



**Alberta Native Plants and Seeds: Wild
Harvest, Registration and Deployment.
A Guide for Technicians and Practitioners**

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Introduction

Re-vegetation of land disturbances began in Alberta in the 1970's and has evolved over time. The use of native plants to revegetate land disturbances in forested areas of Alberta is mandated by the Government of Alberta and guided by numerous Acts of Legislation, standards, guidelines and approvals. Most of the standards were implemented to mitigate forest resources after harvest and do not consider other land uses. Until such time as these are revised, revegetation practitioners must adapt to the existing standards. It is our intention that this publication provides a valuable guide for reclamation practitioners and technicians through the documents that regulate plant placement for reclamation in northwestern Alberta and to provide best management practices for the harvest and handling of native seeds for use in reclamation in the Boreal Forest Natural Region of northwest Alberta.

1. Provincial Guidelines and Regulations Directing Use of Native Plants in Alberta

The following is a short discussion of the documents that mandate and regulate the use of native plants on public lands and how they influence decisions and choices.

1.1 Environmental Protection and Enhancement Act

This act requires that disturbed lands be reclaimed to an equivalent land capability which is defined in the Conservation and Reclamation Regulation (AR 115/1993) as

“...the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but the individual land uses may not necessarily be identical.”

This document is used to guide revegetation regulations, certifications, approvals and criteria for all areas of the province of Alberta.

1.2 Native Plant Revegetation Guidelines for Alberta

The *Native Plant Revegetation Guidelines for Alberta* (Native Plant Working Group 2001) was published in 2001 by Alberta Agriculture, Food and Rural Development and Alberta Environment. These were produced in response to an increasing use of indigenous species for reclamation and revegetation of



disturbed public lands and recognition of the value of maintaining ecosystem function and biological diversity within the native landscapes particularly on public lands.

The document states:

“Planting native species or alternative revegetation practices compatible with native species re-establishment will be required in legislated protected areas. Native plant materials should be used on all other disturbed natural landscapes on publicly owned lands where reestablishment of the native plant community is consistent with the surrounding landscape.”

Following the publication of this document, the use of native plants became the expectation for future regulations, approvals and criteria.

1.3 2010 Well Site Reclamation Criteria

In May 2010, Alberta Environment released the ‘2010 Reclamation Criteria for Wellsites and Associated Facilities for Forested Lands’ (Alberta Environment 2010). These were updated from previous iterations and are being used to evaluate whether a wellsite has met the requirement for equivalent land capability. Stated in the criteria document is

“The Forested Reclamation Criteria have been developed with an understanding that where forest presently exists, the post reclamation land use will also be forested.”

and goes on to indicate that

“The desired plants for forested lands are those species which are representative of the natural sub-region, ecosite and plant community.”

1.4 Alberta Forest Genetic Resource Management and Conservation Standards

In Alberta the management of plant genetic resources on Public Lands is regulated through the ‘*Alberta Forest Genetic Resource Management and Conservation Standards*’ (FGRMS) 2009. The FGRMS is enabled under the Forest Act, Timber Management Regulation, to manage genetic resources used in reforestation and reclamation by setting standards to control survival and growth of individual species (through genetic adaptation) and community resilience (through genetic diversity).

This directs the management of wild seed and propagule collection, handling, registration, storage and deployment.

Although these standards were derived from work done with commercial tree species and until recently used primarily for managing the genetic resources of trees (used in reforestation and reclamation), they



are also applied to other woody species and herbaceous perennials until a more appropriate guide becomes available.

Section 2. Seed Zones

The *Native Plant Revegetation Guidelines for Alberta* (Native Plant Working Group 2001) states that

“The original collection site of native plant material should be as close as possible to the disturbed site (within the same Natural Region). Native plant material collected onsite may be propagated to develop adequate supplies”

The FGRMS (2009) goes one step farther and regulates the movement of wild harvested plant material through the development of seed zones delineated to manage the risks of plants failing to thrive after planting and to preserve genetic diversity within species. Forested areas of the province have been divided into seed zones based on geographic uniformity, natural sub-region and elevation. In general, individuals within each seed zone are deemed similar enough to be exchangeable (*i.e.*, seed from one area should be successful when planted in another area within the zone). Likewise, an individual grown from seed collected in the same seed zone would be equally unlikely to contaminate the population.

Seeds for plants to be utilized as part of a revegetation/reclamation projects in the Boreal Forest Natural Region must be harvested from within the same seed zone as they are to be deployed (Section 5.2). Seeds harvested outside of a given seed zone can only be deployed if a variance is applied for and granted (Section 5.2.1).

2.1 Seed Zones of Northwestern Alberta

There are 21 seed zones in northwestern Alberta, 19 of which are part of the Boreal Forest Natural Region.

Central Mixedwood Natural Subregion comprises a large portion of the Alberta Boreal Forest Natural Region, generally in the central and eastern part of the province. In northwestern Alberta this region is divided into five seed zones:

- CM 1.2 – Vermillion Central Mixedwood Lowlands,



- CM 1.3 – Hay River Central Mixedwood Lowlands,
- CM 2.3 – Loon Lake Central Mixedwood Lowlands,
- CM 3.3 - Swan Hill-Utikuma Central Mixedwood Uplands, and
- CM 3.4 - Wapiti-Smoky Central Mixedwood Uplands.

Dry Mixedwood Natural Subregion encompasses a large area in northwestern Alberta along the Peace River and is divided into the following seed zones:

- DM 1.1 – Vermillion Dry Mixedwood Lowlands,
- DM 1.2 – Peace River Dry Mixedwood Lowlands, and
- DM 1.3. – Smoky River Dry Mixedwood Lowlands.

Northern Mixedwood Natural Subregion comprises the northern most areas of Alberta at lower elevations. Two Alberta seed zones are located in this area in the northwest portion of the province:

- NM 1.1 – Great Slave Northern Mixedwood Plains, and
- NM 2.1 – Bistcho Lake Northern Mixedwood Uplands.

Boreal Sub-arctic includes small areas in the far north of the province at higher elevations and is divided in northwestern Alberta into two seed zones:

- BSA 1.1 – Caribou Mountains Boreal Subarctic Uplands, and
- BSA 1.2 - Cameron Hills Boreal Subarctic Uplands.

Lower Boreal Highlands Natural Subregion is located at middle elevations (higher than the surrounding Central Mixedwood or Dry Mixedwood) and in northwestern Alberta is divided into five seed zones;

- LBH 1.1 – Bistcho Lake Lower Boreal Highlands,
- LBH 1.2 – Birch Mountains Lower Boreal Highlands,
- LBH 1.4 – Buffalo Head Hills Lower Boreal Highlands,
- LBH 1.6 – Clear Hills Lower Boreal Highlands, and
- LBH 2.1 – Cameron Hills Lower Boreal Highlands

Upper Boreal Highlands Natural Subregion includes small areas at higher elevations particularly surrounded by Lower Boreal Highlands. In northwestern Alberta these areas are represented by two seed zones:

- UBH 1.2 – Buffalo Head Upper Boreal Highlands, and



- UBH 1.3 – Clear Hills Upper Boreal Highlands.

Although Lower Foothills Natural Subregion and Peace River Parkland Subregion are represented in northwestern Alberta these do not fall within the Boreal Forest Natural Region (or Green Zone). These areas are dominated by agriculture rather than forestry and are therefore deleted from further discussion in this document.

Section 3. Harvest/Collection Authorization

3.1 Public Lands

All collections of seed and vegetative material intended for reforestation or for research supporting reforestation that is carried out on public land require an authorization from Alberta (ASRD 2009a). Collections of forest tree or plant material by other than forest tenure holders require a temporary letter of authorization from a Government of Alberta Forest District Office (Appendix 1). Native plant material collections not intended for reforestation (*e.g.*, for use in reclamation and revegetation) also require authorization from the field office and must follow the Native Plant Revegetation Guidelines for Alberta (Native Plant Working Group. 2000) (see ethics and practices below).

Action: The proponent must submit a map and collection plan identifying the area of collection, type of material, method of harvest, timing and target species. After harvesting, the proponent submits a report to the appropriate field office identifying the actual areas harvested (on a map) and the approximate yield/volume of seed/plant parts.

If collecting is to occur outside of ASRD's jurisdiction (*e.g.*, Provincial Parks, Federal Lands), approvals must be obtained from those agencies..

Once an organization or individual has been authorized by the province to harvest seeds (or other plant material) they become the owners of the material. This ownership transfers back to the Province of Alberta when the material is deployed back onto public land. The Public Lands Officer or Forest District Officer may request that 10 per cent of seed harvested from Public Lands be returned to the government or to a designated native seed storage facility for use in reclamation, restoration or habitat improvement projects.



3.2 Private Lands

Action: To harvest seeds or other plant material on private land, permission must be obtained from the landowner or lessee. A request, similar to that discussed above (a map and collection plan identifying the area of collection, type of material, method of harvest, timing and target species) should be made and permission granted prior to removing any plant material.

Section 4. Harvest and Handling

4.1 Ethics and Practices

Native Plant Revegetation Guidelines for Alberta state that one should collect/harvest first from areas intended for development or disturbance. If collecting has to be done on undisturbed areas, the following should apply:

- Avoid rare or fragile habitats.
- Know the plants of the area before collecting; only collect common species or those with a large population.
- Collect undamaged ripe seed or cuttings, not entire plants (unless essential for identification).
- Leave at least 50% of the seed in place to allow natural propagation, and to provide food for insects, birds and small mammals.
- Collect minimal amounts (from no more than 10% of the plants) in areas that may be subjected to further collecting by the general public or where grazing reduces natural regeneration.
- Leave an area to rest for at least two years between collections if possible (longer periods of time may be necessary for some species and locations).
- Avoid the use of heavy machinery to prevent rutting when soils are wet.

4.2 Harvest

Seeds can be harvested mechanically or by hand. Dry fruits such as cones and dry capsules should be harvested as seeds ripen but prior to opening. Fleshy fruited species ought to be harvested when fruit is ripe but again before dispersal. Collection times vary among species and within species in different years depending on weather. It is important to survey collection sites during the flowering season to gage



harvest dates. In some cases (*e.g. Populus tremuloides* – aspen) the harvest window is extremely narrow therefore sites should be monitored closely as fruit ripens.

Vegetative material such as softwood or semi-softwood cuttings are taken during the growing season whereas hardwood cuttings (whips) are harvested during the dormant period (late winter or early spring) and stored until deployed.

4.3 Lot Identification

It is imperative that specific information accompany any accession of native plant material (species name, date, collection site, etc.). Most of this information should be on a label accompanying the collection whereas more detailed information can be maintained on an associated tracking sheet.

Alberta Tree Improvement and Seed Centre (ATISC) (where all seeds are eventually registered and stored) prefer seed lot identification to include the type of material (seed, cuttings *etc.*), owner, species name, collection year, quantity (volume of fruit) and the location of harvest. These elements provide the accession identifier. For example, a seed lot may be identified as: NBRI 4-58-24-W5 2002 Shepcan. That would be NAIT Boreal Research Institute buffaloberry seed harvested in 2002 from the 4th section of township 58 and range 24 west of the fifth meridian.

4.3.1 Naming

A convention of naming native trees using common names exists, however due to the similarities in common names between shrub species, scientific binomials are recommended. A seven letter acronym comprising the first four letters of the genus and the first three letters of the species is unique to most plants (*e.g.*, Shepcan for *Shepherdia canadensis* - buffaloberry).

4.3.2 Location

Harvest location is generally given in the form of the Alberta legal land description and also in latitude and longitude. The legal land description describes the general area whereas latitude and longitude are used to define the extent of the collection area for each individual accession.

4.3.3 Date

Harvest dates must be recorded for each accession. Collections made in the same area over a growing season can be combined into a single collection with multiple harvest dates. Harvests from different years must be kept as separate accessions.



4.3.4 Owner, Harvester

The legal owner of the seeds must be identified. This becomes part of the accession name when the seed is registered by ATISC. An acronym is usually sufficient. It is also useful to record the harvester's name and contact information.

4.4 Population Size

In Alberta, there are specific requirements for seed lots of tree species such that they qualify for unrestricted registration under Stream 1 (Section 5 - Registration). With the exception of aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) seeds must be harvested from a minimum of 30 individual trees from a maximum radius of two kilometres. For clonal species such as aspen and balsam poplar, seeds must be harvested from a minimum of 10 well-spaced clones separated by a minimum distance of 500 metres with a maximum collection area of a five kilometre radius.

No species specific standards have yet been set for shrubs and herbaceous perennials however it is recommended that the above standards (for clonal and non clonal material) be used.

4.5 Quantities

The amount of plant material collected will depend on the eventual deployment requirements. It is, however important to bear in mind that up to 30,000 seeds or 5% of original seed lots (whichever is less) can be retained by the government for conservation purposes and that a portion of each seed lot is required for testing.

The amount of raw material harvested should be recorded for tracking purposes. For seeds, this allows a determination of fullness of seed heads/fruitlet bodies and calculations of seeds per unit volume or per unit weight of fruit.

4.6 Handling

4.6.1 Labelling

All seeds or vegetative material should be labelled as they are harvested. Although this can be handled in several ways, generally a tag is affixed to the container into which seeds or fruits are placed and an identical tag placed in the container with the fruit or seeds. Both tags should include all pertinent information and should be legibly printed using indelible pen, wax pencil or pencil on water-proof



material. It is imperative that all containers be labelled and that some indication of the number of containers is documented (*e.g.*, 1 bag of 4).

4.6.2 Temporary Storage and Transport

Temporary storage methods for seeds or fruits vary among species, but for most, store cool and dry. Fleshy fruit requires refrigeration (between 2-10 °C) until cleaned. Dry receptacles, such as cones or capsules, should be kept cool in breathable containers, such as paper, tyvek®, burlap or canvas bags. All seeds/fruits should be delivered to a cleaning facility within a week of collection to prevent spoilage.

Green cuttings (*i.e.*, those which are actively growing) should be stored moist in sealed containers or stems placed in water until transported to a nursery or greenhouse. Dormant whips of woody material are bundled and stored frozen until deployed.

4.7 Seed Processing

4.7.1 Authorization of cleaning facilities

All native seeds to be used for operational deployment must be processed at a seed processing facility approved by the Government of Alberta. To be approved, seed processing facilities must have the verifiable capability to maintain accurate identity and seedlot integrity. At present, only the Smoky Lake Forest Nursery (a division of Coast to Coast Reforestation Inc.) is approved by the Government of Alberta.

To apply for approval for a cleaning facility, contact the Provincial Seed Officer, Alberta Tree Improvement and Seed Centre in Smoky Lake, Alberta (ASRD 2009b).

4.7.2 Tracking

Seeds and vegetative materials must have verifiable identity documentation, and the integrity of individual lots must have been maintained throughout the process. Any mixing of collections must be carried out and documented in such a way that the eventual distribution of individuals can be assured to be random within the deployment lot.

If plant material lots are divided, a copy of the tracking document must accompany each sub-lot.



4.8 Testing

Seed is tested to assess seedlot quality and value for seedling production and storage. Seed testing must be conducted at facilities approved for seed testing by Alberta (Smoky Lake Forest Nursery) and an experienced seed testing technician or laboratory scientist responsible for the seed testing laboratory must sign seed test result reports. To qualify for approval see Alberta Seed Testing Standards (ASRD 2009b).

4.8.1 Sampling

It is important that a representative sample of the seed lot be tested for the various attributes. This is generally done by taking primary samples (small fraction randomly selected from the entire seedlot) which are then combined and mixed to form a composite sample. A smaller subsample drawn from the larger composite sample is then submitted to a laboratory for testing and is the submitted sample. A portion of the submitted sample is then used for testing and the remaining seeds in the submitted sample are stored for up to one year. For more information on sampling or for specific methods and sample sizes for individual species refer to Alberta Seed Testing (ASRD 2009b).

4.8.2 Purity

Purity testing will determine the percentage composition by weight of pure seeds, seeds of other (often weedy) species, and inert particles in a seedlot.

4.8.3 Seed Weights

The weight (in grams) of 1000 seeds is to be measured and documented. Seed weight tests determine the average weight of 1000 seeds from a given seedlot. Eight (8) replicates of 100 seeds, drawn randomly from the pure seed fraction of the purity test, are weighed to three decimal places. For a complete methodology refer to Alberta Seed Testing (ASRD 2009b).

4.8.4 Moisture Content

The moisture content of seeds affects longevity when seeds are stored. Moisture content is expressed as a percentage of the weight of the original sample.

4.8.5 Viability/germination

Germination is tested to determine the germination potential of a seedlot. Germination percentage is defined as the percentage of seeds that develop into normal seedlings under specified conditions in a specified period of time. For more detailed methodology refer to Alberta Seed Testing (ASRD 2009b).



4.9 Seed Storage

Although most of the work regarding storage of seeds of native plants has been done with tree species. Extensive studies are underway at University of Saskatchewan to determine optimal storage conditions for individual shrub species; however no results are available as yet. At present, seeds are stored at -18°C to 20°C at a moisture content of between 5-8%.

Section 5. Seed Registration

5.1 Registration

Plant material harvested from Alberta public lands or destined for deployment on public lands must be registered with ATISC. The only exceptions are wild harvested transplants and cuttings from within a five km radius and 100 m elevation of the planting site. These may be deployed without registration provided that the harvested vegetative material have not been or will not be multiplied or serially propagated.

There are two types of registration depending on the type of material; Stream 1 registration is for plant material that is wild harvested from public lands or wild harvested material that will be deployed on public lands, and Stream 2 for material collected from locally adapted material or from non-local material (generally orchard grown or non-native material). Stream 2 will not be discussed further in this document but information is available from ASRD (2009a).

Registration of wild harvested plant material involves filing a fully completed Stream 1 Registration Form (ASRD 2009) with ATISC along with the plant material which has been assigned a temporary lot number by the owner. Material must be presented for registration with all accompanying information within six months of harvest and all collection, handling, storage and processing information must be made available to ATISC for review upon request. Registration will be complete when the information and material is reviewed and material is assigned a registered lot number. Registration may be held up if information is missing.

Registration will either be unrestricted or restricted. Unrestricted Registration is applied to lots that comply with documentation, adaptation and diversity requirements that allow a seed or vegetative lot to be used for deployment within its seed zone. There are two types of unrestricted lots – Point Collections and Seed Zone Collections. Point Collections meet all the requirements for number of parent plants, size



of the harvest area and the differences in elevations set out in Appendix 4 of the FGRMS (ASRD 2009b). Seed Zone Collections are collections that are harvested from a single seed zone but do not meet the area or elevation requirements but do meet the number of parents requirements. These collections are unrestricted within the seed zone but are not eligible for variances (therefore can never be deployed outside the seed zone).

Restricted registration is applied to material that does not comply with the number of parents requirements for unrestricted registration. They are not considered Point Collections or Seed Zone Collections. Restrictions on deployment may be imposed.

All registered seed must be stored at ATISC or another storage facility approved by Alberta. Registered vegetative material can be placed in stooling beds at approved locations but these beds must be available for inspection if requested.

5.2 Deployment

The Alberta Forest Genetic Resource Management and Conservation Standards states that

“Genetic resources of forest vegetation will be deployed within the Green Area in a manner that strives to:

- conserve the genetic integrity, adaptability, diversity and health of wild and managed populations while
- recognizing that genetic change will occur through evolutionary pressure, breeding and deployment,
- maintain or enhance forest productivity,
- be consistent with sustainable forest management principles (economic, social and environmental sustainability), and
- recognize that the Forest Management Plan (FMP) or plans of an equivalent level, guided by this and other related *policies, will determine how deployment will occur.*

Generally, only registered materials – unrestricted or restricted – may be deployed within forested areas and these must be deployed in the seed zone from which they were collected (seed zone of origin).

Point collections can be deployed anywhere within the seed zone of origin and up to a maximum depending on the size of the seed zone (Appendix 2). These collections can also be deployed up to one



km outside of the seed zone of origin provided the elevation change is less than 100 m. Unrestricted seed zone collections can be deployed within the seed zone of origin only and up to a maximum of five million individuals can be deployed.

Wild transplants and vegetative material taken from within 5 km and 100 m elevation of the target planting site may be deployed without registration. A maximum of 5000 individual propagules may be deployed in this manner.

5.2.1 Material Withdrawal

To withdraw registered materials a Reforestation Seed and Vegetative Materials Withdrawal and Transportation Form is to be completed and submitted.

5.2.3 Variances

A variance is an approval by ASRD to deploy plant material outside its seed zone of origin. This can be applied for from the ATSIC (Smoky Lake). A variance will be given if the climate and ecological setting of the target site are similar to that of the collection site (*i.e.*, species are adapted) and if there is no concern for hybridization with existing vegetation (*i.e.*, the genetic integrity of the existing vegetation can be maintained).

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Appendix 2. Stream 1 Seedling and Vegetative Propagule Lot Deployment Limit by Seed Zone.

Size Category	Seed Zone Area (ha)	Maximum Number Deployable per Lot ¹		Approximate kg Seed ²			Approximate Coverage in ha (@1800/ha)	
		Seedlings	Vegetative Propagules	Sw ³	Aw ⁴	PI ⁵	Seedlings	Vegetative Propagules
1	> 1 million	25 million	20 million	150	2.1	250	13 888	11 110
2	500 000 to 1 million	20 million	16 million	120	4.9	200	11 111	8 889
3	100 000 to 500 000	15 million	12 million	90	3.7	150	8 333	4 167
4	<100 000	10 million	8 million	60	2.4	100	5 555	2 778

¹ Deployment limit includes seed and vegetative propagules from a single lot

² Assumes two seeds per cavity.

³ *Picea glauca* (white spruce)

⁴ *Populus tremuloides* (aspen)

⁵ *Pinus contorta* (lodgepole pine)