



SOCIETY FOR
ECOLOGICAL
RESTORATION

2015 Weekly Restoration Tips

Tip#1:

Did you know that the Canada Parks Council worked with a number of organizations and agencies (including SER) to develop the document [Principles and Guidelines for Ecological Restoration in Canada's Protected Natural Areas](#) (Canada Parks Council, 2008)? Follow the link to read the document.

Tip #2:

What is soil bioengineering? Learn about using live plants for stabilization and erosion control in [Soil Bioengineering Techniques for Riparian Restoration](#) (Polster, 2002). This paper outlines techniques including live staking, wattle fences, and live palisades.

Tip #3:

Evergreen's [Native Plant Database](#) is a useful tool for finding native species to grow in your region. Are you a native species expert? Help add to the database.

Tip #4:

Take a read through [Dead planet, living planet: Biodiversity and ecosystem restoration for sustainable development](#) (United Nations Environment Programme, 2010) for inspiration! The report "documents over 30 successful case studies referencing thousands of restoration projects ranging from deserts and rainforests to rivers and coasts" and "confirms that restoration is not only possible but can prove highly profitable in terms of public savings; returns and the broad objectives of overcoming poverty and achieving sustainability".

Tip #5:

In honour of World Wetland Day on February 1, 2015, we're promoting wetland restoration. First, learn what a wetland is by reviewing the [The Canadian Wetland Classification System](#) (or read the Ducks Unlimited [summary](#)). [An Introduction and Users Guide to Wetland Restoration, Creation, and Enhancement](#) published by the US Environmental Protection Agency provides guidance on how to plan, implement and monitor a wetland restoration project. Environment Canada also has useful [wetland resources for Canadians](#).

Tip #6:

Many restoration projects rely on good volunteers. The Land Stewardship Centre has developed some helpful resources, including a [Stewardship Toolbox](#) and tips on being a [great place to volunteer](#).

Tip #7:

Restoration in Canada's north has many unique challenges: access, northern environmental conditions (such as permafrost and short growing seasons), community needs, and climate change. The document [Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories](#) – 2013 provides insight into limitations and considerations for restoration work in northern environments.

Tip #8:

This [Ecological Site Restoration Risk Analysis](#) is a planning tool that can be used by developers and land use professionals to predict the restoration potential for a disturbed site. The tool integrates information from vegetation inventories, ecological site descriptions, and native plant communities to estimate how sensitive a site will be to development and the likelihood that restoration efforts will succeed.

Tip #9:

Spring is on its way, and so are high flows associated with snowmelt and high rainfall months. For any active restoration projects, this often means consideration of sediment and erosion control measures. This US Environmental Protection Agency [guidance document](#) has useful descriptions of mitigation measures, how to use them, and their pros/cons (scroll to page 3-13). Here is an [example of an inspection checklist](#) to confirm if sediment and erosion control measures are in place and working as designed.

Tip #10:

Planning for collection and propagation of native species this field season? The Garry Oak Ecosystem Recovery Team has resources on native plant [flowering times](#) and [seed collection times](#), as well as guidelines for [propagation](#) and [ethical collection/use of native plants](#).

Tip #11:

Looking to control erosion and promote vegetation growth? Try the ["rough and loose"](#) approach.

Tip #12:

Happy Canada Water Week! To celebrate, we recommend reading some of the [BC Stewardship Centre's publications](#), including *Shoreline Structures Environmental Design*, *Stream Stewardship*, *The Streamkeepers Handbook*, *The Wetlandkeepers Handbook*, *Water Stewardship*, and *Watershed Stewardship*. In *Shoreline Structures Environmental Design* we learned about 11 plant species that can be successfully established via cuttings.

Tip #13:

Spring has sprung! If you're picking up some new plants for your garden, take a look at your regional *Grow Me Instead Guide* to help stop the spread of invasive species. Guides for: [BC](#), [Alberta](#), [Manitoba](#), and [Yukon Territory](#).

Tip #14:

In the spirit of Easter, learn how to restore habitat for the Nuttall's Cottontail, which is listed as of Special Concern under the Committee on the Status of Endangered Wildlife in Canada and the Species at Risk Act. Learn about their habitat needs in the [Management Plan for the Nuttall's Cottontail nuttallii subspecies \(*Sylvilagus nuttallii nuttallii*\) in Canada \[Proposed\]](#)

Tip #15:

Spring is the optimal time for prescribed burning. The Parks Canada [website](#) provides background on the history and role of wildfire management. As prescribed burning becomes a more common technique (refer to work being done by the [BC Wildfire Branch](#) as an example), take the time to educate yourself on [the role of fire in restoring adapted grassland ecosystems](#) (Toledo, Sorice and Kreuter, 2013).

Tip #16:

Are you serious about ecological restoration? Formal [education options](#) range from online courses to degrees from institutions across the country

Tip #17:

Understanding and selecting soil amendments can be an overwhelming process. [The Role of Organic Soil Amendments in Reclamation: A Review](#) examines mechanisms through which organic amendments affect soil properties (physical, chemical, biological) and describes the role of organic amendments in reclamation, with emphasis on amendment types and application rates for soil amelioration and biomass production.

Tip #18:

As discussed in Tip #11, surface roughening creates more diverse plant microsites, helps retain moisture, and reduces erosion. A second technique that promotes these benefits is application of coarse woody debris to a site undergoing reclamation. As described in [Best Management Practices for Conservation of Reclamation Materials in the Mineable Oil Sands Region of Alberta](#) (page 42), coarse woody debris can help create more diverse microsites and habitats, retain moisture, contribute to long-term soil organic matter, and improve catch of native seeds (or be a transport agent for native seeds and microorganisms). Larger debris with a lower surface area to volume ratio take longer to break down and reduce the risk of tying up valuable soil nitrogen in the decay process. Given the risk of nitrogen being consumed in the wood decay process, appropriate application rates should be selected with an understanding of the site nutrient balance.

Tip #19:

If you're working on a wetland or riparian restoration project, cattails may be a useful native species to incorporate into your revegetation program. Try collecting the seeds yourself from a local wetland, as seen in this [video](#) (it's true, everything really can be found on the internet!). In the video, the seeds are planted individually and grown up as seedlings for transplanting, but for large-scale restoration, this is not necessarily reasonable or cost effective. A better option is to spread the seeds and squish them into the moist soil with your boots.

Tip #20:

Unfortunately, restoration activities come with a cost. If you have a project idea, but no funding, check out the SER-WC [Funding Opportunities page](#).

Tip #21:

The United Nations Environment Programme defines [Phytoremediation](#) as "the direct use of living green plants for in situ, or in place, removal, degradation, or containment of contaminants in soils, sludges, sediments, surface water and groundwater". How can you incorporate it into your restoration plans? A good place to start is the US Environmental Protection Agency's [Phytotechnology Overview](#). Their [Phytotechnologies for Site Cleanup](#) factsheet describes different phytoremediation mechanisms, applications, advantages/disadvantages, and case studies.

Tip #22:

[Integrated pest management](#) and integrated vegetation management (links to US Environmental Protection Agency Fact Sheets) are broad principles applied across industries, including horticulture and agriculture. A major application related to ecological restoration, rehabilitation, and reclamation is invasive species management. [Here](#) are a number of examples of integrated management plans. To learn more, the [BC, Alberta and Saskatchewan/Manitoba](#) integrated vegetation management associations are useful resources.

Tip #23:

Mycorrhizae are defined by the Soil Science Society of America as "literally 'fungus root'. The association, usually symbiotic, of specific fungi." Mycorrhizae are known to play an important role in plant establishment and survival, including nutrient and water uptake. [The Use of Biotechnology in the Restoration of Disturbed Ecosystems](#) provides useful background information on how understanding plant-mycorrhizal interactions can shed light on methods for reclamation and restoration. [The effects of arbuscular mycorrhizal fungal inoculation at a roadside prairie restoration site](#) provides an example of effective use of mycorrhizal inoculation at a restoration site.

Tip #24:

Some industrial projects require salvaging and stockpiling of soil for future use in reclamation. [The Practical Guide to Reclamation in Utah](#), among other information on progressive steps for reclamation and Best Management Practices, provides practical guidance on procedures for assessing, salvaging, and storing soil. One helpful tip we liked: "Leave pedestals, which are small islands of topsoil, to verify soil removal depth."

Tip #25:

Get back to basics and review the building blocks of ecological restoration in the [Society For Ecological Restoration \(SER\) International Primer on Ecological Restoration](#).

Tip #26:

With the dry conditions that have hit Western Canada this spring and summer, it is a good reminder of one of the benefits of planting native species: native plants are adapted to regional climatic conditions. This becomes clear when gardeners (or restorationists) attempt to grow non-native species, which require irrigation to survive, especially in unusually dry conditions. View the Native Plants section of our [Links and Reference Materials webpage](#) for more information.

Tip #27:

Are you or people you know waterfront property owners? Nature Canada's Living by Water project provides programs, services and materials to promote the value of keeping these shorelines healthy, and emphasize what we all can do to help care for them. The Nature Canada website has [resources for each season](#), and the provincial organizations offer additional support.

Tip #28:

With the hot, dry summer conditions this year, above average temperatures in streams and river are causing stress on fish populations. It is for this reason that propagation of riparian vegetation and establishment of shade producing structures are a key element of riparian restoration. Learn more in the [Stewardship Centre for BC's Shoreline Structures Environmental Design – A Guide for Structures along Estuaries and Large Rivers](#). The UK government has also published useful reference information on [the role of riparian shade in controlling stream water temperature in a changing climate](#).

Tip #29:

Interested in learning from home? One place to find free online courses is [edx](#), which offers a variety of free courses on biology and life sciences. Courses such as Introduction to Water and Climate, Tropical Coastal Ecosystems, and Reclaiming Broken Places: Introduction to Civic Ecology, as well as a variety of basic biology courses might be of interest to budding restorationists.

Tip #30:

Genomics is a discipline in genetics that applies recombinant DNA, DNA sequencing methods, and bioinformatics to sequence, assemble, and analyze the function and structure of genomes (the complete set of DNA within a single cell of an organism). It is a rapidly expanding science and has many potential applications to environmental sciences, including ecological restoration. The recently published paper [An Evaluation of Potential Applications of Genomics in the Mining Industry](#) prepared by SRK Consulting Inc. for Genome BC and the Ontario Genomics Institute provides an interesting summary of how genomics can be used in passive water treatment (ex. constructed wetlands) and as a tool for understanding ecosystem characteristics. Two other relevant papers that may be of interest: [At the Crossroads of Genomics and Ecology: The Promise of a Canary on a Chip](#) (Klaper and Thomas, 2004) and [Next generation restoration genetics: applications and opportunities](#) (Williams, Nevill and Krauss, 2014).

Tip #31:

Did you know it is the United Nations [decade of biodiversity](#) from 2011 – 2020? Ecological restoration is a means of conserving biodiversity and sustaining livelihoods. Read this [call to action](#) by the ecological restoration joint working group of Society For Ecological Restoration and the IUCN Commission on Ecosystem Management. Learn more about the [Convention on Biodiversity](#).

Tip #32:

Did you know that we scan job postings across Western Canada and regularly update the [SER-WC job board](#) with posting that might be of interest to restorationists? The page also has links to volunteer opportunities. Please feel free to share any relevant opportunities or postings with us!

Tip #33:

It's been a hot, dry summer and you may be wondering, how do I tell if a tree is dead or alive? For deciduous trees, try breaking a twig; if they snap and break like dead, dry twigs it could mean the tree has died. On the other hand, if the twigs bend and don't break with a snap, the tree may still be alive. Another test is to scrape bark from a small twig or branch. If the tissue under the bark is green and moist, the tree may still be alive. To be absolutely sure the tree is not dead, wait until the next spring to see if it sprouts a new crop of leaves. More information is available at from this [Texas Forest Service article](#). For conifers, one of the first clear signs that a tree is dead is a uniform change in foliage color throughout the entire crown of the tree. If there is doubt as to whether a tree is alive or dead, a simple test is to cut or chop into the inner bark or phloem. The phloem is the living portion of the bark immediately adjacent to the wood. On a live conifer, the inner bark is cream-colored, often with a tinge of pink, and moist. Dead inner bark is brown and may appear moist, dry, or resin-soaked. When the inner bark is dead around the entire circumference of the tree trunk, the tree is dead. More information is available from this [California Department of Forestry and Fire Protection Tree Note](#).

Tip #34:

Often willow cuttings are collected in the fall or winter (when dormant) and stored until spring when they can be planted. Did you know that long-term storage isn't required, and that you can harvest and plant willows in the fall? For most species, pre-soaking the willows for 5-14 days is recommended to increase the speed of root formation. [More information on harvesting, storing, and planting willow cuttings](#).

Tip #35:

Looking for inspiration for a restoration project? Check out SER-WC's [Restoration Showcase](#) for information on projects that have been carried out across Western Canada. If you have a project your proud of, please send us information/photos and we'll add it to the showcase!

Tip #36:

Interested in collecting some native seeds for next year's restoration project? Here are some resources:

[Native Seed Harvesting and Marketing](#) (Native Plant Society of Saskatchewan, 2000)
[Alberta Native Plants and Seeds: Wild Harvest, Registration and Deployment](#) (NAIT Boreal Research Institute, 2011)

[Native Seed Collecting and Saving](#) (North American Native Plant Society)
[Forest Practice Code: Seed and Vegetative Material Guidebook](#) (BC Ministry of Forests, 2005)

[Ethical Guidelines for the Collection and Use of Native Plants](#) [and associated reference material] (Garry Oak Ecosystems Recovery Team)

Tip #37:

Fall is often the time of year for carrying out revegetation assessments for reclamation and restoration projects. The University of Idaho College of Natural Resources has [three lessons online](#) on how to measure vegetation density. A thorough resource is [Measurements for Terrestrial Vegetation](#), a book by Charles Bonham.

Tip #38:

As fall approaches, water temperatures are cooling down. National Geographic had some [helpful illustrations](#) for understanding lake turnover, which is the breakdown of thermal stratification when water temperatures change in spring and fall. This process brings oxygen depleted water up from the depths and takes oxygen down to decomposing sediments. As plant nutrients in the bottom sediments are stirred up, they provide fertile water for plant and algae growth. This turnover or water circulation is a key process that determines the cycling of oxygen, sediment and nutrients within a lake ([Government of New Brunswick](#)).

Tip #39:

Why become a SER member? Member benefits include a subscription to the informative e-newsletter, discounted rates for conference registration, journal subscriptions, and books, access to the online members community and Career Centre, and [more!](#) It's only \$5 extra for SER members to join the SER-WC chapter to get connected regionally. [Learn how to become a member.](#)

Tip #40:

Wondering how to monitor large-scale or remote ecological restoration projects? The Remote Sensing Special Issue "[Ecological Status and Change by Remote Sensing](#)" from MDPI Open Access Journals provides an overview of many potential remote sensing applications.

Tip #41:

Site preparation in reclamation and restoration projects is known to create improved plant microsites. This Forestry Canada and BC Ministry of Forests [site preparation guidance document](#) is a useful tool for determining the most appropriate surface preparation type and equipment.

Tip #42:

Soil is more than just dirt! Soil is full of microbes and mycorrhizal networks, which allow plants to communicate and share resources, even among different plant species. Learn more in the summary paper [Inter-plant communication through mycorrhizal networks mediates complex adaptive behaviour in plant communities](#) (Gorzalak, M.A., Asay, A.K., Pickles, B.J. and Simard, S.W., 2015).

Tip #43:

What are the most commonly used techniques for soil restoration at post mining sites and how do they work? [Click here to read more.](#)

Tip #44:

Biomimicry is based on the idea that "the best ideas might not be ours. They might already have been invented " (Janine Benyus). To learn more about biomimicry watch Janine Benyus' talk at [SXSW Eco Conference](#) or visit [Biomimicry 3.8](#).

Tip #45:

"Is it a disaster or merely a catastrophe? Living with disturbance". In this video, Bruce Larson, professor and FRBC Chair of Silviculture for the faculty of Forestry for the University of British Columbia, discusses the recovery process after a natural disturbance or catastrophe. He talks about disturbance through an ecological and sociological lens, and provides many examples of natural disasters in different locations, as well as the results. Economic and ecological aspects of recovery are elaborated on. He concludes with the assertion that there is no one proper path recovery; that recovery depends on the perspective and priorities of the individual. This presentation was a part of the Mountain Pine Beetle Information Exchange Forum in April, 2015. To view the video, [click here](#).

Tip #46:

Use these [Grassland & Riparian Health Assessment Tools](#) posted by the Saskatchewan Prairie Conservation Action Plan when in the field.

Tip #47:

Already thinking about gardening this spring? Planning takes time, so why not think xeriscape? Find out how you can create a beautiful, sustainable landscape, eliminating chemical use, conserving water and creating habitat for birds and butterflies. Check out the [Okanagan Xeriscape Assciation website](#).

Tip #48:

How does soil compaction influence reclamation success? Check out the presentation "[A comparison of site preparation methods on sub-surface soil resistance and moisture on reclaimed industrial sites in northwestern Alberta](#)" by Marc Mayhew from the Foothills Research Institute to find out. For additional information on site preparation, go back to Tip #41.

Tip #49:

When in the field use Duck Unlimited Canada's [Field Guide of Boreal Wetland Classes in the Boreal Plains Ecozone of Canada](#). It includes five major wetlands classes and 19 minor classes.

Tip #50:

In situ extraction of oil sands reserves requires the production of many temporary exploration drilling pads to assess the bitumen layer. In these operations the forest floor and topsoil can be stripped off, stockpiled and replaced after drilling. As a result, many of these pads are slow to recover native forest vegetation. In this experiment we assessed if the forest floor could be left intact and if it might simply be covered during the drilling operation. [Read the complete article here](#).

Tip #51:

Use Edmonton Area and Land Trust's new and updated [educational resources](#) including an updated copy of Alberta's Species at Risk Guide, a butterfly identification guide, and moth identification guide.

Tip #52:

Our 2016 New Year's resolution is to highlight more photos of ecological restoration in Western Canada. Follow our new instagram account [@restorewc](#), to share your own photos and stories from the field and tag them #CaptureRestoration
