

Vermont Endangered Species Committee

Policy on Transplantation of Threatened or Endangered Plant Species

The Vermont endangered species law (10 VSA, Chapter 123) requires that any application to take a threatened or endangered species include "a plan for conservation or mitigation." There have been several land development projects in Vermont in recent years for which this plan included either on-site or off-site transplantation of individuals or populations of threatened or endangered plant species, and there may be other instances in which transplantation is contemplated (e.g., reintroduction, restoration, augmentation and rescue).

Vermont experience indicates that transplantation may not adequately conserve threatened or endangered species. The scientific literature (see position paper, attached) indicates that transplantation is often not successful in the short-term or in the long-term, and furthermore may have adverse unintended biological consequences.

It is the opinion of the members of the Scientific Advisory Group in Vascular Plants that the biology of the species on the Vermont lists of threatened and endangered species varies widely, that for many or most such species, little is known about how to achieve successful transplantation, and that most have specific habitat requirements that are difficult to replicate off-site.

Therefore, the Scientific Advisory Group recommends the following policy guidelines in regard to transplantation of listed (threatened or endangered) plant species:

1. On-site conservation (without transplantation) is in all cases preferable to transplantation, and such conservation must include an appropriate amount of suitable, unaltered habitat. The avoidance of direct or indirect impacts should be the first consideration.

2. Other alternative methods of conservation may also be preferable to transplantation. Such alternatives may include but are not limited to:

- removal, stock-piling and replanting to the same site, in special cases when the threat or perturbation is of short-term duration;
- off-site in situ preservation of other populations of the same species, or listed species in the same habitat type (e.g., sand-plains);
- contributions for acquisition of threatened habitat of the same type; the contributed funds either dedicated to a specific purchase or pooled¹;
- contributions to an ongoing restoration program or other appropriate conservation program for the same habitat.

3. If transplantation is considered as part of a conservation or mitigation plan, the risks should be evaluated and a number of guidelines adhered to:

- There must be an adequate understanding of the biology of the species and the biological attributes that might affect transplantation must be considered; among these are reproductive biology, life-cycle, mutualists (pollinators, mycorrhizae); breeding strategy, and other innate characters of the organism. For some species, transplantation simply may not be a viable option.

¹ Direct purchase of land in fee, conservation easements, trade lands; etc. might all be contemplated.

- An appropriate receiving site must be selected. Factors to consider include bedrock and soil types, soil pH, hydrologic regime (wetness), surrounding plant community, sun, shade, and other habitat variables and ecological processes. Also to be considered is the potential effect of the transplantation on other species at this site (e.g., genetic contamination, competition, etc.). In order to maintain numbers of populations, it is preferable that the species in question not already exist at the receiving site.
- Transplantation must be done at the time of the year that is most appropriate for the species and at which the transplants are identifiable.
- Due diligence must be exercised to insure that plants are transplanted in a timely and careful manner by competent individuals who are retained by the applicant and approved by the Secretary of the Agency of Natural Resources. Follow-up care such as watering, pruning, etc., must be provided to increase the likelihood of transplant success.
- When possible, additional propagules (e.g., seeds, spores) should be collected and seed-banked prior to or concomitant with transplantation.
- In some cases (e.g., annual species, large shrubs), collection and sowing of propagules or rooting of cuttings may be preferable to transplantation of mature plants.

4. The transplantation (receiving) site should be preserved with long-term restrictions as to land use. It should be set aside specifically for the particular conservation plan contemplated.

5. The success of the transplantation must be monitored at least yearly for at least five years. At such time if the number of living plants is 50% of the number originally transplanted, or if fewer survive but there is evidence of recruitment and a trend of increase, then the plan shall be considered successful in the short term.

6. A surety deposit or other instrument to assure the success of the transplantation should be sought to encourage due diligence. If the transplantation is not successful in the short term (i.e., 5 years) the bond is forfeited. The proceeds thereof shall be used to purchase or manage other conservation land or conservation easements.

7. The financial responsibility for the conservation and mitigation plan should rest with the applicant, to include:

- a. consultant's fees;
- b. purchase and management or other preservation of the transplantation site, unless an existing conservation site is available and is offered for such use;
- c. purchase of a performance bond;
- d. actual cost of transplantation; and
- e. cost of monitoring and management.

8. The actual (not financial) responsibility for design and implementation of conservation should be worked out on a case-by-case basis between the applicant and the Secretary. Botanical expertise should be sought for each proposal.

Position Paper on Transplantation of Threatened or Endangered Plant Species

Submitted to the Vermont Endangered Species Committee

Prepared by Dr. Gregory Lowenberg for the Subcommittee on Vascular Plants of the Vermont Endangered Species Committee

Moving a state-listed plant population from a site threatened by development to another site constitutes the conservation method known as "translocation", or "emergency transplantation". On the surface, this transplantation of otherwise doomed plants (or their seeds) provides an appealing option for conserving threatened and endangered (T&E) plant species, at least in the short term. However, the use of this method as mitigation for permitted projects has serious drawbacks and limitations. The purpose of this position paper is to illustrate the dangers of relying on emergency transplantation as a viable, pragmatic option, and to argue against its use in most cases. Translocation has not been an effective conservation or mitigation tool in the large majority of cases where it has been attempted, and should not be encouraged or lightly considered in the permitting process in the state of Vermont.

The chief danger in the transplantation approach involves the uncertainty of success. A review of the published literature on transplantation involving T&E species reveals that only a small minority of attempts have been successful in establishing viable, reproducing populations. Most projects are deemed failures, because the newly established population do not persist for more than a few years. We have reviewed reports on transplantation experiments available in the published scientific literature and from state and federal agencies. Although these results are preliminary, we can document 116 recent attempts involving native plants, mostly T&E species in the U.S. Of these attempts, 67% resulted in less than 50% survival of transplants. Overall, 44% of attempts were complete failures and many more had extremely poor survival. Only 18% resulted in above 75% survival of translocated plants.¹

Clearly the risks of losing entire populations using the translocation method are very high. In Vermont, endangered species permits for 10 projects involving translocation of 15 plant populations have been approved in the past 6 years. Of these, one population was destroyed because the species could not be identified at the time of transplantation. Another population has experienced serious decline since it was moved (only 3 of 27 plants survived the first year). Seven other populations have been moved to date, and sufficient information exists only to determine that one of these projects is an unqualified success.

The reasons for lack of success are manifold. In many cases, sufficient biological information about the species to be moved is not available to determine the best method and season for translocation. Rare native plant species cannot be considered in isolation from their habitats, which sometimes must include

mutualists such as pollinators and symbiotic fungi. Since these plants have exacting and precise habitat requirements that are unknown, they often slowly decline or fail to successfully reproduce in the "receiver" site, even when a translocation appears to be initially successful. In most cases, there is little time to study the best method for a particular species and no chance to retry should the first attempt fail. Thus, emergency transplantation represents a chancy experiment that cannot be replicated or refined, and which often does not rely on sound biological and horticultural knowledge.

A major objection to the practice of translocation is that genetic variation may be severely eroded with poor transplant survival. Variation is important for adaptation to changing environments and is already limited in small populations of rare species. Further reduction in genetic variation might leave a population more susceptible to pathogens and herbivores. Decreased population size may also increase inbreeding, which can further impair reproduction and adaptation for many species.

At the present time, transplantation of T&E species can only be seen as experimental. It should be the very last resort in devising mitigation for projects and should, from the outset in the permitting process, be discouraged as an alternative to plant protection. Its expense and uncertainties of success should be weighed carefully against alternative actions that would benefit the particular population, species, or rare plant habitat in general.

¹ Data were compiled by Greg Lowenberg, 25 Seminary St., Middlebury, VT 05753, as part of an ongoing review of transplantation projects nationwide. This review is continuing.