THE EFFECT OF POWER UTILITY RIGHTS-OF-WAY ON WETLANDS[1]

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Abstract. Effects of construction of power lines on wetlands in eastern Massachusetts were studied over a five-year period after two years of observation prior to construction. The study was done on a shrub swamp, a wooded swamp, a cattail (Typha) swamp, and as well, both above and below a gravel construction road which served as an impounding structure on an existing wetland. The cattail swamp was essentially unaffected by construction. The shrub swamp slowly returned to its former cover during the period of study; the wooded swamp rapidly became a shrub swamp with seedling and stump-sprout trees forming part of the cover. The impounded wetland areas decreased in vegetational cover; the concamitant drained wetland area below the impoundment rapidly became a dense shrub swamp. Bird populations rose at all woody and shrubby sites over the study period, apparently because of the "edge effect" and use of the cleared areas as corridors of movement.

The initial objective for undertaking this set of studies was to determine the possible effects of power line construction and maintenance on wetlands, especially those wetlands that fall under the Massachusetts Wetlands Protection Act, MGLA Chapter 131, Section 40. The specific goals of these studies were to determine how the natural ecological conditions change as a result of power right-of-way construction and maintenance; how long these differences persist; and whether any changes, temporary or permanent, occur in the wetlands which can be considered an important negative impact in terms of the interests stated in Chapter 131, Section 40. Not incidentally, a further goal was to determine whether any of these ecological changes might have a beneficial impact. Documentation of these results was structured to be of value for regulators (Conservation Commissions and the Army Corps of Engineers), users (New England Power and other utilities), and concerned citizens monitoring the balance between conservation and development.

Methods

During this study the investigators examined four sites. At two of them, data were collected representing (1) shrub swamp and red maple swamp under existing transmission lines which have been managed for approximately forty years, (2) wetlands of the same type which remained untouched and are outside the managed areas, and (3) previously undisturbed wetlands of these types through which a new line was built in 1977-1978. Similar, but less extensive, studies were made at a cattail marsh to document the lack of any discernible change following construction. At the fourth site, data were collected above, below, and within a shrub swamp dammed by a gravel construction road one meter high and four meters wide.

These investigations began in 1976, before construction of the new lines. Subsequent studies were conducted from 1977 through 1982. Data were analyzed using standard ecological measures involving indices of plant species diversity, richness and evenness, as well as a coefficient of similarity among areas developed by the authors. Statistical analysis of these data, using accepted tests, is reported in all cases where there are significant changes. The primary focus of these studies was the wetland vegetation, rather than other parameters, because Chapter 131, Section 40 defines wetlands by the plants they support and because vegetation is a primary determinant of many other ecological considerations, such as wildlife use.

In addition to the botanical studies, avian use was also examined in detail. Several important questions were addressed: Does removal of cover by construction negate use of the area by birds, increase the use, or have no effect? Do

1. Presented at the annual conference of the International Society of Arboriculture in Milwaukee in August 1985.

edges along newly cleared lanes attract more birds, or does the newly cleared area discourage those species remaining in the area? Do the species shift from year to year as regrowth continues?

Breeding birds are a reliable indicator of the "livability" of an area, hence their presence is a measure of the natural value of the ecosystem in which they occur. They are more easily studied and are a richer source of data than any of the other animals likely to be encountered. The ecological values of diversity and evenness were also quantified for birds in much the same manner as for plants.

Results

1982 was the final year of field studies on the effects of powerline construction on wetlands at Cedar Swamp (forested swamp), North Street (impounded swamp), and Tewksbury's Great Swamp (shrub swamp). Earlier studies on recovery at Pleasure Island in Wakefield (cattail marsh) were discontinued in 1980, because there had been no detectable change beyond nearly instantaneous re-establishment of the vegetation which was present prior to construction. Studies of avian use of the Cedar Swamp in Lynnfield and the Great Swamp in Tewksbury were also completed during the 1982 field season.

Throughout the study, the Cedar Swamp area continued to show dramatic re-establishment of the wooded swamp which was present in the area prior to clearing and construction. By the 1982 season, the shrub cover had completely returned to its former state and there was a substantial increase in the tree layer, mostly attributable to red maple growth.

The Tewksbury area study shows a slower return to the species composition and abundance that had existed before disturbance. However, by the end of the study, the vegetation was still increasing in total amount and in the number of species. The higher surface water level at this site probably impedes invasion and growth of many species which require bare soil to germinate, even if they tolerate standing water as adults. Still, the presence of this high water table over much of the summer in most years is a clear indication that the area's water-holding and collecting capabilities have not been damaged because of the activities of construction. It should also be noted that there are large numbers of dead high-bush blueberries along the ROW. Since no other areas under the management program showed this pattern, it is obvious that the practices which lead to this problem are not part of the normal vegetation control scheme. High-bush blueberry plants are common, beneficial to wildlife, and do not interfere with the powerlines. Their presence along ROWs should be encouraged in almost all circumstances.

At the North Street study site, a gravel road that would be breached under normal circumstances was left intact so that its effect could be examined. Continuous flooding above the road extirpated several common and important species within three years. However, in the drained area below the impoundment, there was a substantial invasion by species preferring drier soils as well as an increase in many species associated with wetland edges. (All effects occurred on New England Power Company property.) Water level and its unimpeded fluctuation are clearly critical to the maintenance of the vegetation within wetlands.

Throughout the course of these studies, populations of breeding birds continued to rise at all sites, except during the last year, which was studied only after the breeding season was past. Both species diversity and absolute numbers rose steadily. However, the vast increase in gypsy moth caterpillars in 1982 may have rendered some habitats less desirable, perhaps even useless, for nesting. Nonetheless, some birds which feed heavily upon caterpillars actually increased as a result of the infestation. The strong evidence of increase in bird use year-by-year is a demonstration of the "edge effect": as the ROW grows back, a large number of sunny shrub edges and small open clearings develop, in which a larger and larger number of birds may find both foraging area and cover. Another factor perhaps acting to drive the birds to using the ROW is the inexorable loss of open space everywhere else in the general area of these studies. The ROW, then, serve as both "edge" and as corridors of movement for rather large numbers of birds, certainly demonstrably larger than was supported by the

preconstruction stable vegetation.

Conclusions

Opening forested areas of wetland to construct power line rights-of-way has a net beneficial effect on many ecological parameters, especially in New England, where open field space is now at a premium because of secondary forest development on abandoned farms. The value of the cleared rights-of-way as open corridors for connecting otherwise non-contiguous natural areas, for developing shrub rather than tree vegetation, and for developing edge effect-feeding/nesting/cover opportunities for many animals, is clearly indicated. Further, in most cases, we did not find evidence of long-term degradation of *wetland values* as they are measured by Chapter 131, Section 40. Short-term value changes do occur, but when the wetland soil and water levels remain intact, areas undergo vegetational development in a successional pattern which could not have happened without the trauma of clearing and which is beneficial to wildlife.

For its part, the Power Company must be most stringent to impress on its contractors that there is no room for carelessness. Both the careless use of allowed herbicidal chemicals and the impoundment of surface flow have immediate and unnecessary adverse impact. Where construction and maintenance proceed carefully, there is little *a priori* reason to assume that these activities will be in conflict with the intent of wetland protection legislation or the ecological benefits it is meant to safeguard.

Access to Project Details

These studies have been carefully documented in five scientific papers, of which four have been accepted for publication and of which two have already appeared. The fifth paper, dealing with ROW construction effects noted on avian populations, has as of this writing, not been submitted. All five papers, each substantially in final form, are incorporated in the FINAL REPORT of the project entitled the same as this summary paper, submitted in 1984 to the New England Power Company, 25 Research Drive, Westboro, MA 01581.

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Abstract

DOVE, LOUISE E., THOMAS M. FRANKLIN, and LOWELL W. ADAMS. 1985. **"Plant" wildlife in your yard.** Am Forests 91(3): 13-16.

The key to attracting wildlife is providing proper habitat. Most often this means increasing the abundance and variety of vegetation on your home site. Your yard can be improved for wildlife with appropriate types of trees, shrubs, vines, and grasses. These plants provide food and shelter for wildlife, and will enhance the beauty of your property. The average homeowner can select a number of features of the optimal plan for his or her own property, and can develop excellent wildlife habitat for many species. First, prepare a plan for the area. If you already have considerable landscaping in your yard, you may wish to work with existing plants, perhaps relocating some or removing undesirable ones. Each species of wildlife has specific requirements. If you wish to attract different types of animals, your goal should be to plant your yard to offer a variety of situations and combinations of these requirements. A good rule of thumb might be "a wide variety of plant species and plant configurations will attract a wide variety of wildlife."