A1 horizon.

Analysis of the visual impacts data related them to the magnitudes of each of the six basic components: form, line, color, value, intensity, and texture. Results included measuring change in variable values correlated to the change in magnitude of each visual component and provided a value indicating the significance of that change.

Wildlife. Effects of vegetation treatment methods on ROW wildlife habitat were assessed by a habitat evaluation procedure that concentrates on a species' food and cover requirements, and provides a general rating useful in comparing ROW habitats. Species selected for study included rufous-sided towhee, gray catbird, ruffed grouse, meadow vole, and white-tailed deer. The habitat for each of these species was assessed on all treatment units in medium density (1,500 to 2,900 stems per acre) and high height (over 6 feet high) ROWs, and will be compared to habitat ratings derived from 1982 field data (post-treatment) to assess the effects of seven different treatment methods on wildlife habitat.

Treatments. Treatment methods were applied in the following sequence:

dormant basal	— March-Late April, 1981
cut and stump	
treat	— Late April-Early June, 1981

hand cutting	— Early May-Mid-June, 1981
mowing	— June 1981
aerial foliage	— Late June-Early July, 1981
summer basal	— Mid-June-Late July, 1981
selective ground	
foliar	— Mid July-August*

*One site was unavoidably delayed until early September.

Treatment-cost coordinators collected data relating to the cost effectiveness of each treatment method. These data will be used to develop:

1. Cost comparison of treatments in relation to density and height of target vegetation, adjusted for terrain conditions that affect accessibility.
2. Effects on cost due to terrain conditions that limit or restrict accessibility or treatability.
3. Recommended ROW maintenance in relation to density and height of capable vegetation and terrain conditions.

The entire study will be completed in June, 1983. The analysis of data will provide a comparison of costs and environmental effects of treating capable species at various density/height classes on ROW conditions found in New York State.

Specific results will include a report of changes in density and height of capable species, abundance and sociability of desirable non-target species, soil compaction due to treatments, and changes in wildlife habitat.

*Managerial and Principal Investigator, respectively
Asplundh Environmental Services
Blair Mill Road
Willow Grove, PA 19090*