

Establishing Native Plant Communities: A Primer

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Re-establishing native plant communities in disturbed natural ecosystems can be challenging at the best of times. The importance of avoiding and minimizing disturbance cannot be overstated. The selection of appropriate plant materials for revegetating natural ecosystems is critical for the successful establishment of a native plant cover.

Revegetation goals need to be clearly understood before embarking on project planning. Some examples of questions to consider before finalizing goals and approaches include:

1. What regulations or policies have to be considered during the planning phase?
2. Is the land publicly or privately owned?
3. What is the intended land use?
 - a. Will the area be grazed?
 - b. Is there a need to establish tree cover?
 - c. Are there particular plants required for wildlife consumption or cover?
 - d. Is the area used heavily for recreation? If yes, what type?
4. Will the risk of wind or water erosion require mitigation (e.g., soil surface modification or planting of interim cover)?
5. What is the likelihood of invasion of non-native plants from the soil seedbank or from seeds blowing in from nearby sources (e.g. cultivated land)?
6. Are there plant or animal species at risk that require special treatment?
7. Are there any land use safety concerns?
8. Is aesthetics a concern?

Site Evaluation:

A thorough assessment of land use on and adjacent to the site is necessary. It is important to talk to landowners, land managers and users of the landscape at this stage to understand past and present values and uses as well as desired future plans for the area. An evaluation of biotic, site stability and hydrologic functions is necessary at an early stage of planning. On large scale sites or areas where accelerated erosion risk is high, intensive phased approaches to revegetation may be required. It may be necessary to plant non-persistent, non-native species suitable for the specific site to ensure initial site stability and to enhance soil fertility.

A vegetation inventory (both onsite and offsite) is vital to assess biotic composition. If the site has a lot of weeds, it may be necessary to control them for several growing seasons prior to replanting the site with the desired native species. An inventory of offsite species will confirm whether there is an offsite source of native colonizers. It is also helpful to know if the restoration site is downwind from a potential source of problem species (e.g. an irrigation field). Analysis of a soil sample for weed seeds and nutrient status or potential chemical contamination may also be needed.

Where rare or sensitive plant species or communities are present, local native plant materials may need to be harvested prior to disturbance (e.g., sod in alpine areas) and stored for later re-application. Seed or plant parts may need to be collected and propagated. This requires appropriate lead time and preparation. Small disturbances and wetlands may not need to be revegetated if the soil seedbank was conserved. An exception to this may be situations where the seedbank is contaminated with the seeds of invasive species or where there is a strong likelihood of invasive seed blowing into or being brought onto the site (e.g., by traffic). In cases like this, it may be necessary to plant competitive non-native, but non-persistent plants for several years prior to adding native plant species. In extreme situations where the topsoil is seriously contaminated, it may be necessary to remove the topsoil and then plant into amended subsoil. This needs to be accounted for in the planning phase.

Selecting Plant Species

Plant species should be selected based on their compatibility with the Natural Sub-region where the project is located. The plants must also be able to grow in the altered conditions that may be present on the disturbed site. A review of soil analysis can be very helpful in understanding constraints and choosing the best plants for the current environment. Facilitation is a plant successional process by which one species assists establishment of another by ameliorating harsh site conditions. It may be necessary to plant species that are known to survive in the altered conditions and add other native species at a subsequent time when conditions become more favourable for their establishment and survival.

Availability of many native species may be limited so early investigation of appropriate seed supplies is important. This can allow for collection and propagation of needed plant materials that are not offered commercially. Some species may take up to three years and longer to become available. Use of multiple native species, multiple varieties of native species, different height or age classes can help to achieve the desired plant community diversity.

Wind and water erosion control are paramount to ensure minimal soil loss and the success of revegetation. Many native species are slow to establish. Annual cereal crops sown at a low seeding rate may be needed to control stabilize soil in the interim. Native seed can be sowed into the stubble. When colonization from native plants from the soil seedbank or from offsite is desired, seeding rates of native species onsite should be lowered. When trees will be planted, it's important to limit the amount of native grass that is seeded, otherwise it will out-compete the tree seedlings.

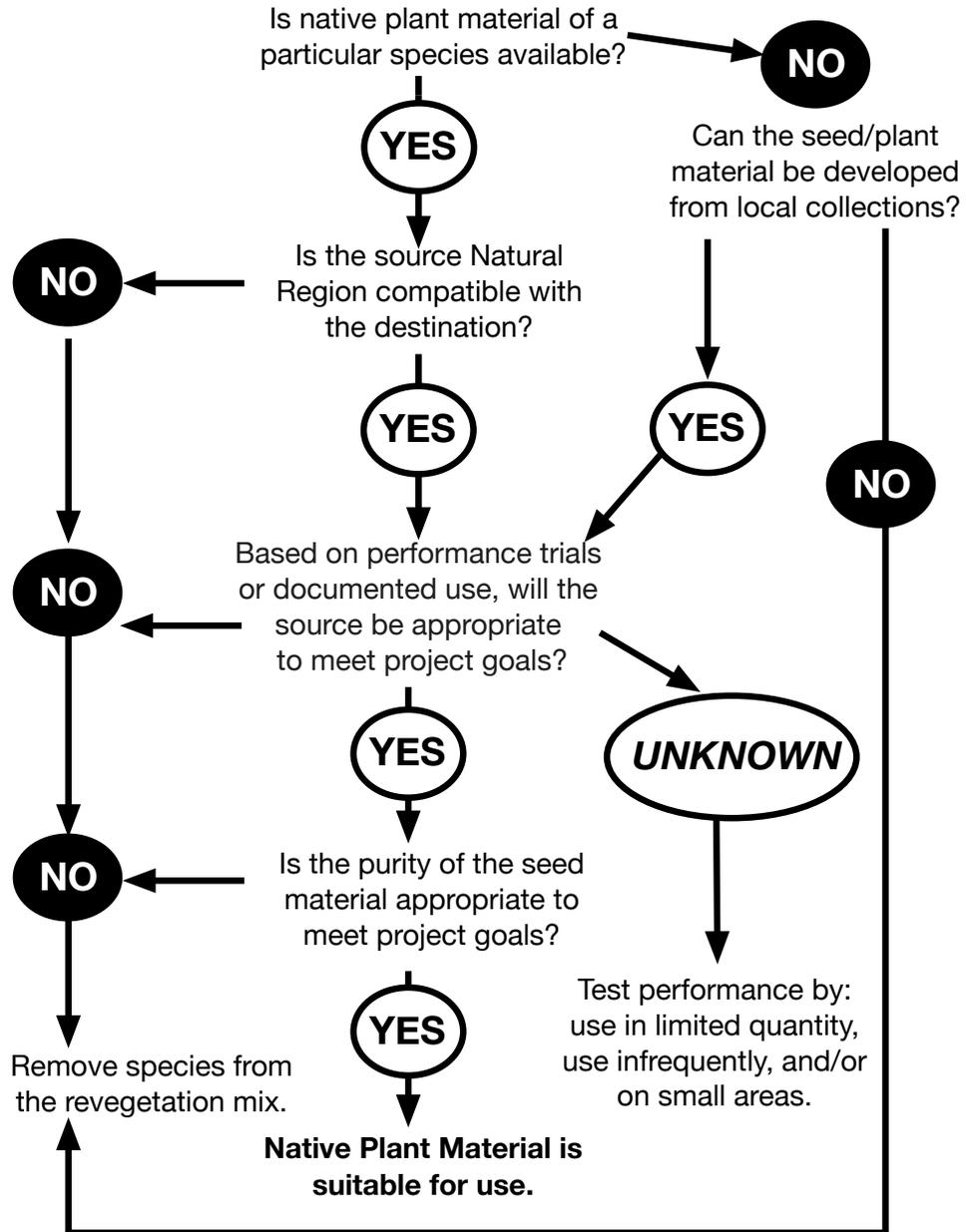
When creation of wildlife habitat is a major objective, it is important to understand the requirements of the wildlife species throughout the year and through their life-cycle. Palatability of vegetation varies throughout the year and the presence of young plants may incur overgrazing by wildlife or cattle. It may be necessary to fence recovering revegetated areas until the plants are well established. This is also a necessary precaution in heavily used recreational areas.

Sourcing the Best Native Plant Materials

The success of a native revegetation project is dependent on the quality of the native plant materials that are used. There are a number of steps that can be taken to assure the best possible outcome (see Figure 1):

1. Develop a list of desirable native plant species for the site.
2. Consult with an experienced native plant expert to learn about the commercial availability of each species and its origin. It is best to use plant material that was sourced from the same or similar natural region to assure performance.
3. If the material has not been tested for performance, field testing on a small scale first is recommended.
4. Only buy seed that has a Seed Analysis Certificate for each seed lot (of each species). The certificates should be reviewed by an experienced practitioner to ensure that problem species are not present. Native seed lots must be free of prohibited, primary and noxious weeds as defined by the *Canada Seeds Act*. In Alberta, seed lots also need to be free of restricted and noxious weeds as designated by the *Weed Control Act* or by a local municipality.
5. If there is also a concern about the presence of other non-native problem species, purchasers can request that a seed analysis be conducted on a 100 gram sample of seed instead of the usual 25 gram sample. This will increase assurance from 95% to 99% that an impurity is not present.
6. If the level of impurities does not meet regulatory standards or project goals, it should be removed from the revegetation mix. It is important to make multiple attempts to secure alternative sources prior to making this decision.
7. If wild harvesting of seed is necessary to secure supplies, refer to the ANPC policy on this subject. Sufficient seed has to be left on the harvesting site to allow native plants to propagate and provide food for wildlife.
8. Keep detailed records, including seed tags, seed analysis certificates and information about procedures. This is very helpful for monitoring and forensic analysis of problems such as weed infestations.

Decision-Making Chart: Sourcing Native Plant Material



Seeding and Planting

It is important to prepare a firm seedbed to ensure good soil to seed contact. Creating microsites (ridges and hollows) can also enhance survival of native plants, particularly in dry environments and on slopes. If amendments are necessary, the use of clean materials is very important. Sources should be inspected for problem plant species prior to purchase. Inspection is best done prior to harvest. Using straw from seed growers is a good practice. It is also possible to have seed inspection labs test samples of the materials that will be used.

Seeding or planting rates need to match revegetation goals and plant characteristics. For example, higher seeding rates may be used in situations where competition with weedy species is expected. Lower seeding rates are more appropriate where the site is not contaminated with problem plant species and establishment of native species from around the site or from the soil seedbank is desired.

Seed placement is dependent on species requirements. Seeding too deep can be a common cause of seeding failure. Timing of seeding or planting should consider species requirements. Some species may require special pre-treatment (e.g., stratification, scarification) to enhance germination. Some species may require rhizobial bacteria to establish. Micorrhizal fungi are usually present in salvaged topsoil. Getting advice from an experienced practitioner is recommended.

Management of Revegetated Areas and Assessing Success

There is a misconception that areas revegetated with native species do not require management. Project sites may become contaminated with unwanted plant species that are brought in by wind, wildlife or human traffic. Control of restricted or noxious weeds as defined in the Alberta Weed Control Act and municipal bylaws is necessary. These should be eliminated using methods that are compatible with the survival of broad-leaved native plants.

Non-persistent non-native annual weeds should only be controlled when they are negatively affecting native plant establishment and survival or the land use. Annual weeds can catch snow and can protect emerging native plants from grazing. Their presence will decline once the native stand is established.

An initial watering may be needed for establishment of native forbs, shrubs and trees that were planted out from containers. Grazing, mowing or prescribed burning of the revegetated area will be necessary at some point to retain plant vigour and diversity over time. Fertilization may be required during or after establishment to achieve specific project goals, such as increasing ground cover to prevent erosion.

Ongoing monitoring of the site is extremely important for determining management needs, to evaluate success relative to the project goals and to adjust procedures for future projects. Assessing site stability, biotic integrity and hydrologic and land use functions at the end of the

planting season, and in years two, three, five and ten is recommended. This should be conducted by an experienced practitioner and detailed records kept for future use.

References

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