

TWIN SISTERS NATIVE PLANT NURSERY: INTEGRATING RESEARCH, TRAINING, AND OUTREACH FOR THE PROPAGATION OF NATIVE AND CULTURALLY SIGNIFICANT PLANT SPECIES IN NORTHEASTERN BRITISH COLUMBIA

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ABSTRACT

The newly incorporated Twin Sisters Native Plant Nursery, a joint venture of the Saulteau First Nations and West Moberly First Nations, was created to meet a growing demand for native plant species for use in reclamation in the Peace River region of British Columbia. Associated with this new native plant nursery is the development of a number of programs that support successful nursery operations as well as the use of native plants in reclamation work in the region. Collaborative research involving First Nations and industry partners aids in the identification of a wide range of culturally significant and ecologically appropriate native plant species for propagation. Training programs in native plant horticulture support the creation of a skilled and knowledgeable workforce. A proposed native plant reclamation guidebook will contribute to successful installation of native plant species at reclamation sites. In this paper we describe the creation of the Twin Sisters Native Plant Nursery and discuss how the associated research and training programs as well as the creation of reclamation guidelines support the overarching goal of the nursery to promote the use of native plant species in reclamation in Northeastern British Columbia.

Key Words: First Nations, Traditional Ecological Knowledge (TEK), Native Plant Propagation, Peace River Region, Reclamation.

INTRODUCTION

The Peace River region of Northeastern British Columbia has sustained a high degree of development from the mining and the oil and gas sectors over the last 30 years (Lee and Hanneman 2012). This development has brought economic benefits to the region but has also contributed to the disturbance of large tracts of land through the development of open pit coal mines, roads, cutlines and pipelines (Lee and Hanneman 2012; Nitschke 2008). Proposed developments in the region, including a number of new pipelines and mines, as well as the BC Hydro Site C Project, are currently in various stages of environmental assessment. Current reclamation practices have led to large fragmented areas being reclaimed using a range of agronomic plant species. In the short term, this type of reclamation is believed to set ecosystems on a different successional pathway than would naturally occur post-disturbance, making it unlikely for the natural establishment of a native plant-dominated community (Keefer 2010).

Both the Sauteau First Nations (SFN) and West Moberly First Nations (WMFN) have expressed concerns with current reclamation standards that create agronomic plant communities in locations formally host to culturally and ecologically productive landscapes. These First Nations have emphasized the need for the incorporation of native and culturally significant plants in reclamation activities in the region to better mitigate the impacts of industrial development¹. At present there is an insufficient supply of genetically local native and culturally significant plants to meet industry demand for reclamation in the Peace River region and elsewhere in British Columbia. It is believed that an increased supply of native species appropriate for use in various environmental conditions that exist at reclamation sites will enhance the broad scale adoption of these plant species in reclamation practice and standards.

To address shortages in native and culturally significant plants that are appropriate for use in reclamation, a collaborative partnership – including Walter Energy Ltd., which operates three surface metallurgical coal mines in Northeastern British Columbia; Keefer Ecological Services (KES), a British Columbia-based consulting firm with expertise in reclamation and ethnobotany; and Sauteau and West Moberly First Nations – was formed to develop a native plant nursery in the Peace River region. In 2011 a suitable site for the proposed nursery was purchased in a location between the two partner First Nations communities. The economic viability of the proposed nursery was analyzed and supported by a KES business feasibility study (Meade et al. 2012). Nursery construction began in 2012 with the arrival of two 35' x 200' greenhouses and an operational business plan was produced in 2013 based on the results of the KES business feasibility study (TSNPN 2013). The nursery was incorporated as Twin Sisters Native Plant Nursery (TSNPN) in the summer of 2013. A pilot crop of native plants was propagated in 2013 in preparation for the initial commercial crops that will be produced in 2014.

While the creation of the Twin Sisters Native Plant Nursery represents a major achievement involving the creative energies of a multitude of private and First Nations interests, its existence alone does not guarantee the successful incorporation of native and culturally significant plant species into reclamation practice. A number of related and integrated programs are also required to support the financial success of TSNPN and by extension, produce a large volume of native and culturally significant plants for use in reclamation activities in the Peace River region. These programs include collaborative ecological and ethnobotanical research, the delivery of a native plant horticulture training program, and the development of a native plant species best practices reclamation guidebook. This integration of business, education and research supporting native plant production has application to other regions of British Columbia where the use of native and culturally significant plant species in reclamation may be hindered by an insufficient supply coupled with a need for more effective collaboration between First Nations and industry².

¹ Culturally significant plant species are native plant species that hold importance with local peoples (usually First Nations) as food, medicine or technological resources.

² All of the programs we describe in this paper were initiated in 2010 or later and are in their initial stages of delivery or development. This paper, therefore, does not report on the results of these projects but rather provides a description of their development and current status.

PROJECT DESCRIPTIONS

Ethnobotanical Research

Ethnobotanical studies seek to document cultural uses of plants using culturally appropriate and scientifically valid methods, which often include extensive interviews with keepers of Traditional Ecological Knowledge (TEK)³. Ethnobotanical research that identifies native plant species with cultural significance is required for the successful incorporation of these plant species into ecological restoration activities.

Successful ethnobotanical research is a *collaborative* process implying that participating First Nations are involved in all stages of the research program; from the initial stages where research agendas are determined through to the dissemination of research results (Smith 1999). Collaboration in the context of ethnobotanical research also implies that First Nations partners retain the intellectual property rights for all data obtained through the program as well as the right to limit the dissemination of results concerning sensitive TEK (Ermine et al. 2004; Smith 1999). Ethnobotanical research should also be *current* and *local*, meaning that research must be site specific and involve knowledge holders as research partners. Reviews of existing literature may be a starting point in such research, but alone are insufficient for the identification of culturally significant plant species as TEK is an oral and dynamic form of knowledge that is substantially altered when committed to writing and translated to English (Simpson 1999; Smith 1999). Substantial First Nations involvement at all stages of the research program helps to ensure the culturally appropriate collection of data and accurate interpretation of research results.

The selection of culturally significant native plant species for propagation at the Twin Sisters Native Plant Nursery has been supported by ethnobotanical research initiated by Saulteau First Nations in collaboration with Walter Energy and Keefer Ecological Services. Initial ethnobotanical research conducted in 2012 and 2013 involved three collaborative meetings with Saulteau First Nations Elders and resulted in a preliminary list of culturally significant plant species. Data collected through this research program will be held by Saulteau First Nations in perpetuity in deference to the highly sensitive aspects of Traditional Ecological Knowledge. Elements of TEK emerging from this program that are less sensitive may enter the public domain through the production of an ethnobotanical handbook. For their contribution to the research, Walter Energy will be provided with a list of important cultural plant species for consideration for use in reclamation which will be annotated with cultural information about these plants, including their uses as food, medicine or technology. Saulteau First Nations Elders are supportive

³ Traditional Ecological Knowledge (TEK), sometimes called Traditional Knowledge (TK), Traditional Ecological Knowledge and Wisdom (TEKW) or Indigenous Knowledge (IK), is a controversial term that is not easily defined (Simpson 1999). For the purpose of this paper we define TEK as “knowledge of ecological principles, such as succession and interrelatedness of all components of the environment; use of ecological indicators; adaptive strategies for monitoring, enhancing, and sustainably harvesting resources; effective systems of knowledge acquisition and transfer; respectful and interactive attitudes and philosophies; close identification with ancestral lands; and beliefs that recognize the power and spirituality of nature” (Turner et al. 2000, p. 1275).

of this program and funding has been secured for additional research to continue with the creation of a comprehensive list of Saulteau First Nation culturally significant species.

Ecological Research

Without detailed knowledge of the habitats that existed prior to disturbance at a reclamation site, native plant species with high potential for use in reclamation are identified through detailed surveys of nearby habitats that have recovered from disturbance without human assistance. Working with Keefer Ecological Services, Walter Energy has supported ecological research in the Peace River region to aid in the selection of appropriate native plants species for propagation at the Twin Sisters Native Plant Nursery. In 2011-2012 data were collected from a series of ecological plots in the areas surrounding Walter Energy mines. Plot work focussed on areas that had experienced natural or anthropogenic disturbances without subsequent reclamation and included landslides, old drill pads and roads, soil stockpiles, cutblocks, gravelly streambeds, and other disturbed locations. Species diversity, above-ground biomass, terrain information and soil data were collected to model the native plant species expected to thrive in the post-mine environment depending on ecological conditions present, and to guide prescription development, seed collection and associated plantings on sites. Further information on these methods can be found in a related study conducted in the East Kootenays in 2010 (Keefer et al. 2011).

Growing Our Futures: Native Plant Horticulture Training Program

Skilled nursery workers are needed for the efficient production of quality native plant seedlings. The Twin Sisters Native Plant Nursery business feasibility study found that a lack of qualified horticultural workers in the Peace River region would likely impede the initial success of the TSNPN nursery (Meade et al. 2012). This issue has been addressed through the development of the *Growing our Futures: Native Plant Horticulture Training Program*, which was developed as a collaborative effort involving Saulteau First Nations, West Moberly First Nations, Keefer Ecological Services (KES) and Royal Roads University Centre for Livelihoods and Ecology (RRU-CLE). Funding for this program was provided by the Investment Agriculture Foundation of British Columbia (IAF), the North East Native Advancing Society (NENAS) and Walter Energy.

Over the summer and autumn of 2013 an instructional team composed of plant ecologists and nursery professionals delivered the pilot training program to students from the SFN and WMFN communities. The program is practical and hands-on, providing trainees with the required knowledge and skills to enter directly into the native plant nursery workforce or to pursue related horticulture and reclamation employment or educational opportunities. Cultural teachings and Elder instruction were important elements of the training program. Student feedback from the program has been overwhelmingly positive and 11 students will continue their learning with a minimum seven months of work experience at Twin Sisters Native Plants through to spring of 2014.

The *Growing our Futures: Native Plant Horticulture Training Program* was also piloted in the summer and fall of 2013 in collaboration with the Ktunaxa First Nation and Tipi Mountain Native Plants (TMNP) with funding from the Aboriginal Training for Employment Program (ATEP) and the British Columbia Aboriginal Mining Training Association (BCAMTA). This program provided a much needed theoretical basis and additional skill development to a group of 11 trainees, the majority of whom are existing

nursery workers at TMNP. Future training initiatives elsewhere in British Columbia and Canada are currently under discussion with interested First Nations and post-secondary institutions. These training programs will develop a skilled workforce who will be able to effectively work at native plant nurseries and manage the involved processes required for the production of large volumes of native plant seedlings to be made available to industry clients, while at the same time providing much needed economic opportunities for First Nations individuals within their home communities.

Land Reclamation Best Practices Field Guidebook

The outplanting success of native plant species in reclamation practice will have large implications on their broad-scale acceptance as a viable alternative to traditional agronomic reclamation species. To enhance the abilities of reclamation practitioners to effectively incorporate native plants with traditional significance into reclamation projects, a practical and standardized outreach tool in the form of a *Land Reclamation Best Practices Field Guidebook* has been proposed. The first volume of this guidebook will be produced for the Peace River region by Keefer Ecological Services (KES), Encana Corporation and Royal Roads University Centre for Livelihoods and Ecology (RRU-CLE) with the support of West Moberly First Nations (WMFN), Doig River First Nation (DRFN) and Prophet River First Nation (PRFN). The guidebook will identify native plant species with broad ecological amplitudes, well known propagation requirements, certain wildlife attributes and species of cultural importance. Plant species identified in this way will be grouped by British Columbia Biogeoclimatic Unit (BEC unit) allowing practitioners to use the estimated BEC unit of a reclamation site to predict the native plant species appropriate for reclamation at that site.⁴ Ethnobotanical research with WMFN, DRFN and PRFN will support the inclusion of First Nations cultural values alongside propagation information and techniques for incorporating these species in reclamation work. The format of the *Land Reclamation Best Practices Field Guidebook* will follow that of the BEC system of guidebooks in order to enhance its familiarity, utility and to encourage its widespread use.

CONCLUSIONS

Saulteau First Nations, West Moberly First Nations and Walter Energy Ltd. share a common goal of returning impacted lands to functioning native plant ecosystems in the Peace River region of Northeastern British Columbia. The use of culturally significant plant species, such as food or medicine plants, in reclamation meets the needs of traditional land users through the restoration of biologically and ethnobotanically diverse landscapes. At the same time, the incorporation of native and culturally significant species into reclamation practice aids industry in meeting commitments toward socially and ecologically sound reclamation. The Twin Sisters Native Plant Nursery represents a sound business opportunity for Saulteau First Nations and West Moberly First Nations while enhancing these communities' ability to participate in industrial development; employ community members, provide a new local tool for ecological restoration, and meet the market demand for native plants. The success of the Twin Sisters Native Plant Nursery, however, depends on an integrated business approach that includes

⁴ Biogeoclimatic ecosystem classification (BEC) is a system of ecological classification widely used in British Columbia with units of classification resulting from a synthesis of vegetation, climate, and soil data (Pojar et al. 1987).

extensive and collaborative ethnobotanical and ecological research, culturally relevant native plant nursery training and the development of a *Land Reclamation Best Practices Field Guidebook* for the effective use of native plant species in reclamation. The ultimate goal of this innovative approach of integrating business development, research, training and outreach is to promote the expanded use of native and culturally significant plant species in reclamation in the Peace River region of Northeastern British Columbia and beyond.

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Overcoming Northern Challenges

Proceedings of the 2013 Northern Latitudes Mining Reclamation Workshop and
38th Annual Meeting of the Canadian Land Reclamation Association

Whitehorse, Yukon September 9 – 12, 2013

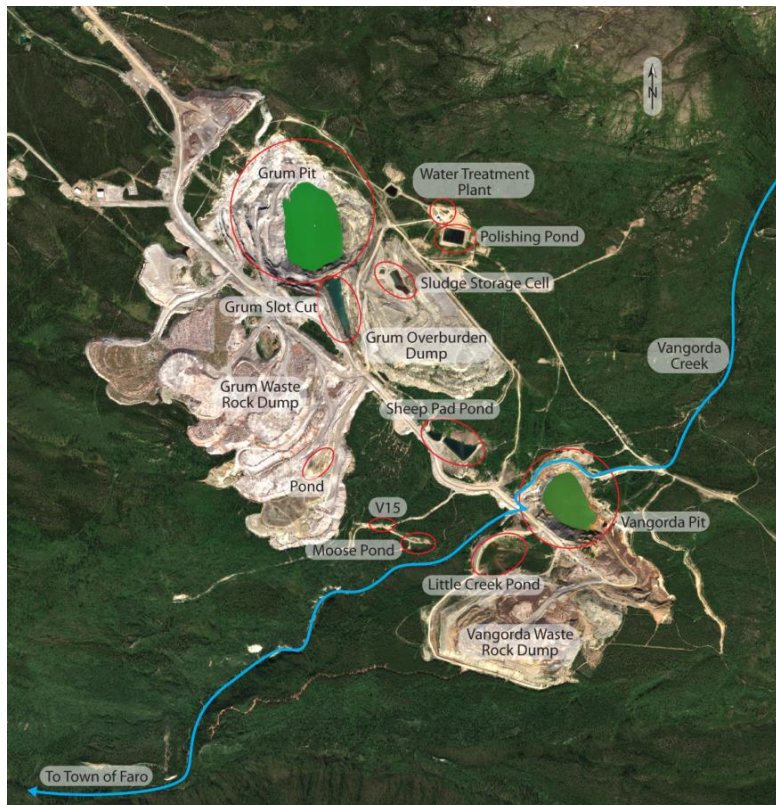


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Stewart, Karpenin, and Siciliano	Northern Biochar for Northern Remediation and Restoration
Petelina	Biochar application for revegetation purposes in Northern Saskatchewan
Chang	Bioremediation in Northern Climates
Geddes	Management of Canada's Radium and Uranium Mining Legacies on the Historic Northern Transportation Route
Hewitt, McPherson and Tokarek	Bioengineering Techniques for Re-vegetation of Riparian Areas at Colomac Mine, Northwest Territories
Bossy, Kwong, Beauchemin, Thibault	Potential As ₂ O ₃ Dust conversion at Giant Mine (paper not included)
Waddell, Spiller and Davison,	The use of ChemOx to overcome the challenges of PHC contaminated soil and groundwater at contaminated sites
Douheret,	Physico-Chemical treatment with Geotube® filtration: Underground Mine Desludging in winter TTS, Iron (Fe) and Zinc treatment
Coulombe, Cote, Paridis, Straub	Field Assessment of Sulphide Oxidation Rate - Raglan Mine
Smirnova et al	Results of vegetation survey as a part of neutralizing lime sludge valorization assessment
Baker, Humbert, Boyd	Dominion Gurney Minesite Rehabilitation (paper not included)
Martínez, Borstad, Brown, Ersahin, Henley	Remote sensing in reclamation monitoring: What can it do for you?

Wednesday:

Eary, Russell, Johnson,
Davidson and Harrington

Knight

Polster

Dustin

Kempenaar, Marques
and McClure

Smreciu, Gould, and
Wood

Keefer

Pedlar-Hobbs, Ludgate and
Luchinski

Chang, et.al

Heck

Janin

Stewart and Siciliano

Nadeau and Huggard

Simpson

Back To Tuesday

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NORTHERN LATITUDES MINING RECLAMATION WORKSHOP

The Northern Latitudes Mining Reclamation Workshop is an international workshop on mining, land and urban reclamation and restoration methods. The objective of the workshop is to share information and experiences among governments, industry, consultants, Alaska Natives, northern First Nations and Inuit groups which undertake reclamation and restoration projects, or are involved in land management in the north or in comparable environments.

The first Workshop was held in Whitehorse, Yukon Territory, Canada in 2001 and it has been held every two years since, alternating between Canada and Alaska. The primary sponsors of the Workshop include the Yukon Geological Survey, Indian and Northern Affairs Canada, Natural Resources Canada, US Department of the Interior Bureau of Land Management, and the State of Alaska Department of Natural Resources.

CANADIAN LAND RECLAMATION ASSOCIATION

The CLRA/ACRSD is a non-profit organization incorporated in Canada with corresponding members throughout North America and other countries. The main objectives of CLRA/ACRSD are:

- To further knowledge and encourage investigation of problems and solutions in land reclamation.
- To provide opportunities for those interested in and concerned with land reclamation to meet and exchange information, ideas and experience.
- To incorporate the advances from research and practical experience into land reclamation planning and practice.
- To collect information relating to land reclamation and publish periodicals, books and leaflets which the Association may think desirable.
- To encourage education in the field of land reclamation.
- To provide awards for noteworthy achievements in the field of land reclamation.

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- The Conference Sponsors (see next page)
- The Conference paper and poster presenters
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