

root regeneration during the initial period of establishment (Prager and Lumis, 1983; Lumis, 1982).

Summary

The model shows why large transplanted trees are likely to have reduced growth for many years following transplanting due to the length of time required to regenerate the roots lost during the transplanting process. The above-ground portion of the tree must be in balance with the root system for proper growth. The size of the above-ground portion of the tree is controlled by the size of the root system. When the root system is reduced or restricted, the growth of the trunk and branches will also be reduced. Since the spread of the regenerated root systems of the large and small transplanted trees differs only by the relatively small difference in size of the original root balls, it follows that the growth of the above-ground portions of the trees must eventually be similar if the root-shoot balance is to be maintained. Trees transplanted into poor sites may never regain proper root-shoot balance and nor-

mal vigor.

Literature Cited

- Himelick, E.B. 1981. Tree and Shrub Transplanting Manual. International Society of Arboriculture, Urbana, IL.
- Kozlowski, T.T. and T. Keller. 1966. *Food relations in woody plants*. Bot. Rev. 32: 293-382.
- Lumis, G.P. 1982. *Stimulating root regeneration of landscape-sized red oak with auxin root sprays*. J. Arboric. 8: 12-13.
- Prager, C.M. and G.P. Lumis. 1983. *IBA and some IBA-synergist increases of root regeneration of landscape-size and seedling trees*. J. Arboric. 9: 117-123.
- Schoeneweiss, D.F. 1981. *Infectious diseases of trees associated with water and freezing stress*. J. Arboric. 7: 13-18.
- Watson, G.W. and E.B. Himelick. 1982a. *Root distribution of nursery trees and its relationship to transplanting success*. J. Arboric. 8: 225-229.
- Watson, G.W. and E.B. Himelick. 1982b. *Root regeneration of transplanted trees*. J. Arboric. 8: 305-310.
- Whitcomb, C.E. 1979. *Factors affecting the establishment of urban trees*. J. Arboric. 5: 217-219.

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DISTRIBUTION TREE CLEARANCE PROGRAM AT BALTIMORE GAS AND ELECTRIC¹

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Abstract. The Baltimore Gas and Electric Company's tree clearance policy is to provide for the safe and reliable supply of electric energy in an economic manner which is compatible with the environment. To that end, the Distribution Tree Clearance Program utilizes many methods and techniques to trim trees and shrubs and to maintain line integrity. Natural trimming is preferred, as is selective clearing with appropriate treatment with an EPA-approved herbicide. Following the introduction of an aggressive "Think Cut Down" program, more trees are being removed from the system, thus reducing future maintenance time. Often, where undesirable tree species are cut down, an aesthetically pleasing grass-herb-shrub-desirable tree species community becomes established.

The Baltimore Gas and Electric Company (BG&E) is an investor-owned utility serving an area of approximately 2,300 square miles in Northern and Central Maryland. The service area is bordered on the north by the State of Pennsylvania, on the east by the Chesapeake Bay and the Susquehanna River, on the south by parts of Calvert and Prince George's Counties, and on the west by portions of Montgomery and Carroll Counties. The BG&E service area experiences about 43 inches of rainfall annually. The climate of

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the counties bordering the Chesapeake Bay, particularly those areas immediately adjacent to it, is much affected by that great body of water. For example, in Anne Arundel County, the growing season varies from 194 days at the Baltimore-Washington International Airport to 232 days at Annapolis, less than 20 miles away. BG&E supplies electric utility service to a population of 2,335,400. Within the service area, the Com-

pany maintains about 10,000 miles of distribution lines. These distribution lines transect the three departmental areas, Northern, Central, and Southern. Each area is responsible for operations and maintenance within its boundary.

The administrative structure of the Distribution Tree Clearance Program (Fig. 1) follows: The Vice President of the Distribution Engineering Department is responsible for line reliability due to tree-

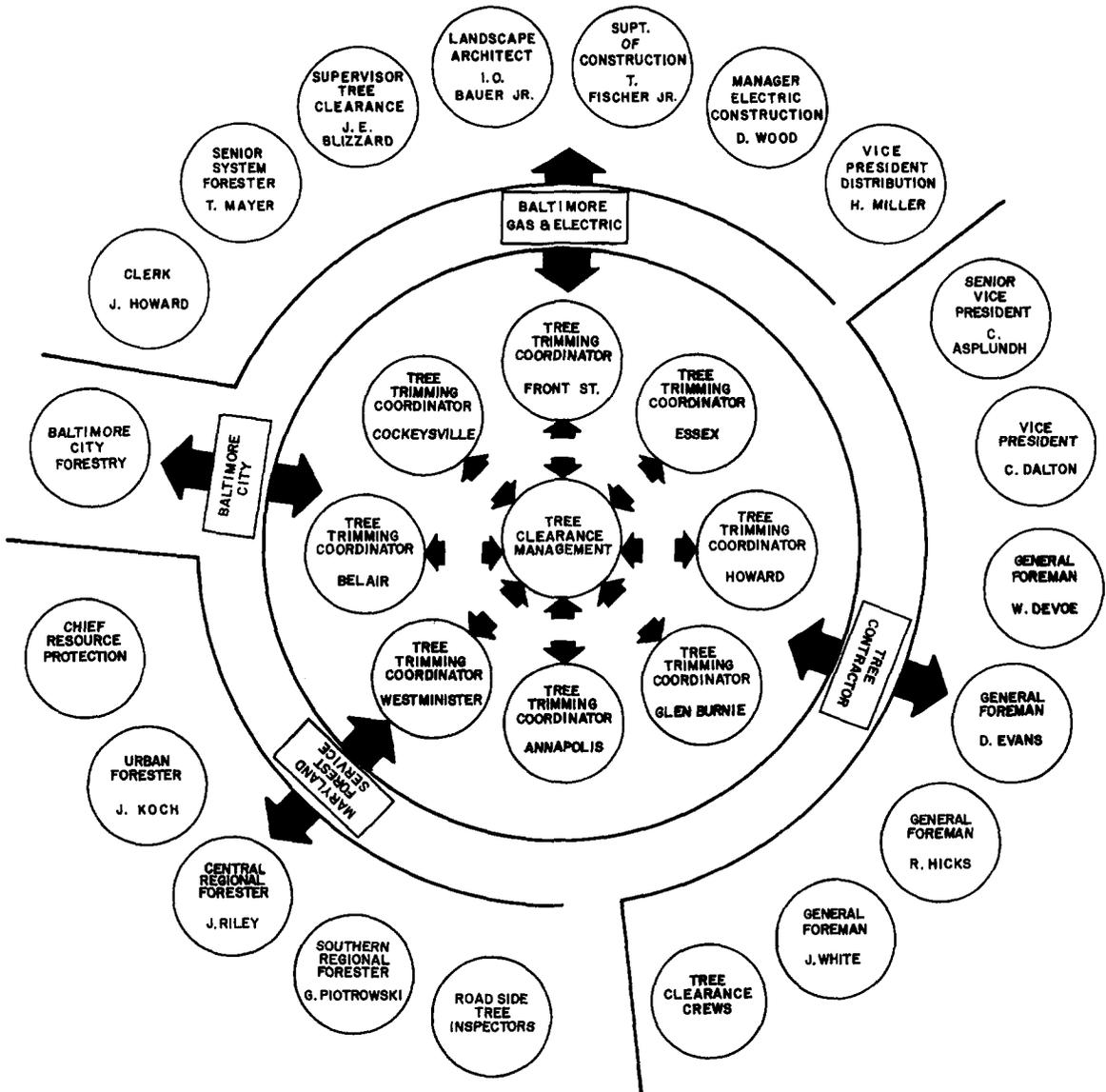


Fig. 1. The administrative structure of BG&E's Distribution Tree Clearance Program.

related outages; the Manager of the Electric Construction Department reports to the Vice President, while the Superintendent of Construction reports to the Manager. The Company Landscape Architect is accountable to the Superintendent. The Supervisor of Tree Clearance reports to the Landscape Architect, and the Senior System Forester reports to the Supervisor of Tree Clearance.

There are eight District Tree Clearance Coordinators, who are answerable to the Supervisor of Tree Clearance. These Coordinators are stationed at service centers throughout the service areas. They are responsible for: 1) routine maintenance scheduling, 2) capital work, 3) storm work, 4) assisting contractors, and 5) customer requests and other duties.

The current contractor is Asplundh Tree Expert Company. The Company sponsor in this service area is Senior Vice President Chris Asplundh, and Charles Dalton is the area Vice President. There are four General Foremen, overseeing forty-five tree crews.

BG&E has a blanket permit for tree maintenance with the City of Baltimore Forestry Department. With regard to the State, Maryland roadside tree inspectors are responsible for the aesthetics of State trees, as Maryland has the oldest roadside tree law in the United States, which dates from 1914. BG&E Coordinators and the contractor's tree crew foremen work together with these inspectors to obtain the goal of aesthetically pleasing roadsides and reliable conductor clearance.

BG&E's Tree Clearance Policy is to provide for the safe, reliable supply of electric energy, in an economic manner, which is compatible with the environment. To that end, the natural trimming (drop-crotch) method is employed where possible on the system. Fewer cuts are made, which produces fewer sprouts, and reduces trimming time. Stubs are eliminated, and the natural shape of the tree is retained. In addition, a stable, low-growing plant community is encouraged, which is primarily accomplished by prescribing the proper maintenance technique for each specific site in order to eliminate tall-growing, undesirable species.

In general, in those areas where landowner approval is obtained, and in those areas along State

roads where State approval is obtained, the selective-clearing method is employed. This method requires that the undesirable tree species be cut down, and that the stump be treated with an herbicide approved by the Environmental Protection Agency (EPA). Where undesirable species have become established, a continuous maintenance problem flourishes (Fig. 2). Less expense is involved in eliminating such growth while it is small than after it grows into a pole or timber state where more time-consuming methods of maintenance (e.g., topping) are required.

From 1976 to 1979, prior to the adoption of selective clearing as a preferred method, more trees were developing on the system, both naturally and from landowner plantings, than were being removed. In 1979, BG&E started its first selective-clearing crew, a second crew was added the following year, and a third in 1981. Productivity in terms of units per manhour increased accordingly (Fig. 3). The total cut-downs for all crews, e.i., manual, bucket, and selective-

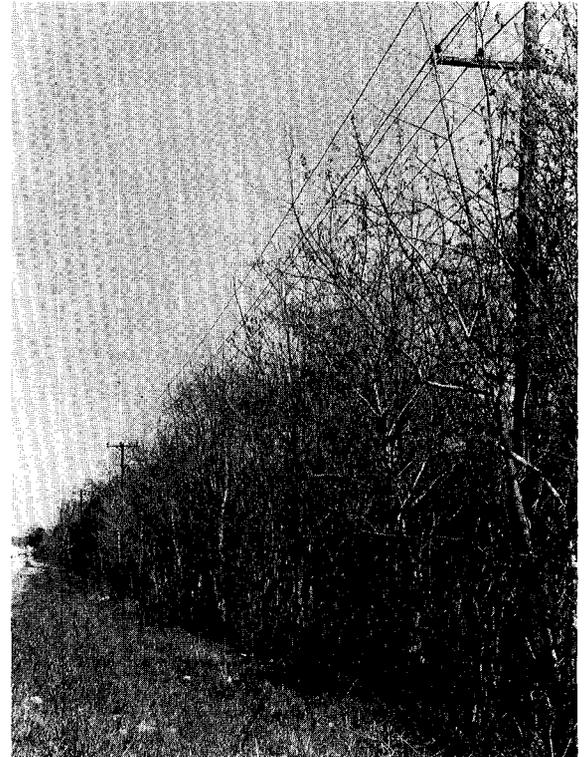


Fig. 2. A continuous maintenance problem exists where undesirable species have become established under distribution lines.

clearing, totaled 33,545 in 1980. In 1981, BG&E initiated an aggressive "Think Cut Down" Program. Consequently, 136,350 trees were cut during 1981, and 117,037 trees were cut in 1983 (Fig. 4). The trees removed from the system will no longer necessitate trimming, and crews reworking those feeders should be able to complete their work in less time than was previously required.

Where trimming is performed, state law requires that the established flush-cut method be employed. There is currently discussion about adoption of a new method whereby the branch bark collar is left intact. As this is thought to reduce sprouting, it would aid utility foresters in their maintenance programs.

A number of trimming techniques are utilized where larger trees are, for a variety of reasons, left standing. These include through-trimming, side-trimming, directional trimming, under-trimming, and topping. Roundovers, however, generally create unhealthy tree conditions which often result in rapid sprout regrowth. This method is, therefore, normally avoided.

The three main factors considered in line clearance are the type of circuit involved, the growth rate of the particular tree species, and its wood strength. It is recognized that various tree species grow at different rates. While the sucker growth of silver maples (*Acer saccharinum*) and sycamores (*Platanus occidentalis*) can be substantially greater than their normal rates, the sucker growth of sugar maples (*A. saccharum*) is

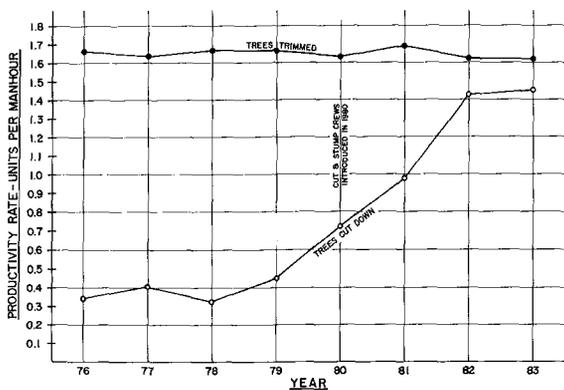


Fig. 3. Productivity in terms of units per manhour with relationship to trees trimmed and trees cut down from 1976 through 1983.

far less. BG&E's program favors the slow-growing species, and whenever possible, the fast-growing species are removed. Of course, the establishment of new plant communities favoring grass, herbs, and shrubs often results from tree removals along the electrical right-of-way.

Often trees that are cut down and branches that are trimmed are removed from the right-of-way, but that varies according to the conditions of each site. Slash is most frequently chipped. Landowners often request felled trees for their own uses. And, in those areas that are inaccessible for BG&E's equipment, the collect-and-pile method is generally employed. The large wood is cut to six-to-eight-foot lengths and left on the site. Slash is placed in small piles so as to avoid a fire hazard.

Where the selective-clearing method has been utilized, the maintenance program is escalated unless treatment with an EPA-approved herbicide follows. Chemical is only used on the BG&E distribution system after permission is obtained from the landowner. The stump application is made around the outer cambial layer so that the chemical is picked up by the phloem cells and translocated throughout the root system. Areas that are selectively cleared are later treated with a selective foliage spray, to pick up any misses and any new growth that may have occurred. BG&E uses Krenite because there is little, if any, brownout, and it is labeled for use near potable water supplies as well as on ditch banks.

Chemicals are utilized on the BG&E distribution system where appropriate. For example, in areas

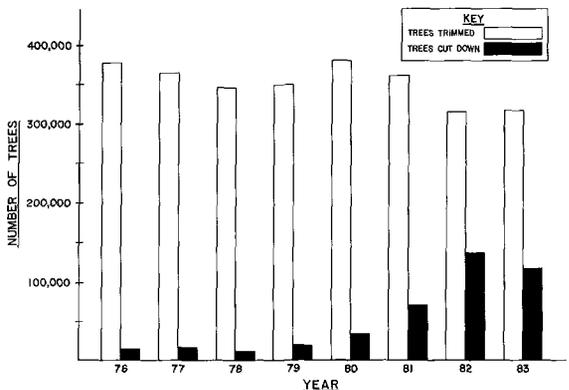


Fig. 4. Number of trees cut down and trimmed from 1976 through 1983.

of low public visibility, the frill-and-treat technique is employed. Also known as hack-and-squirt, this method is accomplished by hacking the undesirable woody stem with a brush ax and applying an EPA-approved herbicide to the freshly cut surface. Frill-and-treat greatly accelerates productivity by eliminating cutting and chipping.

BG&E has approximately twenty sites maintained by the growth inhibitor, Slo-Gro (maleic hydrazide, MH-30). This is applied in a foliage spray to the top of the tree crown after leaf-out, and is far less time consuming than trimming. Particular sites are conducive to this treatment, as where tree species like Osage orange (*Maclura pomifera*) are retained as a screen and for aesthetic reasons.

BG&E strives to attain greater efficacy in the science of right-of-way management. Accordingly, experimental plots have been established with Atrinol, designed to inhibit tree growth through injection into the tree, and Cutless, intended to retard growth through injection into the soil. As new chemicals become available, and as research generates new data pertaining to various aspects of right-of-way maintenance and management, BG&E continues to review and update its system. Information available through such organizations as the International Society of Arboriculture and Utility Arborists Association greatly assist in disseminating relevant information.

On BG&E's distribution system, natural trimming is used, resulting in fewer cuts, and thus fewer sprouts, and a corresponding reduction in trimming time. Where feasible, removal of undesirable

tree species is stressed through selective clearing and selective foliar application. Often maintenance and trimming time are lessened through this process, and an aesthetically pleasing, mixed-plant community establishes itself (Fig. 5). Thus, with proper cooperation among BG&E, its contractor, and the State of Maryland, the goal of providing good, safe, reliable, environmentally compatible, and economic electricity to BG&E's customers is attained.



Fig. 5. An aesthetically pleasing community of grasses, herbs, shrubs, and desirable trees under distribution lines.

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