# SANSC Native Seed Market Needs and Capacity Assessment

Prepared by Enviro Q&A Services and Wild Rose Consulting Inc.

for

Grassland Restoration Forum (on behalf of the Southern Alberta Native Seed Collaborative)

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Enviro Q&A Services

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## REPORT SUMMARY

At the request of the Southern Alberta Native Seed Collaborative, Enviro Q&A Services and Wild Rose Consulting Inc. conducted a survey of Growers/Producers, Wild Harvesters, Distributors, and End Users and Regulators to identify the current state of the sector and opportunities to improve the native species seed market. The authors also produced a high-level review of the literature to provide a sense of the native seed market needs, barriers, opportunities and organizations.

There was clear evidence among the survey participants that the native species seed industry in Alberta is alive and vibrant, and that there is a strong desire to move the market forwards to enable better ecological outcomes for revegetation projects. In addition, there are many other market participants who did not responded to the survey, suggesting an even larger market than demonstrated here and therefore a larger group of potential individuals and companies SANSC could engage with and support.

Consistent with the literature and other surveys, participants identified barriers to efficient functioning of the industry and provided suggestions on ways to reduce or remove these barriers, which provide opportunities for SANSC to support the industry. Key barriers include:

- Cyclical nature of supply and demand.
- Lack of awareness or capability of end users to predict seed needs in advance (i.e., greater than one year lead time).
- Availability of species and volumes to meet the needs of End Users and Regulators.
- Need to go to multiple seed providers and/or go outside Alberta to meet seed needs.

**Recommendations**

SANSC has an opportunity to show leadership in this field by: (1) helping market participants become more knowledgeable, (2) developing tools to make the market more efficient, and (3) transform the market.

SANSC can undertake, lead or facilitate projects in the short-term (i.e., Year 1) and medium-term (i.e., Years 2 and 3) to establish its credentials as an enabling organization and to develop some initial products that demonstrate to users and funders that it can make valuable contributions to the sector and be seen as the go-to place for native species seed information for grasslands regions.

SANSC can then begin to organize, lead, or facilitate longer-term projects that will make major changes that can transform the industry. There are examples of such changes in the literature that can serve as templates for the projects.

Recommendations for short-, medium- and long-term projects are offered following the presentation of the complete survey results.

### *Short-term Opportunities*

There are some quick wins that SANSC could undertake in the first year, including:

1. Establish a stand-alone SANSC website and promote its availability to the native species seed community.
1. Develop and maintain a Community of Practice to share native species seed knowledge.
2. Develop a "Newsletter" or other communication vehicle that interested parties could sign-up for that provides updates on SANSC's work and general native species seed information. The authors' experience is that people are more likely to look at information pushed to them rather than expecting them to periodically visit the website.
3. Develop and maintain an online list of Alberta seed suppliers and their products. This will need to be actively managed to ensure data are up to date (for example, current lists from the ANPC and NPSS do not appear to be current). There was strong support in the survey for this initiative.
4. Publish on the website a Glossary of Terms and Acronyms used in the industry.
5. Develop education tools to promote the use of native species seed and increase awareness of market scope and needs such as:
    a. Promoting the need to use both common and scientific species name in seed orders and marketing tools.
    b. Identifying SANSC's preferred source for scientific and common names of native plants. The authors recommend using the Database of Vascular Plants of Canada (VASCAN) (Canadensys, n.d.) for current scientific and common plant names and the Alberta Conservation Information Management System (ACIMS) to determine if a species is considered native to Alberta.
    c. Promoting the use of native species varieties/cultivars in revegetation projects.
    d. Providing information on the value of and opportunities for wild harvested seed in revegetation projects.
    e. Providing a forum for "good news" stories showcasing native seed use in revegetation projects.
6. Provide regulators with information to support them as they update their requirements. At a minimum, inform regulators of the survey results and inform them that SANSC could be a useful reviewer for draft requirements.

### *Medium-term Opportunities*

The following projects could be undertaken in Years 2 and 3 to continue to establish SANSC's leadership role:

1. Develop and maintain a list of native species varieties/cultivars available for purchase or for use as breeder stock for increasing seed supply.

2. Develop a list of the types of revegetation projects using native seed (e.g., disturbance types, reclamation vs. restoration) to show market breadth and opportunities. The list should go beyond the traditional larger-scale reclamation and restoration projects to include smaller-scale projects served by smaller seed providers. Where possible, identify current and future scale (and therefore seed requirements) of these projects.
3. Develop guidance on acceptable species to substitute in seed mixes.
4. Initiate discussions with other organizations with similar mandates or aspirations in Alberta and outside the province with the aim of coordinating information and resources and potentially engaging in mutually beneficial projects.
5. Develop and maintain an online listing of Regulators and their requirements for use of native species to highlight market potential.
6. Engage with regulators to better understand their oversight roles and tools and increase awareness of these within the sector.
7. Develop an online native species seed "dating service" that will link the Grower/Producer and Wild Harvester sectors with the Distributor and End User sectors to increase awareness of needs and capabilities and facilitate a more efficient market.
8. Collate and update information on seed production, harvesting, handling, cleaning, and storage for individual native species. The literature review identified a variety of sources of current and historical information – SANSC could develop Alberta-specific guidance to help the Grower/Producer and Wild Harvester sectors increase availability.
9. Develop and maintain a list of online resources to support the community.
10. Develop a common PowerPoint presentation and set of messages that speakers could use to promote SANSC at relevant conferences.

***Long-term Opportunities***

There are also longer-term initiatives that SANSC could provide a leadership role in. These initiatives will require buy-in from key stakeholders and/or significant financial support. At the very least, SANSC could initiate discussions to increase awareness of the need and value of these initiatives. Examples include:

1. Explore options for native species seed banks and seed orchards to reduce the highly cyclical nature of the native species seed industry.
1. Engage with Alberta Forestry and Parks to develop greater access to public lands for wild harvesting. Several survey respondents noted frustrations with the lack of access or the difficulties in obtaining access.
2. Engage with regulators to identify opportunities to make better use of the information they collect on use and efficacy of native species in revegetation projects. Sixty seven percent of regulator respondents have data on the use of native species in revegetation projects, but only 25% indicated it was available online or on request.

3. Engage with the CSGA to better understand and promote the agency's Native Plant Certification Program.

## ACKNOWLEDGEMENTS

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The authors are grateful for the support and guidance provided by the SANSC Steering Committee, and in particular Jane Lancaster.

Finally, the authors appreciate the time and effort spent by the survey respondents.

# GLOSSARY

**Acceptable Substitutions**

For the purposes of the Grassland Criteria, seeded native species that may not be present in the control area but are part of the natural sub-region. Their presence is considered temporary as plant succession proceeds, but in the short-term they are considered desirable species as they provide ecological benefits (Environment and Sustainable Resource Development, 2013).

**Alberta Seed**

Seed sourced from plants growing in Alberta (i.e., genetically adapted to local conditions).

**Certified Seed**

The approved progeny of Breeder, Select, Foundation or Registered seed produced by seed growers and so managed to maintain varietal identity and purity. It is the class of seed recommended for commercial crop production (Canadian Seed Growers Association, 2025).

**Common Seed**

Native species seed that is not registered as a Variety and falls outside of the Pedigreed Seed System. This can include wild harvested seed, nursery grown seed from wild harvested seedlots, or downgraded varietal seed (e.g., varietal material that has been grown out for more than three generations). No claims or guarantees can be made about origin (provenance), adaption or performance.

**Compatible Species**

For the purposes of the Grassland Criteria, species used for reclamation on sites prior to 2010 that may not be native to the sub-region and agronomics that are suitable for grazing (Environment and Sustainable Resource Development, 2013).

**Cultivar (Variety)**

A named group of plants of the same species that have been artificially selected for specific characteristics. They must be morphologically distinct, breed true to type, and be registered with the Government of Canada (e.g., AITF Badlands Blue Grama).

**Deployment**

Placement of seed or plants at the Revegetation Site.

**Distributor**

A person, company or organization that buys seed from a Grower/Producer or a Wild Harvester and sells it to an End User.

**End User**

A person, company or organization that deploys native species seed at a Revegetation Site or someone that designs/plans/recommends revegetation programs that require purchasing native seed.

**Forb**

A native herbaceous flowering plant that is not a Graminoid.

**Graminoids**

Native grasses, sedges, rushes and reeds.

**Grassland Criteria**

The 2010 Reclamation Criteria for Wellsites and Associated Facilities for Native Grasslands (July 2013 Update) (Environment and Sustainable Resource Development, 2013).

**Grasslands**

Areas of the province within the Grassland Natural Region, Foothills and Central Parkland Natural Subregions, and Montane Natural Subregion.

**Grower/Producer**

A person, company or organization that grows native species and harvests the seed for sale to an End User or a Distributor.

**Locally-specific Native Plant Materials (Local Ecotype)**

Native plant materials that are matched in terms of their genetic composition to the particular region or location in which they are used, reflecting patterns of local adaptation and carefully increased to maintain the original genetic composition of the wild population (Tangren and Toth, 2020).

**Native-infilling Species**

For the purposes of the Grassland Criteria, a combination of seeded species or species found on the control area that are establishing on the disturbed area and are indistinguishable as to their source. They are considered desirable as they are part of the local native plant community (Environment and Sustainable Resource Development, 2013).

**Native Plant Certification (NPC)**

A voluntary quality control process provided by the CSGA for native plant seed identification. Although legally separate from pedigreed seed crop certification, similar CSGA documents and procedures are used to verify the origin, of collection or production, of native plant reproductive materials which have not been released as a variety. The CSGA's NPC program documents the identity of plant material and verifies that it is from a designated geographic location (Source Identified class) or selected for specific characteristics (Selected class) (Canadian Seed Growers Association, 2025).

**Native Species**

Plants that are indigenous to Alberta and were present prior to Euro-American settlement.

**Naturalized Species**

Species that have been introduced to an area and that now grow and reproduce wild, without cultivation. Some naturalized species have become such common sights that they are often regarded as native (Alberta Native Plant Council, 2006a).

**Natural Recovery**

Long-term re-establishment of native grasslands involving revegetation from the seedbank or natural encroachment and no seeding of non-native agronomic species (Environment and Sustainable Resource Development, 2013).

**Natural Region**

Extensive land mass (of the order of 20,000 $km^2$) characterized by permanent geographic boundaries (geological, physiographic, etc.) and a certain uniformity and individuality of climatic, topographical, geomorphological and biological conditions. There are 6 Natural Regions recognized in Alberta (Natural Regions Committee, 2006).

**Natural Sub-region**

Large land mass (of the order of 10,000 $km^2$) characterized by permanent geographic boundaries (geological, physiographic, etc.) and a certain uniformity and individuality of climatic, topographical, geomorphological and biological conditions. There are 21 Natural Subregions recognized in Alberta (Natural Regions Committee, 2006).

**Plant Rescue**

Efforts to relocate native plants from a site where destruction of the native habitat is imminent (Alberta Native Plant Council, 2009).

**Reclamation**

Steps, including revegetation, required to return a disturbed site regulated under the *Environmental Protection and Enhancement Act* and the *Conservation and Reclamation Regulation* to a state of equivalent land capability.

**Regulator**

An organization that establishes rules or requirements for the use of native species seed in revegetation projects in their jurisdiction.

**Requirements**

A term specific to the Regulator's Survey that is used broadly to encompass legislation, regulation, specifications, standards, and criteria that obligate a practitioner to use, or prioritize use of, native species in revegetation work.

**Restoration**

Re-establishing or enhancing native plant communities and their associated ecological functions, to a state similar to that which existed prior to disturbance or degradation.

**Restoration Species Pool**

The subset of all species in a location that is available as seed in practice for restoration projects (modified from Ladouceur et al., 2018).

**Revegetation**

Seeding or planting vegetation to return disturbed land to a productive state.

**Revegetation Site**

Any disturbed location equal to or greater than one hectare (1 ha) in size.

**Rewilding**

A form of ecological restoration aimed at increasing biodiversity and restoring natural processes. It differs from other forms of ecological restoration in that rewilding aspires to reduce human influence on ecosystems.

**Seed Supplier**

A Grower/Producer, Wild Harvester, or Distributor.

**Source-identified Seed**

The seed certification class of pre-variety germplasm which provides third party assurance of geographic origin, usually for perennial native forage grasses, legumes and forbs produced from parent populations which have not been selected. Source Identified class seed labels, issued by the CSGA, identify the original geographic location, of the collection or production, that has been declared by the responsible Plant Breeder (Canadian Seed Growers Association, 2025).

**Supply Chain**

All stages of growing/harvesting native species seed through to buying and selling seed and deploying seed on a Revegetation Site. Regulators are also considered part of the supply chain.

**Total Acceptable Vegetation**

For the purposes of the Grassland Criteria, the combined cover of native-infilling species and acceptable substitution species (Environment and Sustainable Resource Development, 2013).

**Variety (Cultivar)**

A named group of plants of the same species that have been artificially selected for specific characteristics. They must be morphologically distinct, breed true to type, and be registered with the Government of Canada (e.g., AITF Badlands Blue Grama).

**Wildcrafting (Wild Harvesting)**

The collecting of plant materials from the wild to use for various purposes (Alberta Native Plant Council, 2005).

**Wild Harvester**

A person, company or organization that harvests native seed from mostly undisturbed natural habitats for sale to an End User or a Distributor.

**Workhorse Species**

A few core species that can be reliably and readily sourced, stored at ambient conditions, and easily germinated (Shehadeh, 2021)

## ACRONYMS

| | |
|---|---|
| ACIMS | Alberta Conservation Information Management System |
| AER | Alberta Energy Regulator |
| ANPC | Alberta Native Plant Council |
| BFPS | Boreal Forest Plant & Seed |
| BLM | Bureau of Land Management |
| CRP | Conservation Reserve Program |
| CRR | *Conservation and Reclamation Regulation* |
| CSGA | Canadian Seed Growers Association |
| EPA | Alberta Environment and Protected Areas |
| EPEA | *Environmental Protection and Enhancement Act* |
| NPCP | Native Plant Certification Program |
| NPSS | Native Plant Society of Saskatchewan |
| NSPC | Native Seed Producers of Canada |
| SANSC | Southern Alberta Native Seed Collaborative |
| SOS | Seeds of Success |
| SOSS | Southern Ontario Seed Strategy |
| SPA | Seed Production Areas |
| TEC | Alberta Transportation and Economic Corridors |
| USDI | US Department of the Interior |
| VASCAN | Database of Vascular Plants of Canada |

# 1 INTRODUCTION

The Southern Alberta Native Seed Collaborative (SANSC)[1] was assembled informally in 2018 for the purpose of sharing seed and seed collection resources among local organizations. The need for the group was concern about the lack of suitable high quality, regionally adapted native seeds to restore existing and planned industrial disturbances and restoration projects in southern Alberta. Initially composed of a few governmental organizations, the group quickly expanded to include NGOs, independent consultants, growers, wild seed harvesters, and industry representatives, all with a common interest of improving the availability of local seed.

| Vision |
| --- |
| *Reliable, high-quality, ecologically appropriate, local native seed sources are available for restoration projects in Southern Alberta* |

SANSC is working to advocate for and facilitate the growth of a sustainable, locally sourced native seed industry to supply the needs of restoration projects in Southern Alberta (Southern Alberta Native Seed Collaborative, 2025). However, SANSC has identified barriers to success including access to land for wild harvesting, funding, and unpredictable markets, as well as a lack of policy, communication, education, and knowledge sharing.

The Grassland Restoration Forum (GRF), on behalf of SANSC contracted Enviro Q&A Services and Wild Rose Consulting, Inc. to undertake a Native Seed Market Needs and Capacity Assessment to support development of SANSC's Strategic Plan.

## 1.1 Project Scope

The Project had three parts:

1. A survey of Growers/Producers, Wild Harvesters, Distributors, and End Users to gather information on their current experience, interests and concerns with production, distribution and use of native seed in Grassland[2] revegetation projects;
2. A survey of Regulators to gather information on if and how they regulate the use of native species seed in revegetation projects; and
3. A high-level review of the literature to provide a sense of the native seed market needs, barriers, opportunities and organizations.

The Project focused on areas of the province within the Grassland Natural Region, Foothills and Central Parkland Natural Subregions, and Montane Natural Subregion (Figure 1).

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[1] See https://grasslandrestorationforum.ca/the-southern-alberta-native-seed-collaborative/

[2] See glossary for definitions of capitalized terms.

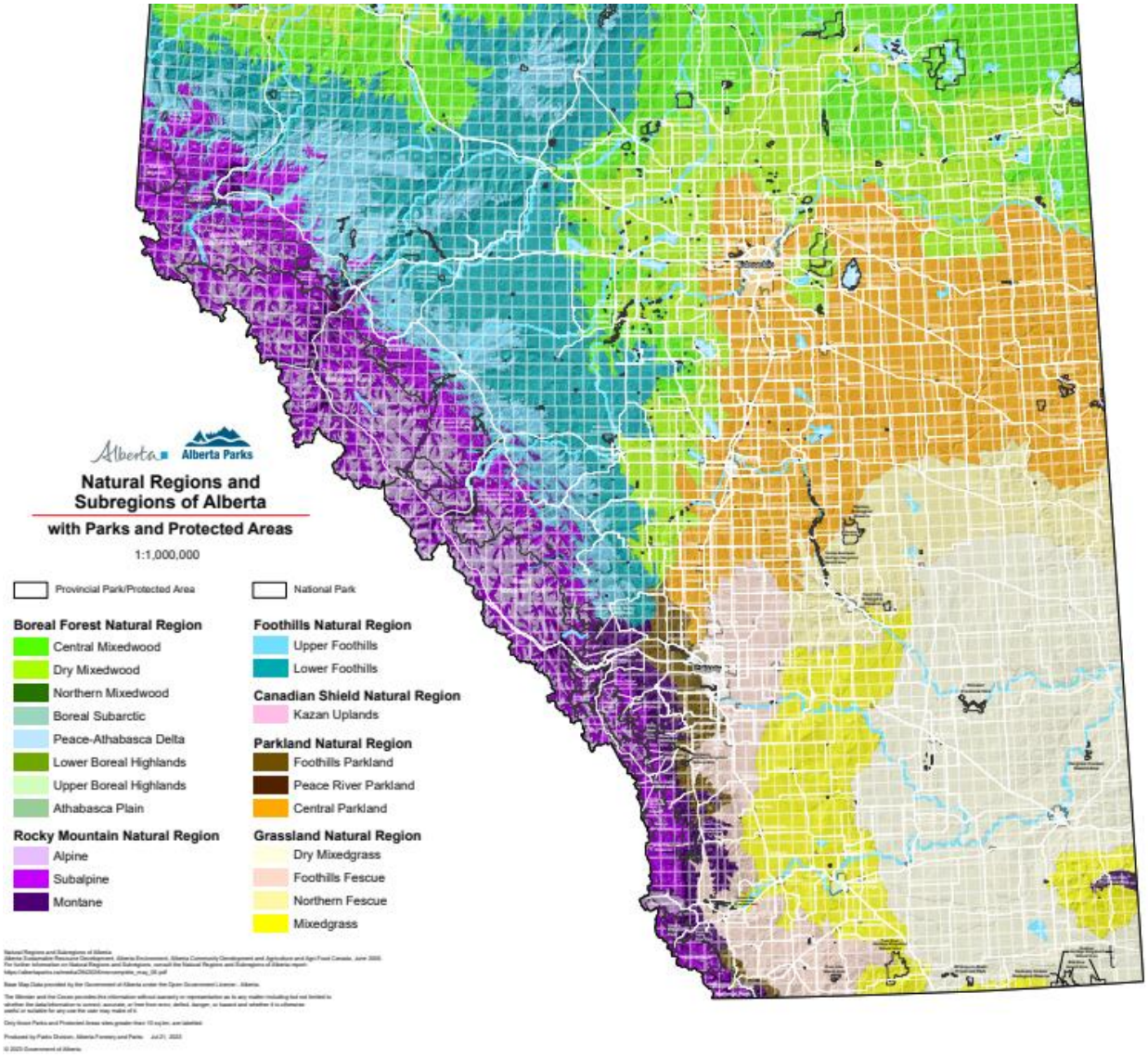


Figure 1. Map of southern Alberta Natural Regions and Sub-regions.
Source: Alberta Forestry and Parks (2023).

## 1.2 Methods

### 1.2.1 *Surveys*

Two surveys were used to gather information from different sets of stakeholders. The SurveyMonkey platform[3] was used to create the survey and gather the responses.

[3] https://www.surveymonkey.com/

#### 1.2.1.1 Grower/Producer, Wild Harvester, Distributor and End User Sector Survey

The survey was designed by the authors with input from the SANSC Steering Committee (Appendix 1). The survey was sent February 24, 2025, to an initial distribution list of 171 people provided by the SANSC Steering Committee and the authors. Additional potential respondents were later identified and sent the survey.

Notice of the survey was also provided through various channels such as the Grassland Restoration Forum website, the SANSC website, the Alberta Native Plant Council (ANPC), the Environmental Services Association of Alberta[4], and LinkedIn.

The survey closed March 28, 2025. Results are provided in Section 2.

#### 1.2.1.2 Regulator Survey

A separate survey of Regulators (Appendix 2), designed by the authors with input from the SANSC Steering Committee, was sent March 24, 2025, to 24 federal, provincial, municipal and Indigenous regulatory bodies. That survey closed April 11, 2025.

For the purposes of this survey, **Regulators** were defined as any organization that establishes rules or requirements for the use of native species in Grasslands revegetation projects, and **Requirements** was used broadly to encompass legislation, regulation, specifications, standards, and criteria that obligate a practitioner to use, or prioritize use of, native species in revegetation work.

The Regulator survey results are provided in Section 3.

### 1.2.2 *Literature Review*

An internet search for online resources was performed and the resources were reviewed and summarized. The literature review is provided in APPENDIX 7 so as not to distract from the primary goal of the project which was the survey results.

[4] See https://esaa.org/week-ending-march-7th-2025/

# 2 GROWERS/PRODUCERS, WILD HARVESTERS, DISTRIBUTORS AND END USERS SURVEY

A total of 44 people completed the survey. Seven people additional people started the survey but did not complete it (Table 1).

Table 1. List of respondents who only completed the background questions.

| Type | Experience | Species |
|---|---|---|
| Grower/Producer | 6 to 10 years | Grasses, Forbs, and Shrubs |
| Wild Harvester and End User | Less than 6 years | Grasses, Other Graminoids, Forbs, and Traditional Use |
| Wild Harvester and End User | 21 to 30 years | Grasses, Other Graminoids, Forbs, Shrubs, and Wetland |
| Wild Harvester and Distributor | 6 to 10 years | Grasses, Other Graminoids, Forbs, Shrubs, and Wetland |
| End User | 11 to 20 years | All types |
| End User | 6 to 10 years | Grasses, Other Graminoids, Forbs, and Shrubs |
| End User | 11 to 20 years | Grasses, Forbs, and Shrubs |

The number of respondents for each question is noted in the Figures and Tables (N=X); where respondents were allowed to select multiple answers the total number of responses is also shown (e.g., 5 people responded and each selected three responses – N=5 (number of responses = 15).

## 2.1 Contact Information

Survey respondents were asked to provide name and e-mail addresses so SANSC could follow up with additional questions if needed. That information is not provided in this report to respect the anonymity of respondents.

## 2.2 Background Information

Most survey respondents were End Users (Figure 2), though there was a good distribution of respondent types. The authors noted that six respondents were from the same municipality, however a review of their submissions showed enough variation that we decided to keep all six survey responses.

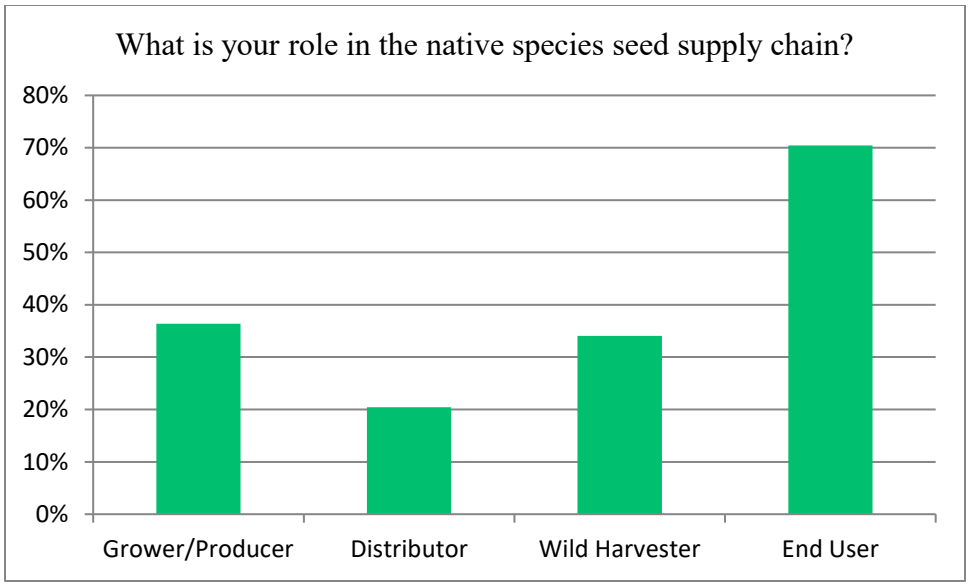


Figure 2. Role in the native species seed supply chain.
N=44; respondents could select more than one category (number of responses = 70).

Thirteen respondents indicated they had multiple roles, including two who selected all roles (Table 2); one was from a seed company and one from a non-profit organization.

Table 2. Number of respondents who selected multiple rows.

| Grower/Producer | Distributor | Wild Harvester | End User | Count |
|---|---|---|---|---|
| • | • | • | • | 2 |
| • | • | • | | 1 |
| • | | • | • | 5 |
| • | • | | | 2 |
| • | | • | | 2 |
| • | | | • | 1 |
| | • | • | | 1 |
| | | • | • | 3 |

Most respondents have been involved in native species seed supply chain activities for many years (Figure 3).

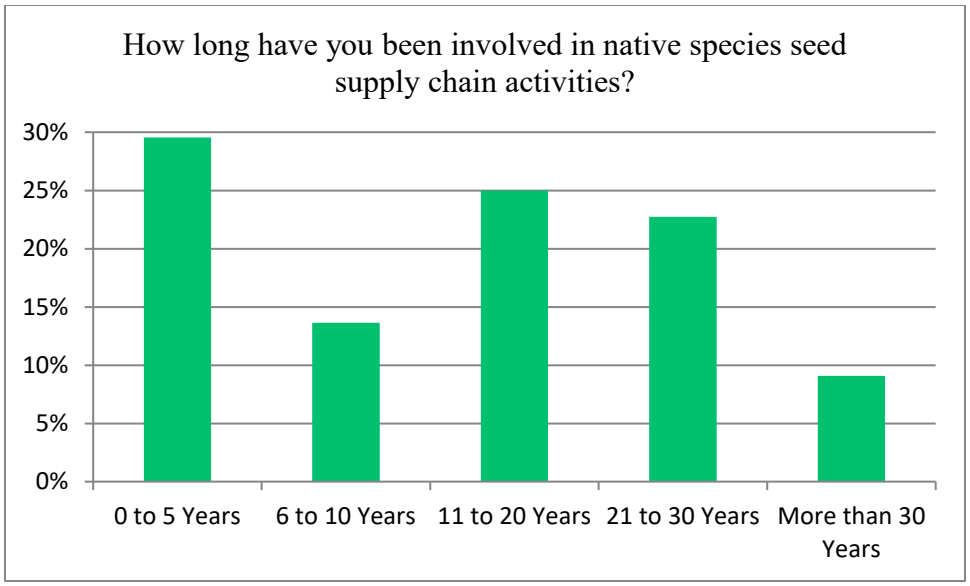


Figure 3. Length of time in the native species seed supply chain. N= 44.

Respondents reported growing, buying, selling or deploying all types of native species seed, with the majority focused on grasses (Figure 4). Many respondents reported working with multiple types.

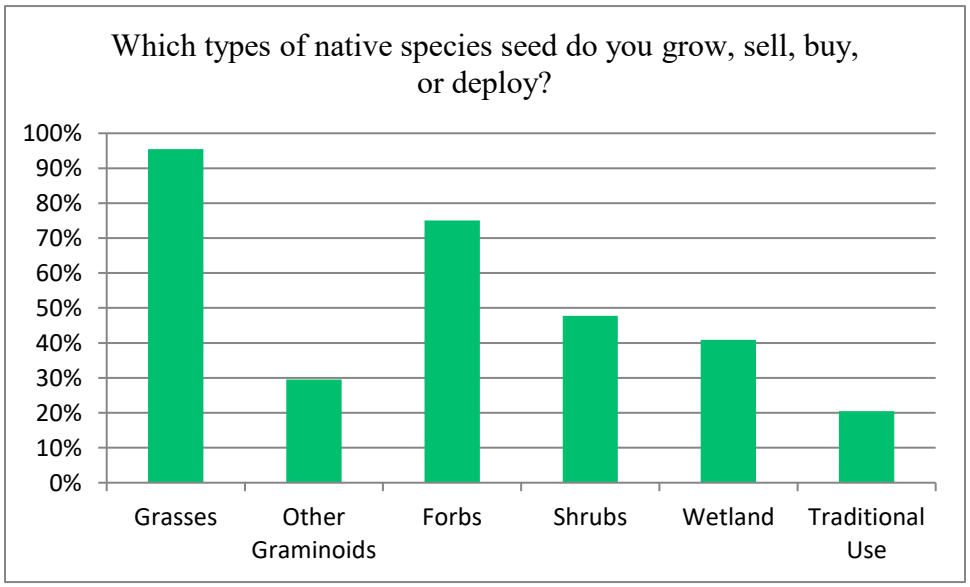


Figure 4. Types of native species seed grown, sold, bought, or deployed. N=44; respondents could select more than one category (number of responses = 136).

Respondents generally felt that more information is needed on Alberta-based native species Seed Suppliers, though there were several who were unsure (Figure 5).

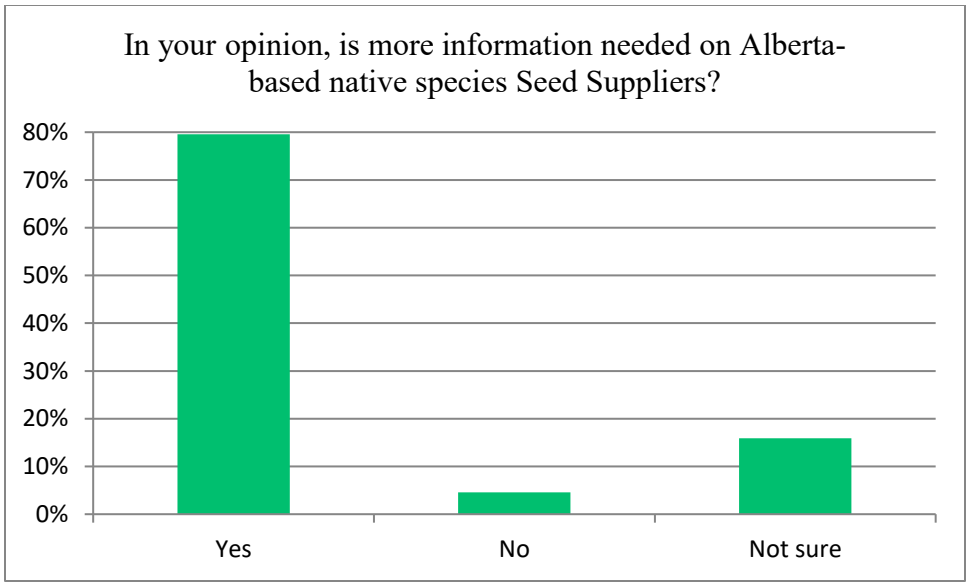


Figure 5. Need for more information on Alberta-based native species Seed Suppliers. N=44

When asked about the top five species they sell or buy, and the top five species that they get asked for but cannot provide or are not available, respondents identified a total of 58 species they sell or buy, and 59 species that they get asked for but cannot provide or are not available. The top five species in each category are shown in Table 3. APPENDIX 3 shows the full list of species in each category. There is a discrepancy for several species where seed is available but those who require it can't find it (e.g., *Hesperostipa comata*). There are, however, some species that seem to be easy to find (e.g., *Pascopyrum smithii*). Finally, there are several species that do not appear to be available, at least in sufficient quantities (see APPENDIX 3).

Table 3. Species respondents identified as being the top five they sell or buy, and those that they get asked for but cannot provide or are not available.
Numbers in the table indicate the number of respondents listing each species.

| Scientific name | Previous name | Common name | Sold | Not Available |
|---|---|---|---|---|
| **Top 5 Species Bought or Sold** | | | | |
| *Pascopyrum smithii* | *Agropyron smithii* | Western wheatgrass | 16 | 1 |
| *Elymus trachycaulus* | *Agropyron trachycaulum* (includes var. *subsecundum*) | Slender wheatgrass | 15 | 1 |
| *Elymus lanceolatus* | *Elymus dasystachyum* | Northern wheatgrass | 14 | 1 |

| Scientific name | Previous name | Common name | Sold | Not Available |
|---|---|---|---|---|
| *Koeleria macrantha* | | June grass | 14 | 9 |
| *Nasella viridula* | *Stipa viridula* | Green needle grass | 13 | 1 |
| *Hesperostipa comata* | *Stipa comata* | Needle and thread grass | 12 | 12 |
| **Top 5 Species Asked for but Cannot be Provided or are not Available** | | | | |
| *Hesperostipa comata* | *Stipa comata* | Needle and thread grass | 12 | 12 |
| *Festuca hallii* | | Plains rough fescue | 4 | 11 |
| *Hesperostipa curtiseta* | *Stipa curtiseta* | Western porcupine grass | 7 | 10 |
| *Koeleria macrantha* | | June grass | 14 | 9 |
| *Festuca campestris* | | Mountain fescue | 4 | 7 |

Some respondents provided comments rather than species names, or comments about species, or groups of species:

Top 5 Species Bought or Sold

Not sure ... I would need to break down all my drawings.

Silver sagebrush (*Artemisia cana*) – sell.

*Salix spp.* (mix of native willow species).

Wheatgrass species.

Conifers (Picea, Pinus, Abes, Pseudotsuga).

Top 5 Species Asked for but Cannot be Provided or are not Available

Not sure … I need time to look at what contractor say they can't get.

Don't have tracked data on this at this time.

Mostly get asked for wild harvested species.

June grass (*Koeleria macrantha*) – can be hard to find clean seed.

*Festuca saximontana* – Rocky Mountain fescue (true seed).

Most wetland species are unavailable.

Not enough rough fescue.

Not enough alpine bluegrass.

Not enough tufted hairgrass.

Alders (*Alnus tenufolia* and *A. crispa*) large quantities.

Some warm species.

The above two questions asked respondents to provide common name and scientific name; however, only 61% and 65% of respondents provided both names for the Top 5 bought/sold and the Top 5 not available questions, respectively (Table 4 and APPENDIX 3). Some respondents provided only common names, while others only scientific names (APPENDIX 3).

Table 4. Number of respondents providing common and scientific names for their Top 5 lists.

| | **Both Common and Scientific Names** | **Common Name Only** | **Scientific Name Only** |
|---|---|---|---|
| Top 5 Bought/Sold | 27 | 14 | 1 |
| Top 5 Not Available | 24 | 14 | 1 |

Respondents indicated they typically grow, harvest, buy, sell, or deploy a range of species in a year, with most reporting more than 30 species (Figure 6).

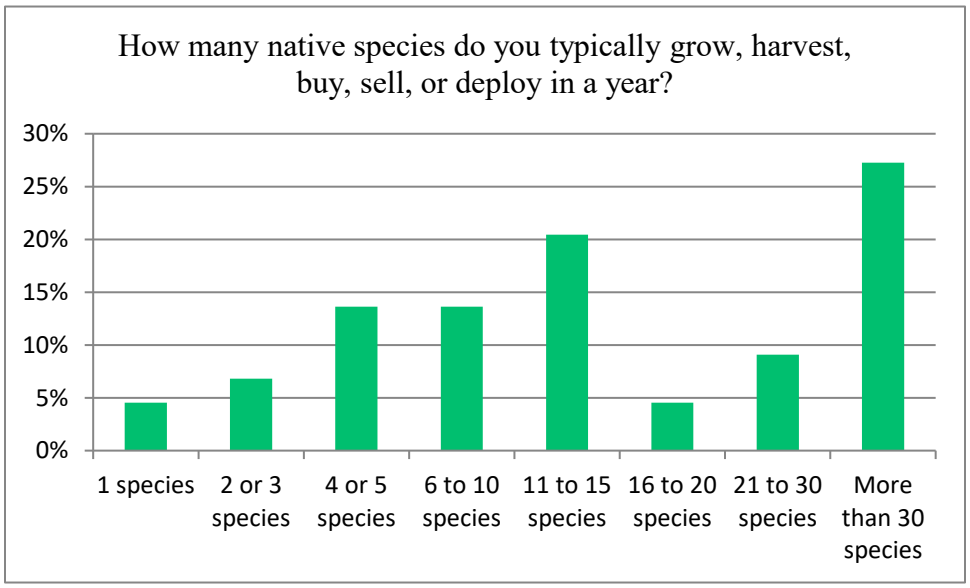


Figure 6. Number of native species typically grown, harvested, bought, sold, or deployed in a year.
N=44.

Volume of native species seed typically grown, harvested, bought, sold, or deployed in a year spanned the full range of options provided, with most respondents indicating 1 to 25 kg or >1,000 kg (Figure 7).

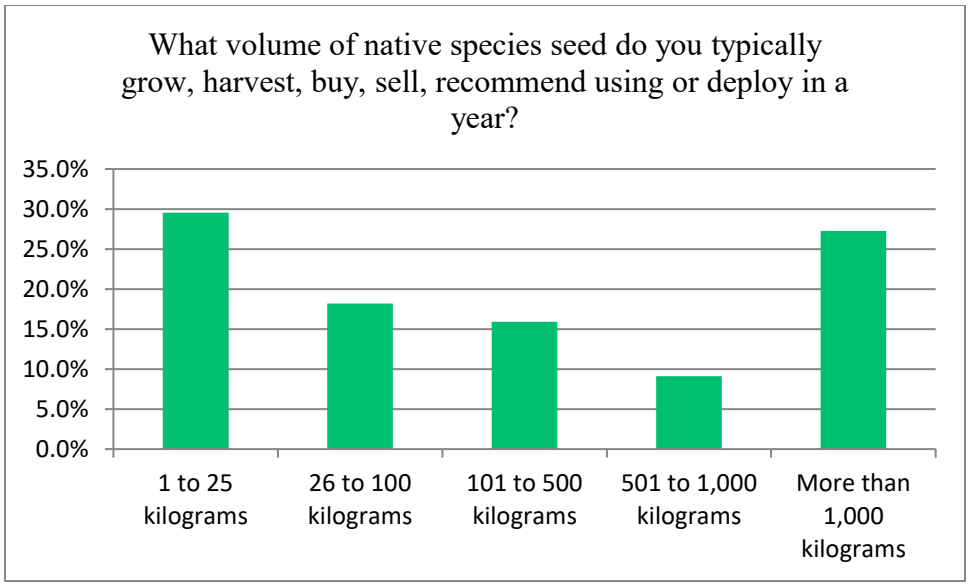


Figure 7. Volume of native species seed typically grown, harvested, bought, sold, recommended using, or deployed in a year.
N=44

### 2.3 End User Question

Eleven respondents indicated they were not End Users.

When asked how difficult it is to obtain the seed they need for a revegetation project, End Users could usually find the species and volume they need (Figure 8), but also needed to request substitute species or must go to multiple suppliers to fill their orders.

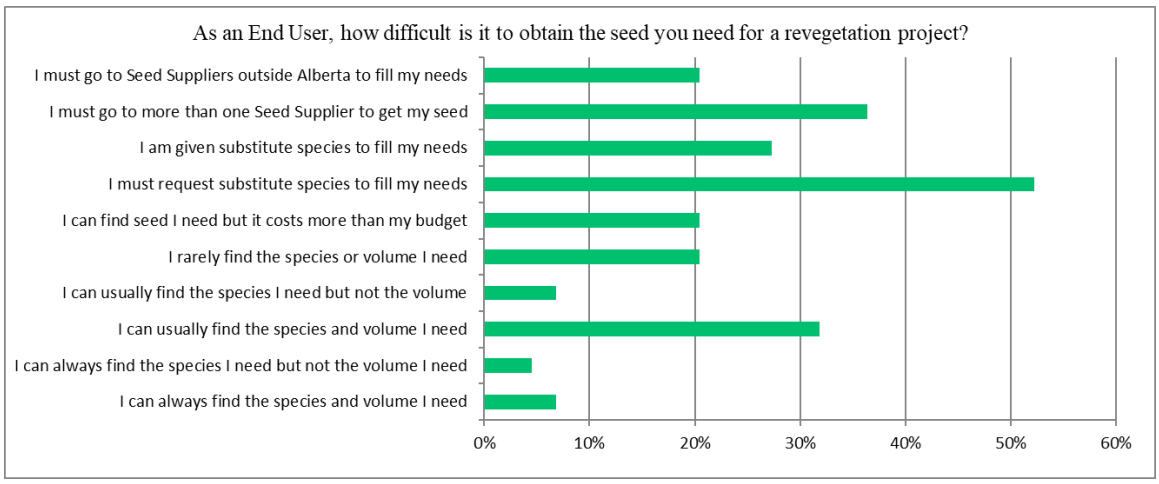


Figure 8. End Users ability to obtain the seed they need for a revegetation project.
N=33; respondents could select more than one category (number of responses = 100).

## 2.4 Distributor or End User Questions

Seven respondents indicated they were not Distributors or End Users.

When asked where they source their seed from, Distributors and End Users indicated they buy from a variety of sources, with the most common being Distributors (Figure 9). Respondents expressed a strong preference to buy from Alberta-based Suppliers.

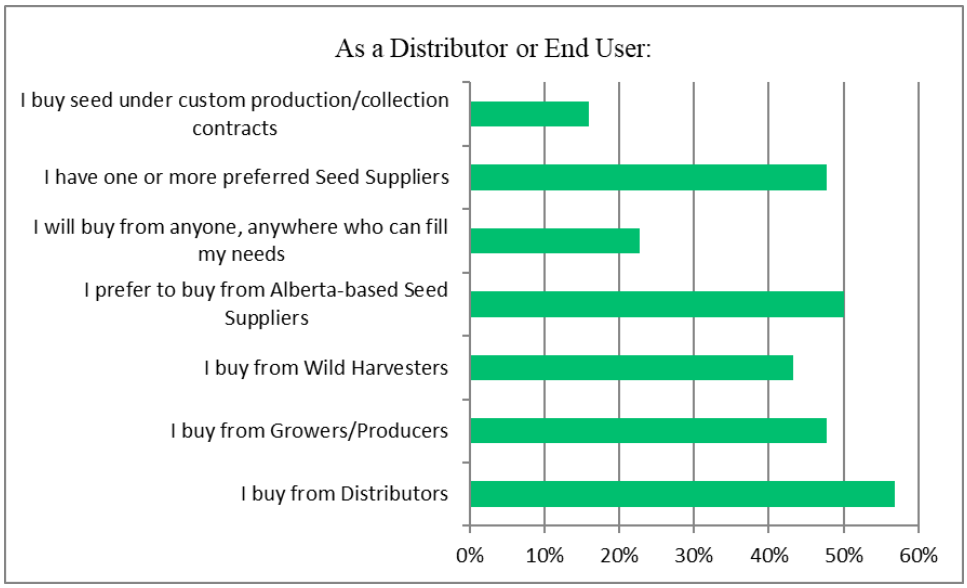


Figure 9. Seed sources reported by Distributors and End Users.
N=37; respondents could select more than one category (number of responses = 100).

Distributors and End Users overwhelmingly buy or recommend individual species and make custom seed mixes (Figure 10).

About 86% of Distributors and End Users reported ordering seed the year they need it rather than ahead of time (N=37).

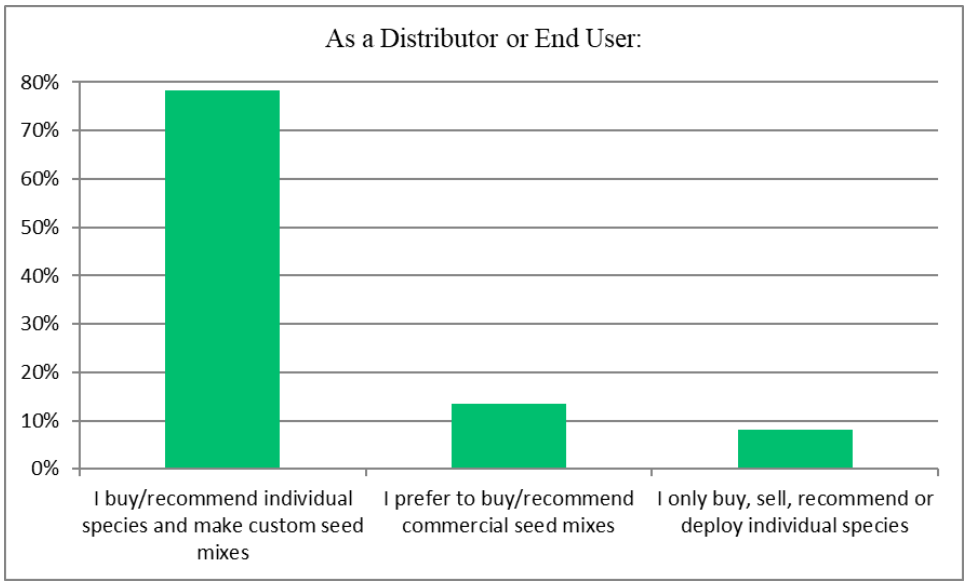


Figure 10. Seed mix design preferences.
N=37

When asked about seed type, Distributors and End Users reported a variety of preferences (Figure 11); 73% of respondents noted they would buy Alberta Seed over seed sourced from plants originally from other jurisdictions even if it is more expensive. Notably, 25% of respondents indicated they don't know the difference between Common Seed and a Variety so they buy/recommend/use either one or they don't believe there is difference in performance between Common Seed or a Variety so they will buy/recommend/use either one.

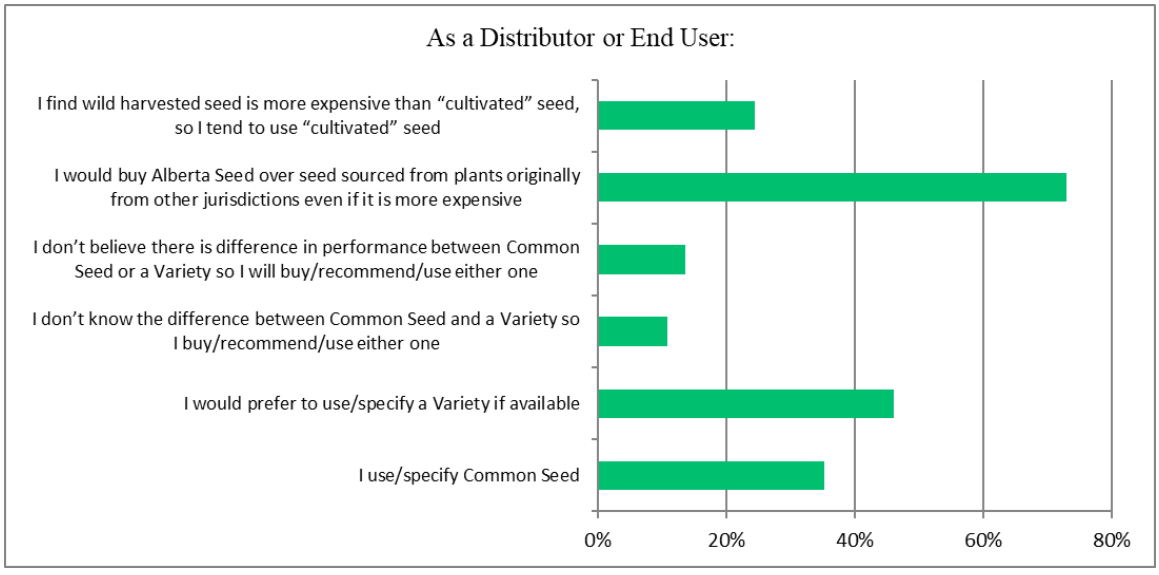


Figure 11. Seed type preferences.
N=37; respondents could select more than one category (number of responses = 75).

When asked what requirements they place on seed they are interested in, 89% of Distributors and End Users indicated they specify the scientific name of the species they are interested in and 65% specify the common name (Table 5); 78% reported requiring a Record of Seed Analysis.

Table 5. Requirements placed on seed by Distributors and End Users.
N=37; respondents could select more than one category (number of responses = 152).

| Requirement | % of Respondents |
|---|---|
| I specify common name of the species I am interested in | 65 |
| I specify scientific name of the species I am interested in | 89 |
| I want to be asked if a substitute species is acceptable | 68 |
| I will substitute species if there is a cheaper alternative | 14 |
| I require Certified Seed Tags for all Varieties I buy | 46 |
| I require a Record of Seed Analysis (i.e., record of germinability and purity) for all seed I buy | 78 |
| I want to buy seed on a Pure Live Seed basis | 51 |

When asked about the drivers for their native seed choices, Distributors and End Users identified ecological suitability as their main driver (Figure 12); though 59% also said availability is the main driver. 70% of respondents stated they care about the genetic source of the seed they buy, recommend or deploy, while only 11% said they did not care.

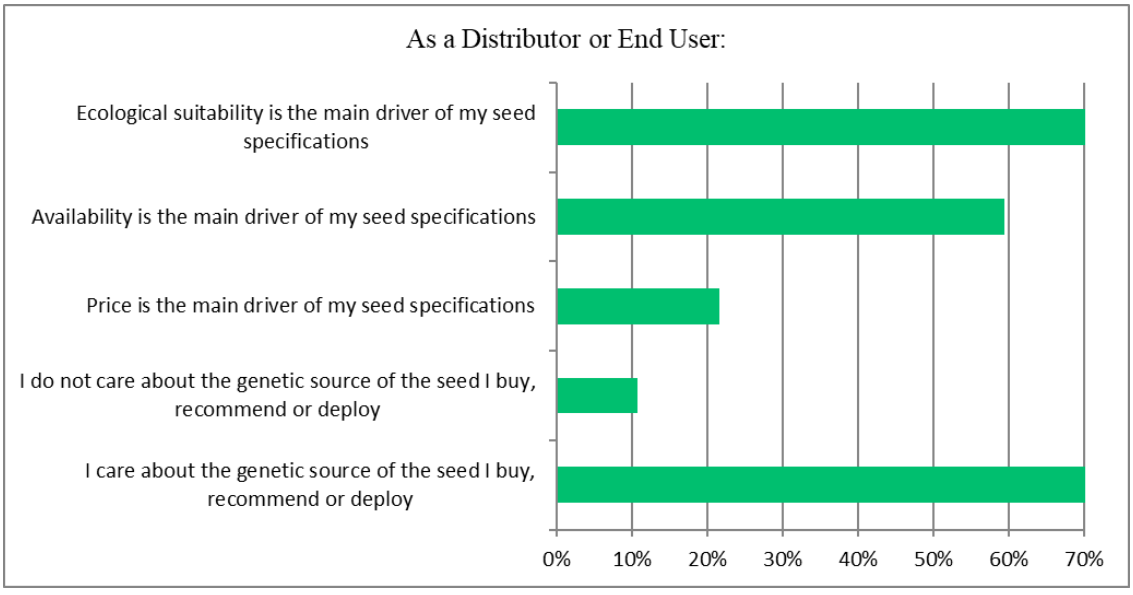


Figure 12. Drivers for seed selection.
N=37; respondents could select more than one category (number of responses = 86).

Distributors and End Users reported buying or deploying varying amounts of seed purchased from Growers/Producers, Distributors or Wild Harvesters outside Alberta, with the most common response being 0% to 5% (Figure 13). Notably, 22% said they did not know where the seed came from.

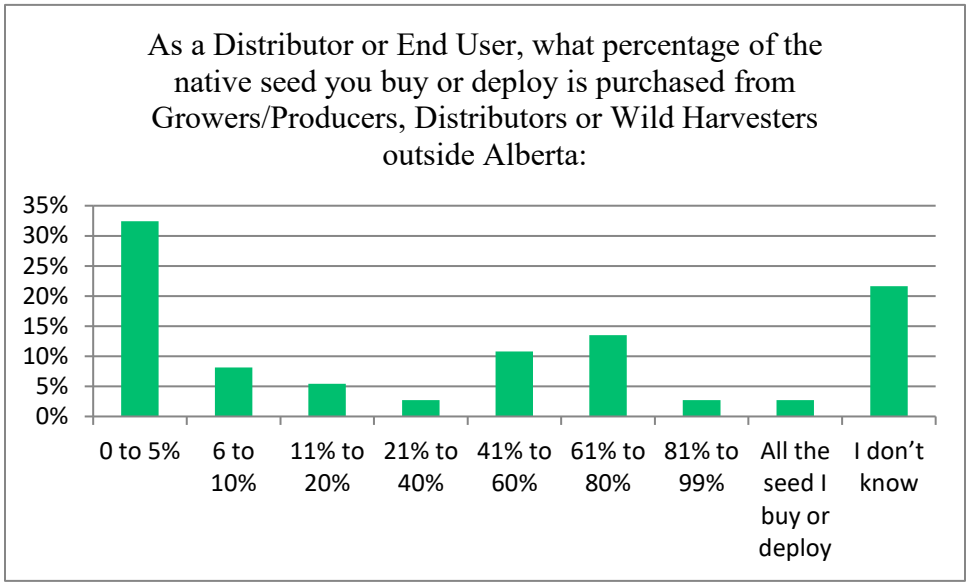


Figure 13. Percentage of seed bought or deployed from Growers/Producers, Distributors or Wild Harvesters outside Alberta.
N=37.

### 2.5 Grower/Producer, Distributor or Wild Harvester Questions

Twenty-two respondents indicated they were not a Grower/Producer, Distributor or Wild Harvester.

When asked who they sell seed to, 73% of Growers/Producers, Distributors and Wild Harvesters indicated they sell to anyone who wants the seed; 23% said they only sell to End Users and 5% only to Distributors.

Growers/Producers, Distributors and Wild Harvesters reported selling common seed more than varieties, and 91% said they sell wild-harvested seed from an identified harvest region (Figure 14).

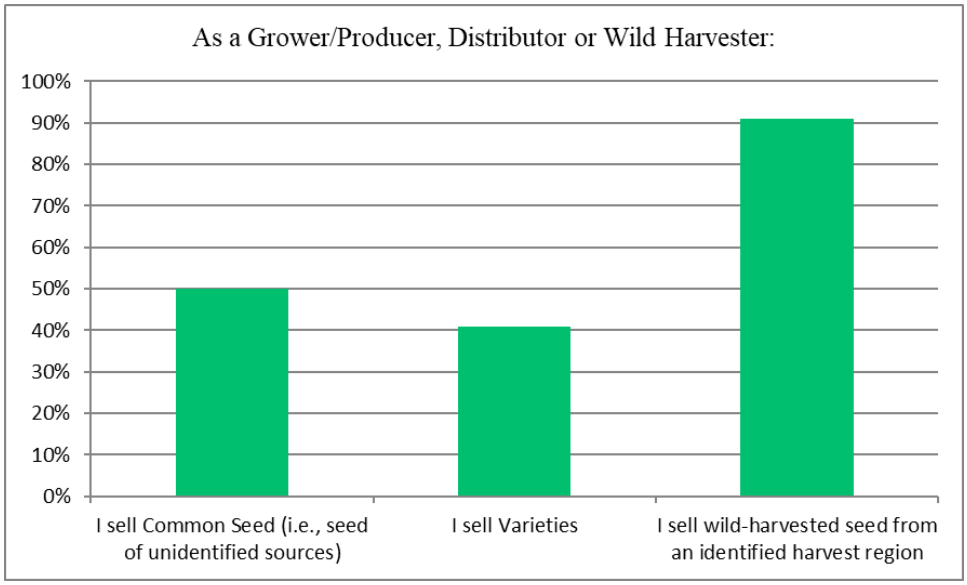


Figure 14. Seed types sold by Growers/Producers, Distributors and Wild Harvesters.
N=22; respondents could select more than one category (number of responses = 40).

Growers/Producers, Distributors and Wild Harvesters provide a variety of information about the seed they sell (Table 6).

Table 6. Information about seed sold by Growers/Producers, Distributors and Wild Harvesters.
N=22; respondents could select more than one category (number of responses = 111).

| | % of Respondents |
|---|---|
| I specify common name of the species I sell | 83 |
| I specify scientific name of the species I sell | 77 |
| I provide Certified Seed Tags with all Varieties I sell | 32 |
| I provide a Record of Seed Analysis for the seed I sell | 64 |
| I sell seed on a Pure Live Seed basis | 14 |
| I provide information on the genetic source of the seed I sell | 50 |
| I get asked about the genetic source of the seed I sell | 36 |
| I sell seed of individual species | 21 |
| I sell seed mixes | 12 |

Growers/Producers, Distributors and Wild Harvesters indicated numerous factors that affect their business (Figure 15).

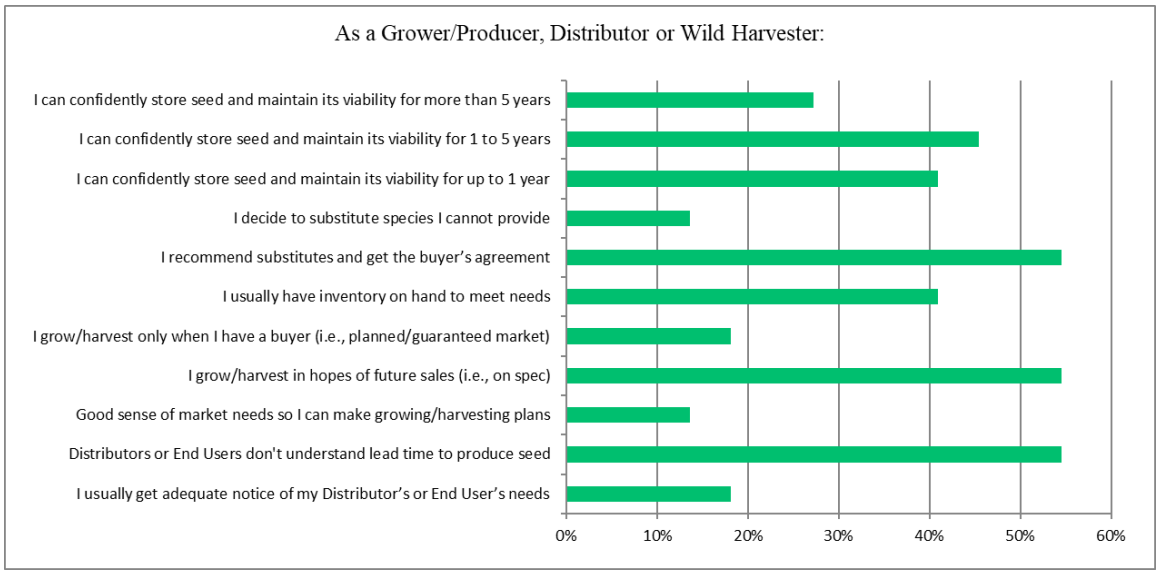


Figure 15. Factors affecting of Growers/Producers, Distributors and Wild Harvesters. N=22; respondents could select more than one category (number of responses = 84).

When asked about the viability of their seed in inventory, Growers/Producers, Distributors and Wild Harvesters most frequently said they have none or <10% non-viable seed at the end of the year (Figure 16), and that any non-viable seed remaining is usually bare seed.

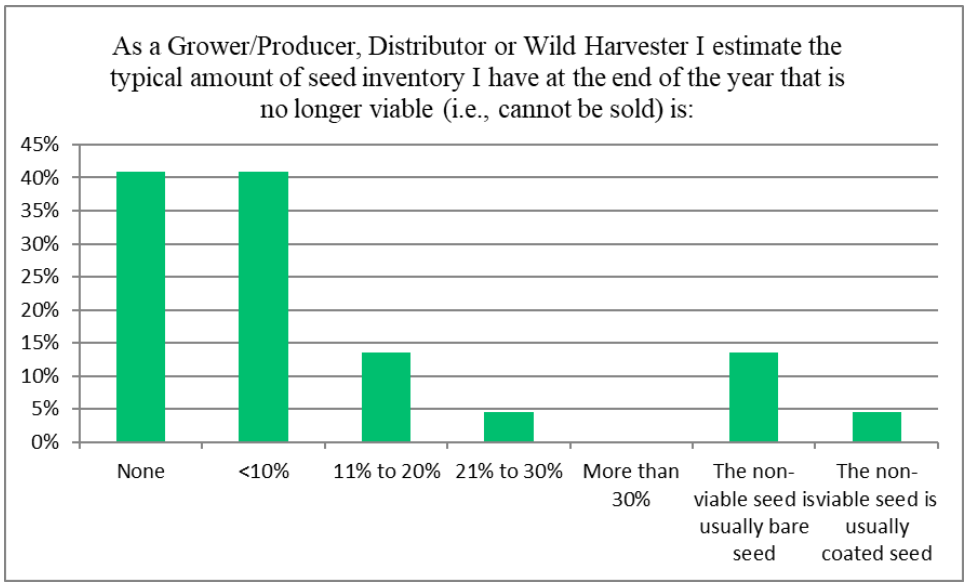


Figure 16. Percentage non-viable seed at the end of the year. N=22

With respect to the state of their business, most Growers/Producers, Distributors and Wild Harvesters indicated that they would expand their businesses, while 27% said they had all the business they can handle; only one respondent is planning on leaving the business (Figure 17).

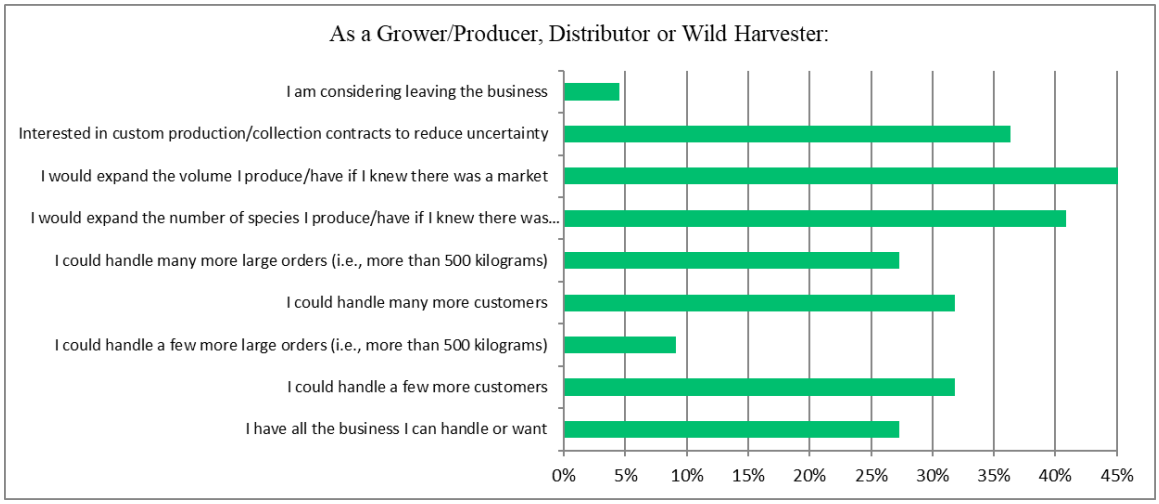


Figure 17. State of the business environment for Growers/Producers, Distributors and Wild Harvesters.
N=22; respondents could select more than one category (number of responses = 56).

Almost 82% of Growers/Producers, Distributors and Wild Harvesters indicated they would be interested in having their company and product(s) listed in an online directory on the SANSC website.

## 2.6 Other Questions

Respondents were asked to choose from a variety of options for increasing the availability and use of native species seed in revegetation projects – the most frequently cited option was "increase the number of native species available for revegetation projects" (Table 7).

When asked to rank the top three options they would like to see implemented, respondents selected:

- Increase the volume of native species seed available for revegetation projects (42%).
- Increase regulatory requirements to use native species in revegetation projects (30%).
- Increase the number of native species available for revegetation projects (30%).

Table 7. Options for increasing the availability and use of native species seed in revegetation projects.
N=44 for the options question; respondents could select more than one category; (number of responses = 391).
N=43 for the top three options question; respondents could select more than one category; (number of responses = 129). Table is sorted in descending order based on this column.

| Option | % of Respondents | Top Three Options |
|---|---|---|
| Increase the volume of native species seed available for revegetation projects. | 73 | 42 |
| Increase regulatory requirements to use native species in revegetation projects. | 52 | 30 |
| Increase the number of native species available for revegetation projects. | 77 | 30 |
| Develop and maintain a forward-looking list of target species that buyers and sellers agree to focus on to align supply and demand. | 43 | 26 |
| Encourage/require the use of Alberta Seed vs. seed from plants from other jurisdictions. | 52 | 21 |
| Develop and maintain a native species seed bank which End Users could draw from. | 55 | 19 |
| Reduce the cost of native species seed. | 39 | 19 |
| Increase awareness of upcoming seeding needs (species, volumes, timing, etc.). | 64 | 16 |
| Provide guidance on species that can be substituted when the desired species is not available. | 59 | 16 |
| Create an online platform to link Growers/Producers, Distributors and Wild Harvesters to End Users. | 66 | 16 |
| Increase awareness and acceptance of wild harvested seed as a viable alternative to commercial seed. | 45 | 12 |
| Develop and maintain a Community of Practice to share native species seed knowledge. | 57 | 12 |
| Make revegetation success stories using native species seed more accessible. | 55 | 9 |

| Option | % of Respondents | Top Three Options |
|---|---|---|
| Develop and maintain a province-wide inventory of species, volumes and vendors available. | 50 | 9 |
| Increase awareness of native seed performance. | 68 | 5 |
| Nothing needs to be done. | 5 | 5 |
| Other (please specify). | 30 | 14 |

Answers from respondents who selected Other for both questions are provided in APPENDIX 4. In general, their responses can be grouped into the following categories:

1. Capacity and Supports
2. Supply and Demand
3. Economics
4. Regulation and Policy
5. Cooperation and Coordination
6. Other Comments

Respondents were asked what barriers hinder the harvesting of seed from natural communities. The full set of responses is available in APPENDIX 4. The top five themes were:

1. Access and permission.
2. Economics.
3. Equipment and people.
4. Inconsistent production.
5. Undesirable species present.

Slightly more than half of the respondents (52%) were aware of the Native Plant Certification Program (NPCP), developed by the Canadian Seed Growers Association (CSGA) (N=44)[5]. The NPCP is "a voluntary quality control process provided by the CSGA for native plant seed identification. Although legally separate from pedigreed seed crop certification, similar CSGA documents and procedures are used to verify the origin, of collection or production, of native plant reproductive materials which have not been released as a variety. The CSGA's NPCP documents the identity of plant material and verifies that it is from a designated geographic location (Source Identified class) or selected for specific characteristics (Selected class)." (Canadian Seed Growers Association, 2025).

[5] See https://seedgrowers.ca/

Approximately 59% of respondents knew about the SANSC website (N=44).

Seventeen respondents provided additional comments at the end of the survey:

- It causes me concern anywhere “required” is used unless it is agreed upon by the contractor/regulator/customer group well in advance of a project. “Recommended” or “Encouraged” would always be preferred terms.
- The idea of using Alberta native seed is ideal but this has the potential to stall seeding if Alberta native seed is not available – I think there is a saying “the best is the enemy of the good” or something to that effect. Industry needs to be educated as well.
- Many contractors assume that native seed is as readily available and plentiful as fuel, building materials etc. and can be obtained readily with a quick phone call.
- The less the Canadian Seed Growers Association has to do with native seed the better.
- The other main issue that hasn't come up in the survey is dormancy. Most native seeds, especially the ones that have not been developed as varieties through selection, have high dormancy. There is a good argument to be made that maybe we can get by with less if we can find ways to improve germination and establishment that first year.
- I am curious to see if there will be any collaboration with the federal government/CWF Native Seed Strategy for Canada. After being involved initially in this project, I have not heard anything more about it.
- Cheatgrass-free production is an incredible bonus for Alberta production beyond its borders. You will want to keep it that way.
- We complete land reclamation in Special Areas, and it is hard to find seed that does not have undesirable species.
- Demand drives supply. If users demand specific diversity of seed and start helping suppliers produce it there will be increased supply. Getting dedicated long-term growers to make a business model of growing is critical.
- Our department sets the seed mixtures, but the seed is purchased by contractors undertaking the work. New standard seed mixtures will be published this year. the average annual kg needed will increase from 30 to 55 kg/ha for the dry mixedgrass and mixedgrass subregions starting next year. There are 8 species needed.
- I don't sell seed. I collect seed ad hoc for volunteer restoration projects I work on and for volunteer organizations that sell seed to fund their operations (Edmonton Native Plant Society).
- I am from Saskatchewan, and I have been selling seed in Alberta for 25 years. I would like the opportunity to continue with that and not be limited by geography.
- Wonderful – long overdue.

- Keep the momentum flowing.  This a great beginning to expand the use of native seed/ plants in the province and build a viable self-sustaining industry.
- Thank you!

# 3 REGULATORS SURVEY

For the purposes of this survey, **Regulators** are loosely defined as anyone who sets requirements for using native species in the Grasslands regions of Alberta. **Requirements** is used broadly to encompass legislation, regulation, specifications, standards, and criteria that obligate a practitioner to use, or prioritize use of, native species in revegetation work.

The number of respondents for each question is noted in the Figures and Tables (N=X); where respondents were allowed to select multiple answers the total number of responses is also shown (e.g., 5 people responded and each selected three responses – N=5 (number of responses = 15).

## 3.1 Background Questions

Seventeen regulators responded to the survey; the majority were provincial government or government agencies (Figure 18).

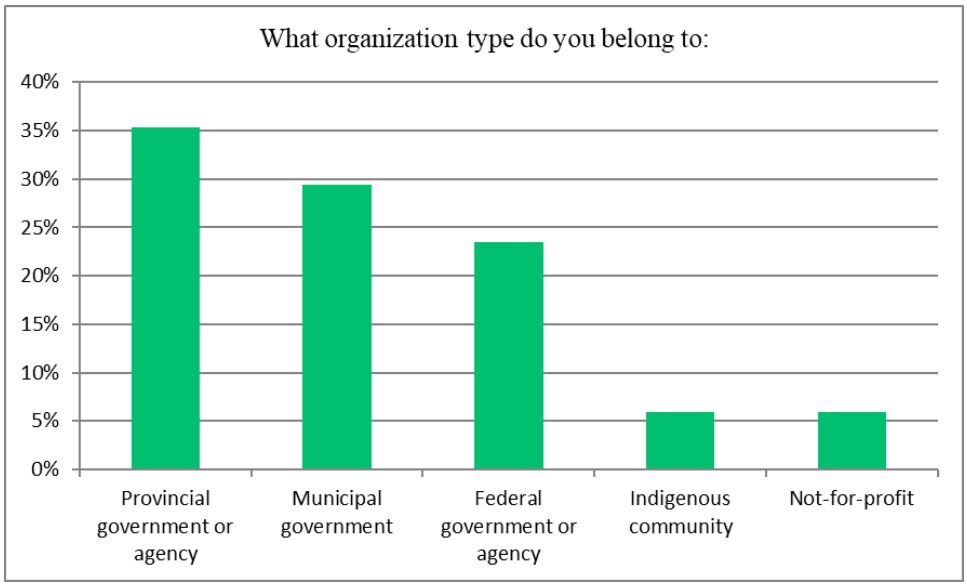


Figure 18. Regulator organization type.
N=17

Most respondents were aware of the provincial government's Grassland Criteria (Environment and Sustainable Resource Development, 2013) and 47% reported it was used as the basis for their requirements or informed their requirements (Figure 19). An equal number of respondents were either unaware of the criteria or were aware but felt it wasn't relevant to their requirements.

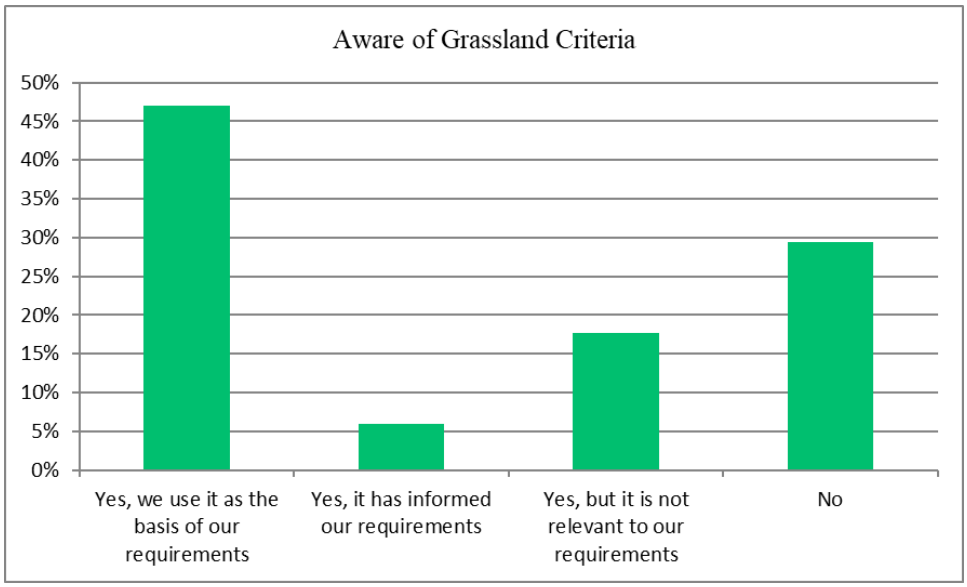


Figure 19. Awareness of the Grassland Criteria.
N=17

Most respondents set requirements for native species (71%); 18% set requirements for locally-adapted native species (Figure 20).

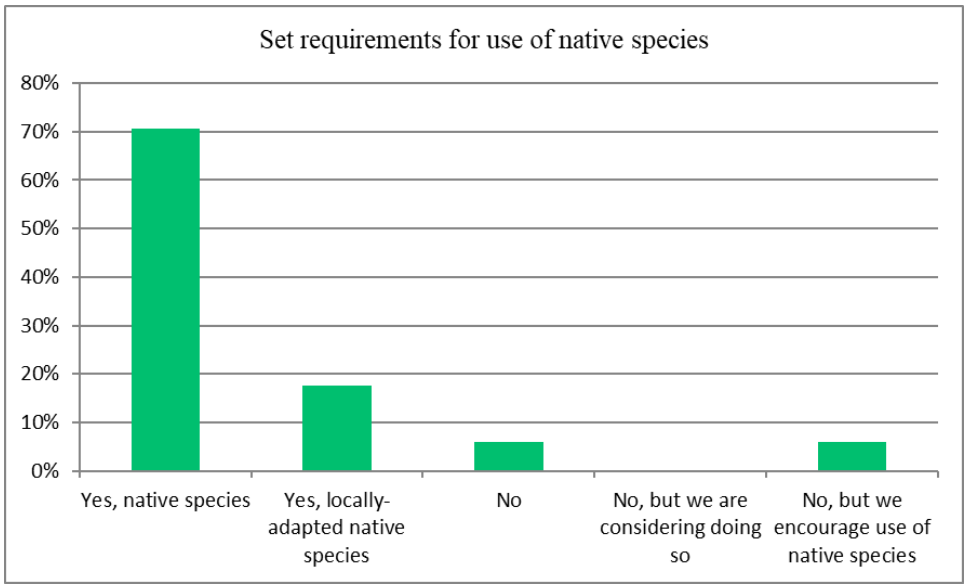


Figure 20. Number of respondents setting requirements for the use of native species in revegetation projects.
N=17

Fifty percent of respondents have their requirements online (7 respondents provided links to their requirements, but three of those were for the Grassland Criteria).

### 3.2 Requirements Questions

Most requirements are more than 2 years old (64%), but 36% of respondents indicated they were planning to update the requirements within two years (Figure 21).

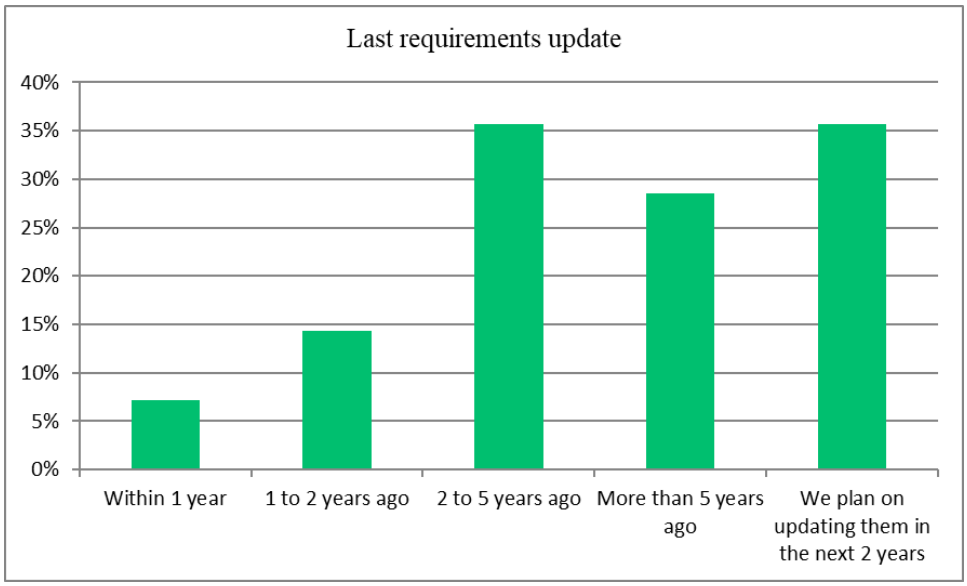


Figure 21. Last update to requirements.
N=14

Most respondents set requirements for seed (71%) and wild harvested seed (43%), and for species mixes (71%) rather than individual species (21%) (Figure 22).

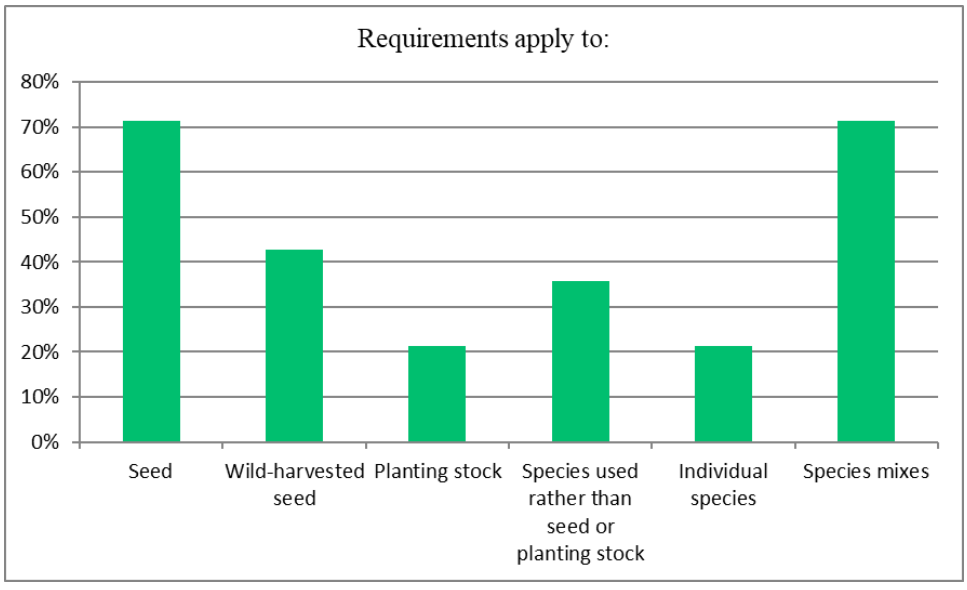


Figure 22. Basis for requirements.
N=14; respondents could select more than one category (number of responses = 37).

All respondents set requirements for grasses (Figure 23), though there are requirements for other types of native species as well.

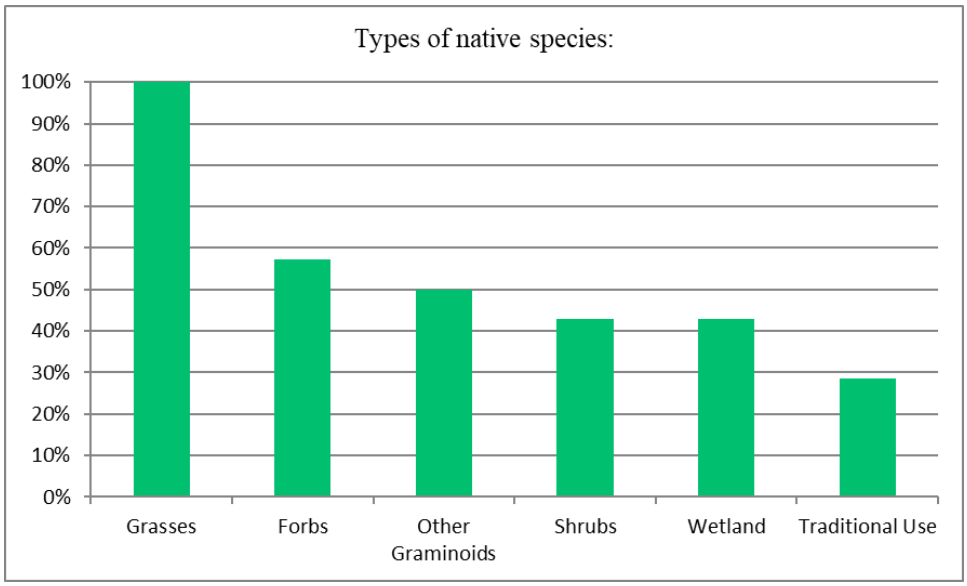


Figure 23. Types of native species that requirements apply to.
N=14; respondents could select more than one category (number of responses = 45).

Most respondents specify plant common name in their requirements (79%); one respondent indicated they do not specify plant names (Figure 24). Fifty seven percent of respondents specify both scientific and common names.

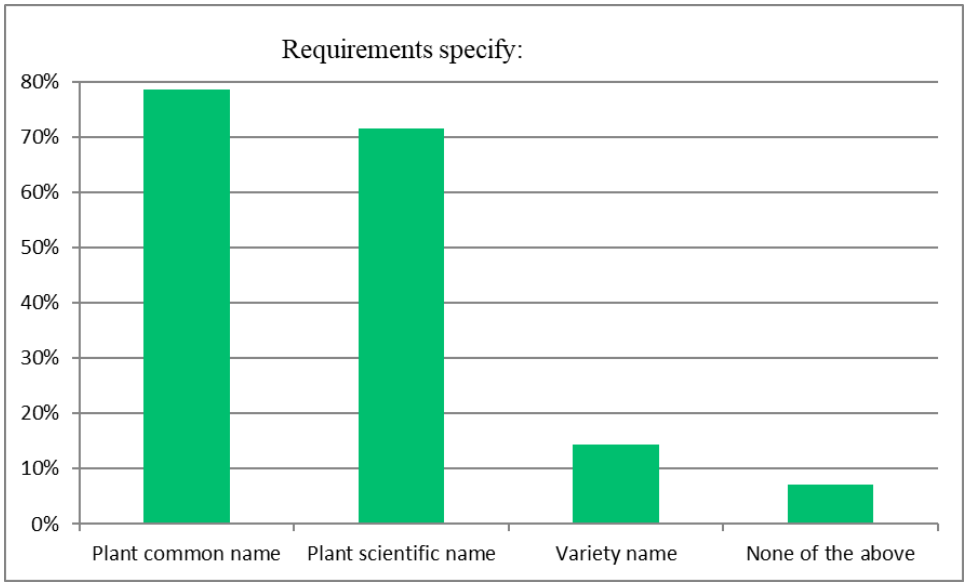


Figure 24. Plant nomenclature in requirements.
N=14; respondents could select more than one category (number of responses = 24).

When asked how they regulate use of native species in revegetation projects, most respondents indicated they "Inspect revegetation sites" (86%) and "Document species seeded/planted" (79%), though all the options provided were selected by at least one respondent (Figure 25).

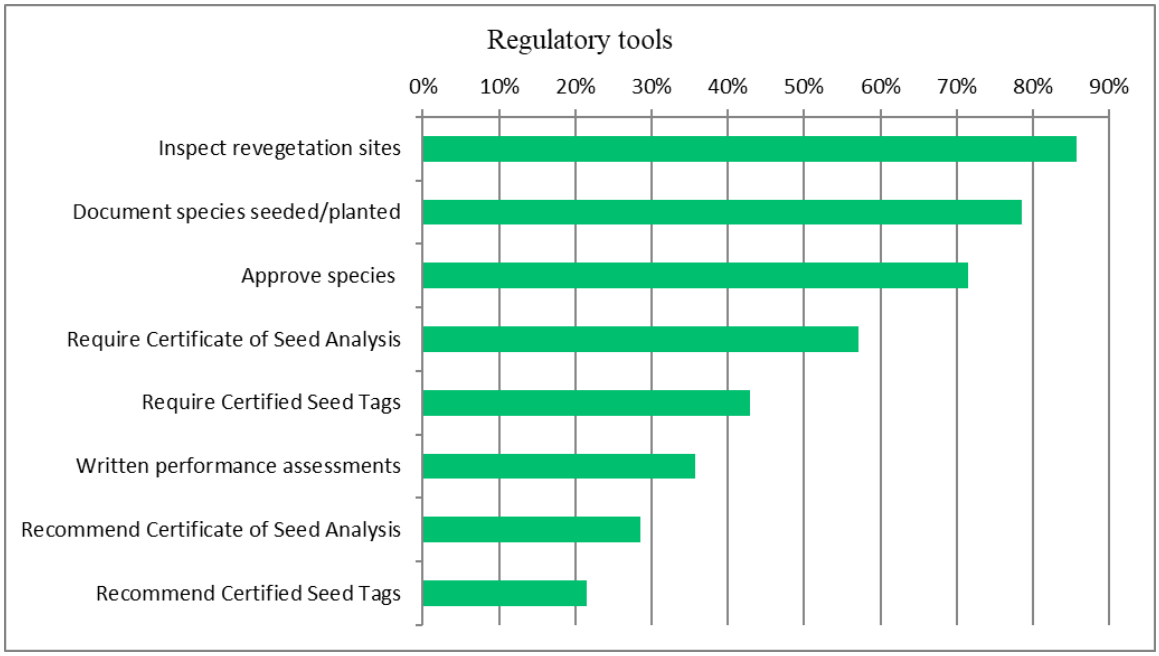


Figure 25. How respondents regulate use of native species in revegetation projects. N=14; respondents could select more than one category (number of responses = 59).

### 3.3 Other Questions

Sixty seven percent of respondents have data on the use of native species in revegetation projects, but only 25% indicated it was available online or on request (Figure 26).

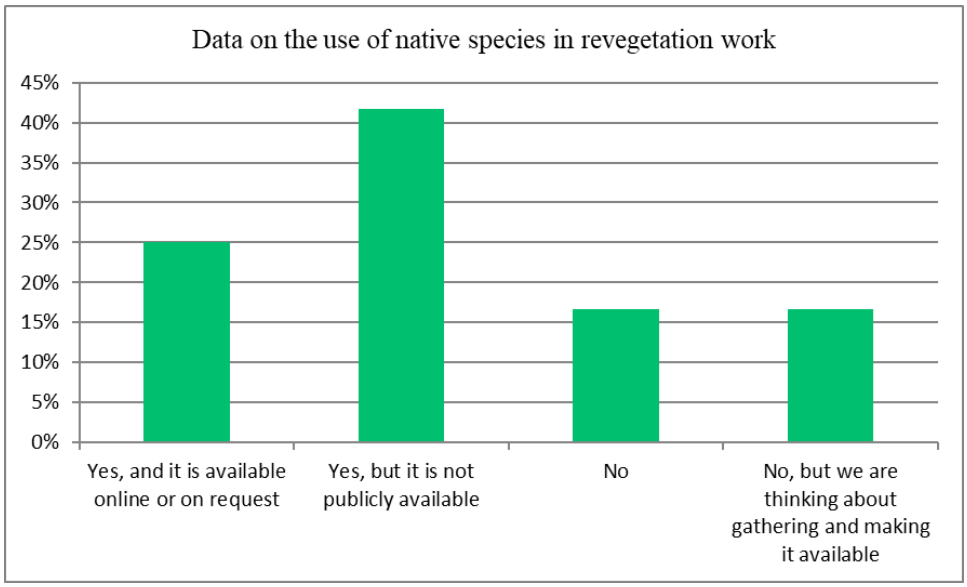


Figure 26. Availability of data on the use of native species in revegetation projects. N=12.

Respondents were asked to prioritize a list of five options if they were developing new requirements; specifying Alberta Seed/Plants was ranked as the most important based on the weighted average of the choices made by respondents (Figure 27).

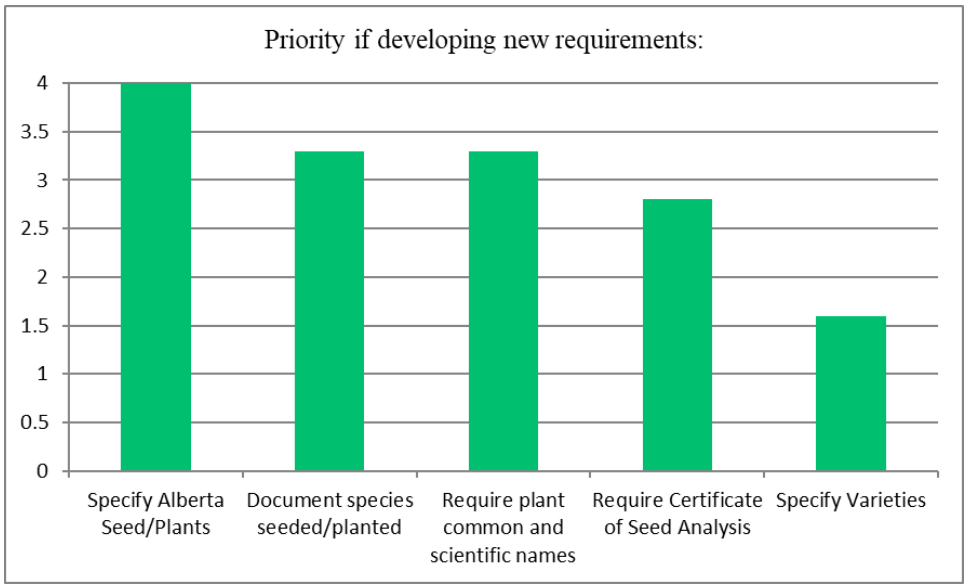


Figure 27. Prioritized options for setting new requirements. N=10.

Respondents were then asked to prioritize options for improving the native seed market. Increasing regulatory requirements to use native species and maintaining an updated list of native species seed and plant suppliers were the highest ranked options based on the weighted average of the choices made by respondents (Figure 28).

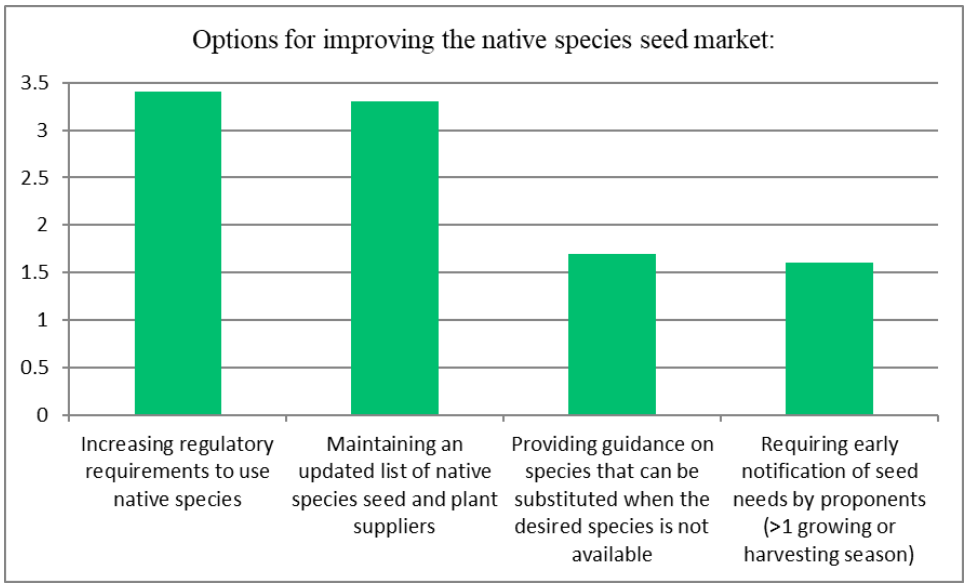


Figure 28. Prioritized options for improving the native seed market. N=10.

One respondent noted these two questions were not useful since most of the options proposed are already requirements and therefore no way to order them.

### 3.4 Additional Comments

When asked what regulatory or policy measures are needed to improve the availability of domestic native seed for revegetation projects in southern Alberta, respondents said:

- Items that could be considered:
  - Requirement to use a qualified professional for seed mix development.
  - Development of an electronic submission of seed mix approvals on public lands.
  - Interim monitoring assessments done for all industrial activities on native grassland (currently activity specific).
  - Zoning areas of public land for seed collection with rating of purity of the donor site. Seed collection from these areas would be exempt from seed certificates and could be considered for further exemptions of approvals under public land.
- Have the requirement to use domestic native seed (the requirement already exists to use native seed). Make it easier to produce – could be done by incentives to farmers, equipment-share programs, set up grants for equipment and cleaning facilities etc.
- Native plant propagation is not very profitable which is why most native plant producers fail to turn a profit for many years and are in the industry due to their passion and not for financial gains. With substantial increases in the costs of living and recent inflation, funds do not stretch as far as they once did, and everyone needs enough capital to cover basic needs. To encourage growth in this sector, there needs to be some financial

incentives for native plant seed producers and the native plant propagation industry in general. These incentives would be most effective in the form of tax breaks to native plant suppliers. These tax incentives should come from government.

- Contacts for suppliers of native seed in Alberta would be great if available.
- Greater variety allowed.

When asked if they had any other comments, respondents said:

- In addition to financial incentives from government for native plant producers, there should also be additional incentives for the protection of native plant sources such as healthy native grasslands.
- I feel like it is very expensive to harvest native seed. Perhaps grants or incentives of some sort would help with those interested in the native seed market.
- Our new mixes for highway rights-of-way and borrow pits and aggregate pits will be published this year.

After the Regulator Survey closed, the authors received an e-mail from a municipal Regulator who indicated that:

- When using native seed blends, especially in sensitive areas around wetlands or healthy coulee areas, we do require seed certifications to be submitted to myself and then are approved or denied before application can begin. This is all done on a project-by-project basis.
- Native plant use has been on the rise in the last five years as part of landscaping projects around the city. The parks department has been pushing for the use of native shrubs, trees and wetland plants in new park and storm pond construction.
- There has also been a big push for naturalization in our parks to help reduce maintenance costs and improve climate resiliency, but these projects in existing parks are really hit and miss and depend on the site.
- Native wetland plants are used extensively in remediation projects of storm pond banks and floating island installations. New storm pond construction requires naturalized bank areas planted with the schedule C Dryland Seed Mix and a mix of schedule E Native Wildflower Seed species[6], and aquatic bench plants provided by local native wetland nurseries (KS Growers)[7] is used a lot by the city and its contractors.

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[6] See the Schedules in https://www.lethbridge.ca/media/vhlfrnak/section-07050.pdf

[7] See https://ksgrowers.com/

# 4 FINDINGS AND RECOMEMNDATIONS

The results of the current survey, plus results of previous surveys, and the literature review provide indications where SANSC could show leadership in improving the native species seed market in Alberta. These are discussed below.

## 4.1 Findings

There was clear evidence among survey participants that the native species seed industry in Alberta is alive and vibrant, and that there is a strong desire to move the market forwards to enable better ecological outcomes for revegetation projects. In addition, there are many other market participants who did not respond to the survey, suggesting an even larger market than demonstrated here and therefore a larger group of potential individuals and companies SANSC could engage with and support.

Consistent with the literature and other surveys, participants identified barriers to efficient functioning of the industry and provided suggestions on ways to reduce or remove these barriers, which provide opportunities for SANSC to support the industry. Key barriers include:

- Cyclical nature of supply and demand.
- Lack of awareness or capability of end users to predict seed needs in advance (i.e., greater than one year lead time).
- Availability of species and volumes to meet the needs of End Users and Regulators.
- Need to go to multiple seed providers and/or go outside Alberta to meet seed needs.

The surveys also surfaced some interesting results which SANSC could explore further:

- Distributor and End User respondents overwhelmingly buy or recommend individual species and make custom seed mixes, and yet 55% of Grower/Producer, Distributor and Wild Harvester respondents indicated they sell seed mixes. In addition, there are several Distributors who sell pre-packaged seed mixes, often designed around the prescribed Alberta Transportation and Economic Corridors mixes or other prescribed mixes (see Powter et al., 2018)[8].
- Distributor and End User respondents indicated that ecological suitability and genetic source of seed are main drivers of their species selections but also indicated that availability and price are drivers. In other words, End Users face a collision between ecological desire and economic reality.

[8] BrettYoung no longer sells pre-packaged reclamation seed mixes as they found End Users wanted changes made to the mixes and/or they were left with unused inventory that had to be disposed (Ashley Dettmer, BrettYoung, pers. com.)

- 73% of Distributor and End User respondents indicated they would buy Alberta Seed over seed sourced from plants originally from other jurisdictions even if it is more expensive.
- 46% of Distributor and End User respondents would prefer to use/specify a Variety if available but 25% said they either didn't believe there was a difference in performance or didn't know the difference between a Variety and Common Seed.
- 20% of Distributor and End User respondents indicated that more than 60% of the native seed they buy or deploy is purchased from Growers/Producers, Distributors or Wild Harvesters outside Alberta, but 22% said they didn't know where it came from.
- 68% of Distributor and End User respondents said they want to be asked if a substitute species is acceptable, yet 14% of Grower/Producer, Distributor and Wild Harvester respondents said they will make the decisions to substitute species they cannot provide.
- Survey respondents identified species that they get asked about but cannot provide, and yet others said they commonly provide the same species.
- The authors were surprised with the range of oversight tools Regulators reported using. SANSC could work with Regulators to better understand their oversight practices and communicate those to the native species seed community.
- Given that 36% of Regulators indicated they were planning to update their requirements in the next two years, and that the top response by Regulators to the question on how to improve the native species seed market in Alberta was to increase regulatory requirements to use native species, SANSC has an opportunity to influence future regulatory requirements.
- 34% of respondents were Wild Harvesters and 43% buy seed from Wild Harvesters, suggesting this is a market segment worth greater emphasis.
- The production, sales and deployment of wetland species by 41% of respondents, and traditional use species by 20% of respondents indicates a broader suite of market opportunities that SANSC could focus on.

### 4.2 Recommendations

SANSC has an opportunity to show leadership in this field by: (1) helping market participants become more knowledgeable, (2) developing tools to make the market more efficient, and (3) transform the market.

SANSC can undertake, lead or facilitate projects in the short-term (i.e., Year 1) and medium-term (i.e., Years 2 and 3) to establish its credentials as an enabling organization and to develop some initial products that demonstrate to users and funders that it can make valuable contributions to the sector and be seen as the go-to place for native species seed information for grasslands regions.

SANSC can then begin to organize, lead, or facilitate longer-term projects that will make major changes that can transform the industry. There are examples of such changes in the literature that can serve as templates for the projects.

### 4.2.1 *Short-term Opportunities*

There are some quick wins that SANSC could undertake in the first year, including:

6. Establish a stand-alone SANSC website and promote its availability to the native species seed community.
7. Develop and maintain a Community of Practice to share native species seed knowledge.
8. Develop a "Newsletter" or other communication vehicle that interested parties could sign-up for that provides updates on SANSC's work and general native species seed information. The authors' experience is that people are more likely to look at information pushed to them rather than expecting them to periodically visit the website.
9. Develop and maintain an online list of Alberta seed suppliers and their products. This will need to be actively managed to ensure data are up to date (for example, current lists from the ANPC and NPSS do not appear to be current). There was strong support in the survey for this initiative.
10. Publish on the website a Glossary of Terms and Acronyms used in the industry.
11. Develop education tools to promote the use of native species seed and increase awareness of market scope and needs such as:
    a. Promoting the need to use both common and scientific species name in seed orders and marketing tools.
    b. Identifying SANSC's preferred source for scientific and common names of native plants. The authors recommend using the Database of Vascular Plants of Canada (VASCAN) (Canadensys, n.d.) for current scientific and common plant names and the Alberta Conservation Information Management System (ACIMS) to determine if a species is considered native to Alberta.
    c. Promoting the use of native species varieties/cultivars in revegetation projects.
    d. Providing information on the value of and opportunities for wild harvested seed in revegetation projects.
    e. Providing a forum for "good news" stories showcasing native seed use in revegetation projects.
12. Provide regulators with information to support them as they update their requirements. At a minimum, inform regulators of the survey results and inform them that SANSC could be a useful reviewer for draft requirements.

### 4.2.2 *Medium-term Opportunities*

The following projects could be undertaken in Years 2 and 3 to continue to establish SANSC's leadership role:

13. Develop and maintain a list of native species varieties/cultivars available for purchase or for use as breeder stock for increasing seed supply.
14. Develop a list of the types of revegetation projects using native seed (e.g., disturbance types, reclamation vs. restoration) to show market breadth and opportunities. The list should go beyond the traditional larger-scale reclamation and restoration projects to include smaller-scale projects served by smaller seed providers. Where possible, identify current and future scale (and therefore seed requirements) of these projects.
15. Develop guidance on acceptable species to substitute in seed mixes.
16. Initiate discussions with other organizations with similar mandates or aspirations in Alberta and outside the province with the aim of coordinating information and resources and potentially engaging in mutually beneficial projects.
17. Develop and maintain an online listing of Regulators and their requirements for use of native species to highlight market potential.
18. Engage with regulators to better understand their oversight roles and tools and increase awareness of these within the sector.
19. Develop an online native species seed "dating service" that will link the Grower/Producer and Wild Harvester sectors with the Distributor and End User sectors to increase awareness of needs and capabilities and facilitate a more efficient market.
20. Collate and update information on seed production, harvesting, handling, cleaning, and storage for individual native species. The literature review identified a variety of sources of current and historical information – SANSC could develop Alberta-specific guidance to help the Grower/Producer and Wild Harvester sectors increase availability.
21. Develop and maintain a list of online resources to support the community.
22. Develop a common PowerPoint presentation and set of messages that speakers could use to promote SANSC at relevant conferences.

### 4.2.3 *Long-term Opportunities*

There are also longer-term initiatives that SANSC could provide a leadership role in. These initiatives will require buy-in from key stakeholders and/or significant financial support. At the very least, SANSC could initiate discussions to increase awareness of the need and value of these initiatives. Examples include:

23. Explore options for native species seed banks and seed orchards to reduce the highly cyclical nature of the native species seed industry.

24. Engage with Alberta Forestry and Parks to develop greater access to public lands for wild harvesting. Several survey respondents noted frustrations with the lack of access or the difficulties in obtaining access.
25. Engage with regulators to identify opportunities to make better use of the information they collect on use and efficacy of native species in revegetation projects. Sixty seven percent of regulator respondents have data on the use of native species in revegetation projects, but only 25% indicated it was available online or on request.
26. Engage with the CSGA to better understand and promote the agency's Native Plant Certification Program.

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## APPENDIX 1 Growers/Producers, Wild Harvesters, Distributors and End Users Survey

### Southern Alberta Native Seed Collaborative (SANSC)

The Southern Alberta Native Seed Collaborative was assembled informally in 2018 for the purpose of sharing seed and seed collection resources among local organizations. Initially composed of a few governmental organizations, the group quickly expanded to include NGOs, independent consultants, growers, wild seed harvesters, and industry representatives, all with a common interest of improving the availability of local seed. SANSC's Vision is to have reliable, high-quality, ecologically appropriate, local native seed sources available for restoration projects in Southern Alberta.

### Purpose of the Survey

SANSC has identified a lack of adequate seed source as a barrier to revegetation work associated with revegetation projects and that growers and collectors require insight into future demand for species so that they may plan which species to target. Seed users will also benefit from knowing who can produce native seed and in what quantities.

### Anonymity and Confidentiality

All survey responses will remain confidential. Survey data will be aggregated and will not be attributed to individuals, companies or organizations in any public report. Name, e-mail, and phone number information is collected in case we have follow up questions for you – it will not be used for any other purpose.

### Scope

The survey focuses on:

- Seed of species native to Alberta required for or used in revegetation projects.
- Seed of individual native grasses, graminoids, and forbs (not seed mixes).
- Seed sources able to provide volumes suitable for revegetation projects at least one hectare in size (e.g., a wellsite).
- Areas of the province within the Grassland Natural Region, Foothills and Central Parkland Natural Subregions, and Montane Natural Subregion.
- All stages of the supply chain from growing/harvesting through buying and selling to deployment. Regulation and related tools will also be included.

### Key Definitions

Please read the definitions carefully as they are used throughout the Survey.

**Alberta Seed** – seed sourced from plants growing in Alberta (i.e., genetically adapted to local conditions).

**Common Seed** – native species seed that is not registered as a Variety and falls outside of the Pedigreed Seed System. This can include wild harvested seed, nursery grown seed from wild

harvested seedlots, or downgraded varietal seed (e.g., varietal material that has been grown out for more than three generations). No claims or guarantees can be made about origin (provenance), adaption or performance.

**Deployment** – placement of seed at the Revegetation Site.

**Distributor** – a person, company or organization that buys seed from a Grower/Producer or a Wild Harvester and sells it to an End User.

**End User** – a person, company or organization that deploys native species seed at a Revegetation Site or someone that designs/plans/recommends revegetation programs that require purchasing native seed.

**Forb** – a native herbaceous flowering plant that is not a Graminoid.

**Graminoids** – native grasses, sedges, rushes and reeds.

**Native Species** – are those that are indigenous to Alberta and were present prior to Euro-American settlement.

**Grower/Producer** – a person, company or organization that grows native species and harvests the seed for sale to an End User or a Distributor.

**Revegetation** – seeding vegetation to return disturbed land to a productive state.

**Revegetation Site** – any disturbed location equal to or greater than one hectare (1 ha) in size.

**Seed Supplier** – a Grower/Producer, Wild Harvester, or Distributor.

**Supply Chain** – all stages of growing/harvesting native species seed through to buying and selling seed and deploying seed on a Revegetation Site. Regulators are also considered part of the supply chain.

**Variety** – a named group of plants of the same species that have been artificially selected for specific characteristics. They must be morphologically distinct, breed true to type, and be registered with the Government of Canada (e.g., AITF Badlands Blue Grama).

**Wild Harvester** – a person, company or organization that harvests native seed from mostly undisturbed natural habitats for sale to an End User or a Distributor.

**Survey Format**

The Survey is divided into parts:

1. Contact Information
2. Background Information
3. General Questions
4. End User Question
5. Distributor or End User Questions
6. Grower/Producer, Distributor or Wild Harvester Questions

7. Other

Please answer ALL questions. There are options to select if the question does not apply to you.

**Questions About the Survey or SANSC**

Any questions about the survey or the use of the survey results can be directed to Chris Powter – enviroqas@shaw.ca

Any questions about SANSC can be directed to nativeseedcollaborative@gmail.com.

**Contact Information**

If you want to participate in the survey but do not wish to share your contact information please call (780 893-3808) or e-mail (enviroqas@shaw.ca) Chris Powter and provide your answers directly.

1. Name:

2. E-mail:

3. Phone:

**Background Information**

4. What is your role in the native species seed supply chain (check all that apply):

□ Grower/Producer □ Distributor □ Wild Harvester

□ End User

5. How long have you been involved in native species seed supply chain activities?

□ 0 to 5 Years □ 6 to 10 Years □ 11 to 20 Years

□ 21 to 30 Years □ More than 30 Years

6. Which types of native species seed do you grow, sell, buy, or deploy (check all that apply)?

□ Grasses □ Other Graminoids □ Forbs

□ Shrubs □ Wetland □ Traditional Use

**General Questions**

7. In your opinion, is more information needed on Alberta-based native species Seed Suppliers (who they are, where they are, species and volumes available, etc.)?

□ Yes □ No □ Not sure

8. The top five (5) species that I sell or buy are (specify common and scientific name):

1.

2.

3.

9. 4.

10. 5.

11. The top five (5) species I get asked about but can't provide, or ask for but aren't available, are (specify common and scientific name):

12. 1.

13. 2.

14. 3.

15. 4.

16. 5.

17. How many native species do you typically grow, harvest, buy, sell, or deploy in a year?

□ 1 species

□ 2 or 3 species

□ 4 or 5 species

□ 6 to 10 species

□ 11 to 15 species

□ 16 to 20 species

□ 21 to 30 species

□ More than 30 species

18. What volume of native species seed do you typically grow, harvest, buy, sell, recommend using or deploy in a year?

□ 1 to 25 kilograms

□ 26 to 100 kilograms

□ 101 to 500 kilograms

□ 501 to 1,000 kilograms

□ More than 1,000 kilograms

**End User Question**

19. As an End User, how difficult is it to obtain the seed you need for a revegetation project (check all that apply)?

□ I'm not an End User

□ I can always find the species and volume I need

□ I can always find the species I need but not the volume I need

□ I can usually find the species and volume I need

□ I can usually find the species I need but not the volume

□ I rarely find the species or volume I need

□ I can find the seed I need but it costs more than my budget allows

□ I must request substitute species to fill my needs

□ I am given substitute species to fill my needs

□ I must go to more than one Seed Supplier to get my seed

□ I must go to Seed Suppliers outside Alberta to fill my needs

**Distributor or End User Questions**

20. As a Distributor or End User (check all that apply):

□ I'm not a Distributor or End User

□ I buy from Distributors

□ I buy from Growers/Producers

□ I buy from Wild Harvesters

□ I prefer to buy from Alberta-based Seed Suppliers

□ I will buy from anyone, anywhere who can fill my needs

□ I have one or more preferred Seed Suppliers

□ I buy seed under custom production/collection contracts

21. As a Distributor or End User (select one):

□ I'm not a Distributor or End User

□ I buy/recommend individual species and make custom seed mixes

□ I prefer to buy/recommend commercial seed mixes

□ I only buy, sell, recommend or deploy individual species

22. As a Distributor or End User (select one):

□ I'm not a Distributor or End User

□ I usually provide, or recommend providing, at least one year's notice of my intent to purchase

□ I usually place purchase orders the year I need the seed

23. As a Distributor or End User (check all that apply):

□ I'm not a Distributor or End User

□ I use/specify Common Seed (i.e., seed of unidentified sources)

□ I would prefer to use/specify a Variety if available

□ I don't know the difference between Common Seed and a Variety so I will buy/recommend/use either one

□ I don't believe there is difference in performance between Common Seed or a Variety so I will buy/recommend/use either one

□ I would buy Alberta Seed over seed sourced from plants originally from other jurisdictions even if it is more expensive (i.e., I think it is "better adapted" than other seed)

□ I find wild harvested seed is more expensive than "cultivated" seed, so I tend to use "cultivated" seed

24. As a Distributor or End User (check all that apply):

□ I'm not a Distributor or End User

□ I specify common name of the species I am interested in

□ I specify scientific name of the species I am interested in

□ I want to be asked if a substitute species is acceptable

□ I will substitute species if there is a cheaper alternative

□ I require Certified Seed Tags for all Varieties I buy

□ I require a Record of Seed Analysis (i.e., record of germinability and purity) for all seed I buy

□ I want to buy seed on a Pure Live Seed basis

25. As a Distributor or End User (check all that apply):

□ I'm not a Distributor or End User

□ I care about the genetic source of the seed I buy, recommend or deploy (Alberta Seed vs. seed produced from plants sourced originally from other jurisdictions)

□ I do not care about the genetic source of the seed I buy, recommend or deploy (Alberta Seed vs. seed produced from plants sourced originally from other jurisdictions)

□ Price is the main driver of my seed specifications

□ Availability is the main driver of my seed specifications

□ Ecological suitability is the main driver of my seed specifications

26. As a Distributor or End User, what percentage of the native seed you buy or deploy is purchased from Growers/Producers, Distributors or Wild Harvesters outside Alberta:

□ 0 to 5%

□ 6 to 10%

□ 11% to 20%

□ 21% to 40%

□ 41% to 60%

□ 61% to 80%

□ 81% to 99%

□ All the seed I buy or deploy

□ I don’t know

□ I’m not a Distributor or End User

**Grower/Producer, Distributor or Wild Harvester Questions**

27. As a Grower/Producer, Distributor or Wild Harvester (select one):

□ I’m not a Grower/Producer, Distributor or Wild Harvester

□ I only sell seed to End Users

□ I only sell seed to Distributors

□ I sell seed to anyone who wants it

28. As a Grower/Producer, Distributor or Wild Harvester (select all that apply):

□ I’m not a Grower/Producer, Distributor or Wild Harvester

□ I sell Common Seed (i.e., seed of unidentified sources)

□ I sell Varieties

□ I sell wild-harvested seed from an identified harvest region

29. As a Grower/Producer, Distributor or Wild Harvester (check all that apply):

□ I’m not a Grower/Producer, Distributor or Wild Harvester

□ I specify common name of the species I sell

□ I specify scientific name of the species I sell

□ I provide Certified Seed Tags with all Varieties I sell

□ I provide a Record of Seed Analysis for the seed I sell

□ I sell seed on a Pure Live Seed basis

□ I provide information on the genetic source of the seed I sell

□ I get asked about the genetic source of the seed I sell

□ I sell seed of individual species

□ I sell seed mixes

30. As a Grower/Producer, Distributor or Wild Harvester (check all that apply):

□ I’m not a Grower/Producer, Distributor or Wild Harvester

□ I usually get adequate notice of my Distributor's or End User's needs

□ I do not believe that Distributors or End Users understand how much lead time is required to produce seed

□ I have a good sense of upcoming market needs so I can make growing and harvesting plans

□ I grow/harvest in hopes of future sales (i.e., on spec)

□ I grow/harvest only when I have a buyer (i.e., planned/guaranteed market)

□ I usually have inventory on hand to meet needs

□ I recommend substitutes for species I cannot provide and get the buyer's agreement

□ I decide to substitute species I cannot provide

□ I can confidently store seed and maintain its viability for up to 1 year

□ I can confidently store seed and maintain its viability for 1 to 5 years

□ I can confidently store seed and maintain its viability for more than 5 years

31. As a Grower/Producer, Distributor or Wild Harvester I estimate the typical amount of seed inventory I have at the end of the year that is no longer viable (i.e., cannot be sold) is (check all that apply):

□ I'm not a Grower/Producer, Distributor or Wild Harvester

□ None

□ <10%

□ 11% to 20%

□ 21% to 30%

□ More than 30%

□ The non-viable seed is usually bare seed

□ The non-viable seed is usually coated seed

32. As a Grower/Producer, Distributor or Wild Harvester (check all that apply):

□ I'm not a Grower/Producer, Distributor or Wild Harvester

□ I have all the business I can handle or want

□ I could handle a few more customers

□ I could handle a few more large orders (i.e., more than 500 kilograms)

□ I could handle many more customers

□ I could handle many more large orders (i.e., more than 500 kilograms)

□ I would expand the number of species I produce/have if I knew there was a market

□ I would expand the volume I produce/have if I knew there was a market

□ I would be interested in custom production/collection contracts to reduce uncertainty

□ I am considering leaving the business

33. As a Grower/Producer, Distributor or Wild Harvester, would you be interested in having your company and product(s) listed in an online directory on the SANSC website?

□ Yes

□ No

**Other Questions**

34. In your opinion, what must be done to increase the availability and use of native species seed in revegetation projects (check all that apply)?

□ Increase regulatory requirements to use native species in revegetation projects.

□ Increase the number of native species available for revegetation projects.

□ Increase the volume of native species seed available for revegetation projects.

□ Encourage/require the use of Alberta Seed vs. seed from plants from other jurisdictions.

□ Increase awareness and acceptance of wild harvested seed as a viable alternative to commercial seed.

□ Increase awareness of upcoming seeding needs (species, volumes, timing, etc.).

□ Develop and maintain a native species seed bank which End Users could draw from.

□ Increase awareness of native seed performance.

□ Make revegetation success stories using native species seed more accessible.

□ Provide guidance on species that can be substituted when the desired species is not available.

□ Create an online platform to link Growers/Producers, Distributors and Wild Harvesters to End Users.

□ Develop and maintain a forward-looking list of target species that buyers and sellers agree to focus on to align supply and demand.

□ Develop and maintain a province-wide inventory of species, volumes and vendors available.

□ Develop and maintain a Community of Practice to share native species seed knowledge.

□ Reduce the cost of native species seed.

□ Nothing needs to be done.

35. If you had to choose, which would be your top three (3) options to implement?

□ Increase regulatory requirements to use native species in revegetation projects.

□ Increase the number of native species available for revegetation projects.

□ Increase the volume of native species seed available for revegetation projects.

□ Encourage/require the use of Alberta Seed vs. seed from plants from other jurisdictions.

□ Increase awareness and acceptance of wild harvested seed as a viable alternative to commercial seed.

□ Increase awareness of upcoming seeding needs (species, volumes, timing, etc.).

□ Develop and maintain a native species seed bank which End Users could draw from.

□ Increase awareness of native seed performance.

□ Make revegetation success stories using native species seed more accessible.

□ Provide guidance on species that can be substituted when the desired species is not available.

□ Create an online platform to link Growers/Producers, Distributors and Wild Harvesters to End Users.

□ Develop and maintain a forward-looking list of target species that buyers and sellers agree to focus on to align supply and demand

□ Develop and maintain a province-wide inventory of species, volumes and vendors available.

□ Develop and maintain a Community of Practice to share native species seed knowledge.

□ Reduce the cost of native species seed.

□ Nothing needs to be done.

36. What barriers exist that hinder the harvesting of seed from natural communities?

37. Are you aware of the Native Plant Certification Program (NPCP), developed by the Canadian Seed Growers Association (CSGA).

□ No

□ Yes

□ Yes, and I am participating in this program

38. Are you aware of the SANSC web page, which hosts information about this initiative, and information about wild-harvesting for harvesters and landholders?

□ Yes

□ No

39. Do you have any other comments?

## APPENDIX 2 Regulators Survey

Southern Alberta Native Seed Collaborative (SANSC) Native Seed Market Regulator Survey

### Southern Alberta Native Seed Collaborative (SANSC)

The Southern Alberta Native Seed Collaborative was assembled informally in 2018 for the purpose of sharing seed and seed collection resources among local organizations. Initially composed of a few governmental organizations, the group quickly expanded to include NGOs, independent consultants, growers, wild seed harvesters, and industry representatives, all with a common interest of improving the availability of local seed. SANSC's Vision is to have reliable, high-quality, ecologically appropriate, local native seed sources available for restoration projects in Southern Alberta.

### Purpose of the Survey

SANSC has identified a lack of adequate seed source as a barrier to revegetation work. Another perceived barrier is the lack of mandatory requirements to use native species and/or native species seed in revegetation projects. The survey aims to better understand the nature and scope of requirements for using native species in the Grasslands regions of Alberta.

For the purposes of this survey, requirements is used broadly to encompass legislation, regulation, specifications, standards, and criteria that obligate a practitioner to use, or prioritize use of, native species in revegetation work.

### Anonymity and Confidentiality

All survey responses will remain confidential. Survey data will be aggregated and will not be attributed to individuals, companies or organizations in any public report.

### Key Definitions

Please read the definitions carefully as they are used throughout the Survey.

***Alberta Seed/Plants*** – seed or plants sourced from plants growing in Alberta (i.e., genetically adapted to local conditions).

***Common Seed*** – native species seed that is not registered as a Variety and falls outside of the Pedigreed Seed System. This can include wild harvested seed, nursery grown seed from wild harvested seedlots, or downgraded varietal seed (e.g., varietal material that has been grown out for more than three generations). No claims or guarantees can be made about origin (provenance), adaption or performance.

***Forb*** – a native herbaceous flowering plant that is not a Graminoid.

***Graminoids*** – native grasses, sedges, rushes and reeds.

***Grasslands*** – areas of the province within the Grassland Natural Region, Foothills and Central Parkland Natural Subregions, and Montane Natural Subregion.

***Native Species*** – are those that are indigenous to Alberta and were present prior to Euro-American settlement.

***Revegetation*** – seeding vegetation to return disturbed land to a productive state.

***Variety*** – a named group of plants of the same species that have been artificially selected for specific characteristics. They must be morphologically distinct, breed true to type, and be registered with the Government of Canada (e.g., AITF Badlands Blue Grama).

Please answer ALL questions. There are options to select if the question does not apply to you.

**Questions About the Survey or SANSC**

Any questions about the survey or the use of the survey results can be directed to Chris Powter – enviroqas@shaw.ca

Any questions about SANSC can be directed to nativeseedcollaborative@gmail.com.

**Background Questions**

1. What organization type do you belong to:

□ Municipal government

□ Provincial government or agency

□ Federal government or agency

□ Indigenous community

□ Not-for-profit

□ Other

Please specify

2. Are you aware of the Government of Alberta's 2010 Reclamation Criteria for Wellsites and Associated Facilities for Native Grasslands (July 2013 Update)?

□ Yes, we use it as the basis of our requirements

□ Yes, it has informed our requirements

□ Yes, but it is no relevant to our requirements

□ No

3. Do you set requirements for use of native species for revegetation of disturbances in native grassland ecosystems?

□ Yes, native species

□ Yes, locally-adapted native species

□ No

□ No, but we are considering doing so

□ No, but we encourage use of native species

**Requirements Questions**

4. Are your requirements available online?

□ No

□ Yes (please provide URL)

5. Approximately when did you last update your requirements (check all that apply)?

□ Within 1 year

□ 1 to 2 years ago

□ 2 to 5 years ago

□ More than 5 years ago

□ We plan on updating them in the next 2 years

6. Do your requirements apply to (check all that apply):

□ Seed

□ Wild-harvested seed

□ Planting stock

□ Species used rather than seed or planting stock

□ Individual species

□ Species mixes

8. Which types of native species do your requirements apply to (check all that apply)?

□ Grasses

□ Shrubs

□ Other Graminoids

□ Wetland

□ Forbs

□ Traditional Use

9. Do your requirements specify (check all that apply):

□ Plant common name

□ Plant scientific name

□ Variety name

□ None of the above

10. Do you (check all that apply):

□ Approve species proposed to be seeded/planted

□ Require documentation of species seeded/planted

□ Require written performance assessments of revegetation projects

□ Inspect revegetation sites to ensure compliance

□ Require Certified Seed Tags for all Varieties used

□ Recommend Certified Seed Tags be obtained for all Varieties used

□ Require a Record or Certificate of Seed Analysis (i.e., record of germinability and purity) be obtained for all seed used

□ Recommend a Record or Certificate of Seed Analysis (i.e., record of germinability and purity) for all seed used

□ None of the above

**Other Questions**

11. Do you have data on the use of native species in revegetation work?

□ Yes, and it is available online or on request

□ Yes, but it is not publicly available

□ No

□ No, but we are thinking about gathering and making it available

12. Given your experience to date, how would you prioritize the following options if you were developing new requirements (1 = most important, 6 = least important):

Specify use of Alberta Seed/Plants where available

Specify use of Varieties over Common seed where available

Require documentation of species seeded/planted

Require a Record or Certificate of Seed Analysis (i.e., record of germinability and purity) for all seed used

Require proponents to specify plant common names and scientific names to ensure the right species is being used

13. Please sort the following statements in order of importance (1 = most important, 4 = least important):

Maintaining an updated list of native species seed and plant suppliers

Increasing regulatory requirements to use native species

Requiring early notification of seed needs by proponents (>1 growing or harvesting season)

Providing guidance on species that can be substituted when the desired species is not available

14. What regulatory or policy measures are needed to improve the availability of domestic native seed for revegetation projects in southern Alberta?

**Closing Comments**

15. Do you have any other comments?

## APPENDIX 3 Lists of Species that are Bought or Sold and that Cannot be Found or are not Available.

Surrey participants were asked to list the top five species that they buy or sell and the top five that they get asked about but cannot find or are not available. The tables below shows a comparison of how many respondents indicate that they sold a given species and those that responded that they could not find the species to purchase.

Several respondents provided partial common names (e.g., Nuttalls, June) which the authors have interpreted in the Tables below.

**Grasses**

| Scientific Name | Previous Name | Common Name | Sold | Not Available |
|---|---|---|---|---|
| *Pascopyrum smithii* | *Agropyron smithii* | Western wheatgrass | 16 | 1 |
| *Elymus trachycaulus* | *Agropyron trachycaulum* (includes var. *subsecundum)* | Slender wheatgrass | 15 | |
| *Koeleria macrantha* | | June grass | 14 | 9 |
| *Elymus lanceolatus* | *Elymus dasystachyum* | Northern wheatgrass | 14 | 1 |
| *Nasella viridula* | *Stipa viridula* | Green needle grass | 13 | 1 |
| *Hesperostipa comata* | *Stipa comata* | Needle and thread grass | 12 | 12 |
| *Hesperostipa curtiseta* | *Stipa curtiseta* | Western porcupine grass | 7 | 10 |
| *Festuca saximontana* | | Rocky Mountain fescue | 7 | 2 |
| *Bouteloua gracilis* | | Blue grama | 7 | 2 |
| *Deschampsia caespitosa* | | Tufted hairgrass | 5 | 2 |
| *Festuca hallii* | | Plains rough fescue | 4 | 11 |
| *Festuca campestris* | | Mountain fescue | 4 | 7 |
| *Puccinellia nuttalliana* | | Alkali grass | 3 | 2 |
| *Festuca idahoensis* | | Idaho fescue; Bluebunch | 3 | 1 |
| *Poa palustris* | | Fowl bluegrass | 3 | 1 |
| *Elymus canadensis* | | Canada wildrye | 3 | |

| Scientific Name | Previous Name | Common Name | Sold | Not Available |
|---|---|---|---|---|
| *Agrostis scabra* | | Tickle grass | 2 | 4 |
| *Poa secunda* | *Poa sandbergii* | Sandberg's bluegrass | 2 | 4 |
| *Bromus ciliatus* | | Fringed brome | 2 | 3 |
| *Bromus sitchensis* | var. *carinatus* | Sitka brome grass | 2 | |
| *Poa alpina* | | Alpine bluegrass | 1 | 4 |
| *Koeleria spicata* | *Trisetum spicatum* | Spike trisetum | 1 | 2 |
| *Eriocoma hymenoides* | *Oryzopsis hymenoides; Achnatherum hymenoides* | Indian rice grass | 1 | 1 |
| *Calamagrostis canadensis* | | Bluejoint | 1 | 1 |
| *Danthonia spicata* | | Poverty oat grass | 1 | |
| *Helictochloa hookeri* | *Helictotrichon hookeri* | Hooker's oat grass | 1 | |
| *Sporobolus rigidus* | *Calamovilfa longifolia* | Prairie sandreed | 1 | |
| *Festuca altaica* | | Northern rough fescue | | 4 |
| *Danthonia parryi* | | Parry's oatgrass | | 2 |
| *Distichlis spicata* | | Inland saltgrass | | 2 |
| *Anthoxanthum hirtum* | | Sweetgrass | | 1 |
| *Bromus anomalus* | | Nodding brome | | 1 |
| *Calamagrostis stricta* | var. *inexpansa* | Northern reed grass | | 1 |
| *Danthonia intermedia* | | Intermediate oatgrass | | 1 |
| *Leymus innovatus* | *Elymus innovatus* | Hairy wildrye | | 1 |
| *Pseudoroegneria spicata* | *Agropyron spictum; Elymus spicatus* | bluebunch wheatgrass | | 1 |

**Herbaceous species**

| Scientific Name | Previous Name | Common Name | Sold | Not Available |
|---|---|---|---|---|
| *Gaillardia aristata* | | Blanketflower | 6 | |
| *Linum lewsii* | | Wild blue flax | 4 | |
| *Monarda fistulosa* | | Wild bergamot | 3 | |
| *Achillea millefolium* | | Common yarrow | 2 | 2 |
| *Symphyotrichum laeve* | *Aster laevis* | Smooth aster | 2 | |
| *Dalea purpurea* | *Petalostemon purpureum* | Purple prairie clover | 2 | 1 |
| *Liatris punctata* | | Dotted blazing star | 2 | 1 |
| *Pulsatilla nuttalliana* | *Pulsatilla patens; Anemone patens* | Prairie crocus | 1 | 1 |
| *Eurybia conspicua* | *Aster conspicuus* | Showy aster | 1 | |
| *Geum triflorum* | | Three-flowered avens | 1 | |
| *Helianthus maximilliani* | | Maximillian's sunflower | 1 | |
| *Liatris ligulistylis* | | Meadow blazing star | 1 | |
| *Ratibida columnifera* | | Prairie cone flower | 1 | |
| *Solidago rigida* | | Stiff goldenrod | 1 | |
| *Solidago altissima* | var. *gilvocanescens* | Canada goldenrod | 1 | |
| *Viola canadensis* | | Western Canada violet | 1 | |
| *Artemisia frigida* | | Pasture sage | | 2 |
| *Carex atherodes* | | Awned sedge | | 2 |
| *Sphaeralcea coccinea* | | Scarlet mallow | | 2 |
| *Thermopsis rhombifolia* | | Golden bean | | 2 |
| *Androsace chamaejasme* | | Alpine rock jasmine | | 1 |
| *Antennaria parviflora* | *Antennaria aprica* | Small-leaved everlasting | | 1 |
| *Artemisia ludoviciana* | | Prairie sage | | 1 |

| Scientific Name | Previous Name | Common Name | Sold | Not Available |
|---|---|---|---|---|
| *Asclepias speciosa* | | Showy milkweed | | 1 |
| *Astragalus canadensis* | | Canada milkvetch | | 1 |
| *Carex aquatalis* | | Water sedge | | 1 |
| *Carthamus tinctorius* | | Safflower | | 1 |
| *Clematis ligusticifolia* | | Western clematis | | 1 |
| *Cleome serrulata* | | Bee plant | | 1 |
| *Eleocharis palustris* | | Creeping spike-rush | | 1 |
| *Erigeron speciosus* | | Showy fleabane | | 1 |
| *Eriogonum ovalifolium* | | Silver-plant | | 1 |
| *Fragaria virginiana* | | Wild strawberry | | 1 |
| *Geranium viscosissimum* | | Sticky geranium | | 1 |
| *Hedysarum spp.* | | Sweetbroom | | 1 |
| *Heterotheca villosa* | | Golden aster | | 1 |
| *Iliamna rivularis* | | Mountain hollyhock | | 1 |
| *Townsendia exscapa* | | Low townsendia | | 1 |
| *Urtica gracilis* | *Urtica dioica ssp. gracilis* | Graceful stinging nettle | | 1 |
| *Viola adunca* | | Early blue violet | | 1 |

**Trees/Shrubs**

| Scientific Name | Previous Name | Common name | Sold | Not Available |
|---|---|---|---|---|
| *Amelanchier alnifolia* | | Saskatoon | 2 | |
| *Artemisia cana* | | Silver sagebrush | 2 | |
| *Elaeagnus commutata* | | Silver berry | 2 | |
| *Picea glauca* | | White spruce | 2 | |
| *Populus balsamifera* | | Balsam poplar | 2 | |
| *Prunus virginiana* | | Chokecherry | 2 | |

| Scientific Name | Previous Name | Common name | Sold | Not Available |
|---|---|---|---|---|
| *Salix exigua* | | Sandbar willow | 2 | |
| *Salix famelica* | | Hungry willow | 2 | |
| *Arctostaphylos uva-ursi* | | Bearberry | 1 | 1 |
| *Pinus spp.* | | Pine species | 1 | 1 |
| *Shepherdia argentia* | | Thorny-buffaloberry | 1 | 1 |
| *Abies spp.* | | Fir species | 1 | |
| *Betula occidentalis* | | Water birch | 1 | |
| *Cornus sericea* | *Cornus stolonifera* | Red-osier dogwood | 1 | |
| *Pseudotsuga menziesii* | | Douglas fir | 1 | |
| *Rosa acicularis* | | Prickly rose | 1 | |
| *Salix interior* | | Sandbar willow | 1 | |
| *Alnus alnobetula* | *Alnus viridis; Alnus crispa* | Green alder | | 1 |
| *Alnus incana* | *Alnus tenuifolia* | River alder | | 1 |
| *Betula pumila* | | Dwarf birch | | 1 |
| *Juniperus horizontalis* | | Creeping juniper | | 1 |
| *Salix planifolia* | | Flat-leaved willow | | 1 |
| *Symphiocarpos albus* | | Snowberry | | 1 |
| *Symphoricarpos occidentalis* | | Buckbrush | | 1 |

## APPENDIX 4 Responses About Options for Increasing Availability and use of Native Species Seed

In response to the questions about options for increasing availability and use of native species seed in revegetation projects, some respondents selected *Other* and provided the following comments.

NOTE: In some cases, the authors have split individual responses to allow for grouping of common themes.

### Capacity and Supports

- Build capacity, perhaps as a co-op or government facility, for cool and frozen storage of native seed to prolong seed life.
- Increase the number of producers growing native seed and collectors harvesting native seed, improve wild harvest efficiency (reduce harvest cost).
- Find ways of increasing the number of producers/suppliers of native seed.
- Increase protection for producers who develop their own varieties (i.e., I spend 10 years developing a species only to have someone else plant my seed and crash the market).
- Seed producers working together in a network.
- Promote and support https://www.seedark.io/ formerly known as Squiirrel for matching seed producers with end users.
- There also needs to be a certain amount of acceptance in using wild harvested seed so what other seed might be in there. So definitely we need more awareness and acceptance.

### Supply and Demand

- If there is a desire to have a strong native seed industry there needs to be stable markets, protections for producers and coordination with other jurisdictions. I farm and I have thought about the issue from the perspective of "what would it take for me to start growing native seed?" and ultimately it comes down to economics.
- If there is no market prices drop and producers leave.
- Supply increases have historically been completed through contract growing.
- Demand follows supply, if more local seed is required then more will be produced. Currently it is more advantageous to produce seed in other jurisdictions and dedicated growers have trouble competing as most seed is sold through large international retailers.
- Inconsistent demand.

**Economics**

- Native seed production is expensive and labour intensive. Most producers lack the manpower and financial depth to produce the volumes required.
- Native seed production is fickle as we are talking about wild plants, so production is variable and takes years to establish so there is a lot of cost and no guaranteed return.
- As an end user, cost is always a consideration and often a limiting factor but hopefully by aligning supply and demand and increased requirements to use native seed that would help reduce costs.
- I think price is always going to be a limiting factor with wild harvesting at volume and will make it hard to become a widespread practice. Unless harvesters can partner with someone who can clean and store the seed to reduce costs of harvesters cleaning the seed.
- For it to be a viable option cost-wise, something else needs to be done to support wild harvesters.

**Regulation and Policy**

- There is no regulation around using native species for ditches and for other infrastructure which could provide stability for the industry, but cost would have to come down significantly.
- Improve and create policy around native seed use for industries that are currently laggards or omitted (highways and roads, tourism, gravel pits, trails, wind energy, solar installations that pitch using native seed).
- Encourage regulatory specifications for seed mixes to be more adaptable to actual seed availability (i.e., it has been a challenge to find markets for our max. sunflower seed in Canada).
- Ultimately if the demand is created through regulation production will follow. Will be several rough years, but the key really is consistent stable demand.

**Cooperation and Coordination**

- Interprovincial and international coordination. Should think outside of just Alberta.
- I am in Montana and provide significant amounts of seed to Alberta companies to be distributed through western Canada. I also source a significant amount of native and introduced species from Canada.

**Other Comments**

- Capital projects (pipelines, transmission etc.) are a large user and they are fickle and hard to plan for.
- With any increase in production there will need to be increased surveillance and monitoring. In field growing season, monitoring is much better than seed labs as most of

the time the seed labs aren't well versed in native species and a lot of species look the similar.

- Better lab testing to ID native species seeds in wild harvested mixes would be needed so that native species are not falling into the “other crop” or “other weed seed” categories.
- A permit system that would allow collection in the parks.
- I clean native grass.  I think they should be listed on the online platform too.
- I would check the reverse of a few of these points.

## APPENDIX 5 Responses About Barriers Hindering Wild Harvesting

Respondent comments on the barriers hindering wild harvesting.

NOTE: In some cases, the authors have split individual responses to allow for grouping of common themes.

### Access and Permission

- Challenges around migratory bird regulation. Most of the time you are still within the nesting window, and it is hard to sweep the large areas required for harvest
- Private landowner approvals, parks and wildland harvesting permit red tape.
- Primarily getting access to public and private land for wild harvesting efforts. Negotiating fair fees for access and/or percentage of seed sales for landowners/managers etc. We have to remember that there is no way to estimate volumes or quality of a native seed harvest until the seed is cleaned, in the bag and a seed analysis is reviewed. It's a total crap shoot, and all the risk is on the harvester!
- Green Area harvesting rules regarding seed zones and genetic deployment.
- Access to land. Bureaucracy not focused on harvesting effects for access to public lands in some jurisdictions.
- Alberta Parks will not allow commercial harvest for sale on any controlled lands even if not in parks.
- Crown land has limitations that make it difficult to wild harvest.
- Access and ridiculous expectations around compensation. For example, we have been told it would cost $500/acre for access in some areas. Unless you own the land, it has been nearly impossible to find clean and affordable places to harvest.
- Access to sites, seed becomes too expensive.
- Access (permission and topography/ability for equipment to reach harvesting sites).
- Lack of access. Very few places left in Central Parkland to obtain seed.
- Lack of suitable land/ecosystems.
- Access to undisturbed sites.
- Access to land and permission to harvest seed.
- Locating the seed and getting permission to pick.
- Access to public and private land for collection.
- Access to land.
- Access (5 responses).

**Economics**

- Cost (multiple scouting events to determine an area to harvest, actual harvesting and hauling, cleaning – since a mix of native species are harder to clean, and storage).
- Cost of harvesting and cleaning relative to selling price.
- Economic feasibility. It makes more business sense to grow 50 acres of one species, compared to hand harvesting small quantities.
- High risk/reward for harvesters when no buyer is yet confirmed for a lot. Could collect it but would the market bear the costs of the wild collected seed?
- Increased cleaning cost and you will likely never be able to clean it down to only one species in a lot of cases.
- Hand collection of individual species can be cost prohibitive due to the cost of labour.
- Cost. Sending crews to hand harvest is super expensive.
- Cost.
- Money.

**Equipment and People**

- Availability of equipment and personnel at critical harvesting times – maybe one crop is shelling out while another is being harvested as it can't be handled all at once.
- Costly and specialized equipment.
- Equipment.
- Finding a facility to clean it.
- I'm going to guess that most native harvesters don't have the storage and drying infrastructure for the crop they could potentially harvest.
- Availability of native seed harvesters and distributors.
- It’s pretty hard to put people who are qualified to pick out all invasive species on the harvester.
- Lack of expertise in seed cleaning leading to hand collection of individual species versus bulk collection of multiple species with subsequent machinery cleaning.
- Not sure. Training?

**Inconsistent Seed Production**

- Weather influencing amount of seed set and timing for harvesting, working around grazing so seed is not eaten before harvesting can occur.
- Mother nature! I could harvest 750 lbs on a very good year and 100 lbs on a dry year. That is out of our control.

- Severe droughts the last 5 years.
- Weather and the nature of some species growth habits.
- Incredibly inconsistent production.
- Inconsistency in seed production from one year to the next.
- I harvest on native prairie. Harvests are few and far between so only harvest when there is enough seed to warrant.

**Undesirable Species Present**

- Weeds and other species are present in the harvesting area.
- Harvesters possibly not knowing that the area they are harvesting is contaminated with problem plants – they go to all the expense and time and then there is something like downy brome (unseparable grass) in the final product.
- Non-desirable species in the natural community.
- Invasive species (3 responses).

**Site Selection / Timing**

- Knowledge of where species are for harvesting (along with patch size and other species present).
- Location – some species do not have a well-known seed source.
- Availability of species to collect from (3 responses).
- Timing. When is it ripe vs. already dispersed?

**Other Factors**

- Loss of habitat.
- Project timelines.
- Time.
- Guidance.
- Landowner awareness.
- Misconceptions.
- Competition from cows.

## APPENDIX 6 InnoTech Alberta Registered Native Seed Varieties

InnoTech Alberta's Breeder Seed Program has registered 22 native seed varieties for use in Alberta (Small et al., 2016). Additional varieties are at various stages of development and registration.

Table 8. InnoTech Alberta registered native seed varieties

| Registered Variety | Scientific Name | Soil /Region Adaptation | Origin |
|---|---|---|---|
| Indian Rice Grass – ARC Porter | *Achnatherum hymenoides* | Sandy, Dark brown | Wainwright – Ribstone Creek |
| Canada Milk Vetch – ARC Aspen | *Astragalus canadensis* | Sandy Parkland | Vegreville |
| Blue Grama – AITF Badlands | *Bouteloua gracilis* | Brown | Hand Hills, Hanna |
| Nodding Brome Grass – ARC Hillbilly | *Bromus porteri* | Sandy Parkland | Wainwright area |
| Tufted Hair Grass – AITF Battle Bend | *Deschampsia caespitosa* | Sandy Parkland, stabilisation of tailings sand | Wainwright area |
| Canada Wild Rye – ARC Centennial | *Elymus canadensis* | Sandy | Wainwright area |
| Awned Wheatgrass – AEC Hillcrest | *Elymus trachycaulus ssp. subsecundus* | Black Chernozem, Brown, Dark Brown | Crowsnest Pass |
| Awned Wheatgrass – ARC Metisko | *Elymus trachycaulus ssp. subsecundus* | Sandy, Brown, Dark Brown | Metiskow |
| Slender Wheatgrass – AEC Highlander | *Elymus trachycaulus ssp. trachycaulus* | Black Chernozem, Brown, Dark Brown | Rocky Mountains |
| Broad-glumed Wheatgrass – AEC Mountaineer | *Elymus violaceus* | Mountain soils, nutrient poor soils | Rocky Mountains |
| Alpine Fescue – ARC Butte | *Festuca brachyphylla* | Sandy | Near Waterton Lake National Park |
| Alpine Fescue – ARC Vista | *Festuca brachyphylla* | Black Chernozem, Brown | Rocky Mountains |

| Registered Variety | Scientific Name | Soil /Region Adaptation | Origin |
|---|---|---|---|
| Rough Fescue – AITF Bison Plains | *Festuca hallii* | Black Chernozem, Brown | Northern fescue region |
| Rocky Mountain Fescue – ARC Plateau | *Festuca saximontana* | Black Chernozem, Brown | Rocky Mountains |
| Rocky Mountain Fescue – AITF Painted Skies | *Festuca saximontana* | Sandy Parkland | Wainwright area |
| June Grass – ARC Mountain View | *Koeleria macrantha* | Black Chernozem, Brown | Crowsnest Pass |
| June Grass – ARC Prairie | *Koeleria macrantha* | Black Chernozem, Brown, sandy | Crowsnest Pass |
| Hairy Wild Rye – AITF Cascade | *Leymus innovatus* | Mountains/Upper Foothills | Jasper/Hinton |
| Green Needle Grass – ARC Grouse | *Nassella viridula* | Black Chernozem, Brown | Wainwright area |
| Alpine Bluegrass – AEC Glacier | *Poa alpina* | Black Chernozem, Brown, Dark Brown | Lower elevation in the Rocky Mountains |
| Alpine Bluegrass – AEC Blueridge | *Poa alpina* | Black Chernozem, Brown, Dark Brown | Rocky Mountains |
| Spike Trisetum – ARC Sentinel | *Trisetum spicatum* | Black Chernozem, Brown, Dark Brown | Rocky Mountains |

## APPENDIX 7 Literature Review

### A.7.1. Market Assessments

#### A.7.1.1. Western Canada

Woosaree (2000) conducted a comprehensive market assessment of the native plant industry to provide the following information:

- seed sources,
- current market demand and future production of native plant materials,
- geographical areas where the plant materials are used,
- market value of the industry,
- original genetic source of native plant materials., and.
- obstacles affecting the industry.

Findings relevant to the SANSC survey were:

6% of the respondents have been producing native plant materials for more than 25 years.

Thirty two percent of the seed source originates from Alberta, 24% from British Columbia, 12% from Saskatchewan, 10% from Manitoba, 19% from the United States and about 3% from other places.

63% of the respondents obtained their plant materials within the Grassland, Parkland and Foothills natural region.

Approximately 57 species of grasses, 14 wetland species, 103 forbs species and 73 species of woody plants were produced in 1998 and 1999.

Most respondents showed no preference for type of plant material, whether a cultivar, ecovar or wild harvested seeds.

Sixty nine percent of the respondents were aware of the original genetic source of materials purchased. Thirty one percent did not have any information of the original genetic source of their plant material.

Three quarters of the respondents received information such as seed germination, purity, and source of seed from the producer.

The NPSS conducted a market assessment to determine the current state of the native plant materials industry in western Canada and the northern United States (Neufeld, 2010). The author identified positive and negative findings from the 133 survey responses:

- Positive
    - There has been a recent influx in the number of people who deal with native plant materials.

    - Currently, there is a demand for native plant materials, and an indication that demand will rise.
    - Compared to previous survey results, the industry is generally growing and improving.
- Negative
    - There is a disconnect between users and providers of native plant materials.
    - Users are not satisfied with the selection of native species available to them.
    - Research on various aspects of native plant materials is still lacking.
    - Most providers of native plant materials only operate on a part-time basis.

Other relevant findings included (Neufeld, 2010):

- Most respondents had been in the industry for less than 5 years.
- The top two services provided to the industry were Grow, contracting/selling native plant material, followed by Harvesting as a seed source for your own business.
- In 2009, seed production from cultivation totalled 109,144 kg (n=20) and 2,005 kg from wild harvesting (n=19).
- 21% of respondents sold all their seed in a year; those who did not averaged 32% carryover.
- An average of 63% of sales were to Alberta (n=32).
- 41% of producers selected the species based on spec (believed there was a market).
- 87% of respondents provided common name and 93% provided scientific name of the species they sell. 70% provided the geographic source.
- Respondents provided extensive lists of obstacles to expansion of their business as well as some solutions.

In 2024, the NPSS updated the market assessment (Neufeld, 2024). The survey had responses from 56 out of 71 known native plant material providers and 512 users of native plant materials. Key findings included:

- Changes since the last assessment included
    - A greater diversity and availability of native species than in the past,
    - An anticipated increase of native plant material use/purchases in the near future,
    - A relatively young user group, which may drive long-term demand, and
    - Slow, steady capacity building by providers of native plant materials.

- Ongoing challenges were noted
    - Despite new species becoming available, users are still not satisfied with the selection of native species available,
    - There is somewhat of a disconnect between users and providers of native plant materials. Also, users may not understand the limitations of native plant materials providers, and
    - Many providers of native plant materials only operate on a part-time basis for various reasons.
- Most respondents had been in business for less than 10 years.
- Most respondents were involved in harvesting native seed or growing /contracting/selling native seed.
- Almost 65% of respondents had no difficulty in finding buyers for their seed, yet 75% did not sell all their seed in a typical year. Respondents provided a variety of reasons for the shortfall.
- 58% of sales were made within 100 km of the respondent's location.
- Alberta was the most common sales destination, followed by Manitoba.
- Most respondents (34%) grow seed on speculation of market.
- 82% of grower/producer respondents provided the scientific name and common names of species, while 63% provided geographic source information; these three were also indicated by users as the information require or wish they got
- 46% of respondents indicated wild harvesting is an acceptable source of seed.
- Most users (94%) indicated they buy seed or plants, 77% spend less than $500 in a year, 40% have difficulty in finding suppliers, and 43% have to us more than one supplier to fill their seed orders.
- Most users indicated their use of native seed would increase by 15% or more in 2025 (45%).
- 60% of respondents bought seed from Alberta.
- The primary driver for use of native seed was a desire to replicate the natural community (83%), followed by increasing diversity (80%); only 8% of respondents indicated regulatory requirements as a driver.
- Respondents were evenly split on their satisfaction with the selection of native species available.
- 92% of users do not require seed to be tested at a lab and only 17% knew where they could get seed tested.

### A.7.1.2. United States

White et al. (2017) reported on a study to determine what species approximately 1,300 vendors in the US had available. They obtained 601 vendor lists containing 16,584 unique species and 109,572 species in total. The unique species list represented only 23% of the native species found in the USDA Plants database[9]. Thirty-two percent of vendors did not have websites.

The Nature Conservancy (2022) surveyed seed users in Wyoming, because "understanding the current native seed market and communicating with stakeholders is a necessary first step toward addressing the needs of restoration, reclamation and rehabilitation efforts across the state." Key survey results were:

- Few organizations had rules or guidelines dictating that the native plant seed had to be "local" or have originated within a certain distance of the project site;
- Most major seed distributors obtain seed from across the western US or sell cultivars of native seed; and
- Almost half of the desired species listed by respondents were forbs.

### A.7.1.3. Australia

Hancock et al. (2020) conducted a survey in 2017 of Australian seed collectors / growers / sellers / suppliers, purchasers / users / distributors, and other interested parties to gather perspectives on the native seed industry. Key findings included:

- Just over 50% of respondents worked in very small organisations with almost one-third being sole traders (part-time 15%, full-time 14%) and a further 21% associated with businesses that employ <5 staff.
- Respondents ranked the top 5 issues for the industry as:
    - Future demand for seed will be difficult to meet from wild harvest;
    - The market is unwilling to pay for the true cost of seed collection/seed production;
    - Demand for seed is inconsistent &/or unpredictable;
    - There is a lack of seed available from a broad range of species; and
    - Seed orders are made at too short notice.
- Tree and shrub seed collection and sales by volume were higher than grasses and non-woody wildflowers.
- Slightly more seed was pre-ordered vs. being collected or purchased opportunistically. The authors suggested that the seed being collected or produced opportunistically was "species that are less commonly used in restoration and so less likely to be candidates for pre-ordering."

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[9] See https://plants.usda.gov/

- Some 60% of Seed Collectors often received species-list requests for less than 20 species while Seed Purchasers typically purchase in the <10, <20 and <50 species categories with a very small percentage from this latter Group purchasing <100 species. The authors noted "the data suggest that very few restoration programs focus on 'whole community' (i.e. species-rich) restoration."
- Most grass and non-woody wildflower seed is purchased from locations between <50 km and <500 km from the revegetation site.
- More than 80% of respondents felt there was a need to form a representative industry group that develops industry best practice protocols or standards for issues such as: seed collection, seed storage, seed testing, seed labelling and buying practices.

#### A.7.1.4. Europe

De Vitis et al. (2017) characterized the native seed production sector in Europe based on direct contacts and a survey, which included 100 native seed producers. Key findings were:

- The European native seed industry consists primarily of small to medium enterprises;
- Native seed users purchase annually an average of 3,600 kg of seed with an average expenditure of €17,600;
- The industry (suppliers and consumers) favours development of seed zones and would participate in a European network for knowledge sharing;
- Most businesses were small, employing less than 4 workers.

### A.7.2. Market Development

#### A.7.2.1. Alberta

In 2016 and 2017, InnoTech Alberta evaluated opportunities to further develop its native species program. Small et al. (2016) reported on workshops to:

1. To bring together government, industry, and research centres to discuss the role InnoTech Alberta should play to enhance the successful development and deployment of native species for reclamation and remediation.
2. To facilitate refocusing of the InnoTech Alberta Native Species Research Program to better serve the native plants industry in a collaborative capacity.

Key findings included:

There are several drivers setting the stage for greater native plant usage.

There are significant opportunities for Aboriginal communities to get involved in native species work, from wild harvest collection to monitoring to growing stock.

Rare species production and deployment (especially for grasslands) requires work. They have different needs than common plants.

Forbs and cryptograms are important for developing biodiversity and both have a high degree of R&D need.

Growers need protocols that help provide scientific background on what to grow and how to manage invasive species.

Clients need more information to develop proper order specs.

We need more how to information to de-risk the use of native plants by increasing likelihood of success.

Need to develop and maintain a catalogue of standard native species mixes used by government agencies (and others if possible).[10]

Explore the notion of a provincial InnoTech Vegetation Cooperative, along the lines of the Oil Sands Vegetation Cooperative.

There is a sense that the focus on environmental outcomes, rather than prescriptive rules, will help generate increasing interest in, and use of, native species.

Training of wild harvest collectors is required. This is highly specialized work.

There is a need for a facilitator organization who can connect native plants practitioners.

There isn't a listing for who works on Native Plants in Alberta. That would be a really good first step!

There is a need to integrate the knowledge between sectors (especially between government and industry).

There are several communication vehicles that should be explored as a means of maximizing the number of people who have access to native plant knowledge.

Small et al. (2017) reported on a workshop to:

1. Bring users together to discuss needs and concerns related to availability and use of native seed varieties in Alberta; and
2. Explore development of a consortium focused on ensuring users have access to local ecological varieties of seed for revegetation projects.

The key learnings from the workshop included:

1. There is definite interest in, and demand for, locally-adapted native seed for reclamation and restoration projects. There is a need to better define/explain what locally-adapted means in terms of seed sourcing.
2. An organized and properly funded partnership is required to oversee the functions necessary to increase availability of locally-adapted native seed.

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[10] See Powter et al. (2019).

3. Cost to participate in the partnership must be reasonable and must be flexible to recognize the variety, interests and size of potential participants.
4. The key hurdle for the partnership to overcome is production (availability) of locally-adapted native seed.
5. Additional partnership functions are: development of new breeder seed species; increased knowledge sharing to assist growers, vendors and users; and, R&D to confirm the success of native species use.
6. Seed growers and distributors will require some form of price guarantee and/or insurance to offset risk of the long timeline to a marketable crop.

#### A.7.2.2. British Columbia

Keefer Ecological Services Ltd. (2021) has been working with the Blueberry River First Nation (BRFN) to develop a potential business opportunity producing native seeds through seeking input from both BRFN leadership and community members, analysing the market, diversifying business options and looking at financial projections for the first three years of startup. Surveys found "a market for a native seed nursery in the northeast of BC and … strong support amongst BRFN members for the new business." Results of the financial analysis showed start-up costs could be around $50k and the enterprise would not produce revenue until Year 3.

#### A.7.2.3. Northwest Territories

A project began in 2005 to explore developing a commercial source for native seed for use in reclamation programs (Trimble, 2005, 2018). The project's two main objectives were:

1. The collection, testing, and development of technology for propagating native plant species that would be suitable for use in reclamation and revegetation in the NWT.
2. The eventual commercial release of native seed varieties appropriate for the biophysical regions of the NWT and Canada's north.

#### A.7.2.4. United States

Jones and Buttolph (2012) described market opportunities for native seed wild harvesting in the Pacific Northwest. The authors noted that "… ecologists … realize the importance of using locally sourced seeds that are genetically adapted to local conditions. This fact provides an advantage for local, small producers that can guarantee and describe local seed provenience over those companies unable to show where their seeds are from."

Gewin (2024) stated that native plant harvesting takes significant investment and time – "the kind of business ready made for investors with deep pockets. Private equity firms have been moving in, buying up independent seed growers while touting their arrival as a lifeline to an increasingly crucial industry. But the consolidation could instead hinder the success of future restoration efforts while potentially driving some seed growers out of business." For example, in

2023 “Heartwood Partners purchased Native Seed Group[11], a collection of the 12 top US native seed producers. It’s the biggest player in the field with 1,142 native grass, shrub and wildflower species.”

Peppin et al. (2010) conducted a demand survey and a supply survey for the Colorado Plateau region in the western US. Key findings included:

- Organization policy and availability of native seed were the most important factors influencing the purchase of native seed.
- Most respondents’ organizations or agencies currently required the use of certified native seed, and the remaining organizations were reported to be planning to require them in the next five years.
- An overwhelming majority of buyers indicated that their organization was concerned about the genetic source of native seed; yet 41% of respondents used non-native seeds in restoration efforts.
- Lack of availability was the primary limiting factor preventing buying local seeds and availability along with the cost of seed were the greatest obstacles to overcome to initiate a successful native plant material market.
- From the supply perspective, the lack of consistent and reliable demand, and knowledge of native plant production were the most significant limitations to supplying a native plant material market.

A 2004 study by the members of the Nevada Wildland Seed Producers Association assessed the feasibility of a business cooperative of Nevada native plant/seed producers to grow, process, package, and market native Nevada plants, grasses, and forbs (Cowie and Curtis, 2007a). The study found that “only a small percentage of native plants and seeds purchased in Nevada are grown/started in Nevada, although survey respondents did express a willingness to pay a premium for native plant and seed products certified as ‘Nevada Grown.’ It was also found that respondents are influenced by the quality of native plant and seed products and the service they receive from their vendors, in addition to the price of the product.” Price and quality were the factors determining buyer purchases (Cowee and Curtis, 2007a). The authors also surveyed homeowners and found that the key factors influencing their use of native plants were price, quality, selection and supplier location (Cowee and Curtis, 2007b).

Mock et al. (n.d.) used a model to assess the economic returns for producers and buyers in Wyoming’s native seed industry. Among other findings, they noted that “Implementing forward contracting and levelling out demand would increase the proportion of total market profits going to producers” and “Maintaining the producers’ desire to stay in the market may help secure steady supplies.”

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[11] See https://nativeseedgroup.com/

Greenstein et al. (2024) reported the results of a survey and interviews of 43 individuals, representing organizations from diverse perspectives: state and federal agencies, non-profits, botanists, foresters, farmers, and anyone with an interest in native plant production. The survey and report focus primarily on Southcentral Alaska. Key findings include:

- 85% of respondents said that they would like to be involved or are already involved in the Alaska Native Plants Program, and identified "Networking, partnerships, communication" and "Education and outreach, sharing ideas and information" as the main reasons for wanting to be involved.
- When asked what services they wanted from the Alaska Native Plants Program, they noted, among others:
    - Create and host a market for the buying and selling of native plants;
    - Clarify funding mechanisms and pathways to reduce barriers to implementation;
    - Host a collective working group and encourage inclusion and participation with diverse groups and stakeholders; and
    - Create a one-stop shop website that hosts a central repository for data and keep it updated, including:
        - Species-specific data;
        - Provide case studies of restoration/seed saving/propagation in Alaska and similar high-latitude regions;
        - Provide best management practices for all aspects of plant work: collection, processing, storage, propagation, grow out, outplanting, monitoring, etc.;
        - How-to guide for responsible harvest and obtaining permits to collect on lands under various ownerships; and
        - Provide a platform for communication and knowledge sharing.
- Slightly more respondents reported needing graminoids, but the responses were generally evenly split amongst graminoids, forbs, shrubs and trees. Seed was the dominant plant material respondents wanted.
- Future demand was expected to increase.
- Out of 22 responses, half indicated they did not know what quantities they need, and most were unsure, providing a rough estimate and often not including specific species.
- Nitrogen-fixing forbs and wetland sedges were the most cited species requested.
- Wild harvesting and purchase from retailers (Distributors in the SANSC survey) were the main sources of native plant materials.

- Most respondents reported not being willing to spend more for genetically appropriate, local plants and seeds (as opposed to out-of-state seed mixes, or nonnative nursery plants), but a similar number were not sure.
- When asked about policy options for native plant material requirements or related issues, respondents noted:
    - Implementing or developing new regulations, and/or enforcing existing regulations;
    - Requesting plant materials a minimum of 1 to 2 years in advance can help stabilize the market and help growers know what to produce; and
    - More support either at the local level or state level, and better communication between project managers up the chain and with decision makers.

Based on the survey results and a literature review, Greenstein (2024) discussed factors involved in starting a native plant business in Alaska, and noted that "to date, there is not adequate economic data association with native plant production and sales to know for certain the costs and profits of a native plant business. It will likely be necessary to operate a plant business for a few years, carefully track expenses, then adjust sale prices accordingly." Greenstein also discussed the issue of scalability in terms of nurseries (Figure 29) and seed collection (Figure 30), and the differences between US federal grants, federal cooperative agreements and federal contracts as potential sources of funding.

| Scale Considerations | Small | Medium | Large |
|---|---|---|---|
| Geographic scale | <1 acre | <1 acre - a few acres | >5 acres |
| Time scale | 1-2 year plants (grow and sell in single season, or over winter once) | 1-5 year plants | 1-5+ year plants |
| Infrastructure | -Potting shed<br>-Outdoor grow space<br>-Irrigation | -High tunnel<br>-Low tunnel<br>-Caterpillar tunnel<br>-Greenhouse | -Fields for seed multiplication<br>-Tree or shrub nursery |
| Tools | -Hand tools | -Small farming equipment | -Heavy equipment |
| Taxonomic groups | Graminoids, forbs | Graminoids, forbs, shrubs, trees | Graminoids, shrubs, trees (less emphasis on forbs) |
| Material types | Plugs, pots, flats | Plugs, pots, flats, bareroot trees and shrubs | -Seed production<br>-Mature trees and shrubs |
| Target market | -Home gardeners<br>-Landscaping companies<br>-Local or state restoration projects | -Local, state, or federal restoration projects | -Home owners/Landscape contractors that need mature trees for privacy<br>-Seed through brokerage*<br>-State (particularly DOT) and federal agencies |

*At present, large seed producers are part of the Alaska Seed Growers Association and use Alaska Mill and Feed as a brokerage service.

Figure 29. Scalability of container and field nurseries. From Greenstein (2024).

| Scale Considerations | Small | Medium | Large |
|---|---|---|---|
| Geographic scale | -Local<br>-Opportunistic | -Regional<br>-Tailor collection locations to meet demand | -Statewide |
| Time scale | August - September | July - October | July - October |
| Infrastructure | None | None | None |
| Tools | -Hand tools: shears, berry pickers, buckets, paper or cloth bags | -Weed whacker modified for seed collection<br>-Tree seed may require felling or climbing | -Heavy equipment (e.g., combine) and truck/trailer to transport<br>-Seed cleaning equipment |
| Taxonomic groups | Graminoids, forbs, shrubs | Graminoids, forbs, shrubs, trees | Graminoids, forbs, shrubs, trees |
| Material types | -Ounces of seed (<3000 seed per collection)<br>-Small quantities of diverse species | -Ounces to pounds of seed (3000-10,000 seed per collection) | -Pounds to hundreds of pounds of seed |
| Target market | Seed packets sold to individuals or retailers | Contract with land managers to collect from target locations and target species | -Contract with land managers<br>-Sell to growers for seed multiplication |

Figure 30. Scalability of seed collections.
From Greenstein (2024).

### A.7.2.5. Australia

Shehadeh (2021) proposed that "through coordination with [Australian] state minerals councils and resources regulators, some key organisations could be encouraged to pilot a procurement auction for seed through a centralised marketplace for a given ecological region." The author noted that "A transparent market could not only broaden the economic realisation of seed's role as an ecosystem service but also incentivise sellers to demonstrate sound collection conventions and proper communication of seed provenance." The author provided a series of short- and medium-term recommendations for developing a seed market strategy:

1. Pilot market mechanism for native seed transactions;
2. Promote the treatment of seed as an ecosystem service to engage passive landholders and activate latent seed and land resources;
3. Develop a supply and use model to establish the ecosystem services accounts for the sector;
4. Explore the idea of developing a seed leasing system;
5. Develop a strategic seed reserve policy and program for stochastic events;
6. Provide fee-for-service contracts to Botanic Gardens to provide propagation protocols for commercial seed growers;
7. Improve the network of existing resources with a view to understanding gaps;

8. Develop seed warehouses to match with the strategic seed reserve system ensure adequacy of seed for rehabilitation of degraded lands;
9. Develop seed zones; and
10. Identify an organisational type to provide strategic oversight and research for the advancement of the native seed sector.

Gallagher (2024) recommended "increasing financial support to expand seed supply systems, particularly for small-scale suppliers, and expanding seed production areas, such as 'seed orchards' … to bring more diverse and difficult-to-store seed on the market."

Dodds et al. (2002) proposed a Framework for Effective Seed Supply for the Corangamite Catchment Management region south-west of Melbourne, Victoria. The authors made two recommendations:

1. The formalisation of a Native Seed Supply Network, comprising of two, complementary components – a Revegetation Network and a Supply Network,
2. The facilitated sharing of supply & demand information relating to native seed throughout this network.

### A.7.3. Market Scale

#### A.7.3.1. Alberta

Woosaree (2000) found that in 1998, 299,450 kg of grass seeds were produced, and in 1999 seed production increased up to 387,425 kg.

Alberta Transportation and Economic Corridors tracks construction prices for highway projects, including information on drill seeding, broadcast seeding and hydroseeding (Bruce Blue, pers. comm.) The documentation does not specify whether seeding is of native species or agronomics so the volume estimates provided should be used with care. Note that the Alberta Transportation and Economic Corridors specifications for seeding with native mixes state "the Consultant shall perform a vegetation assessment of the right-of-way to determine the presence of native plant communities, and to determine the limits for reseeding with either native seed mixture or agronomic seed mixtures. Vegetation characteristics on adjacent properties shall be considered when determining whether to use native or agronomic seed mixtures" (Alberta Transportation and Economic Corridors, 2023).

Table 9. Alberta Transportation and Economic Corridors Southern Region seeding summary. Seed volume based on 30 kg/ha broadcast or 15 kg/ha drill seed.

| Year | Number of Projects | Area Seeded (ha) | Seed Volume (kg) |
|---|---|---|---|
| 2024 | 2 (broadcast) | 0.88 | 26.4 |
| 2023 | 2 (drill) | 23.54 | 353.1 |
| 2022 | 1 (broadcast) | 3.2 | 96 |

| Year | Number of Projects | Area Seeded (ha) | Seed Volume (kg) |
|---|---|---|---|
| 2021 | 5 (broadcast) | 26.91 | 807.3 |
| 2020 | 1 (broadcast) | 1.65 | 49.5 |
| 2019 | 1 (drill)<br>2 (broadcast) | 11 (drill)<br>3 (broadcast) | 255 |
| 2018 | 2 (drill)<br>1 (broadcast) | 19 (drill)<br>2 (broadcast) | 345 |
| | | TOTAL | 1,932.3 |

Hydroseeding was also done on some projects, but no seeding rate information was available: 2024 – 4.22 ha; 2023 – 29.46 ha; 2019 – 3 ha.

#### A.7.3.2. United States

Uyeda (2024) stated that the US Bureau of Land Management "estimates it needs 1 billion pounds of native seed for restoration efforts spanning 117 million acres of BLM land alone." In 2020, the BLM bought over 1.5 million pounds of seed, mostly grasses (Grueskin, 2023). Similarly, the National Academies of Sciences, Engineering, and Medicine (2023) noted that "because more than half of land in the western US is under federal land management, federal seed purchases will have a have a major influence on the native seed industry."

"Demand for native seeds in the US Intermountain West be divided into four categories: (1) government emergency response to wildfire, (2) government demand for seeds for nonemergency purposes such as wildlife habitat, highway seedings, etc., (3) participation of private landowners in government programs that encourage the use of native species for conservation benefits, and (4) corporate demand for native seeds to fulfill government mandates for rehabilitation of disturbed lands (e.g., reclamation of minelands and oil/gas well sites)" (Jones, 2019).

Camhi et al. (2019) examined the challenge of developing native seed supply for BLM land holdings in the Colorado Plateau, USA. They found that "on the demand side of the market, native seed requirements are linked to events that trigger the need for restoration, such as wildfires, which are highly variable. The variability of demand is moderated somewhat by fire management and seed acquisition policies but remains high. Acquisitions of native seeds are typically smaller in quantity and more variable than acquisitions of non-native seeds."

The Nature Conservancy (2022) survey of seed users noted that practitioners in Wyoming spend approximately US$3.9 million on reseeding efforts annually and native seeds make up most seed purchased.

Gewin (2024) described one project to revegetate the reservoirs behind four hydroelectric dams on the Klamath River in Oregon after they were drained. The project required roughly 19 billion pure live seeds to sow the site twice (just in case the first time fails). Since native seed cost

roughly US$50 per pound and 19 billion seeds weigh in the tens of thousands of pounds, the project costs would be in the millions of dollars.

Henes et al. (2017) classified market scale for forbs in the US by purpose and volume as Revegetation (100,000 pounds plus), Special Use (10,000 pounds or less), and Niche Species (1,000 pounds or less), and noted that Special Use and Niche Species are "speculative markets".

#### A.7.3.3. Australia

In Australia, the mining industry is the biggest native seed purchaser and thus can have a significant effect on the market (Hancock et al., 2020; Shehadeh, 2021). Hancock et al. (2020) noted that "Several high-profile public-private restoration projects comprised of multiple partner organisations/ agencies with large landscape-scale and even cross-jurisdictional restoration goals have emerged in recent decades … [which] represent potentially large users of native seed." In addition, they noted that ". Increasing interest by some state jurisdictions to allow 'active restoration' (i.e. not natural regeneration) to be included or recognised in offset mechanisms to increase biodiversity gains at stewardship and offset sites, may also increase the demand for native seed."

#### A.7.3.4. Europe

NASSTEC (2018) noted that "the European native seed market has remained largely underdeveloped, mainly due to the existence of only a few small-scale operations that tend to operate independently."

#### A.7.3.5. International

Credence Research (2024) pegged the global Native Grass Seeds Market is valued at US$9.8B as of 2024, fuelled by "a growing emphasis on ecological restoration projects and sustainable land management practices … and the increasing adoption of native grasses in commercial landscaping and erosion control applications." North America dominates the Native Grass Seeds Market, holding the largest market share at approximately 45%.

Precedence Research (2024) stated the "global native grass seeds market size is calculated at US$11.78 billion in 2024, grow to US$12.79 billion in 2025 and is predicted to hit around US$26.81 billion by 2034. They also noted that "The U.S. native grass seeds market size is evaluated at US$4.06 billion in 2024 and is projected to be worth around US$9.41 billion by 2034."

### A.7.4. Market Drivers

#### A.7.4.1. General

Woosaree (2000) found that among the reasons for using native plants, 21% of survey respondents indicated that native plants performed better than introduced species, 24% indicated changing regulations and another 24% said to increase biodiversity. Other reasons included, aesthetic value, conservation of the natural ecosystem or less invasive when compared to forage species.

A survey of native seed and plant users in the eastern US found respondents expressed an overwhelming preference for local ecotypes (74%), and almost no interest in cultivars (0.3%) (Tangren and Toth, 2020).

Olwell (2017) lists extreme weather events such as wildfires, hurricanes, and flooding as key drivers of the native seed market in the US. She noted that "our nation's seed resources are in need of the same kind of forward-thinking management we demand for other natural resources such as timber and oil."

Kramer et al. (2019) noted that "consistent demand is necessary for native plant nurseries to offer sources" and recommended that "consumers can help drive demand by requesting information about their plant materials and then making decisions based on their survivability and ecosystem function."

Jones (2019) noted that "volumes of native grass seed production have increased with increasing demand. More species and many more plant materials are commercially available, particularly among native grasses, and more materials are becoming available that trace to drier collection sites. Overall, seed costs have declined significantly for many species, though prices continue to reflect supply and demand."

Kramer et al. (2019) noted that practitioners should consider climate change in sourcing their seed, since "in this era of rapid climate change, the 'local is best' assumption is increasingly being questioned." They noted two possible approaches:

- "predictive provenancing", which involves sourcing material from regions with climates similar to what is predicted for the planting site in the future; and
- "regional admixture provenancing', which involves sourcing materials from multiple locations to increase genetic diversity and allowing natural selection to act, with better adapted plants presumably surviving and reproducing over time.

Grilz (2024) described a six-week journey across Europe as part of his Nuffield Canada Agricultural Scholarship, exploring the native seed industry and innovative habitat restoration practices. He noted that pollinator gardens, rewilding projects and green roof development can help drive a native species market.

#### A.7.4.2. Regulatory Requirements

Powter et al. (2018) identified several seed mixes as "required" by various government agencies (e.g., Alberta Transportation and Economic Corridors, City of Calgary, City of Lethbridge, Town of Canmore, and the Eastern Irrigation District). Required mixes for use in National Parks projects were also listed. The City of Medicine Hat also has a required natural seed mix (City of Medicine Hat, 2024). Seed mixes were also identified in government-sanctioned reports (e.g., the Grassland Restoration Forum's Natural Sub-region Recovery Strategies[12]).

[12] See https://grasslandrestorationforum.ca/research-technical-reports/

The wellsite reclamation criteria for native grasslands (Grassland Criteria; Environment and Sustainable Resource Development, 2013) defines native grasslands as "lands that are permanently grassed that include a native component. Grasslands may be native or modified native." The Grassland Criteria states "there is a greater emphasis on native grassland vegetation as an indicator of equivalent land capability, ecosystem function and/or operability." Vegetation requirements are set for sites constructed before January 1, 1993, and for those constructed after that date, and focus on assessing the species present and a grouping according to their grazing response (decreasers, increasers and invaders). The document provides detailed methods for determining the success of reclamation, and more specifically how to determine if revegetation of native species is acceptable.

Alberta Environment and Parks (2018) – conservation and reclamation of renewable energy operations. The document noted that reclamation success will be determined based on the Grassland Criteria and "where required, use native species when seeding or planting during restoration. Operators must consult with the Department and/or local municipal authority regarding the appropriate native species to be used." The reclamation certificate application must "describe vegetation planted (e.g., seed mixes, planting densities)."

Alberta Environment and Parks (2020) – reclamation practices and criteria for powerlines. The document noted that "any proposed seed mixes must be approved by the landowner and/or Public Lands Officer prior to use."

The Alberta Guide to Wetland Construction in Stormwater Management Facilities (Government of Alberta, 2018) provides guidance on suitable native species for revegetation of the wet meadow portions of a stormwater management facility and whether the species can be seeded.

### A.7.4.3. Policies, Guidelines and Programs

#### A.7.4.3.1. Alberta

The Native Plant Working Group (2000) produced the *Native Plant Revegetation Guidelines for Alberta*, which "provide a clear, consistent and integrated information package about using native plant materials throughout Alberta where the revegetation goal is to re-establish a native plant community", but noted they were not prescriptive. The objectives of the guidelines were to:

- Encourage the eventual establishment of native plant communities within native landscapes;
- Promote the use of native species in the revegetation of disturbed sites within native plant communities within the Green and White Areas of Alberta;
- Promote consistency of native plant material use among regulatory jurisdictions; and
- Acknowledge the site-specific role of non-native species to meet short-term revegetation objectives or meet accepted land use needs.

Alberta Environment (2003) released *Revegetation Using Native Plant Materials: Guidelines for Industrial Development Sites* to provide guidance regarding the use of native plant materials for revegetation. The document included guidelines on: Native Plant Selection, Selecting Plant Material for Erosion Control, Selecting Plant Material for Maintaining Biodiversity, Selecting Plant Material for Creation of Wildlife Habitat, and Seeding or Planting Rates. The Fact Sheet also provides guidance on Seed Sources:

- Always ask for preferred species first (no demand means no supply). When preferred species are unavailable, be prepared with alternate choices or to alter the revegetation plan.
- Use scientific names when ordering seed.
- Make sure that the genetic source of the seed is from a similar region, otherwise performance can be an issue.
- Ask the seed supplier for a Seed Analysis Certificate for each seed lot prior to mixing; check certificates for any weed species or other species of concern (e.g., invasive species like crested wheatgrass), timothy or smooth brome. This certificate indicates the germination potential of the seed which can vary widely and affects seeding rates.
- Order early (i.e., January) for availability.

The Alberta Energy Regulator's *Manual 007: Principles for Minimizing Surface Disturbance in Native Prairie and Parkland Areas* (Alberta Energy Regulator, 2014) states:

> Natural recovery or the use of native plant material should be used in reclamation where appropriate. Natural recovery techniques are required on all minimal-disturbance leases on public lands. Where seeding is needed to control erosion or on sites that are prone to weed and agronomic species invasion, reclamation planners should select seed mixes and plant materials that allow the eventual re-establishment of the complete range of native species found offsite. To ensure compatibility with surrounding areas, available native plant materials adapted to local growing conditions may be required.

#### A.7.4.3.2. United States

Eckert (2017) noted a management policy for the US National Park Service is to ensure "restoration … will be accomplished using organisms taken from populations as closely related genetically and ecologically as possible to park populations, preferably from similar habitats in adjacent or local areas" but that "deviations from this general policy may be made where the management goal is to increase the variability of the park gene pool to mitigate past, human-induced loss of genetic variability."

Majerus (1999) described the implementation of this policy and the collaboration between Yellowstone and Glacier National Parks and the USDA Natural Resources Conservation Service, Plant Materials Center in Bridger, MT, to identify native plant species from which seed can be readily collected, propagated on a large scale, and successfully reestablished on disturbed roadsides.

Ernst Seeds (n.d.) describes various US government programs available to support seeding of native species on agricultural land. Among them, the Conservation Reserve Program (CRP) permitted producers to make hay, produce seed, and graze livestock on grasslands enrolled in CRP provided the current ground cover is maintained.

#### A.7.4.3.3. International

The Society for Ecological Restoration developed the International Standards for Native Seeds in Ecological Restoration. A special issue of their journal in 2020 "presents a series of articles examining each key step in the native seed supply chain and provides a framework for the 'standards' that need to be applied to native seed batches if the native seed supply chain is to achieve the levels of reliability and transparency required" (Society for Ecological Restoration, 2020). Pedrini and Dixon (2020) elaborate on the standards, noting that "A seed batch is appropriate for restoration purposes when its genetic diversity, representative of the population of origin, is preserved, as far as practical, throughout the supply chain and deployed on a restoration site of suitable ecological conditions." This means that while "there are uses for [cultivars and ecovars] in revegetation and rehabilitation programs they are not generally acceptable within the framework of what is considered ecological restoration" (Pedrini and Dixon, 2020).

Lobb (2021) conducted a desktop review to identify, review and assess international frameworks, agreements and legislation (including noting any evaluations conducted and relevant findings) related to the native seed sector. His key findings were:

1. Indirect policy mechanisms may not be the most efficient or effective way to incentivise the sector.
2. Direct policy mechanisms can incentivise the native seed sector but careful consideration is needed to align policies and agendas across national, state and local environments, to create unconflicted and appropriate incentives for the sector.
3. Non-legislative frameworks are more easily adopted over international boundaries as they do not create adverse policy outcomes and are within the native seed sector's locus of control.
4. Community-based partnership approaches are particularly relevant for Traditional Owner communities and offer broader social benefits.

### A.7.5. Barriers

#### A.7.5.1. General

In a seed industry panel discussion of the US National Native Seed Strategy, industry members noted that "We want uniformity, you want diversity" (Henes et al., 2017).

Climate change has the potential to affect the availability and viability of native seed (Hancock et al., 2020) by "altering flowering times and/or flowering duration, changing pollination activities, impacting on the depth of seed dormancy depth, germination cues and seed longevity, and increasing seed abortion rates."

### A.7.5.2. Availability

#### A.7.5.2.1. General

Credence Research (2024) found a "limited availability of diverse native grass seed varieties. Native grasses often require specific growing conditions and localized seed strains to thrive in various geographic regions. This limitation is further exacerbated by the lack of widespread commercial cultivation of certain native species, which can lead to supply shortages and higher costs."

Grueskin (2023) noted that "buying locally adapted seeds in quantities needed for ecological restoration is very difficult—and often impossible."

Frost (2025) noted that "re-establishing native forbs for pollinators is currently highly resource-intensive, and limited by the lack of commercially available seed for most species."

#### A.7.5.2.2. Alberta

Participants in an Alberta workshop noted that there is frustration at the lack of availability of the native species varieties that have been developed by InnoTech Alberta. Multiple companies should have access to the breeder seed, instead of just one, to ensure the market functions properly (Small et al., 2016).

They also noted that there is no such thing as a formalized native plant industry in Alberta – there is a collection of individuals who may or may not know about each other. This makes coordination and collaboration difficult (Small et al., 2016).

#### A.7.5.2.3. Ontario

"According to Heather Schibbli, coordinator of the Network for Nature, larger restoration projects [in Ontario] need to wait for several years until plant supply is available – a single restoration project can easily empty the entire plant supply in Ontario" (Arnold, 2023).

#### A.7.5.2.4. United States

The Nature Conservancy (2022) Wyoming survey found that the lack of availability of native seeds was a major barrier.

Jones (2019) noted that "wildland seed harvest may be limited by availability, accessibility, and low annual productivity" and that "availability of native forb seed is more restricted than that of native shrub seed, as harvest of large quantities of the former has been generally unsuccessful both in the wild and in the seed field … hence, the use of exotic forbs continues to predominate."

White et al. (2017) noted that the demand for locally collected seed exceeds supply and relying solely on wild collection is not feasible.

A survey of native seed and plant users in the eastern US found commercial availability as the greatest barrier to their use of the local ecotypes they prefer (Tangren and Toth, 2020). The authors noted this was the tenth consecutive survey to document a commercial shortage.

#### A.7.5.2.5. Australia

Shehadeh (2021) noted that "Grasses ... typically comprise the core of restoration and revegetation seedings, while other functional groups, especially native forbs, are under-represented due to limited availability and/or high seed costs.

Only 10%, or 2,992 species, of Australia's plants can be bought as seed, and of that most was trees or shrubs (Gallagher, 2024).

In a survey of the industry in the Corangamite Catchment Management region south-west of Melbourne, Victoria, Dodds et al. (2002) found that "60% of participants were dissatisfied with the range of species available for regeneration as seed."

### A.7.5.3. Species Information

Alberta workshop participants noted that Producers / Distributors can add significant value to clients by providing information in addition to the commodity (seeds or plants); the problem is they often don't get asked, or there are intermediaries between the supplier and user (Small et al., 2016).

Kramer et al. (2019) noted that "information on adaptation, genetic diversity, and ecosystem function is lacking for [most] native plant sources in the marketplace, particularly for cultivars. Native plant breeders and sellers should work together to ensure this information is available and consumers should ask for this information to help drive demand."

"Significant knowledge gaps remain about how best to grow native plants – it simply was never a priority of research, and nurseries rely on a thin literature, mentorship networks and trial-and-error" (Arnold, 2023).

A major issue for the plant material developer is choosing which species to research and how much emphasis to place on each because candidate native species are numerous. Jones (2019) suggested an approach to address this problem: "consider (1) which species have the greatest economic impact or potential economic impact, (2) which have problem issues in either seed production or restoration practice that, if corrected, could generate economic impact, and (3) whether the developer has the tools available that could correct these issues."

In a European study, Ladouceur et al. (2018) found that "seed farming of native plant species is crucial to meet restoration goals but may be stymied by the disconnection of academic research in seed science and the lack of effective policies that regulate native seed production/supply. [They] identified 1,122 plant species important for European grasslands of conservation concern and found that only 32% have both fundamental seed germination data available and can be purchased as seed." They proposed "(1) substantial expansion of research and development on native seed quality, viability, and production; (2) open-source knowledge transfer between sectors; and (3) creation of supportive policy intended to stimulate demand for biodiverse seed."

### A.7.5.4. Plant Source

Shehadeh (2021) noted that one of the "persistent challenges in the market for native seed lies in sourcing seed which matches the provenance requirements of the restoration site." And seed is

hard to find, “especially if genetic material must be sourced from specific regions and meet other requirements” (Arnold, 2023).

A survey of native seed and plant users in the eastern US found that respondents who prefer local ecotype seeds have to buy outside what they consider to be the “local” area (Tangren and Toth, 2020). The average distance between respondents and their native seed vendors is 418 miles. The second-most popular native seed vendor has an average customer distance of 805 miles.

#### A.7.5.5. Suitability

Kramer et al. (2019) found that “most native plant sources available in the marketplace are cultivars that are typically unsuitable for ecological restoration efforts aimed at reestablishing diverse, self-sustaining populations. However, they may be appropriate in certain planting contexts, where the primary aim is to support pollinators, wildlife, and other ecosystem functions.”

Selection in developing cultivars has “diminished genetic diversity in favour of specific desirable traits … [such as] consistent seeding dates … easier seed threshing, or different soil requirements. Whether cultivars are tolerable or not depends on the breeding process, which unfortunately is not transparent to the buyer. Conservation organizations mostly are warning against the use of cultivars (Arnold, 2023).

Jones (2019) noted that “cultivated seed production has the advantage of being able to be scaled up in proportion to demand.”

Nota et al. (2024) found that of 36 “pollinator-friendly” wildflower seed mixes commercially available in Italy, “most (83%) … contain species alien to Italy, with three of them also including invasive alien species.”

#### A.7.5.6. Price

Prices of native seeds are typically higher and more variable than prices of non-native seeds and cultivars, while the price elasticity of demand for native seeds is typically lower than for non-native seeds (Arnold, 2023; Camhi et al., 2019; Gabruch et al., n.d.; Hall et al., 2024). Mock et al. (n.d.) noted there are “extreme fluctuations in the native seed industry’s prices and quantities demanded” and “peaks and troughs vary in both breadth and depth”, so for producers the highs have to make up for the lows to be a viable business (Figure 31).

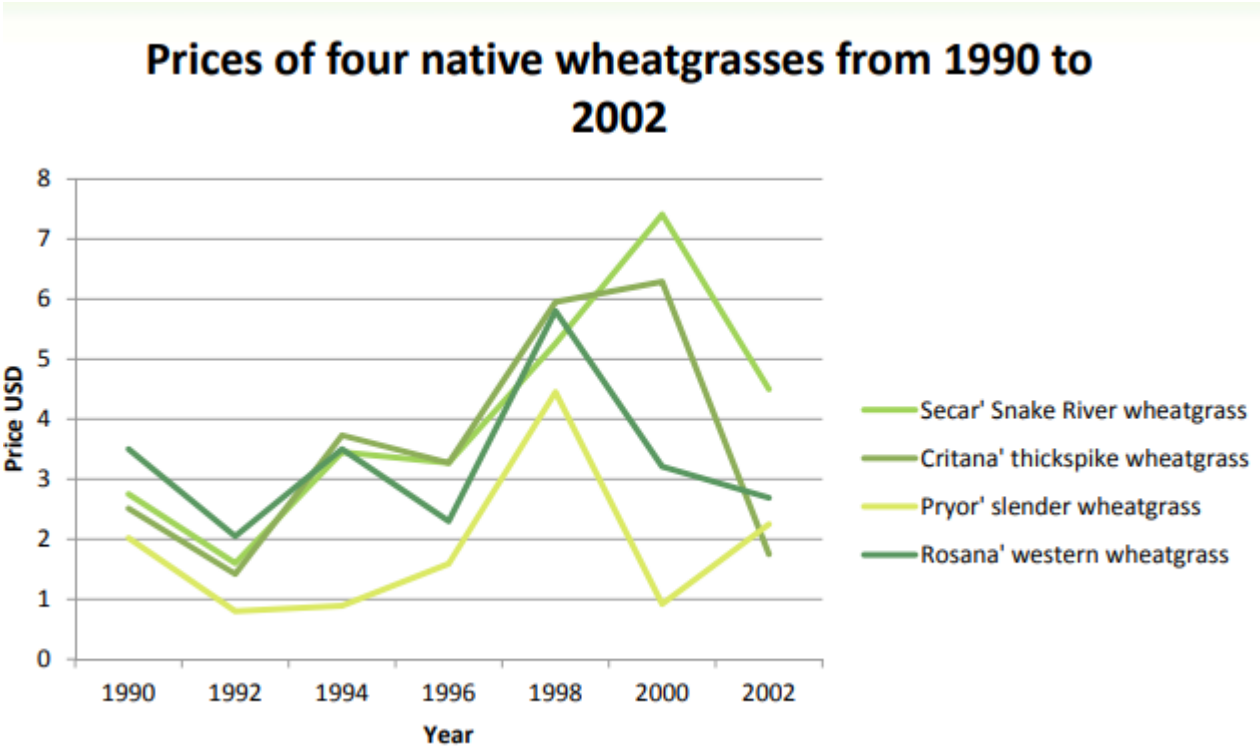


Figure 31. Prices of four native wheatgrasses from 1990 to 2002. From Mock et al. (n.d.)

Thompson (2012), reporting on a presentation by Richard McBride with Ducks Unlimited Canada, listed reasons why native seed is more expensive:

- Often more difficult to produce than tame seed;
- Relatively low germination, high dormancy;
- Light, fluffy, chaffy seed;
- Low seed yields and harvest difficulties (seed shattering);
- Specialized equipment often required (seeding and harvest);
- Limited number of experienced growers; and
- Poor production year can result in no seed

Credence Research (2024) noted "the high cost associated with the procurement and implementation of native grass seeds [is a barrier]. Native grasses often come with a higher price tag compared to non-native alternatives due to the specialized cultivation and certification processes involved."

After the Regulator Survey closed, the authors received an e-mail from a municipal Regulator who indicated that "the use of native seed here … is a bit of a contentious topic, as the seed can be very expensive for contractors to purchase and the success rates are quite low."

The Nature Conservancy (2022) Wyoming survey found that the cost of native seeds was a major barrier.

Native seed Growers/Producers don't have access to crop insurance as traditional farmers do (Gewin, 2024).

Henes et al. (2017) noted that the seed industry's ability to provide the right seed can be either impossible or prohibitively expensive.

#### A.7.5.7. Supply and Demand

Hall et al. (2024) noted that inconsistent and uncertain demand and supply is a barrier. Hirsch (2023) referred to the "asynchronous supply and demand" problem as "the frequent mismatch between restorationists in need of seeds for one specific project and "producers of native seed who want to grow at a large scale and distribute their products to as many markets as possible." Jones (2019) provided an example: "Prices may spike in response to demand stimulated by unpredictable wildfires, but prices drop when demand slows, and warehouse inventories swell. Because a seed field of a perennial native species may produce for several years, supply-demand relationships are complicated by continuing production from existing fields despite falling demand."

Some species are in excess supply while others are in excess demand (Mock et al., n.d.). The variability of demand for native seeds has discouraged development of a native seed supply industry (Camhi et al., 2019).

A survey of seed restoration suppliers in 2010 showed that the primary problem lay with the unpredictability of demand for native seeds (Camhi et al., 2019). More specifically, suppliers had little incentive to invest in the provision of seed stocks as long as demand for those stocks was uncertain." Without large contracts and commitment from industry it is challenging for local nurseries to make the multi-year investments needed to create and maintain the supply (Line, 2020). This is an even bigger problem for Wild Harvesters since they have far less control over seed availability than Growers/Producers using agricultural methods (Shehadeh, 2021). Mock et al. (n.d.) also flagged uncertainties created by rapidly changing regulatory requirements with insufficient lead time as a problem for suppliers.

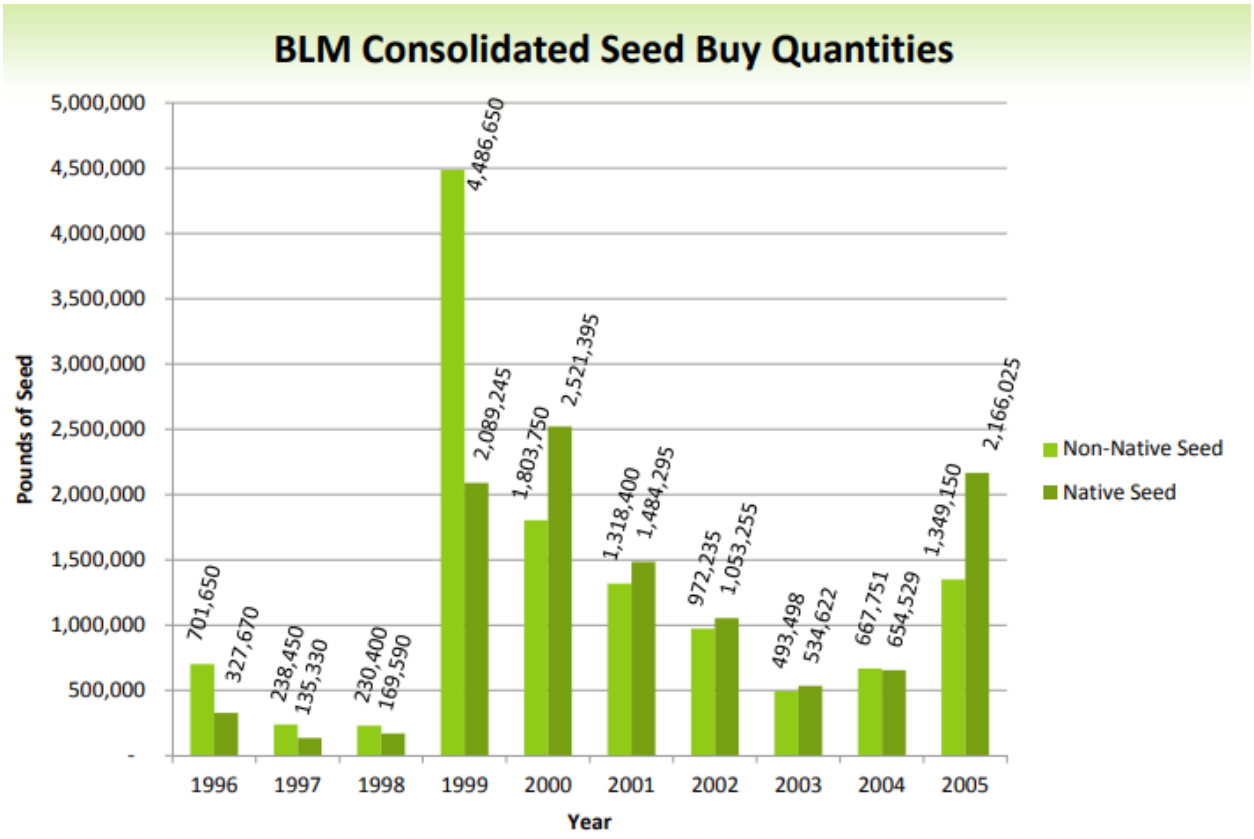


Figure 32. US BLM seed purchases from 1996 to 2005.
From Mock et al. (n.d.)

In a survey of the industry in the Corangamite Catchment Management region south-west of Melbourne, Victoria, Dodds et al. (2002) noted that "55% of participants were unable to forecast any projections for future seed demand."

### A.7.5.8. Lead Times

Tangren and Toth (2020), Shehadeh (2021) and Hall et al. (2024) noted the lead times are insufficient for seed producers. Henes et al. (2017) indicated that "matching the farming and collecting cycles to a federal budgeting world governed by political and financial and bureaucratic constraints can be impossible."

In a survey of the industry in the Corangamite Catchment Management region south-west of Melbourne, Victoria, Dodds et al. (2002) noted that "85% of the participants stated current time frames between project initiation and expected delivery are too short. Most seed suppliers agreed that there should be a minimum of 12 to 24 months between the placement of an order for seed and the expected delivery of seed."

## A.7.6. Supply Chain

McCormick et al. (2021) describe the Native Plant Materials Development Process in the United States that was originally developed by the US Department of the Interior's Bureau of Land

Management. They noted that "the process of increasing and sourcing suitable seed for restoration includes many steps that need to be addressed typically years before a restoration project is initiated. These steps of seed collection, evaluation and development, field establishment, production, certification and procurement, storage, and finally restoration, need to be considered ideally at a scale larger than individual restoration projects and with research conducted in each step."

Hirsch (2023) noted the complexity of the native seed supply chain, citing the former head of MARSB "You can't address [just] one part of the supply chain if there are roadblocks with other parts of the supply chain that stymie the whole effort ... So the challenge is to develop the supply chain in its totality."

Spearing et al. (2023) reported on a Natural Resources Canada series of surveys to scope the Canada's national seed supply chain, focused on trees and shrubs. Some relevant findings included:

- Access to excess tree seed in storage (i.e., seed banks, 25%) and/or access to seed orchards (24%) were identified as alternatives to collection form wild stands (48%).
- There was a desire for ecoregional species lists (reference or ecological plant community lists of what is considered naturally occurring.
- Labour (79%), infrastructure (48%), and market demand (40%) were factors affecting grower's capacity to produce more trees and plant; interestingly, only 15% of respondents indicated that profitability was an impediment.
- Thirty four percent of respondents had up to two years of native grass seed in storage; 22% had up to two years of other herbaceous species seed in storage.
- Reclamation/restoration respondents indicated that:
    - Half (49%) include a native species definition in their procurement contracts. Most respondents said that definition also makes reference to ecoregion, seed zone, local sourcing by distance or otherwise specified plants with genetic origin parameters.
    - Most respondents reported difficulty in forecasting their planting needs. A third were not able to forecast beyond this year, and only 8% could forecast plant material needs 3 years or longer.
    - Fifty-six percent say their organization would be willing to pay up to 25% more for genetically appropriate plants and seeds and improved traceability.
    - Only 6 native grass species are listed in Canada's federal *Seeds Act*.

### A.7.7. Improving Seed Availability/Quality

BrettYoung (n.d.(a)) provides periodic updates of seed availability using 4 classes: Sold Out – Unavailable until 2026; Limited Quantities – Place your order soon; In Stock; and Special Order Only – This item is not regularly stocked (allow 4-week turnaround).

### A.7.7.1. Seed Strategies

#### A.7.7.1.1. Ontario

Hall et al. (2024) published the Southern Ontario Seed Strategy (SOSS) with recommendations that aim to increase restoration capacity in southern Ontario and support local, regional, provincial, and national goals for biodiversity and climate resilience. The SOSS aims to scale up the availability of genetically appropriate native seed and connect and support participants in the native plant supply chain, from growing to planting, to accelerate coordinated, respectful action for local, source-identified, climate-adapted, and native seed.

The Strategy consists of five goals, with objectives and recommendations under each. For example:

> Goal 2: Increase supply and support demand for reliably available genetically appropriate native seed.
>
> > Objective 2.1: Coordinate southern Ontario long-range seed forecasting to connect supply and demand with a full diversity of species on an ecoregional basis.
> >
> > > Recommendation 2.1.2: Establish a tracking process for sales of native plant materials inclusive of both bulk and retail markets to inform reporting and statistics at a national level.

Based on consultations with partners, the top priorities for implementation included:

- Telling the story of the value of native plants through the development of an evaluation tool that will showcase their importance in relation to soil health, carbon sequestration, pollinators, cultural and social impacts, and more;
- Quantifying the contribution of native plants to the green economy, government greening initiatives, and ecosystem services, such as pollination;
- Adopting innovative approaches to enhance leadership within the sector on capacity building strategies, selecting criteria for standards, and connecting with investment strategies;
- Establishing a native seed hub to focus on supply chain gaps and opportunities, such as seed need forecasting, sector marketing capacity, education, and training; and
- Helping new growers through networking support and market development.

#### A.7.7.1.2. United States

In the United States, the Plant Conservation Alliance developed the National Seed Strategy for Rehabilitation and Restoration to foster collaboration between private, tribal, state, local, and federal partners to guide the development, availability, and use of seed needed for timely and effective restoration (USDI, Bureau of Land Management (n.d.)). In 2024, further funding for the initiative was announced, including over US$1 million in initial funding directed towards strategic planning for a National Interagency Seed and Restoration Center, which will serve as

the scientific, logistical and support centre for the nation's restoration and seed needs (USDI, Bureau of Land Management, 2024a).

The USDI, Bureau of Land Management established Seeds of Success (SOS), "a national native seed collection program, led by the BLM in partnership with a variety of federal agencies and non-federal organizations (USDI, Bureau of Land Management, 2025). SOS's mission is to collect wildland native seed for research, development, germplasm conservation, and ecosystem restoration. The long-term conservation outcome of the SOS program is to support the native plant materials development process, by which the BLM increases the quality and quantity of native plant materials available for restoring and supporting resilient ecosystems. To date, SOS has more than 27,000 native seed collections in its National Collection."

#### A.7.7.2. Seed Banks

Belansky (2019) provides an overview of the questions to ask when considering establishing a native seed bank.

White et al. (2016) surveyed 71 individuals in British Columbia in 2016 to "to investigate how native seeds are currently being used and how stakeholders foresee the operation of a provincial seed bank." Key findings included:

- The primary focus of a seed bank should be to provide seed for the revegetation of disturbed environments. The seed bank should provide high volumes of seed for the most desired species and where practical to facilitate demand related to revegetation works.
- Grass and sedges and forbs and herbs had the greatest interest. A seed bank facility should therefore not be restricted to one category of native plants, but rather supply a mix of graminoids, forbs, shrubs, and deciduous trees.
- Most survey respondents indicated they have no consistent schedule when purchasing seed and make purchases on an as needed basis and generally request seed with less than 6 months lead time.
- Establishing a set of commonly used species and focusing on their collection and storage will help to make seed available whenever it is needed, whether seed users have adequate (12 months) notice or require seed immediately.
- Respondents said the lack of availability for their desired species and lack of availability from a desired provenance were their biggest limitations. Affordability and lack of volume availability were also major limitations.
- Native seed demand will increase in the future, but barriers to using native plants must be overcome to make increased demand a reality.
- Respondents listed over 15 companies who they thought were suppliers of native seeds in BC, but 15% of respondents were not aware of any seed suppliers in BC.

- Respondents were interested in both seed analysis reports from an accredited third-party seed lab and seed certifications showing the species and origin of a seedlot.
- An online database or network could be a useful tool in connecting native plant collectors with purchasers without the large start-up and operational costs that would be associated with a physical seed bank.

Grilz (2025) described Meewasin Valley Authority's investigation of the potential to establish a native plant seedbank in Saskatoon, Saskatchewan to support prairie conservation and restoration in Western Canada. He noted that "the goal of the seedbank will be to preserve genetic diversity while enhancing ecosystem resilience and provide critical resources for restoration. Inspired by global best practices, future efforts will focus on partnerships with seed producers, landowners, and conservation groups, developing robust collection and storage protocols, and addressing regional ecological challenges."

The Southwest Seed Partnership partnered with the New Mexico Bureau of Land Management and the New Mexico Department of Game and Fish to purchase and house a 3 m x 3 m walk-in cooler to store the seed collected by the Partnership (Mullins, 2021a). The author noted that "there is often a lag time after seeds are collected but before they are needed in a production field, research, or restoration project, and appropriate processing and storage maintains seed viability and increases longevity. Not only do native seeds need to stay consistently cold after collection (~4°C), but they also need to stay dry (~30% Relative Humidity)."

The National Tree Seed Centre (NTSC) preserves the genetic diversity of Canada's forests[13].

Canada's Oil Sands Innovation Alliance's Vegetation Research Committee (previously the Oil Sands Vegetation Cooperative) was established in 2009 in northern Alberta to harvest and bank seeds of boreal tree and shrub species for use in reclamation and revegetation of oil sands disturbances (Smreciu and Gould, 2024). Their aim is two-fold:

1. To ensure a consistent, genetically diverse supply of quality seeds and propagules of native boreal species, and
2. To provide expertise and knowledge to produce quality seedlings and successful deployment on reclaimed sites.

The Yukon Native Seed Bank (YNSB) is an initiative of Yukon Seed and Restoration aimed at supporting ongoing restoration work across the Yukon and ensuring that this work is conducted with plant material of the local ecosystems that we work within, and is done in a good way (Yukon Seed & Restoration, n.d.).

The Mid-Atlantic Regional Seed Bank (MARSB) in the United States aims to increase the availability of genetically appropriate native seed across the Mid-Atlantic through targeted seed collection and active seed banking because wild, genetically appropriate native seed is the raw

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[13] See https://natural-resources.canada.ca/science-data/science-research/research-centres/ntsc-seed-collection-conservation

material needed for ecological restoration projects (MARSB, n.d.(a)). MARSB established a six-point program to develop a native plant material supply chain, which includes among others: developing a list of species needed, identifying the key species ("workhorse species") to focus on, and organizing an Online Marketplace (MARSB (n.d.(b)).

In a survey of the industry in the Corangamite Catchment Management region south-west of Melbourne, Victoria, Dodds et al. (2002) noted that "all participants agreed that a coordinated network for seed supply with at least one regional seedbank (but with preferably more than one seedbank storage facility – to minimise transport of seed) would improve current seed supply mechanisms."

#### A.7.7.3. Seed Farms and Orchards

Mullins (2021b) described the activities of the Southwest Seed Partnership to meet seed needs by working with local farmers to grow locally sourced seeds. The Institute of Applied Ecology coordinates this partnership, helping stakeholders and funders meet plant materials needs for their agency and the Southwest region. Through this funding contracts are provided to both large- and small-scale farmers to grow seeds in farm fields to increase seeds available for restoration.

A seed orchard is a place where plants of known wild origin are grown for the purpose of harvesting and distributing their seeds (Godfrey, 2023; Weber, 2022). Local native seed gardens and orchards help regenerate the surrounding landscape and create new habitat without putting continued pressure on maternal, wild populations (Weber, 2022). Once mature, these orchard spaces provide not only seed for additional restoration nearby but also provide green jobs and serve as education and community hubs – all while flourishing as restored native habitats themselves (Weber, 2022).

The World Wildlife Fund – Canada funded 10 demonstration seed orchards in Ontario in 2021 (Godfrey, 2023), including one at the University of Guelph (Casey, 2022) and one at Mohawk College in Hamilton (Mohawk College, n.d.).

In Australia, Seed Production Areas (SPA) are parcels of land planted with species for the purpose of producing seed of a broad base of genetic diversity, required for establishing healthy and viable natural populations (Greening Australia, 2023). Most SPAs are smaller than 5 hectares.

#### A.7.7.4. Seed Partnerships/Networks

Larsen et al. (2021) describe seed partnerships in the US, which "provide a venue for committed partners to share resources, knowledge, and capacity" and "are designed to increase the availability and diversity of ecologically appropriate native seed while facilitating regional native seed industries, with the ultimate goal of improving restoration success." They suggested that "a new seed partnership can get off the ground in one year with a modest amount of funding to bring partners together, decide on a partnership model, conduct needs assessments, and secure funding needed for the next phases of seed collection and production."

Baughman et al. (2022) identified "four paths to toward realizing the full potential of using native plants" in the US Intermountain west, including "build native seed partnerships to benefit restoration outcomes and local communities." Some of their comments are noted below:

> Through the formation of seed partnerships, bottlenecks within the native seed and plant material development process can be clarified and coordinated.
>
> … all [parties] involved need to shift from a reactive decision-making process to a proactive prediction-based process that allows for more successful longer-term planning.
>
> To supply locally adapted native seeds for large-scale restoration production systems requires the development of partnerships between seed collectors, researchers, farmers, nurseries, seed storage facilities, seed purchasers, and restoration ecologists.
>
> … land managers need to project the … quantities of seed they are likely to need several years in advance. Fortunately, regional native seed partnerships can provide collective resources, guidance, and confidence in planning to its member farmers and managers to meet these logistical challenges, which aids seed collection and production systems in meeting the need.

The Southwest Seed Partnership (SWSP; n.d.) in the US arose in October 2015 to establish a network for native, genetically appropriate seeds while advocating for a new industry standard. The SWSP "hopes to support the native seed industry by consolidating demand and acting as a liaison between consumers and seed producers." The Partnership prepared a five-year strategic plan with four goals and 17 objectives (Southwest Seed Partnership, 2022). The goals are:

1. Assess needs and gaps in the supply & demand chain for native seeds in the SW;
2. Expand capacity for native plant materials development;
3. Support farmers and nurseries.; and
4. Deliver research-based restoration techniques and tools.

The Montana Native Seed Network brings together public and private conservation practitioners that are working in the native seed industry (Montana Department of Natural Resources and Conservation, n.d.). Through partnerships genetically-rich eco-type seed is derived from wild plant populations and produced on a largescale at The Montana Conservation Seedling Nursery in Missoula. This seed is accessible to all partners and customers to restore and enhance ecosystems throughout Montana.

#### A.7.7.5. Contract Growing

The Native Seed Producers of Canada (NSPC; n.d.) is a working group of farmers dedicated to growing and strengthening Canada's native seed supply. The group consists of Canadian farmers who are actively producing native forb and/or grass seeds for market, working together to advance the country's native seed industry and support ecological restoration efforts.

BrettYoung (2025) also "actively participates in the seed production of native species through [a] Western Canadian grower network." Their Seed Production Guide provides information on growing a variety of native species.

Eastern Slopes Rangeland Seeds (n.d.) has provided contract growing services since 1980, with 12,000 square feet of indoor greenhouse space and another 3,000 square feet of outdoor flood irrigation beds.

ALCLA Native Plants (n.d.) offers custom growing and seed collection services.

EcoSource Native Seeds & Restoration (n.d.(a)) provides opportunities for smaller growers in the western US to participate in large seed orders by subdividing large cooperative agreements and contracts into a series of linked subcontracts for its members.

#### A.7.7.6. Seed Research and Development

InnoTech Alberta's native species research program "applies techniques to help government and industry reclaim and remediate degraded areas and turn them into functioning ecosystems using native plant materials" (InnoTech Alberta, n.d.). The earliest work in the program involved development of several native species cultivars registered with the CSGA (APPENDIX 6). InnoTech Alberta's herbarium laboratory contains thousands of samples of plant species mounts that are used for reference, education, and training.

Asselin (2025) described Agriculture and Agri-Food Canada's breeding work on adapted native forage species, and noted that "integrating native species into agroecosystems presents challenges, particularly in seed availability and adaptation. Not all seed sources are of equal quality or suited to their intended environment, creating barriers to widespread adoption."

Ducks Unlimited Canada had a program developing its own ecovars, initially for grasses, then expanding to native shrubs, flowers and forbs (Alfuth, 1999). The author described the difference between an ecovar and a cultivar as:

> "An 'ecovar' (ecological variety) is a selection that is developed with equal emphasis on maintenance of a broad genetic base and agronomic characteristics. It differs from a 'cultivar' (cultivated variety) which is rigidly selected for uniformity of agronomic characteristics. Ecovars have a broader range of genetic potential of the species retained, and will yield seed that is closer to its native origin than cultivars."

The Northern Alberta Institute of Technology's Centre for Boreal Research in Peace River operates the Boreal Forest Plant & Seed Technology Access Centre (BFPS) as part of a growing network of 60 centres across Canada. As a Technology Access Centre, the BFPS helps Canadian-based businesses get their products, processes and services market-ready by:

- Offering objective advice and specialized technical services
- Providing training related to new types of equipment and processes
- Conducting applied research to develop solutions that address company challenges.

BFPS' goal is to address present and emerging knowledge gaps in seed collection, treatment, propagation and deployment on disturbed sites (NAIT Centre for Boreal Research, n.d.).

### A.7.8. Wild Harvesting

#### A.7.8.1. General

For many species, wildland collection is the only viable option for seed supply. In the US Intermountain West, an extensive public land base offers many opportunities for wildland seed collection under permit (Jones, 2019). However, Jones (2019) noted that "as restoration needs increase, demand for restoration seeds is also increasing, but wildland supplies are stable to declining" and listed several reasons why wildland-collected seed is often in short supply which is reflected in price.

Honourable Harvesting is guided by both spiritual and ecological principles, including that "treating the land with respect and taking only what you need is paramount for being in good relationship with it. Practically, this ensures that when we collect seeds and plant material from the land we are leaving enough of the crop for plants to fulfil their roles in feeding wildlife and seeding the next generation" (Yukon Seed & Restoration, n.d.).

Seed collection should not be centralized in the hands of few – native seed collection should rather build on diversified, localized networks (Arnold, 2023).

In Australia, most wild harvesters tend to collect much of their seed in their local area so, the nearer an End User is to the home base of the Wild Harvester the easier it will be to obtain local indigenous seed from them (Shehadeh, 2021).

#### A.7.8.2. Guidance

##### A.7.8.2.1. Western Canada

The Alberta Native Plant Council produced a variety of guidelines for collection of native species:

- Plant collection guidelines for wild harvesters (Alberta Native Plant Council, 2005). In addition to specific guidance, the overall message is "it is best to collect only parts of common plants with large populations (i.e., 1,000 or more plants). Avoid collecting rare or endangered species and ensure that your harvesting will not affect any such plants that are growing nearby. The most important message is to collect in a sustainable way that doesn't reduce the health or abundance of native plants for the long-term."
- Collection by researchers, students and consultants (Alberta Native Plant Council, 2006).
- Collection for horticultural use of native plants (Alberta Native Plant Council, 2007).
- Plant rescue, defined as efforts to relocate native plants from a site where destruction of the native habitats is imminent (Alberta Native Plant Council, 2009).

Smreciu (2011) provided a detailed guide on wild harvesting, including information on regulatory requirements. The primary focus is on forested lands.

The Native Plant Society of Saskatchewan produced an introductory guide describing basic principles and practices in sustainable native seed harvesting and marketing (Hammermeister, 2000).

Morgan et al. (1995) discussed the ethics of wild harvesting and provided guidance on methods.

Rantala-Sykes (2017) developed seed collection and seed processing protocols for native species desired for revegetation, and compiled information from the literature on their storage and propagation requirements. She produced both a general guide and profiles for 60 species in the Hudson Bay Lowland, specifically the De Beers mine area.

#### A.7.8.2.2. United States

The USDI, Bureau of Land Management's Seeds of Success program produced a seed collection protocol to support contributors to the program (USDI, Bureau of Land Management, 2024b).

Davison (2003) produced a guide for native seed collection in Nevada. Chapter 10 of the Guide discusses marketing of native seed, and notes that "the marketing of native seed may be the most difficult part of the process for new seed collectors." Key steps in this process are: identify the potential consumers of the seed; identify the priority species; determine quality and quantity of seed desired; price the seed competitively based on market prices; and consistently deliver a high quality product.

The Tallgrass Prairie Center (n.d.) has produced a seed collection infographic for smaller projects. The infographic identifies best collection times for various species.

#### A.7.8.2.3. Australia

A Greener World (2022 a,b) provided guidance on wild harvesting collection practices and wild harvest population monitoring, and noted that sustainable wild collection should ensure:

- the plant populations do not decrease,
- the species survives in the long-term,
- the surroundings are not damaged, and
- and no other plants or animals are disturbed.

Australia's Florabank Guidelines (New South Wales Government, 2021) consist of 15 modules that follow seed through the supply chain.

### A.7.9. Seed Certification Programs

#### A.7.9.1. Canada

#### A.7.9.1.1. Canadian Seed Growers Association

In Canada, the seed industry has focussed primarily on agriculture rather than on native plants required for reclamation or restoration of natural habitats. However, several varieties of native grasses have been developed in western Canada and are approved and registered by the Canadian

Food Inspection Agency (CFIA) and Canadian Seed Growers Association (CSGA)[14]. These are sold as certified seeds. Native plant material that has undergone selection for specific characteristics for at least two years and is **not** sufficiently distinct, uniform or stable to be certified as a variety can be released as pre-variety germplasm and labelled as Selected Class.

As well, the CSGA has developed the Native Plant Certification Program (NPCP). They use documents and procedures like the Pedigreed Seed Program to certify the geographical origin of collections of native plant seed. Seed collected from a documented site can be certified as Source-Identified by a CSGA-recognized plant breeder or their designate and must include information regarding species' identity, associated species, and geographic features including elevation, latitude and longitude. Seed can be sold directly (G0) or undergo field multiplication for one generation (G1). To date, the Native Plant Certification Program has resulted in very little source-identified material in the Canadian seed market.

#### A.7.9.1.2. Certificate of Seed Analysis

A Certificate of Seed Analysis provides the results of tests on a seed lot conducted by a laboratory accredited by the Canadian Food Inspection Agency (Wilson et al., 2015). BrettYoung (2024) notes that the Report of Seed Analysis (seed certificate) will provide information on:

- % of pure seed (what is left when you subtract any inert material, weed seed or other crop seed from the sample);
- % of other crop;
- % of weed seed; and
- % of inert matter

### A.7.9.2. United States

The Nevada Department of Agriculture's Seed Program provides aid to seed producers and other business entities by offering regulatory support and various seed-related services. These services include seed certification for both traditional crops and restoration species, phytosanitary inspections of crops destined for export, and analytical seed testing of seed lots for identity, viability, and purity (Nevada Department of Agriculture, n.d.(a)).

The NDA's Foundation Seed Program aims to put free native species seed into the hands of producers for increase (Nevada Department of Agriculture, n.d.(b)). The Department will provide source identified seed inspections and issue the corresponding "yellow tags," which provide an extra level of assurance to seed purchasers that they are receiving what they expect.

[14] See https://seedgrowers.ca/

### A.7.10. Seed, Seed Mix and Seed Supplier Sources

Powter et al. (2018) produced an inventory of native species seed mixes used in Alberta, which included lists of individual species available from Distributors.

The Alberta Native Plant Council maintains a list of native plant suppliers and those providing other services such as Seed Testing, Native Prairie Seed Harvesting Equipment, Custom Labels, Custom Harvesting, Custom Cleaning, and Custom Seed or Plant Production (Alberta Native Plant Council, 2023).

The Edmonton Native Plant Society (n.d.(a)) maintains a list of native species vendors in the Edmonton area.

The Native Plant Society of Saskatchewan (NPSS) maintains a list of Native Plant Material and Services Suppliers (Native Plant Society of Saskatchewan, 2024).

The Xerces Society (n.d.) has an online, searchable database of native plant, seed and services companies in North America. Three Alberta suppliers are listed – ALCLA Native Plants, SeedTime.ca, and TreeTime.ca – the latter two focused on trees and shrubs.

The Alaska Plant Materials Center publishes the Directory of Alaska Native Plant Sources in response to numerous requests from the public, industry, and agencies for sources of native plant materials from Alaska (Alaska Department of Natural Resources, n.d.).

### A.7.11. Tools Supporting Sourcing, Selection and Use of Native Species

#### A.7.11.1. Seed Sourcing

Sinton and Walker (2021) indicated that "the success of a native revegetation project is dependent on the quality of the native plant materials that are used" and provided a decision tool for sourcing native plant material (Figure 33).

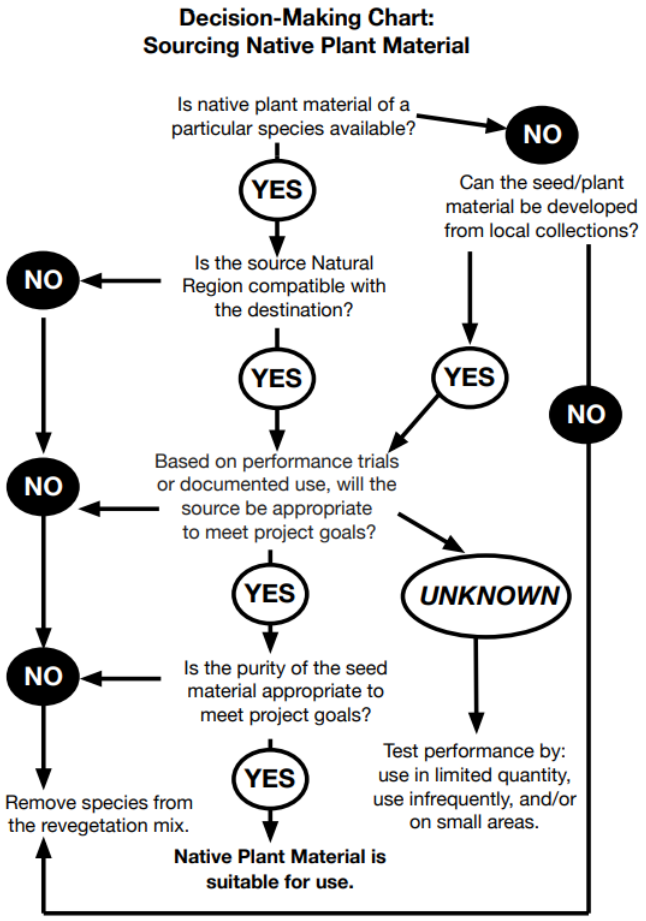


Figure 33. Decision-making chart for sourcing native plant material. From Native Plant Working Group (2000).

Seedark developed Squiirrel as a purpose-built seed collection tool and marketplace providing verifiable provenance tracking and communications between seed collectors and seed users (Seedark, n.d.). The emphasis appears to be on trees.

DLF USA Inc. (n.d.) and Quality Seeds Ltd. (n.d.) have calculators to determine the volume of seed and number of seed bags required for a given area. Their species lists include some native species.

The Seed Finder Tool (USDA Conservation Reserve Program, n.d.), is being developed in partnership with Conservation Biology Institute (CBI), with primary funding provided by the USDA Farm Service Agency. There are currently three components of the Tool: Vendor Match, Plant Finder, and Vendor Browse focused on six states in the northcentral and northwestern part of the country.

Michigan State University (n.d.) developed a Plant Search Tool to select native plants to grow based on region, soil moisture, amount of sunlight and its attractiveness to pollinators and natural enemies.

Silva et al., (2025) reported on development of Climate-Oriented Seed-Sourcing Tool (COSST), a tool built in R[15] capable of suggesting priority areas for seed sourcing according to composite, predictive, or climate-adjusted strategies, as well as the restoration site and focal species.

### A.7.11.2. Seed Mixes

#### A.7.11.2.1. General

Powter et al. (2018) summarized the work of several authors describing the factors that must be considered when developing a seed mix:

- Determine if natural recovery is an option (or landowner/regulatory expectation).
- Determine target vegetation (outcome).
    - The target can be site specific (i.e., match adjacent conditions) or regulatory (e.g., Wellsite Criteria).
    - The target may be a climax community or more likely an earlier stage along the recovery trajectory to a climax community.
    - Target vegetation communities and species should be determined based on a site-specific vegetation assessment.
    - Balance the goals for a site – e.g., erosion control (dense stands) vs. natural invasion (sparse stands).
- Identify the environmental conditions at the site and surrounding area
    - Soil, vegetation, litter/mulch.
    - Climate.
    - Level and type of disturbance, and any residual impacts.
    - Rate and level of natural ingress of all species on the specific site.
- Identify land management practices for the site (e.g., grazing, fencing, access control, etc.)
- Review the characteristics of each species proposed for the mix.
    - Ensure that no species will overwhelm the others.
    - Consider grazing response (e.g., increaser, decreaser, invader) where applicable.
    - Relative protection requirements and shade tolerance of the species.
    - Nutritional effects of the species or combination of species on the soil and each other.

[15] Code is available at https://github.com/silva-mc/COSST

- Determine availability of desired species.
    - Seed suppliers need long lead times to produce new seed.
    - Determine if alternative species are suitable (substitution).
- Assess the source and quality (purity, weeds) of desired species seed.
    - Ensure the seed lots and mix are weed free (obtain weed certificates).
- Calculate Pure Live Seed (PLS) for each species (as an alternative to % weight).

% PLS = % germination x % purity

where % purity = 100 - % inert material.

    - Buy the seed lot with the highest PLS content as this reduces the volume of material handled when seeding.
- Determine appropriate seeding rate (ideally on a seeds (PLS)/m2 basis).
    - Seeding rate can be modified based on climate (moisture), seeding method (drill seeding is preferred to broadcast), season and plant establishment factors.
    - Determine if minimum or maximum seeding rates have been set by regulators.
- Calculate the percentage of seeds for each species in the mix.
- Calculate operational seeding rate (kg/ha).
    - Determine if seed is coated or cleaned as that affects weight.
- Review the proposed seed mix with the landowner / land manager, and where required, obtain their approval.

Tannas and Webb (2016) provide formulas for calculating seeding rates and an example using a mix of rough fescue, western porcupine grass and June grass.

Government of British Columbia (n.d.) provided guidance on seed mixes:

> "It is useful to employ a combination of 5 to 10 species, consisting of some graminoids (grasses, sedges, and rushes) of low and high stature, some species with rhizomes, some (usually legumes) with nitrogen-fixing ability, and some fast germinators. Care should be taken to ensure that the mix will not be dominated by a single aggressive species, and the mature stature of each species should be considered when deriving the ratio of seeds to use.
>
> All seeding ratios and densities should be formulated on the basis of the amount of pure live seed (PLS) per unit area, not the weight of seed or seed stocks. Prescriptions should be developed in PLS/$m^2$, but those prescriptions are usually implemented in the field in terms of kg/ha."

#### A.7.11.2.2. Seed Mix Calculators

Digital seed mix calculators are available:

- Peace Forage Seeding Tool – Seed Mix Calculator – http://www.peaceforagetool.ca/seed-mix-calculator
- Alberta Agriculture and Forestry – Forage Seed Mixture Calculator – http://www.agric.gov.ab.ca/app19/calc/forageseed/forageseedintro.jsp
- Wild About Flowers Plant Selection Tool – http://www.wildaboutflowers.ca/advanced_search_page.php

Seed-Spec (n.d.) is a geo-spatially enabled web application to develop custom native seed blends for re-vegetation projects using site specific soil and plant information and minimal user inputs. Focus is on the south-central US states.

Weber (2023) prepared a guide to using the Meadow Restoration Seed Mix Calculator for Southern Ontario Ecozones. The Calculator emphasizes pollinator mixes. The associated Excel calculator[16] provides two substitutions for each species, seeding rates, and rough price estimates. There is also a video describing the Calculator.[17]

The University of Northern Iowa Tallgrass Prairie Center (n.d.) developed the "Tallgrass Prairie Seed Calculator, a free online tool that allows you to build a custom native prairie seed mix, estimate the cost for each mix and view contact information for Iowa's top native vendors."

The Caesar Kleberg Wildlife Research Institute (n.d.) provides a map-based native species seed mix selection tool for individual counties in Texas.

### A.7.11.3. Species and Seed Mix Suitability

#### A.7.11.3.1. Species Suitability

BrettYoung (n.d.(b)) provides a list of 130 native seed and grass species and a set of characteristics users can select to narrow the list of species suitable to their site. Selection options include:

- Flood tolerance
- Drought tolerance
- Salt tolerance
- Soil pH
- Soil texture

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[16] See https://cwf-fcf.org/en/resources/downloads/booklets-handouts/Native-Seed-Mix-Calculator-Jan23-CWF.xlsx

[17] See https://www.youtube.com/watch?v=0dSJ4mIV9-Q&t=4s

- Species type (e.g., warm season grass)
- Growth habit
- Canopy mature height
- Seeds/lb

Kramer et al. (2019) developed a "decision support tool using expert opinion to assess suitability of different native plant sources, including horticultural cultivars, in two different planting contexts. [They] assessed the suitability of 761 sources for 72 commonly sold native species in two different planting contexts (small, isolated, highly disturbed sites vs. large, undisturbed sites near remnant populations).

Kilkenny et al. (2023) describe development of a Climate-Smart Restoration Tool[18], an interactive web-based application that allows users to match current seed sources with future climate conditions.

#### A.7.11.3.2. Seed Mix Suitability

The Alberta Native Plant Council (2006b) published a position paper based on current knowledge of wildflower seed mixes. They noted that the main concern with commercial wildflower seed mixes is the "assumption on the part of the purchaser that a packet of 'wildflower seeds' contains seeds of wildflowers that are native to the local area. There is absolutely no guarantee that this is true, and in fact is usually **not** the case." Another concern is that "in most cases, wildflower seed packets do not list the species they contain. There is always the chance that they contain invasive species and possibly even noxious weeds."

### A.7.12. Native Species Information

#### A.7.12.1. Nomenclature

Practitioners should consult the Database of Vascular Plants of Canada (VASCAN) (Canadensys, n.d.) for current scientific and common plant names when buying, selling, recommending, or setting rules.

The Alberta Conservation Information Management System (ACIMS) maintains a list of the documented plant species within Alberta; the Excel file lists common name, scientific name and indicates which species are native (Alberta Conservation Information Management System, 2022). This reference should be used by all native seed practitioners to determine if a species is considered native to Alberta.

#### A.7.12.2. Species Characteristics

Powter et al. (2018) summarized the work of several authors who provided information on characteristics of various native species (Table 10; see the original report for the source information).

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[18] See https://climaterestorationtool.org/csrt/

Table 10. Sources for plant characteristics information required to build a seed mix.

| Source | Plant Biology | Plant Ecology | Seed Weight | Grazing | Reclamation Suitability |
|---|---|---|---|---|---|
| Hardy BBT Limited, 1989 | √ | √ | √ | √ | √ |
| Smreciu et al., 2013 | √ | √ | √ | √ | √ |
| Pahl and Smreciu, 1998 | √ | √ | √ | √ | √ |
| Smreciu, 1993 | √ | √ | √ | | √ |
| Northstar Seed, 2017 | √ | √ | √ | | √ |
| Burton and Burton, 2003 | √ | √ | √ | | √ |
| Pickseed, nd | √ | √ | √ | | |
| BrettYoung, 2024a | √ | √ | √ | | |
| Matheus and Omtzigt, 2013 | | √ | √ | | √ |
| Dobb and Burton, 2013 | √ | √ | | √ | √ |
| Ziemkiewicz (1984) | √ | √ | | √ | |
| Tannas and Webb, 2016 | | √ | √ | √ | |
| Native Plant Working Group, 2000 | √ | | √ | | √ |
| Alberta Agriculture and Forestry, 2016 | √ | | | √ | |
| Vaartnou and Wheeler, 1975 | | √ | | | √ |
| Hammermeister, 1998 | | | √ | | |
| Wark et al., nd | | | √ | | |
| Tannas, 2015b | | | √ | | |
| Gabruch, nd | | | √ | | |
| Lancaster et al., 2017b | | | | √ | |
| Parks Canada, 2011 | √ | | | | |
| Morgan et al., 1995 | √ | | | | |

BrettYoung (2024) has a Native Seed Guide that provides detailed information on 60 species, as well as background information on seed production, seed analysis reports, pure live seed, and the difference between native and introduced species.

#### A.7.12.3. Source Information

Kramer et al. (2019) recommended that "relevant information follows plants through the supply chain from source to breeding to sales. At a minimum, information on the climate from which the source originated, as well as the climate in which it was selected and, if it has been evaluated, which climates were tested, should be easily accessible to consumers."

#### A.7.12.4. Growing Plants

There is a variety of resources available to help interested parties grow native species. These often focus on landowners or small-scale projects. Examples include:

- Pahl and Smreciu (1998) provide extensive information on growing and multiplying native grasses and wildflowers.
- The Edmonton Native Plant Society (n.d.(b)) provides botanical and gardening details on popular local native plant species.
- Burton and Burton (2003) provide instructions for this process, focusing on the biology and management of 31 species of herbaceous plants indigenous to the northern Interior of British Columbia. Information is also provided to guide the process of designing seed mixtures and selecting suitable application rates for using these plants in the revegetation of disturbed soils.
- Oregon State University (n.d.) has a series of documents on wildflower production, including sustainable production of native species (Shock et al, n.d.).

### A.7.13. Native Seed and Plant Organizations

#### A.7.13.1. Canada

The Native Seed Producers of Canada (n.d.) is a working group of farmers dedicated to growing and strengthening Canada's native seed supply. The group consists of Canadian farmers who are actively producing native forb and/or grass seeds for market, working together to advance the country's native seed industry and support ecological restoration efforts. The only Alberta member is Golden Acre Seeds located in Fairview.

#### A.7.13.2. United States

The Great Basin Native Plant Project's main objectives are to improve the availability of native plant materials and to provide the knowledge and technology required for their use in restoring diverse native plant communities across the Great Basin (Great Basin Native Plant Project, n.d.). The Great Basin Native Plant Project (GBNPP) is a partnership between the USDA Forest Service Rocky Mountain Research Station (RMRS), the USDI Bureau of Land Management (BLM), the USDI Fish and Wildlife Service and the USDA Forest Service Intermountain Region to research and develop native plant materials for use in conservation and restoration of Great Basin ecosystems (Kilkenny et al., 2023).

The Native Seed Network (n.d.) connects people and organizations involved with all aspects of native seed, from collection, development, production, and use in restoration. Their vision is for

restoration and rehabilitation projects to be supported by an abundance of quality seed that is both appropriate for the site and affordable.

The vision of the Northeast Seed Network is to build a network of trusted partnerships cross all the key seed and plant material supply chain steps to increase the accessibility of genetically diverse source-identified wild seed and plants for the ecoregions of the Northeastern United States (Native Plant Trust, n.d.).

EcoSource Native Seed & Restoration's mission is to increase ecological and economic diversity and resilience through restoration of degraded ecosystems, using genetically appropriate native seeds and vegetation (EcoSource Native Seed & Restoration, n.d.(b)).

Native Resource Preservation (n.d.) encourages using plants and seed native to an area, and sourcing locally whenever possible.

The Alaska Native Plant Society is a non-profit organization dedicated to studying and conserving Alaska native plants. The Society offers an annual seed distribution program and provides resources for anyone interested in collecting or propagating native seed (Alaska Native Plant Society, n.d.).

### A.7.14. Guidance on Use of Native Species

#### A.7.14.1. Documents

The following sources provide general guidance on use of native species in revegetation projects:

- The Native Plant Working Group (2000) – use of native plant materials in Alberta.
- Sinton and Walker (2021) – re-establishing native plant communities in disturbed natural ecosystems.
- Neville (2017) – renewable energy project management practices. She noted that "native seed and native plant materials suitable for the project area are often difficult to secure in sufficient quantities. Qualified professional expertise is needed to ensure quality control of seed and plant materials. It is important to order supplies early in the project development phase; hence do not include purchasing of the native seed and plant material as part of the construction contract. Consider harvesting materials from the site prior to construction. Experienced restoration consultants and contractors are required for these tasks and a separate budget may be required."
- Morgan et al. (1995) – seeding native plants, as well as other means of enhancing revegetation success.
- Gabruch et al. (n.d.) – revegetation with native grasses. Among other advice, the document noted "always buy certified native grass seed of known origin if it is available. Otherwise, 'common seed' is an acceptable second choice as long as it is 'Canada #1' or 'U.S. common' and the origin is known. Native wild harvest seed is an optional source of supply, particularly for some of the species not yet developed as varieties."

- Neufeld (2008a, b) – guidelines for use of native plants in roadside revegetation in Saskatchewan.
- Native Plant Society of Saskatchewan and Saskatchewan Watershed Authority Prairie Stewardship Program (n.d.) – a generalized introduction to prairie restoration, and a guide to the steps necessary to grow prairie, targeted at small-scale projects for schools.
- Prairie Originals (n.d.(b)) – Planting and seed guide for landowners in Manitoba.

There are also older documents that may still provide valuable guidance and/or show how the industry has changed over time. Examples include:

- Wark et al. (1995) and an update issued about 10 years later (Wark et al., n.d.) – Ducks Unlimited Canada publications on revegetating with native grasses

### A.7.14.2. Training

The Grassland Restoration Forum offers a course in How to Use the Range Plant Community Guides and Recovery Strategies Manuals for Project and Reclamation Planning in Grasslands.[19]

Silverberry (n.d.) offers a 2-day interactive Native Plant Seed Collection course to learn to know which native species grow from seed and why safe and successful picking is the product of good planning. The practical skills will be backed up by an introduction to the regulatory rules and ethical obligations collectors must observe to ensure that nature's supply of native plant seed never runs out.

The Nature Conservancy (n.d.) offers an online 2-hour course intended for all levels of experience with native seed activities. It covers basic concepts including types of seed, collection techniques, processing and more. Beyond the basics, it provides specific guidance for a variety of non-woody plant species found natively in the Midwest and Eastern regions of the United States.

[19] See https://grasslandrestorationforum.ca/events/how-to-use-the-range-plant-community-guides-and-recovery-strategies-manuals-for-project-and-reclamation-planning-in-grasslands-september-2024/